Geneglace
ICE TECHNOLOGY

G200 Generator

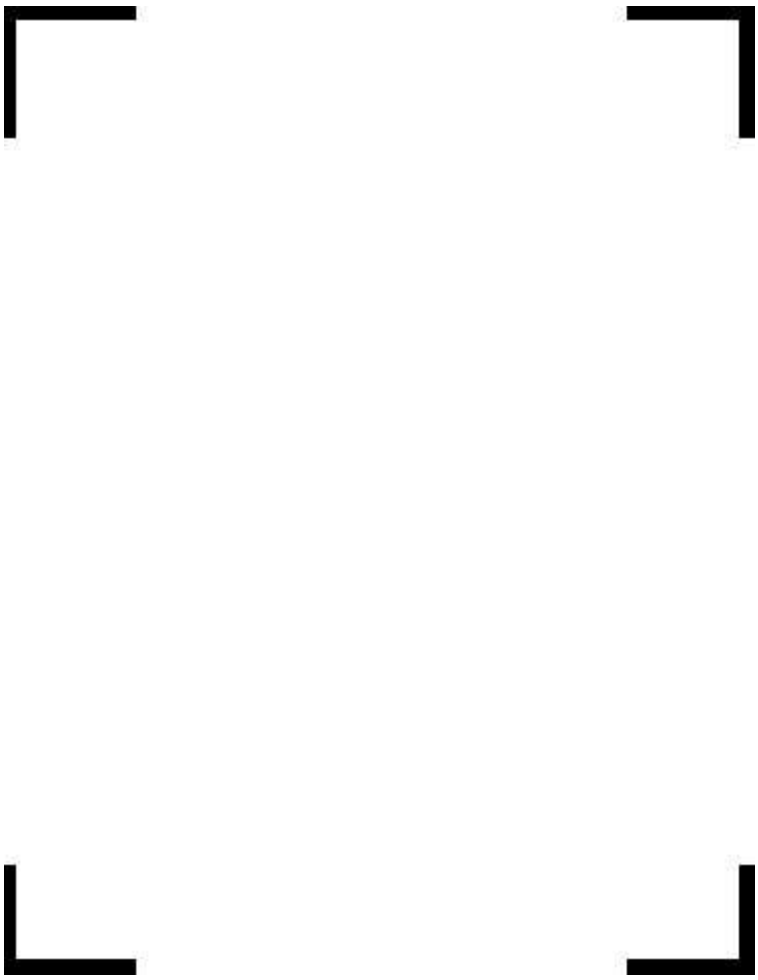
Installator Guide

ENG200_EN_V1.2_2023-03-27

Translation of the original manual

Identification

Maker's plate



Introduction

Your Geneglace Ice Machine has been developed and built in compliance with current regulations; manufactured with the greatest care, it has been subjected to permanent quality control. However, if you discover a manufacturing defect, and in order to protect your Geneglace machine, we kindly ask you not to intervene on it and to contact us as soon as possible.

The information contained in this manual may be modified without notice.

To help us improve this manual, please inform us of any errors or inaccuracies you may have found therein by sending an email to: contact@geneglace.com

Geneglace SAS cannot be held liable for damage or operating problems on Geneglace machines caused by exceeding the service or safety limits or by using options or expendables other than those approved by Geneglace SAS.

Table of Contents

1. Presentation

Read the safety instructions carefully before carrying out any work on the ice machine.

1.1 Introduction to the manual

Your Geneglace Ice Machine has been developed and built in compliance with current regulations; manufactured with the greatest care, it has been subjected to permanent quality control. However, if you discover a manufacturing defect, and in order to protect the personnel and your Geneglace machine, we kindly ask you not to intervene on it, to contact the installer and to register the machine

You can contact the Geneglace after-sales service by sending an email to: service@geneglace.com

1.2 Warnings

- The information contained in this manual may be modified without notice.
- It is possible that some images and diagrams do not correspond exactly to the delivered elements.

1.3 Looking for information

Chapter	Description
• *"Safety instructions" (on page 9)* • *"Pressure equipment safety" (on page 15)*	These chapters provide information for the installer concerning the safety instructions to be respected before installing a Geneglace machine
• *"G200 Generator operation" (on page 17)*	This chapter describes all the operating characteristics, factory settings and other settings to be made.
• *"Handling" (on page 22)*	This chapter provides all the instructions necessary to handle the machine in complete safety
• *"Installation G200 generator" (on page 23)*	This chapter describes how to position and install the G200 Generator and the other parts of the machine such as the ice chute and the guards required.
• *"G200 attachments" (on page 27)*	This chapter also describes the steps required to ensure that the G200 Generator remains securely in position after it has been installed.
• *"Connecting the G200 Generator generator" (on page 29)*	.This chapter concerns all the machine hydraulic, electrical and refrigeration connections.
• *"Cooling diagram" (on page 42)*	This chapter provides .
• *"First commissioning sheet" (on page 87)*	This chapter explains how to start the Geneglace machine for the first time.
• *"Maintenance" (on page 72)* • *"Troubleshooting" (on page 81)*	These chapters provide recommendations to keep the Geneglacemachine in optimum working order for as long as possible

Throughout the manual, you will find boxes such as :

The note provides some background information in addition to the subject matter.

The tip suggests procedures to overcome or bypass difficulties that may be encountered.

This insert is intended to draw the reader's attention to particular points that may be relevant to the safety of the worker or the machine.

2. Safety instructions

This manual contains important instructions relating to safety, installation, operation, maintenance and disposal of the ice machines. For this reason you must read the manual before any activity involving the machine.

A maker's plate indicating the type, identification number and other service and safety characteristics of your Geneglace machine must always remain visible and never be removed.

In addition to the safety instructions in this manual, all national or local accident prevention regulations and recommendations must also be observed.

2.1 Danger pictograms

Failure to respect the safety instructions could result in bodily injury and damage to equipment.

The safety instructions provided in the Geneglace SAS manuals are preceded by the following signals:

Pictograms	Meanings
	General danger
	Electrical danger
	Risk of burn
	Danger of crushing
	Chemical danger
	Gas ejection
	Rotation part

These symbols are shown on the machine and the spare parts. Arrows indicate the mandatory direction of rotation. The markings must not be removed and must remain legible.

2.2 Personnel qualification and training

All assembly and servicing operations must be carried out by qualified personnel in compliance with applicable regulations and all current practices and the safety measures of the profession.

Note that all standards as well as local and regional safety regulations, such as European standard EN378, must be taken into consideration during the design, assembly and commissioning of the system.

If the machine is accessible to the public, the site operator is responsible for preventing any accident that could be caused by its mechanical, electrical, or chemical operation.

2.3 Physical and material dangers

No damage claims can be entertained if the safety instructions have not been properly observed.

The G200 Generator assembly is not designed for loads related to snow, wind and earthquake.

Modifications and use of the Geneglace ice machine outside these limits will result in :

- Physical and material damage
- Pollution of the environment
- Cancellation of the warranty

2.4 Physical limits of the G200 Generator

Coolant type:	• According to the configuration of the G200 : R744

For the other coolants: contact Geneglace

Maxi allowable pressures (PS) :	*"Permissible limits of pressure equipment" (on page 16)*
Mini allowable temperature	
Ambient air temperature:	+ 10 to + 35°C (dry bulb)
Water quality	Fresh water for human consumption
Temperature of water to be frozen	+ 5 to + 25°C
Water supply pressure	1 to 2 bars
Supply water hardness	TH 15 to 20° français
Supply water acidity	PH 7/8
Sodium chloride content	100 g/m³
Protection index:	IP44
Electrical power supply:	Read information on maker's plate and comply with applicable standards.
Value airborne noise	>70 dB

For operation outside these values: contact Geneglace

For further information, refer to the maker's plate in chapter *"Identification" (on page 3)*

2.5 Safety instructions

Before conducting any work, the installation must be locked out/tagged out.

It is prohibited to run the machine without the safety devices originally installed (sensors, housings, etc.)

In the event of problems, maintenance or cleaning operations on the Geneglace ice generator, respect the safety instructions:

1. Before conducting any work, switch off the ice generator using the button provided on the electrical cabinet.
2. Avoid any action on a power outlet or use of an isolating switch installed upline.
3. Lock out/tag out the installation.
4. Perform maintenance or cleaning operations on the ice generator.
5. Before restarting ice production, make sure that all the safety devices operate correctly:
    - Torque limiter
    - Electrical guards
    - Pressure switches
    - Thermostats
    - Transmission guards
    - Covers, hatches in place

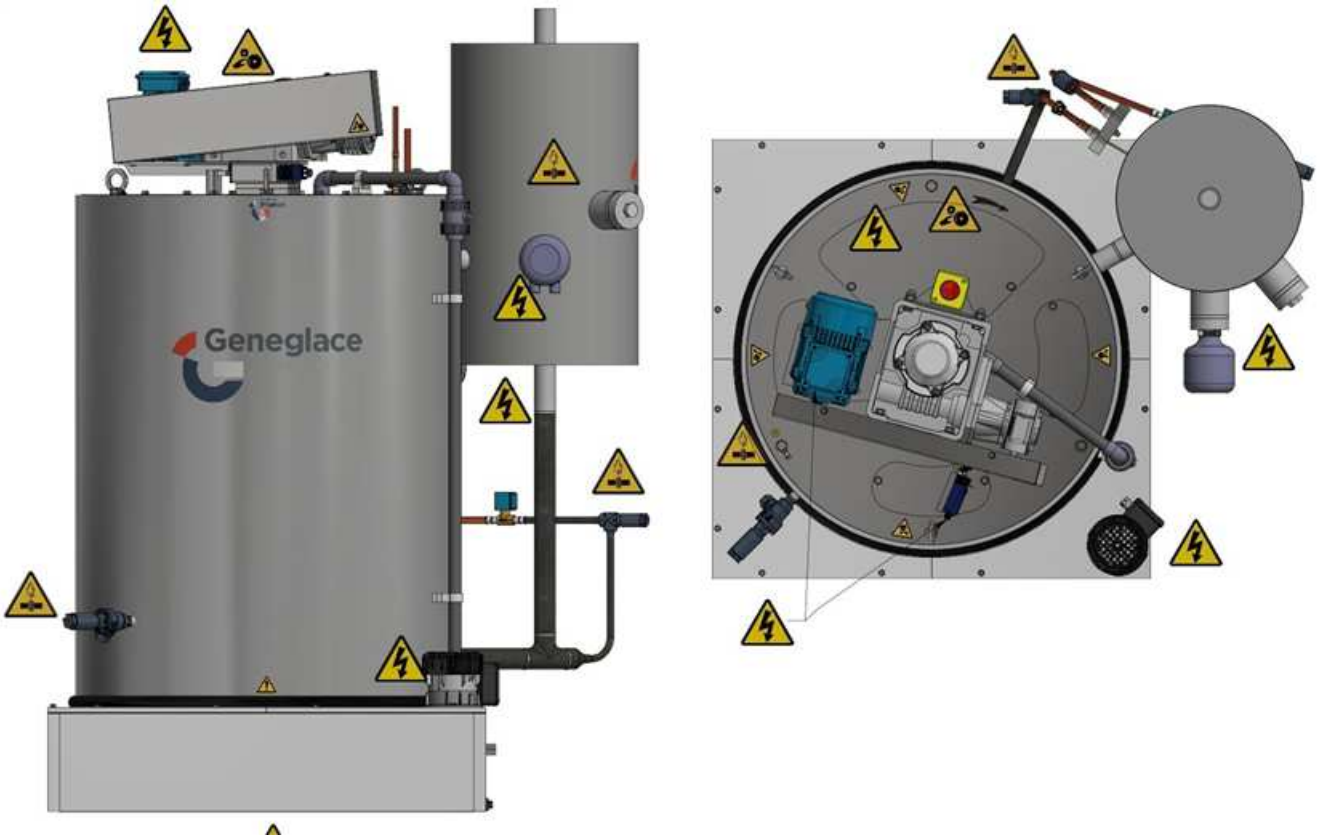
These safety devices must be kept in good working order and the danger pictograms must remain visible.

If necessary, maintenance operations will be carried out by the installer with the necessary skill

2.6 Warnings

Warnings	Safety instructions
On/Off button is difficult to access (machine located at height)	• Install a second control switch at a more accessible level.
Powering up	• Make sure that no employees are near the dangerous areas to avoid possible risks after switching on the electricity supply.
Powering down	1. Switch off the ice machine. 2. Use the isolating switch in the electrical cabinet (three-phase current). 3. Lock out/tag out the installation by placing a padlock on the isolating switch to avoid accidental startup.
The rotating part is driven by a gear reducer and motor coupled by a belt.	• Do not operate the ice machine without its safety housings and its safety sensors.
 When stopping, the rotating part of the generator continues to rotate.	
Cleaning	• Stop and power down the machine. • Secure the installation with a padlock on the disconnecting switch to prevent unintentional switching on. • Do not place the hands or other objects in this area while the rotating parts are still turning. 
Working with the cooling circuit communicating with the atmosphere	• According to the "MONTREAL PROTOCOL" directives, this operation must only be carried out by qualified personnel.
Operating the valves manually	• This operation must only be carried out by maintenance personnel who have the necessary skills (risk of ejection of pressurised fluids). 

Main danger areas on the ice generator Geneglace.



2.7 Environmental protection

Materials and fluids resulting from disposal of the machine must be treated in approved sites in compliance with current regulations.

3. Pressure equipment safety

3.1 Service instructions

Generator type pressure equipment Geneglace alone is intended to be incorporated into refrigeration plants in accordance with the Machinery Directive 2006/42/CE. They may only be commissioned if they have been installed in refrigeration systems in accordance with these instructions and if the refrigeration systems comply in their entirety with the applicable local regulations.

Generator type pressure equipment Geneglace alone is intended to be incorporated into refrigeration plants in accordance with the EC Machinery Directive 2006/42/EC and the EC Pressure Equipment Directive 2014/68/EU. It may only be used if they have been incorporated into refrigeration plants in accordance with this instruction and if these refrigeration plants fully comply with the local regulations in force.

3.2 Residual risks

Pressure equipment may result in inevitable residual risks. Therefore, anyone working on this device should read this service instruction carefully and should consider the accident prevention regulations, the generally accepted safety regulations, the EU directives and the specific provisions of the country concerned.

3.3 Location

Geneglace ice generators should not be used as a coolant storage tank.

The G200 Generator Geneglace must be transported in strong packaging to its installation location.

The G200 Generator Geneglace is a unit designed to be installed in the "low pressure" parts of refrigeration systems and indoors, protected from the weather.

Suitable protective measures must be taken if the machine is used in extreme conditions (e.g. aggressive atmosphere, extreme outside temperatures, etc.). It is advisable to consult Geneglace.

3.4 Pressure equipment directive 2014/68/EU

Ice generators Geneglace are pressure equipment that comply with the Pressure Equipment Directive 2014/68/EU.

Consequently,

- the entire installation must be declared to and authorised by an inspection organisation, in compliance with local applicable regulations.
- An EU declaration of incorporation and conformity is provided with the pressure equipment.
- The installer must comply with Geneglace SAS installation and operating manuals.
- The operator must submit this equipment to periodic requalification inspections in compliance with the regulations applicable in the country of installation.

In countries outside the EU, local regulations must be applied.

3.5 Pressure limitation device

There must be no shut-off devices at the valve outlet.

An overpressure protection system in accordance with EN ISO 4126 and EN 13136 or the relevant local regulations must be installed, the elements necessary for the calculation are indicated in the chapter*"Limites admissibles des équipements sous pression" (sur la page1)* .

3.6 Cut-off safety device

In accordance with current local regulations, cut-off safety devices must be provided to limit pressure or temperature (thermostats and safety pressure switches).

3.7 Partial pump-down

To limit the coolant load in the pressure equipment when stopped, plan a time delayed pump down when stopping the generator.

