

Data Book

T_CRCROW_0523_EN - HFC R410A

CRCROW

8 - 40 kW

FULL INVERTER direct expansion air conditioners with DUAL-FLUID system for IT Cooling application.
To be matched with remote air-cooled condenser.



The picture of the unit is indicative and may vary depending on the model



- In-row installation
- For high density rack and blade server
- Dual-Fluid system with additional coil
- Fully hermetic BLDC inverter compressor
- Single refrigerant circuit

- Frontal or side air delivery
- Back side air suction
- Plug fans with EC electric motor
- Electronic expansion valve

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CERTIFICATIONS



ISO 9001 CERTIFICATION
Quality Management System



ISO 14001 CERTIFICATION
Environmental Management System



BS OHSAS 18001 CERTIFICATION
Occupational Health and Safety Management System



CE MARKING



CCC – CQC CERTIFICATION
(People's Republic of China)



EAC CERTIFICATION
(Russian Federation, Belarus, Kazakhstan)

GENERAL CHARACTERISTICS



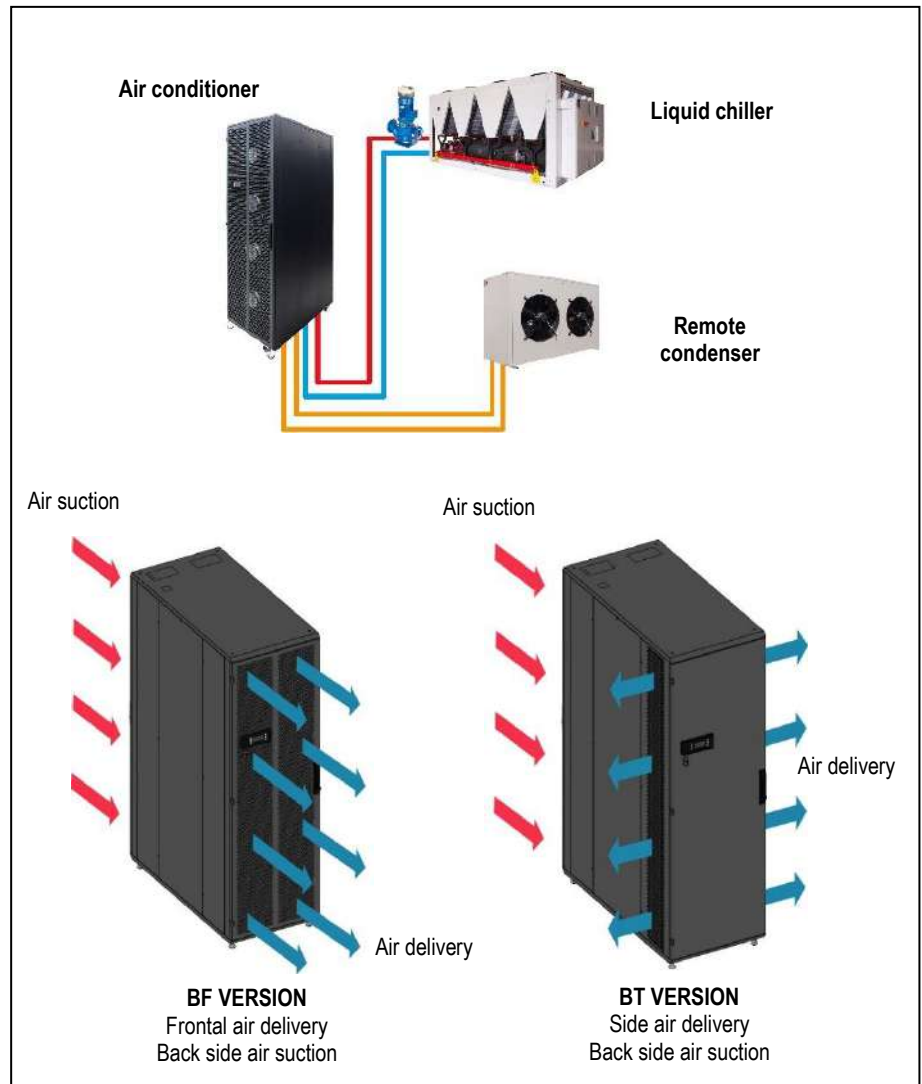
FULL INVERTER Air Conditioners for IT Cooling.

- Direct expansion, air cooled.
- For matching with remote air-cooled condenser.
- **Two independent cooling systems;**
Chilled water coil. Direct expansion coil;
- BLDC inverter compressors.
- Electronic expansion valve;
- Plug fans with EC electric motor.
- Single refrigerant circuit.

This series, for in-row installation, is offered in 2 models available in the following versions:

- Frontal air delivery, back side air suction
- Side air delivery, back side air suction.

Cooling capacity: 8 ÷ 40 kW



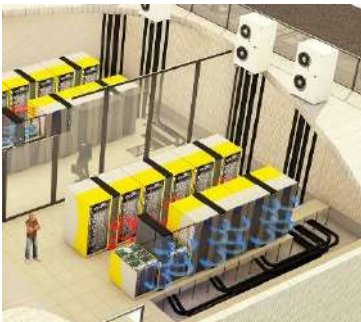
The machines are made for indoor installation.

The constructive solutions and the internal lay-out allow high application flexibility and the frontal access to the main components for the inspection and routine maintenance.

The installation requires refrigerant charge, electrical and hydraulic connections.

Final assembly on all machines before shipment including running test, reading and monitoring of operating parameters, alarms simulation and visual check.

INSTALLATION



The series is particularly suitable for installation in Data Center with hot spot for high density racks and blade server cooling. It can cope the high density of the thermal load in a small space, **up to 40 kW on 0,7 m² floor space.**

For installation are not required underfloor plenum, ducts or false-ceilings; the installation foresees the direct insertion within the rows of racks to cool.

This allows to contrast the localized heat sources (hot spot) tailoring the installation to the actual situation of the plant. Another big advantage is the modularity and scalability of the system, characteristics that allow for quick adjustment and economic development of plant layout, according to the changing needs of the infrastructure.

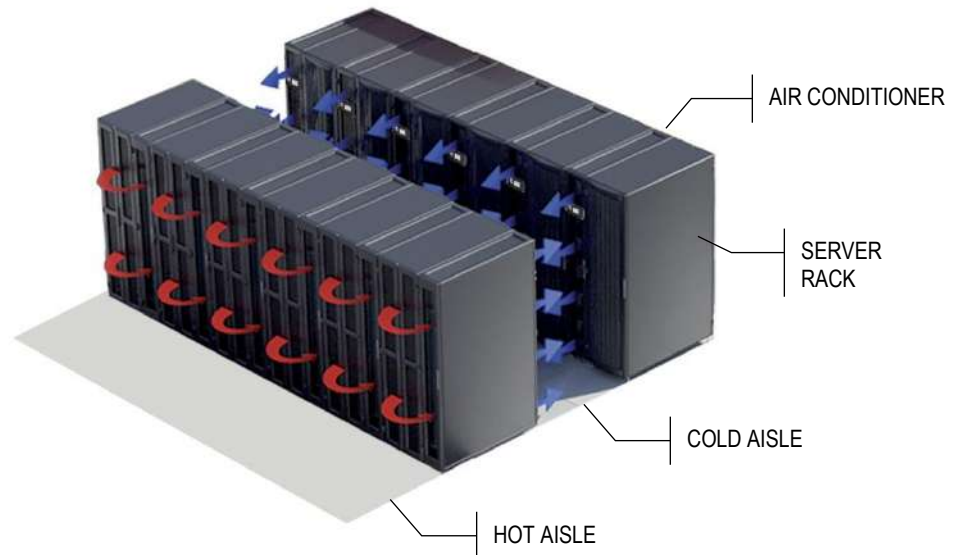
IN ROW COOLING SYSTEM FOR ROWS OF RACKS (hot/cold aisles)

Units are placed in the rows of racks that are arranged so as to obtain alternate cold and hot aisles.

Electronic equipment contained in racks independently provide to aspire the necessary air for cooling.

- In the hot aisle rack expels the hot air used to cool the electronic components while the air conditioner draws the hot air to be cooled.
- In the cold aisle the air conditioner blows the filtered and cooled air while the rack draws cold air to cool the electronic components.

The series is suitable for application in modern IT infrastructure as telephone exchange, data bank, internet hotel and server rooms, all characterized by high thermal loads.



