



STANDARD DEHUMIDIFIERS

ITM

SERIES



CE

TECHNICAL MANUAL

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The ITM manual, contains any information that is needed for a correct use of the equipment while safeguarding operator safety, according to what indicated in the actual directives on units safety.

AIM AND CONTENTS OF THIS MANUAL

This manual provides basic information on the installation, operation and maintenance off the EH unit. It is addressed to machine operators and it enables them to use the equipment efficiently, even if they do not have any previous specific knowledge of it. This manual describes the characteristics of the equipment at the time it is being put on the market; therefore it may not capture later technological improvements introduced by HIDROS SRL as part of its constant endeavour to enhance the performance, ergonomics, safety and functionality of its products.

HOW TO KEEP THIS MANUAL

The manual must be always with the unit it refers to. It must be stored in a safe place, away from the dust and moisture. It must be accessible to all users who shall consult it any time they are in doubt on how to operate the equipment.

HIDROS SRL reserves the right to modify its products and related manuals without necessarily updating previous versions of the reference material. The customer shall store any updated copy of the manual or parts of it delivered by the manufacturer as an attachment to this manual.

HIDROS SRL is available to give any detailed information about this manual and to give information regarding the use and the maintenance of its own units.

GRAPHIC SYMBOLS



Indicates operations that can be dangerous for people and/or disrupts the correct operation of the equipment..



Indicates prohibited operations.








Indicates important information that the operator must follow in order to guarantee the correct operation of the equipment in complete safety

SAFETY LAWS

The units single components or the complete units produced by HIDROS have been designed according to the actual CE and national Directives. For the detailed list of the project technical Directives, refer to the CE declaration enclosed.





GENERAL SAFETY GUIDELINES

Before beginning to operate on ITM units every user must be perfectly knowledgeable about the functions of the equipment and its controls and must have read and understood the information container in this manual.

	It's strictly forbidden to remove and/or camper with any safety device.
	Any routine or not-routine maintenance operation shall be carried out when the equipment has been shut down, disconnected from electric and pneumatic power source and after its pneumatic system has been discharged.
	Do not put your hands or insert screwdrivers, spanners or other tools into moving parts of the equipment.
	The equipment supervisor and the maintenance man must receive training suitable for the performance of their tasks in safety
	Operators must know how to use personal protective devices and must know the accident-prevention guidelines contained in national and international laws and norms.





WORKERS' HEALTH AND SAFETY

The European Community has emanated some Directives about worker's safety and health which the employers have to respect and make the others respect. For the detailed list, see the CE declaration enclosed.

	<i>Do not tamper with or replace parts of the equipment without the specific consent of the manufacturer. The manufacturer shall have no responsibility whatsoever in case of unauthorised operations.</i>
	<i>Using components, expendable materials or spare parts that do not correspond to those recommended by the manufacturer and/or listed in this manual may be dangerous for the operators and/or damage the equipment</i>
	<i>The operator's workplace must be kept clean, tidy and free from objects that may hamper free movements. Appropriate lighting of the work place shall be provided so as to allow the operator to carry out the required operations safely. Poor or too strong lighting can cause risks.</i>
	<i>Ensure that work places are always adequately ventilated and that aspirators are working, in good condition and in compliance with the requirements of the laws in force...</i>



PERSONAL PROTECTIVE EQUIPMENT

When operating and maintaining the ITM unit, use the following personal protective equipment.

	Equipment: people who make maintenance or work with the unit, must wear an equipment in accordance with the safety Directives. They must wear accident prevention shoes with anti-slip sole where the paving is slippery.	
	Gloves: During the cleanings and the maintenance operations, it's necessary the use of appropriate gloves. In case of gas recharge, it's compulsory the use of appropriate gloves to avoid the risk of freezing.	
		Mask and goggles: Respiratory protection (mask) and eye protection (goggles) should be used during cleaning and maintenance operations.

SAFETY SIGNS

The equipment features the following safety signs, which must be complied with:

	General hazard
	Electric shock hazard

UNIT DESCRIPTION

ITM dehumidifiers series are high-performances units especially designed for industrial or commercial purposes where humidity level should be controlled or water vapour condensation should be prevented. These units are particularly indicated for archives, ironing rooms, cheese factories, underground rooms, cellars and industrial sites where high humidity level is present.

Frame

All ITM units are made from hot-galvanised thick sheet metal, painted with polyurethane powder enamel at 180°C to ensure the best resistance against the atmospheric agents. The frame is self-supporting with removable panels. The drip tray is present standard in all ITM units and it's in stainless steel. The colour of the units is RAL 7035

Refrigerant circuit

The refrigerant gas used in these units is R407C. The refrigerant circuit is made by using international primary brands components and according to ISO 97/23 concerning welding procedures. The refrigerant circuit includes:

sight glass,
filter drier,
thermal expansion valve with external equalizer,
Schrader valves for maintenance and control,
pressure safety device (according to PED regulation).

Compressors

The compressor is scroll type with crankcase heater and thermal overload protection by a klixon embedded in the motor winding. It's mounted on rubber vibration dampers and, by request, it can be supplied with some jackets to reduce the noise (accessory). The crankcase heater, when present, is always powered when the compressor is in stand-by. The inspection is possible through the frontal panel of the unit.

Condensers and evaporators

The condensers and evaporators are made of copper pipes and aluminium fins. The diameter of the copper pipes is 3/8" and the thickness of the aluminium fins is 0,1 mm. The tubes are mechanically expanded into the aluminium fins to improve the heat exchange factor. The geometry of these condensers guarantees a low air side pressure drop and then the use of low rotation (and low noise emission) fans. All the units have a stainless steel drip tray. Besides this, each evaporator is supplied of a temperature probe used as automatic antifreeze probe.

Fans

The fan is centrifugal type. It's statically and dynamically balanced and supplied complete of the safety fan guard according to EN 294. It's mounted on the unit frame by interposition of rubber vibration dampers. The electric motor is at 4 poles (about 1500 rpm). Connected to the fan by belts and pulleys and it's equipped of an integrated thermal overload protection. The protection class of the motors is IP 54.

Air Filter

It's supplied standard with the unit. It's made of filtering material in synthetic fibre without electrostatic charge. It can be removed for differential disposal, class G3, according to EN 779:2002

Electric box

The electric switch board is made according to electromagnetic compatibility norms CEE 73/23 and 89/336. The accessibility to the board is possible after removing the front panel of the unit and the OFF positioning of the main switch. The moisture protection degree is IP55. In all ITM units are installed, standard, the compressors sequence relay who disables the operation of the compressor in case the power supply phase sequence is not the correct one (scroll compressors in fact, can be damaged if they rotate reverse wise). The following components are also standard installed: main switch, magnetic-thermal switches (as a protection of pumps and fans), compressors fuses, control circuit automatic breakers, compressor contactors. The terminal board is also supplied with voltage free contacts for remote ON-OFF.

Microprocessors

All ITM units are supplied standard with microprocessor controls. The microprocessor controls the following functions: compressor timing, automatic defrost cycles, alarms. An appropriate LCD display shows the operation mode of the unit, set point and alarms.

Control and protection devices

All units are supplied with the following control and protection devices: defrost thermostat, who signals to the microprocessor control that a defrost cycle is needed and controls its termination, high pressure switch with manual reset, low pressure switch with automatic reset, high pressure safety valve, compressor thermal overload protection, fans thermal overload protection

Test

All the units are fully assembled and wired at the factory, carefully evacuated and dried after leak tests under pressure and then charged with refrigerant R407C. They are all fully operational tested before shipment. They all conform to European Directives and are individually marked with the CE label and provided with Conformity Declaration

OTHER VERSIONS

HOT GAS DEFROST VERSION (S): Beside the components of the standard version, the unit is supplied with a solenoid valves set for the hot gas injection used to defrost the evaporator in case of severe working conditions. The hot gas injection allows a faster defrost time and this permits to use this unit in areas with lower temperatures (down to 1°C) compared to the standard version.

TEMPERATURE CONTROL VERSION (ITMZ): These units are equipped of an external remote condenser and needs to be connected to the dehumidifier through refrigerant connections. The remote condenser is supplied, standard, of a main switch and a fan speed controller. The use of the remote condenser allows the control of temperature and humidity at the same time, operating in cooling or dehumidifying mode. All the units of ITMZ series, to work correctly, have to be connected to a thermostat and a humidistat.

ACCESSORIES

Built-in or remote mechanical hygrostat:	supplied with a regulation knob and working range from 30% to 100% with precision of 3%.
Available static pressure:	with high efficiency fan; available up to 200 pa.
Version for outdoor installation:	Suitable for outdoor installation.
Air filter with ducted installation:	Complete with EU2 efficiency air filter which can be removed by the side and frame for ducted installation.
Floor trolley version:	To be used with movable applications. They are not available for ITMZ versions.

