

SysTemp

Close Control
Engineering Data Manual



Key points

SySmart Control

Advanced electronic control system is conceived and designed to provide an energy savings and the optimized management of the entire unit. Thanks to the control via Modbus® Master protocol, all key components of the unit are continuously supervised, with over 50 different variables that ensure the real-time monitoring of all operating cycles. Integrated RS485 Modbus® card, BACnet™, Lon-Works® and SNMP gateway interfaces provide easy and quick interfacing with supervision systems and building management systems (BMS).

EC fans

State-of-the-art electronic fans allow very high performance levels to be achieved with minimum energy impact.

Energy valve

The chilled water units of the Systemair close control air conditioning range can be equipped with electronically controlled valves which allow the regulation and continuous monitoring of the water flow rate, inlet and outlet temperatures, and thus cooling capacity.

Electronic expansion valve

Electronic expansion valve maximizes the performance of direct expansion cooling circuits, especially under partialisation conditions, reduces the cooling circuit locking risk. By optimizing working conditions, it is possible to increase the cooling circuit energy efficiency by more than 40% compared to a system provided with a mechanical thermostatic expansion valve (TEV).

DC Compressors

DC compressors with inverter regulation, which allow the delivered cooling capacity to be varied, maximizing the motor performance and reducing energy consumption. Thanks to the inverter control system, the brushless DC

motor and the "High Pressure Shell" system, it is possible to ensure the system high functional efficiency, minimising the need to service the cooling circuit.

SysDrive

All direct expansion units are equipped with an innovative control system of the cooling circuit, which allows simplified management, easier maintenance and optimized operational safety. The advanced management system allows the display and monitoring of the operating conditions of the completely cooling cycle, from both the local display and the supervision systems as well as building management systems (BMS).

Smart Net

SysTemp range are equipped with an innovative control system in a local network (LAN) which allows them to be managed and serviced more easily while improving operational safety. Taking advantage of the modulation capabilities of its components, this system makes it possible to actively share the workload among all the units in the local network.

Free Cooling

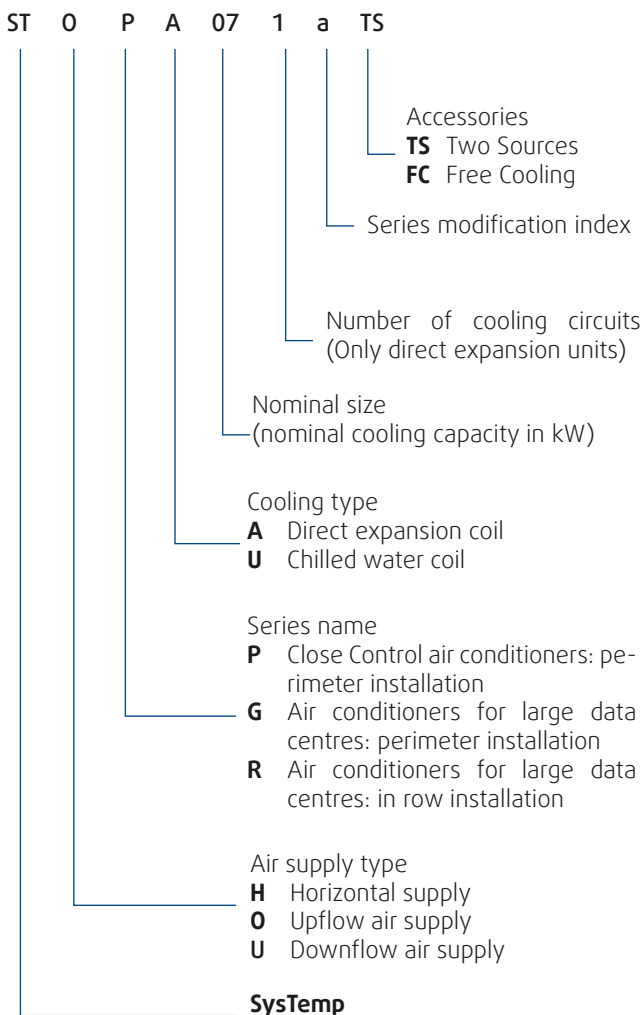
Innovative Free Cooling systems able to achieve energy saving of over 50% compared to a conventional air conditioner and to ensure high energy saving combined with the efficiency and reliability.

DualPower

Specific units are provided with two very independent cooling source DX and CW. The DualPower system is very flexible and allows three different types: the chilled water primary source, the direct expansion primary source, both source of the unit are chilled water coils.

Unit identification and specifications

Unit identification



General

The air conditioners have been specifically designed and manufactured for close control air conditioning where the handling almost exclusively sensible heat loads is a fundamental requirement.

The typical applications are computer rooms, digital telephone exchanges, switch rooms, weather stations, medical laboratories, CAT and MR scanners, as well as any other application where a sensible heat load must be dissipated without modifying the relative humidity.

The series, which can be either upflow or downflow, offers a large range of accessories and variations in design, allowing for maximum flexibility in the use of the units.

Cabinet and frame structure

The structure is made by aluminum profiles painted in anthracite colour RAL 7024. Panels are made by hot-galvanized sheet steel 1mm-thickness, painted in anthracite colour RAL 7024 too.

The insulation is high density, A1 class fire-resistance polyurethane sheets as per norm UNI/ISO 3795, self-extinguishing, protected by a plastic film out friction. The doors are fastened to the structure with hinges and safety access keys.

Valid for models:

- ST OPA/UPA 361-422-461-512-662-852-932
- ST OPU/UPU 60-70-80-110-160-220
- ST UGA 932-1342
- ST UGU 70-150-230-300.

The structure is riveted monobloc made by hot-galvanized sheet steel of 1mm-thickness painted in anthracite colour RAL 7024. Thermal acoustic insulation system consisting of 23mm thickness for the sides panel and 12 or 20 mm for the back panel according to the unit model.

The insulation is high density, A1 class fire-resistance polyurethane sheets as per norm UNI/ISO 3795, self-extinguishing, protected by a plastic film out friction. The doors are fastened to the structure with hinges and safety access keys.

Valid for models:

- ST OPA/UPA 71-141-211-251-321-322
- ST OPU/UPU 10-20-30-50
- ST HRA 121-201-231-361
- ST HRU 20-40.

Supply fan section

Supply fan section composed of one or more EC electric brushless plug fans fixed to the structure of the machine.

Supply air plug fans are electronic commutated, backward blades made of fiberglass statically and dynamically balanced with electronic brushless motor, which allow very high performance levels to be achieved with minimum energy impact. Direct current brushless motor with external rotor coupled directly to electronic adjustment; this allows for continuous fan speed variation according to the control signal Modbus Master coming from the microprocessor of the machine. Maintenance-free ball bearings.

Motor Protection: IP 54 (according to EN 60529).

Airflow versions

- Up-flow unit has a front panel with air inlet grille and air discharge from the top
- Up-flow unit has a closed front panel, suction from the bottom and air discharge from the top
- Down-flow unit has a closed front panel, air inlet from the top and discharge from the bottom
- Frontal-flow unit has an air discharge from front panel with grille, air inlet from the top.

Filtering section

Self-extinguishing filtering surfaces high efficiency; 48 mm thick.

The filters are installed upstream of the cooling coil in an inclined position with an ample filtering surface. The low air speed crossing the coil assures a lower power consumption.

The filters are disposable. They cannot be regenerated or washed. The machine includes provision for the use of a differential pressure probe to allow display of the clogged filter-warning signal.

G4 Class Filters is standard (MERV8 Class)

Classification EN 779:2002

Flame resistance F1 – DIN 5343

Average filtering >90%

Efficiency 23-30%

DX circuit/s (standard execution)

The DX circuit/s include:

- Electronic expansion valve/s (EEV).
The electronic expansion valve (EEV), servo activated with a stepper motor laminates the refrigerant flow in modulating way using a pressure sensor and a temperature as its sensory components. Both sensors are applied on the refrigerant outlet from the evaporator and will be read and processed by a controller that calculates the optimal opening of the valve in real-time to guarantee the actual and appropriate required refrigerant flow to the evaporator. It is so granted the best refrigerant overheating.
- Filter/s dryer with sigh glass (moisture indicator)
- High pressure switch/es with manual reset
- Auto reset low-pressure managed by software
- Suction and discharge service valves on each circuit
- Check valves on the supply and liquid pipes.

The units are supplied with the circuit/s pressurized to 3 bar by nitrogen.

Free cooling and units with water-cooled condenser are supplied with the complete HFC R410a refrigerant charge.

Valid for units with direct expansion circuit only.

Compressors

Scroll hermetic compressors mounted on vibration isolators. The system includes a manual high-pressure reset switch; auto reset low-pressure managed by software.

The compressor of models 301-302-662-852 is positioned in a separate compartment out of the airflow. In all other units, the compressor is inside the airflow.

Valid for units direct expansion circuit only.

DX coil

The coil frame is made of hot dipped galvanized metal sheet with copper tubes expanded into aluminum fins. Valid for units with direct expansion circuit only.

Chilled water circuit

Standard equipped with 2 or 3 way valve, (ball valve), modulating actuator for controlling the water flow. Valid for units with chilled water circuit only.

Coil

The coil frame is made of hot dipped galvanized metal sheet with copper tubes expanded into aluminum fins. Valid for units with chilled water circuit only.

Drain pan

Condensate drain tray is made by 304 stainless steel, 1 mm-thickness.

Valid for models:

- ST OPA/UPA 361-422-461-512-662-852-932
- ST OPU/UPU 60-70-80-110-160-220
- ST UGA 932-1342
- ST UGU 70-150-230-300.

For the units with monobloc structure the drain tray is made by galvanized steel of 1mm-thickness painted in anthracite colour RAL 7024.

Valid for models:

- ST OPA/UPA 071-141-211-251-321-322
- ST OPU/UPU 10-20-30-50
- ST HRA 121-201-231-361
- ST HRU 20-40.

Electrical panel

The machines are equipped with a complete electrical control panel with:

- A yellow/red main switch with door-locking function on the outside of the panel
- Protection of utilities against short-circuits and overloading (valid also as a standard for condensing temperature exceeding 55°C)
- Single-phase isolation transformer to power the auxiliary circuit at 24 Volt AC.

Microprocessor control system and user display

The user terminal is fitted with a large colour display (320 x 240 pixels) and touch keys to view information on the units' control software. A remote control terminal is available.

A microprocessor-based control system with LED numerical display forecasts observation of the following values:

- Temperature set-point (read and write)
- Suction Temperature (read)
- Supply Temperature (read)
- Humidity set-point (read and write)
- Suction humidity (accessory)
- Supply humidity (accessory)
- Date and time.

The operating modes are shown on the display panel with dedicated icons.

Alarm condition are signalled with an audible and visual alarm.

The keyboard LEDs will indicate active alarm, power supply presence and unit conditions.

Alarms log

Unit memory records 100 recent alarms with time and date stamp for each alarm with LI-FO logic management.

Alarm monitor

The control system monitors unit operation and activate an audible and visual alarm in the event either of the following factories present alarm conditions occurs:

- High / Low temperature
- High / Low humidity
- Clogged filter
- Fan/s alarm
- Humidifier alarms
- Cooling circuits components alarm (for units with chilled water circuit only)
- Water leakage under unit
- Power lost

- Sensors and probes alarms
- Fire/Smoke detection alarm, (customizable Digital Input). (Terminal Block for connection of an external smoke/fire alarm signal)

- Customizable digital outputs/input

- Customizable digital outputs

The microprocessor is able to control up to four digital outputs freely configurable by the user.

It is possible to configure one of the following types of control for each digital output:

- Water pump control
- Condensing unit control
- Unit status signal
- Cooling / heating status signal
- Humidification / dehumidification status signal
- Free cooling status signal
- General alarm signal
- Non-critical alarm signal
- Critical alarm signal
- Dirty filters alarm signal
- Cooling / heating alarm signal
- Fans alarm signal
- Temperature alarm signal
- Humidity alarm signal
- Flooding / condensate drain alarm signal.

Customizable digital input

The microprocessor is able to control up to four digital inputs freely configurable by the user.

It is possible to configure one of the following types of controls for each digital input:

- Fire/Smoke Alarm
- General water pump alarm
- External humidifier general alarm
- General supply fans alarm
- Condenser 1 and 2 general alarm
- Dry cooler general alarm
- Gas leak detector alarm
- Condensing unit generic alarm
- Non-critical generic alarm
- Critical generic alarm
- STOP cooling, heating, humidification, dehumidification, heating & humidification, cooling & heating & humidification, free cooling
- Free cooling override
- 2nd Source two sources override.

Total run hours

Menu displays accumulative components operating hours for major components including compressors, fan motor, humidifier and reheat.

Auto restart system

The units will automatically restart after a power loss, providing a power supply failure alarm as signaling.

Temperature and humidity recorder

A daily and weekly graphics charts of the temperature and humidity, (if the humidity sensor is installed), detected every two hours are displayed on the display panel.

Temperature and humidity probe

Temperature range -10...60 °C NTC - accuracy +/-0,9°C

Humidity range 10...90% - accuracy U.R ±0,5% (suitable for remote installation).

Supply limit temperature probe

To control the temperature limit of the system with activated adjustment of the components to prevent the alarm thresholds from being exceeded.

Sensor calibration

Menu allows unit sensors to be calibrated by using external sensors as reference.

System/Network setup

Local network can manage up to 12 units.

Available network logic: Duty/Stand-By or Smart net.

Temperature control type

It is possible to select the following type of control:

- P (proportional)
- PI (proportional integral)
- PID (proportional integral and derivative).

SysDrive management system

It allows the user to monitor the following values reading of the cooling cycle as:

- Evaporating pressure and temperature
- Condensing pressure and temperature
- Superheat
- DE superheat
- Sub cooling
- Compressor discharge temperature

Valid for units direct expansion circuit only.

Supervision and RS 485 / RJ45 port for remote communication

Supervision

It is possible to monitor and control every operative aspect of the system, via a supervision system or BMS (Building Management System).

The unit has the RS485 and RJ45 ports which allow the control to interface with monitoring and BMS systems with the following built-in protocols: Modbus RTU, Modbus IP, BACnet IP (Accessory) and BACnet MS/TP (Accessory) Gateway can be supplied with the units. (Accessory)

The Gateway is required for LONWORKS, SNMP interface.

