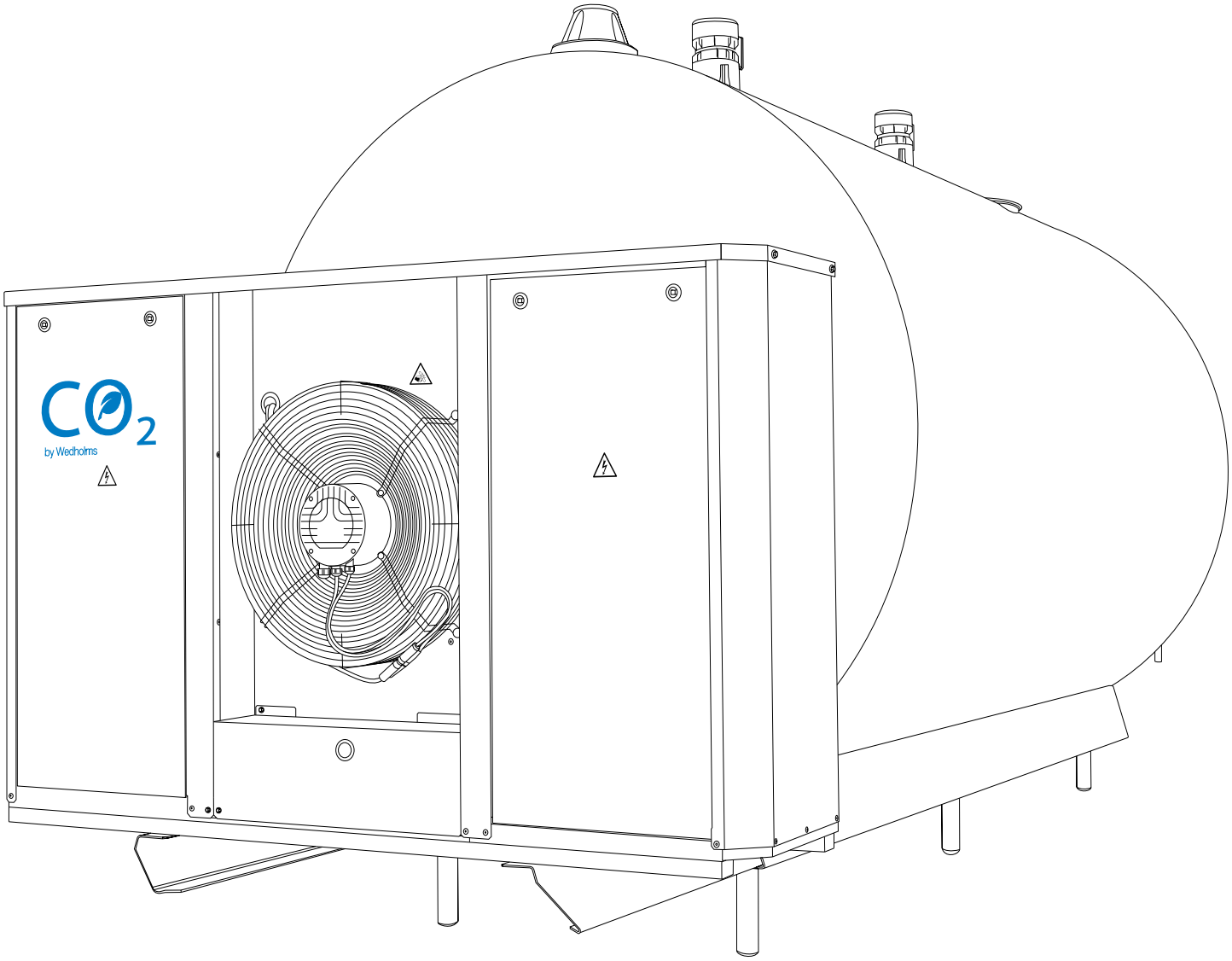

Horizontal Tanks

R744 refrigerant (CO_2)

Manual: installation, maintenance and operation

English | v 1.6 2023-09-11 | DFC/L

Wedholms

Contents

Wedholms

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Manufacturer Fabrikant Hersteller Fabricant Fabbricante Fabricante Fabricante Producent Fabrikant Výrobca Gamintojas	**Wedholms AB** P.O. BOX 1002 SE-611 29 NYKÖPING SWEDEN www.wedholms.se	Производител Βιομήχανος Valmistaja Fabrikant Framleiðandi Виробник Výrobce Tootja Producător Gyártó Výrobca Proizvođač
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Document no. 900001_a

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EC DECLARATION OF CONFORMITY EG-VERKLARING VAN OVEREENSTEMMING EG-KONFORMITÄTSERKLÄRUNG DÉCLARATION CE DE CONFORMITÉ DICHIARAZIONE CE DI CONFORMITÀ DECLARACIÓN CE DE CONFORMIDAD DECLARAÇÃO CE DE CONFORMIDADE DEKLARACJA ZGODNOŚCI WE EF-SAMSVARSERKLÆRING VYHLÁSENIE ES O ZHODE EB ATITIKTIES DEKLARACIJA	CE	ДЕКЛАРАЦИЯ НА ЕО ЗА УЧРЕДЯВАНЕ ΔΗΛΩΣΗ ΣΥΣΤΑΤΙΚΗΣ ΕΤΑΙΡΕΙΑΣ ΕΚ EY-LIITTÄMISVAKUUTUS EF-ERKLÆRING OM INKORPORERING EB-YFIRLÝSING UM UPPTÖKU ДЕКЛАРАЦІЯ ЄС ПРО РЕЄСТРАЦІЮ ES PROHLÁŠENÍ O ZALOŽENÍ SPOLEČNOSTI EÜ ÜHINEMISDEKLARATSIOON DECLARAŢIA DE CONSTITUIRE CE EK-BEÉPÍTÉSI NYILATKOZAT VYHLÁSENIE ES O ZAČLENENÍ IZJAVA O OSNIVANJU EK-A
Manufacturer Fabrikant Hersteller Fabricant Fabbricante Fabricante Fabricante Producent Fabrikant Výrobca Gamintojas	**Wedholms AB** P.O. BOX 1002 SE-611 29 NYKÖPING SWEDEN www.wedholms.se	Производител Βιομήχανος Valmistaja Fabrikant Framleiðandi Виробник Výrobce Tootja Producător Gyártó Výrobca Proizvođač
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Wedholms

UK DECLARATION OF INCORPORATION	UK CA
Manufacturer	**Wedholms AB** P.O. BOX 1002 SE-611 29 NYKÖPING SWEDEN www.wedholms.se
Product category / type designation(s)	Horizontal tanks/vertical tanks/cooling units **DF95, DFC95, DF95L, Silo, MTZ, MT**
Complies with the following directives	The product(s) complies with requirements of the following directives: **The Ecodesign for Energy-Related Products and Energy Information** (Amendment) (EU Exit) **Regulations 2010** **Electromagnetic Compatibility Regulations 2016** **Electrical Equipment** (Safety) **Regulations 2016** **Pressure Equipment** (Safety) **Regulations 2016**
Complies with the following standards	and is harmonized to following standards which have been used or parts thereof: **BS EN 60204-1:2018, IEC 60204-1:2016, BS EN ISO 13857, EN 349:1993+A1, BS EN IEC 61000-6-2:2019, BS EN ISO 14122-1:2016**

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Complies with the following standards	and is harmonized to follow standards in **13.110 Safety of Machinery**, which have been used, or parts thereof: **BS EN 60204-1:2018, IEC 60204-1:2016, BS EN ISO 12100, BS EN ISO 13857, EN 349:1993+A1, BS EN IEC 61000-6-2:2019, BS EN ISO 14122-1:2016**
Signature	These declarations of incorporation and conformity confirms that all demands, regarding assessment and continuous control of the product performance which are mentioned in the standards, have been followed. 27th of June 2023 Nyköping, Sweden Stefan Gavelin Chief Execute Officer Philip Ring Product Development Manager

1. General description

The purpose of the milk-cooling tank is to cool down and store milk until it is collected for further processing. Wedholms' tanks are supplied either with the condensing unit attached to the tank or with a separate condensing unit. A pre-assembled tank with condensing unit is a fully integrated system and has undergone pressure testing, leak testing, as well as test operation prior to delivery.

If the tank and the condensing unit are not pre-assembled as a single system, each component is pressure- and leak-tested individually prior to delivery.

Details of how to operate the milk-cooling tank can be found in the separate instructions for the control unit, Argos, which is supplied with the tank

Ensure that the manuals and operating instructions are kept for an easy access in the immediate vicinity of the tank.

Transportation and storage temperatures should be within –25 °C to +55 °C

The tank is fitted with a type-plate engraved with details including the year of manufacture, serial number, type of refrigerant, quantity of refrigerant (if the condensing unit is attached) and the maximum test pressure. The serial number is specific to the tank.

All metal parts are made of stainless steel according to EN 1 4301 - AISI 304. Both inner- and outer jacket are made of stainless steel.

The tanks are equipped with a manhole and lid.

A 4" (96 mm) ventilation pipe exits at the top of the tank and should be inside the milk tank room to ensure proper ventilation.

The milk is normally pumped into the tank through the bottom outlet.

The tank outlet is equipped with a 3" (76mm) butterfly valve that can be fitted with different types of emptying connections with size and thread that fits the milk truck's connection. The outlet can also be equipped with various adapters (T-pipes etc.) for connection to one or several milking robots.

Wedholms' DFC tanks are insulated with 50 mm ozone-friendly polyurethane foam between the inner and outer jacket.

All internal connection pipes for refrigerant are made of stainless steel and are led out through the outer jacket at the backside of the tank.

The evaporator surface consists of two welded together plates that are enlarged to the correct

dimensions. The tank is equipped with two bottom evaporators specially designed for robotic milking and there are additional evaporators at the sides for conventional milking.

1.1. Technical data

All measurements except weight are including ladder, Argos control unit agitator and cooling unit if integrated.

*DFC95L/DFC953L

Volume, litres	Diameter, mm	Length[1], mm	Length[2], mm	Height[3], mm	Height[4], mm	Weight[5], kg
5000	1700[6]	3338	3978	2090	2127	700
5000	1900	2794	3434	2285	2302	700
6000	1700[6]	3863	4503	2090	2152	900
6000	1900	3209	3849	2285	2305	900
8000	1900	4044	4684	2285	2351	1120
8000	2100	3411	4051	2490	2540	1120
10000	2100	4100	4740	2490	2555	1360
12000	2100	4768	5408	2490	2566	1530
14000*	2240	5342	5982	2460	2627	1730
16000*	2240	5991	6631	2460	2647	1965
18000*	2240	6642	7282	2488	2661	2210

Length[1] - without integrated cooling unit.

Length[2] - with integrated cooling unit.

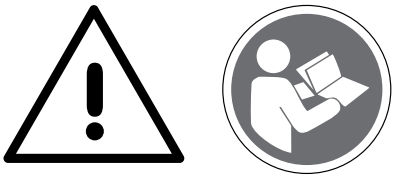
Height[3] - normal transport height. (Removing agitator and legs will decrease height[3] by approximately 250mm)

Height[4] - maximum height at 3,3% tank inclination.

Weight[5] - Add weight of cooling unit, MT45:150kg, MT67: 170kg, MT100: 250 kg

[6] - minimum width is 1825 mm if cooling unit integrated, else, same as diameter.

2. Safety instructions



The installer must complete and adapt to below recommendations, and if necessary, by adding other safety checks according to the refrigeration equipment's operating conditions.

All installing, commissioning and maintenance operations needs to be performed by qualified professionals and conforming with standards EN 378, EN 14276, EN 13136, EN 13313, EN 60204 and EN 60335, the EU directives, the safety rules generally recognized, sound engineering practice, the local regulations; as well as those which may be set up, considering the evolution of the technology and the regulations.

It needs to be verified that installation, commissioning, operation, and maintenance is fulfilled according to these instructions, else, the responsibility of Wedholms is cancelled.

The customer needs to be informed of operating the unit, mandatory maintenance, as well as follow-up of the refrigeration equipment.

The units are designed for 80/80/80/120 bar pressure and are equipped with safety pressure switches set to 120 bar.

Any system that is designed with PS < 60 bar (R744 critical point) have a risk of overpressure when it stops. When installing a CO2 unit to a system designed for lower pressure, the installer is responsible to verify the safety of the installation (for example by installing an extra safety valves).

The devices are delivered pressurized with nitrogen or dry air if delivered separately, (at reception of units, make sure that system is pressurized by using a pressure gauge). Follow standards and regulations for transport and handling of pressure devices.

Install device in a space with sufficient ventilation according to standards and regulations, as the device contains pressurized nitrogen.

Very important:

Before starting the equipment, verify that power cables are undamaged and properly connected.

Replace any damaged power cables and correct any other related faults before starting the system.

Before performing any service on refrigeration equipment, the electric power supply must be switched off and locked. Wait five minutes before the work is started.

When abnormal operation is detected, or before disassembly or repair, switch off and lock the mains

power. Wait five minutes before any work or troubleshooting starts.

The company or the person in charge of the installation, is responsible for required actions.

The rated short-circuit breaking capacity of equipment (SCCR) is 10kA.

Wedholms disclaims any responsibility for change(s) or repair(s) on its devices made without prior agreement.

The devices are exclusively intended for professionals, for refrigeration purposes and for their limits of use.

The identification of the device and its range of use are written on the type-plates. Type-plates are located: on the coil for heat exchangers, on the frame for racks, on the housing for condensing units, on the receiver for liquid receiver sets and for liquid sub-assembly.

The Argos control unit and tank cleaning components are designed for ambient temperatures between 5°C and 38°C. The tank and cooling unit are designed for ambient temperatures between -30°C to 43°C and nominal capacity with saturation temperature 0°C at an ambient air temperature of 38°C.

The expected average lifespan for Wedholms devices is of a minimum of 10 years, if installation, operating, and maintenance instructions are followed.

Wedholms cannot be held responsible in case of violation of the recommendations.

Different types of piping are used in Wedholms' equipment:

Copper, standard NF EN 12735

Steel, standard NF EN 10216-2 (type P265GH; n° 1.0425)

Stainless steel, standard NF EN 10217-7 (type 304L – X2CrNi18-9; n° 1.4307).

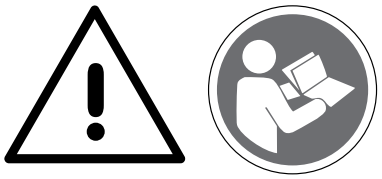
The pipes must be inspected regularly following standards, sound engineering practice and local regulations in the country of use.

Some heat transfer fluids can be harmful or corrosive. Consider risks if there is a liquid- or gas leak.

Do not use other than designated refrigerant (filling, adding, or re-filling) Refrigerant gas leak may cause suffocation.

Piping, components, and tools should be appropriate for use with refrigerant R744 (CO_2).

Use of unsuitable components or those designed for HFC refrigerants may cause serious incidents



such as equipment failure and rupture of the refrigerant cycle.

Securely re-install covers on electrical boxes and enclosure panels. Incomplete attachment may lead to penetration of water, debris or living creatures, meaning potential fire/electrical shock.

Do not change the set values of the safety devices.

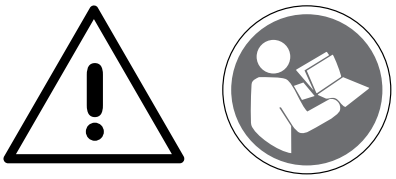
Using the refrigeration unit with altered values may cause failure of the safety functions and might cause a burst or fire.

Only original components to be used for repair.

Use of non-specified components may cause failure of the safety functions and might cause severe damage to humans, animals, or other assets.

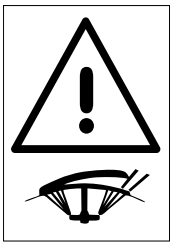
Incorrect moving of unit may cause damage of the refrigeration unit and cause injuries.

Ensure that access and emergency exits are not blocked, and that other local regulations are respected.



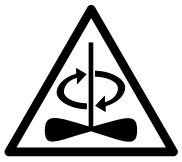
2.1. Safety symbols and information plates

Read the instructions
Before performing any work at the unit or operating the tank or controller



WARNING! Risk of splashing
The manhole lid must be closed during cleaning. Do not open the hatch during cleaning. Hot water and detergent may spray out.

WARNING! Voltage warning
Do not open unless electric power supply is switched off.
Work on electrical equipment must only be performed by a qualified technician.



WARNING! Automatic agitation
The agitator starts automatically. Disconnect the power supply when working in the tank.

WARNING! Hot surface, do not touch
Do not touch the condensing unit and hot cleaning pipes.

WARNING! Rotating fan
The fans starts automatically. Do not touch unless electric power supply is switched off

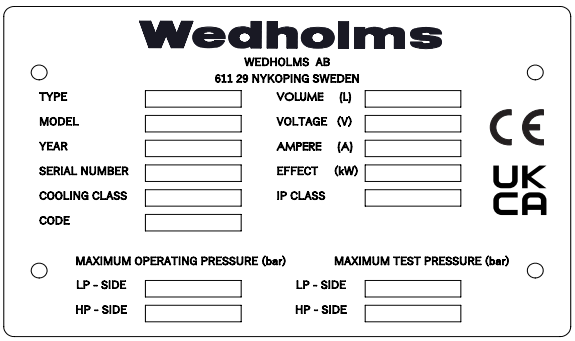
WARNING! Risk of falling
Beware of slippery surfaces.

WARNING! Do not touch
Beware of moving parts. Surface might be hot or cold.

Tank centre of gravity
The tanks centre of gravity is marked on the sides of the tank. The declared weight is printed on the centre-of-gravity label. The tank must never be pushed to slide on its legs.

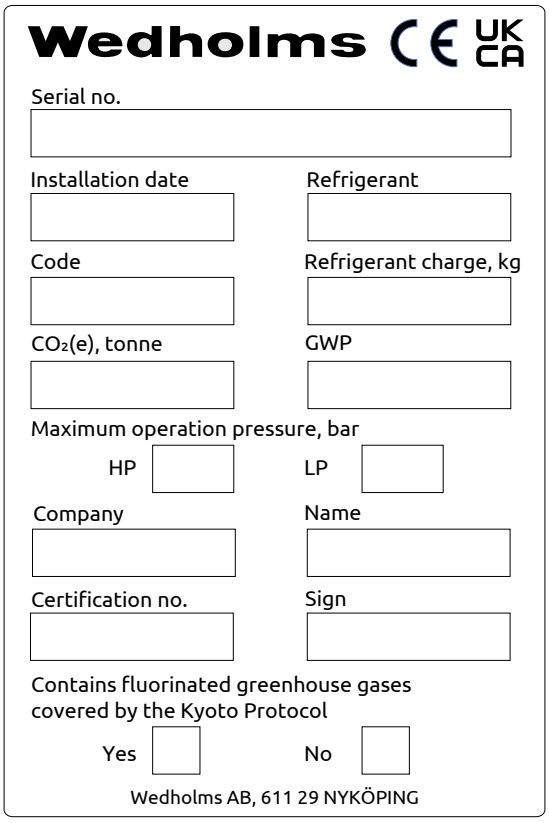
2.1.1. Type plate

The type plate of the tanks covers the entire system, that is, the tank and the condensing unit if these are pre-assembled at the factory. The type plate for assembled tanks also include CE and UKCA marking.



2.1.2. Data label

The data label is placed on the outside of cooling enclosure. Installer is responsible to fill in and place the label when a separated system is delivered.



3. General instructions

The tank and condensing unit should be placed in a well-ventilated area with a temperature not exceeding the performance value for the refrigeration class.

- Argos control unit and cleaning components: between 5˚C and 38°C
- Tank and cooling unit: -30˚C to 43˚C

Excessively high or low ambient temperature will affect the efficiency of the tank:

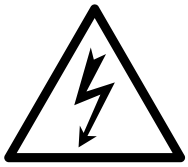
- A high ambient temperature will extend the cooling time and increases power consumption.
- Too low ambient temperature may cause ice to form in the milk and extend the cleaning time.
- Too low ambient temperature may also cause damage of tank components, cooling- or control systems.

3.1. Operation and maintenance

For optimized milk cooling, the farmer should perform a daily inspection according to Operators Maintenance chart. Verify that control and agitation functions without interruption.

When necessary, clean the gas cooler by rinsing it clean with water.

Also check the condensing unit air inlet at regular intervals



NOTE!

Disconnect and lock power supply and wait five minutes before cleaning gas cooler

The owner of the milk-cooling tank is responsible for periodic maintenance of the tank.

Periodic maintenance of all Wedholms tanks is a prerequisite for optimized and efficient milk cooling

Any work involving the refrigerant circuits must only be performed by certified personnel. If the work involving a refrigerant circuit, collect any

refrigerant and compressor oil (polyalkylene glycol [PAG]) for recycling according to applicable regulations. Refrigerant must not be emptied directly into the environment. Necessary protective equipment is mandatory.

The cleaning system of Wedholms tanks requires that the water and milk is free of sand, hay, sawdust, or other debris. We therefore strongly recommend that a sufficient water filter is used to make sure that no particles can get into the cooling- or cleaning system.

See more *12. Maintenance*

3.2. Installation Report

At installation, the Installation Report must be filled in and submitted. The report must be sent via e-mail to *info@wedholms.se*

1. For a tank with integrated cooling unit, marked areas in form must be filled in.
2. For a tank without integrated cooling unit, a complete form must be filled in.

The installation report provides support for the installation, but also proof of correct installation.

A completed and submitted installation report is therefore a prerequisite for the warranty to apply. The report can be found at the end of this manual.

See *17. Installation report*

NOTE! After installation is completed, the installation report must be sent to *info@wedholms.se*

Without a submitted Installation Report, warranty does not apply!

4. Tank installation

4.1. Placement of tank

Position the tank in the milk room so that installation, servicing and operation can take place without the tank having to be moved. Clearance around the tank should be minimum 500 mm.

The milk outlet should be minimum 200 mm from the floor.

There must be a clearance of minimum 1000 mm from the closed manhole lid to ceiling.

If the tank is positioned through a wall, make sure that there is space enough to service agitator and agitator motor.

Position the condensing unit so that there is minimum 500 mm between the gas cooler and a wall, or other obstacle.

Moving the tank from the yard into the milk room should preferably be done using slings. A forklift can also be used. Slings facilitates more careful handling. It is important to lift straight and to identify the tank's centre of gravity before lifting.

The tank's centre of gravity is marked with a label at the factory.

NOTE! All movement must take place by lifting. The tank must not be pushed while standing on its legs.

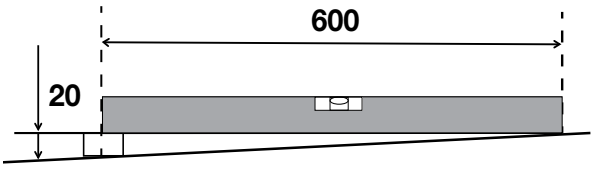
4.1.1. Levelling the tank

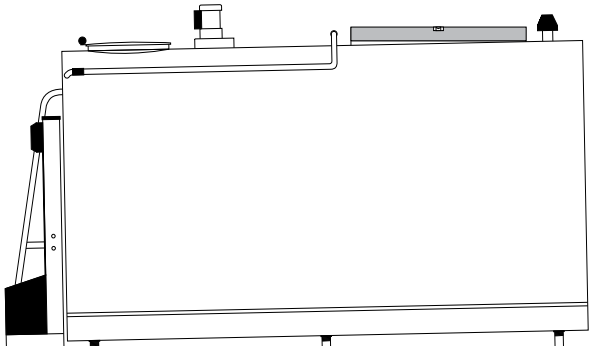
NOTE! The tank inclination, whether with or without a condensing unit, must be 1,9˚, equivalent to 3,3% (3,3% => 33 mm/m)

1. Place a spirit level on the manhole frame to adjust the tank viewed horizontally from the front. Adjust by screwing in or out the front legs of the tank.
2. If there is a dipstick, see the chapter *4.1.2. Dipstick level setting* in order to obtain a correct inclination, else, continue to next step.
3. Adjust the tank viewed from the side. The

correct inclination, 1.9° (3,3%), is achieved with the help of a spirit level placed on the top of the tank. The spirit level should be placed directly on the body of the tank, preferably behind the agitator. If there is insufficient space on the top of the tank to allow a spirit level to be used, then use the longitudinal frame.

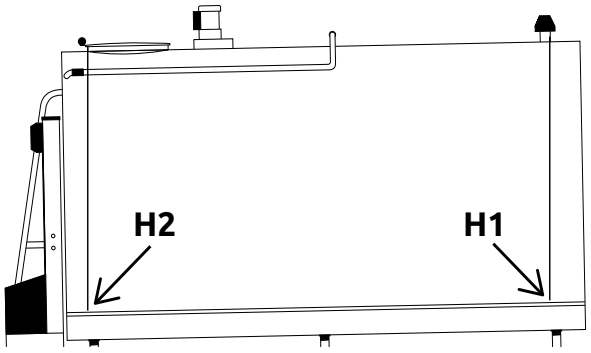
4. Place a 20 mm spacer under the lower part of the 600 mm (minimum) spirit level. Adjust the feet of the tank until the spirit level indicates that it is horizontally. Inclination of the tank is done in order to obtain good emptying and to ensure effective cleaning.





4.1.2. Dipstick level setting

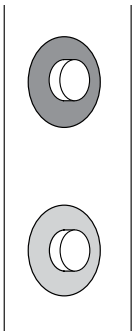
1. Fill the tank with enough water to reach the gauge at the rear end (H1).
2. Let the water stabilize.
3. Wipe the gauge, place it in the water, hanging on the edge of manhole. Read the gauge (H2).
4. Repeat the procedure with the gauge in vent hole (H1).
5. The difference between H2 and H1 must be as in the provided calibration table for the actual tank.



4.2. Water connections

Connect the hot and cold water to inlets at the Argos post.

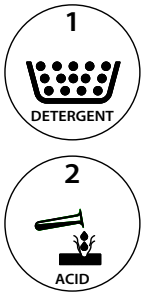
- Upper inlet to cold water (Blue)
- Lower inlet to hot water (Red)



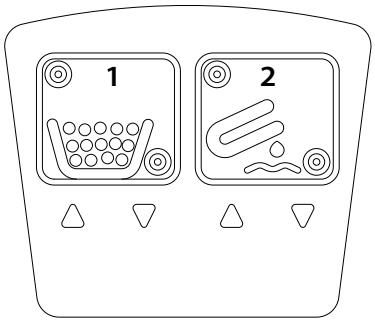
4.3. Detergent connections

Attach suction hoses to corresponding detergent containers

1. Alkaline, blue
2. Acid, red

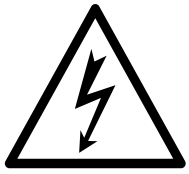


The peristaltic pumps at front of Argos are marked with same symbols as suction hoses.



