INSTALLATION, OPERATION & MAINTENANCE

IOM 1358

AUGUST 2024

TRAILBLAZER®

AIR TO WATER SCROLL HEAT PUMP

- MODEL EWYQ
- 25 TONS
- R-410A REFRIGERANT

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Safety Information

This manual provides installation, operation, and maintenance information for the Daikin Applied Trailblazer Air to Water Scroll Heat Pump.

Installation, start-up and servicing of equipment can be hazardous if certain factors particular to the installation are not considered: operating pressures, presence of electrical components and voltages and the installation site (elevated plinths and built-up structures). Only properly qualified installation engineers and highly qualified installers and technicians, fully trained for the product, are authorized to install and start-up the equipment safely.

NOTICE

Installation and maintenance are to be performed only by licensed, if required by local codes and regulations, or qualified personnel who are familiar with local codes and regulations and are experienced with this type of equipment.

⚠ DANGER

LOCKOUT/TAGOUT all power sources prior to service, pressurizing, de-pressuring, or powering down the unit. Failure to follow this warning exactly can result in serious injury or death. Disconnect electrical power before servicing the equipment. More than one disconnect may be required to denergize the unit. Be sure to read and understand the installation, operation, and service instructions within this manual.

⚠ WARNING

Electric shock hazard. Improper handling of this equipment can cause personal injury or equipment damage. This equipment must be properly grounded. Connections to and service of the MicroTech control panel must be performed only by personnel that are knowledgeable in the operation of the equipment being controlled.

⚠ WARNING

Polyolester Oil, commonly known as POE oil is a synthetic oil used in many refrigeration systems, and may be present in this Daikin Applied product. POE oil, if ever in contact with PVC/CPVC, will coat the inside wall of PVC/CPVC pipe causing environmental stress fractures. Although there is no PVC/CPVC piping in this product, please keep this in mind when selecting piping materials for your application, as system failure and property damage could result. Refer to the pipe manufacturer's recommendations to determine suitable applications of the pipe.

⚠ CAUTION

Static sensitive components. A static discharge while handling electronic circuit boards can cause damage to the components. Discharge any static electrical charge by touching the bare metal inside the control panel before performing any service work. Never unplug any cables, circuit board terminal blocks, or power plugs while power is applied to the panel.

Hazard Identification

⚠ DANGER

Danger indicates a hazardous situation, which will result in death or serious injury if not avoided.

⚠ WARNING

Warning indicates a potentially hazardous situations, which can result in property damage, personal injury, or death if not avoided.

⚠ CAUTION

Caution indicates a potentially hazardous situations, which can result in minor injury or equipment damage if not avoided.

NOTICE

Notice indicates practices not related to physical injury.

Introduction

General Description

The unit purchased is a Water Chiller and/or a Heat Pump, that is a machine designed to cool/heat the water (or a water-glycol mixture) within certain limits which will be listed below. The unit operates based on the compression, condensation and evaporation of the coolant gas as per the Carnot cycle, and is composed mainly of the following parts depending on the Mode of Operation.

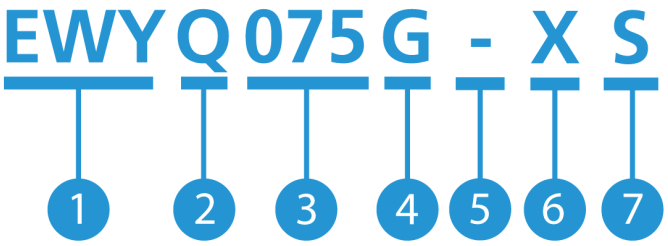
Cooling or Conditioning Mode:

- One or more scroll compressors which increase the pressure of the refrigerant gas from evaporation pressure to condensation pressure.
- A condenser where the refrigerant gas condenses under high pressure and transfers heat to the water.
- An expansion valve which allows the pressure of condensed liquid refrigerant to be reduced from condensation pressure to evaporation pressure.
- An evaporator, where the low pressure liquid refrigerant evaporates and chills the water.

Heating Mode or Heat Pump:

- One or more scroll compressors which increase the pressure of the refrigerant gas from evaporation pressure to condensation pressure.
- A condenser where the refrigerant gas condenses under high pressure and transfers heat to the water.
- An expansion valve which allows the pressure of condensed liquid refrigerant to be reduced from condensation pressure to evaporation pressure.
- An evaporator, where the low pressure liquid refrigerant evaporates and chills the water.
- The operation of the heat exchangers can be inverted using the 4-way valve, with which the use of the heating/cooling unit can be seasonally inverted.

Nomenclature



1.	Machine Type:	EWY = Air to Water Heat pump
2.	Refrigerant:	Q = R-410A
3.	Class in kW (Cooling):	Always 3-digit code
4.	Model Series:	G = Single Circuit
5.	Inverter:	No Inverter
6.	Efficiency Level:	X = High Efficiency
7.	Sound Level:	S = Standard noise R = Reduced noise

Installation

Safety

⚠ WARNING

Installation and maintenance of the unit must be performed only by qualified personnel who have knowledge with local codes and regulations and experience with this type of equipment.

Do not install the unit in a location where it could be considered dangerous to perform any and all maintenance operations.

The unit must be firmly secured to the ground.

The following instructions must be followed:

- Never access electrical components without having first closed the main switch and switched off the power supply
- Never access electrical components without some form of insulation. Never access electrical components if water and/or moisture are present.
- Always disconnect the power supply by closing the main switch before carrying out any work on the cooling fans and/or compressors. Failure to do so may result in serious injury.
- Do not introduce solid objects into water pipes.
- A mechanical filter must be fitted to the water pipe connected to the heat exchanger inlet.
- The unit is supplied with high pressure switches and/or safety valves, that are installed on both the high-pressure and low-pressure sides of the refrigerant circuit: pay attention.

⚠ WARNING

Never remove protective system covering moving parts. Removing protective systems can result in serious injury or death. Contact a Diakin Applied technician for assistance.

In the event of a sudden stop, follow the instructions in the Control Panel Instruction Manual which is part of the documentation supplied with the unit.

We strongly recommend that installation and maintenance operations not be performed alone, but with other people present.

In the event of an accident or problem:

- Keep calm
- Press the alarm button, if present, or close the main switch
- Move the injured person to a warm place far from the unit and in place him or her in the recovery position
- Immediately contact any emergency personnel in the building or the call the Emergency Services
- Wait until emergency personnel arrive and do not leave the injured person alone.
- Give all necessary information to the emergency personnel.

NOTICE

All the units are delivered with wiring diagrams, certified drawings, ID nameplate. These documents list all the technical data of the unit acquired and constitute an integral and essential part of this manual.

In the event of any discrepancy between this manual and the appliance documents, please refer to the documents that come supplied with the unit. In case of doubt, contact the manufacturer's representative.

The aim of this manual is to make sure that the installer and the qualified operator can properly commission, operate and maintain the unit without creating any risk to people, animals or things.

Receiving the Unit

The unit must be inspected for any possible damage immediately upon reaching final place of installation. All components described in the delivery note must be inspected and checked.

Should there be evidence of damage, do not remove the damaged components and immediately report the extent and type of damage both to the transportation company, asking them to inspect it, and the manufacturer's representative, sending if possible photos which may be useful in identifying those responsible.

Damage must not be repaired before inspection by the transportation company representative and the manufacturer's representative.

Before installing the unit, check that the model and power supply voltage shown on the ID plate are correct. The manufacturer will not accept responsibility for any damage following acceptance of the unit.

Handling and Lifting

The unit must be lifted with the utmost care and attention, following the lifting instructions shown on the label applied to the side of the electric panel. Lift the unit very slowly, keeping it perfectly level.

Avoid bumping and/or shaking the unit during handling and loading/unloading operations from the transportation vehicle, push or pull the unit only using the base frame. Secure the unit inside the truck to prevent it from moving and causing damage. Do not allow any part of the unit to fall during loading/unloading.

⚠ CAUTION

Both the lifting ropes and the spacing bars must be strong enough to support the unit safely. Check the weight of the unit on the ID plate as the weight of the units varies depending on the accessories requested.

Lifting Guidance

Daikin Applied equipment is designed to withstand the loads of the lifting and rigging process resulting from ASME Standard P30.1 - Planning for Load Handling Activities or equivalent. Lifting guidance is intended for installations of newly delivered equipment. If moving previously installed equipment for re-location or disposal, consideration should be given to unit condition. Equipment should also be drained as unit weight and center of gravity values do not reflect the addition of water for lifting.

⚠ DANGER

Improper rigging, lifting, or moving of a unit can result in unit damage, property damage, severe personal injury, or death. See the as-designed, certified dimensioned drawings included in the job submittal for the weights and center of gravity of the unit. If the drawings are not available, consult the local Daikin Applied sales office for assistance.

Installation is to be performed only by qualified personnel who are familliar with local codes and regulations, and experienced with this type of equipment. Lifting equipment and mechanisms must be determined by the Lifting Director per the current version of ASME Standard P30.1 or equivalent and must be suited for the load capacity. Daikin Applied is not a licensed nor certified rigging specialist. Therefore it is the customer's responsibility to consult a certified rigging contractor to rig, lift, and move components and subcomponents properly and safely as needed.

⚠ CAUTION

When around sharp edges, wear appropriate Personal Protective Equipment (PPE), such as gloves, protective clothing, foot wear, eye protection, etc. to prevent personal injury.

Lifting Hole

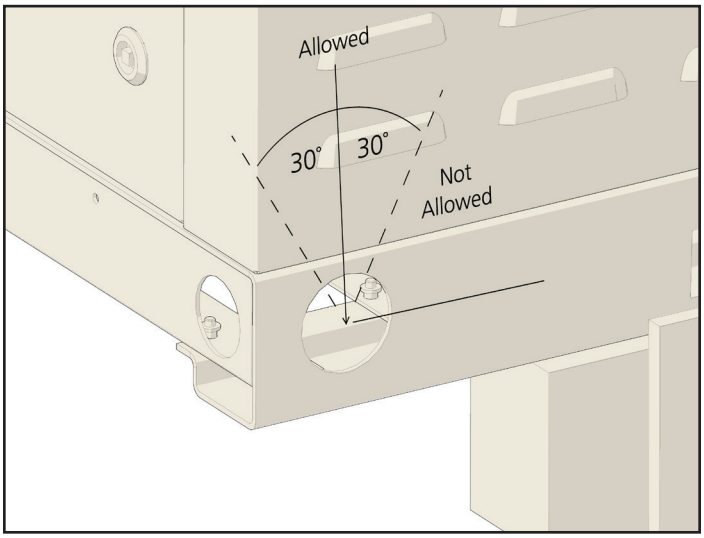
Lifting hole designs vary from product to product. Rules of engagement with the lifting point are the same regardless of the attachment type. For Trailblazer Scroll Heat Pump units, a typical lifting bracket with 2" (51 mm) diameter holes found on the sides of the unit base are illustrated in Figure 1. See the as-designed certified drawings for specific lifting points on this product model.

Engagement with each bracket is to be as close to vertical as possible. The maximum allowable lift angle from the vertical is 30 degrees. If the lift angle shifts beyond 30° from vertical on any of the lift points, the lift shall not proceed until a plan and rigging can be secured that will correct the angle of lift.

⚠ WARNING

The lifting angle must not go beyond 30 degrees from vertical or the unit can become unstable which may result in unit damage, property damage, severe personal injury, or death.

Figure 1: Illustration of Lifting Bracket and Allowed Angle for Lifting



Lifting Equipment

Lifting equipment is supplied by the user or their designate. This is typically selected around the unit certified information of the equipment to be lifted and the available lifting equipment planned to be at the site where the lift is to take place. It is the responsibility of the Lifting Director to follow a standard practice of lift planning and equipment selection, like that found in the ASME P30 series of standards. Lifting plan and equipment must ensure that the only contact with the unit is at that lifting brackets. Straps, chains or spreader bars that are likely to be used shall not come in contact with the unit.

⚠ CAUTION

Lifting mechanisms must not make contact with the unit beyond the lifting bracket. Extreme care must be used when rigging the unit to prevent damage to the control panels, unit handles, unit piping, and unit frame.

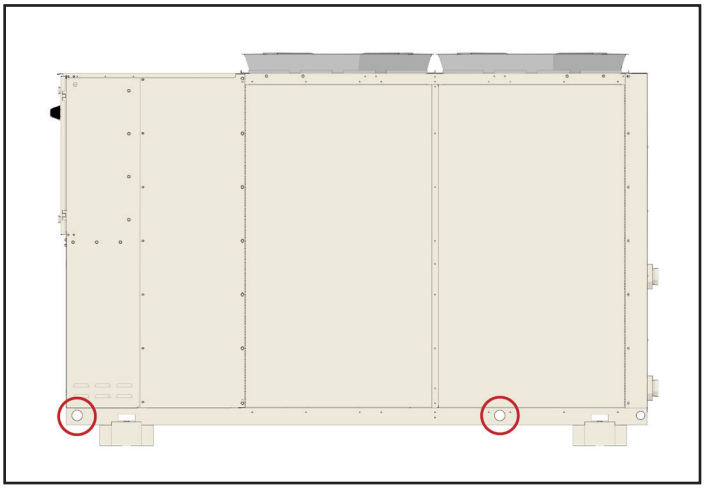
Lifting Points

Lifting points are predetermined by design. When lifting, all factory installed lifting brackets must be used. Figure 2 illustrates a typical 4 point lifting configuration (2 lifting points on each side of the unit). Unit must remain level throughout the entire lifting event. Level is defined as one end being no more than 0.25" per foot of unit length to the opposite end.

⚠ WARNING

Be aware that the center of gravity may not necessarily be in the geometric center of the unit. No additional items can be added to a lift with the unit as it may affect the center of gravity and cause unit damage, property damage, severe personal injury, or death. Refer to as-designed, certified drawings for weight, center of gravity location and details specific to unit configuration.

Figure 2: Typical Lifting Points Locations



Transit and Temporary Storage

If the unit is stored for an intermediate period before installation or moved to a different location, take these additional precautions:

1. Support the unit well along the length of the base rail.
2. Level the unit (no twists or uneven ground surface).
3. Provide proper drainage around the unit to prevent flooding of the equipment.
4. Provide adequate protection from vandalism, mechanical contact, etc.
5. Securely close the doors and lock the handles
6. Long term storage in humid environments may cause condensate corrosion on steel surfaces. Consider adding a desiccant material to alleviate corrosion concerns.

When the unit is being tied down for transit, the maximum allowable attachment angle from the vertical is 30 degrees in the opposite direction of lifting. Shimming of the unit under the lifting brackets or tie-down points must be used to ensure even contact along the length of the base rail.

The unit must be protected from dust, rain, constant exposure to the sun and possible corrosive agents and rodents when being stored outside before installation.

Even though it is covered by a heat-shrinking plastic sheet, this is not intended for long-term storage and must be removed as soon as the unit is unloaded. The unit must be protected by tarpaulins or suchlike, which are more suitable for the long term.

The environment conditions have to be in the following limits:

Minimum Ambient Temperature	**-4°F (-20°C)**
Maximum Ambient Temperature	107°F (42°C)
Maximum R.H.	95% not condensing

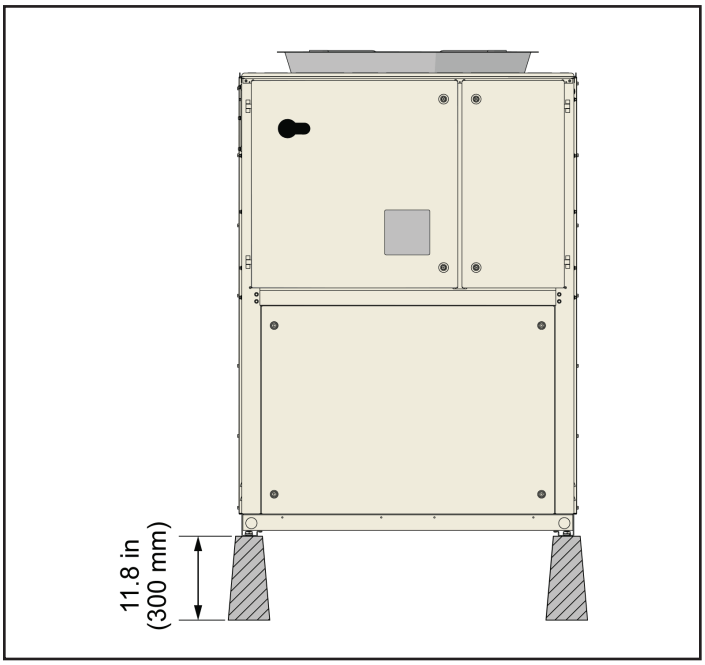
If the unit is stored at a temperature below the minimum ambient temperature, the components may be damaged, while at a temperature above the maximum ambient temperature, the safety valves could open and discharge the refrigerant into the atmosphere.

Positioning and Assembly

The unit must be installed on a solid, perfectly level base. For earthing purposes, a solid cement base, that is wider than the unit, must be made. This base must be able to support the weight of the unit.

The anti-vibration supports must be installed between the unit frame and the cement base or steel beam; a distance of 11.8 in (300 mm) must be left between the unit and the ground as shown below.

Figure 3: Positioning the Unit



To install the anti-vibration supports, follow the instructions in the dimensional diagram supplied with the unit. The frame must be perfectly leveled during installation, if necessary by inserting shims under the anti-vibration supports.

Before first start-up, the installation must be confirmed as being level and horizontal using a laser level or another suitable instrument. Any error in the level and horizontal position must not be greater than 0.2 in. (5 mm) per unit up to 23 ft (7 meters) and 0.4 in. (10 mm) per unit over 23 ft (7 meters).

If the unit is installed in places that are easily accessible to people and animals, we recommend that protection grates are fitted all round to prevent access. To ensure optimal performance in installation site, the following precautions and instructions must be respected:

- Make sure that there is a strong, solid foundation to reduce noise and vibrations.
- Avoid installing the unit in areas that could be dangerous during maintenance operations, such as platforms without handrails, guide rails or in areas that fail to comply with requirements as regards free space around the unit.

The installer is responsible for calculating the best position for the unit. It is vital that all minimum distances for all units are complied with to ensure there is adequate ventilation for the condenser racks.

When deciding where to position the unit and to ensure proper airflow, the following factors must be taken into consideration:

- avoid the recirculation of hot air
- avoid insufficient air supply for the air cooling condensers.

Both these conditions can cause an increase in condenser pressure which can lead to poor energy efficiency and refrigerating capacity.

If two or more units are positioned alongside each other, we recommend leaving a space of at least 141.7 in. (3600 mm) between condenser racks. Each side of the unit must be accessible for post-installation maintenance work. It is therefore vital that the minimum access distance in front of the electrical panel is complied with: 43.3 in. (1100 mm). The manufacturer cannot be expected to consider all these factors. In the unit design stage, we therefore recommend that you consult an authorized manufacturer representative for further solutions.

Noise

The noise generated by the unit is mainly due to the rotation of compressors. The noise level for each model size is listed in sales documentation.

If the unit is correctly installed, operated and maintained, noise emission levels do not require any special protective devices to operate continuously close to the unit without any risk. In case of installation with special noise requirements it may be necessary to install additional noise softening devices.

Sound Protection

When sound levels require special control, great care must be taken to isolate the unit from its base by appropriately applying anti-vibrating elements. Flexible couplings must also be fitted to hydraulic joints.

Chilled Water Piping Connections

The pipes must be designed with the lowest possible number of bends and vertical changes of direction. This means installation costs are reduced considerably and system performance is improved.

The water system must have:

1. Anti-vibrating pipes which reduce the transmission of vibrations to the structures.
2. Isolating valves to isolate the unit from the water system of the installation during service operations.
3. Manual or automatic air venting device at the system's highest point and a draining device at the system's lowest point.
4. Neither the evaporator nor the heat recovery device must be positioned at the system's highest point.
5. A suitable device that can maintain the water system under pressure.
6. Water temperature and pressure indicators to assist operators during service and maintenance.
7. A water filter or a device that can remove particles from the liquid and is mandatory at the entry of the evaporator.

   The filter can be installed at the pump inlet when it is placed on the evaporator water inlet pipe but only if the cleanliness of the water installation between the pump and the evaporator is guaranteed. Any waste in the evaporator will void the unit guarantee.
8. If the unit is being replaced, empty and clean the entire water system before installing a new one. Prior to starting it, carry out adequate tests and chemical treatments of the water.
9. If glycol is added to the water system to provide anti-freeze protection, the performance of the unit will decrease. All unit-protection systems, such as anti-freeze, and low-pressure protection will need to be readjusted to offset the low pressure.
10. Before insulating water piping, check that there are no leaks.
11. Check that the pressure of the water does not exceed the design pressure of the water side heat exchangers and install a safety valve on the water pipe.
12. Fit a suitable expansion tank.

⚠ CAUTION

To avoid damage, install an inspectionable filter on the water pipes at the entry to the heat exchangers.

Pipe Insulation

The complete water circuit, including all pipes, must be insulated to avoid condensate from forming and reducing cooling capacity.

Protect water pipes from freezing during the winter (using for example a glycol solution or a heating cable).

Installing the Flow Switch

To guarantee sufficient water flow to the entire evaporator, it is vital that a flow switch be installed on the water circuit, which can be positioned on the incoming or outgoing water pipes. The purpose of the flow switch is to stop the unit in the event of interrupted water flow, thus protecting the evaporator from freezing.

The manufacturer can supply a flow switch specially selected for this purpose.

This paddle-type flow switch is suitable for heavy-duty applications and 2 1/2" pipe diameters.

It has a clean contact that is electrically connected to the terminals shown in the wiring diagram, and must be calibrated so that it intervenes when the flow of the water of the evaporator drops below 80% of the nominal flow and in any case within the limits listed in the following table.

Preparing and Checking the Water Circuit Connection

The units have water inputs and outputs for connecting the heat pump to water circuit of the system. This circuit must be connected to the unit by an authorized technician and must comply with all local, state, and national regulations on the subject.

NOTICE

The components listed below are not included with the unit, but are supplied upon request, also the event their installation is compulsory.

⚠ CAUTION

If dirt penetrates the water circuit, there could be problems. Therefore always remember the following when connecting the water circuit:

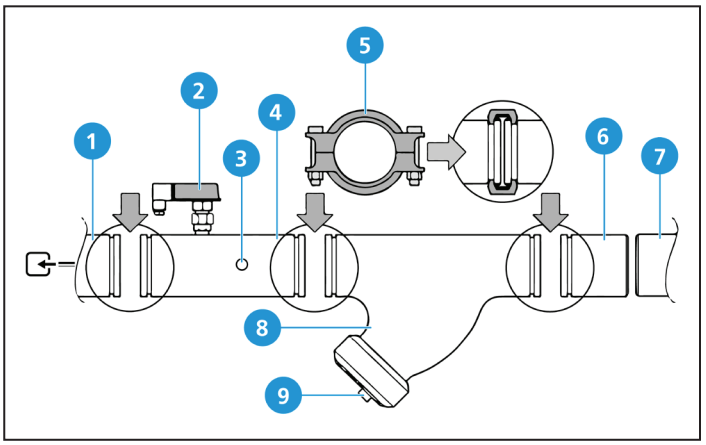
Only use pipes that are clean inside.

Keep the end of the pipe facing downward when removing any burrs.

Cover the end of the pipe when inserting it through a wall to avoid dust and dirt getting in.

Clean the pipes of the system located between the filter and the unit, with running water, before connecting it to the system.

Figure 4: Water Circuit Connections



No.	Description
1	Evaporator Water Inlet
2	Flow Switch
3	Water Inlet Sensor
4	Water inlet pipe with flow switch and water inlet temperature sensor
5	Joint
6	Counter-pipe
7	Water Pipe Circuit
8	Filter
9	Filter and Cup

The water in the system must be particularly clean and all traces of oil and rust must be removed. Fit a mechanical filter at the entry of every heat exchanger. Failure to install a mechanical filter can allow solid particles and/or welding burrs to get inside the exchanger. We recommend installing a filter with a filtering mesh with holes not larger than 0.04 in. (1.1mm) in diameter.

The manufacturer cannot be held responsible for any damage to the exchangers if the mechanical filters are not installed.

Water Treatment

Before putting the unit into operation, clean the water circuit. Dirt, scale, debris and other material can accumulate inside the heat exchanger and reduce both its heat exchanging capacity and the flow of the water.

Correct water treatment can reduce the risk of corrosion, erosion, scale formation, etc. The most suitable treatment must be selected depending on the place of installation, considering the water system and the characteristics of the water.

The manufacturer is not responsible for any damage or malfunctions of the equipment.

The water pressure must not exceed the maximum operating pressure for the unit (300 psi/2065 kPa); Include adequate protection systems in the water circuit to make sure that the pressure of the water never exceeds the maximum limit allowed

Water Flow and Volume

Model (cooling version)	Minimum water flow l/s	Maximum water flow l/s
EWYQ075G-XS	2.22	4.44

To ensure correct operation of the unit, the flow of water in the evaporator must fall within the operating sphere specified in the preceding table and there must be a minimum volume of water in the system.

The distribution circuits of the hot/cold water should have a minimum content of water to avoid an excessive number of start-up and shut-downs of the compressor. Every time the compressor goes into operation, an excessive amount of oil from the compressor starts circulating in the refrigerant circuit and at the same time there is an increase of the temperature of the compressor stator, generated by the inrush current of the start-up. Therefore, to avoid damage to the compressors, the application of a device has been planned to limit frequent shut-downs and start-ups: in one hour, there will only be 6 start-ups of the compressor.

