



TECHNICAL MANUAL

INSTALLATION

USE

MAINTENANCE

HYDRA HYDRA-HP

MODELS:

051C - 061C - 081C - 091C

101C - 121C - 151C



m.a1ch.

**REFRIGERANT
R407C**



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HYDRA SERIES WATER CHILLERS HIDRA-UP- SERIES HEAT PUMPS

1.0 GENERAL PRODUCT INFORMATION

Chillers and high-efficiency heat pumps designed for residential and commercial use.

Hydra units are equipped with hydronic kits standard on-board the machine and use a new regulation device that allows excellent operation without the need to install an inertial accumulation tank. This ready-to-use solution facilitates installation, reducing space and the relative costs in addition to avoiding the useless dispersion of heat to the outside.

The units have a ventilation control that optimizes operation even with low outside air temperatures and, at the same time, reduces noise when operating at night.

The adaptive regulation device turns the compressor on and off in a way that optimizes the production of chilled/heated water in units with low thermal loads, without accumulation, through the dynamic modification of set-points and working differentials in both chiller and heat-pump operation. The function analyzes the compressor's effective operating time between the thermostat's on and off requests and compares it to the minimum set operating time. If the effective operating time is less than the minimum time, every time the compressor is turned off, the chiller and heat pump set point and chiller differential is associated with a fixed value and a proportional value calculated based on the difference between the minimum and effective time multiplied by the value set. The set point and differential are decreased by the same fixed quantity if the compressor's operating time is longer than the time set.

The product was developed using the most current design technologies and tested in our laboratories to guarantee efficiency and absolute reliability over time.

The Hydra product line is another tile in our mosaic of hydronic products for air-conditioning that range from special hot/cold production units to system terminal units.

1.1 UNIT TECHNICAL CHARACTERISTICS

Structure: the units are assembled on a frame made entirely of galvanized sheet metal with removable panels for easy maintenance and all painted with oven-baked RAL 9018 polyester powder.

Compressor: a leading brand hermetic scroll particularly indicated for civil air-conditioning applications and able to provide high-efficiency and, at the same time, decidedly modest levels of noise and vibration. Installed on vibration-damping supports, the motor is protected by a circuit-breaker.

Pack-type: finned cooling condensers made of expanded copper tubes in an aluminum finned pack and frame supporting the galvanized steel exchanger. On request, a version can be supplied with prepainted copper or aluminum fins for installation in especially aggressive environments.

Plate-type: dry-expansion evaporator braise-welded in AISI 316 stainless steel insulated with a thick, closed-cell anti-condensate pad. Provided with threaded plumbing fittings for easy connection to the user's system.

Upon request, we also supply frost-prevention heating elements.

Ventilating section consisting of helical fan(s) with blades and motor with direct, rotating stator coupling. The ventilator is installed on a suitably-shaped nozzle to provide the best air-hydraulic performance and is equipped with an safety grill made of painted galvanized steel.

Refrigeration circuit completely wired and sealed, made with copper tube, including:

dehydrator filter, thermostatic valve with external equalization, safety pressure switch on the high and low pressure side, pressure fitting for filling and discharging refrigerant liquid and possible connection of control manometers. The low-pressure side is insulated with a thick, closed cell anti-condensation pad.

Electrical panel completely wired inside a steel box constructed in conformity with the most rigorous European standards. The power circuit is prepared for 400/3/50 V/ph/Hz power. The auxiliary circuit has separate circuit-breaker protection. Regulation and control are handled by a microprocessor coupled to on-board or externally-connected safety devices. The programming, setting and control of operating parameters is performed directly on the display module located on the outside of the control panel

Main regulation functions:

Main adaptive regulation functions:

- Compressor control as a function of the temperature of the return water or, upon request, the water output by the system.
- Automatic and dynamic set points managed as a function of an evaluation of the effective compressor operating and waiting times. The system allows modulating control of the circulation pump to maintain the temperature of the output water as close as possible to the optimal value, even during the system start-up phase.
- Visual and acoustic alarms with a display of the type of alarm or, if more than one, of their sequence in order of time.
- Ability to manage an external pump.
- Counting pump and compressor operating times.
- Storing programming data in the event of a power failure.
- Storing alarm history for a maximum of 50 reports.
- Ability to control compressor activation as a function of the external temperature (dynamic set point).
- Ventilation control as a function of the temperature of the outside air.
- Combined temperature/pressure control of the defrost function (for heat pumps).

Accessories available upon request:

- MHL manometers on the high and low-pressure sides;
- RAE evaporator frost-resistance;
- SAB basic vibration-damping supports;
- KRC basic simple remote control kit;
- KRC top complete remote control kit;
- RCA compressor guard heating element;
- DCP condensation control based on pressure per temperature of external air up to -10 °C.

1.2 OPERATING LIMITS:

Cooling cycle:

Outside air temperature B.S. + 20°C ÷ + 40°C
 Temperature chilled water + 4°C ÷ + 15°C

Heating cycle:

Outside air temperature B.S. - 5°C ÷ +20°C
 Hot water temperature + 35°C ÷ + 50°C

1.3 INERTIAL ACCUMULATION OPTION:

All models can be equipped with inertial water accumulation tanks under, or alongside, the device, based on the model.

1.4 CONFIGURATION:

HYDRA/HP 081 C

HYDRA	/HP	081	C
TYPE UNIT	VERSION	SIZE	REFRIGERANT TYPE

SIZE

/- Chiller version

/HP Heat Pump version

REFRIGERANT TYPE

C R407c

1.5 TECHNICAL DATA TABLE:

HYDRA MODELS		051	061	081	091	101	121	151
Cooling capacity	kW	12,9	15,9	18,1	21,8	27,1	31,5	37,2
Heating capacity	kW	-	-	-	-	-	-	-
Scroll compressors	n°	1	1	1	1	1	1	1
Refrigeration circuits	n°	1	1	1	1	1	1	1
Capacity control steps	n°	1	1	1	1	1	1	1
Power supply voltage	V/Hz/Ph	380/3/50	380/3/50	380/3/50	380/3/50	380/3/50	380/3/50	380/3/50
Lw sound power	dB(A)	76,0	76,0	79,7	79,4	79,4	79,5	82,3
Lp sound pressure	dB(A)	45,0	45,0	48,7	48,4	48,4	48,5	51,3
DIMENSIONS AND WEIGHTS								
Length	mm	1220	1220	1420	1420	1670	1670	1534
Depth	mm	430	430	650	650	620	620	1160
Height	mm	1115	1115	1215	1215	1300	1300	1300
Weight	kg	165	168	255	270	310	325	380
HYDRA/HP MODELS		051	061	081	091	101	121	151
Cooling capacity	kW	12,9	15,9	18,1	21,8	27,1	31,5	37,2
Heating capacity	kW	14,9	17,5	19,8	24,2	29,9	35,1	39,7
Scroll compressors	n°	1	1	1	1	1	1	1
Refrigeration circuits	n°	1	1	1	1	1	1	1
Capacity control steps	n°	1	1	1	1	1	1	1
Power supply voltage	V/Hz/Ph	380/3/50	380/3/50	380/3/50	380/3/50	380/3/50	380/3/50	380/3/50
Lw sound power	dB(A)	79,2	79,2	79,7	79,4	79,5	79,6	82,3
Lp sound pressure	dB(A)	48,2	48,2	48,7	48,4	48,5	48,6	51,3
DIMENSIONS AND WEIGHTS								
Length	mm	1220	1220	1420	1420	1670	1670	1534
Depth	mm	430	430	650	650	620	620	1160
Height	mm	1115	1115	1215	1215	1300	1300	1300
Weight	kg	170	176	268	285	325	332	398

Legend

REFRIGERATION POWER: Water exchanger system (input/output) 12-7 °C Outside air 35 °C
 THERMAL POWER: Water exchanger system (input/output) 39-45 °C Outside air 7 °C

Sound pressure at 10 meters in an open field

GENERAL INFORMATION

2.0 GENERAL INSTALLATION INFORMATION

Installation and maintenance must be performed by qualified personnel who will scrupulously follow the instructions in the manual and on-board the machine.

The manufacturer will not be liable for personal injury or property damage caused by a failure to follow the instructions.

Before performing any maintenance on the machine, make sure that power is disconnected to the main panel at the main disconnect switch that must, of necessity, be located near the machine.

All units are built for outside installation without additional protection against the weather.

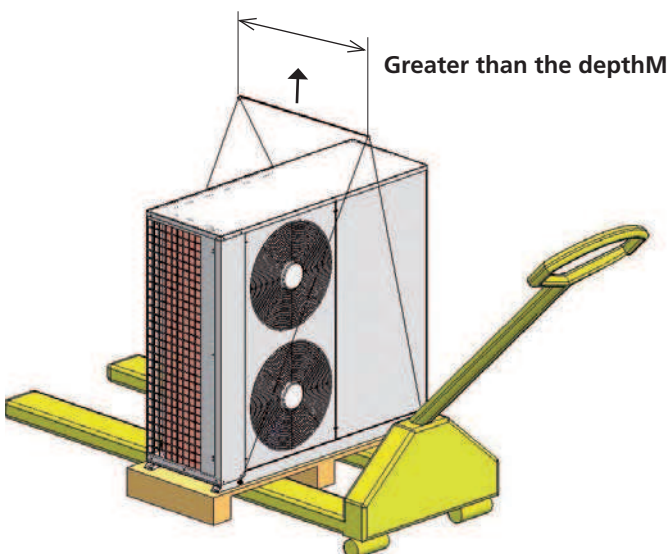
2.1 INSPECTION

When the unit arrives at its destination, it must be visually inspected to determine if it has been damaged during transport. Any defects or obvious signs of damage must be immediately reported to the transporter and noted on the delivery documents in addition to being reported directly to TONONFORTY S.p.A., or its area agent, in writing.

2.2 HANDLING

It is a good idea to handle the unit in its original packing, which will be removed when its definitive location has been determined.

The unit can be handled on a common manual transpallet or, for lifting, using cables and suspended at a sufficient distance to avoid possible crushing of the upper part of the housing.

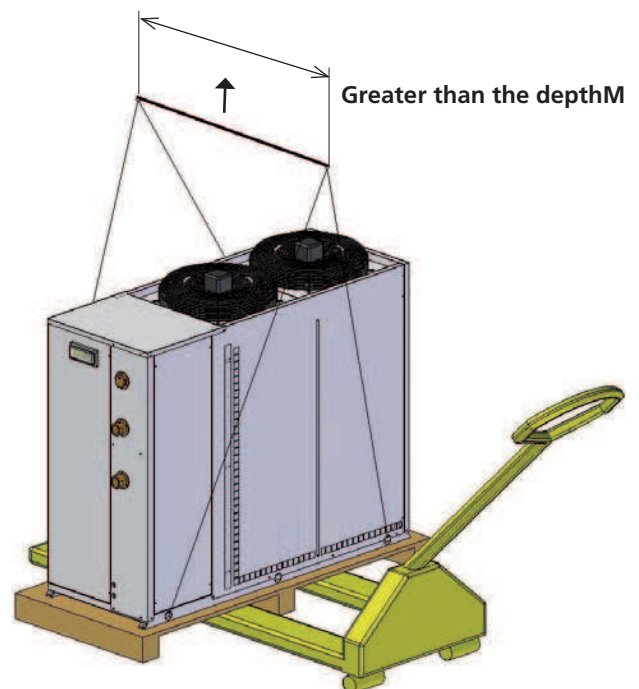


MODELS 051 - 061 - 081 - 091

2.3 POSITIONING

The unit must be carefully positioned with the following precautions in mind:

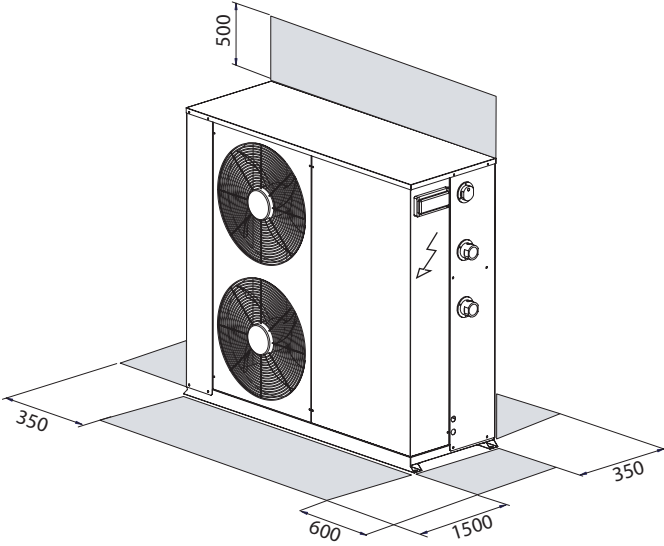
- The chiller must be installed exclusively outside on any flat, horizontal surface capable of supporting its weight (ground, terrace, roof, etc.).
- In the case of roof or terrace installation, it is a good idea to place a rubber pad (available as an accessory), or other suitable vibration-damping material, between the support base and the machine to avoid transmitting vibrations from the unit to the structure of the building.
- If possible, select an area far from windows or openings to inside rooms, if adjacent.
- Avoid placing the unit near fireplaces, flues or ventilation or air extraction devices so it won't be exposed to hot or polluted air.
- It is important not to obstruct air flows in such a way that exhaust air would be sucked back into the unit's intake. Insufficient air circulation, or air being sucked into the intake across the finned pack could cause the machine to run poorly or even stop it.



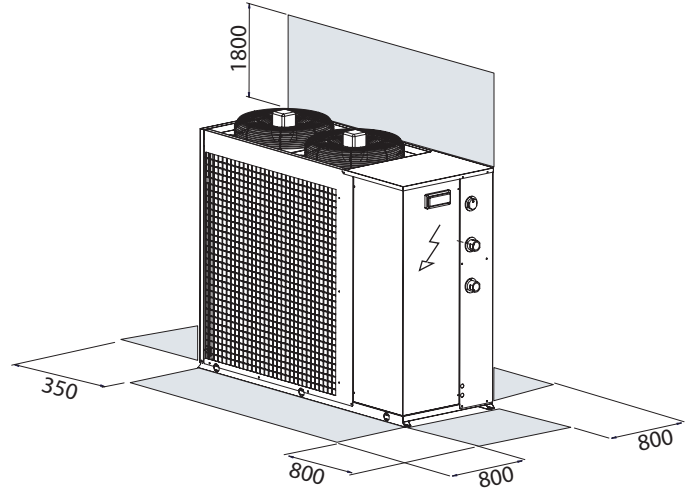
MODELS 101 - 121 - 151

2.4 POSITIONING - SERVICE SPACES -

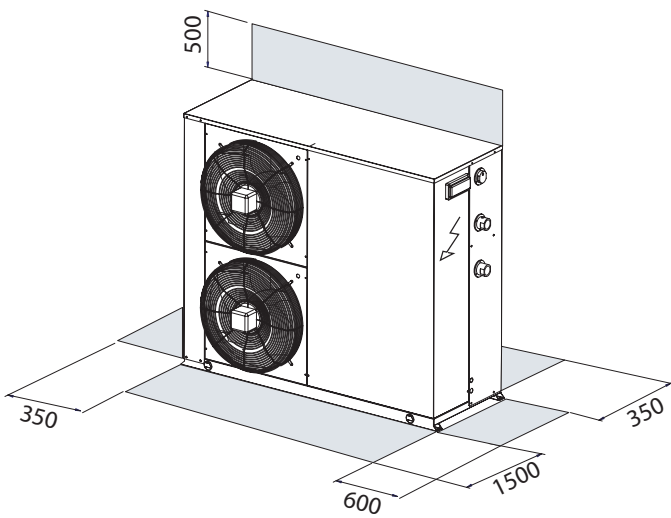
MODELS: HYDRA - HYDRA/HP 051 - 061



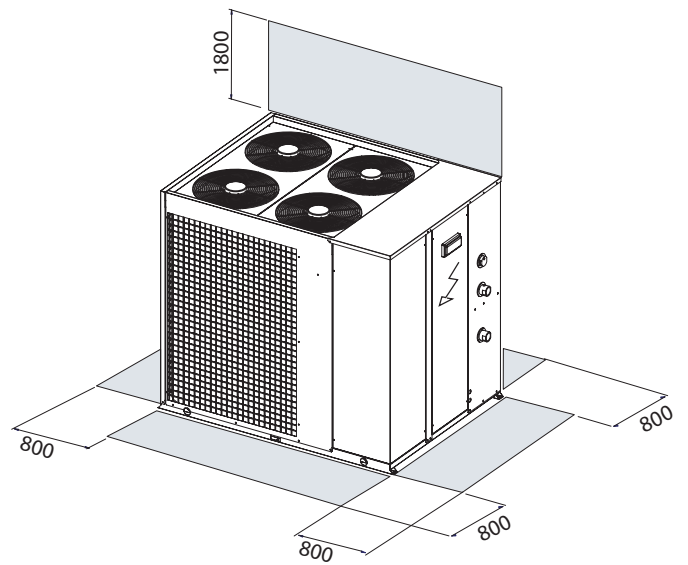
MODELS: HYDRA - HYDRA/HP 101 - 121



MODELS: HYDRA - HYDRA/HP 081 - 091



MODELS: HYDRA - HYDRA/HP 151



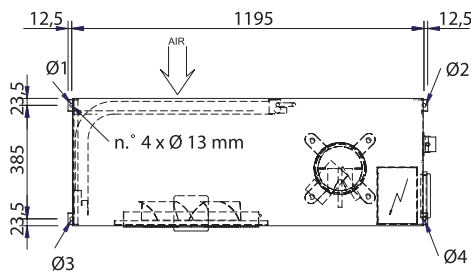
2.5 POSITIONING SUPPORT BASES - ALLOCATING WEIGHTS

MODELS		HYDRA 051~151 Series						Serie HYDRA HP 051~151 Series							
		051	061	081	091	101	121	151	051	061	081	091	101	121	151
Ø1	Kg	40	41	58	62	46	48	58	41	43	61	65	48	49	61
Ø2	Kg	40	41	68	72	51	54	61	42	43	71	76	54	55	64
Ø3	Kg	40	41	60	61	57	59	69	41	43	64	64	59	61	72
Ø4	Kg	45	45	69	75	48	50	56	46	47	72	80	51	51	59
Ø5	Kg	-	-	-	-	53	55	64	-	-	-	-	55	56	67
Ø6	Kg	-	-	-	-	55	59	72	-	-	-	-	58	60	75
TOTAL WEIGHT		165	168	255	270	310	325	380	170	176	268	285	325	332	398

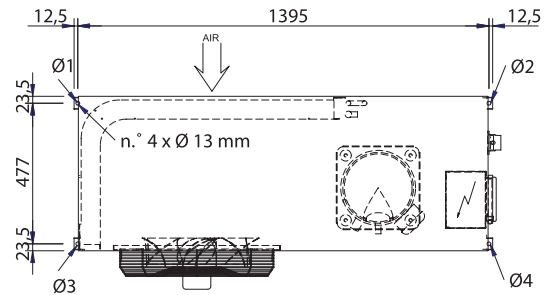
The units' weight distribution refers to machine as they are delivered, without any inertial accumulation tanks, which are considered options.