WARNING!
Always wear protective gloves and glasses when handling detergents. High concentrations of detergent may increase wear on plastic and rubber. Never mix alkaline and acid detergents as this may lead to the formation of hazardous gases and a risk of explosion.

5. Electrical connection



WARNING!
Do not perform any work unless electric power supply is switched off and locked. Wait five minutes after switching off before working. The electrical installation must only be performed by certified technician.

Connect the distribution box and external connections according to electrical diagrams. *5.3. Electrical diagram*

All components will be connected to earth when marked earthing points are correctly connected to earth, (tank frame and terminal block in distribution box).

Always install a protective earth conductor. The protective conductor should be at least 10 mm² if copper, or 16 mm² if aluminium. Alternatively additional protective conductors may be used.

Short-circuit current rating of the electrical equipment for incoming power supply is 10kA.

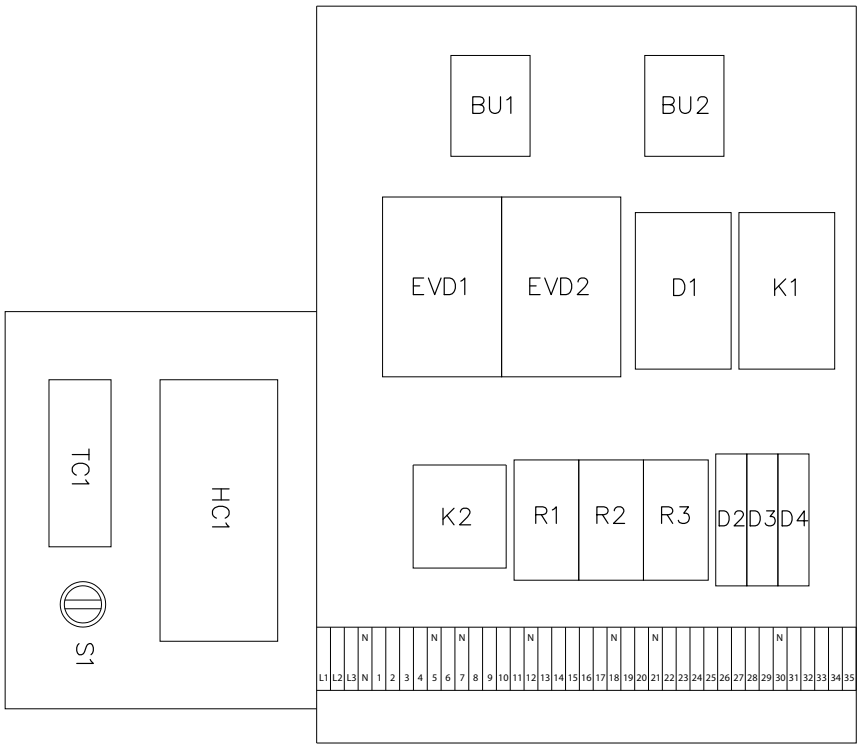
If a Residual-Current Circuit Breaker (RCCB) is to be used, the following conditions apply.

- The RCCB must be a type B device, suitable to protect the equipment against leakage current with a DC component
- Individual RCCB's should be used for each drive conductor.

5.1. Requirements

Voltage/ Model	MT45	MT67	MT100	Conductors (min)	Distribution system
230V, ~3	32A	32A	N/A	6 mm²	IT/TN
400V, ~3	16A	16A	16A	2.5 mm²	TT

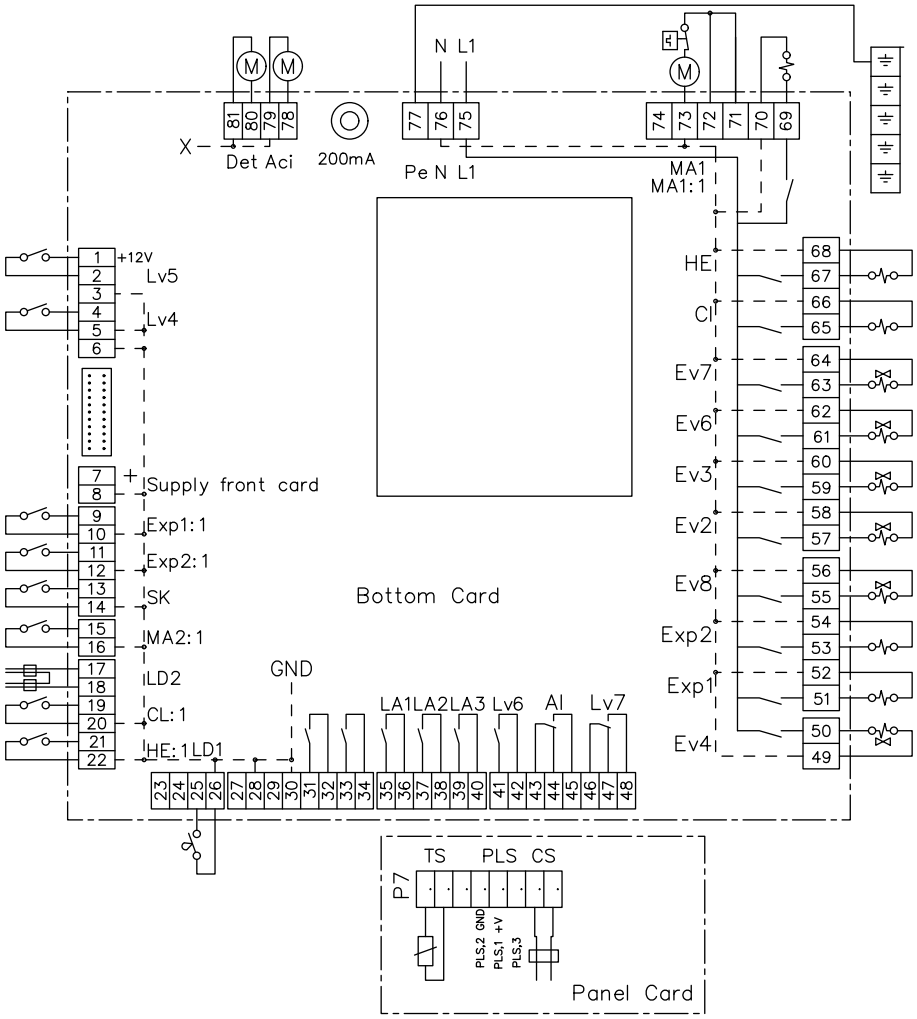
5.2. Component layout



POS.	DESCRIPTION
K1	Contactor Heater
K2	Contactor Cleaning pump
R1	Relay 230VAC, Expansion valve 1
R2	Relay 230VAC, Interpac pump
R3	Relay 230VAC, Expansion valve 2
R1-R3	Socket, relay
D1	Circuit breaker Heater
D2	Circuit breaker Interpac
D3	Circuit breaker Cleaning pump
D4	Circuit breaker Argos
HC1	Condensing unit controller UI
TC1	Interpac controller UI
EVD1	Controller Expansion valve 1
BU1	Backup for regulator expansion valve 1
EVD2	Controller Expansion valve 2
BU2	Backup for regulator expansion valve 2
T1*	Timer forced cooling T1
T2*	Timer forced cooling T2
SV1*	3-way valve actuator Interpac
S1	Switch S1 Interpac
TS*	Temperature sensor
PS*	Pressure sensor
*NOT SHOWN	

5.3. Electrical diagram

5.3.1. PCB relay board



Outputs:

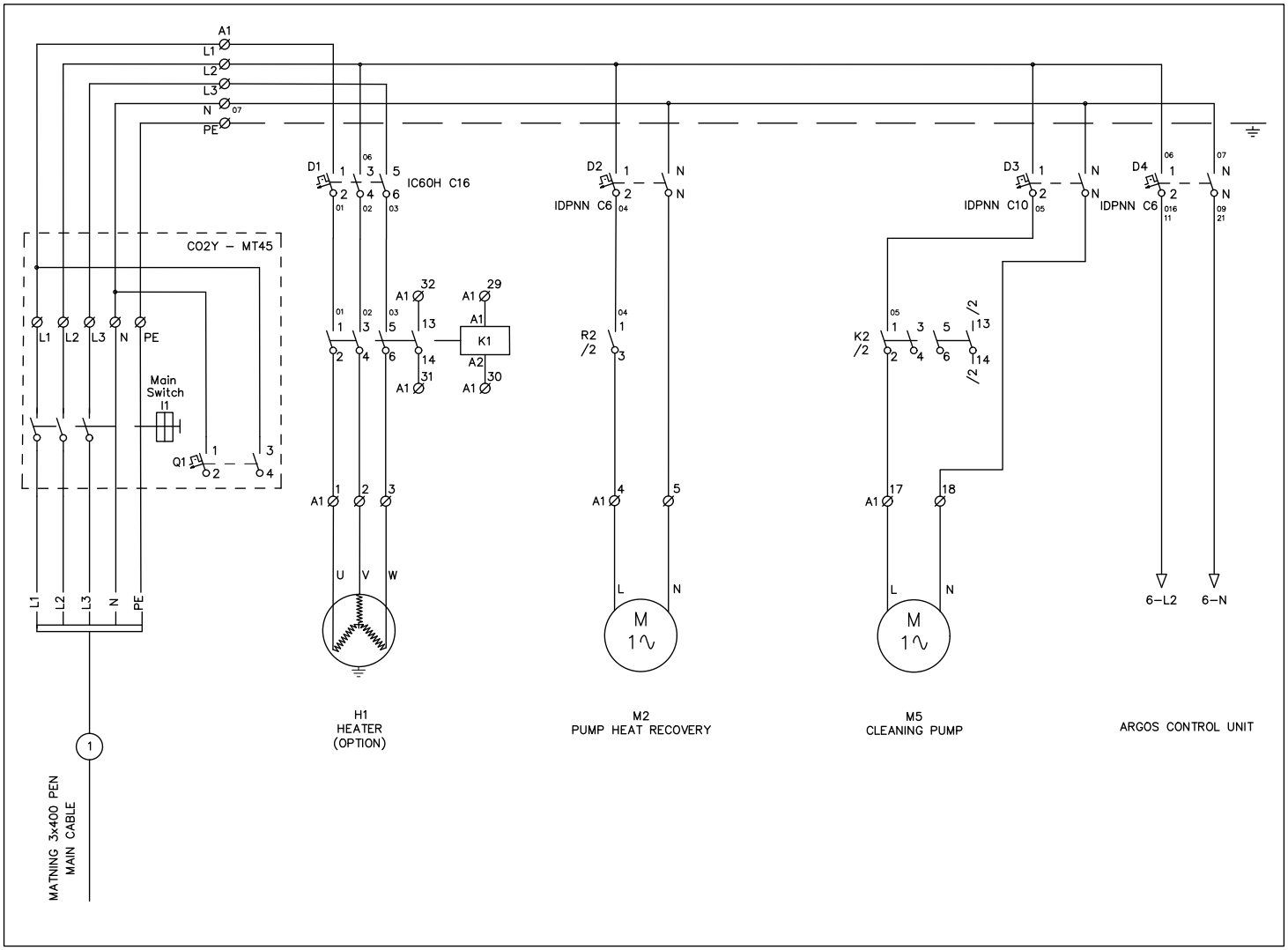
MA1 Agitator
EV2 Solenoid valve Hot Water
EV3 Solenoid valve Cold Water
EV4 Solenoid valve Outlet Valve Tank
EV6 Solenoid valve Drain Valve No 1
EV7 Solenoid valve Drain Valve No 2
EV8 Solenoid valve Capacity Regulator
CL1 Contactor Cleaning Pump
EXP1 Expansion valve 1
EXP2 Expansion valve 2
HE Contactor Heater
DET Dos Pump Detergent
ACI Dos Pump Desinfection
AL1 Alarm
LV6 "Emptying/cleaning"signal to robot
LV7 "Cleaning on" signal to robot
LA1 Light cooling on
LA2 Tankguard red light
LA3 Tankguard green light

Inputs:

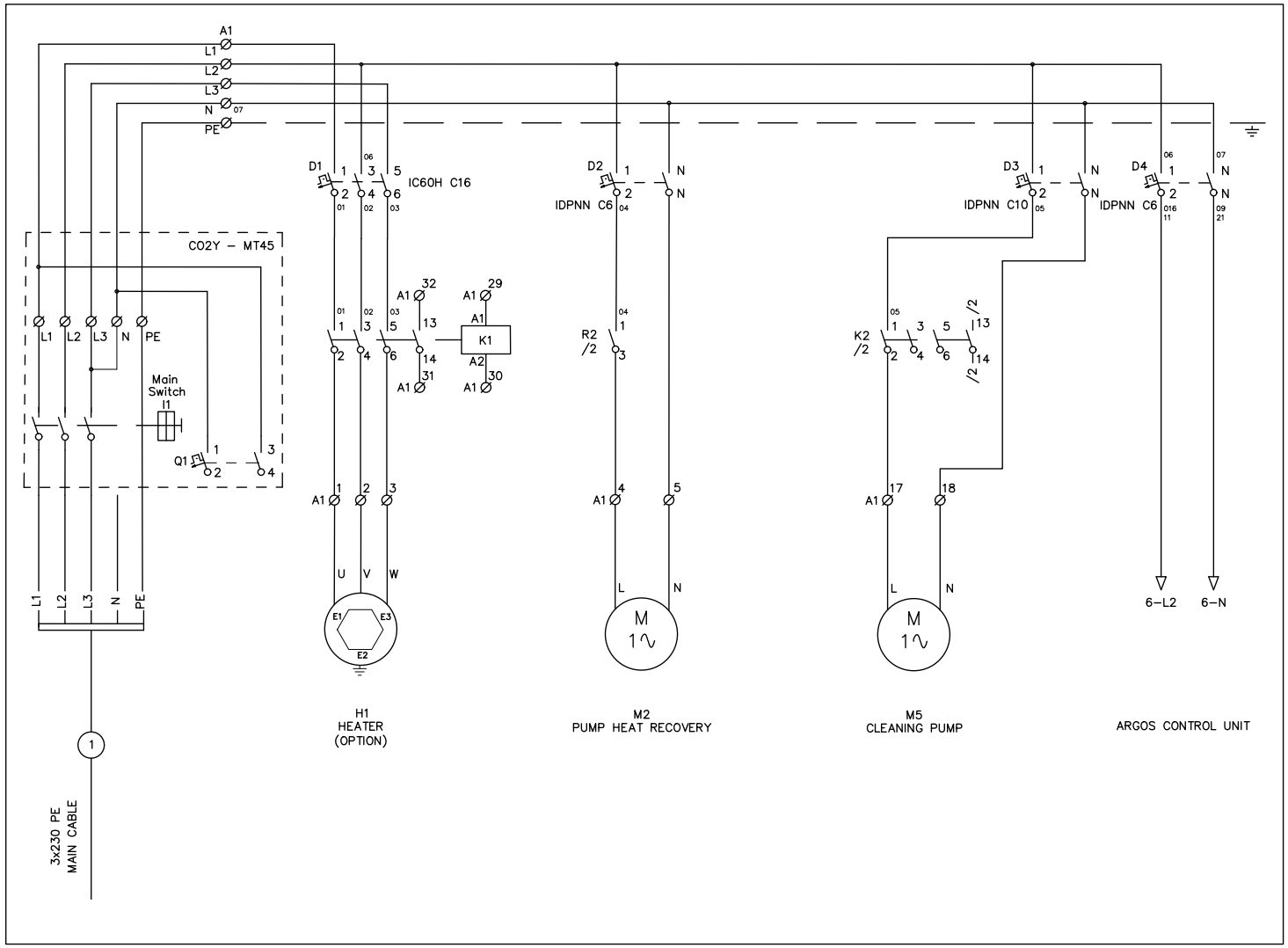
MA:1 Feedback Agitator
MA:2 Feedback Milkpump
EXP1:1 Feedback Expansion Valve 1
EXP2:1 Feedback Expansion Valve 2
CL1:1 Feedback Contactor Cleaning Pump
HE:1 Feedback Contactor Heater
SK Start cooling
LD1 Level Indicator Washing
LD2 Conductive Sensor Detergent
LV4 Position Outlet Valve
LV5 Position Filling Valve robot

TS Sensor Temperature Tank
PLS Level Sensor Tank
CS Conductive Sensor Cleaning

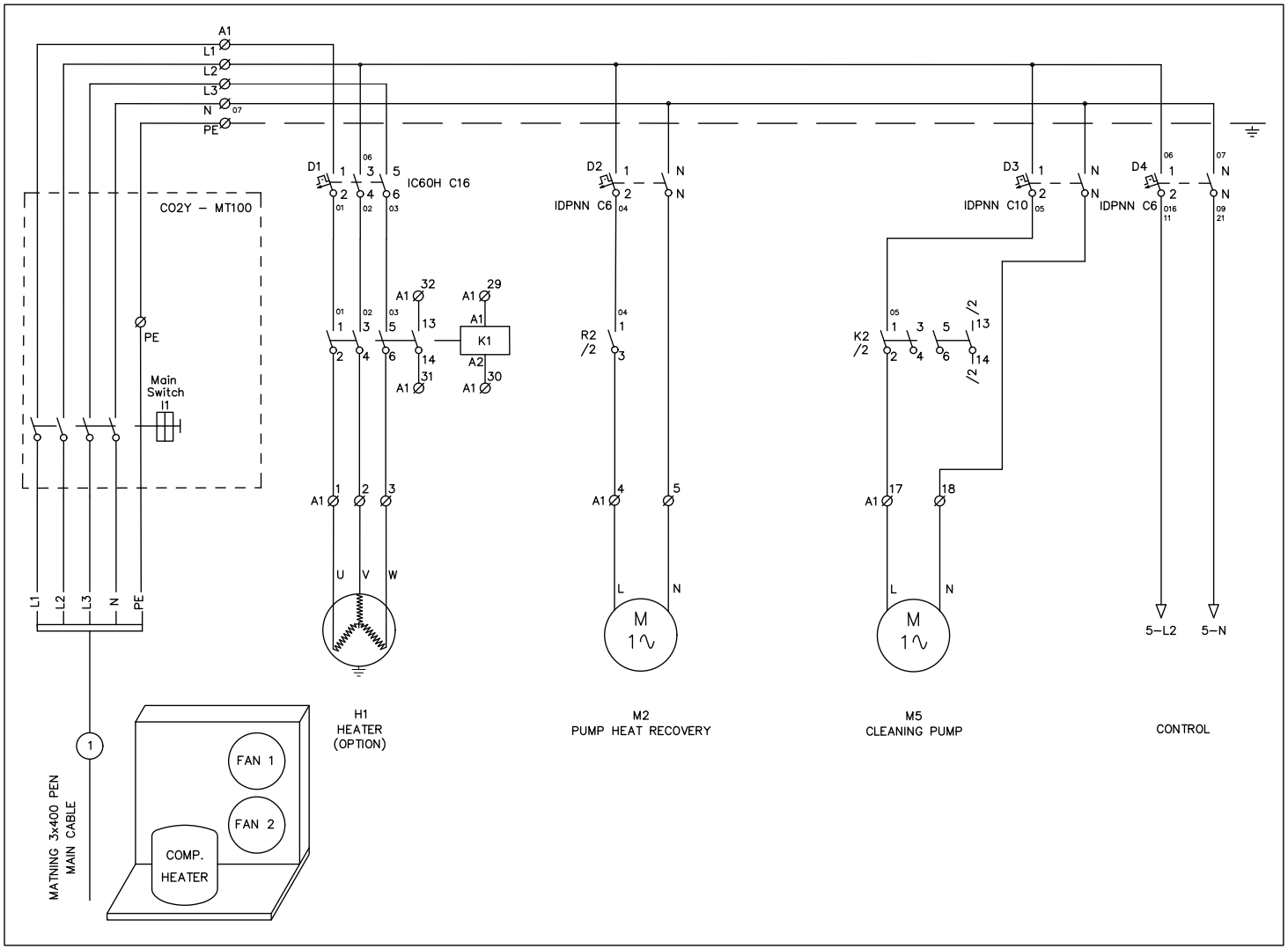
5.3.2. Circuit diagram 3-ph 400V MT45/MT67



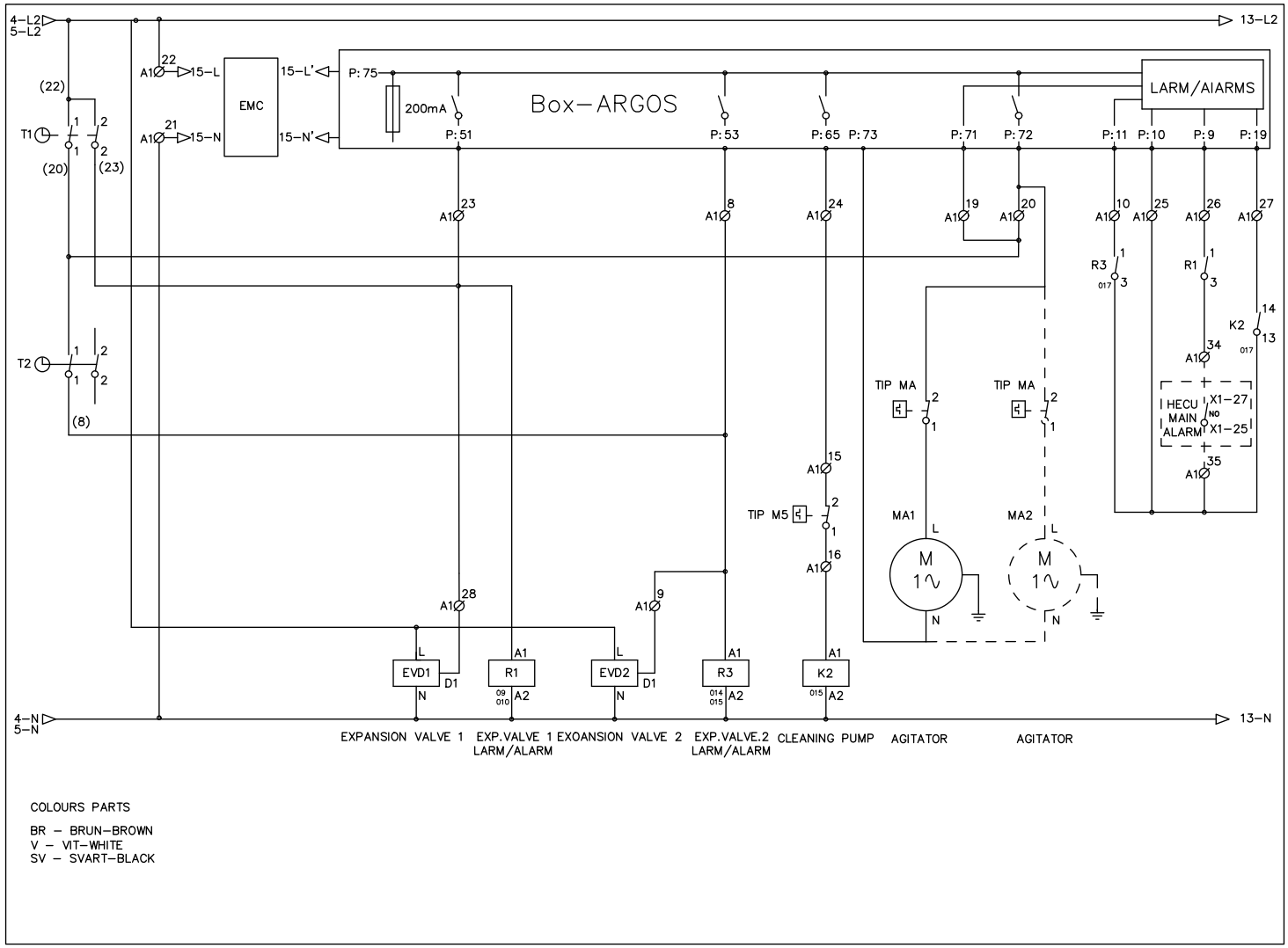
5.3.3. Circuit diagram 3-ph 230V MT45/MT67



