



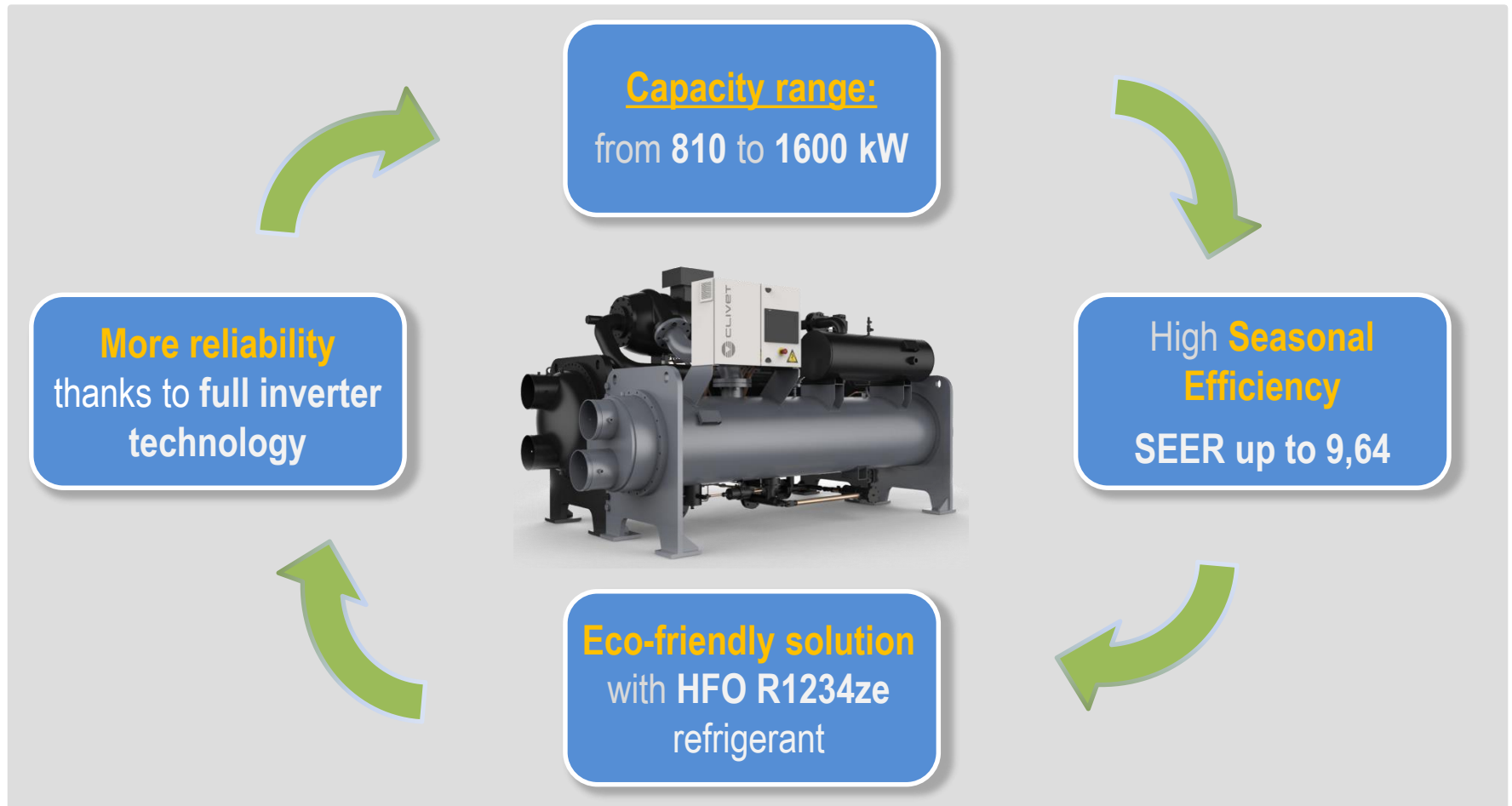
Centrifugal Chiller HFO

WCH-iZ 230 – 450


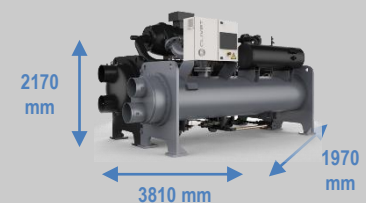
Product Presentation

Centrifugal chiller – Main features

WCH-iZ is the most **technologically advanced solution** available on the Market with horizontal back to back centrifugal compressor with inverter regulation and HFO R1234ze refrigerant





Centrifugal chiller – Capacity range

Series	WCH-iZ 230 - 450						
Sizes	230	270	300	350	380	420	450
Cooling capacity [kW] (A35/W7)	809	950	1070	1230	1354	1477	1600
EER	5,77	5,80	5,97	6,00	6,17	6,14	6,07
SEER	8,00	8,49	8,49	8,90	9,30	9,48	9,64
Dimensions							
n°compressors / n°circuits	1 / 1						
Refrigerant	R1234ze						
Power supply	400/3/50						

Centrifugal chiller – Eco-friendly solution

R1234ze = nearly zero environmental impact, **Eco-friendly solution**

The environmental benefits of R1234ze compared to R-134a

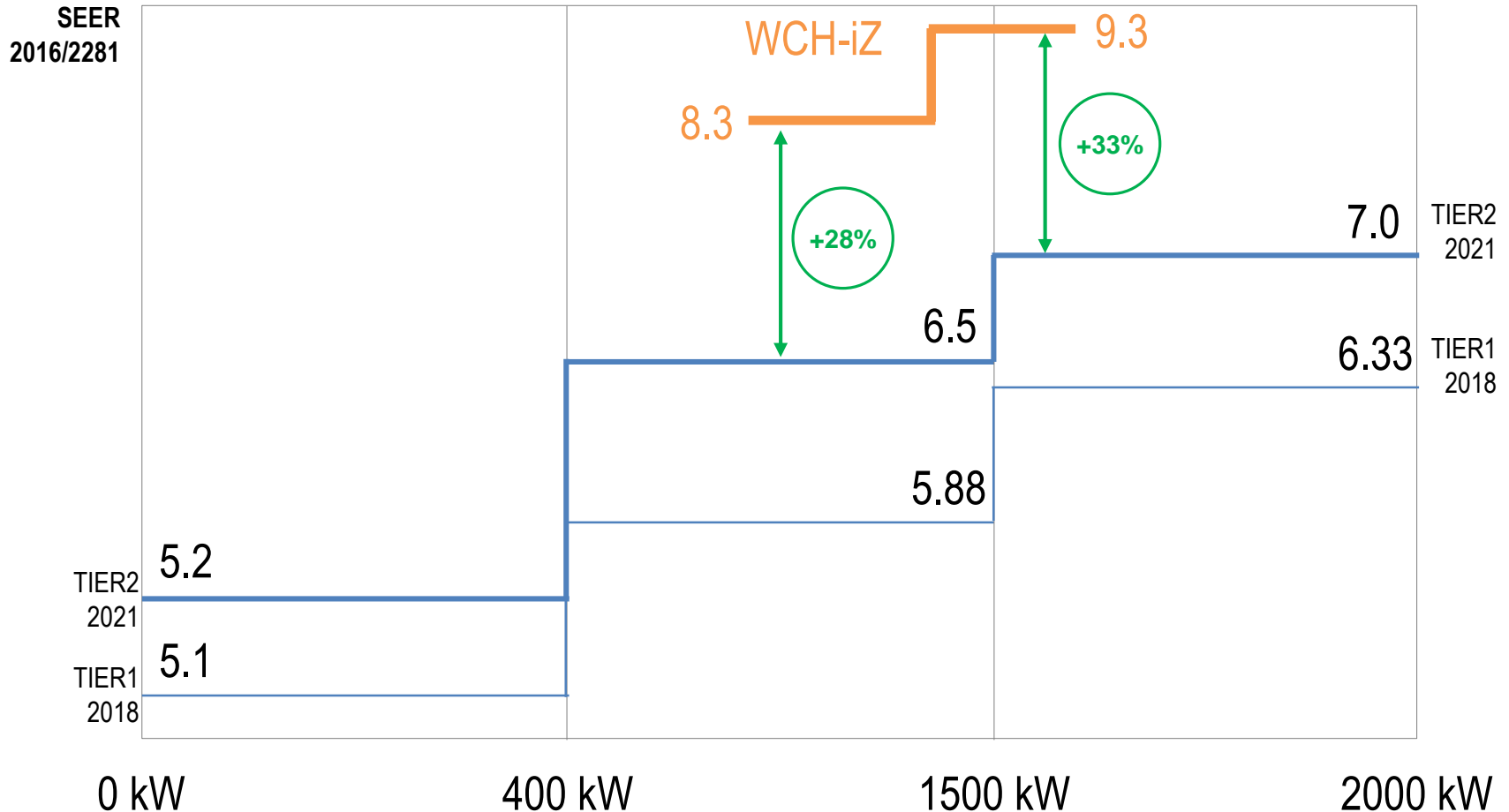
Refrigerant		
Refrigerant type	HFO	HFC
GWP	< 1	1430
Dispersion in the atmosphere	16 days	14 years
ASHRAE 34, ISO 817 classification	A2L	A1



