**Carrier**
United Technologies
turn to the experts

**Technical
Data**

**AQUASMART®
30EX / 30EV
Scroll-Type Chiller with
Air Condensation**
**15 a 120TR**

*Aquasmart*

DC Inverter R410A

# 1. Features/Benefits

The 30E line modular chillers bring to the market a product concept aimed at the highest performance and energy efficiency, with versions in fixed and variable speed, and presents values of superior efficiency to the latest requirements under the ASHRAE 90.1 standard.

Using the "Tandem" concept of parallel compressors, the 30E line provides greater reliability and robustness in a compact chassis with reduced floor area and can be combined with other modules to generate cooling systems from 15 to 120 TR.

Flying Bird type fans with exclusive Carrier technology and DC motor drive complete the assembly, providing even greater energy efficiency, which combined with the use of the Puron® HFC-410A refrigerant fluid proves the line's concern with the environment.

ASHRAE 90.1 COMPLIANT

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### 1.1 Constructive Features

#### *Cabinets*

Built on galvanized and phosphatized steel sheet structures, the chiller cabinets are painted with polyester powder in light gray followed by oven drying.



30EVA15          30EXA15

Figure 1

#### *Condenser Coils*

Internal grooved, 3/8 in. (9,53 mm) diameter copper tube coils and mechanically expanded with Gold Fins (with higher resistance to corrosion) tested for mechanical strength and leakage.

#### *Compressors*

The units are equipped with Scroll compressors, which provide high energy efficiency, high reliability and low noise level. The 30EX units offer the market the Tandem concept (parallel compressors) for the cooling circuit. This configuration allows to achieve high levels of energy efficiency by operating through the staging logic, which has an algorithm suitable for adjustment according to thermal load, in addition to providing better control of the cold-water outlet temperature.

The 30EV units also offer the market the Tandem concept for the cooling circuit. This equipment also has a compressor with DC inverter technology, being the only Chiller produced in the Brazilian market to offer this type of compressor for this category of products, besides reaching levels of energy efficiency at the highest levels in relation to global standards. Its control and staging algorithm also provides an even more accurate control of the cold-water outlet temperature and thermal comfort in the air-conditioned environment.



Figure 2

## Compressor Shields

The 30EX and 30EV chillers offer the highest technology in actuating and protecting the system. Through software routines the units have factory protections that preserve the integrity of all electrical and electronic components, the main ones being:

- Phase Failure (R, S, T)
- Phase Sequence (R, S, T)
- High Discharge Pressure
- Low Suction Pressure
- High Discharge Temperature
- High Suction Temperature
- Low Suction Temperature
- Freezing on the Evaporator
- Compressor Cycling
- High Current (compressor and motor)
- Oil Return from

## Switchboard

The 30EX and 30EV chillers offer the highest technology in actuating and protecting the system. The software protection and operation routines enable longer life of the unit and its components. The control voltage offered by the pump unit and On / Off valve is 24Vac.

## Schrader Valve

The units have access to the cooling system through Schrader valves, located next to the suction and liquid locking valves.

## Thermostatic Expansion Valve

The units are equipped with a thermostatic expansion valve, allowing optimum response throughout the chiller operation range.

## Fans

The 30EX and 30EV chillers use Flying Bird IV propellers. This 4th generation Carrier-patented propeller offers ideal acoustic qualities, eliminating peaks at low frequencies where noise is most inconvenient. They also use a DC motor to meet the highest energy efficiency requirements, operating with variable air flow in the ventilation assembly through motor speed that has a range of 160 to 860 RPM, allowing an efficient control of condensation.
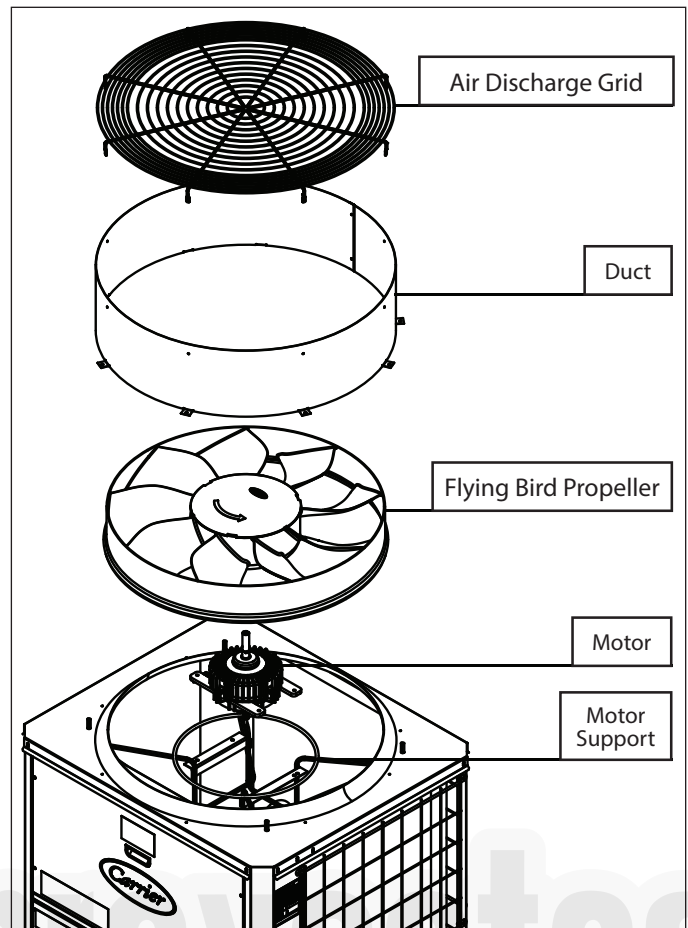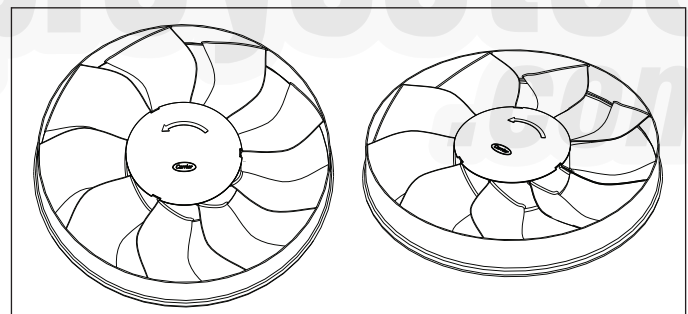


Figure 3: Fan cutaway view



Figure 4: Flying Bird Propeller

# 1. Features/Benefits (cont.)

## IHM Control

The Aquasmart line control (fixed and variable speed model) has a user-friendly interface and allows:

- Daily and weekly programming;
- Reading of all system parameters;
- Log of all errors and alarms of each system unit;
- Incorporated to the master machine module;
- Same contorl for the entire line;
- Access to system configuration;
- Alarms reset.

**The HMI control will only be present in the system master unit.**

> **NOTE**
>
> The closed communication protocol can be opened by MODBUS RTU through a converser available as optional item. (Required for the master unit only).
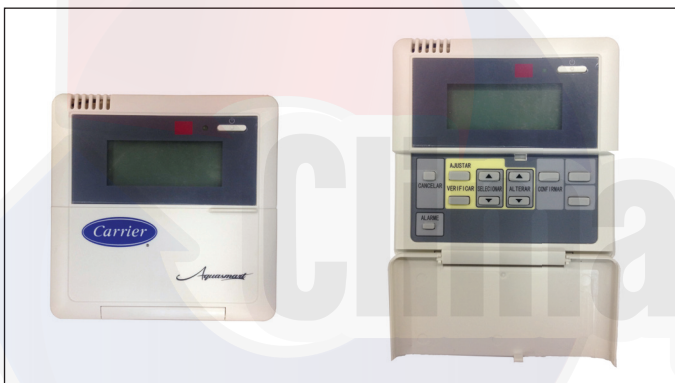


Figure 5

## Evaporator

The units are equipped with 316 stainless steel welded plate evaporators (connections in 304), which allow highly efficient thermal exchange and distribution of the refrigerant flow, in addition to low pressure drop on the water side in a compact equipment. The Victaulic® type connections allow quick and safe connection to the water circuit. The evaporator also has a safety valve on the refrigerant side.
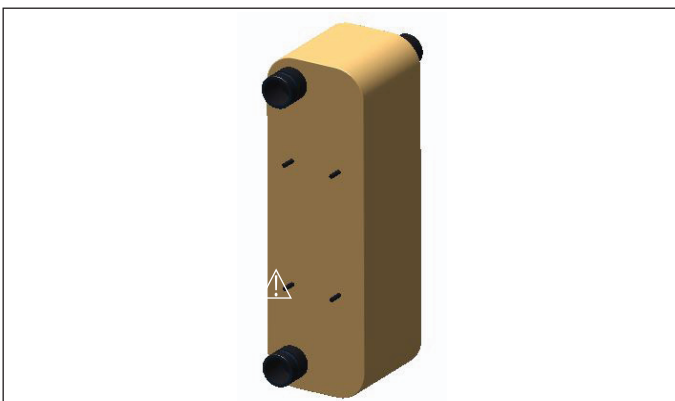


Figure 6

## Oil Sump Heating Resistor

All 30EX and 30EV units leave the factory equipped with an oil sump resistor. The use of an oil sump resistor is essential to prevent refrigerant build-up in the oil during equipment shutdowns.

Make sure that the heaters are firmly attached to prevent them from moving.

> ⚠ **IMPORTANT**
>
> The 30EX and 30EV have oil resistors in the compressors. Make sure that all compressors are heated before starting.

The units have oil sump resistors in the compressors. The resistors are connected depending on the outside temperature. If the outside temperature is below 16 ° C, leave the units energized for 24 hours before turning them on.

## Evaporator Protection

Each 30EX and 30EV unit is supplied with electronic flow switch (field installed) as the main protection against evaporator underflow. In addition to flow switch, the following protections are used by the system:

- Measuring of the outlet water temperature of each unit;
- Measuring of coolant temperature at the cooler inlet;
- Interlocking with the system water pump;
- Flow switch for each system unit.

# 2. Nomenclature

**30EXA15226MAH---S**

| Machine | |
|---|---|
| 30E | Air Conditioning Modular |

| Module Type | |
|---|---|
| X | Fixed Velocity |
| V | Variable Velocity |

| Design Series | |
|---|---|
| A | |

| Nominal Capacity | |
|---|---|
| 15 | 15TR |

| Voltage | |
|---|---|
| 22 | 220V |
| 38 | 380V |
| 44 | 440V |

| Frequency | |
|---|---|
| 6 | 60Hz |

| Request Type | |
|---|---|
| S | Standard |

| Reserved Digits | |
|---|---|
| - | Reserved digits |

| Controls | |
|---|---|
| - | No control (slave only) |
| H | Standard HIC (w/o Modbus) |
| B | Standard HIC (w/ Modbus) |

| Accessories | |
|---|---|
| - | - |
| A | Filter Y + Victaulic-type connection |
| B | Power Factor Correction Capacitor (30EXA only) |
| C | Filter Y + Victaulic-type connection + Power Factor Correction Capacitor (30EXA only) |

| Unit Type * | |
|---|---|
| M | Master |
| E | Slave |

*Inverter unit will always be the master machine.

## Legend:

**BC1** – Communication terminals
**BC2** – Field terminals
**CMCT** – Condensor Middle Temperature Sensor
**DIST** – Discharge Temperature Sensor
**DPS** – Differential Pressure Switch
**FSC** – Fixed Compressor
**OAT** – Environment Temperature Sensor
**RLWT** – System Water Temperature Sensor REWT – System Water
**Inlet Temperature SST** – Saturated Suction Temperature Sensor
**SUCT** – Suction Temperature Sensor

**VSC** – Inverter Compressor
**ULWT** – Unit Water Outlet Temperature Sensor
**FLWD** – Difference of temperature between system inlet and outlet at full load
**WP** – Water Pump
**WV** – Water Valve
**WVSCSDT** – Water valve opening delay
**WFC** – Unit flow sensor
**FP** – Power factor
**CFP** – Power Factor Correction Capacitor

# 3. Combinations

The individual 30EX and 30EV chillers can be combined to create systems with nominal capacity up to 120TR. The Inverter module guarantees a fine tuning of the output temperature, while the fixed modules ensure the required full load and a high level of staging in the system.

With each module comprised of two compressors in parallel, the interconnected systems guarantee a high degree of modulation in partial loads. The control system is programmed to always make a rotation between the compressors in the machines of a system, thus guaranteeing a homogeneous operation time and, consequently, longer service life for the compressors.

This rotation system applies to the fixed speed drives of the system. In the INVERTER unit, the variable compressor will always be active by fine tuning the system capacity.

Each system will always have a master machine, which will control the ice water pump and manage the entire system through the water inlet and outlet temperature readings of the mix. Ocasionally, the system can remain in operation in the event of failure of a slave unit, which can be isolated for maintenance and repair while the rest of the system operates normally. In the event of failure in the master unit, you can isolate the failed unit and turn any other system unit into master.

## 3.1 Inverter System

In an Inverter system, the Inverter module will always be the master machine.

| Models | Nominal Capacity (TR) | Sequence of Installation (Inverter Machine, address 0000, will always be the Master) |
|---|---|---|
| 30EVA15 | 15 | V |
| (01x) 30EVA15 + (01x) 30EXA15 | 30 | V + F |
| (01x) 30EVA15 + (02x) 30EXA15 | 45 | V + F + F |
| (01x) 30EVA15 + (03x) 30EXA15 | 60 | V + F + F + F |
| (01x) 30EVA15 + (04x) 30EXA15 | 75 | V + F + F + F + F |
| (01x) 30EVA15 + (05x) 30EXA15 | 90 | V + F + F + F + F + F |
| (01x) 30EVA15 + (06x) 30EXA15 | 105 | V + F + F + F + F + F + F |
| (01x) 30EVA15 + (07x) 30EXA15 | 120 | V + F + F + F + F + F + F + F |

*Inverter Line*

Table 1

## 3.2 Fixed Systems

| | Nominal Capacity (TR) | Sequence of Installation (Machine, address 0000, will always be the Master) |
|---|---|---|
| 01x 30EXA15 | 15 |  |
| 02x 30EXA15 | 30 |  |
| 03x 30EXA15 | 45 |  |
| 04x 30EXA15 | 60 |  |
| 05x 30EXA15 | 75 |  |
| 06x 30EXA15 | 90 |  |
| 07x 30EXA15 | 105 |  |
| 08x 30EXA15 | 120 |  |

Table 2

| NOTE |
|---|
| *In the event of a defect in the master unit, the system will continue to operate; however, you can transform one of the other fixed units (fixed slave 3 on) on the master machine, changing the address. In this case, disconnect the communication cable from the master unit and switch the water sensors to the new master units.  Information valid both for the Inverter systems as well as for the Fixed systems.* |

| NOTE |
|---|
| *To make sure the other units in the system continue to operate in case of electric power outage     from the Master units and slave 1, make sure to connect the 4 (four) communication cables of terminal BC1 (A, B, 12VDC & GND) + a source of 12VDC/1A (connect to terminals 12VDC and GND).* |

# 4. Physical Data

| | | 30EVA15 | 30EXA15 |
|---|---|---|---|
| Nominal Capacity | TR | 15 | 15 |
| Effective Capacity | kW | 42,2 | 51,4 |
| COP (full load) | - | 3,1 | 3,1 |
| IPLV | - | 5,1 | 5,0 |
| Capacity control range (per unit) | % | 16 to 100% | 50 / 100% |
| Power supply | - | 220V / 380V / 440V (three-phase) | |
| Control - Water pump and on/off valves | - | 24 VCA | |
| Flow Switch / Remote Alarm power supply | - | 24VCA/220VCA | |
| Number of circuits | - | 1 (tandem) | |
| **Compressor** Type | - | Scroll | |
| Quantity | - | 2 | |
| Nominal speed (60Hz) | rpm | 3500 (Fixed speed) | |
| Oil charge | L | 1.70 (FV68S -Polyvinyl Ether) | 1.65 (Polyol Ester) |
| Recommended oil | - | Daphne Hermetic Oil FVC 68D | Copeland Ultra 22CC |
| Oil sump resistor | W | 70 | |
| **Coil** Face area | m² | 3,05 | |
| Number of Rows | - | 2 | |
| Tube diameter | mm (in) | 9,5 (3/8) | |
| Fins per inch | FPI | 20 | |
| Type | - | Pre-coated (Gold Fin) corrugated aluminum fins and internally grooved copper tubes | |
| **Fan** Type / Quantity | - | Axial / 1 | |
| Rotation | RPM | Variable between 160 – 860 | |
| Flow rate | m³/h | 3000 - 16000 | |
| Static Pressure Available | mmCA | 0 | |
| Motor quantity / type | - | 1 / BLDC | |
| Motor power | W | 850 | |
| **Evaporator** Type | - | Exchanger to stainless brazed plates | |
| Water volume | L | 7 | |
| Nominal flow | m³/h | 7,2 | |
| Maximum pressure on the water side | kPa | 1000 | |
| Fittings | - | Victaulic 63.5 type (2.1/2 in) | |
| Refrigerant – Type | - | R-410A | |
| Refrigerant – Quantity | kg | 12,3 | 12 |
| Weight (no packaging) | kg | 302 | 292 |
| Dimensions (LxAxP) | mm | 990 x 860 x 1743 | |

**NOTES:**

*1. Rated according to AHRI\* standard 550/590  at default nominal value conditions.*

*2. The default nominal value conditions are as follows:*

> *Evaporator conditions:*
>
> > *- Water outlet temperature: 6.7℃ (44°F) Water inlet temperature: 12.2℃ (54°F)*
> > *- Fouling factor: 0,000018 m² x ℃/W (0.00010 h x ft² °F/BTU)*
>
> *Condenser conditions:*
>
> > *- Outside air temperature: 35℃ (35.00℃)*

*\* Air Conditioning, Heating and Refrigeration Institute - USA.*

# 5. Data for Hydraulic Interconnection

## 5.5. Data for Hydraulic Interconnection and System Water Sensors

The Aquasmart system always relies on the modulation between its units to ensure that the system's outlet water (mixing water) is meeting the temperature setpoint set on the master machine.