The system where the unit is installed must therefore ensure that the overall content of water allows the unit to operate continuously and therefore offers greater environmental comfort. The minimum water content per unit must be calculated approximately using the following formula:

M(liters) = 5 (l/kW) x P(kW)

Where:

M = minimum content of water per unit expressed in liters

P = refrigerating capacity of the unit express in kW

This formula is valid with the standard parameters of the microprocessor. To determine most accurately the quantity of water, we recommend contacting the designer of the system.

Anti-freeze Protection for Evaporators and Recovery Exchangers

When the entire system of the cooling or heating installation is being designed, two or more of the following anti-freeze protection methods should be considered at the same time:

1. Continuous circulation of water flow inside the exchangers
2. Additional heat insulation and heating of exposed piping
3. Emptying and cleaning the heat exchanger when it is not in use and its maintenance in an anti-oxidant atmosphere (nitrogen)

As an alternative, it is possible to add an appropriate amount of glycol (antifreeze) to the water circuit.

The installer and/or local personnel in charge of maintenance, must make sure that anti-freeze protection methods are in use and ensure that the appropriate maintenance operations of the antifreeze protection devices are always carried out. Failing to follow the instructions above could result in unit damage. Damage caused by freezing is not covered by the guarantee.

Physical Data

EWYQ Models

Cooling Performance	
Capacity - Cooling*	25 Tons
Capacity Control - Type	Step
Capacity Control - Minimum Capacity	44%
Unit Power Input - Cooling (1)	29.1 kW
EER*	9.562 btu/W.h
IPLV	15.27 btu/W.h
Casing	
Color	Ivory White
Material	Galvanized and Painted Steel Sheet
Dimensions	
Height	71 in. (1800 mm)
Width	47 in. (1195 mm)
Length	111 in. (2826 mm)
Weight	
Unit Weight	2011 lbs. (912 kg)
Operating Weight	2030 lbs. (921 kg)
Water Heat Exchanger	
Type	Brazed-Plate Heat Exchanger
Water Volume	2.48 gal (9.40 l)
Nominal Water Flow Rate	66.57 GPM (4.20 l/s)
Nominal Water Pressure Drop	2.78 ftH2O (8.30 kPa)
Insulation Material	Closed Cell
Air Heat Exchanger	
Direct Propeller Type	High Efficiency Fin and Tube Type with internal subcooler.
Fan	
Power Supply	460-3PH-60Hz
Compressor 1 RLA/LRA	22.4A / 150A
Compressor 2 RLA/LRA	22.4A / 150A
Fan PI/FLA (for each fan)	1400W / 2.9A
SCCR	65 kA
Compressor	
Type	Scroll
Oil Charge	2.14 gal (8.1 l)
Quantity	2
Sound Level - Details on measurement methods are available in the Sound Data section	
Sound Power - Cooling	85 dB(A)
Sound Pressure - Cooling	68 dB(A)
Refrigerant Circuit	
Refrigerant Type	EWYQ = R-410A
Refrigerant Charge	39.7 lbs. (18 kg)
Number of Circuits	1
Piping Connections	
Evaporator water inlet/outlet	3 in. (76 mm)

Heating Mode

Heating Performance	
Capacity - Heating**	91.2 kW
Unit Power Input - Heating**	29 kW
COP**	10.66 btu/W.h
SCOP**	11.30 btu/W.h
Heat Exchanger Evaporator	
Nominal Water Flow rate	69.74 GPM (4.4 l/s)
Nominal Water Pressure Drop	3.04 ftH2O (9.10 kPa)

Fluid: Water

(*) Cooling capacity, unit power input in cooling and EER are based on the following conditions: evaporator 53.6°F/44.6°F (12.0/7.0°C); ambient 95°F (35.0°C), unit at full load operation;

(**) Heating capacity, unit power input and COP are based on the following conditions: ambient 44.6°F (7°C); condenser 104.0°F/113.0°F (40.0/45.0 °C), unit at full load operation.

Unit performances are referred to ideal running conditions that are reproducible in laboratory test environment in accordance to recognized industry standards (i.e. EN14511). Weights and dimensions are indicative –For specific values refer to certified drawing issued by factory.

Data are referred to unit with standard options only. For specific information about additional options refer to databook specific section.

Sound Levels

Hz	Sound pressure level at 1 m from the unit (rif. 2x10.5 Pa)
63 Hz	77.0
125 Hz	67.0
250 Hz	65.0
500 Hz	66.0
1000 Hz	63.0
2000 Hz	59.0
4000 Hz	52.0
8000 Hz	45.0
db(A)	68
Power db(A)	85

Space Requirements

It is important to respect the minimum distances which guarantee the best ventilation of the condenser coils. Limitations of space reducing the air flow could cause significant reductions in cooling capacity and an increase in electricity consumption.

To determine unit placement, careful consideration must be given to assure a sufficient air flow across the condenser heat transfer surface. Two conditions must be avoided to achieve the best performance: warm air recirculation and coil starvation. Both these conditions cause an increase of condensing pressures that results in reductions in unit efficiency and capacity. Moreover the unique microprocessor has the ability to calculate the operating environment of the air cooled chiller and the capacity to optimize its performance staying on-line during abnormal conditions.

Each side of the unit must be accessible after installation for periodic service. Figure 5 shows minimum recommended clearance requirements. Vertical condenser air discharge must be unobstructed because the unit would have its capacity and efficiency significantly reduced. If the units are positioned in places surrounded by walls or obstacles of the same height as the units, the units should follow the minimum recommended clearance requirements shown in Figure 6. In the event the obstacles are higher than the units, the minimum recommended clearance requirements are shown in Figure 7. Units installed closer than the minimum recommended distance to a wall or other vertical riser may experience a combination of coil starvation and warm air recirculation, thus causing reduction in unit capacity and efficiency reductions. The microprocessor control is proactive in response “of design condition”. In the case of single or compounded influences restricting airflow to the unit, the microprocessor will act to keep the compressor(s) running (at reduced capacity) rather than allowing a shut-off on high discharge pressure.

When two or more units are positioned side by side it is recommended that the condenser coils are at a minimum distance from one another as shown in Figure 8; strong wind could be the cause of air warm recirculation.

For other installation solutions, consult a Daikin Applied sales representative.

The above recommended information are representative of general installation. A specific evaluation should be done by a contractor depending on the case.

Figure 5: Space Requirements for Service Clearance

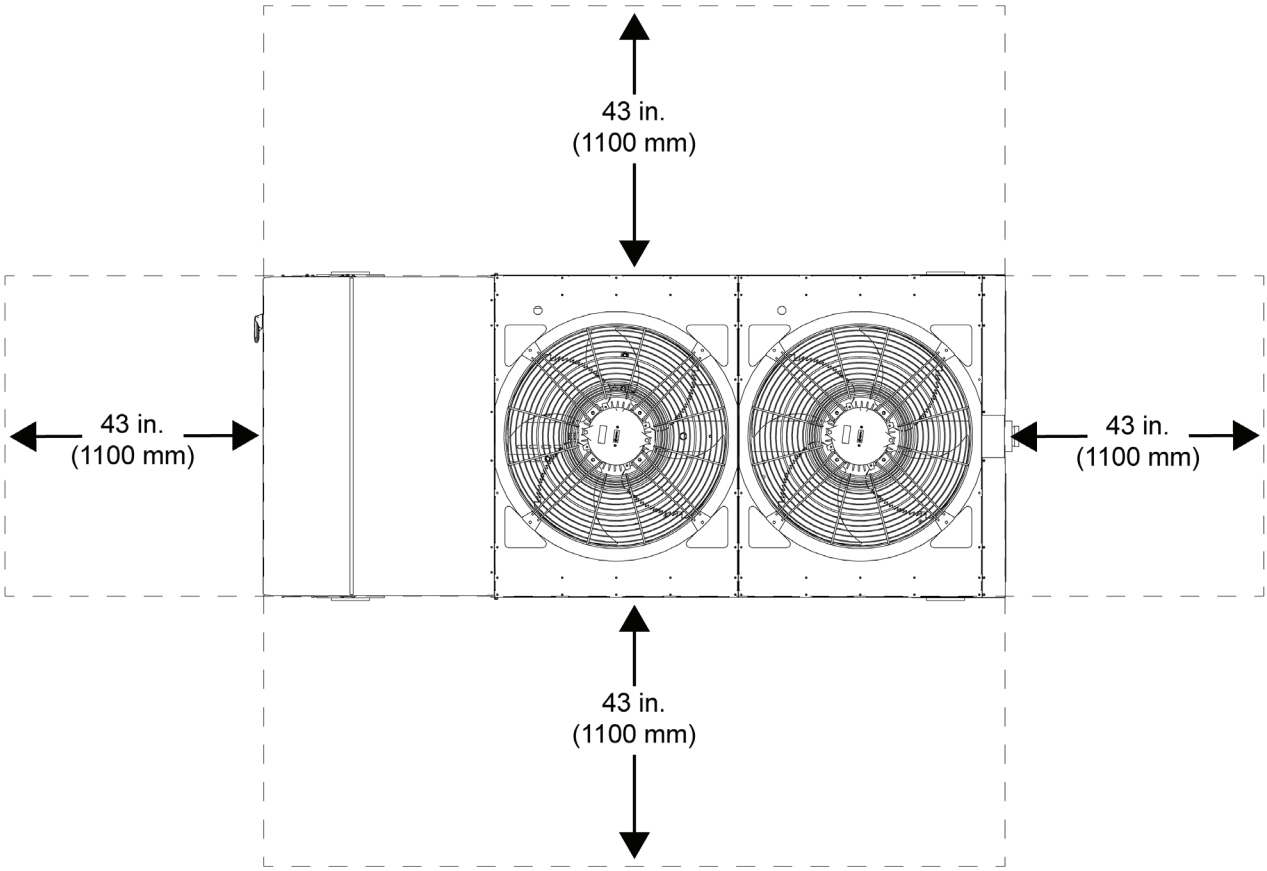


Figure 6: Space Requirements - Installation Surrounded by Walls

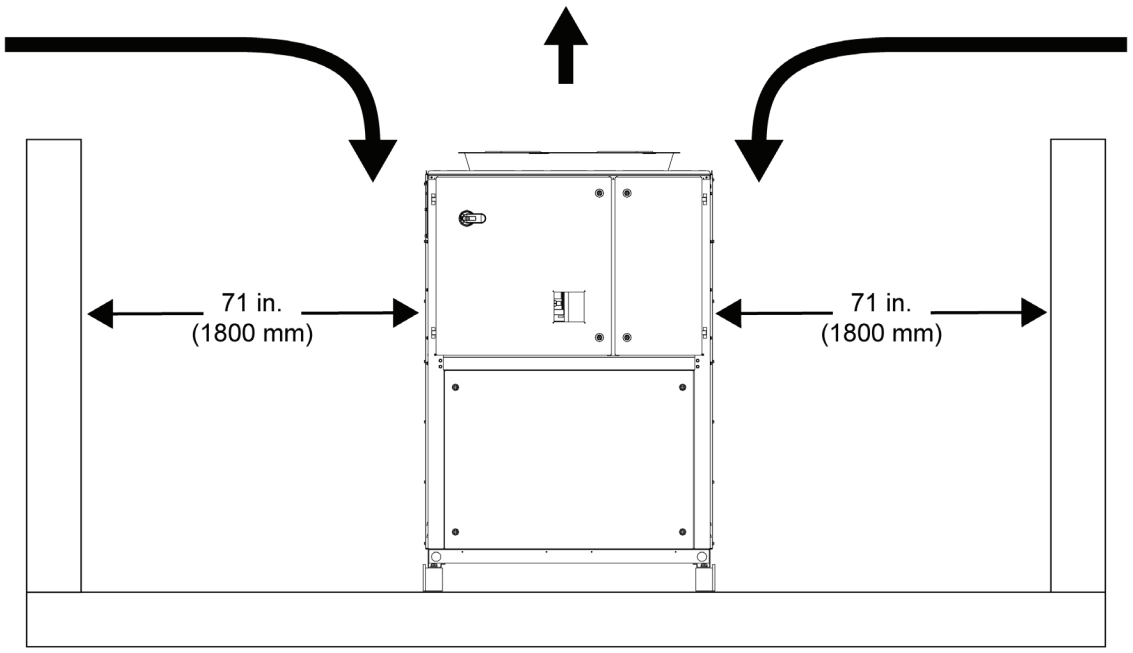


Figure 7: Space Requirements - Installation with Wall Higher than Unit

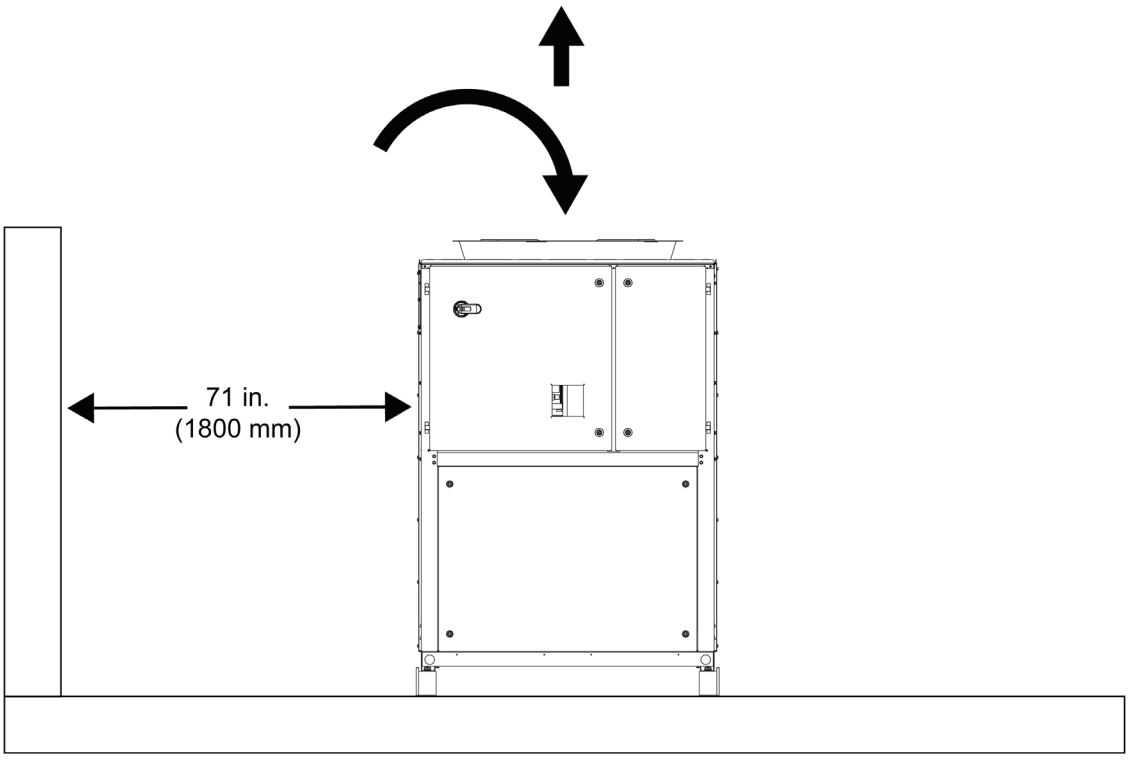
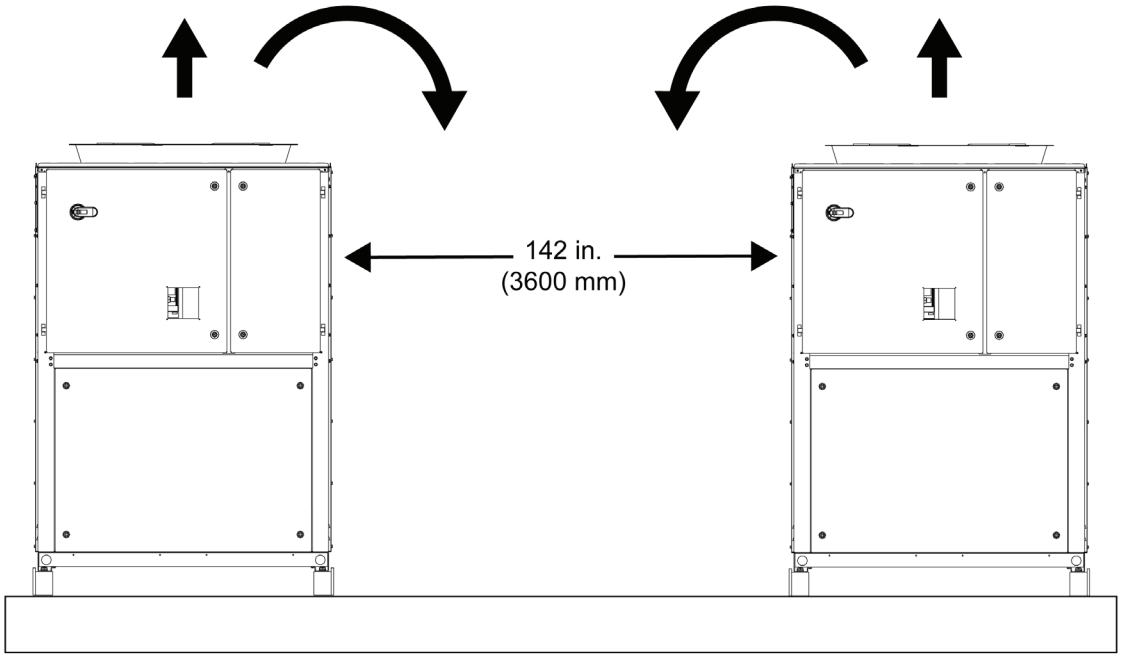


Figure 8: Space Requirements - Minimum Distance Between Units



Electrical

The units must be connected to a TN power supply system.

If the units must be connected to a different type of power system, for example the IT system, please contact the factory. All the electrical connections to the unit must be carried out in compliance with national laws and regulations in force (UL 1995, CSA C22.1 and ANSI/NFPA No. 70.)

All installation, running and maintenance activities must be carried out by qualified personnel. Refer to the specific wiring diagram for the unit purchased. Should the wiring diagram not be on the unit or should it have been lost, please contact the manufacturer's representative who will send you a copy.

In the event of any discrepancies between what is written on the wiring diagram and a visual check of the electric wires of the command and control panel, contact the manufacturer representative.

Use only copper conductors to avoid overheating or corrosion in the connection points, with resulting risk of damage to the unit. To avoid interference, all the command and control cables must be connected separately from the power cables, using more than one cable duct for this purpose.

Before carrying out servicing work on the unit, close the general disconnection switch located on the main power supply.

⚠ CAUTION

If the unit is off but the disconnection switch is in the open position, the circuits not being used are still live.

Never open the compressor terminal board without first having disconnected the unit main switch.

Simultaneous mono and three-phase loads and any imbalance between phases can cause leakage to earth of up to 150mA during the normal unit operations.

The protection system for the power supply must be designed based on the values mentioned above.

Wiring at the Installation Site

⚠ CAUTION

Wiring operations at the installation site and on other components must be performed by authorized technician and must comply with current relevant national.

On-site wiring must be carried out in compliance with the wiring diagram supplied with the machine and the instructions listed below.

Use a dedicated electric circuit. Never use a power supply shared with other equipment.

NOTICE

Check all the operations listed below on the wiring diagram in order to better understand how the equipment works.

Table 1: Component Table

Component	Description
F1, 2	Main appliance fuses
L1, 2, 3	Main power supply terminals
PE	Main earth terminal
FS	Flow switch
Q10	Main insulator switch
-	On-site wiring

Electric Circuit and Wiring Requirements

The power supply to the unit must be prepared so that it can be turned on and off independently from that of other system components or other appliances in general.

Create an electrical circuit for connecting the unit. This circuit must have protective and safety devices fitted i.e. a main switch and a fuse for each phase where required by legislative requirements in the country of installation as well as an earth leakage detector.

⚠ CAUTION

Turn off the main insulator switch before making any connections (turn off the switch, remove or disable the fuses).

Connection of the Unit Power Supply

Using suitable cable, connect the power circuit to terminals L1, L2 and L3 on the electric panel.

⚠ WARNING

Never twist, pull or apply weight to the main switch terminals. The power supply cables must be supported by adequate systems.

The wires connected to the switch must comply with the insulation distance and the distance of surface insulation between the active conductors and the earth.

The cables connected to the main switch must be tightening using a torque wrench and complying with the unified tightening values relative to the quality of the screws of the washers and the nuts used.

Connect the earth wire (yellow/green) to the PE earth terminal.

Operation

Before Start-up

⚠ WARNING

The unit must be started for the first time ONLY by Daikin Applied authorised personnel.

The unit must absolutely not be started, even for a very short period of time, without having checked it in minute detail filling out the following list at the same time.

Table 2: Pre-Start Checklist

No.	Checks To Be Performed Before Starting The Unit
1	Check for exterior damage
2	Open all the closing valves
3	Make sure that all the parts of the unit are pressurised with refrigerant (evaporator, air condenser, compressors) before connecting it to the hydraulic circuit.
4	Upstream of the unit, install a main switch, main fuses and, where required by legislative requirements in the country of installation, an earth leakage detector. To select these components, consult the information on the unit ID plate and the relative technical catalogue.
5	Connect the main voltage and check that it falls within the limits allowed of ±10% compared to the classification listed on the ID plate. The main power supply must be arranged so that it can be turned on or off independently from that of other parts of the system or other appliances in general. Check the wiring diagram, terminals L1, L2, L3 and PE.
6	Install the water filter kit(s) (also when not supplied) at the inputs to the exchangers.
7	Supply water to the exchangers and make sure that the flow falls within the limits shown in the table in the “Load, flow and quality of the water” section.
8	The pipes must be completely flushed out. See also the chapter “Preparing, checking and connecting the water circuit”.
9	Connect the pump contact(s) in series with the contact of the flow meter(s) so that the unit can only be activated when the water pumps are operating and the flow of water is sufficient.
10	Check the oil level in the compressors.
11	Check that all the water sensors are fastened correctly to the heat exchanger (also see the label applied to the heat exchanger).

NOTICE

Before starting the unit, read the operating manual which comes supplied with the unit. It will help you better understand how the appliance and electronic controller work and close the doors on the electrical panel.

Isolation and Shutoff Valves

Before start-up, make sure that all the isolation and/or switch off valves are completely open.

User Responsibilities

It is essential that the user is properly trained and becomes familiar with the system before operating the unit. In addition to reading this manual, the user must study the microprocessor operating manual and the wiring diagram in order to understand the start-up sequence, operation, shutdown sequence and operation of all the safety devices.

The user must keep a log (unit booklet) of the operating data of the unit installed and of all periodical maintenance and service activities.

If the operator notes abnormal or unusual operating conditions, he or she must consult the authorised manufacturer’s technical service.

Operating Limits

EWYQ Models

NOTICE

Operation outside any of the limits shown below may damage the unit. In case of doubt, contact manufacturer's representative.

NOTICE

The diagrams show the guide lines for the range of operating limits. Refer to the Chiller Selection Software (CSS) for the true operating limits under working conditions for each model.