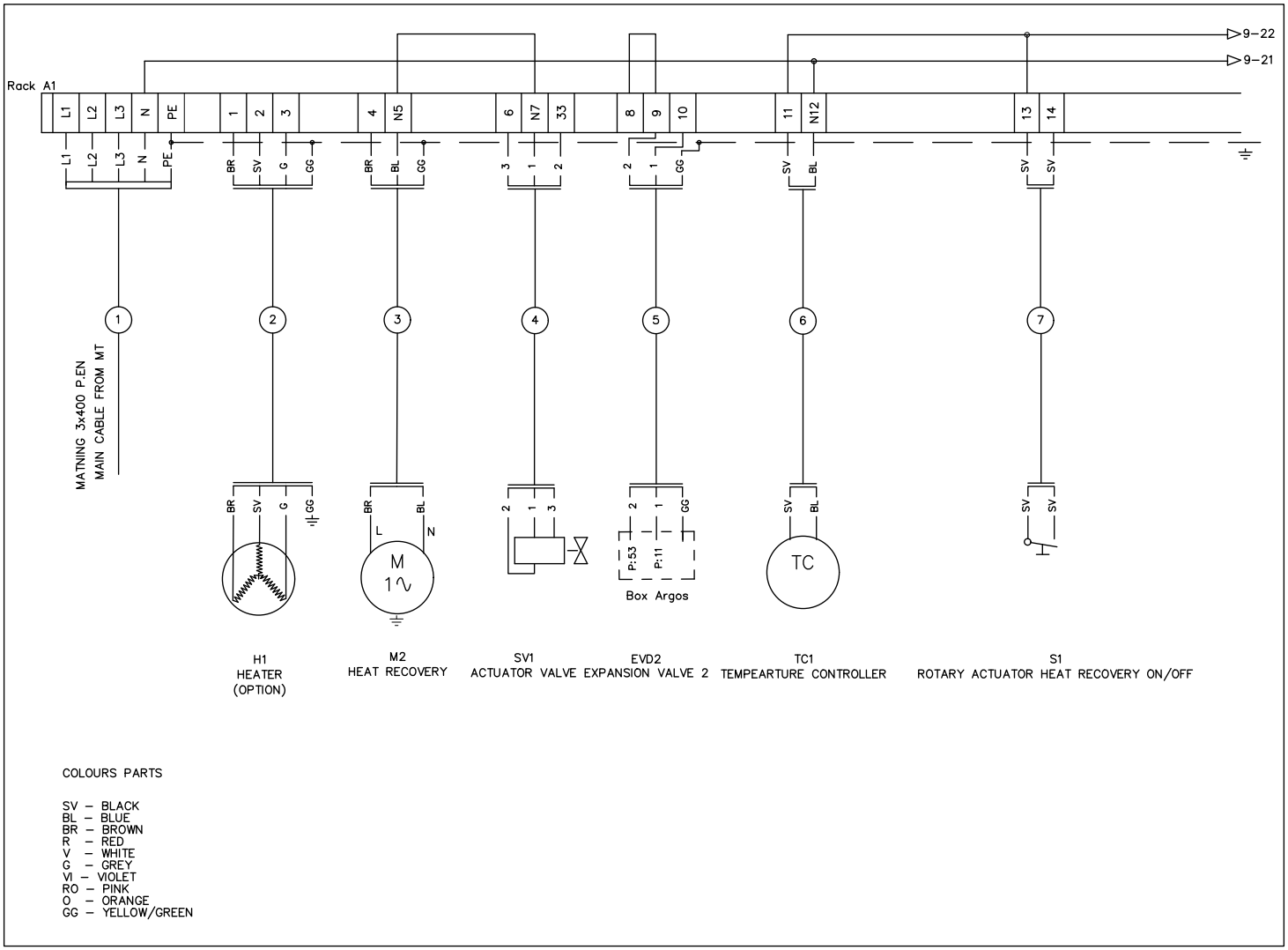
5.3.4. Circuit diagram 3-ph 400V MT100



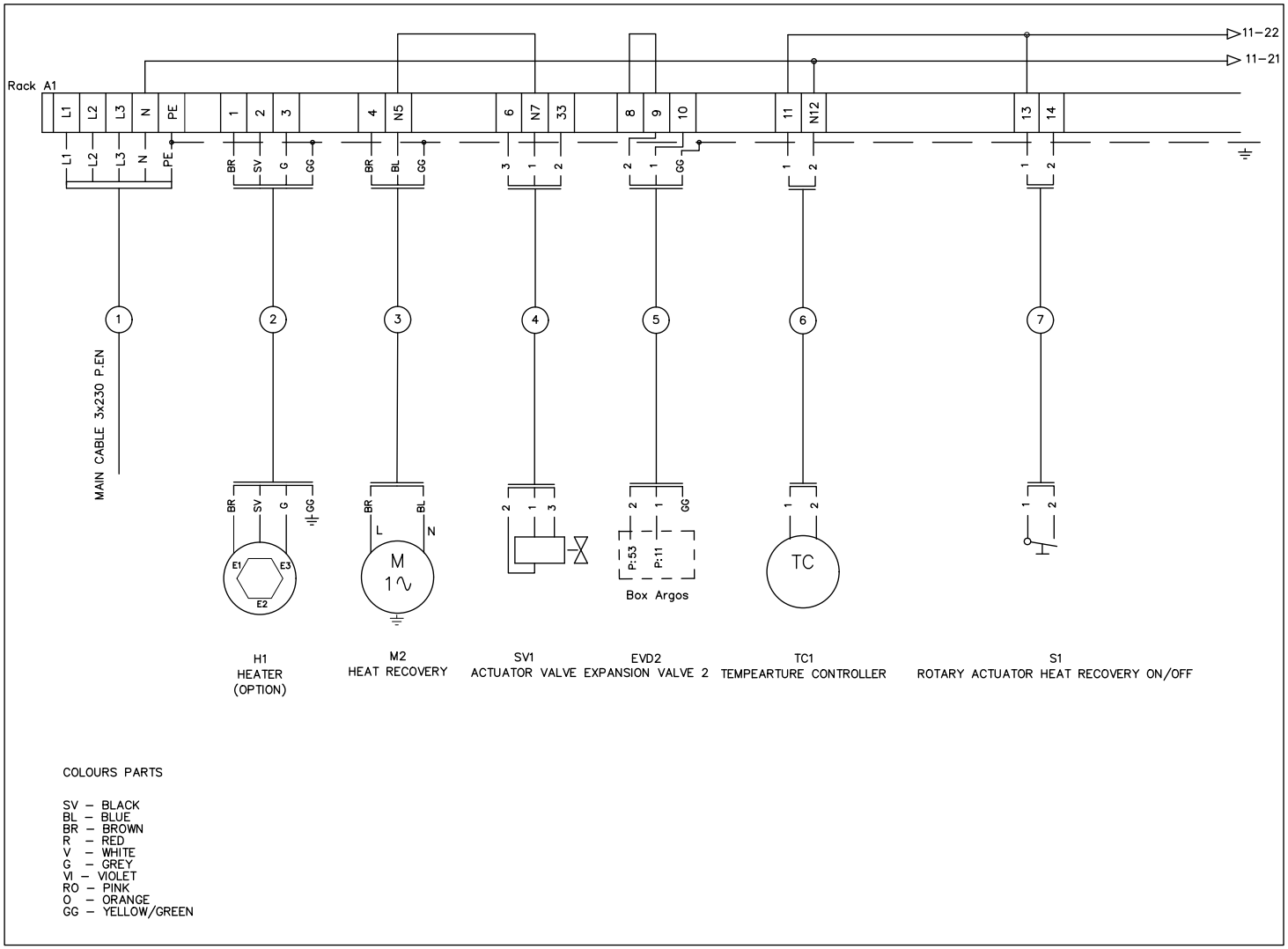
5.3.5. Circuit diagram 2



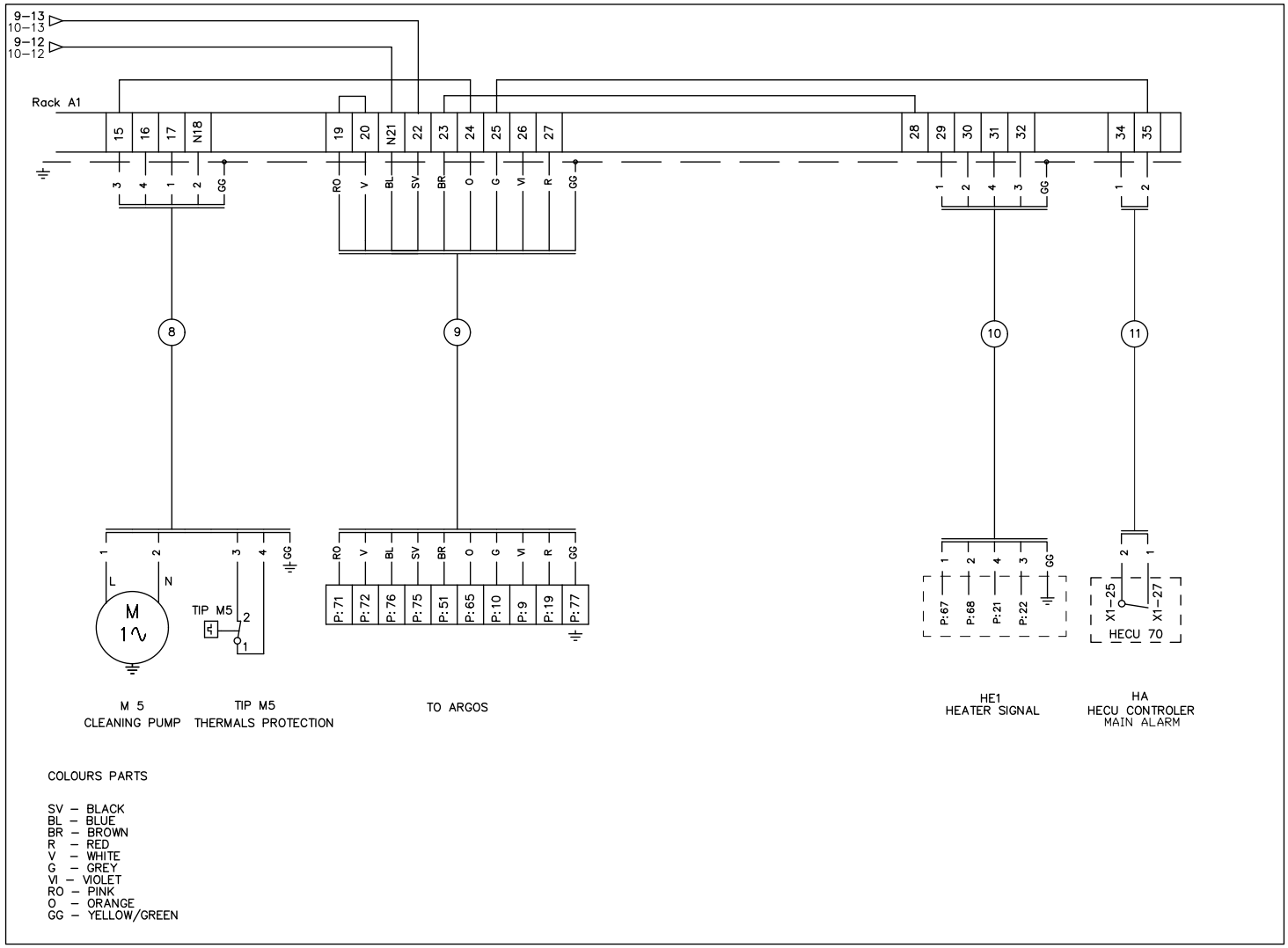
5.3.6. External connections 3-ph 400V



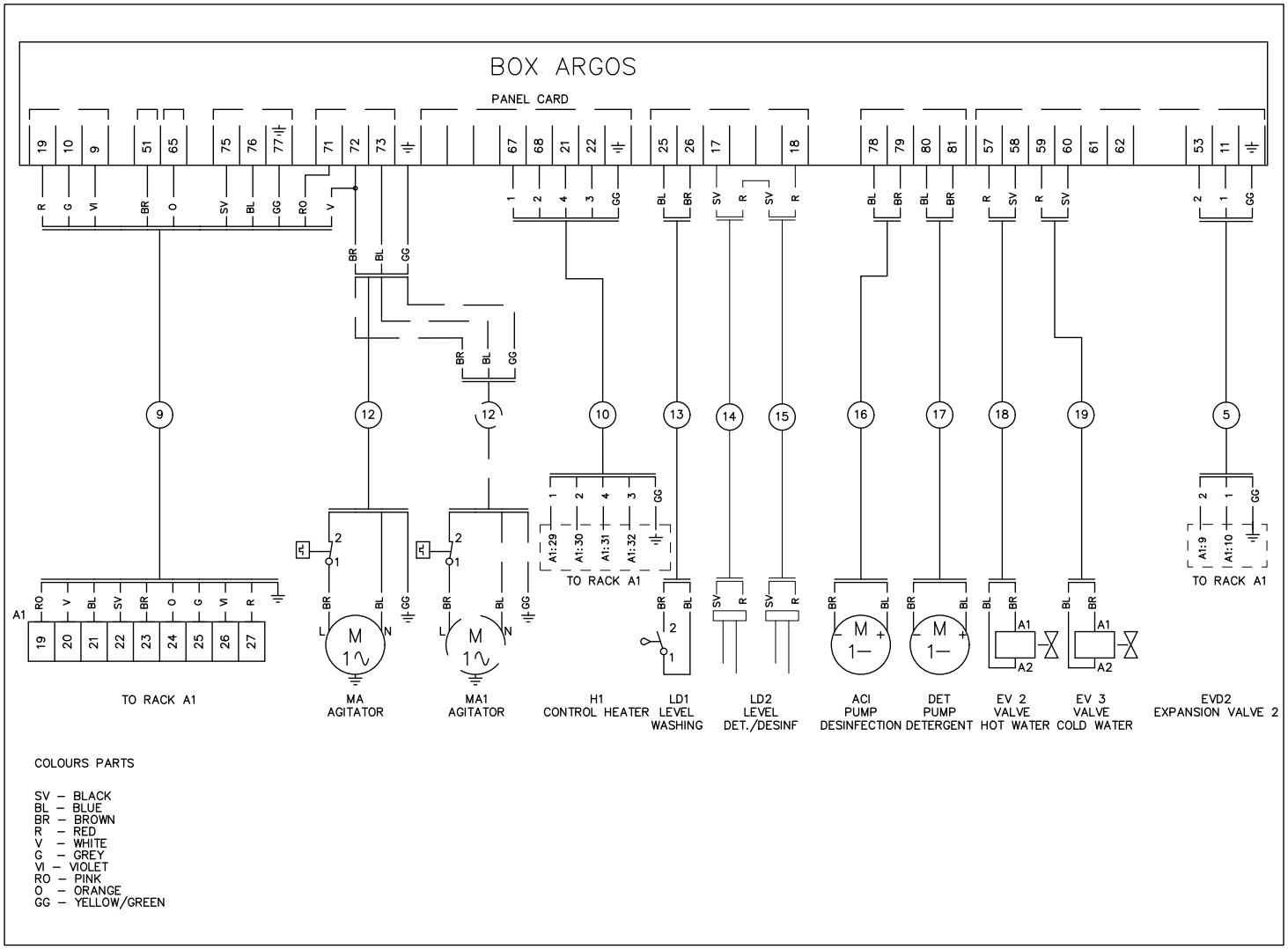
5.3.7. External connections 3-ph 230V



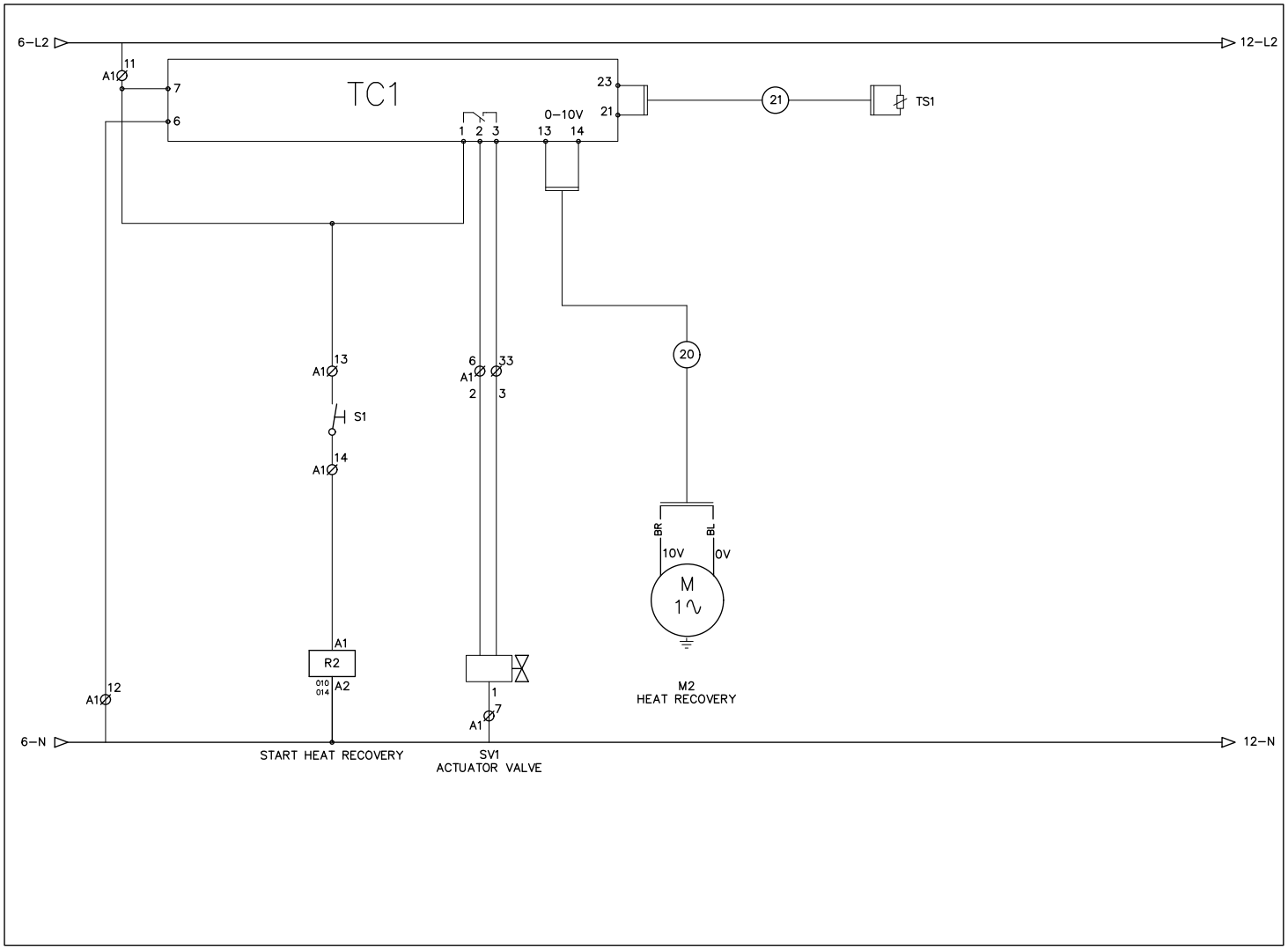
5.3.8. External connections 2



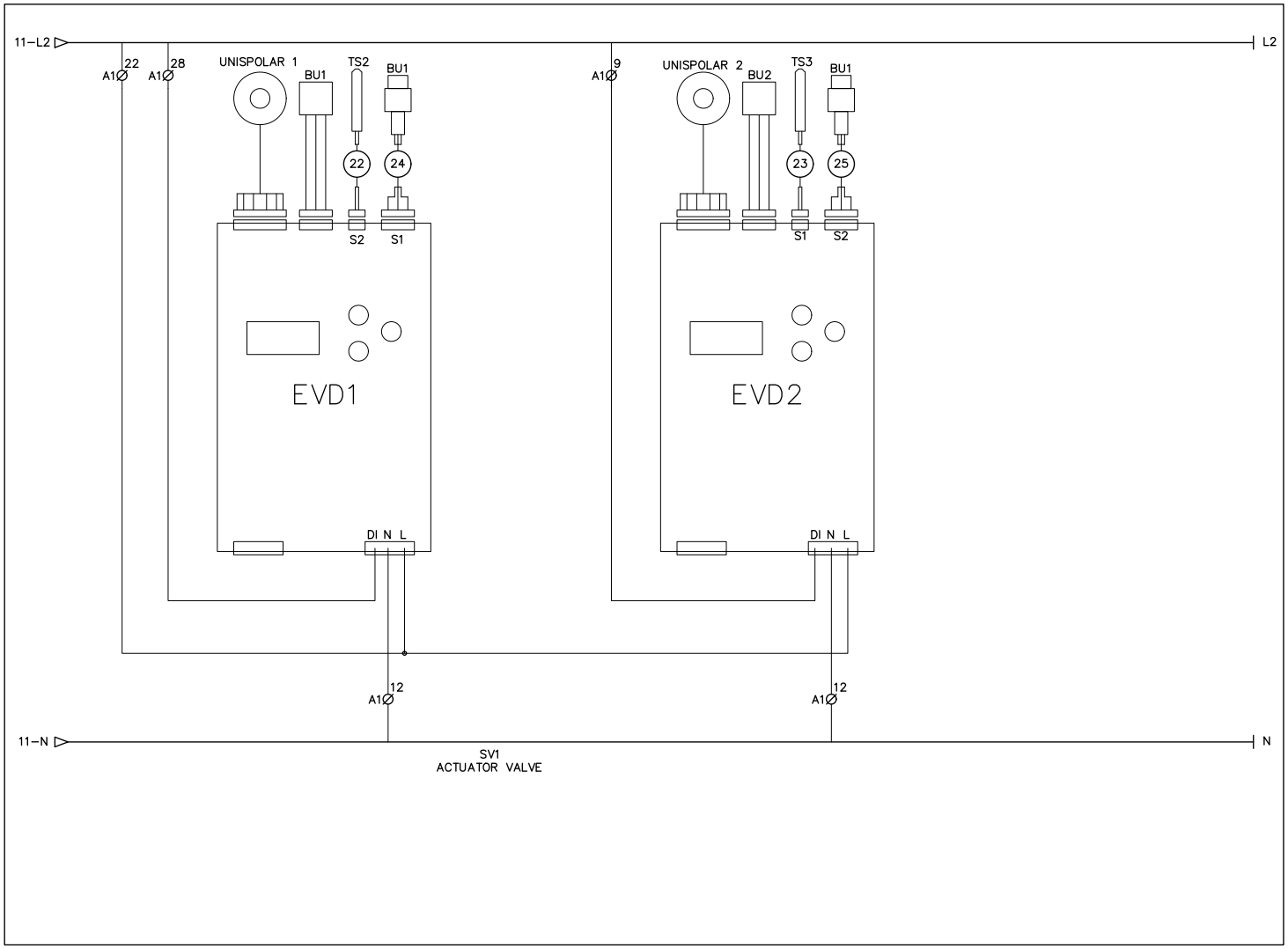
5.3.9. External connections 3



5.3.10. External connections Interpac

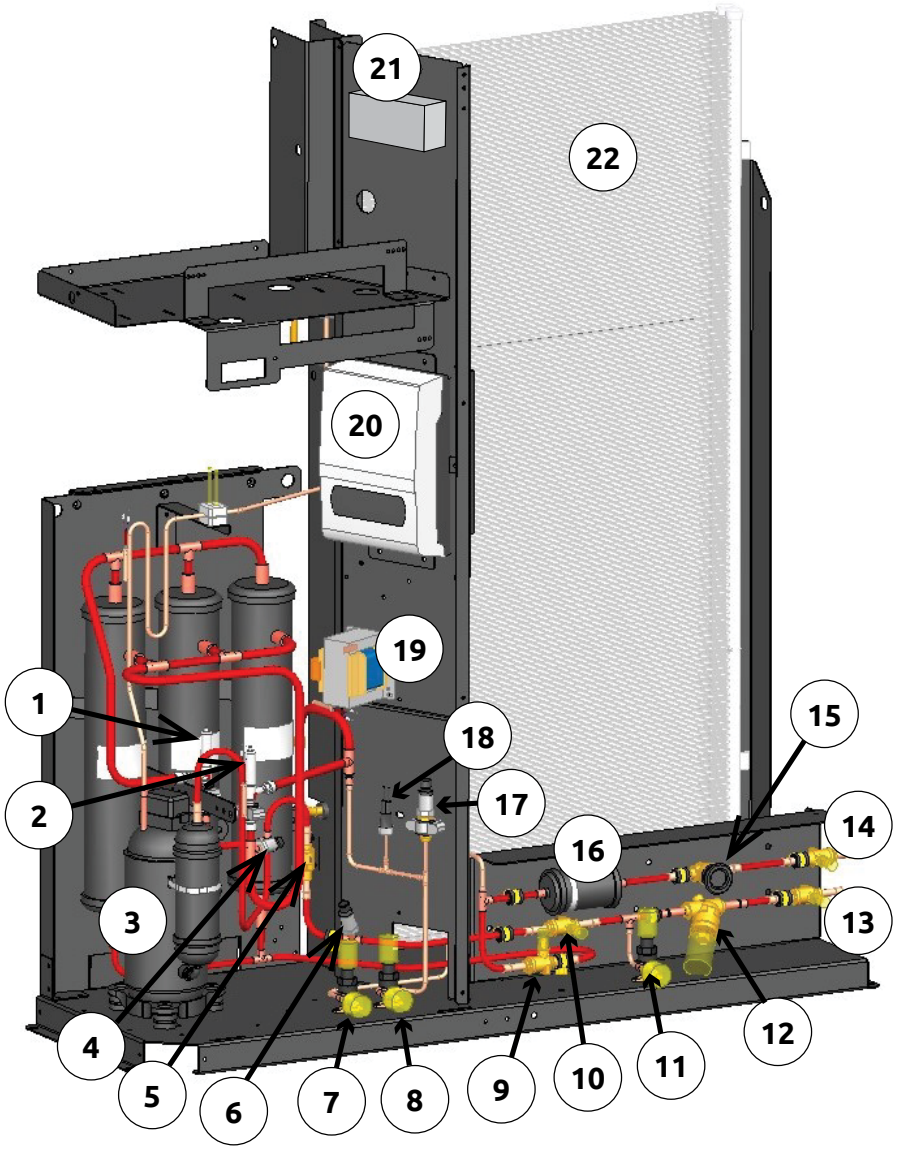


5.3.11. External connections expansion valves



6. Condensing unit installation

6.1. Cooling system description



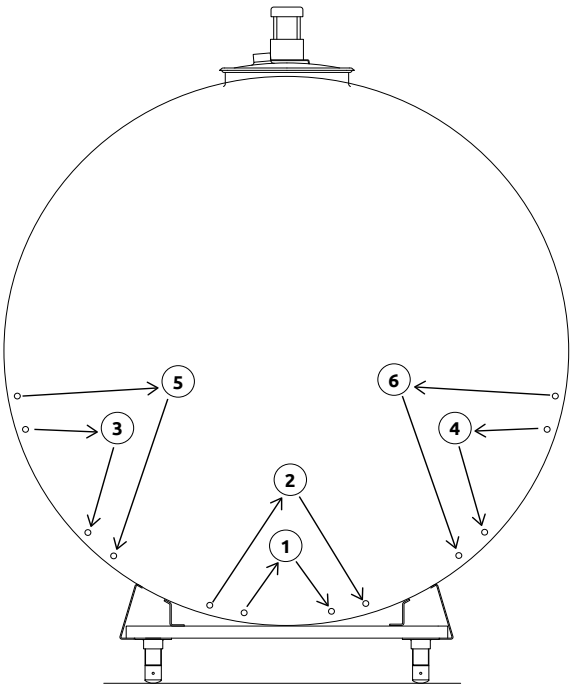
1. EC3, Control Valve
2. EC1, HP Control valve
3. Compressor
4. PT3, Receiver pressure transducer
5. Non return valve
6. PT2, Suction pressure transducer
7. VA12, Service valve, Liquid line
8. VA15, HP Service valve
9. VA16, Shut-off valve suction line
10. VA3, Shut-off valve liquid line
11. VA7, Service valve, Suction line
12. Mesh filter
13. VA17, Shut-off valve suction line
14. VA14, Shut-off valve liquid line
15. Sight glass
16. Filter drier
17. PT1, LP/HP Pressure transducer
18. PZH1, HP safety pressure switch
19. DC link choke
20. Inverter Compressor
21. RC Filter
22. Gas cooler

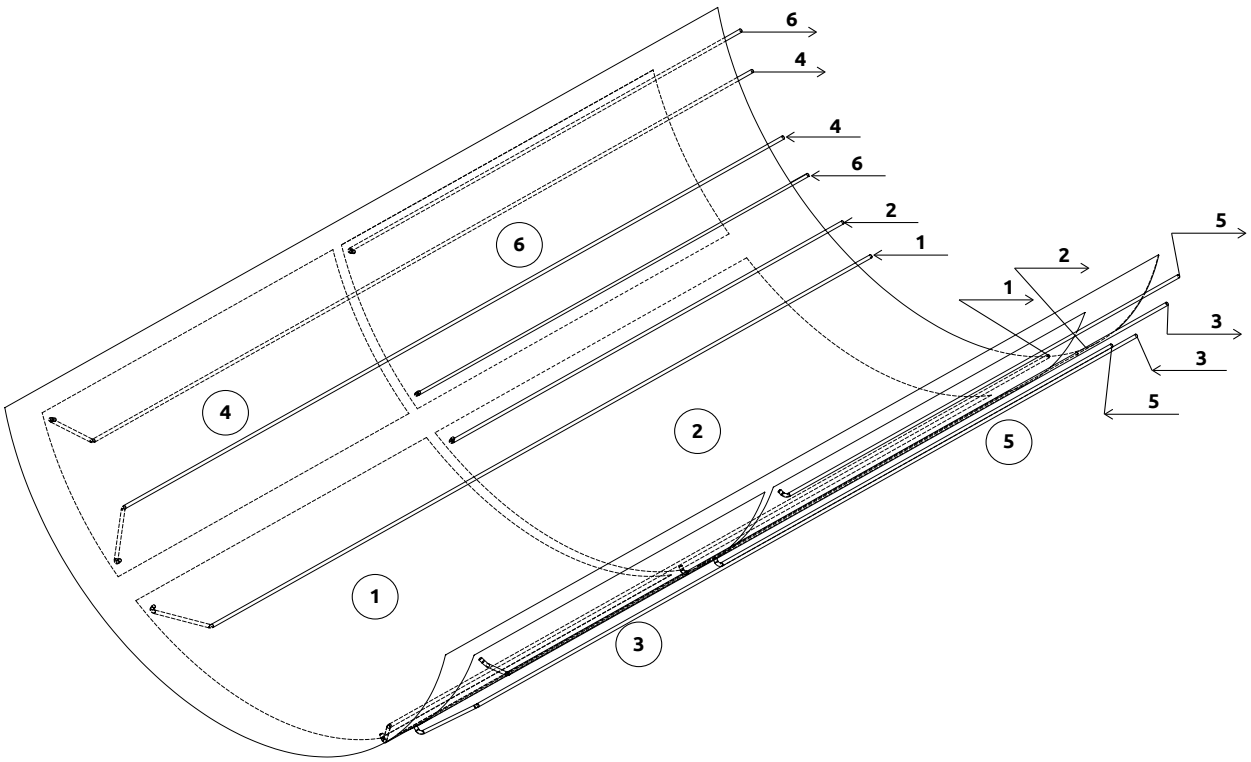
6.2. Evaporator configuration

6.2.1. DFC95/3 tanks

Regardless of how many evaporators that are present, the general layout is as illustrations. If fewer than six evaporator areas, the corresponding inlets and outlets are located similarly.

