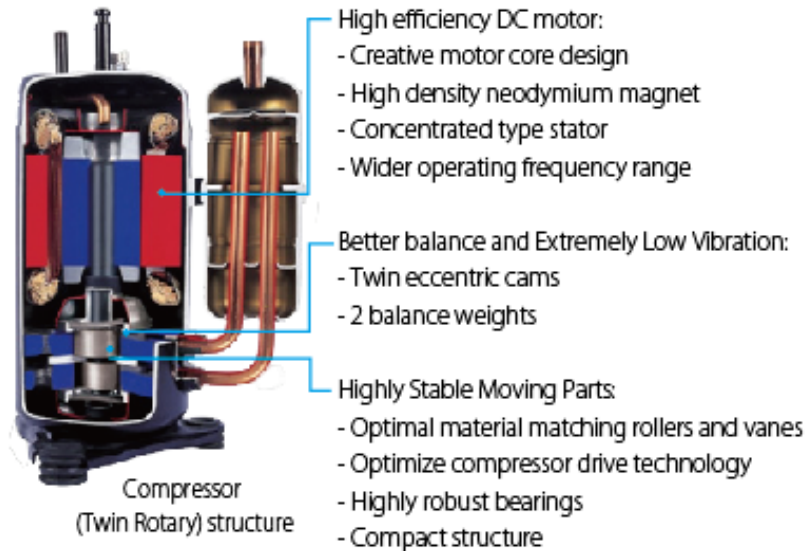


### 3. Features

#### 3.1 High efficient DC inverter compressor

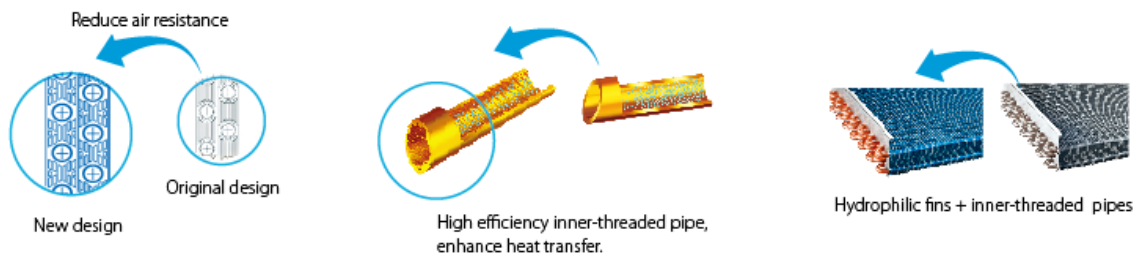
DC inverter Mini chiller adopts highly intelligent inverter-driven compressor. This advanced technology enables the output of the outdoor unit to be modulated by the real heat load demands. This advanced system ensures precise temperature regulation and highly efficient energy usage, making a significant contribution to limiting the impact on the environment.



#### 3.2 High performance heat exchanger

The new designed window fins enlarge the heat-exchanging area, which decrease the air resistance, save more power and enhance heat exchange performance.

Hydrophilic film fins and inner-threaded copper pipes optimize heat exchange efficiency.

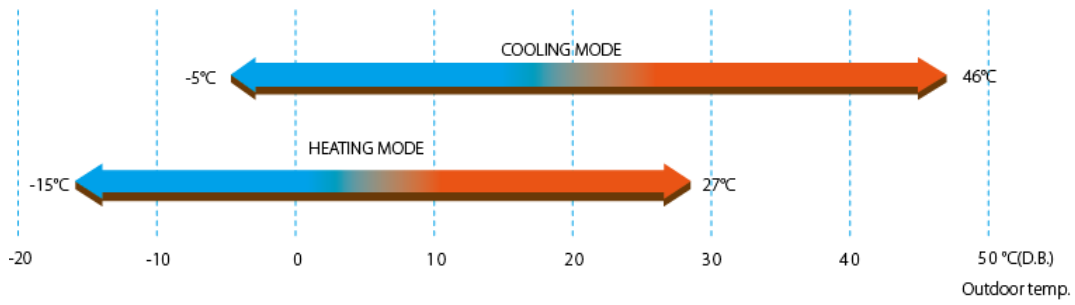


#### 3.3 A<sup>+</sup> rated energy efficiency

The DC inverter chiller integrates the latest technological innovations and ensures precise temperature regulation and highly efficient energy usage, making a significant contribution to the limiting the impact on the environment.

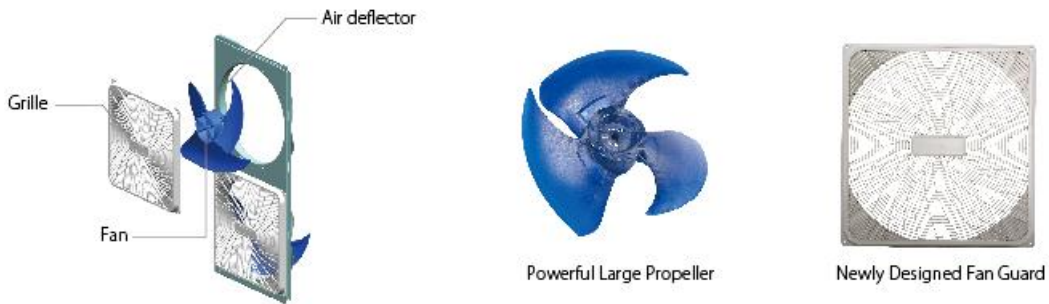
#### 3.4 Wide operation temperature range

Stable and safe running at wide ambient temperature range, cooling performance from -5 °C to 46°C, heating from -15°C to 27°C.



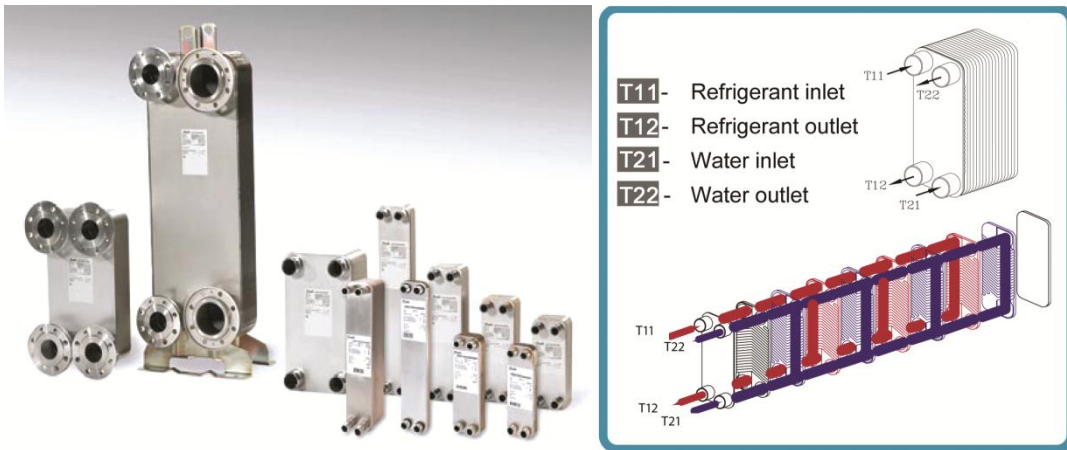
**3.5 Low-operating sound design**

Optimally design fan shape and new designed discharge air grille and air deflector, making higher air volume and reduces running noise.



**3.6 Plate heat exchanger**

By adopting high efficiency plate heat exchanger, the energy consumption can be reduced.

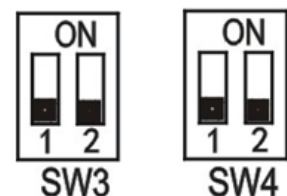


- a. Metallic protective cabinet with rustproof polyester paint;
- b. Built-in with voltage protection, current protection, anti-freezing protection, water flow protection and etc., effectively guarantee the system to work safely.

**3.7 User friendly remote control**

Switch SW4\_1(5-10kW) or SW3\_1(12-16kW) on the PCB to ON to enable the following remote control functions. The default setting at factory is not set remote control functions.

- Remote shut down
- Remote cooling and heating



### 3.8 Flexible and convenient control

- Built-in electronic controller at factory.

Compact devices with advanced function and friendly user interface.



- The chiller can be controlled by wired controller (KJR-120F/BMK-E), which is optional.



Note: When connecting wired controller, outdoor unit control panel is mainly used for display, check parameters and diagnosis function. It can't be used to set mode and adjust temperature.

- Built-in water pressure gauge for inspecting the water pressure all the time.

