

INSTALLATION, OPERATION AND MAINTENANCE MANUAL



FW RANGE – Water cooled condensing units
Cooling only – Monosplit – single-phase – R32

FW09Q6 – WQJ102

FW14Q6 – WQJ103

FW18Q6 – WQJ104

FW24Q6 – WQJ105

Le spécialiste de la climatisation sans unité extérieure

1 INTRODUCTION

The present document constitutes the installation, operation and maintenance manual for the following water condensing units (CU):

- FW09Q6 (model code WQJ102).
- FW14Q6 (model code WQJ103).
- FW18Q6 (model code WQJ104).
- FW24Q6 (model code WQJ105).

Read this document carefully. It must be kept for the entire lifespan of the unit and made available to anyone working on the installation.

Installation, maintenance, and any other work must be carried out by a person with the appropriate skills and authorizations. This person must comply with current regulations and best practices for air conditioning installations. The applicable standard in Europe is NF EN378, which specifies safety and environmental requirements.

The manufacturer declines all liability, and the warranty will no longer apply if these installation instructions are not followed. If in doubt or for additional information, please contact your supplier.

The CU must be connected to an indoor unit (IU), which can be a wall-mounted, cassette, ducted, or console/ceiling unit.

2 RECEIPT, STORAGE AND TRANSPORT OF THE PACKAGE

It is important to inspect the condition of the equipment upon receipt of the package. Impact damage can cause operational problems that are not covered by the warranty..



In the event of damage, make specific reservations on the shipping document and immediately send a registered letter to the carrier, clearly stating the damage. Send a copy of this letter to the manufacturer or their representative.

Each GC is delivered with a wall-mounting rail and an envelope containing the installation, use, and maintenance instructions, including the electrical diagram and commissioning sheet. A simplified version of the electrical diagram is affixed to the inside of the GC.

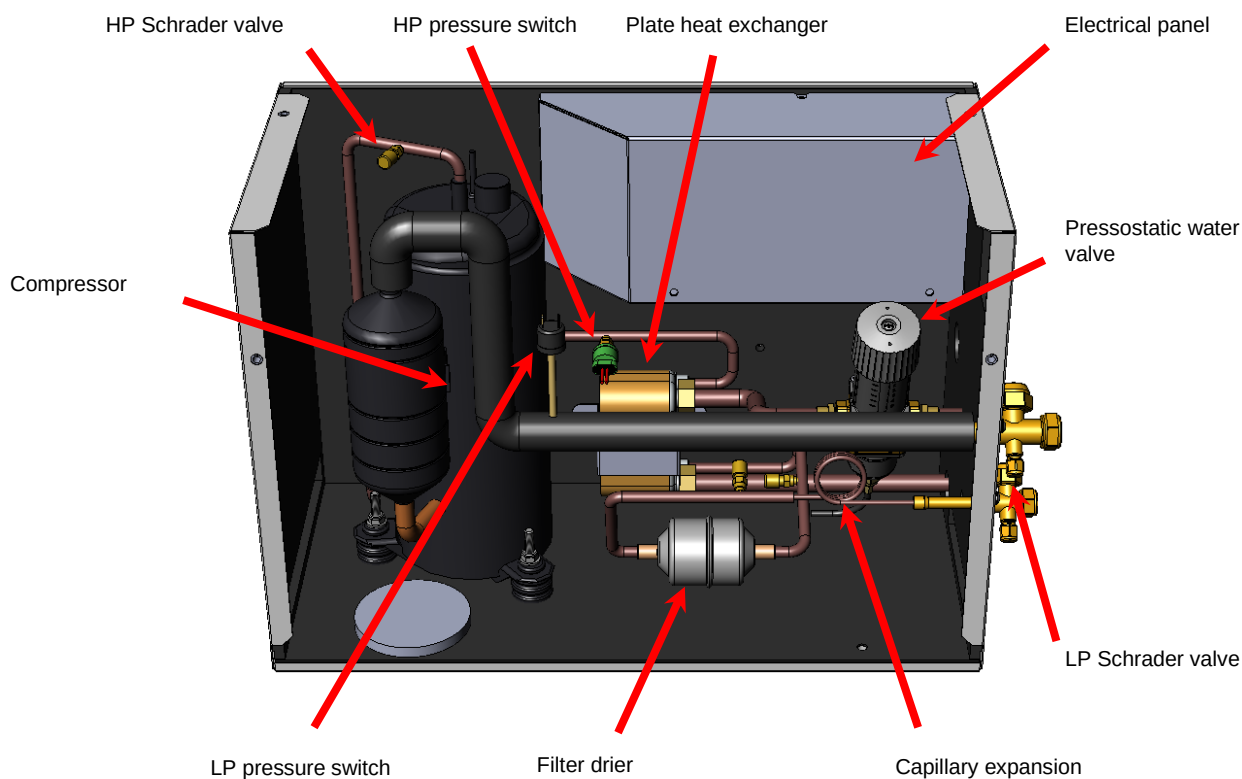
Do not place or transport the unit upside down..