3.8 Permissible limits of pressure equipment

Permissible limits for "Geneglace generator only" pressure equipment :

Type	Volume		PS (Min/Max)	T° (Min/Max)
	(L)		(Bar)	(°C)
G200 ABF*	52	BP	-1/+40	-30/+50
		HP	-1/+60	-30/+50
G200 SBF**	21		-1/+40	-30/+50

* Generator equipped with a flood bottle for direct expansion / ** Generator without flood bottle for pump recirculation.

Type	Coolant	D.E.S.P. Category	Coolant group	Load (kg)	T. eq CO2
G200 ABF*	R744	III	2	22	0
G200 SBF**	R744	II	2	11	0

* Generator equipped with a flood bottle for direct expansion / ** Generator without flood bottle for pump recirculation.

4. G200 Generator operation

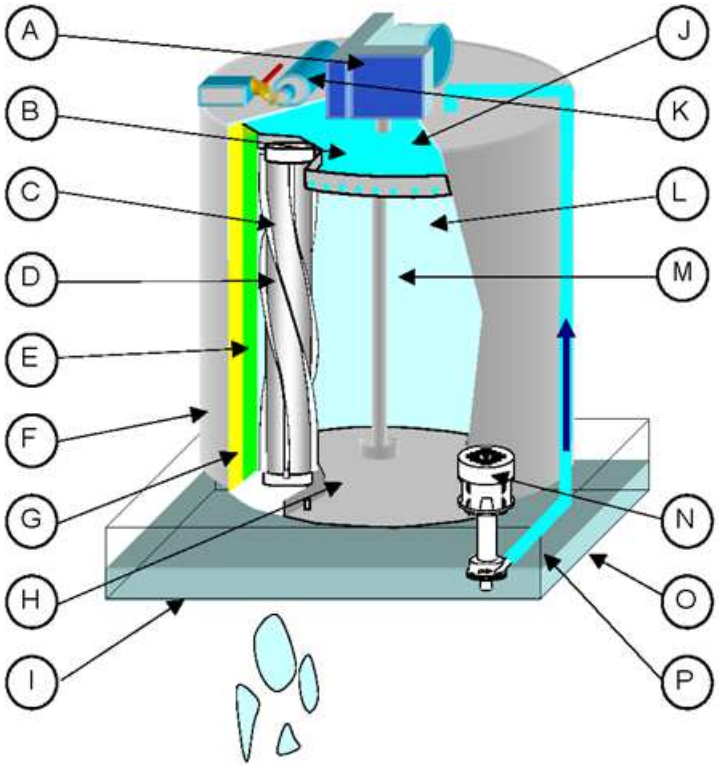
This chapter describes the operating principles of the G200 Generator generator and of the cooling circuit.

4.1 Normal use of the G200 Generator

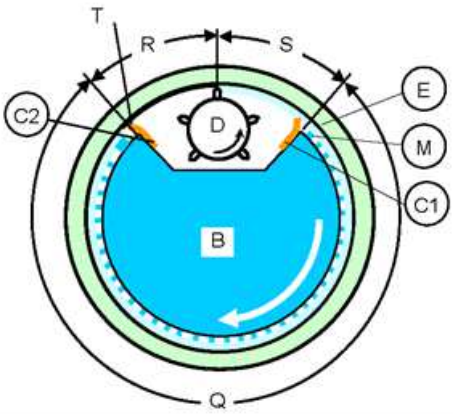
The G200 Generator Geneglace is designed to produce dry and subcooled flake ice from .

4.2 Principle of operation of the G200 generator

Simplified cross-section of a generator



Water distribution plan view



DANGER: DO NOT MOVE THE REAMER AWAY FROM THE CYLINDER, this could cause:

- Bearing wear
- The torque limiter safety device to trip
- Liquid hammer and oil leaks that could destroy the compressor

DANGER: DO NOT CHANGE THE SPEED OF ROTATION OF THE REDUCER, this could cause operating problems. The speed of rotation of the reducer is set in the factory

The ice thickness does not depend on the distance between the reamer and the cylinder.

The thickness and quantity of ice produced by the ice generator depend on:

- The generator cooling power,
- The evaporation temperature,
- The speed of rotation of the reducer.

Operating principle:

1. The water distributed by the bowl **B** flows abundantly and permanently on the inner surface of the fixed cylinder **F**.
2. In the fixed cylinder **F**, low-temperature coolant flows in the double wall **E**.
3. The cylinder insulation **G** ensures that all the cooling power is transmitted to the water and the ice.
4. Some of this water is frozen **M**.
5. The excess frozen water returns via the recovery bowl **H** into the base **O**.
6. In the base **O**, the level **P** is kept constant by a float valve (not shown).
7. This water is circulated by the pump **N**.
8. The helical reamer **D** driven by a gear reducer **A** sweeps the surface **L**.
9. The helical reamer **D** rotates due to the thickness of the ice and removes the ice by simple pressure.
10. For proper operation, the distance between the reamer and the cylinder must be **less than 0.4 mm** without the reamer coming into contact with the cylinder.
11. The torque limiter **K** switches off the gear reducer electricity supply in case of excessive stress on the reamer.
12. The spraying area **Q** is defined by two scrapers **C1** and **C2**, on each side of the reamer **D**.
13. The scraper **C1** in front of the reamer, dries the ice before it reaches the subcooling area **S**.
14. The ice removal area **R** is located between a tooth of the reamer **D** and the rear scraper **C2**.

15. There must be no water in areas **R** and **S** between the two scrapers to produce good quality ice and ensure that the machine operates correctly.
16. The scraper **C2** provides a seal between areas **R** and **Q**.
17. However, a trickle of water **T** of about 1 mm must flow along the rear scraper **C2** on its front side at the junction with the cylinder.
18. The ice is evacuated down the ice chute **I**, ready for use.

4.3 Operation of the cooling circuit

1. The coolant flows in a fixed, sealed double wall (see *"Principle of operation of the G200 generator" (on page 17)*)
2. The coolant (pressure reduced previously) is injected via the branch connection on the lower part of the cylinder.
3. The coolant enters the double wall and changes from liquid to gaseous state.
4. This evaporation absorbs the heat brought by the water running over the inner wall of the cylinder, turning it into ice.
5. The heat exchange takes place through the inner wall of the generator and the coolant is never in contact with the water to be frozen.
6. The coolant is pumped and regenerated by a condensation unit.and regenerated by a condensation unit.

To ensure that the ice machine operates correctly, make sure that the flow rate of reduced pressure coolant injected into the generator is controlled to obtain optimal and constant filling of the generator via the adjustment devices. (See *"First commissioning sheet" (on page 87)*

4.4 Recommended operations

- Avoid stopping and starting the machine for short periods of time.
- Allow the machine to operate for 4 consecutive hours rather than alternating 4 times 1 hour on and 1 hour off.
- During prolonged stops (more than one week), operate the generator for 1 hour , then drain and dry the base before stopping the G200 Generator.
- Managing an ice tank: the basis used to calculate the useful volume is: about 500 kg of fresh ice flakes for 1 m^3 storage.
- Over time, the ice quality deteriorates. For optimum ice quality, adjust ice production to match consumption.
- The ice tank must be emptied at least once a week, otherwise the ice might be difficult to remove with a risk of damaging the Geneglace ice machine due to ice going up in the generator.

5. G200 Generator transportation

The G200 Generator should be transported in secure packaging to its installation location.

The centre of gravity of the G200 Generator is offset from its base. It should be transported in its original packaging and remain bolted to the pallet until it is unpacked.

The location of the G200 Generator must be strong enough to support its weight.

6. Unpacking the G200 Generator

The G200 Generator is screwed to the pallet it comes with.

1. Remove the packing box from the G200 Generator
2. Loosen the screws on the covers of the G200 Generator base with a 10 mm spanner.

3. Once the screws are removed, remove the covers from the G200 Generator base and then unbolt the screws attached to the pallet with a 17mm spanner.

You can now remove the pallet from the generator.

7. Handling

The ice machine must only be handled by qualified personnel.

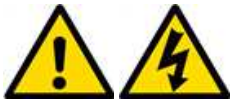
Toutes les précautions seront prises afin d'assurer la sécurité des personnes et d'éviter tout risque de chute et d'endommagement du G200 Generator pendant la manutention.

Lift the G200 Generatoronly with a hoist.

The dimensions and strength of the slings must be adapted to the load to be handled

Generator		Net weight
G200	ABF	510 kg (1 124 lb)
	SBF	460 kg (1 014 lb)

8. Installation G200 generator



Operations to be carried out in accordance with the recommendations given in chapter *"Safety instructions" (on page 9)*

Risk of freezing when the machine is stopped: protect the generator as indicated in chapter *"Physical limits of the G200 Generator" (on page 11)*

The installation site of the G200 Generator must be strong enough to support its weight.

8.1 Dimensions

Reserve sufficient access for servicing and maintenance of the ice machine.

SBF generator

*Values in millimetres

D1 = Minimum space required to dismantle the gear reducer.

D2 = Minimum space for dismantling the reamer.

ABF generator

*Values in millimetres

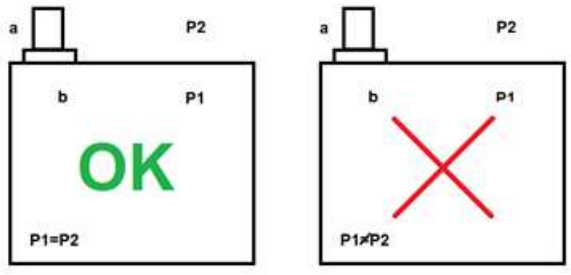
D1 = Minimum space required to dismantle the gear reducer.

D2 = Minimum space for dismantling the reamer.

8.2 Installing the G200 generator

Once you have chosen its location, you can install the generator.

1. When selecting the location of the G200 Generator, avoid pressure differences between the G200 Generator and the storage room.There must be no air circulation in the generator.



a=Generator room

b= Storage room

P1 =Storage room pressure

P2 = Generator room pressure

2. Place the generator on a flat, level surface, preferably on a coaming.
3. Place the generator in a non aggressive environment and protected from:

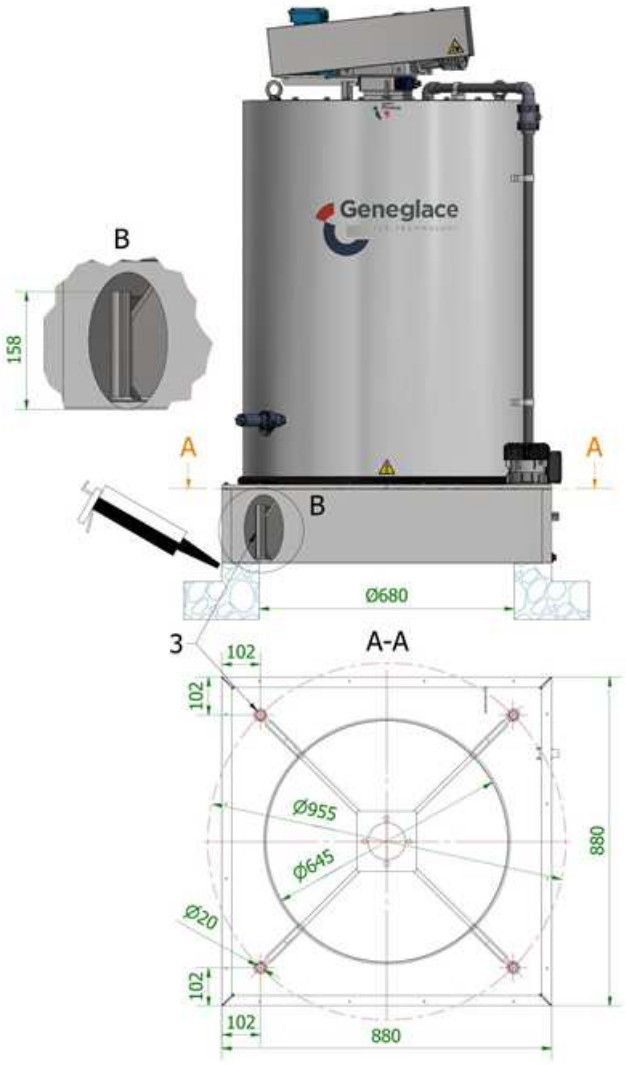
- bad weather,
- dust,
- splashes of water or any other liquid product.

4. Position the generator leaving sufficient access for servicing and maintenance (see *"Dimensions" (on page 24)* for the minimum servicing space).
5. Position the generator high enough to allow suitable storage for its daily ice production (e.g. cold room, static or orbital silo, etc.).
6. Do not locate the ice output in the air flow of an evaporator.
7. Do not reduce the cross-section of the generator ice output.

Remember to leave access above and below the machine to simplify all servicing and maintenance work on the generator

8.3 G200 attachments

1. The opening in the generator support must be at least equal to the ice chute diameter "**G**".



Ref. 1 = Seal around the hole.

Ref. 2 = Raised floor to avoid accidental ingress of water into the ice storage tank.

Ref 3 = Tubular fixing spacer. Qty 4.

8.4 Ice level security

If there is a risk of ice rising, install an ice level sensor.

For more information see *"Ice level detection" (on page 58)*

8.5 Ice level control

To use the highest quality ice, adjust the ice production as closely as possible to the ice consumption with an ice level control sensor.

For more information see *"Ice level detection" (on page 58)*

8.6 Installing the ice chute

After installing the generator, make sure that the ice chute is installed correctly.

Follow the instructions to install the chute correctly.

1. Make sure that the chute can be dismantled easily.
2. Choose a material which prevents the ice flakes from sticking. (PVC recommended)
3. Do not incline the chute more than 45°.
4. Do not reduce the cross-section of the generator ice output.
5. Make sure that there is an overflow space of at least 100 mm at the top of the chute to prevent the ice from going up in the generator.

8.7 Protecting the generator against freezing

- Upstream from the installation, protect the water supply against freezing.
- Downstream from the installation, protect the water evacuation against freezing.

For further information, refer to *"Physical limits of the G200 Generator" (on page 11)*

9. Connecting the G200 Generator generator

Operations to be carried out in accordance with the recommendations given in chapter *"Safety instructions" (on page 9)*

9.1 Hydraulic connections

9.1.1 Hydraulic characteristics

G200 Generator

Hydraulic connections

Ref.	Designation	Qty.	Connections		
			Dimensions	Type	Material
A	Water supply	1	1/2 " gaz	Threaded	
B	Overflow	1	22x1 mm	Smooth tube	Stainless steel
C	Draining	1	1/2 " gaz	Tapped	Stainless steel

9.1.2 Connecting the water supply

To avoid malfunctions of your ice machine, remember to install the following devices:

- Water pressure control
- Water filtration or purification
- Protection against loss of water or water supply

1. Install water filtration or purification devices.

   Filtering the water supply can reduce the rate of impurities deposited in the Geneglace ice generator, but not scale build-up.
2. Install a water treatment system when the water hardness exceeds the recommended limits *"Physical limits of the G200 Generator" (on page 11)*
3. Make sure that the water supply pressure complies with the recommended values *"Physical limits of the G200 Generator" (on page 11)*
4. Check that the water flow rate is always constant and greater than that required for ice production.
5. Install a flexible tube to connect the water supply.

The water consumption of your Geneglace ice machine is equal to its ice production.

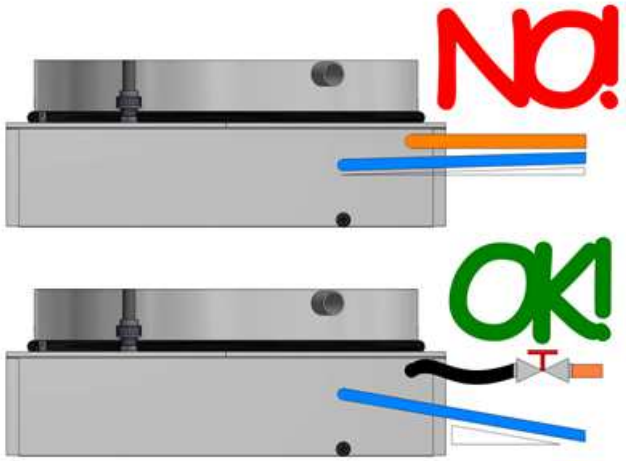
Plan a valve on the water supply to simplify the maintenance operations.

