



User Manual

HL Hydronics

Vacuum Degassing Unit

02-X



STELLTECH

Table of Contents

1. Definition, function and description	2
Function	2
Automatic refill	2
Control system and display	3
Pump	3
Summary	3
2. Delivery exceptions and consumer's responsibility	4
General and safety regulations	4
3. Copy of Declaration of Conformity	5
5. CE-marking	6
5. Technical details	7
General	7
Pump data	7
Electrical data	7
Applied standards	8
6. Installation instructions	9
Placement	10
Pipe connection	10
Electrical connection	10
7. Commissioning	11
7.1 Connections and preparations	11
7.2 Control system setting	12
.....	12
8. Troubleshooting and alarm instructions	15
9. Electrical documentation	17
General information (electrical safety)	17
Electrical danger and power disconnection (switch and lock)	17
10. Maintenance and care	18
Pump	18
Filter	18
11. Revisions/changes	19



STELLTECH

1. Definition, function and description

Function

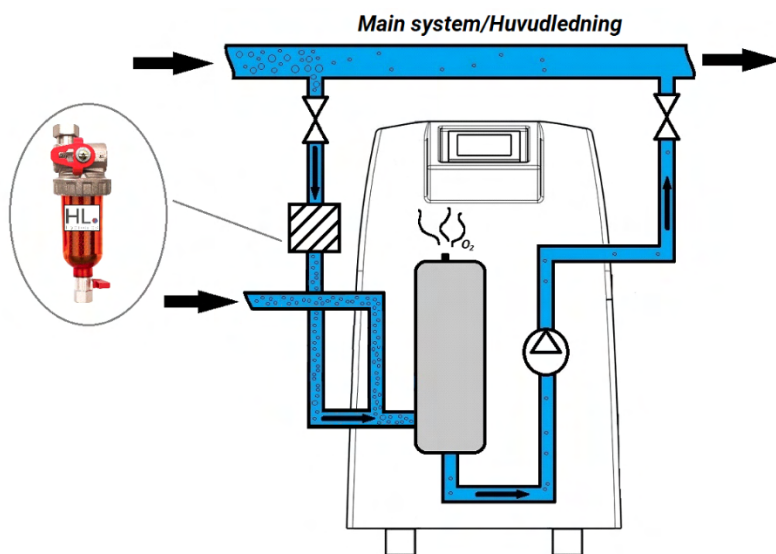
O2-X is an automated vacuum degasser that takes in the system liquid in sequential flow, removes gases from the liquid and pumps it back to the system. To be able to remove gases the O2-X uses a pressure differential. By pumping a vacuum of $-0.7 \cdot -0.95$ bar the gases are released from the system liquid and new liquid is inserted into the pressure vessel. The degassed liquid is then reintroduced to the system.

Automatic refill

O2-X can be complemented with the option of automatic refill. This option makes O2-X able to control a minimum pressure in the system. If the pressure falls below the set minimum pressure then the automatic refill will start. The pressure will increase during the refill until the pressure reaches the set pressure allowed. Refilled liquid is degassed before entering the system.

O2-X is recommended to be delivered with a dirt and magnetite filter MAG-NUS. MAG-NUS helps filtering dirt and magnetite from the system which prolongs the lifetime of all the components in the system and protects the degasser from dirt in the system. The figure below shows where such a filter should be placed in the system. For a much simpler installation, flexible connecting hoses can be chosen as an option for O2-X. The flexible hoses are steel braided and in optional length of 1 meter or 1.5 meter.

When O2-X is installed and started it will degas the system liquid continuously for 30 days, a so called start-up degassing mode. When the start-up degassing is complete the O2-X automatically changes to maintenance degassing mode which means that the system liquid is degassed one hour per day Monday to Friday between 12.30 -13.30. It is possible to change the start-up degassing's interval to suit the needs of the system.



STELLTECH

Control system and display

O2-X is supplied with a control unit with different settings for how often and when degassing should be undertaken. These settings are easily changed via the touchscreen display which is located on top of the O2-X. The unit comes with pre-installed programs such as start-up degassing. It is also possible to set alarms for high and/or low system pressure.

Pump

The pump in O2-X creates vacuum in the tank and pumps the degassed liquid back into the system. The pump is controlled by the control system which communicates with pressure sensors and solenoid valves to identify when the pump should start and stop. This smart control system has pre-installed programmes but the option exists to programme the intervals for how and when the pump should be active.

