



Installation and Servicing Instructions

English

Version 1.1, ARGOS



Contents

CONTENTS	3
SAFETY INSTRUCTIONS	5
SAFETY SYMBOLS AND INFORMATION PLATES.....	6
<i>Refrigerant information plate</i>	7
<i>Type plate</i>	8
OPERATING INSTRUCTIONS FOR FARMERS	9
MILK ROOM TEMPERATURE AND VENTILATION.....	9
OPERATION AND MAINTENANCE	9
PREVENTIVE MAINTENANCE OF WEDHOLMS MILK COOLING TANKS	10
ACTION TO BE TAKEN IN THE EVENT OF BREAKDOWN.....	10
Forced cooling.....	10
COMPLAINTS AND WARRANTY CLAIMS.....	10
INSTALLATION REPORT	11
INSTALLING THE MILK-COOLING TANK	12
TANK INSTALLATION	12
ATTACHED CONDENSING UNIT	14
SEPARATE CONDENSING UNIT.....	15
<i>Cooling system flowchart</i>	15
<i>Condenser</i>	16
<i>Electrical connection</i>	16
<i>Evacuation and charging of the cooling system</i>	16
<i>Scroll compressors</i>	16
<i>Starting up a tank with a separate condensing unit</i>	17
REGULATING THE WATER QUANTITY	18
SETTING THE CLEANING FUNCTION	18
REGULATING THE WATER QUANTITY.....	18
CHECKING THE WATER QUANTITY	18
HOT-WATER TEMPERATURE	19
DOSING OF DETERGENT.....	19
SERVICING	20
ANNUAL SERVICING.....	20
<i>General inspection</i>	20
<i>Inspecting the cooling circuit</i>	21
EXTRA EQUIPMENT AND ACCESSORIES	22
INTERPAC.....	22
<i>Cooling circuit</i>	22
Condensation.....	22
Refrigerant quantities	22
Remember	23
<i>Mains water circuit</i>	23
Circulation circuit for water hardness < 8,4°dH	23
Circulation circuit for water hardness > 8,4°dH	23
Holding tank / water heater	23

Two or more holding tanks	24
<i>Dimensions</i>	24
<i>Electrical connection</i>	24
<i>Settings</i>	25
DELAYED START COMPRESSOR 2	26
CAPACITY REGULATOR	27
<i>Setting</i>	28
<i>Connections</i>	28
MEASURING STICK	29
<i>Installation</i>	29
PRESSOSTAT	30
<i>Setting</i>	30
Setting the high-pressure pressostat	30
Setting the low-pressure pressostat	31
SPEED REGULATOR	32
<i>Connection diagram</i>	32
<i>Farm-needs button</i>	33
<i>Connection diagram</i>	33
ELECTRIC HEATER.....	34
<i>Installation</i>	34
INSTRUCTIONS FOR RECYCLING THE TANK	36
INSTALLATION REPORT FOR MILK-COOLING TANK.....	37
INSTALLATION REPORT FOR MILK-COOLING TANK WITH SEPARATE CONDENSING UNIT	38
INSTALLATION REPORT FOR MILK-COOLING TANK.....	39
INSTALLATION REPORT FOR MILK-COOLING TANK WITH SEPARATE CONDENSING UNIT	40

Errors and omissions excepted. Products and designs are subject to change.

Safety instructions

**Please read these instructions before taking
the tank into service!**

- Unauthorized persons must not operate the equipment.
- The tank must be lifted when it is moved – it must not be pushed.
- The equipment must only be used for its intended purpose.
- Gloves and safety glasses should always be worn when working with refrigerants or when handling chemicals for tank cleaning.
- Never mix the various chemicals used for tank cleaning.
- Do not touch the condensing unit or hot cleaning pipes due to the risk of burn injury.
- The cooling and electrical installation must be carried out by a qualified expert from an authorized company.
- Check the earthing of electrical installations.
- Do not step on the base plate of the condensing unit.
- The manhole cover should be closed during cleaning. If the cover is opened during cleaning, hot water with or without detergent may spray out.
- Live parts must not be opened.
- Work on electrical equipment should only be carried out by a qualified expert.
- The tank's agitator starts automatically.
- Never work alone in the tank.
- Use a ladder for climbing into and out of the tank.
- Do not enter the tank without disconnecting the power supply to the tank.
- Use a low-voltage lamp (max 48V).
- Non-certified persons must never drill into the tank. The heat from drilling may cause harmful gas to be released from the insulation, which contains isocyanates.
- Replacement of fuses or resetting of a tripped automatic fuse must be carried out in consultation with a service engineer after the power supply has been switched off.
- The warranty does not cover equipment that has been installed incorrectly, or incorrect or careless operation.
- Responsibility is accepted only for equipment supplied by Wedholms.
- Check that all parts located outdoors are designed for outdoor use.

Safety symbols and information plates



WARNING! Risk of splashing

The manhole cover must be closed during cleaning. Do not open the hatch during cleaning. Hot water with or without detergent may spray out.



WARNING! Automatic agitation

The tank's agitator starts automatically. Disconnect the power supply when working in the tank.



WARNING! do not touch

Do not touch the condensing unit and hot cleaning pipes.



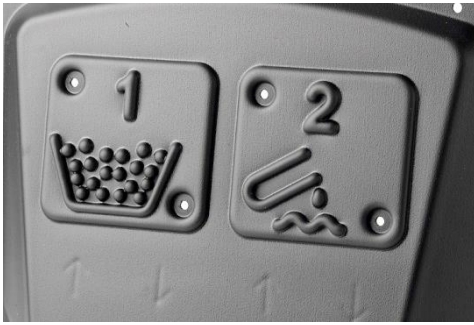
WARNING! Voltage warning

Live parts must not be opened. Work on electrical equipment must only be carried out by a qualified expert. Replacement of fuses or resetting of a tripped automatic fuse should be carried out in consultation with a service engineer and on a tank whose power supply has been switched off. Check that the earthing is OK.



Tank's centre of gravity

The tank's centre of gravity is marked on the long side of the tank. A declared weight is printed on the packaging next to the centre-of-gravity mark. The tank must not be pushed when it is standing on its legs.



Dosing of detergent

The control system, Argos, provides automatic dosing of detergent.

The left-hand level electrode (1) is for alkaline detergents, and the right-hand one (2) is for acid detergent/disinfectant.

Refrigerant information plate

An information plate is fixed to the assembled tank, indicating the type of refrigerant with which the tank is filled.

Contains fluorinated
greenhouse gases covered
by the Kyoto protocol.
Refrigerant: R134A
Please refer to the rating
plate for amount of refrigerant
changed in this unit.

Information plate for R134a

Contains fluorinated
greenhouse gases covered
by the Kyoto protocol.
Refrigerant: R448A
Please refer to the rating
plate for amount of refrigerant
changed in this unit.

Information plate for R448A

Type plate

The tank's type plate covers the entire system, i.e. the tank and the condensing unit if these are assembled together as a single unit at the factory. The type plate for assembled tanks also carries CE marking.

Wedholms			
WEDHOLMS AB			
611 29 NYKOPING SWEDEN			
TYPE	██████████	VOLUME (L)	██████████
MODEL	██████████	VOLTAGE (V)	██████████
YEAR	██████████	AMPERE (A)	██████████
SERIAL NUMBER	██████████	EFFECT (kW)	██████████
COOLING CLASS	██████████	IP CLASS	██████████
CODE	██████████		
			CE
	MAXIMUM OPERATING PRESSURE (bar)	MAXIMUM TEST PRESSURE (bar)	
LP - SIDE	██████████	LP - SIDE	██████████
HP - SIDE	██████████	HP - SIDE	██████████

TYPE:	Tank type
MODEL:	Model
YEAR:	Year of manufacture
SERIAL NUMBER:	Serial number
COOLING CLASS:	Refridgeration class
CODE:	Type of installation
MAXIMUM OPERATING PRESSURE LP-SIDE:	Relief pressure LP side
MAXIMUM OPERATING PRESSURE HP-SIDE:	Relief pressure HP side
VOLUME LITRES:	Tank volume
VOLTAGE:	Votage
AMPERE:	Ampere
EFFECT:	Motor output
IP CLASS:	Protection class
MAXIMUM TEST PRESSURE LP-SIDE:	Test pressure LP side
MAXIMUM TEST PRESSURE HP-SIDE:	Test pressure HP side

Operating instructions for farmers

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. An "assembled" tank is a self-contained system and has undergone pressure testing and leak testing, and trial operation prior to delivery. If the tank and the condensing unit are not assembled together as a single system, each component is pressure-tested 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 together with an electrical circuit diagram.

Ensure that the manuals and operating instructions are kept in a safe location in the immediate vicinity of the tank.

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.

Milk room temperature and ventilation

The tank and condensing unit should be in a well-ventilated area with a temperature not exceeding the performance value for the refrigeration class or lower than 5°C.

