HL Hydronics

User Manual

Pressurisation Unit

H-Line

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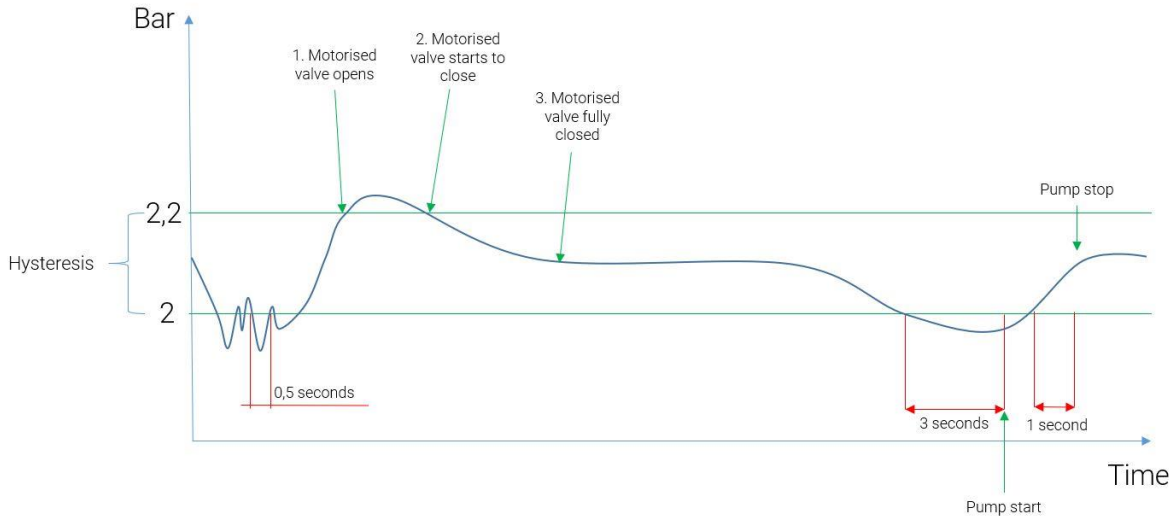
Innehåll

1. Foreword

This user manuel gives a summary about the machine’s safety instructions, Ce-information, operational instructions, maintenance and service for the delivered machine.

2. Definition, function and description

The pressure in the facility is regulated by a motorised valve and pump. When the pressure varies the following happens:



2.1 Motorised valve

If the pressure in the facility increases too much (relative to the preset value) the motor valve opens and releases as much water from the system to the tank as is needed for the pressure to decrease below the preset value.

2.2 Pump

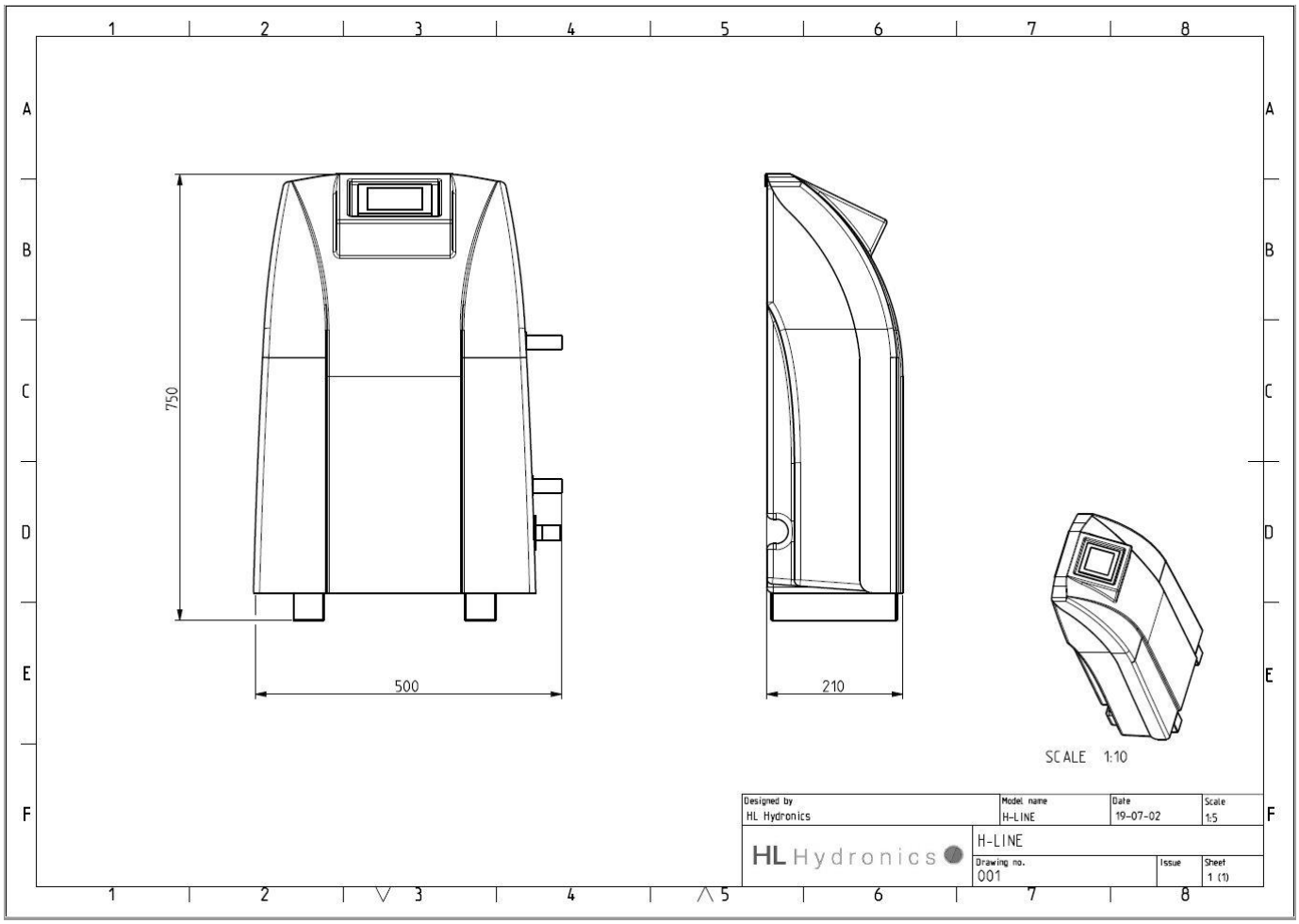
The pump has an on-time delay timing which makes the system avoid unneeded pump starts due to short pressure variations below the preset value. At low pressures the soft-starting pump builds pressure and pumps water from the tank to the system. When the pressure is increased above the preset value there is a off-time delay timing which also helps to avoid unneeded pump starts. Therefore, H-Line keeps the system at the preset pressure in a very efficient and calm way.

