R 744

CARBONLINE

CARBONLINE

CO_2 MULTI-COMPRESSOR RACKS

Natural refrigerant R 744 (CO_2)

Cooling capacity range:	MT	LT
Transcritical rack MT + LT	15 - 150 kW	2 - 50 kW
Transcritical rack MT	15 - 225 kW	-

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CO_2 MULTI-COMPRESSOR RACK

- Multi-compressor rack is a refrigeration system used for indirect cooling of industrial processes, food retailers, supermarkets, logistic centers and warehouses, data centers, etc. Racks supply the required cooling capacity which is then transfered from the refrigerant to the cooling medium. Refrigerant used in multi-compressor racks is **carbon dioxide** (chemical symbol **CO_2**; in refrigeration technology labeled as **R 744**).
- With its unique thermo-physical properties, **CO_2** rightfully belongs into a category of highly efficient and sustainable refrigerants, ready to make the refrigeration systems more environmentally friendly and future-proof.
- CO_2 multi-compressor rack systems can operate as **transcritical or subcritical**, depending on the required cooling capacity of a system and type of cooling of refrigerant gas (air or water cooling). The multi-compressor rack is packaged into a single housing and is easily connected to the heat exchangers on site.

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SAFETY

CO_2 belongs to safety group A1, according to EN 378-1 (Appendix E). According to Pressure Equipment Directive 2014/68/EU (PED), it belongs to the fluid group 2. Considering that transcritical and subcritical CO_2 systems have very high operating pressures, the safety principles and regulation are of utmost importance for stable and reliable operation. All CO_2 multi-compressor racks are designed in accordance with the highest safety standards.

ECOLOGY

CO_2 is a naturally occuring gas. It is also a by-product of many industrial processes, so it is abundant. It has a GWP = 1, which means that it has a minimum global warming potential compared to all other refrigerants. Because of that, it is exempted from the restrictions prescribed by the EU F-GAS REGULATION. Furthermore, it doesn't have any negative effects on the ozone layer, so it has ODP = 0.

QUALITY PROGRAMME

- ISO 9001 : 2015
- Monitoring of Final Assessment, according to Pressure Equipment Directive 2014/68/EU (PED)
- Declaration of Incorporation

CERTIFICATE

Certificate No: Q191BJ2411C

This is to Certify that the Quality Managment System Of

FRIGO PLUS d.o.o.

Prepuštovečka ulica 19, 10360 Sobilnec, Croatia

has been independently assessed and is compliant with the requirements of

ISO 9001:2015

for the following scope

Sales of components, design, production and mounting of systems for refrigeration and air conditioning technology.

Prodaja komponenti, projektiranje, proizvodnja i montaža sustava za rashladnu i klima tehniku.

11 September, 2014 - Original Registered
28 August, 2020 - Latest Issued
27 August, 2023 - Valid Until
August 2018 - 1st Surveillance Audit
August 2019 - 2nd Surveillance Audit

DIRECTOR

TÜV ADRIA Ltd. for affirmation of business systems certification

The Certificate of Registration remains the property of TÜV ADRIA Ltd. for affirmation of business systems certification and shall be returned immediately upon request. For more information (For current validity of the certificate, visit our website: www.tqv-adria.hr)

IABSI

CERTIFICATE CHECK

TÜV NORD

CERTIFIKAT

CERTIFICATE

o sukladnosti br. TO-1/08 C 0222/21
of conformity Nr.

Unutarnja kontrola proizvodnje i nadzirane provjere tlačne opreme u nasumično odabranim vremenskim razmacima (Modul A2) prema Pravilniku o tlačnoj opremi – Direktive 2014/68/EU
Internal production control plus supervised pressure equipment checks at random Intervals (Module A2) according to Regulation of pressure equipment - Directive 2014/68/EU

Naziv i adresa proizvođača: / Name and address of manufacturer:
FRIGO PLUS d.o.o.
Prepuštovečka ulica 19, Soblinec
10 360, Sesvete
Hrvatska

Prema rezultatima ispitivanja, proizvođač ima pravo obilježiti opremu pod tlakom proizvedenu unutar raspona ovog modula s oznakom.
According to the test results, the manufacturer is entitled to mark the pressure equipment produced within the range of this module with the mark:

CE 2464

Ispitano prema 2014/68/EU: / Tested according to 2014/68/EU:
Unutarnja kontrola proizvodnje i nadzirane provjere tlačne opreme u nasumično odabranim vremenskim razmacima (Modul A2)
Internal production control plus supervised pressure equipment checks at random Intervals (Module A2)

Ispitni izvještaj br.: / Test report No.:
001P025A/21 TP

Područje primjene: / Scope of application:
Projektiranje i proizvodnja tlačne opreme: posude pod tlakom, cjevovodi, rashladni uređaji i postrojenja

Mjesto proizvodnje: / Place of manufacture:
FRIGO PLUS d.o.o.
Prepuštovečka ulica 19, Soblinec
10 360, Sesvete
Hrvatska

Vrijedi do: / Valid until:
07.10.2024.

Zagreb, 08.10.2021.

Tijelo za ocjenu sukladnosti za tlačnu opremu
Identifikacijski broj 2464
Notified Body for Pressure equipment
Identification Nr. 2464

TÜV NORD Adriatic d.o.o.
Buni 110, 10010 Zagreb
Tel +385(0)1 3668 307, Fax +385(0)1 3668 308
OB-06-TPC Certifikat Modul A2

V. Perkušić dipl. ing.

Frigo Plus
Smart & Natural Cooling

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Prepuštovečka ulica 19, 10360 Sesvete, Croatia
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Naziv dokumenta / Document Name	Broj dokumenta / Document No.	Datum dokumenta / Document Date	Verzija / Rev.	Oznaka / CLS
IZJAVA	19093900637	28.6.2021.	0	IZJ-21-0637/0

DECLARATION

Installationserklärung

Wir erklären hiermit, dass die folgenden Maschinen in andere Maschinen eingebaut werden sollen und erst in Betrieb genommen werden dürfen, wenn die entsprechenden Maschinen, in die sie eingebaut werden sollen, in Übereinstimmung mit den grundlegenden Anforderungen der Maschinenrichtlinie 2006/42/EC deklariert wurden.

EC Declaration of Incorporation

We hereby declare that the following machinery is intended to be incorporated into other machinery, and must not be put into service until the relevant machinery into which it is to be incorporated has been declared in conformity with the essential requirements of the Machinery Directive 2006/42/EC.