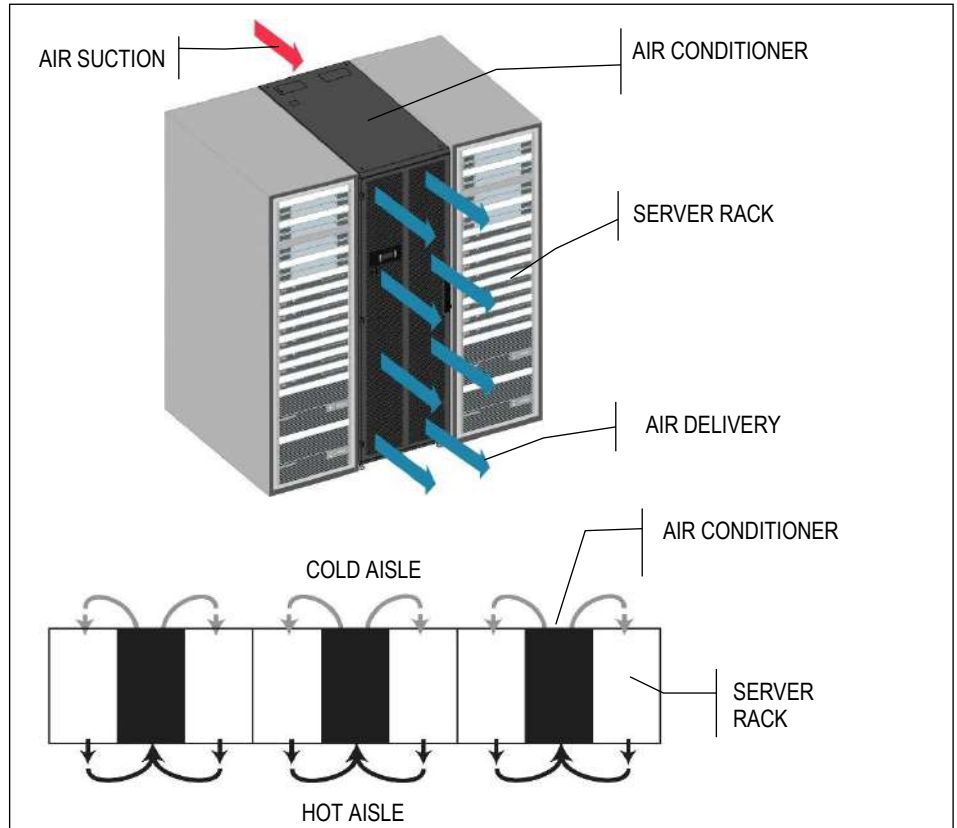
OPTIONAL

An extensive list of accessories allows the unit to adapt effectively to the real needs of the system, reducing the time and cost of installation.

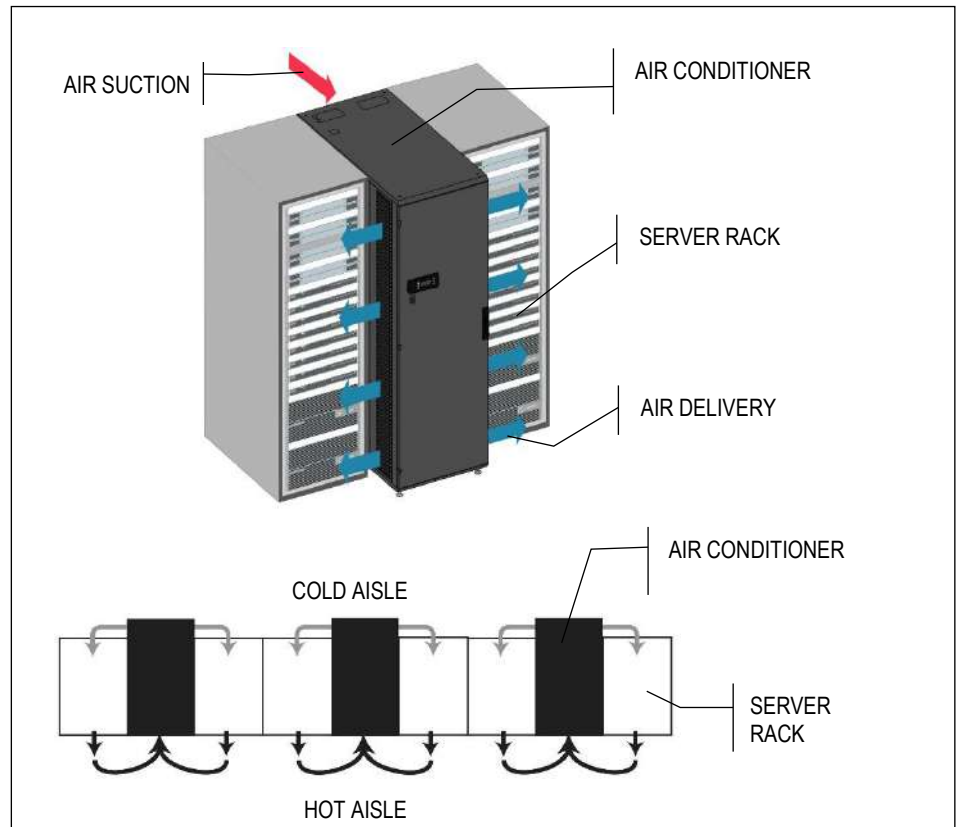
AIR DELIVERY

Two versions are available.

BF VERSION – Frontal air delivery. Back-side air suction.



BT VERSION – Side air delivery. Back-side air suction.



PRODUCT FEATURES AND BENEFITS

The series represents the state of the art of the air conditioning of Data Center with hot spots for high density racks and blade server cooling. The modularity of the system together with the adaptive logic of microprocessor control, make it the best solution for racks and the latest generation equipment cooling.

- **Dual Fluid System:** Two independent cooling systems: Chilled water coil; Direct expansion coil
- EER up to 7,03 at partial load condition;
- High cooling density, **up to 40 kW on 0,7 m² floor space.**
- BLDC hermetic inverter compressor in order to provide always the best efficiency;
- New plug fans with EC electric motors and impeller in composite material, which guarantees a reduction of power consumption;
- New fans electric motor that do not require maintenance;
- Total modulating, FULL INVERTER;
- Improvement of the control software with advanced control logic;
- Single refrigerant circuit;
- Total frontal access and lateral panels fully removable to facilitate the operations of extraordinary maintenance;

F-GAS DIRECTIVE

These units contain <HFC R410A [GWP₁₀₀ 2088]> fluorinated greenhouse gases.

MODEL IDENTIFICATION

model: CRCO ROW BF 25 B 6

CRCO ROW Series direct expansion, air cooled with BLDC hermetic inverter compressor

BF **Air delivery**
BF: Frontal air delivery
BT: Side air delivery

25 **Model / Cooling capacity (kW) at nominal conditions**

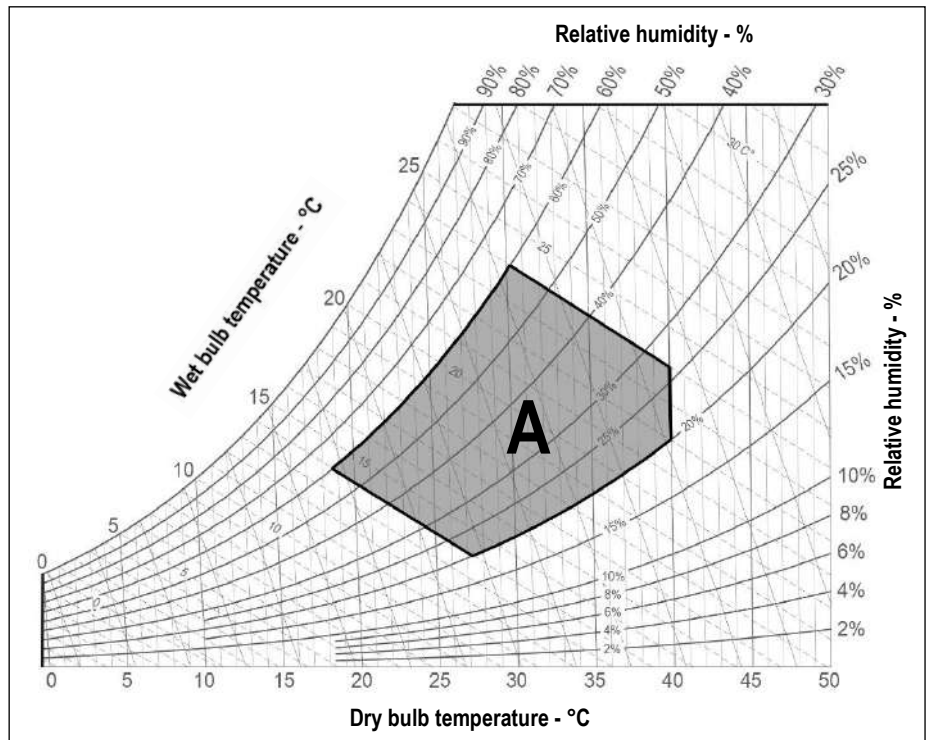
B **Cabinet length 1200 mm**

6 **Cabinet width 600 mm**

TRANSPORT AND STORAGE TEMPERATURE

During transport and if the machine is not installed at the reception, do not remove the packaging and place the machine in an enclosed, dry and protected from sunlight site at temperatures ranging between -30°C and 50°C in absence of superficial condensation.

WORKING LIMITS



ROOM AIR CONDITIONS

Room air temperature:

14°C	minimum temperature with wet bulb.
24°C	maximum temperature with wet bulb.
18°C	minimum temperature with dry bulb
40°C	maximum temperature with dry bulb.

AREA "A". Machine operating envelope.

Room air humidity:

20%RH	minimum relative humidity.
60%RH	maximum relative humidity.

AMBIENT AIR TEMPERATURE

45°C	Maximum ambient air temperature
-20°C	Minimum ambient air temperature

With "Kit for air -45°C" for low ambient temperature operation (optional)

-45°C	minimum ambient air temperature with remote condensers with AC fans
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CHILLED WATER TEMPERATURE (Dual Fluid circuit)

6-25°C	temperature range of the water entering the coil
ΔT 3°C	Minimum temperature difference between water inlet and outlet
ΔT 10°C	Maximum temperature difference between water inlet and outlet

All the values are indicative. The working temperatures are influenced by a series of variables as:

- Working conditions;
- Thermal load;
- Set of the microprocessor control.