Summary

O2-X, with its carefully selected internal components, solves the problem of gas propagation in systems and its associated efficiency reduction and corrosion potential. The permanent degassing intervals make the system continuously effective, simple and maintenance free avoiding bonded oxygen which is so problematic in pressurised liquid systems.



STELLTECH

2. 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, are responsible for the associated electricity and plumbing installations and also for overflow drainage within the installation area (see chapter 6).

General and safety regulations

- O2-X is designed for stationary use in a non-mobile facility.
- **Assembly and operation of O2-X is to be undertaken by competent, trained engineers/staff only.**
- O2-X may only be installed in systems with the allowed fluids specified in the technical details (chapter 6).
- During all types of maintenance or repair, O2-X needs to be disconnected from its power source.
- Details about manufacturer, manufacturing date, manufacturing number can be found on the manufacturing label on the O2-X.
- Ensure that the facility has temperature and pressure level safety cut-outs so that they stay within the allowed maximum and minimum parameters of operation.
- O2-X may only be used in systems with non-toxic water.

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



STELLTECH

3. Copy of Declaration of Conformity

EU Declaration of Conformity

In accordance with of European Parliament and Council Decision No 768/2008/EC ANNEX III

1. *Product model/product:*
Product Avgasare
Model/type O2-X
Serial nos 123456
2. *Manufacturer*
Address HL Hydronics AB
Bögatan 40, 67010, Töcksfors
3. *This declaration is issued under sole responsibility of the manufacturer.*
4. *Object of declaration:*
Product Machine for reducing oxygen concentration in closed heating and cooling systems.
5. *The object of the declaration described above is in conformity with relevant Union Harmonisation legislation:*
2006/42/EC The Machinery Directive
2014/30/EU The Electromagnetic Compatibility Directive (EMC)
2014/35/EU The Low Voltage Directive (LVD)
6. *References to the relevant harmonised standards used or references to the other technical specifications in relation to which conformity is declared:*

LVD: Reference & Date	Title
EN 61010-1:2010	Safety requirements for electrical equipment for measurement, control, and laboratory use

EMC: Reference & Date	Title
EN 55014-1:2016+A1:2009 +A2:2011	Electromagnetic compability - Requirements for household appliances, electric tools and similar apparatus.
EN 55014-2:2015	Electromagnetic compability - Requirements for household appliances, electric tools and similar apparatus.
EN 61000-6-2:2005+C1:2005	Electromagnetic compability - Generic standards, Immunity for industrial environments.
EN 61000-3-2:2014	Electromagnetic compability - Limits for harmonic current emission (equipment input current = 16 A per phase)
EN 61000-3-3:2013	Electromagnetic compability - Limits, Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipments with rated current = 16 A per phase and not subject to conditional connection.

7. *The technical file is available from the manufacturer at the address above*
Signed for and behalf of: HL Hydronics
Place of issue: Töcksfors, Sweden
Date of issue: 20th June 2019
Name: Björn Lennartsson
Position: Chief Executive Officer (CEO)
Signature:



STELLTECH

5. CE-marking

O2-X is equipped with a legible and lasting marking in accordance with the Machinery Directive Appendix 1 item 1.7.3.

The manufacturing label contains the following information:

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



STELLTECH

5. Technical details

General

Machine definition:	O2-X
Manufacturer:	HL Hydronics AB
MMI/HMI:	Operator interface is operator's panel/IPC
Weight:	~24 kg
Dimensions:	Height 750mm Width 500mm Depth 230mm
Noise level:	Below 80 db (A)

Pump data

Max. pressure in connecting pipe:	0,5 — 4,0 bar
Fluid temperature:	Max. 70°C
Ambient temperature:	Max. 45°C
Max. inlet pressure:	Present inlet pressure + the pump's pressure against closed valve should be less than max "maximum operating pressure".
Electrical safety switch::	Plug
Allowed fluids:	Water, ethylene glycol, propylene glycol, glycol (maximum concentration 30%)

Electrical data

Supply voltage::	230 V earthed 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:	Inlet: ½" external thread Outlet: ½" external thread Automatic refill: ½" external thread



