

INSTALLATION AND OPERATION MANUAL

BUUS FLAKE ICE MACHINE **Type C, D, E & F**



Section 1.

BUUS flake ice machine: general information

Congratulations on your BUUS flake ice machine. BUUS flake ice machines are among the most efficient flake ice machines available. Your flake ice machine will produce subcooled flake ice using the lowest possible power consumption. The best materials and components were used to manufacture the ice machine. The ice machine was produced with great care, and post-production testing was done.

Several design options are made in building a standard ice machine. This instruction book covers all types of BUUS ice machines—type C, D, E and F ice machines with serial numbers up through 1582.

At Buus Køleteknik A/S, we keep an index containing all the data for every ice machine that we have produced. We enter information on all the parts that are used and data from test runs into the index.

When ordering spare parts, please indicate the ice machine's serial number so that the index is kept as well updated as possible. When you provide us with your serial number, you can be sure that you will receive the right spare part from us.

All type C, D, E & F BUUS flake ice machines are produced with a horizontal, rotating aluminium drum that rotates in a water trough. When the drum is cooled, ice forms on the surface. The ice hits an ice knife on the front of the ice machine and slides down the ice chute.

The ice machines are equipped with a primary and a secondary seal so that there is maximum security against leakages of refrigerant and coolant.

This manual contains the information necessary for installing and connecting your flake ice machine. Note that the flake ice machine should be installed and launched by trained refrigeration technicians.

Legislation: Be aware that local legislation has to be complied with.

This manual is not limited to your ice machine, as it describes all ice machines starting with series number 2100 onwards.

Sincerely,

BUUS Køleteknik A/S.

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Functional description

BUUS flake ice machine models C, D, E and F are made with corrosion-resistant material, aluminium, stainless steel, and synthetic materials.

The flake ice machines operate under the rotating evaporator principle which is, i.a., used in the food industry and used where there is a need for high quality flake ice. The parts of the machine that come in contact with production water are made of food grade materials.

The machines are approved for use with food in accordance with applicable norms.

The freezing drum, in which the ice is formed, is made of surface-treated aluminium. Aluminium is greatly thermally conductive. This makes for fast freezing and high capacity in relation to the size of the drum.

All BUUS flake ice machines are able to, without making changes in construction, produce subcooled saline ice.

The frame and cabinet are made of stainless steel.

Drum dimensions and capacity:

Diameter, $\varnothing 263$. This is applicable for all the types of machines covered by this manual.

Type	kilograms flake ice per 24 hours	length in mm.
C	700-2000	264
D	1000-3500	565
E	3000-5000	785
F	5000-10000	1108

The flake ice machine is designed to be used with CO₂, CFC/HCFC, brines and ammonia. The ice machine has a horizontal, rotating freezing drum. The interior of the drum is cooled by an evaporating refrigerant or by a secondary refrigerant. The exterior surface, depending on the type of ice machine, is submerged and/or sprinkled with water.

Some of the water freezes to the cold surface of the drum. Excess water returns to the water tank. In marine type machines, the water level is low and some of the water in the water tank therefore gets pumped into the sprinkler piping which floods the drum.

The water level in the water tank is held constant through the addition of water through a float valve.

If the ice machine comes equipped with a water pre-cooler, the water gets cooled down to approximately 15°C before it is brought to the water tank. The water pre-cooler is installed in the cabinet.

The water pre-cooler can also be installed separately and service several machines: It can be left out if the temperature of the production water does not exceed 20°C.

The ice on the drum's surface can be removed using an ice knife. The ice then slides out via the ice chute on the ice machine's front side.

BUUS flake ice machines make dry, subcooled ice. On the land models, it is possible to adjust the quality of the ice by changing the drum's RPM. A lower RPM makes for thicker ice but lower ice production. A higher RPM makes for a thinner ice but higher production. This depends, however, on the cooling capacity available on the unit. In addition, with the land models, water level can be adjusted. This must, however, be done carefully because low water levels result in very subcooled ice which can bind strongly on the drum and unnecessarily strain the ice knife. On marine models, it is possible to adjust the amount of water in the sprinkler piping using a ball valve.

The drum is operated by an electric motor over a V-belt to a worm gear or by a fixed gear which pulls the drum. The marine model's water pump is installed on the gear's output shaft. The water pump can also be electrically powered.

The transmission is protected against overloads with a safety wedge placed under the gear wheel on the gearbox's output shaft.

The drum is supported by plain bearings at each end. The ice machines are equipped with primary and secondary shaft sealing. In case of leaks in the axle box, dynamic seals protect against refrigerant leakage.

The dynamic seals protect against water intrusion from the water trough.

The plain bearings and the gear transmission are grease-free and therefore require only a minimum level of service.

Refrigerants - coolants

HFC/HCFC.

Direct expansion.

An automatic expansion valve helps to regulate the refrigerant supply. The expansion valve ensures correct refrigerant injection. Superheat is adjusted on the expansion valve.

Pump circulation:

When it is supplied, the refrigerant is pumped through a manual throttle valve, and there is an automatic aspirated constant pressure valve.

Brine:

Glycol, Temper® or the like are pumped through the drum. Valves help to regulate the refrigerant. The brine ice machine is supplied without valves.

NH3 (Ammonia):

Direct expansion:

There is automatic regulation which uses an electronic injection valve that is controlled by its corresponding controller.

The controller can be adjusted so that it corresponds to Buus Køleteknik A/S specifications.

Pump circulation:

When it is supplied, the ammonia is pumped through a manual throttle valve, and there is an automatic aspirated constant pressure valve.

CO2

Direct expansion:

There is automatic regulation which uses an electronic injection valve that is controlled by its corresponding controller.

The controller can be adjusted so that it corresponds to Buus Køleteknik A/S specifications.

Pump circulation:

When it is supplied, CO2 is pumped through a manual throttle valve, and there is an automatic aspirated constant pressure valve.

Protection against ice in the water trough

The ice machine is protected against frosting in the water trough with the help of a frost protection thermostat and a thermostat that controls the heating elements in the water

tank. If the water temperature in the water tank is too low, the heating elements will be activated. If this is not sufficient to maintain the temperature at above the freezing point, the frost protection thermostat stops the inflow of refrigerant to the drum and a solenoid valve in the liquid piping locks.

If the water inflow to the water tank stops, a pressure regulator in the water pipe will stop the refrigerant inflow by locking the solenoid valve in the liquid piping.

Water quality

The ice machine is designed to also produce ice using fresh water, lightly salted water, and salt water. If water with a low calcium content or with no calcium is used, it is necessary to add saline solution to the water.

If water with low calcium content is added to the ice machine, the ice will freeze excessively on the drum and will break off into very small flakes on the ice knife. The ice will therefore be less suitable for use and could also hinder the optimal functioning of the ice machine.

If adding salt is necessary, a salt dosing system should be connected to the ice maker.

Application

The user instructions are to be used for the operation and maintenance of the ice machines. If the working area for the ice machine is changed or if the refrigerant is changed, the supplier should be contacted as there could be a risk of accident.

BUUS flake ice machines are designed for continuous operation and may be started one time per hour at a maximum.

Planning and calculations

Planning and calculations for the cooling system are to be done according to an updated ice machine report in which capacities and the like are given. These documents can be obtained via Buus Kølleteknik A/S.

Service

Maintenance and repairs which require professional expertise shall be carried out according to service instructions by trained installers.

Avoidance of liquid slugging

To avoid liquid slugging, it is very important to keep the suction gas superheated at the point of entry to the compressor. Depending on the refrigerant and compressor type used, superheating to a minimum of 8-10° is suggested. The superheat is controlled with an expansion valve. As the valve(s) is/are automatic, it/they can be regulated for plenty of liquid. Therefore, the temperature of the compressor should be measured.

Legislation

Installation, operation and service should be carried out in accordance with applicable legislation which varies country to country. The components must be approved and set in accordance with the legislation.

Additional information

Any inquiries regarding installation, service, operation, maintenance or spare parts should be directed to your distributor.

Codes determining ice machine type

Expansion type:	'P'=pump circulation (all types of refrigerant). 'T'=direct expansion (applies only to NH3 flake ice machines)
Coolant:	'A'=NH3. 'B'=brine. 'C'=CO2. 'S'=HFC/HCFC.
Drum size:	'C', 'D', 'E' and 'F'.
Capacity in kg/24h:	700 → 10,000kg/24h
Marine version:	'M' if the machine is to be used on fishing vessels.
Compressor:	'U' if the machine is delivered together with a compressor system.
Condenser:	'L'=air cooled. 'SW'=cooled with sea water. 'W'=cooled with fresh water
Tropical model:	'T'. For units.
Split model: placed	'S'. The ice machine and compressor system are to be separately placed
Water pre-cooler:	'P'. Built-in water pre-cooler.
Salt-water ice:	'N'. Applies only to units.
With no cabinet:	'Y'. Ice machine without a cabinet. Only applies to flake ice machine units without a compressor unit.
With no cabinet: and frame:	'G'. Ice machine without a cabinet and base frame. Applies only to flake ice machines without compressors.
Machine for foodstuff:	'O'. Machines for foodstuff. Used for special flake ice machines. Only applies to flake ice machines without compressors.

Example:

PAF6000MUSWTSN

P:	Pump circulation.	A:	Ammonia.
F:	F drum.	6,000:	6,000 kg of ice per 24 hours.
M:	Marine models.	U:	Complete with a comp. unit.
SW:	Sea-water-cooled condenser.	T:	Tropical model.
S:	Split model.	N:	Sea-water ice.

Name plate information

All BUUS ice machines come with a name plate, as is shown below.
 In all inquiries, the three or four digit "FACTORY NO." should be provided.
 The name plate is installed on the gear side of the ice factory.



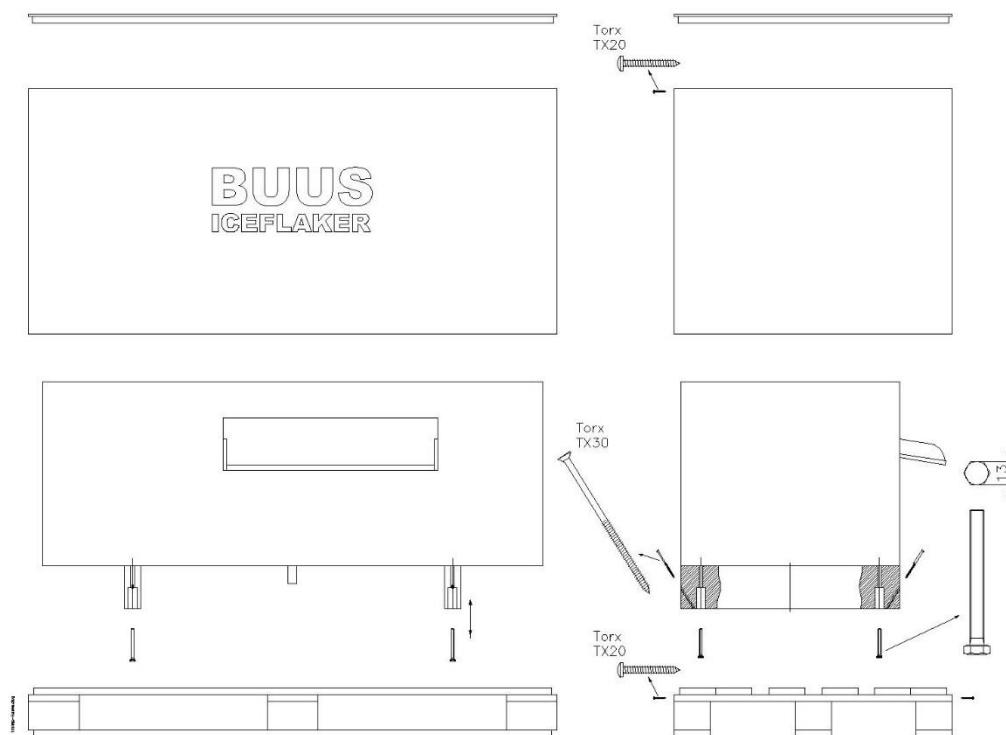
Section 2. Transportation and handling

Measurements and weight:

<i>Model</i>	<i>With a stainless steel cabinet. Measurement. LxHxB (mm)</i>	<i>With a stainless steel Cabinet. Weight. Kg.</i>	<i>Without a stainless steel cabinet. Measurement. LxHxB (cm)</i>	<i>Without a stainless steel cabinet. Weight. Kg.</i>
CC, SC & BC	960x515x605	99	950x500x605	90
CD, SD & BD	1385x510x605	190	1250x500x605	130
CE, SE & BE	1385x510x605	200	1350x500x605	140
CF, SF & BF	1885x510x605	260	1850x500x605	180
AC	970x515x605	140	950x500x605	130
AD	1385x510x605	210	1250x500x605	150
AE	1385x510x605	220	1350x500x605	160
AF	1885x510x605	280	1850x500x605	200

Handling and unpacking

The shipping box and shipping brackets are removed by removing the marked screws. Use lifting equipment when handling the ice machine.

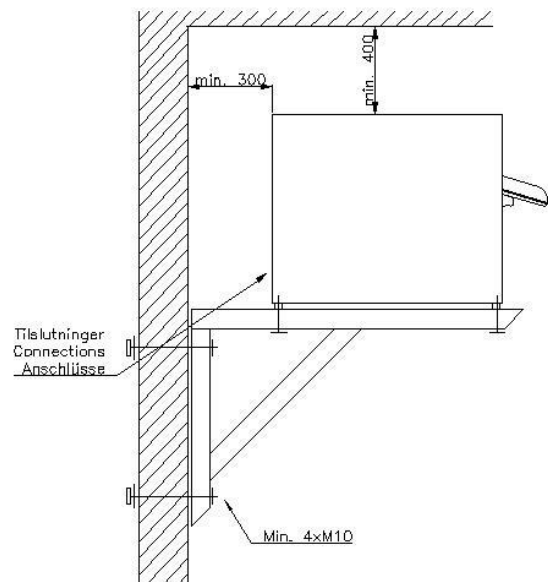
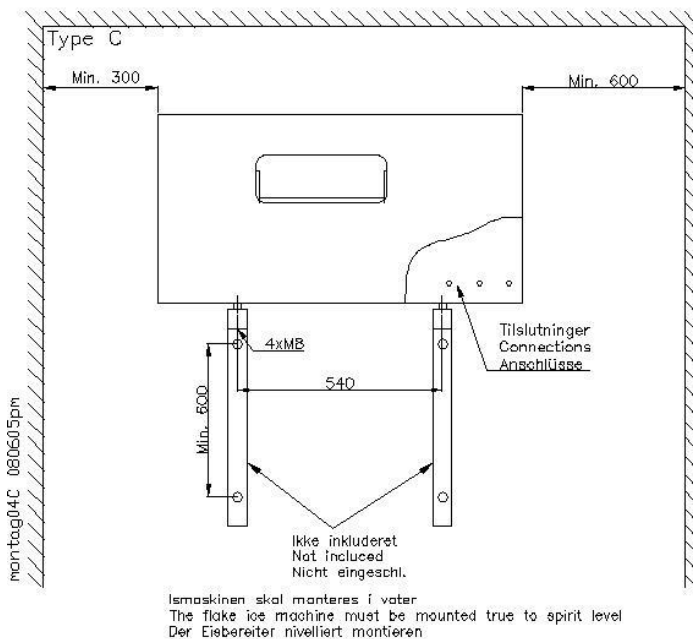


Section 3. Installation and assembly. Mounting brackets

Important. Never weld the piping set where the "frame" is installed at the opposite ends of the ice machine in relation to the welding location. The "frame" should be installed as tight on the welding location as possible. The ice machine will be damaged if welding current flows through the wiring, stuffing boxes, bearings and drum.

For reasons of personal safety and machine performance, it is of utmost importance that the ice machine is correctly installed. Be especially careful that when installing land-based ice machines, they are level both length and width-wise.

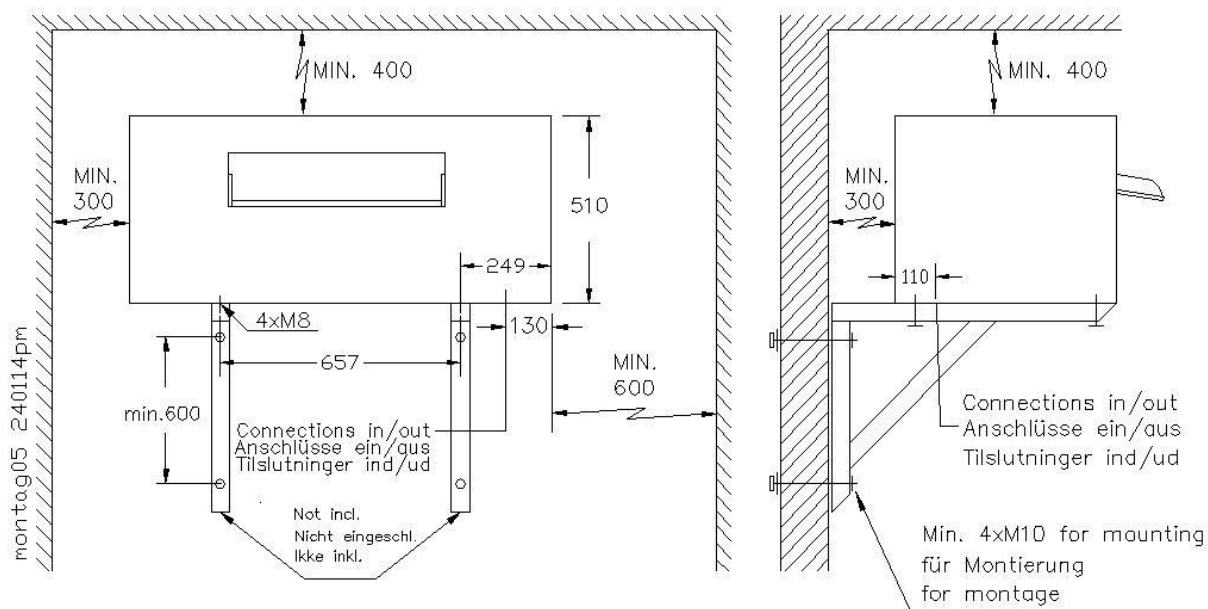
Reinforcing the ice machines



Mounting instruction for flake ice machine type D

Montageanleitung für Scherbereisbereiter Typ D

Montagevejledning for ismaskine type D

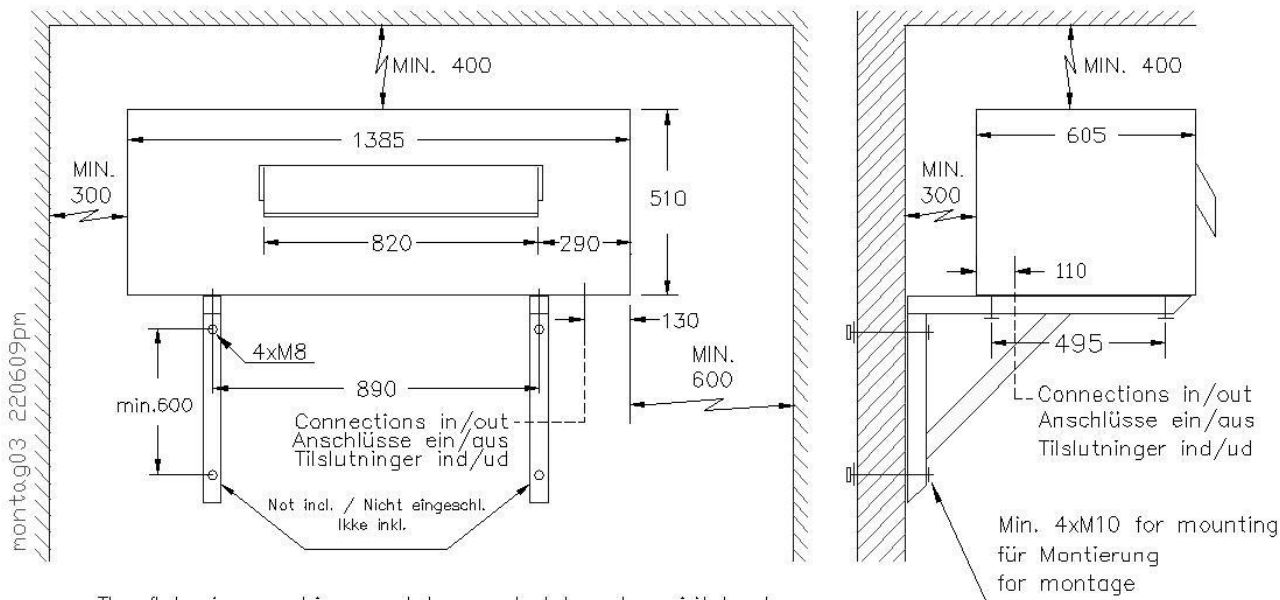


The flake ice machine must be mounted true to spirit level

Der Eisbereiter nivelliert montieren

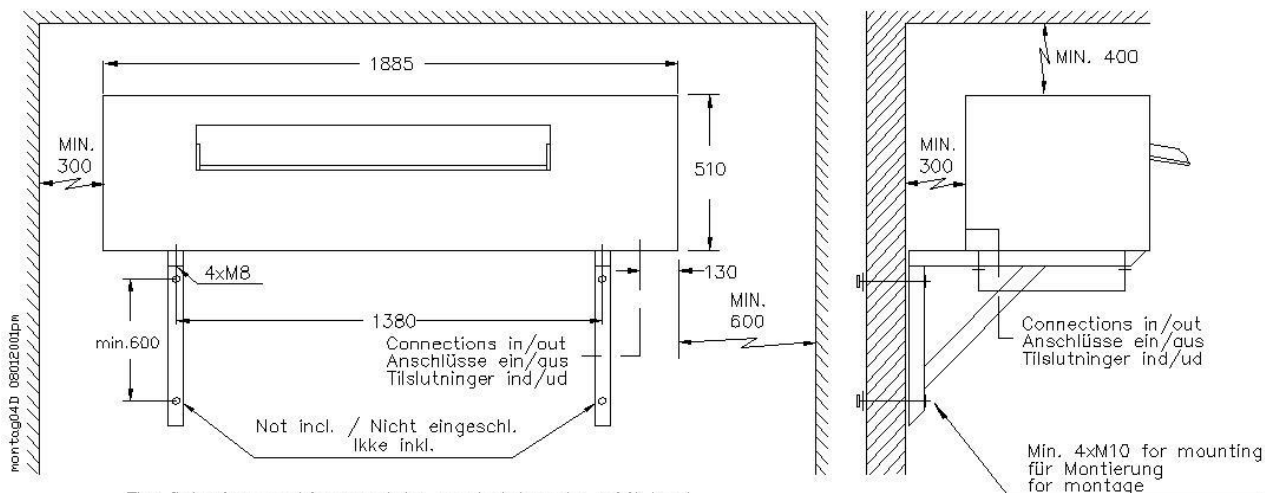
Ismaskinen skal monteres i vater

Mounting instruction for flake ice machine type E
 Montageanleitung für Scherbereisbereiter Typ E
 Montagevejledning for ismaskine type E



The flake ice machine must be mounted true to spirit level
 Der Eisbereiter nivelliert montieren
 Ismaskinen skal monteres i vater

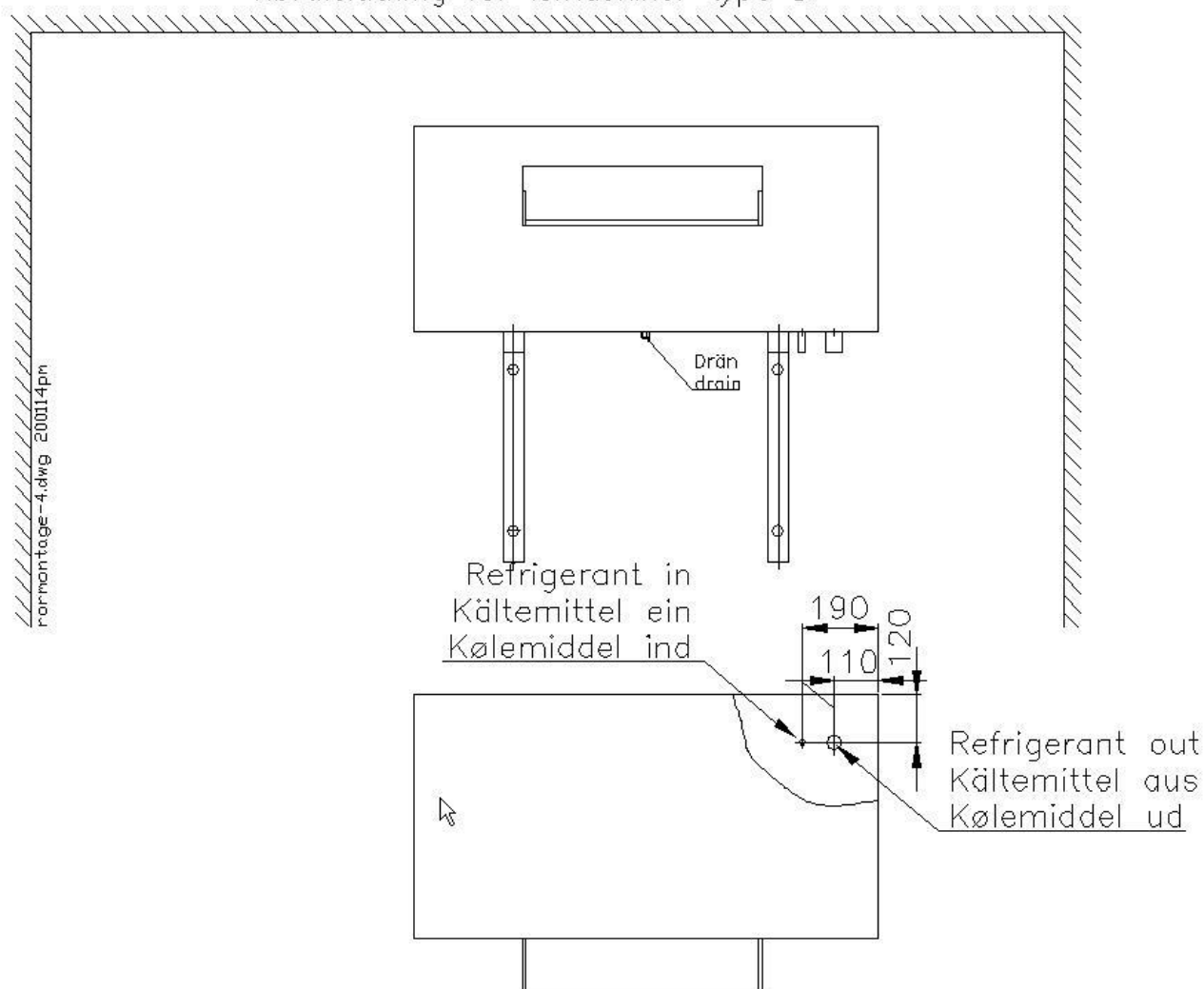
Mounting instructions for flake ice machines type F
 Montageanleitung für Scherbereisbereiter Typ F
 Montagevejledning for ismaskine type F



The flake ice machine must be mounted true to spirit level
 Der eisbereiter nivelliert montieren
 Ismaskinen skal monteres i vater

Pipe connections. C-model.

Tubing instructions for flake ice machines type: D
Rohreinleitung für Scherbeneisbereiter Typ D
Rørtilslutning for ismaskiner type D

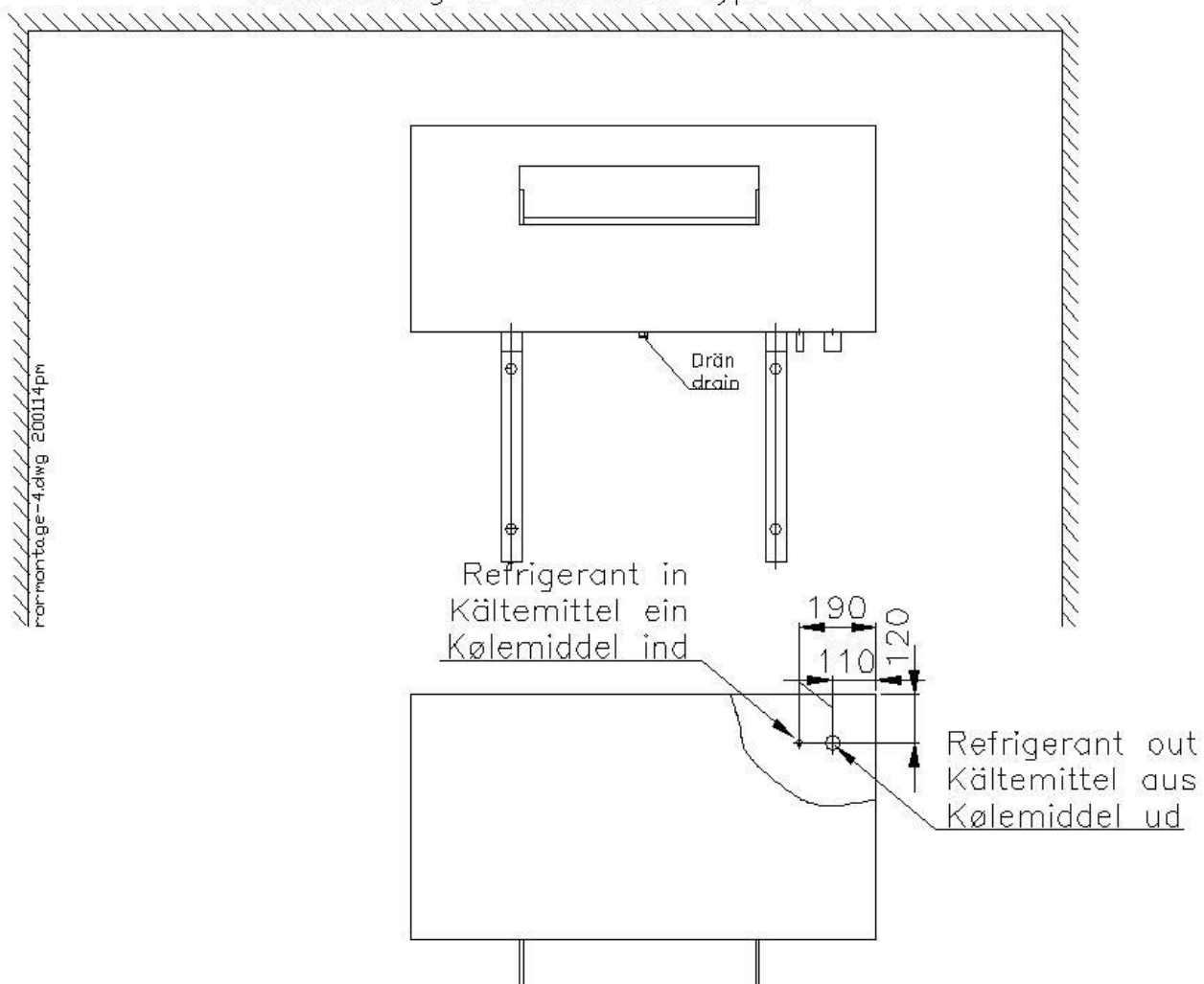


Pipe connections. D-model

Tubing instructions for flake ice machines type: D

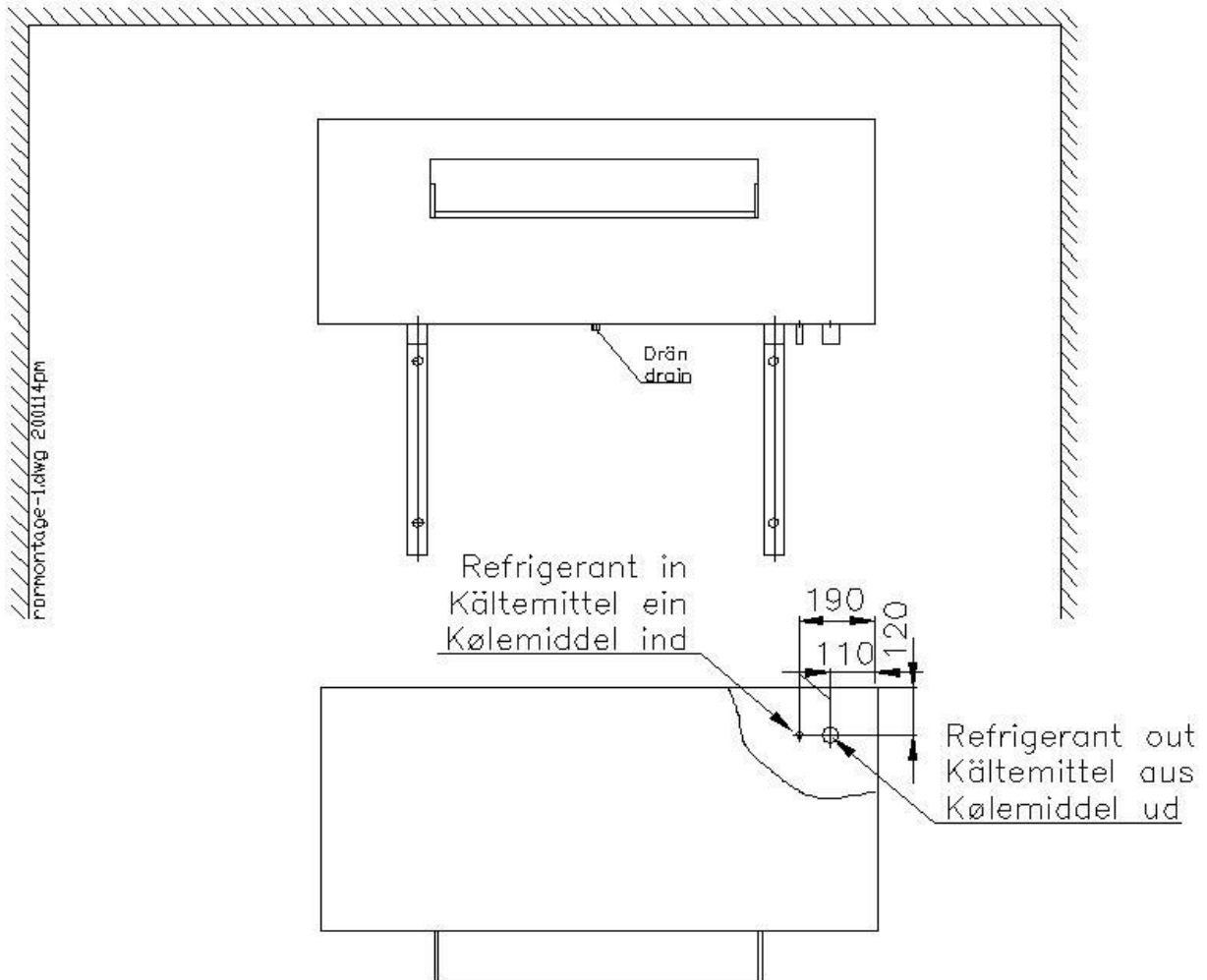
Rohreinleitung für Scherbenisbereiter Typ D