LONWORKS communication gateway

Consisting in an electronic interface for connection to control systems by Lonworks communication protocol up to 6 units. The units have to be controlled by supervisory software developed by the manufacturer or third parties.

SNMP gateway

Consisting in an electronic interface for connection to control systems by SNMP communication protocol up to 12 units. The units have to be controlled by supervisory software developed by the manufacturer or third parties.

Available close control accessories

Inverter on the compressor

DC brushless technology, driven by frequency driver (inverter), mounted on vibration isolators. The system includes a manual high-pressure reset switch; auto reset low-pressure managed by software. Valid for units direct expansion circuit only.

Energy valve system

Equipped with 2 way valve (ball valve), in/out water temperature sensor and water flow meter for controlling water flow through the coil and calculating the total cooling capacity and the EER viewable on the unit display. Valid for units chilled water circuit only.

Air filter F7 class filters (MERV13 Class)

Classification EN 779:2012

Flame resistance F1 – DIN 5343

Average arrestance >95%

Efficiency 80-90%

Air filter M5 class filters (MERV10 Class)

Classification EN 779:2002

Flame resistance F1 – DIN 5343

Average arrestance >95%

Efficiency 40-60%

Electric reheat coils

It consists of a low-thermal inertia electrical heater up to 3 stages, with its contactor and safety switch to prevent overheating.

The heating material is NIKROTHAL 40

Other components present in small parts are C, Mn and Fe.

% Chemical Composition: Si: 1.6 – 2.5, Cr: 18 – 21, Ni: 34 – 37.

Humidifier system

Immersed Electrode modulating humidifier consists in an immersed electrode humidifier complete with water filling valve, drain valve and piping. Steel distribution nozzle and circuit board for control and management of general operation and alarm detection.

Condensate pump system

It consists in an electric condensate drain pump supplied pre-installed and connected to the condensate drain tray and humidifier drain. It is ETL labelled. The ETL Mark is proof of product compliance to North American safety standards.

High temperature and smoke detection sensors

FIRE/SMOKE detection alarm consists terminal blocks, (customizable digital input), and sensors to detect smoke and high temperature which will have the unit switched off in event of fire alarm.

Water leak detector

Consisting in a flood detection probe supplied with the appliance and an electronic detection board with a water detection alarm voltage-free contact. Additional probes are available.

Discharge air shut-off damper

Consisting in an air flow shut-off motorised damper installed on the air supply with an ON-OFF motor installed on the air intake. Gravitational damper in up-flow air discharge.

Air distribution system and support devices

- **Discharge air plenum with FRONT / REAR grille**

Consists of a structure made of hot-galvanised metal sheet and a frame made of aluminium profiles, painted in anthracite colour, high up to a 550 mm. The structure is internally insulated by have a thermal acoustic insulation, consisting of 23 mm-thickness, high density, self-extinguishing, fire-resistance polyurethane sheets as per norm UNI/ISO 3795, protected by a plastic friction-proof superficial film. A distribution system with a frontal aluminium grille is provided.

The plenum is suitable to be positioned over or under the unit.

- **Discharge plenum with front and two sides air discharge**

Consists of a structure made of hot-galvanised metal sheet and a frame made of aluminium profiles, painted in anthracite colour, high up to a 550 mm. The structure is internally insulated by have a thermal acoustic insulation, consisting of 23 mm-thick, high density, self-extinguishing fire-resistance polyurethane sheets as per norm UNI/ISO 3795, protected by a plastic friction-proof superficial film. A distribution system with a frontal and two side grilles is provided.

- **Free-cooling air plenum with modulating dampers**

Consists of a structure made of hot-galvanised metal sheet and a frame made of aluminium profiles, painted in anthracite colour, high up to a 900 mm. The structure is internally insulated by have a thermal acoustic insulation, consisting of 23 mm-thickness, high density, self-extinguishing, fire-resistance polyurethane sheets as per norm UNI/ISO 3795, protected by a plastic friction-proof superficial film.

A couple of shut-off motorised dampers equipped with a modulating motor are installed on the air plenum to provide free-cooling function mixing indoor and outdoor air.

The plenum is suitable to be positioned over or under the UP units.

Floor stand

Adjustable Under base (height up to 600mm) made of hot-galvanised tubular metal structure with relevant feet. The under-base comes demounted in a package with the installation manual.

Protected line and air condenser regulator

Consisting in an electrical line protected from overload and short-circuits and a FSC, single-phase fan speed control, with phase cutting regulation for air condenser fan regulation to maintain a constant condensing temperature, or EC fan speed control by 0-10 signal.

Valid for units with direct expansion circuit only.

Plate water condenser

- Consisting in a galvanised steel plate water condenser sized for water supplied from a dry-cooler or another external water font.

- Two-Way water flow adjustment pressure controlled valve.

Consisting in a two-way ball valve for constant condensing control by 0-10V signal from microprocessor, and a water condenser installed.

Valid for units with direct expansion circuit only.

Extremely low external temperature kit

Consisting in a LAC valve, in addition to a non-return valve installed on discharge pipe and an oversize liquid receiver (already included in the standard delivery) for units to be installed in extremely cold climates.

Valid for units with direct expansion circuit only.

Technical and testing documentation

The unit are supplied with the technical documentation required by current international reference regulations regarding correct construction and production of the unit, such as: complete wiring diagram, declaration of conformity.

Technical manuals enclosed in an USB pen drive.

Unit testing

The units are provided after having been tested by the manufacturer. The testing procedure includes a leak test by pressurisation with dry air at 30 Bars for 48 hours of the cooling circuit, an electrical safety test in accordance with the applicable regulation and a functional unit test with settings being implemented on the microprocessor, all the components installed and any accessories supplied.

Air cooled condenser and dry cooler

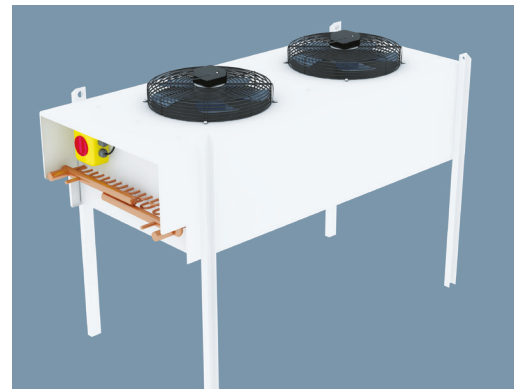
- Versions for horizontal and vertical installation and with V-shaped structure.
- Turbocoil heat exchangers made of hot dipped galvanized metal sheet with copper tubes expanded into aluminum fins
- Casing made of galvanised steel, powder coated Epoxy-Polyester RAL 9003 resistant to corrosion
- High-efficiency, low-consumption motors, statically and dynamically balanced, with permanently greased bearings, in-built overheat protection and integrated protection grilles
- Valid for units with direct expansion circuit only.

Available air-cooled condenser and dry cooler accessories

- Latest generation EC fans for high-energy savings, reduced noise levels and better regulation of the number of revolutions
- Fins coated with ALUPAINT for better aluminum corrosion protection. (ACC only)
- Configuration with multiple circuits or sub cooling circuits

TMC H/V - Horizontal (horizontal installation) and Vertical (vertical installation) series

Horizontal installation



Vertical installation





SystemTemp P

The P Series close control air conditioners have constructional and operating characteristics suitable for environments where thermal loads of a sensitive nature prevail.

Although optimised for data centers, the technical characteristics of the P series make these units suitable for various types of special applications, such as metrology laboratories, TV production studios, recording and conservation rooms for musical instruments, museums and archives, control rooms in power stations and railway junctions.

In addition, their application proves ideal for various industrial sectors: optics, electronics, electromedical equipment, production of electrical or electronic equipment, production of musical instruments, etc.

P series air conditioners offer:

- Temperature and humidity close control.
- A high delivered cooling capacity to footprint ratio, which makes it easier to design the environments to be air conditioned.
- Very high values of energy efficiency, which translate into lower CO₂ emissions into the environment, and in particularly low operating costs.
- High flexibility of use, thanks to the wide range of accessories which can be selected.

Technical feature

- Very high EER (Energy Efficiency Ratio)
- Limited footprint
- Dark gray RAL 7024 metal structure
- Panels with thermo-acoustic insulation
- Electrical panel complete with control and safety devices
- **SySmart** control microprocessor LCD with graphic display
- G4-class efficiency air filters with dirty filter alert
- Return air temperature sensor
- Supply air temperature sensor
- Electronic **EC fans**
- R410A scroll compressors
- Electronic expansion valves with **SysDrive** system
- Three-way control valves
- Unit shutdown system for the presence of fire
- RS485 and RJ45 ports for Modbus® RTU and TCP/IP



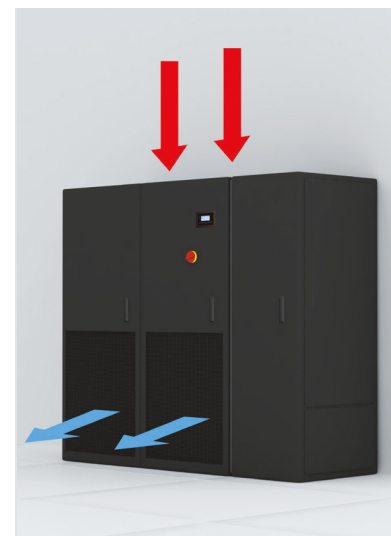
Air Conditioners with downflow air supply



Standard version with top air intake and downflow air supply, with stand for raised floors.



Version with top air intake and front air supply through air distribution plenum with adjustable grilles.



Version with top air intake and front air supply through front panel.

ST UPA: Direct expansion air conditioners with downflow air supply and aircooled or watercooled condensers

ST UPA		071	141	211	251	321	322	361	422	461	512	662	852	932
Performance														
Total cooling capacity (1)	kW	9,2	16,3	22,7	32,2	36,8	33,8	40,3	45,4	54,0	61,6	69,2	88,8	100,8
Sensible cooling capacity	kW	8,3	13,6	22,4	27,8	36,8	33,8	40,3	45,4	49,4	55,2	67,0	75,6	88,9
EER (2)		3,37	3,45	3,43	3,29	3,34	3,29	3,84	3,50	3,18	3,47	3,29	2,95	3,37
Air flow rate	m3/h	2.200	3.200	7.000	7.000	12.000	12.000	14.000	14.000	14.000	14.000	18.000	18.000	21.000
Noise level (3)	dB(A)	51	59	57	58	67	68	59	59	59	60	63	63	62
Dimensions and weights														
Width	mm	750	750	860	860	1.410	1.410	1.750	1.750	1.750	1.750	2.300	2.300	2.640
Depth	mm	601	601	872	872	871	871	871	871	871	871	871	871	871
Height	mm	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990
Net weight	kg	150	205	260	285	365	390	440	485	450	500	645	665	705
Free Cooling		o	o	o	o	•	o	o	o	o	•	o	•	•
Two Sources		o	o	•	o	•	o	o	o	•	•	•	•	•

ST UPU: Chilled water air conditioners with downflow air supply

ST UPU		10	20	30	50	60	70	80	110	160	220
Performance											
Total cooling capacity (1)	kW	9,9	17,2	30,0	41,0	52,8	63,1	65,4	80,0	110,0	160,0
Sensible cooling capacity	kW	9,3	14,9	27,8	36,2	47,4	54,2	61,8	73,0	99,7	146,0
EER (2)		32,1	23,5	27,0	20,9	21,3	22,8	23,2	19,8	24,4	19,8
Air flow rate	m3/h	2.200	3.200	7.000	8.000	12.000	12.000	16.000	18.000	24.000	36.000
Noise level (3)	dB(A)	51	60	57	62	67	68	62	63	63	66
Dimensions and weights											
Width	mm	750	750	860	860	1410	1410	1750	1750	2640	3496
Depth	mm	601	601	872	872	871	871	871	871	871	871
Height	mm	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990
Net weight	kg	115	130	225	220	240	260	340	360	620	720
Two Sources		o	o	o	•	o	•	o	•	•	o

Notes:

- (1) Performance refers to: R410A refrigerant; condensing temperature 45°C; incoming air 24°C-45%Rh; water 7/12°C; external static pressure 30 Pa. The declared performance does not take into account the heat generated by fans, which must be added to the system thermal load.
- (2) EER (Energy Efficiency Ratio) = total cooling capacity / compressors power consumption + fans power consumption (air cooled condensers excluded).
- (3) Sound levels at a 2 m distance, in a free field, as per UNI EN ISO 3744:2010.

Air Conditioners with upflow air supply



Standard version with front air intake and upflow air supply.



Version with front air intake and supply, through air distribution plenum with adjustable grilles.



Version with air intake from the bottom, stand for raised floor, blind front panel and upflow air supply.

ST OPA: Direct expansion air conditioners with upflow air supply and aircooled or watercooled condensers

ST OPA		071	141	211	251	321	322	361	422	461	512	662	852	932
Performance														
Total cooling capacity (1)	kW	9,2	16,3	22,7	32,2	36,8	33,8	40,3	45,4	54,0	61,6	69,2	88,8	100,8
Sensible cooling capacity	kW	8,3	13,6	22,4	27,8	36,8	33,8	40,3	45,4	49,4	55,2	67,0	75,6	88,9
EER (2)		3,43	3,55	3,49	3,32	3,38	3,54	3,93	3,57	3,22	3,52	3,40	3,02	3,41
Air flow rate	m ³ /h	2.200	3.200	7.000	7.000	12.000	12.000	14.000	14.000	14.000	14.000	18.000	18.000	21.000
Noise level (3)	dB(A)	51	59	56	58	67	67	58	58	58	59	61	62	61
Dimensions and weights														
Width	mm	750	750	860	860	1.410	1.410	1.750	1.750	1.750	1.750	2.300	2.300	2.640
Depth	mm	601	601	872	872	871	871	871	871	871	871	871	871	871
Height	mm	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990
Net weight	kg	150	205	260	285	365	390	440	485	450	500	645	665	705
Free Cooling		o	o	o	o	•	o	o	o	•	o	•	•	o
Two Sources		o	o	•	o	•	o	o	o	•	•	•	•	•

ST OPU: Chilled water air conditioners with upflow air supply

ST OPU		10	20	30	50	60	70	80	110	160	220
Performance											
Total cooling capacity (1)	kW	9,9	17,2	30,0	41,0	52,8	63,1	65,4	80,0	110,0	160,0
Sensible cooling capacity	kW	9,3	14,9	27,8	36,2	47,4	54,2	61,8	73,0	99,7	146,0
EER (2)		38,3	29,1	30,0	24,5	22,8	22,2	24,8	24,2	29,3	24,2
Air flow rate	m ³ /h	2.200	3.200	7.000	8.000	12.000	12.000	16.000	18.000	24.000	36.000
Noise level (3)	dB(A)	51	59	56	60	67	68	61	62	62	65
Dimensions and weights											
Width	mm	750	750	860	860	1410	1410	1750	1750	2640	3496
Depth	mm	601	601	872	872	871	871	871	871	871	871
Height	mm	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990
Net weight	kg	115	130	225	220	240	260	340	360	620	720
Two Sources		o	o	o	•	o	•	o	•	•	o

Notes:

- (1) Performance refers to: R410A refrigerant; condensing temperature 45°C; incoming air 24°C-45%Rh; water 7/12°C; external static pressure 30 Pa. The declared performance does not take into account the heat generated by fans, which must be added to the system thermal load.
- (2) EER (Energy Efficiency Ratio) = total cooling capacity / compressors power consumption + fans power consumption (air cooled condensers excluded).
- (3) Sound levels at a 2 m distance, in a free field, as per UNI EN ISO 3744:2010.