Figure 9: EWYQ - Cooling Mode

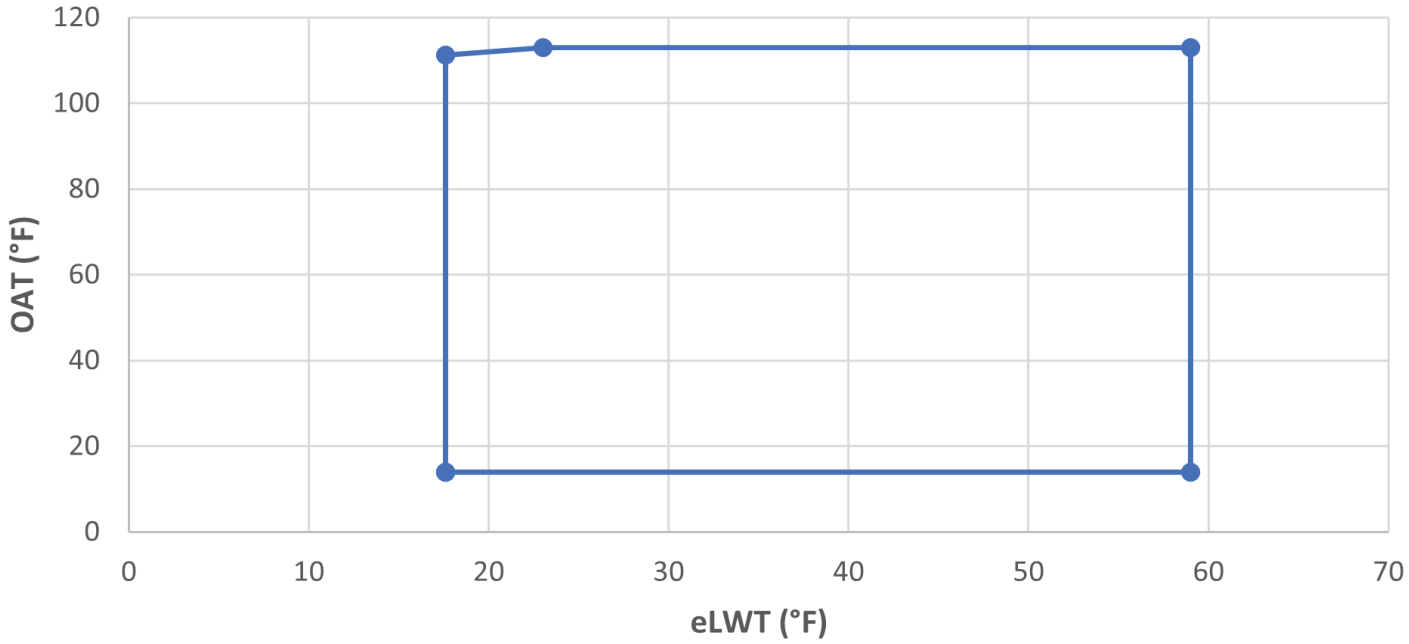


Figure 10: EWYQ - Heating Mode

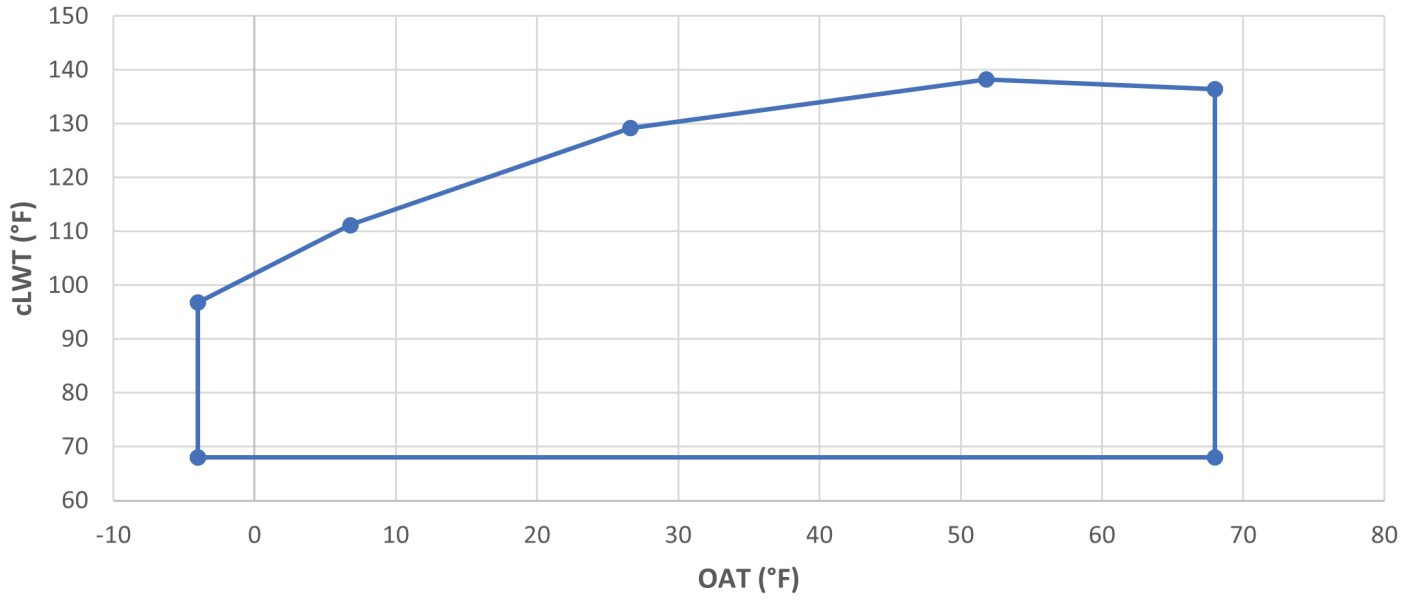


Table 3: Evaporator - Scaling Factor

Scaling (m² °C / kW)	Refrigeration capacity correction	Power consumption correction	EER correction
0.0176	1.000	1.000	1.000
0.0440	0.978	0.986	0.992
0.0880	0.957	0.974	0.983
0.1320	0.938	0.962	0.975

Legend:

A = Scaling factor (m² °C / kW)

B = Refrigeration capacity correction factor

C = Power consumption correction factor

D = EER correction factor

Table 4: Air Heat Exchanger - Correction Factor at Altitude

A	0	300	600	900	1200	1500	1800
B	1012	977	942	908	875	843	812
C	1.000	0.993	0.986	0.979	0.973	0.967	0.960
D	1.000	1.005	1.009	1.015	1.021	1.026	1.031

A	0	300	600	900	1200	1500	1800
B	1013	977	942	908	875	843	812
E	1.000	0.989	0.979	0.968	0.957	0.945	0.934
D	1.000	0.998	0.997	0.996	0.995	0.994	0.992

Legend:

A = Altitude above sea level (m)

B = Atmospheric pressure (mbar)

C = Refrigeration capacity correction factor

E= Heating capacity correction factor

D = Power consumption correction factor

- The maximum operating altitude is 2000 metres above sea level
- If the unit is to be installed at an altitude of between 1000 and 2000 metres above sea level, contact manufacturer

Table 5: Minimum percentage of glycol for low ambient air temperature

Ambient Air Temperature (°C) (2)	-3	-8	-15	-20
Ethylene glycol (%) (1)	10%	20%	30%	40%
Ambient Air Temperature (°C) (2)	-3	-8	-15	-20
Propylene glycol (%) (1)	10%	20%	30%	40%

(1) Minimum percentage of glycol to prevent the water circuit from freezing at the indicated ambient air temperature

(2) Ambient air temperature which exceeds unit operating limits Water circuits must also be protected in winter even if the unit is not being used.

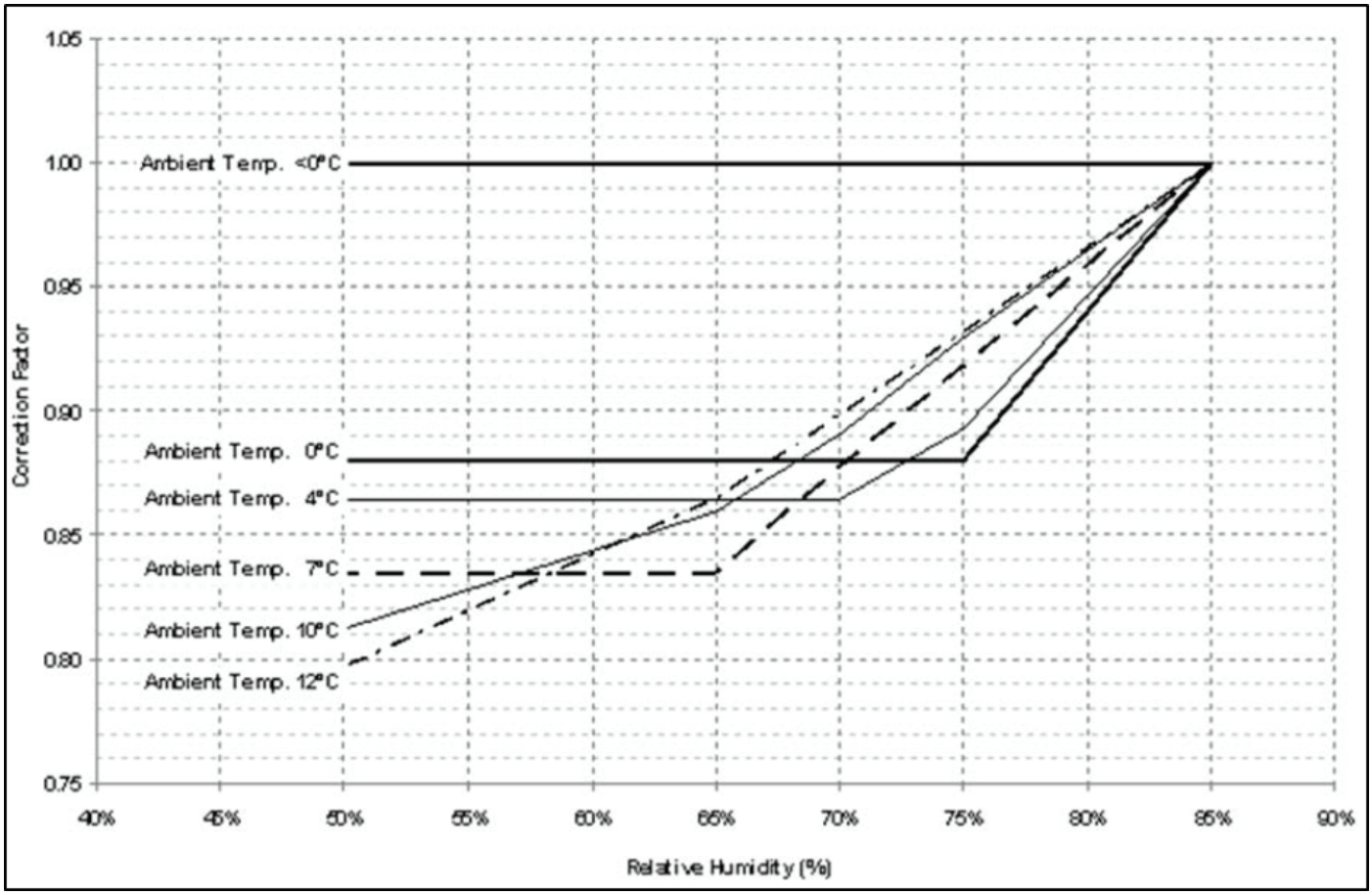
Table 6: Available Fan Static Pressure Correction Factors - Cooling

External Static Pressure (Pa)	0	10	20	30
Cooling Capacity Correction Factor (kW)	1	1	0.99	0.99
Unit PI Correction Factor	1	1.01	1.02	1.02
Reduction of MAX Operating Ambient Temperatures (°C)	0	-0.3	-0.5	-1

Table 7: Available Fan Static Pressure Correction Factors - Heating

External Static Pressure (Pa)	0	10	20	30
Heating Capacity Correction Factor (kW)	1	0.991	0.972	0.96
Unit PI Correction Factor	1	0.998	0.995	0.994
Increase of MIN Operating Ambient Temperatures (°C)	0	0.5	0.8	1

Figure 11: Heating capacity correction factor for different air temperature at the evaporator inlet with relative humidity conditions



NOTICE
The following values shown in the diagram: <0 °C ; 0 °C ; 4 °C ; 7 °C ; 10 °C ; 12 °C, are for ambient temperature.

MicroTech Unit Controller

The MicroTech unit controller's design not only permits the heat pump to run more efficiently, but also can simplify troubleshooting if a system failure occurs. Every MicroTech unit controller is programmed and tested prior to shipment to facilitate start-up.

The controller menu structure is separated into three distinct categories that provide the operator or service technician with a full description of:

1. current unit status
2. control parameters
3. alarms

Security protection prevents unauthorized changing of the setpoints and control parameters.

MicroTech unit control continuously performs self-diagnostic checks, monitoring system temperatures, pressures and protection devices, and will automatically shut down a compressor or the entire unit should a fault occur. The cause of the shutdown will be retained in memory and can be easily displayed in plain English for operator review. The MicroTech controller will also retain and display the date/time the fault occurred. In addition to displaying alarm diagnostics, the MicroTech chiller controller also provides the operator with a warning of limit (pre-alarm) conditions.

Controller Operating Limits

Operation (IEC 721-3-3):

Operating Limit	Min	Max
Temperature	-40°F (-40°C)	158°F (70°C)
Restriction LCD	-4°F (-20°C)	140°F (60°C)
Restriction Process-Bus	-13°F (-25°C)	158°F (70°C)
Humidity	< 90 % r.h (no condensation)	
Air Pressure Min.	700 hPa, corresponding to max. 3,000 m above sea level	

Transport (IEC 721-3-2):

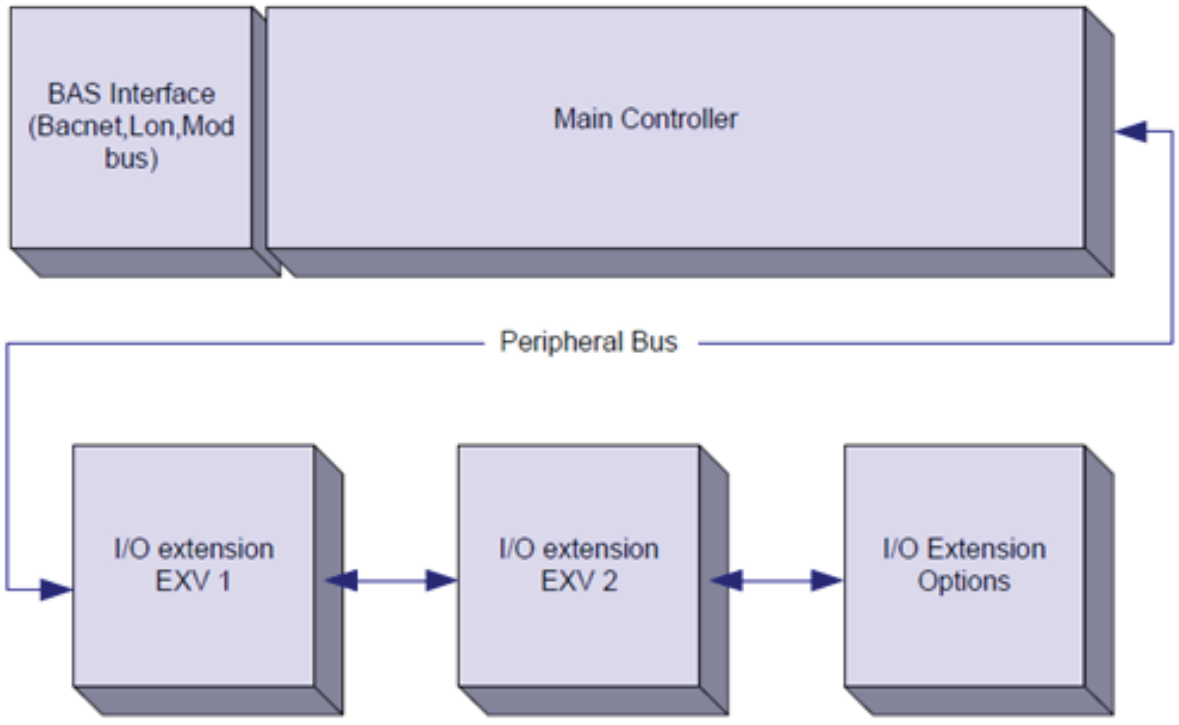
Operating Limit	Min	Max
Temperature	-40°F (-40°C)	158°F (70°C)
Humidity	< 95 % r.h (no condensation)	
Air Pressure Min.	260 hPa, corresponding to max. 10,000 m above sea level.	

System Architecture

The overall controls architecture uses the following:

- One MicroTech unit controller
- I/O extension modules as needed depending on the configuration of the unit
- Communications interface(s) as needed based on installed options
- Peripheral Bus is used to connect I/O extensions to the main controller

Figure 12: System Architecture



Controller/ Extension Module	Siemens Part Number	Address	Usage
Main Controller	POL688.00/MCQ	n/a	Used on all configurations
EEXV Module 1	POL94E.00/MCQ	3	Used on all configurations
EEXV Module 2	POL94E.00/MCQ	5	Used when configured for 2 circuits
Option Module	POL965.00/MCQ	18	Used when options required

All boards are supplied from a common 24 Vac sourced directly from the unit. Extension boards can be directly powered by the Unit Controller. All boards can be also supplied by a 24Vdc source. These are the limits for the two different power supplies available:

- AC: 24V ± 20% (frequency 45 ÷ 65Hz)
- DC: 24V ± 10%

⚠ CAUTION

Maintain the correct G-G0 polarity when connecting the power supply directly to the extension boards. The peripheral bus communication will not operate and the boards may be damaged.

Communication Modules

Any of the following modules can be connected directly to the left side of the main controller to allow a BAS or other remote interface to function. Up to three can be connected to the controller at a time. To make the connection is required to remove the knockout covers on both the unit controller and communication module as shown in the following pictures.

The controller should automatically detect and configure itself for new modules after booting up. Removing modules from the unit will require manually changing of the configuration.

Module	Siemens Part Number	Usage
BacNet/IP	POL908.00/MCQ	Optional
Lon	POL906.00/MCQ	Optional
Modbus	POL902.00/MCQ	Optional
BACnet/MSTP	POL904.00/MCQ	Optional

Separate documents contain all the information about the different protocols supported and how to setup a proper communication with a BMS.

BACnet Module installation

In case of BACnet connection with a BMS, there are two different modules available depending on the physical connection to the customer network. The two possible connections are IP or MSTP.

A dedicated menu allows setup of the communication parameters.

LON Module installation

In case of LON connection with a BMS, the corresponding module has to be installed on the unit. The type of connection is FTT10.

A dedicated menu allows setup of the communication parameters.

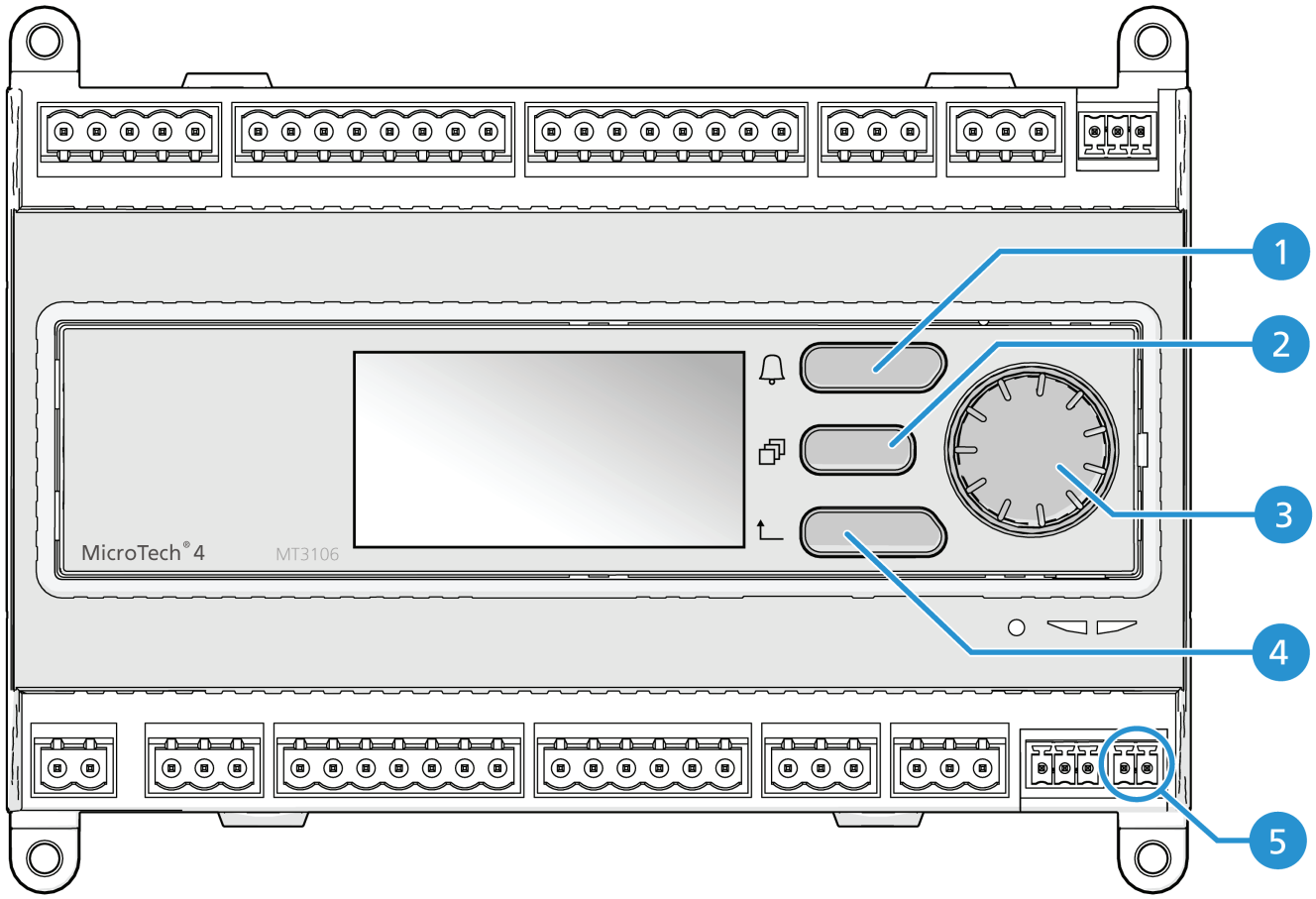
Modbus Module installation

In case of Modbus connection with a BMS, the corresponding module has to be installed on the unit. It has to be connected to the Unit Controller as indicated in the previous section.

The module has two different ports available but only the top port is programmed and operational. A dedicated menu allows setup of the communication parameters

Using the Controller

Figure 13: MicroTech 4 Unit Controller

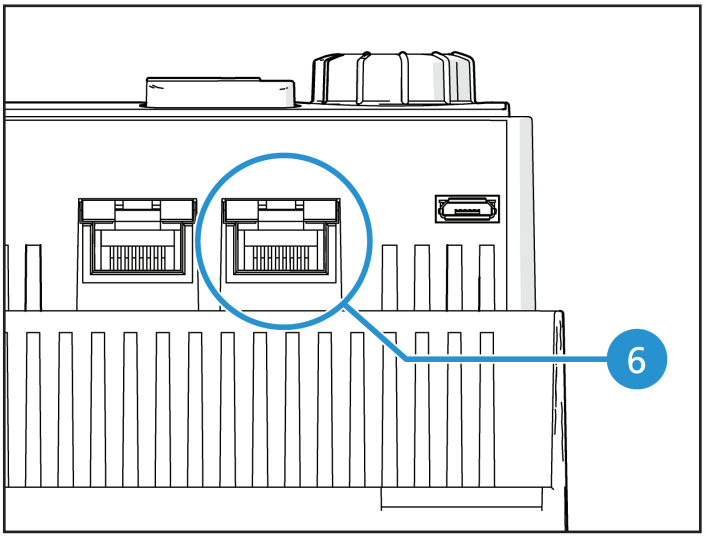


The control system consists of a unit controller equipped with a set of extension modules that implement additional features. All boards communicate via an internal peripheral bus with the Unit Controller. The Unit Controller continuously manages the information received from the various pressure and temperature probes installed on the unit. The Unit Controller incorporates a program that controls the unit.

Table 8: MicroTech 4 Unit Controller Componet Locations

No.	Description
1	Alarm Button
2	Menu Button
3	Navigation Wheel
4	Back Button
5	PB Bus - Remote Operator Display
6	TCP/IP Port

Figure 14: MicroTech 4 Unit Controller TCP/IP Port



General Recommendations

Before switching on the unit read the following recommendations:

- When all the operations and all the settings have been carried out, close all the switchbox panels.
- The switchbox panels can only be opened by trained personnel.
- When the Unit Controller requires to be accessed frequently the installation of a remote interface is strongly recommended.
- Compressor are protected from freezing by electrical heaters. These heaters are supplied through unit main supply and temperature controlled by thermostat.
- LCD display of the unit controller may be damaged by extremely low temperatures. For this reason, it is strongly recommended to never power off the unit during winter, especially in cold climates.

Passwords

The HMI structure is based on access levels that means that each password will disclose all the settings and parameters allowed to that password level. Basic information about the status including the active alarm list, active setpoint and controlled water temperature can be accessed without the need to enter the password.

Table 9: Password Levels

Level	Password
User	5321
Maintenence	2526

The following information will cover all data and settings accessible with the maintenance password. User password will disclose a subset of the settings explained in subsiquent sections.

In the Enter Password screen, the line with the password field will be highlighted to indicate that the field on the right can be changed. This represents a setpoint for the controller. Pressing the wheel the individual field will be highlighted to allow an easy introduction of the numeric password. By changing all fields, the 4 digits password will be entered and, if correct, the additional settings available with that password level will be disclosed.

The password will time out after 10 minutes and is cancelled if a new password is entered or the control powers down. Entering an invalid password has the same effect as continuing without a password.

Once a valid password has been entered, the controller allows further changes and access without requiring the user to enter a password until either the password timer expires or a different password is entered. The default value for this password timer is 10 minutes.

Editing

Only line with highlighted value field can be edited, through the right buttons it is possible selected and modify the value.

A parameter with an “R” is read only; it is giving a value or description of a condition. An “R/W indicates a read and/or write opportunity; a value can be read or changed (providing the proper password has been entered).

Example 1: Check Status, for example -is the unit being controlled locally or by an external network? We are looking for the Unit Control Source since this a unit status parameter, start at Main Menu and select View/Set Unit and press the wheel or button 6 to jump to the next set of menus. There will be an arrow at the right side of the box, indicating that a jump to the next level is required.

In the new page rotate the wheel or use button 4/5 to highlight the Network Ctrl and press the wheel or the button 6 again to jump to the next menu where it is possible read the actual Control Source.

Example 2: Change a Set point, the chilled water set point for example. This parameter is designated as Cool LWT Set point 1 and is a unit set parameter. From the Main Menu select Active Setpt. The arrow indicated that there is a link to a further menu.

Press the wheel or button 6 and jump to the temperature setpoint page. Select Cool LWT 1 and press the wheel or button 6 to jump to the item change page. Rotate the wheel or use buttons 4 / 5 to adjust the set point to the desired value. When this is done press the wheel or button 6 again to confirm the new value. With the button ESC or 3 it will be possible to jump back to the main menu where the new value will be displayed.