Déclaration d'installation

Nous déclarons par la présente que les machines suivantes sont destinées a etre incorporées dans d'autres machines et ne doivent pas etre mises en service avant que la machine concernée dans laquelle elles doivent etre incorporées ait été déclarée conforme aux exigences essentielles de la Directive Machines 2006/42 / CE.

CARBON DX TKA-4-75-85-I-S

mit der/den Seriennummer(n): / with the serial number(s) / avec numéro(s) de série :

155-156/21

Die oben genannten Produkte erfüllen auch alle relevanten Bestimmungen von	Above mentioned products also fulfils all relevant provisions of	Les produits mentionnés ci-dessus remplissent également toutes les dispositions pertinentes de
2014/30/EU	2014/30/EU	2014/30/EU
2014/35/EU	2014/35/EU	2014/35/EU
2014/68/EU	2014/68/EU	2014/68/EU
2015/1095/EU	2015/1095/EU	2015/1095/EU
und sind in Übereinstimmung mit	**and are in conformity with**	**et sont conformes a**
EN 378-2:2016	EN 378-2:2016	EN 378-2:2016
EN ISO 13854:2019	EN ISO 13854:2019	EN ISO 13854:2019
EN ISO 12100:2010	EN ISO 12100:2010	EN ISO 12100:2010
EN ISO 13857:2019	EN ISO 13857:2019	EN ISO 13857:2019

Sesvete
28.6.2021.

Manager Toni Grubišić

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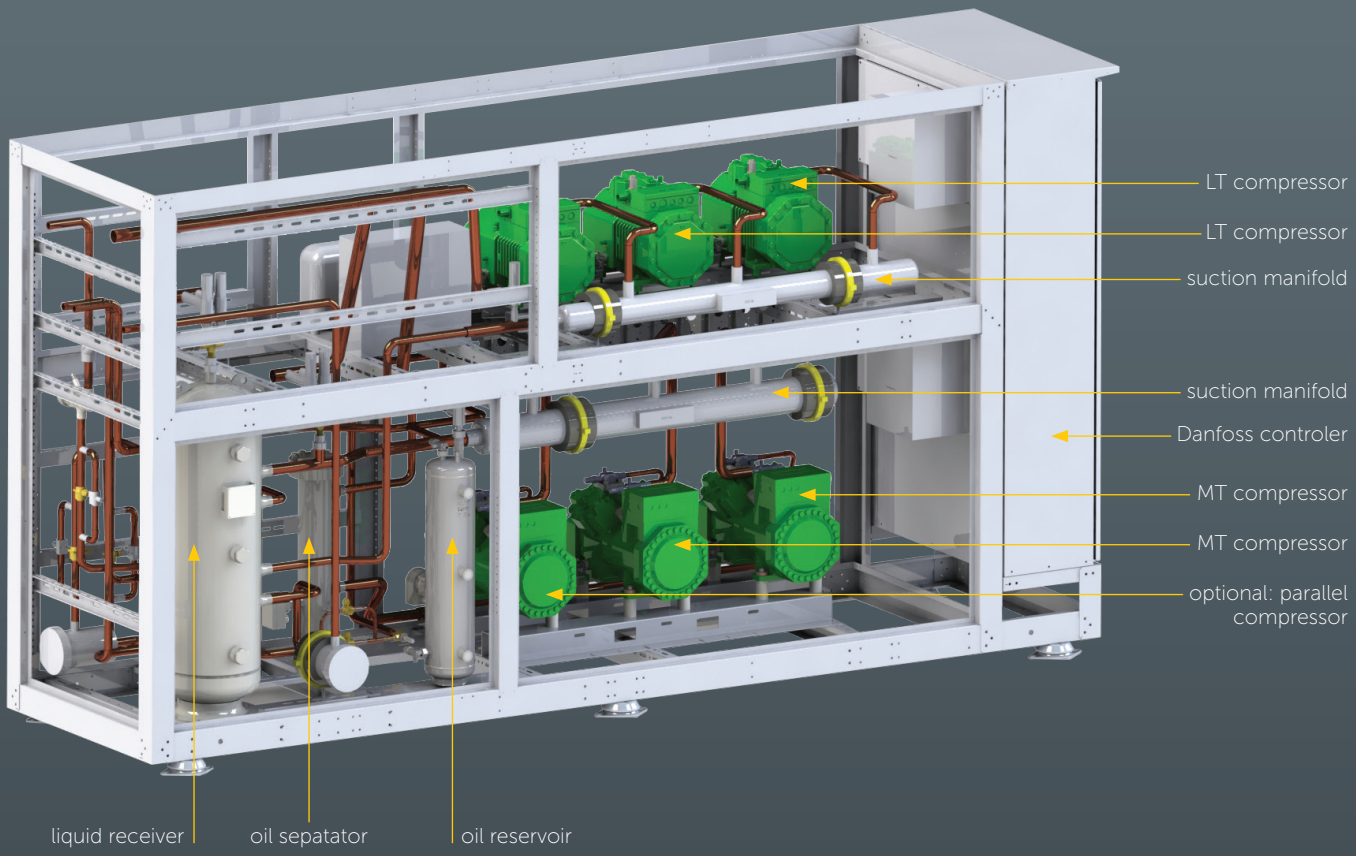
DETAILS AND SPECIFITIES OF CO_2 RACKS

TRANSCRITICAL SYSTEM



CONFIGURATIONS

STANDARD EQUIPMENT					OPTIONAL EQUIPMENT		
MT compressor	LT compressor	variable speed (lead compressor)	safety rack	housing for indoor installation	heat recovery	housing for outdoor installation	parallel compressor
2	0 - 2	✓	✓	✓	✓	✓	✓
3	0 - 3	✓	✓	✓	✓	✓	✓
4	0 - 3	✓	✓	✓	✓	✓	✓

