

Datatech+ Bluethink Data

7÷100 kW



General

Air conditioners equipped with a brushless, inverter-controlled DC compressor, specifically designed for IT applications: maximisation of sensible capacity, efficiency, reliability, availability and redundancy. They additionally provide for utmost flexibility in terms of direction of the air delivery and return lines for better adaptation to the different site layouts.

Configurations

EDA: Direct expansion, air-condensed conditioning units

EDW: Direct expansion, water-condensed conditioning units

EDA-W/DC: Dual fluid conditioning units with chilled water circuit and with either air- or water-condensed direct expansion circuit

EDW/FC: Conditioning units with integrated indirect free cooling and water- condensation option

Strengths

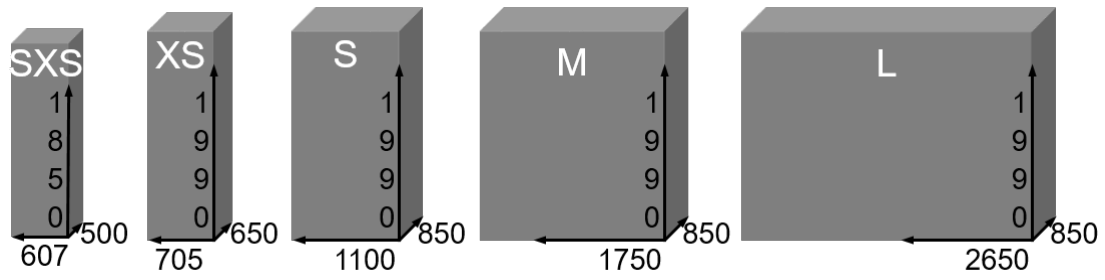
- ▶ Reliability over time
- ▶ Wide configurability
- ▶ Full access
- ▶ Installation flexibility
- ▶ Max. efficiency guaranteed by the most advanced technology: brushless, inverter-controlled DC compressors, EC electronically commutated fans, electronic expansion valves
- ▶ Rapid answer to thermal load variations with the possibility to vary the operating frequency of the compressor from 30% to 120% of the nominal value.



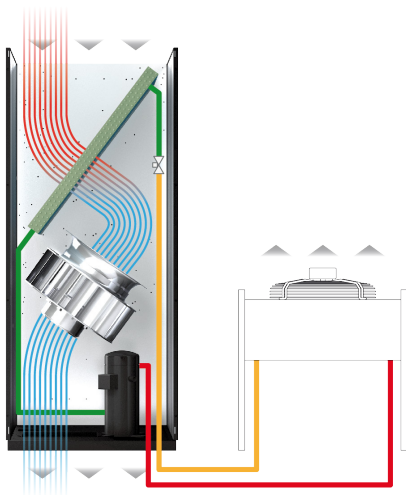
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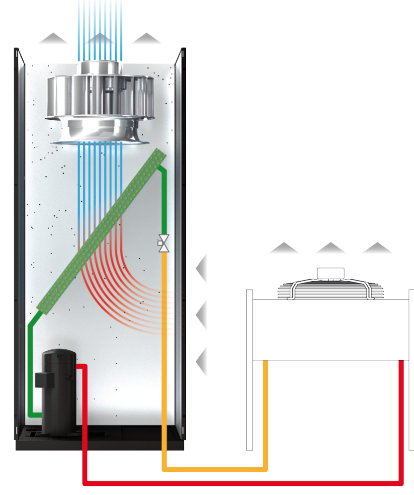
FRAMES AND DIMENSIONS



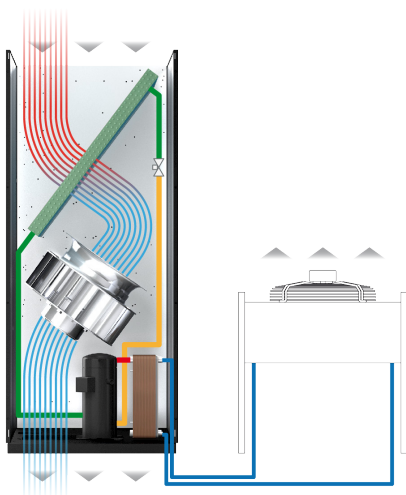
VERSIONS, SET-UPS AND AIR FLOWS



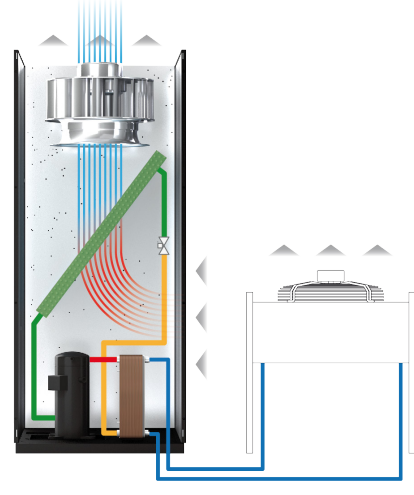
UEDA: Downflow delivery, air-condensed direct expansion



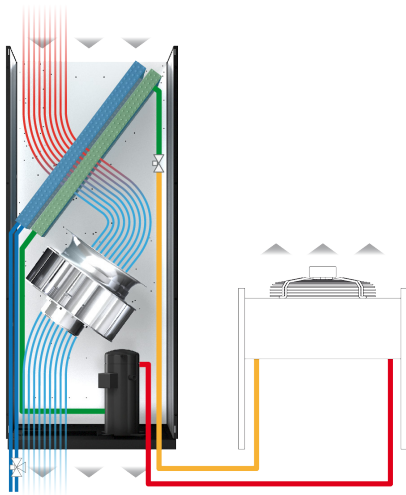
OEDA: Upflow delivery, air-condensed direct expansion



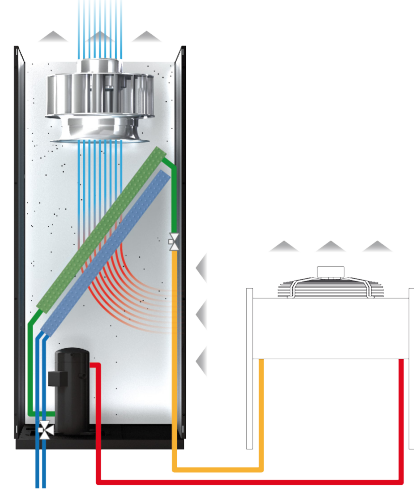
UEDW: Downflow delivery, water-condensed direct expansion



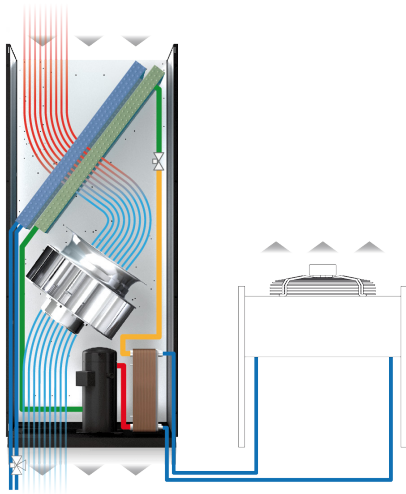
OEDW: Upflow delivery, water-condensed direct expansion



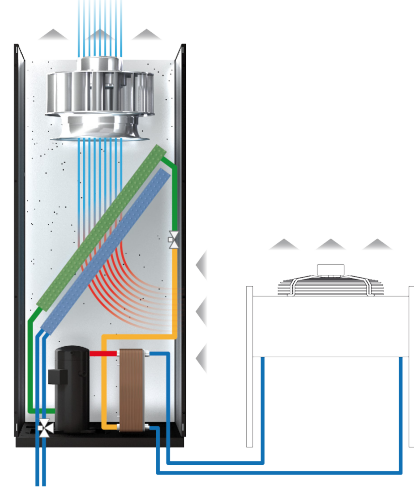
UEDA DC: Downflow delivery, air-condensed direct expansion + Chilled water



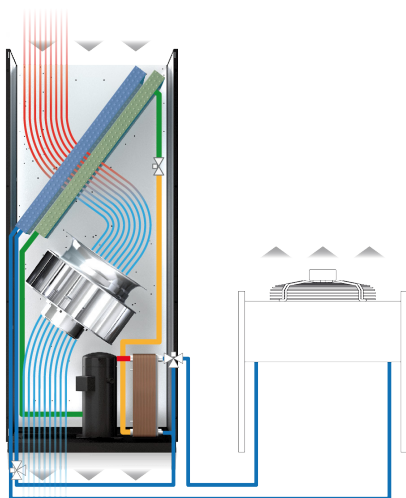
OEDA DC: Upflow delivery, air-condensed direct expansion + Chilled water



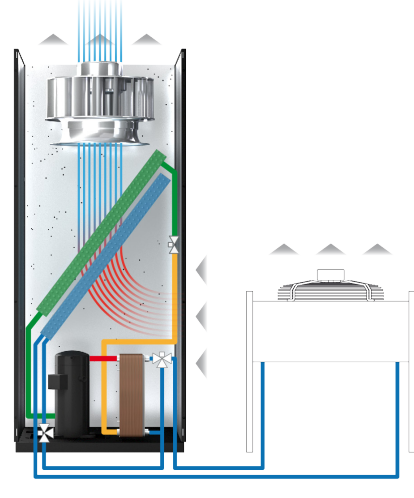
UEDW DC: Downflow delivery, water-condensed direct expansion + Chilled water



OEDW DC: Upflow delivery, water-condensed direct expansion + Chilled water



UEDW FC: Downflow delivery, Water-condensed, free cooling direct expansion



OEDW FC: Upflow delivery, Water-condensed, free cooling direct expansion

DATATECH+BTD

Datatech+ BTD is the solution for all technological applications requiring optimised and continuous monitoring of the thermo-hygrometric conditions in which the various apparatuses operate.

Datatech+ BTD is a series of vertical air-conditioning cabinets which are available in different versions and set-ups for better adaptation to the various systems.

Air conditioning units are available with either upflow or downflow air delivery and as plain direct expansion units or with dual direct expansion coil + chilled water version (dual cooling and free cooling).

The offer is completed by an extensive range of aeraulic, cooling and electrical options to be fitted on the Datech units to increase the product customisation options and make it the most suitable solution to meet the diversified needs of its users.

APPLICATIONS

Datatech BTD units are mainly used as air-conditioning solutions for IT equipment. This specific application context has direct repercussions on the machine design in that machines are optimised to meet the relevant requirements. Below is a short introduction to the main distinguishing design features of IT air-conditioning units. A more in-depth description is then provided in the following sections.

- **Extended indoor work conditions** The ASHRAE guidelines (American Society of Heating Refrigeration Air-conditioning Engineers) are globally recognised as the standards for the monitoring of environmental conditions in Data Centres. The above-mentioned conditions have been extended over the years and they require that all air-conditioning units can operate with increasingly higher input air temperatures.
- **Optimisation of sensible capacity** IT equipment represent a purely sensible load. As a result, Datatech BTD units have thermodynamic and aeraulic parameters specifically designed for max. sensible capacity under design conditions as opposed to latent capacity.
- **Maximum service continuity** The IT load, by its very nature, is present uniformly all year round. Air-conditioners used for these applications must take into account the ultimate target consisting in the provision of continuous operation throughout the year. As is the case with the operating conditions, service continuity too is defined by specific guidelines which are laid down by a private entity known as UPTIME INSTITUTE.

Ashrae and guidelines for optimised thermo-hygrometric conditions in data centre applications

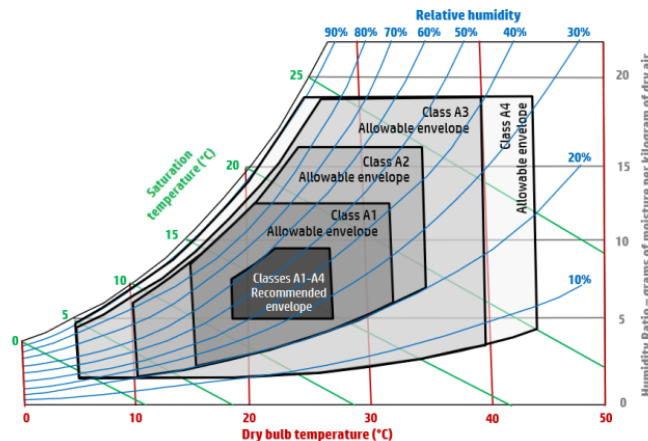
ASHRAE Technical Committee 9.9, which is named "Mission Critical Facilities, Technology Spaces and Electronic Equipment", offers a wide range of information for the IT sector. The first publication of TC 9.9 "Thermal Guidelines for Data Processing Environments" addresses some critical issues, including the operating temperature, humidity, the air flow through the equipment and the points of measurement of the environmental conditions.



It specifically defines temperature and humidity limits which are deemed as optimised or acceptable for these applications. These limits include:

- recommended limits (ASHRAE Recommended Envelope) – conditions within which IT equipment (e.g. servers, etc.) operate in conditions of optimal balance between operating costs and long-term reliability;
- allowable limits (ASHRAE Allowable Envelope A1-A2-A3-A4) – less stringent conditions within which it is tolerable for equipment to operate for shorts operating periods.

Below is an illustration that shows the work areas as defined in the latest publication.



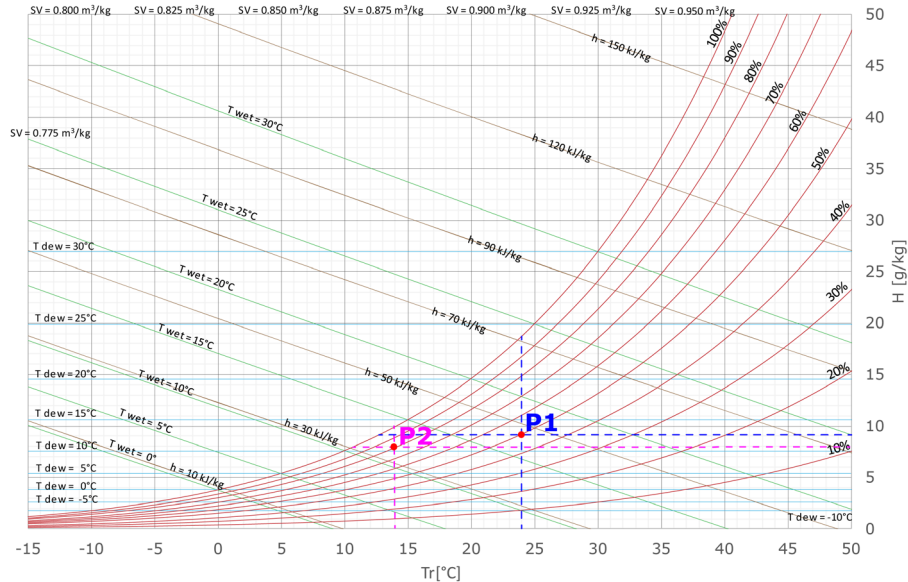
Note: Envelopes define air entering IT equipment operating at sea level.

It is now important to stress that the conditions illustrated in the ASHRAE diagram refer to air in front of racks/servers, in other words air available for equipment cooling. In modern Data Centres, for instance, configurations are such as to keep the air delivery flows to the equipment separate from the air return flows to the air-conditioners for maximised efficiency.

Sensible capacity vs. Latent capacity

The key parameter to measure the quantity of sensible heat removed as opposed to latent heat is the sensible heat ratio, otherwise known with the acronym SHR. This is the ratio (in congruent units of measurement, for instance [kW]) between the sensible capacity and the total capacity.

It is quite easy to identify the sensible capacity and the latent capacity along the air treatment line in a psychrometric chart.



Sensible capacity corresponds to the pure temperature drop, as shown in the figure, to reduce the temperature from 24°C to 14°C. Latent capacity, on the other hand, corresponds to the shift of the water vapour to condensate, which changes the humidity content from 9.3g/kg to 8g/kg (i.e. the amount of water removed is 1.3g per kg of dry treated air).

Needless to say, latent capacity in applications mainly requiring sensible capacity is not useful and actually causes water condensation, which consequently reduces the relative humidity. This may not be acceptable and results in the usage of electricity and water to humidify the environment again.

Uptime and guidelines for service continuity maximisation

The Uptime Institute has created a Tier Classification System standard, i.e. a tool which is used for efficient evaluation of the data centre infrastructure in terms of company requirements for system availability. The Tier Classification System provides the Data Centre sector a consistent method to compare customised facilities (generally, unique) according to the performances of the site infrastructure contemplated by Uptime.



The "Data Centre Site Infrastructure Tier Standard: Topology" outlines the requirements and benefits resulting from four Tier classifications, as identified for the Data Centre infrastructure. Each Tier is aligned with a specific function in the business world and sets appropriate criteria for power supply, cooling, maintenance and the system ability to resist to a fault. Tiers are progressive: each tier incorporates the requirements of all underlying tiers.

TIER	Definition	Redundancy	Description	Service disruption accepted
1	Basic site infrastructure	Non-redundant capacity components, non-redundant distribution path	The site is susceptible to disruption from both planned and unplanned activities/events. An outage or failure of any capacity component will have an impact on the critical environment.	99,671% 28,819hours/year
2	Redundant site infrastructure	Redundant capacity components, non-redundant distribution path	The site is susceptible to disruption from both planned and unplanned activities/events. A component error may have an impact on the critical environment. An outage will have an impact on the critical environment.	99,741% 22,670hours/year
3	Site infrastructure allowing for simultaneous maintenance	Redundant capacity components, redundant distribution path (main and backup)	The site is susceptible to disruption from unplanned activities/events. Scheduled maintenance has no impact.	99,982% 1,5770hours/year
4	Fault tolerant site infrastructure	Redundant capacity components, independent redundant distribution paths (both active)	The site is not susceptible to disruptions from one single unplanned event or scheduled maintenance.	99,995% 0,440hours/year

Datatech BTD units offer set-ups, options and software solutions that have been conceived to meet this type of need at best.

CONFIGURATION

Configuration example:

Datatech+	O	ED	A	23.	1	CO	--
1	2	3	4	5	6	7	8
1	Series		Datatech+				
2	Air flow		O :Air upflow (OVER) U :Air downflow (UNDER)				
3	Type of unit		ED :Direct expansion CW				
4	Condensation		A :Air-condensed unit (remote condenser required) W :Water-condensed unit (including condenser)				
5	Size		xx :Nominal cooling capacity at catalogue conditions				
6	Number of compressors		1 :One compressor/circuit 2 :Two compressors 3 :three compressors; 4 :four compressors.				
7	Version		CO :Cooling CH :Cooling plus heating HH :Cooling plus heating plus humidity control				
8	Set-up		-- :No set-up DC :Dual Cooling (chilled water circuit plus direct expansion circuit) FC :Free cooling (indirect water free cooling)				

SPECIFICATIONS

STRUCTURE

For enhanced thermal and acoustic insulation the units consist of a load-bearing frame made of a 22 mm thick sandwich sheet metal, with internal insulating glass wool material, 30 kg/m³ density. The fire reaction class of the panelling is A1 (in accordance with EN13501). Air tightness is achieved with adhesive sealing strips placed all around the edges of the panels.



The internal sheet metal parts are hot galvanised and have variable thickness (from 2.5 mm for the base to 1 mm for removable panels), whereas visible parts are painted with an oven-baked epoxy polyester powder coating RAL7016 and have a textured surface finish.

The frame is secured with structural rivets. The front and rear panels are fixed with ¼ turn fasteners or they are screwed to the top part, respectively, and they are supplied with tabs for installation in dedicated slots on the base. The front panel opposite the electric switch is hinged and supplied with a handle for opening.

Access to all the main components of the unit is gained from the front, so no clearance spaces must be left at the sides and back of the unit for both routine and non-routine maintenance.

All the materials making up the unit are CFC-free.

All electrical, cooling and hydraulic connections are normally made from the bottom of the unit. Solutions for lateral connections are also available upon request.

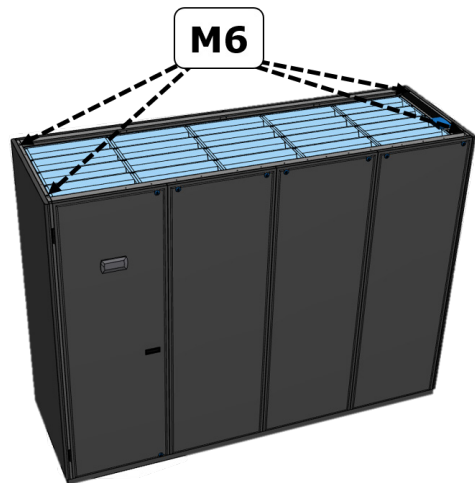


S: Bottom connections (standard)

OL: LH side connections (option)

OR: RH side connections (option)

On the air side, the units are supplied with four threaded hex inserts M6 that are designed to connect the return/delivery plenum or to fit the ducting in the unit, where required.



FANS

Units are equipped with 1, 2, 3 radial fans with backward-curved blades, without scroll. Fans are balanced, as required by standard ISO DIN 1940.

Smaller units (7.1) have a 230V/50Hz single phase motor; all other units have 400V/50Hz three phase motors.

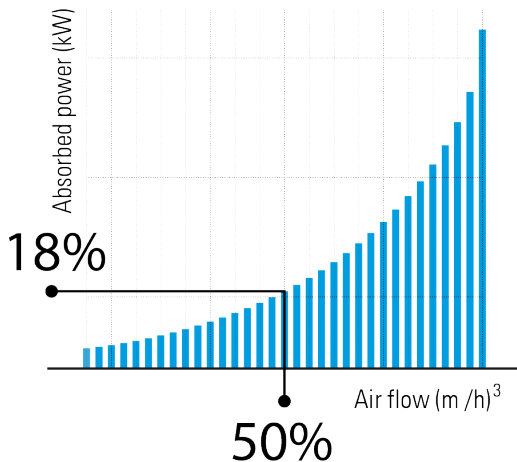
The average air capacity value is 82 l/s per kW of sensible cooling capacity.

Fans are fitted with brushless, electronically commutated (EC) motors and they offer a number of advantages.

- greater efficiency at full load if compared with the corresponding AC model;
- Cosfi value close to 1;
- built-in soft starter;
- user-friendly adjustment - the 0-10V control signal enables monitoring the motor speed electronically with continuous regulation via the microprocessor onboard the unit so as to implement various control strategies (constant flow, constant pressure, based on thermal load, etc.).
- The motors are provided with integrated electronic protection against overtemperature, overcurrent, over or under-voltage with absence of one or more phases.

The strategic advantage of EC fans is the cubic ratio between speed and absorption. In other words, the consumption of a fan running at 70% is 50%, it is 18% when running at 50%, etc.

This brings about a potential saving that is exponential to partial loads. Hence, the need exists to modulate the fan efficiently and continuously using the correct algorithm required by the application.



Datatech+ BTD in combination with EC fans offer automatic control of the air flow as standard.

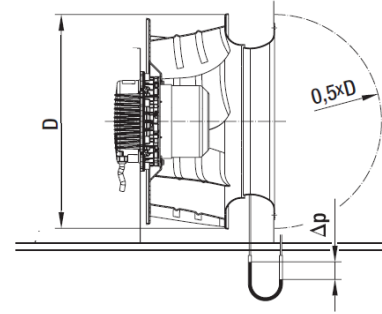
This solution enables making the most out of the advantage in efficiency offered by EC fans at partial loads. The unit will modulate the fans according to the room load (distance from the temperature setpoint to be checked). It will also adapt to any aerodynamic variations on site thanks to the back action on the air flow rate.

With the algorithm the exact amount of air required by the application is available at all times thanks to the constant measurement performed by a differential pressure transducer. The unit keeps the air at the reference value using a PID back action control algorithm which changes the fan speed whenever the external conditions change.

Please find a simplified list of the implied steps below:

- load change;
- change of controlled temperature;
- calculation of fan speed and of expected air flow rate;
- feedback of flow rate actually measured based on the site conditions (on-site losses, progressive filter fouling, etc.);
- new fan speed.

The Bernoulli's principle is the physical principle referenced to measure the air flow rate: the fan intake nozzle, which may be compared to a bottleneck, causes a pressure reduction which is affected by the geometrical features of the nozzle and of the air flow rate.



The simplified formula which summarises the link between the air flow rate and the pressure difference inside and outside the nozzle is as follows:

$$\dot{V} = k \times \sqrt{\Delta P}$$

V = air flow rate in m³/h

k = geometrical constant of nozzle

ΔP = pressure difference in Pa

If the unit is equipped with a pressure control option, this control replaces the pressure control described above, as it is no longer usable.

Technical specifications of EC fans

EC FANS WITH ALUMINIUM IMPELLER						
Cabinet		SXS	XS	S	M	L
Nominal diameter	mm	355	450	560	560	560
No. fans		1	1	1	2	3
Max. speed	rpm	1970	1560	1350	1350	1350
Max. power absorbed by each fan	kW	0.50	1.01	2.16	2.16	2.16
No. phases		1	3	3	3	3
Power supply	V	200 - 277	380 - 480	380 - 480	380 - 480	380 - 480
Frequency	Hz	50 - 60	50 - 60	50 - 60	50 - 60	50 - 60
Protection level		IP 54	IP 54	IP 54	IP 54	IP 54
Insulation class		B	F	F	F	F

AIR FILTERS

The filters are pleated and in a rigid galvanized steel frame, filtration class ISO Coarse 75% (ISO 16890-3; G4 - EN779), and designed to minimize head losses and to have a high degree of filtration. The thickness of the filters can be 50 or 100 mm depending on the sizes or the set-ups. The filters are always removed from the front of the unit. Higher efficiency and low head loss filters ISO ePM10 (M5), ISO ePM10 75% (M6), ISO ePM1 50% (F7) may be supplied upon request (refer to the corresponding options for further details).



If the specific option (CF) is ordered, the condition of the filters is constantly monitored by a differential pressure switch that signals when they are excessively fouled.

REFRIGERANT CIRCUIT

The refrigerant circuit comprises:

- Brushless BLDC compressor
- direct expansion evaporator coil;
- liquid receiver (excluding water-condensed size 7.1);
- oil separator in delivery line (excluding water-condensed sizes);
- Electronic expansion valve;
- solenoid valve for shutting off the refrigerant liquid
- refrigerant liquid transit gauge with humidity indicator;
- solid cartridge freon filter;
- safety valve; (excluding water-condensed size 7.1);
- high pressure safety pressure switch with manual reset;
- low pressure transducer with automatic reset;
- on-off valves for external connections (air-condensed versions);
- copper refrigerant pipes with anti-condensation insulation on the suction line;
- 5/16" service pressure outlets on high and low pressure sides;
- 5/16" service pressure outlet on liquid side.

COMPRESSORS

Compressors are either rotary or scroll type (depending on size): they operate with refrigerant R410A and have a power supply of 400V/3~/50Hz. Models with an up to 8kW nominal capacity require a power supply to the compressor of 230V/1~/50Hz (optionally, 400V three phase power).

All compressors are provided with the following:

- internal thermal overload protection which automatically cuts out the power supply in the event of a thermal overload and internal bypass valve between high and low pressure;
- pre-filled oil and heater for crankcase pre-heating;
- internal mechanical non-return valve on gas delivery line.
- acoustic hood.