ITM - ITMZ TECHNICAL DATA

Mod.		330	330Z	400	400Z		
Refrigerant		R407C	R407C	R407C	R407C		
Dehumidification capacity ⁽¹⁾	l/24h	329,9	329,9	414,8	414,8		
Cooling capacity ⁽²⁾	kW	---	15,5	---	19,4		
Compressor input power ⁽¹⁾	kW	5,3	5,9	6,6	6,6		
Maximum input power ⁽¹⁾	kW	5,8	6,4	7,3	7,9		
Nominal input current ⁽¹⁾	A	13,5	16,7	15,8	19		
Maximum input current	A	14,2	17,4	16,5	19,7		
Power supply	V/Ph/Hz	400/3+N/50					
Total air flow	m3/s	1,055	1,055	1,111	1,111		
Supply fan available static pressure	Pa	50	50	50	50		
Compressor	tipo	SCROLL					
	n°	1	1	1	1		
Refrigerants circuits	n°	1	1	1	1		
Capacity steps		1	1	1	1		
Sound power level ⁽⁵⁾	dB(A)	73	73	75	75		
Sound pressure level ⁽⁶⁾	dB(A)	66	66	68	68		
Length	mm	1004	1004	1004	1004		
Width	mm	635	635	635	635		
Height	mm	1283	1283	1283	1283		
Weight	Kg	175	175	205	205		

TECHNICAL DATA REMOTE CONDENSERS

Mod.		330	330Z	400	400Z		
Refrigerant		---	R407C	---	R407C		
Maximum input current	A	---	5,0	---	5,0		
Power supply	V/Ph/Hz	230/1/50					
Total air flow	m3/s	---	3,2	---	3,2		
Sound power level ⁽⁵⁾	dB(A)	---	73	---	73		
Sound pressure level ⁽⁷⁾	dB(A)	---	45	---	45		
Length	mm		1292	---	1292		
Width	mm		480	---	480		
Height	mm		610	---	610		
Weight	Kg		45	---	45		

Performances are referred to the following conditions:

(1) Ambient temperature 30 °C relative humidity 80%;

(2) Ambient temperature 30 °C relative humidity 80%; ambient temperature 35°C.

(5) Sound power level calculated according to ISO 3746.

(6) Sound pressure level measured in free field, at 1 mt from the unit, directional factor Q=2 according to ISO 3746.

(7) Sound pressure level measured in free field, at 10 mt from the unit, directional factor Q=2 according to ISO 3746

ITM 330
PERFORMANCE TABLES

Ambient temperature	Dehumidification capacity	Input Power	Air temperature increase	Thermal load in the room
	[l/24h]	[kW]	[°C]	[kW]
	Relative humidity 50%			
10°C	47,3	2,8	3,2	4,6
15°C	58,0	3,0	3,6	5,1
20°C	84,8	3,4	4,5	6,3
25°C	122,3	3,8	5,8	7,9
30°C	158,4	4,4	7,0	9,5
35°C	190,1	4,9	8,1	10,9

Ambient temperature	Dehumidification capacity	Input Power	Air temperature increase	Thermal load in the room
	[l/24h]	[kW]	[°C]	[kW]
	Relative humidity 60%			
10°C	62,2	2,8	3,6	5,1
15°C	86,1	3,1	4,3	6,1
20°C	119,1	3,5	5,4	7,4
25°C	167,7	4,0	6,9	9,3
30°C	215,9	4,5	8,4	11,2
35°C	255,7	5,0	9,7	12,9

Ambient temperature	Dehumidification capacity	Input Power	Air temperature increase	Thermal load in the room
	[l/24h]	[kW]	[°C]	[kW]
	Relative humidity 70%			
10°C	80,2	2,9	4,0	5,7
15°C	113,3	3,2	5,0	7,0
20°C	158,9	3,6	6,4	8,7
25°C	210,7	4,1	7,9	10,7
30°C	269,9	4,7	9,7	13,0
35°C	306,9	5,2	11,0	14,5

Ambient temperature	Dehumidification capacity	Input Power	Air temperature increase	Thermal load in the room
	[l/24h]	[kW]	[°C]	[kW]
	Relative humidity 80%			
10°C	98,3	2,9	4,4	6,2
15°C	142,2	3,2	5,7	7,8
20°C	198,7	3,7	7,3	9,9
25°C	258,0	4,2	9,1	12,1
30°C	329,9	4,8	11,2	14,8
35°C	370,1	5,3	12,5	16,5

NOTE Shadowed fields refer to nominal condition capacities.

ITM 400
PERFORMANCE TABLES

Ambient temperature	Dehumidification capacity	Input Power	Air temperature increase	Thermal load in the room
	[l/24h]	[kW]	[°C]	[kW]
	Relative humidity 50%			
10°C	60,8	3,5	3,9	5,8
15°C	74,5	3,7	4,4	6,4
20°C	108,4	4,3	5,5	7,9
25°C	155,4	4,9	6,9	9,9
30°C	200,4	5,6	8,4	11,9
35°C	240,4	6,2	9,7	13,6

Ambient temperature	Dehumidification capacity	Input Power	Air temperature increase	Thermal load in the room
	[l/24h]	[kW]	[°C]	[kW]
	Relative humidity 60%			
10°C	80,0	3,5	4,3	6,3
15°C	110,3	3,9	5,2	7,6
20°C	151,6	4,4	6,5	9,3
25°C	212,5	5,0	8,3	11,7
30°C	272,4	5,8	10,1	14,1
35°C	322,5	6,4	11,6	16,2

Ambient temperature	Dehumidification capacity	Input Power	Air temperature increase	Thermal load in the room
	[l/24h]	[kW]	[°C]	[kW]
	Relative humidity 70%			
10°C	103,0	3,6	4,9	7,1
15°C	144,7	4,0	6,1	8,7
20°C	201,9	4,6	7,7	10,9
25°C	266,5	5,2	9,6	13,4
30°C	340,1	6,0	11,7	16,3
35°C	386,7	6,6	13,2	18,3

Ambient temperature	Dehumidification capacity	Input Power	Air temperature increase	Thermal load in the room
	[l/24h]	[kW]	[°C]	[kW]
	Relative humidity 80%			
10°C	126,2	3,6	5,4	7,7
15°C	181,3	4,1	6,9	9,8
20°C	251,9	4,7	8,9	12,4
25°C	325,6	5,3	10,9	15,2
30°C	414,8	6,1	13,4	18,6
35°C	465,2	6,8	15,0	20,7

NOTE Shadowed fields refer to nominal condition capacities.

ITM 330 Z
PERFORMANCE TABLES

Ambient temperature	Dehumidification capacity	Total cooling capacity	Input power
	[l/24h]	[kW]	[kW]
	Relative humidity 50%		
10°C	41,9	4,2	3,0
15°C	58,0	5,7	3,3
20°C	84,8	7,6	3,7
25°C	122,3	9,9	4,1
30°C	158,4	12,7	4,5
35°C	190,1	14,6	4,7

Ambient temperature	Dehumidification capacity	Total cooling capacity	Input Power
	[l/24h]	[kW]	[kW]
	Relative humidity 60%		
10°C	58,6	4,7	3,0
15°C	86,1	6,3	3,3
20°C	119,1	8,2	3,7
25°C	167,7	10,6	4,1
30°C	215,9	13,5	4,5
35°C	255,7	15,5	4,7

Ambient temperature	Dehumidification capacity	Total cooling capacity	Input Power
	[l/24h]	[Kw]	[kW]
	Relative humidity 70%		
10°C	75,6	5,1	3,1
15°C	113,3	6,8	3,5
20°C	158,9	9,0	3,9
25°C	210,7	10,8	4,3
30°C	269,9	14,6	4,7
35°C	306,9	16,5	4,8

Ambient temperature	Dehumidification capacity	Total cooling capacity	Input Power
	[l/24h]	[kW]	[kW]
	Relative humidity 80%		
10°C	98,3	5,4	3,1
15°C	142,2	7,3	3,5
20°C	198,7	9,6	3,9
25°C	258,0	12,3	4,3
30°C	329,9	15,5	4,7
35°C	370,1	17,6	4,8

NOTE Shadowed fields refer to nominal condition capacities.