STELLTECH

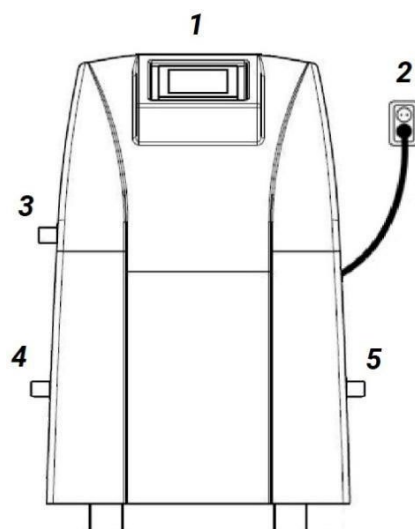
Applied standards

Pump supplier: En 50081-1, EN 50082-2, EN 60335-5-51
Installation: EN 60208-1



STELLTECH

6. Installation instructions



Number	Description
1	O2-X Degasser
2	Plug for 230 V
3	Connection to the system (inlet), ½" external thread
4	Connection for fresh water, ½" external thread
5	Connection to system (outlet), ½" external thread

Electricity is connected to the facility with the help of a pre-mounted plug which is wound on the degassing unit when delivered. For commissioning and operational instructions see chapter 8. See also chapter 2 for more information about the working principle.



STELLTECH

Placement



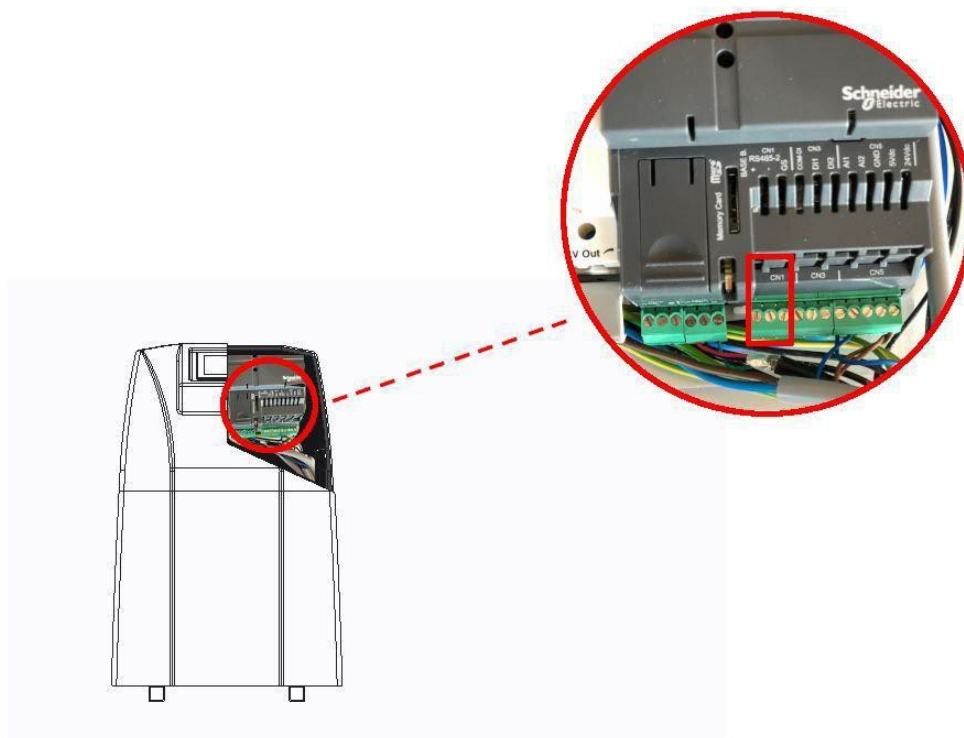
Make sure that O2-X is installed in level and that it is not placed out of level or in an unstable way. Adjust the level of the unit easily by rotating the height adjustable feet under the unit.

Pipe connection

O2-X should be connected to the system line with a minimum distance between inlet and outlet of 500 mm to make sure that its function is not disturbed and that it is able to reach maximum operational efficiency. See chapter 7.1-1 for more information.