Example 3: Clear an Alarm,. The presence of a new alarm is indicated with a Bell ringing on the top right of the display. If the Bell is frozen one or more alarm had been acknowledged but are still active. To view the Alarm menu from the Main Menu scroll down to the Alarms line. Note the arrow indicating this line is a link. Press the button 6 to jump to the next menu Alarms. There are two lines here; Alarm Active and Alarm Log. Alarms are cleared from the Active Alarm link. Press the button 6 to jump to the next screen. When the Active Alarm list is entered scroll to the item AlmClr which is set to off by default. Change this value to on to acknowledge the alarms. If the alarms can be cleared then the alarm counter will display 0 otherwise it will display the number of alarm still active. When the alarms are acknowledged the Bell on the top right of the display will stop to ring if some of the alarms are still active or will disappear if all the alarms are cleared.

Basic Control System Diagnostic

Unit controller, extension modules and communication modules are equipped with two status LED (BSP and BUS) to indicate the operational status of the devices. The BUS LED indicates the status of the communication with the controller. The meaning of the two status LED is indicated below.

Table 10: Unit Controller BSP LED

BSP LED	Mode
Solid Green	Application running
Solid Yellow	Application loaded but not running (*) or BSP Upgrade mode active
Solid Red	Hardware Error (*)
Flashing Green	BSP startup phase. The controller needs time for starting
Flashing Yellow	Application not loaded (*)
Flashing Yellow/Red	Fail safe mode (in case that the BSP upgrade was interrupted)
Flashing Red	BSP Error (software error*)
Flashing Red/Green	Application/BSP update or initialization
(*) = Contact Service	

Extension Modules

Table 11: BSP LED

BSP LED	Mode
Solid Green	BSP running
Solid Red	Hardware Error (*)
Flashing Red	BSP Error (*)
Flashing Red/Green	BSP updgrade mode
(*) = Contact Service	

Table 12: BUS LED

BUS LED	Mode
Solid Green	Communication running, I/O working
Solid Yellow	Communication running but parameter from the application wrong or missing, or uncorrect factory calibration
Solid Red	Communication down (*)
(*) = Contact Service	

Communication Modules

Table 13: BSP LED (Same for All Modules)

BSP LED	Mode
Solid Green	BSP running, communication with controller
Solid Yellow	BSP running, no communication with controller (*)
Solid Red	Hardware Error (*)
Flashing Red	BSP Error (*)
Flashing Red/Green	Application/BSP update
(*) = Contact Service	

Table 14: LON Module BUS LED

BUS LED	Mode
Solid Green	Ready for Communication. (All Parameter loaded, Neuron configured). Doesn't indicate a communication with other devices.
Solid Yellow	Startup
Solid Red	No Communication to Neuron (internal error, could be solved by downloading a new LON application)
Flashing Yellow	Communication not possible to the Neuron. The Neuron must be configured and set online over the LON Tool.
(*) = Contact Service	

Table 15: BACnet MSTP LED

BUS LED	Mode
Solid Green	Ready for Communication. The BACnet Server is started. It doesn't indicate a active communication
Solid Yellow	Startup
Solid Red	BACnet Server down. Automatically a restart after 3 seconds are initiated.
(*) = Contact Service	

Table 16: BACnet IP BUS LED

BUS LED	Mode
Solid Green	Ready for Communication. The BACnet Server is started. It doesn't indicate a active communication
Solid Yellow	Startup. The LED stays yellow until the module receives a IP Address, therefore a link must be established.
Solid Red	BACnet Server down. Automatic restart after 3 seconds is initiated.
(*) = Contact Service	

Table 17: Modbus BUS LED

BUS LED	Mode
Solid Green	All Communication running
Solid Yellow	Startup, or one configured channel not communicating to the Master
Solid Red	All configured Communications down. Means no communication to the Master. The timeout can be configured. In case that the timeout is zero the timeout is disabled
(*) = Contact Service	

Controller Maintenace

The Unit Controller requires to maintain the installed battery. Battery model is: BR2032 and it is produced by many different vendors.

NOTICE

On board real time clock settings are maintained thanks to a battery mounted on the controller. Make sure that the battery is replaced regularly each 2 years.

NOTICE

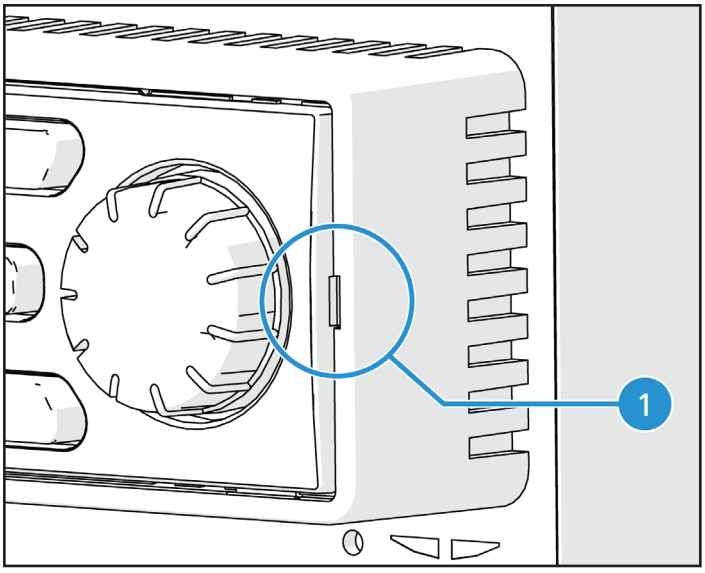
Battery is only used to supply the onboard real time clock. All the other settings are retained in a non volatile memory.

Battery Replacement

To replace the battery, do the following:

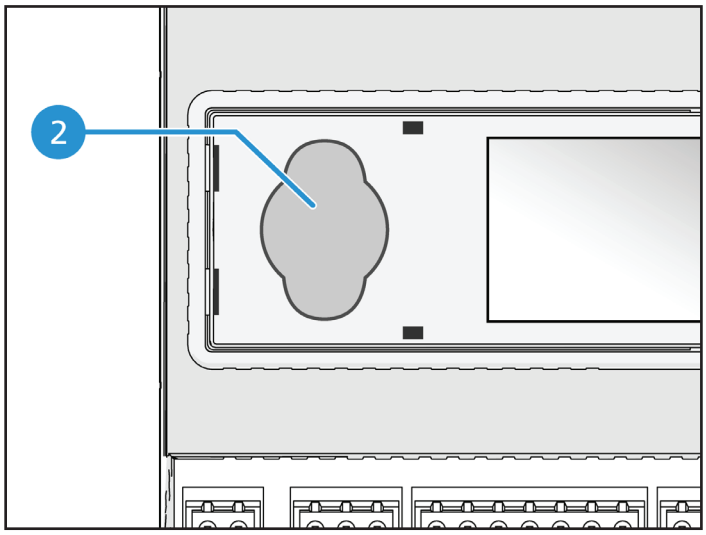
1. Using a flathead screedriver, gently remove the plastic cover of the controller display. Place the tip of the screwdriver into the tab shown in Figure 15 and gently lift the cover from the controller. Be careful to avoid damages to the plastic cover.

Figure 15: Unit Controller Cover Removal



2. The battery is shown in Figure 16. Remove the old battery and replace it with a new one respecting the polarities indicated on the battery holder.

Figure 16: Unit Controller Battery Holder



Software Update Procedure

The unit controller can be updated by using an SD card and an appropriate pin.

SD card has to be FAT32 formatted before any update process can be started. Supported SD types are:

- SD standard
- High speed SD
- SDHC

The following SD cards have also been tested and found operational:

- 1 GByte SD V1.0 (Inmac)
- 2 GByte SD V2.0 SpeedClass 2 (SanDisk)
- 4 GByte SDHC V2.0 SpeedClass 6 (Hama High Speed Pro)
- 4 GByte SDHC V2.0 SpeedClass 4 (SanDisk Ultra II)
- 8 GByte micro SDHC SpeedClass 4 (Kingston)

In case an update is received all the files included in the archive are to be saved in the SD card with their original name. The standard software pack is composed with 6 files:

1. BSP file (operative system of the Unit Controller),
2. Code file,
3. HMI file,
4. OBH file (multilingual and protocol support),
5. HMI for Web (web interface),
6. Cloud file.

NOTICE

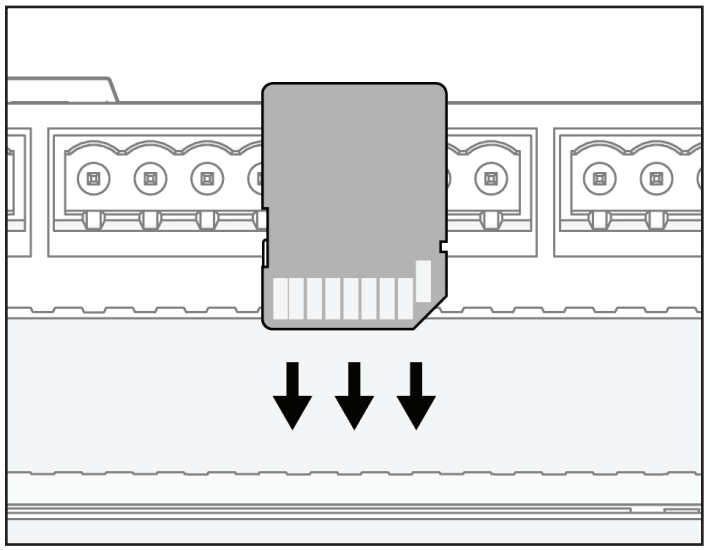
The software for this specific range of units cannot be used with the large Unit Controller's (POL687.xx/MCQ) used on other products. In case of doubts, please contact your Daikin Service reference.

NOTICE

Before proceeding it is required to disable the unit using the Q0 switch and perform a normal shutdown procedure.

1. To install the software, take care to make a copy of the controller settings on the SD card by using the Save/ Restore menu (see Save and Restore menu for details).
2. Remove power to the controller using the Q12 switch and insert the SD card in its slot as shown in the picture with the contact strips looking toward you (Figure 17).

Figure 17: SD Card



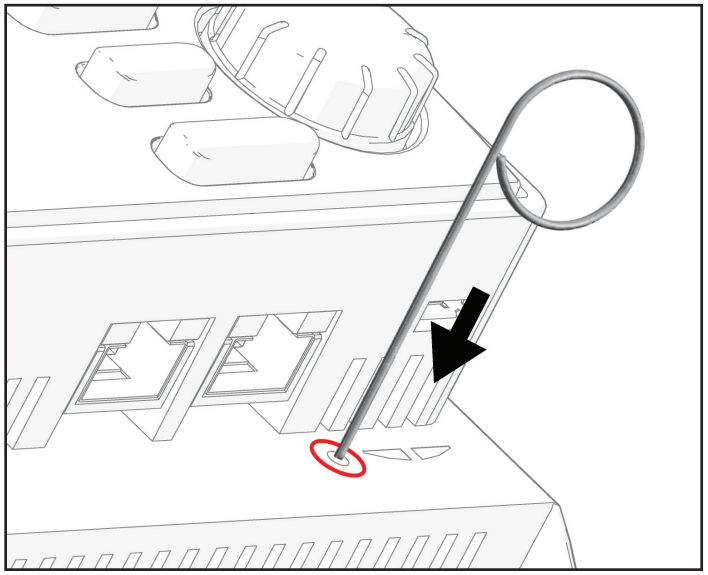
3. Once this is done, insert the pin in the reset hole, gently push the service microswitch and keep it pressed until the update process is initiated (Figure 18).

⚠ CAUTION

Service microswitch is an electronic component. An excessive pressure on the service microswitch can permanently damage the Unit Controller. Please take care of not exceed with your strength to avoid damages to your unit.

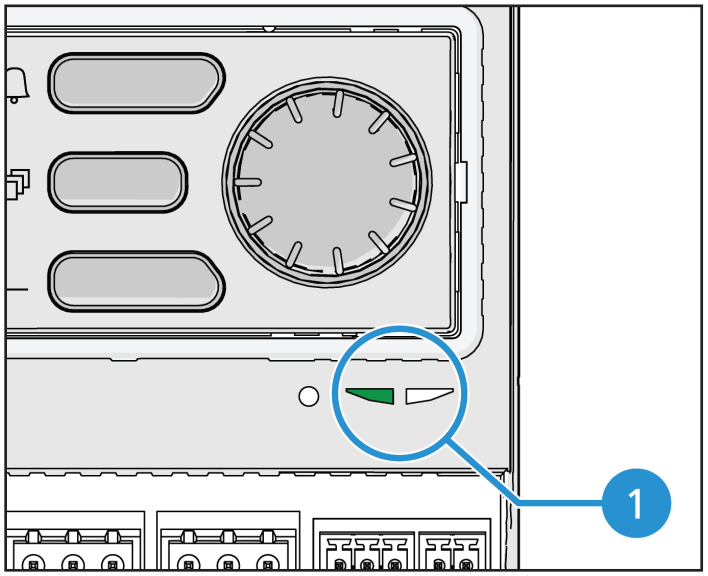
4. With the service microswitch pressed, re-establish the power to the controller using the Q12 switch. After a short while the BSP led on the Unit Controller will start to blink between green and off (Figure 19). When this happen release the service microswitch and wait for the update process to start. Update process is indicated by the BSP led blinking between green and red.

Figure 18: Microswitch



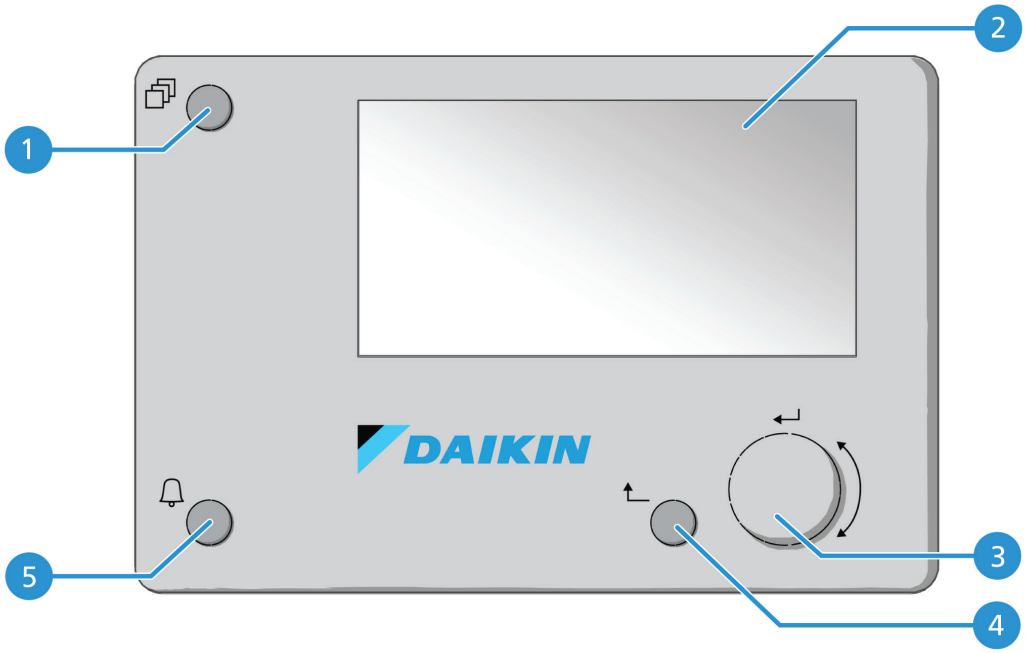
5. In case of BSP update the BSP led will stop in off. If this happen the update process has to be repeated once more. If the BSP led will stop in yellow color the process is completed and the controller restarted.
6. After the controller is restarted the BSP led will blink green during the boot up and then it will remain solid green to indicate normal operations. It's now possible to restore the previous settings if available and restart the unit.

Figure 19: BSP LED



Optional Remote User Interface

Figure 20: Optional Remote Interface - Overview



No.	Function
1	Menu Button
2	Display Screen
3	Navigation Wheel / Enter Button
4	Back Button
5	Alarm Button

As an option an external Remote HMI can be connected on the Unit Controller. The Remote HMI offers the same features as the inbuilt display plus the alarm indication done with a light emitting diode located below the bell button.

Figure 21: Alarm Indication

All views, data and setpoint adjustments available on the Unit Controller HMIs are available on the remote panel. Navigation is identical to the Unit Controller as described in this manual.

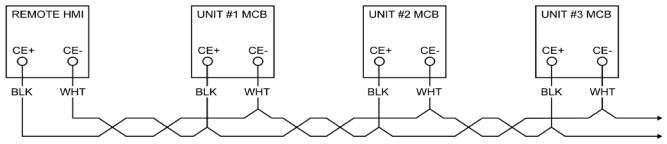
The initial screen when the remote is turned on shows the units connected to it. Highlight the desired unit and press the wheel to access it. The remote will automatically show the units attached to it, no initial entry is required.

NOTICE

Long press of the ESC button will show the list of the connected controllers. Use the weel to select the desired controller.

The Remote HMI can be extended up to 700m using the process bus connection available on the Unit Controller. With a daisy-chain connection as below, a single HMI can be connected to up to 8 units. Refer to the specific HMI manual for details.

Figure 22: Daisy-Chain Connection



Menu Structure

All settings are divided in different menus. Each menu collects in a single page other sub-menus, settings or data related to a specific function (for example Power Conservation or Setup) or entity (for example Unit or Circuit). In any of the following pages a grey box will indicate changeable values and the defaults.

Main Menu

Setpoint/ Sub-Menu	Default	Range	Description
Enter Password	►	-	Submenu to activate access levels
View/Set Unit	►	-	Submenu for unit data and settings
View/Set Circuit	►	-	Submenu for circuit data and settings
Unit Status=	Off: Unit Loc/Rem Sw	Auto Off: Ice Mode Tmr Off: All Cir Disabled Off: Unit Alarm Off: Keypad Disable Off: BAS Disable Off: Unit Loc/Rem Sw Off: Test Mode Auto: Wait For Load Auto: Evap Recirc Auto: Wait For Flow Auto: Pumpdn Auto: Max Pull Limited Auto: Unit Cap Limit Off: Cfg Chg, Rst Ctrlr	Status of the Unit
Active Setpt=	7.0°C ►	-	Active setpoint and link to the Setpoint page.
Evap LWT=	-273.1°C ►	-	Evaporator leaving water temperature and link to the Temperatures page.
Unit Capacity=	0.0%	-	Actual unit capacity.
Chiller Enable=	Enable	Enable-Disable	Chiller operation enable/disable setting.
Unit Mode=	Cool ►	-	Actual unit mode and link to unit available mode selection page.
Timers	►	-	Submenu compressors and thermoregulation safety timers.
Alarms	►	-	Submenu for alarms; same function as Bell Button.
Commission Unit	►	-	Submenu for the chiller configuration.
Save and Restore			Submenu to the Save and Restore page.
About Chiller	►	-	Application Info submenu.

View/Set Unit

Setpoint/ Sub-Menu	Default	Range	Description
Thermostat Ctrl	►	-	Submenu Thermoregulation control parameter
Network Ctrl	►	-	Submenu Network Control
Pumps	►	-	Submenu Pumps control and data
Master/Slave	►	-	Submenu Master Slave
Date/Time/ Schedule	►	-	Submenu Date, Time and Quiet Night mode schedule
Power Conservation	►	-	Submenu Unit Limiting functions
Modbus Setup	►	-	Submenu Setup of Modbus communication
BACnet IP Setup	►	-	Submenu Setup of Bacnet IP communication
BACnet MSTP Setup	►	-	Submenu Setup of Bacnet MSTP communication
LON Setup	►	-	Submenu Setup of LON communication
Ctrlr IP Setup	►	-	Submenu IP settings for on-board web-server
Cloud Connection	►	-	Submenu Cloud Connection

Thermostat Ctrl

Setpoint/Sub-Menu	Default	Range	Description
Start Up DT=	2.7°C	0.0 - 5.0°C	Offset respect the active setpoint for unit start.
Shut Dn DT=	1.5°C	0.0 - 5.0°C	Offset respect the active setpoint for unit shutdown
Stage DT=	1.0°C	0.0 - Start Up DT°C	Offset respect the active setpoint for unit stage up and down
Max Pulldn=	1.7°C/min	0.1 - 2.7°C/min	Max pull down rate of controlled water temperature
Max PullUp=	1.7°C/min	0.1 - 2.7°C/min	Max pull up rate of controlled water temperature
Stg Up Delay=	2min	0 - 8min	Compressor start inter-stage delay
Stg Dn Delay=	30sec	20 - 60sec	Compressor stop inter-stage delay
Strt Strt Dly=	10min	10 - 60min	Compressor Start to Start delay
Stop Strt Dly=	3min	3 - 20min	Compressor Stop to Start delay
Ice Cycle Dly=	12h	1 - 23h	Ice cycle delay
OAT En Bckp Htr=	-3.0°C	-20.0 - 5°C	Outside Air Temperature to enable the backup heater logic.

Network Ctrl

This page resumes all settings (unit on/off, unit mode, temperature setpoint, capacity limit) set by BMS when the unit is controlled from network.

Setpoint/Sub-Menu	Default	Range	Description
Control Source=	Local	Local, Network	Determines whether on/off, cooling/heating/ice setpoint, operation mode, capacity limit, should be commanded by local (HMI) settings or from BMS
Netwrk En SP=	-	-	Unit enable from BMS
Netwrk Mode SP=	-	-	Unit mode from BMS
Netwrk Cool SP=	-	-	Cooling setpoint from BMS
Netwrk Heat SP=	-	-	Heating setpoint from BMS
Netwrk Cap Lim=	-	-	Capacity limitation from BMS Ice setpoint from BMS
Netwrk Ice SP=	-	-	Ice setpoint from BMS

Pumps

This page resumes all setting for the water pumps management. For more details about this parameters and the pump control logic refer to section 0.

Setpoint/Sub-Menu	Default	Range	Description
Evap Pmp Ctrl=	#1 Only	#1 Only #2 Only Auto #1 Primary #2 Primary	Set number of evaporator pumps operational and their priority
Recirc Tm=	30s	15 - 300s	Recirculation water timer
Evap Pmp 1 Hrs=	0h		Running Hours Evaporator Pump 1 (if euipped)
Evap Pmp 2 Hrs=	0h		Running Hours Evaporator Pump 2 (if equipped)

Master/Slave

This page resumes all submenus for the configuration and monitoring of the Master Slave function.

Setpoint/Sub-Menu	Default	Range	Description
Standby Chiller	►	-	Submenu Standby Chiller
Options	►	-	Submenu Options
Thermostat Ctrl	►	-	Submenu Thermostat Ctrl
Data	►	-	Submenu Data
Timers	►	-	Submenu Timers
Disconnect Unit	No	No, Yes	Parameter to disconnect the unit by the Master Slave network. When this parameter is set to Yes the unit follows all local settings.

Standby Chiller

Setpoint/ Sub-Menu	Default	Range	Description
Standby Chiller=	No	No, Auto, Master, Slave 1, Slave 2, Slave 3	Define the standby chiller
Rotation Type=	Time	Time, Sequence	Define the rotation type of the standby chiller if the previous parameter Standby Chiller is set as Auto
Interval Time=	7 Days	1 - 365	Define the interval time (expressed in day) for the rotation of the standby chiller
Switch Time=	00:00:00	00:00:00 - 23:59:59	Define the time within the day when will be performed the switch of the standby chiller
Tmp Cmp=	No	No,Yes	Enabling of the Temperature Compensation function through the standby chiller.
Tmp Comp Time=	120 min	0 - 600	Time constant for the enabling of the standby chiller used for the Temperature Compensation
Standby Reset=	Off	Off, Reset	Parameter to reset the counter of the standby chiller rotation

Options

Setpoint/ Sub-Menu	Default	Range	Description
Master Priority=	1	0.0 - 5.0°C	Start Up / Shut Down priority of the chiller Master Priority = 1 → highest priority Priority = 4 → lowest priority
Slave 1 Priority=	1	0.0 - 5.0°C	Start Up / Shut Down priority of the chiller Slave 1 Priority = 1 → highest priority Priority = 4 → lowest priority
Slave 2 Priority=	1	30% - 100%	Start Up / Shut Down priority of the chiller Slave 2. Priority = 1 → highest priority Priority = 4 → lowest priority This menu is visible only if the parameter M/S Num Of Unit has been configured at least with value 3
Slave 3 Priority=	1	0min - 20min	Start Up / Shut Down priority of the chiller Slave 3. Priority = 1 → highest priority Priority = 4 → lowest priority This menu is visible only if the parameter M/S Num Of Unit has been configured at least with value 4
Master Enable=	Enable	0min - 20min	Parameter is used to disable the Master Chiller

Thermostat Control

Setpoint/Sub-Menu	Default	Range	Description
Start Up DT=	2.7°C	0.0 - 5.0°C	Offset respect the active setpoint for the unit startup.
Start Up DT=	1.5°C	0.0 - 5.0°C	Offset respect the active setpoint for the unit shutdown.
Threshold=	60%	30% - 100%	Threshold of load that have to reach all units running before allow the startup of a new chiller
Stage Up Time=	5min	0min - 20min	Minimum time between the start of two chillers
Stage Dn Time=	5min	0min - 20min	Minim time between the stop of two chillers

Data

Setpoint/ Sub-Menu	Default	Range	Description
Next On=	-	-,Master, Slave 1, Slave 2, Slave 4	Display next chiller that will be starts
Next Off=	-	-,Master, Slave 1, Slave 2, Slave 4	Display next chiller that will be stopped
Standby Chiller=	-	-,Master, Slave 1, Slave 2, Slave 4	Display the actual stand-by chiller
Switch Date/Time	-	dd/mm/yyyy hh:mm:ss	Display the day and the time in the day when will be performed the rotation of the sandby chiller
Master State=	-	Off, On	Display the actual state of the Master
Slave 1=	-	Off, On	Display the actual state of the Slave 1
Slave 2=	-	Off, On	Display the actual state of the Slave 2
Slave 3=	-	Off, On	Display the actual state of the Slave 3
Master Load=	-	0% - 100%	Display the actual load of the Master
Slave 1 Load=	-	0% - 100%	Display the actual load of the Slave 1
Slave 2 Load=	-	0% - 100%	Display the actual load of the Slave 2
Slave 3 Load=	-	0% - 100%	Display the actual load of the Slave 3
Master ELWT=	-	-	Display the Master ELWT
Slave 1 EWLT=	-	-	Display the Slave1 ELWT
Slave 2 EWLT=	-	-	Display the Slave2 ELWT
Slave 3 EWLT=	-	-	Display the Slave3 ELWT

Timers

Setpoint/Sub-Menu	Default	Range	Description
Stage Up Timer=	-	-	Current delay for new chiller stage up
Stage Dn Timer=	-	-	Current delay for new chiller stage down

Date/Time

This page will allow to adjust the time and date in the Unit Controller. This time and date will be used in the alarm log. Additionally it's also possible to set the starting and ending date for the DayLight Saving time (DLS) if used.

