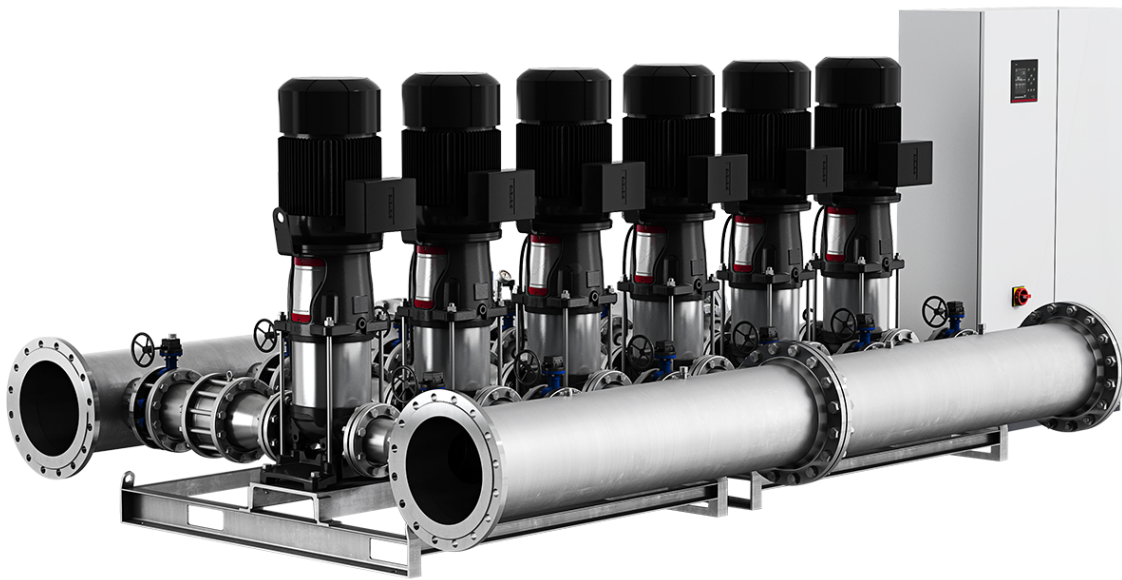


# Control DDD

## Demand Driven Distribution

### Installation and operating instructions



**Control DDD**  
**Installation and operating instructions**  
(all available languages)  
<http://net.grundfos.com/qr/i/93365208>



# Control DDD

English (US)	
Installation and operating instructions . . . . .	4
<b>Limited consumer warranty . . . . .</b>	<b>67</b>
<b>Limited manufacturer's warranty . . . . .</b>	<b>69</b>

## English (US) Installation and operating instructions

## Original installation and operating instructions

## Table of contents

<b>1. General information</b>	<b>4</b>
<b>2. Hazard statements</b>	<b>4</b>
<b>3. Notes</b>	<b>4</b>
<b>4. Product introduction</b>	<b>5</b>
4.1 Product description	5
4.2 Functions	5
4.3 Identification	6
<b>5. Overview of control variants</b>	<b>8</b>
<b>6. Receiving the product</b>	<b>9</b>
6.1 Transporting the product	9
6.2 Lifting the product	9
<b>7. Installation requirements</b>	<b>9</b>
7.1 Location	9
<b>8. Mechanical installation</b>	<b>9</b>
<b>9. Electrical connection</b>	<b>9</b>
9.1 Installing the data loggers or remote sensors	9
<b>10. Starting up the product</b>	<b>9</b>
<b>11. Control functions</b>	<b>10</b>
11.1 Operating panel	10
11.2 Buttons and indicator lights	10
11.3 Menu overview	11
<b>12. Overview of functions</b>	<b>12</b>
12.1 Tree of functions	12
<b>13. Description of functions</b>	<b>16</b>
13.1 Status (1)	16
13.2 Operation (2)	21
13.3 Alarm status (3)	23
13.4 Settings (4)	26
13.5 Data communication	64
<b>14. Measuring parameters</b>	<b>64</b>
14.1 Transmitter types	64
14.2 Parameter list	64
<b>15. Service</b>	<b>64</b>
15.1 Maintaining the product	64
<b>16. Taking the product out of operation</b>	<b>65</b>
<b>17. Fault finding</b>	<b>65</b>
17.1 The system has stopped and cannot restart	65
<b>18. Technical data</b>	<b>65</b>
18.1 Operating conditions	65
18.2 Electrical data	65
<b>19. Further product information</b>	<b>66</b>
<b>20. Disposing of the product</b>	<b>66</b>
<b>21. Document quality feedback</b>	<b>66</b>

## 1. General information



Read this document before you install the product. Installation and operation must comply with local regulations and accepted codes of good practice.

## 2. Hazard statements

The symbols and hazard statements below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.

**DANGER**

Indicates a hazardous situation which, if not avoided, will result in death or serious personal injury.

**WARNING**

Indicates a hazardous situation which, if not avoided, could result in death or serious personal injury.

**CAUTION**

Indicates a hazardous situation which, if not avoided, could result in minor or moderate personal injury.

The hazard statements are structured in the following way:

**SIGNAL WORD****Description of the hazard**

Consequence of ignoring the warning

- Action to avoid the hazard.

## 3. Notes

The symbols and notes below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.



Observe these instructions for explosion-proof products.



A blue or gray circle with a white graphical symbol indicates that an action must be taken.



A red or gray circle with a diagonal bar, possibly with a black graphical symbol, indicates that an action must not be taken or must be stopped.



If these instructions are not observed, it may result in malfunction or damage to the equipment.



Tips and advice that make the work easier.

4. Product introduction

4.1 Product description



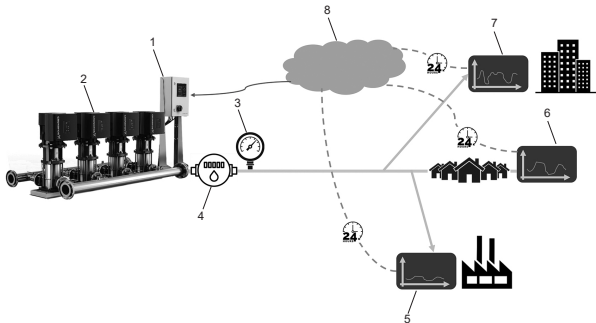
Control DDD

Grundfos Control DDD is used for controlling and monitoring of pressurized systems in water distribution networks. Control DDD consists of a control cabinet with a built-in controller, CU 354. The control cabinet contains all necessary components such as main switch, contactors, I/O modules, communication modules and cabling. In systems with external frequency converters, the frequency converters can be installed in the cabinet if size permits. By default, the control cabinet is for floor mounting.

4.2 Functions

Control DDD is designed for water distribution networks. At the pumping station, the controller controls the pump speed based on the actual flow rate and pressure. To optimize the proportional-pressure curve used by the controller, a number of data loggers or remote sensors (up to ten) are installed at critical points in the distribution network, that is, where stable pressure is required. The data loggers or remote sensors log the pressure every 15 minutes, giving 96 measurements during one day. Every 24 hours the logged data are sent to Grundfos iCloud (GiC). GiC will deliver these data to Control DDD every midnight. The controller automatically adapts its proportional-pressure curve every day, ensuring stable pressure at critical points. When the water demand is low, the controller lowers the outlet pressure at the pumping station to save energy and to reduce leakages and wear of the pipes.

TM058016



TM089937

DDD main components

Pos.	Description
1	Control DDD
2	Booster pumps
3	Primary outlet pressure sensor
4	Flowmeter at pumping station
5	
6	Data logger or remote sensor
7	
8	Grundfos iCloud

4.2.1 Pumps

Control DDD is designed for controlling pumps for water supply.

**!** The main pumps of the system must be of the same type and size.

4.2.2 Control variant

Control DDD is divided into three groups based on control variant:

Control variant	Description
-E	Two to six Grundfos pumps with integrated frequency converter (0.5 - 30 HP).
-EC	Two to six pumps connected to a Grundfos CUE frequency converter - one per pump.
-EF	Two to six pumps connected to VFD frequency converters - one per pump.

Related information

[5. Overview of control variants](#)

4.2.3 Data logger or remote sensor

The data logger or remote sensor logs the pressure in the water distribution network at the end-user or critical point. It logs the pressure every 15 minutes, giving 96 measurements during one day. Every 24 hours the logged data are sent to Grundfos iCloud (GiC). GiC will deliver these data to Control DDD every midnight. The data are combined with the data from other data loggers or remote sensors to form a model of the distribution network. See also the installation and operating instructions of the Wavelet 4R data logger.



Wavelet 4R data logger

4.3 Identification

4.3.1 Nameplate

The nameplate is fitted on the control cabinet.




Nameplate

Pos.	Description
1	Company logo
2	Company address
3	Type designation
4	Product number - Serial number
5	Model
6	Supply voltage
7	Maximum operating pressure [psi]
8	Liquid temperature [°F]
9	Panel part number
10	Net weight [lb]
11	Country of origin
12	Production code (year and week)
13	Nominal flow rate and maximum flow rate [gpm]
14	Nominal head and maximum head [ft]
15	Marks of approval
16	QR code

### 4.3.2 Software label

The software label is placed on the back of CU 354 and gives an overview of the GSC file numbers.

GSC area name	Number	
1. Basic DDD	①	
2. Primary sensor	②	
3. a IO 351(41)	③	
3. b IO 351 (41 + 42)	④	
4. Redundant sensor	⑤	
5. Pumps	⑥	
6. Service information	⑦	
CONFIGURATION STEPS - PLEASE FOLLOW THE NUMBERS		99038450

TM066734

#### Software label

Pos.	Description
1	Basic DDD - GSC file
2	Primary sensor - GSC file
3a	IO 351 (41) - GSC file
3b	IO 351 (41 + 42) - GSC file
4	Redundant sensor - GSC file
5	Pump data - GSC file
6	Service information - GSC file



A GSC (Grundfos Standard Configuration) file is a configuration data file.

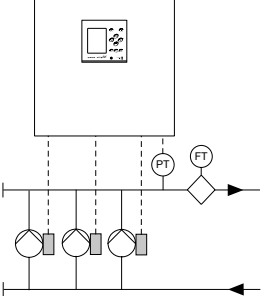
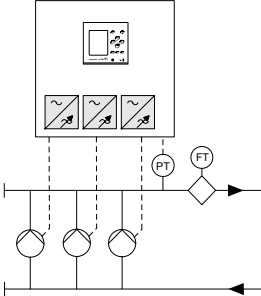
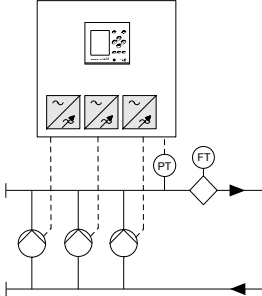
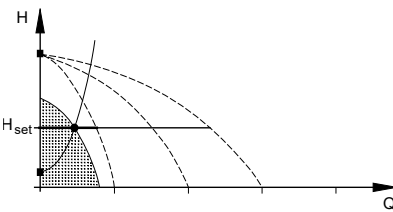
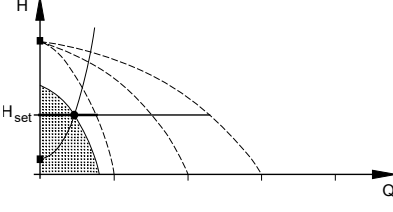
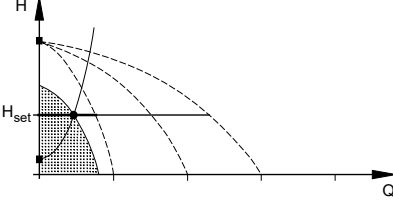
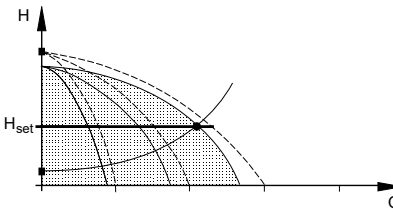
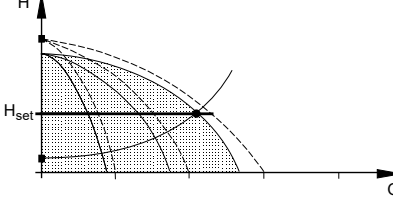
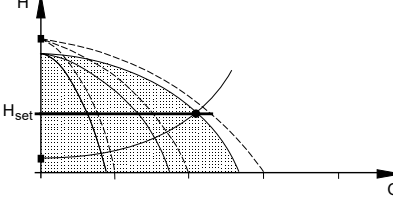
### 4.3.3 Type key

**Example: Control DDD-E 3×15.0-25.0 A U1**

Code	Explanation
Control	Product type
DDD	Control range
E	Control variants
	E: Pumps with integrated frequency converter
	EC: Pumps connected to a Grundfos CUE frequency converter - one per pump
	EF: Pumps connected to other frequency converters - one per pump
3×	Number of pumps
15.0-25.0 A	Current range of pumps
U1	Mains
	U1: 3 × 400 V, 60 Hz, PE
	U2: 3 × 400 V, 60 Hz, N, PE

## 5. Overview of control variants

The examples below are based on the possible speed-controlled systems.

Systems with speed-controlled pumps	Systems with pumps connected to frequency converters	
Control DDD-E	Control DDD-EC	Control DDD-EF
E: Control DDD with three E-pumps.	EC: Control DDD with three pumps, each connected to a Grundfos CUE frequency converter.	EF: Control DDD with three pumps, each connected to a frequency converter.
		
TM0057998	TM0057997	TM0057997
System overview, E-pumps	System overview, frequency converters	System overview, frequency converters
		
TM007995	TM007995	TM007995
One E-pump in operation	One pump connected to a frequency converter in operation	One pump connected to a frequency converter in operation
		
TM007996	TM007996	TM007996
Three E-pumps in operation	Three pumps connected to frequency converters in operation	Three pumps connected to frequency converters in operation
<ul style="list-style-type: none"> <li>Control DDD-E maintains the pressure at critical points in the system through continuous adjustment of the speed of the pumps.</li> <li>The system performance is adjusted to the demand through cutting in/out the required number of pumps and through parallel control of the pumps in operation.</li> <li>Pump changeover is automatic and depends on load, operating hours and fault.</li> <li>All pumps in operation run at the same speed.</li> <li>The number of pumps in operation also depends on the energy consumption of the pumps. If only one pump is required, two pumps will be running at a lower speed if this results in a lower energy consumption. This requires that the differential pressure of the pump is measured and pump curve data are available for the controller.</li> </ul>	<ul style="list-style-type: none"> <li>Control DDD-EC maintains the pressure at critical points in the system through continuous adjustment of the speed of the pumps.</li> <li>The system performance is adjusted to the demand through cutting in/out the required number of pumps and through parallel control of the pumps in operation.</li> <li>Pump changeover is automatic and depends on load, operating hours and fault.</li> <li>All pumps in operation run at the same speed.</li> <li>The number of pumps in operation also depends on the energy consumption of the pumps. If only one pump is required, two pumps will be running at a lower speed if this results in a lower energy consumption. This requires that the differential pressure of the pump is measured and pump curve data are available for the controller.</li> </ul>	<ul style="list-style-type: none"> <li>Control DDD-EF maintains the pressure at critical points in the system through continuous adjustment of the speed of the pumps.</li> <li>The system performance is adjusted to the demand through cutting in/out the required number of pumps and through parallel control of the pumps in operation.</li> <li>Pump changeover is automatic and depends on load, operating hours and fault.</li> <li>All pumps in operation run at the same speed.</li> <li>The number of pumps in operation also depends on the energy consumption of the pumps. If only one pump is required, two pumps will be running at a lower speed if this results in a lower energy consumption. This requires that the differential pressure of the pump is measured and pump curve data are available for the controller.</li> </ul>



## Related information

### 4.2.2 Control variant

## 6. Receiving the product

### 6.1 Transporting the product

Depending on size, the control cabinet is supplied in an open wooden box or wooden/cardboard box designed for transport by forklift truck or a similar vehicle.

### 6.2 Lifting the product

The control cabinet is equipped with eyebolts.

The lifting point must always be above the center of gravity of the control cabinet.



Correct lifting of the control cabinet

Use suitable lifting equipment that is in good condition and approved for the weight. The weight is stated on the packaging label of the control cabinet.



Do not use chains for lifting the control cabinet, as this may damage the control cabinet.

## 7. Installation requirements

Before installing the product, check the following:

- The system corresponds to the order.
- All visible parts are intact.

### 7.1 Location

Install Control DDD in a well-ventilated room to ensure sufficient cooling of the control cabinet.

DDD is only designed for indoor installation.



Do not expose the product to direct sunlight.

## 8. Mechanical installation

Install the pumps according to the installation and operating instructions supplied with the pumps.

## 9. Electrical connection

### WARNING



#### Electric shock

Death or serious personal injury

- The electrical installation must be carried out by an authorized person in accordance with local regulations and the relevant wiring diagram.
- The electrical installation of the system must comply with enclosure class UL type 3R.
- Make sure that the system is suitable for the power supply to which it is connected.
- Make sure that the wire cross-section corresponds to the specifications in the wiring diagram.

### 9.1 Installing the data loggers or remote sensors

Install the data loggers or remote sensors according to the installation and operating instructions supplied with the product.



The data logger comes with a pre-installed SIM card.

## Related information

### 13.4.41 Remote sensors (4.3.25)

## 10. Starting up the product

1. Switch on the power supply.
2. Wait for the first display to appear.
3. The first time CU 354 is switched on, a startup wizard guides you through the basic settings.
4. Follow the instructions in each display.
5. When the wizard is complete, check that all pumps are set to **Auto** in the **Status** menu.
6. Set the flow measurement on one of the analog inputs.
7. Set the data to be received via fieldbus, and enter the number of data loggers or remote sensors.
8. Enable each data logger or remote sensor, and set a target pressure for the individual critical points.
9. The system is now ready for operation.

Note that Grundfos can supply hydraulic data for CR, CRI, CRE and CRIE pumps where GSC files can be downloaded to CU 354. Enter power data manually.

All other pump types require manual entering of both hydraulic and electrical pump data.

## Related information

### 13.4.28 Analog inputs (4.3.8)

### 13.4.36 Pump curve data (4.3.19)

### 13.4.41 Remote sensors (4.3.25)

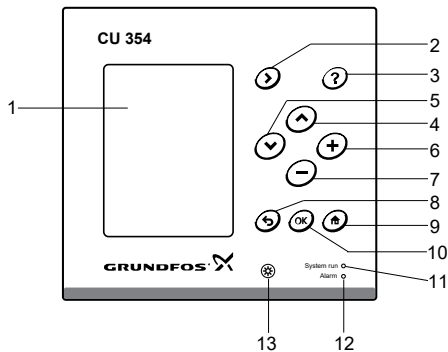
### 13.4.42 Remote sensors 1-10 (4.3.25.1)

TM057988

## 11. Control functions

### 11.1 Operating panel

The control panel in the front cover of the controller features a display, a number of buttons and two indicator lights. The control panel enables manual setting and monitoring of the performance of the system.



TM084469

CU 354 control panel

Pos.	Description
1	Display
2	Arrow to the right
3	Help
4	Up
5	Down
6	Plus
7	Minus
8	Back
9	Home
10	OK
11	Indicator light, operation (green)
12	Indicator light, fault (red)
13	Display brightness

#### Related information

[11.2 Buttons and indicator lights](#)

### 11.2 Buttons and indicator lights

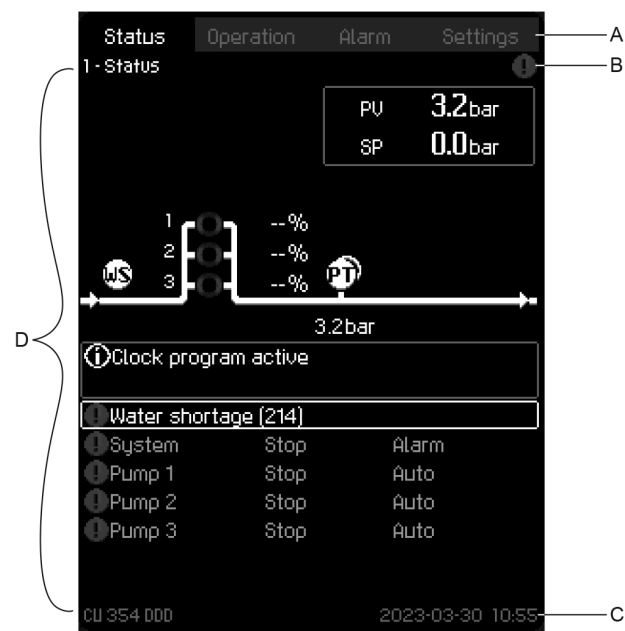
The buttons on the CU 354 operating panel are active when they are lit.

Arrow to the right (2)	Press [Right] to go to the next menu in the menu structure. If you press [Right] when the menu <b>Settings</b> is highlighted, you will go to the menu <b>Status</b> .
Help (3)	When [?] is lit, a help text applying to the display will appear if you press the button. Close the text by pressing [Back].
Up and down (4 and 5)	Move up and down in lists with the [Down] and [Up] buttons. You can select a text with [OK] when it is in a box. If a text is marked and you press [Up], the text above will be marked. If you press [Down], the text below will be marked. If you press [Down] in the last line in the list, the first line will be marked. If you press [Up] in the first line in the list, the last line will be marked.
Plus and minus (6 and 7)	Increase and reduce a value with [+] and [-]. Save with [OK].
Back (8)	Press [Back] to go one display back in the menu. If you have changed a value and press [Back], the new value will not be saved. If you press [OK] before pressing [Back], the new value will be saved.
Home (9)	Press [Home] to return to the menu <b>Status</b> .
OK (10)	Use the button as an enter button. The button is also used to start the setting of a value. If you have changed a value, you must press [OK] to save the change.
Indicator lights (11 and 12)	The operating panel incorporates a green and red indicator light. The green indicator light will be on when the system is in operation and flash when the system has been set to stop. The red indicator light will be on if there is an alarm or a warning. The fault can be identified from the alarm list.
Brightness (13)	You can change the brightness in the display with this button: 1. Press [Brightness]. 2. Adjust the brightness with [+] and [-].
Back light	If no button is touched for 15 minutes, the back light of the display is dimmed, and the first display in the <b>Status</b> menu appears. Press any button to re-activate the back light.

#### Related information

[11.1 Operating panel](#)

### 11.3 Menu overview



Display

Pos.	Description
A	Menu line
B	Top line
C	Bottom line
D	Graphical illustration

#### Menu line (A)

The display has four main menus:

<b>Status</b>	Indication of system status
<b>Operation</b>	Change of operating parameters such as setpoint
<b>Alarm</b>	Alarm log for fault finding
<b>Settings</b>	Change of settings

#### Top line (B)

The top line shows the following:

- the display number and title (left side)
- the selected menu (left side)
- the alarm symbol in case of alarm (right side)
- the warning symbol in case of warning (right side)
- the settings symbol if the service language has been selected (right side).

#### Bottom line (C)

The bottom line shows the controller type, date and time.

#### Graphical illustration (D)

The graphical illustration may show a status, an indication or other elements, depending on the position in the menu structure.

The illustration may show the entire system or part of it as well as various settings.

#### Scroll bar

If the list of illustration elements exceeds the display, the symbols [Up] and [Down] appear in the scroll bar to the right. Move up and down in lists with these buttons.

## 12. Overview of functions

### 12.1 Tree of functions

The functions depend on system configuration.

#### Menu overview

---

##### Status

This menu shows alarms, status of the system and a graph of logged data.

Note: No settings can be made in this menu.

---

##### Operation

In this menu, you can set the basic parameters, such as setpoint, operating mode, control mode and individual pump control.

---

##### Alarm

This menu gives an overview of alarms and warnings.

You can reset alarms and warnings in this menu.

---

##### Settings

In this menu, you can set various functions:

- **Primary controller**  
PI controller, Alternative setpoints, External setpoint influence, Primary sensor, Clock program, Proportional pressure, Setpoint ramp, Tank filling.
  - **Pump cascade control**  
Min. time between start/stop, Max. number of starts/hour, Standby pumps, Forced pump changeover, Pump test run, Pump stop attempt, Pump start and stop speed, Compensation for pump startup time.
  - **Secondary functions**  
Stop function, Pilot pump <sup>1)</sup>, Soft pressure build-up, Emergency run, Digital inputs, Analog inputs, Digital outputs, Analog outputs <sup>2)</sup>, Pilot pump curve data <sup>1)</sup>, Pump curve data, Control source, Fixed inlet pressure, Flow estimation, Reduced operation, Remote sensors, User-defined duty, Tank filling parameters, Measurement supervision.
  - **Monitoring functions**  
Dry-running protection, Min. pressure, Max. pressure, External fault, Limit 1 exceeded, Limit 2 exceeded, Pumps outside duty range, Log values, Fault, primary sensor, Night flow monitoring.
  - **Functions, CU 354**  
Display language, Units, Date and time, Password, Ethernet, GENIbus number, Software status.
- 

<sup>1)</sup> If pilot pump is enabled.

<sup>2)</sup> If IO 351 is installed.

## Function tree

<i>Status (1)</i>	
	<i>Actual alarms (3.1)</i>
	<i>System (1.2)</i>
	<i>Operating mode (1.2.1)</i>
	<i>Setpoint (1.2.2)</i>
	<i>Setpoint influence (1.2.3)</i>
	<i>Measured values (1.2.4)</i>
	<i>Analog inputs (1.2.5)</i>
	<i>Log graph (1.2.6)</i>
	<i>Battery status (1.2.7)</i>
	<i>Status of remote sensors (1.2.8)</i>
	<i>Pump 1-6 (1.3 - 1.10)</i>
<i>Operation (2)</i>	
	<b>Further settings (2.1)</b>
	<i>System operating mode (2.1.1)</i>
	<i>Alternative setpoints (2.1.3)</i>
	<i>Individual pump control (2.1.4)</i>
	<i>Pump 1-6 (2.1.4.1 - 2.1.4.6)</i>
<i>Alarm status (3)</i>	
	<i>Actual alarms (3.1)</i>
	<i>Alarm log (3.2)</i>
	<i>Service contact information (3.3)</i>
<i>Settings (4)</i>	
	<i>Primary controller (4.1)</i>
	<i>PI controller (4.1.1)</i>
	<i>Alternative setpoints (4.1.2)</i>
	<i>Alternative setpoints 2-7 (4.1.2.1 - 4.1.2.7)</i>
	<i>External setpoint influence (4.1.3)</i>
	<b>Input value to be influenced by (4.1.3.1)</b>
	<i>Setting of influence function (4.1.3.2)</i>
	<i>Primary sensor (4.1.4)</i>
	<i>Clock program (4.1.6)</i>
	<b>Event 1-10 (4.1.6.1)</b>
	<i>Proportional pressure (4.1.7)</i>
	<i>Setpoint ramp (4.1.9)</i>
	<i>Tank filling (4.1.10)</i>
	<i>Pump cascade control (4.2)</i>
	<i>Min. time and max. number of starts (4.2.1)</i>
	<i>Standby pumps (4.2.3)</i>
	<i>Forced pump changeover (4.2.4)</i>
	<i>Pump test run (4.2.5)</i>
	<i>Pump stop attempt (4.2.7)</i>
	<i>Pump start and stop speed (4.2.8)</i>
	<i>Compensation for pump startup time (4.2.10)</i>
	<i>Secondary functions (4.3)</i>
	<i>Stop function (4.3.1)</i>
	<i>Pilot pump (4.3.2)</i>
	<i>Soft pressure build-up (4.3.3)</i>
	<i>Emergency run (4.3.5)</i>

<i>Digital inputs (4.3.7)</i>	
	<i>Functions of digital inputs (4.3.7.1)</i> <ul style="list-style-type: none"> <li>• <b>Function, DI1 (CU 354)</b> - DI3, [10, 12, 14]</li> <li>• <b>Function, DI1 (IO 351-41)</b> - DI9, [10-46]</li> <li>• <b>Function, DI1 (IO 351-42)</b> - DI9, [10-46]</li> </ul>
<i>Analog inputs (4.3.8)</i>	
	<i>Analog inputs (4.3.8.1 - 4.3.8.7)</i> <ul style="list-style-type: none"> <li>• <b>Setting, AI1 (CU 354), [51]</b> - AI3, [51, 54, 57]</li> <li>• <b>Setting, AI1 (IO 351-41), [57]</b> - AI2 [57, 60]</li> <li>• <b>Setting, AI1 (IO 351-42), [57]</b> - AI2 [57, 60]</li> <li>• <i>Analog inputs and measured value (4.3.8.1.1 - 4.3.8.7.1)</i> <ul style="list-style-type: none"> <li>- <b>Function, AI1 (CU 354)</b> - AI3 [51, 54, 57]</li> <li>- <b>Function, AI1 (IO 351-41)</b> - AI2 [57, 60]</li> <li>- <b>Function, AI1 (IO 351-42)</b> - AI2 [57, 60]</li> </ul> </li> </ul>
<i>Digital outputs (4.3.9)</i>	
	<i>Function of digital outputs (4.3.9.1 - 4.3.9.16)</i> <ul style="list-style-type: none"> <li>• <b>DO1 (CU 354), [71] is signalling</b> - DO2 [71, 74]</li> <li>• <b>DO1 (IO 351-41), [77] is signalling</b> - DO7 [77-88]</li> <li>• <b>DO1 (IO 351-42), [77] is signalling</b> - DO7 [77-88]</li> </ul>
<i>Analog outputs (4.3.10)</i>	
	<i>Output signal (4.3.10.1 - 4.3.10.3)</i> <ul style="list-style-type: none"> <li>• <b>AO1 (IO 351-41) [18]</b> - AO3 [18, 22, 26]</li> <li>• <b>AO1 (IO 351-42) [18]</b> - AO3 [18, 22, 26]</li> </ul>
<i>Pilot pump curve data (4.3.18)</i>	
<i>Pump curve data (4.3.19)</i>	
<i>Control source (4.3.20)</i>	
<i>Fixed inlet pressure (4.3.22)</i>	
<i>Flow estimation (4.3.23)</i>	
<i>Reduced operation (4.3.24)</i>	
<i>Remote sensors (4.3.25)</i>	
	<i>Remote sensors 1-10 (4.3.25.1)</i>
<i>User-defined duty (4.3.26)</i>	
<i>Tank filling parameters (4.3.27)</i>	
<i>Measurement supervision (4.3.28)</i>	
	<i>Supervision 1 to Supervision 6 (4.3.28.1 - 6)</i>
<i>Monitoring functions (4.4)</i>	
<i>Dry-running protection (4.4.1)</i>	
	<i>Pressure/level switch (4.4.1.1)</i>
	<i>Measurement, inlet pressure (4.4.1.2)</i>
	<i>Measurement, tank level (4.4.1.3)</i>

