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

FRIGO PLUS d.o.o.

ISO 9001:2015


CERTIFIKAT

CERTIFICATE


DECLARATION

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

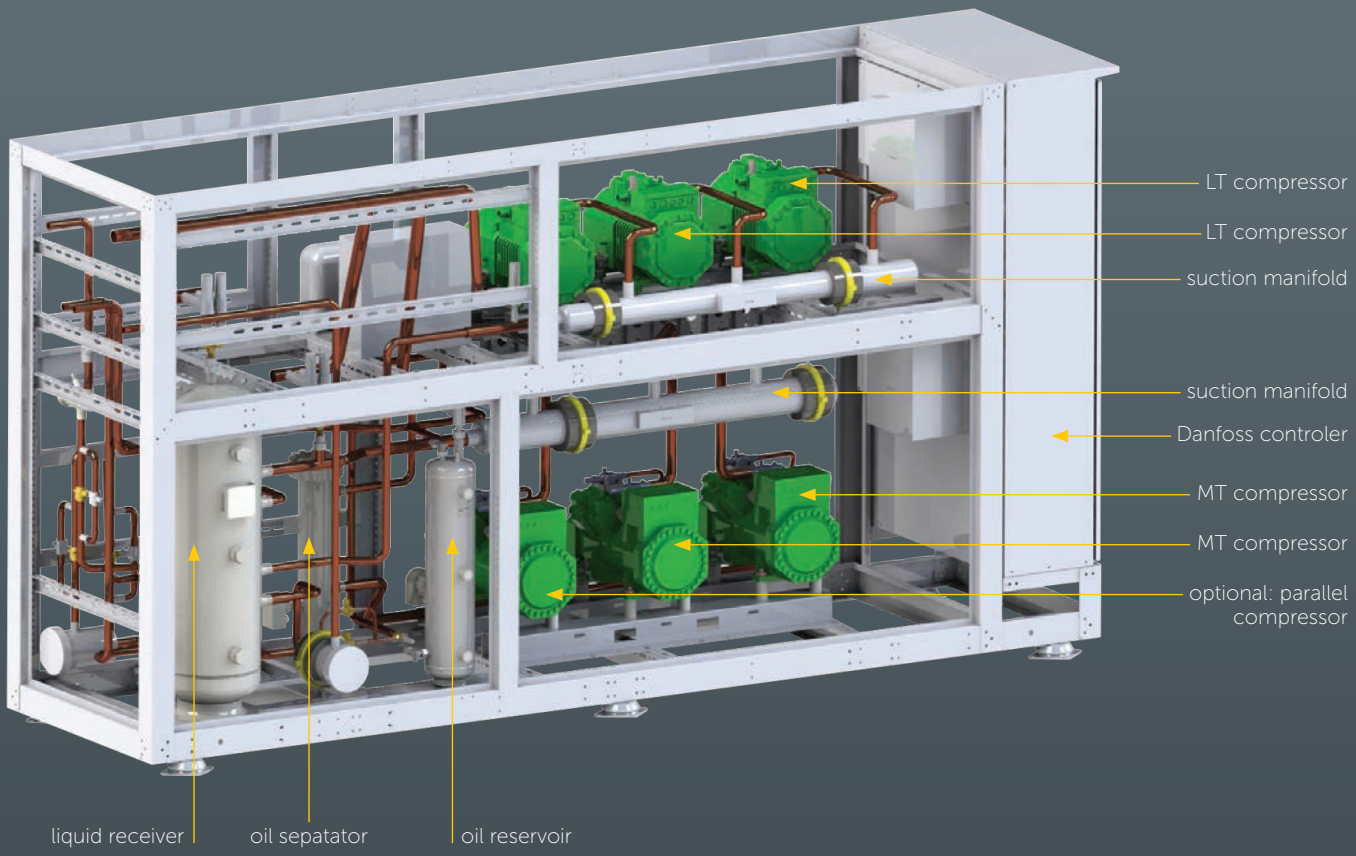
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DETAILS AND SPECIFITIES OF CO_2 RACKS