Centrifugal chiller – Seasonal efficiency (Comfort application)

WCH-iZ reaches very high seasonal efficiency values (SEER = 9,64)

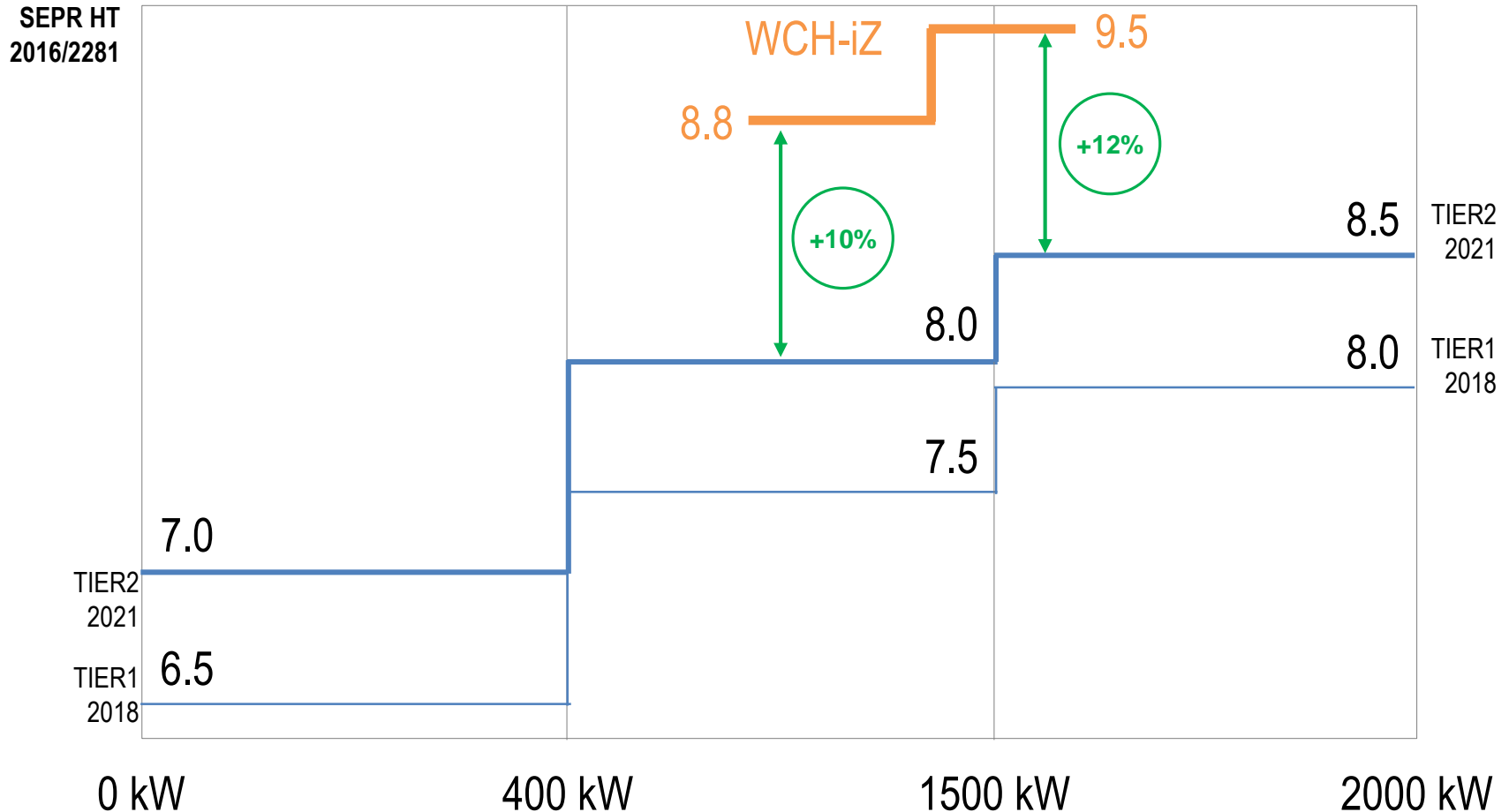
It's already conforming today to 2021 requirements (Tier 2)



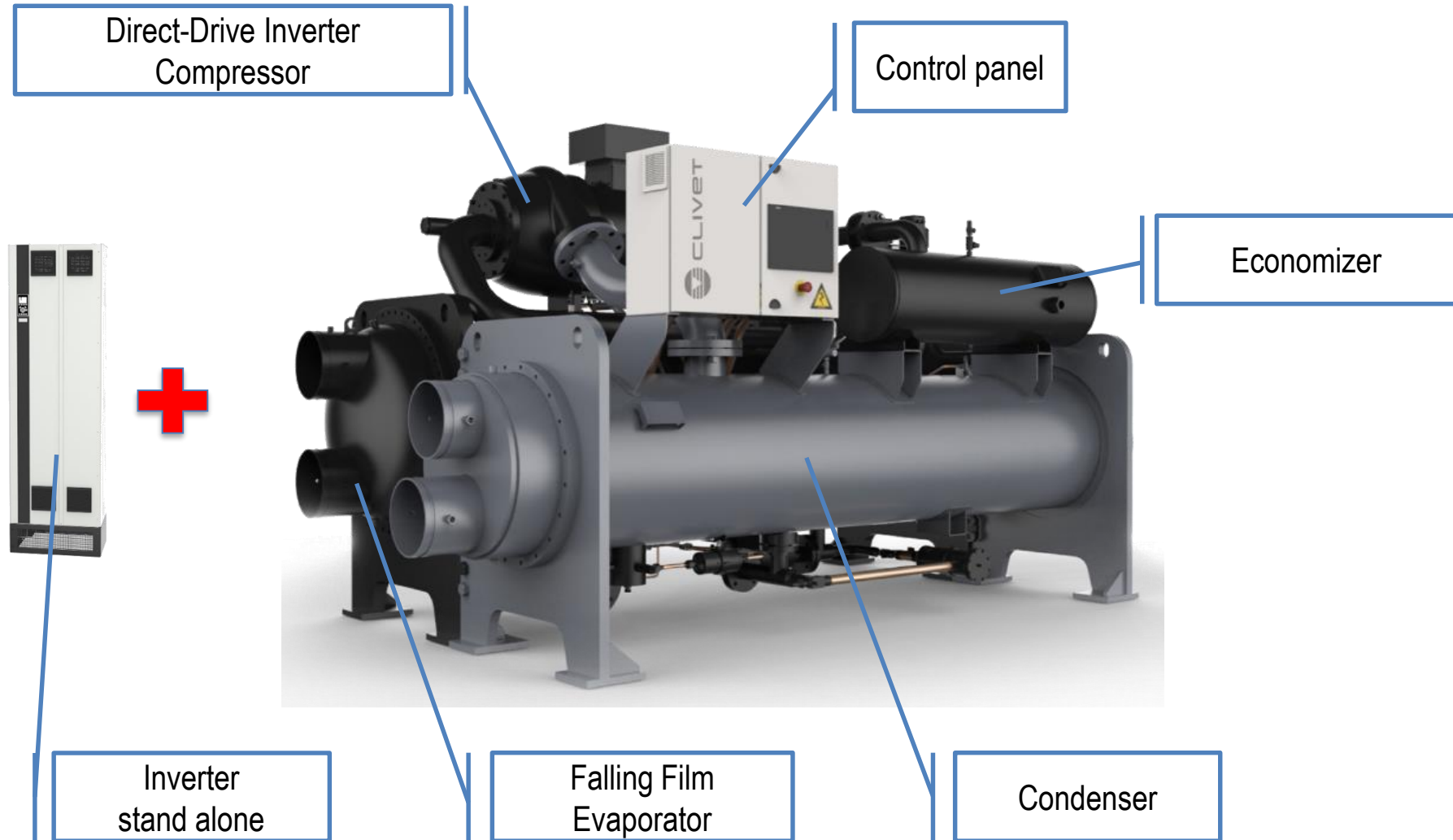
Centrifugal chiller – Seasonal efficiency (Industrial application)

