

ENVIRONMENT HEALTH & SAFETY INSTRUCTIONS FOR CHILLERS AND HEAT PUMPS

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1 - Introduction

This safety manual applies for all types of chillers & heat pumps except for 30XF units. It refers, when necessary, to information included in the installation, operation and maintenance (IOM) manual of your unit. The IOM is available on line (flash the QR code on the unit to access the IOM).

Prior to the initial start-up of the chiller, people involved in the storage, transportation, handling, on-site installation, start-up, operation, and maintenance of this unit should read, understand and be thoroughly familiar with these instructions, the installation, operation and maintenance manual and the specific project data for the installation site.

Units are designed to cool/heat water for the air conditioning of buildings and industrial processes.

Units are designed to provide a very high level of safety during installation, start-up, operation and maintenance. They will provide safe and reliable service when operated in strict accordance with the specifications of the IOM.

The manufacturer highlights the importance of conforming with a periodic requalification of the frigorific circuit according to applicable local regulations. Except in case of a most restrictive local regulation, the manufacturer then recommends a 5 years periodicity requalification.

It is user's responsibility to ensure that the final installation respects all local, national and international regulations.

This manual provides the necessary information to safely do all operations on the equipment from installation to dismantling.

2 - General safety considerations

Unit Access

The unit must be installed in a place that is not accessible to the public or protected against access by non-authorized persons. The units are not intended to operate in an ATEX area, unless specified in the IOM.

Do not modify or bypass any of the safety guards or switched in the system.

The main working place for the operator of the unit is in front of the control panel (see IOM for the position of the operator workstation).

Qualification requirements

Any person authorized to access the unit must be aware of the general and special safety precautions for the installation site.

It also must be qualified and trained in surveillance and maintenance and familiar with the equipment and the installation and fully qualified to work on these units.

Any person carrying out work concerning:

- Handling
- Electrical circuits & components
- Frigorific circuits & components (leak tightness tests, refrigerant recovery...)
- Welding / Brazing operations
- Manipulation of a shut-off valve (opening or closing)
- Fire extinguishing

Must:

- Have the relevant qualifications and certifications ;
- Have been specifically trained and warned on this equipment and system ;
- Be authorized to operate.

These procedures must be carried out with the unit shut-down.

Only a qualified and certified personnel can perform installation operations, maintenance, as well as the equipment disposal.

All operations on the unit must be carried out by authorized, qualified and trained people to do it using appropriate procedures and tools.

Personal Protective Equipment

The necessary protection equipment must be available.

All persons who have to work with the equipment must wear personal protective equipment adapted to the intervention on the unit:

- Safety shoes
- Safety gloves or specific hand protection (cut resistant gloves, chemical gloves, thermic gloves, ...)
- Head protection
- Ears protection
- Eyes or face protection (safety glasses, goggles, facial shield)
- If applicable (see sticker on the machine) : A2L or A3 portable detector of flammable gas in the machine

Additional equipment may be required, depending on the risk analysis that must be done prior to any intervention.

Do not wear clothes or accessories that can get caught or sucked in by flows of air, tie back long hair before entering the unit.

2.1 - Access to the unit and its components

Risk of falling



No part of the unit must be used as a walk-way, rack or support. Periodically check and repair or if necessary replace any component or piping that shows signs of damage.

The refrigerant lines can break under the weight and release refrigerant, causing personal injury.

Use a platform, or staging to work at higher levels.

Risk of burn : Hot / Cold surfaces

Some pipes can reach temperatures :

- Higher than 65°C.
- Lower than 0°C.

WARNING : Do not touch the frigorific circuit piping without gloves. Risk of human injury by hot / cold burn.

After the unit shutdown, wait 10 minutes before accessing the unit frigorific piping.

Moving parts : Propellers

Do not remove the guards from moving parts while the unit is operating.

Make sure that moving parts are fitted correctly before restarting the unit.

Risk in case of refrigerant leak:

Do not use your hands to check possible refrigerant leaks.

Ensure good ventilation, as accumulation of refrigerant in an enclosed space can displace oxygen and cause asphyxiation or explosions.

Inhalation of high concentrations of vapor is harmful and may cause heart irregularities, unconsciousness, or death. Vapor is heavier than air and reduces the amount of oxygen available for breathing. These products cause eye and skin irritation. Decomposition products are hazardous.

