

# Manual

## Boomlink 30





## Introduction

Thank you for choosing the *Boomlink 30*. This manual is a preliminary edition and will be expanded and revised as software optimization progresses.

This means that some texts may be difficult to interpret, and some functions may not work exactly as described, since the software may have changed after this manual was written.

To make it easier to find the section you're looking for, a detailed table of contents is included.

An intensive optimization effort is ongoing, and we strive to keep the manual as up to date as possible. Overall, the user must take responsibility for monitoring unexpected events to ensure that safety is not compromised.

Current revision: β2025-05-19-01

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# Boomlink 30

## Control and Operation of Irrigation Booms

Manual ver. β20250519-01

### The System

The system consists of a control unit for each boom, located near the respective boom. All control units communicate with each other and with a central main station, using wired Ethernet, fibre optics, radio link, WiFi, or a combination of these.

Each control unit is equipped with a PLC from ABB, and typically also includes a frequency inverter—also from ABB—for the drive motor. We've chosen not to use a touchscreen or other types of displays on the control unit, based on our experience that displays can be difficult to use in bright sunlight, snow, and rain.

Instead, the unit is fitted with a number of sturdy rotary switches, two of which can be user-programmed to perform various irrigation functions. The door of the control unit features a 7-segment LED display with sufficiently bright LEDs to remain visible from a distance and even in strong sunlight. The function of the display is described in more detail later in the manual.





## Control Buttons on the Control Center

### *Green Indicator Light*

Illuminates when the power supply from the PSU is sufficient to operate the system. This green light is normally on when the control cabinet is energized. If the voltage (nominally 24VDC) drops below 21.4 VDC, typically indicating excessive current draw, the light turns off. All connected loads such as solenoid valves, contactors, etc., are also automatically shut off, and the boom halts and enters alarm mode.

### *Red Indicator Light*

Lights up in alarm conditions. This red light is triggered, when possible, during all alarm states. To identify the cause of the alarm, check the HMI on the connected PC.

### *Seven-Segment LED Display – “Repetitions”*

Indicates remaining program runs or cycles, as well as status messages: E (error), P (pause), C (continuous watering), and A (advanced edge watering). Normally toggles between the active program number and remaining runs. When a cycle begins, the display blinks the current program number for 30 seconds, followed by a steady display of the remaining repetitions for another 30 seconds. This cycle repeats throughout the run. A blinking “P” indicates pause mode.

### *Manual Program Selector Switch*

Spring-loaded switches labelled “Program 1 – 2” and “3 – 4” return to the neutral “0” position.

Rotating to “1” queues or starts Program 1, while rotating to “2” does the same for Program 2. The “Repetitions” display shows how many runs are queued. Each turn reduces the count by one. Note that a single program run may include several cycles depending on the setup. This function works only if enabled under “Settings > Main Settings > Enable Repetition via Button.” Program setup is performed via the PC-based HMI included with the system. Each boom in Boomlink30 supports four user-defined preset programs.

#### *“Cont. Water” Selector Switch*

Spring-loaded switch. When turned to “1”, the boom continuously runs with clean water until stopped using the “Cancel” switch.

When activated, the boom moves to the nearest end position, checks if fluid replacement is needed, pressurizes the system, and begins continuous back-and-forth operation with water and all valves open. Valves remain open during direction changes. This function is suitable for watering dry pots. The switch must be held or will return to “0”. Use the “Cancel” switch to stop this function.

#### *“Cancel” Selector Switch*

Two spring-loaded positions: “Stop” and “Return Home.”

Turning to “Stop” halts the current program and deletes remaining cycles; the boom awaits new instructions. To return the boom to the home position without water, turn to “Return Home.”

#### *“Pause/Alarm Reset” Selector Switch*

Has two fixed positions. Controls both pause and alarm reset.

- **Pause:**

Turning to “1” pauses current boom activity. The switch stays in this position without spring return. All movement and valve operations stop, and system state is retained in memory. When switched back to “0”, the operation resumes from the same state.

If the boom is active, it stops and depressurizes the system (relief valve opens, pumps stop). If idle, it prevents any scheduled activity from starting. When returned to “0”, a standard pressurization sequence initiates before resuming the task.

Using this function is recommended over emergency stop unless necessary.

- **Alarm Reset:**

Also resets alarms. Reset occurs by turning from position “1” to “0”. Alarms typically pause the system, so resetting clears the pause as well.

#### *“Nozzle Test” Selector Switch*

Has two fixed positions. Turning to “1” activates all nozzles on the boom and the pump start output. This allows verification of nozzle cleanliness and uniform spray. Operates independently of the PLC, and can be used for emergency watering with the “Jog” switch.

#### *“Jog” Selector Switch*

Three fixed positions: Forward – 0 – Reverse. Allows manual movement of the boom without PLC control. Mainly for service, but also usable for emergency watering.



If the PLC is non-functional, activate “Nozzle Test” and turn “Jog” to “Forward”. The boom moves at a speed set by an internal potentiometer. When it reaches the far end, it stops. Turning “Jog” to “Reverse” moves it back to the home position. The boom stops wherever it is if the switch is turned to “0”.

If “Nozzle Test” is active, all valves open. To avoid using all valves,

manually close the ones not needed.

Boomlink30 uses Bermad Trio solenoid valves with manual/auto controls.

This switch acts directly on the VFD and should not be used while the boom is in motion. Default acceleration/deceleration is 1 second.

### *Synchronized Start (Optional)*

Not present on all control cabinets. When enabled, all associated booms configured for synchronized start will begin watering simultaneously with the selected program (1–4).

### *Emergency Stop*

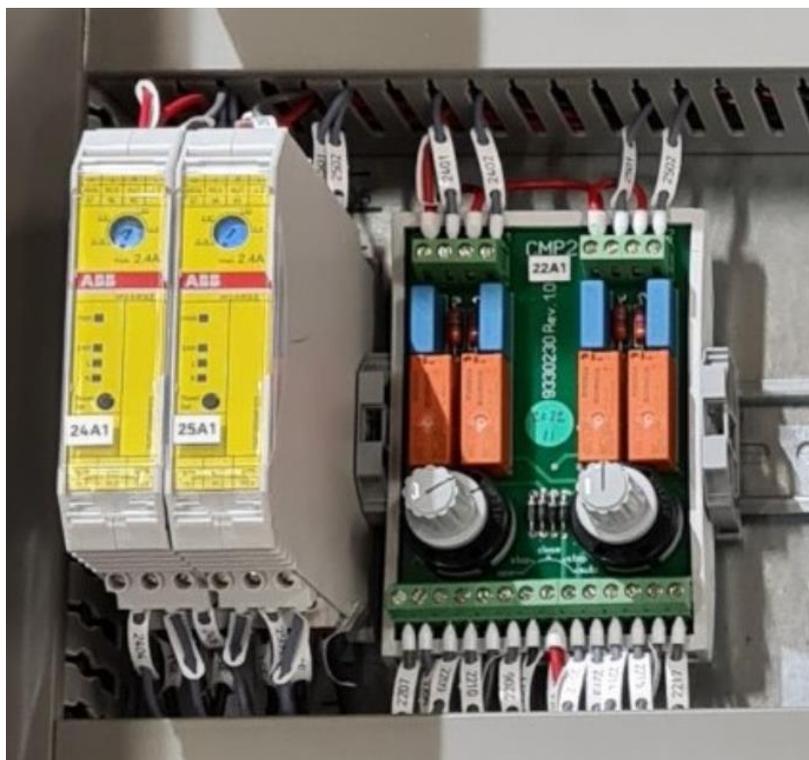
Using this button disables the VFD, halts any PLC sequence, and prevents new starts. It also shuts all valves and sets the PLC into alarm mode. Only use this in real emergencies. Prefer “Pause” or “Cancel” in normal operation.

### *“Long Night” Selector Switch*

Optional, with three positions: Off – Auto – On. Boomlink30 can manage up to 4 curtain motors for long-night scenarios. Each motor has its own CMP2 manual override switch inside the cabinet.

The front-panel “Long Night” switch controls all four simultaneously:

- “Off”: opens all curtains.
- “On”: closes all curtains.
- “Auto”: curtain positions are controlled by the PLC, assuming internal switches are set to “Auto”. Only connected motors are affected.



### *Identification panel “B”*

In the upper right corner of the cabinet front, there is a cut-out for an ID plate. This is intended for an aluminum ID tag included in the Boomlink concept. The ID is used to uniquely identify the irrigation boom, both for nursery personnel and service technicians.

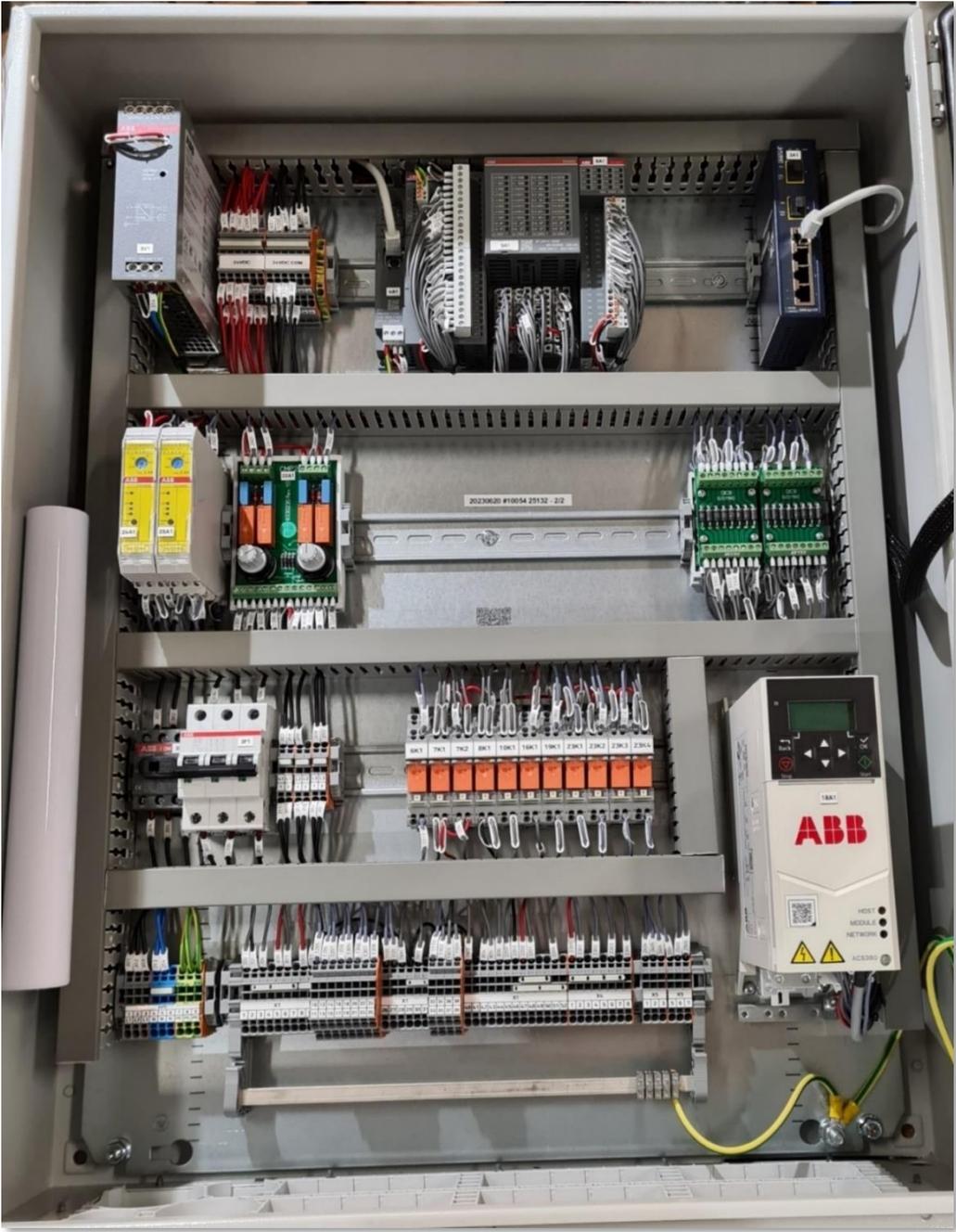
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### *Other Information*