Setpoint/ Sub-Menu	Default	Range	Description
Actual Time=	12:00:00		
Actual Date=	01/01/2014		
UTC Diff=	-60min		Difference with UTC
DLS En-able=	Yes		No, Yes
DLS Strt Month=	Mar		DayLight Saving time start month
DLS Strt Week=	2ndWeek		DayLight Saving time start week
DLS End Month=	Nov	NA, Jan… Dec	DayLight Saving time end month
DLS End Week=	1stWeek	1st…5th week	DayLight Saving time end week

NOTICE

On board real time clock settings are maintained thanks to a battery mounted on the controller. Make sure that the battery is replaced regularly each 2 years

Power Conservation

This page resumes all the settings that allows chiller capacity limitations.

Setpoint/ Sub-Menu	Default	Range	Description
Unit Capac-ity	-	-	Displays current unit capacity
Demand Limit=	-	-	Displays current demand limit
Lwt reset Type=	None	None 4-20mA Return OAT	Set leaving water temperature set-point reset type Refer to section
Max Reset Dt=	5°C	0.0…10.0°C	Refer to section
Start Reset Dt=	5°C	0.0…10.0°C	Refer to section
Cooling			
Max Reset OAT=	23.8°C	10.0…29.4°C	Refer to section
Start Reset OAT=	15.5°C	10.0…29.4°C	Refer to section
Heating			
Max Reset OAT=	0.0°C	10.0…-10.0°C	Refer to section
Start Reset OAT=	6.0°C	10.0…-10.0°C	Refer to section

Controller IP Setup

The Unit Controller has an embedded web server showing a replica of the onboard HMI screens. To access this additional web HMI can be required to adjust the IP settings to match the settings of the local network. This can be done in this page. Please contact your IT department for further information on how to set the following setpoints.

To activate the new settings a reboot of the controller is required, this can be done with the “Apply Changes” setpoint.

The controller also supports DHCP, in this case the name of the controller must be used.

Setpoint/Sub-Menu	Default	Range	Description
Apply Changes=	No	No, Yes	Reboot of the controller to apply the changes made
DHCP=	Off	Off,On	Enable or disable the DHCP (Dynamic Host Configuration Protocol)
Act IP=	-	-	Actual IP address
Act Msk=	-	-	Actual Subnet mask
Act Gwy=	-	-	Actual Gateway
Gvn IP=	-	-	Given IP address (it will become the active) if the DHCP = Off
Gvn Msk=	-	-	Given Subnet mask
Gvn Gwy=	-	-	Given Gateway
Prim DNS=	-	-	Primary DNS
Sec DNS=	-	-	Secondary DNS
Host Name=	-	-	Name of the controller
MAC=	-	-	MAC address of the controller

Daikin on Site (if equipped)

NOTICE

Daikin on Site is not available on units sold in the United States.

The Daikin on Site (DoS) page can be accessed navigating through Main Menu → View/Set Unit → Daikin on Site.

In order to use the DoS utility, the customer has to communicate the Serial Number to Daikin company and subscribe to the DoS service. Then, from this page, it is possible to:

- Start/Stop the DoS connectivity
- Check the connection status to DoS service

according to the parameters shown into the table below.

Setpoint/ Sub-Menu	Default	Range	Description
Comm Start	Off	Off, Start	Stop/Start the connection to DoS
Comm State	-	-, IPErr, Connect-ed	Status of the connection to DoS (off, established, established and working)

View/Set Circuit

In this section it is possible to select between the available circuits and access data available for the circuit selected.

Setpoint/Sub-Menu	Default	Range	Description
Circuit #1	►		Menu for Circuit #1
Circuit #2	►		Menu for Circuit #2 (if present)

The submenus accessed for each circuit are identical but the content of each of them reflects the status of the corresponding circuit. In the following the submenus will be explained only once. If only one circuit is available the item Circuit #2 in the above table will be hidden and not accessible.

Setpoint/ Sub-Menu	Default	Range	Description
Settings	►		Link to circuit settings
Circuit Status=		Off: Ready Off: Cycle Timer Off: All Comp Disable Off: Keypad Disable Off: Circuit Switch Off: Alarm Off: Test Mode Run: Preopen Run: Pumpdown Run: Normal Run: Evap Press Low Run: Cond Press High Run: High Amb Limit Run: Defrost	Status of the circuit.
Circuit Cap=	0.0%		Circuit Ca-pacity
Circuit Mode=	Enable	Enable, Disable	Circuit key-pad enabling
Evap Pressure=	-	-	Evaporating Pressure
Cond Pressure=	-	-	Condensing Pressure
Evap Sat Temp=	-	-	Evaporating saturated temperature
Cond Sat Temp=	-	-	Condensing saturated temperature
Suction Temp=	-	-	Suction Tem-perature
Suction SH=	-	-	Suction Superheat
Evap Approach=	-	-	Evaporator Approach
Cond Approach=	-	-	Condenser Approach

Setpoint/ Sub-Menu	Default	Range	Description
EXV Position=	-	-	Expansion valve position
VFD Speed	0%	0-100	Fan Speed

Settings

Setpoint/ Sub-Menu	Default	Range	Description
Compressors	►		Link to the compressor page
Fan Control	►		Link to the circuit fan control page
EXV	►		Link to the EXV page
Defrost	►		Link to the defrost page

Compressors

This page resumes all the relevant information about compressors of the related circuit.

Note the following compressors enumeration:

1. Compressor 1 and compressor 3 belong to the Circuit #1
2. Compressor 2 and compressor 4 belong to the Circuit #2

Setpoint/ Sub-Menu	Default	Range	Description
Comp Enable	►		Link to Compressor Enable page
Compressor 1			
State	Off	Off, On	Compressor State
Start=			Date and time of the last start
Stop=			Date and time of the last stop
Run Hours=	0h		Running hours of compressor
No. Of Starts=	0		Number of compressor starts
Compressor 3			
State	Off	Off, On	Compressor State
Start=			Date and time of the last start
Stop=			Date and time of the last stop
Run Hours=			Running hours of compressor
No. Of Starts=	0		Number of compressor starts

The compressors enable page allows to enable or disable each compressor of the unit.

Setpoint/ Sub-Menu	Default	Range	Description
Comp 1	Auto	Off, Auto	Enabling of the compressor
Comp 2	Auto	Off, Auto	Enabling of the compressor (if available)
Comp 3	Auto	Off, Auto	Enabling of the compressor
Comp 4	Auto	Off, Auto	Enabling of the compressor (if available)

If a compressor is switched to off while it is in running, it does not shutdown immediately, but the controller waits normal shutdown for thermoregulation or unit off and after the compressor disabled will not started until it is enabled again.

Circ 1 Cond Ctrl

Setpoint/ Sub-Menu	Default	Range	Description
Cnd Sat Tmp SP=	35.0°C	30.0…50°C	Condensing saturated temperature setpoint
Cnd Sat Tmp=	-	-	Actual condensing saturated temperature
Output=	-	-	Actual condensing control output
Max Output=	100.0%	50…100%	Maximum condensing control output
Min Output	0.0%	0…50%	Minimum condensing control output

Fan Control

This page resumes all settings for the fan control.

Setpoint/ Sub-Menu	Default	Range	Description
Cond Target=	38.0°C	20 - 55°C	Condensation target for fan control
Evap Target=	2.0°C	-5 - 10°C	Evaporation target for fan control
Cond Sat Temp=	-	-	Condenser pressure
Evap Sat Temp=	-	-	Evaporator pressure
VFD Speed=	-	0-100%	Actual fan speed
Fan Max Speed=	100%	50 - 100%	Maximum fan speed
Fan Min Speed=	20%	20 - 50%	Minimum fan speed

EXV

This page resumes all the relevant information about the status of the EXV logic.

Setpoint/ Sub-Menu	Default	Range	Description
EXV State=	Closed		Closed, Pressure, Superheat
Suction SH=	-		Suction Superheat
Evap Pressure	-		Evaporating pressure
Act Position=	-		Expansion valve opening
Cool SSH Target=	6.5dK	4.4…30.0dK	Cool Suction Superheat setpoint
Heat SSH Target=	6.5dK	2.5…30.0dK	Heat Suction Superheat setpoint
Max Op Pressure=	900.0 kPa	890.0 - 1172.2kPa	Maximum operating pressure

Defrost

This page resumes all the relevant settings for defrost management.

Setpoint/ Sub-Menu	Default	Range	Description
Man Defrost=	Off	Off, On	Closed, Pressure, Superheat
Defrost Cnt=	0		Counter of defrost cycles
Defrost State=	W	W, Pr1, 4W1, Df, Pr2, 4W2, WuH	Defrost execution phase
Cond Pr Lim=	2960kPa	2200…3100kPa	Condensing pressure limit to finish the defrost
Time to Defrost=	20s	0…310s	Delay before the defrost is started when the defrost request is active
Defrost Parameter=	10dK	4…15dK	Parameter do identify the need for a defrost
Defrost Timeout=	600s	240…1800s	Maximum defrost duration
Reset Cnt=	Off	Off, On	Defrost counter Reset

Tmp Setpoints

This page allows to set the water temperature setpoints in the several modes.

Setpoint/ Sub-Menu	Default	Range	Description
Cool LWT 1=	7.0°C	4.0…15.0°C (cool mode) -8.0…15.0°C (cool w/ glycol mode)	Primary cooling setpoint
Cool LWT 2=	7.0°C	4.0…15.0°C (cool mode) -8.0…15.0°C (cool w/ glycol mode)	Secondary cooling setpoint (see 3.6.3)
Ice LWT=	4.0°C	-10.0…4.0°C	Ice setpoint (ice banking with on/off mode)
Heat LWT 1=	45.0°C	25.0…55.0°C	Primary heating setpoint (H/P only)
Heat LWT 2=	45.0°C	25.0…55.0°C	Secondary heating setpoint (H/P only)

Temperatures

This page shows all water temperatures, evaporator and condenser delta temperature between inlet and outlet.

Setpoint/Sub-Menu	Default	Range	Description
Evap LWT=	-	-	Evaporator leaving water temperature
Evap EWT=	-	-	Evaporator entering water temperature
Evap Delta T=	-	-	Evaporator delta temperature
Evap LWT Slope=	-	-	Evaporator leaving water temperature rate of change

Available Modes

This page allows to set the operating mode of the unit

Setpoint/ Sub-Menu	Default	Range	Description
Modes	Cools	Cool Cool w/Glycol Cool/Ice w/Glycol Ice Heat/Cool Heat/Cool w/Glycol Heat/Ice w/Glycol Pursuit Test	Available modes for unit operations.

Timers

This page indicates the remaining cycle timers for each compressor. When the cycle timers are active any new start of a compressor is inhibited.

Setpoint/ Sub-Menu	Default	Range	Description
Comp 1=		0s	
Comp 2=		0s	
Comp 3=		0s	
Comp 4=		0s	
Clear Cycle Tmrs	Off	Off,On	Clear Cycle Timers
Stg Up Dly Rem=			
Stg Dn Dly Rem=			
Clr Stg Delays=	Off	Off,On	Clear Stages Delays
Ice Cycle Dly Rem			
Clear Ice Dly=	Off	Off,On	Cleat Ice Delay

Alarms

This link jumps to the Alarm page. Each of the items represents a link to a page with different information. The information shown depends on the abnormal operating condition that caused the activation of unit, circuit or compressor safeties. A detailed description of the alarms and how to handle will be discussed in the section Troubleshooting this chiller.

Setpoint/ Sub-Menu	Default	Description
Alarm Active	►	List of the active alarms
Alarm Log	►	History of all the alarms and acknowledges
Event Log	►	List of the events
Alarm Snapshot	►	List of alarm snapshots with all the relevant data recorded at time the alarm occurred.

Commission Unit

Configure Unit

This page resumes all the specific settings for this unit like unit type, number of circuits, type of condensing control, etc.. Part of these settings cannot be adjusted and are supposed to be set during the manufacturing or commissioning of this unit. The modification of each parameter in this menu requires that the unit switch is set to 0.

Setpoint/ Sub-Menu	Default	Range	Description
Apply Changes=	No	No, Yes	Type yes after changes
	None	None, Chiller, HeatPump	Select the unit type basing on the model name.
Noise Class=	Std	Std, Low	Selects between the two noise class.
Number Of Cir=	1	1,2	Number of circuit of the chiller
M/S Address	Standalone	Standalone, Master, Slave 1 , Slave 2, Slave 3	Define if the chiller works as standalone or belongs to Master Slave network,
M/S Nom Of Unit	2	2,3,4	Indicate the number of chiller belonging to Master Slave network. This parameter have to be set only in the chiller Master, in all Slave units it can be let at default value as ignored.
M/S Sns Type	NTC10K	NTC10K, PT1000	Define the sensor type used to measure the common leaving water temperature. This parameter have to be set only in the chiller Master, in all Slave units it can be let at default value as ignored.
Unit Alm Behavior=	Blinking	Blinking, NotBlinking	Behavior of the unit alarm digital output
Display Units=	Metric	Metric,English	Measurement system
HMI Language=	English	English	
Enable Options			
PVM/GFP=	Disable	Disable, Enable	Enabling of the phase voltage monitor
External Alarm=	Disable	Disable, Event, Alarm	Enabling of the Event or External Alarm input.
Demand Limit=	Disable	Disable, Enable	Enabling of the Demand Limit signal
Lwt Reset=	Disable	Disable, Enable	Enabling of the Lwt Reset signal
Comm Module 1=	None	None, IP, Lon, MSTP, Modbus, AWM	Auto-configured when Unit Controller link with related module
Comm Module 2=	None	Modbus, Bacnet IP, Bacnet MSTP, Lon, AWM	Auto-configured when Unit Controller link with related module
Comm Module 3=	None	Modbus, Bacnet IP, Bacnet MSTP, Lon, AWM	Auto-configured when Unit Controller link with related module

NOTICE

Modification to any of these values will require to be acknowledged to the controller by setting "Apply Changes = Yes". This will cause a controller reboot. This action can only be performed with the Q0 switch on the unit switchbox set to 0.

Software Options

For the EWYQ units, the possibility to employ a set of software options has been added to the functionality of the chiller, in according with the new Microtech 4 installed on the Unit. The Software Options do not require any additional hardware and regard communication channels

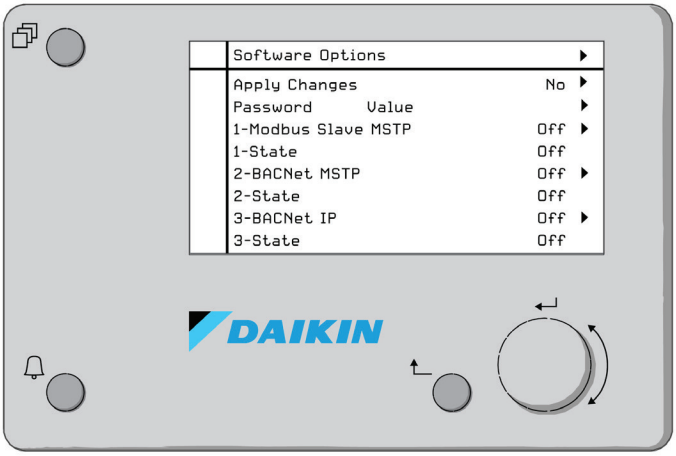
During the commissioning the machine is delivered with the Option Set chosen by the customer; the Password inserted is permanent and depends on the Serial Machine Number and the Option Set selected.

In order to check the current Option Set:

Main Menu → Commission Unit → Option SW

Setpoint/Sub-Menu	Description
Password	Writable by Interface/Web Interface
Option Name	Option Name
Option Status	Option is (not) active)

Figure 23: Software Options Screen



The Current Password inserted activates the selected options.

The Option Set and the Password are updated in the Factory. If the customer wants to change its *Option Set*, he needs to contact the Daikin Personnel and asks for a new password.

As soon as the new password is communicated, the follow steps allow the customer to change the *Option Set* by himself:

1. Wait for the circuits are both OFF, then, from the Main Page, go to Main Menu → Commission Unit → Software Options
2. Select the Options to Activate
3. Insert the Password
4. Wait for the States of the selected options going to On
5. Apply Changes → Yes (it will reboot the controller)

NOTICE

The Password is changeable only if the machine is working in safe conditions: both the circuits are in the State Off.

Inserting the Password in a Spare Controller

If the Controller is broken and/or it needs to be replaced for any reason, the customer needs to configure the *Option Set* with a new password.

If this replacement is scheduled, the customer can contact Daikin Applied for a new password and repeat the steps above.

If there is not enough time to ask for a Password from a Daikin Applied technician (ex. an expected failure of the controller), a set of free, limited passwords is provided in order not to interrupt machine operation.

These free passwords can be viewed by navigating to:

Main Menu → Commission Unit → Configuration → Options SW → Temporary Passwords.

Their Use is limited up to three months:

- 553489691893 – 3 Months Duration
- 411486702597 – 1 Month Duration
- 084430952438 – 1 Month Duration

It gives the customer the time enough to contact Daikin Applied Service and insert a new unlimited password.

Table 18: Limited Passwords

Setpoint/Sub-Menu	Specific Status	Description
553489691893		Activate the Option Set for 3 Months.
411486702597		Activate the Option Set for 1 Month.
084430952438		Activate the Option Set for 1 Month.
Mode	Permanent	A permanent Password is inserted. Option set can be used for unlimited time.
	Temporary	A temporary Password is inserted. Option set can be used depending on the password inserted.
Timer		Last duration of the Option Set activated. Enabled only if the mode is Temporary.

NOTICE

The Password is changeable only if the machine is working in safe conditions: both the circuits are in the State Off.

Alarm Limits

This page contains all alarm limits, including low pressure alarm prevention thresholds. In order to ensure proper operation, they have to be set manually according to the specific application.

Setpoint/ Sub-Menu	Default	Range	Description
Low Press Alm=	200.0 kPa	200.0 - 630.0 kPa	Low pressure alarm limit
Low Press Hold=	670.0 kPa	150.0 - 793.0 kPa	Low pressure hold limit
Low Press Unld =	650.0 kPa	150.0 - 793.0 kPa	Low pressure unload limit
Hi Press Unld=	3850 kPa	3800 - 3980 kPa	High pressure unload limit
Hi Press Stop,=	4000 kPa	3900 - 4300 kPa	High pressure alarm limit
Evap Water Frz=	2.0°C	2.0 - 5.6°C (without Glycol)	Evaporator freeze protection limit
Flw Proof=	5 sec	5 - 15 sec	Flow proof delay
Evp Rec Timeout=	3 min	1 - 10 min	Recirculating timeout before the alarm is raised
Low OAT Strt Time	165 sec	150 - 240 sec	Start time during which the low pressure alarm is ignored.
Min Delta Pres=	400.0 kPa	50 - 700 kPa	Minimum pressure difference to trigger the Low Delta Pressure alarm

NOTICE

Once tripped, the software will get back to normal operation. However, the alarm will not be reset until the high pressure switches are manually reset through the button included in the switch.

Calibrate Unit Sensors

This page allows a proper calibration of the unit sensors

Setpoint/ Sub-Menu	Default	Range	Description
Evap LWT=	7.0°C		Evaporator LWT current reading (includes the offset)
Evp LWT Offset=	0.0°C	-5.0…5.0°C	Evaporator LWT calibration
Evap EWT=	12.0°C		Evaporator EWT current reading (includes the offset)
Evp EWT Offset=	0.0°C	-5.0…5.0°C	Evaporator EWT calibration
OA Temp=	30.0°C		Oustide Air Temperature current reading (includes the offset)
OA Temp Offset=	0.0°C	-5.0…5.0°C	Oustide Air Temperature calibration

Calibrate Circuit Sensors

This page allows a proper calibration of the circuit sensors

Setpoint/ Sub-Menu	Default	Range	Description
Evap Pressure=			Evaporator Pressure current reading (includes the offset)
Evp Pr Offset=	0.0kPa	-100.0… 100.0kPa	Evaporator Pressure offset
Cond Pressure=			Condenser Pressure current reading (includes the offset)
Cnd Pr Offset=	0.0kPa	-100.0… 100.0kPa	Condenser Pressure offset
Suction Temp=			Suction Temperature current reading (includes the offset)
Suction Offset=	0.0°C	-5.0…5.0°C	Suction Temperature offset
Discharge Temp=			Discharge Temperature current reading (includes the offset) (A/C only)

⚠ CAUTION

Calibrations of the Evaporator Pressure and Suction Temperature are mandatory for the applications with negative water temperature setpoints. These calibrations have to be performed with proper gauge and thermometer.

An improper calibration of the two instruments may generate limitation of the operations, alarms and even damages to components.

Unit Manual Control

This page contains all the test point, status of the digital inputs, status of the digital output and raw value of the analog inputs associated to the Unit. To activate the test point it's required to set the Available Modes to Test.

Setpoint/ Sub-Menu	Default	Range	Description
Test Unit Alarm=	Off	Off/On	Test of the General Alarm relay output
Test Evap Pump 1=	Off	Off/On	Test of the Evaporator Pump #1
Test Evap Pump 2=	Off	Off/On	Test of the Evaporator Pump #2
Test Cond Pump 1=	Off	Off/On	Test of the Condenser Pump #1
Test Cond Pump 2=	Off	Off/On	Test of the Condenser Pump #2
Test Cond Valve Out=	0.0%	0…100%	Test Valve output for condensing control
Test VFD Out=	0.0%	0…100%	Test VFD output for condensing control
Input/Output Values			
Unit Sw Inpt=	Off	Off/On	Status of the Unit Switch

Setpoint/ Sub-Menu	Default	Range	Description
Dbl Sp Inpt=	Off	Off/On	Status of the Double Setpoint
Evap Flow Inpt=	Off	Off/On	Status of the Evaporator Flow switch
Cond Flow Inpt=	Off	Off/On	Status of the Condenser Flow switch
HP Switch Inpt=	Off	Off/On	Status of the Heat Pump switch
PVM/GFP Inpt=	Off	Off/On	Status of Phase Voltage monitor, Under-Over voltage protection or Ground Fault protection (check option installed)
Ext Alm Inpt=	Off	Off/On	Status of the External Alarm
Unit Alm Outpt=	Off	Off/On	Status of the General Alarm relay
Evp Pmp1 Outpt=	Off	Off/On	Status of the Evaporator Pump #1 relay
Evp Pmp2 Outpt=	Off	Off/On	Status of the Evaporator Pump #2 relay
Evap EWT Res=	0Ohm	340-300kOhm	Resistance of the Evap EWT sensor
Evap LWT Res=	0Ohm	340-300kOhm	Resistance of the Evap LWT sensor
Dem Lim Curr=	0mA	3-21mA	Current input for the Demand Limit
LWT Reset Curr=	0mA	3-21mA	Current input for the Setpoint Reset
Cond Valve Outpt=	0.0V	0.0-10.0V	Voltage output for the valve of the condensing control
VFD Outpt=	0.0V	0.0-10.0V	Voltage output for the VFD of the condensing control

Circuit 1 Manual Control

This page contains all the test point, status of the digital inputs, status of the digital output and raw value of the analog inputs associated to the Circuit #1 (or Circuit #2 if present and depending on the link followed). To activate the test point it's required to set the Available Modes to Test (see section 4.6).

Setpoint/ Sub-Menu	Default	Range	Description
Test Comp 1=	Off	Off/On	Test of the compressor 1 (first compressor of the circuit number 1)
Test Comp 3=	Off	Off/On	Test of the compressor 3 (second compressor of the circuit number 1)
Test 4 Way Valve=	Off	Off/On	Test of the 4 way valve
Test VFD=	Off	Off/On	Test of the VFD enable.
Test EXV Pos=	0.0%	0-100%	Test of the Expansion Valve movements
Test Cond Valve Out=	0.0%	0-100%	Test Valve output for condensing control
Test VFD Out=	0.0%	0-100%	Test VFD output for condensing control
Input/Output Values			
Evap Pr Inpt=	0.0V	0.4-4.6V	Input voltage for the Evap Pressure
Cond Pr Inpt=	0.0V	0.4-4.6V	Input voltage for the Cond Pressure
Suct Temp Res=	0Ohm	340-300kOhm	Resistance of the Suction Temp sensor
Comp 1 Output=	Off	Off/On	Status of the compressor 1 (first compressor of the circuit number 1)
Comp 3 Output	Off	Off/On	Status of the compressor 3 (second compressor of the circuit number 1)
Cond Valve Outpt=	0.0V	0.0-10.0V	Voltage output for the valve of the condensing control
VFD Outpt=	0.0V	0.0-10.0V	Voltage output for the VFD of the condensing control

Scheduled Maintenance

This page may contains the contact number of the Service organization taking care of this unit and the next maintenance visit schedule.