TEMPERATURE RANGE

temperature regime	evaporation temperature T_r, °C
MT (medium)	-8
LT (low)	-32

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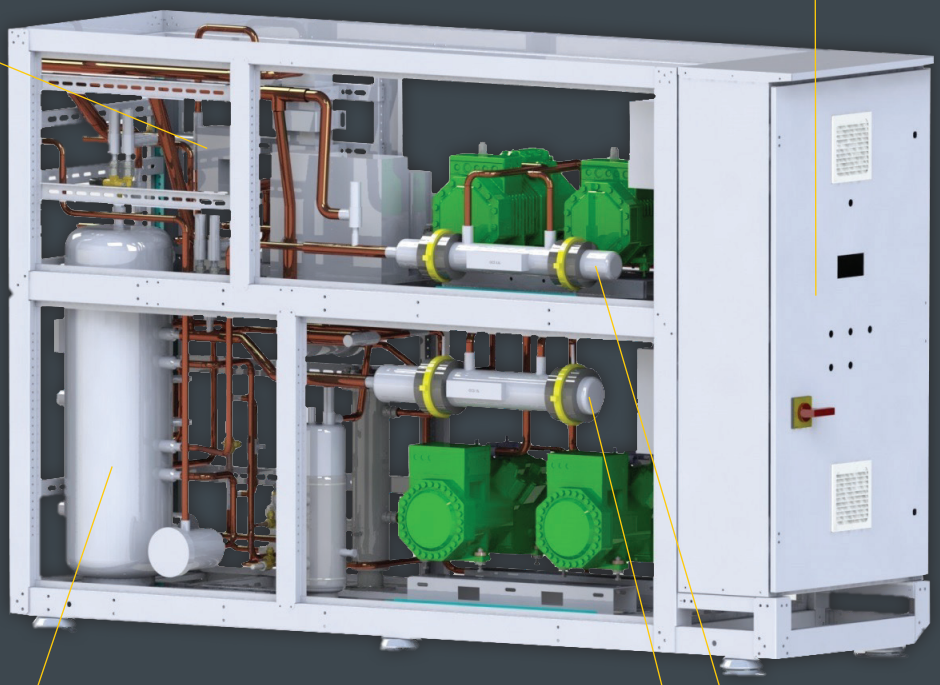
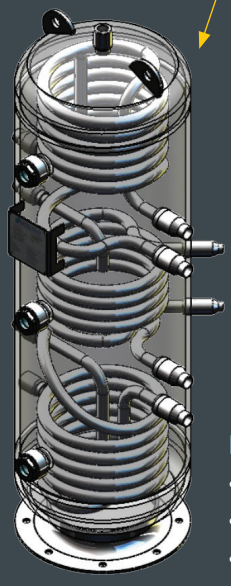
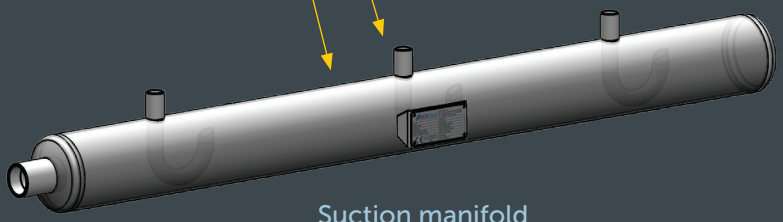
DETAILS AND SPECIFITIES OF CO_2 RACKS

TRANSCRITICAL SYSTEM

Danfoss controller







Suction manifold

- homogeneous distribution of suction gas
- liquid separation
- dipping tube for oil return
- compressor protection

Liquid receiver (PS = 60 bar)

- coil for bypass superheating
- coil for emergency cooling
- coil for superheating LT (liquid subcooling)

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DETAILS AND SPECIFITIES OF CO_2 RACKS

DESCRIPTION OF TRANSCRITICAL SYSTEM

- Natural refrigerant (CO_2, R 744)
- Semi-hermetic reciprocating compressors
- Inverter driven (variable speed) lead compressors
- Electronic expansion valves
- High energy efficiency
- Optional equipment:
  - Heat recovery with integrated plate heat exchanger fitted inside of the housing together with three way valve for optimal temperature control
  - Parallel compressor - higher efficiency throughout the year
  - Optional housing panels for outdoor installation.

HOUSING

- Housing made of powder-coated galvanized sheet metal
- Screws, nuts and rivets made of stainless steel.

REFRIGERANT CIRCUIT COMPONENTS

- High pressure switch for every compressor
- General MT and LT high and low pressure switches
- Lead compressors for MT and LT equipped with frequency inverter
- Oil level regulator for every compressor
- Oil separator & reservoir with oil level sensor for proper operation
- Service ball valve before each filter dryer
- Bypass valve for liquid refrigerant receiver pressure regulation
- Liquid level sensor on the liquid refrigerant receiver
- Liquid line check valves
- Safety valves on MT and LT side
- Safety rack for cooling.

