Installation manual
Milk cooling tanks

General part – 160251

Installation manual: General part

About this manual

Introduction

The company PACKO INOX N.V. thanks you for choosing one of its products. It hopes it may also count you as one of its satisfied customers. That is why it does everything possible to inform and be of service to you as well as possible.

Use of the icons

A number of icons are used in this manual, to draw your attention to, for example, safety information. The table below provides an overview of the icons used and what they mean:

Icon	Meaning	Description
	Remark	A remark provides additional information about a certain topic. The information in a remark is not invaluable, but can be useful.
	Attention!	If you do not follow the directions precisely, then: • The system can be damaged (in this case, damage is not covered by the warranty) • The quality of the milk can be affected.
	Warning!	A warning draws your attention to a possible danger or risk of personal injury.

Procedures

The procedures in this manual have been divided into numbered steps. The steps should be carried out in the order described.

Changes

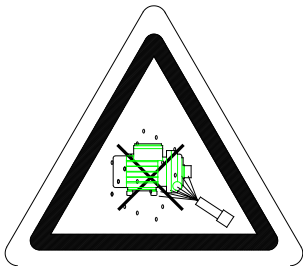
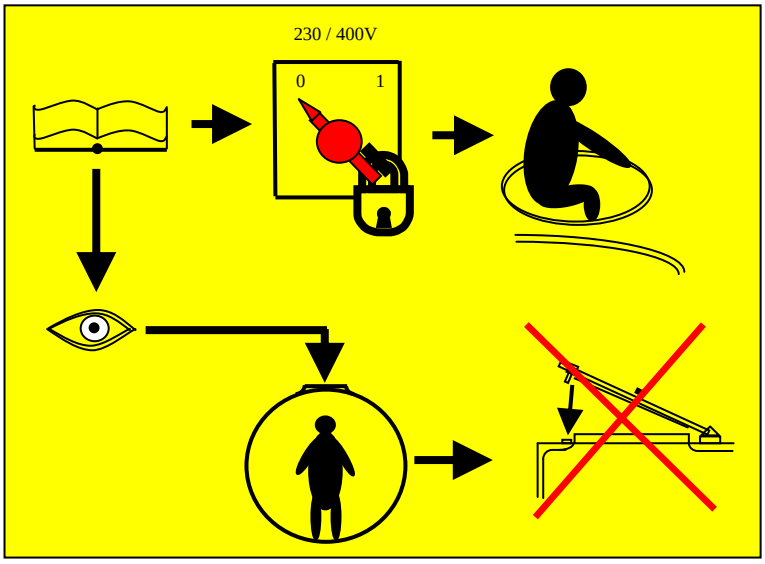
The company PACKO INOX N.V. reserves the right to make changes to the manual at any time and without prior notice.

Safety instructions

Stickers

The stickers below can be fixed on to your tank to assure the safety of the use of the tank. They cannot be removed according to the CE regulations:

Sticker	Instructions
CE	The machine or part of it is built according to the CE regulations.
NF 016	The machine or part of it is certified according to the EN13732 standard.
• Read instructions • Voir mode d'emploi • Siehe Gebrauchsanleitung • Véase instrucciones de empleo • Vedere istruzioni d'uso • Se brugsanvisning • Lees gebruiksaanwijzing	You are invited to read the instructions.
	Danger : machinery connected to electrical network
	Do not spray water on the motor.

Sticker	Instructions
	Do not spray water on the pump.
	Switch off and lock the main switch before entering the tank. Insure there is nobody in the tank before closing the manhole cover.

Maintenance and repairs

Only **trained personnel** may carry out maintenance or repairs.

Electricity

Before doing the following, turn the **main switch** to 0 or OFF and lock it:

- Before opening the electrical control box of the tank.
- Before the servicing of the milk cooling tank.
- Before checking the agitator blades, spray balls or the inner vessel.
- In case of electrical or mechanical faults, inform the installer immediately.
- Before you start working on the cooling unit

Make sure that your hands are **dry** when you use the buttons.

When you touch electronic equipment make sure you unload yourself of static electricity.

Entering in the tank

If someone has to get into the tank for specific work, this should be done under **supervision**, and only when the **power has been switched off**. It must not be possible for the agitator to start. That is why you should always turn the main switch to 0 or OFF and lock it.

 Always use a ladder to enter the milk cooling tank

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Cleaning

Never spray water under high pressure at the milk cooling tank.
Keep cleaning agents away from children and animals. Read the packaging or the instructions carefully and always follow the safety instructions.
Wear protective gloves and **safety goggles** whilst using the cleaning agents.

Cleaning unit

Never sit, lean or place any foreign objects on the cooling unit.
Do not put anything in front of the condenser. This will reduce air circulation and affect cooling efficiency.

General

- Only use the tank for milk. The tank is not suitable for other fluids or solids.
- Do not put anything on the tank.
- Always wear sturdy, anti-slip footwear when using the steps.
- Always hold the handle of the manhole lid when opening or closing the manhole to insure your hands cannot get caught between the tank and the lid.
- Pay attention to the hoses for water supply when mounting the SS plate

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Installation instructions

Overview

Introduction

In this chapter you will find detailed directions for installing your milk cooling tank.

Warning


Only a recognised installer may carry out the installation. The installation is to be carried out in the order described below.

On delivery

Checking the delivery

Check whether the delivery is complete, in other words whether it completely meets the order. Check what has been delivered against what is written on the delivery note. Write any shortcomings on the delivery note before signing it.
If there is something missing you should immediately inform your supplier.

Unpacking

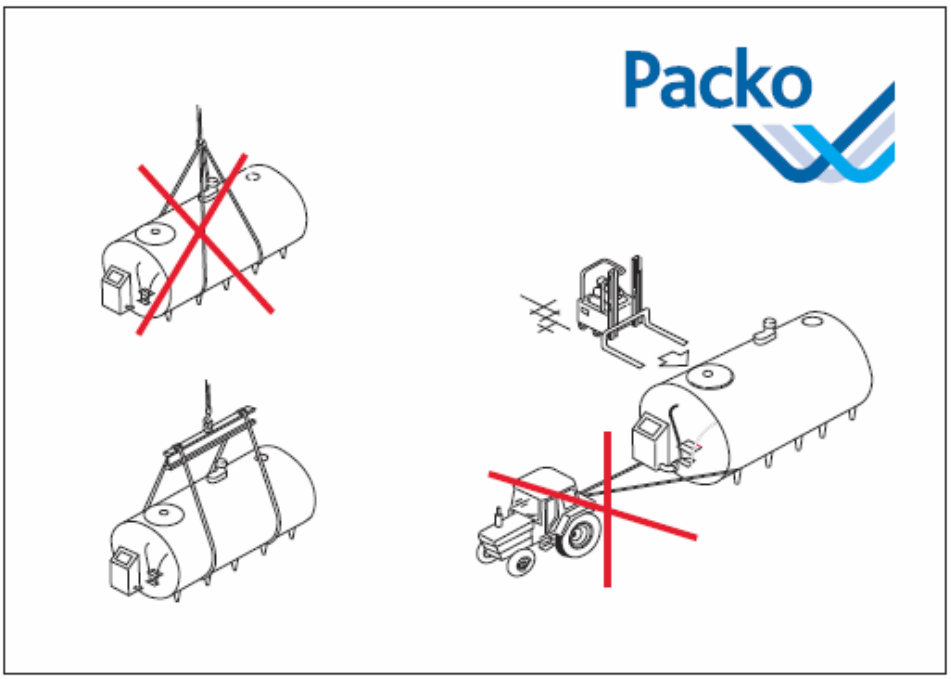
The tank was packaged with the greatest care for transport. However, when you unpack it, we do advise that you check for possible damage which the tank may have incurred during transport.
In case of damage, please inform your supplier immediately.

Moving closed tanks

It is important that the guidelines below are observed when lifting a closed tank. If not, the tank may be damaged. See transport instruction on the packing.

See center of gravity

10 000 - 25 000 l **<10 000 l**

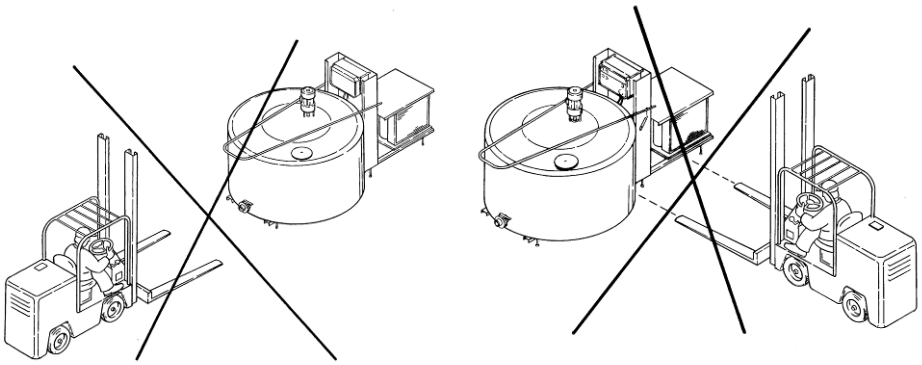


Moving VM/DX

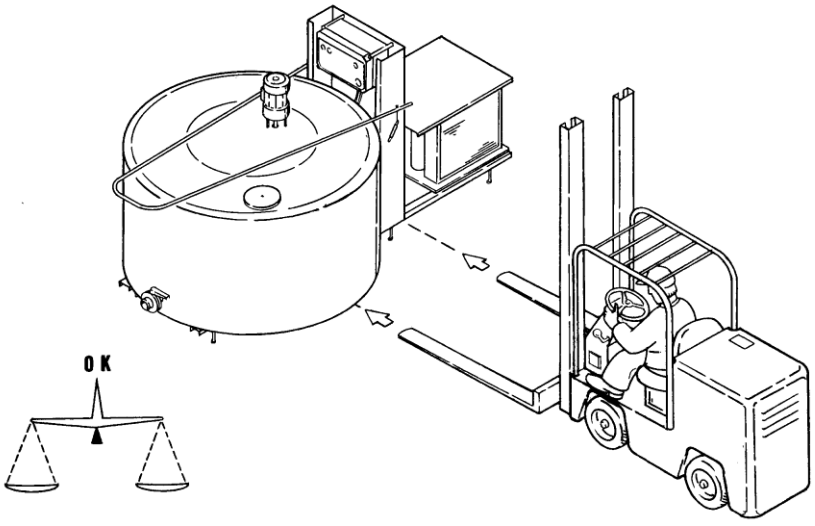
It is important that the guidelines below are observed when moving a tank with a built on cooling unit. If not, the tank may be damaged.

See center of gravity

WRONG



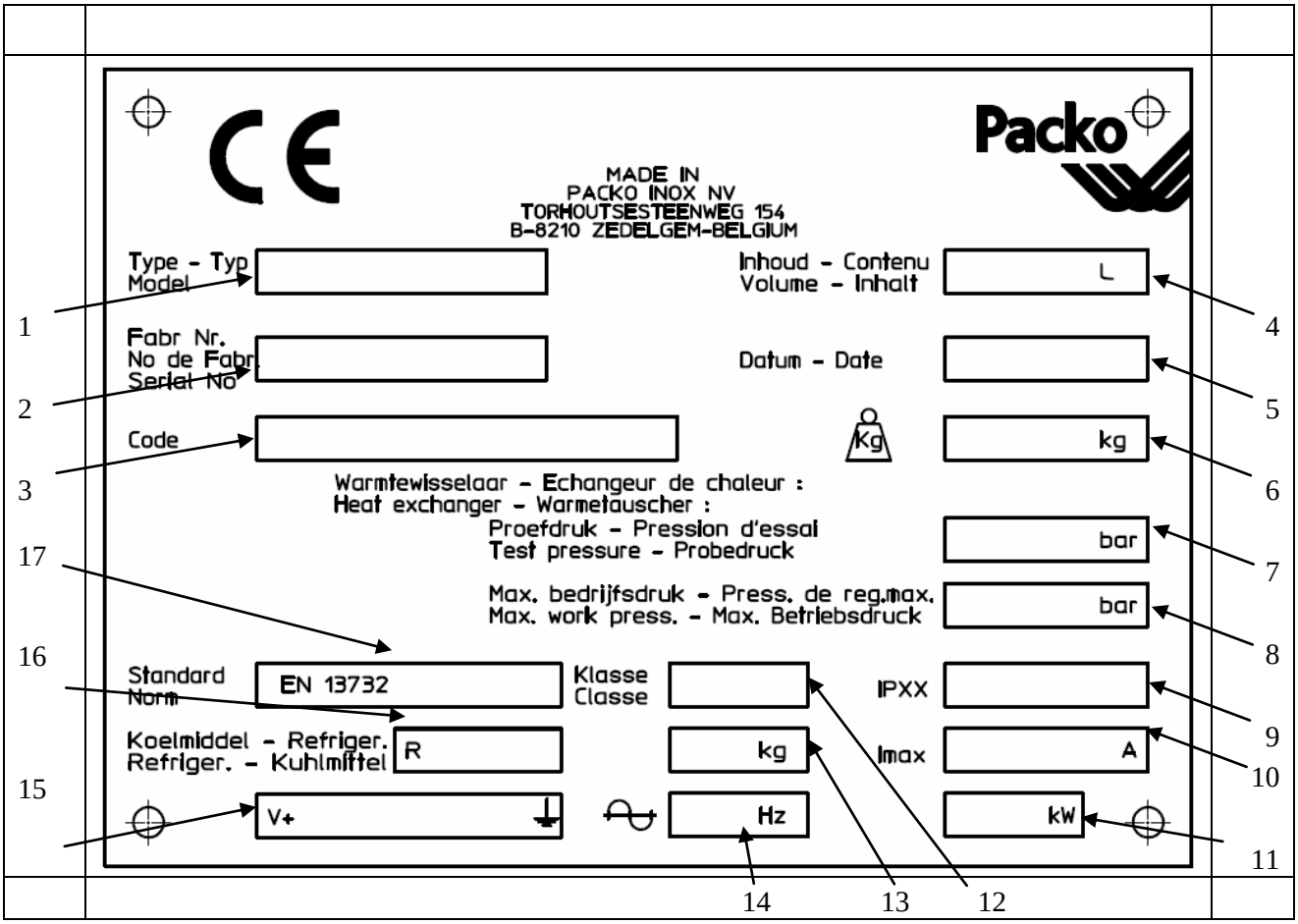
RIGHT



About your milk cooling tank

General specifications

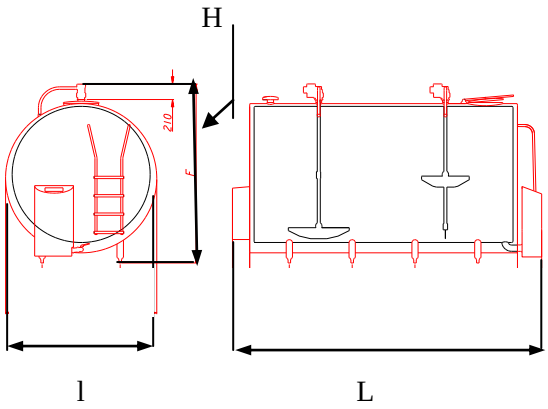
- The average sound level of the tank (excl. cooling unit) in the working area is less than 70 dBa.
- Electrical connections:
  - Tank: 200 – 240V / 50-60 Hz nominal
    No harmonic interferences
  - Condensing unit: - Single-phase : 230 V / 50-60 Hz nominal
    - Three-phase: 3 x 400 V / 50-60 Hz nominal (3Ph+N)
- A protection against low voltage must be installed
- Ambient conditions : ambient temperature :
  - The tank is operational between -10°C and + 50°C
  - The tank can be stored between -20°C and + 70°C
- On the tank a fabrication plate is installed on which you find the following information :