Setpoint/ Sub-Menu	Default	Description
Next Maint=	Jan 2015	Schedule date for next maintenance
Support Reference=	999-999-999	Reference number or email of Service Org

Save and Restore

The controller has a feature to save and then restore on an SD card the actual unit settings. This feature can be useful when a software upgrade is needed or to keep a copy of the actual settings for future usages like a controller replacement.

NOTICE

In case of backup, part of the settings like number of starts and running hours may not be restored. Backups may be done periodically to save a more recent status of the settings.

This page has all the setpoints to command a save and/or a restore of a previously saved parameter file.

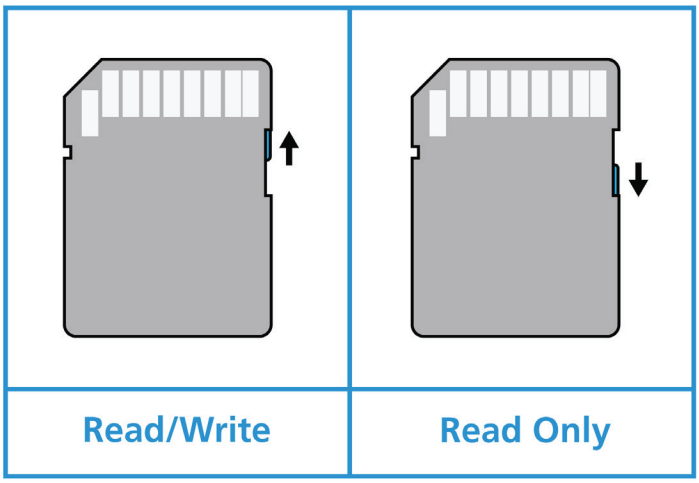
Setpoint/ Sub-Menu	Default	Range	Description
SD Card State=	NoCard	NoCard, ReadOnly, ReadWrite	Status of the SD card.
Save to SD=	No	No, Yes	Setpoint to force a parameter file creation on an SD card
Save SD Rslt=	Idle	Fail, Pass, Idle	Result of the Save command
Rstr From SD=	No	No, Yes	Setpoint to force a parameter restore from an SD card
Rstr SD Rslt=	Idle	Fail, Pass, Idle	

Before proceeding be sure that the SD card is properly fitted in its slot. A status of the SD card is also displayed in the same page to check if it's allowed to save the parameters.

NOTICE

To save a copy of the settings the SD Card State must be ReadWrite (1). If the State is ReadOnly (2) check the position of the card-lock (Figure 24).

Figure 24: SD CARD - Read and Write



When the SD card is in and Write is allowed change Save to SD to Yes. The Save to SD Result will temporarily change to Fail and if the process is successful it will then change to Pass. A file named "PARAM.UCF" will be saved in the root folder of the SD Card.

The same procedure is used to restore the settings from a previously saved configuration file. The file must be stored in the root folder of the SD Card.

After the parameters have been restored a reboot of the controller is required to let the new settings operational.

About this Chiller

This page retains all the information needed to identify the unit and the current software version installed. These information may be required in case of alarms or unit failure

Setpoint/ Sub-Menu	Description
Model	Code name
G.O.	This field could contain the unit order number (OVyy-zzzzz)
Unit S/N	Unit serial number
Enter Data	This field should contain the unit serial number (CH-yyLxxxxx)
BSP Ver=	Firmware version
App Ver=	Software version
HMI GUID=	Unique Identification of the HMI software
	HEX number for HMI GUID
OBH GUID=	Unique Identification of the OBH software
	HEX number for OBH GUID

Working with the Unit

This sections contains a guide on how to deal with the everyday usage of the unit. The next sections describe how to perform routine tasks on the unit and which type of controls are available on the unit.

Unit Setup

Before starting up the unit, some basic settings need to be set by the customer according to the application.

Control Source

This function allows to select which source should be used for unit control. The following sources are available:

Local	Unit is enabled by local switches placed into the switch-box. Chiller mode (cool, cool w/glycol, ice, heat, pursuit), LWT setpoint and capacity limit are determined by local settings in the HMI.
Network	Unit is enable by a remote switch. Chiller mode, LWT setpoint and capacity limit are determined by an external BMS. This function requires: - Remote enable connection to a BMS (unit on/off switch must be in remote) - Communication module and its connection to a BMS.

Available Mode Setting

The following operating modes can be selected through the Available modes menu.

Cool	Set if chilled water temperature down to 4°C is required. No glycol is generally needed in the water circuit, unless ambient temperature may reach low values.
Cool w/ Glycol	Set if chilled water temperature below 4°C is required. This operation requires proper glycol/water mixture in the evaporator water circuit.
Cool/Ice w/Glycol	Set in case a dual cool/ice mode is required. This setting implies an operation with double setpoint which is activated through a customer supplied switch, according to the following logic: - Switch OFF: The chiller will work in cooling mode with the Cool LWT 1 as the Active Setpoint. - Switch ON: The chiller will work in ice mode with the Ice LWT as the Active Setpoint.
Ice	Set if ice storage is required. The application requires the compressors to operate at full load until the ice bank is completed, and then to stop for at least 12 hours. In this mode the compressor(s) will not operate at part load, but will work only in on/off mode.
The following three modes allow to switch the unit between heat mode and one of the previous cool mode (Cool, Cool w/Glycol, Ice) Set heat mode if warmed water temperature up to 55°C is required (H/P only)	
Heat/Cool	Set in case a dual cool/heat mode is required. This setting implies an operation with double functioning which is activated through the Cool/Heat switch on the electric box - Switch COOL: The chiller will work in cooling mode with the Cool LWT 1 as the Active Setpoint. - Switch HEAT: The chiller will work in heat pump mode with the Heat LWT 1 as the Active Setpoint.
Heat/Cool w/Glycol	Set in case a dual cool/heat mode is required. This setting implies an operation with double functioning which is activated through the Cool/Heat switch on the electric box - Switch COOL: The chiller will work in cooling mode with the Cool LWT 1 as the Active Setpoint. - Switch HEAT: The chiller will work in heat pump mode with the Heat LWT 1 as the Active Setpoint.
Heat/Ice w/Glycol	Set in case a dual cool/heat mode is required. This setting implies an operation with double functioning which is activated through the Cool/Heat switch on the electric box - Switch ICE: The chiller will work in cooling mode with the Ice LWT as the Active Setpoint. - Switch HEAT: The chiller will work in heat pump mode with the Heat LWT 1 as the Active Setpoint.
Test	Enables the Manual Control of the unit. The manual test feature helps in debugging and checking the operational status of sensors and acutators. This feature is accessible only with the maintenance password in the main menu. To activate the test feature is required to disable the Unit from the Q0 switch and change the available mode to Test.

NOTICE

When the Available Mode setpoint is changed to Test for a unit that has been configured for brine application, water setpoint, freeze limit and low pressure safeties are set to the minimum value for non-brine units and require to be restored to the previously adjusted values.

Temperature Setpoint Settings

Purpose of the chiller is to keep the evaporator leaving water temperature as close as possible to a pre-set value, called Active Setpoint. The Active Setpoint is calculated by the unit controller based on the following parameters and physical input

- Base setpoint determined by the actual operating mode (Cool, Cool w/Glycol, Ice, Heat, Pursuit)
- Double Setpoint (Digital input)
- Setpoint Reset (4-20mA analog input)
- OAT Reset
- Evaporator Delta T Reset

LWT setpoint can also be set via network if the appropriate control source has been selected.

Setpoint range is limited according to the selected operating mode. The controller includes two setpoint in cooling mode (either standard cool or cool w/glycol) and one setpoint in ice mode, which are activated according to Operating mode and Dual Setpoint selection. All default setpoint with their ranges are reported in Table 19.

Table 19: Temperature Setpoint Settings

Actual Operating Mode	Double Setpoint Input	LWT Setpoint	Default	Range
Cool	Off	Cool LWT 1	7.0°C	4.0°C 15.0°C
	On	Cool LWT 2	7.0°C	4.0°C 15.0°C
Cool w/ Glycol	Off	Cool LWT 1	7.0°C	-10.0°C ÷ 15.0°C
	On	Cool LWT 2	7.0°C	-10.0°C ÷ 15.0°C
Ice	N/A	Ice LWT	-4.0°C	-10.0°C ÷ 4.0°C
Heat	Off	Heat LWT 1	45.0°C	25.0°C ÷ 55.0°C
	On	Heat LWT 2	45.0°C	25.0°C ÷ 55.0°C

Thermostat Control Settings

Thermostat control settings allow to set up the response to temperature variations and the precision of the thermostat control. Default settings are valid for most applications, however site specific conditions may require adjustments in order to have a smooth and precise temperature control or a quicker response of the unit. The parameters mentioned below can be set from the Thermostat Control menu.

The following explanation can be read for Chiller/Heat Pump modes.

Compressors start conditions. The control will start the first compressor if the controlled temperature is higher/lower than the active setpoint of at least a *Start Up DT* value. The other compressors will start, one at a time, if the controlled temperature is higher/lower than the active setpoint of at least *Stage Up DT* value.

Compressors shutdown conditions. The control will shut down the compressors, one at a time, if the controlled temperature is lower/higher than the active setpoint of at least *Stage Down DT* value. Last compressor in run will shut down if the controlled water temperature is lower/higher than the active setpoint of at least *Shut down DT* value.

Temperature Limitation. The start-up and shut-down of all compressors are inhibited if the controlled water temperature decreases/increases faster than *Pull Down Rate/Pull Up Rate* limit value.

Time Limitation. The start-up and shut-down of each compressor must respect the following time constrains.

1. A compressor can start only if since the last start-up or shut-down of any other compressor the *Stage Up Delay* has expired.
2. A compressor can stop only if since the last start-up or shut-down of any other compressor the *Stage Dn Delay* has expired.
3. A compressor can start only if since its previous start-up the *Start to Start Delay* has expired
4. A compressor can start only if since its previous stop the *Stop to Start Delay* has expired

The unit capacity remains constant if the controlled temperature is within the interval:

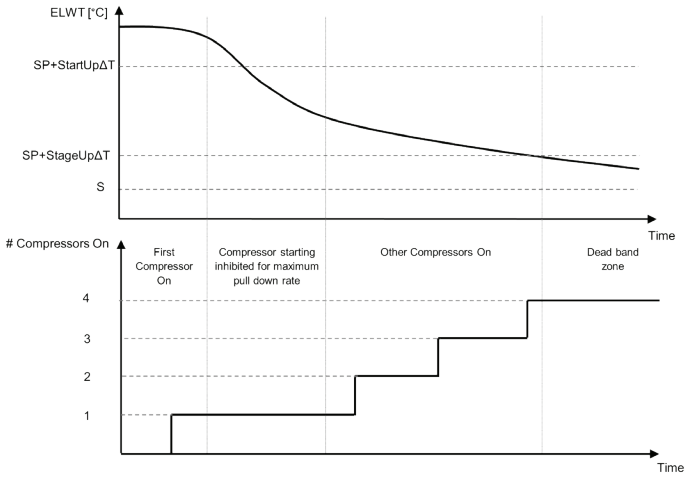
[Setpoint - Stage Up DT ÷ Setpoint + Stage Down DT]

The following table summarize the conditions for compressors start and shut down explained above.

	Cool Mode	Heat Mode
First Compressor Start	Controlled Temperature > Setpoint + Start Up DT	Controlled Temperature < Setpoint - Start Up DT
Other Compressor Start	Controlled Temperature > Setpoint + Stage Up DT	Controlled Temperature < Setpoint - Stage Up DT
Last Compressor Off	Controlled Temperature < Setpoint - Shut Dn DT	Controlled Temperature > Setpoint - Shut Dn DT
Other Compressor Off	Controlled Temperature < Setpoint - Stage Dn DT	Controlled Temperature > Setpoint - Stage Dn DT

A qualitative example of compressors start-up sequence in cool mode operation is shown in the graph below.

Figure 25: Compressors Start-up Sequence - Cool Mode



NOTICE

Compressors are always started and stopped to guarantee the balancing of running hours and number or starts in multiple circuits units. This strategy optimizes the lifetime of compressors, inverters, capacitors and all the others circuit components.

Alarm Setting

Factory defaults are set for standard cooling mode, therefore they may not be properly tuned when working at different conditions. Depending on the application, the following alarm limits need to be adjusted:

- Low Press Hold
- Low Press Unload
- Evap Water Frz

Low Press Hold	Set the minimum refrigerant pressure of the unit. It is generally recommended to set to a value whose saturated temperature is 8 to 10°C below the minimum active setpoint. This will allow a safe operation and a proper control of compressor suction superheat.
Low Press Unload	Set lower than the hold threshold enough to allow a suction pressure recovery from fast transients without unloading the compressor. A 20 kPa differential is generally appropriate for most applications.
Evap Water Frz	Stops the unit in case the evaporator leaving temperature falls below a given threshold. To allow a safe operation of the chiller, this setting must be adequate to the minimum temperature allowed by the mixture water/glycol present in the evaporator water circuit.

Pumps

The Unit Controller can manages one or two water pumps either for the evaporator either for the condenser. Number of pumps and their priority can be set from the Pumps menu (see “Pumps” on page 29).

Evap Pump Ctrl	Set number of active pumps and priority
Recirc Tm	This parameter indicates the minimum time for which the evaporator/condenser flow switches must be active before to start the thermostat control

The following options are available for the pumps:

#1 Only	Set to this in case of single pump or twin pump with only #1 operational (f.e. in case of maintenance on #2)
#2 Only	Set to this in case of twin pump with only #2 operational (f.e. in case of maintenance on #1)
Auto	Set for automatic pump start management. At each chiller start, the pump with the least number of hours will be activated.
#1 Primary	Set to this in case of twin pump with #1 running and #2 as a backup
#2 Primary	Set to this in case of twin pump with #2 running and #1 as a backup

Pump Control

In this case the Unit Controller only manages the pumps connected to the load water circuit. Lead pump is started when the unit is set to *Enabled* and there are compressors available to run.

Depending on the HMI setting pumps are managed differently.

In case of twin pumps in case of flow loss, the Unit Controller will try to change over between the lead and the standby pump to avoid flow loss alarms.

When the unit is disabled the pump is kept running for additional Recirculate Timer delay.

Power Conversation

The unit controller provides two different functions that allow to limit the chiller capacity.

1. Demand Limit: limits the maximum unit capacity.
2. Lwt Reset: applies an offset to the base water temperature setpoint.

Both function must be enabled through the menu Configure Unit 0.

Demand Limit

Demand limit function allows the unit to be limited to a specified maximum capacity. The capacity limit is given through an external 4-20 mA signal. The table below reports the unit limitation based on the 4-20mA signal:

Number of Compressors	Demand Limit Signal [mA]	Maximum unit capacity [%]	Maximum Number of Compressors “ON”
2	< 12 mA	100%	2
	> 12 mA	50%	1
4	< 8 mA	100%	4
	8 mA < < 12 mA	75%	3
	12 mA < < 16 mA	50%	2
	16 mA < < 20 mA	25%	1

NOTICE

The actual unit capcity and demand limit can be found in the Power Conservation menu (see “Power Conservation” on page 31).

LWT Reset

The LWT Reset function applies a variable offset to the base temperature setpoint selected through the interface from the menu Temperature Setpoints.

If the unit works in Chiller mode the offset has a positive value, so the new setpoint will be greater than the base setpoint.

If the unit works in Heat pump mode the offset has a negative value, so the new setpoint will be lower than the base setpoint.

This offset can be calculated starting from:

- External signal (4-20mA),
- OAT Reset

The following setpoints are available through the Power Conversation menu on page 31.

LWT Rest Type	Set the Setpoint Reset mode (None, 4-20 mA, Return, OAT)
Max Reset	Max Setpoint Reset (valid for all active modes)
Start reset DT	Used on Setpoint Reset by Evaporator DT

Setpoint Reset by External 4-20 mA Signal

The active setpoint is calculated applying a correction based on an external 4-20mA signal. 4 mA corresponds to 0°C correction, while 20 mA corresponds to a correction of the active setpoint as set in Max Reset (MR). Figure 26 and Figure 27 show how the setpoint is modified respectively in Cool and Heat modes.

The following abbreviations are used:

Abbreviation	Definition
MR	Max Reset
AS	Active Setpoint
LWT SP	LWT Setpoint
Signal	4-20 mA Analog Input Signal

Figure 26: Cool Mode

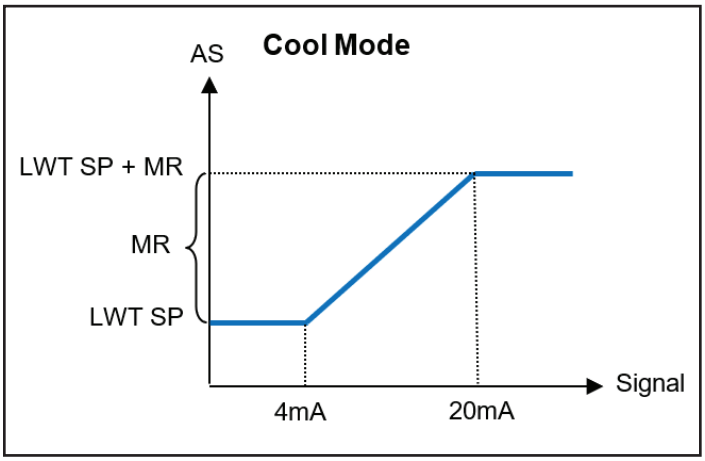
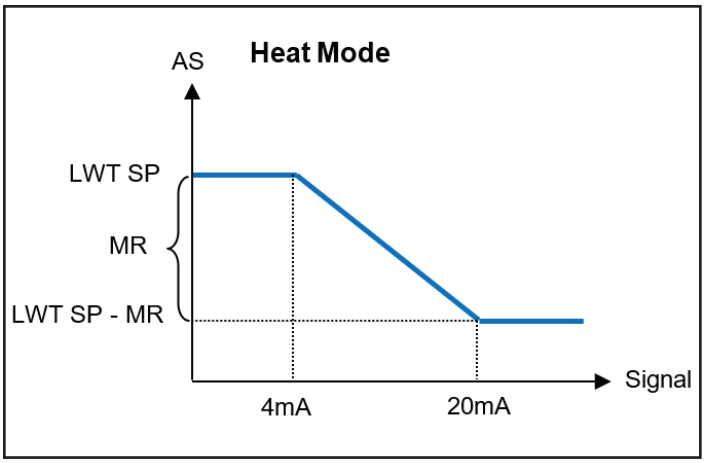


Figure 27: Heat Mode



Setpoint Reset by Evaporator Return Temperature

The active setpoint is calculated applying a correction that depends on the evaporator entering (return) water temperature

When the evaporator/condenser ΔT becomes lower than the SRΔT value, an offset to the LWT setpoint is increasingly applied, up to the MR value when the ΔT is equal to zero

Abbreviation	Definition
MR	Max Reset
AS	Active Setpoint
SRΔT	Start reset DT
LWT SP	LWT Setpoint

Figure 28: Evaporator Return Temp - Cool Mode

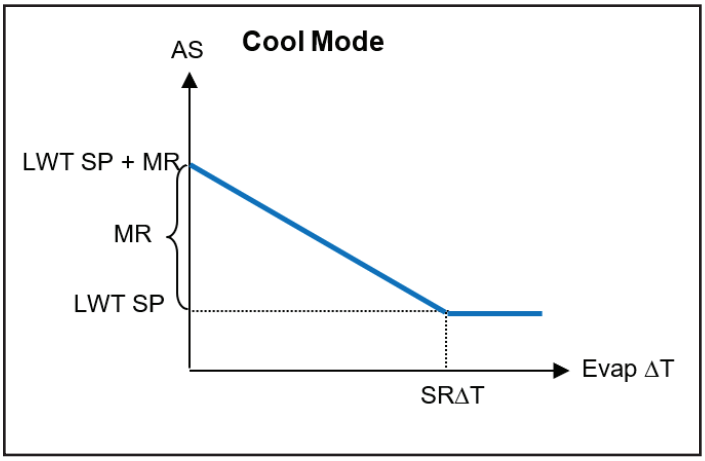
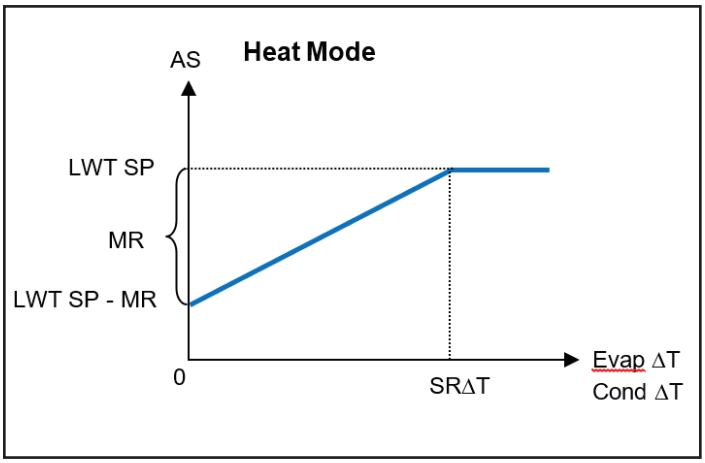


Figure 29: Evaporator Return Temp - Heat Mode



NOTICE

The Return Reset may affect negatively the chiller operation when operated with variable flow. Avoid to use this strategy in case of inverter water flow control.

Setpoint Reset by Outside Air Temperature (OAT)

The active setpoint is calculated applying a correction that depends on the outside air temperature.

Abbreviation	Definition
MR	Max Reset
AS	Active Setpoint
LWT SP	LWT Setpoint
MROAT-C	Max Reset OAT Cooling
SROAT-C	Start Reset OAT Cooling
MROAT-H	Max Reset OAT Heating
SROAT-H	Start Reset OAT Heating

Figure 30: Outside Air Temp (OAT) - Cool Mode

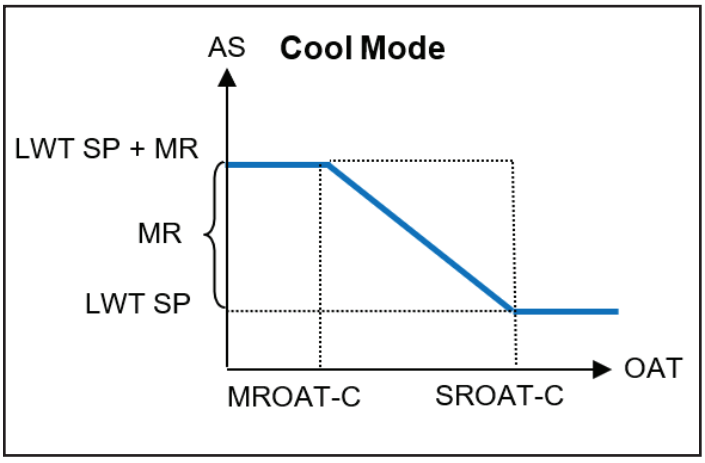
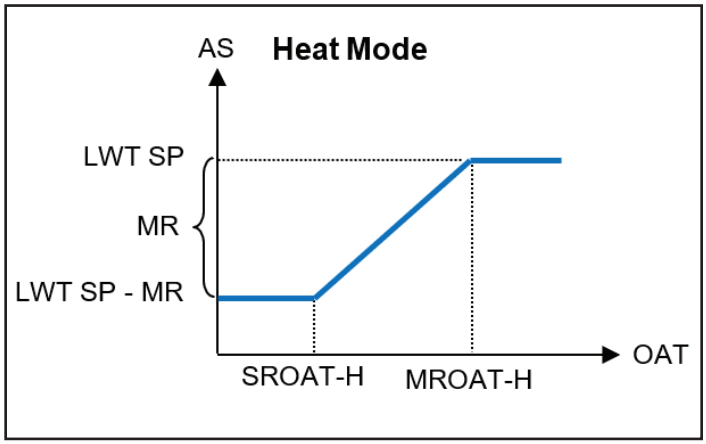


Figure 31: Outside Air Temp (OAT) - Heat Mode



Unit/Circuit Start-up

In this section, starting and stopping sequence of the unit will be described. All HMI status will be briefly described to allow a better understanding of what is going on into the chiller control.

Prepare the Unit to Start

In order to let the unit start all the enable signals has to be changed to enable. The list of enabling signals are:

- Local/Remote Enable signals = Enable
- Keypad Chiller Enable = Enable
- BMS Chiller Enable Setpoint = Enable

Each unit is equipped with a Local/Remote selector. It is installed on the unit switchbox and can be positioned on three different positions: Local, Disable, and Remote.

Q1 Switch-box Positoin	Description
STOP	With the Q1 switch in the Stop position the unit is disabled. Pump will not start in normal operational condition. Compressors are kept disabled independently from the status of the individual enable switches.
START	With the Q1 switch in the Start position the unit is enabled. Pump will start if all other enable signals are set to enable and at least one compressors is available to run
REMOTE	With the Q1 switch in the Remote position the unit can be enabled using the additional connections available on the connection terminals. A closed loop will identify an enable signal, this can come from a remote switch or a timer by example.