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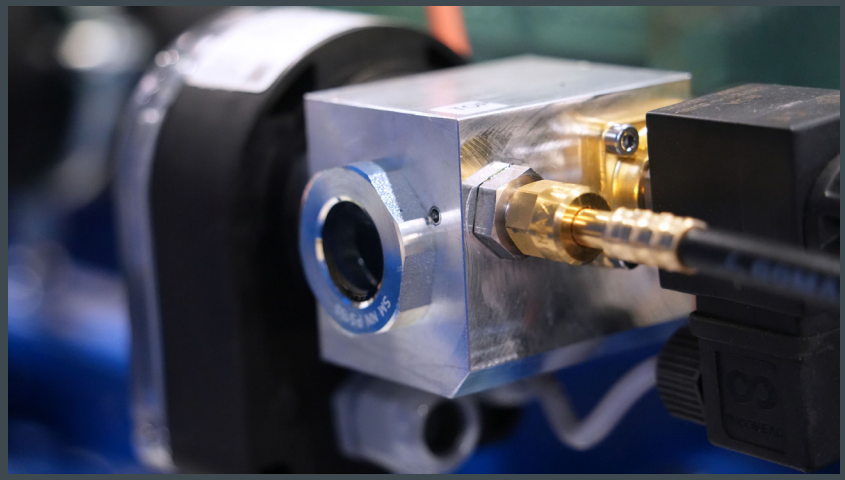
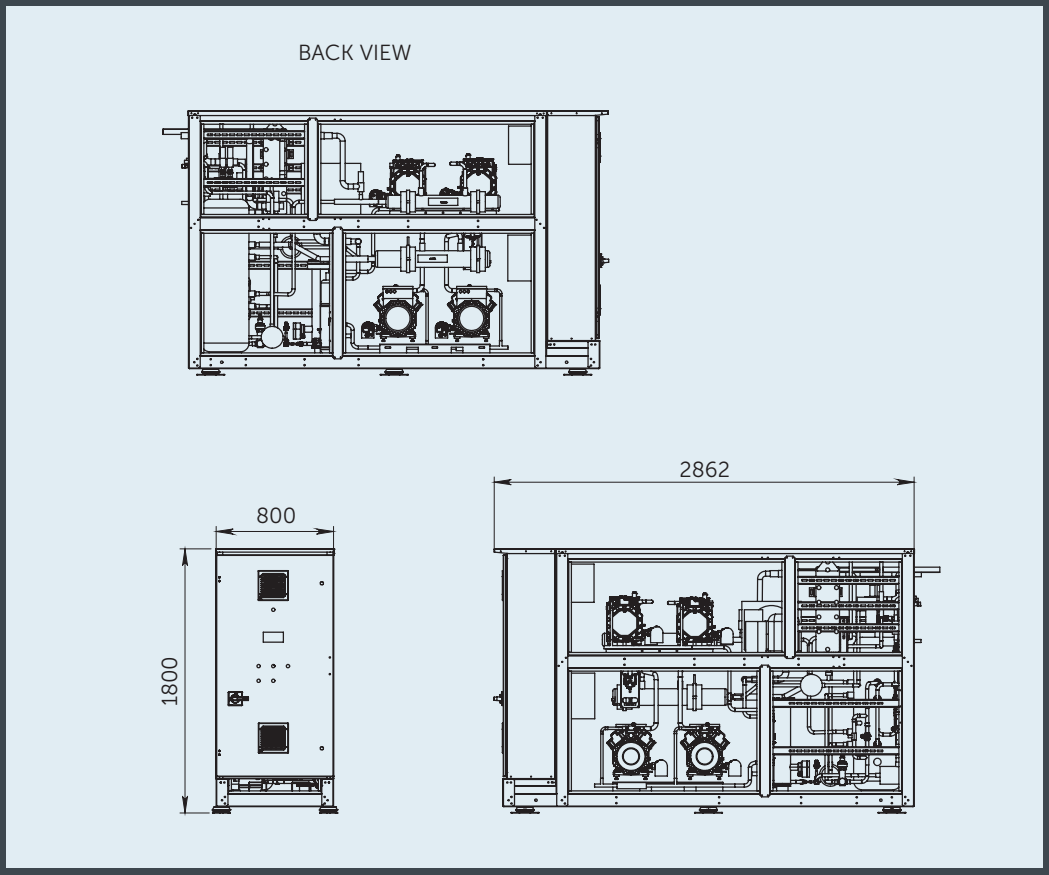
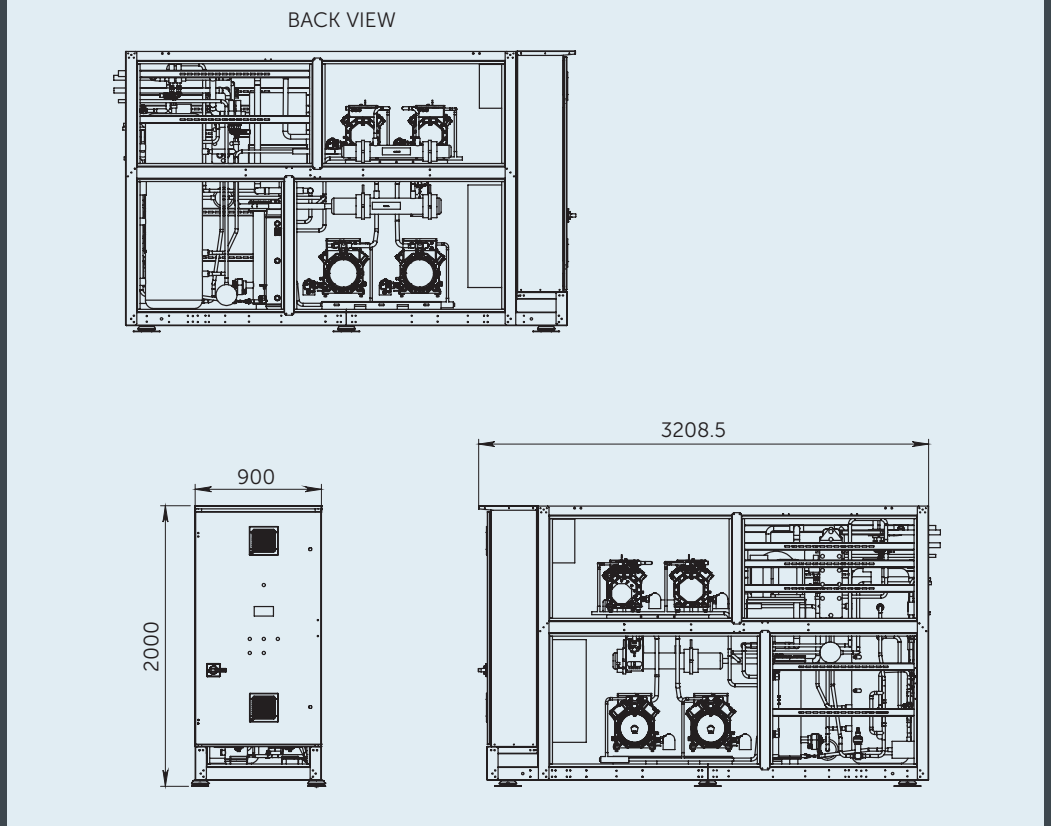