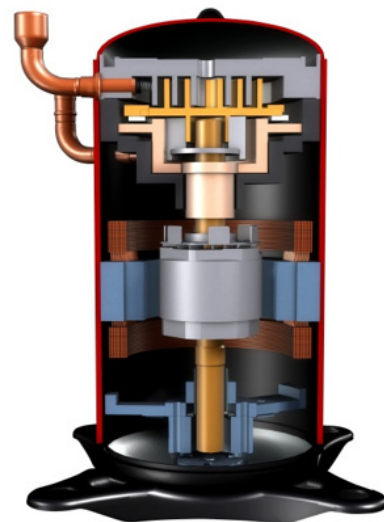
Where the unit features multiple compressors, one compressor shall always be brushless DC, and the other shall be On/Off type.

The unit shall always enable the brushless DC compressor first and shall modulate it according to the demanded thermal load. The remaining fixed compressors (in units with multiple compressors) are enabled as soon as the modulating compressor achieves 90 rps (approx. 75% its potential modulation capability). This solution comes from the need to keep the compressors operational for as long as possible in the highest efficiency area.

BRUSHLESS DC COMPRESSORS

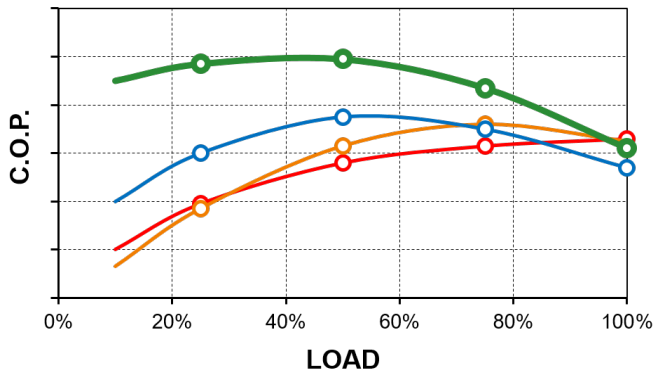
The compressor motor control driver is provided with integral electronic protection against overtemperature, overcurrent, over or under-voltage with absence of one or more phases.

The electronic control of the inverter is provided with automatic soft-start system and continuous control of the compressor curve to prevent and correct its use beyond the maximum allowed limits.



The brushless DC motor is inherently more efficient than an AC motor and it is designed to allow for speed regulation.

Below is a graph showing the efficiency trends of various compressor technologies according to the varying modulation capability. Brushless DC compressors appear to be the most efficient ones in the largest part of the work range.



- Green curve: Inverter-controlled brushless DC compressor
 - Blue curve: Inverter AC compressor
 - Orange curve: Digital scroll compressor
 - Red curve: Scroll compressor On/Off
- Besides higher efficiency at partial loads, the use of a brushless DC compressor offers a significant set of additional advantages:
- possibility to follow the thermal load demand quickly and constantly;
 - possibility to monitor the air delivered to the servers in place of working with the conditioning of the entire room;
 - reduced inefficiencies linked to the thermal inertia effect;
 - possibility to control the temperature more accurately and punctually.

EVAPORATOR COIL

Evaporator coils consist of a finned pack, copper tubes and aluminium fins with a corrugated profile and hydrophilic surface treatment. The sensible heat ratio is close to 1. All direct expansion coils are specifically designed and sized for use with refrigerant R410A, and they are guaranteed for pressure values up to 45 bar. A stainless steel condensation collection basin is installed at the base of the coil, complete with fitting for drain and siphon.

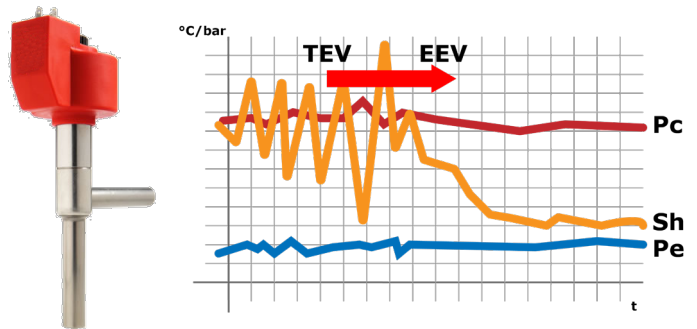


ELECTRONIC EXPANSION VALVE

Datatech+ BTD units are supplied with an electronic thermostatic valve as standard, which offers a number of advantages, including:

- quick and precise adjustment of the refrigerant flow;
- faster achievement of unit stability;
- constant preservation of the superheating value under variable thermal load conditions;
- efficient compressor work conditions, especially with low external temperatures;
- large working field with consequent extension of the operating limits of the unit.

These features contribute to increasing the unit performance and to achieving very significant energy saving results every year (e.g. in continental European climates yearly consumption may be reduced up to max. 12%).



The graph above illustrates the improvement achieved in the controller and in the superheating value (Sh), in parallel with the performance of the evaporation (Pe) and condensing (Pc) pressures, in cases where an electronic valve (E2V) is used.

CONDENSER

- Unit with "EDA" remote condenser
Remote condensers with axial fans (230/1~/50 power supply) are included in air-condensed units (supplied as option) in the standard, low noise, oversize, low noise oversize and high temperature (HT) versions. The fan motors are AC or, optionally, EC brushless (not for HT). The protective devices and the speed regulator are included in the internal unit in this case (this does not apply to some HT models).
speed regulation is designed for correct condensation with outdoor temperatures up to -15°C. When the temperature is below the above threshold, and at temperatures up to -25°C/-35°C, a low temperature kit with flooding condensation control is available;
- Unit with "EDW" water condenser
For units with water condensation, the condensers are braze-welded stainless steel (AISI 316) plate condensers, installed as standard inside the unit.
Condensers are sized for use with tower water at input/output water temperatures of 35/40°C. They may also be used with (total loss) well water at lower temperatures (15°C). In this specific case we recommend that a pressostatic valve for water flow rate control be used (see corresponding option).

HYDRAULIC CIRCUIT (dual fluid units EDA/EDW - DC or FC with reference to the chilled water circuit)

The hydraulic circuit comprises:

- Single- (CW) or interlaced dual-circuit (DW) water-chilled coil
- threaded hydraulic connectors;
- a 3-way chilled water valve with modulating servo control.

The chilled water circuit is PN10.

CHILLED WATER VALVE (dual fluid units EDA/EDW - DC or FC with reference to the chilled water circuit)

Chilled water valves are brass body, ball valves with equal percentage flow on the straight line and linear flow on the bypass line, including threaded female connectors. These valves are supplied with a modulating, microprocessor-controlled servo onboard the machine with 0-10V signal.

Technical specifications of Datatech EDA/EDW - DC or FC (with reference to valve in chilled water circuit)

Model	Kvs (straight line)	Kvs (Bypass line)	max. differential pressure [kPa]
23.1	10	6.3	240
27.1	10	6.3	240
35.2	16	10	240
36.2	16	10	240
45.2	25	16	240
44.2	25	16	240
66.3	40	25	240
82.3	40	25	240

WATER COILS (dual fluid units EDA/EDW - DC or FC with reference to the chilled water circuit)

Coils are finned pack type and they consist of copper tubes and aluminium fins with corrugated profile and hydrophilic surface treatment.

All chilled water coils are supplied with an air exhaust valve and a threaded drain plug, and they are guaranteed for pressures up to 16 bar.

A stainless steel condensation collection basin is installed at the base of the coil, complete with fitting for drain and siphon.

VERSIONS CO-CH-HH

The version in all models indicates the operating mode required to preserve the thermo-hygrometric conditions in the relevant environment.

- CO versions are normally intended for cooling only. They are supplied with a temperature probe on the air return line and they are used to control cooling devices based on the sensed temperature.
- CH versions are provided with heating devices (electric heaters or hot water coils) and, based on the capacity of the heating elements, they are also designed to keep the desired temperature in the served environment switching between cooling and heating automatically.

- HH versions are fitted with cooling, heating and humidification devices. In addition to the temperature probe fitted on the air return line, these units are provided with a humidity probe that is used to control the humidity parameter as well. More specifically, when the relative humidity drops below the desired value, the humidifier outputs vapour into the environment.

The HH version may be supplied without heaters upon request.

Versions CO/CH (where fitted with an additional humidity probe) and HH are also used for de-humidification of the environment whenever the humidity value exceeds the desired threshold. Please keep in mind that the units have limited dehumidification properties for the intended type of application. For more efficient de-humidification, the units can modulate their components to increase their latent heat removal capabilities via software where these operations are programmed. When de-humidification is required, the units can reduce the fan speed and increase their de-humidification capability.

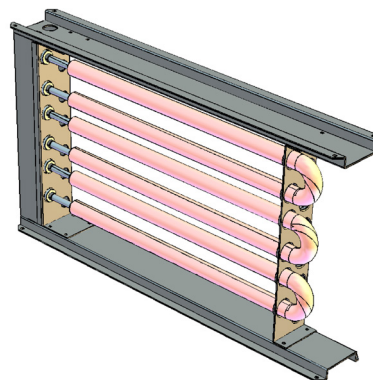
ELECTRIC HEATERS BY VERSION CH-HH

The heating elements are made of AISI304 steel and have low surface temperature, spiral AISI304 steel fins featuring a safety bimetal thermostat. The heating elements are grouped in banks that are made of galvanised sheet metal with a locked electric box or they are installed in circle configuration around the fan ("XS" sizes).

The electric heaters are controlled according to power steps (either one or two depending on the unit size).

- Frames SXS, XS, S: 1 power step.
- All other frames: 2 power steps.

The execution with three power steps is available upon request. Binary management is implemented in this case: Step 1, Step 2, Step 1+2.



HUMIDIFIER FOR VERSION HH

When the necessary option is fitted, the unit can be equipped with an immersed electrode humidifier to wet the air in cases where the air humidity is below the setpoint stored.

The operating principle of the humidifier is as follows. A container featuring electrodes is filled with water until the electrodes are slightly covered, as water serves as the conducting medium between the electrodes. The Joule effect causes the running current to heat the water which evaporates as soon as it reaches the boiling point.

The output vapour is transferred to the environment. The solution with immersed electrodes is fully safe from a health standpoint and it is designed for proportional adjustment of vapour generation.



There are precise relationships between the humidifier potential and the absorbed power. Generally speaking, the following may be stated:

$$P = 0.75 \times Pv$$

where

P this is the absorbed power, expressed in kW;

Pv this is the generated vapour, expressed in kg/h.

Moreover:

$$I = \frac{P}{S \times \sqrt{n}}$$

where

I this is the absorbed current, expressed in A;

P this is the absorbed power, expressed in W;

S this is the rated voltage, expressed in V.

n this is the number of phases in the power supply.

This shows a directly proportional relation between the absorbed current and the generated vapour, which may be summarised in the formula below:

$$Pv = \frac{\sqrt{n} \times S}{0.75} \times I$$

where

Pv this is the generated vapour, expressed in kg/h.

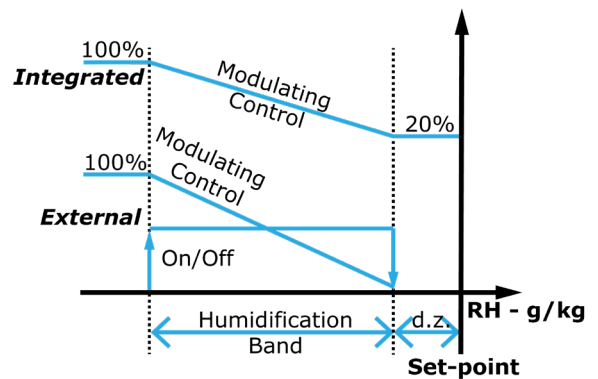
n this is the number of phases in the power supply.

S this is the rated voltage, expressed in V.

I this is the absorbed current, expressed in A.

The microprocessor controller proportionally adjusts the output steam, based on the humidification level required in the room, through the regulation of the current absorbed by the electrodes. Additionally, it controls all the operating phases: water filling and discharge, periodic emptying cycle, viewing of operating status and alarm messages. The end user will be able to select whether the control needs to be based on either relative or absolute humidity.

Upon request, the piloting of an external humidifier equipped with its own controller may be implemented with both a 0-10V signal and an On/Off signal.



The table below shows the specifications of the humidifiers fitted on the units.

Cabinet type		SXS	XS	S - M - L
Max. steam output	kg/h	3	3	8
Max. absorbed power	kW	2.25	2.25	6
Power supply	V/ph/Hz	230/1/50	400/3/50	400/3/50
Water volume	l	2.5	3.9	6
Max. load capacity	l/min	4 c.a.	4 c.a.	4 c.a.
Max. load capacity	l/min	0.6	0.6	0.6
Feed water conductivity	μS/cm	350-1250	350-750	350-750
Filling fitting,		¾"G, male	¾"G, male	¾"G, male
Drain fitting	mm	32	32	32

The humidifier cylinder is not designed for inspections and maintenance. A check should be made that the conditions of feed water to the humidifier are within the allowed limits. Consult the relevant installation, operation and maintenance manual for this purpose.

ELECTRICAL CONTROL PANEL

The electrical panel located in a dedicated compartment and separately from the air flow is made in accordance with IEC standards. It includes:

- a main power switch;
- automatic switches for the power circuit and the auxiliary circuit;
- contactors for power loads;
- phase sequence relays (on direct expansion, three-phase units);
- a transformer to separate the power lines of the power circuits and the control circuits;
- a microprocessor electronic controller;
- an auxiliary terminal board for the electrical connection of loads and external signals/ok signals.

The electrical control panel is always accessible from the front part of the unit. The main power switch is supplied with a door lock handle that prevents opening of the electrical control panel door if the power supply is enabled. (excluding size 7.1) The electrical control panel is structured in such way that it meets protection level IP42.

The microprocessor controller inside the electrical control panel is provided with the following functions/features:

- display showing the return air temperature;
- humidity (versions HH or featuring the relevant option);
- display showing the temperature in the delivery line;
- display showing the fan speed;
- Nominal air flow rate (If the unit is supplied with a pressure control option, the flow rate value is replaced by the pressure value);
- saturated suction and delivery pressure and temperature;
- two-level alarm message(s) (serious alarm and minor alarm);
- log recording of the last 100 alarms;
- operating hour meter;
- display showing the status of the controlled devices;
- display showing the status of inputs and outputs of the microprocessor.

Power supply [V/ph/Hz]: 230/1~/50 ±5% & 400/3~/50 ±5% (option) for size 7.1; 400/3~/50 ±5% for remaining models;

The following potential-free contacts are supplied in the terminal board as standard:

- remote ON/OFF;
- serious alarm;
- minor alarm (message).

BLUE THINK DATA

The Blue Think Data software fully incorporates the know-how and expertise of Swegon-Blue Box in Data Cooling applications. Blue Think Data is developed and constantly updated in-house through a continual improvement process.

Blue Think Data was conceived for the best functionality of the various units and systems installed in multiple machines, and at the same time it guarantees the highest safety level for both the components and application.

Blue Think Data incorporates the following key functions:

- control of return temperature;
- control of delivery temperature;
- delivery temperature restriction;
- control of either relative or absolute humidity in the return line (only applies to units with the necessary sensor and/or humidifier);
- multiple solutions for ventilation control;
- integrated control of brushless DC compressor, with constant optimisation of operation;
- integrated condensation control (where the relevant options have been selected);
- advanced alarm management: recording of 100 alarms in the memory, division of alarms into two categories (minor and serious alarms), smart automatic reset;
- auto restart after a voltage failure;
- function for quick restart (only if the Black Out Restart option has been selected);
- function for absorption limitation, which is implemented either via the setting of a limit absorption value or via an external digital request signal (only if the relevant options have been selected);
- integrated clock for timer-controlled switch-on/off and setpoint variation according to time bands;
- password-protected levels of access to parameter setup pages, protection against undesired tampering or tampering by unauthorised/non qualified staff;
- multi language interface, which the operator can select in real time;
- management of multiple locally networked units (up to 32) for integrated and optimised operation (if the corresponding option has been selected).

Specific functionalities (e.g. Local Network, Air free cooling, Ventilation) and set-up solutions are illustrated in more in-depth details in the relevant sections.

The graphic interface was designed for immediate feedback on the operating condition as well as for easy and efficient access to the various functionalities.

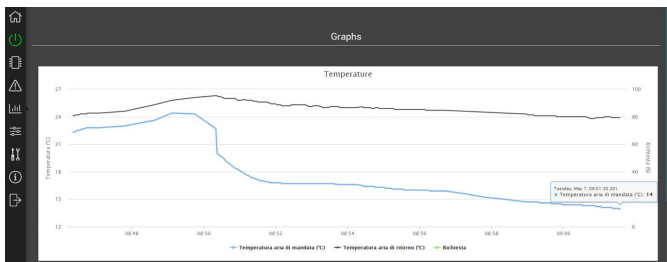


The standard unit offers the following control system interfaces, which are always included and active:

- a Modbus RS485 serial port for reading and writing purposes;
- a RJ45 port for IP communication, including a reading and writing Modbus TCP/IP, available as standard.

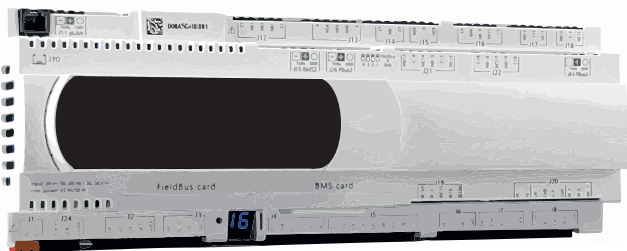
Supervision via WEB is always available with the RJ45 port. When the machine IP address is queried via web browser from any computer connected to the same local network to which the units are linked, access can be gained to the unit web page (password-protected access).

This solution is especially convenient and efficient to view the machine status or to perform maintenance. The solution does not require any dedicated software or hardware and it gives access to a set of graphs which are launched to monitor the trends of the main operating parameters of the unit in real time (temperature, humidity, air flow rate, etc.).



HARDWARE

The operating hardware consists of the following elements:



input/output boards including a 32-bit, 100 MHz microprocessor, with a 128-Mbyte non-volatile (FLASH) memory, 90Mbyte of which are available as file storage, and a 16 Mbyte data memory (RAM). Three different board sizes are used to optimise the number of inputs and outputs with respect to the application;



a humidifier-specific I/O board (which is therefore only fitted if this option is selected) communicating with the master board in serial mode;



a driver for the electronic expansion valve (where this option is selected) to pilot the electronic valve and integrate its data and functions in the machine. Communication with the master board is in serial mode.



The graphic terminal is a 4.3" touch screen panel. The electronic technology featured and the 65.000 colour display help manage high quality images and advanced functions. The touch screen panel is also designed for easier man-machine interaction as it makes screen browsing much more user-friendly.

The display is also supplied with a LED bar featuring different message-associated colours. The machine status can be viewed at any time without having to go close to the display.

Another innovative feature is the front position of the USB outlet for easier access without the use of specific tools.

Type	LCD TFT
Resolution	480 x 272 Wide
Display active area	4.3", diagonal
Colours	67 K
Back-lighting	LCD - Lifetime 20k hrs @ 25 °C
Touchscreen	Resistive
System LED indicators	8-colour notification bar

Set-up DC: Dual Cooling units

Units with Dual Cooling set-up have two coils: one is a direct expansion coil connected to the unit refrigerant circuit and the other is a chilled water coil that is normally connected to an external water chiller.

In addition to the elements normally featured in direct expansion units DC versions also include the following:

- an additional chilled water coil, placed in series with the air flow and located upline of the direct expansion coil, having the same front surface and approximately the same rated output as the coil;
- a 3-way regulating valve with modulating servo control commanded by a 0-10V signal;
- a flow switch and a temperature probe on the water infeed line.

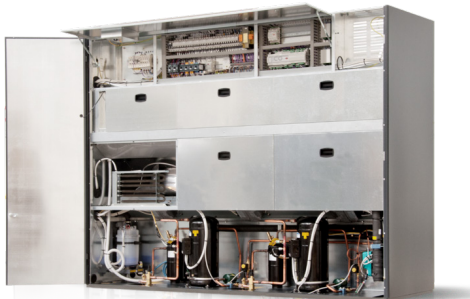
According to the standard operating logic, the unit operates in normal conditions with chilled water. Where there is no water flow (as sensed by the pressure switch) or the temperature is too low (as sensed by the temperature probe), the electronic controller installed on board the machine automatically closes the water coil and switches cooling mode to the refrigerant circuit.

The software includes an Anti Sticking function to prevent operation of the direct expansion circuit to become ineffective when needed after a relatively short downtime. This function is designed to set the max. downtime after which the direct expansion circuit is started and operated for a predefined settable time.

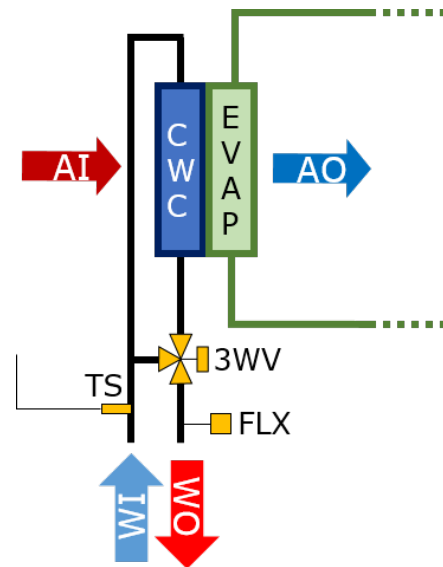
In addition to the above-mentioned operating mode, the software offers a complete range of additional solutions:

- alternating circuit mode, giving priority to the chilled water circuit;
- alternating circuit mode, giving priority to the direct expansion circuit;
- cascade mode, giving priority selectively (the software assigns one circuit the first proportional band and the other the second band).

This type of set-up is especially useful in "critical" applications where service continuity is to be guaranteed or in cases when the available chilled water is not guaranteed 24 hours a day. For maximised availability of the chilled water circuit even in cases when the direct expansion section requires inspection or maintenance, Datatech BTDC units have been designed with a dedicated and separate compartment in which the compressor(s) and the other cooling components are housed.



The Dual Cooling set-up normally includes a 3-way regulating valve. A 2-way valve option may be ordered. In this case, the mechanical flow switch is removed and the virtual flow switch function is enabled. This function periodically checks whether water is supplied in order to enable activation of the chilled water circuit.



- AI:** Input air to be conditioned
- AO:** Output chilled air
- CWC:** Chilled water coil
- EVAP:** Evaporator
- FLX:** Mechanical flow switch
- TS:** Input water temperature sensor
- WI:** Input water
- WO:** Output water
- 3WV:** Three-way water valve

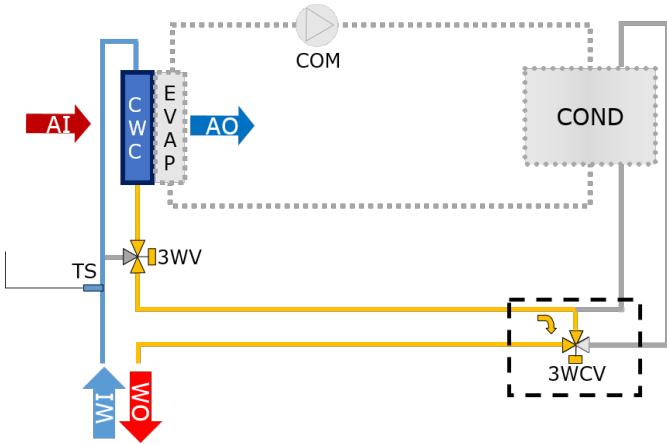
Set-up FC: Free cooling unit

FC units (Free Cooling) are water-condensed, direct expansion units featuring the elements below in addition to standard components:

- an additional chilled water coil, placed in series with the air flow and upline to the direct expansion coil;
- a temperature probe on the input water line;
- two valves on the water circuit: one valve to control the flow in the chilled water coil and the other (supplied for installation by the customer) for condensing pressure control.

The operating logic requires that the unit be coupled to a heat dissipation system, either dry cooler or equivalent type. This solution is designed for input water into the unit (normally glycol water) to be used for direct air cooling at times of the year when the external air conditions are favourable. When this is not the case, water will be used to dissipate the condensation heat. A peculiar hydraulic connection will be implemented to automatically switch between the two operating modes and to use them simultaneously when the water coil can only partially make up for the thermal load.

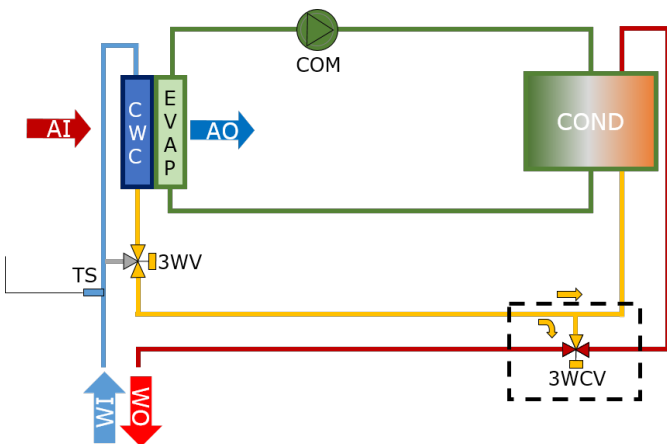
Operation in fully Free Cooling mode:



- AI:** Input air to be conditioned
- AO:** Output chilled air
- COMP:** Compressor
- COND:** Plate condenser
- CWC:** Chilled water coil
- EVAP:** Evaporator
- TS:** Input water temperature sensor
- WI:** Input water
- WO:** Output water
- 3WCV:** 3-way water valve for condensation control (supplied separately from the unit for installation directly on site, outside the machine perimeter; only one valve is provided even when the unit is fitted with two plate condensers, which must be connected in parallel with the valve)

3WV: 3-way valve for capacity control in the chilled water coil

Operation in mixed Free Cooling mode:



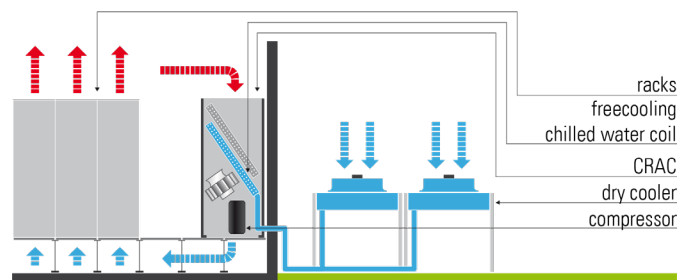
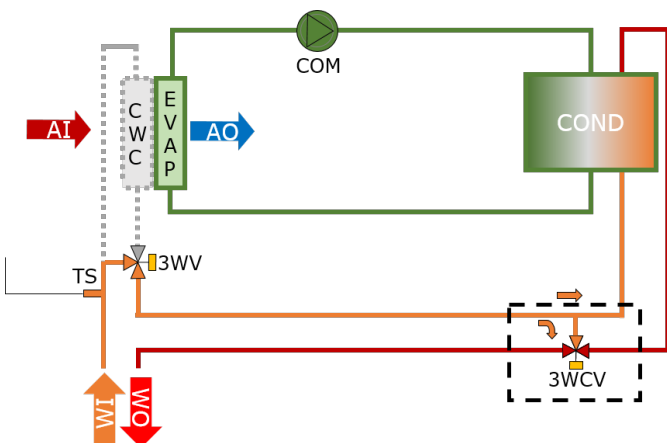
The solution with internal Free Cooling units is generally completed with external dry coolers that are designed for glycol water cooling and pumps for glycol water circulation. The pump is always in operation as long as the internal unit is running and cooling is required.