Rørtilslutning for ismaskiner type D



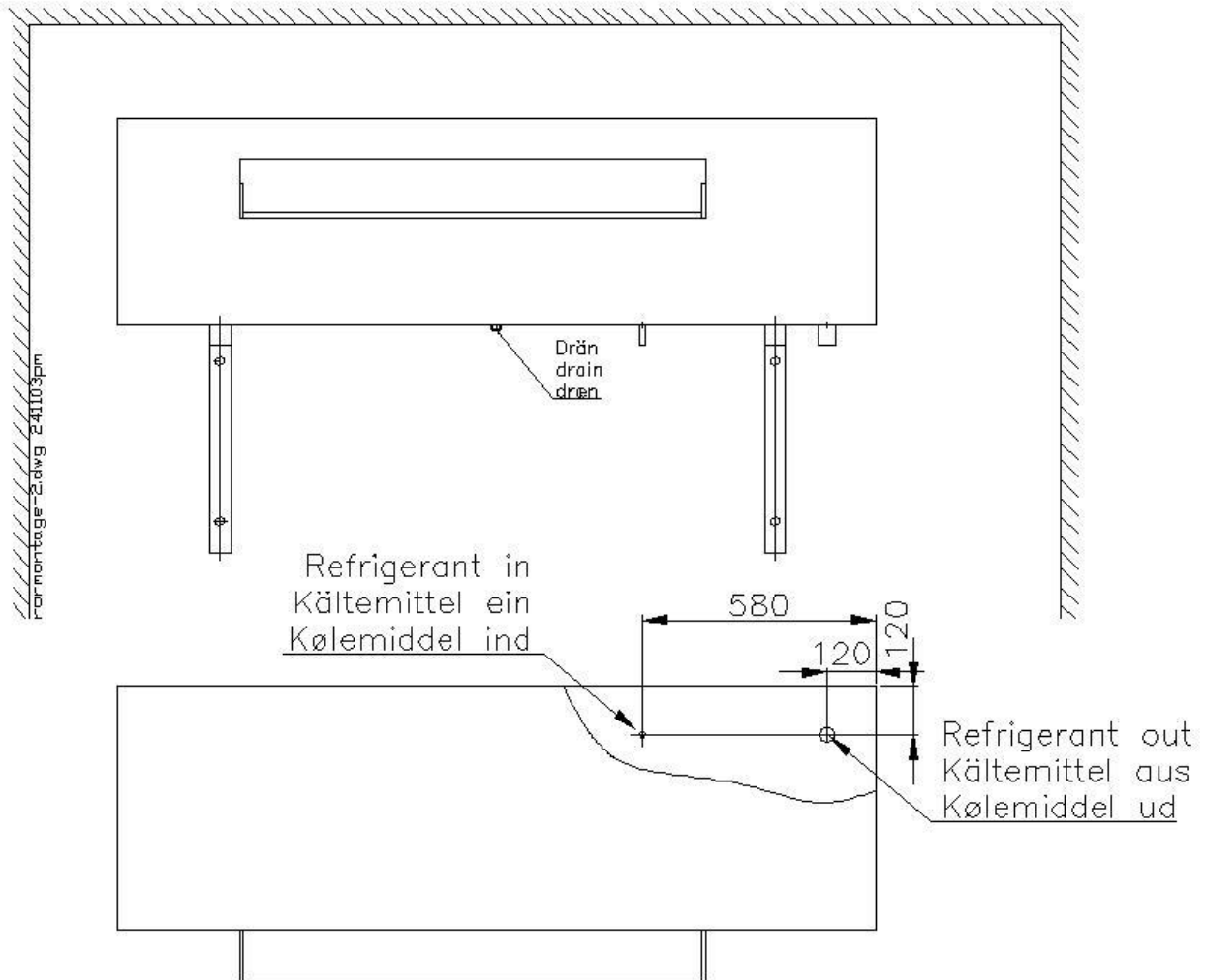
Pipe connections. E-model

Tubing instructions for flake ice machines type: E
 Rohreinleitung für Scherbeneisbereiter Typ E
 Rørtilslutning for ismaskiner type E



Pipe connections. F model

Tubing instructions for flake ice machines type F
 Rohreinleitung für Scherbeneisbereiter Typ F
 Rørtilslutning for ismskinner type F

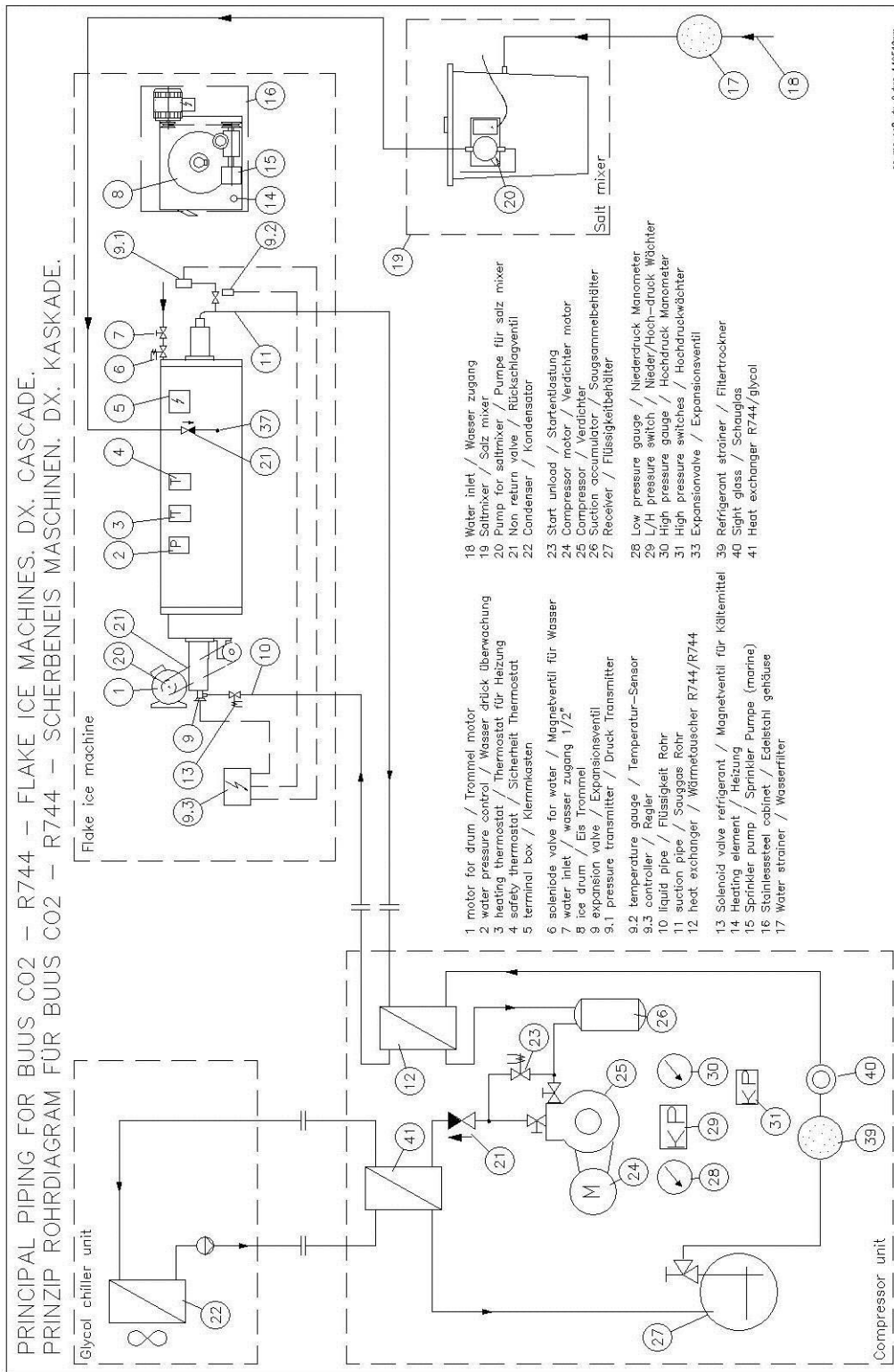


Ice machines that use brine

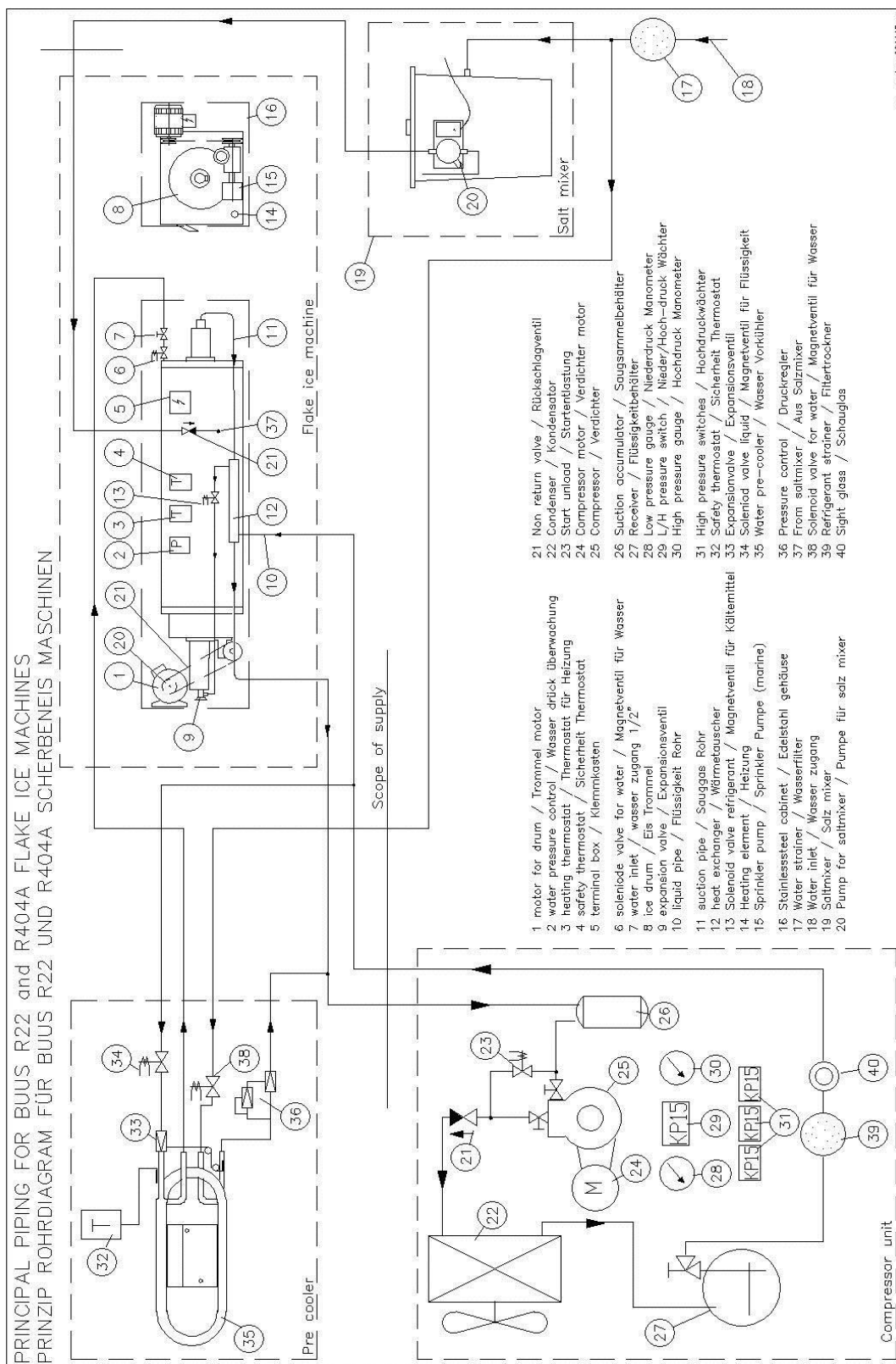
If the delivered ice machine uses brine, such as for example glycol or Temper, to operate, the ice machine is delivered with plastic or stainless steel pipe connections.

Principle diagrams

CO2 – DX. Direct expansion.

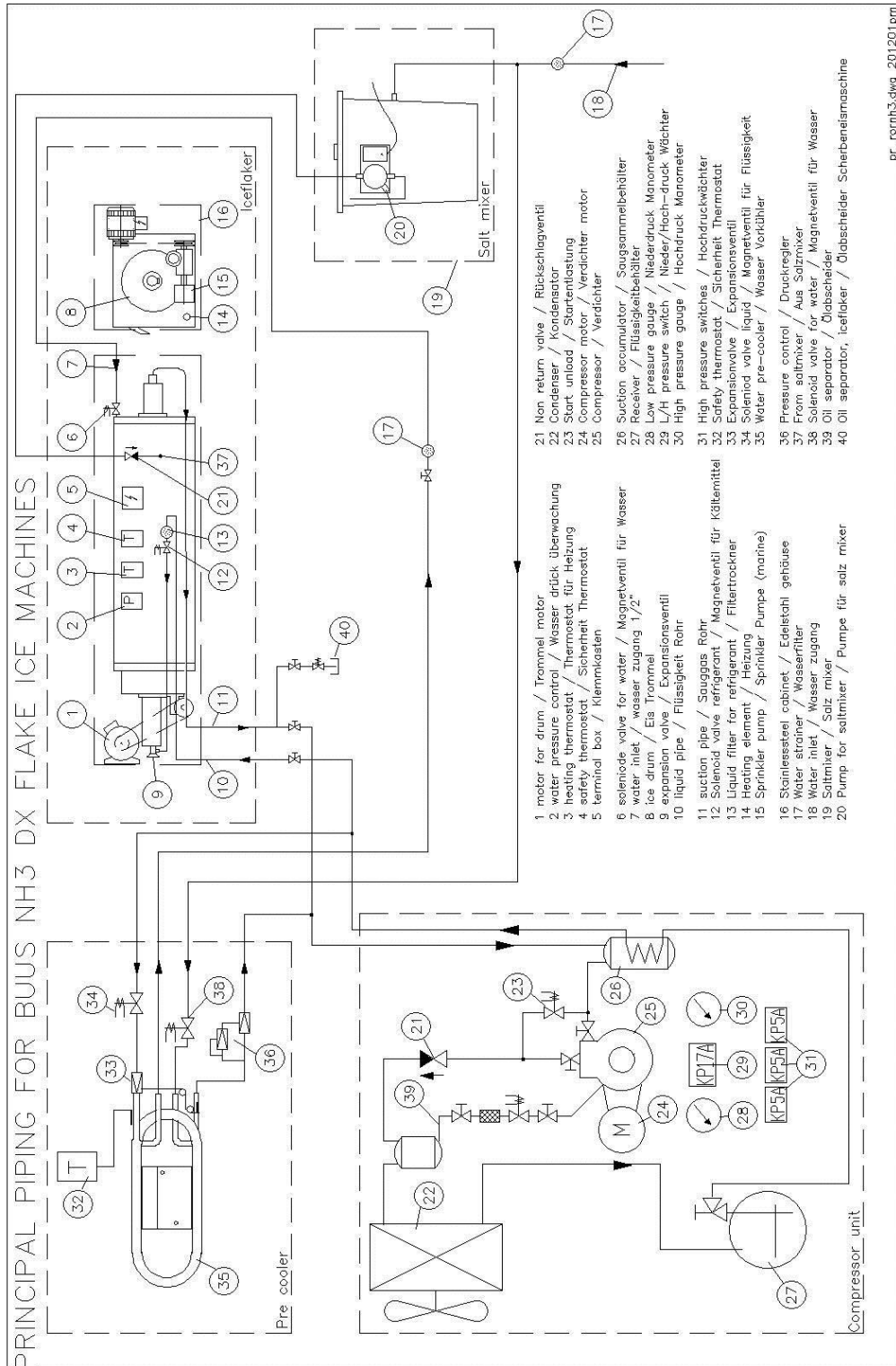


HFC/HCFC. – DX. Direct expansion.



Principle diagrams

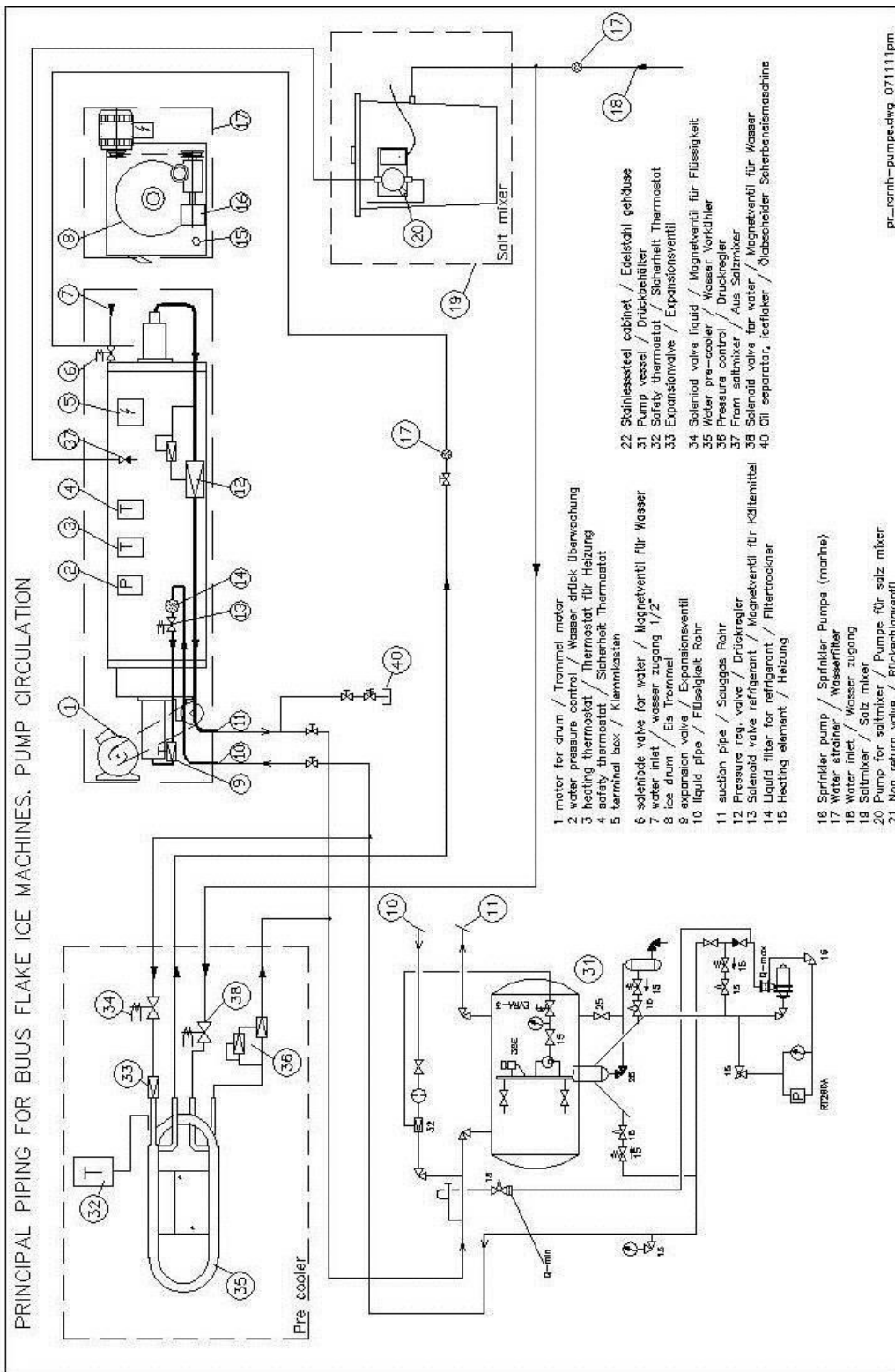
NH3 – DX. Direct expansion.



Principle diagrams

Pump circulation

PRINCIPAL PIPING FOR BUUS FLAKE ICE MACHINES. PUMP CIRCULATION



pr_cornth-pumpe.dwg_071111.dwg

Electrical coupling

The ice factory can immediately be connected to the terminal block. Certain conditions are, however, to be observed. Two type RT 14 DANFOSS thermostats are used for frost/heat protection.



Settings:

- Heat protection (water thermostat), SP=+11°C / +8°C
- Frost protection (frost safety), SP=+1°C
- The coupling difference is fixed at 1° at the factory.
- Water pressure regulator (water pressure), SP=1 bar. Diff. 1 bar. Switching on=2 bar

Important! The thermostats are factory set and may not be adjusted without consulting the supplier.

With deliveries containing compressors or ice machine controls:

Starting, operating and using the cooling system.

Refer to special legislation regarding installing, servicing and using cooling systems. There may be local rules on this in some countries. With installations delivered with control and compressor systems, the manual is divided into two with one manual for ice machines and one for the compressor system.

1. The main switch is in the control box.
2. If the installation stops for an extended time, the water trough should be fully emptied.

3. The main switch should be connected for at least two hours before starting up so that the heating elements in the crankcase has time to heat the compressor oil.
4. The water trough is to be filled with water before it is switched on.

Control switch

1. The control switch is located at or near the ice machine. (It may be built-into the control box.)
2. The ice machine starts and stops using the control switch.
3. If the control switch is disengaged, the freezing drum runs for an additional 5 minutes (after run).

If the ice machine is comes without a control box, an electrical diagram can be obtained upon request from Buus Køleteknik A/S or your supplier.

Only a qualified electrical installer can make the necessary connections.

BUUS Køleteknik A/S delivers electrical controls with optimal control and operational safety.

Important: The main switch must never be used to stop ice production. If electricity to the installation is stopped, water in the water trough will freeze and an accident may result.

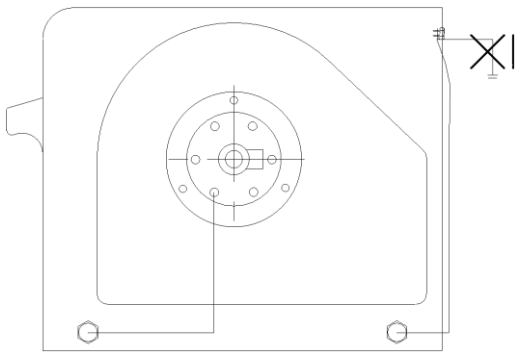
Equalizing connections on the ice machine

To avoid galvanic corrosion of the ice machine, ensure that connections between the drum and other parts of the ice machine are not made, and that the attached diagram on equalizing line connections is carefully followed.

If there is a connection, this will cause galvanised corrosion to occur and subsequently damage the drum.

The drawing shows the basic ice machine end view.

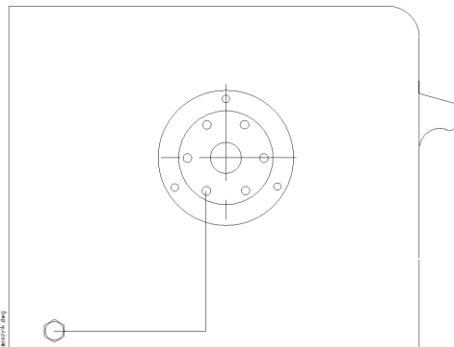
Equalizing connections in addition to these seen on the drawings may not be made.



Zinc anodes at the ends of the drum and in the water trough protect the aluminium drum from corrosion.

Zinc anode corrosion is dependant on the conditions under which the ice factory operates.

It is recommended to check on the condition of the zinc anodes every six months,



Installation start-up

the first time the installation is started, and after prolonged periods of inactivity.

- ! Fill the water tank up with water before starting it. You may want to use a water hose so that this is done more speedily. Pay special attention to this with marine models in which the water pump for the sprinkler piping can be damaged by dry runs.
- 1. Open the stop valve in the water inlet.
- 2. Engage the main switch at least two hours before starting up. This is done in order to give the crankshaft time to heat the oil in the compressor crankcase. At the same time, open the suction stop valve/pressure stop and receiver stop valves.
- 3. Check the oil level in the compressor. The oil should be visible in the inspection window.
- 4. Ammonia, R717/CO2, R744 machines. Direct expansion.

Data for the injection valve is assumed to be encoded. See the specifications from Buus Kølleteknik A/S in the diagram.

Refer to general instructions on starting subcritical R744 installations.

When this is in place, the ice machine can be started up with the control switch. After the installation has run for a few minutes, the automatic expansion valve should be checked. This can be done in the following ways:


- a. In the applicable electronic switch's menu.
 - b. Find the menu item for display viewing and select superheat. You can now check whether the superheat is correct, and in conjunction with visually checking the ice on the drum's surface, you can determine whether the installation has been adjusted. For any corrections, refer to the control manual.
- 5. HFC/HCFC machines. Direct expansion:


The ice machine can be started using the control switch. After the installation has run for a few minutes, the automatic expansion valve should be adjusted. This can be done in the following way:

- a. Remove the plastic protective cap.

b. Adjust the adjusting screw until the suction pipe is frosted all the way back to the compressor's suction stop valve/end shield.

c. A rotation of the adjusting screw on the automatic expansion valve is equal to a pressure change of 0.8 bar.

d.  Adjustment in the clockwise direction=greater degree of opening.

e.  Adjustment in the counter clockwise direction=lesser degree of opening.

Please note. With air-cooled compressors, it may be necessary, during very warm periods, to adjust the expansion valve due to pressure changes in the system. The expansion valve should be adjusted back again when temperature conditions are normal. See generally the data sheet in section 9.



Expansion valve

5. If there are beating noises or the oil boils, immediately throttle the suction stop valve and later open it slowly again.
6. Check on the amount of refrigerant in the installation.
7. Check the pressure of the condenser.
8. With **freshwater ice**, check the suction pressure.

Recommended suction pressure:

Ammonia R717		HFC/HCFC		CO2 R744	
Type	°C	Type	°C	Type	°C
AC 800	-23	CD 800	-18	CC 900	-18
AC 1000	-25	CD 1000	-20	CC 1100	-20
AC 1200	-28	CD 1200	-23	CC 1400	-23
AC 1400	-29	CD 1400	-25	CC 1700	-25
AC 1700	-30	CD 1700	-27	CC 2100	-29
AC 2000	-31	CD 2000	-29		
AD 1000	-18	SD 1000	-13	CD 1700	-15
AD 1500	-20	SD 1500	-14	CD 2100	-18
AD 2000	-22	SD 2000	-17	CD 2800	-20
AD 2500	-24	SD 2500	-19	CD 3500	-26
				CD 4000	-29
AE 3000	-21	SE 3000	-17	CE 3500	-18
AE 4000	-23	SE 4000	-20	CE 4400	-20
AE 4500	-24	SE 4500	-23	CE 5100	-24
				CE 6000	-29
AF 5000	-20	SF 5000	-17	CF 5500	-18
AF 6000	-22	SF 6000	-19	CF 6700	-20
AF 7000	-24	SF 7000	-22	CF 7800	-22
AF 8000	-26	SF 8000	-23	CF 9000	-24
AF10000	-31	SF10000	-29	CF 11000	-30

*: See the ice machine's order confirmation.

With salt-water ice, the suction pressure should always be at -27°C or below.

9. The operator can first leave the installation when it is balanced.

BUUS brine ice machines

BUUS brine type BC, BD, BE & BF ice machines can be used with glycol and Temper®. The amount, pressure and temperature of the brine to be used with your ice machine appear in the order confirmation.

Type	Ice product/24h	T1°C. Intake temperature	T2°C. Outlet temperature	Amount m3/h	DP Pressure drop Bar
BC	800	-20	-18	2.3	0.6
BC	1000	-22	-20	2.8	0.6
BC	1200	-25	-23	3.4	0.8
BC	1400	-29	-27	4.1	1
BD	1000	-15	-13	4	0.6
BD	1500	-16	-14	4	0.6
BD	2000	-19	-17	6	0.8
BD	2500	-22	-19	8	1
BE	3000	-19	-17	9	1.2
BE	3500	-23	-20	9	1.2
BE	4000	-26	-23	11	1.4
BF	5000	-21	-18	11	1.5
BF	6000	-24	-20	11	1.5
BF	7000	-27	-23	11	1.5
BF	8000	-29	-24	11	1.5
BF	10000	*	*	*	*

* Calculated according to the task.

With salt-water ice, the outlet temperature should always be at -27°C or below.

Water level

Land models

The following should be taken into account when setting the water level in the trough:

1. If wet ice is desired, adjust to a high water level using the float valve.

The water level may, however, not be adjusted to a level higher than just below the knife height (263mm) measured from the bottom of the trough to the water mirror. The ice does not get subcooled at higher water levels.

2. If dry ice is desired, adjust the water level to a few millimetres lower. Make the adjustment and let the ice machine run for a few minutes before making the next adjustment.
3. The adjustments are made by adjusting the counterweight on the swim valve.
4. The normal water level on the land models is 263mm during operation. The minimum water level for land models is 250mm. Water levels lower than 250mm results in cold and too thin ice, increasing the wear on the ice machine.



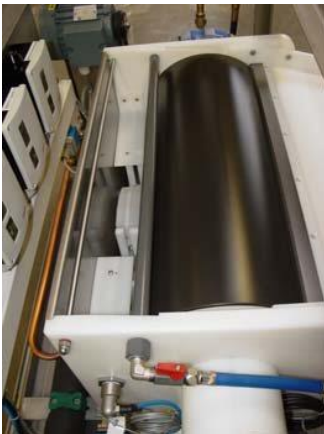
The water level is measured with a ruler. On the ice machine's gable, there is a marked line at 263mm above the bottom of the water trough.



The marine models are equipped with a water level fixed at 140mm. By turning the sprinkler pipes, ice quality can be adjusted.

Water level Marine models

1. The sprinkler valve is adjusted to a suitable water distribution above the freezing drum.



Marine models with sprinkler piping

2. The ice quality can be changed from dry to wet by turning the sprinkler pipe so that the water sprays onto the drum.
3. The ice machine's setting should be supervised at appropriate intervals. If changes are recorded, adjustments can be made again. If the machine comes with a water pump, the pump and sprinkler pipes are to be controlled for impurities.
4. If seawater is used for ice production, concentrated salt water can accumulate at the bottom of the water trough during ice production. The valves should be opened so

that every hour, approximately 3% of the ice machine's capacity is drained out.



Drain tap.

Example: For an ice machine that produces 2,500kg ice/24h, the following amount should be drained:

$2500/24 \times 0.03 = \text{approximately } 3 \text{ litres of water per hour.}$

Ice factory with a water pre-cooler

A water pre-cooler is recommended to be used if the water temperature of the domestic water exceeds 20°C.

A safety thermostat, position 2, is built-in to protect the water pre-cooler from freezing in case the suction pressure regulator fails. The safety thermostat is to be adjusted to a minimum of +5°C.

The water temperature is to be adjusted to 8°C with an evaporation pressure regulator.

Please note: The evaporation pressure regulator is set at the factory!

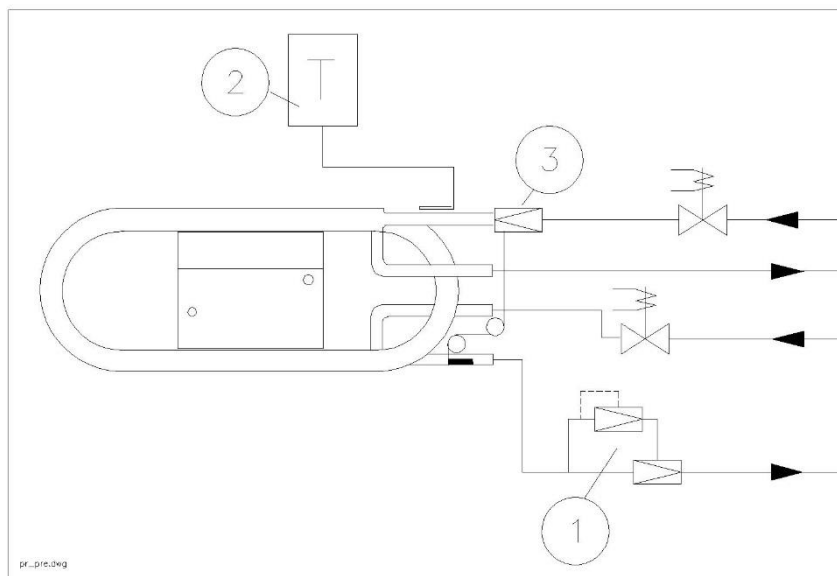
BUUS pre-cools PRE-01 for HFC/HCFC and type PRE-10A which are for NH₃, a water pre-cooler made of rust proof, corrosion resistant steel so that it can withstand warm salt water. Ice machines to be used with brine and CO₂ are delivered without built-in water coolers.