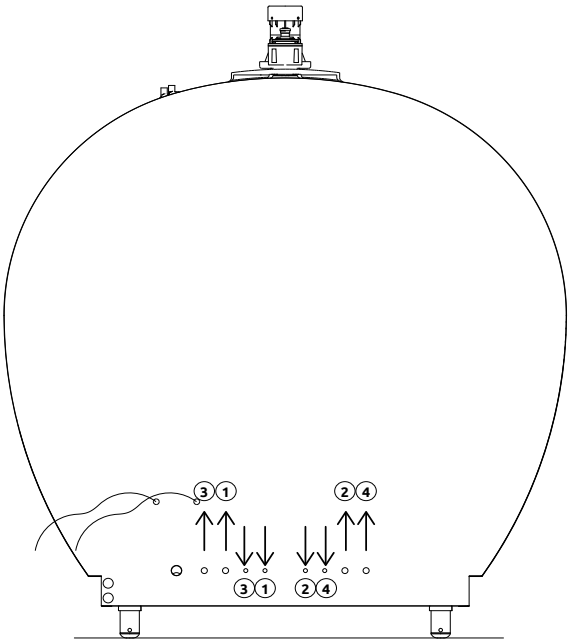
1. Front bottom evaporator
2. Rear bottom evaporator
3. Right side front upper evaporator
4. Left side front upper evaporator
5. Right side rear upper evaporator
6. Left side rear upper evaporator



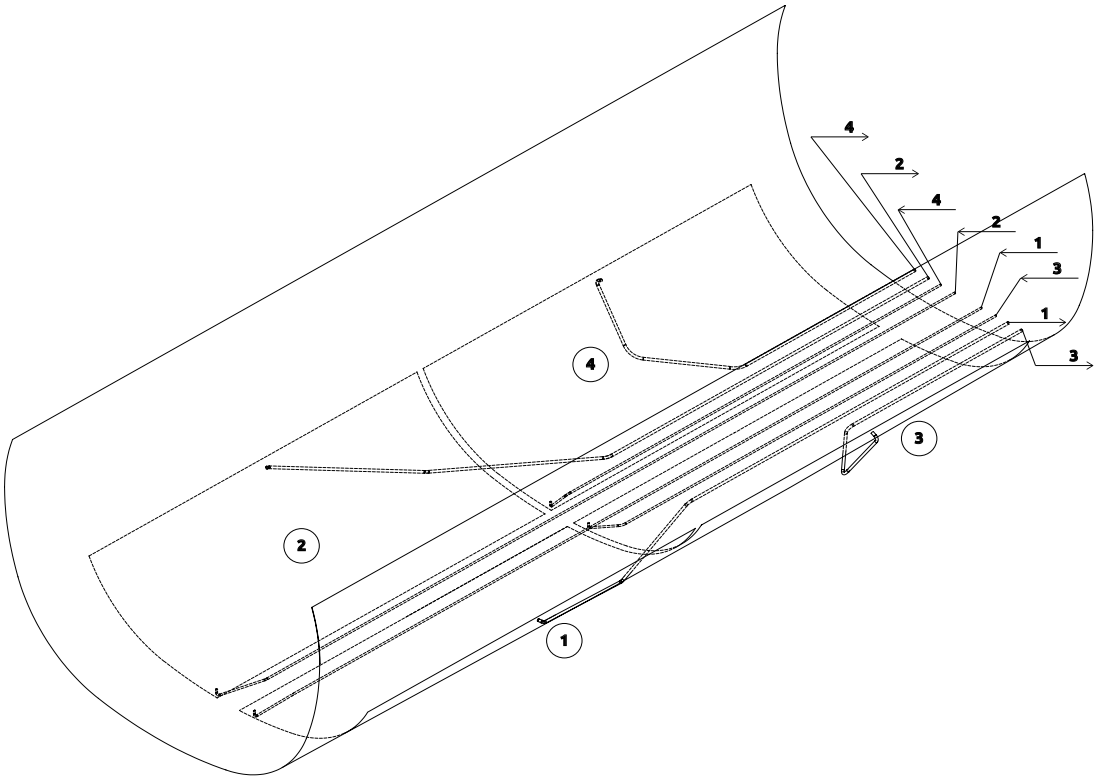


6.2.2. DFC95/3L tanks

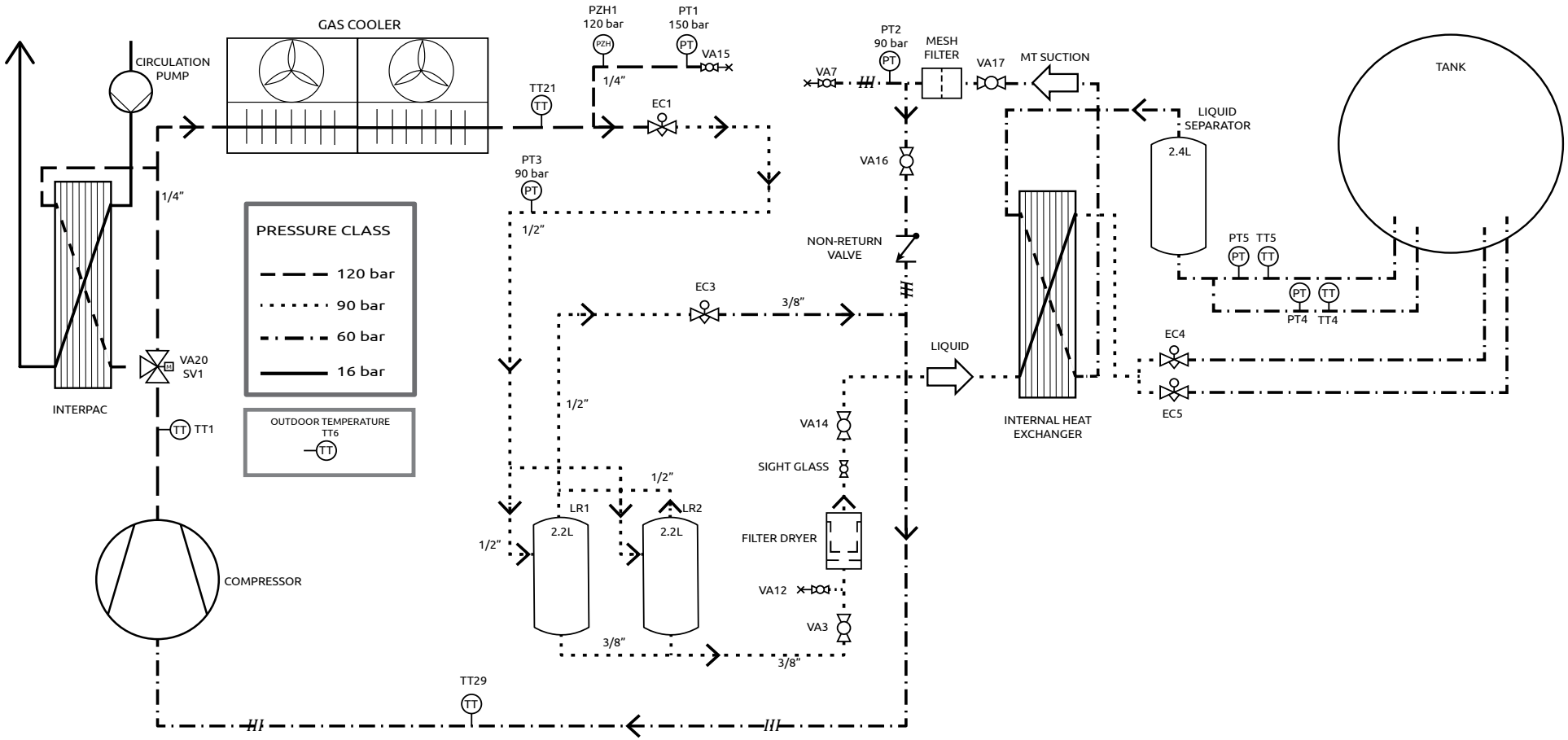
Evaporators on DFC95/3L tanks are routed so that four areas act as cooling areas.



1. Right front evaporator
2. Left front evaporator
3. Right rear evaporator
4. Left rear evaporator



6.3. Flowchart diagram



6.4. Separated condensing unit

When the tank is installed according to the description in the chapter *4. Tank installation*, and the condensing unit is separated from the tank, the following should be considered:

- The condensing unit must be mounted in a well-ventilated area.
- The gas cooler must have adequate air circulation to permit effective milk cooling.

The evaporator and compressors are pre-charged with nitrogen gas, and the compressors are supplied with PAG 100 oil.

NOTE! Milk cooling tanks delivered with separate cooling unit are filled with nitrogen gas and should have a minimum pressure of 2 bar at delivery. If not, perform a leakage test.

6.4.1. Pipe dimensions

The piping size for refrigeration unit is, in principle, as shown in table. But for each installation it should be determined by calculating pressure drop and refrigerant flow speed to ensure correct cooling capacity and oil return.

Since refrigeration units using R744 refrigerant uses higher pressure than with traditional refrigerants, it is necessary that piping and other equipment used meets appropriate standards (tubes and fittings: EN 12735-1, R300, 120 bar).

Make sure that tubes are connected to the appropriate pressurized equipment (EN378-2)

Use brazing rod that meets DIN 8513: L-Ag15P, EN ISO 17672: CuP 284 AWS 5.8: BCuP-5.

Condensing unit	Suction line OD	Liquid line OD	PS (max allowable pressure)
MT45	3/8” (9,52mm)	1/2” (12,7mm)	60 bar
MT67	3/8” (9,52mm)	1/2” (12,7mm)	60 bar
MT100	3/8” (9,52mm)	1/2” (12,7mm)	60 bar

6.4.2. Connecting pipes

Connect the condensing unit to the suction and liquid pipes of the tank. Use correct pipe dimensions and specifications. See *6.4.1. Pipe dimensions*

If the difference in height is more than 2,4 m, make sure to have good oil return. Use clean pipes and protective gas (nitrogen gas) when brazing. Oil traps must be positioned at all vertical risers

NOTE! Use continuous flow of nitrogen as shield gas in pipes while brazing. Inside and outside surface must be clean.

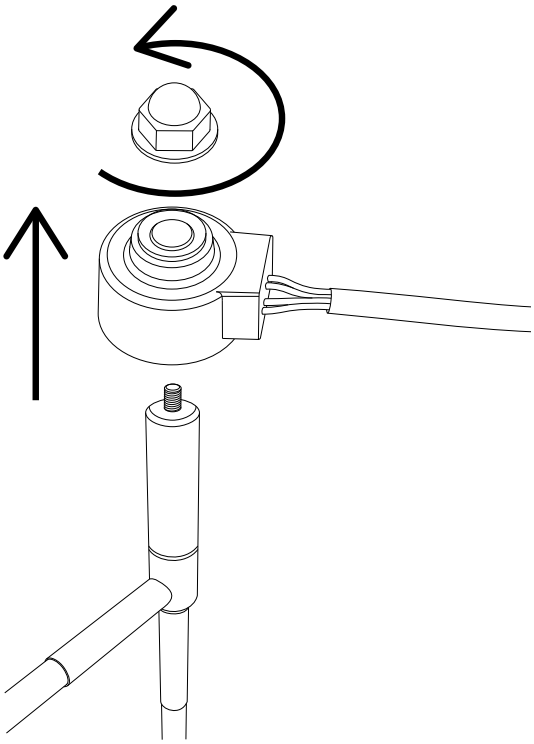
6.5. Evacuation and dehydration of circuits

NOTE! When performing vacuum drying, make sure that valves EC1, EC2, EC3, EC4, and if present EC5, are fully open, refer to chapter *7.8. Force valves open* or *6.5.1. Manual opening of valves*

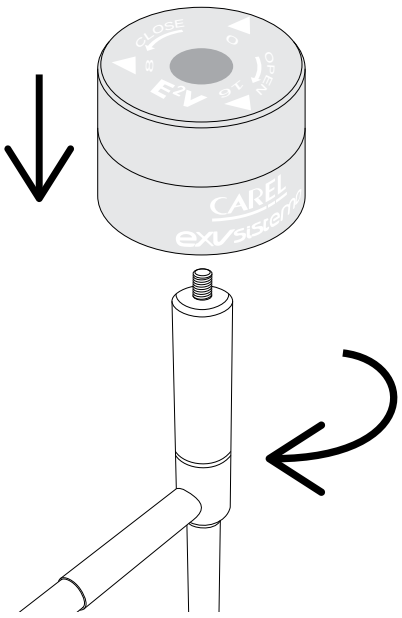
6.5.1. Manual opening of valves

To manually open valves:

1. Remove plastic nut at top of actuator valve.
2. Remove actuator coil.



3. Place E2VMAG tool at actuator.
4. Turn E2VMAG tool clockwise until clicking.

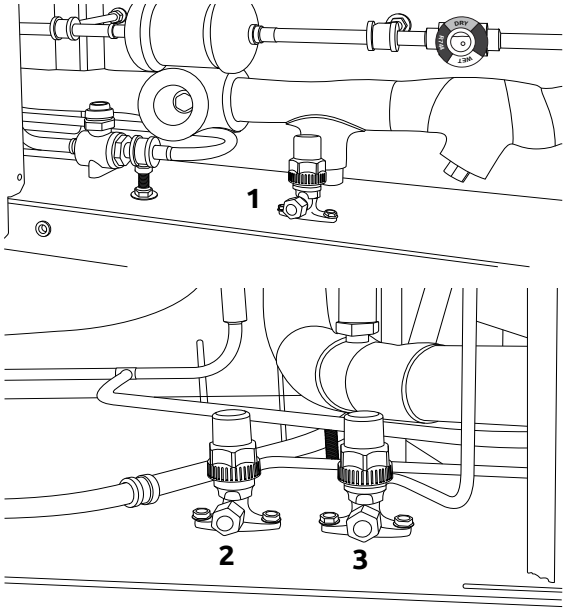


6.5.2. Service valves

The service valves are located inside cooling cabinet.

In present systems the service valve for suction line is located in centre cabinet, near sight glass.

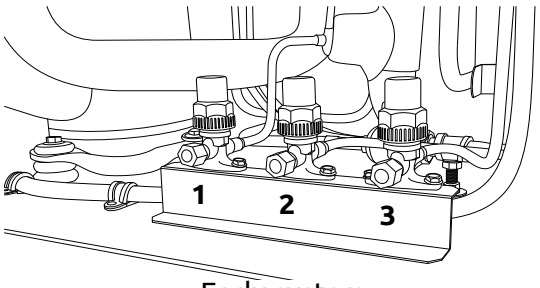
Liquid line and HP service valves are located in left main cabinet.



Present system

1. VA7, Suction line service valve
2. VA12, Liquid line service valve
3. VA15, HP service valve

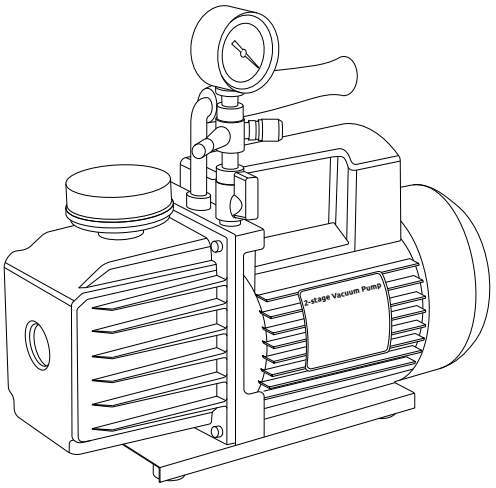
In early systems all three service valves are found in the left main cabinet.



Early system

6.5.3. Dehydration of circuits

To avoid inclusion of air or moisture in the refrigerant circuit, be sure to perform vacuum drying of the entire circuit before filling refrigerant by using a vacuum pump. Perform the evacuation after pressure testing.



This operation must be performed with all valves open and connected to a vacuum pump to prevent motor damage.

See *6.5.1. Manual opening of valves* or *7.8. Force valves open*

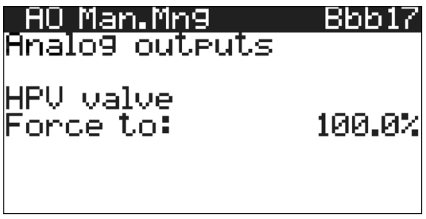
A vacuum meter should be connected to system during dehydration.

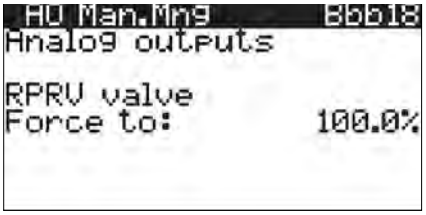
After evacuating the system completely, stop the vacuum pump, and let system stabilize for 15 minutes.

The maximum pressure allowed is 260 Pa (2,6 mbar).

If a hygrometer is used, the residual moisture in the system should be less than 10 ppm.

When the installation is under vacuum, any insulation check of the motor should not be performed, nor should the compressor(s) be started unless minimum 100 kPa (1 bar) fluid pressure is reintroduced.





6.6. Refrigerant and Oil filling

- Fill with refrigerant after evacuation.
- Use refrigerant R744 (CO_2) only. Do not mix with other refrigerants.
- Always use refrigerant grade R744, moisture content must be below 10 ppm.
- Use only PAG100 oil (DIN 51503-1).

NOTE! In case of leakage or repair: empty the system completely and refill according to the initial filling level.

6.6.1. Refrigerant and oil charge

NOTE! Do not charge liquid in compressor suction line. CO_2 gas only thru VA7.

Overfilling the system may cause malfunction and compressor damage.

In case of compressor replacement, add 250 ml of PAG100 oil if the total R744 charge is more than 6.5 kg. This extra oil is normally added from factory in new tanks.

Oil filling must be done through the liquid service line during vacuum operation.

Perform an initial charge of refrigerant into the system according to table.

Model	Charge
MT45	4.5
MT67	7
MT100	8.5

6.6.2. Filling

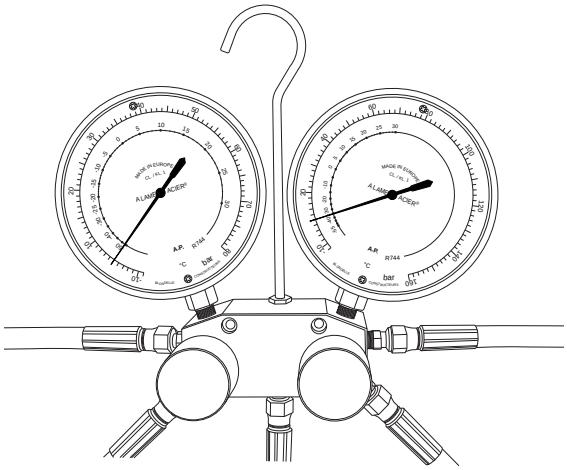
Use only manifold gauges and filling hoses intended for R744.

Use a refrigerant scale to measure and record correct quantity into the system from the R744 container.

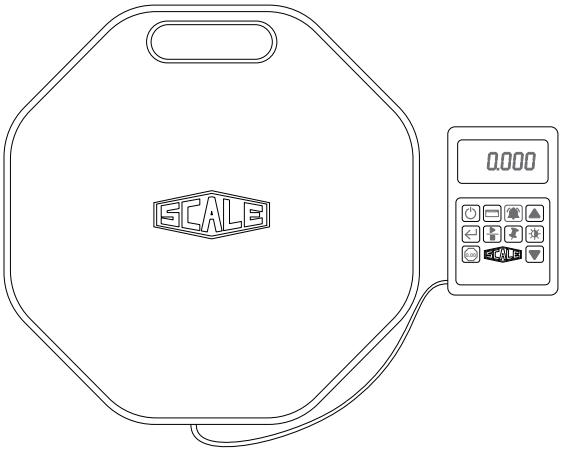
Fill R744 through suction service valve (VA7).

Oil filling must be done through the liquid service line (VA12) during vacuum operation.

Verify correct readings at both electronic pressure indicators and manifold gauges.



As vapour is drawn from the R744 container, pressure and temperature inside the container will decrease. Frosting on the bottom exterior of the container is indication that some R744 liquid evaporated in the container. The pressure reduction will also cause a slower flow rate of vapour into the system. Once the flow from the container has slowed down, the cold container should be disconnected and allowed to warm up. After the container has warmed up, additional R744 can be filled.



6.6.3. Verify correct charge

Fill minimum 15% of milk (or lukewarm water) into the tank and start the cooling system, including Interpac if applicable. Let system run for 5 minutes to stabilise.

Monitor receiver pressure, receiver valve opening and superheat value.

See *7. Controller Condensing unit*

Normal operation

Receiver pressure: 50-55 barg.

Receiver valve opening: 20-60%

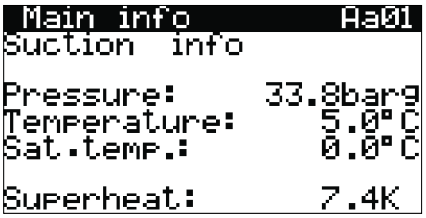
Superheat value: 6-10 K

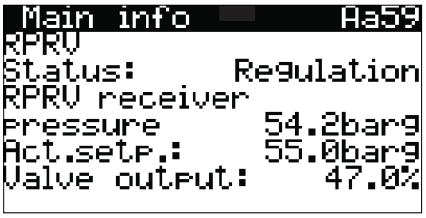
Add R744 if:

Receiver pressure is lower than 50 barg and receiver valve opening is higher than 60%. Superheat value is lower than 6 K. Sight glass indicates less than 3/4.

Remove R744 if:

Receiver pressure is higher than 55 barg and receiver valve opening is lower than 20%. Superheat is higher than10 K. Sight glass indicates full.



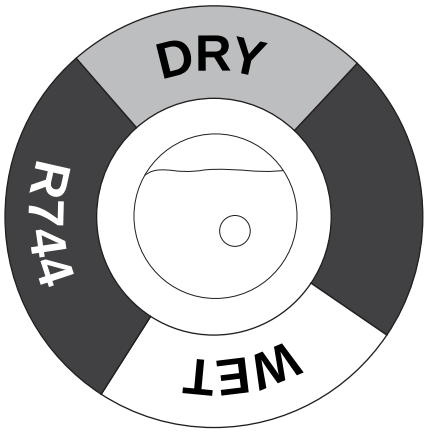


Sight glass does not indicate correct R744 level if 100% full. Verify that superheat is normal (6-10K). 3/4 to full level in the sight glass is within limits.

Simulate critical conditions when charging in low ambient temperature conditions by blocking the air flow into the condenser/gas cooler to verify correct filling level.

Run the unit until cooling stop (Argos cooling set-point 1 =4˚C). Then switch to Argos cooling set-point 2 (3,2˚C) and restart cooling.