Item	Function	Item	Function
1	Type of tank: e.g. REM/DX	**10**	Max. operating current (A)
2	Serial number	**11**	The absorbed power (KW)
3	Internal code	**12**	Performance class of the tank (e.g. 2BII)
4	Nominal volume of the tank (L)	**13**	Nominal kg cooling agent to be charged to the cooling unit
5	Fabrication date	**14**	Frequency (Hz)
6	Weight of the tank (kg)	**15**	Voltage (e.g. 3 x 400 V + N)
7	Test pressure of the heat exchanger (bar)	**16**	Type of cooling agent (e.g. R404A)
8	Working pressure of the heat exchanger (bar)	**17**	Manufactured according european standard. (e.g. EN13732)
9	Protection grade of the control cabinet (e.g. IP24)		

Measurements

Table of measurements and weights of the different DX/DIB-models

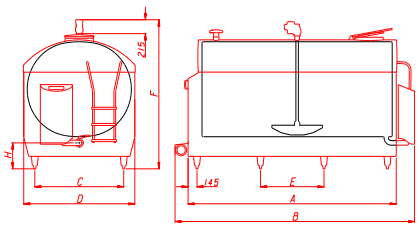


Type tank	Volume (in litres)	Milkings	L * (in mm)	l (in mm)	H (in mm)	Weight (in kg)
REM/DX REM/DIB	**1050**	T2 – T4	1944	1308	1550 – 1585	220
	1300	T2 – T4	2250	1308	1550 – 1585	295
	1700	T2 – T4	2616	1308	1550 – 1585	365
	2100	T2 – T4	3099	1308	1550 – 1585	412
	2600	T2 – T4	2458	1660	1852 - 1972	437
	3100	T2 – T4	2818	1660	1852 - 1972	500
	3800	T2 – T4	3050	1800	1840 – 1960	590
	4400	T2 – T4	3420	1800	1840 – 1960	667
	5000	T2 – T4	3760	1800	1840 – 1960	730
	6150	T2 – T4	3440	2100	2058 - 2178	854
	7200	T2 – T4	3900	2100	2058 - 2178	901
	8200	T2 – T4	4355	2100	2058 - 2178	1090
	9000	T2 – T4	4227	2233	2208 – 2328	1155
	10000	T2 – T4	4567	2233	2208 - 2328	1229
	12000	T2 – T4	5356	2233	2208 - 2328	1450
	15000	T2 – T4	6532	2233	2208 - 2328	1800
RS/DX - RS/DIB	**5000**					
	8000	T4	3686	2233	2208 - 2328	1065
LEM/DX + LEM/DIB	**5000**	T4 – T6	2965	1876	2260 - 2380	785
	6200	T4 – T6	3525	1876	2260 - 2380	905
	7000	T4 – T6	3905	1876	2260 - 2380	990
	8000	T4 – T6	4375	1876	2260 - 2380	1120
	9000	T4 – T6	4148	2033	2440 - 2560	1205

Type tank	Volume (in litres)	Milkings	L * (in mm)	l (in mm)	H (in mm)	Weight (in kg)
	10000	T4 – T6	4535	2033	2440 - 2560	1280
	12000	T4 – T6	5335	2033	2440 - 2560	1495
	14000	T4 – T6	5570	2133	2550 - 2670	1665
	15500	T4 – T6	6115	2133	2550 - 2670	1800
	18000	T4 – T6	6870	2133	2550 - 2670	1975
	22000	T4 – T6	8165	2133	2550 - 2670	2245
	25500	T4 – T6	9743	2133	2550 - 2670	2550
	32000	T4 – T6	11648	2133	2550 - 2670	3200
LS/DX LS/DIB	**10250**	T6	4205	2133	2550 - 2670	1196
	13100	T6	5195	2133	2550 - 2670	1414
	14500	T6	4182	2500	2917 - 3037	1421
	15500	T6	4358	2500	2917 – 3037	1562
	17500	T6	4967	2500	2917 – 3037	1750
	21500	T6	5932	2500	2917 – 3037	2078
	25500	T6	6752	2500	2917 – 3037	2453
	30450	T6	8205	2500	2917 - 3037	2925
A/DX	**8150**	T4 – T6	3705	2033	2440 – 2560	980
	10350	T4 – T6	3921	2203	2605 – 2725	1080
	12300	T4 – T6	4534	2203	2605 – 2725	1270

* For ECO-WASH: L = L + 190 mm

Table of measurements and weights of the different models RM/IB



Type tank	Volume (in litres)	Milkings	B*(in mm)	D (in mm)	F (in mm)	Weight (in kg)
RM/IB	**1600**	T4	2710	1300	1630 – 1750	429
		T2	2710	1300	1825 – 1945	464
	2200	T4	3398	1300	1630 – 1750	525
		T2	3398	1300	1885 – 1945	584
	2800	T4	2590	1800	1996 – 2116	601
		T2	2590	1800	2179 – 2299	682
	3300	T4	2930	1800	1996 – 2116	655
		T2	2930	1800	2178 – 2299	750
	3800	T4	3245	1800	1996 – 2116	730
		T2	3245	1800	2178 – 2299	830
	4400	T4	3615	1800	1996 – 2116	860
		T2	3615	1800	2178 – 2299	980
	5000	T4	3955	1800	1996 – 2116	940
		T2	3955	1800	2178 – 2299	1076
	6000	T4	3955	1800	2269 – 2382	1050
		T2	4580	1800	2173 – 2293	1240
	7150	T4 – T6	4580	1800	2269 – 2389	1300
	9650	T4 – T6	4580	2256	2526 – 2646	1700
	12400	T6	5621	2256	2526 – 2646	1930
	15400	T6	6797	2256	2526 – 2646	2240

* for ECO-WASH : B* = B + 190 mm

Placing the tank

Before placing

If the free area above the tank in the dairy is insufficient, then put the agitator blade(s) inside the milk vessel before placing the tank inside.

Directions

Put the tank in the dairy, bearing in mind the local regulations and the following directions:

- The tank must be placed in a frost-free area.
- Put the tank (together with the floor plate) on a sturdy and hard underground (concrete or tiles), which can take a pressure of 12 N/mm² minimum.
- Keep at least 0.6 metres around the tank (including e.g. steps, operator console, built on cooling machine,…) free for cleaning it.
- The space between the ceiling and the top ladder step should be min. 2m.
- If necessary, you should install a ladder or platform in order to let the installer have access to the milk entry point without risk.
- Preferably, the door should be 20% wider than the maximum width of the milk cooling tank.
- There must be a drain on the side of the milk outlet.
- Preferably place the tank with the outlet towards a door opening to facilitate milk collection.
- There must be sufficient ventilation and lighting in the dairy.

Placing the agitator

Overview

Introduction

This section covers the installation procedure of the agitator, depending on the type of tank.

Placing the agitator on closed tanks

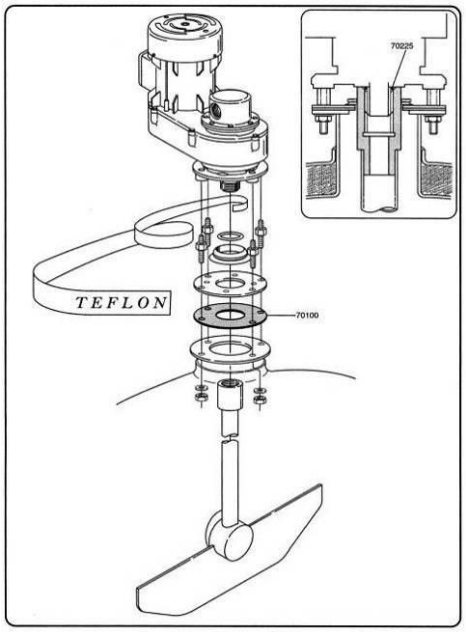
Remark

- The agitator blades and the motor are delivered separately.
- The agitator motor has a built-in watercoupling for the automatic cleaning system.
- If the free area above the tank in the dairy is insufficient, then put the agitator blade(s) inside the milk vessel before placing the tank inside.

How to place it

Take the following steps to place the agitator – see also the drawing below:

Step	Action
1	Apply 1 layer of Teflon (PTFT-tape) to the threaded piece of the agitator motor shaft and check that the O-ring is present.
2	Mount the 4 threaded rods to the motor flange. These rods must be screwed into the motor flange until they are just coming through it.
3	Put the paddle in the tank via the manhole.
4	Put the paddle through the opening.
5	Put the rubber seal, the intermediary SS flange and the V-ring over the paddle shaft.
6	Screw the agitator motor to the agitator paddle.
7	Fit the motor on the mounting flange of the milk cooling tank. Take into account that the water inlet is facing the water supply pipe of the cleaning system.
8	Fix the motor to the flange with the supplied 4 hex nuts and spring washers.
9	Check the positioning of the V-seal



Placing the agitator on open tanks (OM/DX and OM/IB)

Remark

The agitator blades and the motor are delivered separately.

How to place it

Take the following steps to place the agitator:

Step	Action
1	Open the tank and put the agitator blades inside.
2	Put the shaft trough the hole in the lid or the bridge between the lids.
3	Slip the rubber agitator shaft shield over the end of the agitator shaft.
4	Push the agitator bushing over the motor output shaft, align the holes in both shafts and insert the stainless steel elastic pin.
5	Secure the motor: • to the lid: with 4 washers and 4 bolts M6 x 12; • to the bridge: with 4 spacer sleeves Ø10 x 1 x 50 and 4 studs M6x60.
6	For tanks with 1 lid: in the motor terminal box a float switch is fitted which cuts the power supply to the motor the moment the lid is opened. To have this function, the agitator motor positioning has to be choosen accordingly. Test this function during commissioning
7	Position the shaft shield.

Placing the agitator on VM/DX

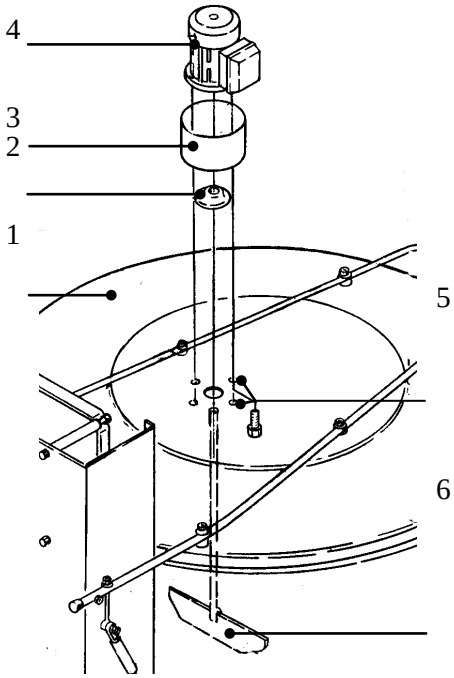
Remark

The agitator blades and the motor are delivered separately.

How to place it?

Take the following steps to place the agitator :

Step	Action
1	Open the tank and put the agitator blades (6) inside.
2	Put the shaft trough the hole in the lid (1).
3	Slip the rubber agitator shaft shield (2) over the end of the agitator shaft. Fit it onto the lid.
4	Put the distance ring (3) on the lid.
5	Push the agitator bushing over the motor (4) output shaft, align the holes in both shafts and insert the stainless steel elastic pin.
6	For tanks with 1 lid: in the motor terminal box a float switch is fitted which cuts the power supply to the motor the moment the lid is opened. To have this function, the agitator motor positioning has to be choosen accordingly. Test this function during commissioning
7	Secure the motor to the lid with 4 bolts and spring washers (5): the bolts on the inside of the distance ring.



Levelling the tank

For your information

In certain cases, you can find reference points, indicated with a sticker to aid the leveling process.

Introduction

The milk cooling tank should slope slightly towards the milk outlet to ensure that all the milk is properly removed.

Procedure

Take the following steps to put the tank at the right angle:

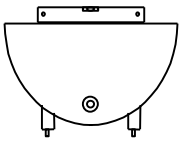
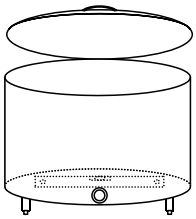
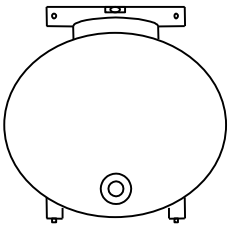
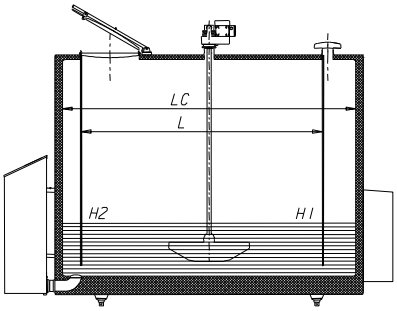
Step	Action
1	With the aid of a spirit level, check that the milk cooling tank is properly levelled widthwise. If necessary adjust the 2 front legs (on the milk outlet side). • For OM tanks: put the spirit level on the milk outlet side (H2)  • For VM tanks: put the spirit level on the bottom of the tank  • For closed tanks: put the spirit level on the edges of the manhole while the cover is open and manhole seal removed. 
2	Fill the tank with water to 20% of the nominal volume of the tank.
3	Adjust the 2 back legs (opposite the milk outlet side) so that there is a difference on the measuring rod between points H2 (milk outlet side) and H1 (see figure) which corresponds with a value in the measurement table. If there is a separate individual measurement table enclosed with this manual, then use the values on that table. If not, use the table on the page(s) hereafter.
4	Screw ALL the legs to the ground plate.
5	Check the levels again and adjust if necessary. Make sure the water is standing still when checking the levels.

