# Installation, Operation, and Maintenance

## CGWF SE – R-454B, CGWF HE – R-454B, CXWF – R-454B, CXWF GEO – R-454B

Indoor Water-cooled Chillers and Water/Water Heat Pumps with Scroll Compressors, Symbio™ 800 Controller, and R-454B Refrigerant

CGWF SE - R-454B - Cooling Capacity 52 - 695 *kW*
CGWF HE - R-454B - Cooling Capacity 53 - 699 *kW*
CXWF - R-454B - Heating Capacity 59 - 795 *kW (reversible on water side)*
CXWF GEO R-454B - Heating Capacity 59 - 520 *kW*
*(reversible on refrigerant side)*


CITY ADVANTAGE

August 2025 **CG-SVX060E-GB**

TRANE TECHNOLOGIES

# Table of Contents


General Information ..... 6
Safety Regulations ..... 8
- Precautions against Risks Due to the Refrigerant ..... 9
- Precautions against Residual Risks ..... 9
- Prevention against Residual Mechanical Risks ..... 9
- Prevention against Residual Electrical Risks ..... 9
- Prevention against Residual Risks of a Different Nature ..... 10
- Precautions to be Observed During Maintenance Operations ..... 10
- Manual Alarm Reset ..... 11

Unit Description ..... 12
- Nameplates ..... 12
- Unit Nameplate ..... 12
- Compressor Nameplate ..... 12

Unit Model Number Description ..... 13
General Data Table ..... 15
Pre-Installation ..... 18
- Inspection Checklist ..... 18
- Unit Storage ..... 18
- Installation Requirements and Contractor Responsibilities ..... 19

Typical Components Location ..... 20
- CGWF and CXWF ..... 20
- CXWF GEO ..... 21

Installation Requirements ..... 22
- Location Requirements ..... 23
- Sound Consideration ..... 23
- Installation Responsibilities ..... 24
- Lifting and Moving Instructions ..... 25
- Dimension and Weights ..... 25
- Center of Gravity ..... 25
- Unit Isolation and Levelling ..... 26

Water Connection ..... 27
- Typical View of Water Connection ..... 27
- CXWF GEO ..... 27
- CGWF / CXWF ..... 27
- Water Treatment ..... 28

## Table of Contents


Hydraulic Package ..... 33
Hydraulic Schematic Diagrams ..... 35
CGWF and CXWF ..... 35
CXWF GEO ..... 42
Refrigerant Scheme - CGWF and CXWF ..... 45
Refrigerant Scheme - CXWF GEO ..... 46
Chilled Water Freeze Protection ..... 47
Freeze Protection ..... 47
1. Water Pump and Heaters ..... 47
2. Freeze Inhibitor ..... 47
3. Drain Water Circuit ..... 47
Low Refrigeration Temperature Setpoint and Antifreeze Setpoint on CGWF Unit Control ..... 48
Freeze Protection with Glycol ..... 48
Electrical Parts ..... 50
General Electrical Recommendations ..... 50
Electrical Data ..... 51
Installer-Supplied Components ..... 53
Power Supply Wiring ..... 53
Control Power Supply ..... 53
Heater Power Supply ..... 53
Main Switched Features ..... 54
Water Pump Power Supply ..... 55
Interconnecting Wiring ..... 55
Supplemental Heat Option ..... 56
Operating Principles ..... 57
General ..... 57
Refrigerant Cycle ..... 57
CGWF and CXWF ..... 57
CGWF GEO ..... 57
Oil System ..... 57
Storage ..... 58
Operating Limits ..... 58
Controls/Tracer TD-7 Operator Interface ..... 60
Controls Overview ..... 60

## Table of Contents


Communication Interfaces ..... 60
Tracer TD-7 Operator Interface ..... 60
Operator Interface ..... 60
Tracer® TU ..... 60
Pre-Start Checkout ..... 61
Installation Checklist ..... 61
General ..... 61
Unit Voltage Imbalance ..... 62
Unit Voltage Phasing ..... 62
Water System Flow Rates ..... 62
Water System Pressure Drop ..... 62
Unit Voltage Power Supply ..... 62
Symbio™ 800 Setup ..... 62
General ..... 63
Electric and Electronic ..... 64
Refrigerant Circuit ..... 64
Water Circuit ..... 65
Water Circuit (Continued) ..... 66
Unit Start-Up Procedures ..... 67
Daily Unit Start-Up ..... 67
General ..... 67
Seasonal Unit Start-Up Procedure ..... 67
System Restart After Extended Shutdown ..... 67
Temporary Shutdown and Restart ..... 68
Extended Shutdown Procedure ..... 68
Periodic Maintenance ..... 69
General ..... 69
Weekly Maintenance ..... 69
Monthly Maintenance ..... 70
Annual Maintenance ..... 70
Refrigerant Emission Control ..... 70
Refrigerant and Oil-charge Management ..... 71
Refrigerant Leak Detector R-454B Calibration ..... 71
Periodic Maintenance ..... 72
Standard Controls ..... 72

## Table of Contents


Compressor Service Information ..... 73
- Compressor Electrical Connections ..... 73
- Oil Level ..... 73
- Oil Fill, Removal and Capacity ..... 73
- Oil Testing ..... 73
- Oil Equalizer Line ..... 73
- Tandem and Triple Compressor Suction Restrictors ..... 73
- Compressor Replacement ..... 73
- Refrigerant System Open Time ..... 74
- Mechanical Compressor Failure ..... 74
- Electrical Compressor Failure ..... 74
- Compressor Motor Megging ..... 74
- Compressor Current Imbalance ..... 74
- Compressor Crankcase Heaters ..... 74
- Refrigerant Piping ..... 74

Log Check Sheet ..... 75

Recommended Service Routine Frequencies ..... 76

Notes ..... 77

# General Information

## Foreword

These instructions are given as a guide to good practice in the installation, start-up, operation, and maintenance by the user - Chillers manufactured in Italy.

A separate manual is available for the use and maintenance of the unit's control, Symbio™ 800. They do not contain full service procedures necessary for the continued successful operation of this equipment. The services of a qualified technician should be employed through the medium of a maintenance contract with a reputable service company. Read this manual thoroughly before unit start-up.

**Note:** All the Chiller / Heat Pump Units are assembled, pressure tested, dehydrated, charged and tested in accordance with factory standard before shipment.

## Warnings and Cautions

Warnings and Cautions appear at appropriate sections throughout this manual. Your personal safety and the proper operation of this machine require that you follow them carefully. The constructor assumes no liability for installations or servicing performed by unqualified personnel.

**WARNING:** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

**CAUTION:** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices or for equipment or property-damage-only accidents.

## Safety Recommendations

To avoid death, injury, equipment or property damage, the recommendation contains in the IOM addendum (PROD-SVX01) should be observed during commissioning, start-up, maintenance and service visit.

The following pictograms can be found on the unit and detailed in the IOM addendum (PROD-SVX01). Take necessary precautions to avoid damage and injury.

*Figure 1 – Warning pictograms*


1 = Risk that unit is powered up

2 = Risk hazard due to fan rotation

3 = Risk hazard of burns on compressors or refrigeration piping

4 = Unit contains refrigerant gas. See specific warnings.

5 = Risk of residual voltage when speed drive, capacitor or softstarter options are present

6 = Unit under pressure

7 = Risk to cut, particularly on heat exchanger fins

8 = For R-454B, risk of fire and flammable material

9 = Disconnect all electric power before servicing

10 = Read technical instructions

11 = Read instructions before installation

## Reception

On arrival,

- Inspect the unit before signing the delivery note.
- Specify any visible damage on the delivery note.
- Notify the local Universal sales office at the same time.

**Note:** The delivery note must be clearly signed after inspection and countersigned by the driver.

Also send a registered letter of protest to the last carrier of the goods within 7 days of delivery.

Concealed damage also shall be notified by a registered letter of protest to the last carrier of the goods within 7 days of delivery. Notify the local Universal sales office at the same time.

**Important notice:** No shipping claims will be accepted by Universal if the above mentioned procedure is not respected.

For more information, refer to the general sales conditions of your local Universal sales office.

**Note:** For units delivered in France, the scheduled time for unit inspection and notifying through registered letter in case of visible and concealed damage is only 72 hours.

## Loose Parts Inventory

Check all the accessories and loose parts that are shipped with the unit against the shipping list. Included in these items will be the water vessel drain-plugs, rigging and electrical diagrams, service literature, which are placed inside the control panel and/or starter panel for shipment. If optional elastomeric isolators are ordered with the unit, they are shipped mounted on the horizontal support frame of the chiller/heat pump. The isolators' location and distribution weight diagram is placed with the service literature inside the starter/control panel.

## Warranty

Warranty is based on the general terms and conditions of the manufacturer. The warranty is void if the equipment is repaired or modified without the written approval of the manufacturer, if the operating limits are exceeded or if the control system or the electrical wiring is modified. Damage due to misuse, lack of maintenance, or failure to comply with the manufacturer's instructions or recommendations is not covered by the warranty obligation. If the user does not conform to the rules of this manual, it may entail the cancellation of warranty and liabilities by the manufacturer.

Start-up must be performed by the sales support team of the manufacturer, or an authorized agent of the manufacturer

## Maintenance Contract

It is strongly recommended that you sign a maintenance contract with your local Service Agency.

This contract provides regular maintenance of your installation by a specialist in our equipment. Regular maintenance ensures that any malfunction is detected and corrected in good time and minimizes the possibility that serious damage will occur. Finally, regular maintenance ensures the maximum operating life of your equipment. We would remind you that the failure to respect these installation and maintenance instructions may result in the immediate cancellation of the warranty.

## Training

To assist you in obtaining the best use of it and maintaining it in perfect operating condition over a long period of time, the manufacturer has at your disposal a refrigeration and air conditioning service school. The principal aim of this is to give operators and technicians a better knowledge of the equipment they are using, or that is under their charge. Emphasis is particularly given to the importance of periodic checks on the unit operating parameters as well as on preventive maintenance, which reduces the cost of owning the unit by avoiding serious and costly breakdown.

## Refrigerant

The refrigerant provided by the manufacturer meets all the requirements of our units. When using recycled or reprocessed refrigerant, it is advisable to ensure its quality is equivalent to that of a new refrigerant. For this, it is necessary to have a precise analysis made by a specialized laboratory. If this condition is not respected, the manufacturer warranty could be cancelled.

# Safety Regulations

All units are designed, built and inspected in compliance with Pressure Equipment Directive (PED97/23/EC or 2014/68/EU and Machinery Directive 2006/42/EC.

## Definitions

### Owner:

The legal representative of the company, body or natural person who owns the plant in which the unit is installed: he or she is responsible for the control and respect of all the safety regulations indicated in this manual as well as the national ones in force.

### Installer:

The legal representative of the company appointed by the owner to position and hydraulically, electrically etc. connect the unit to the plant: he or she is responsible for moving and the correct installation of the unit in accordance with the indications in this manual and with the national regulations in force.

### Operator:

A person authorized by the owner to carry out all the operations of regulation and control on the unit which are specifically mentioned in this manual. He or she should keep to actions described in the manual and limit his or her action to what is explicitly allowed.

### Technician:

A person who is directly authorized by the manufacturer or, secondarily, for all EU countries except for Italy, by the distributor of the product, under their own responsibility, to carry out all ordinary or extraordinary maintenance operations, as well as regulations, controls, repairs and parts replacement which may be necessary during the lifetime of the unit.

## Access to Dangerous Area

The access to the unit dangerous areas is usually obstructed through protection panels, which are removable, by using a tool. Axial fans are protected with accident prevention grilles.

For all the units which allow access to the cooling piping without security gratings (optional) or closing panelling, the following precautions must be taken:

– mark the areas with contact risks;
– apply warning signs.

The danger zone must be of a suitable size to avoid any contact, even accidental contact.

The Manufacturer declines any responsibility for damage to things and unauthorized personnel in case of absence of clear and static limiting systems of the risk areas and of the relevant warning and danger signs.

## General Precautions

The operator must only intervene on the unit commands; he or she must not open any panels except for the one which gives access to the command module.

The installer must only intervene on the connections between the plant and the machine; he or she must not open any machine panels nor carry out any commands.

The following precautions should be made when approaching or working on the unit:

- Do not wear jewelry, baggy clothes or any other accessory which can get caught up.
- Use appropriate protection (gloves, glasses etc.) when using an open flame (welding) or compressed air.
- If the unit is located in a closed environment, wear hearing protection.
- Before disconnecting, removing tubes, filters, joints or other line parts intercept the connection tubes, empty them until the pressure reaches that of the atmosphere.
- Do not use your hands to check for possible pressure losses.
- Always use tools which are in good condition; make sure the instructions have been fully understood before using them.
- Make sure that any tools, electrical cables or other loose objects have been removed before closing the unit and starting it up again.

## Precautions against Risks Due to the Refrigerant

| **Safety data** | |
|---|---|
| Toxicity | Not WARNING |
| Risks for skin touching | Splashes or sprinkles can cause chill burns. The risk of absorptions through the skin is not relevant. |
| | The R-454B refrigerant could take some lightly irritating effects and in liquid stage it has a strong skinning effect. In this case it is necessary to rinse with fresh water the contaminated parts of the skin |
| | The refrigerant in liquid stage in contact with wet fabrics cause freezing and adherence to the skin. In this case it is necessary to put off the contaminated clothes to avoid freezing. Please contact a doctor in case of irritation of the contaminated parts. |
| Risks for contact with the eyes | Vapors don't take any effect. Splashes or sprinklers can cause chill burns. In those cases it is necessary to rinse the eyes with water or with solution for ocular washings for 10 minutes. The intervention of a doctor is needed. |
| Risks for ingestion | Should it happen, it causes chill burns. It does not cause vomiting. The person must be kept awake. It is needed to rinse the mouth with fresh water and to drink almost 0.25 liters. The intervention of a doctor is needed. |
| Risks for inhalation | High concentration of vapors in air can lead to anesthetic effects up to a loss of conscience. Long exposures could give rise to cardiac arrhythmia and sometimes even to death. |
| | High concentrations can create a reduction of oxygen in air, with consequent possibility of suffocation. Should it happen the person must be taken to the open air and let him take a rest. |
| | Administer oxygen if needed. In case the breathing has interrupted or become irregular, it is necessary to apply the artificial breathing. In case of cardiac arrest a heart massage must be applied. Contact a doctor immediately. |
| Conditions to avoid | Use in presence of exposed flames, and of high levels of humidity. |
| Dangerous reactions | Possibility of violent reactions with the sodium, the potassium, the barium and with other alkaline substances, incompatible materials and all the alloys containing more than 2% of magnesium. |
| Protection wearing - Behavior in case of losses or escapes | Wear protection apparel and self-rescuer respirators. Insulate the source of the loss, if this operation can be done in safety conditions. Small quantitative of refrigerant escaped at liquid state can be allowed to evaporate only if the room is well ventilated. In case of great losses ventilate the room immediately. Plug the loss with sand, soil or other absorbent material; avoid that the liquid refrigerant can enter in water-drainages or losing pools. |
| Dismantlement | The best procedure is the recovery and the recycle. If this is not possible the refrigerant must be conferred to an accredited system for its destruction in order to neutralize acid and toxic by-products. |

## Precautions against Residual Risks

Prevention from risks due to the command system.

- Make sure the instructions for use have been understood before carrying out any work on the control panel.
- Always keep the instruction manual close at hand when working on the control panel.
- Start up the unit only after having certified that it is correctly connected to the plant.
- Inform the technician promptly of any alarms which appear on the unit.
- Do not reset the alarms to manual restart without having first identified the cause and removed it.

## Prevention against Residual Mechanical Risks

- Install the unit in accordance with the provisions of the following manual.
- Carry out all the maintenance operations provided for by this manual regularly.
- Wear a protective helmet before entering inside the unit.
- Before opening a machine panel make sure that it is firmly connected by means of a hinge.
- Do not touch the air condensation batteries without having first put on protective gloves.
- Do not remove the protections to the moving parts while the unit is running.
- Before restarting the unit make sure that the moving part protections are in the correct position.

## Prevention against Residual Electrical Risks

- Connect the unit to the mains in accordance with the provisions of this manual.
- Carry out all maintenance operations regularly.
- Before opening the control panel or access any electrical component installed on the unit disconnect the unit from the mains by means of the main switch.

  It must be taken into account especially that when soft starters instead of contactors are installed as compressors drives, one phase of any compressor remains live when the compressor is off but the main switch is closed. Do not access the compressor electrical box.
- Check that the unit has been earthen correctly before starting it up.
- Control all the electrical connections and the connection cables paying particular attention to the state of isolation; replace the cables which are clearly worn or damaged.
- Carry out periodic checks of the wiring inside the panel.
- Do not use cables with an inappropriate section or flying connections not even for a limited period or in an emergency.

# Safety Regulations

## Prevention against Residual Risks of a Different Nature

- The residual risks due to pressure are mainly coming from a failure of the safety devices. To prevent them it is necessary to check and replace them when required
- The unit is equipped with high pressure safety valves which may relieve high pressure and high temperature refrigerant in close vicinity of the unit in case of an abnormal overpressure event. In order to prevent harm to people who might find themselves close to the unit, the installer should convey the escaped refrigerant by means of piping. The safety valves installed in the unit are equipped with a threaded connection that makes conveying easier.

  If a piping aimed at conveying refrigerant from safety valves, as described above, has not been installed by the installer, in order to protect from safety devices exhausting it is not allowed to remove the protections while the unit is in operation and to approach the unit without wearing the right protections. In case of accidental contact with refrigerant due to the safety valves exhaust it is necessary to follow the above indicated.
- Carry out the plant connections to the unit by following the indications reported on the following manual and on the panels of the unit itself.
- If a part is disassembled, make sure that it is correctly reassembled before restarting the unit.
- Do not touch the discharge line of the compressor, the compressor itself or any other tube or component which is inside the machine without putting on protective gloves.
- Keep a fire extinguisher which is able to put out fires on electrical equipment near the machine.
- In the event of fire either if it originates on the unit or near it make sure the power supply to the unit is promptly cut and that any person who might be near the unit at that moment is moved to a secure location.
- On units installed inside, connect the refrigerant circuit shut off valve to a network of tubes which are able to lead the possible spillage of refrigerating fluid outside.
- Eliminate any fluid loss inside or outside the unit.
- Collect the discharge liquid and clean up any possible oil leakage.
- Periodically clean the compressor casing of the accumulated dirt deposits.
- Do not keep inflammable liquids near the unit.
- Do not dispose of the refrigerant fluid and the lubricating oil in the environment.
- Welding should only be carried out on empty tubes; do not approach the tubes containing refrigerant fluid with flames or other sources of heat.
- Do not bend or strike tubes containing pressurized fluids.

## Precautions to be Observed During Maintenance Operations

Only authorised technicians may carry out maintenance operations. Before carrying out any maintenance the following must be performed:

- Isolate the unit from the mains electricity by using the external knife switch.
- Place a notice on the external knife switch which says "**do not use - maintenance in progress**".
- Make sure that any possible on-off commands are disabled.
- Use appropriate safety equipment (helmet, isolating gloves, protective glasses, safety shoes etc.).

If measurements or controls must be carried out which require the machine to be running the following observations must be followed:

- Operate with the electrical panel open for as short a time as is possible.
- Close the electrical panel as soon as the individual measurement or control has been carried out.
- For units which are located outside, do not carry out interventions in dangerous atmospheric conditions such as rain, snow, fog etc.

The following precautions should also be taken at all times:

- Never dispose of fluids contained in the refrigerant circuit into the environment.
- When replacing the electronic card always use appropriate equipment (extractor, anti-static bracelet, etc.).
- If a compressor, the evaporator, the condensation batteries or any other heavy part is to be replaced, make sure that the lifting equipment matches the weight to be lifted.
- If the unit has an independent compressor compartment, do not open the ventilator compartment without having first isolated the machine using the knife switch on the side of the panel and only after having placed a sign which says "do not use - maintenance in progress".
- If modifications must be carried out to the cooling, hydraulic or electrical circuit of the unit, as well as to its command logic, contact the sales office.
- If particularly complicated assembly or disassembly operations are to be carried out contact the sales office.
- Always use original spare parts bought directly from the manufacturer or from official dealers of the companies reported in the list of recommended spare parts.

**Important:** No high pressure safety valve is installed on the unit.

The unit fail safe is assured by cut-out of the electrical power supply to the coils of the compressor's contactors. The cut-out action is carried out by the electrical contact of a dedicated high-pressure switch.

No Schrader valve is installed in the service socket the circuit high pressure switch is screwed into. This implies that the replacement of the high pressure switch requires that the relevant refrigerant circuit has been discharged of all the refrigerant inside it.

***Figure 2- Indicative position of the signs warning about the necessity of replacing the high pressure switches with the unit void of refrigerant***


## Manual Alarm Reset

If there is an alarm the unit must not be manually reset before having located and eliminated the cause of the fault. Repeated manual resets may cause the warranty to be annulled.

# Unit Description

**City Advantage** CGWF SE, CGWF HE, CXWF are water-cooled heat pump and chiller reversible on water side. CXWF GEO are water-cooled heat pumps reversible on refrigerant side. The units are equipped with scroll compressor designed for indoor Installation. The units could have one or two independent refrigerant circuits, where each circuit is composed by two compressors per circuit. Units are packaged with an evaporator and a condender.

Each Unit is completely assembled, hermetic packaged, refrigerant circuit factory piped, electrical components wired, leak tested, dehydrated, charged and tested.

The chilled water inlet and outlet openings are covered for shipment.

Units feature exclusive Symbio™ 800 Control logic and controls.It monitors the control variables that govern the operation of the unit. Control logic can correct these variables when necessary to optimize operational efficiencies, to avoid the unit shut down, and keep producing the chilled or hot water.

These units come with various options and can be customized depending on capacity, efficiencies, acoustic levels, application requirements at the time of order placement.

## Nameplates

The CXWF, CGWF and CXWF GEO nameplates are applied to the exterior of the control panel. A compressor nameplate is located on each compressor.

## Unit Nameplate

The unit nameplate provides the following information:

- Unit model and size description
- Unit serial number
- Identifies unit electrical requirements
- Lists correct operating charges of refrigerant and refrigerant oil
- Lists unit test pressures

## Compressor Nameplate

The compressor nameplate provides following information:

- Compressor model number.
- Compressor serial number.
- Compressor electrical characteristics.
- Utilization range.
- Recommended refrigerant.

# Unit Model Number Description

**Digit 1, 2, 3, 4 – Unit Model**
CXWF - Water-Water Heat pump Scroll Chiller
CGWF - Water-Water Cooling only Scroll Chiller
CCUF - Water-Water condenserless Scroll

**Digit 5-6-7 – Unit size**
013 = Size 013
015 = Size 015
019 = Size 019
023 = Size 023
025 = Size 025
029 = Size 029
033 = Size 033
037 = Size 033
041 = Size 033
042 = Size 033
048 = Size 033
056 = Size 033
064 = Size 064
072 = Size 072
078 = Size 078
088 = Size 088
096 = Size 096
112 = Size 112
128 = Size 128
144 = Size 144
162 = Size 162
176 = Size 176
192 = Size 192

**Digit 8 – Efficiency**
N = Standard Efficiency
H = High Efficiency

**Digit 9 – Closed Panel Casing**
X = No Panel
C = With Closed Panel Casing

**Digit 10 - Refrigerant**
A = R-410A
3 = Nitrogen Charge (for R454B)
B = R-454B

**Digit 11 - Acoustic Package**
X = Standard Noise
L = Low Noise
S = Super Low Noise

**Digit 12 – Reversible Refrigerant System**
X = Non reversible refrigerant system
R = Reversible refrigerant Water to Water Heat Pump

**Digit 13 – Electronic Expansion Valve**
V = Electronic expansion valve

**Digit 14 – Power Factor Correction**
X = Without

**Digit 15 – Automatic Circuit Breakers**
B = Automatic Circuit Breakers

**Digit 16 – Master Slave**
X = Without
M = With

**Digit 17 – Ball valves Discharge and Liquid**
X = Without
V = Ball Valves discharge and liquid

**Digit 18 – Phase Failure protection relay**
X = Without
A = Phase failure protection relay

**Digit 19 – Soft Starter**
X = Without
A = Soft Starter

**Digit 20 – Electrical Power Supply**
G = 400V 50Hz 3Ph IT Neutral
X = Without Neutral

**Digit 21 – Numbered wires**
1 = Numbered wires

**Digit 22 – Control**
M = Symbio

**Digit 23 –Remote Control Display**
X = With built in display

**Digit 24 – Communication card**
1 = Modbus RTU
2 = Bacnet MS-TP
3 = Bacnet TCP-IP
4 = Lontalk
5 = Modbus TCP

**Digit 25 – Water Gauges**
X = Without
W = Water Gauges on 1 side
Y = Water Gauges on both sides

**Digit 26 – Gas Gauges**
X = Without
B = Gas Gauges

**Digit 27 – Automatic Water Filling**
X = Without

**Digit 28 – Isolators**
X = Without
R = Rubber antivibration mounts

**Digit 29 – Sea Container Kit**
X = Standard packaging
C = Sea container kit

**Digit 30 – Literature language**
D = Dutch
E = English
F = French
G = German
R = Greek
I = Italian
P = Polish
S = Spanish
T = Turkish

**Digit 31 – Evaporator Water Pump**
X = Without
1 = Single Low Head Evap water pump
2 = Single High Head Evap water pump
3 = Dual High Head Evap water pump
A = Single Low Head Evap Inverter water pump
B = Single High Head Evap Inverter water pump
C = Dual High Head Evap Inverter water pump

**Digit 32 – Buffer Tank on Evap water pump**
X = Without
B = Buffer tank on Evap water pump

**Digit 33 – Flow switch on Evap**
F = Flow switch on Evap

**Digit 34 – Water strainer on Evap**
X = Without
V = Water strainer on Evap

# Unit Model Number Description

**Digit 35 – Victaulic kit on Evap**
X = Without
V =Victaulic kit on Evap

**Digit 36 – Evap pump Auto Changeover**
X = Without
C = Automatic changeover on Evap water pump

**Digit 37 – External control package**
X = Without
1 = External control package

**Digit 38 – Energy meter**
X = Without
M = Energy meter

**Digit 39 – Supplemental Heat control**
X = Without
M = Supplemental Heat control

**Digit 40 – Evaporator smart flow control**
X = Without
P = VPF Constant Delta T Evaporator Water Flow Control

**Digit 41 – Condenser Water Pump**
X = Without
1 = Single Low Head Cond water pump
2 = Single High Head Cond water pump
3 = Dual High Head Cond water pump
A = Single Low Head Cond Inverter waterpump
B = Single High Head Cond Inverter waterpump
C = Dual High Head Cond Inverter waterpump

**Digit 42 – Condensing Control**
X = Constant Water Flow Control
C = VPF Constant Delta T Condenser Water Flow Control
D = Condensing control without Valves

**Digit 43 – Flow switch on Cond**
X = Without
F = Flow switch on Cond

**Digit 44 – Water strainer on Cond**
X = Without
F = Water strainer on Cond

**Digit 45 – Victaulic kit on Cond**
X = Without)
V = Victaulic kit on Cond

**Digit 46 – Cond pump Auto Changeover**
X = Without
A = Automatic Changeover on Cond water pump

**Digit 47 – Anti-freeze protection for Hydraulic**
X = Without
A = Anti freeze protection

**Digit 48 – BPHE Configuration**
B = B-Standard BPHE

**Digit 49 – 3-way valve for hot sanitary water**
X = Without
A = 3-way valve for hot sanitary water

**Digit 50 – Liquid Receiver**
X = Without
1= Liquid Receiver

**Digit 51 – Agency Listing**
C = CE Certification
U = UKCA marking

**Digit 52 – Unit Branding**
T = Trane
I = ICS
Z = Thermocold
M = MTA

**Digit 53 – Refrigerant Leak Detector**
X = Without
A = With Refrigerant leak detector (R454b)

**Digit 54 – Unit Application**
X = Comfort
L = Process
H = Booster

**Digit 55 – Special**
X = Without
S = Special

# General Data Table

| *CGWF SE* | | | | |
|---|---|---|---|---|
| **Unit size** | **Total cooling capacity [kW]** | **EER (1)** | **SEER (2)** | **ηsc (2)** |
| **13** | 52 | 4.75 | 6.43 | 254.2 |
| **15** | 59.7 | 4.64 | 6.26 | 247.4 |
| **19** | 66.8 | 4.56 | 6.06 | 239.5 |
| **23** | 79.3 | 4.57 | 6.21 | 245.3 |
| **25** | 91.5 | 4.7 | 6.17 | 243.9 |
| **29** | 107.5 | 4.73 | 6.33 | 250.1 |
| **33** | 126.3 | 4.79 | 6.43 | 254 |
| **37** | 139.5 | 4.84 | 6.57 | 259.9 |
| **41** | 152 | 4.78 | 6.33 | 250.3 |
| **42** | 151.7 | 4.55 | 5.79 | 228.5 |
| **48** | 175.5 | 4.31 | 5.34 | 210.4 |
| **56** | 207.9 | 4.51 | 5.7 | 225.2 |
| **64** | 245.9 | 4.59 | 5.92 | 233.7 |
| **72** | 272.6 | 4.68 | 6.06 | 239.4 |
| **78** | 296.7 | 4.6 | 5.84 | 230.7 |
| **88** | 328.7 | 4.59 | 6.03 | 238.1 |
| **96** | 356.2 | 4.39 | 5.75 | 227 |
| **162** | 595.4 | 4.58 | 6.4 | 253 |
| **176** | 645.6 | 4.65 | 6.47 | 255.8 |
| **192** | 690.9 | 4.59 | 6.39 | 252.5 |

| *CGWF HE* | | | | |
|---|---|---|---|---|
| **Unit size** | **Total cooling capacity [kW]** | **EER (1)** | **SEER (2)** | **ηsc (2)** |
| **13** | 52.7 | 5.04 | 6.67 | 263.6 |
| **15** | 60.3 | 4.91 | 6.53 | 258.3 |
| **19** | 69.7 | 5.02 | 6.69 | 264.6 |
| **23** | 83.6 | 5.04 | 6.74 | 266.6 |
| **25** | 94 | 5 | 6.52 | 257.8 |
| **29** | 110.9 | 5.03 | 6.56 | 259.4 |
| **33** | 129.8 | 5.17 | 6.83 | 270.4 |
| **37** | 143 | 5.1 | 6.75 | 266.8 |
| **41** | 155.7 | 5.01 | 6.52 | 257.7 |
| **42** | 158 | 5.04 | 6.47 | 255.8 |
| **48** | 185 | 4.96 | 6.25 | 246.9 |
| **56** | 217.2 | 4.87 | 6.15 | 243.2 |
| **64** | 250.2 | 4.93 | 6.33 | 250.2 |
| **72** | 277.5 | 5.04 | 6.53 | 258.3 |
| **78** | 302.5 | 4.99 | 6.4 | 252.9 |
| **88** | 331.2 | 4.76 | 6.18 | 244.3 |
| **96** | 372 | 4.88 | 6.47 | 255.8 |
| **112** | 430.9 | 4.96 | 6.53 | 258.1 |
| **128** | 483.5 | 5.02 | 6.81 | 269.4 |
| **144** | 563.2 | 4.9 | 6.56 | 259.6 |
| **162** | 613.9 | 4.87 | 6.65 | 262.9 |
| **176** | 663.4 | 4.83 | 6.52 | 257.8 |
| **192** | 694.5 | 4.67 | 6.42 | 253.8 |

**(1)** Evaporator water temperature in/out 12/7°C - condenser water temperature in/out 30/35°C. Technical data in accordance to EN 14511.