The functions “Dystest” and “Jog” are the only controls that can operate the boom without a PLC. This ensures emergency watering capability even if the PLC fails. Note: “Jog” is primarily intended for small movements—such as repositioning the boom—but it can also be used for emergency watering in combination with “Dystest”.

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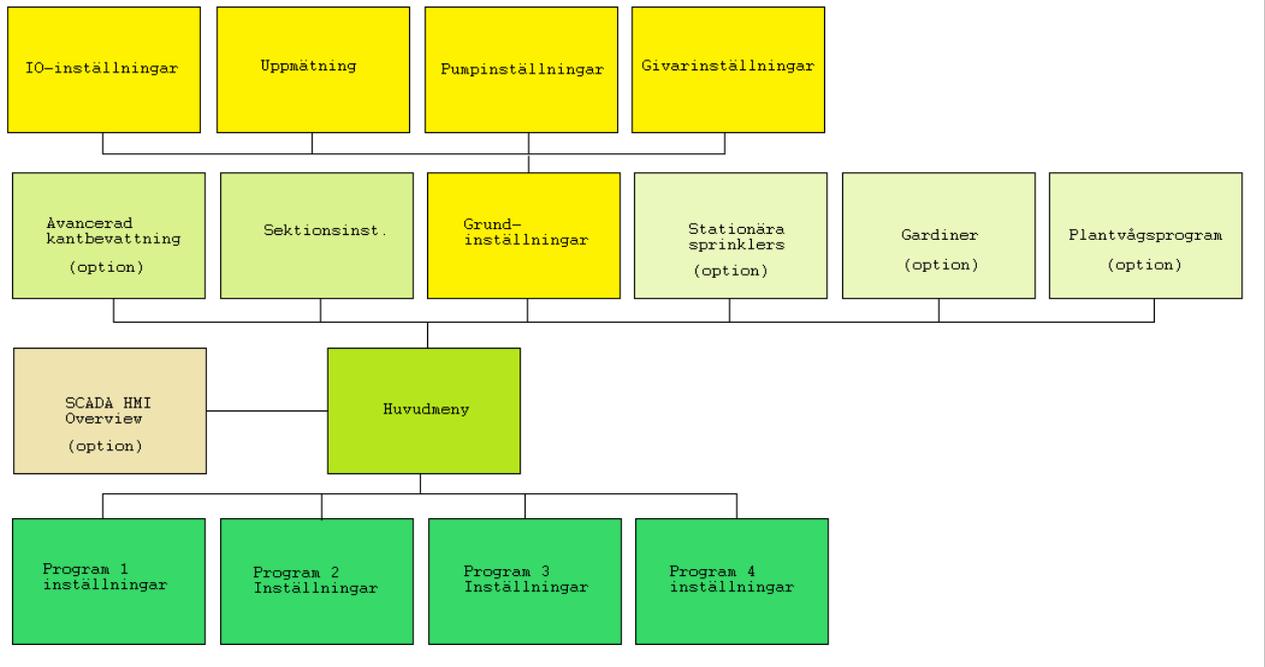
# Boomlink 30 Control Cabinet



- **Top Row:** ABB power supply, ABB PM5052 PLC, fiber switch
- **Second Row:** ABB hybrid motor starters for curtain motors, CMP2 units, diode bridges
- **Third Row:** ABB main switch, ABB fuses, Wago control relays, ABB frequency inverter
- **Fourth Row:** Terminal blocks for external connections

## Menu System

Settings and readings are managed via the **Main Menu**, accessible by clicking a boom icon in the SCADA system's Overview Menu. If SCADA is not used, the system defaults to the Main Menu on startup.



There are two ways to configure and monitor the Boomlink system:

1. **Web Visualization (ABB Webvisu):**

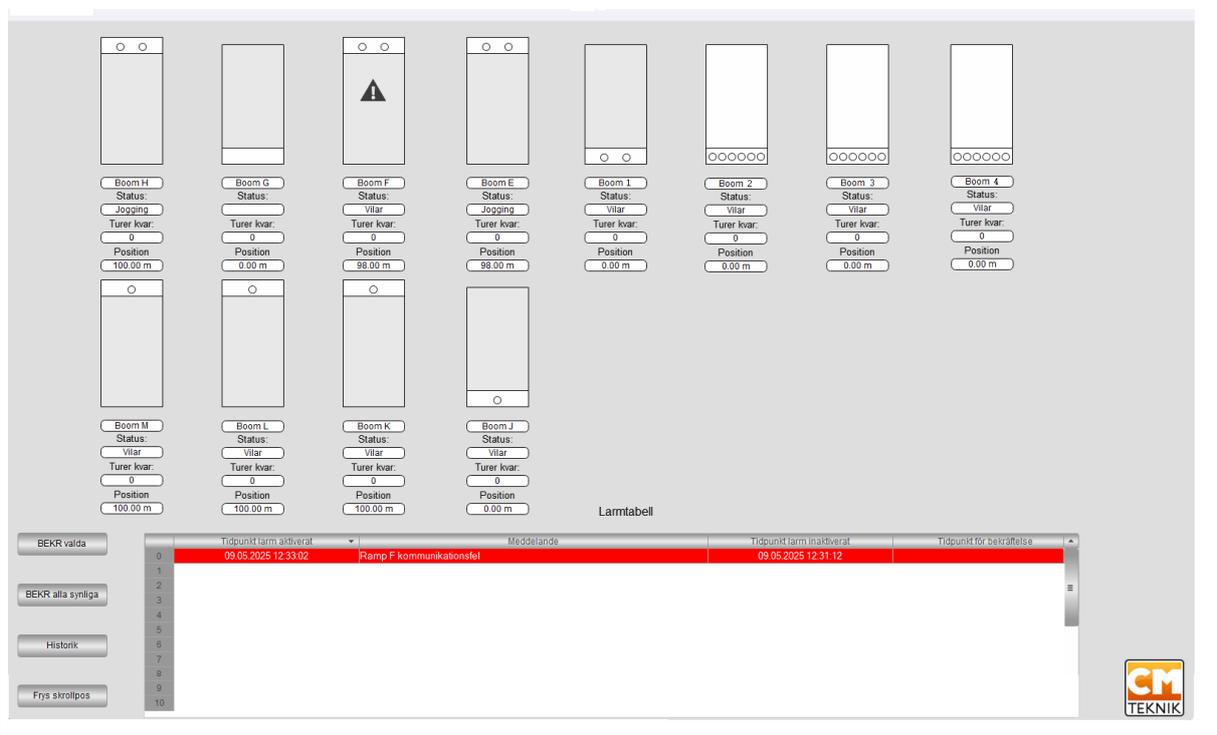
Ideal for systems with one or two booms. Uses a web browser to access the control system via IP address. No additional software installation is required. Each screen displays one boom at a time.

2. **SCADA Interface (Codesys HMI):**

Suitable for larger systems with multiple booms. Displays all booms in a single overview screen and simplifies navigation between booms.

## Overview Menu (SCADA)

Displays a graphical, animated overview of all installed booms and an active alarm list.



## Boom Icons

Each irrigation area is shown as a rectangle. The boom's home position is always along the bottom edge. A typical program consists of two treatments. At start, treated areas light up in colors:

- **Blue:** Clean water
- **Green:** Fertilizer
- **Red:** Chemicals
- **Yellow:** Lighting

Each treatment may include multiple passes, in either direction, calculated for optimal efficiency. The boom itself is shown as a moving bar, with valve symbols indicating which ones are active.

## Alarm List (Overview)

Shows alarms for all connected booms. The list is scrollable, with the most recent alarm at the top (Row 0). Each row includes:

- Alarm number
- Timestamp of alarm
- Message

- Confirmation timestamp
- Clear timestamp

Buttons available:

- Acknowledge Selected
  - Acknowledge All
  - Alarm History
  - Freeze Scroll Position
- 

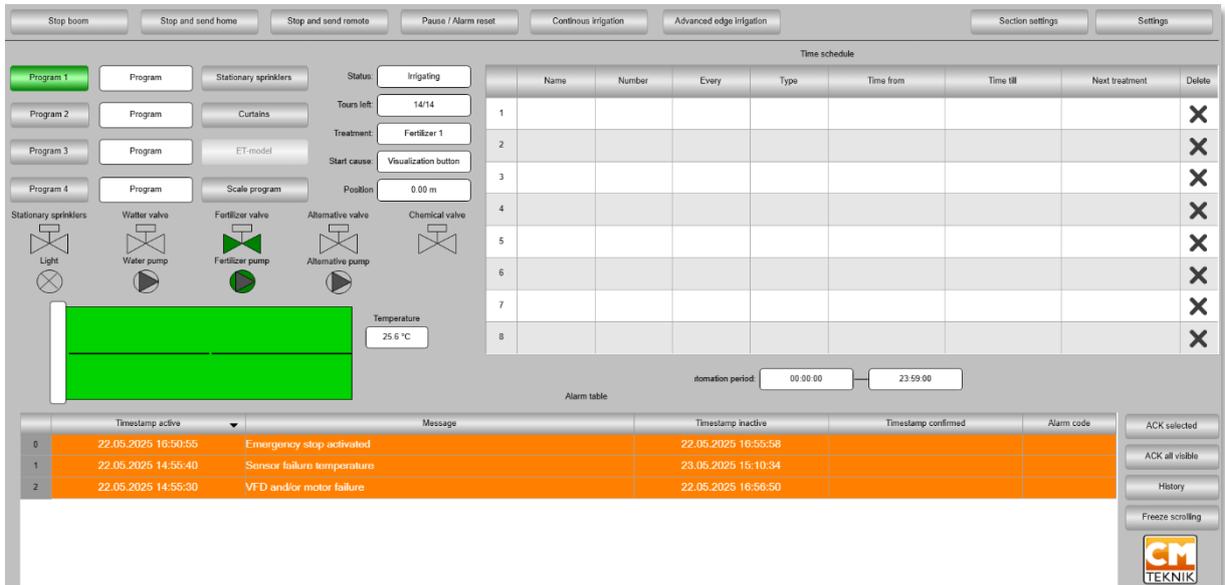
### *Opening the Main Menu*

Clicking a boom's irrigation area brings up the **Main Menu** for that boom.