2.3 Display

During installation of a H-Line you can easily set the pressure you wish to have in the system (i.e. the pressure the system should not fall below). The preset pressure controls both the pump and the motor valve. Settings for alarm limits is made directly on H-Line's touch display. Continuous display of pressure in the system and water level in the tank is available on the display with help of the integrated sensors

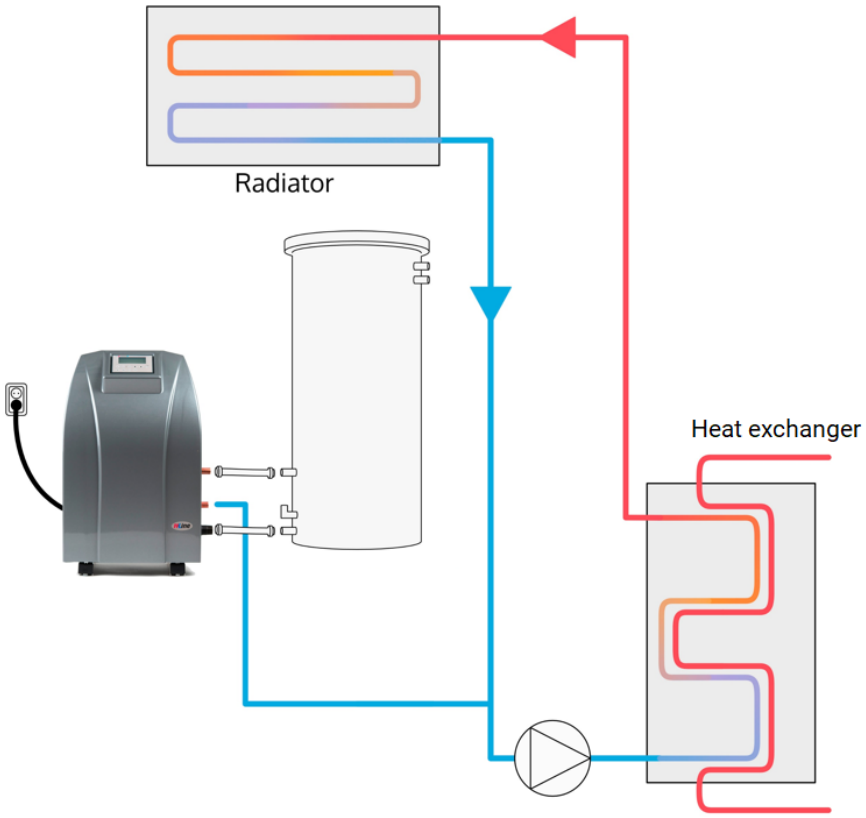
2.4 Summary

This in combination with a special program in H-Line's control unit controls the pressure in the system in a soft and flexible way. H-Line is delivered with a connection kit of flexible hoses, which makes the pressurisation unit easy to place with respect to need and available space.