**(2)** Ecodesign rating for comfort chiller - fan coil application. ηsc/SEER as defined in Directive 2009/125/EC of the European Parliament and of the Council with regard to Ecodesign requirements for Comfort Chillers with 2000 kW maximum capacity - COMMISSION REGULATION (EU) N° 2016/2281 of 20 December 2016.

## General Data Table

| CXWF | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Unit size** | **Total cooling capacity [kW]** | **EER (1)** | **SEER (2)** | **ηsc (2)** | **Total heating capacity [kW]** | **COP (3)** | **SCOP LT (4)** | **ηsc LT (4)** | **SCOP MT (5)** | **ηsc MT (5)** |
| **13** | 52.7 | 5.04 | 6.7 | 263.6 | 58.8 | 4.33 | 6.41 | 248.4 | 4.94 | 189.5 |
| **15** | 60.4 | 4.92 | 6.5 | 258.3 | 67.9 | 4.28 | 6.23 | 241.2 | 4.9 | 188.2 |
| **19** | 69.7 | 5.03 | 6.7 | 264.6 | 77.3 | 4.38 | 6.52 | 253 | 5.02 | 193 |
| **23** | 83.6 | 5.04 | 6.7 | 266.6 | 93.2 | 4.42 | 6.4 | 248.2 | 5.02 | 193 |
| **25** | 94 | 5 | 6.5 | 257.8 | 104.4 | 4.44 | 6.45 | 250.1 | 5.03 | 193.2 |
| **29** | 111.2 | 5.04 | 6.6 | 259.4 | 123.5 | 4.46 | 6.44 | 249.5 | 5.07 | 194.7 |
| **33** | 129.8 | 5.17 | 6.8 | 270.4 | 142.9 | 4.54 | 6.55 | 254 | 5.12 | 197 |
| **37** | 143.1 | 5.11 | 6.7 | 266.8 | 158.2 | 4.53 | 6.52 | 252.7 | 5.14 | 197.5 |
| **41** | 155.8 | 5.01 | 6.5 | 257.7 | 173.2 | 4.48 | 6.38 | 247.3 | 5.09 | 195.6 |
| **42** | 158 | 5.04 | 6.5 | 255.8 | 175.1 | 4.44 | 6.41 | 248.2 | 5.01 | 192.2 |
| **48** | 185 | 4.96 | 6.2 | 246.9 | 206.7 | 4.42 | 6.22 | 240.8 | 4.94 | 189.5 |
| **56** | 217.2 | 4.87 | 6.2 | 243.2 | 243.3 | 4.37 | 6.09 | 235.5 | 4.92 | 188.9 |
| **64** | 250.4 | 4.93 | 6.3 | 250.2 | 280.6 | 4.43 | 6.18 | 239.3 | 4.99 | 191.5 |
| **72** | 277.7 | 5.04 | 6.5 | 258.3 | 310.7 | 4.49 | 6.25 | 242.2 | 5.06 | 194.6 |
| **78** | 302.7 | 4.99 | 6.4 | 252.9 | 339.8 | 4.46 | - | - | 5 | 192.1 |
| **88** | 331.4 | 4.77 | 6.2 | 244.3 | 376.8 | 4.3 | - | - | - | - |
| **96** | 372.2 | 4.88 | 6.5 | 255.8 | 421.5 | 4.37 | - | - | - | - |
| **112** | 431.1 | 4.97 | 6.5 | 258.1 | 484.6 | 4.46 | - | - | - | - |
| **128** | 483.7 | 5.02 | 6.8 | 269.4 | 543.1 | 4.5 | - | - | - | - |
| **144** | 563.5 | 4.9 | 6.6 | 259.6 | 635.7 | 4.39 | - | - | - | - |
| **162** | 614.2 | 4.87 | 6.6 | 262.9 | 693.5 | 4.39 | - | - | - | - |
| **176** | 663.8 | 4.83 | 6.5 | 257.8 | 750.8 | 4.38 | - | - | - | - |
| **192** | 694.8 | 4.67 | 6.4 | 253.8 | 791.7 | 4.28 | - | - | - | - |

**(1)** Evaporator water temperature in/out 12/7°C - condenser water temperature in/out 30/35°C. Technical data in accordance to EN 14511.

**(2)** Ecodesign rating for comfort chiller - fan coil application. ηsc/SEER as defined in Directive 2009/125/EC of the European Parliament and of the Council with regard to Ecodesign requirements for Comfort Chillers with 2000 kW maximum capacity - COMMISSION REGULATION (EU) N° 2016/2281 of 20 December 2016.

**(3)** Evaporator water temperature in/out 10/7°C - condenser water temperature in/out 40/45°C. Technical data in accordance to EN 14511.

**(4)** Ecodesign rating at low temperature conditions. Source water temperature in/out 10/7°C and inlet hot water temperature in/out 30/35°C. ηsc / SCOP as defined in Directive 2009/125/EC of the European Parliament and of the Council with regard to Ecodesign requirements for Space heaters and combination heaters with Prated < 400kW - COMMISSION REGULATION (EU) N° 813/2013 of 2 August 2013.

**(5)** Ecodesign rating at low temperature conditions. Source water temperature in/out 10/7°C and inlet hot water temperature in/out 47/55°C. ηsc / SCOP as defined in Directive 2009/125/EC of the European Parliament and of the Council with regard to Ecodesign requirements for Space heaters and combination heaters with Prated < 400kW - COMMISSION REGULATION (EU) N° 813/2013 of 2 August 2013.

## General Data Table

| CXWF GEO | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Unit size** | **Total cooling capacity [kW]** | **EER (1)** | **SEER (2)** | **ηsc (2)** | **Total heating capacity [kW]** | **COP (3)** | **SCOP LT (4)** | **ηsc LT (4)** | **SCOP MT (5)** | **ηsc MT (5)** |
| **13** | 49.6 | 4.56 | 6.34 | 245.6 | 55.49 | 4 | 6.1 | 235.9 | 4.43 | 169.2 |
| **15** | 57.38 | 4.52 | 6.33 | 245.3 | 64.2 | 3.98 | 6.06 | 234.5 | 4.49 | 171.4 |
| **19** | 64.8 | 4.52 | 6.12 | 236.8 | 72.56 | 4 | 5.89 | 227.6 | 4.42 | 168.9 |
| **23** | 78.67 | 4.59 | 6.35 | 246.2 | 87.63 | 4.07 | 6.04 | 233.5 | 4.52 | 172.7 |
| **25** | 87.31 | 4.5 | 5.93 | 229.3 | 97.71 | 4.03 | 5.82 | 225 | 4.41 | 168.6 |
| **29** | 104.2 | 4.56 | 6.17 | 238.8 | 115.99 | 4.08 | 5.96 | 230.6 | 4.54 | 173.5 |
| **33** | 121.18 | 4.63 | 6.14 | 237.7 | 134.01 | 4.13 | 5.96 | 230.5 | 4.51 | 172.2 |
| **37** | 134.17 | 4.62 | 6.19 | 239.6 | 148.4 | 4.12 | 5.97 | 230.8 | 4.55 | 174.2 |
| **41** | 146.97 | 4.59 | 5.94 | 229.7 | 162.67 | 4.1 | 5.86 | 226.3 | 4.49 | 171.6 |
| **42** | 151.82 | 4.38 | 6.01 | 232.3 | 167.65 | 3.91 | 5.9 | 228.1 | 4.6 | 176 |
| **48** | 179.36 | 4.38 | 5.93 | 229.3 | 198.51 | 3.93 | 5.87 | 226.8 | 4.59 | 175.4 |
| **56** | 210.08 | 4.27 | 5.74 | 221.7 | 232.72 | 3.85 | 5.67 | 218.8 | 4.53 | 173 |
| **64** | 239.12 | 4.43 | 6.18 | 239.3 | 267.7 | 4.07 | 5.92 | 228.7 | 4.67 | 178.8 |
| **72** | 269.92 | 4.6 | 6.59 | 255.4 | 300.05 | 4.19 | 6.28 | 243.3 | 4.83 | 185.2 |
| **78** | 295.03 | 4.59 | 6.42 | 248.9 | 328 | 4.18 | 6.16 | 238.6 | 4.81 | 184.5 |
| **88** | 323.79 | 4.4 | 6.23 | 241.2 | 364.34 | 4.05 | 5.95 | 229.9 | 4.68 | 179.3 |
| **96** | 359.86 | 4.42 | 6.41 | 248.3 | 406.02 | 4.06 | - | - | - | - |
| **112** | 408.32 | 4.41 | 6.29 | 243.7 | 459.66 | 4.07 | - | - | - | - |
| **128** | 462.77 | 4.51 | 6.67 | 258.7 | 517.7 | 4.16 | - | - | - | - |

**(1)** User water temperature in/out 12/7°C - source water temperature in/out 30/35°C. Technical data in accordance to EN 14511.

**(2)** Ecodesign rating for comfort chiller - fan coil application. ηsc/SEER as defined in Directive 2009/125/EC of the European Parliament and of the Council with regard to Ecodesign requirements for Comfort Chillers with 2000 kW maximum capacity - COMMISSION REGULATION (EU) N° 2016/2281 of 20 December 2016.

**(3)** Source water temperature in/out 10/7°C - user water temperature in/out 40/45°C. Technical data in accordance to EN 14511.

**(4)** Ecodesign rating at low temperature conditions. Source water temperature in/out 10/7°C and inlet hot water temperature in/out 30/35°C. ηsc/ SCOP as defined in Directive 2009/125/EC of the European Parliament and of the Council with regard to Ecodesign requirements for Space heaters and combination heaters with Prated < 400kW - COMMISSION REGULATION (EU) N° 813/2013 of 2 August 2013.

**(5)** Ecodesign rating at low temperature conditions. Source water temperature in/out 10/7°C and inlet hot water temperature in/out 47/55°C. ηsc / SCOP as defined in Directive 2009/125/EC of the European Parliament and of the Council with regard to Ecodesign requirements for Space heaters and combination heaters with Prated < 400kW - COMMISSION REGULATION (EU) N° 813/2013 of 2 August 2013.

# Pre-Installation

## Inspection Checklist

When the unit is delivered, verify that it is the correct unit and that it is properly equipped. Compare the information which appears on the unit nameplate with the ordering and submittal information.

Inspect all exterior components for visible damage. Report any apparent damage or material shortage to the carrier and make a “unit damage” notation on the carrier’s delivery receipt. Specify the extent and type of damage found and notify the appropriate Sales Office. Do not proceed with installation of a damaged unit without sales office approval.

## Unit Storage

If the chiller is to be stored for more than one month prior to installation, observe the following precautions:

- Store the unit in a secured area, to avoid intentional damages.
- Store the chiller in a dry, vibration-free, secure area.
- At least every three months, attach a gauge and manually check the pressure in the refrigerant circuit.
- If the refrigerant pressure is below 13 bar (R-410A)/ 12.5 bar (R-454B) at 20°C {or 10 bar (R-410A)/ 9.5 bar (R-454B) at 10°C}, call a qualified service organization and the appropriate sales office.

**Note:** If the unit is stored before servicing near a construction site it is highly recommended to protect micro channel coils from any concrete and iron element. Failure to do so may considerably reduce reliability of the unit.

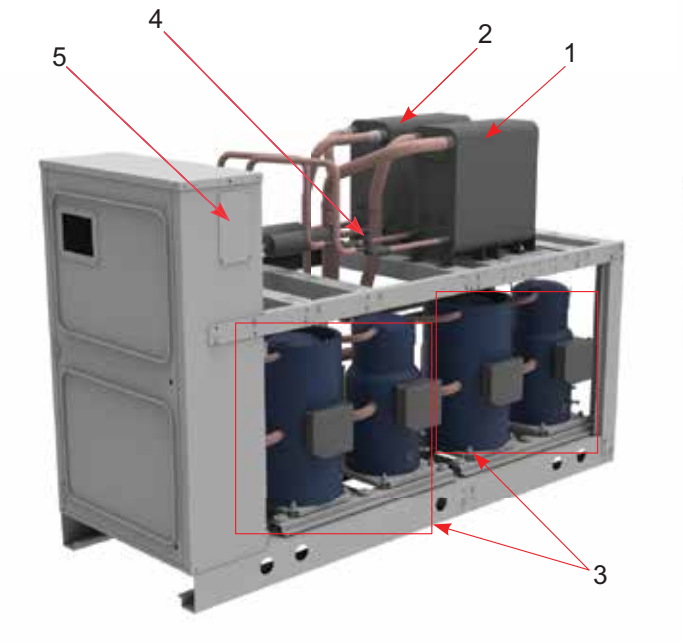
## Installation Requirements and Contractor Responsibilities

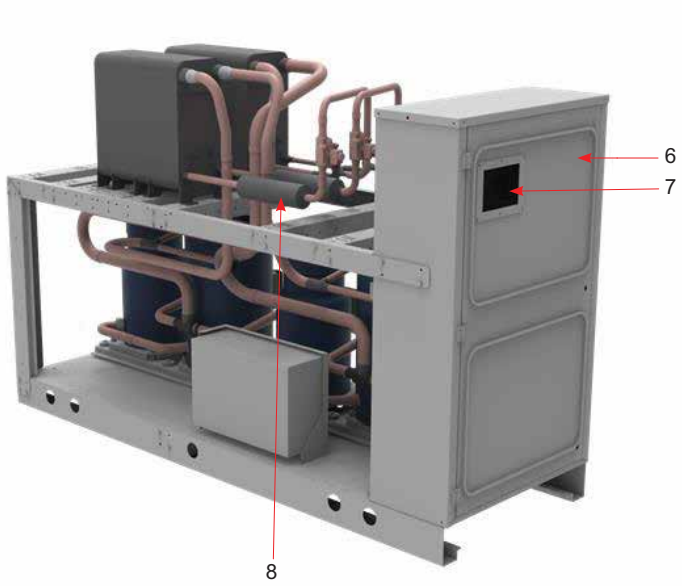
***Table 1 - List of the contractor responsibilities typically associated with the unit installation process is provided.***

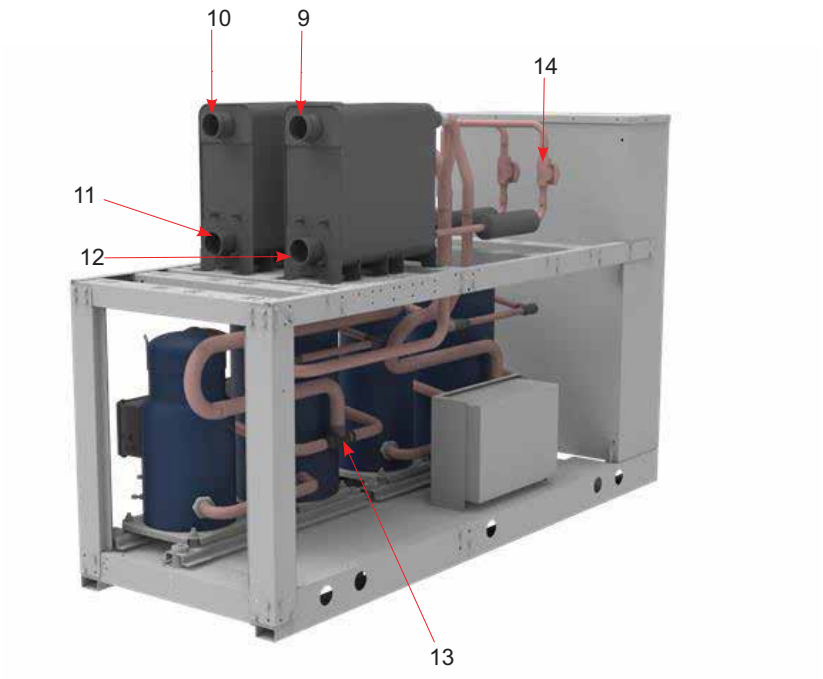
| Type of requirement | Manufacturer-supplied Manufacturer-installed | Manufacturer-supplied Field-installed | Field-supplied Field-installed |
|---|---|---|---|
| Foundation | | | • Meet Foundation Requirements |
| Rigging | | | • Safety Chains<br>• Clevis Connectors<br>• Lifting Beams |
| Isolation | | • Isolators (Optional) | • Neoprene Pads<br>• Isolators (Customer Supplied) |
| Electrical | • Disconnect Switch<br>• Unit Mounted Starter | | • Wiring Sizes Per Submittals and Local Codes and Regulations<br>• Terminal Lugs<br>• Ground Connection(s)<br>• Bas Wiring (Optional)<br>• Control Voltage Wiring<br>• Chilled Water Pump Contactor and Wiring Including Interlock<br>• Option Relays and Wiring |
| Water Piping | | • Water Strainer (Optional)<br>• Flow Switch | • Taps For Thermometers and Gauges<br>• Thermometers<br>• Water Flow Pressure Gauges<br>• Isolation and Balancing Valves in Water Piping<br>• Vents and Drains<br>• Pressure Relief Valves<br>• Pressure Switch Device to Detect Lack of Water |
| Insulation | Insulation | | Insulation (Piping) |
| Water Piping Connection Elements | Grooved Pipe | Grooved Pipe Couplings (Or) Flanged Adapters | |
| Leak Detector | Leak Detector is Supplied by manufacturer and Wired | | |

# Typical Components Location

## CGWF and CXWF



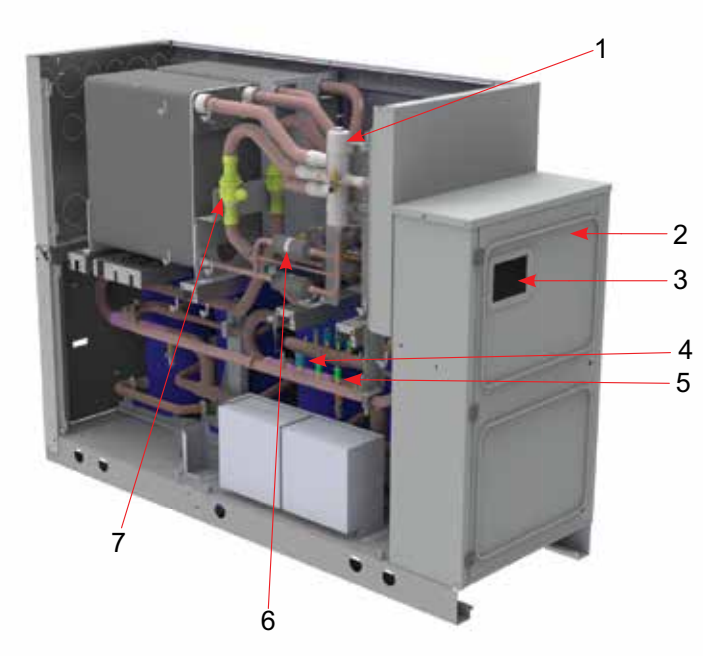



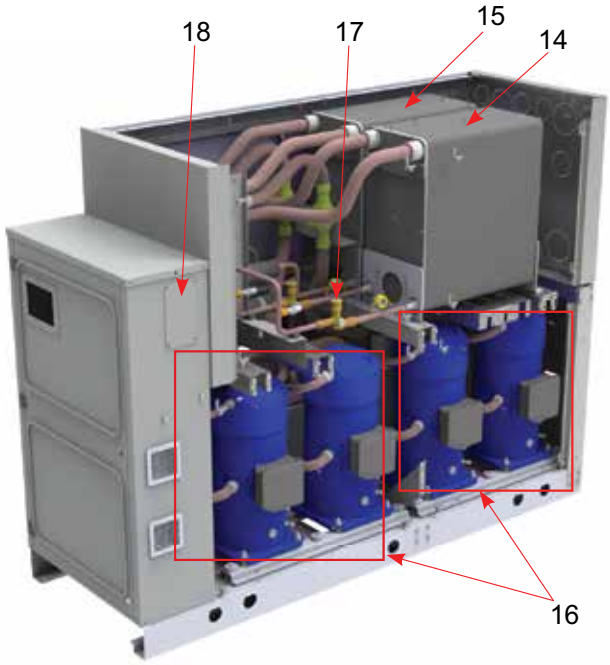

| Item | Description |
|---|---|
| 1 | Evaporator |
| 2 | Condenser |
| 3 | Compressor Circuits 1 and 2 |
| 4 | EXV |
| 5 | Electrical Cable Inlet |
| 6 | Control Box |
| 7 | Display |
| 8 | Filter Drier |
| 9 | Water Outlet Cond Side |
| 10 | Water Inlet Evap Side |
| 11 | Water Outlet Evap Side |
| 12 | Water Inlet Cond Side |
| 13 | Suction Line |
| 14 | Liquid Solenoid valve |

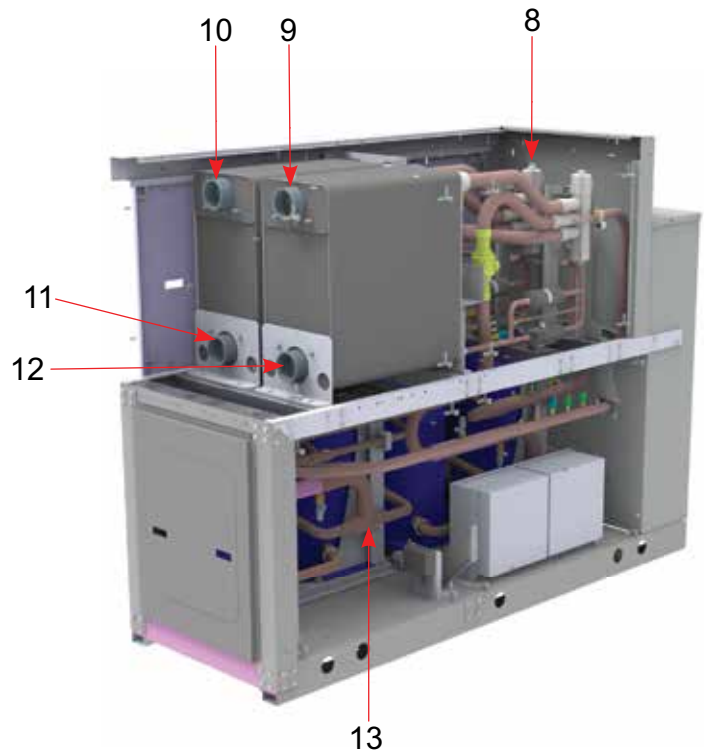
***Note:*** *The image shows the unit equipped without optional closed panels case.*

## Typical Components Location

# CXWF GEO



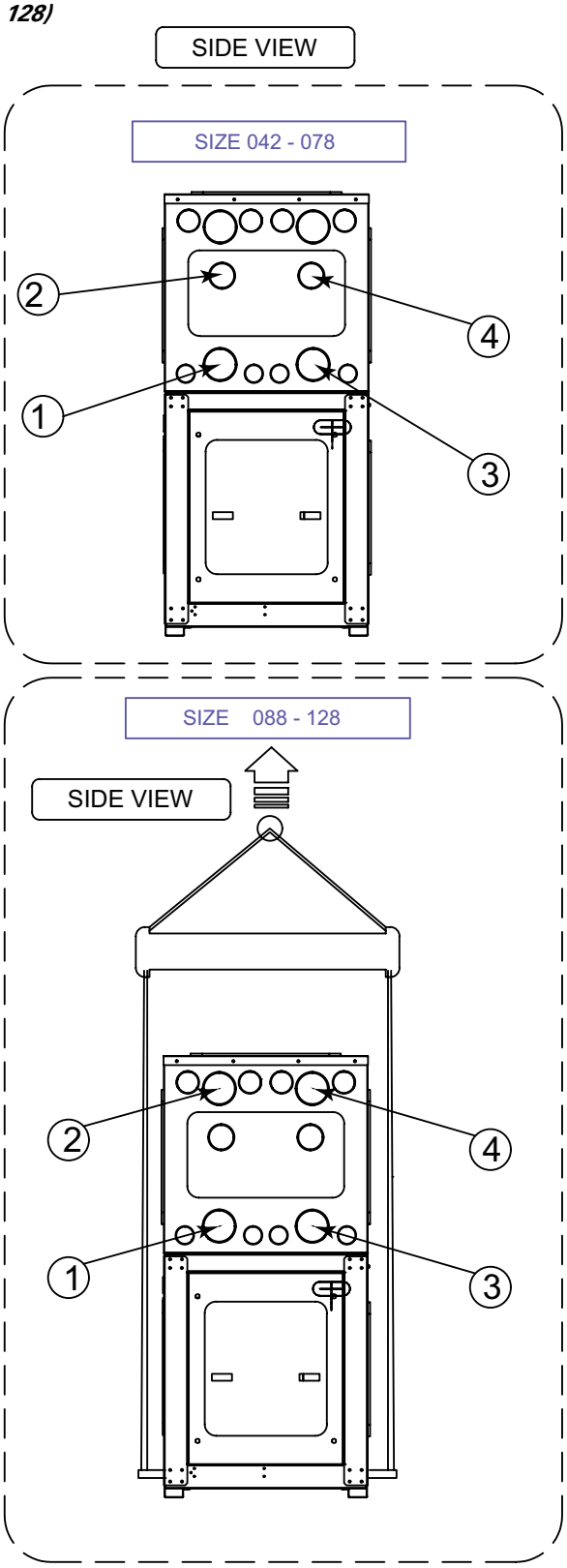

| Item | Description |
|---|---|
| 1 | 4-way Valve |
| 2 | Control Box |
| 3 | Display |
| 4 | Temp Sensor |
| 5 | Pressure Switch |
| 6 | Filter Drier |
| 7 | Ball Valve |
| 8 | Reversing Valve (Ckt1) |
| 9 | Water Inlet User Side |
| 10 | Water Inlet Source Side |
| 11 | Water Outlet Source Side |
| 12 | Water Outlet User Side |
| 13 | Suction Line |
| 14 | Source Side |
| 15 | User Side |
| 16 | Compressor Circuits 1 and 2 |
| 17 | EXV |
| 18 | Electrical Cable Inlet |

***Note:*** *The image shows the unit equipped with optional closed panels case.*

# Installation Requirements

***Important:*** *Ensure to remove the metal pre-cuts according to the submittals.*

***Figure 3 - Pre-cuts location (CGWF/CXWF size 042 to 128)***




**Attention**

Do not use forklift trucks to lift the unit from below.

If equipment for lifting from above is not available, using rollers may move the unit.

The surface on which the unit is placed must be flat and strong enough to withstand the weight of the unit while running. In order to reduce the transmission of vibrations to the supporting structures, fit shock absorbers in every fastening point. Rubber shock absorbers are recommended for units installed on the ground, spring shock absorbers for units installed on roofs. Open spaces around the unit must be provided for in order to allow for the passage of necessary airflow and in order to allow normal maintenance to be carried out (as shown on general catalogues).

**WARNING:** Make sure that during transport the CGWF SE / CGWF HE unit ALWAYS remains in the correct position!

For example horizontal positioning of the unit can lead to irreversible damage to the compressors.

Damage arising from incorrect transport will not be under warranty by the manufacturer.

**Immediately report an incorrect receipt of goods.**

An arrow positioned upward indicates the vertical position of the unit.

# Location Requirements

## Sound Consideration

The most effective form of acoustical isolation is to locate the unit away from any sound sensitive area. Structurally transmitted sound can be reduced by isolators. Spring isolators are not recommended.

For maximum isolation effect, isolate water lines and electrical conduit. Rubber isolated piping hangers can be used to reduce the sound transmitted through water piping. To reduce sound transmitted through electrical conduit, use flexible electrical conduit.

EU and Local Regulations codes on sound emissions should always be considered. Since the environment in which a sound source is located affects the sound pressure, unit placement must be carefully evaluated.

## Minimum Space Requirement

Dimensional drawing shall be respected to avoid:

- Noise.
- Incorrect heat exchange and ventilation.
- Difficult maintenance or inaccessibility to components.

## Clearances

When installing the unit, provide enough space around the unit to allow the installation and maintenance personnel unrestricted access to all service points.

Unobstructed flow of condenser air is essential to maintain chiller capacity and operating efficiency. When determining unit placement, give careful consideration to ensuring a sufficient airflow across the condenser coils heat-transfer surface.

In case of enclosure around the unit, the height of the enclosure must not be higher than the unit itself. If the enclosure is higher than the unit, restrictive airflow louvers should be fitted to ensure fresh air supply.