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# Main Menu

Displays a detailed, animated view of the selected boom and its irrigation area.



## Animated Status Display

On the left, a real-time animation shows the boom's actual position, valve status (up to 8), and treatment sections. Treatment types are color-coded:

- **Blue:** Clean water
- **Green:** Fertilizer
- **Red:** Chemicals
- **Yellow:** Lighting

## Curtain Symbols

If the boom has blackout curtains (for long-night setups), curtain positions are also shown, in green. Up to 4 curtain motors can be managed.

## Valve and Pump Symbols

Above the boom graphic:

- 5 valve icons:
  - Fixed sprinkler valve
  - Main clean water valve
  - Main fertilizer valve
  - Alternative source valve
  - Chemical treatment valve
- Additional icons for lighting and up to 3 pumps

Filled icons = active; empty = inactive.

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## Settings

Only one direct setting is available here:

- *Auto Period:*  
A daily time window during which automatic starts and watering are permitted. Most triggers can be configured to only run during this window.
- 

## Alarm List (Per Boom)

Located under the status display. This list shows only the alarms for the selected boom.

Each row includes:

- Alarm timestamp
- Message
- Clear timestamp
- Confirmation timestamp
- Alarm code

## Buttons:

- Acknowledge Selected
  - Acknowledge All
  - Alarm History
  - Freeze Scroll Position
- 

## Quick Access Buttons (Top of Menu)

1. **Stop Boom** – Halts the current program, shuts all valves, and leaves the boom in place.
  2. **Stop and Send Home** – Stops the program, closes valves, and moves the boom to its home position.
  3. **Stop and Send Away** – Same as above but sends the boom to the far end.
  4. **Pause / Alarm Reset** – Temporarily stops operation. Press again to resume. If a fault is active, pressing twice resets the alarm.
  5. **Continuous Watering** – Starts a continuous forward/back cycle with all valves open, for flushing or emergency irrigation. Speed is set under Service Settings. To stop, press Stop and send home.
-

## Additional Menus

These open more detailed configuration options:

- **Advanced Edge Irrigation**
- **Section Settings**
- **General Settings**

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### Advanced Edge Irrigation (optional feature)

This feature extends irrigation to crosswise edges and not just the sides. Useful in setups with blackout curtains where obstacles or gaps prevent full coverage.

The screenshot shows a configuration window titled "Advanced edge irrigation:" with a "Start now" button in the top right. The interface is divided into several sections by dashed lines:

- Selection of sections:** A grid of checkboxes and text boxes. The first row has a checked checkbox for "test", followed by "test 2" and four empty boxes. The second row has five empty boxes.
- Valves:** A row of checkboxes labeled "Along:" and "Across:". Under "Along:", valve 2 is checked. Under "Across:", all valves are unchecked.
- Every:** Two input fields: "0.2 m irrigate" and "0.3 m (Tvårs)".
- Treatment:** "2" in a field, "tour(s) irrigating" with a checked checkbox, and "High speed".
- Tours started by time:** A checkbox "Only active during automation period" which is unchecked.
- Frequency:** "Every" followed by "1" in a field and "day(s)" with a dropdown arrow.
- Buttons:** "Set time controlled tours" and "Close" buttons.
- Time Range:** "from" followed by "2026-01-01" and "00:00:00" in fields, and "until" followed by "2027-01-01" and "00:00:00" in fields.

### Configuration

- Select sections (1–10) to irrigate using checkboxes.
- Choose valves for longitudinal, crosswise, or both edge types.
- Specify distance between crosswise passes (e.g., 6.0 m).
- Optional offset start (e.g., start 1 m before cable line).
- Choose number of passes (1 pass = out and back = 2 runs).
- Press **Start Now** to run manually.

### Scheduled Edge Irrigation

Set time-triggered runs under "**Time-triggered Runs**".

- Check “Active Only During Auto Period” to limit to certain times.
- Define intervals (e.g., every 2 hours).
- Set valid date/time range.
- Missing data fields will show a warning icon. Once all fields are complete, press "**Set Time-Controlled Runs**" to save.
- Press **Close** to return to Main Menu.

## Section Settings

To define irrigation areas (sections), press the “**Section Settings**” button located in the upper right of the main menu. A configuration screen will appear where you can define **up to 10 different sections** of the total irrigation area.

Section settings:																
Activated Section	Section	Start position	End position	Valves								Chemical valves				
				1	2	3	4	5	6	7	8	1	2	3	4	
<input checked="" type="checkbox"/>	test	0.0	1.6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
<input checked="" type="checkbox"/>	test 2	0.0	1.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
<input type="checkbox"/>		0.0	0.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
<input type="checkbox"/>		0.0	0.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
<input type="checkbox"/>		0.0	0.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
<input type="checkbox"/>		0.0	0.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
<input type="checkbox"/>		0.0	0.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
<input type="checkbox"/>		0.0	0.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								
<input type="checkbox"/>		0.0	0.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								

Close

Each section can be freely named, for example: “Gran Saleby”, “Whole Area”, “Edge Irrigation”, or similar. You simply type the desired name for each section under “**Section Name**”.

### Lengthwise Definition

A section is defined by its **start and end positions in meters**, relative to the ramp's home position. The home position is considered **0 meters**. For example:

- If you set **Start Position = 12 m** and **End Position = 28 m**, you are defining an area that starts 12 meters from the home position and ends 28 meters from it.

- If the entire area is 100 m long and you want to define the whole area as one section, set **Start Position = 0 m** and **End Position = 100 m**.

### **Widthwise Definition**

A section's width is defined by selecting one or more **valves** on the ramp.

This may need further explanation:

- The ramp is equipped with at least one **sprinkler pipe** running from the left to the right end of the ramp.
- The sprinkler pipe is fed by one or more **solenoid valves**, which are controlled by the **Boomlink30**.
- If only one valve is present (referred to as **Valve 1** in the software), it supplies water across the entire width of the ramp.

In the **Section Settings** menu, you specify:

- The **number of valves**
- The **position and width** each valve covers

The system supports up to **8 valves**, allowing the ramp's width to be divided into up to **8 zones**. Additionally, up to **4 special valves** can be defined for **chemical irrigation**.

If multiple sprinkler pipes are used (e.g., one for regular watering, another for misting), this must be taken into account during setup.

Using the **start/end positions** and **valve selections**, you can define a rectangular irrigation area **anywhere on the total surface**. Complex shapes can usually be handled by **combining two or more sections**.

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## Settings

Pressing this button opens the "Main Settings" menu for the ramp setup. This menu will be described later in the manual.

## Time Start Schedule

Name	Number	Every	Type	Time from	Time till	Next treatment	Delete
	1						X
	2						X
	3						X
	4						X
	5						X
	6						X
	7						X
	8						X

Timestamp active	Message	Timestamp inactive	Timestamp confirmed	Alarm code
22.05.2025 16:50:55	Emergency stop activated	22.05.2025 16:55:58		
22.05.2025 14:55:40	Sensor failure temperature	23.05.2025 15:10:34		
22.05.2025 14:55:30	VFD and/or motor failure	22.05.2025 16:56:50		

The right side of the main screen displays a **detailed schedule** for programmed irrigation runs.

- The next scheduled run always appears **at the top of the list**.
- If a new run is scheduled **earlier than the current top entry**, it will be inserted at the top and push the others down.

The list is sorted in the order of **upcoming execution**.

### Column Headers (from left to right):

- **Name**  
Each ramp can have 4 programs. You may rename them from the default "Program 1", "Program 2", etc., to aliases that better describe their function. These names appear in this column.
- **Number**  
Indicates the time-based order of execution. Lower numbers run before higher ones.
- **Every**  
Indicates frequency of repetition:  
1 = every, 2 = every second, 3 = every third, etc.
- **Unit**  
The time unit: **minute, hour, or day**.
- **Start Time**  
When the program becomes active.

- **End Time**  
When the program ends.
- **Next Run**  
The scheduled time for the next run. The list is sorted by this value.
- **Clear**  
Clicking the “X” removes the schedule for this program.

## Stationary Sprinklers

Stationära sprinklers:		Aktivera:	<input type="checkbox"/>
Autoperiod:	<input type="text" value="00:00:00"/> — <input type="text" value="00:00:00"/>	Frostskydd aktivt utanför autoperiod:	<input type="checkbox"/>
Bevattningsintervall:	<input type="text" value="0"/> timme(-ar) <input type="text" value="0"/> minut(er)	Frostskydd starttemperatur:	<input type="text" value="0.0 °C"/>
Körtid ventil 1:	<input type="text" value="0"/> minut(er) <input type="text" value="0"/> sekund(er)	Frostskydd stopptemperatur:	<input type="text" value="0.0 °C"/>
Körtid ventil 2:	<input type="text" value="0"/> minut(er) <input type="text" value="0"/> sekund(er)	Frostskyddsintervall:	<input type="text" value="0"/> timme(-ar) <input type="text" value="0"/> minut(er)
Körtid ventil 3:	<input type="text" value="0"/> minut(er) <input type="text" value="0"/> sekund(er)	Frostskyddshysteres:	<input type="text" value="0.0 °C"/>
Körtid ventil 4:	<input type="text" value="0"/> minut(er) <input type="text" value="0"/> sekund(er)	Status:	<input type="text" value="Vilar"/>
Ventil växlingspaus(s)	<input type="text" value="0"/> sekund(er)	V1:	<input type="radio"/>
		V2:	<input type="radio"/>
		V3:	<input type="radio"/>
		V4:	<input type="radio"/>
	Vattenspump	Gödselpump	Alternativ pump
Pumpval vid vattning:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="button" value="Stäng"/>			

Press the “**Stationary Sprinklers**” button in the main menu to access settings for stationary sprinkler systems. These are commonly used in northern regions for **frost protection**.