Refrigerant inflow occurs through the inner pipe and the built-in solenoid valve and expansion valve. The suction pressure is adjusted with the suction pressure regulator, position 1. The suction pressure is set to a minimum value of -0°C to avoid freezing or rupturing the cooler.

The automatic expansion valve, position 3, ensures that the pre-cooler is correctly filled with the refrigerant.

The water pre-cooler's thermostat is adjusted when it is delivered. The warranty is void if the thermostat is adjusted by end-users.

Refrigerant access to the pre-cooler should be such that the magnetic valve is opened during the operation of the compressor and closed off when not in operation.



Water quality

With the production of flake ice using freshwater, a small amount of salt (NaCl) can be added to the water using a metering pump. This will result in:

- the ice being broken into larger pieces, and the ice would loosen more easily off of the drum
- reduction in calcareous deposits on the drum
- less overload on the ice machine's mechanical parts.

The amount of salt to be added can vary from 0 to 500g salt per ton or 0 to 0.05% salt. This salt content cannot be tasted and has no effect on the application of the ice for, e.g., the cooling of foodstuff.

If the ice is produced using freshwater, the water at a minimum should contain 20ppm (20 parts per million) salt which equals 0.25mS/cm when measuring conductivity. Drinking water may contain up to 200ppm salt according to the EU Drinking Water Directive 98/83/EC.

Ice produced with freshwater

In ice production, the water's composition has a large effect on the ice's characteristics. Therefore, ice produced with soft water (rain water) will be partially clear and have a tendency to stick to the drum. It will therefore be necessary to add a small amount of salt to the water so that the ice is more easily released from the drum.

Very hard water with a high calcium content will cause calcareous deposits to form on the drum which will cause the ice to stick to the drum. The knife will crush a large portion of the ice. Our experience shows that adding small amounts of salt to the water will reduce calcareous deposits. It also makes the ice more consistent, not stick to the drum, and fall off in larger pieces.

When adding the salt, it will be advantageous to use a salt dosing pump.

Mineral content (including salt content) is measured in milli siemens (mS/cm).

The following are generally applicable values:

Rain and glacier water: 0.05 mS/cm.

City water: 0.25 mS/cm.

Seawater (approximately 3% salt): 19.75 mS/cm.

Ice produced with seawater

This ice is tough but also soft and can be scraped off the drum easier. Therefore, there is no need for adding more salt.

De-mineralised water, deionized freshwater, water with chlorine added, etc.

If the ice machine is to use such water, you must contact Buus Køleteknik A/S for advice and guidance!

Salt quality: The salt which is used shall be completely clean. Such water is often described as "vacuum salt". Ordinary table salt cannot be used.

BUUS recommends "Bröste EXPO 25 tablets" (Buus item number 1025) or equivalent salt tablets with a diameter of 25mm or above.

The water's PH value has a significance as to the drum's surface condition and in order to avoid corrosion, the PH value should be in the neutral range, i.e. $6.5 > \text{PH} < 7.5$. The warranty will be voided if the values fall outside of this range.

In summary, our recommendations are:

1. If the calcium content of the water is under a hardness grade of 15, we recommend using BUUS salt blends.
2. Baltic Sea water can be used directly.
3. North Sea water with a salt content of 3.5% can be blended with approximately 50% freshwater.
4. For other cases, ask BUUS Køleteknik A/S.

Connecting salt blends

Buus Kølleteknik A/S supplies three different types of salt blends. Manuals for the different salt blends are provided together with the delivered equipment.

SALT-01 is throughput. The water during ice production draws the saline solution in through the ice machine's hose.

SALT-01 is suitable for several ice machines.



SALT-02 MK2 injects a concentrated saline solution into the ice machine's water tank. Salinity is measured and the right amount of saline solution is added.

SALT-02 is suitable for one ice machine.

If the salt blend is delivered together with the ice machine, the pump can be placed in the ice machine's cabinet.



Salt 02 MK2



Probe

SALT-03 is often used on fishing vessels and comes in two models. SALT-03 measures the water's conductivity and adds salt water to the ice machine's production water.

SALT-03-L can add smaller amounts of salt water (seawater) to the production water.

SALT-03-H adds a larger amount of salt water to the production water.



Connecting the ice machine

Connecting the refrigerant to the ice machine is to be done in accordance with the piping diagram found in "Installation and assembly. Mounting brackets". Refer also to safety precautions for working with refrigerants.

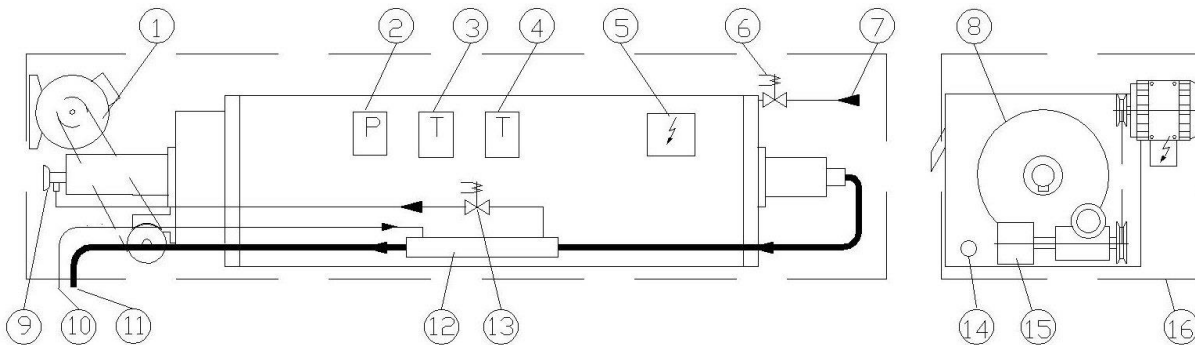
Excess water and drainage



Ice machine drainage. The ice machine seen from below.

The ice machine comes with a stainless steel cabinet equipped with a 1/2" pipe threaded studs. The stud is connected to the hose or pipe. If the ice machines comes without a cabinet, a collection tray should be installed under the ice machine to collect and drain condensed water and any excess water.

DX connection. HFC/HCFC. (Direct expansion):



1. Motor
2. Water pressure controller
3. Electric heating thermostat
4. Safety thermostat
5. Electrical connection box
6. Solenoid valve for water
7. Water in. ½" RG. ø13mm hose stud
8. Ice drum
9. Automatic expansion valve
10. Liquid piping
11. Vacuum piping
12. Heat exchanger
13. Solenoid valve for the refrigerant
14. Electric heating frame
15. Sprinkler pump (only marine models)
16. Cabinet

Any BUUS salt blends are connected to the water tank:



Inflow water pressure: Minimum 1 bar.
Maximum 3 bars.

The salt content in the water trough is measured and the salt content is automatically dispensed.



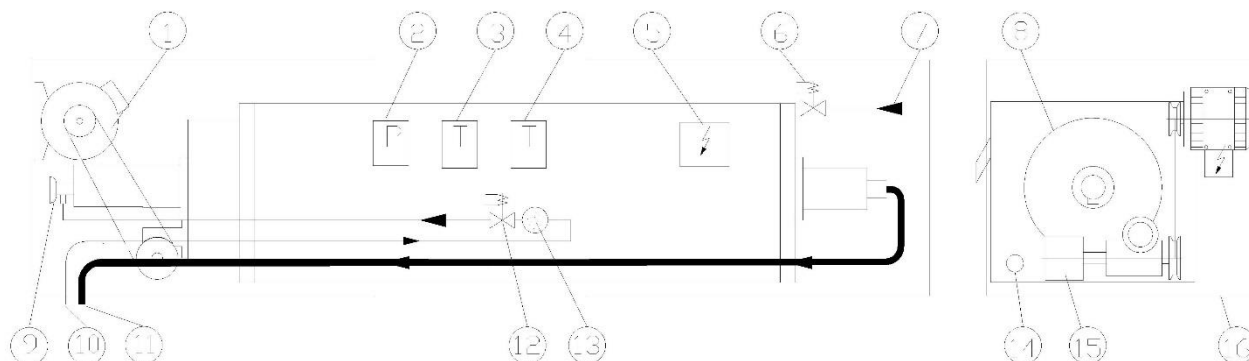
If the ice machine comes with a salt mixer, the sensor and pump are installed in the ice machines cabinet. After the salt mixer is delivered, the coupling of the sensor should be done locally.

Connecting the refrigerant:

Connect the freon compressor system as a normal evaporator.

The delivered machine must be suitable for the desired refrigerant. See the name plate.

DX connection. R717. Ammonia. (Direct expansion):



1. Motor
2. Water pressure controller
3. Electric heating thermostat
4. Safety thermostat
5. Electrical connection box
6. Solenoid valve for water
7. Water in. 1/2" RG. ø13mm hose stud
8. Ice drum
9. Thermostatic level regulator
10. Liquid piping
11. Vacuum piping
12. Solenoid valve for NH3
13. Liquid filter for NH3
14. Electric heating frame
15. Sprinkler pump (only marine models)
16. Cabinet

Any BUUS salt blends are connected to the water tank:



Inflow water pressure: Minimum 1 bar.
Maximum 3 bars.

The salt content in the water trough is measured and the salt content is automatically dispensed.



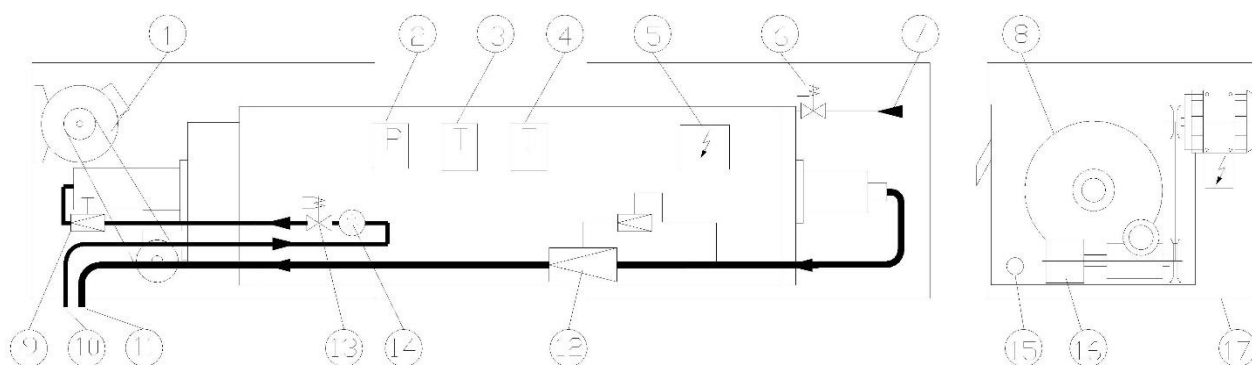
If the ice machine comes with a salt mixer, the sensor and pump are installed in the ice machines cabinet. After the salt mixer is delivered, the coupling of the sensor should be done locally.

Connecting the refrigerant:

Connect the ammonia compressor system as a normal evaporator.

The delivered machine must be suitable for the desired refrigerant. See the name plate.

Connecting the P (Pump). R717. Ammonia.



1. Motor
2. Water pressure controller
3. Electric heating thermostat
4. Safety thermostat
5. Electrical connection box
6. Solenoid valve for water
7. Water in. ½" RG. ø13mm hose stud
8. Ice drum
9. Manual throttle valve
10. NH3 inlet pipe
11. NH3 outlet pipe
12. Pressure regulator
13. Solenoid valve for the refrigerant
14. Liquid filter for the refrigerant
15. Electric heating frame
16. Sprinkler pump (only marine models)
17. Cabinet

Any BUUS salt blends are connected to the water tank:



Inflow water pressure: Minimum 1 bar.
Maximum 3 bars.

The salt content in the water trough is measured and the salt content is automatically dispensed.



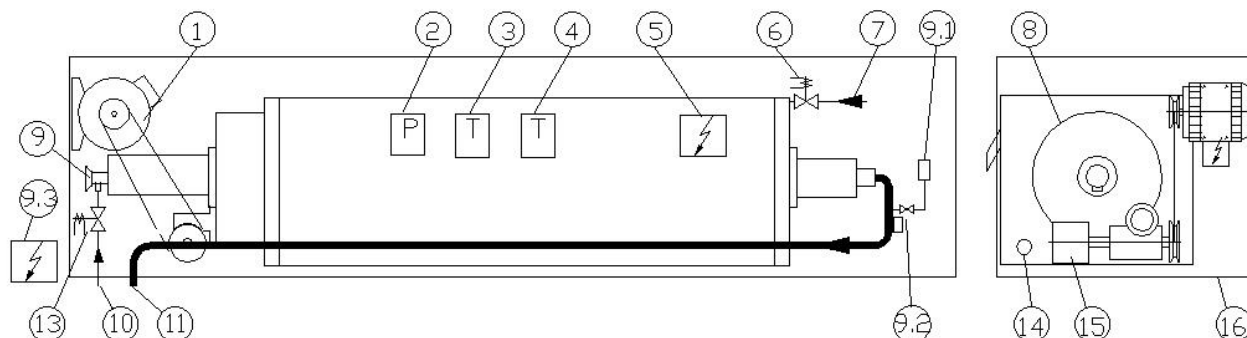
If the ice machine comes with a salt mixer, the sensor and pump are installed in the ice machines cabinet. After the salt mixer is delivered, the coupling of the sensor should be done locally.

Connecting the refrigerant:

Connect the ammonia compressor system as a normal evaporator.

The delivered machine must be suitable for the desired refrigerant. See the name plate.

DX connection. CO2. R744. (Direct expansion):



1. Motor
2. Water pressure controller
3. Electric heating thermostat
4. Safety thermostat
5. Electrical connection box
6. Solenoid valve for water
7. Water in. 1/2" RG. ø13mm hose stud
8. Ice drum
9. Expansion valve
- 9.1 Pressure transmitter
- 9.2 Temperature sensor
- 9.3 Controller
10. Liquid piping
11. Vacuum piping
13. Solenoid valve for the refrigerant
14. Heating element
15. Sprinkler pump (only marine models)
16. Cabinet

Any BUUS salt blends are connected to the water tank:



Inflow water pressure: Minimum 1 bar.
Maximum 3 bars.

The salt content in the water trough is measured and the salt content is automatically dispensed.

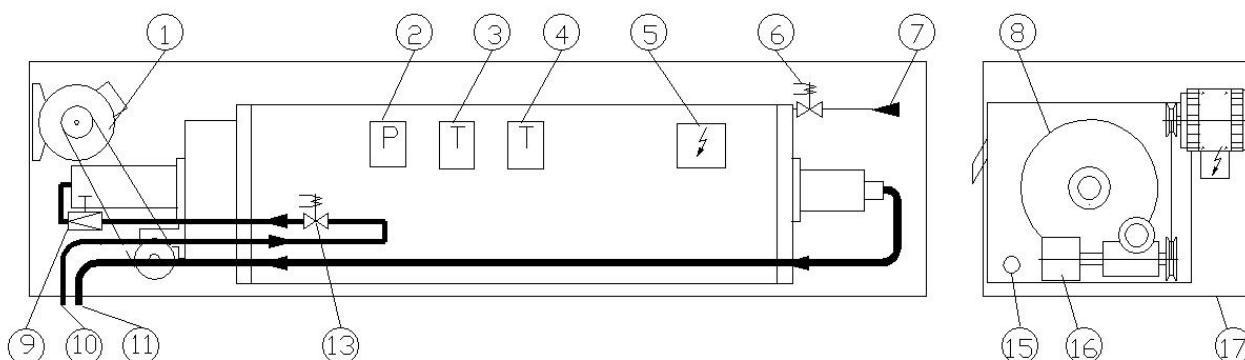


If the ice machine comes with a salt mixer, the sensor and pump are installed in the ice machines cabinet. After the salt mixer is delivered, the coupling of the sensor should be done locally.

Connecting the refrigerant:

Connect the ammonia compressor system as a normal evaporator. The delivered machine must be suitable for the desired refrigerant. See the name plate.

Connecting P (Pump). CO2. R744.



1. Motor
2. Water pressure controller
3. Electric heating thermostat
4. Safety thermostat
5. Electrical connection box
6. Solenoid valve for water
7. Water in. 1/2" RG. ø13mm hose stud
8. Ice drum
9. Manual throttle valve
10. CO2 inlet pipe
11. CO2 outlet pipe
12. Pressure regulator
13. Solenoid valve for the refrigerant
14. Liquid filter for the refrigerant
15. Electric heating frame
16. Sprinkler pump (only marine models)
17. Cabinet

Any BUUS salt blends are connected to the water tank:



Inflow water pressure: Minimum 1 bar.
Maximum 3 bars.

The salt content in the water trough is measured and the salt content is automatically dispensed.



If the ice machine comes with a salt mixer, the sensor and pump are installed in the ice machines cabinet. After the salt mixer is delivered, the coupling of the sensor should be done locally.

Connecting the refrigerant:

Connect the CO2 compressor system as a normal evaporator. The delivered machine must be suitable for the desired refrigerant. See the name plate.

Section 4 Safety system

Water thermostat
regulator

Frost thermostat

Water pressure



The ice machine has two thermostats and one safety pressure regulator.

The thermostat (marked Water thermostat) regulates the water temperature in the water tank. (Set point: +8°C).

The thermostat (marked frost safety) is for protecting against the freezing of the water in the tank. (Set point: +1°C).

The water pressure regulator, which comes with automatic reset, is installed in the access side pipe for protecting against a faulty water supply. The pressure regulator can interrupt refrigerant inflow, the compressor can "pump down" and stop. Setting: 1 bar. Diff. 1 bar. Restart: 2 bars.

Automatic operation

It is presumed that the control unit is designed in accordance with the designated electrical diagrams, or that it is supplied by Buus Køleteknik A/S.

When the main and control current is connected, the ice machine runs automatically. When the ice machine is stopped, the ice drum will continue to run for approximately 4 minutes before it stops. (This is adjustable). The compressor will "pump down" and stop.

With ammonia and CO2 pump models, this time can be increased to ensure that the drum is completely emptied of refrigerant.

Warning: automatic start

The installation can start and stop automatically using an ice stop sensor (if this is built-in), a water pressure regulator, or a high and low pressure regulator.

The pump-down control can also cause the compressor to start if the pressure exceeds the LT pressure regulator's set values.

Environment and safety: personal injuries

<p>Refrigerant spills Keep them localised as large quantities of gas or liquid refrigerant are lethal.</p>
<p>Protective mask There should be easily accessible protective masks with respirators available at the entrance to the machine room.</p>
<p>Protective glasses While separating the compressor, protective glasses should be used due to liquid refrigerant risk.</p>
<p>Eye injuries Refrigerant vapours will normally not injure the eyes. If liquid splashes directly into the eyes, the injured individual must be brought to the hospital or a doctor as soon as possible. Avoid rubbing the eyes.</p>
<p>Eye corrosion Lift the eyelids and rinse with an ample amount of water for at least 15 minutes. For interim first aid, we recommend that the eyes be dipped in sterile mineral oil (cooling machine oil or paraffin oil) and then rinsed with water.</p>
<p>Skin corrosion Rinse with an ample amount of water for at least 15 minutes, possibly even before clothes are removed. Do not cover the corroded areas with clothes, bandages, oil or cream.</p> <p>Bring the injured individual to a doctor or hospital as soon as possible.</p>
<p>First aid for injuries with R717 (Ammonia) Immediate rinse with a massive amount of water. Call a doctor and ambulance equipped with a breathing apparatus immediately. The patient's breathing and cough can be helped by loosening the clothes on the upper body. Persons who have inhaled large amounts of ammonia gas should receive an oxygen supply as soon as possible and kept calm as much as possible. Unconscious individuals may not be given water or other drinks. If the injured individual is conscious, it will be helpful to give him water or diluted orange juice with sugar or glycerine.</p>
<p>Inhalation of ammonia vapours causing shortness of breath. Until the ambulance comes, the patient should be moved to a warmed room and placed in a lying position with slightly raised head and shoulders. This is often called the "recovery position".</p>
<p>Ingestion of liquid ammonia Allow the injured individual to drink large amounts of water and you may also add household vinegar at a ratio of 1 part vinegar to 5 parts water. Milk, to which you may add a raw egg, is also neutralising.</p>

First aid for injuries with (H)CFC refrigerants and the like.**Frost injuries**

Direct contact with refrigerant liquid can cause frostbite as a result of the strong liquid evaporation. Cover the frozen area with clothing or blankets and call an ambulance. You may also heat the frozen area with lukewarm water (not hot water).

Refrigerants are normally not corrosive**Faintness**

If a large refrigerant spill occurs in a poorly ventilated room, there is a risk of asphyxiation due to a lack of oxygen.

As soon as possible, the injured individual is to be brought out into the fresh air and any tight clothes should be loosened.

Mouth-to-mouth resuscitation is to be done immediately and continued until experts come and give the injured individual pure oxygen.

CO₂

In closed rooms, CO₂ alarms are required for safety. CO₂ is odourless and therefore can not be immediately sensed if it is spilled.

CO₂ systems must comply with applicable regulations.

Environment and safety

Precautions.

<p>Sealed stop valve on the high pressure side Never allow the compressor to operate with a sealed valve on the high pressure side.</p>
<p>Emergency stop The compressor must always be equipped with an easily accessible and clearly visible emergency stop.</p>
<p>V-belt screen On units with V-belt drive, never allow the compressor to operate without the V-belt screen.</p>
<p>Legislation The system must always be set up in accordance with applicable national law and regulations.</p>
<p>Coupling guard On units with direct drive, never allow the compressor to operate without a protective screen.</p>
<p>Sealed compressor A sealed non-evacuated compressor is always under pressure. The pressure can be read on the manometers. A sealed compressor must never be heated.</p>
<p>Refrigerant container The refrigerant container should be opened slowly and carefully. Never expose it to physical shocks and prevent it from tipping over, rolling and protect it from heat radiation.</p>
<p>Refrigerant spills Machine rooms should be equipped with effective ventilation as the refrigerants have a tendency to displace the air and cause oxygen shortages, which in the worst case can be lethal. This especially applies to (H)CFC refrigerants as these cannot be smelled. If in doubt, use a respirator.</p>
<p>Ammonia R717, NH₃, may not come near open flames as an explosion can occur in some areas where they blend with air. (Flammability limit 108-201g/m³). See also IAR bulletin no. 110.</p>
<p>Open flames (H)CFC refrigerants which contain chlorine (Cl) may not come near open flames as this may cause the formation of toxic compounds, which in extreme cases can cause death. At hazardous concentrations, a cautionary odour is emitted. Avoid smoking tobacco if there is an (H)CFC risk in the area.</p>
<p>Attachments Periodically check the compressor and motor anchor bolts.</p>

Environmental considerations

<p>Cooling machine oil Follow authorities' instructions on the filling and draining of cooling machine oil. Used cooling machine oil should be returned to the oil supplier or handled in accordance with applicable regulations in this area.</p>
<p>Refrigerant spills</p>

One must never deliberately allow the refrigerant to escape into the atmosphere. Used refrigerant should be collected in steel cylinders and returned to the refrigerant supplier or handled in accordance with applicable regulations in this area.

Internal combustion engines and refrigerants

W A R N I N G

If internal combustion engines are going to be installed in the same room as the (H)CFC system or in a room with piping containing (H)CFC, it is imperative that the combustion air for the engine does not extend to any location in which the (H)CFC gas may be present. This is the case for areas where an accident can occur when gas escapes from the system.

If this warning is ignored, the lubricating oil from the ignition engine can blend with the refrigerant and this can result in the corrosion of or damage to the engine.

Section 5. Troubleshooting

Troubleshooting table for ice factories. For troubleshooting on the compressor, condenser, etc., refer to the respective manuals.

FAQ:

Problem	Cause	Solution
There is ice along only half of the ice drum's width.	1: Too little refrigerant is passed through the ice drum. 2: The compressor unit's refrigerant is not filled up.	1: Increase the amount of refrigerant to be passed through the drum. See "Installation start-up" for adjustment instructions. 2: Increase the amount of refrigerant in the system.
The ice is too thin	1: The drum rotates too fast in relation to its surface temperature. 2: Land models: The water level is too low. 3: Marine models: The sprinkler pipes are clogged. 4: Marine models: The water pump is defective.	1: Adjust the drum's rotational speed. Contact your dealer or Buus Kølleteknik for advice and guidance. 2: Land models: Adjust the water level to 263mm. 3: Clean the sprinkler pipes. 4: Check the pump for defects and wear.
The ice runs under the ice knife.	1: The ice is being produced by water with too low conductivity. 2: The ice knife is worn. 3: The bearings are worn. 4: The ice is too thin.	1: Add salt with a type 1, 2, or 3 BUUS salt mixer. 2: Replace the ice knife. 3: Replace the bearings. 4: High water level. Marine: More water on the drum. Lower rotational drum speed.
The ice does not break off of the ice drum.	1: The ice is being produced by water with too low conductivity. 2: The suction pressure is too low.	1: Add salt with a BUUS salt mixer. 2: Raise the temperature of the ice drum.

Problem	Cause	Solution
The ice is very hard and freezes on the drum	1: The ice is produced with "soft" water with too low conductivity. 2: The suction pressure is too low.	1: Add salt with a type 1, 2, or 3 BUUS salt blender. 2: Raise the temperature of the ice drum.
Ice freezes on the drum when the ice machine is not running	The liquid valve does not close tightly.	Clean or replace the liquid valve.
The engine and gears run but the drum does not rotate.	1: The safety belt is cracked. The causes can be: 2: Stop via the emergency stop. 3: The water is too "soft" for ice production. 4: The distance from the drum to the ice knife is too long. 5: Unstable supply of electricity.	1: Replace the safety belt. 2: Instruct users on how to correctly operate the system. 3: Add up to 200ppm salt with a BUUS salt mixer. 4: Adjust or replace the ice knife. 5: Establish a stable supply of electricity to the ice machine.
The ice does not form on the entire drum surface but in "spots".	1: Oil in the drum. 2: Impurities in the refrigerant filter.	1: Drain the oil from the ice machine. You may contact the dealer for instructions on draining the oil in NH3 systems. 2: Change the filter.
The ice is stuck to the ice chute. The ice builds up in the ice machine.	1: There is calcium on the ice chute. 2: Humid air blows in and out of the ice machine. 3: The ice knife is not adjusted correctly. 4: The deck plate is not installed.	1: Clean the ice chute with a mild acid such as vinegar. 2: Remove the cause until there is traction. 3: Adjust the ice knife. 4: Install the deck plate. Contact the dealer if the problem continues.
Ice machines with pump circulation: Pump pressure failure.	Other users along the same string can be causing the pressure drop.	Contact those responsible for the cooling unit.
BUUS ice machine controls: Alarm. Frost thermostat.	1: The temperature in the water trough is at under the frost thermostat's set point. 2: The water supplied to the water trough is too cold.	1: Check the heating elements. 2: Contact the dealer. Several heating elements can be installed in the water trough.

BUUS ice machine controls: Alarm. Water pressure regulator.	The water pressure is too low.	Check the water supply. Other users along the same water line can be causing the low water pressure.
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Section 6.

Maintenance and cleaning

It is advantageous to keep the machine in good condition and at a reasonable cleaning level. This makes for the most secure operation of the unit.

The ice machine is made of corrosion-resistant and foodstuff approved materials, stainless steel and POM. It can therefore be washed with water.

Do **not** directly rinse the inside of the cabinet or the components directly as water can enter electrical contacts and the engine thus causing operational problems.

The inside of the machine should be cleaned with a brush.

General notes on maintenance.

To avoid operational malfunctions, it is essential that the engagement of the system's circuitry is done in accordance with the following instructions. An intervention that is done incorrectly can result in:

- Moisture in the engines, electrical parts or in the cooling system.
- Air in the cooling system.
- Metal particles and debris in the cooling system.
- Iron oxides or copper oxides in the cooling system.

Note: Failing to fill the refrigerant up or incorrectly controlling the liquid delivery to the ice machine are frequent causes of operational malfunctions.

Minimising corrosion on the ice machines

When different materials are submerged in a common water trough, galvanic corrosion can occur if the following rules are not complied with.

Electrical connections between the drum and other parts of the ice machine should not be made. In practice, this means that the tubing set and the stainless steel water trough should not be connected. If they are connected, corrosion will escalate, risking damage to the surface of the drum.

During operation

- A minimal amount of salt if such is used. As concentrated saltwater has a tendency to deposit at the bottom of the water trough, draining the water trough is recommended.

- The knife may not touch the drum!

At standstill

At standstill lasting two days, the following measures **MUST** be taken in order to avoid galvanised corrosion of the drum.

- The ice machine should be emptied of water.
- The drum should be dried so that any water film between the drum and the knife disappears.
- Cleaning with freshwater. Lubricating the drum with foodstuff approved oil.

Standstill for longer periods.

If the ice machine is not used for longer periods, the drum should be rotated for 15 minutes at least one time a week to make sure the stuffing boxes have an oil film between the sealing surfaces and leaking. You may also your supplier or BUUS Køleteknik A/S for advice and guidance.

Cleaning the water trough

Use gloves and protective glasses while cleaning.

1. Empty the water tank by dismantling the drain tap. Rinse the water tank thoroughly so that all foreign matter comes out.
2. Disconnect the attached gear with four M8x20mm so that the drum can be rotated by hand.
3. Attach the drain tap again. Prepare a mixture of *COMET** (BUUS item number 1210-005). 10 litres 40°C warm water per 0.5 litres of *COMET*. Wash the entire machine thoroughly, pour the rest of the mixture into the water trough and then fill the tank with 40°C warm water. Let the mixture stand for approximately 10 minutes and then wash the inside of the tub and all around the drum thoroughly. Empty the water tank. You can remove the drain tap so that this is done more speedily. Rinse thoroughly.
4. Attach the drain tap and perform the same procedure named in point 3 on *Comet* using *BENCO EXTRA/DUGE*** (BUUS item number 1481-005). Rinse thoroughly!
5. Attach the gear again and fill the water tank with clean, cold water. If the ice is used for foodstuff, the ice produced during the first ten minutes of production may not be used.

If cleaning takes place in a closed room, certified grade respirators should be used.

Cleaning the exterior of the cabinet

It would be beneficial to lubricate the machine cabinet with oil after cleaning it. This preserves the stainless steel surface's gloss.

BUUS recommends a paraffin-based maintenance oil for stainless steel. For example, 0.75 litre *SUMA INOX D7*. Buus item number 638966.

Cleaning the ice drum

If the ice machine is used with medium hard or hard water (>10dH), over time limestone deposits form on the drum's surface. The limestone can not be immediately removed with an acid solution and must be removed mechanically.

Use the following procedure:

- Empty the water trough
- Dry the drum.
- Start the gear motor so that the drum runs without any refrigerant.
- Sand the drum with an emery cloth with a grain size of 150. the grinding process is long, taking up to two hours. Stop grinding when the drum's dark surface is visible.
- If the ice machine is put into use immediately following sanding, it must be lubricated with an acid-free, foodstuff approved oil.

Section 7. Repairs.

Suctioning out the contents of the unit.

May only be done by trained personnel or an authorised cooling company.

1. Receiver stop valve after the receiver closes. Suction out the contents of the evaporator. Do not run the low pressure regulator to lower than a little over 0 ato.
2. The compressor should be stopped for a few minutes and the pressure and temperature will rise in the evaporator. Suctioning out is to be repeated again until the ato is a little over 0.
3. The compressor stops and the vacuum/pressure stop valve closes.
4. Disconnect electrical supply.
5. The entire refrigerant load is thereafter transferred to the receiver.

Separating the system

1. When the above procedure is followed, a little overpressure in the system will result. When opening the system, keep the following in mind:
Ventilation, open flames and any gas masks.
2. The system should not be opened more than is necessary, and preferably in only one place at a time.
3. In order to avoid foreign materials from entering, the openings should be plugged after the separation.
4. After smaller repairs, the system should be evacuated. See "Drying the system". With larger repairs, it is recommended that a leakage control test (see the next page) be done before the evacuation.
5. Then, start the system.
6. Please note: Remember to replace the dry filter during the separation.

Leakage test

1. Before starting the machine after larger reparations, a leakage test should be done. It should be done using nitrogen or with dry air with a pressure at least

equal to the system's operating pressure. All joints and endings should thereafter be examined for leakage problems.

2. After the refrigerant has been filled, all joints and endings should be examined with a gas detector.

Drying the unit

1. To remove moisture/water from a unit, it is necessary to set the vacuum on the unit as moisture/water can boil when pressure falls. At 0.001 ata, the boiling point of water is approximately +6°C.
2. A suction line is installed on the vacuum pump and water will boil at constant pressure corresponding to the temperature. The pressure falls further first when evaporation stops. It continues to a minimum 0.001 ata=7.6mm. HG.