### 3.9 Integrated and compact design

Hydraulic module, such as expansion tank, plate type of heat exchanger, water circulating pump is built-in the outdoor unit. The integrated structure design saves installation space and cost.

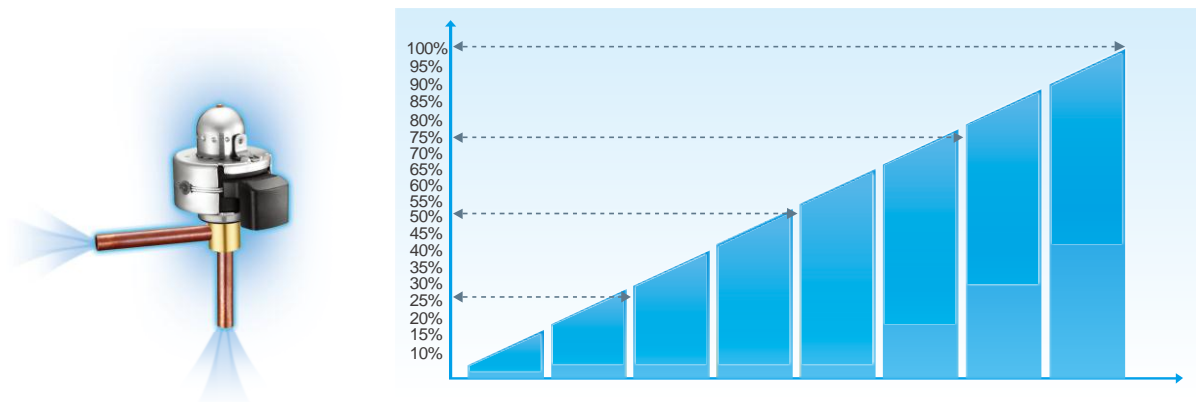
### 3.10 EXV control flow more precisely

Patented liquid distribution components to maximize performance and minimize defrost impact.

EXV adopted for stable and accurate gas flow control. EXV achieves 500 pulses to adjust flow precisely.

Ensure the temperature-control precisely and steadily to provide a comfortable environment.

Fast respond resulting in higher efficiency and improved reliability.



### 3.11 Water pump starts/stops compulsory function

Press "Check" button for 3 seconds to start the water pump operating when the unit is standby.

Press "Check" button for 3 seconds again to stop the water pump.

## 4. Description of main components

### **Structure:**

Panels and base are made from galvanized steel plate painted with epoxy powder to ensure total resistance to atmospheric pollution, condensate collection pan as standard.

### **Condenser coils:**

The coils are made from high performance and seamless copper tube and high surface area aluminum fins to ensure optimum heat exchange capability. Condenser coil protection grill is standard.

### **Fan motor:**

To achieve high efficiency heat exchange, the unit is equipped with the high performance axial-flow fans. The fan is driven directly by weather proof motor to ensure reliable operation; the fan motor is six-pole electric motor with built-in thermal cut-out.

### **Evaporator:**

The heat exchanger is made of AISI 316 stainless steel to ensure high heat exchange efficiency, complete with electric heater and differential pressure switch. The complete heat exchanger is insulated with thermal insulation closed cell rubber foam to give optimum thermal insulation.

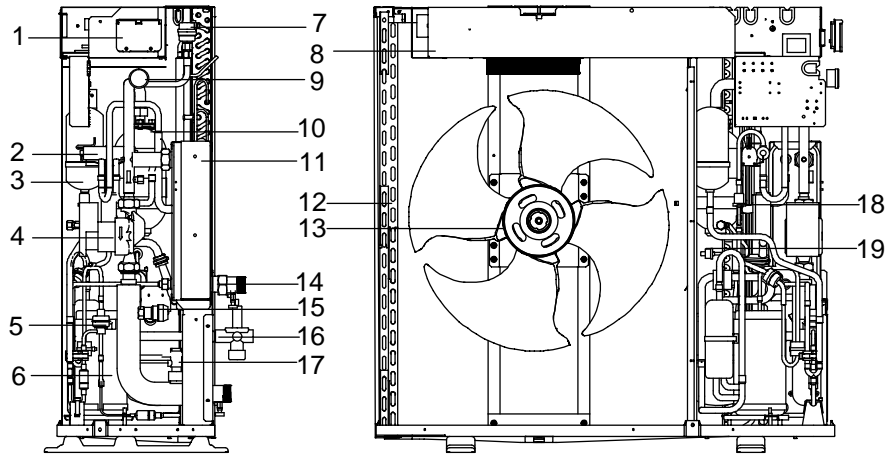
### **Hydraulic module:**

It is fully integrated and equipped with key hydraulic components such as expansion tank, plate type of heat-exchanger, water circulating pump.

The water pressure differential switch is provided in the units to protect against damage to the water pump.

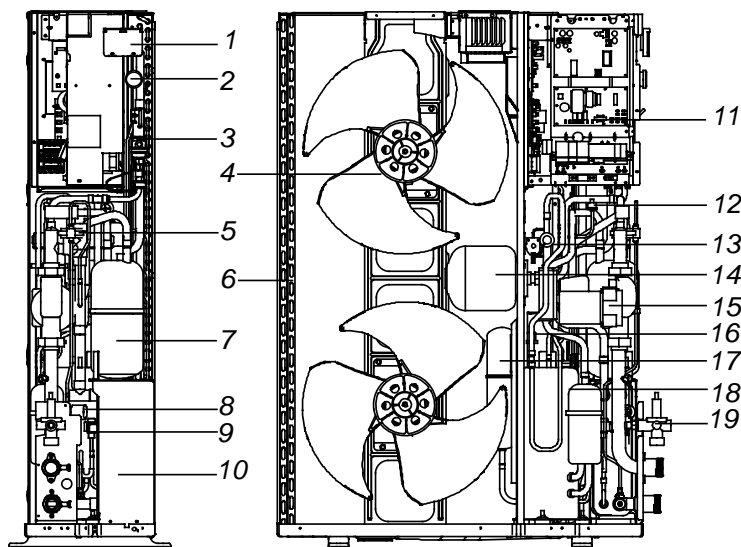
### **Power and control electrical panel:**

Power and control electrical panel constructed in accordance with IEC 204-1/EN60335-2-40, complete with compressor contactor, control via control panel.



**5/7KW**

- |                             |                                   |
|-----------------------------|-----------------------------------|
| 1 Operation panel           | 10 Expansion tank                 |
| 2 4-ways valve              | 11 Plate heat exchanger           |
| 3 Storage tank              | 12 Condenser                      |
| 4 Pump                      | 13 Axial-flow fan                 |
| 5 Electric expansive valve  | 14 Adapter substitute (accessory) |
| 6 Compressor                | 15 Security discharge             |
| 7 Automatic discharge valve | 16 Water supply valve (accessory) |
| 8 Electrical panel          | 17 Water flow switch              |
| 9 Water manometer           | 18 High pressure switch           |
|                             | 19 Low pressure switch            |



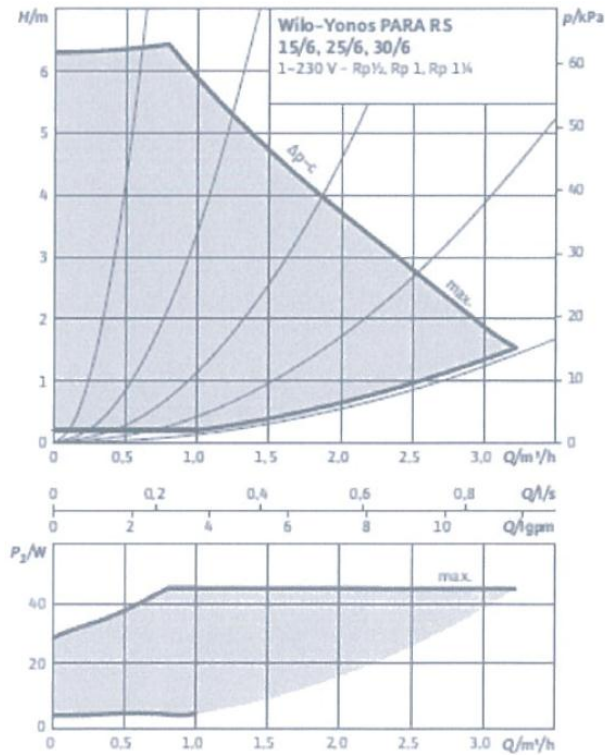
**10~16KW**

- |                                |                         |
|--------------------------------|-------------------------|
| 1 Operation panel              | 11 Electrical panel     |
| 2 Water manometer              | 12 High pressure switch |
| 3 Automatic discharge valve    | 13 4-ways valve         |
| 4 Axial-flow fan               | 14 Expansion tank       |
| 5 Differential pressure switch | 15 Pump                 |
| 6 Condenser                    | 16 Low pressure switch  |
| 7 Accumulator                  | 17 Storage tank         |
| 8 Security discharge           | 18 Compressor           |
| 9 Electric expansive valve     | 19 Water supply valve   |
| 10 Plate heat exchanger        |                         |