<i>Min. pressure (4.4.2)</i>	
<i>Max. pressure (4.4.3)</i>	
<i>External fault (4.4.4)</i>	
<i>Limit 1 exceeded, Limit 2 exceeded (4.4.5 - 4.4.6)</i>	
	<b>Input value to be monitored (4.4.5.1)</b>
	<b>Input value to be monitored (4.4.6.1)</b>
	<b>Delays, limit 1 exceeded (4.4.5.2)</b>
	<b>Delays, limit 2 exceeded (4.4.6.2)</b>
	<b>Warning, limit 1 exceeded (4.4.5.3)</b>
	<b>Warning, limit 2 exceeded (4.4.6.3)</b>
	<b>Alarm, limit 1 exceeded (4.4.5.4)</b>
	<b>Alarm, limit 2 exceeded (4.4.6.4)</b>
<i>Pumps outside duty range (4.4.7)</i>	
<i>Log values (4.4.9)</i>	
<i>Fault, primary sensor (4.4.10)</i>	
<i>Night flow monitoring (4.4.11)</i>	
<i>Functions, CU 354 (4.5)</i>	
	<b>Change language to the service language (English)</b>
	<b>Run wizard again</b>
	<i>Display language (4.5.1)</i>
	<i>Units (4.5.2)</i>
	<b>Pressure (4.5.2.1)</b>
	<b>Differential pressure (4.5.2.2)</b>
	<b>Head (4.5.2.3)</b>
	<b>Level (4.5.2.4)</b>
	<b>Flow rate (4.5.2.5)</b>
	<b>Volume (4.5.2.6)</b>
	<b>Specific energy (4.5.2.7)</b>
	<b>Temperature (4.5.2.8)</b>
	<b>Power (4.5.2.9)</b>
	<b>Energy (4.5.2.10)</b>
	<b>Differential temperature (4.5.2.11)</b>
<i>Date and time (4.5.3)</i>	
<i>Password (4.5.4)</i>	
<i>Ethernet (4.5.5)</i>	
<i>GENIbus number (4.5.6)</i>	
<i>Software status (4.5.9)</i>	

### 13. Description of functions

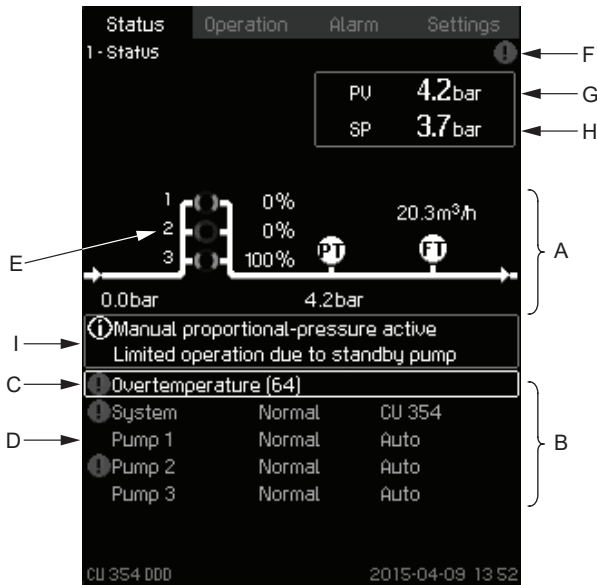
The description of functions is based on the four main menus of CU 354:

- **Status**
- **Operation**
- **Alarm**
- **Settings**.

The functions apply to all control variants unless otherwise stated.

#### 13.1 Status (1)

This display is shown when the power is switched on, and it appears if the buttons of the operating panel remain untouched for 15 minutes.



#### Status

##### Description

No settings can be made in this menu.

The actual value (process value, **PV**) of the control parameter, usually the **Discharge pressure**, is shown in the upper right corner (G) together with the selected setpoint (**SP**) (H).

The upper half of the display (A) shows a graphic illustration of the pump system. The selected measuring parameters are shown with sensor symbol and actual value.

In the middle of the display, an information field (I) will be shown if any of the following events occurs:

- **Limited operation due to standby pump**
- **Manual proportional-pressure active** (during manual operation)
- **External setpoint influence active**
- **Alternative setpoint active**
- **Low flow boost active**
- **Clock program active**
- **Remote-controlled via Ethernet**
- **Remote-controlled via GENI (RS-485 / TTL)**
- **Limited due to reduced operation**
- **Stopped due to low flow.**

The lower display half (B) shows the following:

- the most recent active alarm, if any, and the fault cause with the fault code in brackets
- system status with current operating mode and control source
- pump status with current operating mode.



If a fault has occurred, a warning or alarm symbol will be shown in line (C) together with the cause and fault code, for instance, "Overtemperature (64)".

If the fault is related to one of the pumps, a warning or alarm symbol will also be shown in front of the status line (D) of the pump in question. At the same time, the pump status indicator (E) will change color to either yellow or red as described in the table below. The warning or alarm symbol will be shown to the right in the top line of the display (F). As long as a fault is present, this symbol is shown in the top line of all displays.

To open a menu line, select the line with [Down] or [Up] and press [OK].

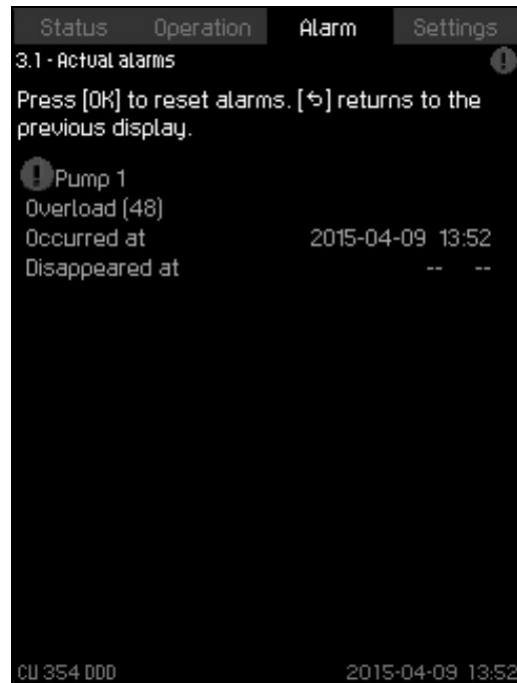
The display makes it possible to open status displays showing the following:

- current alarms
- system status
- status of each pump.

#### Description of pump status indicator (E)

Pump status indicator	Description
Rotating, green	Pump running.
Permanently green	Pump ready (not running).
Rotating, yellow	Warning. Pump running.
Permanently yellow	Warning. Pump ready (not running).
Permanently red	Alarm. Pump stopped.

#### 13.1.1 Actual alarms (3.1)



#### Actual alarms

##### Description

The display shows active un-reset alarms and warnings.

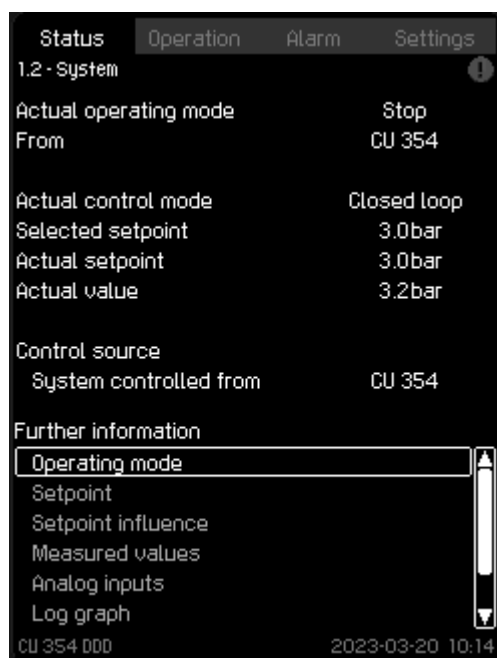
##### Related information

[13.3.1 Actual alarms \(3.1\)](#)

[13.3.2 Alarm log \(3.2\)](#)



### 13.1.2 System (1.2)



#### System

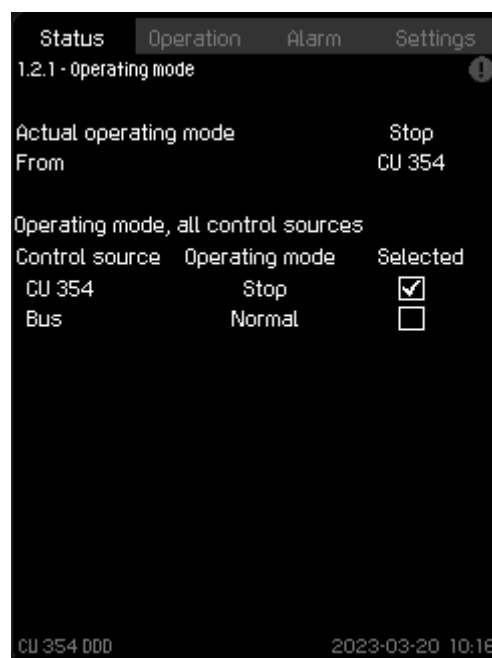
##### Description

The display shows the operational state of the system. Go to the sub-menus to show details.

The display allows you to open the following sub-menus:

- **Operating mode**
- **Setpoint**
- **Setpoint influence**
- **Measured values**
- **Analog inputs**
- **Log graph**
- **Battery status**
- **Status of remote sensors.**

### 13.1.3 Operating mode (1.2.1)



#### Operating mode

##### Description

The display shows the operating mode of the system and from where it is controlled.

The system has four operating modes:

- **Normal**  
The pumps adapt their performance to the requirement.
- **User-defined**  
The pumps run at a constant speed set by the user. It is usually a performance between **Max.** and **Min.**
- **Stop**  
All pumps have been stopped.
- **Emergency run**  
The pumps run according to the setting made in the **Emergency run** (4.3.5) menu.

The performance required in these operating modes can be set in the **Settings** menu.

- **User-defined**
- **Emergency run.**

The current operating mode can be controlled from four different sources that are mentioned below in prioritized order:

- fault
- external signal
- CU 354
- bus.

##### Control source

You can set the system to remote control via an external bus (option). In this case, you must set a setpoint and an operating mode via the bus.

In the **Settings** menu, you can select whether CU 354 or the external bus is to be the control source.

The status of this setting is shown in the **Operating mode** menu.

##### Related information

[13.4.25 Emergency run \(4.3.5\)](#)

[13.4.43 User-defined duty \(4.3.26\)](#)

### 13.1.4 Setpoint (1.2.2)

Status	Operation	Alarm	Settings
1.2.2 - Setpoint			
From	CU 354		
Setpoint	Closed loop	Selected	
No 1	3.0bar	<input checked="" type="checkbox"/>	
No 2	3.3bar	<input type="checkbox"/>	
No 3	3.5bar	<input type="checkbox"/>	
No 4	3.8bar	<input type="checkbox"/>	
No 5	4.0bar	<input type="checkbox"/>	
No 6	4.3bar	<input type="checkbox"/>	
No 7	4.5bar	<input type="checkbox"/>	
CU 354 000 2023-03-20 10:17			

#### Setpoint

#### Description

The display shows the selected setpoint and whether it comes from CU 354 or an external bus.

It also shows all seven possible setpoints from CU 354. At the same time, the selected setpoint is shown.

As it is a status display, no settings can be made.

Setpoints can be changed in the **Operation** or **Settings** menu.

#### Related information

[13.4.3 Alternative setpoints \(4.1.2\)](#)

[13.4.22 Stop function \(4.3.1\)](#)

### 13.1.5 Setpoint influence (1.2.3)

Status	Operation	Alarm	Settings		
1.2.3 - Setpoint influence					
Control mode		Closed loop			
Selected setpoint		3.0bar			
Actual setpoint		3.0bar			
Influenced by					
External setpoint influence		--%			
Low flow boost		0.0bar			
Proportional pressure		--%			
Automatic adaptation		100%			
Tank filling		3.0bar ->	3.0bar		
Measurement supervision		3.0bar ->	3.0bar		
Setpoint ramp		3.0bar ->	3.0bar		
Measurement supervision					
1	2	3	4	5	6
0%	0%	0%	0%	0%	0%
CU 354 000					
2023-03-20 15:37					

#### Setpoint influence

#### Description

The selected setpoint can be influenced by parameters. The parameters are shown as a percentage from 0 to 100 % or as a pressure measured in psi. They can only reduce the setpoint, as the influence in percentage divided with 100 is multiplied with the selected setpoint:

Actual setpoint (SP) = selected setpoint × influence (1) × influence (2) etc.

The display shows the parameters influencing the selected setpoint and the percentage or value of influence.

Some of the possible parameters can be set in the **External setpoint influence** (4.1.3) menu. The parameter **Low flow boost** is set as a start/stop band as a percentage of the setpoint set in the **Stop function** (4.3.1) menu. The parameter is set as a percentage in the **Proportional pressure** (4.1.7) menu.

Finally, the resulting actual setpoint (SP) is shown.

#### Related information

[13.4.5 External setpoint influence \(4.1.3\)](#)

[13.4.9 Proportional pressure \(4.1.7\)](#)

[13.4.22 Stop function \(4.3.1\)](#)

### 13.1.6 Measured values (1.2.4)

Status	Operation	Alarm	Settings
1.2.4 - Measured values			
Actual control parameter (PU)			
Discharge pressure	0.0bar		
Other measured or calculated values			
Discharge pressure	0.0bar		
Power consumption	0.0kW		
Energy consumption	0kWh		
Average night flow	--m³/h		
CU 354 000 2023-03-20 15:40			

#### Measured values

#### Description

The display gives a general status of all measured and calculated parameters. In DDD-E/-EC systems, the specific energy is shown as an average value and actual value (mean value over the last minute). The average value is based on the accumulated flow shown as total volume. The total volume and specific energy average can be reset in this menu.

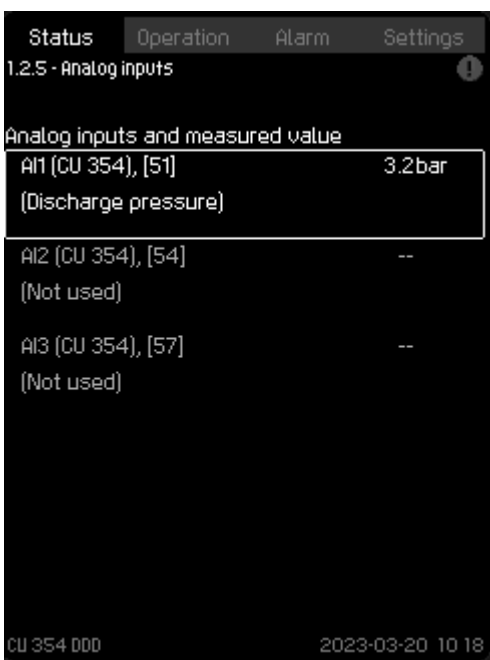
<b>Discharge pressure</b>	Actual value from sensors
<b>Flow rate</b>	
<b>Power consumption</b>	Current consumption for all pumps
<b>Energy consumption</b>	Energy consumed by all pumps since startup (or latest reset)
<b>Specific energy, actual</b>	Current energy used to pump 1 m³ of water

<b>Specific energy, average</b>	Average energy used per m <sup>3</sup> of water since startup (or latest reset)
<b>Total volume</b>	Total volume pumped since startup (or latest reset)
<b>Average night flow</b>	If night flow monitoring is enabled, the display will show the average flow rate of the latest monitoring period.



The lines **Power consumption**, **Energy consumption**, **Specific energy, actual** and **Specific energy, average** are only shown in DDD E/-EC systems.

### 13.1.7 Analog inputs (1.2.5)



#### Analog inputs

##### Description

The display shows an overview of the analog inputs and the measured values of each input.

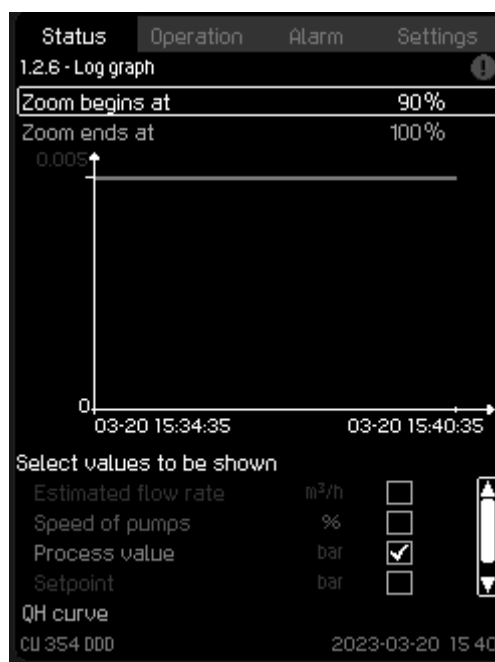
##### Related information

[13.4.28 Analog inputs \(4.3.8\)](#)

[13.4.29 Analog inputs \(4.3.8.1 - 4.3.8.7\)](#)

[13.4.30 Analog inputs and measured value \(4.3.8.1.1 - 4.3.8.7.1\)](#)

### 13.1.8 Log graph (1.2.6)



#### Log graph

##### Description

The display shows logged data stored in the controller.

Select log values in the **Log values** (4.4.9) menu. Various values can be shown, and the time scale can be changed.

##### Setting via operating panel

- **Status > System > Log graph**

1. Set as a percentage:

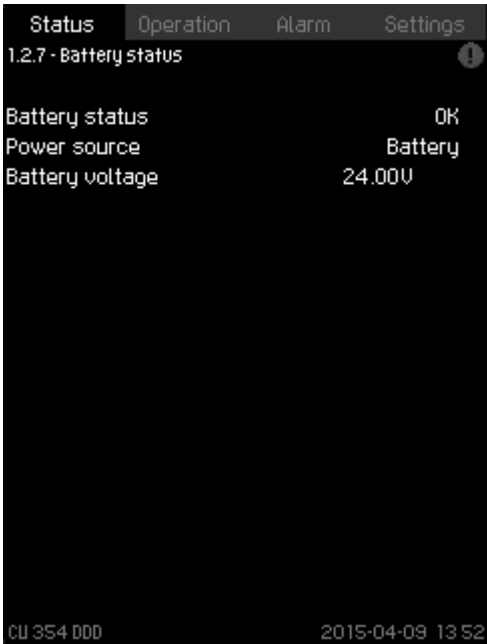
- **Zoom begins at**
- **Zoom ends at**

2. **Select values to be shown**

##### Related information

[13.4.57 Log values \(4.4.9\)](#)

13.1.9 Battery status (1.2.7)



Battery status

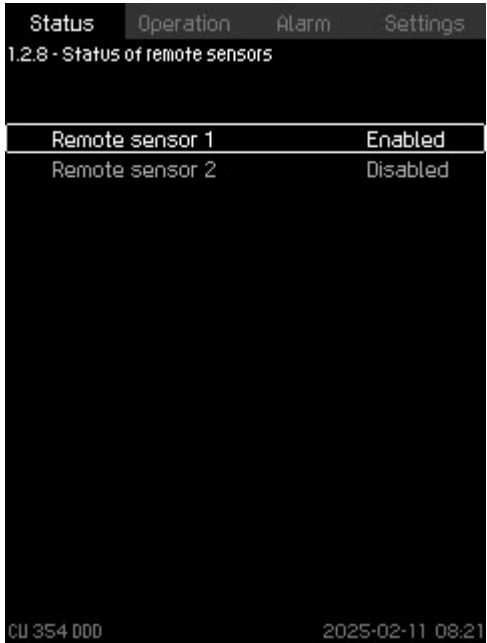
Description

The display shows the status of the backup battery, if installed.



The battery only supplies CU 354 with backup power.

13.1.10 Status of remote sensors (1.2.8)

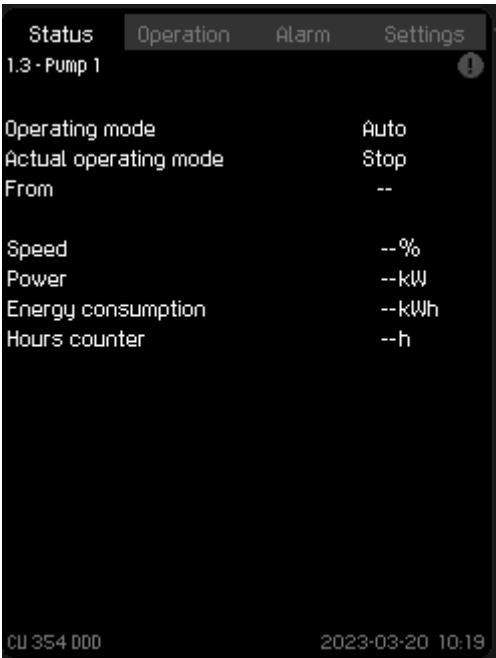


Status of remote sensors

Description

The display shows the number and status of the configured data loggers or remote sensors.

13.1.11 Pump 1-6 (1.3 - 1.10)



Pump 1

Description

The display shows the operational state of the individual pumps. Note that the displays may vary as not all operational states are available for all pump types.

The pumps can have different operating modes:

- **Auto**
  - Together with other pumps in automatic operation, the pump is controlled by CU 354 which ensures that the system delivers the required performance.
- **Manual**
  - The pump is not controlled by CU 354. In manual operation, the pump has one of the following operating modes:
    - **Normal**: The pump runs at a set speed.
    - **Stop**: The pump has been forced to stop.

Besides information about the operating mode, you can read various parameters in the status display, such as:

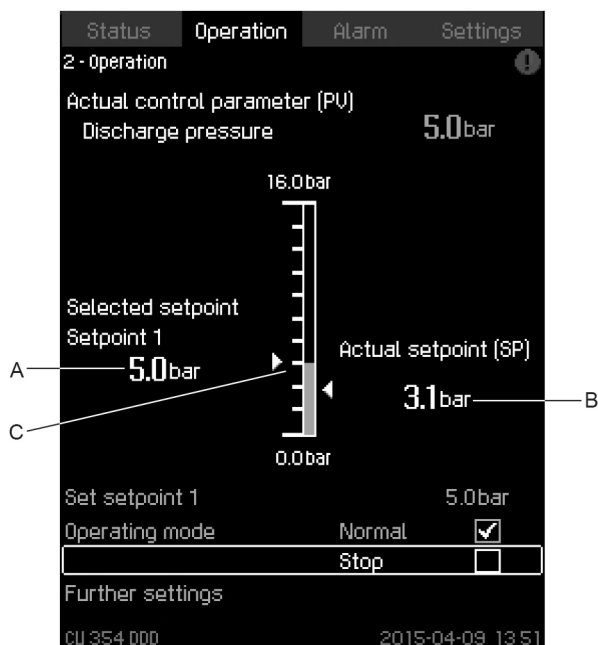
- current operating mode
- control source
- speed
- power (only DDD-E/-EC)
- energy consumption (only DDD-E/-EC)
- operating hours.

Related information

[13.4.36.1 How to read the pump curve data](#)

## 13.2 Operation (2)

In this menu, you can set the basic parameters, such as setpoint, operating mode, control mode and individual pump control.



### Operation

#### Description

The column shows the setting range that corresponds to the range of the primary outlet pressure sensor, here 0-232 psi.

At the left hand of the column, the selected setpoint 1 (A) is shown, that is the value set in the menu.

At the right hand of the column, the actual setpoint (B) is shown, that is the setpoint acting as reference for the PI controller. If no kind of external setpoint influence has been selected, the two values will be identical. The measured value (**Discharge pressure**) is shown as the grey part of the column (C).

Below the display is a menu line for setting of setpoint 1 and selection of operating mode, including the operating modes **Normal** and **Stop**. You can select further settings: system operating mode and individual pump control.

#### Setting range

- Setpoint of the primary outlet pressure sensor.
- Operating mode.

#### Setting via operating panel

##### Setpoint:

- **Operation > Set setpoint 1**

1. Set the value.

##### Operating mode:

- **Operation**

1. Select: **Normal / Stop**.

##### Further settings

- **Operation > Further settings**

1. Select one of the settings below:
  - **System operating mode.**
  - **Alternative setpoints.**
  - **Individual pump control.**

#### Factory setting

The setpoint is set in the startup wizard and depends on the application.

### Related information

[13.2.1 System operating mode \(2.1.1\)](#)

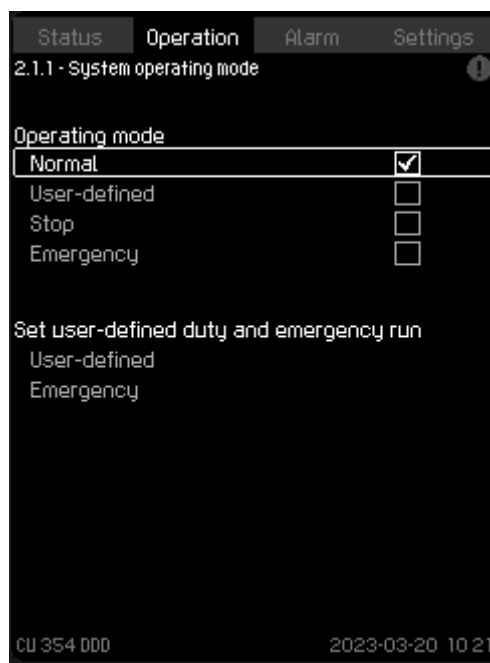
[13.2.2 Alternative setpoints \(2.1.3\)](#)

[13.2.4 Pump 1-6 \(2.1.4.1 - 2.1.4.6\)](#)

[13.4.5 External setpoint influence \(4.1.3\)](#)

[13.4.6 Setting of influence function \(4.1.3.2\)](#)

#### 13.2.1 System operating mode (2.1.1)



### System operating mode

#### Description

The system can be set to four different operating modes. **Normal** is the typical setting.

The performance of these operating modes can be set in this menu:

- **User-defined**
- **Emergency.**

#### Setting range

- **Normal**
- **User-defined**
- **Stop**
- **Emergency.**

#### Setting via operating panel

- **Operation > Further settings > System operating mode > Operating mode**

1. Select the desired line at the bottom of the display to set the performance for **User-defined duty** or **Emergency run**.

#### Factory setting

**Normal.**

### Related information

[13.2 Operation \(2\)](#)

[13.4.25 Emergency run \(4.3.5\)](#)

[13.4.35 Pilot pump curve data \(4.3.18\)](#)

13.2.2 Alternative setpoints (2.1.3)



Alternative setpoints

Description

In addition to the primary setpoint 1 shown in the **Operation** menu, you can set six alternative setpoints for primary control. You can activate one of the alternative setpoints by means of external contacts.

Setting range

The setting range of setpoints for the primary controller depends on the range of the primary sensor.

Setting via operating panel

- **Operation > Further settings > Alternative setpoints**

1. Set the setpoint.

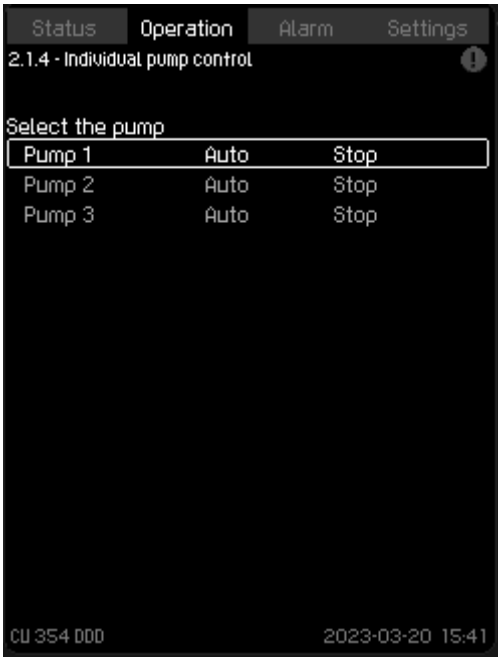
Factory setting

Setpoint 1 is set to 43.5 psi.

Related information

- [13.2 Operation \(2\)](#)
- [13.4.3 Alternative setpoints \(4.1.2\)](#)
- [13.4.4 Alternative setpoints 2-7 \(4.1.2.1 - 4.1.2.7\)](#)
- [13.4.7 Primary sensor \(4.1.4\)](#)
- [13.4.26 Digital inputs \(4.3.7\)](#)

13.2.3 Individual pump control (2.1.4)



Individual pump control

Description

The display shows the status and operating mode of the pumps.



If manual operation is set, the pumps will not be controlled by CU 354.