HYDRAULIC CIRCUIT (Dual Fluid circuit)

ΔP 5-150kPa	Pressure drop range of the hydraulic circuit.
10 Bar	Maximum working pressure of the hydraulic circuit

POWER SUPPLY

± 10%	Maximum tolerance of the supply voltage (V)
± 2%	Maximum unbalancing of the phases.

MAIN COMPONENTS



FRAMEWORK

- Framework and base in galvanized steel sheet externally painted with epoxy powders.
- Panels in galvanized steel sheet externally painted with epoxy powders and internally insulated with noise absorption material.
- Total front and rear access for routine maintenance.
- Hinged front and rear panels with handle and security lock.
- Removable panels on lateral side.
- Holders for unit height adjusting.
- Colour RAL 7016 textured (anthracite grey).

AIR FLOW

Horizontal air flow for IN ROW cooling system application (for rows of racks):

- BF VERSION. Air intake from the back side and frontal air delivery through honeycomb type grilles.
- BT VERSION. Air intake from the back side and side air delivery through honeycomb type grilles.

FILTER SECTION

- Washable air filters with COARSE 40% efficiency (according to ISO EN 16890) efficiency, with cells in synthetic fibre, on air suction panel.

FANS SECTION

- Centrifugal fans with backward curved blades, single suction and without scroll housings (Plug-fans), directly coupled to electric motor.
 - Impeller in composite material exempt from rust formation.
 - Brushless type synchronous EC motor with integrated electronic commutated system and continuous variation of the rotation speed. The motor rotation control is obtained with the EC system (Electronic Commutation) that manage the motor according to signal coming from the microprocessor control.
- Fans control through ModBus. In case of failure, the control stops the fan indicating the type of fault. The machine is not stopped.
- Temperature sensor on air delivery.
- Temperature sensor on air intake.
- Adjustable External Static Pressure (ESP).
- Fan guard.

COOLING SECTION – DIRECT EXPANSION COIL

- Heat exchanger coil with copper tubes and high efficiency aluminium fins, specifically developed to provide high heat transfer and lower pressure drops.
- Finned pack with hydrophilic treatment that assure the condensate water drop, high thermal conductivity and does not favour the growth of micro-organisms.
- Frame in galvanized steel.
- Condensate tray in peraluman with connection (external diameter Ø16) for a discharge tube or for a pump for condensate drain (option).

COOLING SECTION – CHILLED WATER COIL

- Chilled water 4 rows cooling coil with copper tubes, aluminium fins and galvanized steel frame.
- 2-way motorized valve with 0÷10 VDC control actuator and emergency manual control.
- Temperature probe on water inlet
- Hydraulic pipes in copper with anticondensate insulation



COMPRESSORS

Model BF 25 B6:

- Rotary BLDC inverter compressor for R410A refrigerant

Model BF 40 B6:

- Scroll BLDC inverter compressors with spiral profile optimized for R410A refrigerant.
- Synchronous brushless inverter driven motor.
- Inverter for modulating capacity control.
- Filter for the reduction of electromagnetic noise and interference.
- Crankcase heater.
- Compressor soundproof cap.
- Rubber supports.

REFRIGERANT CIRCUIT

- Electronic expansion valve. The valve allows high performance and system efficiency thanks to a timely and accurate response to changes in temperature and pressure
- Sight glass.
- Filter dryer on liquid line.
- Pressure transducers with indication, control and protection functions, on low and high refrigerant pressure.
- High pressure safety switch with manual reset.
- Liquid receiver.
- Pressure relief valve on liquid receiver.
- Refrigerant circuit with copper tubing with anticondensate insulation of the suction line.
- Lubricant oil charge.
- Oil separator on gas discharge.
- Valves on gas delivery and liquid return placed on the bottom side of the unit for coupling to remote air-cooled condenser.
- 0÷10V proportional signal to manage the condensing control system of the remote air-cooled condenser.
- Condensing control by continuous variation of remote condenser fan rotation speed for operations with ambient temperature down to -20°C.



ELECTRICAL PANEL

Extractable electrical panel, in accordance with EN60204-1 norms, complete with:

- Magnetothermic switch for fans electric motor protection
- Magnetothermic switch for compressor inverter protection
- Inverter to drive the compressor motor.
- Transformer for auxiliary circuit and microprocessor supply.
- Terminals:

OUTLETS

- Voltage free deviating contact for General Alarm.
- Voltage free contact for machine operating status.

INLETS

- Emergency unit stop with signalling on display (external alarm).
- External enabling.
- Power supply 400/3+N/50



CONTROL SYSTEM

- Microprocessor control system with graphic display for control and monitor of operating and alarms status. The system includes:
 - Built-in clock for alarms date and time displaying and storing;
 - Built-in memory for the storing of the intervened events (up to 100 events recorded);
 - Integrated connectivity port MBUS RS485/JBUS;
 - Predisposition for additional connectivity board housing (MODBUS, LON, BACNET MS/TP RS485, BACNET OVER IP). The electronic cards are optional accessories.
 - Main components hour-meter;
 - Non-volatile "Flash" memory for data storage in case of power supply faulty;
 - Menu with protection password;

REMOTE AIR-COOLED CONDENSERS

The descriptions of these series can be found in Chapter REMOTE AIR-COOLED CONDENSERS.

..... **Remote air-cooled condenser:** Remote air-cooled condenser in PERALLUMAN aluminum alloy with microchannel condensing coil:

OPTIONAL ACCESSORIES

- A548..... **Constant prevalence.** Automatic system for the air pressure control in the aisle. The system controls the supply fans rotation speed to keep constant the air pressure via a differential pressure transmitter connected to the microprocessor control.
- P091..... **Back-up module controller.** The system guarantees the microprocessor power supply for a few minutes, in case of supply voltage failure. (size E1 excluded).
- P171..... **Kit for air -45°C MCH axial AC** Kit for operations with low ambient air temperature down to -45°C. For machine start up and operation with very low ambient air temperatures (between -20°C and -45°C).
- P191..... **Power supply for condenser.** Electrical power supply for remote condenser from the indoor machine electrical board. The optional includes magneto-thermic switches for condenser fans and the control/alarm signals.
- 383..... **Numbered wirings + UK requests;**
..... **Serial cards:**
4181 – Serial card MODBUS;
4182 – Serial card LON;
4184 – Serial card BACNET MS/TP RS485;
4185 – Serial card BACNET OVER IP.
- A491..... **Water leakage detector.** Supplied in mounting kit.
- A492..... **Water leakage detector + additional sensor.** Supplied in mounting kit.
- A501..... **Clogged filter sensor.** Differential pressure switch on the air side for clogged filters alarm signal.
- P183..... **Kit network analyser** (standard machine) Multifunction utility for calculating and displaying the machine electrical measurements.
- P184..... **Kit network analyser + optional** (full optional machine) Multifunction utility for calculating and displaying the machine electrical measurements.
- A431..... **Electric heater.** Heating with electric heaters.
- 4301 (2)..... **Humidification:** Modulating steam humidifier with immersed electrodes with electronic control.
- P051 (3)..... **Dehumidification function.**
- P161..... **T / rH air intake sensor.** Combined Temperature / Humidity sensor on air intake. The optional replace the standard temperature sensor on machine air intake.
- P071..... **Remote T / rH probe.** Combined Temperature / Humidity sensor for remote installation. The optional is added to the standard temperature sensor on machine air intake.
- P271..... **Electromechanical dual supply.** Double power supply with electromechanical change-over.
- A381..... **Drain pump.** Supplied in mounting kit. The system includes pump with activation float and 10 linear meters long discharge pipe.
- P083..... **Air filter COARSE 60%:** Washable high efficiency air filter (according to ISO EN 16890). Replace the standard filter.
- P260..... **Handling kit:** The kit includes support wheels with safety brake and wheels cover (Baseboard
- 3601..... **Compressor operating signal contact.** Voltage free contact for compressor status signalling.
- 9973..... **Wooden cage packing.** The machines are delivered on wooden pallet, covered with shrink wrap and packaged in wooden cage.

WARNING

The Manufacturers reserves the right to accept the matching of the optional installed on the machine.

MANDATORY COMBINATIONS OF ACCESSORIES

1. When optional accessory "4301 Humidification" is present, it requires mandatory accessory "P161 T/rH air intake sensor".
2. When optional accessory "P051 Dehumidification function" is present, it requires mandatory accessory "P161 T/rH air intake sensor".