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

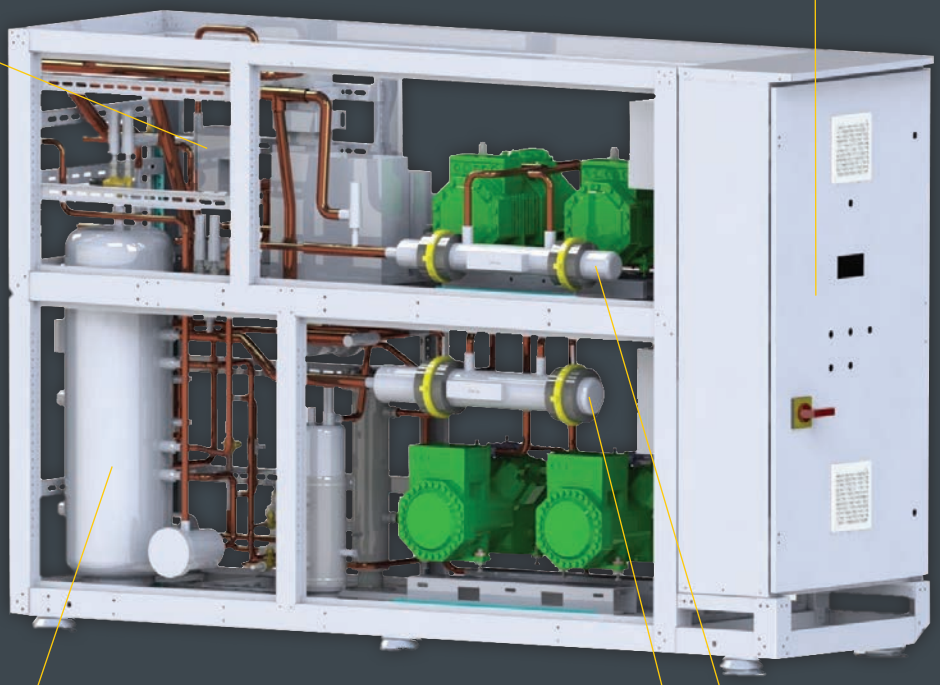


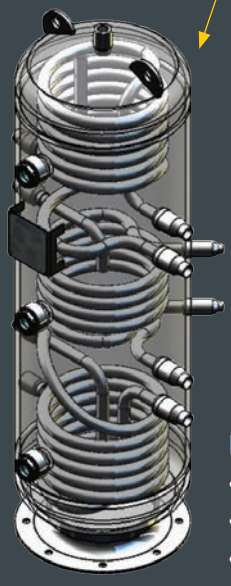
Danfoss controller













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

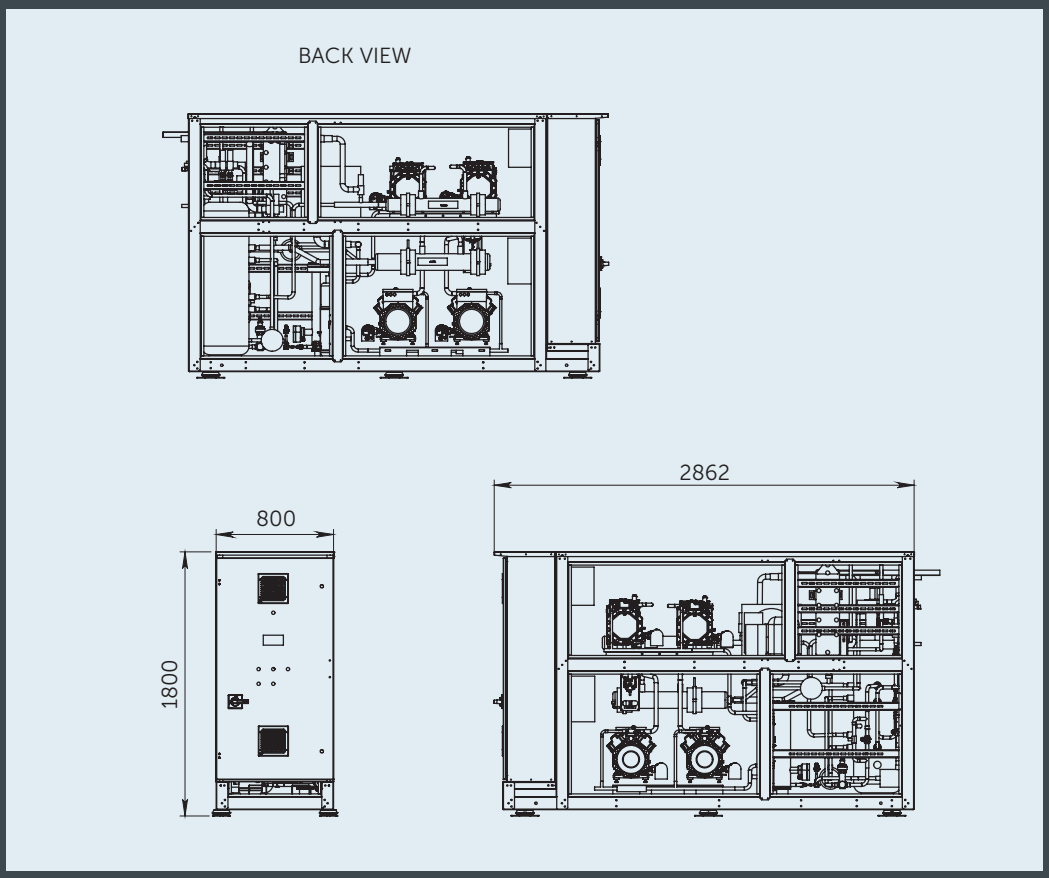
- High pressure switch for every compressor
- General MT and LT high and low pressure switches