Available accessories

Direct expansion:

- Brushless **DC compressors** with inverter regulation and integrated oil separator
- Power supply line for remote condenser
- Power supply line with speed regulator for remote condenser
- Condensing regulation with 0-10V signal for remote condenser with **EC fans**
- LAC valve for operation with low temperature outside air with remote condenser
- Water-cooled condenser
- Water-cooled condenser with a condensing temperature control valve

Chilled water:

- Three-way control valves
- Inlet and outlet water temperature sensors
- **Energy valve** kit

Heating:

- Low thermal inertia electric heaters with stage control
- Low thermal inertia electric heaters with modulating control (available on request on selected models only)
- Hot water heating coils with 2- or 3-way control valve (available on request on selected models only)

Humidification:

- Room humidity probe
- Supply humidity probe
- Immersed electrodes humidifier

Mechanical and structural:

- Condensate drain pump
- Condensate and humidifier drain pump
- Supply overpressure relief damper
- F7 efficiency class intake air filter (EU7)
- M5 efficiency class intake air filter (EU5)
- Soundproofed duct section on the supply line
- Distribution plenum with adjustable grilles
- Free-cooling air plenum with modulating dampers (UPA series only)
- Height adjustable stand for installation with raised floor
- Grilled panels for front supply
- Closed panels for air intake from the bottom
- Panels with sandwich counter panelling (available on request on selected models only)
- Panels with reinforced acoustic lining (available on request on selected models only)

Electrical:

- Alternative voltages available: 460V/3ph/60Hz - 380V/3ph/60Hz - 230V/3ph/60Hz
- Electrical supply line without neutral
- Automatic transfer switch (ATS), Basic version
- Automatic transfer switch (ATS), Advanced version

Regulation:

- Constant air flow control
- Constant pressure control
- Local network set up and connection cable
- User terminal for remote installation
- Flooding detection system

SystemTemp G

G series close control air conditioners have constructional and operating characteristics suitable for meeting the design criteria of the latest generation data centers.

When designing air conditioning systems for large data centers, the need for electrical cable housing and the enormous air volumes required to cool down the servers have made it essential to increase the height of raised floors up to the current 550/1,000-millimetre level. A large space below the air conditioner for the installation of an adjustable stand has thus created. It was therefore decided to use this large space to house supply fans.

Without increasing the footprint of the machine, and only exploiting space where it is provided, great advantages have been obtained:

- With the same air conditioner footprint, it has been possible to increase the front section of the coil by about 40-50% by reducing the pressure drop on the air side, and thus the fan energy consumption.
- Increasing the size of the air filters installed upstream of the cold coil allows a significant reduction in load losses and replacement frequency for maintenance.
- Increased efficiency of the fans which, installed in the stand, expel treated air horizontally and completely unobstructedly.

Technical feature

- Very high EER (Energy Efficiency Ratio)
- Limited footprint
- Dark gray RAL 7024 metal structure
- Panels with thermo-acoustic insulation
- Electrical panel complete with control and safety devices
- **SySmart** control microprocessor with LCD graphic display
- G4-class efficiency air filters with dirty filter alert
- Return air temperature sensor
- Supply air temperature sensor
- Electronic **EC fans**
- R410A scroll compressors
- Electronic expansion valves with **SysDrive** system
- Three-way control valves
- Unit shutdown system for the presence of fire
- RS485 and RJ45 ports for Modbus® RTU and TCP/IP



Air Conditioners with downflow air supply



Standard version for data center perimetral installation: the height of the raised floor must be at least 550 mm.



Standard version for data center perimetral installation with raised floor height less than 550 mm. In this case the stand, having a fixed height of 550 mm provided with side closing panels, must be installed above the floor. However, please make sure that the ceiling height allows good air intake.



Version for installation outside the data center, with no raised floor and rear supply line. In this case the stand, having a fixed height of 550 mm, is provided with side closing panels and rear supply grilles. The installation of a plenum with a rear air intake system is optional, in the absence of a duct system.

ST UGA: Direct expansion air conditioners with downflow air supply and aircooled or water cooled condensers

ST UGA		932	1342
Performance			
Total cooling capacity (1)	kW	96,8	130,5
Sensible cooling capacity (1)	kW	80,1	121,2
EER (2)		3,43	3,83
Air flow rate	m ³ /h	18.000	31.500
Noise level (3)	dB(A)	56	61
Dimensions and weights			
Width	mm	2.390	3.290
Depth	mm	921	921
Height	mm	1.990+550	
Net weight	kg	720	1.000

ST UGU: Chilled water air conditioners with downflow air supply

ST UGU		70	150	230	300
Performance					
Total cooling capacity (1)	kW	50,0	98,1	153,1	190,5
Sensible cooling capacity (1)	kW	42,7	83,6	130,4	172,3
EER (2)		43,5	46,9	52,8	40,2
Air flow rate	m ³ /h	9.000	18.000	28.000	40.000
Noise level (3)	dB(A)	55	56	58	60
Dimensions and weights					
Width	mm	1.320	1.840	2.740	4.020
Depth	mm	921	921	921	921
Height	mm	1.990+550			
Net weight	kg	400	620	930	1.250

Notes:

- (1) Performance refers to: R410A refrigerant; condensing temperature 45°C; incoming air 24°C-45%Rh; water 7/12°C; external static pressure 30 Pa. The declared performance does not take into account the heat generated by fans, which must be added to the system thermal load.
- (2) EER (Energy Efficiency Ratio) = total cooling capacity / compressors power consumption + fans power consumption (air cooled condensers excluded).
- (3) Sound levels at a 2 m distance, in a free field, as per UNI EN ISO 3744:2010.

Available accessories

Direct expansion:

- Brushless **DC compressors** with inverter regulation and integrated oil separator
- Power supply line for remote condenser
- Power supply line with speed regulator for remote condenser
- Condensing regulation with 0-10V signal for remote condenser with **EC fans**
- LAC Valve for operation with low temperature outside air with remote condenser
- Water-cooled condenser
- Water-cooled condenser with a condensing temperature control valve

Chilled water:

- Three-way control valves
- Inlet and outlet water temperature sensors
- **Energy valve** kit

Heating:

- Low thermal inertia electric heaters with stage control
- Low thermal inertia electric heaters with modulating control (available on selected models only)
- Hot water heating coils with 2- or 3-way control valve (available on selected models only)

Humidification:

- Room humidity probe
- Supply humidity probe
- Immersed electrodes humidifier

Mechanical and structural:

- Condensate drain pump
- Condensate and humidifier drain pump
- Supply overpressure relief damper
- M5 efficiency class intake air filter (EU5)
- Front or rear intake plenum
- Free-cooling air plenum with modulating dampers (UGA series only)
- Ventilated stand with panelling for front or rear supply
- Ventilated stand with panelling for bottom supply (installation on the raised floor)
- Panels with sandwich counter-panelling
- Panels with reinforced acoustic lining

Electrical:

- Alternative voltages available: 460V/3ph/60Hz - 380V/3ph/60Hz - 230V/3ph/60Hz
- Electrical supply line without neutral
- Automatic transfer switch (ATS), Basic version
- Automatic transfer switch (ATS), Advanced version

Regulation:

- Constant air flow control
- Constant pressure control
- Local network set up and connection cable
- User terminal for remote installation
- Flooding detection system



SystemTemp R

R series close control air conditioners are built and sized in such a way that they can be installed alongside data center racks. In air conditioning systems for large data centers, the adoption of the following design concepts has in fact become an established custom:

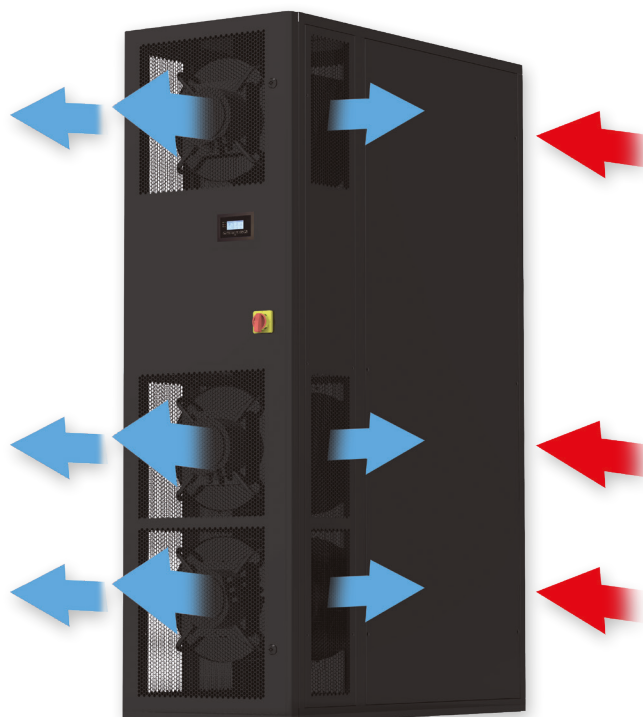
- The racks containing servers are increasingly positioned according to the Hot Aisle and Cold Aisle layout.
- Air temperatures are allowed to rise up to 30-35°C in the hot aisle and 20-25°C in the cold one, with very low humidity (never above 30%).
- Server performance is increasingly on the rise, while server sizes are increasingly reduced. As a result, many more servers can be installed in a rack, so some of these racks can be eliminated as they are empty. At the same time, heat dissipation increases, thereby requiring more power from air conditioners. R series air conditioners are designed and built so as to fit into this plant layout perfectly. As a matter of fact:
- They exploit the space left free from racks and allow cold air to be distributed as close as possible to servers, that is, where heat is generated.
- They feature rear intake from the hot aisle and front supply to the cold aisle with a horizontal flow. The horizontal flow reduces internal pressure drop, with a consequent reduction in the power draw of the fan.

Technical feature

- Very high EER (Energy Efficiency Ratio)
- Limited footprint
- Dark gray RAL 7024 metal structure
- Panels with thermo-acoustic insulation
- Front and rear accessibility for easy maintenance
- Cooling, electric and water top/bottom connections
- Electrical panel complete with control and safety devices
- **SySmart** control microprocessor with LCD graphic display
- G2/G4-class efficiency air filters with dirty filter alert (according to the size)
- Return air temperature sensor
- Supply air temperature sensor
- Electronic **EC fans**
- Brushless DC compressors with R410A inverter regulation
- Electronic expansion valves with **SysDrive** system
- Three-way control valves
- Unit shutdown system for the presence of fire
- RS485 and RJ45 ports for Modbus® RTU and TCP/IP



Air Conditioners with horizontal air supply



Version for "in row" installation with front and side air supply

ST HRA: Direct expansion air conditioners with horizontal supply

ST HRA		121	201	231	361
Performance					
Total cooling capacity (1)	kW	9,6	19,3	20,8	32,5
Sensible cooling capacity	kW	9,6	15,1	17,2	26,3
EER(2)		3,14	3,09	3,36	3,43
Air flow rate	m3/h	3.200	3.600	6.000	6.600
Noise level (3)	dB(A)	51	54	54	57
Dimensions and weights					
Width	mm	300	300	600	600
Depth	mm	1.200	1.200	1.222	1.222
Height	mm	1.975	1.975	1.985	1.985
Net weight	kg	200	215	215	215
Free Cooling		○	○	●	○
Two Sources		○	○	●	○

ST HRU: Chilled water air conditioners with horizontal supply

ST HRU		20	40
Performance			
Total cooling capacity (1)	kW	24,9	37,8
Sensible cooling capacity	kW	22,2	33,9
EER(2)		22,81	27,78
Air flow rate	m3/h	5.600	9.000
Noise level (3)	dB(A)	54	62
Dimensions and weights			
Width	mm	300	600
Depth	mm	1.200	1.222
Height	mm	1.975	1.985
Net weight	kg	120	190
Two Sources		○	●

Notes:

- (1) Performance refers to: R410A refrigerant; condensing temperature 45°C; incoming air 24°C-45%Rh; water 7/12°C; external static pressure 30 Pa. The declared performance does not take into account the heat generated by fans, which must be added to the system thermal load.
- (2) EER (Energy Efficiency Ratio) = total cooling capacity / compressors power consumption + fans power consumption (air cooled condensers excluded).
- (3) Sound levels at a 2 m distance, in a free field, as per UNI EN ISO 3744:2010.

Available accessories

Direct expansion:

- Power supply line for remote condenser
- Power supply line with speed regulator for remote condenser
- Condensing regulation with 0-10V signal for remote condenser with **EC fans**
- LAC valve for operation with low temperature outside air with remote condenser
- Water-cooled condenser
- Water-cooled condenser with a condensing temperature control valve

Chilled water:

- Three-way control valves
- Inlet and outlet water temperature sensors

Heating:

- Low thermal inertia electric heaters with stage control

Humidification:

- Room humidity probe
- Supply humidity probe
- Immersed electrodes humidifier

Mechanical and structural:

- Condensate drain pump
- G4/M5 efficiency class intake air filter (EU5) (available on request on selected models only)
- Closed front panel for side supply
- Closed side panels for front supply
- Wheels for handling

Electrical:

- Alternative voltages available 460V/3ph/60Hz - 380V/3ph/60Hz - 230V/3ph/60Hz
- Electrical supply line without neutral
- Automatic transfer switch (ATS), Basic version
- Automatic transfer switch (ATS), Advanced version

Regulation:

- Constant air flow control
- Constant pressure control
- Local network set up and connection cable
- User terminal for remote installation
- Flooding detection system

TMC

Remote condensers and dry coolers for Close Control units.