Avoid contact with liquid refrigerant. Wash any spills from the skin with soap and water. If liquid refrigerant enters the eyes, immediately and abundantly flush the eyes with water and consult a doctor.

The accidental releases of the refrigerant, due to small leaks or significant discharges following the rupture of a pipe or an unexpected release from a relief valve, can cause frostbites and burns to personnel exposed. Do not ignore such injuries. Installers, owners and especially service engineers for these units must:

- Seek medical attention before treating such injuries.
- Have access to a first-aid kit, especially for treating eye injuries.

Refrigerant combustion

In case of combustion of refrigerant, do not clean combustion by-products with water, the mixture is highly corrosive.

Risk of flammability:



If the unit contains refrigerant other than A1, always use a certified detector for the refrigerant used when near the unit.

Default potential flammable zone is 0,6m around the unit. For more details on your unit zone (for refrigerant other than A1), please refer to the dedicated instruction, operation & maintenance (IOM) instruction and dimensional drawings provided with the unit.

Risk of explosion:



Never exceed the specified maximum allowable pressures.

Verify the allowable maximum high-side and low-side pressures by given on the unit nameplate and checking the instructions in this manual.

Never apply an open flame or live steam to a refrigerant container. Dangerous overpressure can result.

Electrical risk :



Never work on a unit that is still energized.

WARNING : Even if the unit has been stopped (not frigorifically operating), it remains on standby mode and all the electrical circuits on the unit remain energized, unless the unit or circuit disconnect switch is open.

Refer to the electrical wiring diagram for further details. Follow the appropriate safety guidelines.

Before any intervention is carried out on the unit :

- Electrical power supply must be isolated, locked out and tagged out ahead of the unit at the site facility ;
- Verify that there is no voltage present at any accessible conducting parts of any electrical circuit inside the unit.

If the intervention is interrupted, always ensure that all electrical circuits are still deenergized before resuming the intervention.

Never access to any of the electrical components :

- If the unit is still energized ;
- If water and/or moisture are present.

Electrical Power Supply Disconnect Switch

Refer to the electrical wiring diagram to determine whether the unit has an electrical power supply disconnect switch or not.

Some units have an electrical power supply disconnect switch inside the electrical cabinet, dedicated to isolating the electrical power supply by being put in open position.

WARNING : Even if the electrical power supply disconnect switch has been switched OFF, hazardous voltage is still present inside the electrical cabinet on input connections of the disconnect switch.

Variable Frequency Drives (VFD)

Refer to the electrical wiring diagram to determine whether the unit has VFD or not.

WARNING: The variable frequency drives (VFD) fitted to the units have circuit capacitors.

Energy is stored in them even if the supply disconnect switch was switched off. Therefore, hazardous voltage can still be present.

They take around 20 minutes to discharge after the power supply is disconnected. If the discharge circuit inside the capacitor fails, it is not possible to define the discharge time.

After disconnecting all electrical power supplies to the unit, wait around 20 minutes before accessing the electrical box or VFD. This value is a guide and may differ from one VFD to another: refer to the information given on the VFD to find out the precise value.

An internal fault with a VFD can cause serious injury if the VFD has not been closed correctly: it is essential to ensure that all VFD covers are in place and correctly secured before switching on any electrical power supply to the unit.

3 - Storage and transportation safety considerations

When it is necessary to store the unit before installation, it is mandatory to observe some precautions :

- Do not remove the protection,
- Protect the unit from dust and bad weather

The units are intended to be stored and operated in an environment where the ambient temperature must not be lower than the minimum allowable temperature not be higher than the maximum allowable temperature indicated on the nameplate.

Never cover or obstruct any protective device.

This applies to any fusible plugs, pressure switches, rupture disks and relief valves fitted on the refrigerant or heat transfer medium circuits.

4 - Safety consideration upon reception

Check that the unit and the accessories have not been damaged during transport and that no parts are missing. If the unit and the accessories have been damaged or the shipment is incomplete, send a claim to the shipping company.

Compare the name plate data with the order.

The name plate is attached in two places to the unit :

- On the outside of one of the unit frames,
- On the electrical cabinet, inside.