- Lead compressors for MT and LT equipped with frequency inverter
- Oil level regulator for every compressor
- Oil separator & reservoir with oil level sensor for proper operation
- Service ball valve before 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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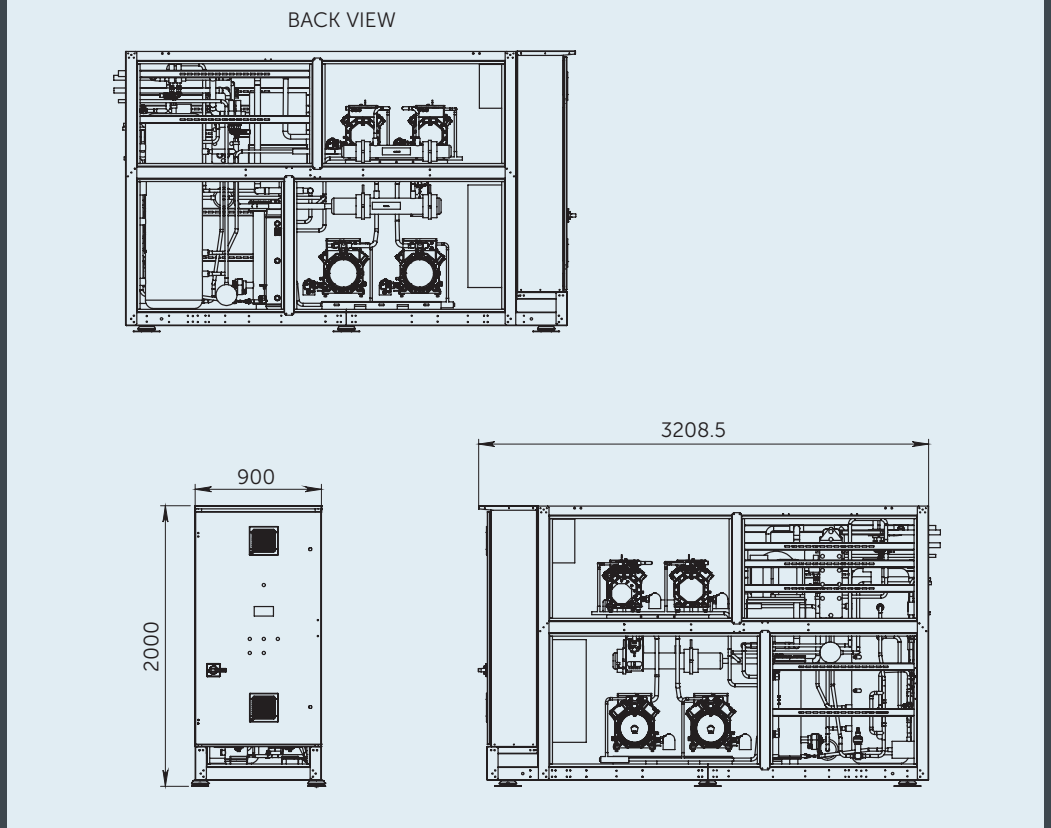