The equipment must be stored indoors, completely protected from rain, snow, etc. Weather fluctuations (high and low temperatures) must not damage the unit. Excessively high temperatures (over 60°C) or excessively low temperatures (below -30°C) can cause permanent damage.

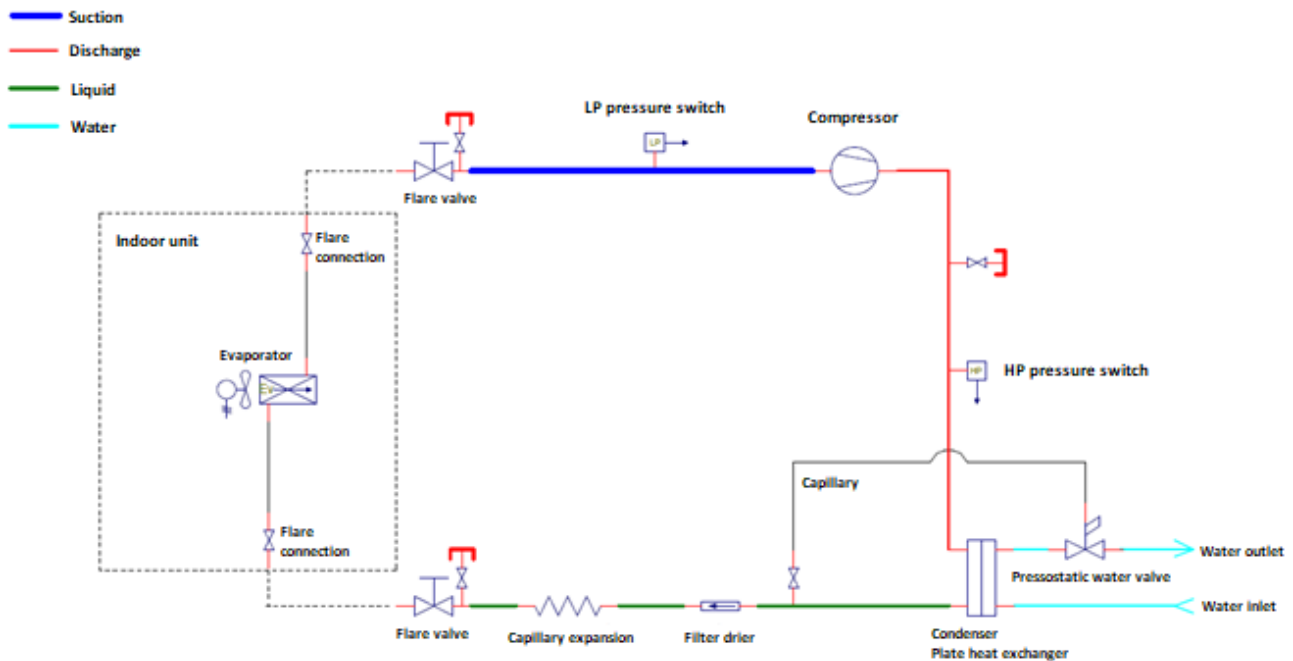
The storage area must be well ventilated, with no continuously operating ignition sources, and a minimum flow rate to the outside of 60 m³/h.

The vehicle transporting the package must be equipped with adequate ventilation and a minimum 2 kg powder fire extinguisher. The reference regulation is the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR).

3 DESCRIPTION OF THE UNIT



4 FLUIDIC DIAGRAM



The refrigerant is R32.

It is classified A2L according to standard NF EN378.

The maximum working pressure (PS) of the high-pressure part of the refrigeration circuit is 38 bar.

The maximum working pressure (PS) of the low-pressure part of the refrigeration circuit is 15 bar.

The minimum operating temperature (TS) is -25°C.

The maximum operating temperature (TS) is +80°C.

The model classification by category is:

- FW09Q6 (model code WQJ102) : category I.
- FW14Q6 (model code WQJ103) : catégorie I.
- FW18Q6 model code WQJ104) : catégorie II.
- FW24Q6 (model code WQJ105) : catégorie II.

The maximum working pressure of the hydraulic circuit is 10 bar.

5 INSTALLATION : CHOICE OF LOCATION

This section explains how to choose the location for the CUs and the connecting pipes to the UI. Regarding the IU, refer to its documentation.

The CU support must be solid. This support must withstand the unit's weight (indicated on the unit's nameplate), but it must also be strong enough to prevent vibrations. For example, it is not recommended to install the CU on a wooden floor.

GCs must not be installed in an environment presenting a fire risk due to flammable gas leaks.

The refrigerant used is R32. It is classified A2L (toxicity class A and flammability class 2L). CUs must therefore be installed in an environment without open flames. The CU should not be installed in a kitchen equipped with a gas stove or a room with a fireplace, for example.

The location must meet three criteria:

1. Respect for service areas.
2. Respect for the minimum volume of the site.
3. Respect for the minimum surface area of the site.

The criteria concerning the minimum volume and minimum surface area to be respected are based on the following classifications :

- Access category: a = general access (see NF EN371-1:2016 paragraph 5.1).
- Site class: I = Mechanical equipment located in the occupied space (see NF EN371-1:2016 paragraph 5.3).