The Keypad enable signal cannot be modified with the user password level but it requires the maintenance password.

The last enable signal is coming through the high level interface, that mean from a Building Management System. From a BMS connected to the Unit Controller using a communication protocol the unit can be disabled. To see if the enable signal is coming from a BMS in the View/Set Unit and then Status/Settings check the Control Source, if it is set to Network than the Network En SP setpoint in the same page will reflect the actual signal coming from the BMS. If the value is set to Disable then the unit cannot start. In this case check with your BAS company how the chiller is operated.

The Unit Status will inform about the current unit status, possible status will be described in the following table:

Overall Status	Status	Description
Off:	Ice Mode Tmr	This status can be shown only if the unit can work in Ice Mode. The unit is off because the Ice setpoint has been satisfied. Unit will remain off until the Ice Timer has expired.
	All Cir Disabled	No circuit is available to run. All circuits can be disabled by a component safety condition active or can be disabled by keypad or can be all in alarms. Check the individual circuit status for further details.
	Unit Alarm	A unit alarm is active. Check the alarm list to see what is the active alarm inhibiting the unit to start and check if the alarm can be cleared. Refer to the Troubleshooting section before proceeding.
	Keypad Disable	The Unit has been disabled by keypad. Check with your local maintenance if it can be enabled.
	Unit Loc/ Rem Switch	The Local/Remote enable switch is set to disable. Turn it to Local to enable the unit to start its starting sequence.
	BAS Disable	Unit is disabled by BAS/BMS system. Check with the BAS company how to start the unit.
	Test Mode	Unit mode set to Test. This mode is activated to check operability of onboard actuators and sensors. Check with the local maintenance if the Mode can be reverted to the one compatible with unit application (View/Set Unit – Set-Up – Available Modes).
	Cfg Chg, Rst Ctrlr	The configuration of the unit is changed and the controller requires a reboot
Auto		Unit is in Auto control. The pump is running and at least one compressor is running.
Auto	Wait For Load	Unit is in standby because the thermostat control satisfied the active setpoint.
	Evap Recirc	Unit is running the evaporator pump to equalize the water temperature in the evaporator.
	Wait For Flow	Unit pump is running but the flow signal still indicate a lack of flow through the evaporator.
	Pumpdn	Unit is shutting down.
	Max Pulldn	Unit thermostat control is limiting the unit capacity because the water temperature is dropping at a rate that could exceed the active setpoint.
	Unit Cap Limit	Demand limit has been hit. Unit capacity will not further increase.
	High Amb Limit	Ambient temperature is higher than 46.6°C the unit capacity will be limited to 50% in case of single circuit units.
	Defrost	One circuit is performing a defrost procedure

Prepare Circuits to Start

To allow a circuit start up is required to enable the circuit through the parameter Circuit Mode in the menu 0

The status of the circuit is indicated in the View/Set Circuit – Circuit #x. The possible status will be described in the following table.

Overall Status	Status	Description
Off:	Ready	Circuit is off waiting for a stage up signal from thermostat control
	Cycle Timer	Circuit is off waiting for the compressor cycle timer to expire
	All Comp Disable	Circuit is off, as all compressors are disable
	Keypad Disable	Circuit is off by the local or remote HMI. Check with your local maintenance if it can be enabled.
	Alarm	A circuit alarm is active. Check the alarm list to see what is the active alarm inhibiting the circuit to start and check if the alarm can be cleared. Refer to the Troubleshooting section before proceeding.
	Test Mode	Circuit mode set to Test. This mode is activated to check operability of onboard circuit actuators and sensors. Check with the local maintenance if the Mode can be reverted to Enable.
	Preopen	EXV prepositioning before compressor starts.

Overall Status	Status	Description
Run:	Pumpdown	Circuit is shutting down because of thermostat control or pumpdown alarm or because the enable switch has been turned to off.
	Normal	Circuit is running within the expected operational conditions.
	Evap Press Low	Circuit is running with low evaporator pressure. This could be due to a transitory condition or a lack of refrigerant. Check with the local maintenance if corrective actions are required. Circuit is protected by preventive logic.
	Cond Press High	Circuit is running with high condenser pressure. This could be due to a transitory condition or high ambient temperature or problems with the condenser fans. Check with the local maintenance if corrective actions are required. Circuit will be protected by preventive logic.
	High Amb Limit	Ambient temperature is higher than 46.6°C the unit capacity will be limited to 50% in case of single circuit units.
	Defrost	This circuit is performing a defrost procedure

Circuit Capacity Control

Once a Circuit is started, capacity will be adjusted according to thermostat control requirements. However, there are some limitations which override the capacity control in order to prevent the chiller from abnormal running conditions. These preventions are summarized below:

- Low Evaporating Pressure
- High Condensing Pressure

Low Evaporating Pressure

When the circuit is running and the evaporating pressure drops below the safety limits the circuit control logic reacts at two different levels in order to recover the normal running conditions.

If the evaporating pressure drops below the Low Pressure Hold limit, a new starting of the compressor is inhibited. This condition is indicated on the controller display in the circuit status as “Run: Evap Press Low”. The status is automatically cleared when the evaporating pressure rise above the Low Pressure Hold limit by 20 kPa.

If the evaporating pressure drops below the Low Pressure Unld limit and at least two compressor in the same circuit are on, one compressor is shut down in order to recover the normal operating conditions. This condition is indicated on the controller display in the circuit status as “Run: Evap Press Low”. The status is automatically cleared when the evaporating pressure rise above the Low Pressure Hold limit.

If the evaporating pressure drops below the Low Press Alm limit the related circuit is immediately stopped and a Low Pressure Alarm is generated.

High Condensing Pressure

When the circuit is running and the condensing pressure rises above the safety limits the circuit control logic reacts at two different levels in order to recover the normal running conditions.

If the condensing pressure rises above the High Pressure Unload limit and at least two compressor in the same circuit are on, one compressor is shut down in order to recover the normal operating conditions. This condition is indicated on the controller display in the circuit status as “Run: Cond Press High”. The status is automatically cleared when the condensing pressure falls below the High Pressure Hold limit by 862 kPa.

If the condensing pressure rises above the Hi Press Stop limit the related circuit is immediately stopped and an High Pressure Alarm is generated.

Mode Change-Over

Mode change-over switch is only present on units with the heat pump option. It allows to switch from heat mode to cool mode and vice-versa. Change over should be performed seasonally, following the prescriptions required for this specific activity.

Q8 Switch-box Positoin	Description
COOLING	With the Q8 switch in the Cooling position the unit will operate in Cool mode. Cool setpoints will be used. In case of 4 way valve, the corresponding solenoid valve will be de-energized.
HEATING	With the Q8 switch in the Heating position the unit will operate in Heat mode. Heat setpoints will be used. In case of 4 way valve, the corresponding solenoid valve will be energized.
REMOTE	With the Q8 switch in the Remote position the unit will be commanded by a remote switch. If the switch will remain open the unit will operate in Cool mode. If the switch will close the unit will operate in Heat mode.

When a mode change over will be commanded, the unit will be switched off in order to execute the exchange of the 4 way valve if installed.

Backup Heaters

In predefined circumstances and if enabled, the Unit Controller may decide to enable the additional backup heater contact.

The heater contact has to be connected to an external backup heater inserted into the buffer tank of the customer's water system.

There are several conditions that can enable the heater contact:

- When the unit runs at low ambient temperature it may not be able to satisfy the Heat Setpoint. In this case if all of the following are TRUE:
  - the OAT is lower than the Backup Heater enable temperature,
  - the unit is running at full capacity,
  - the Leaving Water Temperature is lower than the Heat Setpoint – Stage Up dT,
  - If unit is in defrost,
- If there is an alarm active AND the Leaving Water Temperature is lower than the Heat Setpoint – Stage Up dT,

NOTICE

To activate the Backup Heater no Capacity Limitation must be active.

The Backup Heater is then deactivated if any of the following is TRUE:

- the Leaving Water Temperature rises above the Heat Setpoint,
- the Unit Mode is different from Heat,
- A Capacity Limitation become active.

Fan Control

Fan control is used to keep the condenser pressure at a level that guarantee the best operation at any ambient condition both in cool and heat mode.

In cooling mode the fan speed is controlled with a PID regulator in order to maintain the condenser pressure at a stable value. Depending on the ambient temperature fans may not be able to maintain the condenser pressure at the setpoint even while running at the full speed. Maximum fan speed can be lower than 100%, this may depend on the noise class of this unit. In case an high pressure event will activate the maximum fan speed can be forced to full speed also for low noise units in order to prevent high pressure trips.

In heating mode the fan speed is controlled with a PID regulator in order to maintain the evaporator pressure at a stable value. When the ambient temperature is below 15.0°C the fans are forced to run at full speed independently from the evaporator pressure to keep the circuit operation stable and avoid as much as possible defrosts. In heat mode the fans can reach the full speed if needed, no limitation is applied in this case also for low noise units.

EXV Control

As a standard, the unit is equipped with one electronic expansion valve (EXV) per circuit, moved by a stepper motor. The EXV controls the suction superheat in order to optimize evaporator efficiency and avoid at the same time suction of liquid to the compressor.

The controller integrates a PID algorithm which manages the dynamic response of the valve in order to keep a satisfactory quick and stable response to system parameter variations. PID parameters are embedded into the controller and cannot be changed. The EXV has the following operating modes:

- Pre-open
- Start
- Pressure
- Superheat

The parameters mentioned below in italics can be set from the Fan Control menu (see page 33).

When the circuit is required to start, the EXV will go into the Pre-open with a fixed opening *Pre Open %* for a fixed time *Pre Open Time*.

After that, the EXV can change to Start phase, in which it works always with a fixed opening *Start %* and for a fixed time *Start Time*. The compressor will start synchronously with this transition.

Ended the Start phase the EXV switches in Pressure control to maintain the evaporating pressure close to pressure target *Max Op Pressure*.

When the EXV works in pressure mode the transitions to Superheat mode is possible if the following conditions are met:

- SSH < SSH Target + 1.5°C

or

- Pressure control active for plus than 5 minutes

When the EXV works in Superheat mode the control maintains the superheat close to the *Cool SSH target* or *Heat SSH target* depending on the actual operating mode.

The transition from Superheat Control to Pressure Control may happen only if the evaporating pressure increases above the Maximum Operating Pressure (MOP) limit:

- Evap Press > Max Op Press

Whenever the circuit is running, the EXV position is limited between 2% or 98% position.

Any time the circuit is in the Off or starts the shutdown procedure, the EXV shall be in the closed position. In this case additional closing steps are commanded to guarantee a proper recovery of the zero position.

Defrost

When the outside air become colder the circuit can start a defrost procedure. An algorithm is used to determine the presence of ice on the air heat exchanger. The ice accumulation tends to degrade the performances and for this reason a defrost may be needed to remove the ice layer.

Defrost is divided in phases. In each phase a specific status is forced to allow a proper execution of the defrost. First of all the circuit is prepared for the 4 way valve change over to cool mode. To do this smoothly one compressor is switched off and the exv prepared to manage the change over. The 4 way valve is then changed to cool mode position and after a delay the other compressors are also started. The defrost will finish when the discharge pressure reaches a pressure target that has been determined to guarantee a complete deicing of all the coil surface.

NOTICE

Decreasing the Condensing Pressure limit may cause ice accumulation on the coils with degradation of the unit performance. In case of need contact your local Daikin Service reference.

If the Condensing Pressure limit is not reached within the Defrost Timeout limit, the defrost is finished and the circuit changed over back to heat mode.

NOTICE

If during the defrost the circuit cannot reach the final Condensing Pressure limit before the timer expires consider to increase this time limit. In case of doubts contact your local Daikin Service reference.

There are other protections that may stop the defrost before it reaches the Condensing Pressure limit or the timer expires. In particular if the discharge temperature rises above a safety limit value the defrost is finished and the circuit change over back to heat mode.

During the whole period of operation in cool mode the fans will never be started to let the Condensing Pressure reach the limit.

The Defrost will be performed in a sequence of 7 steps:

No.	Phase	Description
1	W	Wait for the defrost interstage timer to expire
2	Pr1	Preparation to 4 Way Valve change-over to Cool Mode
3	4W1	4 Way Valve change-over to Cool Mode execution
4	Df	Defrost
5	Pr2	Preparation to 4 Way Valve change-over to Heat Mode
6	4W2	4 Way Valve change-over to Heat Mode execution
7	WuH	Heating Warm-Up (back to normal operation)

Four-Way Valve (H/P Gas Side Reversal Only)

The four way valve is managed by each circuit to follow the active unit mode. To guarantee a proper handling of this device the four way valve can only be commanded with a minimum delta pressure. This statement implies that the four way valve command can be given only when a compressor is running.

Alarms

The Unit Controller protects the unit and the components from operating in abnormal conditions. Protections can be divided into preventions and alarms. Alarms can then be divided into pump-down and rapid stop alarms. Pump-down alarms are activated when the system or sub-system can perform a normal shutdown in spite of the abnormal running conditions. Rapid stop alarms are activated when the abnormal running conditions require an immediate stop of the whole system or sub-system to prevent potential damages.

The Unit Controller displays the active alarms in a dedicated page and keep an history of the last 50 entries divided between alarms and acknowledges occurred. Time and date for each alarm event and of each alarm acknowledge are stored.

The Unit Controller also stores alarm snapshot of each alarm occurred. Each item contains a snapshot of the running conditions right before the alarm has occurred. Different sets of snapshots are programmed corresponding to unit alarms and circuit alarms holding different information to help the failure diagnosis.

Unit Warning Alarms

External Event

This alarm indicate that a device, whose operation is linked with this machine, is reporting a problem. This alarm can occur only if the parameter *External Alarm* is set as *Event*.

Symptom	Cause	Solution
Unit status is Run. Bell icon is moving on controller's display. Led on the button 2 of External HMI is blinking String in the alarm list: + Unit External Event String in the alarm log: ± Unit External Event String in the alarm snapshot: Unit External Event	There is an external event that has caused the opening, for at least 5 seconds, of the digital input on the option module POL965 with address 18.	Check for reasons of external event and if it can be a potential problem for a correct chiller operation.

Bad LWT Reset Input Signal

This alarm can occur only when the function Lwt Reset is enabled. It indicates that the Lwt Reset signal input is out of admissible range.

Symptom	Cause	Solution
Unit status is Run. Bell icon is moving on controller's display. Led on the button 2 of External HMI is blinking String in the alarm list: + BadSetPtOverrideInput String in the alarm log: ± BadSetPtOverrideInput String in the alarm snapshot: BadSetPtOverrideInput	Lwt Reset input signal is out of the admissible range that is [3 - 21] mA	Check the electrical connection of the Lwt Reset signal. Check the device that produces the Lwt Reset signal.

Bad Demand Limit Input Signal

This alarm can occur only when the function Demand Limit is enabled. It indicates that the Demand Limit signal input is out of admissible range.

Symptom	Cause	Solution
Unit status is Run. Bell icon is moving on controller's display. Led on the button 2 of External HMI is blinking String in the alarm list: + BadDemandLimitInput String in the alarm log: ± BadDemandLimitInput String in the alarm snapshot: BadDemandLimitInput	Demand Limit input signal is out of the admissible range that is [3 - 21] mA	Check the electrical connection of the demand limit signal. Check the device that produces the demand limit signal

Heat Recovery Entering Water Temperature (HREWT) Sensor Fault

This alarm is generated any time the input resistance is out of an acceptable range.

Symptom	Cause	Solution
Unit status is Off. All circuits are stopped with a normal shutdown procedure. Bell icon is moving on controller's display. Led on the button 2 of External HMI is blinking String in the alarm list: +UnitAlHREwtSen String in the alarm log: ± UnitAlHREwtSen String in the alarm snapshot: UnitAlHREwtSen	Sensor is broken.	Check for sensor integrity.
		Check correct sensors operation according with information about kOhm (kΩ) range related to temperature values.
	Sensor is shorted.	Check if sensor is shorted with a resistance measurement.
	Sensor is not properly connected (open).	Check for absence of water or humidity on electrical contacts.
		Check for correct plug-in of the electrical connectors on the Unit Controller.
		Check for correct sensors wiring according with wiring diagram.

Heat Recovery Leaving Water Temperature (HRLWT) Sensor Fault

This alarm is generated any time the input resistance is out of an acceptable range.

Symptom	Cause	Solution
Unit status is Off. All circuits are stopped with a normal shutdown procedure. Bell icon is moving on controller's display. Led on the button 2 of External HMI is blinking String in the alarm list: +UnitAlHRLwtSen String in the alarm log: ± UnitAlHRLwtSen String in the alarm snapshot: UnitAlHRLwtSen	Sensor is broken.	Check for sensor integrity.
		Check correct sensors operation according with information about kOhm (kΩ) range related to temperature values.
	Sensor is shorted.	Check if sensor is shorted with a resistance measurement.
	Sensor is not properly connected (open).	Check for absence of water or humidity on electrical contacts.
		Check for correct plug-in of the electrical connectors on the Unit Controller.
		Check for correct sensors wiring according with wiring diagram.

Unit Pumpdown Stop Alarms

The following alarms will stop the unit commanding a pumpdown on all running circuits. The unit will not run again until the root-cause of the alarm is not fixed.

Evaporator Entering Water Temperature (EEWT) Sensor Fault

This alarm is generated any time the input resistance is out of an acceptable range.

Symptom	Cause	Solution
Unit status is Off. All circuits are stopped with a normal shut-down procedure. Bell icon is moving on controller's display. Led on the button 2 of External HMI is blinking String in the alarm list: + EvapEntWTempSen String in the alarm log: ± EvapEntWTempSen String in the alarm snapshot: EvapEntWTempSen	Sensor is broken.	Check for sensor integrity.
		Check correct sensors operation according with information about kOhm (kΩ) range related to temperature values.
	Sensor is shorted.	Check if sensor is shorted with a resistance measurement.
	Sensor is not properly connected (open).	Check for absence of water or humidity on electrical contacts.
		Check for correct plug-in of the electrical connectors on the Unit Controller.
		Check for correct sensors wiring according with wiring diagram.

Evaporator Leaving Water Temperature (ELWT) Sensor Fault

This alarm is generated any time the input resistance is out of an acceptable range.

Symptom	Cause	Solution
Unit status is Off. All circuits are stopped with a normal shut-down procedure. Bell icon is moving on controller's display. Led on the button 2 of External HMI is blinking String in the alarm list: +UnitOff EvpLvgW-TempSen String in the alarm log: ±UnitOff EvpLvgW-TempSen String in the alarm snapshot: UnitOff EvapLvgW-Temp Sen	Sensor is broken.	Check for sensor integrity.
		Check correct sensors operation according with information about kOhm (kΩ) range related to temperature values.
	Sensor is shorted.	Check if sensor is shorted with a resistance measurement.
	Sensor is not properly connected (open).	Check for absence of water or humidity on electrical contacts.
		Check for correct plug-in of the electrical connectors on the Unit Controller.
		Check for correct sensors wiring according with wiring diagram.

Outside Air Temperature (OAT) Sensor Fault

This alarm is generated any time the input resistance is out of an acceptable range.

Symptom	Cause	Solution
Unit status is Off. All circuits are stopped with a normal shutdown procedure. Bell icon is moving on controller's display. Led on the button 2 of External HMI is blinking String in the alarm list: +UnitOff AmbTempSen String in the alarm log: ±UnitOff AmbTempSen String in the alarm snapshot: UnitOff AmbTemp Sen	Sensor is broken.	Check for sensor integrity.
		Check correct sensors operation according with information about kOhm (kΩ) range related to temperature values.
	Sensor is shorted.	Check if sensor is shorted with a resistance measurement.
	Sensor is not properly connected (open).	Check for absence of water or humidity on electrical contacts.
		Check for correct plug-in of the electrical connectors on the Unit Controller.
		Check for correct sensors wiring according with wiring diagram.

Unit Rapid Stop Alarms

The unit is immediately stopped. All the running circuits will stop rapidly without performing the normal shutdown procedure.

Options controller communication fail alarm

This alarm is generated in case of communication problems with the module for optional functions. POL965 with address 18. This alarm can occur only if the at least one of the optional functions is enabled (PVM, External Alarm, Demand Limit, LWT Reset.

Symptom	Cause	Solution
Unit status is Off. All circuits are stopped immediately. Bell icon is moving on controller's display. Led on the button 2 of External HMI is blinking String in the alarm list: +Unit Off OptCtrlrCom-Fail String in the alarm log: ±Unit Off OptCtrlrCom-Fail String in the alarm snapshot: Unit Off OptCtrlrComFail	Module has no power supply	Check the power supply from the connector on the side of the module.
		Check if LEDs are both green.
		Check if the connector on the side is tightly inserted in the module
	Module address is not properly set	Check if module's address is correct referring to the wiring diagram.
	Module is broken	Check if LED are on and both green. If BSP LED is solid red replace the module
		Check if power supply is ok but LEDs are both off. In this case replace the module

Phase Voltage Monitor Alarm

NOTICE

Resolution of this fault requires a direct intervention on the power supply of this unit.

Direct intervention on the power supply can cause electrocution, burns or even death. This action must be performed only by trained persons. In case of doubts contact your maintenance company.

This alarm is generated in case of problems with the power supply to the chiller. This alarm can occur only if the PVM is enabled.

Symptom	Cause	Solution
Unit status is Off. All circuits are stopped immediately. Bell icon is moving on controller's display. Led on the button 2 of External HMI is blinking String in the alarm list: +UnitOff PvmGfp String in the alarm log: ± UnitOff PvmGfp String in the alarm snapshot: UnitOff PvmGfp	Loss of one phase.	Check voltage level on each of the phases.
	Not correct sequence connection of L1,L2,L3.	Check sequence of L1, L2, L3 connections according indication on chiller's electrical scheme.
	Voltage level on the unit's panel is not in the allowed range (±10%).	Check that voltage level on each phases is into the allowed range that is indicated on the chiller label. It is important to check the voltage level on each phases not only with chiller not running, but mainly with chiller running from minimum capacity up to full load capacity. That's because voltage drop can occur from a certain unit cooling capacity level, or because of certain working condition (i.e. high values of OAT); In these cases the issue can be related with the sizing of power cables.
	There is a short-circuit on the unit.	Check for correct electrical isolation condition of each unit's circuit with a Megger tester.

Evaportaor Flow Loss Alarm

This alarm is generated in case of flow loss on the evaporator. This alarm protect the evaporator against:

- Freezing: when unit works as chiller or as heat pump with water inversion
- High Pressure: when unit works as heat pump with gas inversion

Symptom	Cause	Solution
Unit status is Off. All circuits are stopped immediately. Bell icon is moving on controller's display. Led on the button 2 of External HMI is blinking String in the alarm list: +UnitOff EvapWaterFlow String in the alarm log: ± UnitOff EvapWaterFlow String in the alarm snapshot: UnitOff EvapWaterFlow	No evaporator water flow sensed or water flow too low.	Check the evaporator water pump filler and the water circuit for obstructions.
		Check the evaporator flow switch calibration and adapt to minimum water flow.
		Check if evaporator pump impeller can rotate freely and it has no damages.
		Check evaporator pumps protection devices (circuit breakers, fuses, inverters, etc.)
		Check evaporator flow switch connections.

Evaporator Water Freeze Protect Alarm

This alarm is generated to indicate that the evaporator (entering or leaving) water temperature has dropped below a safety limit.

Symptom	Cause	Solution
Unit status is Off. All circuits are stopped immediately. Bell icon is moving on controller's display. String in the alarm list: +UnitOff EvpWaterTempLo String in the alarm log: ± UnitOff EvpWaterTempLo String in the alarm snapshot: UnitOff EvpWaterTempLo	Water flow too low.	Increase the water flow.
	Inlet temperature to the evaporator is too low.	Increase the inlet water temperature.
	Flow switch is not working or no water flow.	Check the flow switch and the water pump.
	Refrigerant temperature become too low (< -0.6°C).	Check the water flow and filter. No good heat exchange conditions into the evaporator.
	Sensors temperature readings (entering or leaving) are not properly calibrated	Check the water temperatures with a proper instrument and adjust the sensor offsets

External Alarm

This alarm is generated to indicate that an external device whose operation is linked with this unit operation. This alarm can occur only if the parameter *External Alarm* is set to *Alarm*.

Symptom	Cause	Solution
Unit status is Off. All circuits are stopped immediately. Bell icon is moving on controller's display. Led on the button 2 of External HMI is blinking String in the alarm list: UnitOff ExternalAlarm String in the alarm log: ± UnitOff ExternalAlarm String in the alarm snapshot: UnitOff External Alarm	There is an external alarm that has caused the opening, for at least 5 seconds, of the port on the option module POL965 with address 18.	Check causes of the external alarm.
		Check electrical wiring from unit controller to the external equipment in case of any external events or alarms have been occurred.

Circuit Event

Evaporator Pump #1 Failure

This event is generated if the pump is started but the flow switch is not able to close within the recirculate time. This can be a temporary condition or may be due to a broken flowswitch, the activation of circuit breakers, fuses or to a pump breakdown.

Symptom	Cause	Solution
Unit could be ON. Bell icon is moving on controller's display. Backup pump is used or stop of all circuits in case of pump #2 failure. String in the event list: EvapPump1Fault String in the event log: ± EvapPump1Fault String in the snapshot EvapPump1Fault	Pump #1 may not be operating.	Check for problem in electrical wiring of the pump #1.
		Check that electrical breaker of pump #1 is tripped.
		If fuses are used to protect the pump, check the integrity of fuses.
		Check for problem in wiring connection between pump starter and unit controller.
		Check the water pump filter and the water circuit for obstructions.
	Flow Switch doesn't operate properly	Check flow switch connection and calibration.