DIMENSIONS

2 x TC3 + 2 x SC2

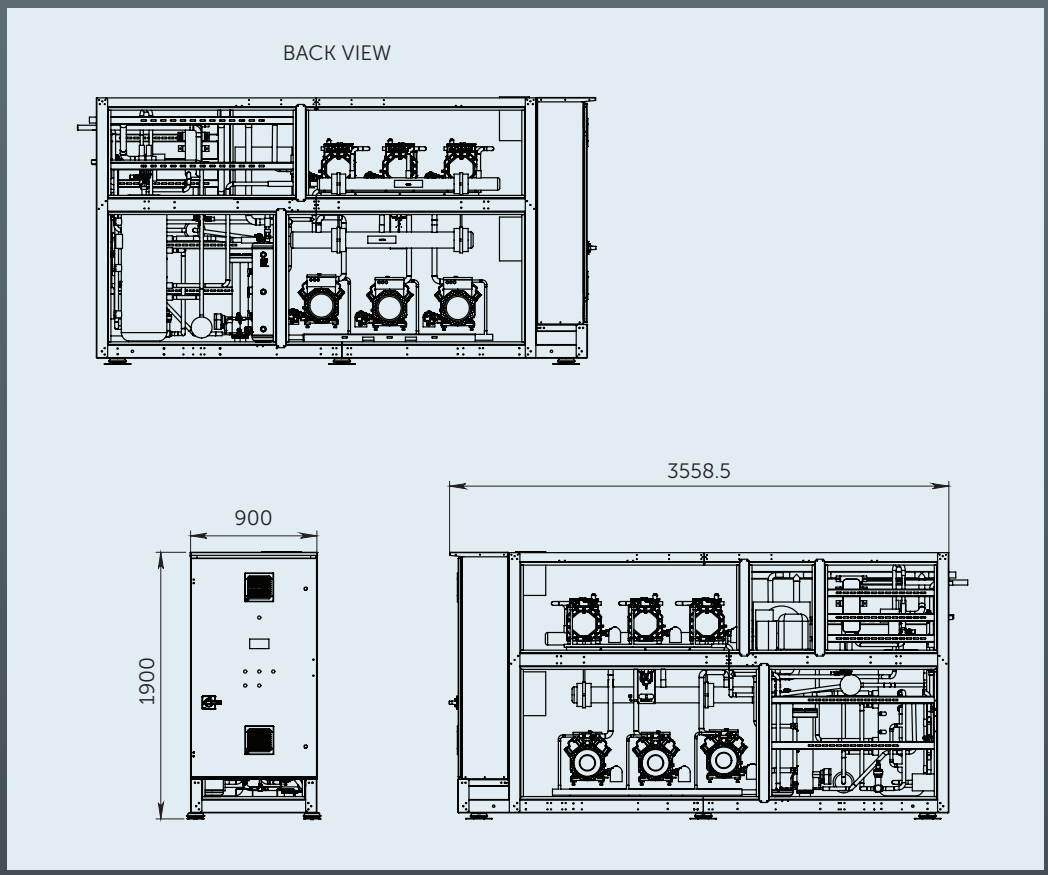


2 x TC4 + 2 x SC3

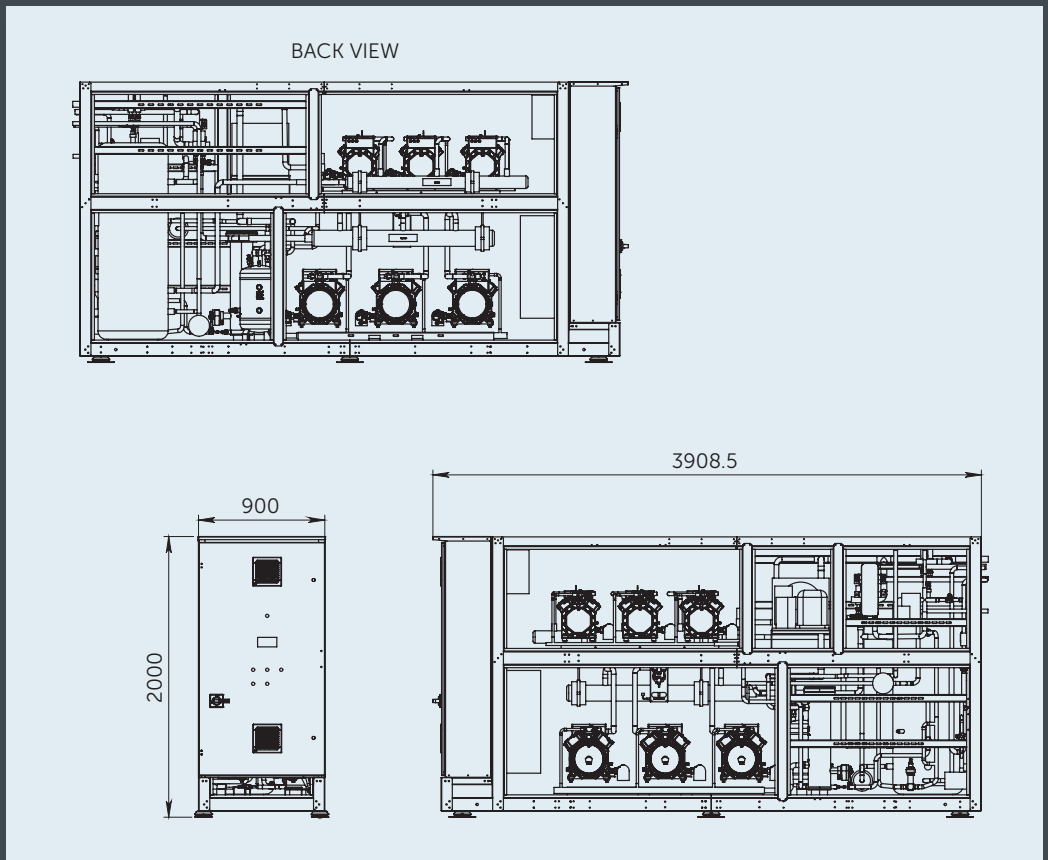


DIMENSIONS

3 x TC3 + 3 x SC2

