

R744 CO₂ SYSTEMS

SUBCRITICAL & TRANSCRITICAL SYSTEMS

ORIGINAL MANUFACTURED EQUIPMENT

R744 CO₂
Systems



In 2004 BITZER Australia introduced the Enviro-Cold CO₂ System to the Australian Refrigeration Industry. This was the first step in utilising CO₂ in commercial refrigeration systems in Australia since the conception of refrigeration as we know it today. Since this time BITZER Australia has improved our systems to where we are today. This document provides an overall look at the full range of CO₂ engineered equipment manufactured by BITZER Australia. The range includes:

- Generation 6 DX Hybrid
- Generation 7 Flooded Sub Critical
- Modular Cascade R134a / R744
- COBALT Unit – R744 Sub Critical
- High Ambient R744 Booster Rack

Each product has been specifically designed to suit a particular application with efficiency and safety at the forefront of our designs.

Transcritical Development

BITZER Australia continues to invest in further advancements of transcritical CO₂. Realising the increase in governmental and public awareness about issues concerning global warming potential BITZER has engineered the R744 Booster System design that has been optimised for warm climate operation. The purpose of this development is to provide a higher Seasonal Energy Efficiency Ratio (S.E.E.R) compared to all other systems. Further information relating to High Ambient R744 Booster Rack can be found on pgs. 12.

Research and Development - BITZER Australia

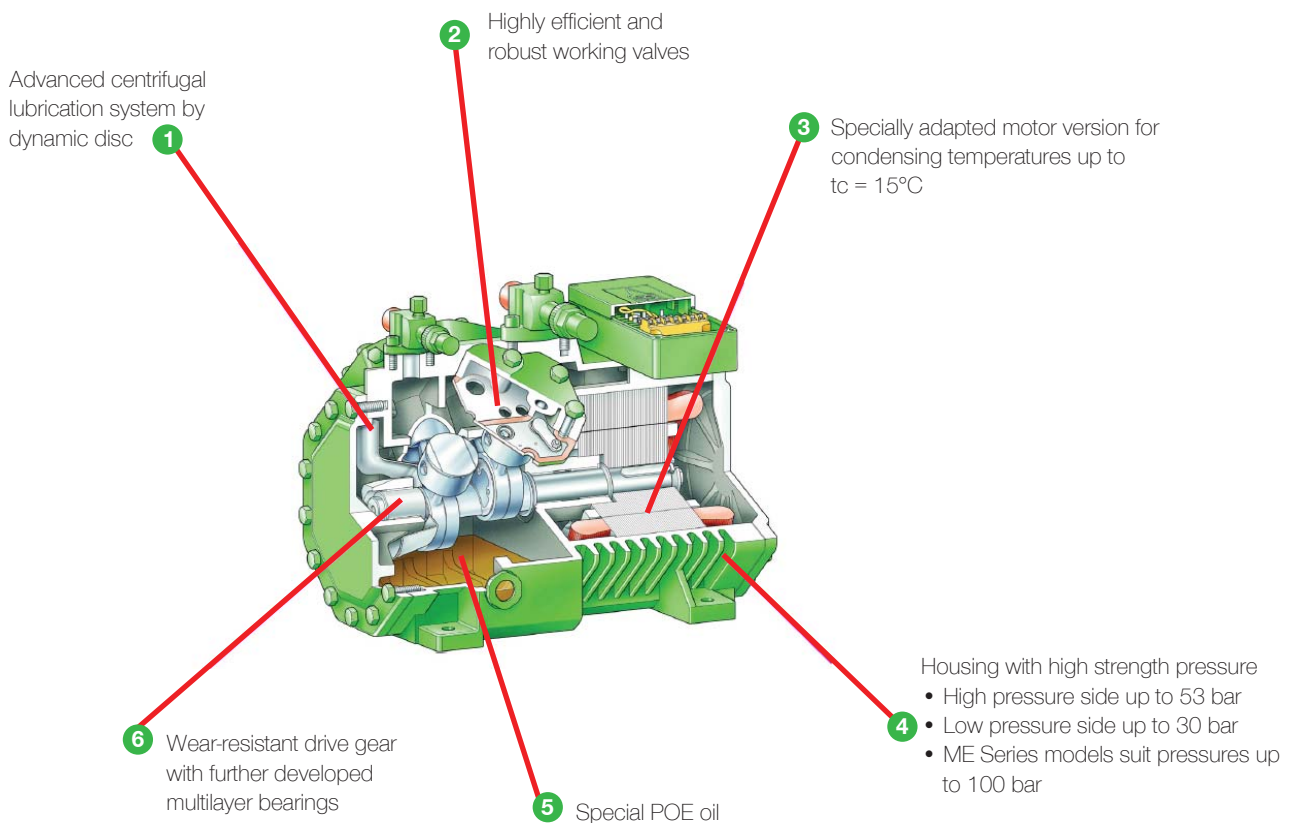
BITZER Australia has created two state of the art research and development laboratories across the two manufacturing facilities in Australia. Both facilities have fully operation R744 / CO₂ plants specialising in testing compressor packages combined with heat exchange equipment. This enables BITZER to fully test and run all equipment before going to market. With this knowledge BITZER can also provide the technical support when commissioning your product for the first time.

CO₂ Compressor Features

The BITZER Semi Hermetic reciprocating SL compressors for CO₂ are the heart of BITZER Australia's R744 / CO₂ natural refrigerant equipment range. The compressor range offers cooling capacity from 1.9KW to 82 KW for sub critical applications. The compressor series is characterised by improved energy efficiency, extended application limits up to a higher condensing temperature, and a permitted pressure load at the high side of 53 30 bar.