***Figure 4 - Minimum space requirements [mm] for platform 1 units (CGWF, CXWF, CXWF GEO from size 013 to 025)***

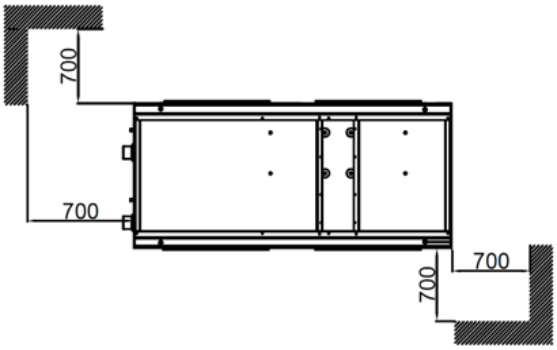
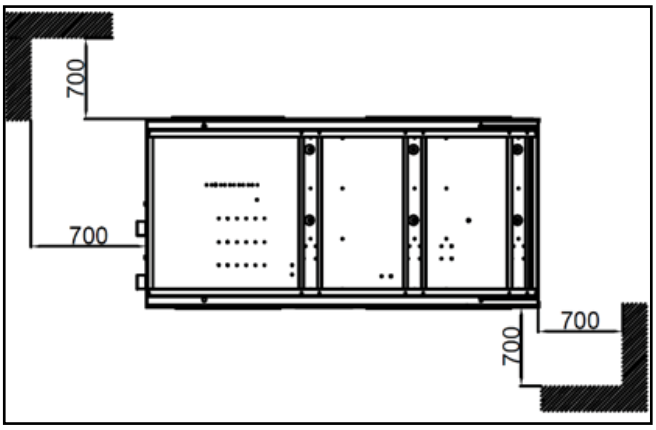



***Figure 5 - Minimum space requirements [mm] for platform 2 units Correct lifting procedure for units with size 2 frame (CGWF, CXWF, CXWF GEO from size 029 to 041)***



# Installation Requirements

***Figure 6 - Minimum space requirements [mm] for platform 3 units (sizes with two refrigerant circuits - CGWF, CXWF, CXWF GEO from size 064 to 128)***

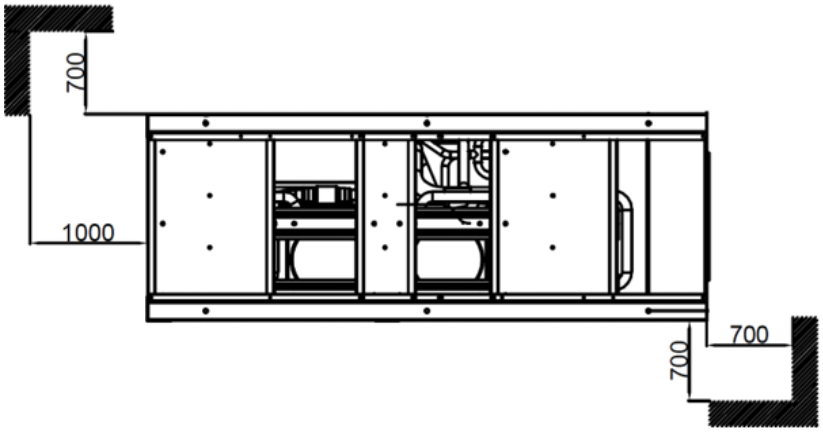
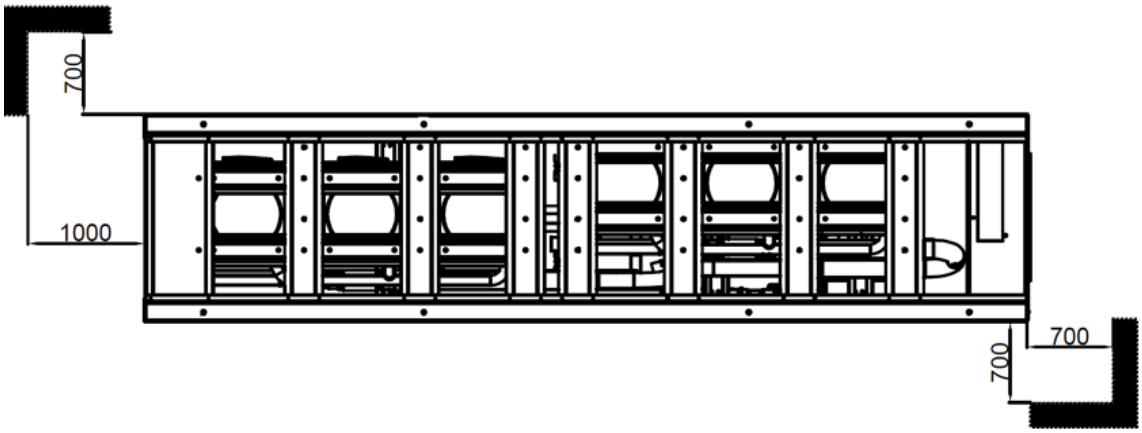



***Figure 7 - Minimum space requirements [mm] for platform 4 units (CGWF, CXWF, CXWF GEO from size 144 to 192)***




Side of the unit that can be placed next to the wall. This means that with the unit at a distance less than the optimal one of 700 mm the accessibility to some components is worse but in any case is ensured even if the unit is leaning against the wall.

**CAUTION:** In case two units have to be installed side by side, the distance of respect must be doubled. After the unit has reached the final position, fix the anti-vibration bolts.

## Installation Responsibilities

Generally contractor must do the following Items when installing the unit:

1. Install the unit on a flat foundation strong enough to support unit loading and level (within 5 mm across the length and width of the unit).
2. Install the units as per instructions contained in this manual.
3. Where specified, provide and install valves in the water piping upstream and downstream of the evaporator water connections, to isolate the evaporator for maintenance, and to balance and trim the system.
4. Furnish and install a water flow prove device and/or auxiliary contacts to prove chiller water flow.
5. Furnish and install water pressure gauges in the inlet and outlet of the evaporator water box.
6. Supply and install an air vent cock to the top of the evaporator or evaporator piping.
7. Furnish and install strainers ahead of all pumps and automatic modulating valves.
8. Provide and install field wiring according to schematics provided in the control panel.
9. Install heat tape and insulate the chilled water lines and any other portion of the system, as required, to prevent sweating under normal operating conditions or freezing during low ambient temperature conditions

10. Ensure that the compressor and compressor heaters have been operating for a minimum of 24 hours before starting. Failure to do so may result in equipment damage.
11. Start the unit under supervision of a qualified service technician.
12. Install the flow switch and cable it, following the correct installation instructions.
13. The user must make a risk analysis of the machinery room where the unit is installed.

## Lifting and Moving Instructions

A specific lifting method is recommended, which can be described as follow:

1. Lifting points are built into the unit, see lifting instruction label on the unit.
2. Slings and spreader bar must be provided by crane operator and attached on the lifting points.
3. Use the 4 rigging points which are built into the unit.
4. The minimum lifting capacity of each sling as well as the spreader bar must be higher than the tabulated unit shipping weight.

***Figure 8- Lifting the unit***

**CAUTION!** Lift and handle with care. Avoid shocks while handling.

Details of lifting instruction and container pull out are given in the drawings specific for lifting and handling shipped with the unit.

**WARNING! Heavy Objects!** Ensure that all the lifting equipment used is properly rated for weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles used to lift the unit must be capable of supporting the entire weight of unit. Lifting cables (chains or slings) may not be the same length. Adjust as necessary for even unit lift. Other lifting arrangements could cause equipment or property damage. Failure to follow instructions above or properly lift unit could result in unit dropping and possibly crushing operator/ technician which could result in death or serious injury.

**WARNING! Improper Unit Lift!** Test lift unit approximately 10 cm to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level. Failure to properly lift unit could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury and possible equipment or property- only damage.

## Dimension and Weights

Dimensions details, dimensions of hydraulic connections, electrical connections, isolator positioning, specific features for heat recovery and free-cooling are included in submittals and diagrams provided in documentation package.

## Center of Gravity

See instructions on lifting drawings, available on request.

# Installation Requirements

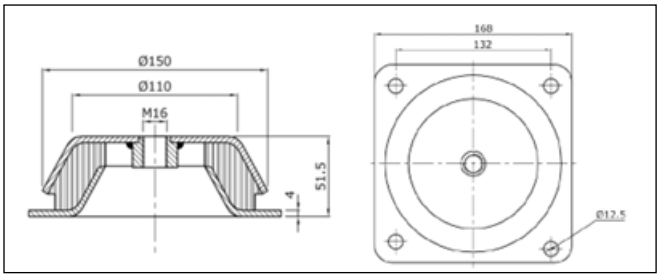
## Unit Isolation and Levelling

Provide a foundation with sufficient strength and mass to support the unit operating weight (that is, including completed piping, full operating charges of refrigerant and oil, and water). Refer to unit operating weights. The unit must be levelled within 5 mm over its length and width. Use shims as necessary to level the unit. For additional reduction of sound and vibration, install the optional isolator. Isolators Installation (Optional)

Isolators are ready to install. Mountings have to be placed on a rigid and level foundation. External equipment should not transmit additional vibration to the chiller. The position of elastomeric isolator and weight per point are given in the Neoprene isolators installation drawing which is supplied with the chiller. Wrong placement along the unit may result in excessive deflection.

1. Secure the isolators to the mounting surface using the mounting slots in the isolator's base plate. Do NOT fully tighten the isolators mounting bolts at this time. See the isolators submittals for isolators location, maximum weights, and isolators diagrams.
2. Align the mounting holes in the base of the unit with the threaded positioning pins on the top of the isolators.
3. Level the unit carefully. Fully tighten the isolator mounting bolts.
4. The Shore of TKAGDOM4 is 45 and TKAGWA04.
5. For more information contact sales support.

***Figure 9- Rubber isolator (TKAGDOM4 and TKAGAWA04)***

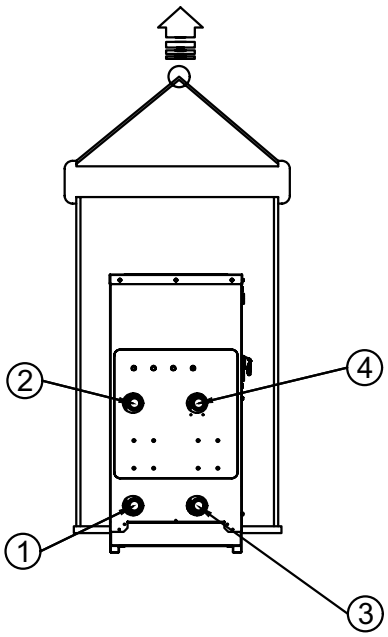



| D42=1 (Rubber Isolators) | | | | | |
|---|---|---|---|---|---|
| **CGWF HE/SE, CXWF, CCUF Size** | **No. Support Point** | **Basic Unit** | **No. Support Point** | **Pump(s) Hydraulic Kit** | **Tank Hydraulic Kit** |
| **013** | 4 | TKAGAWA04 | 4 | TKAGHY2G1 | TKAGHY2G2 |
| **015** | 4 | TKAGAWA04 | 4 | TKAGHY2G1 | TKAGHY2G2 |
| **019** | 4 | TKAGAWA04 | 4 | TKAGHY2G1 | TKAGHY2G2 |
| **023** | 4 | TKAGAWA04 | 4 | TKAGHY2G1 | TKAGHY2G2 |
| **025** | 4 | TKAGAWA04 | 4 | TKAGHY2G1 | TKAGHY2G2 |
| **029** | 4 | TKAGAWA04 | 4 | TKAGHY2G1 | TKAGHY2G2 |
| **033** | 4 | TKAGAWA04 | 4 | TKAGHY2G1 | TKAGHY2G2 |
| **037** | 4 | TKAGAWA04 | 4 | TKAGHY2G1 | TKAGHY2G2 |
| **041** | 4 | TKAGAWA04 | 4 | TKAGHY2G1 | TKAGHY2G2 |
| **042** | 6 | TKAGDOM2 | 4 | TKAGHY2G1 | TKAGHY2G2 |
| **048** | 6 | TKAGAWA05 | 4 | TKAGHY2G1 | TKAGAWA04 |
| **056** | 6 | TKAGAWA05 | 4 | TKAGHY2G1 | TKAGAWA04 |
| **064** | 6 | TKAGAWA05 | 4 | TKAGHY2G1 | TKAGAWA04 |
| **072** | 6 | TKAGAWA05 | 4 | TKAGHY2G1 | TKAGAWA04 |
| **078** | 6 | TKAGAWA05 | 4 | TKAGHY2G1 | TKAGAWA04 |
| **088** | 6 | TKAGDOM4 | 4 | TKAGHY2G1 | TKAGAWA04 |
| **096** | 6 | TKAGDOM4 | 4 | TKAGHY2G1 | TKAGAWA04 |
| **112** | 8 | TKAGDOM4 | 4 | TKAGHY2G1 | TKAGAWA04 |
| **128** | 8 | TKAGDOM4 | 4 | TKAGHY2G1 | TKAGAWA04 |
| **144** | 8 | TKAGDOM3A | | | |
| **162** | 8 | TKAGDOM3A | | | |
| **176** | 8 | TKAGDOM3A | | | |
| **192** | 8 | TKAGDOM3A | | | |

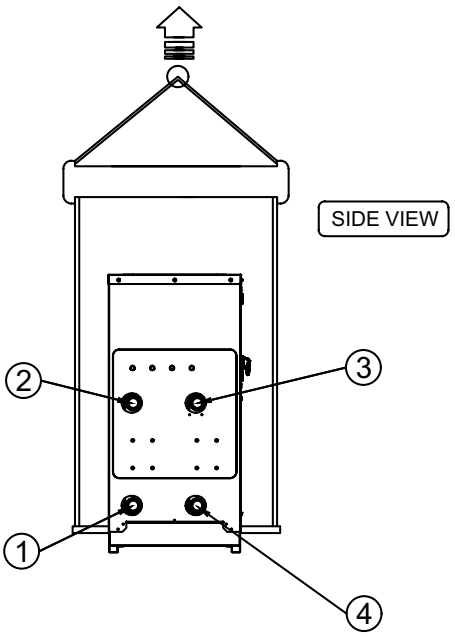
# Water Connection

## Typical View of Water Connection

### CXWF GEO




### CGWF / CXWF




Note the correct water inlet and outlet connections.

| Item | Description |
|---|---|
| 1 | SOURCE WATER OUTLET |
| 2 | SOURCE WATER INLET |
| 3 | USER WATER OUTLET |
| 4 | USER WATER INLET |

| Item | Description |
|---|---|
| 1 | EVAPORATOR WATER OUTLET |
| 2 | EVAPORATOR WATER INLET |
| 3 | CONDENSER WATER OUTLET |
| 4 | CONDENSER WATER INLET |

***Note:*** *In the TD-7 display for CXWF GEO, even though it is labeled as Evap Entering / Leaving, it is Condenser Entering / Leaving information and it represents the User Side BPHE, see "Heating - CXWF GEO" on page 60.*

# Water Connection

## Water Treatment

**NOTICE**:The use of untreated or improperly treated water in a chiller may result in scaling, erosion, corrosion, algae or slime. It is recommended that the service of a qualified water treatment specialist be engaged to determine what water treatment, if any, is required. Manufacturer assumes no responsibility for equipment failures which results from untreated or improperly treated water or saline or brackish water.

Dirt, scale, products of corrosion, and other foreign material will adversely affect heat transfer between the water and system components. Foreign matter in the chilled-water system can also increase pressure drop and consequently, reduce water flow. Proper water treatment must be determined locally, depending on the type of system and local water characteristics.

**NOTICE**: **Equipment Damage!** If using any commercial flushing/cleaning solution, construct a temporary bypass around the unit to prevent damage to internal components of the evaporator/condenser. Manufacturer assumes no responsibility for equipment damage caused by flushing/cleaning solutions or water-born debris.

Condenser piping must follow the installation features represented in “Hydraulic Package” on page 33.

Condensing temperature and water flow rate have to be in accordance with nominal values, unless the acknowledgement order shows different indications. It is strictly necessary that in the presence of condenser side dirty or aggressive water, an intermediate heat exchanger must be installed before the condenser.

Condenser nominal pressure (PN) = 10 bar.

The connections schemes relating to evaporator are featured in “Hydraulic Package” on page 33. The connection tubes have to be supported adequately in order that their weight does not damage the plant.

It is necessary that the water flow rate to the unit is compatible with the evaporator one. It is also necessary that the water flow rate is kept uniform while the unit is running: it is suggested to use always a pump system dedicated to the unit and independent from the remaining part of the plant.

Before installing units with temperature around 0°C please evacuate the exchanger with compressed air in order to avoid breakings due to ice.

If the unit is installed in order to replace another, the entire hydraulic system must be emptied and cleaned before the new unit is installed. Regular tests and proper chemical treatment of water are recommended before starting up the new unit.

In the event that glycol is added to the hydraulic system as anti-freeze protection, pay attention to the fact that intake pressure will be lower, the unit’s performance wil be lower and water pressure drops will be greater. All unit-protection methods, such as anti-freeze, and low-pressure protection will need to be reset. Before insulating water piping, check that there are no leaks.

Evaporator nominal pressure (PN) = 10 bar.

**CAUTION:** Install a mechanical water filter at the water inlet of each evaporator heat exchanger and of each condenser heat exchanger as featured in “Hydraulic Schematic Diagrams” on page 31. Failure to install the filter allows access of solid particles and/or welding slag inside the heat exchanger. We recommend the installation of a filter having a filtering net with holes not exceeding 1.6 mm in diameter.

***Table 2 - Calculation of total minimum water content, total optimal water content and flow rates***

| Plant side chilled water heat exchanger | | | | | | |
|---|---|---|---|---|---|---|
| **CGWF** | **SE** | **Vopt [m3]** | **Vmin [m3]** | **K** | **Q min [m3/h]** | **Q max [m3/h]** |
| **One refrigerant circuit sizes** | **013** | 0,45 | 0,26 | 242,5 | 4,5 | 14,9 |
| | **015** | 0,51 | 0,29 | 241,5 | 5,1 | 17,1 |
| | **019** | 0,58 | 0,33 | 240,8 | 5,8 | 19,2 |
| | **023** | 0,68 | 0,39 | 239,8 | 6,8 | 22,8 |
| | **025** | 0,79 | 0,45 | 102,8 | 7,9 | 26,3 |
| | **029** | 0,93 | 0,53 | 102,4 | 9,3 | 30,8 |
| | **033** | 1,09 | 0,62 | 55,9 | 10,9 | 36,8 |
| | **037** | 1,20 | 0,69 | 55,8 | 12,0 | 40,0 |
| | **041** | 1,31 | 0,75 | 55,7 | 13,1 | 43,6 |
| **Two refrigerant circuits sizes** | **042** | 1,31 | 0,75 | 54,2 | 13,1 | 43,5 |
| | **048** | 1,51 | 0,86 | 54,1 | 15,1 | 50,3 |
| | **056** | 1,79 | 1,02 | 53,9 | 17,9 | 59,7 |
| | **064** | 2,12 | 1,21 | 22,8 | 21,2 | 70,5 |
| | **072** | 2,34 | 1,34 | 22,7 | 23,4 | 78,2 |
| | **078** | 2,55 | 1,46 | 22,7 | 25,5 | 85,0 |
| | **088** | 2,84 | 1,62 | 16,3 | 28,4 | 94,8 |
| | **096** | 3,08 | 1,76 | 16,1 | 30,8 | 120,7 |
| | **162** | 5,15 | 2,94 | 5,1 | 51,5 | 171,7 |
| | **176** | 5,58 | 3,19 | 5,0 | 55,8 | 186,1 |
| | **192** | 5,98 | 3,41 | 4,9 | 59,8 | 199,2 |

**LEGEND:**

**Vmin:** minimum water content of the plant

**Vopt:** optimal water content of the plant

**Q min:** minimum water flow to the heat exchanger

**Q max**: maximum water flow to the heat exchanger

$\Delta$**Tmax chiller** = 10 °C

$\Delta$**Tmin chiller** = 3 °C

**dpw** = $K \cdot Q^2$ / 1000 Q = 0,86 P/$\Delta$T

# Water Connection

***Table 3 - Calculation of total minimum water content, total optimal water content and flow rates***

| Plant side chilled water heat exchanger | | | | | | |
|---|---|---|---|---|---|---|
| **CGWF** | **HE** | **Vopt [m3]** | **Vmin [m3]** | **K** | **Q min [m3/h]** | **Q max [m3/h]** |
| **One refrigerant circuit sizes** | **013** | 0,45 | 0,26 | 242,4 | 4,5 | 15,1 |
| | **015** | 0,52 | 0,30 | 241,5 | 5,2 | 17,3 |
| | **019** | 0,60 | 0,34 | 103,6 | 6,0 | 20,0 |
| | **023** | 0,72 | 0,41 | 103,0 | 7,2 | 24,0 |
| | **025** | 0,81 | 0,46 | 56,3 | 8,1 | 27,0 |
| | **029** | 0,96 | 0,55 | 56,1 | 9,6 | 31,9 |
| | **033** | 1,12 | 0,64 | 38,5 | 11,2 | 37,3 |
| | **037** | 1,23 | 0,70 | 38,4 | 12,3 | 41,1 |
| | **041** | 1,34 | 0,77 | 38,4 | 13,4 | 44,7 |
| **Two refrigerant circuits sizes** | **042** | 1,32 | 0,76 | 54,2 | 13,2 | 44,1 |
| | **048** | 1,59 | 0,91 | 22,9 | 15,9 | 53,1 |
| | **056** | 1,89 | 1,08 | 15,2 | 18,9 | 63,0 |
| | **064** | 2,17 | 1,24 | 17,1 | 21,7 | 72,2 |
| | **072** | 2,40 | 1,37 | 16,8 | 24,0 | 80,0 |
| | **078** | 2,62 | 1,50 | 16,5 | 26,2 | 87,2 |
| | **088** | 2,86 | 1,64 | 16,3 | 28,6 | 95,5 |
| | **096** | 3,22 | 1,84 | 9,2 | 32,2 | 107,3 |
| | **112** | 3,73 | 2,13 | 5,4 | 37,3 | 124,3 |
| | **128** | 4,18 | 2,39 | 5,2 | 41,8 | 139,4 |
| | **144** | 4,87 | 2,79 | 3,1 | 48,7 | 162,5 |
| | **162** | 5,31 | 3,04 | 3,1 | 53,1 | 177,1 |
| | **176** | 5,74 | 3,28 | 3,1 | 57,4 | 191,4 |
| | **192** | 6,01 | 3,43 | 3,0 | 60,1 | 200,3 |

**LEGEND:**

**Vmin:** minimum water content of the plant

**Vopt:** optimal water content of the plant

**Q min:** minimum water flow to the heat exchanger

**Q max:** maximum water flow to the heat exchanger

$\Delta$**Tmax chiller** = 10 °C

$\Delta$**Tmin chiller** = 3 °C

**dpw** = $K \cdot Q^2 / 1000$ Q = 0,86 P/$\Delta$T

*Table 4 - Calculation of total minimum water content, total optimal water content and flow rates*

| | | Plant side chilled water heat exchanger | | | | | Plant side hot water hot exchanger | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CXWF | | Vopt [m3] | Vmin [m3] | K | Q min [m3/h] | Q max [m3/h] | Vopt [m3] | Vmin [m3] | K | Q min [m3/h] | Vopt [m3] |
| One refrigerant circuit sizes | **013** | 0,45 | 0,26 | 242,4 | 4,5 | 15,1 | 1,45 | 0,51 | 112,0 | 3,4 | 16,9 |
| | **015** | 0,52 | 0,30 | 241,5 | 5,2 | 17,3 | 1,67 | 0,58 | 111,5 | 3,9 | 19,5 |
| | **019** | 0,60 | 0,34 | 103,6 | 6,0 | 20,0 | 1,90 | 0,67 | 111,1 | 4,4 | 22,2 |
| | **023** | 0,72 | 0,41 | 103,0 | 7,2 | 24,0 | 2,29 | 0,80 | 60,4 | 5,3 | 26,7 |
| | **025** | 0,81 | 0,46 | 56,3 | 8,1 | 27,0 | 2,57 | 0,90 | 60,2 | 6,0 | 29,9 |
| | **029** | 0,96 | 0,55 | 56,1 | 9,6 | 31,9 | 3,03 | 1,06 | 41,2 | 7,1 | 35,4 |
| | **033** | 1,12 | 0,64 | 38,5 | 11,2 | 37,3 | 3,51 | 1,23 | 28,4 | 8,2 | 41,0 |
| | **037** | 1,23 | 0,70 | 38,4 | 12,3 | 41,1 | 3,89 | 1,36 | 28,3 | 9,1 | 45,4 |
| | **041** | 1,34 | 0,77 | 38,4 | 13,4 | 44,7 | 4,26 | 1,49 | 28,3 | 9,9 | 49,7 |
| Two refrigerant circuits sizes | **042** | 1,32 | 0,76 | 54,2 | 13,2 | 44,1 | 4,25 | 1,49 | 28,1 | 9,9 | 49,6 |
| | **048** | 1,59 | 0,91 | 22,9 | 15,9 | 53,1 | 5,08 | 1,78 | 18,6 | 11,8 | 59,2 |
| | **056** | 1,89 | 1,08 | 15,2 | 18,9 | 63,0 | 6,01 | 2,10 | 18,6 | 14,0 | 70,1 |
| | **064** | 2,17 | 1,24 | 17,1 | 21,7 | 72,2 | 6,93 | 2,42 | 14,9 | 16,2 | 80,8 |
| | **072** | 2,40 | 1,37 | 16,8 | 24,0 | 80,0 | 7,67 | 2,68 | 8,4 | 17,9 | 89,5 |
| | **078** | 2,62 | 1,50 | 16,5 | 26,2 | 87,2 | 8,39 | 2,94 | 8,3 | 19,6 | 97,9 |
| | **088** | 2,86 | 1,64 | 16,3 | 28,6 | 95,5 | 9,30 | 3,26 | 8,2 | 21,7 | 108,5 |
| | **096** | 3,22 | 1,84 | 9,2 | 32,2 | 107,3 | 10,40 | 3,64 | 4,8 | 24,3 | 121,4 |
| | **112** | 3,73 | 2,13 | 5,4 | 37,3 | 124,3 | 11,96 | 4,19 | 4,7 | 27,9 | 139,5 |
| | **128** | 4,18 | 2,39 | 5,2 | 41,8 | 139,4 | 13,41 | 4,69 | 3,1 | 31,3 | 156,4 |
| | **144** | 4,87 | 2,79 | 3,1 | 48,7 | 162,5 | 15,69 | 5,49 | 2,8 | 36,6 | 183,0 |
| | **162** | 5,31 | 3,04 | 3,1 | 53,1 | 177,1 | 17,12 | 5,99 | 2,7 | 40,0 | 199,8 |
| | **176** | 5,74 | 3,28 | 3,1 | 57,4 | 191,4 | 18,53 | 6,49 | 2,7 | 43,2 | 216,2 |
| | **192** | 6,01 | 3,43 | 3,0 | 60,1 | 200,3 | 19,54 | 6,84 | 2,7 | 45,6 | 228,0 |

**LEGEND:**

**Vmin:** minimum water content of the plant

**Vopt:** optimal water content of the plant

**Q min:** minimum water flow to the heat exchanger

**Q max**: maximum water flow to the heat exchanger

$\Delta$**Tmax chiller** = 10 °C

$\Delta$**Tmin chiller** = 3 °C

**dpw** = $K \cdot Q^2 / 1000$ Q = 0,86 P/$\Delta$T

# Water Connection

***Table 5 - Calculation of total minimum water content, total optimal water content and flow rates***

| | | Plant side user heat exchanger | | | | Plant side source heat exchanger | | | |
|---|---|---|---|---|---|---|---|---|---|
| **CXWF GEO** | | **Vopt [m3]** | **Vmin [m3]** | **Q min [m3/h]** | **Q max [m3/h]** | **Vopt [m3]** | **Vmin [m3]** | **Q min [m3/h]** | **Vopt [m3]** |
| **One refrigerant circuit sizes** | **013** | 1.37 | 0.50 | 4.27 | 14.22 | 1.49 | 0.54 | 3.58 | 11.93 |
| | **015** | 1.58 | 0.58 | 4.93 | 16.45 | 1.72 | 0.63 | 4.14 | 13.78 |
| | **019** | 1.78 | 0.65 | 5.57 | 18.58 | 1.95 | 0.71 | 4.68 | 15.60 |
| | **023** | 2.16 | 0.79 | 6.77 | 22.55 | 2.36 | 0.86 | 5.68 | 18.94 |
| | **025** | 2.40 | 0.88 | 7.51 | 25.03 | 2.62 | 0.96 | 6.32 | 21.06 |
| | **029** | 2.85 | 1.04 | 8.96 | 29.87 | 3.12 | 1.14 | 7.53 | 25.11 |
| | **033** | 3.30 | 1.21 | 10.42 | 34.74 | 3.63 | 1.33 | 8.73 | 29.11 |
| | **037** | 3.65 | 1.34 | 11.54 | 38.46 | 4.02 | 1.47 | 9.66 | 32.21 |
| | **041** | 4.00 | 1.46 | 12.64 | 42.13 | 4.40 | 1.61 | 10.58 | 35.26 |
| **Two refrigerant circuits sizes** | **042** | 4.18 | 1.53 | 13.06 | 43.52 | 4.59 | 1.68 | 10.92 | 36.40 |
| | **048** | 4.95 | 1.81 | 15.42 | 51.42 | 5.42 | 1.98 | 12.95 | 43.18 |
| | **056** | 5.80 | 2.12 | 18.07 | 60.22 | 6.38 | 2.33 | 15.08 | 50.28 |
| | **064** | 6.59 | 2.41 | 20.56 | 68.55 | 7.21 | 2.64 | 17.37 | 57.90 |
| | **072** | 7.38 | 2.70 | 23.21 | 77.38 | 8.08 | 2.96 | 19.66 | 65.52 |
| | **078** | 8.07 | 2.95 | 25.37 | 84.57 | 8.84 | 3.23 | 21.47 | 71.57 |
| | **088** | 8.96 | 3.28 | 27.85 | 92.82 | 9.77 | 3.58 | 23.60 | 78.67 |
| | **096** | 9.99 | 3.65 | 30.95 | 103.16 | 10.85 | 3.97 | 26.32 | 87.74 |
| | **112** | 11.31 | 4.14 | 35.12 | 117.05 | 12.32 | 4.51 | 29.82 | 99.40 |
| | **128** | 12.74 | 4.66 | 39.80 | 132.66 | 13.91 | 5.09 | 33.83 | 112.75 |

**LEGEND:**

**Vmin:** minimum water content of the plant

**Vopt:** optimal water content of the plant

**Q min:** minimum water flow to the heat exchanger

**Q max**: maximum water flow to the heat exchanger

$\Delta$**Tmax chiller** = 10 °C

$\Delta$**Tmin chiller** = 3 °C

# Hydraulic Package

CGWF SE / CGWF HE / CXWF / CXWF GEO units are available in combination with various external hydraulic kits which are supplied separately from the unit and supplied directly by manufacturer.

***Figure 10 – The available modules are the following ones:***

Single pump hydraulic kit with or without inverter

2 x single pump hydraulic kit with or without inverter

Double pump hydraulic kit with or without inverter

Tank kit

Possible combinations are all the ones that can be generated by the hydraulic kits represented above.

