Original
Instruction manual

Continuous Flow Chiller
FRIGOPURMAT

with a 2-substance cooling circuit system

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1. Introduction

This instruction manual is valid for the continuous flow chiller FRIGOPURMAT. It is made for the persons who work with this machine and gives you advices for the use, the adjusting and the operation of the continuous flow chiller FRIGOPURMAT.

Make this instruction manual available to all persons who work with the machine. Texts and pictures are kept neutral as far as possible. Attention is drawn to differences by means of picture headings or text notes.

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2. Content

Read this instruction manual carefully and completely before working with the continuous flow chiller FRIGOPURMAT. Follow the advice for the correct care and maintenance of your machine and you will achieve constant operational readiness and a long service life for your machine.

3. General remarks

3.1 Special attention

All people who would use, care or control the continuous flow chiller FRIGOPURMAT have to read, comprehend and pay attention to the instructions of this instruction manual to avoid danger.
Especially pay attention to the “Security and accident prevention instructions”. The use of spare parts, accessories and additional devices which do not come original from HMF and are not checked and released from HMF, constructively given qualities of the HMF machine or her functional ability negatively change and thereby affect the active and/or passive safe driving as well as working security (accident protection), is not permitted.

For damages, in this respect by the use of Non-HMF-Original-Spare Parts, accessories and additional devices every liability is excluded from HMF.

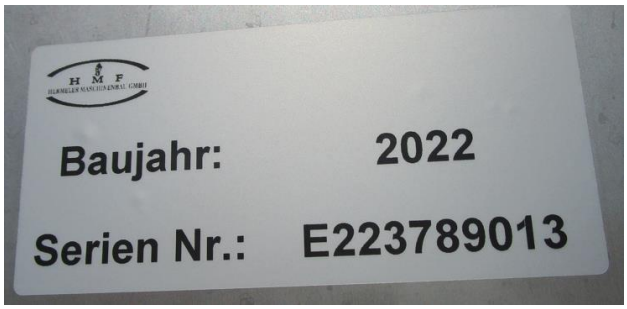
Technical designations, measures and weights are non-binding. We reserve ourselves changes in the course of the technical development and mistakes. In front, behind, right and left is valid always in direction of the traffic.

3.2 Description of the type plate

The serial number of the machine, the type and the year of manufacture are stamped on the type plate. This type plate is normally located on the front right of the machine. Front, rear, right and left always apply in the direction of travel.

In the event of a spare parts order, please provide us with the following information:

1. **Type**
2. **Year of manufacture**
3. **Serial number**



When ordering spare parts, photos of the defective part or machine are often helpful. The following communication channels can be used for this purpose:

WhatsApp: +49 (0) 54 26 / 53 84
Email: sales@hmf-hermeler.de

4. Safety instructions

Please read and observe these operating instructions and the safety instructions before you start working with the machine.

Labelling of warnings and hazards

In these operating instructions we have marked all passages concerning your safety and the safety of the machine with the following symbols. Pass on all safety instructions to other users as well!

Danger!
Marking of instructions which, if not followed, pose a risk to the life and limb of the operator or his fellow human beings and measures to avoid the danger

Attention!
Marking of instructions which, if not followed, may cause damage to the machine and measures to avoid danger to the machine.

Note!
Marking of indications that enable a more effective and economical use of the machine

Environment!
Labelling of instructions which, if not followed, pose a risk to the environment.

There is an environmental hazard if environmentally hazardous substances (e.g. oils, foils, etc.) are not handled properly and/or disposed of.
The warning and information signs attached to the machine provide important information for safe operation. Observance of this information is for your own safety.

In general:
a) Strictly follow warning signs and information signs!
b) Pass on all safety instructions to other users as well!
c) Keep warning signs and information signs in good condition, replace if necessary!

	**Before commissioning, read the operating instructions and observe the safety instructions!** **For maintenance and repair work, switch off the engine and remove the ignition key.!**
	**When operating the power lift, do not stand in the lifting range stop!** **It is forbidden to stand between the tractor and the implement during operation.!**
	**Do not touch machine parts until they have come to a complete standstill.** **During operation and when the engine is running do not open or remove the guard.** **Never reach into the rotating parts.** **Do not stand near the rotating parts or touch moving machine parts! Wait until they have come to a complete standstill!**

	**There is a risk of crushing!**
	**Caution! Danger from ejecting parts when the machine is running.** **Keep a safe distance!**
	**Do not stay within the swivel range of the implements!**

4.1. Safety and accident prevention regulations

1. In addition to the information in this instruction manual, observe the general safety and accident prevention regulations.

2. Before starting work, familiarise yourself with all the actuating devices and their function before starting work. It is too late to do this while driving!

3. Before starting the engine, make sure that no gear is engaged and that all guards are in place and in protective position.

4. Workers' clothing should be close-fitting. Avoid loose-fitting clothing!

5. The power supply must be disconnected when repairing the machine!
   The CE plug must be removed.

6. The FRIGOPURMAT continuous shock unit may only be entered when the system has been disconnected from the power supply.