Features include:

- Up to **4 solenoid valves** can be assigned for stationary sprinklers.
- Optional pump activation.
- Separate **auto-periods** for stationary sprinklers.
- Supports only **interval or frost protection** watering.
- **Frost protection** operates within a defined **temperature range**.
- Each valve can be given its own **valve run time**.
- Separate **start intervals** for regular and frost protection watering.

## Activate

At the top of the menu, you can enable or disable the function via a **checkbox**. If disabled, no watering occurs, but all settings are retained.

## Autoperiod

Defines the time window during which watering is allowed.

- For interval watering, a sequence always starts when the autoperiod begins.
- **Exception:** Frost protection can run outside the autoperiod if “**Frost protection active outside autoperiod**” is checked.

## Irrigation Interval

Sets how often a watering sequence starts within the autoperiod.

## Valve Run Time (Valve n)

Each valve can be assigned a specific **duration** for how long it should stay open during a sequence.

## Valve Switching Pause

Since the valves are typically servo-operated and rely on water pressure for both opening and closing, a **pause** is added between valve activations to allow the current valve to close before the next one opens.

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## Frost Protection Start/Stop Temperature

Frost protection continues as long as the temperature is within the defined interval:

- **Start temperature** must be higher than the **stop temperature**.
- Example:
  - Temperature falls and reaches **start temperature** → Frost protection starts.
  - Temperature continues to drop and reaches **stop temperature** → Protection stops to avoid ice build-up.
  - When temperature rises above stop temperature, watering resumes until it exceeds start temperature.

## Frost Protection Interval

Frost protection watering is **not continuous**. As long as a thin water film remains on plants, ice temperature doesn't fall below 0°C. Therefore, watering should be frequent enough to maintain the film, but not excessive.

- The interval sets the time **between sequences**.
- Valves always open **sequentially**, starting with **Valve 1**.

## Frost Protection Hysteresis

A **hysteresis** or margin can be set. Frost protection starts when the temperature drops **below**:

- Start temperature **minus hysteresis**
- Stops when it rises **above**:
  - Start temperature **plus hysteresis**

The same logic applies to the stop temperature

### Status Display

This view shows the current state of the **stationary sprinkler system**:

- **Idle** – No irrigation occurring. Awaiting time-based or frost-triggered start.
  - **Frost Protection Active** – Sprinklers are operating due to frost conditions.
  - **Interval Irrigation Active** – Fixed-interval irrigation is in progress.
- 

### Pump Selection During Watering

Users can select from:

- Water pump
- Fertilizer pump
- Alternative pump
- Combination of the above

The selected pump(s) will activate before the watering valves open.

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### Valves V1, V2, V3, V4:

Each valve has a ring icon. When the valve is open, the ring is filled.

### Pump Selection During Irrigation

You can choose between:

- Water pump
- Fertilizer pump
- Alternate pump
- Any combination of the above

The selected pump will **start before the irrigation valves open**.

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## Curtain Control

Accessed via the “**Curtains**” button in the main menu.

Gardiner:		Aktivera: <input checked="" type="checkbox"/>	Blockera rampen om gardiner är på: <input type="checkbox"/>
Antal gardiner för denna ramp:	2		
Gardin nr:	1	2	
Långnatt startar:	00:00:00	00:00:00	
Långnatt slutar:	00:00:00	00:00:00	
Frostskydd starttemperatur:	0.0 °C	0.0 °C	
Frostskyddshysteres:	0.0 °C	0.0 °C	
Lägsta arbetstemperatur:	0.0 °C	0.0 °C	
Vindhastighet för fråndrag:	0 m/s	0 m/s	
Status:	<input type="radio"/>	<input type="radio"/>	
<input type="button" value="Stäng"/>			

Curtains are typically used in forest nurseries for **photoperiod extension at night**. Boomlink30 can control **up to 4 curtain motors** per irrigation boom.

### Activate

Check this box to **enable curtain control** according to the settings below.

### Block Boom When Curtains Are Drawn

Most boom constructions cannot operate while under or over closed curtains. Enable this checkbox to **block boom movement** while curtains are closed.

### Number of Curtains for This Boom

Enter the number of curtain motors (1 to 4). The corresponding number of control columns will appear. Curtains are numbered **1 to 4**.

### Long Night Start

Time at which curtains should be **closed**.

### Long Night End

Time at which curtains should be **opened**.

### **Frost Protection Start Temperature**

Below this temperature, curtains will **close automatically** for frost protection.

### **Frost Protection Hysteresis**

Set a hysteresis margin to prevent rapid switching.

Example:

- Start temp = 3°C
- Hysteresis = 0.5°C
- Curtain closes at 2.5°C
- Reopens at 3.5°C

### **Minimum Operating Temperature**

Curtains will **not move** if the temperature drops below this threshold.

This prevents **damage from ice**. Note: This may conflict with frost protection settings — adjust carefully.

### **Wind Speed for Curtain Retraction**

High winds can damage closed curtains.

You may set a wind speed at which the curtain will **retract for protection**.

⚠ May affect long-night settings — use with caution.

### **Curtain Status**

Filled dots indicate the curtain is currently **closed**.

---

## Plant Weighing System (Plant Scale)

Access via the “**Plantvåg**” button in the main menu.

Plantvågsprogram:	Våg A	Våg B
Aktivera:	<input type="checkbox"/>	<input type="checkbox"/>
Endast aktiv under autoperiod:	<input type="checkbox"/>	<input type="checkbox"/>
Viktavläsning:	999.0 kg	999.0 kg
Viktvarning:	0.0 kg	0.0 kg
Start vid vikt:	0.0 kg	0.0 kg
Startvikt, hysteres:	0.0 kg	0.0 kg
Program nr för start på vikt:	Ej använd ▼	Ej använd ▼
<input type="button" value="Stäng"/>		

### Purpose

Monitoring substrate moisture content is critical, especially with small substrate volumes. The system uses a **load cell sensor** to measure weight changes, indirectly indicating water content.

- Load cell placed under one end
- Fulcrum (e.g., L-bracket) on the opposite side
- Measures **half the total weight** of the plant tray

### Tare the Tray

During setup:

1. Fill the tray with dry peat and plants.
2. Record this weight as the **tare** (zero reference).

This tare is set as a **negative offset** in the **Sensor Setup** menu.

## Functionality

- Receive alerts when moisture content is low.
- Automatically **trigger irrigation** if water drops further.
- Data can be logged with systems like **Raptor**.

## Hardware

CM Teknik supplies load cells with digital transmitters:

- **POF (Polymer Optical Fiber)**
- **Wireless (LoRa)**

## Dual Scales (A and B)

Two scales per ramp can be used.

- Scale A shown on the **left panel**
- Scale B shown on the **right panel**

## Settings

- **Activate:** Enable one or both scales.
  - **Active Only During Autoperiod:** Irrigation starts only within set autoperiods if checked.
  - **Weight Reading:** Displays the weight (water content only).
  - **Weight Warning:** Set threshold to alert user that watering is needed.
  - **Start at Weight:** Set emergency threshold for **automatic program start**.
  - **Start Weight Hysteresis:** Prevents rapid cycling.  
E.g., with 10 kg hysteresis, watering starts 10 kg below threshold and stops 10 kg above.
  - **Program Number for Weight Trigger:** Select which program (1–4) to start on low moisture.
-

## Program Setup

There are four buttons in the main menu: **Program 1–4**.

Programs can also be started via controls on the boom cabinet.

The screenshot shows a 'Program Setup' window with the following fields and controls:

- Program name:
- Park boom at remote  Smart swap
- Selection of sections:
  - 
  -
- Repeat:  times
- Treatment 1:  Amount of tours:  High speed:
- Treatment 2:  Amount of tours:  High speed:
- Tours started by time:  Only active during automation period
- Every:
- from   until
- Block boom after finished treatment:  minute(s)
- Buttons: Program 1 (green), Program 2, Program 3, Program 4, Close

### To Configure a Program

1. Press the desired **Program button**.
2. The selected program's button turns **green**.

### Program Name

Rename to something more descriptive. This name appears on the main menu button.

### Park Boom at Far End

Check this box if the boom should automatically **park at the far limit** after finishing.

### Smart Fluid Change

Enables fluid change on the move — helpful when switching between substances.

- Optionally, enable **Advanced Smart Fluid Change** (requires flow sensors).

## Section Selection

Choose one or more sections (from those active on the main menu).

Only active sections appear.

Movement between sections occurs at **maximum speed**.

## Start Now

Starts the program **immediately**.

Disabled if boom is unavailable (e.g., paused, alarm active).

## Repeat

Number of times this program should run each time it starts.

## Treatment 1

Define what to perform:

- **Substance:** Water, Fertilizer, Chemical, Light, None
- **Number of Passes:** Max 100. Runs in both directions if more than one.
- **Speed:** Choose High (box checked) or Low (box unchecked).  
Speed set in **Ramp Setup** menu (17–50 Hz).

## Treatment 2

Same settings as Treatment 1. Starts immediately after Treatment 1 ends.

---

## Timed Starts (Scheduled Operations)

Each program (1–4) can be started by time:

- **Interval:** every X minutes/hours/days
- **Start/End Time:** define exact duration

## Examples:

- **Water every 2 hours** from July 1, 15:00 to July 8, 15:00
- **Single Run** on July 2, 15:00:
  - Set: Every 1 day, from 2020-07-02 15:00 to 2020-07-02 15:01

**Note:** “Every 0 day” disables the timer.

Program ignores start commands if already running.

You can restrict execution **only during autoperiod** by checking the relevant box.

---

## **Post-Treatment Options**

### **Block Boom After Completion**

Prevents further operations for a set period after treatment ends (e.g., to avoid rinsing off chemicals).

- Set duration (minutes)
- Enabled via checkbox

### **Stop at Far End (Optional)**

Displays “Yes” if boom is set to stop at far end.

### **Program Self-Blocking (Optional)**

Informs how long (in minutes) the program blocks itself and other programs post-completion.