Auto

The pumps are controlled by the PI controller, ensuring that the system delivers the required performance.

Manual

The pump is not controlled by the PI controller, but set to one of the following manual operating modes:

- **Normal**
  - The pump runs at a set speed.
- **Stop**
  - The pump has been forced to stop.

Pumps in manual operation are not part of the normal pump cascade and speed control. The manually operated pumps are a 'disturbance' to the normal operation of the system.

If one or more pumps are in manual operation, the system may not be able to deliver the set performance.

There are two menus for the function. In the first menu, the pump to be set is selected, and in the next menu, the operating mode is selected.

Setting range

All pumps can be selected.

Setting via operating panel

- **Operation > Further settings > Individual pump control**

### 13.2.4 Pump 1-6 (2.1.4.1 - 2.1.4.6)



**Pump 1-6**

#### Description

The display shows the individual pumps and allows you to set an operating mode.

#### Setting range

You can select **Auto** or **Manual** as well as the operating mode of the pump for manual operation - **Normal** or **Stop**.

#### Setting via operating panel

- **Operation > Further settings > Individual pump control**

1. Select pump.
2. Select: **Auto** or **Manual**.
3. **Manual**: Select operating mode.
  - **Normal**
    - **Setpoint, manual operation**: Set the setpoint.
  - **Stop**

#### Factory setting

**Auto.**

#### Related information

[13.2 Operation \(2\)](#)

### 13.3 Alarm status (3)

This menu gives an overview of alarms and warnings. You can also reset the alarms.



**Alarm status**

#### Description

A fault in the system or one of the components monitored can cause an alarm or a warning. Besides the fault signal via the alarm and warning signal relay and the red indicator light on CU 354, an alarm can also cause a change of operating mode, for instance, from **Normal** to **Stop**. A warning only causes a fault indication.

The table shows the possible causes of fault together with an alarm code, and whether they result in an alarm or a warning. It also shows to what operating mode the system will change in case of alarm, and whether restarting of the system and resetting of the alarm is manual or automatic.

The table also shows that the reaction to some of the fault causes mentioned can be set in the **Settings** menu. See sections **Soft pressure build-up** (4.3.3) and **Monitoring functions** (4.4).

Fault	Warning Alarm	Change of operating mode to	Resetting of alarm, restarting	Set in the menu Settings	Alarm code
Leakage current	-	-	-	-	1
Phase failure	Warning	-	Auto	-	2
External fault	Warning	-	Man/auto	X	3
	Alarm	<b>Stop</b>	Man/auto		
Too many restarts	-	-	-	-	4
Mains supply failure	-	-	-	-	6
Undervoltage, pump	Warning	-	Auto	-	7
Communication fault	Warning	-	Auto	-	10
Other fault	-	-	-	-	16

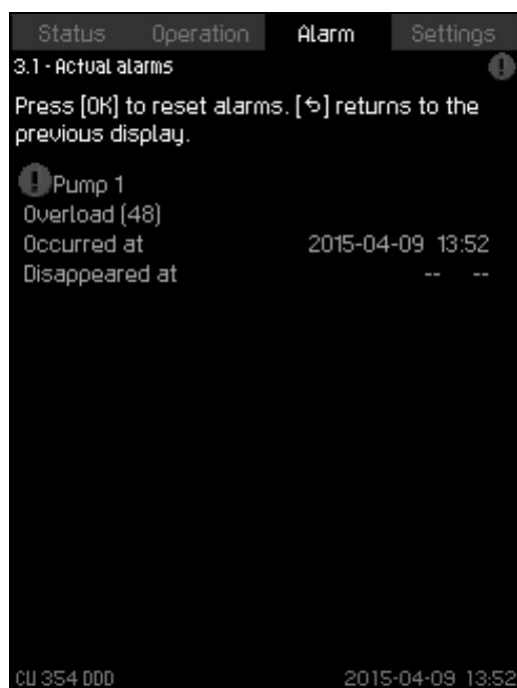
Fault	Warning Alarm	Change of operating mode to	Resetting of alarm, restarting	Set in the menu Settings	Alarm code
Performance required cannot be met	-	-	-	-	17
Battery low	Warning	-	-	-	28
Replace bearings	-	-	-	-	30
Replace varistor(s)	-	-	-	-	31
Overvoltage, pump	Warning	-	Auto	-	32
Undervoltage, pump	Warning	-	Auto	-	40
	Warning	-	Auto	-	42
Overload, pump	Warning	-	Auto	-	48
Overload	Warning	-	Auto	-	49
Overload, pump	Warning	-	Auto	-	50
	Warning	-	Auto	-	51
	Warning	-	Auto	-	54
Overload	Warning	-	Auto	-	55
Underload	Warning	-	-	-	56
Dry running	Warning	-	-	-	57
Low flow rate	Warning	-	-	-	58
Motor temperature too high	Warning	-	Auto	-	64
	Warning	-	Auto	-	65
Overtemperature	Warning	-	-	-	66
Motor temperature too high	Warning	-	Auto	-	67
Overtemperature	Warning	-	-	-	68
Motor temperature too high	Warning	-	Auto	-	70
Internal fault, IO 351	Alarm	<b>Stop</b>	Auto	-	72
Undervoltage, pump	Warning	-	Auto	-	73
Internal supply voltage too high	-	-	-	-	74
Internal supply voltage too low	-	-	-	-	75
Other fault, pump	Warning	-	Auto	-	76
Communication fault	-	-	-	-	77
Internal fault	-	-	-	-	80
Internal fault, IO 351	Alarm	<b>Stop</b>	Auto	-	83
Other fault	-	-	-	-	85
Fault, sensor and remote sensor 1-10	Warning	-	Auto	-	88
Fault, primary sensor	Alarm	<b>Stop</b>	Auto	-	89
Fault, speed sensor	-	-	-	-	90
Temperature sensor fault	-	-	-	-	91
Calibration fault, feedback sensor	-	-	-	-	92
Signal fault, sensor 2	-	-	-	-	93

Fault	Warning Alarm	Change of operating mode to	Resetting of alarm, restarting	Set in the menu Settings	Alarm code
Setpoint signal outside range	-	-	-	-	96
Overload	-	-	-	-	105
	-	-	-	-	106
Undervoltage	-	-	-	-	155
Other fault	Warning	-	-	-	156
Internal fault, CU 354	Warning	-	Auto	-	157
CIM module fault	-	-	-	-	159
SIM card fault	-	-	-	-	160
Signal fault, temperature sensor 2	-	-	-	-	175
Signal fault, temperature sensor 3	-	-	-	-	176
Limit 1 exceeded	Alarm/Warning	-	Man/auto	X	190
Limit 2 exceeded	Alarm/Warning	-	Man/auto	X	191
Alarm, all pumps	Alarm	<b>Stop</b>	Auto	-	203
Dissimilar sensor signals	Warning	-	Auto	-	204
Inconsistency, float switch	-	-	-	-	205
Water shortage	W	-	Man/auto	X	206
Water leakage	-	-	-	-	207
Pumps outside duty range	Warning	-	Man/auto	X	208
Fault, non-return valve	-	-	-	-	209
Pressure high	Alarm	<b>Stop</b>	Man/auto	X	210
Pressure low	Warning	-	Man/auto	X	211
	Alarm	<b>Stop</b>	Man/auto		
Tank precharge outside limits	-	-	-	-	212
VFD not ready	Warning	-	Auto	-	213
Water shortage	Alarm	<b>Stop</b>	Man/auto	X	214
Pressure buildup fault	Alarm/Warning	-	Man/auto	X	215
Fault, pilot pump	-	-	-	-	216
Insufficient pressure reduction	-	-	-	-	219
High flow rate	-	-	Man/auto	X	228
Fault, Ethernet	Warning	-	Auto	-	231
	Warning	-	Auto	-	232
IP address conflict, Ethernet	-	-	-	-	233
Fault, backup pump	-	-	-	-	234
Lubricate bearings	-	-	-	-	240
Other fault	-	-	-	-	242



Fault	Warning Alarm	Change of operating mode to	Resetting of alarm, restarting	Set in the menu Settings	Alarm code
Fault, battery/UPS and battery of remote sensor	Warning	-	Man/auto	-	248
SMS data not received within time limit	Warning	-	Auto	-	253
Model data of pipe system not consistent	Warning	-	-	-	254

### 13.3.1 Actual alarms (3.1)



#### Actual alarms

##### Description

The display shows the following:

- Warnings caused by faults that still exist.
- Warnings caused by faults that have disappeared, but the warning requires manual resetting.
- Alarms caused by faults that still exist.
- Alarms caused by faults that have disappeared, but the alarm requires manual resetting.

All warnings and alarms with automatic resetting are automatically removed from the menu when the fault has disappeared.

Alarms requiring manual resetting can be reset in this display by pressing [OK]. An alarm cannot be reset until the fault has disappeared.

For every warning or alarm, the following is shown:

- Whether it is a warning or an alarm.
- Where the fault occurred: **System, Pump 1, Pump 2, Remote sensor** etc.
- In case of input-related faults, the input will be shown.
- The cause of the fault and the alarm code in brackets, for instance, "Water shortage (214)".
- When the fault occurred: Date and time.
- When the fault disappeared: Date and time. If the fault still exists, date and time will be shown as "--:--:--".

The most recent warning or alarm is shown at the top of the display.

#### Related information

[13.1.1 Actual alarms \(3.1\)](#)

### 13.3.2 Alarm log (3.2)

The alarm log can store up to 24 warnings and alarms.



#### Alarm log

##### Description

The display shows warnings and alarms.

For every warning or alarm, the following is shown:

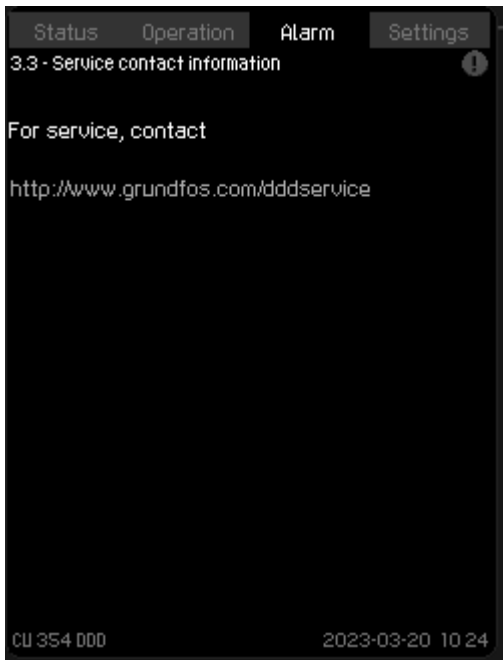
- Whether it is a warning or an alarm.
- Where the fault occurred: **System, Pump 1, Pump 2, Remote sensor** etc.
- In case of input-related faults, the input will be shown.
- The cause of the fault and the alarm code in brackets, for instance, "Water shortage (214)".
- When the fault occurred: Date and time.
- When the fault disappeared: Date and time. If the fault still exists, date and time will be shown as "--:--:--".

The most recent warning or alarm is shown at the top of the display.

#### Related information

[13.1.1 Actual alarms \(3.1\)](#)

13.3.3 Service contact information (3.3)

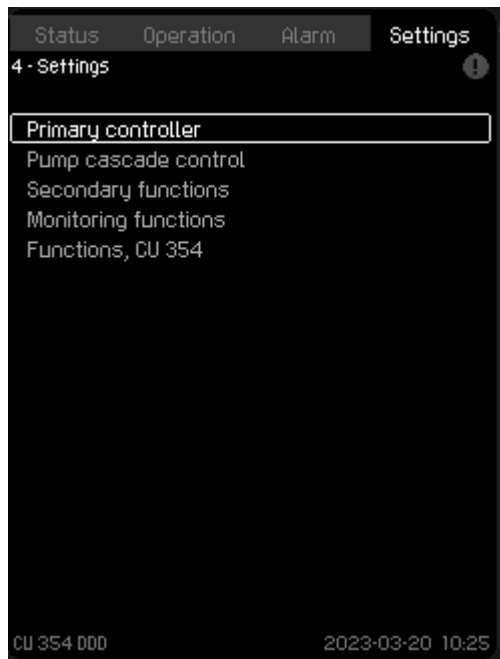


**Service contact information**

**Description**

The display shows the contact information of the installer if entered during commissioning.

13.4 Settings (4)



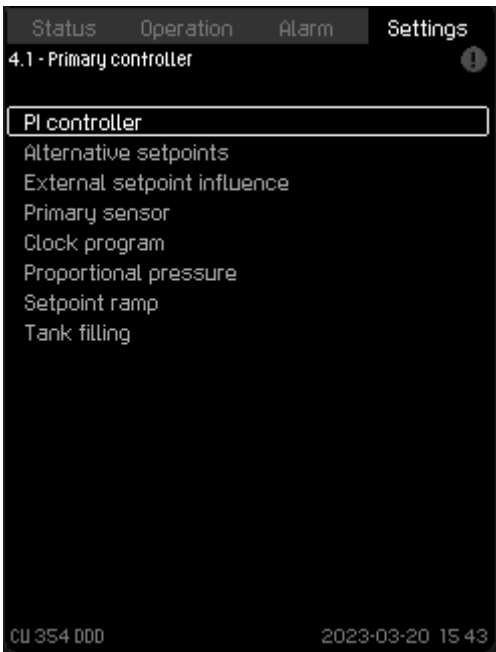
**Settings**

In this menu, you can set the following functions:

- **Primary controller**  
PI controller, Alternative setpoints, External setpoint influence, Primary sensor, Clock program, Proportional pressure, Setpoint ramp.

- **Pump cascade control**  
Min. time between start/stop, Max. number of starts/hour, Standby pumps, Forced pump changeover, Pump test run, Pump stop attempt, Pump start and stop speed, Compensation for pump startup time.
- **Secondary functions**  
Stop function, Pilot pump, Soft pressure build-up, Emergency run, Digital inputs, Analog inputs, Digital outputs, Analog outputs, Pump curve data, Pilot pump curve data, Control source, Fixed inlet pressure, Flow estimation, Reduced operation, Remote sensors, User-defined duty.
- **Monitoring functions**  
Dry-running protection, Min. pressure, Max. pressure, External fault, Limit 1 exceeded, Limit 2 exceeded, Pumps outside duty range, Log values, Fault, primary sensor, Night flow monitoring.
- **Functions, CU 354**  
Display language, Units, Date and time, Password, Ethernet, GENIbus number, Software status.
- The service language, British English, can be selected for service purposes. All these functions are usually set correctly when the system is switched on.

13.4.1 Primary controller (4.1)



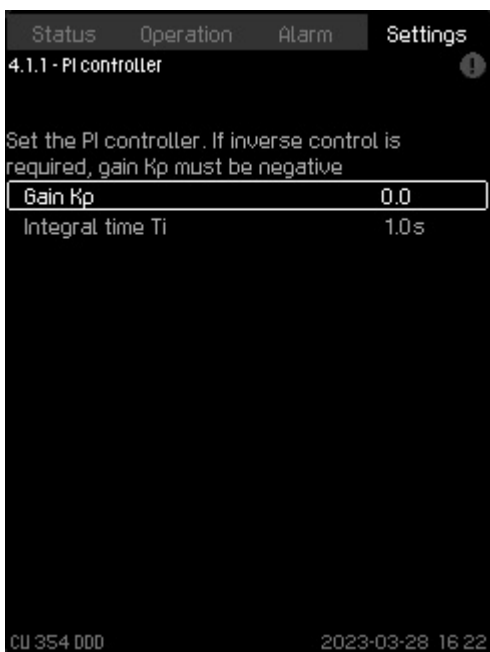
**Primary controller**

**Description**

You can set the functions related to the primary controller. It is only necessary to make settings in this menu if the functionality is to be expanded with one of following functions:

- **PI controller**
- **Alternative setpoints**
- **External setpoint influence**
- **Primary sensor**
- **Clock program**
- **Proportional pressure**
- **Setpoint ramp**
- **Tank filling.**

### 13.4.2 PI controller (4.1.1)



#### PI controller

##### Description

The system includes a standard PI controller which ensures that the pressure is stable and corresponds to the setpoints of the data loggers or remote sensors.

With this function, you can adjust the PI controller if a faster or slower reaction to changes of consumption is required.

To obtain a faster reaction, increase Kp and reduce Ti.

To obtain a slower reaction, decrease Kp and increase Ti.

##### Setting range

- **Gain Kp:** 0-30.
- **Integral time Ti:** 0.1 to 3600 seconds.

##### Setting via operating panel

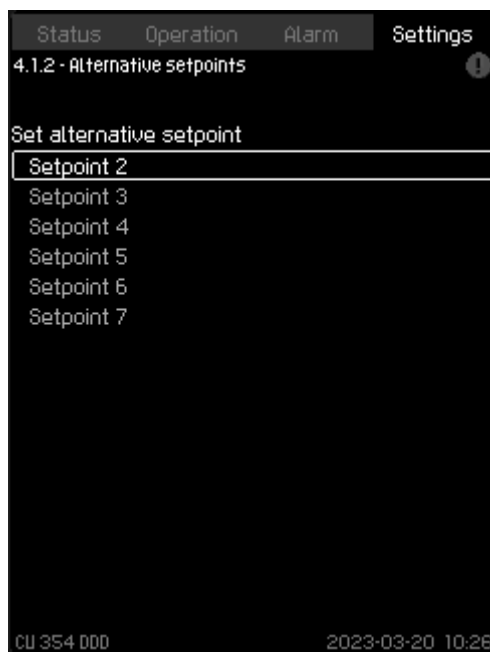
- **Settings > Primary controller > PI controller**

1. Set the gain (Kp) and integral time (Ti).  
Usually it is not necessary to adjust Kp.

##### Factory setting

- Kp: 0.5
- Ti: 1 second.

### 13.4.3 Alternative setpoints (4.1.2)



#### Alternative setpoints

##### Description

With this function, you can select up to six setpoints (2 to 7) as alternatives to the primary setpoint (1). The primary setpoint (1) is set in the **Operation** menu.

Every alternative setpoint can be addressed manually to a separate digital input (DI). When the contact of the input is closed, the alternative setpoint applies.

If more than one alternative setpoint has been selected, and they are activated at the same time, CU 354 will select the setpoint with the lowest number.

##### Setting range

- Six setpoints, No 2 to 7.

##### Factory setting

No alternative setpoints have been selected.

##### Related information

[13.1.4 Setpoint \(1.2.2\)](#)

[13.2.2 Alternative setpoints \(2.1.3\)](#)

### 13.4.4 Alternative setpoints 2-7 (4.1.2.1 - 4.1.2.7)



#### Alternative setpoints 2-7

For each alternative setpoint, select the digital input to activate the setpoint.

#### Setting via operating panel

- **Settings > Primary controller > Alternative setpoints**
- 1. Select alternative setpoint.
- 2. Select: **Go to setting of digital input**. Menu **Digital inputs** (4.3.7) appears.
- 3. Set the input.
- 4. Press [Back].
- 5. Select the menu line of the setpoint.
- 6. Set the setpoint.

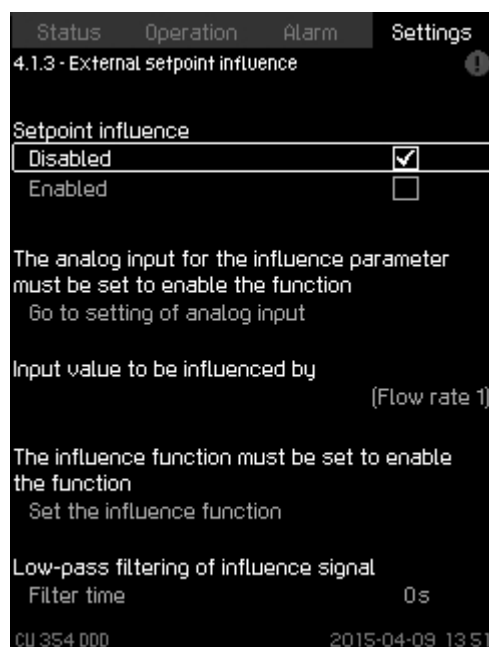
#### Factory setting

No alternative setpoints have been set.

#### Related information

[13.2.2 Alternative setpoints \(2.1.3\)](#)

### 13.4.5 External setpoint influence (4.1.3)



#### External setpoint influence

#### Description

With this function, you can adapt the setpoint by letting measuring parameters influence the setpoint. Typically an analog signal from a flow transmitter, or a similar transmitter. Section **Measuring parameters** shows an overview of transmitter types and possible positions.

As an example, the setpoint can be adapted to parameters that can influence the outlet pressure of the system. The parameters which influence the performance of the system are shown as a percentage from 0 to 100 %. They can only reduce the setpoint, as the influence as a percentage divided with 100 is multiplied with the setpoint:

Actual setpoint (SP) = selected setpoint x influence (1) x influence (2)

The influence values can be set individually.

A low-pass filter ensures smoothing of the measured value which influences the setpoint. This results in stable setpoint changes.

#### Setting range

- **0-100 % signal**
- **Inlet pressure**
- **Discharge pressure**
- **External pressure**
- **Diff. pressure, pump**
- **Diff. pressure, external**
- **Flow rate**
- **Tank level, discharge side**
- **Tank level, suction side**
- **Water temperature**
- **Ambient temperature.**

### Setting via operating panel

- **Settings > Primary controller > External setpoint influence > Input value to be influenced by**

A list of available parameters appears.

1. Select the parameter which is to influence the setpoint.
2. Press [Back].
3. Set the influence function.
4. Set the number of points.
5. Set: **External input value** (Point 1).
6. Set as a percentage: **Reduce setpoint to** (Point 1).
7. Repeat steps 4 to 6 for all desired parameters.
8. Press [Back].
9. Set as seconds: **Filter time**.
10. Select: **Enabled**.

### Factory setting

The function is disabled.

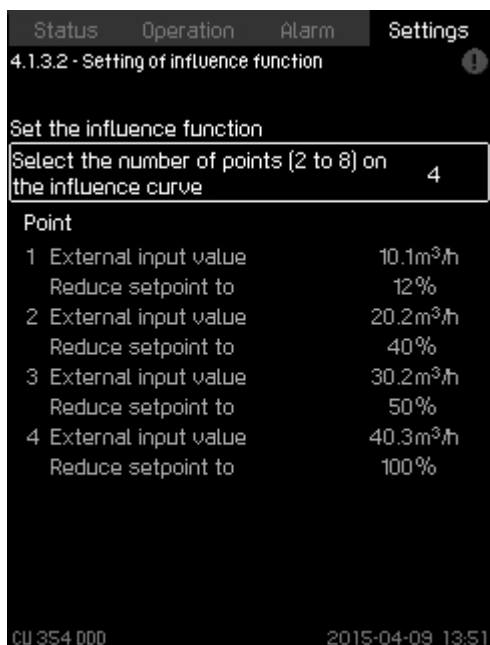
### Related information

[13.1.5 Setpoint influence \(1.2.3\)](#)

[13.2 Operation \(2\)](#)

[13.4.6 Setting of influence function \(4.1.3.2\)](#)

### 13.4.6 Setting of influence function (4.1.3.2)



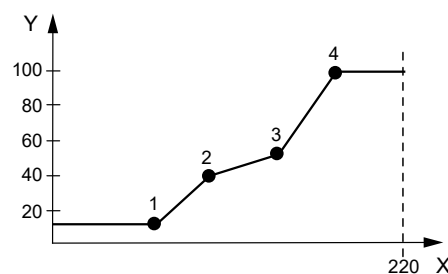
### Setting of influence function

#### Description

With this function, you can select the relation between the measuring parameter which is to influence the setpoint and the desired influence as a percentage.

Set the relation by entering values in a table with maximum eight points by means of the operating panel.

Example:



Relation between setpoint influence and flow rate

Pos.	Description
X	Flow rate [gpm]
Y	Setpoint influence [%]

The control unit draws straight lines between the points.

A horizontal line is drawn from the minimum value of the relevant sensor (0 gpm in the example) to the first point. This is also the case from the last point to the sensor's maximum value (example 220 gpm).

### Setting range

Two to eight points can be selected. Each point contains the relation between the value of the parameter which is to influence the setpoint and the influence of the value.

### Setting via operating panel

- **Settings > Primary controller > External setpoint influence**

1. Set the influence function.
2. Set the number of points.
3. Set: **External input value** (Point 1).
4. Set as a percentage: **Reduce setpoint to** (Point 1).
5. Repeat steps 2 to 4 for all desired parameters.

### Factory setting

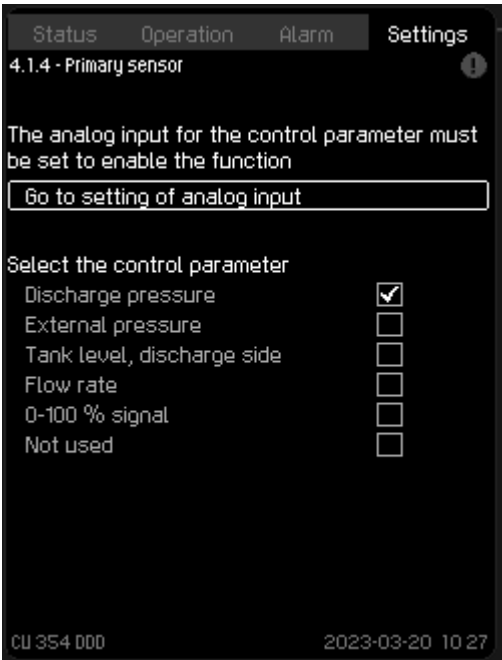
The function is disabled.

### Related information

[13.2 Operation \(2\)](#)

[13.4.5 External setpoint influence \(4.1.3\)](#)

13.4.7 Primary sensor (4.1.4)



Primary sensor

Description

With this function, you can select the control parameter of the system and set the sensor to measure the value.

Setting range

- Discharge pressure
- External pressure
- Tank level, discharge side
- Flow rate
- 0-100 % signal
- Not used.



The primary control parameter must always be set to **Discharge pressure**.

Setting via operating panel

- Settings > Primary controller > Primary sensor > Go to setting of analog input

Menu **Analog inputs** (4.3.8) appears.

1. Select analog input (AI) for the primary sensor and set the parameters.
2. Press [Back].
3. Select control parameter for the primary sensor.

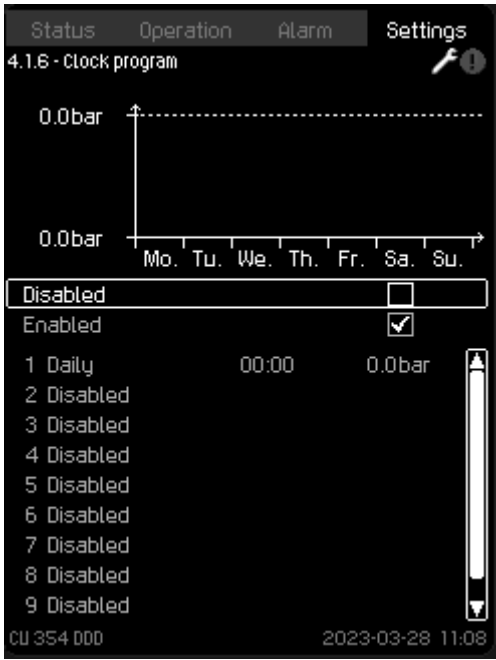
Factory setting

The primary parameter is **Discharge pressure**. The sensor is connected to AI1 (CU 354). Other primary parameters can be selected in the startup wizard.

Related information

- [13.2.2 Alternative setpoints \(2.1.3\)](#)
- [13.4.28 Analog inputs \(4.3.8\)](#)

13.4.8 Clock program (4.1.6)



Clock program

Description

With this function, you can adjust the setpoint, and day and time for the activation. You can also set day and time for stop of the system. The clock program works in two different ways, depending on the selected mode. See the details below.

Automatic adaptation

In this mode, the value is an offset you add to the setpoint of all the data loggers or remote sensors. The system will therefore increase the pressure at the remote sensor with the given value. Use negative values to reduce the pressure.



If **Clock program** is disabled in **Automatic adaptation** mode, the setpoint of all the data loggers or remote sensors will be reverted to their given values (offset = 0).

Manual adaptation and Disabled

For these modes, the value you enter is the absolute outlet pressure at the pumping station.



If **Clock program** is disabled in **Manual adaptation** mode or **Disabled** mode, the last used setpoint of the clock program will be the active setpoint.



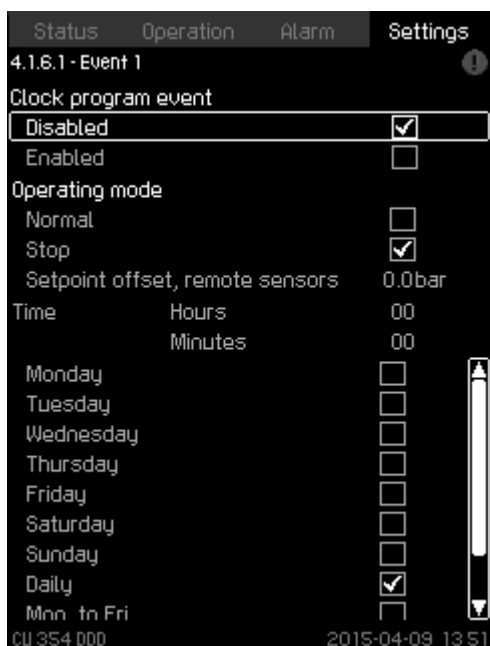
Minimum two events are required when activating the **Clock program**: one to start the system and one to stop the system.