7. Never touch the control cabinet with sweaty or wet hands!

8. The control cabinet may only be opened when the machine's main electrical switch is in the ‘Off’ or ‘0’ position.

9. All pumps and components must be installed in a frost-proof location!

10. Repairs to the machine may only be carried out by qualified personnel.

11. Other users must be instructed in the use of the machine.

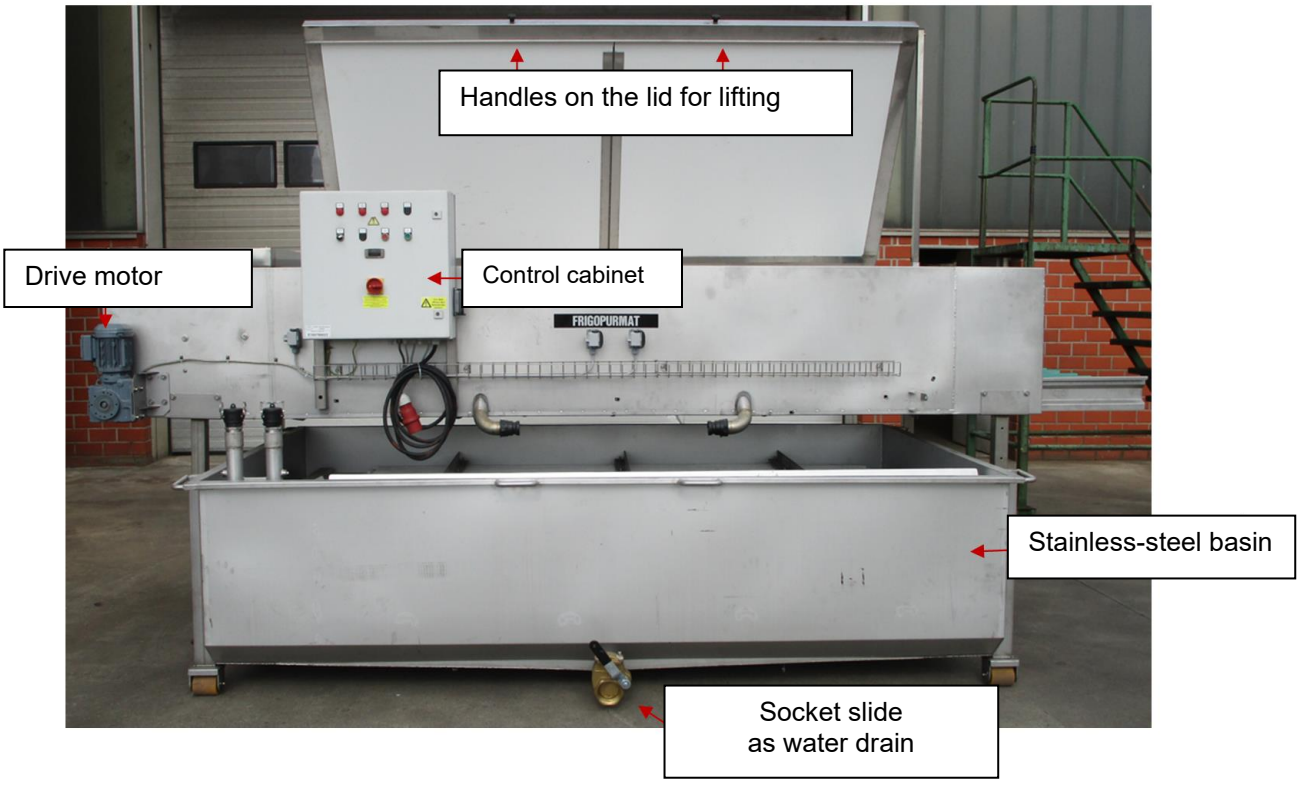
In addition to the above accident prevention information, the generally recognized safety, occupational health and road traffic regulations apply, cf. the agricultural employers' liability insurance associations.