All holes for attaching support bases are Ø 13 mm.

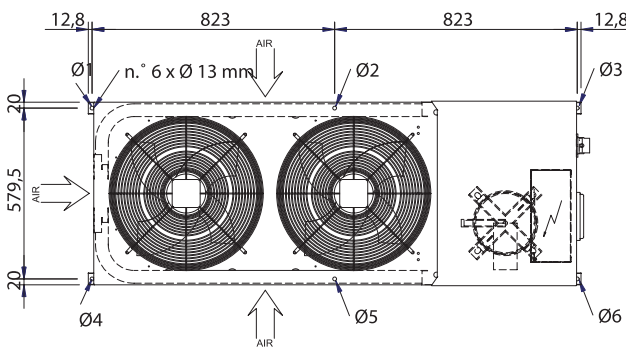
MOD. 051 - 061



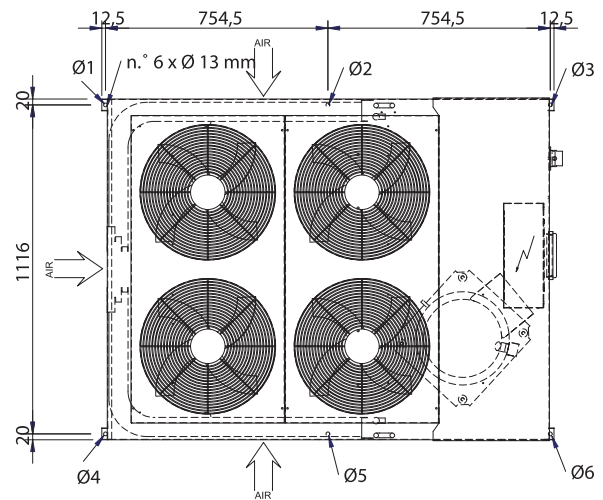
MOD. 081 - 091



MOD. 101 - 121



MOD. 151



PLUMBING CONNECTIONS

3.0 PIPES

System pipes can be made of steel, galvanized steel, polyethylene or PVC.

Pipes must be dimensioned as a function of their nominal water flow capacity, the losses of load of the system and the characteristics of the circulator or pump used in the system.

All units are supplied complete with a pump capable of guaranteeing the available static pressure shown in the accompanying table. In this case, the pipes must, of necessity, be dimensioned based on the performance of the pump, carefully evaluating losses of load in the system.

All pipes must be suitably insulated to avoid the accumulation of heat (and the consequent decline of the unit's performance) and the formation of condensate on the outside. For this purpose, use closed-cell materials with a minimum thickness of 10 mm.

To avoid transmitting vibrations from the unit to the user's system and compensate for thermal expansion, it is a good idea to use elastic joints on the units plumbing fittings.

The system must be installed conforming to the regulations of the company of installation.

In any case, it is a good idea to install the following devices to guarantee the correct use and maintenance of the unit.

- elastic, vibration-damping joints
- shut-off taps
- wells for housing sensors to measure the water temperature.
- metal mesh filter
- air-vent devices
- automatic filling unit
- drain tap
- expansion vessel (1)
- safety valve (1)

(1) - These devices are already installed on-board the HYDRA and HYDRA-HP versions

In order to guarantee correct operation and performance, units need the constant, nominal water flow shown in the table below.

The use of less water could create operating problems and seriously damage important components, such as the compressor.

Paragraph 19 contains the principal plumbing diagrams with an indication of the parts present on-board the machine and to be installed in the field.

TECHNICAL DATA TABLE FOR DIMENSIONING THE PLUMBING CIRCUIT:

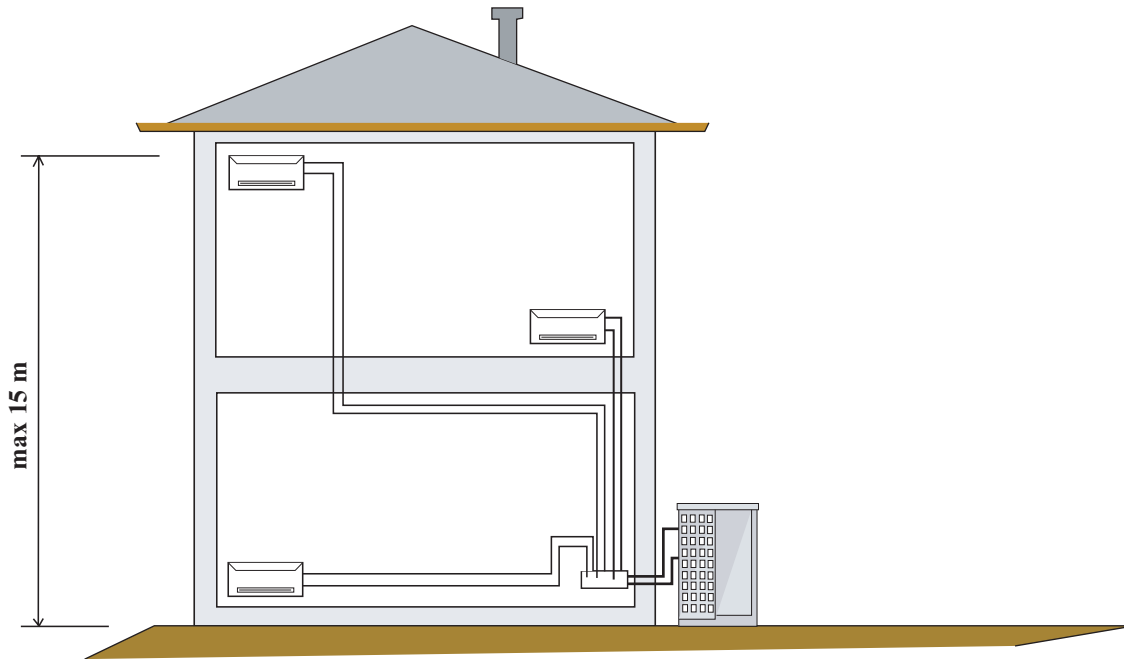
HYDRA MODELS		051	061	081	091	101	121	151
Water flow capacity	l/s	0,62	0,76	0,86	1,04	1,29	1,51	1,78
Losses of load - EXCHANGER	kPa	19,0	28,8	15,5	22,4	34,7	33,0	46,5
External available static pressure	kPa	169	145	165	146	117	98	107
HYDRA/HP MODELS		051	061	081	091	101	121	151
Water flow capacity	l/s	0,62	0,76	0,86	1,04	1,29	1,51	1,78
Losses of load - EXCHANGER	kPa	19,0	28,8	15,5	22,4	34,7	33,0	46,5
External available static pressure	kPa	169	145	165	146	116	99	108

DEPENDING ON THE MODEL AND CONFIGURATION OF THE USER SYSTEM, THE MACHINES MUST BE EQUIPPED WITH A SERIES OF COMPONENTS, ALREADY LISTED ABOVE, TO GUARANTEE THE MAXIMUM FUNCTIONALITY OF THE SYSTEM. HOWEVER, THESE DEVICES MUST BE CHECKED PERIODICALLY TO MAKE SURE THEY ARE WORKING.

- * PERIODICALLY CHECK THE OPERATION OF THE DIFFERENTIAL WATER PRESSURE SWITCH.
- * CHECK THE READING ON THE ANTI-FREEZE PROBE AND COMPARE IT WITH A CERTIFIED INSTRUMENT. IF THE VALUE IS WRONG, CALIBRATE THE PROBE.
- * PERIODICALLY CLEAN THE MESH FILTER INSTALLED AT THE INTAKE TO THE MACHINE'S EXCHANGER.
- * CHECK THAT THE PRESSURE IN THE PLUMBING SYSTEM IS WITHIN SAFETY LIMITS (MAX 3 bar).

UNDER NORMAL CONDITIONS, THE WATER PRESSURE CAN VARY FROM 0.8 ÷ 1.2 bar.

DIFFERENCE IN LEVEL BETWEEN THE CHILLER UNIT AND THE HIGHEST POINT IN THE SYSTEM



3.1 USE OF ANTI-FREEZE

If the water system is not emptied during the winter pause, a suitable percentage of anti-freeze needs to be added to the water.

The use of anti-freeze slightly reduces cooling capacity but has a significant impact on water flow values and loss of load in the system.

In these cases, it will be necessary to carefully evaluate pump performance to avoid the malfunctions and damage that will be caused if the required nominal flow capacity is not provided.

The table below provides suggested mixture percentages for ethylene glycol as a function of the minimum outside temperature where the unit is located.

ATTENTION:

The pumps installed in the AP versions can function with a maximum of 30% glycol. Contact TONONFORTY S.p.A. for machines that must be used with mixture greater than 30%.

Outside winter air temperature (machine off)	°C	5	2	-3	-10	-15
Recommended percentage of ethylene glycol (by weight)	%	0	10	20	30	40
Coefficient of corr. cooling capacity*	-	1	0.97	0.95	0.93	0.9
Coefficient of corr. absorbed power*	-	1	0.99	0.98	0.97	0.96
Coefficient of corr. water flow capacity	-	1	1.02	1.1	1.14	1.3
Coefficient of corr. losses of evaporator load	-	1	1.08	1.3	1.39	1.6
Mixture freezing point	°C	0	-3	-8	-15	-23

*for operation under nominal conditions (outside air temperature 35 °C/Cooling water temperature 7 °C)

ELECTRICAL CONNECTIONS

4.0 GENERAL REQUIREMENTS

All units are supplied with an electrical panel with everything needed to control the machine and its safety devices.

Electrical connections must be made conforming to current CEI standards in Italy or the regulations of the country of installation and following the instructions on the electrical diagram attached to the machine.

Before working on any of the machine's internal or external electrical parts, make sure power has been disconnected. Dimension the section of the power supply cables based on the maximum total absorption. The electrical diagram shows the recommended sections for installations where there is a cut-off switch with fuses installed near the unit.

Provide an adequate ground connection using the terminal inside the electrical panel.

The power supply voltage must conform to the specifications defined for the unit (voltage, frequency, no. phases and a neutral conductor), must not be subject to variations greater than $\pm 5\%$ with an imbalance between the phases (in the case of three-phase power) of less than 2%.

The use of power sources that do not conform to the manufacturer's specifications could have an impact on the machine's functioning and integrity and void the warranty.

4.1 ELECTRICAL CONNECTIONS

The electrical connections that the user must make are shown in the electrical diagram and can be summarized as follows:

• Connections to the power supply line:

EP terminal block numbering

051 models: 151

L1-L2-L3-N-PE

All units are dimensioned for line power of 400V/50Hz + N (neutral conductor for auxiliary power) + Pe.

• Remote On/Off consent:

051 models : 151

terminals 2-3

USE A CLEAN CONTACT WITH NO VOLTAGE

Parameter CF16=0

Logic:

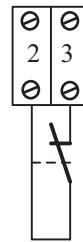
- contact closed: operation disabled
- contact open: operation enabled.

The operating logic of the digital On/Off input can be reversed by changing parameter CF16 in the user menu (see point 12.1).

Example:

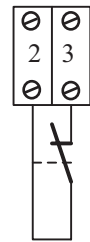
EP terminal block numbering

CF16=0



Contact closed
Unit OFF from remote

CF16=1



Contact closed
Unit ON from remote

Note: It is only possible to power the unit on and off from the keyboard if the input is deactivated (priority from remote).

• Summer/Winter remote consent:

051 models : 151

terminals 2-6

- Function active only for HYDRA heat pump models. Allow remote chiller/heat pump selection.

USE A CLEAN CONTACT WITH NO VOLTAGE

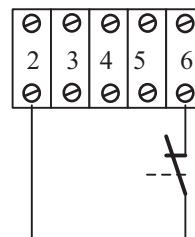
Operating logic:

With parameter CF13=1 (standard configuration), remote consent open forces the machine to HP mode while closed forces it to Chiller mode.

With parameter CF13=0 and remote consent open, the machine is forced to Chiller mode, while closed forces it to HP mode.

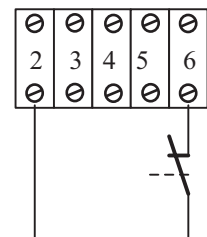
EP terminal block numbering

CF13=0



Contact closed
Unit in HP mode

CF13=1



Contact closed
Unit in Chiller mode

To use summer/winter remote consent, parameter CF28 on the User Menu must be enabled (CF28=1).
When this parameter is activated, the selection from remote consent has priority (see paragraph 7).

• **Remote alarm signals:**

051 models: 151

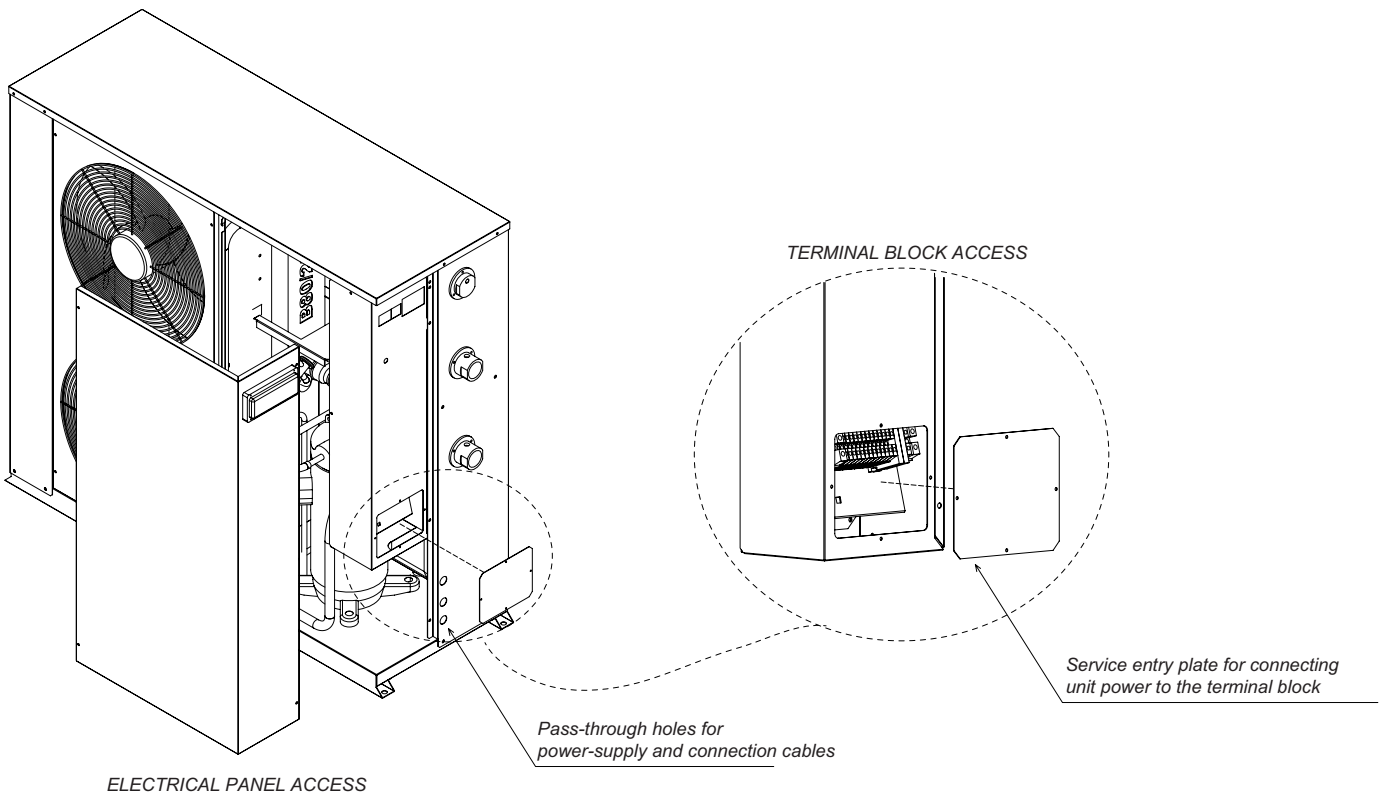
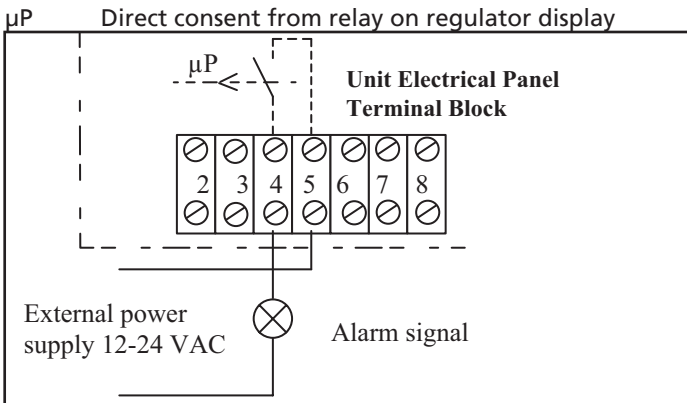
terminals 4-5

- Allows the remote reporting of an "alarm intervened" signal. Terminals 4-5 are connected to a clean, normally-open contact that switches state when one of the alarms handled by the microprocessor intervenes. Any alarm signaling device connected to terminals 4-5 must, preferably, be powered with 12 or 24 VAC.