Simple and safe operation is achieved by adopting a set of sensors that allows the reading of control temperatures and keeps both the system and each module operating safely. The main safety elements are:

| Equipment | Key | Function | Supply |
|---|---|---|---|
| Inlet water sensor | REWT | Evaluate whether the inlet temperature is within the operating values for the system. | Factory default (field installation) |
| Outlet water sensor (system) | RLWT | Main system control sensor, where it allows the system to perform the modulation to guarantee the delivery of water at the desired temperature. | Factory default (field installation) |
| Outlet water sensor (unit) | ULWT | Evaluate the outlet temperature of each unit for freeze protection. | Factory default (field installation) |
| Unit flow sensor | WFC | Freeze protection due to lack or low water flow per unit. | Factory default (field installation) |
| Differential pressure switch | DPS | Switch that switches to identify pressure difference between water inlet and outlet. | Field installation. Mandatory for ODU>=4. |
| Pump drive | 13 and 14 of terminal BC2 (K4) | Pump drive control (WP), to ensure the correct and safe operation of the units. | The pump is not shipped from the factory, only the 24VAC command. |
| Valve actuation | 10 to 12 of terminal BC2 (K2) | Valve drive control (WV), to ensure the correct and safe operation of the units. | The valve is not shipped from the factory, only the 24VAC command. |
| Filter Y | - | Filter for heat exchanger protection | Factory optional |

Table 4
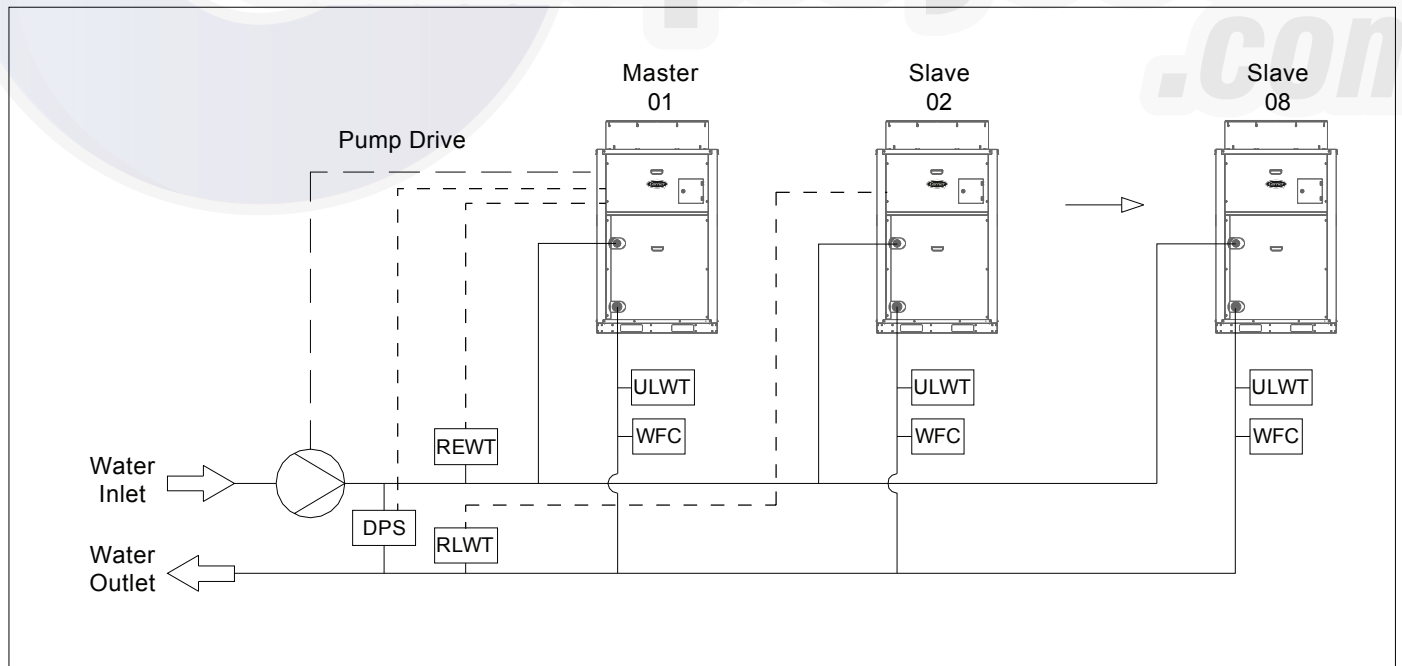


Figure 7 - Typical schematic drawing of the system sensor positions

| NOTE |
|---|
| The layout of the modules and piping design depend on the characteristics of each installation. It is the customer's responsibility to design their piping and install the modules meeting the minimum requirements required by Carrier. |

# 5. Hydraulic Interconnection Data (cont.)

## 5.1 Water flows in the chillers

The Aquasmart system operates with the concept of flow through the modules in operation, allowing a more accurate temperature control. To ensure a constant outflow of chilled water, it is advisable to use a primary and secondary ring, resulting in greater accuracy in the outlet water temperature.

**NOTE**

In the use of primary and secondary circuits, it is common to use a cooled water tank (chillers system outlet) and a return water tank.

## 5.2 System Hydraulic Interconnection

The control allows two types of hydraulic interconnection: Interconnection with Single Pump or Individual Pump. It is necessary to configure the control.

### A) Interconnection with single pump

Concept where there is only one power pump for the system. An ON / OFF valve must be installed for each module that will control it individually. This valve will open when the chiller is driven by the master unit and will remain closed while the chiller is turned off. Interconnection with a single pump can be done using a variable flow pump (field installation), which allows absorbing the flow variations of the modules on / off function. If no variable flow is used, a 3-way valve must be used (see a1) instead of the two-way ON/OFF valve.

⚠ **IMPORTANT**

The chiller does not have on its electrical switchboard a power system for the pumps, only signal sending to on / off. The pump power switchboard must be installed in the field
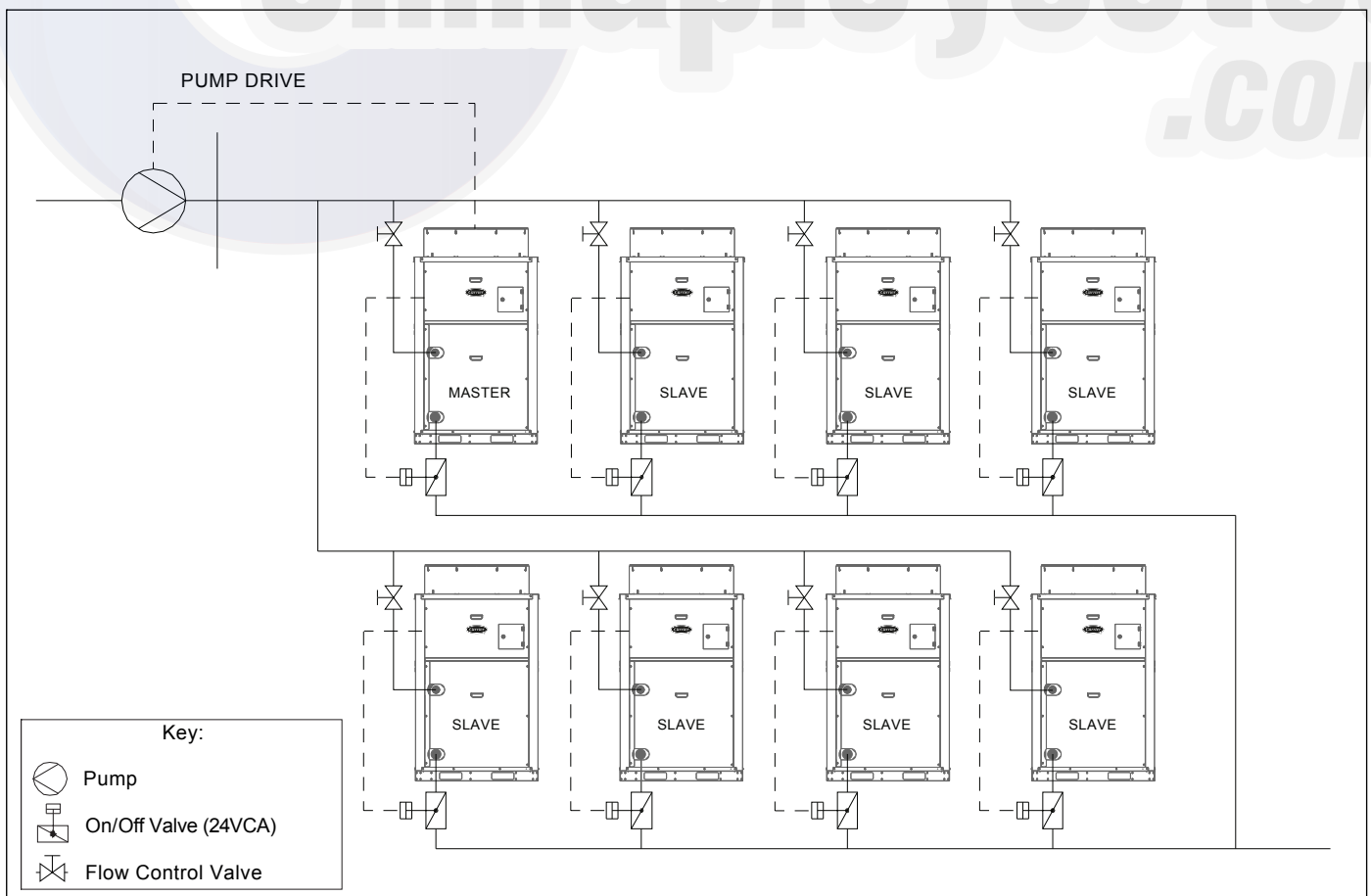


Figure 8: Typical Single-Pump Interconnection Schematic Drawing

## a1) Interconnection with single pump and use of a 3-way valve

Alternative concept for using a good quality power pump for the system. A three-way valve where the bypass must be discharged after the RLWT sensor. This adjustment is required to provide system stability and a more precise control.

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### ⚠ IMPORTANT

The chiller does not have on its electrical switchboard a power system for the pumps, only signal sending to on / off. The pump power switchboard must be installed in the field.

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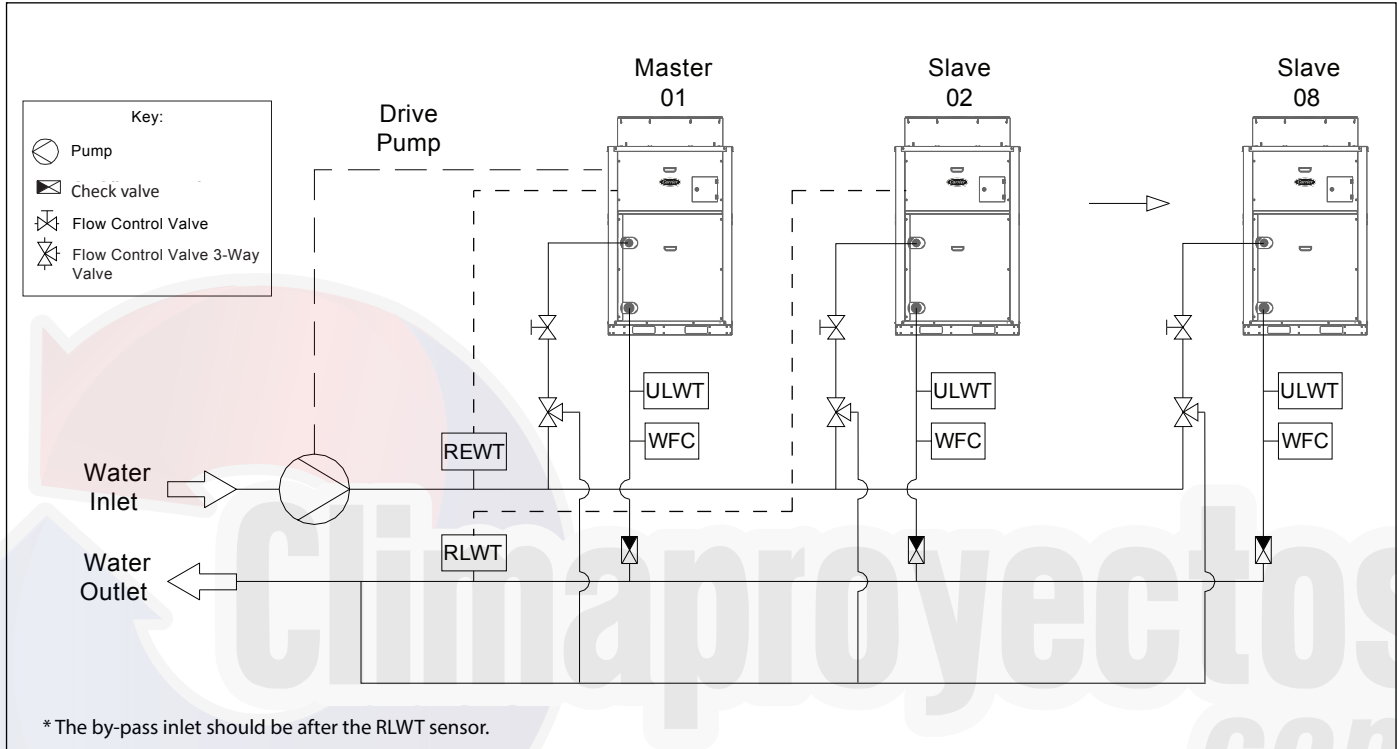


Figure 9: Typical Interconnection schematic drawing with a single 3-way valve pump

# 5. Hydraulic Interconnection Data (cont.)

## B) Interconnection with single pump

Concept where each module will be interlocked with its dedicated pump, facilitating the flow balance in each unit. When a module is switched off (by demand or due to a triggered alarm), the pump will automatically shut down.