DIMENSIONS

2 x TC3 + 2 x SC2

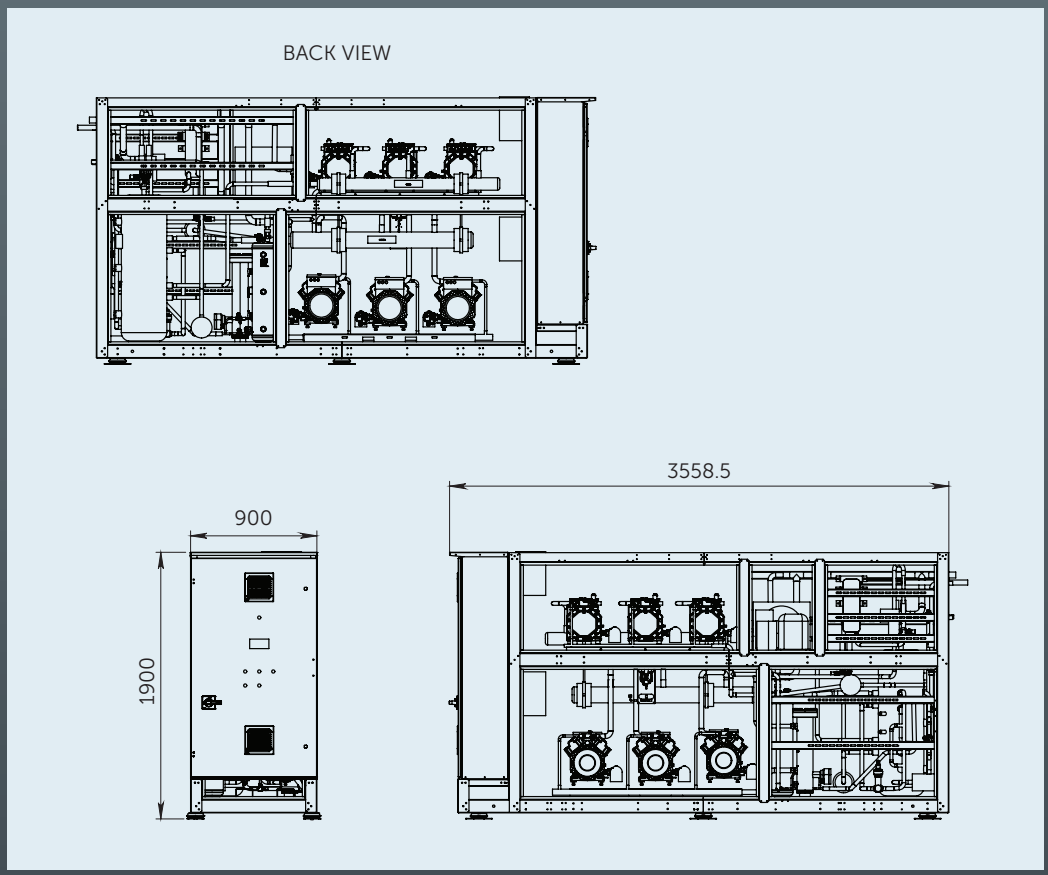


2 x TC4 + 2 x SC3

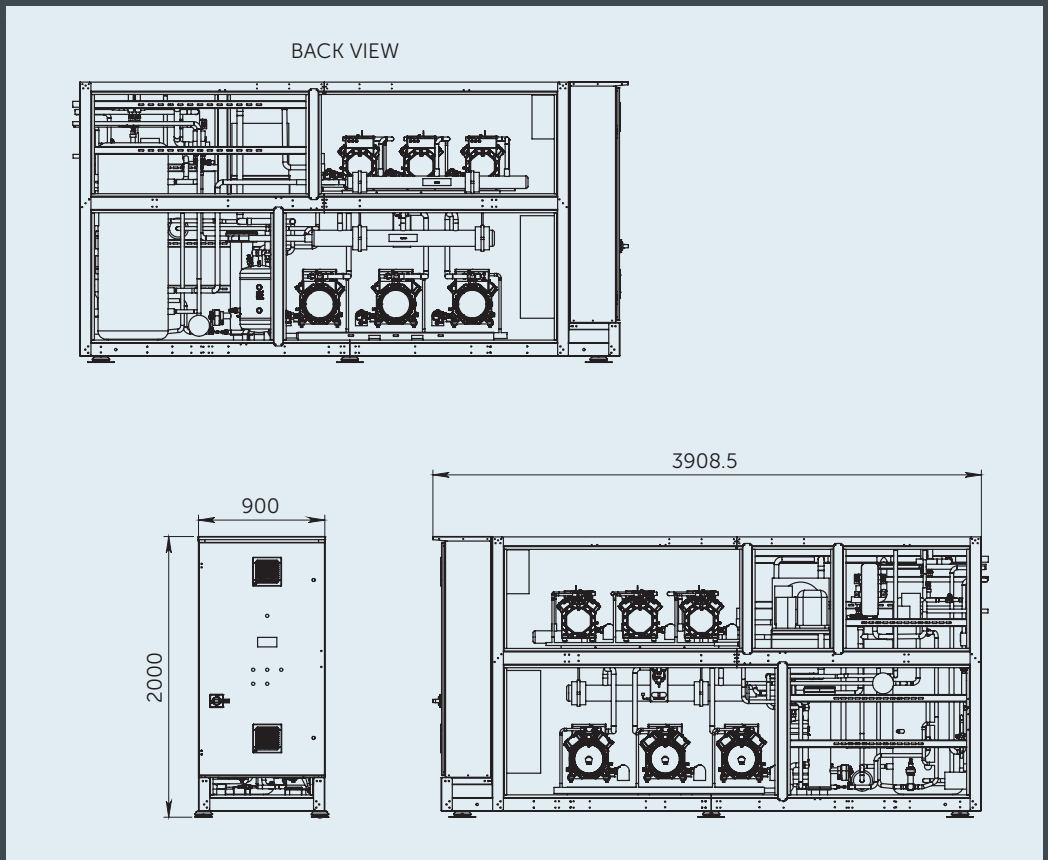


DIMENSIONS

3 x TC3 + 3 x SC2

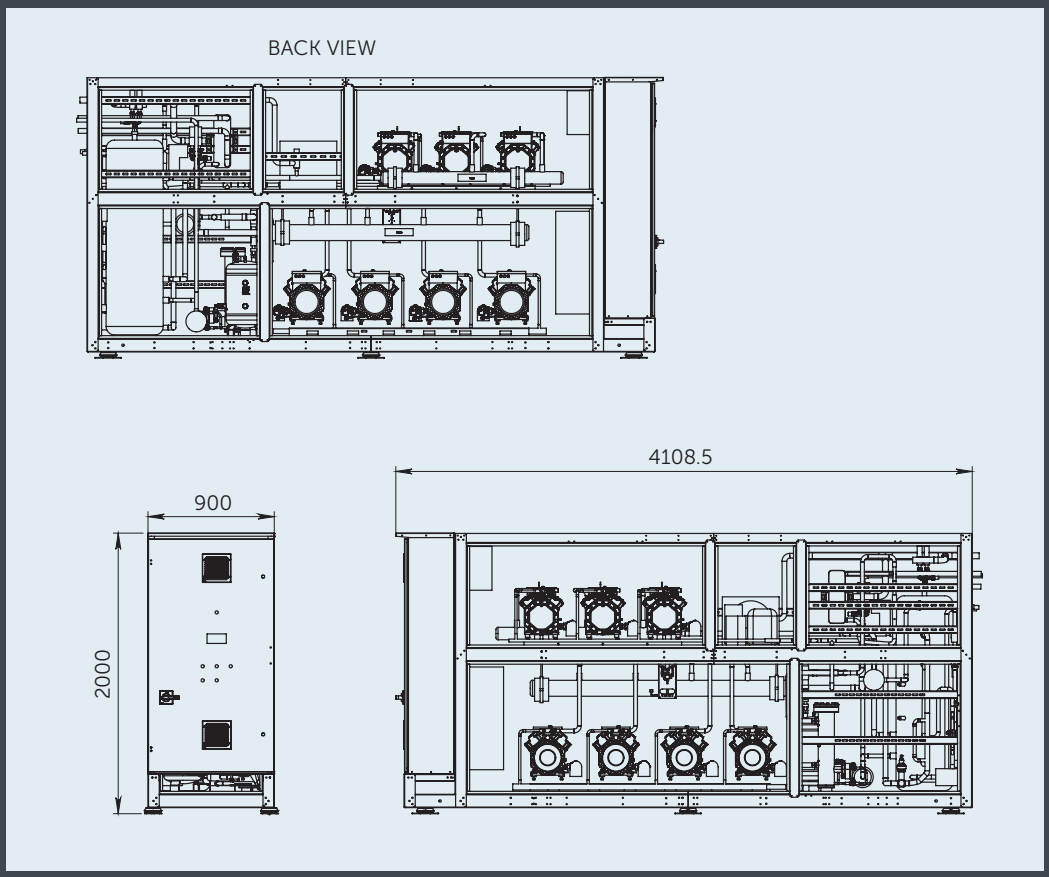


3 x TC4 + 3 x SC3

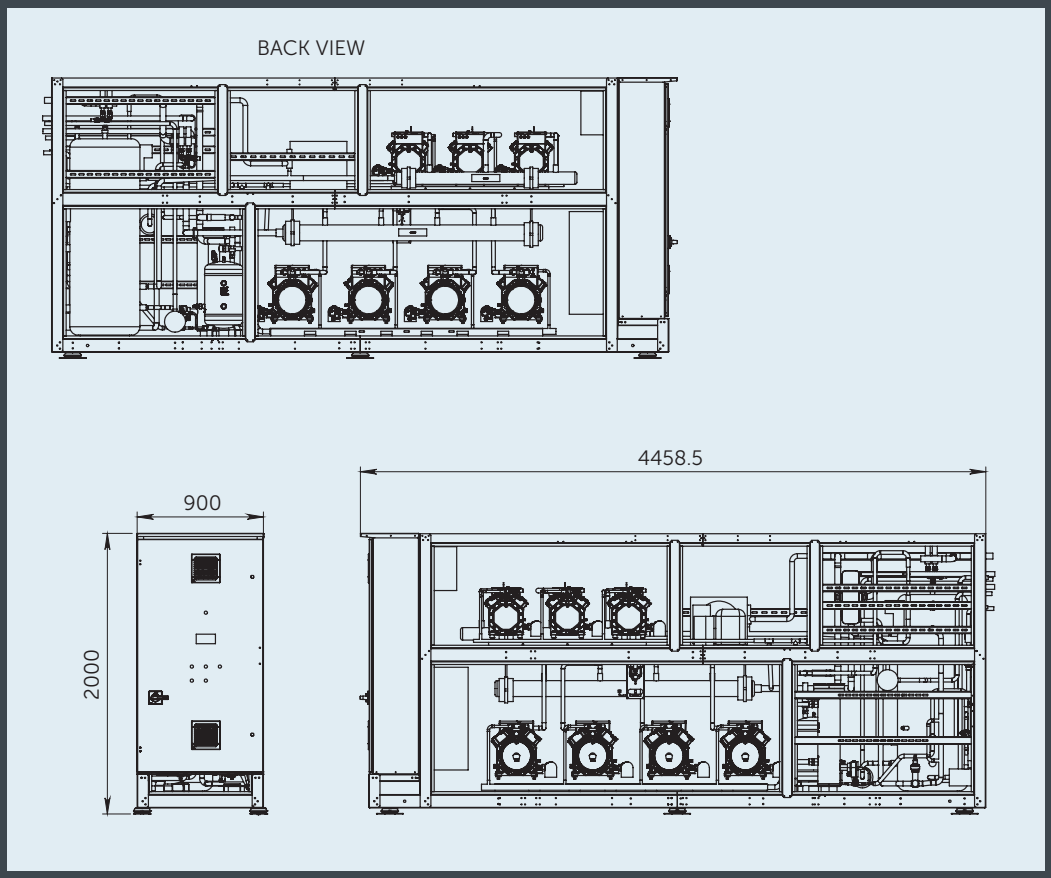


DIMENSIONS

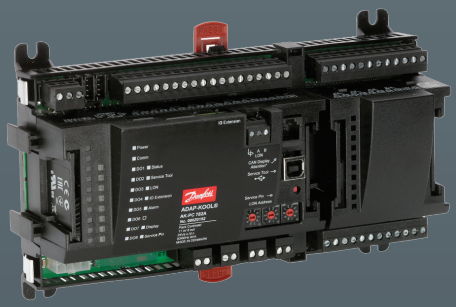
4 x TC3 + 3 x SC3

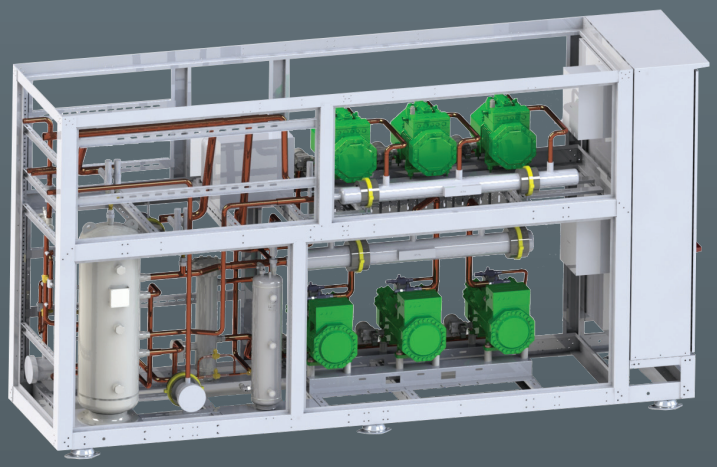


4 x TC4 + 3 x SC3



CONTROLLER





CONTROLLER for transcritical CO_2 systems:

AK-PC 782A is a complete regulating unit for capacity control of compressors and condensers in a transcritical CO_2 booster system with parallel compressors. The controller's main function is to control process parameters (e.g. lead compressor's frequency), so that operation takes place at the energy-optimum pressure conditions all the time. Both suction pressure and condensing pressure are controlled by signals from pressure transmitters.
The controller also provides oil management and heat recovery management. Additonally, it can give signals to other controllers about operating conditions. The controller is modular by design so it allows for extension of regulation, depending on the user's needs.