The unit name plate must include the following information:

- Model number and size,
- Leak tightness test date,
- Fluid used for transport,
- Refrigerant used with his GWP,
- Refrigerant charge per circuit,
- PS: Min./max. allowable pressure (high and low pressure side),
- TS: Min./max. allowable temperature (high and low pressure side),
- Pressure switch cut-out pressure,
- Voltage, frequency, number of phases,
- Maximum current,
- Maximum power input,
- Unit net weight.

5 - Handling/Installation on site safety considerations

Do not remove the skid or the packaging until the unit is in its final position.

Do not throw away lifting instruction present on the tarpaulin.

The manufacturer strongly recommends employing a specialized company to load or unload the machine.

Lift the unit using the lifting instruction provided.

Unit's weight is indicated on the nameplate.

Units can be moved with a fork lift truck, as long as the forks are positioned in the correct place and direction on the unit.

The units can also be lifted with slings, using only the designated lifting points marked on the unit according the lifting instructions on the certified drawings supplied with the unit. Use slings or lifting beams with the correct capacity that have been tested and certified.

Do not tilt the unit more than 15°.

The unit must be placed on hard ground or concrete.

In case of refrigerant leak, the customer condensate evacuation pipe could contain refrigerant. For this case, the installer should evaluate the risk through a specific risk assessment and install an hermetic pipe.

CAUTION: Before lifting the unit, check that all casing panels and grilles are securely fixed in place. Lift and set down the unit with great care. Tilting and jarring can damage the unit.

WARNING: never apply pressure or leverage to any of the unit's panels or uprights; only the base of the unit frame is designed to withstand such stresses. No force or effort must be applied to pressurised parts, especially via pipes connected to the water-cooled heat exchanger (with or without the hydraulic kit if the unit is equipped with this).

No combustible matter should be placed within 6.5m of the unit.

6 - Start-up safety considerations

After the unit has been received, when it is ready to be installed or reinstalled, and before it is started up, it must be inspected for damage:

- Check that the frigorific circuit(s) is (are) intact, especially that no components or pipes have shifted (e.g. following a shock).
- If in doubt, carry out a leak tightness check and verify with the manufacturer that the circuit integrity has not been impaired.

Pressure Equipment Directive (PED)

The unit complies with the pressure equipment regulation. The list of pressure equipment integrated in the unit is given in the declaration of conformity.

NOTE: Pressure equipment for the hydraulic side (optional) are delivered as separate items. Their integration in the complete hydraulic installation remain under the user's responsibility.

Overpressure Safety Devices - Classification & Control

In accordance with local regulation :

- Pressure equipment must be checked periodically, see in the maintenance part of this manual.
- The relief valves are not safety accessories but damage limitation accessories in case of an external fire.

SAFETY DEVICES CLASSIFICATION		
	Safety accessories ⁽¹⁾	Over pressure protection in case of an external fire ⁽²⁾
Frigorific circuit(s)		
High-pressure switch	X	
External relief valve ⁽³⁾		X
Rupture disk		X
Heat transfer medium circuit(s)		
External relief valve	(4)	(4)

(1) Classified for protection in normal service situations.

(2) Classified for protection in abnormal service situations. These accessories are sized for fires with a thermal flow of 10kW/m².

(3) The instantaneous over-pressure limitation of 10% of the operating pressure does not apply to this abnormal service situation (see EN 764-7 §7.2 / Guideline E-02 / EN378-2 §6.2.2.3).

(4) The selection of these discharge valves must be made by the personnel responsible for completing the hydraulic installation.

NEVER COVER OR OBSTRUCT ANY PROTECTIVE DEVICE.

This applies to any fusible plugs, pressure switches, rupture disks and relief valves fitted on the refrigerant or heat transfer medium circuit.

Check that the protective devices are well installed and not covered before operating the unit.

Relief Valves - Installation guidelines

Refer to the installation regulations, for example those of standard EN 378-3 and EN 13136.

Do not remove valves, even if the fire risk is under control for a particular installation. There is no guarantee that the accessories have been re-installed if the system is changed or for transport with a gas charge.

Check whether the original protection plugs are still present at the valve outlets. These plugs are generally made of plastic and should not be used. If there are still present, please remove them.