5. Application

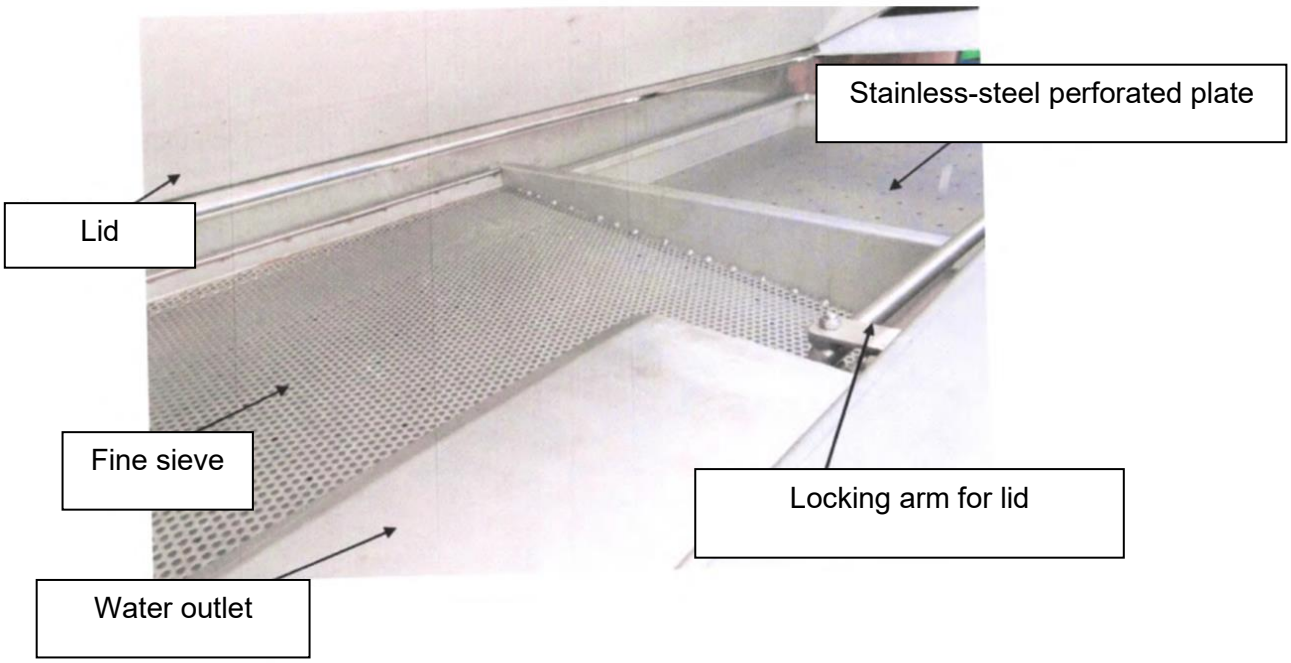
The FRIGOPURMAT continuous flow chiller is suitable for blast-chilling and cleaning asparagus. The asparagus is sprinkled with a large amount of chilled water, which both cools and cleans it. A speed controller can be used to adjust the speed of the conveyor belt, e.g. to adjust the sprinkling time to the temperature of the asparagus or to change the target temperature of the asparagus.