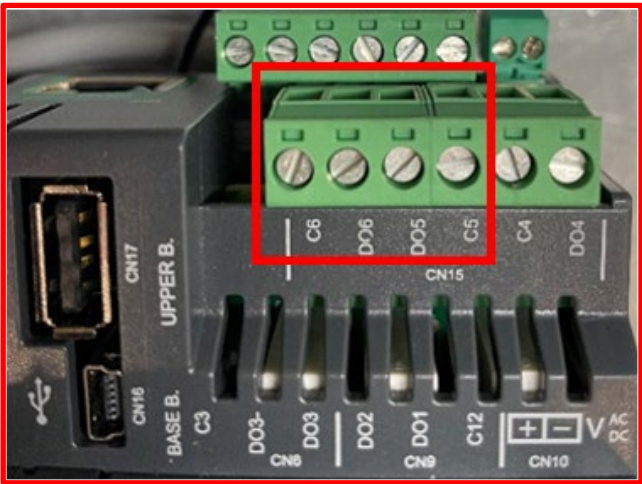
Electrical connection

For Modbus communication with alarm, control etc. connect cable to terminal CN1.



STELLTECH

B larm = slutning mellan plintar C5-DO5
 A larm = slutning mellan plintar C6-DO6



CN15		C4	Common for output relay 4 Maximum current: 3 A
		C5	Common for output relay 5 Maximum current: 3 A
		C6	Common for output relay 6 Maximum current: 3 A
		DO4...DO6	Output relays 4...6



STELLTECH



Address	Name	Display label	Device type	App type	Size	Default	Min	Max	Scale	Offset	Unit	Format	Level	ReadOnly	Description	Note
8960	HMI_Start		Boolean	BOOL		1			1	0			Always visible	RW	Changeable	
8961	HMI_InitiaIngssing		Boolean	BOOL		0			1	0			Always visible	RW	Changeable	
8962	HMI_PayIlningssion		Boolean	BOOL		0			1	0			Always visible	RW	Changeable	
8963	Systemtryck_Skaiad		Signed 16-bit	INT		0			1	0	bar		Always visible	RW	Supervision	
8964	Tanktryck_Skaiad		Signed 16-bit	INT		0			1	0	bar		Always visible	RW	Supervision	
8968	HMI_SystemckMax		Signed 16-bit	INT		170			1	0	bar		Always visible	RW	Changeable	
8969	HMI_SystemckMin		Signed 16-bit	INT		150			1	0	bar		Always visible	RW	Changeable	
8970	HMI_SystemckIntervall		Signed 16-bit	INT		0			1	0			Always visible	RW	Supervision	
8971	Fyllning_aktiv		Boolean	BOOL		0			1	0			Always visible	RW	Supervision	
8972	SystemckHogLarm		Boolean	BOOL		0			1	0			Always visible	RW	Supervision	
8973	SystemckLagLarm		Boolean	BOOL		0			1	0			Always visible	RW	Supervision	
8974	HMI_SystemckHogLarmGr		Unsigned 16-bit	UINT		400			1	0	bar		Always visible	RW	Changeable	
8975	HMI_SystemckLagLarmGr		Unsigned 16-bit	UINT		80			1	0	bar		Always visible	RW	Changeable	
8976	HMI_InitiaAvgIdDagar		Unsigned 16-bit	UINT		30			1	0	bar		Always visible	RW	Supervision	
8977	HMI_InitiaIdDagarKvar		Unsigned 16-bit	UINT		0			1	0	degär		Always visible	RW	Supervision	
8979	SystemckOlka_Larm		Boolean	BOOL		0			1	0			Always visible	RW	Supervision	
8980	Lang_Fyllid_Farskvaeten_Larm		Boolean	BOOL		0			1	0			Always visible	RW	Supervision	
8982	SystemckGivarefel_Larm		Boolean	BOOL		0			1	0			Always visible	RW	Supervision	
8983	TanktryckGivarefel_Larm		Boolean	BOOL		0			1	0			Always visible	RW	Supervision	

Name	Value
Addr_RS485_OB	3=Modbus/RTU
Proto_RS485_OB	8
DataBit_RS485_OB	1
StopBit_RS485_OB	2=Even
Parity_RS485_OB	2=38400
Baud_RS485_OB	2=38400