ITM 400 Z
PERFORMANCE TABLES

Ambient temperature	Dehumidification capacity	Total cooling capacity	Input Power
	[l/24h]	[kW]	[kW]
	Relative humidity 50%		
10°C	54,1	5,5	3,7
15°C	74,5	7,4	4,2
20°C	108,3	9,7	4,7
25°C	155,4	12,7	5,2
30°C	200,4	16,0	5,7
35°C	240,4	18,2	6,0

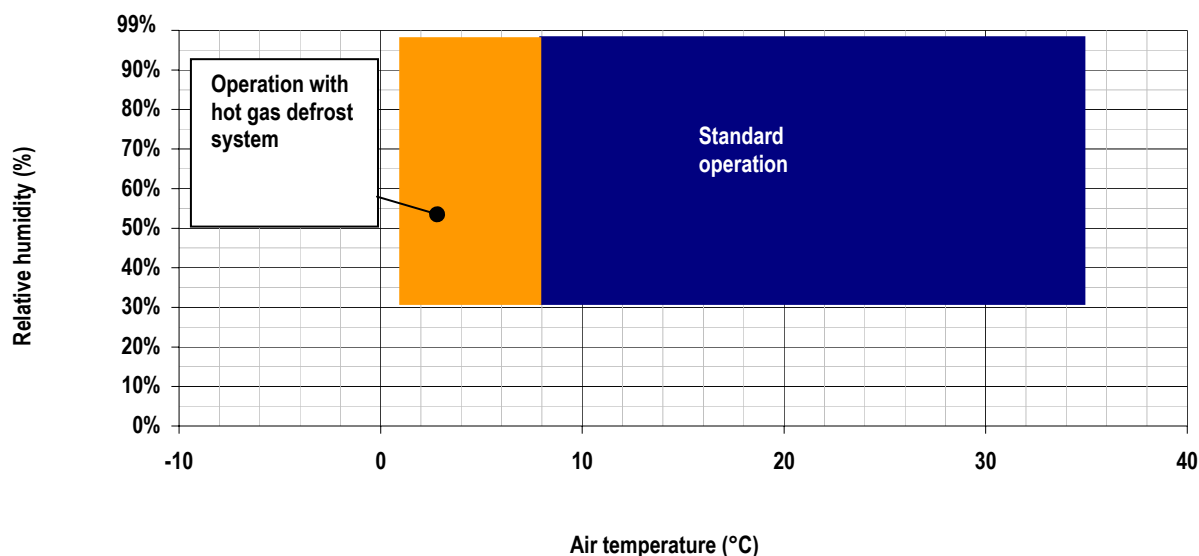
Ambient temperature	Dehumidification capacity	Total cooling capacity	Input Power
	[l/24h]	[kW]	[kW]
	Relative humidity 60%		
10°C	75,5	6,1	3,7
15°C	110,3	8,2	4,2
20°C	151,6	10,5	4,7
25°C	212,5	13,5	5,2
30°C	272,4	17,0	5,7
35°C	322,5	19,4	6,0

Ambient temperature	Dehumidification capacity	Total cooling capacity	Input Power
	[l/24h]	[kW]	[kW]
	Relative humidity 70%		
10°C	97,3	6,6	3,9
15°C	144,7	8,8	4,5
20°C	201,9	11,6	5,0
25°C	266,5	14,5	5,5
30°C	340,1	17,8	6,0
35°C	386,7	20,8	6,2

Ambient temperature	Dehumidification capacity	Total cooling capacity	Input Power
	[l/24h]	[kW]	[kW]
	Relative humidity 80%		
10°C	126,2	7,0	3,9
15°C	181,3	9,4	4,5
20°C	251,9	12,2	5,0
25°C	325,6	15,6	5,5
30°C	414,8	19,4	6,0
35°C	465,2	22,0	6,2

NOTE Shadowed fields refer to nominal condition capacities.

OPERATION LIMITS



Ambient temperatures

ITM units are designed to operate with ambient temperatures from 1°C to 35°C, relative humidity from 30% to 99%



WARNING: The units **MUST** be used within the operation limit indicated in the diagrams (see above). the warranty will be invalidated if the units are used in ambient conditions outside the limits reported. If there is the necessity to operate in different conditions, please contact our technical office.

SOUND DATA INTERNAL UNIT

Mod.	Octave band (Hz)								Lw		Lp1
	63	125	250	500	1K	2K	4K	8K	dB	dB(A)	dB(A)
	dB	dB	dB	dB	dB	dB	dB	dB			
330	86,1	77,3	71,2	69,7	68,6	63,2	59,8	50,7	86,9	73	66
400	88,1	79,3	73,2	71,7	70,6	65,2	61,8	52,7	88,9	75	68
330Z	86,1	77,3	71,2	69,7	68,6	63,2	59,8	50,7	86,9	73	66
400Z	88,1	79,3	73,2	71,7	70,6	65,2	61,8	52,7	88,9	75	68

SOUND DATA EXTERNAL UNIT (ONLY FOR Z VERSION)

Mod.	Octave band (Hz)								Lw		Lp2
	63	125	250	500	1K	2K	4K	8K	dB	dB(A)	dB(A)
	dB	dB	dB	dB	dB	dB	dB	dB			
330Z	86,1	77,3	71,2	69,7	68,6	63,2	59,8	50,7	86,9	73	45
400Z	86,1	77,3	71,2	69,7	68,6	63,2	59,8	50,7	86,9	73	45

Lw: Sound power level according to ISO 3746.

Lp1: Sound pressure level measured at 1 mt from the unit in free field conditions direction factor Q=2 according to ISO 3746.

Lp2: Sound pressure level measured at 10 mt from the unit in free field conditions direction factor Q=2 according to ISO 3746.

SAFETY DEVICE

The frost on the coil, obstructs the air flow, reduces the available exchange area and consequently the unit performances and can seriously damage the system. All the units are supplied, standard, with a control which defrost automatically the heat exchanger if necessary. This control provides a temperature probe (defrost thermostat) on the unit evaporator. When the defrost cycle is required, the microprocessor control (according to set parameters) starts working (the yellow led turns on) according to these modalities:

- air defrost: the compressor is switched off while the fan keeps on working.
- hot gas defrost: the fan is switched off while the compressor keeps on working. An appropriate switching on the refrigerant system is activated.

For both the modalities, at the end of the defrost cycle, there is the dripping time (the green led starts flashing)

HYGROSTAT

The hygrostat enables or disables unit operation depending on the humidity value desired.

To verify its correct operation, rotate the control knob clock wise (or set the desired value through the instrument keyboard if a keyboard instrument should be present) and set the humidity desired value close to lower limit. At this point verify that fan and compressor (after a time delay) will be started in sequence. Verify as well that the unit is stopped when humidity set is reached

THERMOSTAT (Z versions only)

The thermostat enables or disables unit operation depending on the temperature value desired.

To verify its correct operation, rotate the control knob clock wise (or set the desired value through the instrument keyboard if a keyboard instrument should be present) and set the temperature desired value close to lower limit. At this point verify the fan is all the time running and that compressor, after a time delay, is started.

Verify as well that the compressor is stopped when temperature set is reached.



If temperature switch should be present, it takes priority on the humidity switch. The humidity switch is enabled only when temperature set is reached

HIGH PRESSURE SWITCH

The high pressure switch stops the unit when the condensing pressure is higher than the set value. The restart is manual (you need to press the button on the pressure switch) and it can be carried out only when the pressure is under the value indicated by the differential set (see table below).

LOW PRESSURE SWITCH

The low pressure switch stops the unit when the evaporation pressure is lower than the set value. The restart is automatic and it is only possible when the pressure back over the value indicated by the differential set (see table below).

DEFROST THERMOSTAT

It's a device which signals to the electronic control, the necessity to make the defrost cycle. Once the defrost cycle is activated, the defrost thermostat determines also its conclusion

SAFETY DEVICE SETTING

Device		Set-point	Differential	Reset
Antifreeze thermostat	°C	1	3	MANUAL
High pressure switch	Bar	26	7,7	MANUAL
Low pressure switch	Bar	0,7	1	MANUAL

ELECTRICAL DATA

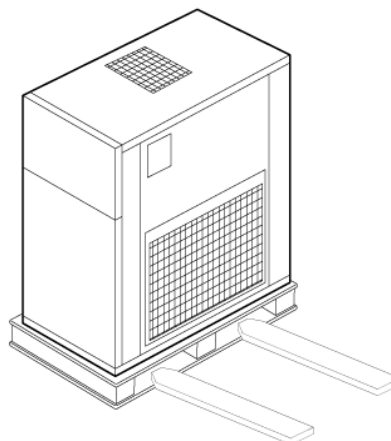
Power supply	V/~/Hz	400 / 3+N/ 50		Control circuit	V/~/Hz	24 / 1 / 50
Auxiliary circuit	V/~/Hz	230 / 1 / 50		Fans power supply	V/~/Hz	230 / 1 / 50
Remote condenser fan supply (ITMZ versions only)					V/~/Hz	230 / 1 / 50

INSPECTION

When installing or servicing the unit, it is necessary to strictly follow the rules reported on this manual, to conform to all the specifications of the labels on the unit, and to take any possible precautions of the case. Not observing the rules reported on this manual can create dangerous situations. After receiving the unit, immediately check its integrity. The unit left the factory in perfect condition; any eventual damage must be questioned to the carrier and recorded on the Delivery Note before it is signed. HIDROS must be informed, within 8 days, of the extent of the damage. The Customer should prepare a written statement of any severe damage.