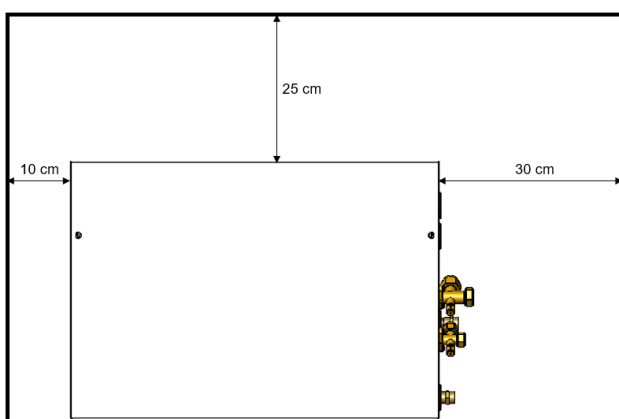
Criterion 1 – Service areas :

Respecting service areas allows for:

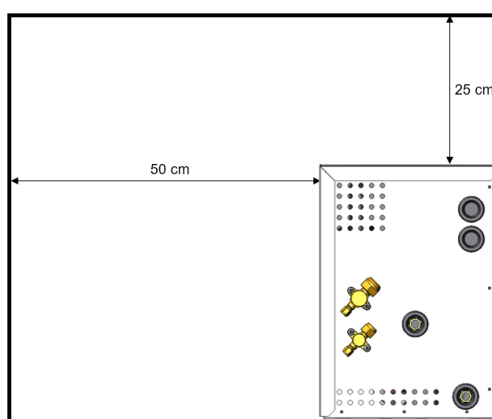
- Easy access to the CU.
- Easy access to flare valves and water connections.
- Allows for removal of the cover.
- Read the nameplate.
- Allows for the installation of accessories (water filter, flow meter valve).
- Allows for proper ventilation of the CU interior via the ventilation grilles.

The service areas to be maintained are as follows:

Front view :



Side view :



The values given for the service areas are the minimum values to be respected.

Criterion 2 - minimum space volume:

The minimum volume is determined according to standard NF EN371-1:2016 Annex C. It is calculated according to the toxicity of the refrigerant: too high a concentration of the refrigerant in the event of a leak presents risks for a person present in the space where the CU is installed.

Where the spaces surrounding the space where the CU is installed are, by construction or design, not airtight (compared to the space where the CU is installed), then they may be considered part of the space where the CU is installed (void spaces above false ceilings, access passages, ducts, movable partitions, doors with grilles or skewed doors).

The minimum volume to be respected for the space where the CU is installed is:

Total load [g]	300	400	500	600	700	800	900	1000	1100	1200	1300
Minimum volume [m ³]	1,0	1,4	1,7	2,0	2,4	2,7	3,0	3,4	3,7	4,0	4.4

The constraint on the minimum volume of the location is determined by the access category (a) and the class of the location (I). According to table C.1 of NF EN371-1:2016 Appendix C, there may no longer be a minimum volume to respect if:

- If the access category is less restrictive (category b, business or professional offices for example).
- If the class of the location is less restrictive (class II, CU in a machine room for example).

Criterion 3 - minimum surface area of the location :

The minimum surface area is determined according to standard NF EN371-1:2016 Annex C. It is based on the flammability of the refrigerant: a too high concentration of refrigerant in the event of a leak in the space where the CU is installed presents risks of flame propagation.

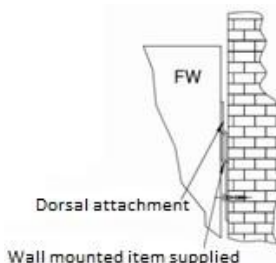


No minimum surface area to be respected because the final load of the installation must be less than 1.8 kg.

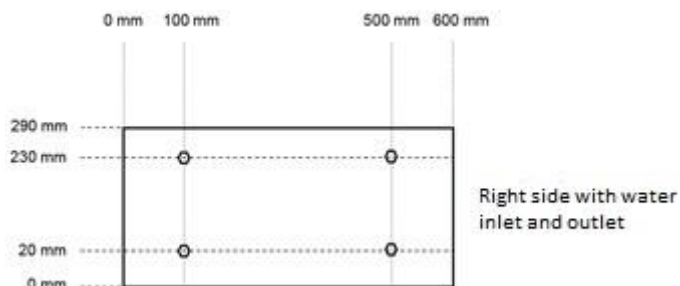
6 INSTALLATION OF THE UNITS

It is possible to install the CU in two ways:

- First possibility: hanging the CU against a wall using its back mounting rail (supplied with the CU):



- Second possibility: installation of the CU (on feet, brackets ...) and fixing the CU on the bottom. four hexagonal M8 inserts are provided for this purpose:



The installation following the second possibility allows for better vibration attenuation..

7 INSTALLATION : FRIGORIFIC CONNECTIONS

All the usual precautions should be taken when setting up the refrigerant connections. In particular, it is necessary to limit the number of bends, to make a 2% gradient on the suction line and to make the necessary oil traps in order to have a good oil circulation. It must also be ensured that the connections are plugged in order to prevent any impurity or moisture penetration during the installation.