A dedicated logic is essential for optimised global system consumption as it contributes, among other things, to minimising the consumption of the external dry coolers so as to prevent their consumption to affect the total yearly consumption.

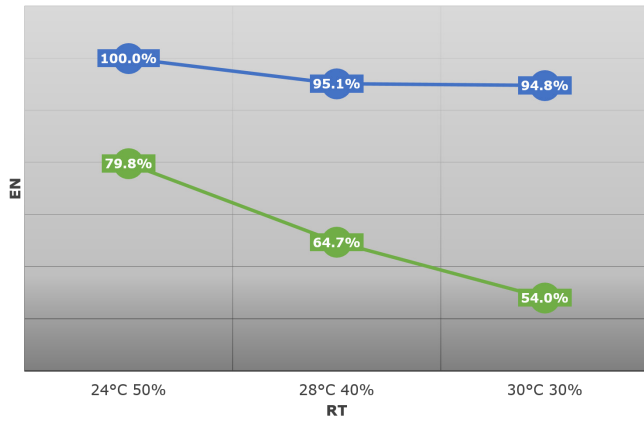
Different solutions are available for dry cooler control. Datatech BTD with the PDC option offers a solution conceived for optimised consumption of the entire system by piloting the dry cooler with a variable setpoint, based on both internal and external conditions (refer to the PDC option for details).

The achievable saving will depend on the place of installation and on the conditions of air return to the air conditioners. Below is a set of graphs comparing the energy annually consumed (EN) by a traditional air-condensed system and a Free Cooling system (including external units and pumps) under three different air return (RT) conditions. As is immediately evident, the saving improves as the return temperature to the air conditioner increases. Finally, if the saving in cooler climate is definitely very high, the Free Cooling solution offers interesting energy saving opportunities in more temperate climate too.

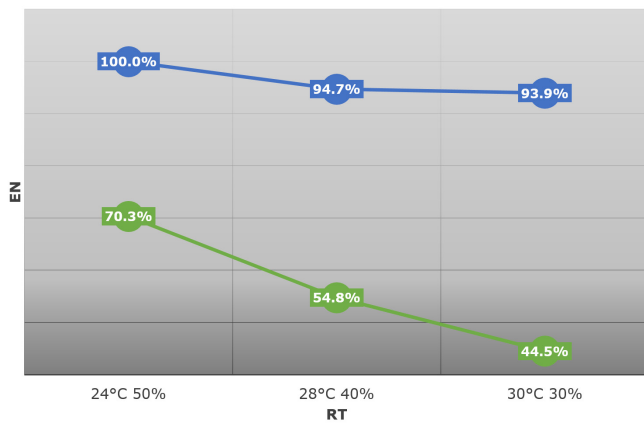
Operation with direct expansion circuit active only:



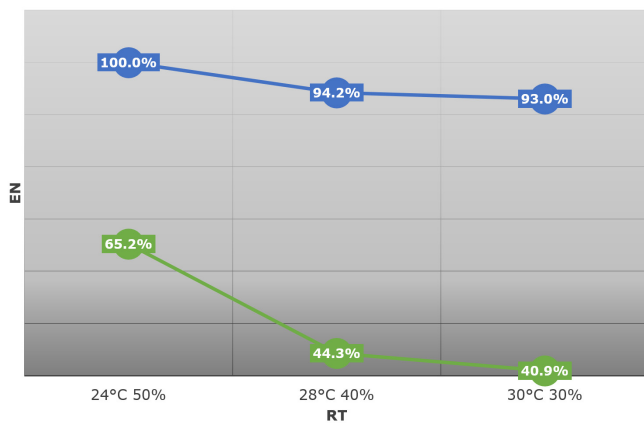
MADRID:



FRANKFURT:



HELSINKI:



TESTING

All units are leak tested for possible leaks. Units are filled with a mix of nitrogen and helium (30 Bar for direct expansion systems and 8 Bar for water circuits). The circuit is pressurised and left in such condition for a predefined period of time (which varies according to the mix used), after which the pressure level is tested. The entire circuit is also checked for micro leaks with a sniffer.

The units are then subjected to a functional test which includes the following, among others:

- inspection that the correct options are fitted and the necessary documentation is available;
- software uploading in the unit controller and parameter setup, based on the unit and the featured options;
- inspection that the probes can read correctly and probe calibration, where necessary;
- functional dry run testing.

The units are finally delivered as follows:

- air-condensed direct expansion units (to be coupled with a remote condenser) - with a nitrogen-filled refrigerant circuit and a compressor featuring a pre-filled oil;
- water-condensed direct expansion units (with a condenser onboard) - complete with refrigerant and oil;

PACKAGING AND SHIPMENT

All Datatech units are anchored to a pallet at the time of shipment, with corners protected by polyethylene angular pieces and wrapped in stretch film.

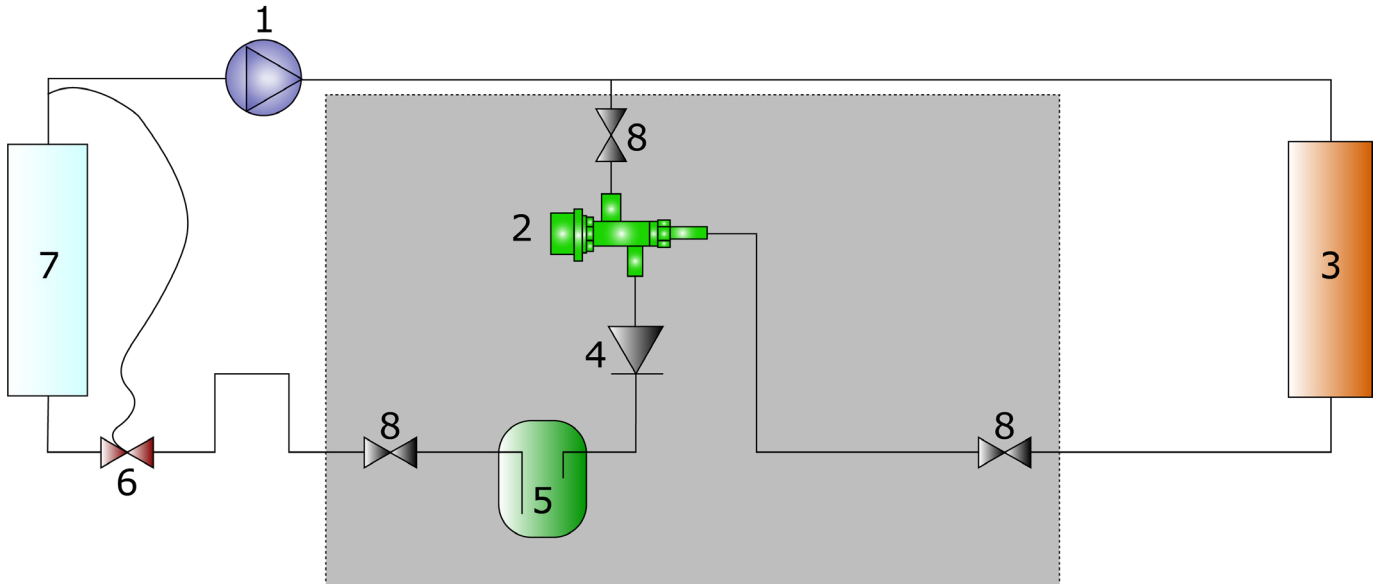
DESCRIPTION OF ACCESSORIES

REFRIGERANT CIRCUIT ACCESSORIES

LAK Low external temperature kit (-25°C)

The low external temperature kit is a solution for condensation control in direct expansion units featuring a remote condenser when the external air temperatures are cooler than the min. operational level. It is normally recommended when the engagement of the condenser fans alone is not sufficient.

The system operates according to the condenser flooding principle and condensing pressure regulation is achieved using a mechanical valve (see figure):

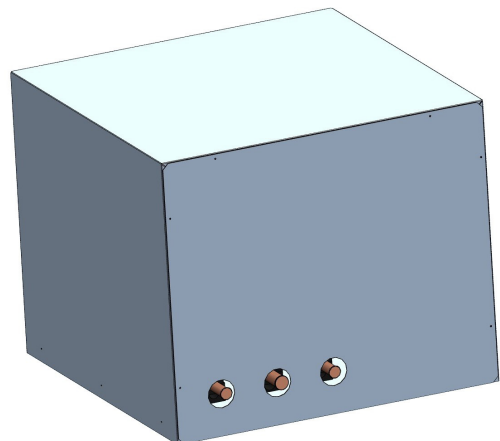
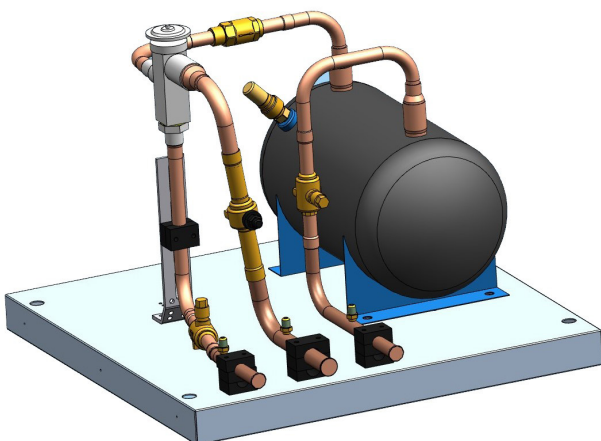


1. Compressor
2. Condensation control valve
3. Condenser
4. Non-return valve
5. Liquid receiver
6. Electronic expansion valve
7. Evaporator
8. Shut-off valve

The kit (two kits for dual circuit units) is supplied as a separate assembly (area within broken line in figure) and it needs to be connected to the unit and to the remote condenser for optimised adaptation to as many unit installations and configurations possible. The kit may be installed near the unit, including underneath a raised floor (where provided), in an indoor place with temperatures exceeding 0°C.

The liquid receiver is not fitted onboard the unit: it will be oversized and installed in the kit.

The option is sized for a min. external air temperature of -25°C.



The table below shows information on the max. overall dimensions of each single kit and the increased volume provided by the liquid receiver in each circuit (difference between standard receiver onboard the machine, which is removed, and oversized receiver included in the kit).

Cabinet	Size	Indicative dimensions [mm]	Receiver volume difference [l]	Quantity
SXS	7.1	602 x 600 x H=500	1.8	1
XS	12.1-16.1	602 x 600 x H=500	3.0	1
S	23.1-27.1-33.1	602 x 600 x H=500	6.6	1
M	36.2	602 x 600 x H=500	1.2	2
	35.2-45.2	602 x 600 x H=500	6.6	1
	44.2-58.2	602 x 600 x H=500	6.6	2
L	66.3-82.3-100.4	602 x 600 x H=500	5.4	2

LAM Low external temperature kit (-35°C)

Same construction logic and functionality as LAK. The option is sized for a min. external air temperature of -35°C.

The table below shows information on the max. overall dimensions of each single kit and the increased volume provided by the liquid receiver in each circuit (difference between standard receiver onboard the machine, which is removed, and oversized receiver included in the kit).

Cabinet	Size	Indicative dimensions [mm]	Receiver volume difference [l]	Quantity
SXS	7.1	602 x 600 x H=500	3.0	1
XS	12.1-16.1	602 x 600 x H=500	8.4	1
S	23.1-27.1-33.1	Contact the factory for details.	12.6	1
M	36.2	602 x 600 x H=500	8.4	2
	35.2	Contact the factory for details.	12.6	1
	45.2	Contact the factory for details.	15.4	1
	44.2-58.2	602 x 600 x H=500	6.6	2
L	66.3 C1 - 82.3 C1	602 x 600 x H=500	5.4	2
	66.3 C2 - 82.3 C2	Contact the factory for details.	12.6	2
	100.4	Contact the factory for details.	15.4	2

SITL Settings for applications with long pipes

This option is required for applications in which the equivalent length between the internal unit and the remote condenser exceeds predefined distances. The option requires proper settings in order to provide for oil return and correct unit operation in similar contexts. For 7.1 and 12.1 sizes, this specifically means 30 to 60m long pipes; 50 to 100m long pipes for all other sizes (equivalent lengths).

BCO Hot gas, post-heating coil with On/Off control

The option is designed to post heat the air under dehumidification conditions and to prevent the application from overcooling. This solution with hot gas contributes to reducing the size of electric components if compared with units featuring electrical heaters, which enables cutting electricity consumption.

The size of the option is such that it is not generally compatible with other heating solutions and water Free Cooling or Dual Cooling set-ups.

BCM Hot gas, post-heating coil with modulating

Similar option to BCO - the only difference is the modulating post-heating controller. The modulating controller contributes to more punctual and precise control of the heating capacity.

AEREAULIC CIRCUIT OPTIONS

AF Dirty filters alarm

Differential pressure sensor used to monitor any head loss through the filters and to warn about the critical threshold setpoint having been exceeded



PLRI Air return plenum

Plenum enclosed on the four sides and open at top and bottom To be used with downflow units (Under) as intake plenum The plenum must be installed on top of the unit.

The plenums have the same construction features as the units: sandwich panels of the same thickness and insulation. Plenums are supplied with the installation kit, complete with the necessary instructions and assembly hardware.



Figure showing a valid example for both PLRI and PLMV

PLMV Vertical delivery plenum

Plenum similar to a PLRI from a construction standpoint to be used with upflow units (Over) as exhaust plenum

Dimension table relating to both intake plenums (PLRI) and vertical air delivery plenums (PLMV):

Cabinet type		SXS	XS	S	M	L
Height	mm	400	600	600	600	600
Width	mm	607	702	1100	1750	2650
Depth	mm	500	650	850	850	850

PLMA Front air delivery plenum

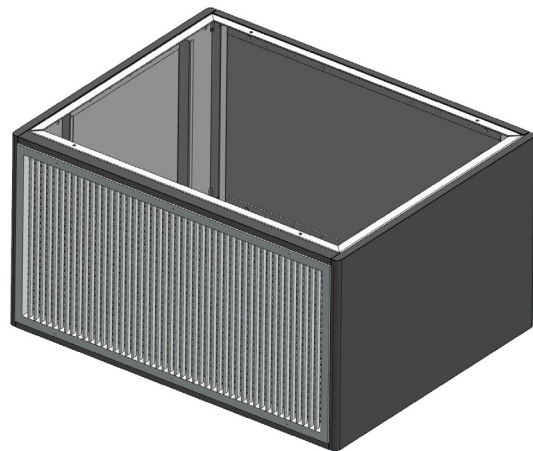
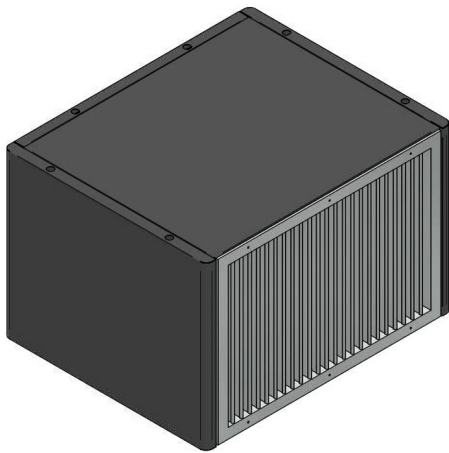
Front air delivery plenum with two rows of adjustable fins, available in two versions:

- closed top - to be used with upflow units to introduce air into the environment directly. It must be installed on top of the unit;
- closed bottom - to be used with downflow units to introduce air into the environment at floor level. It must be installed underneath the unit.

The plenums have the same construction features as the units: sandwich panels of the same thickness and insulation. Plenums are supplied with the installation kit, complete with the necessary instructions and assembly hardware.

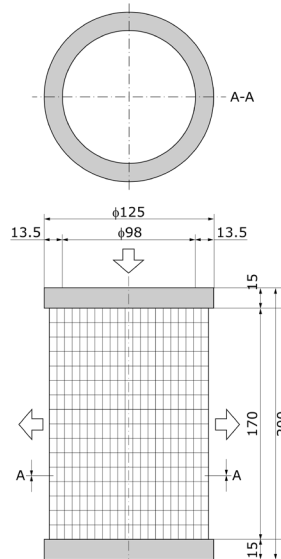
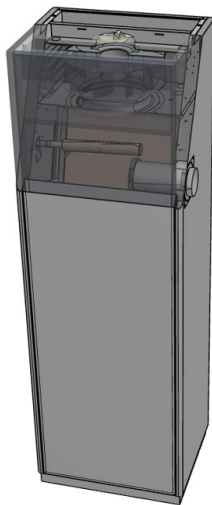
Dimension table

Cabinet type		SXS	XS	S	M	L
Height (PLMA - UPFLOW)	mm	400	600	600	600	600
Width (PLMA - UPFLOW)	mm	607	702	1100	1750	2650
Depth (PLMA - UPFLOW)	mm	500	650	850	850	850
Height (PLMA - DOWNFLOW)	mm	350	500	600	600	600
Width (PLMA - DOWNFLOW)	mm	635	730	1080	1730	2630
Depth (PLMA - DOWNFLOW)	mm	526	676	830	830	830



PARI Fresh air intake with filter

Each unit can be equipped with a fresh air intake to mix the air returning from the environment with a limited amount of air taken from the external environment (5% to 10% based on work conditions). The air inlet - 100 mm in diameter - is supplied with a filter, filtration class ISO Coarse 45% (under ISO 16890-3, corresponding to G3 EN779), and it is positioned in such way as to introduce fresh air downline of the evaporating coil.



FEU5 High efficiency filters ISO ePM10 50% (M5)

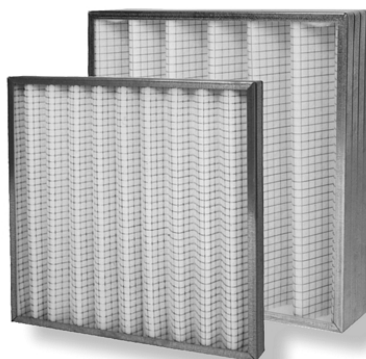
The units are available with filters having a greater filtration level than standard. This purpose is served in particular by a filter, class ISO ePM10 50% (under ISO 16890-3, corresponding to M5 EN779). The filtering material (synthetic fibre) is optimised to guarantee the required filtration class and, at the same time, to minimise the head losses on the air side.

FF6 High efficiency filters ISO ePM10 75% (M6)

The units are available with filters having a greater filtration level than standard. This purpose is served in particular by a filter, class ISO ePM10 75% (under ISO 16890-3, corresponding to M6 EN779). The filtering material (synthetic fibre) is optimised to guarantee the required filtration class and, at the same time, to minimise the head losses on the air side.

FF7 High efficiency filters ISO ePM1 50% (F7)

The units are available with filters having a greater filtration level than standard. This purpose is served in particular by a filter, class ISO ePM1 50% (under ISO 16890-3, corresponding to F7 EN779). The filtering material (synthetic fibre) is optimised to guarantee the required filtration class and, at the same time, to minimise the head losses on the air side.

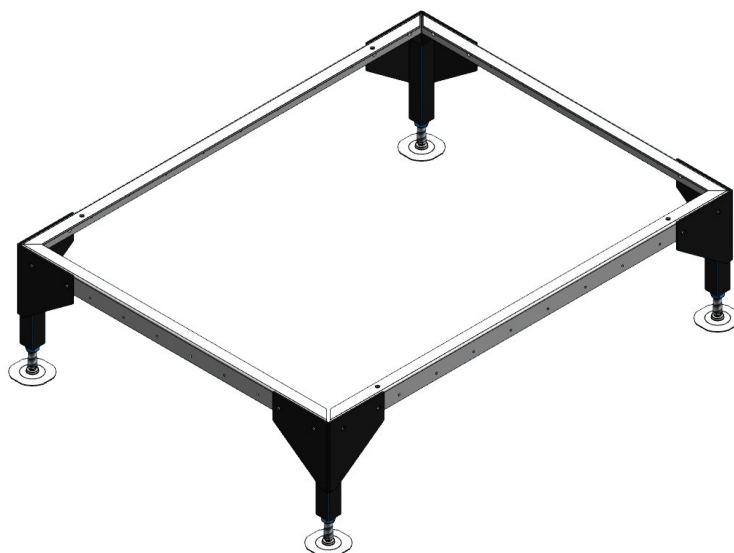


TB30 - TB50 Base frame

The base frame option is available for installations on raised modular flooring. The base frame is made of steel sheets and square-section tubes painted in RAL9005, with adjustable anti-vibration feet supplied with soft pads. The structure is especially robust and stable and it can support the weight of the units.

The base frame complete with legs and feet is supplied in the assembly kit together with instructions and hardware. The feet adjustment range in height is +30/-30 mm.

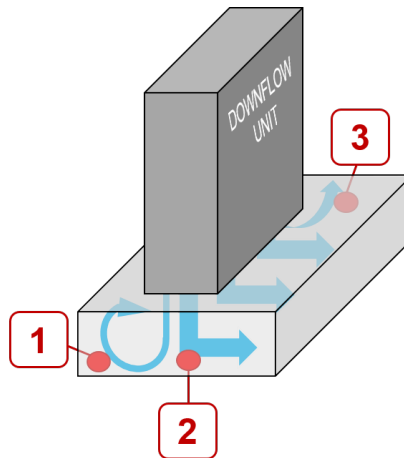
Base frames are available in two standard heights (300 and 500 mm), but intermediate or greater heights are also available upon request.



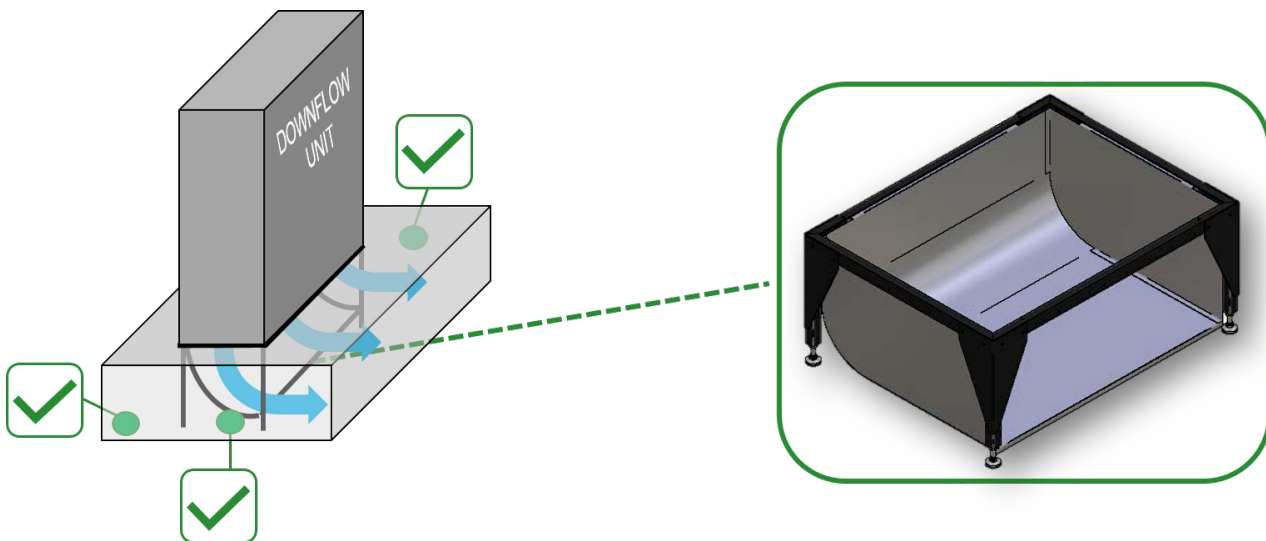
DF30 - DF50 Deflectors for base frames

A deflector may be integrated in the base frame to convey the output air horizontally in the floor. This solution is specifically designed to overcome aerodynamic inefficiencies caused by the air downflow into the raised floor:

1. swirls of stagnating air, chilled but not used for application requirements;
2. inefficiency generated by head losses as a result of a 90° deviation of the air flow;
3. conflicts between side air flows from nearby units.



The base frame with a built-in deflector solves any and all inefficiencies punctually examined above. The side walls prevent conflicts between nearby units. The properly sized deflector gently guides the flow and prevents losses generated by brisk deflection, besides preventing rear swirls.



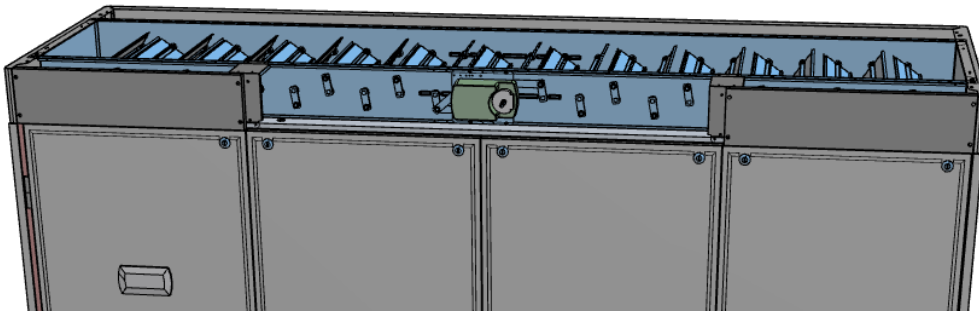
The deflector is normally shipped from the factory assembled to the frame.

SEMO Motor-driven air non-return shutters

Air non-return shutters are available for both down- and upflow units and they isolate the unit from the system when the unit is off. This is, for instance, a solution to prevent the air bypass due to nearby units (where one is in operation and the other is in standby).

Motor-driven shutters are made of galvanised steel and have a leverage-controlled motion transmission system between the elements. Shutters are placed in a 150 mm tall module installed on top of the unit which includes the shutter itself and an On/Off servo control. The solution with a module covering the shutter perimeter was studied for optimised quality from an aesthetic point of view (same panelling and finishing as the unit) and from the standpoint of safety (no risk of crushing in the shutter, sharp corners/edges in the frame guarded with aluminium pieces, no risk for limbs resulting from lever mechanisms or blades).

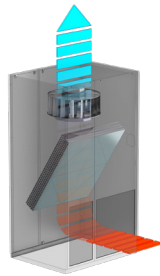
The solution also includes installation of the servo control at the front and a dedicated panel for access. The arrangements above remarkably improve accessibility if compared to solutions with a side servo control and they offer the opportunity to install the units side by side.