Technical features

- Versions for horizontal and vertical installation and with V-shaped structure.
- Turbocoil heat exchangers made of hot dipped galvanized metal sheet with copper tubes expanded into aluminum fins
- Casing made of galvanised steel, powder coated Epoxy-Polyester RAL 9003 resistant to corrosion
- High-efficiency, low-consumption motors, statically bearings, in-built overheat protection and integrated protection grilles
- Valid for units direct expansion circuit only.

Accessories

- Latest generation EC fans for high-energy savings, reduced noise levels and better regulation of the number of revolutions
- Fins coated with ALUPAINT® for a better aluminum corrosion protection (ACC only)
- Configuration with multiple circuits or sub cooling circuits
- Vibration-damping kits
- Electrical panel complete with control, safety devices and fans wiring
- The Whisperer silencers



Main technical data

Operating range Air Conditioners

Type		Direct Expansion	Chilled Water
Maximum Temperature (Air infeed)	°C	38	40
Minimum Temperature (Air infeed)	°C	20	18
Minimum Humidity (Air infeed)	%	60	60
Maximum Humidity (Air infeed)	%	25	25
Storage Conditions	°C	Temperature from -20°C to + 45°C - Humidity 10%Ur to 90 %Ur non condensing – Store in a room that is closed and protected from external atmospheric agents.	

Operating limit TMC Air Cooled Condenser

Type		Air infeed temperature
Maximum Temperature	°C	55
Minimum Temperature	°C	-40
Storage Conditions	°C	Store in environments with temperatures no lower or higher than the functional limits.

Chemical characteristics of the water supply

Type		Min	Max
Hydrogen ion activity	pH	7	8,5
Specific conductivity at 20 °C	µS/cm	350	1250

Notes: More information you can find in an installation manual.

Water circuits

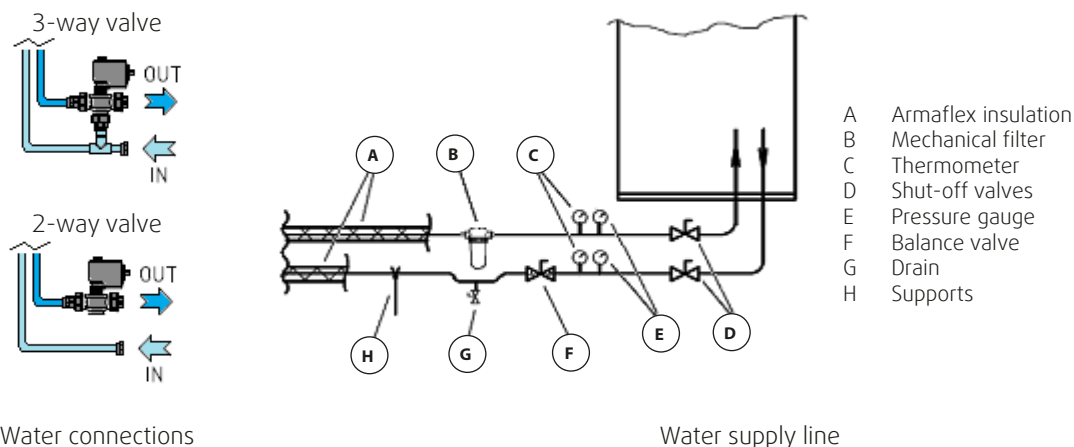
Type		Chilled Water	Hot Water	Internal Humidifier	Plate Condenser
Maximum Pressure	bar (MPa)	16 (1.6)	16 (1.6)	8 (0.8)	16 (1.6)
Minimum Pressure	bar (MPa)	1 (0.1)	1 (0.1)	1 (0.1)	1 (0.1)
Maximum adjustment valve ΔP	bar (kPa)	1.8 (180)	1.8 (180)	-	1.8 (180)
Maximum Temperature	°C	40	85	40	45
Minimum Temperature	°C	5	5	5	-10

Notes: More information you can find in an installation manual.

Electrical data

Characteristics of the standard unit supply line				
Type	%	Nominal	Minimum	Maximum
400 V – 3 phase – 50 Hz				
Voltage tolerance limits:	± 15%	400 V	340 V	460 V
Difference of voltage between the phases	± 2%	0 V	- 8 V	+ 8 V
Frequency tolerance	± 2%	50 Hz	49 Hz	51 Hz
460 V – 3 phase – 60 Hz				
Voltage tolerance limits:	± 15%	460 V	391 V	529 V
Difference of voltage between the phases	± 2%	0 V	- 8 V	+ 8 V
Frequency tolerance	± 2%	60 Hz	58.8 Hz	61.2 Hz
380 V – 3 phase – 60 Hz				
Voltage tolerance limits:	± 15%	380 V	323 V	437 V
Difference of voltage between the phases	± 2%	0 V	- 7.6 V	+ 7.6 V
Frequency tolerance	± 2%	60 Hz	58.8 Hz	61.2 Hz

Water circuit connections



Cooled water coil connection

Water connections				
Standard models	Fitting diameter Ø		Threading	Water circuit volume
	Inches	DN	ISO 7/1	dm ³
P Series				
10	3/4"	20	Female	3,5
20	1"	25		7
30	1-1/4"	32		10
50				16
60				19
70	1-1/2"	40		28
80				22
110	2"	50		38,5
160				56
220				76,5
G Series				
70	1-1/2"	40	Female	26,5
150	2"	50		59,5
150 XH				63,9
230	2-1/2"	65		79,5
230 XH				90,8
300				118
R Series				
20	1"	25	Female	11,5
40	1-1/4"	32		17,5

Chilled water coil connection-two sources design (accessory)

Water connections				
Standard models	Fitting diameter Ø		Threading	Water circuit volume
	Inches	DN	ISO 7/1	dm ³
P Series				
50	3/4"	20	Female	5
211	1"	25		5.5
321	1-1/4"	32		18
70				16
110				22
461 - 512	1-1/2"	40		22.5
662 - 852				27.5
932				34,8
160				28.5
R Series				
231	1"	25	Female	15.5
40	1-1/4"	32		22.5

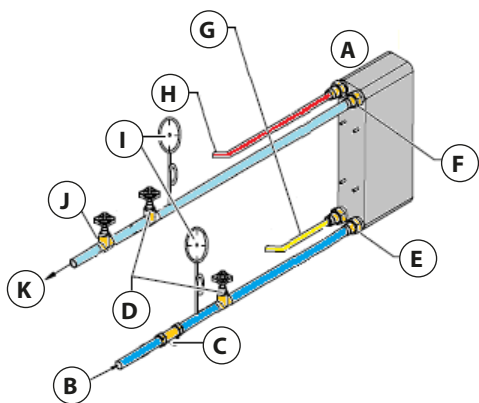
Free Cooling unit water circuits connection (accessory)

Water connections				
Standard models	Fitting diameter Ø		Threading	Water circuit volume
	Inches	DN	ISO 7/1	dm ³
P Series				
321	1-1/4"	32	Female	18
461 - 512	1-1/2"	40		26.5
662 - 852				33.5
R Series				
231	1"	25	Female	17.5

Water condenser connection (accessory)

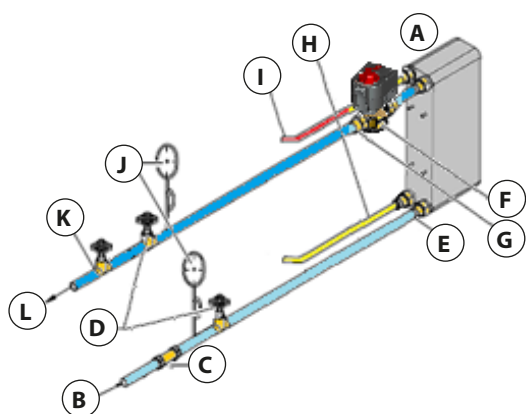
Water connections							
Standard models	Plate condenser			Adjustment valve			Water circuit volume
	Fitting diameter Ø		Threading	Fitting diameter Ø		Threading	
	Inches	DN	ISO 7/1	Inches	DN	ISO 7/1	
P Series							
071 - 141	3/4"	20	Male	1"	25	Female	0.7
211				1-1/4"	32		1.5
251				1-1/4"	32		1.6
321	2						
361	1-1/4"	32		2.5			
461				3			
322 - 422	3/4"	20		1"	25		1.2
512	1-1/4"	32		1-1/4"	32		1.6
662				2			
852				2.5			
932	3						
G Series							
612	3/4"	20	Male	1-1/4"	32	Female	1.6
461 - 932	1-1/4"	32		3			
R Series							
231	3/4"	20	Male	1"	25	Female	1.2
361	1-1/4"	32		1-1/4"	32		2

For models with several circuits the figures are intended per circuit

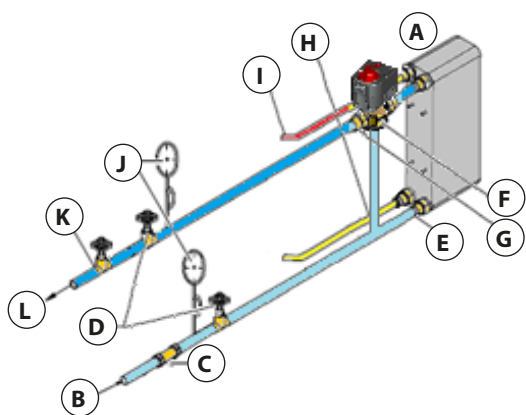


- A Plate condenser
- B Condenser water inlet
- C Water discharge
- D Shut-off valve
- E Inlet fitting
- F Outlet fitting
- G Liquid line
- H Hot gas line
- I Thermometers and pressure gauges
- J Balancing valve
- K Condenser water outlet

Non-regulated water-cooled condensers water circuit supply line





- A Plate condenser
- B Condenser water inlet
- C Water discharge
- D Shut-off valve
- E Inlet fitting
- F Condensation pressure adjustment modulating valve (accessory)
- G Outlet fitting
- H Liquid line
- I Hot gas line
- J Thermometers and pressure gauges
- K Balancing valve
- L Condenser water outlet

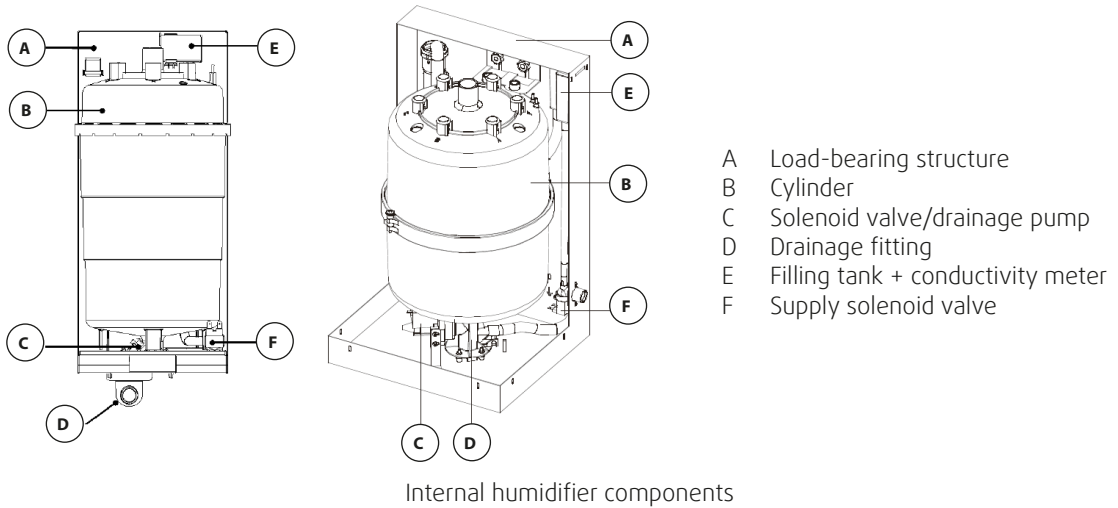


Water circuit supply line for water-cooled condensers with 2 and 3-way regulation valve

Water condenser connection of the submerged electrode humidifier

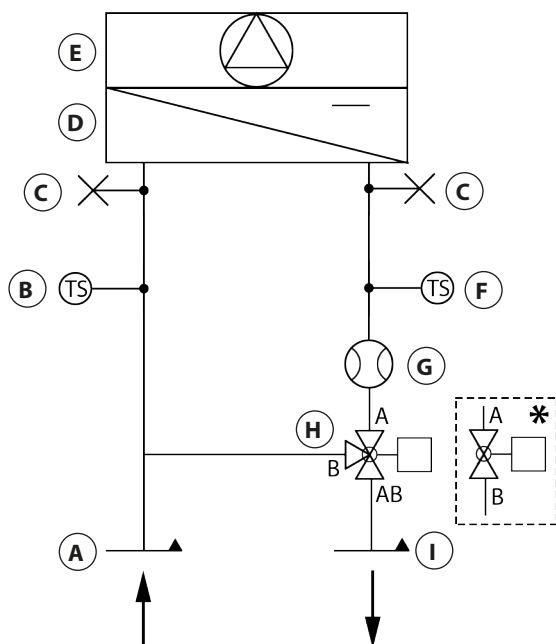
Water connections				
Flexible hose adaptor		Threaded fitting		
				
Connection diameter Ø (mm)		Connection diameter Ø		Threading
External	Internal	Inches	DN	ISO 7/1
8	6	3/4	20	Male

Humidifier cylinder



Chilled water circuit

The following image represents the water circuit of chilled water units.