An excessively high or low temperature in the milk room will affect the efficiency of the tank:

- A high milk room temperature will extend the cooling time and increase the power consumption.
- A low milk room temperature may cause ice to form in the milk and extend the cooling time.
- A low milk room temperature may also cause damage to the tank's component parts, and the cooling and control systems.
-

Cooling class	Minimum milk room temperature	Performance Temperature	Safe operating temperature
A	5°	38°	43°
B	5°	32°	38°
C	5°	25°	32°

Operation and maintenance

For satisfactory milk cooling, the farmer should conduct a daily inspection of the tank by checking the control unit. Check that control and agitation function without interruption.

If necessary, clean the condenser by rinsing it clean with water. **NOTE! Disconnect the power supply beforehand!** Also check the condensing unit air inlet at regular intervals.

The owner of the milk-cooling tank is responsible for maintaining the tank. Annual servicing of all milk-cooling tanks is recommended for efficient and effective milk cooling.

Any work involving the refrigerant circuits must only be performed by certified personnel from a refrigeration company. If the events of any work involving a refrigerant circuit, the refrigerant must not be emptied directly into the environment. The necessary protective equipment should be used.

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

Preventive maintenance of Wedholm's milk cooling tanks

To ensure the function and service life and to avoid downtime of your milk cooling tank, it is important that preventive maintenance of the tank is performed in accordance with our recommendations. Some maintenance measures can be done by the milk producer himself and others by a regular service technician. As the owner of a cooling system that contains between 5 and 49,9 tonnes of CO₂ equivalents, you are legally responsible for the system being leakage tested once a year by a qualified refrigeration technician.

Action to be taken in the event of breakdown

In the event of breakdown, the following possible causes must be excluded:

- Check that the condenser is clean.
- Check that the room temperature is not below +5°C or alternatively does not exceed the performance temperature specified for the tank.
- Check that the agitator rotates freely.
- Check that the fuses in the mains distribution board of the farm have not tripped, and that the connectors are inserted so that the electric current reaches the tank and the compressor motor protection.
- Check the troubleshooting chart in the Argos manual.

If the tank does not function normally after taking these measures, request a service call.

Forced cooling

Cooling can be started and stopped manually when cooling does not function automatically, for example in the event of an electronic malfunction. This is done with the help of the timer located on the side of the contactor box. The maximum period for which the timer can be set is 60 minutes. The timer bypasses the automatic system.



Timer

**Forced cooling sends an alarm to the control unit.
Cooling and agitation will stop when the timer reaches the 0 position.**

Complaints and warranty claims

Please contact your dealer in the event of any complaint or warranty claim. An updated warranty claim report can be downloaded from Wedholms web page.

Please note that the warranty is invalid without an installation report having been completed at the time of installation.

Installation report

An installation report can be found at the end of this manual. This must be filled in at the time of the installation and sent by email to info@wedholms.se when the installation is finished.

1. For a milk-cooling tank with a condensing unit attached, the first page of the installation report should be completed at the time of installation.
2. If changes are made on a milk cooling tank with attached cooling unit both pages of the installation protocol need to be completed at the time of the change.
3. For a milk-cooling tank with a separate condensing unit, both pages should be completed at the time of installation.

The installation report is an aid to ensure that the installation is carried out in a satisfactory manner. The installation report also provides proof that the installation inspection has been carried out and that the tank is installed correctly. The warranty is invalid without a completed installation report!

The warranty does not cover equipment that has been installed incorrectly, or incorrect or careless operation. Responsibility is accepted only for equipment supplied by Wedholms.

**The installation protocol must be sent by email to
info@wedholms.se when the installation is finished!
The warranty is invalid without a completed
installation report!**

Installing the milk-cooling tank

Tank installation

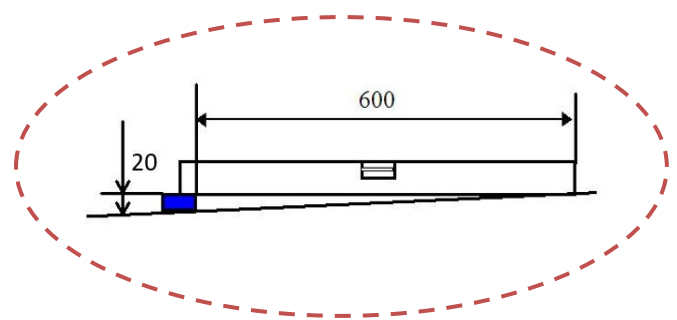
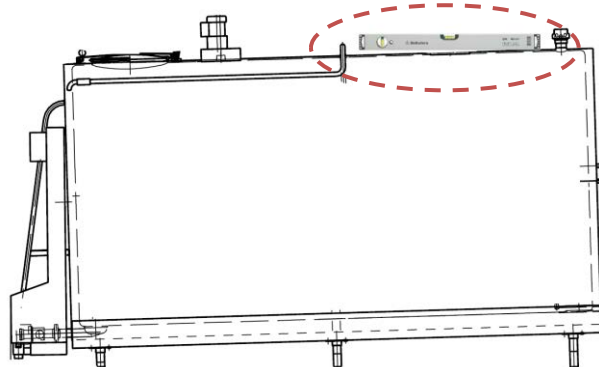
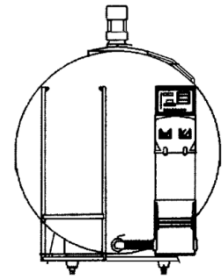
Regardless of whether the tank to be installed has a separate condensing unit or one that is attached, the following eight installation steps should be followed. Then refer to the chapter “Attached condensing unit” or “Separate condensing unit” depending on the design of the tank.

1. Position the tank in the milk room so that installation, servicing and use can take place without the tank having to be moved.
Moving the tank from the yard into the milk room should preferably be done using slings. Otherwise, the next best option is to use a fork-lift truck. Slings facilitate careful handling. Manoeuvring with a fork-lift truck requires very 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 “CG” mark at the factory.



All movement must take place by lifting. The tank must not be pushed.

2. Adjust the tank from the front, viewed horizontally from the manhole frame. Place a spirit level on the manhole frame to adjust the tank horizontally, viewed from its short side. Adjust by screwing the front legs of the tank in or out.
3. Always position the condensing unit so that there is at least 250 mm between the condenser and the wall.
4. If there is a measuring stick, see the chapter entitled “Measuring stick” in order to obtain a correct inclination, and then continue according to Point 6. If there is no measuring stick, go directly to Point 5.
5. 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 on top of the tank, directly on the body of the tank, and 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 member.



If a digital spirit level is not used, proceed as follows:

Place a 20 mm spacer under the lower part of the 600 mm long spirit level (do not use shorter spirit level than 600 mm). Adjust the feet of the tank until the spirit level indicates that it is horizontally. This is how the recommended inclination is achieved. Inclination of the tank is done in order to obtain good emptying and to ensure that cleaning functions effectively.

The tank inclination, whether with or without a condensing unit, must be 1.9° which responses 3.3% (3.3% => 33 mm per metre)

6. Check that the outlet is situated at least 100 mm from the floor.

7. Connect the hot and cold-water supply pipes to the Argos post.



8. Attach the dosing hoses to the detergent containers.

Note that the various chemicals must never be mixed!

To proceed with the installation, read the chapter *“Attached condensing unit”* or *“Separate condensing unit”* depending on the design of your tank.

Attached condensing unit

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

1. Turn on the power supply.
Wait for one hour after switching on the electricity before starting the compressors, if they have been kept at 0°C or in a colder environment. This will ensure the longest possible service life for the compressors.
2. Work through and complete the first page of the “*Installation report*” for the milk-cooling tank at the back of this manual. The installation report must be completed for the warranty to be valid.

The warranty is invalid without a completed installation report!

3. Check that the tank has an adequate supply of water by following the description in the chapter “*Regulating the water quantity*”.
4. Check the settings on the control unit.
Settings for the control unit, Argos, can be found in the accompanying separate Argos manual. 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, quantity 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. And 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 new conditions.
3. Make sure that the tank is empty and perform a complete cleaning cycle on the tank before taking it into service. This is important for two reasons:
 - To verify that the tank cleaning function is working correctly, after installation.
 - To identify and make any necessary adjustment to the settings.
4. Instruct the personnel concerned in the operation and future servicing of the tank, for example:
 - Starting cooling and cleaning.
 - Who does what? Farmer and driver.
 - Viewing and acknowledging alarms.
 - Content of the manuals.
 - Operation and maintenance of the tank.

The capacity regulator is adjusted in the factory on tanks with attached cooling units. But the capacity regulator might need to be adjusted to the local conditions for ideal function. If the milk flow, to a tank connected to a robot, is less than 65% of the tank's dimensioned capacity then the capacity regulator's activated time must be prolonged in the Argos. Please read in the Argos manual.

Separate condensing unit

When the tank is installed according to the description in the chapter “*Tank installation*” and the condensing unit is separate from the tank, the following points should be considered:

If the tank and the condensing unit are not assembled together at the factory, installation must be carried out by a certified refrigeration engineer.