Analog outputs is available for both pressure and level. For the receiving unit the signal is 0 to 10 Volts which scales linearly to the measured value.

H-Line is delivered with a one meter cable and a 230 V one-phase plug as standard. It is possible to install H-Line to a fixed switch on the wall. The overall principal of the H-Line installed in a system is showed in figure below.



3. Delivery exceptions and consumer's responsibility

Note during delivery!

Please remember to check that the product is complete and undamaged at delivery. If any damages exist, report it immediately to the transporter.

You as the customer/consumer is responsible for needed electricity and plumbing installations and also for overflow drainage from the tank (see chapter 7).

General and safety regulations

- **H-Line** is designed for stationary operation in a non-mobile facility.
- **Assembly and operation of H-Line is only to be made by specially trained staff or professional.**
- **H-Line** may only be installed in systems with the allowed fluids specified in the technical details (chapter 6).
- During all types of maintenance or repair, **H-Line** needs to be disconnected from its power source.
- Details about manufacturer, manufacturing date, manufacturing number can be found on the manufacturing badge on the **H-Line**.
- Make sure that the facility has a safety for temperature and pressure levels so that they stay within the allowed maximum and minimum parameters of operation.
- **H-line** may only be used in systems with non-toxic water.

Further instructions can be found in the maintenance and care chapter.

4. Copy of Declaration of Conformity

HL Hydronics

Försäkran om överensstämmelse

Maskindirektivet 98/37 EG, Bilaga 2, avsnitt A

AFS 1994:48, Bilaga2, avsnitt A

Tillverkare **HL Hydronics AB**
Bögatan 40
670 10 Töcksfors

Försäkrar härmed att

Maskin: **H-Line pumpstation (med enkel- eller dubbelpump)**

- uppfyller bestämmelserna i AFS 1994:48 "Maskiner och vissa andra tekniska anordningar eller motsvarande nationella bestämmelser i annat land inom EES som överför maskindirektivet (98/37/EG).
- uppfyller även bestämmelserna i följande nationella bestämmelser som över andra EG-direktiv:
  *Lågspänningsdirektivet 73/23/EEG (i Sverige ELSÄK-FS 2000:2).
  *EMC-direktivet 89/336/EEG med senare ändringar (i Sverige ELSÄK-FS 2000:1) på systemnivå enligt "modular approach principen" EMC-guideline.

Vidare försäkras

- att bl a följande harmoniserade standarder tillämpats som guideline:
  SSEN 60204-1 maskiners elutrustning.

Töcksfors den 5 maj 2010

5. CE-marking

H-Line is equipped with a readable and lasting marking in accordance with the Machinery Directive Appendix 1 item 1.7.3.

The manufacturing badge contains the following information:

- ***Type***
- ***Manufacturing number***
- ***Year of manufacture***
- ***Contact information***

6. Technical details

6.1 General

Machine definition:	H-Line pressurisation unit (single or double pump).
Manufacturer:	Hl Hydronics AB
MMI/HMI:	Operator interface is operator’s panel/PIC

6.2 Pumpdata

Fluid temperature:	Max 70°C (for PE-container)
Ambient temperature:	Max 50°C
Max. pressure at temp.:	0°C - 40°C → max 10 bar, 41°C - 90°C → max 6 bar
Max. inlet pressure:	Present inlet pressure + the pump’s pressure against closed valve should be less than ”Maximum operating pressure”.
Max. weight:	20/25 kg (delivery condition without accessories)
Dimensions:	Height 750 mm Width 500 mm Depth 230 mm
Noise level:	Below 85 db (A) during normal operation.
Electrical safety switch:	Placed in eyesight above panel when stationary installed.

6.3 Electrical data

Supply voltage:	230 V grounded plug.	
Phase voltage:	230 V	
Rated current:	10 A	
Overflow protection:	230 V Thermal fuse in motor/pump, 400 V motor protection.	
Trigger conditions:	230 V overheated motor, 400 V current fuse adjusted for respective motor power.	
IP-Code:	IP-54.	
Connections:	Suction line	1” external thread
	Return line	CU22
	Expansion line	22 mm CU external thread
	Manual refill tank (in)	½” external thread
	Automatic refill tank	½” external thread
	Overflow drainage	1” external thread

6.4 Applied standards

Pump supplier:	EN 50081-1, EN 50082-2, EN 60335-1, EN 60335-5-51
Installation:	EN 60204-1
Semicond, motor,	
Controllers, starters:	EN 50082-2, EN 60947-47-4-2a
Process module:	EN 50081-2, EN 61131-2

7. Installation instructions

Note! The water level sensor is located inside H-Line. To reach it, remove the side locks located low on the silver housing.