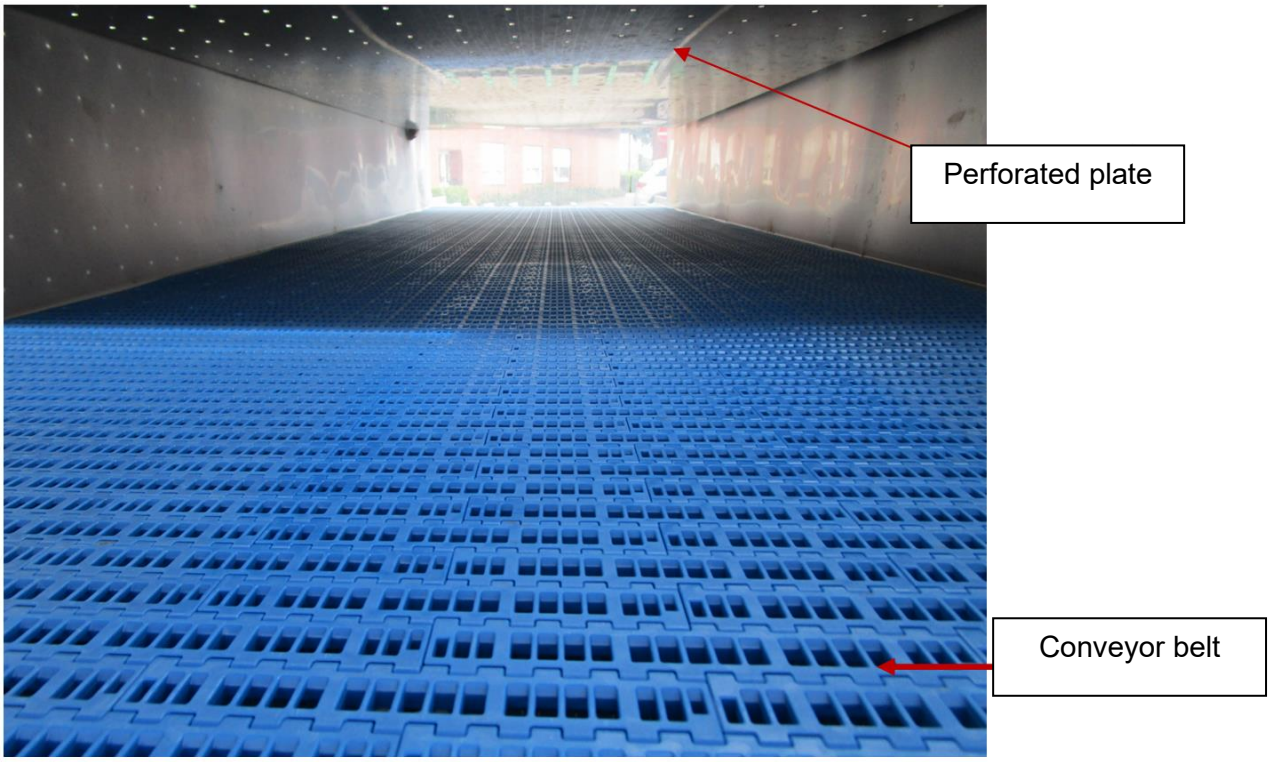
6. Description

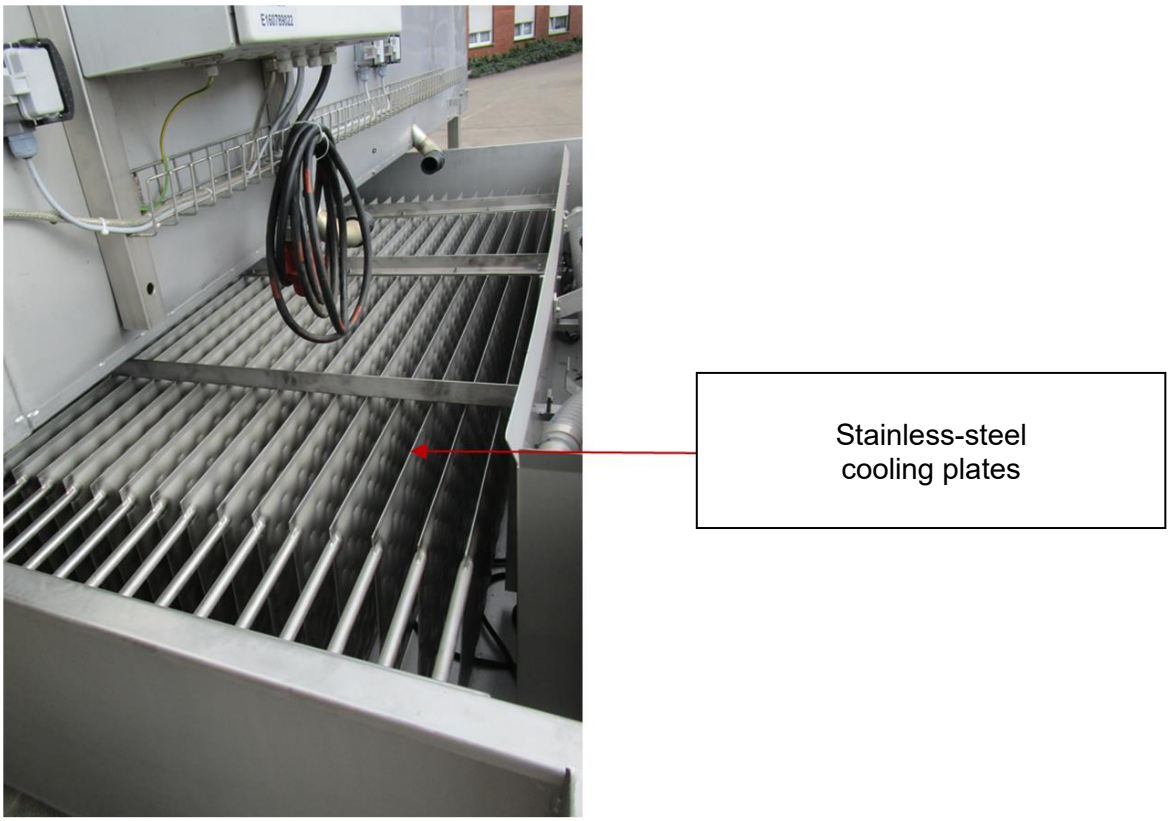
The FRIGOPURMAT is a two-part construction consisting of a sprinkler section and a separate stainless-steel basin. With the aid of a separate cold-water chiller unit, ice forms on the stainless-steel pipes/plates in the basin to cool the water. A submersible pump delivers the cold water to a perforated plate for sprinkling the asparagus. The pump and the cold-water chiller unit can be operated via a control cabinet.



Running direction


Stainless-steel perforated plate
Lid
Fine sieve
Locking arm for lid
Water outlet


Perforated plate
Conveyor belt



7. Before commissioning

To take full advantage of your new machine, please read and follow this instruction manual before using your machine. Before using the machine, check that it has been delivered completely. Remove the packaging carefully and completely. Familiarize yourself with the technical instruments. Lubricate all grease nipples and grease all moving parts with grease or oil. Please always observe the safety instructions.
We must reject warranty claims resulting from improper handling!