| ⚠ IMPORTANT |
|---|
| The chiller does not have on its electrical switchboard a power system for the pumps, only signal sending to on / off. The pump power switchboard must be installed in the field. |
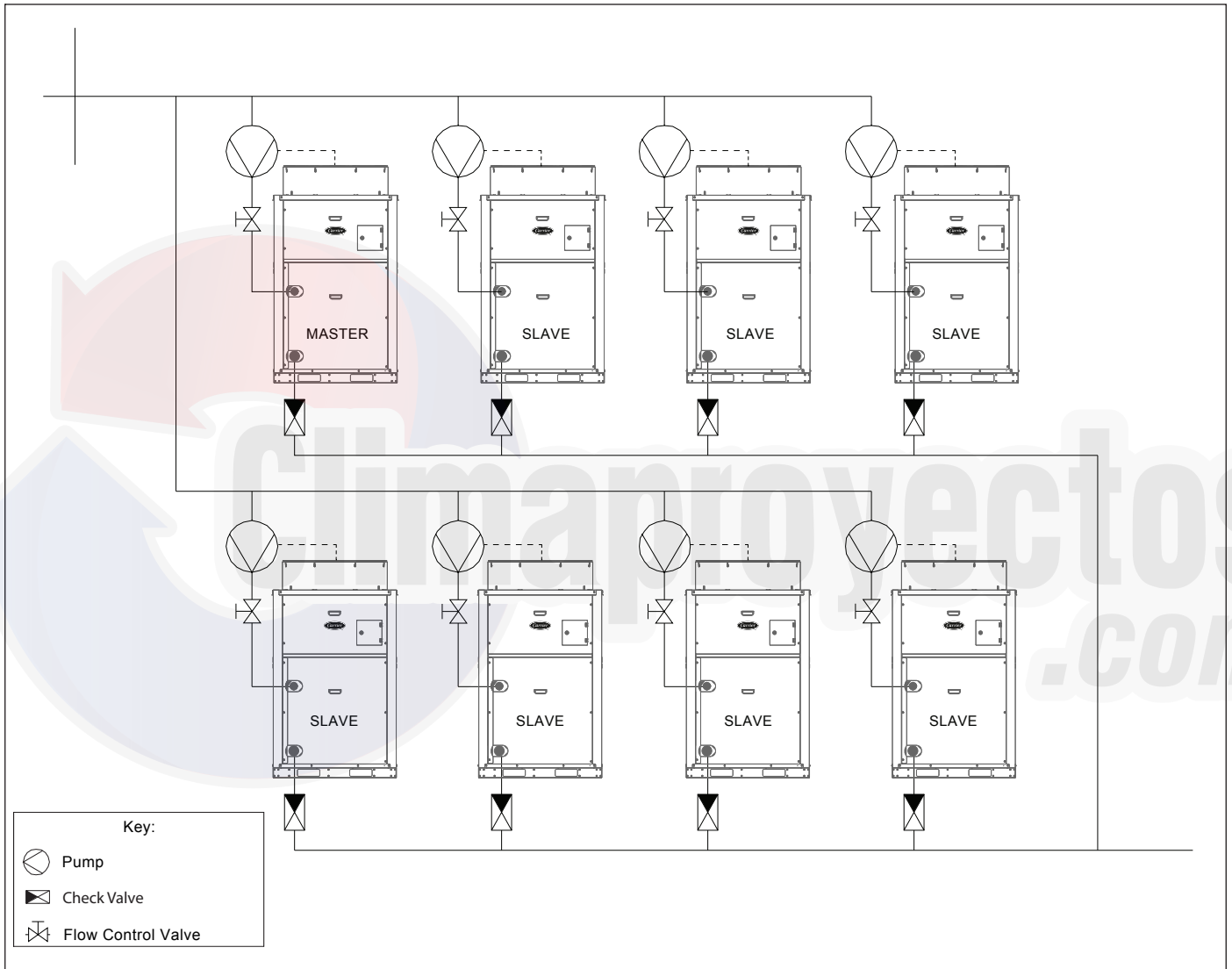


Figure 10: Typical Individual-Pump Interconnection Schematic Drawing

| NOTE |
|---|
| For this interconnection model it is necessary to use a non-return valve at the outlet of each module. |

# 6. Data for Electrical Interconnection

The power supply must be individual per module. The switchboard has a power terminal for this connection.
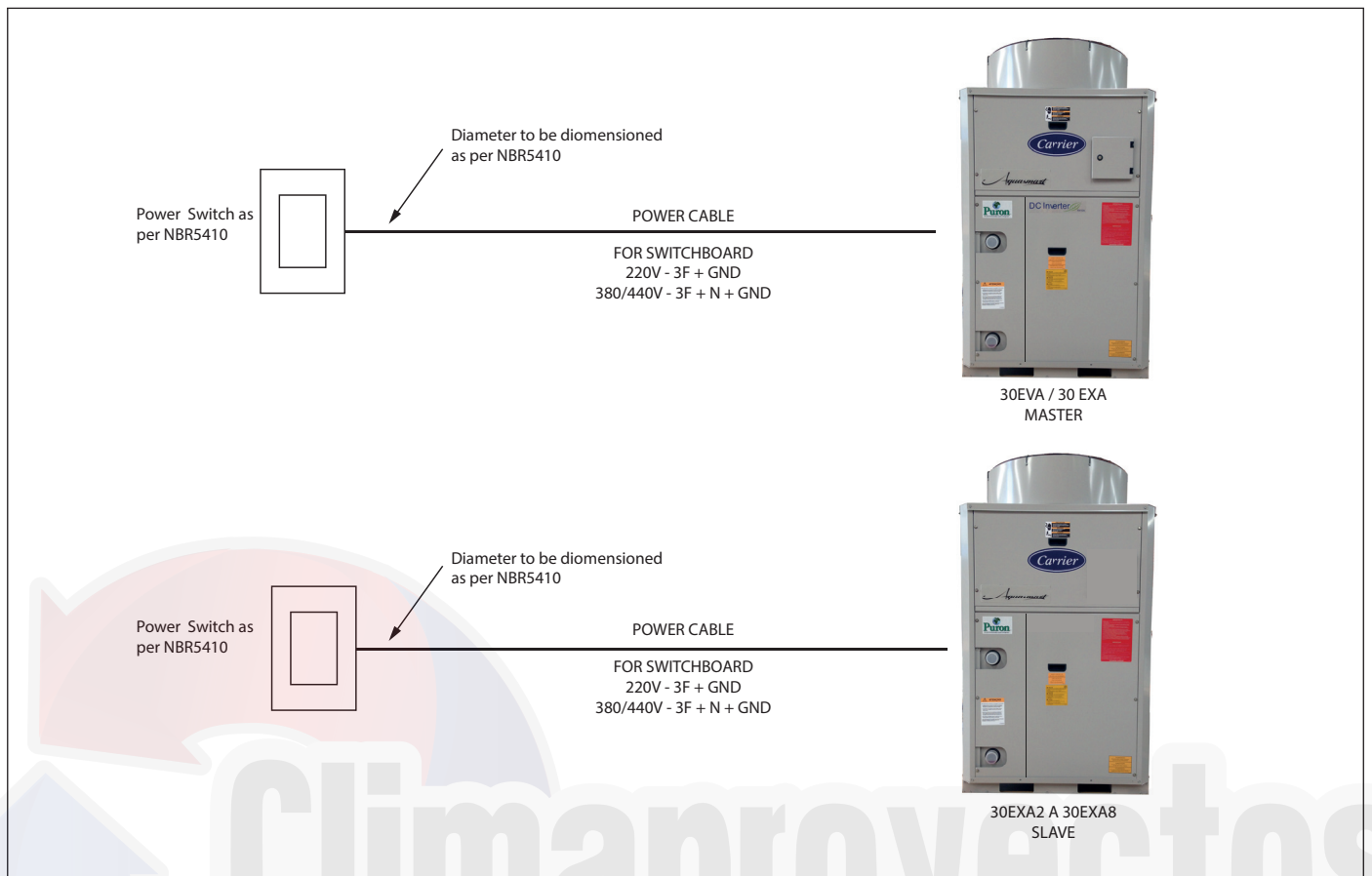


Figure 11

All modules must be interconnected via a communication terminal named BC1. The control must also be connected to this bus.
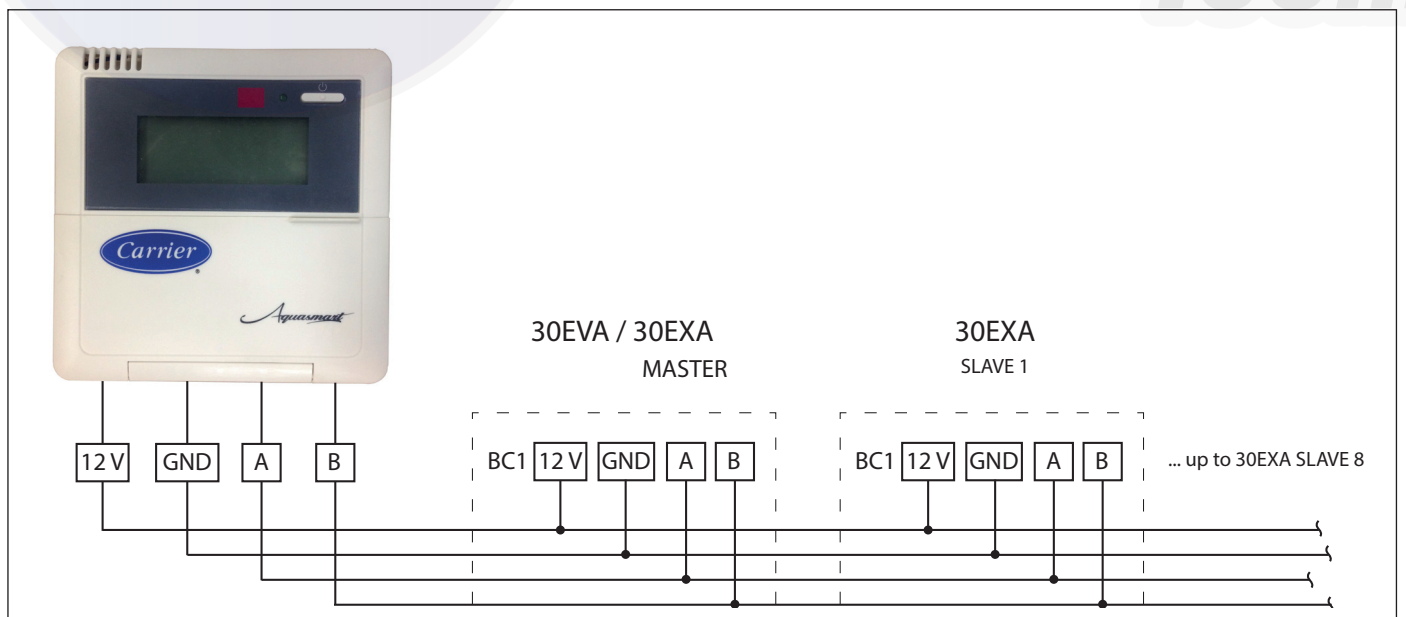


Figure 12

# 7. Selection Procedure

To select a modular chiller system, use the methodology presented with the example below:

A)  Determine the installation data:

- Capacity required:                                                                       130 kW
- Chilled Water Outlet Temperature (RLWT):                      8°C
- Water temperature differential on the evaporator:       5°C
- Air inlet temperature in the condenser:                          35°C
- Desired Inverter system

B)  Based on the chiller Performance table and the evaporator charge drop curve (both under Performance Data in this catalogue):

- Inverter Unit Definition:
  - o Unit:                                              30EVA15
  - o Capacity:                                       43,9 kW
  - o Flow Rate:                                     7,5 m³/h
  - o Load loss on evaporator:              3,2 mca

- Definition of fixed units
  - o Unit:                                              30EXA15
  - o Capacity:                                       53,1 kW
  - o Number of Units:                         (130-43,9)/53,1 = 1,62 > 2 units
  - o Flow Rate per Unit:                     9,1 m³/h
  - o Load loss on evaporator:              3,9 mca

C) Final System

- Unit 30EVA15:                                     01
- Unit 30EXA15:                                     02
- Total Capacity:                                    150,1 kW (in nominal conditions)
- Total Flow:                                          25,7 m³/h
- Load Loss:                                           3,9 mca + piping loss

D) Notes

- Interpolations can be performed in the performance data tables for other installation data values, but extrapolations are not allowed.
- If the evaporator flow rate is variable, the rate of flow change shall not exceed 10% per minute. The minimum volumes of the primary water ring must be observed, as well as the minimum and maximum flow limits for each unit.
- There may be a greater loss of charge in the chiller when delta T is low.  A closed mixing circuit may help mitigate this.
- A lower head loss on the evaporator may occur when delta T is high.
- Poor water quality can lead to higher than standard fouling factors, resulting in lower capacity and higher power consumption (kW) for a given chiller, when compared to the same application with better water quality (and lower fouling factors).

# 8. Performance Data

## Aquasmart 15TR inverter full load

### Water Delta Temp. 3,0 °C

| TBS outdoor (°C) | Parameter | | 5,0 | 6,0 | 7,0 | 8,0 | 9,0 | 10,0 | 11,0 | 12,0 | 13,0 | 14,0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **20** | Capacity | KW | 46,1 | 46,9 | 49,1 | 50,6 | 52,1 | --- | --- | --- | --- | --- |
| | Eletrical Consumption | KW | 10,5 | 11,3 | 10,7 | 10,8 | 10,9 | --- | --- | --- | --- | --- |
| | Water Flow | m³/h | 13,2 | 13,4 | 14,1 | 14,5 | 14,9 | --- | --- | --- | --- | --- |
| | Loss on Exchanger | mCa | 1,0 | 1,1 | 1,2 | 1,2 | 1,3 | --- | --- | --- | --- | --- |
| **25** | Capacity | KW | 44,1 | 45,5 | 46,9 | 48,3 | 49,8 | 51,3 | 52,8 | --- | --- | --- |
| | Eletrical Consumption | KW | 11,4 | 11,5 | 11,6 | 11,7 | 11,8 | 11,9 | 12,0 | --- | --- | --- |
| | Water Flow | m³/h | 12,6 | 13,0 | 13,4 | 13,9 | 14,3 | 14,7 | 15,2 | --- | --- | --- |
| | Loss on Exchanger | mCa | 0,9 | 1,0 | 1,1 | 1,1 | 1,2 | 1,3 | 1,4 | --- | --- | --- |
| **30** | Capacity | KW | 41,8 | 43,2 | 44,6 | 46,0 | 47,4 | 48,8 | 50,3 | 51,7 | 53,2 | --- |
| | Eletrical Consumption | KW | 12,4 | 12,5 | 12,6 | 12,7 | 12,8 | 12,9 | 13,0 | 13,1 | 13,2 | --- |
| | Water Flow | m³/h | 12,0 | 12,4 | 12,8 | 13,2 | 13,6 | 14,0 | 14,4 | 14,8 | 15,3 | --- |
| | Loss on Exchanger | mCa | 0,8 | 0,9 | 1,0 | 1,0 | 1,1 | 1,2 | 1,2 | 1,3 | 1,4 | --- |
| **35** | Capacity | KW | 39,5 | 40,8 | 42,2 | 43,5 | 44,9 | 46,2 | 47,6 | 49,0 | 50,4 | 51,9 |
| | Eletrical Consumption | KW | 13,5 | 13,6 | 13,7 | 13,8 | 13,9 | 14,0 | 14,1 | 14,2 | 14,4 | 14,5 |
| | Water Flow | m/h | 11,3 | 11,7 | 12,1 | 12,5 | 12,9 | 13,3 | 13,7 | 14,1 | 14,5 | 14,9 |
| | Loss on Exchanger | mCa | 0,8 | 0,8 | 0,9 | 0,9 | 1,0 | 1,0 | 1,1 | 1,2 | 1,2 | 1,3 |
| **40** | Capacity | KW | 37,1 | 38,4 | 39,7 | 41,0 | 42,3 | 43,6 | 44,9 | 46,3 | 47,6 | 49,0 |
| | Eletrical Consumption | KW | 14,7 | 14,8 | 14,9 | 15,0 | 15,1 | 15,2 | 15,3 | 15,5 | 15,6 | 15,7 |
| | Water Flow | m³/h | 10,6 | 11,0 | 11,4 | 11,7 | 12,1 | 12,5 | 12,9 | 13,3 | 13,7 | 14,1 |
| | Loss on Exchanger | mCa | 0,7 | 0,7 | 0,8 | 0,8 | 0,9 | 0,9 | 1,0 | 1,0 | 1,1 | 1,2 |
| **45** | Capacity | KW | 34,8 | 36,0 | 37,2 | 38,4 | 39,7 | 40,9 | 42,2 | 43,5 | 44,8 | 46,1 |
| | Eletrical Consumption | KW | 15,9 | 16,1 | 16,2 | 16,3 | 16,4 | 16,5 | 16,6 | 16,7 | 16,9 | 17,0 |
| | Water Flow | m³/h | 9,9 | 10,3 | 10,7 | 11,0 | 11,4 | 11,7 | 12,1 | 12,5 | 12,9 | 13,2 |
| | Loss on Exchanger | mCa | 0,6 | 0,6 | 0,7 | 0,7 | 0,8 | 0,8 | 0,9 | 0,9 | 1,0 | 1,0 |