9.1.3 Connecting the overflow

If the float valve malfunctions, excess water is evacuated via the overflow.

The overflow prevents water from overflowing through the ice chute evacuates water from the base.

1. The overflow water must be sent down the drains, as stipulated by regulations.
2. The evacuation pipe must have no rising section which could prevent the natural flow of water.
3. The slope of the evacuation pipe must be sufficient to allow the natural flow of water.



9.1.4 Prevention measures for hydraulic connections

Risks	solutions
Risk of frost upstream and downstream from the machine installation	Fit the water supply and evacuation pipes with devices protecting them against freezing.
The supply water is too hard	Install a water treatment system
The water flow rate is not constant and remains less than the generator water consumption rate.	Install a pump with a tank.

A water meter can be installed to monitor the machine ice production

9.2 Electrical connection

In all the following cases, do not forget to connect the earth terminal.

9.2.1 Electrical characteristics

The cross-section of the electrical supply cable must be suitable for the installed power of the machine (see Maker's plate).

Electrical power supply:

The type of electricity supply is indicated on the maker's plate attached to the generator.

Make sure that the electricity supply of the Geneglace ice machine complies with applicable regulations and the following characteristics:

- Voltage (Volts)
- Frequency (Hz)

- Installed power (kVA)
- Nominal current (A)An electrical box ensures the control and operation of the G200 Generator. The electrical box respects the electrical sequences recommended by Geneglace *"Diagramme de fonctionnement" (Page 1)*.

Electrical cabinet:

An electrical box is required to monitor the operation of the generator.

It must respect:

- The electrical sequences recommended by Geneglace, refer to *"Operating diagram" (on page 36)*.
- The applicable regulations.

Geneglace proposes an electrical box on option (refer to *"PGS_2.1 Electrical panel" (on page 55)*

An electrical box ensures the control and operation of the G200 Generator. The electrical box respects the electrical sequences recommended by Geneglace *"Diagramme de fonctionnement" (Page 1)*.

Electrical protection device

he electrical protection devices in compliance with applicable standards must protect all the machine actuators.

Generator SBF

Generator ABF

9. Connecting the G200 Generator generator

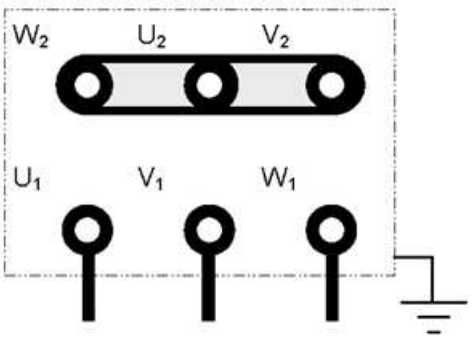
Ref.	Designation	Qty.	Electrical power supply	Nominal power	Nominal current	Contact
F1	Scraper motor	1	400V-3-50Hz	250 W	0,95 A	-
			460V-3-60Hz	370 W	1,3 A	-
			575V-3-60HZ	370 W	0,91 A	-
F2	Water pump	1	230V-1-50Hz	40 W	0,3 A	-
F3	Torque limiter	1	-	-	-	1 NC/1 NO
F4	Emergency stop for torque limiter	1	-	-	-	1 NC/1 NO
F5	Solenoid valve*	1	220-230V-1-50Hz	17 W	0,1 A	-
			220-230V-1-60Hz	14 W	0,1 A	-
			115V-1-60Hz	10 W	0,1 A	-
F6	Liquid level controller*	1	(dc) U= 20 - 60V	-	I< 6 mA	1 NC/1 NO
F7	Salt Dosing Pump (Option)	1	120-240V - 1 - 50/60HZ	15 W	0,1/0,2 A	-
PE	Equipotential earth bonding socket	1	-	-	-	-

*Delivered only in ABF version

9.2.2 Three-phase electric motor

In case of three-phase power supply, make the correct coupling according to the characteristics of the electricity source.

400 V three-phase coupling to be made



If all the moving parts do not rotate in the direction indicated by the arrow on the top, then reverse the connection of the two-phase supply.

9.2.3 Water pump

The water pump runs on 230 V single-phase and is already fitted with a cable.

Respect the colours of the cable conductors.

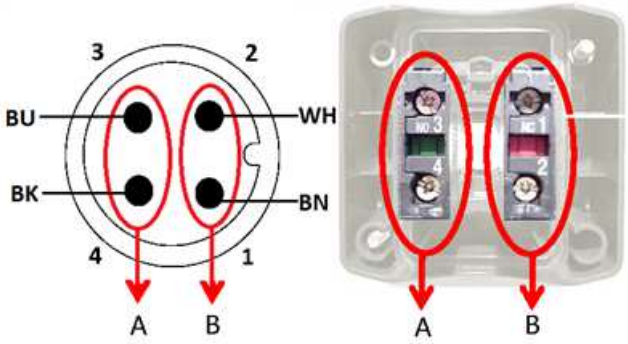
- Neutral (blue)
- Phase (brown)
- Earth (green/yellow)

9.2.4 Torque limiter contact

9.2.4.1 Generator G200

The torque limiter consists of two parts:

- a mechanical torque limiter
- an emergency stop allowing the scraper motor to be switched off manually and immediately



A: Fault indication

B: Action on the safety chain

BU: Blue

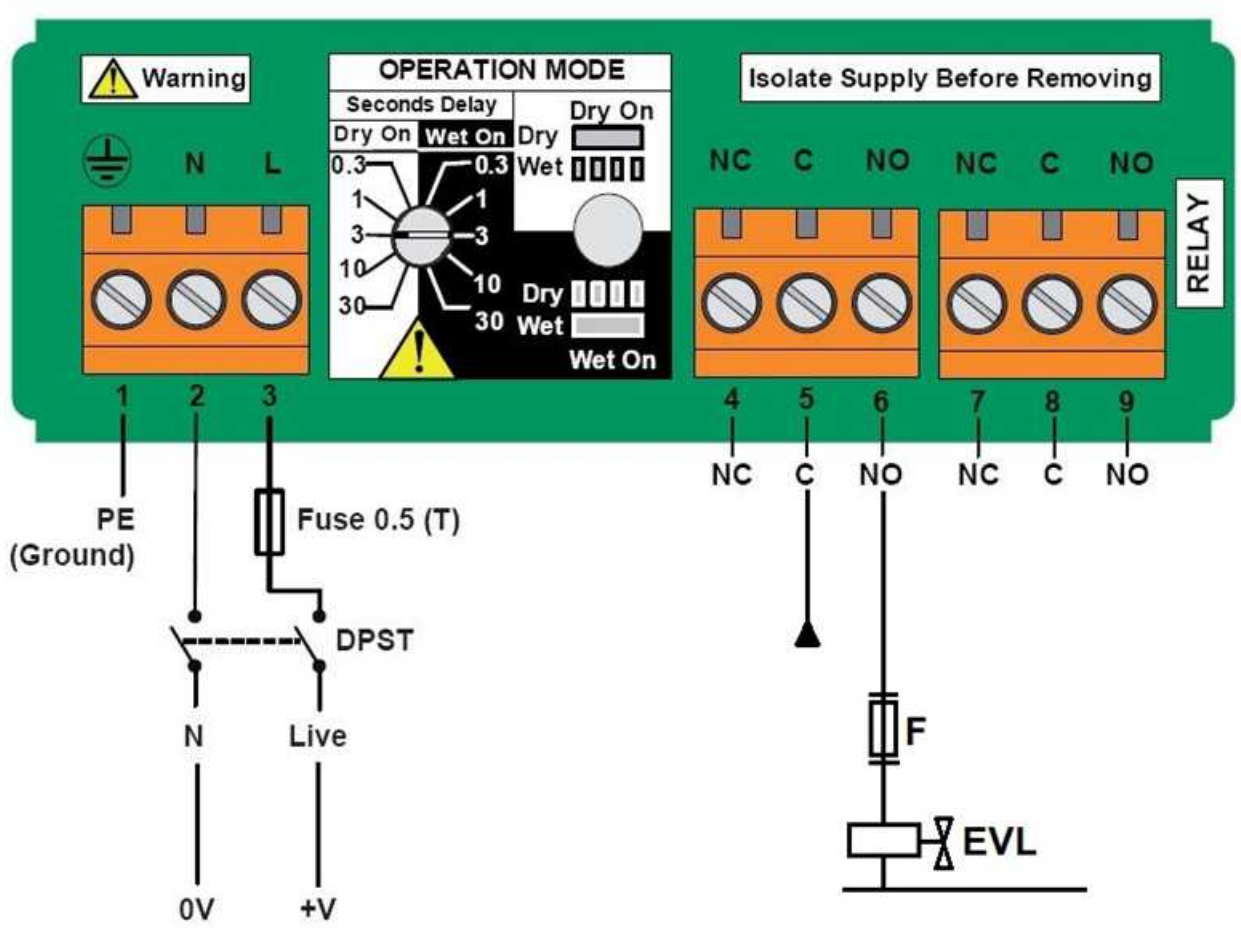
BK: Black

WH: White

BN: Brown

9.2.5 Liquid level controller for ABF generator

9.2.5.1 Vibrating level switch version



9.2.6 Solenoid valve for ABF generator

Ref	Designation
1	Earth
2	Phase
3	Neutral

9.2.7 Operating diagram

9.2.7.1 General Information

Automatic restarting is PROHIBITED after resetting a safety device.

The electrical sequences must be adapted to the type of installation.

Safe tripping of the torque limiter,, the torque limiter emergency stop or the scraper motor circuit breaker must simultaneously:

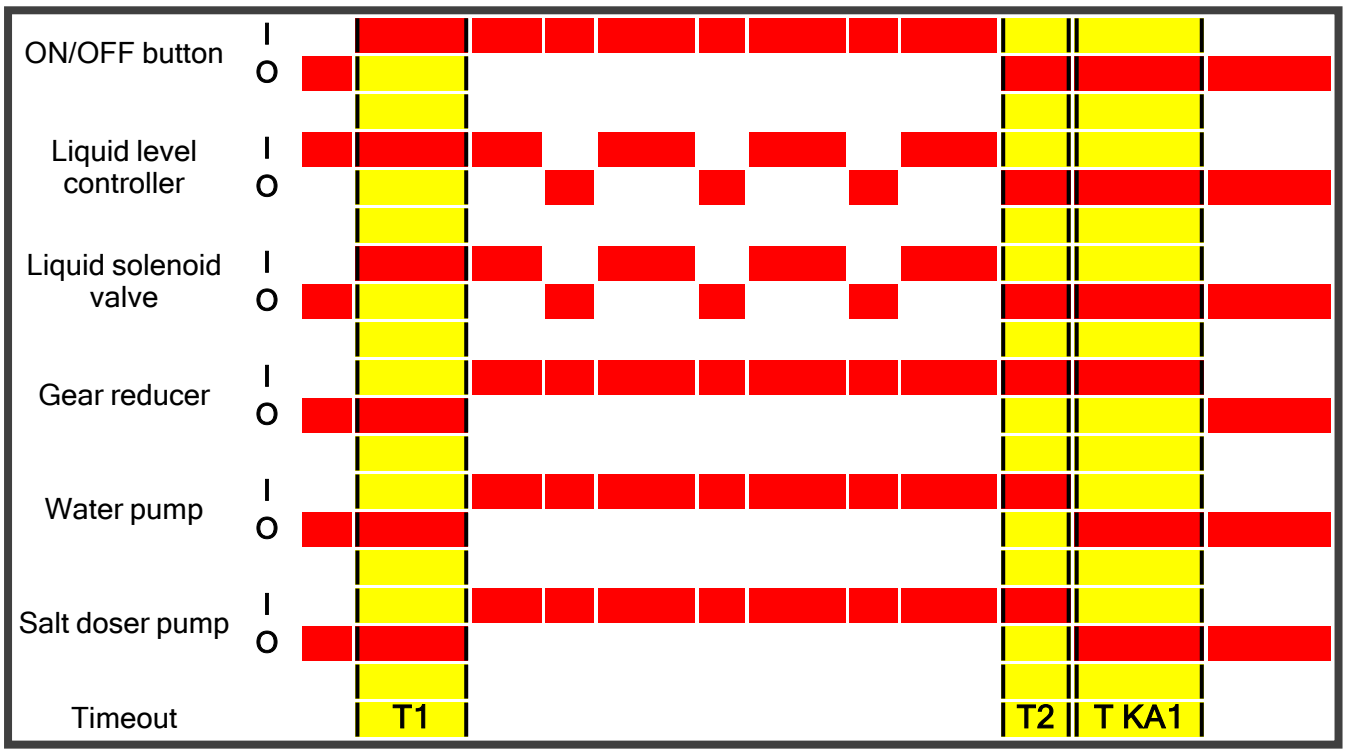
- Stop the water pump
- Stop the scraper motor
- Close the liquid solenoid valve
- Stop the generator condensation unit if one is connected
- Stop the salt doser pump (option)

To preserve your machine, install an anti-short cycle

To simplify the maintenance operations, install manual operation switches inside the electrical cabinet for the scraper motor, water pump and salt doser pump .

Timeout	Description	Duration
Timeout T1	Time required to clean the cylinder after stopping the generator	180 s
Timeout T2	For , R744 the Pump Down must be set between:	15s and 30s
Timeout T.KA1	Time required to clean the cylinder after stopping the generator	180s

9.2.7.2 Generator connected to a refrigeration unit



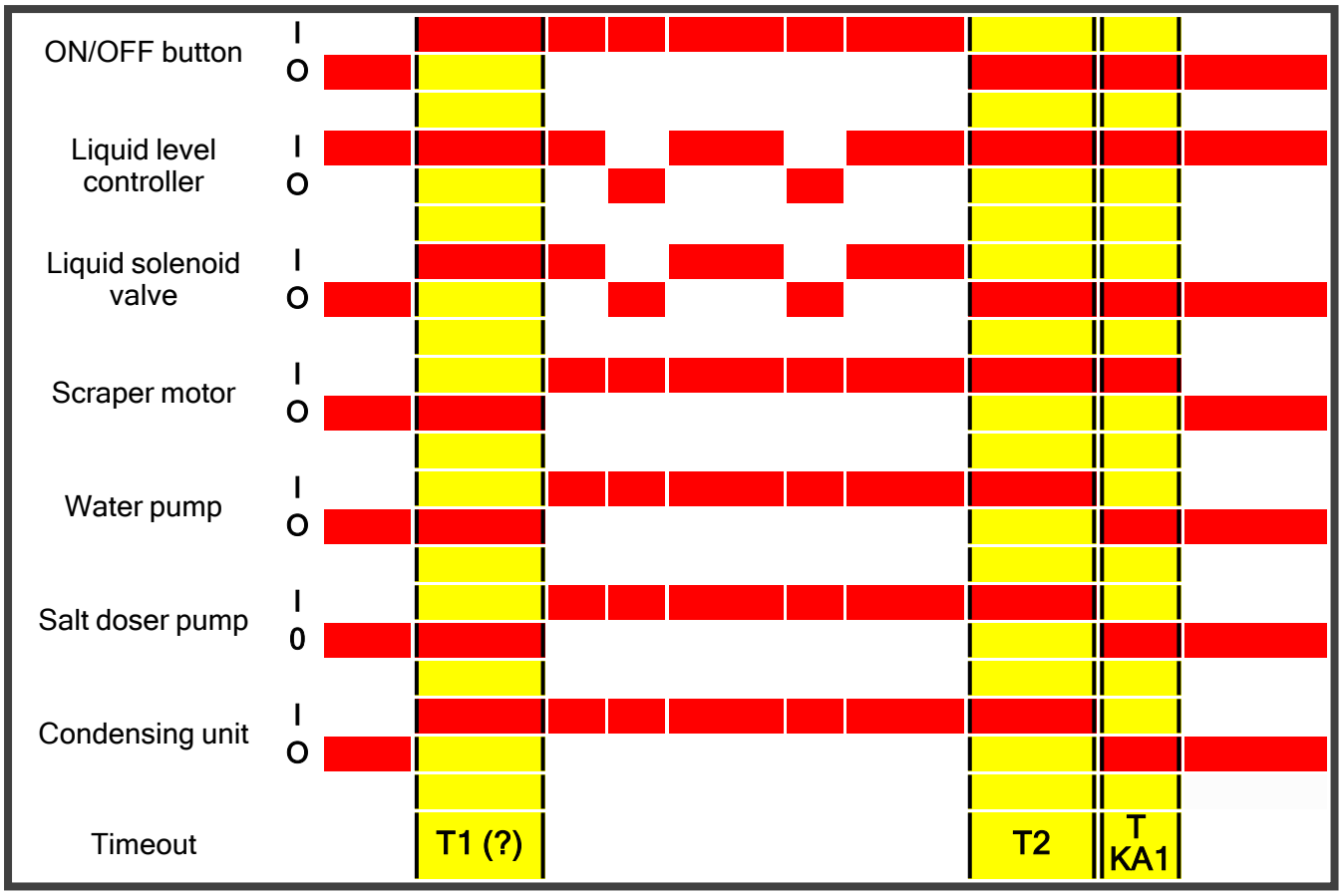
9.2.7.3 Generator connected to a condensation unit

When the ice machine is switched on, the following items start at the same time:

- The compressor,
- The liquid supply solenoid valve,
- The water pump,
- The gear reducer.
- Salt Dosing Pump

If the condensing unit is outside or far from the generator, it may be necessary to set a delay in starting the gear motor and the water pump. This delay ensures that at least 3/4 of the height of the generator is filled with fluid at start-up.