8. Commissioning

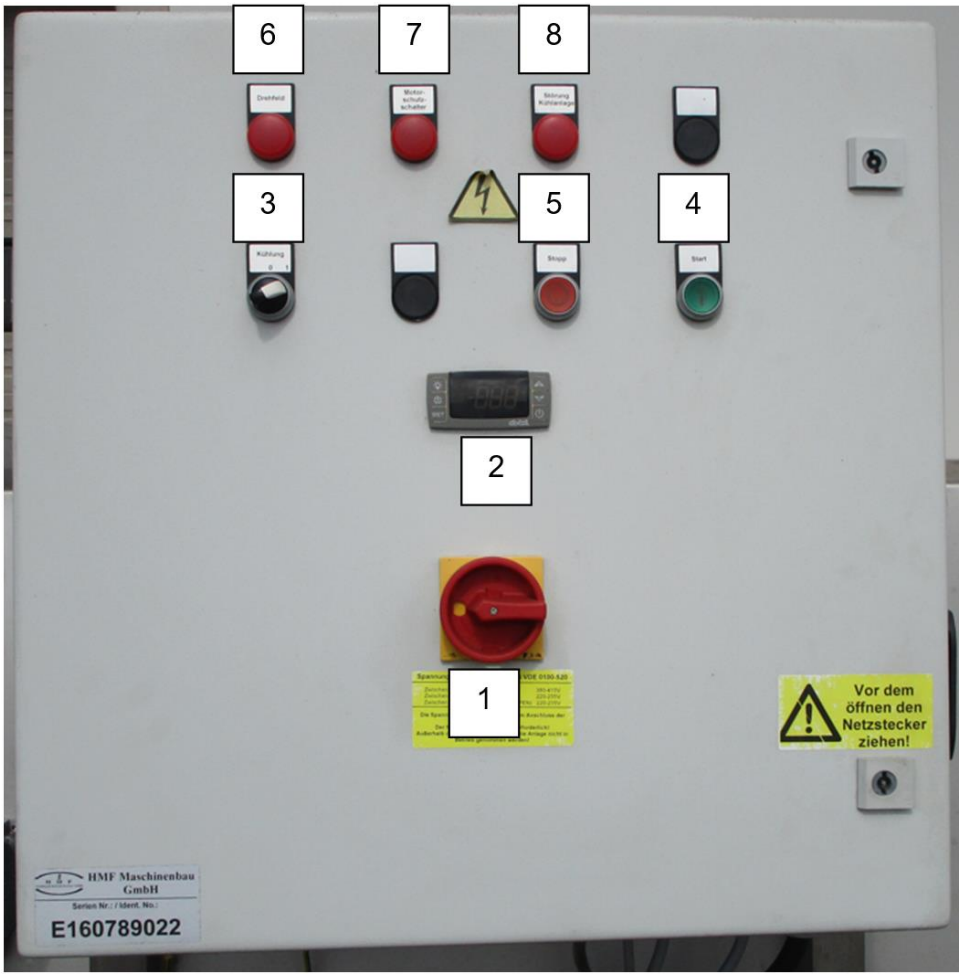
- The FRIGOPURMAT must first be transported to its final location. It should be placed on as level a surface as possible.
- A 3‘ or 2’ shut-off valve is fitted for water drainage. Please ensure that the used water drains away properly.
- Depending on the model, the following is required for the power connection: 400V/16A or 32A or 230V plug connection.
- Ensure that all power cables and sockets have 5 wires and are correctly connected.

- The continuous flow chiller must be connected to the separately installed cold-water chiller unit using a hose or pipe.
- The entire system must be left to stand for at least 10 hours before initial commissioning so that the coolant can settle.
- Using a hose, fill the basin with fresh water up to the lower edge. The stainless-steel pipes/plates must be completely submerged in the water.
- Then ensure that the switches for the pump (3) and cooling (2) are set to ‘OFF’.

Submersible pumps must not be run without water, as this will destroy the seals in the submersible pump.

9. Operating the system

To supply the system with power, the main switch (1) must be set to ‘ON’ (only for 380V). Switch (3) Cooling activates the cooling unit.



1 Main switch (on/off switch for the entire system)
2 Temperature display
3 Rotary switch for cooling (0=OFF 1=ON)
4 Switch for conveyor belt (start)
5 Switch for conveyor belt (stop)

Fault indicators:

6 Rotating field
7 Motor protection
8 Cooling system fault

The temperature of the water for cooling the asparagus can be set on the water temperature display (9) via the display:

1 Unusable
2 Unusable
3 Set button
4 Up button
5 Down button
6 On/Off button

The water in the continuous flow chiller is kept within a specific temperature range. A temperature sensor measures the temperature of the water. If the water temperature exceeds a preset value, the cooling unit starts. The water is then cooled. As soon as the water temperature reaches a lower limit value, the cooling unit switches off again.

Example:
- Cooling unit starts at a water temperature of 4°C
- Cooling unit switches off at a water temperature of 2°C

Setting the upper limit for the water temperature:

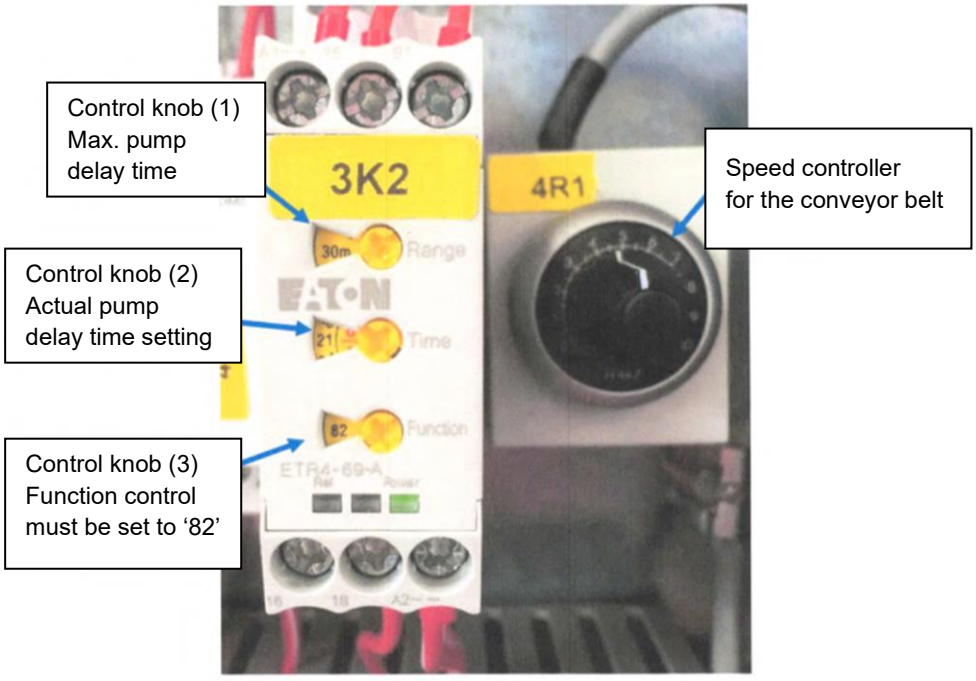
The display always shows the current water temperature. Pressing the Set button (3) displays the set temperature for the upper limit of the water. If button 3 (Set button) is held down for longer, the display starts to flash. The setting can now be changed using the arrow buttons (4) and (5). Press the Set button (3) again to save the entry.