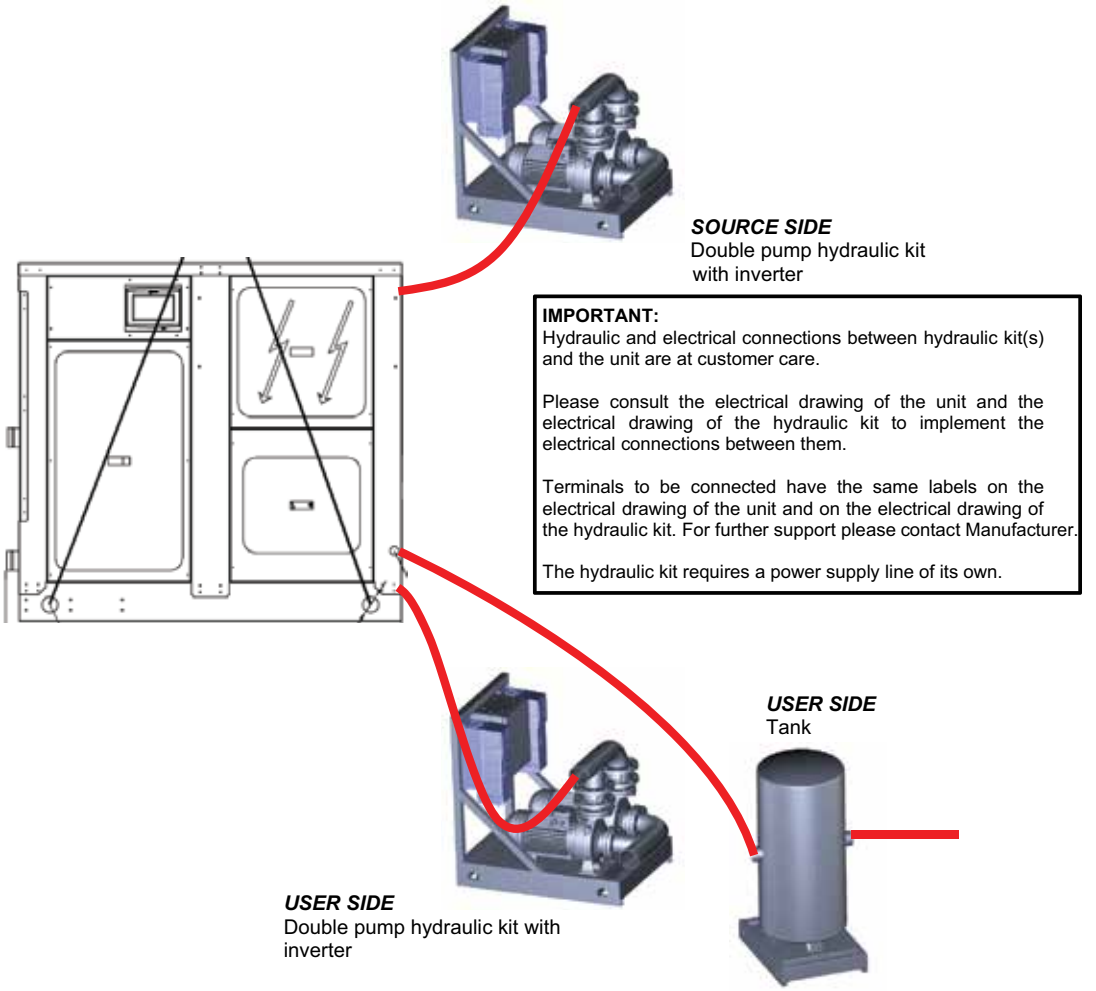
The combinations “single pump module with or without inverter” and “double pump module with or without inverter” can be selected for both the evaporator side and the condenser side.

The kit “2 x single pump module with or without inverter” is selected when a single pump is needed on both the evaporator side and the condenser side.

Tank module can be selected only for the evaporator side.

# Hydraulic Package

***Figure 11 – Example of a possible configuration:***




**IMPORTANT**: No hydraulic kits are provided for the biggest 4 sizes of CGWF HE (585 ÷ 700) and CXWF (670 ÷ 835)

Optional Hydraulic accessories on the price list

- "Y" water strainer (sold separately), consists of body and stainless steel mesh (*), with replaceable filter through the inspection cap.
- Automatic water filling (sold separately).
- Water gauges kit
- Victaulic kit (**)

**IMPORTANT:** Water strainer and flow switch must be installed on water circuit (user side) in order to keep the warranty. Since no water flow control device is installed on the unit, the flow switch is always provided as a loose accessory (optional) and must be installed by the customer.

(*) Water strainer with meshes not over 0.5mm

(**) A Victaulic kit must be provided for every side of the unit (user and or source one) to be connected.

In case of selection of external hydraulic kit, it is necessary to provide 1 kit for the unit and 1 kit for the external hydraulic kit module.

E.g. : CGWF + external water kit module + water tank module + Victaulic kit on user side

Select nr. 3 victaulic kits (1 kit for unit + 1 kit for pump hydraulic kit + 1 kit for water tank)

# Hydraulic Schematic Diagrams

## CGWF and CXWF

***Figure 12 - Hydraulic diagram for CGWF (SE and HE) - CXWF units and hydraulic modules with no pump no tank on user side, and 2 pumps without tank on source side***

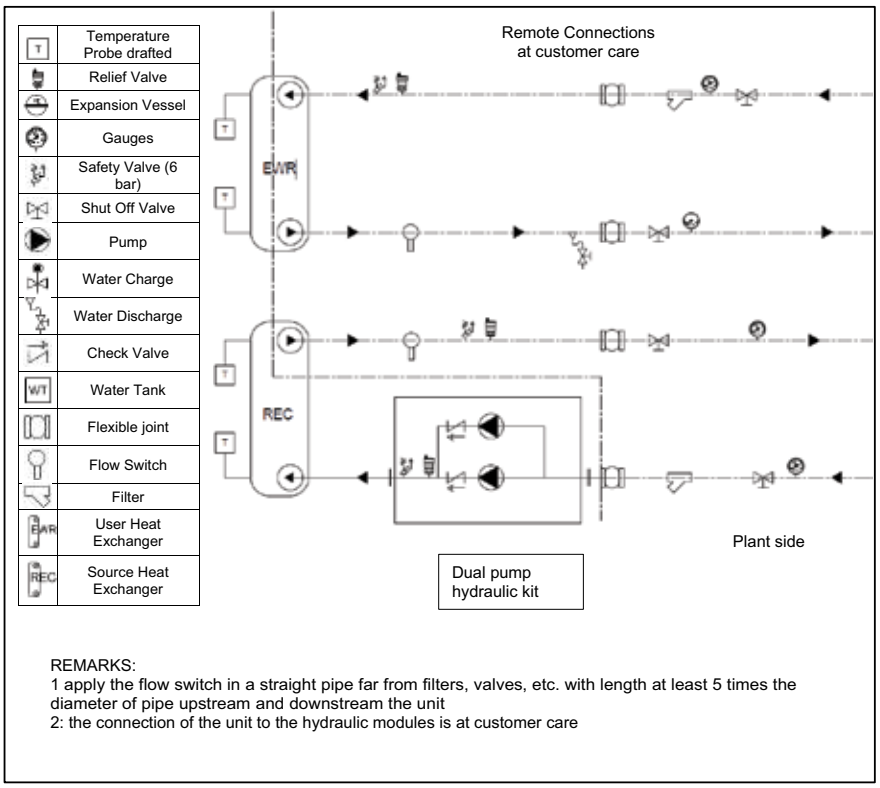
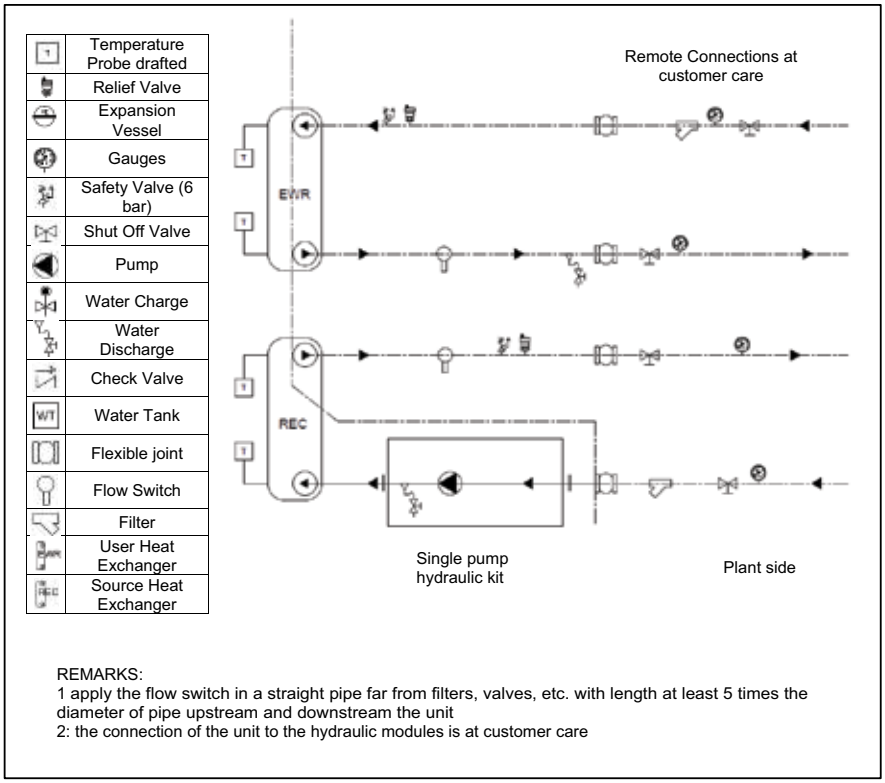



***Figure 13- Hydraulic diagram for CGWF (SE and HE) - CXWF units and hydraulic modules with no pump no tank on user side and 1 pump without tank on source side, with low or high head***



# Hydraulic Schematic Diagrams

***Figure 14 - Hydraulic diagram for CGWF (SE and HE) - CXWF units and hydraulic modules with 1 pump without tank on user side with low or high head; no pump no tank on source side***

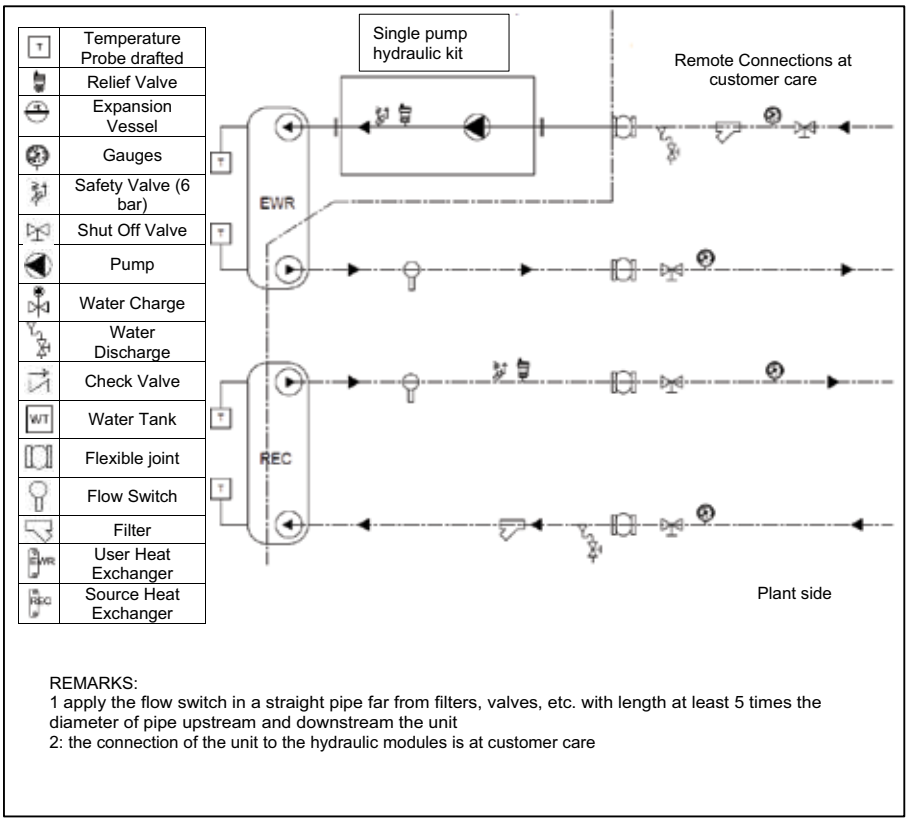



***Figure 15 - Hydraulic diagram for CGWF (SE and HE) - CXWF units and hydraulic modules with 1 pump with low or high head and tank on user side; no pump no tank on source side***

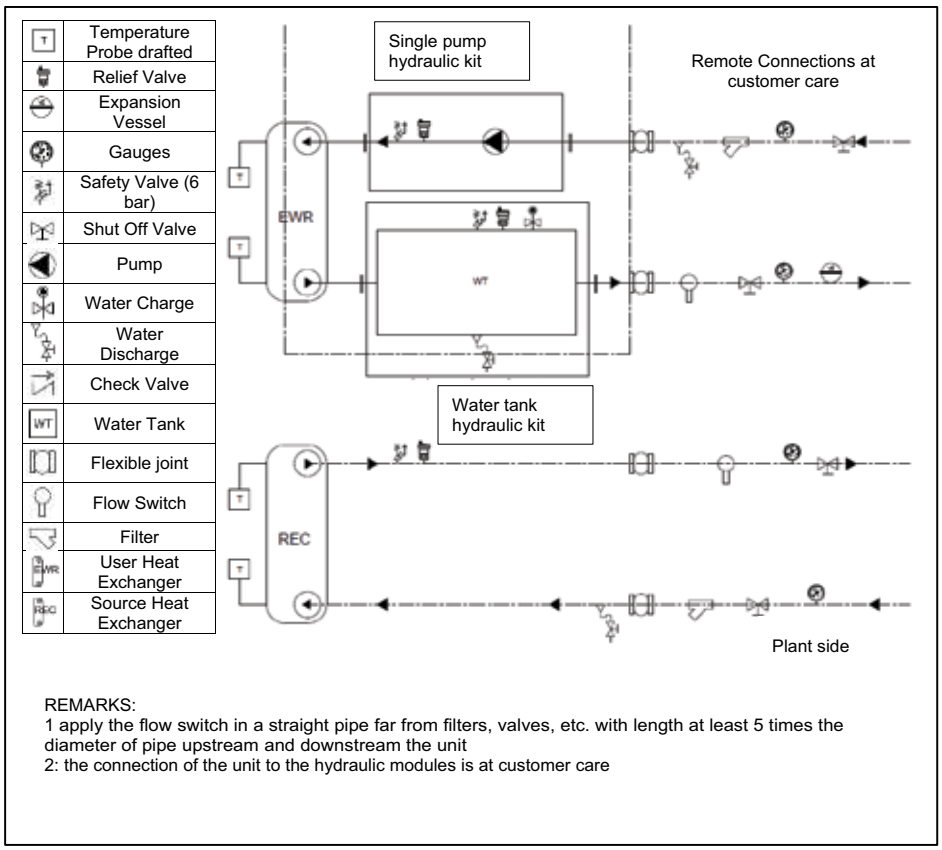


***Figure 16 - Hydraulic diagram for CGWF (SE and HE) - CXWF units and hydraulic modules with 1 pump without tank on user side and 1 pump on source side***

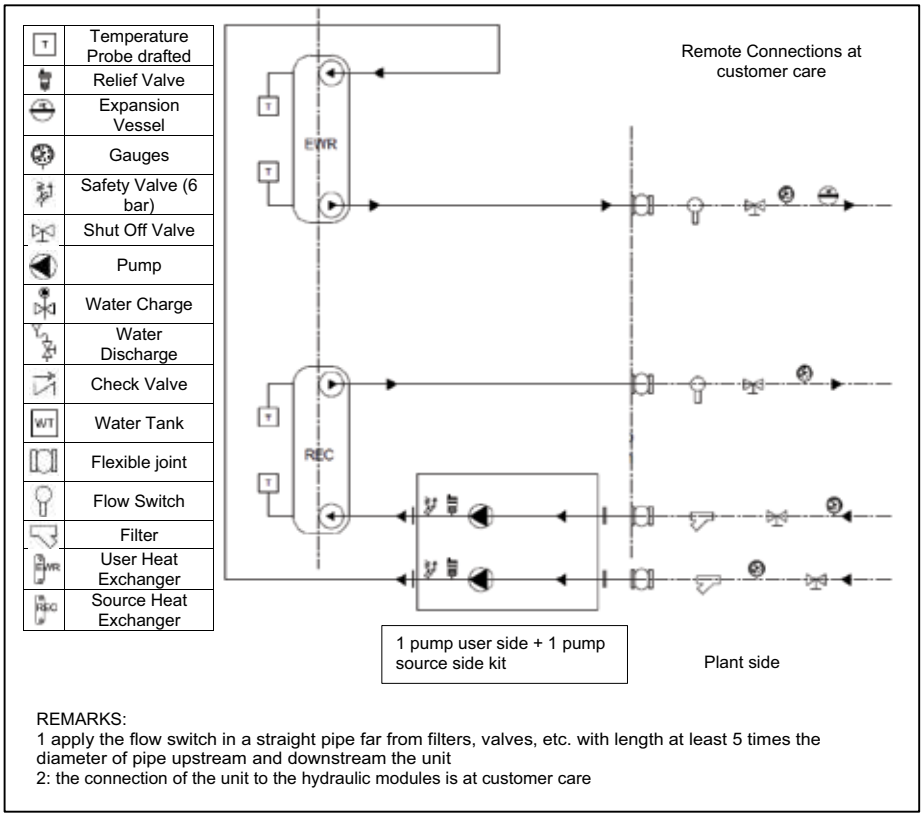
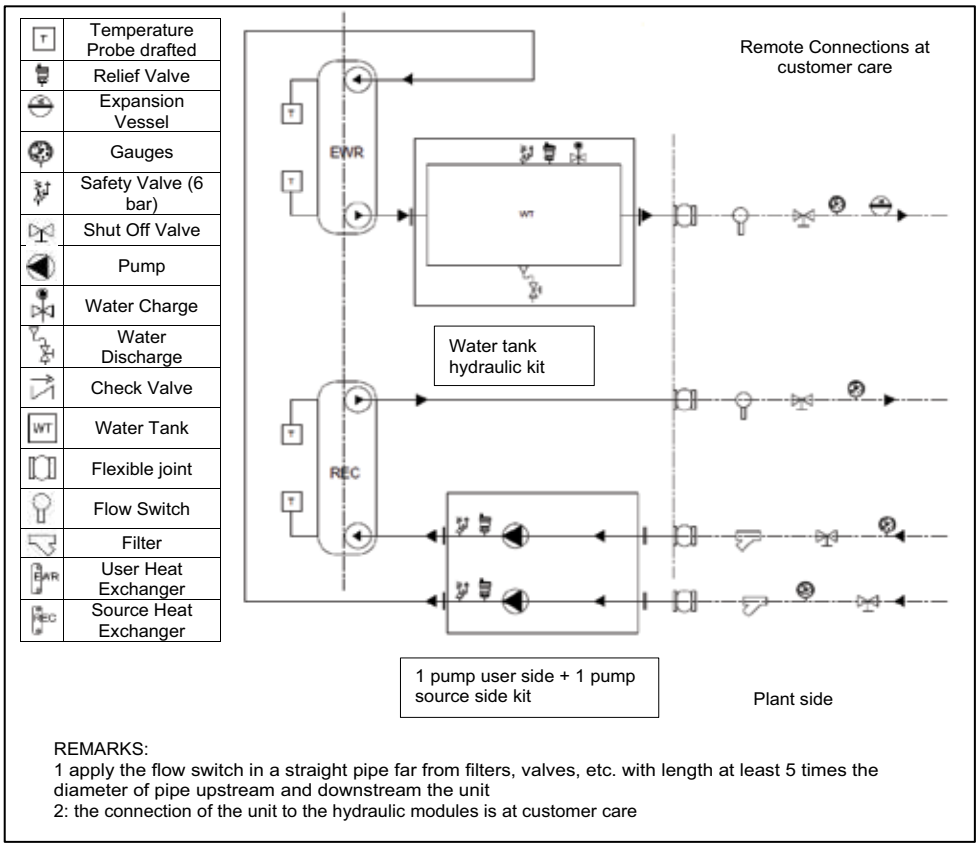
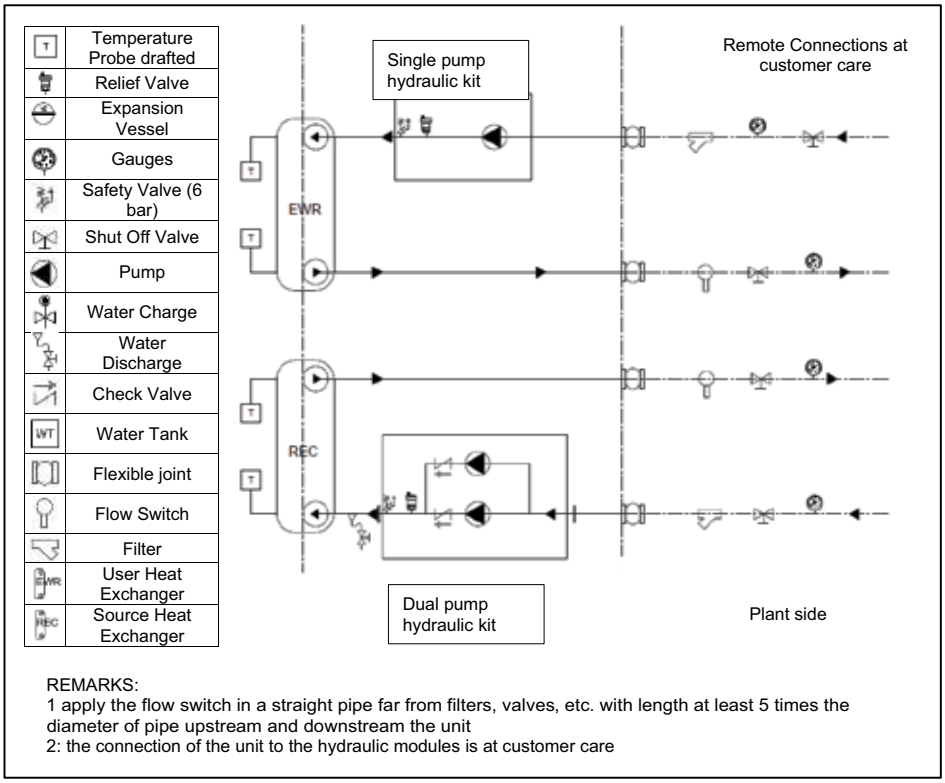



***Figure 17 - Hydraulic diagram for CGWF (SE and HE) - CXWF units and hydraulic modules with 1 pump and tank on user side and 1 pump without tank on source side***



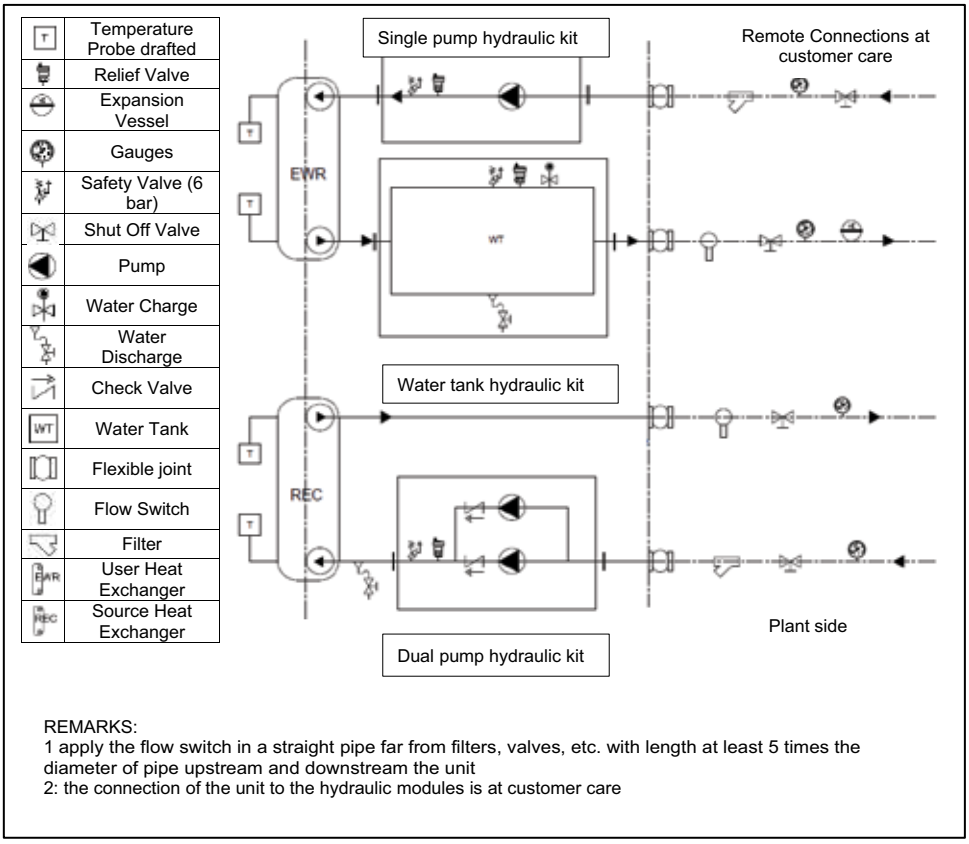
# Hydraulic Schematic Diagrams

***Figure 18 - Hydraulic diagram for CGWF (SE and HE) - CXWF units and hydraulic modules with 1 pump without tank on user side and 2 pumps without tank on source side***




REMARKS:
1 apply the flow switch in a straight pipe far from filters, valves, etc. with length at least 5 times the diameter of pipe upstream and downstream the unit
2: the connection of the unit to the hydraulic modules is at customer care

***Figure 19 - Hydraulic diagram for CGWF (SE and HE) - CXWF units and hydraulic modules with pump and tank on user side and 2 pumps without tank on source side***




REMARKS:
1 apply the flow switch in a straight pipe far from filters, valves, etc. with length at least 5 times the diameter of pipe upstream and downstream the unit
2: the connection of the unit to the hydraulic modules is at customer care

***Figure 20 - Hydraulic diagram for CGWF (SE and HE) - CXWF units and hydraulic modules with 2 pumps without tank on user side and no pump no tank on source side***

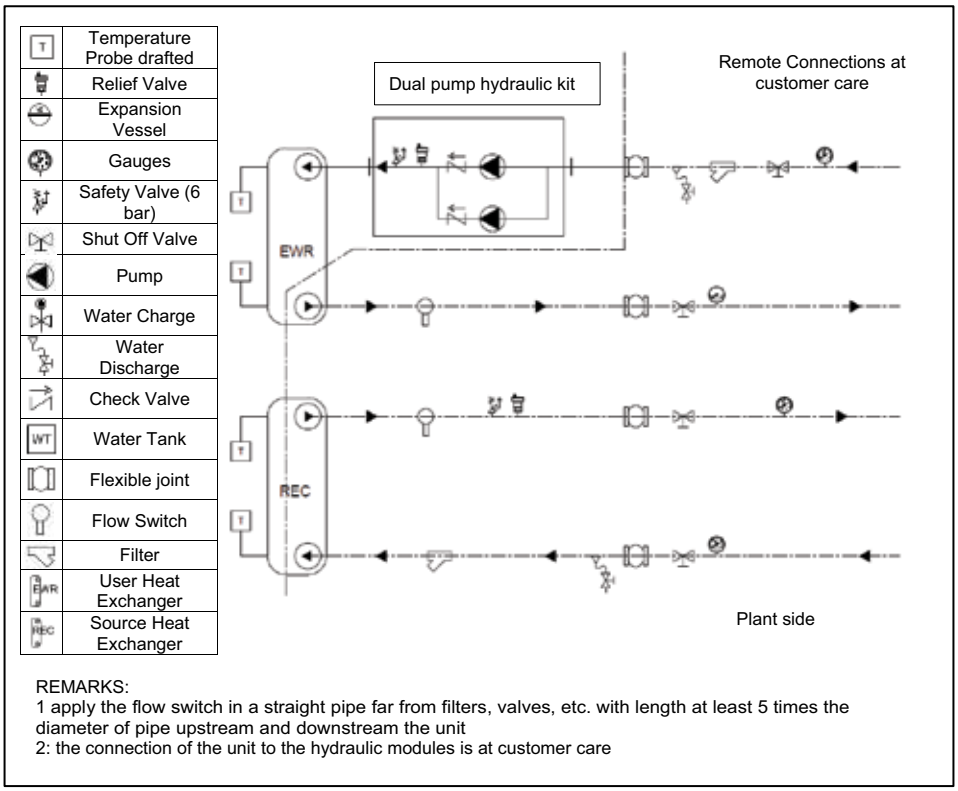
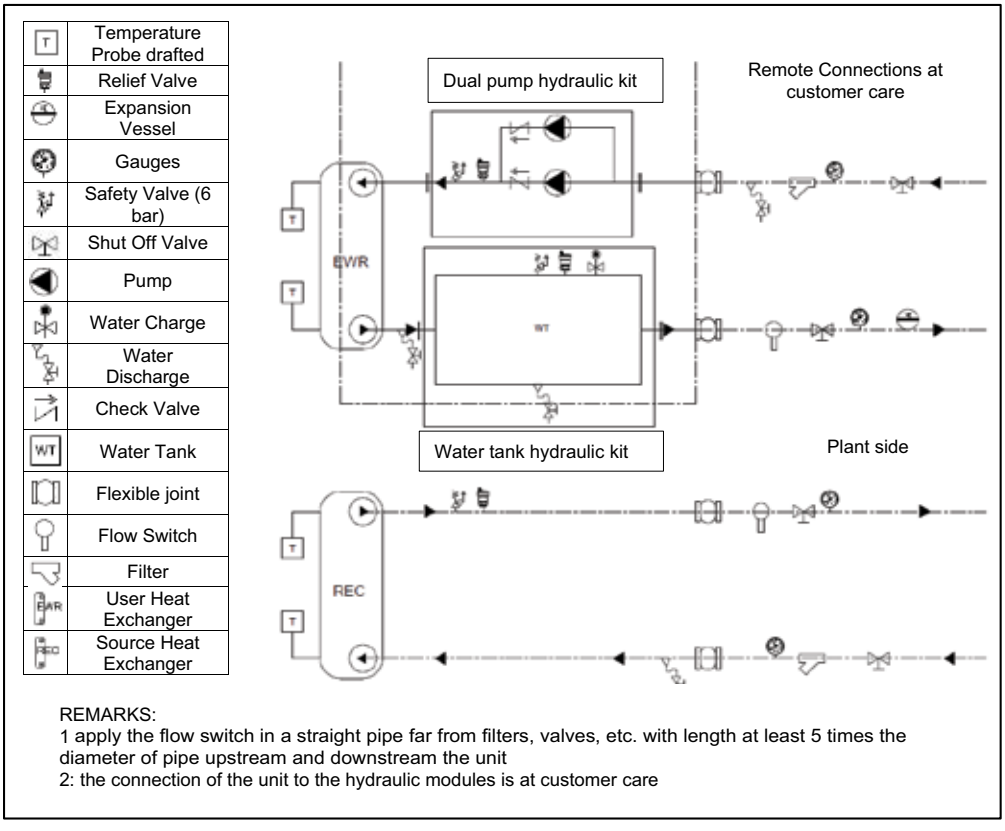
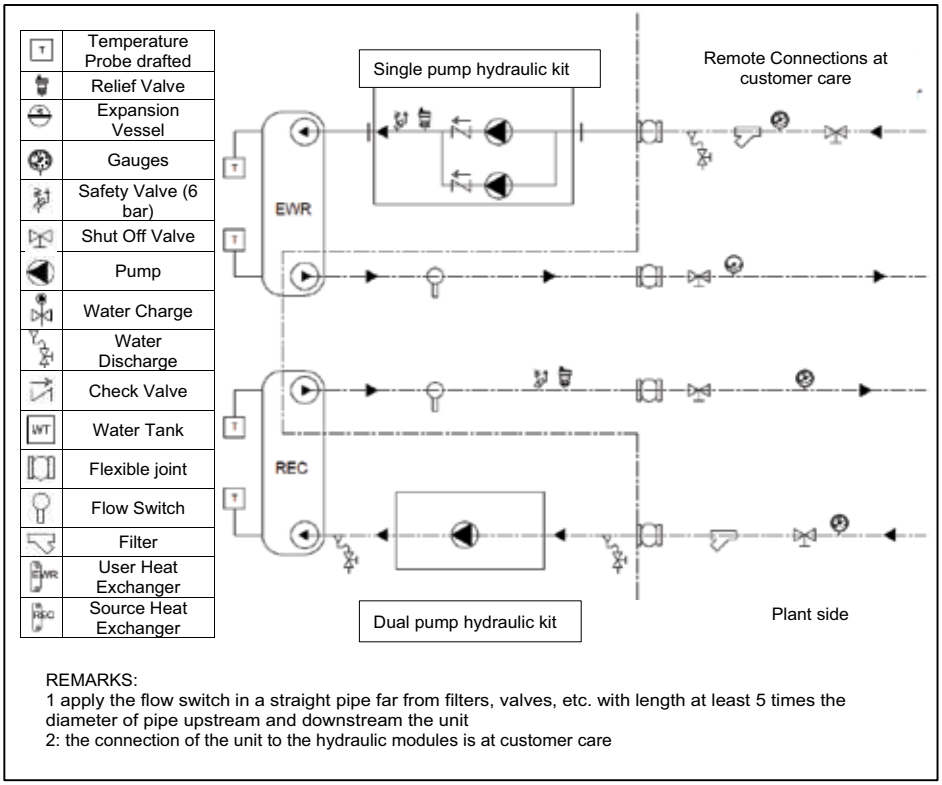