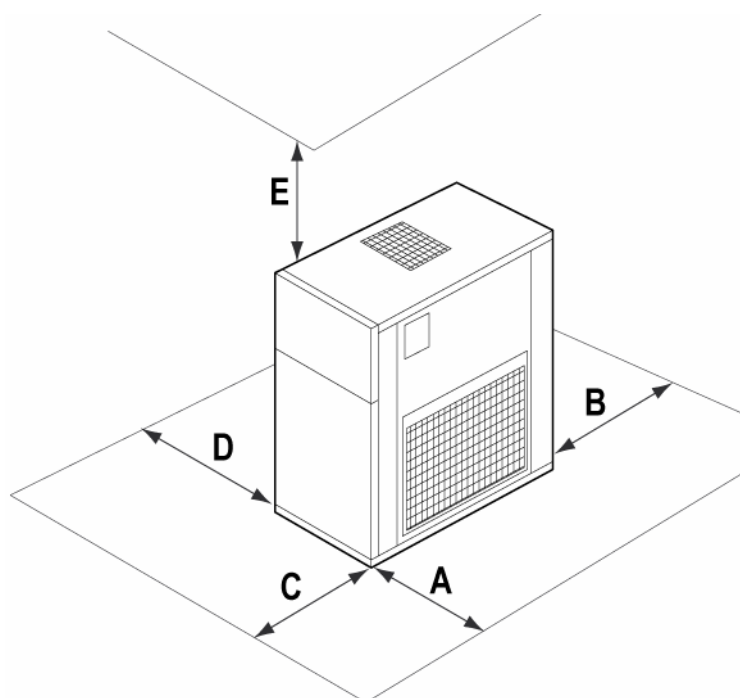
LIFTING AND HANDLING

When unloading the unit, it is highly recommended to avoid any sudden move in order to protect refrigerant circuit, copper tubes or any other unit component. Units can be lifted by using a forklift or, in alternative, using belts, being sure that the method of lifting does not damage the lateral panels and the cover. It is important to keep the unit horizontal at all time to avoid damages to the internal components.



LOCATION AND MINIMUM TECHNICAL CLEARANCES

ITM units are designed for internal installation; it is advisable to create a proper basement, with a size similar to unit foot-print. Unit vibration level is very low: it is advisable however, to fit a rigid rubber band between basement and unit base-frame. If it is the case, it is possible to install anti-vibration mounts (spring or rubber), to keep vibrations at a very low level. Absolute care must be taken to ensure adequate minimum technical clearances, necessary to guarantee checking and maintenance operation. For these reasons it is necessary to observe the clearances indicated in the below table.



Mod	A	B	C	D	E
ITM330	1000	1000	800	1000	3000
ITM400	1000	1000	800	1000	3000



WARNING: The unit should be installed so that maintenance and/or repair services be possible. The warranty does not cover costs due to lifting apparatus, platforms or other lifting systems required by the warranty interventions.



WARNING: All the maintenance operation must be done by **TRAINED PEOPLE** only.



WARNING: Before every operation of servicing on the unit, be sure that the electric supply is disconnected.



WARNING: Inside the unit some moving components are present. Be very careful when operating in their surroundings even if the electric supply is disconnected.



WARNING: The top shell and discharge line of compressor are usually at high temperature level. Be very careful when operating in their surroundings.

WARNING: Aluminium coil fins are very sharp and can cause serious wounds. Be very careful when operating in their surroundings.



WARNING: After servicing operation close the unit with cover panels, fixing them with locking screws

CONDENSATE DRAINING CONNECTIONS

Condensate draining should be done with a rubber pipe passing through the condensate draining connection located on the suction side of the unit. The discharge hole is located inside the unit and with a 3/4" female thread diameter. On the condensate discharge pipe it must be installed a syphon with a minimum height equal to the suction pressure of the fan.



DUCTWORK UNIT CONNECTION

All the ITM units are supplied with ductable centrifugal fan.

If it's necessary to duct only the discharge side, use a flange with overall dimensions larger than the mouth of the fan, on the superior part of the unit (refer to the dimensional drawing of the unit).

If also the suction side has to be ducted, remove the filter panel, use a flange with overall dimensions larger than the suction opening on the front on the unit. Take care to install always a filter on the suction side.



WARNING: It is extremely important to fit a filter on the suction side otherwise the operation mode of the units can be compromised or damaged.



WARNING: When ductworks are connected it is IMPORTANT to check if the airspeed through the evaporator is around +/-15%. This parameter allows the unit to operate with the maximum efficiency.

STANDARD UNIT



UNIT WITH FRAME FOR DUCTED INSTALLATION



REFRIGERANT CONNECTIONS FOR Z VERSIONS

Inspection

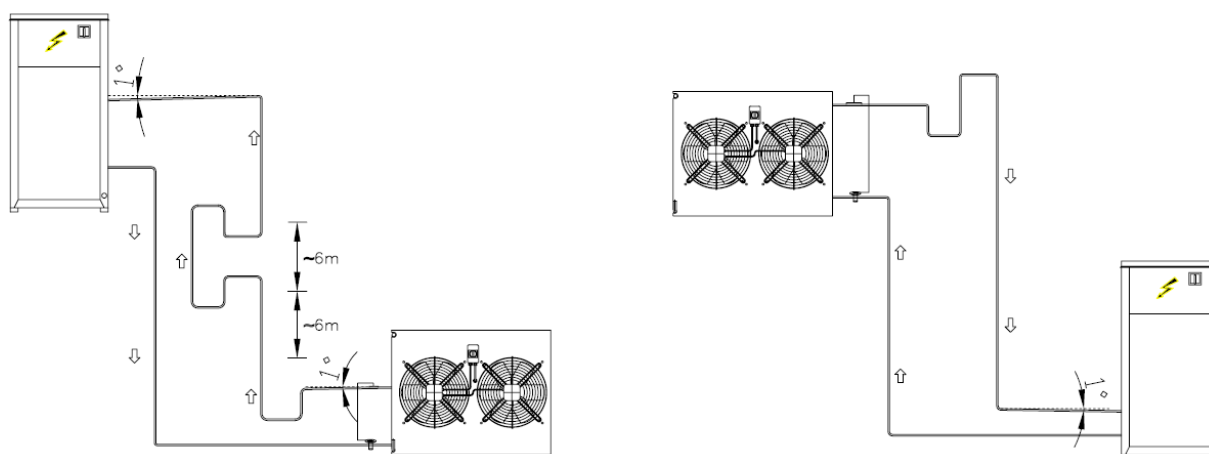
The Z version units are supplied of a remote condenser and they need to be connected with the dehumidifier through refrigerant lines. The remote condenser is equipped of a main switch and a fan speed control. Please refer to the following paragraphs for the refrigerant connections and to the next chapter for the electrical ones.

Line path/course and max. distance between the sections

For the units in Z version with separate sections, the path/course of the refrigerant pipes is influenced by the location of the sections themselves and by the structure of the building. The pipes have to be in any case as short as possible, so that they can contain/hold the charge lacks and reduce the quantity of refrigerant present in the refrigerant circuit: The connections must be isolated and their length must not exceed 30 m. Our Company is available for any information even in case of applications not included in the limits indicated above

Indications for the realisations of the refrigerant connection

According to the relative position of the dehumidifier and of the remote condenser, there are some indications to follow regarding the realisation of the refrigerant connection.



Condenser installed at a lower level than the dehumidifier:

- On the rising vertical pipes, oil traps should be fitted every 6 metres to allow oil circulation in the system;
- Install a collection pit immediately downstream from the bulb of the thermostatic valve;
- On horizontal suction pipelines a minimum 1% slope should be allowed in order to let the oil easily come back to compressor. Pipelines diameter can be read in Table II depending on the unit size and the length of refrigerant pipelines

Condenser installed at a higher level than the dehumidifier:

- Install a liquid trap on suction line at the evaporator outlet whit the same height of the evaporator so that liquid refrigerant, when the system is not running, will not fall into compressor;
- On horizontal suction pipelines a minimum 1% slope should be allowed in order to let the oil easily come back to compressor