The installation of refrigeration connections must comply with standard NF EN 378.

As a reminder, the volume and floor area of the rooms through which the refrigeration connections pass must comply with the minimum values for volumes and areas as indicated in the paragraph "installation – choice of location".

The maximum distance between the CU and the IU is 20 linear meters and the maximum height difference is 5 m. The length of the liquid line as that of the suction line should not exceed 20 meters.

The IUs do not all have the same connection diameter as the CU for the suction line or for the liquid line. You must then install the adaptations at the IU level. **These are delivered in a separate cardboard package.**

The creation of the flares for the connection on the flare fittings must be careful. The presence of a burr, crack, too small or too large a flare surface can cause leakage.



Flared valves must be kept closed during connection.

The tightening torques for the flare nuts are:

Diameter ["]	1/4	3/8	1/2	5/8	3/4
Torque [N/m]	14 to 18	33 to 42	50 to 62	63 to 77	90 to 110

8 INSTALLATION : HYDRAULIC CONNECTION

In order to limit clogging of the plate heat exchanger and optimize CU operation, it is advisable to install a strainer filter (Ø 0.1mm) on the CU water inlet piping. This filter must remain easily accessible for the operator so that he can perform a periodical check. A strainer filter performing this function is available as an accessory. It is delivered separately and to be connected at a workmanlike manner.

All precautions should be taken. In particular, it must be ensured that:

- All piping is protected against freezing
- There is no high point where an air pocket could be formed.
- The pipes have a sufficient section for the water flow that is to be established.
- The available water flow and water pressure are sufficient.

The proper functioning of the CU depends on the good quality of the heat exchange between the refrigerant and the water to reject calories. The water inlet temperature and the flow rate are essential parameters for the proper functioning of the installation:

- If the water temperature is slightly too high or the flow rate is too low, the power output can be lower than the rated power.
- If the water temperature is too high or the flow rate too low, the CU will get into safety (HP cut).

CUs are designed to operate when fed with tap water with a temperature of +15°C and a pressure of 4 bar, with a wide tolerance around these values.

The rated water flows (eg, to provide the rated cooling capacity) of CUs are summarized in the tables below :

Nominal water flow depending on water inlet temperature				
Size FW	09	14	18	24
Water flow [L/h] for T° = +15°C	100	120	220	275
Water flow [L/h] for T° = +30°C	290	340	880	900

9 INSTALLATION : ELECTRICAL CONNECTION OF THE CU



The installation must be carried out by a person with the appropriate skills and qualifications.

The installation must be switched off before any intervention, by cutting the power supply of the CU.

The choice of the cables must be made by the installer to comply with the standards in force at the time of installation. Among others, the installer will have to pay attention to the electrical powers absorbed in all life phases of the installation.



**A dedicated circuit breaker must be installed for the installation.
A residual current circuit breaker must protect the installation.**

The CU provides power to the IU. The selection of the CU power supply cable must therefore take into account the presence or absence of the "electrical heating" function on the IU. Suggestions regarding the supply cables of the CU are given in the table below, but **the final decision remains the responsibility of the installer.**

CU power supply when the IU is without electric heating				
Size FW	09	14	18	24
Section [mm ²]	3 x 1.5	3 x 1.5	3 x 2.5	3 x 4.0
Max current [A]	5.0	6.0	9.5	13.5

CU power cable when the IU is a cassette with electric heating				
Size FW	09	14	18	24
Section [mm ²]	3 x 1.5	3 x 1.5	3 x 2.5	3 x 4.0
Max current [A] (cooling mode)	5.0	6.0	9.5	13.5
Max current [A] (heating)	6.4	6.4	6.4	9.5

CU power cable when the IU is a ducted type with electric heating				
Size FW	09	14	18	24
Section [mm ²]	3 x 1.5	3 x 2.5	3 x 2.5	3 x 4.0
Max current [A] (cooling mode)	5.0	6.0	9.5	13.5
Max current [A] (heating)	9.2	10.5	10.5	19.8

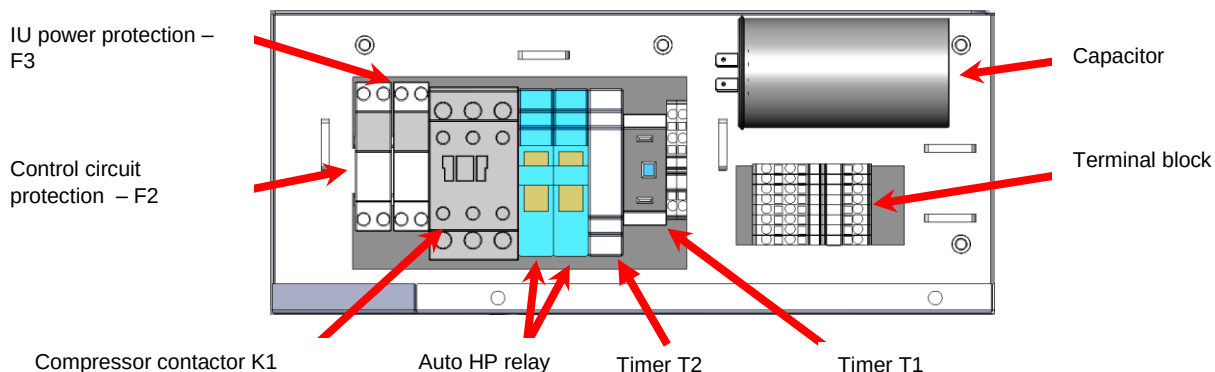
The protection chosen for the installation at the power supply panel must be of the motor support type (i.e. D curve).