### Water Delta Temp. 4,0 °C

| TBS outdoor (°C) | Parameter | | 5,0 | 6,0 | 7,0 | 8,0 | 9,0 | 10,0 | 11,0 | 12,0 | 13,0 | 14,0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **20** | Capacity | KW | 46,3 | 47,8 | 49,2 | 50,7 | 52,3 | 53,8 | 55,3 | 56,9 | 58,4 | 60,0 |
| | Eletrical Consumption | KW | 10,5 | 10,6 | 10,7 | 10,8 | 10,9 | 11,0 | 11,1 | 11,2 | 11,3 | 11,4 |
| | Water Flow | m³/h | 9,9 | 10,3 | 10,6 | 10,9 | 11,2 | 11,6 | 11,9 | 12,2 | 12,6 | 12,9 |
| | Loss on Exchanger | mCa | 0,6 | 0,6 | 0,7 | 0,7 | 0,7 | 0,8 | 0,8 | 0,9 | 0,9 | 1,0 |
| **25** | Capacity | KW | 44,3 | 45,7 | 47,1 | 48,5 | 50,0 | 51,5 | 53,0 | 54,5 | 56,0 | 57,5 |
| | Eletrical Consumption | KW | 11,4 | 11,5 | 11,6 | 11,7 | 11,8 | 11,9 | 12,0 | 12,1 | 12,2 | 12,3 |
| | Water Flow | m³/h | 9,5 | 9,8 | 10,1 | 10,4 | 10,7 | 11,1 | 11,4 | 11,7 | 12,1 | 12,4 |
| | Loss on Exchanger | mCa | 0,5 | 0,6 | 0,6 | 0,6 | 0,7 | 0,7 | 0,8 | 0,8 | 0,9 | 0,9 |
| **30** | Capacity | KW | 42,0 | 43,4 | 44,8 | 46,1 | 47,6 | 49,0 | 50,4 | 51,9 | 53,3 | 54,8 |
| | Eletrical Consumption | KW | 12,4 | 12,5 | 12,6 | 12,7 | 12,8 | 12,9 | 13,0 | 13,1 | 13,2 | 13,3 |
| | Water Flow | m³/h | 9,0 | 9,3 | 9,6 | 9,9 | 10,2 | 10,5 | 10,9 | 11,2 | 11,5 | 11,8 |
| | Loss on Exchanger | mCa | 0,5 | 0,5 | 0,6 | 0,6 | 0,6 | 0,7 | 0,7 | 0,7 | 0,8 | 0,8 |
| **35** | Capacity | KW | 39,7 | 41,0 | 42,4 | 43,7 | 45,0 | 46,4 | 47,8 | 49,2 | 50,6 | 52,0 |
| | Eletrical Consumption | KW | 13,5 | 13,6 | 13,7 | 13,8 | 13,9 | 14,0 | 14,1 | 14,2 | 14,4 | 14,5 |
| | Water Flow | m/h | 8,5 | 8,8 | 9,1 | 9,4 | 9,7 | 10,0 | 10,3 | 10,6 | 10,9 | 11,2 |
| | Loss on Exchanger | mCa | 0,4 | 0,5 | 0,5 | 0,5 | 0,6 | 0,6 | 0,6 | 0,7 | 0,7 | 0,7 |
| **40** | Capacity | KW | 37,4 | 38,6 | 39,9 | 41,2 | 42,4 | 43,8 | 45,1 | 46,4 | 47,8 | 49,1 |
| | Eletrical Consumption | KW | 14,7 | 14,8 | 14,9 | 15,0 | 15,1 | 15,2 | 15,3 | 15,4 | 15,6 | 15,7 |
| | Water Flow | m³/h | 8,0 | 8,3 | 8,6 | 8,8 | 9,1 | 9,4 | 9,7 | 10,0 | 10,3 | 10,6 |
| | Loss on Exchanger | mCa | 0,4 | 0,4 | 0,4 | 0,5 | 0,5 | 0,5 | 0,6 | 0,6 | 0,6 | 0,7 |
| **45** | Capacity | KW | 35,0 | 36,2 | 37,4 | 38,6 | 39,8 | 41,1 | 42,3 | 43,6 | 44,9 | 46,2 |
| | Eletrical Consumption | KW | 15,9 | 16,0 | 16,2 | 16,3 | 16,4 | 16,5 | 16,6 | 16,7 | 16,8 | 17,0 |
| | Water Flow | m³/h | 7,5 | 7,8 | 8,0 | 8,3 | 8,6 | 8,8 | 9,1 | 9,4 | 9,7 | 10,0 |
| | Loss on Exchanger | mCa | 0,3 | 0,4 | 0,4 | 0,4 | 0,4 | 0,5 | 0,5 | 0,5 | 0,6 | 0,6 |

**NOTES:**

1. Values generated with fouling factor of 0.018 m2*K/kW;
2. For other fouling factor values, multiply the capacity and water flow values by:

   1- ((0.05/0.15)*((FI)-0.0176))

   Where FI is the desired fouling factor, in m2 * K/kW

   Maximum fouling factor allowed of 0.15 m2 * K/kW

# 8. Performance Data (cont.)

## Aquasmart 15TR inverter full load

### Water Delta Temp. = 5,0 °C

| TBS outdoor (°C) | | °C | 5,0 | 6,0 | 7,0 | 8,0 | 9,0 | 10,0 | 11,0 | 12,0 | 13,0 | 14,0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | Capacity | KW | 46,5 | 48,0 | 49,5 | 50,9 | 52,4 | 53,9 | 55,4 | 57,0 | 58,5 | 60,1 |
| | Eletrical Consumption | KW | 10,5 | 10,6 | 10,7 | 10,8 | 10,9 | 11,0 | 11,1 | 11,2 | 11,3 | 11,4 |
| | Water Flow | m³/h | 8,0 | 8,2 | 8,5 | 8,8 | 9,0 | 9,3 | 9,5 | 9,8 | 10,1 | 10,4 |
| | Loss on Exchanger | mCa | 0,4 | 0,4 | 0,4 | 0,5 | 0,5 | 0,5 | 0,5 | 0,6 | 0,6 | 0,6 |
| 25 | Capacity | KW | 44,5 | 45,9 | 47,3 | 48,7 | 50,1 | 51,6 | 53,1 | 54,6 | 56,1 | 57,6 |
| | Eletrical Consumption | KW | 11,4 | 11,5 | 11,6 | 11,7 | 11,8 | 11,9 | 12,0 | 12,1 | 12,2 | 12,3 |
| | Water Flow | m³/h | 7,6 | 7,9 | 8,1 | 8,4 | 8,6 | 8,9 | 9,1 | 9,4 | 9,7 | 9,9 |
| | Loss on Exchanger | mCa | 0,4 | 0,4 | 0,4 | 0,4 | 0,4 | 0,5 | 0,5 | 0,5 | 0,6 | 0,6 |
| 30 | Capacity | KW | 42,2 | 43,6 | 45,0 | 46,3 | 47,7 | 49,1 | 50,6 | 52,0 | 53,5 | 54,9 |
| | Eletrical Consumption | KW | 12,4 | 12,5 | 12,6 | 12,7 | 12,8 | 12,9 | 13,0 | 13,1 | 13,2 | 13,3 |
| | Water Flow | m³/h | 7,3 | 7,5 | 7,7 | 8,0 | 8,2 | 8,5 | 8,7 | 9,0 | 9,2 | 9,5 |
| | Loss on Exchanger | mCa | 0,3 | 0,3 | 0,4 | 0,4 | 0,4 | 0,4 | 0,5 | 0,5 | 0,5 | 0,5 |
| 35 | Capacity | KW | 39,9 | 41,2 | 42,6 | 43,9 | 45,2 | 46,6 | 47,9 | 49,3 | 50,7 | 52,1 |
| | Eletrical Consumption | KW | 13,4 | 13,6 | 13,7 | 13,8 | 13,9 | 14,0 | 14,1 | 14,2 | 14,3 | 14,5 |
| | Water Flow | m/h | 6,9 | 7,1 | 7,3 | 7,5 | 7,8 | 8,0 | 8,3 | 8,5 | 8,7 | 9,0 |
| | Loss on Exchanger | mCa | 0,3 | 0,3 | 0,3 | 0,3 | 0,4 | 0,4 | 0,4 | 0,4 | 0,5 | 0,5 |
| 40 | Capacity | KW | 37,6 | 38,8 | 40,1 | 41,3 | 42,6 | 43,9 | 45,2 | 46,6 | 47,9 | 49,3 |
| | Eletrical Consumption | KW | 14,7 | 14,8 | 14,9 | 15,0 | 15,1 | 15,2 | 15,3 | 15,4 | 15,6 | 15,7 |
| | Water Flow | m³/h | 6,4 | 6,7 | 6,9 | 7,1 | 7,3 | 7,6 | 7,8 | 8,0 | 8,3 | 8,5 |
| | Loss on Exchanger | mCa | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,4 | 0,4 | 0,4 | 0,4 |
| 45 | Capacity | KW | 35,2 | 36,4 | 37,6 | 38,8 | 40,0 | 41,3 | 42,5 | 43,8 | 45,0 | 46,3 |
| | Eletrical Consumption | KW | 15,9 | 16,0 | 16,1 | 16,3 | 16,4 | 16,5 | 16,6 | 16,7 | 16,8 | 17,0 |
| | Water Flow | m³/h | 6,0 | 6,2 | 6,5 | 6,7 | 6,9 | 7,1 | 7,3 | 7,5 | 7,8 | 8,0 |
| | Loss on Exchanger | mCa | 0,2 | 0,2 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,4 | 0,4 | 0,4 |

### Water Delta Temp. = 6,0 °C

| TBS outdoor (°C) | | °C | 5,0 | 6,0 | 7,0 | 8,0 | 9,0 | 10,0 | 11,0 | 12,0 | 13,0 | 14,0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | Capacity | KW | 46,7 | 48,1 | 49,6 | 51,0 | 52,5 | 54,0 | 55,5 | 57,1 | 58,6 | 60,1 |
| | Eletrical Consumption | KW | 10,5 | 10,6 | 10,7 | 10,8 | 10,9 | 11,0 | 11,1 | 11,2 | 11,3 | 11,4 |
| | Water Flow | m³/h | 6,7 | 6,9 | 7,1 | 7,3 | 7,5 | 7,8 | 8,0 | 8,2 | 8,4 | 8,6 |
| | Loss on Exchanger | mCa | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,4 | 0,4 | 0,4 | 0,4 | 0,4 |
| 25 | Capacity | KW | 44,6 | 46,0 | 47,4 | 48,9 | 50,3 | 51,7 | 53,2 | 54,7 | 56,1 | 57,6 |
| | Eletrical Consumption | KW | 11,4 | 11,5 | 11,6 | 11,7 | 11,8 | 11,9 | 12,0 | 12,1 | 12,2 | 12,3 |
| | Water Flow | m³/h | 6,4 | 6,6 | 6,8 | 7,0 | 7,2 | 7,4 | 7,6 | 7,8 | 8,1 | 8,3 |
| | Loss on Exchanger | mCa | 0,2 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,4 | 0,4 | 0,4 |
| 30 | Capacity | KW | 42,4 | 43,7 | 45,1 | 46,5 | 47,9 | 49,3 | 50,7 | 52,1 | 53,6 | 55,0 |
| | Eletrical Consumption | KW | 12,3 | 12,4 | 12,5 | 12,7 | 12,8 | 12,9 | 13,0 | 13,1 | 13,2 | 13,3 |
| | Water Flow | m³/h | 6,1 | 6,3 | 6,5 | 6,7 | 6,9 | 7,1 | 7,3 | 7,5 | 7,7 | 7,9 |
| | Loss on Exchanger | mCa | 0,2 | 0,2 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,4 | 0,4 |
| 35 | Capacity | KW | 40,1 | 41,4 | 42,7 | 44,0 | 45,4 | 46,7 | 48,1 | 49,4 | 50,8 | 52,2 |
| | Eletrical Consumption | KW | 13,4 | 13,5 | 13,6 | 13,8 | 13,9 | 14,0 | 14,1 | 14,2 | 14,3 | 14,4 |
| | Water Flow | m³/h | 5,7 | 5,9 | 6,1 | 6,3 | 6,5 | 6,7 | 6,9 | 7,1 | 7,3 | 7,5 |
| | Loss on Exchanger | mCa | 0,2 | 0,2 | 0,2 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 |
| 40 | Capacity | KW | 37,7 | 39,0 | 40,2 | 41,5 | 42,8 | 44,1 | 45,4 | 46,7 | 48,0 | 49,4 |
| | Eletrical Consumption | KW | 14,6 | 14,7 | 14,9 | 15,0 | 15,1 | 15,2 | 15,3 | 15,4 | 15,5 | 15,7 |
| | Water Flow | m³/h | 5,4 | 5,6 | 5,8 | 5,9 | 6,1 | 6,3 | 6,5 | 6,7 | 6,9 | 7,1 |
| | Loss on Exchanger | mCa | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,3 | 0,3 | 0,3 | 0,3 |
| 45 | Capacity | KW | 35,3 | 36,5 | 37,7 | 38,9 | 40,2 | 41,4 | 42,6 | 43,9 | 45,2 | 46,4 |
| | Eletrical Consumption | KW | 15,9 | 16,0 | 16,1 | 16,2 | 16,4 | 16,5 | 16,6 | 16,7 | 16,8 | 16,9 |
| | Water Flow | m³/h | 5,1 | 5,2 | 5,4 | 5,6 | 5,8 | 5,9 | 6,1 | 6,3 | 6,5 | 6,7 |
| | Loss on Exchanger | mCa | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 |

**NOTES:**

1. Values generated with fouling factor of 0.018 m2*K/kW;
2. For other fouling factor values, multiply the capacity and water flow values by:

$$1- ((0.05/0.15)*((FI)-0.0176))$$

Where FI is the desired fouling factor, in m2 * K/kW
Maximum fouling factor allowed of 0.15 m2 * K/KW