## 12. Hydraulic Data

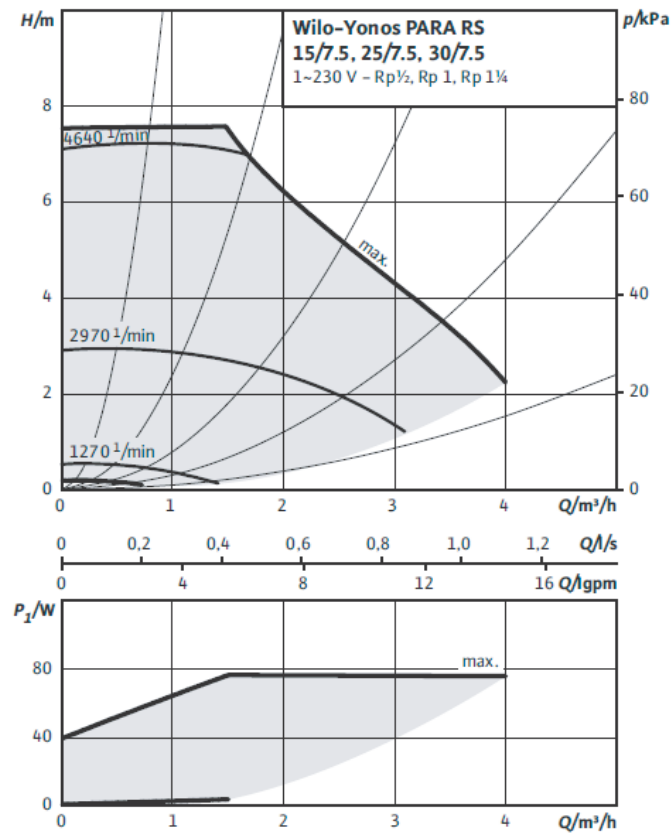
### 12.1 Useful pump head curves

$\Delta P$ -C (constant) curve for 5/7 kW



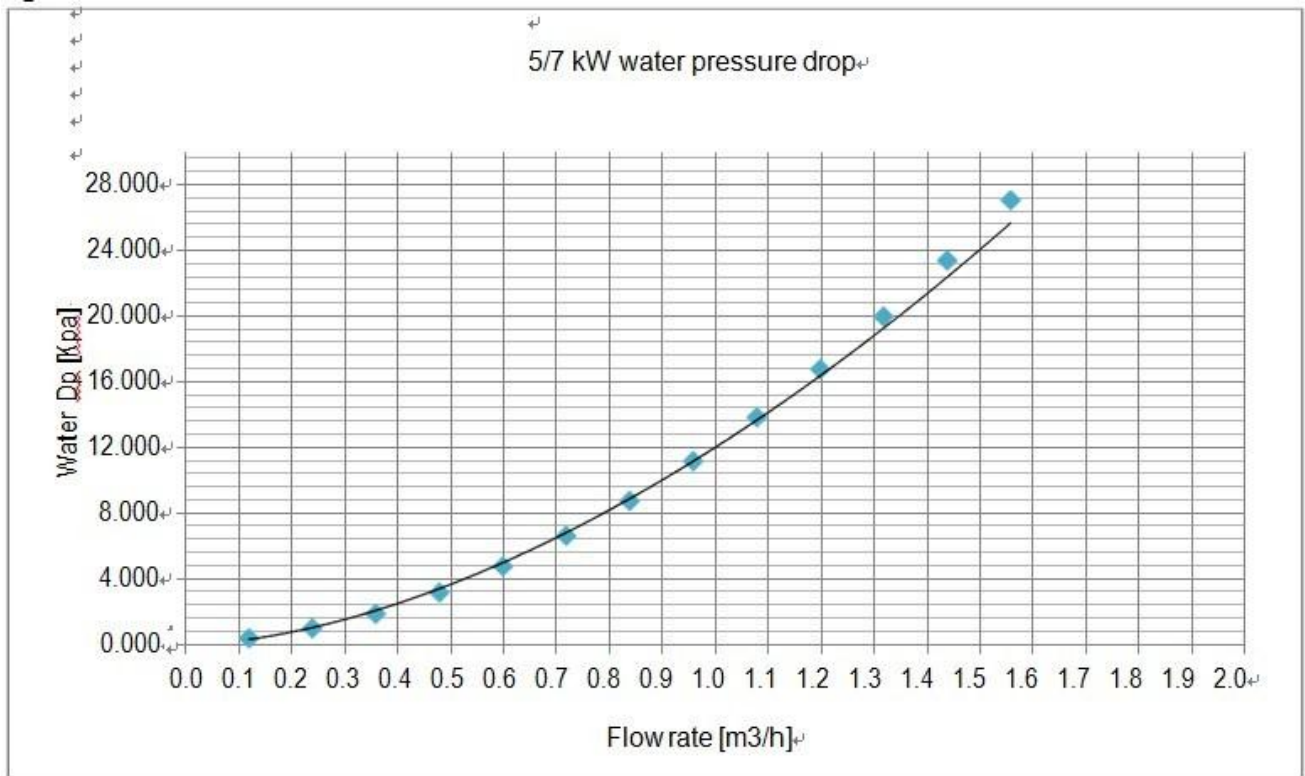
$\Delta P$ -C(constant) curve for 10/12/14/16 kW