TECHNICAL DATA

VERSION	BF / BT						BF / BT					
MODEL	25						40					
SIZE	B6						B6					
COOLING CAPACITY (1)	100%	80%	60%	40%	30%	100%	80%	60%	40%	30%		
Total	kW	28,8	23,0	17,3	11,5	7,92	40,0	32,0	24,0	16,0	12,2	
Sensible	kW	28,7	22,9	17,2	11,4	7,82	40,0	32,0	24,0	16,0	12,1	
SHR (2)		1	1	1	1	0,99	1	1	1	1	1	
Total power input (Comp. + Fans)	kW	7,81	5,15	3,34	1,91	1,25	11,1	7,05	4,40	2,48	1,73	
"EC" SUPPLY FANS	n.	4						4				
Air flow	m ³ /h	7400	5822	4244	2666	1680	9400	7483	5565	3648	2720	
Nominal external static pressure	Pa	0	0	0	0	0	0	0	0	0	0	
Maximum external static pressure	Pa	579	--	--	--	--	396	--	--	--	--	
Power input (3)	kW	0,52	0,29	0,13	0,05	0,02	0,96	0,52	0,27	0,10	0,05	
COMPRESSOR		Rotative						Scroll				
BLDC compressor quantity	n.	1						1				
Proportional cooling capacity		Modulating						Modulating				
Compressor power input	kW	7,31	4,87	3,21	1,86	1,23	10,1	6,52	4,14	2,38	1,68	
AIR FILTERS	n.	1						1				
Efficiency (ISO EN 16890)	COARSE	40%						40%				
GAS CIRCUIT	n.	1						1				
POWER SUPPLY	V/Ph/Hz	400/3+N/50						400/3+N/50				
ENERGY EFFICIENCY INDEXES (4)												
EER - Energy Efficiency Ratio	kW/kW	3,68	4,47	5,18	6,02	6,33	3,60	4,54	5,45	6,45	7,05	
DIMENSIONS												
Length	mm	1200						1200				
Width	mm	600						600				
Height	mm	2000						2000				
NET WEIGHT	kg	290						290				
REMOTE CONDENSER (4)												
Quantity	n.	1						1				
Series T-MATE DX-A STD	Mod.	M35						M45				
REFRIGERANT CONNECTIONS												
Gas delivery	ODS Ø	16						18				
Liquid line	ODS Ø	16						16				
HYDRAULIC CONNECTIONS												
CONDENSATE DISCHARGE												
Rubber pipe – Outer diameter	Ø mm	16						16				

THE COOLING CAPACITY DOES NOT CONSIDER THE SUPPLY FANS MOTOR THERMAL LOAD

1. Gross value. Characteristics referred to entering air at 35°C with 27% rH, ambient temperature 35°C. ESP=0Pa.
2. SHR = Sensible cooling capacity / Total cooling capacity.
3. Corresponding to the external nominal static pressure.
4. The Energy Efficiency Index does not consider the remote air-cooled condenser (optional) indicated in table.

The units highlighted in this publication contain <HFC R410A [GWP₁₀₀ 2088]> fluorinated greenhouse gas.

NOTE:

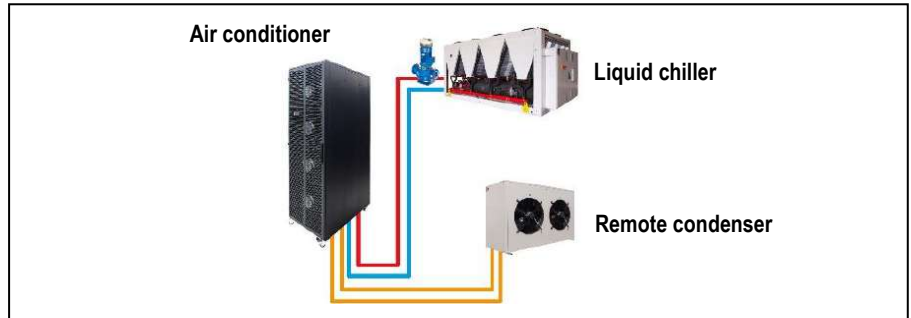
Below 30% of cooling capacity, the inverter compressor enters the "cycling" area in which the compressor operates with ON / OFF cycles below the minimum modulation frequency (operation only for short periods).

SELECT THE UNIT IN THE MODULATION FIELD

DUAL FLUID SYSTEM

DUAL FLUID system on the machine allows to obtain two independent cooling systems:

- Chilled water coil
- Direct expansion coil



The microprocessor control system automatically manages the system, by activating the cooling circuit more convenient according to the parameters set.

With this system, it is possible, with a limited use of space, to solve several plant problems such as:

- Chilled water coil fed with chilled water or mains water as a stand-by of the main cooling circuit.
- Double chilled water feeding with two independent circuit. This solution is used when you need to ensure redundancy of the cooling system.

The temperature control is performed with the same logic of the main coil.

TECHNICAL DATA - DUAL FLUID SYSTEM

VERSION		BF / BT	BF / BT
MODEL		25	40
SIZE		B6	B6
COOLING CAPACITY (1)			
Total	kW	35,6	50,7
Sensible	kW	33,2	48,0
COOLING COIL			
Water flow rate (1)	m ³ /h	6,13	8,74
dP coil + valve (1)	kPa	12	20
Water volume	l	6,2	6,2
HYDRAULIC CONNECTIONS			
WATER INLET / OUTLET	ISO 7/1 - R	Ø 1 1/2"	1 1/2"

THE COOLING CAPACITY DOES NOT CONSIDER THE SUPPLY FAN MOTOR THERMAL LOAD

1. Characteristics referred to entering air at 35°C-27%UR with chilled water temperature 10-15°C - 0% glycol

2-WAY VALVE FOR WATER FLOW CONTROL ON DUAL FLUID CIRCUIT



The water flow control in the finned coil is achieved through a **2-way modulating ball valve with equal percentage flow control** ensured by the integrated characterizing disc.

This type of valve offers the following series of benefits:

- Equal percentage flow control.
- No peaks initial flow.
- Excellent stability control thanks to the integrated characterizing disc.
- Excellent characteristic in partialisation.
- Stability in control.
- Maintenance free.
- Self-cleaning.

CHARACTERISTICS OF THE 2-WAY BALL VALVE

- Closing seal with leakage rate in Class A (EN 12266-1)
- Maximum fluid pressure Ps=1600kPa
- Maximum closing pressure (Close-off) ΔPs=1400kPa

The rotative actuator is controlled by a signal 0 ... 10VDC from the microprocessor controller. The actuator is equipped with an emergency button for manual operation and is maintenance-free.

WATER QUALITY OF THE HYDRAULIC CIRCUITS

The values shown in the table must be guaranteed during the entire life cycle of the machine.

	Description	Symbol	Range
1	Hydrogen Ions	pH	7.5 ÷ 9
2	Presence of calcium (Ca) and magnesium (Mg)	Hardness	4 ÷ 8.5 °D
3	Chlorine ions	Cl ⁻	< 150 ppm
4	Iron Ions	Fe ³⁺	< 0.5 ppm
5	Manganese Ions	Mn ²⁺	< 0.05 ppm
6	Carbon dioxide	CO ₂	< 10 ppm
7	Hydrogen sulphide	H ₂ S	< 50 ppb
8	Oxygen	O ₂	< 0.1 ppm
9	Chlorine	Cl ₂	< 0.5 ppm
10	Ammonia	NH ₃	< 0.5 ppm
11	Ratio between carbonates and sulphates	HCO ₃ ⁻ /SO ₄ ²⁻	> 1
12	Sulphate ions	SO ₄ ⁻	< 100 ppm
13	Phosphate ions	PO ₄ ³⁻	< 2.0 ppm

where: $1/1.78^{\circ}D = 1^{\circ}Fr$ with $1^{\circ}Fr = 10 \text{ gr CaCO}_3 / \text{m}^3$

ppm = parts for millions

ppb = part for billion

Explanatory notes:

- ref.1: A greater concentration of hydrogen ions (pH) than 9 implies a high risk of deposits, whereas a lower pH than 7 implies a high risk of corrosion.
- ref.2: The hardness measures the amount of Ca and Mg carbonate dissolved in the water with a temperature lower than 100°C (temporary hardness). A high hardness implies a high risk of deposits.
- ref.3: The concentration of chloride ions with higher values than those indicated causes corrosion.
- ref. 4 - 5 - 8: The presence of iron and manganese ions and oxygen leads to corrosion.
- ref.6 - 7: Carbon dioxide and hydrogen sulphide are impurities that promote corrosion.
- ref.9: Usually in water from the waterworks it is a value of between 0.2 and 0.3 ppm. High values cause corrosion.
- ref.10: The presence of ammonia reinforces the oxidising power of oxygen
- ref.11: Below the value shown in the table, there is a risk of corrosion due to the trigger of galvanic currents between copper and other less noble metals.
- ref.12: The presence of sulphates ions triggers corrosion phenomenon.
- ref.13: The presence of phosphates ions triggers corrosion phenomenon.

It is necessary to carry out periodic checks, with withdrawals at different points of the hydraulic system. During the first year of operation, checks are recommended every 4 months which can be reduced every 6 months starting from the second year of operation.

WARNING:

Values of the parameters outside the indicated ranges can lead to the formation of deposits and limescale and/or favour corrosive phenomena within the plant. For operating fluids other than water (mixtures of ethylene and propylene glycol) it is recommended to use specific inhibitors, designed to offer thermal stability within the operating temperature range and protection against corrosion. It is necessary that, in the presence of dirty and / or aggressive waters, an intermediate heat exchanger is installed upstream of the heat exchangers.

ANTIFREEZE MIXTURES

In plants that are not adequately protected by heating cables, protect the hydraulic circuit with an anti-freeze mixture when the ambient air temperature can drop below 5°C.

Minimum ambient air temperature	°C	5	0	-5	-10	-15	-20	-25	-30
ETHYLENE GLYCOL (suggested % in weight)	%	0	12	20	30	35	40	45	50

Minimum ambient air temperature	°C	5	2	-3	-9	-13	-17	-23	-29
PROPYLENE GLYCOL (suggested % in weight)	%	0	10	20	30	35	40	45	50

The values are indicative and may significantly vary depending on the glycol manufacturer. Refer to your glycol supplier for detail.