If you change the offset by using the events, be aware that if you add 7.25 psi in one time slot and 7.25 psi immediately after, the resulting pressure for both settings will be the setpoint +7.25 psi. The offset is always added to the original setpoint. See the table below.

Time [hh:mm]	Setpoint [psi]	Offset [psi]	Resulting pressure [psi]
08:00 - 09:00	36	7.25	43.5
09:00 - 10:00	36	7.25	43.5
10:00 - 11:00	36	14.5	50.7

## Setting range

Activation and setting of event.



### Event 1

#### Setting via operating panel

- **Settings > Primary controller > Clock program**
- 1. Enable the function in menu 4.1.6.
- 2. Select and enable one of the ten events in menus 4.1.6.1 to 10.
- 3. Select: **Normal** or **Stop**. (Skip step 4 if you select **Stop**.)
- 4. Set the following:
  - **Setpoint offset, remote sensors** for **Automatic adaptation** mode
  - **Setpoint, closed loop** for **Manual adaptation** mode and **Disabled**.
- 5. Set: **Time: Hours, Minutes**.
- 6. Select the day(s) of week on which the settings are to be activated.
- 7. Press [Back].
- 8. Repeat steps 2 to 7 if several events are to be enabled. You can set up to ten events.

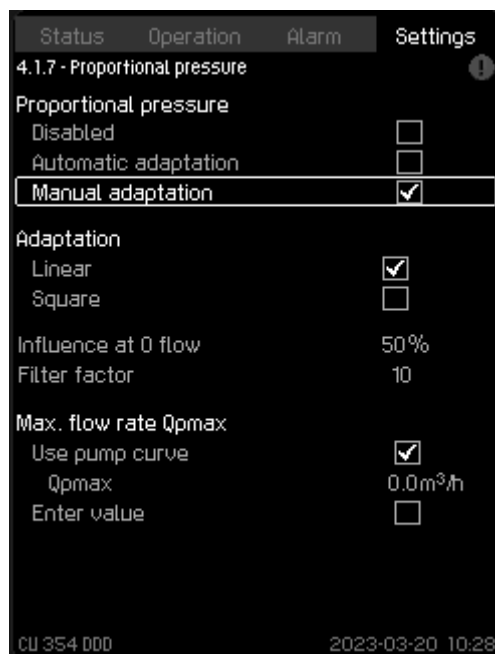
#### Factory setting

The function is disabled.

#### Related information

[13.4.9 Proportional pressure \(4.1.7\)](#)

## 13.4.9 Proportional pressure (4.1.7)



### Proportional pressure

#### Description

With this function, the setpoint is automatically adapted to the actual flow rate to compensate for flow-dependent dynamic losses.

Proportional pressure works in two different ways, depending on the selected operation mode. See the details below.

#### Disabled

Disable the function to maintain a constant pressure at the pumping station.



If this function is disabled, data from the data loggers or remote sensors will not be used.

#### Automatic adaptation

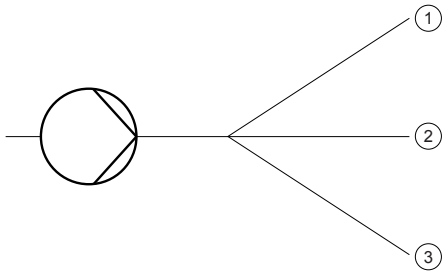
This function automatically optimizes the proportional-pressure curve using the logged pressure data from the data loggers or remote sensors and ensures a constant pressure at consumers or critical points. The pressure at the pumping station will vary depending on the usage-pattern at the critical points.

The system pressure is automatically adjusted when a change in the water requirement is registered at the pumping station. The controller ensures that a change of system characteristics at critical points results in a changed curve characteristic based on the logged data received daily from the data loggers or remote sensors. The system changes the proportional-pressure control curve by maximum  $\pm 2.9$  psi per day to ensure stable pressure throughout the system.

It can take several days for a change, for instance, in the water distribution network or consumption pattern, to take full effect.

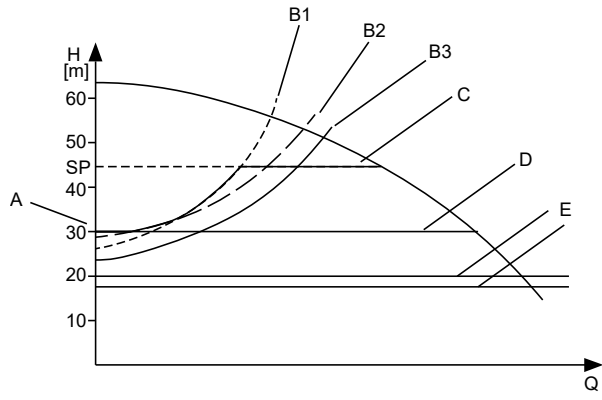
Set the required minimum pressure if automatic adaptation is enabled. This will ensure a minimum outlet pressure at the pumping station. See figure Proportional pressure.

Adaptation takes place within a given performance area depending on the pump and system characteristics. See figure Automatic adaptation of proportional-pressure curve.



Simplified model of water distribution network

TM058100



TM058101

Automatic adaptation of proportional-pressure curve

Pos.	Description
A	Pressure at 0 flow. Starting point of proportional-pressure control.
B1	System characteristics 1
B2	System characteristics 2
B3	System characteristics 3
C	Proportional-pressure curve
D	Required minimum pressure at pumping station
E	Required minimum pressure at data loggers or remote sensors

The function has the following purposes:

- to increase the comfort for the user
- to reduce pipe leakages
- to minimize pipe wear
- to reduce energy consumption.

Setting range

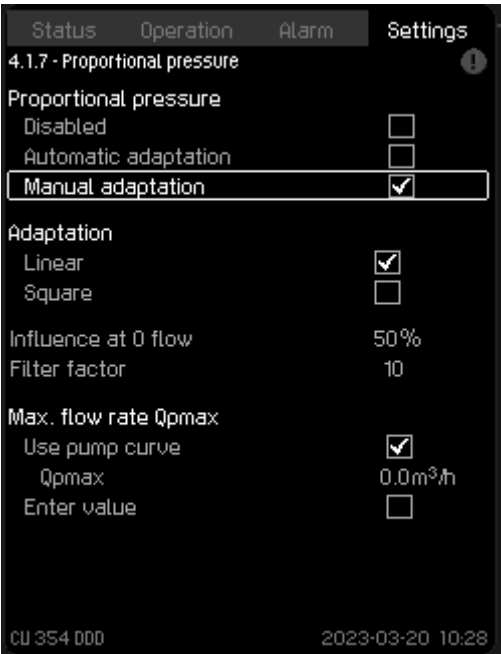
- Selection of control mode.
- **Minimum discharge pressure.**

Setting via operating panel

- **Settings > Primary controller > Proportional pressure**
  1. Select: **Automatic adaptation: Enabled.**
  2. Set: **Minimum discharge pressure.**

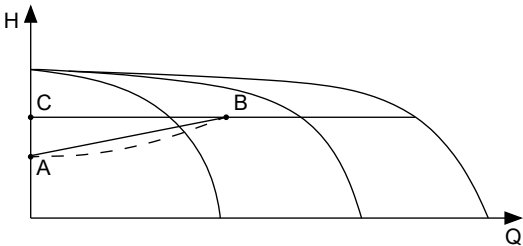
Manual adaptation

Set the function to **Manual adaptation** to set the controller to automatically adapt the setpoint to the actual flow rate to compensate for flow-dependent dynamic losses. In systems with CR pumps, the pump curves can be used to calculate the maximum flow rate at the selected setpoint. A filter factor can be set to prevent fluctuation.



Manual adaptation of proportional pressure

The adaptation can be linear or square. See figure Manual adaptation of proportional pressure.



TM053000

Proportional pressure, manual adaptation

Pos.	Description
A	Pressure at 0 flow. Starting point of proportional-pressure control (influence at 0 flow = x % of setpoint)
B	$Q_{pmax}$
C	Setpoint

The function has the following purposes:

- to compensate for pressure losses
- to reduce the energy consumption
- to increase the comfort for the user.

Setting range

- Selection of control mode
- **Influence at 0 flow**
- **Estimated flow rate**
- **Filter factor.**

Setting via operating panel

- **Settings > Primary controller > Proportional pressure**
  1. Select: **Enabled.**
  2. Select:
    - **Adaptation**
    - **Linear / Square.**
  3. Set: **Influence at 0 flow.**



- Set: **Filter factor**.
- Select: **Use pump curve** or **Enter value**.
- Set **Qpmax** if you select **Enter value**.

#### Factory setting

##### Automatic adaptation.

#### Related information

[13.1.5 Setpoint influence \(1.2.3\)](#)

[13.4.8 Clock program \(4.1.6\)](#)

#### 13.4.10 Setpoint ramp (4.1.9)



#### Setpoint ramp

##### Description

When this function is enabled, setpoint changes are affected by the setpoint ramp, and the setpoint changes gradually over a period of time.

**Proportional pressure** or **Setpoint influence** are not affected by this function.

You can activate the **Accelerate below pressure limit** function to ensure an easy startup and to reduce the risk of too low pressure periods. This function is optional.

##### Setting range

You can enable the **Setpoint ramp** function, and you can set **Max. change per minute**.

**Acceleration factor** allows for multiplication of the **Max. change per minute** value. This reduces the time the pressure is below the setpoint. The function is active as long as the pressure is below **Resulting pressure limit**.

##### Setting via operating panel

- Settings > Primary controller > Setpoint ramp**

- Select: **Enabled**.
- Set: **Max. change per minute**.

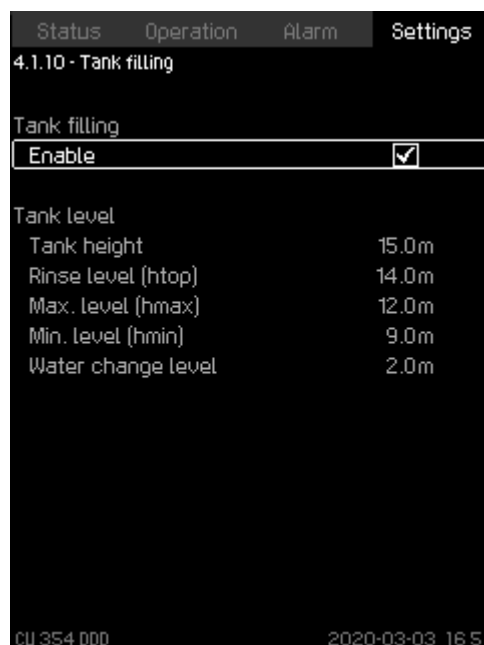
Optional:

- Activate: **Accelerate below pressure limit**.
- Set: **Acceleration factor**.
- Set: **Pressure limit % of setpoint**.
- Verify that the **Resulting pressure limit** is as requested.

#### Factory setting

The function is disabled.

#### 13.4.11 Tank filling (4.1.10)

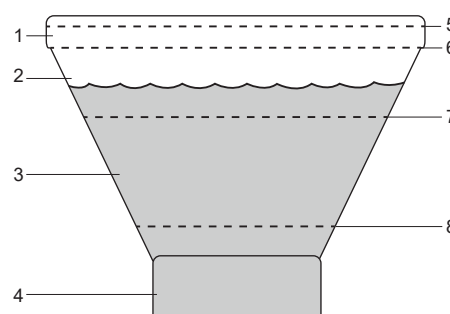


#### Tank filling

##### Description

With this function, you can use intelligent level control for tank filling applications. The intelligent level control works by keeping a constant level in the tank, typically between  $h_{max}$  and  $h_{min}$ . This results in a more constant pressure in the pipes to the tank and fewer start/stops compared to a traditional start/stop system.

The basic information about the tank, such as height, maximum and minimum level, rinse level and water change level needs to be entered in order for the level control to work.



Water tower

Pos.	Description
1	Overflow elevation: tank overflow protection area
2	Operating storage: tank operating area
3	Emergency and/or fire storage: emergency area
4	Dead storage: tank area that are normally not used
5	Rinse level (htop)
6	Max. level (hmax)
7	Min. level (hmin)
8	Water change level

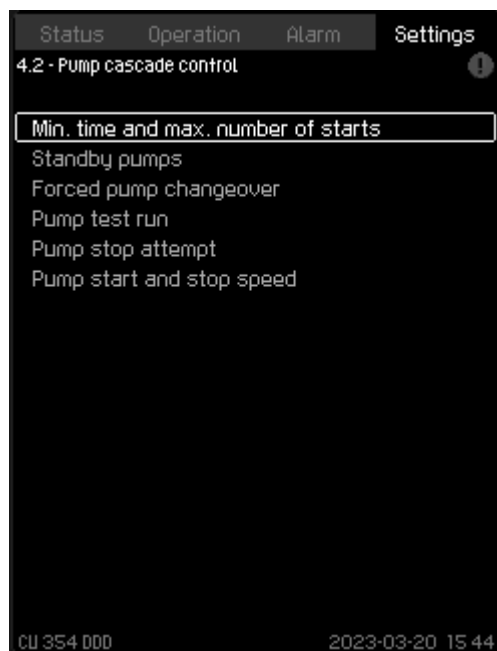
TM076078

**Setting range**

- Tank height
- Rinse level (htop)
- Max. level (hmax)
- Min. level (hmin)
- Water change level.

**Setting via operating panel**

- **Settings > Primary controller > Tank filling**
  1. Select: **Enable**.
  2. Set **Tank height**, which corresponds to the height of the tank.
  3. Set **Rinse level (htop)**, which is the overflow area of the tank and is used during forced water change if enabled.
  4. Set **Max. level (hmax)**, which is the maximum water level of the tank.
  5. Set **Min. level (hmin)**, which is the minimum water level of the tank.
  6. Set **Water change level**, which is the minimum water level used during water change.

**13.4.12 Pump cascade control (4.2)****Pump cascade control**

In the menu, you can set the functions connected to pump cascade control.

The following menus can be selected:

- **Min. time between start/stop**
- **Max. number of starts/hour**
- **Standby pumps**
- **Forced pump changeover**
- **Pump test run**
- **Pump stop attempt**
- **Pump start and stop speed.**

**13.4.13 Min. time between start/stop (4.2.1)****Min. time between start/stop****Description**

The function ensures a delay between the starting and stopping of one pump and the starting and stopping of another pump.

The purpose is to prevent hunting when pumps start and stop continuously.

**Setting range**

From 1 to 3600 seconds.

**Setting via operating panel**

- **Settings > Pump cascade control > Min. time between start/stop**

**Factory setting**

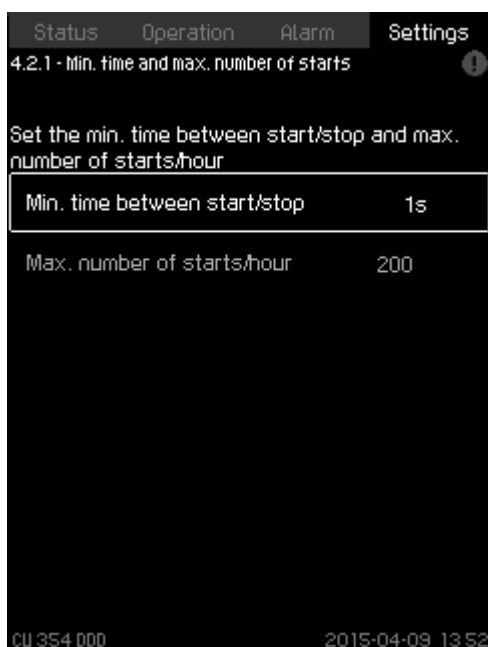
The setting is done in the startup wizard and depends on the application.

**Related information**

[13.4.14 Min. time and max. number of starts \(4.2.1\)](#)

[13.4.53 Max. pressure \(4.4.3\)](#)

## 13.4.14 Min. time and max. number of starts (4.2.1)

**Min. time and max. number of starts****Description**

The function limits the number of pump starts and stops per hour for the complete system. It reduces noise emission and improves the comfort of systems with mains-operated pumps.

Each time a pump starts or stops, CU 354 calculates when the next pump is allowed to start/stop in order not to exceed the permissible number of starts per hour.

The function always allows pumps to be started to meet the requirement, but pump stops are delayed, if needed, in order not to exceed the permissible number of starts per hour.

The time between pump starts must be between the minimum time between start/stop, see section **Min. time between start/stop** (4.2.1), and  $3600/n$ ,  $n$  being the set number of starts per hour.

**Setting range**

1 to 1000 starts per hour.

**Setting via operating panel**

- **Settings > Pump cascade control > Max. number of starts/hour**

1. Set:

- **Min. time between start/stop.**
- **Max. number of starts/hour.**

**Factory setting**

DDD-E: 200 starts per hour

DDD-EC, DDD-EF: 100 starts per hour.



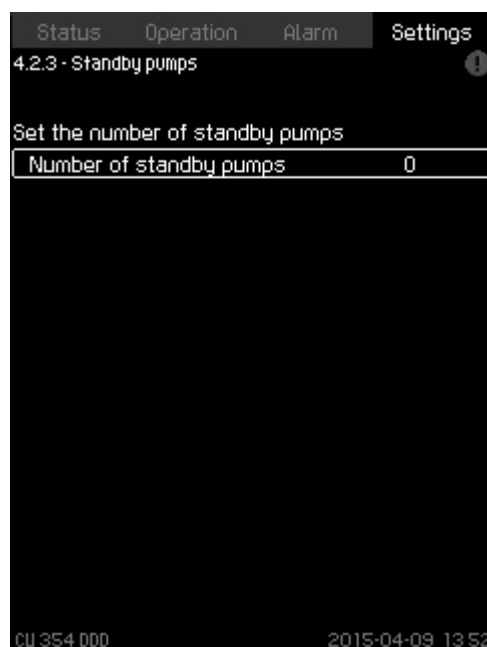
This function has no influence on **Stop function** (4.3.1).

**Related information**

[13.4.13 Min. time between start/stop \(4.2.1\)](#)

[13.4.22 Stop function \(4.3.1\)](#)

## 13.4.15 Standby pumps (4.2.3)

**Standby pumps****Description**

The function can limit the maximum performance of the system, by selecting one or more pumps as standby pumps.

If a three-pump system has one standby pump, maximum two pumps are allowed to be in operation at a time.

If one of the two pumps in operation has a fault and has stopped, the standby pump is started. The performance of the system is thus not reduced.

The status as standby pump alternates between all pumps.

**Setting range**

The number of possible standby pumps in a system is equal to the total number of pumps in the system minus 1.

**Setting via operating panel**

- **Settings > Pump cascade control > Standby pumps**

1. Set: **Set the number of standby pumps.**

**Factory setting**

The number of standby pumps is set to 0. The function is disabled.

### 13.4.16 Forced pump changeover (4.2.4)

Status	Operation	Alarm	Settings
4.2.4 - Forced pump changeover			
Forced pump changeover			
Disabled		<input type="checkbox"/>	
Enabled		<input checked="" type="checkbox"/>	
Time of day for changeover			
Hours	03		
Minutes	00		
Once every 24 hours		<input checked="" type="checkbox"/>	
Once every 48 hours		<input type="checkbox"/>	
Once a week		<input type="checkbox"/>	

CU 354 000 2015-04-09 13:52

#### Forced pump changeover

##### Description

The function ensures that the pumps run for the same number of operating hours.

In certain applications, the requirement remains constant for long periods and does not require all pumps to run. In such situations, pump changeover does not take place naturally, and forced pump changeover may thus be required.

Once every 24 hours, CU 354 checks if any pump running has a larger number of operating hours than pumps that are stopped. If this is the case, the pump is stopped and replaced by a pump with a lower number of operating hours.

##### Setting range

You can enable and disable the function. You can set the hour of the day at which the changeover is to take place.

##### Setting via operating panel

- **Settings > Pump cascade control > Forced pump changeover**
- 1. Select: **Enabled**.
- 2. Set: **Time of day for changeover**.
- 3. Select interval for pump changeover.

##### Factory setting

The function is enabled. The time is set to 03:00.

### 13.4.17 Pump test run (4.2.5)

Status	Operation	Alarm	Settings
4.2.5 - Pump test run			
Select interval			
Not used		<input type="checkbox"/>	
Once every 24 hours		<input checked="" type="checkbox"/>	
Once every 48 hours		<input type="checkbox"/>	
Once a week		<input type="checkbox"/>	
Time of day			
Hours	10		
Minutes	00		

CU 354 000 2015-04-09 13:52

#### Pump test run

##### Description

The function is primarily used in situations where the forced pump changeover is disabled, and/or if the system is set to operating mode **Stop**, for instance, in a period when the system is not needed. In such situations, it is important to test the pumps regularly.

Advantages of this function:

- The pumps do not seize up during a long standstill due to deposits from the pumped liquid.
- The pumped liquid does not decay in the pump.
- Trapped air is removed from the pump.

The pumps start automatically one by one and run for five seconds.



Pumps in operating mode **Manual** are not included in the test run. If there is an alarm, the test run will not be carried out.

##### Setting range

- **Time of day**
- **Day of week**

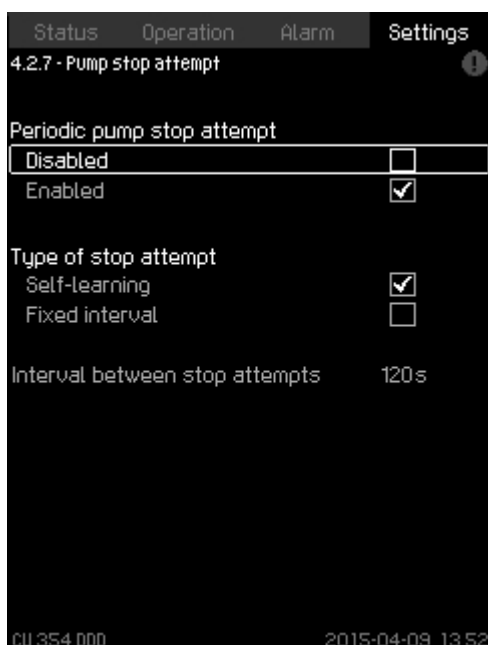
##### Setting via operating panel

- **Settings > Pump cascade control > Pump test run**
- 1. Select interval.
- 2. Set:
  - **Time of day**
    - **Hours**
    - **Minutes**
- 3. Select the day of week if you select **Once a week**.

##### Factory setting

The function is disabled.

### 13.4.18 Pump stop attempt (4.2.7)



#### Pump stop attempt

##### Description

The function can set automatic stop attempts of a pump when several pumps are running. It ensures that the optimum number of pumps is always running, in terms of energy consumption.

At the same time, the purpose is to avoid disturbances in connection with automatic stop of pumps.

Stop attempts can either take place with a fixed interval set under **Interval between stop attempts** or by self-learning. If self-learning is selected, the interval between stop attempts will be increased if repeated attempts to stop the pump fail.

##### Setting via operating panel

- **Settings > Pump cascade control > Pump stop attempt**

1. Select: **Self-learning** or **Fixed interval**.
2. Set **Interval between stop attempts** if you select **Fixed interval**.
3. Select: **Enabled**.

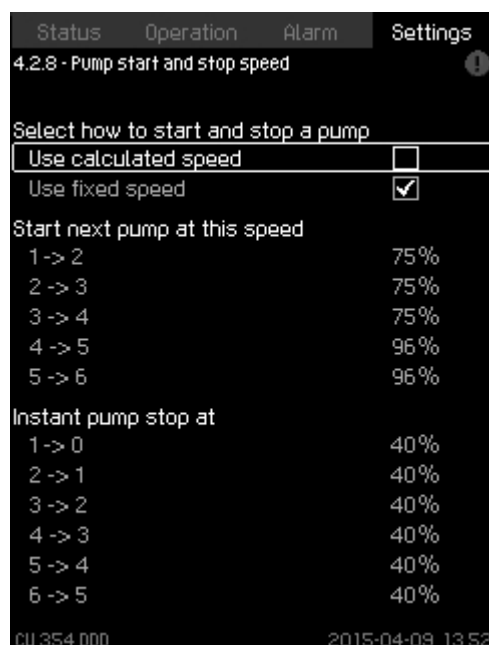
##### Factory setting

The function is enabled, and **Self-learning** is selected.

##### Related information

[13.4.19 Pump start and stop speed \(4.2.8\)](#)

### 13.4.19 Pump start and stop speed (4.2.8)



#### Pump start and stop speed

##### Description

The function controls the starting and stopping of pumps.

There are two options:

- **Use calculated speed**

This function ensures that the optimum number of pumps is always running at a desired duty point, in terms of energy consumption. CU 354 calculates the required number of pumps and their speed. This requires that the differential pressure of the pump is measured by a differential-pressure sensor or separate pressure sensors on the inlet and outlet side.

If calculated speed has been selected, CU 354 will ignore the percentages set.

##### Setting via operating panel

- **Settings > Pump cascade control > Pump start and stop speed > Use calculated speed**

- **Use fixed speed**

The pumps are started and stopped at speeds set by the user.

##### Setting via operating panel

- **Settings > Pump cascade control > Pump start and stop speed**

1. Select: **Use fixed speed**.
2. Set: **Start next pump at this speed > 1 -> 2**.
3. Set the speed as percentage.
4. Set the other pumps in the same way.
5. Select: **Instant pump stop at > 1 -> 0**.
6. Set the speed as percentage.
7. Set the other pumps in the same way.

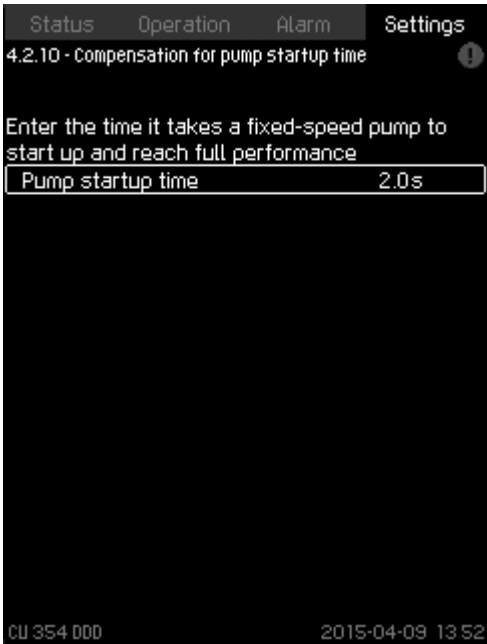
##### Factory setting

The function is set to calculated speed.

##### Related information

[13.4.18 Pump stop attempt \(4.2.7\)](#)

13.4.20 Compensation for pump startup time (4.2.10)

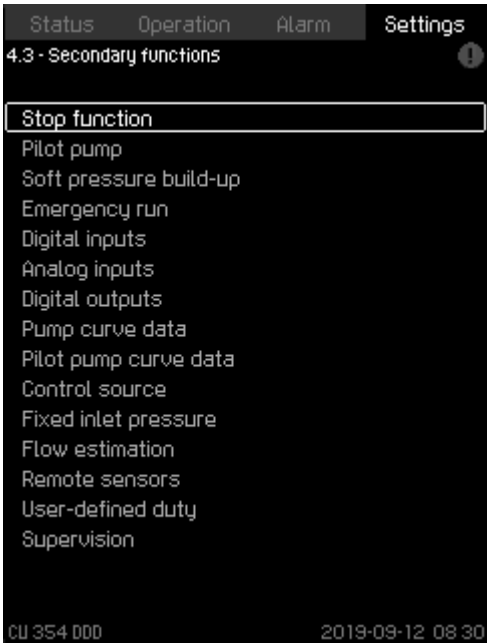


Compensation for pump startup time



The function is not used for DDD systems.

13.4.21 Secondary functions (4.3)



Secondary functions

Description

In the menu, you can set functions that are secondary in relation to the normal operation of the system. Secondary functions are functions that offer additional functionality.

The following sub-menus are available:

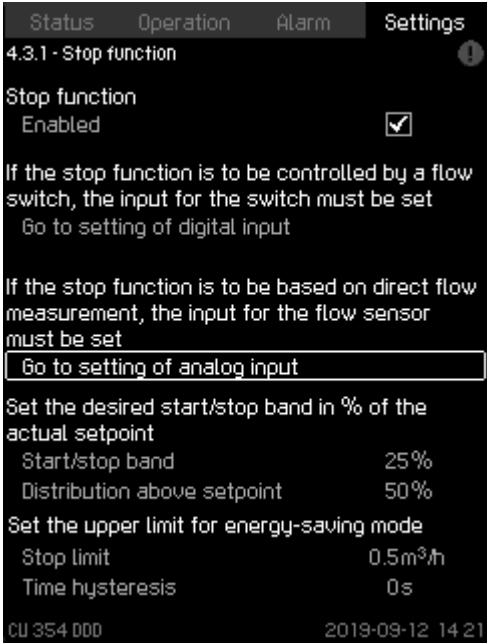
- **Stop function** (4.3.1)
- **Pilot pump** (4.3.2)
- **Soft pressure build-up** (4.3.3)

- **Emergency run** (4.3.5)
- **Digital inputs** (4.3.7)
- **Analog inputs** (4.3.8)
- **Digital outputs** (4.3.9)
- **Analog outputs** (4.3.10)
- **Pilot pump curve data** (4.3.18)
- **Pump curve data** (4.3.19)
- **Control source** (4.3.20)
- **Fixed inlet pressure** (4.3.22)
- **Flow estimation** (4.3.23)
- **Reduced operation** (4.3.24)
- **Remote sensors** (4.3.25)

Related information

- [13.4.22 Stop function \(4.3.1\)](#)
- [13.4.23 Pilot pump \(4.3.2\)](#)
- [13.4.24 Soft pressure build-up \(4.3.3\)](#)
- [13.4.25 Emergency run \(4.3.5\)](#)
- [13.4.26 Digital inputs \(4.3.7\)](#)
- [13.4.28 Analog inputs \(4.3.8\)](#)
- [13.4.31 Digital outputs \(4.3.9\)](#)
- [13.4.33 Analog outputs \(4.3.10\)](#)
- [13.4.35 Pilot pump curve data \(4.3.18\)](#)
- [13.4.36 Pump curve data \(4.3.19\)](#)
- [13.4.37 Control source \(4.3.20\)](#)
- [13.4.38 Fixed inlet pressure \(4.3.22\)](#)
- [13.4.39 Flow estimation \(4.3.23\)](#)
- [13.4.40 Reduced operation \(4.3.24\)](#)
- [13.4.41 Remote sensors \(4.3.25\)](#)

13.4.22 Stop function (4.3.1)



Stop function

Description

The function is used to stop the last pump if there is no or a very small consumption.