Constant speed I, II, III

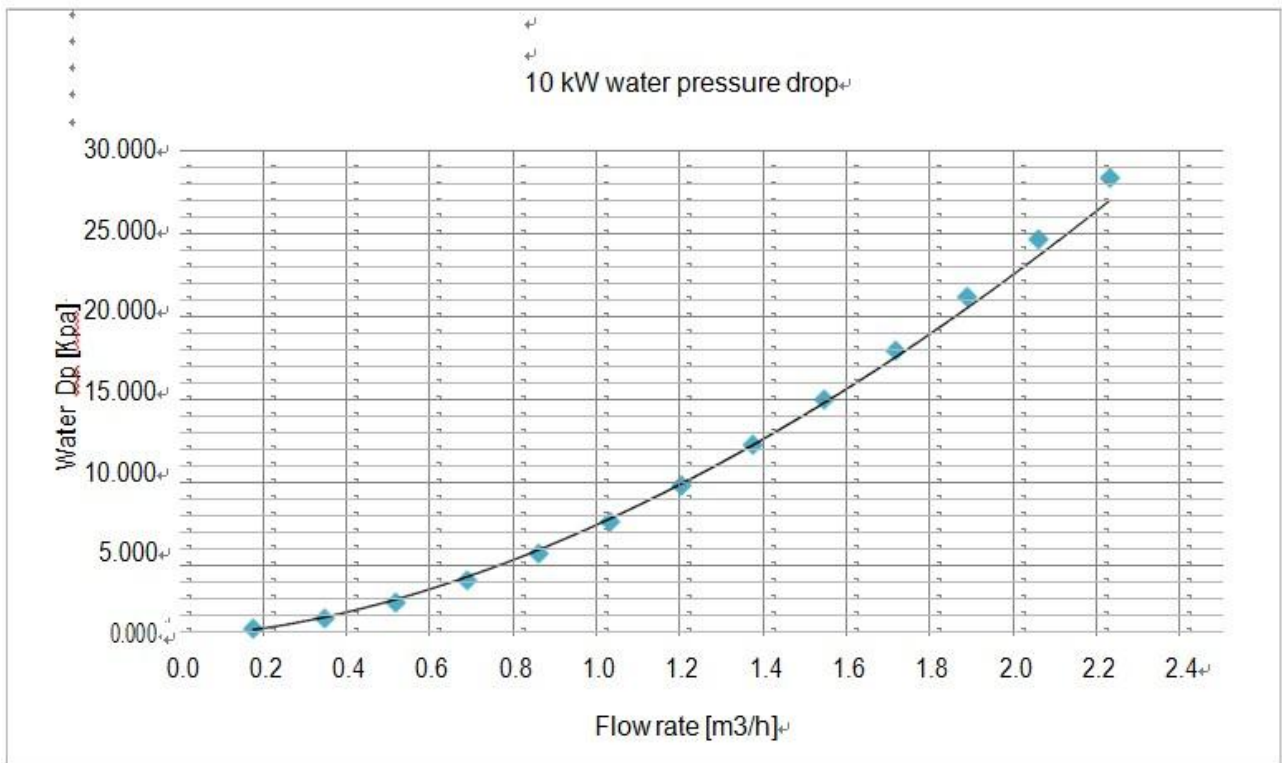


### 12.2 Water Side Water Pressure Drop

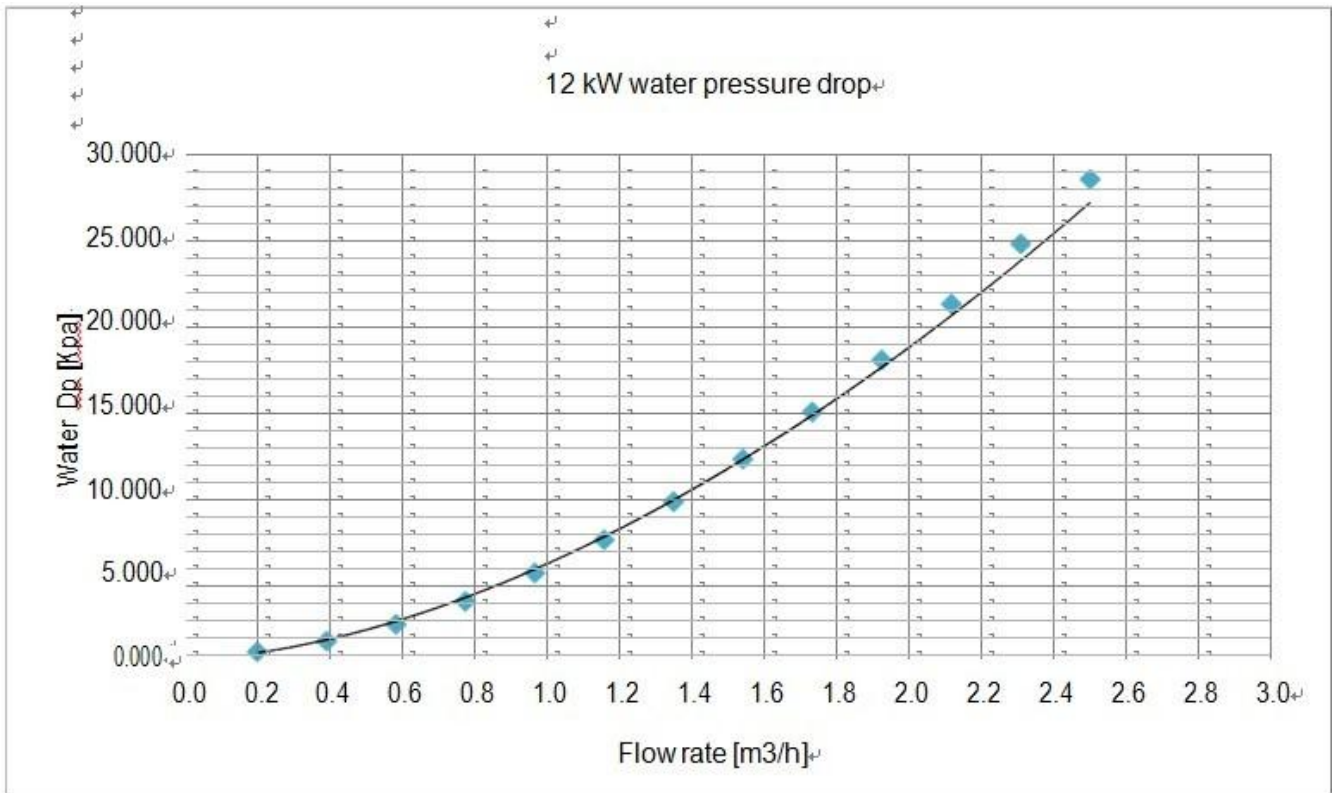
#### MGC-V5W/D2N1, MGC-V7W/D2N1



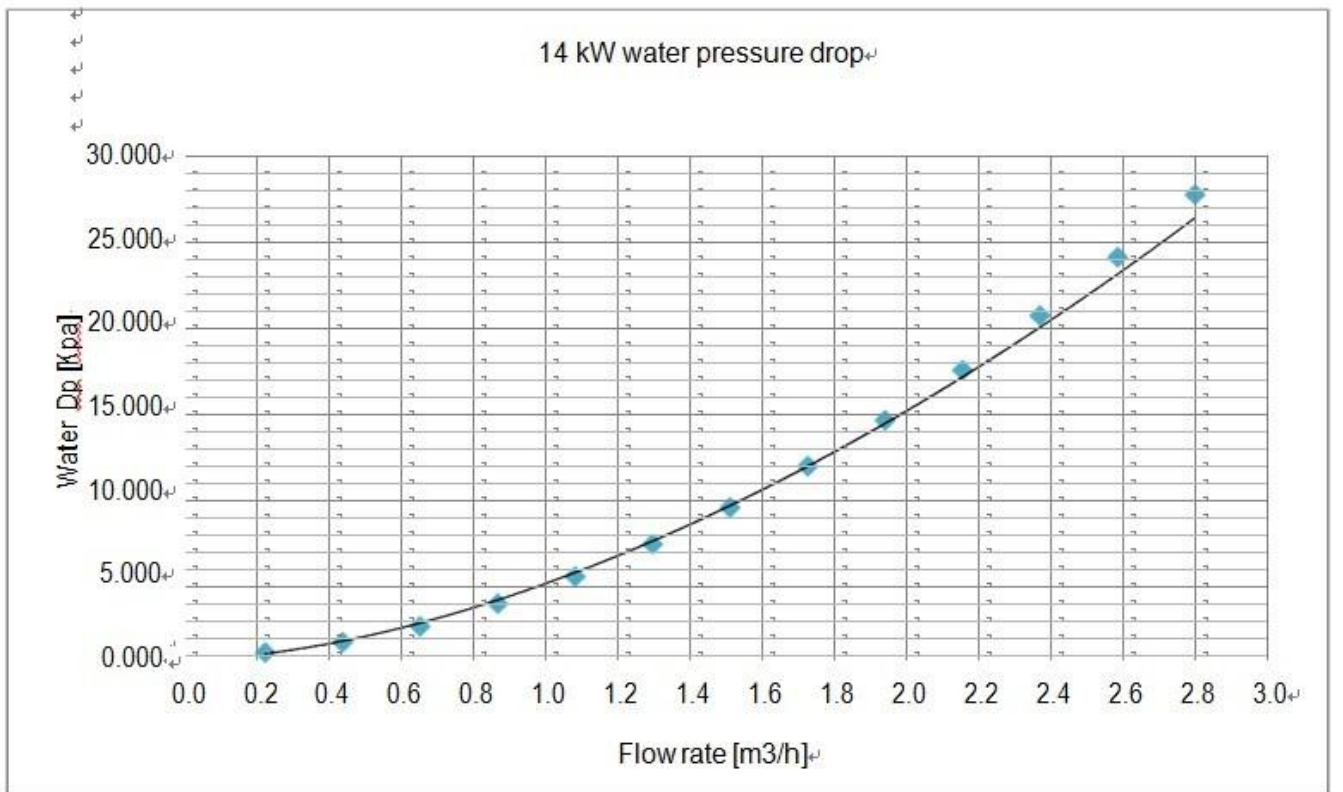
#### MGC-V10W/D2N1



**MGC-V12W/D2N1, MGC-V12W/D2RN1**

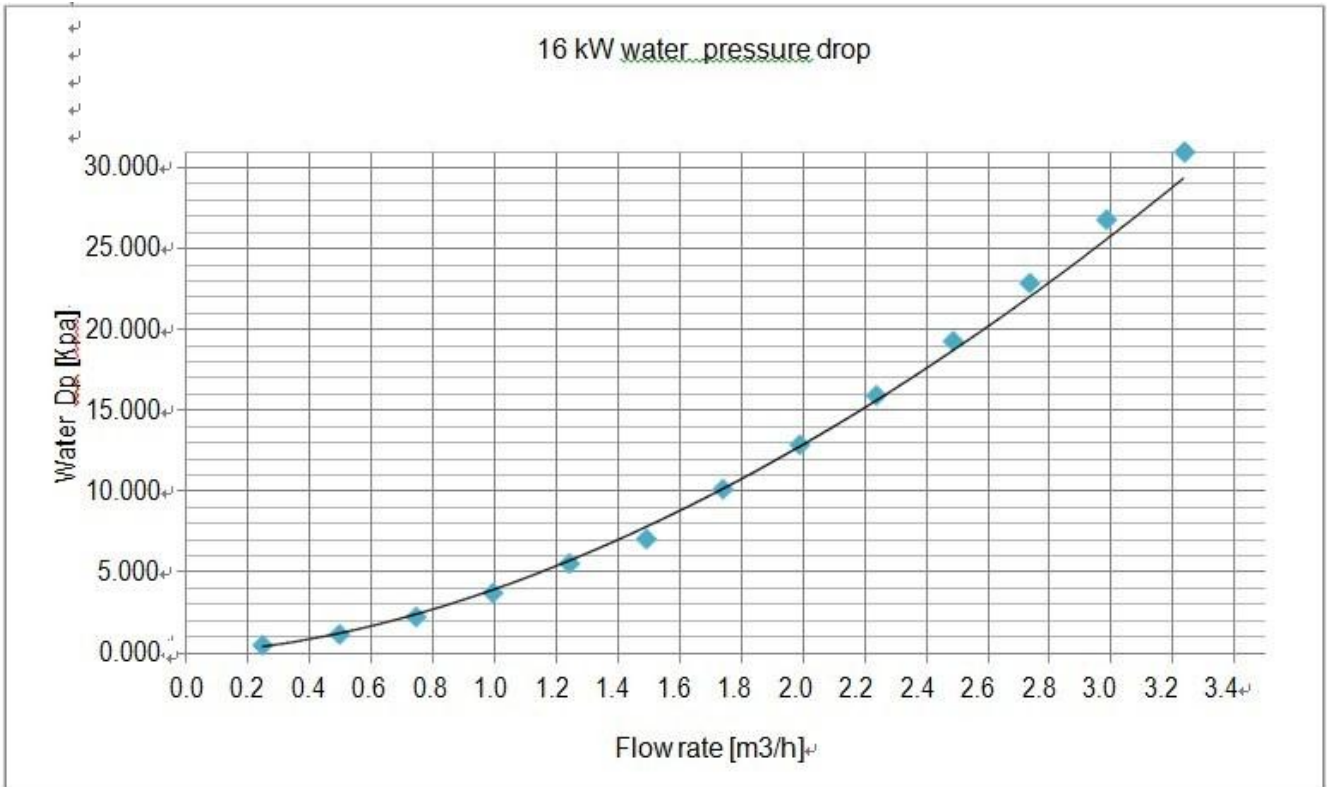


**MGC-V14W/D2RN1**

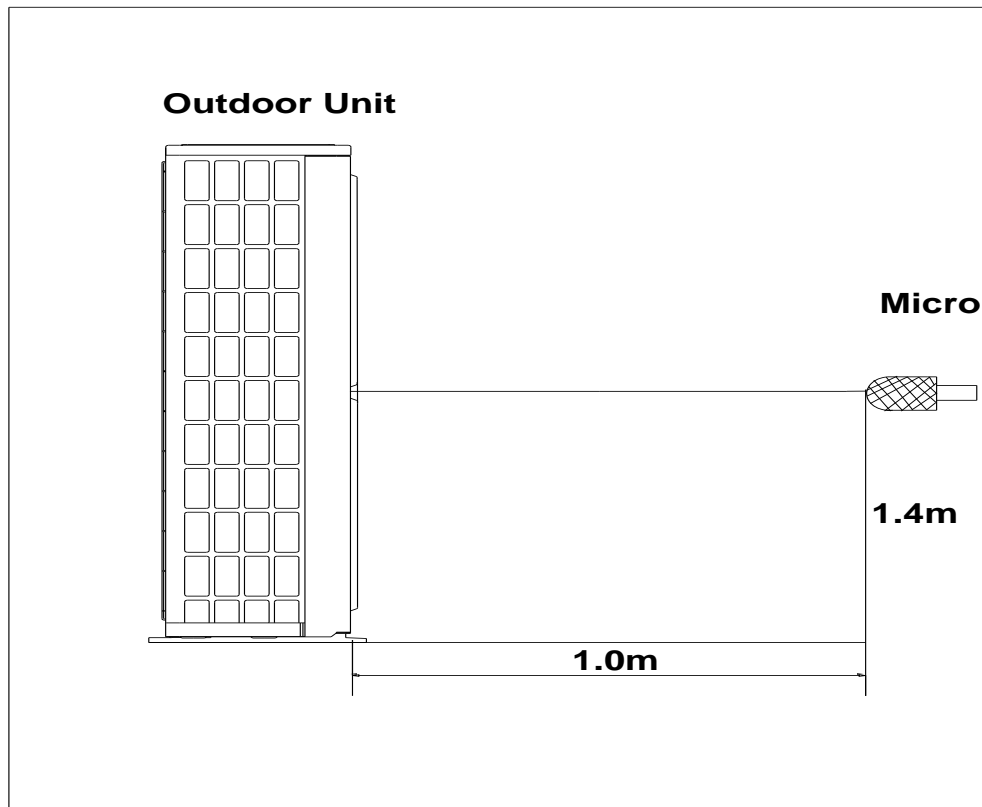




**MGC-V16W/D2RN1**



### 13. Sound Level



Model	Noise level (dB(A))
MGC-V5W/D2N1	58
MGC-V7W/D2N1	58
MGC-V10W/D2N1	59
MGC-V12W/D2N1	59
MGC-V12W/D2RN1	59
MGC-V14W/D2RN1	60
MGC-V16W/D2RN1	60

**Note:**

It is tested 1 meter away from the machine in a semi-anechoic room (sound pressure).

## 15. Installation

### 15.1 Installation of general information

#### General warning

1. These units have been designed to chilled and hot water and must be used in applications compatible with their performance characteristics; these appliances are designed for residential or similar applications.
2. Incorrect installation, regulation and maintenance or improper use absolves the manufacturer from all liability, whether contractual or otherwise, for damage to people, animals or things. Only those applications specifically indicated in this list are permitted.
3. Read this manual carefully. All work must be carried out by qualified personnel in conformity with legislation in force in the country concerned.
4. The guarantee is invalidated if the above instructions are not respected and if the unit is started up for the first time without the presence of personnel authorized by the Company (where specified in the supply contract) who should draw up a "start-up" report.
5. The documentation supplied with the unit must be consigned to the owner who should keep it carefully for future consultation in the event of maintenance or service.
6. All repair or maintenance work must be carried out by the Company's Technical Service or qualified personnel following the instructions in this manual. The air-conditioner must under no circumstances be modified or tampered with as this may create situations of risk. Failure to observe this condition absolves the manufacturer of all liability for resulting damage.

#### Fundamental safety rules

When operating equipment involving the use of electricity and water, a number of fundamental safety rules must be observed, namely:



#### Prohibition

1. This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
2. Do not touch the unit with bare feet or with wet or damp parts of the body.
3. Do not carry out cleaning operations without first disconnecting the system from the electricity supply.
4. Do not modify safety or regulation devices without authorization and instructions from the manufacturer.
5. Do not pull, detach or twist the electrical cables coming from the unit, even when disconnected from the mains electricity supply.
6. Do not open doors or panels providing access to the internal parts of the unit without first ensuring that the mains switch is in the off position.
7. Do not introduce pointed objects through the air intake and outlet grills.
8. Do not dispose of, abandon or leave within reach of children packaging materials (cardboard, staples, plastic bags, etc.) as they may represent a hazard.



#### Important

1. The chiller appliances are supplied without the main switch. The power supply to the unit must be disconnected using a suitable main switch that must be supplied and installed by the installer.
2. Respect safety distances between the unit and other equipment or structures. Guarantee adequate space for access to the unit for maintenance and/or service operations.

Power supply: the cross section of the electrical cables must be adequate for the power of the unit and the power supply voltage must correspond with the value indicated on the respective units. All units must be earthed in conformity with legislation in force in the country concerned.

3. Hydraulic connections should be carried out as indicated in the instructions to guarantee correct operation of the unit. Empty the water circuit or add glycol if the unit is not used during the winter. Handle the unit with the utmost care to avoid damage.

## 15.2 Installation of outdoor unit

### Choice of installation site

Before installing the unit, agree with the customer the site where it will be installed, taking the following points into consideration:

- Check that the fixing points are adequate to support the weight of the unit.
- Pay scrupulous respect to safety distances between the unit and other equipment or structures to ensure that air entering the unit and discharged by the fans is free to circulate.