The pressurisation unit and the pressure tank should be installed on the facility's return line to get as low temperature as possible and to get the correct operating pressure on the pump's suction side. The pressurisation unit should be located as close as possible to the tank so that the suction line length is minimised. Pressurisation unit and tank are to be connected as shown below:

Komponentöversikt
H-Line

Nr.	Beskrivning
1	H-Line tryckhållningsenhet med touchdisplay
2	Stickkontakt för 230 V
3	Anslutning - returledning till kärl 22CU
4	Anslutning - mot systemet (trycksidan) 22CU
5	Anslutning - sugledning 1"
6	Slang för returvatten mellan H-Line och expansionskärl
7	Anslutning - sugledning 1"
8	Slang för vatten mellan H-Line och expansionskärl
9	Anslutning - returledning till kärl 1"
10	Anslutning - tryckgivare
11	Bräddavlopp 1"
12	Påfyllningsanslutning 1/2"
13	Öppet expansionskärl med lock
14	*Tillval* Gummimembran inuti expansionskärl

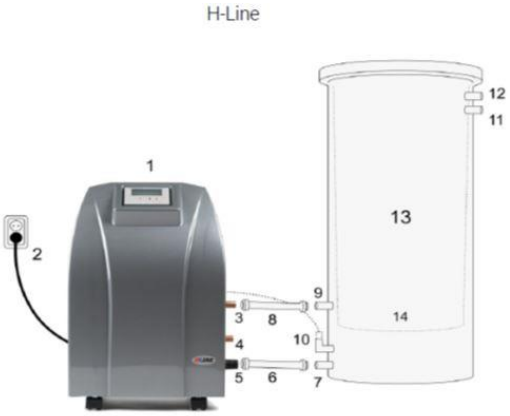
Electricity is supplied by a pre-installed plug which is wound on the pressurisation unit when delivered. For commissioning and operational instructions see chapter 8. See chapter 2 for more information about the working principle.

Make sure that overflowed water can be lead to a floor drain or other drainage. For example, overflow may happen during manual refill or if the boiler boils (motor valve opens - tank overflows). The installer is responsible for assembly of needed overflow drainage on the tank (connection exists). Refill is performed via component 12.

8. Commissioning instructions

8.1 Connections and preparations

1 Assemble the required connections between H-Line and expansion tank. See component list in chapter 7.



2 *OPTIONAL* Assemble the supplied solenoid valve on the tank's refill connection (½"). Connect the supplied cable in the connection head on the solenoid valve then connect the cable in the following marked terminals 8, N and PE. The supplied cable is three meter long 3G0,75 has a ground wire and two black wires marked with 1 and 2. Wire 1 should be connected to connection head 1 and terminal 8 in the unit. Wire 2 should be connected to connection head 2 and terminal PE in the unit.

3 Fill the expansion tank with water up to about 30% of full.

4 Open the shut-off valves to the system

5 The pressurisation unit should be preceded by an all-pole switch. It should be switched to “On”. If it is connected with a plug, put the plug in the outlet (230V).

8.2 Control unit settings

1 A box with “time/date” should now appear on the screen.. (Please note! The message box will disappear automatically after about 2 minutes, if you do not make it within this time frame, press and hold the upper left corner of the screen for about 30 second and the unit will restart.).

- Press the box ”time/date” and type in today’s date.
- Press the arrow in the lower right corner and type in the current time.
- Press ”OK” to continue

The main menu is now on the screen. The main menu shows the pressure in the facility and the water level in the expansion tank.

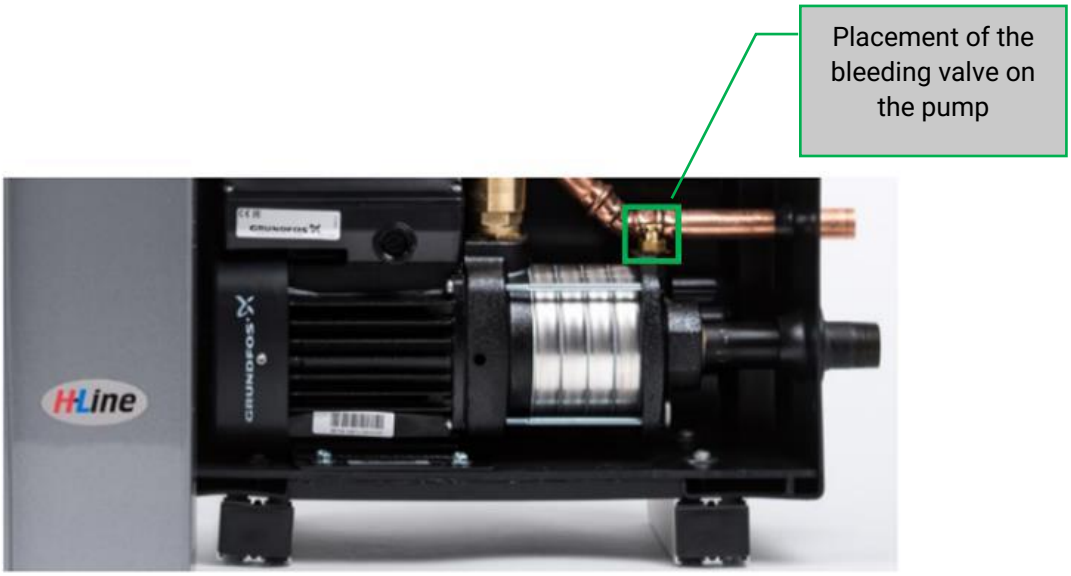
2 Check that the display shows OFF and that the unit is in stop mode.

