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ABZ Clean Station

OPERATOR MANUAL

Version 1.1

General information

Overview

This manual describes the ABZ Clean Station system, its intended application, safety requirements, system components, operation, controls, service functions, and troubleshooting.

The Clean Station and its accessories may only be operated in accordance with the instructions in this manual.

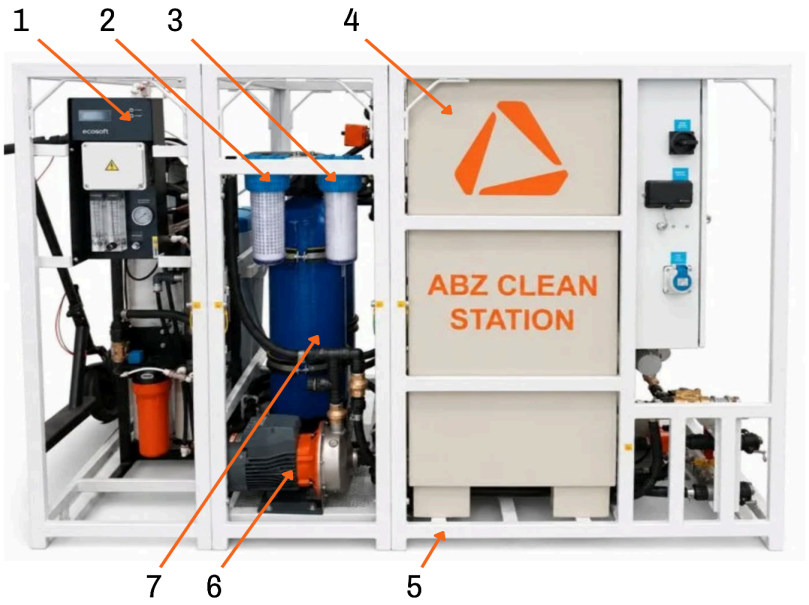
Please read this notice and the manual provided for your ABZ Clean Station before use. If you have any questions, please contact ABZ Innovation customer service before use. The contact details can be found at the end of this document. By using the Clean Station, you declare that you have read this manual, that you understand and acknowledge the information contained herein, and that you consent to use the station only in full compliance with the instructions in this manual. Furthermore, you agree that you are now exclusively responsible for the Clean Station and its operation, and for any direct or indirect legal consequences arising from its operation.

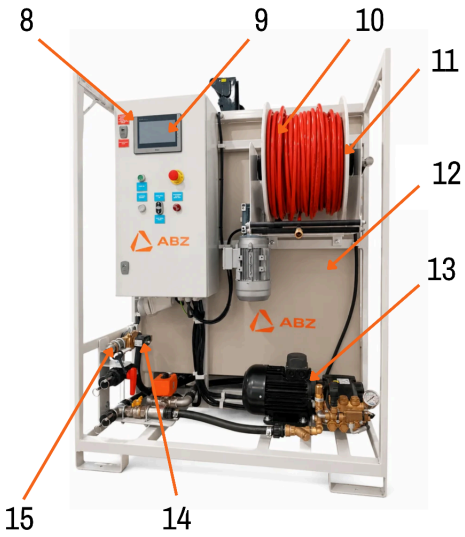
The ABZ Clean Station is to be used only with care. Improper use of the Clean Station poses a serious risk and can cause damage to the equipment and its surroundings, severe personal injury, or death.

Any modification to the Clean Station, its components, or software will immediately void the warranty.