WCH-iZ reaches very high seasonal efficiency values (SEPR HT = 9,59)

It's already conforming today to 2021 requirements (Tier 2)



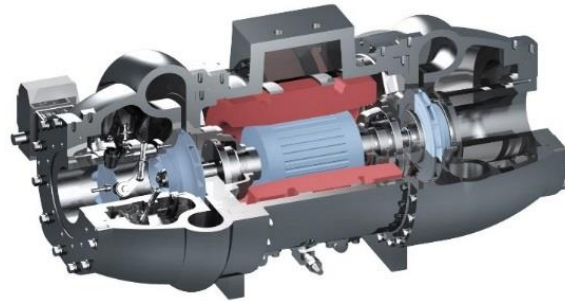
Centrifugal chiller – Technology



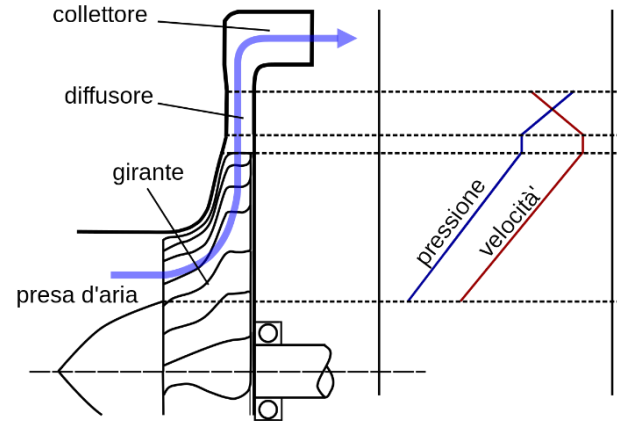
Proprietary technology

- Horizontal back-to-back self-balanced impeller
- Keyless joint system thanks to a profile connection between impeller and shaft
- Inlet guide vane regulating mechanism with rolling element
- Integration design of thrust plate and rotation axis
- Refrigerant flow motor cooling system
- Inlet guide vane correcting algorithm
- Gas-inlet regulation mechanism for centrifugal compressor

7 Patents



How does the centrifugal compressor work?

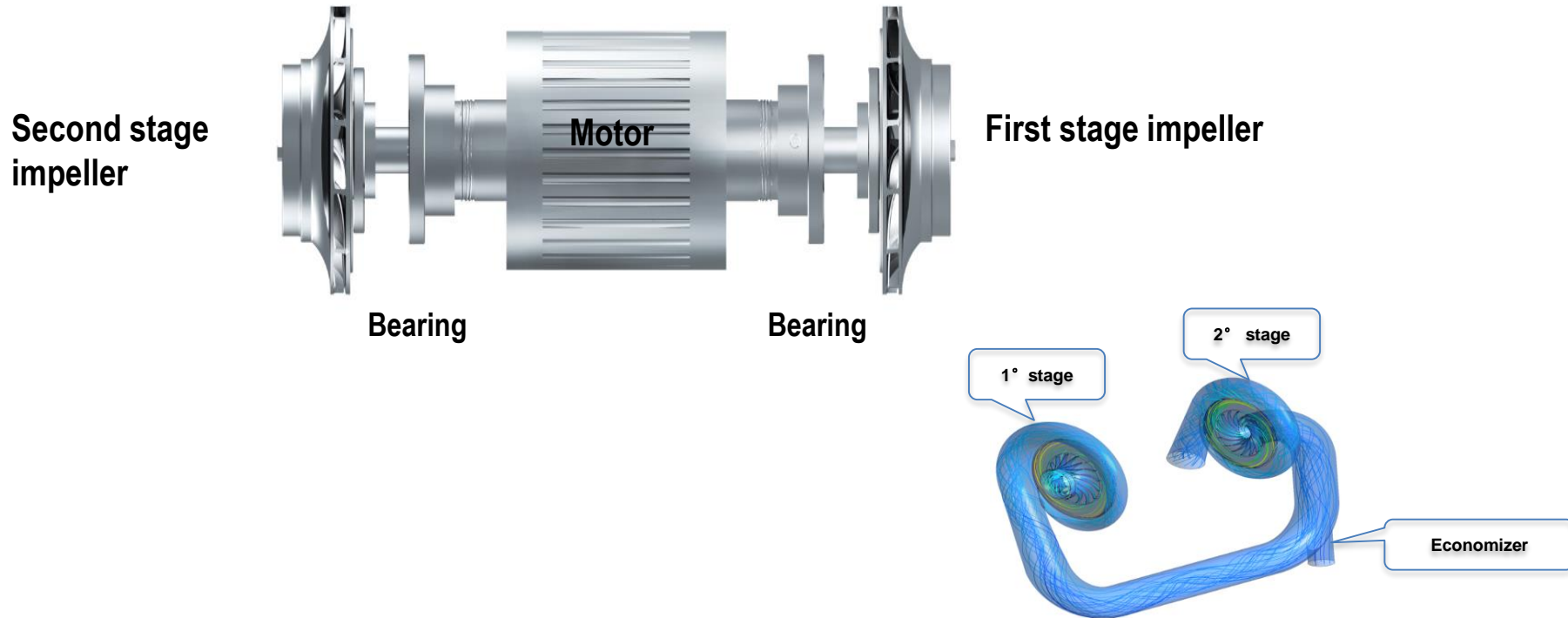


- **Rotational speed ~ 15000 rpm**
- The pressure increase occurs by the acceleration of the steam inside the impeller and the subsequent conversion of the energy accumulated under pressure
- The impeller is composed by a series of blades, whose bending is designed according to the working conditions (properties of the refrigerant, speed, working pressures)
- IGV (Inlet Guide Vane) regulates the direction of the steam entering the impeller: it is used to regulate the refrigerant flow and therefore the absorbed power and the cooling capacity

Distinguishing features

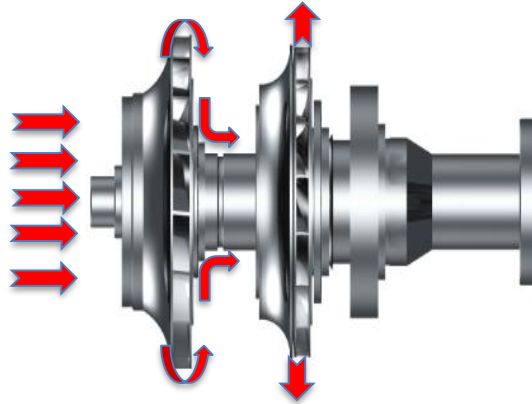
- **Two stages:** higher compression efficiency
- **Back to back impellers:** balance the thrust forces
- **Direct drive motor coupling:** no gear losses
- **Economizer:** further increases efficiency
- **Oil circulation system:** optimal lubrication
- **Very low vibration levels**
- **High silence**