Setting the lower value for the water temperature:

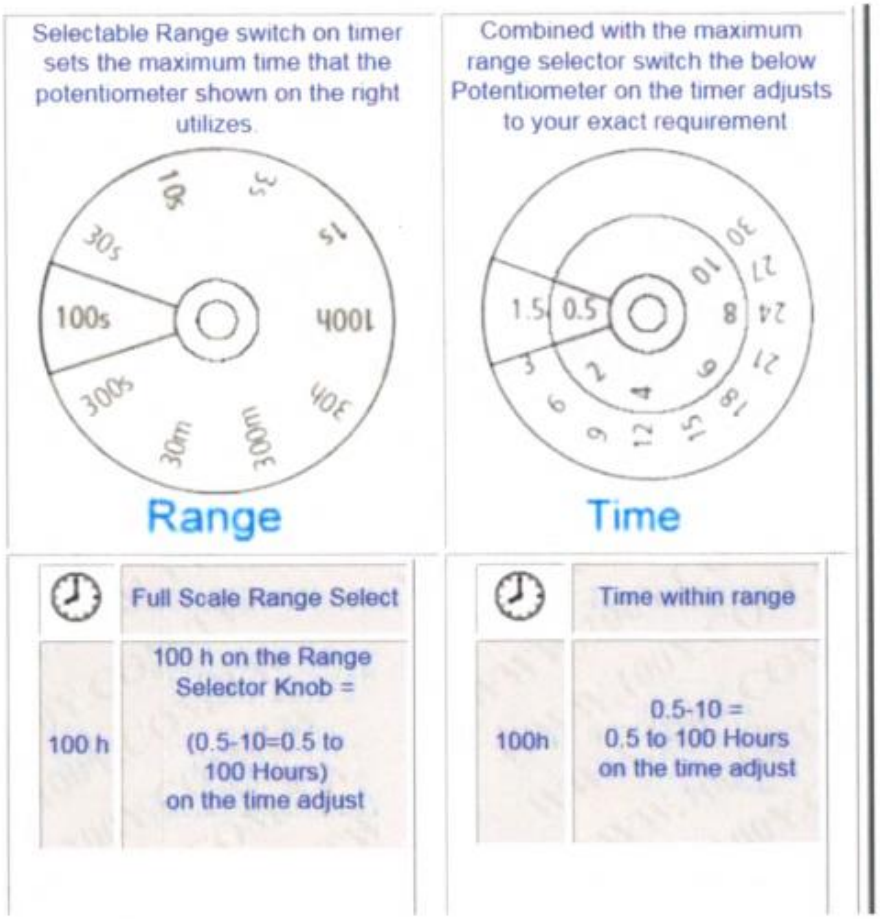
The lower value for the water temperature is not entered directly. Instead, you enter a cooling temperature, i.e. the amount by which the water temperature is to be cooled, e.g. -2°C.
The cooling is entered via the Hy parameter. Press the Set button (3) and the Down button (5) simultaneously to access the programming level. The buttons must be held down for a few seconds. The '°C' LED flashes. The individual setting parameters now appear on the display. As soon as 'Hy' appears on the display, press the Set button (3) once. The default value for the Hy parameter is now displayed, e.g. -2°C.
The default value can be changed using the 'Up/Down' buttons (4) and (5). Press the Set button (3) to save the display value. Press the Set button (3) and the Up button (4) simultaneously to exit the programming level.

9.1 Setting the pump run-on time

In the control cabinet:



Possible settings for control knob 1 (left) and control knob 2 (right)



The maximum times from 1 s to 100 h can be set on the control knob (1). For the FRIGOPURMAT, the control knob should be set to 30 min.
The actual time can now be set on the control knob (2) in proportion to the selected maximum running time. The scale on the control knob (2) ranges from 1.5 to 30 - black to black, red scale for red values on control knob (1)
If you divide the maximum value set on control knob (1) by the maximum scale value, you get the time per scale unit for control knob (2).

Example:
Control knob (1) = 30 m => black scale on control knob (2) = 30
=> 30 m/30 = 1 min/scale unit
Control knob (1) = 100 s => red scale on control knob (2) => 100 s/10= 10 s/scale unit

The desired running time is now set using the control knob (2).