The values consider a precautionary difference of 5°C between the minimum ambient air temperature and the freezing temperature of the mixture.

In the hydraulic circuit do not send fluids other than water or mixtures with ethylene / propylene glycol.

If other products are provided, in addition to mixtures of water and ethylene or propylene glycol, contact the Manufacturer to check the compatibility with the machine components.

REFRIGERANT CHARGE

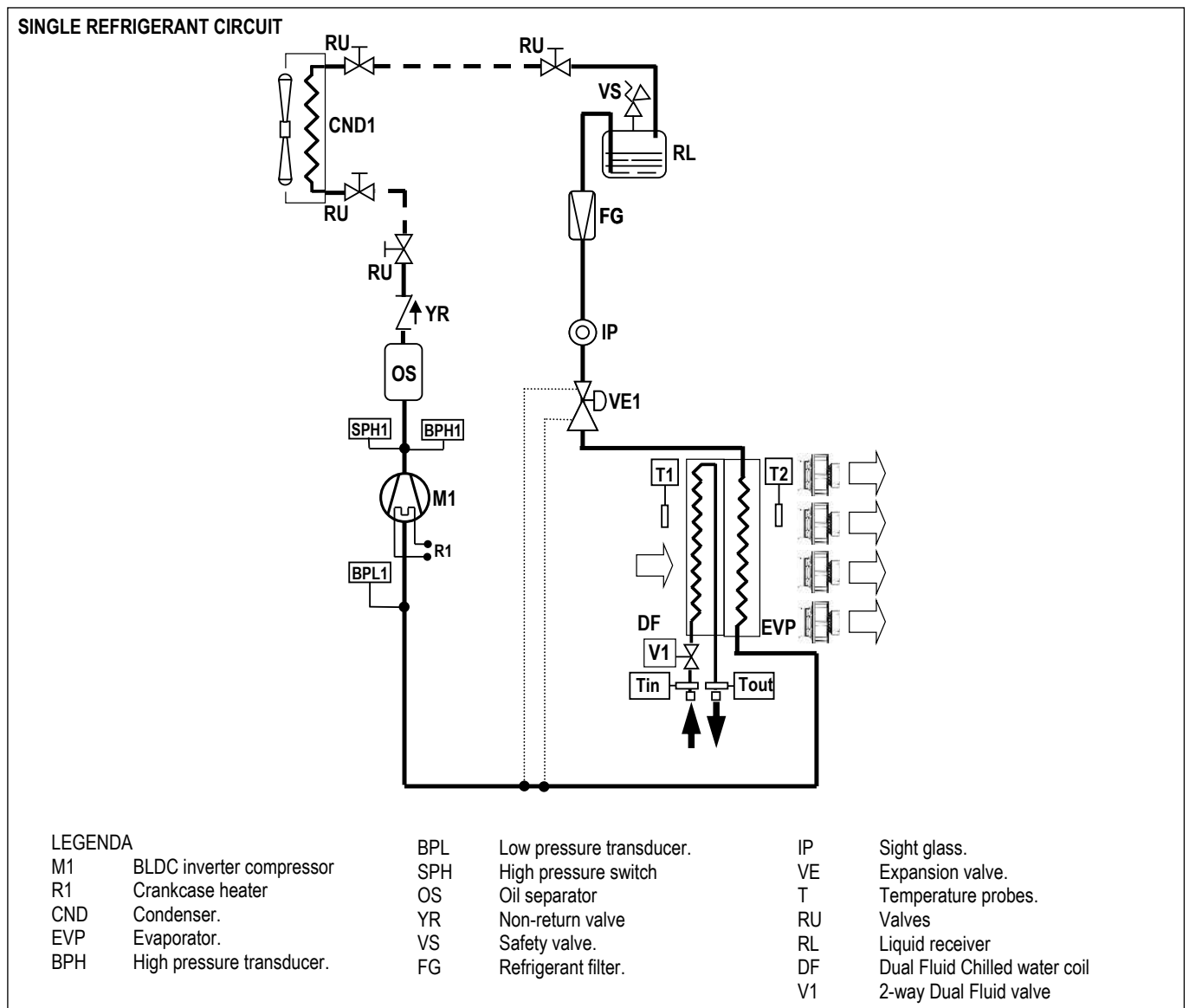
The air conditioner is supplied with a minimum R410A refrigerant charge. **Refrigerant must be charged.** The following table shows the refrigerant charge that must be introduced for the air conditioner only. Remote condenser, connections pipes and optional are excluded.

VERSION		BF / BT	BF / BT
MODEL		25	40
SIZE		B6	B6
REFRIGERANT		R410A	R410A
Refrigerant circuits x Refrigerant charge (1)	n x kg	1 x 4,5	1 x 4,6
HFC R410A - F Gas - CO ₂ equivalent	t	9,39	9,60

1. Refrigerant charge required for the air conditioner only operation. Remote condenser, connections pipes and optional are excluded.

REFRIGERANT / HYDRAULIC CIRCUIT

Below refrigerant diagram. The diagram refers to the standard configuration, without optional.



RECOMMENDED REFRIGERANT LINES

Please always refer to the "INSTALLATION DIAGRAM" to properly select all necessary components. Verify the need to use pressure limiting devices (safety valves) where not already provided for by Directive 2014/68 / EU.

Nominal diameter: Refrigerant connection of the indoor unit. In some cases, the diameter of the refrigerant lines may not correspond with the nominal diameter. This is completely normal. It is enough to provide a reduction fitting to adjust the diameter.

"SI" INTERNATIONAL SYSTEM PIPES DIAMETERS

SI system	Diameter	mm	6	8	10	12	16	18	22	28	35
	Thickness	mm	1	1	1	1	1	1	1	1,5	1,5

INVERTER COMPRESSOR

Model	Line	Nominal diameter Ø [mm]	EQUIVALENT LENGTH [m] FOR INVERTER COMPRESSOR R410A																			
			5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
25	Gas	16	18	18	18	18	18	18	18	22	22	22	22	22	22	22	22	22	22	22	22	22
	Liquid	16	16	16	16	16	16	16	18	18	18	18	18	18	18	18	18	18	18	18	18	18
40	Gas	18	18	18	18	18	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
	Liquid	16	16	16	16	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18

For equivalent lengths over 100m, please contact the Manufacturer's Sales Office.

"IMPERIAL" SYSTEM PIPES DIAMETERS

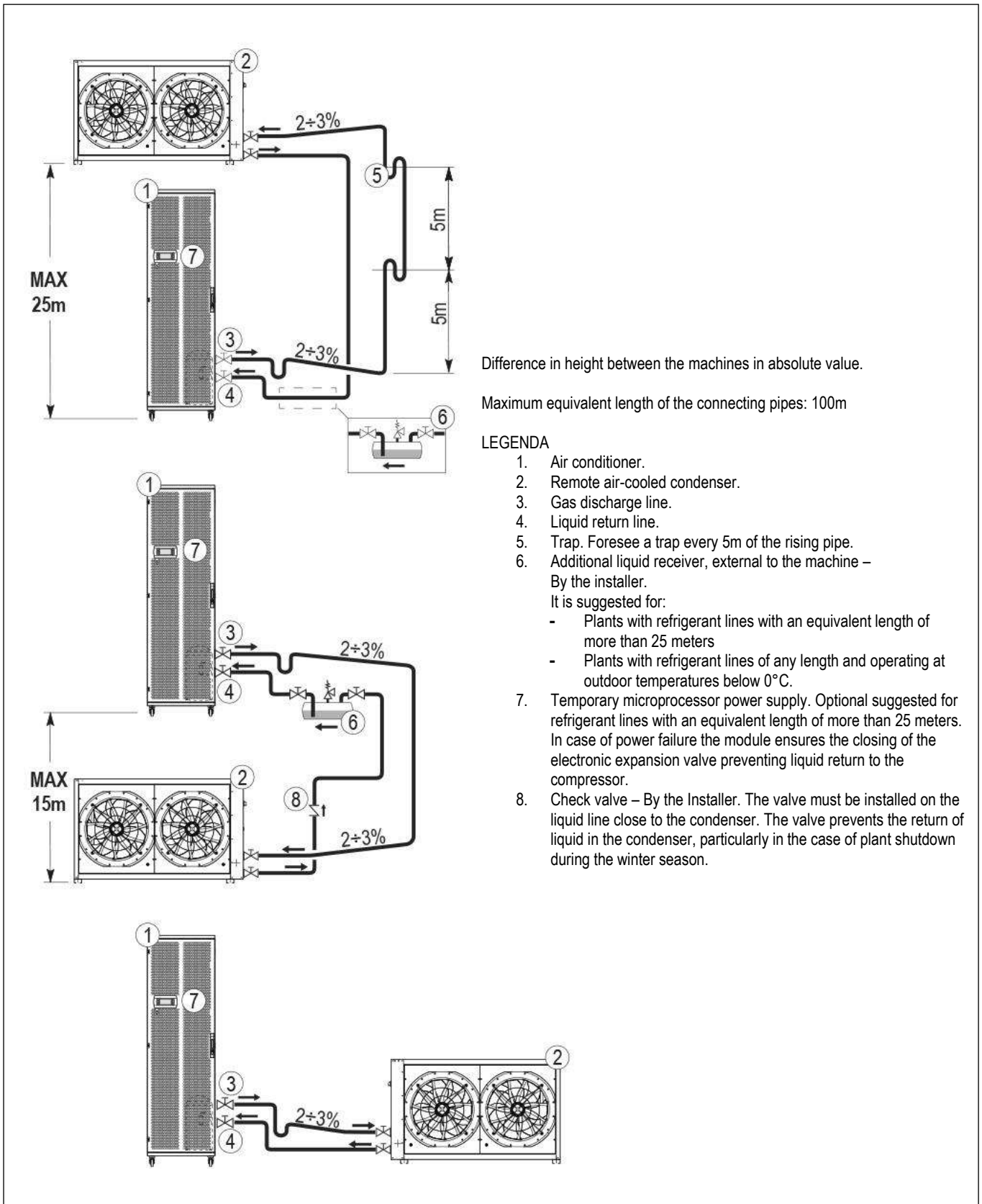
IMPERIAL system	Diameter	inch	1/4"	3/8"	1/2"	5/8"	3/4"	7/8"	1"	1 1/8"	1 3/8"
	Thickness	mm	6,35	9,52	12,7	15,87	19,05	22,22	25,4	28,57	34,92
		mm	1	1	1	1	1	1	1	1,25	1,25