Among the different functions are:

- capacity control of up to 4 compressors on MT
- capacity control of up to 3 compressors on LT
- control of oil separator and oil receiver
- speed control of the lead compressor
- option for capacity limitation to minimize consumption peaks
- regulation of liquid injection into suction line
- safety monitoring of high pressure / low pressure / discharge temperature
- heat recovery function
- CO_2 gas cooler control and receiver control
- the status of the outputs and inputs is shown by means of light-emitting diodes on the front panel
- alarm signals can be generated via data communication.

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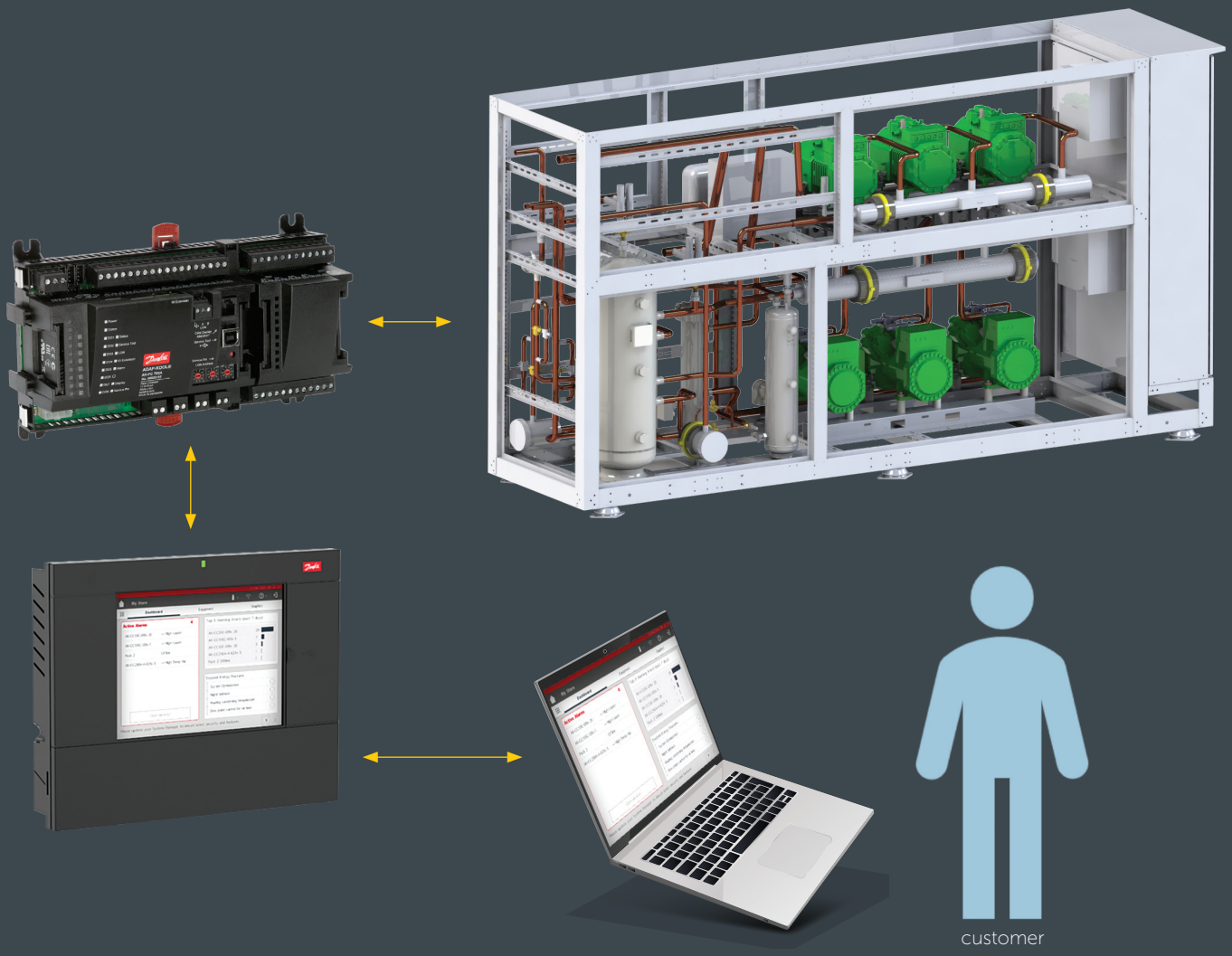
REMOTE ACCESS

SYSTEM MANAGER



AK-SM 800A System Manager **for transcritical CO_2 systems:**

- full remote access to your system through StoreView Web
- intuitive and user frendly touch screen
- full HTML5 web browser.

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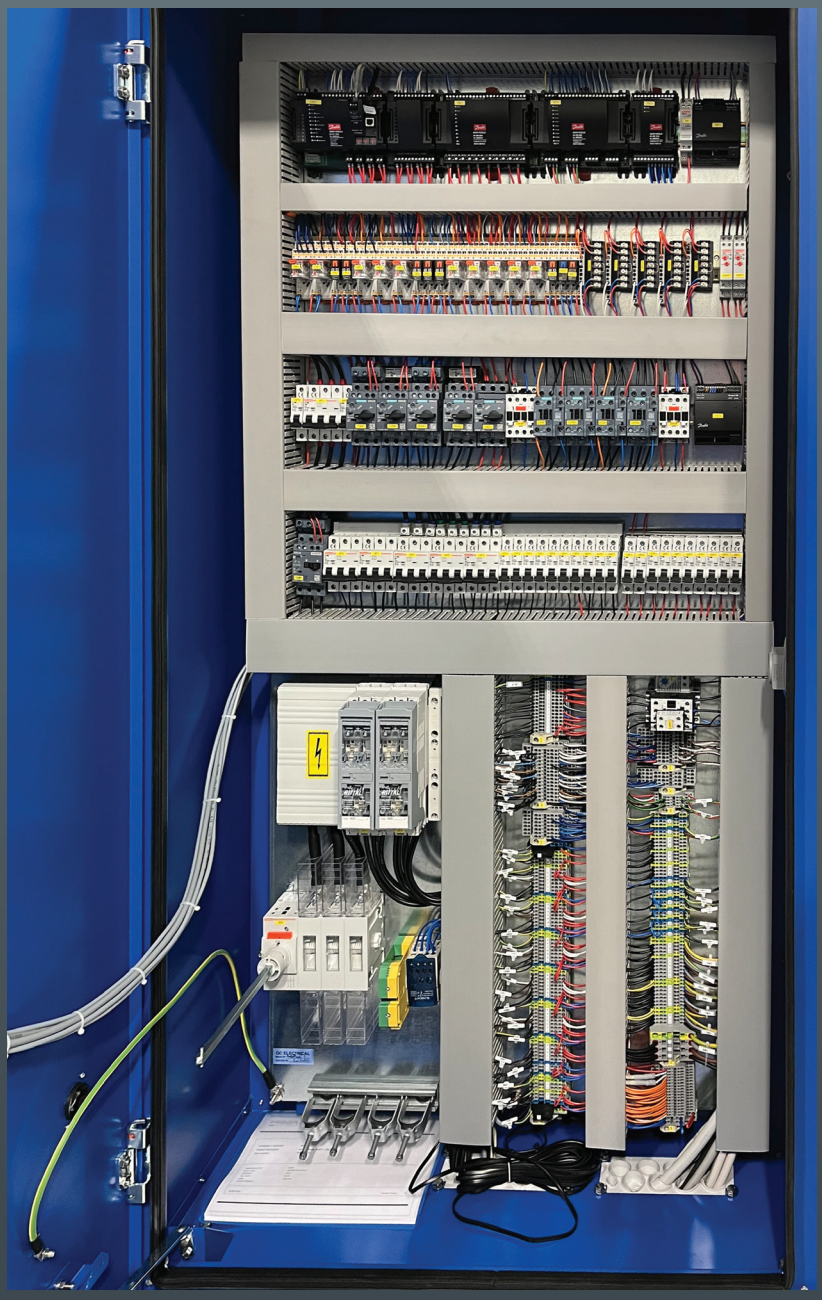
SYSTEM MANAGER