Example:
Control knob (1) = 30 min
1 min/scale unit => For a run-on time of 20 min, the control knob (2) must be set to the value 20.

10. Cold-water chiller unit

The cooling unit is controlled by a temperature sensor. If the ice jacket on the stainless-steel pipes/plates falls below a certain thickness set by the temperature sensor, the cold-water chiller unit starts up and refills the ice jacket. The temperature sensor should be set so that the ice coats on the stainless-steel pipes/plates have a diameter of 40-50 mm. Under no circumstances should a closed ice block form. The cold-water chiller unit only runs when the stainless-steel pipes/plates in the container are covered with water.

To defrost the system, set the 'Cooling' switch (2) to '0' or "OFF". Continue to operate the system until the ice on the stainless-steel pipes/plates has melted. Under no circumstances should you attempt to 'pick off' the ice, as this may damage the stainless-steel pipes/plates.

10.1 Commissioning the cold-water chiller unit

See separate instructions manual for cold-water chiller unit.

10.2 Frost protection for the cold-water chiller unit

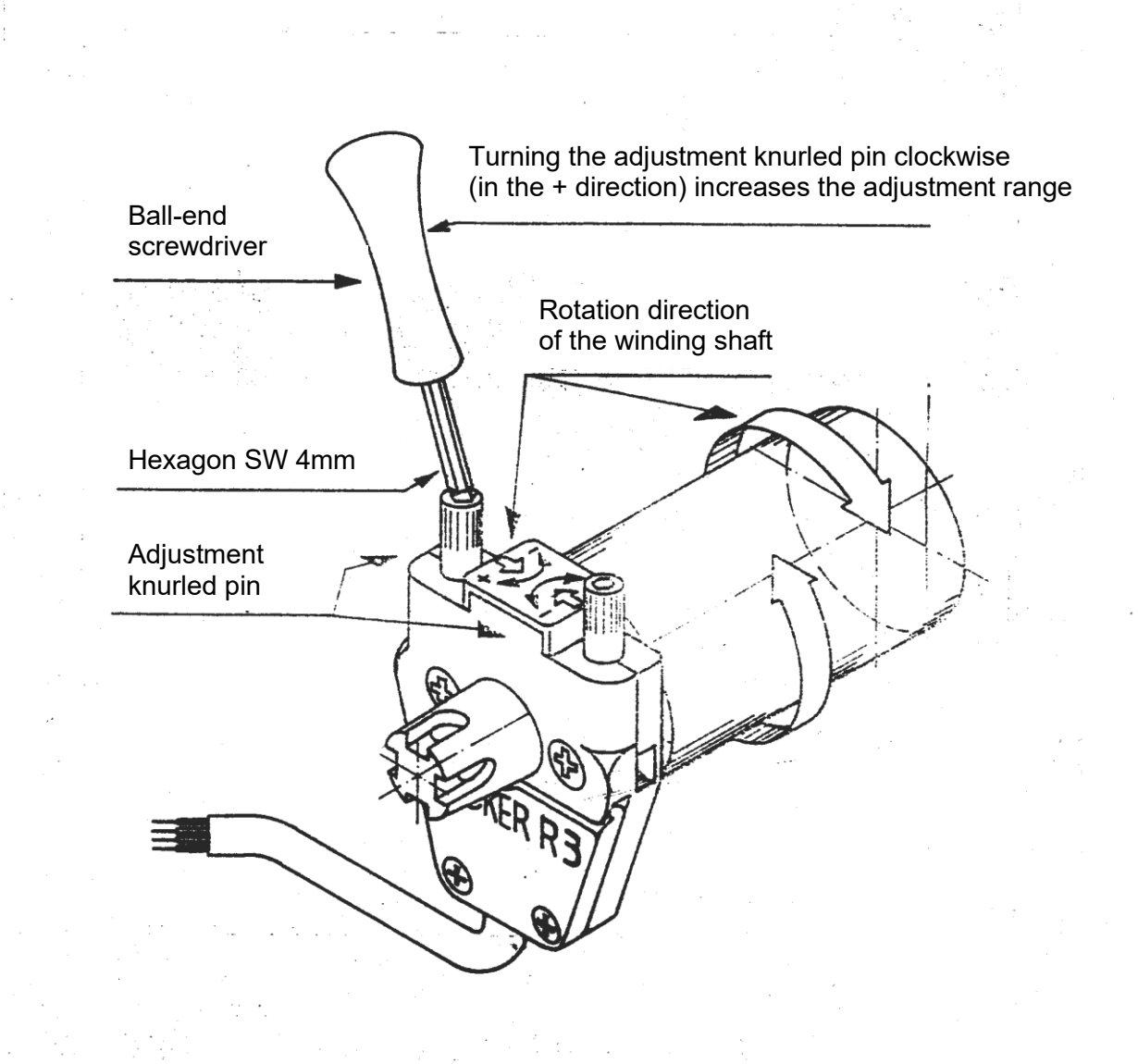
Please note:
At sub-zero temperatures, ensure that the antifreeze added to the water-glycol mixture can withstand sub-zero temperatures. This should be checked with a measuring device, especially during the winter months.