INVERTER COMPRESSOR

Model	Line	Nominal diameter Ø [mm]	EQUIVALENT LENGTH [ft] FOR INVERTER COMPRESSOR R410A																			
			15	35	50	65	80	100	115	130	150	165	180	195	215	230	245	260	280	295	310	330
25	Gas	16	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"
	Liquid	16	5/8"	5/8"	5/8"	5/8"	5/8"	5/8"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"
40	Gas	18	3/4"	3/4"	3/4"	3/4"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"
	Liquid	16	5/8"	5/8"	5/8"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"

For equivalent lengths over 330ft please contact the Manufacturer's Sales Office.

INSTALLATION DIAGRAM



WARNING

It is necessary to provide the refrigerant charge for the connection pipes and for the remote air-cooled condenser. Charge refrigerant in the suitable quantity and lubricant oil in 10% ratio of charged refrigerant. Lubricant oil must be the same type as the charged one as shown on the compressor plate.

ACOUSTIC DATA

Acoustic data of the standard machine at full load working conditions.

WARNING:

In a closed room the noise produced by a sound source reaches the listener in two different ways:

- Directly
- Reflected from the surrounding walls, floor, ceiling, from furniture.

With the same sound source, the noise produced in a closed room is greater than that produced outdoors. In fact, the sound pressure level generated by the source, must be added to the one reflected from the room. Also, the shape of the room affects the sound.

Spectrum	Hz	63	125	250	500	1000	2000	4000	8000	Totale
		dB	dB	dB	dB	dB	dB	dB	dB	dB(A)
Model										
25 B6	Power [Lw]	64	66	67	68	66	62	56	51	70
	Pressure [L _{Pm}] (1)	48	50	51	52	50	46	40	35	54
40 B6	Power [Lw]	68	71	73	74	71	68	62	59	76
	Pressure [L _{Pm}] (1)	52	55	57	58	55	52	46	43	60

1. Average noise pressure level at 1 meter in free field – ISO 3744

ELECTRICAL DATA

VERSION		BF / BT	BF / BT
MODEL		25	40
SIZE		B6	B6
Power supply	V/ph/Hz	400/3+N/50	400/3+N/50
Maximum engaged power (FLI)	kW	6,91	9,99
Maximum current input (FLA)	A	27,2	34,2
Starting current (SA)	A	13,2	14,2
Engaged power	kW	7,83	11,1

WARNING:

The electric data indicated refer only to the indoor unit.

Optional accessory electric data are included within the dedicated chapters and must be added.

Please refer to ELCA WORLD selection program to calculate the electrical data of the air conditioner according to the requested optional accessories.

The remote air-cooled condenser is not included because it has independent power supply.

MICROPROCESSOR CONTROL SYSTEM








The microprocessor control system is equipped with 6 keys terminal and back lighted graphic display on which all information in different languages or easily identifiable symbols are displayed. The system disposes of a “flash” memory that preserves the information even in absence of power supply. Part of memory is dedicated to the registration of intervened events - up to 100 events.

CHARACTERISTICS OF THE CONTROLLER:

- CPU: 32 bit – 100 MHz
- 4 Mbyte FLASH memory that preserves the information even in absence of power supply - 2Mbyte dedicated to the recording of intervened events (records up to 100 events)
- Acoustic and optical signal of alarms
- Integrated LAN connection that does not require additional hardware

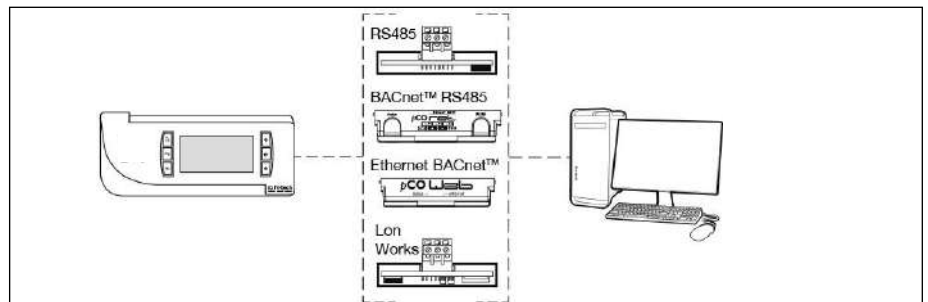
KEYBOARD FUNCTIONS

	ALARM	Alarm, Back-red light active – alarm presence, push to silence and to have alarm description. If more than one alarm(s), the others can be scrolled by Key UP / DOWN
	PRG	Menu list scrolled by key UP/DOWN: Status; Set-point; Reset Alarm; Service set; Memo; Manual; Clock set; Communication; Switch unit (in LAN mode); Unit ON/OFF using the ENTER to execute the mode.
	ESC	Home, main screen displayed
	UP DOWN	Used to change the pages and values of sets. When display is in main screen (HOME), pressing one of them (UP/DOWN) will display the synoptic of the main controls.
	ENTER	Moving the cursor on adjustable Program(s) fields, to confirm the changes, press the key (ENTER) to get out of the fields.

CONNECTIVITY

Through the integrated serial port MBUS/JBUS (RS485) and optional serial port, the microprocessor control enables communication with the modern buildings BMS systems with the following protocols:

- MBUS/JBUS (RS485) serial card;
- LON Works serial card;
- BACnet per Ethernet – SNMP – TCP/IP serial card;
- BACnet per MS/TP serial card;



PASSWORD

Level 1: On request of the End User. Allowing the changes of SETPOINT, RESET ALARM, SEASON, UNIT ON/OFF and COMMUNICATION.

Level 2: Asks to Service: Allowing the changes of SERVICE SET and MANUAL

Level 3: Asks to Service: Allowing the changes of MANUFACTURER SET.

No passwords request to enter into: STATUS, MEMO, CLOCK SET, SWITCH UNIT (LAN)

REMOTE CONTROLS/ALARMS

1 INLETS: External enabling •

2 INLETS: Smoke/Fire alarm •

1 OUTLETS: General alarm 1 – programmable deviating contact ••

2 OUTLETS: General alarm 2 – programmable deviating contact ••

• controls/alarms for remotization

•• voltage free controls/alarms for remotization

REMOTE AIR-COOLED CONDENSERS



Remote air-cooled condensers for matching to air conditioners for IT Cooling.
The constructive solutions allow high application flexibility.
Horizontal air flow, from coil to fan.
The series has an independent power supply from the indoor unit.
Among the indoor unit and the condenser is necessary the refrigerant connection and electrical connection of the condensing proportional control signal and the alarms.:
Is available the optional "P191 Power supply for condenser" from the indoor machine electrical board.

Remote air-cooled condenser:

Remote air-cooled condenser in PERALUMAN aluminium alloy with microchannel condensing coil:

- with AC axial fans and standard acoustic version
- with AC axial fans and low noise acoustic version
- with EC axial fans and standard acoustic version
- with EC axial fans and low noise acoustic version

Remote air-cooled condenser with condensing coil with copper tubes and aluminium fins:

- with AC axial fans and standard acoustic version
- with AC axial fans and low noise acoustic version
- with EC axial fans and standard acoustic version
- with EC axial fans and low noise acoustic version

Please refer to ELCA WORLD selection program to calculate the cooling capacity of the air conditioner according to the remote condenser.

The remote air-cooled condenser has independent power supply from the indoor unit.

OPTIONAL ACCESSORIES: A548 - CONSTANT PREVALENCE



The optional is a differential pressure sensor with a 0...20mA output signal. The device is installed in the machine. The sensor is connected to the microprocessor control of the indoor unit and allows the control of: A548 - CONSTANT PREVALENCE

The system controls the air pressure in the aisle. Through the relief piping of the room pressure (low pressure side) and the air supply of the fan (high pressure side) the fan rotation speed is controlled to keep the air pressure constant.

Pressure control range from 0 to 100 Pa.

OPTIONAL ACCESSORIES: P091 - BACK-UP MODULE CONTROLLER



The optional is installed within the electrical panel.

The system powers the microprocessor for a few minutes in the event of a power failure or voltage surges, preventing the re-boot of the controller.