Two stage compression

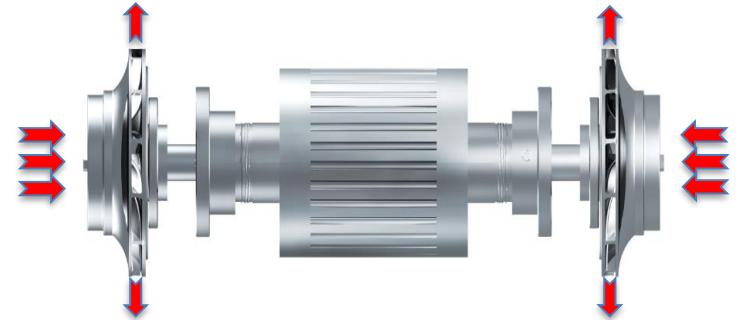
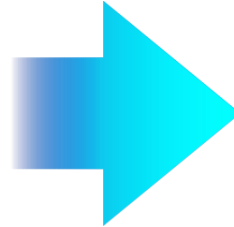


- Higher compression efficiency

Horizontally back to back impellers



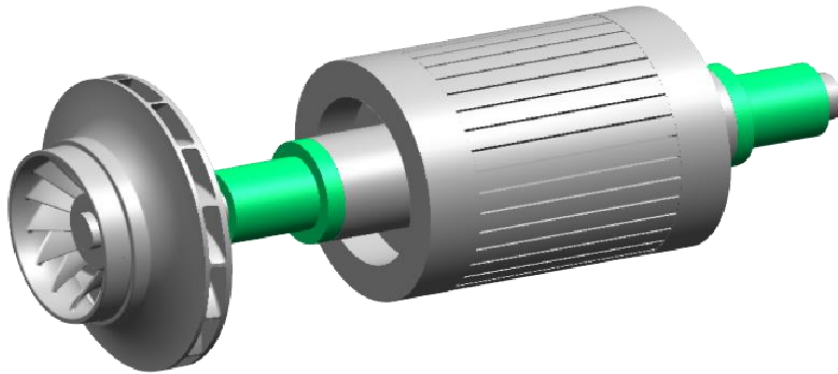
In line impellers



Back to Back impellers

- **Balanced load on the bearings**
- **Low mechanical stress**
- **Higher reliability**

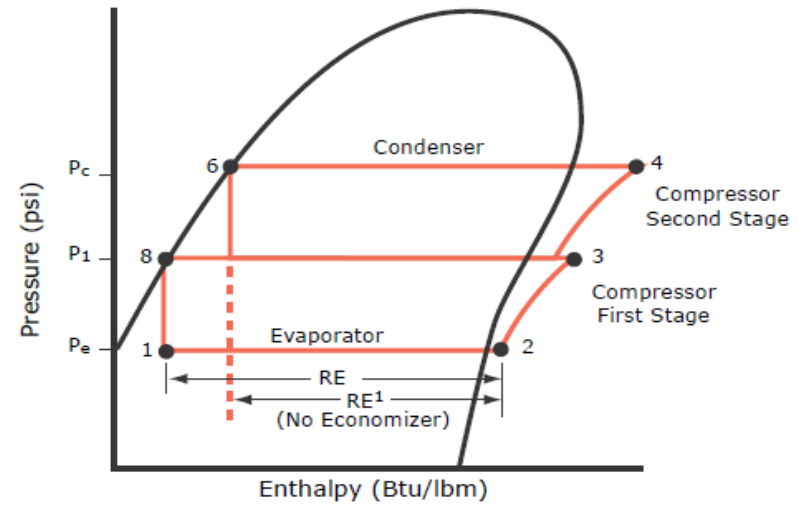
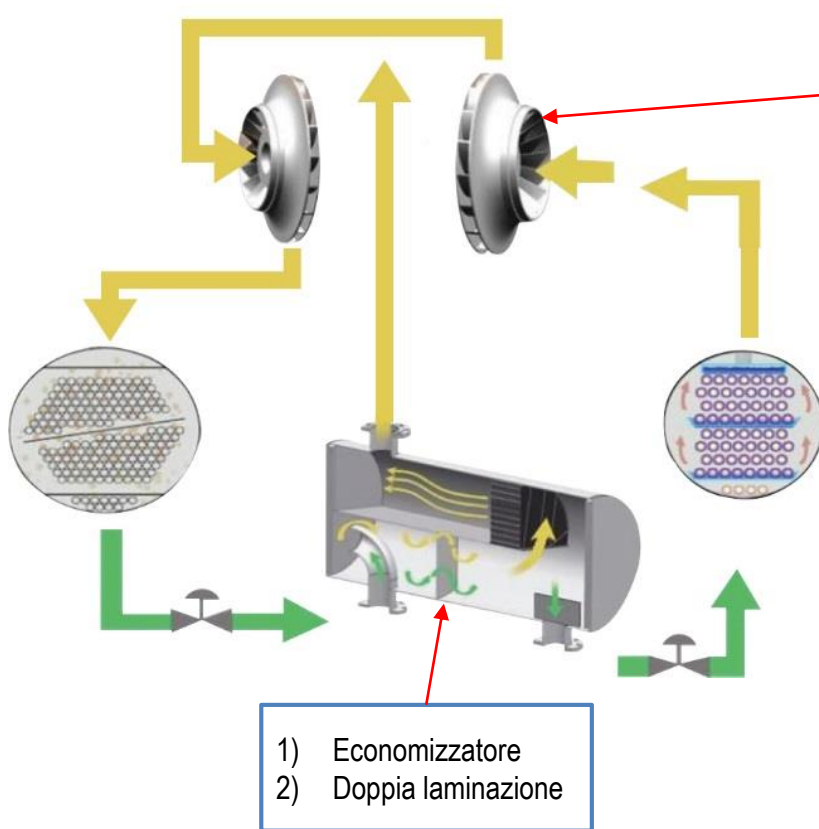
Direct drive motor coupling



Direct drive

- **2 bearings instead of 4 = More compact structure and smaller size**
- **No gear losses**
- **Higher silence**

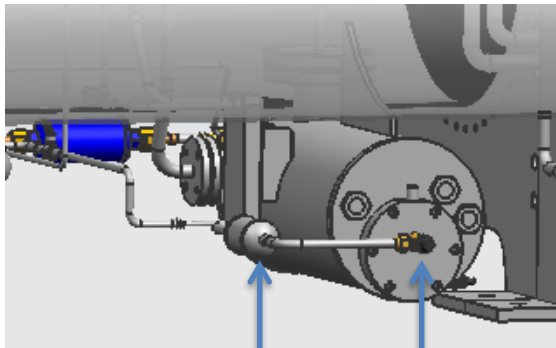
Economizer



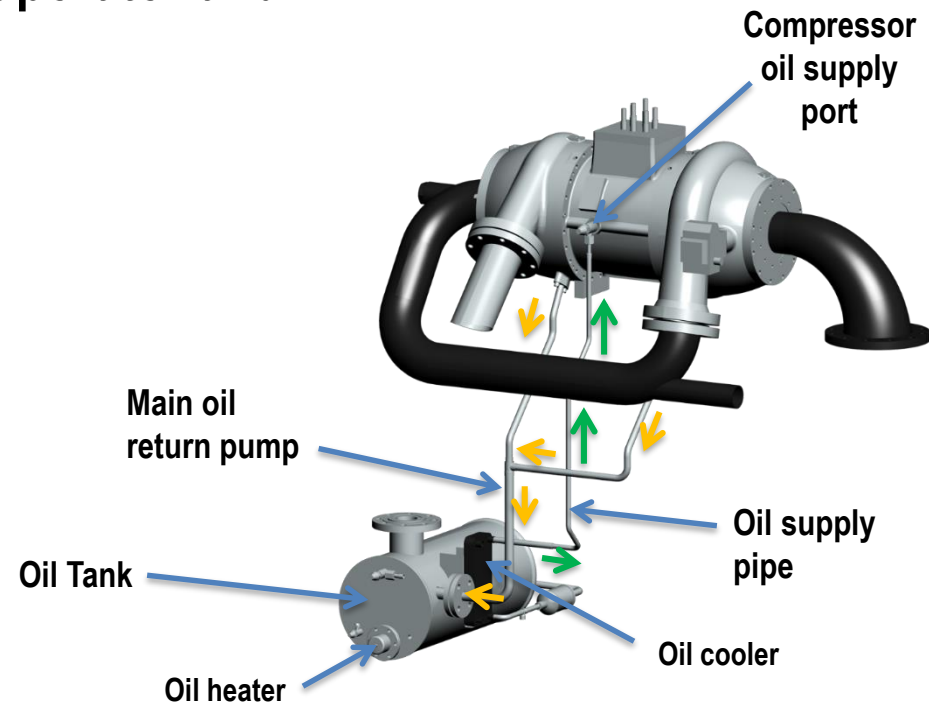
+6% Higher efficiency with the economizer