3

Press “menu” and then “System setting H-Line” to get to the settings for the preset pressure value (the system pressure which H-Line should keep above). Press the up or down arrows to increase or decrease the pressure.

Note! Changes are applied in real-time and saves automatically.

Note! Bleed the pump at the pump station before starting. Bleeding is done with the valve on the pump, see image below. The bleeding valve is easily opened by hand, no tools needed.



H-Line is ready to be started!

Note! *H-Line is delivered with standard settings for alarm limits, hysteresis and start/stop delay and is therefore ready to be started. Starting H-Line can be done with a few simple steps covered in item 16 below. However it is recommended that you check that the settings are suitable to you and your facility.*

4

Press ”>>” to access the menu for setting the high pressure alarm. Check that the setting is correct, if you wish to make changes, press the up or down arrow to increase or decrease the value. When the pressure in the system exceeds this value the alarm will go off and the display will go from green to red.

5

Press ”>>” to access the menu for setting the low pressure alarm. Check that the setting is correct, if you wish to make changes, press the up or down arrow to increase or decrease the value. When the pressure in the system falls below this

6

Press ”>>” to access the menu for setting the high water level in tank alarm.
Check that the setting is correct, if you wish to make changes, press the up or down arrow to increase or decrease the value. When the water level in the tank exceeds this value the alarm will go off and the display will go from green to red.
Suggestion for high water level value: measure from the level sensor to about 15 cm under the overflow drainage and use that as the alarm limit

7

Press ”>>” to access the menu for setting the low water level in tank alarm. Check that the setting is correct, if you wish to make changes, press the up or down arrow to increase or decrease the value. When the water level falls below this value the alarm will go off and the display will go from green to red. Recommended alarm limit for low water level is 15 cm.

Note! there is an extra built-in protection blocking the pump for protection against dry running the pump.

8

Press ”>>” to access the menu for setting start and stop levels for automatic refill.

Note! only possible on units with the automatic refill addon.

H-Line is delivered with refill levels set to 0. *Start level* is the level which gives a signal to the refill valve to open. *Stop level* is the level which gives a signal to the refill valve to close. So when the water level in the expansion tank reaches respective value, opening or closing of the refill valve happens. Change the values according to the needs of the facility.

9

Press ”>>” to access the menu for setting the amount of permitted refills of the expansion tank.

Note! only possible on units with the automatic refill addon.
You fill the tank between level 1 and 2.

Example:
One fill results in 50 liter of refilled water. You want to limit the volume of refilled water to 150 liters in case of a leak in the system. To do this you set the alarm limit for the amount of automatic refills to 3. H-Line will not allow any more refills after the third and the alarm will go off. To reset the alarm, press the reset button on the main menu. Despite of the alarm and cancelled refill, H-Line will still control the pressure in the system as normal. H-Line is delivered with these limits set to 0.

10

In the menu for setting the low water level alarm or alarm for amount of refills, press the advanced button to get to the factory settings. The factory settings are optimal for most systems.

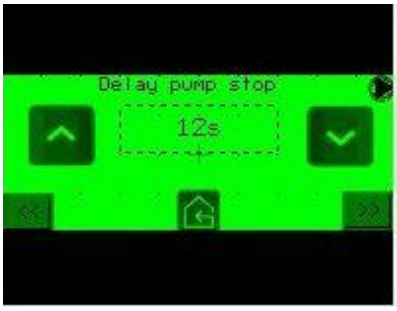
11

Hysteresis is the difference between pump start (i.e the preset pressure) and opening of motor valve (the factory setting is 0,4 bar). Use the up or down arrow to increase or decrease the hysteresis value.

Example:
If the preset pressure is 2,0 bar and hysteresis is set to 0,4 bar then the pump will start when the system pressure falls below 2,0 bar and the motor valve opens when the system pressure exceeds 2,4 bar.

12

Press ”>>” to access the menu for setting the stop delay timing (the factory setting is set to 1 second). Use the up or down arrow to increase or decrease the stop delay timing.



Example:
If you set the stop delay timing to 2 seconds then the pump will continue to run for 2 seconds after the system pressure has reached the preset pressure.