If there is not enough space to install a shutter or a physical upgrade is not possible although such functionality is needed, the machine software offers the **Virtual Damper** feature. This solution is designed to enable units in standby (other than for an alarm) to keep the fan running at low speed. It is managed by the controller ($\leq 10\%$) to avoid the air bypass.

RP Rear return

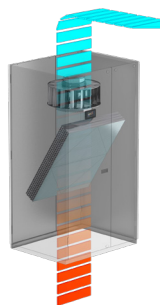
A solution for rear air return is available for upflow units (Over). This solution is especially useful if the units are located outside the room to be conditioned, in a service aisle for instance.



The design has been optimised so as to ship the unit as one single piece (no additional plenums required) and with a standard height.

RD Return from bottom

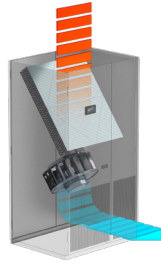
A solution for bottom-up air return is available for upflow units (Over). This solution is especially useful if the units sit on a hot channel designed to convey the return air.



The design has been optimised so as to ship the unit as one single piece (no additional plenums required) and with a standard height.

MF Front delivery

A solution for front air delivery is available for downflow units (Under). This solution is especially useful if the units are installed in small rooms where there is no raised floor. In this case, either side connections or the use of a base (ZB) is recommended.



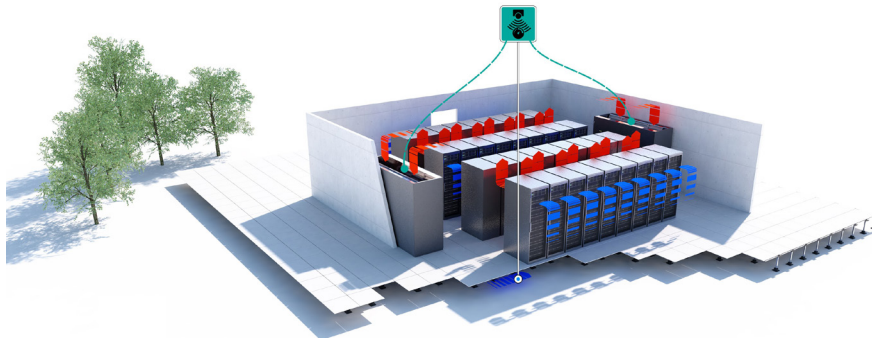
CPA Pressure control in air delivery line

This option is used to check the radial fan speed required to keep the pressure setpoint (ESP) constant in the floor or in the delivery line. Units are therefore supplied with an internal pressure outlet (placed on the return line) and one outlet at the control point. This sensor can only be used for positive pressures.

If multiple units operate in the same area, the regulation value may be set to the min.-medium-max. pressure value sensed by each individual transducer.

The option is available for chilled water units or SC units (without compressor) on condition that these are paired with a motocondensing unit featuring a variable capacity compressor.

Min ESP	0 Pa
Max ESP	100 Pa



CPR Remote pressure delta control

This option is used to check the radial fan speed required to keep the differential air pressure setpoint constant. Units are supplied with a differential sensor with two pressure outlets to be fitted remotely. The sensor is used to check values around zero, i.e. with pressures that switch from negative to positive and vice versa.

This is the ideal solution to contain the cold or hot aisle and it contributes to the optimisation of the air flows as it balances the unit flow rate with the server-processed flow rate through pressure balancing in the compartmentalised aisle.

If multiple units operate in the same area, the regulation value may be set to the min.-medium-max. pressure value sensed by each individual transducer.

This option is similar to CPA: the only difference is that both transducers in the sensor must be installed remotely. The sensor will also be used to check values around zero, i.e. with pressures that switch from negative to positive and vice versa.

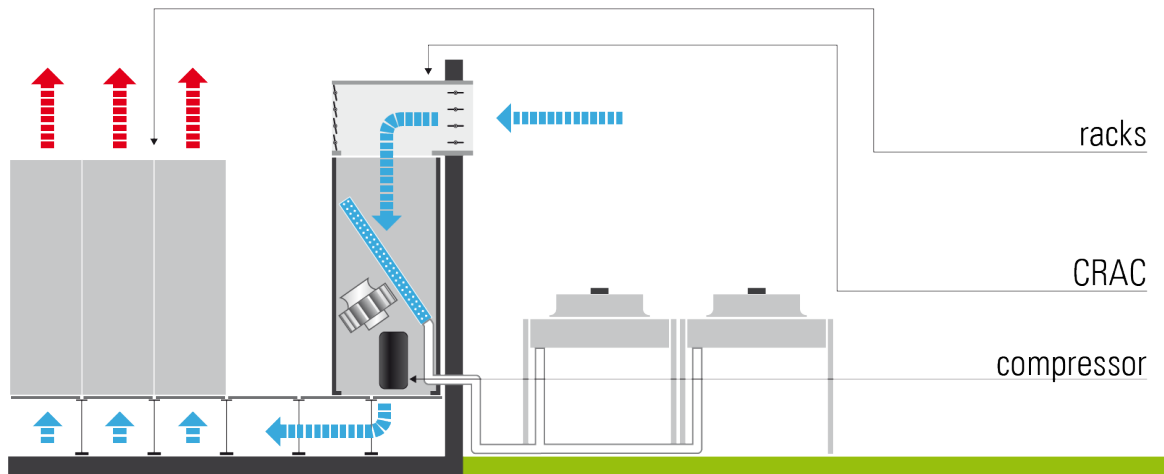
The option is available for chilled water units or SC units (without compressor) on condition that these are paired with a motocondensing unit featuring a variable capacity compressor.

Min ESP	-50 Pa
Max ESP	+50 Pa

FCDA Direct air free cooling

The solution featuring direct free cooling directly exploits external air to reduce consumptions linked to the compressor or chilled water coil.

When the conditions of external air are appropriate, a plenum placed on the air conditioner introduces air into the environment to directly reduce the temperature of the thermal load.

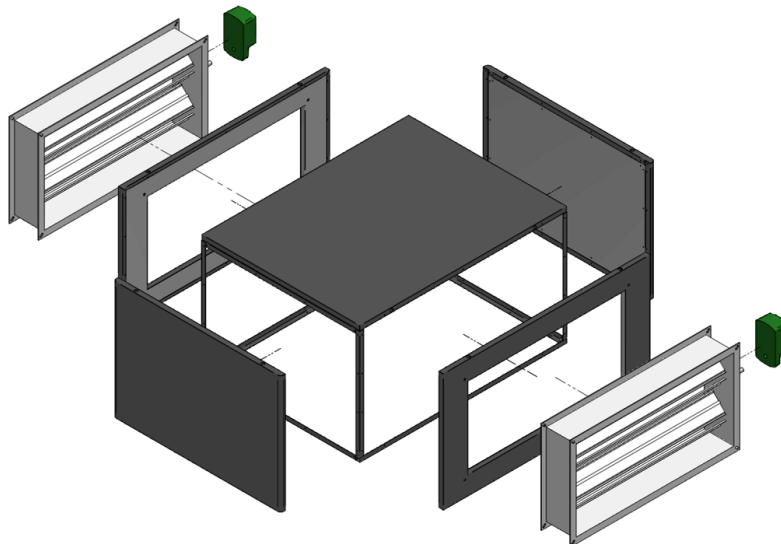


This solution offers remarkable energy saving advantages. However, its applicability must be evaluated, based on the sensitivity of the equipment that needs to be conditioned. The energy saving it will generate depends on the width of the temperature and humidity range admissible in the room, as well as on the external air specifications in terms of cleanliness (physical cleanliness and pollutants).

The option includes:

- air free cooling plenum, complete with an external air shutter and a recirculated air shutter, with modulating servo controls that are activated by the unit microprocessor;
- external air probe, supplied separately from the unit, to be installed by the customer;
- room air probe, supplied separately from the unit, to be installed by the customer;
- delivery air probe, wired and installed inside the unit;
- 0-10V signal to pilot the exhaust fan, where fitted;
- dedicated input to disable free cooling after receiving an external signal (fire - smoke - polluted air signal).

Below is a detailed view of plenum construction. The panels are built with a sandwich solution and they have the same surface finish as the unit. Shutters are outside the plenum layout.



The unit uses external air in presence of favourable conditions. If the external air inflow is not enough to make up for the required load, the controller will start the compressor or the chilled water coil to fulfil the demand for cool air. In the harshest winter months, on the other hand, when external air risks being extremely cold, the unit will mix external air with room air so that the correct temperature is delivered to the servers at all times.

Preservation of the correct pressure in the room requires that the air introduced in the room is the same amount as air released from it.

An overpressure shutter must, therefore, be installed in the room to release the exhaust air.

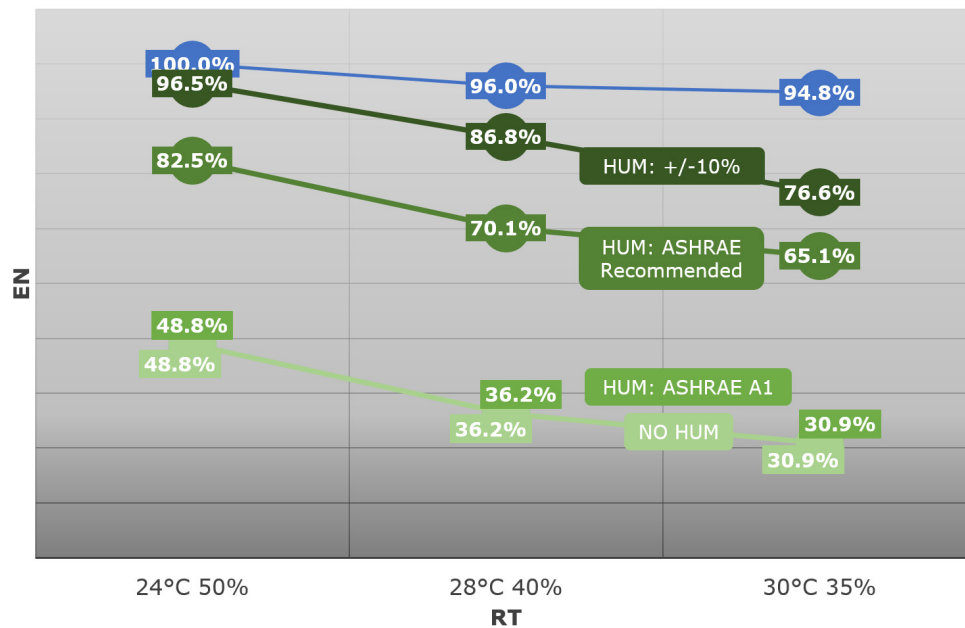
An alternative to the shutter is the installation of a dedicated exhaust fan. In such cases, Datatech offers the opportunity to pilot this fan (using a signal made available in the panel) at a speed that is proportional to the amount of air introduced in the room.

The software also offers the opportunity to define min./max. external humidity thresholds that the unit will check to determine whether to switch to free cooling or not. The case may be that the temperature is suitable for free cooling, but the air is either too dry or too wet and its introduction would require energy to be consumed for humidification/de-humidification. Thresholds depend on the application specifications and their impact in terms of annual efficiency is definitely significant.

Please find below a set of three graphs showing the annual consumption trends relating to a unit covering a sensible thermal load equal to 25 kW. The graphs refer to the climate profiles in Madrid, Frankfurt and Helsinki respectively. The initial condition in each graph is the yearly consumption of an air-condensed, direct expansion unit at a room temperature of 24°C and humidity of 50%. This condition fully represents the reference parameter. The graphs also show the consumption values as the internal temperature increases and if the machine is fitted with a direct air free cooling option for four different allowable humidity thresholds.

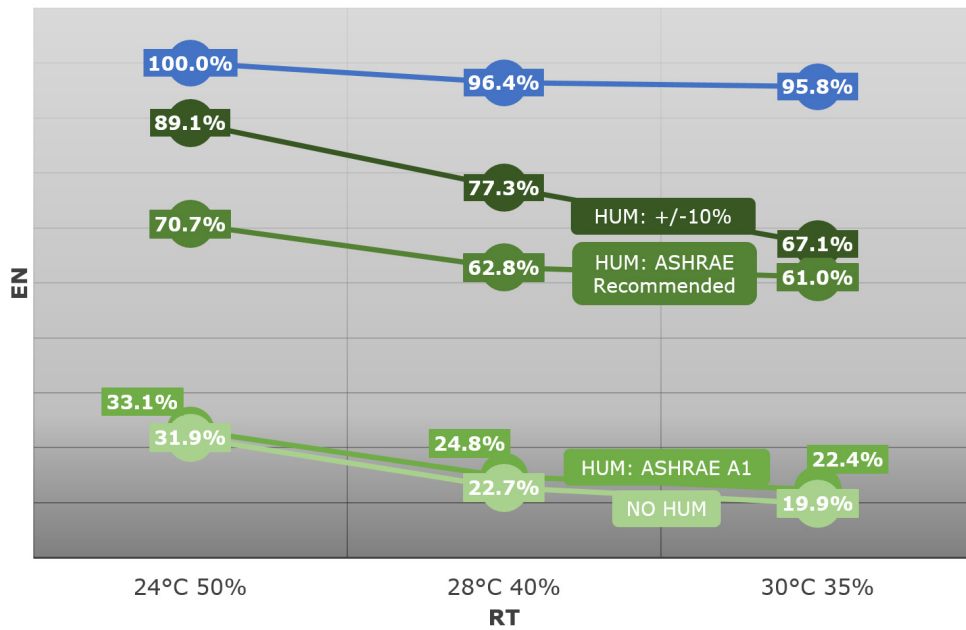
The temperatures refer to the input air conditions in the air conditioning unit; the temperatures in front of the servers always comply with the strictest ASHRAE requirements.

- Strict humidity control: +/-10%
- Humidity control with reference to the areas defined as "ASHRAE Recommended"
- Humidity control with reference to the areas defined as "ASHRAE Allowable A1"
- No humidity control (NO HUM)

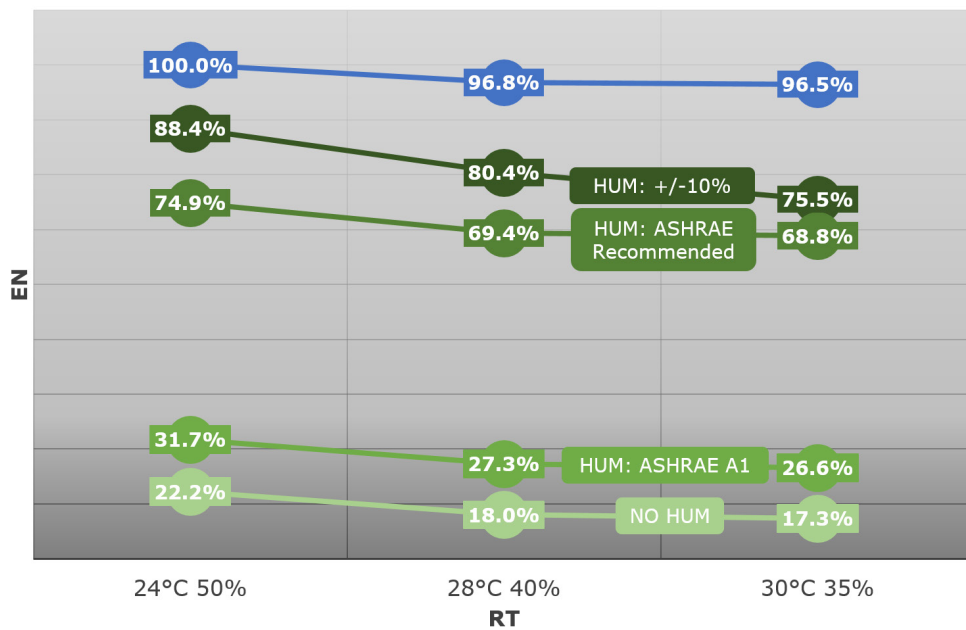


The results for Madrid are shown above. Needless to say, the energy saving increases as the internal temperature goes up and the allowable humidity thresholds are expanded. It is interesting to note that the case where no humidity control is envisaged for a climate profile like Madrid corresponds to thresholds that are in line with the limits of "ASHRAE Allowable A1".

Where a strict humidity control is performed, the energy saving is reduced as a result of the high number of hours in which humidity is not in line with the internal demand.



The results for Frankfurt are shown above. In this case, a difference can be identified between the case with no humidity control and the case with limits according to "ASHRAE Allowable A1". The energy saving value with a strict energy saving control (although smaller than in other cases) is in any case interesting.



The results for Helsinki are shown above. In this case, a difference can be identified between the case with no humidity control and the case with limits according to "ASHRAE Allowable A1". Results are similar to Frankfurt or even inferior in some cases (in terms of % saving), although the city of Helsinki is remarkably colder. This applies to all cases where there is humidity control, of any type whatsoever. The reason for this is that air is very dry during winter periods with very cold temperatures, so it is outside the conditions allowable for free cooling. An extremely cold winter appears to be counter-productive, except in cases with no humidity control.

HYDRAULIC ACCESSORIES

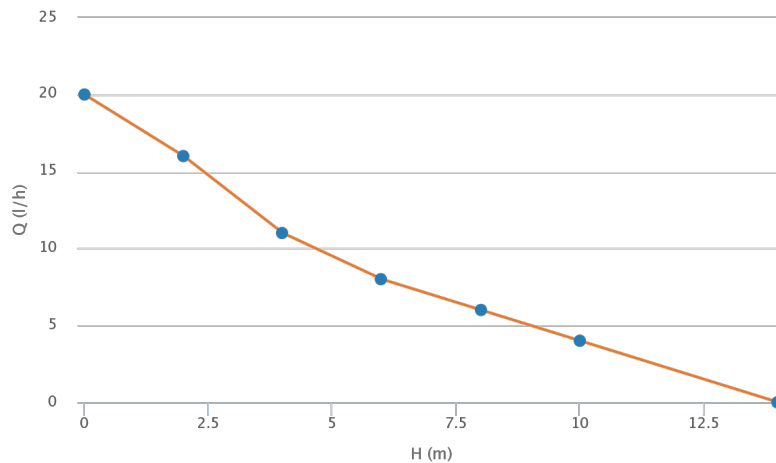
PSC Condensate booster pump

This pump is used to boost condensate that may have formed on the cooling coil and is collected in the condensate tray. It is also used in units featuring a dehumidifier to manage the water exhausted by this device. The condensate exhaust pump is supplied separately from the unit (it is not installed in the unit), but provision is made in the electrical control panel for protections and an electrical connection, plus an alarm signal.

The pump is always duly sized for correct unit operation within the stated operating limits.

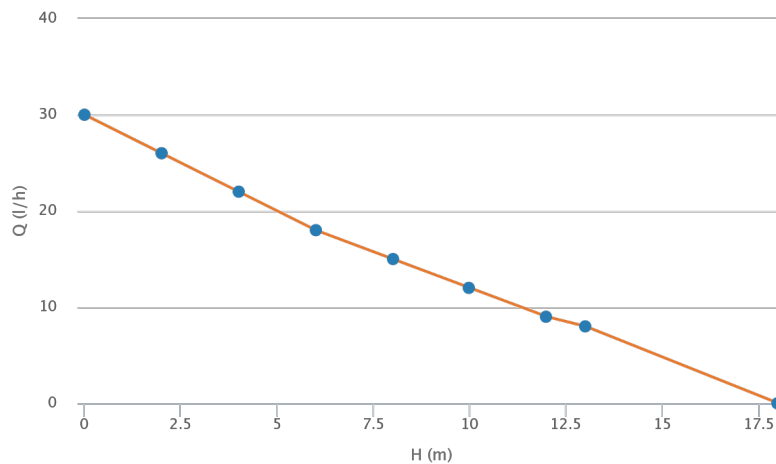
Up to size 27.1 Main specifications

- Length: 96 mm
- Width: 44 mm
- Height: 76 mm
- Power supply: 230 V - 1 ph - 50/60 Hz
- Max. absorption: 14 W



Up to size 58.2 Main specifications

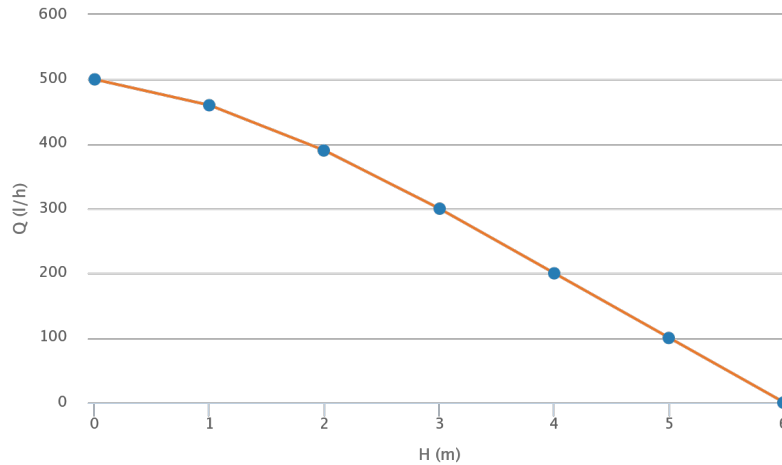
- Length: 66 mm
- Width: 44 mm
- Height: 60 mm
- Power supply: 230 V - 1 ph - 50/60 Hz
- Max. absorption: 21 W



All sizes fitted with a humidifier and remaining sizes even with cooling units only Main specifications

All sizes Main specifications

- Length: 195 mm
- Width: 130 mm
- Height: 135 mm
- Power supply: 230 V - 1 ph - 50/60 Hz
- Max. absorption: 90 W



BPR Hot water heating coil

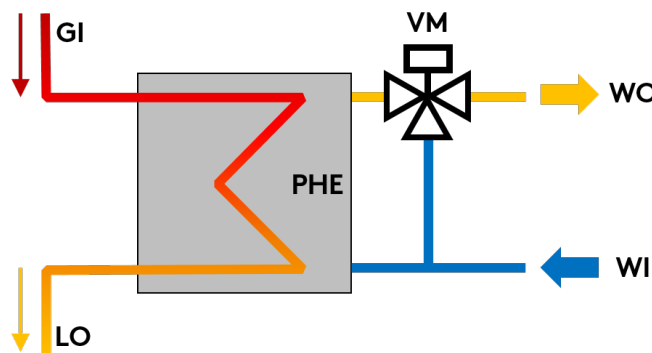
The hot water heating coil is normally an alternative to electric heaters. It is placed downline of the cooling coil and it can operate in post cooling mode when de-humidification is required or in heating mode only.

The coil is with copper tubes and fully aluminium fins. A 3-way valve with a 0-10V regulation signal is always supplied for water flow regulation.

VM Motor-driven condensation control valve

Specifically sized for condensation control in tower water-condensed units (or in closed circuits more generally), this motor-driven valve is a 3-way ball valve equipped with a modulating servo control and it is piloted by the microprocessor via a 0-10V signal, based on the condensing pressure. The optimised water flow rate to the plate heat exchanger is thus guaranteed under all operating conditions.

There is always one valve only for each unit (if two refrigerant circuits and two plate heat exchangers are fitted, the valve must be connected in parallel to both). The valve is supplied separately from the unit for installation by the customer. A two-way connection is possible at all times: it simply requires closing of the bypass line with a proper plug (the hydraulic circuit must be duly studied for variable flow rates to be fitted with either a variable pump or a bypass upline the valve).

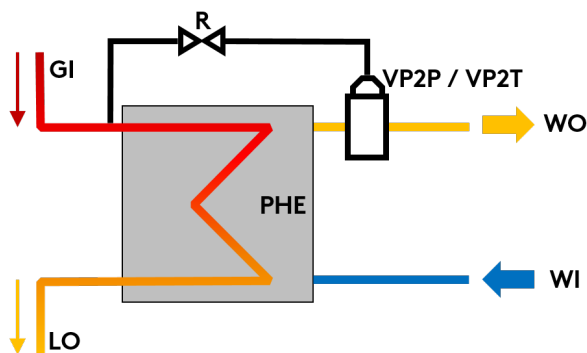


- GI: Refrigerant gas inlet
- LO: Liquid refrigerant outlet
- WI: Water inlet
- WO: Water outlet
- PHE: Plate heat exchanger
- VM: Motor-driven condensation control valve

VP2T Two-way pressostatic valve for tower water

The 2-way pressostatic valve is a mechanical device designed to adjust the water flow rate to the plate heat exchangers in order to keep the condensation pressure at an acceptable level in response to the various conditions of the input water. This valve also fills the role of economizer as it closes when the compressor is switched off.

The VP2T version is sized for tower water (in closed circuit and at normally higher temperatures and flow rates). The valve is always supplied separately from the unit for installation by the customer.



- GI: Refrigerant gas inlet
- LO: Liquid refrigerant outlet
- WI: Water inlet
- WO: Water outlet
- PHE: Plate heat exchanger
- VP2P / VP2T Two-way pressostatic valve
- R: Tap on pressostatic valve capillary

VP2P Two-way pressostatic valve for well water

The VP2P version is sized for well water (total loss water at a relatively low temperature and equally low flow rate). The valve is always supplied separately from the unit for installation by the customer.

VRM2 2-way chilled water valve

The 2-way chilled water valve (units with Dual Cooling set-up) is used for variable flow applications. The 2-way solution is obtained by closing the bypass line. The technical specifications are the same as the 3-way solution.

SIOA Input/output water temperature probes

Chilled water circuits can be fitted with an input and output water temperature probe for viewing/monitoring purposes only. The measured values are shown on a display, but they do not cause any changes to be made to the regulation and control logic.

FLM Water flow meter

Chilled water circuits can be fitted with a flow meter for viewing/monitoring purposes only. The measured value is shown on a display, but it does not cause any changes to the regulation and control logic. Flow meters are supplied bulk for installation by the customer.

ELECTRICAL ACCESSORIES

FUOC Fire sensor

For fire detection with sensors placed on the unit or in its vicinity The sensor is a thermo-differential sensor and can perceive the speed with which the temperature is rising so as to react quickly to the currents of hot air from a fire. It can protect an area of 49 sq.m (7x7).

The sensor is supplied bulk for installation on site. As it operates correctly with air speeds below 0.2 m/s, it must be installed outside the unit (not inside it).

FUMO Smoke sensor

For smoke detection with sensors placed on the unit or in its vicinity This optical sensor is approved at national level by the Ministry of the Interior and it is type-approved at international level in conformity with harmonized European regulations CEN EN 54 part 7 and 8. It can protect an area of 81 sq.m (9x9).

The sensor is supplied bulk for installation on site. As it operates correctly with air speeds below 0.2 m/s, it must be installed outside the unit (not inside it).



The picture on the left shows a fire sensor (FUOCO - FIRE), whereas the picture on the right shows a smoke sensor (FUMO - SMOKE).

REFF 24V relay for remote smoke/fire sensor

If an external fire/smoke detection system needs to be connected to the units, a 24V relay may be required for connection of the potential-free alarm contact from the field to the microprocessor in the unit.

SAL Single-point flood sensor

The flood detection sensor is the recommended solution to monitor possible water leaks which are not visible to the naked eye, typically underneath raised floors. The single-point flood sensor (SAL) consists in a single-point sensor wired to the electrical control panel, which is provided with a long enough cable to position the sensor close to the unit.

