

Tender Specification

SyScrew 300-1400 Air CO

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SERIES: SyScrew 300-1400 Air CO

TYPE: Air cooled water chiller

TECHNOLOGY: screw compressors, R134a refrigerant

CAPACITY RANGE:

Cooling → 295-1395 [kW]

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General description

SyScrew Air units have been designed and optimized to operate with R134a refrigerant, in order to match the market target and fulfill the requirements for comfort and industrial process application

SyScrew Air units are available in 21 sizes, with a nominal capacity range from 295 to 1395 [kW]

All units are equipped with two separated refrigerant circuits, each one equipped with one screw compressor

SyScrew Air can be supplied with 3 acoustic options:

- Basic Low Noise (-): the units are equipped with delta connected fans. The chillers are supplied with compressors box to reduce the noise emissions
- Low Noise (L): the units are equipped with star connected fans implying lower rotation speed. Besides lower fan deck sound emission, the chillers are supplied with compressors box to reduce the noise emissions
- Super Low Noise (S): the units are equipped with star connected fans, fitted with a speed controller which allows the units to operate with a very low rotation speed. Besides very low fan deck sound emission, the chillers are supplied with acoustically insulated compressor box and flexible pipes as well as mufflers on compressor discharge lines

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To increase its application field, SyScrew Air range is available in two additional versions:

- HT (High Temperature) version: same equipment as the basic version, but also fitted with brushless EC fan motors to ensure low energy consumption and to operate on a wider envelope
- HPF (High Pressure Fans) version: same equipment as the basic version, but also fitted with brushless EC fan motors so as to provide external static pressure up to 120 [Pa]

Two heat recovery options are available:

- Desuperheater: plate type heat exchangers fitted on the compressor discharge line, to recover about 20 % of the total heat rejected to the condensers
- Total Heat Recover (TR version): double circuit shell& tube or plate type heat exchanger to recover the total heat rejected to the condensers. 4-way valves and field installed control sensor are also provided to ensure the cooling/heat recovery mode changeover

Several hydraulic options are available in order to cover a wide range of requirements in terms of pump available static pressure and redundancy

The general operation status of the unit is steadily managed by a microprocessor implementing a dedicated developed software, ensuring a total protection of compressor inside its operating envelope and including parameter customization according application field

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1 Key points

- Common configuration for the different versions → Easy upgrade of the units in stock or on field
- Electronic expansion device → Excellent control of superheating for the best performance at full and partial load and for a safe operation
- Microchannel coils → Significant reduction on refrigerant charge and operating weight
- New generation of pure counter-current shell&tube evaporators → Maximum efficiency and new levels of competitiveness
- Compressors box → Remarkable sound reduction even for the basic noise version
- Control platform → Modular architecture, compressor envelope integration, corrective actions in border line areas, easy-friendly user interface

- Several options / accessories provided with standard delivery:
 - Phase sequence control → safe electric installation
 - Electronic expansion valve → precision in SH control
 - Control circuit transformer → power supply without neutral
 - Control data logger → thermodynamic parameters recording
 - Antifreeze electrical heater → protection against shell&tube freezing
 - ModBus interface → supervision ready

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2 Cabinet

The cabinet is made of heavy gauge galvanized steel

All galvanized steel components are individually painted by a special painting process before the assembly of the unit. This painting system performs a homogeneous protection to the corrosion

The painting is a polyester powder based type, colored in RAL 7040. The units are suitable for outdoor installation, directly on the building roof or at the ground level

3 Compressors

Compressors are semi-hermetic high-efficiency twin-screw type, optimized to work with high pressure ratio, featuring an integrated oil separator and step or stepless capacity control ranging from 25 to 100%

Thanks to economizer operation mode, it is possible to increase cooling capacity and efficiency both at full and at partial load. Liquid injection allows operation on a wider envelope without compromising unit reliability

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4 Evaporator

Internal heat exchanger is direct expansion shell & tube type, with an innovative refrigerant distribution system and single-pass pure countercurrent design, so as to reach maximum efficiency and new levels of competitiveness

Pipe bundle is made of inner grooved tubes to maximize the R134a heat transfer coefficient and to limit the negative effects of refrigerant pressure drop

Steel housing is insulated by UV resistant closed cell polyethylene foam material and equipped with an electric heater on the external surface to prevent the unit from freezing at a low temperature when the unit is off. Besides antifreeze electrical heater, water temperature probes are protecting the unit against freezing while the unit is operating

5 Condenser

External heat exchangers are micro-channel type, the best possible technology in terms of heat transfer both refrigerant and air side. Micro-channel coils provide an outstanding reduction of refrigerant charge and a remarkable decrease of operating weights if compared to traditional finned-tubes technology. Additional surface coating is provided for the standard delivery in order to further improve resistance to corrosion.