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# Aquasmart 15TR inverter full load

| | | | Water Delta Temp. 7,0 | | | | | | | | | Water Delta Temp. 8,0 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TBS outdoor (°C) | Water Outlet Temp. | °C | 5,0 | 6,0 | 7,0 | 8,0 | 9,0 | 10,0 | 11,0 | 12,0 | 13,0 | 5,0 | 6,0 | 7,0 | 8,0 | 9,0 | 10,0 | 11,0 | 12,0 |
| **20** | Capacity | KW | 46,8 | 48,2 | 49,7 | 51,2 | 52,6 | 54,1 | 55,6 | 57,2 | 58,7 | 46,9 | 48,4 | 49,8 | 51,3 | 52,8 | 54,2 | 55,7 | 57,2 |
| | Eletrical Consumption | KW | 10,5 | 10,6 | 10,7 | 10,8 | 10,9 | 11,0 | 11,1 | 11,2 | 11,3 | 10,5 | 10,6 | 10,7 | 10,8 | 10,9 | 11,0 | 11,1 | 11,2 |
| | Water Flow | m³/h | 5,7 | 5,9 | 6,1 | 6,3 | 6,5 | 6,7 | 6,8 | 7,0 | 7,2 | 5,0 | 5,2 | 5,4 | 5,5 | 5,7 | 5,8 | 6,0 | 6,2 |
| | Loss on Exchanger | mCa | 0,2 | 0,2 | 0,2 | 0,2 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 |
| **25** | Capacity | KW | 44,8 | 46,1 | 47,6 | 49,0 | 50,4 | 51,9 | 53,3 | 54,8 | 56,2 | 44,9 | 46,3 | 47,7 | 49,1 | 50,5 | 52,0 | 53,4 | 54,9 |
| | Eletrical Consumption | KW | 11,4 | 11,5 | 11,6 | 11,7 | 11,8 | 11,9 | 12,0 | 12,1 | 12,2 | 11,4 | 11,4 | 11,5 | 11,6 | 11,7 | 11,8 | 11,9 | 12,1 |
| | Water Flow | m³/h | 5,5 | 5,7 | 5,8 | 6,0 | 6,2 | 6,4 | 6,6 | 6,7 | 6,9 | 4,8 | 5,0 | 5,1 | 5,3 | 5,4 | 5,6 | 5,7 | 5,9 |
| | Loss on Exchanger | mCa | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,3 | 0,3 | 0,3 | 0,1 | 0,1 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 |
| **30** | Capacity | KW | 42,5 | 43,9 | 45,2 | 46,6 | 48,0 | 49,4 | 50,8 | 52,2 | 53,7 | 42,6 | 44,0 | 45,4 | 46,7 | 48,1 | 49,5 | 50,9 | 52,3 |
| | Eletrical Consumption | KW | 12,3 | 12,4 | 12,5 | 12,6 | 12,7 | 12,9 | 13,0 | 13,1 | 13,2 | 12,3 | 12,4 | 12,5 | 12,6 | 12,7 | 12,8 | 13,0 | 13,1 |
| | Water Flow | m³/h | 5,2 | 5,4 | 5,6 | 5,7 | 5,9 | 6,1 | 6,3 | 6,4 | 6,6 | 4,6 | 4,7 | 4,9 | 5,0 | 5,2 | 5,3 | 5,5 | 5,6 |
| | Loss on Exchanger | mCa | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,3 | 0,1 | 0,1 | 0,1 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 |
| **35** | Capacity | KW | 40,2 | 41,5 | 42,8 | 44,1 | 45,5 | 46,8 | 48,2 | 49,6 | 50,9 | 40,3 | 41,6 | 42,9 | 44,2 | 45,6 | 46,9 | 48,3 | 49,7 |
| | Eletrical Consumption | KW | 13,4 | 13,5 | 13,6 | 13,7 | 13,9 | 14,0 | 14,1 | 14,2 | 14,3 | 13,4 | 13,5 | 13,6 | 13,7 | 13,8 | 14,0 | 14,1 | 14,2 |
| | Water Flow | m/h | 4,9 | 5,1 | 5,3 | 5,4 | 5,6 | 5,8 | 5,9 | 6,1 | 6,3 | 4,3 | 4,5 | 4,6 | 4,8 | 4,9 | 5,1 | 5,2 | 5,3 |
| | Loss on Exchanger | mCa | 0,1 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,1 | 0,1 | 0,1 | 0,1 | 0,2 | 0,2 | 0,2 | 0,2 |
| **40** | Capacity | KW | 37,8 | 39,1 | 40,3 | 41,6 | 42,9 | 44,2 | 45,5 | 46,8 | 48,1 | --- | 39,2 | 40,4 | 41,7 | 43,0 | 44,3 | 45,6 | 46,9 |
| | Eletrical Consumption | KW | 14,6 | 14,7 | 14,8 | 15,0 | 15,1 | 15,2 | 15,3 | 15,4 | 15,5 | --- | 14,7 | 14,8 | 14,9 | 15,1 | 15,2 | 15,3 | 15,4 |
| | Water Flow | m³/h | 4,6 | 4,8 | 5,0 | 5,1 | 5,3 | 5,4 | 5,6 | 5,8 | 5,9 | --- | 4,2 | 4,3 | 4,5 | 4,6 | 4,8 | 4,9 | 5,1 |
| | Loss on Exchanger | mCa | 0,1 | 0,1 | 0,1 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | --- | 0,1 | 0,1 | 0,1 | 0,1 | 0,1 | 0,1 | 0,2 |
| **45** | Capacity | KW | 35,4 | 36,6 | 37,8 | 39,0 | 40,3 | 41,5 | 42,8 | 44,0 | 45,3 | --- | --- | --- | 39,1 | 40,4 | 41,6 | 42,8 | 44,1 |
| | Eletrical Consumption | KW | 15,9 | 16,0 | 16,1 | 16,2 | 16,3 | 16,5 | 16,6 | 16,7 | 16,8 | --- | --- | --- | 16,2 | 16,3 | 16,4 | 16,6 | 16,7 |
| | Water Flow | m³/h | 4,3 | 4,5 | 4,6 | 4,8 | 5,0 | 5,1 | 5,3 | 5,4 | 5,6 | --- | --- | --- | 4,2 | 4,3 | 4,5 | 4,6 | 4,7 |
| | Loss on Exchanger | mCa | 0,1 | 0,1 | 0,1 | 0,1 | 0,1 | 0,2 | 0,2 | 0,2 | 0,2 | --- | --- | --- | 0,1 | 0,1 | 0,1 | 0,1 | 0,1 |

**NOTES:**

1. Values generated with fouling factor of 0.018 m2*K/kW;
2. For other fouling factor values, multiply the capacity and water flow values by:

$$1- ((0.05/0.15)*((FI)-0.0176))$$

Where FI is the desired fouling factor, in m2 * K/kW

Maximum fouling factor allowed of 0.15 m2 * K/kW

**Aquasmart 15TR inverter full load**

| TBS outdoor (°C) | | Water Delta Temp. | °C | 9,0 | | | | | | | 10,0 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Water Outlet Temp. | °C | 5,0 | 6,0 | 7,0 | 8,0 | 9,0 | 10,0 | 11,0 | 5,0 | 6,0 | 7,0 | 8,0 | 9,0 | 10,0 |
| 20 | Capacity | | KW | 47,0 | 48,5 | 49,9 | 51,4 | 52,8 | 54,3 | 55,8 | --- | 48,5 | 50,0 | 51,4 | 52,9 | 54,4 |
| | Eletrical Consumption | | KW | 10,5 | 10,6 | 10,7 | 10,8 | 10,9 | 10,9 | 11,0 | --- | 10,6 | 10,7 | 10,7 | 10,8 | 10,9 |
| | Water Flow | | m³/h | 4,5 | 4,6 | 4,8 | 4,9 | 5,1 | 5,2 | 5,3 | --- | 4,2 | 4,3 | 4,4 | 4,6 | 4,7 |
| | Loss on Exchanger | | mCa | 0,1 | 0,1 | 0,1 | 0,1 | 0,2 | 0,2 | 0,2 | --- | 0,1 | 0,1 | 0,1 | 0,1 | 0,1 |
| 25 | Capacity | | KW | 45,0 | 46,3 | 47,8 | 49,2 | 50,6 | 52,0 | 53,5 | --- | --- | --- | 49,2 | 50,7 | 52,1 |
| | Eletrical Consumption | | KW | 11,3 | 11,4 | 11,5 | 11,6 | 11,7 | 11,8 | 11,9 | --- | --- | --- | 11,6 | 11,7 | 11,8 |
| | Water Flow | | m³/h | 4,3 | 4,4 | 4,6 | 4,7 | 4,8 | 5,0 | 5,1 | --- | --- | --- | 4,2 | 4,4 | 4,5 |
| | Loss on Exchanger | | mCa | 0,1 | 0,1 | 0,1 | 0,1 | 0,1 | 0,1 | 0,2 | --- | --- | --- | 0,1 | 0,1 | 0,1 |
| 30 | Capacity | | KW | --- | 44,1 | 45,4 | 46,8 | 48,2 | 49,6 | 51,0 | --- | --- | --- | --- | 48,3 | 49,7 |
| | Eletrical Consumption | | KW | --- | 12,4 | 12,5 | 12,6 | 12,7 | 12,8 | 12,9 | --- | --- | --- | --- | 12,7 | 12,8 |
| | Water Flow | | m³/h | --- | 4,2 | 4,3 | 4,5 | 4,6 | 4,7 | 4,9 | --- | --- | --- | --- | 4,2 | 4,3 |
| | Loss on Exchanger | | mCa | --- | 0,1 | 0,1 | 0,1 | 0,1 | 0,1 | 0,1 | --- | --- | --- | --- | 0,1 | 0,1 |
| 35 | Capacity | | KW | --- | --- | --- | 44,3 | 45,7 | 47,0 | 48,4 | --- | --- | --- | --- | --- | --- |
| | Eletrical Consumption | | KW | --- | --- | --- | 13,7 | 13,8 | 13,9 | 14,1 | --- | --- | --- | --- | --- | --- |
| | Water Flow | | m/h | --- | --- | --- | 4,2 | 4,4 | 4,5 | 4,6 | --- | --- | --- | --- | --- | --- |
| | Loss on Exchanger | | mCa | --- | --- | --- | 0,1 | 0,1 | 0,1 | 0,1 | --- | --- | --- | --- | --- | --- |
| 40 | Capacity | | KW | --- | --- | --- | --- | --- | 44,4 | 45,7 | --- | --- | --- | --- | --- | --- |
| | Eletrical Consumption | | KW | --- | --- | --- | --- | --- | 15,2 | 15,3 | --- | --- | --- | --- | --- | --- |
| | Water Flow | | m³/h | --- | --- | --- | --- | --- | 4,2 | 4,4 | --- | --- | --- | --- | --- | --- |
| | Loss on Exchanger | | mCa | --- | --- | --- | --- | --- | 0,1 | 0,1 | --- | --- | --- | --- | --- | --- |
| 45 | Capacity | | KW | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Eletrical Consumption | | KW | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Water Flow | | m³/h | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Loss on Exchanger | | mCa | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

**NOTES:**

1. Values generated with fouling factor of 0.018 m2*K/kW;
2. For other fouling factor values, multiply the capacity and water flow values by:

   1- ((0.05/0.15)*((FI)-0.0176))

   Where FI is the desired fouling factor, in m2 * K/kW
   Maximum fouling factor allowed of 0.15 m2 * K/kW

# Aquasmart 15TR fixed full load



| TBS outdoor (°C) | | Water Delta Temp. (°C) | 4,0 | | | | | | | | | | 3,0 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Water Outlet Temp. (°C) | 14,0 | 13,0 | 12,0 | 11,0 | 10,0 | 9,0 | 8,0 | 7,0 | 6,0 | 5,0 | 14,0 | 13,0 | 12,0 | 11,0 | 10,0 | 9,0 | 8,0 | 7,0 | 6,0 | 5,0 |
| 20 | Capacity | KW | 72,1 | 70,2 | 68,4 | 66,5 | 64,7 | 63,0 | 61,2 | 59,4 | 57,7 | --- | --- | --- | --- | --- | --- | 62,3 | 60,5 | 58,8 | 57,0 | --- |
| | Eletrical Consumption | KW | 14,0 | 13,9 | 13,7 | 13,6 | 13,5 | 13,3 | 13,2 | 13,1 | 12,9 | --- | --- | --- | --- | --- | --- | 13,3 | 13,2 | 13,1 | 12,9 | --- |
| | Water Flow | m³/h | 15,5 | 15,1 | 14,7 | 14,3 | 13,9 | 13,5 | 13,2 | 12,8 | 12,4 | --- | --- | --- | --- | --- | --- | 17,9 | 17,3 | 16,8 | 16,3 | --- |
| | Loss on Exchanger | mCa | 1,4 | 1,3 | 1,2 | 1,2 | 1,1 | 1,1 | 1,0 | 0,9 | 0,9 | --- | --- | --- | --- | --- | --- | 1,8 | 1,7 | 1,6 | 1,5 | --- |
| 25 | Capacity | KW | 68,8 | 67,0 | 65,3 | 63,6 | 61,8 | 60,1 | 58,4 | 56,8 | 55,1 | --- | --- | --- | --- | 62,9 | 61,2 | 59,5 | 57,8 | 56,1 | 54,4 | --- |
| | Eletrical Consumption | KW | 15,1 | 15,0 | 14,8 | 14,7 | 14,5 | 14,4 | 14,3 | 14,1 | 14,0 | --- | --- | --- | --- | 14,7 | 14,5 | 14,4 | 14,3 | 14,1 | 14,0 | --- |
| | Water Flow | m³/h | 14,8 | 14,4 | 14,1 | 13,7 | 13,3 | 12,9 | 12,6 | 12,2 | 11,8 | --- | --- | --- | --- | 18,1 | 17,6 | 17,1 | 16,6 | 16,1 | 15,6 | --- |
| | Loss on Exchanger | mCa | 1,3 | 1,2 | 1,1 | 1,1 | 1,0 | 1,0 | 0,9 | 0,9 | 0,8 | --- | --- | --- | --- | 1,9 | 1,8 | 1,7 | 1,6 | 1,5 | 1,4 | --- |
| 30 | Capacity | KW | 65,5 | 63,9 | 62,2 | 60,5 | 58,9 | 57,2 | 55,6 | 54,0 | 52,4 | --- | --- | 63,3 | 61,6 | 59,9 | 58,2 | 56,6 | 54,9 | 53,3 | 51,7 | --- |
| | Eletrical Consumption | KW | 16,3 | 16,2 | 16,0 | 15,9 | 15,7 | 15,6 | 15,5 | 15,3 | 15,2 | --- | --- | 16,2 | 16,0 | 15,9 | 15,7 | 15,6 | 15,4 | 15,3 | 15,2 | --- |
| | Water Flow | m³/h | 14,1 | 13,8 | 13,4 | 13,0 | 12,7 | 12,3 | 12,0 | 11,6 | 11,3 | --- | --- | 18,2 | 17,7 | 17,2 | 16,7 | 16,2 | 15,7 | 15,3 | 14,8 | --- |
| | Loss on Exchanger | mCa | 1,1 | 1,1 | 1,0 | 1,0 | 0,9 | 0,9 | 0,8 | 0,8 | 0,7 | --- | --- | 1,9 | 1,8 | 1,7 | 1,6 | 1,5 | 1,4 | 1,3 | 1,3 | --- |
| 35 | Capacity | KW | 62,2 | 60,6 | 59,0 | 57,4 | 55,8 | 54,2 | 52,7 | 51,2 | 49,6 | --- | 61,6 | 60,0 | 58,3 | 56,7 | 55,1 | 53,6 | 52,0 | 50,4 | 48,9 | --- |
| | Eletrical Consumption | KW | 17,6 | 17,5 | 17,4 | 17,2 | 17,0 | 16,9 | 16,8 | 16,6 | 16,5 | --- | 17,6 | 17,5 | 17,3 | 17,2 | 17,0 | 16,9 | 16,7 | 16,6 | 16,4 | --- |
| | Water Flow | m/h | 13,4 | 13,0 | 12,7 | 12,4 | 12,0 | 11,7 | 11,3 | 11,0 | 10,7 | --- | 17,7 | 17,2 | 16,7 | 16,3 | 15,8 | 15,4 | 14,9 | 14,4 | 14,0 | --- |
| | Loss on Exchanger | mCa | 1,0 | 1,0 | 0,9 | 0,9 | 0,8 | 0,8 | 0,7 | 0,7 | 0,7 | --- | 1,8 | 1,7 | 1,6 | 1,5 | 1,4 | 1,4 | 1,3 | 1,2 | 1,1 | --- |
| 40 | Capacity | KW | 58,7 | 57,2 | 55,6 | 54,1 | 52,6 | 51,1 | 49,6 | 48,1 | 46,7 | --- | 58,1 | 56,5 | 55,0 | 53,4 | 51,9 | 50,4 | 48,9 | 47,4 | 45,9 | --- |
| | Eletrical Consumption | KW | 19,0 | 18,9 | 18,7 | 18,6 | 18,4 | 18,3 | 18,2 | 18,0 | 17,9 | --- | 19,0 | 18,9 | 18,7 | 18,6 | 18,4 | 18,3 | 18,1 | 18,0 | 17,8 | --- |
| | Water Flow | m³/h | 12,6 | 12,3 | 12,0 | 11,6 | 11,3 | 11,0 | 10,7 | 10,3 | 10,0 | --- | 16,7 | 16,2 | 15,8 | 15,3 | 14,9 | 14,4 | 14,0 | 13,6 | 13,1 | --- |
| | Loss on Exchanger | mCa | 0,9 | 0,9 | 0,8 | 0,8 | 0,7 | 0,7 | 0,7 | 0,6 | 0,6 | --- | 1,6 | 1,5 | 1,4 | 1,3 | 1,3 | 1,2 | 1,1 | 1,1 | 1,0 | --- |
| 45 | Capacity | KW | 55,0 | 53,6 | 52,1 | 50,7 | 49,2 | 47,8 | 46,4 | 45,0 | 43,6 | --- | 54,4 | 52,9 | 51,5 | 50,0 | 48,5 | 47,1 | 45,6 | 44,2 | 42,8 | --- |
| | Eletrical Consumption | KW | 20,5 | 20,4 | 20,2 | 20,1 | 19,9 | 19,8 | 19,6 | 19,5 | 19,3 | --- | 20,5 | 20,3 | 20,2 | 20,0 | 19,9 | 19,7 | 19,6 | 19,4 | 19,3 | --- |
| | Water Flow | m³/h | 11,9 | 11,5 | 11,2 | 10,9 | 10,6 | 10,3 | 10,0 | 9,7 | 9,4 | --- | 15,6 | 15,2 | 14,8 | 14,3 | 13,9 | 13,5 | 13,1 | 12,7 | 12,2 | --- |
| | Loss on Exchanger | mCa | 0,8 | 0,8 | 0,7 | 0,7 | 0,6 | 0,6 | 0,6 | 0,5 | 0,5 | --- | 1,4 | 1,3 | 1,2 | 1,2 | 1,1 | 1,0 | 1,0 | 0,9 | 0,9 | --- |