OPTIONAL ACCESSORIES: P171 – KIT FOR AIR -45°C MCH AXIAL AC

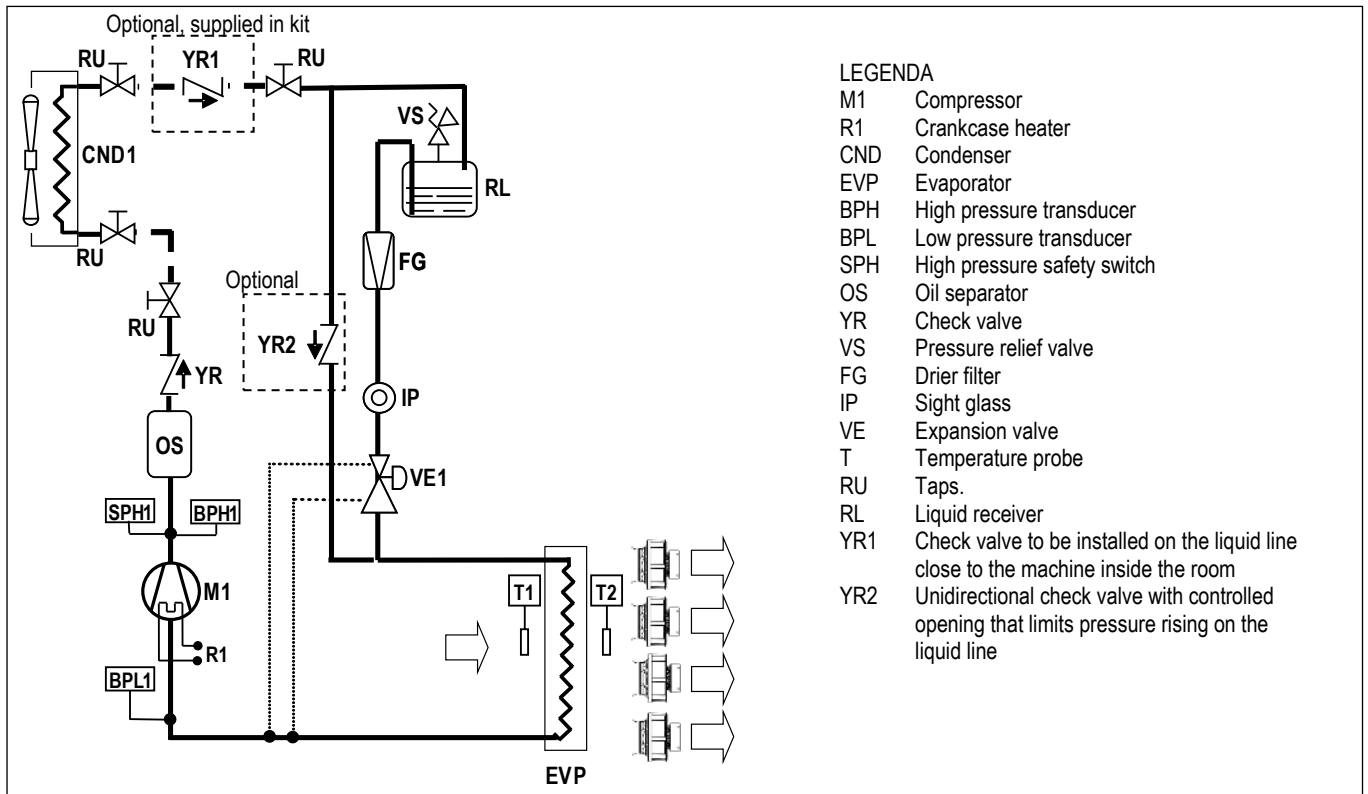
P171 – KIT FOR AIR -45°C MCH AXIAL AC

The optional is available only for air conditioners matched with remote air-cooled condensers with axial fans with AC electric motors:

The system is necessary for the correct machine start up and operation with very low ambient air temperatures: between -20°C and -45°C.

Components for each refrigerant circuit:

- A non-return valve (YR₁), supplied in kit. The valve must be installed indoor, near to the air conditioner, on the liquid line on the return of the remote condenser. This valve avoids the migration of the refrigerant at liquid state in presence of very low ambient air condition.
- A non-return valve (YR₂), with controlled opening, installed in factory within the unit. It limits the pressure raising on the liquid pipe between the expansion valve and the non-return valve (YR₁).



OPTIONAL ACCESSORIES: A491 - WATER LEAKAGE DETECTOR



The system includes an electronic relay installed in the electrical panel of the machine and a water detector. The electrical connections for the probe and the alarm contact are present in the machine's terminal board. Sensor is supplied to be connected and installed at customer care.

OPTIONAL ACCESSORIES: A492 – WATER LEAKAGE DETECTOR + ADDITIONAL DETECTOR



The system includes an electronic relay installed in the electrical panel of the indoor machine and 2 water detectors to be connected in series. The electrical connections for the probe and the alarm contact are present in the indoor machine's terminal board. The sensors are supplied to be connected and installed at customer care.

OPTIONAL ACCESSORIES: A501 – CLOGGED FILTERS SENSOR



The system includes a differential pressure switch installed in the electrical panel or in the front of the indoor unit and the plastic hoses for the relief of the pressure upstream and downstream the air filters.

Control range: 0.3 ... 4.0 mbar (30 ... 400 Pa)
 Differential for intervention: 0.15 mbar (15 Pa)

OPTIONAL ACCESSORIES: P183 – NETWORK ANALYZER

OPTIONAL ACCESSORIES: P184 – NETWORK ANALYZER + OPTIONAL



This device provides continuous measurement of power consumption, monitoring current, voltage and power. These values are sent to unit microprocessor via RS485 serial cable, as shown on the unit wiring diagram.

The displayed variables are:

- Phase to phase voltage, only for three-phase units;
- Phase voltage (phase-neutral);
- Phase current;
- Neutral current only for three-phase units;
- Active phase power, only for three-phase units;
- Total active power;
- Active energy;
- Hour counts

INSTALLATION

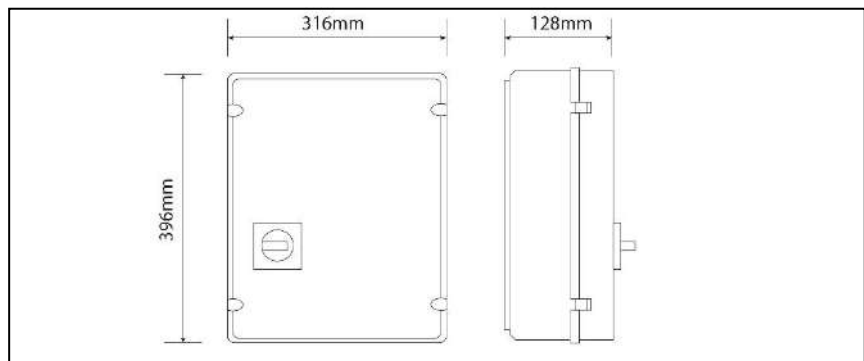
Frame	Power Supply	Installation	
BF B6	400/3+N/50	EXTERNAL to the unit, supplied in kit	P183 / P184 (*)
BT B6	400/3+N/50	EXTERNAL to the unit, supplied in kit	P183 / P184 (*)

(*) P184 for units with optional (with electric heaters and/or humidifier)

MOUNTING KIT

The optional is supplied in box for external installation to the machine with the dimensions showed in the figure below, and includes:

- Main switch with door lock safety;
- Fuse;
- Network transducer;
- Current transformers, one for each power supply phase cable;
- Terminals.



OPTIONAL ACCESSORIES: A431 – ELECTRIC HEATERS



The optional is not compatible with “Electromechanical dual supply (P271)” optional accessory. Electric heater consisting of finned aluminum elements, ensuring low surface temperature and deleting the air ionization problems. The optional is installed downstream the main cooling coil. In electric heaters with two working steps the activation is binary type.

Components:

- Electric heater in aluminium armoured elements with integral fins
- Electrical control
- Safety thermostat.

VERSION		BF / BT	BF / BT
MODEL		25	40
SIZE		B6	B6
THERMAL CAPACITY	kW	1,7	1,7
Absorbed current (OA)	A	3,0	3,0
First working step	kW	0,85	0,85
Second working step	kW	0,85 + 0,85	0,85 + 0,85
NET WEIGHT (1)	kg	5	5

1. Value to be added to the weight of the standard unit.

OPTIONAL ACCESSORIES: 4301 – HUMIDIFIER



The optional is not compatible with “Electromechanical dual supply (P271)” optional accessories.

The optional requires mandatory accessory “P161 T/rH air intake sensor”.

The optional is factory installed and requires only water filling connection.

The accessory is factory installed and requires only water filling connection.

It is recommended to install a filter and a shut-off valve on the pipe to the water inlet.

This humidifier produces non-pressurized steam by electrodes immersed in the water inside the cylinder: they bring the electric phase in the water that works as an electrical resistance and overheats. The steam so produced is distributed with dedicated distributors and used for ambient humidification or for industrial processes.

CHARACTERISTICS OF THE SUPPLY WATER

The quality of the used water influences the evaporation process, so the humidifier can be fed with **not-treated water, only when potable and non-demineralised**.