Oil circulation system

- Oil flows only in the bearings housing, almost no oil through the refrigerant circuit
- Higher exchange efficiency at evaporator and condenser
- Improved compressor reliability



Oil filter Oil pump



Inverter control

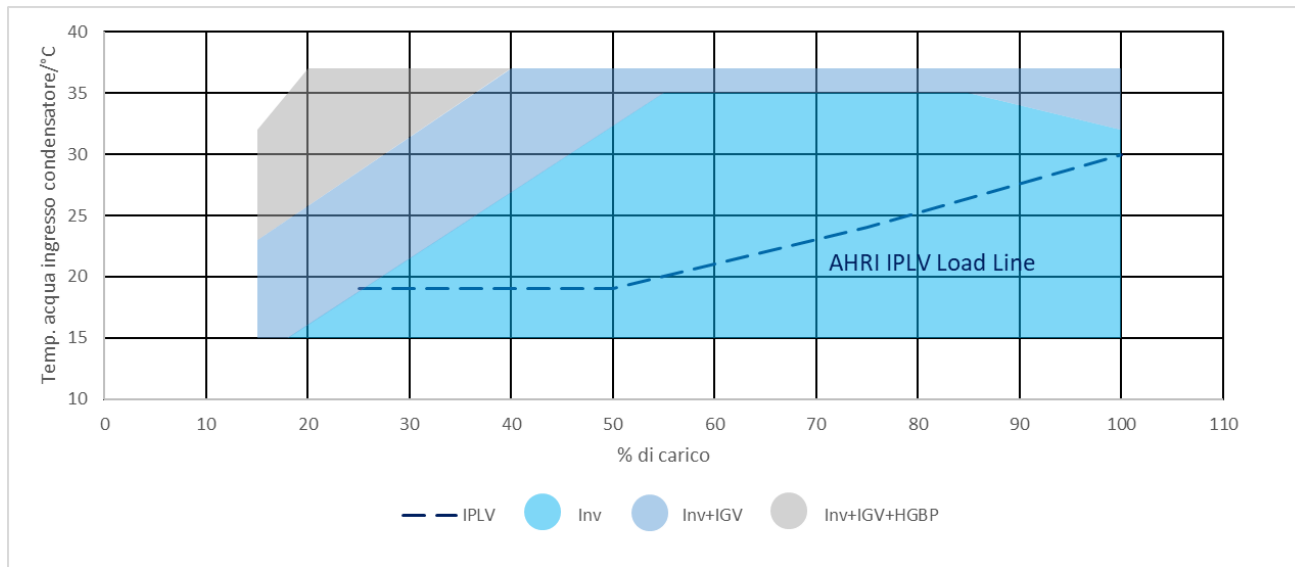
The use of inverter technology ensures the rotation speed of the compressor matches the real demand of the plant:

- Capacity control from 100% to 15%
- SEER up to 9,64
- Linear in-rush current
- Management of compressor working conditions



Capacity control and Operating range

- Capacity control is performed by combining 2 settings: (1) inverter frequency (2) IGV opening / closing
- Usually capacity control is done by inverter because it is more efficient. When it is no longer possible to reduce the capacity, by decreasing the frequency of the inverter, the IGV comes into action, reducing the flow of refrigerant in suction
- When the compressor is switched on, the IGV is partially closed and the frequency of the inverter is at minimum to reduce the in-rush current



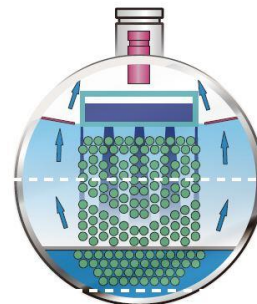
Maximum source side inlet water temperature: + 37° C

Falling film evaporator

- **Technology:** water passes inside the copper pipes, the refrigerant, injected through a distribution system, comes down from above on the pipes creating a continuous turbulence
- **Heat exchange comparable to a flooded evaporator:** (evaporation at 6°C, superheating close to 0 K, with no risk of liquid return to the compressor). The high exchange efficiency and the low superheat allow to reach an evaporation temperature of 6°C with outlet water at 7°C
- **Less refrigerant content**