**NOTES:**

1. Values generated with fouling factor of 0.018 m2*K/kW;
2. For other fouling factor values, multiply the capacity and water flow values by:

   1- ((0.05/0.15)*((FI)-0.0176))

   Where FI is the desired fouling factor, in m2 * K/kW

   Maximum fouling factor allowed of 0.15 m2 * K/kW

# 8. Performance Data (cont.)

## Aquasmart 15TR fixed full load

| TBS outdoor (°C) | | Unit | Water Delta Temp. 5,0 | | | | | | | | | | Water Delta Temp. 6,0 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Water Outlet Temp. | °C | 5,0 | 6,0 | 7,0 | 8,0 | 9,0 | 10,0 | 11,0 | 12,0 | 13,0 | 14,0 | 5,0 | 6,0 | 7,0 | 8,0 | 9,0 | 10,0 | 11,0 | 12,0 | 13,0 | 14,0 |
| 20 | Capacity | KW | 56,5 | 58,1 | 59,9 | 61,6 | 63,3 | 65,1 | 66,9 | 68,7 | 70,5 | 72,4 | 56,8 | 58,5 | 60,2 | 61,9 | 63,6 | 65,4 | 67,1 | 68,9 | 70,7 | 72,5 |
| | Eletrical Consumption | KW | 12,8 | 12,9 | 13,1 | 13,2 | 13,3 | 13,5 | 13,6 | 13,7 | 13,9 | 14,0 | 12,8 | 12,9 | 13,1 | 13,2 | 13,3 | 13,4 | 13,6 | 13,7 | 13,9 | 14,0 |
| | Water Flow | m³/h | 9,7 | 10,0 | 10,3 | 10,6 | 10,9 | 11,2 | 11,5 | 11,8 | 12,2 | 12,5 | 8,1 | 8,4 | 8,6 | 8,9 | 9,1 | 9,4 | 9,6 | 9,9 | 10,2 | 10,4 |
| | Loss on Exchanger | mCa | 0,5 | 0,6 | 0,6 | 0,6 | 0,7 | 0,7 | 0,8 | 0,8 | 0,8 | 0,9 | 0,4 | 0,4 | 0,4 | 0,5 | 0,5 | 0,5 | 0,5 | 0,6 | 0,6 | 0,6 |
| 25 | Capacity | KW | 54,0 | 55,5 | 57,2 | 58,8 | 60,5 | 62,2 | 63,9 | 65,6 | 67,4 | 69,1 | 54,3 | 55,9 | 57,5 | 59,1 | 60,8 | 62,5 | 64,2 | 65,9 | 67,6 | 69,3 |
| | Eletrical Consumption | KW | 13,9 | 14,0 | 14,1 | 14,3 | 14,4 | 14,5 | 14,7 | 14,8 | 15,0 | 15,1 | 13,9 | 14,0 | 14,1 | 14,3 | 14,4 | 14,5 | 14,7 | 14,8 | 15,0 | 15,1 |
| | Water Flow | m³/h | 9,3 | 9,5 | 9,8 | 10,1 | 10,4 | 10,7 | 11,0 | 11,3 | 11,6 | 11,9 | 7,8 | 8,0 | 8,2 | 8,5 | 8,7 | 9,0 | 9,2 | 9,5 | 9,7 | 10,0 |
| | Loss on Exchanger | mCa | 0,5 | 0,5 | 0,6 | 0,6 | 0,6 | 0,7 | 0,7 | 0,7 | 0,8 | 0,8 | 0,4 | 0,4 | 0,4 | 0,4 | 0,4 | 0,5 | 0,5 | 0,5 | 0,5 | 0,6 |
| 30 | Capacity | KW | 51,4 | 52,9 | 54,5 | 56,0 | 57,6 | 59,3 | 60,9 | 62,5 | 64,2 | 65,9 | 51,7 | 53,3 | 54,8 | 56,4 | 57,9 | 59,5 | 61,1 | 62,8 | 64,4 | 66,1 |
| | Eletrical Consumption | KW | 15,0 | 15,2 | 15,3 | 15,5 | 15,6 | 15,7 | 15,9 | 16,0 | 16,2 | 16,3 | 15,0 | 15,2 | 15,3 | 15,4 | 15,6 | 15,7 | 15,9 | 16,0 | 16,2 | 16,3 |
| | Water Flow | m³/h | 8,8 | 9,1 | 9,4 | 9,6 | 9,9 | 10,2 | 10,5 | 10,8 | 11,1 | 11,4 | 7,4 | 7,6 | 7,9 | 8,1 | 8,3 | 8,5 | 8,8 | 9,0 | 9,3 | 9,5 |
| | Loss on Exchanger | mCa | 0,5 | 0,5 | 0,5 | 0,5 | 0,6 | 0,6 | 0,6 | 0,7 | 0,7 | 0,7 | 0,3 | 0,3 | 0,4 | 0,4 | 0,4 | 0,4 | 0,4 | 0,5 | 0,5 | 0,5 |
| 35 | Capacity | KW | 48,7 | 50,1 | 51,6 | 53,1 | 54,7 | 56,2 | 57,8 | 59,3 | 60,9 | 62,5 | 49,0 | 50,5 | 52,0 | 53,5 | 55,0 | 56,5 | 58,0 | 59,6 | 61,1 | 62,7 |
| | Eletrical Consumption | KW | 16,3 | 16,5 | 16,6 | 16,8 | 16,9 | 17,0 | 17,2 | 17,3 | 17,5 | 17,6 | 16,3 | 16,5 | 16,6 | 16,8 | 16,9 | 17,0 | 17,2 | 17,3 | 17,5 | 17,6 |
| | Water Flow | m/h | 8,4 | 8,6 | 8,9 | 9,1 | 9,4 | 9,7 | 9,9 | 10,2 | 10,5 | 10,8 | 7,0 | 7,2 | 7,4 | 7,7 | 7,9 | 8,1 | 8,3 | 8,6 | 8,8 | 9,0 |
| | Loss on Exchanger | mCa | 0,4 | 0,4 | 0,5 | 0,5 | 0,5 | 0,5 | 0,6 | 0,6 | 0,6 | 0,7 | 0,3 | 0,3 | 0,3 | 0,3 | 0,4 | 0,4 | 0,4 | 0,4 | 0,4 | 0,5 |
| 40 | Capacity | KW | 45,8 | 47,2 | 48,7 | 50,1 | 51,6 | 53,0 | 54,5 | 56,0 | 57,6 | 59,1 | 46,1 | 47,6 | 49,0 | 50,4 | 51,9 | 53,3 | 54,8 | 56,3 | 57,7 | 59,2 |
| | Eletrical Consumption | KW | 17,7 | 17,9 | 18,0 | 18,2 | 18,3 | 18,5 | 18,6 | 18,7 | 18,9 | 19,0 | 17,7 | 17,9 | 18,0 | 18,1 | 18,3 | 18,4 | 18,6 | 18,7 | 18,9 | 19,0 |
| | Water Flow | m³/h | 7,9 | 8,1 | 8,4 | 8,6 | 8,9 | 9,1 | 9,4 | 9,7 | 9,9 | 10,2 | 6,6 | 6,8 | 7,0 | 7,2 | 7,4 | 7,7 | 7,9 | 8,1 | 8,3 | 8,5 |
| | Loss on Exchanger | mCa | 0,4 | 0,4 | 0,4 | 0,4 | 0,5 | 0,5 | 0,5 | 0,5 | 0,6 | 0,6 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,4 | 0,4 | 0,4 | 0,4 |
| 45 | Capacity | KW | 42,7 | 44,1 | 45,5 | 46,9 | 48,3 | 49,7 | 51,1 | 52,5 | 54,0 | 55,4 | 43,1 | 44,4 | 45,8 | 47,2 | 48,6 | 50,0 | 51,4 | 52,8 | 54,2 | 55,6 |
| | Eletrical Consumption | KW | 19,2 | 19,3 | 19,5 | 19,6 | 19,8 | 19,9 | 20,1 | 20,2 | 20,4 | 20,5 | 19,2 | 19,3 | 19,5 | 19,6 | 19,8 | 19,9 | 20,0 | 20,2 | 20,3 | 20,5 |
| | Water Flow | m³/h | 7,3 | 7,6 | 7,8 | 8,1 | 8,3 | 8,6 | 8,8 | 9,1 | 9,3 | 9,6 | 6,2 | 6,4 | 6,6 | 6,8 | 7,0 | 7,2 | 7,4 | 7,6 | 7,8 | 8,0 |
| | Loss on Exchanger | mCa | 0,3 | 0,3 | 0,4 | 0,4 | 0,4 | 0,5 | 0,5 | 0,5 | 0,5 | 0,5 | 0,2 | 0,2 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,4 | 0,4 |

**NOTES:**

1. Values generated with fouling factor of 0.018 m2*K/kW;
2. For other fouling factor values, multiply the capacity and water flow values by:

   1- $((0.05/0.15)*((FI)-0.0176))$

   Where FI is the desired fouling factor, in m2 * K/kW
   Maximum fouling factor allowed of 0.15 m2 * K/kW

**Aquasmart 15TR fixed full load**

| TBS outdoor (°C) | | Water Delta Temp. °C | | 7,0 | | | | | | | | | 8,0 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Water Outlet Temp. °C | | 5,0 | 6,0 | 7,0 | 8,0 | 9,0 | 10,0 | 11,0 | 12,0 | 13,0 | 5,0 | 6,0 | 7,0 | 8,0 | 9,0 | 10,0 | 11,0 | 12,0 |
| 20 | | Capacity | KW | 57,1 | 58,8 | 60,4 | 62,1 | 63,8 | 65,7 | 67,3 | 69,1 | 70,9 | 57,3 | 59,0 | 60,6 | 62,3 | 64,0 | 65,7 | 67,5 | 69,2 |
| | | Eletrical Consumption | KW | 12,8 | 12,9 | 13,1 | 13,2 | 13,3 | 13,5 | 13,6 | 13,7 | 13,9 | 12,8 | 12,9 | 13,0 | 13,2 | 13,3 | 13,4 | 13,6 | 13,7 |
| | | Water Flow | m³/h | 7,0 | 7,2 | 7,4 | 7,6 | 7,8 | 8,1 | 8,3 | 8,5 | 8,7 | 6,2 | 6,3 | 6,5 | 6,7 | 6,9 | 7,1 | 7,3 | 7,5 |
| | | Loss on Exchanger | mCa | 0,3 | 0,3 | 0,3 | 0,3 | 0,4 | 0,4 | 0,4 | 0,4 | 0,4 | 0,2 | 0,2 | 0,2 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 |
| 25 | | Capacity | KW | 54,6 | 56,3 | 57,8 | 59,4 | 61,1 | 62,7 | 64,4 | 66,1 | 67,8 | 54,8 | 56,3 | 58,0 | 59,6 | 61,2 | 62,9 | 64,5 | 66,2 |
| | | Eletrical Consumption | KW | 13,9 | 14,0 | 14,1 | 14,3 | 14,4 | 14,5 | 14,7 | 14,8 | 14,9 | 13,9 | 14,0 | 14,1 | 14,2 | 14,4 | 14,5 | 14,7 | 14,8 |
| | | Water Flow | m³/h | 6,7 | 6,9 | 7,1 | 7,3 | 7,5 | 7,7 | 7,9 | 8,1 | 8,3 | 5,9 | 6,1 | 6,2 | 6,4 | 6,6 | 6,8 | 6,9 | 7,1 |
| | | Loss on Exchanger | mCa | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,4 | 0,4 | 0,4 | 0,2 | 0,2 | 0,2 | 0,2 | 0,3 | 0,3 | 0,3 | 0,3 |
| 30 | | Capacity | KW | 52,0 | 53,5 | 55,1 | 56,6 | 58,2 | 59,8 | 61,4 | 63,0 | 64,6 | 52,2 | 53,7 | 55,2 | 56,8 | 58,3 | 59,9 | 61,5 | 63,1 |
| | | Eletrical Consumption | KW | 15,0 | 15,2 | 15,3 | 15,4 | 15,6 | 15,7 | 15,9 | 16,0 | 16,1 | 15,0 | 15,2 | 15,3 | 15,4 | 15,6 | 15,7 | 15,9 | 16,0 |
| | | Water Flow | m³/h | 6,4 | 6,6 | 6,8 | 7,0 | 7,2 | 7,4 | 7,6 | 7,8 | 8,0 | 5,6 | 5,8 | 5,9 | 6,1 | 6,3 | 6,4 | 6,6 | 6,8 |
| | | Loss on Exchanger | mCa | 0,2 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,4 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,3 | 0,3 |
| 35 | | Capacity | KW | 49,3 | 50,8 | 52,2 | 53,7 | 55,2 | 56,7 | 58,3 | 59,8 | 61,3 | 49,5 | 50,9 | 52,4 | 53,9 | 55,4 | 56,9 | 58,4 | 59,9 |
| | | Eletrical Consumption | KW | 16,3 | 16,5 | 16,6 | 16,7 | 16,9 | 17,0 | 17,2 | 17,3 | 17,5 | 16,3 | 16,5 | 16,6 | 16,7 | 16,9 | 17,0 | 17,2 | 17,3 |
| | | Water Flow | m/h | 6,0 | 6,2 | 6,4 | 6,6 | 6,8 | 7,0 | 7,2 | 7,4 | 7,6 | 5,3 | 5,5 | 5,6 | 5,8 | 6,0 | 6,1 | 6,3 | 6,5 |
| | | Loss on Exchanger | mCa | 0,2 | 0,2 | 0,2 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 |
| 40 | | Capacity | KW | 46,4 | 47,8 | 49,2 | 50,7 | 52,1 | 53,6 | 55,0 | 56,5 | 58,0 | 46,6 | 48,0 | 49,4 | 50,8 | 52,3 | 53,7 | 55,2 | 56,6 |
| | | Eletrical Consumption | KW | 17,7 | 17,9 | 18,0 | 18,1 | 18,3 | 18,4 | 18,6 | 18,7 | 18,9 | 17,7 | 17,9 | 18,0 | 18,1 | 18,3 | 18,4 | 18,6 | 18,7 |
| | | Water Flow | m³/h | 5,7 | 5,9 | 6,0 | 6,2 | 6,4 | 6,6 | 6,8 | 7,0 | 7,1 | 5,0 | 5,2 | 5,3 | 5,5 | 5,6 | 5,8 | 5,9 | 6,1 |
| | | Loss on Exchanger | mCa | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,3 | 0,3 | 0,3 | 0,3 | 0,1 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 |
| 45 | | Capacity | KW | 43,3 | 44,7 | 46,1 | 47,4 | 48,8 | 50,2 | 51,6 | 53,0 | 54,4 | 43,5 | 44,9 | 46,2 | 47,6 | 49,0 | 50,4 | 51,8 | 53,2 |
| | | Eletrical Consumption | KW | 19,2 | 19,3 | 19,5 | 19,6 | 19,8 | 19,9 | 20,0 | 20,2 | 20,3 | 19,2 | 19,3 | 19,5 | 19,6 | 19,7 | 19,9 | 20,0 | 20,2 |
| | | Water Flow | m³/h | 5,3 | 5,5 | 5,7 | 5,8 | 6,0 | 6,2 | 6,4 | 6,5 | 6,7 | 4,7 | 4,8 | 5,0 | 5,1 | 5,3 | 5,4 | 5,6 | 5,7 |
| | | Loss on Exchanger | mCa | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,3 | 0,1 | 0,1 | 0,1 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 |

**NOTES:**

1. Values generated with fouling factor of 0.018 m2*K/kW;
2. For other fouling factor values, multiply the capacity and water flow values by:

   1- ((0.05/0.15)*((FI)-0.0176))

   Where FI is the desired fouling factor, in m2 * K/kW

   Maximum fouling factor allowed of 0.15 m2 * K/kW

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**Carrier**®

## Aquasmart 15TR fixed full load

| TBS outdoor (°C) | Water Delta Temp. °C | | 9,0 | | | | | | | 10,0 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Water Outlet Temp. °C | | 5,0 | 6,0 | 7,0 | 8,0 | 9,0 | 10,0 | 11,0 | 5,0 | 6,0 | 7,0 | 8,0 | 9,0 | 10,0 |
| **20** | Capacity | KW | 57,5 | 59,1 | 60,8 | 62,5 | 64,1 | 65,9 | 67,6 | 57,6 | 59,2 | 60,9 | 62,6 | 64,3 | 66,0 |
| | Eletrical Consumption | KW | 12,8 | 12,9 | 13,0 | 13,2 | 13,3 | 13,4 | 13,6 | 12,8 | 12,9 | 13,0 | 13,2 | 13,3 | 13,4 |
| | Water Flow | m³/h | 5,5 | 5,6 | 5,8 | 6,0 | 6,1 | 6,3 | 6,5 | 4,9 | 5,1 | 5,2 | 5,4 | 5,5 | 5,7 |
| | Loss on Exchanger | mCa | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,1 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 |
| **25** | Capacity | KW | 54,9 | 56,5 | 58,1 | 59,7 | 61,3 | 63,0 | 64,6 | 55,0 | 56,6 | 58,2 | 59,8 | 61,4 | 63,1 |
| | Eletrical Consumption | KW | 13,9 | 14,0 | 14,1 | 14,2 | 14,4 | 14,5 | 14,6 | 13,8 | 14,0 | 14,1 | 14,2 | 14,4 | 14,5 |
| | Water Flow | m³/h | 5,2 | 5,4 | 5,6 | 5,7 | 5,9 | 6,0 | 6,2 | 4,7 | 4,9 | 5,0 | 5,1 | 5,3 | 5,4 |
| | Loss on Exchanger | mCa | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,1 | 0,1 | 0,1 | 0,2 | 0,2 | 0,2 |
| **30** | Capacity | KW | 52,3 | 53,8 | 55,4 | 56,9 | 58,5 | 60,1 | 61,6 | 52,4 | 53,9 | 55,5 | 57,0 | 58,6 | 60,1 |
| | Eletrical Consumption | KW | 15,0 | 15,2 | 15,3 | 15,4 | 15,6 | 15,7 | 15,8 | 15,0 | 15,1 | 15,3 | 15,4 | 15,6 | 15,7 |
| | Water Flow | m³/h | 5,0 | 5,1 | 5,3 | 5,4 | 5,6 | 5,7 | 5,9 | 4,5 | 4,6 | 4,8 | 4,9 | 5,0 | 5,2 |
| | Loss on Exchanger | mCa | 0,1 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 | 0,1 | 0,1 | 0,1 | 0,1 | 0,1 | 0,2 |
| **35** | Capacity | KW | 49,6 | 51,1 | 52,5 | 54,0 | 55,5 | 57,0 | 58,5 | --- | 51,2 | 52,6 | 54,1 | 55,6 | 57,1 |
| | Eletrical Consumption | KW | 16,3 | 16,4 | 16,6 | 16,7 | 16,9 | 17,0 | 17,1 | --- | 16,4 | 16,6 | 16,7 | 16,9 | 17,0 |
| | Water Flow | m/h | 4,7 | 4,9 | 5,0 | 5,2 | 5,3 | 5,5 | 5,6 | --- | 4,4 | 4,5 | 4,7 | 4,8 | 4,9 |
| | Loss on Exchanger | mCa | 0,1 | 0,1 | 0,1 | 0,2 | 0,2 | 0,2 | 0,2 | --- | 0,1 | 0,1 | 0,1 | 0,1 | 0,1 |
| **40** | Capacity | KW | 46,7 | 48,1 | 49,5 | 51,0 | 52,4 | 53,8 | 55,3 | --- | --- | --- | 51,1 | 52,5 | 53,9 |
| | Eletrical Consumption | KW | 17,7 | 17,8 | 18,0 | 18,1 | 18,3 | 18,4 | 18,5 | --- | --- | --- | 18,1 | 18,3 | 18,4 |
| | Water Flow | m³/h | 4,5 | 4,6 | 4,7 | 4,9 | 5,0 | 5,2 | 5,3 | --- | --- | --- | 4,4 | 4,5 | 4,6 |
| | Loss on Exchanger | mCa | 0,1 | 0,1 | 0,1 | 0,1 | 0,1 | 0,2 | 0,2 | --- | --- | --- | 0,1 | 0,1 | 0,1 |
| **45** | Capacity | KW | --- | --- | 46,4 | 47,7 | 49,1 | 50,5 | 51,9 | --- | --- | --- | --- | --- | 50,6 |
| | Eletrical Consumption | KW | --- | --- | 19,4 | 19,6 | 19,7 | 19,9 | 20,0 | --- | --- | --- | --- | --- | 19,9 |
| | Water Flow | m³/h | --- | --- | 4,4 | 4,6 | 4,7 | 4,8 | 5,0 | --- | --- | --- | --- | --- | 4,4 |
| | Loss on Exchanger | mCa | --- | --- | 0,1 | 0,1 | 0,1 | 0,1 | 0,1 | --- | --- | --- | --- | --- | 0,1 |

**NOTES:**

1. Values generated with fouling factor of 0.018 m2*K/kW;
2. For other fouling factor values, multiply the capacity and water flow values by:

   1- ((0.05/0.15)*((FI)-0.0176))
   Where FI is the desired fouling factor, in m2 * K/kW
   Maximum fouling factor allowed of 0.15 m2 * K/kW

## 8.1 Performance Data ( Partial Loads per unit)

### A) AQUASMART 15 INVERTER (30EVA15)

| Load | | 100% | 75% | 50% | 25% |
|---|---|---|---|---|---|
| Capacity | TR | 12,00 | 9,00 | 6,00 | 3,00 |
| Consumption | KW | 13,56 | 10,11 | 7,44 | 6,90 |
| EER | Btu/h/W | 10,62 | 14,24 | 19,35 | 20,88 |
| COP | - | 3,11 | 4,17 | 5,67 | 6,12 |
| KW/TR | KW/TR | 1,13 | 0,85 | 0,62 | 0,57 |
| External Air | C | 35,00 | 26,67 | 18,33 | 12,78 |

| IPLV (EER) | 17,30 |
|---|---|
| IPLV (COP) | 5,07 |
| IPLV (KW/TR) | 0,70 |

### B) AQUASMART 15 FIXED (30EXA15)

| Load | | 100% | 2 compressores** | 75% | 1 compressor** | 50% | 1 compressor** | 25% |
|---|---|---|---|---|---|---|---|---|
| Capacity | TR | 14,60 | 14,60 | 10,95 | 9,05 | 7,30 | 9,20 | 3,65 |
| Load | % | 100% | 100% | 75% | 62% | 50% | 63% | 25% |
| Consumption | KW | 16,56 | 16,56 | 8,66 | 5,61 | 4,64 | 5,46 | 2,34 |
| EER | Btu/h/W | 10,58 | 10,58 | 15,19 | 19,36 | 18,88 | 20,20 | 18,73 |
| COP | - | 3,10 | 3,10 | 4,45 | 5,67 | 5,53 | 5,92 | 5,49 |
| KW/TR | KW/TR | 1,13 | 1,13 | 0,84 | 0,62 | 0,64 | 0,59 | 0,64 |
| External Air | C | 35,00 | 35,00 | 26,67 | 18,33 | 18,33 | 12,78 | 12,78 |

| IPLV (EER) | 17,23 |
|---|---|
| IPLV (COP) | 5,05 |
| IPLV (KW/TR) | 0,71 |

*  Values generated according to standard AHRI 540/560.

** Reference values for operation of parallel compressors (tandem).

# 9. Electrical Data

| Model | Voltage (V) | Compressors (2x) | | | | | Motor | | | I Nom. Total [A] | I Max. Total [A] | FP w/o CFP | FP w/ CFP | Nominal Power Total [W] | Nominal Power Max. [W] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Qtde. | I Nom. [A] | I Max. [A] | Nom. Power [W] | Max. Power [W] | Qtde. | FLA [A] | Max. Power [W] | | | | | | |
| 30EVA15 | 220 | 2 | 40,3 | 51,3 | 12450 | 16140 | 1 | 7,1 | 1150 | 47,4 | 58,4 | - | 0,94 | 13600 | 17290 |
| | 380 | 2 | 21,8 | 28,8 | 12450 | 16870 | 1 | 7,1 | 1150 | 28,9 | 35,9 | - | 0,96 | 13600 | 18020 |
| | 440 | 2 | 21,8 | 27,3 | 12450 | 15470 | 1 | 7,1 | 1150 | 28,9 | 34,4 | - | 0,96 | 13600 | 16620 |
| 30EXA15 | 220 | 2 | 49,0 | 60,0 | 15450 | 20900 | 1 | 7,1 | 1150 | 56,1 | 67,1 | 0,84 | 0,94 | 16600 | 22050 |
| | 380 | 2 | 30,0 | 36,7 | 15450 | 20900 | 1 | 7,1 | 1150 | 37,1 | 43,8 | 0,82 | 0,94 | 16600 | 22050 |
| | 440 | 2 | 24,8 | 30,4 | 15450 | 20900 | 1 | 7,1 | 1150 | 31,9 | 37,5 | 0,82 | 0,94 | 16600 | 22050 |

Table 5

| Data current for compressor 30EVA15: | | | |
|---|---|---|---|
| Description | 220V | 380V | 440V |
| I nom comp. 1 | 18,5 | 9,7 | 9,7 |
| I nom comp. 2 | 21,8 | 12,1 | 12,1 |
| I máx comp. 1 | 25,8 | 13,9 | 13,9 |
| I máx comp. 2 | 25,5 | 14,9 | 13,4 |

| Data current for compressor 30EXA15: | | | |
|---|---|---|---|
| Description | 220V | 380V | 440V |
| I nom comp. 1 | 24,5 | 15,0 | 12,4 |
| I nom comp. 2 | 24,5 | 15,0 | 12,4 |
| I máx comp. 1 | 30,0 | 18,4 | 15,2 |
| I máx comp. 2 | 30,0 | 18,4 | 15,2 |

**NOTES:**

- The fan motors are the BLDC type.
- The nominal voltage must be as indicated on the unit nameplate. Voltage variation should be at no more than +/- 10%. In this range, the unit may eventually operate the protection devices. Values outside this range are not allowed in any time interval.
- Refer to the applicable Codes and / or Standards for on-site installation to ensure that the electrical wiring complies with the standards and requirements specified. Standard NBR5410 "Low Voltage Wiring"
- Nominal data obtained under the conditions of standard AHRI 550/590.
- It is mandatory to consider the values of Current and Maximum Power for calculation of electrical design (as above).
- CFP is the standard on Inverter units. In fixed units, the CFP is supplied as an accessory in their respective models.

# 10. Operating Limits

| | Unit | 30EV_15 | 30EX_15 |
|---|---|---|---|
| Minimum flow on evaporator | m³/h | 4,2 | 4,4 |
| Maximum flow on evaporator | m³/h | 15,3 | 18,2 |
| Maximum outdoor temperature | °C | 45 | 45 |
| Minimum outdoor temperature | °C | 10 | 10 |
| Maximum REWT (evaporator)[1] | °C | 35 | 35 |
| Minimum REWT (evaporator)[1] | °C | 6 | 6 |
| Maximum ULWT (evaporator)[2] | °C | 35 | 35 |
| Minimum ULWT (evaporator)[2] | °C | 5 | 5 |
| Minimum temperature delta[3] | °C | 3 | 3 |
| Maximum temperature delta[3] | °C | 10 | 10 |

Table 6

**Key:**

*REWT:  System water inlet temperature*
*ULWT:  Unit water outlet temperature*

**Notes:**

- *For continuous operation, the maximum temperature delta (REWT-ULWT) should not exceed 10 ° C.*

[1]  *For continuous operation, REWT must be within the range of 8.0 ° C to 20.0 ° C.*

[2]  *The standard control setpoint is 5 ° to 14 ° C. This value may vary depending on the FLWD of the project and the unit number configured in the control. In continuous operation at full load the maximum ULWT shall not exceed 15.0 ° C. For more details refer to the Technical Catalogue.*

[3]  *Refer to the Technical Catalogue - Performance Data section for case-by-case limits.*

**Wiring Limits**

The minimum and maximum acceptable supply voltages are indicated in Electrical Data (See Table 5).
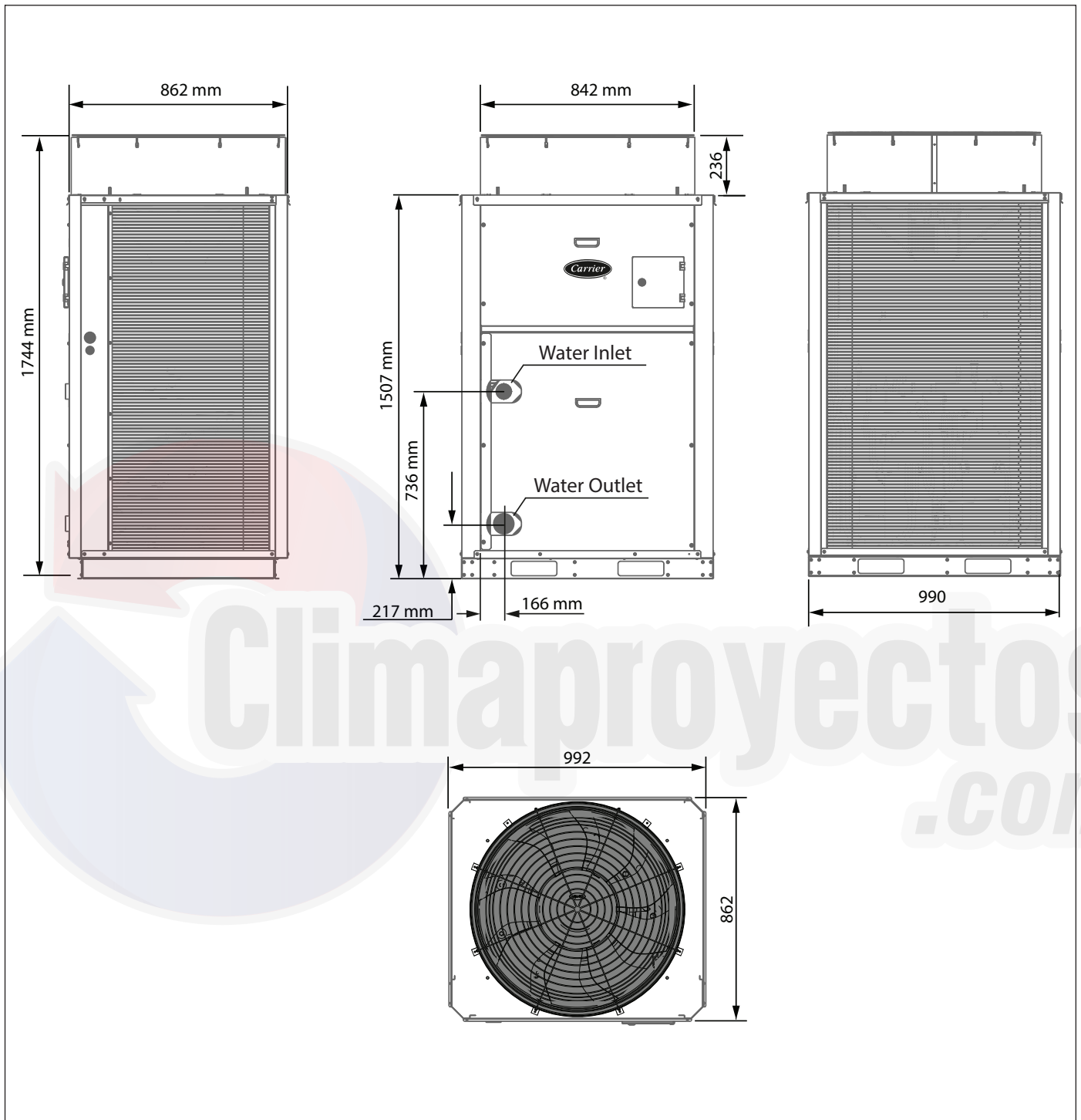
# 11. Dimensions