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Clean Station main parts







1: RO filter unit

2: Pre-filter 1

3: Pre-filter 2

4: Chemical tank

5: Steel support frame

6: Pressure booster pump

7:Water softener

8:Electrical control cabinet

9: HMI operator panel

10: High-pressure hose

11: Hose reel

12: Clean water tank

13: High-pressure pump

14: Solenoid valve

15: Water supply

16: Brine tank

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Machine description

The Clean Station processes incoming water through several filtration and treatment stages before supplying it for cleaning and rinsing. The system operates as follows:

- **Water inlet and solenoid valve**
  Water enters the system through the water inlet (15). The solenoid valve (14) controls the incoming water supply.
- **Mechanical filtration**
  The water passes through two mechanical filters (2,3) connected in series. These filters remove suspended contaminants and solid particles from the water.
- **Water softening**
  The water softener (7) reduces dissolved calcium and magnesium salts, lowering water hardness and minimizing the risk of deposits and stains on cleaned surfaces.
  The brine tank (16) stores a concentrated salt solution used to regenerate the resin beads inside the water softener.
- **Pressure boosting**
  The pressure booster pump (6) provides the 2 bar water pressure required for the reverse osmosis filtration process.
- **Reverse Osmosis filtration**
  The reverse osmosis (RO) filter unit (1) removes contaminants, salts, and other dissolved substances from the water. This process produces highly purified water with low ion content and electrical conductivity.
  The RO process also generates concentrated wastewater, which the system continuously drains.
- **Chemical tank**
  The treated water flows into the chemical tank (4). A Keller pressure sensor probe monitors the liquid level and controls tank filling according to the upper and lower level limits.
  The operator adds the cleaning agent through the filling port at the top of the tank.
- **Clean water storage**
  The clean water tank (12) stores the high-purity water produced by the RO filter unit. This water is used for the final rinse to achieve a streak-free finish.
- **High-pressure water supply**
  The industrial high-pressure pump (13) pressurizes the water to a maximum operating pressure of 220 bar.
  Due to its high power requirements, the pump operates on a three-phase electrical supply.
- **High-pressure hose and motorized reel**
  The electric motor-driven hose reel (11) stores and manages the high-pressure hose (10).

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The standard configuration includes 60 meters of lightweight DN6 high-pressure hose. The system can accommodate up to 100 meters of hose when required.

- **Electrical control cabinet and HMI operator panel**
  The electrical control cabinet (8), located at the front of the unit, houses the control system that monitors and manages the Clean Station's operation.
  The HMI operator panel (9) provides a flowchart-based interface for monitoring and controlling the system.
- **Structural frame**
  All Clean Station components are mounted within a welded steel frame (5) constructed from closed-section profiles.
  The frame provides structural rigidity and stability while allowing access to components for maintenance and repair.

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Specifications

Overall dimensions	2030 × 1100 × 1430 mm
Empty weight	540 kg
Power supply	400 V / 50 Hz
Environmental protection rating	IP66
Pressure booster pump power	5.6 kW
Pump pressure range	40-220 bar
Pump flow rate	13-16 L/min
Water softener capacity	30–42 L/min
RO clean-water production	8.4 L/min
Number of controlled valves	3
Valve control voltage	24 V DC
Hose reel motor power	0.75 kW
Hose reel speed	110 rpm
Clean-water tank	440 L, PE
Chemical tank	200 L, PE
Control cabinet	800 × 400 × 200 mm
Standard hose	DN6, 60 m
Optional hose length	100 m

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Safety requirements

General safety precautions

- Only persons who have read and understood the User Manual may operate the equipment. Operators must follow all instructions in the manual.
- Follow all applicable occupational safety and operating regulations.
- Use only original replacement parts. If you use non-original parts, obtain written approval from the manufacturer.
- Any other modification can immediately void the warranty.
- Keep all warning labels and nameplates clean and legible.
- Before starting the equipment, check the electrical and hydraulic connections.
- Do not operate the pumps without water. Before operation, make sure that there is sufficient water. Operating the pumps without water can reduce their service life.
- If the water level is low or the water supply stops, stop the equipment.
- Fill the tanks only with the cleaning agent specified for the washing process.
- Maintain the water treatment and water softening units at the maintenance intervals specified by the manufacturer.
- Check the emergency shut-off regularly to make sure that it operates correctly.
- After use, de-energize and depressurize the equipment.

