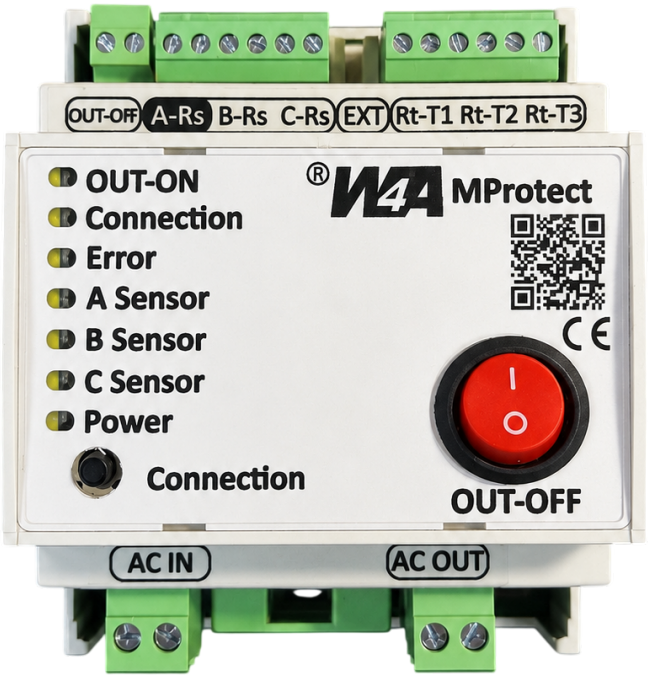
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W4A MProtect

Configuration Guide

Practical Installation and Configuration Examples



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1. About this guide

1.1. Purpose and intended audience

This guide presents practical examples of W4A MProtect installation and configuration. It is intended for installers and qualified technical personnel and complements the **Installation and configuration manual** and the **User manual**.

Each example presents the connections, settings, test procedure and expected result for a specific application.

1.2. Common preparation

Identify the model and check the power supply, available modes, output rating and motor characteristics. Choose direct control or a contactor and prepare the protective devices and hydraulic circuit.

Identify the sensors and current channels, pair the device with the app and check communication, date and time. Record the initial configuration before applying an example.

> **DANGER — Electrical work**
>
> Make connections with all energy sources isolated, prevent accidental reconnection and verify the absence of voltage. Electrical work must only be carried out by qualified personnel.

1.3. Using the examples

The available modes and functions depend on the model and the firmware and app versions. Changing the measurement mode does not change the supply voltage required by the equipment or the electrical rating of the output.

The durations shown are programming examples. Current limits, starting times and reset settings must be defined according to the motor, actual operating conditions and test results.

The tank diagrams show the sensor positions and direction of pumping. Electrical connections for dry contacts and impedance probes must follow the manual.

1.4. Saving settings and testing

Before submitting, check that the load can start safely. Select **Submit**, wait for confirmation and check the saved settings again. A change on the screen only takes effect after it has been transferred to the device.

> **WARNING — Starting during configuration**
>
> Saving settings, switching OUT-OFF to position I or disabling STOP-SW may allow the motor to start if a run command is present. Check that the load is safe before performing these operations.

2. Installing and configuring a single-phase pump

2.1. Purpose

Install a pump supplied by L and N and configure W4A MProtect to monitor the current on channel T1. This example uses direct control only when the model and load characteristics allow it. If a contactor is required, keep the single-phase configuration in this example and use the power connection described in 3 Controlling a pump through an external contactor.

2.2. Equipment and requirements

- W4A MProtect compatible with the power supply and single-phase mode.
- Single-phase pump and hydraulic circuit ready for testing under normal conditions.
- One current sensor compatible with the model and motor current.
- Suitable electrical enclosure, conductors, external protective devices and means of isolation.

Check the rated current, starting current, utilisation category and switching frequency. A single-phase load cannot necessarily be connected directly to the output.

2.3. Electrical connections

Connect the W4A MProtect power supply to **AC IN** and the pump to the output specified in the variant's diagram. Connect the PE protective conductor to the pump and the rest of the assembly according to the electrical design. Identify and connect the OUT-OFF switch as described in the manual.

Install **only one current sensor**, enclosing only the pump's phase conductor, and connect its cables to **Rt-T1**. Leave Rt-T2 and Rt-T3 without sensors. Do not pass L and N through the same sensor.

The following diagram shows current measurement; the device power supply, pump control, PE and protective devices must follow the model's electrical diagram.