### Positioning

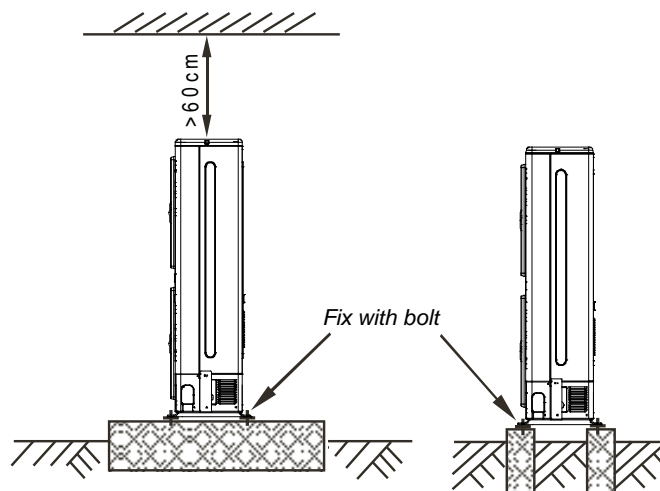
Before handling the unit, check the capacity of the lifting equipment used, respecting the instructions on the packaging.

To move the unit in the horizontal, make appropriate use of a lift truck or similar, bearing in mind the weight distribution of the unit. To lift the unit, insert tubes long enough to allow positioning of the lifting slings and safety pins in the feet on the unit.

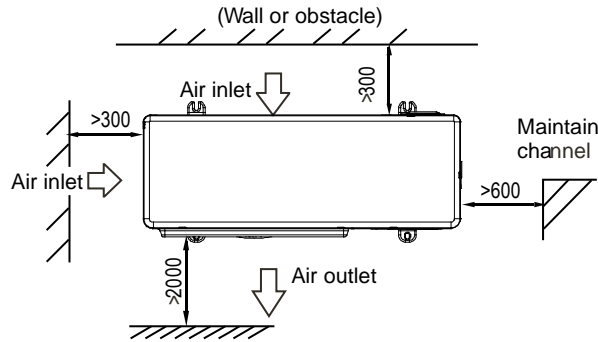
To avoid the slings damaging the unit, place protection between the slings and the unit. Position the unit in the site indicated by the customer. Place either a layer of rubber (min. thickness 10 mm) or vibration damper feet (optional) between the base and support surface. Fix the unit, making sure it is level and that there is easy access to hydraulic and electrical components. If the site of installation is exposed to strong winds, fix the unit adequately to the support surface using tie rods if necessary. If a heat pump unit is being installed, make sure the condensate is drained using the drain hose supplied as standard. Prevent leaves, branches or snow from accumulating around the unit. These could reduce the efficiency of the unit.

### Installation space (units: mm)

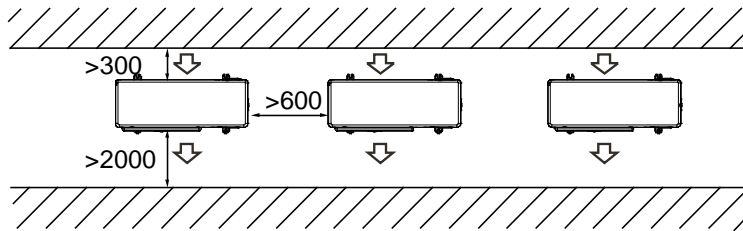
1. Since the gravity center of the unit is not at its physical center, so please be careful when lifting it with a sling.
2. Never hold the inlet of the outdoor unit to prevent it from deforming.
3. Do not touch the fan with hands or other objects.
4. Do not lean it more than 45°C, and do not lay it sidelong.
5. Make concrete foundation according to the specifications of the outdoor units.
6. Fasten the feet of this unit with bolts firmly to prevent it from collapsing in case of earthquake or strong wind.



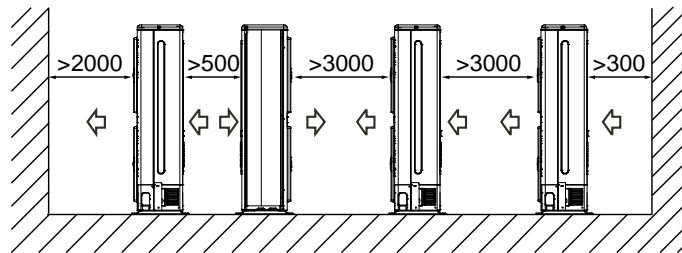
### Single unit installation



### Parallel connect two units or above



### Parallel connect the front with rear sides

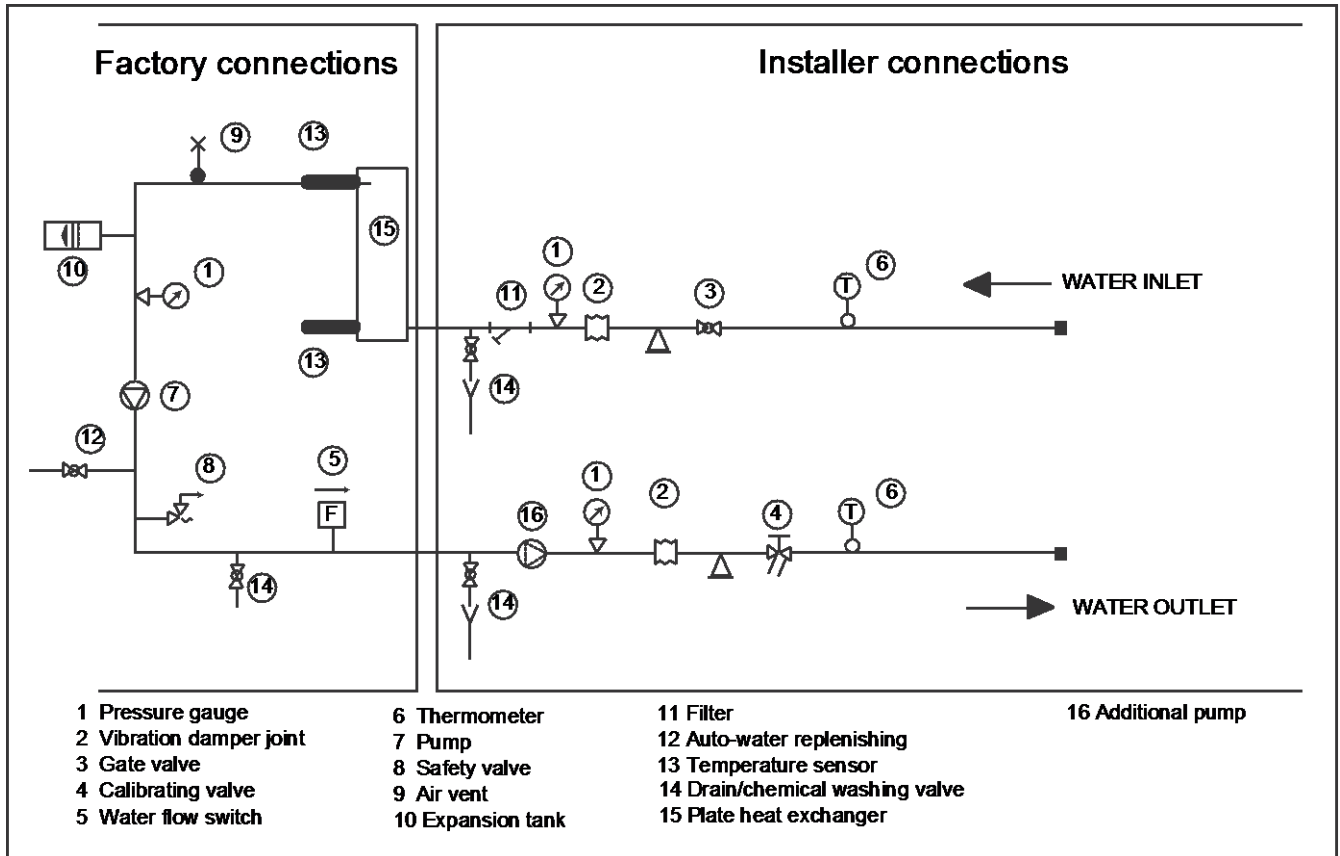


All the pictures in this manual are for explanation purpose only. They may be slightly different from the air conditioner you purchased (depend on model). The actual shape shall prevail.