LIMIT VALUES

		Min	Max
Hydrogen ions	pH	7	8,5
Specific conductivity at 20°C	$\sigma_{R, 20^\circ C}$ $\mu S/cm$	350	750
Total dissolved solids	TDS mg/l	(1)	(1)
Dry residue at 180°C	R ₁₈₀ mg/l	(1)	(1)
Total hardness	TH mg/l CaCO ₃	100 (2)	400
Temporary hardness	mg/l CaCO ₃	60 (3)	300
Iron + Manganese	mg/l Fe + Mn	0	0,2
Chlorides	ppm Cl	0	30
Silica	mg/l SiO ₂	0	20
Residual chlorine	mg/l Cl ⁻	0	0,2
Calcium sulphate	mg/l CaSO ₄	0	100
Metallic impurities	mg/l	0	0
Solvents, diluents, soaps, lubricants	mg/l	0	0

(1) Values depending on specific conductivity; in general: TDS \cong 0,93 * $\sigma_{R, 20^\circ C}$; R₁₈₀ \cong 0,65 * $\sigma_{R, 20^\circ C}$

(2) Not lower than 200% of the chloride content in mg/l di Cl⁻

(3) Not lower than 300% of the chloride content in mg/l di Cl⁻

WARNING:

- Use only with drinking water.
- There is no reliable relationship between hardness and water conductivity
- Do not treat water with softeners! This could cause corrosion of the electrodes or the formation of foam, leading to potential operating problems or failures.
- Do not add disinfectants or corrosion inhibitors to water, as these substances are potentially irritant.
- Is absolutely forbidden to use well water, industrial water or water drawn from cooling circuits; in general, avoid using potentially contaminated water, either from a chemical or bacteriological point of view.

CRC D ROW

VERSION		BF / BT	BF / BT
MODEL		25	40
SIZE		B6	B6
VAPOUR PRODUCTION	kg/h	3,0	3,0
Power input	kW	1,4	1,4
Absorbed current (OA)	A	6,1	6,1
Max absorbed current (OA)	A	8,8	8,8
Water content	l	3,9	3,9
Max water supply pressure	Bar	1÷8	1÷8
NET WEIGHT (1)	kg	3	3
HYDRAULIC CONNECTION			
WATER INLET - ISO 228/1 – G M	Ø	3/4"	3/4"
WATER OUTLET – external diameter	Ø mm	19	19

1. Value to be added to the weight of the standard unit. Does not include the weight of the water content.

OPTIONAL ACCESSORIES: P051 – DEHUMIDIFICATION FUNCTION

The optional requires mandatory accessory "P161 T/rH air intake sensor".

Components:

- Temperature / Humidity sensor on the air intake.
- Electronic control system of the dew point temperature for the combined intervention of cooling capacity and air flow.

OPTIONAL ACCESSORIES: P161 - T/RH AIR INTAKE SENSOR

OPTIONAL ACCESSORIES: P071 - REMOTE T/RH PROBE



P161: T/RH AIR INTAKE SENSOR

The accessory replaces the temperature sensor installed on the air intake in the unit and allows the displaying of the relative humidity room value.

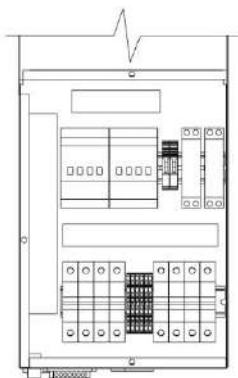
The sensor is mandatorily required with following option:

- 4301 Humidifier;
- P161 Dehumidification function;

P071: REMOTE T/RH PROBE

The accessory is added to the standard temperature sensor or to the temperature / humidity sensor (optional) on the machine air intake. For indoor installation in a specific point of the room to be conditioned.

OPTIONAL ACCESSORIES: P271 – ELECTROMECHANICAL DUAL SUPPLY



The optional is not compatible with "4301 Humidifier" and "A430 Electric Heaters".

These devices are suitable for low voltage systems with interruption of the supply to the load during transfer.

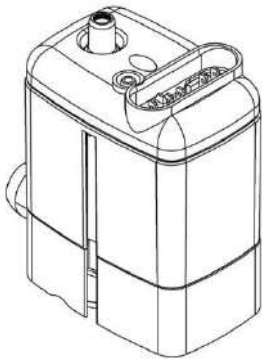
OPEN TRANSITION TYPE TRANSFER SWITCH WITH A MINIMUM INTERRUPTION OF THE SUPPLY DURING TRANSFER.

To maintain the microprocessor powered and avoid its restarts it is suggested the "P091 Back-up module controller" optional accessory. The back-up module guarantees the microprocessor power supply for a few minutes, in case of supply voltage failure.

The remote condenser must be powered by the automatic transfer switch.

It is suggested the optional "P191 power supply for condenser" from the indoor machine electrical board. The optional includes magnetothermic switches for condenser fans.

OPTIONAL ACCESSORIES: A381 - CONDENSATE DISCHARGE PUMP



A plastic case contains the pump motor, the thermal protection with automatic reset, the float with the trigger threshold and alarm threshold overflow and hydraulic and electric connection. Together the pump 4 linear meters of rubber discharge tube is supplied. Wiring includes power supply and an alarm signal displayed on microprocessor. The condensate discharge pump operation is fully automatic.

The pump is placed in the condensate tray on the bottom unit side.

TECHNICAL DATA

Power supply		230/1/50
Power input	W	14
Discharge pipe	Ø mm	6x9
Maximum water flow	l/h	20
Discharge head:		
- With minimum water flow	mH ₂ O	14(*)

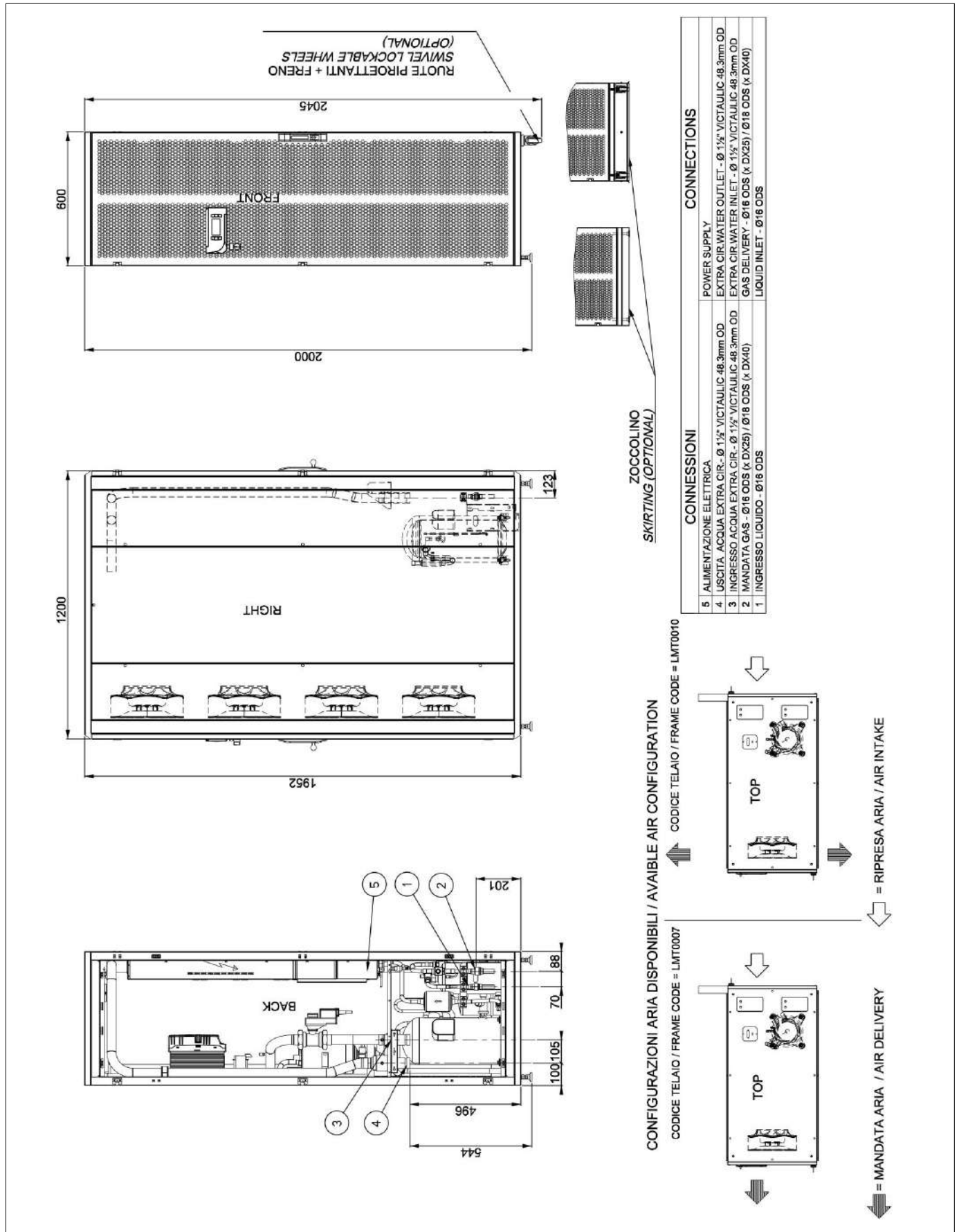
(*) with water flow 0 l/h

CONDENSATE DISCHARGE PUMP PERFORMANCE

Vertical discharge tube length	Water flow rate (l/h)
0m	20
2m	16
4m	11,5

MACHINE DRAWINGS

Dimensions in mm





for a greener tomorrow

Eco Changes is the Mitsubishi Electric Group's environmental statement, and expresses the Group's stance on environmental management. Through a wide range of businesses, we are helping contribute to the realization of a sustainable society.



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