Personal precautions

- Personnel must wear safety goggles and protective gloves during operation. We recommend using hearing protection.
- Do not operate the equipment if you find external damage or other faults in the electrical or hydraulic system. These faults can cause personal injury or property damage.
- Operate the equipment only with proper grounding and the specified electrical power supply.
- Keep the control cabinet closed during operation. Open the control cabinet only when the system is de-energized.
- Before disassembling the high-pressure system, make sure that the system is depressurized.
- Never point a high-pressure water jet at people, animals, electrical equipment, or unsuitable surfaces.
- Before operation, check all pressurized hoses, connectors, and fittings.
- Do not operate the equipment if a hose or connector is damaged or if you find a leak.
- Do not fill the tanks with substances that are denser than water or have corrosive properties, such as acids or alkalis. These substances can damage the tank material.
- Before working near motorized valves or automatic components, stop the system.

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- If you detect abnormal noise, vibration, overheating, or pressure fluctuations, stop the equipment immediately. Find and correct the cause of the fault.
- If an overload or protective trip occurs, correct the cause of the fault before restarting the equipment.

Transport, handling and storage

- Before transport, drain water and depressurize the system. If freezing is possible, completely drain the water system.
- During lifting or loading, consider the steel frame and the equipment's center of gravity. Use only the designated lifting points.
- Secure the equipment on the transport vehicle.
- Transport and operate the equipment only on a solid foundation.
- After transport, perform a visual inspection for damage before commissioning.
- Store in a clean, dry, protected environment. Before prolonged storage, drain the water system and preserve it as necessary.
- Protect the electrical cabinet and connectors from moisture and corrosion.
- After prolonged inactivity, perform a full functional check before restarting.

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Installation and operation
Equipment startup

Before operating the equipment, verify that it is in working order.



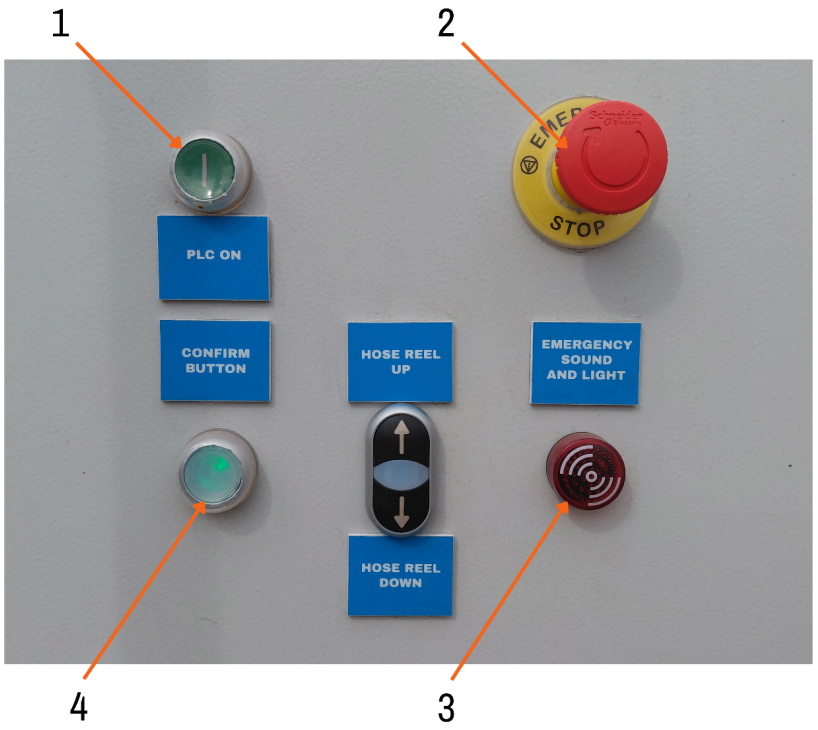
1: Water source connection
2: Electrical power supply connection
3: Main power switch

Connect the equipment to a suitable **water source** (1), secure the **electrical power supply** (2) and turn the **main power switch** (3) to the ON position.

The high-pressure pump requires a **3-phase electrical connection** with the following specifications:

- **Rated voltage:** 400 V
- **Minimum current-carrying capacity:** 32 A
- **Connection:** 5 poles (L1, L2, L3, N, PE)

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1: PLC on button
2: Emergency stop button
3: Emergency sound and light button
4: Confirm button

After connecting the equipment, release the **Emergency stop button** (2). Then press the **PLC on button** (1) to switch on the equipment.