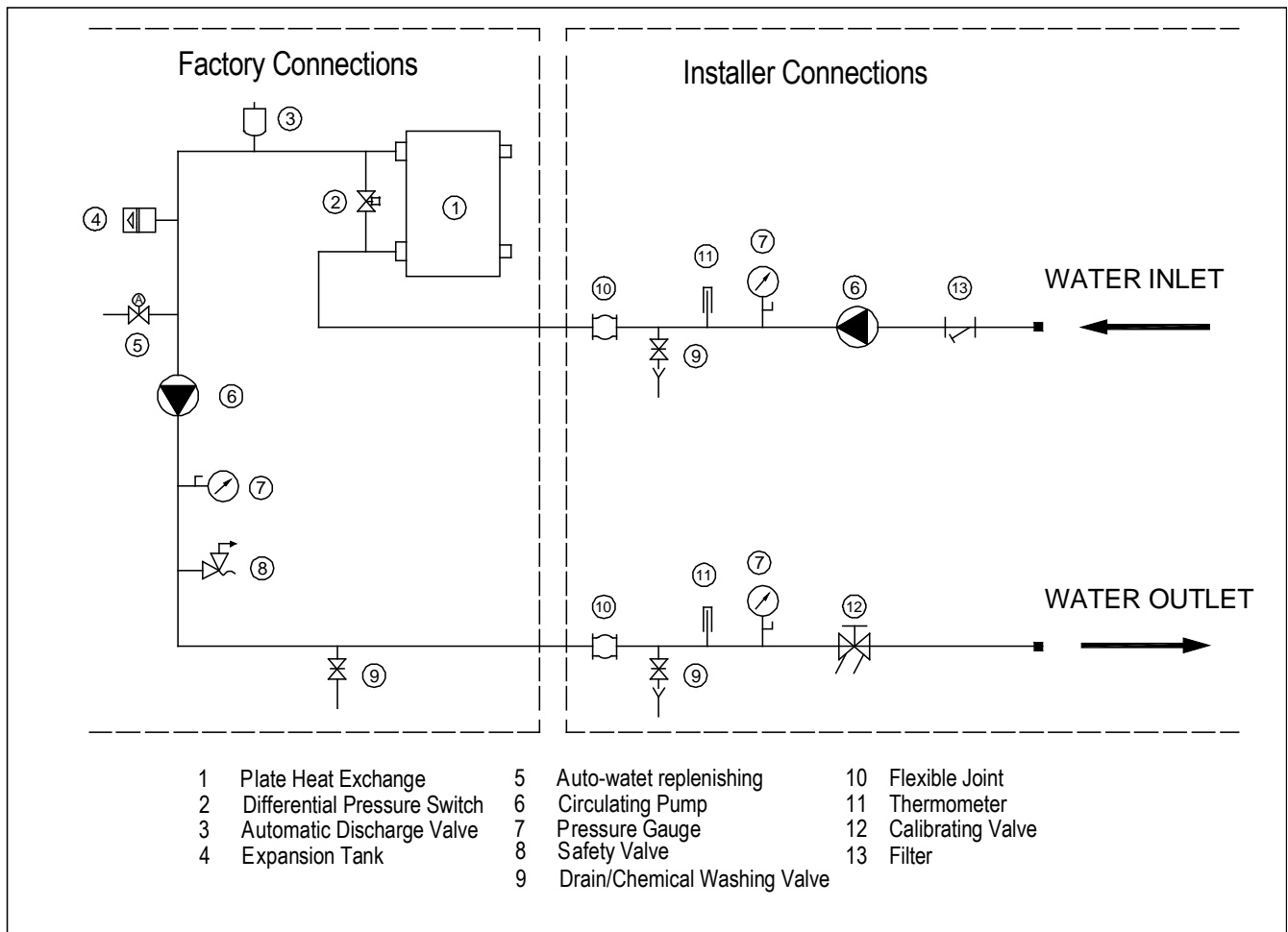
### 15.3 Hydraulic connection

The choice and installation of components is the responsibility of the installer who should follow good working practice and current legislation. Before connecting the pipes, make sure they do not contain stones, sand, rust, or others which might damage the unit. Construction of a bypass is recommended to enable the pipes to be washed through without having to disconnect the unit (see drain valves). The connection piping should be supported in such a way as to avoid it weighing on the unit. It is recommended that the following devices are installed in the water circuit of the evaporator. A hydraulic safety valve shall be mounted in water system, which should open constantly.

**Connecting drawing of pipeline system  
MGC-V5W/D2N1 & MGC-V7W/D2N1**



**MGC-V10W/D2N1, MGC-V12W/D2N1, MGC-V12W/D2RN1, MGC-V14W/D2RN1 & MGC-V16W/D2RN1**



If the installation requires a useful head higher than that obtained by installing a pump assembly and storage tank, it is recommended that an additional pump is installed on the unit. Provided the additional pump installed inside of unit, the pump must be connected close to plate heat exchanger. Provided the pump installed outside of unit, the pump shall be connected at water pipe's outlet. The pump can be easily installed in the unit by removing the pump connection pipe. Connect to terminal PL, PN on the electric panel.

### Important

- 1) The chillers must be provided with a filling/top-up system connected to the return line and a drain cock in the lowest part of the installation. Installations containing anti-freeze or covered by specific legislation must be fitted with hydraulic disconnections.
- 2) The manufacturer is not liable for obstruction, breakage or noise resulting from the failure to install filters or vibration dampers. Particular types of water used for filling or topping up must be treated with appropriate treatment systems.

### 15.4 Design of the store tank in the system

- kW is the unit for cooling capacity, L is the unit for (G) minimum water flow volume in the formula.

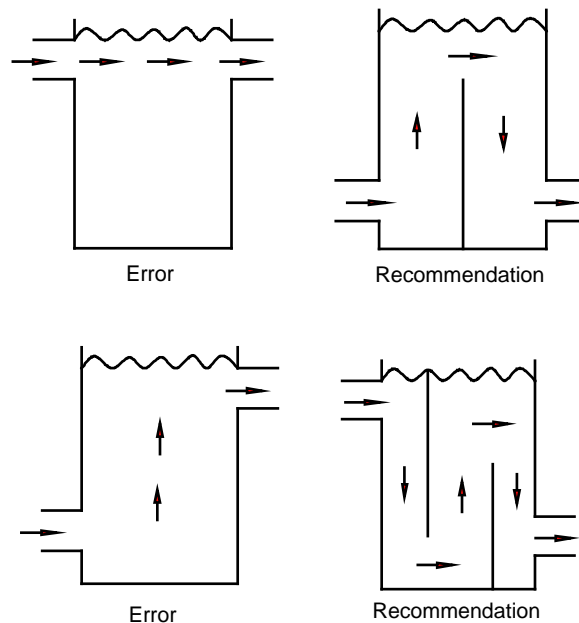
Comfortable type air conditioner

$$G = \text{cooling capacity} \times 2.6L$$

Process type cooling

$$G = \text{cooling capacity} \times 7.4L$$

- In certain occasion (especially in manufacture cooling process), for conforming the system water content requirement, it's necessary to mount a tank equipping with a cut-off baffle at the system to avoid water short-circuit, Please see the following schemes:



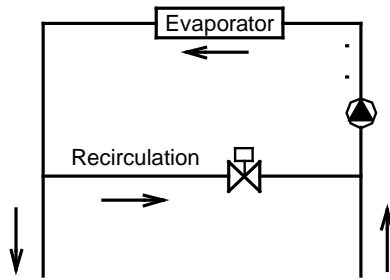
### 15.5 Chilled water flow

#### Minimum chilled water flow

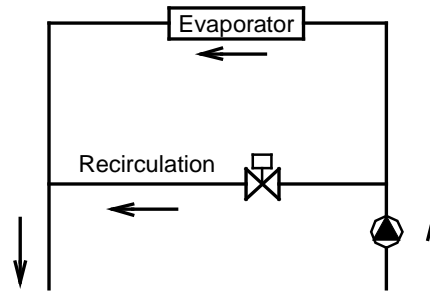
The minimum chilled water flow is shown in the below table.

If the system flow is less than the minimum unit flow rate, the evaporator flow can be recalculated, as shown in the diagram.

For minimum chilled water flow rate



For maximum chilled water flow rate



**Maximum chilled water flow**

The maximum chilled water flow is limited by the permitted pressure drop in the evaporator. It is provided in the below table. If the system flow is more than the maximum unit flow rate, bypass the evaporator as shown in the diagram to obtain a lower evaporator flow rate.

**Minimum and maximum water flow rates**

Item	Water flow rate(m <sup>3</sup> /h)	
	Minimum	Maximum
MGC-V5W/D2N1	0.77	0.95
MGC-V7W/D2N1	1.08	1.32
MGC-V10W/D2N1	1.54	1.89
MGC-V12W/D2N1	1.72	2.11
MGC-V12W/D2RN1	1.72	2.11
MGC-V14W/D2RN1	1.93	2.36
MGC-V16W/D2RN1	2.24	2.73

**15.6 Design of expansion tank**

If a closed expansion tank with its filled volume of air is too small, the system pressure will easily exceed the maximum allowable pressure and cause water to discharge from the pressure relief valve, thus wasting water. If the closed tank is too large, when the water temperature drops, the system pressure may decrease to a level below the minimum allowable value and cause trouble in the air vent. Therefore, accurate sizing of a closed expansion tank is essential.