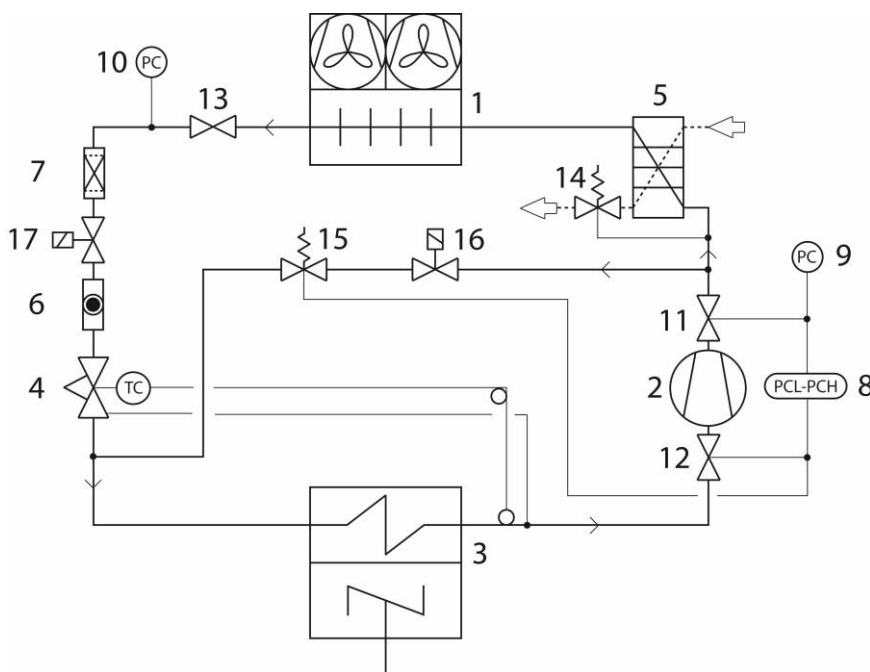
In order to guarantee the function of the milk-cooling tank, both pages of the “*Installation report*” for the milk-cooling tank must be completed after installation. The report can be found at the back of this manual.

The condensing unit must be in a well-ventilated area, and the condenser must have adequate air circulation to permit effective milk cooling. The evaporator and compressors are supplied charged with nitrogen gas, and the compressors are supplied with ester oil.

Note! Milk cooling tanks delivered with separate cooling units are filled with nitrogen gas and should have a minimum pressure of 2 bar at 0°C, at delivery. If not, please make a leakage control.

Connect the condensing unit to the suction and liquid pipes of the tank, using the same dimension of pipe as on the tank. If the height difference is more than 2,4m make sure to have oil return. Use clean pipes and a protective gas (nitrogen gas) for soldering. Oil traps must be positioned under all vertical risers. Make sure that there is a good oil return.

Cooling system flowchart



1. Condenser
2. Compressor
Piston or Scroll
3. Evaporator
4. Expansion valve
With internal or external pressure equalization depending on the type of tank and options.
5. Heat exchanger, Interpac (Option)
6. Sight glass (Option)
7. Drying filter
8. High and low-pressure pressostat
With automatic reset
9. Fan pressostat for fan No. 2
10. Speed control of fan No. 1 (Option)
11. Service valve, compressor pressure side
12. Service valve, compressor suction side
13. Service valve
14. Water regulator valve (Option)
15. Capacity regulator (Option)
16. Solenoid valve (Option)
17. Solenoid valve (Option)

Condenser

The following table shows the size of the condenser and the number of systems per condenser depending on the type of condenser.

Type of condenser (BASE)	Condenser volume litres/system	Number of systems per condenser
J	2.0	1
K	3.0	1
L	4.0	1
M	5.2	2
N	6.9	2
P	8.3	2

Electrical connection

The distribution box is connected according to the circuit diagram and the external connection supplied with the tank. All electrical installation must be carried out by a qualified expert.

Evacuation and charging of the cooling system

Recommendations for evacuation and charging of refrigerant (*must only be carried out by a qualified refrigeration engineer*):

- Check that the condensing unit's service valves are fully open.
- Connect a vacuum pump to the suction and pressure pipe of the compressor and evacuate to a pressure of less than 1 mm Hg (1.5 mbar) for 1 hour. Check that the pressure does not increase.
- Charge the system with refrigerant. Check that the suction and pressure values conform to the operating data for the cooling system of the tank concerned.
- Any adjustment to the expansion valve must be made when the temperature in the tank is lower than +8°C and the ambient temperature is above +20°C.

Scroll compressors

Reliability is not affected if the scroll compressor is run in the opposite direction of rotation, although the compressor motor protection will trip after a few minutes' operation.

If the direction of rotation is incorrect, change the position of two cables in the connection box (T1, T2, T3).

When starting a 3-phase scroll compressor for the first time, check that the direction of rotation is correct by observing that the low-pressure falls, and the high pressure rises when the compressor is started up.

Starting up a tank with a separate condensing unit

Recommendations for starting-up a tank with a separate condensing unit:

1. Turn on the power supply.
Wait for one hour after switching on the electricity before starting the compressors, if they have been kept at 0°C or in a colder environment. This will protect the compressors and increase their service life.
2. High and low-pressure pressostats are not pre-set at the factory. For setting, see the chapter *“Pressostats”*.
3. The capacity regulator cannot be completely preinstalled at the factory and needs to be adjusted at the farm. For further information please look at the *“Capacity regulator”* chapter.
4. Check the direction of rotation of the fans (the air flow should be directed towards the compressor).
5. Adjust the overheating (*“superheat”*), with a minimum measurement of 8K at the service valve on the compressor.
6. After a minimum of 2 hours, check that the oil level lies between 1/4 and up to 3/4 on the sight glass of the compressor.
7. Check the cooling circuits for leaks after starting up.
8. Check that the tank has an adequate supply of water by following the description in the chapter *“Regulating the water quantity”*.
9. Check the settings on the control unit.
Settings for the control unit, Argos, can be found in the accompanying separate Argos manual. 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, quantity 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. And 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 new conditions.
10. Make sure that the tank is empty and perform a complete cleaning cycle on the tank before taking it into service. This is important for two reasons:
 - To verify that the tank cleaning function is working correctly, after installation.
 - To identify and make any necessary adjustment to the settings.
11. Complete both pages of the installation report at the back of this manual. The installation report must be completed for the warranty to be valid.
12. Instruct the personnel concerned in the operation and future servicing of the tank, for example:
 - Starting cooling and cleaning.
 - Who does what? Farmer and driver?
 - Viewing and acknowledging alarms.
 - Content of the manuals.
 - Operation and maintenance of the tank.

Robot tanks:

The capacity regulator must be adjusted at installation if the amount of milk is a lot less than the tank is dimensioned for. Also adjust the Argos' settings according to the new conditions.

Regulating the water quantity

Setting the cleaning function

Read the chapter “5 – Cleaning” in the instruction manual for the Argos to find the settings to be made in Argos.

Regulating the water quantity

The quantity of water taken in by the tank during cleaning is adjusted using a levelling screw on the side of the Argos post. The screw raises or lowers a glass gauge inside the Argos post. Located inside the glass gauge is a float, which transmits a signal to Argos once the water has reached the set height.



See the table below for recommended water quantities for tanks of different sizes.

Size	1600-2500	3200-5000	6000-8000	9000-12000	14000-18000	20000-30000
Litres	40	55	80	95	110	130

Checking the water quantity

It is difficult to judge what a particular height on the glass gauge means in terms of the volume of water inside the tank, and instructions on how to measure this are given below:

1. Measure 10 litres of water into a bucket using a measuring jug and mark this position with a marker pen (many buckets already have quantities marked inside them).
2. Remove the panel on the front of Argos to gain access to the hoses.
3. Take out the water hoses which pass down into the water tank, and place these in the bucket.
4. Go to menu 9 – Test/Testing, “Relays” in Argos. Highlight H. water valve and press change. When this is done the hot water valve will open. Measure the time it will take for the water to reach the mark done in step 1. To close the water valve; press change again or move to another component.
5. Place the hoses back in the water tank.
6. Go to menu 5, start the cleaning process and measure the time for which the water valve is open.
7. NOTE. The level monitor is not used in phases 1 and 8, hot water is used in phases 3 and 4, and both hot and cold water are used in phases 2 and 5. Therefore, only the time in phases 3 and 4 should be measured. See the description in the chapter “Menu 5 - Cleaning” in the Argos manual of how to go directly to the desired phase.
8. The quantity of water to which the levelling screw corresponds can be calculated with the help of the measured times.

Example: In point 4, the measurement showed that 10 litres were filled in 24 seconds. In point 6, the time for filling with water was measured at 144 seconds. This gives a quantity of water of 60 litres ($=10 \times 144/24$).

The above measurements can 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 measurement in point 6 must take place in phases 6 or 7.