T1 with a question mark (?) indicates that it does not always have to be installed if the condensation unit is close to the generator.



9.2.7.4 Automatic starting and stopping

For an automatic start and stop, a first request for start must be made by pressing the start push button on the PLC.

Redo a request if the G200 Generator has been switched off.

Ice production can be controlled by a clock. The operating time is estimated according to the possible capacity of the ice tank (approx. 500 kg/m³) and the hourly production rate of the machine.

To control the height of ice in the storage tank, it is recommended to install infrared or laser distance sensors.

To prevent ice production from accidentally stopping or starting, we recommend installing a timeout to acquire the signal from the sensor.

If the ice level detection or the clock cut out, the machine stops automatically according to the standard procedure

If the ice level detection or the clock cut in, the machine starts automatically according to the standard procedure

Refer to *"Recommended operations" (on page 19)*

9.2.7.5 Ice high level safety device

To prevent ice from going up in the generator, install electromechanical level control devices (paddle driven by micro-motor).

If the ice high level detection safety device opens (ice level control probably faulty), when it closes again you must restart the installation manually.

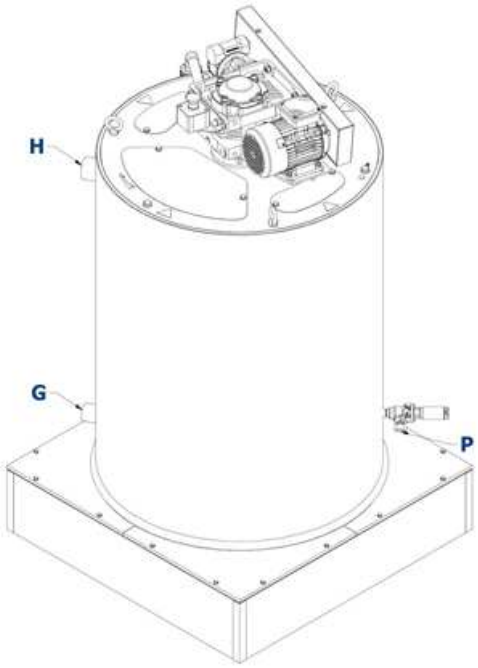
9.3 Cooling connections

Every precaution will be taken to ensure that the refrigeration piping complies with professional standards: clean, favouring the return of oil to the compressor...

See *"Pressure equipment safety" (on page 15)*.

9.3.1 Cooling characteristics

G200 Generator SBF

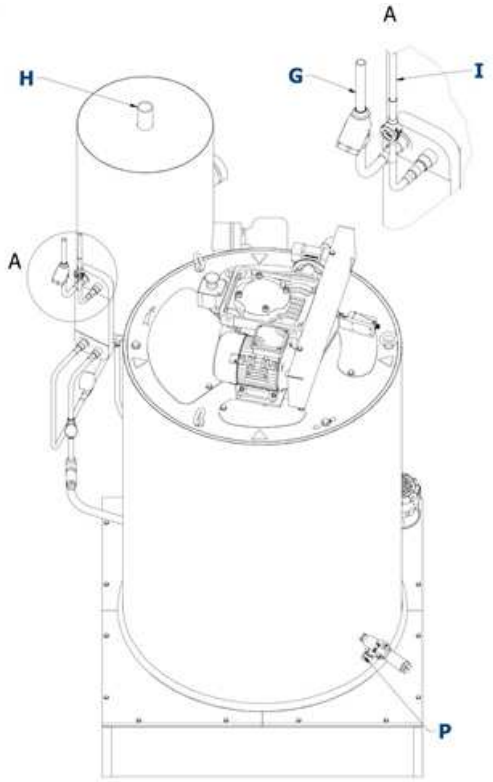


Cooling connections

Ref.	Designation	Qty.	Connections	
G	Liquid supply	1	Dimensions (mm)	42,4x3,2 mm
			Type	Smooth tube
			Material	Steel
H	Suction	1	Dimensions (mm)	42,4x3,2 mm
			Type	Smooth tube
			Material	Steel
P	Oil purge	1	Dimensions	1/2"
			Type	O.D.M.-G
			Material	Steel

9. Connecting the G200 Generator generator

G200 GeneratorABF



Ref.	Designation	Qty.	Connections	
G	Liquid supply	1	Dimensions (mm)	1/2"
			Type	O.D.F
			Material	Copper
H	Suction	1	Dimensions (mm)	42,3x3,6 mm
			Type	Smooth tube
			Material	Steel
I	Oil return	1	Dimensions (mm)	3/8"
			Type	O.D.F
			Material	Copper
P	Oil purge	1	Dimensions (mm)	1/2"
			Type	O.D.M.-G
			Material	Steel

9.3.2 Cooling diagram

For the Maximum Allowable Operating Pressure (PS) refer to chapter *"Permissible limits of pressure equipment" (on page 16)*, and to the manufacturer's identification plate on the generator.

Provide adequate safety systems to prevent pressure rises above the Maximum Allowable Working Pressure (PS), according to the regulations in force.

If the generator is likely to be isolated from the rest of the cooling circuit by isolation valves:

- It is essential to install a safety valve to protect the generator.
- The generator must be systematically drained each time before closing these valves.

When incorporating the G200 Generator into the rest of the refrigeration circuit, a pressure resistance and leakage test shall be carried out at a PT value **less than or equal** to the factory applied PT test pressure by Geneglace. This value is indicated on the generator nameplate in chapter *"Identification" (on page 3)*

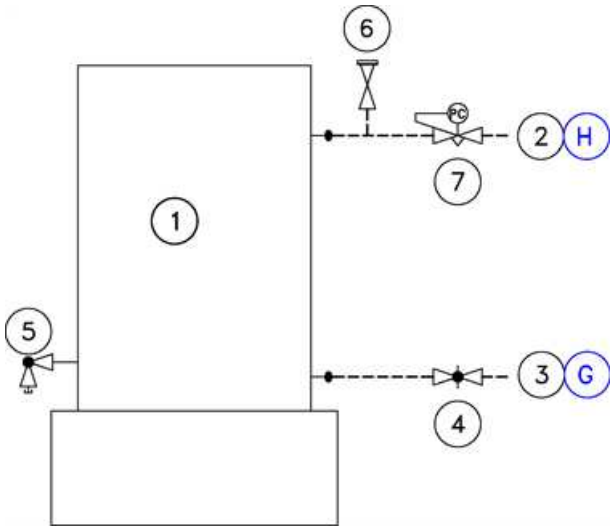
9.3.2.1 G200 GeneratorSBF

The G200 GeneratorSBF is intended to be connected to a refrigeration system already fitted with a low pressure tank. It is designed to be installed on centralised refrigeration systems with recirculation. If the evaporation temperature of the centralised system is less than the temperature indicated for the generator, a constant pressure valve must be installed to obtain the suction pressure required for the generator.

Refrigerant supply to the generator is achieved by adjusting the rate of fluid recirculation in the cylinder.

Trec = Qm(fl) / Qm(fl.evap)
Trec : Recirculation rate
Qm(fl) :Mass flow rate of fluid flowing through the generator
Qm(fl.évap) : Evaporated fluid mass flow rate in the generator

- The recirculation rate must be between 3 and 4 (between 4 and 5 for refrigerant R717).
- The mass of refrigerant circulating in the generator must be greater than the mass evaporated in the generator.
- The refrigerant flow control valve (not supplied) is used to adjust the recirculation flow rate and to balance pressure drops in pump-fed multi-evaporator refrigeration circuits.



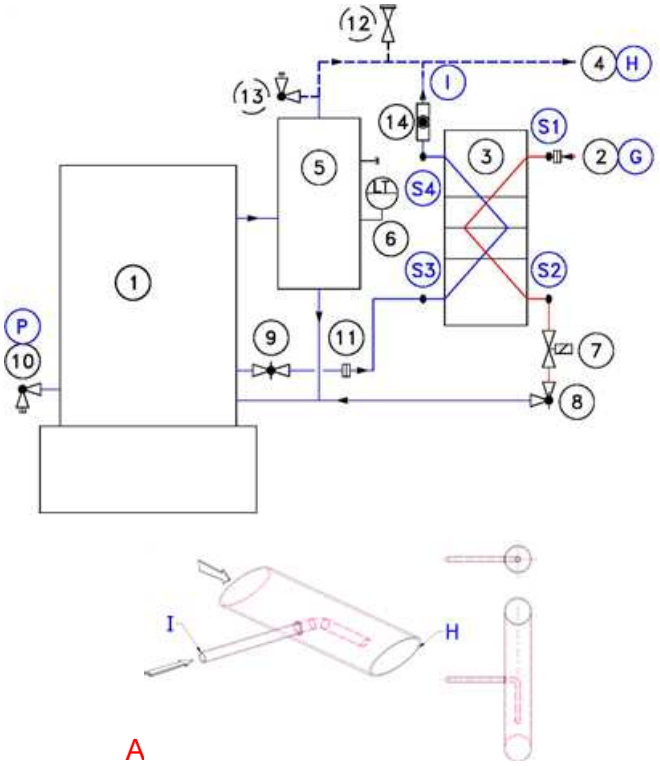
1. Generator
2. Suction
3. LP liquid supply
4. Adjuster (not supplied)
5. Oil purge
6. LP valve (not supplied)
7. Constant pressure valve (not supplied)

Connections (not supplied)

9.3.2.2 Generator with exchanger

The G200 GeneratorABF is intended to be connected to a refrigeration system supplying the generator with HP liquid.

Cooling diagram G200 ABF



- 1. Generator
- 2. HP liquid supply + filters
- 3. Oil return exchangers
- 4. Suction
- 5. Flood bottle
- 6. Liquid level controller
- 7. Solenoid valve
- 8. HP Liquid Manual Regulator
- 9. Manual oil return regulator
- 10. Oil drain
- 11. Filters
- 12. Safety valve (not supplied)
- 13. Pressure test (not supplied)
- 14. Indicator light

Connections (not supplied)

9.3.3 Oil return system

For the oil return system to be operational, the temperature of the high pressure liquid at the generator inlet must be above 0°C.

The oil return system consists of a heat exchanger and a manual adjuster.

1. In established operation, make sure that there is sufficient oil flow through the oil return line
2. Use the manual adjuster to control the fluid flow rate.

It is possible that an operating problem could reduce the oil return and accumulate in the generator.

It is possible to remove the oil that accumulates in the generator through the drain located on the cylinder during an oil return problem.

9.3.4 Liquid and suction lines

Every precaution will be taken to ensure that the refrigeration piping complies with professional standards: clean, favouring the return of oil to the compressor...

1. Align the liquid and suction pipe connections at the same level at the generator or heat exchanger connections

   Incorrect alignment could cause the pipes to crack and/or break.

2. The pipes must be fixed at regular intervals. These fixings must rest on a mounting which prevents the pipes from moving and absorbs vibrations.

   For safety reasons, do not use the pipes as a step or support for other equipment.

3. For the suction line, make sure that the pressure drop between the generator and the compressor is as low as possible (to be taken into account for calculations).

9.3.5 Compressor

The refrigeration compressor must be fitted with a casing resistor.

9.3.6 Oil separator

An oil separator must be installed to prevent compressor oil from getting into the cooling circuit components.

This is carried out to:

- Maintain a low concentration of oil and therefore ensure optimum heat transfer coefficient.
- Eliminate risks of abnormal mechanical wear of the compressor due to insufficient oil in the casing.
- Reduce the pressure drop in the pipes of the installation.

An oil separator must be selected according to professional standards.

The oil concentration to reach after the separator must be 50 ppm maximum.

9.3.7 Generator and refrigeration unit located at the same level

For the pipe diameters, refer to tables *"Dimensions" (on page 24)* and *"Connecting the G200 Generator generator" (on page 29)*.

The stated pipe diameters can be kept for a maximum developed length of 6m (236 inch) . The performance may drop in this case.

9.3.8 Generator and refrigeration unit located at different levels

If the compressor and the generator are located at different levels, take care when connecting the pipes.

9.3.8.1 Suction line

The piping must avoid any oil retention

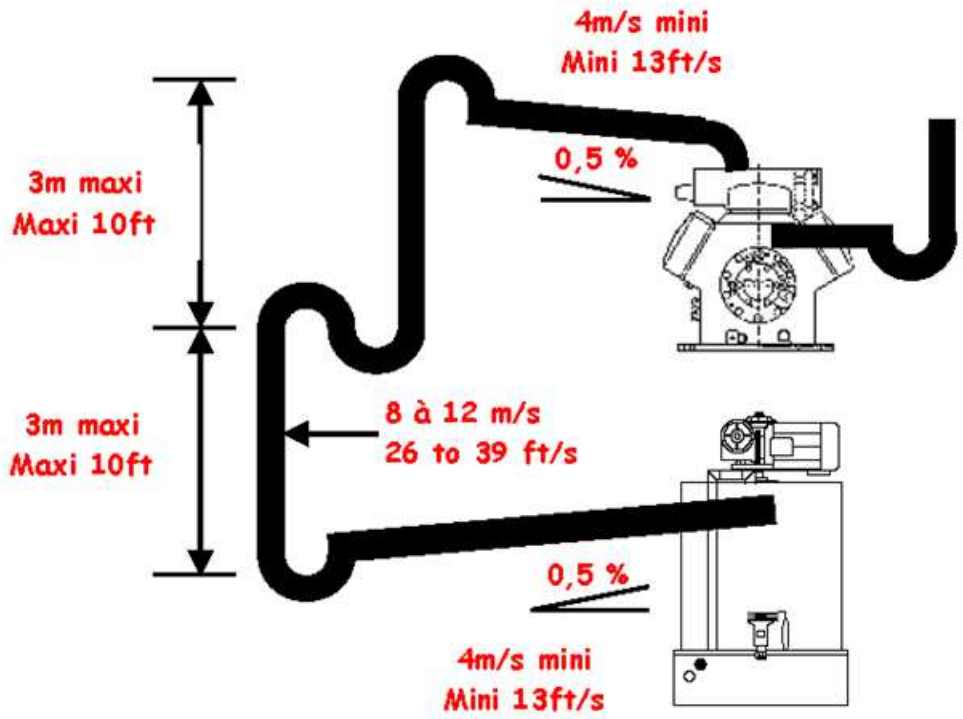
The suction piping must slope downwards towards the compressor.