> **Caution:** Check the filters after switching on the equipment. Make sure that they are clean and operate correctly.

If all required conditions are met, start the equipment through the software. You can start the equipment in **local mode** or **remote mode**. After startup, the system filling process begins.

If a fault or alarm occurs during operation, the **Emergency sound and light button** (3) indicates the fault.

Identify and correct the cause of the fault using the fault list in the Troubleshooting section.

After correcting the fault, acknowledge the fault by pressing the **Confirm button** (4), then you can continue operating the equipment.

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Filling process

The first step in operating the equipment is to fill the tanks. The system continues to produce and supply water during operation. We recommend starting work only when the tanks are full.

The filling time depends on several factors, including the feed water flow rate and the performance of the water softener and reverse osmosis (RO) filter.

The system typically requires **10–15 minutes** to reach operating condition. During this time, you can prepare the drone and other equipment required for the job.

During filling, tap water passes through the pre-filters. The pre-filters remove coarse mechanical contaminants from the water. This filtration protects the downstream components and supports efficient system operation.

Water treatment during filling

As the system fills, the incoming water passes through several treatment stages.

The first treatment unit after the pre-filters is the **water softener**. It uses ion exchange to reduce the calcium and magnesium ions that cause water hardness. This process reduces the risk of scale formation, protects downstream treatment units, and extends their service life. The water treated by the water softener primarily fills the chemical tank.

When the chemical tank reaches the upper level, the motorized directional control valve, downstream of the water softener, automatically switches the water supply to the **reverse osmosis (RO) unit**. The RO unit then starts producing purified water. The purified water flows into the separate **clear water tank**.

The motorized directional control valve remains in the RO position after the rinse water tank is full. The system stops the filling process by switching off the fill pump or, when using mains water, by closing the fill valve.

A new filling cycle can only be started manually. This function prevents unnecessary automatic refilling when the process is nearing completion. It also helps optimize water consumption and system operation.

During operation, the built-in **RO unit** separates approximately **10–30%** of the feed water as concentrate. The concentrate contains an increased salt concentration and is discharged as wastewater. The system does not reuse the concentrate. Ensure continuous concentrate drainage during operation.

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The equipment has a separate drain connection for the concentrate.



1: Ball valve

This connection includes a **ball valve** (1). The ball valve prevents water remaining in the piping from draining during transport or relocation. Keep the concentrate-side ball valve open during operation.

> **Caution:** Do not operate the equipment with the concentrate-side ball valve closed. A closed valve blocks concentrate discharge from the RO unit and can cause the system to malfunction.

Preparing the equipment for operation

When the tanks contain the required amount of water, add the cleaning agent to the **chemical tank** through the top filling port.

> **Caution:** Use only cleaning agents that are less dense than water and are non-corrosive. Do not use acids, alkalis, or other corrosive substances, as they may damage the tank material.

Unroll the required length of hose from the hose reel before starting the cleaning operation.

After completing these steps, the system is ready for operation.

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Local operation

The equipment can be operated locally using the 7-inch Human–Machine Interface (HMI).

The main HMI functions are:

- **Filling Process Control**: Start and control the tank filling process manually and monitor its current status.
- **Washing Control**: Start and control the washing process manually and monitor the process status and individual operating steps.
- **Operating States and Alerts**: View the current equipment status and any alerts or errors that occur during operation.
- **Service Menu**: Configure operating and control parameters for commissioning.

Select **Manual** on the main screen to open the manual operation view.