### **Block One Limit Switch (Optional)**

Prevent the boom from reaching either the **home** or **far limit**:

- Check the box
- Choose which end to block

## General Settings

General settings:											
Length (m):	<input type="text" value="1.8"/>	Amount of boom valves:	<input type="text" value="8"/>	Chemical treatment start delay (s):	<input type="text" value="0"/>	Time setting:	<input type="text" value="1970-01-01 00:00:00"/>				
Ticks:	<input type="text" value="651"/>	Pressure relief valve time (s):	<input type="text" value="2"/>	Stirring time (s)	<input type="text" value="0"/>	Current time:	<input type="text" value="2025-05-23-15:04:37"/>				
Ticks alarm delay (s):	<input type="text" value="120"/>	Depressurizing time (s):	<input type="text" value="5"/>	Chemical rinse time (s):	<input type="text" value="10"/>	<input type="button" value="Set the time"/>					
VFD frequency with low speed (Hz)	<input type="text" value="50"/>	Pressurizing pump (s):	<input type="text" value="10"/>								
VFD frequency with high speed (Hz)	<input type="text" value="50"/>	Pressurizing main valve (s):	<input type="text" value="5"/>								
Pause time in case of direction change (s)	<input type="text" value="2"/>	Pressurizing boom valves (s):	<input type="text" value="5"/>								
Continuous irrigation with high speed	<input checked="" type="checkbox"/>	Valve change time (s):	<input type="text" value="0"/>								
Activate repetitions by the switch:	<input type="checkbox"/>	Pressurizing on the field:	<input type="checkbox"/>								
Program no. for remote start:	<input type="text" value="Program 1"/>	Pressurizing time (s)	<input type="text" value="5"/>								
Program no. for sync start:	<input type="text" value="Not used"/>	Pressure alarm:	<input type="checkbox"/>								
Program nr for temperature start:	<input type="text" value="Program 1"/>	Rinse time (s):	<input type="text" value="15"/>								
Temperature start	<input type="text" value="-10.0 °C"/> <input type="text" value="0.5 °C"/>	Time addition for smart fluid change:	<input type="text" value="0"/>								
Temperature start outside of automation period:	<input type="checkbox"/>	Expansion cabinet connected:	<input type="checkbox"/>								
Frost protection alarm temperature:	<input type="checkbox"/> <input type="text" value="0.0 °C"/>										
<input type="button" value="IO Settings"/>								<input type="button" value="Measuring"/>		<input type="button" value="Pump settings"/>	
								<input type="button" value="Sensor settings"/>		<input type="button" value="Close"/>	

## Boom Layout

- **Length**

Enter the distance in meters between the home and far end positions. This refers to the distance the irrigation boom (spray pipe) travels from its home position to its farthest position.
- **Position Pulses**

Position is determined using a pulse generator that produces pulses as the boom moves. The more pulses per unit distance, the higher the position resolution. During setup, measure the total boom travel and enter the total number of pulses here.
- **Position Pulse Alarm Delay**

This delay triggers an alarm if the time between pulses is too long—indicating the boom is moving too slowly or has stopped. The alarm stops the boom motor, closes all valves, shuts off pumps, and puts the system into pause mode. To resume, press the Pause/Alarm Reset button on the screen or turn the corresponding switch on the control panel from 0 to 1 and back.
- **Number of Boom Valves**

Set the number of valves installed on the boom for different irrigation zones.
- **Expansion Unit Used**

Check this box if an additional control cabinet is installed directly on the moving boom (e.g., mobile cabinet on the ramp).

## VFD Data

Settings and readings for the frequency inverter, which typically controls the boom's drive motor speed and direction. It also monitors motor status and issues alarms if anomalies are detected.

**We use only two speed levels**, which users can change at any time. This simplification helps with accurate calculation of water/fertilizer dosing and flush times.

#### Settings:

- **VFD Frequency – Low Speed**  
Set the frequency (17–55 Hz) output to the motor for low-speed operation.
  - **VFD Frequency – High Speed**  
Set the frequency (17–55 Hz) output to the motor for high-speed operation.
  - **Pause Time on Direction Change (s)**  
Delay between releasing one direction relay and engaging the other, to prevent both relays from energizing at once, which would trip the motor protection.
  - **Use High Speed for Continuous Irrigation**  
If checked, the boom will run at high speed during continuous irrigation. Otherwise, it uses low speed. Speeds are defined above.
- 

## Program

- **Enable Repeat via Button**  
When checked, allows the user to repeat irrigation cycles via front panel program buttons. Rotate the selector to the desired program number to repeat, up to 9 times. You have 15 seconds to set repetitions. The display increments with each turn and counts down each time the program restarts.

**Note:** *This sets the number of program repetitions, not the number of passes. If a program is set for 4 passes and you repeat it 4 times, you get 16 total passes.*

- **Program Number for Remote Start**  
Choose which program (1–4) to start via a digital input. Can be linked to external triggers like evaporators, thermostats, or external control systems.
- **Program Number for Sync Start (SCADA)**  
For simultaneous start of multiple booms, select which program (1–4) to use. In the I/O setup, specify which digital input triggers the sync. Not all booms need to have the input—just assign the program.

**Note:** Sync start requires an installed SCADA system.

- **Temperature-Based Start**  
If enabled, the boom starts at high speed when ambient temperature falls within a defined range.
  - **Used for Cooling or Frost Protection:**
    - **For frost:** Starts when temp drops below upper limit, stops when below lower limit.
    - **For cooling:** Starts when temp exceeds lower limit and runs until above upper limit. Use fine nozzles for misting.

- **Program Number for Temperature Start**  
Choose the program (1–4) for temperature-triggered frost or cooling operations.
  - **Temperature Range**  
Set the low and high limits for temperature-triggered operation. The left field must be lower than the right.
  - **Temp Start Outside Auto Period**  
If checked, temperature start can occur any time of day. Otherwise, only during scheduled auto periods.
  - **Frost Protection Alarm Temperature**  
Set the temperature at which an alarm triggers, warning that the temperature is nearing frost start conditions.
- 

## Pressure and Delays

- **Pressure Relief Valve Delay**  
Time between pressure relief valve closing and main valve opening to prevent premature water discharge. Default: 5 seconds.
- **Pressure Relief Time**  
Time the pressure relief valve remains open after irrigation stops to ensure clean valve shutdown.
- **Pump Pressurization Time**  
Time required to start pumps, open valves, and stabilize flow before irrigation starts. If at endpoints, ramp valves also open.
- **Main Valve Pressurization Time**  
Set time needed for stationary end-of-bed valves (water, fertilizer, chemical) to reach stable pressure.
- **Ramp Valve Pressurization Time**  
Set opening/pressurization time for boom valves (e.g., left side, right side, misting, edge irrigation). Supports 8 standard + 4 chemical valves.
- **Valve Switching Pause**  
Delay between opening servotype valves to maintain pressure during sequencing.
- **Field Pressurization**  
Check this if pressurization is required on the field (not just at endpoints). Important when running partial section irrigation or when using anti-drip nozzles that need pressure before opening.
- **Field Pressurization Time (s)**  
Duration the boom should pause at the start of a section to pressurize.
- **Pressure Alarm**  
Check this if the boom is equipped with a pressure sensor.
- **Flush Time (s)**  
Set the time required to flush the hose when switching between liquids (e.g., water to

fertilizer). Measure with a conductivity meter or similar tool. Add buffer time beyond measured value to ensure complete switch.

- **Smart Flush Add-On Time**

When using in-motion fluid switching, add extra flush time at endpoints to guarantee full changeover.

---

## Chemical Treatment

- **Chemical Treatment Start Delay (s)**

Time delay after start button is pressed to allow staff to move to a safe distance.

- **Mixing Time for Chemical Treatment (s)**

Time for the chemical agitator to mix contents before boom movement starts.

- **Chemical Flush Time (s)**

Usually shorter than standard flush, as chemical injection systems are mounted directly on the boom and use shorter hose runs.

---

## Clock Settings

- **Set Clock**

Time and date must be accurate for scheduled operations. Format: YYYY-MM-DD-HH-MM-SS. Navigate fields with arrow keys and enter values.

- **Current Time**

Shows the system's current time.

---

## Language Selection

Switch between Swedish and English by pressing the respective flag icon.

## IO Settings

To configure the inputs and outputs of the PLC, press the IO Settings button. The following screen will appear:

IO Settings: Onboard IOs						
		Negate	Status		Negate	Status
DI 0	Power supply signal	<input type="checkbox"/>	<input type="checkbox"/>	DO 0	Alarm relay	<input type="checkbox"/>
DI 1	Limit switch home	<input type="checkbox"/>	<input type="checkbox"/>	DO 1	Boom forward	<input type="checkbox"/>
DI 2	Limit switch remote	<input type="checkbox"/>	<input type="checkbox"/>	DO 2	Boom reverse	<input type="checkbox"/>
DI 3	Counter	<input type="checkbox"/>	<input checked="" type="checkbox"/>	DO 3	Pressure relief valve	<input type="checkbox"/>
DI 4	User 1 switch	<input type="checkbox"/>	<input type="checkbox"/>	DO 4	Water valve	<input type="checkbox"/>
DI 5	User 2 switch	<input type="checkbox"/>	<input type="checkbox"/>	DO 5	Fertilizer valve	<input type="checkbox"/>
DI 6	User 3 switch	<input type="checkbox"/>	<input type="checkbox"/>	DO 6	Alternative source valve	<input type="checkbox"/>
DI 7	User 4 switch	<input type="checkbox"/>	<input type="checkbox"/>	DO 7	Chemical treatment	<input type="checkbox"/>
DI 8	Continous irrigation	<input type="checkbox"/>	<input type="checkbox"/>	DC 12	Curtain 4 on	<input type="checkbox"/>
DI 9	Stop boom switch	<input type="checkbox"/>	<input type="checkbox"/>	DC 13	Curtain 4 off	<input type="checkbox"/>
DI 10	Go home switch	<input type="checkbox"/>	<input type="checkbox"/>			
DI 11	Pause-Reset switch	<input type="checkbox"/>	<input type="checkbox"/>			

Test mode      Side module      Close

The menu is divided into three categories:

- **Digital In** – digital inputs (e.g., limit switches, buttons)
- **Digital Out** – digital outputs (e.g., relays, contactors)
- **Digital Configurable** – assignable as either input or output

**Note:** These IO settings apply to the main control unit. If additional control units are used on the boom, they have separate configurations.

---

### Configuring a Digital Input

To assign a function to a digital input (Di), select the physical input terminal on the PLC that you want to use.

Example: If you want to set Di4 to handle the "Position Pulse" signal:

1. Press the arrow button to the right of the Di4 field (which might show "Preset Button 1" by default).
2. A dropdown will appear listing all available functions.

3. Select "Position Pulse" from the list.

Now, Di4 will act as the Position Pulse input.

---

### IO Status Indicators

Each IO point has an associated status indicator:

- Green LED ON: Input is active (e.g., position pulse is being received).
  - For outputs: The indicator reflects if the output is currently energized.
- 

### Input Inversion

Each IO can be inverted by checking the Invert checkbox. This reverses the logic:

- A normally inactive input will show green (active).
- An inactive output will appear energized.

**⚠ Important:** Inversion is potentially risky if you're not sure how it affects system logic. For safety, this function requires a password, which can be requested from CM Teknik.