The microprocessor warns about the relevant alarm and either switches off the unit or not, based on the selected alarm configuration (serious alarm or simple message).

SA2 2 x Single-point flood sensor

SA2 consists of two single-point sensors: one sensor is wired to the control panel, the other is supplied bulk for installation on site at the required point.

SA3 3 x Single-point flood sensor

SA3 consists of three single-point sensors: one sensor is wired to the control panel, the other two are supplied bulk for installation on site at the required point.

SAN Tape extension flood sensor

The tape extension flood sensor (SAN) consists of a 25m long tape extension sensor. This solution provides for coverage of a larger area around the unit.



The picture shows both the single-point flood sensor (SAL) and the tape extension sensor (SAN).

ALMT No voltage alarm

The No Voltage alarm is a potential-free contact in the terminal board in the electrical control panel. It is closed when the unit is energised.

SCAL Alarm management card

The alarm management board is an extension of the microprocessor control board. It consists in a series of additional (solid state relay) digital outputs (up to max. 4, although the number is variable according to the machine configuration) which can be assigned to 21 different unit operating statuses. This allows for more accurate monitoring of the operating conditions through the remoting (with potential-free contacts) of individual operating statuses or specific alarms.

In addition to the above, the option is supplied with terminals that are directly linked to the digital inputs designed for connection of potential-free contacts for the purpose of:

- disabling the electrical heaters (where fitted);
- disabling the humidifier (where fitted);
- connecting a configurable external alarm.

CP Single potential free operating contacts

All standard units offer the opportunity to remote the signals/functions below through potential-free contacts:

- remote switch-on/off.
- serious alarm;
- Minor alarm (message).

If the configuration is supplemented with the CP option, potential-free contacts are made available in addition to those listed above for the following purposes:

- fan status;
- compressor status (where fitted);

A216 Power supply 230 V - 1 ph - 60 Hz

60Hz power supply for single-phase sizes in the range.

A241 Power supply 240 V - 1 ph - 50 Hz

240V power supply for single-phase sizes in the range.

A41 Power supply 415 V - 3 ph - 50 Hz

415V power supply for three-phase sizes in the range which do not require a neutral. The neutral is applied when the internal unit is required to power a single-phase component (remote condenser, remote single-phase dry cooler, condensate exhaust pump) or whenever dual power supply with automatic switching is needed.

A41N Power supply 415 V - 3 ph - 50 Hz + N

415V power supply for three-phase sizes in the range which require a neutral. The neutral is applied when the internal unit is required to power a single-phase component (remote condenser, remote single-phase dry cooler, condensate exhaust pump) or whenever dual power supply with automatic switching is needed.

A46 Power supply 380-400 V - 3 ph - 60 Hz

60Hz power supply without neutral (380 - 400V voltage) for three-phase sizes in the range.

The neutral is applied when the internal unit is required to power a single-phase component (remote condenser, remote single-phase dry cooler, condensate exhaust pump) or whenever dual power supply with automatic switching is needed.

A46N Power supply 380-400 V - 3 ph - 60 Hz + N

380-400 V / 60 Hz power supply for three-phase sizes in the range which require a neutral.

The neutral is applied when the internal unit is required to power a single-phase component (remote condenser, remote single-phase dry cooler, condensate exhaust pump) or whenever dual power supply with automatic switching is needed.

DAA Dual power supply with automatic switchover

This allows immediate automatic switching to the other source if one of the two power supplies fails, in order to maintain continuity of service in installations where high redundancy is required. This obligatorily requires a dual power supply system.

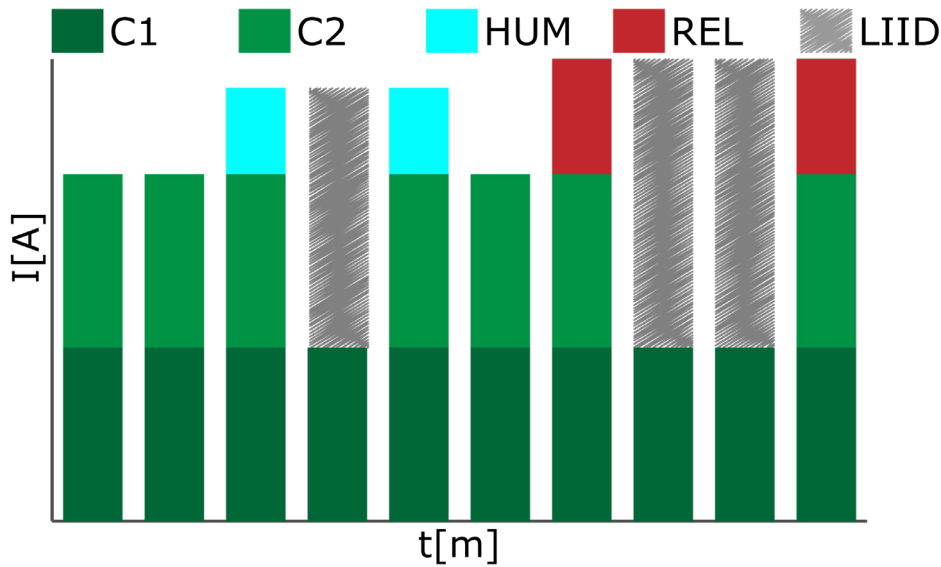
As the two sources do not switch instantly, the unit will be switched off, first, and then switched on automatically. If controller switch-off is to be avoided, thus reducing the subsequent switch-on times, a capacitive condenser (BORU) is available as option to keep the controller operational during the switching phase.

This solution necessarily requires that the power cables be supplied with a neutral.

LIID Limitation of the current absorbed by digital input

When this accessory is requested, a digital input is prepared in the terminal board to activate the forced capacity reduction of the unit to a set fixed level.

This option is useful when the power absorbed by the unit needs to be limited under particular conditions. The controller enables selection of the components to be disabled during forced operation (e.g. electric heaters, humidifier, 1 compressor in units with multiple compressors, etc.).



Example of operation of dual-compressor units with LIID configured to disable the compressor in second circuit, the electric heaters, the humidifier.

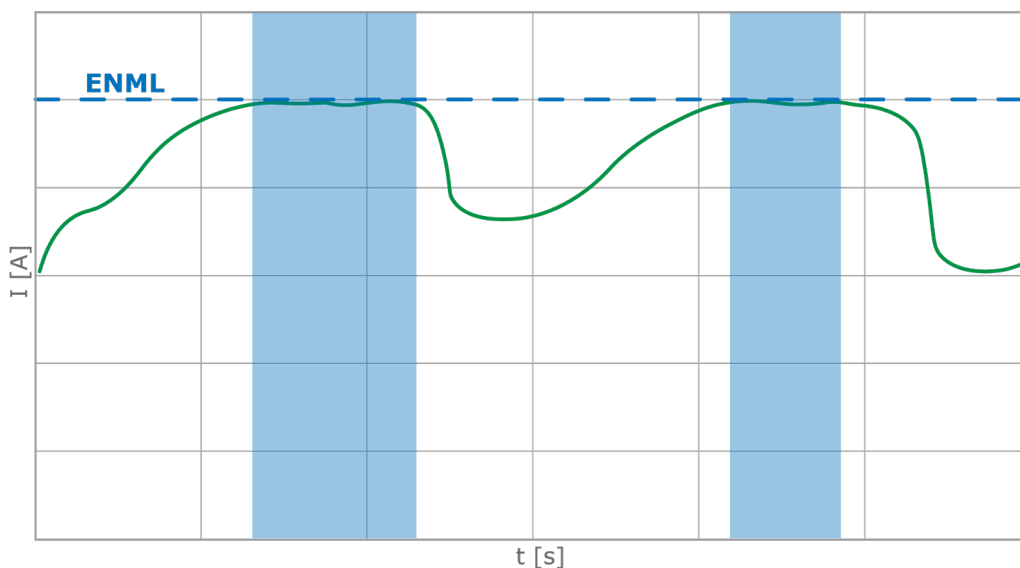
- C1 Compressor in primary circuit
- C2 Compressor in second circuit
- REL Electrical heaters
- HUM Humidifier
- LIID Time for which LIID is active
- I [A] Absorbed current in A
- t [m] Time in minutes

ENML Energy meter with current limiter

The accessory allows the main electrical quantities (including voltage, current, power) to be read on the three phases, via current transformer.

This accessory communicates with the BlueThink controller to supervise the monitored data. The values measured are then made available through the unit display and the web server.

This accessory is designed to limit the maximum current the unit can absorb. The controller instantly checks the absorption levels and, where necessary, it applies a forced capacity reduction that keeps the absorbed current value below the stored threshold.



Picture exemplifying tripping of the function for absorption reduction when scalable devices are engaged.

BORU Blackout restart

For quicker restart after a power failure (blackout), the unit can be supplied with capacitive electrical condensers to keep the controller operational for 15 - 20 seconds (depending on its use). This allows for quicker cooling system restart as soon as the power supply is restored (or switches to the other line in cases with dual power supply).

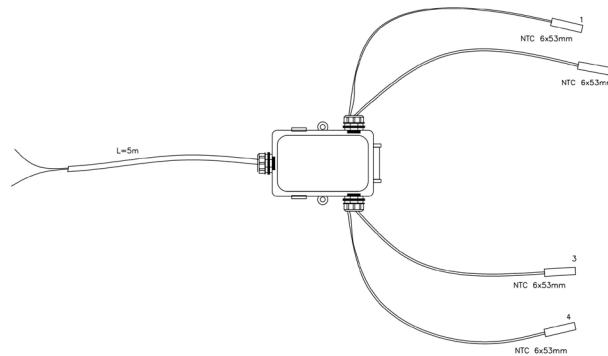


MUSR Multi sensor (4) on return line

Solution with 4 sensors detecting the return temperatures and calculating the average for multi-point reading of the temperature and for more accurate temperature regulation. The option is supplied separately from the unit and it must be wired on site, based on the specific length requirements of the application layout. The option connection cable to the unit is 5m long and the cable of each sensor is 6m long.

MUSM Multi sensor (4) on delivery line

Solution with 4 sensors detecting the delivery temperatures and calculating the average for multi-point reading of the temperature and for more accurate temperature regulation. The option is supplied separately from the unit and it must be wired on site, based on the specific length requirements of the application layout. The option connection cable to the unit is 5m long and the cable of each sensor is 6m long.



SUM Probe for humidity indication

This probe is available for cool only or cool and heat units and it is used to view the return humidity and the de-humidification value.



TR1 1 x Remote temperature sensor

This option is used to command temperature regulation and ventilation based on the values measured by a sensor that is installed in a remote position from the unit (at a max. distance of 30m) and in a closer position to the equipment that requires conditioning.

Where multiple units are fitted, each unit can be supplied with one sensor and the operator can choose whether to use the min., medium or max. value as the reference value.

TUR1 1 x Remote temperature and humidity sensor

This option is used to command temperature regulation and ventilation and to regulate humidity (either relative or absolute) with the help of a sensor installed in a remote position from the unit (at a max. distance of 30m). in a closer position to the equipment that requires conditioning.

Where multiple units are fitted, each unit can be supplied with one sensor and the operator can choose whether to use the min., medium or max. value as the reference value.

TR2 2 x Remote temperature sensor

This option is used to command temperature regulation and ventilation with the help of two sensors installed in remote positions from the unit (each at a max. distance of 30m). The setpoint of the reference value can be the min., medium or max. value of both sensors.

Where multiple units are installed, the value (min., medium, max.) can be calculated as an average of the measurements by all featured sensors.

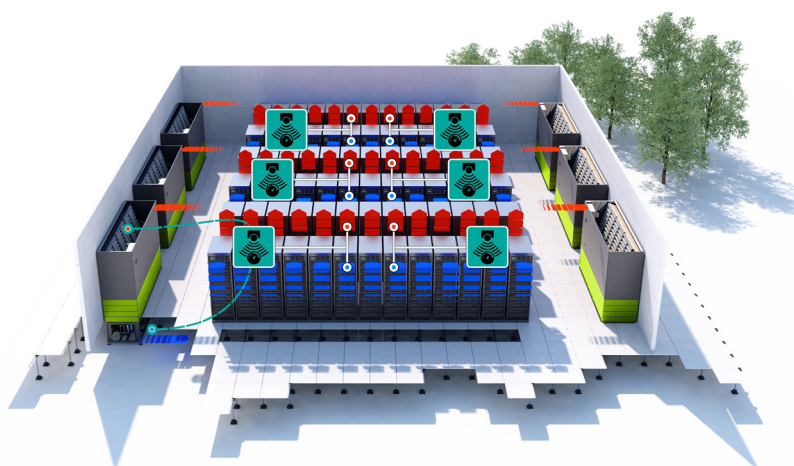
This option is also designed for use of the T Delta controller. This controller solution is conceived to balance the air flow rate processed by the conditioners with the air flow rate processed by the servers in the most accurate and continuous way possible.

The controller can pilot machine ventilation in such way that the difference (delta) between the unit input and output temperature is equal to the difference processed by the servers. For instance. If the application has either hot or cold aisle containment, the regulation of the cold source (compressor / valve) can be set to keep the delivery temperature constant and the fan regulation can be set so that the T delta between the input and output temperature (and the air flow rate as a result) is equal to the delta measured between the front and the back of the servers (including their flow rate).

The efficiency of this solution is enhanced with multiple units. When multiple units are fitted, a higher number of remote readings will be available and their min., medium and max. values can be processed.

The controller changes the fan speed iteratively, according to a logic by which the speed is either increased or reduced until the controller senses the correct air flow. For instance. When the delta temperature processed by the units is greater than the remote reference delta temperature, the controller will increase the fan speed through a small incremental step. The opposite will apply if the delta temperature measured in the machine is smaller than the remote reference delta.

The control is thus extremely regular and precise and brisk actions on the ventilation system are prevented, which may eventually disturb the conditions in front of the servers.

**TUR2 2 x Remote temperature and humidity sensor**

This solution is under all aspects equivalent to the solution with two sensors for remote temperature detection only (each at a max. distance of 30m from the unit). The only significant difference is that the remote sensors in this case can be used to also manage the control of the overall humidity in the room.

TR3 3 x Remote temperature sensor

This option is used to command temperature regulation and ventilation with the help of three sensors installed in remote positions from the unit (each at a max. distance of 30m). The setpoint of the reference value can be the min., medium or max. value of both sensors.

Where multiple units are installed, the value (min., medium, max.) can be calculated as an average of the measurements by all featured sensors.

TUR3 3 x Remote temperature and humidity sensor

This option is used to command temperature regulation and ventilation, and to regulate humidity (either relative or absolute), with the help of three sensors installed in remote positions from the unit (at a max. distance of 30m). The setpoint of the reference value can be the min., medium or max. value of both sensors.

Where multiple units are installed, the value (min., medium, max.) can be calculated as an average of the measurements by all featured sensors.

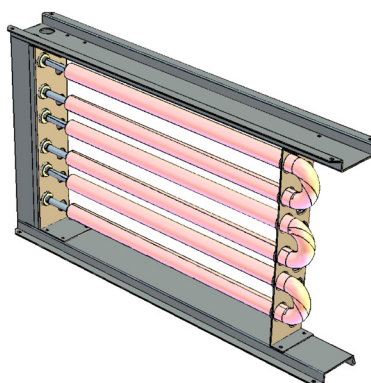
REM Oversize electric heaters

Oversize electric heaters provide for greater heating power - approx. 50% greater on average.

The power increase is approx. 30% for frame sizes SXS.

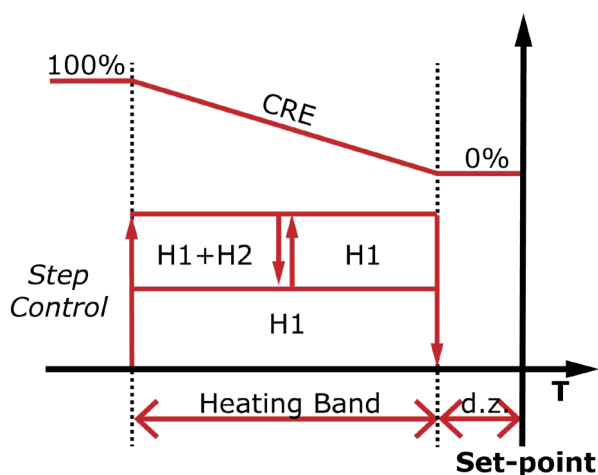
For punctual and precise values, refer to the technical specification tables given in the dedicated section of this document.

The ideal application of oversize electric heaters is in laboratories and metrological rooms where there is a poor sensible thermal load.



CRE Control for modulating electric heaters

If the unit is fitted with electric heaters, modulating heaters can be selected in place of step heaters. Triac-controlled electric heaters can follow the condition of the room with accuracy, thus improving efficiency in heating and post-heating operation.

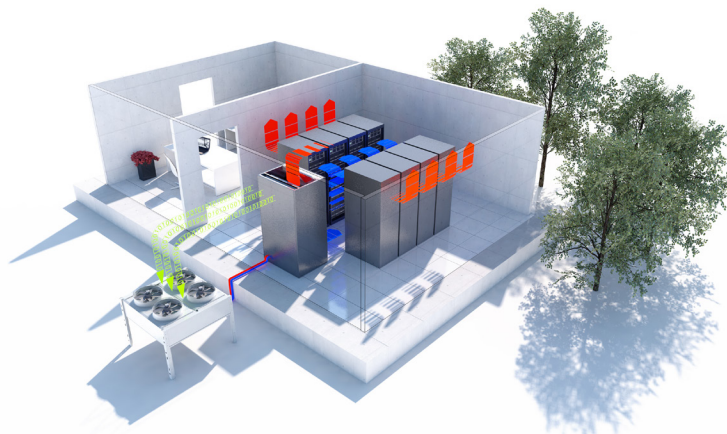


CRM Provision for remote condenser (with speed regulator)

This option is mandatory if an air-condensed, direct expansion unit (EDA) is combined with a remote condenser supplied by our company, type Standard, Plus, Low Noise, with AC fans. This set-up consists in an automatic switch and in the regulation of the fan speed in the remote condenser. Speed is regulated by a phase-cutting speed regulator that is directly commanded by the microprocessor fitted on board the unit. These components are always installed inside the unit.

At installation level, a power connection (phase and neutral) must be created for each cooling circuit between the internal unit and the remote condensers.

In dual circuit units, the unit is supplied with two independent speed regulators to pilot two separate remote condensers.



With this solution the remote condenser is an integral part of the internal unit controller, which results in the creation of a system. This brings about a number of benefits. The main ones are listed below:

- **#B#prevention** instead of reaction - with a remote controller, the condenser responds independently to any changes in the local condensing pressure, whereas with the system-oriented approach the internal unit constantly pilots the condenser, based on the application requirements;
- **homogeneous control** - no risk of conflicts between the remote condenser controller and the controller in the internal unit;
- **simplified site operation** - no risk of catastrophic repercussions on internal unit operation as a result of human errors linked to work performed on the remote control;
- **advanced software solutions** - speed-up solutions to ensure operation in extreme conditions such as in the event of cold start-ups with the risk of frost on the fan; optimization of the system global efficiency thanks to tracking of the best condensation condition;
- **"Night Shift System"** - possibility to set speed limits according to time bands in order to adapt to specific noise conditions on site (e.g. low noise level at night);
- **best response, including in unexpected extreme cases** - design errors (longer piping than expected, narrower piping than required, too close distance between condensers) or poor maintenance (condensers fouled) may cause fake high pressure alarms in remote control conditions. The condenser may "sense" condensing pressures within the limits even in cases when the compressor delivery pressure may have exceeded the limits. Provided that the system design and maintenance must always comply with the guidelines illustrated in the instruction manual for operation, pressure control at machine level directly allows a quicker and more accurate response, including in the extreme cases above.

The table below shows the possible combinations between the fan speed regulators in the remote condenser and the various unit models.

Cabinet	Size	Rated current [A]	Number
SXS	7.1	4	1
XS	12.1-16.1	4	1
S	23.1-27.1	8	1
	33.1	12	1
M	36.2-44.2-58.2	8	2
	35.2-45.2	12	1
L	66.3-82.3-100.4	12	2

CREC Provision for remote condenser EC

This option is mandatory if the unit is combined with an EC type remote condenser supplied by our company. This set-up consists in an automatic switch and in the regulation of the fan speed in the remote condenser. Speed regulation is directly implemented via a modulating signal (0-10V) coming from the internal unit controller. These components are always installed inside the unit.

The operating logic, the system benefits and the currents in the automatic switches are the same as the CRM option.

CRHT Provision for high temperature remote condenser

This option is mandatory if the unit is combined with an HT type remote condenser (high external temperature) supplied by our company. This set-up consists in an automatic switch and in the regulation of the fan speed in the remote condenser. These components are always installed inside the unit.

This solution is equal to the CRM option, the only difference being the size of the speed regulators.

The table below shows the possible combinations of the regulators with the various models.

A speed regulator cannot be installed onboard larger condensers due to space constraints. The speed regulator in these cases will be installed on the remote condenser.

Cabinet	Size	Rated current [A]	Number
SXS	7.1	4	1
XS	12.1	8	1
	16.1	12	1
S	23.1-27.1	12	1
	33.1	In condenser	NA
M	36.2-44.2-58.2	12	2
	35.2-45.2	In condenser	NA
L	66.3-82.3 - C1	12	1
	66.3-82.3 - C2	In condenser	NA
	100.4	In condenser	NA

PDC Provision for dry cooler advanced control

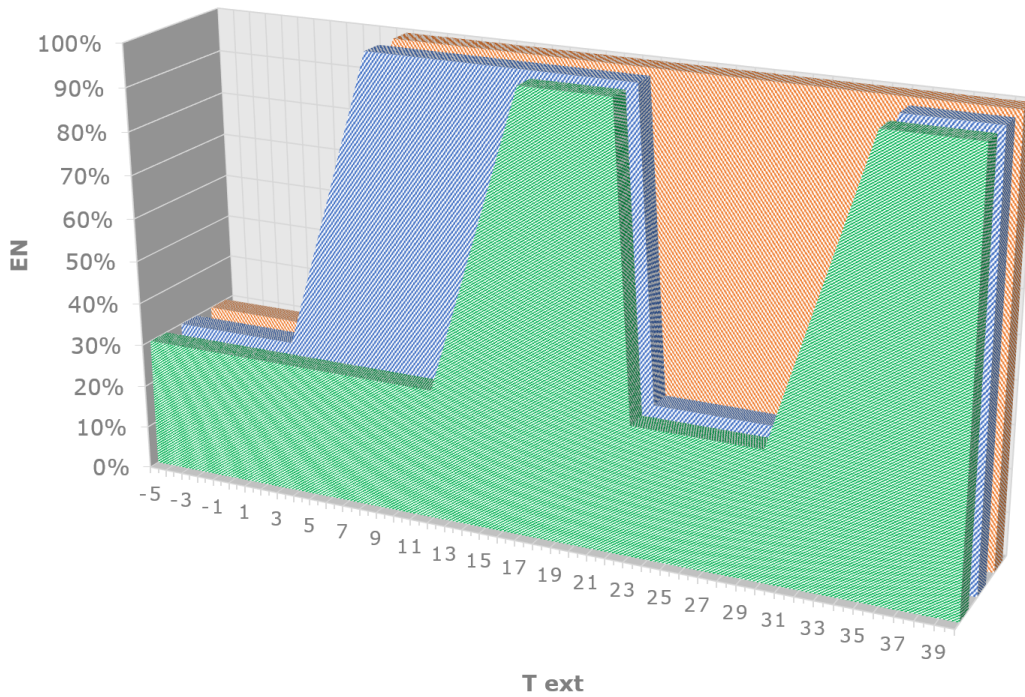
As explained in the section describing the features of the free cooling set-up (FC), the dry cooler controller is an essential component to define the global efficiency of the system. Different solutions are available for dry cooler regulation in such application. The graphs below show the energy used by the dry cooler with respect to the external air temperature, based on different dry cooler control methods.

The graphs were made considering two different conditions for air return to the conditioner and two thermal load levels (full 100% - partial 70%). The partial load case may also be indicative for a full load application on condition that the number of conditioners is such as to include redundancy. For this type of systems, redundancy offers the opportunity to use the entire free cooling capacity installed and to minimise the global annual consumption.

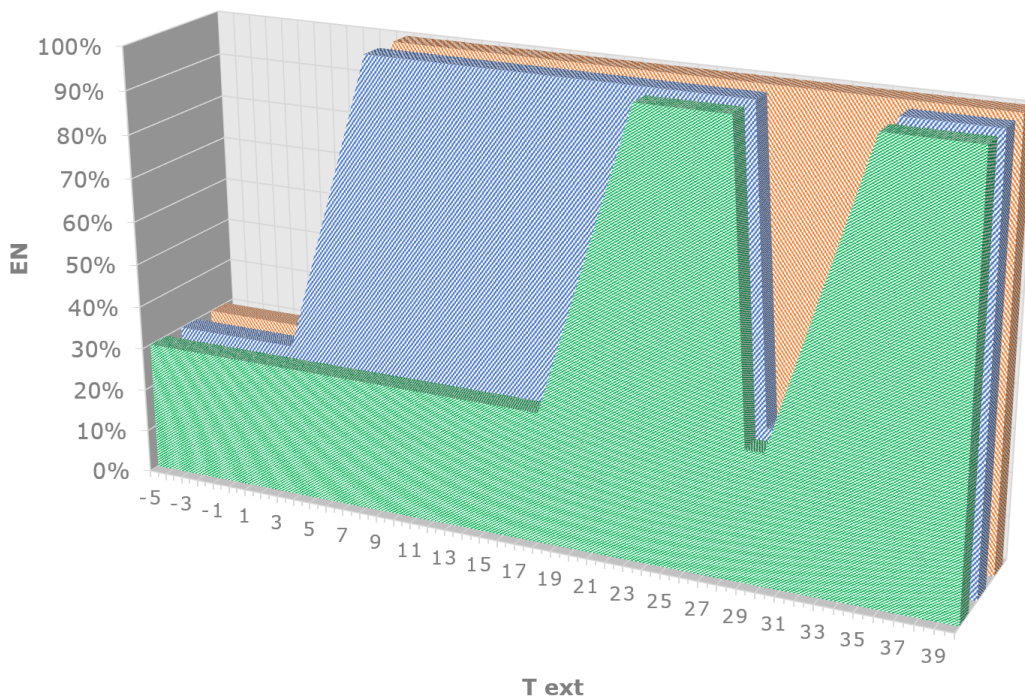
Below is a list of the solutions considered for the comparison.