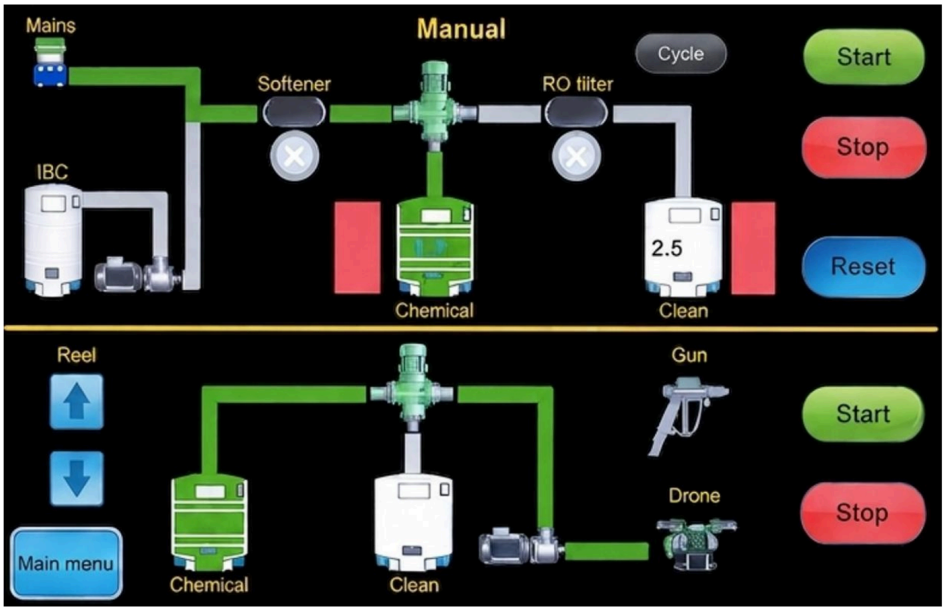
Note: When manual mode is selected, operate the equipment only through the local operator interface. Remote control commands are ignored in Manual Mode, even when the remote control is switched on.

The manual operation view displays the system process diagram and main controls.

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The control panel is divided into two horizontal sections.

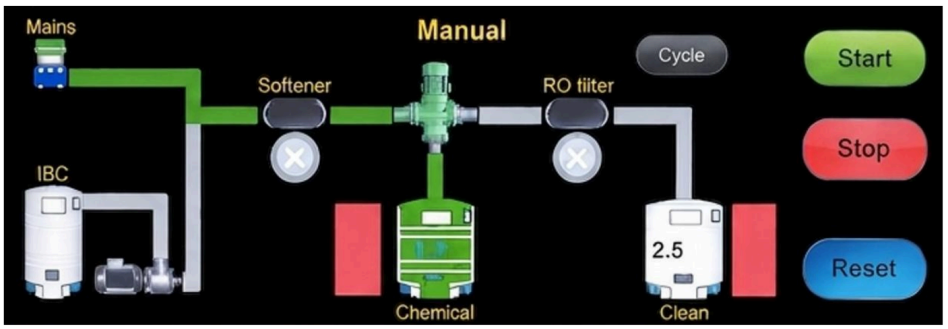
- The **upper section** contains the controls for the filling process.
- The **lower section** contains the controls for washing, hose reel operation, and related functions.



- The HMI displays the main system components as icons, including:
  - Tanks
  - Valve positions
  - Filter elements
  - Water sources
- Tap an icon to **select** or **activate** a component. Selecting a component does not start its operation.
  - Press **Start** on the right side of the interface to start the selected process.
  - Press **Stop** to stop the process.
  - Press **Reset** to stop the process and return the system and selected components to their default state.

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Filling process



1. Select the water supply

The equipment can receive feed water from two sources:

- **Municipal water supply:** This is the default operating mode. The solenoid valve on the feed water side controls the water supply.
- **External water source:** This includes a tank truck or IBC container. Select the external water source on the HMI. When filling from an external water source, the system checks that water is available before starting the fill pump. This prevents the pump from running dry and helps prevent malfunctions. The external water storage does not provide sufficient mains pressure. The 230 V pressure booster pump provides the pressure required for the water treatment system.

Tap on the icon of the water supply to select it.

2. Select water treatment options

You can control the water treatment units individually. The **water softener** and **reverse osmosis (RO) filter unit** each have a dedicated control icon. Tap on the control icon to activate the function.