• **Access for electric power supply cables:**

The holes for the entry of the power supply and machine control cables on the plumbing connection side. The entry to the electrical panel is on the lower side through cable glands.

To access the terminal blocks, remove the small panel on the front of the electrical panel.



**4.2 POWER ABSORPTION TABLE
HYDRA/HYDRA HP**

MODELS HYDRA-HYDRA/HP		051	061	081	091	101	121	151	
Scroll compressors	n°	1	1	1	1	1	1	1	
Refrigeration circuits	n°	1	1	1	1	1	1	1	
Capacity control steps	n°	1	1	1	1	1	1	1	
Power supply voltage	V/Hz/Ph	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	
COMPRESSOR									
Max power absorbed	kW	4,6	5,4	6	7,5	9,1	10,8	12,6	
Nominal current	A	8	9,3	12,1	13	15,6	18,4	23	
Max current	A	11	13	17	20	22	27	35	
Breakaway starting current	A	66	74	98	123	127	167	175	
contactor ac3 400v	n°	1	1	1	1	1	1	1	
	kW	5,5	5,5	7,5	11	11	15	15	
PUMP									
Nominal power	kW	0,37	0,37	0,37	0,37	0,37	0,37	0,75	
Nominal current	A	1,4	1,4	1,4	1,4	1,4	1,4	3	
mini-contactor ac3 400V	n°	1	1	1	1	1	1	1	
	mod.	4	4	4	4	4	4	4	
GLASS 5*20 FUSES	n°	3	3	3	3	3	3	3	
	mod.	3.15A	3.15A	3.15A	3.15A	3.15A	3.15A	4A	
FANS									
Nominal power	kW	0,165	0,165	0,3	0,3	0,3	0,3	0,165	
Nominal current	A	1	1	1,25	1,25	1,25	1,25	1	
	n°	2	2	2	2	2	2	4	
TOTAL nominal power	kW	0,33	0,33	0,6	0,6	0,6	0,6	0,66	
TOTAL nominal current	A	2	2	2,5	2,5	2,5	2,5	4	
Board for slave application XV Ichill230V AC	n°	1	1	1	1	1	1	1	
	W	1000	1000	1000	1000	1000	1000	1000	
Automatic aux. switch motor curve D 10kA	n°	1	1	1	1	1	1	1	
	mod.	2p/6A_D	2p/6A_D	2p/6A_D	2p/6A_D	2p/6A_D	2p/6A_D	2p/6A_D	
TOTAL ABSORPTION									
TOTAL nominal power	kW	5,3	6,1	7,0	8,5	10,1	11,8	14,0	
TOTAL nominal current	A	11,4	12,7	16,0	16,9	19,5	22,3	30,0	
TOTAL maximum current	A	14,4	16,4	20,9	23,9	25,9	30,9	42,0	
General autom. switch motor curve D 10kA	n°	1	1	1	1	1	1	1	
	mod.	3p/16A_D	3p/20A_D	3p/20A_D	3p/20A_D	3p/25A_D	3p/32A_D	3p/40A_D	
TOTAL breakaway starting current	A	69,4	77,4	101,9	126,9	130,9	170,9	182,0	
phase control relay	n°	1	1	1	1	1	1	1	
12 VAC circuit transformer 6VA 230/12 V	n°	1	1	1	1	1	1	1	
glass 5X20 protection fuses 12 VAC circuit	n°	2	2	2	2	2	2	2	
	A	3,15	3,15	3,15	3,15	3,15	3,15	3,15	
Microprocessor control IC100c mach_1 V3.0	n°	1	1	1	1	1	1	1	
Modular EP terminals 2.5mmQ	n°	10	10	10	10	10	10	10	
XA terminal block Faston 10-pin	n°	1	1	1	1	1	1	12 poli Q.ta 1	
XB Faston terminal block 10-pin	n°	1	1	1	1	1	1	1	
LINE CABLE SEC.	mmq	4	4	6	6	6	6	10	
ELECTRICAL DIAGRAM	cod.	670507200			670507210			670507220	

The data for total absorption does not include the pump.

REGULATION DEVICE

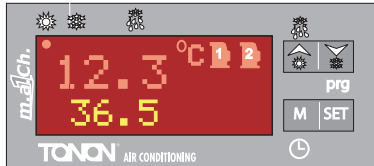
5.0 USING THE REGULATION DEVICE

REGULATION DEVICE **A**

MICROPROCESSOR *m.a.Ch.* **a**

All the units are equipped with a microprocessor regulator that controls all the parameters that determine the operation of the machine.

5.1 USER INTERFACE



The regulator's display is divided into three areas.

- Upper left:
Displays the IN/OUT temperature of the user's water system.
IN - Input water temperature (return from the user's system) OUT - Output water temperature (output to the user's system)
- Lower left:
Displays the temperature/condensing pressure or current time (function active upon request as an accessory).
- Right:
Signal icons.

5.2 SIGNAL ICONS

The signal icons provide general information about the status of the machine.

°C **Degrees Celsius**
Indicates that the value on the display is a temperature (also in the user menu).

bar **Bar**
Indicates that the value on the display is a pressure (also in the user menu).

1 2 **Compressor 1 / 2**
Indicates the status of the compressors
Flashing: Compressor 1/2 request
A timer is running
Fixed: Compressor 1/2 active

Z Z **Unit in Stand-By**
Whenever the unit is powered-off in Chiller or Heat Pump mode, it goes to stand-by mode.

Signaled by lighting the icon.
Even in stand-by mode, the controller offers the options of:

- 1) Displaying the temperature measured;
- 2) Handling alarms by displaying them and signaling them;
- 3) Turning on the heating elements to prevent freezing.



Generic alarm

signals the presence of one or more alarms. In the case of automatic-reset alarms, access the M-key functions menu and select "AlrM".



High-pressure alarm

signals that the high-pressure safety switch alarm has intervened. The safety device is connected to digital input ID3 (see the relative electrical diagram).



Low-pressure alarm

signals that the low-pressure safety switch has intervened. The safety device is connected to digital input ID4 (see the relative electrical diagram).



Anti-freeze heating element

Indicates the status of the anti-freeze heating elements.

Flow!

Flow-switch alarm

signals that water-flow safety switch alarm has intervened. The safety device is connected to digital input ID1 (see the relative electrical diagram).



Time remaining/Clock



Maintenance request





Compressor or pump requires maintenance because operating hours have been exceeded.

Menu

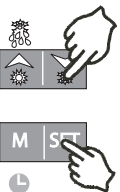


Menù

Indicates that you have entered the "function menu"







5.3 FUNCTIONS OF THE KEYS

	M is used to enter the functions menu and set the time.
	SET is used to display or change the set point. When programming, it selects a parameter or confirms a value.
	If pressed for 5 seconds, powers the unit on and off in cooling (Chiller) mode. It selects IN/ OUT water temperature on the upper display. When programming, it scrolls parameter codes or increments their value.
	If pressed for 5 seconds, powers-on the unit in heating (Heat Pump) mode. Selects the display of the outside air/defrosting temperature. In programming, it scrolls the parameter codes or decrements their value.

5.4 FUNCTIONS OF THE COMBINED KEYS

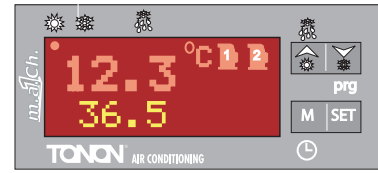
	To enter programming mode.
	To exit programming mode.
	When pressed for more than 5 seconds they start a manual defrost cycle.

5.5 SYMBOLS AND LEDS ON THE FRONT

Symbol	Led	Function
	On	Unit on in chiller mode
	On	Unit on in Heat Pump mode
	Flashing.	In programming mode (flashes together with LED )
	Flashing.	Time waiting to start defrost
	On	Defrost active
	Off	Defrost disabled or finished
		Setting the clock

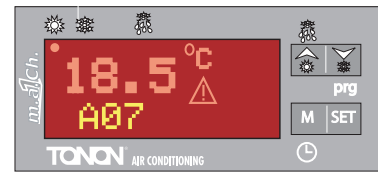
DISPLAYING INFORMATION

6.0 DISPLAYS IN NORMAL CONDITIONS



Upper display: Input water temperature (return from user's system), Output water temperature (output to user's system).
Lower display: Temperature or condensing pressure with relative unit of measure.
 The current time (optional upon request).


6.1 DISPLAYS DURING ALARMS

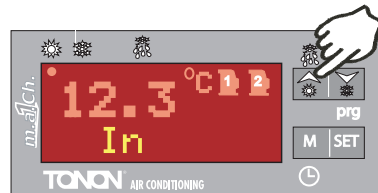



Starting from a normal situation (no active alarms), as soon as the regulator detects an alarm situation, the lower display shows the alarm code and the respective icon begins flashing and alternating with the temperature/pressure (the example in the figure shows a high-pressure alarm).

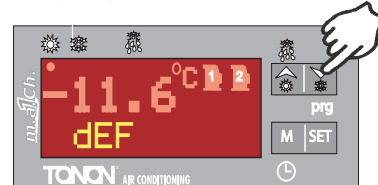
6.2 RAPID DISPLAY OF BASIC INFORMATION

To make it easier for the user to test and check the machine, the display of important information does not require accessing the selection menu.

- when the up key is pressed  the display alternates between the output and return water temperatures to and from the user system. This function allows checking the thermal gradient between the evaporator input/output, which in normal operation should be about 5 °C..




- when the down key is pressed  the display alternates between the outside air temperature (optional probe) and the condensation point or defrost temperature (heat pump).



UNIT IN STAND-BY

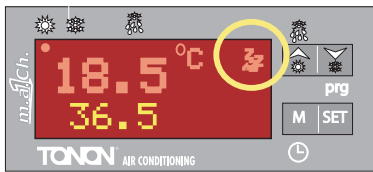
7.0 UNIT IN STAND-BY

The unit goes to stand-by mode when it is powered-off in Chiller or Heat Pump mode.


This is indicated by the  icon lit.

Even in stand-by mode, the controller offers the options of:

- 1) Displaying measurements
 - 2) Handling alarms by displaying them and signaling them.
- Activating the electric heating elements to avoid the freezing of the evaporator when functioning as a thermoregulator. The unit can only switch from Chiller to Heat pump mode by being powered-off.

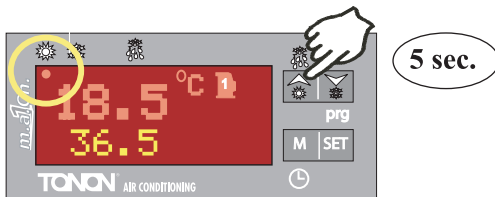


7.1 ACTIVATING/DEACTIVATING COOLING (SUMMER) MODE


When the  key is pressed for 5 seconds, the unit goes from stand-by to Chiller mode and vice versa. After the delay times, if no alarms are active, the compressors are powered-on in sequence.



During power-on, the stand-by  icon is off, while the "sun" LED,  flashes, indicating Chiller mode.

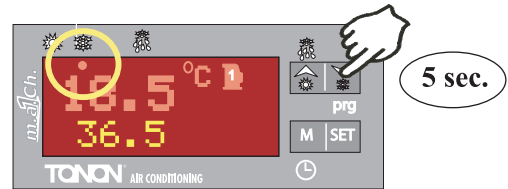
When operating in Chiller mode, it is only possible to change the set point ("StC" Set Chiller), or display the dynamic setting ("StD"), if active.



7.2 ACTIVATING/DEACTIVATING HEATING (WINTER) MODE

When the  key is pressed for 5 seconds, the unit goes from stand-by to Heat Pump mode or vice versa. After the delay times, if no alarms are active, the compressors are powered-

on. During power-on, the stand-by icon  is off, while the "snowflake" LED  flashes to indicate Heat Pump mode. When operating in Heat Pump mode, it is only possible to change the set point ("StH" Set Heat Pump) or display the dynamic setting ("StD"), if active.



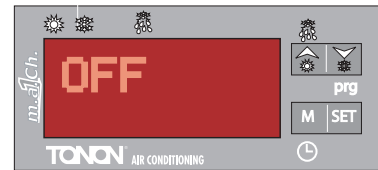
7.3 ACTIVATION/DEACTIVATION FROM DIGITAL INPUT

USE A CLEAN CONTACT WITH NO VOLTAGE

1. It has priority over the keypad
2. The unit can only be powered-on and off from the keypad with the input deactivated
3. With the digital input deactivated, the regulator returns to its state before activation.

The upper display contains OFF, with the decimal LEDs flashing.

Note: The polarity of input ID5 can be reversed so that the unit is ON with the signal active. The parameter that controls this function is CF16=1, which can be changed by the user (see the paragraph on accessing the user menu).



7.4 CONTROL LING CHILLER/HP MODE FROM DIGITAL INPUT

To use summer/winter remote consent, parameter CF28 on the User Menu must be enabled (CF28=1). When this parameter is activated, the selection from remote consent has priority.

With CF28=1, if the unit is running in Chiller or Heat Pump mode and an operating mode change is requested, the controller powers-off all outputs (compressor, pump, etc.), waits a fixed delay time that is indicated by the flashing of the Chiller or Heat Pump LED. The flashing indicates that the machine will be restarted with respect for the compressor protection times.

SET POINTS

8.0 SETTING THE SET POINTS



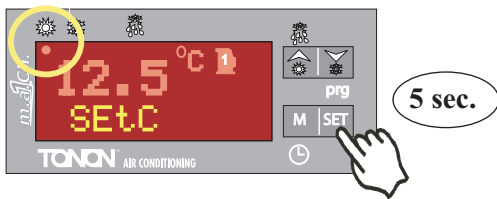
8.1 SET.C Chiller Set Point 12.5 °C

The value set can be displayed by pressing SET when the unit is in Chiller or stand-by mode.

To change the setting, just hold the SET key down for about 5 seconds until the value displayed begins to flash.

Use the cursor keys (Up or Down arrow) to change the value within the factory set limits.

ST05	10°C	minimum summer setting
ST06	18°C	maximum summer setting



The value flashes and is changed with the cursor keys.

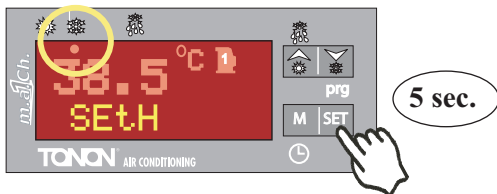


The change is stored by pressing SET.

8.2 SET.H Heat Pump set point 38,5°C

The value of the set point can be displayed by pressing the SET key when the unit is in stand-by or Heat Pump mode. To change the setting, just hold the SET key down for about 5 seconds until the value displayed begins to flash. Use the cursor keys (Up or Down arrow) to change the value within the factory set limits.

ST07	36°C	minimum winter setting
ST08	43°C	maximum winter



The value flashes and is changed with the cursor keys.



The change is stored by pressing SET.

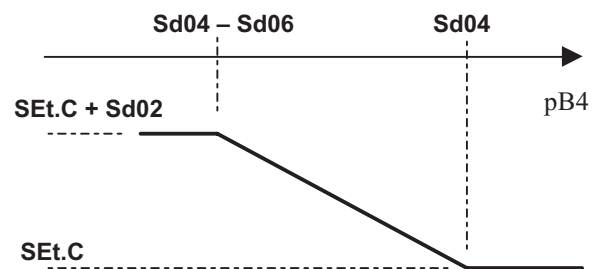
8.3 SET.D Dynamic Set Point (Optional upon request)

This changes the working set point based on the temperature measured by optional outside probe pB4. This increases the yield of the compressor (COP) and saves energy.

With the dynamic set point active, when the SET key is pressed, the lower display shows "SET.D" (dynamic set point) and the upper display shows the real set-point value the machine is working with.

(The SET.D label is only active if the dynamic set point is enabled). The parameters that regulate the dynamic control of the Chiller and Heat Pump are set directly from the user menu and respect the following relationships:

- Summer SET.D (Chiller) operating logic**
 With $pB4 \geq Sd04$ $SET.D = SET.C$
 With $pB4 < Sd04 - Sd06$ $SET.D = SET.C + Sd02$

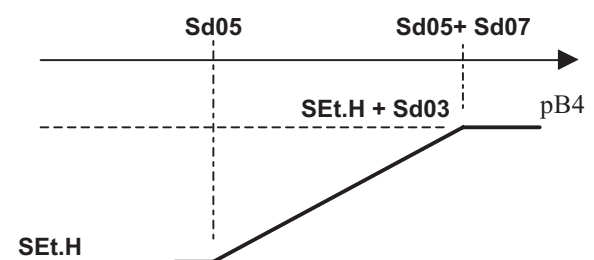


Sd02 Maximum dynamic set point increment in Chiller. Determines the maximum change of the working set point in Chiller mode.

Sd04 Set temperature outside air dynamic set point in Chiller mode.