- Solution with standalone dry cooler control with one single setpoint (**orange area**) This is a very simple solution according to which a very cold water setpoint should be entered for the dry cooler (e.g. 7°C). The dry cooler will attempt to track this setpoint all year round, which will cause it to consume unnecessary energy most of the time in direct expansion operation (when water may be warmer) and in full free cooling, with a consequent overcooling of the water that is then diverted by the valve installed in the unit.
- Solution with standalone dry cooler control and feedback from internal unit, and double setpoint (**blue area** - most frequently used solution in the industry) In this solution, the internal unit (equipped with a probe measuring the external temperature) outputs a signal to the dry cooler when the external air is in potentially free cooling conditions (external air below a differential with respect to the return air to the internal unit). The speed regulator in the dry cooler must accept a double setpoint. The dry cooler will supply water in either "summer" (e.g. water setpoint 35°C) or free cooling (e.g. water setpoint 7°C) conditions, based on the signal received from the internal unit. This solution is definitely an improvement of the previous one as it prevents the dry cooler from wasting energy when operating in direct expansion mode, considering that a water temperature around 35°C provides for excellent condensation conditions. However, as the setpoints are static, the solution is not related to the actual internal work conditions (except for the setpoint change threshold) and significant work areas are not optimised in fully free cooling conditions.

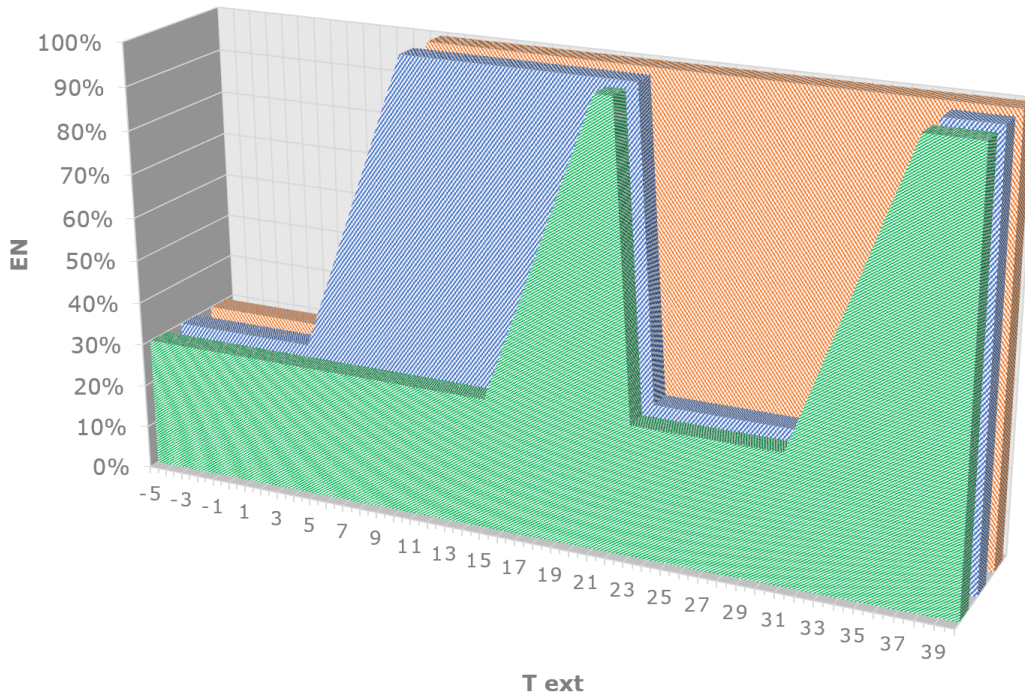
- The solution with the **PDC** option is represented by the **green** curve. This solution (compatible with the dry cooler supplied by Blue Box - Swegon) requires that the dry cooler be supplied with a passive speed regulator which receives information on the fan speed from the internal unit. More specifically, the internal unit calculates the best work condition minute after minute, based on the actual internal conditions in terms of temperature and thermal load. Based on the position of the cold water valve and on the return air temperature, the Datatech BTD FC will output the request for water to the dry cooler so that water is at the highest possible temperature in order to provide for full free cooling. The water setpoint is variable and constantly optimised so that the internal unit can operate in free cooling mode and, at the same time, the dry cooler can use the min. amount of energy possible.



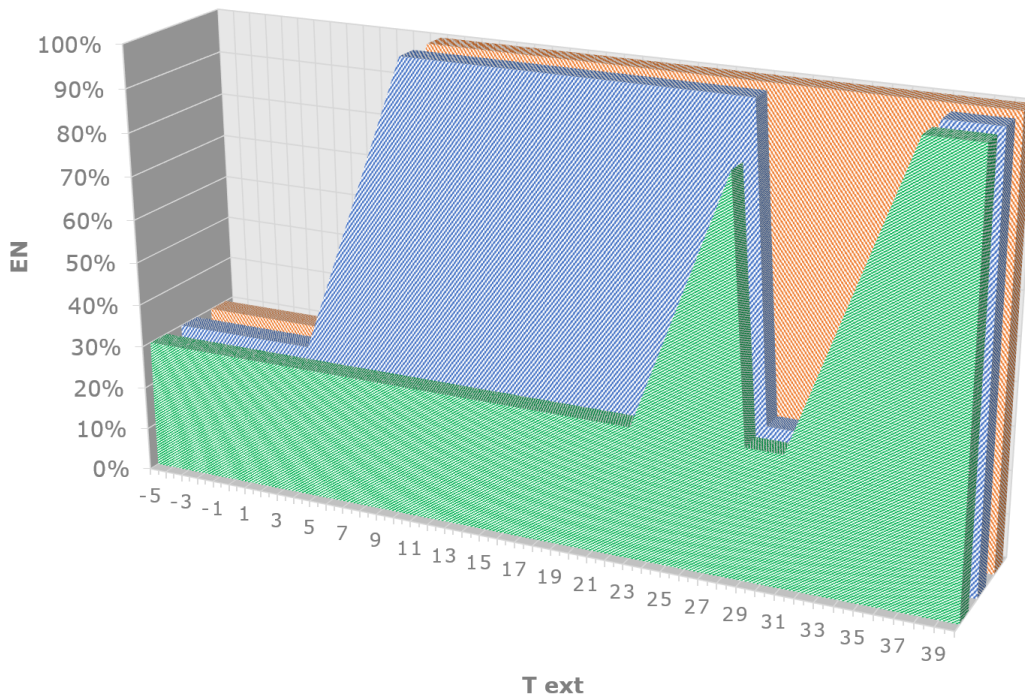
24°C return and full load



30°C return and full load



24°C return and partial load (70% - or redundant operation)



30°C return and partial load (70% - or redundant operation)

The graphs clearly show the enormous saving potential that the Datatech BTD FC controller offers. The dynamic approach and the adaptability of this solution contribute to the exponential increase of benefits as the return temperature rises and at partial loads, if compared to the max. capacity of the unit.

CWDS Chilled water dynamic setpoint

A chilled water system consists of two separate sub-systems: internal units and external chillers (possibly, free cooling type). At partial loads and with a constant flow rate to the primary circuit (or a variable flow rate below the min. flow rate thresholds), the chiller system outputs water at the standard setpoint and this water is then partially recirculated either inside the unit (3-way valves) or through the flow separation system (tank, piping, etc.). This reflects into a system energy inefficiency.

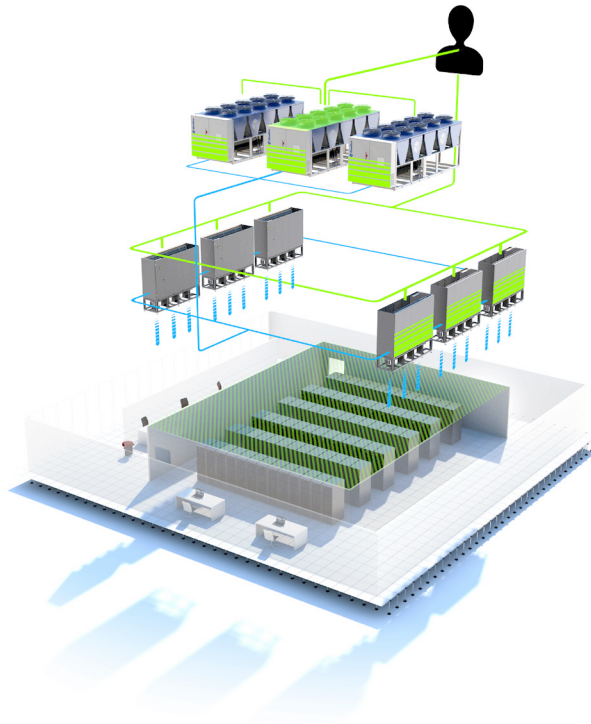
As the highest amount of energy is consumed by the chiller unit, in the ideal operating condition the chiller setpoint should be modified dynamically so as to deliver water to the air conditioners at the highest temperature possible, compatibly with the thermal load. This exponentially improves the system efficiency: as the water temperatures are increased, evaporation improves (in direct expansion mode) and the hours of free cooling increase remarkably.

Solutions have been developed over time to increase the water setpoint of the external chiller unit in an inversely proportional manner, for instance, through a 0-10V proportional signal upon an internal load request. This type of solutions only partly responds to the needs of modern Data Centres. The 0-10V only is a strong limitation in terms of point to point connection of each individual machine (when the connection is lost, the signal is lost too). Additionally, it does not efficiently provide for temperature control on the air delivery line (a far more critical factor as it directly impacts the temperature in front of the servers).

With the CWDS option, direct and smart communication is guaranteed between the set of internal machines and the external chillers, which are supplied by Swegon-Blue Box. Communication is not implemented through one single analog signal, but via continuous exchange of information at a higher level.

This is how internal units dynamically change the water setpoint of the connected chillers, based on the cold water valve position. More specifically, the more the valve is closed, the more the water temperature setpoint is increased; on the other hand, if the valve tends to its max. opening, the internal units will require the chillers to reduce their water setpoint. This prevents sudden disturbance to negatively affect the temperature/pressure in the room.

The aim of the logic is to stabilise the water temperature to such condition that the valve opens in the area where its energy consumption is optimised, leaving a margin for reaction under sudden peak loads, if any.



The picture above shows an example of a typical system featuring a set of internal units and a set of external free cooling chillers.

The solution with smart communication between internal and external units, however, offers the opportunity to provide for solutions with one-to-one systems. This solution requires that each single unit be connected to one single external free cooling chiller. Although it may appear to be less cost-effective, this solution actually is, if the concept of redundancy is added to the equation.

Example.

- Traditional design: 500 kW load handled using 5+1 internal units, 100 kW each, and 2+1 external free cooling, multi scroll chillers, 250 kW each; uncoupled primary and secondary pumping systems.
- One-to-one design: 500 kW load handled using 5+1 internal units, each connected to a free cooling, scroll inverter chiller, 100 kW; direct pumping system between chiller and internal unit, with inertia tank directly installed onboard the chiller.

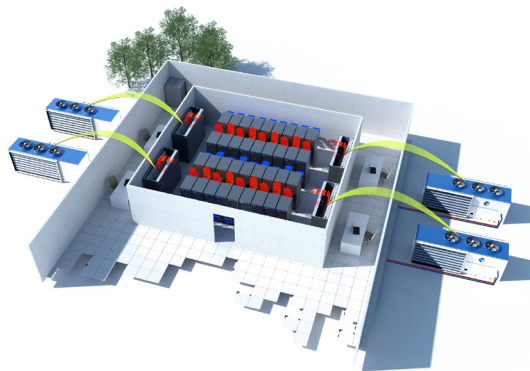
The economic result generated by the chiller section only (as determined by comparing the investment in the chillers only, excluding pipes, tanks and pumping systems) gives a **saving of 15% in one-to-one design**. The above applies even if the units included in the second solution offer an additional inverter on the compressors. The reason for this is redundancy. In a one-to-one system the exceeding cooling capacity can be reduced to cover the N+1 demand, which is the very reason for the above-mentioned saving.

Moreover, a saving is also obtained at system level because of the reduced number of tanks and pumping units.

This solution, however, only works if the system can be converted into a "system of systems". In this case, the CWDS option offers a set of solutions specifically conceived for this application.

- The internal units pilot the demand from the chillers according to the load (when an internal unit is switched on, the chiller is pre-activated to pre-cool the water in the circuit and to provide for greater temperature stability).
- If a unit or the chiller connected to such unit is alarmed, all units in standby start their dedicated chiller in quick start-up mode for better service continuity.
- Units in standby, if any, in systems featuring free cooling chillers are started up to increase the free cooling capacity, when the external conditions allow so.
- Every internal unit - free cooling chiller system will dynamically optimise the water temperature for maximised free cooling of each individual sub-system as well.

These advanced logics, including from the standpoint of energy savings, enable the one-to-one system of the previous example to obtain **an annual saving of 21%, as calculated taking the climate profile in Frankfurt as reference**, over the total energy consumed by the chillers and the pumping system in one year.



The one-to-one solution also offers an additional series of interesting advantages:

- the modularity and scalability of a direct expansion system combined with the effectiveness of a chilled water system with optimised free cooling;
- the possibility to implement a variable flow rate on the chiller in a simple and linear manner without the complications implied in a multi-machine system;
- a simplified layout and a very strong reduction of costs with TIER 3 or TIER 4 design.

NETWORK ACCESSORIES

BAC BacNet serial board

Serial connection boards allow connection to supervision and remote management systems, thereby making it possible to display the main operating parameters and edit the main operational parameters. The BacNet serial board allows connection to supervision systems with the MS/TP protocol.

The monitoring solution is BTL-certified (BACnet Testing Laboratories) and ensures that the system is developed and tested according to the highest standards in the industry.

This option is mutually incompatible with the GLO option (Gateway per Lonworks).



GLO Modbus Lonworks Gateway

With this accessory, a RS485/Lon gateway is installed inside the electrical control panel.

By default, the programming gives read-only access to the control of the unit. Enabling of read/write access should be requested when ordering.

This option is mutually incompatible with the BAC option (BacNet serial protocol).



PSN SNMP protocol

The accessory consists of a gateway that allows Ethernet connection to a SNMP manager supervision system.

SNMP

Simple Network Management Protocol

PBA BACnet protocol over IP (Ethernet)

The controller is set for use, in read and write mode, of the BACnet port on IP protocol.

By default, the programming gives read-only access to the control of the unit. Enabling of read/write access should be requested when ordering.

The monitoring solution is BTL-certified (BACnet Testing Laboratories) and ensures that the system is developed and tested according to the highest standards in the industry.



GRLD Datalink local network management

The local network Datalink is managed for communication among the various air conditioning units for the purpose of optimising system operation in terms of control efficiency and effectiveness. The local network Datalink is designed for connection of multiple Datatech BTD units (up to 32).



Management of the local network Datalink converts a set of multiple machines into one single smart system and is designed for the configuration of unit control in the system via different solutions.

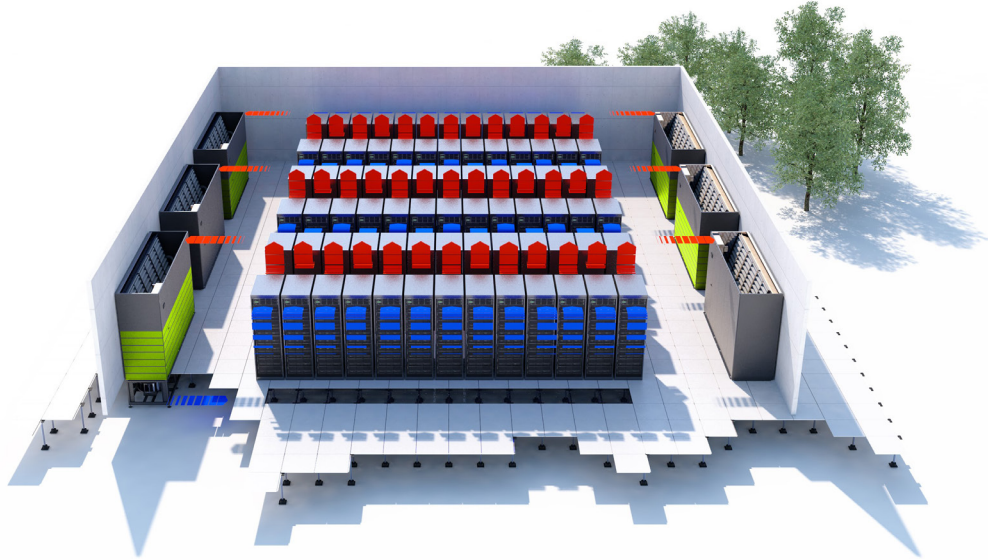
- **Running-Standby** This function is intended to control redundant units that rotate together with the main units allowing for their homogeneous use and preventing possible conflicts between machines.

Units in standby can also be called up in the event of serious alarms occurring in the active units.

Finally, a function can be configured to call up units in standby if a Hot Spot is provided in the room.

This configuration is recommended with units having a fixed cold source (e.g. stationary compressors).

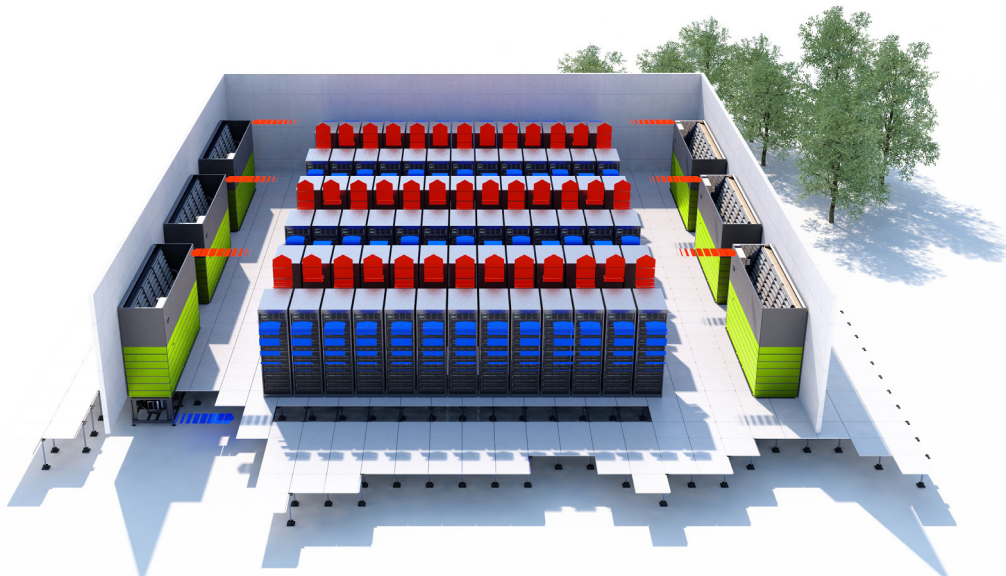
To address any localised hot spots, each single machine can be configured to automatically exit the network for a predefined time when peak loads need to be covered. As soon as the emergency condition has been solved, the units are networked again.



- **Distributed control** Units operate as if they were one big machine. Units share the values read by the probes and they operate according to the averages (max. or min. values) of all detected signals.

To address any localised hot spots, each single machine can be configured to automatically exit the network for a predefined time when peak loads need to be covered. As soon as the emergency condition has been solved, the units are networked again.

This solution is recommended with units having a cold source, a modulating fan and a thermal load close to the nominal value.

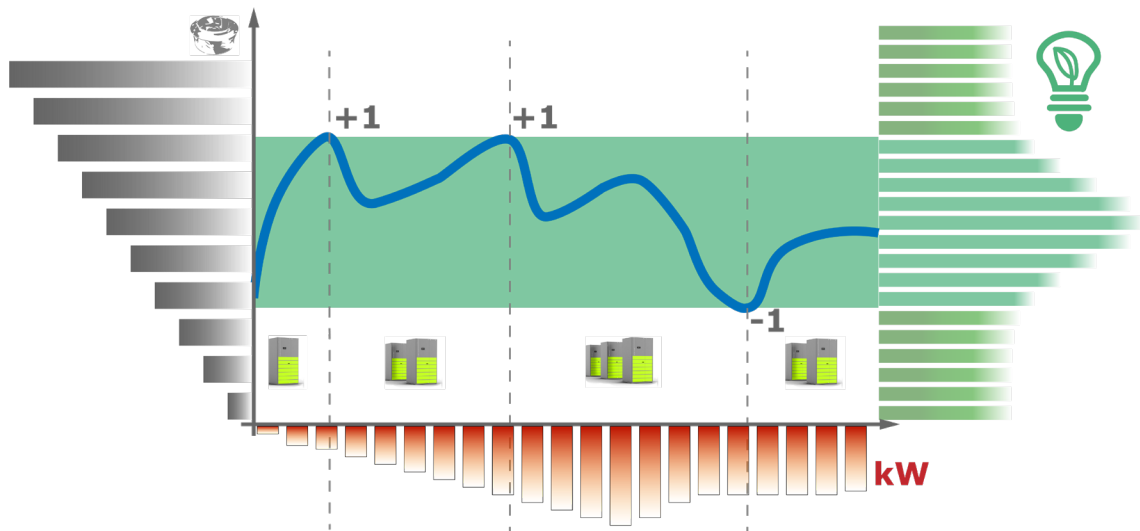


- **Dynamic and Continuous Optimisation** This function was developed to help the networked machines follow the load trends over time (both in terms of cold source and ventilation) in the most effective manner possible. Units share the readings of the probes and they are enabled one at a time as the demand grows.

In other words, as using the performance of the efficiency curves of components with brushless motors (e.g. EC fans) is the final target, the system does not wait until each unit is saturated before calling the next one; the second unit is indeed enabled as soon as the first one has achieved the threshold which represents the max. efficiency point. Active units operate as if they were one big unit.

With this solution, the number of machines always in operation within their max. efficiency area is the minimum required.

This solution is recommended with units having a cold source, a modulating fan and a variable thermal load over time.



If the connection between the units fails, the units will individually work in "stand alone" mode.

Other accessories

GRSU Grid on the top part for non-channelled overfloor units

The fan is installed on the top part of the unit in upflow units. In most installations this type of units is channelled. On the other hand, if the unit has a non-channelled air delivery, this option allows for the installation of a grid on the top part to increase safety and to reduce the risks to which an operator may improperly be exposed while the fan is in motion.

VACO Stainless steel unit containment tank H=20mm

The containment tank is designed for placement under the base frame (option) of units that are installed in environments with raised flooring. The purpose of the tank is to collect and contain any leaking water from the unit, where applicable. We recommend that this option be installed together with the flooding sensor, to be fitted inside the tank.



The containment tank is 20mm tall for all cabinets. Its dimensions change according to the table below.

Cabinet type		SXS	XS	S	M	L	XL	XXL
Width	mm	650	745	1145	1795	2698	2698	3345
Depth	mm	550	700	900	900	900	940	940

ZB Base

The 200 mm base, which is the same size as the base of the units to which it is coupled, was designed to run the electrical, hydraulic and refrigerant connections underneath the upflow or front delivery units. This option is useful in installations without a raised flooring and where the units (upflow or front delivery units) directly sit on the ground.

The base is supplied with various side and front openings (front openings are covered with a cover plate).

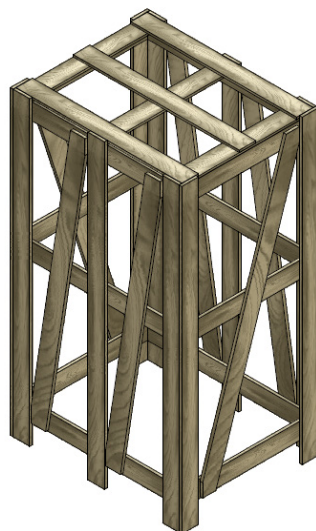


This solution is shipped already installed on the machine for easier and quicker assembly on site. The table below shows the dimensions of the base.

Cabinet type		SXS	XS	S	M	L
Width	mm	585	680	1080	1730	2633
Depth	mm	480	630	830	830	830

GABB Packaging in wooden crate

The units can be packaged in a HT wooden crate, in accordance with Directive ISPM15, suitable for export and ocean/container/air transport in addition to the standard packaging with profiles and stretch film.



Moisture absorbing desiccant bags can be added to the units, upon request, to protect them against moisture during long distance ocean freight.

IPL Wooden crate packaging for return/delivery plenum

If the unit is packaged in a wooden cage and it is provided with a plenum as an option, the plenum must be placed in a dedicated wooden crate.

IZB Wooden crate packaging for Base

If the unit is packaged in a wooden cage and it is provided with a base as an option, the base must be placed in a dedicated wooden crate. The base is shipped separately from the unit.

ISE Wooden crate packaging for Shutter module

If the unit is packaged in a wooden cage and it is provided with a motor-driven shutter as an option, this option must be placed in a dedicated wooden crate. The shutter module is shipped separately from the unit.

ITB Wooden crate packaging for Base frame

If the unit is packaged in a wooden cage and it is provided with a base frame as an option, this option must be placed in a dedicated wooden crate.

IDF Wooden crate packaging for Base frame with deflector

If the unit is packaged in a wooden cage and it is provided with a base frame with deflector as an option, this option must be placed in a dedicated wooden crate.

LED LED edition

The Led Edition panel is available for Datatech+ units with a variable speed compressor. The wording "Datatech" is laser stamped and LED backlit.

TECHNICAL SPECIFICATIONS

Datatech+ BTD ED-Direct expansion version

Unit size			7.1m	7.1t	12.1	16.1	23.1
Total refrigeration capacity	(1)	kW	6.9	6.9	11.9	17.2	21.5
Sensible cooling capacity	(1)	kW	6.7	6.7	11.7	15.0	20.5
SHR			0.97	0.97	0.98	0.87	0.95
EER	(1)		3.77	3.77	3.60	3.59	3.66
Max. total cooling capacity	(2)	kW	9.1	9.1	14.2	22.2	27.1
Max. sensible cooling capacity	(2)	kW	8.2	8.2	13.2	17.9	24.7
Compressors							
Number			1	1	1	1	1
Absorbed power	(1)	kW	1.7	1.7	2.9	4.3	5.4
Absorbed power	(2)	kW	2.5	2.5	3.9	6.1	7.8
Fans							
Quantity		n°	1	1	1	1	1
Nominal air flow rate		m ³ /h	2,000	2,000	4,000	4,160	6,500
Power absorbed by fan	(1)	kW	0.2	0.2	0.4	0.5	0.5
Max. available head, EC fans - filters G4	(5)	Pa	350	350	345	265	520
Refrigerant connections(EDA units)							
Gas delivery		n°x mm	1 x 10	1 x 10	1 x 12	1 x 16	1 x 16
Liquid		n°x mm	1 x 10	1 x 10	1 x 12	1 x 16	1 x 16
Plate condenser(EDW units)							
Quantity		n°	1	1	1	1	1
In/out connectors			G1"	G1"	G1"	G1"	G1"
Head loss		kPa	31	31	31	33	36
Electric heater(vers. CH-HH)							
Capacity in standard version		kW	3.0	3.0	4.5	4.5	4.5
Operating stages		n°	1	1	1	1	1
Hot water heating coil(vers. CH-HH)							
Capacity	(3)	kW	6.2	6.2	10.6	10.7	24.0
Total head loss		kPa	25.0	25.0	12.0	13.0	29.0
Humidifier(vers. HH)							
Standard steam output		kg/h	1.5	1.5	3.0	3.0	5.0
Max. steam output		kg/h	3.0	3.0	3.0	3.0	8.0
Noise levels							
Sound pressure level UNDER	(4)	dB(A)	49.1	49.1	52.4	53.0	53.9
Sound pressure level OVER	(4)	dB(A)	50.3	50.3	53.7	54.9	55.5
Coupling with remote condensers(EDA units)							
Quantity		n°	1	1	1	1	1
Standard model			NHNM 1135.5	NHNM 1135.5	NHNM 1145.2	NHNM 1145.4	NHNM 1245.2
Low noise model			NHLM 1145.2	NHLM 1145.2	NHLM 1145.4	NHLM 1245.2	NHLM 1245.3
Plus model			NHNM 1145.2	NHNM 1145.2	NHNM 1145.3	NHNM 1245.2	NHNM 1245.3
Low noise Plus model			NHLM 1145.2	NHLM 1145.2	NHLM 1150.4	NHLM 1245.3	NHLM 1250.5
HT model			NHNM 1145.4	NHNM 1145.4	NHNM 1245.2	NHNM 2245.2	NHNM 2245.2
Coupling with dry cooler(EDW units)							
Quantity		n°	1	1	1	1	1
Standard model			DGS501AS	DGS501AS	DGS501CS	DGS502BS	DGS502CS
Refrigerant charge							
Unit refrigerant chargeEDW		kg	0.7	0.7	1.8	3.3	3.8
Dimensions and weights of basic unit							
Frame dimensions			SXS	SXS	XS	XS	S
Length		mm	607	607	705	705	1,100
Depth		mm	500	500	650	650	850
Height		mm	1,850	1,850	1,990	1,990	1,990
Operating weightUEDW HH		kg	182	182	248	280	374
Operating weightOEDW HH		kg	182	182	248	280	369

(1) Input air 24°C, 50% RH.Saturated condensation temperature 45°C.Available head at 20 Pa,Filters, ISO Coarse 75% (G4),BLDC compressor speed 90 rps

(2) Input air 24°C, 50% RH.Saturated condensation temperature 45°C.Available head at 20 Pa,Filters, ISO Coarse 75% (G4),BLDC compressor speed 120 rps

(3) Input air temperature 20°C; in/out water temperature 80/70°C

(4) Sound pressure levels at a 2 metre distance from the channelled unit

(5) Head achievable under reduced air flow rates

The specified cooling capacities are gross values. The net capacity is calculated by subtracting the power absorbed by the fan.