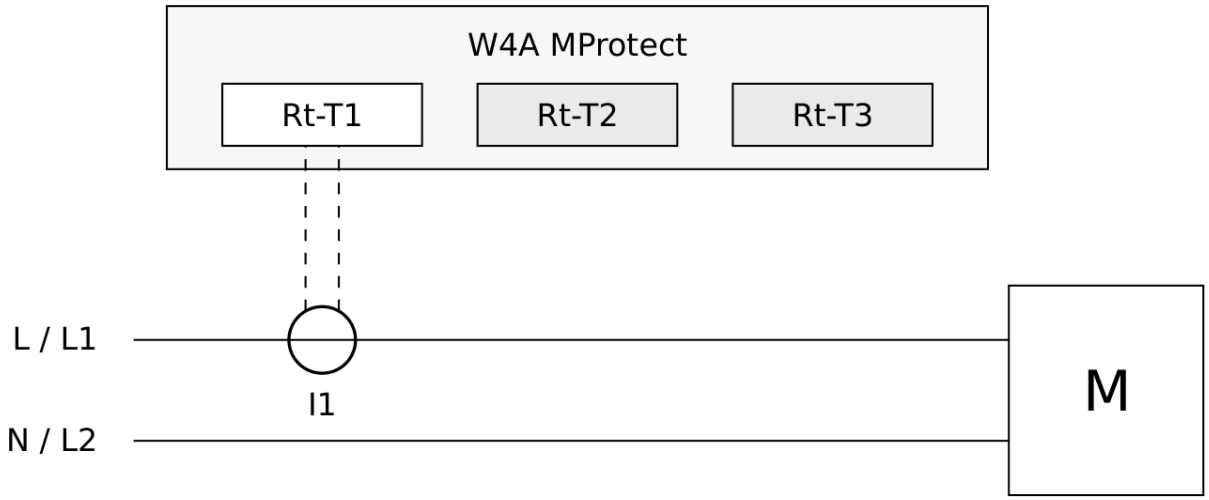


Figure 2.1: Current sensor connected to Rt-T1; use L and N for this example.

2.4. Mandatory change to single-phase mode

> **NOTE — Select single-phase mode**
>
> Connecting a single sensor to Rt-T1 does not automatically configure the measurement mode. You must change the app setting to **Single-phase mode**, submit the change and check the saved value before testing.

1. Open the correct device and go to the **Configuration** tab.
2. Open the current monitoring or current sensor settings.
3. Under measurement mode, select **Single-phase mode**. Do not leave three-phase mode selected for this installation.
4. Review the current limits and times applicable to the motor. Do not copy values from another pump.
5. Select **Submit** and wait for confirmation.
6. Check the saved mode again and confirm that it remains **Single-phase**.

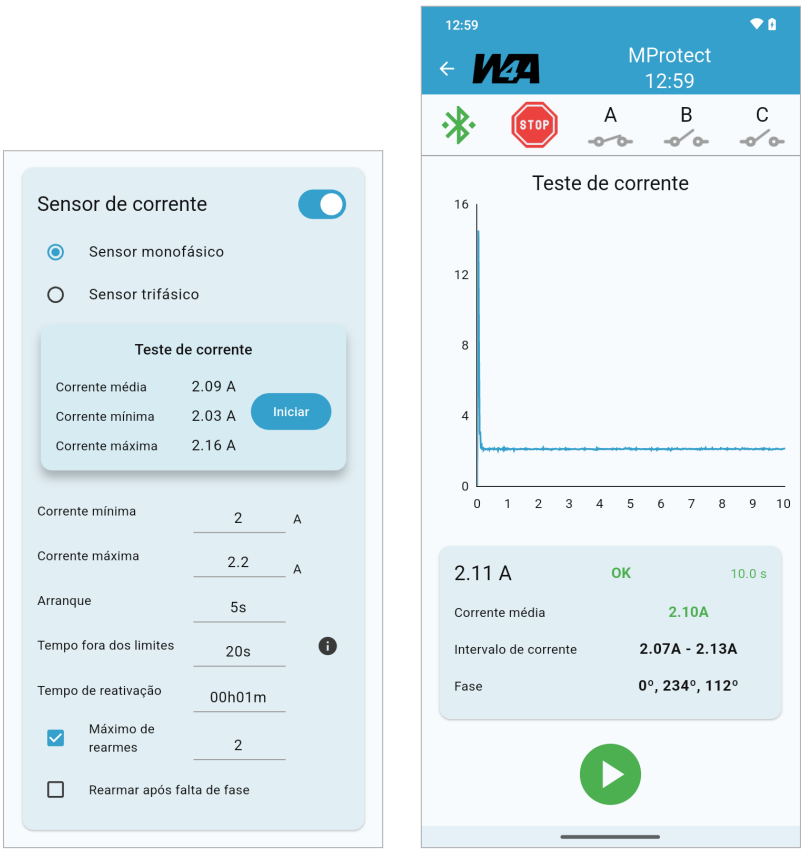


Figure 2.2: Single-phase mode configuration and current test described in 2.5 Current test and final configuration.