Sd06 Differential outside air temperature dynamic set point in Chiller mode.

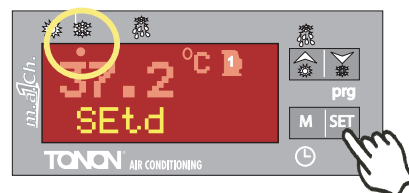
- Operating logic SET.D Winter (Heat Pump)**
 With $pB4 \geq Sd05$ $SET.D = SET.H$
 With $pB4 < Sd05 + Sd07$ $SET.D = SET.H + Sd03$



Sd03 Maximum dynamic set point increment in Heat Pump mode. Determines the maximum change of the working set point in Heat Pump mode.

Sd05 Set outside air temperature dynamic set point in Heat Pump mode.

Sd07 Differential outside air temperature dynamic set point in Heat Pump mode.



8.4 SET.S Energy saving (Optional su richiesta)

The Energy Saving function manages two different working set points in both Chiller and Heat Pump mode. Programmable daily or weekly with time bands (model with on-board clock accessory upon request) or managed from an external contract.

In the Energy Saving cycle, the set point is increased by the value in ES10/ES12 so that the working set point becomes SET+ES10 in Chiller mode and SET+ES12 in Heat Pump mode. The differential of reference for thermoregulation with Energy Savings activated is given by the value of ES11, Chiller mode, and ES13, in Heat Pump mode.

- **Daily programming in ES mode (Only models with integrated clock. Optional upon request)**

Set the Energy Savings parameter for the day to 1.

Example: ES03=1 (set Energy Savings active for all 24 hours on Monday).

Set ES04 to ES09 to 1 to enable Energy Savings during the other days of the week.

- **Time Band programming in ES mode (Only models with integrated clock. Optional upon request)**

Set parameters ES01 (Energy Savings cycle start time) and ES02 (Energy Savings cycle end time).

Example: ES01=8.0, ES02=10.0, Energy Savings activated from 8:00-10:00 every day of the week.

Example: ES01=23.0, ES02=8.0, Energy Savings activated from 23:00 at night to 8:00 the next morning, for every day of the week.

Note: The time band function is deactivated if parameters ES01/ES02 contain the same value or are 0.

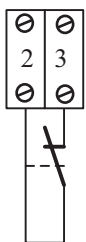
- **Energy Savings Management from External Contact**

In any case, the ES function can be managed directly from external contact ID5 (terminals 2-3). This management mode uses the same digital input that is normally used as the remote On/Off (see paragraph 12.1). To enable this function, set parameter CF10=8 (user menu).

Note: The operating logic is inverted based on parameter CF16.

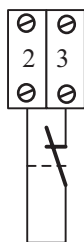
Example:

CF16=0



Contact closed
Energy Savings active

CF16=1



Contact closed
Energy Savings not active

Use a clean contact with no voltage.

• **Energy Savings Parameter**

- ES01 Energy Savings Start Time
- ES02 Energy Savings End Time
- ES03 Monday
- 0 = not enabled
- 1 = enabled
- ES04 Tuesday
- 0 = not enabled
- 1 = enabled
- ES05 Wednesday
- 0 = not enabled
- 1 = enabled
- ES06 Thursday
- 0 = not enabled
- 1 = enabled
- ES07 Friday
- 0 = not enabled
- 1 = enabled
- ES08 Saturday
- 0 = not enabled
- 1 = enabled
- ES09 Sunday
- 0 = not enabled
- 1 = enabled
- ES10 Energy Savings set point increment in Chiller mode
- ES11 Energy Savings differential in Chiller mode
- ES12 Energy Savings increment in Heat Pump mode.
- ES13 Energy Savings differential in Heat Pump mode.

8.5 AUTOMATIC CHANGE OVER (Optional upon request)

Automatically changes the unit's operating mode (Chiller/Heat Pump) based on its programming and outside climatic conditions.

This function is only available on HYDRA-HP Heat Pump models with optional pB4 environmental probe.

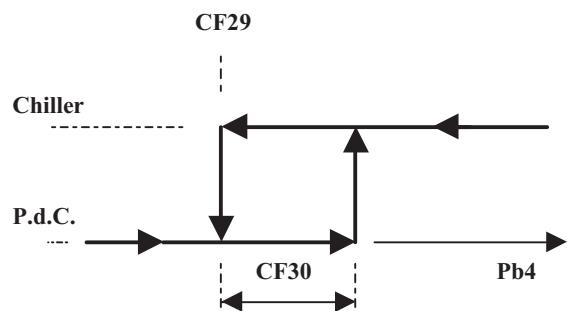
Parameters that govern the change-over function:

CF29 Sets the change-over set point. It is the temperature measured by pB4, below which the regulator changes to Heat Pump mode.

CF30 Sets the change-over differential. This is the temperature differential on the basis of which the regulator changes to Chiller mode.

To assist the user in setting the change-over set point, pressing and releasing the "Down" arrow displays the temperature measured by probe pB4 in the upper area; at the same time, the lower area displays the label Et.

Regulator Change-Over Diagram.



PANEL

**9.0 REMOTE CONTROL PANEL (BASIC KRC)
(Optional upon request)**

This keypad provides ON/OFF control for all HYDRA and HYDRA-HP units. In the case of units that can be reversed to HYDRA-HP heat pumps, it switches operating mode from Chiller to Heat Pump and vice versa. In addition, it signals the alarm status of the machine with a red LED. Once the electrical connections have been made, as shown below, check that the jumper located to the right of the electrical terminal block is closed (12 VAC power supply). Incorrect positioning of the jumper can damage the remote device.

Note: Change parameter CF16=1 so that the activation logic is the same as that of the remote panel. This parameter can be changed directly in the user menu, see paragraph 12.1.

COMMANDS

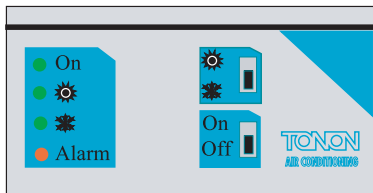
1 ON/OFF switch 2 Summer/Winter switch

DISPLAYING INFORMATION

3 green LED On 5 green LED Winter
4 green LED Summer 6 red LED Alarm

DIMENSIONS

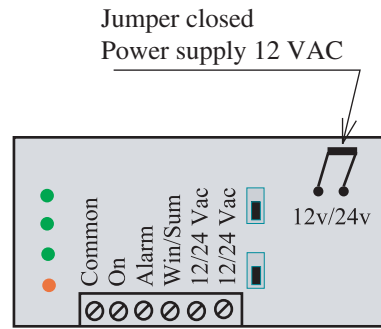
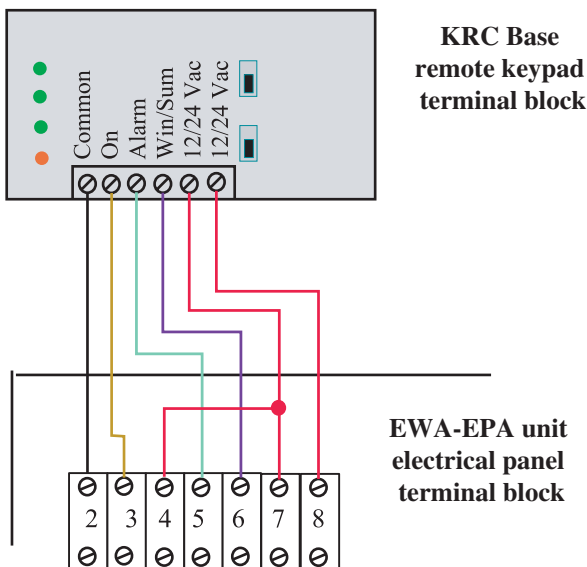
- 120 x 70 x 28.7 mm



9.1 REMOTE ELECTRICAL CONNECTIONS BASE KRC

The user must make the electrical connections between the remote keypad and the electrical panel of the unit to be controlled using 6-wire cable with a minimum section of 0.5 mmq. The maximum recommended length must not exceed 150 m.

The electrical connections to the remote panel can be summarized as follows



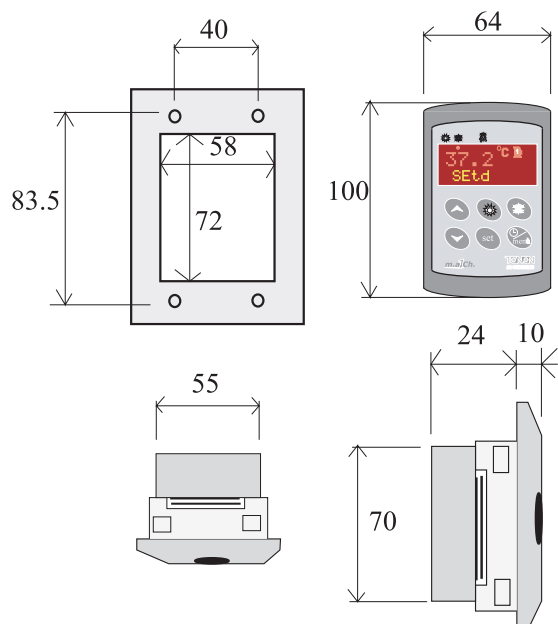
Rear view
remote keypad

REMOTE KITS

**10.0 TOP REMOTE CONTROL KIT TOP KRC
(Optional upon request)**

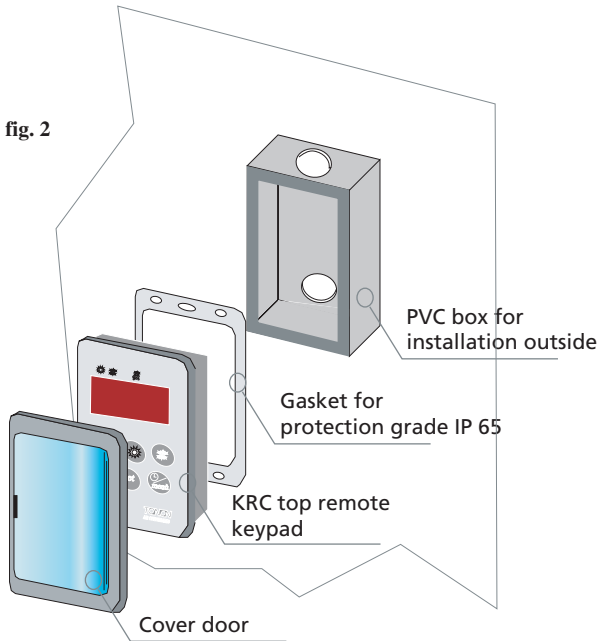


The kit is provided as an accessory upon request and displays and manages all parameters the same as from the machine's controller. The keypad's shape allows the device to be installed in the common wall boxes (3 modules) used in civil electrical systems. The remote terminal is mounted on a panel, or 72x56 mm hole, and attached with screws.



Use the rubber front protector for IP65 protection.

A V-KIT-Top vertical keypad adapter is available for attaching it to a wall as shown in Figure 2.



10.1 FUNCTION OF TOP KRC KEYS

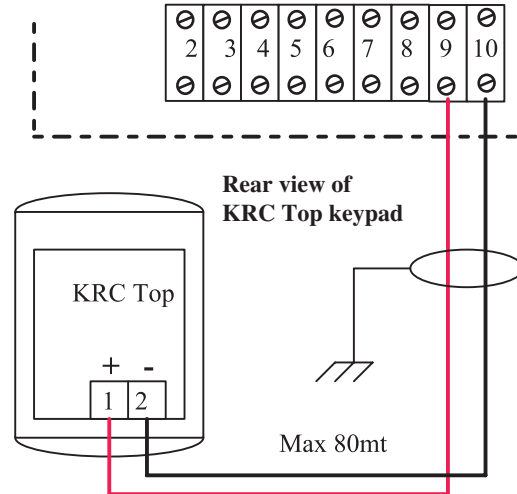
	M is used to enter the functions menu and set the time.
	SET is used to display or change the set point. When programming, it selects a parameter or confirms a value.
	It selects IN/OUT water temperature on the upper display. When programming, it scrolls parameter codes or increments their value.
	Selects the display of the outside air/defrost temperature. In programming, it scrolls the parameter codes or decrements their value.
	If pressed for 5 sec, it allows turning the unit on or off in Chiller or Heat Pump mode.
	If pressed for 5 sec, it allows turning the unit on or off in Chiller or Heat Pump mode.

10.2 TOP KRC ELECTRICAL CONNECTIONS

Connections between the electrical panel and the remote terminal must be made by the user using a shielded, 2-way cable with a minimum section of 0.5mmQ.

The maximum recommended length must not exceed 80 m. Beyond this length, the section must be increased to 1.5 mmQ for a maximum length of 150 m. **The connection cable is not included in the remote control kit.**

EP TERMINAL BLOCK



FUNCTIONS MENU

11.0 M KEY FUNCTION MENU

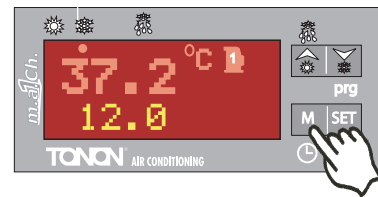
In the functions menu, it is possible to:

- 1) Display and reset active alarms;
- 2) Display and reset controlled load operating times;
- 3) Display the time left before the start of defrost (only if the unit is configured as a Heat Pump);
- 4) Display alarm history;
- 5) Erase alarm history.

(The menu icon is lit when the function menu is displayed.)

11.1 ACCESSING THE M FUNCTIONS MENU

Press and release the M (menu) key and the menu icon appears.



11.2 EXITING THE M MENU

Press and release the M key or wait for the time-out of 15 seconds. The menu icon disappears.

11.3 DISPLAYING ALARMS

The system manages about 30 alarm codes. The most important are displayed with the side icons on the 2 displays. All alarms are identified by a code and stored chronologically up to a maximum of 50.

Go to the function menu:

- 1) Select the "ALrM" function using the Up and Down keys.
- 2) Press and release the SET key.
- 3) Scroll through all the alarms using the Up and Down keys.

To exit, press M or wait for the time-out of 15 seconds.

11.4 RESETTING ALARMS

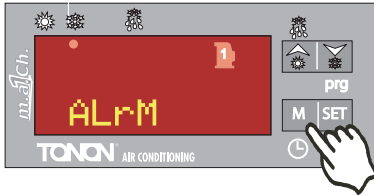
If a serious alarm occurs, such as high pressure, evaporator anti-freeze, etc., the system must be reset manually.

Whether they are reset manually or automatically, all the alarms are stored in Eprom memory to allow checking the operation of the unit over time.

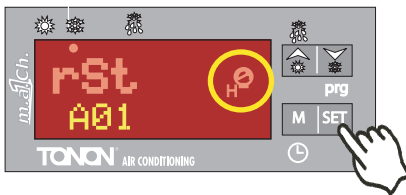
Note: If an alarm persists, call an authorized TONONFORTY® service center.

Procedure for manually resetting alarms:

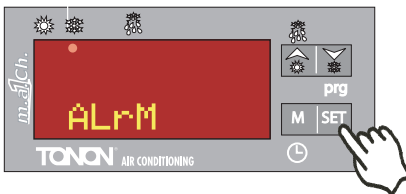
- 1) Go to the function menu.
- 2) Select the "ALrM" function



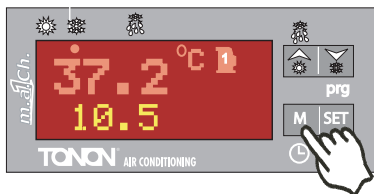
- 3) Press SET and the alarm code will appear in the lower display
- 4) Upper display: the label rSt appears if the alarm can be reset and NO if it cannot. Scroll through all the alarms using the Up and Down keys



- 5) When the label rSt appears, press SET to reset the alarm and go to the next one



- 6) To exit, press menu or wait for the time-out of 15 seconds.

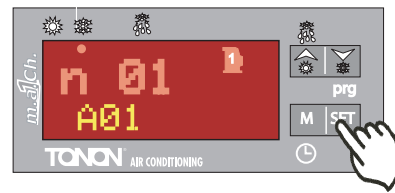


11.5 DISPLAYING ALARM HISTORY

- 1) Go to the function menu
- 2) Select the "ALOG" function



- 3) Press SET; the lower display will show the alarm code and the upper display will show "n°" and a progressive number;

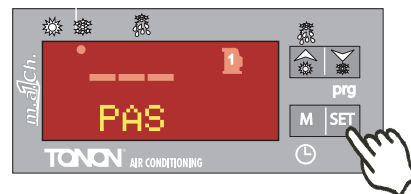


- 4) Scroll through all the alarms using the Up and Down keys;



- 5) To exit the ALOG function and return to the normal display, press M or wait for the time-out of 15 seconds.

The memory holds 50 alarms and each new alarm cancels the oldest (the display starts with the oldest alarm and ends with the most recent).



Note: Alarm history can only be erased with the maintenance password.