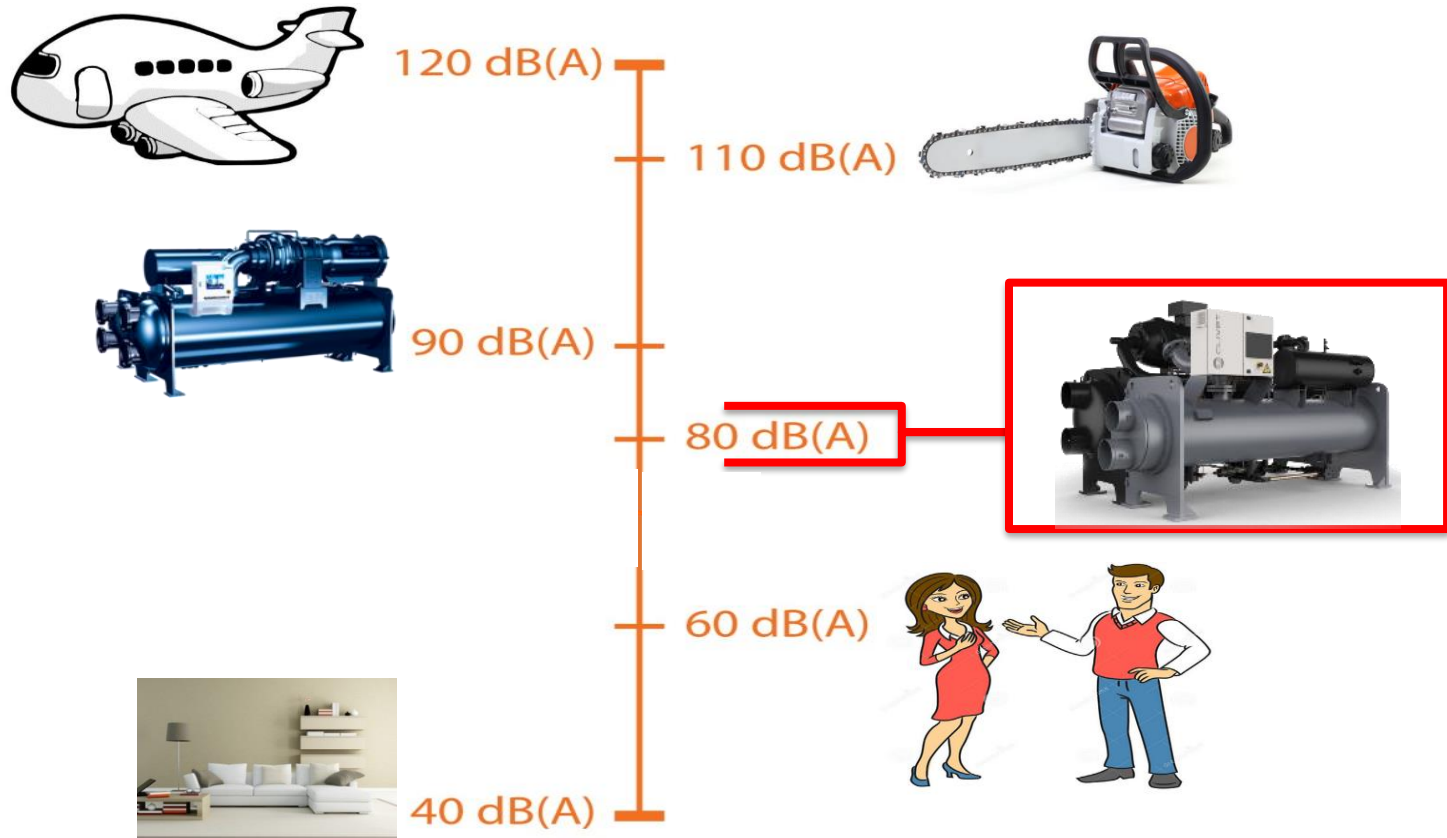
Flooded



Falling Film

-40%
refrigerant

Sound pressure level @1 m



Touch screen display

Home page



Settings

Alarms

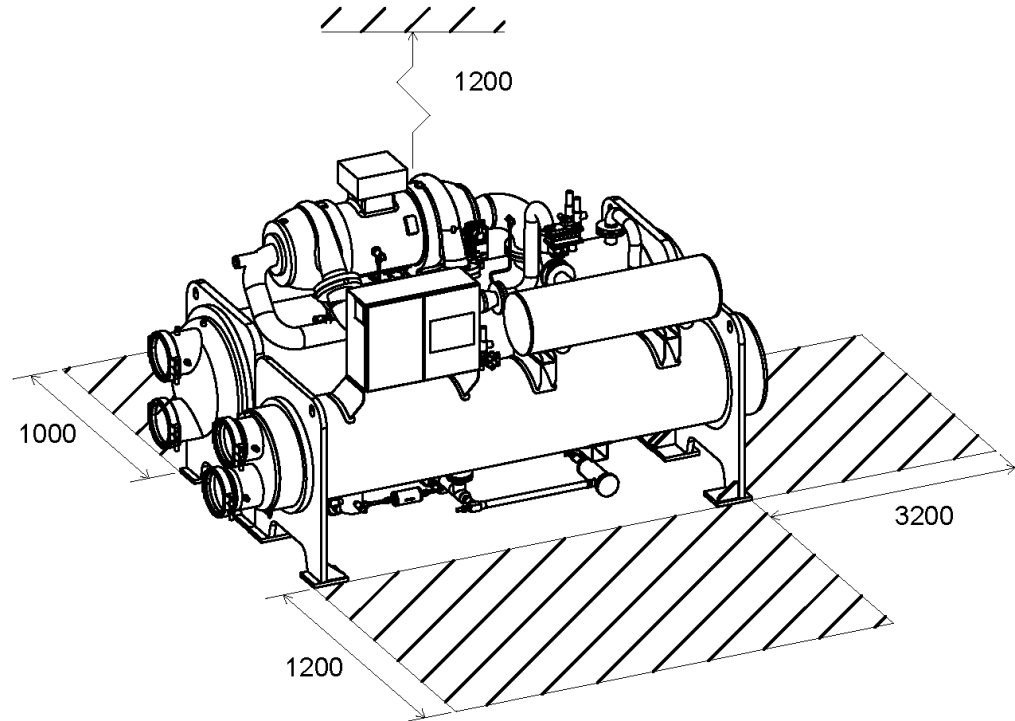
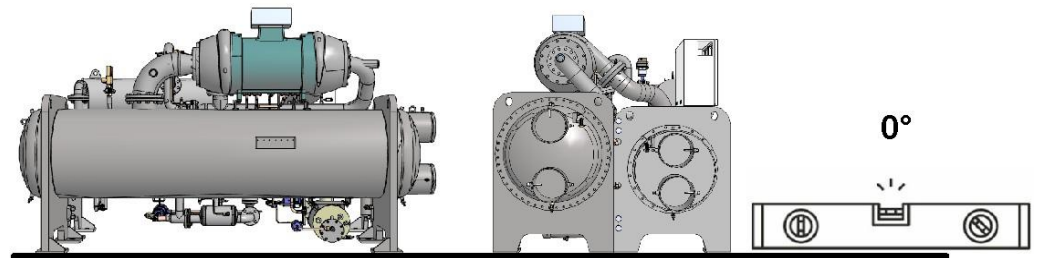
Evaporator and Condenser temperatures

Detailed operation of the various subsets

INSTALLATION

Main Installation – Unit

- **INDOOR UNIT**
- **TO BE PLACED IN FLOOR, WITH ANTI-VIBRATION OR NEOPRENE STRIPS**
- **INSTALL FLEXIBLE JOINTS ON HYDRAULIC CONNECTIONS**
- **INSTALLATION SPACES TO BE RESPECTED, EVEN IN HEIGHT**



Main Installation – Inverter

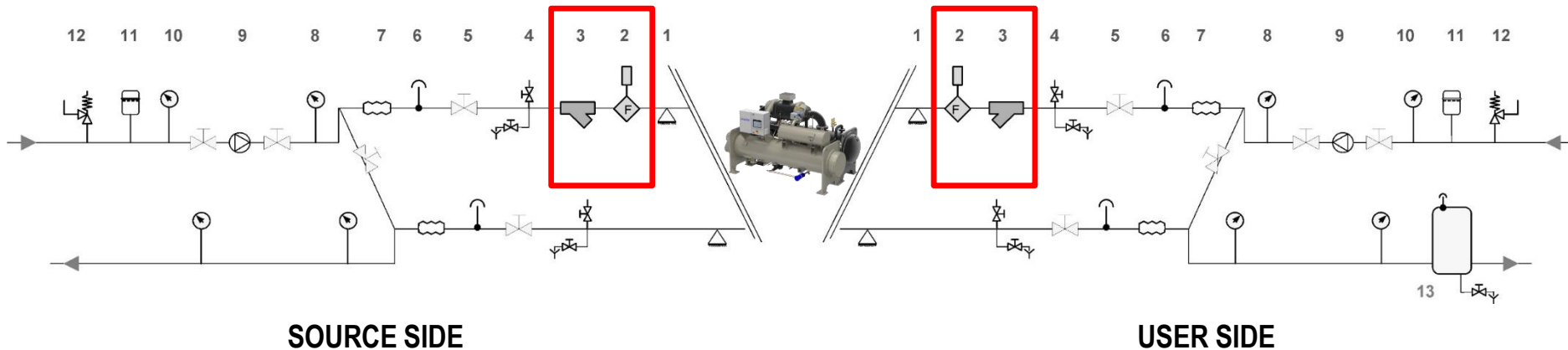
- **AIR COOLED INVERTER,
SEPARATELY SUPPLIED**
- **MAXIMUM AIR OPERATION
TEMPERATURE +43°C**
- **INVERTER COOLING MUST BE
GUARANTEED**
- **MAXIMUM HEAT REJECTION BY
INVERTER = 2% OF POWER INPUT AT
FULL LOAD**



Main Installation – Hydraulic connections

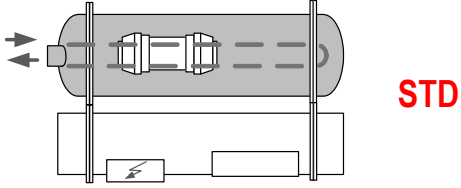
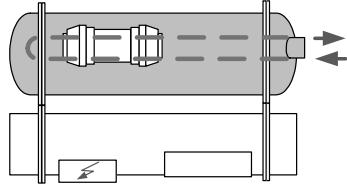
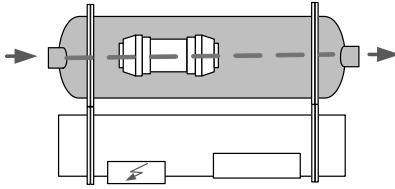
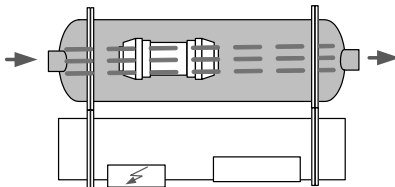
TO GUARANTEE PROPERLY OPERATION IT'S NECESSARY TO INSTALL THE FOLLOWING COMPONENTS (SOURCE SIDE AND USER SIDE):