Refrigerant diameters lines for version ITMZ

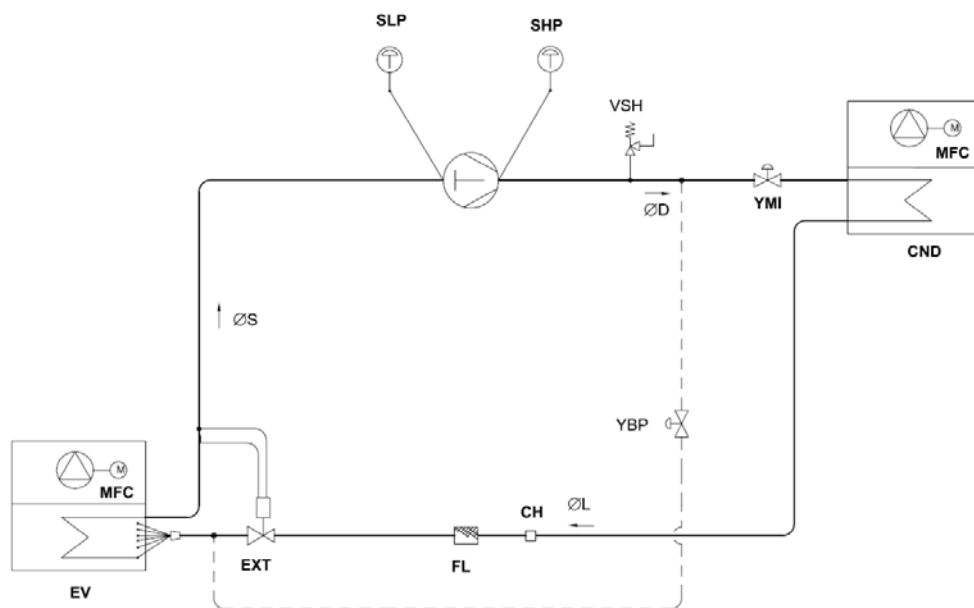
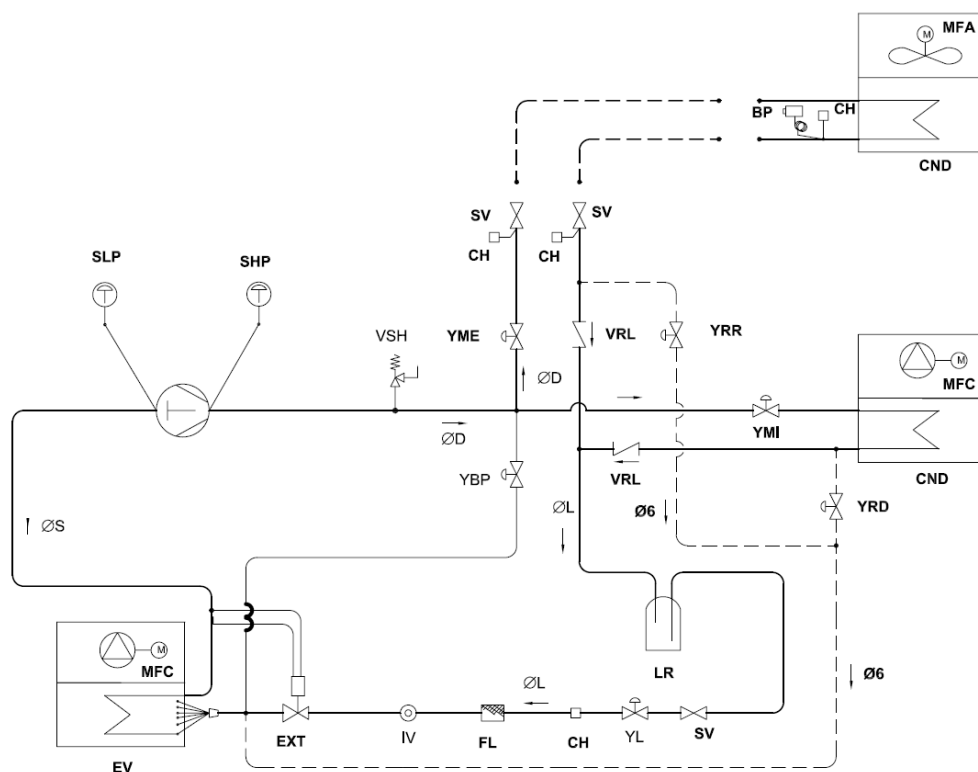
Distance [m]	10		20		30	
Mod.	gas [mm]	Liquid [mm]	gas [mm]	Liquid [mm]	gas [mm]	Liquid [mm]
330	15,8	7,94	15,8	7,94	15,8	7,94
400	15,8	7,94	18	9,52	18	9,52

Liquid line refrigerant charge

Liquid line diameter	Refrigerant charge g/m	Liquid line diameter	Refrigerant charge g/m
7,94 mm	30	9,52 mm	50

Cooling capacity correction factors

Mod.	Refr. Line = 0 mt.	Refr. Line = 10 mt.	Refr. Line =20 mt.	Refr. Line =30 mt.
ITMZ	1	0,98	0,96	0,95

REFRIGERANT LAY-OUT VERSION ITM - ITMS

REFRIGERANT LAY-OUT VERSION ITMZ – ITMZ/S


CND	Condenser	FL	Liquid line filter
CH	Charging plug	SV	Manual valve
EXT	Expansion valve	MFC	Centrifugal fan
EV	Evaporator	LR	Liquid receiver
SHP	High pressure switch	VRL	One way valve
YRD	Solenoid valve	YRR	Solenoid valve
YMI	Solenoid valve	BP	Pressure transducer
YME	Solenoid valve	---	Only for version "S"

ELECTRICAL CONNECTIONS

The power supply must correspond to the electric nominal data (tension, phases, frequency) reported on the label in the front panel of the unit. Power connections must be made in accordance to the wiring diagram enclosed with the unit and in accordance to the norms in force. Power cable and line protection must be sized according to the specification reported on the wiring diagram enclosed with the unit.



WARNING: The line voltage fluctuations can not be more than $\pm 5\%$ of the nominal value, while the voltage unbalance between one phase and another can not exceed 2%. If those tolerances should not be respected, please contact our Company.



WARNING: Electric supply must be in the limits shown: in the opposite case warranty will terminate immediately. Before every operation on the electric section, be sure that the electric supply is disconnected.

START UP

Before start-up

- Check that all power cables are properly connected and all terminals are hardly fixed.
- The voltage at the phase R S T is the one shown in the unit labels.
- Check that there is not any refrigerant leakage.
- Check that crankcase heaters are powered correctly.
- Check that all water connections are properly installed and all indications on unit labels are observed.
- Before proceeding to start up check that all the cover panels are re-located in the proper position and locked with fastening screws.



WARNING: Crankcase heaters must be powered at least 12 hours before start up by closing the main switch (heaters are automatically supplied when main switch is closed). The crankcase heaters are working properly if after some minutes the compressor crankcase temperature is about $10\div 15^{\circ}\text{C}$ higher than ambient temperature.



WARNING: Never switch off the unit for temporary stop.



WARNING: Never modify internal wiring connections; warranty will be invalidated.

Before proceeding to start up close the main switch.

All the units are provided with microprocessor control that manages all the various functions of the unit.

The functions described below are applied both for local board control and remote panel control.

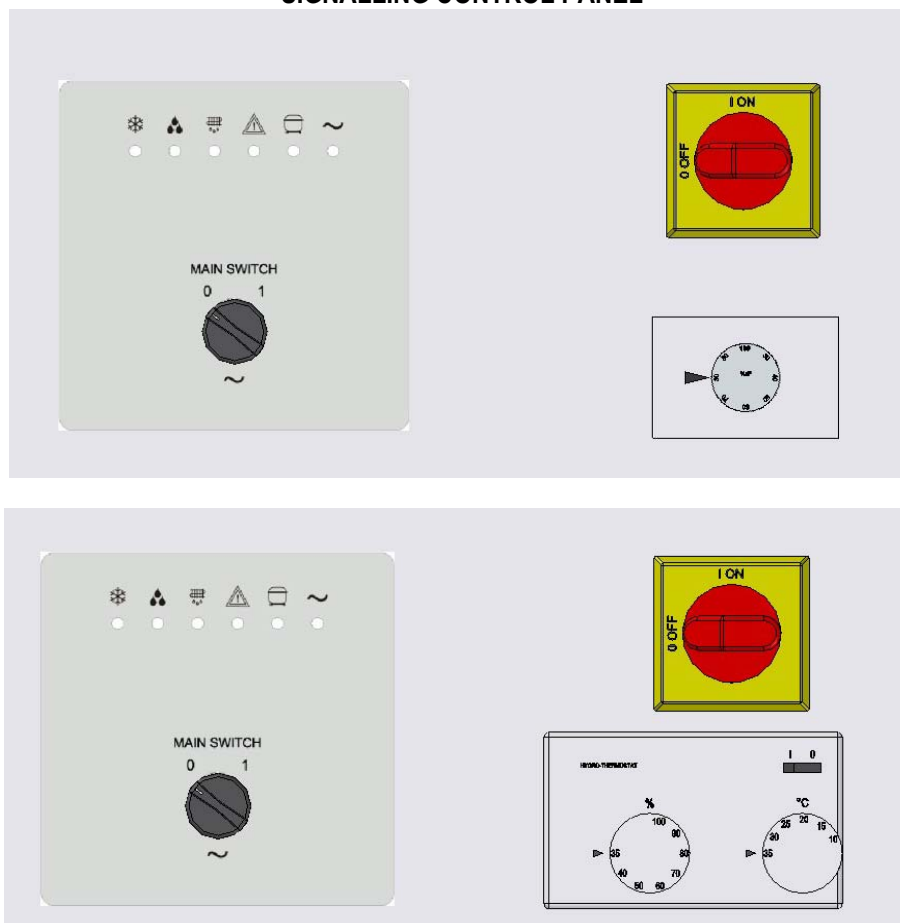
To start the unit turn the green switch ON (the inner led will light up).