3. Select water tank

By default, water from the water softener fills the **chemical tank**. To direct water to the clean water tank click on the **RO filter** and select the **clean water tank**.

4. Start the selected process

The right side of the display contains three main control buttons for the filling and washing processes:

- **Start:** Starts the filling cycle. During the first startup, this button activates the process.
- **Stop:** Immediately stops the filling process.
- **Reset:** Enables a new filling cycle after the previous cycle has finished or stopped.

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The **Start**, **Stop**, and **Reset** functions provide control over the safe start, interruption, and restart of the filling process.

Refill cycle

During operation, continuously monitor the water level in the tanks. Refill the tank as needed to maintain a sufficient water supply.

You can configure the lower and upper liquid level limits for both the clean water tank and the chemical tank in the **HMI Service Menu**.

If the liquid level drops below the configured lower limit, the equipment continues to operate. An **audible and visual alarm** alerts the operator that the next filling cycle should be started.

Use the **Cycle** button in the upper section of the control panel to select the refill mode.

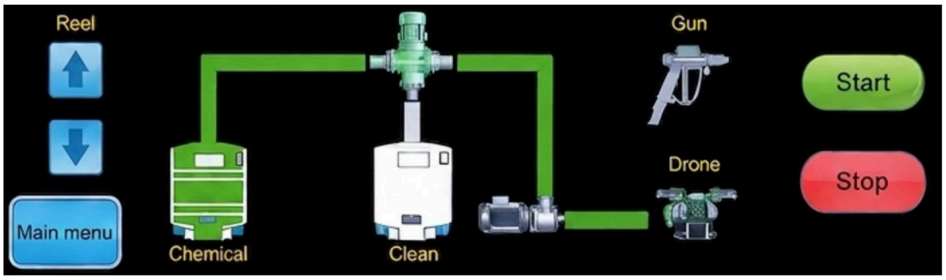
- **Basic refill cycle**
  - The system automatically stops filling when the chemical and clean water tanks reach their required levels.
  - The fill pump stops. When using mains water, the solenoid valve also closes.
  - The system does not start a new refill cycle automatically.
  - To start a new filling cycle, press **Reset** in the upper-right corner of the control panel. This re-enables the cycle.
- **Continuous cycle**
  - The system only maintains the **clean water supply automatically**.
  - The system **does not automatically refill the chemical tank**. The concentration of the cleaning agent can change during operation, so the chemical tank requires manual adjustment and dosing.

These settings allow you to adapt the filling cycle and required liquid levels to the specific process requirements. The software-based level control prevents the tanks from overfilling.

Note: The amount of water required to clean a specific surface depends on the operating conditions, degree of soiling, and cleaning technology. Therefore, the system does not have a general specific water consumption value.

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Washing process



1. Set the hose length

The two buttons on the left control the hose reel:

- **Rewind:** Rewinds the hose.
- **Unwind:** Unwinds the hose.

Press and hold the selected button to move the hose reel. Release the button to stop the hose reel immediately.

2. Select the washing liquid

Before starting the washing process, tap on the **Chemical** or **Clean** tank to select the water source.

By default, the valve selects the **Chemical tank**. The system then uses the cleaning solution to wash the surface.

For surfaces, technical requirements, or site conditions where chemicals are not permitted or required, switch the valve to the **clean water tank** by tapping the clean water tank icon. The system then uses only RO-filtered purified water for washing.

3. Select the washing mode

After selecting the liquid source, select the required washing mode by tapping on the icons:

- Manual lance washing mode
- Drone washing mode

> **Note:** Both modes use the same hose and connector system.

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4. Start the selected process

The right side of the display the **Start** and **Stop** functions provide control over the safe start and interruption of the washing process.

- In manual lance washing mode:
  - Press **Start** to put the system into standby mode.
  - The pressure booster pump starts only when you pull the trigger on the manual lance (gun).
- In drone washing mode:
  - Press **Start** to start the pressure booster pump.
  - The pump operates continuously until you press **Stop**.
  - This mode provides a constant fluid supply for drone washing.