The CUs are supplied with a 10x38 6 A gG protection fuse for the UI power supply (see F3 on the electrical diagram, paragraph 16). It must therefore be changed if the IU has the "electric resistance heating" function, the fuse to be installed being supplied with the IU (in its electrical box). To check the fuse value, refer to the table below.

Control protection fuse – F3				
Size FW	09	14	18	24
Indoor unit without electrical heating	6 A	6 A	6 A	6 A
Cassette indoor unit with electrical heating	10 A	10 A	12 A	12 A
Ducted indoor unit with electrical heating	12 A	12 A	12 A	20 A

The CUs are supplied with a 10x38 1 A aM protection fuse for the CU control circuit (see F2 on the electrical diagram, paragraph 16).

Below is an example of a CU electrical box:



Timers T1 and T2 are factory-set, and these settings must be checked:

- Timer T1 is the anti-short-cycle timer. It must be set to open 1/4 turn clockwise..
- Timer T2 is the timer that allows the LP bypass at startup. It must be set with the first slider set to 20M and the second slider set to 5 (red light steady when activated, then flashing when deactivated).

The GC and the UI must be connected according to the electrical diagram (see paragraph 16) and the interconnection diagram provided with the indoor unit.

The switches on the indoor unit must be checked for correct positioning (refer to the UI documentation).

10 INSTALLATION : REFRIGERANT GAS CHARGE



The intervention must be carried out by a person with the appropriate skills and authorizations. In particular, he/she must have the certificate of aptitude for handling refrigerants. In addition, the company employing this person must have the certificate of capacity.

When the connections are made, it is necessary to **check the tightness by always keeping the flare valves closed**:

- Pressurizing dehydrated nitrogen (20 bar maximum) and monitoring pressure maintenance. Check sensitive areas using a leak detector.
- Vacuum: obtain a pressure of 10^{-4} bar and maintain it for 1 hour. Then check the vacuum resistance.

Once the leak-tightness has been verified, the flare valves must be opened. The CUs are delivered charged for a 4-meter pipe run. For longer runs, the charge must be completed with the compressor running using a charge balance, while monitoring superheat and respecting to the **operating ranges in Chapter 14**.

The refrigerant used is R32. It is classified A2L.

The table below shows the initial and maximum charges :

	FW09Q6	FW14Q6	FW18Q6	FW24Q6
Initial load (4 m connection)	360 g	400 g	500 g	600 g
Maximum load	700 g	750 g	900 g	1250 g

The additional nominal charge is 20 g per meter for a 1/4" liquid line and 38 g per meter for a 3/8" liquid line.

The final charge of the installation must be transferred by the installer to the condensing unit.

The final charge of the installation must not exceed the maximum charge.

11 USE : UNIT START-UP

This paragraph concerns both the first start-up and starts following an intervention.



The intervention must be carried out by a person with the **appropriate skills and authorizations**. In particular, he/she must have the **certificate of aptitude for handling refrigerants**. In addition, the company employing this person must have the **certificate of capacity**

Before starting, it is necessary, among other things, to:

- Check that the CU and IU are correctly mounted.
- Check that the electrical connections are all tight, with proper earthing.
- Check that the voltage of the power supply at terminals L and N of the CU is compliant.
- Check that the refrigeration connections are compliant, with proper insulation and protection.
- Check that the nuts are tight and without gas leaks.
- Check that the flare valves are open.
- Check that the CU is well supplied with water and at the correct temperature.
- Check the general condition of the installation and components.

The installation is started via the IU. When the IU is in cooling demand, it sends a start order to the CU compressor. The compressor must therefore start operating and circulate the refrigerant. There is a waiting time of up to 8 minutes for the CUs between a cooling demand made via the remote control and the compressor start.

The CU is equipped with the following security features:

- HP switch: This stops the compressor when the pressure exceeds 38 bar. To reset, turn the IU off and then back on.
- LP switch: This stops the compressor when the pressure drops below 0.5 bar. When the pressure rises above 1.5 bar, the pressure switch automatically closes, and the compressor restarts after a 5-minute delay (T1). Note that the T2 delay allows this safety feature to be bypassed during the first 5 minutes of compressor startup.



It is important to **carry out complete operational tests during commissioning and to record the measurements on the commissioning sheet** (provided with this documentation). The same tests must also be carried out during the maintenance phases and any troubleshooting interventions.