Lubricating oil requirements

The lubricating oil first and foremost should satisfactorily lubricate the compressor and should also be able to withstand relatively high temperatures which occur in the cylinders during compression, i.e.: There is no carbonisation with high temperatures and no ice or paraffin at low temperatures.

The oil must not be corrosive.

General rules for using cooling machine oils:

1. Only new, clean cooling machine oil made by a well-known manufacturer may be used.
2. Use the same quality of oil as was originally delivered for the cooling compressor, or an oil of equivalent quality.
3. Avoid blending different oils together as much as possible. In most cases, no damage occurs from blending two homogeneous oils made by different manufacturers, but the blended oil is normally inferior to the two unblended oils separately and blending oils may the risk of sludge formation.
4. Switching from one oil brand to another should be done during a complete oil change on the compressor.
5. Cooling machine oil should normally be purchased in appropriately sized oil cans which can contain be kept closed until the oil is used.
6. Avoid filling old, dirty oil in the same cans due to the risk of reusing the oil.

7. If there is a question about which oil should be used, you are recommended to contact BUUS Køleteknik instead of risking filling with an improper oil. BUUS Køleteknik recommends the oils summarised below.

Filling lubricating oil in the compressor

1. Evacuate the unit (see "suctioning out the contents of the unit")
2. An oil pump should be used when filling the oil. The oil pump should be connected to the compressor crankcase and the oil can be filled immediately.

Oil in the cooling system

In cooling systems, oil should protect the compressor from all types of refrigerants and all operating conditions (pressure and temperature).

Nowadays, the following types of oil are used for cooling systems:

Mineral oil
 Synthetic oil
 A blend of the two types

R717 (NH₃)

The oil is only blendable with R717 to a very limited extent. Due to its higher density, it will always separate under the R717 level. The oil, which is led through the system, cannot immediately be reused and it is therefore necessary to equip the compressor with an effective oil separator and automatic oil retraction. With systems with a stempel compressor, and with a high pressure gas temperature, it is important to choose an oil with high oxidation stability.

HFC/HCFC

A synthetic, ester-based oil is to be used

R744 (CO₂)

A synthetic, ester-based oil is to be used

Oil grade

A high-quality oil such as, e.g. DIN 51503, must always be used. The viscosity of stempel compressors should be at least 20 cst even if the oil contains some refrigerant. Different oil manufacturers and grades may not be mixed. The oil grade and/or manufacturer should not be changed without contacting your own oil supplier.

Mineral oil

Mineral oil is denoted with the letter M and is made of good quality raw oil. The oil consists of hydrocarbons of various sizes and structures. The most major ones are paraffin, naphthalene and flavouring agents. Modern refining processes can produce a refrigerant

oil with a high paraffin and naphthalene content, whereas undesired flavouring substance content is kept as low as possible.

MN

MN is a naphthalene-based oil well-suited for R22 systems.

MP

MP is a paraffin-based oil used only for R717 systems in which it is most suitable due to, i.a., low oil usage.

Synthetic oil

There are a number of types of synthetic oil:

A

A is an alkylbenzene cooling machine oil, or is an alkyl aromatic compound characterized by a high miscibility at R22 with low temperatures. The flow properties are, however, relatively poor at low temperatures which can lead to reduced evaporator capacity and require the installation of a suction gas superheater. The oil is more stable than mineral oil and tolerates high temperatures without oxidising.

MA

MA is a mix of synthetic A oil and mineral oil. MA can be mixed in various ways, but generally MA has the same properties as the best mineral oils.

PAO

PAO is a synthetic oil based on polyalphaolefin and characterised by a high chemical and thermal stability and a high viscosity index. This makes it suitable for operating conditions with high oil and pressure pipe gas temperatures.

The oil has a low pour point which makes it suitable for R717 systems with low suction temperatures. The miscibility of CFC and HCFC is low and therefore the system should contain an efficient oil separator and efficient oil return from the evaporators.

The oil is relatively expensive but has a long service life. The oil drained from the system can normally be reused after filtration. Oil changes are often based on the analysis of oil done by the oil suppliers.

AP

AP is a mix of A oil and PAO oil. It has a miscibility of R22 which makes it more suitable for such systems than PAO oil. The oil is also suitable for R717 systems.

G

G is a synthetic oil based on polyglycol used in connection with, e.g. R290 (propane), R600 (butane) and other chemicals. On the other hand, the oil is not suitable for R22 and R717.

POE

POE is an ester oil which is, i.a. used in R744 systems.

Properties of the oil**Kinematic viscosity**

Viscosity is measured in cst (centistokes) and are classified for ISO VG which means that the measurement is done at an oil temperature of 40°. For example, ISO VG 68 means that the viscosity is 68 cst at 40°C.

With R22 compressors in which in the crankcase is a mix of oil and R22, the mixture's viscosity must be calculated. This can be determined by using a diagram which shows the viscosity with respect to temperature and pressure.

Viscosity index ISO 2909

The index expresses the viscosity's dependence on temperature changes. A high index means a small change in the viscosity in the range of 40-100°C. An oil for use in cooling systems with a high viscosity index is recommended.

Other properties

The oil suppliers specify a wide variety of other cooling machine oil properties, such as e.g. flash point, pour point, floc point, aniline point, colour, acidity and sliding properties. This information appears in the "technical data" and can also be obtained from the oil supplier.

Permissible temperatures

Depending on the viscosity, the following are the maximum limits for stempel compressors:

ISO VG no.	Oil temperature	Maximum Pressure piping temperature
46	50°C	120°C
68	60°C	130°C
100	65°C	130°C

In case of doubt, contact the supplier of the cooling system or the oil supplier.

Operating log

By keeping an eye on the cooling system's operating condition via an operating log, it is possible to remedy a defect before operational problems occur.

The following should be continually noted in the operating log:

Electrical motor:	Measure Amp usage	amp.
Compressor:	Read the suction pipe and pressure pipe pressure	ato
	Read the suction pipe and pressure pipe temperature	°C
	Check the condition of the oil	
Water-cooled condenser:	Cooling water intake	°C
	Cooling water discharge	°C
	Cooling water amount	L/h
Air cooled Condenser:	Check the ventilators and surface for debris and other things on the cooling surface.	
	Air temperature:	°C
Machine room temperature.	Air temperature:	°C

Maintenance schedule

To avoid operational stoppages, the intervals named in the schedule should be observed.

Subject	Control of	Interval	Activity
Compressor	Suction and Pressure valves with valve springs	Should be replaced At approximately 10,000 operating hours	A leaking pressure valve can be controlled by stopping the compressor, closing the pressure stop valve and observing the manometer so the pressure is quickly equalised.
	Stuffing box	Periodic	The compressor stops and the stuffing box is checked for leakages with a leak detection lamp or leakage spray.
Electrical motor:	Lubricating the electrical motor	Periodic	Clean and lubricate.
	The clutch, V-belts, and transmission	Periodic	The clutch, V-belts and transmission are to be checked. Tighten or replace loose V-belts.
Air-cooled condenser	Failing condenser Cooling	Periodic	Clean the cooling surface with cold water. Only hose down parallel with the cooling fins' direction.
Water-cooled condenser	Failing condenser-cooling	Periodic	Adjust condenser cooling. During inspection, drain any water and check all parts affected by water for contamination, stone deposits and fouling.

Oil	The oil level in the crankcase/bearings	Weekly	The oil used for ice machine bearings is the same as the oil used for the compressor.
	The crankcase oil filter	Clean during oil changes	Replace the filter cartridge during larger repairs of the compressor.
	Oil changes		The compressor's oil must be replaced if it discolours.
Filters	Filter in the liquid piping - term. Valve: suction line	Clean as needed	Dirt accumulation results in reduced coolant inflow to the evaporator. The filter having a warm inflow and a cold outflow indicates the presence of clogging of the component.
	Remove moisture in the inspection window	Periodic	Some installations are equipped with inspection windows with moisture indicators. The colour changes from green to yellow in the presence of moisture in the refrigerant.
Refrigerant	Refrigerant filling		Insufficient filling results in reduced capacity and in the liquid foaming on an inspection window.
	Detecting leaks	Periodic	The installation should be regularly inspected for leaks.
Automatic	Safety pressure regulator. Automatic mode Alarm.	Periodic	Verify functioning.

Important!

Also refer to the detailed manuals from the manufacturers.

If there are special requirements, the manufacturers' suggestions supersede the general suggestions from BUUS Kølleteknik A/S.

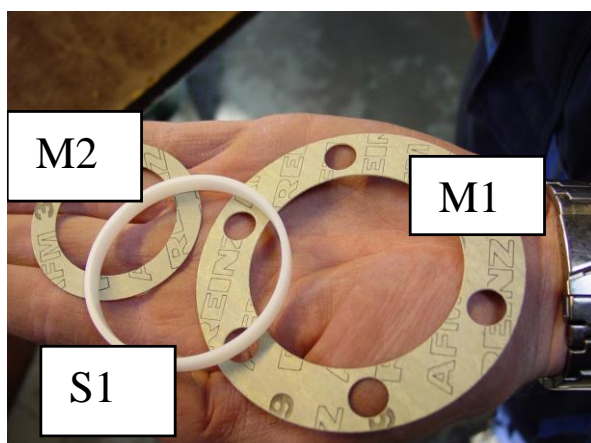
Changing stuffing boxes

Applicable to type C, D, E and F ice machines with serial numbers at above 1534 which were produced after week 42, 2004.

Install type 01129, 011299, 011103 & 010805 stuffing boxes for BUUS flake ice machines. Take material temperature measurements: 20°C. The instructions on the following pages apply to both the left and right side of the ice machine.

SCHEDULE A

Installation kit no.	Measured distance	Flange middle layer. M1	Item number	Stuffing box middle layer M2	Item number	Stop ring S1	Item number
011103E1	28.80-29.29	0.5mm.	Ø90x58x075	3x0.5mm.	1027128	5.8mm.	1300321202
011103E2	28.30-28.79	0.5mm.	Ø90x58x075	2x0.5mm.	1027128	5.8mm.	1300321202
011103E3	27.80-28.29	0.5mm.	Ø90x58x075	1x0.5mm.	1027128	5.8mm.	1300321202
011103E4	27.30-27.79	0.5mm.	Ø90x58x075	No middle layer	-	5.8mm.	1300321202
011103E5	26.80-27.29	1.0mm.	Ø90x59x1.0	No middle layer	-	6.3mm.	1300331202
011103E6	26.30-26.79	1.5mm.	Ø90x59x1.5	No middle layer	-	6.8mm.	1300341202
011103E7	25.80-26.29	2.0mm.	Ø90x58x075 + Ø90x59x1.5	No middle layer	-	7.3mm.	1300351202



This procedure is applicable to both ends of the ice machine.

1:

Install the bearing without the stuffing box.



Photo 1a



Photo 1b

2.

Measure the installation's stuffing box length with a depth gauge. In this case, 29.3mm is measured. Note the measurement. Use this in point 4 when you choose the mounting kit.



Photo 2a

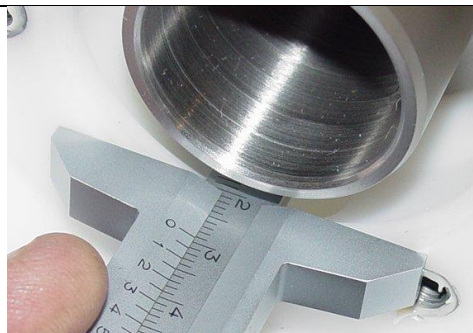








Photo 2b

3.

Remove the bearings.



Photo 3a

<p>4.</p> <p>Choose the mounting kit in schedule A based on the measurement you noted in point 2.</p>		
<p>5.</p> <p>If there is to be a middle layer (paper based), use type M2 and install it behind the stuffing box. Tighten the stuffing box.</p>		
<p>6</p> <p>Install the dynamic seal on the mounting mandrel (Buus item number 060509) and install the seal.</p>		
<p>7. Install the bearings.</p>		

8.

Degrease the stuffing box's rotating part and the stationary part with alcohol or acetone. Do not apply oil to the surfaces. Make sure there are no foreign materials on the stuffing box's surfaces.



Photo 8a



Photo 8b

9.

Install the S1 stop ring and the M1 middle layer following schedule A.



Photo 9a



Photo 9b

10.

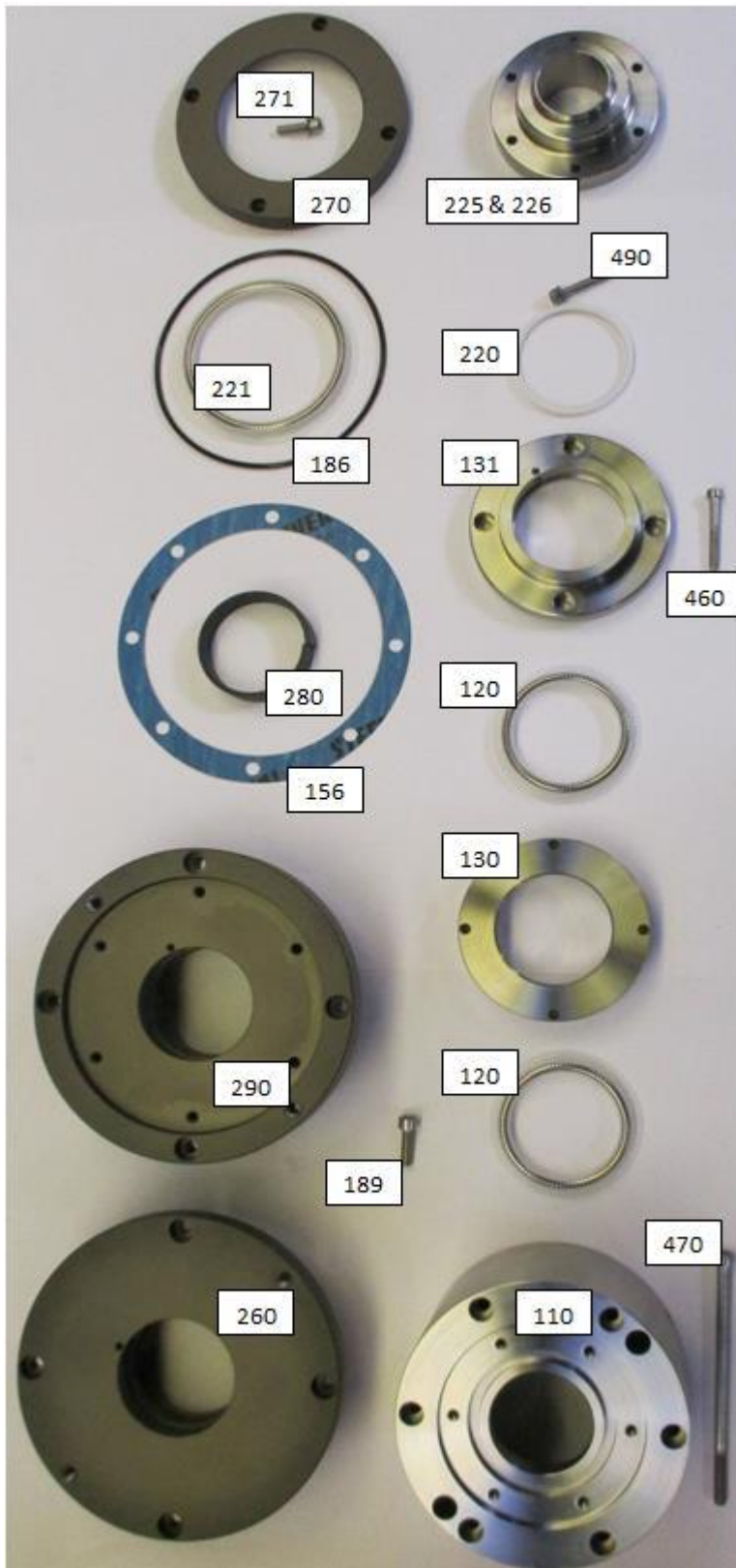
Install the S1 stop ring and the M1 middle layer following schedule A.



Photo 10a

**Replacing the conveyor belt and the axial seals
Applicable to type CC, CD, CE and CF ice machines.**








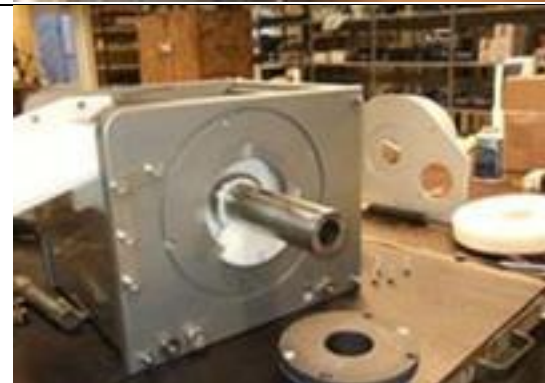
SCHEDULE B



Position 110	Seal housing influx/aspirate
Position 120	Dynamic sealing Ø55
Position 130	Inner seal ring
Position 131	Outer seal ring
Position 156	Gasket Ø160
Position 186	O-ring Ø125
Position 189	M6x20 screw
Position 220	Dynamic and flange sealing
Position 221	Dynamic sealing Ø80
Position 225	Flange-in
Position 226	Flange-out
Position 260	Bearing housing-in
Position 270	Clamp ring
Position 271	M5x20 screw
Position 280	Conveyor belt
Position 290	Bearing housing-out
Position 460	M6x40 screw
Position 470	M6x100 screw
Position 490	M6x30 screw

See also the spread drawing and parts list for descriptions and item numbers. Make sure that the o-ring and gaskets are installed correctly.

Applicable to type CC, CD, CE and CF ice machines.

<p>Changing the conveyor belt and axial seal for water.</p> <p>Remove the screw which holds the nylon gear wheel in place and pull the gear wheel out.</p>		
<p>Remove the note.</p>		
<p>Using screws in the threaded holes, press the bearing house out of the gable.</p>		
<p>Remove and clean the bearings.</p> <p>Hold the drum's axle up. The special tool with item number 170114 can be used for this and ordered from Buus Kølleteknik A/S.</p>		

Remove the clamp ring and clean all the surfaces.



Change the water seal ring. Clean and polish the surface where the water seal ring abuts.



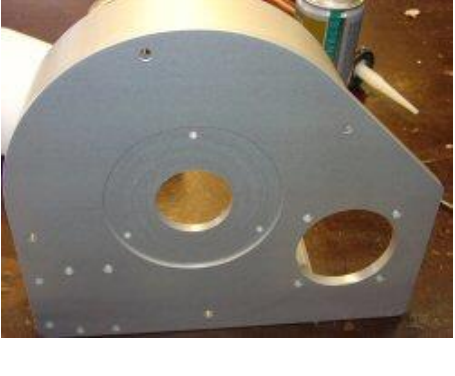












Change the feed belts. They can be easily removed with a small screwdriver and then the new feed belts can be installed.



Pull the bearing house in place using bolts and nuts in the puller threads. You may also use a small rubber or plastic hammer.



<p>Install the note and the gear wheel. Remember the safety screw.</p>		
<p>Install the gear house.</p>		
<p>Separate and clean the bearing housing.</p>		
<p>Remove the axial seals and feed belts.</p>		

<p>Install new axial seals and feed belt.</p>		
<p>Install the innermost and outermost ring.</p>		
<p>Install the outermost ring with screws and a spring washer.</p>		
<p>Install the bearing housing with new axial seals and bearing tape.</p>		
<p>The bearing housing is installed</p>		

Installation instructions for ice knife/knives

Type C, D, E & F BUUS flake ice machines. Type C, D and E machines have an ice knife. Type F has two ice knives.

All measure at 20°C / 68°F

1:

Remove the existing knife (F model: two knives) and the various plastic plates. Remove also the gear so that the drum can freely rotate.

Find the drum's highest point using a dial gauge.

With a felt-tip pen, mark the point.

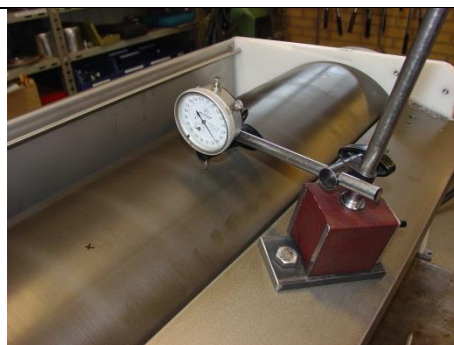


Photo 1.a

2.

Apply silicone as shown.



Photo 2.a

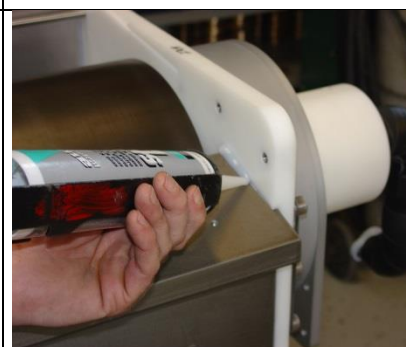


Photo 2.b

3.

On F models, apply silicone also at the centre of the knife bridge where the two ice knives meet.

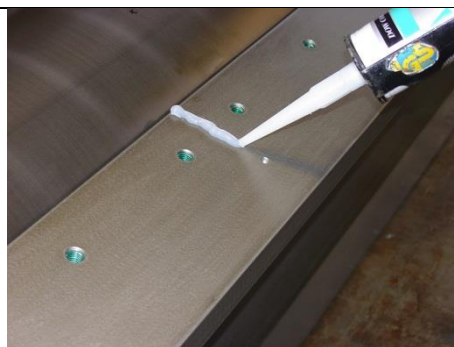


Photo 3.a

4.

Turn the drum so that the highest point is next to the ice knife. Install the ice knife (ice knives).

To prevent tearing, apply "anti-seize" grease to all stainless steel bolts.

At BUUS, anti-tearings and lubricants from Mega Metal are used. (www.partsmaster.com) Make sure that the knife/knives do not damage the surface of the drum!



Photo 4.a



Photo 4.b

5.

Tighten the bolts a little so that the distance to the drum can be adjusted.



Photo 5.a



Photo 5.b

6.

The distance from the tip of the knife to the drum should now be approximately 0.5mm.



Photo 6.a

7.

Use a 0.15mm feeler gauge to determine the distance from the drum to the ice knife. It may be necessary to loosen and tighten the bolts several times to get the right distance at both ends of the ice knife.



Photo 7.a

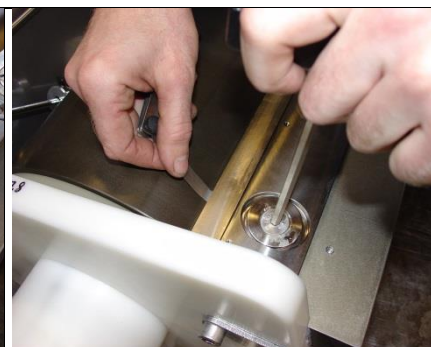


Photo 7.b

8.

Tighten the bolts by maximum of 35Nm.



Photo 8.a








Photo 8.b

9.

When all the bolts are tightened, check the distance to the drum again with a 0.15mm feeler gauge.



Photo 9.b

	Photo 9.a	
<p>10.</p> <p>Apply silicone behind the ice knife.</p>	 <p>Photo 10.a</p>	
<p>11.</p> <p>Attach the plastic base for the ice chute.</p> <p>Use the "anti-tearing agent" for the bolts. This makes it easier to disconnect the knives the next time they are replaced.</p>	 <p>Photo 11.a</p>	 <p>Photo 11.b</p>
<p>12.</p> <p>Attach the ice chute.</p> <p>Use M4 plastic screws to attach the ice chute. Be careful not to tighten the screws too much.</p>	 <p>Photo 12.a</p>	




<p>13.</p> <p>Attach the ice chute wings.</p>		<p>Photo 12.b</p> 
<p>14.</p> <p>The ice machine after it has been installed.</p>		

Photo 13.a

Photo 13.b

Photo 14.a

Ordering spare parts

When ordering spare parts, provide the following information:

- The ice factory's serial number (shown as the "factory no." on the ice machine's nameplate)
- A description of the spare part
- The item number of the spare part
- The position number of the spare part
- Quantity
- Preferred shipping method. Regular shipping or express shipping.
- Any special requirements for the shipment. Documents, etc.
- Billing address
- Recipient address

Please specify if you desire a shipping tracking number.

The spare parts can normally be sent the same day if we receive the order before 12:00 noon.

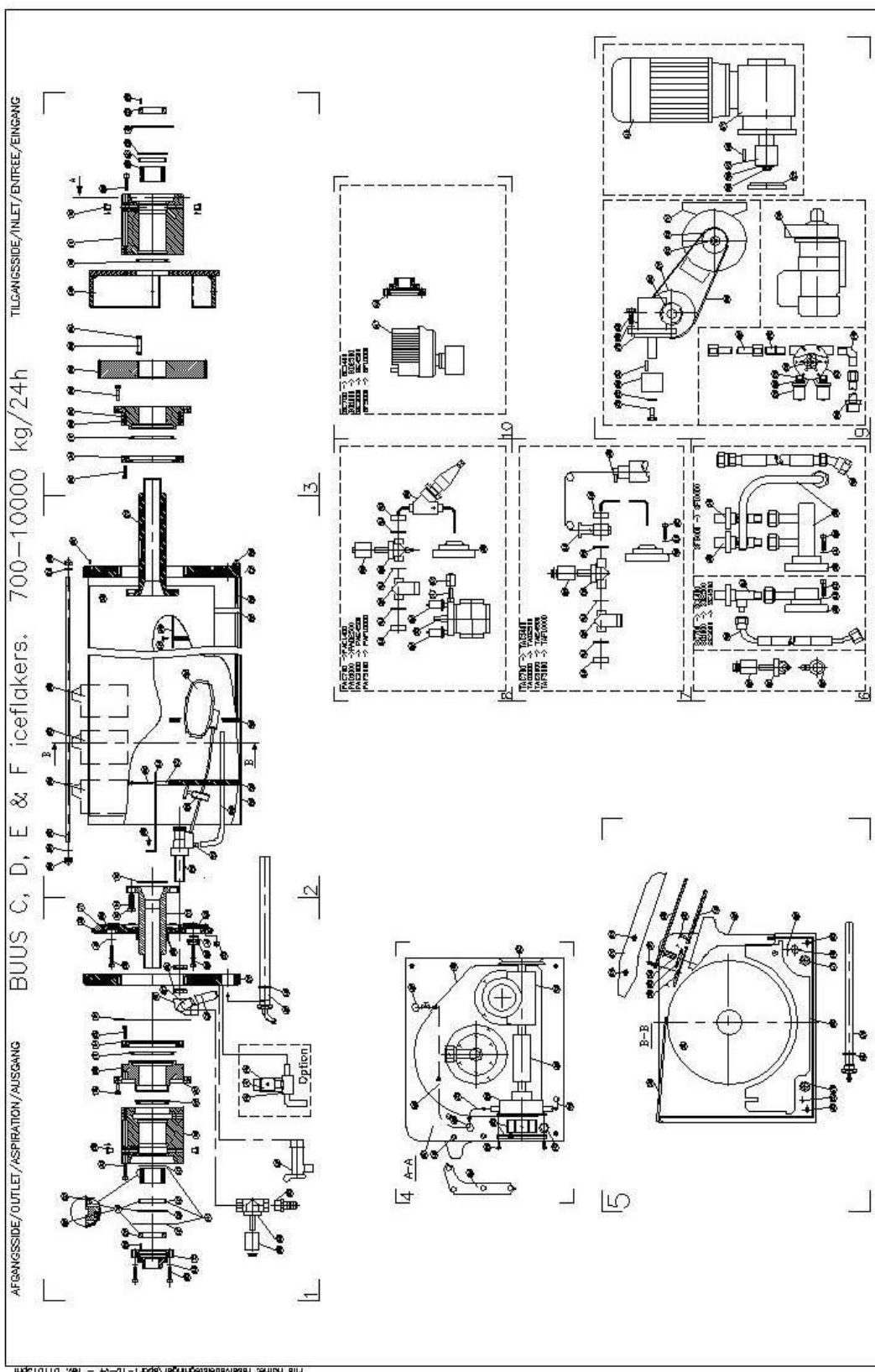
At <http://www.buus.dk/tracking.htm>, you can follow your package via the shipping company's tracking services.