Master control functionality:

- cooling optimization, suction pressure optimization (PO), adaptive defrost coordination
- lighting scheduling for case lighting, store & outside lighting, night mode
- control for HVAC application via built-in control or via de-centralized distributed network controls
- built-in energy saving functionality (no additional licenses needed)
- master scheduling - schedule groups, central defrost, night setback
- flexible alarm routing/output - via e-mail, IP address or relay.



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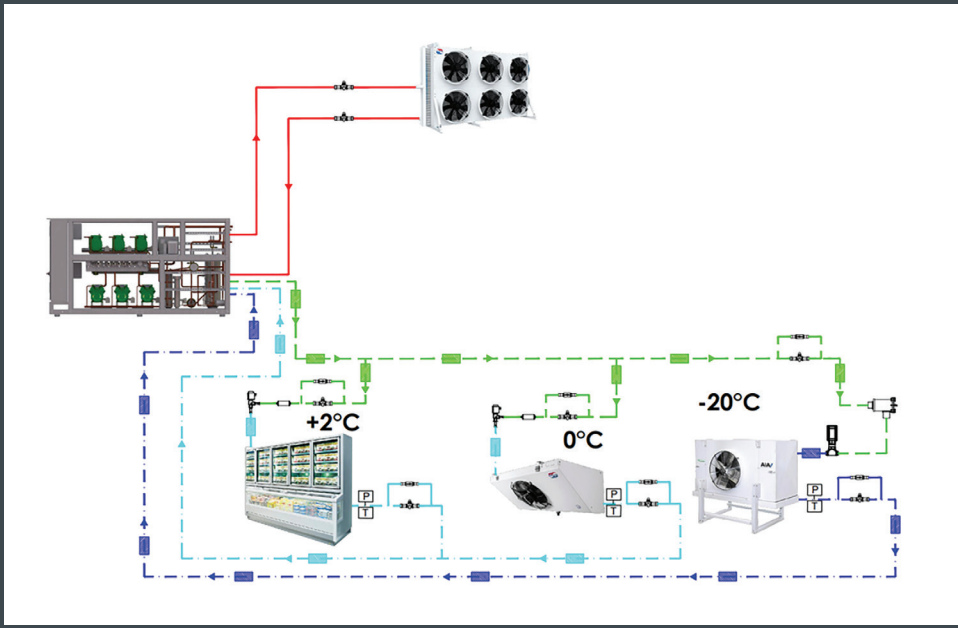
TRANSCRITICAL CO_2 SYSTEM

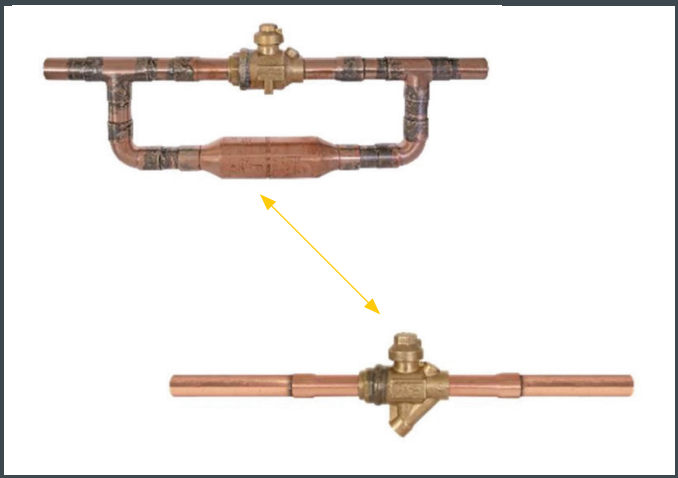
Technical support in all phases of project implementation:

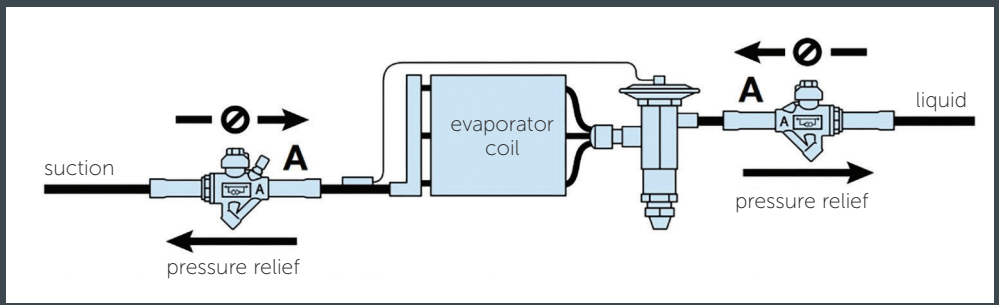
- tender phase
- design phase
- execution phase
- commissioning
- aftersales support.



Wholesale support in procurement of all necessary equipment for procject execution:

- gas coolers, evaporators
- cold room control cabinets
- evaporator kits (EEVs, presure probes, shut-off valves, strainers, servicing connections)
- CO_2 gas sensors and alarms
- piping (K65, copper), cabling.





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Producing natural cooling and heating systems since 2002.

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NATURAL COOLING & HEATING

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