***Figure 21 - Hydraulic diagram for CGWF (SE and HE) - CXWF units and hydraulic modules with 2 pumps and tank on user side and no pump no tank on source side***



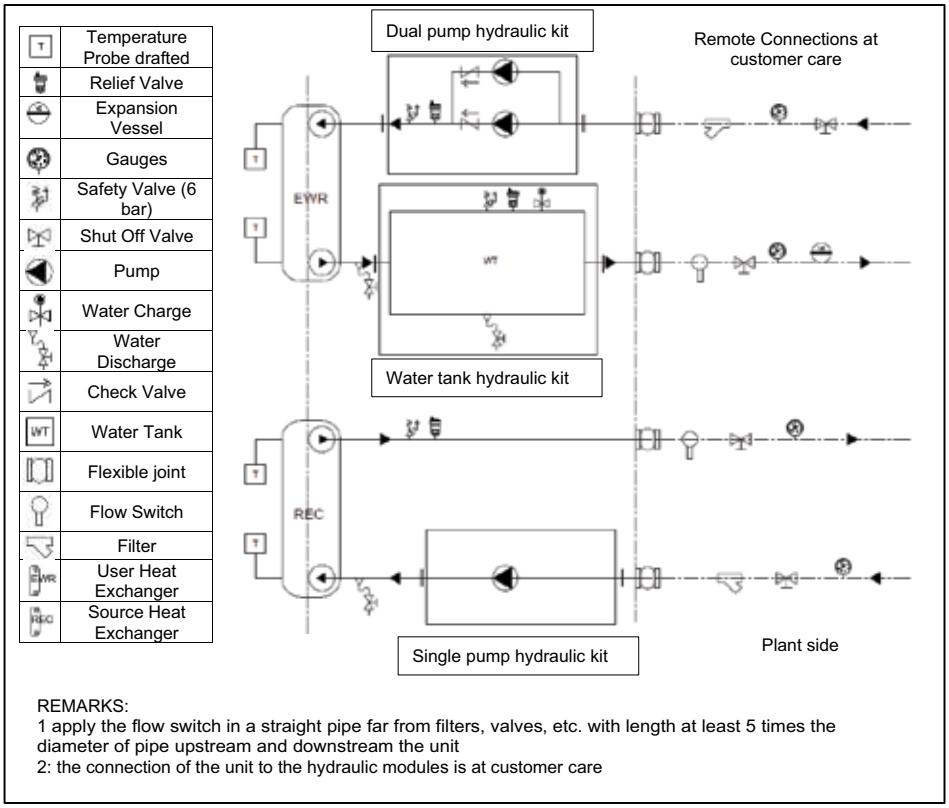
# Hydraulic Schematic Diagrams

***Figure 22 - Hydraulic diagram for CGWF (SE and HE) - CXWF units and hydraulic modules with 2 pumps without tank on user side and 1 pump without tank on source side***



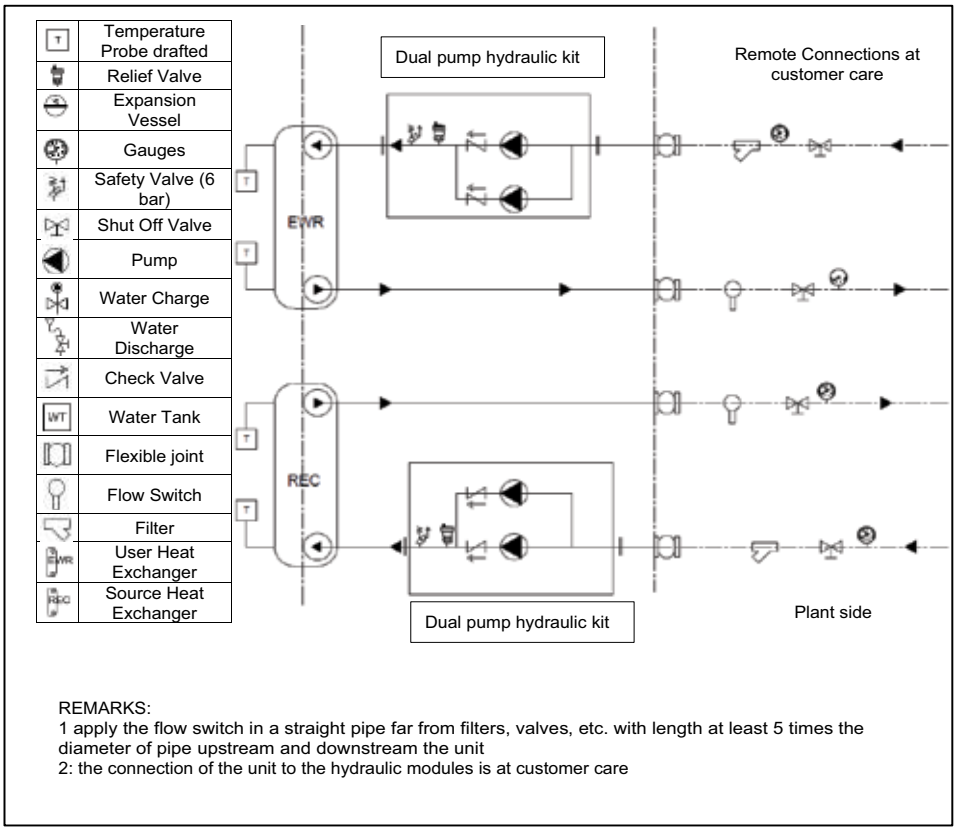

REMARKS:
1 apply the flow switch in a straight pipe far from filters, valves, etc. with length at least 5 times the diameter of pipe upstream and downstream the unit
2: the connection of the unit to the hydraulic modules is at customer care

***Figure 23 - Hydraulic diagram for CGWF (SE and HE) - CXWF units and hydraulic modules with 2 pumps and tank on user side and 1 pump without tank on source side***



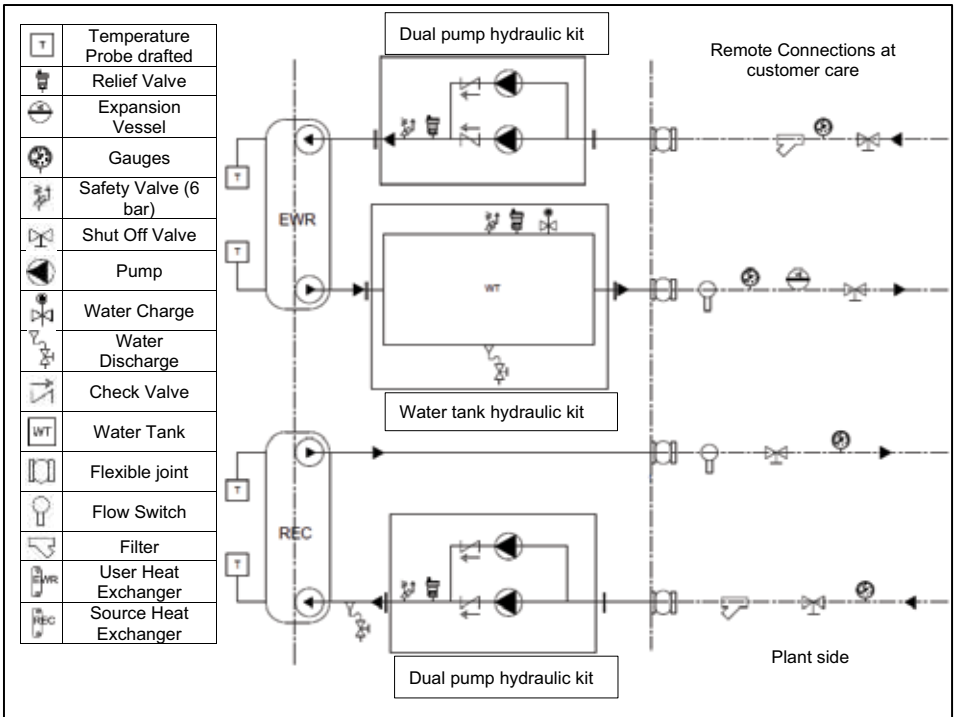

REMARKS:
1 apply the flow switch in a straight pipe far from filters, valves, etc. with length at least 5 times the diameter of pipe upstream and downstream the unit
2: the connection of the unit to the hydraulic modules is at customer care

***Figure 24 - Hydraulic diagram for CGWF (SE and HE) - CXWF units and hydraulic modules with 2 pumps without tank on user side and 2 pumps without tank on source side***




REMARKS:
1 apply the flow switch in a straight pipe far from filters, valves, etc. with length at least 5 times the diameter of pipe upstream and downstream the unit
2: the connection of the unit to the hydraulic modules is at customer care

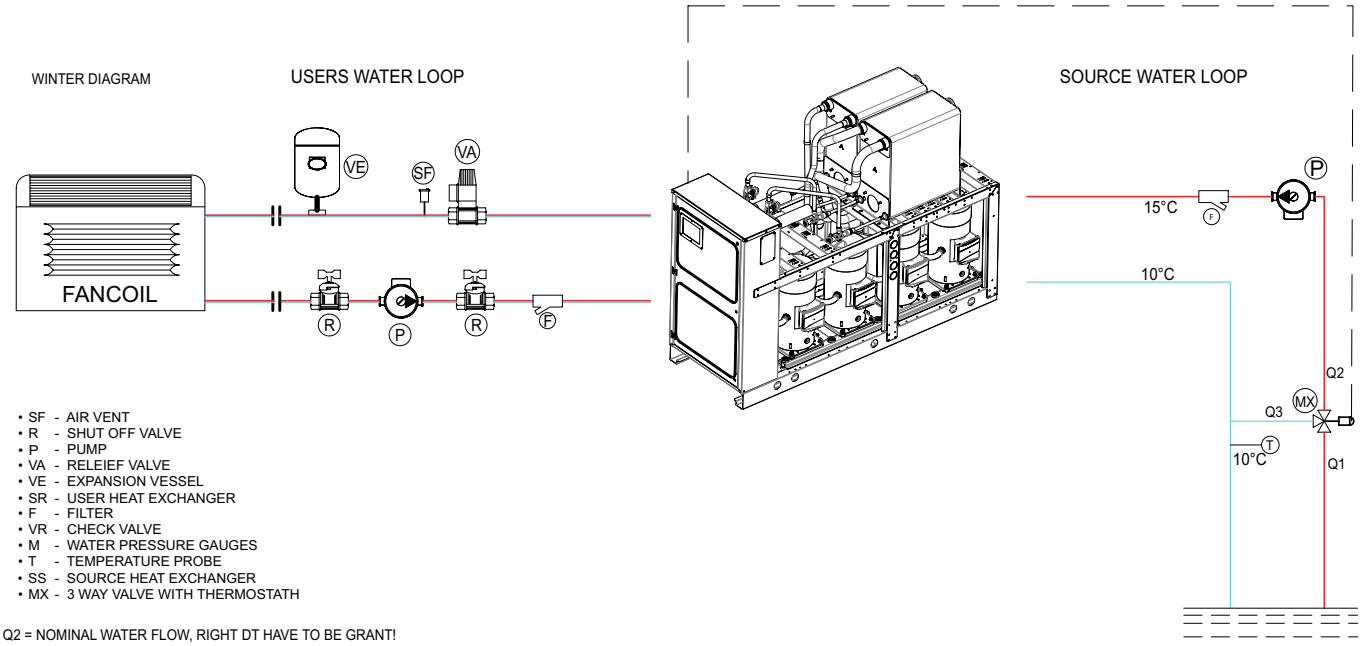
***Figure 25 - Hydraulic diagram for CGWF (SE and HE) - CXWF units and hydraulic modules with 2 pumps and tank on user side and 2 pumps without tank on source side***




REMARKS:
1 apply the flow switch in a straight pipe far from filters, valves, etc. with length at least 5 times the diameter of pipe upstream and downstream the unit
2: the connection of the unit to the hydraulic modules is at customer care

# Hydraulic Schematic Diagrams

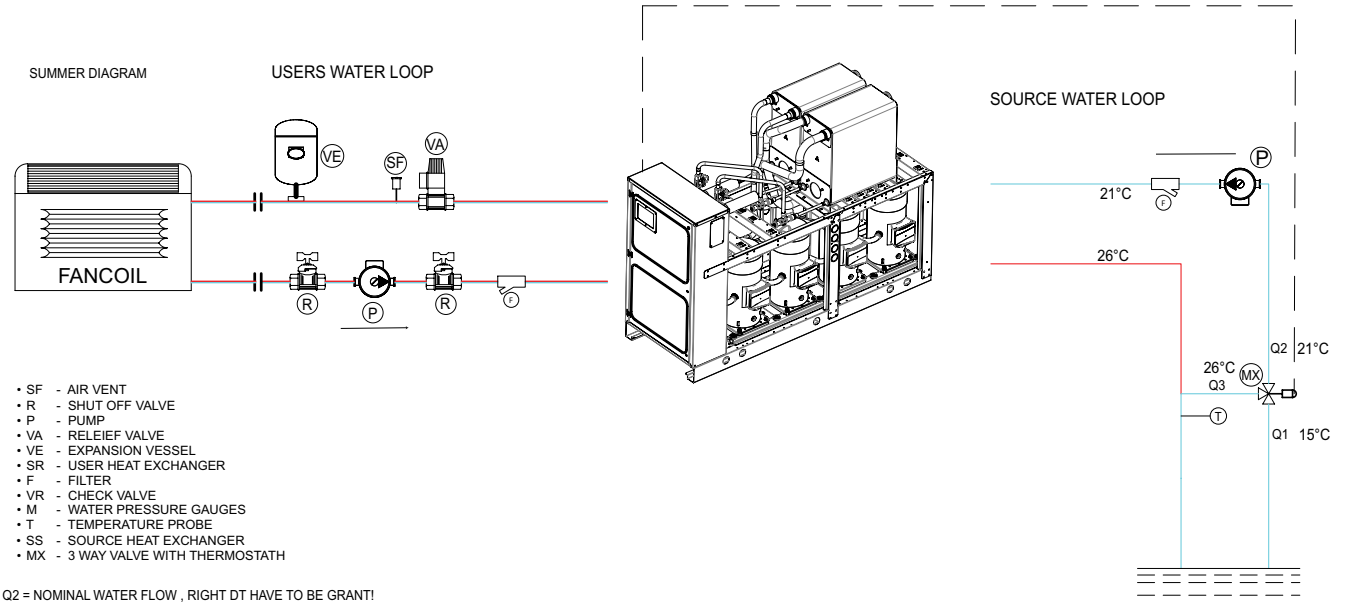
## CXWF GEO




- SF - AIR VENT
- R - SHUT OFF VALVE
- P - PUMP
- VA - RELEIEF VALVE
- VE - EXPANSION VESSEL
- SR - USER HEAT EXCHANGER
- F - FILTER
- VR - CHECK VALVE
- M - WATER PRESSURE GAUGES
- T - TEMPERATURE PROBE
- SS - SOURCE HEAT EXCHANGER
- MX - 3 WAY VALVE WITH THERMOSTATH

Q2 = NOMINAL WATER FLOW, RIGHT DT HAVE TO BE GRANT!

Q2 = Q1+Q3




- SF - AIR VENT
- R - SHUT OFF VALVE
- P - PUMP
- VA - RELEIEF VALVE
- VE - EXPANSION VESSEL
- SR - USER HEAT EXCHANGER
- F - FILTER
- VR - CHECK VALVE
- M - WATER PRESSURE GAUGES
- T - TEMPERATURE PROBE
- SS - SOURCE HEAT EXCHANGER
- MX - 3 WAY VALVE WITH THERMOSTATH

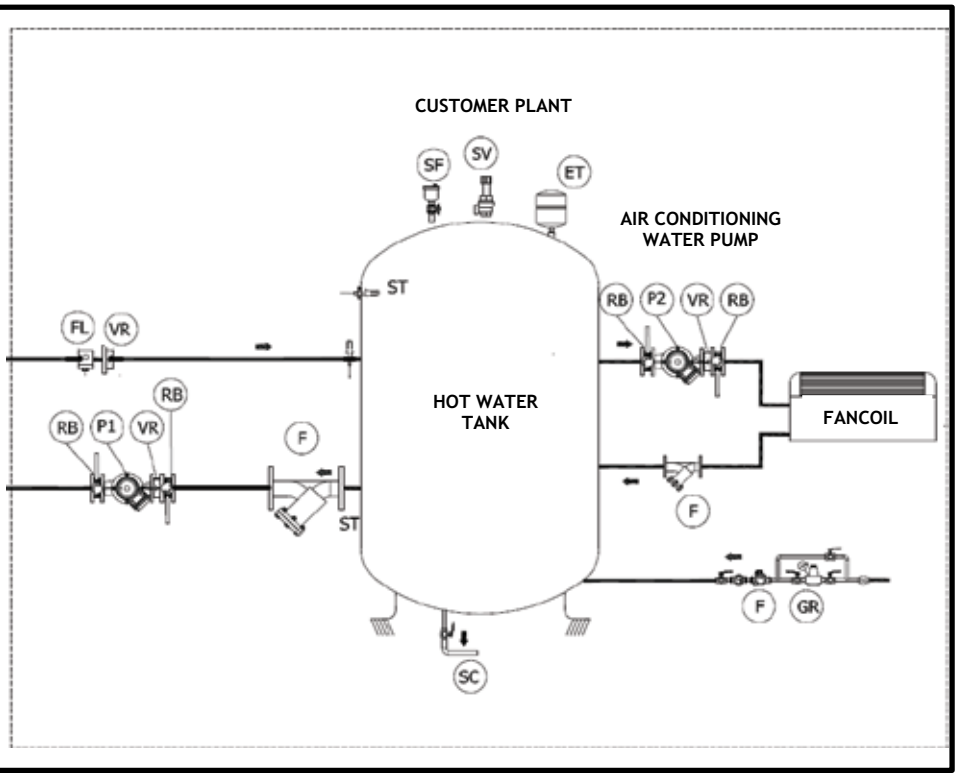
Q2 = NOMINAL WATER FLOW , RIGHT DT HAVE TO BE GRANT!

Q2 = Q1+Q3

***Note**: "This diagram is only a suggested application. All the hydraulic part are not included with the unit. For 3 way valve signal it is necessary to select digit 41= D ".*

***Figure 26- Customer plant sketch on the condenser side of CGWF SE / CGWF HE / CXWF units with no on board unit pump***

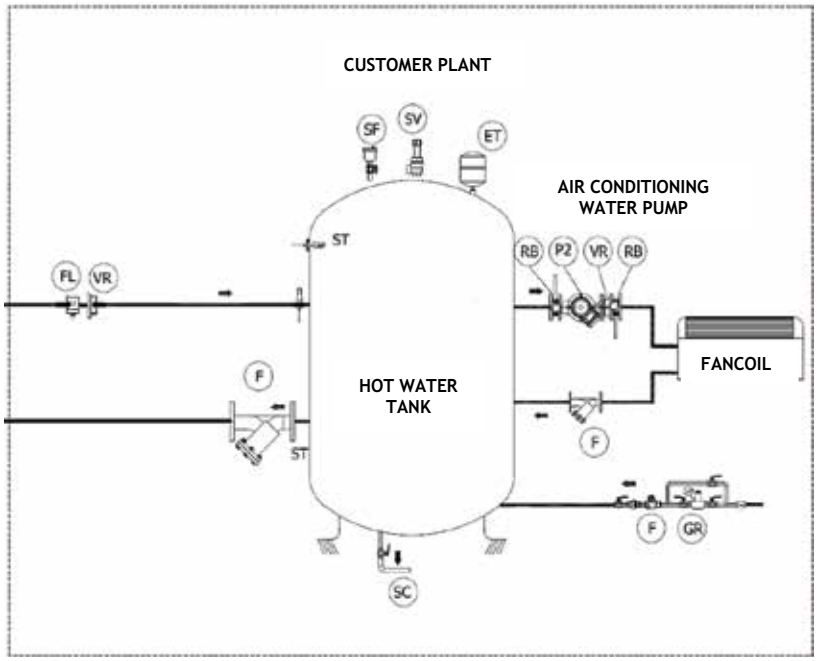
| | |
|---|---|
| P1 | Primary Pump |
| P2 | Secondary Pump |
| ST | Temperature Probe |
| FL | Flow Switch |
| SC | Drainage |
| SF | Vent Valve |
| ET | Expansion Vessel |
| GR | Filling group |
| F | Steel Mesh Strainer |
| VR | Check Valve |
| SV | Safety Valve |
| RB | Interception valve |




***IMPORTANT:*** *The steel mesh strainer in the customer plant is obligatory in order to keep the warranty, the flow switch is optional*

***Figure 27 - Customer plant sketch without primary pump on the condenser side of CGWF SE / CGWF HE / CXWF units***

| | |
|---|---|
| P1 | Primary Pump |
| P2 | Secondary Pump |
| ST | Temperature Probe |
| FL | Flow Switch |
| SC | Drainage |
| SF | Vent Valve |
| ET | Expansion Vessel |
| GR | Filling group |
| F | Steel Mesh Strainer |
| VR | Check Valve |
| SV | Safety Valve |
| RB | Interception valve |




***IMPORTANT:*** *The steel mesh strainer in the customer plant is obligatory in order to keep the warranty, the flow switch is optional*

# Hydraulic Schematic Diagrams

To ensure adequate water flow through the evaporator, install a flow switch on each water circuit to ensure adequate water flow throughout the unit. The flow switch must be installed according to the relevant hydraulic diagram among those reported in “Hydraulic Schematic Diagrams” on page 35. The purpose of the flow switch is to stop the unit in case of an interruption of the water flow while protecting the evaporator from freezing. Since no water flow control is installed on board the unit, the installation of the flow switch, always provided as a loose accessory by Commercial sales office, in the customer’s plant is mandatory.

**ATTENTION**

- Avoid direct exposure to sunlight.
- Protect your device from atmospheric agents. (Protection rating IP65).
- Protect your device from high thermal changes to avoid condensation inside.
- For the electrical connection, use a cable with a suitable diameter for the cable gland to avoid liquid infiltration.
- We recommend continuing the cable downwards out of the cable gland to prevent liquid routing inside.
- Use the same tightening torque for all cover screws.
- For a correct seal, the gasket must never be damaged or too compressed.
- Based on the diameter of the pipe, if multiple blades are used, these must always be mounted in sequence, starting from the smallest.

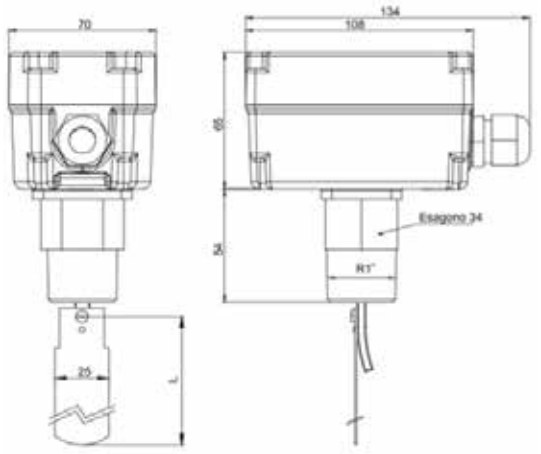
For example, if the paddle 3 is required, paddles 1+2+3 must ALWAYS be mounted, as defined in the technical data sheet.

- Use a suitable tool when assembling, never force the cover to fix the flow switch.The flow switch installation can be horizontal and vertical, screw-in thread, RP 1” (ISO7/1). It should be installed far from elbows or throttling with an arrow on flow direction. If pipe is vertical recalibrate range to balance paddle weight. If the device is downwards mounted take care to slags, and apply it in a straight pipe far from filters, valves, etc with length at least 5 times the diameter of pipe upstream and downstream the unit. The paddles must be installed starting from the shortest.

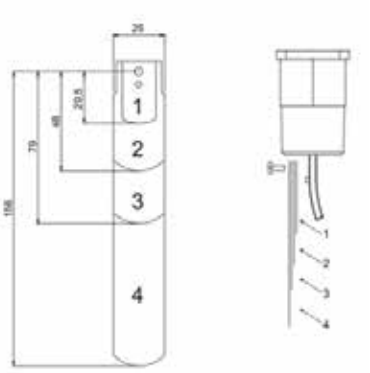
Blade type flow switches are available as loose accessories and are suitable for harsh environments and for pipes with diameters from 1” to 8”. The flow switch has a contact which must be wired, by the contractor, on the jobsite. Check the unit wiring diagram for more information. See the instruction sheet inside the flow switch box for information about positioning and settings.

***Figure 28 - Dimensions***

**Dimensions in (mm)**



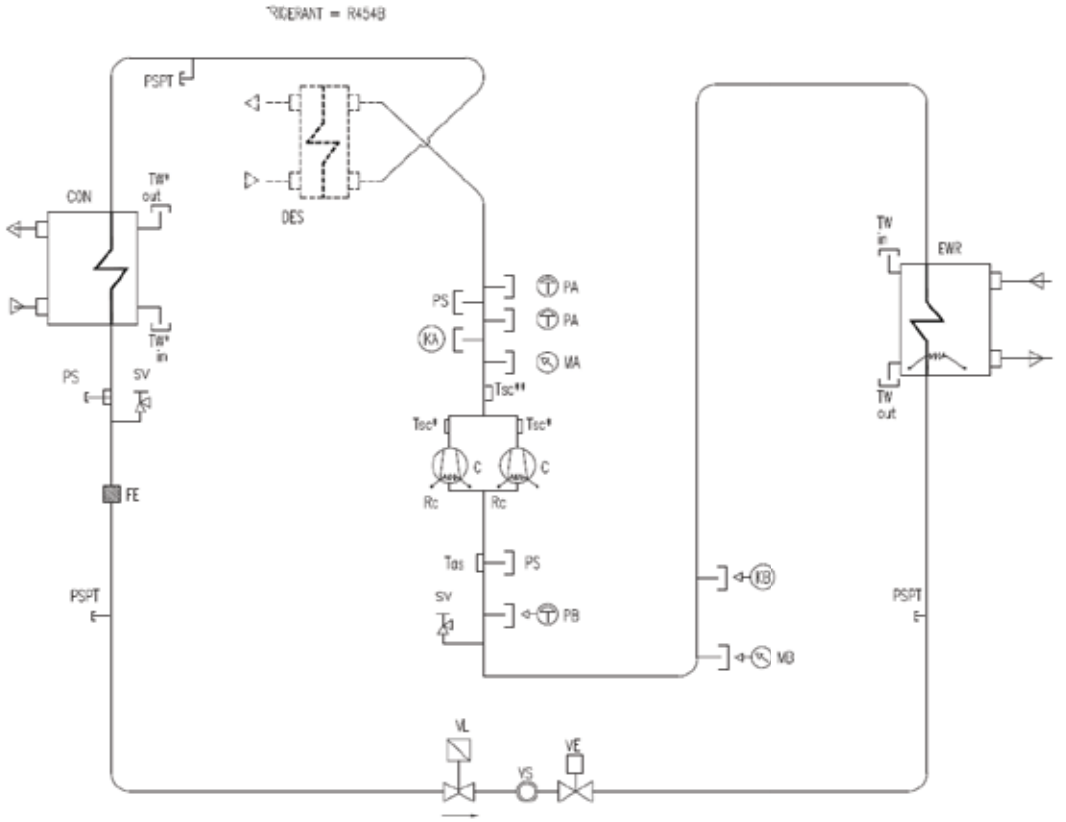

**Paddle**




| PIPES | TABLES |
|---|---|
| 1” | 1 |
| 1 1/4” | 1 |
| 1 1/2” | 1, 2 |
| 2” | 1, 2 |
| 2 1/2” | 1, 2, 3 |
| 3” | 1, 2, 3 |
| 4” | 1, 2, 3 |
| 5” | 1, 2, 3 |
| 6” | 1, 2, 3, 4<br>1, 2, 3 |
| 8” | 1, 2, 3, 4<br>1, 2, 3 |

## Refrigerant Scheme - CGWF and CXWF

The following drawing is valid for CGWF SE, CGWF HE and CXWF. No cycle reversing valve is shown since the switch from chiller mode to heat pump mode for CXWF is made by modifying the customer plant water circuit as described in the diagram on the following page.