11.6 ALLARM TABLE


Cod	Meaning	Cause	Action	Reset
P1	Probe pB1 alarm	Probe failed or resistance value out of range	Activates alarm relay output Sounds buzzer Flashes generic alarm icon Displays code	Automatic, if value returns within required range.
P2	Probe pB2 alarm	Probe failed or resistance value out of range	Activates alarm relay output Sounds buzzer Flashes generic alarm icon Displays code	Automatic, if value returns within required range.
P3	Probe pB3 alarm	Probe failed or resistance value out of range	Activates alarm relay output Sounds buzzer Flashes generic alarm icon Displays code	Automatic, if value returns within required range.
P4	Probe pB4 alarm	Probe failed or resistance value out of range	Activates alarm relay output Sounds buzzer Flashes generic alarm icon Displays code	Automatic, if value returns within required range.
A01	Probe pB2 alarm	One of the high-pressure switches Hp1-Hp2 has intervened	Activates the alarm relay output Sounds buzzer Flashes high-pressure alarm icon Displays code	Manual Pressure returns within range plus reset procedure in point 11.4.
A02	High-pressure switch alarm	Low-pressure switch Lp1 has intervened	Activates alarm relay output Sounds buzzer Flashes low-pressure alarm icon Displays code	Automatic Becomes manual after two interventions in one hour Manual Pressure returns within range plus reset procedure in point 11.4.
A05	Low-pressure switch alarm	Limit AL11 exceeded by probe pB3 (condensation control)	Activates alarm relay output Sounds buzzer Flashes high-pressure alarm icon Displays code	Manual Temperature returns within range plus reset procedure in point 11.4.
A06	Condenser high-temperature alarm	Limit AL13 exceeded by probe pB3 (defrost control)	Activates alarm relay output Sounds buzzer Flashes low-pressure alarm icon Displays code	Automatic Becomes manual after 2 interventions in one hour Manual Pressure returns within range plus reset procedure in point 11.4.
A07	Anti-freeze alarm	Limit AR03 anti-freeze alarm set point exceeded by probe pB2 on evaporator (output temperature)	Activates alarm relay output Sounds buzzer Flashes generic alarm icon Displays code	Manual Temperature returns within range plus reset procedure in point 11.4.
A08	Flow switch alarm	Evaporator water flow safety (FL) intervened	Activates alarm relay output Sounds buzzer Flashes flow-switch alarm icon Displays code	Automatic Becomes manual after 2 interventions in one hour Manual Pressure returns within range plus reset procedure in point 11.4.
A09	Compressor 1 thermal alarm	Digital input activated by compressor 1 magnetothermal switch	Activates alarm relay output Sounds buzzer Flashes generic alarm icon Displays code	Manual Safety reset plus reset procedure in point 11.4.
A10	Compressor 2 thermal alarm	Digital input activated by compressor 2 magnetothermal switch	Activates alarm relay output Sounds buzzer Flashes generic alarm icon Displays code	Manual Safety reset plus reset procedure in point 11.4.

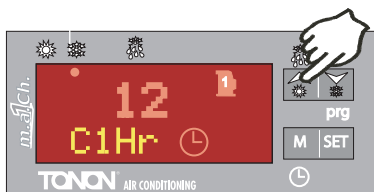
Cod	Meaning	Cause	Action	Reset
A11	Condensation fan thermal alarm	Digital input activated by fan thermal (thermal and klixon)	Activates alarm relay output Sounds buzzer Flashes generic alarm icon Displays code	Manual Safety reset plus reset procedure in point 11.4.
A12	Defrost error alarm	End DEFROST by dF07 (maximum time)	Displays code Signal only	Automatic With next correct DEFROST cycle
A13	Compressor 1 maintenance alarm	Compressor 1 working hours exceeded	Activates alarm relay output Sounds buzzer Flashes maintenance icon Displays code	Manual Reset working time point 11.9.
A14	Compressor 2 maintenance alarm	Compressor 2 working hours exceeded	Activates alarm relay output Sounds buzzer Flashes maintenance icon Displays code	Manual Reset working time point 11.9.
A15	Water pump maintenance alarm	Pump system working hours exceeded	Activates alarm relay output Sounds buzzer Flashes maintenance icon Displays code	Manual Reset working time point 11.9.
rtC	Clock alarm	Clock needs to be set	Activates alarm relay output Sounds buzzer Flashes generic alarm icon Displays code	Manual Set clock plus reset procedure in point 11.4.
rtF	Clock alarm	Clock broken Clock malfunction	Activates alarm relay output Sounds buzzer Flashes generic alarm icon Displays code	Manual Reset procedure in point 11.4. If alarm reappears after reset, replace clock.
EE	Eeprom error alarm	Memory data loss	Activates alarm relay output Sounds buzzer Flashes generic alarm icon Displays code	Manual Reset procedure in point 11.4. If the alarm reappears after reset, the device remains blocked.
ACF1	Configuration alarm	Unit configured as Heat Pump with inversion valve not configured	Activates alarm relay output Sounds buzzer Flashes generic alarm icon Displays code	Automatic With correct reprogramming.
ACF2	Configuration alarm	Air/water unit without probe configured for condensation control	Activates alarm relay output Sounds buzzer Flashes generic alarm icon Displays code	Automatic With correct reprogramming.
ACF3	Configuration alarm	Two digital inputs with the same configuration	Activates alarm relay output Sounds buzzer Flashes generic alarm icon Displays code	Automatic With correct reprogramming.
ACF4	Configuration alarm	CF28=1 and digital input not configured or CF28=2 probe pB4 different from 3	Activates alarm relay output Sounds buzzer Flashes generic alarm icon Displays code	Automatic With correct reprogramming.
AFr	Power grid frequency alarm	Grid frequency out of range	Activates alarm relay output Sounds buzzer Flashes generic alarm icon Displays code	Automatic Frequency returns within working range.

11.7 TABELLA BLOCCO USCITE

Alarm Code	Alarm Description	Comp.1	Anti-Freeze Heater	Pump	Condenser Fan	Boiler
P1	Probe pB1	OFF	Yes with Ar19 =0		OFF	OFF
P2	Probe pB2	OFF	Yes with Ar19 =0		OFF	OFF
P3	Probe pB3	OFF	Yes with Ar19 =0		OFF	OFF
P4	Probe pB4	OFF	Yes with Ar19 =0		OFF	OFF
A01	Maximum pressure switch	OFF				
A02	Minimum pressure switch	OFF			OFF	
A05	High temperature High pressure	OFF				
A06	Low Pressure Low temperature	OFF			OFF	
A07	Anti-Freeze	OFF			OFF	
A08	Flow switch	OFF	Res. Boiler OFF	OFF		OFF
A09	Compressor 1 thermal	OFF				
A10	Compressor 2 thermal					
A11	Condensation fan thermal	OFF			OFF	
A12	Defrost error					
A13	Compressor 1 maintenance					
A14	Compressor 2 maintenance					
A15	Water pump maintenance					
rtC	Clock alarm					
RtF	Clock alarm					
EE	Eeprom error	OFF	OFF	OFF	OFF	OFF
ACF1	Configuration alarm	OFF	OFF	OFF	OFF	OFF
ACF2	Configuration alarm	OFF	OFF	OFF	OFF	OFF
AB	Configuration alarm	OFF	OFF	OFF	OFF	OFF
AF	Configuration alarm	OFF	OFF	OFF	OFF	OFF
A	Power grid frequency alarm	OFF	OFF	OFF	OFF	OFF

11.8 DISPLAYING LOAD OPERATING HOURS



- 1) Go to the M-key function menu;
- 2) Press the Up or Down key  until the lower display shows the label of the single load; C1Hr (compressor 1 operating hours), CHr2 (compressor 2 operating hours), PFHr (water pump system operating hours).

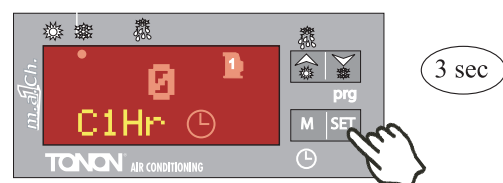


The upper displays shows the operating hours.

The  icon will be lit.

11.9 RESETTING LOAD OPERATING HOURS

- 1) Go to the M-key function menu
- 2) Press the Up and Down keys  until the lower displays shows the label of the single load (C1Hr, C2Hr, PFHr) and the upper displays shows the operating hours.
- 3) Press the SET key  for 3 seconds: **the upper displays will display 0, indicating that it has been reset.**
- 4) Exit the function menu by pressing M or waiting for the time-out of 15 seconds
- 5) Repeat operations 1 to 4 for the other loads.



We recommend that the unit be checked by the manufacturer before resetting this signal in order to avoid future problems.

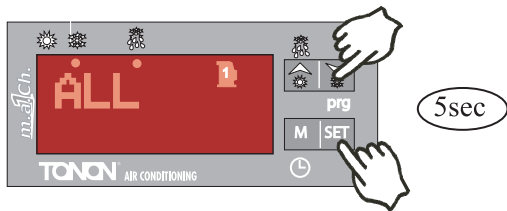
PROGRAMMING FROM THE KEYPAD

12.0 PROGRAMMING FROM THE KEYPAD

Control parameters are grouped by family and each identified by a label. This allows the user to access the parameters involved quickly.

LABEL	MEANING
ALL	Displays all parameters
ST	Displays only thermoregulation parameters
CF	Displays only configuration parameters
SD	Displays only dynamic set point parameters
ES	Displays only Energy Savings parameters
CO	Displays only compressor parameters
FA	Displays only ventilation parameters
Ar	Displays only anti-freeze heating element/boiler parameters
DF	Displays only defrost parameters
AL	Displays only alarm parameters

12.1 ACCESSING PR1 (USER LEVEL) PARAMETERS



To enter the pr1, user-accessible parameters, menu:
1) Press the SET+Down arrow keys for several seconds.

(The and begin to flash)
the upper display shows "ALL," the first family of parameters.

2) Select the various families with the Up and Down keys .

3) 3) When the SET key is pressed , the regulator displays the code of the first parameter in the Pr1 family on the lower display and its value in the upper display.

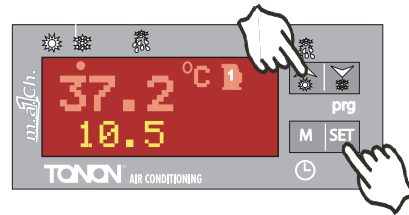
Having selected the family, it is now possible to scroll and modify only the parameters of that family.

12.2 CHANGING THE VALUE OF A PARAMETER

1. Go to programming mode;
2. Select the desired parameter;
3. Press SET to enable editing of that value;
4. Change the value with the Up or Down keys .
5. Press SET to store the new value and go to the next parameter code;

6. TO EXIT PROGRAMMING MODE:

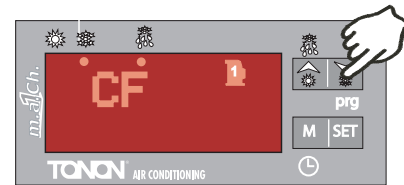
Press SET + + Up arrow when a parameter is displayed or wait for the 15-second time-out without pressing any key.



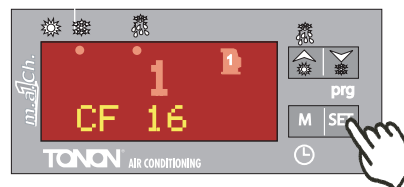
Note: The new value is only stored when the programming mode times out without SET being pressed.

12.3 KEY SEQUENCES FOR CHANGING PARAMETERS

- 1) Press SET + Up arrow to access the pr1 user menu
- 2) Press the , keys to select the parameter family to display (such as CF for configuration parameters)

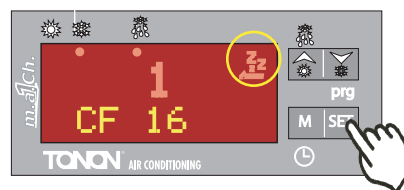


- 3) Press SET to access the parameters of the selected family.



- 4) Press SET to select the value to change.

Note: this function is only possible with the unit in stand-by.



- 5) Press to change the parameter. Press SET to save the change.

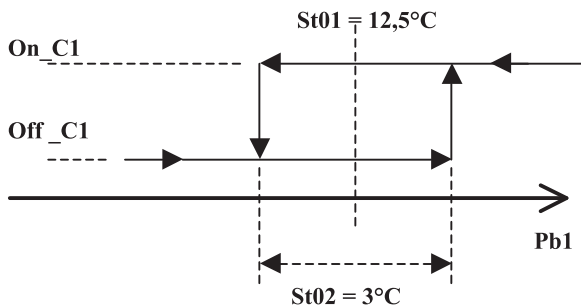
COMPRESSOR REGULATION

13.0 REGULATING COMPRESSORS IN CHILLER OR HP MODE"

All units are controlled using the temperature measured by probe pB1 located at the entrance to the evaporator (return temperature from the user's system). The operation of the compressors is described below:

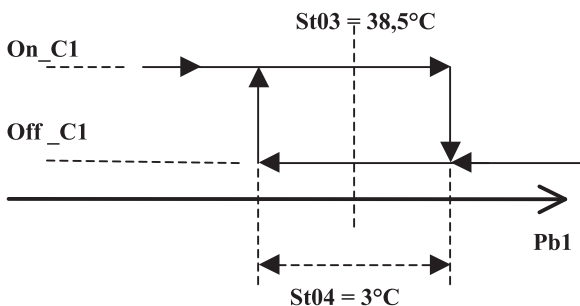
Chiller Operation

St01 summer (Chiller) set point
St02 summer differential
C1 Compressor 1
pB1 regulation probe



Heat Pump Operation

St03 winter (Heat Pump) set point
St04 winter differential
C1 Compressor 1
pB1 regulation probe



13.1 CIRCULATION PUMP OPERATING MODES

The operation of the pump system is managed by the regulator. The standard versions without accumulation tank and pump, the terminal block of the electrical panel has an On/Off consent to be interfaced to an external power relay (see electrical connections paragraph 4.1).

13.2 TIMERS

The regulation contains the following timers that prevent the safety devices from intervening when the unit is being powered on or off:

CO02 360 seconds

Minimum power-off time.

Determines the time that the compressor must remain deactivated even if power-on is requested. During this phase the relative compressor LED flashes.

CO03 10 seconds

Start-up delay between the two compressors.

Sets the start-up delay between the two to reduce the absorption at start-up. During this phase the relative compressor LED flashes.

CO05 60 seconds

The power-on delay understood as the physical powering of the control.

Activation delay of all the outputs to distribute absorption from the power grid and protect the compressor(s) from repeated power-ons in the case of frequent power grid outages.

CO07 250 seconds

Delay in powering off the water pump after the compressor is powered off.

The water pump is only deactivated when the machine is powered off (unit in stand-by).

13.3 FAN OPERATION

All units are supplied with a device to control the fan speed. They can be regulated based on a temperature (pB3) or a pressure (TR3); the latter is supplied as an accessory upon request (DCP).

Note: in applications with low outside temperatures in Chiller mode, it is a good idea to use the DCP for more reliable control.

Ideal temperature range for each type of control:

Operating in Chiller mode:

Outside air temperature: 20 to 35 °C

Standard temperature control

Outside air temperature: -10 to 35 °C

DCP pressure control

As for EPA models in Heat Pump mode, the DCP also provides better defrost control.

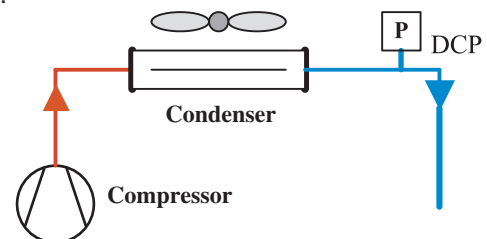
13.4 PRESSURE CONTROL DEVICE DCP

Viene utilizzato per questo tipo di controllo, un sensore di A pressure sensor with 4-20 mA output signal is used for this type of control. The regulation range of the sensor is from 0 to 30 bar. The device can even installed on-site. In addition to installation of the transducer, this operation also requires changing a series of control parameters. So, this operation can only be performed by the qualified personnel of TONON S.P.A. or its authorized service centers.

HYDRA Chiller only models:

The position of the pressure fitting for the installation of the pressure transducer is on the pipe of the liquid line exiting from the condensation battery.

Example:



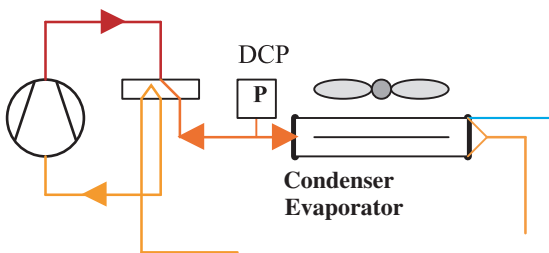
HYDRA-HP Chiller + Heat Pump models:

The position of the pressure fitting for the installation of the pressure transducer is on the output pipe exiting from the 4-way inversion valve at the entrance to the finned battery (summer condenser/winter evaporator). This mode provides the following controls:

- Control of the condensing pressure in Chiller mode for managing the fan speed in summer operation.
- Control of the evaporation pressure in Heat Pump mode to for managing the fan speed in winter operation.
- Defrost control with input for low pressure and output for high pressure.

Example:

Compressor



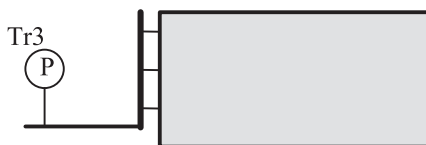
13.5 DEFROST

All HYDRA/HP heat pumps use a defrost control with pressure sensor.

Operation:

the delay counter starts when the start defrost pressure TR3 (parameter DF03) is reached. The defrost cycle starts when the delay time has elapsed. It exists based on the setting (parameter DF04), once the value of probe TR3 is reached. A maximum cycle is set to 5 minutes. When the maximum time is exceeded, the display shows a defrost error.

- Combined pressure control



The probe is positioned as in the drawing, and respectively:

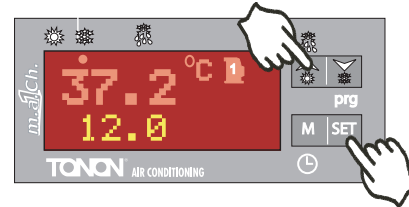
Tr3 defrost control pressure sensor

Note: If supplied as an accessory, the wire heating elements inside the pipes of the lower part of the battery are turned on. This heats the lower part of the battery to facilitate dripping and avoid packing the ice.

13.6 MANUAL DEFROST

The control also always a defrost cycle to be manually forced. Once the cycle starts, it ends based on the temperature or pressure set (parameter DF04).