2.5. Current test and final configuration

1. Check that the pump is ready, water is available and the hydraulic circuit allows normal operation.
2. Confirm the saved single-phase mode, OUT-OFF in the enabled position and the absence of any active interlocks.
3. Open **Current test** and hold down **Play** to run the pump under controlled conditions.
4. Observe the starting current and steady-state current on channel T1. Compare them with the motor nameplate and, where necessary, with a suitable instrument.
5. Release **Play** to end operation and confirm that the pump stops.
6. Set suitable limits and times, submit them and check the values again.

2.6. Functional test

1. Send a valid run command and confirm that the pump starts and T1 gives a consistent reading.
2. Send a stop command and check the response of the output and the pump.
3. Set OUT-OFF to position O and confirm that operation is inhibited; prepare for a safe restart before returning to position I.
4. Enable STOP-SW and confirm that operation is inhibited; check restarting under the intended conditions.
5. Check errors, warnings and logs. Confirm that there is no phase-loss condition caused by an incorrect mode selection.

2.7. Expected result and troubleshooting

The saved configuration shows **Single-phase mode**. Current is analysed on channel T1 and the pump responds to valid commands and configured interlocks.

If the reading is zero, check that the pump conductor passes through the sensor and that the sensor is connected to Rt-T1. If a phase-loss condition appears, first check the saved mode; if there is another fault, check the supply and connections. Do not disable monitoring or widen the limits to hide the problem.

3. Controlling a pump through an external contactor

3.1. Purpose and equipment

Control a pump through an external contactor, keeping the motor power current out of the W4A MProtect control output. Use this solution when required by the model or when the load exceeds the ratings permitted for direct control. Select the contactor to suit the motor and the coil to suit the variant's control circuit.

3.2. Electrical connections

Connect AC IN to the supply specified for the model. Connect the control output to the contactor coil according to the variant's diagram and complete the coil circuit with the appropriate return. The motor supply conductors must pass through the contactor's power contacts. Install the protective devices and connect PE according to the design.

Do not assume that the output is a volt-free contact: check the type, voltage and connection in the model's manual. Fit coil suppression where required, following the manufacturer's instructions.

Installation	Measurement and configuration
Single-phase	L and N; one sensor on one phase, connected to Rt-T1; single-phase mode
Two-phase	L1 and L2; one sensor on one phase, connected to Rt-T1; two-phase mode
Three-phase	L1, L2 and L3; three sensors on Rt-T1, Rt-T2 and Rt-T3; three-phase mode

3.3. Configuration

Select the measurement mode corresponding to the load, regardless of whether a contactor is used. For a single-phase pump, make the explicit change described in 2 Installing and configuring a single-phase pump. Set the current limits, starting time and reset settings according to the motor and test results. Configure the source of the run command as described in the following examples.

Before submitting, check that the load can start safely. Select **Submit**, wait for confirmation and check the saved settings again. A change on the screen only takes effect after it has been transferred to the device.

3.4. Test procedure

1. Check the wiring with the supply isolated and confirm that sensors and phases correspond correctly.
2. Under safe conditions, send a valid run command.
3. Confirm operation of the relay, coil and power contacts and check that the motor starts.
4. Check the current on the channels used and, for three-phase operation, the correspondence between each phase and channel.

5. Send a stop command and confirm that the contactor releases and the load stops.

3.5. Expected result and troubleshooting

The contactor switches the motor on and off in response to valid commands. The measured current corresponds to the load. If the relay operates but the motor does not start, check the coil, control supply, protective devices and power contacts. If a channel displays an inconsistent value, check its sensor and phase before changing the limits.

4. Configuring current protection

4.1. Purpose

Define an acceptable current range for pump operation and the response to a persistent deviation. This example complements 2 Installing and configuring a single-phase pump or 3 Controlling a pump through an external contactor and must be completed before automatic operation.

4.2. Preparation and connections

Use the current diagram in 2 Installing and configuring a single-phase pump for single-phase and two-phase modes: one sensor connected to Rt-T1. For three-phase operation, use three sensors, as described in 3 Controlling a pump through an external contactor. Always select the mode corresponding to the installation in the app.

Collect the motor nameplate data and observe starting and different normal load conditions using **Current test**. Do not deliberately cause dry running, overload or phase loss to obtain configuration values.

4.3. Settings to define

Parameter	Example setting
Minimum current	Below the lowest acceptable normal consumption and suitable for the condition to be detected
Maximum current	Compatible with the motor and above acceptable normal variations
Starting time	Shortest period that allows normal operation to be reached
Time outside limits	Permitted accumulated deviation time before operation is interrupted
Reactivation time	Minimum waiting time before another automatic attempt
Maximum number of resets	Limit suitable for the application; avoid unlimited attempts
Reset after phase loss	Set only where applicable and technically authorised

Low current alone does not identify a lack of water, and high current does not determine the cause of an overload. Interpret the values in the context of the installation.

Before submitting, check that the load can start safely. Select **Submit**, wait for confirmation and check the saved settings again. A change on the screen only takes effect after it has been transferred to the device.