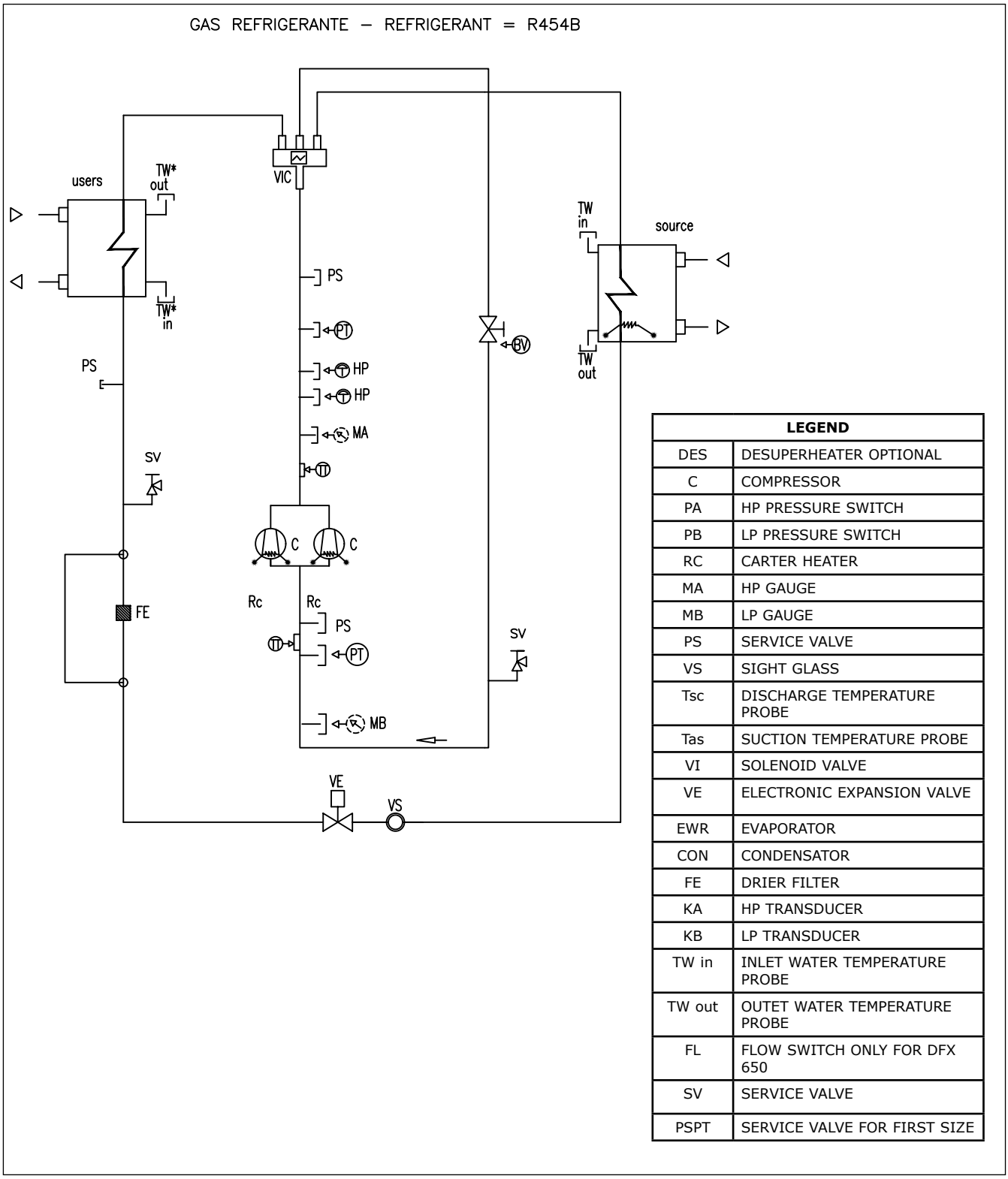



| | |
|---|---|
| DES | DESUPERHEATER OPTIONAL |
| C | COMPRESSOR |
| PA | HP PRWSSURE SWITCH |
| PB | LP PRESSURE SWITCH |
| RC | CARTER HEATER |
| MA | HP GAUGE |
| MB | LP GAUGE |
| PS | SERVICE VALVE |
| VS | SIGHT GLASS |
| Tsc | DISCHARGE TEMPERATURE PROBE |
| Tas | SUCTION TEMPERATURE PROBE |
| VI | SOLENOID VALVE |
| VE | ELECTRONIC EXPANSION VALVE |
| EWR | EVAPORATOR |
| CON | CONDENSATOR |
| FE | DRIER FILTER |
| KA | HP TRANSDUCER |
| KB | LP TRANSDUCER |
| TW in | INLET WATER TEMPERATURE PROBE |
| TW out | OUTET WATER TEMPERATURE PROBE |
| FL | FLOW SWITCH ONLY FOR DFX 650 |
| SV | SERVICE VALVE |
| PSPT | SERVICE VALVE FOR FIRST SIZE |

# Hydraulic Schematic Diagrams

## Refrigerant Scheme - CXWF GEO

The following drawing is valid for CXWF GEO




| LEGEND | |
|---|---|
| DES | DESUPERHEATER OPTIONAL |
| C | COMPRESSOR |
| PA | HP PRESSURE SWITCH |
| PB | LP PRESSURE SWITCH |
| RC | CARTER HEATER |
| MA | HP GAUGE |
| MB | LP GAUGE |
| PS | SERVICE VALVE |
| VS | SIGHT GLASS |
| Tsc | DISCHARGE TEMPERATURE PROBE |
| Tas | SUCTION TEMPERATURE PROBE |
| VI | SOLENOID VALVE |
| VE | ELECTRONIC EXPANSION VALVE |
| EWR | EVAPORATOR |
| CON | CONDENSATOR |
| FE | DRIER FILTER |
| KA | HP TRANSDUCER |
| KB | LP TRANSDUCER |
| TW in | INLET WATER TEMPERATURE PROBE |
| TW out | OUTET WATER TEMPERATURE PROBE |
| FL | FLOW SWITCH ONLY FOR DFX 650 |
| SV | SERVICE VALVE |
| PSPT | SERVICE VALVE FOR FIRST SIZE |

# Chilled Water Freeze Protection

## Freeze Protection

Depending on the ambient temperature the unit may be exposed to freeze, there are multiple options for freeze protection. They are listed in order of highest ambient (least freeze protection) to the lowest ambient (most freeze protection).

For all chiller running with water under cold ambient temperature (below 0°C), it is extremely important to keep full water flow in the evaporator for an extended time after last compressor stops. This will protect brazed plate evaporator from freezing by refrigerant migration. This is why evaporator water pump output relay must be used to control the chilled water pump. This is not mandatory if glycol is used with protection down to lowest ambient expected.

## 1. Water Pump and Heaters

a. Heaters are factory installed on brazed plates evaporator. They will protect it from freezing in ambient temperatures down to -18°C.Heaters are installed on the water piping and on the pumps of units equipped with hydraulic module.

b. Install heat tape on all water piping, pumps, and other components that may be damaged if exposed to freezing temperatures. Heat tape must be designed for low ambient temperature applications. Heat tape selection should be based on the lowest expected ambient temperature.

c. Symbio™ 800 controller can start the pump(s) when freezing conditions are detected. For this option the pumps must be controlled by the CGWF unit and this function validated on the chiller / Heat pump controller.

d. Water circuit valves need to stay open at all times.

**Note:** Water pump control and heater combination will protect the evaporator down to any ambient temperature provided power is available to the pump and the Symbio™ 800 controller. This option will NOT protect the evaporator in the event of power failure to the chiller unless backup power is supplied to the necessary components.

**OR**

## 2. Freeze Inhibitor

a. Freeze protection can be accomplished by adding sufficient glycol to protect against freezing down to the lowest ambient expected.

b. See “evaporator glycol requirement” section for guidance on determining the glycol concentration.

**Note:** Use of glycol type antifreeze reduces the cooling capacity of the unit and must be considered in the design of the system specifications.

**CAUTION!** When using freeze inhibitor, never fill the system with pure glycol.

Always fill the system with diluted solution.

Maximum concentration of glycol is 40%. Higher glycol concentration will damage pump seal.

**OR**

## 3. Drain Water Circuit

For ambient temperatures below -20°C and for those installation not including either option 1 or 2 above described

a. Shut off power supply to unit and to all heaters.

b. Purge the water circuit

c. Blow out the evaporator to ensure that no liquid is left inside the evaporator and the water lines. Drain the pump.

**Note:** It is not recommended to drain the water circuit for the following reasons.

1. The water circuit will rust and its lifetime could be reduced.
2. Water will remain in the bottom of the plate heat exchangers and freeze damage could occur.

**CAUTION! Evaporator damage!**

If insufficient concentration or no glycol is used, the evaporator water pumps must be controlled by the Symbio™ 800 to avoid severe damage to the evaporator due to freezing. A power loss of 15 minutes during freezing can damage the evaporator. It is the responsibility of the installing contractor and/or the customer to ensure that a pump will start when called upon by the chiller controls. Please consult manufacturer service for unit setting and % of glycol required.

With factory-fitted disconnect switch option, evaporator trace heating is taken from the live side of the isolator. As a consequence, the heaters are energized as long as the main switch is closed. Supply voltage to the heating tapes is 400V.

- Avoid the use of very low or near minimum chilled fluid flow rates through the chiller. Higher velocity chilled fluid flow reduces freeze risk in all situations.
- Flow rates below limits have increased freeze potential and have not been considered by freeze protection algorithms.
- Avoid applications and situations that result in a requirement for rapid cycling or repeated starting and stopping of the chiller. Keep in mind that chiller control algorithms may prevent a rapid compressor restart after shutting down when the evaporator has been operating near or below the LERTC (Low Refrigerant Temperature Cutout) limit.
- Maintain refrigerant charge at appropriate levels. If charge is in question, contact manufacturer service. A reduced or low level of charge can increase the likelihood of freezing conditions in the evaporator and/or LERTC diagnostic shutdowns.

**The warranty will be void, in case of freezing due to the lack of use of either of these protections.**

# Chilled Water Freeze Protection

## Low Refrigeration Temperature Setpoint and Antifreeze Setpoint on CGWF Unit Control

**CAUTION!** The chiller is provided with standard factory settings. It can be necessary to modify the low refrigerant cutout temperature and the antifreeze setpoint on the unit control. Based on the following examples, it is necessary to modify on the unit control the following settings:

- The LP saturation temperature
- The antifreeze setpoint

Examples for:

- 7°C, the LRTC setting must be -4°C where the antifreeze setting shall be 2°C
- 0°C, the LRTC setting must be -12°C where the antifreeze setting shall be -6°C

## Freeze Protection with Glycol

It is mandatory to use a freeze inhibitor for leaving water setpoint less or equal to 5°C. On the glycol recommended concentration figure, you must select concentration on or above the curve. For example, for -4°C brine temperature, a concentration of 25% ethylene glycol is not sufficient. The concentration must be 28% ethylene glycol or 33% propylene glycol.

### Using Glycol with Hydraulic Module

If the glycol brine percentage is not at the recommended percentage (greyed area), corrosion inhibitor present in the glycol may not be efficient enough. For instance, a glycol concentration of 15% will provide freeze protection to the unit down to -5°C, but it might generate additional corrosion.

***Figure 29 – Low refrigerant cutout temperature setpoint and antifreeze water temperature based on active chilled water setpoint***

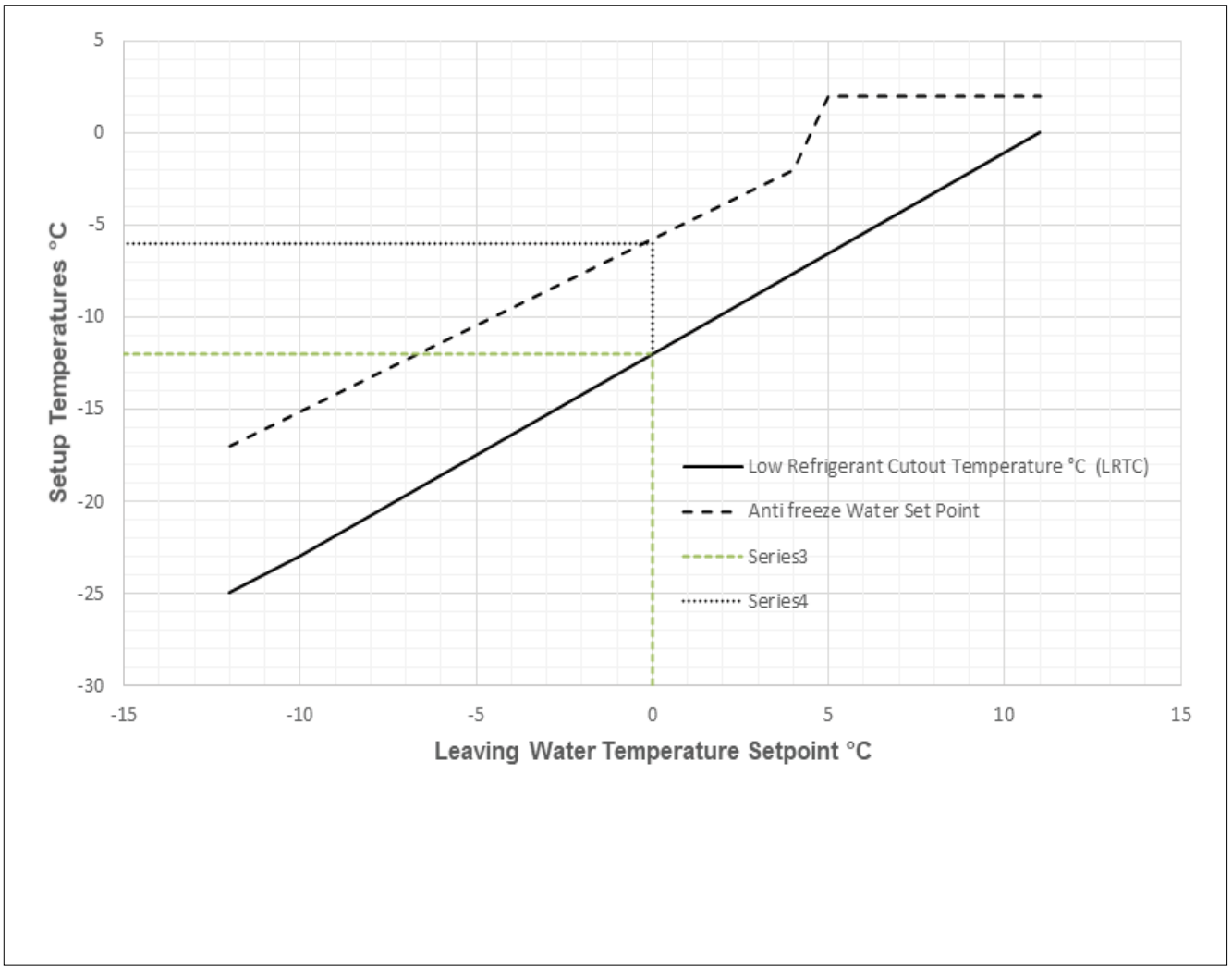
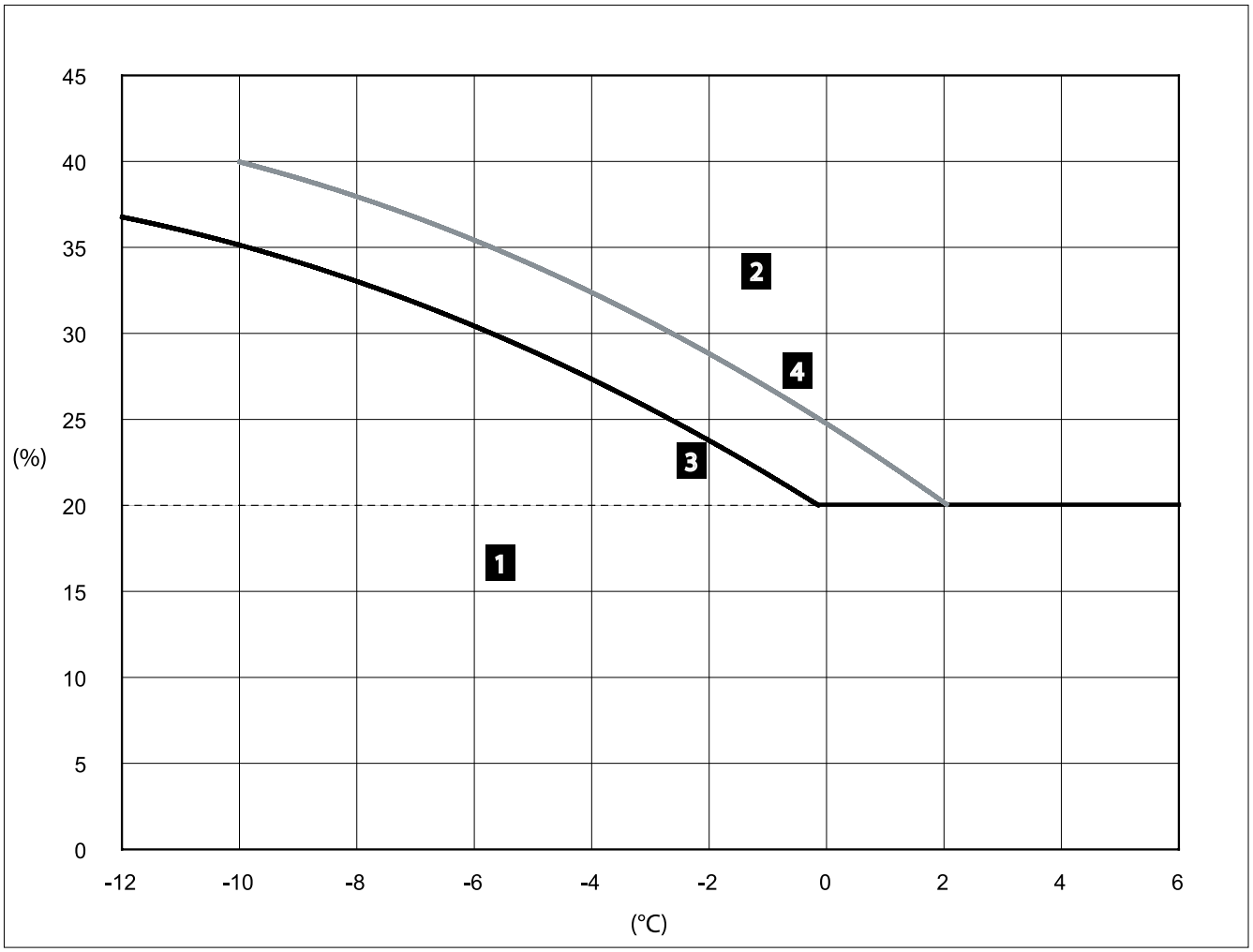


*Figure 30 – Glycol percentage recommendation curve*




1 = Critical risks of freezing

2 = Efficient freeze protection

3 = Ethylene glycol

4 = Propylene glycol

% = Glycol percentage (mass concentration)

°C = Glycol or water temperature

**CAUTION!**

1. Additional glycol beyond the recommendations will adversely affect unit performance. The unit efficiency will be reduced and the saturated evaporator temperature will be reduced. For some operating conditions this effect can be significant.
2. If additional glycol is used, then use the actual % glycol to establish the low refrigerant cutout set point with manufacturer service advice.
3. The minimum low refrigerant cutout set point allowed is - 20.6°C. This minimum is established by the solubility limits of the oil in the refrigerant.
4. With glycol application, ensure that there is no fluctuation of brine flow versus Order Write Up value, as a reduction of flow will adversely affect unit performance and behavior.
5. Full unit simulation is required for proper prediction of unit performance for specific operating conditions. For information on specific conditions, contact the sales office.

# General Electrical Recommendations

## Electrical Parts

When reviewing this manual keep in mind.

- All field-installed wiring must be in accordance with local regulations, CE directives and guidelines. Be sure to satisfy proper equipment grounding requirements according CE
- The following standardized values - Maximum Amps - Short Circuit Amps - Starting Amps are displayed on unit nameplate.
- All field-installed wiring must be checked for proper terminations, and for possible shorts or grounds.

***Note:*** *Always refer to wiring diagrams shipped with chiller or unit submittal for specific electrical schematic and connection information.*

**Important:** To prevent control malfunctions, do not run low voltage wiring (<30V) in conduit with conductors carrying more than 30 volts.

**WARNING!** Hazardous Voltage with Capacitor!

Disconnect all electric power, including remote disconnects and discharge all motor start/run and AFD (Adaptive Frequency TM Drive) capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized.

- For variable frequency drives or other energy storing components provided by the manufacturer or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharges capacitors. Verify with an appropriate voltmeter that all capacitors have discharged
- DC bus capacitors retain hazardous voltages after input power has been disconnected. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized
- After disconnecting input power, wait five (5) minutes for units which are equipped with EC fans and wait twenty (20) minutes for units which are equipped with Variable frequency drive (0V DC) or with Power Factor correction option before touching any internal components.
- Failure to follow these instructions could result death or serious injury

*For additional information regarding the safe discharge of capacitors, see "Adaptive Frequency™ Drive (AFD3) Capacitor Discharge" and BAS-SVX19*-E4.*

Hazardous Voltage – Pressurized Burning Fluid!

Before removing compressor terminal box cover for servicing, or servicing power side of control panel, CLOSE COMPRESSOR DISCHARGE SERVICE VALVE and disconnect all electric power including remote disconnects. Discharge all motor start/ run capacitors. Follow lockout/tagout procedures to ensure the power cannot be inadvertently energized. Verify with an appropriate voltmeter that all capacitors have discharged.

The compressor contains hot, pressurized refrigerant. Motor terminals act as a seal against this refrigerant. Care should be taken when servicing NOT to damage or loosen motor terminals.

Do not operate compressor without terminal box cover in place.

Failure to follow all electrical safety precautions could result in death or seriously injure.

**CAUTION!** To avoid corrosion, overheating or general damage, at terminal connections, unit is designed for copper mono-conductors only. In case of multiconductor cable, an intermediate connection box must be added. For cable with alternative material, bi-material connecting devices are mandatory. Cable routing inside control panel should be made case by case by installer.

Do not allow conduit to interfere with other components, structural members or equipment. Control voltage (115V) wiring in conduit must be separate from conduit carrying low voltage (<30V) wiring. To prevent control malfunctions, do not run low voltage wiring (<30V) in conduit with conductors carrying more than 30V.

**WARNING!** The Warning Label is displayed on the equipment and shown on wiring diagrams and schematics. Strict adherence to these warnings must be observed. Failure to do so may result in personal injury or death.

**CAUTION!** Units must not be linked to the neutral wiring of the installation. Units are compatible with the following neutral operating conditions:

| TNS | IT | TNC | TT |
|---|---|---|---|
| Standard | Standard** | Special | Standard* |

* Differential protection should be suited for industrial machinery with current leak which can be higher than 500 mA (several motors and frequency drives).

** Filter RFI disconnect on VPF and EC fan.

## Electrical Data

To get the following electrical data details: Refer to General Data tables for each unit configuration and size.

- Maximum Power input (kW)
- Unit rated amps (Max comp + Fan + Control)
- Unit start up amps (Starting Amps of the largest comp + RLA of 2nd comp + RLA of all fans+ control)
- Compressor Power factor
- Disconnect switch size (A)
- Short Circuit Rating for all sizes =10 kA

Wiring diagrams are shipped with unit and can be found in the unit control panel.

***Note***: *Rating is made for 400 V, 3 phases, 50 Hz power supply.*

| Standard Unit | | | | | | |
|---|---|---|---|---|---|---|
| **Model (Digit 1)** | **Digit 19 (softstarter)** | **"Max Amps (A)"** | **Max Power (kW)** | **Start current (A)** | **"CosPhi (DPF)"** | **"Icc (KA)"** |
| 013 | X | 32.4 | 18.5 | 156.9 | 0.83 | 10 |
| 015 | X | 36.6 | 21.5 | 161.9 | 0.85 | 10 |
| 019 | X | 41.2 | 24.1 | 166.5 | 0.85 | 10 |
| 023 | X | 49.9 | 29.2 | 218.7 | 0.85 | 10 |
| 025 | X | 56.3 | 32.8 | 225.2 | 0.84 | 10 |
| 029 | X | 64.1 | 38.4 | 255.2 | 0.87 | 10 |
| 033 | X | 71.8 | 43.9 | 262.9 | 0.88 | 10 |
| 037 | X | 80.1 | 48.6 | 295.9 | 0.88 | 10 |
| 041 | X | 88.4 | 53.3 | 304.2 | 0.87 | 10 |
| 042 | X | 92.1 | 54.7 | 225.8 | 0.86 | 10 |
| 048 | X | 112.6 | 65.6 | 281.5 | 0.84 | 10 |
| 056 | X | 128.1 | 76.8 | 289.2 | 0.87 | 10 |
| 064 | X | 143.6 | 87.9 | 334.7 | 0.88 | 10 |
| 072 | X | 160.2 | 97.3 | 351.3 | 0.88 | 10 |
| 078 | X | 176.8 | 106.7 | 392.6 | 0.87 | 10 |
| 088 | X | 199.9 | 122.3 | 438.2 | 0.88 | 10 |
| 096 | X | 223.0 | 137.9 | 459.0 | 0.89 | 10 |
| 112 | X | 252.2 | 153.1 | 525.9 | 0.88 | 10 |
| 128 | X | 281.5 | 168.3 | 555.1 | 0.86 | 10 |
| 144 | X | 334.5 | 206.9 | 572.8 | 0.89 | 10 |
| 162 | X | 363.7 | 222.1 | 637.4 | 0.88 | 10 |
| 176 | X | 393.0 | 237.3 | 666.6 | 0.87 | 10 |
| 192 | X | 422.2 | 252.5 | 695.9 | 0.86 | 10 |
| 013 | A | 32.4 | 18.5 | 109.8 | 0.83 | 10 |
| 015 | A | 36.6 | 21.5 | 113.3 | 0.85 | 10 |
| 019 | A | 41.2 | 24.1 | 116.5 | 0.85 | 10 |
| 023 | A | 49.9 | 29.2 | 153.1 | 0.85 | 10 |
| 025 | A | 56.3 | 32.8 | 157.6 | 0.84 | 10 |
| 029 | A | 64.1 | 38.4 | 178.6 | 0.87 | 10 |
| 033 | A | 71.8 | 43.9 | 184.0 | 0.88 | 10 |
| 037 | A | 80.1 | 48.6 | 207.1 | 0.88 | 10 |
| 041 | A | 88.4 | 53.3 | 212.9 | 0.87 | 10 |

# General Electrical Recommendations

| Standard Unit | | | | | | |
|---|---|---|---|---|---|---|
| **Model (Digit 1)** | **Digit 19 (softstarter)** | **"Max Amps (A)"** | **Max Power (kW)** | **Start current (A)** | **"CosPhi (DPF)"** | **"Icc (KA)"** |
| 042 | A | 92.1 | 54.7 | 158.0 | 0.86 | 10 |
| 048 | A | 112.6 | 65.6 | 197.0 | 0.84 | 10 |
| 056 | A | 128.1 | 76.8 | 202.5 | 0.87 | 10 |
| 064 | A | 143.6 | 87.9 | 234.3 | 0.88 | 10 |
| 072 | A | 160.2 | 97.3 | 245.9 | 0.88 | 10 |
| 078 | A | 176.8 | 106.7 | 274.8 | 0.87 | 10 |
| 088 | A | 199.9 | 122.3 | 306.7 | 0.88 | 10 |
| 096 | A | 223.0 | 137.9 | 321.3 | 0.89 | 10 |
| 112 | A | 252.2 | 153.1 | 368.1 | 0.88 | 10 |
| 128 | A | 281.5 | 168.3 | 388.6 | 0.86 | 10 |
| 144 | A | 334.5 | 206.9 | 400.9 | 0.89 | 10 |
| 162 | A | 363.7 | 222.1 | 446.2 | 0.88 | 10 |
| 176 | A | 393.0 | 237.3 | 466.6 | 0.87 | 10 |
| 192 | A | 422.2 | 252.5 | 487.1 | 0.86 | 10 |

# Installer-Supplied Components

Customer wiring interface connections are shown in the electrical schematics and connection diagrams that are shipped with the unit. The installer must provide the following components if not ordered with the unit:

- Power supply wiring (in conduit) for all field- wired connections
- All control (interconnecting) wiring (in conduit) for field supplied devices
- Fused-disconnect switches

## Power Supply Wiring

All power supply wiring must be sized and selected accordingly by the project engineer in accordance with standard IEC 60364. All wiring must comply with local codes. The installing (or electrical) contractor must provide and install the system interconnecting wiring, as well as the power supply wiring. It must be properly sized and equipped with the appropriate fuse- disconnect switches. The type and installation location(s) of the fused-disconnect switches must comply with all applicable codes.

Cut holes into the sides of the control panel for the appropriately-sized power wiring conduits. The wiring is passed through these conduits and connected to the terminal blocks.

To provide proper phasing of 3 phase input, make connections as shown in field wiring diagrams and as stated on the yellow WARNING label in the starter panel. Proper equipment grounds must be provided to each ground connection in the panel.

CAUTION! Customer wiring interface connections are shown in the electrical schematics and connection diagrams that are shipped with the unit. The installer must provide the following components if not ordered with the unit.

**WARNING!** To prevent injury or death, disconnect all electrical power sources before completing wiring connections to the unit.

CAUTION! The use of copper mono-conductors is the preferred solution to avoid corrosion and overheating at terminal connections.

## Control Power Supply

Chiller is provided with control power transformer, it is not necessary to provide additional control power voltage to the unit.

## Heater Power Supply

The evaporator shell is insulated from ambient air and protected from freezing for temperature down to -20°C by two thermostatically-controlled immersion heaters combined with evaporator pumps activation through Symbio™ 800. Whenever the ambient temperature drops below 0°C the thermostat energizes the heaters and the Symbio™ 800 activates the pumps. If ambient temperatures below -20°C are expected, contact your local office.

**CAUTION!** The control panel main processor does not check for loss of power to the heat tape nor does it verify thermostat operation. A qualified technician must frequently verify power to the heat tape and confirm operation of the heat tape thermostat, to avoid catastrophic damage to the evaporator.

**CAUTION!** With factory-fitted disconnect switch, trace heating is taken from the live side of the isolator, so power remains on. Supply voltage to the heating tapes is 400V.

**Don't energize heaters without water**. In case of winter water drainage for freeze protection, it is compulsory to disconnect the evaporator heaters to protect them from burning due to overheat.