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 not fall 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 smaller quantity 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 performance. Check that an enough quantity of hot water in relation to the size of the tank is available for all phases in which hot water is used.

Also remember to check the temperature of the hot water immediately adjacent to the tank, as any long pipe runs 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 and rubber components.

Dosing of detergent

Because the strength of detergent can vary widely, it is important to use a detergent with appropriate strength and to dilute it according to the recommendations. Excessively strong detergent can damage parts of the tank. The strength of the detergent should normally lie between 0.4 and 0.6%, i.e. the detergent that is used must be intended for dosing at a concentration of between 0.4 dl detergent and 0.6 dl detergent per 10 litres of water. Stronger detergents than those intended to be diluted at a ratio of 0.3% (0.3 dl detergent / 10 litres of water) must not be used.

Detergents containing strong acids, nitric acid, should be used with caution. High concentrations of strong acids increase the wear of tubes and such, which will decrease its durability.

Servicing

Annual servicing

Annual servicing is recommended for all tanks in order to maintain good and effective milk cooling. Leakage detection of the cooling system carried out by a refrigeration company is also a statutory requirement for milk-cooling tanks with a refrigerant charge of more than 3 kg. The owner of the tank is responsible for ensuring that servicing is carried out on the tank.

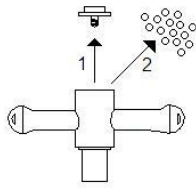
A qualified refrigeration engineer must adhere to the applicable legislation in respect of the servicing of tanks, for which the following are recommendations. The recommendations may therefore differ from the servicing carried out by the refrigeration company.

General inspection

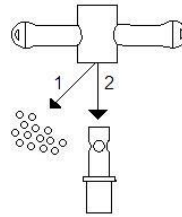
The following points should be checked (this does not have to be done by a certified refrigeration engineer).

- Check all seals and replace if necessary.
- Replace the dosing pump hoses once a year.
After replacing the dosing pump hoses, check their function to ensure that they pump enough detergent around during cleaning.
- Check all the water intake filters and clean them.
- Check the regulation of the quantity of water according to the chapter *“Regulating the water quantity”*
- Check that the oil level in the compressor is OK.
- Check that the condenser has been cleaned. If necessary, clean the condenser by rinsing it clean with water. **NOTE. Disconnect the power supply beforehand!**
- Check that the inside of the tank is clean.
- If the tank is equipped with a GSM module, replace the battery every three years.
- Check that any extra equipment and accessories are correctly adjusted; see the chapter *“Extra equipment and accessories”*.
- When using a powder detergent or if there is a risk of water being mixed with sand on the farm, annual servicing of the spray head is recommended in order to maintain optimal cleaning function. See the following instruction for inspecting the spray head. Handle the small Delrin balls with care.

Dismantling the spray head

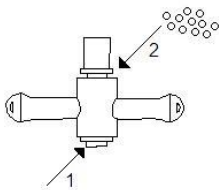


1. Unscrew the end bearing using an adjustable spanner.
2. Empty out the 16 plastic balls.
3. Clean.

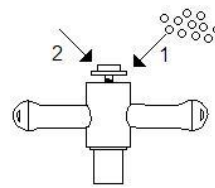


4. Take apart the cleaning apparatus.
5. Empty the 16 plastic balls.
6. Clean.

Assembling the spray head



1. Secure the end bearing in the threads for a few turns.
2. Insert the 16 plastic balls.



3. Turn the apparatus over and insert the 16 plastic balls.
4. Tighten the end bearing using an adjustable spanner.

Inspecting the cooling circuit

Inspection of the cooling circuit should be carried out by a certified refrigeration engineer.

Under EU regulations, leakage detection is required to be carried out at least once a year on a milk-cooling tank with a total charge of more than 3.0 kg of refrigerant. However, the recommendation is that all milk-cooling tanks should undergo an annual leakage inspection.

Checking for any leakage includes:

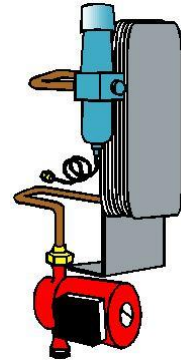
- Leakage detection of the refrigerant system: compressors, condensers, evaporator, heat exchanger, expansion valves, shut-off valves, pressure safety relief/limiting equipment, pipes, fittings, flange band and rigid connections.
- Oil leakage: checking of compressors, screwed joints/rigid connections, condensers, 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.
- Operating data for the equipment. Pressure, temperature and current.

Extra equipment and accessories

Interpac

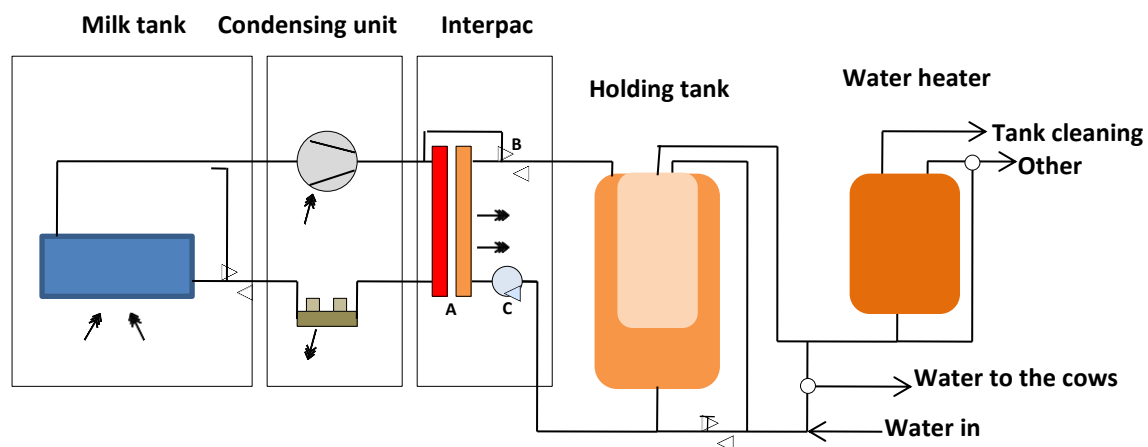
Interpac is a compact heat recovery unit for heating water. The Interpac is connected to a cooling circuit on the condensing unit. The resulting hot water is collected in one or more holding tanks. Approximately 0,7-1 litre of water at a temperature of 40-45°C can be produced from each litre of milk cooled from 35°C to 4°C. Note that there is a limit to how much recovered heat can be obtained without influencing the performance of the condensing unit, i.e. the cooling capacity of the tank.

Note that the Interpac does not withstand temperatures below 0°C, when the water freezes.



Cooling circuit

The milk is filled into the milk-cooling tank at a temperature of 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 condenser. Hot gas from the compressor is led through the heat exchanger (A). Water from the holding 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 regulator valve (B).



Condensation

The Interpac must be installed in series with the condenser, directly after the compressor, where it recovers energy from the system. The refrigerant condenses partially in the heat exchanger. The heat exchanger must therefore be installed vertically so that the condensed refrigerant can drain out from the exchanger. The flow of water must be in the opposite direction (from the bottom upwards). The Interpac will not be damaged if it is run with only refrigerant in those cases in which the circulation circuit for the water is not assembled or if it is turned off.

The flow of water through the Interpac is regulated by the regulating valve, which is controlled by the condensation pressure.

When the water is cold, the flow of water is reduced so that the desired condensation pressure is maintained. The valve is opened gradually as the water heats up.

Refrigerant quantities

The internal volume of the Interpac is so small that the quantity of refrigerant does not need to be increased once it has been installed in a cooling system.

Remember

If cooling equipment other than Wedholms is used, the following points must be taken into consideration. The cooling system must be equipped with a thermostatic expansion valve. An expansion valve adjusts the various operating conditions better than a capillary tube:

- Cold/warm milk
- Cold/warm ambient temperature
- Cold/hot water in the heat recovery unit

Mains water circuit

Note. When the water hardness >8.4°dH the Interpac should be used with a separate heat exchanger in the water heater.

Circulation circuit for water hardness < 8,4°dH

The circulation pump is positioned horizontally so that the flow of water is vertical (from the bottom upwards). The suction side of the pump is connected to the bottom of the holding tank, where the cold-water supply for the system is also located (T-piece).

The hot water passes from the pressure regulating valve to the top of the holding tank.

Circulation circuit for water hardness > 8,4°dH

The circulation pump is positioned horizontally so that the flow of water is vertical (from the bottom upwards). The suction side of the pump is connected to the outlet on the heat exchanger connected to the holding tank. The hot water passes from the pressure regulating valve to the top of the holding tank. Please contact a professional water serviceman if problems with scale that clog the plumbing occur.

Holding tank / water heater

The temperature in the holding tank can vary depending on variations in the quantity of milk and the quantity of hot water used. A water heater is installed if the purpose for which the water will be used calls for a higher temperature than can be produced from the condensing unit with the help of the Interpac.