4.4. Test procedure

1. Perform controlled starts and check that the starting transient is accommodated without unnecessarily extending the starting time.
2. Observe the current under different normal conditions and confirm that it remains within the defined range.

3. Where an authorised simulation procedure exists, check interruption and reset without creating an actual fault in the load.
4. Check the logs and confirm that there are no unwanted stops.

4.5. Expected result and troubleshooting

The pump operates within the permitted range and the configuration provides for interruption when the accumulated deviation reaches the defined time. If unwanted stops occur, first investigate the load, supply, sensors and measured values. Review the settings only after identifying the cause. Correct the fault before authorising further resets.

5. Minimum level protection — Tank

5.1. Purpose and equipment

Prevent a pump from operating when the source tank does not contain the minimum water level. Use a compatible level sensor and the Tank preset configuration.

5.2. Connections and sensor positions

Keep the power circuit described in 2 Installing and configuring a single-phase pump or 3 Controlling a pump through an external contactor and make the sensor connections shown below.

Component	Installation / connection
Sensor A	At the minimum acceptable level in the source tank; input A-Rs
Sensors B and C	Not used in this example
Pump	Draws water from the tank; controlled according to the chosen electrical example

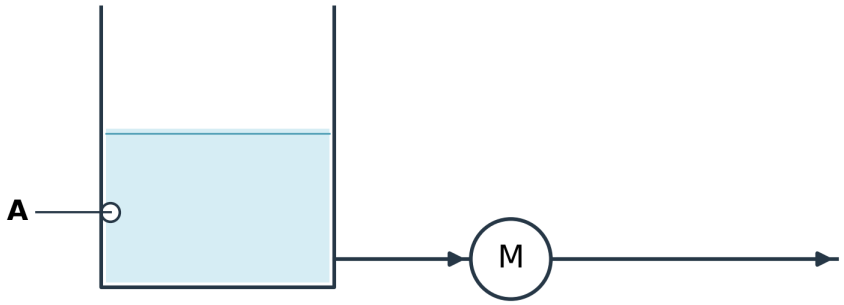


Figure 5.1: Functional sensor arrangement and direction of pumping.

For a dry-contact sensor, connect the contact between the corresponding input (A, B or C) and Rs. For impedance probes, use the reference and arrangement specified in the manual. Physically check the open or closed state of each input before configuration.

5.3. Configuration in the app

Select the **Tank** preset configuration. Check that the state detected below the minimum level stops or inhibits operation. This configuration determines whether operation is permitted; the source of the start command must suit the application, for example a timer.

Set current monitoring as described in 4 Configuring current protection and set unused sensors to have no effect. If using schedules, select the appropriate interaction, as described in 10 Operation on a weekly schedule.

Before submitting, check that the load can start safely. Select **Submit**, wait for confirmation and check the saved settings again. A change on the screen only takes effect after it has been transferred to the device.

5.4. Test procedure

1. With water available, check the state of sensor A and send a valid run command.
2. Simulate a low-level indication using the appropriate procedure for the sensor, without allowing the pump to run dry.
3. Confirm that the pump stops or is inhibited and that its state changes in the app.
4. Restore the normal state and check the restart response to the existing command.

5.5. Expected result and troubleshooting

Below the minimum level, the pump must not operate. With water available, it may run if all other conditions allow it.

If the behaviour is reversed, check the contact, sensor position and connection before changing the logic. If the pump does not restart, check the run command, OUT-OFF, STOP-SW and active errors.

6. Automatic emptying — Pumping

6.1. Purpose and equipment

Empty a tank between an upper starting level and a lower stopping level. Two compatible level sensors are required.

6.2. Connections and sensor positions

Keep the power circuit described in 2 Installing and configuring a single-phase pump or 3 Controlling a pump through an external contactor and make the sensor connections shown below.

Component	Installation / connection
Sensor A	Lower level; input A-Rs
Sensor B	Upper level; input B-Rs
Sensor C	Not used
Pump	Draws water from the tank

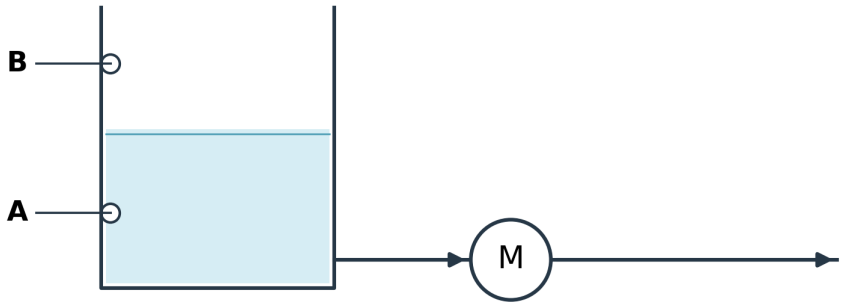


Figure 6.1: Functional sensor arrangement and direction of pumping.