- WATER FILTER
- FLOW SWITCH



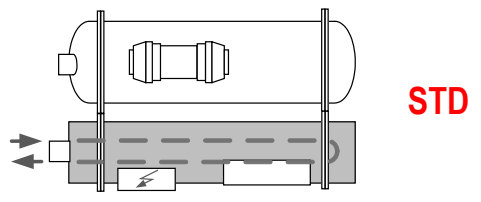
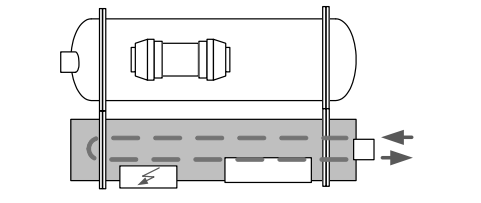
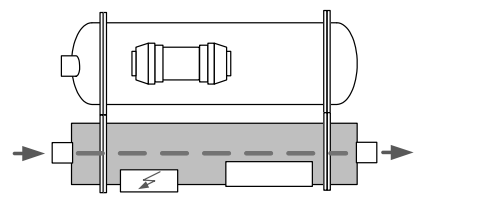
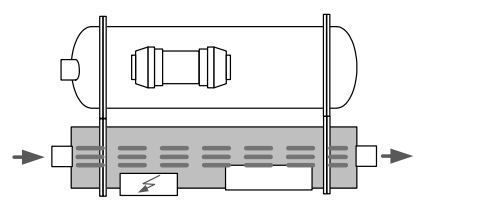
Configuration Options – Evaporator

THE CHOICE OF THE EVAPORATOR IS CONSEQUENT TO THE USER SIDE WATER FLOW

WATER FLOW	N° PASSES	WATER CONNECTION	SCHEME
Standard (4°C ≤ DT ≤ 7°C)	Two pass	Left (Std)	
		Right (Option)	
High (DT < 4°C)	One pass	Opposed	
Low (DT > 7°C)	Three pass	Opposed	

Configuration Options – Condenser

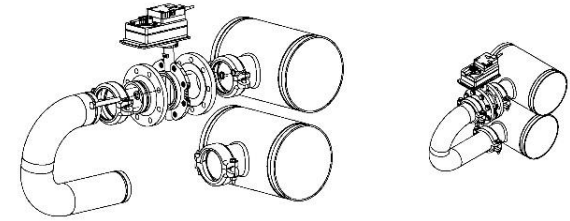
THE CHOICE OF THE CONDENSER IS CONSEQUENT TO THE SOURCE SIDE WATER FLOW

WATER FLOW	N° PASSES	WATER CONNECTION	SCHEME
Standard (4°C ≤ DT ≤ 7°C)	Two pass	Left (Std)	
		Right (Option)	
High (DT < 4°C)	One pass	Opposed	
Low (DT > 7°C)	Three pass	Opposed	

Configuration Options – By Pass Valves

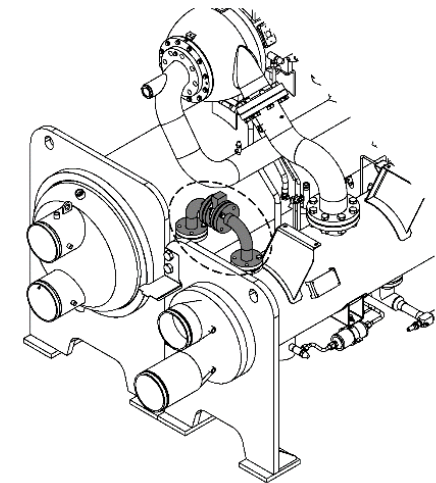
ON/OFF MOTORIZED BY-PASS VALVE – ACCESSORY

- Separately supplied
- To be installed between the water inlet and outlet on the condenser side
- **Minimum water source temperature = + 19°C in input**
- It keeps the unit running, reducing the water flow rate, by raising the condensing pressure



HOT GAS BY PASS – OPTION

- Installed on the refrigerant side between evaporator and condenser
- **It allows to increase the turndown up to 10%, bypassing a part of the refrigerant**
- It also provides additional protection against surges, in case the temperature of the condensation water is beyond the operating limits

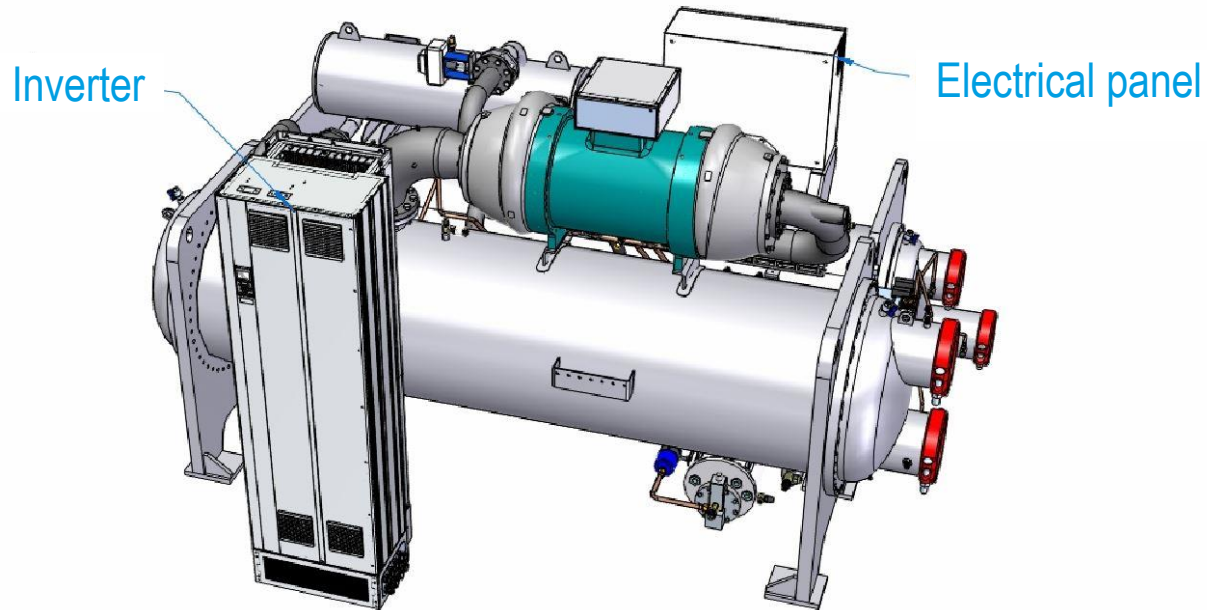


Installation – Part 1

WCH-iZ centrifugal chillers are supplied complete with refrigerant charge.
The inverter is supplied separately and must be installed on site by the Customer.

Maximum allowed distance between inverter and unit = 10 meters (cable length)

CLIVET recommends to install the inverter as shown in the following figure:

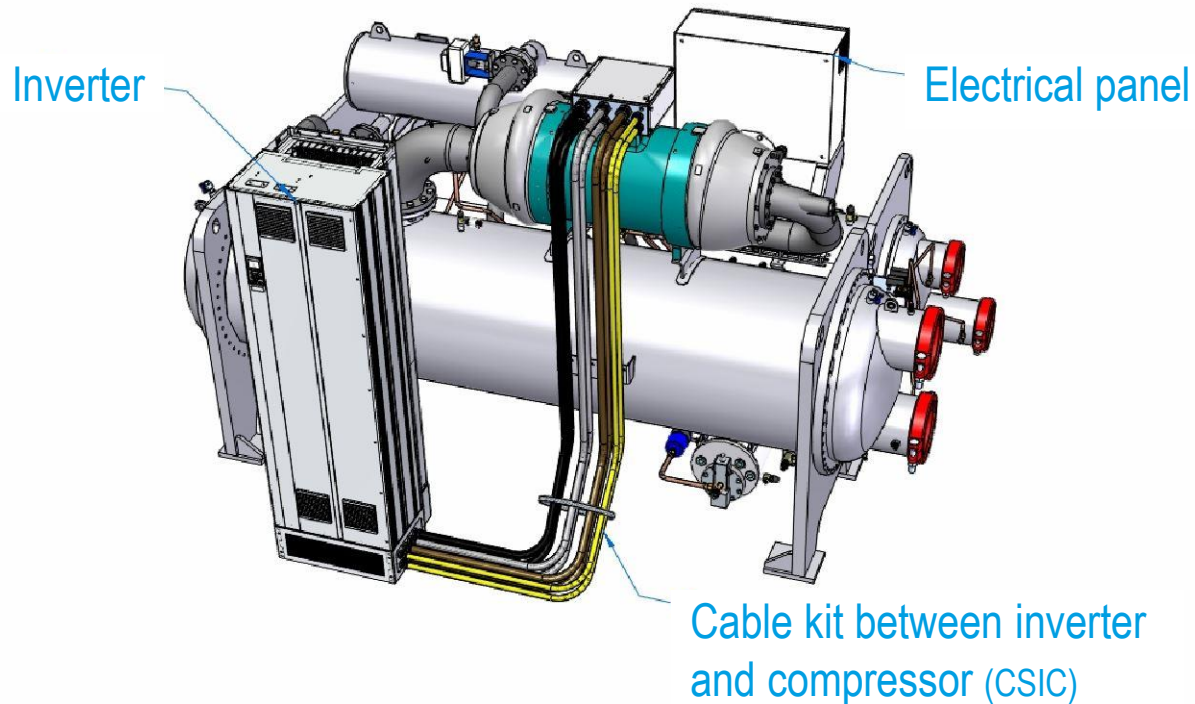


Installation – Part 2

Clivet can supply a cable kit for the connection between inverter and compressor (CSIC option). The cables are shielded, 4.5 meters long.

The cables are sent already connected to the compressor.

The connection to the inverter must be made on site after its placement by the Customer.



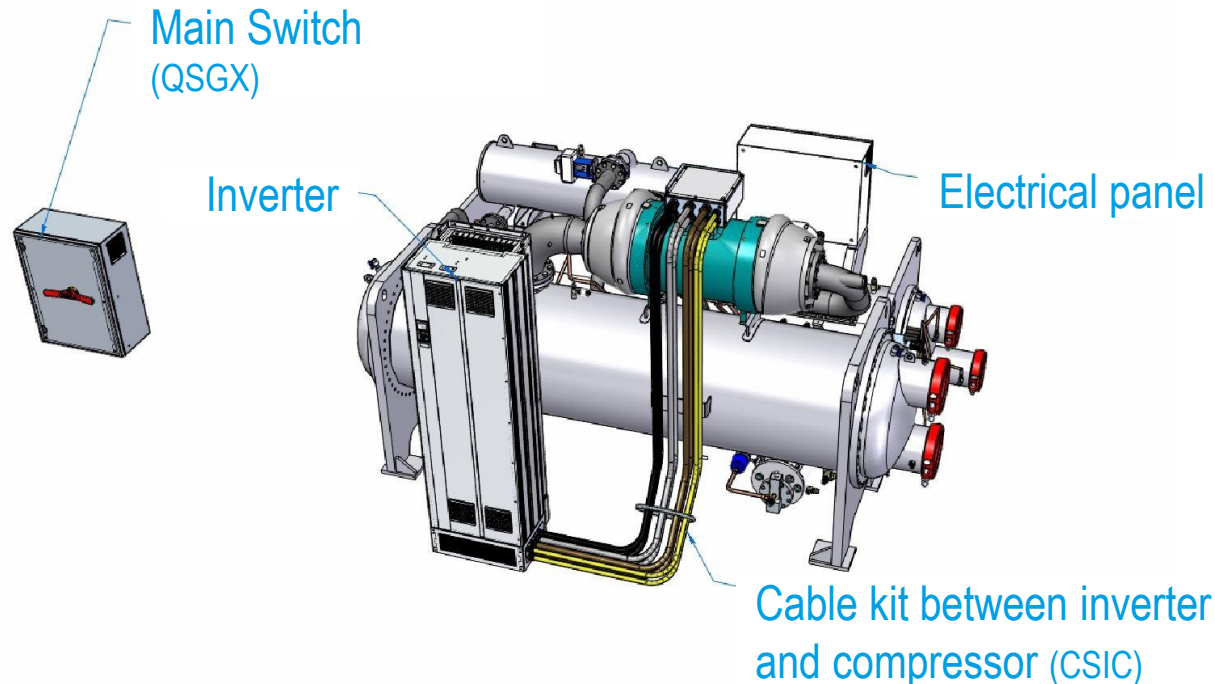
Installation – Part 3

Chiller and Inverter have two separate power supplies.

It is necessary to provide a main switch to allow the interruption of the power supply to the whole system.

Clivet can provide an electrical panel with main switch (QSGX option).

This panel is supplied separately and must be installed on site by the Customer.

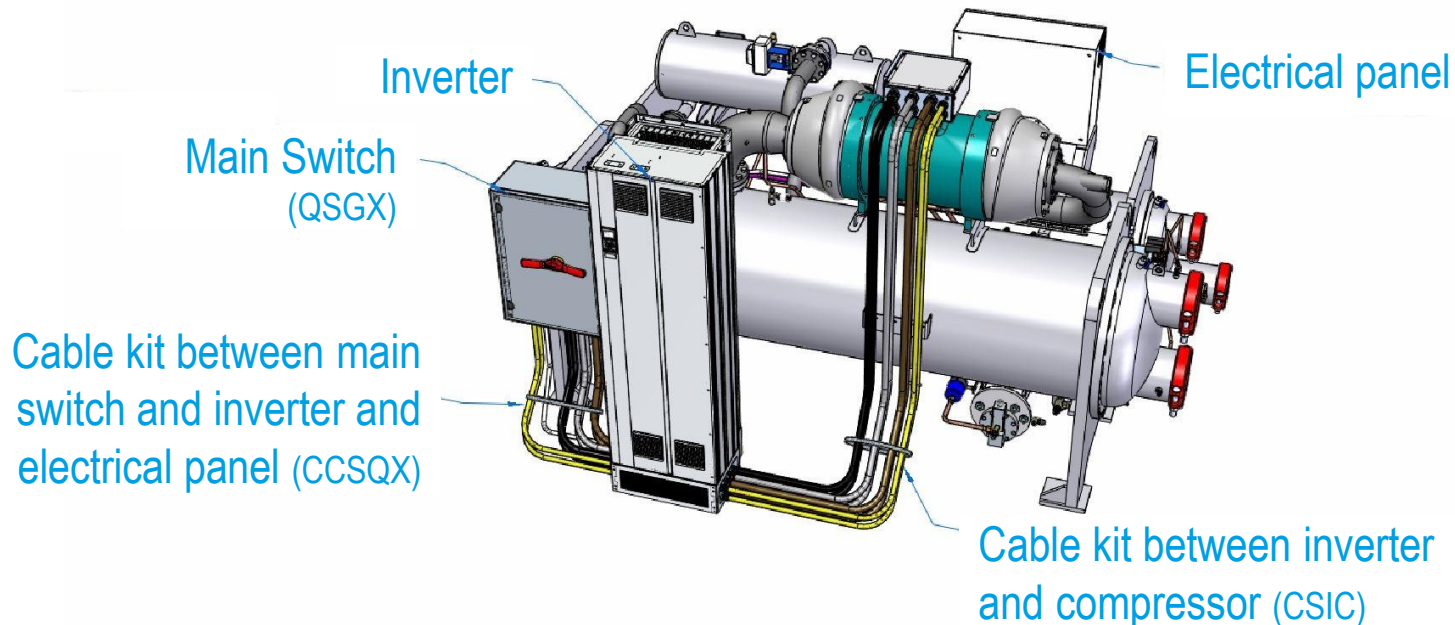


Installation – Part 4

Clivet can supply a cable kit for connecting the main switch to the inverter and to the panel on board the unit (CCSQX option). Kit is supplied separately and must be installed on site by the Customer.

Cables are long enough to allow the main switch to be positioned next to the inverter.

The cable kit also includes a steel support for positioning the main switch.





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