Relief Valves - Indoor Installation guidelines

The external relief valves must always be vented to outside if the units are installed in a closed space.

These pipes must be installed in a way that ensures that people and property are not exposed to vented refrigerant. As the fluids can be diffused in the air, ensure that refrigerant is discharged away from building air intakes, or they must be discharged in a quantity that is appropriate for a suitably absorbing environment.

Relief Valves - Drainpipes Installation guidelines

Fit devices at the valve or discharge piping outlets to prevent the penetration of foreign bodies (dust, building debris, etc.) and atmospheric agents (water can form rust or ice).

Provide a drain in the discharge circuit, close to each relief valve, to avoid an accumulation of condensate or rain water.

These devices, as well as the discharge piping, must not impair operation or lead to a pressure drop that is higher than 10% of the set pressure.

Dual Relief Valves on changeover

If the relief valves are installed on a change-over valve, this is equipped with a relief valve on each of the two outlets. Only one of the two relief valves is in operation, the other one is isolated.

Never leave the change-over valve in the intermediate position, i.e. with both ways open bring the actuator in abutment, front or back according to the outlet to isolate.

If a relief valve is removed for checking or replacement, ensure that there is always an active relief valve on each of the change-over valves installed in the unit.

Relief Valves - Leaks

All factory installed relief valves are lead-sealed to prevent any calibration change.

It is recommended to install an indicating device to show if part of the refrigerant has leaked from the valve. The presence of oil at the outlet orifice is a useful indicator that refrigerant has leaked.

Keep this orifice clean to ensure that any leaks are obvious.

Fire Risk

When the unit is subjected to fire, relief devices prevent rupture due to over-pressure by releasing refrigerant. The fluid may then be decomposed into toxic residues when subjected to the flame:

- Stay away from the unit
- Set up warnings and recommendations for personnel in charge to stop the fire.
- Do not restart the unit after it has been submitted to a fire. Material may have been seriously damaged by the heat.
- Restart may only be possible after detailed verification by a competent personnel in order to insure that the unit has not suffered any damage.

7 - Maintenance and repair safety considerations

All installation parts must be maintained by the personnel in charge, in order to avoid material deterioration and injuries to people.

Faults and leaks must be repaired immediately. The authorized technician must have the responsibility to repair the fault immediately. Each time repairs have been carried out to the unit, the operation of the protection devices must be re-checked.

All maintenance and repair operation must be done in compliance with regulations and IOM.

Only use original replacement parts for any repair or component replacement.

Consult the list of replacement parts that corresponds to the specification of the original equipment.

Maintenance Logbook

The manufacturer recommends the following drafting for a logbook (the table below should not be considered as reference and does not involve the manufacturer responsibility):

Intervention		Name of the commissioning engineer	Applicable national regulations	Verification organism
Date	Nature ⁽¹⁾			

(1) Maintenance, repairs, regular verifications (See EN 378), leakage, etc.

Ensure regularly that the vibration levels remain acceptable and close to those at the initial unit start-up.

Refrigerant Regulations and Standards

This product may contain fluorinated greenhouse gas covered by the Kyoto protocol. For the fluid type refer to the name plate.

Any intervention on the frigorific circuit of this product should be performed in accordance with the applicable legislation. The regulation is called F-Gas, (EU) 2024/573.

Refrigerant Leaks

- If a refrigerant leak is detected, ensure that it is stopped and repaired as quickly as possible by a competent and trained technician.**
- Periodic leak tests have to be carried out by the customer or by third parties. The regulation set the periodicity here after:**