Verify that unit starts and cooling reaches set value



Sight glass

6.7. Attached condensing unit

Once the tank has been installed according to the description in the chapter *4. Tank installation*, and the condensing unit is attached to the tank, proceed as follows:

1. Complete the steps described in the *17. Installation report*
2. Check that the tank has an adequate supply of water by following the description in the chapter *11.2. Adjusting water volume*
3. Check the settings in the Argos control unit. See Argos instruction manual, chapter 5 Cleaning
4. The Argos unit is pre-programmed at the factory with standard settings, although account must be taken of conditions specific to the farm, and the values adjusted accordingly. The pressure, temperature, volume and quality of the water at the farm will affect the recommended values. Optimize your tank by setting the values according to the conditions on your farm. If the tank is used for less amount of milk than optimised for, or if a buffer tank is used, it's important to adjust the setting after the actual conditions.
5. Make sure that the tank is empty and perform a complete cleaning cycle on the tank before taking it into service. Carefully monitor that each phase performs as expected. Adjust settings if required.
6. Instruct relevant personnel regarding operation and future maintenance of the tank, for example:

- Starting cooling and cleaning.
- Who does what? Operator or driver.
- Viewing and acknowledging alarms.
- Content and understanding of the manual.
- Operation and maintenance of the tank.

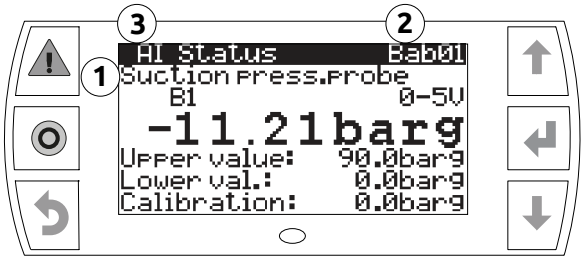
7. Controller Condensing unit

7.1. Display

An example of how to view/setting the parameters is shown in illustration , also highlighting the fields and symbols used

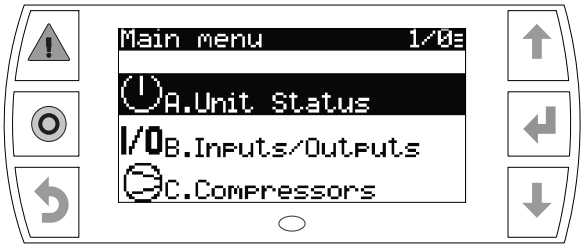
1. Parameters
2. Display identifier
3. Menu

The display identifier (2) details the menu branch and the mask, the first character indicates the menu branch, while the two alphanumeric digits identify the order of the mask within the menu. Example, mask Bab01 is the first mask in menu B-a-b



7.2. Navigation

To navigate in the menu tree, use buttons as described.



Button		Function
	ALARM	Displays list of active alarms and access to alarm log
	MENU	Enter the main menu
	RETURN	Returns to the higher level mask
	UP	Scroll upwards or increasing a highlighted value
	DOWN	Scroll downwards or decreasing a highlighted value
	ENTER	Enters the selected sub-menu or confirms value

7.3. Password

User password: 1502
Press Enter to continue

To change parameters or other settings, enter password: 1502, then press enter to continue.

7.4. Parameter table

Label	Description	UOM	Min	Max	Setpoint
Cab03	Compressor pressure	barg	12.4*	40.0	33.8
Cae24	Suction high pressure alarm threshold	barg			60.0
Cae26	Suction low pressure alarm threshold	barg			10.0
Caf17	Minimum on time compressor	s	0	999	120
Caf17	Minimum off time compressor	s	0	999	180
Caf17	Minimum time to start same compressor	s	0	999	360
Cag52	Max speed	rps	0.0	999.9	100.0
Cag52	Min speed	rps	0.0	99.9	25.0
Dab03	Gascooler set-point	°C	12.0	38.0	30.0
Dae06	High gas cooler pressure alarm threshold	barg	0.0	6553.	110.0
Dae07	Low gas cooler pressure alarm threshold	barg	0.0	6553.	10.0
Fhb10	Maximum HPV safety set-point	barg	10.0	120.0	90.0
Fhb10	Minimum HPV set-point	barg	-1.0	150.0	75/40**
Fhb25	Regulation – CO2 receiver pressure set-point	barg	0.0	150.0	55

* Given the compressor limits, the temperature limit must not be set below -32°C (12.4 barg)

** If Interpac active - Minimum HPV set-point 75 barg. If Interpac deactivated - Minimum HPV set-point 40 barg.

To optimize the operation of the unit, it is recommended to adapt the parameters according to the actual ambient conditions and the type of installation.

WARNING! Risk of condensation if the CO_2 receiver pressure is below 55 Bar

7.5. Menu tree

Level 1	Level 2	Level 3	
A. Unit Status	a. Main info		Information of the different operating states
	b. Set-point		Set-point modification
	c. On/Off		Regulation on/off
B. Inputs / Outputs	a. Status	a. Digital input	Configuration and status of the digital inputs
		b. Analogue input	Configuration and status of the analogue inputs
		c. Digital output	Configuration and status of the digital outputs
		d. Analogue output	Configuration and status of the analogue outputs
	b. Manual Management	a. Digital output	Manual management of the digital outputs
		b. Analogue output	Manual management of the analogue outputs
		c. BLDC output	Manual management of the BLDC outputs
	c. Test	a. Digital output	Factory test of the digital outputs
		b. Analogue output	Factory test of the analogue outputs
C. Compressor	a. I/O status		Configuration and status of the compressor input/outputs
	b. Regulation		Parameters of the compressor regulation
	c. Working hours		Maintenance threshold and run time of the compressor
	d. Energy savings		Not used
	e. Alarms		Configuration of the LP/HP security of the compressors
	f. Configuration		Hardware configurations of the system
	g. Advanced		Advanced configurations of the system
D. Condenser	a. I/O status		Configuration and status of the gas cooler's input/outputs
	b. Regulation		Parameters of the gas cooler's regulation
	c. Driver EVD		Not used
	d. Energy savings		Energy saving, HP floating, winter time difference
	e. Alarms		Configuration of the LP/HP security of the gas cooler
	f. Configuration		Hardware configurations of the system
	g. Advanced		Advanced configurations of the system
E. Evaporator	a. I/O status		Not used
	b. Configuration		Not used
	c. Regulation		Not used
	d. Driver EVD		Not used

Level 1	Level 2	Level 3	
F. Other functions	a. Oil	a. I/O status	Not used
		b. Settings	Not used
	b. Defrost	a. I/O status	Not used
		b. Regulation	Not used
		c. Info	Not used
	c. Economizer	a. I/O status	Not used
		b. Settings	Not used
	d. Injection	a. I/O status	Not used
		b. Settings	Not used
	e. Heat reclaim	a. I/O status	Not used
		b. Settings	Not used
	f. Generic functions	a. Thermostats	Not used
		b. Modulations	Not used
		c. Alarms	Not used
		d. Scheduler	Not used
		e. I/O status	Not used
	g. Chill Booster	a. I/O status	Not used
		b. Settings	Not used
	h. Transcritical	a. I/O status	Not used
		b. Settings	Transcritical mode settings
		c. EVO Settings	Not used
G. Settings	a. Clock	a. Scheduler	Hour/weekly scheduling
		b. Adjustment	Internal clock setup (date and time)
	b. Language		Language setting of the regulator
	c. BMS		Address and communication speed setup
	d. Field bus		Not used
	e. Passwords		Not used
H. Safety	a. Data logging		Not used
	b. Prevent		Not used
	c. Alarm configuration		Not used
I. Info			Software version BIOS
L. Setup	a. Pre- configurations		Not used
	b. Wizard		Not used
	c. Quick configurations		Not used
	d. Defaults		Regulator setup erasure and factory reset

7.6. Language setting

Default language is English.

Other available languages are German and French.

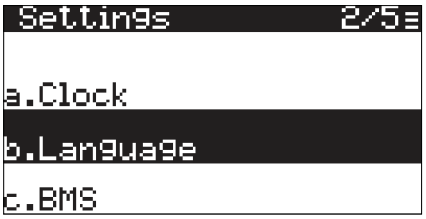
To change language, use up/down arrows to access the menu.

Select: G. Settings.

Press Enter

Select: b. Language

Press Enter

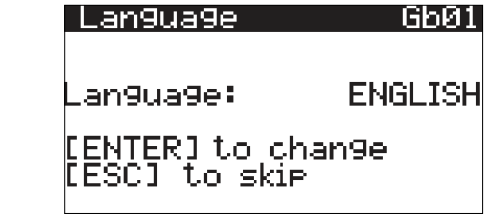


Press Enter to access language selection.

Use up/down arrows to select language.

Press Enter to save changes.

Press Return to disregard changes.

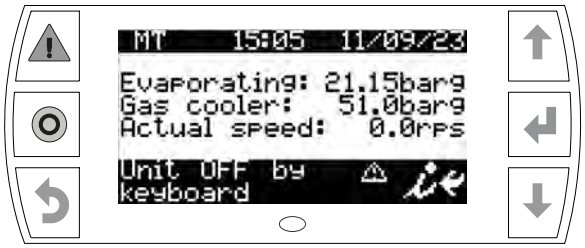


7.7. Alarm management

When an alarm is activated, the red LED flashes.

Pressing alarm button, the red LED stays on steady, and the alarm screen is shown.

If there are more than one active alarm, these can be scrolled using arrow buttons. Additional alarms are indicated by an arrow at the bottom right of the screen.



7.7.1. Alarm reset

Press and hold the alarm button for at least 3 seconds to manually acknowledge alarms, which then are cleared from the display unless still active.

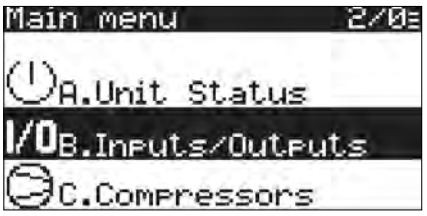
Automatic alarms are reset automatically as soon as alarm condition ceases.

Alarms are saved in the log.

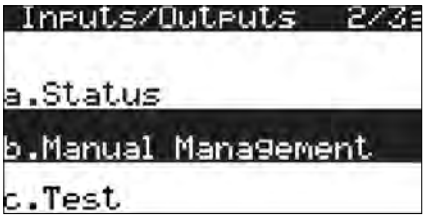
See also *7.11. Alarm table*

7.8. Force valves open

Also see *6.5.1. Manual opening of valves*
Use arrows up/down to access the menu.
Select: B. Inputs/Output
Press Enter.

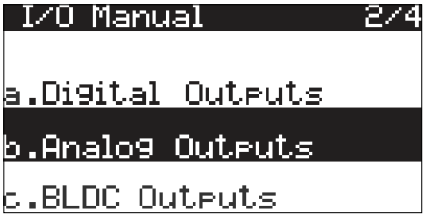


Select: b. Manual Management
Press Enter.

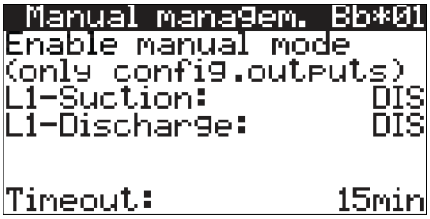


NOTE! Use this function ONLY during evacuation of the unit to force EC1 and EC3 valves open

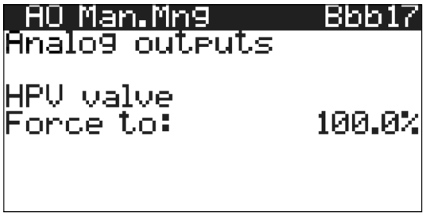
Select: b. Analog Outputs
Press Enter



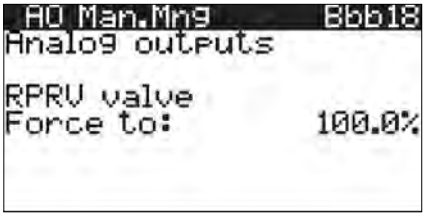
Press Enter to enable L1-Suction / L1-Discharge
Use arrows and Enter to set Timeout (15 min).
Once the evacuation procedure is finalized, either wait for the time-out to end or go back to this menu to disable manual management.



Manual management of HPV (EC1) valve, (only used during evacuation of the unit).
Use arrows to change value to 100 %
Press Enter



Manual management of RPRV (EC3) valve, (only used during evacuation of the unit).
Use arrows to change value to 100 %
Press Enter.
Press Return to go back to Start menu.



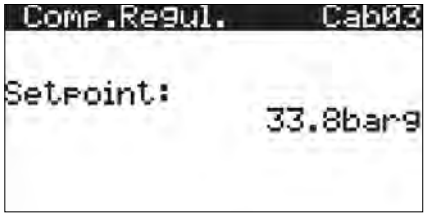
7.9. Set parameters

7.9.1. Evaporating set-point

Use arrows up/down to access the relevant menu.
Select: C. Compressors
Press Enter.

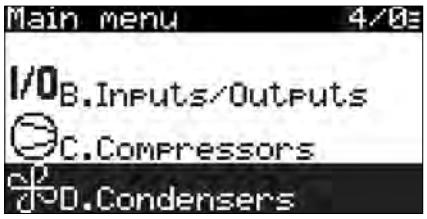
Select: b. Regulation
Press Enter.

Use arrows up/down to access Cab03
Press enter to access variable
Use arrows up/down to change value
Press Enter to confirm value.



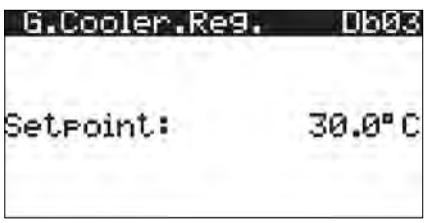
7.9.2. Condensing temperature

Use arrows up/down to access correct sub-menu
Select: D. Condensers
Press Enter.



Select: b. Regulation
Press Enter.

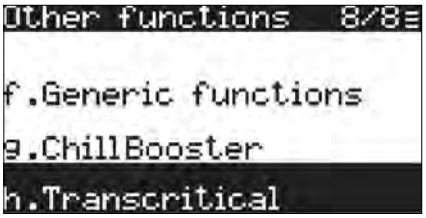
Use arrows up/down to access Db03
Press enter to access variable.
Use arrows up/down to change value
Press Enter to confirm value.



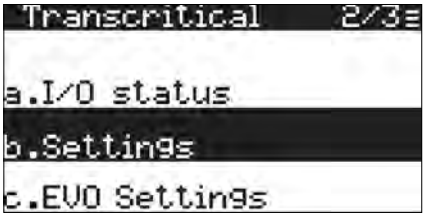
7.9.3. Receiver set-point

Use arrows up/down to access the relevant menu.
Select: F. Other functions
Press Enter.

Select: h. Transcritical
Press Enter.



Select: b. Settings
Press Enter.



Use arrows up/down to access Fhb25; press enter to access variable

Use arrows up/down to change value (to 55 barg)

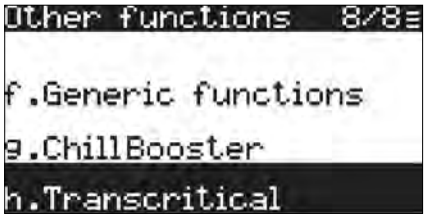
Press Enter to confirm value and jump to next setting. Repeat for receiver pressure, proportion gain, and integral time.

7.9.4. High pressure set-point

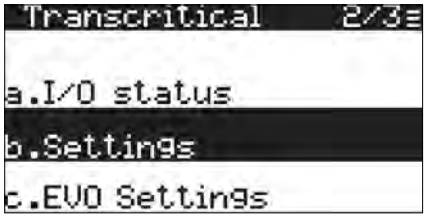
Note! Dependant if Interpac is deactivated or not, High pressure minimum set-point must be set to correct value.
If Interpac active - Minimum HPV set-point 75 barg.
If Interpac deactivated - Minimum HPV set-point 40 barg

Use arrows up/down to access relevant selection.
Select: F. Other functions
Press Enter.

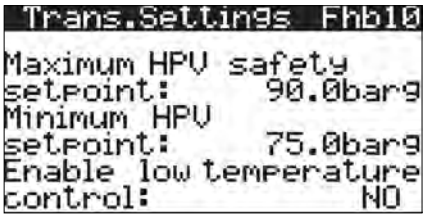
Select: h. Transcritical
Press Enter.



Select: b. Settings
Press Enter
If Interpac active - Minimum HPV set-point 75 barg.
If Interpac deactivated - Minimum HPV set-point 40 barg.



Use arrows up/down to access Fhb10
Press enter to access variable
Use arrows up/down to change value
Press Enter to confirm value and jump to next setting. Repeat for receiver pressure, proportion gain and integral time
For more settings, see *7.5. Menu tree*



7.10. Troubleshoot guide

	Symptom	Cause	Action
1	Evaporating temperature too high	Too much suction gas superheat (above 20 K)	Examine and adjust expansion valves in the evaportors
2	Evaporating temperature too low.	Liquid in the suction line	Adjust expansion valve
		Sensor is loose or incorrectly positioned	Check if the sensor is in contact with the suction line. Replace if necessary
3	Evaporating pressure too low.	Setpoint incorrect	Check the set point
		Too much oil in the evaporators	Clear out the oil from the evaporator
		Filter in the liquid line clogged	Examine and replace filters in liquid line
		Too much superheat	Adjust expansion valves
		Installation insufficiently charged	Charge the installation with refrigerant
4	Compressor cuts in and out too often on LP safety switch	See above	
		Inside of tank frozen, or ice present in the distributor	Verify that agitator is running correctly
			Clean and remove ice from tank. Never run cooling without milk in tank
5	Evaporating pressure too high	Restart after defrost	Wait for confirmation
		Compression problem	Replace compressor
6	Gas cooler pressure too high	Insufficient flow of air into the gas cooler	Clean the gas cooler. Check motor fans
		Installation overcharged	Drain liquid into reservoir
		Air or non-condensable gas in the HP circuit	Drain, use a vacuum pump and recharge
7	Gas cooler pressure too low	Fan cut-in incorrectly set	Adjust
8	Discharge temperature too high	Too much superheat on suction	Adjust expansion valves
		Internal by-pass	Check compressors
9	Capacity too high	Problem with control system or other automatic devices	Replace, repair or reset
		No correspondence between the unit and the cooling demand	Check the design of the installation
10	Insufficient capacity	Problem with control system or other automatic devices	Replace, repair or reset
		No correspondence between the unit and the cooling demand	Check the design of the installation

11	Abnormal noise in the compressor	Screw loose	Tighten screw
		Fluid in the suction line	Check and reset the expansion valves. Check that the liquid solenoid valves do not remain open when machine stops
		The Discharge temperature sensor is not stable or incorrectly positioned	Check sensor position
		Emulsion in oil crankcase	Incorrect lubrication
12	The compressor motor does not start	Low pressure switch cuts-out	See paragraph 3
		High pressure switch cuts-out	See paragraph 5
		Fuses burn out	Check the cause and change fuses
		Anti-short cycle time delay relay is in operation	Wait
		Internal security switched out	Check cause of increase in motor winding temperatures
		Main circuit-breaker open	Close circuit-breaker
13	Compressor works continuously	Control system or other automatic device fault	Check settings and components. Replace if necessary
		Installation insufficiently charged	Charge installation with refrigerant
		Evaporators blocked or ice present	Clean and defrost evaporators

7.11. Alarm table

Code	Description	Reset	Delay	Action
ALU02	Regulation probe(s) missing	Automatic	N/A	Shutdown unit
ALA01	Discharge temperature probe broken or disconnected	Automatic	60 s	Related functions disabled
ALA02	Gascooler pressure probe broken or disconnected	Automatic	60 s	Related functions disabled
ALA03	External temperature probe broken or disconnected	Automatic	60 s	Related functions disabled
ALA04	General function probe A in board 1 broken or disconnected	Automatic	60 s	Related functions disabled
ALA05	General function probe B in board 1 broken or disconnected	Automatic	60 s	Related functions disabled
ALA06	General function probe C in board 1 broken or disconnected	Automatic	60 s	Related functions disabled
ALA07	General function probe D in board 1 broken or disconnected	Automatic	60 s	Related functions disabled
ALA08	General function probe E in board 1 broken or disconnected	Automatic	60 s	Related functions disabled
ALA24	Suction pressure probe broken or disconnected	Automatic	60 s	Related functions disabled
ALA25	Suction temperature probe broken or disconnected	Automatic	60 s	Related functions disabled
ALA43	Gascooler outlet temperature probe broken or disconnected	Automatic	60 s	Related functions disabled
ALB01	Low common suction pressure at pressure switch Num.autom.reset: / in min	Semiautomatic	Config.	Shutdown compressor
ALB02	High common condensing pressure at pressure switch	Man./Autom	Config.	Shutdown compressor
ALB03	Low gascooler pressure alarm	Automatic	Config.	Fan forcing at 0%
ALB04	High gascooler pressure alarm	Automatic	Config.	Fan forcing at 100% (5 min.) and shutdown compressor
ALB07	Fans common overload	Automatic	Config.	-
ALB15	High suction pressure alarm	Automatic	Config.	-
ALB16	Low suction pressure alarm	Automatic	Config.	-
ALC01	Alarm 1 compressor 1	Man./Autom.	Config.	Shutdown compressor
ALC02	Alarm 2 compressor 1	Man./Autom.	Config.	Shutdown compressor
ALC05	Alarm comp. backup	Man./Autom.	Config.	Shutdown compressor
ALG01	Clock board error	Automatic	-	Related functions disabled
ALG02	Extended memory error	Automatic	-	Related functions disabled
ALG11	High thermostat alarms Function: 1-5	Man./Autom.	Config.	-
ALG15	Low thermostat alarms Function: 1-5	Man./Autom.	Config.	-
ALG19	High modulating alarms Function : 6-7	Man./Autom.	Config.	-
ALG23	Low modulating alarms Function : 6-7	Man./Autom.	Config.	-
ALG27	Generic normal alarms Function : 8-9	Man./Autom.	Config.	-
ALG28	Generic serious alarms Function : 8-9	Man./Autom.	Config.	-
ALP01	Power + nβ disconnected	Automatic	N/A	Related functions disabled

Code	Description	Reset	Delay	Action
ALP03	Compressor start failure (tempt.: / max:)	Semiauto-matic	N/A	5 tries, Shutdown compres-sor
ALP05	High discharge gas temperature	Automatic	N/A	Shutdown compressor
ALP06	Low pressure differential (insufficient lubrica-tion)	Automatic	Config.	Shutdown compressor
ALT01	Compressors working hours	Manual	N/A	-
ALT15	Low superheat alarm	Settable	Config.	Shutdown compressor
ALT17	Warning setpoint HPV gascooler press. too different from current setpoint	Automatic	Config.	Related functions disabled
ALT18	HPV alarm high receiver pressure	Automatic	N/A	Related functions disabled
ALW01	Warning high pressure prevent	Automatic	Config.	Related functions disabled
ALW05	Warning Fans inverter	Automatic	N/A	-
ALW10	Warning Low superheat	Automatic	N/A	-
ALW15	Warning an error occured during auto-configur.	Automatic	N/A	-
ALW16	Warning Invalid activation of oil level inputs, check the connections	Automatic	-	-
ALW24	Power + n° Device Offline	Semiauto-matic	2 s	Shutdown compressor
ALW25	Power+ n°	Semiauto-matic	N/A	Shutdown compressor
ALW26	Compressor start failure (tempt. : / max.:)	Semiauto-matic	N/A	-
ALW27	Application working area alarm zone	Semiauto-matic	N/A	Shutdown compressor
ALW28	High discharge gas temperature	Automatic	10 s	-
ALW29	Low pressure differential (insuff. lubrication)	Automatic	Config.	Shutdown compressor
ALW30	Inverter model not compatible (Power+ only allowed)	Automatic	N/A	-
ALW35	Low suction temperature	Automatic	N/A	Related functions disabled
ALW38	Low oil level fault	Manual	Config.	Shutdown compressor
ALW39	High oil level fault	Manual	Config.	Shutdown compressor
ALW40	Store number : !! OFFLINE !!	-	N/A	2
ALW41	Store number : Low temperature alarm [Generic Probe 1]	Display only (refer to +0300055IT MPXPRO manual)		
ALW42	Store number : High temperature alarm [Generic Probe 1]	Display only (refer to +0300055IT MPXPRO manual)		
ALW43	Store number : Low temperature alarm [Generic probe 2]	Display only (refer to +0300055IT MPXPRO manual)		
ALW44	Store number : High temperature alarm [Generic Probe 2]	Display only (refer to +0300055IT MPXPRO manual)		
ALW45	Store number : Defrost timeout	Display only (refer to +0300055IT MPXPRO manual)		
ALW46	Store number : Low superheat alarm	Display only (refer to +0300055IT MPXPRO manual)		
ALW47	Store number : Low suction temp. alarm	Display only (refer to +0300055IT MPXPRO manual)		
ALW48	Store number : MOP alarm	Display only (refer to +0300055IT MPXPRO manual)		
ALW49	Store number : LOP alarm	Display only (refer to +0300055IT MPXPRO manual)		