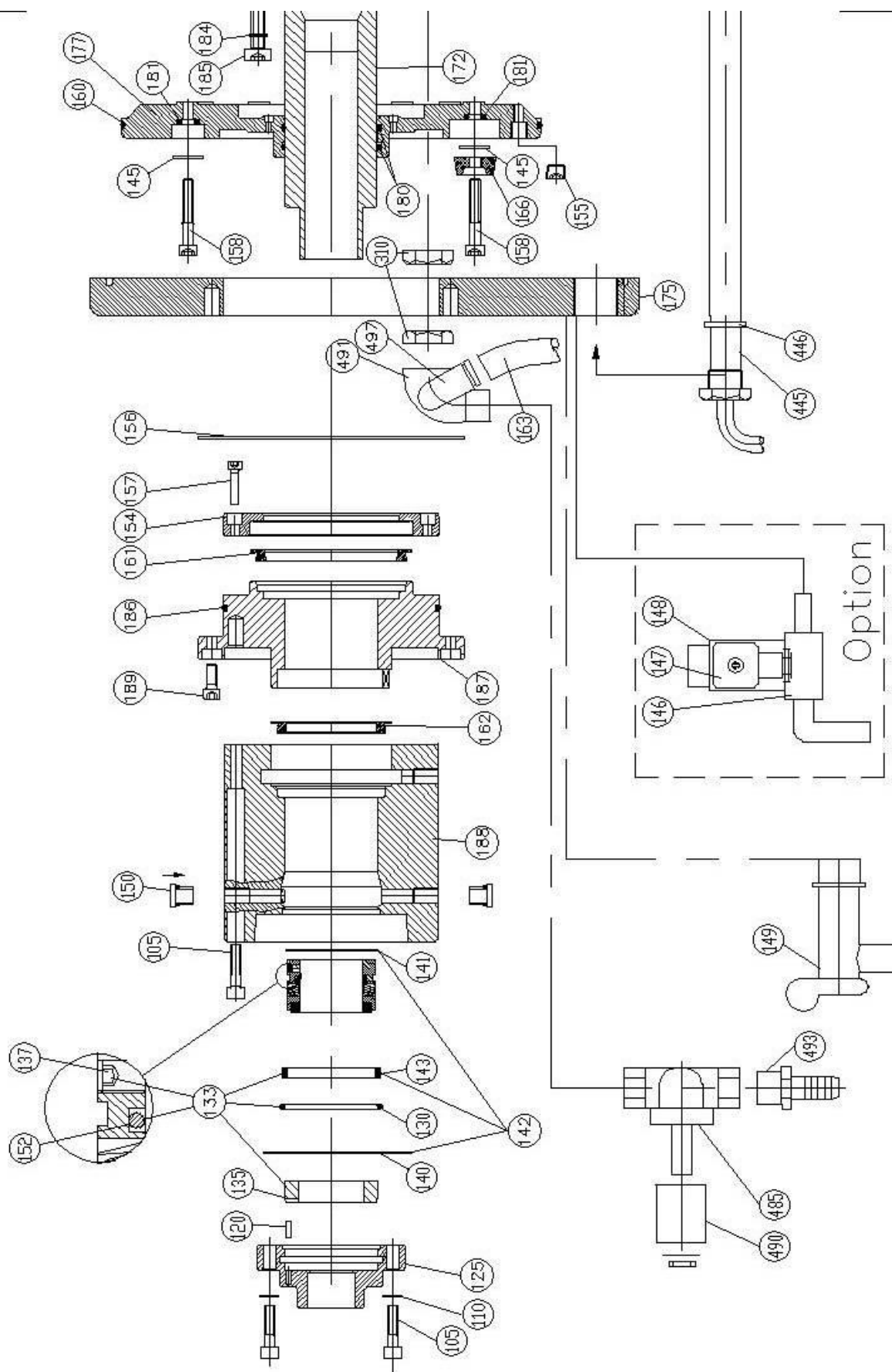
Section 8

Product specifications

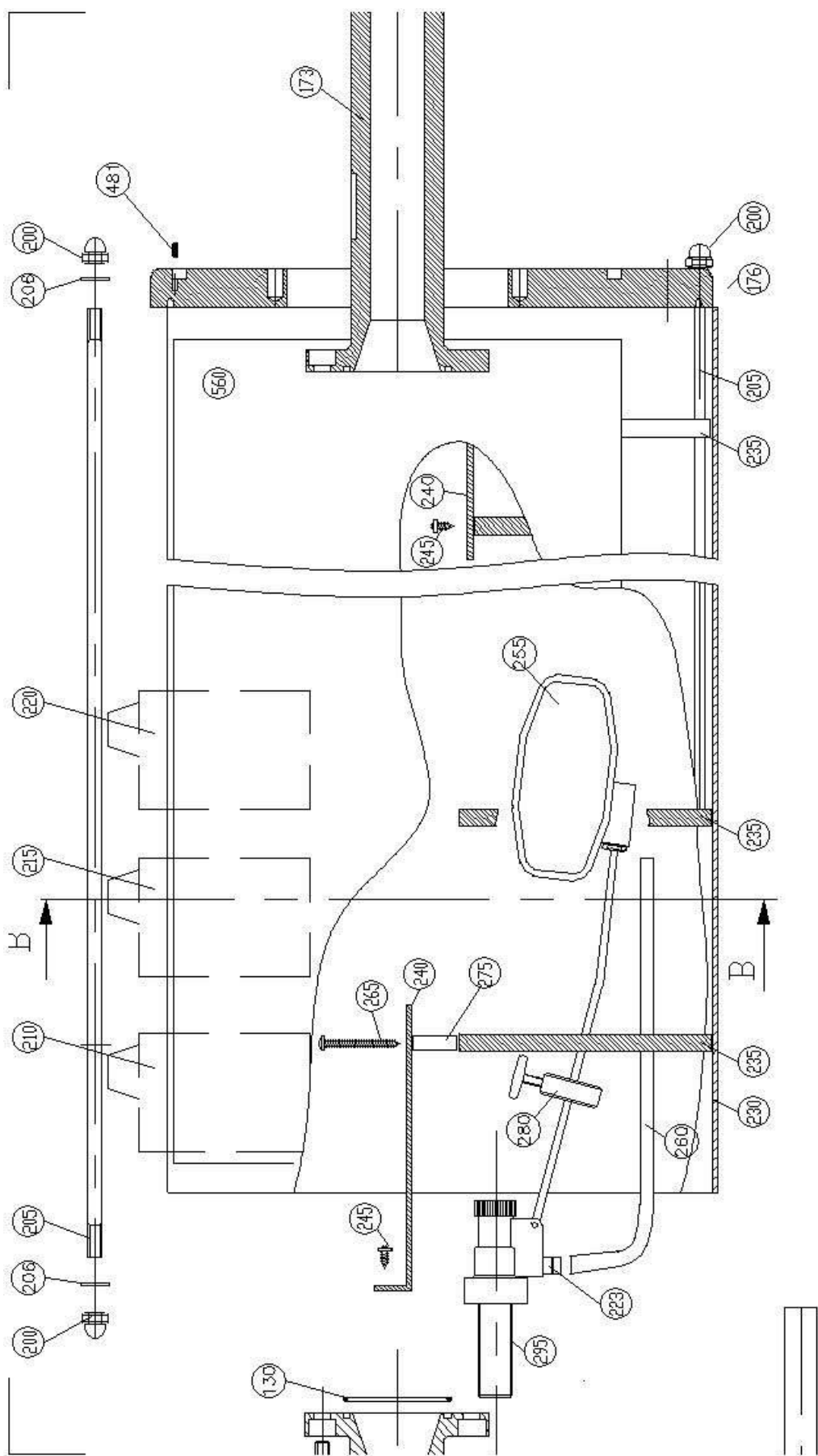
Data

Drawings. Iceflakers delivered before 31st December 2019

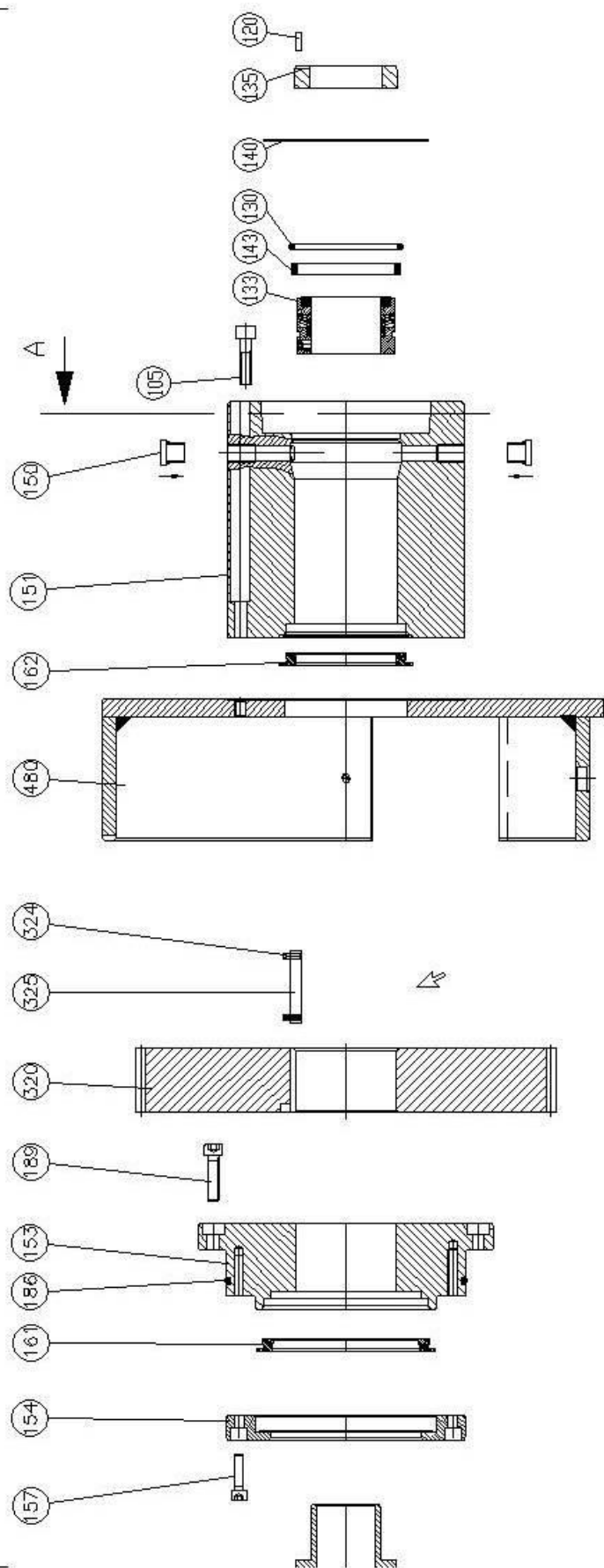


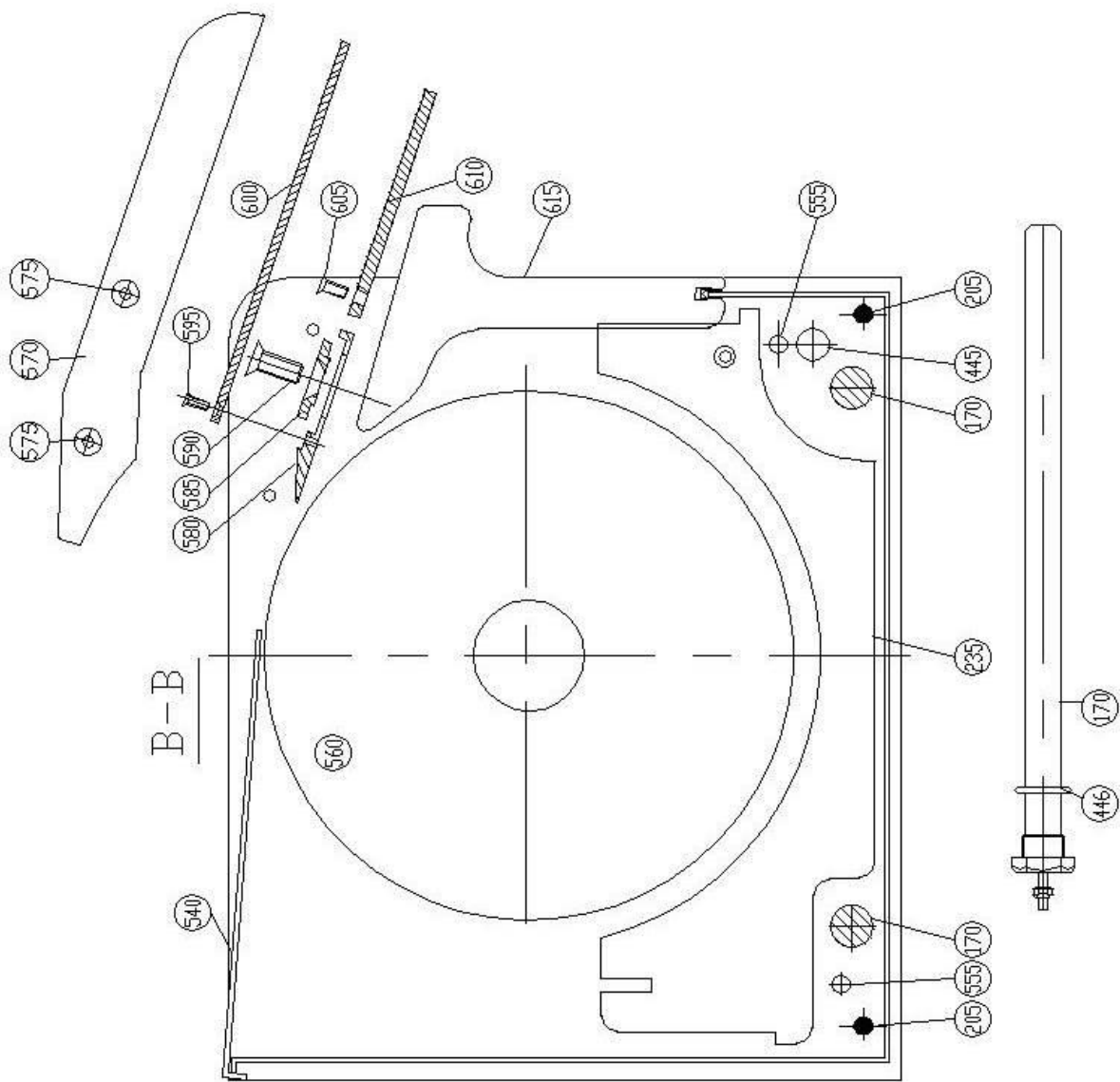


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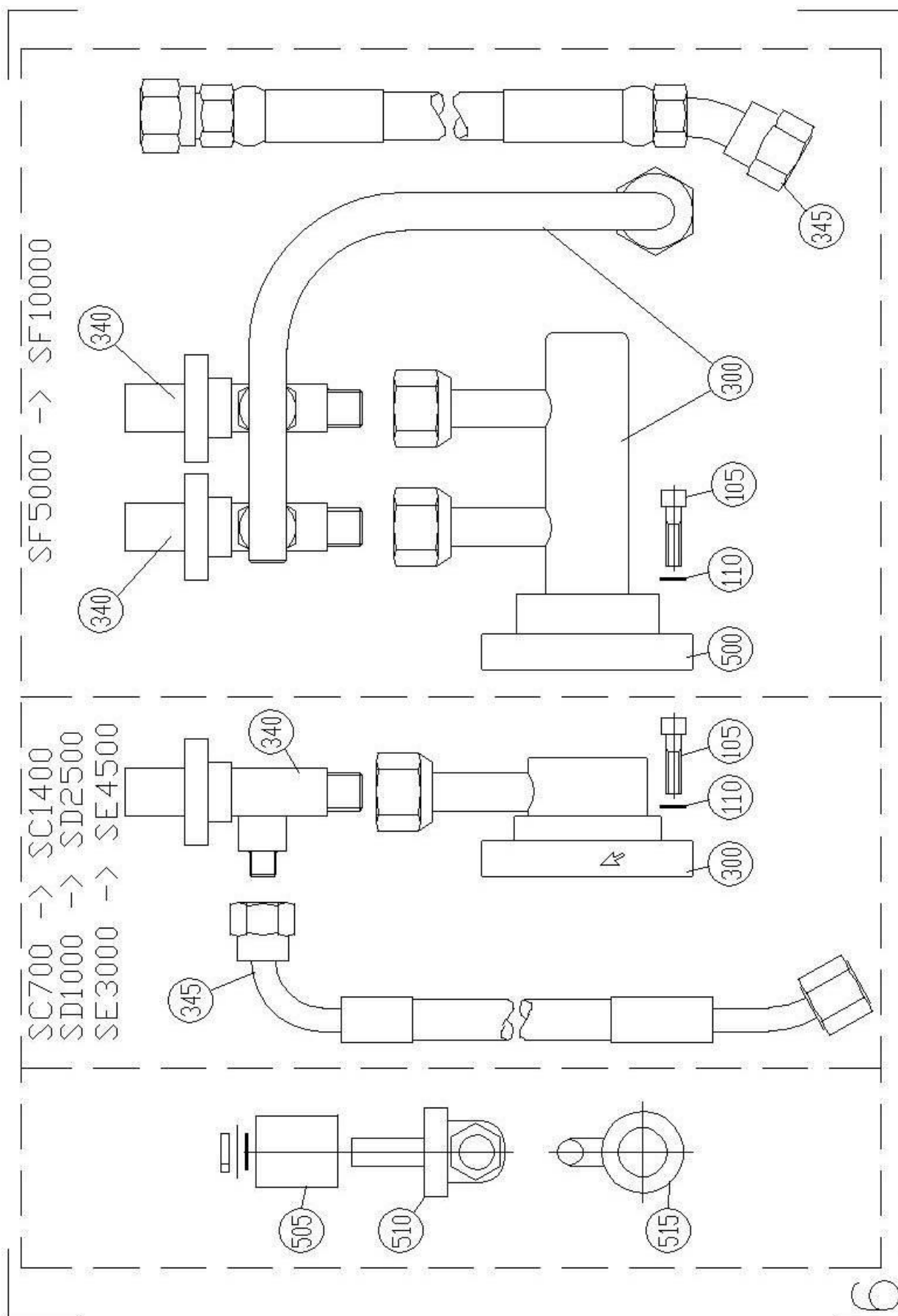


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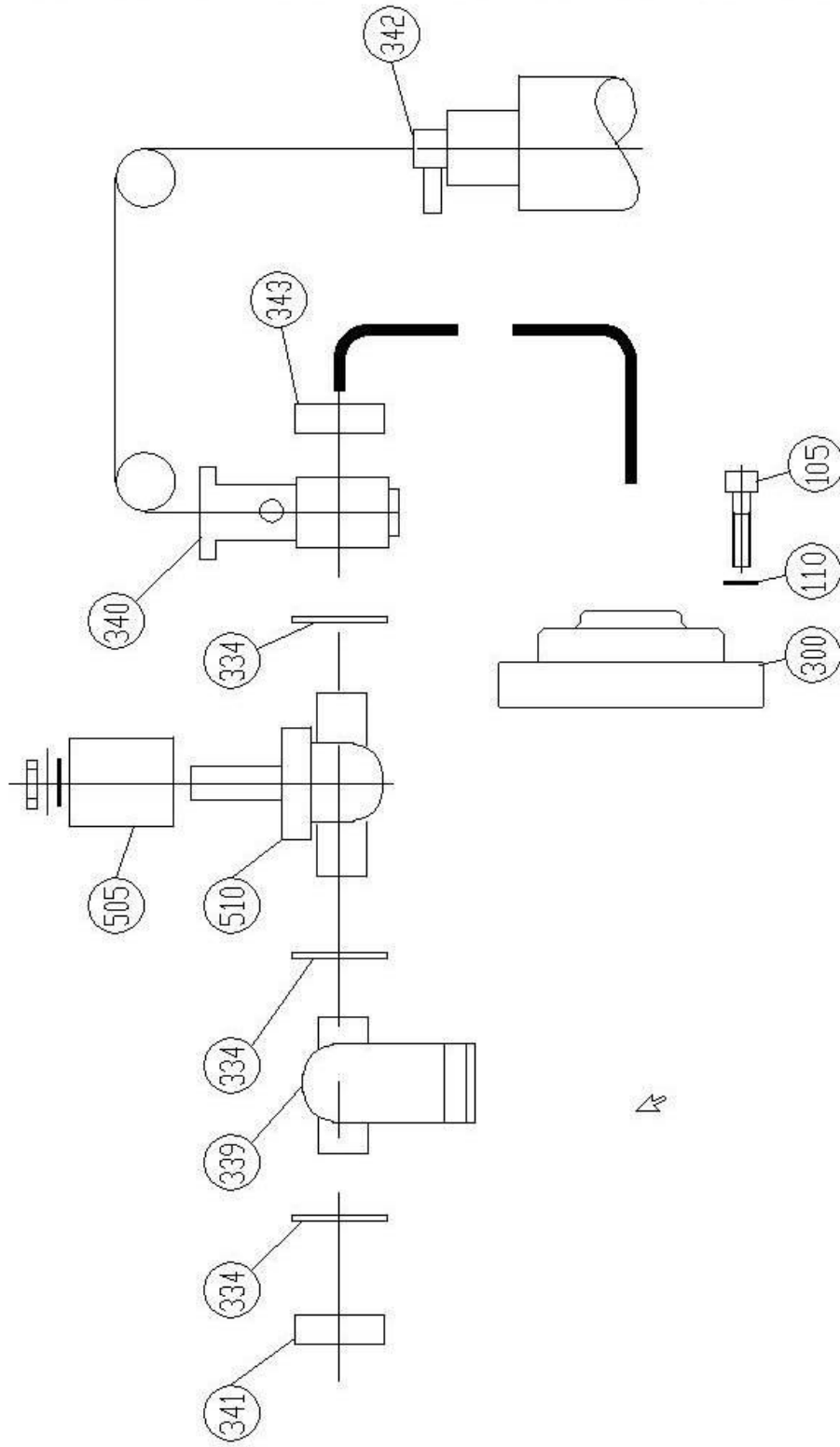




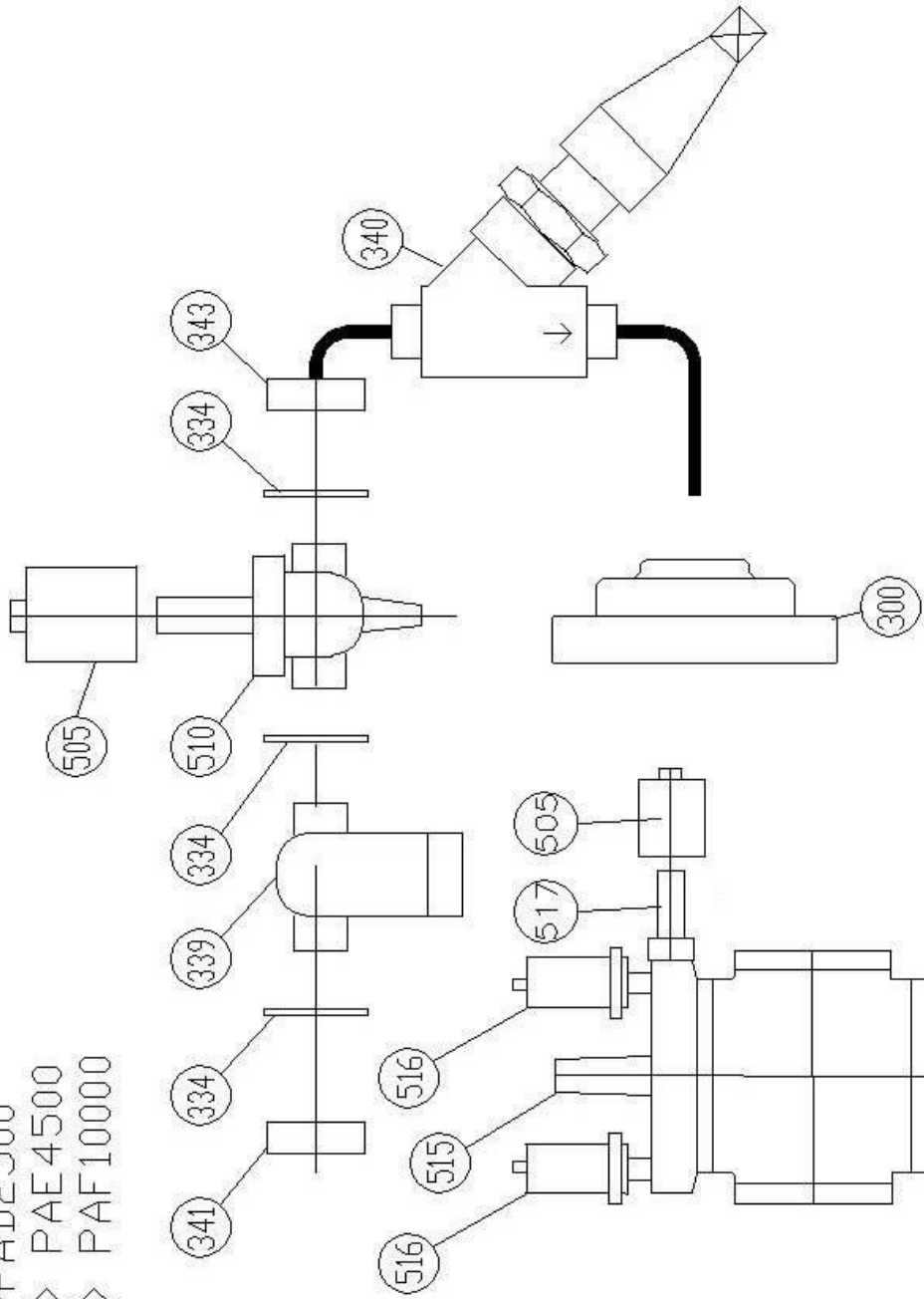
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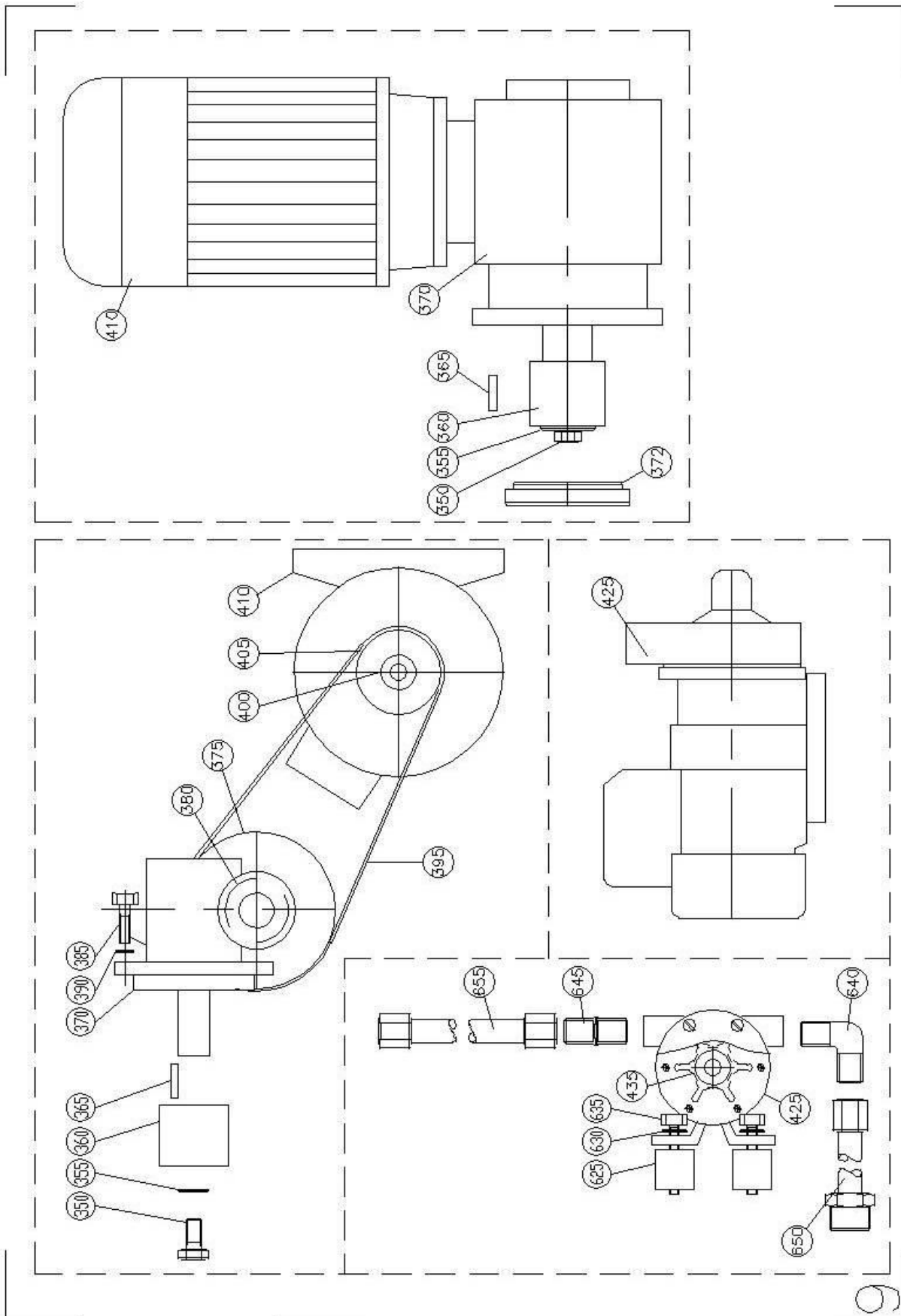


TAC700 -> TAC1400
 TAD1000 -> TAD2500
 TAE3000 -> TAE4500
 TAF5000 -> TAF10000

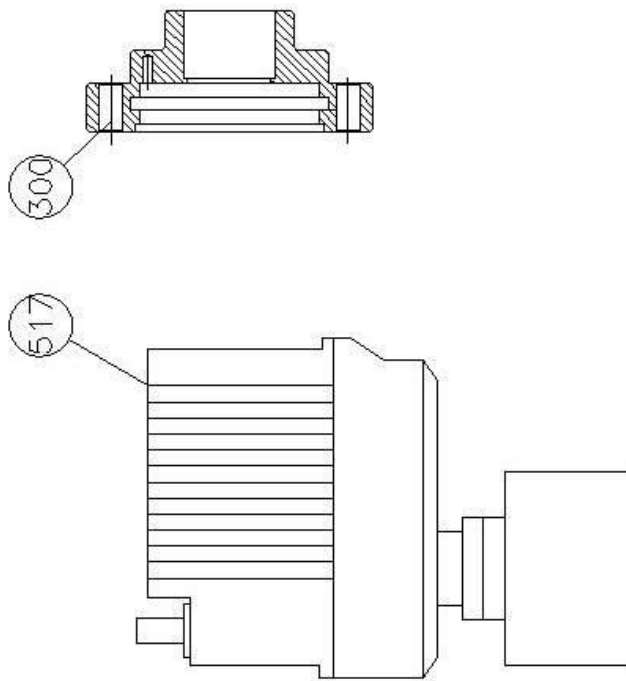


PAC700 -> PAC1400
 PAD1000 -> PAD2500
 PAE3000 -> PAE4500
 PAF5000 -> PAF10000

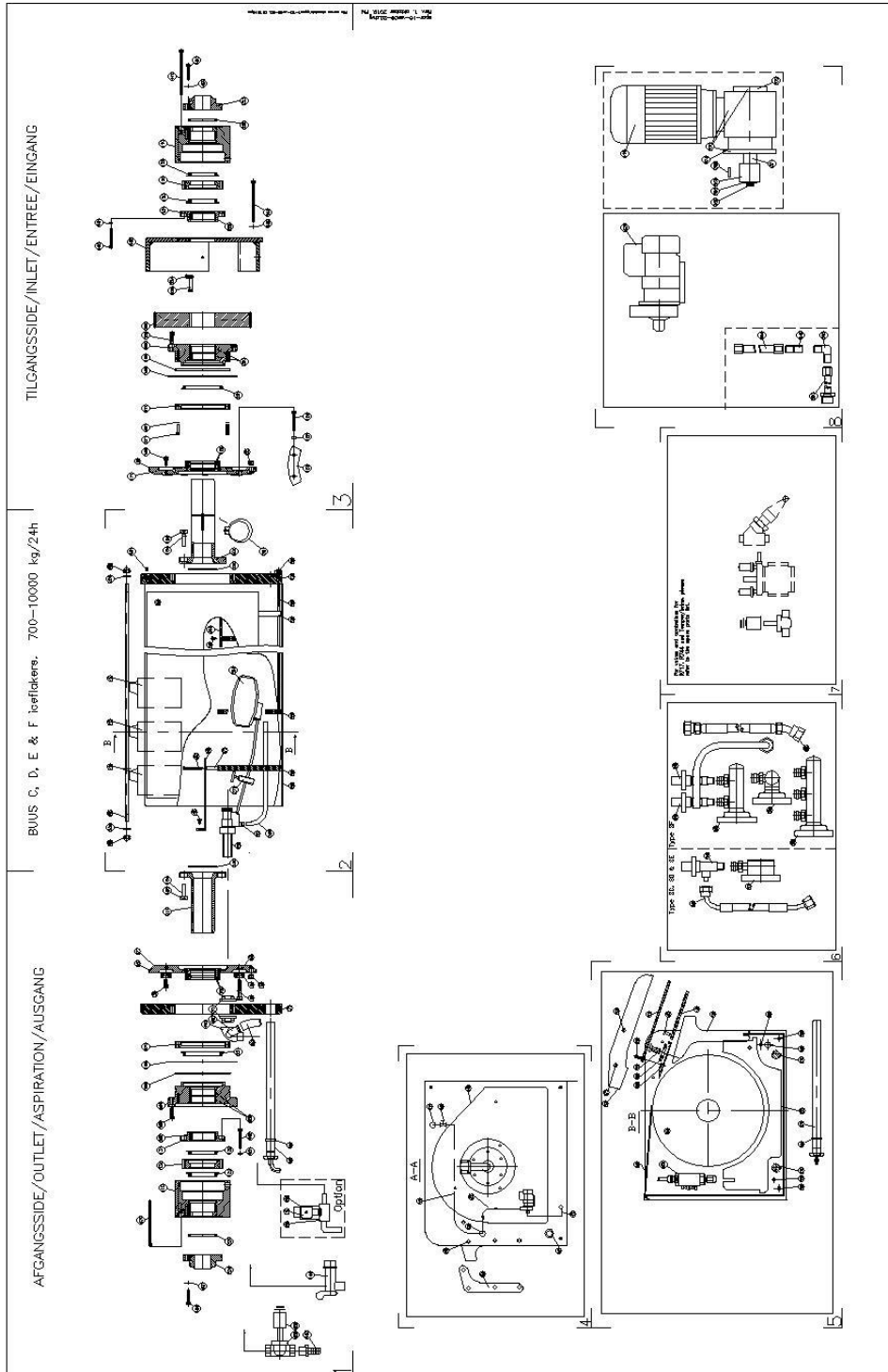




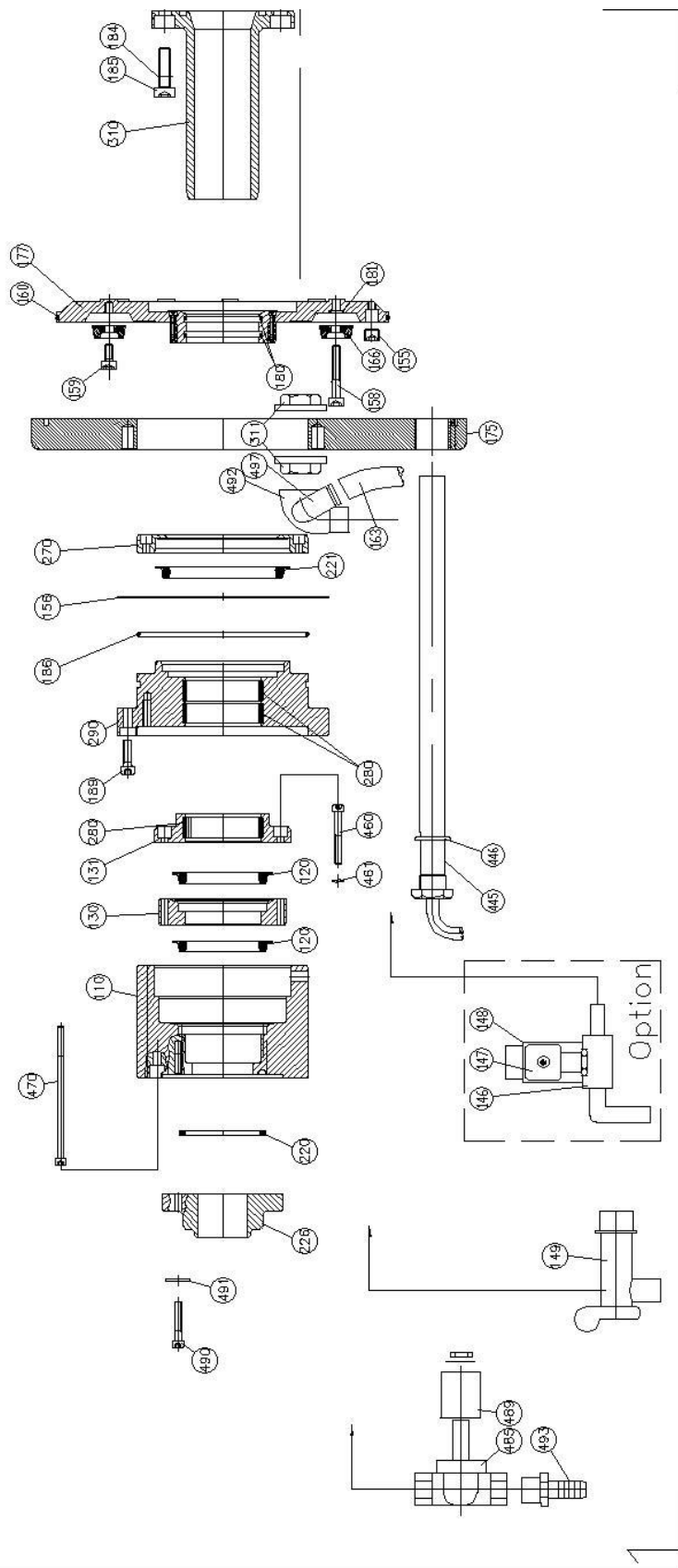
BC700 → BC1400
BD1000 → BD2500
BE3000 → BE4500
BF5000 → BF10000