Recommended sizes of the holding tank and water heater (for 4 milking's), for one circuit and conventional milking:

Tank size [litres]	Holding tank (1 milking) [litres]	Hot water needs per 70° tank clean [litres]
1600	200-300	100
2000	300-400	120
2500	300-500	140
3200	300-600	150
4000	300-800	170
5000	300-1000	190
6000	500-1200	220
7000	500-1500	250
8000	500-1800	290
9000	500-2000	290
10000	600-2200	310
12000	600-2500	340
16000	600-3000	370

With a smaller holding tank, the water passes through the Interpac several times, which results in the water having a higher temperature than when the holding tank is larger, and the water does not pass through the Interpac as many times.

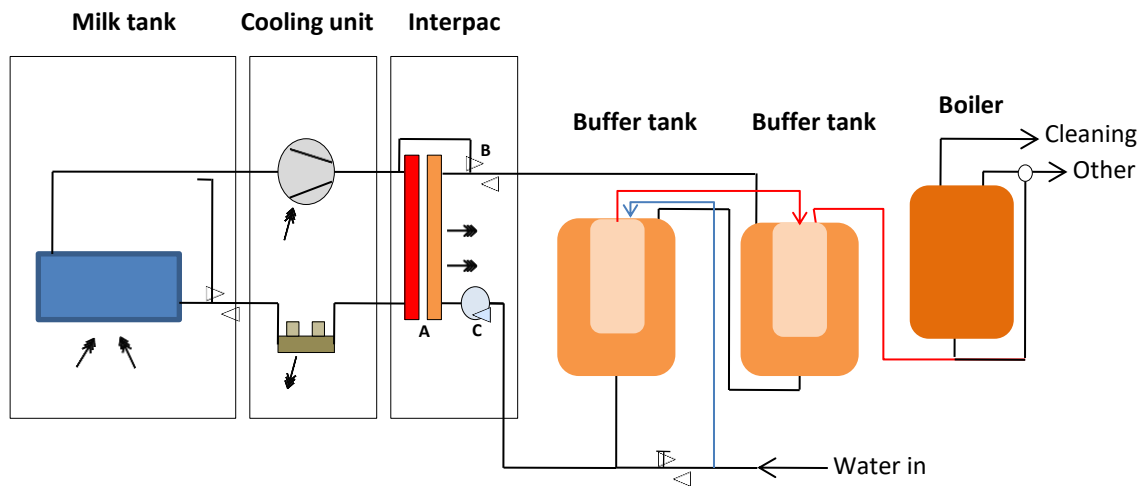
Only 65-70% of the warm water can be used, after that is the warm water from the holding tank mixed with cold water.

A smaller holding tank can be used because heat recovery in robot milking is more continuous and, at the same time, with a smaller quantity of milk than in conventional milking. The size of the holding tank should correspond to approximately 3 hours' milking:

Number of robots	Holding tank [litres]
1	200-300
2	300-600
3	600-900

Two or more holding tanks

When several holding tanks are used, these must be connected in series. See the general sketch below.



Dimensions

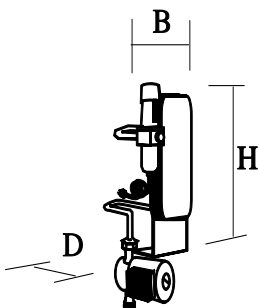
Internal volume, gas side: 0.65 litres.

Test pressure, max: 50 bar

Temperature, max: +225°C

Min: - 195°C

Thermal load, max: 30.0 kW



H = 400 mm

B = 190 mm

D (14 plates) = 170 mm

D (20 plates) = 184 mm

D (40 plates) = 225 mm

Electrical connection

Electrical connection, pump 1 x 230 V, 50 Hz.

The pump should be running when the compressor in the cooling circuit is in operation. See separate connection diagram for connection details.

Settings

The pressure-controlled regulator valve is marked with the numbers 1 to 5.

- 3 on the adjusting screw scale is equivalent to approx. 45°C with refrigerant HFC 404A.
- 3 on the adjusting screw scale is equivalent to approx. 40°C with refrigerant HFC 134a.

Complete condensation must not take place in the heat exchanger without a refrigerant receiver.

During installation, check and record the value set for the flow adjustment of the Interpac in the installation report.

Delayed start compressor 2

Argos has two separate output signals for switching on the compressors. One of these can be delayed, see the Argos manual for details of a later first start of compressors 2 or 3 and 4.

This function is an option that can be ordered when purchasing the tank or it can be installed at a later date. If purchased subsequently, the contactor box must be upgraded. A separate control cable is supplied with the order.

For details of the electrical installation, see the separate connection diagram.

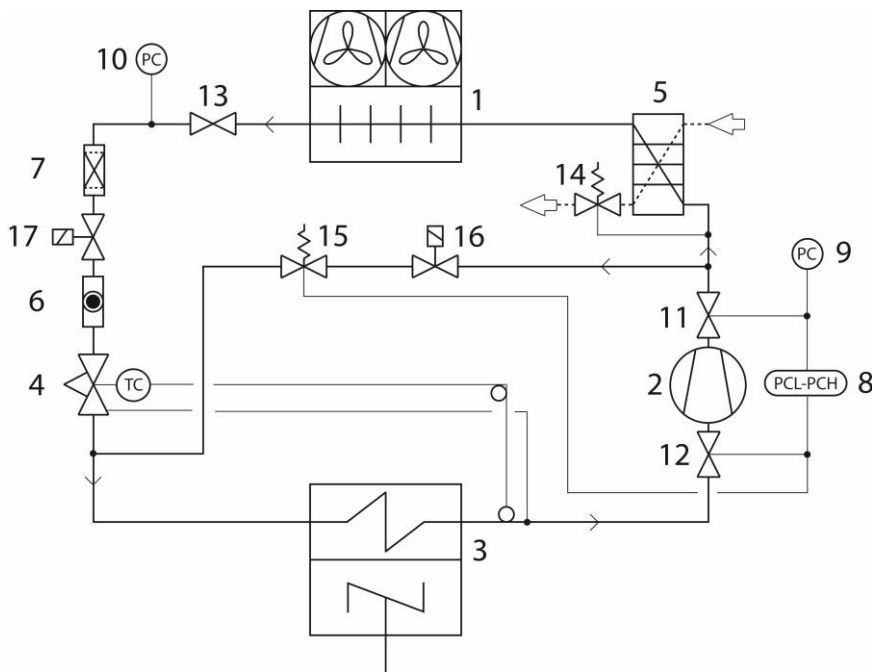
Capacity regulator

If the quantity of milk is small relative to the size of the tank over quite a long period, there is a risk of ice forming as large parts of the evaporator surfaces are exposed. The capacity regulator is used in these cases in order to adapt the cooling capacity to the current evaporation load.



The regulator senses the evaporation pressure via a pressure transducer. When the evaporation pressure falls below the value set by the regulator, the valve opens and admits hot gas (from the high-pressure side) into the evaporator. The hot gas is injected via a liquid-gas mixer that is soldered in place between the thermostatic expansion valve and the evaporator (or distributor, if present). This causes the evaporator to work at an "artificial" loading with a higher evaporation pressure.

A solenoid valve can also be connected to the capacity regulator. This is controlled by Argos so that the capacity regulator only functions for a certain period. When soldering in the vicinity of the capacity regulator, it must be protected by winding a wet rag around the valve during soldering.



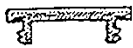
1. Condenser
2. Compressor
Piston or Scroll
3. Evaporator
4. Expansion valve
With internal or external pressure equalization depending on the type of tank and options.
5. Heat exchanger, Interpac (Option)
6. Sight glass (Option)
7. Drying filter
8. High and low-pressure pressostat
With automatic reset
9. Fan pressostat for fan No. 2
10. Speed control of fan No. 1 (Option)
11. Service valve, compressor pressure side
12. Service valve, compressor suction side
13. Service valve
14. Water regulator valve (Option)
15. Capacity regulator (Option)
16. Solenoid valve (Option)
17. Solenoid valve (Option)

The capacity regulator at a robot tank must be adjusted during installation if the amount of milk in the tank is less than 65%. Change also the settings in Argos according to the Argos manual.

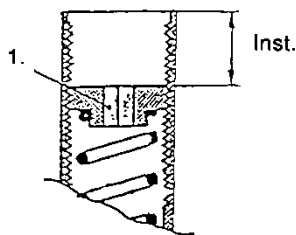
Setting

The capacity regulator can be set at any time during cooling when the solenoid valve (No. 16) is actuated.