11. After the asparagus season

- Drain water from the pool.
- Store the pump in a frost-proof location.
- Protect all electrical components from moisture.

12. Checking the direction of rotation of the pump

- The direction of rotation of the pump must be checked before commissioning. As the pump is supplied with 400 volts, phase shifts may occur.
- There is an arrow on the cast housing of the pump that indicates the direction of rotation of the impeller. Furthermore, incorrect rotation of the pump is noticeable due to loud noises.
- To check the direction of rotation, it may be necessary to run the pump outside the water basin. In this case, the pump should only be switched on briefly, as 'dry' operation can damage the pump.
- If the pump is running in the wrong direction, two phases of the power supply for the pump must be changed in the control cabinet or in the plug. This will change the direction of rotation.



13. Maintenance and Care

There is a sieve on the perforated plate for sprinkling the asparagus to clean the water of fibrous material. This sieve must be cleaned daily or more often, depending on the degree of contamination. The perforated plate should also be cleaned daily. To do this, loosen the side mounting bolts and fold down the perforated plate. (Caution: heavy!) Cleaning can then be carried out. Afterwards, fold the perforated plate back up and carefully reattach it!
The water itself should also be changed as needed (approx. every 2–3 days). It is not necessary to defrost the system for this. The dirt should be rinsed out of the ice water basin with a water hose.

14. Notes before recommissioning

To restart the system after a prolonged period of inactivity, the following instructions must be observed:

- Has condensation formed in the control cabinet due to moisture in the air during the winter? If so, please dry/ventilate and only connect to the power supply once everything is dry. **Danger!**
- Is the direction of rotation of the power supply correct? (clockwise)
- Are 5 wires connected to all sockets/supply lines (including extension cables)? This is essential, otherwise control modules may be damaged.
- Check all plugs and cables for damage.
- Check the steel band suspension on the roller doors.
- Check the electronic components.
- Is there still enough glycol?
- Before commissioning, please have all screw connections on the refrigeration system checked by a refrigeration specialist!

15. Cleaning schedule

	Daily	Weekly	14-daily	Before or after season
Change water (no defrosting necessary), rinse with clear water	**Every 2-3 days**			
Clean the sieves and the perforated plate, spray with water and clean from dirt	**X**			
Check the pump for contamination		**X**		
Clean the inside of the machine with water		**X**		
Clean the conveyor belt with water		**X**		
Check fan/ cold-water chiller unit /filter and clean if necessary			**X**	
Clean the whole machine thoroughly Empty the machine, clean the inside: - Dissolve sodium hydroxide (caustic soda) in lukewarm water (follow the manufacturer's recommendations for the mixing ratio!), add to the water tank of the flow chiller. - Allow running for approx. 2 hours until the dirty film is gone. Then drain off the liquid. - Rinse thoroughly with clean water: To do this, let in new water at least twice, let it run through for 15 minutes each time, then drain. Afterwards, you can rinse again with citric acid. (To do this, mix water with citric acid (follow the manufacturer's recommendations for the mixing ratio!), fill the water tank of the flow chiller, let it run for 15 minutes, drain and rinse.				**X**

16. Information on DIN VDE

Citation:

DIN VDE 0100 part 705

3 Protection against shock current

3.2 Electric circuits with sockets of the TN-, TT-, IT-system have to be protected by residual current devices with a nominal fault current $I_{\Delta n}$ shorter or equal 30mA.

3.3 For preventive measures at indirect touching by automatically disconnection of the electrical power supply there is valid as stipulated limit of the permanent allowed touching-voltage U_L=25V AC voltage RMS-value or 60V DC voltage (harmonic-free) for zones of cattle breeding. The maximum disconnecting-time until the cut-off of the electrical power supply will be shown in a chart which is in preparing now.

4 Protection against thermic influence

4.1 Fire protection
The fire protection has to be assured by a residual current device with an $I_{\Delta n}$ shorter or equal than 0,5A.

5 Choice and Installation of electrical utilities

5.3 Control units
Annotation: It is recommended to protect final electric circuits by a residual current device with a nominal fault current as low as possible, preferred up to 30mA, at which no faulty activations appear.

Explanations

Concerning 3.2:
If there are devices connected firmly, it is allowed to use a residual current device with an $I_{\Delta n}$ up to 0,5 A (please see 4.1)

Concerning 3.3:
In agricultural constructions without cattle breeding the allowed touching-voltage is at U_L=50V AC-voltage RMS-value or 120V DC voltage (harmonic-free) according DIN VDE 0100 part 410.

Concerning 4:
It is not allowed to use residual current devices with a release current higher than $I_{\Delta n}$=0,5A.

Concerning 5.3:
This recommendation is addressed to constructions, in which the residual current device does not release while failure-free operation. But because the leakage currents of electrical devices may cause faulty deactivations, it is also allowed to use residual current devices with a higher release current.

In addition the producers of electronic frequency converters recommend the use of all-current sensitive residual current devices.

Additional annotation:
A residual current device with a defined release current must have released at that release current. But this does not determine, that for example an earth leakage circuit breaker (FI) with an $I_{\Delta n}$ = 30mA does only activate at more than 30mA. Conditional on its construction even a fault current of 20mA may cause an interruption of the earth leakage circuit breaker (FI).