To facilitate technical interventions, it is advisable to install a pressure test connection on the suction pipe at the generator outlet.

If the suction piping rises, then:

1. Install an oil trap at the evaporator outlet.
2. Install a trap every two or three metres (79 to 118 inches) of rising piping.
3. For the suction piping sloping downwards towards the compressor, place an inverted trap at the top end to prevent any oil return.
4. If the suction piping is very long after a section of rising piping designed to guarantee correct oil return, go back to a larger cross-section to minimise the head losses.
5. Insulate the suction and liquid piping in accordance with best practices:
    - Minimum thickness 13 mm (0,5 inch), to be adapted according to ambient conditions
    - Water vapour must not be allowed to migrate through the insulation to prevent rotting of the insulation and corrosion of the tube. (e.g. use of grease tape).

Note that all local safety standards and regulations, such as European standard EN378, must be taken into consideration during the design, assembly and commissioning of the system.



9.3.8.2 Liquid line

1. Any gas trap, any section of piping in an inverted "U" must be avoided to prevent interruption of the liquid flow.
2. Where the difference in level is greater than approximately 5m (197 inches):
    - it is recommended to increase the diameter of the liquid piping.
    - Reconsider the selection of the expansion valve, taking into account the **pressure upstream** from the pressure reducer.

9.3.9 Assembly on refrigeration unit

Minimum refrigeration equipment to be provided by the installer:

- Safety valve according to local regulations.
- Constant pressure valve with manometric plug **if necessary**.

Option: a safety level controller can be installed on the flood bottle

Electrical equipment to be provided by the installer: refer to chapter: *"Operating diagram" (on page 36)*

10. Operating conditions

Do not operate the generator outside the operating ranges specified by Geneglace SAS. See

The stated production values are given for an oil-free cylinder.

For the production values and speeds not indicated, contact Geneglace SAS for a more precise definition.

Before using any coolant other than those indicated in this manual, contact Geneglace SAS.

Geneglace SAS reserves the right to make any modifications or improvements to the data in this chapter without prior notice.

10.1 Generator G200 with refrigerant R744 (CO^2)

Generator **G200 ABF** with refrigerant R744 (CO^2)

Characteristics	Units	
Approx. load (ABF)	kg	*"Permissible limits of pressure equipment" (on page 16)*
Water to be frozen	°C	15
	°F	59
Production	T /24h	7
	UST/24h	7.7
Cooling capacity	KW	35
	BTU/h	119425
Condensation temp. (ABF)		
Max.: (Liquid hammer)	°C	15
	°F	59
Frequency	**Hz**	**50**
Speed of rotation	tr/h	93
Thickness of ice flakes	mm	2,2
	inch	0.08
Evaporation temperature at the generator	°C	-23
	°F	-9.4
Frequency	**Hz**	**60**
Speed of rotation	tr/h	113
Thickness of ice flakes	mm	1,9
	inch	0.07
Evaporation temperature at the generator	°C	-21
	°F	-5.8

Generator **G200 SBF** with refrigerant R744 (CO^2)

Characteristics	Units	
Approx. load. (SBF)	kg	*"Permissible limits of pressure equipment" (on page 16)*
Water to be frozen	°C	15
	°F	59
Production	T /24h	7
	UST/24h	7.7
Cooling capacity	KW	35
	BTU/h	119425
Frequency	**Hz**	**50**
Speed of rotation	tr/h	93
Thickness of ice flakes	mm	2,2
	inch	0.08
Evaporation temperature at the generator	°C	-23
	°F	-9.4
Frequency	**Hz**	**60**
Speed of rotation	tr/h	113
Thickness of ice flakes	mm	1,9
	inch	0.07
Evaporation temperature at the generator	°C	-21
	°F	-5.8

10. Operating conditions

11. Addition of salt

11.1 General Information

The operation of a flake ice machine is improved by adding sodium chloride to the water to be frozen.

Salt addition function:

- Delays scaling if hard water is used.
- Produces larger flakes with less broken flakes or "snow".
- Makes it easier to scrape off the ice and minimises the forces produced by reaction on the gear reducer.
- Helps to rebalance the supply water if soft water is used.

Overall, the result is large ice flakes and more "flexible" operation.

Adding salt:

- The standard doser using tablets calibrated to diameter 25mm (0.98 inch), used in softeners for resin regeneration.

- The doser pump using salt dissolved in water in PVC tanks.

The quantity of salt consumed:

- 100 g of salt per ton of ice, usual quantity, to be corrected according to the characteristics of the water

The ice quality:

- The presence of very small ice flakes indicates a lack of salt, often a sign of soft water.
- The presence of very large ice flakes which can break off before the reamer goes past is a sign that there is too much salt.

11.2 Salt doser tube

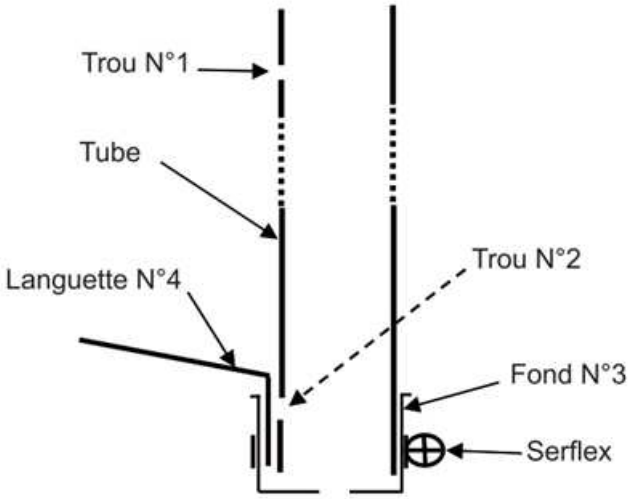
The salt doser tube is the salt addition system mounted in series, if you did not order the salt doser pump option.

The salt doser tube is attached to the generator cylinder by two collars.

1. It consists of a rigid transparent tube closed at its bottom by a drilled plug held by a collar.
2. A small metal tab collects the water trickling through the bottom of the cylinder, to guide it to the doser tube.
3. The water collected flows between the tube and its plug.
4. The water comes into contact with the salt tablets.
5. This method generates a drip of salted water through the hole of bottom **No. 3**.
6. The doser tube is installed in a corner of the base and positioned so that the bottom **No. 3** is 125mm (4.9 inch) from the bottom of the base and so that the tab is directed towards the central shaft of the generator.
7. Hole **No. 1** fits on the head of the screw of the top collar.

Raise the bottom **No. 3** or reduce the inclination of the tab No. 4 to reduce the salt consumption (and vice versa).

The salt doser tube of the G200 is equipped with a hole in front of the tab, uncover it to increase the consumption of water. (and vice versa).



Precautions required when using these systems:

- The tablets used in standard dosers must be perfectly cylindrical with at rounded ends so that they do not jam in the vertical tube.
- The tube must remain vertical after being filled.
- Adjusting the flow rate requires great care.
- The bottom of the doser must be cleaned every month to maintain correct operation.

11.3 Salt doser pump

Refer to the salt doser pump manual - *02 933 070* included with the salt doser pump.

The doser pump must operate during ice production.

The electrical characteristics are as follows:

- Power supply 100÷240 Vac - 50/60 Hz - 15 W
- Flow rate range: (0.1 % to 100%)x 2 L/h.
- IP65
- Fuse 1.6 A (20 W).

12. Options

The options concern all the peripherals of the ice machine related directly to its operation, proposed by Geneglace SAS.

12.1 PGS_2.1 Electrical panel

Refer to the *PGS2.1* electrical panel manual supplied with the electrical box

As standard, the box is designed for a three-phase + neutral power supply.

This manual describes the operation of the Electrical Panel PGS_2.1 + CIP from the PGS V6 program of the PLC. (See electrical diagram in the Electrical Panel PGS_2.1 + CIP)

The Electrical Panel PGS_2.1 + CIP is used to control the generator electrical operating sequences Geneglace.

The Electrical Panel PGS_2.1 + CIP can be used in the following configurations:

- A refrigeration unit supplying several direct expansion evaporators, including the generator Geneglace.
- A refrigeration unit supplying several forced recirculation evaporators, including the generator Geneglace.
- A refrigeration unit dedicated to the generator Geneglace.
- A cascade refrigeration supply for the generator Geneglace.

Code Article	Description
02 500 094	OPTION CIP/400 V-3-50Hz

12.2 Remote control

Option article code: 02 534 003

12.2.1 Use

The remote control option is a box used to start and stop ice production remotely.

The remote control option is mainly used when the electrical box is not easy to access.

The remote control option is consists of:

- An On button
- An Off button
- A green On indicator light
- A red fault indicator light
- An emergency stop button

The remote control box must be connected electrically to the generator box alone.

12.2.2 Weekly programmable clock

The clock programming manual is provided in the remote control box together with the wiring diagram.

Using a weekly programmable clock, the remote control option can be used to postpone the ice production.

The clock is a digital time switch controlled by a microprocessor.

12.2.3 Assembly

The remote control box must be installed in a place that is easy to access by the generator operator.

12.2.4 Connection

The remote control box must be connected to the generator electrical box according to the wiring diagram supplied in the Electrical Panel G200 Generator .

12.3 Ice level detection

Ice level detection is used to :

- To secure the ice production from a rise of ice in the generator
- Regulate the height of the ice in the ice storage.

Geneglace offers:

- To secure ice production:
  - An infrared sensor detector.
- To control the height of the ice in the storage:
  - An infrared sensor detector.
  - An ice level indicator with high and low level control

12.3.1 Ice level detector with infrared sensor.

12.3.1.1 Safety and control detection characteristics.

If the infrared sensor dedicated to the control is not supplied, consult Geneglace. Example: installation with another ice control system.

For the ice level detection option with ice production, Geneglace provides :

- 1 Infrared sensor for security level
- 1 Infrared sensor for the control level
- 1 Support for 2 detectors per infrared sensor.

The infrared sensor for the security level and the infrared sensor for the control level are identical.

Code Article	Quantity	Characteristics
OGDDNB	2	Infrared sensor 10-30 V DC IP67
	1	Ice level sensor support

12.3.1.2 Operating principle of the infrared safety sensor

Automatism to be realized if electric box not supplied by Geneglace SAS.

1. The infrared security sensor is directed horizontally towards the ice outlet of the generator and monitors the presence of ice in this area.
2. The infrared security sensor allows to secure the ice production from ice rising in the generator.
3. When ice is detected in the area and after an adjustable timeout, the infrared security sensor triggers the contact to stop the ice production in ice level security.
4. If the ice level in the ice storage system decreases and the infrared security sensor no longer detects the presence of ice at the generator outlet, the system does not restart automatically. The security shutdown information for ice level remains active.
5. Adjustable timeout prevent the contact from being triggered by a single ice chip passing the detector.

12.3.1.3 Operating principle of the infrared ice level control sensor

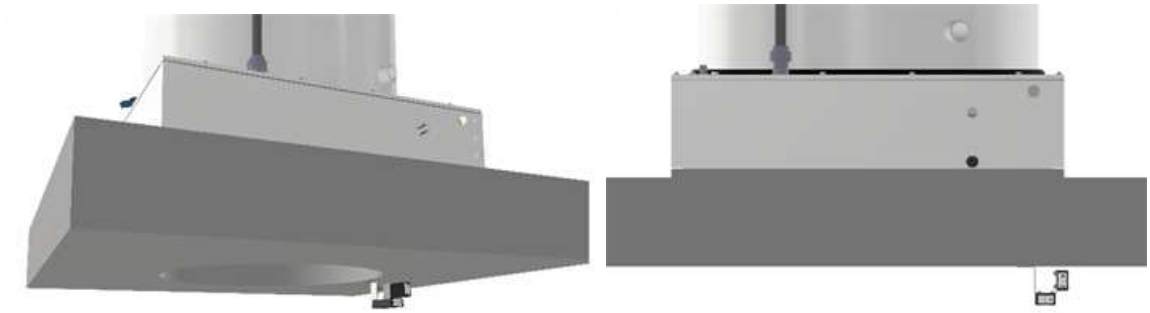
Automatism to be realized if electric box not supplied by Geneglace SAS.

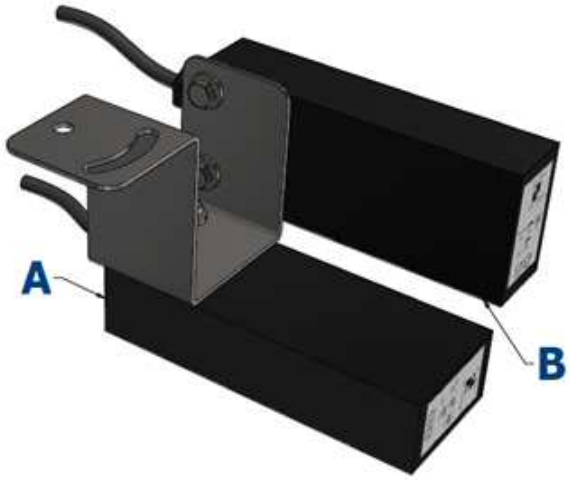
1. The infrared level control sensor is directed towards an ice heap and measures the distance between the top of the ice heap and the infrared area.
2. The infrared level control sensor is used to set a cut-off level which corresponds to the height of ice required in the storage tank.
3. Once the ice height has been reached and after an adjustable timeout, the infrared level control sensor closes the contact requesting ice production to stop.
4. When the height of ice in the storage tank drops below the cut-off level set, after an adjustable timeout, the infrared ice control sensor closes the contact requesting ice production to start.
5. The adjustable timeouts prevent the contact from closing if a single ice flake goes in front of the infrared level control sensor.

12.3.1.4 Installation of the infrared sensors

1. The infrared sensors are installed on the same support.
2. The infrared detection area must be directed horizontally towards the ice generator outlet for the security infrared sensor and vertically towards the ice slope for the level control infrared sensor.
3. When selecting the position of the infrared sensors, take into account the angle of slope formed by the flake ice in the ice storage.

4. Position the infrared sensors to avoid ice rising in the ice generator cylinder.
5. The infrared sensors should not be placed directly in the ice fall but as close as possible to the ice fall and protected from the falling flakes.
6. The infrared level control sensors must be installed inside the ice storage.
7. Make sure that the cables of the infrared control sensors pass through the wall and that there is no water on the sensors.