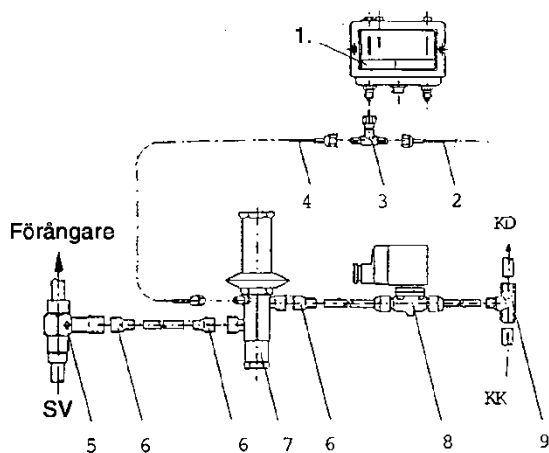
1. Remove the cover from the capacity regulator (No. 15) and place an 8 mm Allen key on the adjusting screw.
2. Attach a manometer to the compressor service valve (No. 12) on the suction side. Open the valve so that the suction pressure can be read off.
3. Close the condenser outlet valve (No. 13) fully so that the flow of liquid to the expansion valve ceases. The pressure, which is displayed on the manometer, will fall, but will then stabilize for a few seconds before continuing to fall. Open the outlet valve (No. 13) again.
4. The temperature that corresponded to the temporarily stabilized pressure must lie between -3°C and -5°C . If the pressure was higher, adjust the screw on the capacity regulator (15) upwards and repeat step 3. If the pressure was lower, screw down the capacity regulator and then repeat step 3.
5. Close the service valve (No. 12), open the condenser outlet valve (No. 13) fully and disconnect the suction pressure manometer.



The standard setting when using refrigerant R134a is 11 mm (setting =11 mm).



Connections



Position

- | | | | |
|---|------------------|---|---------------------------|
| 1 | LP pressostat | 6 | Reduction 1/2" - 3/8" |
| 2 | Capillary tube | 7 | Capacity regulator |
| 3 | T-piece | 8 | Solenoid valve EVRG 3/8" |
| 4 | Capillary tube | 9 | T-piece 1/2 x 1/2" x 3/8" |
| 5 | Liquid-gas mixer | | |

Measuring stick

The measuring stick is an accessory that can be ordered if the farmer himself needs to be able to check the quantity of milk in the tank. The depth indicated on the measuring stick gives an indication of the volume, with the help of the calibration table. A milk-cooling tank can be individually calibrated at the factory, although general tables are also available for each size of tank. Contact your dealer if you do not have a general calibration table for the measuring stick.

Installation

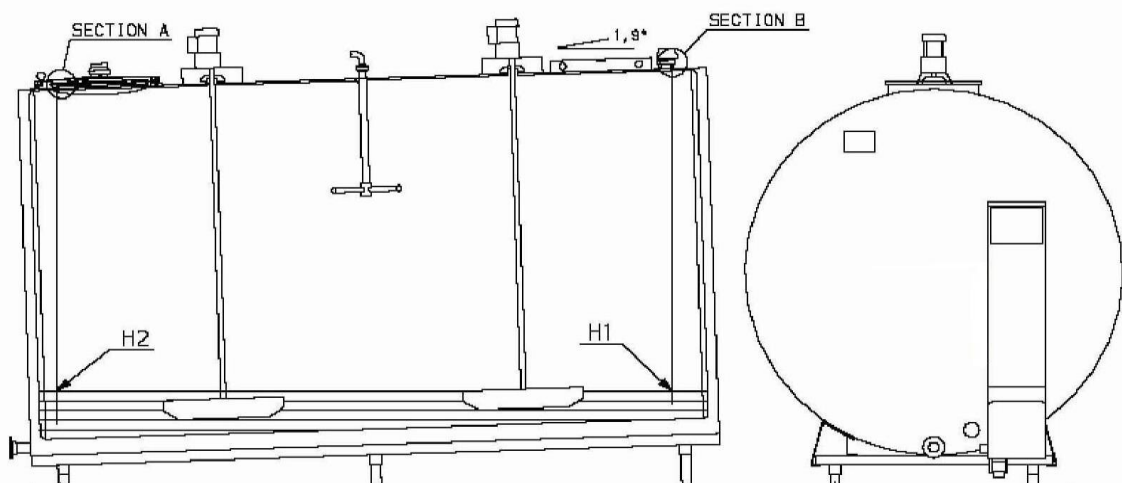
The tank must be positioned on a stable base for installation and use.
Set the level of the tank as follows:

Along the short side

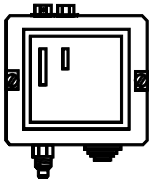
1. Adjust the tank from the front, viewed horizontally from the manhole frame.
Place a spirit level on the manhole frame to adjust the tank horizontally, viewed from its short side.
2. Adjust the level using the front feet.

Along the long side

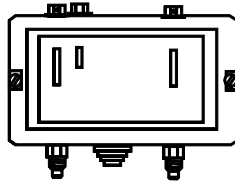
1. Pour in enough water to allow the measuring stick to be dipped at the back. Wait until the water has stabilized.
2. Wipe the measuring stick, dip it into the water by suspending it securely at the mark A. Read off the number (H2).
3. Repeat the procedure at the mark B (H1).
4. The tank is level if the difference between H1 and H2 is the same as the setting dimension ($H2 - H1 = X$ mm) indicated in the calibration table.
If this result is not achieved, adjust the rear feet.
5. Check the level one month after installation, and then once a year.



Pressostat



Fan pressostat



Low and high-pressure pressostat

A **high-pressure pressostat** is used to prevent excessively high pressure in the cooling system, for example because of a closed valve or poor ventilation of the condenser, and in connection with pressure control of the condenser fan.

A **low-pressure pressostat** is used partly to prevent excessively low pressure in the cooling system, for example because of a blockage in the liquid pipe or an insufficient quantity of refrigerant and stopping the compressor for pump down.

Setting

Setting the high-pressure pressostat

Set “Stop” and “Difference” according to the following table depending on what refrigerant is being used.

As protection

		134a	448A
Stop	[bar (e)]	18.0	25.0
Difference	[bar (e)]	3.0	3.0
Start	[bar (e)]	15.0	22.0

(e) = overpressure

Fan control

		134a Fan No. 2	448A Fan No. 2
Stop	[bar (e)]	9.5	17.5
Difference	[bar (e)]	3.0	3.5
Start	[bar (e)]	12.5	21.0

(e) = overpressure

Setting the low-pressure pressostat

Set “Start” and “Difference” according to the following table depending on what refrigerant is being used.

As protection

		134a	448A
Start	[bar (e)]	0.7	2.5
Difference	[bar (e)]	0.5	0.5
Stop	[bar (e)]	0.2	2.0

(e) = overpressure

For pump down

		134a	448A
Start	[bar (e)]	1.2	3.5
Difference	[bar (e)]	1.0	1.5
Stop	[bar (e)]	0.2	2.0

(e) = overpressure

Speed regulator

As an option for fan control, a pressure-controlled speed regulator can be installed after the condenser. This is controlled by the condensation pressure and regulates the speed of the fan to between 30 % and 90 % of its maximum speed. At 30 % the speed regulator will stop, and the fan is turned off.

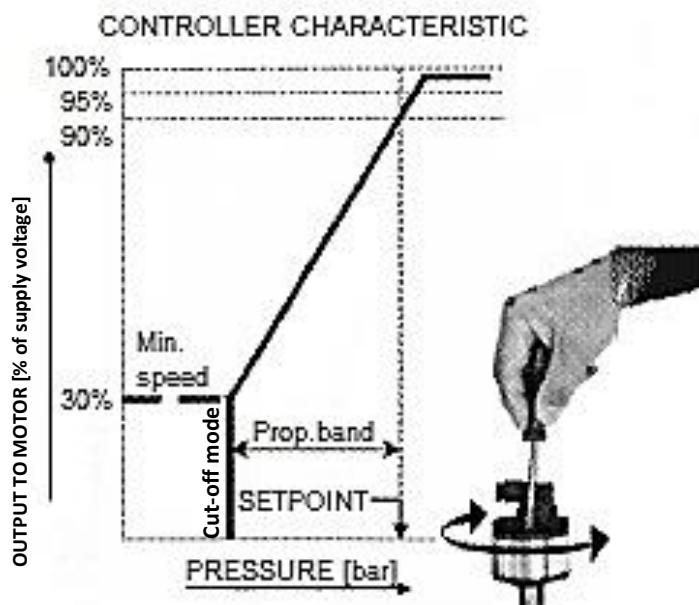
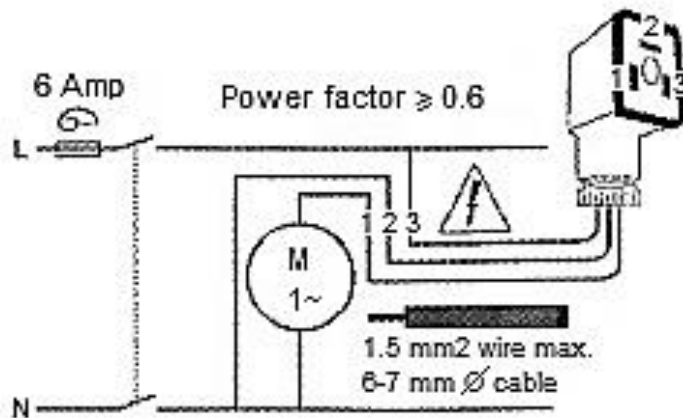


Wedholms uses the speed regulator; P215Px:

- Type **P215Px** has a working range of 10 – 25 bar. P215Px is pre-set to 9 bar. Adjustment can be affected by turning the adjusting screw clockwise. One turn corresponds to +2,5 bar.