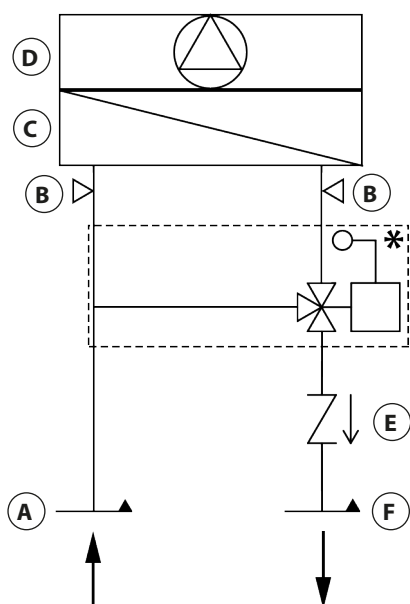


- A Water inlet
- B Inlet water temperature (accessory)
- C Manual air vent valves
- D Chilled water coil
- E Fan
- F Outlet water temperature (accessory)
- G Water flow measuring device (accessory)
- H 3-way ball valve
- I Water outlet

* 2-way ball valve (accessory)

TMC air-cooled condenser cooling circuit

The following image represents the cooling circuit of a TMC air-cooled condenser.



Hot gas line (HP gas: PS 41 Bar - TS 64 °C):

- A Hot gas line
- B Pressure intake SAE 1/4" male flare
- C Air-cooled condenser
- D Fan

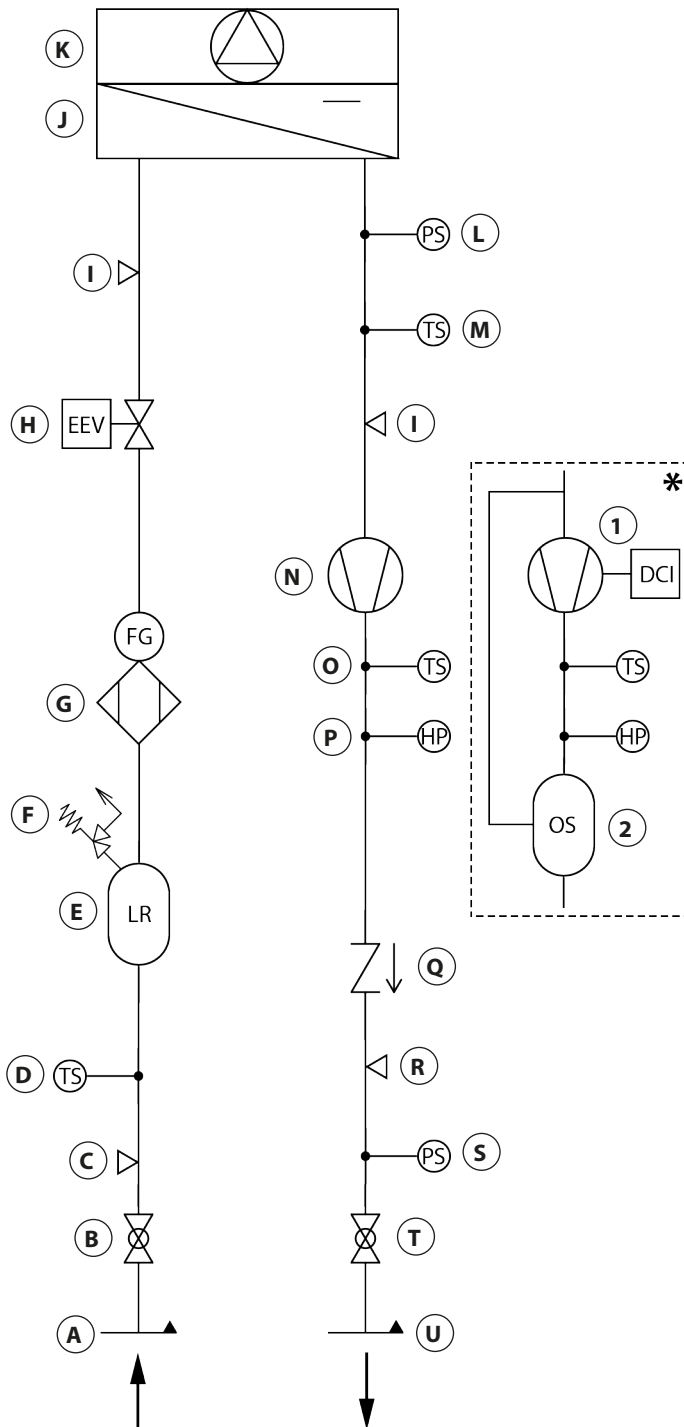
Liquid line (HP liq: PS 45 Bar - TS 68 °C):

- E Liquid line check valve
- F Liquid line

* LAC (Low Ambient Control) Valve (Accessory)

Cooling circuit with single compressor and remote condenser

The following image represents the cooling circuit in units with single compressor and remote condenser.



Liquid line (HP liq: PS 45 Bar - TS 68 °C):

- A Liquid line
- B Liquid line cock
- C Pressure intake SAE 5/16" male flare
- D Liquid temperature probe
- E Liquid receiver
- F Safety valve (44 Bar)
- G Dehydrator filter with liquid sight glass
- H Electronic expansion valve

Suction line (LP: PS 22 Bar - TS 38 °C):

- I Pressure intake SAE 5/16" male flare (for refrigerant charging)
- J Direct expansion coil
- K Fan
- L Evaporation pressure probe
- M Suction temperature probe

Hot gas line (HP gas: PS 41 Bar - TS 64 °C):

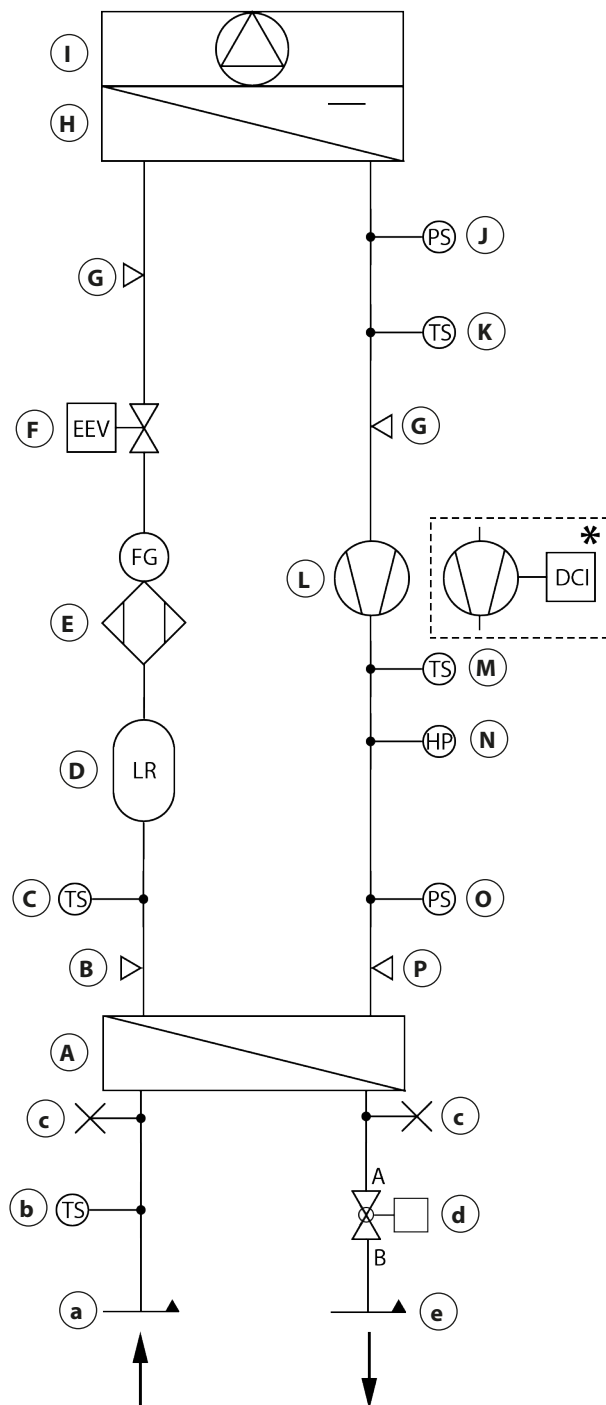
- N Compressor
- O Discharge temperature probe
- P High pressure switch with manual reset (41 Bar)
- Q Hot gas line check valve
- R Pressure intake SAE 5/16" male flare
- S Condensation pressure probe
- T Hot gas line cock
- U Hot gas line

* DC inverter compressor (accessory):

- 1 DC inverter compressor
- 2 Oil separator

Cooling circuit with single compressor and water-cooled condenser

The following image represents the cooling circuit in units with single compressor and air-cooled condenser.



Cooling circuit:

Liquid line (HP: PS 41 Bar - TS 64 °C):

- A Water-cooled condenser
- B Pressure intake SAE 5/16" male flare
- C Liquid temperature probe
- D Liquid receiver
- E Dehydrator filter with liquid sight glass
- F Electronic expansion valve

Suction line (LP: PS 22 Bar - TS 38 °C):

- G Pressure intake SAE 5/16" male flare (for refrigerant charging)
- H Direct expansion coil
- I Fan
- J Evaporation pressure probe
- K Suction temperature probe

Hot gas line (HP: PS 41 Bar - TS 64 °C):

- L Compressor
- M Discharge temperature probe
- N High pressure switch with manual reset (41 Bar)
- O Condensation pressure probe
- P Pressure intake SAE 5/16" male flare

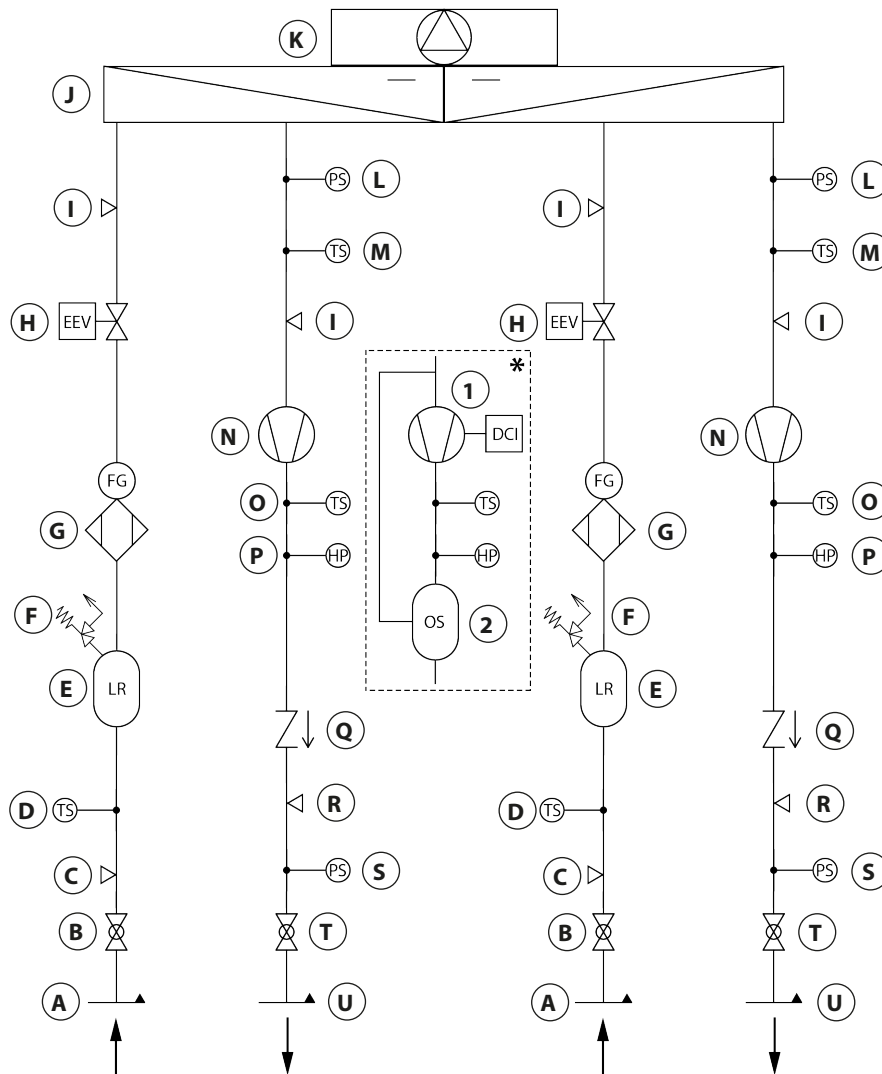
* DC inverter compressor (accessory)

Water circuit:

- a Water inlet
- b Inlet water temperature for dry cooler regulation (accessory)
- c Manual air vent valves
- d Adjustment valve of water-cooled condenser (accessory)
- e Water outlet

Cooling circuit with double compressor and remote condenser

The following image represents the cooling circuit in units with double compressor and remote condenser.



Liquid line (HP liq: PS 45 Bar - TS 68 °C):

- A Liquid line
- B Liquid line cock
- C Pressure intake SAE 5/16" male flare
- D Liquid temperature probe
- E Liquid receiver
- F Safety valve (44 Bar)
- G Dehydrator filter with liquid sight glass
- H Electronic expansion valve

Suction line (LP: PS 22 Bar - TS 38 °C):

- I Pressure intake SAE 5/16" male flare (for refrigerant charging)
- J Direct expansion coil
- K Fan
- L Evaporation pressure probe
- M Suction temperature probe

Hot gas line (HP gas: PS 41 Bar - TS 64 °C):

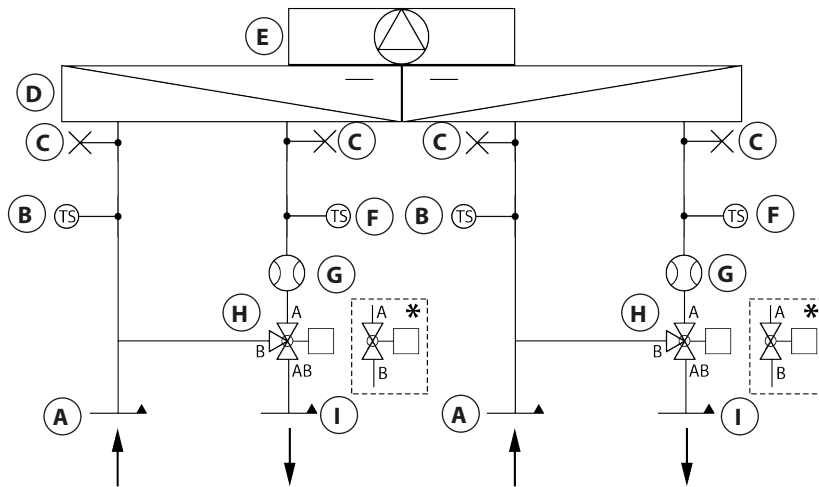
- N Compressor
- O Discharge temperature probe
- P High pressure switch with manual reset (41 Bar)
- Q Hot gas line check valve
- R Pressure intake SAE 5/16" male flare
- S Condensation pressure probe
- T Hot gas line cock
- U Hot gas line

* DC inverter compressor (accessory):

- 1 DC inverter compressor
- 2 Oil separator

Two sources water circuit with chilled water circuits

The following image represents the water circuit of chilled water two sources units.