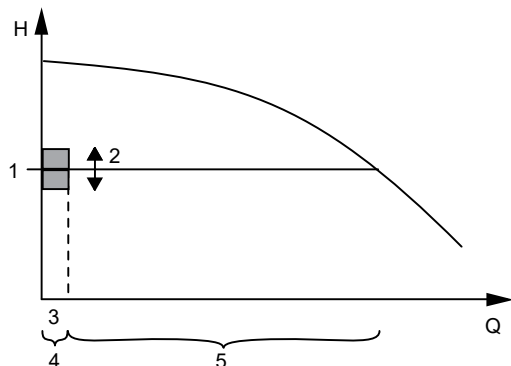
The function has the following purposes:

- to save energy
- to prevent heating of shaft seal faces due to increased mechanical friction as a result of reduced cooling by the pumped liquid
- to prevent heating of the pumped liquid.



When a pilot pump is connected to the system, the stop function parameters will be valid for the pilot pump and not the main pump as the pilot pump will be the last pump in operation.

The description of the stop function applies to all DDD systems.



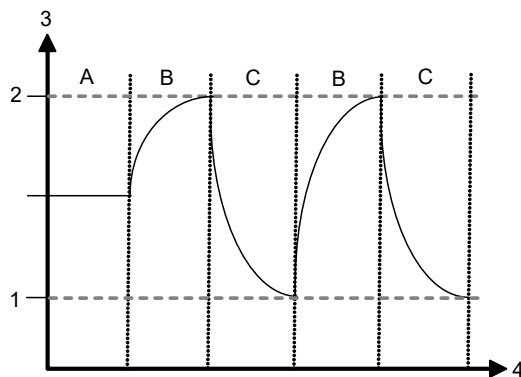
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#### Start/stop band

Pos.	Description
1	$H_{set}$
2	Start/stop band
3	$Q_{min}$
4	On/off control
5	Normal operation

When the stop function is enabled, the operation is continuously monitored to detect a low flow rate. When CU 354 detects no or a low flow rate ( $Q < Q_{min}$ ), it changes from constant-pressure operation to on/off control of the last pump in operation.

Before stopping, the pump increases the pressure to a value corresponding to  $H_{set}$  plus (distribution above setpoint / 100) × start/stop band. The pump is restarted when the pressure is  $H_{set}$  minus (100-distribution above setpoint) / 100 × start/stop band. See the figure below. The start/stop band can be distributed around the setpoint.



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#### On/off operation

Pos.	Description
1	Start: $H_{set} - 0.5 \times \text{start/stop band}$
2	Stop: $H_{set} + 0.5 \times \text{start/stop band}$
3	$H$ [m]
4	Time [s]
A	Normal operation
B	Pressure boosting
C	Stop

The flow rate is measured by CU 354 when the pump is in the stop period. As long as the flow rate is lower than  $Q_{min}$ , the pump runs in on/off operation. If the flow rate is increased to above  $Q_{min}$ , the pump returns to normal operation,  $H_{set}$ .  $H_{set}$  is equal to the actual setpoint. See section **Setpoint** (1.2.2).

#### Detection of low flow rate

Low flow rate will be detected by direct flow measurement with a flowmeter.

A diaphragm tank of a certain size and with a certain pre-charge pressure is required.

#### Diaphragm tank size

Pump type	Recommended diaphragm tank size [liters]		
	-E	-F	-S
CRI, CRIE 3	8	8	80
CRI, CRIE 5	12	12	120
CRI, CRIE 10	18	18	180
CRI, CRIE 15	80	80	300
CRI, CRIE 20	80	80	400
CR, CRE 32	80	80	600
CR, CRE 45	120	120	800
CR, CRE 64	120	120	1000
CR, CRE 90	180	180	1500
CR, CRE 120	180	180	1500
CR, CRE 150	180	180	1500

#### Pre-charge pressure

For the whole DDD system,  $0.7 \times$  the setpoint.

The minimum flow rate can be set, that is, the flow rate at which the DDD system changes to on/off control of the last pump in operation.

#### Setting range

Start/stop band:	5-30 %
Minimum flow rate:	2-50 % of the rated flow rate ( $Q_{nom}$ ) of one of the pumps. To be able to set it, select direct flow measurement by means of flowmeter.
Distribution above setpoint:	0-100 %

#### Setting via operating panel

- **Settings > Secondary functions > Stop function**

1. Set: **Enabled**.
2. Select: **Go to setting of analog input**  
The menu **Analog inputs** (4.3.8) appears.
3. Select the analog input where the flowmeter is connected.
4. Select: Flow rate.
5. Press × 2.
6. Set: **Start/stop band**.

### 7. Set: **Stop limit**

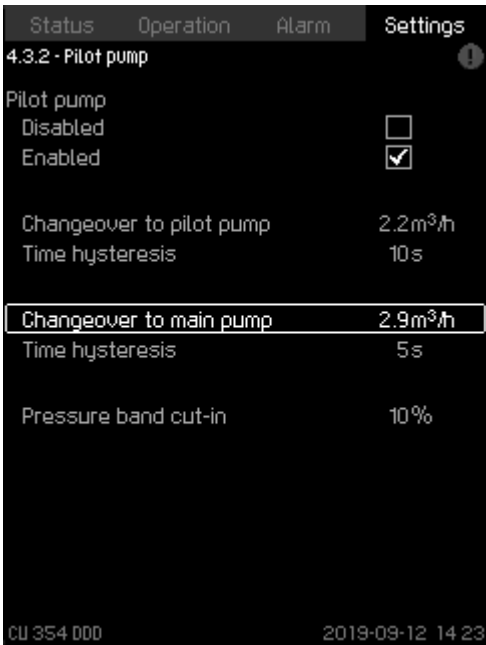


By default, there is a 10-second detection hysteresis.

#### Related information

- [13.1.4 Setpoint \(1.2.2\)](#)
- [13.1.5 Setpoint influence \(1.2.3\)](#)
- [13.4.14 Min. time and max. number of starts \(4.2.1\)](#)
- [13.4.28 Analog inputs \(4.3.8\)](#)
- [13.4.21 Secondary functions \(4.3\)](#)

#### 13.4.23 Pilot pump (4.3.2)



#### Pilot pump

##### Description

The function is used to save energy in low flow situations. The pilot pump is typical  $Q_{nom}$  1/4 of the  $Q_{nom}$  on the main pump, thus allowing the system to run more energy efficient at a low flow. Both cut-in and cut-out speed for pilot pump and main pump are calculated using the pump curve data.



Pilot pump needs to be activated using PC Tool. We recommend uploading pump data for the pilot pump or go to the menu **Pilot pump curve data** (4.3.18).

1. Enable/disable the pilot pump.
2. **Changeover to pilot pump**  
Set the flow for the changeover from main pump to the pilot pump. Factory settings are 75 % of the pilot pump  $Q_{nom}$ .
  - **Time hysteresis** Set the delay time for the changeover to a stable low flow before the changeover.

### 3. **Changeover to main pump**

Set the flow for the changeover from pilot pump to the main pump. Factory settings are 95 % of the pilot pump  $Q_{nom}$ .

- **Time hysteresis**  
Set the delay time for the changeover to a stable low flow before the changeover.
- **Pressure band cut-in**  
Set the pressure band in percentage of the setpoint. The pressure band is used for cut-in/cut-out of pumps.
- Main pumps cut-out when then pilot pump ramps up to a stable setpoint "+ or and" outlet pressure.
- Pilot pump cut-out when the main pumps ramps up to a stable setpoint "+ or and" outlet pressure.
- Or if the pilot pump is running at 100 % and the pressure band is below setpoint-pressure band the main pumps will cut in.

#### Setting via operating panel

- **Settings > Secondary functions > Pilot pump**

1. Enable pilot pump
  - Set: **Changeover to pilot pump**
  - Set: **Time hysteresis**
  - Set: **Changeover to main pump**
  - Set: **Time hysteresis**

2. Set: **Pressure band cut-in**

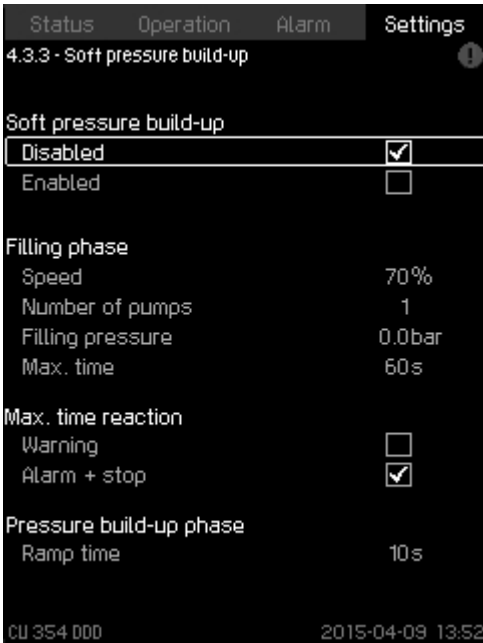
#### Factory setting

The function is disabled.

#### Related information

- [13.4.35 Pilot pump curve data \(4.3.18\)](#)
- [13.4.21 Secondary functions \(4.3\)](#)

#### 13.4.24 Soft pressure build-up (4.3.3)



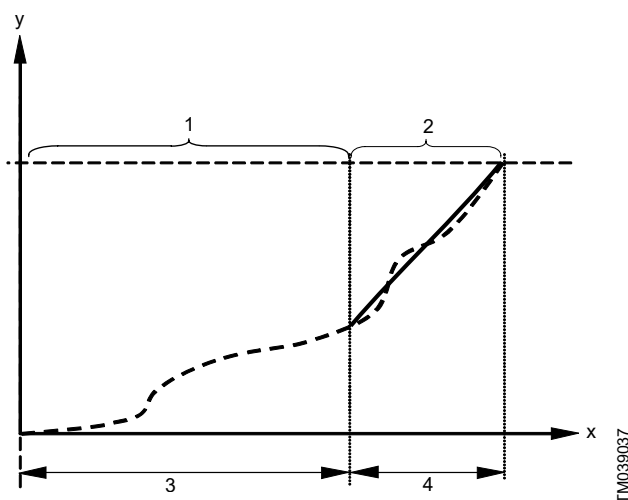
#### Soft pressure build-up

##### Description

The function ensures a smooth startup of systems with, for instance, empty pipes. Startup takes place in two phases. See the figure below.



1. **Filling phase** The pipes are slowly filled with water. When the pressure sensor of the system detects that the pipes have been filled, phase two begins.
2. **Pressure build-up phase** The system pressure is increased until the setpoint is reached. The pressure buildup takes place over a ramp time. If the setpoint is not reached within a given time, a warning or an alarm can be given, and the pumps can be stopped at the same time.



Filling and pressure buildup phases

Pos.	Description
1	<b>Filling phase</b>
2	<b>Pressure build-up phase</b>
3	Filling time
4	<b>Ramp time</b>
x	Time [s]
y	H [m]

#### Setting range

- pump speed
- number of pumps
- filling pressure
- maximum filling time
- warning or alarm + stop
- ramp time for the pressure buildup phase.

#### Setting via operating panel

- **Settings > Secondary functions > Stop function > Soft pressure build-up**

1. Select and set:
  - **Speed**
  - **Number of pumps**
  - **Filling pressure**
  - **Max. time.**
2. Select: **Warning or Alarm + stop.**
3. Set: **Ramp time.**
4. Select: **Enabled.**

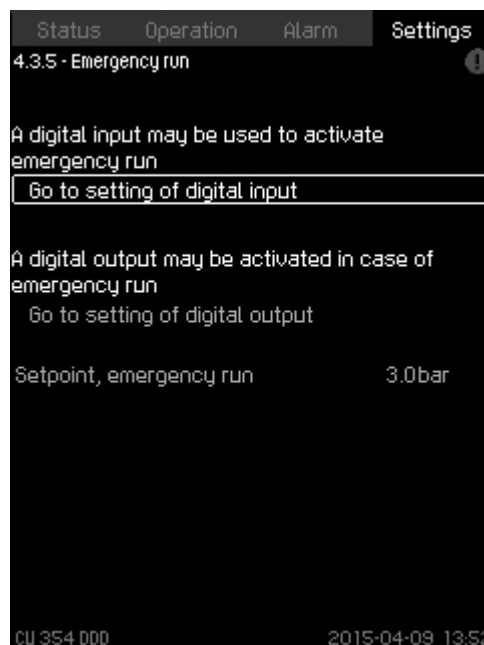
#### Factory setting

The function is disabled.

#### Related information

[13.4.21 Secondary functions \(4.3\)](#)

#### 13.4.25 Emergency run (4.3.5)



#### Emergency run

##### Description

If enabled, this function will keep the pumps running regardless of warnings or alarms. The pumps run according to a setpoint set specifically for this function.



In case of sensor fault, both main and standby pumps will run at 100 % speed.

##### Setting range

- Setting of digital input.
- Setting of digital output.
- Setting of setpoint for **Emergency run**.

##### Setting via operating panel

- **Settings > Secondary functions > Stop function > Emergency run > Go to setting of digital input**

1. Select digital input.
2. Select: **Emergency run**.
3. [Back] × 2.
4. Select: **Go to setting of digital output**.
5. Select digital output.
6. Select: **Emergency run**.
7. [Back] × 2.
8. Set: **Setpoint, emergency run**.

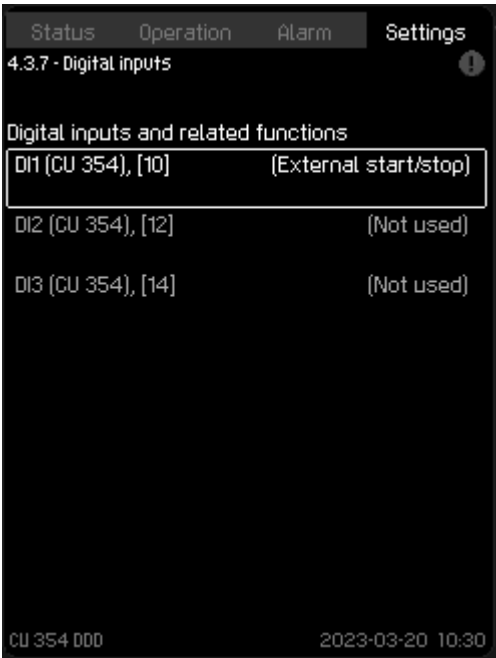


When this function has been set as described above, you can also enable it via the menu **System operating mode (2.1.1)**.

##### Related information

- [13.1.3 Operating mode \(1.2.1\)](#)
- [13.2.1 System operating mode \(2.1.1\)](#)
- [13.4.26 Digital inputs \(4.3.7\)](#)
- [13.4.31 Digital outputs \(4.3.9\)](#)
- [13.4.21 Secondary functions \(4.3\)](#)

13.4.26 Digital inputs (4.3.7)



Digital inputs

Description

In the menu, you can set the digital inputs of CU 354 and IO 351B. Each input, except DI1, can be activated and related to a certain function.

As standard, the system has 12 digital inputs.

All digital inputs are shown so that their physical position in the system can be identified.


Example

DI1 (IO 351-41), [10]:

DI1:	Digital input No 1
(IO 351-41):	IO 351, GENibus number 41
[10]:	Terminal No 10

For further information on the connection of various digital inputs, see the wiring diagram supplied with the control cabinet.

Setting range

 DI1 (CU 354) cannot be selected.

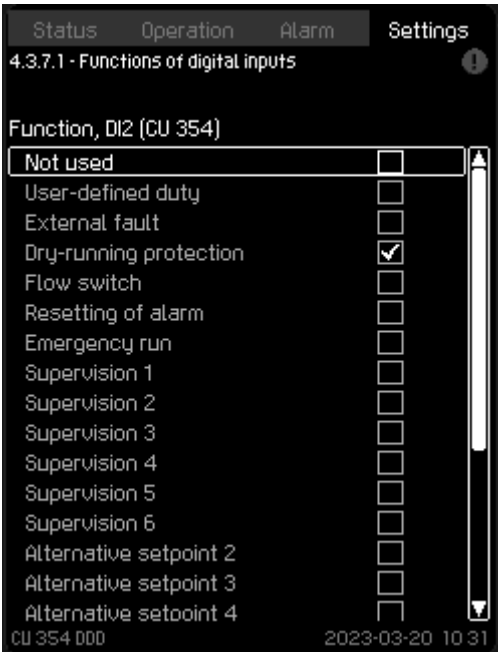
Setting via operating panel

- Settings > Secondary functions > Stop function > Digital inputs

Related information

- [13.2.2 Alternative setpoints \(2.1.3\)](#)
- [13.4.25 Emergency run \(4.3.5\)](#)
- [13.4.40 Reduced operation \(4.3.24\)](#)
- [13.4.49 Pressure/level switch \(4.4.1.1\)](#)
- [13.4.54 External fault \(4.4.4\)](#)
- [13.4.21 Secondary functions \(4.3\)](#)

13.4.27 Functions of digital inputs (4.3.7.1)










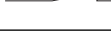
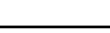
Functions of digital inputs

Description

A function can be related to the digital inputs.

Setting range

You can select one function in each sub-menu:

Function	Contact activated
Not used	
User-defined duty	 = Operating mode <b>User-defined</b>
External fault	 = External fault
Dry-running protection	 = Water shortage
Flow switch	 = Flow
Resetting of alarm	 = Alarms are reset
Emergency run	 = Operating mode <b>Emergency run</b>
Alternative setpoint 2-7	 = The setpoint is selected
Reduced operation	 = Activation of <b>Reduced operation</b>
Stop pump 1-6	 = Forces the pump to stop

See the relevant sections for further information about the functions. Generally, a closed contact activates the function selected.

Setting via operating panel

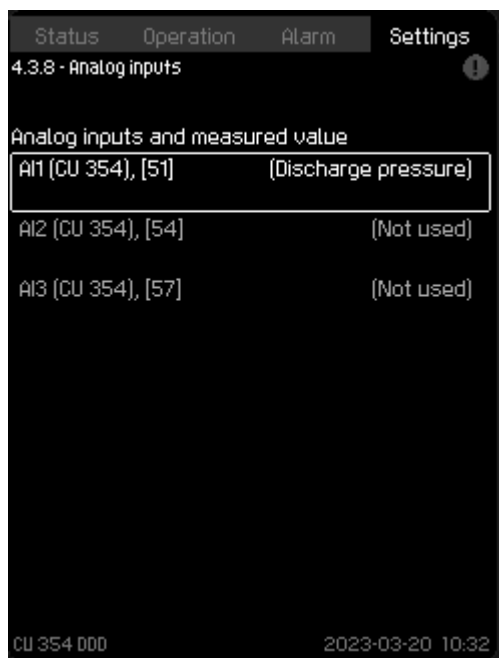
- Settings > Secondary functions > Digital inputs.

**Factory setting**

Digital input	Function
DI1 (CU 354) [10]	External start/stop. Open contact = stop. <b>Note:</b> Input No 1 cannot be changed.
DI2 (CU 354) [12]	Monitoring of water shortage (dry-running protection). Open contact = water shortage (if the system is supplied with this option).



Monitoring of water shortage requires a pressure switch connected to the system.

**13.4.28 Analog inputs (4.3.8)****Analog inputs****Description**

Each analog input of CU 354 and IO 351B can be activated and related to a certain function.

As standard, the system has five analog inputs.

All analog inputs are shown so that their physical position in the system can be identified. A redundant primary sensor can be fitted as backup for the primary sensor in order to increase reliability and prevent stop of operation.



If two sensors are to be redundant, each must have a separate analog input.

**Example:**

AI1 (CU 354) [51]:

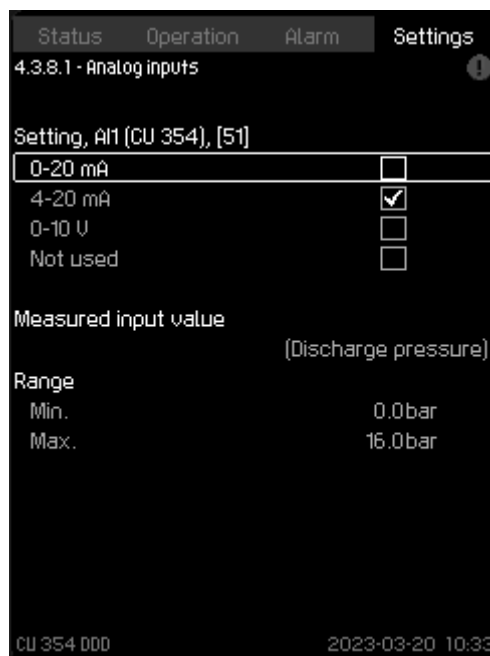
AI1:	Analog input No 1
(CU 354):	CU 354
[51]:	Terminal No 51

**Setting via operating panel**

- Settings > Secondary functions > Analog inputs**

**Related information**

- [10. Starting up the product](#)
- [13.1.7 Analog inputs \(1.2.5\)](#)
- [13.4.7 Primary sensor \(4.1.4\)](#)
- [13.4.22 Stop function \(4.3.1\)](#)
- [13.4.50 Measurement, inlet pressure \(4.4.1.2\)](#)
- [13.4.51 Measurement, tank level \(4.4.1.3\)](#)
- [13.4.55 Limit 1 exceeded, Limit 2 exceeded \(4.4.5 - 4.4.6\)](#)
- [13.4.21 Secondary functions \(4.3\)](#)

**13.4.29 Analog inputs (4.3.8.1 - 4.3.8.7)****Analog inputs****Description**

In the menu, you can set analog inputs. Each display is divided into three parts:

- setting of input signal, for instance, 4-20 mA
- measured input value, for instance, **Discharge pressure**
- measuring range of the sensor or signal transmitter, for instance, 0-232 psi.

**Setting range**

You can set the following parameters in each part:

- **Not used**
- Range of input signal, 0-20 mA, 4-20 mA, 0-10 V
- **Measured input value**
- Sensor range.

**Setting via operating panel**

- Settings > Secondary functions > Analog inputs**



If an analog input is deactivated, the display will only show the top part, that is, the setting of the analog input.

If the input is activated, the middle part, **Measured input value**, will be shown. This makes it possible to relate a function to the analog input in another display. When the analog input has been related to a function, CU 354 will return to the display for setting of analog inputs.

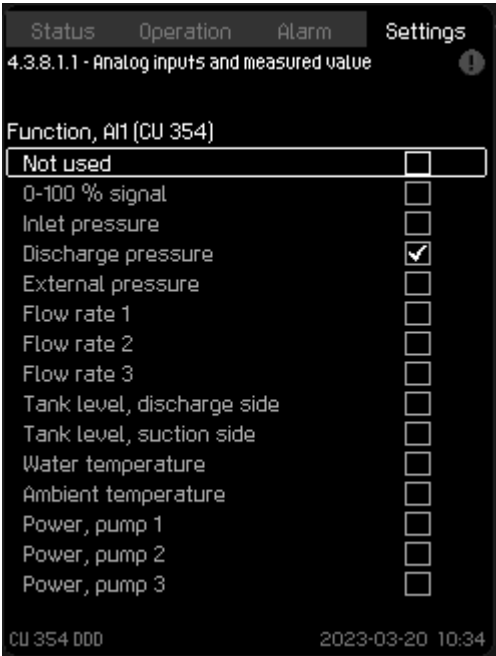
Factory setting

Analog input	Function
AI1 (CU 354) [51]	Discharge pressure
AI3 (CU 354) [57]	Flow rate 1-3

Related information

- [13.1.7 Analog inputs \(1.2.5\)](#)
- [13.4.55 Limit 1 exceeded, Limit 2 exceeded \(4.4.5 - 4.4.6\)](#)

13.4.30 Analog inputs and measured value (4.3.8.1.1 - 4.3.8.7.1)



Analog inputs and measured value

Description

A function can be related to the individual analog inputs.

Setting range

You can select one function per analog input. For further details, see section **Measuring parameters**.

- **Not used**
- **0-100 % signal**
- **Inlet pressure**
- **Discharge pressure**
- **External pressure**
- **Flow rate 1-3**
- **Tank level, discharge side**
- **Tank level, suction side**
- **Water temperature**
- **Ambient temperature**
- **Power, pump 1-6**

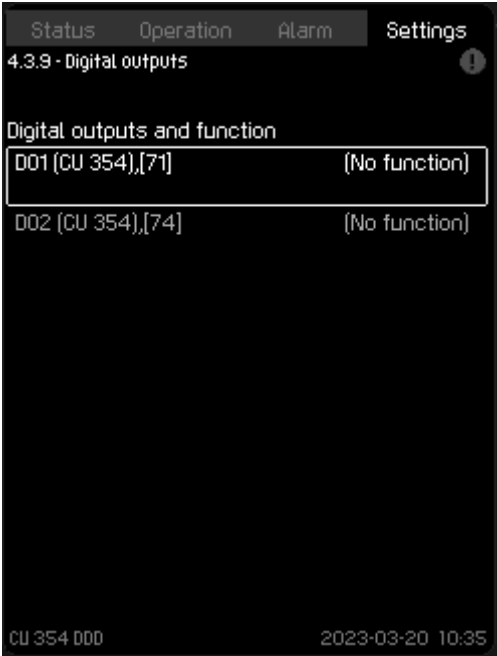
Setting via operating panel

- **Settings > Secondary functions > Analog inputs**
- 1. Select **Analog inputs**.  
Select **Measured input value** and menu 4.3.8.1.1 appears.
- 2. Select input.
- 3. Press [Back].
- 4. Set the minimum and maximum sensor value.

Related information

- [13.1.7 Analog inputs \(1.2.5\)](#)
- [14.1 Transmitter types](#)
- [14.2 Parameter list](#)

13.4.31 Digital outputs (4.3.9)



Digital outputs

Description

Each digital output can be activated and related to a certain function.

As standard, the system has nine digital outputs.

All digital outputs are shown so that their physical position in the system can be identified.

Example:

DO1 (IO 351-41) [71]:

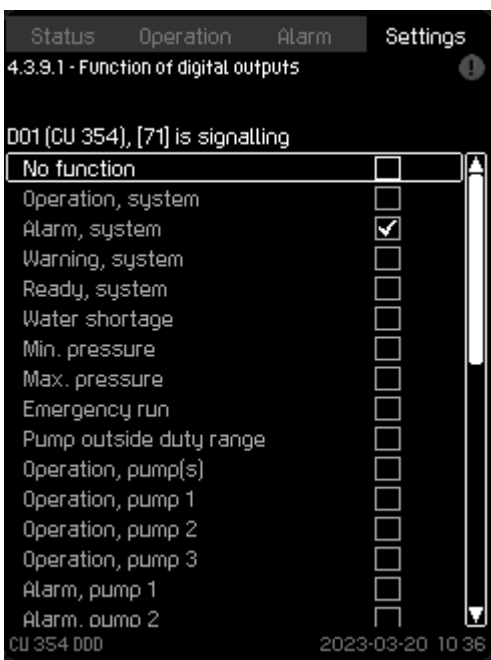
DO1	Digital output No 1
(IO 351-41)	IO 351B, GENIbus number 41
[71]	Terminal No 71

For further information on the connection of various digital outputs, see the wiring diagram supplied with CU 354.

Related information

- [13.4.25 Emergency run \(4.3.5\)](#)
- [13.4.40 Reduced operation \(4.3.24\)](#)
- [13.4.21 Secondary functions \(4.3\)](#)

## 13.4.32 Function of digital outputs (4.3.9.1 - 4.3.9.16)

**Function of digital outputs****Description**

A function can be related to the individual outputs.

**Setting range**

You can select one function in each sub-menu:

- No function
- Operation, system
- Alarm, system
- Warning, system
- Ready, system
- Water shortage
- Min. pressure
- Max. pressure
- Emergency run
- Pump outside duty range
- Operation, pump(s)
- Operation, pump 1-6
- Alarm, pump 1-6
- Alarm, limit 1 exceeded
- Warning, limit 1 exceeded
- Alarm, limit 2 exceeded
- Warning, limit 2 exceeded
- Reduced operation.
- All pumps 100 %
- Fault, remote sensor 1-10

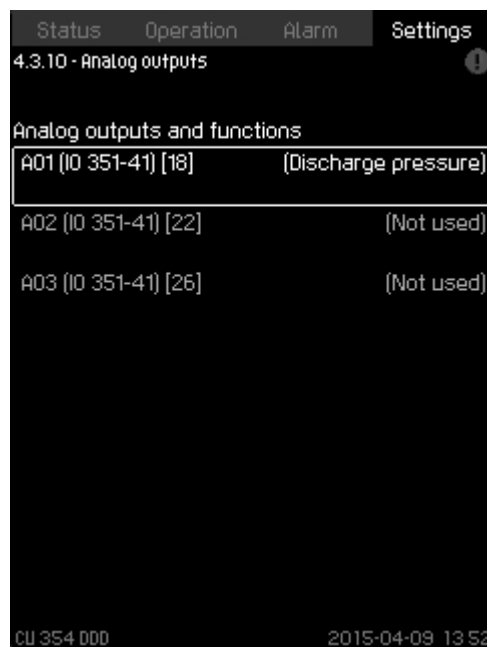
**Setting via operating panel**

- Settings > Secondary functions > Digital outputs

**Factory setting**

Digital output	Function
DO1 (CU 354) [71]	Alarm, system
DO2 (CU 354) [74]	Operation, system

## 13.4.33 Analog outputs (4.3.10)

**Analog outputs****Description**

DDD has three 0-10 V analog outputs.