For the electrical installation of the speed regulator, see the separate connection diagram.

Connection diagram



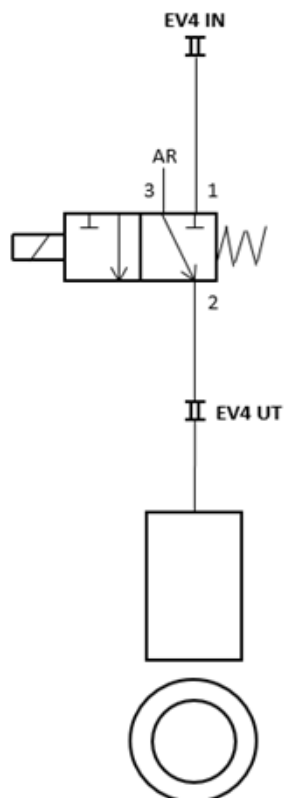
Range (bar)	360°
10 to 25	~2.5 bar

Farm-needs button

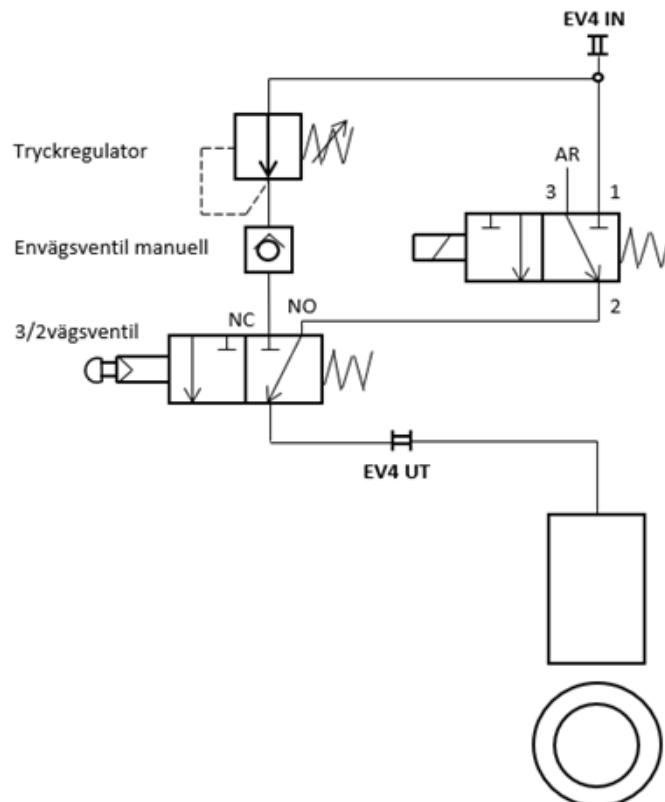
During robot milking, a farm-needs button can be installed to permit a small quantity of milk to be drawn off for farm needs. The pneumatically actuated valve can be regulated with the help of the button so that only a little milk can be drawn off. This farm-needs button function is an option that can either be ordered when the tank is purchased, or it can be installed at a later date.

Connection diagram

Without home consumption button:



With home consumption button:



Electric heater



A Wedholms heater is available as an option for farms where there is a risk that the hot water supply is insufficient. The heater is connected into the cleaning system and heats the water when it flows through the heater during the cleaning process. If the heater will be ordered when purchasing a new tank it will be pre-installed when purchasing. Installation of the heater can be requested when ordering and purchasing a new tank, or the heater can be purchased separately for fitting at a later date.

The heater is only active in cleaning phase 4. This phase runs until the desired temperature set into the control unit Argos is reached (not the electrical heater) **or** the set maximal waiting time has been passed. Note! The knob on the heater should be set at 75° - 80° C.

The heating element is installed in a stainless-steel container that is installed in the pressure pipe of the cleaning pump. The electrical heater is supplied with a built-in thermostat and an overheating protection.

If the heater will not be taken in use within two weeks, **it's strongly recommended** to store the heater indoors with a relative humidity below 50% until the installation. If the heater has been stored in higher humidity for a longer period, the warranty may expire. After installation it's not affected regarding temperature or humidity.

Note! When the heater has been in operation for a while and you for some reason take the tank out of operation, you should always empty it on water. Use the drain plug located on the bottom of the heater. See picture above. After the drainage, **it's strongly recommended** to store the heater indoors with a relative humidity below 50%.

Technical data

Voltage	400V	400V	230V, 3 phase 50 HZ
Power	10 kW	7.5 kW	7.5 kW
Current	14.5 A	10.8 A	18.8 A
Fuse	16A	13A	20A
Max temperature	85°C	85°C	85°C
Enclosure class	IP44	IP44	IP44

Water quality

In localities with hard water (water rich in lime), so-called boiler scale builds 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 a higher temperature.

In heating systems, boiler scale adheres to heating elements and acts as an insulator, which increases the surface temperature of the heating element. The service life of the heating element decreases at a higher temperature, and the risk of short-circuiting, spark-over or leakage increases.

In order to avoid problems caused by boiler scale, inspection and any necessary descaling of the heating element should be carried out at regular intervals when the heater is installed in locations with so-called hard water (>14°dH). High chlorine content in the water can cause damage to the stainless-steel heating element.

Installation

The equipment must be installed horizontally with the connections facing upwards. The heating element must only be turned on during a filled liquid phase and when the cleaning pump is functioning.

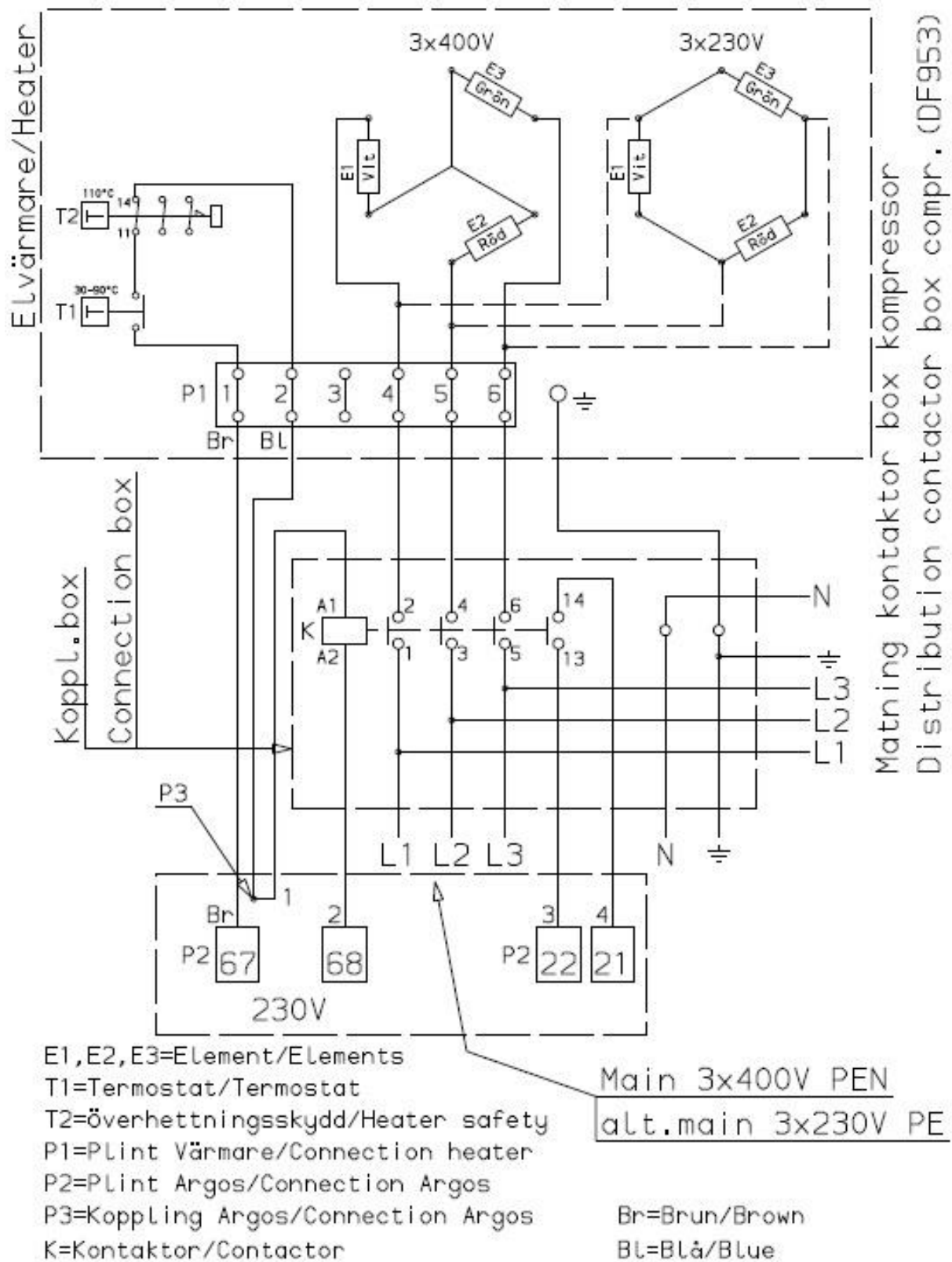
See the next page for details regarding connecting a heater to the Argos control unit.