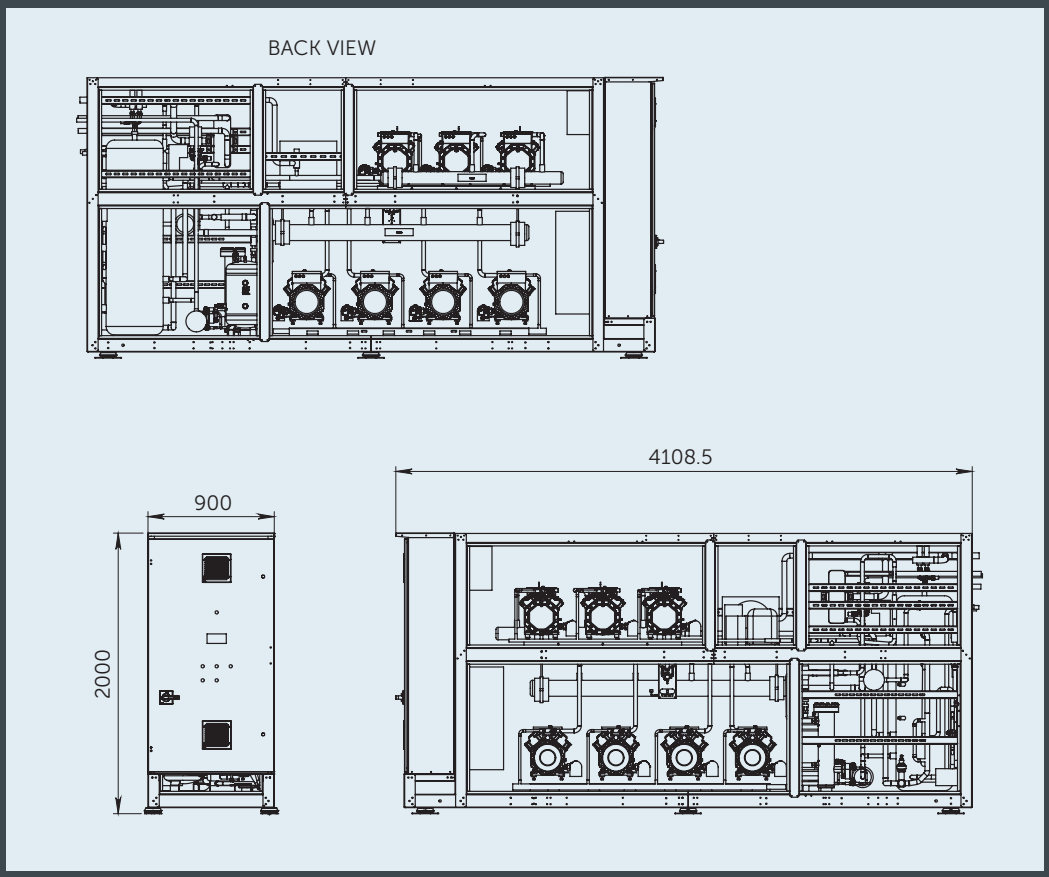


3 x TC4 + 3 x SC3

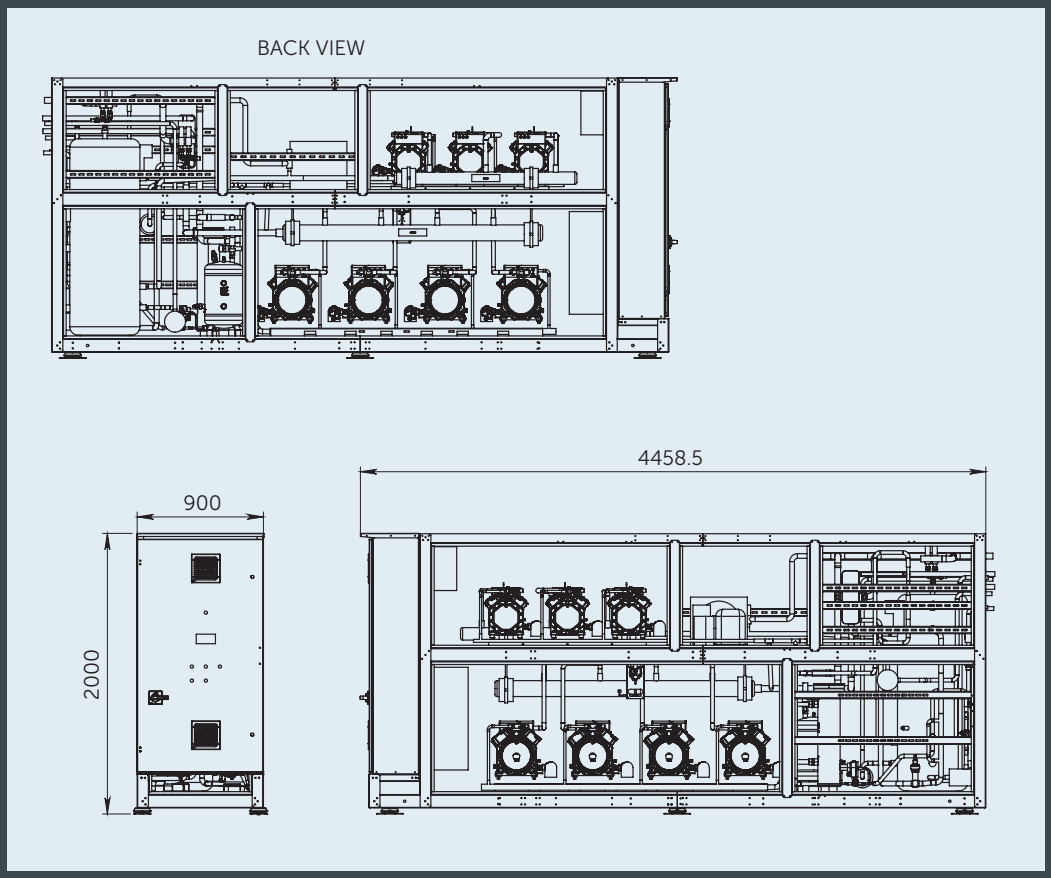


DIMENSIONS

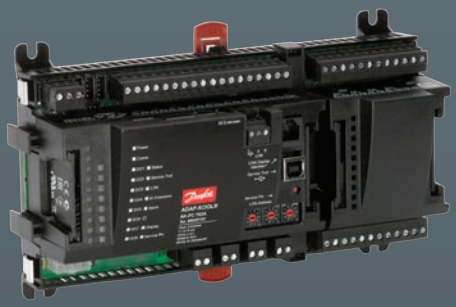
4 x TC3 + 3 x SC3