#### To enter the password:

- Navigate to the hidden field in the top-right corner of the IO Settings screen.
- 

### Test Mode

The Test Mode button temporarily decouples the IO from the PLC logic. IOs respond to physical signals, but they won't trigger programmed actions. The button lights up pink to indicate test mode is active.

Use Test Mode to safely verify inputs and outputs without operating the boom.

---

### Side Module Configuration

Use the Side Module button to open the IO configuration for any additional side IO modules.

---

### Available IO Functions

The following functions can be assigned to inputs and outputs (IDs correspond to internal system definitions):

ID	Function	ID	Function
0	Not Used	2	Limit Switch - Far End
1	Limit Switch - Home Position	3	Position Pulse

ID	Function	ID	Function
4	Emergency Stop	39	Boom Moving Outward
5	Continuous Irrigation	40	Boom Moving Home
6	Stop Button	41	High Speed Mode
7	Move to Home Button	42	Alarm Relay
8	Move to Far End Button	43	Frost Warning
9–12	Preset Buttons 1–4	44	Water Valve
13	Pause / Alarm Reset	45	Fertilizer Valve
14	Jog Out Button	46	Alternate Valve
15	Jog Home Button	47	Lighting
16	Jogging Active	48	Chemical Treatment
17	Low Voltage Warning	49	Water Pump
18	Nozzle Test Button	50	Fertilizer Pump
19	Flow Sensor	51	Alternate Pump
20	Pressure Switch	52– 59	Boom Valves 1–8
21	Rain Sensor	60	Pressure Relief Valve
22	Remote Start	61– 64	7-Segment Display Segments (1/4 to 4/4)
23	VFD / Motor Error	65– 72	Curtain 1–4 On/Off
24	Wireless Valve Alarm	73	Chemical Agitator
25	Wireless Valve Battery Alarm	74– 77	Chemical Valves (1–4)
26– 28	Curtain Auto Mode / Off / On	78– 81	Fixed Sprinklers (1–4)
29– 36	Curtain 1–4 On / Off	82	Frost Protection Relay
37	Motor Protection – Curtain Motor 1		
38	Motor Protection – Curtain Motor 2		

**Note:** Most of these functions can be assigned freely depending on the system design and available hardware.

## Measurement Setup

Measuring:		<input type="checkbox"/>	Activate		
<input type="button" value="Stop boom"/>		<input type="button" value="Stop and send home"/>		<input type="button" value="Measure"/>	
Ticks:	<input type="text" value="651"/>	Ready for measurement:	<input checked="" type="checkbox"/>		
Measuring to remote (low speed):	<input type="text" value="1.831"/>	Finished:	<input type="checkbox"/>		
Measuring to home (high speed)	<input type="text" value="3.484"/>	Status:	<input type="text" value="Idle"/>		
		Current amount of pulses:	Low <input type="text" value="0"/>	High <input type="text" value="0"/>	
		Low speed reading:	<input type="text" value="1.831 (m/min)"/>		
		High speed reading:	<input type="text" value="3.484 (m/min)"/>		
<input type="button" value="Close"/>					

When you press the “Measurement” button, the screen shown above will appear.

### Purpose of Measurement Setup

Measurement setup is used to calibrate the necessary data for the ramp’s operation:

- **Position Pulses (ticks):** An inductive sensor detects pulses from a non-driven wire wheel (or similar mechanism). Each full revolution of the wheel corresponds to a specific travel distance of the ramp. By measuring the distance between the home and far limit positions, the ramp’s position can be determined very precisely. The resolution depends on the number of measurement points on the wheel—more points mean better accuracy. A reading interval of 5 cm between points is recommended.

During the measurement process, the system automatically counts the number of position pulses over the full ramp travel (from home to far position and back). The ramp moves outward at low speed and returns at high speed.

- **Speed Measurement:** At the same time, the system records both low and high travel speeds. This data is essential when using features like *Smart Fluid Change* or *ET/Weighing Models* to calculate precipitation rates (liters per square meter).

## Measurement Procedure

1. **Ensure Readiness:** Make sure the ramp is idle—no active irrigation, no alarms, and not paused.
  2. **Enter Ramp Length:** Navigate to Main Settings and input the irrigation area length (distance between home and far positions).
  3. **Park Ramp at Home:** Return to the Measurement menu and press “Stop – Send Home” to ensure the ramp is at its home position.
  4. **Activate Measurement:** Press “Activate”. The status LED to the left of this button will turn green.
  5. **Verify Readiness:** When the ramp is ready, the “Ready for Measurement” LED will light green, and the “Start Measurement” button becomes enabled. If the system is not ready, the button remains inactive.
  6. **Previous Values:** Three fields on the left side of the screen display values from the previous measurement:
    - *Position Pulses*
    - *Outward Measurement – Low Speed*
    - *Return Measurement – High Speed*These will be updated after the new measurement.
  7. **Start Measurement:** Press “Start Measurement”.
  8. **Status Updates:** Status messages will change as follows:
    - “Waiting”
    - “Moving Out – Low Speed – Counting”
    - “Switch Pause”
    - “Returning – High Speed – Counting”
    - “Measurement Completed”
  9. **Review Results:** After completion, the fields for pulse counts and speeds (in m/min) will be updated.
  10. **Save Pulse Count:** Enter the measured pulse count into the respective field.
  11. **Save Speed Values:** Input the low and high speed values in their designated fields.
  12. **Finish:** Press “Activate” to save settings, then “Close” to return to the main menu.
-

## Pump Settings

Pressing the Pump Settings button opens a submenu.

Pump settings:			
	Water pump:	Fertilizer pump:	Alternative pump:
Pump selection for water treatment	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pump selection for fertilizer treatment:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Pump selection for alternative treatment:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pump selection for chemical treatment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Up to three pump outputs** may be available in the control cabinet:

- Water Pump
- Fertilizer Pump
- Alternative Pump

Installations may vary significantly. The available settings cover most configurations.

### Pump Selection During Irrigation

- **Water Irrigation:** Choose whether to use None, Water Pump, Alternative Pump, Fertilizer Pump, or any combination.
- **Fertilizer Irrigation:** Same selection options as above.
- **Alternative Treatment:** Same selection options as above.
- **Chemical Treatment:** Same selection options as above.

**Close:** Returns to the Main Settings menu.

---

## Sensor Settings

Pressing the Sensor Settings button opens the following menu.

Sensor settings:			
Modbus start address	<input type="text" value="0"/>	Modbus end address	<input type="text" value="0"/>
Modbus temperature value selection	<input type="text" value="Minimum"/>	Select Modbus wind value:	<input type="text" value="Minimum"/>
Temperature sensor	<input type="text" value="Own sensor"/>	Own temperature sensor:	<input type="text" value="PT100"/>
Smoothing factor:	<input type="text" value="0.90"/>		
Gain:	<input type="text" value="0.10"/>	Offset:	<input type="text" value="0.00"/>
		Processed value:	<input type="text" value="25.47"/> °C
Wind speed sensor:	<input type="text" value="Not used"/>	<input type="checkbox"/>	Own sensor installed
Smoothing factor:	<input type="text" value="0.90"/>		
Input:	<input type="text" value="0.00"/> - <input type="text" value="0.00"/>	Volt	Output: <input type="text" value="0.00"/> - <input type="text" value="0.00"/> m/s
Gain:	<input type="text" value="1.00"/>	Offset:	<input type="text" value="0.00"/>
		Processed value:	<input type="text" value="999.00"/> m/s
Scale 1:	<input type="text" value="Not used"/>	<input type="checkbox"/>	Own sensor installed
Input:	<input type="text" value="0.00"/> - <input type="text" value="0.00"/>	Volt	Output: <input type="text" value="0.00"/> - <input type="text" value="0.00"/> kg
Gain:	<input type="text" value="1.00"/>	Offset:	<input type="text" value="0.00"/>
		Processed value:	<input type="text" value="999.00"/> kg
Scale 2:	<input type="text" value="Not used"/>	<input type="checkbox"/>	Own sensor installed
Input:	<input type="text" value="0.00"/> - <input type="text" value="0.00"/>	Volt	Output: <input type="text" value="0.00"/> - <input type="text" value="0.00"/> kg
Gain:	<input type="text" value="1.00"/>	Offset:	<input type="text" value="0.00"/>
		Processed value:	<input type="text" value="999.00"/> kg
<input type="button" value="Close"/>			

This menu is used to define network nodes, configure sensors, and perform calibration and adjustments.

### Modbus Configuration

- **Start/End Addresses:** Define the Modbus group from which sensors can be selected. You can choose a sensor from another ramp if it is more representative.
- **Temperature/Wind Modbus Selection:** Select the sensor showing the highest or lowest value within the defined Modbus group (for temperature or wind speed).

### Temperature Sensor

- **Sensor Selection:** Choose between internal and Modbus-based sensors. Supported types: RT10, NTC 5k3A, NTC 3k3A, Pt100.
- **Smoothing Factor:** A value from 0.0 to 1.0.
  - **1.0:** Value is completely stable.
  - **0.0:** Always shows the most recent reading.
  - **Example:** 0.9 gives gradual transitions.
- **Calibration – Gain and Offset:**
  - *Gain* multiplies the sensor reading. Default is 1.
  - *Offset* adds/subtracts a fixed value. Default is 0.

### Zero Adjustment

To calibrate:

1. Submerge the sensor in melting ice water (0°C).
2. If the processed value is not 0.0°C, adjust offset accordingly.
  - Example: Reading = -0.9°C → Offset = +0.9.

### Gain Adjustment

1. Remove and dry the sensor, then expose it to shaded ambient air.
2. Measure the reference temperature with a separate thermometer.
3. Compare and adjust the gain if the reading deviates.
  - Example: Reading 10% too high → Gain = 0.9.

---

### Wind Speed Sensor

Used mainly to protect curtain systems and in ET-based models. Select a sensor via Modbus or use a locally connected one.

- **Sensor Type:** Generator-based anemometer outputting a voltage proportional to wind speed.
  - **Input/Output Voltage Range:** Example: 0–10 V = 0–50 m/s.
  - **Calibration:** Same gain and offset procedure as temperature sensor.
    - Zero gain when anemometer is stationary.
    - Gain adjustment requires wind or a reference sensor (optional).
  - **Smoothing Factor:** Works identically to the temperature sensor.
-

### *Plant Weighing Scale*

Up to two weighing platforms (Plant Scales) can be connected to each ramp.

- **For each scale:**
  - Select it from a dropdown menu (Scale 1 or Scale 2).
  - Mark the checkbox if it's a local (own) sensor.
- **Analog Input Range:**
  - Example: 0–10V signal from a load cell transmitter.
- **Weight Range Mapping:**
  - Example: 0–10V = 0–300 kg → Output range: 0–300.
- **Gain and Offset Calibration:**
  - **Zero Adjustment:** Perform when the scale is empty.
  - **Gain Adjustment:** Use a known reference weight.
- **Smoothing Factor:** Functions the same as with other sensors.