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Remote operation

The Clean Station is designed for mobile operation. In addition to the local user interface, the system provides a remote control for washing operations.



You can only start the refilling process from the **local HMI**. The remote control does not provide a control for starting the refilling process.

The remote control provides the control functions for washing operations.

Some remote functions use **two-step authorization**. These functions require confirmation from both the local control panel and the remote control before they can operate.
For example, starting the high-pressure pump requires two-step authorization. This safety function prevents accidental or unauthorized activation of the high-pressure system.

Note: Some remote functions, such as valve position adjustment, do not require two-step authorization. An accidental button press can therefore cause unintended operation. Do not store the remote control in a clothing pocket. We recommend wearing the remote control on a lanyard during operation.

Activate the remote control mode

To use remote control mode:

1. Select **Remote control** on the main screen of the local control interface.
2. Switch on the remote control using the **ON/OFF button** (I).

Note: After switching off the remote control, the system applies a **reactivation delay** of approximately **10 seconds**. Wait until the delay has elapsed before switching on the remote control again. When the remote control is active, the indicator LED in the lower-left corner lights up green.

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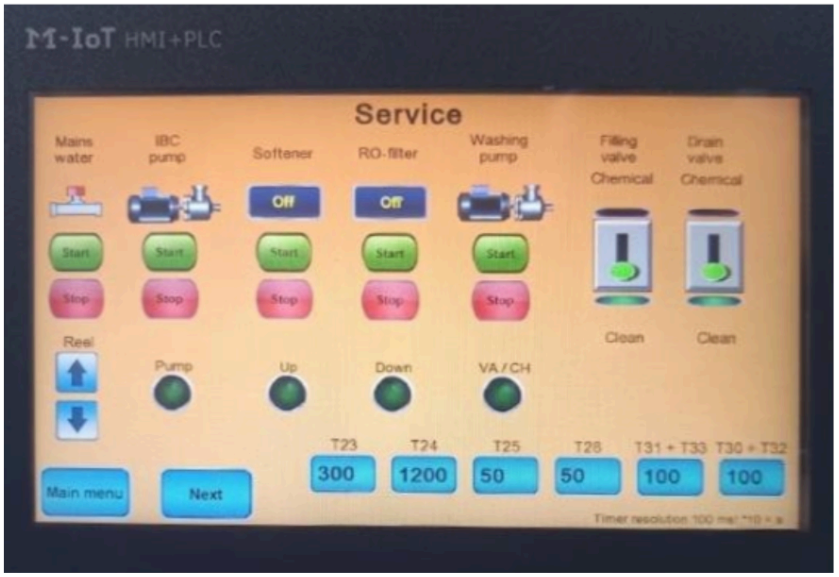
Remote control functions

- **I – ON/OFF**
  Switches the remote control on or off
- **II – Suction-side switching valve**
  Switches the suction-side valve between the chemical tank and the clean water tank. Press the button to change the valve position. The button remains temporarily inactive while the valve changes position. Wait until the switching process is complete before issuing another command. This prevents incorrect or interrupted valve movement.
- **III – Derby nozzle mode**
  The equipment can use a unique dual-head wash nozzle, which allows different spray patterns for chemical application and rinsing while using a single hose. If you have a compatible dual-head wash lance, enable this function through the control system of the equipment. If the appropriate wash lance is not available, this function is not required, therefore it is disabled by default.
- **IV–V – Hose reel**
  Buttons IV and V control the hose reel. The hose reel operates only while you hold the selected button. Releasing the button immediately stops the electric motor. Button IV controls one direction and button V controls the other direction. Each function has a dedicated indicator LED that shows the direction of operation.
- **VI – High-pressure pump**
  Button VI starts the pressure booster pump. You can start the pump from the remote control only after local authorization has been granted. This two-step startup is a safety interlock. It prevents accidental activation of the high-pressure system, which operates at pressures of up to **220 bar**.
- **VII – System shutdown**
  This button shuts down the entire system.
  When activated, the system:
  - Stops any active filling process.
  - Stops the high-pressure pump.
  - Closes or returns the controlled valves to their default positions.
  - Returns the system to a safe default state.