Table for levelling standard LEM tanks

Introduction

The table for levelling your LEM milk cooling tank can be found below. In the chapter "Levelling the tank", you can find how to use the table.

Figure



LR = measuring rod length
LC = inside dimensions milk tank
L = distance between mounting studs of the dipsticks

Table

Type	H2-H1 (mm) 2 %	H2-H1 (mm) 5 %	LR (mm)	LC (mm)	L (mm)
5000	88	100	1712	2299	1893
6200	96	108	1712	2859	2453
7000	113	-	1712	3239	2833
8000	115	125	1712	3709	3303
9000	111	118	1853	3482	3076
10000	113	140	1853	3869	3463
12000	138	157	1853	4669	4263
14000	107	157	1853	4904	4498
15500	163	182	1853	5453	5045
18000	128	-	1853	6204	5806
22000	128	-	1853	7499	7093
25500	221	-	1853	9059	8653
32000	305	-	1853	10964	10558

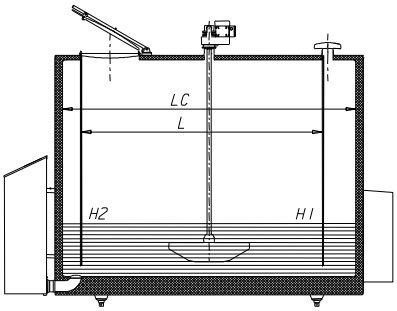
Type = nominal contents of the tank

Table for levelling Australian LEM tanks

Introduction

The table for levelling your LEM milk cooling tank can be found below. In the chapter "Levelling the tank", you can find how to use the table.

Figure



LR = measuring rod length
LC = inside dimensions milk tank
L = distance between mounting studs of the dipsticks

Table

Type	H2-H1 (mm) 3%
5000	58
6200	88
7000	
8000	114
9000	97
10000	130
12000	140
14000	160
15500	166
18000	201
22000	246
25500	278
32000	384

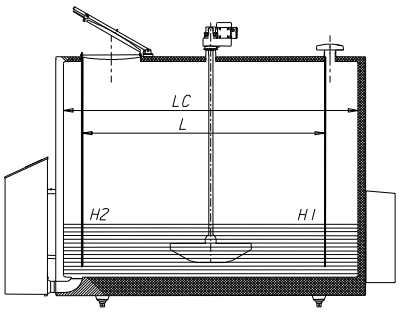
Type = nominal contents of the tank

Table for levelling LS

Introduction

The table for levelling your LS milk cooling tank can be found below. In the chapter "Levelling the tank", you can find how to use the table.

Figure



LR = measuring rod length
LC = inside dimensions milk tank
L = distance between mounting studs of the dipsticks

Table

Type	H2-H1 (mm) 2 %	H2-H1 (mm) 5 %	LR (mm)	LC (mm)	L (mm)
10250	124	-	1864	3543	3135
13100	150	-	1864	4533	4125
14500	123	-	2356	3543	3135
15500	123	-	2356	3719	3311
17650	142	-	2356	4328	3920
21500	132	-	2356	5293	4872
25500	233	-	2356	6113	5875
30450	247	-	2356	7413	7005

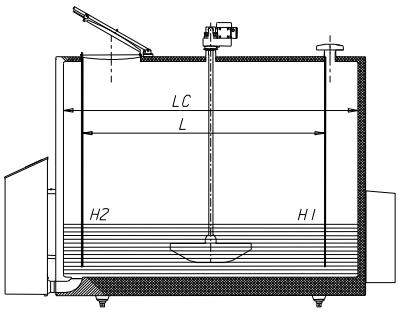
Type = nominal contents of the tank

Table for levelling ADX

Introduction

The table for levelling your ADX milk cooling tank can be found below. In the chapter "Levelling the tank", you can find how to use the table.

Figure



LR = measuring rod length
LC = inside dimensions milk tank
L = distance between mounting studs of the dipsticks

Table

Type	H2-H1	LR (mm)	LC (mm)	L (mm)
8150	106	1853	3039	2634
10350	127	2050	3255	2850
12300	130	2050	3891	3486

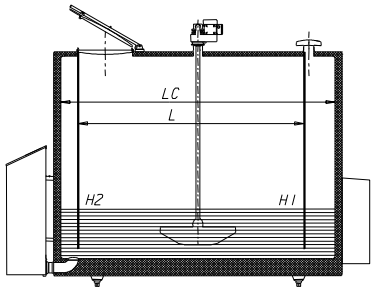
Type = nominal contents of the tank

Table for levelling REM tanks

Introduction

The table for levelling your REM milk cooling tank can be found below. In the chapter "Levelling the tank", you can find how to use the table.

Figure



LR = measuring rod length
LC = inside dimensions milk tank
L = distance between mounting studs of the dipsticks

Table

Type	H2-H1 (mm) 2%	H2-H1 (mm) 5%	LR (mm)	LC (mm)	L (mm)
1050	57	-	876	1279	936
1300	65	-	876	1588	1169
1700	65	-	876	1889	1487
2100	72	-	876	2376	1967
2600	56	-	1175	1777	1372
3100	66	-	1175	2137	1732
3800	74	-	1175	2372	1961
4400	81	-	1175	2742	2331
5000	99	-	1175	3082	2671
6150	87	-	1420	2760	2354
7200	94	98	1420	3218	2817
8200	90	111	1420	3677	3269
9000	95	115	1584	3565	3157
10000	112	117	1584	3912	3504
12000	127	136	1584	4694	4286
15000	166	181	1584	5670	5479

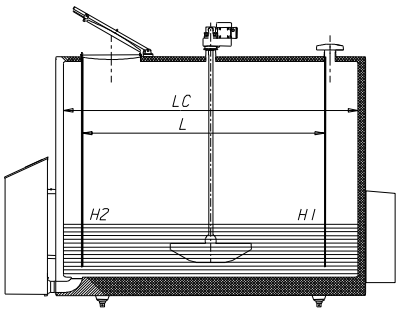
Type = nominal contents of the tank.

Table for levelling RS

Introduction

The table for levelling your RS milk cooling tank can be found below. In the chapter "Levelling the tank", you can find how to use the table.

Figure



LR = measuring rod length
LC = inside dimensions milk tank
L = distance between mounting studs of the dipsticks

Table

Type	H2-H1 (mm) 2%	H2-H1 (mm) 3%	H2-H1 (mm) 5%	LR (mm)	LC (mm)	L (mm)
5000	67	-	-	1432	2264	1856
8000	95	-	-	1595	3028	2616

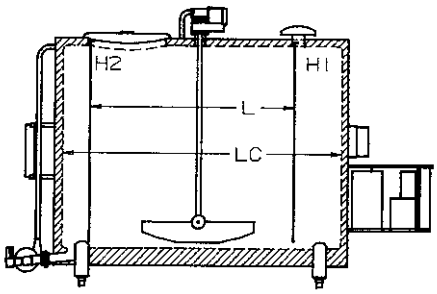
Type = nominal content of the tank (in litres)

Table for levelling CRM tanks

Introduction

The table for levelling your CRM milk cooling tank can be found below. In the chapter "Levelling the tank", you can find how to use the table.

Figure



LR = measuring rod length
LC = inside dimensions milk tank
L = distance between mounting studs of the dipsticks

Table

Type	H2-H1 (mm)	LR (mm)	LC (mm)	L (mm)
1300	58	1175	1225	807
1600	66	1175	1522	1140
2000	77	1175	1872	1482
2500	89	1175	2322	1940
3000	101	1175	2772	2355

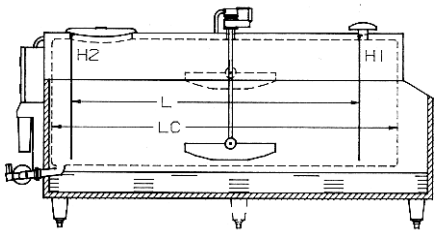
Type = nominal contents of the tank

Table for levelling RM/IB

Introduction

The table for levelling your RM/IB milk cooling tank can be found below. In the chapter "Levelling the tank ", you can find how to use the table.

Figure



LR = measuring rod length
LC = inside dimensions milk tank
L = distance between mounting studs of the dipsticks

Table

Type	H2-H1 (mm) 2%	H2-H1 (mm) 5%	LR (mm)	LC (mm)	L (mm)
1600	62	-	876	1891	1481
2200	71	95	876	2524	2114
2800	62	-	1175	1716	1306
3300	67	-	1175	2056	1646
3800	71	-	1175	2371	1961
4400	75	-	1175	2740	2331
5000	82	-	1175	3080	2671
6000 – T4	82	118	1420	3080	2671
6000 – T2	90	-	1175	3703	3286,5
7150	90	-	1420	3703	3290,5
9650	113	-	1584	3649	3245
12400	114	-	1584	4694	4286
15400	162	-	1584	5870	5462

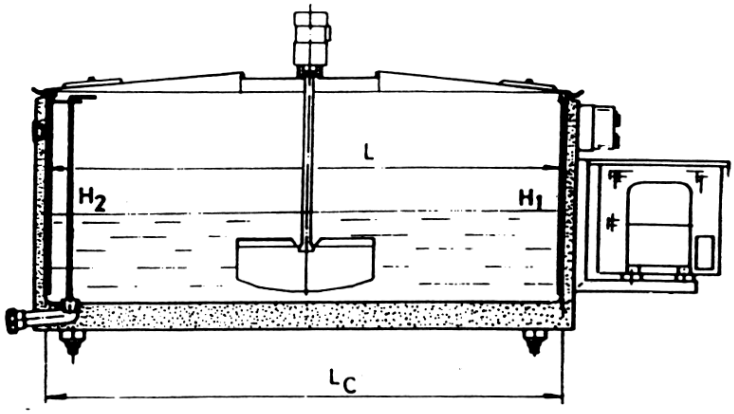
Type = nominal contents of the tank

Table for levelling OM/DX

Introduction

The table for levelling your OM/DX milk cooling tank can be found below. In the chapter "Levelling the tank", you can find how to use the table.

Figure



LR = measuring rod length
LC = inside dimensions milk tank
L = distance between mounting studs of the dipsticks

Table

Type	H2-H1 (mm)	LR (mm)	LC (mm)	L (mm)
300	0	607	723,5	715,5
450	0	607	1097,5	1089,5
600	0	607	1447,5	1439,5
800	0	607	1497	1489
1000	0	607	1847	1839
1200	0	607	2197	2189
1500	0	697	1862	1854
1800	0	697	2246	2238
2300	0	720	2595	2589
2750	0	720	3096	3090
3400	0	720	3096	3090

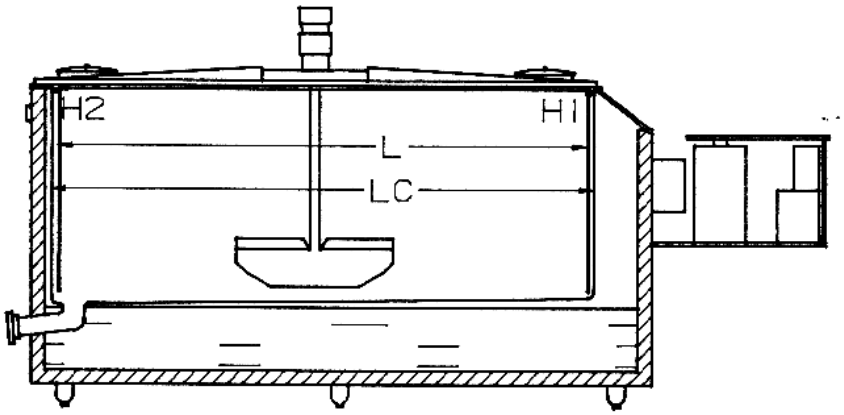
Type = nominal contents of the tank

Table for levelling OM/IB

Introduction

The table for levelling your OM/IB milk cooling tank can be found below. In the chapter "Levelling the tank ", you can find how to use the table.

Figure



LR = measuring rod length
LC = inside dimensions milk tank
L = distance between mounting studs of the dipsticks

Table

Type	H2-H1 (mm)	LR (mm)	LC (mm)	L (mm)
600	0	607	1097	1089
800	0	607	1497	1489
1000	0	607	1847	1839
1200	0	607	2197	2189
1500	0	697	1866	1858
1800	0	697	2246	2238
2300	0	720	2595	2587

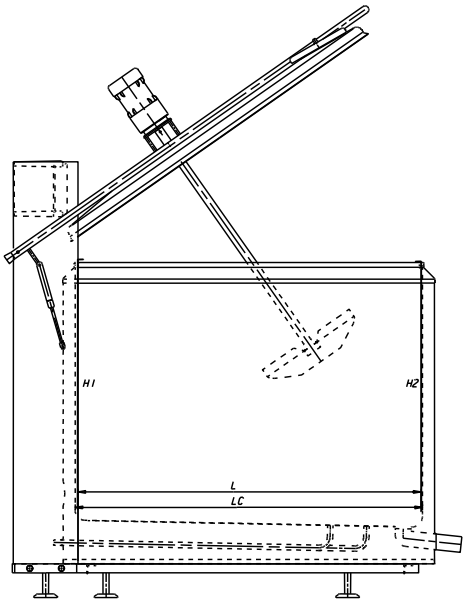
Type = nominal contents of the tank

Table for levelling VM/DX

Introduction

The table for levelling your VM/DX milk cooling tank can be found below. In the chapter "Levelling the tank", you can find how to use the table.

Figure



LR = measuring rod length
LC = inside dimensions milk tank
L = distance between mounting studs of the dipsticks

Table

Type	H2-H1 (mm)	LR (mm)	LC (mm)	L (mm)
325	0			
525	0	504	1147	1130
680	0	670	1147	1130
830	0	820	1147	1130
1000	0	670	1400	1383
1200	0	820	1400	1383
1500	0			
1800	0			
2000	0			

Type = nominal contents of the tank.