For a dry-contact sensor, connect the contact between the corresponding input (A, B or C) and Rs. For impedance probes, use the reference and arrangement specified in the manual. Physically check the open or closed state of each input before configuration.

6.3. Configuration in the app

Select the **Pumping** preset configuration. Sensor B starts operation when the liquid reaches the upper level; the pump continues running until the level falls below sensor A.

For this example without schedules, keep timers disabled. Check the actual sensor states and current

monitoring. Do not swap A and B to compensate for incorrect wiring.

Before submitting, check that the load can start safely. Select **Submit**, wait for confirmation and check the saved settings again. A change on the screen only takes effect after it has been transferred to the device.

6.4. Test procedure

1. Confirm that the pump is stopped below the lower level.
2. Raise or simulate the level up to sensor B and confirm that the pump starts.
3. Lower the level below B while keeping it above A; confirm that pumping continues.
4. When the level falls below A, confirm that the pump stops before there is any risk of dry running.
5. Repeat the sequence and check the recorded events.

6.5. Expected result and troubleshooting

The pump starts at the upper level and stops at the lower level. It maintains the cycle between the two levels.

If the pump stops as soon as B no longer detects water, check that Pumping is selected and that the inputs are assigned correctly. If operation fluctuates, check the sensors, connections and separation between levels.

7. Pressurisation — Pressure tank only

7.1. Purpose and equipment

Control a pump through a pressure switch: start when pressure falls and stop when pressure is restored. Use a compatible pressure switch adjusted to suit the hydraulic system.

7.2. Connections and sensor positions

Keep the power circuit described in 2 Installing and configuring a single-phase pump or 3 Controlling a pump through an external contactor and make the sensor connections shown below.

Component	Installation / connection
Sensor A	Dry-contact pressure switch; input A-Rs
Sensors B and C	Not used
Pressure switch	Contact closed at low pressure and open when pressure is restored
Pump and pressure tank	Installed according to the system characteristics

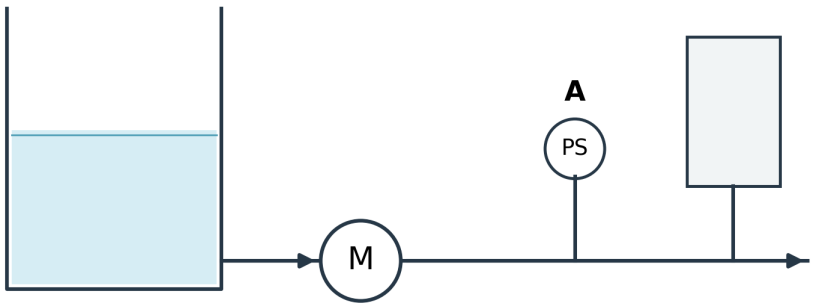


Figure 7.1: Functional sensor arrangement and direction of pumping.

For a dry-contact sensor, connect the contact between the corresponding input (A, B or C) and Rs. For impedance probes, use the reference and arrangement specified in the manual. Physically check the open or closed state of each input before configuration.

7.3. Configuration in the app

Select the **Pressure tank only** preset configuration. Check that the contact corresponds to the actual pressure: closed at low pressure and open after pressure is restored. Pressure values are adjusted on the pressure switch and must suit the installation.

For this example, do not add schedules or other commands that change the sequence. Keep current monitoring configured.

Before submitting, check that the load can start safely. Select **Submit**, wait for confirmation and check the saved settings again. A change on the screen only takes effect after it has been transferred to the device.

7.4. Test procedure

1. Check the hydraulic conditions and initial pressure.
2. Create controlled demand to reduce pressure and confirm that contact A closes and the pump starts.
3. Reduce demand and confirm that pressure rises until the contact opens and the pump stops.
4. Repeat the test and check that there is no abnormal sequence of very frequent starts.

7.5. Expected result and troubleshooting

The pump receives a run command while the pressure switch indicates low pressure and stops receiving it once pressure is restored.

If cycles are too frequent, check the pressure tank, pressure switch, leaks and hydraulic conditions. Do not use extended operation to hide a pressure fault.

8. Pressurisation with level protection — Pressure tank with sensor

8.1. Purpose and equipment

Combine a pressure-switch command with minimum level protection in the source tank. Use the pressure switch and a compatible level sensor.

8.2. Connections and sensor positions

Keep the power circuit described in 2 Installing and configuring a single-phase pump or 3 Controlling a pump through an external contactor and make the sensor connections shown below.