Refrigerant charge/ circuit (CO ₂ equivalent)		< 5 Tons	5 ≤ Charge < 50 Tons	50 ≤ Charge < 500 Tons	Charge > 500 Tons ⁽¹⁾
Refrigerant charge/ Circuit (kg)	R-32 ⁽²⁾ (GWP 675, following AR4)	Charge < 7,4 kg	7,4 ≤ Charge < 74,1 kg	74,1 ≤ Charge < 740,8 kg	Charge > 740,8 kg
	R-410A ⁽²⁾ (GWP 2088, following AR4)	Charge < 2,4 kg	2,4 ≤ Charge < 23,9 kg	23,9 ≤ Charge < 239,5 kg	Charge > 239,5 kg
	R-134a ⁽²⁾ (GWP 1430, following AR4)	Charge < 3,5 kg	3,5 ≤ Charge < 34,9 kg	34,9 ≤ Charge < 349,7 kg	Charge > 349,7 kg
	R-515B ⁽²⁾ (GWP 288, following AR4)	Charge < 17,4 kg	17,4 ≤ Charge < 173,6 kg	173,6 ≤ Charge < 1736,1 kg	Charge > 1736,1 kg
	R-407C ⁽²⁾ (GWP 1774, following AR4)	Charge < 2,8 kg	2,8 ≤ Charge < 28,2 kg	28,2 ≤ Charge < 281,9 kg	Charge > 281,9 kg
Refrigerant charge/circuit (kg)	R-1234ze(E) ⁽²⁾ (GWP 1,37, following AR6)	Charge < 1 kg	1 ≤ Charge < 10 kg	10 ≤ Charge < 100 kg	Charge > 100 kg ⁽¹⁾
	R-1233zd(E) ⁽²⁾ (GWP 3,88, following AR6)	Charge < 1 kg	1 ≤ Charge < 10 kg	10 ≤ Charge < 100 kg	Charge > 100 kg ⁽¹⁾
	R-1234yf ⁽²⁾ (GWP 0,50, following AR6)	Charge < 1 kg	1 ≤ Charge < 10 kg	10 ≤ Charge < 100 kg	Charge > 100 kg ⁽¹⁾
	R-290 ⁽²⁾ (GWP 0,02, following AR6)	No requirement			
System WITHOUT leakage detection		No Check	12 Months	6 Months	3 Months
System WITH leakage detection		No Check	24 Months	12 Months	6 Months

- (1) From 01/01/2017, units must be equipped with a leakage detection system.
 (2) Fluorinated greenhouse gas covered by the Kyoto protocol and the F-gas (EU) 2024/573

- A logbook must be established for equipment subject to periodic leak tests. It should contain the quantity and the type of fluid present within the installation (added and recovered), the quantity of recycled fluid, regenerated or destroyed, the date and output of the leak test, the designation of the operator and its belonging company, etc.**
- Contact your local dealer or installer if you have any questions.**

Information on operating inspections given in EN 378 standard can be used when similar criteria do not exist in the national regulation.

Additionally, refrigerant leaks must be checked :

- After any handling / transport of the unit
- Before and after the commissioning start-up of the unit
- Before and after any storage / long term non-usage of the unit
- Before and after any intervention are carried out on the unit (even if it does not concern the frigorific circuit).

Overpressure Safety Devices - Periodical Checks

Periodic inspections of the safety devices and external overpressure devices (external relief valves) must be carried out in accordance with national regulations.

At least once a year thoroughly inspect the protection devices (valves).

Installer/owner should perform its own risks assessment on the unit environment (and the potential corrosive operating conditions). Depending on the result of the assessment, installer/owner should inspect the overpressure safety devices more frequently than the manufacturer's recommendation and/or the nation regulation requirements

High Pressure Switches - Maintenance guidelines

The safety device shall be tested at least once a year to verify good operation and cut out value.

Relief Valves - Maintenance guidelines

Relief valves must be checked periodically.

External relief valves Model	3060--	3061--	Other Model
Replacement Cycle	Every 5 years	Every 9 years	Every 5 years

Frigorific Circuit - Opening / Closing

Before opening a frigorific circuit, purge, consult the pressure gauges and ensure that the circuit has been purged

Change the refrigerant when there are equipment failures, carry out a refrigerant analysis in a specialist laboratory.

If the frigorific circuit is scheduled to remain open for longer than a day after an intervention (such as a component replacement), the openings must be plugged and the circuit must be charged with oxygen free nitrogen (inertia principle). The objective is to prevent penetration of atmospheric humidity and the resulting corrosion on the internal walls and on non-protected steel surfaces.

If work on the evaporator is required, ensure that the piping from the compressor is no longer pressurized (as the valve is not leak tight in the compressor direction.)

Frigorific Circuit - Refrigerant Leak / Contamination

If a leak occurs or if the refrigerant becomes contaminated (e.g. by a short circuit in a motor) remove the complete charge using a recovery unit and store the refrigerant in mobile certified containers.