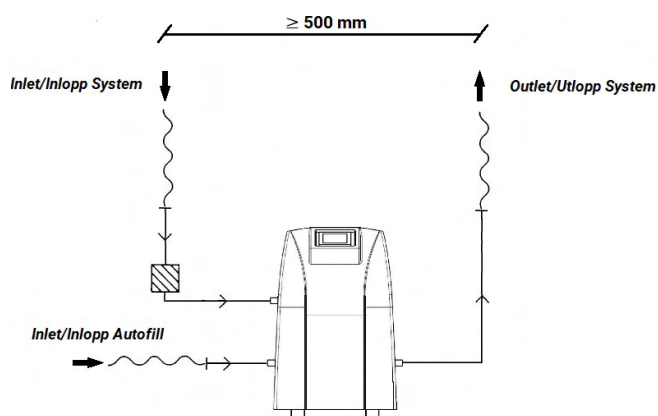


STELLTECH

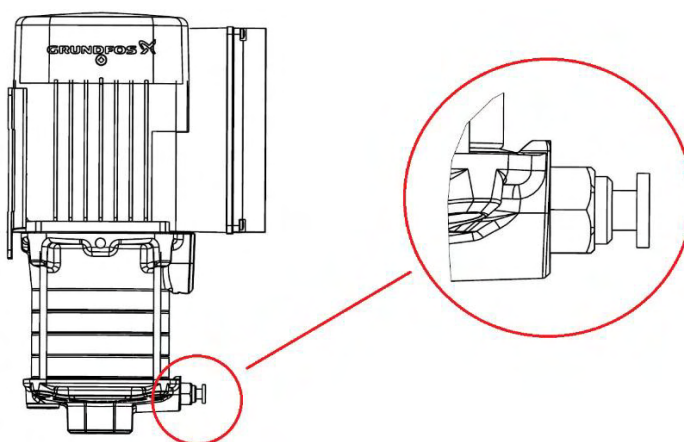
7. Commissioning

7.1 Connections and preparations

- 1 Place O2-X in the system according to the figure below. Minimum distance between inlet and outlet is 500mm.



- 2 Make sure that all ball valves between O2-X and the system are open. Bleeding the air out of the pump is carried out with the bleed valve located on the pump according to the figure below. The valve can be opened by hand, tools are not needed.

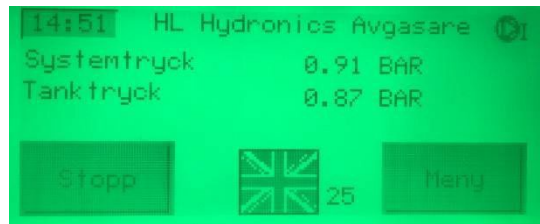


STELLTECH

7.2 Control system setting

1

The main menu is now showing on the display. The system pressure and the pressure in the tank can be seen here. The pressure should be equal if the system is on standby



2

Check that the unit is in stop mode.



3

Press "menu" and then "system settings degasser". In this menu the date and time may be changed if needed. To change the date and time press the respective boxes, to save date and/or time changes press "Set time".



4

Press ">>" to get to the settings for system pressure alarm. If you wish to set alarms for high or low pressure in the facility then set the respective limits with the arrows. (If you wish to not have an alarm then set the limit



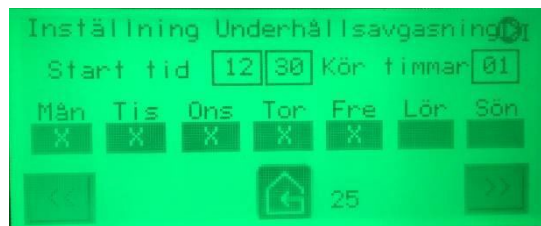
for low pressure below the static height and the limit for high pressure above the opening pressure of the pressure relief valve.)



STELLTECH

5

Press ">>" to get to the settings for maintenance degassing. Here you can choose which days and at what time degassing should start. You can also choose how long the degassing should



last. One cycle of degassing usually takes about 2 minutes.

Example:

It has been decided that degassing should be done for 2 hours every other day starting at 12:00. Degassing will then start at 12:00 and run for 2 hours on Monday, Wednesday and Friday.

Note! This setting is only applied to ordinary maintenance degassing and not for start-up degassing. Settings for start-up degassing are discussed below, see 7.2 - 6.

6

Press ">>" to get to the menu for start-up degassing. This menu allows you to activate or deactivate start-up degassing by checking or unchecking the small box to the right of "start-updegassing".



If the box is checked then start-up degassing is active. The display also shows how many days of the start-up degassing that is left before O2-X returns to maintenance degassing. By pressing "Reset" start-up degassing will run again for another 30 day period.