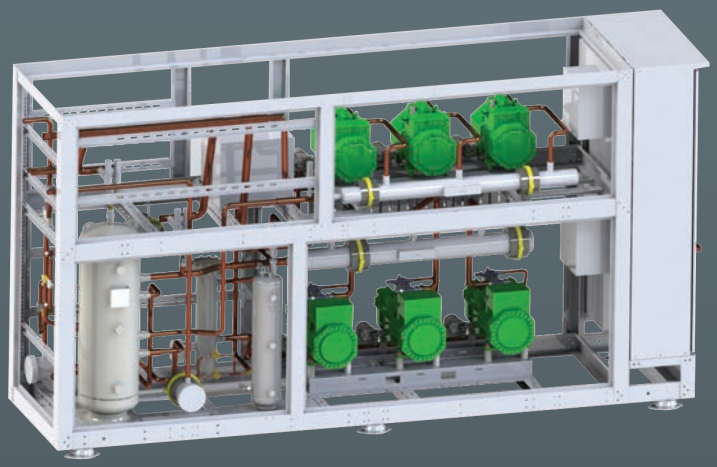


4 x TC4 + 3 x SC3



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.

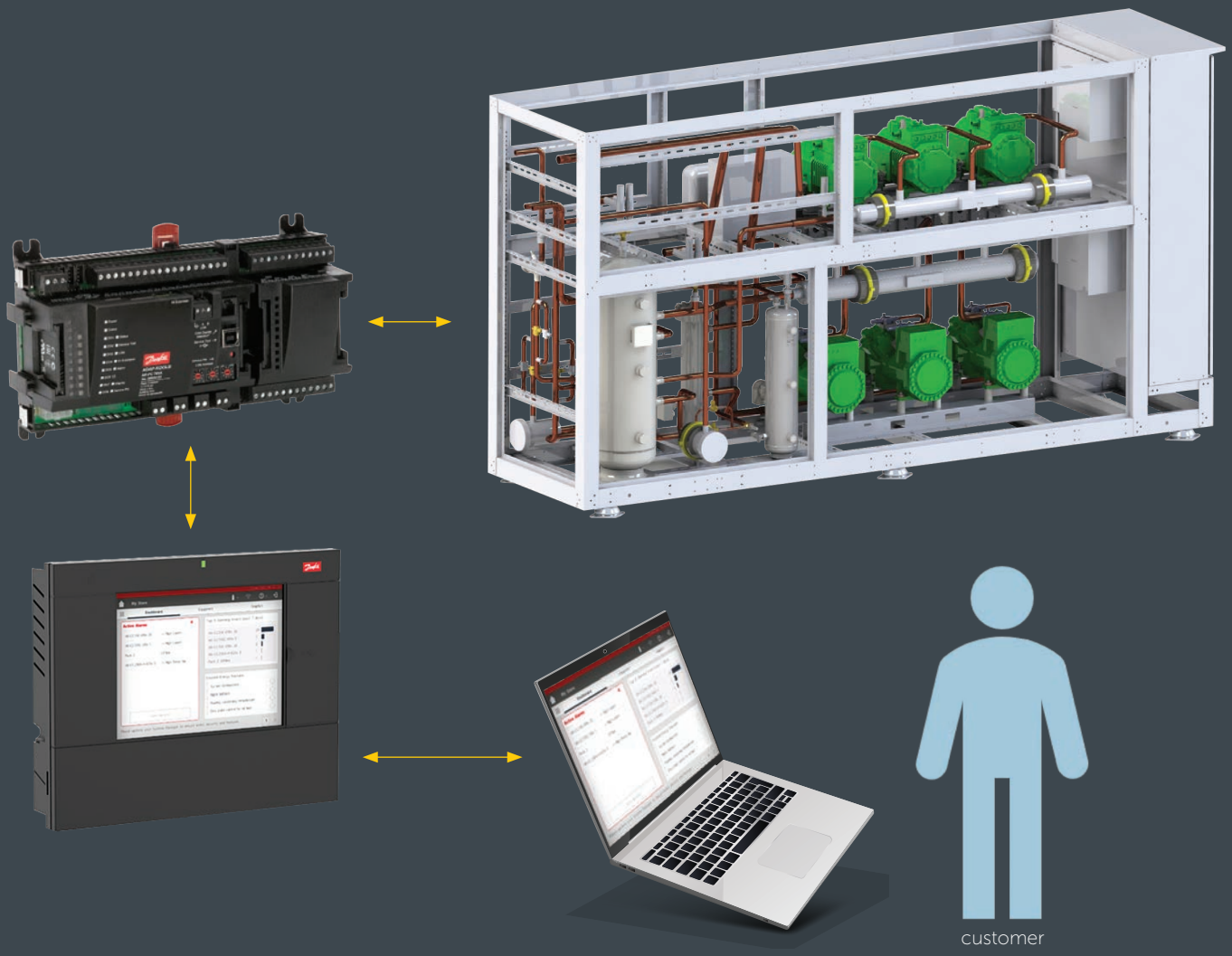
Among the different functions are:

- 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.

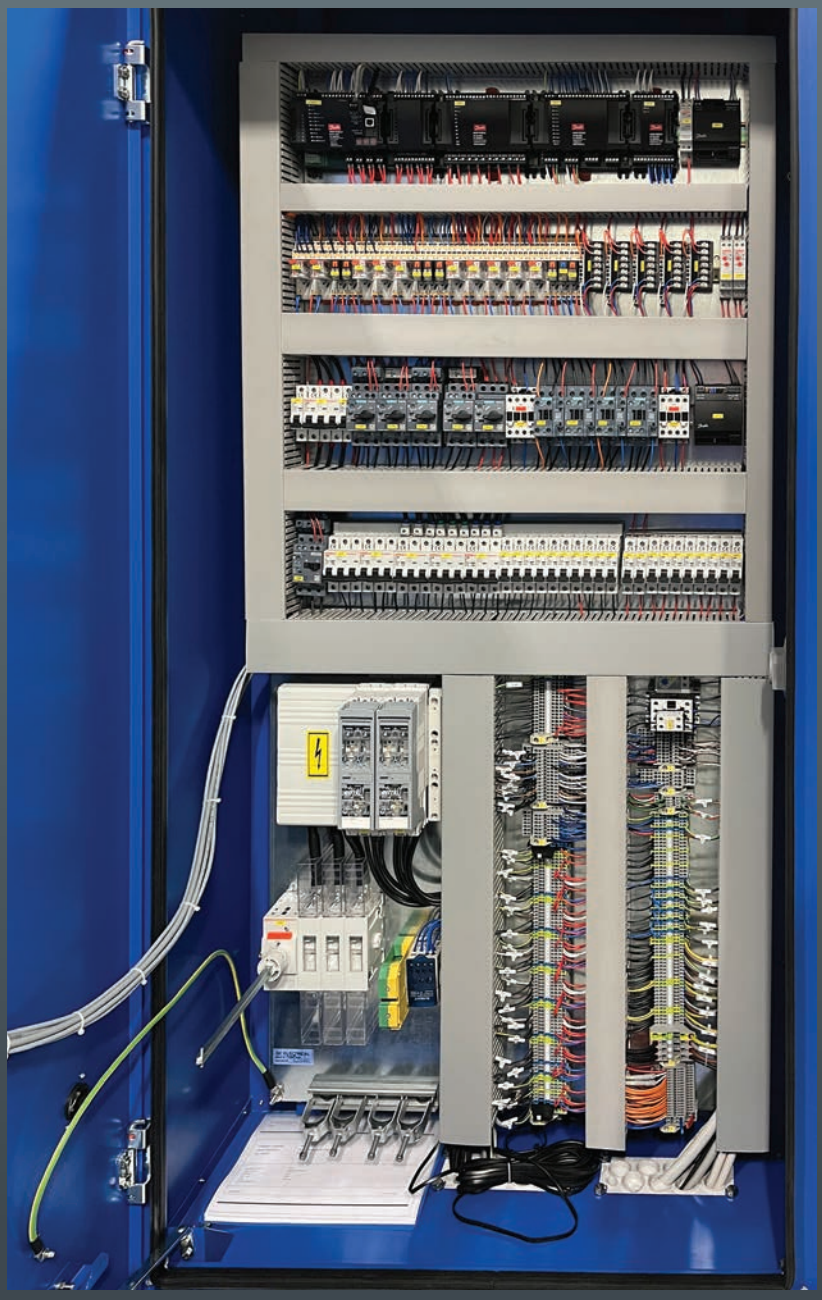
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SYSTEM MANAGER

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.