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6 Condenser fans

Condensing decks are equipped with 800 [mm] diameter axial fan motors with profiled, sickle shaped blades designed with bionical know how. Fan motors have IP54 protection grade, and thermostat protection placed in the bearings. Fan motors are complete with nozzle profile housing to provide a basic sound attenuation and a safety grill

Special fan with electronic brushless type motors are used in HT and HPF versions

All fan motors are equipped with externally mounted nozzle profile housing generating low sound levels

7 Refrigerant circuit

All the units are composed of two independent and separate refrigerant circuits. Each refrigerant circuit is equipped with discharge line shut-off valves, filter-drier with solid core, sight glass and electronic expansion valve. Some units are equipped with economizer system (ECO) to further improve the performances and the efficiency

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8 Control panel

A new optimized control with an easy-friendly interface, manages unit operation under different load and temperature condition and can provide:

- Compressor management
 - Power on/off
 - Anti-cycle
 - Unloading for high pressure, high temperature and/or high compressor pressure ratio
- Chilled and hot water temperature regulation (return water temperature RWT - P+I type or leaving water temperature LWT - neutral band type)
- Automatic control of suction superheating through electronic expansion valve with optimized functions (cooling and start-up)
- Evaporator antifreeze protection
- High and low pressure operating conditions management
- External interlocks management
- Remote control management
 - Unit power on / off
 - Compressor Load Shedding or On/Off remote contact
 - Summary alarm signal
- Remote signaling, by dry contacts:
 - Voltage presence
 - Compressors in operation

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- General alarm
- Hydro-kit management
- Heat recovery management by means of RWT sensor at the heat recovery condenser

Unit controller can display all operating parameters such as:

- Return water temperature
- Leaving water temperature
- Outdoor ambient temperature
- Refrigerant discharge pressure
- Refrigerant suction pressure
- Refrigerant suction temperature
- Refrigerant discharge temperature
- Heat recovery temperature

Unit controller can display various alarms and operation status:

- Low / High pressure
- Evaporator antifreeze
- Lack of water flow
- Compressor operation / operating hours and start-up numbers
- Pump operation / operating hours
- Compressor thermal protection
- Fan thermal protection
- Faulty sensors

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9 Safety and control devices

Each unit is complete with the following safety and control devices

Safety

- Power disconnect switch with an emergency stop function
- Phase sequence control
- High pressure switches
- Low pressure switches
- Evaporator antifreeze electric heater
- Crankcase oil electric heater
- Safety valve on discharge lines
- Safety valve on suction lines

Control

- High pressure transducers
- Low pressure transducers
- Discharge gas temperature probes
- Return water temperature sensor
- Leaving water temperature sensor (with an antifreeze function)
- Suction temperature sensor (for EEV control)
- Outdoor ambient temperature sensor

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- Heat recovery temperature sensor (TR only)

10 Optional hydro kits

On board mounted and remote hydro-kits are available as option.

On board hydro kits can be supplied only without buffer tank while remote hydro kits (supplied loose for field installation) are always provided with internal tank.

On board hydro kit without buffer tank are provided with following components:

- Single or double pump with low available static pressure (100 [kPa]) or high available static pressure (200 [kPa])
- Expansion tank (24 [l] from 300 to 800 size, 2 x 24 [l] from 850 to 1400 size)
- Shut-off valves
- Check valves (in case of 2 pumps)
- Safety valve
- Automatic air vent valve
- Thermal insulation for pipes and water pump(s)

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11 Factory installed options

- Lonwork protocol kit for BMS
- Bacnet protocol kit for BMS
- Compressors soft-starter
- Fan speed control for low ambient operation
- Double set-point
- Power factor correction capacitors
- Automatic circuit breaker
- HP & LP gauges
- Compressor suction valves
- Compressor oil level switch
- Compressor stepless control
- Al/Cu finned tubes coils
- E-coating for Al/Cu finned tubes coils
- Condenser coils with copper fins
- Chiller grilles
- Compressor acoustic box
- Desuperheater
- Total heat recovery (TR)
- On board hydro kits 1P/2P without tank

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12 Field installed accessories

- Remote ON/OFF control
- Remote keyboard panel
- Sequencer, up to max four units
- Master and slave control, up to max four units
- Anti-vibration spring
- Water flow switch
- Water pressure switch
- Water filter
- Remote hydro kits with 2.500 [l] buffer tank, 1 or 2 low or high pressure pump(s), relevant accessories and with or without antifreeze heater

13 Conformity with standards

The units are in conformity with the following standards:

- Machine Directive: 2006/42/EC
- Electromagnetic Compatibility Directive: 2014/30/EU
- Pressure Equipment Directive: 2014/68/EU