Code	Description	Reset	Delay	Action
ALW50	Store number : Stepper driver communication error	Display only (refer to +0300055IT MPXPRO manual)		
ALW51	Store number : Stepper motor error	Display only (refer to +0300055IT MPXPRO manual)		
ALW52	Store number : Installation or config problems on EEV driver	Display only (refer to +0300055IT MPXPRO manual)		
ALW53	Store number : !! OFFLINE !!	-	N/A	2
ALW54	Store number : Low temperature alarm [Generic Probe 1]	Display only (refer to +0300055IT MPXPRO manual)		
ALW55	Store number : High temperature alarm [Generic Probe 1]	Display only (refer to +0300055IT MPXPRO manual)		
ALW56	Store number : Low temperature alarm [Generic probe 2]	Display only (refer to +0300055IT MPXPRO manual)		
ALW57	Store number : High temperature alarm [Generic Probe 2]	Display only (refer to +0300055IT MPXPRO manual)		
ALW58	Store number : Defrost timeout	Display only (refer to +0300055IT MPXPRO manual)		
ALW59	Store number : Low superheat alarm	Display only (refer to +0300055IT MPXPRO manual)		
ALW60	Store number : Low suction temp. alarm	Display only (refer to +0300055IT MPXPRO manual)		
ALW61	Store number : MOP alarm	Display only (refer to +0300055IT MPXPRO manual)		
ALW62	Store number : LOP alarm	Display only (refer to +0300055IT MPXPRO manual)		
ALW63	Store number : Stepper driver communication error	Display only (refer to +0300055IT MPXPRO manual)		
ALW64	Store number : Stepper motor error	Display only (refer to +0300055IT MPXPRO manual)		
ALW65	Store number : Installation or config problems on EEV driver	Display only (refer to +0300055IT MPXPRO manual)		
ALW66	Store number : !! OFFLINE !!	-	N/A	2
ALW67	Store number : Low temperature alarm [Generic Probe 1]	Display only (refer to +0300055IT MPXPRO manual)		
ALW68	Store number : High temperature alarm [Generic Probe 1]	Display only (refer to +0300055IT MPXPRO manual)		
ALW69	Store number : Low temperature alarm [Generic probe 2]	Display only (refer to +0300055IT MPXPRO manual)		
ALW70	Store number : High temperature alarm [Generic Probe 2]	Display only (refer to +0300055IT MPXPRO manual)		
ALW71	Store number : Defrost timeout	Display only (refer to +0300055IT MPXPRO manual)		
ALW72	Store number : Low superheat alarm	Display only (refer to +0300055IT MPXPRO manual)		
ALW73	Store number : Low suction temp. alarm	Display only (refer to +0300055IT MPXPRO manual)		
ALW74	Store number : MOP alarm	Display only (refer to +0300055IT MPXPRO manual)		
ALW75	Store number : LOP alarm	Display only (refer to +0300055IT MPXPRO manual)		
ALW76	Store number : Stepper driver communication error	Display only (refer to +0300055IT MPXPRO manual)		
ALW77	Store number : Stepper motor error	Display only (refer to +0300055IT MPXPRO manual)		
ALW78	Store number : Installation or config problems on EEV driver	Display only (refer to +0300055IT MPXPRO manual)		
ALW79	Store number : !! OFFLINE !!	-	N/A	2
ALW80	Store number : Low temperature alarm [Generic Probe 1]	Display only (refer to +0300055IT MPXPRO manual)		

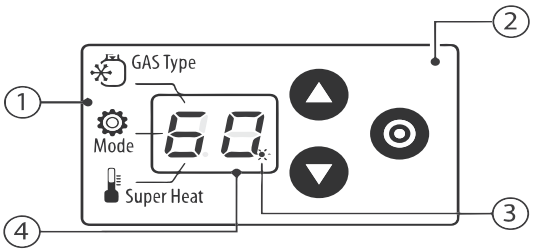
Code	Description	Reset	Delay	Action
ALW81	Store number : High temperature alarm [Generic Probe 1]	Display only (refer to +0300055IT MPXPRO manual)		
ALW82	Store number : Low temperature alarm [Generic probe 2]	Display only (refer to +0300055IT MPXPRO manual)		
ALW83	Store number : High temperature alarm [Generic Probe 2]	Display only (refer to +0300055IT MPXPRO manual)		
ALW84	Store number : Defrost timeout	Display only (refer to +0300055IT MPXPRO manual)		
ALW85	Store number : Low superheat alarm	Display only (refer to +0300055IT MPXPRO manual)		
ALW86	Store number : Low suction temp. alarm	Display only (refer to +0300055IT MPXPRO manual)		
ALW87	Store number : MOP alarm	Display only (refer to +0300055IT MPXPRO manual)		
ALW88	Store number : LOP alarm	Display only (refer to +0300055IT MPXPRO manual)		
ALW89	Store number : Stepper driver communication error	Display only (refer to +0300055IT MPXPRO manual)		
ALW90	Store number : Stepper motor error	Display only (refer to +0300055IT MPXPRO manual)		
ALW91	Store number : Installation or config problems on EEV driver	Display only (refer to +0300055IT MPXPRO manual)		
ALZ00	Store number : MOP alarm	Display only (refer to +0300055IT MPXPRO manual)		
ALZ01	Store number : LOP alarm	Display only (refer to +0300055IT MPXPRO manual)		
ALZ02	Store number : Stepper driver communication error	Display only (refer to +0300055IT MPXPRO manual)		
ALZ03	Store number : Stepper motor error	Display only (refer to +0300055IT MPXPRO manual)		
ALZ04	Store number : Installation or config problems on EEV driver	Display only (refer to +0300055IT MPXPRO manual)		

8. Controller Expansion valve

8.1. Display

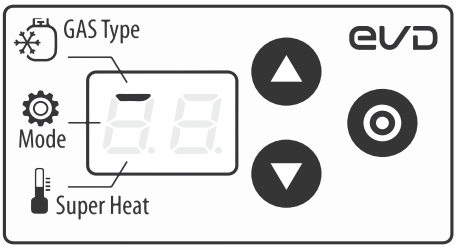
During operation, the display shows the superheat value or any alarms if present, see *8.5. Alarm table*.

If an replacement Controller for Expansion valve is ordered, settings needs to be re-configured to standard parameters

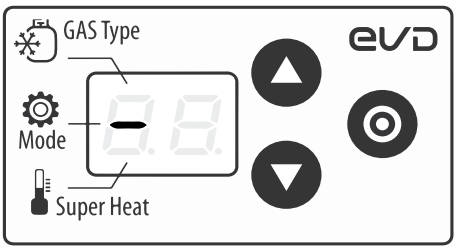


1. Parameter symbol
2. Keypad
3. Control ON/OFF digital input status LED
4. Flashing/off = DI closed/open

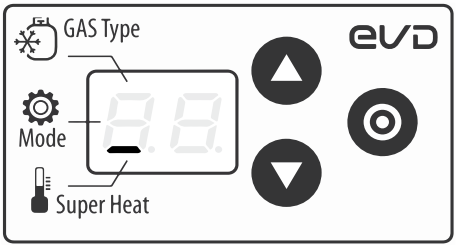
A. Refrigerant



B. Mode (Operation mode)

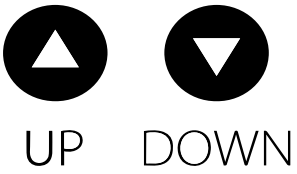


C. Superheat set point



8.2. Navigation

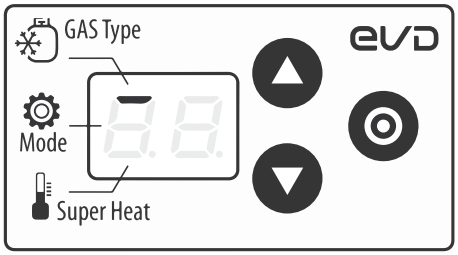
- Increase/decrease the set point value or selected parameters
- Menu navigation



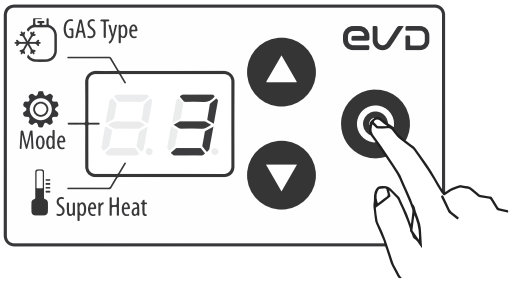
- Enter/exit control mode, saving the parameters
- At the end of the set-up procedure, press and hold 2 seconds to exit and activate control unit
- Reset alarm E8

8.3. Programming procedure

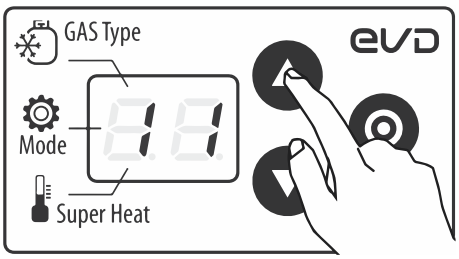
1. Press PRG/Set to access programming menu
2. The display shows the top segment in first digit window: refrigerant (gas type)



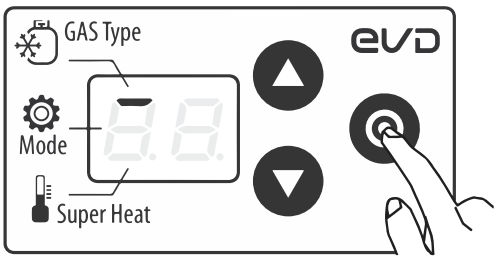
3. Press PRG/Set to display the refrigerant setting



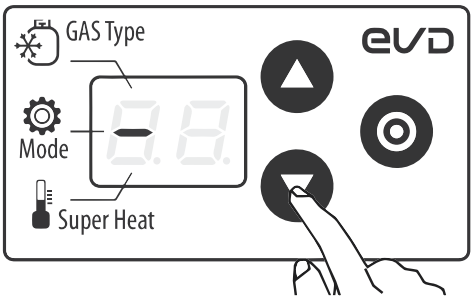
4. Press UP/DOWN to modify the value



5. Press PRG/Set to save the setting and return to the selection menu



6. Press DOWN to move to next parameter setting indicated by the horizontal segment in first digit window.



Repeat steps 3-5 to set Mode and Superheat

See *8.4. Parameter table*

Note that many other parameters will be changed when set to standard parameters

Standard parameters:

- Gas type: **11** (R744)
- Mode: **2**
- Superheat set point: **3.5** K

8.4. Parameter table

Param.	Description	Std	Def.	Min	Max	UOM	Type	R/W
Gas type	Refrigerant	**11**	3	1	41	-	I	R/W
Mode	Operating mode	**2**	1	1	9	-	I	R/W
Super heat	Superheat set-point	**3.5**	11(20)	LowSH protection threshold	55 (99)	K(°F)	A	R/W
_P	Hot gas bypass pressure set-point		3	-20 (-290)	200 (2900)	barg (psig)	A	R/W
_t	Hot gas bypass temperature set-point		10	-85 (-121)	200 (392)	°C(°F)	A	R/W
Service								
P1	Probe S1 reading		-	-85 (-290)	200 (2900)	barg (psig)	A	R
P2	Probe S2 reading		-	-85 (-121)	200 (392)	°C(°F) /V	A	R
tE	Evaporation temperature (converted)			-85 (-121)	200 (392)	°C(°F)	A	R
tS	Suction temperature			-85 (-121)	200 (392)	°C(°F)	A	R
Po	Valve opening		-	0	100	%	A	R
CP	PID: proportional gain		15	0	800	-	A	R/W
ti	PID: integral time		150	0	999	s	I	R/W
C1	LowSH protection: threshold		5 (9)	-5 (-9)	Superh. set-point	K (°F)	A	R/W
C2	LowSH protection: integral time		15	0	800	s	A	R/W
C3	LOP protection: threshold		-50 (-58)	-85 (-121)	MOP protection: threshold	°C(°F)	A	R/W
C4	LOP protection: integral time		0	0	800	s	A	R/W
C5	MOP protection: threshold		50 (122)	LOP protection: threshold	200 (392)	°C(°F)	A	R/W
C6	MOP protection: integral time		20	0	800	s	A	R/W
C7	MOP protection: disabling threshold		30 (86)	-85 (-121)	200 (392)	°C (°F)	A	R/W
C8	Low suction temperature alarm threshold		-50 (-58)	-85 (-121)	200 (392)	°C (°F)	A	R/W
S1	Type of probe		3	1	11	-	I	R/W
n1	Network address		99	1	99	-	I	R/W
n2	Baud rate		2	0	17	-	I	R/W
Si	Unit of measure 1=°C/K/barg; 2=°F/psig		1	1	2	-	I	R/W
IA	Enable operating mode modification		0	0	1	-	I	R/W
U1	Enable manual valve position		0	0	1	-	I	R/W
U2	Manual valve position		0	0	999	Step	I	R/W
U3	Valve control steps 1/2=480/960		1	1	2	-	I	R/W
U4	Valve opening at start-up		50	0	100	%	I	R/W
Fr	Firmware version		1.3	-	-	-	A	R
di	DI configuration		1	1	2	-	I	R/W

Param.	Description	Std	Def.	Min	Max	UOM	Type	R/W
rt	Reserved		1	1	1	-	-	-
L1	Pressure S1 minimum alarm value		-1	-85 (-121)	Pressure S1 max	barg (psig)	A	R/W
H1	Pressure S1 maximum alarm value		9.3	Pressure S1 min	200 (392)	barg (psig)	A	R/W

8.5. Alarm table

Code	Red LED	Cause	Reset	Effect	Solution
A1	Flash	Probe S1 faulty or set alarm range exceeded	Auto	Valve closed	Check the probe connections
A2	Flash	Probe S2 faulty or set alarm range exceeded	Auto	Valve closed	Check the probe connections
E1	Flash	MOP protection activated	Auto	Protection action already in progress	Check parameter “MOP protection: threshold”
E2	Flash	LOP protection activated	Auto	Protection action already in progress	Check parameter “LOP protection: threshold”
E3	Flash	LowSH protection activated	Auto	Protection action already in progress	Check parameter “LowSH protection: threshold”
E4	Flash	Low suction temperature	Auto	No effect	Check the threshold parameter
E5	Flash	Emergency closure: LowSH, LOP, MOP, low suction T / P, power failure	Auto	Valve closed	Reset power supply
E6	Flashes	Network error	Auto	Control based on DI	Check the wiring and that the pCO is on and operating
E7	Flash	Ultracap module powered at low voltage or low charge	Auto	No effect	Check the wiring, the power supply and that the minimum recharge time has elapsed
E8	Flash	Emergency closing not completed	Manual	Valve closed	Press PRG/Set or set the corresponding supervisor variable to 0
EE	On	EEPROM operating and/or unit parameters damaged	Replace unit	Total shut-down	Replace the driver/Contact service

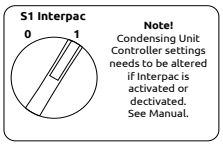
9. Controller Interpac

The CO_2 unit is equipped with a separate controller for the heat recovery system (Interpac). This system controls the three-way valve and speed of the circulation pump to optimize heat recovery.

If an replacement Interpac controller is ordered, settings needs to be re-configured to standard parameters See *9.3. Programming procedure* and *9.4. Parameter table*

9.1. Activation/Deactivation

The Interpac function can manually be deactivated or activated by operating the S1 switch inside right main cabinet.



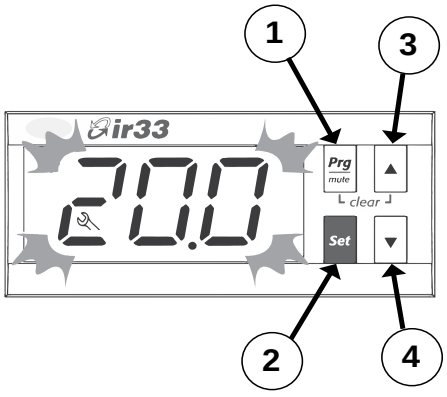
Note! If Interpac function is deactivated/activated, Condensing unit controller settings has to be adjusted. See *7.9.4. High pressure set-point*

9.2. Navigation

During operation, the display shows the ingoing water temperature at the heat exchanger.

The numbers on the left side of the display indicates start/stop regulation status. Lightened numbers indicates activated.

1. Prg/mute
2. Set
3. Increase value ▲
4. Decrease value ▼



9.3. Programming procedure

To change set point 1 & 2 (standard = 75°)

1. Press Set: The display shows St1 and then the current value of St1.
2. Press ▲ or ▼ to reach the desired value.
3. Press Set to confirm the new value of St1.
4. The display shows St2 and then the current value of St2. Repeat step 2 & 3.

The display returns to the standard view.

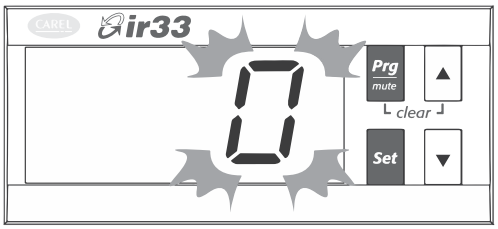
9.3.1. Parameter setting

If the value entered is correct, the first modifiable parameter will be shown, otherwise the standard display will resume.

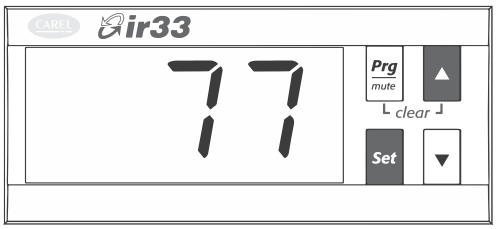
Press ▲ or ▼ until reaching the parameter to be modified. When scrolling, an icon appears on the display representing the category the parameter belongs to. See *9.3.2. Parameter icons* and *9.4. Parameter table*

To permanently save the new values of the parameters and exit the parameter setting procedure, press Prg/mute for 5 s.

1. Press **Prg/mute** and **Set** simultaneously for more than 5 seconds, the display shows 0.



2. To adjust the service parameters, a password is required. Press ▲ or ▼ until displaying the password = 77 then confirm by pressing **Set.**



9.3.2. Parameter icons

1. - **1**
2. - **2**
3. - **3**
4. - **4**
5. -
6. -
7. - TUNING
8. -

9.4. Parameter table

Par	Description	**Std.**	Def.	Min	Max	UOM	Type	R/W	Ico
St1	Set-point 1, 3-way valve	**75**	20 (68)	c21	c22	°C(°F)	A	R/W	5
St2	Set-point 2 , Circ pump	**75**	40 (104)	c23	c24	°C(°F)	A	R/W	5
c0	Operating mode	**1**	2	1	9	-	I	R/W	5
P1	Set-point 1 differential		2 (3.6)	0.1 (0.2)	50 (90)	°C(°F)	A	R/W	5
P2	Set-point 2 differential	**2**	2 (3.6)	0.1 (0.2	50 (90)	°C(°F)	A	R/W	5
P3	Dead zone differential	**1**	2 (3.6)	0	20 (36)	°C(°F)	A	R/W	5
c4	Authority.	**2**	0.5	-2	2	-	A	R/W	5
c5	Type of control 0=on/off; 1=PID		0	0	1	-	D	R/W	5
c6	Delay between activation of relays		5	0	225	s	I	R/W	5
c7	Minimum time between deactivation of same relay		0	0	15	min	I	R/W	5
d1	Minimum time between deactivation of relays		0	0	255	s	I	R/W	5
c8	Minimum relay off time		0	0	15	min	I	R/W	5
c9	Minimum relay on time		0	0	15	min	I	R/W	5
c10	Status of control output 1 if probe 1 alarms		0	0	3	-	I	R/W	5
d10	Status of control output 2 if probe 2 alarms		0	0	3	-	I	R/W	5
c11	Ouput rotation		0	0	8	-	I	R/W	5
c12	PWM cycle time		20	0.2	999	s	A	R/W	5
c13	Probe type		0	0	3	-	I	R/W	5
P14	Probe 1 calibration		0 (0)	-20 (-36)	20 (36)	°C(°F)	A	R/W	5
P15	Probe 2 calibration		0 (0)	-20 (-36)	20 (36)	°C(°F)	A	R/W	5
c17	Probe filter		4	1	15	-	I	R/W	5
c18	Temperature UOM 0= °C; 1=°F		0	0	1	-	D	R/W	5
c19	Probe 2 function		0	0	12	-	I	R/W	5
c21	Minimum value set-point 1	**-50**	-50 (-58)	-50 (-58)	c22	°C(°F)	A	R/W	5
c22	Maximum value set-point 1	**110**	60 (140)	c21	150 (302)	°C(°F)	A	R/W	5
c23	Minimum value set-point 2	**-50**	-50 (-58)	-50 (-58)	c24	°C(°F)	A	R/W	5
c24	Maximum value set-point 2	**110**	60 (140)	c23	150 (302)	°C(°F)	A	R/W	5
P25	Low temp alarm probe 1		-50 (-58)	-50 (-58)	P26	°C(°F)	A	R/W	6
P26	High temp alarm probe 1		150 (302)	P25	150 (302)	°C(°F)	A	R/W	6
P27	Alarm diff probe 1		2 (3.6)	0 (0)	50 (90)	°C(°F)	A	R/W	6
P28	Alarm delay time probe 1		120	0	250	0	I	R/W	6
P29	Type of alarm threshold probe1		1	0	1	-	D	R/W	6
P30	Low temp alarm threshold probe 2		-50 (-58)	-50 (-58)	P31	°C(°F)	A	R/W	6
P31	High temp alarm threshold probe 2		150 (302)	P30	150 (302)	°C(°F)	A	R/W	6
P32	Alarm diff probe 2		2 (3.6)	0 (0)	50 (90)	°C(°F)	A	R/W	6
P33	Alarm delay time probe 2		120	0	250	min(s)	I	R/W	6
P34	Type of alarm threshold probe 2		1	0	1	-	D	R/W	6
c29	Digital input 1	**0**	0	0	15	-	I	R/W	6
c30	Digital input 2	**0**	0	0	15	-	I	R/W	5

Par	Description	**Std.**	Def.	Min	Max	UOM	Type	R/W	Ico
c31	Status of control output in circuit 1 if alarm from digital input		0	0	3	-	I	R/W	5
d31	Status of control output in circuit 2 if alarm from digital input		0	0	3	-	I	R/W	5
c32	Serial connection address		1	0	207	-	I	R/W	5
c33	Special operation 0=off; 1=on	**1**	0	0	1	-	D	R/W	1
c34	Output 1 dependence		1	0	29	-	I	R/W	1
c35	Type of output 1 (3-way valve, NC)	**1**	0	0	1	-	D	R/W	1
c36	Output 1 activation	**100**	-25	-100	100	%	I	R/W	1
c37	Output 1 differential/logic	**25**	25	-100	100	%	I	R/W	1
d34	Output 1 activation restriction		0	0	4	-	I	R/W	1
d35	Output 1 deactivation restriction		0	0	4	-	I	R/W	1
d36	Minimum value for modulating output 1	**1**	0	0	100	%	I	R/W	1
d37	Maximum value for modulating output 1	**100**	0	0	100	%	I	R/W	1
F34	Output 1 cut-off		0	0	1	-	D	R/W	1
F35	Output 1 speed up duration	**30**	0	0	120	s		R/W	1
F36	Type of override for output 1		0	0	5	-	I	R/W	1
c38	Output 2 dependence	**2**	1	0	29	-	I	R/W	2
c39	Type of output 2 (circ. pump speed 0-10V)	**1**	0	0	1	-	D	R/W	2
c40	Output 2 activation	**100**	-50	-100	100	%	I	R/W	2
c41	Output 2 differential/logic	**-100**	25	-100	100	%	I	R/W	2
d38	Output 2 activation restriction		0	0	4	-	I	R/W	2
d39	Output 2 deactivation restriction		0	0	4	-	I	R/W	2
d40	Minimum value for modulating output 2	**30**	0	0	100	%	I	R/W	2
d41	Maximum value for modulating output 2		100	0	100	%	I	R/W	2
F38	Output 2 cut-off	**1**	0	0	1	-	D	R/W	2
F39	Output 2 speed up duration	**30**	0	0	120	s	I	R/W	2
F40	Type of override for output 2	**0**	0	0	5	-	I	R/W	2
c42	Output 3 dependence	**0**	1	0	29	-	I	R/W	3
c43	Type of output 3		0	0	1	-	D	R/W	3
c44	Output 3 activation		-75	-100	100	%	I	R/W	3
c45	Output 3 differential/logic		25	-100	100	%	I	R/W	3
d42	Output 3 activation restriction		0	0	4	-	I	R/W	3
d43	Output 3 deactivation restriction		0	0	4	-	I	R/W	3
d44	Minimum value for modulating output 3		0	0	100	%	I	R/W	3
d45	Maximum value for modulating output 3		100	0	100	%	I	R/W	3
F42	Output 3 cut-off		0	0	1	-	D	R/W	3
F43	Output 3 speed up duration		0	0	120	s	I	R/W	3
F44	Type of override for output 3		0	0	5	-	I	R/W	3

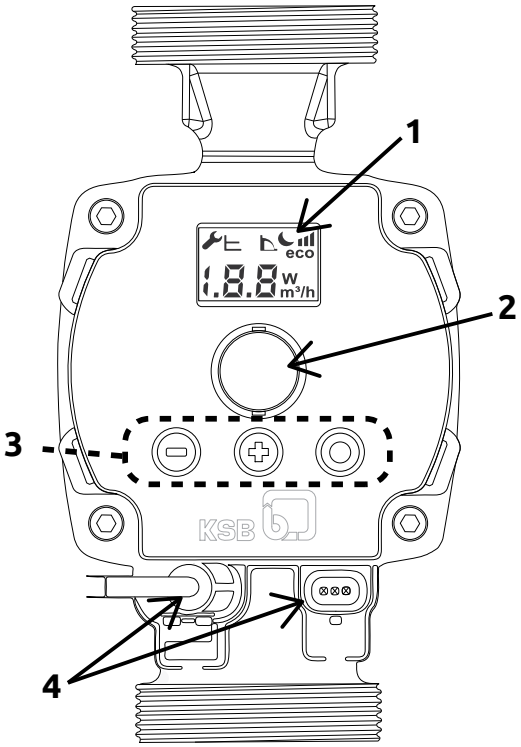
Par	Description	**Std.**	Def.	Min	Max	UOM	Type	R/W	Ico
c46	Output 4 dependence	**0**	1	0	29	-	I	R/W	4
c47	Type of output 4		0	0	1	-	D	R/W	4
c48	Output 4 activation		-100	-100	100	%	I	R/W	4
c49	Output 4 diff erential/logic		25	-100	100	%	I	R/W	4
d46	Output 4 activation restriction		0	0	4	-	I	R/W	4
d47	Output 4 deactivation restriction		0	0	4	-	I	R/W	4
d48	Minimum value for modulating output 4		0	0	100	%	I	R/W	4
d49	Maximum value for modulating output 4		100	0	100	%	I	R/W	4
F46	Output 4 cut-off		0	0	1	-	D	R/W	4
F47	Output 4 speed up duration		0	0	120	s	I	R/W	4
F48	Type of override for output 4		0	0	5	-	I	R/W	4
c50	Lock keypad and remote control		1	0	2	-	I	R/W	5
c51	Remote control enabling code		1	0	255	-	I	R/W	5
c52	Display		0	0	10	-	I	R/W	5
c53	Buzzer		0	0	1	-	D	R/W	5
c56	Delay on power up		0	0	255	s	I	R/W	5
c57	Soft start circuit 1		0	0	99	min/°C	I	R/W	5
d57	Soft start circuit 2		0	0	99	min/°C	I	R/W	5
c62	ti_PID 1		600	0	999	s	I	R/W	7
c63	td_PID 1		0	0	999	s	I	R/W	7
d62	ti_PID 2		600	0	999	s	I	R/W	7
d63	td_PID 2		0	0	999	s	I	R/W	7
c64	Auto tuning		0	0	1	-	D	R/W	7
c65	Logical enabling hysteresis		1.5(2.7)	0(0)	99.9(179)	°C(°F)	A	R/W	5
c66	Start enabling interval		-50(-58)	-50(-58)	150(302)	°C(°F)	A	R/W	5
c67	End enabling interval		150(302)	-50(-58)	150(302)	°C(°F)	A	R/W	5
P70	Enable working cycle		0	0	3	-	I	R/W	8
P71	Working cycle: step 1 duration		0	0	200	min	I	R/W	8
P72	Working cycle: step 1 temperature set point		0(32)	-50(-58)	150(302)	°C(°F)	A	R/W	8
P73	Working cycle: step 2 duration		0	0	200	min	I	R/W	8
P74	Working cycle: step 2 temperature set point		0(32)	-50(-58)	150(302)	°C(°F)	A	R/W	8
P75	Working cycle: step 3 duration		0	0	200	min	I	R/W	8
P76	Working cycle: step 3 temperature set point		0(32)	-50(-58)	150(302)	°C(°F)	A	R/W	8
P77	Working cycle: step 4 duration		0	0	200	min	I	R/W	8
P78	Working cycle: step 4 temperature set point		0(32)	-50(-58)	150(302)	°C(°F)	A	R/W	8
P79	Working cycle: step 5 duration		0	0	200	min	I	R/W	8
P80	Working cycle: step 5 temperature set point		0(32)	-50(-58)	150(302)	°C(°F)	A	R/W	8
P0	Firmware revision		20	0	999	-	-	R	8
AL0	Alarm 0 date – time (press Set)		-	-	-	-	-	R	8