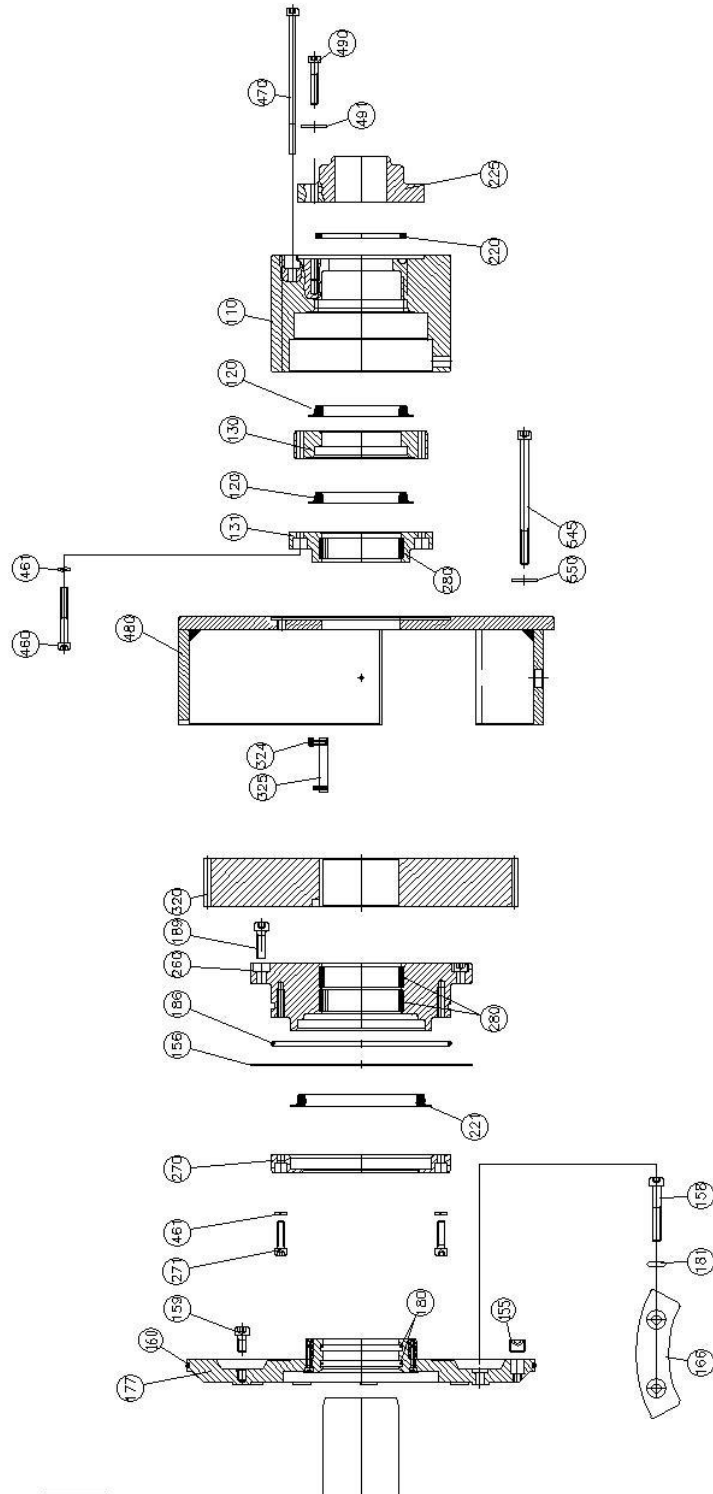
Drawings. Iceflakers delivered after 1st January 2020



AFGANGSSIDE/OUTLET/ASPIRATION/AUSGANG

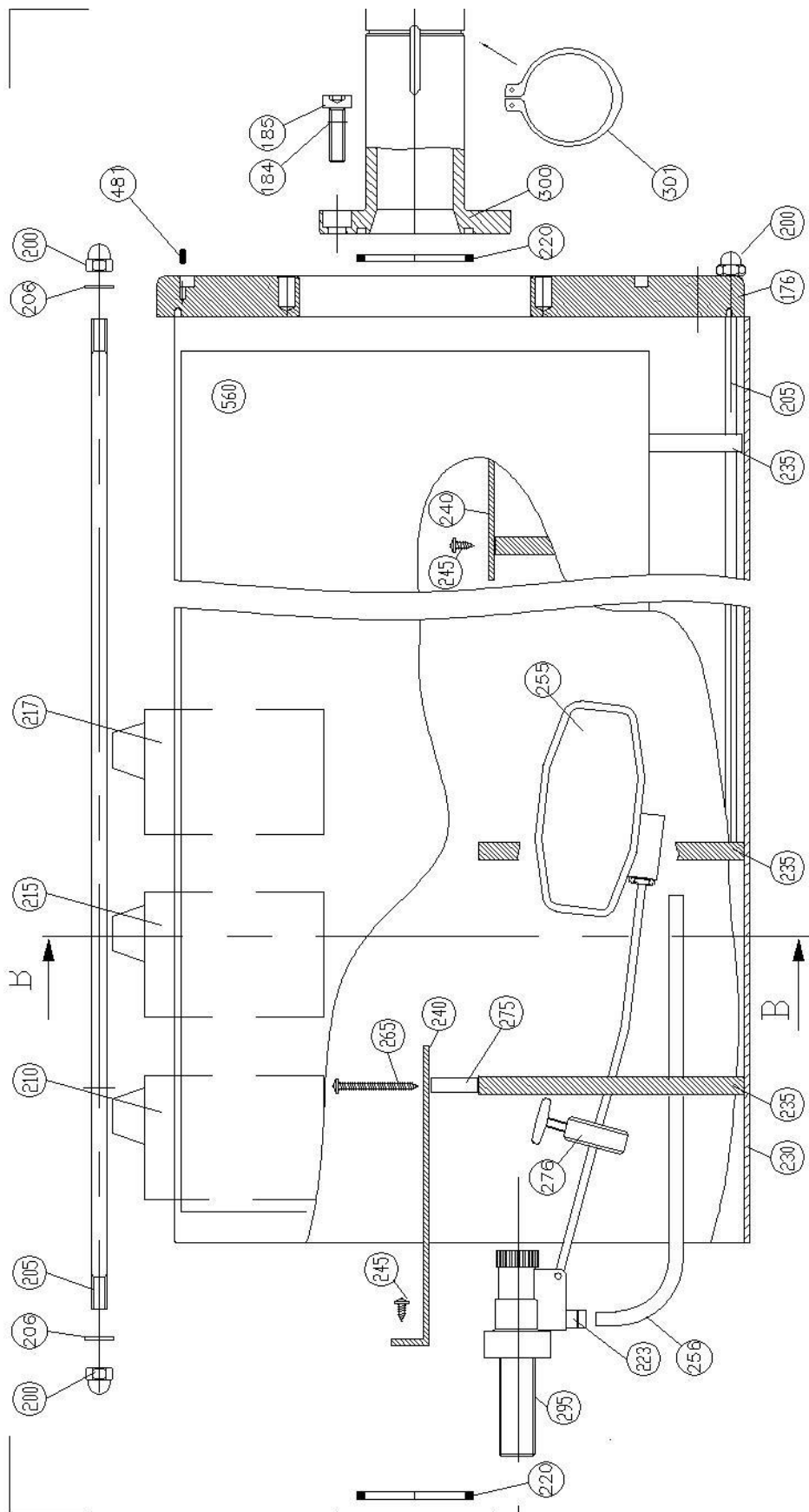


TILGANGSSIDE/INLET/ENTREE/EINGANG

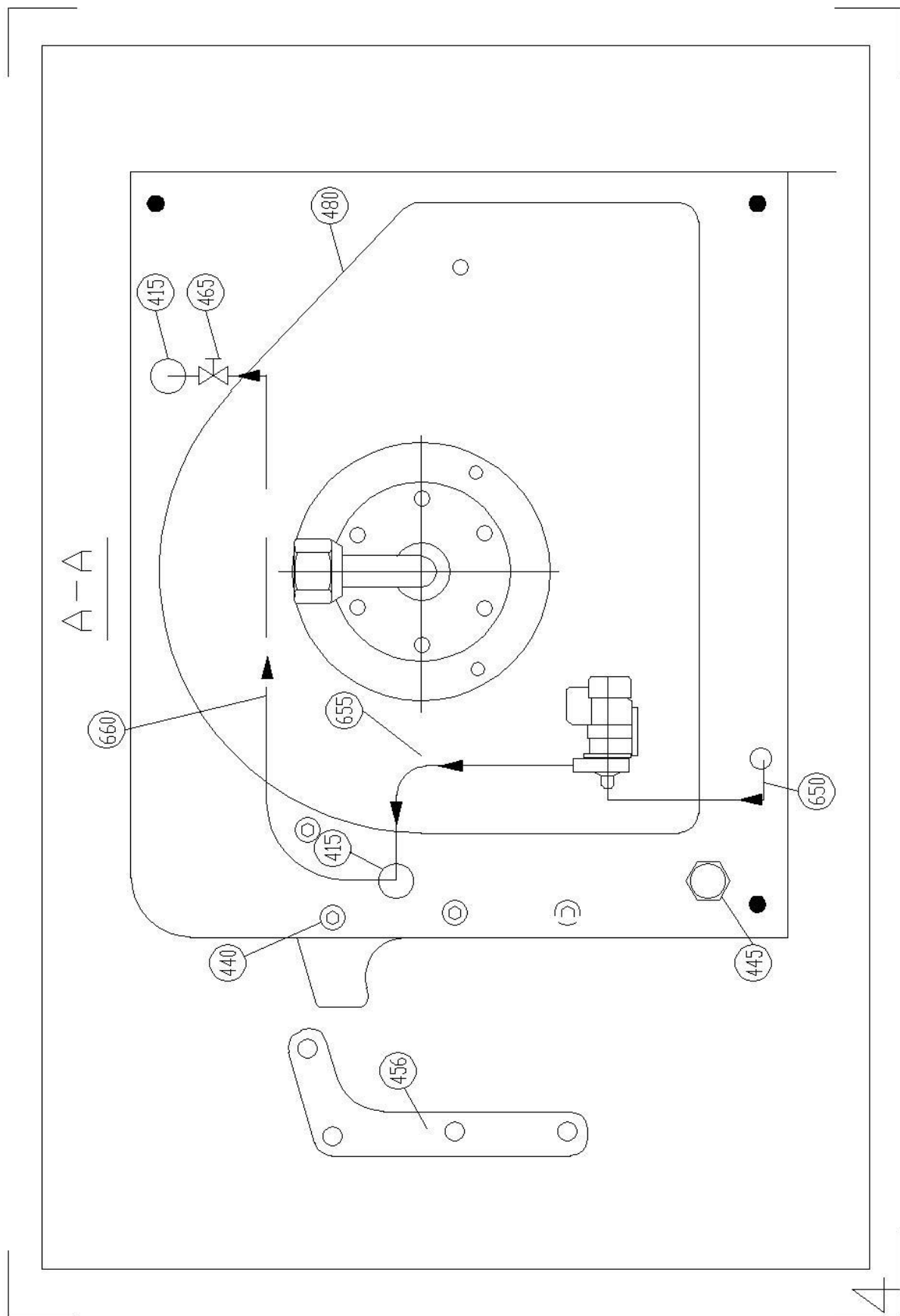


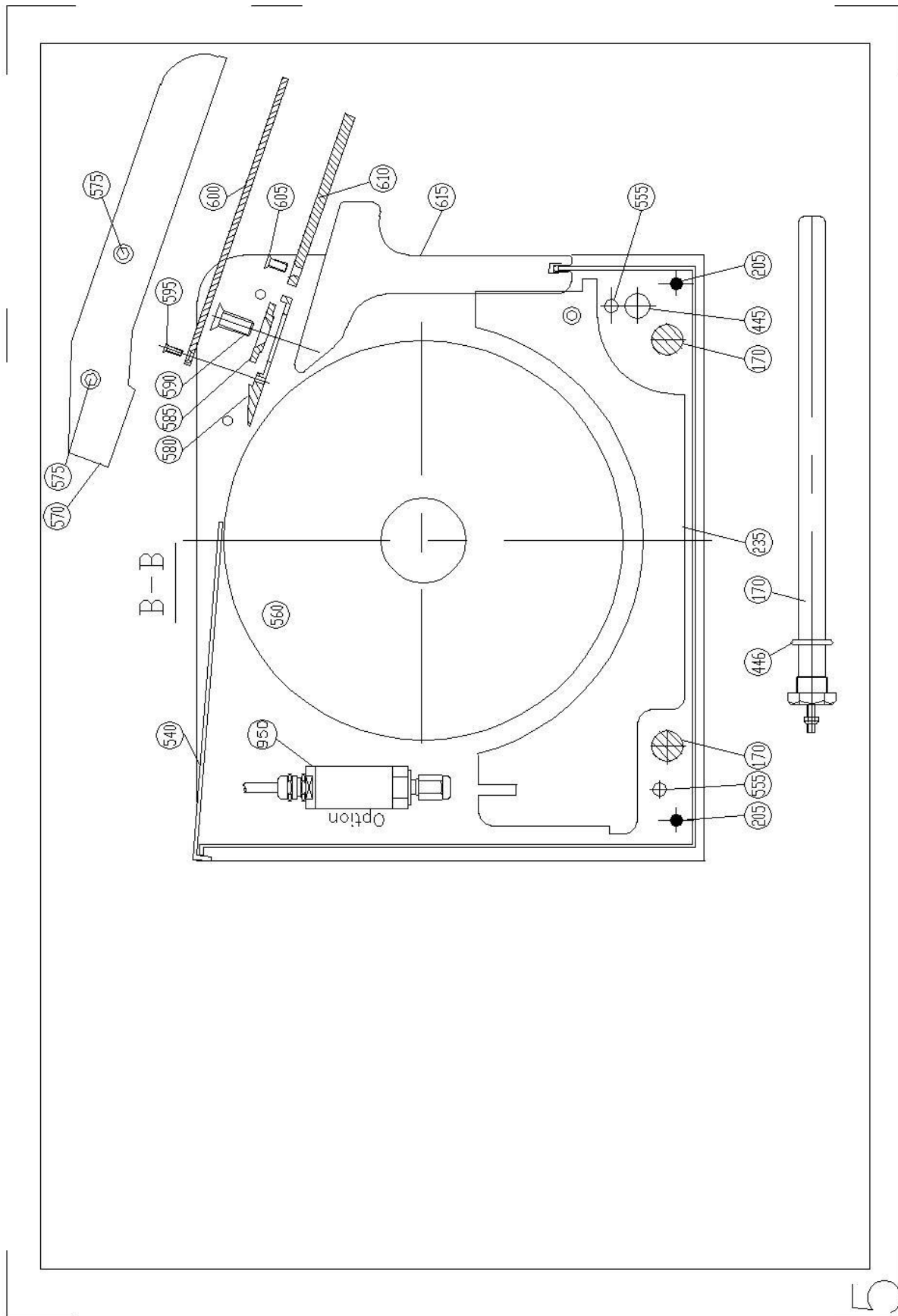
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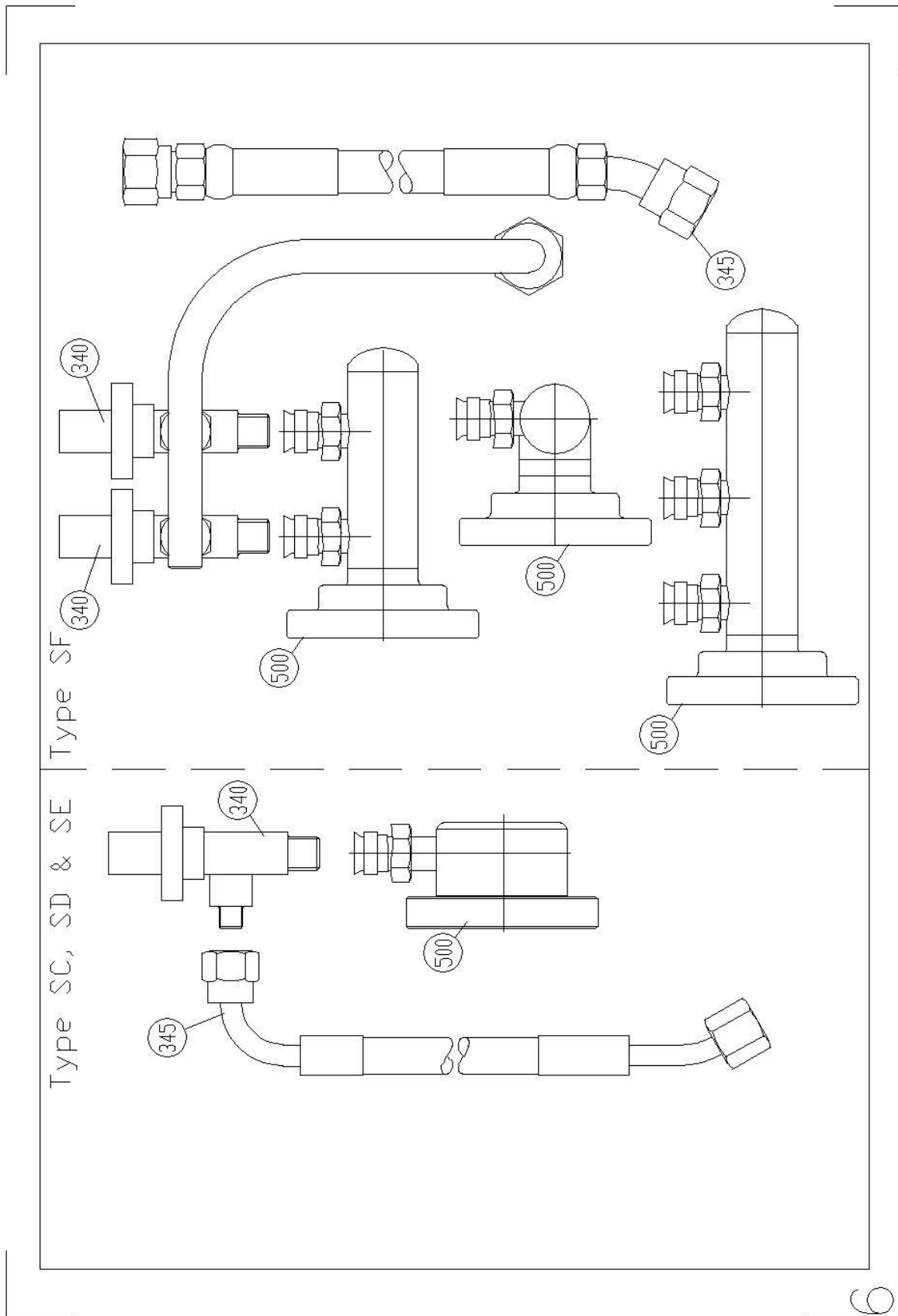
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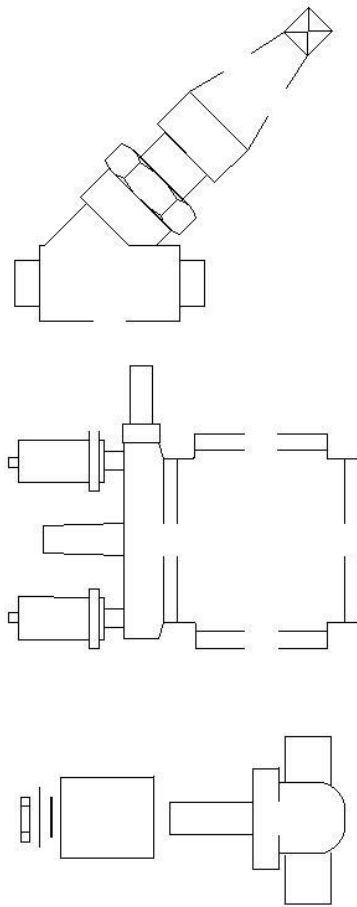
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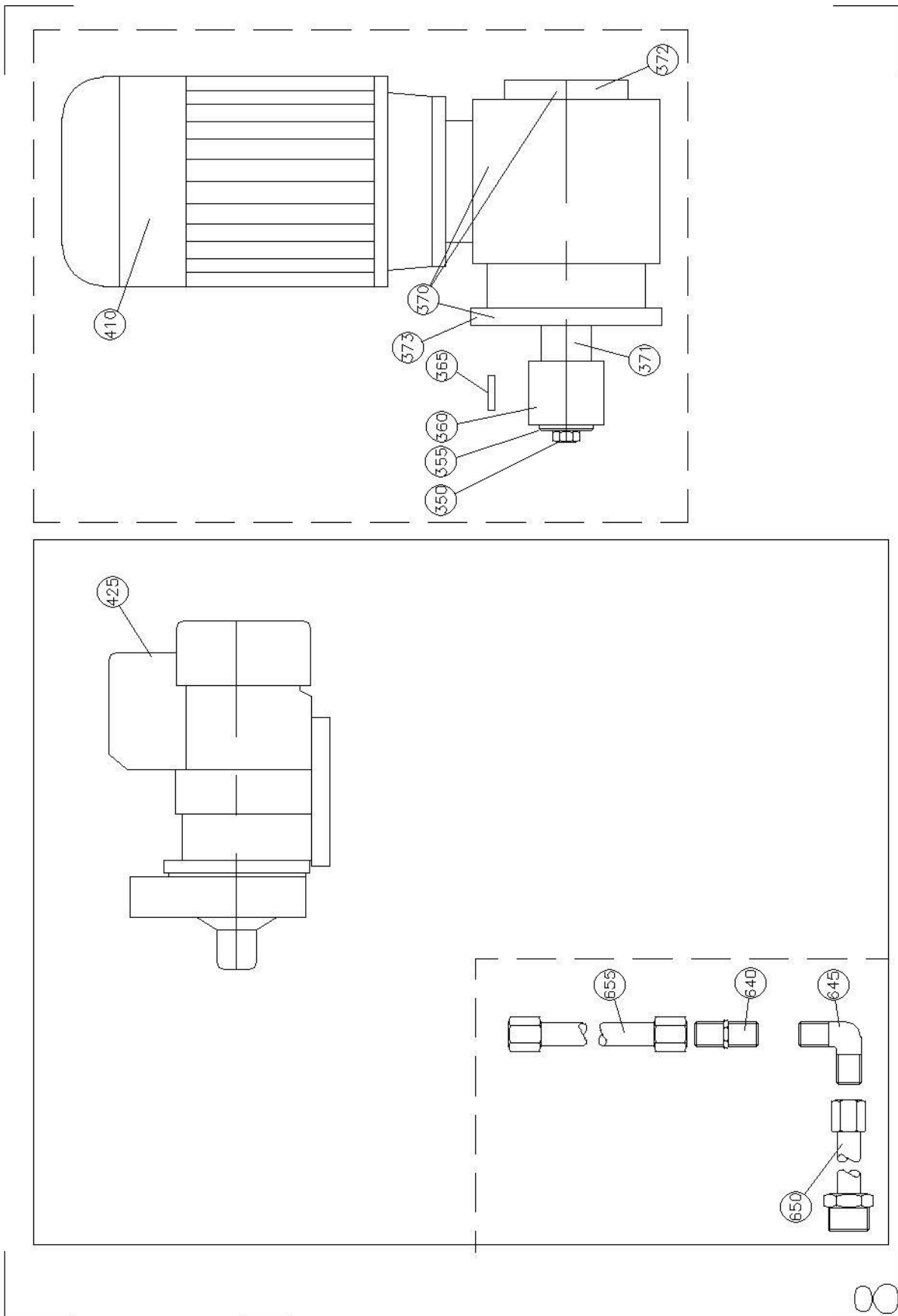






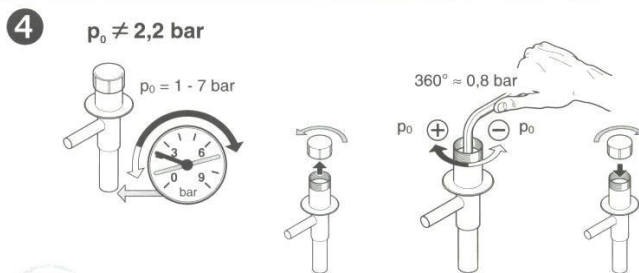
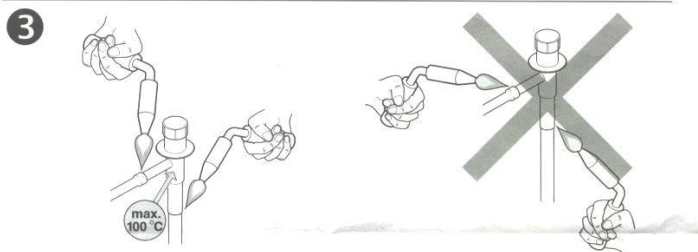
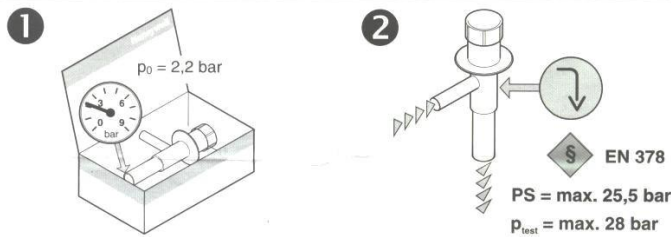
For valves and controllers for
R717, R744 and Temper/brine, please
refer to the spare parts list.





Subcomponents

Expansion valve. Only HFC/HCFC



Honeywell

Honeywell Cooling Solutions
Honeywell AG
Hardhofweg • 74821 Mosbach / Germany
Phone: +49 (0) 62 61 / 81-475
Fax: +49 (0) 62 61 / 81-461
E-Mail: Cooling.Mosbach@honeywell.com

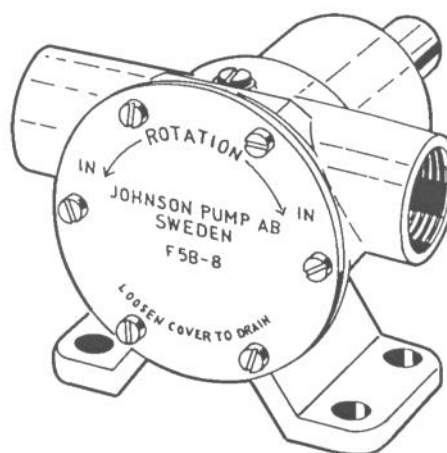
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Subject to change without notice • MU1H-1912GE23 R0602

Johnson impeller pumper

Instruction Manual
Flexible Impeller Pump
bronze, pedestal mounted

F35B-8, F4B-8, F5B-8, F7B-8, F8B-8



IB-501/01 (0009)


JOHNSON PUMP

Självsugande flexibel impellerpump i brons, fotmonterad

Typiska användningsområden

- *Marint*
Kylvattenpump, länsypump, spolpump, tömning av septiktankar.
- *Industri och jordbruk*
Transport- och cirkulationspump, tömning av slam- och spillvåtskebrunnar, pumpning av förorenade våtskor innehållande fasta partiklar.

Teknisk beskrivning

Pumphus:	Brons
Impeller:	Neopren alt nitril
Axel:	Syrafast stål
	Axeln är lagrad i två permanentmorda dubbla kullager
Tätning:	Låpptätning alt. mekanisk tätning
Kam:	Hel alt reducerad
Anslutning:	Se "Modellspecifikation", sid 4

Tryck- och kapacitetsdata

Se sid 45-47

Serviceinstruktion

Se reservdelslista sid 5-9

Demontering

1. Lossa pumplocket och tag bort o-ringen
2. Tag ur impellern med t ex två skruvmejslar.
3. Demontera kammen och tag bort tåtningsmedlet på kammen och i pumphuset. Tag även bort slitbrickan.
4. Demontera låpptåtningen alt. mekaniska tåtningen .
5. Demontera brickan (pos 9 för F35B-8 - F7B-8 resp pos 10 för F8B-8) genom att slå in en mejsel genom urgjutningen och bånd ut brickan.
6. Demontera låsringen som håller lagerpaketet.

7. Demontera axeln med kullager genom att pressa på axelånden från impellersidan.
8. Demontera kullagren/låsringen och distanshylsan. På F35B-8, F4B-8 och F8B-8 får inte kullagren pressas över tåtningsytan.
9. Tag bort o-ringen på axeln.

Montering

1. Montera kullagren/låsringen och distanshylsan på axeln. På F35B-8, F4B-8 och F8B-8 får inte lagren pressas över tåtningsytan.
2. Montera o-ringen på axeln (gåller ej F8B-8).
3. Pressa i axeln med kullagren i pumphuset och montera låsringen samt bricka (pos 9 för F35B-8 - F7B-8 resp pos 10 för F8B-8). Montera o-ringen pos 21 (gåller endast F8B-8)
4. Montera låpptåtningen (fjådern i låpptåtningen ska vara vånd mot impellern) alt mekaniska tåtningen. Montera slitbrickan .
5. Skruva fast kammen, men lågg först på tåtningsmedel på kam och kamskruv för att förhindra låckage.
6. Smørj impellern med vaselin el dyl och montera med roterande rørelse i impellerns rotationsriktning.
7. Montera o-ringen och skruva fast locket.