For diaphragm expansion tanks, the minimum volume of the water tank, V<sub>t</sub>, gal (m<sup>3</sup>), can be calculated by the following formula, recommended by ASHRAE Handbook 1996, HVAC Systems and Equipment:

$$V_t = V_s \left\{ \frac{v_2/v_1 - 1 - 3\alpha(T_2 - T_1)}{1 - p_1/p_2} \right\}$$

T<sub>1</sub>=lower temperature, °F (°C)

T<sub>2</sub>=higher temperature, °F (°C)

V<sub>s</sub>=volume of water in system, gal(m<sup>3</sup>)

p<sub>1</sub>=absolute pressure at lower temperature, psia (kPa abs.)

p<sub>2</sub>=absolute pressure at higher temperature, psia (kPa abs.)

v<sub>1</sub>, v<sub>2</sub> =specific volume of water at lower and higher temperature, respectively, ft<sup>3</sup>/lb(m<sup>3</sup>/kg)

α =linear coefficient of thermal expansion; for steel, α =6.5x10-6in./in · °F(1.2x10-5per°C); For copper, α =9.5x10-6in./in · °F(1.7x10-5per°C)



In a chilled water system, the higher temperature T2 is the highest anticipated ambient temperature when the chilled water system shuts down during summer. The lower temperature in a heating system is often the ambient temperature at fill conditions (for example, 50°F or 10°C).

### 15.7 Water quality control

When industrial water is used as chilled water, little furring may occur; however, well water or river water, used as chilled water, may cause much sediment, such as furring, sand, and so on. Therefore, well water or river water must be filtered and softened in softening water equipment before flowing into chilled water system. If sand and clay settle in the evaporator, circulation of chilled water may be blocked, and thus leading to freezing accidents; if hardness of chilled water is too high, furring may occur easily, and the devices may be corroded. Therefore, the quality of chilled water should be analyzed before being used, such as PH value, conductivity, concentration of chloride ion, concentration of sulfide ion, and so on.

PH	6~8
Total hardness	less than 50 ppm
Electrical conductivity	less than 200 mV/cm (25℃)
Sulfide ion	none
Chlorine ions	less than 50 ppm
Ammonia ions	none
Sulfate ion	less than 50 ppm
Silicon	less than 30 ppm
Total iron	less than 0.3 ppm
Sodium ion	No requirement
Calcium ion	less than 50 ppm

#### Filling the installation

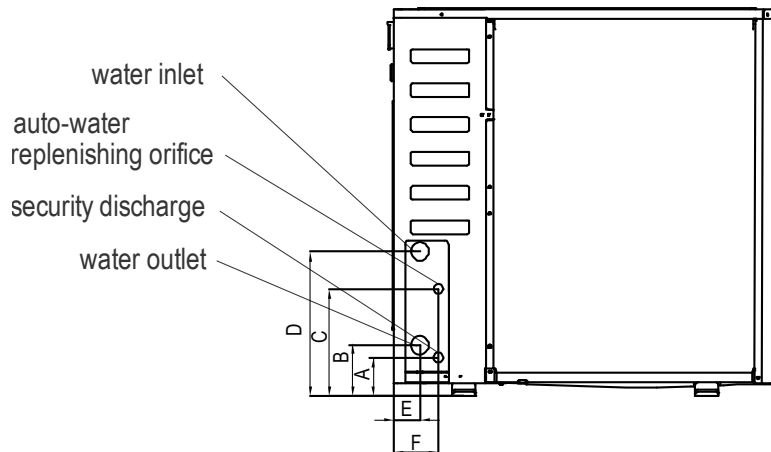
- Before filling, check that the installations drain cock is closed.
- Open all installation and terminal air vents.
- Open the gate valves.
- Begin filling, slowly opening the water filling cock outside the unit.
- When water begins to leak out of the terminal air vent valves, close them and continue filling until the pressure gauge indicates a pressure of 1.5 bars.

#### Emptying the installation

- Before emptying, place the mains switch in the “off” position.
- Make sure the installation fill/top-up water cock is closed.
- Open the drain cock outside the unit and all the installation and terminal air vent valves.

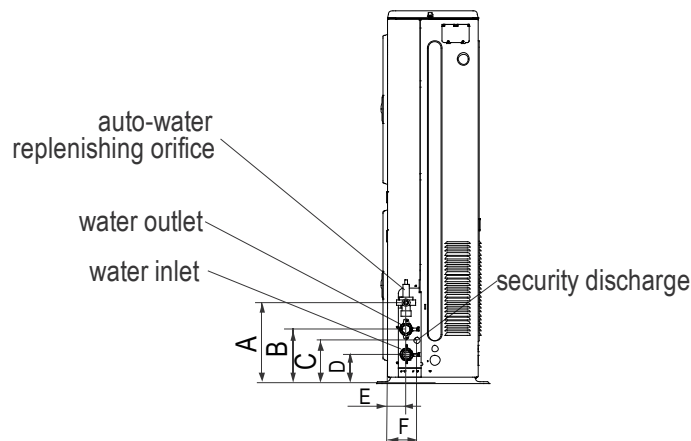
## Size and position of connections

### For MGC-V5W/D2N1 & MGC-V7W/D2N1



Model	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	Water inlet/outlet (Ø)	Auto-water replenishing (Ø)	Security discharge (Ø)
MGC-V5W/D2N1 MGC-V7W/D2N1	95	126	250	360	68	114	R1	G1/2	G1/2

### For MGC-V10W/D2N1, MGC-V12W/D2RN1, MGC-V14W/D2RN1, MGC-V16W/D2RN1



Model	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	Water inlet/outlet (Ø)	Auto-water replenishing (Ø)	Security discharge (Ø)
MGC-V10W/D2N1 MGC-V12W/D2N1 MGC-V12W/D2RN1 MGC-V14W/D2RN1 MGC-V16W/D2RN1	300	195	155	105	68	105	R5/4	G1/2	G1/2

### Important

- The installation must be filled to a pressure of between 1 and 2 bars.
- It is recommended that this operation be repeated after the unit has been operating for a number of hours. The pressure of the installation should be checked regularly and if it drops below 1 bar, the water content should be topped-up.
- Check the hydraulic tightness of joints.
- An all-pole disconnection device which has at least 3mm separation distance in all pole and a residual current device (RCD) with the rating of above 10mA shall be incorporated in the fixed wiring according to the

national rule the appliance shall be installed in accordance with national wiring regulations.

e) If the fluid in the circuit contains anti-freeze, it should not be allowed to drain freely as it is pollutant. It should be collected for possible reuse. When draining after heat pump operation, take care as the water may be hot (up to 50°).

### 15.8 Electrical connection

The unitary mini chillers leave the factory already wired, and require the installation of an omni polar thermal overload switch, a lockable mains disconnecting switch for the connection to the mains power supply, and the connection of the flow switch to the corresponding terminals. All the above operations must be carried out by qualified personnel in compliance with the legislation in force.

For all electrical work, refer to the electrical wiring diagrams in this manual. You are also recommended to check that the characteristics of the mains electricity supply are adequate for the absorptions indicated in the electrical characteristics table below, also bearing in mind the possible use of other equipment at the same time.



#### Important

- Power to the unit must be turned on only after installation work (hydraulic and electrical) has been completed.
- All electrical connections must be carried out by qualified personnel in accordance with legislation in force in the country concerned.
- Respect instructions for connecting phase, neutral and earth conductors.
- The power line should be fitted upstream with a suitable device to protect against short-circuits and leakage to earth, isolating the installation from other equipment.
- Voltage must be within a tolerance of  $\pm 10\%$  of the rated power supply voltage for the unit (for three phase units, the unbalance between the phases must not exceed 3%). If these parameters are not respected, contact the electricity supply company.
- For electrical connections, use double insulation cable in conformity with current legislation in the country concerned.
- An omnipolar thermal overload switch and a lockable mains disconnecting switch, in compliance with the CEI-EN standards (contact opening of at least 3mm), with adequate switching and residual current protection capacity based on the electrical data table shown below, must be installed as near as possible to the appliance.
- The devices on the unit must be lockable. An efficient earth connection is obligatory. Failure to earth the appliance absolves the manufacturer of all liability for damage.
- Do not use water pipes to earth the unit.