A complete test must include at least the following measurements:

- Verification of the HP safety device's operation (shutdown and reset). It is possible to cause an HP cutoff by cutting off the water supply to the CU.
- Verification of the absence of abnormal noise and vibrations.

A complete test must include at least the following measurements:

- Measurement of the HP, LP, compressor discharge, liquid, and compressor suction temperatures.
- Measurement of the water inlet and outlet temperatures.
- Measurement of the current absorbed by the compressor and by the UI.



The commissioning form must be completed and returned. Receipt by LTB of this correctly completed form conditions the validation of the guarantee.

12 USE : COMMON DEFAULTS

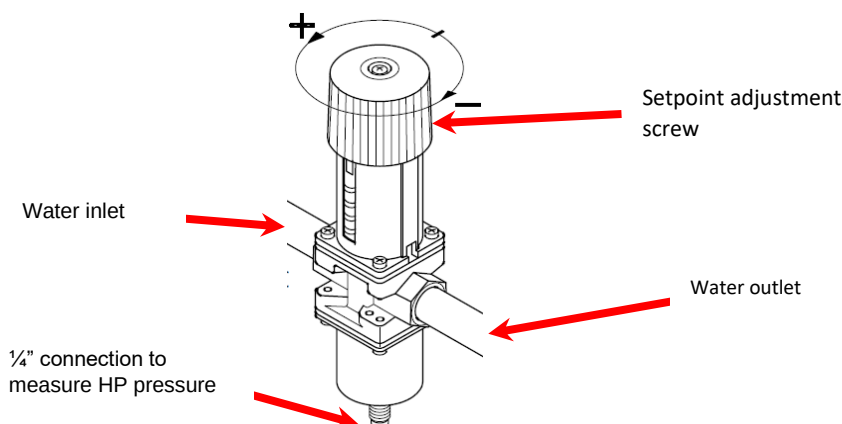
Below is a table listing the common defaults:

Default	Probable causes	Action to be taken
The installation does not turn on	No power supply	Check voltage
	Bad wiring	Check position of the disconnecting switch
The IU is on but does not start	Installation in security mode	Check wiring
	Bad wiring	Check error codes of the IU
The IU is in cooling demand but the compressor does not start.	Installation in security mode	Check the securities of the CU
	The anti-short-cycle delay has not expired yet	Wait 3 to 8 minutes, see paragraph 9
The installation starts but pressures are abnormal	Unadapted refrigerant load	Remove or add fluid
	Gas leakage	Check airtightness
	Water flow too low	Check water flow (measure, DT water)
	Unadapted water temperature	Check water temperature
	Non-tight compressor valves	Change compressor
	Dirty filter	Check condition of the filter

The warranty does not cover the damage caused in case of incorrect implementation or -use.

13 USE: ADJUSTMENT OF THE PRESSOSTATIC WATER VALVE

The pressostatic water valves regulate the flow of water passing through the condenser according to the HP pressure measured in the high pressure part of the refrigeration circuit, in order to maintain the HP pressure constant, at its set value.



If the HP pressure increases, the valve will open and the water flow will increase. The HP pressure will then return to its setpoint. If the valve is already fully open, the HP pressure will increase.

If the HP pressure decreases, the valve will close and the water flow will decrease. The HP pressure will then return to its setpoint. The valve must close completely when the compressor stops.

The pressostatic water valve is factory-set for a water pressure of approximately 4 bar. It may be necessary to adjust the pressostatic valve:

- If the water system pressure is above or below 4 bar,
- When replacing the pressure-controlled valve with a new one,
- If the pressostatic water valve has been misadjusted,
- If the CU is installed in a room with a relatively high temperature.

The setpoint can be adjusted by turning the adjustment screw located on the top of the valve. Turning the screw clockwise decreases the setpoint.

The correct pressure switch valve setting results in the following condensing temperatures:

	FW09Q6	FW14Q6	FW18Q6	FW24Q6
Condensing temperature/pressure	+50°C / 30 bar rel	+50°C / 30 bar rel	+45°C / 27 bar rel	+50°C / 30 bar rel

These values ensure the CU's nominal performance.

If the CU is installed in a room with a high temperature, the ambient temperature around the CU may be high enough that the valve is partially open even when the compressor is off. Under these conditions, the valve's set point must be increased to allow the valve to close when the compressor is off.

An improperly adjusted pressostatic water valve can result in excessive water consumption..