Cooling

Overview

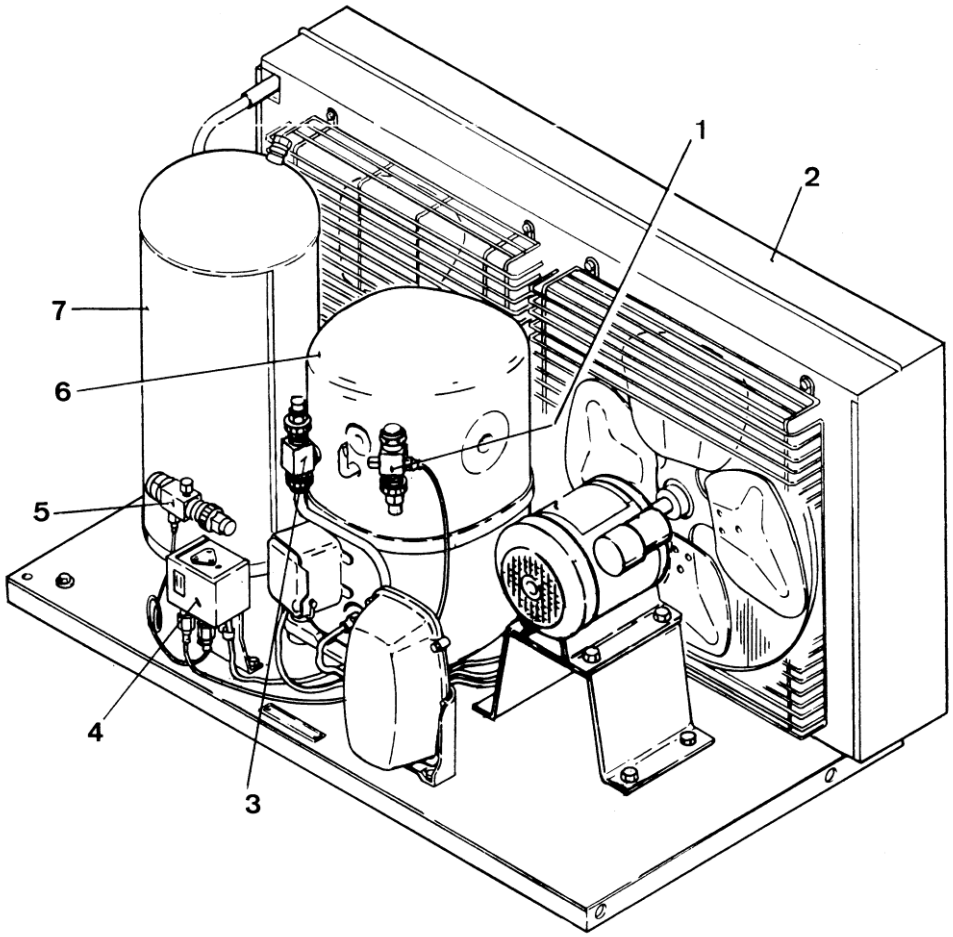
Introduction

The installation procedure differs depending on the type of cooling system of the milk cooling tank. This section covers the cooling instructions.

The cooling unit

Illustration

The drawing below shows the most important parts of a cooling unit supplied by Packo. As not all the parts are standard, you will perhaps not find all of them in your cooling unit.



Parts

Element	Function
1	Suction Rota-lock valve
2	Condenser
3	High-pressure Rota-lock valve
4	High and low-pressure switch
5	Liquid receiver valve
6	Compressor
7	Liquid receiver

Positioning of the remote cooling unit

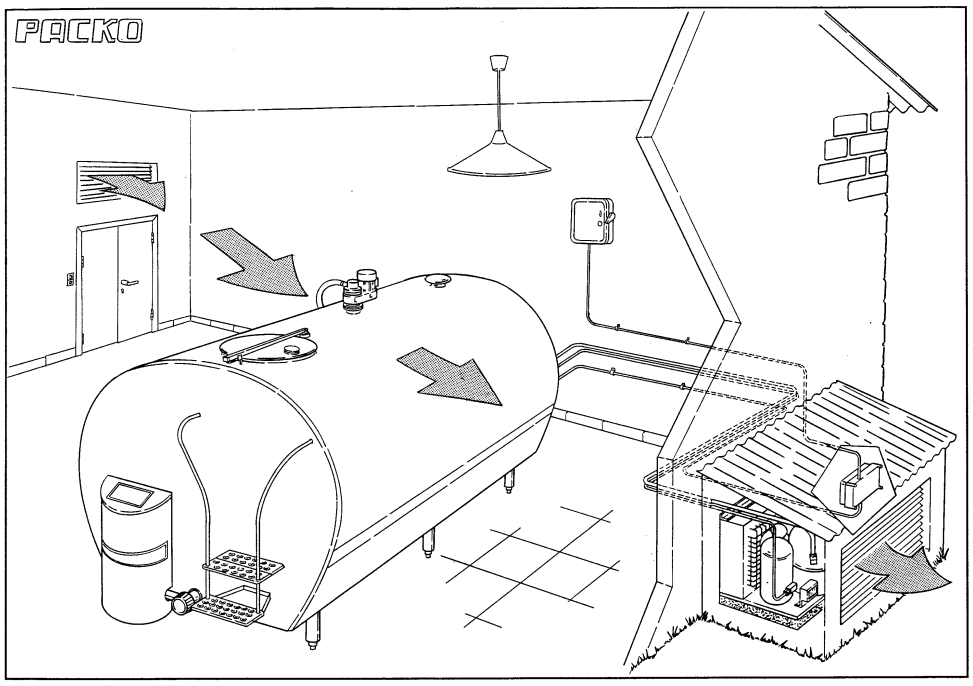
Placing the cooling unit

The cooling unit may be placed both inside and outside. In any case, sufficient air circulation must be provided (see also schematic diagram).

- If it is placed outside, a sufficiently large lockable protective shelter must be provided.
- If the cooling unit is placed inside in front of a opening in the wall, the following measures have to be taken:
  - Keep a free area of at least 25 cm between the wall and the condenser.
  - Make an opening in the wall that the condenser is standing against which is at least as large as the condenser is.
  - In the wall opposite the condenser, make an opening the size of the condenser for the evacuation of hot air.
- If the cooling unit is placed inside in front of a closed wall, the following measures have to be taken:
  - Keep a free area between the wall and the consensor equal to the following formula: $\frac{L \times H}{2 \times H + L}$

  L = length, H = height of the condensing unit
  - Make sure there is enough ventilation
- In cold weather, the front of the condenser may be partly covered.
- If the condenser is in a place where the temperature is always lower than 5°C, a high-pressure switch should be placed to control the fan motor(s).
- It must **not** be possible for the cooling unit to suck in the exhaust gases of the vacuum pump of the milk machine.

Schematic diagram



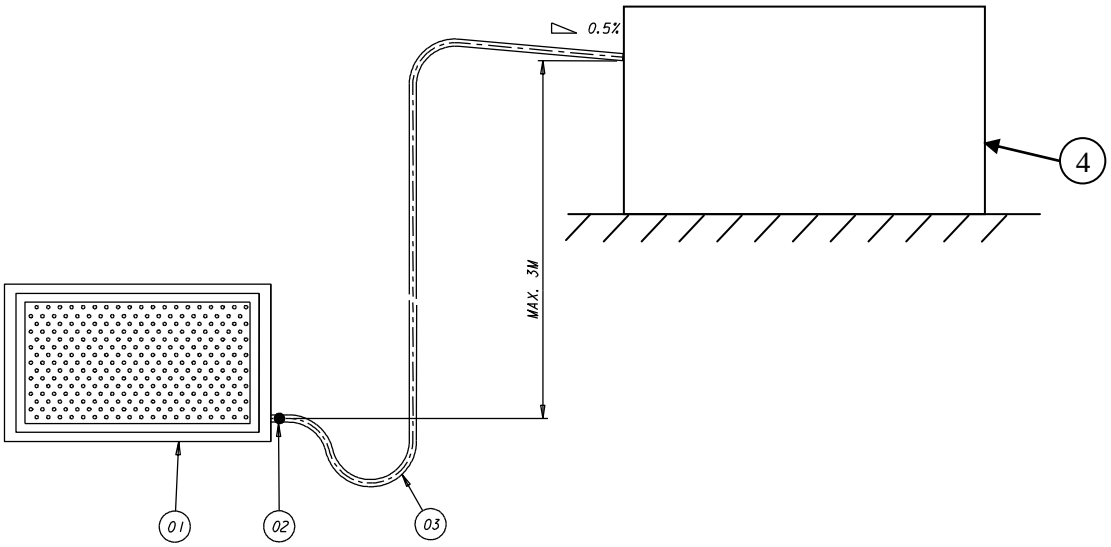
Piping the remote cooling unit

Method

Take the following steps:

Step	Action
1	The separate cooling unit is always delivered filled with nitrogen (N_2). Check whether the unit is still under pressure. If not, check for leaks and repair.
2	Place the suction pipe and then the liquid pipe. The diameter of the pipes depends on the type of cooling unit. Take the following into account: • Always use sealed and dehydrated copper pipes especially for refrigeration engineering. • The distance between the compressor and the tank should not exceed 10 metres. • The horizontal suction pipe should slope slightly down towards the compressor. • If the cooling unit is placed higher than the tank, an oil trap (as small as possible) **has** to be made in the suction pipe before the vertically placed pipe (see drawing on next page). • Preferably mount the liquid pipe against the suction pipe so that a heatchanger is created.
3	Carry out a pressure test: connect a low and high-pressure manometer to the compressor. Put the compressor under pressure (maximum 2500 kPa) with nitrogen (N_2) and check for leaks. If necessary, repair the leaks and do the pressure test again.
4	Using a 2-step vacuum pump, vacuum the system fully for at least 1 hour.
5	Put the system under pressure with the right type of cooling agent (see identification plate of the milk cooling tank).

Fitting oil traps



Element	Function
1	Evaporator
2	Suction pipe
3	Oil trap
4	Cooling unit

Warnings:

Blow dry (moisture content < 7ppm) N_2 through the pipe (5 litres/minute) to prevent oxidation during welding. Use a copper solder to weld the pipes together.

Use a silver solder to weld the pipes to the different elements (evaporators, liquid receivers,…)

Avoid getting moisture and dirt in the pipes!

If cooling agent or oil is accidentally spilt on the milk cooling tank it must be thoroughly cleaned immediately. If not, the stainless steel surface can be affected.

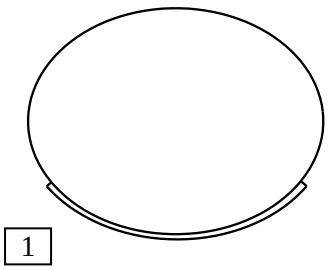
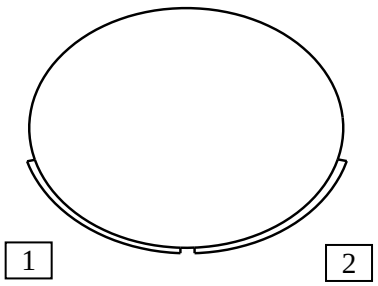
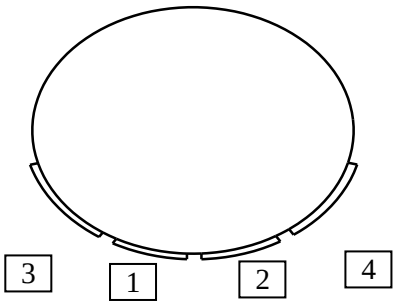
All hot parts/pipes must be properly insulated (e.g. Armaflex)

Cooling agent when burnt spreads very poisonous gases. Ensure that welding work is carried out away from any cooling agent.

Setting the the pressure switches

Warning

For safety reasons, the maximum pressure of the cooling installation may **NEVER** be exceeded. The setting of the high-pressure pressostat must always be **LOWER** than the maximum permissible pressure indicated on the identification plate of the cooling group.

1 bottom evaporator segment	2 bottom evaporator segments	4 evaporator segments
		

Low-pressure pressostat

Set the following values (in kg/cm²):

Evaporator segments milk cooling tanks	R22		R404A		R134a (R12)	
	ON	OFF	ON	OFF	ON	OFF
Only bottom segment	1.5	0.5	1.5	0.5	1.3	0.3
Bottom segment 1&2	1.5	0.5	1.5	0.5	1.3	0.3
and						
Top segment 3&4	4.5	3.1	5.6	4	2.4	1.5

The settings for the **IB-tanks** are similar to DX-tanks with only **a bottom evaporator segment.**

On tanks with bottom and top evaporators, the settings of the low pressure switch is **VERY IMPORTANT** in evaporator section 3 & 4 to prevent ice-building with small milk quantities (less than 15% nominal content).

High-presssure pressostaat

The settings depend on the type of condensing unit and refrigerant being used. You always **HAVE TO** respect the values (indicated on the identification label) stated by the manufacturer of the cooling unit.

Basic values:

Type cooling unit	R22	R404A	R134a (R12)
Open	23	23	18
Hermetic	26	30.5	18

The differential is 5.5 bar.

Control of fan motor(s)

If the cooling unit is installed outside (ambient temperature < + 5 °C for long periods) or connected to a heat recovery system, the pressure of the refrigerant in the receiver tank **HAS TO** be kept above a certain minimum. One of the methods which can be used is switching the condensor fans on and off by means of a pressure switch or electronic fan speed controller connected to the **RECEIVER TANK**.

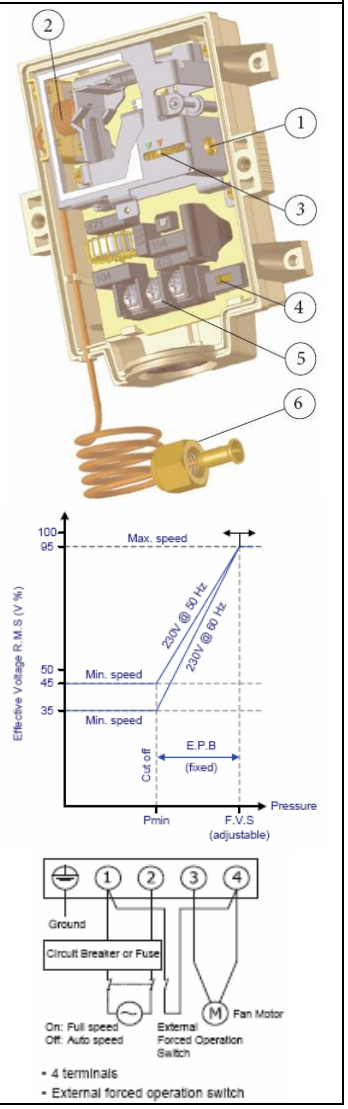
Set the following values (in kg/cm²):

	R22		R404A		R134a(R12)	
Fan	**ON**	**OFF**	**ON**	**OFF**	**ON**	**OFF**
1	14	12.5	17.5	16	10	8.5
2	15	13.5	18	16.5	11	9.5

Fan speed controller

In case an electronic fan speed controller is used, Packo advises to use a Saginomiya fan speed controller.