To activate the manual function, hold down the SET + Up arrow keys simultaneously for 5 seconds.



13.7 DISPLAYING TIME REMAINING BEFORE DEFROST

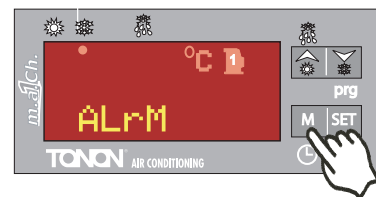
The time remaining before defrost can be displayed directly on the display. To display it, press M and use the Up and Down



keys to find dEF.

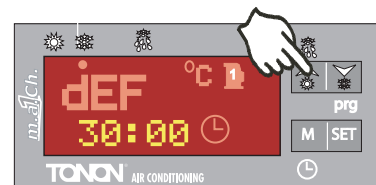
The lower display shows the time in minutes and seconds.

- 1- Press the M key to access the function menu.



- 2- Scroll with the  keys to find the dEF label. The lower display will show the time remaining before defrost.

Note: In the case of combined defrost, once the delay time has elapsed, defrost is only activated if the combined set condition is satisfied (see paragraph 13.5).



START-UP

14.0 PRELIMINARY CHECKS

Before starting the unit, several general checks must be made to ensure the good operation of the entire system.

- 1) check that the plumbing connections have been made correctly following the diagrams enclosed with this manual. Make sure that the water pipe returning from the user's system is connected the fitting called **"SYSTEM WATER ENTRY"** while the output water pipe must be connected to the **"SYSTEM WATER EXIT"** fitting.
- 2) Carefully vent the plumbing system with the pump stopped. Air bubbles could cause poor operation and, moreover, could lead to the formation of ice in the evaporator with its possible breakage and pollution of the refrigeration circuit.
- 3) Make sure that all the system's shut-off valves are open, that the system is under pressure and that the water is circulating normally.
- 4) Check the electrical connections and make sure that the sections of the wires used and their housing conforms to the enclosed electrical diagram.
- 5) Check the tightness of the terminals.
- 6) Check that the power supply voltage matches the requirements of the electrical diagram. Also make sure that the voltage is constant and within 5% of the required value.
- 7) All units are equipped with three-phase compressors and a control relay for the cyclical connection of the phases. The machine cannot start if the connections are wrong. The LED lit on the relay indicates that the connections and phase sequence are correct. If the phase connections are wrong, the LED goes off. In this case, just reverse the connections of two of the three phases to ensure the correction direction of rotation of the compressor.
- 8) Units equipped with a compressor oil heater (guard heating element), must be powered on at least 8 hours before starting the compressor. To power the guard heating element, turn on the main switch without activating the compressor with the On/Off command on the display panel.
- 9) Make sure that the flow of air through the finned pack is not obstructed (presence of foreign objects, packing materials, leaves, etc.).

We recommend not using the main switch to start or stop the unit.

14.1 PUTTING IN OPERATION

Once all the checks described above have been made, the unit is ready to be started.

The control can be accessed directly from the front of the machine through the PVC door.

All the thermal breakers of the electrical panel, QM1, etc., must be closed so that all the parts of the machine are powered. If the regulator's display is not on, make sure that phase KA3 is active.

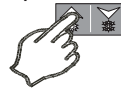
Otherwise, reverse the phases where the line is attached to the terminal block (see paragraph 13.7).

The regulator's display shows, respectively, the return temperature from the system (system water input) and the lower display shows the fan-control temperature or pressure.

The machine waits for a command with the stand-by icon lit



. To power-on the unit in summer (Chiller) mode, press



the key



for 5 seconds or press the key to power on the unit in winter mode (HYDRA only), see paragraph 7.1 or 7.2.

PUTTING IN SUMMER OPERATION

The regulation device is calibrated in the factory with a working summer set point (Chiller) of 12.5 °C and differential of 3 °C. This means that the unit is enabled to operate when the temperature of the return water is higher than 14 °C and will automatically stop when the temperature reaches 11 °C.

Before starting the unit, it is a good idea to check the Set Point value as follows:

- press SET
- the lower display contains the code Set C (set Chiller/summer point)
- the upper displays shows the value set, 12.5.

To change the value see paragraph 8.0.

PUTTING IN WINTER OPERATION

The regulation device is calibrated in the factory with a working winter set point (Heat Pump) of 38.5 °C and differential of 3 °C. This means that the unit is enabled to operate when the temperature of the return water is lower than 37 °C and will automatically stop when the temperature reaches 40.0 °C.

Before starting the unit, it is a good idea to check the Set Point value as follows:

- press SET
- the lower display contains the code Set H (set Heat Pump/winter point)
- the upper displays shows the value set 38.5.

To change the value see paragraph 8.0.

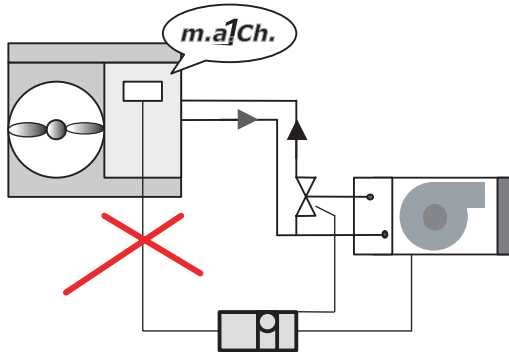
Note: if the unit is not active by remote control, the upper display shows the label OFF (see paragraph 7.3).

14.2 INTERFACING WITH THE USER'S SYSTEM

TONONFORTY® Chillers and Heat Pumps can be interfaced with different types of systems. It is important to keep several technical aspects of the plumbing and electrical connections in mind to avoid more or less serious problems during operation.

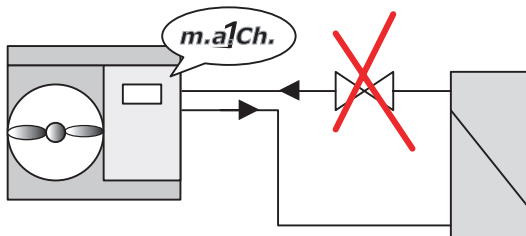
1. All the units are automatically thermoregulated. When working, it is preferable to keep the unit always on so as to maintain the temperature in the user's system.

DO NOT USE THE AMBIENT THERMOSTAT TO TURN THE MACHINE ON AND OFF.



2. All the units need a constant flow of water to the exchanger. So, it is important that the flow does not vary while the unit is operating.

IN NO CASE SHOULD THE MACHINE'S OUTPUT AND RETURN PLUMBING LINES BE SHUT-OFF.



3. All units require a nominal water flow, see paragraph 3.0, that will ensure a thermal gradient of about 5 °C between the exchanger input and output. One of the simplest checks is to make sure that the losses of load in the system are not too high.

OPERATING CHECKS

15.0 GENERAL INSTRUCTIONS

- Units supplied complete with a temperature/condensing pressure control device allow operation even with low outside air temperatures (min. -10 °C). This device activates modulation of the fan rotation speed based on the temperature of the condensed refrigerant.

When the compressor is started, the fan is immediately turned on at its maximum rotation speed. After several seconds, the regulation device automatically enables modulation of the air flow to maintain a constant temperature/condensing pressure within the values established based on the temperature of the outside air.

The regulation device has timers that prevent the compressor from being damaged by start-ups that are too close together (see paragraph 13.2).

15.1 CHECKS

- Water temperature

When the unit is running at full speed, check the difference between the input and output water temperatures.

The input temperature is normally shown on the display.

To display the output temperature, call up parameter r6 from the direct menu.

The temperature difference should be between 4.5 and 5.5 °C. Larger differences indicate poor water circulation in the system (in this case, check the specifications of the pump).

Smaller differences indicate excessive water circulation in the system (in this case, it is possible to reduce the flow of water from the system shut-off valve).

- Temperature/working pressure

After several minutes of operation, use *m a n o m e t e r s* (supplied as accessories or connected in the field) to check the condensation temperature (high-pressure side) and the evaporation temperature (low-pressure side)

High-pressure side:

Pressure	Bar	17.5	-	19
	kPa	17500	-	9000

Low-pressure side:

Pressure	Bar	4	-	4.7
	kPa	400	-	470

- Refrigerant charge

The temporary presence of small bubbles in the liquid indicator (if present) is considered normal. If they persist, it means that there is not enough refrigerant in the cooling circuit.

The refrigerant charge is indicated on the adhesive identification plate on the machine.

- Presence of humidity

After several hours of operation, check the color of the crown inside the liquid indicator (if present):

- a yellowish color means that there is humidity in the refrigeration circuit. In this case, have the circuit dewatered by qualified personnel

- Overheating temperature of the refrigerant gas

This is the difference between the temperature of the gas measured on the intake pipe and the evaporation temperature read on the manometer.

Good operation of the unit requires values between 4 and 10 °C.

- Overcooling temperature of the refrigerant liquid

This is the difference between condensation temperature read on the manometer and the temperature measured on the liquid pipe.

Good operation of the unit requires values higher than 2 to 3 °C.

- Electricity absorbed

Check that the electricity absorbed corresponds to the values shown in the electrical data tables.

15.2 CONTROL AND SAFETY DEVICES

All units are equipped with regulation and safety devices as shown in the regulator parameters table. These devices are calibrated at the factory and checked during the acceptance testing phase before shipment. Once the unit is installed and operating for a reasonable period of time, it is a good practice to check that the safety devices are working and correspond to the calibration values shown in the tables that follow.

Safety Devices

Safety Device	set point	differential
Anti-freeze thermostat	4°C	3°C

- Alarm activation temperature: set point
- Reenabling temperature: set point + diff.

Pressure Switch high Pressure	28 Bar 2800 kPa	6,5 Bar 650 kPa
----------------------------------	--------------------	--------------------

- Alarm activation temperature: set point
- Reenabling temperature: set point – diff.

Pressure Switch low Pressure	2 Bar 200 kPa	1 Bar 100 kPa
---------------------------------	------------------	------------------

- Alarm activation temperature: set point
- Reenabling temperature: set point + diff.

thermal protection Compressor	1,33 x l nom. comp.
----------------------------------	---------------------

The anti-freeze and high-pressure alarms are reset manually. Determine the cause of the problem before resetting a blocked unit (see paragraph 11.4). If the alarm persists, call a TONONFORTY® authorized service center, which will provide maintenance.

MAINTENANCE

16.0 GENERAL INFORMATION

All machines are carefully tested before leaving the factory after running for a sufficient period of time to make sure that all the components and control and safety devices are working properly.

Units that have been correctly installed do not require fine-tuning unless repairs have been made or there are abnormal operating conditions.

In any case, periodic checks are essential for correct operation, especially after a prolonged shutdown.

Such maintenance must be exclusively performed by qualified TONONFORTY® personnel, following the instructions in this manual.

The normal, routine maintenance described below is extremely important for the good operating quality and life of the machine.

There is a troubleshooting chart at the end of the chapter that lists possible problems and solutions.

16.1 CONTROLS AND PERIODIC MAINTENANCE

Monthly checks

- Check the operating pressures on the high and low-pressure sides using a common manometer or, if supplied, the cabled manometers on-board the machine.

Nominal working pressures:

Outside air temperature:		35°C
High-pressure side	Bar	18,5
	kPa	1850

Water temperature:		12-7 °C
Low-pressure side	Bar	4,2
	kPa	420

Check that the safety devices are operating correctly, including the correspondence of the intervention values listed in paragraph 15.2.

Check the refrigerant charge using the liquid indicator, if present. Bubbles in the indicator at full speed indicates a possible lack of refrigerant.

Also check the color of the crown inside the liquid indicator. A yellowish color indicates humidity, which requires replacing the filter and, if not sufficient, the dewatering of the refrigeration circuit.

Check the level of oil in the compressor guard (starting from model 091). After several hours of continuous operation, the level must be slightly below the midpoint of the inspection glass.

Check that the electricity absorbed corresponds to the values shown in the electrical data tables.

Check that the plumbing circuit is filled and carefully remove and air residues using a suitable venting device.

Check the tightness of the terminal connections in the electrical panel and components that use electricity outside the electrical panel.

Checks and maintenance to perform every six months

Perform all the monthly maintenance.

Check the cleanliness of the condensing battery. If necessary, clean the fins by blowing compressed air in the opposite direction of the air flow or, in the case of marked clogging, a jet of water under moderate pressure.

Check the noise level and vibrations of moving parts (compressor, fan and pump).

16.2 SEASONAL SHUT-DOWN

HYDRA and HYDRA-HP series water chillers and heat pumps are normally used in civil air-conditioning systems and remain idle during the winter.

If the machine is installed in an area where there is a possibility of frost during the winter, it is essential that the water be drained from the system or mixed with anti-freeze in a suitable percentage. In the latter case, the machine's performance will be slightly penalized and the pump must be dimensioned by taking into account the changed water flow and loss of load parameters (see the table in paragraph 3.0).

Note: IF THE UNIT IS EQUIPPED WITH ANTI-FREEZE HEATING ELEMENTS, DO NOT DISCONNECT THE ELECTRICITY SO THE SAFETY DEVICE CAN WORK DURING COLD PERIODS.

The anti-freeze heating elements even work in stand-by mode.

16.3 SAFETY INFORMATION

All maintenance, repairs, replacement of any components, addition of refrigerant and disposal of the unit must be performed by qualified personnel, capable of working on air-conditioning equipment.

Electrical connections

Install an automatic differential switch adequate for the power absorbed near the unit.

Connect the unit to ground and check its effectiveness.

Refrigerant fluids

The type of refrigerant used is shown on the technical data plate on the plumbing connection side. The lubrication oil used is shown on the compressor plate.

Notices

In the case of an accidental refrigerant spill, take the following precautions:

- Refrigerant gas can cause freeze burns on contact with the skin and eyes. We recommend the use of gloves, protective clothing and eye and face protection.
- The inhalation of refrigerant gas for extended periods can cause loss of consciousness or cardiac dysfunctions. Higher

concentrations can cause suffocation due to a lack of oxygen in the surrounding air.

- Absolutely avoid the use of open flame, which can form toxic substances by combustion.

16.4 SCRAPING THE MACHINE AND DISPOSING OF HARMFUL SUBSTANCES

The machine must be demolished by authorized personnel and the substances used must be disposed of in conformity with current law. Dangerous substances such as compressor oil and refrigerant must not be discharged into the atmosphere but must be recovered and delivered to a collection center. All machine identification plates and technical documentation must be destroyed.

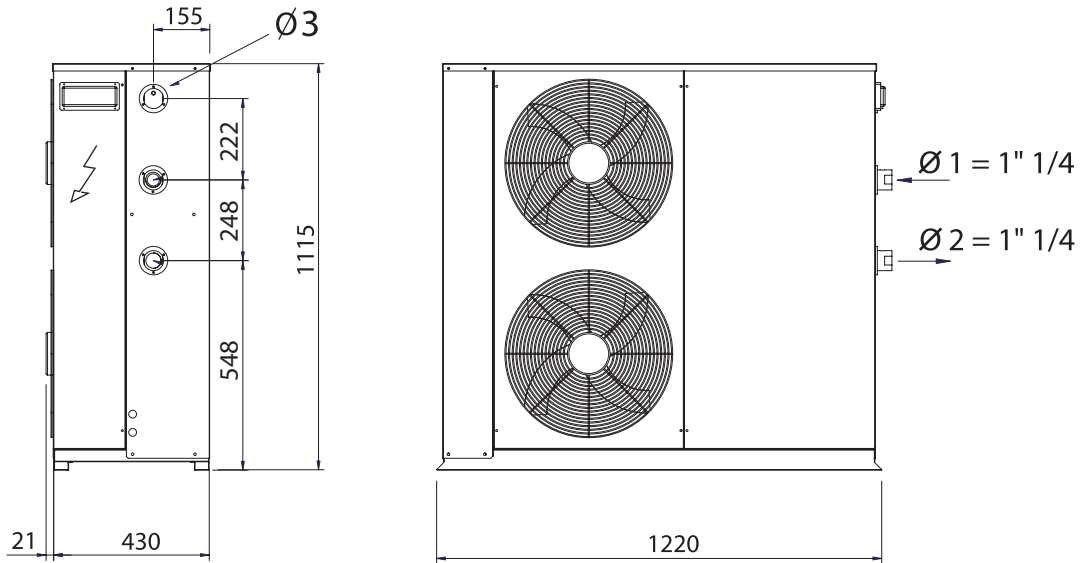
17.0 TROUBLESHOOTING

PROBLEM	SYMPTOM	PROBABLE CAUSE	RECOMMENDED SOLUTION
The machine doesn't start	The display doesn't light-up	No electricity	Check the electrical connections to the main power supply terminals and check the voltage values. Check the fuses on the secondary side of the auxiliary transformer.
		Phases reversed. The KA3 phase control relay is not giving its consent. Signal LED not active.	Reverse the input phases on the electrical panel terminal block.
	The panel is lit but the machine doesn't start.	Unit in stand-by	See paragraph 7.0 to activate the machine.
	The display panel shows OFF.	No external consent	Check the connections to external consent terminals 2-3.
	The machine doesn't start and the comp. LED on the display is flashing.	Timer running	Wait for the timer to run out (max. 360 seconds), after which the compressor should start.
	The lower display on the Control panel is flashing, indicating one or more alphanumeric codes alternating with the temperature.	One or more safety devices are in alarm.	Check which safety device has intervened, remove the cause of the alarm and reset the safety device (see the alarm code list in paragraph 11.6)
The compressor stops and starts continuously.	Normal operation but stops and starts too frequently due to the intervention of the low-pressure switch.	Lack of refrigerant	Identify and eliminate the refrigerant leak and recharge.
	Intake pressure too low and frost on the filter.	Filter on the liquid line clogged.	Replace the filter.
The compressor is working and never stops	The temperature in the air-conditioned room is too high.	Excessive thermal load	Check for infiltrations and the insulation.
		The temperature at which the thermostat is intervening is too low.	Recalibrate or repair the thermostat.
	Bubbles on the refrigerant indicator.	Lack of refrigerant.	Identify and eliminate the refrigerant leak and recharge.
The compressor is noisy	The compressor is noisy or the output pressure is too low and the intake pressure too high.	Wear or failure of the compression spirals of the compressor.	Overhaul the compressor.
	The compressor is "knocking". The intake pipe is abnormally cold.	Internal compressor parts broken.	Overhaul the compressor.
		Liquid return	Check overheating and the position of the bulb of the expansion valve.
		Expansion valve locked in the open position.	Repair or replace the expansion valve.