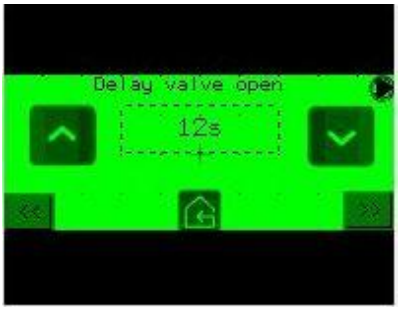
13

Press ”>>” to access the menu for setting the start delay timing (factory setting is set to 2 seconds). Use the up and down arrow to increase or decrease the start delay timing.

Example:
If the start delay timing is set to 2 seconds then the pump will wait for 2 seconds before it starts after the system pressure falls below the preset pressure.

14

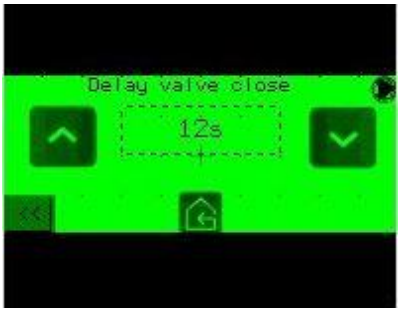
Press ”>>” to access the menu for setting the opening delay timing of the motor valve (factory setting is set to 2 seconds). Use the up or down arrow to increase or decrease the opening delay timing.



Example:
If the opening delay timing is set to 2 seconds then the valve will not open until 2 seconds after the system pressure has exceeded the preset pressure + hysteresis.

15

Press ”>>” to access the menu for setting the closing delay timing of the motor valve (factory setting is set to 0 seconds). Use the up or down arrow to increase or decrease the closing delay timing.



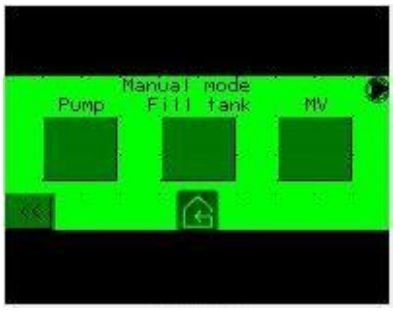
Example:
If the closing delay timing is set to 0 seconds then the pump will wait to start for 0 seconds after the system pressure falls below the preset pressure + hysteresis.

16

Return to the main menu press the start button down in the left corner under the display and H-Line will start.

17

To test run the pump and the motor valve manually, press “Menu” and then “Manual operation” to get to the menu for manual operation. The pump, motor valve and refill (option) can be operated from this menu. Press and hold respective button to manually run respective component.



18 From the main menu press “Menu” followed by “Alarm list” to show active alarms. Scroll through the active alarm with the arrows.

The following alarms are shown in the list: :

- High pressure
- Low pressure
- High water level
- Low water level
- Dry-run protection

Note! If the dry-run protection is active then it needs to be reset by pressing “Reset dry-run protection” in the main menu. This button blocks the start button. To be able to reset the dry-run protection you need to fill the tank with water then press “Reset dry-run protection”. H-Line is now ready to be started again. The pump is blocked as long as the dry run protection alarm is active.

19 From the main menu, press “Menu” followed by “Alarm history”. The alarm history shows which alarms has been set off and at what time.

9. Troubleshooting and alarm instructions

Table 1 shows the most common faults along with cause and solution. If other faults or problems occur please contact an expert or trained staff, alternatively HL Hydronics directly.

TABEL 1 SHOWING FAULTS WITH RESPECTIVE CAUSE AND SOLUTION

Fault	Cause	Solution
Pump does not reach correct pressure.	Air could be trapped inside the pump even though it has been bled.	Keep bleeding the air out of the pump from the valve until correct pressure is achieved. Note! Several attempts may be needed.
Pump starts and stops repeatedly.	Air in the system.	Bleed the system and try to start again. If the problem remains then the system may have a problem with air. If that is the case then an install of a degasser is recommended.. (Contact HL Hydronics for more information)
Pump is running a lot of cycles before stabilising on correct pressure.	Due to a large system (m^3)	Increase stop pump delay.

Table 2 shows the alarms that may occur and what their causes and solutions are. All alarms generated a summation alarm where the outputs' voltage are zero, closed. If H-Line has an active alarm then the display's colour will be red until the fault causing the alarm has been solved. The display turns green automatically when the alarm has been taken care of.

TABEL 2 SHOWS DIFFERENT TYPES OF ALARMS WITH THEIR RESPECTIVE CAUSE AND SOLUTION.

Alarm	Cause	Solution
High pressure	The system pressure exceeds preset value for the high pressure alarm. For more information **see 8.2 - 4**	1. Try to determine the cause of the high pressure and fix it. 2. Adjust the alarm limit.
Low pressure	The system pressure is below the preset value for the low pressure alarm. For more information **see 8.2 - 5**	1. Try to determine the cause of the low pressure and fix it. 2. Adjust the alarm limit.
High level in the tank	Level in tank is higher than the preset value for the high level in tank alarm. For more information **see 8.2 – 6**	1. Try to determine the cause of the high level in tank and fix it. 2. Adjust the alarm limit.
Low level in the tank	Level in tank is lower than the preset value for the high level in tank alarm. For more information **see 8.2 – 7**	1. Try to determine the cause of the low level in tank and fix it. 2. Adjust the alarm limit.
Dry run protection	Level in expantion tank is too low.	Fill the tank and check for any leakage.