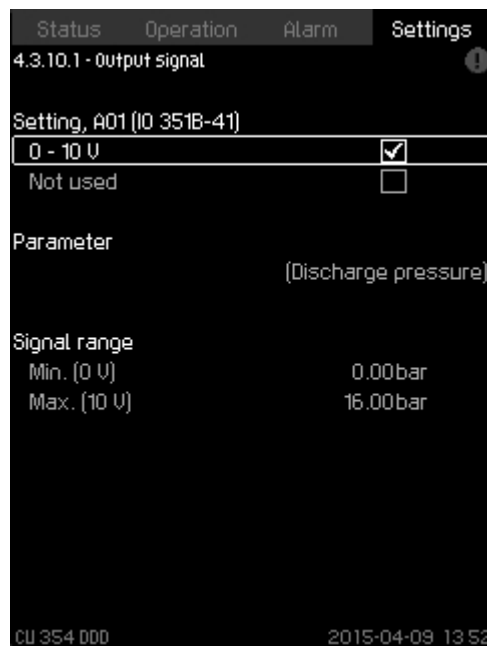
**Setting via operating panel**

- Settings > Secondary functions > Analog outputs

**Related information**

[13.4.21 Secondary functions \(4.3\)](#)

## 13.4.34 Output signal (4.3.10.1 - 4.3.10.3)

**Output signal****Description**

You can select the parameters below.

Setting range

- 0-100 % signal
- Inlet pressure
- Discharge pressure
- External pressure
- System pressure
- Ambient temperature
- System power
- Power, pump 1-6
- Power, VFD
- Speed, pump 1-6
- Current, pump 1-6

Setting via operating panel

- **Settings > Secondary functions > Analog outputs**
1. Select analog output and range.
  2. Select: **Parameter**. Display 4.3.10.2 appears.
  3. Select output.
  4. Press [Back].
  5. Set: **Signal range**.

13.4.35 Pilot pump curve data (4.3.18)

Status

Operation

Alarm

Settings

4.3.18 - Pilot pump

Pump data

Rated flow rate Q <sub>nom</sub>	0.0m³/h
Rated head H <sub>nom</sub>	0m
Max. head H <sub>max</sub>	0m
Max. flow rate Q <sub>max</sub>	0.0m³/h

Motor data

Power, Q0, 100 % speed	0.00kW
Power, Q0, 50 % speed	0.00kW
Rated power P <sub>nom</sub>	0.00kW

CU 354 000

2019-09-12 14:24

Pilot pump curve data

Description

Pilot pump data is needed for the pilot pump function to work. The function uses the following data:

- Rated flow rate Q<sub>nom</sub> [gpm]
- Rated head H<sub>nom</sub> [ft]
- Max. head H<sub>max</sub> [ft]
- Max. flow rate Q<sub>max</sub> [gpm]
- Power, Q0, 100 % speed [kW]
- Power, Q0, 50 % speed [kW]
- Rated power P<sub>nom</sub> [kW]



Grundfos can supply hydraulic data for CR, CRI, CRE and CRIE pumps where GSC files can be downloaded to CU 354.

All other pump types require manual entering of hydraulic pump data.



Enter the electrical data, **Power, Q0, 100 % speed** and **Power, Q0, 50 % speed**, manually for all pump types, including CR, CRI, CRE and CRIE.

For Grundfos E-pumps, enter the data of input power (P1).

Read the data using the pump performance curves which can be found in Grundfos Product Center at [www.grundfos.com](http://www.grundfos.com). See figures *Reading of Q<sub>nom</sub>, H<sub>nom</sub>, H<sub>max</sub> and Q<sub>max</sub> (Grundfos Product Center)* to *Reading of rated power P<sub>nom</sub> (Grundfos Product Center)*.

If you cannot access Grundfos Product Center, try bringing a pump into the three duty points:

- **Power, Q0, 100 % speed**
- **Power, Q0, 50 % speed**
- **Rated power P<sub>nom</sub>**.

See section How to read the pump curve data in Grundfos Product Center.

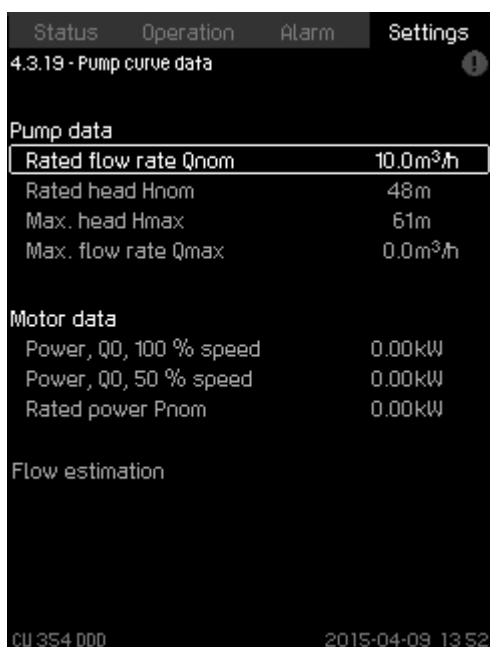
Setting via operating panel

- **Settings > Secondary functions > Pilot pump curve data**
1. Select and set:
    - **Rated flow rate Q<sub>nom</sub>**
    - **Rated head H<sub>nom</sub>**
    - **Max. head H<sub>max</sub>**
    - **Max. flow rate Q<sub>max</sub>**
    - **Power, Q0, 100 % speed**
    - **Power, Q0, 50 % speed**
    - **Rated power P<sub>nom</sub>**.

Related information

- [13.2.1 System operating mode \(2.1.1\)](#)
- [13.4.23 Pilot pump \(4.3.2\)](#)
- [13.4.36.1 How to read the pump curve data](#)
- [13.4.56 Pumps outside duty range \(4.4.7\)](#)
- [13.4.21 Secondary functions \(4.3\)](#)

## 13.4.36 Pump curve data (4.3.19)

**Pump curve data****Description**

CU 354 has a number of functions using these pump data:

<b>Rated flow rate Qnom</b>	[gpm]
<b>Rated head Hnom</b>	[ft]
<b>Max. head Hmax</b>	[ft]
<b>Max. flow rate Qmax</b>	[gpm]
<b>Power, Q0, 100 % speed</b>	[kW]
<b>Power, Q0, 50 % speed</b>	[kW]
<b>Rated power Pnom</b>	[kW]



Grundfos can supply hydraulic data for CR, CRI, CRE and CRIE pumps where you can download GSC files to CU 354.

All other pump types require that you manually enter the hydraulic pump data.



Always enter the electrical data, **Power, Q0, 100 % speed** and **Power, Q0, 50 % speed** manually for all pump types, including CR, CRI, CRE and CRIE.

For Grundfos E-pumps, enter the data of input power (P1).

Read the data using the pump performance curves which can be found in Grundfos Product Center at [www.grundfos.com](http://www.grundfos.com). See figures *Reading of  $Q_{nom}$ ,  $H_{nom}$ ,  $H_{max}$  and  $Q_{max}$  (Grundfos Product Center)* to *Reading of rated power  $P_{nom}$  (Grundfos Product Center)*.

If you cannot access Grundfos Product Center, try bringing a pump into the three duty points:

- **Power, Q0, 100 % speed**
- **Power, Q0, 50 % speed**
- **Rated power Pnom.**

**Related information**

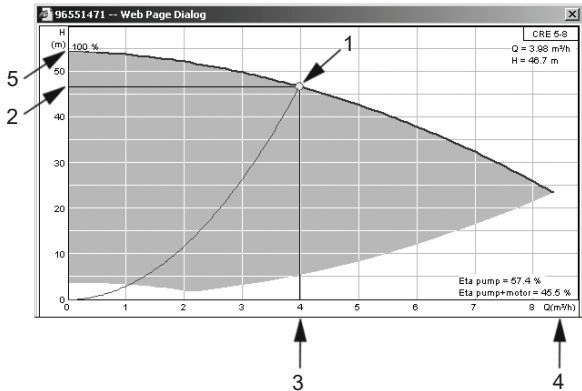
[10. Starting up the product](#)

[13.4.36.1 How to read the pump curve data](#)

[13.4.21 Secondary functions \(4.3\)](#)

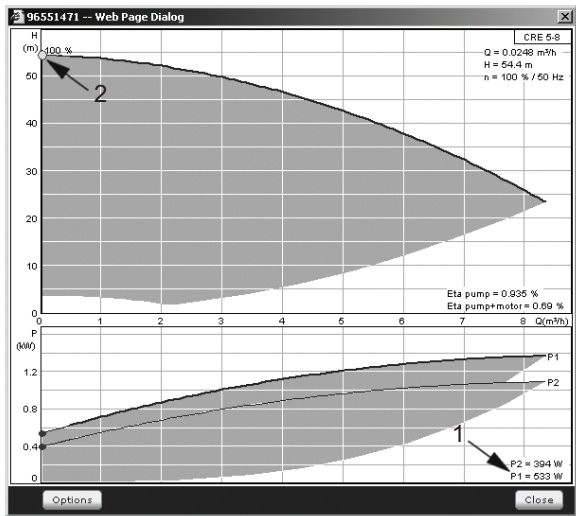
13.4.36.1 How to read the pump curve data

Read the power values in the menus 1.3 to 1.8, depending on the pump. See section **Pump 1-6** (1.3 - 1.10).



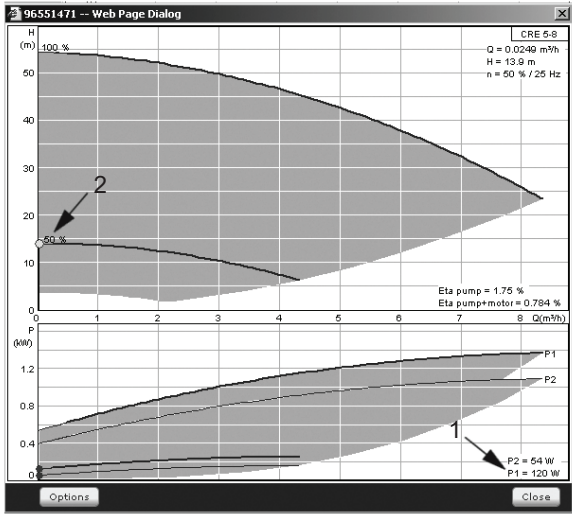
Reading of  $Q_{nom}$ ,  $H_{nom}$ ,  $H_{max}$  and  $Q_{max}$  (Grundfos Product Center)

Pos.	Description
1	Rated duty point
2	$H_{nom}$
3	$Q_{nom}$
4	$Q_{max}$
5	$H_{max}$



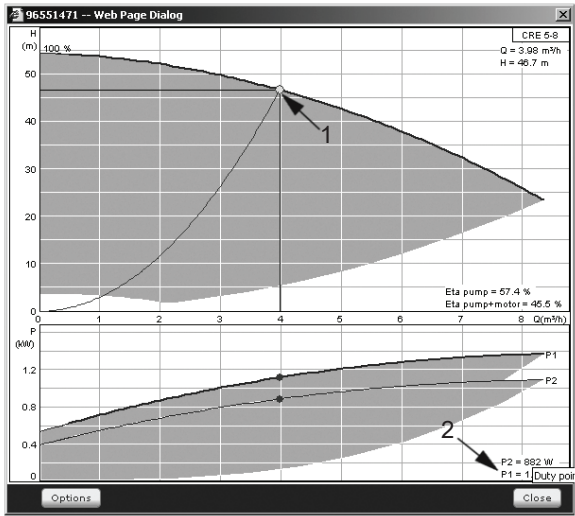
Reading of power,  $Q_0$ , 100 % speed (Grundfos Product Center)

Pos.	Description
1	Power, $Q_0$ , 100 % speed
2	Duty point, $Q_0$ , 100 % speed



Reading of power,  $Q_0$ , 50 % speed (Grundfos Product Center)

Pos.	Description
1	Power, $Q_0$ , 50 % speed
2	Duty point, $Q_0$ , 50 % speed



Reading of rated power  $P_{nom}$  (Grundfos Product Center)

Pos.	Description
1	Duty point, rated power $P_{nom}$
2	Rated power $P_{nom}$



$Q_{nom}$  and  $H_{nom}$  are the rated duty point of the pumps and usually the duty point with the highest efficiency.



### Setting via operating panel

- **Settings > Secondary functions > Stop function > Settings > Secondary functions > Stop function > Pump curve data**

#### 1. Select and set:

- **Rated flow rate Qnom**
- **Rated head Hnom**
- **Max. head Hmax**
- **Max. flow rate Qmax**
- **Power, Q0, 100 % speed**
- **Power, Q0, 50 % speed**
- **Rated power Pnom.**

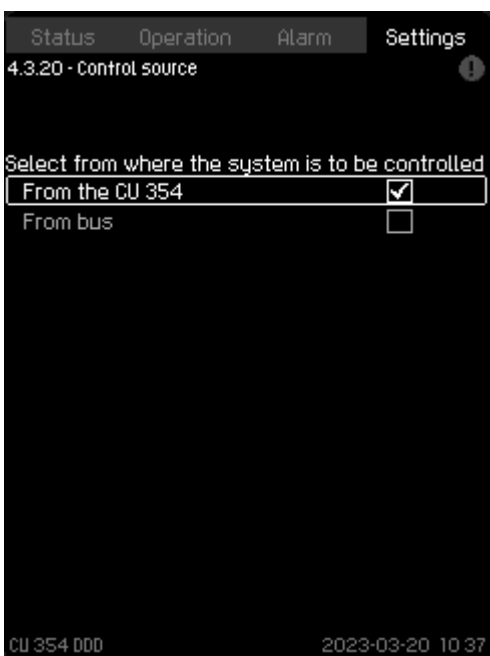
### Related information

[13.1.11 Pump 1-6 \(1.3 - 1.10\)](#)

[13.4.36 Pump curve data \(4.3.19\)](#)

[13.4.35 Pilot pump curve data \(4.3.18\)](#)

### 13.4.37 Control source (4.3.20)



### Control source

#### Description

The system can be remote-controlled via an external bus connection (option).

Select the control source, that is, either CU 354 or the external bus connection.

#### Setting via operating panel

- **Settings > Secondary functions > Stop function > Control source**

#### Factory setting

The control source is CU 354.

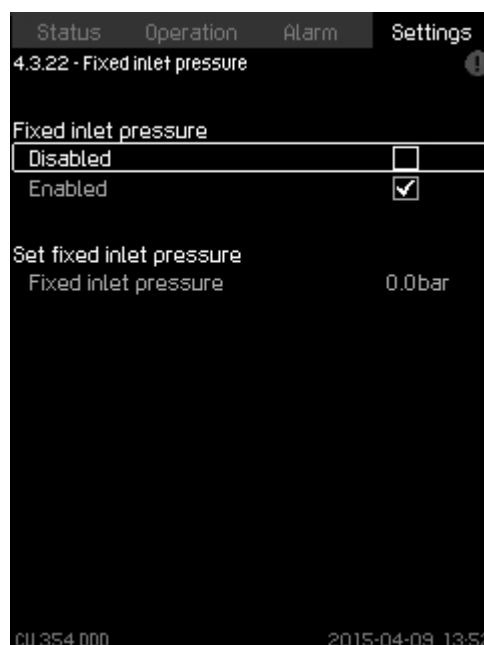
### Related information

[13.4.21 Secondary functions \(4.3\)](#)

[13.5 Data communication](#)

[13.5.1 GENIbus](#)

### 13.4.38 Fixed inlet pressure (4.3.22)



### Fixed inlet pressure

#### Description

The function is only used when no inlet-pressure sensor is fitted in the system and the inlet pressure is fixed and known.

If the pressurized system has a fixed inlet pressure, it can be entered in this menu so that CU 354 can optimize the performance and control of the system.

#### Setting range

A fixed inlet pressure can be set, and the function can be enabled or disabled.

#### Setting via operating panel

- **Settings > Secondary functions > Fixed inlet pressure**

1. Select: **Enabled** or **Disabled**.
2. Set: **Fixed inlet pressure**.

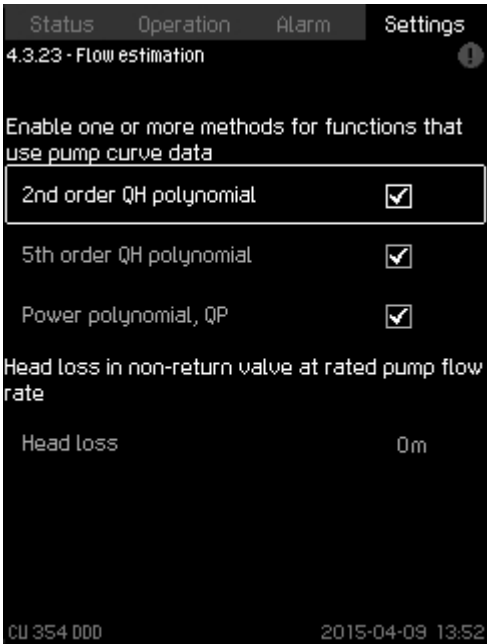
#### Factory setting

The function is disabled.

### Related information

[13.4.21 Secondary functions \(4.3\)](#)

13.4.39 Flow estimation (4.3.23)



Flow estimation

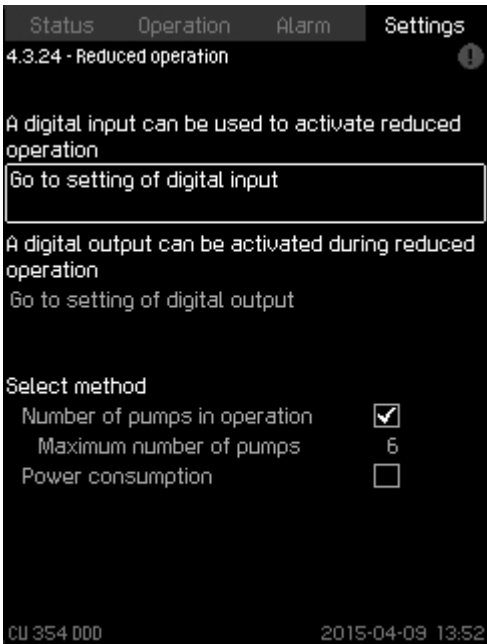


The function is not used for DDD systems.

Related information

[13.4.21 Secondary functions \(4.3\)](#)

13.4.40 Reduced operation (4.3.24)



Reduced operation

Description

With this function, you can limit the number of pumps in operation, or in DDD-E/-EC systems, to limit power consumption. The limit is activated by a digital input.

Setting range

- Setting of digital input.
- Setting of digital output.
- Maximum number of pumps in operation.
- Maximum power consumption.

Setting via operating panel

- **Settings > Secondary functions > Reduced operation > Go to setting of digital input**
  1. Select digital input.
  2. Select: **Reduced operation**.
  3. Press [Back] × 2.
  4. Select: **Go to setting of digital output**.
  5. Select digital output.
  6. Select: **Reduced operation**.
  7. Press [Back] × 2.
  8. Set: **Number of pumps in operation** or **Power consumption**.

Factory setting

No digital input is selected (disabled).

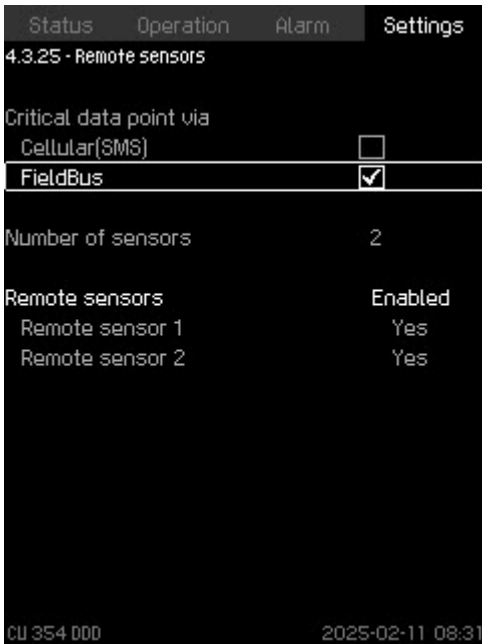
Related information

[13.4.26 Digital inputs \(4.3.7\)](#)

[13.4.31 Digital outputs \(4.3.9\)](#)

[13.4.21 Secondary functions \(4.3\)](#)

13.4.41 Remote sensors (4.3.25)



Remote sensors

Description

With this function, you can select how the controller receives data. The number of data loggers or remote sensors installed at critical points can be set, and each sensor can be enabled or disabled.

Setting via operating panel

- **Settings > Secondary functions > Remote sensors**
  1. Select **FieldBus**.

Factory setting

**Number of sensors:** 1

## Related information

[9.1 Installing the data loggers or remote sensors](#)

[10. Starting up the product](#)

[13.4.21 Secondary functions \(4.3\)](#)

### 13.4.42 Remote sensors 1-10 (4.3.25.1)



## Remote sensors

### Description

With this function, you can enable the data logger or remote sensor. You can also rename the data logger or remote sensor for easy identification, for instance, by using the street name or zip code. You can enter a setpoint for the data logger or remote sensor. Based on the logged data, CU 354 controls the outlet pressure at the pumping station to achieve the set pressure at the data logger or remote sensor.

You can see when the latest response from the data logger or remote sensor was received. The data logger or remote sensor sends the logged data once every 24 h (between 12:00 AM and 01:00 AM).

### Setting range

- Setting the data logger or remote sensor to enabled.
- Entering a unique name for the data logger or remote sensor.
- Setting the setpoint.

### Setting via operating panel

- **Settings > Secondary functions > Remote sensors > Remote sensors 1-10**
  1. Select: **Enabled**.
  2. Enter a unique name for the data logger or remote sensor.
  3. Set the setpoint, that is, the minimum pressure at the critical point.
  4. Press [Back].
  5. Set the next data logger or remote sensor if there is any.

### Factory setting

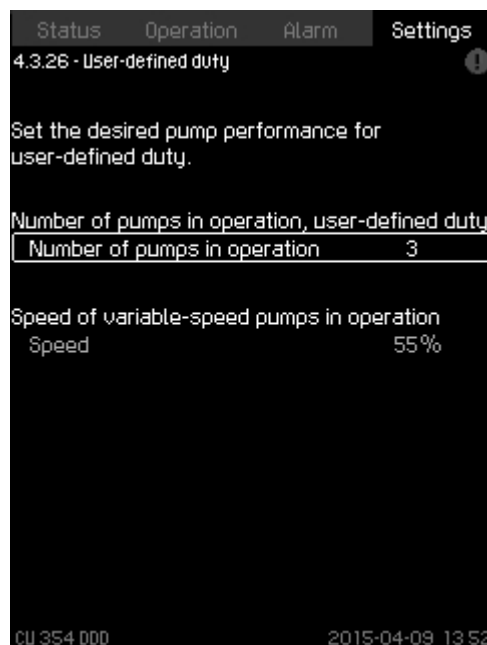
Disabled.

Setpoint: 29 psi.

### Related information

[10. Starting up the product](#)

### 13.4.43 User-defined duty (4.3.26)



## User-defined duty

### Description

With this function, you can set a user-defined performance, typically a performance between minimum and maximum duty.

The function makes it possible to set a pump performance by selecting the number of pumps to run and the speed.

### Setting range

- Number of pumps in operation.
  - Speed as percentage.
- Note: The speed can be set between 25 and 100 %.

### Setting via operating panel

- **Settings > Secondary functions > User-defined duty**
  1. Select and set:
    - **Number of pumps in operation, user-defined duty.**
    - **Speed.**

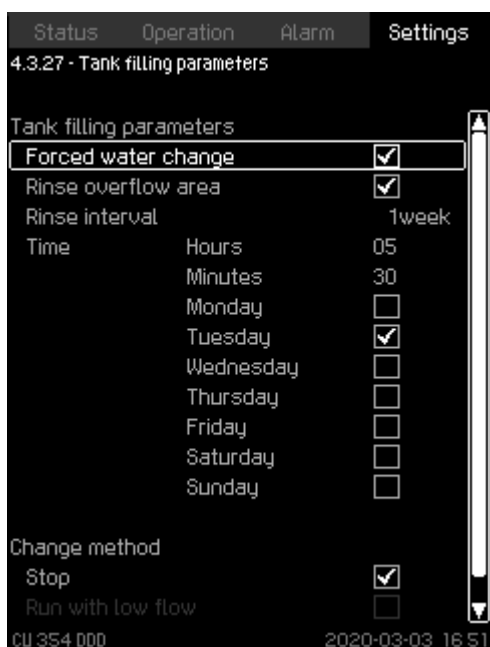
### Factory setting

The function is disabled as the following has been set:  
Number of pumps in operation during user-defined duty: 0

### Related information

[13.1.3 Operating mode \(1.2.1\)](#)

## 13.4.44 Tank filling parameters (4.3.27)

**Tank filling parameters****Description**

With this function, you can set water change parameters for the tank. If enabled, the water change happens one or several days a week, depending on the days selected. If all days are selected, it happens every day at the selected time of day. The water change can also include the overflow area to be rinsed to avoid bacteria growth. The frequency of rinsing the overflow area can be selected from 1 to 52 weeks, as it might not be needed to rinse the overflow area every week. The rinse always happens on the first day selected.

**Setting range**

- Enable: **Forced water change**.
- Enable: **Rinse overflow area**.
- Set **Rinse interval** to an interval from 1 to 52 weeks.
- Set the day and time of day for forced water change. Multiple days can be selected.
- Set **Change method** to either of the following:
  - **Stop**: the system is stopped.
  - **Run with low pressure**: you can set a fixed pressure during the water change to keep pressure in the system.
  - **Run with low flow**: you can set a fixed flow during the water change to keep a minimum flow.

**Setting via operating panel**

- **Settings > Secondary functions > Tank filling parameters**
  1. Select **Forced water change** to enable it.
  2. Select **Rinse overflow area** to enable it.
  3. Set **Rinse interval** to an interval from 1 to 52 weeks.
  4. Set the following:
    - Time of day
      - **Hours**
      - **Minutes**.
  5. Select the day of week. Multiple days can be selected.
  6. Select and set **Change method**:
    - **Stop**
    - **Run with low pressure**
    - **Run with low flow**.

## 13.4.45 Measurement supervision (4.3.28)

**Measurement supervision****Description**

The function is designed to monitor up to six different input values and let them influence or limit the setpoint. The influence can be different from that of the primary sensor, so for example, the primary control can be set to flow control and the supervision can be set to discharge pressure to monitor and ensure that the outlet pressure never goes below a specific level.

**Setting range**

- **Setpoint limits**:  
The settings of the function change the control setpoint up or down according to the supervision feedback.
- Set Supervision 1-6 depending on the parameters that need to be monitored.

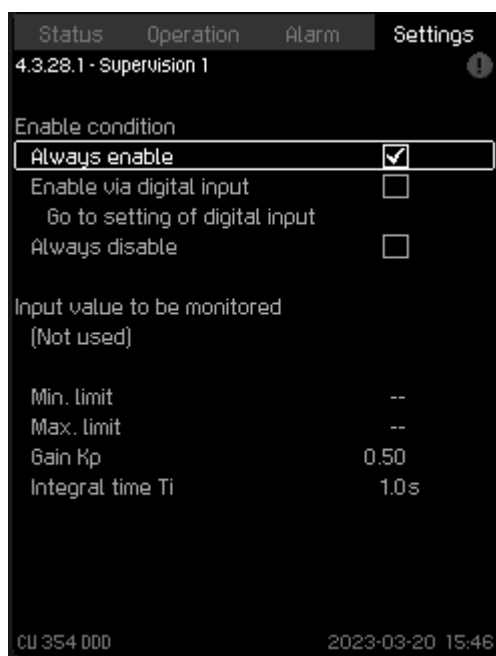
**Setting via operating panel**

- **Settings > Secondary functions > Measurement supervision**
  1. Set **Setpoint limits**. Select the minimum and maximum limit.
  2. Select **Supervision 1** to **Supervision 6** to set the individual settings for each supervision parameter.

**Related information**

[13.4.46 Supervision 1 to Supervision 6 \(4.3.28.1 - 6\)](#)

## 13.4.46 Supervision 1 to Supervision 6 (4.3.28.1 - 6)

**Supervision 1 to Supervision 6****Description**

Each Supervision parameters must be defined.

**Setting range**

- On-off
  - **Always disable**: the supervision parameter is disabled.
  - **Always enable**: the supervision parameter is enabled.
  - **Enable via digital input**: set the digital input to enable the supervision parameter.
- **Input value to be monitored**: select the input value to be monitored.
- Supervision limits: the minimum and maximum limits for the selected input value.
- **Gain Kp**: -30 to 30. For inverse control, set Kp to a negative value.
- **Integral time Ti**: 0.0 to 3600 seconds.