14 USE : OPERATING LIMITS

To preserve the integrity of the CU, make sure that the **water inlet temperature** of the unit is always between the values given in the following table:

Minimum water inlet temperature	+5°C
Maximum water inlet temperature	+45°C

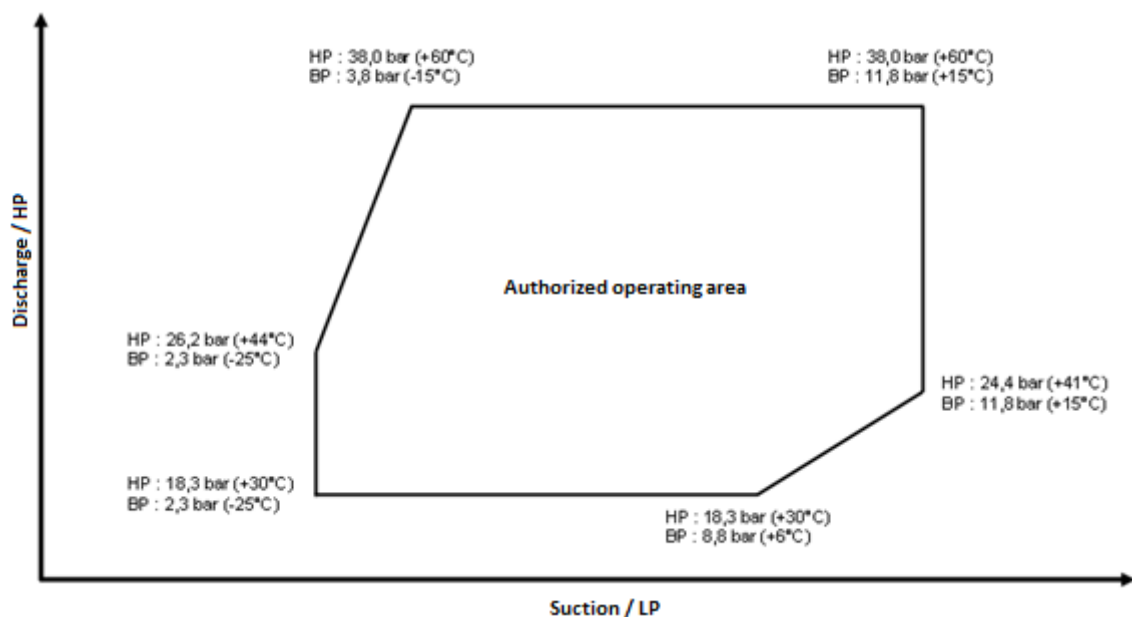
In order to preserve the integrity of the GC, it is necessary to ensure that the **external ambient temperature when the Cu is operating** is always between the values given in the following table:

Minimum ambient temperature – operating	+5°C
Maximum ambient temperature – operating	+45°C

In order to preserve the integrity of the GC, it is necessary to ensure that the **external ambient temperature when the CU is stopped** is always between the values given in the following table:

Minimum ambient temperature – when stopped	-25°C
Maximum ambient temperature – when stopped	+60°C

In order to preserve the integrity of the CU, it must be ensured that the **LP temperature** and **HP temperature** of the CU are always within the following permitted operating zone :



15 MAINTENANCE



The maintenance must be carried out by a person with the appropriate skills and qualifications.

The maintenance frequencies are to be adapted according to the environment and the context of the use of the split system, with at least **one maintenance every year**.

During the maintenance, among other things, it is necessary to:

- Check the condition of the UI air filter and the GC water filter, and clean or replace them if necessary.
- Check the operation of the HP safety device (shutdown and reset). It is possible to cause an HP cutoff by turning off the CU water supply.
- Check for refrigerant leaks.
- Check for premature wear of the various components.
- Check that the electrical connections are tight and that there is no abnormal heating of the electrical cables.
- Check the flow of the UI condensate tray and clean if necessary.
- Check the condition of the refrigerant connections and that the insulation and protection are compliant.
- Check that the pressostatic water valve is not scaled and verify its proper operation. In particular, check that it shuts off the water flow when the compressor is off.
- Check the condition of the capacitor. The capacitor is class C = 3000 hours of operation. Replace it if necessary.
- Check the operation of the split system by taking the appropriate readings (see commissioning sheet).

All interventions on the refrigerant circuit must comply with the rules of practice and regulations in force. In particular, it is necessary to recover the refrigerant before opening the circuit and fill the circuit with dehydrated nitrogen before any solder.

16 END OF LIFE RECYCLING



Disposal must be carried out by a person with the appropriate skills and authorizations.

The applicable standard in Europe is the NF EN378 standard. Paragraph 6 EN 378-4 specifies the procedure to follow.