Component	Installation / connection
Sensor A	Pressure switch; input A-Rs; closes at low pressure
Sensor B	Minimum level in the source tank; input B-Rs
Sensor C	Not used
Pump	Supplies the pressurisation system

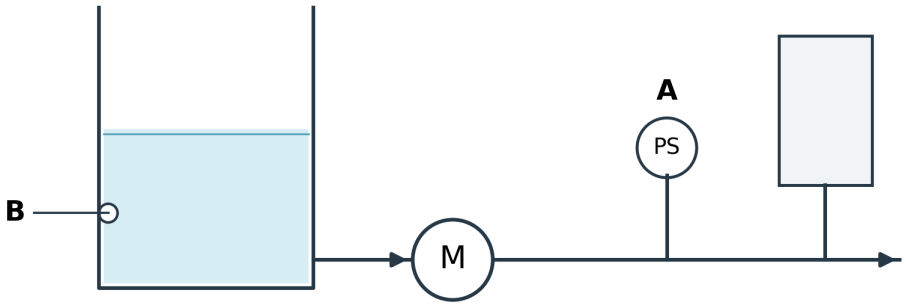


Figure 8.1: Functional sensor arrangement and direction of pumping.

For a dry-contact sensor, connect the contact between the corresponding input (A, B or C) and Rs. For impedance probes, use the reference and arrangement specified in the manual. Physically check the open or closed state of each input before configuration.

8.3. Configuration in the app

Select the **Pressure tank with sensor** preset configuration. Sensor A requests operation when pressure is low. Sensor B must interrupt or inhibit operation when the minimum water level is not available.

Confirm that the level interlock takes priority over the pressure-switch request. Do not add timers in this example and keep current protection configured.

Before submitting, check that the load can start safely. Select **Submit**, wait for confirmation and check the saved settings again. A change on the screen only takes effect after it has been transferred to the device.

8.4. Test procedure

1. With water available, lower the pressure and confirm that A starts the pump.
2. Simulate an insufficient-level indication at B and confirm that the pump stops, even while pressure remains low.
3. Safely restore the water-available state and check restarting in response to the pressure-switch request.
4. Restore pressure and confirm that the pump stops.

8.5. Expected result and troubleshooting

The pump may run when pressure is low and the water level is sufficient. An insufficient-level indication inhibits operation, even when the pressure switch requests it.

If the pump runs with an insufficient level, stop the test and check the selected configuration, the connection to B and the interpreted state. If it does not start, check both sensors and the active interlocks.

9. Automatic tank filling

9.1. Purpose and equipment

Fill a destination tank between two levels, starting below the lower level and stopping at the upper level. This example uses advanced mode and action extension to maintain the command during filling.

9.2. Connections and sensor positions

Keep the power circuit described in 2 Installing and configuring a single-phase pump or 3 Controlling a pump through an external contactor and make the sensor connections shown below.

Component	Installation / connection
Sensor C	Lower level in the destination tank; input C-Rs
Sensor B	Upper level in the destination tank; input B-Rs
Sensor A	Optional: minimum level in the source tank; input A-Rs
Pump	Transfers water to the destination tank

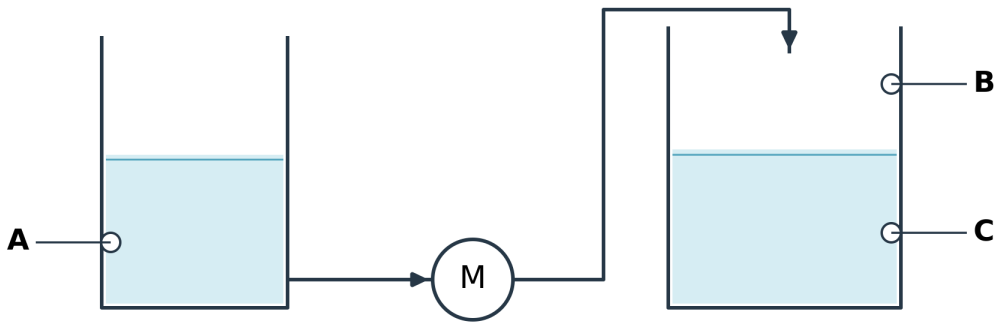


Figure 9.1: Functional sensor arrangement and direction of pumping.

For a dry-contact sensor, connect the contact between the corresponding input (A, B or C) and Rs. For impedance probes, use the reference and arrangement specified in the manual. Physically check the open or closed state of each input before configuration.

NOTE — Optional sensor A and mandatory shunt when not used

Sensor A is optional and detects the minimum level in the source tank. When used, connect it to A-Rs so that a lack of water opens the circuit and interrupts the control command through hardware, according to the model's diagram.
If sensor A is not used, a shunt (jumper) must be fitted between A and Rs, according to the variant's diagram. Without this jumper, the open input prevents operation. The shunt must be installed by qualified personnel, with all power supplies isolated and after verifying the absence of voltage. The jumper removes the detection of a lack of water by A; keep all other protective measures required for the installation.

9.3. Configuration in the app

First determine which open and closed states correspond to each level. In **Advanced mode**, assign actions according to the physical condition, as shown in the table, ordered from highest to lowest priority: stopping conditions first, followed by the start command. Conditions with no action do not generate a command. Do not assume that all sensors have the same polarity.