Evaporator Pump #2 Failure

This event is generated if the pump is started but the flow switch is not able to close within the recirculate time. This can be a temporary condition or may be due to a broken flowswitch, the activation of circuit breakers, fuses or to a pump breakdown.

Symptom	Cause	Solution
Unit could be ON. Backup pump is used or stop of all circuits in case of pump #2 failure. String in the event list: EvapPump2Fault String in the event log: ± EvapPump2Fault String in the snapshot EvapPump2Fault	Pump #2 may not be operating.	Check for problem in electrical wiring of the pump #2.
		Check that electrical breaker of pump #2 is tripped.
		If fuses are used to protect the pump, check the integrity of fuses.
		Check for problem in wiring connection between pump starter and unit controller.
		Check the water pump filter and the water circuit for obstructions.
	Flow Switch doesn't operate properly	Check flow switch connection and calibration.

EXV Driver Extension Communication Error

This event is generated in case of communication problems with the EEXV module.

Symptom	Cause	Solution
Unit status is Off. All circuits are stopped immediately. String in the event list: EXV1 DriverFailure String in the event log: ± EXV1 DriverFailure String in the snapshot EXV1 DriverFailure	Module has no power supply.	Check the power supply from the connector on the side of the module.
		Check if LEDs are both green.
		Check if the connector on the side is tightly inserted in the module
	Module address is not properly set	Check if module's address is correct referring to the wiring diagram.
	Module is broken.	Check if LED are on and both green. If BSP LED is solid red replace the module
		Check if power supply is ok but LEDs are both off. In this case replace the module.

Low Outside Ambient Temperature at Start Alarm

This event can occur only if the condenser less unit type is configured or if the unit is A/C. It indicates that the circuit is starting with low outside ambient temperature.

Symptom	Cause	Solution
Circuit status is Off. The circuit is stopped. Led on the button 2 of External HMI is blinking String in the event list: +StartInhbAmbTempLo String in the event log: ± StartInhbAmbTempLo String in the snapshot: StartInhbAmbTempLo	Low outside ambient temperature.	Check the operating condition of the condenser-less unit.
	Refrigerant charge low.	Check sight glass on liquid line to see if there is flash gas.
		Measure sub-cooling to see if the refrigerant charge is correct.

Low Evaporator Pressure Hold

This event is generated to indicate that the circuit is inhibited to load; for this reason, no compressor is turned off or on.

Symptom	Cause	Solution
The Circuit reduces its capacity if the EvapPr < Evap-PressHold. Inhibit loading. String in the event list: Cx InhbtLoadEvpPr String in the event log: ± Cx InhbtLoad-EvpPr String in the snap-shot Cx InhbtLoadEvpPr	The circuit is working near at the end of compressor envelope.	Check if the EXV is working well.
		Check the working conditions, if the unit is working inside the unit envelope, and if the expansion valve is working well.
	The outside air temperature is low (in heat mode).	Check if the unit is working correctly inside the unit en-velope.
		The Circuit is near the Defrost request.
	The leaving water temperature is low (Cool Mode)	Check if the unit is working correctly inside the unit en-velope.

Low Evaporator Pressure Unload

This event is generated to indicate that the circuit partialized, shutting down a compressor, due to the low value of Evaporator pressure detected. This is important for compressor reliability.

Symptom	Cause	Solution
The Circuit reduces its capacity if the EvapPr < Evap-PressUnload. If only one compres-sor is running, the circuit will maintain its capacity. Otherwise, the circuit will shut down one compressor each X sec, till the evaporator pressure increase. String in the event list: Cx UnloadEvap-Press String in the event log: ± Cx UnloadEvap-Press String in the snap-shot Cx UnloadEvap-Press	The circuit is working near at the end of compressor envelope.	Check if the EXV is working well.
		Check the working conditions, if the unit is working inside the unit envelope, and if the expansion valve is working well.
	The outside air temperature is low (in heat mode).	Check if the unit is working correctly inside the unit en-velope.
		The Circuit is near the Defrost request.
	The leaving water temperature is low (Cool Mode)	Check if the unit is working correctly inside the unit en-velope.

High Condenser Pressure Unload

This event is generated to indicate that the circuit partialized, shutting down a compressor, due to the high value of Condensing pressure detected. This is important for compressor reliability.

Symptom	Cause	Solution
The Circuit reduces its capacity if the CondPr > CondPressUnload. If only one compressor is running, the circuit will maintain its capacity. Otherwise, the circuit will shut down one com-pressor each X sec, till the condenser pressure decrease. String in the event list: Cx UnloadCondPress String in the event log: ± Cx UnloadCondPress String in the snapshot Cx UnloadCondPress	The circuit is working outside the compressor envelope.	Check for ice on evaporator (Heat mode).
		Check the working conditions, if the unit is working inside the unit envelope, and if the expansion valve is working well.
	The outside air temperature is high (in cool mode).	Check the correct functioning of the fans (in cool mode).
	The leaving water tempera-ture is too high (Heat Mode)	Check if the unit is working correctly inside the unit en-velope.

Circuit Warning Alarms

The following alarms will stop the circuit immediately but will allow the circuit to restart when the anti-recycle timers are expired.

Failed Pumpdown

This alarm is generated to indicate that the circuit hadn't been able to remove all the refrigerant from the evaporator.

Symptom	Cause	Solution
Circuit status is Off. Led on the button 2 of External HMI is blinking String in the alarm list: +Cx FailedPump-down String in the alarm log: ± Cx FailedPump-down String in the alarm snapshot: Cx FailedPump-down	EEXV is not closing completely, therefore there's "short-cir-cuit" between high pressure side with low pressure side of the circuit.	Check for proper op-eration and full closing position of EEXV. Sight glass should not show refrigerant flow after the valve is closed.
		Check that the C-LED on the EXV driver is solid green. If both LEDs on the EXV driver are blinking alternately the valve motor is not properly connected.
	Evaporating pres-sure sensor is not working properly.	Check for proper op-eration of evaporating pressure sensor.
	Compressor on circuit is internally damaged with a mechanical prob-lems for example on internal check-valve, or on internal spirals or vanes.	Check compressors on circuits.

Failed Pumpdown in High Pressure

This alarm is generated to indicate that the circuit hadn't been able to remove all the refrigerant from the evaporator before getting too close to the High-Pressure alarm limit. In this case the pumpdown is finished before the pumpdown pressure target is reached.

Symptom	Cause	Solution
Circuit status is Off. Led on the button 2 of External HMI is blinking String in the alarm list: +Cx FailedPumpdown-HiPr String in the alarm log: ± Cx FailedPumpdown-HiPr String in the alarm snap-shot: Cx FailedPumpdownHiPr	Excessive refrigerant charge	Verify the refrigerant charge by checking the subcooling

Circuit Pumdown Stop Alarms

The circuit is stopped with the normal pumpdown procedure. It will not be allowed to start again until the root-cause of the alarm is fixed.

Suction Temperature Sensor Fault

This alarm is generated to indicate that the sensor is not reading properly.

Symptom	Cause	Solution
Circuit status is Off. The circuit is switched off with the normal shut-down procedure. Bell icon is moving on controller's display. String in the alarm list: +CxOff SuctTempSen String in the alarm log: ± CxOff SuctTempSen String in the alarm snapshot: CxOff SuctTemp Sen	Sensor is shorted.	Check for sensor integrity.
		Check correct sensors operation according information about kOhm (kΩ) range related to temperature values.
	Sensor is broken.	Check if sensor is shorted with a resistance measurement.
	Sensor is not good connected (open).	Check for correct installation of the sensor on refrigerant circuit pipe.
		Check for absence of water or humidity on sensor electrical contacts.
		Check for correct plug-in of the electrical connectors.
		Check for correct sensors wiring also according with electrical scheme.

Discharge Temperature Sensor Fault

This alarm is generated to indicate that the sensor is not reading properly.

Symptom	Cause	Solution
Circuit status is Off. The circuit is switched off with the normal shut-down procedure. Bell icon is moving on controller's display. String in the alarm list: +CxOff DischTempSen String in the alarm log: ± CxOff DischTempSen String in the alarm snapshot: CxOff DischTemp Sen	Sensor is shorted.	Check for sensor integrity.
		Check correct sensors operation according information about kOhm (kΩ) range related to temperature values.
	Sensor is broken.	Check if sensor is shorted with a resistance measurement.
	Sensor is not good connected (open).	Check for correct installation of the sensor on refrigerant circuit pipe.
		Check for absence of water or humidity on sensor electrical contacts.
		Check for correct plug-in of the electrical connectors.
		Check for correct sensors wiring also according with electrical scheme.

Circuit Rapid Stop Alarms

The circuit is immediately stopped to prevent damages to the components. The circuit will not be allowed to run again until the root-cause of the alarm is fixed.

EXV Drive Circuit Communication Fail Alarm

Symptom	Cause	Solution
Unit status is Auto. The circuit is stopped immediately. Bell icon is moving on controller's display. Led on the button 2 of External HMI is blinking String in the alarm list: +C*Off EXVCtrlrComFail String in the alarm log: ± C*Off EXVCtrlrCom-Fail String in the alarm snapshot: C*Off EXVCtrlrComFail	Module has no power supply	Check the power supply from the connector on the side of the module.
		Check if LEDs are both green.
		Check if the connector on the side is tightly inserted in the module
	Module address is not properly set	Check if module's address is correct referring to the wiring diagram.
	Module is broken	Check if LED are on and both green. If BSP LED is solid red replace the module
		Check if power supply is ok but LEDs are both off. In this case replace the module

* refers to either driver #1 or driver #2

Low Pressure Alarm

This alarm is generated if the evaporating pressure drops below the Low-Pressure Unload and the control is not able to compensate this condition.

Symptom	Cause	Solution
Circuit status is Off. The compressor does not load anymore or even unload, circuit is stopped immediately. Bell icon is moving on controller's display. Led on the button 2 of External HMI is blinking String in the alarm list: +Cx Off EvapPressLo String in the alarm log: ± Cx Off EvapPressLo String in the alarm snapshot: Cx Off EvapPress Lo	Refrigerant charge is low.	Check sight glass on liquid line to see if there is flash gas.
		Measure sub-cooling to see if the refrigerant charge is correct.
	Protection limit not set to fit customer application.	Check the evaporator approach and the corresponding water temperature setpoint to evaluate the low pressure hold limit.
	High Evaporator Approach.	Clean the evaporator
		Check the quality of the fluid that flows into heat exchanger.
		Check the glycol percentage and type (ethilenic or propilenic)
	Evaporating pressure transducer is not working properly.	Check the sensor for proper operation and calibrate the readings with a gauge.
	EEXV is not working correctly. It's not opening enough or it's moving in the opposite direction.	Check if pump-down can be finished for pressure limit reached.
		Check valve movements.
		Check connection to the valve driver on the wiring diagram.
		Measure the resistance of each winding, it has to be different from 0 Ohm.
	Water temperature is low	Increase inlet water temperature.
	Default alarm limit not valid for the specific plant	Adjust the low pressure alarm settings.
	Fans do not operate properly	Check Fans operation. Check that all the fans can run freely and at the proper speed.
		Check the phase cut device.

High Pressure Alarm

This alarm is generated if the condensing pressure rise above the Hi Press Stop limit.

Symptom	Cause	Solution
	Condenser water flow too low.	Check the minimum water flow admitted
	Excessive charge of refrigerant into the unit.	Check liquid sub-cooling and suction super-heat to control indirectly the correct charge of refrigerant. If necessary recover all the refrigerant to weight the entire charge and to control if the value is in line with kg indication on unit label.
	Condensing pressure transducer could not operate properly.	Check for proper operation of the high pressure sensor.
	Fans do not operate properly	Check Fans operation. Check that all the fans can run freely and at the proper speed.
		Check the phase cut device.

Low Delta Pressure Alarm

This alarm is generated if the pressure difference between condensing and evaporating pressure is below a minimum Delta Pressure limit for more than 10 minutes.

Symptom	Cause	Solution
Circuit status is Off. The compressor does not load anymore or even unload, circuit is stopped. Bell icon is moving on controller's display. Led on the button 2 of External HMI is blinking String in the alarm list: +CxOff DeltaPressLo String in the alarm log: ± CxOff DeltaPressLo String in the alarm snapshot: CxOff CxOff DeltaPressLo	Compressors are not running	Check the starter signals to compressors.
		Check if the Thermal protection of compressors is properly connected to the Unit Controller.
		Check if the Mechanical High Pressure Switch is properly connected to the Unit Controller
	Condenser Pressure Transducer is not working properly	
	Evaporator Pressure Transducer is not working properly	

Circuit X Alarm

This alarm is generated when the digital input DI1 on the EXV driver of the related circuit is open. This digital input collects a series of alarm signals coming from different protection devices:

1. Mechanical High-Pressure Switch
2. Compressor 1 Circuit X Thermal Protection/Soft Starter Failure
3. Compressor 2 Circuit X Thermal Protection/Soft Starter Failure
4. Phase cut device failure

This means that this alarm is generated if at least one of the previous digital contact is open. When this happens an immediate shutdown of the compressors and all the other actuators in this circuit is commanded.

Symptom	Cause	Solution
Circuit status is Off. The compressor does not load anymore or even unload, circuit is stopped. Bell icon is moving on controller's display. Led on the button 2 of External HMI is blinking String in the alarm list: +CxOff CircAlm String in the alarm log: ± CxOff CircAlm String in the alarm snapshot: CxOff Circ Alm	Mechanical High-Pressure Switch (MHPS) open	Perform High Pressure Alarm check
		MHPS damaged or not calibrated. Check for correct plug-in of the electrical connectors.
		Check for proper operation of the high-pressure switch.
	Compressor 1/2 Thermal Protection open	Excessive charge of refrigerant. Check liquid sub-cooling and suction super-heat to control indirectly the correct charge of refrigerant
		Check the correct operation of the electronic expansion valve. Blocked valve can impede the correct refrigerant flow.
	Compressor 1/2 Soft Starter Failure	Check Alarm code on the Soft Starter and refer to the related documentation to fix the alarm.
		Check the size of the Soft Starter compared with the associated compressor maximum current.

Restart Fault Alarm

This alarm can occur only if the condenser less unit type is configured. This alarm is generated if for three times the Unit Controller recognizes a low evaporating pressure and a low saturated condensing temperature at the starting of the circuit.

Symptom	Cause	Solution
Circuit status is Off. The circuit is stopped. Bell icon is moving on controller's display. Led on the button 2 of External HMI is blinking String in the alarm list: +Cx Off RestrtsFaultAlm String in the alarm log: ± Cx Off Restrts-FaultAlm String in the alarm snapshot: Cx Off RestrtsFault Alm	Low outside ambient temperature	Low outside ambient temperature
	Refrigerant charge low.	Check sight glass on liquid line to see if there is flash gas.
		Measure sub-cooling to see if the refrigerant charge is correct.
	Evaporator or condensing sensor pressure broken or not correctly installed	Check the proper operation of the pressure transducers.

No Pressure Change at Start Alarm

This alarm indicates that the compressor is not able to start or it is not able to create a minimum variation of the evaporating or condensing pressures after start.

Symptom	Cause	Solution
Circuit status is Off. The circuit is stopped. Bell icon is moving on controller's display. Led on the button 2 of External HMI is blinking String in the alarm list: +Cx Off NoPressChg-StartAlm String in the alarm log: ± Cx Off NoPressChg-StartAlm String in the alarm snapshot: Cx Off NoPressChgStart Alm	Compressor cannot start	Check if the start signal is properly connected to the compressor.
	Compressor is turning in wrong direction.	Check correct phases sequence to the compressor (L1, L2, L3) according to the electrical scheme.
	Refrigerant circuit is empty of refrigerant.	Check circuit pressure and presence of refrigerant.
	Not proper operation of evaporating or condensing pressure transducers.	Check proper operation of evaporating or condensing pressure transducers.

Evaporating Pressure Sensor Fault

This alarm indicates that the evaporating pressure transducer is not operating properly.

Symptom	Cause	Solution
Circuit status is Off. The circuit is stopped. Bell icon is moving on controller's display. Led on the button 2 of External HMI is blinking String in the alarm list: +CxOff EvapPressSen String in the alarm log: ± CxOff EvapPressSen String in the alarm snapshot: Cx Off EvapPress Sen	Sensor is broken.	Check for sensor integrity.
		Check correct sensors operation according information about mVolt (mV) range related to pressure values in kPa..
	Sensor is shorted.	Check if sensor is shorted with a resistance measurement.
	Sensor is not properly connected (open).	Check for correct installation of the sensor on refrigerant circuit pipe. The transducer must be able to sense the pressure through the valve's needle.
		Check for absence of water or humidity on sensor electrical contacts.
		Check for correct plug-in of the electrical connectors.
		Check for correct sensors wiring also according electrical scheme.

Condenser Pressure Sensor Fault

This alarm indicates that the condensing pressure transducer is not operating properly.

Symptom	Cause	Solution
Circuit status is Off. The circuit is stopped. Bell icon is moving on controller's display. Led on the button 2 of External HMI is blinking String in the alarm list: +CxOff CndPressSen String in the alarm log: ± CxOff CndPressSen String in the alarm snapshot: Cx Off CondPress Sen	Sensor is broken.	Check for sensor integrity.
		Check correct sensors operation according information about mVolt (mV) range related to pressure values in kPa.
	Sensor is shorted.	Check if sensor is shorted with a resistance measurement.
	Sensor is not properly connected (open).	Check for correct installation of the sensor on refrigerant circuit pipe. The transducer must be able to sense the pressure through the valve's needle.
		Check for absence of water or humidity on sensor electrical contacts.
		Check for correct plug-in of the electrical connectors.
		Check for correct sensors wiring also according electrical scheme.

High Discharge Temperature Alarm

This alarm indicates that the temperature at the discharge port of the compressor exceeded a maximum limit which may cause damages to the mechanical parts of the compressor.

⚠ WARNING

When this alarm occurs compressor's crankcase and discharge pipes may become very hot. Be careful when getting in contact with the compressor and discharge pipes in this condition. Failure to do so may result in injury.

Symptom	Cause	Solution
Discharge Temperature > High Discharge Temperature alarm value. Alarm cannot trigger if discharge temperature sensor fault is active. Bell icon is moving on controller's display. String in the alarm list: CxOff DischTmpHi String in the alarm log: ± CxOff DischTmpHi String in the alarm snapshot CxOff DischTmpHi	The circuit is working outside the compressor envelope.	Check the working conditions, if the unit is working inside the unit envelope, and if the expansion valve is working well.
	One of the compressors is damaged.	Check if the compressors are working properly, in normal conditions and without noises.
		Check for proper operation of the discharge temperature.
	Discharge temperature sensor could not operate properly.	Check for proper operation of the discharge temperature.

Maintenance

Planned Maintenance

The periodical maintenance activities (minimum), are listed in the specific table of this manual.

Table 20: Maintenance Schedule

List of Activities	Weekly	Monthly (Note 1)	Annually / Seasonally (Note 2)
General:			
Collecting operational data (Note 3)	X		
Visual inspection of machine for any damage and/or loosening		X	
Verification of thermal insulation integrity			X
Clean and paint where necessary (Note 4)			X
Water analysis			X
Check flow switch operation		X	
Electronics:			
Check start-up sequence			X
Check wear on contacts – Replace if necessary			X
Check the that all electrical terminals are tight – Tighten if necessary			X
Clean the inside of the electrical panel (Note 4)		X	
Clean the ventilation filters on the electrical panel (Note 4)		X	
Visual inspection of components for any signs of overheating		X	
Check operation of compressor and electrical resistance		X	
Use a Megger to test the insulation of the compressor motor			X
Refrigerant circuit:			
Carry out a refrigerant leak test		X	
Check the refrigerant level through the inspection port – level full	X		
Check for a load loss in filter dryer (where present)		X	
Analyze the compressor vibrations			X
Check the safety valve (Note 5)		X	
Heat Exchangers:			
Check that the heat exchangers are clean (Note 6)			X

NOTICE

1) Monthly activities include all weekly ones

2) Annual activities (or start of the season) include all weekly and monthly ones

3) The unit's operating values should be measured on a daily basis for more thorough monitoring

4) If a unit is installed in an "aggressive" environment, this activity should be carried out once a month.

The following are considered "aggressive" environ:

- Environments with a high concentrations of industrial waste gases in the atmosphere:

- Environments near the sea (salty air);

- Environments near the desert with the risk of sandstorms;

- Other aggressive environments.

5) Safety valve:

Check that the cap and seal have not been tampered with.

Check that the safety valve outlet has not been accidentally blocked by foreign objects, rust or ice.

Check the date of manufacture on the safety valve and replace it as required by current national legislative requirements.

6) Clean the water heat exchangers. Particles and fibers can block heat exchangers. An increase in water flow or a drop in thermal efficiency indicates that the heat exchangers are blocked.

Clean the air heat exchanger cooling fins. If a unit is installed in an environment where there is a high concentration of particles in the air, the condenser may need to be cleaned often.

Service And Limited Guarantee

All the units are tested at the factory and guaranteed for a specific period of time.

These units have been developed and constructed according to high quality standards to provide years of problem-free operation. However, it is important to ensure proper and periodical maintenance work carried out in accordance with all the procedures listed in this manual and with good practice of machines maintenance.

We strongly recommend taking a maintenance contract with a service authorized by the manufacturer. The experience and skill of the personnel can ensure efficient operation without problems over time.

NOTICE

The unit must be covered by a suitable maintenance program from the time it is installed and not just from the start-up date.

Keep in mind that operating the unit in an inappropriate manner, beyond its operating limits or not performing proper maintenance according to this manual will void the guarantee.

Observe the following points in particular, in order to comply with the guarantee:

1. The unit cannot function beyond the specified limits

2. Connection to power supply must be done in accordance with UL 1995, CSA C22.1 and ANSI/NFPA No. 70.
3. In the event of electrical problems, the unit must remain switched off until the problem has been solved.
4. Do not disable or cancel the safety devices, whether mechanical, electrical or electronic.
5. The water used for filling the water circuit must be clean and suitably treated. A mechanical filter must be installed at the point closest to the evaporator inlet.
6. Unless specifically agreed at the time of order, the flow of water of the evaporator must never exceed 120% or be below 80% of the nominal capacity and in any case within the limits shown in this manual.

Important Refrigerant Information

NOTICE
The refrigerant system will be charged with fluorinated greenhouse gases. Do not vent gases into the atmosphere.

Refrigerant Type:	R410A
GWP (Global Warming Potential) Value:	2087.5

The amount of refrigerant needed for standard operation is indicated on the unit ID plate.

The actual quantity of refrigerant contained in the unit is listed on a silver plate inside the electrical panel.

Depending on local, state, and national requirements, periodical inspections may be required to check for potential refrigerant leaks.

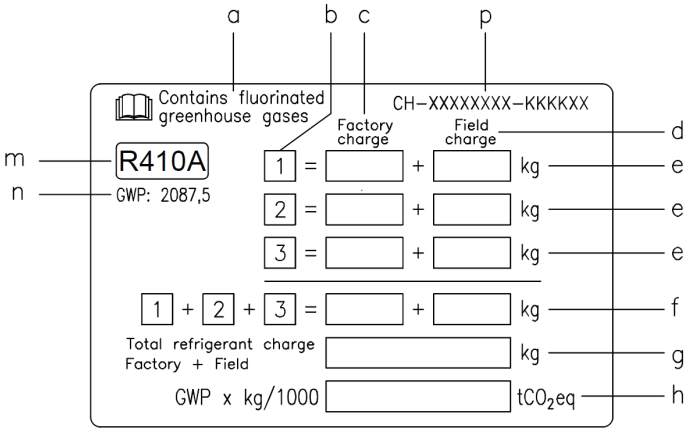
Please contact your local dealer for more information.

Factory and Field Charged Units Instructions

1. Fill in with indelible ink the refrigerant charge label supplied with the product as following instructions:
   - the refrigerant charge for each circuit (1; 2; 3) \
   - the total refrigerant charge (1 + 2 + 3)
   - calculate the greenhouse gas emission with the following formula:

   GWP value of the refrigerant x Total refrigerant charge (in kg) / 1000\

Figure 32: Refrigerant Charge Table



a	Contains fluorinated greenhouse gases
b	Circuit number
c	Factory charge
d	Field charge
e	Refrigerant charge for each circuit (according to the number of circuits)
f	Total refrigerant charge
g	Total refrigerant charge (Factory + Field)
h	Greenhouse gas emission of the total refrigerant charge expressed as tonnes of CO2 equivalent
m	Refrigerant type
n	GWP = Global Warming Potential
p	Unit serial number

2. The filled out label must be adhered inside the electrical panel.

   Periodical inspections for refrigerant leaks may be required depending on local, state, and national legislation. Please contact your local dealer for more information.

Formula to calculate the greenhouse gas emission:

- GWP value of the refrigerant x Total refrigerant charge (in kg) / 1000.
- Use the GWP value mentioned on the greenhouse gases label. This GWP value is based on the 4th IPCC Assessment Report. The GWP value mentioned in the manual might be outdated (i.e. based on the 3rd IPCC Assessment Report)

Unit Disposal

The unit is made of metal, plastic and electronic components. All these components must be disposed of in accordance with relevant current national legislative requirements.

Lead batteries must be collected and sent to specific waste collection centers. Oil must be collected and sent to specific waste collection centers.

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