BITZER's ME Series compressors for CO₂ are specifically designed for low and medium temperature applications with low condensing temperatures. Models 2MME-07K ... 2DME-7K have a maximum permissible pressure of 100 bar.

The Special Highlights - Sub Critical Compressor



BITZER ECOLINE+ CO₂ Transcritical Compressors

The BITZER ECOLINE+ series for Transcritical CO₂ applications allow a wide range of applications, providing the highest energy efficiency and operational reliability. Using the new LSPM motors and the performance control CRII, the 4- and 6-cylinder compressors can offer an optimum efficiency for all CO₂ applications and markets.

BITZER ECOLINE+

The complete solution for outstanding eco-efficiency

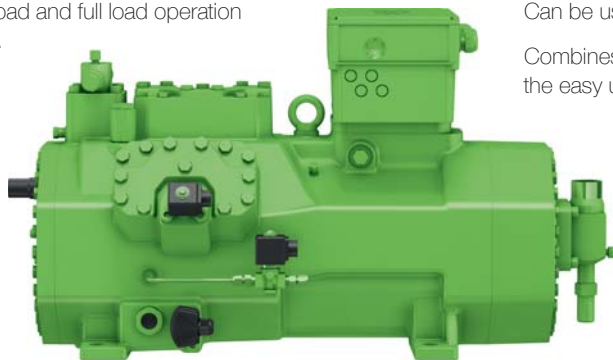
Optimised efficiency at part-load and full load operation for simple system integration.

LSPM MOTOR

Line Start Permanent Magnet Motor (LSPM)

Can be used with or without frequency inverter

Combines the efficiency of a synchronous motor with the easy use of an asynchronous motor



CRII

Virtually stepless capacity control, easy and flexible.

Developed for all system designs

Wide range of control for summer and winter operation

IQ MODULE

Simplifies the electronic connection of the compressor to the superior system control

New extended protection concept with enhanced operation range for increased compressor availability

Generation 6 DX Hybrid

The Generation 6 (Gen 6) Low temperature R744 parallel compressor plant is the latest DX CO₂ cascade system being manufactured by BITZER Australia. The "Gen 6" is a cascade plant with CO₂ cascade BPHE's condensers / R134a evaporating. This plant is connected to a dedicated BITZER R134a medium temperature plant.

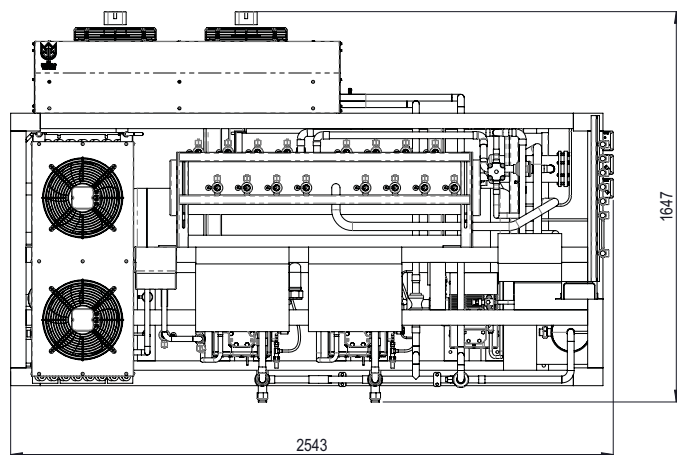
The system has key features as standard to benefit the end user and enable the system to operate as efficiently as possible. As seen in the attached drawings the air cooled de-superheater is attached to the rear of the rack fully piped and factory tested (remote fitment is possible). This reduces the high temperature system load and improves system stability / operation. In addition a hot water heat reclaimed brazed plate heat exchanger can also be fitted. Utilising this heat exchanger not only assists in removing pressure and temperature for the high side of the discharge of the CO₂ plant but also provides free hot water to your facility. The system is proven technology and is commonly being used throughout supermarket and commercial plants around Australia.

Features of the "Gen 6"

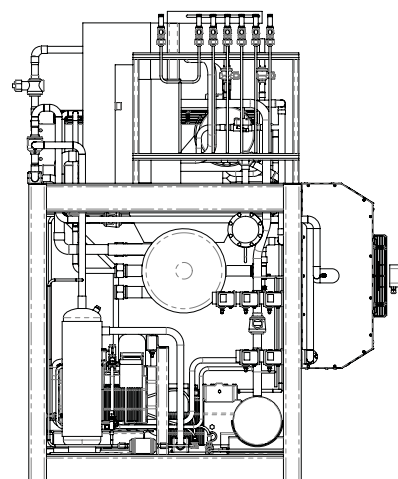
- BITZER Semi Hermetic reciprocating SL compressors
- Compact design
- Easy to Service (Component accessibility)
- Rectangular robust frame concept - 2 , 3 & 4 compressor option
- Solid steel construction
- Reduced footprint & overall dimension
- Compressor sub frame with engineered vibration mounts
- Quiet operation under all conditions
- Improved commissioning & service access
- Simple transport crate design
- Hot Water BPHE (optional)
- Pressure vessels manufactured to AS 1210 & AS 2971 where applicable
- BITZER dual Liquid and Suction insulated header design
- All pipework insulated with minimum 25mm foam insulation with moulded inserts
- Metal clad thermal insulated suction header / accumulator
- 6 x 40 bar relief valves with changeover manifold for vessel relief valve
- 1 x 25 bar relief valve
- HP & LP Bleed / Solenoids
- Air Cooled De superheater installed on the rack (Remote fitment optional)
- Compressor and system pressure controls
- Emergency Cooling BPHE & Optional BITZER Integral Emergency cooling condensing unit
- Liquid Line By Pass Circuit