SVENSKA

Modellspecifikation

F35B-8 Pump typ	Order Nr. Läpptätning	Order Nr. Mek.tätning	Impeller	Kam	Pumphus	Anslutning
F35B-8	10-24569-13	10-24569-01	Neopren	1	01-35881-1	ISO7/1-Rp3/8
F35B-802	10-24569-15	10-24569-03	Neopren	1/2	01-35881-1	ISO7/1-Rp3/8
F35B-8007	10-24569-52	10-24569-51	Neopren	1	01-35881-2	3/8-18NPTF
F35B-8027	10-24569-21	10-24569-09	Neopren	1/2	01-35881-2	3/8-18NPTF

F4B-8 Pump typ	Order Nr. Läpptätning	Order Nr. Mek.tätning	Impeller	Kam	Pumphus	Anslutning
F4B-8	10-24570-13	10-24570-01	Neopren	1	01-35882-1	ISO7/1-Rp3/8
F4B-89	10-24570-14	10-24570-02	Nitril	1	01-35882-1	ISO7/1-Rp3/8
F4B-8007	10-24570-19	10-24570-07	Neopren	1	01-35882-2	3/8-18NPTF
F4B-8007	10-24570-52	10-24570-51	Neopren	1	01-35882-2	3/8-18NPTF

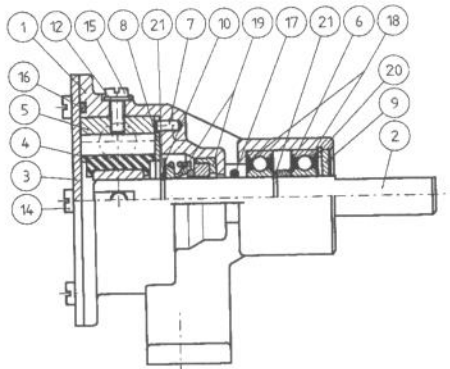
F5B-8 Pump typ	Order Nr. Läpptätning	Order Nr. Mek.tätning	Impeller	Kam	Pumphus	Anslutning
F5B-8	10-24571-13	10-24571-01	Neopren	1	01-24573-1	ISO7/1-Rp3/4
F5B-89	10-24571-14	10-24571-02	Nitril	1	01-24573-1	ISO7/1-Rp3/4
F5B-802	10-24571-15	10-24571-03	Neopren	1/2	01-24573-1	ISO7/1-Rp3/4
F5B-8007	10-24571-52	10-24571-51	Neopren	1	01-24573-2	3/4-14NPTF

F7B-8 Pump typ	Order Nr. Läpptätning	Order Nr. Mek.tätning	Impeller	Kam	Pumphus	Anslutning
F7B-8	10-24572-13	10-24572-01	Neopren	1	01-24574-3	ISO7/1-Rp1
F7B-8007	10-24572-52	10-24572-51	Neopren	1	01-24574-4	1-11 1/2NPTF

F8B-8 Pump typ	Order Nr. Läpptätning	Order Nr. Mek.tätning	Impeller	Kam	Pumphus	Anslutning
F8B-8		10-13021-1	Neopren	1	01-13164-1	ISO7/1-Rp11/2
F8B-8007		10-13021-9	Neopren	1	01-13164-2	11/2-111/2NPTF
F8B-8007		10-13021-95	Neopren	1	01-13164-3	11/4-111/2NPTF
F8B-8007		10-13021-96	Neopren	1	01-13164-4	11/2-111/2NPTF

SVENSKA

Reservdelista



F4B-8

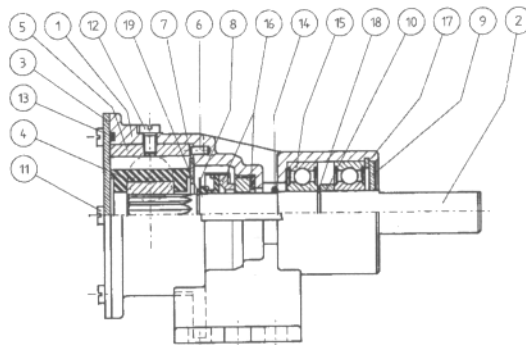
Pos	Antal	Benämning	10-24570-13	10-24570-14	10-24570-19	10-24570-52	Läpptätning
			10-24570-01	10-24570-02	10-24570-07	10-24570-51	Mek.tätning
1	1	Pumphus	01-35882-1	01-35882-1	01-35882-2	01-35882-2	
2	1	Axel	01-46735-1	01-46735-1	01-46735-1	01-46740	
3	1	Lock	01-46007-2	01-46007-2	01-46007-2	01-46007-2	
4	1	Impeller	09-810B	09-810B-9	09-810B	09-810B	
5	1	Kam	01-42389	01-42389	01-42389	01-42389	
6	1	Distansring	01-45542	01-45542	01-45542	01-45542	
7	1	Stift	01-42400	01-42400	01-42400	01-42400	
8	1	Slitbricka	01-46737-2	01-46737-2	01-46737-2	01-46737-2	
9	1	Bricka	01-45049	01-45049	01-45049	01-45049	
10	1	Bricka					
10	1	Bricka	01-45659	01-45659	01-45659	01-45659	
12	1	Bricka	01-46790-01	01-46790-01	01-46790-01	01-46790-01	
14	6	Skruv	0.0279.300	0.0279.300	0.0279.300	0.0279.300	
15	1	Skruv	01-46794-04	01-46794-04	01-46794-04	01-46794-04	
16	1	O-ring	0.2173.476	0.2173.476	0.2173.476	0.2173.476	
17	1	O-ring	0.2173.432	0.2173.432	0.2173.432	0.2173.432	
18	2	Kullager	0.3431.748	0.3431.748	0.3431.748	0.3431.748	
19	1	Läpptätning	0.2233.010	0.2233.010	0.2233.010	0.2233.010	
19	1	Mek.tätning	0.2247.021	0.2247.021	0.2247.021	0.2247.021	
20	1	Låsring	0.0371.028	0.0371.028	0.0371.028	0.0371.028	
21	1	Låsring	0.0370.012	0.0370.012	0.0370.012	0.0370.012	
21	2	Låsring	0.0370.012	0.0370.012	0.0370.012	0.0370.012	

Reservdelssats:

4,14,16 & 19	09-45587	09-45588	09-45587	09-45587	Läpptätning
4,14,16 & 19	09-46841	09-46842	09-46841	09-46841	Mek.tätning

SVENSKA

Reservdelista



F5B-8

Pos	Antal	Benämning	10-24571-13	10-24571-14	10-24571-15	10-24571-52	Läpptätning Mek.tätning
			10-24571-01	10-24571-02	10-24571-03	10-24571-51	
1	1	Pumphus	01-24573-1	01-24573-1	01-24573-1	01-24573-2	
2	1	Axel	01-46744	01-46744	01-46744	01-46746	
3	1	Lock	01-46747-2	01-46747-2	01-46747-2	01-46747-2	
4	1	Impeller	09-1027B	09-1027B-9	09-1027B	09-1027B	
5	1	Kam	01-42397	01-42397	01-45014	01-42397	
6	1	Stift	01-42400	01-42400	01-42400	01-42400	
7	1	Slitbricka	01-42399-2	01-42399-2	01-42399-2	01-42399-2	
8	1	Bricka					
8	1	Bricka	01-45680	01-45680	01-45680	01-45680	
9	1	Bricka	01-45047	01-45047	01-45047	01-45047	
10	1	Distansring	01-46009	01-46009	01-46009	01-46009	
11	6	Skruv	0.0279.300	0.0279.300	0.0279.300	0.0279.300	
12	1	Skruv	01-46794-05	01-46794-05	0.0279.032	01-46794-05	
13	1	O-ring	0.2173.475	0.2173.475	0.2173.475	0.2173.475	
14	1	O-ring	0.2173.402	0.2173.402	0.2173.402	0.2173.402	
15	2	Kullager	0.3431.742	0.3431.742	0.3431.742	0.3431.742	
16	1	Läpptätning	0.2233.012	0.2233.012	0.2233.012	0.2233.012	
16	1	Mek.tätning	0.2247.022	0.2247.022	0.2247.022	0.2247.022	
17	1	Låsring	0.0371.040	0.0371.040	0.0371.040	0.0371.040	
18	1	Låsring	0.0370.017	0.0370.017	0.0370.017	0.0370.017	
19	1	Låsring					
19	1	Låsring	0.0370.516	0.0370.516	0.0370.516	0.0370.516	

Reservdelssats:

4,11,13 & 16	09-45585	09-45586	09-45585	09-45585	Läpptätning
4,11,13 & 16	09-46843	09-46844	09-46843	09-46843	Mektätning

ENGLISH**Self-priming, flexible impeller pump of bronze, pedestal mounted****Typical applications**

- *Marine*
Engine cooling, bilge pump, deck-wash pump, wash-down, emptying holding tanks.
- *Industry*
Liquid circulation and transfer, emptying tanks and sump drainage, handling of solids in suspension.

Design features

Body:	Bronze
Impeller:	Neoprene or nitrile
Shaft:	Stainless steel The shaft is mounted with two permanently lubricated double ball bearings
Seal:	Lip seal alt. mechanical seal
Cam:	Full or reduced
Connection:	See "Type designation", page 11

Pressure and capacity data

See page 45-47

Service instructions

See parts list page 12-16.

Disassembly

1. Remove the endcover and the o-ring.
2. Pull out the impeller using two screw drivers or other suitable implements.
3. Remove the cam and wash away any traces of sealing compound on the cam and inside the pump body. Remove the wear plate.
4. Remove the lip seal alt mechanical seal.

5. Remove the washer (pos 9 for F35B-8 - F7B-8 and pos 10 for F8B-8) by inserting a screw driver through the slot and lever out the washer.
6. Remove the retaining ring for the bearing assembly.
7. Remove the shaft with ball bearings by pressing on the shaft end from the impeller side.
8. Remove the ball bearings/retaining ring and the spacer. On F35B-8, F4B-8 and F8B-8 do not press the ball bearings over the sealing surface.
9. Remove the o-ring from the shaft.

Assembly

1. Mount the ball bearings/retaining ring and the spacer on the shaft. On F35B-8, F4B-8 and F8B-8 do not press the ball bearings over the sealing surface.
2. Mount the o-ring on the shaft (not on F8B-8)
3. Press the shaft with ball bearings into the body and fit the retaining ring and washer (pos 9 for F35B-8 - F7B-8 and pos 10 for F8B-8). Mount the o-ring pos 21 (only on the F8B-8).
4. Mount the lip seal (spring towards the impeller) alt mechanical seal. Mount the wear plate (pos 18).
5. Fasten the cam, but before doing so apply sealing compound to cam and screw in order to prevent leakage.
6. Lubricate the impeller with vaseline or the like and fit it with a rotating movement in the intended direction of rotation.
7. Fit the o-ring before mounting the endcover.



INSTRUCTIONS

RT 1, 1A, 5, 5A



017R9507

Fig. 1. RT 1

Fig. 2. RT 5A

Fig. 3

	1	2	3	4	5	6	7	8	9	10
RT 1	0.5	0.7	0.9	1.1	1.3	1.5	1.6			
RT 1A (17-5001)										
RT 1A (17-5007)	1.3	1.5	1.7	1.9	2.1	2.3	2.4			
RT 5										
RT 5A	1.2	1.6	2.0	2.4	2.8	3.2	3.6	4.0		

Min. 1 2 3 4 5 6 7 8 9 10 Max.

Fig. 4

Fig. 6

Fig. 5

Fig. 7 **Fig. 8**

DANSK				
Pressostater				
Tekniske data				
Type	Best.nr.	Reset	Reguleringsområde bar (p _e)	Indstillelig mekanisk differens bar(Δp)
RT 1	017-5245	–	–0.8 → +5	0.5 til 1.6
	017-5246	min.		fast ca. 0.5
RT 1A	017-5001	–	–0.8 → +5	0.5 til 1.6
	017-5002	min.		fast ca. 0.5
RT 5	017-5007	–	4 → 17	1.3 til 2.4
	017-5250	–		1.2 til 4
RT 5A	017-5251	maks.	4 → 17	fast ca. 1.2
	017-5046	–		1.2 til 4
	017-5047	maks.		fast ca. 1.2

Kølemidler
 RT 1 og 5: alle fluorerede
 RT 1A og 5A: R 717 (NH₃) samt alle fluorerede

Tilladeligt driftstryk, PB: 22 bar

Maks. prøvetryk, p': 25 bar

Maks. till. temp. i bælge: 70°C

Tæthedegrad: IP 66 iht. IEC 529

Kontaktbelastning:
 Se kontaktdækslet eller fig. 4.
 Mærkningen, f.eks. 10(4) A, 400 V ~, angiver, at der maks. må tilsluttes 10 A ohmsk eller 4 A induktiv belastning ved 400 V ~. Den maksimale startstrøm ved indkobling af motor (L.R.) må være op til syv gange den induktive belastning – dog maks. 28 A. RT pressostaterne opfylder betingelserne i VDE* 0660.

*VDE = Verband Deutscher Elektrotechniker

Montering
 Pressostaten monteres på ventiltavlen eller på selve kompressoren.
 Benyt monteringshullerne 25.
 Hvis apparatet kan blive udsat for vibrationer, bør det monteres på et blødt underlag.

Forekommer der trykpulsationer i anlægget, skal disse dæmpes effektivt, f.eks. ved at tilslutte pressostaten til anlægget ved hjælp af et kapillarrør. Se fig. 6.

EI-tilslutning Se fig. 5
 START = slutte
 STOP = bryde
 DIFF = differens
 Kabeldiameter: 6 → 14 mm
 Jordforbindelse tilsluttes jordskruen 38.
 Beskyttelsesdækslet monteres.

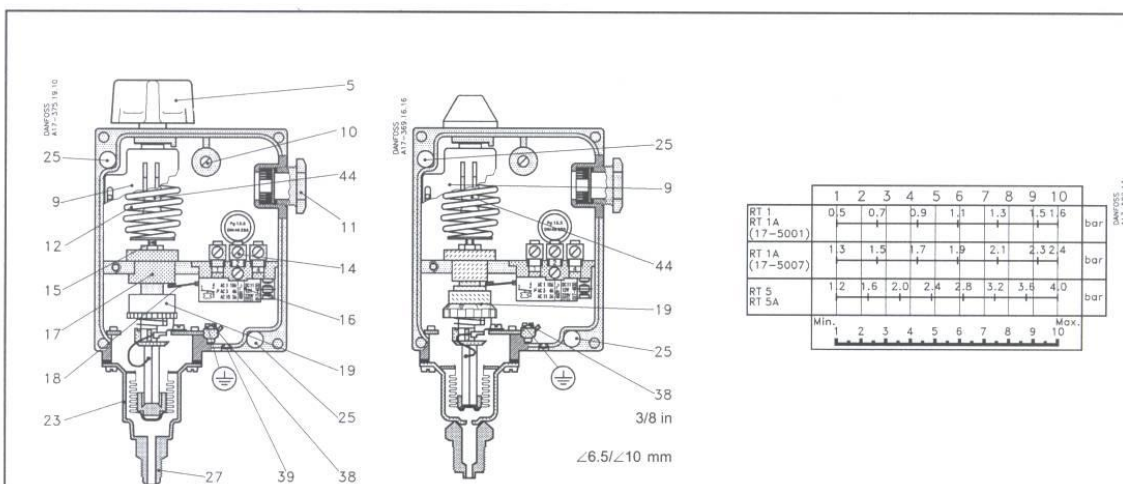


Fig. 1. RT 1

Fig. 2. RT 5A

	1	2	3	4	5	6	7	8	9	10	
RT 1 RT 1A (17-5001)	0,5	0,7	0,9	1,1	1,3	1,5	1,6				bar
RT 1A (17-5007)	1,3	1,5	1,7	1,9	2,1	2,3	2,4				bar
RT 5 RT 5A	1,2	1,6	2,0	2,4	2,8	3,2	3,6	4,0			bar
	Min.									Max.	
	1	2	3	4	5	6	7	8	9	10	

Fig. 3

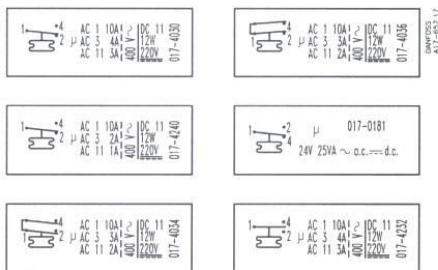


Fig. 4



RT 1, 5:
1 m, 1/4 in x 1/4 in flare
060-0071

RT 1A, 5A:
1 m, 3/8 in x M10-0.75
060-0082

Fig. 6

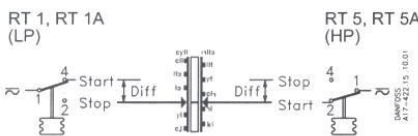


Fig. 5

Pg 13.5 x 3/8 in -18 UNF
614X3009

3/8 in x 1/4 in flare
017-4205

Fig. 7

Fig. 8

Indstilling Se fig. 2, 3 og 5
Pressostaten indstilles på laveste aktiveringstryk (områdeindstilling).

NB: RT 5 og 5A med maks. reset (best.nr. 017-5251 og 017-5047) indstilles på højeste aktiveringstryk (områdeindstilling). Indstillingen udføres med områdespindelen 44 under samtidig aflæsning af hovedskalaen 9. Differensen indstilles med differensrullen 19 efter diagrammet fig. 3. Højeste aktiveringstryk er lig summen af indstillingstryk og differens.

Eksempel

En indstilling på »5« fig. 3 vil på type RT 1A (best.nr. 017-5007) give en differens på ca. 1.8 bar, medens samme indstilling på type RT 5A vil give en differens på ca. 2.3 bar.

Generelt gælder, at en drejning af områdespindelen automatisk flytter både højeste og laveste aktiveringstryk (bryde og slutte) op eller ned på grund af den uændrede differens. En drejning på differensrullen vil derimod kun ændre det højeste aktiveringstryk.

Alle RT-typer uden resetsamt RT-typer med min. reset har skalaen kalibreret således at den på skalaen indstillede værdi svarer til kontaktskifte ved laveste aktiveringstryk (normal indstilling). I RT-apparater med min. reset skal trykket i bælgsystemet stige med en værdi svarende til differensen, før manual reset kan ske. RT-apparater med maks. reset har skalaen kalibreret således, at den på skalaen indstillede værdi svarer til kontaktskifte ved højeste aktiveringstryk (NB: modsat normal indstilling). Trykket i bælgsystemet skal falde med en værdi svarende til differensen, før manual reset kan ske.

Tilbehør Se fig. 6, 7 og 8.

ENGLISH

Pressure controls

Technical data

Type	Code no.	Reset	Range bar (p _e)	Adjustable mechanical differential bar(Δp)
RT 1	017-5245	-	-0.8 → +5	0.5 to 1.6
	017-5246	min.		fixed approx. 0.5
RT 1A	017-5001	-	-0.8 → +5	0.5 to 1.6
	017-5002	min.		fixed approx. 0.5
RT 5	017-5250	-	4 → 17	1.2 to 4
	017-5251	max.		fixed approx 1.2
RT 5A	017-5046	-	4 → 17	1.2 to 4
	017-5047	max.		fixed approx.1.2

Refrigerants

RT 1 and 5: All fluorinated refrigerants
RT 1A and 5A: R 717 (NH₃) and all fluorinated refrigerants

Max. working pressure, PB/MWP:
22 bar/315 psig

Max. test pressure, p': 25 bar

Maximum permissible bellows temperature:
70°C

Enclosure: IP 66 according to IEC 529

Contact load: See switch cover or fig. 4.

The marking, e.g. 10(4) A, 400 V ~ means that max. connection current is 10 A ohmic or 4 A inductive at 400 V ~.

The max. starting current on motor cutin (L.R.) may be up to seven times the inductive load – but max. 28 A.

The RT pressure controls comply with conditions specified in VDE* 0660.

* VDE = Verband Deutscher Elektrotechniker.

Fitting

The pressure control is designed for fitting on the valve panel or the compressor. Use the mounting holes 25. If the control is subjected to vibration, it should be mounted on a soft intermediate base.

If pressure pulsations occur in the system, such pulsations should be effectively damped, e.g. by connecting the pressure control to the system through a capillary tube. See fig. 6.

Mains connection See fig. 5

START = make

STOP = break

DIFF = differential.

Cable diameter: 6 ~ 14 mm

The earth terminal 38 should be connected to earth.

Refit protective cap.

Adjustment See figs. 2, 3 and 5

Set the pressure control for minimum actuating pressure (range setting).

NOTE: RT 5 and 5A with max. reset (code nos. 017-5251 and 017-5047) should be set for maximum actuating pressure (range setting). Setting is done by rotating the main spindle 44, at the same time reading the main scale 9. The differential is set by rotating the differential adjusting nut 19 according to the diagram in fig. 3. Maximum actuating pressure is the sum of the setting pressure and the differential.

Example

A setting on "5" fig. 3 will give a differential of approx. 1.8 bar on type RT 1A (code no. 017-5007), while the same setting on type RT 5A will give a differential of approx. 2.3 bar.

In general, turning the main spindle automatically moves both the maximum and minimum actuating pressures (break and make pressures) up or down because of the fixed differential.

On the other hand turning the differential adjusting nut only alters the maximum actuating pressures.

The scale of all RT types without reset and RT types with min. reset is calibrated in such a way that the scale setting corresponds to contact change-over at minimum actuating pressure (normal setting).

In RT controls with min. reset, the pressure in the bellow system must increase by a value corresponding to the differential, before manual reset can be effected.

RT controls with max. reset have a scale which is calibrated in such a way that the scale setting corresponds to contact changeover at maximum actuating pressure. (NOTE: contrary to normal setting). The pressure in the bellows system must decrease by a value which corresponds to the differential, before manual reset can be effected.

Accessories See figs. 6, 7 and 8.

DEUTSCH

Pressostate

Technische Daten

Typ	Bestell-Nr	Reset	Regelbereich bar (p _a)	Einstellbare mechanische Differenz bar(Δp)
RT 1	017-5245	–	–0.8 → +5	0.5 bis 1.6
	017-5246	min.		fest ca. 0.5
RT 1A	017-5001	–	–0.8 → +5	0.5 bis 1.6
	017-5002	min.		fest ca. 0.5
RT 5	017-5250	–	4 → 17	1.2 bis 4
	017-5251	max.		fest ca. 1.2
RT 5A	017-5046	–	4 → 17	1.2 bis 4
	017-5047	max.		fest ca. 1.2

Kältemittel

RT 1 und 5: alle fluorierten Kältemittel
RT 1A und 5A: R 717 (NH₃) sowie alle fluorierten Kältemittel

Zul. Betriebsüberdruck, PB: 22 bar

Max. Prüfdruck, p': 25 bar

Max. zul. Temp. im Wellrohr: 70°C

Schutzart: IP 66 nach IEC 529

Schaltleistung: Siehe Kontaktdeckel oder Fig. 4. Die Kennzeichnung, z.B. 10(4) A, 400 V ~, gibt an, daß bei 400 V ~ maximale eine Belastung von 10 A ohmsch oder 44 A induktiv angeschlossen werden darf.

Der maximale Einschaltstrom beim Einschalten eines Motors (L.R.) darf bis zum siebenfachen der induktiven Belastung betragen – jedoch max. 28 A. Die RT Pressostate genügen den Bedingungen nach VDE 0660.

Montage

Der Pressostat kann an der Ventiltafel oder am Kompressor selbst montiert werden. Montagelöcher 25 benutzen.

Falls das Gerät Vibrationen ausgesetzt ist sollte es auf einer weichen Unterlage montiert werden.

Kommen Druckpulsationen in der Anlage vor, müssen diese wirksam gedämpft werden, z.B. durch Anschluß des Pressostats an die Anlage über ein Kapillarrohr, siehe Fig. 6.

Elektrischer Anschluß Siehe Fig. 5

START = Einschalten

STOP = Ausschalten

DIFF = Differenz

Kabeldurchmesser: 6 → 14 mm

Die Erdleitung ist an die Erdungsschraube 38 anzuschließen.

Schutzkappe wieder montieren.

Einstellung Siehe Fig. 2, 3 und 5

Der Pressostat ist auf den unteren Ansprechdruck einzustellen (Bereichseinstellung). Anm.: RT 5 und RT 5A mit max. Reset (Bestell-Nr. 017-5251 und 017-5047) sind auf den oberen Ansprechdruck einzustellen (Bereichseinstellung).

Die Einstellung wird mit der Bereichsspindel 44 unter gleichzeitigem Ablesen der Hauptskala 9 vorgenommen.

Die Differenz wird nach dem Diagramm in Fig. 3 mit der Differenzrolle 19 eingestellt. Der obere Ansprechdruck ist gleich der Summe von Einstelldruck und Differenz.

Beispiel

Eine Einstellung auf »5« Fig. 3 wird beim Typ RT 1A (Bestell-Nr. 017-5007) eine Differenz von etwa 1.8 bar, ergeben, während die gleiche Einstellung beim Typ RT 5A eine Differenz von etwa 2.3 bar ergeben wird.

Allgemein gilt, daß eine Verstellung an der Bereichsspindel automatisch sowohl den oberen als auch den unteren Ansprechdruck (Aus-

schalten und Einschalten) nach oben oder unten versetzen wird, weil die Differenz unverändert ist. Eine Verstellung an der Differenzrolle wird dagegen nur den oberen Ansprechdruck ändern. Bei allen RT-Typen ohne Reset sowie bei den RT-Typen mit min. Reset ist die Skala so kalibriert, daß der an der Skala eingestellte Wert einem Kontaktwechsel beim unteren Ansprechdruck entspricht (die normale Einstellung).

Bei RT-Geräten mit min. Reset muss der Druck im Wellrohrsystem um einen der Differenz entsprechenden Wert ansteigen, bevor eine Rückstellung von Hand vorgenommen werden kann.

Bei RT-Geräten mit max. Reset ist die Skala so kalibriert, daß der an der Skala eingestellte Wert einem Kontaktwechsel beim oberen Ansprechdruck entspricht (also im Gegensatz zur normalen Einstellung).

Der Druck im Wellrohrsystem muß um einen der Differenz entsprechenden Wert abfallen bevor eine Rückstellung von Hand vorgenommen werden kann.

Zubehör Siehe Fig. 6, 7 und 8.

FRANÇAIS

Pressostats

Caractéristiques techniques

Type	N° de code	Ré- arme- ment	Plage de réglage bar (p _a)	Différentiel mécanique réglable bar(Δp)
RT 1	017-5245	–	–0.8 → +5	0.5 à 1.6
	017-5246	min.		fixe env. 0.5
RT 1A	017-5001	–	–0.8 → +5	0.5 à 1.6
	017-5002	min.		fixe env. 0.5
RT 5	017-5250	–	4 → 17	1.2 à 4
	017-5251	max.		fixe env. 1.2
RT 5A	017-5046	–	4 → 17	1.2 à 4
	017-5047	max.		fixe env. 1.2

Réfrigérants

RT 1 et 5: tous liquides fluorés
RT 1A et 5A: R 717 (NH₃) et tous liquides fluorés

Pression de service max., PB: 22 bar

Pression d'essai max., p': 25 bar

Pression max. admis. dans le soufflet: 70°C

Capsulage: IP 66 selon IEC 529

Charge des contacts: Voir le couvercle de contact ou la fig. 4. Le marquage de, par exemple, 10(4) A, 400 V ~ indique qu'au maximum, il est admis de raccorder une charge ohmique de 10 A ou charge inductive de 4 A sous 400 V ~.

Le courant de démarrage maximal à l'enclenchement du moteur (L.R.) est admis à sept fois la charge inductive – avec un maximum de 28 A. Les pressostats RT sont conformes aux normes VDE 0660.

*VDE = Verband Deutscher Elektrotechniker
(Association des Ingénieurs Électriciens Allemands)

Montage

Monter le pressostat sur le tableau général ou sur le compresseur proprement dit. Utiliser les trous de montage repère 25.

Si l'appareil risque d'être soumis à des vibrations, il doit être fixé sur un support souple.

En cas de pulsations au niveau de la prise de pression il faut les amortir d'une façon efficace, p. ex. en raccordant le pressostat à l'installation au moyen d'un capillaire. Voir fig. 6.

Raccordement électrique Voir fig. 5

START = enclencher

STOP = déclencher

DIFF = différentiel

Diamètre du câble: 6 → 14 mm

Raccorder la terre à la vis 38

Remonter la capuchon protecteur.

Réglage Voir fig. 2, 3 et 5

Régler le pressostat sur la pression d'actionnement la plus basse (réglage de la plage).

NB: régler le RT 5 et 5A à réarmement max. (no de code: 017-5251 et 017-5047) sur la pression d'actionnement la plus élevée (réglage de la plage).

Faire le réglage à l'aide de la tige de plage 44, en lisant simultanément l'échelle principale 9.

Régler le différentiel au moyen du rouleau 19 d'après le diagramme fig. 3.

La pression d'actionnement la plus élevée est égale à la somme de la pression de réglage et du différentiel.

Exemple

Le réglage sur «5» fig. 3 donnera, pour type RT 1A (no de code 017-5007) un différentiel d'env. 1,8 bar, tandis qu'il donnera, pour le type RT 5A, un différentiel d'env. 2,3 bar.

En général, en tournant la tige de la plage, on déplace automatiquement vers le haut ou vers le bas tant la pression d'actionnement la plus élevée que celle la plus basse (de coupure et de fermeture) car la valeur de différentiel reste inchangée.

La modification du différentiel ne fait varier par contre, que la pression d'actionnement la plus élevée.

Pour tous les types RT sans réarmement ainsi que pour les types RT à réarmement min., l'échelle est étalonnée de sorte que sa valeur de réglage corresponde à une inversion du contact pour la pression d'actionnement la plus basse (réglage normal).

Pour les appareils RT à réarmement min., la pression dans le système de soufflet doit augmenter d'une valeur correspondant au différentiel, avant que le réarmement manuel ne puisse avoir lieu.

En ce qui concerne les appareils RT à réarmement max. l'échelle est étalonnée de sorte que sa valeur de réglage corresponde à une inversion du contact pour la pression d'actionnement la plus élevée (NB: contraire au réglage normal). La pression dans le système de soufflet doit baisser d'une valeur correspondant au différentiel, avant que le réarmement manuel ne puisse avoir lieu.

Accessoires Voir fig. 6, 7 et 8.

ESPAÑOL**Presostatos****Características técnicas**

Tipo	Número de código	Rearme manual	Campo bar (p _s)	Diferencial mecánica ajustable bar(Δp)
RT 1	017-5245	-	-0.8 → +5	0.5 - 1.6
	017-5246	min.		fijado aprox.0.5
RT 1A	017-5001	-	-0.8 → +5	0.5 - 1.6
	017-5002	min.		fijado aprox.0.5
RT 5	017-5007	-	4 → 17	1.3 - 2.4
	017-5250	-		1.2 - 4
RT 5A	017-5251	max.	4 → 17	fijado aprox.1.2
	017-5046	-		1.2 - 4
	017-5047	max.		fijado aprox.1.2

Refrigerantes

RT 1 y 5: Todos Los refrigerantes fluorados
RT 1A y 5A: R 717 (NH₃) y todos los refrigerantes fluorados

Presión de funcionamiento max., PB: 22 bar

Presión de prueba max., p: 25 bar

Temperatura máxima permisible en el fuelle: 70°C

Caja: IP 66 según normas IEC 529

Carga de los contactos: véase tapa del termostato o figura 4.

La inscripción, por ejemplo 10(4) A, 400 V ~ significa que la corriente de conexión máxima es de 10 A con carga ohmica o de 4 A con carga inductiva, a 400 V ~.

La corriente de arranque máxima en el momento de la conexión del motor (L.R.) puede ser de hasta 7 veces la corriente con carga inductiva (máx. 28 A).

Los presostatos RT satisfacen las condiciones estipuladas en VDE* 0660.

*VDE = Verband Deutscher Elektrotechniker.

Montaje

El presostato está destinado a ser montado en el panel de control o en el mismo compresor. Utilice los orificios de montaje 25.

Si el presostato está expuesto a vibraciones ha de ser montado en una base intermedia blanda.

Si se producen pulsaciones de presión en el sistema, estas pulsaciones han de ser eficazmente amortiguadas, por ejemplo conectando el presostato a la instalación por medio de un tubo capilar. Véase fig. 6.

Conexión a la red de alimentación

Véase fig. 5

START = cierre

STOP = abertura

DIFF = diferencial

Diámetro del cable: 6 → 14 mm

El terminal de tierra 38 ha de ser conectado a tierra.

Volver a colocar caperuza protectora.

Reglaje Véanse figuras 2, 3 y 5

Ajustar el presostato a la presión de accionamiento mínima (ajuste de gama).

NOTA: Los aparatos RT 5 y 5A con reposición máx. (no de código 017-5251 y 017-5047) han de ser ajustados para la presión de accionamiento máxima (ajuste de gama).

Ej ajuste se hace haciendo girar el eje principal 44 observando al mismo tiempo la escala principal 9.

La diferencial se regula haciendo girar la tuerca de ajuste de diferencial 19 de acuerdo con el diagrama de la fig. 3.

La presión de accionamiento máxima es la suma de la presión de ajuste y de la diferencial.

Ejemplo

Un reglaje sobre «5» fig. 3 dará una diferencial de aproximadamente 1,8 bar el aparato tipo RT 1A (no de código 017-5007), mientras que el mismo ajuste en el aparato tipo RT 5A dará una diferencial de aproximadamente 2,3 bar.

En general haciendo girar el eje principal, las presiones de accionamiento máxima y mínima (presiones de abertura de cierre) se desplazan ambas automáticamente hacia arriba o hacia abajo debido a la diferencial fija. Por otra parte, haciendo girar la tuerca de ajuste de diferencial, solamente cambia la presión de accionamiento máxima.

La escala de todos los tipos RT *sin reposición*, y de todos los tipos RT *con reposición min.*, está calibrada de tal manera que el ajuste de escala corresponda al cambio de posición del contacto - cuando se supera la presión de accionamiento mínima (ajuste normal).

En Los presostatos RT *con reposición mínima*, la presión en el sistema de fuelle debe *aumentar* en un valor correspondiente a la diferencial, antes de que pueda realizarse la reposición manual.

Los equipos de control RT *con reposición máx.*, tienen una escala calibrada de tal manera que el ajuste de escala corresponda al cambio de posición del contacto cuando se alcanza la presión de accionamiento máxima, (NOTA: al revés que en el ajuste normal). La presión en el sistema de fuelle debe *disminuir* en un valor correspondiente a la diferencial, antes de que pueda realizarse la reposición manual.

Accesorios Véanse figuras 6, 7 y 8.

ITALIANO**Pressostati****Dati tecnici**

Tipo	N° codice	Reinserzione	Campo bar (p _s)	Differenziale meccanico regolabile bar(Δp)
RT 1	017-5245	-	-0.8 → .5	0.5 - 1.6
	017-5246	min.		0.5 fija
RT 1A	017-5001	-	-0.8 → .5	0.5 - 1.6
	017-5002	min.		0.5 fija
RT 5	017-5250	-	4 → 17	1.2 - 4
	017-5251	max.		1.2 fija
RT 5A	017-5046	-	4 → 17	1.2 - 4
	017-5047	max.		1.2 fija

Refrigeranti

RT 1 e 5: Tutti i refrigeranti al fluoro

RT 1A e 5A: R 717 (NH₃) e tutti i refrigeranti al fluoro

Max. pressione di esercizio, PB: 22 bar

Max. pressione di prova, p: 25 bar

Max. temperatura permessa ai soffiatti: 70°C

Sistema di chiusura: IP 66 a IEC 529

Carico contatti: indicato sul coperchio dello stesso contatto fig. 4.

Esempio di marcatura: 10(4) A, 400 V ~ significa che alla tensione di 400 V ~ il contatto può sopportare un massimo di 10 A omico o 4 A induttivi.

La corrente di spunto (L.R.) può essere calcolata per un massimo di sette volte il carico induttivo (max. 28 A).

Il pressostato RT è omologato secondo norme VDE* 0660.

*VDE = Verband Deutscher Elektrotechniker

Montaggio

Il pressostato è adatto per essere montato sul pannello delle apparecchiature o direttamente sul compressore stesso. Usare i fori di fissaggio 25.

Se l'automatismo può essere sottoposto a vibrazioni, dovrà essere montato su una bassetta ammortizzata.

Se si verificano pulsazioni di pressione nel sistema, tale pulsazioni dovranno essere eliminate, collegando, per esempio, il pressostato al sistema per mezzo di un tubo capillare. Vedere fig. 5.

Collegamenti principali Vedere fig. 5

START = attacco

STOP = stacco

DIFF = differenziale

Diámetro del cavo: 6 → 14 mm

Il terminale terra 38 dovrà essere collegato alla massa.

Rimontare il cappuccio di protezione.

Regolazione Vedere fig. 2, 3 e 5

Tarare il pressostato per la minima pressione di funzionamento (taratura del campo).

NOTA: RT 5 e 5A con reinserzione di massima (n° codice 017-5251 e 017-5047) dovrebbero essere tarati per una massima pressione di funzionamento (taratura del campo).

La taratura è fatta girando l'asta principale 44, leggendo contemporaneamente la scala principale 9.

Il differenziale è tarato girando il dado 19 di regolazione del differenziale, secondo il diagramma della fig. 3.

La massima pressione di funzionamento è la somma della pressione di taratura e del differenziale.

Esempio

Una taratura di «5» fig. 3 darà un differenziale di circa 1.8 bar sul tipo RT 1A (n° codice 017-5007), mentre la stessa taratura sul tipo RT 5A darà un differenziale di circa 2.3 bar.