PROBLEM	SYMPTOM	PROBABLE CAUSE	RECOMMENDED SOLUTION
The system has less than normal yield.	The thermostatic valve is whistling.	Vaporization of the refrigerant liquid.	Add refrigerant.
	Difference of temperature in the refrigerant pipe at the height of the filter or the expansion valve.	Filter or solenoid valve clogged.	Clean or replace.
	Intermittent or interrupted operation.	Expansion valve locked or obstructed.	Repair or replace.
	Excessive overheating.	Overheating poorly regulated.	Adjust the expansion valve and check the overheating.
		Excessive pressure drop in the evaporator.	Check the overheating and recalibrate the expansions valve.
Output pressure too high.	Air too hot at the exit of the condenser.	Poor condensation air flow.	Check the state of the fan and the presence of an obstacles to the flow of air.
		Condenser dirty.	Remove the material that is blocking the condenser (leaves, paper, etc.).
	Cold air at the exit of the condenser.	Refrigerant circuit overcharged, condenser partially flooded.	Remove refrigerant from the condenser.
Intake pressure too high.	The compressor is working and never stops	Excessive load on the evaporator.	Check for excessive infiltrations of outside air in the air-conditioned room.
	Intake pipe abnormally cold.	Expansion valve overfed.	Adjust the degree of overheating and check the position of the bulb.
		Expansion valve locked in the open position.	Repair or replace the valve.
	Return of liquid to the compressor.	Compressor compression spirals damaged.	Overhaul the compressor.

18.0 IDENTIFYING FITTINGS

HYDRA-HYDRA/HP MODELS 051-061



IN water system input (return from the user's system)

OUT water system output (output to the user's system)

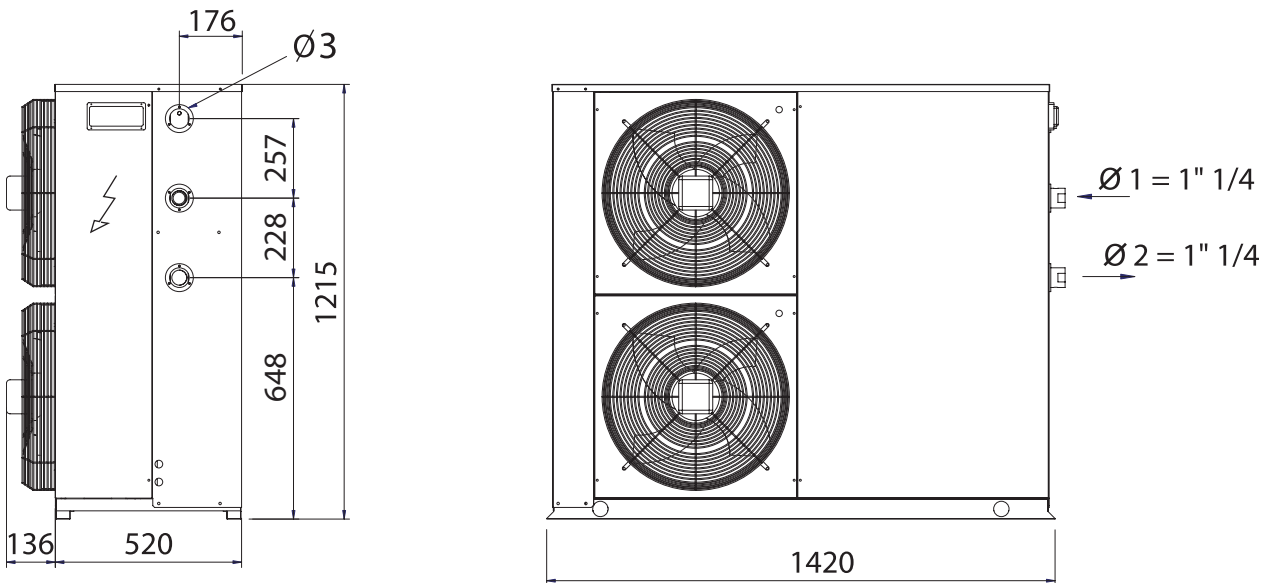
Note: All plumbing fittings are female threaded.

Ø 1 = INPUT

Ø2= OUTPUT (pump unit)

Ø3= INPUT (unit without pump - optional)

HYDRA-HYDRA/HP MODELS 081 - 091



IN water system input (return from the user's system)

OUT water system output (output to the user's system)

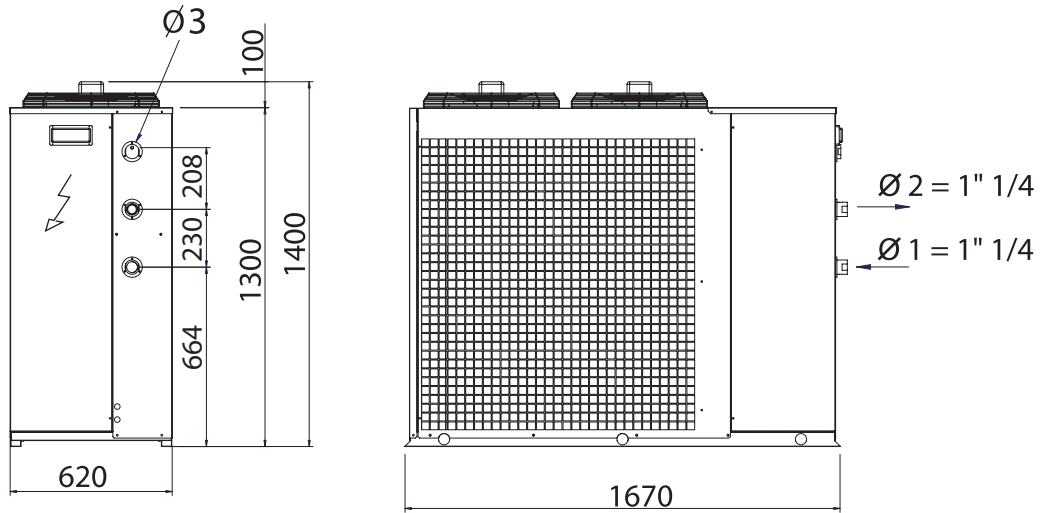
Note: All plumbing fittings are female threaded.

Ø 1 = INPUT

Ø2= OUTPUT (pump unit)

Ø3= INPUT (unit without pump - optional)

HYDRA-HYDRA/HP MODELS 101 - 121



IN water system input (return from the user's system)

OUT water system output (output to the user's system)

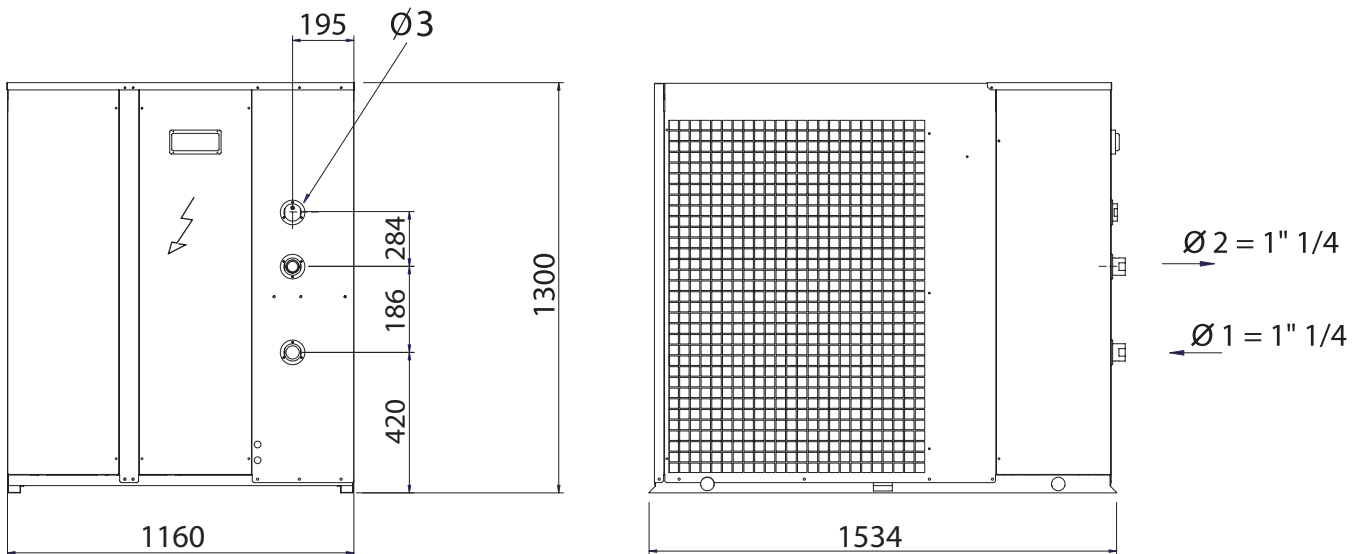
Note: All plumbing fittings are female threaded.

$\varnothing 1$ = INPUT

$\varnothing 2$ = OUTPUT (pump unit)

$\varnothing 3$ = INPUT (unit without pump - optional)

HYDRA-HYDRA/HP MODELS 051



IN water system input (return from the user's system)

OUT water system output (output to the user's system)

Note: All plumbing fittings are female threaded.

$\varnothing 1$ = INPUT

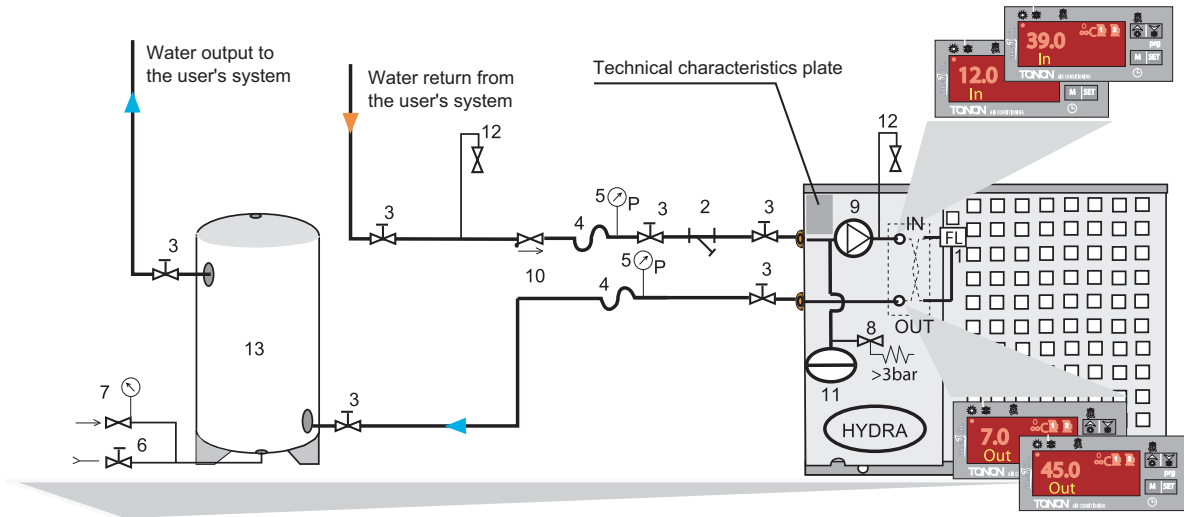
$\varnothing 2$ = OUTPUT (pump unit)

$\varnothing 3$ = INPUT (unit without pump - optional)

19.0 MAIN PLUMBING DIAGRAMS

SYSTEM TYPE FOR CONNECTION TO HYDRA CHILLER AND HYDRA-HP HEAT PUMP

MODEL HYDRA-HYDRA/HP 051 - 061 - 081- 091 - 101 - 121 - 151



LEGEND

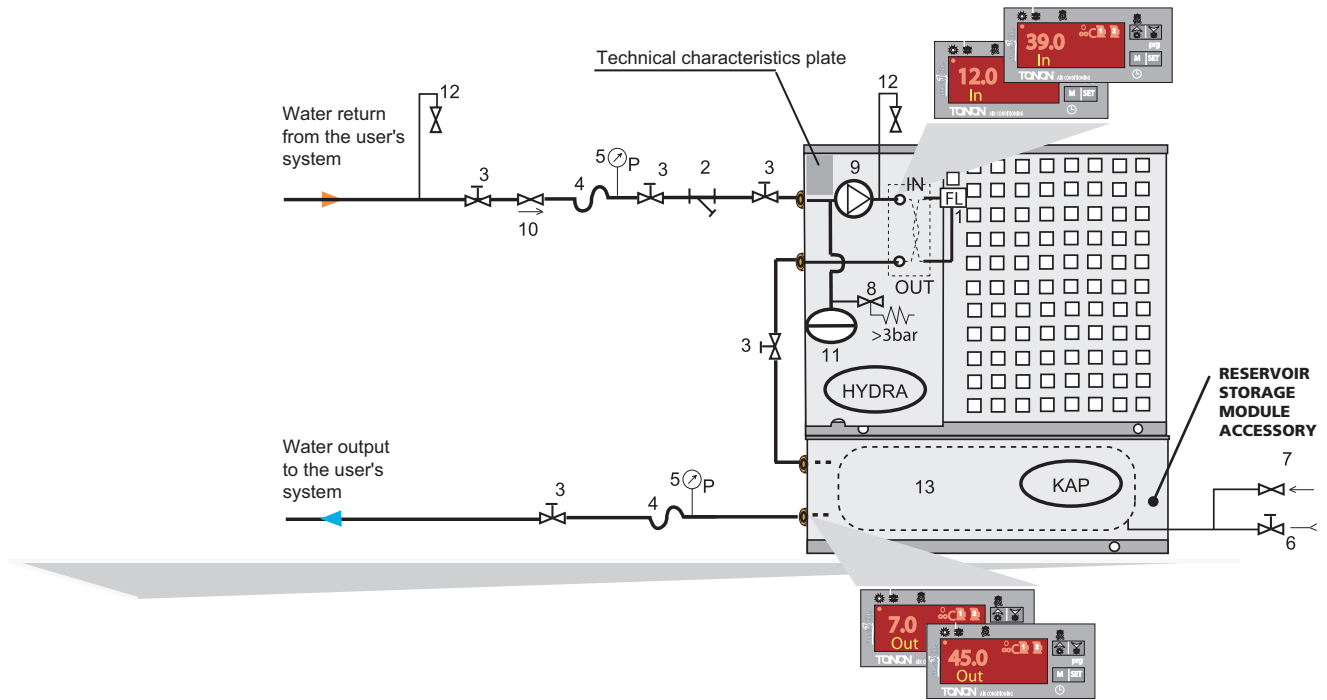
- | | | | | | |
|-----|---|-----|--------------------|-----|------------------|
| 1- | differential pressure switch | 2- | mesh filter | 3- | shut-off valve |
| 4- | vibration-damping plumbing joints | 5- | manometers | 6- | drain tap |
| 7- | load unit | 8- | 3-bar safety valve | 9- | circulation pump |
| 10- | check valve | 11- | expansion vessel | 12- | air vent valve |
| 13- | water accumulation tank (2-fitting type) - ACCESSORY UPON REQUEST | | | | |

Note: ON SYSTEMS WITH ACCUMULATION TANK IN SERIES, THE CIRCULATION PUMP MUST BE CHECKED TO OVERCOME MACHINE AND SYSTEM LOAD LEAKS.

ALL THE COMPONENTS LISTED MUST BE INSTALLED IN THE ORDER DESCRIBED IN THE ATTACHED DIAGRAMS TO ENSURE THE CORRECT OPERATION OF THE SYSTEM.