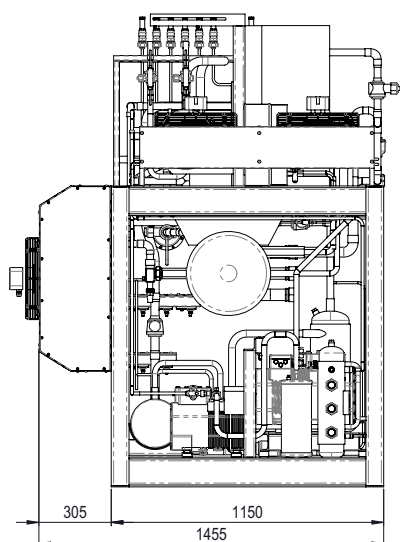
Generation 6 - Dimensional Data



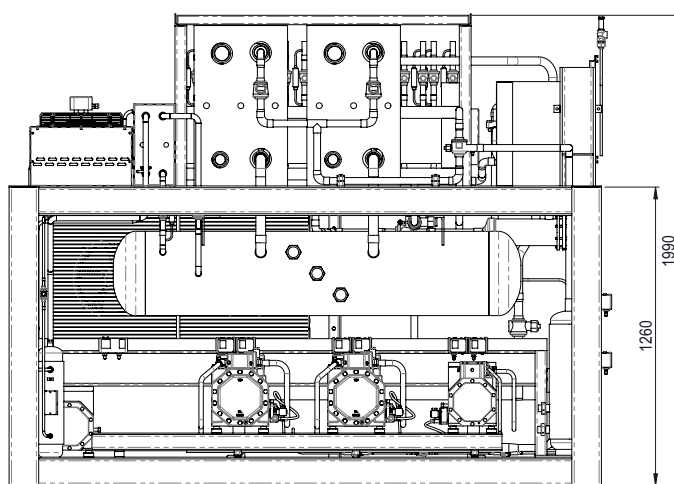
Top View



Side View



Side View



Front View

Note drawing indicates optional accessories:

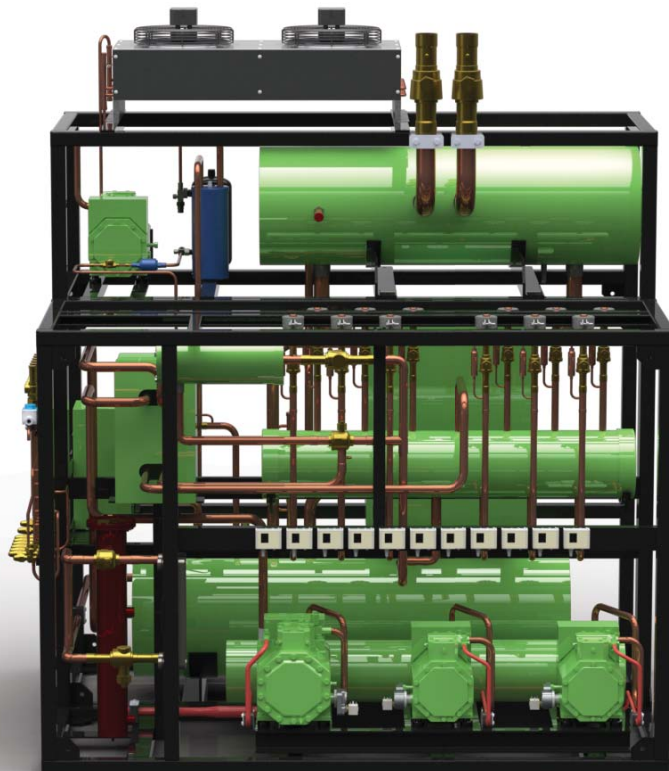
- Emergency Cooled Condensing Unit
- Hot water BPHE
- De-superheater fitted

Generation 7 Flooded Sub-Critical

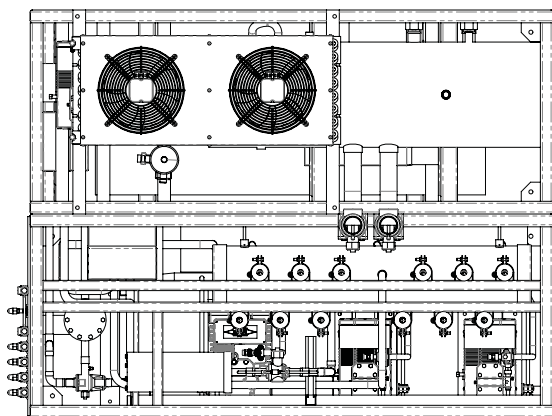
The Generation 7 (Gen 7) R134a Flooded / R744 Rack System has been designed to reduce stress on brazed plate heat exchangers with a passive R134a fully flooded / R744 thermosiphon operation. The R744 thermosiphons vapour from the top of the liquid receiver and condenses the vapour in the primary side of the BPHE returning liquid to the vessel. The R134a separation vessels floods the secondary side of the BPHE thermo siphoning back to the top of the separation vessel. The new design reduces commissioning time and provides more stable operation under all conditions as the discharge gas is diffused into the liquid refrigerant within the liquid receiver via a BITZER designed and PATENTED sparge tube assembly. Adding innovation to the package is the flexibility of having the compressor package and vessel package on separate frames. They can be connected front to back for a conventional installation, installed side by side or L shape to meet plant room dimensions. This also eases onsite installation.