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Service menu

The Service menu supports periodic, seasonal, and emergency maintenance tasks.



In this menu, you can perform functional checks and tests on electrically controlled equipment, including:

- Checking the operation of solenoid valves and other valves.
- Testing the startup of electric motors.

The second screen of the Service menu provides access to additional operating parameters and software functions. You can enable or disable certain functions and devices through this interface.

You can also configure the lower and upper level setpoints for the filling process. In addition, you can configure the lower and upper alarm levels for the tanks.

The system controls the filling process based on the configured lower and upper level setpoints. The alarm levels monitor the liquid level and trigger an alarm when the configured limits are reached.

Only an authorized person with the required technical expertise may change these parameters.

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Preparing the equipment for transport

We recommend transporting the equipment only with empty tanks.

After completing the work:

- Drain the remaining water from the tanks.
- Rewind the hose onto the hose reel and disconnect the power supply.
- Pack and prepare the equipment for transport

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Maintenance

Regular maintenance of the Cleaning Station is essential to ensure safe operation, reliable performance, and a long service life. This chapter describes the recommended inspection, cleaning, and maintenance procedures to keep the equipment in optimal working condition and minimize downtime. Always follow the specified safety precautions before performing any maintenance work.

- Check the oil level in the high-pressure pump regularly to prevent damage due to insufficient lubrication. The pump housing is equipped with an oil dipstick. If the oil level is low, drain the used oil and then refill the pump with oil through the dipstick opening.
- Clean or replace the pre-filter cartridges if you notice a decrease in water flow.
- Fill the brine tank with water softener salt. The salt pellets are commercially available in bags weighing 10–25 kg.
- For details regarding maintenance tasks for the RO unit, refer to the manufacturer's maintenance manual [1], [2].

[1] Ecosoft, Manual for commercial reverse osmosis systems, Available at: https://www.ecosoft.com/sites/default/files/2026-01/Manual%20for%20Ecosoft%20Inox%20IoT%20MO24000%20reverse%20osmosis%20filter.pdf.

[2] DuPont, *FilmTec™ Reverse Osmosis Membranes Technical Manual*, Available at: https://www.dupont.com/content/dam/water/amer/us/en/water/public/documents/en/RO-NF-FilmTec-Manual-45-D01504-en.pdf.

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Troubleshooting

If any malfunction is experienced, contact an ABZ Innovation service center for further instructions. No repair attempts are allowed by the pilot or operator.

Fault Symptom	Possible Cause	Corrective Action
Equipment does not start	No power	Check the power supply and fuses.
	Emergency stop is activated	Reset the emergency stop.
	Motor protection is deactivated	Find the cause of the fault and engage the motor protection.
	Control or start-up error	Check the control system.
Pump does not start	Motor or control failure	Check electrical and control systems.
No or low operating pressure	Insufficient water supply	Check inlet water pressure and filters.
	Pump wear	Examine the pump.
Pressure Fluctuates	Air in the system	Bleed the system.
	Clogged filter	Clean the filter.
Pump is making an unusual noise	Running dry	Stop the pump immediately. Check the water supply.
	Bearing wear	Examine the bearings.
	Cavitation	Check the inlet water side.
Pump overheats	Overload	Check the operating parameters.
	Cooling problem	Check ventilation and load.
Leak detected	Damaged seal	Replace the seal.
	Loose connection	Tighten the connection.
	Damaged pipe	Replace the damaged pipe section.

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Motorized valve does not operate	No control signal	Check the control system.
	Valve mechanism is stuck	Clean or repair the valve.
Motor does not start	Overload protection is active	Troubleshoot the fault and set the protection.
	Contactor or relay fault	Examine the electrical system.
Motor overheats	Excessive load	Check the operating conditions.
Protection trip occurs repeatedly	Electrical fault	Examine the electrical system.
Operational Problem	Damaged pipe or fitting	Replace the damaged parts.

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If you have any questions, please contact us: support@abzinnovation.com

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