Description

Nr.	Part	Description	Schematic
1	Adjusting screw	Range: 8 – 28 bar Setting: Turn the adjusting screw clockwise for increasing the setting, and counterclockwise for decreasing the setting Factory setting: 19 bar	
2	Bellows	Used for operating	
3	Range setting pointer	Indicates the setting ⚠ Only use the adjusting screw to change the setting	
4	Change over switch	Mode change at low speed, two settings possible: - CutOff: fan motor will be stopped when speed decreases to minimum speed (45V% of R.M.S) - Min. speed: fan motor will be kept running at minimum speed when speed decreases to minimum speed (45V% of R.M.S.) Factory settings: CutOff ℹ In order to protect the fan motor the minimum speed is limited at 45% of R.M.S. (V%)	
5	Terminal board	Used for wiring, power supply is connectd to terminals 1 and 2; terminals 3 and 4 to fan motor. (See electrical diagram in one off the panels)	
6	¼” flare with depressing pin	Used to connect the fan speed controller to the liquid receiver.	

Caution

⚠ For safety reasons, **NEVER** exceed the maximum pressure of the cooling unit. Set the high pressure switch below the maximum allowed pressure, indicated on the identification label of the compressor.

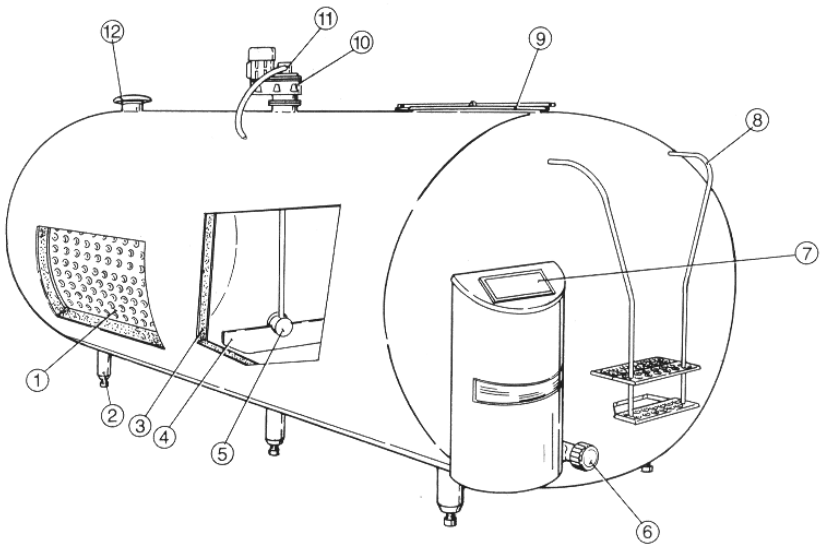
For your information

1 bar = 100 kPa = 14.2 psi

Parts of the DX/DIB milk cooling tank

Illustration

The drawing below shows the most important parts of the milk cooling tank.



The shape of the tank and the control panel may be round or oval, depending on the type.

Parts

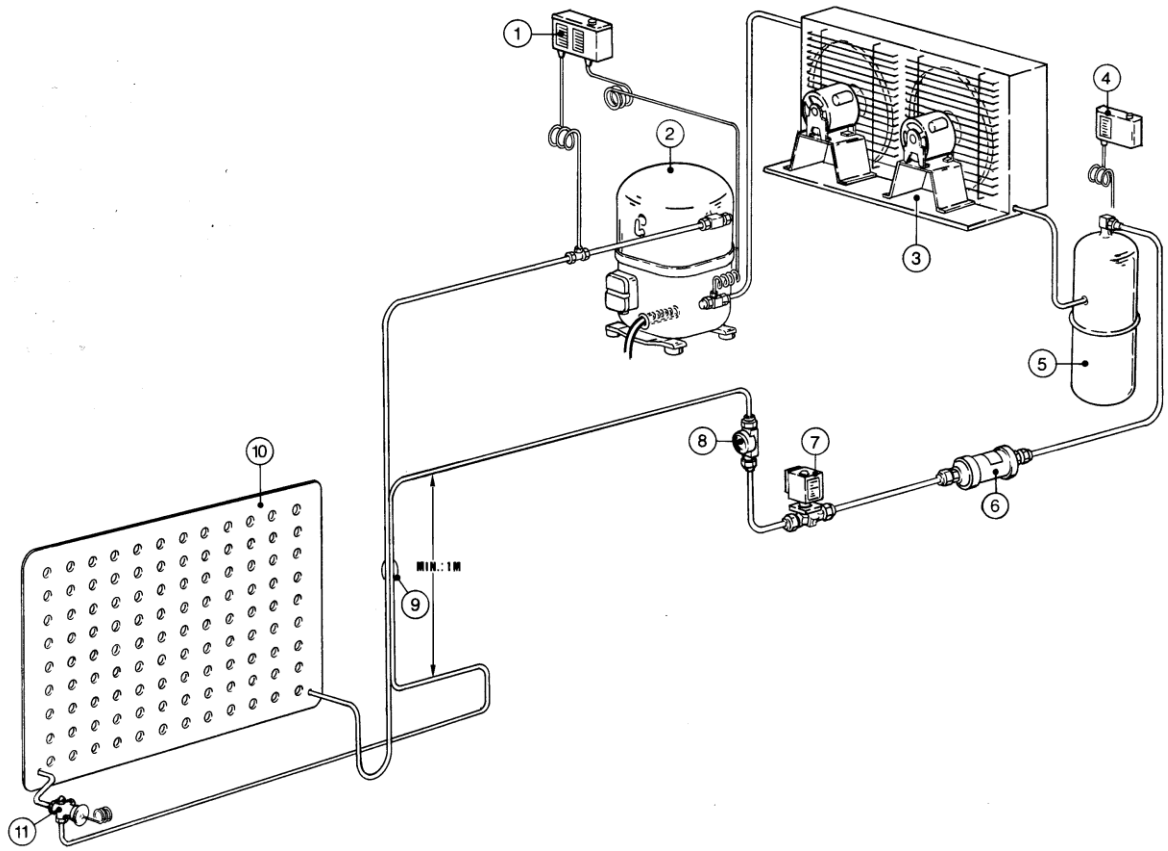
The table below provides an overview of all the parts:

Part	Description
1	Evaporator
2	Adjustable legs
3	Insulation layer
4	Agitator
5	Roto-Jet Spray ball
6	Milk outlet
7	Control panel
8	Steps
9	Manhole, manhole cover with milk inlet opening
10	Agitator motor
11	Pressure pipe for cleaning
12	Vent (the vent hole can be used as a milk inlet)

The DX cooling system

Schedule

The drawing below shows the DX cooling system schematically:



Parts

The table below provides an overview of the parts of the DX cooling system:

No	Description	No	Description
1	High and low pressure switch	**7**	Solenoid valve
2	Compressor	**8**	Sight-glass
3	Air-cooled fan condenser	**9**	Heat Exchanger (option)
4	High-pressure switch (option)	**10**	Evaporator
5	Liquid receiver	**11**	Thermostatic expansion valve
6	Filter drier		

Operation

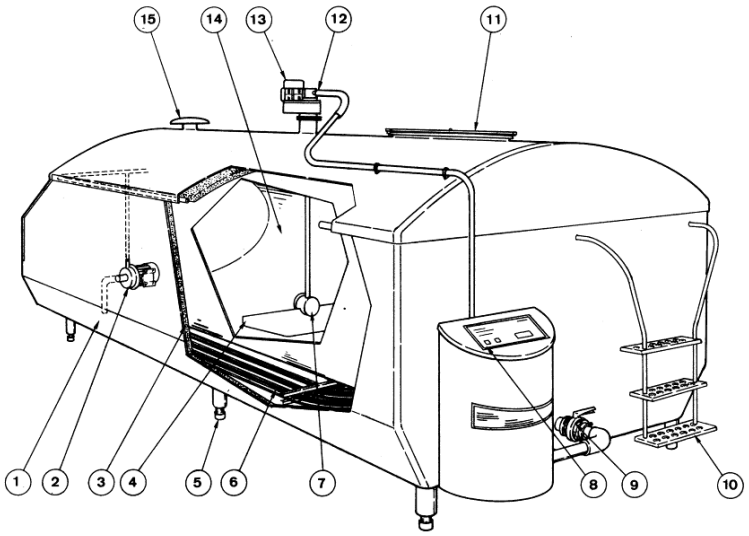
The table below describes how the DX cooling system works.

Phase	Description
1	The compressor (2) extracts the gaseous cooling agent under low pressure from the evaporator (10), and forces it under high pressure and high temperature to the condenser (3).
2	The fan sucks air over the cooling fins of the condenser, so that the gas condenses into a fluid at a lower temperature.
3	The fluid created in this way leaves the condenser under high pressure.
4	The thermostatic expansion valve (11) injects the fluid into the evaporator (10).
5	The fluid in the evaporator takes the heat from the milk in the tank and evaporates. This is how the milk is cooled.
6	The compressor (2) extracts the gas created and the cycle starts again.

Parts of the IB milk cooling tank

Illustration

The drawing below shows the most important parts of the milk cooling tank.



Parts

The table below provides an overview of all the parts:

Part	Description
1	Ice water reservoir
2	Ice water pump
3	Insulation layer
4	Agitator
5	Adjustable legs
6	Evaporator tubes
7	Spray head
8	Control panel (shape depends on the type of tank)
9	Milk outlet
10	Steps
11	Manhole, manhole cover with milk inlet
12	Pressure pipe for the cleaning system
13	Agitator motor
14	Milk cooling tank
15	Vent (the vent hole can be used as a milk inlet)

The IB cooling system

IB cooling (=Ice Bank cooling) is achieved by spraying ice water on the outer walls of the inner tank (the milk tank itself). This is a fast and efficient way of cooling.
As the stock of ice water does not have direct contact with the milk tank, the milk, even in small quantities, does not freeze.

Diagram

The diagrams below represent the IB cooling system schematically:

Figure 1

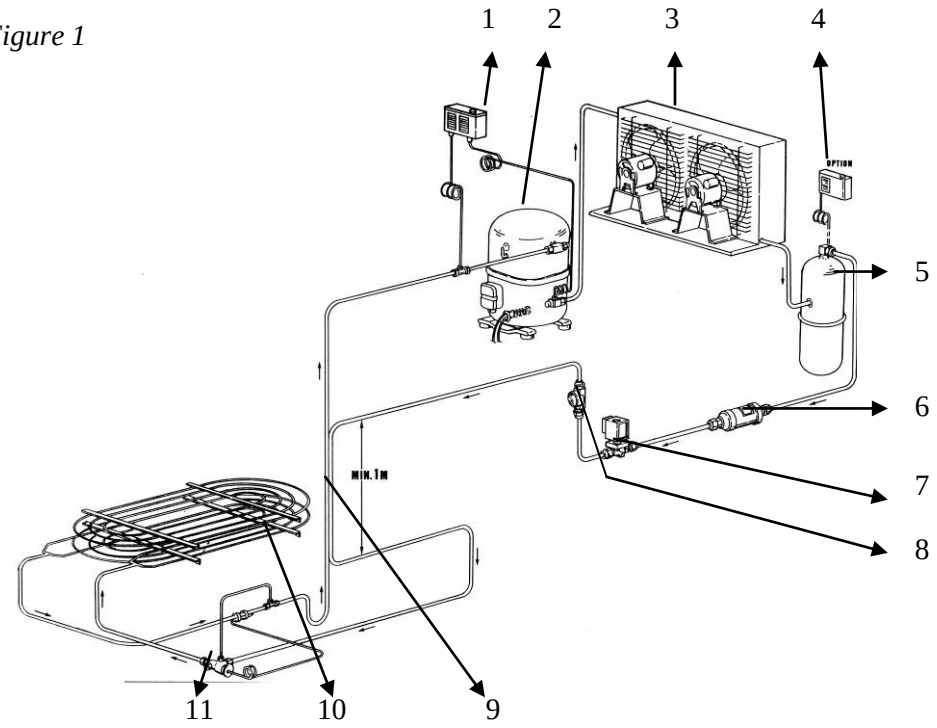
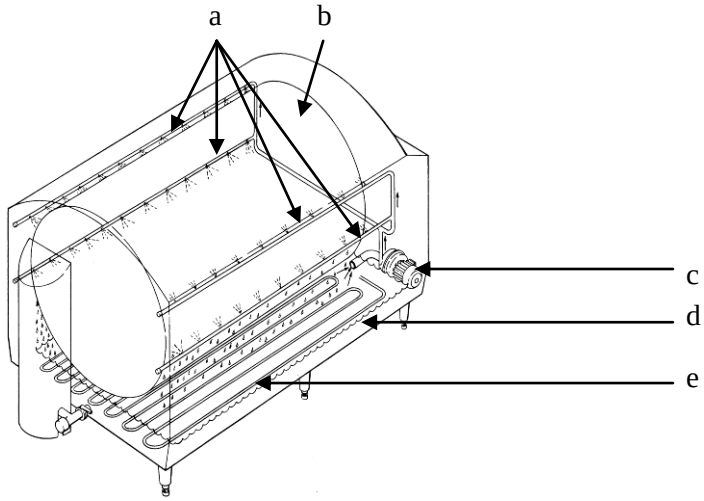


Figure 2



Parts

The table below provides an overview of the parts of the IB cooling system:

No	Description	No	Description
1	High and low pressure switch	**9**	Heat exchanger (option)
2	Compressor	**10**	Evaporator pipes
3	Air-cooled fan condenser	**11**	Thermostatic expansion valve
4	High pressure switch (option)	**a**	Spray tube
5	Liquid receiver	**b**	Milk tank
6	Filter drier	**c**	Ice water pump
7	Solenoid valve (not on OM/IB)	**d**	Ice water
8	Sight-glass	**e**	Evaporator pipes

Operation of the IB cooling system

The table below describes the operation of the IB cooling system.