Physical condition	Action
A: insufficient level at source, if used	Motor switches off
B: upper level reached	Motor switches off
C: level below the lower threshold	Motor switches on
C: level above the lower threshold	No action
B: below the upper level	No action
A: water available, if used	No action

Extend the **Motor switches on** action of C after the low-level condition disappears. Choose a duration that covers the expected normal filling time and suits the application. Place the stopping conditions of A and B above the start command and its extension.

Operation is maintained by the timed extension and ends if the extension expires before B is reached. The Pumping configuration is intended for emptying and does not apply to this example.

Leave timers disabled. Validate priorities and the extension in the installed version; if the test does not confirm the complete sequence, contact technical support before applying this example.

Before submitting, check that the load can start safely. Select **Submit**, wait for confirmation and check the saved settings again. A change on the screen only takes effect after it has been transferred to the device.

9.4. Test procedure

1. Confirm that sensor A is connected and allows operation or, if it is not used, that the A-Rs shunt specified in the diagram is fitted. With the tank below the lower level and water at the source, confirm that the pump starts.
2. Raise the level above C and confirm that the extension maintains operation.
3. When B is reached, confirm that stopping cancels the extension. Then lower the level below B while keeping it above C, and confirm that the pump remains stopped until a new start condition occurs at C.
4. Simulate a lack of water at the source, if A is used, and confirm that stopping takes priority.
5. Test the end of the extension separately, without causing overflow, and check the response when B is not reached.

9.5. Expected result and troubleshooting

The pump starts filling below C, maintains the command through the configured extension and stops when B is reached or when a higher-priority stopping condition occurs.

If the pump stops near C, check the extension. If it does not stop at B, inhibit operation and check the state, action and priority of B. Review the duration if normal filling does not finish within the configured period.

10. Operation on a weekly schedule

10.1. Purpose and preparation

Program two weekly timers: one from Monday to Friday, from 10:00 to 11:00, and another on Saturday and Sunday, from 15:00 to 16:00. Check the device date, time and time zone.

Keep the connections, protective devices and sensor configuration appropriate to the installation. This example only changes schedule programming.

10.2. Interaction with sensors

Select **Motor switches on with timers** to require permission from both the schedule and the sensors. The sensor mode does not need to be changed to configure these schedules. The **Motor switches on with timers or sensor** option accepts alternative commands and may allow operation outside the programmed periods, so it does not meet the purpose of this example.

10.3. Configuration

Enable timers and create two timers with the following settings:

Parameter	Timer 1	Timer 2
Type	Weekly	Weekly
Days	Monday to Friday	Saturday and Sunday
Start / end	10:00 / 11:00	15:00 / 16:00
Intermittent operation	Disabled	Disabled

Before submitting, check that the load can start safely. Select **Submit**, wait for confirmation and check the saved settings again. A change on the screen only takes effect after it has been transferred to the device.



Figure 10.1: Weekly timer configuration: weekdays, from 10:00 to 11:00, and weekends, from 15:00 to 16:00.

10.4. Test procedure

1. To test without waiting for the final schedule, temporarily use a short period close to the current time and include the test day. Confirm that the pump is stopped before the start time.
2. At the start of the period, with the sensors and other interlocks allowing operation, confirm that the pump runs.
3. Safely simulate a stopping condition for a sensor used in the installation and confirm that it prevents operation during the active schedule.
4. At the end of the period, confirm that the pump stops.
5. Restore and submit the two final schedules. Check the days and times saved in each timer again.

10.5. Expected result and troubleshooting

The pump is allowed to run from Monday to Friday, from 10:00 to 11:00, and on Saturday and Sunday, from 15:00 to 16:00, subject to the sensors and other interlocks. Outside these periods, neither timer allows operation.

If the pump runs outside the intended schedule, check other commands, overlapping timers and the selected interaction. If it does not start, check the clock, days and enabling conditions.

11. Timed operation with rest periods

11.1. Purpose and preparation

Program a weekly timer to alternate 5 minutes of operation and 5 minutes of rest on Saturday and Sunday, between 15:00 and 16:00. Check the device date, time and time zone, and confirm that the motor allows this starting frequency.

Keep the connections, protective devices and sensor configuration appropriate to the installation. This example only changes timer programming.

11.2. Interaction with sensors

Select **Motor switches on with timers** so that ON periods only allow operation when the sensors also permit it. Sensors and other interlocks continue to govern operation during the programmed schedule.

11.3. Configuration

Enable timers and configure the timer with the following settings:

Parameter	Example setting
Timer	Advanced mode; weekly
Days	Saturday and Sunday
Start / end	15:00 / 16:00
Intermittent operation	Enabled
ON	5 minutes
OFF	5 minutes

ON and OFF define the alternating periods of operation and rest within the selected weekly schedule. Check that no other timers or commands allow operation during rest periods.