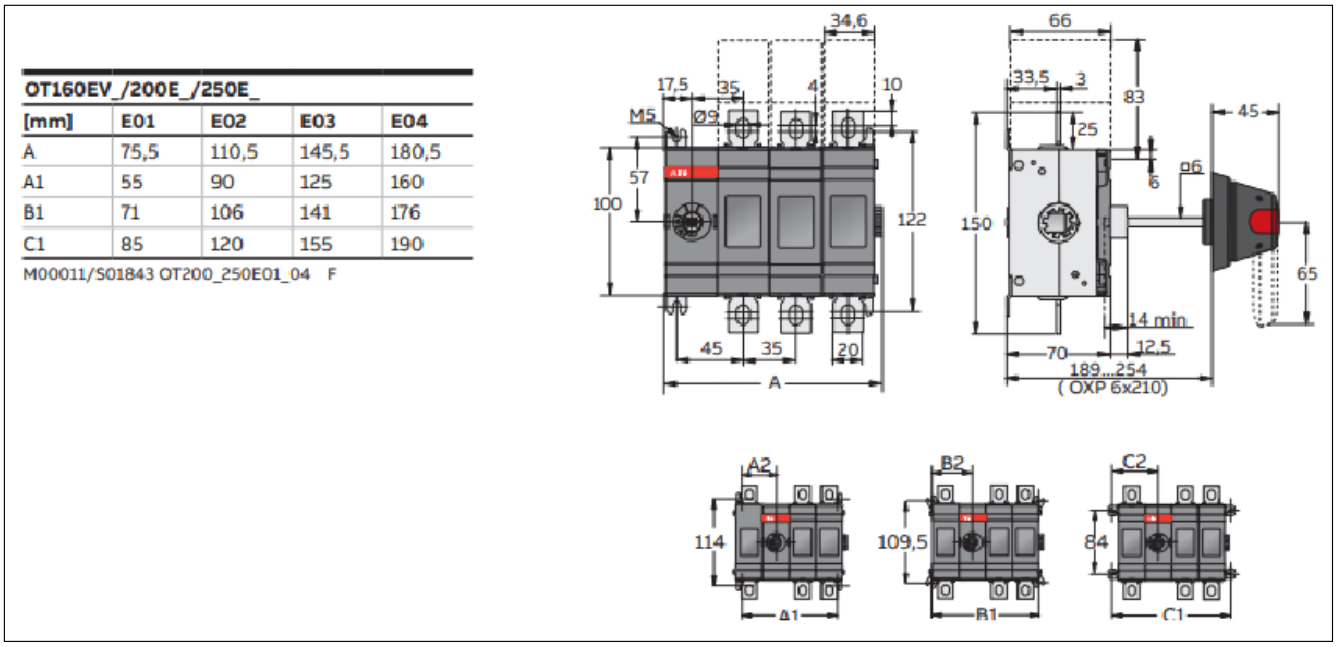
# Installer-Supplied Components

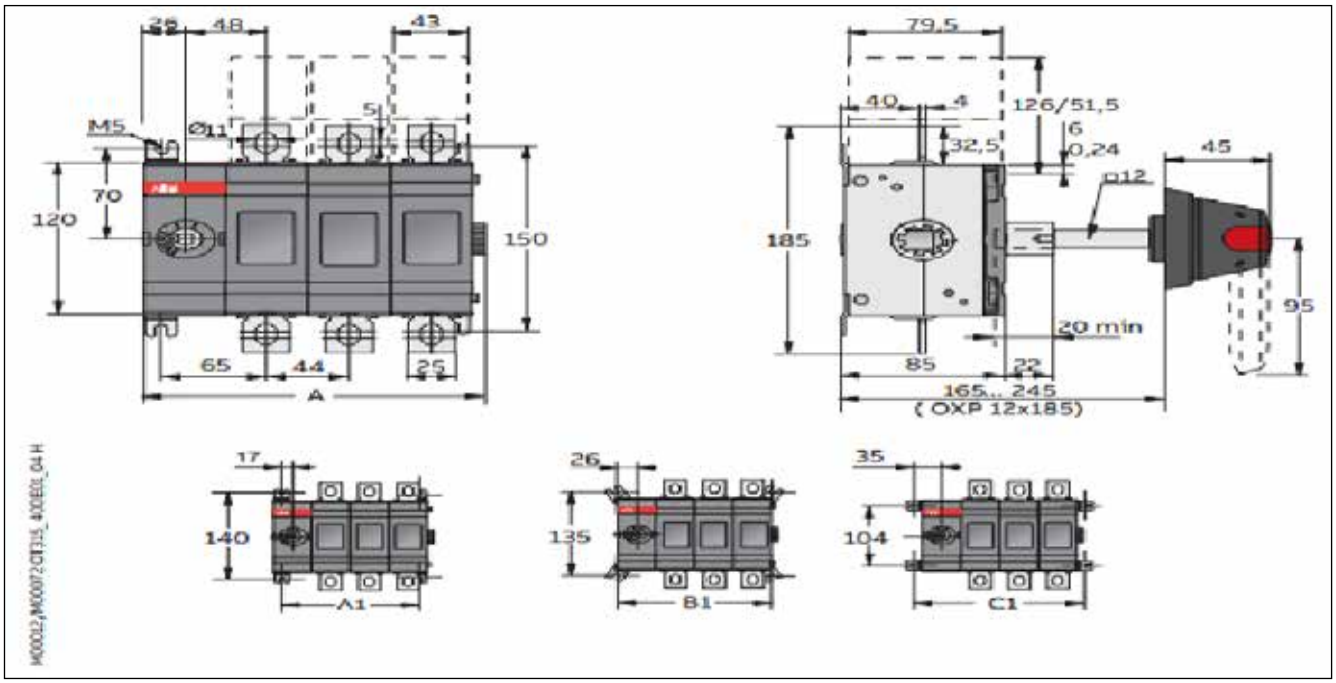
## Main Switched Features

Following switch disconnector are used according to the unit and the accessories selected.
All two types of switches have the same dimensions

| OT160EV_/200E_/250E_ | | | | |
|---|---|---|---|---|
| [mm] | E01 | E02 | E03 | E04 |
| A | 75,5 | 110,5 | 145,5 | 180,5 |
| A1 | 55 | 90 | 125 | 160 |
| B1 | 71 | 106 | 141 | 176 |
| C1 | 85 | 120 | 155 | 190 |

M00011/S01843 OT200_250E01_04 F




| mm | OT315/400/500 | | | |
|---|---|---|---|---|
| | E01 | E02 | E03 | E04 |
| A | 103 | 147 | 191 | 235 |
| A1 | 78 | 122 | 166 | 210 |
| B1 | 96 | 140 | 184 | 228 |
| C1 | 114 | 158 | 202 | 246 |

*Table 6 - Main Switched Features*

| CGWF HE/ CGWF SE/ CXWF Unit Size | Poles | Ampere | Type |
|---|---|---|---|
| **013** | 3P | 80 A | OT80F3 |
| **015** | 3P | 80 A | OT80F3 |
| **019** | 3P | 80 A | OT80F3 |
| **023** | 3P | 100 A | OT100F3 |
| **025** | 3P | 100 A | OT100F3 |
| **029** | 3P | 100 A | OT100F3 |
| **033** | 3P | 100 A | OT100F3 |
| **037** | 3P | 125 A | OT125F3 |
| **041** | 3P | 125 A | OT125F3 |
| **042** | 3P | 160 A | OT160G03 |
| **048** | 3P | 160 A | OT160G03 |
| **056** | 3P | 200 A | OT200E03 |
| **064** | 3P | 200 A | OT200E03 |
| **072** | 3P | 250 A | OT250E03 |
| **078** | 3P | 250 A | OT250E03 |
| **088** | 3P | 250 A | OT250E03 |
| **096** | 3P | 315 A | OT315E03 |
| **112*** | 3P | 400 A | OT400E03 |
| **128*** | 3P | 400 A | OT400E03 |
| **144*** | 3P | 630 A | OT630E03 |
| **162** | 3P | 630 A | OT630E03 |
| **176** | 3P | 630 A | OT630E03 |
| **192** | 3P | 630 A | OT630E03 |

Note: * Only for CGWF HE and CXWF.

## Water Pump Power Supply

Provide power-supply wiring with fused disconnect switch(es) for the chilled water pump(s).

## Interconnecting Wiring

### Chilled/Hot Water Flow (Pump) Interlock

CGWF requires a field-supplied, control-voltage contact input through a flow proving switch (5S1/5S2) and an auxiliary contact (6K51/6K52). Connect the proving switches and auxiliary contacts to terminal 2 connector J2 cards (1A17). Refer to the field wiring diagram for details.

### Chilled/Hot Water Pump Control

Chilled/hot water-pump output relay close when the unit is given a signal to go into the AUTO mode of operation from any source. The contact is opened to turn off the pump in the event of most machine-level diagnostics, to prevent the buildup of pump heat.

**CAUTION!** The water pump output relays must be used to control the water pumps and to benefit of the water pump timer function at unit startup and shutdown. This is required when the unit is in operation under freezing conditions, especially if the chilled / hot water loops does not contain glycol.

**CAUTION!** Refer to Freeze Protection section for information about the water pumps.`

# Installer-Supplied Components

## Alarm and Status Relay Outputs (Programmable Relays)

See CGWF User Guide for alarm and status relay outputs.

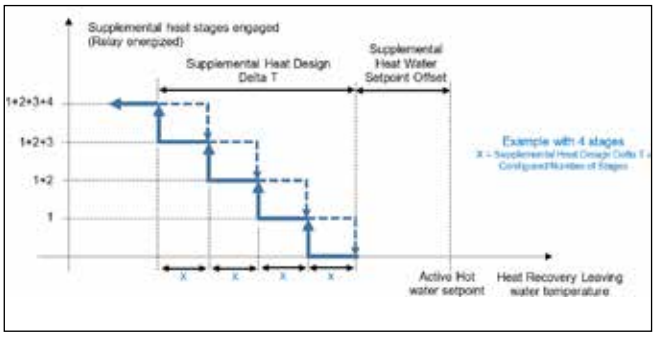
External Demand Limit Setpoint (EDLS) and External Chilled Water Setpoint (ECWS) Analog Input Signal Wiring Details, see User Guide for EDLS and ECWS.

## Supplemental Heat Option

Supplemental heat option provides the possibility to control up to 4 additional heating stages in order to help to maintain the hot water supply temperature warm enough especially in coldest temperatures of winter. It allows to improve the reliability of the unit and the seasonal efficiency of the system.

When the option is activated, it engages 1 to 4 additional heating stages when the leaving water temperature is below the hot water set point and the unit is not able to recover the set point.

The 4 relay card have to be wired to heater command and additional heaters shall be installed downstream the hot water exchanger.



# Operating Principles

This section contains an overview of the operation of CGWF/ CXWF / CXWF GEO unit equipped with symbio 800 control systems.

It describes its overall operating principles. Note: To ensure proper diagnosis and repair, contact a qualified service organization if a problem could occur.

**Note:** To ensure proper diagnosis and repair, contact a qualified service organization if a problem could occur.

## General

The model CGWF and CXWF units have scroll compressor(s), mono and dual circuit reversible on water side. The CXWF GEO units have have scroll compressor(s), mono and dual circuit reversible on refrigerant side.

These units are equipped with unit-mounted starter control.

The basic components of a CGWF/ CXWF / CXWF GEO unit are:

The basic components of a unit are:

- Unit-mounted panel containing starter and Tracer Symbio™ 800 controller and Input/Output LLIDS
- Scroll compressors
- Brazed plate chilled / hot water exchanger
- Electronic expansion valve (EXV)
- Four way valves (only for CXWF GEO units)
- Actuated isolating valve (CGWF and CXWF units)

## Refrigerant Cycle

## CGWF and CXWF

The CGWF/ CXWF unit has 2 exchangers, a dedicated brazed plate chilled/hot water exchanger for respectively chilled and hot water.

CGWF, chiller version, the evaporator is the user side meanwhile the condenser is the source side.

CXWF, heat pump version, the condenser is the user side meanwhile the evaporator is the source side.

The compressors use suction gas cooled motors and an oil management system to provide almost oil-free refrigerant to exchangers for maximum heat transfer while lubricating and sealing compressor rotors and bearings. The lubrication system helps to assure long compressor life and contributes to quiet operation.

An isolation valve is mounted on high pressure side to permit the pump down.

CGWF and CXWF unit is equipped with a unit-mounted starter and control panel. Microprocessor based unit control modules provide accurate water control and providing monitoring, protection and adaptive limit functions. The adaptive nature of the controls intelligently prevent the unit from operating outside of its limits, or compensates for unusual operating conditions while keeping the unit running rather than simply shutting it off. If problems do occur, the Tracer Symbio™ 800 controls provide diagnostic messages to help the operator in troubleshooting.

## CGWF GEO

The CXWF GEO unit has 2 exchangers, a dedicated brazed plate chilled/hot water exchanger for respectively user and source side identified from the labels on the BPHE and the 4 way valve.

The compressors use suction gas cooled motors and an oil management system to provide almost oil-free refrigerant to exchangers for maximum heat transfer while lubricating and sealing compressor rotors and bearings. The lubrication system helps to assure long compressor life and contributes to quiet operation.

CXWF unit is equipped with a unit-mounted starter and control panel. Microprocessor based unit control modules provide accurate water control and providing monitoring, protection and adaptive limit functions. The adaptive nature of the controls intelligently prevent the unit from operating outside of its limits, or compensates for unusual operating conditions while keeping the unit running rather than simply shutting it off. If problems do occur, the Tracer Symbio™ 800 controls provide diagnostic messages to help the operator in troubleshooting.

Depending on the operating mode, the refrigerant go through the 4 way valve towards the source heat exchanger.

## Oil System

The oil is efficiently separated inside the scroll compressor and will remain in the scroll compressor during all run cycles.Between 1-2% of the oil circulates around with the refrigerant.

See compressor section for oil level information.

# Operating Principles

## Storage

The units can be stored within the following environmental conditions:

Min ambient temperature: -10°C

Max ambient temperature: 53°C

Max relative humidity: 95% not condensable

**CAUTION:** The storage in a very high humidity space (condensation) can damage electronic components.

## Operating Limits

CGWF SE / CGWF HE unit operation is permitted within the limits indicated in the diagram provided in 3.3.

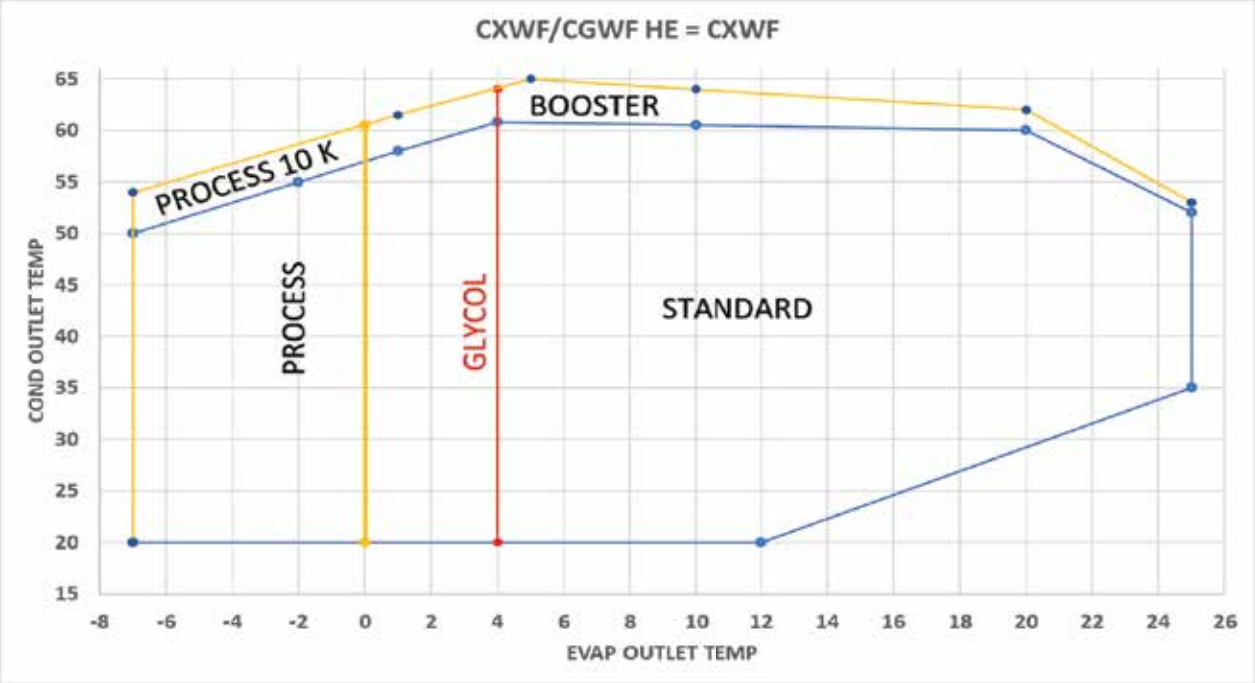
**CAUTION:** The operation outside the limits specified may cause the activation of the protections and disrupt the operation of the unit and, in extreme cases, damage the unit.

In case of doubt, consult the sales office.

These operating limits apply to unit operating at full load.

***Figure 31 – CGWF/ CXWF / CXWF GEO***

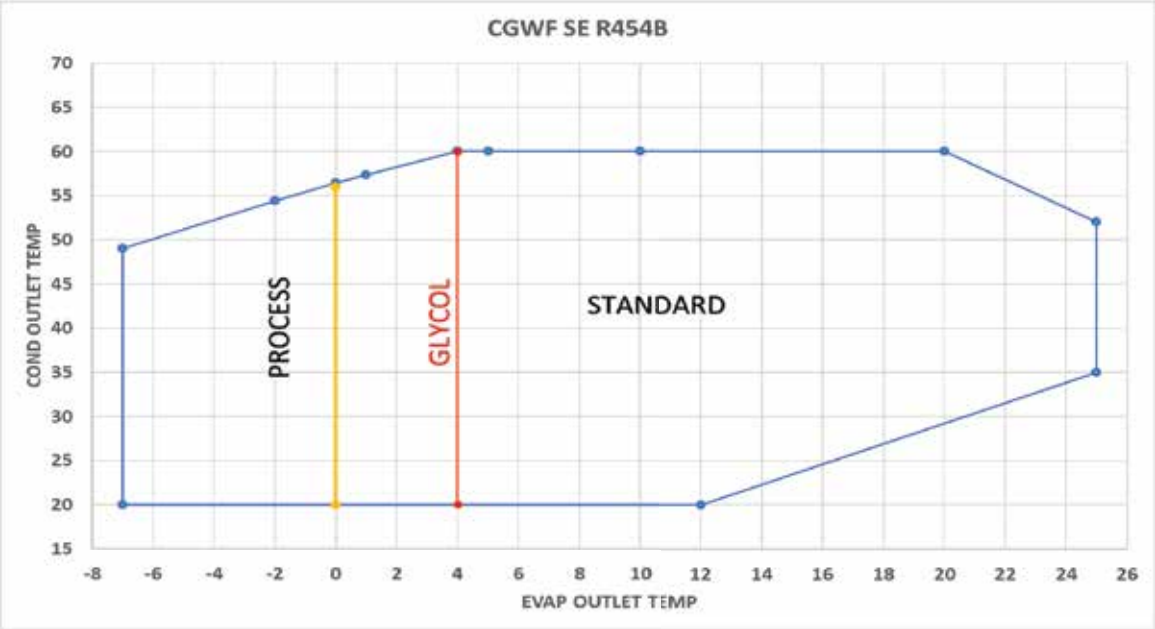
**CXWF/CGWF HE = CXWF**




--CXWF

--CGWF EH = CXWF high-temperature kit (delta T 10°C)

**CGWF SE**




**LWT = Leaving water temperature*

**CXWF GEO**

# Controls/Tracer TD-7 Operator Interface

## Controls Overview

CGWF/ CXWF/ CXWF GEO units use the following control/interface components:

- Symbio™ 800 Controller
- Tracer TD-7 Operator Interface

## Communication Interfaces

There are four connections on the Symbio™ 800 that support the communication interface. See CGWF user Guide to locate the following ports: “Wiring and Ports Description” section.

- BACnet MS/TP
- BACnet® IP (Only with Symbio™ 800)
- MODBUS RTU
- MODBUS TCP (Only with Symbio™ 800)
- LonTalk®

See User Guide for information on communication interface.

## Tracer TD-7 Operator Interface

## Operator Interface

Information is tailored to operators, service technicians and owners. When operating a chiller, there is specific information you need on a day-to-day basis, like set points, limits, diagnostic information, and reports.

Day-to-day operational information is presented at the display. Logically organized groups of information-chiller mode of operation, active diagnostics, settings and reports put information conveniently at your fingertips.

## CXWF GEO

***Note:*** *To identify the Heating or Cooling Mode operation, see the hot or cold water setpoints in the TD-7 display.*

**Heating - CXWF GEO**


***Note:*** *In the TD-7 display for Heating Mode, even though it is labeled as Evap Entering / Leaving, it is Condenser Entering / Leaving information and it represents the User Side BPHE.*

**Cooling - CXWF GEO**


***Note:*** *In the TD-7 display for Cooling Mode, the water temperature are aligned with the functioning of the unit.*

## Tracer® TU

The TD-7 operator interface allows for daily operation tasks and set point changes. However to adequately service CGWF/ CXWF/ CXWF GEO chillers Tracer® TU service tool is required (Non-qualified personnel, contact your local office for software purchase information). Tracer TU adds a level of sophistication that improves service technician effectiveness and minimizes chiller downtime. This portable PC-based service-tool software supports service and maintenance tasks.

# Pre-Start Checkout

## Installation Checklist

Complete this checklist as the unit is installed, and verify that all recommended procedures are accomplished before the unit is started. This checklist does not replace the detailed instructions given in the “Installation Requirement” and “Installation Electrical” sections of this manual. Read both sections completely, to become familiar with the installation procedures, prior beginning the work.

## General

When installation is complete, before starting the unit, the following prestart procedures must be reviewed and verified.

**Caution:** Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

**WARNING Live Electrical Components!**

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

This checklist is not intended to be a substitution for the contractor’s installation instruction. This checklist is intended to be a guide for the technician just prior to unit ‘start-up’.Many of the recommended checks and actions could expose the technician to electrical and mechanical hazards. Refer to the appropriate sections in the unit manual for appropriate procedures, component specifications and safety instructions.

Except where noted; it is implied that the technician is to use this checklist for inspection/ verification of prior tasks completed by the general contractor at installation.

1. Unit clearances adequate for service , etc.
2. Unit properly grounded.
3. Inspect all wiring connections in the compressor power circuits (disconnects, terminal block, contactors, compressor junction box terminals and so forth) to ensure they are clean and tight.
4. Verify that all refrigerant valves in the discharge, liquid, and oil return lines are “OPEN”.
5. Check the power-supply voltage to the unit at the main-power fused-disconnect switch. Voltage must be within the voltage use range and stamped on the unit nameplate. Voltage fluctuation must not exceed 10%. Voltage imbalance must not exceed 2%.
6. Check the unit power phasing L1-L2-L3 in the starter to ensure that it has been installed in a “A-B-C” phase sequence.
7. Fill the evaporator chilled water circuit. Vent the system while it is being filled. Open the vents on the top of the evaporator during filling and close when filling is completed.
8. Close the fused-disconnect switch(es) that supplies power to the chilled water pump starter.
9. Start the chilled water pump to begin circulation of the water. Inspect all piping for leakage and make any necessary repairs.
10. With water circulating through the system, adjust the water flow and check the water pressure drop through the evaporator.
11. Adjust the chilled water flow switch for proper operation.
12. Apply power to complete the procedures.
13. Prove all interlock and interconnecting wiring interlock and external as described in the electrical installation section.
14. Check and set, as required, all Symbio™ 800 TD-7 menu items.
15. Stop the chilled water pump.
16. Energize the compressor and oil separator heaters 24 hours, prior to unit start-up.

# Pre-Start Checkout

## Unit Voltage Imbalance

Excessive voltage imbalance between the phases of a three-phase system can cause motors to overheat and eventually fail. The maximum allowable unbalance is 2%. Voltage imbalance is determined using the following calculations:

% Imbalance = [(Vx – Vave) x 100/Vave]

Vave = (V1 + V2 + V3)/3

Vx = phase with greatest difference from Vave (without regard to the sign)

## Unit Voltage Phasing

It is important that proper rotation of the compressors be established before the unit is started. Proper motor rotation requires confirmation of the electrical phase sequence of the power supply. The motor is internally connected for clockwise rotation with the incoming power supply phases A-B-C.

When rotation is clockwise, the phase sequence is usually called “ABC”, when counterclockwise “CBA”

This direction may be reversed by interchanging any two of the line wires.

1. Stop the unit from TD-7/ Symbio™ 800.
2. Open the electrical disconnect or circuit protection switch that provides line power to the line power terminal block(s) in the starter panel (or to the unit mounted disconnect).
3. Connect the phase-sequence indicator leads to the line power terminal block (L1-L2-L3).
4. Turn power on by closing the unit supply-power fused-disconnect switch.
5. Read the phase sequence on the indicator. The ABC LED of the phase indicator will glow.

**WARNING!** It is imperative that L1, L2, and L3 in the starter be connected in the A-BC phase sequence to prevent equipment damage due to reverse rotation.

**WARNING!** To prevent injury or death due to electrocution, take extreme care when performing service procedures with electrical power energized.

**CAUTION!** Do not interchange any load leads that are from the unit contactors or the motor terminals. Doing so may damage the equipment.

## Water System Flow Rates

Establish a balanced chilled water flow through the evaporator. The flow rates should be between the minimum and maximum values given on the pressure drop curves.

## Water System Pressure Drop

Measure the water-pressure drop through the evaporator on the field installed pressure taps on the system water piping. Use the same gauge for each measurement. Do not include valves, strainers, or fittings in the pressure drop readings.

## Unit Voltage Power Supply

Unit voltage must meet the criteria given in the electrical installation section. Measure each lead of the supply voltage at the main power fused-disconnect switch for the unit. If the measured voltage on any lead is not within the specified range, notify the supplier of the power and correct the situation before operating the unit.

## Symbio™ 800 Setup

Using Tracer TU service tool, adjust the settings. Refer to Tracer TU manual and Symbio™ 800 user guide for instruction on settings.

**CAUTION!** To prevent compressor damage, do not operate the unit until all refrigerant valves and oil-line service valves are opened.

**IMPORTANT!** A clear sight glass alone does not mean that the system is properly charged. Also check system discharge superheat, approach temperature and unit operating pressures.

# Pre-Start Checkout

**Check list - Mandatory operation control before Start-up**

| | | | |
|---|---|---|---|
| Date | | N. | |
| Unit | | | |

| | |
|---|---|
| Customer: | SITE : |
| | ADDRESS : |
| | POSTCODE : |
| | COUNTRY : |

The intended purpose of units is not for industrial process application. Please contact commercial technical department in case of industrial process application.

## General

| | | COMPLIANCE | |
|---|---|---|---|
| | | YES | NO |
| 1 | The hydraulic circuit is complete and ready to be used and the thermal load is available.<br>Please note that **the first start-up shall not be carried out unless the plant is ready and the water load is available.** | | |
| 2 | If any, specify below:<br>**Warning:** Please be aware that relevant damages caused by the quoted circumstances may result in the call-off of the warranty. | | |
| 3 | The unit has been installed in accordance with the minimum distance provided in the dimensional drawing and technical documentation provided. | | |
| 4 | The unit is installed next to the: photovoltaic system, electronic transmitters,antennas or similar devices. | | |
| 5 | The unit is positioned on a perfectly flat (not inclined) surface. | | |
| 6 | Anti-vibrations dampers have been installed between the unit and the floor. | | |
| 7 | The unit displays defects or damages resulting from modifications or changes (unit tampering / unauthorized modifications to the refrigerant circuit or the hydraulic circuit or the electrical panel or changes to the unit operating parameters) made by a third person without a written authorization issued by manufacturer. The unit shall be conform to manufacturer wiring diagrams and technical documentation) in case of relevant difference between the unit and standard configuration please contact sales office.<br>**Warning:** please be aware that relevant damages caused by the quoted circumstances may result in the call-off of the warranty. | | |
| 8 | The unit has been installed very close to a **marine environment** or an **aggressive installation environment** (highly corrosive chemical agent).<br>**Warning:** please be aware that relevant damages caused by the quoted circumstances may result in the call-off of the warranty. | | |
| 9 | Spotted presence of mold, mushrooms, bacteria, microbial of any type. | | |
| 10 | The unit displays damages caused by: floods, lightning, fire, any accident beyond unit control. | | |

# Pre-Start Checkout

## Electric and Electronic

| | | COMPLIANCE | |
|---|---|---|---|
| | | YES | NO |
| 11 | The unit is electrically powered and all the relevant electrical wires are properly connected. | | |
| 12 | Electrical supply has been installed in accordance with the instructions provided in the name plate and in the technical documentation. (Electrical power supply: 230v/400v +/- 10% - maximum "%" of phase imbalance: +/- 2% ) . It is recommendable to check by using a tester the voltage value ( between phases and between phase and neutral). | | |
| 13 | Phases are connected in the proper sequence. | | |
| 14 | Electrical cables size are conform to fla max value. | | |
| 15 | Both external and internal electrical wires are well tightened. | | |
| 16 | The compressor cranckcase heaters have been powered and heated at least 8 hours before the start-up. | | |
| 17 | An electronic supervisor (or any additional controller) has been installed. | | |
| 18 | The connection wires are shielded. | | |
| 19 | Remote control devices or interfaces are connected to the electrical panel in conformity. | | |
| 20 | Electronic devices are intact and don't display any damage. | | |
| 21 | An external water pump is electrically connected to the electrical panel in accordance with the wiring diagrams provided by the manufacturer. | | |
| 22 | The electrical absorption and the water pump overheating are standard. | | |

## Refrigerant Circuit

| | | COMPLIANCE | |
|---|---|---|---|
| | | YES | NO |
| 23 | All connections on the refrigerant circuits are well tightened. | | |
| 24 | The electronic leakage detector or the pressure gauge level installed on the refrigerant circuit have detected any leakage.<br>If any, specify below: | | |
| 25 | The compressor oil indicator light points the maximum level. | | |
| 26 | The filter indicator light on the liquid line is green.<br>**Warning**: the yellow indicator light indicates presence of moisture in the circuit. In this case please contact the sales office. | | |

## Water Circuit

| | | COMPLIANCE | |
|---|---|---|---|
| | | YES | NO |
| 27 | The filter is installed on the heat exchanger inlet pipes, at a maximum distance of 2 meters from the unit.<br>Please note that the filter installation is **mandatory**. For further technical information relating the filter please refer to the technical documentations. | | |
| 28 | The flow switch has been installed and electrically connected. Please note that flow switch installation is **mandatory**. | | |
| 29 | The valves on the water plant must be opened. Please be aware that if the machine is powered (or in stand-by mode) pumps will start if the water temperature is equal or below 4°c. Closing the valves may therefore cause severe damages. | | |
| 30 | Drainage valves are installed. The drainage valves are installed on the lowest point. The utilization of automatic drainage valves is recommended. | | |
| 31 | Automatic or manual purge valves are installed.<br>Automatic or manual purge valves are installed on the highest point. | | |
| 32 | The hydraulic circuit has been filled and purged.<br>The plant shall be purged several times before starting up the unit. The filter installed next to the heat exchanger shall be cleaned several times before starting up the unit, until the correct delta t is assured and the hydraulic pressure is conform to the plant and to the water pressure drops.<br>For further techical informations please refer to the documentations and procedure for the first start up. | | |
| 33 | Hydraulic connections to the unit are compliant with the unit name plate and dimensional drawings (hot water inlet, hot water outlet, cold water inlet, cold water outlet, ext.). | | |
| 34 | Rubber joints are installed on the hydraulic connections, in order to minimize vibrations between the unit and water pipes. | | |
| 35 | Shutoff valves are installed on the hydraulic circuit. | | |
| 36 | The expansion tank is installed on the hydraulic circuit. Expansion tank capacity concurs with the water plant capacity. | | |
| 37 | Temperature probes and pressure gauges are installed on the hydraulic circuit, both inlet and outlet side. | | |
| 38 | The hydraulic circuit is free from obstruction or any kind of constraint. | | |
| 39 | Buffer tanks are installed in the hydraulic circuit. The buffer tanks installation is strongly recommended in order to warranty the optimal unit operation.<br>Specify buffer tank capacity:lt | | |
| 40 | The pressure relief valve is installed between delivery and return pipes.<br>**Warning:** in order to avoid water-hammer, the relief valve pressure shall be set up in accordance with the standard operating pressure of the water circuit. | | |
| 41 | The auxiliary heating system is installed in the water circuit in order to avoid the start-up of the unit with water temperature below 18°c. Before starting up the unit the inlet water temperature must be equal or higher than 18°c.<br>**Warning:** the unit shall never work (not even for short periods) with an inlet water temperature lower than 18°c. | | |

## Pre-Start Checkout

## Water Circuit (Continued)

| | | | |
|---|---|---|---|
| 42 | Antifreeze protections are installed in the water circuit (electrical heaters are installed on water pipes and tanks).<br>For further technical information please refer to technical documentation provided. Please note that antifreeze protections are mandatory for outdoor air temperature lower than 3°c. | | |
| 43 | The water circuit is filled with ethylene glycol. Ethylene glycol "%" shall conform with the data provided in the technical documentation. | | |
| 44 | All water pipes are ground connected (in order to avoid abnormal voltages that can cause dangerous corrosions). | | |
| 45 | The evaporator water flow is compliant to the technical documentation provided by manufacturer. | | |
| 46 | The water pumps are correctly set up in accordance with the plant water flow, available head pressure and pressure drop. | | |
| 47 | The pump impellers are mechanically unblocked and unclogged (free from any kind of constraints.) | | |

| Date: | Authorized Service : | Customer : |
|---|---|---|
| | Name and Signature | Name and Signature |

# Unit Start-Up Procedures

## Daily Unit Start-Up

The time line for the sequence of operation begins with a power-up of the main power to the chiller. The sequence assumes with no diagnostics or malfunctioning components. External events such as the operator placing the chiller in AUTO or STOP, chilled water flow through the evaporator, and application of load to the chilled water loop causing loop water-temperature increases, are depicted and the chiller responses to those events are shown, with appropriate delays noted. The effects of diagnostics, and other external interlocks other than evaporator water-flow proving, are not considered.