Phase	Description
1	The cooling unit builds up a bank of ice around the copper evaporator pipes (10) – see figure 1.
2	The thickness of the layer of ice around the pipes is controlled by an ice thickness regulator. When the layer of ice is sufficiently thick, the cooling unit is automatically switched off. This prevents one block of ice being formed.
3	When the milk cooling is activated, the ice water is sprayed (d) by the ice water pump (c) via the spray tubes (a) along the outer wall of the milk tank (b). The water absorbs the heat of the milk. That is how the milk is cooled.
4	The heated water flows back into the ice storage tank and makes sure that the ice melts.
5	When the ice thickness regulator detects that the layer of ice is becoming too thin, the cooling unit is reactivated so that there is always a sufficient stock of ice.

Operation of the cooling unit

Phase	Description
1	The compressor (2) extracts the cooling gas out of the evaporator (10), under low pressure and pumps it under high pressure to the condenser (3).
2	The fan sucks air over the cooling fins of the condenser, so that the gas in it condenses into a liquid.

Phase	Description
3	The liquid formed in this way leaves the condenser under high pressure.
4	The thermostatic expansion valve (11) sprays the cooling fluid into the evaporator (10).
5	The cooling fluid in the evaporator absorbs the heat of the water and evaporates. This is how the water is cooled and ice is formed.
6	The compressor (2) extracts the cooling gas out of the evaporator (10), and the cycle starts again.

IB: filling the ice water reservoir

Introduction

The ice water reservoir, containing the copper evaporator pipes, must be filled with water of drinking quality. To protect the system an inhibitor must be added to the water before the start-up.

Warning

 The ice water reservoir may only be filled with water after the cooling circuit has been made vacuum and put under pressure.

Water quality

The water in the ice water reservoir should be of drinking quality as determined in European directive 80/778/EEC. To check this you can have the water analysed by a recognized laboratory.

Inhibitor

The product which is added is "1, 2, 3 Benzotriazol". The right dose is delivered with every IB tank or ice builder. It must be added to the water in the ice water reservoir by the installer when commissioning is finished.
If the water in the ice water reservoir is lost as a result of, for example, a defect or a repair, when the reservoir is refilled inhibitor has to be added again.

Concentration

A concentration of 3 mg/litre must be achieved. Consult the table below to determine how much is needed:

IB tanks Content	**Amount needed in grams**	
	4 milkings	**2 milkings**
1600 – 2200 L	3	5
2800 – 3300 L	3	5
3800 – 4400 L	3	8
5000 – 7000 L	5	8
9650	5	
12400	2 x 5	
15400	12	

How to fill it

Proceed as follows.

Step	Action
1	Remove the cover plate of the ice water reservoir.
2	Put the overflow pipe with stop in the appropriate opening in the ice water reservoir (right hand corner)
3	Fill the reservoir with water until 1 cm under the overflow pipe.
4	Add the amount of 1, 2, 3 Benzotriazol needed to the ice water reservoir.
5	Put the cover plate back in place.

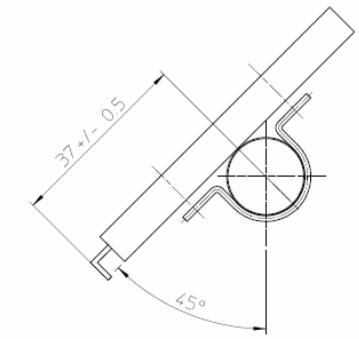
IB ice thickness sensors

OM/IB tanks 1200 liter and smaller are equipped with 1 sensor. The so called +50% sensor. Factory setting of this sensor is corresponding with an ice diameter of 76 mm (+/- 2mm)

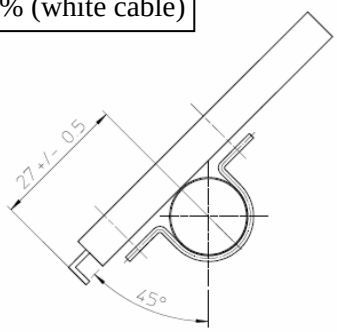
All other OM/IB and RM/IB tanks are equipped with 2 sensors, a +50% (brown cable) and -50% (white cable) one, for each cooling unit. When the -50% sensor is selected the ice is formed till a diameter of 53 mm (+/- 2 mm)

The sensor must always be installed according to underneath drawing and may not be moved

+50% (brown cable)



-50% (white cable)



How to use:

Factory settings: all IB systems equiped with a +50/-50% sensor and selector switch, the system is always set at -50%

If the milk cooling is within its limits (depending on the performance class) it is strongly advised to work with the -50% sensor, this is to avoid ice blocking. Generally this position can be used until a milk quantity equal to +/- 75% of one milking, when the milk is not pre cooled with mains water. If the milk is pre cooled this position can be used until a milk quantity equal to +/- 100% of one milking.

If the quantity of milk is increasing without pre cooling the milk with mains water, the selector switch can be set to +50%.

 Do not forget to switch back to -50% when milk production reduces.

TR15

If a time relay (TR15) is installed, the cooling unit is started with a delay. This means if milk cooling (ice-water pump) is started, the time relay is counting down and after the preset time and if not enough ice is available, the cooling unit starts forming ice.

Time switch

A time switch can be mounted in areas where electricity cost is lower during certain periods in time. This time clock controls the cooling unit to build ice in periods of low electricity cost.

Electrical

Electrical connection

Introduction

All the internal wiring was done at the factory. You will find a circuit diagram inside the control box.

Regulations

Always observe the local regulations concerning electrical installations.

Power required

The power required depends on the type of milk cooling tank and the cooling unit. (see table hereafter)

Connections

The electrical connections should be done by a qualified person; always respecting the local regulations. You will find a general circuit diagram in the electrical box of the milk cooling tank.

Crank-case heating

If the compressor has crank-case heating (CV), it should be connected. Details of the connection can be found on the "Installation diagram" inside one of the control boxes.

Softstarter

If the cooling unit is fitted with a softstarter, the correct settings have to be made. Proceed as follows:

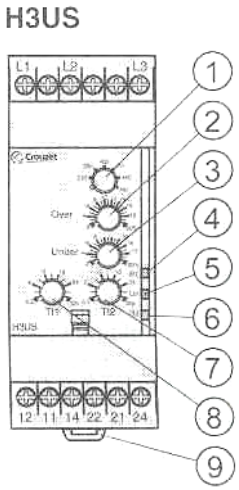
Step	Action	
1	Open the control box on the cooling unit.	
2	Open the softstarter cover.	
3	Make the correct settings using a screw driver: Acceleration time = E Initial torque = E Deceleration time = E	
4	Close the softstarter cover and the control box.	

Voltage control relay

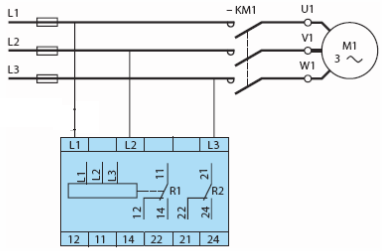
The H3US control realy controls the 3-phase network:

- overvoltage between phases
- undervoltage between phases

Description

Nr	Part	Description	Schematic
1	Voltage range selection switch (220-380-400-415-440-480V)	Select the nominal mains voltage (Un)	
2	Potentiometer for overvoltage setting, +2 → +10% (Over)	Set the maximum threshold	
3	Potentiometer for undervoltage setting, -2 → -12% (Under)	Set the minimum threshold	
4	Relay output status (yellow) LED. Over threshold (R1)	Is lit when the voltage exeeds the maximum threshold after the set delay (8)	
5	Relay supply status (green) LED. Un	Is lit when the voltage lies between the minimum and maximum voltage	
6	Relay output status (yellow) LED. Under threshold (R2)	Is lit when the voltage exeeds the minimum threshold, after the set delay(7)	
7	Threshold time delay adjusting potentiometer (0.3 → 30s): undervoltage (Tt2)	Set the time delay for undervoltage Factory settings: 4 seconds	
8	Threshold time delay adjusting potentiometer (0.3 → 30s): overvoltage (Tt1)	Set the time delay for overvoltage Factory settings: 4 seconds	
9	35 mm rail clip-in spring		

Diagram



Differential cut-out

We advise you to protect the installation with a differential cut-out of no more than 30 mA. This cut-out has to be choosen in function of the installed electrical power.
It is advisable to foresee a main switch for the electrical supply of the milk cooling tank. In case the main electrical cable is equipped with a plug, it is not necessary to install an extra circuit breaker.

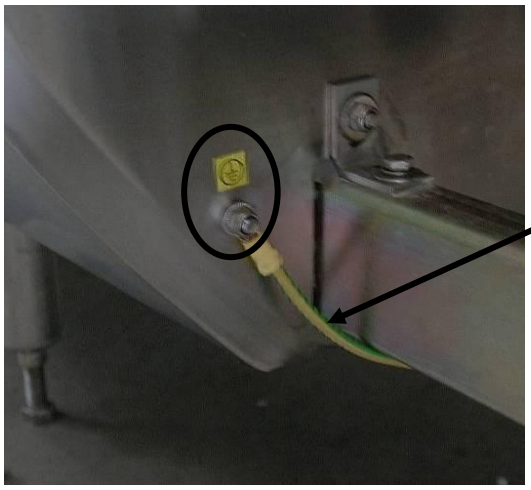
Check the local regulations.

The main switch must be lockable in the OFF position

Earth

The installation must have a good earth, earth resistance ≤ 5 Ohm, earth wire min. 6mm². Also to be checked with the local regulations.

Bonding



The bonding has to be installed by means of a yellow/green wire with ϕ 6 mm², near the connection clamp  , foreseen on the tank, the cooling unit and the main earth connection of the building and must be continuous.

Do not connect the bonding to the earth terminal strip in the electrical panel!

Power

Hereafter, the power (P) and the intensity (I) of the different cooling tanks.

REM/DX, RS/DX

Type	Content (in L)	P (Watt)/class			I max (A)/class		
		2BII	4BII	6BII	2BII	4BII	6BII
REM/DX	1050	6038	4330	-	15,90	13,01	-
	1300	7150	4330	-	16,93	13,01	-
	1700	7726	5109	-	17,92	14,00	-
	2100	9587	6038	-	20,45	15,90	-
	2600	11472	7150	-	25,15	16,93	-
	3100	12064	7726	-	25,65	17,92	-

Type	Content (in L)	P (Watt)/class			I max (A)/class		
		2BII	4BII	6BII	2BII	4BII	6BII
	3800	14674	9587	-	29,85	20,45	-
	4400	16655	11472	-	33,05	25,15	-
	5000	21444	11472	-	42,05	25,15	-
	6150	22628	14674	-	43,05	29,85	-
	7200	27848	16622	-	51,45	33,05	-
	8200	32244	21944	-	60,60	44,80	-
	9000	32244	21944	-	60,60	44,80	-
	10000	38118	21944	-	69,20	44,80	-
	12000	43072	28348	-	79,60	54,20	-
	15000	62488	32244	-	110,20	60,60	-
RS/DX	5000						
	8000	27848	16622		51,45	33,05	

LEM/DX, RS/DX

Type	content (in L)	P (Watt)/class			I max (A)/class		
		2BII	4BII	6BII	2BII	4BII	6BII
LEM/DX	5000	-	12064	9587	-	25,65	20,45
	6200	-	14674	11472	-	29,85	25,15
	7000	-	-	-	-	-	-
	8000	-	18174	12564	-	35,40	28,40
	9000	-	21944	15174	-	44,80	32,60
	10000	-	21944	17122	-	44,80	35,80
	12000	-	28348	21944	-	54, 20	44,80
	14000	-	32344	22044	-	61,10	45,30
	15500	-	39748	23228	-	72,06	46,30
	17500	-	38218	28448	-	69,70	54,70
	21000	-	43372	32544	-	80,60	61,60
	25000	-	53672	42188	-	96,40	79,60
	30000	-	62788	49776	-	111,20	90,00
LSDX	10250	-	21944	17122	-	44,80	35,80
	13100	-	28348	21944	-	54,20	44,80
	14500	-	32104	21804	-	58,15	42,35
	15500	-	39748	23228	-	72,06	46,30
	17650	-	38218	28448	-	69,70	54,70
	21500	-	43372	32544	-	80,10	61,10

Type	content (in L)	P (Watt)/class			I max (A)/class		
		2BII	4BII	6BII	2BII	4BII	6BII
	25500	-	-	-	-	-	-
	30450	-	-	-	-	-	-

REM/DIB, RS/DIB, LEM/DIB, LS/DIB

Type	content (in L)	P (Watt)/class			I max (A)/class		
		2BII	4BII	6BII	2BII	4BII	6BII
REM/DIB RS/DIB	≤ 7200	-	1500	-	-	8,25	-
	≥ 8200		2000	-	-	11,00	-
LEM/DIB	< 8000	-	1500	-	-	8,25	-
	8000-12000	-	2000	-	-	11,00	-
	14000-17500	-	2100	-	-	11,50	-
	> 17500	-	2300	-	-	12,00	-
LSDIB	10250-13100	-	2000	-	-	11,00	-
	14500	-	1860	-	-	10,30	-
	15500-21500	-	2100	-	-	11,50	-

A-TANK

Type	content (in L)	P (Watt)/class			I max (A)/class		
		2BII	4BII	6BII	2BII	4BII	6BII
A-TANK	8150	27848	16622		51,45	33,05	-
	10350	38118	21944		69,20	44,80	-
	12300	43072	28348		79,60	54,20	-

RM/IB

Type	Content (in L)	P (Watt)/class			I max (A)/class		
		2BII	4BII	6BII	2BII	4BII	6BII
RM/IB	1600	7038	5330	-	22,00	19,11	-
	2200	8726	6109	-	24,02	20,10	-
	2800	10587	7038	-	26,55	22,00	-
	3300	12472	8150	-	31,25	23,03	-
	3800	13064	8150	-	31,75	23,03	-
	4400	15674	8726	-	35,95	24,02	-
	5000	17622	10587	-	39,15	26,55	-
	6000	18122	10587	-	41,90	26,55	-

Type	Content (in L)	P (Watt)/class			I max (A)/class		
		2BII	4BII	6BII	2BII	4BII	6BII
	7150	-	12972	-	-	34,00	-
	9650	-	19222	14073	-	48,00	40,10
	12400	-	-	17274	-	-	44,80
	15400	-	-	19222	-	-	48,00

OM/DX, OM/IB

Type	content (in L)	P (Watt)/class			I max (A)/class		
		2BII	4BII	6BII	2BII	4BII	6BII
OMIB	600	2061	1838	-	4,83	4,04	-
	800	2960	1838	-	6,07	4,04	-
	1000	4029	2127	-	7,25	4,41	-
	1200	4029	2061	-	7,25	4,83	-
	1500	4958	2960	-	9,15	6,07	-
	1800	5500	3250	-	9,48	6,26	-
	2300	6646	4029	-	11,17	7,25	-
OMDX	300	1588	1033	-	3,54	5,25	-
	450	1811	1301	-	4,33	3,16	-
	600	2710	1877	-	5,57	3,91	-
	800	3779	1811	-	6,75	4,33	-
	1000	4708	2710	-	8,65	5,57	-
	1200	5250	2710	-	8,98	5,57	-
	1500	5820	3779	-	9,68	6,75	-
	1800	8257	3779	-	13,20	6,75	-
	2300	10142	5250	-	17,90	8,98	-
	2750	10954	6040	-	19,40	10,68	-
	3400	13564	6616	-	23,60	11,67	-

EIB, IBR, IBR (COMPACT)

Type	Type	P (Watt)/class	I max (A)/class
EIB (high)	15	5300	14,50
	25	7008	17,50
	40	9426	22,00
	60	13172	27,50
	80	16374	34,00

Type	Type	P (Watt)/class	I max (A)/class
	120	23144	45,50
	160	29548	56,50
	320	63688	109,80
IBR (low)	40	8696	19,50
	60	12442	26,50
	90	13034	27,50
	120	23144	45,50
	135	27461	49,50
IBR (compact)	5	282	5,00
	7.5	377	5,50
	12	373	6,00
	16	713	7,50

ATTENTION: REM/DIB, LS/DIB, LEM/DIB and LS/DIB (single-phase connection). The power and the intensity are only for the tank, so without the ice-builder and its cooling group.