**Close:** Returns to the Main Settings menu

### **Volume for Fluid Change (Optional Feature)**

This setting defines the volume, in liters, contained within the pipeline between the main valve and the ramp's nozzles. It is used in the following cases:

- With Smart Swapping, in combination with a flow sensor.
- During fluid change at bed end if Smart Swapping is not used.

Correct configuration ensures accurate timing for fluid changeovers and avoids mixing fluids during irrigation transitions.

---

### *Valve Coverage (SCADA Only)*

This setting specifies the width covered by the ramp when each individual valve is open. Up to four partial coverage zones can be configured per valve.

For example, if a valve is used for edge irrigation, it typically covers the outer edges of the bed. It may also include the inner edges if there is a central path under the ramp (e.g., a rail track).

Many ramps are equipped with manual valves that can be closed when irrigation is only required on one side (e.g., right side of the bed).

If a partial zone is used (either physically present or manually opened), check the box next to the corresponding dimension to activate that zone.

### Coverage Orientation

Widths are measured from left to right, as viewed from outside the bed, with the ramp in its home position.

## **Nominal Flow Rate**

The nominal flow rate in liters per second is shown at the far right for each valve setup. This value is primarily used to trigger alarms if the measured flow deviates significantly from the expected nominal rate.

---

## **Close**

Press the “Close” button to exit this menu and return to the previous screen

## Data Logging and Related Functions

*For comprehensive instructions on using the Netcomd-Raptor software suite, refer to the specific manual for each application.*

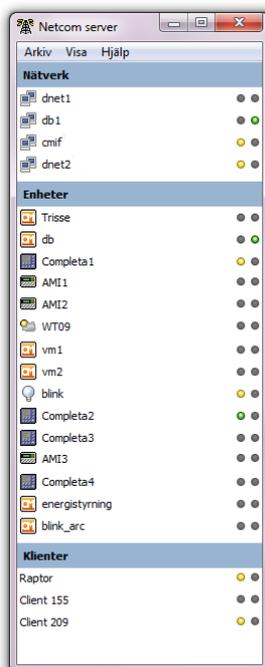
### System Architecture

In the supervisory system, the following software is installed on a PC:

---

## Communication

Netcomd serves as the central communications hub and is installed on a supervisory PC. It currently supports communication with devices over the following networks:



- **MODBUS/TCP** – PLCs, Grundfos pump controllers, LCC2, LCC4, etc.
- **MODBUS/RTU** – PLCs
- **DirectNET** – Koyo PLC, Pelle, Trisse, Maja
- **ARCNET/DGT** – LCC900, Completa, LCC2, LCC4, AMI Penta
- **DGT Serial** – LCC1200
- **Superlink 3/5** – All LCC units
- **LCT1** Load Cell

The above devices are examples; other devices compatible with these networks may also be connected.

Netcomd can also communicate with another Netcomd server on a different PC, enabling support for complex network architectures.

---

### Status Monitoring and Diagnostics

Netcomd features an interface for reading and configuring parameters of all connected devices. This is particularly useful for troubleshooting and system adjustments.

All communications passing through the Netcomd server can be logged, aiding in diagnostics and operational verification.

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### Backup Functionality

Netcomd allows saving the configuration of all connected devices, enabling system backups and reuse of seasonal settings.

Note: This function requires Netcomd to recognize available parameters for each device. As such, not all devices are supported by default.

Full support is provided for CM Teknik and Senmatic controllers. Support for additional device types can be added as needed.

---

### Influences (Logic-Based Scheduling)

Schemaläggare

Schemalagda uppgifter:

Fuktbroms

Namn: Fuktbroms

Uppgift: Villkor

Om:

Avd1: 11 är större än Avd1: 12

Gör följande:

Sätt: Avd1: 13 till 50

Annars:

Gör ingenting

Sätt: Avd1: 13 till 25

Uppreppning:

Första datum: 2015-06-29

Första klockslag: 15:23

Upprepa var: 10 minut

Lägg till Ta bort

Close

In addition to the influences built into Boomlink, conditional controls, and control instructions, Netcomd includes basic influence handling via its internal scheduler.

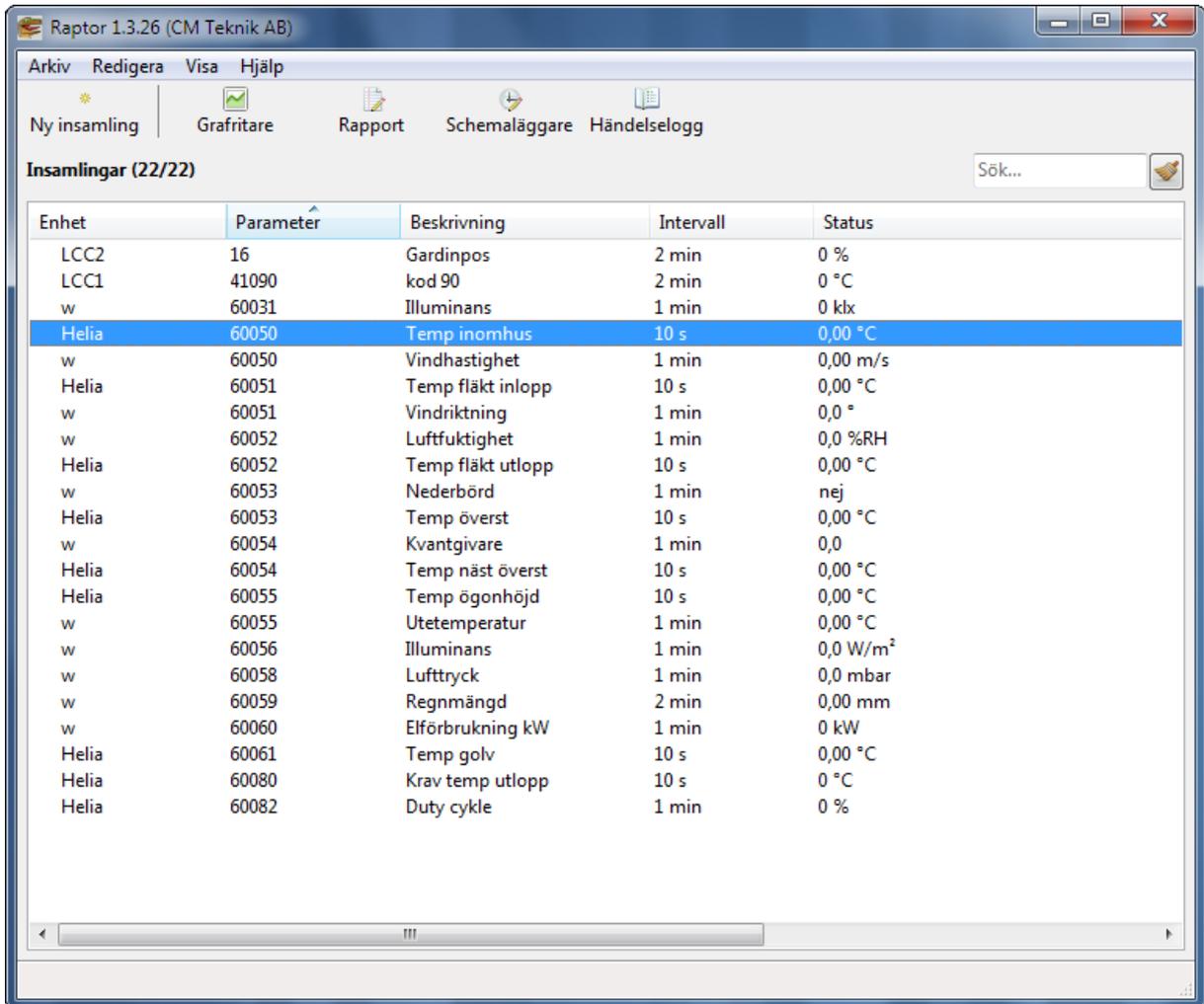
Examples of influence functionality:

- Set fixed parameter values at specific times.
  - Copy a value from one parameter to another at scheduled times.
  - Execute basic logic (e.g., “If parameter X > 5, set parameter Y = 20”).
-

# Raptor

Raptor is CM Teknik's software platform for industrial process monitoring, with specialized support for climate control systems.

## Data Acquisition



The screenshot shows the Raptor 1.3.26 (CM Teknik AB) software interface. The window title is "Raptor 1.3.26 (CM Teknik AB)". The menu bar includes "Arkiv", "Redigera", "Visa", and "Hjälp". The toolbar contains icons for "Ny insamling", "Grafitäre", "Rapport", "Schemaläggare", and "Händelselogg". Below the toolbar, there is a section titled "Insamlingar (22/22)" with a search box labeled "Sök...". The main area displays a table with the following columns: "Enhet", "Parameter", "Beskrivning", "Intervall", and "Status".

Enhet	Parameter	Beskrivning	Intervall	Status
LCC2	16	Gardinpos	2 min	0 %
LCC1	41090	kod 90	2 min	0 °C
w	60031	Illuminans	1 min	0 klx
Helia	60050	Temp inomhus	10 s	0,00 °C
w	60050	Vindhastighet	1 min	0,00 m/s
Helia	60051	Temp fläkt inlopp	10 s	0,00 °C
w	60051	Vindriktning	1 min	0,0 °
w	60052	Luftfuktighet	1 min	0,0 %RH
Helia	60052	Temp fläkt utlopp	10 s	0,00 °C
w	60053	Nederbörd	1 min	nej
Helia	60053	Temp överst	10 s	0,00 °C
w	60054	Kvantgivare	1 min	0,0
Helia	60054	Temp näst överst	10 s	0,00 °C
Helia	60055	Temp ögonhöjd	10 s	0,00 °C
w	60055	Uttemperatur	1 min	0,00 °C
w	60056	Illuminans	1 min	0,0 W/m <sup>2</sup>
w	60058	Lufttryck	1 min	0,0 mbar
w	60059	Regnmängd	2 min	0,00 mm
w	60060	Elförbrukning kW	1 min	0 kW
Helia	60061	Temp golv	10 s	0,00 °C
Helia	60080	Krav temp utlopp	10 s	0 °C
Helia	60082	Duty cykle	1 min	0 %

Raptor collects a virtually unlimited number of data points from connected devices and stores them in a purpose-built database for later analysis.