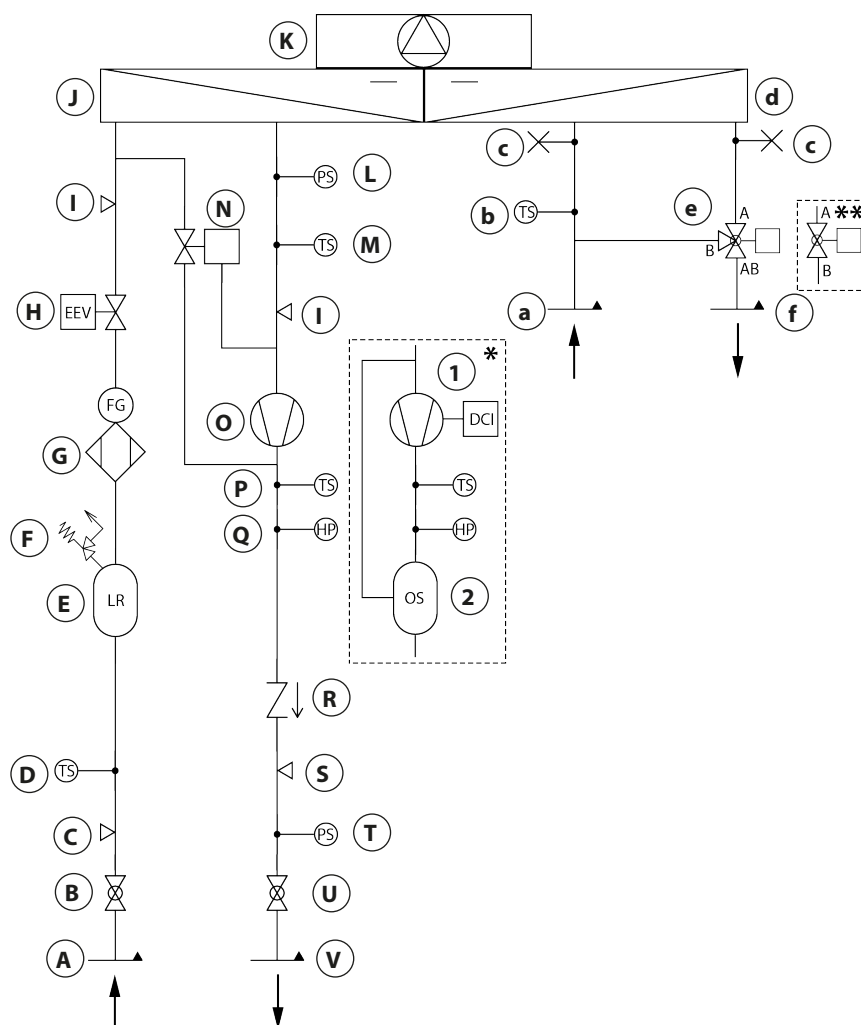


- A Water inlet
- B Inlet water temperature (accessory)
- C Manual air vent valves
- D Chilled water coil
- E Fan
- F Outlet water temperature (accessory)
- G Water flow measuring device (accessory)
- H 3-way ball valve
- I Water outlet

* 2-way ball valve (accessory)

Two sources cooling circuit with single compressor and remote condenser

The following image represents the cooling circuit in two sources units with single compressor and remote condenser.



Cooling circuit:

Liquid line (HP liq: PS 45 Bar - TS 68 °C):

- A Liquid line
- B Liquid line cock
- C Pressure intake SAE 5/16" male flare
- D Liquid temperature probe
- E Liquid receiver
- F Safety valve (44 Bar)
- G Dehydrator filter with liquid sight glass
- H Electronic expansion valve

Suction line (LP: PS 22 Bar - TS 38 °C):

- I Pressure intake SAE 5/16" male flare (for refrigerant charging)
- J Direct expansion coil
- K Fan
- L Evaporation pressure probe
- M Suction temperature probe
- N Antifreeze hot gas injection valve

Hot gas line (HP gas: PS 41 Bar - TS 64 °C):

- O Compressor
- P Discharge temperature probe
- Q High pressure switch with manual reset (41 Bar)
- R Hot gas line check valve
- S Pressure intake SAE 5/16" male flare
- T Condensation pressure probe
- U Hot gas line cock
- V Hot gas line

* DC inverter compressor (accessory):

- 1 DC inverter compressor
- 2 Oil separator

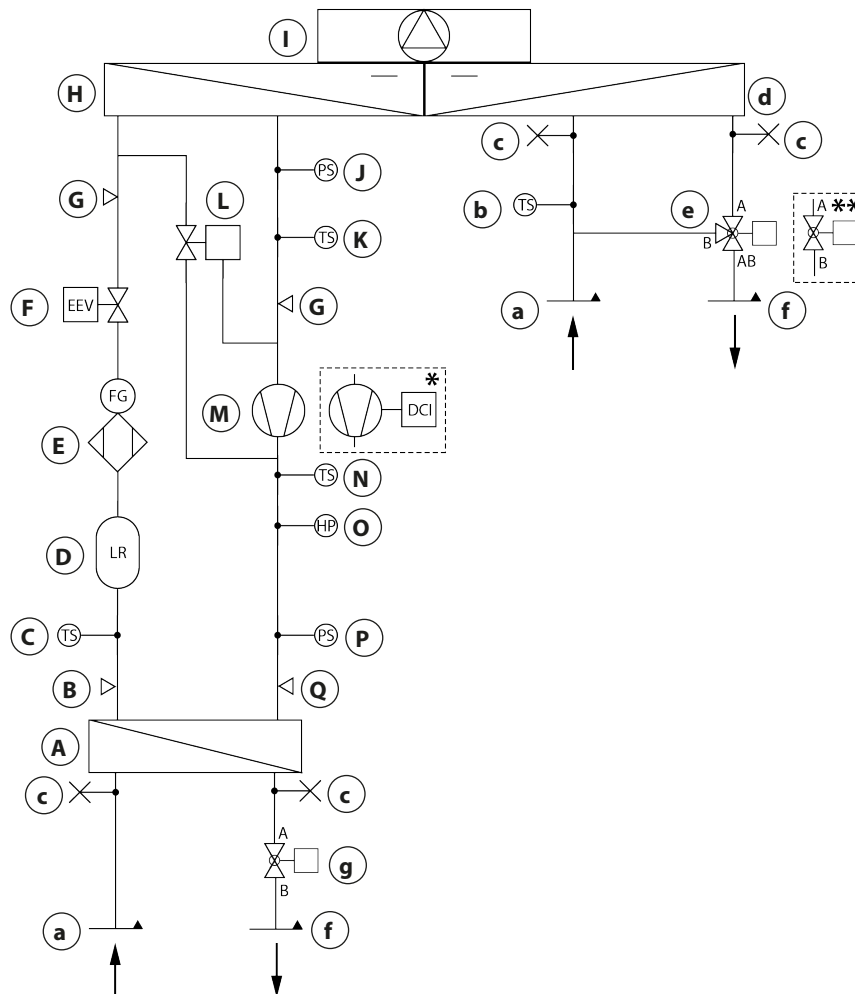
Water circuit:

- a Water inlet
- b Inlet water temperature
- c Manual air vent valves
- d Chilled water coil
- e 3-way ball valve
- f Water outlet

** 2-way ball valve (accessory)

Two sources cooling circuit with single compressor and water-cooled condenser

The following image represents the cooling circuit in two sources units with single compressor and water-cooling condenser.



Cooling circuit:

Liquid line (HP: PS 41 Bar - TS 64 °C):

- A Water-cooled condenser
- B Pressure intake SAE 5/16" male flare
- C Liquid temperature probe
- D Liquid receiver
- E Dehydrator filter with liquid sight glass
- F Electronic expansion valve

Suction line (LP: PS 22 Bar - TS 38 °C):

- G Pressure intake SAE 5/16" male flare (for refrigerant charging)
- H Direct expansion coil
- I Fan
- J Evaporation pressure probe
- K Suction temperature probe
- L Antifreeze hot gas injection valve

Hot gas line (HP: PS 41 Bar - TS 64 °C):

- M Compressor
 - N Discharge temperature probe
 - O High pressure switch with manual reset (41 Bar)
 - P Condensation pressure probe
 - Q Pressure intake SAE 5/16" male flare
- * DC inverter compressor (accessory)

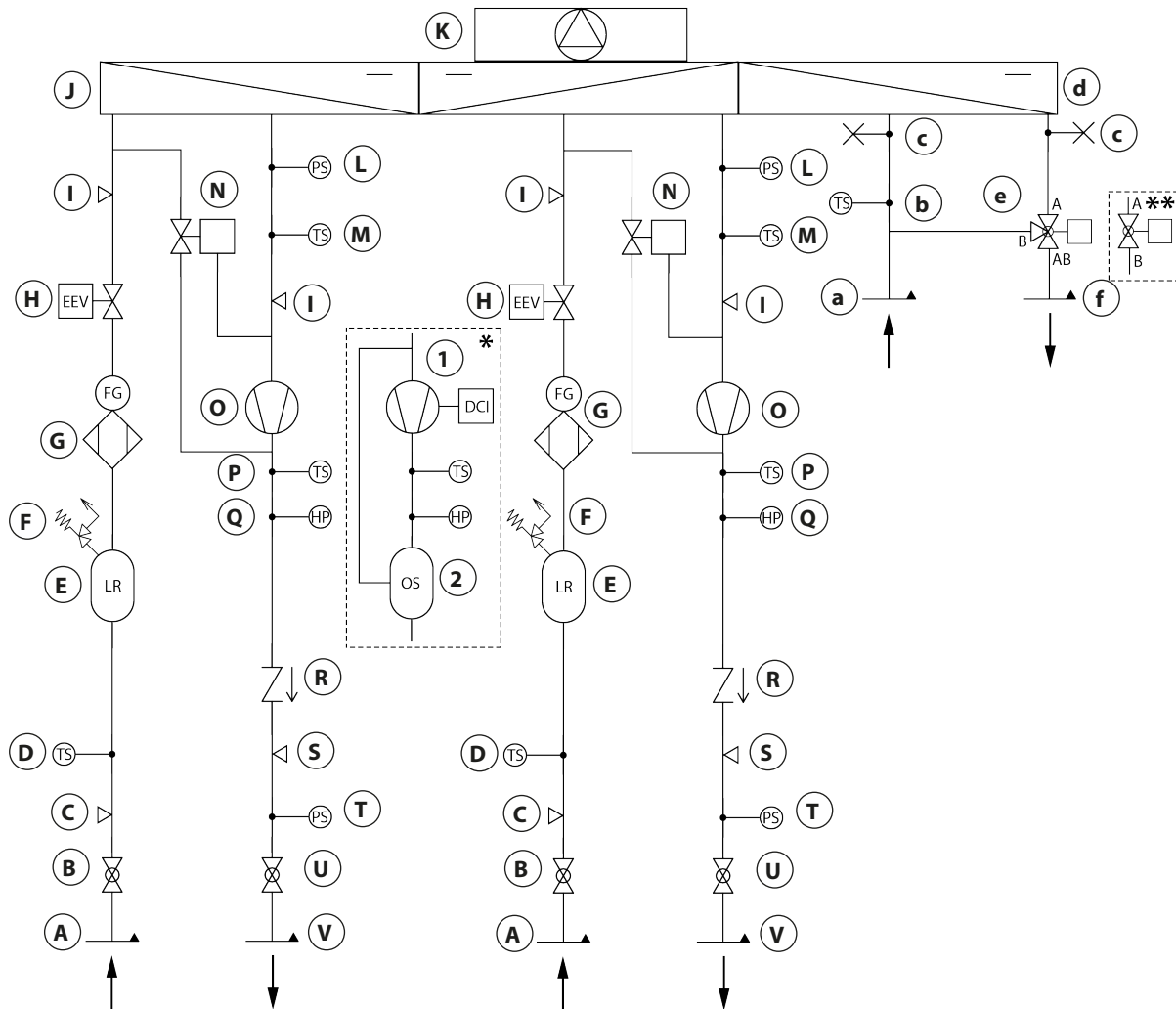
Water circuit:

- a Water inlet
- b Inlet water temperature
- c Manual air vent valves
- d Chilled water coil
- e 3-way ball valve
- f Water outlet
- g Adjustment valve of water-cooled condenser (accessory)

** 2-way ball valve (accessory)

Two sources cooling circuit with double compressor and remote condenser

The following image represents the cooling circuit in two sources units with double compressor and remote condenser.