Features

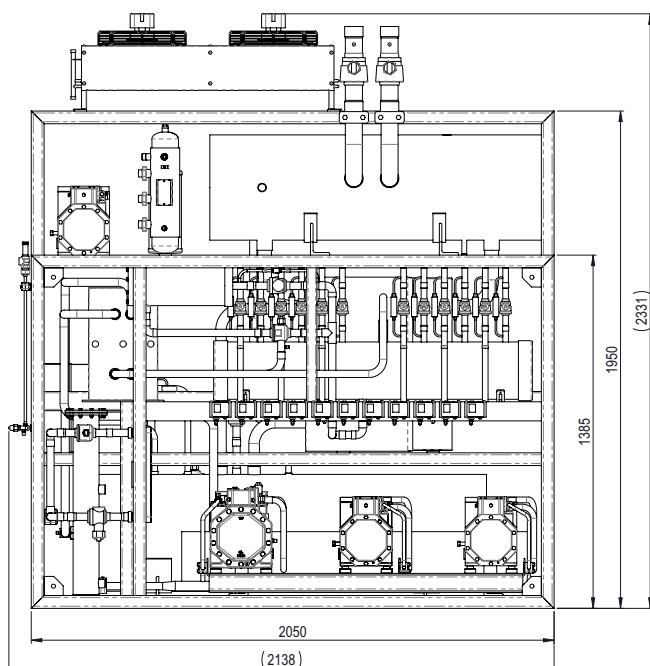
- BITZER Semi Hermetic reciprocating SL compressors
- 2 Frame Concept with multiple mounting positions
- Compressor sub frame with engineered vibration mounts
- Metal clad thermal insulated suction header / accumulator
- 5 x 40 bar relief valves with changeover manifold for vessel relief valve
- 1 x 25 bar relief valve
- Easy to Service (Component accessibility)
- Rectangular frame concept - 2 , 3 & 4 compressor option
- Solid steel construction
- Reduced footprint & overall dimension
- Pressure vessels manufactured to AS 1210 & AS2971 where applicable
- Liquid Line by pass circuit
- BITZER dual Liquid and Suction insulated header design
- Liquid separation vessel R134a with level probe and level switch
- Liquid receiver with low level indicator



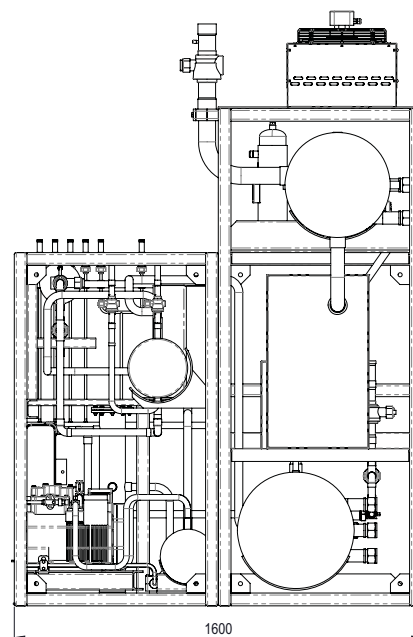
Generation 7 - Dimensional Drawings



Top View



Front View



Side View

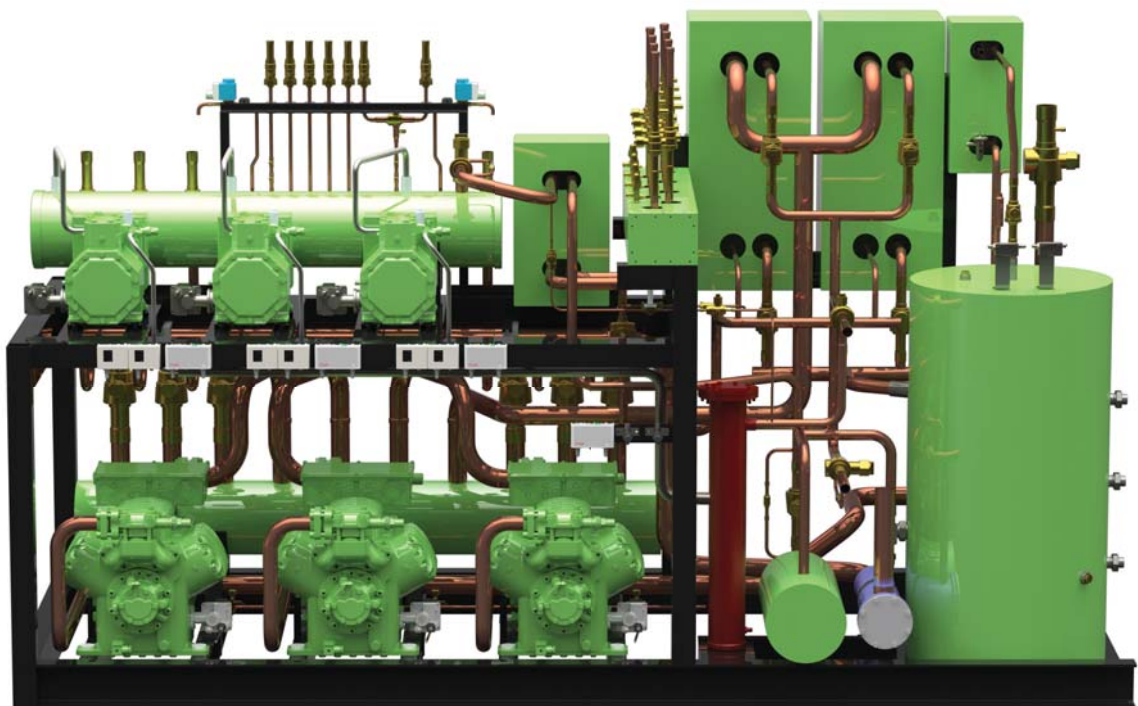
Note drawing indicates optional accessories:

- BITZER Emergency Cooled Condensing Unit
- Hot water BPHE

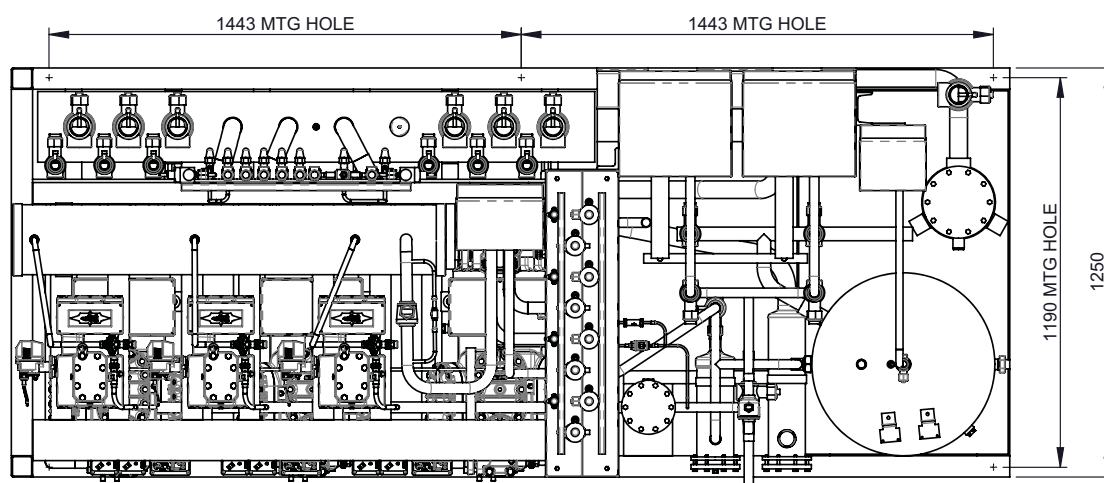
Modular Cascade R134a / R744

The newly developed Cascade solution by BITZER Australia provides the combination of low side R744 /CO2 and R134a high side systems into the one compact unit. This provides contractors and end users a robust construction with compact dimensions. Utilising the new SL series R744 compressors for the low temperature cascade and optimised Ecoline series for the R134a high stage and medium temperature application, this compact package delivers efficiency and energy savings with a reduced Global Warming Potential.

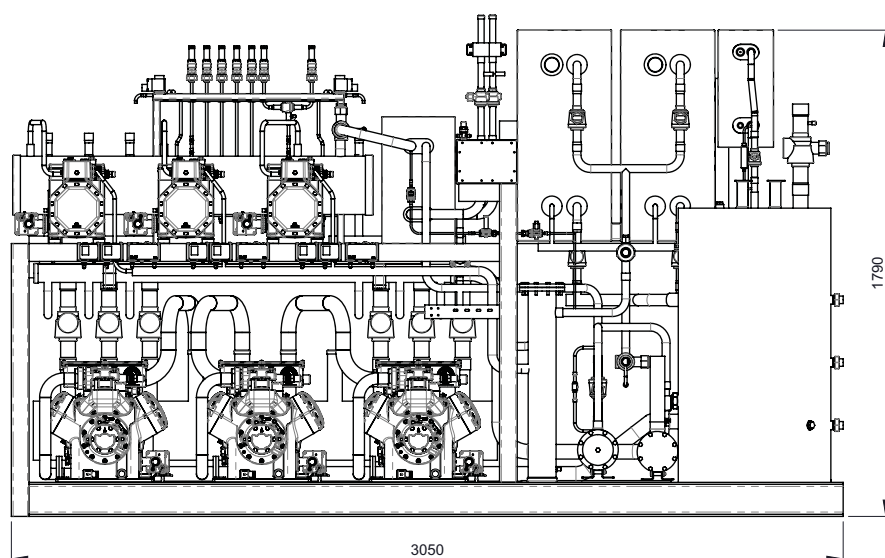
- BITZER Semi Hermetic reciprocating SL compressors
- BITZER Ecoline Semi Hermetic reciprocating compressors
- Metal clad thermal insulated suction drier / accumulator
- 6 x 40 bar relief valves with changeover manifold for vessel relief valve
- 1 x 25 bar relief valve
- Easy to Service (Component accessibility)
- Rectangular frame concept - 2 , 3 & 4 compressor option
- Solid steel construction
- Reduced footprint & overall dimension
- Pressure vessels manufactured to AS 1210 & AS 2971 where applicable