10. Electrical documentation

10.1 General information (electrical safety)

During maintenance work with high amperage in the machine always cut the electrical power with a local safety switch. You should always be able to have a clear view of the safety switch during the maintenance so that the switch cannot be turned on by another person.

In the case that there is no local safety switch or where the safety switch cannot be seen then the main switch that is connected to the power source must always be turned off.

In the case where the main switch is used to cut the power the main switch is always to be locked and a warning sign must be placed close to the switchboard which informs others that maintenance is being done.

If fuses are removed then they must be replaced by a switch that is mounted with special tools.

Working with high amperage is only to be done by especially qualified personnel.

10.2 Electrical danger and power disconnection (switch & lock)

Layman in this case refers to the operator of the machine (a person which is not an expert or has been trained) and should never perform any work inside the outer shell of the electrical apparatus due to the danger of high voltage. See electrical data.

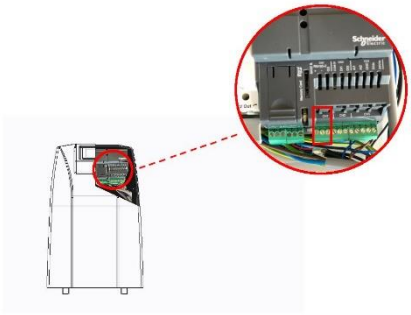
Other than short work inside the machine (inside the electrical apparatus) cannot be performed without the main switch on incoming power being turned off thus making the facility powerless.

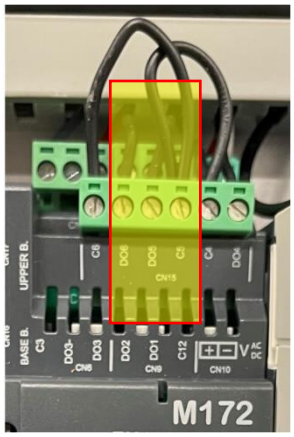
Contact expert or trained personnel during electrical work on the machine.

Contact supplier for more detailed information about electrical connections of the pump and motor. This is normally already connected when delivered from HL Hydronics.

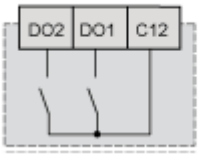
10.3 Common alarm

Connection is made to the potential free connection. The connection plinth is located inside of the chassi on the H-Line unit. On the top, inner row of the M172. Outlet DO1 and DO2 on M172. See picture.





B larm = non-stopping fault = DO2-C12
A larm = stopping fault = DO1-C12

Connector		Label	Description
CN9		C12	Common for output relays 1…2 Maximum current: 6 A
		DO1…DO2	Output relays 1…2