**30EV / 30EX Units**



Figure 13 - Dimensional

# 12. Application Data

The unit must be installed on level horizontal surface to ensure correct return of the oil to the compressors. There should be a maintenance area around the Chillers for air circulation, repair and local requirements. See the dimensional drawings for the specific maintenance area requirements of the unit. Make sure that a proper maintenance area is maintained between adjacent Chillers.

| ⚠ IMPORTANT |
| :---: |
| Units should never be installed on facades. |

## 12.1 Minimum Clearances Recommended for Installation

The minimum recommended maintenance area to ensure proper airflow through the condenser coils and to allow the fan to be maintained is indicated below.



| Clearance for: | Quote | Dimension (mm) |
| :--- | :---: | :---: |
| Air circulation | A | 1000 |
| Air circulation | B | 600 |
| Maintenance & Repair | C | 500 |
| Air circulation between units: | | |
| Minimum | D | 300 |
| Recommended | | 1000 |
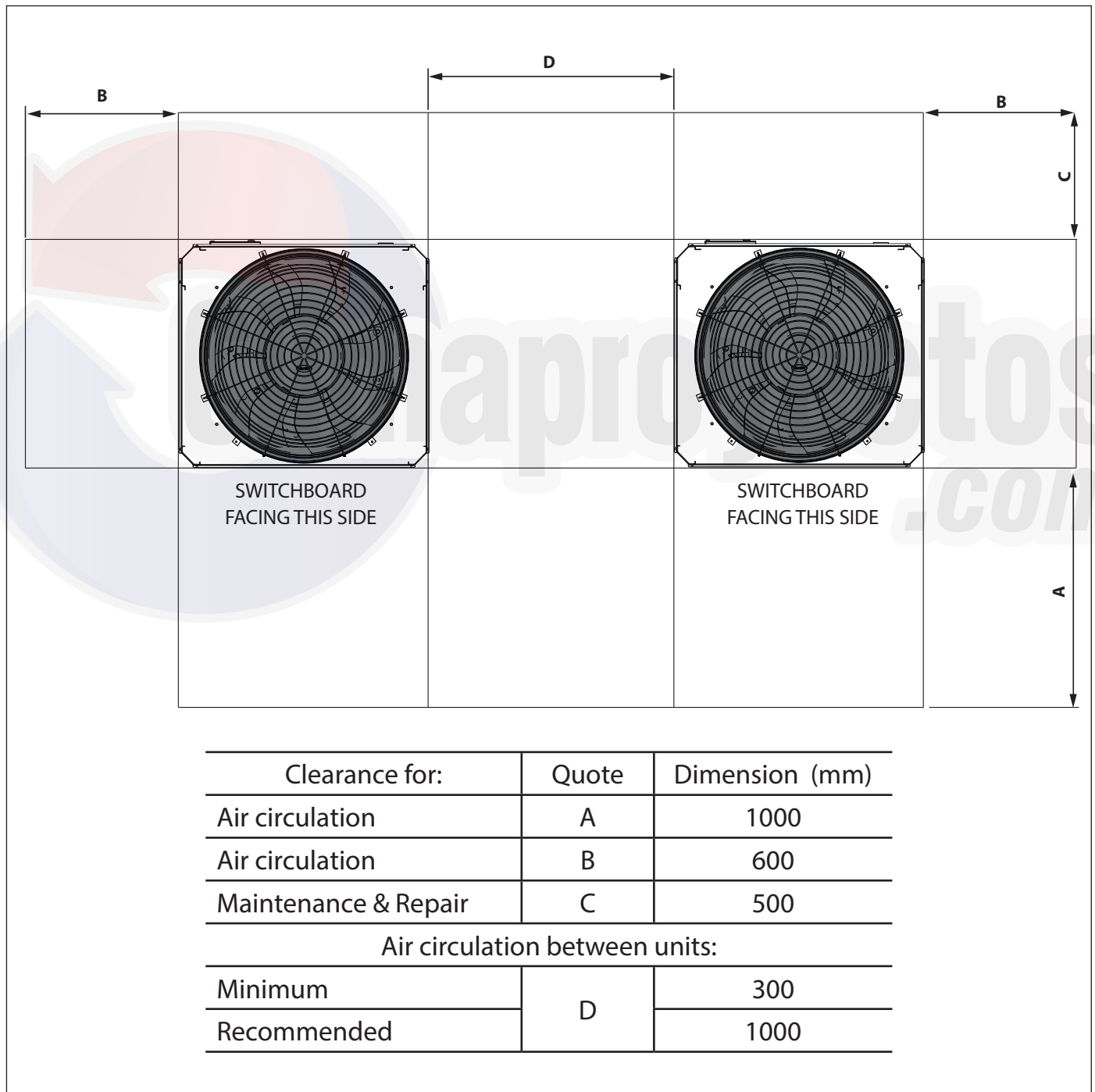
Figure 14 - Clearance between units

# 12. Application Data (cont.)

## 12.1 Minimum Clearance Recommended (cont.)



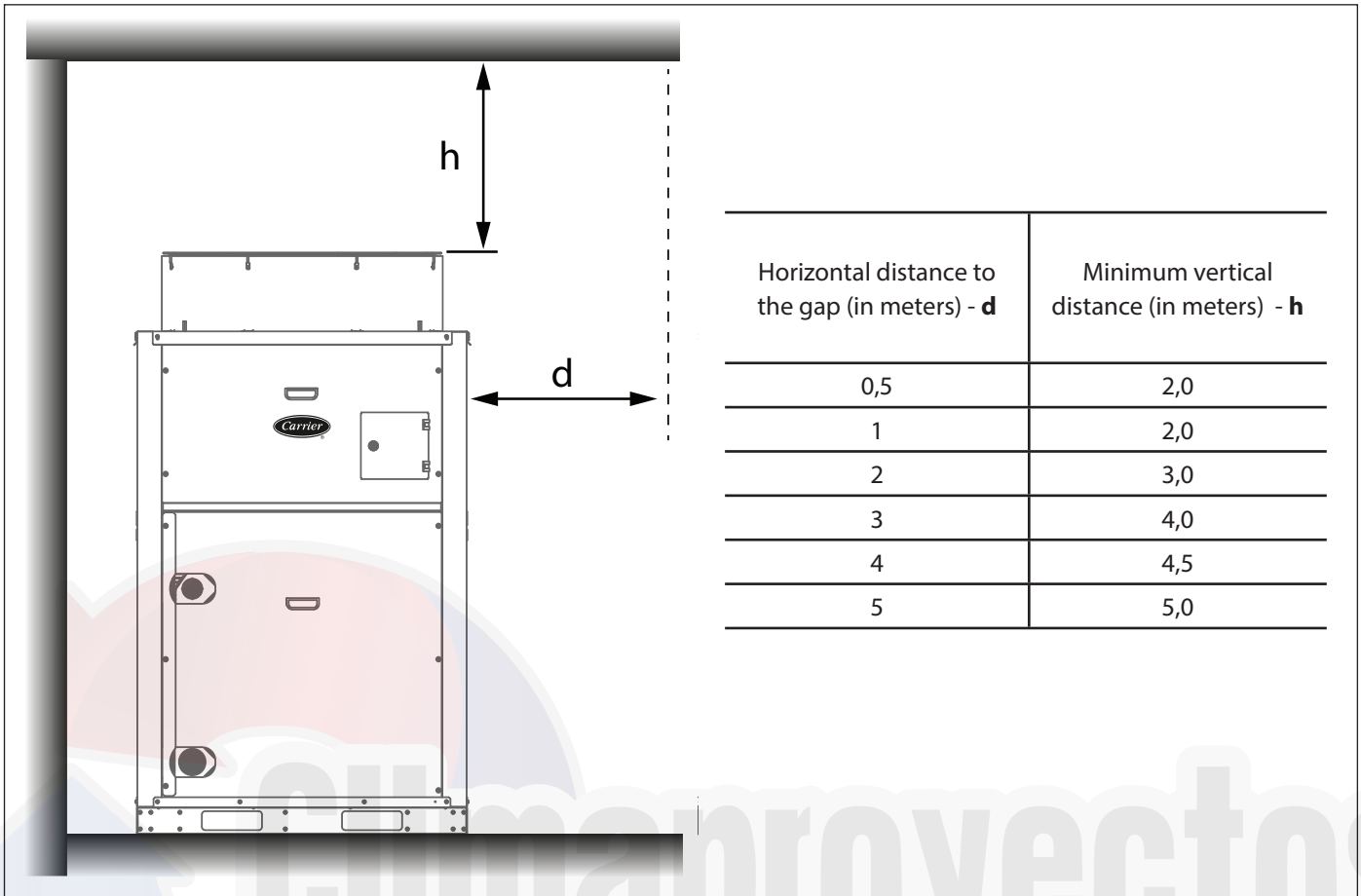| Horizontal distance to the gap (in meters) - **d** | Minimum vertical distance (in meters) - **h** |
|:---:|:---:|
| 0,5 | 2,0 |
| 1 | 2,0 |
| 2 | 3,0 |
| 3 | 4,0 |
| 4 | 4,5 |
| 5 | 5,0 |

Figure 15 - Minimum clearance

## Piping Installation

The piping must always be installed on the opposite side of the machine covers, to allow the correct access for operation and maintenance/repair. They must always be installed above or below the condenser, avoiding obstruction of the condenser and loss of efficiency.

## 12.2 Evaporator fouling factor

The fouling factor used to calculate the performance tables is 0.018 m²°C/kW (0.1 ft²hr°F/Btu). As the fouling factor increases, the capacity of both the unit and its efficiency decreases.

For the use of other fouling values, the capacity and water flow of the performance tables should be multiplied by the factor below:

$$\text{FOULING CORRECTION FACTOR} = [(0,05/0,15) \times (FI - 0,0176)]$$

Where **FI** is the desired fouling factor. The maximum value allowed for the fouling factor is 0.15 m² ° C / kW.

## 12.3 Altitude Correction Factor

Correction factors will be applied for standard performance at altitudes above 2,000 feet (609.6 m) using the following multipliers:

| Altitude | | Capacity Multiplier | Energy Multiplier on Compressor |
|:---:|:---:|:---:|:---:|
| (ft) | (m) | | |
| 2.000 | 609,6 | 0,99 | 1,01 |
| 4.000 | 1219,2 | 0,98 | 1,02 |
| 6.000 | 1828,8 | 0,97 | 1,03 |
| 8.000 | 2438,4 | 0,96 | 1,04 |
| 10.000 | 3048,0 | 0,95 | 1,05 |

Table 7

## 12.4 Condenser Air Flow

Restrictions of airflow at the fan outlet will affect the unit capacity, the condenser discharge pressure and the compressor energy consumption, and the discharge shall remain unplugged, following the clearances specified in section 12.1.

## 12.5 Water ring volume

### Water Ring Minimum Volume

The water ring minimum volume must be established according to the formula below:

$$\text{VOLUME (l)} = \text{CAP (kW)} \times 6 \text{ (l/kW)}$$

Where CAP is the nominal cooling capacity under normal operating conditions. To reach this volume, it will often be necessary to install a tank in the closed loop.
The tank shall be provided with a baffle to ensure that the water is properly mixed, avoiding temperature differentials. The piping between the chiller and the circuit volume tank can be installed to allow the tank to be on the supply side of the chiller (tank connected to the chiller system outlet) or in the return to the chiller (tank in the inlet line of the chiller system).

This tank also has the function of guaranteeing stable flow in the chilled water circuit to the evaporators (secondary circuit), in the case of systems with more than one unit, since the primary circuit can have variable flow, as the modulation in the system occurs to adjust the output temperature (see Data section for Hydraulic Interconnection).
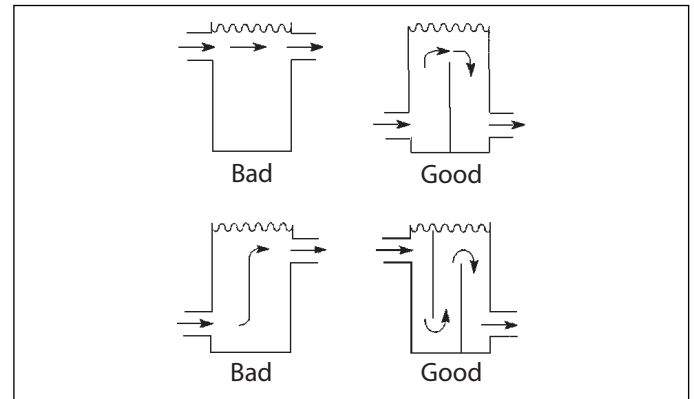


Figure 16

# 13. Optional Items and Accessories

Aquasmart units have the main protection routines:

- Evaporator freezing (plate changer);
- High discharge temperatures, saturated suction and suction;
- Oil return;
- Excessive cycle of compressors;
- Water temperature limits;
- Water flow.

The Aquasmart units also offer:

- Option to turn on and off remotely;
- Remote alarm signal (for Inverter systems only);
- Reset of a unit or system through the control (Access the Service menu and use password "325193").

### *Victaulic-weld Connection with Filter Y Kit*

Contains couplings and tubes with Victaulic® standard grooves, filter Y (mesh 40) and pipe sections for welding in the piping. These parts are intended to provide a complete system for connection to the evaporator as well as its protection through the filter, which is a mandatory part of the hydraulic system.
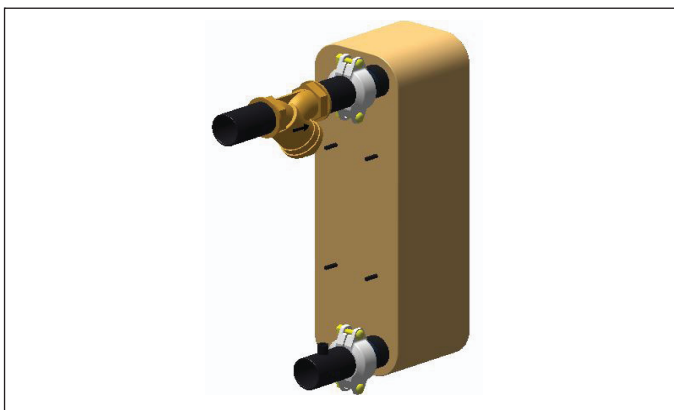


Figure 17

**General Table**

| Item | Factory Default | | Factory Optional Item | |
|---|---|---|---|---|
| | 30EVA | 30EXA | 30EVA | 30EXA |
| **ELECTRICAL SWITCHBOARD** | | | | |
| Control voltage 220V | X | X | | |
| Control voltage 24V* | X | X | | |
| Power factor correction | X | | | X |
| Sequence / phase loss protection (on main board) | X | X | | |
| ModBus Kit ** | | | X | X |
| Overcurrent protection (on main board) | X | X | | |
| **COOLING SYSTEM** | | | | |
| Scroll compressors | X | X | | |
| Oil sump resistor | X | X | | |
| High and low pressure switch | X | X | | |
| Filter on suction (solid) | X | X | | |
| Dryer filter | X | X | | |
| Thermostatic expansion valve (TXV) | X | X | | |
| Service valve on the high and low sides | X | X | | |
| Locking valve on the high and low sides | X | X | | |
| Condensation control | X | X | | |
| Safety valve for evaporator | X | X | | |
| Liquid sight glass | X | X | | |
| Suction accumulator | X | - | | |
| Freezing protection | X | X | | |
| **OTHERS** | | | | |
| Flow switch*** | X | X | | |
| System water inlet/outlet sensors *** | X | X | | |
| Victaulic-type connection with Filter Y Kit | | | X | X |
| NR-13 | X | X | | |

\*    The machine control voltage is 220V, but with 24V output for pump control and water valve. (Water pump and valve are not included in the chillers).

\*\*   Converter that allows communication in the Modbus RTU protocol.

\*\*\*  Provided by Carrier and installation is the customer's responsibility. Failure to install the flow switch may result in loss of warranty.

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• Evaporator freezing (plate changer);
• High discharge temperatures, saturated suction and suction;
• Oil return;
• Excessive cycle of compressors;
• Water temperature limits;
• Water flow.

The Aquasmart units also offer:
• Option to turn on and off remotely;
• Remote alarm signal (for Inverter systems only);
• Reset of a unit or system through the control (Access the Service menu and use password "325193").