Cooling circuit:

Liquid line (HP liq: PS 45 Bar - TS 68 °C):

- A Liquid line
- B Liquid line cock
- C Pressure intake SAE 5/16" male flare
- D Liquid temperature probe
- E Liquid receiver
- F Safety valve (44 Bar)
- G Dehydrator filter with liquid sight glass
- H Electronic expansion valve

Suction line (LP: PS 22 Bar - TS 38 °C):

- I Pressure intake SAE 5/16" male flare (for refrigerant charging)
- J Direct expansion coil
- K Fan
- L Evaporation pressure probe
- M Suction temperature probe
- N Antifreeze hot gas injection valve

Hot gas line (HP gas: PS 41 Bar - TS 64 °C):

- O Compressor
- P Discharge temperature probe
- Q High pressure switch with manual reset (41 Bar)
- R Hot gas line check valve
- S Pressure intake SAE 5/16" male flare
- T Condensation pressure probe
- U Hot gas line cock
- V Hot gas line

* DC inverter compressor (accessory):

- 1 DC inverter compressor
- 2 Oil separator

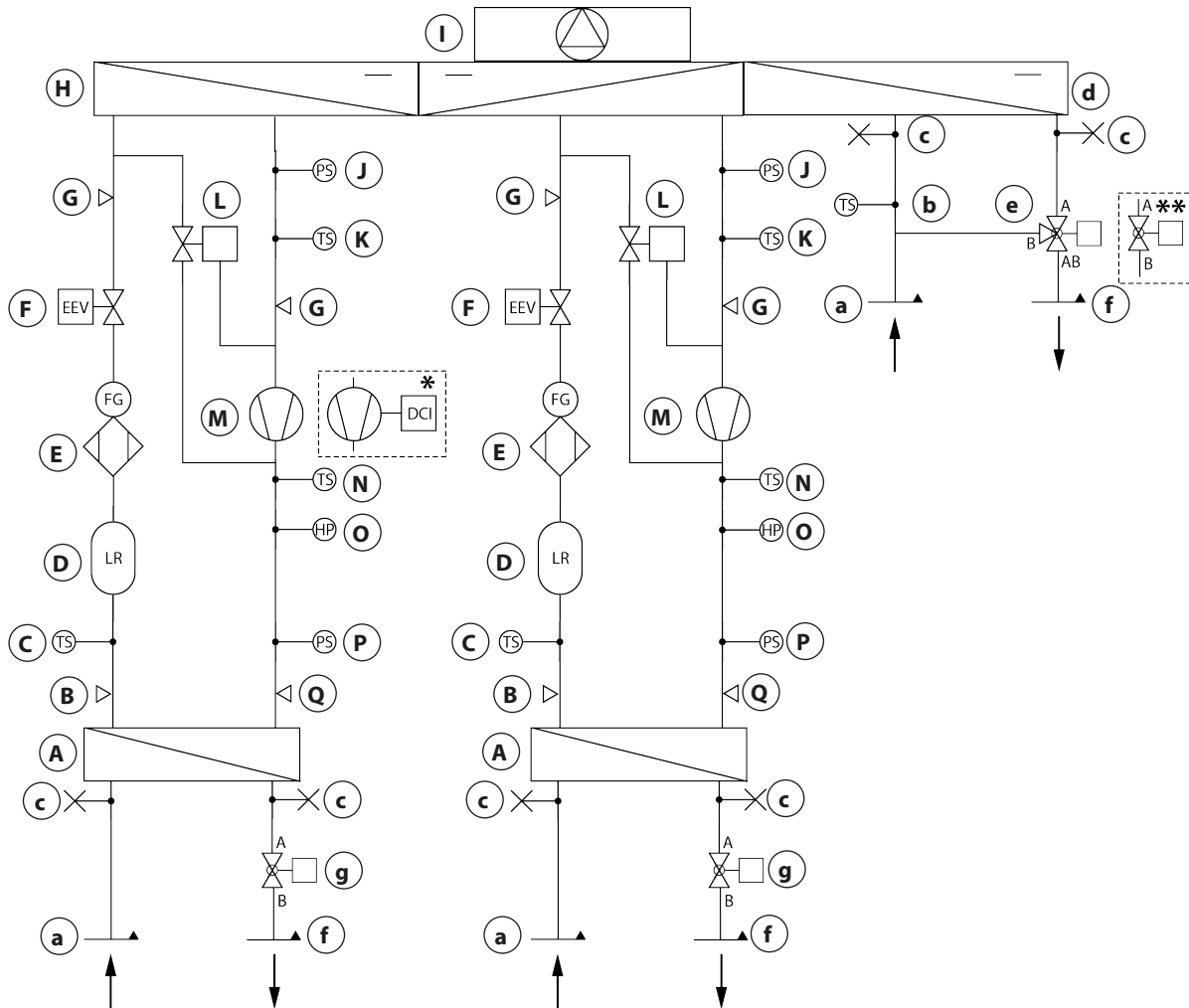
Water circuit:

- a Water inlet
- b Inlet water temperature
- c Manual air vent valves
- d Chilled water coil
- e 3-way ball valve
- f Water outlet

** 2-way ball valve (accessory)

Two sources cooling circuit with double compressor and water-cooled condenser

The following image represents the cooling circuit in two sources units with double compressor and water-cooling condenser.



Cooling circuit:

Liquid line (HP: PS 41 Bar - TS 64 °C):

- A Water-cooled condenser
- B Pressure intake SAE 5/16" male flare
- C Liquid temperature probe
- D Liquid receiver
- E Dehydrator filter with liquid sight glass
- F Electronic expansion valve

Suction line (LP: PS 22 Bar - TS 38 °C):

- G Pressure intake SAE 5/16" male flare (for refrigerant charging)
- H Direct expansion coil
- I Fan
- J Evaporation pressure probe
- K Suction temperature probe
- L Antifreeze hot gas injection valve

Hot gas line (HP: PS 41 Bar - TS 64 °C):

- M Compressor
 - N Discharge temperature probe
 - O High pressure switch with manual reset (41 Bar)
 - P Condensation pressure probe
 - Q Pressure intake SAE 5/16" male flare
- * DC inverter compressor (accessory)

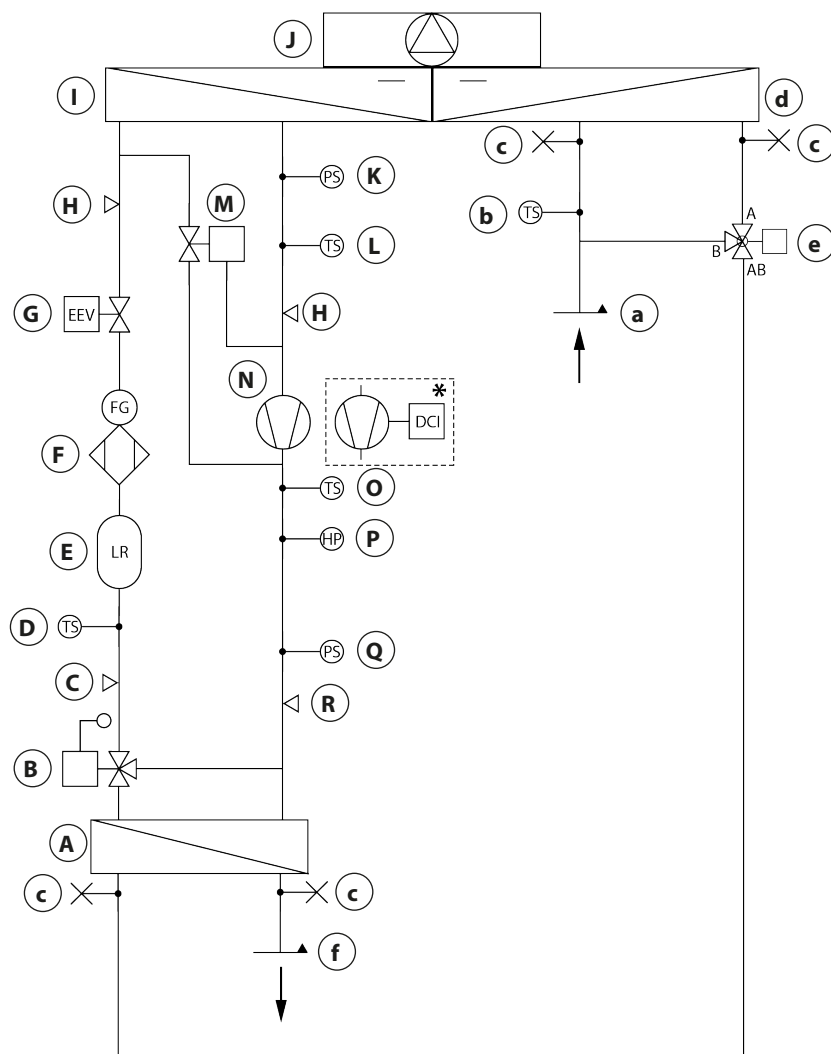
Water circuit:

- a Water inlet
- b Inlet water temperature
- c Manual air vent valves
- d Chilled water coil
- e 3-way ball valve
- f Water outlet
- g Adjustment valve of water-cooled condenser (accessory)

** 2-way ball valve (accessory)

Cooling circuit with free cooling and single compressor

The following image represents the cooling circuit of the free cooling units with single compressor.



Cooling circuit:

Liquid line (HP: PS 41 Bar - TS 64 °C):

- A Water-cooled condenser
- B LAC valve for controlling condensation pressure
- C Pressure intake SAE 5/16" male flare
- D Liquid temperature probe
- E Liquid receiver
- F Dehydrator filter with liquid sight glass
- G Electronic expansion valve

Suction line (LP: PS 22 Bar - TS 38 °C):

- H Pressure intake SAE 5/16" male flare (for refrigerant charging)
- I Direct expansion coil
- J Fan
- K Evaporation pressure probe
- L Suction temperature probe
- M Antifreeze hot gas injection valve

Hot gas line (HP: PS 41 Bar - TS 64 °C):

- N Compressor
- O Discharge temperature probe
- P High pressure switch with manual reset (41 Bar)
- Q Condensation pressure probe
- R Pressure intake SAE 5/16" male flare

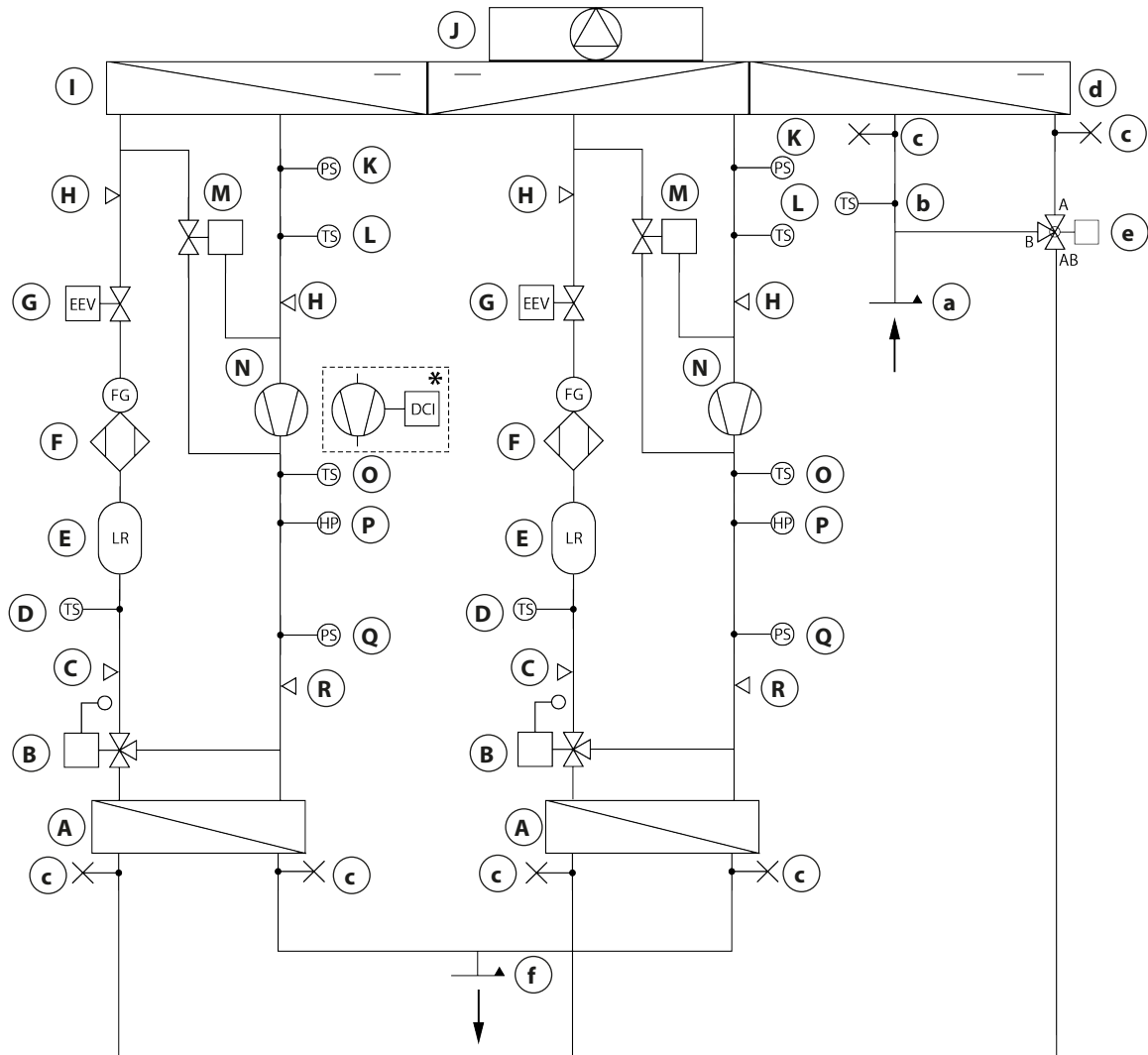
* DC inverter compressor (accessory)

Water circuit:

- a Water inlet
- b Inlet water temperature
- c Manual air vent valves
- d Chilled water coil
- e 3-way ball valve
- f Water outlet

Cooling circuit with free cooling and double compressor

The following image represents the cooling circuit of the free cooling units with double compressor.