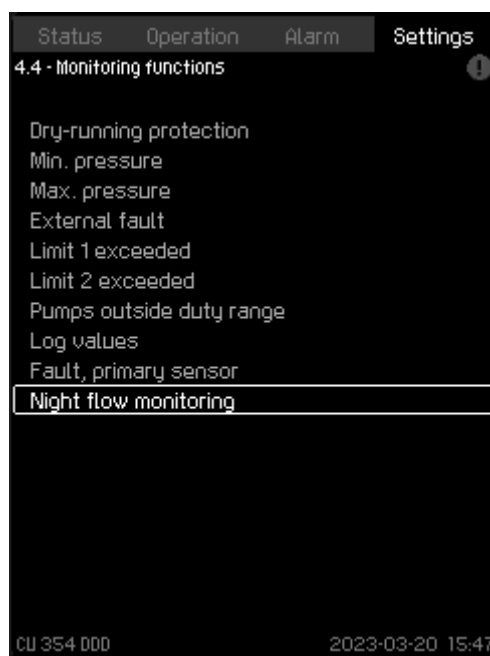
**Setting via operating panel**

- **Settings > Secondary functions > Measurement supervision > Supervision 1**
1. Set On-off:
    - **Always disable**
    - **Always enable**
    - **Enable via digital input**
      - Go to the settings of digital input: set the digital input.
      - Press [Back].
  2. Select the input value to be monitored.
  3. Press [Back].
  4. Set **Setpoint limits**. Select the minimum and maximum limit.
  5. Set **Gain Kp**.
  6. Set **Integral time Ti**.

**Related information**

[13.4.45 Measurement supervision \(4.3.28\)](#)

## 13.4.47 Monitoring functions (4.4)

**Monitoring functions****Description**

The system has a series of functions that constantly monitor the operation of the system.

The primary purpose of the monitoring functions is to ensure that faults do not damage pumps or the system.

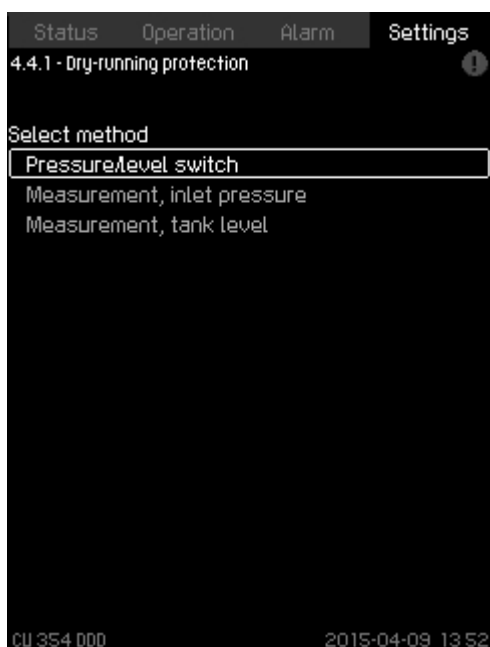
**Setting range**

- [Dry-running protection \(4.4.1\)](#)
- [Min. pressure \(4.4.2\)](#)
- [Max. pressure \(4.4.3\)](#)
- [External fault \(4.4.4\)](#)
- [Limit 1 exceeded, Limit 2 exceeded \(4.4.5 - 4.4.6\)](#)
- [Pumps outside duty range \(4.4.7\)](#)
- [Log values \(4.4.9\)](#)
- [Fault, primary sensor \(4.4.10\)](#)
- [Night flow monitoring \(4.4.11\)](#)

**Setting via operating panel**

- **Settings > Monitoring functions**

## 13.4.48 Dry-running protection (4.4.1)

**Dry-running protection****Description**

Dry-running protection is one of the most important monitoring functions, as bearings and shaft seal may be damaged if the pumps run dry. We thus always recommend dry-running protection.

The function is based on monitoring of the inlet pressure or the level in a possible tank or pit on the inlet side.

Level switches, pressure switches or analog sensors signaling water shortage at a set level can be used.

There are three different methods for detection of water shortage:

- Pressure switch on inlet manifold or float switch/electrode relay in the supply tank.
- Measurement of inlet pressure in the inlet manifold by means of an analog pressure transmitter.
- Measurement of level in the supply tank by means of an analog level transmitter.

**Setting via operating panel**

- **Settings > Monitoring functions > Dry-running protection > Select method**

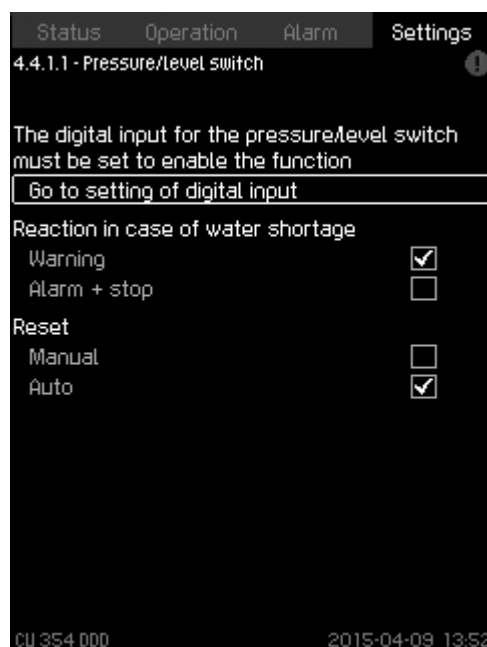
**Related information**

[13.4.49 Pressure/level switch \(4.4.1.1\)](#)

[13.4.50 Measurement, inlet pressure \(4.4.1.2\)](#)

[13.4.51 Measurement, tank level \(4.4.1.3\)](#)

## 13.4.49 Pressure/level switch (4.4.1.1)

**Pressure/level switch****Description**

Dry-running protection can take place by means of a pressure switch on the inlet manifold or a level switch in a tank on the inlet side.

When the contact is open, CU 354 will register water shortage after a time delay of approximately five seconds. You can set whether the indication is to be just a warning or an alarm stopping the pumps.

You can set restarting and resetting of alarms to be automatic or manual.

**Setting range**

- Selection of digital input for the function.
- Reaction in case of water shortage: **Alarm + stop**.
- Restarting: **Manual** or **Auto**.

**Setting via operating panel**

- **Settings > Monitoring functions > Dry-running protection > Pressure/level switch > Go to setting of digital input**

Display **Digital inputs** (4.3.7) appears.

1. Set the input to dry-running protection.
2. Press [Back].
3. Select:
  - **Warning** or **Alarm + stop**.
  - **Manual** or **Auto**.

**Factory setting**

The setting is done in the startup wizard and depends on the application.

**Related information**

[13.4.48 Dry-running protection \(4.4.1\)](#)

[13.4.26 Digital inputs \(4.3.7\)](#)

## 13.4.50 Measurement, inlet pressure (4.4.1.2)

**Measurement, inlet pressure****Description**

Dry-running protection can take place by means of a pressure transmitter measuring the inlet pressure.

You can set two levels:

- **Warning**
- **Alarm + stop.**

You can set restarting and resetting of alarms to be automatic or manual.

**Setting range**

- Selection of analog input for the function.
- Inlet pressure level for warning.
- Inlet pressure level for alarm + stop.
- Restarting: **Auto** or **Manual**.

**Setting via operating panel**

- **Settings > Monitoring functions > Dry-running protection > Measurement, inlet pressure > Go to setting of analog input**  
Menu **Analog inputs** (4.3.8) appears.

1. Select: **Inlet pressure**.
2. Press [Back].
3. Select: **Enabled**.
4. Select and set the level:
  - **Warning**.
  - **Alarm + stop**.
5. Select resetting: **Auto** or **Manual**.



If one of the levels is not required, the level value must be the minimum value of the inlet-pressure transmitter. This disables the function.

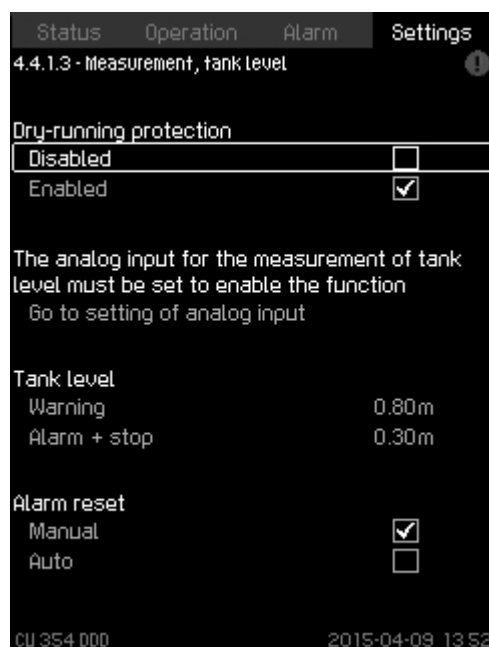
**Factory setting**

The setting is done in the startup wizard and depends on the application.

**Related information**

- [13.4.48 Dry-running protection \(4.4.1\)](#)
- [13.4.28 Analog inputs \(4.3.8\)](#)

## 13.4.51 Measurement, tank level (4.4.1.3)

**Measurement, tank level****Description**

Dry-running protection can take place by means of a level transmitter measuring the level in a tank on the inlet side.

You can set two levels:

- **Warning**
- **Alarm + stop.**

You can set restarting and resetting of alarms to be automatic or manual.

**Setting range**

- Selection of analog input for the function.
- Tank level for warning.
- Tank level for alarm + stop.
- Restarting: **Manual** or **automatic**.

**Setting via operating panel**

- **Settings > Monitoring functions > Dry-running protection > Measurement, tank level > Go to setting of analog input**  
Menu **Analog inputs** (4.3.8) appears.

1. Set the input to **Tank level, suction side**.
2. Press [Back].
3. Select: **Enabled**.
4. Select and set the level:
  - **Warning**.
  - **Alarm + stop**.
5. Select resetting: **Manual** or **Auto**.

**Factory setting**

The function is disabled.

**Related information**

- [13.4.48 Dry-running protection \(4.4.1\)](#)
- [13.4.28 Analog inputs \(4.3.8\)](#)

## 13.4.52 Min. pressure (4.4.2)

**Min. pressure****Description**

The outlet pressure will be monitored if the function is enabled. CU 354 will react if the pressure becomes lower than a set minimum level for an adjustable time.

The minimum pressure can be monitored if a fault indication is required in situations where the outlet pressure becomes lower than the set minimum pressure.

You can set whether the indication is to be just a warning or an alarm stopping the pumps.

You can set a startup delay ensuring that the system can build up pressure before the function is enabled. You can also set a time delay, that is, for how long time the outlet pressure may be lower than the set minimum pressure before the alarm is activated.

**Setting range**

- Minimum pressure level within the range of the primary sensor.
- Activation of stop when the pressure falls below the minimum pressure.
- **Time delay of function at startup.**
- **Time delay of function during operation.**

**Setting via operating panel**

- **Settings > Monitoring functions > Min. pressure > Enabled**
  1. Select and set: **Min. pressure.**
  2. Select: **Alarm + stop at min. pressure.**
  3. Set:
    - **Time delay of function at startup**
    - **Time delay of function during operation.**

**Factory setting**

The function is disabled.

## 13.4.53 Max. pressure (4.4.3)

**Max. pressure****Description**

The outlet pressure will be monitored if the function is enabled. CU 354 will react if the pressure becomes higher than a set maximum level.

In certain installations, a too high outlet pressure may cause damage. It may therefore be necessary to stop all pumps for a short period if the pressure is too high.

You can set whether the system is to restart automatically after the pressure has dropped below the maximum level, or if the system must be reset manually. Restarting will be delayed by an adjustable time.

**Setting range**

- Maximum pressure level within the range of the primary sensor.
- Manual or automatic restarting.

**Setting via operating panel**

- **Settings > Monitoring functions > Max. pressure > Enabled**
  1. Set: **Max. pressure.**
  2. Select resetting: **Auto** or **Manual.**

**Factory setting**

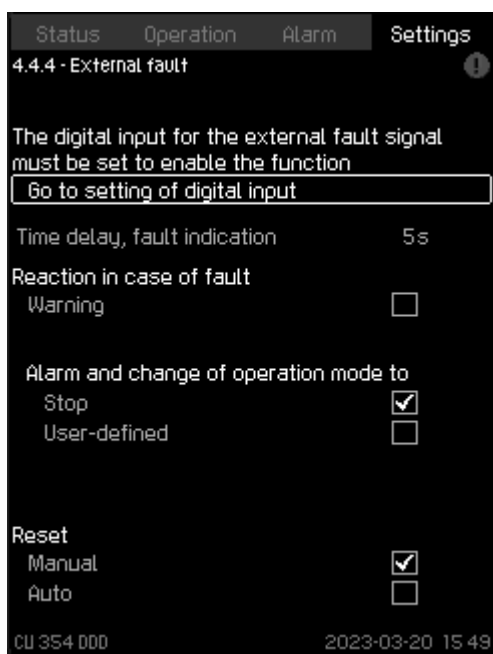
The function is disabled.

**Related information**

[13.4.13 Min. time between start/stop \(4.2.1\)](#)



## 13.4.54 External fault (4.4.4)

**External fault****Description**

The function is used when CU 354 is to be able to receive a fault signal from an external contact. In case of external fault, CU 354 indicates warning or alarm. In case of alarm, the system changes to another manual operating mode, for instance, **Stop**.

**Setting range**

- Selection of digital input for the function.
- Setting of time delay from closing of the contact until CU 354 reacts.
- Reaction in case of external fault: Warning or alarm and change of operating mode.
- Restarting after alarm: Manual or automatic.

**Setting via operating panel**

- **Settings > Monitoring functions > External fault > Go to setting of digital input**  
Menu **Digital inputs** (4.3.7) appears.
- 1. Set the input to **External fault**.
- 2. Press [Back].
- 3. Set: **Time delay, fault indication**.
- 4. If only a warning is required in case of external fault, select **Warning**.  
If the system is to give alarm and change operating mode in case of external fault, select operating mode **Manual** or **Auto**.

**Factory setting**

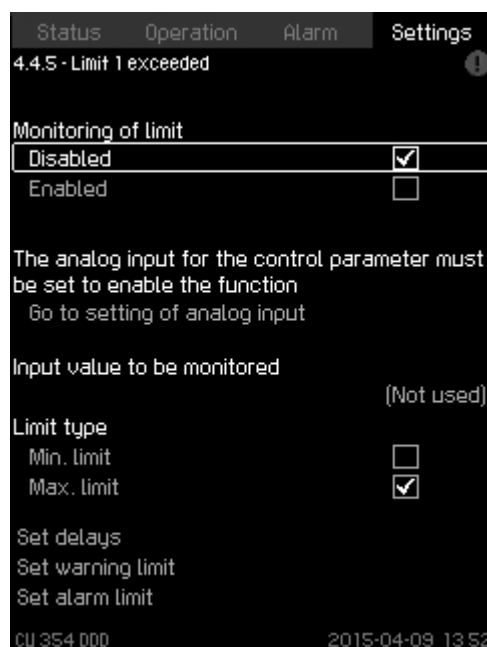
The function is disabled. If the function is enabled, the following values have been set from factory:

- Time delay: 5 seconds.
- Operating mode in case of alarm: **Stop**.
- Restarting: **Manual**.

**Related information**

[13.4.26 Digital inputs \(4.3.7\)](#)

## 13.4.55 Limit 1 exceeded, Limit 2 exceeded (4.4.5 - 4.4.6)

**Limit 1 exceeded****Description**

With this function, CU 354 can monitor set limits of analog values. It will react if the values exceed the limits. Each limit can be set as a maximum or minimum value. For each of the monitored values, a warning limit and an alarm limit must be defined.

If the value exceeds the warning limit, a warning is given. If the value exceeds the alarm limit, the pumps will be stopped.

You can set a delay between the detection of an exceeded limit and the activation of a warning or an alarm. You can also set a delay for resetting a warning or an alarm.

A warning can be reset automatically or manually.

You can set whether the system is to restart automatically after an alarm, or if the alarm must be reset manually. Restarting can be delayed by an adjustable time. You can also set a startup delay ensuring that the system reaches a steady state before the function becomes active.

**Setting range**

- selection of analog input for the function
- input value to be monitored
- limit type (min. or max.)
- warning limit
- alarm limit.

**Setting via operating panel**

Analog inputs must be correctly set before the function is enabled. See section **Analog inputs** (4.3.8).

- **Settings > Monitoring functions > Limit 1 exceeded > Go to setting of analog input**
- **Settings > Monitoring functions > Limit 2 exceeded > Go to setting of analog input**
- 1. Select analog input.
- 2. Select: **Input value to be monitored**. Menu 4.3.8.1.1 appears.
- 3. Select input.
- 4. Press [Back].
- 5. Set the minimum and maximum sensor value.
- 6. Press [Back] × 2.

7. Select: **Input value to be monitored.**
8. Select input.
9. Press [Back].
10. Select:
  - **Min. limit / Max. limit.**
  - **Set delays.**
11. Press [Back].
12. Select:
  - **Set warning limit**
  - **Enabled.**
13. Set limit.
14. Select resetting: **Auto** or **Manual**.
15. Press [Back].
16. Select:
  - **Set alarm limit**
  - **Enabled.**
17. Set limit.
18. Select resetting: **Auto** or **Manual**.
19. Press [Back].
20. Select: **Enabled.**

#### Factory setting

The function is disabled.

#### Related information

[13.4.28 Analog inputs \(4.3.8\)](#)

[13.4.29 Analog inputs \(4.3.8.1 - 4.3.8.7\)](#)

#### 13.4.56 Pumps outside duty range (4.4.7)



#### Pumps outside duty range

##### Description

The function gives a warning if the duty point of the pumps moves outside the defined range. For instance, if the inlet pressure becomes lower than a minimum permissible value, thus causing a risk of cavitation for some pump types.

The warning is given with a set time delay. You can set whether the warning is to be reset automatically or manually when the duty point comes within the defined duty range. You can also set a relay output to be activated when the warning is given, and to be deactivated when the warning is reset.

This function requires that the outlet pressure and the inlet pressure (either measured or configured) or the differential pressure of the pumps is monitored, and that CU 354 contains valid pump data from either a GSC file or from manual input.

#### Setting range

- Setting of manual or automatic resetting.
- Setting of warning delay.

#### Setting via operating panel

- **Settings > Monitoring functions > Pumps outside duty range > Manual > Set warning delay**
- **Settings > Monitoring functions > Pumps outside duty range > Auto > Set warning delay**

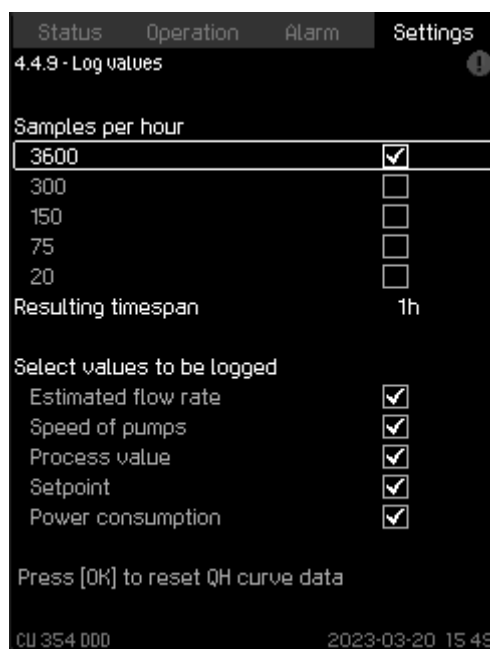
#### Factory setting

The function is disabled.

#### Related information

[13.4.35 Pilot pump curve data \(4.3.18\)](#)

#### 13.4.57 Log values (4.4.9)



#### Log values

##### Description

With this function, you can select the values to be logged and the number of samples per hour. The resulting timespan is shown. When the timespan has elapsed, old logged values will be deleted and overwritten by the new ones.

##### Log values

- **Flow rate**
- **Speed of pumps**
- **Process value**
- **Setpoint**
- **Power consumption (DDD-E/-EC systems)**

#### Setting range

**Samples per hour:** 1-3600.

#### Setting via operating panel

- **Settings > Monitoring functions > Log values**

1. Set: **Samples per hour.**
2. Select the values to be logged.

## Related information

[13.1.8 Log graph \(1.2.6\)](#)

### 13.4.58 Fault, primary sensor (4.4.10)

#### **Fault, primary sensor**

##### Description

With this function, you can set how the system reacts if the primary sensor fails.

##### Setting range

- **Stop (without delay)**
- **Stop (with delay)**
- **User-defined**
- **Operating mode "Local"**
- **Emergency run**
- **Reset: Manual or Auto.**

##### Setting via operating panel

- **Settings > Monitoring functions > Fault, primary sensor**
1. Select reaction in case of a fault in the primary sensor.
  2. Select resetting: **Auto** or **Manual**.

### 13.4.59 Night flow monitoring (4.4.11)

#### **Night flow monitoring**

##### Description

With this function, you can set the system to monitor the flow at night (default setting is between 2:00 AM and 4:00 AM). This will help detect leakages as the flow rate during this period is normally stable. If the flow rate exceeds the warning limit, a warning is given.

##### Setting range

- **Enabled.**
- **Warning limit.**
- **Warning reset: Auto or Manual.**
- **Monitoring period.**

##### Setting via operating panel

- **Settings > Monitoring functions > Night flow monitoring**
1. Select: **Enabled**.
  2. Set warning limit.
  3. Select resetting: **Auto** or **Manual**.
  4. Set the period.

##### Factory setting

The function is disabled. The period is set to 2:00 AM to 4:00 AM.

13.4.60 Functions, CU 354 (4.5)



Functions, CU 354

Description

In this sub-menu, you can set the basic settings of CU 354. CU 354 comes with most of these settings, or they are made at startup and normally not to be changed.

The service language, British English, can be selected for service purposes. If no buttons are touched for 15 minutes, the display returns to the language selected at startup or to the language set in **Display language (4.5.1)**.



If the service language is selected, the settings symbol will be shown to the right of the top line of all displays.

Setting range

- Activation of service language, British English.
- Re-activation of startup wizard. (After startup, the wizard is inactive.)
- Selection of display language.
- Selection of display units.
- Setting date and time.
- Selection of password for the menu **Operation** and **Settings**.
- Setting of Ethernet communication.
- Setting of GENIbus number.
- Reading of software status.

Related information

[13.4.61 Display language \(4.5.1\)](#)

13.4.61 Display language (4.5.1)



Display language

Description

With this function, you can select the language for the CU 354 controller.

Setting range

- **English.**

Setting via operating panel

- **Settings > Functions, CU 354**

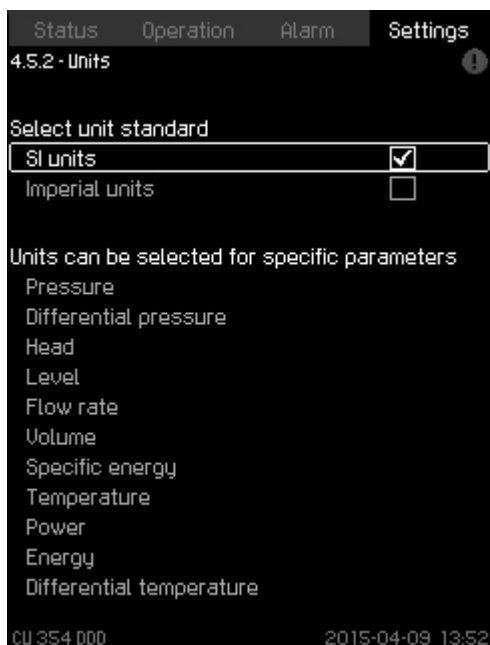
Factory setting

The language is British English.

Related information

[13.4.60 Functions, CU 354 \(4.5\)](#)

## 13.4.62 Units (4.5.2)

**Units****Description**

With this function, you can select units for the various parameters. Select between SI and imperial units. You can also select other units for the individual parameters.

**Setting range**

Parameter	Basic setting		Possible units
	SI	Imperial	
Pressure	bar	psi	kPa, MPa, mbar, bar, m, psi
Differential pressure	m	psi	kPa, MPa, mbar, bar, m, psi
Head	m	ft	m, cm, ft, in
Level	m	ft	m, cm, ft, cm
Flow rate	m <sup>3</sup> /h	gpm	m <sup>3</sup> /s, m <sup>3</sup> /h, l/s, gpm, yd <sup>3</sup> /s, yd <sup>3</sup> /mi, yd <sup>3</sup> /h
Volume	m <sup>3</sup>	gal	l, m <sup>3</sup> , gal, yd <sup>3</sup>
Specific energy	kWh/m <sup>3</sup>	Wh/gal	kWh/m <sup>3</sup> , Wh/gal, Wh/kgal, BTU/gal, HPh/gal
Temperature	°C	°F	K, °C, °F
Differential temperature	K	K	K
Power	kW	HP	W, kW, MW, HP
Energy	kWh	kWh	kWh, MWh, BTU, HPh

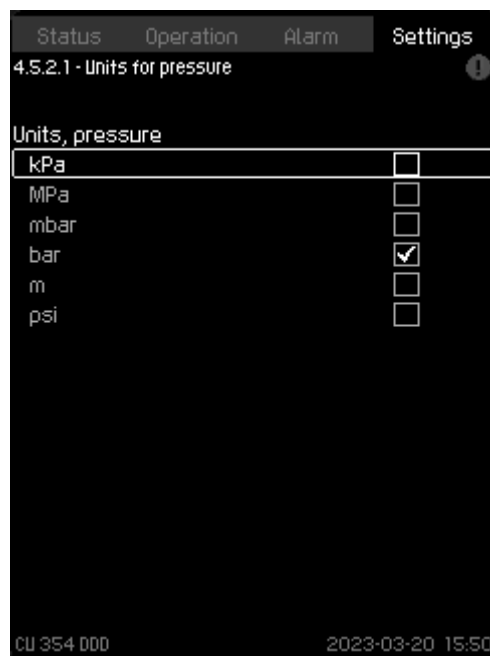


If units are changed from SI to imperial or vice versa, all individually set parameters will be changed to the basic setting in question.

**Setting via operating panel**

- **Settings > Functions, CU 354 > Units**

Set unit standard, measuring parameter and specific unit. See the example in the figure below.



*Example of selection of units*

**Factory setting**

The setting is done in the startup wizard and depends on the application.

## 13.4.63 Date and time (4.5.3)

**Date and time****Description**

With this function, you can set date and time as well as how they are to be shown in the display.

The clock has a built-in rechargeable voltage supply which can supply the clock for up to 20 days if the voltage supply to the system is interrupted.

If the clock is without voltage for more than 20 days, it must be set again.

Control DDD is using Grundfos iCloud (GiC) to receive data from the data logger or remote sensor. GiC is a global service and handles all data's timestamp in UTC+00:00 time.



All components with built-in real time clock, that is, the CU 354 controller and the data loggers or remote sensors, must be set to UTC+00:00 time. The data loggers or remote sensors are automatically synchronizing the time with the cellular network, but the time in the CU 354 controller must be set manually. The **Automatic time synchronization** must be disabled otherwise the controller synchronizes the time with the cellular network.



The main dashboard shows the UTC+00:00 time and not the local time.

Setting range

The date can be set as day, month and year. The time can be set as a 24-hour clock showing hours and minutes. Three formats are supported.

Examples of format
2012-09-27 13:49
27-09-2012 13:49
9/27/2012 1:49pm

You can select if Sunday or Monday is to be the first day of week. You can choose to have the PC and the controller clocks synchronized automatically to ensure the system is sending and receiving data at the specified time.

Setting via operating panel

- **Settings > Functions, CU 354 > Date and time**
  1. Select and set:  
**Day, Month, Year, Hours, Minutes.**
  2. Select format.
  3. Select **Sunday** or **Monday** under **First day of week**.
  4. Choose to activate or deactivate **Automatic time synchronization**.

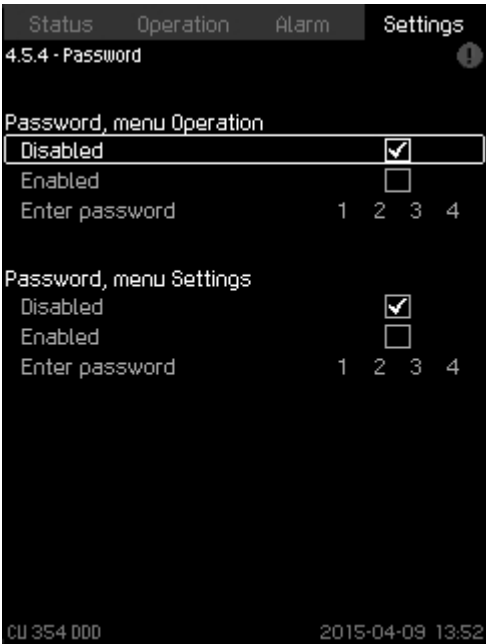
Factory setting

The function is activated as default and set to local time.



If the system has been without voltage for more than 20 days since it left the factory, the clock may have returned to the factory setting: 01-01-2005 0:00. Date and time may have been changed during the setting of system.

13.4.64 Password (4.5.4)



Password

Description

With this function, you can limit the access to the menu **Operation** and **Settings** by setting a password. If the access is limited, it is not possible to view or set any parameters in the menus. The password must consist of four digits and may be used for both menus.

If you have forgotten the password(s), contact Grundfos.