Datatech+ BTD ED-Direct expansion version

Unit size			27.1	33.1	35.2	36.2	45.2
Total refrigeration capacity	(1)	kW	27.0	34.6	36.1	34.3	45.4
Sensible cooling capacity	(1)	kW	25.0	31.0	35.0	34.1	43.0
SHR			0.93	0.90	0.97	0.99	0.95
EER	(1)		3.59	3.58	3.74	3.88	3.66
Max. total cooling capacity	(2)	kW	33.7	41.0	42.2	39.1	53.1
Max. sensible cooling capacity	(2)	kW	28.9	35.1	39.9	37.5	49.2
Compressors							
Number			1	1	2	2	2
Absorbed power	(1)	kW	6.8	8.5	8.9	8.1	11.2
Absorbed power	(2)	kW	9.5	12.2	11.2	9.9	13.9
Fans							
Quantity		n°	1	1	2	2	2
Nominal air flow rate		m ³ /h	7,650	8,000	11,500	11,500	13,500
Power absorbed by fan	(1)	kW	0.8	1.2	0.8	0.8	1.2
Max. available head, EC fans - filters G4	(5)	Pa	410	280	550	550	460
Refrigerant connections(EDA units)							
Gas delivery		n°x mm	1 x 18	1 x 18	1 x 18	2 x 16	1 x 18
Liquid		n°x mm	1 x 16	1 x 18	1 x 18	2 x 16	1 x 18
Plate condenser(EDW units)							
Quantity		n°	1	1	1	2	1
In/out connectors			G1 1/4"	G1 1/4"	G1 1/4"	G1"	G1 1/4"
Head loss		kPa	36	35	35	35	36
Electric heater(vers. CH-HH)							
Capacity in standard version		kW	9.0	9.0	9.0	9.0	9.0
Operating stages		n°	2	2	2	2	2
Hot water heating coil(vers. CH-HH)							
Capacity	(3)	kW	26.4	27.0	41.7	41.7	45.5
Total head loss		kPa	35.0	36.0	25.0	25.0	30.0
Humidifier(vers. HH)							
Standard steam output		kg/h	5.0	5.0	5.0	5.0	5.0
Max. steam output		kg/h	8.0	8.0	8.0	8.0	8.0
Noise levels							
Sound pressure level UNDER	(4)	dB(A)	57.9	58.2	59.9	59.9	60.6
Sound pressure level OVER	(4)	dB(A)	59.4	58.9	60.0	60.0	61.9
Coupling with remote condensers(EDA units)							
Quantity		n°	1	1	1	2	1
Standard model			NHNM 1245.3	NHNM 2335.3	NHNM 2335.3	NHNM 1145.4	NHNM 2245.2
Low noise model			NHLM 1250.5	NHLM 2245.2	NHLM 2245.2	NHLM 1245.2	NHLM 2245.3
Plus model			NHNM 1245.4	NHNM 2245.2	NHNM 2245.2	NHNM 1245.2	NHNM 2245.3
Low noise Plus model			NHLM 2245.2	NHLM 2245.3	NHLM 2245.3	NHLM 1245.3	NHLM 2245.4
HT model			NHNM 2245.4	KA4M 2250.4	KA4M 2250.4	NHNM 2245.2	KA4M 2350.2
Coupling with dry cooler(EDW units)							
Quantity		n°	1	1	1	1	1
Standard model			DGS503BS	DGS504BS	DGS504BS	DGS504BS	DGS504CS
Refrigerant charge							
Unit refrigerant chargeEDW		kg	4.4	5.3	6.2	6.9	6.9
Dimensions and weights of basic unit							
Frame dimensions			S	S	M	M	M
Length		mm	1,100	1,100	1,750	1,750	1,750
Depth		mm	850	850	850	850	850
Height		mm	1,990	1,990	1,990	1,990	1,990
Operating weightUEDW HH		kg	382	400	608	608	616
Operating weightOEDW HH		kg	376	394	574	638	586

(1) Input air 24°C, 50% RH.Saturated condensation temperature 45°C.Available head at 20 Pa,Filters, ISO Coarse 75% (G4),BLDC compressor speed 90 rps

(2) Input air 24°C, 50% RH.Saturated condensation temperature 45°C.Available head at 20 Pa,Filters, ISO Coarse 75% (G4),BLDC compressor speed 120 rps

(3) Input air temperature 20°C; in/out water temperature 80/70°C

(4) Sound pressure levels at a 2 metre distance from the channelled unit

(5) Head achievable under reduced air flow rates

The specified cooling capacities are gross values. The net capacity is calculated by subtracting the power absorbed by the fan.

Datatech+ BTD ED-Direct expansion version

Unit size			44.2	58.2	66.3	82.3	100.4
Total refrigeration capacity	(1)	kW	44.5	56.7	66.8	81.4	96.6
Sensible cooling capacity	(1)	kW	42.6	52.3	63.2	76.1	87.1
SHR			0.96	0.92	0.95	0.93	0.90
EER	(1)		3.77	3.74	3.81	3.70	3.70
Max. total cooling capacity	(2)	kW	51.0	64.4	73.9	88.1	104.7
Max. sensible cooling capacity	(2)	kW	48.1	58.4	70.9	80.0	91.8
Compressors							
Number			2	2	3	3	4
Absorbed power	(1)	kW	10.6	13.1	15.8	19.4	22.3
Absorbed power	(2)	kW	12.9	15.9	18.1	22.2	25.1
Fans							
Quantity		n°	2	2	3	3	3
Nominal air flow rate		m ³ /h	13,500	14,500	20,000	23,000	23,000
Power absorbed by fan	(1)	kW	1.2	2.1	1.8	2.5	3.9
Max. available head, EC fans - filters G4	(5)	Pa	460	330	480	385	245
Refrigerant connections(EDA units)							
Gas delivery		n°x mm	2 x 16	2 x 16	(1x16)+(1x18)	(1x16)+(1x18)	2 x 18
Liquid		n°x mm	2 x 16	2 x 16	(1x16)+(1x18)	(1x16)+(1x18)	2 x 18
Plate condenser(EDW units)							
Quantity		n°	2	2	2	2	2
In/out connectors			G1"	G1 1/4"	G1 1/4"	G1 1/4"	G1 1/4"
Head loss		kPa	38	37	35	59	35
Electric heater(vers. CH-HH)							
Capacity in standard version		kW	9.0	9.0	13.5	13.5	13.5
Operating stages		n°	2	2	3	3	3
Hot water heating coil(vers. CH-HH)							
Capacity	(3)	kW	45.5	47.2	71.4	77.2	77.2
Total head loss		kPa	30.0	32.0	54.0	62.0	62.0
Humidifier(vers. HH)							
Standard steam output		kg/h	5.0	5.0	8.0	8.0	8.0
Max. steam output		kg/h	8.0	8.0	8.0	8.0	8.0
Noise levels							
Sound pressure level UNDER	(4)	dB(A)	60.6	62.0	63.6	64.6	64.8
Sound pressure level OVER	(4)	dB(A)	61.9	63.5	65.0	66.6	66.8
Coupling with remote condensers(EDA units)							
Quantity		n°	2	2	2	2	2
Standard model			NHNM 1245.2	NHNM 1245.3	NHNM 1245.2 + NHNM 2245.2	NHNM 1245.3 + NHNM 2245.3	NHNM 2245.2
Low noise model			NHLM 1245.3	NHLM 1250.5	NHLM 1245.3 + NHLM 2245.3	NHLM 1245.4 + NHLM 2245.3	NHLM 2245.3
Plus model			NHNM 1245.3	NHNM 1245.4	NHNM 1245.4 + NHNM 2245.3	NHNM 1245.4 + NHNM 2245.4	NHNM 2245.4
Low noise Plus model			NHLM 1250.5	NHLM 2245.2	NHLM 1250.5 + NHLM 2245.4	NHLM 1245.2 + NHLM 2245.4	NHLM 2245.4
HT model			NHNM 2245.2	NHNM 2245.3	NHNM 2245.2 + KA4M 2250.4	NHNM 2245.3 + KA4M 2350.2	KA4M 2350.2
Coupling with dry cooler(EDW units)							
Quantity		n°	1	1	1	1	1
Standard model			DGS504CS	DGS634CT	DGS634CT	BDMS802DT	BDMS803BT
Refrigerant charge							
Unit refrigerant chargeEDW		kg	7.3	9.3	10.5	11.3	13.7
Dimensions and weights of basic unit							
Frame dimensions			M	M	L	L	L
Length		mm	1,750	1,750	2,650	2,650	2,650
Depth		mm	850	850	850	850	850
Height		mm	1,990	1,990	1,990	1,990	1,990
Operating weightUEDW HH		kg	634	691	953	985	1023
Operating weightOEDW HH		kg	664	721	939	985	1009

(1) Input air 24°C, 50% RH.Saturated condensation temperature 45°C.Available head at 20 Pa,Filters, ISO Coarse 75% (G4),BLDC compressor speed90 rps

(2) Input air 24°C, 50% RH.Saturated condensation temperature 45°C.Available head at 20 Pa,Filters, ISO Coarse 75% (G4),BLDC compressor speed120 rps

(3) Input air temperature 20°C; in/out water temperature 80/70°C

(4) Sound pressure levels at a 2 metre distance from the channelled unit

(5) Head achievable under reduced air flow rates

The specified cooling capacities are gross values. The net capacity is calculated by subtracting the power absorbed by the fan.

Datatech+ BTD ED - DC-Direct expansion version+Chilled water circuit

Unit size			23.1	27.1	35.2	36.2
Total refrigeration capacity	(1)	kW	21.5	27.0	36.1	34.3
Sensible cooling capacity	(1)	kW	20.5	25.0	35.0	34.1
SHR			0.95	0.93	0.97	0.99
EER	(1)		3.66	3.59	3.74	3.88
Max. total cooling capacity	(2)	kW	27.1	33.7	42.2	39.1
Max. sensible cooling capacity	(2)	kW	24.7	28.9	39.9	37.5
Dual Cooling coil						
Total refrigeration capacity	(3)	kW	23.3	25.6	40.4	40.4
Sensible cooling capacity	(3)	kW	21.1	23.5	36.9	36.9
SHR			0.91	0.92	0.91	0.91
Total head loss		kPa	46	55	47	47
Compressors						
Number			1	1	2	2
Absorbed power	(1)	kW	5.4	6.8	8.9	8.1
Absorbed power	(2)	kW	7.8	9.5	11.2	9.9
Fans						
Quantity		n°	1	1	2	2
Nominal air flow rate		m ³ /h	6,500	7,650	11,500	11,500
Power absorbed by fan	(1)	kW	0.5	0.8	0.8	0.8
Max. available head, EC fans - filters G4	(6)	Pa	520	410	550	550
Refrigerant connections(EDA units)						
Gas delivery		n°x mm	1 x 16	1 x 18	1 x 18	2 x 16
Liquid		n°x mm	1 x 16	1 x 16	1 x 18	2 x 16
Plate condenser(EDW units)						
Quantity		n°	1	1	1	2
In/out connectors			G1"	G1 1/4"	G1 1/4"	G1"
Head loss		kPa	36	36	35	35
Electric heater(vers. CH-HH)						
Capacity in standard version		kW	4.5	9.0	9.0	9.0
Operating stages		n°	1	2	2	2
Hot water heating coil(vers. CH-HH)						
Capacity	(4)	kW	24.0	26.4	41.7	41.7
Total head loss		kPa	29.0	35.0	25.0	25.0
Humidifier(vers. HH)						
Standard steam output		kg/h	5.0	5.0	5.0	5.0
Max. steam output		kg/h	8.0	8.0	8.0	8.0
Noise levels						
Sound pressure level UNDER	(5)	dB(A)	53.9	57.9	59.9	59.9
Sound pressure level OVER	(5)	dB(A)	55.5	59.4	60.0	60.0
Coupling with remote condensers(EDA units)						
Quantity		n°	1	1	1	2
Standard model			NHNM 1245.2	NHNM 1245.3	NHNM 2335.3	NHNM 1145.4
Low noise model			NHLM 1245.3	NHLM 1250.5	NHLM 2245.2	NHLM 1245.2
Plus model			NHNM 1245.3	NHNM 1245.4	NHNM 2245.2	NHNM 1245.2
Low noise Plus model			NHLM 1250.5	NHLM 2245.2	NHLM 2245.3	NHLM 1245.3
HT model			NHNM 2245.2	NHNM 2245.4	KA4M 2250.4	NHNM 2245.2
Coupling with dry cooler(EDW units)						
Quantity		n°	1	1	1	1
Standard model			DGS502CS	DGS503BS	DGS504BS	DGS504BS
Refrigerant charge						
Unit refrigerant chargeEDW		kg	3.8	4.4	6.2	6.9
Dimensions and weights of basic unit						
Frame dimensions			S	S	M	M
Length		mm	1,100	1,100	1,750	1,750
Depth		mm	850	850	850	850
Height		mm	1,990	1,990	1,990	1,990
Operating weightUEDW HH		kg	411	418	644	643
Operating weightOEDW HH		kg	405	413	610	673

(1) Input air 24°C, 50% RH.Saturated condensation temperature 45°C.Available head at 20 Pa,Filters, ISO Coarse 75% (G4),BLDC compressor speed 90 rps

(2) Input air 24°C, 50% RH.Saturated condensation temperature 45°C.Available head at 20 Pa,Filters, ISO Coarse 75% (G4),BLDC compressor speed 120 rps

(3) Input air 24°C, 50% RH.Input/output water 7/12 °C;

(4) Input air temperature 20°C; in/out water temperature 80/70°C

(5) Sound pressure levels at a 2 metre distance from the channelled unit

(6) Head achievable under reduced air flow rates

The specified cooling capacities are gross values. The net capacity is calculated by subtracting the power absorbed by the fan.

Datatech+ BTD ED - DC-Direct expansion version+Chilled water circuit

Unit size			45.2	44.2	66.3	82.3
Total refrigeration capacity	(1)	kW	45.4	44.5	66.8	81.4
Sensible cooling capacity	(1)	kW	43.0	42.6	63.2	76.1
SHR			0.95	0.96	0.95	0.93
EER	(1)		3.66	3.77	3.81	3.70
Max. total cooling capacity	(2)	kW	53.1	51.0	73.9	88.1
Max. sensible cooling capacity	(2)	kW	49.2	48.1	70.9	80.0
Dual Cooling coil						
Total refrigeration capacity	(3)	kW	52.7	52.7	88.2	96.7
Sensible cooling capacity	(3)	kW	47.5	47.5	74.1	82.2
SHR			0.90	0.90	0.84	0.85
Total head loss		kPa	53	53	83	99
Compressors						
Number			2	2	3	3
Absorbed power	(1)	kW	11.2	10.6	15.8	19.4
Absorbed power	(2)	kW	13.9	12.9	18.1	22.2
Fans						
Quantity		n°	2	2	3	3
Nominal air flow rate		m ³ /h	13,500	13,500	20,000	23,000
Power absorbed by fan	(1)	kW	1.2	1.2	1.8	2.5
Max. available head, EC fans - filters G4	(6)	Pa	460	460	480	385
Refrigerant connections(EDA units)						
Gas delivery		n°x mm	1 x 18	2 x 16	(1x16)+(1x18)	(1x16)+(1x18)
Liquid		n°x mm	1 x 18	2 x 16	(1x16)+(1x18)	(1x16)+(1x18)
Plate condenser(EDW units)						
Quantity		n°	1	2	2	2
In/out connectors			G1 1/4"	G1"	G1 1/4"	G1 1/4"
Head loss		kPa	36	38	35	59
Electric heater(vers. CH-HH)						
Capacity in standard version		kW	9.0	9.0	13.5	13.5
Operating stages		n°	2	2	3	3
Hot water heating coil(vers. CH-HH)						
Capacity	(4)	kW	45.5	45.5	71.4	77.2
Total head loss		kPa	30.0	30.0	54.0	62.0
Humidifier(vers. HH)						
Standard steam output		kg/h	5.0	5.0	8.0	8.0
Max. steam output		kg/h	8.0	8.0	8.0	8.0
Noise levels						
Sound pressure level UNDER	(5)	dB(A)	60.6	60.6	63.6	64.6
Sound pressure level OVER	(5)	dB(A)	61.9	61.9	65.0	66.6
Coupling with remote condensers(EDA units)						
Quantity		n°	1	2	2	2
Standard model			NHNM 2245.2	NHNM 1245.2	NHNM 1245.2 + NHNM 2245.2	NHNM 1245.3 + NHNM 2245.3
Low noise model			NHLM 2245.3	NHLM 1245.3	NHLM 1245.3 + NHLM 2245.3	NHLM 1245.4 + NHLM 2245.3
Plus model			NHNM 2245.3	NHNM 1245.3	NHNM 1245.4 + NHNM 2245.3	NHNM 1245.4 + NHNM 2245.4
Low noise Plus model			NHLM 2245.4	NHLM 1250.5	NHLM 1250.5 + NHLM 2245.4	NHLM 2245.2 + NHLM 2245.4
HT model			KA4M 2350.2	NHNM 2245.2	NHNM 2245.2 + KA4M 2250.4	NHNM 2245.3 + KA4M 2350.2
Coupling with dry cooler(EDW units)						
Quantity		n°	1	1	1	1
Standard model			DGS504CS	DGS504CS	DGS634CT	BDMS802DT
Refrigerant charge						
Unit refrigerant chargeEDW		kg	6.9	7.3	10.5	11.3
Dimensions and weights of basic unit						
Frame dimensions			M	M	L	L
Length		mm	1,750	1,750	2,650	2,650
Depth		mm	850	850	850	850
Height		mm	1,990	1,990	1,990	1,990
Operating weightUEDW HH		kg	680	662	1003	1035
Operating weightOEDW HH		kg	632	710	989	1035

(1) Input air 24°C, 50% RH.Saturated condensation temperature 45°C.Available head at 20 Pa,Filters, ISO Coarse 75% (G4),BLDC compressor speed90 rps

(2) Input air 24°C, 50% RH.Saturated condensation temperature 45°C.Available head at 20 Pa,Filters, ISO Coarse 75% (G4),BLDC compressor speed120 rps

(3) Input air 24°C, 50% RH.Input/output water 7/12 °C;

(4) Input air temperature 20°C; in/out water temperature 80/70°C

(5) Sound pressure levels at a 2 metre distance from the channelled unit

(6) Head achievable under reduced air flow rates

The specified cooling capacities are gross values. The net capacity is calculated by subtracting the power absorbed by the fan.

Datatech+ BTD ED - FC-Indirect free cooling version

Unit size			23.1	27.1	35.2	36.2
Total refrigeration capacity	(1)	kW	21.2	26.7	35.7	33.9
Sensible cooling capacity	(1)	kW	20.5	24.9	34.9	33.9
SHR			0.97	0.93	0.98	1.00
EER	(1)		3.59	3.47	3.61	3.77
Free-Cooling						
Total refrigeration capacity	(2)	kW	20.2	22.5	32.9	32.9
Sensible cooling capacity	(2)	kW	18.3	20.7	30.1	30.1
SHR			0.91	0.92	0.91	0.91
Compressors						
Number			1	1	2	2
Absorbed power	(1)	kW	5.2	6.6	8.7	7.8
Fans						
Quantity		n°	1	1	2	2
Nominal air flow rate		m3/h	6,500	7,650	11,500	11,500
Power absorbed by fan	(3)	kW	0.7	1.1	1.2	1.2
Max. available head, EC fans - filters G4	(5)	Pa	430	290	460	460
Plate condenser(EDW units)						
Quantity		n°	1	1	1	2
In/out connectors			G1"	G1 1/4"	G1 1/4"	G1"
Head loss		kPa	63	76	63	60
Electric heater(vers. CH-HH)						
Capacity in standard version		kW	4.5	9.0	9.0	9.0
Operating stages		n°	1	2	2	2
Humidifier(vers. HH)						
Standard steam output		kg/h	5.0	5.0	5.0	5.0
Max. steam output		kg/h	8.0	8.0	8.0	8.0
Noise levels						
Sound pressure level UNDER	(4)	dB(A)	53.9	57.9	59.9	59.9
Sound pressure level OVER	(4)	dB(A)	55.5	59.4	60.0	60.0
Coupling with dry cooler(EDW units)						
Quantity		n°	1	1	1	1
Standard model			DGS502CS	DGS503BS	DGS504BS	DGS504BS
Refrigerant charge						
Unit refrigerant chargeEDW		kg	3.8	4.4	6.2	6.9
Dimensions and weights of basic unit						
Frame dimensions			S	S	M	M
Length		mm	1,100	1,100	1,750	1,750
Depth		mm	850	850	850	850
Height		mm	1,990	1,990	1,990	1,990
Operating weightU/O_EDW HH		kg	411	418	608	608

(1) Input air 24°C, 50% RH. Water input/output temperature to/from condenser 35/40°C with 30% ethylene glycol

(2) Water input/output temperature to/from free cooling coil 7/12°C with 30% ethylene glycol

(3) Available head at 20 Pa, Filters, ISO Coarse 75% (G4);

(4) Sound pressure levels at a 2 metre distance from the channelled unit

(5) Head achievable under reduced air flow rates

The specified cooling capacities are gross values. The net capacity is calculated by subtracting the power absorbed by the fan.

Datatech+ BTD ED - FC-Indirect free cooling version

Unit size			45.2	44.2	66.3	82.3
Total refrigeration capacity	(1)	kW	44.9	44.0	66.0	80.5
Sensible cooling capacity	(1)	kW	42.8	42.5	63.0	76.0
SHR			0.95	0.97	0.95	0.94
EER	(1)		3.47	3.57	3.60	3.45
Free-Cooling						
Total refrigeration capacity	(2)	kW	43.3	43.3	76.8	83.7
Sensible cooling capacity	(2)	kW	38.3	38.3	73.2	81.9
SHR			0.88	0.88	0.95	0.98
Compressors						
Number			2	2	3	3
Absorbed power	(1)	kW	10.9	10.3	15.5	19.4
Fans						
Quantity		n°	2	2	3	3
Nominal air flow rate		m3/h	13,500	13,500	20,000	23,000
Power absorbed by fan	(3)	kW	2.0	2.0	2.8	4.0
Max. available head, EC fans - filters G4	(5)	Pa	325	325	350	225
Plate condenser(EDW units)						
Quantity		n°	1	2	2	2
In/out connectors			G1 1/4"	G1"	G1 1/4"	G1 1/4"
Head loss		kPa	80	80	73	85
Electric heater(vers. CH-HH)						
Capacity in standard version		kW	9.0	9.0	13.5	13.5
Operating stages		n°	2	2	3	3
Humidifier(vers. HH)						
Standard steam output		kg/h	5.0	5.0	8.0	8.0
Max. steam output		kg/h	8.0	8.0	8.0	8.0
Noise levels						
Sound pressure level UNDER	(4)	dB(A)	60.6	60.6	63.6	64.6
Sound pressure level OVER	(4)	dB(A)	61.9	61.9	65.0	66.6
Coupling with dry cooler(EDW units)						
Quantity		n°	1	1	1	1
Standard model			DGS504CS	DGS504CS	DGS634CT	BDMS802DT
Refrigerant charge						
Unit refrigerant chargeEDW		kg	6.9	7.3	10.5	11.3
Dimensions and weights of basic unit						
Frame dimensions			M	M	L	L
Length		mm	1,750	1,750	2,650	2,650
Depth		mm	850	850	850	850
Height		mm	1,990	1,990	1,990	1,990
Operating weightU/O_EDW HH		kg	616	634	953	985

(1) Input air 24°C, 50% RH. Water input/output temperature to/from condenser 35/40°C with 30% ethylene glycol

(2) Water input/output temperature to/from free cooling coil 7/12°C with 30% ethylene glycol

(3) Available head at 20 Pa, Filters, ISO Coarse 75% (G4);

(4) Sound pressure levels at a 2 metre distance from the channelled unit

(5) Head achievable under reduced air flow rates

The specified cooling capacities are gross values. The net capacity is calculated by subtracting the power absorbed by the fan.

ELECTRICAL DATA

Datatech+ BTD ED-Direct expansion version

Unit size			7.1m	7.1t	12.1	16.1	23.1
Max. power absorbed by compressor		kW	2.9	2.9	5.8	9.2	11.8
Max. power absorbed by EC fan		kW	0.5	0.5	1.0	1.0	2.2
Max. power absorbed by standard heaters		kW	3.0	3.0	4.5	4.5	4.5
Max. power absorbed by humidifier		kW	2.3	2.3	2.3	2.3	6.0
Max. current absorbed by compressors(FLA)	(1)	A	14.7	8.5	14.0	14.0	18.0
Max. current absorbed by EC fans(FLA)	(1)	A	3.2	3.2	1.9	1.9	3.3
Max. current absorbed by standard heaters(FLA)	(1)	A	13.0	4.3	6.5	6.5	6.5
Max. current absorbed by humidifier(FLA)	(1)	A	9.8	9.8	3.2	3.2	8.7
Power supply	(2)	V/ph/Hz	230/1~/50 ±5%	400/3~/50 ±5%	400/3~/50 ±5%	400/3~/50 ±5%	400/3~/50 ±5%

(1) Current absorption at max. admissible operating conditions Refer to the specific wiring diagrams for the sizing of the power lines.