7

Press the icon that resembles a house with an arrow inside. This will return you to the menu. Press "Alarm history". This menu shows alarms that have occurred historically during operation. If no alarms



have occurred then the display will display "Alarm list is empty.". To see potential alarm codes and their solutions see chapter 8.



STELLTECH

8

Return to the menu by pressing the icon resembling a man running towards a door. Press "Alarm list" to see all currently active alarms. If there is one or more active alarms the display's background colour will be red.



Note! The background color will automatically return to green when the active alarm's fault has been solved.

9

Return to the menu. Press "Service and run time". The display now shows information about the operation of pump and valves. Amount of openings respective solenoid valves and total run time for the pump.



STELLTECH

8. Troubleshooting and alarm instructions

Table 1 shows some of the most common faults that may occur with their respective cause and solution. Should some other fault or problem occur, please contact trained personal or expert, alternatively HL Hydraulics.

Table 1 shows different kinds of faults, their cause and solution.

Fault	Cause	Solution
Wrong pressure in tank	Ball valve on in-/outlet	Open ball valve
Takes a long time when refilling	Ball valve for refill	Open ball valve



STELLTECH

Table 2 shows alarms that may occur and their respective cause and solution. All alarms trigger a summation **alarm** where all outlets are voltage free and closed.

If O2-X has an active alarm then the display's background colour will be red until the fault has been corrected. When the fault has been corrected the display will automatically turn green.

Table 2 shows different kinds of alarms, its cause and solution.

Alarm	Cause	Solution
Alarm high pressure (secondary alarm)	System pressure is too high compared to set limit	Adjust the limit for the high pressure alarm or investigate what is causing the high pressure
Alarm low pressure (secondary alarm)	System pressure is too low compared to set limit	Adjust the limit for the low pressure alarm or investigate what has caused the low pressure
Fault on tank pressure gauge	Something is wrong with the connection to the transmitter.	Search for fault in the plug to the transmitter. Is the plug not mounted correctly, mount it. Is the plug broken, contact an electrician or reseller.
Fault on system pressure gauge	Something is wrong with the connection to the transmitter.	Search for fault in the plug to the transmitter. Is the plug not mounted correctly, mount it. Is the plug broken, contact an electrician or reseller.
Alarm for too long filling time	The refilling of water has taken too long time.	Check the valve on the freshwater supply pipe. Make sure it is fully open.
Alarm wrong tank pressure	The valve on the in- or outlet is closed.	Check that all valves on in- and outlet is fully open.



STELLTECH

9. Electrical documentation

General information (electrical safety)

During maintenance work on high current machinery always break 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 competent installer using appropriate tools.

Working on high current capacity equipment is only to be carried out by competent, qualified personnel.

Electrical danger and power disconnection (switch and lock)

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

Prior to any visual inspection or work of any type and duration inside the electrical apparatus, the main switch on the incoming mains power supply must be isolated /turned off thereby disabling the equipment.

Only competent, suitably trained, electrical personnel should carry out electrical work on the equipment.

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



STELLTECH

10. Maintenance and care

Pump

For operation and maintenance of the pump reference shall be made to the specific Grundfos pump assembly and operating instructions. The pump does not require maintenance under normal use. If the pump has been used with contaminated liquids, clean it immediately.

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

Filter

Visually inspect the MAG-NUS filter. If dirt can be seen then close all valves. Remove the filter insert and clean it. Re-insert and check function for proper operation. For further information about handling the filter see separate instructions included with the filter.



STELLTECH

11. 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 corresponding CE marking then the original insurance may cease to be valid. All essential design changes in and on the equipment that affects and/or changes the equipment's function, performance or safety should be documented and assessed for risks.

For changes that are of such a 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 equipment has been insured to it may be relevant to assign new insurance and CE marking. However, it is normally sufficient to supplement 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 equipment. For the change to be deemed significant it must be a change to the safety mechanisms, the engineering, risks and/or capacity.

Changing parts that do 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 the equipment and affect the basic health and safety requirements that the equipment has been declared to then an assessment must be done to decide if the original insurance remains 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 arise about the possible changes to the equipment that may affect the health and safety requirements in the design or this user manual, please contact HL Hydraulics AB, Töcksfors, Sweden.

Töcksfors, May 2019



STELLTECH