In generale, girando l'asta principale automaticamente muove sia la pressione massima e minima di funzionamento (interrompe e attacca) per pressioni più alte o più basse per via del differenziale fisso. D'altra parte, girando il dado di regolazione del differenziale si altera solo la pressione massima di funzionamento.

La scala di tutti i tipi RT *senza reinserzione* e dei tipi RT con *reinserzione di minima* è calibrata in modo tale che la taratura della scala corrisponde all'intervento del contatto relativo alla *pressione minima di funzionamento* (taratura normale). Sulle apparecchiature RT con *reinserzione di minima*, la pressione nel sistema dei soffiotti deve aumentare di un valore corrispondente al differenziale, prima che la reinserzione manuale si possa effettuare.

Gli apparecchi RT con *reinserzione di massima* hanno una scala che è calibrata in modo che la taratura della scala corrisponda all'intervento del contatto relativo alla *pressione massima di funzionamento*. (NOTA: contrariamente alla taratura normale).

La pressione nel sistema dei soffiotti deve diminuire di un valore che corrisponde al differenziale, prima che la reinserzione manuale possa essere effettuata.

Accessori Vedere fig. 6, 7 e 8.

NETHERLANDS**Pressostaten****Technische gegevens**

Type	Kodenr.	Ver-grendeling	Bereik bar (p _a)	Instelbare mechanische differentie bar(Δp)
RT 1	017-5245	—	—0.8 → +5	0.5 – 1.6
	017-5246	min.		0.5 vast
RT 1A	017-5001	—	—0.8 → +5	0.5 – 1.6
	017-5002	min.		0.5 vast
RT 5	017-5007	—	4 → 17	1.3 – 2.4
	017-5250	—		1.2 – 4
RT 5A	017-5251	max.	4 → 17	1.2 vast
	017-5046	—		1.2 – 4
RT 5A	017-5047	max.	4 → 17	1.2 vast

Koelmiddelen

RT 1 en 5: Alle halogene koelmiddelen
RT 1A en 5A: R 717 (NH₃) en alle halogene koelmiddelen.

Max. werkdruk, PB: 22 bar

Max. beproevingsdruk, p': 25 bar

Max. toelaatbare balgtemperatuur: 70°C

Dichtheid: IP 66 volgens IEC 529

Contactbelasting: zie deksel van contactsysteem of fig. 4.

Bijv. 10(4) A, 400 V ~ betekent max. 10 A niet-inductieve belasting of 4 A inductieve belasting bij een aansluitingspanning van 400 V ~. De maximale aanloopstroom bij het inschakelen van de motor (L.R.) mag maximaal 7 x de inductieve belasting bedragen (max. 28 A). De RT pressostaten voldoen aan de voorschriften volgens VDE* 0660.

*VDE = Verband Deutscher Elektrotechniker.

Montage

De pressostaat is geschikt voor paneelmontage en montage op de compressor zelf. Gebruik de bevestigingsgaten 25. Wordt het apparaat blootgesteld aan trillingen, dan is montage op een basis met een zachte tussenlaag aan te bevelen.

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Eventuele drukpulsaties in het systeem moeten op effectieve wijze worden gedempt, bijvoorbeeld door aansluiting van de pressostaat op het systeem met behulp van een capillaire leiding, zie fig. 6.

Aansluiting Zie fig. 5

START = maken

STOP = verbreken

DIFF = differentie

Kabeldoorsnede: 6 → 14 mm

De aardaansluiting 38 moet met aarde verbonden worden.

Monteer beschermkap.

Instelling Zie fig. 2, 3 en 5

De pressostaat moet worden afgesteld op de minimum schakeldruk (bereikinstelling).

NB.: RT 5 en 5A met max. reset (vergrendeling aan de hogedrukszijde) kodenrs. 017-5251 en 017-5047, moeten worden afgesteld op de maximale schakeldruk (bereikinstelling). De instelling vindt plaats door verdraaiing van de hoofdspindel 44, waarbij dan gelijktijdig de hoofdschaal 9 afgelezen wordt. De differentie is instelbaar door verdraaiing van de differentie-instelmoer 19 en wordt bepaald met behulp van het diagram van fig. 3. De maximum schakeldruk is de som van drukbereikinstelling en de differentie.

Voorbeeld

Een instelling «5», zal bij type RT 1A (kodenr. 017-5007) resulteren in een differentie van ca. 1.8 bar, terwijl bij dezelfde instelling deze bij type RT 5A ca. 2.3 bar zal bedragen.

Algemeen: Verdraaiing van de hoofdspindel verplaatst automatisch zowel de maximale als de minimale schakeldruk (verbreek- en maakdruk) naar boven en beneden, tengevolge van de vaste differentie. Verdraaiing van de differentie-instelmoer daarentegen verandert alleen de maximum schakeldruk.

Deschaal van alle RT-typen *zonder vergrendeling* en van RT-typen met *min. reset* (vergrendeling aan de lagedrukszijde) is zodanig gekalibreerd dat de schaalafstelling overeenkomt met de kontaktoverschakeling bij de *minimum schakeldruk* (normale afstelling). Bij RT-apparaten met *min. reset* (vergrendeling aan de lagedrukszijde) moet de druk in de balg eerst *toenemen* met een waarde gelijk aan de differentie voordat handinschakeling weer kan plaatsvinden. RT-apparaten met *max. reset* (vergrendeling aan de hogedrukszijde) hebben een schaal die zodanig gekalibreerd is dat de kontaktoverschakeling bij *maximale schakeldruk* plaatsvindt. (N.B.: één en ander in tegenstelling tot de normale afstelling). De druk in de balg moet eerst *verminderen* met een waarde gelijk aan de differentie, voordat handinschakeling weer kan gebeuren.

Toebehoren Zie fig. 6, 7 en 8.

SUOMEKSI**Pressostaatit****Tekniset tiedot**

Malli	Tilau-numere	Palautuspainike	Asettelu-alue bar (p _a)	Aseteltava mekaaninen ero bar(Δp)
RT 1	017-5245	—	—0.8 → +5	0.5 – 1.6
	017-5246	alaraja		kiinteä n. 0.5
RT 1A	017-5001	—	—0.8 → +5	0.5 – 1.6
	017-5002	alaraja		kiinteä n. 0.5
RT 5	017-5007	—	4 → 17	1.3 – 2.4
	017-5250	—		1.2 – 4
RT 5A	017-5251	yläraja	4 → 17	kiinteä n. 1.2
	017-5046	—		1.2 – 4
RT 5A	017-5047	yläraja	4 → 17	kiinteä n. 1.2

Kylmäaineet

RT 1 ja 5A: kaikki fluorinoidut

RT 1A ja 5A: R 717 (NH₃) sekä kaikki fluorinoidut

Maks. käyttöpainne, PB: 22 bar

Maks. koestuspainne, p': 25 bar

Korkein sallittu lämpötila palkeessa: 70°C

Kotelointi: IP 66; IEC 529:n

Kosketinkuormitus: Katso kosketinlaitteen kantta tai kuvaa 4.

Merkintä esim. 10(4) A, 400 V ~ tarkoittaa että saadaan kytkeä maks. 10 A ohminen tai 4 A induktiivinen kourma 400 V ~.

Maksimi käynnistysvirta, moottoria kytkettäessä (L.R.), saa olla jopa seitsemän kertaa induktiivinen kourma – kuitenkin maks. 28 A. RT pressostaati täyttää VDE* 0660.

*VDE = Verband Deutscher Elektrotechniker.

Asennus

Pressostaatti asennetaan venttiilitalulle tai itse kompressorin.

Käytä kiinnitysreikiä 25.

Mikäli koje voi joutua alttiiksi tärinälle, on asennuksessa käytettävä pehmeää alustaa.

Jos laitoksessa esiintyy painesykyntä, on tämä vaimennettava tehokkaasti, esim. yhdistämällä pressostaatti laitokseen kapillaariputkella. Katso kuva 6.

Sähköliitäntä Katso kuva 8

START = kytkee

STOP = katkaisee

DIFF = ero

Kaapelin läpimitta: 6 → 14 mm

Maadoitusjohto kytketään maadoitusruuviin 38.

Asenna suojajohdot paikoilleen.

Asettelu katso kuvat 2, 3 ja 5

Pressostaatti asetellaan *atalimmalle toimintapaineelle* (alueasettelu).

HUOM: RT 5 ja 5A ylärajan palautuspainikkeella (til. n:o 017-5251 ja 017-5047) asetellaan korkeimmalle toimintapaineelle (alueasettelu). Asettelu suoritetaan kiertämällä aluekaraa 44 ja vastaava lukema nähdään pääasteikolta 9. Ero asetellaan erorullalla 19 diagrammin kuva 3 mukaan. Korkein toimintapaine on asettelupaineen ja eron summa.

Esimerkki

Erorullan asettelu lukemaan »5« fig. 3 mallissa RT 1A (til. n:o 017-5007) antaa eroksi n. 1.8 bar, kun taas sama asettelu mallissa RT 5A antaa eroksi n. 2.3 bar.

Yleisesti pätee, että aluekaran kiertäminen siirtää automaattisesti sekä ylinta toimintapainetta (katkaisu ja kytkentä) koska erorullan asetelua ei muuteta.

Erorullan kiertäminen muuttaa sen sijaan vain ylinta toimintapainetta.

Kaikki RT-malli *ilman palautuspainiketta*, sekä RT-mallit *alarajan palautuspainikkeella* on asteikoltaan kalibroitu siten, että asteikolle aseteltu arvo vastaa kosketinasennon vaihtumista *matalimmalla toimintapaineella* (normaali asettelu).

RT-malleissa, joissa on *alarajan palautuspainike*, tulee paineen palje-elementissä *nousta* eroasettelun verran ennen kuin käsin suoritettava palautus voi tapahtua.

RT-mallit *ylärajan palautuspainikkeella* on asteikoltaan kalibroitu siten, että asteikolle aseteltu arvo vastaa kosketinasennon vaihtumista *korkeimmalla toimintapaineella* (HUOM: *asettelu päinvastoin* kuin tavallisesti). Paineen palje-elementissä tulee *laskea* eroasettelun verran, ennen kuin käsin suoritettava palautus voi tapahtua.

Lisätarvikkeet katso kuvat 6, 7 ja 8.



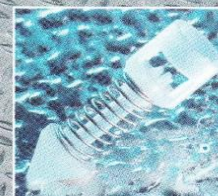
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m³/h

D 25 RE 2 - 0.2 - 2 %



SPECIFICATIONS

- Injection Range : 0.2 - 2 %
[1 : 500 - 1 : 50]
 - Water flow range* : 10 l/h - 2.5 m³/h
[0.16 l/min - 41.66 l/min]
[1/3 US Pint/min - 11 US GPM]
 - Operating pressure : 0.3 - 6 bar
[4.3 PSI - 85 PSI]
 - Concentrated additive injection : 0.02 l/h - 50 l/h
[0.011 US Fl oz/min - 0.22 US GPM]
- * For operating unit with other fluids than water, please contact us

A unique technology associating all dosing functions

Dosing Technique :

Non-electric proportional

Energy Source :

Water flow and pressure

Integrated functions :

- Metering : volumetric hydraulic motor
- Injecting : continuous proportional injection of liquid or soluble concentrate
- Regulating : proportionality servo-controlled by the water flow
- Mixing : integrated mixing

Package contents :

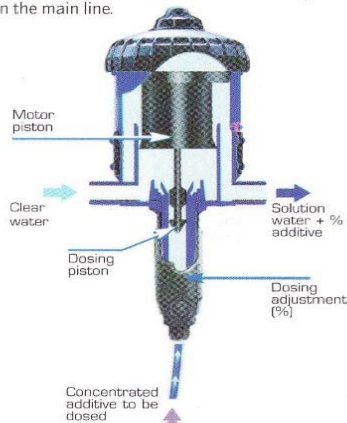
- 1 Dosatron, 1 wall bracket,
- 1 Suction tube 175 cm [69"]
- Ø 6 X 9 mm [1/4" id X 3/8" od]
- 1 Owner's manual.



2.5 m³/h - 0.2 - 2 %

Operating principle

Installed directly in the water supply line, the Dosatron operates by using the flow of water as the power source. The water activates the Dosatron, which takes up the required percentage of concentrate directly from the container and injects it into the water. Inside the Dosatron, the concentrate is mixed with the water, and the water pressure forces the solution downstream. The dose of concentrate will be directly proportional to the volume of water entering the Dosatron, regardless of variations in flow or pressure, which may occur in the main line.



Proportional injection externally adjustable

The injection rate is set by lining up the top of the adjusting sleeve with the desired ratio on the scale. The amount of injected concentrate is proportional to the amount of water coming into the Dosatron: i.e. Adjustment at 1% = 1 : 100 =

1 Volume of concentrate into 100 Volumes of water.

Dosatron, a complete range
 Dosatron develops, manufactures and markets a unique dosing technology that allows any liquid or soluble concentrate to be continuously and proportionally injected and mixed into water.

The 2.5 m³/h range

REF.	DOSAGE	PRESSURE
FIXED		
D 25 F	0.8 %	0.3 - 6 bar
D 25 F 0.2	0.2 %	0.3 - 6 bar
D 25 F 2	2 %	0.3 - 6 bar
EXTERNAL ADJUSTMENT		
D 25 RE 1500	0.07 - 0.2 %	0.3 - 6 bar
D 25 RE 2	0.2 - 2 %	0.3 - 6 bar
D 25 RE 5	1 - 5 %	0.3 - 6 bar
D 25 RE 10	3 - 10 %	0.3 - 4 bar

Other product lines available to treat water flows up to 1.5 m³/h, 4.5 m³/h, 8 m³/h, 20 m³/h, 30 m³/h, 60 m³/h, ... For special models, accessories and particular systems: please consult us.

DOSATRON INTERNATIONAL

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S.A. DOSATRON INTERNATIONAL au capital de 3 050 000 EUROS - SIRET BORDEAUX 416 826 822 00011 - APE 291 B - N° TVA/VAAT - FR96418826822

Specifications

General	
- Maximum operating water temperature :	40°C [104°F]
- Minimum operating water temperature :	5°C [41°F]
- Dosing rate :	i.e. Adjustment at 1 % = 1:100 = 1 V concentrate into 100 V water
- Average dosing accuracy :	+/- 5 % (Charts on demand)
- Repeatability :	+/- 3 % (API standard)
- Pressure loss :	0.3 - 1.4 bar [4.35 - 23.3 PSI] (depending on operating conditions)
Other integrated functions	
Internal motor filter :	no
Inlet/Outlet :	3/ 4" M : BSP- NPT Ø 20 x 27 mm
Built-in by-pass :	option
Built-in airbleeder :	yes
Built-in anti-siphon device :	no
Motor	
Motor :	differential hydraulic piston
Motor capacity :	0.45 l [0.118 US Gallons]
Mixing chamber :	integrated
Dosage	
Injection :	internal at the inlet
Dosing plunger :	simple effect, injection on the upstream
Injection check valve :	spring-loaded cone
Suction	
Self-priming :	yes
Maximum viscosity of concentrate :	400 cSt at 20°C [68 °F] - V Kit recommended from 200 cSt
Maximum vertical or horizontal suction of the concentrate :	4 m [13 ft]
Strainer :	yes - foot strainer with weight

Markets

Environment - Hygiene - Water treatment - Vehicle wash - Metal processing - Food processing - Graphic Arts - Horticulture - Livestock...

Principal applications :

Medication - Disinfecting - Cleaning - Fertilization - Phytosanitation - Supplementation - Lubrication - PH/TH Correction - Sanitation - Flocculation - Vehicle wash...

Installation

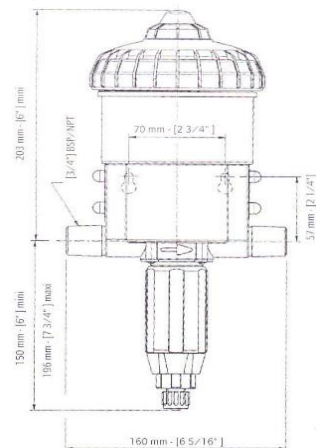
Regulations : Refer to local water regulations, prior to installing your Dosatron.

To optimize your Dosatron, we advise to :

- Install a filter (300 mesh [60 microns]) upstream, depending on your water quality.
 - Change the dosing seals once a year.
 - Rinse as often as possible with clear water.
 - Turn off the water supply and allow the pressure to drop to zero before adjusting the injection rate.
 - Install necessary protections for excess flow, excess pressure and water hammer (anti-hammer flow/pressure device).
 - Install your Dosatron on a total by-pass line.
- For all other installation advice, please consult us.

Size :

- Package size : 52 X 16.8 X 17.5 cm [20 1/2" X 6 5/8" X 6 7/8"]
- Package weight : ~ 1.7 kg [3.7 lbs]



Standard material

Housing : polyacetal, EPDM
 Motor piston : polypropylene, polyamide, stainless steel, viton, polyacetal
 Injection area : polypropylene, polyethylene, hastelloy (check valve spring)
 Injection hose : PVC

Available options

(■ : Option ● : Standard ★ : not available for this model)

Optimized compatibility

- AF : Recommended seals for alkaline concentrate
- VF : Recommended seals for acid concentrate
- PVDF : Housing
- ★ H : Hastelloy plunger rod (not needed for this model)
- IE : External injection
- V : Kit for viscous concentrate
- Injection hose : Special material hose and foot strainer available



PVDF housing.

Optimized installation

- BP : integrated by-pass
- ★ Other fittings
- Strap
- ★ Support legs
- Other : please contact us



Integrated by-pass : system of turning concentrate injection on and off.

These options allow adapting your Dosatron to your needs. Contact our technical service to help determine what option you may need.

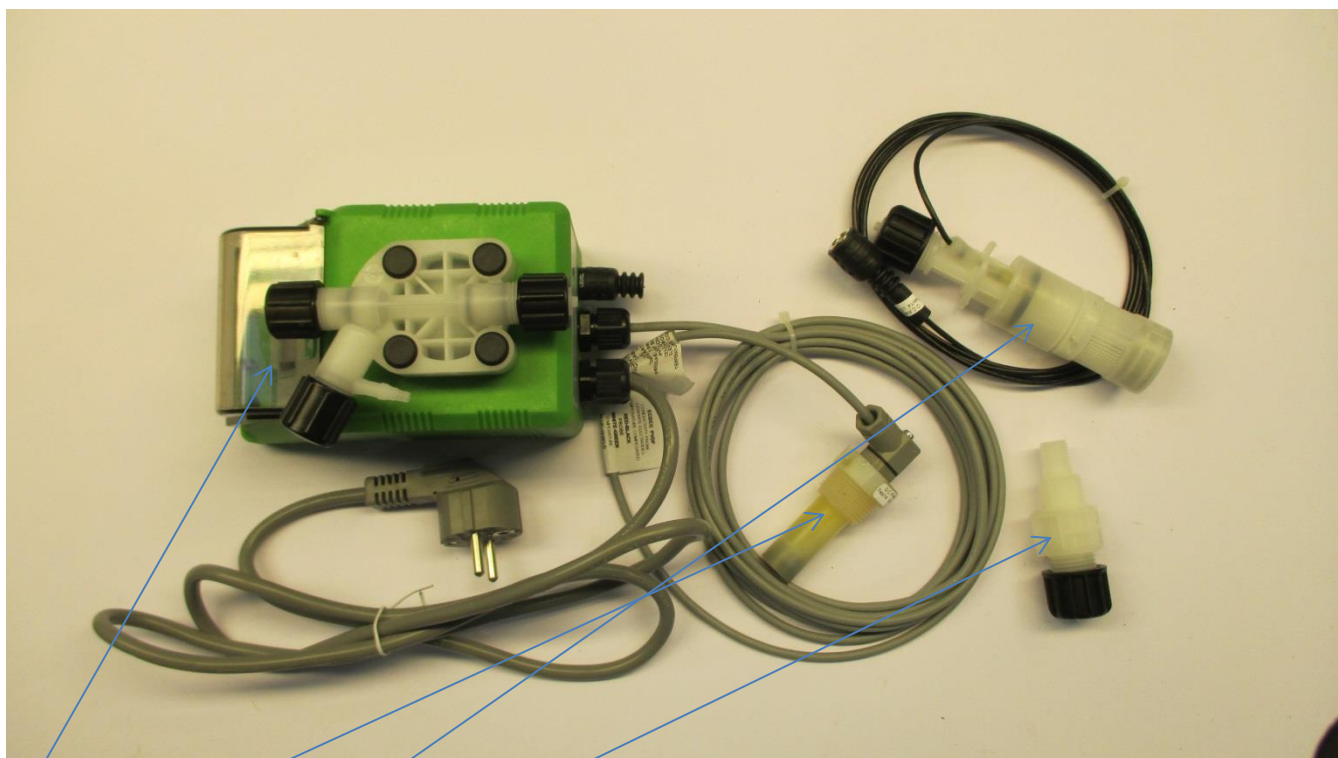
PATENTED PRODUCTS

Each Dosatron unit is factory tested.

CUSTOMER SERVICE - SERVICE CLIENTÈLE

FT/D35R2/GB/10/03

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1

2

3

4

1. Dosing pump incl. display for setup
2. Sensor for water tank
3. Suction filter for inlet brine
4. Delivery connection for brine

Ordering spare parts

Adjustment of the FMSCD salt dosing pump

How to use the "FMSCD" PUMP:

On power up pump shows 'Waiting'. Default time is 10 seconds. This functions helps conductivity probe to stabilize readings. At the end of this pause, pump's display shows conductivity's value (mS), electrovalve's status and pump's flow (00%).

Now setpoints and probe must be set. To enter into setup mode keep pressed "E" for about 4 seconds.

Instrument will ask for a password showing "Enter PW" message. If this is the first operation made with the pump (or after a reset) simply press "E" to enter into main menu. Default password is "0 0 0 0".

From main menu you may choose: "Setup", "Param" or "Serv." Move on "Setup" (using ">") and choose it by pressing "E".

From "Setup" menu you may choose: "SetPn", "Calib" or "AI Dos". Choose "Calib" for probe's calibration. Press "E" to confirm.

"Calib" menu shows the temperature read by probe ("C"). Press ">" to get into "COMP" menu for conductivity probe/temperature compensation. Default value (refers to NaCl solution) is 3.0% / °C.

To change it use "^" or "E" and confirm it pressing ">". Pump's display shows "R00.80ms" as probe's read value and "C 5.00mS" as probe's calibration value. To change it use "^" or "E" and confirm it pressing ">". Pump's display will show "Calibr. NO". Press "^" to confirm calibration pump's display will show "Calibr. YES". Press "E" to confirm. Pump's display will show "Calib; Success". In the next menu, you can choose "Calib" or "SetPn". Move on "SetPn" and press "E" to confirm. Now go back to "Setup" menu and choose "SetPn" to set up pump's setpoint and electrovalve's setpoint. Press "E" to enter. Into "SetPn" menu you may begin setpoint calibration for metering pump.

"SetPn" menu shows "1) 0%" and "1.00mS". Using ">" key you may navigate through these parameters. Pressing twice ">" key pump's display shows "2) 100%" and "0.50mS". Percentual values are pump's flow. mS values are pump's activation point. Pump will stop to work when it reaches 1.00mS value. When the flow will reduce to 0.50mS value, pump will increase flow proportionally until 100%. Pump functioning mode is proportional; reducing the difference between the mS values pump will work in On/Off mode. To choose / change these values use 'A' or "E". To confirm it press ">". Pump's display will show "Exit No SAVE". Press "^" to save. Pump's display will show "Exit SAVE". Press "E" to confirm.

Now go back to main setup menu. Choose "Param" and press "E" to confirm. From this menu is possible to change pump's activation delay. Press "^" to set delay time from 0 to 60 sec.

Press ">" key to get into "NEW PW" menu to change the password. Press "^" to change password and "E" to confirm.

Now go back to main setup menu. Choose "Serv."
Into this menu you may manually open and close pump's electrovalve. Press "E" to manually start and stop the pump. To exit press "^".

AL DOS (Maximum Time Dosing Alarm):

This alarm prevents the pump to dose if a set time is reached. To set this alarm enter into "Setup menu". Use ">" key to choose "AI Dos" and press "E" key. The pump shows: > AL OFF

DOSING:

To activate the alarm use "E" key to set the time (from 1 to 100 minutes or "AL OFF"). To setup the alarm mode use the ">" key. Cursor moves on "DOSING". Use "^" key to change this voice. On "STOP" mode the pump will stop the dosing procedure once the set time is reached. The pump's display will show the alarm condition and requires to press a key to continue. On "DOSING"

mode the pump will NOT stop the dosing procedure once the set time is reached.

The pump's display will show the alarm condition ("DOS. Al:') and requires to press a key to continue. To exit press ">" until the display shows "EXIT NO SAVE". Press "E" key to exit without saving. To save data press "^" key to save data and press "E" key to exit.

SPECIAL FUNCTIONS - STAND BY:

Keeping pressed "^" key for about 4 seconds the pump will be disabled. During this time pump's display shows "OFF". To go back to normal operation keep pressed "^" key for about 4 seconds.

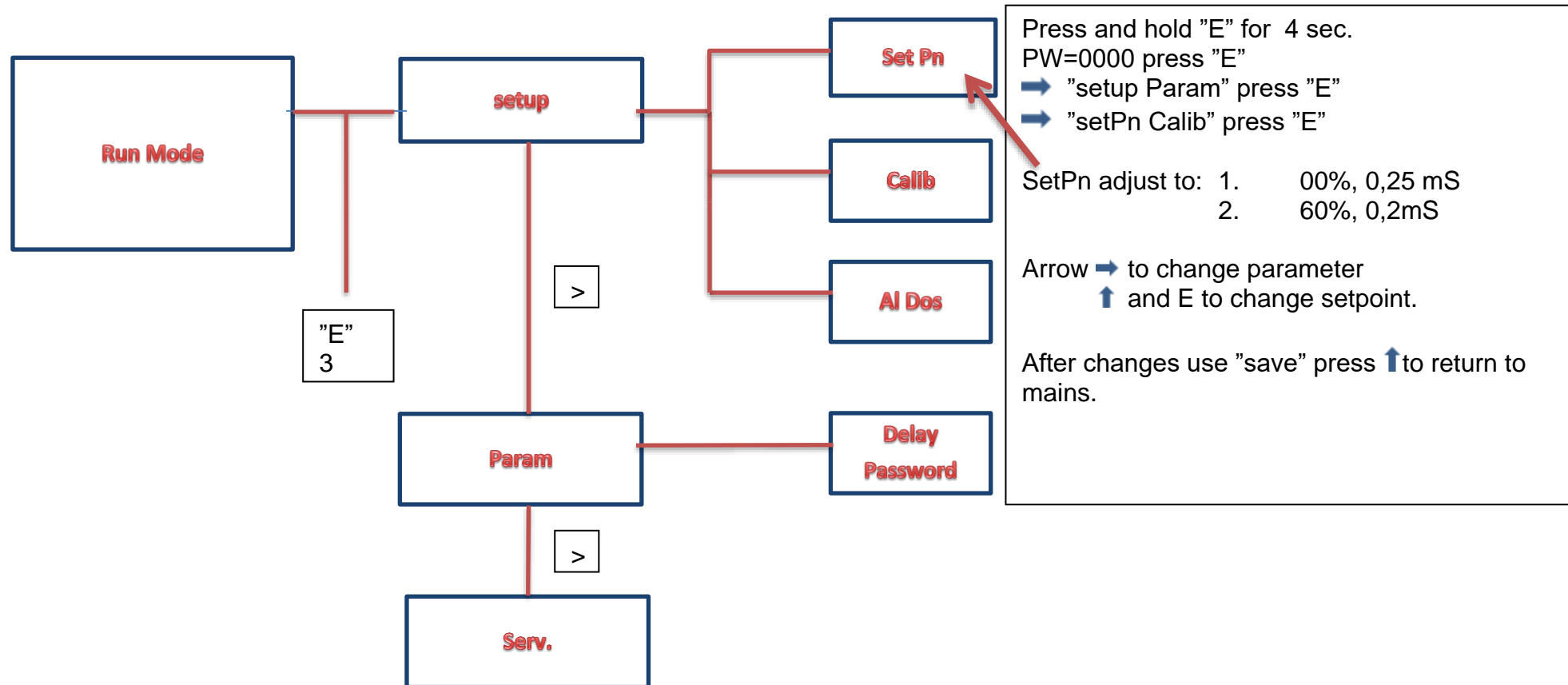
During this time pump's display shows "Supply 240 Volt". To go back to normal operation keep pressed "^"

Pump`s RESET:

Turn off the pump. Keeping pressed "A" and "E" turn on the pump.

Be careful: all stored data will be restored to their original values.

Navigation menu:



Product liability

This ice machine should be connected as shown in the manual. Be especially careful that the control unit is equipped with "afterrun" so that the drum continues to rotate at least five minutes after the refrigerant is interrupted. The warranty is void if the ice machine is not installed according to the instructions in the manual.

BUUS ice machines are made to be used only with water. The water grades generally are shown in section 3. If other water grades or other liquids are used, the warranty is void unless another water grade or liquid is specified in the order confirmation.

Likewise, the ice machine is designed for the refrigerant/coolant listed on the machine's nameplate. If other refrigerants/coolants are used, injuries can result and the machine's warranty will be void.

Local regulations on, e.g., special installation conditions or statutory inspections must always be observed.

Section 9

Disassembly and discarding

For discarding the ice machine, contact a registered cooling company.

The oil and refrigerant should be drained and destroyed in accordance to applicable regulations.

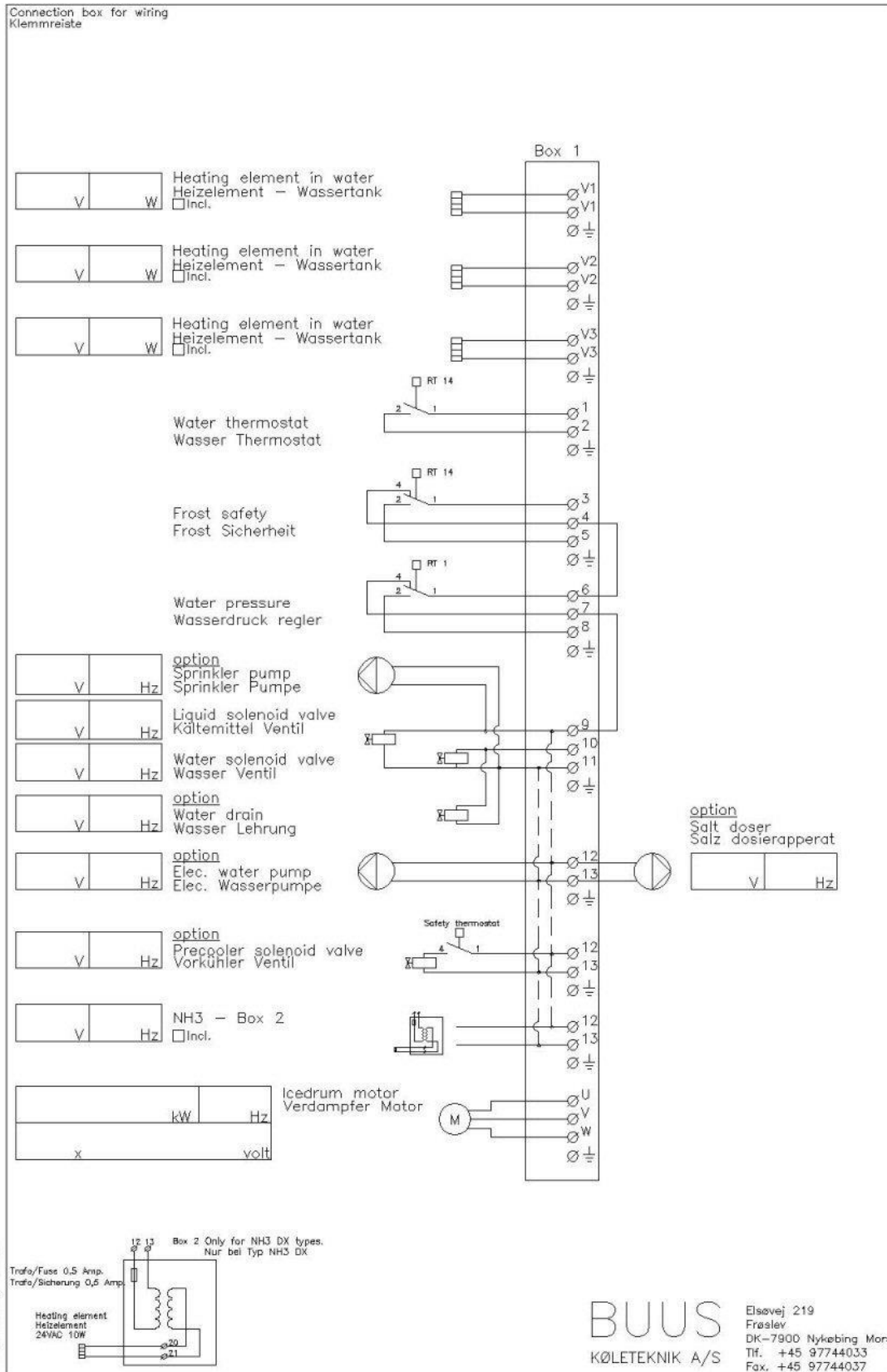
The ice machine's other parts pose no environmental hazard and can be destroyed as ordinary waste.

Section 10

Certificates and approvals

Terminal block

BUUS type C, D, E & F



Electrical diagram

Parts list