(2) The three-phase power supply MUST always include a neutral when the unit is set up for a remote condenser, a condensate exhaust pump, and dual power supply with automatic switching.

Datatech+ BTD ED-Direct expansion version

Unit size			27.1	33.1	35.2	36.2	45.2
Max. power absorbed by compressor		kW	14.2	18.6	16.6	15.4	20.5
Max. power absorbed by EC fan		kW	2.2	2.2	4.3	4.3	4.3
Max. power absorbed by standard heaters		kW	9.0	9.0	9.0	9.0	9.0
Max. power absorbed by humidifier		kW	6.0	6.0	6.0	6.0	6.0
Max. current absorbed by compressors(FLA)	(1)	A	22.4	35.0	25.5	25.8	32.8
Max. current absorbed by EC fans(FLA)	(1)	A	3.3	3.3	6.6	6.6	6.6
Max. current absorbed by standard heaters(FLA)	(1)	A	13.0	13.0	13.0	13.0	13.0
Max. current absorbed by humidifier(FLA)	(1)	A	8.7	8.7	8.7	8.7	8.7
Power supply	(2)	V/ph/Hz	400/3~/50 ±5%	400/3~/50 ±5%	400/3~/50 ±5%	400/3~/50 ±5%	400/3~/50 ±5%

(1) Current absorption at max. admissible operating conditions Refer to the specific wiring diagrams for the sizing of the power lines.

(2) The three-phase power supply MUST always include a neutral when the unit is set up for a remote condenser, a condensate exhaust pump, and dual power supply with automatic switching.

Datatech+ BTD ED-Direct expansion version

Unit size			44.2	58.2	66.3	82.3	100.4
Max. power absorbed by compressor		kW	20.0	24.4	28.3	34.6	37.6
Max. power absorbed by EC fan		kW	4.3	4.3	6.5	6.5	6.5
Max. power absorbed by standard heaters		kW	9.0	9.0	13.5	13.5	13.5
Max. power absorbed by humidifier		kW	6.0	6.0	6.0	6.0	6.0
Max. current absorbed by compressors(FLA)	(1)	A	33.0	43.4	48.0	64.4	65.2
Max. current absorbed by EC fans(FLA)	(1)	A	6.6	6.6	9.9	9.9	9.9
Max. current absorbed by standard heaters(FLA)	(1)	A	13.0	13.0	19.5	19.5	19.5
Max. current absorbed by humidifier(FLA)	(1)	A	8.7	8.7	8.7	8.7	8.7
Power supply	(2)	V/ph/Hz	400/3~/50 ±5%	400/3~/50 ±5%	400/3~/50 ±5%	400/3~/50 ±5%	400/3~/50 ±5%

(1) Current absorption at max. admissible operating conditions Refer to the specific wiring diagrams for the sizing of the power lines.

(2) The three-phase power supply MUST always include a neutral when the unit is set up for a remote condenser, a condensate exhaust pump, and dual power supply with automatic switching.

Datatech+ BTD ED - DC-Direct expansion version+Chilled water circuit

Unit size			23.1	27.1	35.2	36.2
Max. power absorbed by compressor		kW	11.8	14.2	16.6	15.4
Max. power absorbed by EC fan		kW	2.2	2.2	4.3	4.3
Max. power absorbed by standard heaters		kW	4.5	9.0	9.0	9.0
Max. power absorbed by humidifier		kW	6.0	6.0	6.0	6.0
Max. current absorbed by compressors(FLA)	(1)	A	18.0	22.4	25.5	25.8
Max. current absorbed by EC fans(FLA)	(1)	A	3.3	3.3	6.6	6.6
Max. current absorbed by standard heaters(FLA)	(1)	A	6.5	13.0	13.0	13.0
Max. current absorbed by humidifier(FLA)	(1)	A	8.7	8.7	8.7	8.7
Power supply	(2)	V/ph/Hz	400/3~/50 ±5%	400/3~/50 ±5%	400/3~/50 ±5%	400/3~/50 ±5%

(1) Current absorption at max. admissible operating conditions Refer to the specific wiring diagrams for the sizing of the power lines.

(2) The three-phase power supply MUST always include a neutral when the unit is set up for a remote condenser, a condensate exhaust pump, and dual power supply with automatic switching.

Datatech+ BTD ED - DC-Direct expansion version+Chilled water circuit

Unit size			45.2	44.2	66.3	82.3
Max. power absorbed by compressor		kW	20.5	20.0	28.3	34.6
Max. power absorbed by EC fan		kW	4.3	4.3	6.5	6.5
Max. power absorbed by standard heaters		kW	9.0	9.0	13.5	13.5
Max. power absorbed by humidifier		kW	6.0	6.0	6.0	6.0
Max. current absorbed by compressors(FLA)	(1)	A	32.8	33.0	48.0	64.4
Max. current absorbed by EC fans(FLA)	(1)	A	6.6	6.6	9.9	9.9
Max. current absorbed by standard heaters(FLA)	(1)	A	13.0	13.0	19.5	19.5
Max. current absorbed by humidifier(FLA)	(1)	A	8.7	8.7	8.7	8.7
Power supply	(2)	V/ph/Hz	400/3~/50 ±5%	400/3~/50 ±5%	400/3~/50 ±5%	400/3~/50 ±5%

(1) Current absorption at max. admissible operating conditions Refer to the specific wiring diagrams for the sizing of the power lines.

(2) The three-phase power supply MUST always include a neutral when the unit is set up for a remote condenser, a condensate exhaust pump, and dual power supply with automatic switching.

Datatech+ BTD ED - FC-Indirect free cooling version

Unit size			23.1	27.1	35.2	36.2
Max. power absorbed by compressor		kW	11.8	14.2	16.6	15.4
Max. power absorbed by EC fan		kW	2.2	2.2	4.3	4.3
Max. power absorbed by standard heaters		kW	4.5	9.0	9.0	9.0
Max. power absorbed by humidifier		kW	6.0	6.0	6.0	6.0
Max. current absorbed by compressors(FLA)	(1)	A	18.0	22.4	25.5	25.8
Max. current absorbed by EC fans(FLA)	(1)	A	3.3	3.3	6.6	6.6
Max. current absorbed by standard heaters(FLA)	(1)	A	6.5	13.0	13.0	13.0
Max. current absorbed by humidifier(FLA)	(1)	A	8.7	8.7	8.7	8.7
Power supply	(2)	V/ph/Hz	400/3~/50 ±5%	400/3~/50 ±5%	400/3~/50 ±5%	400/3~/50 ±5%

(1) Current absorption at max. admissible operating conditions Refer to the specific wiring diagrams for the sizing of the power lines.

(2) The three-phase power supply MUST always include a neutral when the unit is set up for a remote condenser, a condensate exhaust pump, and dual power supply with automatic switching.

Datatech+ BTD ED - FC-Indirect free cooling version

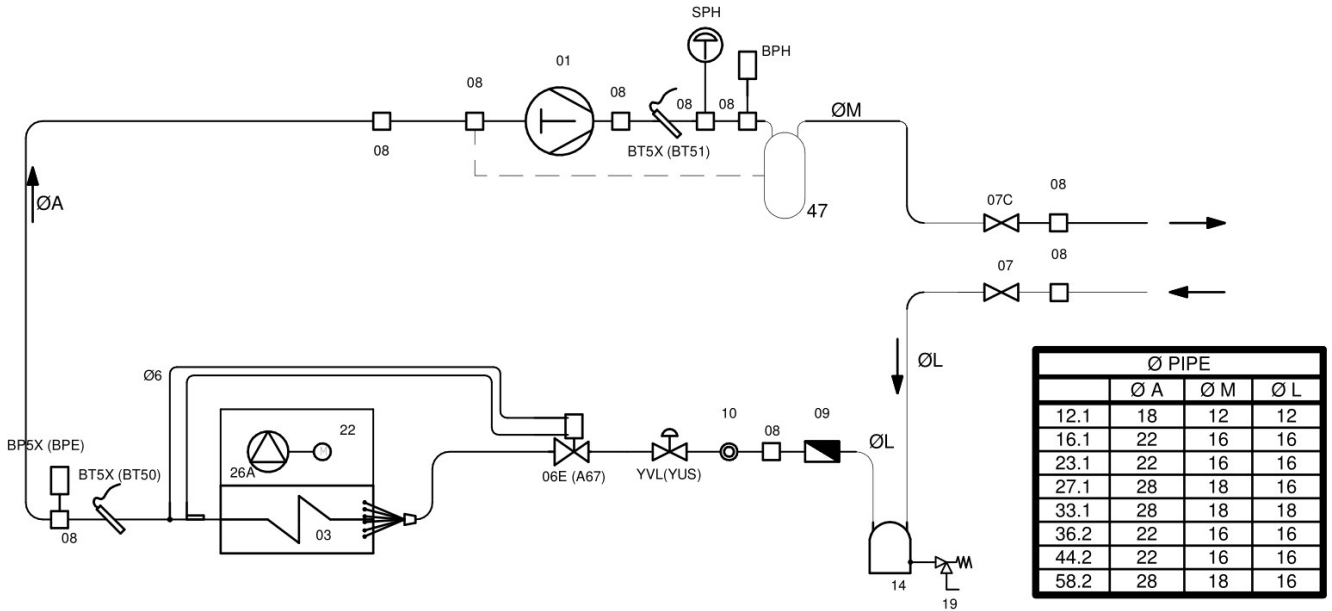
Unit size			45.2	44.2	66.3	82.3
Max. power absorbed by compressor		kW	20.5	20.0	28.3	34.6
Max. power absorbed by EC fan		kW	4.3	4.3	6.5	6.5
Max. power absorbed by standard heaters		kW	9.0	9.0	13.5	13.5
Max. power absorbed by humidifier		kW	6.0	6.0	6.0	6.0
Max. current absorbed by compressors(FLA)	(1)	A	32.8	33.0	48.0	64.4
Max. current absorbed by EC fans(FLA)	(1)	A	6.6	6.6	9.9	9.9
Max. current absorbed by standard heaters(FLA)	(1)	A	13.0	13.0	19.5	19.5
Max. current absorbed by humidifier(FLA)	(1)	A	8.7	8.7	8.7	8.7
Power supply	(2)	V/ph/Hz	400/3~/50 ±5%	400/3~/50 ±5%	400/3~/50 ±5%	400/3~/50 ±5%

(1) Current absorption at max. admissible operating conditions Refer to the specific wiring diagrams for the sizing of the power lines.

(2) The three-phase power supply MUST always include a neutral when the unit is set up for a remote condenser, a condensate exhaust pump, and dual power supply with automatic switching.

REFRIGERANT DIAGRAMS

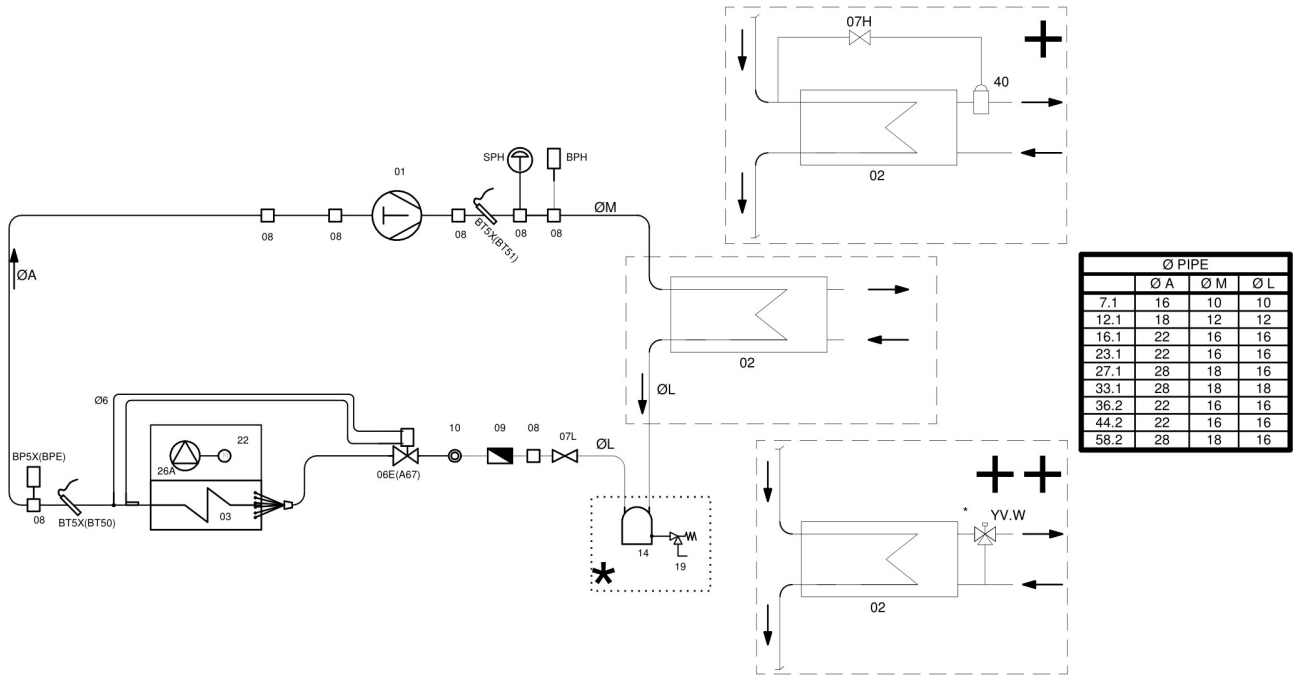
DATATECH+ BTD EDA - AIR-CONDENSED DIRECT EXPANSION VERSION



Ref.	Component
01	Compressor
03	Evaporator
06E	Electronic expansion valve
07	Isolating valve on liquid line
07C	Isolating valve on gas line
08	Fill valve
09	Filter drier
10	Humidity indicator

Ref.	Component
14+19	Receiver with safety valve
22+26	EC Fan
47	Oil separator
BPH	High pressure sensor
BP5X	Pressure sensor for electronic valve
BT5X	Temperature sensor for electronic valve
SPH	High pressure switch
YVL	Solenoid valves on liquid line

DATATECH+ BTD EDW - WATER-CONDENSED DIRECT EXPANSION VERSION



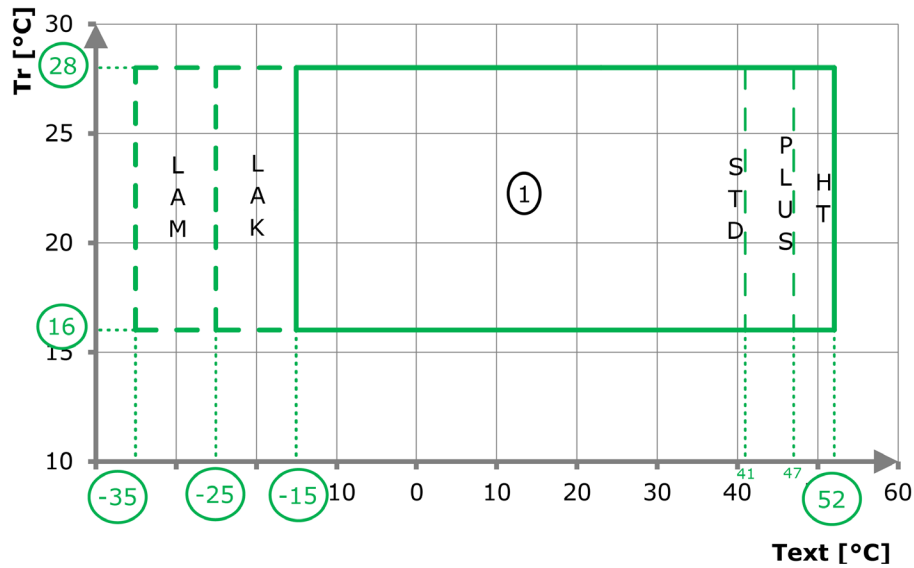
- *: Not fitted in size 7.1
- +: Optional version featuring 2-way pressostatic valve (VP2P - VP2T) as option. The option is always supplied separately from the unit and is for installation by the customer.
- ++: Optional version featuring a modulating valve to control condensation (VM) as option. The option is always supplied separately from the unit and is for installation by the customer. The option is always supplied separately from the unit and is for installation by the customer. If the unit is a dual-circuit unit, both circuits must be manifolded to one single valve.

Ref.	Component
01	Compressor
02	Plate heat exchanger
03	Evaporator
06E	Electronic expansion valve
07H	Tap valve for capillary pipes
07L	Isolating valve on liquid line
08	Fill valve
09	Filter drier
10	Humidity indicator

Ref.	Component
14+19	Receiver with safety valve
22+26	EC Fan
40	Pressostatic valve
BPH	High pressure sensor
BP5X	Pressure sensor for electronic valve
BT5X	Temperature sensor for electronic valve
SPH	High pressure switch
YV.W	Motor-driven valve for condensation control

OPERATING LIMITS - DATATECH BTD ED

AIR-CONDENSED DIRECT EXPANSION VERSION "EDA" WITH RC GREEN CONDENSER



Tr: return air temperature to internal unit

Text: external air temperature

LAK: work area requiring option LAK to achieve an outside temperature of -25°C

LAM: work area requiring option LAM to achieve an outside temperature of -35°C Contact the factory for ad hoc solutions whenever a larger limit range is required.

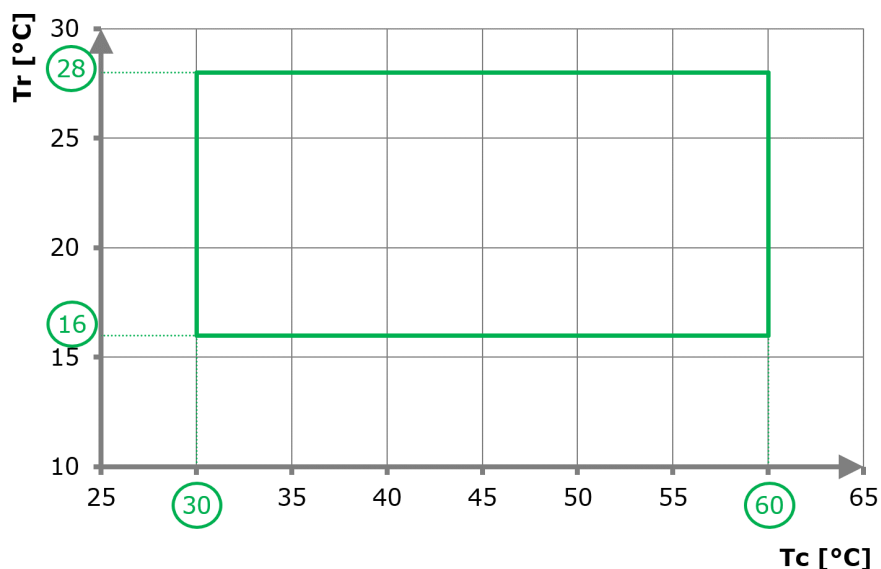
(1): with remote condenser and remote condenser set-up, both supplied by Blue Box

(*): for coupling with STD and PLUS condensers - the specified limits are merely for the sake of exemplification. Actual value to be checked with the selection software (changes according to size, work conditions, length and pipe path) For HT, the official limit is +52°C. Contact the factory for ad hoc solutions whenever a larger limit range is required.

The limits above are general purpose: refer to the selection software to check whether the single units can be selected under specific conditions.

Units may operate with larger limits as well, according to the global operating conditions.

AIR-CONDENSED DIRECT EXPANSION VERSION "EDA": CONDENSATION TEMPERATURE LIMITS WITH THIRD-PARTY CONDENSER



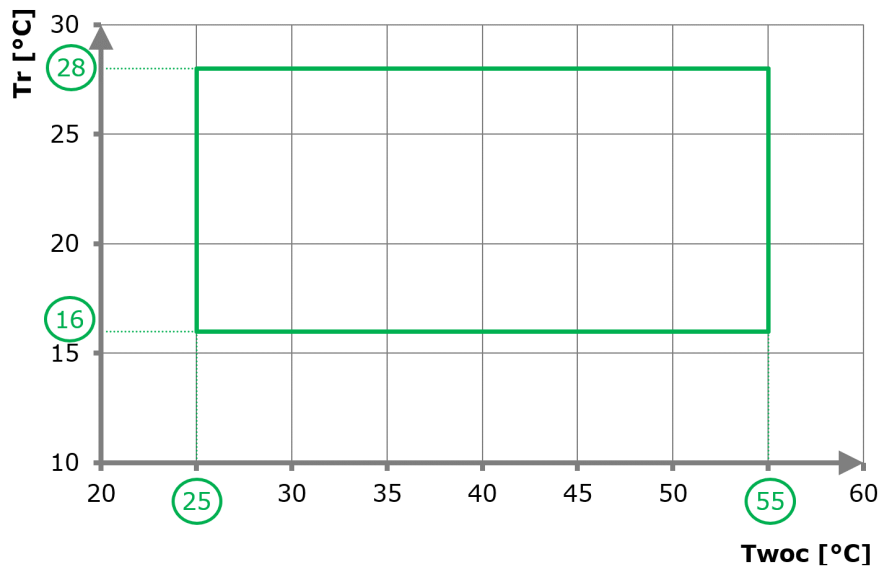
Tr: return air temperature to internal unit

Tc: condensing temperature

The limits above are general purpose: refer to the selection software to check whether the single units can be selected under specific conditions.

Units may operate with larger limits as well, according to the global operating conditions.

WATER-CONDENSED DIRECT EXPANSION VERSION "EDA"



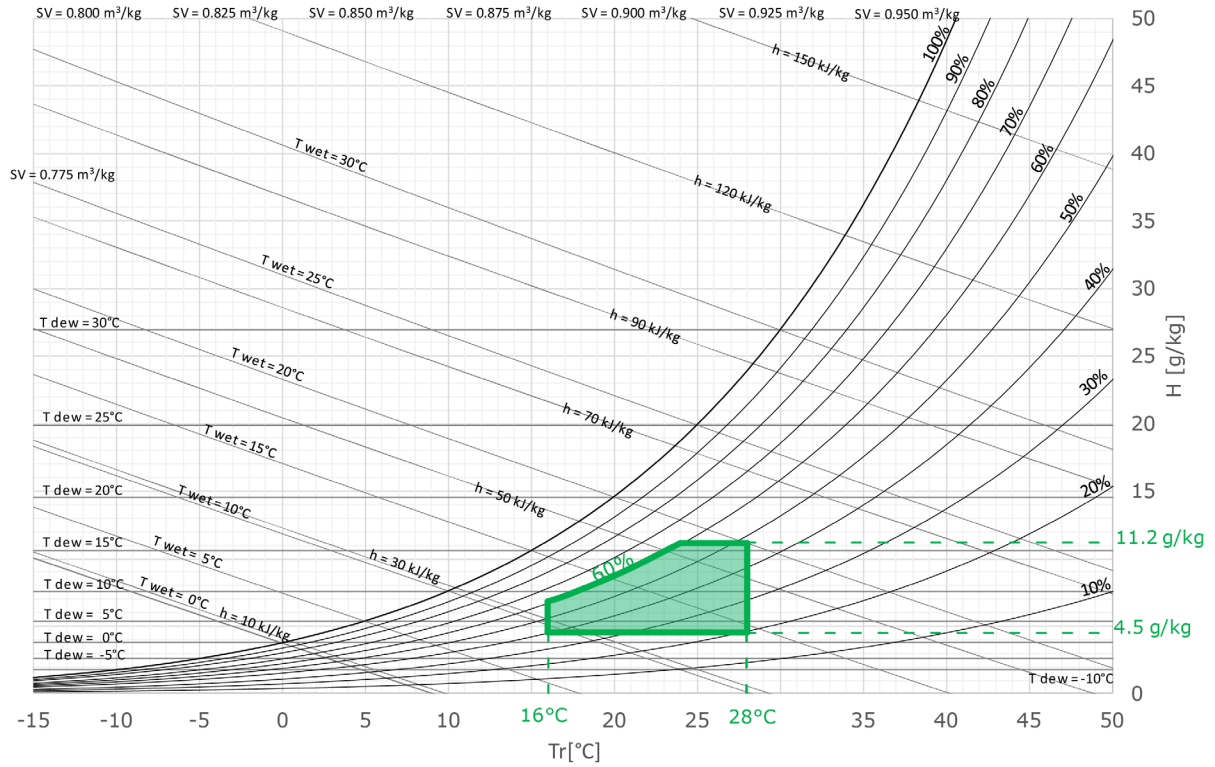
Tr: return air temperature to internal unit

Twoc: water output temperature from plate condenser

The limits above are general purpose: refer to the selection software to check whether the single units can be selected under specific conditions.

Units may operate with larger limits as well, according to the global operating conditions.

INTERNAL TEMPERATURE AND HUMIDITY RANGE



Limit values refer to the conditions of air return to the unit.

Indicative operating limits A check must at all times be made that the latent and sensible capacities meet the specific requirements of the application. Units may operate with larger limits as well, according to the global operating conditions.

Refer to the selection software for more detailed information on the correctness of each specific operating point.

INSTALLATION TIPS

PUTTING IN PLACE

Check for possible obstructions in the finned coil intake line or in the fan delivery line.

Place the unit in a manner that assures the lowest environmental impact (noise emissions, integration with nearby structures, etc.).

Strictly comply with the clearance spaces indicated in the catalogue.

Datatech BTD units are designed and made for indoor use only. The hydraulic circuits are not provided with freeze protection.

ELECTRICAL CONNECTIONS

Always consult the attached wiring diagram, which provides all the instructions necessary for making the electrical connections.

Direct expansion units require energisation (close the power switch) at least 12 hours before start-up so that the heaters in the crankcase are powered.

Power to the heaters must not be cut out during short unit stops.

Before access is gained to internal unit components, engage the power switch to switch the power off.

The power supply line must be protected in accordance with current regulations.

Electrical connections required: three-pole power cable + earth, or three pole cable + neutral + earth; external interlock; remote alarm signalling.

HYDRAULIC AND REFRIGERANT CONNECTIONS

Make the refrigerant connections strictly following the instructions provided with the installation, operation and maintenance manual, in particular as regards the braze-welding, cleaning, vacuum and charging operations.

Engage the purge valves to carefully vent the hydraulic system, with the pumps switched off. This procedure is particularly important, as even small air bubbles may cause the evaporator to freeze.

Drain the hydraulic system during winter stops or use special anti-freeze solutions.

Install the hydraulic circuit with all the components shown in the referenced diagrams (expansion vessel, flow switch, storage tank, air valve, on-off valves, flexible connections, etc. Please refer to the user, installation and maintenance manual). If the flow switch is supplied separately from the units, connect it by carefully following the instructions provided with the units.

START-UP AND MAINTENANCE

Strictly follow the instructions given in the operation and maintenance manual. These operations must in any case be carried out by qualified persons.