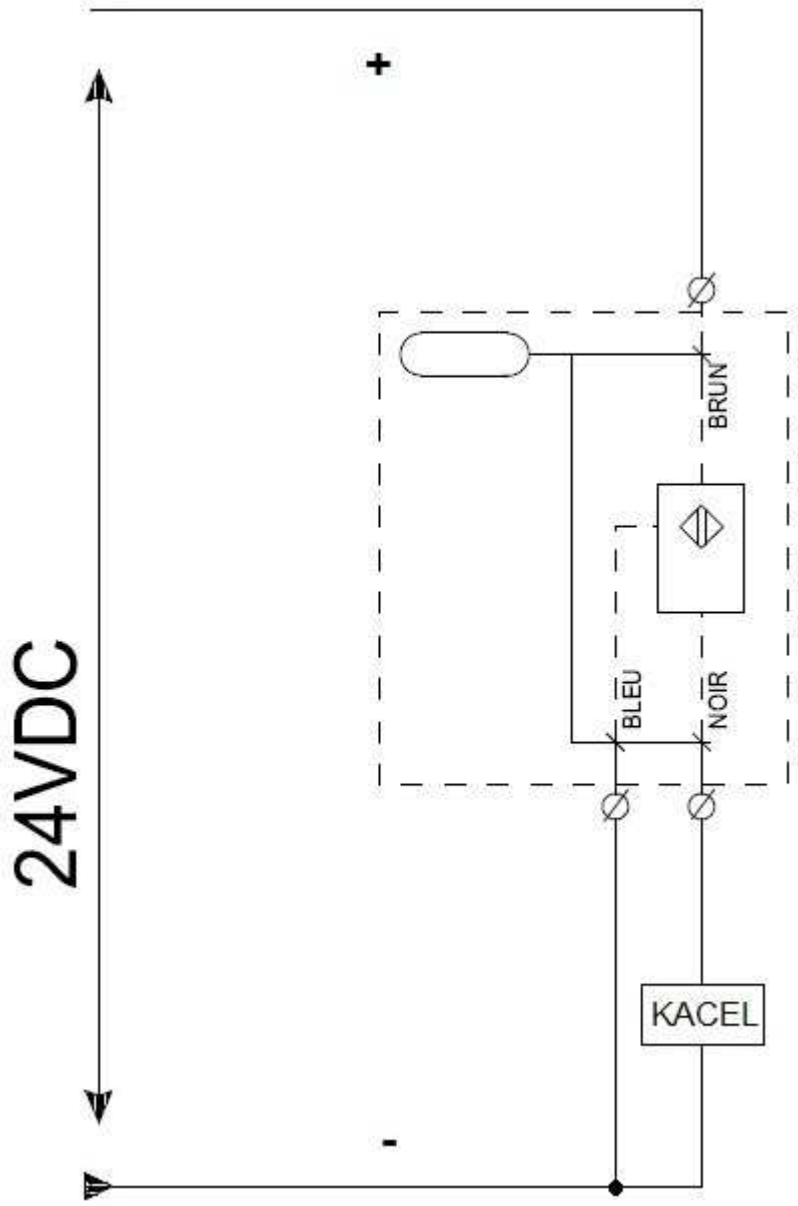




A: Infrared sensor for safety level

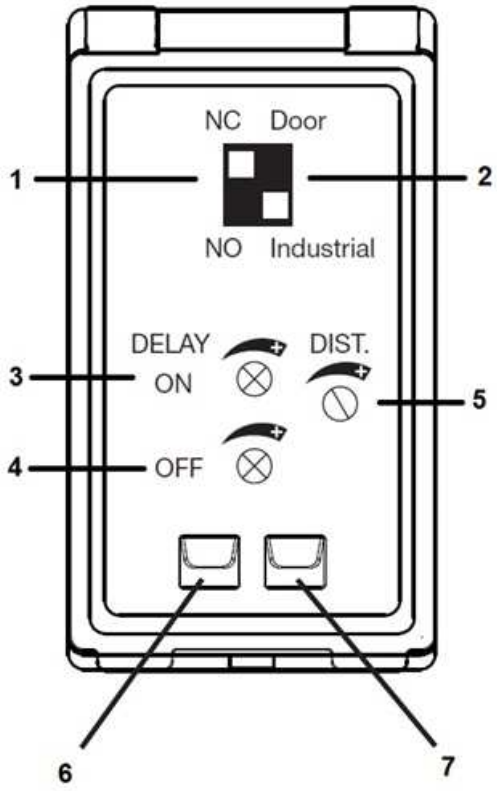
B: Infrared sensor for the control level

12.3.1.5 Connection



KACEL= Cell relay (not supplied)

12.3.1.6 Adjustment of the infrared control sensor



1. Contact type (**NC** or **NO**)
2. Detector moder (**Door** or **Industrial**)
3. Output timeout **ON**
4. Output timeout **OFF**
5. Distance adjustment
6. Output indicator light
7. Power supply indicator light

1. Switch on the infrared sensor detector, the power supply indicator light (**7**) comes on.
2. Set the contact type (**1**)
3. Set the detector mode (**2**) to **Industrial**.
4. Set the output timeouts **ON** (**3**) to maximum (16 seconds).
5. Set the output timeouts **OFF** (**4**) to maximum (16 seconds).
6. Adjust the cut-off level with the distance adjustment potentiometer (**5**) depending on the height of ice required in the ice storage tank (from detector 50 to 2500 mm).
7. When the ice level is detected, the output indicator light (**6**) flashes until the end of the output timeout **ON** (**3**) and stays lit.
8. When the ice level is no longer detected, the output indicator light (**6**) flashes until the end of the timeout **OFF** (**4**) and goes out.

12.3.2 Ice level indicator with high and low level control

Refer to the attached *Ice level indicator with high and low level control* manual with the ice level indicator control.

12.3.2.1 General information

The G200 Generator Geneglace is an option providing digital display of the ice level in a storage unit.

1. An analogue level detector with a vertical laser continuously measures the height of the ice at a point in the storage silo.

2. The measurement is converted to a **4-20mA** electrical signal and sent to a digital display.
3. The display interprets the **4-20mA** signal and displays the corresponding height on a digital readout.

The display unit is fitted with two dry contact relays that can be actuated independently according to the configured ice levels. This function is used mainly for starting and stopping the production of ice fed to the storage unit, thereby avoiding superfluous filling in periods of low ice consumption.

The display may be incorrect if the laser beam of the detector is deviated by the position of an ice flake.

Depending on the position of the analogue level sensor in the ice storage, the number of ice production, the ice quality or the slope of the ice slope, the ice level display may not reflect reality.

If the option is ordered when purchasing a new installation. Then the level indication is shown on the PLC display as a bar graph. In this case, the analogue level is tested and set at the factory. (See Silo AOS Manual)

As an option, it is possible to connect a box equipped with a digital indicator in order to report the ice level display.

The "Ice Level Indicator" box complements the "Ice Level Indication" option on the automatic orbital silo cabinet.

The "Ice Level Indicator" box displays the ice level in the automatic orbital silo.

The "Ice Level Indicator" box must be installed so that it is visible to users.

12.3.2.2 List of the ice level indicator supplies

The G200 Generator Geneglace option, is composed of the following components:

- Distance sensor
- Cable 5 m (16.4 ft) connector M12
- Detector mounting bracket
- Ice level indicator box

12.4 Liquid Level Safety

It is possible to install a safety level controller on the flood bottle. (Optional)

Electrical equipment to be provided by the installer: refer to the chapter : *"Operating diagram" (on page 36)*

13. First commissioning

All first commissioning operations must be carried out by qualified personnel in compliance with applicable regulations and all current practices and the safety measures of the profession. Refer to *"Personnel qualification and training" (on page 10)*

This chapter describes the chronology of checks and actions required before, during and after the first commissioning of your Geneglace ice machine in complete safety.

Consequently, before starting your Geneglace ice machine, refer to the recommendations provided in this chapter, by putting an X in the boxes corresponding to the checks you have performed (see *"First commissioning sheet" (on page 87)*).

At this stage, the machine is in position, installed and connected in compliance with our recommendations.

13.1 Checks and settings

The G200 Generatoris tested in the factory, but due to the sometimes random transport conditions, a check of the electrical and hydraulic parts of the G200 Generator is still necessary.

13.1.1 Electrical checks

13.1.1.1 Electrical panel checks

- ☐ Set all the circuit breakers to the values corresponding to the nominal current absorbed by their respective motors.
- ☐ Set or preset the timeouts:

  If a Geneglace panel (option) is used, refer to "*PGS2 and PGS2 CO_2* electrical panel manual"

  If an electrical panel not supplied by Geneglace is used, refer to *"Operating diagram" (on page 36)*

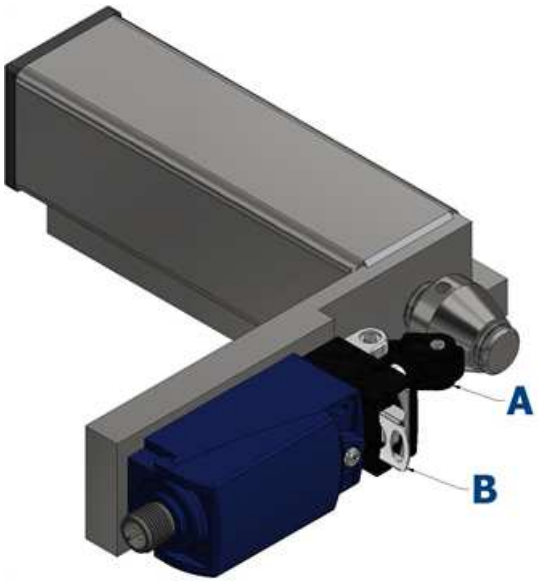
13.1.1.2 Gear reducer checks

- ☐ Start the gear reducer
- ☐ Check that the rotating parts rotate in the direction shown by the arrow on the top of the generator. If the direction of the motor is reversed, make the change to the electric motor supply as described in chapter *"Three-phase electric motor" (on page 34)*
- ☐ Check that the speed of rotation of the gear reducer corresponds to the machine selected.

The gear reducer speed is the number of complete turns made by all the rotating parts within one hour.

13.1.1.3 Torque limiter checks

- ☐ Start the gear reducer.
- ☐ Check that the torque limiter works correctly by making it trip, turning the black wheel **A** of the torque limiter electrical contact.
- ☐ Reset the torque limiter by actuating the reset lever **B** located on the top of the cabinet. The gear reducer must not restart.



13.1.1.4 Emergency stop for torque limitor checks

- ☐ Start the gear reducer
- ☐ Check that the emergency stop for torque limitor works correctly by pressing it
- ☐ Reset the torque limiter. The gear reducer must not restart.

13.1.1.5 Liquid level controller checks

⚠ The liquid detector is only present on the generators. G200 ABF

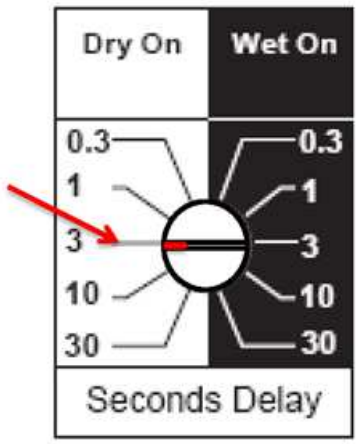
- ☐ Check the liquid level controller

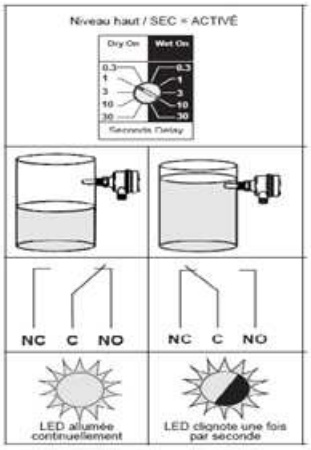
Operating mode

- ☐ Set the selector to "Dry on".

Switching delay

- ☐ Choose a switching delay of 3 seconds



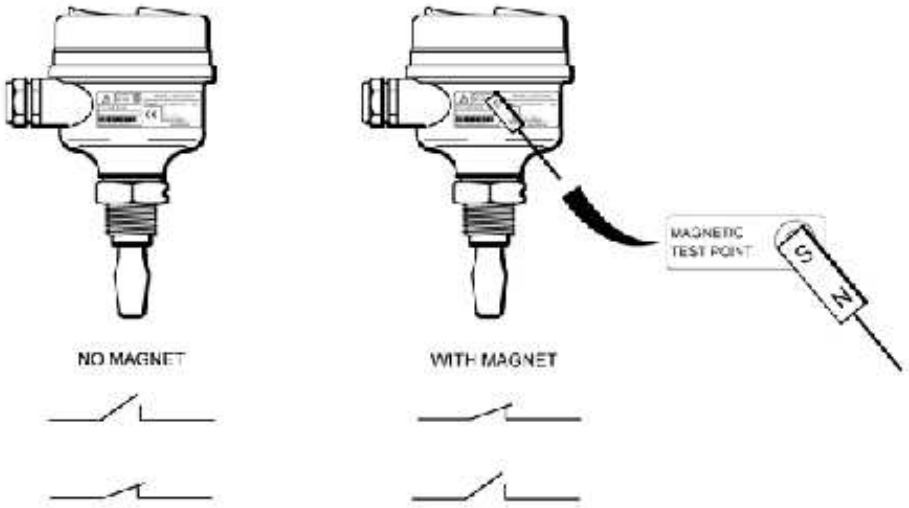


Led indicator light indication

	Vitesse de clignotement	Etat de fonctionnement
	Continu	Sortie activée
	1 fois par seconde	Sortie désactivée
	1 fois toutes les 2 secondes	non calibré
	1 fois toutes les 4 secondes	Défaut de charge ; courant trop fort ; court-circuit
	2 fois par seconde	Indication d'un calibrage réussi
	3 fois par seconde	Défaut interne (micro, ROM ou RAM)
	Eteint	Problème (par exemple : alimentation)

Magnetic test point

A magnetic test point, the location of which is marked on the housing, enables a functional test to be carried out. The sensor output changes state when a magnet is placed on this test point and returns to its original state when the magnet is removed.



13.1.2 Hydraulic checks

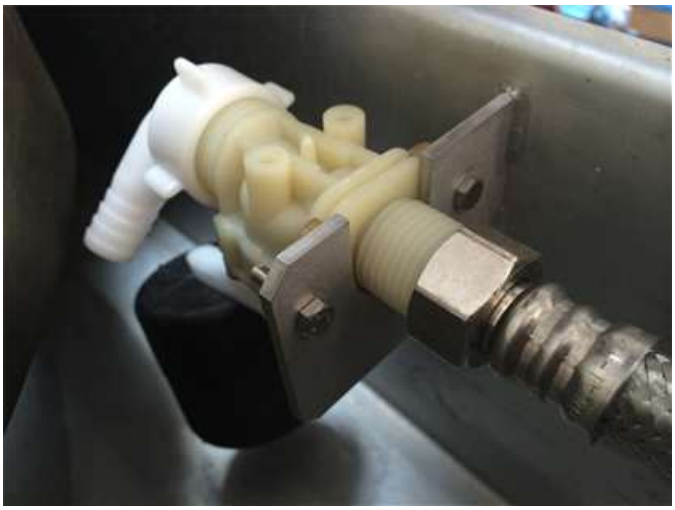
- ☐ Check that the water supply rate is greater than the quantity of water required for maximum production of your Geneglace generator and that the water quality is adequate.
- ☐ Check that the water supply pressure of your machine corresponds to the value indicated.
- ☐ Check, by pressing the valve float, that water enters the base.

13.1.2.1 Presetting the float valve

> ⚠ Whether the machine is running or stopped, the water must never overflow out of the base overflow.

The water level in the base must be high enough to avoid pump cavitation due to insufficient water, but not too high to avoid water going through the overflow.

Water level in the base		**G200**
Maximum level when stopped	mm	95
	inch	3.75
Minimum level during operation	mm	75
	inch	2.95



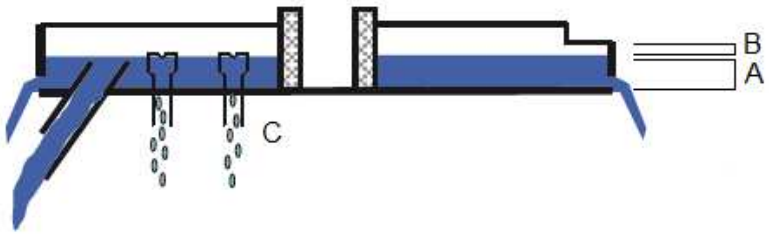
The first time the machine is used, immerse the float so that the water level is nearly up to the overflow, to help prime the pump.

13.1.2.2 Levels in the distribution bowl

To check the water level, supply the water pump separately.

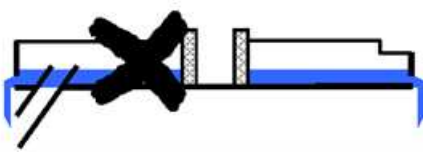
- ☐ The water level must be at least **A** and at most 1 mm below the step **B**.
- ☐ The de-icing tube **C** must be submerged.