Par	Description	**Std.**	Def.	Min	Max	UOM	Type	R/W	Ico
y	AL0_y = alarm 0 year		0	0	99	year	I	R	8
M	AL0_M = alarm 0 month		0	1	12	month	I	R	8
d	AL0_d = alarm 0 day		0	1	31	day	I	R	8
h	AL0_h = alarm 0 hours		0	0	23	hour	I	R	8
n	AL0_n = alarm 0 minutes		0	0	59	min	I	R	8
E	AL0_t = type of alarm 0		0	0	99	-	I	R	8
AL1	Alarm 1 date – time (press Set)		-	-	-	-	-	R	8
y	AL1_y = alarm 1 year		0	0	99	year	I	R	8
M	AL1_M = alarm 1 month		0	1	12	month	II	R	8
d	AL1_d = alarm 1 day		0	1	31	day		R	8
h	AL1_h = alarm 1 hours		0	0	23	hour	I	R	8
n	AL1_n = alarm 1 minutes		0	0	59	minute	I	R	8
E	AL1_t = type of alarm 1		0	0	99	-	I	R	8
AL2	Alarm 2 date – time (press Set)		-	-	-	-	-	R	8
y	AL2_y = alarm 2 year		0	0	99	year	I	R	8
M	AL2_M = alarm 2 month		0	1	12	month	I	R	8
d	AL2_d = alarm 2 day		0	1	31	day	I	R	8
h	AL2_h = alarm 2 hours		0	0	23	hour	I	R	8
m	AL2_n = alarm 2 minutes		0	0	59	min	I	R	8
E	AL2_t = type of alarm 2		0	0	99	-	I	R	8
AL3	Alarm 2 date – time (press Set)		-	-	-	-	-	R	8
y	AL3_y = alarm 2 year		0	0	99	year	I	R	8
M	AL3_M = alarm 2 month		0	1	12	month	I	R	8
d	AL3_d = alarm 2 day		0	1	31	day	I	R	8
h	AL3_h = alarm 2 hours		0	0	23	hour	I	R	8
m	AL3_n = alarm 2 minutes		0	0	59	min	I	R	8
E	AL3_t = type of alarm 2		0	0	99	-	I	R	8
AL4	Alarm 2 date – time (press Set)		-	-	-	-	-	R	8
y	AL4_y = alarm 2 year		0	0	99	year	I	R	8
M	AL4_M = alarm 2 month		0	1	12	month	I	R	8
d	AL4_d = alarm 2 day		0	1	31	day	I	R	8
h	AL4_h = alarm 2 hours		0	0	23	hour	I	R	8
m	AL4_n = alarm 2 minutes		0	0	59	min	I	R	8
E	AL4_t = type of alarm 2		0	0	99	-	I	R	8
ton	Start unit (Press Set)		-	-	-	-	-	R	8
d	tON_d = start day		0	0	11	day	I	R/W	8
h	tON_h = start hours		0	0	23	hour	I	R/W	8
n	tON_m = start minutes		0	0	59	minute	I	R/W	8
toF	Stop unit (Press Set)		-	-	-	-	-	R	8
d	tOFF_d = stop day		0	0	11	day	I	R/W	8
h	tOFF_h = stop hours		0	0	23	hour	I	R/W	8
h	tOFF_n = stop minutes		0	0	59	minute	I	R/W	8
tc	Date – time (Press Set)		-	-	-	-	-	R	8

10. Circulation pump Interpac

10.1. Overview

The pump set is designed with a radial fluid inlet (suction nozzle) and a radial outlet (discharge nozzle) arranged on the same axis. The impeller is rigidly connected to the motor shaft. Mechanical sealing is not required as the rotating assembly is completely isolated from the stator winding. The rotating assembly is lubricated and cooled by the fluid handled. The motor housing has two connections, one for the power supply and one for an external control cable (data cable). The lubricating system and high-quality ceramic bearings ensure smooth running and a long service life.



1. Display, see *10.3.1. Display*
2. Vent plug, see *10.2.2. Priming and venting*
3. Navigation buttons, see *10.3. Navigation*
4. Cable connections, see *10.2.1. Electrical connections*

10.1.1. Function

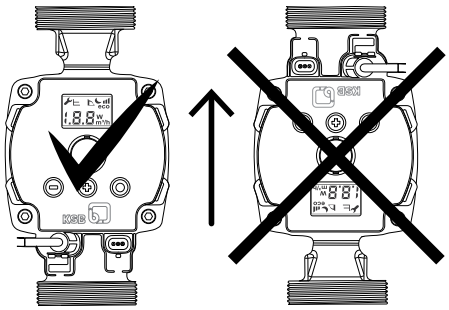
The fluid handled enters the pump set via the suction nozzle and is accelerated outward by the rotating impeller. In the flow passage of the pump casing, the kinetic energy of the fluid handled is converted into pressure energy. The fluid handled is pumped to the discharge nozzle, where it leaves the pump set.

10.2. Installation

Inlet and outlet has R25 (G1") union connections.

Illustration shows possible mountings. An arrow on the pump casing and thermal insulation shell indicates the direction of flow.

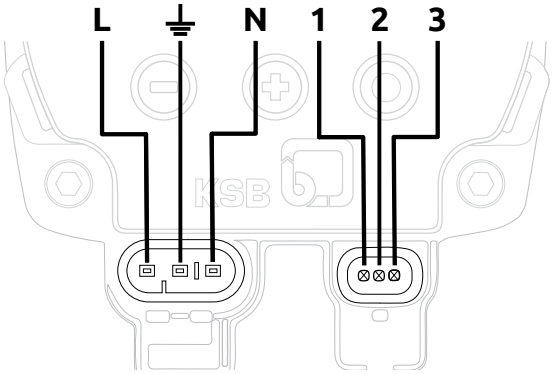
Front of pump can be positioned in 90° increments by removing the four hexagon socket head screws in each corner of front, turning the front to desired position, and reinstall screws.



10.2.1. Electrical connections

- Left - power connection
- Right - control connection

1. Brown (from external control system to pump system)
2. Blue, earthing (analog signal 0-10 V)
3. Black (N/A)



10.2.2. Priming and venting

Before start-up, make sure that power supply in properly connected, and piping is clean. Also prime and vent the pump. Repeat procedure until all air is evacuated.

1. Open valve in suction line
2. Start pump at maximum speed and open vent plug until liquid escapes.
3. Tighten vent plug. Maximum torque 0,5 Nm

10.2.3. Start-up

1. Clean piping
2. Vent and prime system
3. Close priming- and venting valves
4. Open suction valve
5. Close or slightly close valve in discharge line
6. Start the motor

10.3. Navigation

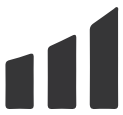
All settings are made using the control buttons at front of pump

- Change operating mode
- Turn on display backlighting
- Save setpoint
- Increase setting or setpoint
- Decrease setting or setpoint

10.3.1. Display

The measured electrical input power, flow rate and head are shown on the pump front panel. The values are displayed with corresponding units

The symbols indicates operating modes, functions and settings

Symbol	Description	Unit
m³/h	Flow rate	m³/h
	• Symbols light up	
	• Display shows the flow rate	
W	Measured electrical input power	W
	• Symbol lights up	
	• Display shows the electrical power	
m	Head (pressure)	m
	Symbol lights up	
	• Display shows the head	
	Constant-pressure control operating mode	-
	• Symbol lights up when this operating mode is active	
	Proportional-pressure control operating mode	-
	• Symbol lights up when this operating mode is active	
	Open-loop Control operating mode	-
	• Symbol lights up when this operating mode is active	
	• The bar diagram shows the active speed level	
eco	EcoMatch operating mode	-
	• Symbol lights up when this operating mode is active	
	Operation controlled by external input	-
	• Symbol lights up when this operating mode is active	
	Error message (e.g. error code E08)	-
	• An error code (E01-E09) is shown on the display	

10.4. Programming procedure

If an replacement pump is ordered, operating mode needs to be re-configured to operation controlled by external input. At delivery the pump is pre-set to Proportional-pressure Control (Δp-v)

The pump set speed should be adjusted via an analog signal, 0 - 10 Volts

The pump set starts up with the minimum speed at 3 V DC. The pump set increases the speed in a linear fashion with the increasing input signal up to the maximum readable voltage (10 V DC). When the input signal drops down to the threshold value of 3 V DC, the pump set switches to its minimum speed. When the input voltage drops below 1.5 V DC, the pump stops. This prevents unnecessary stopping and starting of the pump set at fluctuating input signals around the stop threshold value (hysteresis).

1. Activating the setting mode

Press and hold the control button (**O**) for 3 seconds

- This will activate the display backlight.
- The flashing symbol indicates the active operating mode.

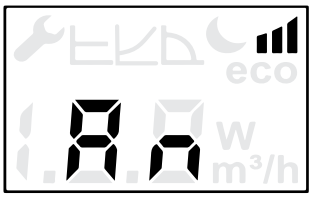
2. Select the External Input

- Press the control button (**O**) for a minimum of 0.5 seconds until the symbol for External Input flashes.

3. Select the analog signal application

- Select the application by pressing the control buttons (**+**) or (**-**).

The bar diagram shows the active speed level.

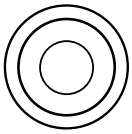


- PA = heating applications
- PC = solar applications
- An = analog signal 0 - 10 V

4. Confirm settings

- Press and hold the control button (**O**) for a minimum of 3 seconds.

The set setpoint flashes and is saved.



10.5. Error codes

Error code	Cause	Status	Action
E01	Excessive temperature	Alarm	Pump stops
E02	Over-current	Alarm	Pump stops
E03	Internal fault	Alarm	Pump stops
E04	Blocked rotor	Alarm	Pump stops
E06	Voltage error	Alarm	Pump stops
E08	Motor fault	Alarm	Pump stops

11. Cleaning setup

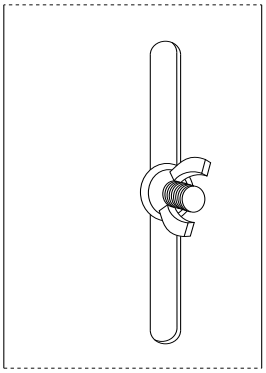
11.1. Setting up cleaning

Refer to chapter 5, Cleaning in Argos instruction manual for settings.

11.2. Adjusting water volume

The volume of water used in the tank during cleaning is adjusted using a wing nut on the side of the Argos post.

When the nut is loosen, one can raise or lower a measure cup inside the Argos post. In the measure cup is a float that affects a switch. The switch sends a signal to Argos when the set height is reached.



11.2.1. Recommended cleaning volume

Recommended cleaning volumes per tank size.

Note that the water heater needs to be able to deliver minimum 70°C at end of main cleaning phase. The total heater capacity needs to be dimensioned accordingly.

Tank Size	5000	6000	8000	10000-12000	14000-18000
Cleaning volume, l/ phase	55	70	80	95	110
Hot water (70°C), l/ cleaning cycle	190	240	280	330	380

11.2.2. Verify cleaning volume

In this way, you can determine which position of the wing nut corresponds to the actual amount of water in the tank.

1. Measure 10 litres of water into a bucket. Mark the level and empty the bucket.
2. Remove the panel on the front of Argos to gain access to the water hoses.
3. Remove the ends of water hoses which pass down into the water tank, and place them in the bucket.
4. Go to menu 9 – Test/Testing, *Relays* in Argos. Highlight *H water valve* and press *Change*. Now the hot water valve will open. Measure the time it will take for the water to reach the 10 l mark in bucket. To deactivate the water valve; press *Change* again or move to another component.
5. Re-install the hoses.
6. Go to menu 5, start the cleaning process and note the time for which the water valve is open.

The level sensor is not used in phases 1 and 8. Hot water is used in phases 3 and 4. Both hot and cold water are used in phases 2 and 5. Therefore, only phases 3 and 4 should be measured. See description in Argos manual, chapter 5, Cleaning, how to operate the unit.

The volume of water to which the location of wing nut corresponds to, can be calculated using the formula:

cleaning volume(l)=measured volume(l) x valve time(s)/filling time(s)

Example: In point 4, the measured 10 litres were filled in 24 seconds. In point 6, the filling time was 144 seconds. This gives a cleaning volume of 60 litres (=10 x 144/24).

The above test should also be performed with cold water. In this case, in point 4, the cold-water valve should be opened (see *menu 9 – Test, Relays, C water valve* in Argos), and the time collected during phases 6 or 7.

11.3. Hot water temperature

Maintaining a sufficiently high temperature during cleaning is essential to achieve a good cleaning result.

The temperature of the incoming water should never be below 60°C. If the temperature is lower, a larger quantity of water must be used in order to be able to heat up the tank. Similarly, if the temperature is higher than 60°C, a lesser volume of water can be used, or cleaning phases can be omitted. However, with an excessively small quantity of water, there is a risk of air entering the pump, resulting in reduced cleaning performance.

Verify that an enough of hot water volume in relation to the size of the tank is available during all cleaning phases.

See *11.2.1. Recommended cleaning volume*

The water heater volume and capacity is essential for a optimized cleaning.

Also remember to check the temperature of the hot water adjacent to the tank, as excessively long pipes from the water heater can reduce the water temperature significantly.

NOTE! The incoming hot water must not exceed 80°C to avoid damage to valves or rubber components

11.4. Detergent dosing

DANGER! Never mix acid and alkaline detergents. This can cause chemical reactions creating dangerous gases.

The cleaning unit has automatic liquid detergent pumps. The peristaltic pump capacity is normally 400ml/min.

Due to a wide variation between detergent manufacturers, it is important to follow the recommendations for the actual detergent used. Excessively concentrated detergents may damage parts of the tank. The dosage of a detergent should normally be between 0,4% and 0,6%, meaning that the detergent that is used must be intended for a dosing concentration between 40 ml - 60 ml detergent per 10 litres of water.

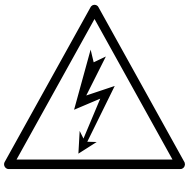
Detergents that are intended to be used at ratio of 0,3% or less (≤ 30 ml detergent / 10 litres of water) must not be used as it may decrease durability of components in the system.

11.4.1. Verify pump capacity

Pump capacity should be 400 ml/min when peristaltic hoses are new. Follow the instructions to verify pump capacity. Adjust pump time according to actual capacity (D12/D13).

1. Remove the panel on the front of Argos to gain access to the detergent hoses.
2. Remove the ends of detergent hoses.
3. Go to menu 9 – Test/Testing, *Relays* in Argos. Highlight *Dos pump alk* and press *Change*. The alkaline pump will start. Use a suitable vessel to measure the volume pumped during 1 minute. To deactivate the pump; press *Change* again or move to another component
4. Repeat the process for acid pump (*Dos pump acid*).
5. Reinstall hoses and front.

12. Maintenance



WARNING! Disconnect the control unit from the mains power supply and wait five minutes before working inside the control box of the unit or electrical wiring.

WARNING! The unit starts automatically. Always disconnect the main power supply. Lock the main switch in off position, wait five minutes before performing any installation, inspection, adjustment, maintenance, or repair of the equipment.

12.1. Operators Maintenance

Every month, clean gas cooler.

Clean coils with:

- Compressed air
- A soft brush with non-metallic materials

Avoid all kinds of aggressive detergents which may cause eventual corrosion.

Every 6 months, check electrical cables:

- Verify that power cables are undamaged and properly connected. Replace any damaged power cables and correct any other electrical related faults.

12.2. Periodic Maintenance

It is mandatory to perform Periodic Maintenance according to the maintenance schedule to secure high milk quality, as well as to extend the life of the cooling system and to avoid unexpected stops.

Contact a certified technician for any work to be performed on the refrigeration system

The owner is responsible to ensure that recommendations and regulations are followed.

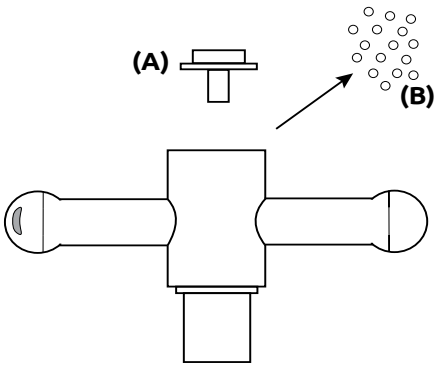
12.3. Maintenance Schedule

- Perform leakage detection on the refrigerant system: compressors, gas coolers, evaporator, heat exchanger, expansion valves, shut-off valves, pressure safety relief/limiting equipment, pipes, fittings, flange band and rigid connections.
- Verify that power cables are undamaged and properly connected.
- Replace any damaged power cables and correct any other electrical related faults.
- Oil leakage: checking of compressors, screwed joints/rigid connections, gas coolers, evaporator, heat exchanger, containers, fittings, and pipes.
- Corrosion in components, equipment, connections, containers, and pipes.
- Control of the refrigerant charge. Sight glass and liquid-level indicator.
- Vibrations in compressors, fans and pumps.
- Clean the gas cooler(s)
- Check all seals and gaskets. Replace when necessary.
- Replace peristaltic pump hoses once a year. After replacing the dosing pump hoses, verify function, and ensure correct capacity. See chapter *11.4.1. Verify pump capacity*
- Check and clean water intake filters.
- Verify correct water volume according to chapter *11.2.2. Verify cleaning volume*
- Verify correct cleaning of tank.
- Replace the Argos backup battery every two years.
- Clean and service the spray head every 12 months.
- When using a powder detergent, or if there is a risk of water being mixed with sand, a more frequent servicing of the spray head is recommended in order to maintain optimal cleaning function. See *12.3.1. Spray head service*

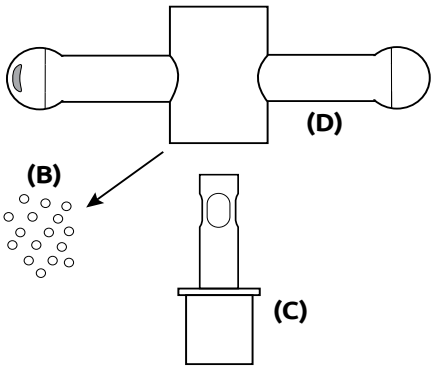
12.3.1. Spray head service

Required tools

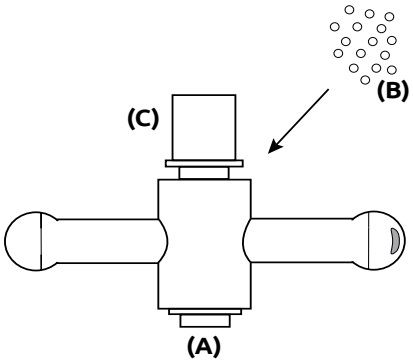
- Spanner, 17mm.
- Torque spanner 50Nm, 17mm.
- Food grade threadlocker.



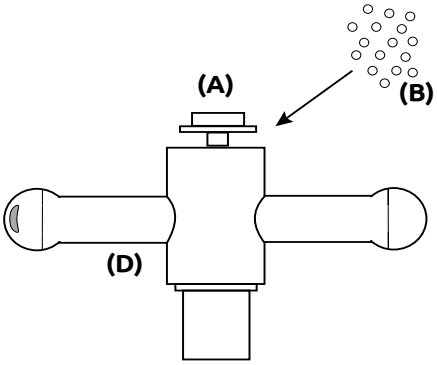
1. Unscrew end bearing A
2. Remove the plastic bearing balls B (16 pcs)
3. Clean and inspect parts Replace if necessary.



4. Remove cleaning head C
5. Remove the plastic bearing balls B (16 pcs)
6. Clean and inspect parts. Replace if necessary.



7. Reinstall cleaning head, note direction.
8. Secure the end bearing A, a few threads.
9. Place the plastic bearing balls B (16 pcs)



10. Turn spray head upside down and place the plastic bearing balls B (16pcs)
11. Tighten the end bearing A. Use food approved thread locker. Torque 50Nm.
12. Verify that the spray head D, rotates freely.

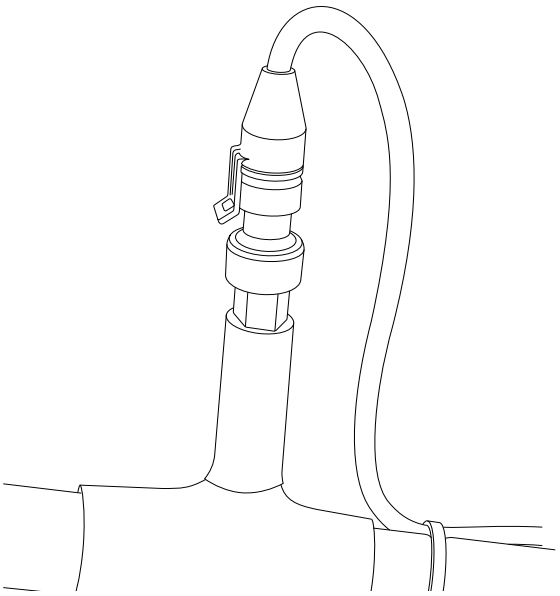
13. Replace and Repair

13.1. Replace pressure sensor

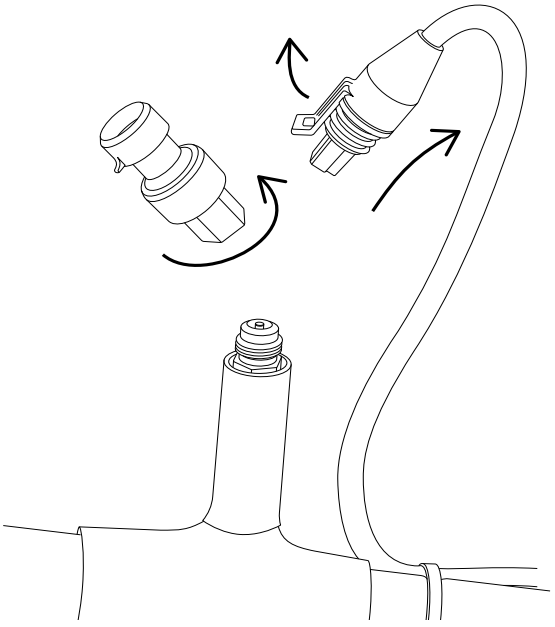
The pressure sensors are attached to an adaptor that has a built in Schrader valve. The sensors can be replaced without emptying the system.

Required tools:

- Spanner, 14mm
- Spanner, 11mm



- Unlock the connector flap lock and remove electrical connector from pressure sensor.
- Hold Schrader adaptor with a 11mm spanner. Unscrew the sensor from Schrader adaptor with a 14mm spanner.
- Replace sensor and reinstall connector.



14. Troubleshoot

If the tank does not function normally after below checks, contact your local Wedholms Service Partner

14.1. Troubleshoot guide

Symptom	Cause	Action
Tank doesn't start	No power	Verify that power is present
		Check mains switch
		Check main fuses
		Check cables
Tank starts, but doesn't cool at all	Compressor doesn't run	Main circuit-breaker open. Close circuit-breaker.
		Fuses burn out. Check the cause and change fuses
		Anti-short cycle time delay relay is in operation. Wait for cycle to complete.
		Low pressure switch cuts-out. Suction Temperature too low.
		High pressure switch cuts-out. Gas cooler pressure too high.
		Internal security switched out. Check cause of increase in motor winding temperatures.
	Evaporating temperature too low.	Set-point incorrect. Check settings.
		Too much oil in the evaporators. Clear out the oil from the evaporator
		Filter in the liquid line clogged. Examine and clean filters in liquid line
		Too much superheat. Adjust expansion valves
		Installation insufficiently charged. Charge the installation with refrigerant
		Liquid in the suction line. Adjust the expansion valve
		Sensor is loose or incorrectly positioned. Check if the sensor is in contact with the suction line and replace if necessary
	Problem with control system.	Replace, repair or reset
	Gas cooler pressure too low	Fan start settings incorrectly set. Adjust settings.