Before submitting, check that the load can start safely. Select **Submit**, wait for confirmation and check the saved settings again. A change on the screen only takes effect after it has been transferred to the device.



Figure 11.1: Weekly timer for Saturday and Sunday, from 15:00 to 16:00, with 5 minutes ON and 5 minutes OFF.

11.4. Test procedure

1. To test without waiting for the weekend, temporarily select the current day and a nearby time, keeping the ON and OFF periods at 5 minutes.
2. Observe two complete cycles and confirm the alternation between 5 minutes of operation and 5 minutes of rest, with all enabling conditions satisfied.
3. Safely simulate a stopping condition during ON and confirm that the interlock takes priority and that operation resumes as intended after it is cleared.
4. Confirm that the end of the schedule ends the timer's permission to run.
5. Restore and submit the final configuration: Saturday and Sunday, from 15:00 to 16:00. Check the saved settings again.

11.5. Expected result and troubleshooting

On Saturday and Sunday, between 15:00 and 16:00, the run command alternates between 5 minutes ON and 5 minutes OFF, subject to the sensors and other interlocks. Outside this schedule, the timer does not allow operation.

If the pump does not stop during OFF, check the Intermittent operation option and other active commands. If it does not start during ON, check the days, clock and enabling conditions. If starts are too frequent, review the times according to the motor and installation.

12. Detecting abnormal operation

12.1. Purpose and preparation

Identify abnormal operating times, such as excessive pumping. Collect representative historical data from an installation operating normally; do not use analysis to compensate for incorrect sensors or limits.

12.2. Time window analysis

Configure an observation window and the expected minimum and maximum operating times. As an illustrative example, an installation that normally runs for between 5 and 20 minutes per hour may use a 60-minute window and those limits after technical validation.

Set the action for excessive operating time, including STOP-SW where available and appropriate. Failure to reach the minimum may trigger a warning; check the options shown by the installed version.



Figure 12.1: Time window analysis configuration.

12.3. Operating pattern analysis

Select an earlier period that represents normal use. Define the tolerance and daily or weekly repetition, and choose the action to take in response to a deviation. Exclude maintenance, communication failures and exceptional use from the reference period.

Review the pattern whenever you change the pump, sensors, schedules or use of the installation.



Figure 12.2: Operating pattern analysis configuration.

Submit under safe conditions, wait for confirmation and check the saved settings.

12.4. Test procedure

1. Confirm that settings have been saved and check the quality of the logs used as a reference.
2. Observe a complete window of normal operation and compare the results with the historical data.
3. If an authorised procedure exists, safely test an analysis condition and restore the final settings.
4. Check the indication, notification and selected action when the condition occurs.
5. Before disabling STOP-SW, identify the cause and check that the load can resume operation.

12.5. Expected result and troubleshooting

The system performs the selected action when it detects the configured deviation. Analysis does not identify the cause: check for leaks, exceptional demand, sensors, clock and data before changing tolerances.

13. Final checks and handover to the user

13.1. Purpose

Verify the installation and complete configuration, record the results and explain the controls and intended automatic behaviour to the user.

13.2. Checklist

1. Check the model, power supply, protective devices, conductors and protective earthing according to the design and manual.
2. Check the control mode and the correspondence between the output, contactor and load.
3. Check the number of current sensors and the saved mode: for single-phase operation, **one sensor on Rt-T1 and Single-phase mode**.
4. Physically test all sensors and relevant combinations, including priorities and extensions.
5. Confirm actual starting and stopping and the currents on the channels used.
6. Test OUT-OFF and STOP-SW; check the intended restart response under controlled conditions.
7. Check the clock, timers, limits, reset settings and analyses.
8. Check communication, errors, warnings, notifications and logs.
9. Explain the response to a power failure and restoration; test it only where the load and installation allow.
10. Resolve any faults before handover.

13.3. Installation record

Information	Record
Model / identification	_____
Motor / rated current	_____
Mode and direct control / contactor	_____
Sensors A, B and C	_____
Current channels used	_____
Current limits and times	_____
Reset and reactivation settings	_____
Timers / analyses	_____
Date / installer	_____
Test results	_____

Also retain the complete submitted settings and test observations, including current values under normal operating conditions.

13.4. Information to provide

- How to check the state and distinguish a run command from an interlock condition.
- How to use OUT-OFF, STOP-SW and permitted controls.
- When automatic starting may occur, including after power is restored.
- Which schedules the user may change and which settings are reserved for the installer.
- How to view errors and historical data and who to contact if a fault occurs.

Provide the User manual and make the Installation and configuration manual available to the technical person responsible. Explain the stopping devices provided for the installation.

13.5. Completion criteria

The installation should only be handed over when the load responds correctly, sensors and priorities have been tested, measured values are consistent, settings have been saved and there are no errors or warnings with unexplained causes. The observed behaviour must match the configured example.