Repair the leak detected and recharge the circuit (with a new refrigerant in case of contamination).

Frigorific Circuit - Brazing

Refrigerant in contact with an open flame produces toxic gases.

Do not unweld or flame-cut the refrigerant lines or any frigorific circuit component until all refrigerant (liquid and vapor) has been removed from chiller.

Explosion Risk - Oxygen Reaction

Do not use oxygen to purge lines or to pressurize a machine for any purpose. Oxygen gas reacts violently with oil, grease, and other common substances.

Do not use air for leak testing. Use only oxygen free nitrogen.

Explosion Risk - Maximum Pressure Levels

Never exceed the specified maximum operating pressures.

Verify the allowable maximum high-side and low-side test pressures by checking the instructions in this manual and the pressures given on the unit nameplate.

Explosion Risk - Refrigerant Heating

Do not clean the unit with hot water or steam. This may cause the refrigerant pressure to rise.

8 - Interventions Procedures

8.1 - Refrigerant & Oil Charges Transfer & Storage

Only qualified personnel are allowed to perform frigorific circuit leak test and the refrigerant recovering.

Refrigerant & Oil transfer service valves

A 3/8" SAE connector on the manual liquid line valve is supplied with all units for connection to the transfer station.

The units must never be modified to add refrigerant and oil charging, removal and purging devices. All these devices are provided with the units.

Refrigerant & Oil storage container

Any refrigerant transfer and storage operations must be carried out using mobile containers.

It is dangerous and illegal to re-use disposable (non-returnable) cylinders or attempt to refill them.

When cylinders are empty, evacuate the remaining gas pressure, and move the cylinders to a place designated for their recovery. Do not incinerate.

Refrigerant Charge removal

Do not siphon refrigerant.

The compressors cannot transfer the whole refrigerant charge and can be damaged if used to pump-down.

The refrigerant charge should not be transferred to the high pressure side.

WARNING : Deliberate refrigerant release into the atmosphere is not allowed. Ensure that the refrigerant is never released to the atmosphere during installation, maintenance, or equipment disposal.

The customer must ensure that any refrigerant recovered is recycled, regenerated, or destroyed.

Refrigerant Charge filling

Before recharging the unit, check the refrigerant type and charge, as indicated on the unit name plate.

Charging any refrigerant other than the original charge type will impair machine operation and can even lead to a destruction of the compressors.

Some parts of the circuit can be isolated. Only charge liquid refrigerant at the liquid line.

The compressors are lubricated with a synthetic polyolester oil.

Oil Charge removal

When oil is removed from a unit, it always contains some gaseous refrigerant bubbles. That refrigerant is required to be put back into the frigorific circuit.

Oil Charge filling

Before filling the unit with oil, check the type and quantity of oil required for a given size of the unit range in this document.

8.2 - Overpressure Safety Devices

8.2.1. - High Pressure Switches

The company or organization that conducts a pressure switch test shall establish and implement a detailed procedure to fix:

- Safety measures
- Measuring equipment calibration
- Validating operation of protective devices
- Test protocols
- Recommissioning of the equipment.

CAUTION: If the test leads to replacing the pressure switch, it is necessary to recover the refrigerant charge, these pressure switches are not installed on automatic valves (Schrader type).

HIGH PRESSURE SAFETY LOOP (SRMCR):

Each circuits of the unit is equipped with a high pressure safety loop, also known as safety related measurement control and regulation system (SRMCR), consisting of:

- High pressure switches (HPS) located on the high pressure side of compressor. PZHH (manual) or PSH (automatic) type, depending on the compressor technology
- A control relay on the compressor board.
- Compressor(s) main contactor(s)

See the wiring diagram and bill of material of the unit for details of identification and references.

This safety loop is designed to be reliable for the whole life of the chiller providing adequate annual testing is performed or tests in accordance with national regulations, at the earliest opportunity.

FUNCTION DESCRIPTION AND RESET:

Switches and compressor contactors are closed during normal operation. A pressure above the set value opens the switch(es) which open the compressor(s) contactor(s) stopping the power supply to compressors.