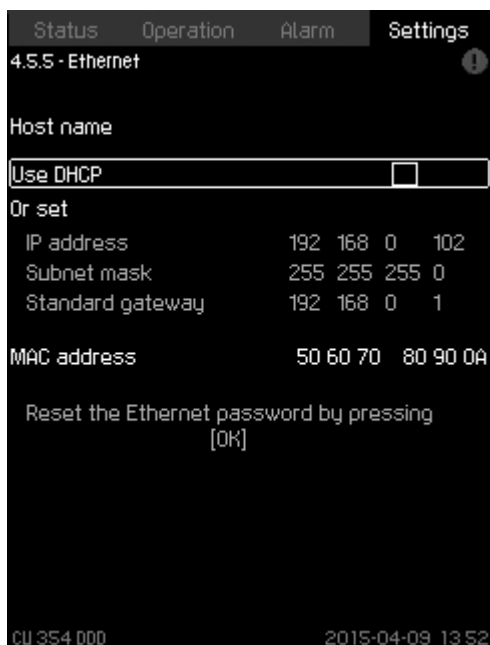
Setting via operating panel

- **Settings > Functions, CU 354 > Password**
  1. Select the password to be enabled.
  2. Select: **Enter password**. The first digit of the password is flashing.
  3. Select digit. The second digit of the password is flashing.
  4. Repeat these steps if it is necessary to enable the other password.

Factory setting

Both passwords are disabled. If a password is enabled, the factory setting will be "1234".

### 13.4.65 Ethernet (4.5.5)

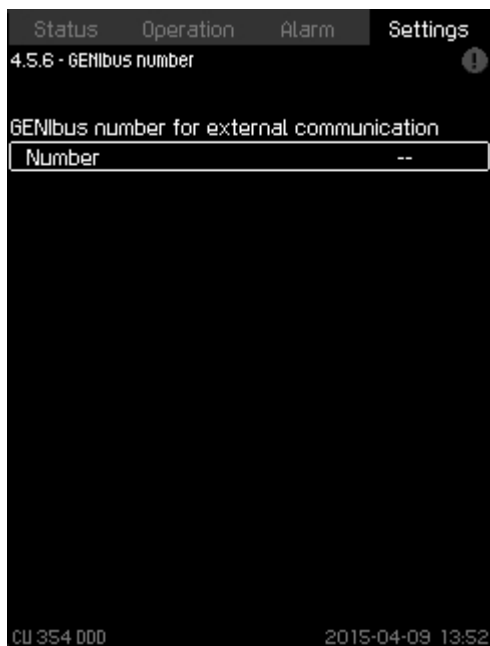


#### Ethernet

##### Description

CU 354 is equipped with an Ethernet connection for communication with a computer, either direct or via internet.

### 13.4.66 GENIbus number (4.5.6)



#### GENIbus number

##### Description

CU 354 can communicate with external units via an RS-485 interface (option). See also figure Data communication and section GENIbus.

Communication is carried out according to the Grundfos bus protocol, GENIbus, and enables connection to a building management system or another external control system.

Operating parameters, such as setpoint and operating mode, can be set via the bus signal. Furthermore, status about important parameters, such as actual value, input power, and fault indications can be read from CU 354.

Contact Grundfos for further information.

##### Setting range

The number can be set between 1 and 64.

##### Setting via operating panel

- **Settings > Functions, CU 354 > GENIbus number**

##### Factory setting

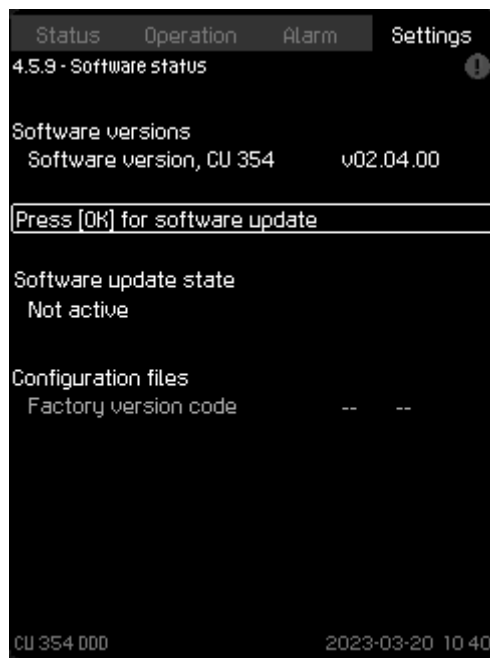
No number has been set.

##### Related information

[13.5 Data communication](#)

[13.5.1 GENIbus](#)

### 13.4.67 Software status (4.5.9)



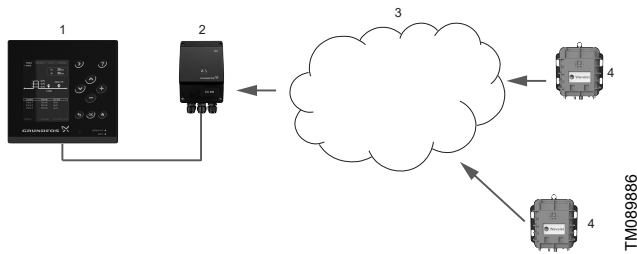
#### Software status

##### Description

The display shows the status of the software installed in CU 354. Furthermore, the version code and the product numbers of configuration files (GSC) read into the unit are shown. You can also upgrade the software version. Contact Grundfos for further information.

13.5 Data communication

CU 354 is equipped with a hardware enabling communication with external units, such as a computer, via an external GENIbus or Ethernet connection.



Data communication

Pos.	Description
1	CU 354 controller
2	Grundfos CIU 900 + CIM 280 communication devices
3	Grundfos iCloud
4	Wavelet 4R data logger

Related information

- 13.4.37 Control source (4.3.20)
- 13.4.66 GENIbus number (4.5.6)

13.5.1 GENIbus

By installing a GENIbus module in CU 354 you can connect the system to an external network. The connection can take place via a GENIbus-based network or a network based on another fieldbus protocol via a gateway. See examples in fig. Data communication via external GENIbus and Ethernet connection. Contact Grundfos for further information.

The gateway may be a Grundfos CIU or a third-party gateway. For further information on the CIU, see Grundfos Product Center, or contact Grundfos.

Related information

- 13.4.37 Control source (4.3.20)
- 13.4.66 GENIbus number (4.5.6)

14. Measuring parameters

14.1 Transmitter types

The transmitter types in the table below can be used for the measurement of values in the system.

Abbreviation	Transmitter
FT	Flow transmitter
PT	Pressure transmitter
RPT	Remote sensor

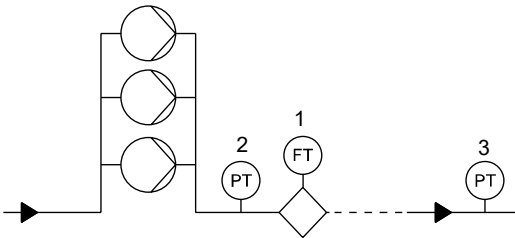
Related information

- 13.4.30 Analog inputs and measured value (4.3.8.1.1 - 4.3.8.7.1)

14.2 Parameter list

The table below shows which measured values CU 354 can receive via its analog inputs. The figure below shows where these values can be measured.

Pos.	Parameter
1	Flow rate
2	Outlet pressure
3	Pressure, critical point



Pressure boosting

Related information

- 13.4.30 Analog inputs and measured value (4.3.8.1.1 - 4.3.8.7.1)

15. Service

WARNING

Electric shock

Death or serious personal injury



- Switch off the power supply before you start any work on the product.
- Lock the main switch with a padlock to ensure that the power supply cannot be accidentally switched on.

15.1 Maintaining the product

CU 354 is maintenance-free.

Keep the unit clean and dry, and protect it against direct sunlight.



## 16. Taking the product out of operation

1. Switch off the main switch to take the system out of operation.

### WARNING

#### Electric shock

Death or serious personal injury



- Do not touch the conductors in front of the main switch as they are still energized.
- Lock the main switch with a padlock to ensure that the power supply cannot be accidentally switched on.

## 17. Fault finding

### WARNING

#### Electric shock

Death or serious personal injury



- Switch off the power supply for at least five minutes before you start any work on the product.
- Make sure that the power supply cannot be accidentally switched on.

### 17.1 The system has stopped and cannot restart

Cause	Remedy
The primary sensor is defective.	<ul style="list-style-type: none"> <li>• Replace the sensor.</li> <li>• Transmitters with 0-20 mA or 4-20 mA output signals are monitored by the system.</li> </ul>
The cable is broken or short-circuited.	<ul style="list-style-type: none"> <li>• Repair or replace the cable.</li> </ul>
The power supply is disconnected.	<ul style="list-style-type: none"> <li>• Connect the power supply.</li> </ul>
CU 354 is defective.	<ul style="list-style-type: none"> <li>• Contact Grundfos.</li> </ul>
The power supply is disconnected.	<ul style="list-style-type: none"> <li>• Connect the power supply.</li> </ul>
The main switch is switched off.	<ul style="list-style-type: none"> <li>• Switch on the main switch.</li> </ul>
The main switch is defective.	<ul style="list-style-type: none"> <li>• Replace the main switch.</li> </ul>
The motor protection is activated.	<ul style="list-style-type: none"> <li>• Contact Grundfos.</li> </ul>

## 18. Technical data

### 18.1 Operating conditions

#### Altitude

Maximum 3280 ft.

#### Relative humidity

Maximum relative humidity: 95 %.

#### Ambient temperature

0 °F to 104 °F.

### 18.2 Electrical data

#### Supply voltage

See the nameplate of the system.

#### Backup fuse

See the wiring diagram supplied with the system.

#### Digital inputs

Open-circuit voltage	24 VDC
Closed-circuit current	5 mA, DC
Frequency range	0-4 Hz



All digital inputs are supplied with SELV voltage (Safety Extra-Low Voltage).

#### Analog inputs

	0-20 mA
Input current and voltage	4-20 mA 0-10 V
Tolerance	± 3.3 % of full scale
Repetitive accuracy	± 1 % of full scale
Input resistance, current	< 250 Ω
Input resistance, voltage, CU 354	50 kΩ ± 10 %
Input resistance, voltage, IO 351	> 50 kΩ ± 10 %
Supply to sensor	24 V, maximum 50 mA, short-circuit protected



All analog inputs are supplied with SELV voltage (Safety Extra-Low Voltage).

#### Digital outputs (relay outputs)

Maximum contact load	240 VAC, 2 A
Minimum contact load	5 VDC, 10 mA

All digital outputs are potential-free relay contacts.



Some outputs have a common C terminal. For further information, see also the wiring diagram supplied with the system.

#### Inputs for PTC sensor/thermal switch

Open-circuit voltage	12 VDC ± 15 %
Closed-circuit current	2.6 mA, DC



Inputs for PTC sensors are electrically separated from the other inputs and outputs of the system.

## 19. Further product information

Further information about Control DDD and the pumps is available in Grundfos Product Center at [www.grundfos.com](http://www.grundfos.com).

## 20. Disposing of the product

This product or parts of it must be disposed of in an environmentally sound way.

1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.



The crossed-out wheeled bin symbol on a product means that it must be disposed of separately from household waste. When a product marked with this symbol reaches its end of life, take it to a collection point designated by the local waste disposal authorities. The separate collection and recycling of such products will help protect the environment and human health.

See also end-of-life information at [www.grundfos.com/product-recycling](http://www.grundfos.com/product-recycling).

## 21. Document quality feedback

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## Limited consumer warranty

### 1. Limited consumer warranty

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**This Limited Warranty gives you specific legal rights, and you may also have other rights which vary from State to State.**

New products manufactured by Grundfos are warranted to the original purchaser only and are to be free from defects in design, material and workmanship under normal use and service for no greater than a period of thirty (30) months from the date of manufacture which is set forth on the product's nameplate and on the product's packaging or the minimum period required by the applicable State law. For New Jersey, the applicable period is one year from the date of purchase.

The warranty period for replacement products, parts and components expires thirty (30) months from the original date of manufacture of the product originally purchased, unless a longer period is required under the applicable State law. For New Jersey, the warranty period for replacement products, parts and components expires one year from the original date of purchase of the product, not the date of replacement. Products sold by Grundfos that are manufactured by others are not covered by this warranty.

**Note that when purchasing a Grundfos product online, it is important to check the date of manufacture and the duration of the warranty with the seller as the product might no longer be covered under this Limited Warranty.**

**When a product is subject to this Limited Warranty a purchaser should contact the seller from which it purchased the product to make a claim.**

If the seller of a product is no longer in business, the purchaser should contact a Grundfos Authorized Service Partner, which can be found at [www.grundfos.com/us](http://www.grundfos.com/us) under > Support > Contact Service.

As part of making a claim, a purchaser shall return a defective product at the purchaser's cost, to the extent allowed by applicable law, along with proof of purchase and an explanation of the defect, date the defect occurred and circumstances surrounding the defect. For New Jersey there is no prohibition on returning a defective product at a purchaser's cost. If Grundfos is required by applicable State law to pay for the cost of shipment under applicable State law, then a purchaser should contact a Grundfos Authorized Service Partner to arrange for shipment. A purchaser also needs to promptly respond to Grundfos as to any inquiries regarding a warranty claim.

**Grundfos' liability under this Limited Warranty to purchaser is limited to the repair or replacement of a product (at Grundfos' decision) that is the sole and exclusive remedy for purchaser to the extent permissible by applicable law.** For New Jersey this limitation is permissible.

This warranty does not cover the following: ordinary wear and tear; use of a product for applications for which it is not intended; use of a product in an unsuitable environment; modifications, alterations or repair undertaken by anyone not acting with Grundfos' written authorization; failure to follow Grundfos' instructions, operations manuals, any other guidelines or good industry practice; use of faulty or inadequate ancillary equipment in combination with a product; application of spare or replacement parts not provided or authorized by Grundfos; accidental or intentional damage or misuse of a product.

The time period for making a claim under the implied warranty of merchantability and implied warranty of fitness are limited to the same time period as provided by this warranty to the extent permissible by applicable law. For residents of New Jersey, this limitation is permissible, but note that some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

**Grundfos shall not be liable for any incidental and consequential damages in connection with a product to the extent permissible by applicable law.** For residents of New Jersey, this limitation is permissible, but note that some states do not allow limitations of incidental or consequential damages, so the above limitation may not apply to you.

## 2. Garantía limitada del consumidor

Esta garantía limitada se proporciona únicamente para los productos de consumo vendidos en los Estados Unidos y es aplicable a las transacciones de consumo tal y como se define en y resulta aplicable en virtud de la ley de Garantías Magnusson-Moss y cualquier otra legislación federal y/o estatal aplicable. Para el caso de productos que no sean de consumo, consulte los términos de la garantía de Grundfos definidos en la cláusula 10 de los términos y condiciones de venta de productos y servicios de Grundfos para los EE. UU., disponibles en <https://www.grundfos.com/legal/grundfos-customer-terms/usa-grundfos-general-terms-for-sales-of-products-and-services>.

**Esta garantía limitada le confiere derechos legales específicos. Puede que también tenga otros derechos en virtud de su jurisdicción estatal.**

Se garantiza únicamente al comprador original que los productos fabricados por Grundfos estarán libres de defectos de diseño, materiales y mano de obra en condiciones normales de uso y servicio durante un periodo no mayor a treinta (30) meses a partir de la fecha de fabricación que figura en la placa de datos del producto y en el empaque del mismo o el periodo mínimo exigido por la legislación estatal aplicable. Para Nueva Jersey, el periodo aplicable es de un año a partir de la fecha de compra.

El periodo de garantía para los productos, partes y componentes de repuesto vence a los treinta (30) meses contados a partir de la fecha de fabricación original del producto adquirido en primer lugar, a menos que la legislación estatal aplicable exija un periodo más largo. Para Nueva Jersey, el periodo de garantía de los productos, partes y componentes de repuesto vence un año contado a partir de la fecha original de compra del producto, no de la fecha de sustitución.

Los productos vendidos por Grundfos que sean producidos por otros fabricantes no están cubiertos por esta garantía.

**Tenga en cuenta que, al comprar un producto Grundfos en línea, es importante revisar la fecha de fabricación y la duración de la garantía con el vendedor, ya que es posible que el producto ya no esté cubierto por esta garantía limitada.**

**Cuando un producto esté sujeto a esta garantía limitada, el comprador deberá ponerse en contacto con el vendedor al que haya comprado el producto para presentar una reclamación.**

Si el vendedor de un producto ya no está en el negocio, el comprador debe ponerse en contacto con socio de servicio autorizado por Grundfos, que puede encontrar en la dirección [www.grundfos.com/us](http://www.grundfos.com/us), en la sección "Support" > "Contact Service".

Como parte de la presentación de una reclamación, el comprador deberá devolver el producto descompuesto a su costa, en la medida en la que lo permita la legislación aplicable, junto con el comprobante de compra y una explicación del defecto, la fecha en que este se haya producido y las circunstancias en torno al defecto. En Nueva Jersey no existe ninguna prohibición de devolver un producto descompuesto a costa del comprador. Si la legislación estatal aplicable obliga a Grundfos a hacerse cargo de los gastos de envío, el comprador deberá ponerse en contacto con un servicio técnico autorizado por Grundfos para organizar el envío. El comprador también debe responder con prontitud a Grundfos cualquier consulta relacionada con una reclamación de garantía.

**La responsabilidad de Grundfos hacia el comprador en virtud de esta garantía limitada se limita a la reparación o sustitución de un producto (a decisión de Grundfos), que es el único y exclusivo remedio para el comprador en la medida permitida por la legislación aplicable.** Para Nueva Jersey, esta limitación resulta permisible.

Esta garantía no cubre lo siguiente: el desgaste ordinario; el uso de un producto para aplicaciones para las que no está diseñado; el uso de un producto en un entorno inadecuado; las modificaciones, alteraciones o reparaciones realizadas por cualquier persona que no actúe con la autorización por escrito de Grundfos; el incumplimiento de las instrucciones, manuales de operación, cualquier otro lineamiento o las buenas prácticas industriales de Grundfos; el uso de equipos auxiliares descompuestos o inadecuados en combinación con un producto; el uso de repuestos o partes de sustitución no proporcionados ni autorizados por Grundfos; el daño accidental o deliberado o el uso indebido de un producto.

El periodo para presentar una reclamación en virtud de la garantía implícita de comerciabilidad y la garantía implícita de idoneidad se limita al mismo periodo previsto por esta garantía en la medida permitida por la legislación aplicable. Para los residentes de Nueva Jersey, esta limitación resulta permisible, si bien se debe tener en cuenta que algunos estados no permiten limitaciones en cuanto a la duración de una garantía implícita, por lo que la limitación anterior puede no resultar aplicable en su caso.

**Grundfos no será responsable de ningún daño indirecto o consecuente en relación con un producto en la medida en la que lo permita la legislación aplicable.** Para los residentes de Nueva Jersey, esta limitación resulta permisible, si bien debe tenerse en cuenta que algunos estados no permiten limitaciones en cuanto a daños indirectos o consecuentes, por lo que la limitación anterior puede no resultar aplicable en su caso.

## Limited manufacturer's warranty

### 1. Limited manufacturer's warranty

This Limited Manufacturer's Warranty outlines applicable coverage and claims procedures for the pumps manufactured by Grundfos (the "Product").

This Limited Manufacturer's Warranty is provided for consumer products sold and used in Canada only and applies to consumer transactions as defined in the applicable provincial and territorial laws. In case of non-consumer products, please refer to Grundfos' warranty terms defined in clause 10 of Grundfos Canada Terms and Conditions of Sale of Product and Services available at: <https://www.grundfos.com/ca/legal/general-terms-and-conditions-of-sales-and-delivery>

This Limited Manufacturer's Warranty provides specific rights and limitations. Some of the limitations may not apply to you, and you may also have other rights that vary from province to province.

#### Scope of the Limited Manufacturer's Warranty

Subject to the following warranty terms and conditions, Grundfos Canada Inc. of 2941 Brighton Rd, Oakville, ON L6H 6C9, Canada ("Grundfos"), warrants to the original consumer (the "Purchaser") that the new Product manufactured by Grundfos is free from defects in design, material and workmanship under normal use and service for a period of twenty-four (24) months from the date of retail purchase but no greater than a period of thirty (30) months from the date of manufacture which is set forth on the Product's nameplate and on the Product's packaging (the "Warranty Period").

**Note that when purchasing a Grundfos Product online, it is important to check the date of manufacture and the duration of the warranty with the seller as the Product might no longer be covered under this Limited Manufacturer's Warranty.**

This Limited Manufacturer's Warranty applies exclusively to a new Grundfos Product sold and used in Canada. This Limited Manufacturer's Warranty does not apply to any Product sold "as is" or "sales final". This Limited Manufacturer's Warranty is not transferrable by the original Purchaser. Products sold by Grundfos that are manufactured by others are not covered by this warranty.

The sole and exclusive remedy under this Limited Manufacturer's Warranty is the repair or, at the discretion of Grundfos, the replacement of the Product, as set out below. Defects or damages are not covered by the Limited Manufacturer's Warranty if they are due to:

- ordinary wear and tear;
- use of the Product for an application for which it is not intended;
- installation of the Product in an environment not suitable for the Product;
- any modification, alteration or repair of the Product undertaken by the Purchaser or a third party (not acting on Grundfos' behalf);
- failure to follow Grundfos' instructions, including in the installation manual, operation manual, maintenance manual or service manual;
- installation, commissioning, operation (including the use of the Product or any Grundfos product outside its specifications) or maintenance of the Product other than in accordance with Grundfos installation manual, operation manual, maintenance manual or service manual or with good industry practice;
- use of faulty or inadequate ancillary equipment in combination with the Product;
- the application of spare parts of poor quality (excluding the application of any Grundfos original spare parts);
- accidental or intentional damage or misuse of the Products or services by the Purchaser or a third party (not acting on Grundfos' behalf); or
- the non-compliance of the Purchaser or of the Purchaser's own products with applicable law and regulation.

#### How to get service under the Limited Manufacturer's Warranty:

When a Product is subject to this Limited Manufacturer's Warranty, the Purchaser should contact the seller from which it purchased the Product to make a claim within 24 months from the date of retail purchase but no later than thirty (30) months from the date of manufacture which is set forth on the Product's nameplate and on the Product's packaging (the "Warranty Notification Period").

If the seller of a Product is no longer in business, the Purchaser should contact Grundfos Service at [www.grundfos.com/us](http://www.grundfos.com/us) under **Support > Contact Service**.

To exercise the rights under this Limited Manufacturer's Warranty, the Purchaser shall return a defective Product at the Purchaser's cost, to the extent allowed by applicable law, along with proof of purchase and an explanation of the defect, date the defect occurred and circumstances surrounding the defect.

The Purchaser is responsible for any expenses for dismounting and mounting the Product and for any and costs related to removal, reinstallation, transportation, and insurance. If Grundfos is required by applicable provincial or territorial law to pay for the cost of transportation, then the Purchaser should contact Grundfos Service Partner to arrange for shipment. The Purchaser also needs to promptly respond to Grundfos as to any inquiries regarding a warranty claim.

Unless requested by Grundfos, the Product may not be disassembled prior to remedy. Any failure to comply herewith will render this Limited Manufacturer's Warranty void.

Grundfos will either arrange the repair of the defective Product under this Limited Manufacturer's Warranty or, at Grundfos' option, provide the Purchaser with a replacement of the defective Product. The replacement unit can be new or remanufactured.

**To the extent permissible by applicable law, Grundfos shall not be liable for any incidental and consequential damages or losses of any kind whatsoever arising under, relating to or in connection with the Product, use of the Product or the inability to use the Product.**

## 2. Garantie limitée du fabricant

Cette garantie limitée du fabricant décrit la couverture applicable et les procédures de réclamation pour les pompes fabriquées par Grundfos (ci-après le « Produit »).

Cette garantie limitée du fabricant est fournie pour les produits de consommation vendus et utilisés au Canada uniquement et s'applique aux transactions de consommateurs telles que définies dans les lois provinciales et territoriales applicables. Dans le cas de produits non destinés aux consommateurs, se référer aux conditions de garantie de Grundfos définies à l'article 10 des Conditions générales de vente des produits et services de Grundfos Canada, qui sont disponibles à l'adresse suivante : <https://www.grundfos.com/ca/fr/legal/general-terms-and-conditions-of-sales-and-delivery>

Cette garantie limitée du fabricant prévoit des droits et des limitations spécifiques. Certaines des limitations peuvent ne pas s'appliquer à vous, et vous pouvez également bénéficier d'autres droits qui varient d'une province à l'autre.

### Champ d'application de la garantie limitée du fabricant

Sous réserve des conditions générales de garantie suivantes, Grundfos Canada Inc., dont le siège social est situé au 2941, Brighton Rd, Oakville, ON L6H 6C9, Canada (ci-après « Grundfos »), garantit au consommateur initial (ci-après « l'Acheteur ») que le nouveau Produit fabriqué par Grundfos est exempt de défauts de conception, de matériaux et de fabrication dans des conditions normales d'utilisation et d'entretien pendant une période de vingt-quatre (24) mois à compter de la date d'achat au détail, mais pas plus de trente (30) mois à compter de la date de fabrication indiquée sur la plaque signalétique et sur l'emballage du Produit (« Période de garantie »).

**Lors de l'achat d'un Produit Grundfos en ligne, il est important de vérifier la date de fabrication et la durée de la garantie auprès du vendeur, car le Produit pourrait ne plus être couvert par cette garantie limitée du fabricant.**

Cette garantie limitée du fabricant s'applique exclusivement à un Produit Grundfos neuf vendu et utilisé au Canada. Cette garantie limitée du fabricant ne s'applique pas aux Produits vendus « en l'état » ou « vente finale ». La présente garantie limitée du fabricant n'est pas transférable par l'Acheteur initial. Les produits vendus par Grundfos qui sont fabriqués par des tiers ne sont pas couverts par cette garantie.

Le seul et unique recours dans le cadre de cette garantie limitée du fabricant est la réparation ou, à la discrétion de Grundfos, le remplacement du Produit, comme indiqué ci-dessous. Les défauts ou dommages ne sont pas couverts par la garantie limitée du fabricant s'ils sont dus à :

- l'usure normale ;
- l'utilisation du Produit pour une application pour laquelle il n'est pas prévu ;
- l'installation du Produit dans un environnement non adapté au Produit ;
- toute modification, altération ou réparation du Produit entreprise par l'Acheteur ou un tiers (n'agissant pas pour le compte de Grundfos) ;
- la non-observation des instructions de Grundfos, y compris dans les notices d'installation, d'utilisation, de maintenance ou d'entretien ;
- l'installation, la mise en service, l'utilisation (y compris l'utilisation du Produit ou de tout produit Grundfos en dehors de ses spécifications) ou l'entretien du Produit autrement que conformément aux notices d'installation, d'utilisation, de maintenance ou d'entretien Grundfos ou aux bonnes pratiques de l'industrie ;
- l'utilisation d'un équipement auxiliaire défectueux ou inadéquat en combinaison avec le Produit ;
- l'utilisation de pièces de rechange de mauvaise qualité (à l'exclusion de l'utilisation de pièces de rechange d'origine Grundfos) ;
- tout dommage accidentel ou intentionnel ou toute mauvaise utilisation des Produits ou des services par l'Acheteur ou un tiers (n'agissant pas pour le compte de Grundfos) ; ou
- la non-conformité de l'Acheteur ou de ses propres produits aux lois et règlements applicables.

### Procédure à suivre pour bénéficier d'un service dans le cadre de la garantie limitée du fabricant :

Lorsqu'un Produit est soumis à la présente garantie limitée du fabricant, l'Acheteur doit contacter le vendeur auprès duquel il a acheté le produit pour faire une réclamation dans les 24 mois suivant la date d'achat au détail, mais au plus tard trente (30) mois à compter de la date de fabrication indiquée sur la plaque signalétique du Produit et sur l'emballage du Produit (« Période de notification de garantie »).

Si le vendeur d'un Produit n'est plus en activité, l'Acheteur doit contacter le service Grundfos à l'adresse [www.grundfos.com/us](http://www.grundfos.com/us) sous **Support > Contact Service**.

Pour exercer les droits prévus par la présente garantie limitée du fabricant, l'Acheteur doit renvoyer le Produit défectueux à ses frais, dans la mesure où la loi applicable le permet, accompagné de la preuve d'achat et d'une explication du défaut, de la date à laquelle le défaut s'est produit et des circonstances entourant le défaut.

L'Acheteur est responsable de tous les frais de démontage et de montage du Produit et de tous les frais liés à l'enlèvement, à la réinstallation, au transport et à l'assurance. Si Grundfos est tenu par la loi provinciale ou territoriale applicable de payer les frais de transport, l'Acheteur doit contacter le partenaire de service Grundfos pour organiser l'expédition. L'Acheteur doit également répondre rapidement à Grundfos pour toute demande concernant une réclamation au titre de la garantie.

Sauf demande de Grundfos, le Produit ne doit pas être démonté avant d'être remis en état. Tout manquement à ces dispositions entraînera l'annulation de la présente garantie limitée du fabricant.

Grundfos procédera à la réparation du Produit défectueux dans le cadre de cette garantie limitée du fabricant ou, à la convenance de Grundfos, fournira à l'Acheteur un produit de remplacement du Produit défectueux. L'unité de remplacement peut être neuve ou refabriquée.

**Dans la mesure autorisée par la loi applicable, Grundfos ne sera pas responsable des dommages accessoires et indirects ou des pertes de quelque nature que ce soit découlant de, liés à ou en rapport avec le Produit, l'utilisation du Produit ou l'incapacité d'utiliser le Produit.**

**U.S.A.**

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