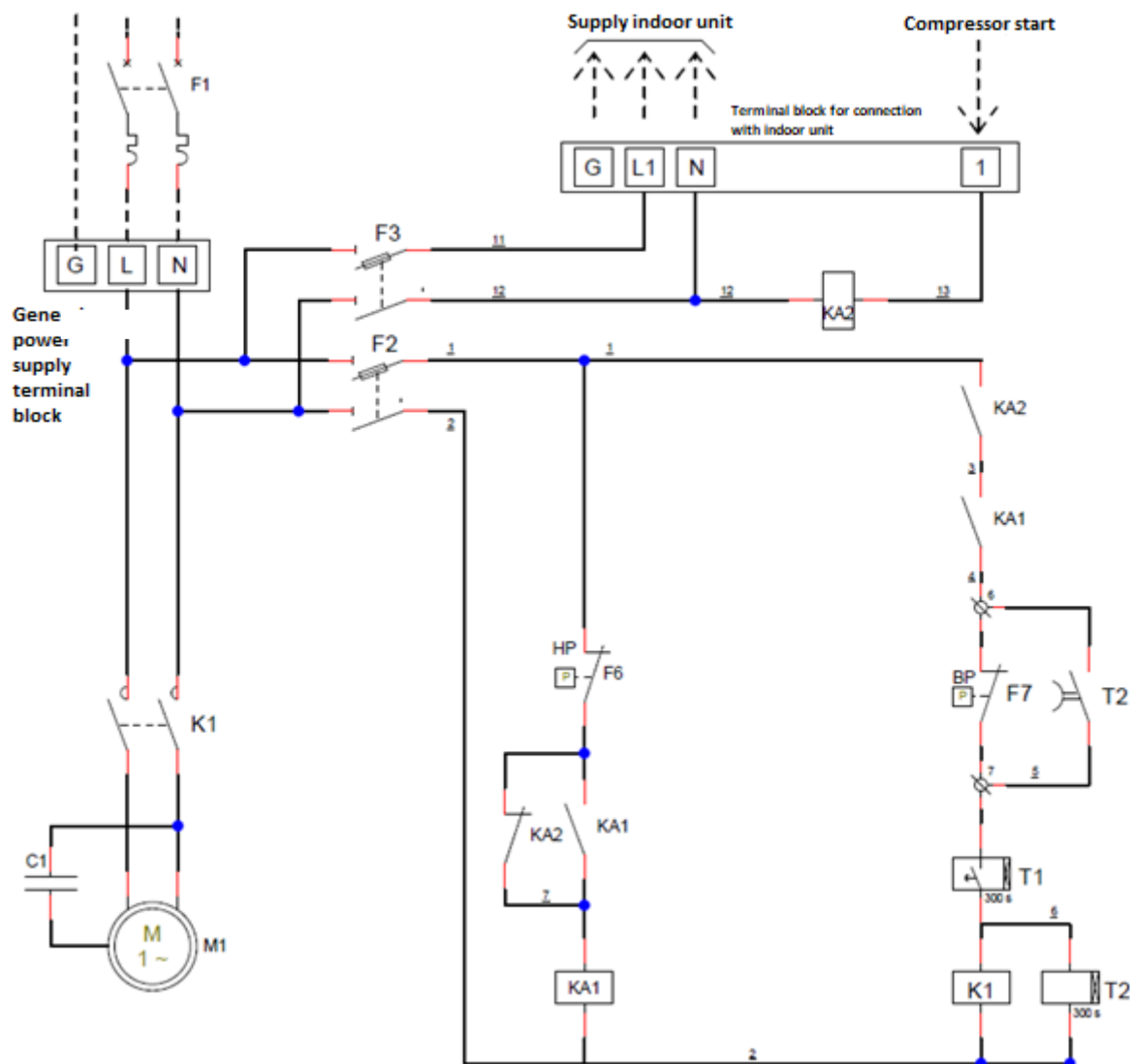
The installation contains refrigerant oil as well as refrigerant. These products present a risk of environmental pollution and fire or even explosion. They must therefore be disposed of in accordance with the regulations in force.

The refrigerant can be regenerated or discarded. An analysis of this determines the procedure to follow.

Oil that cannot be reprocessed must be stored in an appropriate separate container and then disposed of according to current regulations.

The CU must be the subject of selective collection with a view to its recycling or revalorization. You must contact the distributor if necessary.

17 ELECTRICAL DIAGRAM



CAPTION :

Wire numbers are underlined
C1 – Compressor motor capacitor
F1 – General protection (not included)
F2 – Control circuit protection
F3 – Indoor unit protection
F6 – HP pressure switch (auto reset)
F7 – LP pressure switch (auto reset)
K1 – Compressor contactor
KA1 – HP relay
KA2 – Cooling request relay
M1 – Compressor motor
T1 – Anti-short cycle relay
T2 – LP shunt relay at compressor start-up

TERMINAL BLOCK :

G – Earth
L/L1 – Phase
N – Neutral
1 – Compressor
6/7 – LP pressure switch

NOTA :

The installer must place the electrical protections in accordance with the installation instructions and the standards in force.

----- : Wiring to be carried out by the installer

18 COMMISSIONING FORM

Name intervener	
Date of intervention	

CU reference and serial number	Reference :	SN :
Compressor reference and serial number	Reference :	SN :
IU reference and serial number	Reference :	SN :
Refrigerant		
Liquid- and suction line diameter	Liquid :	Suction :
Length refrigerant tube connections		
Height refrigerant tube connections		
Presence of water filter	YES / NO	
Circuit breaker characteristic at the head of the installation	Cut : A	Type :
Control protection fuse value		

HP pressure switch test	Cut : bar	Reset : OK / NOK
Final load of the installation		
CU supply voltage		
Compressor current measure		
IU current measure		
HP measure		
LP measure		
Suction measure		
Discharge measure		
Liquid measure		
Water inlet temperature measure		
Water outlet temperature measure		
Air inlet temperature and RH measure		
Air outlet temperature measure		

A copy of the commissioning sheet (photo, scan, etc.) must be sent to LTB (sav@ltb.fr) for coverage of the machine warranty under the LTB general sales conditions.