Supply cable

Hereafter the types of cables, to be used in function of the main fuse:

I max A	cable n x ∅ (mm^2)	Main fuse (circuit breaker) A
< 10	4x1,5+1,5	16
10-20	4x2,5+2,5	20
20-25	4x4+4	25
25-35	4x6+6	40
35-50	4x10+10	50
50-63	4x16+16	63
63-80	4x25+25	80
80-100	4x35+35	100
100-125	4x50+50	125
125-160	4x70+70	160

Always us a safety fuse, type "AM".

Cleaning

Connection to the water mains (with automatic cleaning)

Water quality

The cleaning water must be of drinking water quality as determined in European directive 80/778/EEC. You can have the water analysed at a recognised laboratory to check it.

Water pressure and flow

Water pressure: minimum 1.5 bar, maximum 5 bar
Flow: minimum 20 litres/minute

Connect to the water mains

Connect the cold water valve (blue sticker) and the hot water valve (red sticker) to the cold and hot water taps provided by the dairy farmer. Use heat and pressure-resistant flexible hoses with the following diameters:

Type of cleaning system	Inner diameter
Standard cleaning (1 agitator)	13 mm
Standard cleaning (>1 agitator)	18 mm
ECO-WASH	18 mm

For ECO-WASH: only use supply pipes with a diameter of minimum ¾" (18 mm)

About cleaning the milk cooling tank

Why clean it?

Thoroughly cleaning and disinfecting the tank guarantees:

- Hygienic storage and therefore higher quality milk.
- A longer life of the system.

Automatic cleaning system

It is difficult or impossible to manually clean a closed tank. That is why closed tanks are always fitted with automatic cleaning systems. The automatic cleaning system:

- Removes all traces of milk from the tank.
- Removes milk stone from the tank walls (with an acid cleaning agent).
- Disinfects the tank.

When to clean

You must clean the tank before you put fresh milk in it:

- After every collection.
- If you have not used the tank for a week or more.

Operation of the automatic cleaning system

The tank is cleaned in phases, each phase using an amount of water equal to 1% of the tank content, with a minimum of 25 litres.

Phase	Description
1*	A first pre-rinse with cold water removes the remains of milk. If your system has a second outlet valve, the rinse water is discharged separately.
2	A second pre-rinse with hot water removes remains of milk and preheats the tank.
3	The main cleaning is carried out with hot water and the cleaning agent of your choice. This treatment gives you a clean and hygienic tank.
4*	The tank is rinsed first time with cold water.
5	Second rinsing is again with cold water. This phase is made redundant by the ECO-WASH.

* With ECO-WASH these two phases are pump flushes. The cleaning pump is turned off and on several times. There are 2 cold pre-rinse flushes and 3 after rinse flushes. Each flush uses approximately 20 litres of water.

Options

Automatic dosing

With the automatic dosing, the system ensures that the right amount of cleaning agent is automatically taken into the cleaning water. The alternation of cleaning products occurs automatically (see specific installation manual on controls)

ECO-WASH

This is an automatic cleaning system that reduces the cleaning time to 50% of the standard automatic cleaning system. Another advantage is the reduction of the cold water consumption.

Manual cooling and cleaning

Your milk cooling tank can be equipped with timers that allow you to manually activate cooling, agitation and cleaning in case of a break down of all automatic functions.

Separation of the rinse waters

With the standard drain valve, all the cleaning water runs into the sewer. A second drain valve can be fitted to allow the milky water remains of the first rinse be piped to a separate drain.

Second dosage cup or third dosage pump

Using the second dosage cup or third dosage pump, allows you to add a disinfectant to the final rinse water.

Drain water detection

An extra sensor can be mounted to check if there is still water in the tank at the end of the cleaning cycle.

Hot water boiler

If a warm water boiler is installed the capacity required depends of the volume of the tank. Make sure you install a boiler that gives enough warm water for both warm water cycles. E.g. 10000 liter tank, 200 liter of warm water is needed; a boiler 25% more in capacity has to be installed to be sure enough water is available for the main wash.

More information

If you would like more information about one of the options, please consult your after-sales department.

Cleaning agents

Choise of cleaning agent

There are two types of cleaning product for the inside of the milk-cooling tank:

- Base (alkaline): cleans, degreases and desinfects
- Acid: cleans and removes milk stone.

Using acid or alkaline cleaning products

PACKO INOX N.V. advises:

- To alternate with acid and alkaline products.
- Or to use an acid one at least once a week.

Warning

 Never mix alkaline products with acids or products containing chlorine. Mixing them will cause a chemical reaction resulting in poisonous gases!

Recommended products

PACKO INOX N.V. recommends the following cleaning agents:

Type	Name	Art. no.	content
Alkaline	FULL CLEAN DA	36861	23 kg
Acid	FULL CLEAN S	36860	25 kg

 Never use an alkaline cleaning agent, which is older than 6 months after the purchase date.

 Never use a foam forming product.

Dose

Follow the instructions either on or with the product. Note that for automatic cleaning the amount of water is approximately equal to 1 % of the tank content but with a minimum of 25 litres.

Example: For a 2,000 litre tank, the amount of cleaning water is 25 litres.

Automatic dosing

In case of automatic dosing, the drums of cleaning agent should be connected as follows:

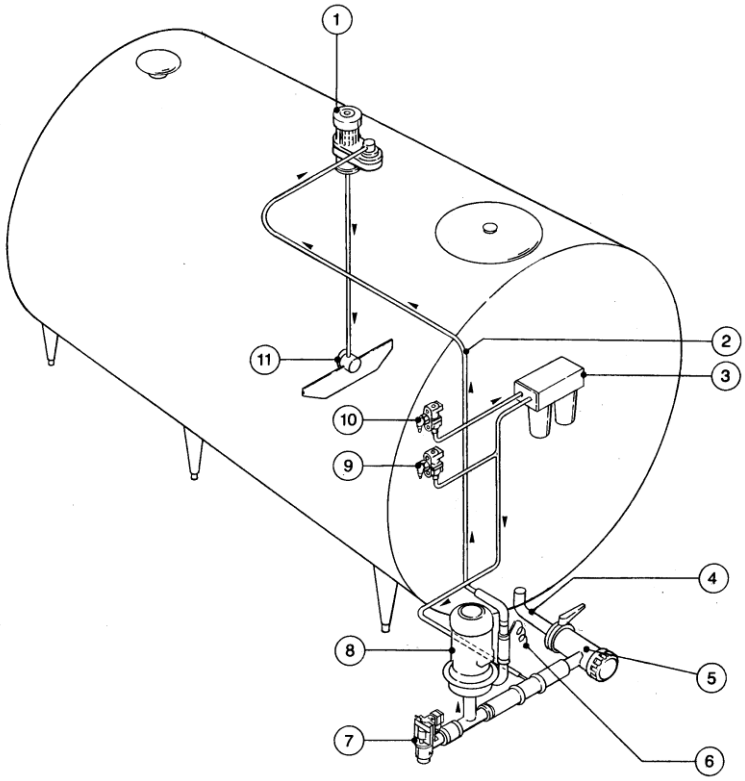
- Connect a drum with an alkaline product to the blue hose.
- Connect a drum with an acid product to the red hose.
- Connect a drum with desinfectant with a white/transparent hose.

The output of the standard dosage pumps is 280cc/min at 50Hz.

The standard automatic cleaning system

Picture

This drawing represents the standard automatic cleaning system.



Parts

The table below provides an overview of the parts of the standard cleaning system. The arrows indicate the flow of the cleaning water.

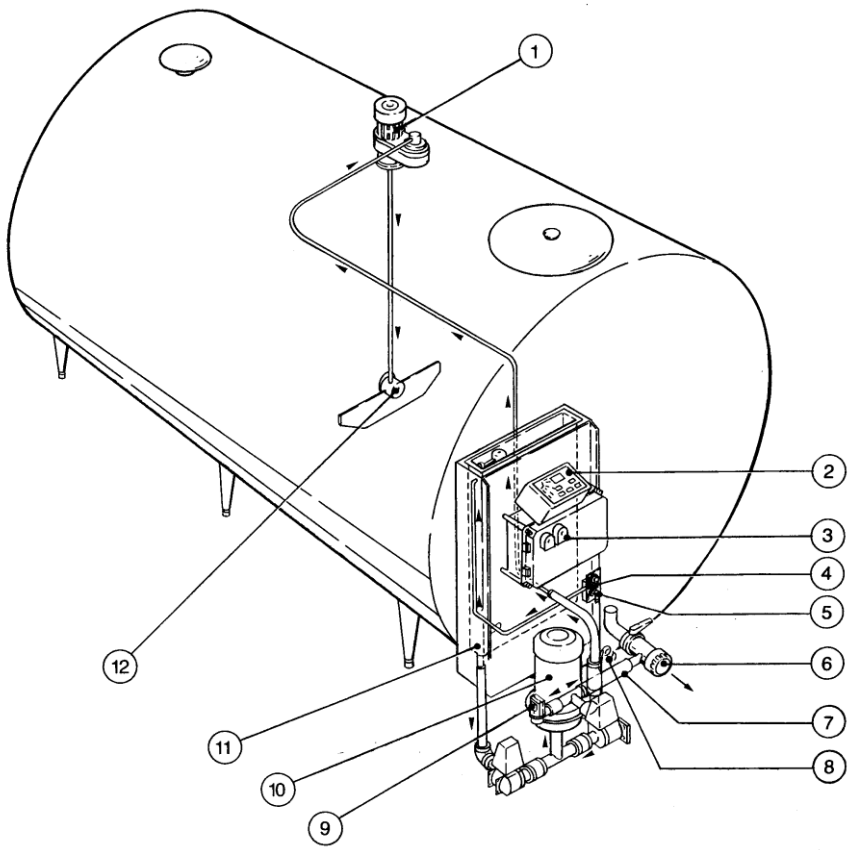
N°	Description	N°	Description
1	Agitator motor with rotating water coupling	**7**	Dump valve
2	Pressure pipe	**8**	Cleaning pump
3	Water box with dosage cups (second container = option)	**9**	Cold water inlet valve
4	Outlet tank	**10**	Hot water inlet valve
5	Self washing outlet	**11**	Roto-Jet Spray ball
6	Level sensor for the cleaning water		

The standard automatic cleaning cycle can also be equipped with automatic dosage.

The ECO-WASH automatic cleaning system

Picture

This drawing represents the ECO-WASH automatic cleaning system.



Parts

The table below provides an overview of the parts of the standard cleaning system. The arrows indicate the flow of the cleaning water.

N°	Description	N°	Description
1	Agitator motor with rotating water coupling	**7**	Suction pipe of the cleaning pump
2	The Dolphin control panel	**8**	Level sensor of the cleaning water
3	The dosage pumps for the cleaning agent.	**9**	Dump valve
4	Cold water inlet valve	**10**	Cleaning pump
5	Hot water inlet valve	**11**	Water reservoir
6	Milk outlet (optional self cleaning outlet)	**12**	Roto-Jet Spray ball

Manual cooling and cleaning (option)

Warning

The manual cooling function is only to be used in case of a breakdown of all automatic functions and under permanent supervision!

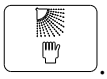
Manual cooling

Proceed as follows to start up manual cooling:

Step	Action
1	Remove the protective cover from the operator console.
2	Set the desired cooling time using the timer  . Mind that the cooling will not stop automatically when the setpoint temperature is reached - in DX tanks there is danger of freezing. Do not set too long a cooling time and regularly check the milk temperature.

Manual cleaning

Proceed as follows to clean the tank manually:

Step	Action
1	Screw the wash cap to the milk outlet or attach the rubber connection from the cleaning pump to the outlet.
2	Open the outlet valve.
3	Fill the tank with water via the manhole with ± 1% of its nominal volume. Depending on the cleaning phase (see next page), use hot water and a cleaning agent. • Follow the instructions enclosed or on the packaging of the cleaning agent. • Make sure the alkaline cleaning agent is not too old. It should not be older than 6 months after the purchase date
4	Close the manhole cover and check that the vent and the rubber plug are fitted.
5	Set the required circulation time (see next page) using timer  .
6	After the cleaning pump has stopped, open the outlet valve and remove the wash cap or the rubber connection.
7	Empty the tank.
8	Repeat steps 1-7 for each of the cleaning phases stated on the next page.

Cleaning phases

First hose the milk residues out of the milk vessel

To guarantee a sufficiently clean tank, clean it in three phases as described below:

Stage	Description
1	Rinse the tank with warm water for 2 minutes.
2	Clean the tank with hot water and a cleaning agent for 12 minutes. The water temperature required depends on the type of cleaning agent. - check the instructions on the drum for each cleaning product
3	Rinse the tank with cold water for 2 minutes.
4	Rinse the tank a second time with cold water for 2 minutes. (If applicable use a desinfectant)

Commissioning

See relevant installation manuals:

Dolphin: 160183

PCV-3: 155480

Maintenance and trouble shooting

Overview

Introduction

This chapter provides you with guidelines for maintenance and will help you to look for a solution if problems occur.