- a) Dehumidification only version: activate humidity switch by rotating the knob or by pressing the instrument keyboard depending on the type of instrument installed;
- a) b) Dehumidification and cooling Z version units: activate humidity and temperature switch by rotating the knob or by pressing the instrument keyboard depending on the type of instrument installed;



If the green electrical supply led should not light up (see following page), please reverse two electrical phases on the connection to the main switch.

SIGNALLING CONTROL PANEL



Units are provided with signalling lighting leds that indicate unit operational status.

Below is reported a brief description of their meaning.



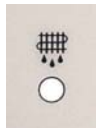
- Electrical supply (green): indicates that green switch has been turned in On position and the unit is electrically supplied with the following meanings:
led ON: unit running;
led slowly blinking: unit turned off from remote



- Compressor led (green): indicates compressor status with the following meanings:
led ON: compressor running;
led blinking: compressor time delay to start;



- Alarm led (red): indicates the unit alarm status according to the following meanings:
red led ON: high pressure alarm;
red led blinking: low pressure alarm;
red led and compressor led ON: compressor thermal overload alarm;
red led and defrost led blinking: maximum defrost cycle time overcome;
red led and defrost led alternatively blinking: operating threshold limit overcome or NTC probe failure;



- Defrost led (yellow): indicates that the units is executing the defrost cycle;
led fastly blinking: execution of drop cycle at the defrost end.



Dehumidification led (green): indicates that the control is requiring dehumidification operating mode;



Cooling mode (green): indicates that the control is requiring cooling system operating mode

UNIT SWITCH OFF

To stop the unit, turn to the OFF position the green switch. Its internal led will be turned off.



Warning: never switch off the unit (for temporary stop), opening the main switch: this component should be used only to disconnect the unit from power supply when the current is not passing through, i.e. when the unit is in OFF mode

Controls during unit operation

- Check the fans rotation. If the rotation is incorrect, disconnect the main switch and change over any two phases of the incoming main supply to reverse motor rotation (only for units with three-phase fan motors).
- Check that the air speed through the evaporator coil is not higher than 1,5 2 m/s to grant a high dehumidification performance.



ATTENTION: If the air speeds through the evaporating coil exceeds 2 m/s, the dehumidification capacity of the unit is highly reduced and the required environment conditions can not be respected !!!.

REFRIGERANT CHARGE CHECKING

- After few hours the unit is working, check that sight glass shows a green colour core: if the core is yellow moisture would be present in the circuit. In this case it is necessary circuit dehydration to be carried out by qualified people only. Check that at the sight glass there is no continuous vapour bubbles presence. In this case additional refrigerant charge could be required. It is however allowed the presence of few vapour bubbles.
- Few minutes after the start up, working on summer operating mode (cooling), check that condensing temperature, is approximately 15 °C higher than condenser inlet air temperature. Check moreover that evaporation temperature is about 5 °C lower than the evaporator outlet temperature.
- Check that refrigerant superheat on the evaporator is about 5-7 °C
- Check if refrigerant sub-cooling on the condenser is about 5-7 °C.

ENERGY SAVINGS

To reduce power consumption it is advisable to refer to the following notes :

- Be sure that room in which unit should operate, has doors and windows firmly closed;
- Set the humidity control switch to the proper value: lower set values than necessary (even few points) may cause great capacity loss with consequently longer operating periods: it is advisable to set humidity values below 60% only if strictly necessary.

MAINTENANCE AND PERIODIC CHECKS

- It is a good rule to carry on periodic checks in order to verify the correct working of the unit:
- Check that safety and control devices are working correctly (monthly).
- Check all the terminals on the electric board and on the compressor are well locked. Periodic cleaning of the sliding terminals of the contactors should be done: if any damage is found, please replace the contactors (monthly).
- Check there is no oil leakage from compressor (monthly).
- Check compressor crankcase heater proper supply and functioning (monthly: low temperature units only).
- Clean draining pan and pipeline (monthly).
- Clean finned coils filters with compressed air in the opposite direction of the airflow. If filters should be fully clogged, clean them with a water jet (monthly or more frequently if the unit operates on a dusty environment).
- Check mounting of fan blades and their balancing (every 4 months).
- Check the unit is not too noisy every 4 months).

REFRIGERANT CIRCUIT REPAIR

In the case that refrigerant circuit should be discharged, all the refrigerant must be recovered with proper machines. The system must be charged with nitrogen, using a gas bottle with a pressure reducing valve, until 15 bar pressure is reached. Any eventual leakage must be searched with a bubble leak finder. In case bubbles appear discharge the circuit before welding with proper alloys.



WARNING: Never use oxygen instead of nitrogen: explosions may occur.

ENVIRONMENT PROTECTION

According to European norms dealing with the use of depleting stratospheric ozone substances, it is forbidden to release refrigerants fluids in the atmosphere. They must be redelivered to the seller or to proper gathering points at the end of their operating life. Refrigerant R407C is mentioned among controlled substances and for this reason it must be subjected to the mentioned norms. **A particular care is recommended during service operations in order to reduce as much as possible any refrigerant loss.**

UNIT OUT OF SERVICE

Once the unit is arrived at the end of its life and needs to be removed or replaced, the following operations are recommended:

- the unit refrigerant has to be recovered by trained people and sent to proper collecting centre;
 - compressor lubricating oil has to be recovered and sent to proper collecting centre;
- the frame and various components, if not usable any longer, have to be dismantled and divided according to their nature; particularly copper and aluminium, which are present in conspicuous quantity in the unit. These operations allow easy material recover and recycling process, reducing environmental impact.

UNIT IN ALARM

When red led is lighted up the unit is stopped and set under alarm condition.



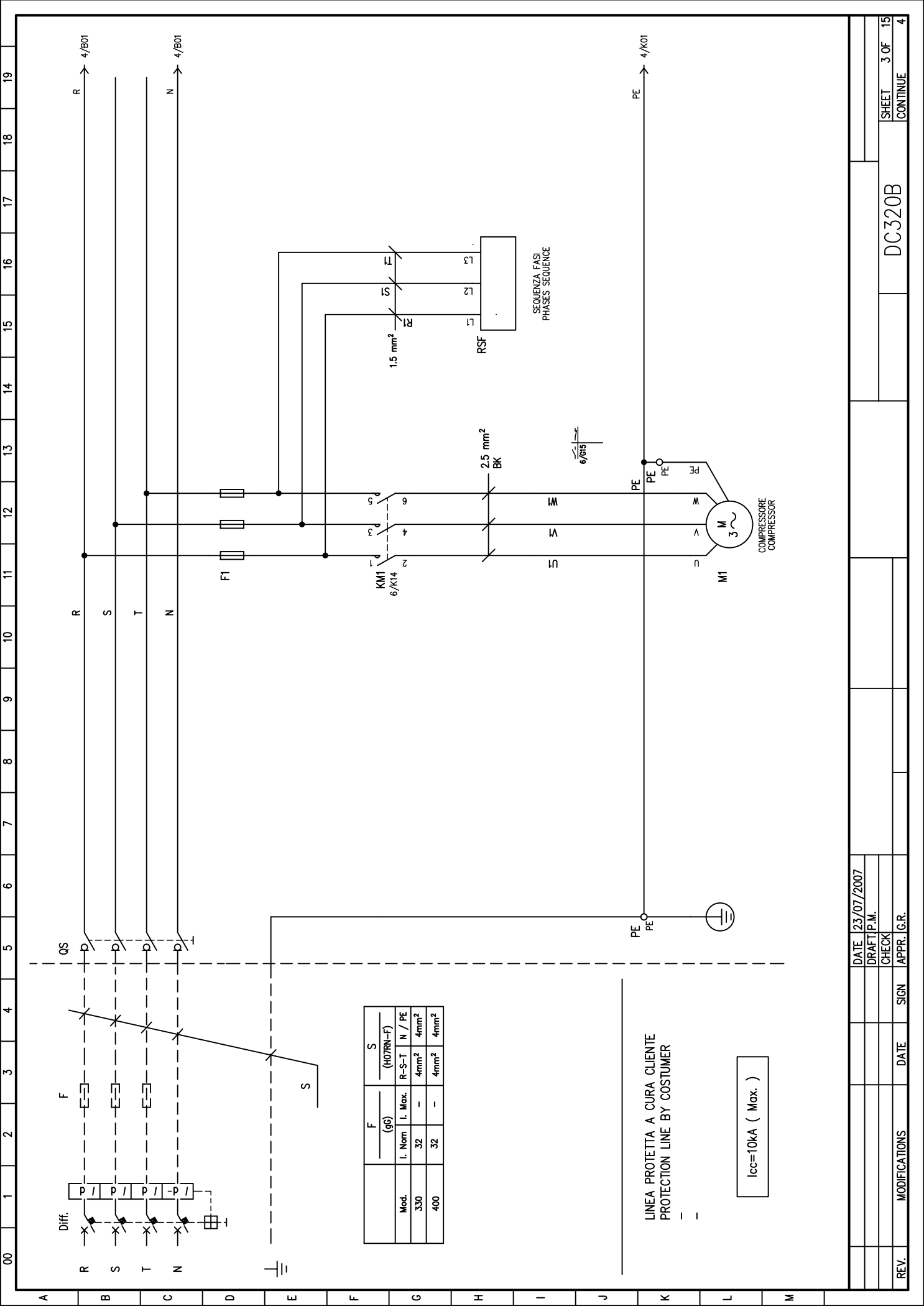
Concerning the solutions, it is necessary to take an extreme care on the actions to adopt: an excessive confidence may cause serious accidents to unexperienced people. It is advisable, once the cause is detected, to contact our servicing people or trained people only.