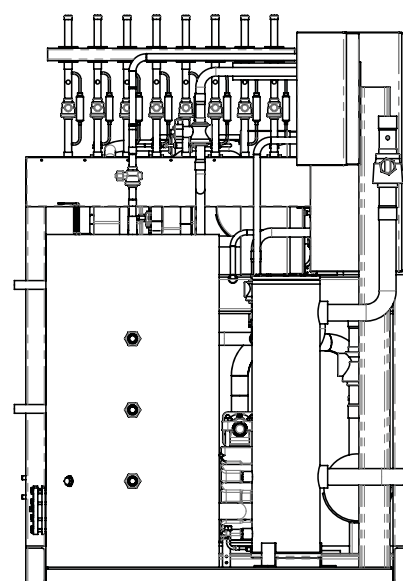
Dimensional Drawings



Top View



Front View



Side View

COBALT Unit - R744 Sub-Critical

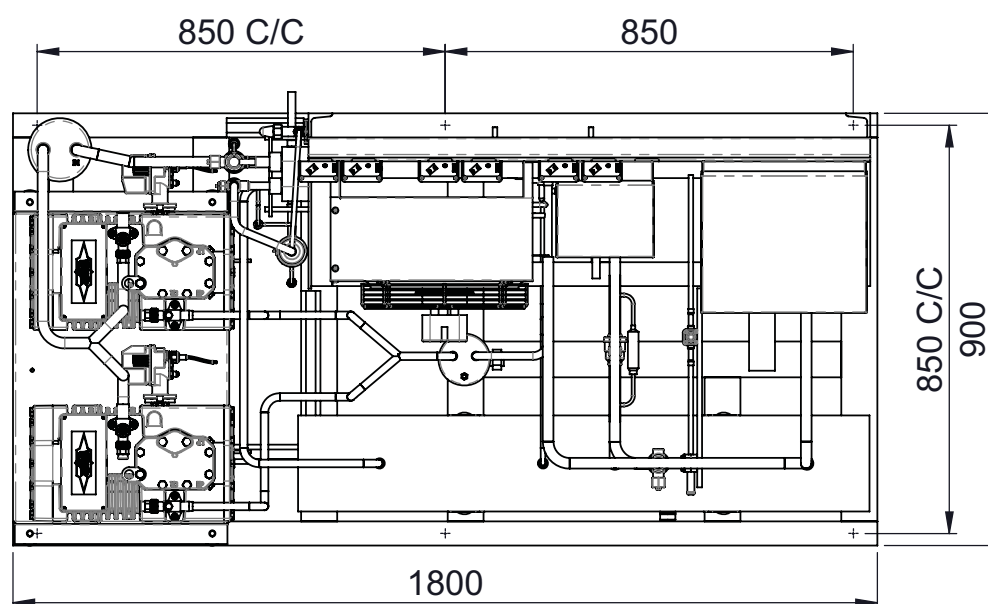
The BITZER Australia COBALT Unit is a self-contained small capacity DX CO₂ Cascade low temperature system. It is designed to be close coupled to the evaporator and connected to a high side medium temperature ring main. It has been designed with a low height and small footprint making it perfect to fit into tight spaces for example above freezer rooms or cabinets. There is also the opportunity to have a dual unit which provides 2 individual circuits which can operate at differing suction temperatures.

Features:

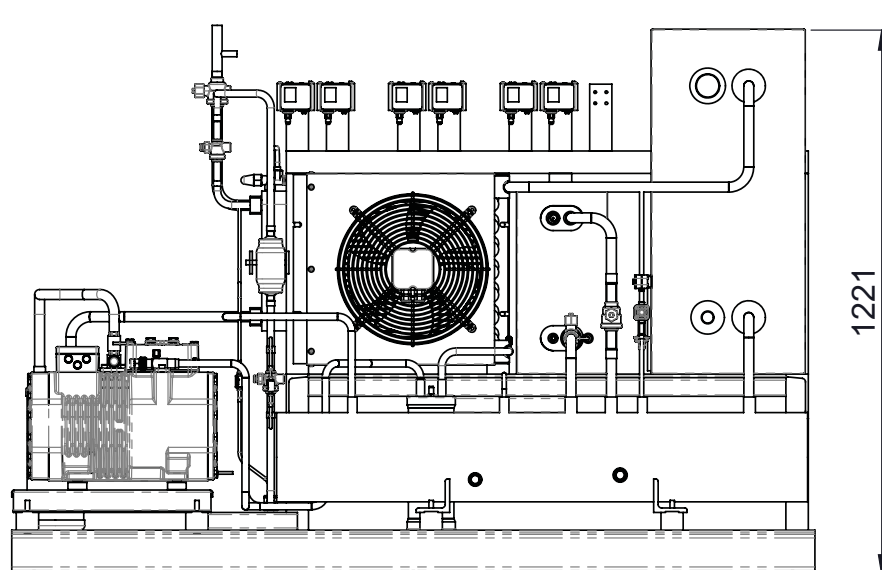
- Electrical Board option with control of EX valve
- R744 high pressure vent solenoid
- Off cycle solenoid
- R744 access valves
- 7 Litre liquid receiver
- Suction to liquid plate heat exchanger
- Single relief valve
- High pressure vent control
- Reduced footprint & overall dimension
- Pressure vessels manufactured to AS 1210 & AS 2971



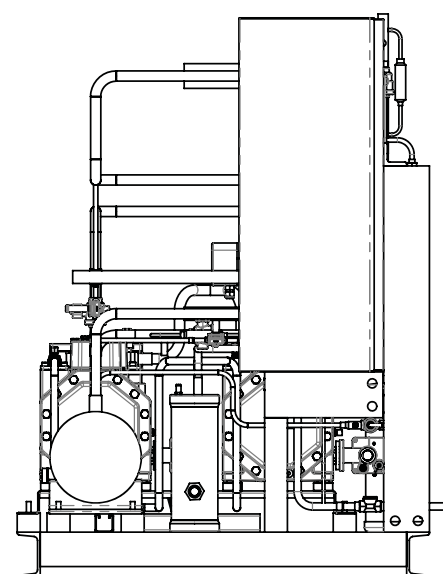
Cobalt - Dimensional Drawings



Top View



Front View



Side View

Booster Rack - A New Generation Two-Stage CO₂ Trans-Critical System

BITZER CO₂ BOOSTER RACK is a new generation of Transcritical CO₂ Booster system engineered for efficiency in the Australian climate. It is comprised of an LT system, a MT system and a Parallel Compression system. Comparing to a standard Flash Gas Bypass CO₂ transcritical booster system & CASCADE CO₂ transcritical System currently on the market, the BITZER CO₂ BOOSTER RACK will produce a better Seasonal Energy Efficiency Ratio (SEER) thanks to the benefits of parallel compression. In other words, end users of BITZER Australia products will benefit from consuming less energy while helping to reduce their overall carbon footprint.