Shortly after compressor shutdown, the pressure in the system comes back to equilibrium.

Restart after high pressure detection.

After safety loop activation:

- Reset manually the triggered pressure switch (screw type compressors only).
- Clear the alarm on the unit control panel. This has to be done physically on the panel, not remotely.

CHECKS IN CASE OF APPARENT FAILURE OF THE SAFETY ACCESSORY:

If the maximum allowable pressure of the unit appears to have been exceeded (for example: after opening of the relief valves), the unit must be stopped immediately. The unit and the safety loop must pass periodic testing procedure successfully before any possible restart.

If the test reveals any malfunctions that could have led to exceed the maximum allowable pressure (PS) of the device, a complete check of all pressure equipment must be performed to verify their mechanical integrity.

In order to verify the full integrity of the safety loop, the following checks have to be performed periodically:

- High pressure safety loop periodic test
- Contactors check
- Complete loop operation check

POWER CONTACTOR CHECK PROCEDURE:

This procedure shall be applied for each compressor of the unit.

1. Switch off the power of the electrical equipment.
2. Measure the resistance between upstream and downstream terminals of the main power contactors for each phase.

Note: calibrated Ohmmeter shall be used for this task.

3. Confirm resistance is more than 1.0 MOhm.

A resistance lower than 1.0 MOhm might indicate that contactor is defective: further investigations are required.

COMPLETE SAFETY LOOP TEST:

The purpose of this periodic test is to verify the proper functioning and setting of the high-pressure safety loop of a frigorific circuit.

In order to reach the triggering pressure of the loop, the pressure and temperature thresholds activating the discharge of the compressor by the regulation system are raised.

This procedure must be repeated for each circuit of the unit:

1. Set up a calibrated pressure gauge on the high pressure part of the circuit (compressor discharge)
2. Clear all activated alarms
3. Activate the HP test mode for the corresponding circuit via the control interface.

Enable Quick Test Mode (Quick Test Menu> [QCK_TEST] parameter active)

Activate the high pressure test for the desired circuit (Menu Quick Test> parameter [HP_TEST] to 0 for circuit A or 1 for the B circuit. The corresponding circuit starts to perform the HP test.

4. Start the unit
5. For water-cooled units, stop the circulation of the secondary circuit to the condenser in order to stop the condensation and cause the increase in pressure (this operation is managed by the control on air-cooled machines)
6. Record the trigger value
7. Check if the trigger values are correct

The release values should be between -1.5 /+0 bars of nominal values indicated on the unit.

8. Reset all alarms

For screw type compressors, this procedure should be repeated if only one of the pressure switch has triggered. The triggered pressure switch shall then be substituted with a mean of stopping the system or a pressure switch with a higher triggering value.

Note:

Access to the maintenance functions can be protected by a password. Contact your dealer or the manufacturer's service department for more information.

The type of connector must be WAGO 231-302 or equivalent.

9 - Final shutdown safety considerations

Separate the units from their energy sources, allow them cool then drain them completely

DISASSEMBLY

Comply with local environmental laws and guidelines.

At the end of its life, the unit must be disassembled, and contaminated fluids removed by professionals and processed via approved channels for waste electrical and electronic equipment. Check whether any part of the unit can be recycled for another purpose.

Refrigerant and oil must be removed from the machine, then recycled in suitable industries before dismantling operations

Only a qualified and certified personnel can remove the refrigerant from the equipment

Use the original lifting equipment.

APPENDICES (PROVIDED WITH THE UNIT)

1 - Appendix 1: Declaration of conformity

2 - Appendix 2: Dimensional drawings

The quality management system of the assembly site for this product has been certified as compliant with the requirements of ISO 9001 (latest version) after an audit conducted by an authorised independent third party.
The environmental management system of the assembly site for this product has been certified as compliant with the requirements of ISO 14001 (latest version) after an audit by an independent third party.
The occupational health and safety management system of the assembly site for this product has been certified as compliant with the requirements of ISO 45001 (latest version) after an audit by an independent authorised third party.
Please contact your sales representative for more information.

Order No.: 10532, 01.2025. Supersedes order No.: 10532, 07.2021.
The manufacturer reserves the right to change the product specifications without notice.

Carrier, Montluel, France.
Printed in the European Union.