**Note:** Unless the Symbio™ 800/ TD-7 and building automation system are controlling the chilled water pump, the manual unit start sequence is as follows. Operator actions are noted.

## General

If the present checkout, as discussed above, has been completed, the unit is ready to start.

1. Press the STOP key on the TD-7 display.
2. As necessary, adjust the set point values on the TD-7 menus using Tracer TU.
3. Close the fused-disconnect switch for the chilled-water pump. Energize the pump(s) to start water circulation
4. Check the service valves on the discharge line, suction line, oil line, and liquid line for each circuit. These valves must be open (back seated) before starting the compressors.
5. Verify that chilled water pump runs for at least one minute after the chiller is commanded to stop (for normal chilled water systems).
6. Press the AUTO key. If the chiller control calls for cooling, and all safety interlocks are closed, the unit will start. The compressor(s) will load and unload in response to the leaving chilled – water temperature.

After the system has been operating for approximately 30 minutes and has become stabilized, complete the remaining start up procedures, as follows:

1. Check the evaporator refrigerant pressure and the condenser refrigerant pressure under Refrigerant Report on the TD-7.
2. Check the EXV sight glasses after enough time has elapsed to stabilize the chiller. The refrigerant flow through the sight glasses should be clear. Bubbles in the refrigerant indicate either low refrigerant charge or excessive pressure drop in the liquid line, or an expansion valve that is stuck open. A restriction in the line can sometimes be identified by a noticeable temperature differential between the two sides of the restriction. Frost will often form on the line at this point. Proper refrigerant charges are shown in the General Information Section.

## Seasonal Unit Start-Up Procedure

1. Close all valves and reinstall the drain plugs in the evaporator.
2. Service the auxiliary equipment according to the startup and maintenance instructions provided by the respective equipment manufacturers.
3. Close the vents in the evaporator and condenser chilled water circuits.
4. Open all the valves in the evaporator and condenser chilled water circuits.
5. Open all refrigerant valves.
6. If the evaporator and condenser was previously drained, vent and fill the evaporator and chilled water circuit. When all air is removed from the system (including each pass), install the vent plugs in the evaporator water boxes.
7. Check the adjustment and operation of each safety and operating control.
8. Close all disconnect switches.
9. Refer to the sequence for daily unit start up for the remainder of the seasonal start up.

**CAUTION!** Ensure that the compressor and heaters have been operating for a minimum of 24 hours before starting. Failure to do so may result in equipment damage.

## System Restart After Extended Shutdown

1. Verify that the liquid-line service valves, compressor discharge service valves, and optional suction service valves are open (back seated).
2. Check the oil level (see Maintenance procedures section).
3. Fill the evaporator and condenser water circuit. Vent the system while it is being filled. Open the vent on the top of the evaporator while filling, and close it when filling is completed.
4. Close the fused-disconnect switches that provide power to the chilled water pump.

# Unit Start-Up Procedures

5. Start the evaporator and condenser, while water is circulating, inspect all piping for leakage. Make any necessary repairs before starting the unit.
6. While the water is circulating, adjust the water flow and check the water pressure drops through the evaporator and condenser. Refer to "water-system flow rates" and "water-system pressure drop".
7. Adjust the flow switch on the evaporator piping for proper operation.
8. Stop the water pump. The unit is now ready for start-up as described "Start-Up procedures".

**CAUTION!** To prevent damage to the compressor, ensure that all refrigerant valves are open before starting the unit. Do not use untreated or improperly treated water. Equipment damage may occur.

## Temporary Shutdown and Restart

Temporary Shutdown is used for control operation, maintenance or to repair the unit typically less than one week.

To shut the unit down for a short time, use the following procedure:

1. Press the STOP key on the TD-7. The compressors will stop when the compressor contactors de-energize.
2. Stop the water circulation by turning off the chilled water pump at least one minute after the stop of the compressors.

To restart the unit after a temporary shutdown, enable the chilled water pump and press the AUTO key.

The unit will start normally, provided the following conditions exist:

- The Symbio™ 800 receives a call for cooling and the differential-to-start is above the set point.
- All system operating interlocks and safety circuits are satisfied.

**CAUTION!** Under freezing conditions, the chilled water pump must remain in operation during the full shutdown period of the chiller if the chilled water loop does not contain glycol, to prevent any risk of evaporator freeze-up.

## Extended Shutdown Procedure

The following procedure is to be followed if the system is to be taken out of service for an extended period of time (i.e. seasonal shutdown):

1. Test the unit for refrigerant leaks and repair as necessary.
2. Open the electrical disconnect switches for the chilled water pump. Lock the switches in the "OPEN" position.
3. Close all chilled water supply valves. Drain the water from the evaporator.
4. Open the unit main electrical disconnect and unit-mounted disconnect (if installed) and lock in the "OPEN" position.
5. At least every three months (quarterly), check the refrigerant pressure in the unit to verify the refrigerant charge integrity.

**CAUTION!** Lock the chilled water pump disconnects open to prevent pump damage. Lock the disconnect switch in the "OPEN" position to prevent accidental startup and damage to the system when it has been set up for extended shutdown.

During an extended shutdown period, especially over the winter season, the evaporator must be drained of water, if the chilled water loop does not contain glycol, to prevent any risk of evaporator freeze-up.

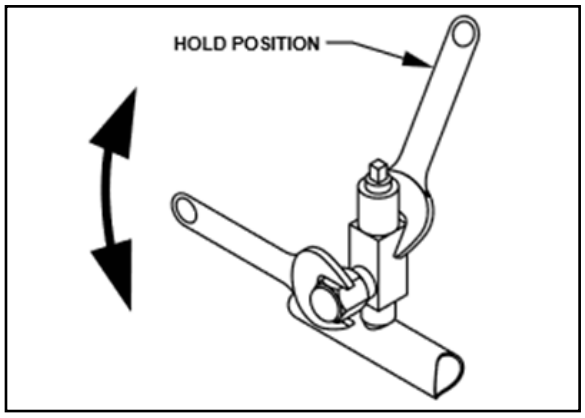
# Periodic Maintenance

## General

Perform all maintenance procedures and inspections at the recommended intervals. This will increase the life of the chiller and minimize the possibility of serious and costly breakdown.

Use an "Operator's Log" to record the unit's operating history. The log serves as a valuable diagnostic tool for service personnel. By observing trends in operating conditions, an operator can anticipate and prevent problem situations before they occur. If the unit is not operating properly during maintenance inspections, consult the "Diagnostic and Troubleshooting" section of this manual. Proper servicing of the service valves is required. Use a backup wrench as shown in Figure when loosening or tightening the service valve cap.

***Figure 32 – Servicing of service valves***




## Weekly Maintenance

After the unit has been operating for approximately 30 minutes and the system has stabilized, check the operating conditions and complete the procedures below:

1. Check on the TD-7 pressure for evaporator, condenser, and intermediate oil.

   Note: Pressures are referenced at sea level.

2. Inspect the entire system for unusual conditions and inspect the condenser coils for dirt and debris. If the coils are dirty, refer to coil cleaning.

**Check the electronic expansion valve sight glasses.**

**Note:** The electronic expansion valve is commanded closed at unit shutdown and if the unit is off, there will be no refrigerant flow through the sight glasses. Only when a circuit is running will refrigerant flow be present.

The refrigerant flow through the sight glasses should be clear. Bubbles in the refrigerant indicate either low refrigerant charge or excessive pressure drop in the liquid line. A restriction in the line can sometimes be identified by a noticeable temperature differential between the two sides of the restriction. Frost may often form on the liquid line at this point. Correct refrigerant charges is shown in nameplate.

**NOTICE:** A clear sight glass alone does not mean that the system is properly charged. Also check the system superheat, sub cooling and unit operating pressures.

**NOTICE:** Use only manifold gauge sets designed for use with R-410A refrigerant.

Use only recovery units and cylinders designed for the higher pressure of R-410A refrigerant and POE oil.

**NOTICE:** R-410A must be charged in a liquid state.

Check the system superheat, subcooling, evaporator temperature drop (Delta-T), evaporator water flow, evaporator approach temperature, compressor discharge superheat, and compressor RLA. Normal operating conditions at ISO conditions are:

Evaporator pressure: 8bars (R-410A), 7.6bars (R-454B)

Evaporator Approach: 3-5°C

Evaporator Superheat: 6-7°C

**Note:** If the superheat is unstable, check the suction temperature sensor. The suction temperature sensor should be well inserted into the well and thermal grease should be used to ensure a good contact between the sensor and the well.

Electronic Expansion Valve: 30-50 percent open

Evaporator Temperature Drop (Delta-T): 5°C

Condensing Pressure: 28-32bars (R-410A) 26.5-30.5bars (R-454B) Condensing Approach Temperature: 14-18°C System Subcooling: 8-12°C (R-410A) 6-10°C (R-454B) If operating pressures and sight glass conditions seem to indicate a refrigerant shortage, measure the system superheat and sub cooling.

Refer to "System Superheat" and "System Sub cooling." If operating conditions indicate a refrigerant overcharge, remove refrigerant at the liquid line service valve.

Allow refrigerant to escape slowly to minimize oil loss. Use a refrigerant recovery cylinder and do not discharge refrigerant into the atmosphere.

**WARNING!** Do not allow refrigerant to directly contact skin as injury from frostbite may result.

## Monthly Maintenance

1. Perform all weekly maintenance procedures.
2. Manually rotate the condenser fans to ensure that there is proper clearance on the fan shroud openings.
3. Check water pump (option): Manually rotate the pump. Remove plastic plug located at the bottom of the motor frame to drain any condensation which can occur in the motor.
4. Check and clean air filter of the control panel (option).
5. In case of Twin-pump, make sure there is no pump motor fault.

   **Note:** pump operation will be alternated at each new request of water flow or when a pump fault is detected.

   **WARNING!** Position all electrical disconnects in the "OPEN" position and lock them to prevent injury of death due to electrical shock or moving parts. When electrical panels are ventilated, you need to change the fan filter.
6. Make any repairs necessary.

## Annual Maintenance

1. Perform all weekly and monthly procedures.
2. Check the oil sump oil level and refrigerant charge while the unit is OFF.

**Note:** Routine changing of the oil is not required. Make an oil analysis to determine the condition of the oil.

1. Have manufacturer or another qualified laboratory perform a compressor oil analysis to determine system moisture content and acid level. This analysis is a valuable diagnostic tool.
2. Contact a qualified service organization to leak-test the chiller, to check operating and safety controls, and to inspect electrical components for deficiencies.
3. Inspect all piping components for leakage and damage.
4. Clean all water strainers.

   **Notice:** If the CGWF chiller Heat pump evaporator is drained of water, the freeze protection heater must be de-energized. Failure to de-energize the heater might cause it to burn out.
5. Clean and repaint any areas that show signs of corrosion.
6. Clean the condenser coils.
7. Check and tighten all electrical connections as necessary.

**CAUTION!** A clear sight glass alone does not mean that the system is properly charged. Also check the rest of the system operating conditions.

**WARNING!** Position all electrical disconnects in the "Open" position and lock them to prevent injury or death due to electrical shock.Clean the condenser fans. Check the fan assemblies for proper clearance in the fan shroud openings and for motor shaft misalignment or abnormal end-play, vibration and noise.

## Refrigerant Emission Control

Conservation and emission reduction can be accomplished by following recommended operation, maintenance, and service procedures, with specific attention to the following:

1. Refrigerant used in any type of air-conditioning or refrigerating equipment should be recovered and/or recycled for reuse, reprocessed (reclaimed). Never release refrigerant into the atmosphere.
2. Always determine possible recycle or reclaim requirements of the recovered refrigerant before beginning recovery by any method.
3. Use approved containment vessels and safety standards. Comply with all applicable transportation standards when shipping refrigerant containers.
4. To minimize emissions while recovering refrigerant, use recycling equipment. Always attempt to use methods that will pull the lowest possible vacuum while recovering and condensing refrigerant into containment.
5. Refrigerant-system cleanup methods that use filters and dryers are preferred. Do not use solvents that have ozone depletion factors. Properly dispose of used materials.
6. Take extra care to properly maintain all service equipment that directly supports refrigeration service work, such as gauges, hoses, vacuum pumps, and recycling equipment.
7. Stay aware of unit enhancements, conversion refrigerants, compatible parts, and manufacturer's recommendations that will reduce refrigerant emissions and increase equipment operating efficiencies. Follow the manufacturer's specific guidelines for conversion of existing system.
8. In order to assist in reducing power-generation emissions, always attempt to improve equipment performances with improved maintenance and operations that will help conserve energy resources.

## Refrigerant and Oil-charge Management

Proper oil and refrigerant charge is essential for proper unit operation, unit performances, and environmental protection. Only trained and licensed service personnel should service the chiller.

***Some of the symptoms of a refrigerant under-charged unit:***

- Larger-than-normal evaporator approach temperatures (leaving water temperature – saturated evaporator temperature). If the refrigerant charge is correct the approach temperature is 4°C. These values are given for units running at full load and with water without antifreeze
- Low Evaporator-refrigerant temperature limit
- Low Refrigerant-Temperature cutout diagnostic
- Fully-open expansion valve
- Possible whistling sound coming from liquid line (due to high vapour velocity)
- High condenser + Sub cooler pressure drop

***Some of the symptoms of a refrigerant over-charged unit***

- Condenser Pressure Limit
- High –Pressure Cutout diagnostic
- More-than-normal number of fans running
- Erratic fan control
- Higher-than-normal compressor power

***Some of the symptoms of an oil over-charged unit***

- Larger-than-normal evaporator approach temperatures (Leaving-water-temperature – Saturated Evaporator Temperature)
- Low Evaporator-refrigerant Temperature limit
- Low Refrigerant – Temperature Cutout diagnostic
- Low unit capacity
- High oil-sump level after normal shutdown
- Discharge temperature is lower than prediction provided by compressor manufacturer selection program.

***Some of the symptoms of an oil under-charged unit***

- Seized or Welded compressors
- Low oil-sump level after normal shutdown

## Refrigerant Leak Detector R-454B Calibration

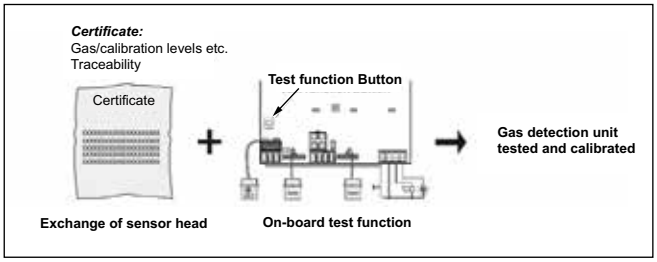
Calibration of this component must be done every year. It is important to ensure proper accuracy and operation of the detector.

There are two different methods to fulfill the calibration requirements:

- **Replacing the sensor head with a new factory pre-calibrated sensor**

It is necessary to make an order of this sensor head as spare part.

After sensor head exchange, the detector must be tested with the on-board test button function, which simulates alarm signals and relay activation, to ensure all electrical components are functional.




This method is preferred due to the following factors:

As sensors have a limited lifetime, this method basically ensures that the customer has a gas detector as good as new after replacing the sensor head.

The method is typically more efficient and cost effective compared to calibration carried out on site.

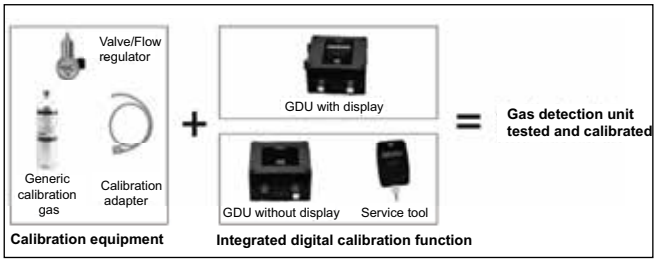
- **Performing a calibration to the sensor using calibration gas (gas mixture with known target gas concentration)**

Test equipment and basic competence in calibration is required to carry out this method.

Calibration equipment for Gas Detection Units (GDU) consists of:

- Valve/Flow regulator.
- Gas cylinder with the correct calibration gas for each refrigerant and concentration (ppm).
- Calibration adapter.

In order to execute the calibration function, the gas detector unit needs to be equipped with a display or connection to either the service tool or the PC tool.



# Periodic Maintenance

## Standard Controls

| Operations description | Recommended basis |
|---|---|
| Compressors oil level check | monthly |
| Inlet temperature check (overheating) | monthly |
| Water circuits filling check | monthly |
| Compressors motors electrical input check | monthly |
| Power supply and auxiliary power voltage check | monthly |
| Refrigerant charge check through sight glass | monthly |
| Compressors carter heaters operation check | monthly |
| Tightening all electrical connections | monthly |
| Compressors and liquid circuit solenoid valve check | semiannual |
| Compressors contactors state check | quarterly |
| Evaporator heater operation check | quarterly |

**Temperature and pressure probes –** The unit comes factory-equipped with all the sensors listed below. Periodically check that their measurements are correct by means of sample instruments (manometers, thermometers); correct readings if necessary using the microprocessor keyboard. Well- calibrated sensors ensure better efficiency for the unit and a longer lifetime.

Note: refer to the microprocessor use and maintenance manual for a complete description of applications, setting and adjustments.

All sensors are preassembled and connected to the microprocessor. The descriptions of each sensor are listed below:

**Outgoing water temperature sensor –**This sensor is located on the evaporator outgoing water connection and is used by the microprocessor for antifreeze protection and to control the unit load according to the system thermal load.

WARNING In case a temperature control based on ingoing water temperature is needed please contact the sales office before carrying out any trying to set it autonomously.

**Ingoing water temperature sensor –**This sensor is located on the evaporator ingoing water connection and is used for monitoring the return water temperature.

**External air temperature sensor –**This sensor allows to monitor the external air temperature on the microprocessor display.

**High pressure transducer –**This allows to monitor the delivery pressure and to control the ventilators on each circuit. Should an increase in condensation pressure occur, the microprocessor will control the circuit load in order to allow it to function even if choked. It contributes to complementing the oil control logic.

**Low-pressure transducer –**This allows to monitor the compressor suction pressure along with low pressure alarms on each circuit. It contributes to complementing the oil control logic.

# Compressor Service Information

## Compressor Electrical Connections

It is very important that DSH compressors used in model CGWF chillers Heat Pumps are wired correctly for proper rotation. These compressors will not tolerate reverse rotation. Verify correct rotation/phasing using a rotation meter.

Proper phasing is clockwise, A-B-C. If wired incorrectly a DSH compressor will make excessive noise, will not pump and will draw about half the normal current. It will also become very hot if allowed to run for an extended period.

**Notice:** Do not "bump" the compressor to check rotation as incorrect rotation could cause compressor motor failure in as little as 4 to 5 seconds!

## Oil Level

To check compressor oil level, refer to the label near the compressor sight glass. The compressor(s) must be off. Wait three minutes. With tandem or triple compressors the oil level will equalize after shutdown. Compressor oil level should be no lower than the bottom of the sight glass and no more than a full sight glass. When operating, each compressor in a tandem or trio set may have a different oil level. The oil level may not be in the sight glass, but it must be visible through the sight glass.

## Oil Fill, Removal and Capacity

The Model DSH compressors have an oil charging valve with a dip tube that goes to the bottom of the compressor. This can be used to add or remove oil from the compressor.

Care must be taken to prevent moisture from entering the systems when adding oil. Note that the POE oil used in this product is very hygroscopic and easily absorbs and retains moisture. Moisture is very difficult to remove from oil using vacuum. Also note that once the seal on a container of POE oil is opened, the oil must be used.

Use only OIL0057 (3.8 l) or OIL00058E (18.9 l). These are the same oil but different container size. Do not use any other POE oil.

**NOTE:** Never reuse oil.

## Oil Testing

We recommend performing a complete oil analysis at least once a year with a laboratory specifically dedicated to oil analysis for equipment. It provides an in-depth view of both compressor and refrigerant circuit conditions including presence of water, wear particles, viscosity, acidity or dielectric data. If unacceptable wear conditions develop, a change in the characteristics of the oil will be evident. Minor problems can be detected and repaired before they become major problems.

## Oil Equalizer Line

### DSH Compressors

The oil equalizer line is equipped with a Rotolock fitting for easy removal. Torque value for tightening these fitting is 145 N.m. Recover the system refrigerant charge and Drain the oil to a level below the oil equalizer tube fitting before removing the oil equalizer line. This must be done on both compressors. Use the oil drain valve on the compressor. If the oil is drained below the level of the oil level sight glass, it will be below the oil equalizer line level. Pressurize the low side of the compressor using nitrogen to help drain the oil. No more than 70 kPa of pressure will be needed.

## Tandem and Triple Compressor Suction Restrictors

Since most tandem and triple compressor sets use unequal size compressors, these combinations require the use of a restrictor in the suction line of one or more compressors in order to provide correct oil level balance between compressors when they are operating.

## Compressor Replacement

If the F chiller Heat Pump suffers a failed compressor, use these steps for replacement:

Each compressor has lifting eyes. Both lifting eyes must be used to lift the failed compressor. DO NOT LIFT A COMPRESSOR USING A SINGLE LIFTING EYE. Use proper lifting techniques, a spreader bar and rigging as for lifting both compressors simultaneously.

After a mechanical failure of a compressor, it is necessary to change the oil in the remaining compressor and also replace the liquid line filter drier. After an electrical failure of a compressor, it will also be necessary to change the oil in the remaining compressor, replace the liquid line filter

drier and add a suction filter drier with clean-up cores.

**Note:** Do not alter the refrigerant piping in any way as this can affect compressor lubrication.

## Refrigerant System Open Time

Model CGWF/CXWF/CXWF GEO chillers Heat Pump use POE oil and therefore refrigerant system open time must be kept to a minimum. The following procedure is recommended:

- Leave a new compressor sealed until it is ready to be installed in the unit. Maximum system open time is dependent upon ambient conditions, but do not exceed one hour open time.
- Plug the open refrigerant line to minimize moisture absorption. Always change the liquid line filter drier.
- Evacuate the system to 500 microns or below.
- Do not leave POE oil containers open to the atmosphere. Always keep them sealed.

## Mechanical Compressor Failure

Replace the failed compressor(s) and change the oil in the remaining compressor(s) along with the refrigerant system liquid line filter drier.

## Electrical Compressor Failure

Replace the failed compressor and change the oil in the other compressor(s). Also add a suction filter with cleanup cores and change the liquid line filter drier. Change filters and oil until the oil no longer test acidic. See “Oil Testing.”

## Compressor Motor Megging

Motor megging determines the electrical integrity of the compressor motor winding insulation. Use a 500 volt megger. A less than 1 meg-ohm reading is acceptable and 1000 ohms per nameplate volts is required to safely start the compressor.

## Compressor Current Imbalance

Normal current imbalance could be 4 to 15 percent with balanced voltage due to motor design. Each phase should register 0.3 to 1.0 ohms and each phase should be within 7 percent of the other two phases. Phase to ground resistance must be infinity.

**NOTICE:** Maximum allowable voltage imbalance is 2 percent.

## Compressor Electrical Terminal Box

Be sure to protect the terminal box when unbrazing or brazing compressor refrigerant piping connections.

## Compressor Crankcase Heaters

Compressor crankcase heaters must be energized at least eight hours before starting the CGWF/CXWF/CXWF GEO chiller. This is required to boil refrigerant out of the oil before startup. Ambient temperature (except 20°C and above) is not a factor and the crankcase heaters must always be energized prior to startup.

## Refrigerant Piping

The compressor suction and discharge connections and piping are copper clad steel for easy brazing. In most instances, piping may be reused. If piping is not reusable, order the correct service parts. Cut all tubing with a tubing cutter to prevent copper filings from entering the system. Cut the tubing in a straight length of pipe after the compressor connection has been unsweated. The line can then be reinstalled using a slip coupling and brazing.

**Notice:** The compressor suction line configuration must not be changed in any way. Changing compressor suction line configuration will compromise proper oil return to the compressor(s).

# Log Check Sheet

The operator log sheet are included for use as appropriate, for installation completion verification before Start-up is scheduled, and for reference during the Start-up.

| Operator Log | | | | |
|---|---|---|---|---|
| **CGWF/CXWF/CXWF GEO chiller with Symbio™ 800 Controller - Tracer AdaptiView Reports - Log Sheet** | | | | |
| | **Start** | **15 minutes** | **30 minutes** | **1 hour** |
| **Evaporator** | | | | |
| Active Chilled Water Setpoint | | | | |
| Entering Water Temperature | | | | |
| Leaving Water Temperature | | | | |
| **Ckt 1** | | | | |
| Saturated Refrigerant Temperature (°C) | | | | |
| Refrigerant Pressure (kPa) | | | | |
| Approach Temperature (°C) | | | | |
| Water flow Status | | | | |
| EXV % Open | | | | |
| **Ckt 2** | | | | |
| Saturated Refrigerant Temperature (°C) | | | | |
| Refrigerant Pressure (psia) | | | | |
| Approach Temperature (°C) | | | | |
| Water flow Status | | | | |
| EXV % Open | | | | |
| **Condenser** | | | | |
| Outdoor Temperature | | | | |
| **Ckt 1** | | | | |
| Airflow (%) | | | | |
| Saturated Refrigerant Temperature (°C) | | | | |
| Refrigerant Pressure (kPa) | | | | |
| Sub cooling in °C | | | | |
| **Ckt 2** | | | | |
| Airflow (%) | | | | |
| Saturated Refrigerant Temperature (°C) | | | | |
| Refrigerant Pressure (kPa) | | | | |
| Sub cooling in °C | | | | |
| **Compressor 1A** | | | | |
| Running Status | | | | |
| Starts | | | | |
| Running Time (Hr:min) | | | | |
| Oil Pressure (kPa) | | | | |
| **Compressor 1B** | | | | |
| Running Status | | | | |
| Starts | | | | |
| Running Time (Hr:min) | | | | |
| Oil Pressure (kPa) | | | | |
| **Compressor 2A** | | | | |
| Running Status | | | | |
| Starts | | | | |
| Running Time (Hr:min) | | | | |
| Oil Pressure (psia) | | | | |
| **Compressor 2B** | | | | |
| Running Status | | | | |
| Starts | | | | |
| Running Time (Hr:min) | | | | |
| Oil Pressure (psia) | | | | |
| **Compressor 3A** | | | | |
| Running Status | | | | |
| Starts | | | | |
| Running Time (Hr:min) | | | | |
| Oil Pressure (psia) | | | | |
| **Compressor 3B** | | | | |
| Running Status | | | | |
| Starts | | | | |
| Running Time (Hr:min) | | | | |
| Oil Pressure (psia) | | | | |

| |
|---|
| Date: |
| Technician: |
| Owner: |

# Recommended Service Routine Frequencies

As a commitment to our customers, we have created a wide service network staffed with experienced factory-authorized technicians. We offer all the benefits of after sales service direct from the manufacturer and we are committed to our mission statement to provide efficient customer care.

We would be delighted to discuss your individual requirement with you. For further information regarding maintenance agreements please contact your local sales office.

| Year | Commis-sioning | Inspec-tion visit | Seasonal shut down | Seasonal start up | Oil analysis (2) | Vibration analysis (3) | Annual mainte-nance | Preven-tive mainte-nance | Tube analysis (1) | Com-pressor R'newal (4) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | x | x | x | x | | x | | xx | | |
| 2 | | | x | x | x | | x | xxx | | |
| 3 | | | x | x | x | | x | xxx | | |
| 4 | | | x | x | x | | x | xxx | | |
| 5 | | | x | x | x | x | x | xxx | x | |
| 6 | | | x | x | x | x | x | xxx | | |
| 7 | | | x | x | x | x | x | xxx | | |
| 8 | | | x | x | x | x | x | xxx | | |
| 9 | | | x | x | x | x | x | xxx | | |
| 10 | | | x | x | x | x | x | xxx | x | |
| over 10 | | | every year | every year | every year (2) | x | every year | every 3-year | every 3-years | 40000 h |

This timetable is applicable to units operating in normal conditions with an average of 4000 hours per year. If operating conditions are abnormally severe, an individual timetable must be made for that unit.

1. Tube testing required if aggressive water conditions exist. Applies to condensers only on water cooled units.
2. Schedule as per previous analysis result or at least once a year.
3. Year 1 to define equipment baseline. Subsequent year based on oil analysis results or schedule as per vibration analysis.
4. Recommended at 40 000 run hours or 100 000 equivalent operating hours whichever comes first. Schedule also depends on results from oil analysis / vibration analysis.

Seasonal start up and shutdown are mainly recommended for comfort air conditioning. Annual and preventive maintenance are mainly recommended for Process applications.

# Notes

Trane – by Trane Technologies (NYSE: TT), a global climate innovator – creates comfortable, energy efficient indoor environments through a broad portfolio of heating, ventilating and air conditioning systems and controls, services, parts and supply. For more information, please visit trane.eu or tranetechnologies.com.



CG-SVX060E-GB August 2025
Supersedes CG-SVX060D-GB (May 2025)