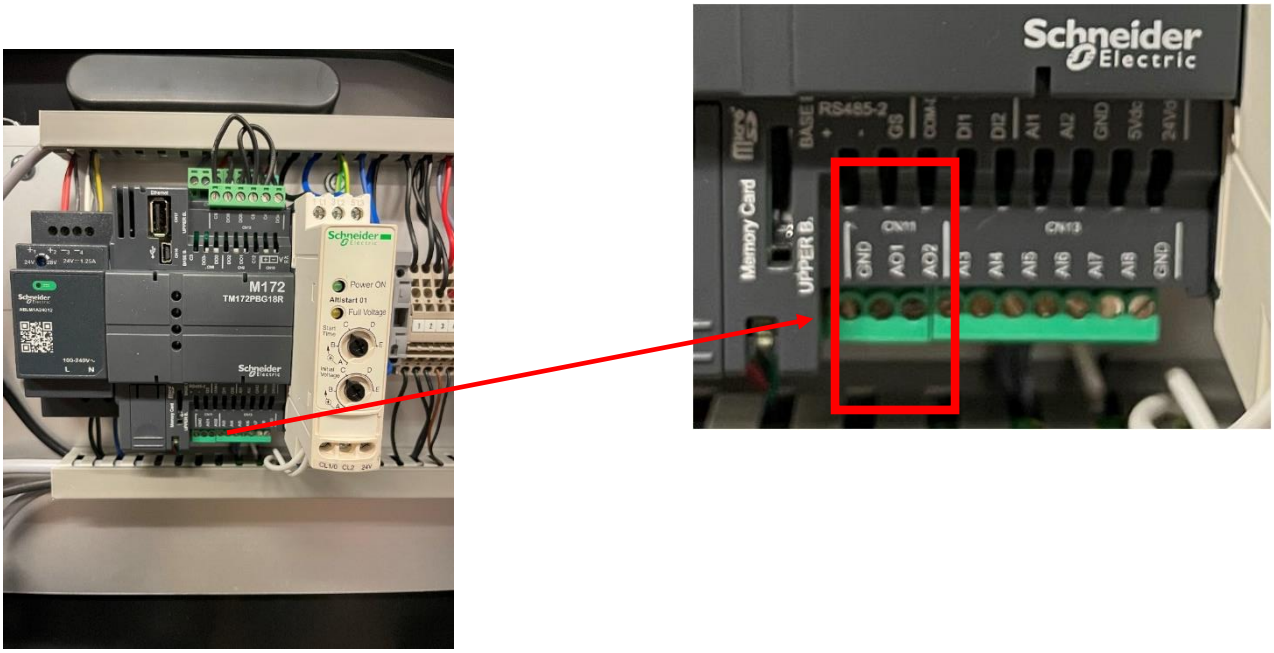
10.4 Analoga signals from AO1 and AO2

Connection is made from the outlets AO1 and AO2. The connection plinths is located under the chassi of H-Line. Connection is made to the lower and outer row of plinths.

Pressure is collected from outlet AO1 (0 - 10 bar).

Level is collected from outlet AO2 (0 - 300 cm).

Värdet från de analoga utgångarna skalas linjärt från 0 - 10 V.



FIGUR 1 VISAR EN ÖVERBLICK FÖR AO1 OCH AO2.

10.5 Automatic refill, 8N and PE

Automatic refill is connected according to the scheme below with the supplied cord. Terminal 8, N and PE is found inside the shell of H-Line to the right in the row with all the electrical components

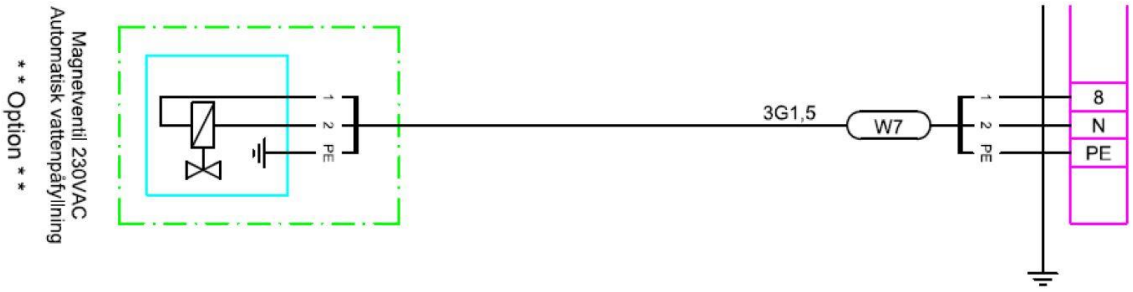


FIGURE 2 SHOWS AN OVERVIEW OF THE AUTOMATIC REFILL.

11. Maintenance and care

11.1 Tank

Clean the water tank level sensor once per year. Clean the polyethylene tank's walls when dirt coating appears. Be aware of tendencies for water leakage and re-tighten connections and fittings when needed.

11.2 Pump

Operation and maintenance of the pump are redirected to Grundfos's assembly and operating instructions. The pump does not require maintenance under normal use. If the pump has been used with unclean liquids, clean it immediately.

Pumps which are not used during periods of frost should be drained so that no damage can occur.

12. Revisions/changes

If the machine goes through significant changes that severely change the most basic health and safety requirements that the machine has been declared against in the CE marking that has been done then the original insurance may cease to be valid. All essential design changes in and on the machine that affects and/or changes the machine's function, performance or safety should be documented and assessed for risks.

For changes that are of such nature that the machine after the redesign/reconstruction has been deemed to affect the original insurance of the health and safety requirements in one or more of the directives that the machine has been insured to it may be relevant for a new insurance and CE marking. However, it is normally sufficient to compliment existing documents (technical file and user manual).

In discussion between the nordic working health authorities it has been decided that to demand a new CE marking requires a significant change of the machine. For the change to be deemed significant it has to be a change to the safety mechanisms, the engineering, risks and/or capacity.

Changing parts that does not change the function or performance of the product can normally be done without a new CE marking.

Every form of significant change must have a risk assessment and be documented regardless of if it requires a new CE marking or not. In the case that the significant changes happen inside of the machine and affects the basic health and safety requirements that the machine has been declared to then a assessment must be done to decide if the the original insurance still is valid after the change. This document only contains the user manual. The main document for the CE marking is in our possession as manufacturer and contains the technical file. That documentation contains any future changes that could possibly affect the safety aspects.

If any uncertainties or questions aries about the possible changes to the machine that may affect the health and safety requirements in the design or this user manual, please contact HL Hydronics AB in Töcksfors, Sweden.

Töcksfors, May 2010