See the Argos manual for details regarding the programming of parameters for a heater in Argos.

All electrical installation must be carried out by a qualified electrical contractor.

Circuit diagram

Circuit diagram for electric heater and Argos.



Instructions for recycling the tank

The following should be considered if the milk-cooling tank is scrapped:

Cooling system

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

Electrical system

The electrical connections are executed with PVC-insulated copper wires. Retrieve the circuit boards that are contained in the control system, Argos, and recycle these according to the applicable rules.

Tank body

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

The tank is insulated with water-blown polyurethane foam containing CO₂ gas. Heating causes isocyanates to be produced. Harmful gas can be formed in the presence of high heat, for example during drilling. Make sure that there is good ventilation.

Note that the electrical cable to the tank's agitator is moulded into the tank insulation.

Installation report for milk-cooling tank with integrated condensing unit

Must be completed at all tank installations and sent by email to info@wedholms.se when the installation is finished. Required for valid warranty!

INSPECTION OF COOLING AND ELECTRICAL

Customer:		
Tank type:	Volume:	Serial number:

FUNCTION TEST

	OK	COMMENTS
Compressors		
Pipework		
Cleaning pump		
Heater		

CLEANING

Inclination, at least 3.3% (1.9°)		%
Water quantity in resp. phase		litres
Detergent dose per cleaning cycle		dl
Hot water temperature to the tank		°C

OK COMMENTS

Test cleaning		
---------------	--	--

ELECTRICAL

	OK	COMMENTS
Correctly adjusted motor protection		
Correct fuse		

ARGOS

	OK	COMMENTS
Checking of settings		

HEAT RECOVERY

Setting of regulating screw		Turns
-----------------------------	--	-------

OK COMMENTS

Function test		
---------------	--	--

DOCUMENTATION

	OK	COMMENTS
Argos instructions		
Installation manual		
Electrical diagram		
Instructions Driver/Farmer		

INFORMATION TO CUSTOMER

	OK	COMMENTS
General information		
Security		
Maintenance		

Place:	Date:
Installer:	Signature:

Installation report for milk-cooling tank with separate condensing unit

Must be completed at all tank installations and sent by email to info@wedholms.se when the installation is finished. Required for valid warranty!

INSPECTION OF TANK

Customer:					
Tank type:		Volume:		Serial number:	

COMPRESSOR 1

Model:		Serial No.:		Model:		Serial No.:	
Refrigerant	R:		Kg	Refrigerant	R:		Kg

HP cut-off		Bar	HP cut-off		Bar
LP cut-off		Bar	LP cut-off		Bar

COMPRESSOR 2

Model:		Serial No.:		Model:		Serial No.:	
Refrigerant	R:		Kg	Refrigerant	R:		Kg

HP cut-off		Bar	HP cut-off		Bar
LP cut-off		Bar	LP cut-off		Bar

COMPRESSOR 3

Model:		Serial No.:		Model:		Serial No.:	
Refrigerant	R:		Kg	Refrigerant	R:		Kg

HP cut-off		Bar	HP cut-off		Bar
LP cut-off		Bar	LP cut-off		Bar

COMPRESSOR 4

Model:		Serial No.:		Model:		Serial No.:	
Refrigerant	R:		Kg	Refrigerant	R:		Kg

HP cut-off		Bar	HP cut-off		Bar
LP cut-off		Bar	LP cut-off		Bar

Fill the tank with water to at least 15% of its volume. Then start the cooling and complete the table below at two different water temperatures. Temp 1 should be above 20°C, and Temp 2 should be below 7°C.

TEMP 1:

	°C
--	----

TEMP 2:

	°C
--	----

EVAPORATOR 1

Temp1 Temp2

Evaporation pressure			Bar
Superheating			K

EVAPORATOR 2

Temp1 Temp2

Evaporation pressure			Bar
superheating			K

EVAPORATOR 3

Temp1 Temp2

Evaporation pressure			Bar
Superheating			K

EVAPORATOR 4

Temp1 Temp2

Evaporation pressure			Bar
Superheating			K

CONDENSER 1

Temp1 Temp2

Temp in			°C
Condensation pressure			Bar
Supercooling (guide = 10 K)			K

CONDENSER 2

Temp1 Temp2

Temp in			°C
Condensation pressure			Bar
Supercooling (guide = 10K)			K

HEAT EXCHANGER 1

Temp1 Temp2

Evaporation pressure			Bar
Superheating			°C

HEAT EXCHANGER 2

Temp1 Temp2

Evaporation pressure			Bar
Superheating			°C

OTHER

OK

COMMENTS

Installation of expansion valves		
Vacuum test/Pressure testing/Leak detection		
Setting of capacity regulator		

ELECTRICAL

OK

COMMENTS

Tank connected according to the accompanying electrical diagram		
---	--	--

Place:	Date:
Installer:	Signature:

Installation report for milk-cooling tank with integrated condensing unit

Must be completed at all tank installations and sent by email to info@wedholms.se when the installation is finished. Required for valid warranty!

INSPECTION OF COOLING AND ELECTRICAL

Customer:		
Tank type:	Volume:	Serial number:

FUNCTION TEST	OK	COMMENTS
---------------	----	----------

Compressors		
Pipework		
Cleaning pump		
Heater		

CLEANING

Inclination, at least 3.3% (1.9°)		%
Water quantity in resp. phase		litres
Detergent dose per cleaning cycle		dl
Hot water temperature to the tank		°C

	OK	COMMENTS
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Test cleaning		
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ELECTRICAL	OK	COMMENTS
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Correctly adjusted motor protection		
Correct fuse		

ARGOS	OK	COMMENTS
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Checking of settings		
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HEAT RECOVERY

Setting of regulating screw		Turns
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	OK	COMMENTS
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Function test		
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DOCUMENTATION	OK	COMMENTS
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Argos instructions		
Installation manual		
Electrical diagram		
Instructions Driver/Farmer		

INFORMATION TO CUSTOMER	OK	COMMENTS
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General information		
Security		
Maintenance		

Place:	Date:
Customer:	Signature:

Installation report for milk-cooling tank with separate condensing unit

Must be completed at all tank installations and sent by email to info@wedholms.se when the installation is finished. Required for valid warranty!

INSPECTION OF TANK

Customer:			
Tank type:		Volume:	
Serial number:			

COMPRESSOR 1

Model:		Serial No.:	
Refrigerant	R:		Kg

COMPRESSOR 2

Model:		Serial No.:	
Refrigerant	R:		Kg

HP cut-off		Bar	HP cut-off		Bar
LP cut-off		Bar	LP cut-off		Bar

COMPRESSOR 3

Model:		Serial No.:	
Refrigerant	R:		Kg

COMPRESSOR 4

Model:		Serial No.:	
Refrigerant	R:		Kg

HP cut-off		Bar	HP cut-off		Bar
LP cut-off		Bar	LP cut-off		Bar

Fill the tank with water to at least 15% of its volume. Then start the cooling and complete the table below at two different water temperatures. Temp 1 should be above 20°C, and Temp 2 should be below 7°C.

TEMP 1:

	°C
--	----

TEMP 2:

	°C
--	----

EVAPORATOR 1

Temp1 Temp2

Evaporation pressure			Bar	Evaporation pressure			Bar
Superheating			K	superheating			K

EVAPORATOR 2

Temp1 Temp2

EVAPORATOR 3

Temp1 Temp2

Evaporation pressure			Bar	Evaporation pressure			Bar
Superheating			K	Superheating			K

EVAPORATOR 4

Temp1 Temp2

CONDENSER 1

Temp1 Temp2

Temp in			°C	Temp in			°C
Condensation pressure			Bar	Condensation pressure			Bar
Supercooling (guide = 10 K)			K	Supercooling (guide = 10K)			K

CONDENSER 2

Temp1 Temp2

HEAT EXCHANGER 1

Temp1 Temp2

Evaporation pressure			Bar	Evaporation pressure			Bar
Superheating			°C	Superheating			°C

HEAT EXCHANGER 2

Temp1 Temp2

OTHER

OK

COMMENTS

Installation of expansion valves		
Vacuum test/Pressure testing/Leak detection		
Setting of capacity regulator		

ELECTRICAL

OK

COMMENTS

Tank connected according to the accompanying electrical diagram		
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Place:	Date:
Installer:	Signature:

Wedholms

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