Each data point can be customized with:

- Name
- Data type (boolean, integer, float, etc.)
- Sampling interval
- Additional configuration options

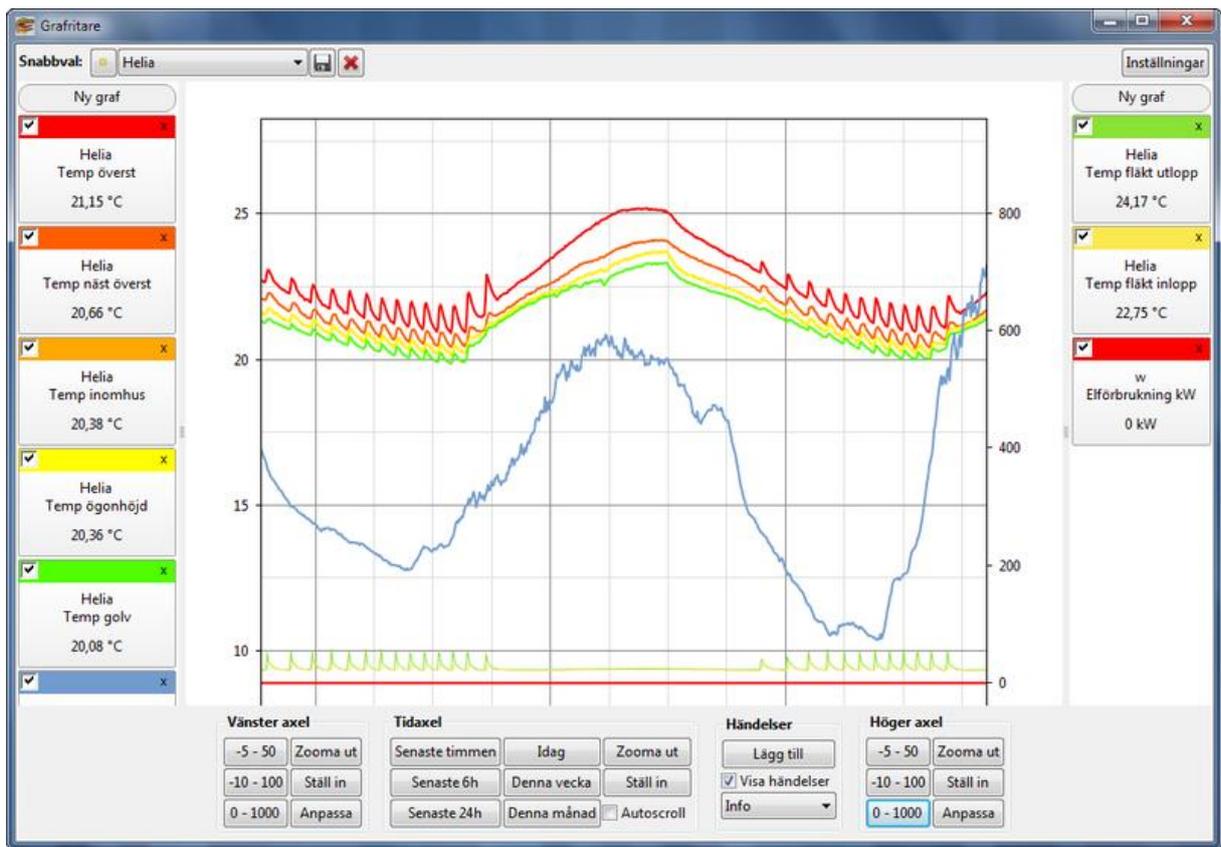
For CM Teknik control units, preconfigured data templates are available. For other devices, manual setup is required—but the process is fast and straightforward.

## Event Log (Alarm List)

Tid	Klient	Enhet	Meddelande
2010-11-18 10:26:24	Raptor		Raptor started
2010-12-21 09:42:15	Raptor		Raptor started
2011-01-03 15:02:11	Raptor		Raptor started
2011-01-08 17:53:15	Raptor		Raptor started
2011-01-18 17:08:09	Raptor		Raptor started
2011-02-02 12:07:40	Raptor	test1	Max lufttemperatur
2011-02-02 14:15:13	Raptor	test1	Max lufttemperatur
2011-02-02 14:18:28	Raptor	test1	Max lufttemperatur
2011-02-11 16:00:48	Raptor		Raptor started
2011-02-16 12:31:14	Raptor		Raptor started
2011-02-17 14:35:16	Raptor		Raptor shut down normally
2011-02-17 14:37:13	Raptor		Raptor started
2011-02-17 14:37:53	Raptor		Raptor shut down normally
2011-02-17 14:38:36	Raptor		Raptor started
2011-02-17 14:38:51	Raptor		Raptor started
2011-02-17 14:38:55	Raptor		Raptor shut down normally
2011-02-17 14:38:57	Raptor		Raptor started
2011-02-17 14:39:01	Raptor		Raptor shut down normally
2011-02-17 14:39:04	Raptor		Raptor started
2011-03-07 13:45:36	Raptor	test1	Max framledningstemp primär
2011-03-07 13:45:37	Raptor	test1	Max lufttemperatur
2011-03-07 13:46:40	Raptor	test1	Max framledning...rimär upphört
2011-03-07 13:46:40	Raptor	test1	Max lufttemperatur upphört
2011-03-07 13:47:41	Raptor	test1	Max framledningstemp primär
2011-03-07 13:47:41	Raptor	test1	Max lufttemperatur
2011-03-07 13:48:45	Raptor	test1	Max framledning...rimär upphört
2011-03-07 13:48:45	Raptor	test1	Max lufttemperatur upphört
2011-03-17 07:42:55	Raptor	test1	Max lufttemperatur upphört
2011-04-26 08:51:40	Raptor		Raptor started

For irregular events (e.g., alarms, mechanical actions), Raptor uses an event log. Events are monitored via user-defined watchers, which continuously check specific data points. When criteria are met (e.g., threshold exceeded, state change), the event is logged with a timestamp and message.

## Graphing Tool



Raptor's graphing module is essential for monitoring and troubleshooting.

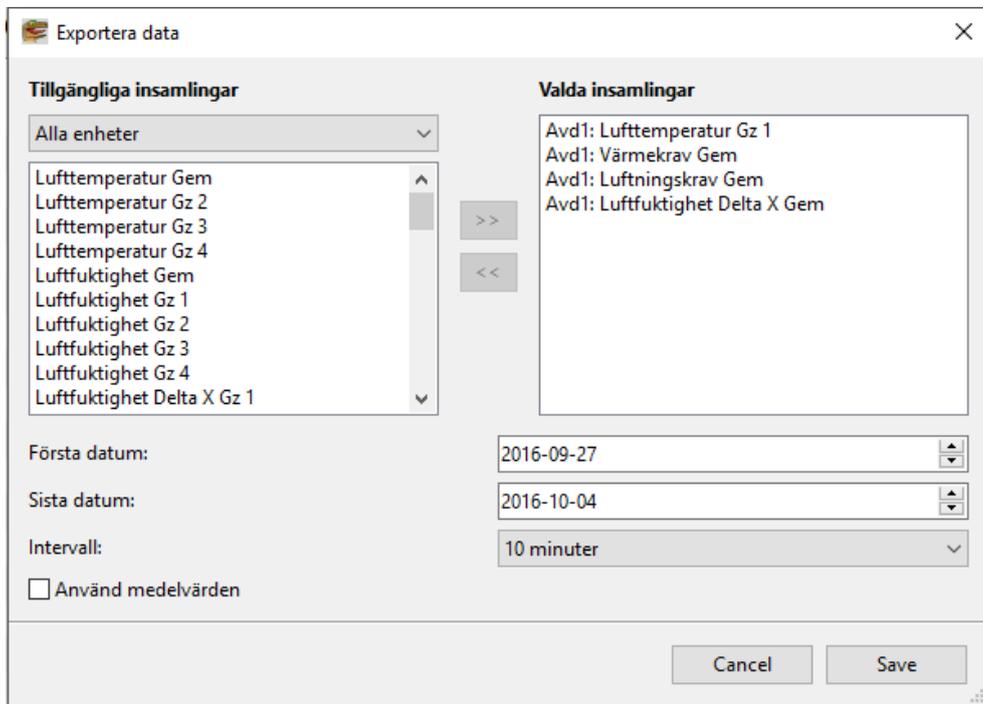
Features include:

- Simultaneous display of multiple graphs
- Zoom and pan on all axes
- Overlay of event log entries on time series plots

This makes Raptor a powerful tool for real-time diagnostics and historical data analysis.

## Data Export

Raptor supports data export to Excel format through a simple dialog interface.



## Report Generator

Raptor includes a built-in report generator capable of processing collected data using standard statistical functions. Reports are based on templates; a selection of general-purpose templates is included.

Dag	Helia: Temp golv	Helia: Temp ögonhöjd	Helia: Temp näst	Helia: Temp överst	Ej aktiv	Ej aktiv
1	19,1 °C	19,6 °C	20,1 °C	21,0 °C		
2	19,8 °C	20,1 °C	20,5 °C	21,3 °C		
3	19,5 °C	19,8 °C	20,2 °C	21,1 °C		
4	19,3 °C	19,7 °C	20,2 °C	21,1 °C		
5	19,8 °C	20,2 °C	20,7 °C	21,5 °C		
6	20,2 °C	20,6 °C	21,0 °C	21,8 °C		
7	19,7 °C	20,0 °C	20,6 °C	21,4 °C		
8	19,4 °C	19,8 °C	20,3 °C	21,1 °C		
9	20,8 °C	21,0 °C	21,4 °C	22,2 °C		
10	21,2 °C	21,5 °C	22,0 °C	23,0 °C		
11	21,6 °C	21,8 °C	22,2 °C	23,9 °C		
12	21,1 °C	21,4 °C	21,8 °C	22,5 °C		
13	21,0 °C	21,3 °C	21,7 °C	22,4 °C		
14	19,9 °C	20,1 °C	20,3 °C	21,3 °C		
15	19,5 °C	19,8 °C	20,3 °C	21,1 °C		
16	20,1 °C	20,3 °C	20,6 °C	21,4 °C		
17	20,0 °C	20,3 °C	20,6 °C	21,4 °C		
18	20,2 °C	20,4 °C	20,7 °C	21,5 °C		
19	20,0 °C	20,2 °C	20,3 °C	21,3 °C		
20	####	####	####	####		
21	####	####	####	####		
22	####	####	####	####		
23	####	####	####	####		
24	20,7 °C	20,9 °C	21,3 °C	22,0 °C		

Custom templates can be:

- Created manually using an HTML-like syntax
  - Developed by CM Teknik upon request
- 

### **Device Communication**

Raptor supports communication with an unlimited number of devices across supported networks:

- Superlink
- DirectNET
- MODBUS

Additionally, Raptor can interface with the Netcomd server, significantly expanding network compatibility.

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### **External Communication**

Boomlink30 includes a built-in MODBUS server via TCP/IP, providing full access to all control parameters from external devices such as PLCs.

Parameters are unencrypted, and data format specifications are available upon request.

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