Maintenance and checks

Introduction

Regular and preventive maintenance:

- prevents loss of milk quality;
- guarantees a long life of the system;
- guarantees optimum return of the cooling unit;
- prevents defects and repairs.

 Let your tank be maintained by qualified personnel of the after-sales-service.

Clean the outside

Clean the outside of the milk cooling tank every week. Use a kitchen cleaning agent (f.e. CIF 500 ml). Always rinse thoroughly afterwards with pure water (= drinking water) and dry off.

 *Never use cleaning agents which contain chlorine, or the products for internal cleaning. These can harm or damage the cooling tank.*

Cleaning the inside

Clean the tank every time milk has been collected.
Clean the tank at least once a week with an acid cleaning agent to remove milk stone.

 *Wear protective gloves and safety goggles whilst using the cleaning agents.*

Cleaning the condensor

Too much dust on the fins of the condenser hinders good cooling. Regularly (e.g. every month) remove the dust from the fins of the condenser with a brush or an air compressor.
If the fins are damaged and pressed flat, you can put them back in place using a specially designed comb (part number 95820).

Checks

These points should be explaned to the farmer when handing over the installation after commissioning.

The list below provides an overview of all the checks that should be carried out regularly:

- Check the milk temperature at the end of each milking and when leaving the milking room.
- Check the milk outlet pipe and complete tank after each cleaning.
- Check all the water supply pipes, valves and taps for leaks.
- Check the oil level of the compressor using the sight-glass. The level should be at least 1/4 of the sight-glass.
- Check the sight-glass in the cooling circuit. You should not be able to see any vapour bubbles ones the system works for minimum 0.5 hours.
- Check the operation of the agitator.
- For IB tank only: check if there is sufficient water in the ice water reservoir: ± 1 cm below the overflow pipe.

Solving problems

What to do in case of a problem

You can solve a lot of problems yourself using the information in this chapter.

 **Electrical or cooling technical repairs may ONLY be carried out by trained staff. In that case, contact the after-sales department.**

 For more info to solve problems related to the control unit, consult the specific parts of the installation manual.

After-sales department

It is best to give the after-sales department the following information so that it can help you as quickly as possible:

- The serial number – see identification plate.
- The type and content of the system – see identification plate.
- Options (example: automatic dosing, extra discharge, etc).
- Clear description of the problem as possible.
- When, how long and how often the problem occurs.

Safety fuses

There is a spare for every type of safety fuse in the switch box. If you have used a safety fuse, get a replacement spare as quickly as possible from the after-sales department.

 *__Always__ replace a safety fuse with a new safety fuse of __exactly the same type__. __Never__ bridge a safety fuse.*

Direction of rotation of the motors

 Always check the rotation direction of all the motors when work has been carried out to the electrical installation. The rotation direction is indicated by an arrow.
If the rotation direction does not correspond, contact the after-sales department.

Cooling compressor

As a result of a built-in safety feature, the cooling unit may start up for a very short time when the cooling is inactive.

Manual cooling and cleaning

If your milk cooling tank is equipped with the manual cooling and cleaning option you can, is case of a breakdown of all automatic functions, activate the cooling manually for a short period of time. The tank can also be cleaned semi-automatically.

Specials

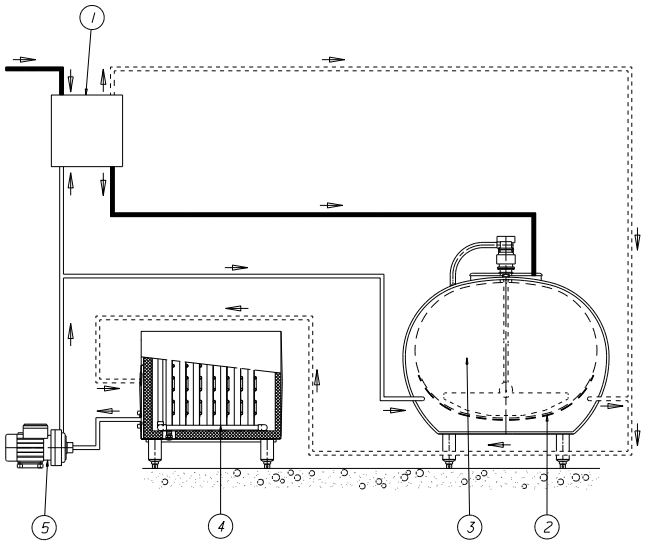
The DIB cooling system

The DIB cooling system

Together with the milk tank, the double-walled, stainless steel heat exchanger forms one unit. The supporting plate is laser welded to the flat plate of the inner tank (the real milk tank) and expanded under pressure.
At the bottom of the milk cooling tank, the ice water is pumped into the heat exchanger through a multi injection manifold. At the top, the warmed up ice water is extracted. In this way, the heat exchanger surface is used for the full 100 %.
The various injection points are connected by stainless steel collector pipes. This is called the MULTI injection system.

Schematic overview

The drawing below gives you a schematic overview of the DIB cooling system with pre-cooler:



Parts

Part	Function
1	Pre-cooler (optional)
2	Heat exchanger
3	Milk cooling tank
4	Ice-builder: ice + ice water
5	Ice water pump
	Ice water
	Warmed up ice water
	Milk

Operation

In the table below, you will find a description of the operation of the DIB cooling system:

Stage	Description
1 *	The fresh milk runs through the pre-cooler (1).
2 *	Ice water, coming from the ice builder (4), is pumped in counter flow through the same pre-cooler by means of the ice water pump (5).
3 *	The ice water in the pre-cooler takes the heat from the milk. This is how the milk is pre-cooled.
4	The milk now runs into the milk cooling tank (3).
5	Ice water is also being pumped into the heat exchanger (2) of the milk cooling tank.
6	The ice water in the heat exchanger takes the heat from the milk. The milk is now being cooled until the temperature setpoint is reached.
7	The warmed up water, coming from the pre-cooler as well as from the heat exchanger of the milk cooling tank, runs back to the ice builder (4) for cooling.
8	The cycle is repeated.

* Optional, only when there is a pre-cooler present.

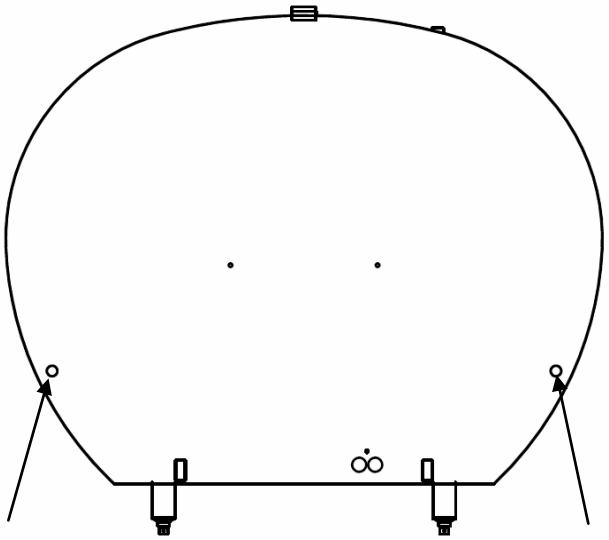
DIB: connection to the ice builder

Introduction

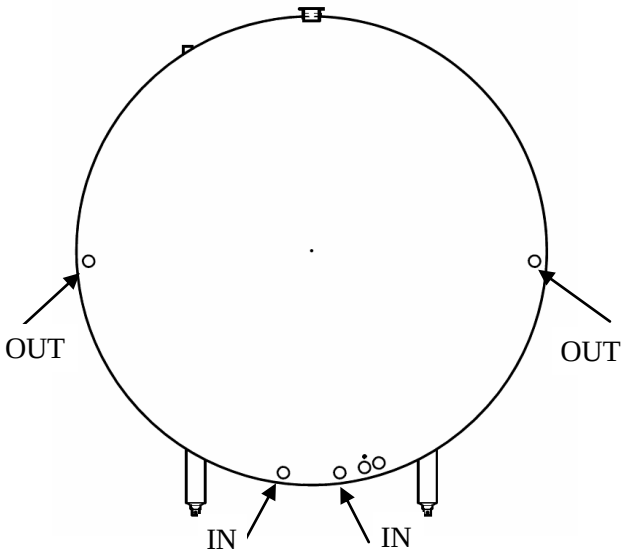
You have to connect the milk cooling tank to an ice builder by means of a supply pipe and an outlet pipe.

Connection at the milk cooling tank

You will find the connection points for the supply and outlet pipe(s) of ice water at the backside of the milk cooling tank.



On small tanks, equipped with only 1 heat exchanger, you will find 1 connection point on the right hand side and one on the left hand side. It is not important which one is used as inlet.



On big tanks, equipped with 2 heat exchangers, you will find 2 inlet and 2 outlets. The 2 heat exchangers each have to be connected to an ice water pump.

	OD connection	Reduction G - glue		Reduction glue	
		Ø	Ref.	Ø	Ref.
OM/DIB	G ¾"	¾"-25/32	128655	32F-32F	23826
REM/DIB	G 1¼"	1¼"-40/50	128656	40M-32F	26466
LEM/DIB	G 1½"	1½"-50/63	128657	50M-32F	27824

Connection at the ice builder

Check the installation manual of your ice builder.

Attention

- See to it that all connections are leakproof.
- Only use copper, PVC or stainless steel pipes.

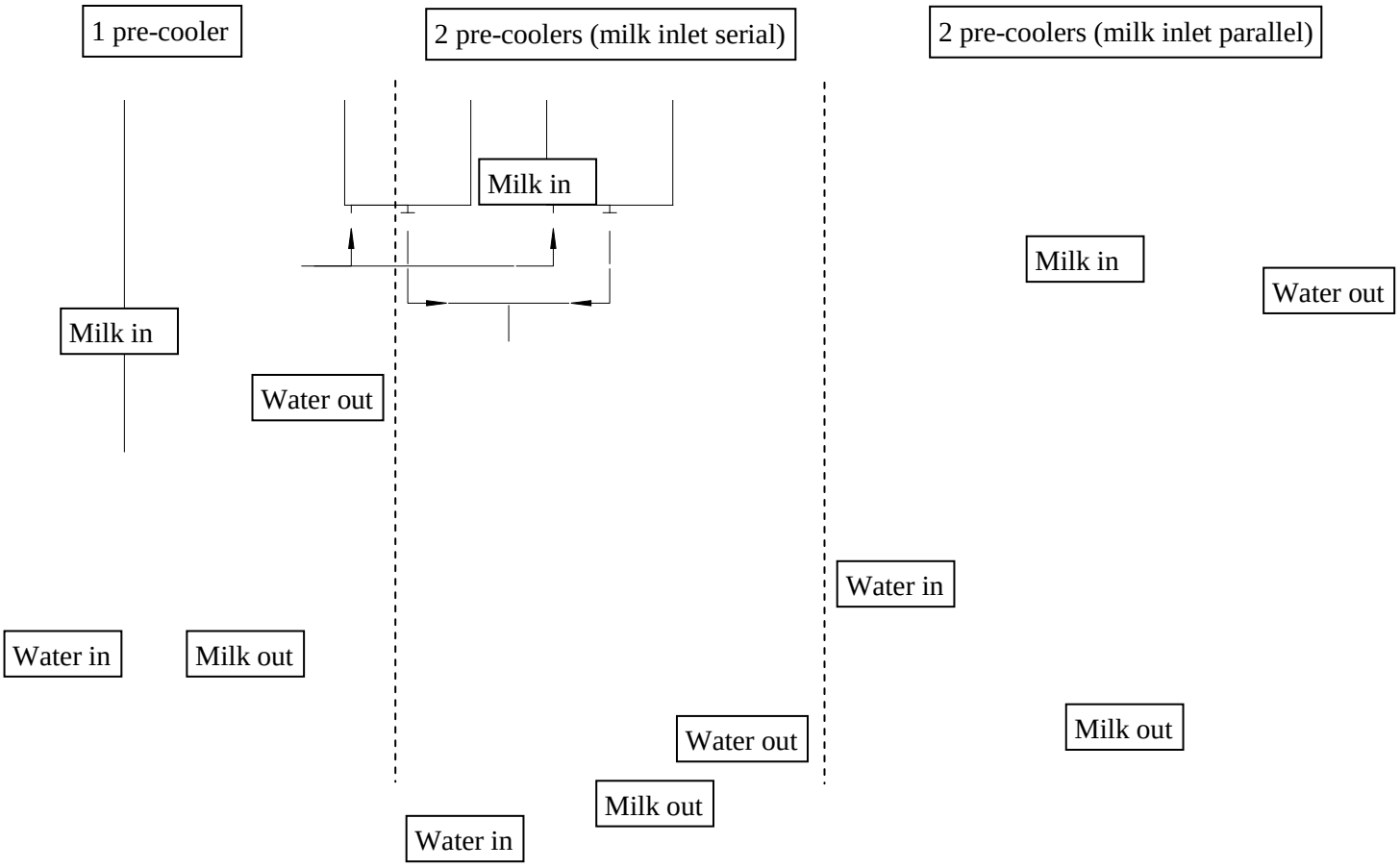
- Restrict the distance between the ice builder and the milk cooling tank.
- In order to reduce heat losses, we recommend to properly insulate the pipes for icewater circulation (e.g. 15 mm Armaflex)

Pre-cooling

Pre-cooling is used to cool down the milk by means of spring water or ice water before the milk enters the milk cooling tank.

Installation

Depending on the volume of milk one or more pre coolers can be installed.



One pre-cooler can be used to pre cool 1000 liter of milk/hr. To further cool down the milk a second pre-cooler can be used (see 2 pre coolers (milk inlet serial)). For more than 1000 liter milk a second pre-cooler should be installed in parallel (see 2 pre coolers (milk inlet parallel)).

The volume of a pre-cooler is 7.6 liter. For good results the milk should enter in batches of 7.6 liter. Water supply must at least continue for 40 seconds after the milk pump has stopped. Water flow must be equal or bigger than the milk flow.

 It is strongly recommended, when the milk line is cleaned with hot water, a pressure relieve valve (max. 5 bars) should be fitted at the water outlet side as close as possible to the tubular cooler.