Correct level : minimum 35 mm G200

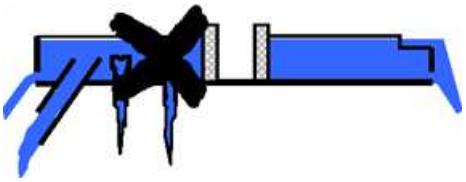


There are 2 adjustable deflector de-icing tubes on the G200

On all the generators, the bowl has a non-adjustable rear scraper de-icing tube which must always be supplied with water.



Level too low: see pump flow rate



If the water level in the distribution bowl is much too high, check that:

- ☐ The holes in the bowl are not blocked.
- ☐ Check the water overflow

13.1.2.3 Checks when adding salt

- ☐ If salt is added using a salt doser, refer to *"Le tube doseur de sel" (Page 1).*
- ☐ (option)salt doser pump supplied by Geneglace see "*Manual Salt Dosing Pump*".

13.1.3 Refrigeration checks

13.1.3.1 How to adjust the coolant supply

Incorrect adjustment of the coolant supply may cause mechanical malfunctions on the generator and the compressor.

Before using any coolant other than those indicated in this manual, contact Geneglace SAS.

After filling up with coolant and once the supply pressure is constant and close to the average operating conditions, adjust the expansion valve.

Correct adjustment of the coolant supply depends on:

- Filling of the generator with coolant and therefore the ice production.
- Evaporation pressure.
- Overheating of the gases sucked in.
- Oil return to the compressor.

Supplying generators

The generator is supplied with coolant by adjusting the fluid recirculation rate in the cylinder.

Trec = Qm(fl) / Qm(fl.evap)
Trec: Recirculation rate
Qm(fl): Mass flow rate of fluid circulating in the generator
Qm(fl.evap): Mass flow rate of fluid evaporated in the generator

- The recirculation rate must be between 3 and 4.
- The weight of coolant circulating in the generator must be greater than the weight evaporated.

- The coolant flow rate adjustment valve (not supplied) is used to adjust the recirculation flow rate and balance the head losses on multi-evaporator cooling circuits supplied by pump.

Refrigerant supply to generators G200 ABF

The supply of refrigerant to the generator is achieved by adjusting the injection time.

The injection time is adjusted by the refrigerant injection controller.

The overheating is the difference between the contact temperature taken at the cylinder outlet and the temperature corresponding to the evaporating pressure at the same point.

The injection time ensures optimal glazing of the cylinder and good oil return.

Problems Encountered	Solutions
Cooling capacity too high	Use a constant pressure valve that can adjust the operating suction pressure.
The opening time is too long compared to the closing time	The regulator is not open enough or lacks refrigerant
The closing time is too long compared to the opening time	The regulator is too open.
Opening time 5 to 10 times longer than closing time	The generator is not supplied with enough power: • Lack of refrigerant • Blocked HP line
Poor oil return	Proper adjustment of the refrigerant injection and oil return adjusters ensures correct oil return.

If you notice any other problems, see the chapter *"Dépannage" (Page 1).*

13.1.3.2 Before first startup

- ☐ Check that the cooling circuit is leaktight.
- ☐ If an independent cooling circuit is used, in other words a generator connected to a compressor alone, the generator fluid load is indicated in chapter *"Operating conditions" (on page 48)*.
- ☐ The installer must plan the load for the rest of the circuit.
- ☐ Load the installation with coolant
- ☐ In the case of a G200 Generator ABF (With Flood Bottle) make sure that the blade liquid level detector is supplied with electricity.
- ☐ Fill the generator with coolant by powering the solenoid valve separately.
- ☐ In the case of a G200 Generator ABF (With Flood Bottle, preset the manual liquid injection adjuster by opening it about 3 turns
- ☐ The opening by 1 or 2 turns of the oil return adjuster.

13.1.3.3 Starting your ice machine

- ☐ Check that your Geneglace ice machine starts according to the procedure described in chapter *"Operating diagram" (on page 36)*

- ☐ Check that the distribution bow is correctly supplied with water.
- ☐ Check that the high pressure state is steady.
- ☐ Check that the machine has been correctly loaded with coolant.
- ☐ Adjust the constant pressure valve to the reference suction pressure of your Geneglace ice generator (if connected to a refrigeration unit).
- ☐ Adjust the injection controller so that the longest injection time is 2 to 3 times longer than the closing time. (Disregard the first few beats at the beginning of the injection cycle.)
- ☐ Check that the output superheat of the G200 Generator is around 6°K *"Fonctionnement circuit frigorifique" (Page 1)*
- ☐ Check that the oil returns to the compressor.

- ☐ Check the oil flow in the oil return line sight glass at the heat exchanger outlet.
- ☐ After a few minutes' operation, check that ice forms over the entire height of the cylinder concerned by the reamer.

Otherwise, refer to *"Troubleshooting" (on page 81)*.

13.1.4 Other checks

- ☐ Check that the ice is scraped off correctly.

If after 30 minutes' operation a lot of noise comes from the generator when scraping off the ice, or if the ice does not scrape off easily, refer to *"Troubleshooting" (on page 81)* and *"Addition of salt" (on page 52)*.

- ☐ Check that the scrapers operate correctly (no water flowing in the ice tank). To adjust the scrapers, refer to *"Adjusting the scrapers" (on page 79)*.
- ☐ Simulate the presence of ice to check that the ice level sensors operate correctly.

13.1.4.1 Addition of salt

- ☐ Check that the salt addition system operates correctly.
- ☐ If necessary, adjust the salt dose rate, refer to *"Addition of salt" (on page 52)*.

14. Maintenance

14.1 Frequency of servicing and monitoring operations

In the event of earthquakes, bad weather or exceptional events, it is mandatory to check the general good condition of the G200 Generator , its structure and installations before putting it back into service.

Periodic checks should be carried out to ensure that the G200 Generator and its installations are in good condition.

To monitor and maintain your Geneglace equipment, a maintenance logbook is provided with your Geneglace ice machine

Operations	Frequency
Inspect the gear reducer (signs of oil)	If necessary
Inspect the inner wall of the cylinder to check the level of scaling Presence of a whitish deposit on the dry wall.	If necessary
Oil purge (generator running on NH3): Use the purge valves (authorised and qualified personnel)	If necessary (lower production)
Standard salt dosing refill Fill the brine bottles for the doser pump	Depending on consumption
Routine monitoring: Compressor oil level Icing up of the suction valve Housing temperature (bottom warm when stopped) Spraying of the cylinder wall Presence of unwanted ice on the reamer Bearings Regular consumption of salt or saline solution	Daily
Clean the water circuit: Base Bowls Pump Valve handling	Weekly
Clean the salt dose rate	Monthly
Clean the outside of the machine	Monthly
Grease the pump bearings: Central shaft and reamer bearings (With food grade grease in compliance with standards: NSF.H1), contact us if necessary.	Quarterly
Check the operating pressures	Quarterly
Check the operation of the torque limiter contact and of the scrapers	Quarterly
Check the condition of the cooling pipes and the insulation (corrosion, chemical attack, etc.), correct if necessary Check the good condition of the equipment and its protection (thermal insulation, paint, etc.), correct if necessary	Annually

Refer to applicable regulations regarding all other periodic checks to be carried out on your ice production machine.

14.2 Servicing

All assembly and maintenance work must be carried out by qualified personnel in accordance with the regulations in force and all current practices and safety measures of the profession.

The products proposed below have been tested by us and offer full reliability criteria in terms of efficiency and compatibility with Geneglace ice machines

Use of other products (e.g. hydrochloric acid) will permanently damage the generator.

Do not use a water jet and/or high pressure cleaner.

The cleaning products used must be compatible with:

- Stainless steel
- Chromium
- Natural rubber
- EPDM

Over time, certain operating problems due to the water quality may occur on the Geneglace= ice machine.

The two main sources of problems are:

- Proliferation of micro-organisms
- Build-up of scale

We therefore propose a range of descaling and anti micro-organism products.

To guarantee optimum hygiene and correct operation, carry out the following actions regularly:

- The entire outside of the generator **must** be cleaned *"Frequency of servicing and monitoring operations" (on page 72)*.
- Dusting and manual washing is recommended to prevent proliferation of bacteria. Do not use a water jet and/or a high-pressure cleaner.

14.2.1 Anti micro-organism product

Read the product safety data sheet before use.

PR 61 is a curative decontaminating sanitary anti-algae product for all microbial contamination.

Description:

It consists of a light coloured liquid.

- Relative density 1.02.
- pH 7.

Composition:

- Alkyl dimethyl benzyl ammonium salt
- Dimethyl benzyl ammonium chloride*
- Organic binders
- Surfactants

* This variety of cationic detergents is authorised in Appendix 1, Products for the cleaning of materials which may come into contact with foodstuffs. Decree of 27 October 1975.

Advantages

- It is hygienic and safe for use.
- It is not volatile.
- It is fast and acts on all surfaces.
- It has a high decontamination power.
- It stops corrosion of the circuit walls attacked by microbial corrosion.

Dosage:

1. Before decontaminating the ice generator, make sure that the ice storage tank is empty.
2. Switch off the machine or switch off the cabinet power supply.
3. Open the base on the water supply side
4. Pour a dose of decontaminating product into the base, according to the table below.
5. Add water up to the base overflow.
6. Close the base.
7. Switch on the machine.
8. Start only: the gear reducer and the pump for about 1 to 2 hours.
9. Stop the operation then drain and rinse 2 or 3 times, switching on the gear reducer and the pump again.
10. Repeat if necessary.

Average dosage 9 g/m^3

Generator	Quantity (g)
G200	0,31

14.2.2 Descaling

Read the product safety data sheet before use.

Do not spill descaling product in the ice tank.

Use of other products (e.g. hydrochloric acid) will permanently damage the generator.

PR 5200 ST (France) is a corrosion inhibitor for cooling circuits.

A data sheet is provided with each bottle, with the instructions for use.

Description:

It consists of a light coloured liquid.

- Relative density 1.23.
- pH 3.5, diluted.

Composition:

- Phosphoric acid preparation
- Zinc chloride

Advantages

- It is not volatile.
- It is fast and acts on all surfaces.
- It has a high descaling power.

Dosage

1. Before descaling the ice generator, make sure that the ice storage tank is empty.
2. Switch off the machine and switch off the electrical cabinet power supply.
3. Open the base on the water supply side
4. Pour a dose of descaling product into the base, according to the table.
5. Add water up to the base overflow.
6. Close the base.
7. Switch on the machine.
8. Start only: the gear reducer and the pump for about 1 to 2 hours depending on the degree of scale.
9. Stop the operation then drain and rinse 2 or 3 times, switching on the gear reducer and the pump again.
10. Repeat if necessary.

Average dilution 7 %

Generator	Quantity (g)	Quantity (L)
G200	2,2	2

14.2.3 Oil drain

Oil is a polluting product and must be treated in an approved facility in accordance with the regulations in force.

1. Empty the generator of its refrigerant by closing the liquid supply.
2. Let the pressure drop to 0.1 bar.
3. Circulate lukewarm water (+30°C maximum) for about 60-120 minutes, using the pump to fluidize the oil inside the generator.

   The oil descends more quickly to the drain points at the base of the generator.
4. Carry out the drains by repeating, if necessary, the previous operations until there is no more oil.

14.3 Replacing the wearing parts

For the dismantling, reassembly and adjustment operations, the parts are marked on the exploded views.

The average frequencies are indicated for normal round the clock operating conditions and monitoring according to Geneglace recommendations *"Frequency of servicing and monitoring operations" (on page 72)*.

Parts	Frequencies
Float valve	As required
Central shaft bearings	3 years
Central shaft centring	Each time the bearings are changed
torque limiter	3 to 5 years
Scrapers	3 to 5 years
Water pump	2 to 3 years
reamer and its bearings	5 to 7 years
reamer bearing	3 to 5 years
gear reducer	3 years

A maintenance logbook is provided to monitor your ice generator.

14.4 Adjusting the reamer

Before conducting any work, refer to the manual for the safety instructions and for further information.

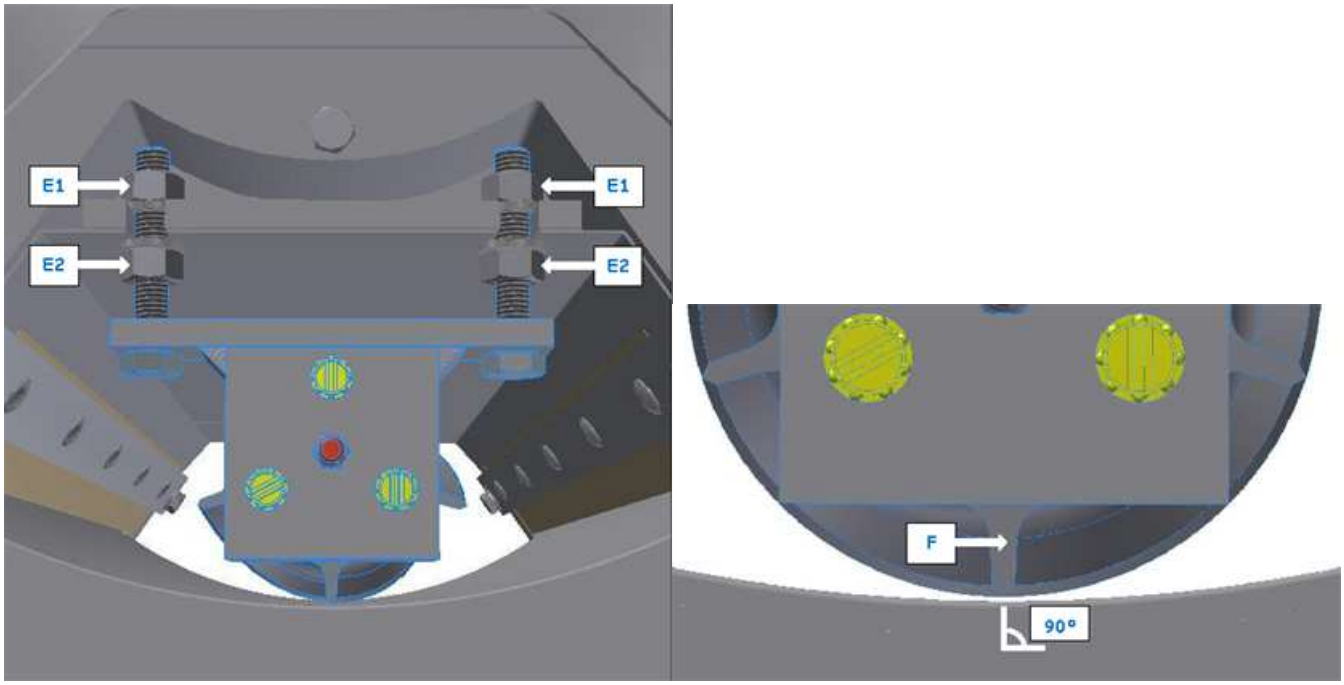
14.4.1 Adjusting the reamer G200

Before any intervention, electrically lock out the installation

14.4.1.1 Tools required

- 1 set of shims
- 2 open-end wrench 17

14.4.1.2 Adjustment



The adjustment principle mentioned below for the upper bearing of the reamer is to be carried out identically for the lower bearing.

1. Place the reamer in front of the inspection hatch.
2. Select the largest tooth of the reamer using a set of shim by rotating them one after the other perpendicular to the cylinder.
3. Loosen the nuts **E1** and **E2**.
4. Position the selected tooth **(F)** perpendicular to the cylinder.
5. Tighten the **E1** nuts to move the tooth of the reamer away from the cylinder.
6. Unscrew the **E2** nuts to bring the tooth of the reamer closer to the cylinder.
7. Take a shim of 0.4 mm or less and place it between the tooth and the cylinder.
8. Unscrew nuts **E1** and screw nuts **E2** until tooth/shim/cylinder contact.

9. Record this setting by tightening the **E1** nuts while holding the **E2** nuts.
10. Remove the shim by turning the reamer on itself.