Cooling circuit:

Liquid line (HP: PS 41 Bar - TS 64 °C):

- A Water-cooled condenser
- B LAC valve for controlling condensation pressure
- C Pressure intake SAE 5/16" male flare
- D Liquid temperature probe
- E Liquid receiver
- F Dehydrator filter with liquid sight glass
- G Electronic expansion valve

Suction line (LP: PS 22 Bar - TS 38 °C):

- H Pressure intake SAE 5/16" male flare (for refrigerant charging)
- I Direct expansion coil
- J Fan
- K Evaporation pressure probe
- L Suction temperature probe
- M Antifreeze hot gas injection valve

Hot gas line (HP: PS 41 Bar - TS 64 °C):

- N Compressor
- O Discharge temperature probe
- P High pressure switch with manual reset (41 Bar)
- Q Condensation pressure probe
- R Pressure intake SAE 5/16" male flare

* DC inverter compressor (accessory)

Water circuit:

- a Water inlet
- b Inlet water temperature
- c Manual air vent valves
- d Chilled water coil
- e 3-way ball valve
- f Water outlet

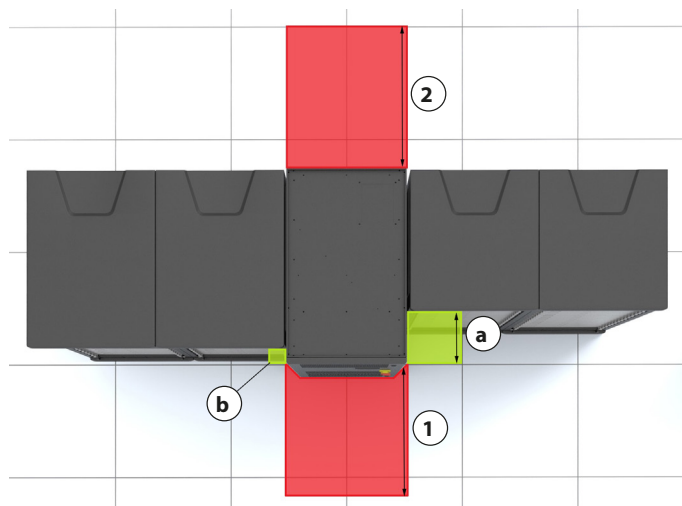
Weights

Standard models	Weight +/-5% [kg]	Standard models	Weight +/-5% [kg]	Standard models	Weight +/-5% [kg]
P Series					
071	170	322	430	10	125
141	225	422	535	20	150
211	280	512	540	30	245
251	305	662	685	50	250
321	385	852	705	60	270
361	460	932	745	70	280
461	470			80	375
				110	410
				160	690
				220	810
Free Cooling and Two Sources P Series					
211	310	512	590	50	260
321	420	662	750	70	300
		852	770	110	435
461	520	932	1320	160	760
G Series					
461	620	70	540	230 XH	1250
612	690	150	840	300	1630
932	910	150 XH	865		
1342	1240	230	1220		
R Series					
121	220	231	235	20	145
201	235	361	235	40	210
Free Cooling and Two Sources R Series					
231	270			40	260

Dimensions and clearances

Standard Model	Plan dimensions						
	Dimensions (mm)			Clearances (mm)		Routine maintenance (mm)	
	Length	Depth	Height	Front and side intake	Front intake	Front	Rear
	A	B	H	a	b	1	2
R Series Units							
20 - 121 - 201	300	1200	1975+70*	200	-	800	800
40 - 231 - 361	600	1222	1985+30*	315	45	800	800

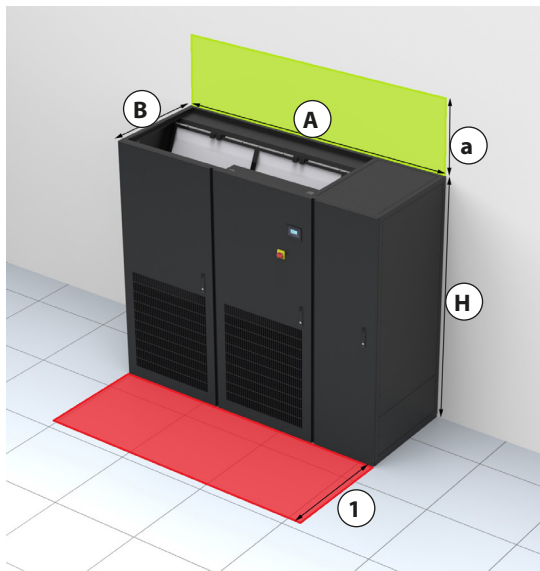
* Height of the "Wheel Kit" accessory



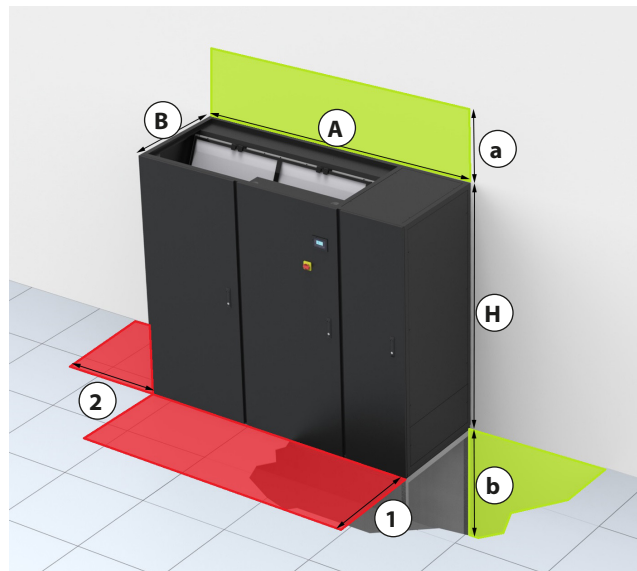
Series R clearance spaces

Dimensions and clearances

Standard models		Plan dimensions																														
		Dimensions (mm)			Clearances (mm)		Routine Maintenance (mm)																									
		Length	Depth	Height	Upper	Lower	Front	Left																								
		A	B	H	a	b	1	2																								
071 - 141 10 - 20	Over	750	600	1990	300	300	750	-																								
	Under																															
211 - 251 30 - 50	Over	860	880				300		300	860	600																					
	Under																															
321 - 322 60 - 70	Over	1410									880	300	300	860	-																	
	Under																															
361 - 461 422 - 512 80 - 110	Over	1750														880	300	300	860	-												
	Under																															
662 - 852	Over	2300																			880	300	300	860	-							
	Under																															
932 160	Over	2640																								880	300	300	860	-		
	Under																															
932 TS	Over	3190		880	300	300		860																							-	
	Under																															
220	Over	3495	880				300		300	860																						-
	Under																															



Over



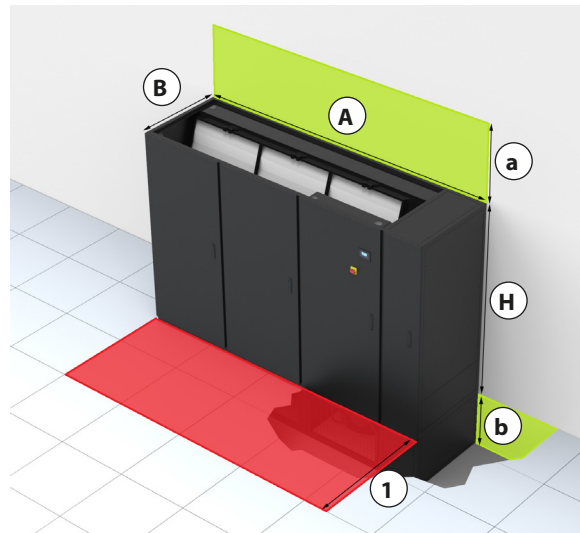
Under

Series P clearance spaces

Dimensions and clearances

Standard models	Plan dimensions					
	Dimensions (mm)			Clearances (mm)		Routine maintenance (mm)
	Length	Depth	Height	Upper	Lower	Front
	A	B	H	a	b	1
70	1320					
461 - 612	1490	921	1990			
150						
150 XH	1840	1050	2350			
932	2390	921	1990	300	550*	860
230						
230 XH	2740	1050	2350			
1342	3120	921	1990			
300	4020					

* Minimum height of ventilating plinth. Check definitive height when placing the order.



Series G clearance spaces

Plenum and base frame (accessory)

Various types of air distribution plenum and base frame are available as accessories for both the Under (U) and Over (O) versions of the unit.

When installing plenums and base frame, it is advisable to place a gasket (rubber or similar material) of an adequate thickness and length, between them and the machine to avoid transmitting vibrations to the structure. Placing this gasket in between also ensures the air seal between the two elements and contains the noise level of the installation.

Below are the various types of available plenums and base frame:

Type	Front view	Right - Left Side View
Plenum with opaque panels (Drilling must be carried out by the customer)		
G series ventilated plenums with solid panels		
Plenum with front grille		
G series ventilated plenums with front grilles		
Plenum with front and side grilles		
Soundproofed duct section		
Free-cooling plenum		
Adjustable plinths		
Ventilated plinths (G series)		

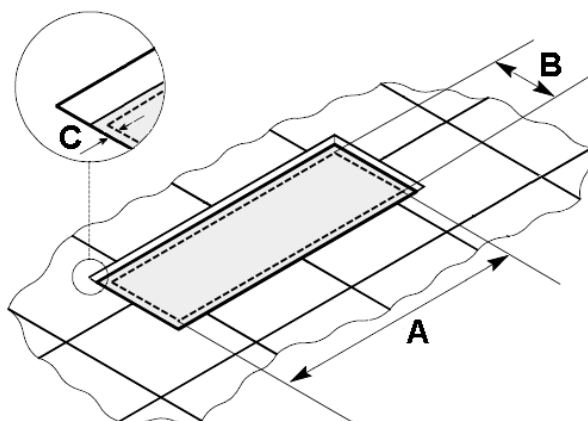
Dimensions and clearances plenum and plinth

P series - Plenum and soundproofed duct section	Plan dimensions - standard model dimensions (mm)		
	Length	Depth	Height
071 - 141 - 10 - 20	750	580	450/550 (lower plenum)
211 - 251 - 30 - 50	860	850	550
321 - 322 - 60 - 70	1410		
361 - 461 - 422 - 512 - 80 - 110	1750		
662 - 852	2300		
932 - 160	2640		
220	3495		
P series - Free-cooling plenum *	Length		
071 - 141 - 10 - 20	750	580	580
211 - 251 - 30 - 50	860	850	850
321 - 322 - 60 - 70	1410		
361 - 461 - 422 - 512 - 80 - 110	1750		
662 - 852	2300		
932 - 160	2640		
220	3495		
P series - Adjustable base frame	Length		
071 - 141 - 10 - 20	750	580	300 / 600
211 - 251 - 30 - 50	860	850	
321 - 322 - 60 - 70	1410		
361 - 461 - 422 - 512 - 80 - 110	1750		
662 - 852	2300		
932 - 160	2640		
220	3495		
G series - Plenum and soundproofed duct section	Length		Depth
70	1320	900	550
461 - 612	1490		
150	1840		
932	2390		
230	2740		
1342	3120		
300	4020		
G series - Free-cooling plenum *	Length	Depth	Height
70	1320	900	900
461 - 612	1490		
150	1840		
932	2390		
230	2740		
1342	3120		
300	4020		
G series - Adjustable base frame	Length	Depth	Height
70	1320	900	550 (set height) 1000 (set height)
461 - 612	1490		
150	1840		
932	2390		
230	2740		
1342	3120		
300	4020		

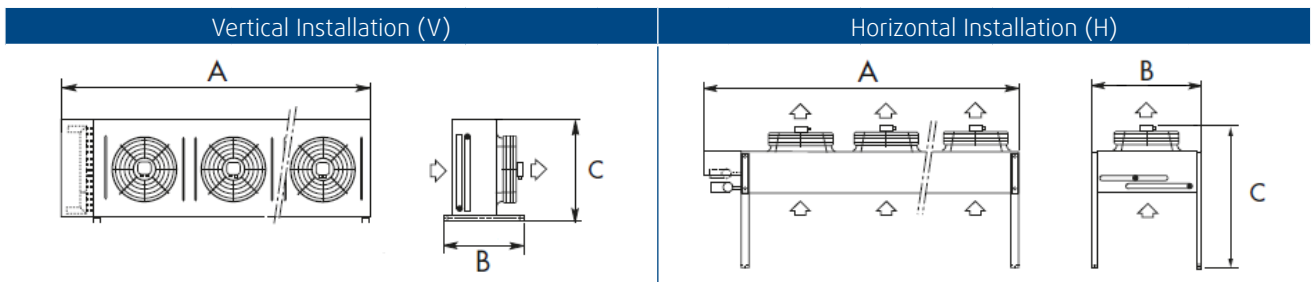
* Damper depth: 130 mm

Sizing the hole for the installation of the base frame in the finished floor surface

P series Plinth plan dimensions - Dimensions (mm)	Length	Depth	Tolerance
	A	B	C
071- 141 - 10 - 20	750	580	10
211 - 251 - 30 - 50	860	850	
321 - 322 - 60 - 70	1410		
361 - 461 - 422 - 512 - 80 - 110	1750		
662 - 852	2300		
932 - 160	2640		
220	3495		
G series ventilated base frame plan dimensions - Dimensions (mm)	Length	Depth	Tolerance
	A	B	C
70	1320	900	10
461 - 612	1490		
150	1840		
932	2390		
230	2740		
1342	3120		
300	4020		

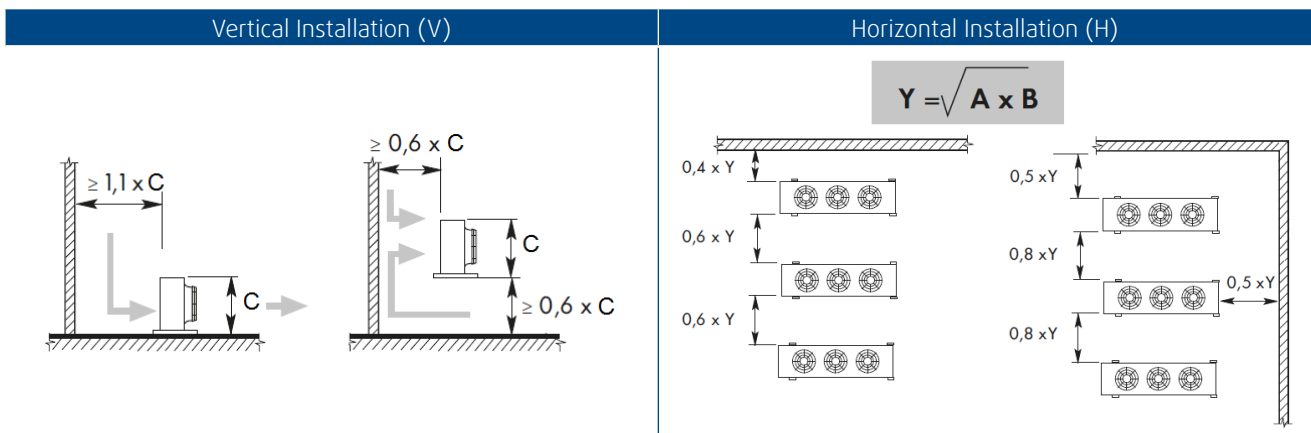


TMC Dimensions



Standard models	Length (A)	Depth (B)		Height (C)		Fixing holes Ø	Weight
		V	H	V	H		
	mm	mm		mm		mm	kg
11	882	480	550	510	818	10	27
19	1582						44
31	1225	570	900	830	1050	13	67
35							71
40							104
49	2225	570	900	830	1050	13	112
55							112
63							120
84	3225	570	900	830	1050	13	157
92							170

TMC Clearances



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