BITZER CO₂ BOOSTER RACK is able to offer countless options & service abilities to suit individual requirements and boost overall system efficiency such as hot gas defrost on LT evaporators, heat reclaim for process hot water or space heating or air conditioning.

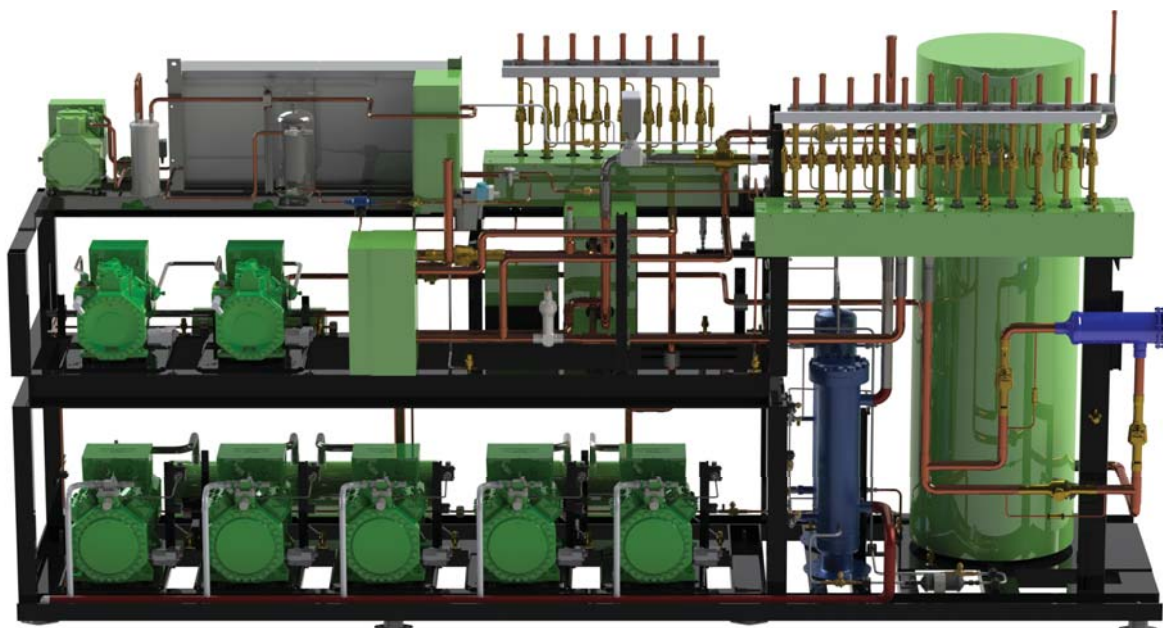
Standard features of the BITZER CO₂ BOOSTER RACK are:

- 120Bar HP and up to 50Bar Interstage Design Pressure
- High stage compressor capable of handling high stage evaporator load & high load conditions
- Parallel (flash gas) compressor to boost system efficiency in warm climates
- R134a emergency cooling system for liquid receivers
- 1 or 2 Liquid Receivers, depending on system configuration
- BITZER dual Liquid and Suction insulated headers included in rack delivery
- Individual compressor oil level control and alarming
- All compressors are fully isolatable for service without needing to shut down the remainder of the plant
- AS1210, ASME or PED pressure vessel certification as required

Optional Features Include:

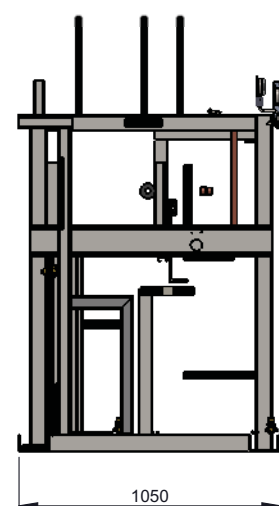
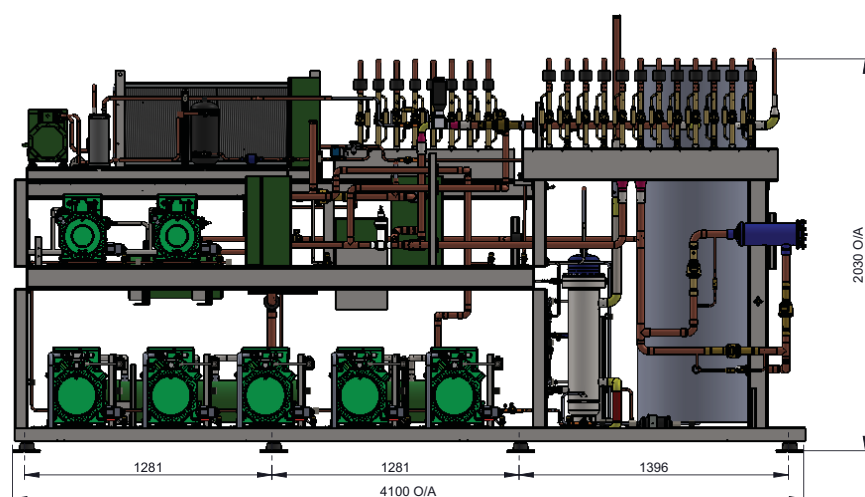
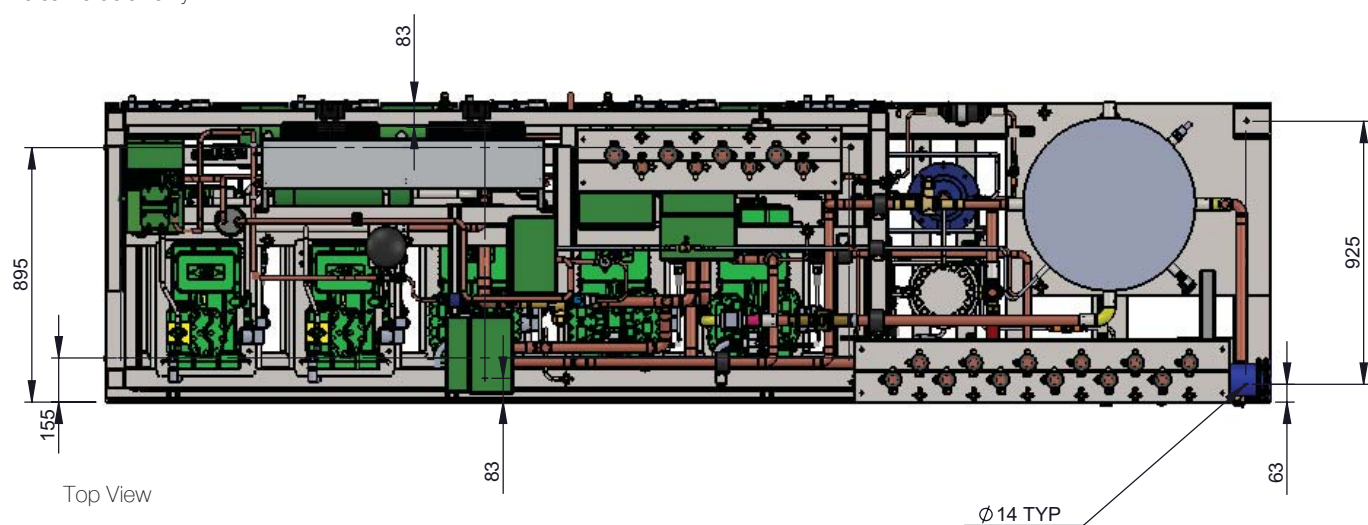
- Fully integrated CAREL control system, including HP Control Valves, valve drivers and rack controllers
- Heat reclaim for water heating or space heating
- Air Conditioning
- LT discharge gas for hot gas defrost on LT evaporators
- CAREL showcase and coolroom controllers
- Gas cooler with optional on-board evaporative cooling system
- Stainless Steel, Carbon Steel or K65 Piping

Other features can be considered upon request and in consultation with BITZER Engineering Team

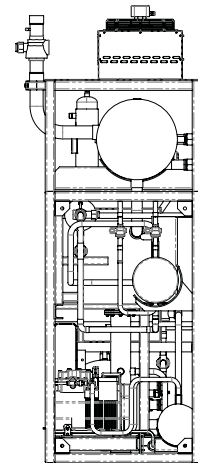
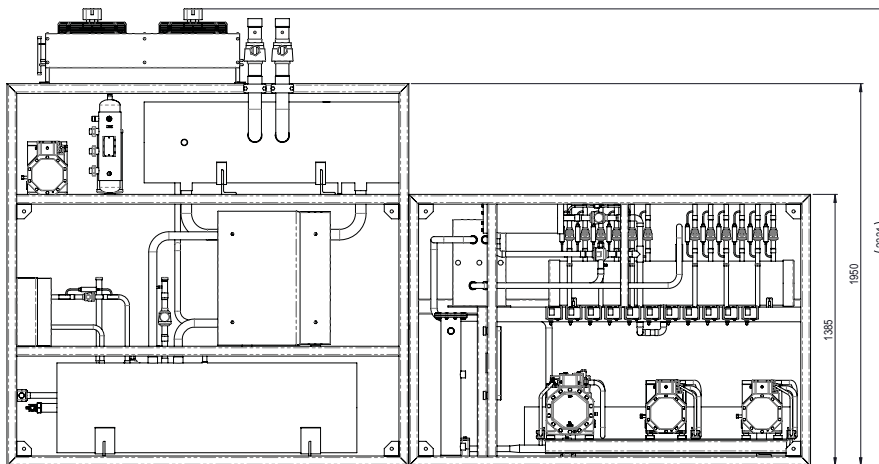
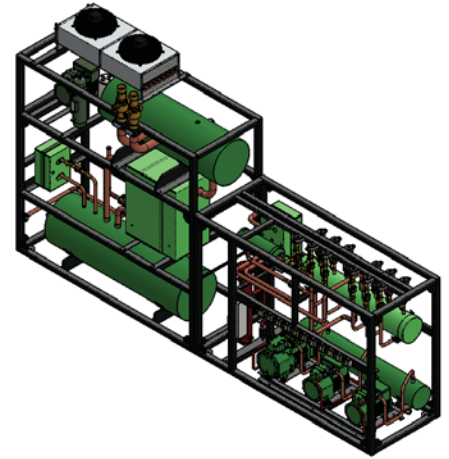
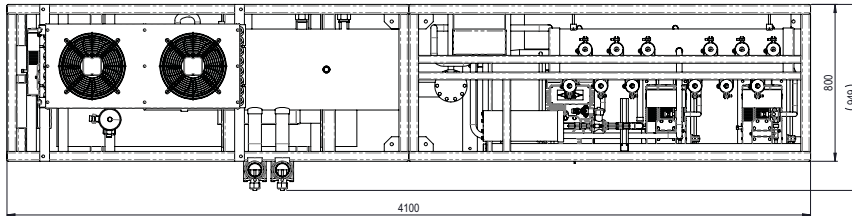


Dimensional Drawings

Indicative detail only.



Additional Gen 7 Mounting Configurations



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Note: The ISO standard only applies to the BITZER NSW and VIC branches