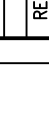
FAULT FINDING

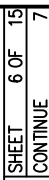
In the following pages are reported the most common troubles that can cause the unit stop or an incorrect operation.

PROBLEM	LED ON	PROBABLE CAUSE	CORRECTIVE ACTION
Unit does not start but alarm red led is off	None	Power supply missing fuses open	Provide power supply replace fuses
	Power supply led	Humidistat on set	Set a lower set point
	Power supply led, dehumidification led	Compressor thermal protection enabled, compressor defective	Let the compressor cool down, replace compressor defective
	Power supply led, defrost led		
	None	Electronic board or led board defective	Replace defective board
Fan starts, compressor does not start, but red alarm led is off	Power supply led, dehumidification led	Compressor thermal protection enabled, compressor defective	Let the compressor cool down, replace the compressor defective
	any	Electronic board or led board defective	Replace defective board
Fan starts, compressor does not start but red alarm led is on	Red alarm led	Air filters clogged	Clean filters and reset unit
		Low refrigerant charge	Charge the system
		Open panel, low air flow, suction side obstructed, high pressure switch on	Close the panel, clear suction side, reset high pressure switch
	any	Electronic board or led board defective	Replace defective board
Fan starts, compressor does not start, but red alarm is blinking	Red alarm led	Defrost thermostat detective, low refrigerant charge	Replace thermostat, charge the system.
	any	Electronic board or led board defective	Replace defective board

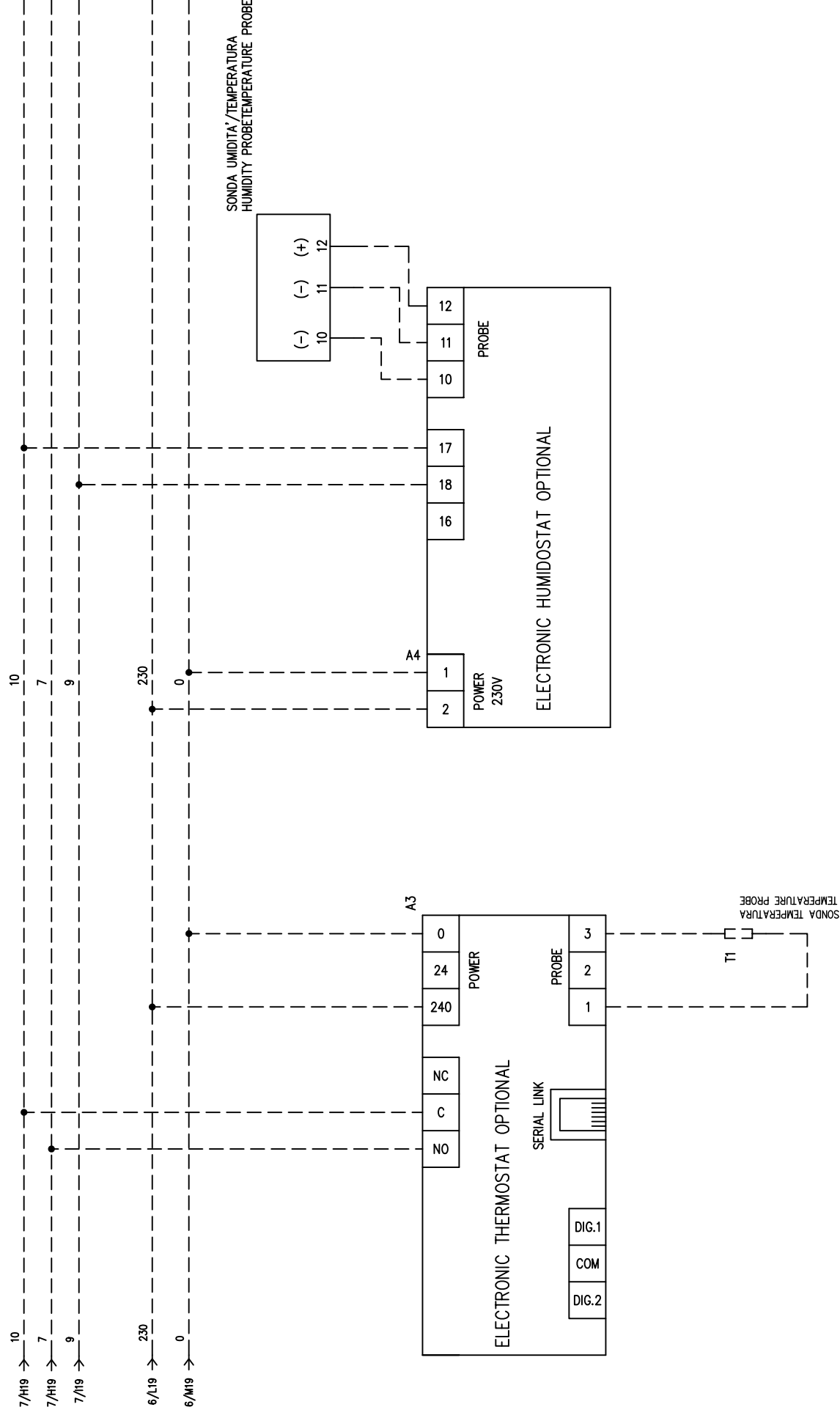
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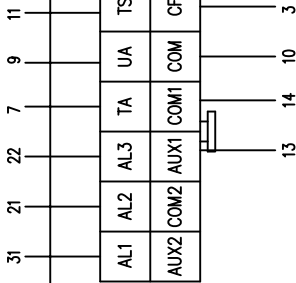
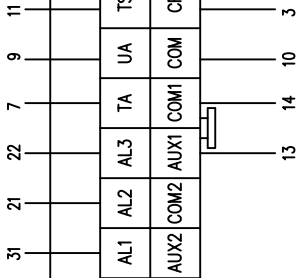


**CONTROLLI ELETTRONICI TEMPERATURA E UMIDITA'
TEMPERATURE-HUMIDITY ELECTRONIC CONTROLS**

[illegible]

—v.

LAYOUT SCHEDA PER UNITA' ITM
LAYOUT BOARD FOR ITM UNITS



HDR05

mode = 2 - AIR DEFROST

mode = 3 - GAS DEFROST

mode = 4 - GAS DEFROST : BT

mode = 5 - AIR DEFROST : Z

mode = 6 - GAS DEFROST : Z

mode = 7 - GAS DEFROST : BT - Z

[illegible]