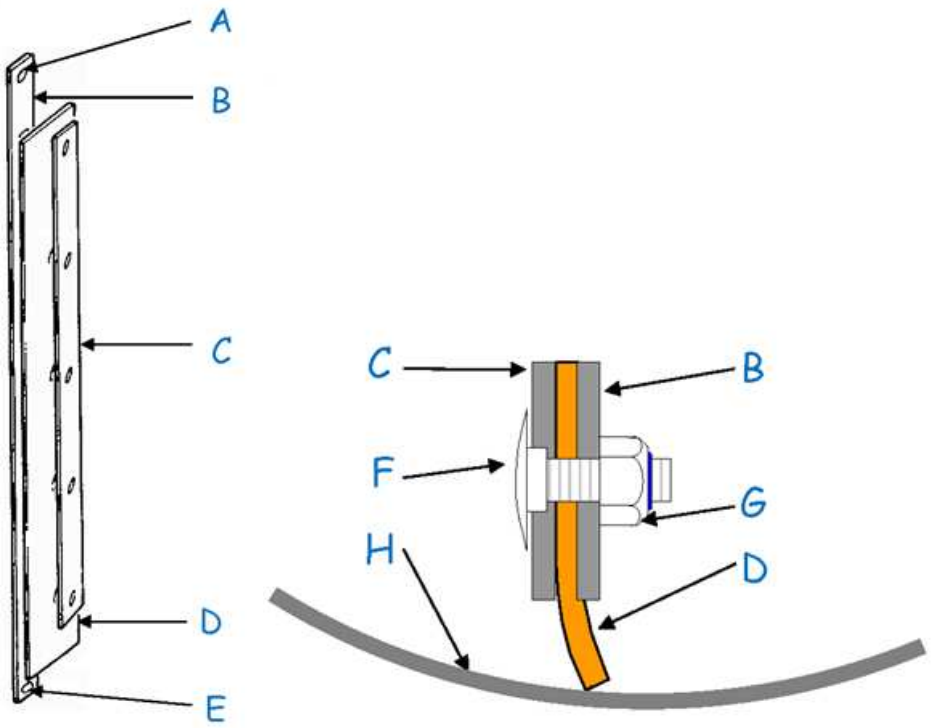
14.5 Adjusting the scrapers

Before conducting any work, refer to the manual for the safety instructions and for further information.

14.5.1 Tools required

- 1 flat screwdriver
- 2 x 17 mm open-ended spanners

14.5.2 Description



A. Top oblong hole
B. Part 34a
C. Part 34b
D. Scraper
E. Bottom oblong hole
F. Round head screw

G. Locknut
H. Cylinder wall

14.5.3 Adjustment

The following adjustment principle applies to the front scraper.

The oblong attachment holes at the ends of the scraper supports allow the scrapers to be moved towards the cylinder.

Adjust so that the scraper touches the cylinder slightly over its entire height and only on its outer corner (see photos below).

1. Loosen the bolts to release the scraper supports.
2. Use a screwdriver to move the scraper closer to the cylinder (see photo).
3. Tighten the bolt to keep the adjustment.

Adjusting the front scraper with a screwdriver

Rear scraper, plan view

Front scraper, plan view

15. Troubleshooting

The following table will help you diagnose the malfunction observed.

Observations symptoms and effects	Possible causes								
Lower ice production	5	11	12	13	15				
Low pressure abnormally high	12	13	14						
Low pressure abnormally low	11	15	17						
Bubbles in the high pressure liquid indicator	15								
Torque limiter tripped (reamer blocked)	1	2	3	6	8	9	10	17	19
Low pressure switch tripped	2	6	7	11	15	16	17	18	
High pressure switch tripped	13								
Scraper motor thermal relay tripped	1	2	3	6	8	9	10	19	
Base overflow permanently overflowing	5								
Noisy operation	1	3	6	8	9	10			
Abnormal icing up of the compressor suction valve	2	6	7	8	9	14			
Hard ice, difficult to scrape off the cylinder and coming off in 2 thicknesses	8	9	10						
Thin, transparent, wet ice, coming off in 2 thicknesses	5	12							
Granular ice surface on one side (orange-peel)	2								
Irregular ice with drips	6								
Ice located in the bottom of the cylinder and/or thick	6	11							
Block of ice building up under the machine	3	4	11	16	17				
Ice difficult or impossible to detach as the reamer goes past	1	2	12						
Thick, soft ice which does not come off the cylinder	2								
Highly fragmented ice	1	17							
gear reducer out of service	19								
Compressor oil level low	11								
Compressor oil level high when starting, then low afterwards	18								

	Possible causes
1	Not enough salt
2	Too much salt
3	Front scraper badly set or damaged (water leak)
4	Rear scraper badly set or damaged (water leak)
5	Float valve blocked open or closing completely, float damaged
6	Insufficient water distribution: hole blocked, pump discharge rate low (pump unprimed or damaged)
7	No water distribution: water switched off, float valve blocked, closed? pump fault
8	Reamer too far from the cylinder
9	Play in shaft bearings, incorrect centring
10	Cylinder scaled up
11	Oil or lack of coolant in the double wall: excessive overheating, coolant leak, partial blocking of the liquid line, pressure reducer filter dirty
12	Insufficient cooling power: dirty condenser, ambient temperature high, compressor check valves worn, dirty compressor filter
13	Dirty compressor, ambient temperature high
14	Pressure reducer temperature increase too low
15	Insufficient coolant, coolant leak
16	Condensation too low
17	Excessive cooling power (evaporation too low)
18	Compressor housing resistor out of service
19	torque limiter badly adjusted or out of service

16. Exploded views

16.1 Generator G200

16.1.1 External Parts

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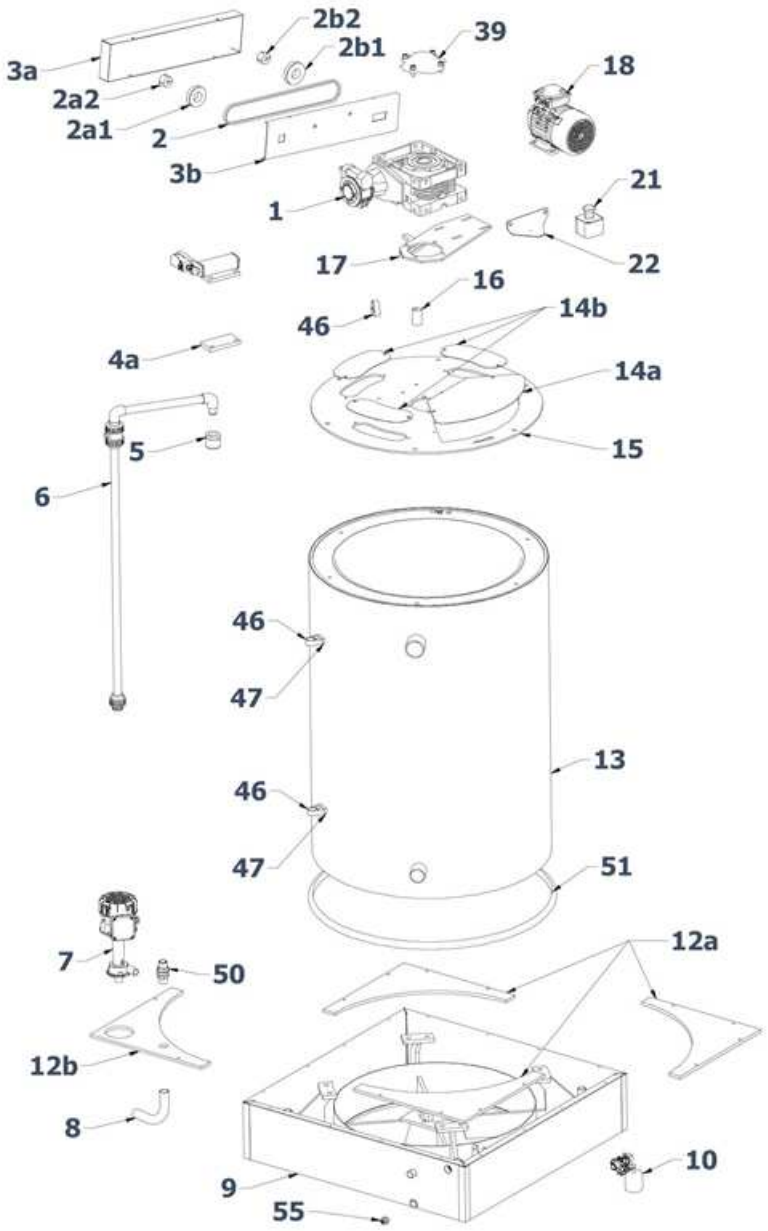

Ref.	Designation	Qty.
1	Gear reducer	1
2	Belt	1
2a1	Reducer pulley	1
2a2	Reducer pulley hub	1
3a	Belt protection cover	1
3b	Belt protection base	1
4	Torque limiter	1
4a	Torque limiter spacer	1
5	Water spray of the Water pipe	1
6	Water supply pipe	2
7	Water pump	2
8	Hose	1
9	Base	1
10	Valve float	1
12a	Base cover	3
12b	Water pump base cover	1
13	Insulated cylinder	1
14a	Cover upper part A	1
14b	Cover upper part B	3
15	Upper part A	1
16	End stop of the torque limitor	1
17	Gear reducer support	1
18	Scraper motor	1
21	Scraper motor box	1
22	Scraper motor box support	1
39	Shaft protection cover	1
46	Water pipe clamp	3
47	Spacer collar water tube	2
50	Wall duct	1
51	Seal for Base cover	1
55	Base drain plug	1

16.1.2 Internal Parts

Ref.	Designation	Qty.
19	Upper centre shaft bearing	1
20	Upper central shaft bearing housing	1
23	Reamer bearing	2
24	Reamer bearing seal	2
25	Upper reamer bearing	2
26	Reamer	1
27	Additional front scrapper plate	1
27a	Additional back scrapper plate	1
28	Additional scrapper	2
29	Lower central shaft bearing housing	1
30	Lower centre shaft bearing	1
31	Lower central shaft bearing circlips	1
33	Scrapper	2
34a	Back scrapper support assembly	1
34b	Front scrapper support assembly	1
35	Vertical deflector	1
36	Central shaft	1
37	Key	1
38	Distribution bowl	1
40	Spacer	1
41	Upper and lower central shaft bearing seal	2
42	Upper central shaft bearing seal	1
43	Upper central shaft bearing circlips	1
45	Recovery bowl deflector	1
52	Grease nipple + upper shaft bearing cap	1
53	Grease nipple + lower shaft bearing plugs assembly	1
54	Grease nipple + reamer bearing plugs assembly	2
56	De-icing downpipe	2

17. First commissioning sheet

Before conducting any work, refer to the manual for the safety instructions and for further information.

This inspection sheet is used to check the main points when installing a generator to ensure it operates correctly.

Tick the boxes o as you proceed with the inspection:

17.1 Check before powering up

- ☐ Check that the base is secure and watertight (flat and level).
- ☐ Check that the base is fixed properly and watertight (silicone seal around the ice outlet).
- ☐ Check that the diameter of the ice chute (if any) (according to manual).
- ☐ Check that the possibility of dismantling this chute for future servicing.
- ☐ Check that the ice chute is not in the air supply of an evaporator.
- ☐ Check the opening of the oil return adjuster by 1 to 2 turns.
- ☐ Check that the oil return connection is properly installed on the suction tube. (only for G200 Generator ABF) See *"Schéma frigorifique" (sur la page1)*
- ☐ Check the presence and electrical connection of the ice high level detection safety device.
- ☐ Check the presence and electrical connection of the ice high level detection regulation device.
- ☐ Check the connection of the overflow to the drain.
- ☐ Check that the float valve can move freely.
- ☐ Check the water level in the generator base when stopped (according to manual).
- ☐ Check the position of the salt doser (if any) (according to manual).
- ☐ Check that the gear reducer coupling.
- ☐ Check the electrical connection of the liquid detector.
- ☐ Check the electrical connection of the torque limiter and of the torque limiter emergency stop.
- ☐ Check the presence of a time delayed pump down to be set.
- ☐ Check the presence of a "work" timeout (delay when starting) on the reducer and water pump control (if the generator is connected to a refrigeration unit).
- ☐ Check the presence of a "standby" timeout (delay when stopping) on the gear reducer control.

17.2 Check after powering up

- ☐ According to the manual, trigger the torque limiter manually (complete shutdown of the generator and its associated unit), then reset it.
- ☐ According to the manual, trigger the torque limiter emergency stop manually (complete shutdown of the generator and its associated unit), then reset it.
- ☐ Check the scraper direction of rotation (shown by the arrow painted on the top – clockwise).
- ☐ Check the operation and setting of the doser pump (if any).
- ☐ Check the operation of the ice high level detection safety device.
- ☐ Check the operation of the regulation detection.
- ☐ Adjust the injection time delay (T1) if the machine is connected to a refrigeration unit.
- ☐ Adjust the cylinder cleaning time delay (TKA 1) to 180 s.
- ☐ Pre-fill the cooling circuit after draining.
- ☐ In the case of a G200 GeneratorABF (With Flood bottle), check the correct operation of the liquid level detection (closing / opening).

17.3 Check after starting up

- ☐ As soon as the liquid solenoid valve is activated, time the filling time of the cylinder (see suction outlet icing) (Connection to refrigeration unit).
- ☐ Defer this time to the injection time delay (T1) (value to be adjusted if necessary).
- ☐ Check that the scrapper and water pump are switched on after this time delay.
- ☐ Check the stability of the high-pressure system. (stable ventilation)
- ☐ Check the setting of the constant pressure valve (if existing) in order to obtain the pressure recommended when selecting the generator.
- ☐ Adjust the oil regulator to achieve good oil circulation. Check that the oil is transferred to the suction tube using the sight glass.
- ☐ Check that the scrapper are working properly (according to the instructions).
- ☐ Check the water level in the upper bowl and the level in the base (according to the instructions).
- ☐ Check the oil level at the sight glass of the compressor (also check later).

17.4 After 20 to 30 minutes' operation, check:

- ☐ The water level in the base (according to manual)
- ☐ Removal of the ice without the gear reducer moving.
- ☐ Spraying of water droplets on the tab of the salt doser (if any).
- ☐ The drip of the doser pump (if any).
- ☐ Adjust the injection adjuster so that the opening time is double the closing time (at least at R717).
- ☐ The adjustment of the oil return device.
- ☐ The oil level return shown by the compressor indicator lamp (depending on the type of installation, it may be necessary to top up with oil).

- ☐ The operating pressures (depending on the production defined).
- ☐ Stop the G200 generator with the Stop button.
- ☐ Check the water level in the base (according to manual) (that no water drains out of the overflow tube when the generator is stopped).
- ☐ Switch on the installation again and complete the operation checklist.

18. CE Declaration of Conformity

ENR-TRA-006-An
vG

CE DECLARATION OF CONFORMITY

As per EC Machines Directive 2006/42/EC Annex IIB.

The manufacturer: Geneglace SAS
ZAC de la Forêt - 9, Rue des Orfèvres
44840 LES SORINIERES - FRANCE

Hereby declares that the below-designated machine,

Flake ice Generator type:	**G200**	**Serial number:**	
File number:			

. May not be commissioned until the machine into which it is to be incorporated has been declared to be in conformity with the provisions of revised Directive 2006/42/EC.

. Complies with the provisions of the revised Directive 2014/30/UE on "Electromagnetic compatibility".

The EC Pressure Equipment Directive 2014/68/EU conformity assessment has been made according to the following provisions:

	Type	Serial N°	N.B. N°	Category	Conformity assessment procedure	EU Type examination certificate N°	Evaluation approval N°
Generator							
Components:							
Heat exchanger							
Float switch							
Bottle							
Drum							

Person authorised to compile the technical file, established in the Community :
Hervé Crouan - Quality Manager Geneglace SAS

Signed at LES SORINIERES:
Serge Vidal
President

Geneglace SAS

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