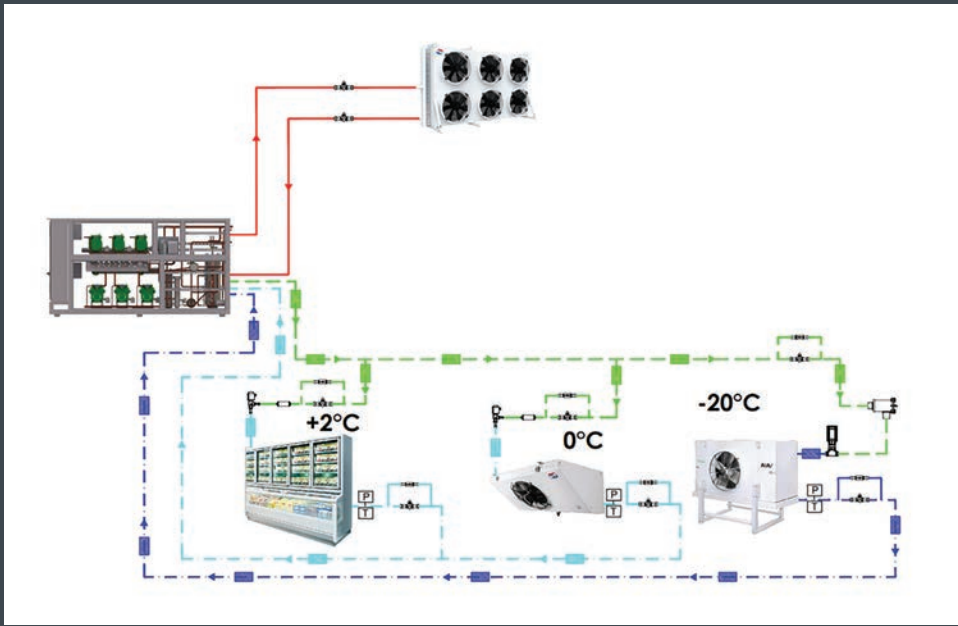
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TRANSCRITICAL CO_2 SYSTEM

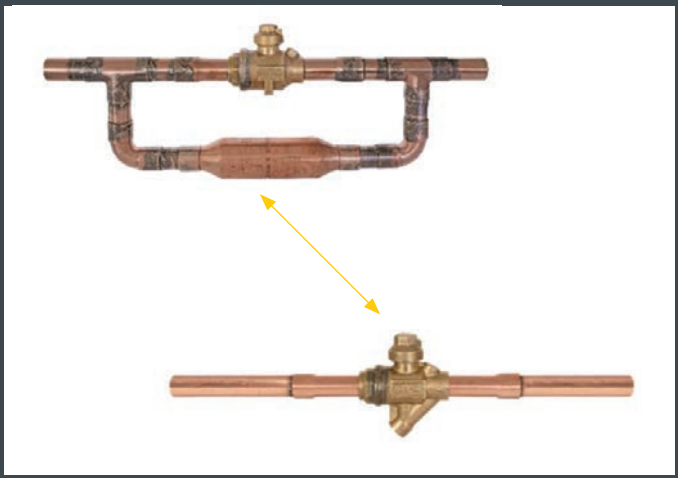
Technical support in all phases of project implementation:

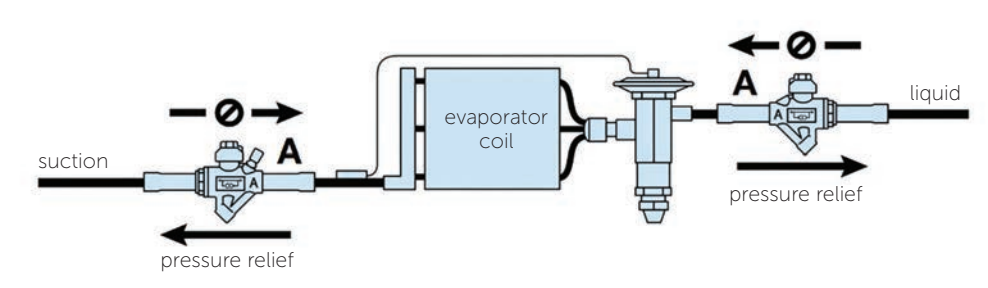
- tender phase
- design phase
- execution phase
- commissioning
- aftersales support.



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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Frigo Plus d.o.o.

Address:

Prepuštovečka ulica 19, Soblinec

HR-10 360 Sesvete, Croatia

Tel.: +385 1 202 00 10

Fax: +385 1 200 38 01

www.frigo-plus.hr