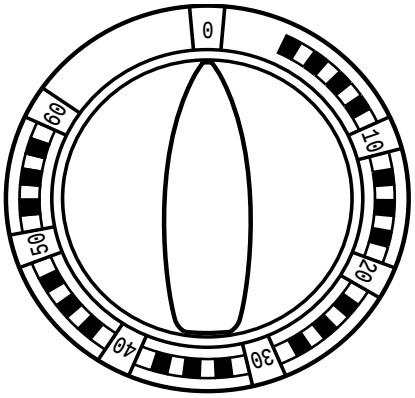
Symptom	Cause	Action
Tank starts, but doesn't cool properly	Low refrigerant charge	Check filling level, minimum 3/4 at sight glass. If less, fill. Verify that there aren't any leakages before charging.
	Low pressure	Pressure probe malfunction. Connect pressure meter and verify system pressures. Replace faulty sensors.
	High pressure	Pressure probe malfunction. Connect pressure meter and verify system pressures. Replace faulty sensors. Check high pressure valve EC1.
	Gas cooler pressure too high	Insufficient flow of air into the gas cooler. Clean the gas cooler. Check motor fans
		Installation overcharged. Drain liquid into reservoir
		Air or non-condensible gas in the HP circuit. Drain, use a vacuum pump and re-charge.
		Pressure valve EC1 faulty. Verify with E2VMAG tool. Replace faulty valve.
	Clogged gas cooler	Clean gas cooler
	Incorrect settings	Check settings. Refer to control units respectively
	Evaporating temperature too high	Too much suction gas superheat (above 20 K). Examine and adjust the expansion valves in the evaporators
	Insufficient capacity	Calculate correct dimensioning. Replace components that doesn't fulfil dimensioning.
	Capacity too high	Calculate correct dimensioning. Replace components that doesn't fulfil dimensioning.
	Problem with control system.	Replace, repair or reset faulty units
	Discharge temperature too high	Too much superheat on suction. Adjust expansion valves.
		Internal by-pass. Check compressors.
		Main circuit-breaker switched off
Compressor start and stops too often.	Inside of tank frozen.	Clean and remove ice from tank. Never run cooling without milk in tank.
	Set-point incorrect	Check the settings
	Too much oil in the evaporators	Clear out the oil from the evaporator
	Filter in the liquid line clogged	Examine and clean filters in liquid line
	Too much superheat	Adjust expansion valves
	Installation insufficiently charged	Charge the installation with refrigerant
Compressor runs continuously	Control system or other automatic device fault	Check settings and components. Replace if necessary
	Installation insufficiently charged	Charge installation with refrigerant
	Evaporators blocked or ice present	Clean and remove ice from tank. Never run cooling without milk in tank.

Symptom	Cause	Action
Abnormal noise in the compressor	Screw loose	Tighten screw
	Fluid in the suction line	Check and reset the expansion valves. Check that the liquid solenoid valves do not remain open when machine stops
	The discharge temperature sensor is not stable or incorrectly positioned	Check sensor position and function
	Emulsion in oil crankcase	Incorrect lubrication. Clean and flush system.
	High refrigerant charge	Installation overcharged. Drain liquid into reservoir
Condensing unit alarm	Condensing unit sending alarm	See Condensing unit alarm list
Expansion valve controller alarm	Expansion valve controller sending alarm	See Expansion valve controller alarm list
Interpac circulation pump alarm	Interpac circulation pump sending alarm	See Interpac circulation pump alarm list
Low capacity of Interpac	Incorrect settings	Adjust Interpac controller and circulation pump settings.
	3-way valve doesn't move.	Verify Interpac controller settings
		Faulty servo motor unit. Replace.
	System pressure too low	Fill up liquid
HCB button doesn't respond	Low pressure setting	Adjust regulator
	Regulator valve malfunction	Replace regulator valve
	Blocked or kinked pneumatic tubes	Check tubes and connections
	Manual valve (button) broken	Replace valve
Cleaning doesn't start	Control unit has no power	Check fuses
	No cleaning signal from robot	Valve sensor malfunction. Verify sensor signal. Refer to robot manual
Poor cleaning result	No water circulation during cleaning	Air leakage into cleaning pump. Check hose and tube connections. Replace worn and broken parts.
		Cleaning pump malfunction. Replace parts or pump.
	Spray head doesn't spin	Debris in spray head. Clean and service the spray head.
		Bearing balls worn. Replace bearing balls.
	Fat deposits in tank	Incorrect alkaline detergent dosage. Re- calculate dosage and calibrate peristaltic pumps.
		Low or no alkaline detergent. Check peristaltic pumps. Replace peristaltic tubes every 12 months.
		Low or no alkaline detergent in container. Replace containers
		Low cleaning temperature. Check hot water supply and temperature.
	Mineral deposits in tank	High pre-cleaning temperature. Check strainers at cold water inlet. Clean or replace strainer.
		Incorrect acid detergent dosage. Re- calculate dosage and calibrate peristaltic pumps.
		Low or no acid detergent. Check peristaltic pumps. Replace peristaltic tubes every 12 months.
		Low or no acid detergent in container. Replace containers

14.2. Forced cooling

Cooling can be started manually if cooling doesn't function automatically. The forced cooling is started with the timers located on the side of the electrical cabinet. The maximum time in forced cooling is 60 minutes. The timer bypasses the automatic system.

T1 must be activated for T2 to be active.



15. Equipment and accessories

15.1. Interpac

Interpac is a compact heat recovery unit for heating water. The Interpac is connected to the condensing unit. The heated water is collected in one or more accumulator tanks. Approximately 70-80˚C can be obtained. Note that there is a limit to how much recovered heat can be obtained without influencing the cooling capacity of the tank.

Do not pre-cool the milk when Interpac is active. Any pre-cooling of milk would decrease the capacity of Interpac heat recovery system.

NOTE! Minimum ambient temperature for the Interpac is 0°C (risk of freezing).

NOTE! The Interpac function can manually be activated or deactivated.

See chapter *9.1. Activation/Deactivation*

NOTE! If Interpac is deactivated or activated, Condensing unit controller settings has to be adjusted. See *7.9.4. High pressure set-point*

15.1.1. Heat recovery flowchart

The milk is filled into the milk-cooling tank at a temperature of circa 35˚C and is cooled down to 4˚C.

The thermal energy from the milk can be recovered with the help of the Interpac heat recovery unit that is installed in the cooling circuit between the compressor and gas cooler.

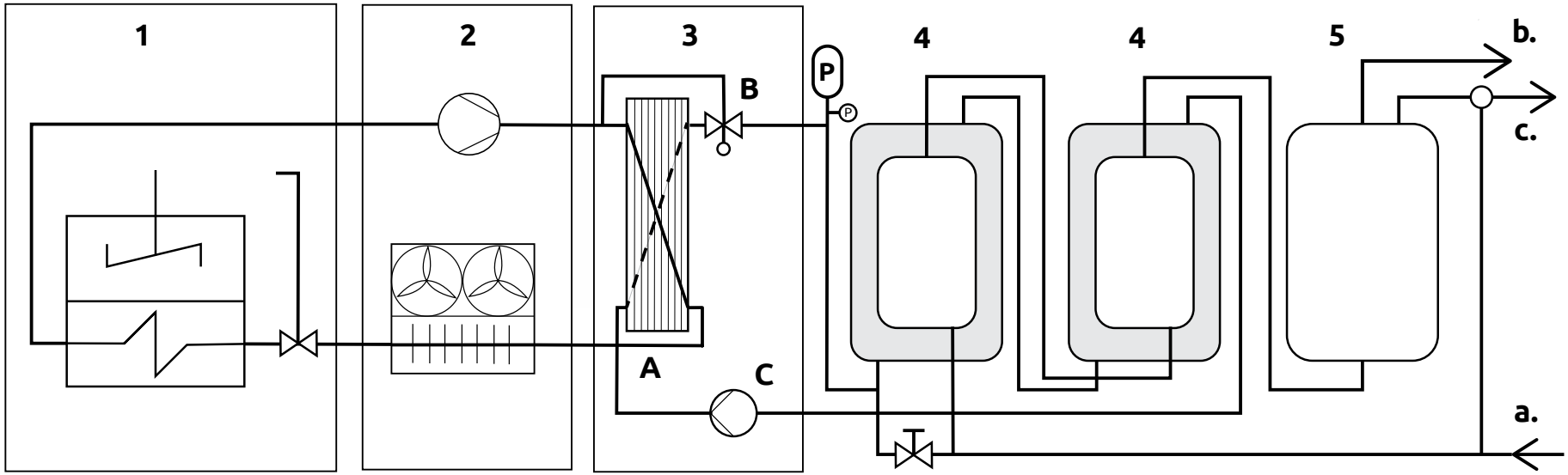
Hot gas from the compressor is led through the heat exchanger (A).

Water from the accumulator tank is pumped by the pump (C) through the heat exchanger and is heated up by the hot gas to the temperature set by the Interpac controller.

See chapter *9. Controller Interpac*

15.1.2. Accumulator tank without coil

When several accumulator tanks are used, these must be connected in series. See illustration.



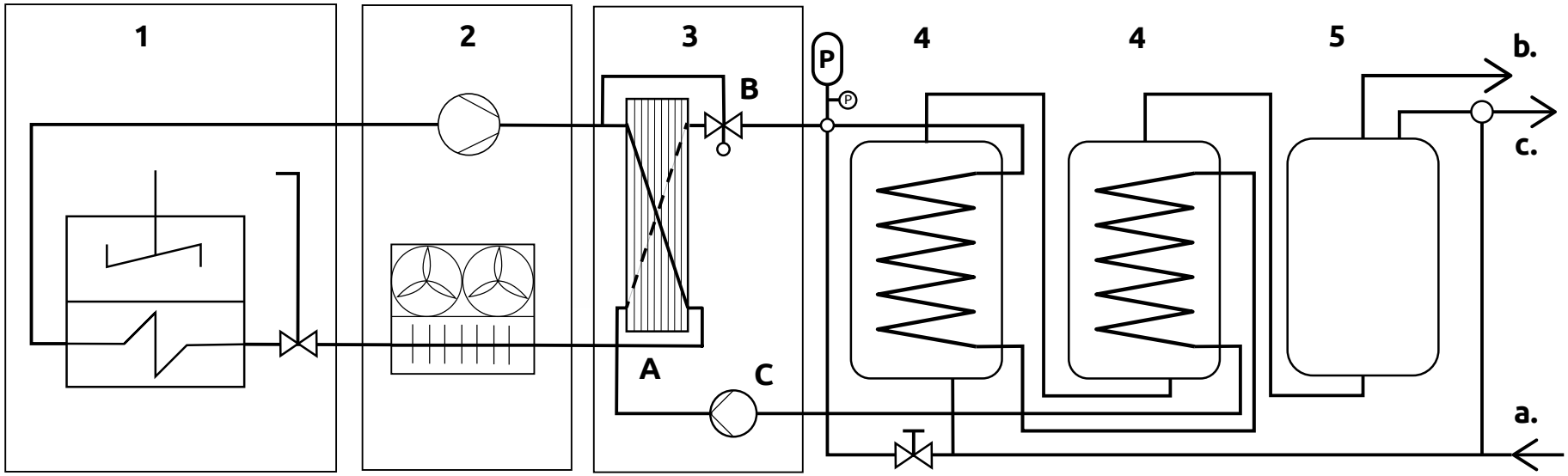
1. Milk tank
2. Condensing unit
3. Interpac
4. Accumulator tank
5. Water heater

A. Heat exchanger
B. Regulator valve
C. Circulation pump

a. Water in
b. Hot water, cleaning unit
c. Hot water (mixed)

15.1.3. Accumulator tank with coil

When several accumulator tanks are used, these must be connected in series. See illustration. Recommended minimum continuous transfer capacity for accumulator coils is 32 kW.



1. Milk tank
2. Condensing unit
3. Interpac
4. Accumulator tank
5. Water heater

A. Heat exchanger
B. Regulator valve
C. Circulation pump

a. Water in
b. Hot water, cleaning unit
c. Hot water (mixed)

15.1.4. Water heater

The temperature in the accumulator tank can vary depending on variations in the quantity of milk and of hot water used. Install a water heater to be able to reach higher temperatures and volumes than Interpac can produce.

15.1.5. Conventional milking

Recommended accumulator volume for one circuit and conventional milking, 4 milking sessions:

Tank size (litres)	Accumulator volume (litres)
3200-5000	300-800
6000-9000	500-1200
10000-18000	600-1200

15.1.6. Robotic milking

With a smaller accumulator tank, the water passes through the Interpac several times, which results the water to reach higher temperatures. With larger accumulator volume, water pass through the Interpac less times.

A smaller accumulator tank can preferably be used in a robotic milking system since heat recovery is more continuous and slower milk flow than conventional milking.

Recommended accumulator volumes for robotic milking:

Number of robots	Accumulator volume (litres)
1	300-500
2	400-800
3	500-1000
4	800-1200

15.2. Home Consumption Button (HCB)

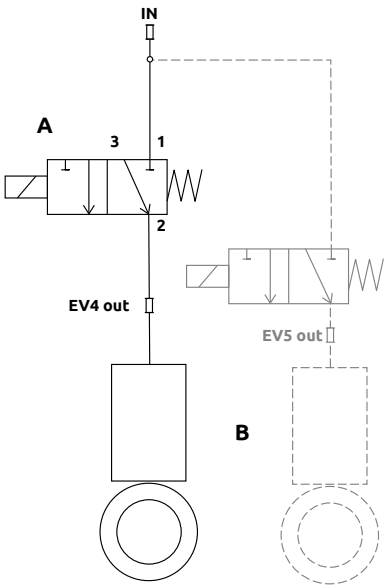
If the tank is connected to robotic milking, a home consumption button can be installed. This to easily allow operator to take out a small amount of milk from the tank during operation. A button opens the pneumatically actuated butterfly valve.

Opening speed is regulated with a regulator knob to ease the milk flow during manual pick-up.

The HCB is an option that can be retrofitted.

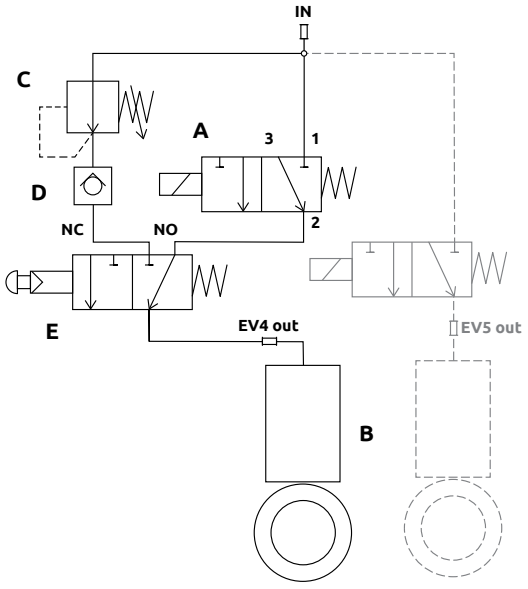
Different pneumatic connections are required depending on if the robot brand activates tank butterfly valve via Argos or not. See note below.

Without HCB



A. 3/2 valve, electric
B. Outlet butterfly valve
C. Regulator valve
D. Check valve
E. 3/2 valve, push button

With HCB



NOTE! If outlet valve isn't activated via Argos, disregard valve A in HCB schematic. Connect pneumatic signal tube from robot directly to E, port NO.

15.3. Electrical heater

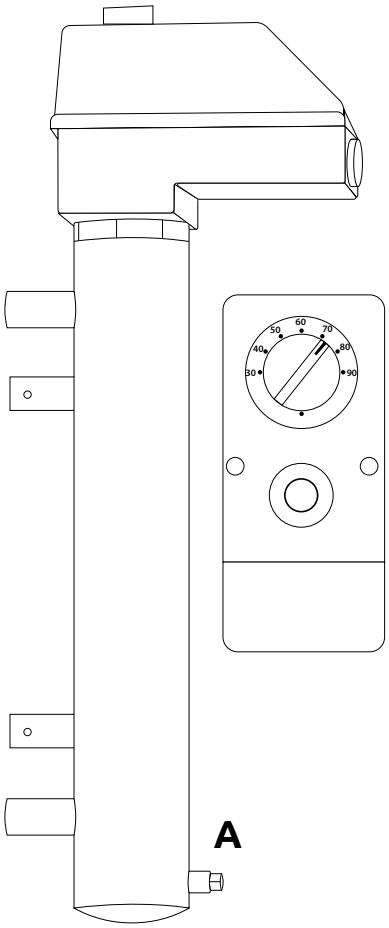
A Wedholms heater is available as an option where there is a risk of insufficient hot water supply. The heater can increase the water temperature by 5 to 10 °C under ideal conditions and will never replace a correctly dimensioned water heater. See *11.2.1. Recommended cleaning volume* and *11.3. Hot water temperature*

The heater is connected to the cleaning system and heats the water when it flows through the heater during the cleaning process. If the option is ordered at purchase, it is pre-installed. The heater can also be retrofitted.

The heater is only active in cleaning phase 4 until the desired temperature is fulfilled, or time-out of cleaning phase 4, (see Argos manual).

The heating element is installed in a stainless-steel container connected to the cleaning line, down-stream the cleaning pump. The electrical heater has a built-in thermostat and overheating protection. The heater must be stored in an ambient relative humidity below 50% until start-up. If the heater has been stored in higher humidity for a longer than two weeks, warranty is expired.

If the tank is taken out of service, always drain heat chamber. Use the drain plug located on the bottom of the heater. After drainage, store the heater indoors with a relative humidity below 50%. Remove drain plug during storage.

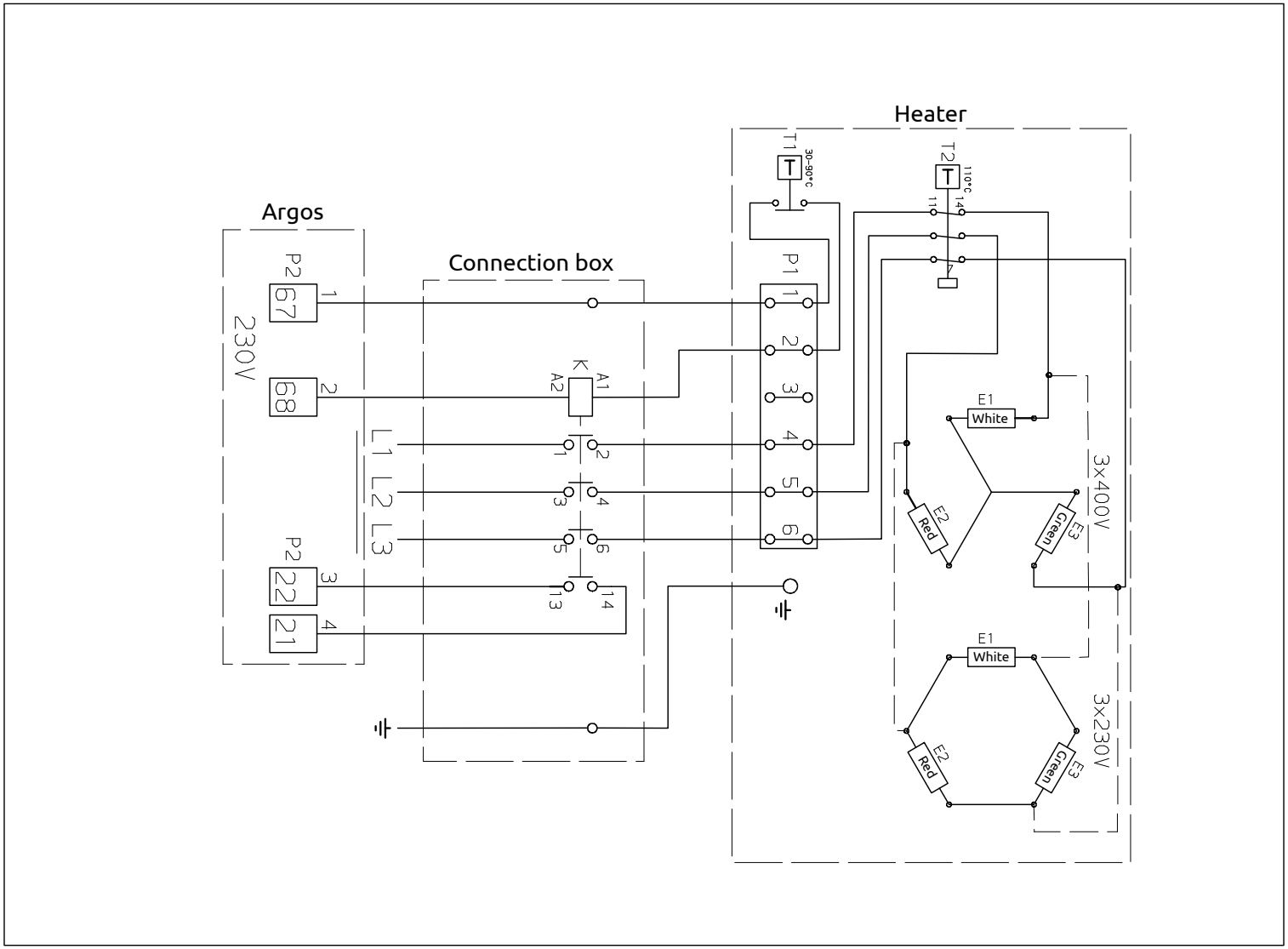


A. Drain valve

15.3.1. Technical data

Technical data			
Voltage (V)	400, ~3	400, ~3	230, ~3
Power (kW)	10	7,5	7,5
Current (A)	14,5	10,8	18,8
Fuse (A)	16	13	20
Max temperature (°C)	85	85	85
Enclosure class	IP44	IP44	IP44

15.3.2. Electrical diagram



15.3.3. Water quality

In localities with hard water (>14°dH), scale may build up on the heating element.

Boiler scale consists mainly of calcium and magnesium carbonates, which are dissolved in water at lower water temperatures but are deposited as a hard coating at higher temperatures.

In heating systems, boiler scale adheres to heating elements and acts as an insulator. The scale decreases the effectiveness and service life of the heater, as well as higher risk of short circuiting or leakage.

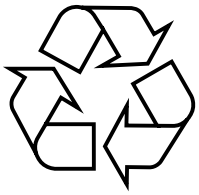
In order to avoid problems caused by boiler scale, inspection and cleaning of the heating element should be performed at regular intervals when the heater is used under such conditions.

High chlorine content in the water can cause damage to the stainless-steel heating element.

NOTE! Set the temperature knob to 75° - 80° C

16. Recycling instructions

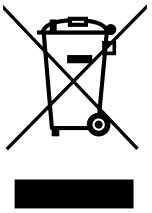
The following should be considered when the milk-cooling tank is recycled.



16.1. Cooling system

Empty the cooling system of refrigerant, which can be reused or destroyed according to applicable regulations. Collect the cooling system compressor oil (ester oil) for recycling.

16.2. Electrical system



The electrical connections has PVC-insulated copper wires.

Remove circuit boards from the control system, Argos, and recycle according to applicable regulations.

16.3. Tank body

The tank body is made of EN 1.4301 stainless steel (SS2333).

The tank is insulated with water-blown polyurethane foam containing CO_2 gas. High temperatures, for example during drilling, can cause harmful gases to form.

Make sure that there is good ventilation.

NOTE! There are electrical cables for the agitator that is moulded into the tank insulation

17. Installation report

The report must be completed and submitted for all tank installations. Send a copy by email to *info@wedholms.se*. The document is required for valid warranty.

Fields marked * is mandatory for all systems. All fields are mandatory for tanks delivered without integrated cooling unit.

To perform a full test of cooling system, fill the tank with water to at least 15% of its volume. Then start cooling, and fill in the data accordingly when the temperature of the water is below 7 °C.

Note the temperature.

Customer*					
Address*					
Postal code*		City*			
Tank type*		Volume*		Refrigerant*	
Serial number*			Date*		
Installing company*			Certification no*		

FUNDAMENTALS	Check
Leakage test	☐
Vacuum test (min 2,6 mbar)	☐
Pressure test	☐
Testing temperature (°C)	

ELECTRICITY*	Check
Residual-current circuit breaker*	☐
Mains power supply*	☐
Correct motor protection*	☐

COMPRESSOR 1	
Model	
Serial no	
Refrigerant charge (kg)	
HP cut-off (bar)	
LP Cut-off (bar)	

COMPRESSOR 2	
Model	
Serial no	
Refrigerant charge (kg)	
HP cut-off (bar)	
LP Cut-off (bar)	

COMPRESSOR 3	
Model	
Serial no	
Refrigerant charge (kg)	
HP cut-off (bar)	
LP Cut-off (bar)	

COMPRESSOR 4	
Model	
Serial no	
Refrigerant charge (kg)	
HP cut-off (bar)	
LP Cut-off (bar)	

CONDENSING UNIT 1	
Temperature in (°C)	
Condensing temperature (°C)	
Subcooling (K)	

CONDENSING UNIT 2	
Temperature in (°C)	
Condensing temperature (°C)	
Subcooling (K)	

CONDENSING UNIT 3	
Temperature in (°C)	
Condensing temperature (°C)	
Subcooling (K)	

CONDENSING UNIT 4	
Temperature in (°C)	
Condensing temperature (°C)	
Subcooling (K)	

EVAPORATOR 1	
Evaporating temperature (°C)	
Superheat to compressor (6-10K)	

EVAPORATOR 2	
Evaporating temperature (°C)	
Superheat to compressor (6-10K)	

EVAPORATOR 3	
Evaporating temperature (°C)	
Superheat to compressor (6-10K)	

EVAPORATOR 4	
Evaporating temperature (°C)	
Superheat to compressor (6-10K)	

RECEIVER	
Receiver pressure (bar)	
Valve opening (%)	

CLEANING*		
Water volume in phase 2*		Litres
Detergent dosage, alkaline*		ml
Detergent dosage, acid*		ml
Hot water temperature to tank*		°C
Inclination, at least 3,3% (1,9°)*		%

FUNCTION TEST*	Check
Compressor*	☐
Expansion valve* (CO_2 only)	☐
3-way valve* (CO_2 only)	☐
Circulation pump*	☐
Cleaning pump*	☐
Detergent pumps*	☐
Drain valve*	☐
Heater*	☐

ARGOS*	Check
Verify settings*	☐

FUNCTION TEST CLEANING*	Check
Temperature sensor calibration*	☐
Complete cleaning test*	☐

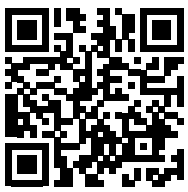
INFORMATION TO CUSTOMER*	Check
General information*	☐
Safety*	☐
Periodic Maintenance*	☐

INTERPAC*	Check
Temperature settings*	☐
Function test*	☐

DOCUMENTATION*	Check
Instructions Argos*	☐
Tank manual*	☐
Electrical diagrams*	☐
Instruction sheets driver/farmer*	☐

COMMENTS

Installer name*		Customer name*	
Signature*		Signature*	



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https://webshop-wedholms.com/en

Support telephone: +46-155-28 03 80

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Contact information Wedholms AB

Order:	*order@wedholms.se*
Support:	*support@wedholms.se*
Spare parts:	*spareparts@wedholms.se*
Warranty:	*warranty@wedholms.se*

Support telephone: +46-155-28 03 80