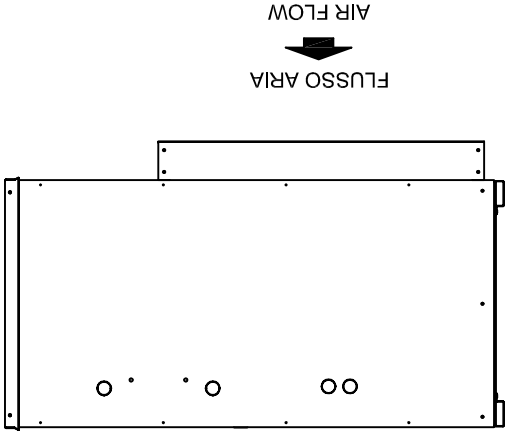
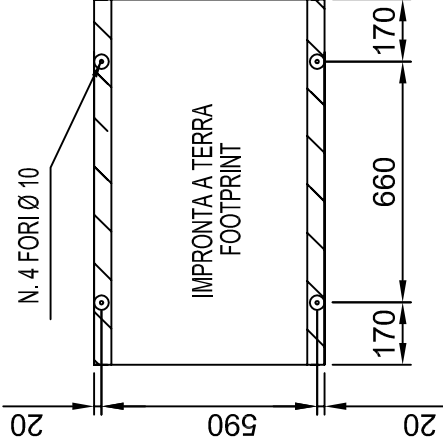
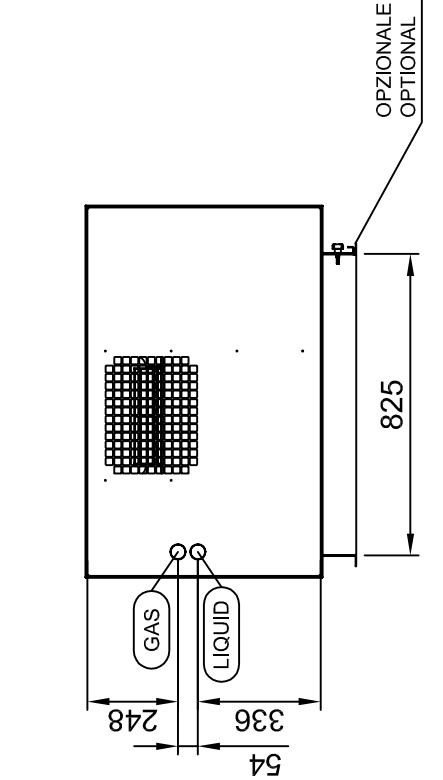
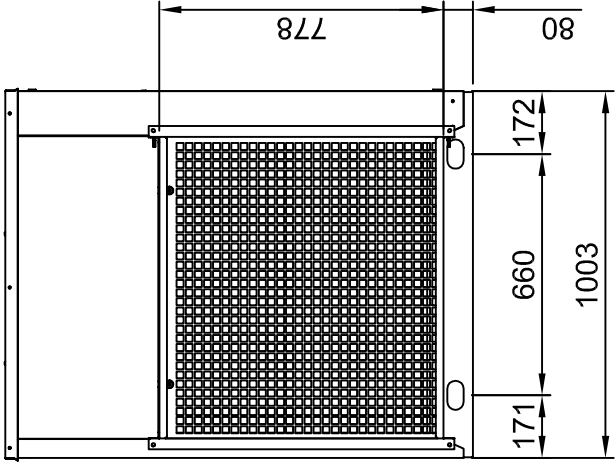
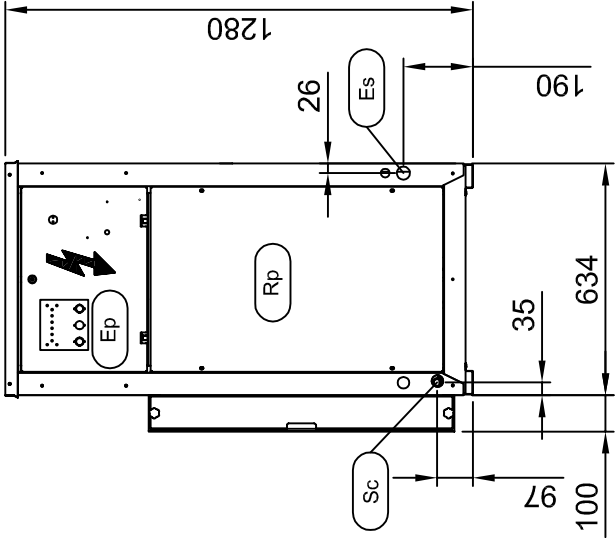
00	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19			
330-400		Sigla	Descrizione			Note tecniche			Codice articolo		Descrizione articolo					Quantità		U.M.	Posizione			
A		BP1	SONDA PRESSIONE COND.			4...20mA										1			10/D08			
		B1/2	SONDE NTC													1			10/D10			
B		F2				ITALWEBER "20A" Gg			2303038		Portaf sez.BCH 10X38 32A 690V					1		PCE	2/C15			
		F9				ITALWEBER "10A" Gg			2302038		Portaf sez.BCH 10X38 32A 690V					1		PCE	2/C15			
C		KA2	RISCALDAMENTO (A CURA HIDROS)			FINDER			405280230		MINI RELÈ PER C.S.					1		PCE	6/J17			
		KA1	ALLARME GENERALE			FINDER			405290120000		MINI RELÈ PER C.S. IN CC					1		PCE	6/J18			
D		KM1	COMPRESSORE			MOELLER			276838		DILM12-10 (220V50HZ,240V60HZ) CONT. 5.5KW					1		PCE	7/J10			
		RSF	SEQUANZA FASE			GAVAZZI			DPA51							1			5/H14			
		QS	TRASF.			ABB			OT 32 E4							1		PCE	7/J10			
E		A1	CONTROLLO			HDR05										1			5/H14			
F																						
G																						
H																						
I																						
J																						
K																						
L																						
M																						
						DATE	23/07/2007															
						DRAFT	P.M.															
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REV.		MODIFICATIONS	DATE	SIGN	APPR.	G.R.											DC320B		SHEET 14 OF 15 CONTINUE 15			

		00	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
A	SIGLA INITIALS SIGLE KENNZEICH	POSIZIONE POSITION POSITION ORTEN		-- Denominazione --					-- Denomination --					-- Bezeichnung --							
B	-A1			CONTROLLO ELETTRONICO					ELECTRONIC CONTROL												
	-A2			TERMO-IGROSTATO					HYGRO-THERMOSTAT												
	-A3			REGOLATORE DI VELOCITA'					SPEED REGULATOR												
	-B1			SONDA LIMITE					LIMIT PROBE												
C	F1			FUSIBILI COMPRESSORE					COMPRESSOR FUSES												
	F2			FUSIBILI RELE' SEQUENZA FASI					PHASE SEQUENCE RELAY FUSES												
	F7			FUSIBILI CONDENSATORE REMOTO					REMOTE CONDENSER FUSES												
	F9			PROTEZIONE ELETTRONICA					ELECTRONIC PROTECTION												
D	F3			FUSIBILI TRASFORMATORE					TRANSFORMER FUSES												
	F10			FUSIBILE AUSILIARI					AUXILIARY FUSE												
	KM1			CONTATTORE COMPRESSORE					COMPRESSOR CONTACTOR												
	RSF			RELE' SEQUENZA FASI					SEQUENCE RELAY FUSES												
E	KM2			CONTATTORE VENTILATORE					FAN CONTACTOR												
	KM3			RELE' CONDENSATORE REMOTO					REMOTE CONDENSER RELAY												
	KA1			RELE' ALLARME GENERALE					GENERAL ALARM RELAY												
	-M1			COMPRESSORE					COMPRESSOR												
F	-M2			VENTILATORE					FAN												
	-M3			VENTILATORE					FAN												
	-M4			VENTILATORE					FAN												
	-M5			POMPA					PUMP												
	QS			SEZIONATORE					ISOLATOR												
G	Q1			INTERRUTTORE AUTOMATICO VENTILATORE					FAN AUTOMATIC SWITCH												
	QS			SEZIONATORE					ISOLATOR												
	Q3			INTERRUTTORE ON - OFF					ON - OFF SWITCH												
H	R3			RESISTENZA CARTER					CARTER HEATER												
	R1			RESISTENZA					HEATER												
	R2			RESISTENZA					HEATER												
	SHP			PRESSOSTATO ALTA PRESSIONE					HIGH PRESSURE SWITCH												
I	SLP			PRESSOSTATO BASSA PRESSIONE					LOW PRESSURE SWITCH												
	S2			TERMOSTATO SBRINAMENTO					DEFROST THERMOSTAT												
	S3			TERMOSTATO SBRINAMENTO					DEFROST THERMOSTAT												
	TR			TRASFORMATORE					TRANSFORMER												
J	-X1			MORSETTIERA					TERMINAL STRIP												
	-X2			MORSETTIERA					TERMINAL STRIP												
	Y5			ELETTROVALVOLA SBRINAMENTO					DEFROST VALVE												
	Y3			ELETTROVALVOLA DEUMIDIFICA					DRYING VALVE												
K	Y4			ELETTROVALVOLA SCARICO CONDENSA					COND. DISCHARGE VALVE												
	Y1			ELETTROVALVOLA RAFFREDDAMENTO					COOLING VALVE												
	Y2			ELETTROVALVOLA SCARICO DEUMIDIFICA					DRYING DISCHARGE VALVE												
L																					
M																					
																	</				

REV.		Data/Date		Dis./Draftsman	Visto/Checked by	Descrizione modifica/Review description	
□	□	□	□	□	□	□	□

Ep	QUADRO ELETTRICO ELECTRICAL PANEL
Es	INGRESSO ALIMENTAZIONE ELETTRICA POWER SUPPLY INLET
Cd Ø1/2"	SCARICO CONDENSA CONDENSATE DRAIN
GAS Ø22	LINEA GAS (SOLO VERS. Z) GAS LINE (Z VERS. ONLY)
LIQUID Ø16	LINEA LIQUIDO (SOLO VERS. Z) LIQUID LINE (Z VERS. ONLY)

- ◇ OPZIONALE/OPTIONAL
- SOLO SU TAGLIE/ONLY ON SIZE



Denominazione/Denomination				SCHEMA DIMENSIONALE DEUMIDIFICATORE ITM 330-400 DIMENSIONAL DRAWING DEHUMIDIFIER ITM 330-400			
Disegno/Drawing	Rev.	Data/Date	Foglio Sheet	N. 1 di 1 of 1	Scala/Scale	Form.	
SD.1ITM.0005	B	27/08/07			1:40	A4	
Sost. il dis./Replace draw.	Sost. dal dis./Replaced by draw.		Dis./Draftsman		Visto/Checked by		Ordine-Order



HIDROS srl
Via dell'Industria 5
35020 Brugine (Pd)
Tel. +390-49-9731022
Fax. +390-49-5806928
Info@hidros.it
www.hidros.it

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