**SYSTEM TYPE FOR CONNECTION TO HYDRA CHILLER AND HYDRA-HP HEAT PUMP
COMPLETE WITH KAP ACCUMULATION COUPLING**

MODEL HYDRA-HYDRA/HP 051 - 061 - 081- 091 - 101 - 121 - 151 vs. KAP



LEGEND

- | | | | | | |
|-----|---|-----|--------------------|-----|------------------|
| 1- | differential pressure switch | 2- | mesh filter | 3- | shut-off valve |
| 4- | vibration-damping plumbing joints | 5- | manometers | 6- | drain tap |
| 7- | load unit | 8- | 3-bar safety valve | 9- | circulation pump |
| 10- | check valve | 11- | expansion vessel | 12- | air vent valve |
| 13- | water accumulation tank (2-fitting type) - ACCESSORY UPON REQUEST | | | | |

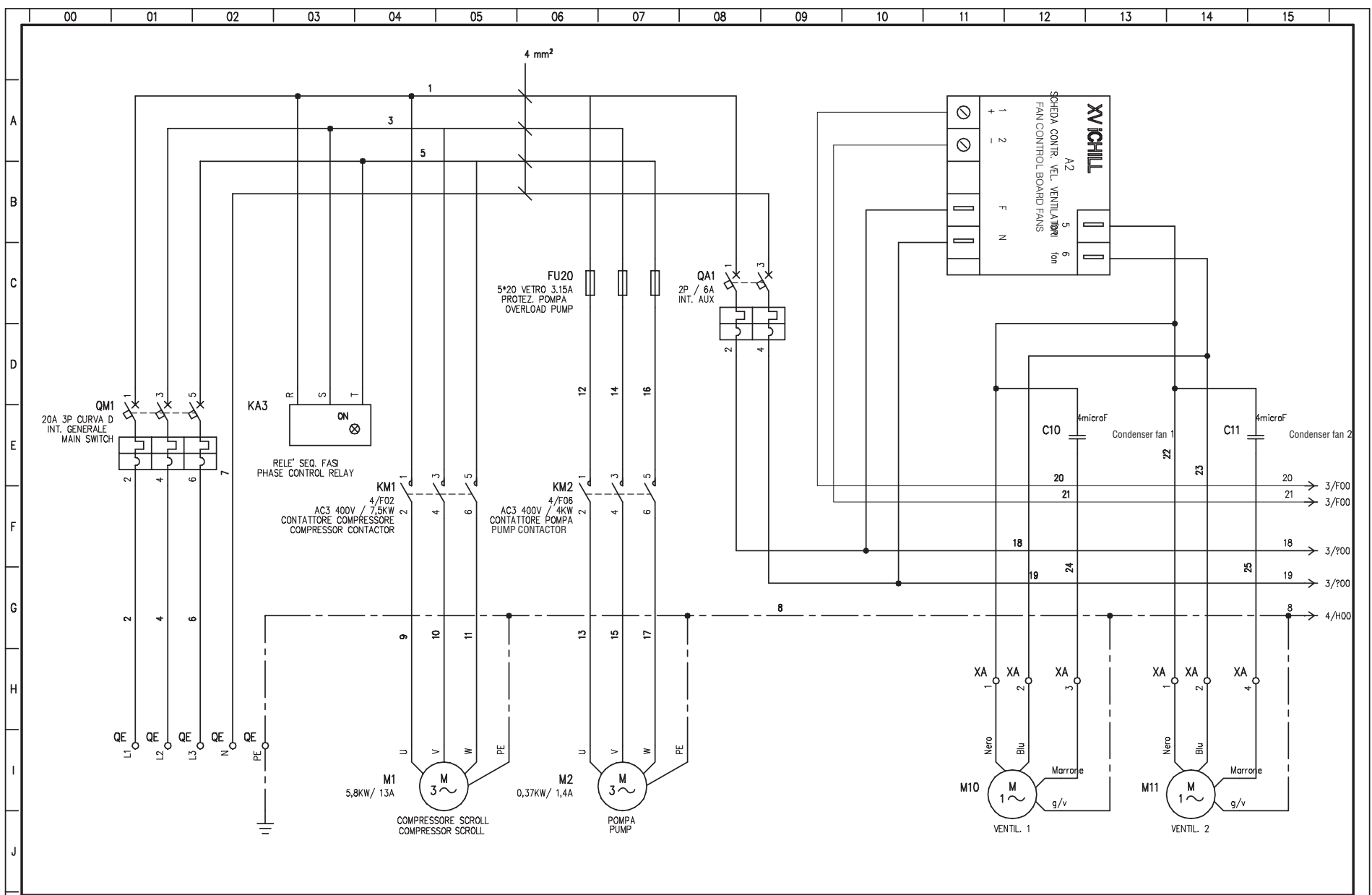
Note: ON SYSTEMS WITH ACCUMULATION TANK IN SERIES, THE CIRCULATION PUMP MUST BE CHECKED TO OVERCOME MACHINE AND SYSTEM LOAD LEAKS.

ALL THE COMPONENTS LISTED MUST BE INSTALLED IN THE ORDER DESCRIBED IN THE ATTACHED DIAGRAMS TO ENSURE THE CORRECT OPERATION OF THE SYSTEM.

20.0 ELECTRICAL DIAGRAMS

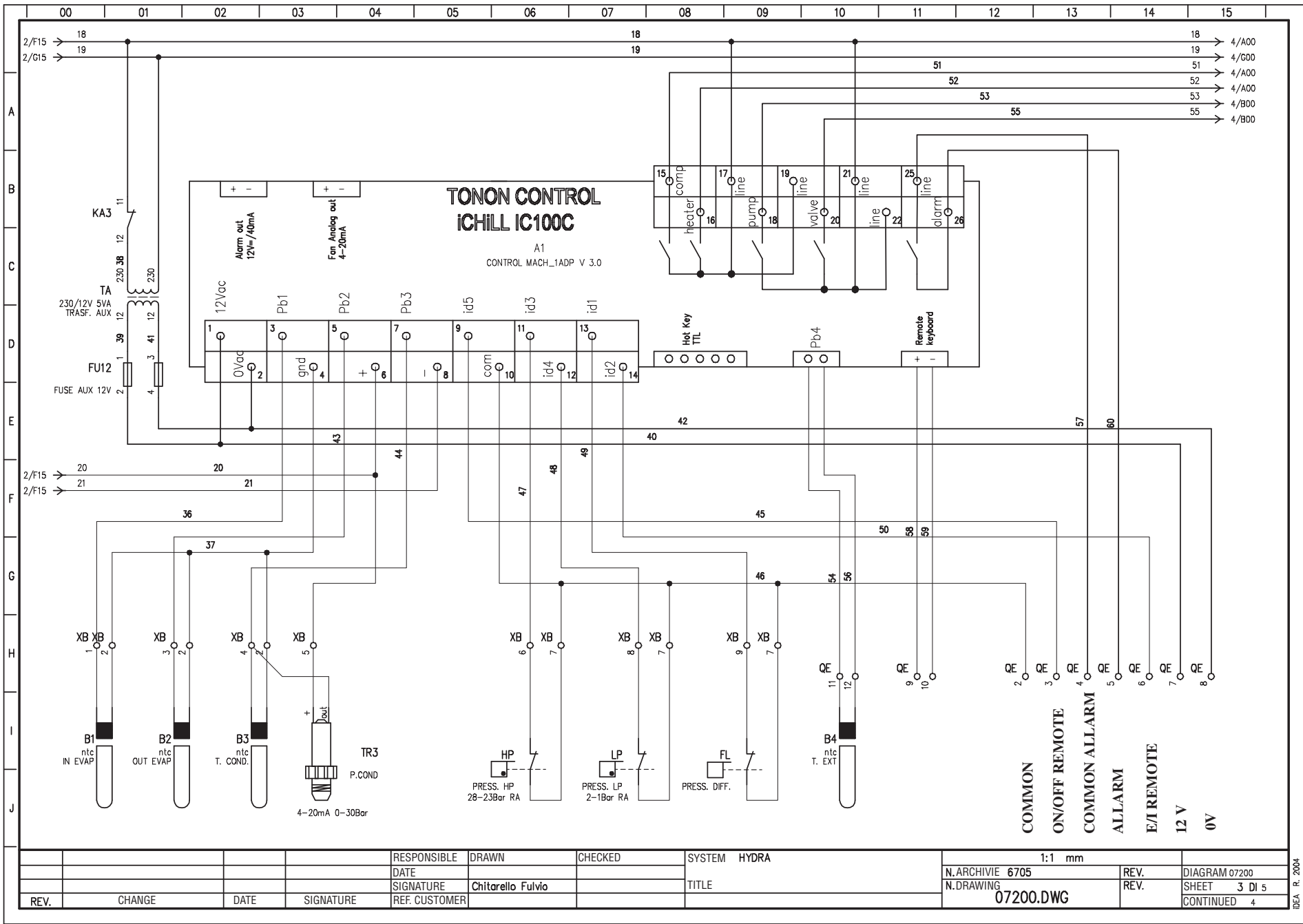
LEGEND ELECTRICAL PANEL ELECTRICAL COMPONENTS

A1	ELECTRONIC MICROPROCESSOR REGULATOR
A2	FAN SPEED MODULATION BOARD (max power 2.2 kW)
*A2	FAN SPEED MODULATION BOARD
EV1	CYCLE INVERSION VALVE
FL	DIFFERENTIAL FLOW SWITCH
FU12	AUXILIARY CIRCUIT PROTECTION FUSES
HP	HIGH-PRESSURE SWITCH
KA3	CYCLICAL PHASE CONTROL RELAY
KM1	COMPRESSOR POWER METER
*KM2	PUMP POWER METER (models 051 - 071 - 091 - 101 - 121)
KM3	PUMP POWER METER (models 151 - 092 - 102 - 122 - 152)
LP	LOW-PRESSURE SWITCH
M1	COMPRESSOR MOTOR M2
M2	PUMP MOTOR
M3	FAN MOTOR model 151
M4	FAN MOTOR model 151
M10	FAN MOTOR
M11	FAN MOTOR
B1	WORKS PROBE
B2	ANTI-FREEZE PROBE
B3	CONDENSER PROBE
B4	OPTIONAL PROBE
QA1	230-V LINE MAGNETOTHERMAL PROTECTION
QE	ELECTRICAL PANEL TERMINAL BLOCK
QM1	GENERAL COMPRESSOR MAGNETOTHERMAL PROTECTION
RC1	COMPRESSOR OIL GUARD HEATING ELEMENT
TA	230-V/12-V 5VA AUXILIARY TRANSFORMER CIRCUITS
TR3	OPTIONAL 4-20mA PRESSURE TRANSDUCER
TX1	KLIXON FAN 1
TX2	KLIXON FAN 2



				RESPONSIBLE	DRAWN	CHECKED	SYSTEM HYDRA	1:1 mm	
				DATE	Chitarello Fulvio		TITLE	N. ARCHIVIE 6705	REV. DIAGRAM 07200
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REV.	CHANGE	DATE	SIGNATURE	REF. CUSTOMER					CONTINUED 3

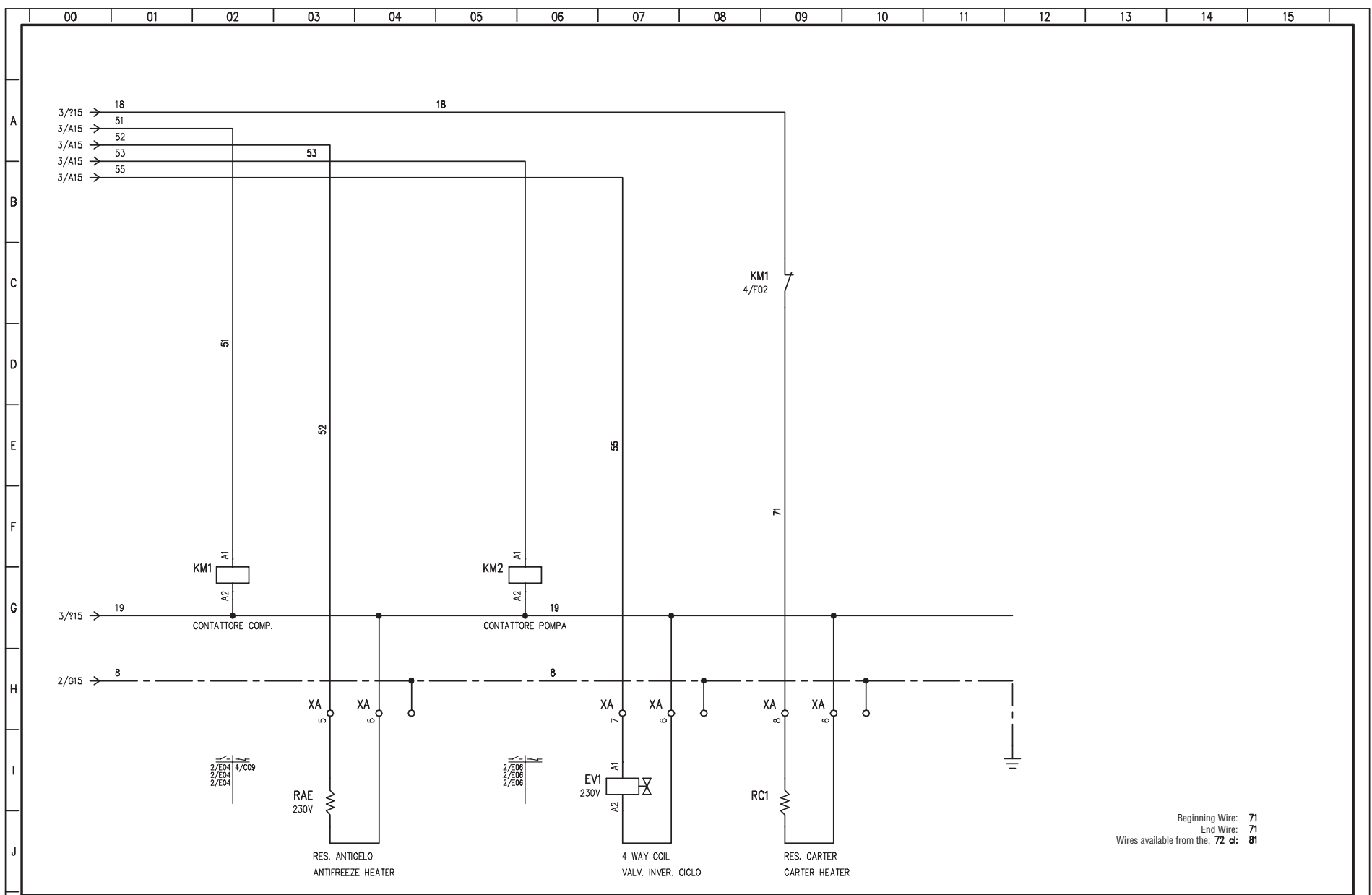
DEA R. 2004



REV.	CHANGE	DATE	SIGNATURE	RESPONSIBLE	DRAWN	CHECKED	SYSTEM	HYDRA
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				SIGNATURE				
				REF. CUSTOMER				

1:1 mm	
N.ARCHIVIE 6705	REV. DIAGRAM 07200
N.DRAWING 07200.DWG	REV. SHEET 3 DI 5
	CONTINUED 4

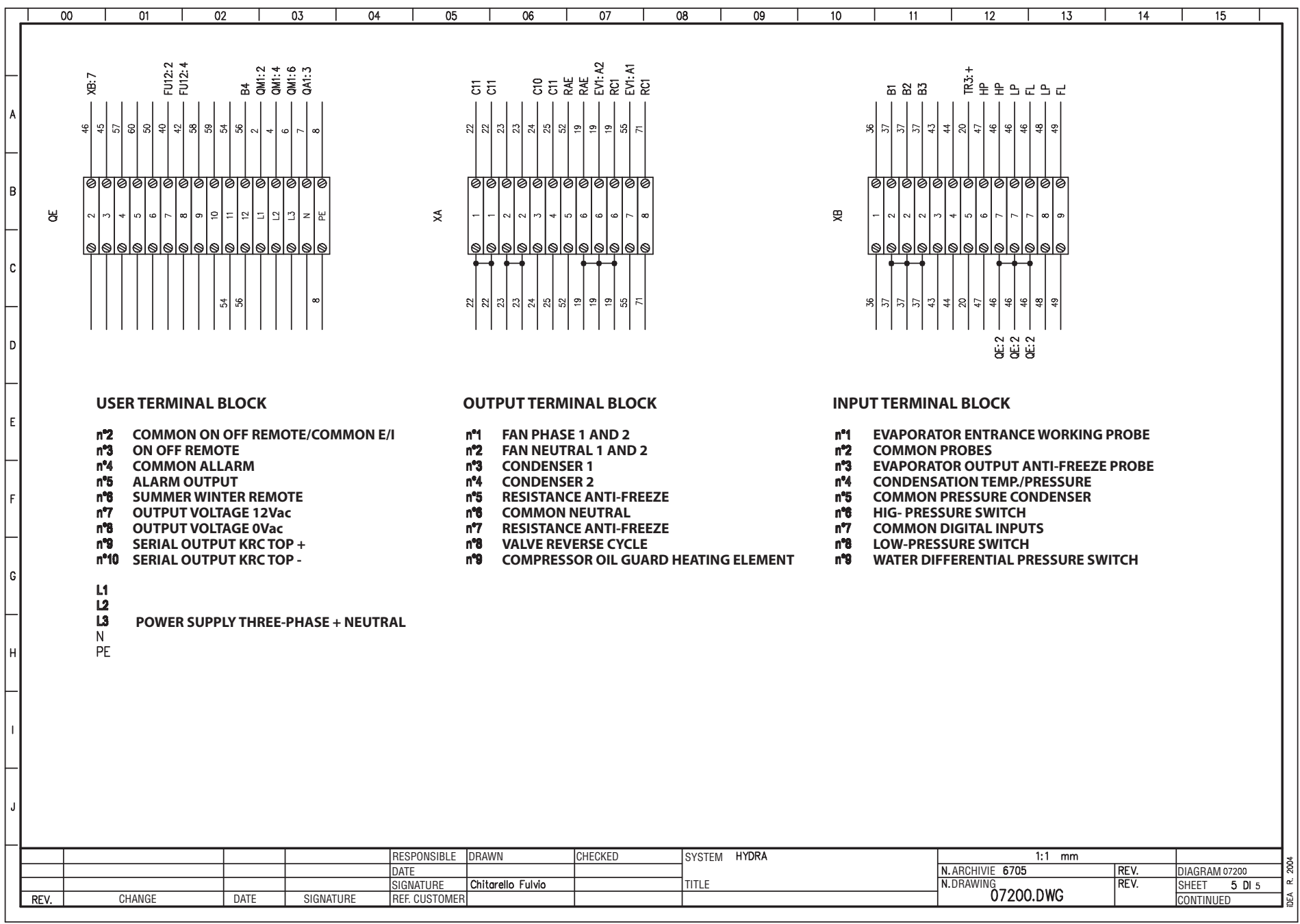
DEA R. 2004



Beginning Wire: 71
End Wire: 71
Wires available from the: 72 to 81

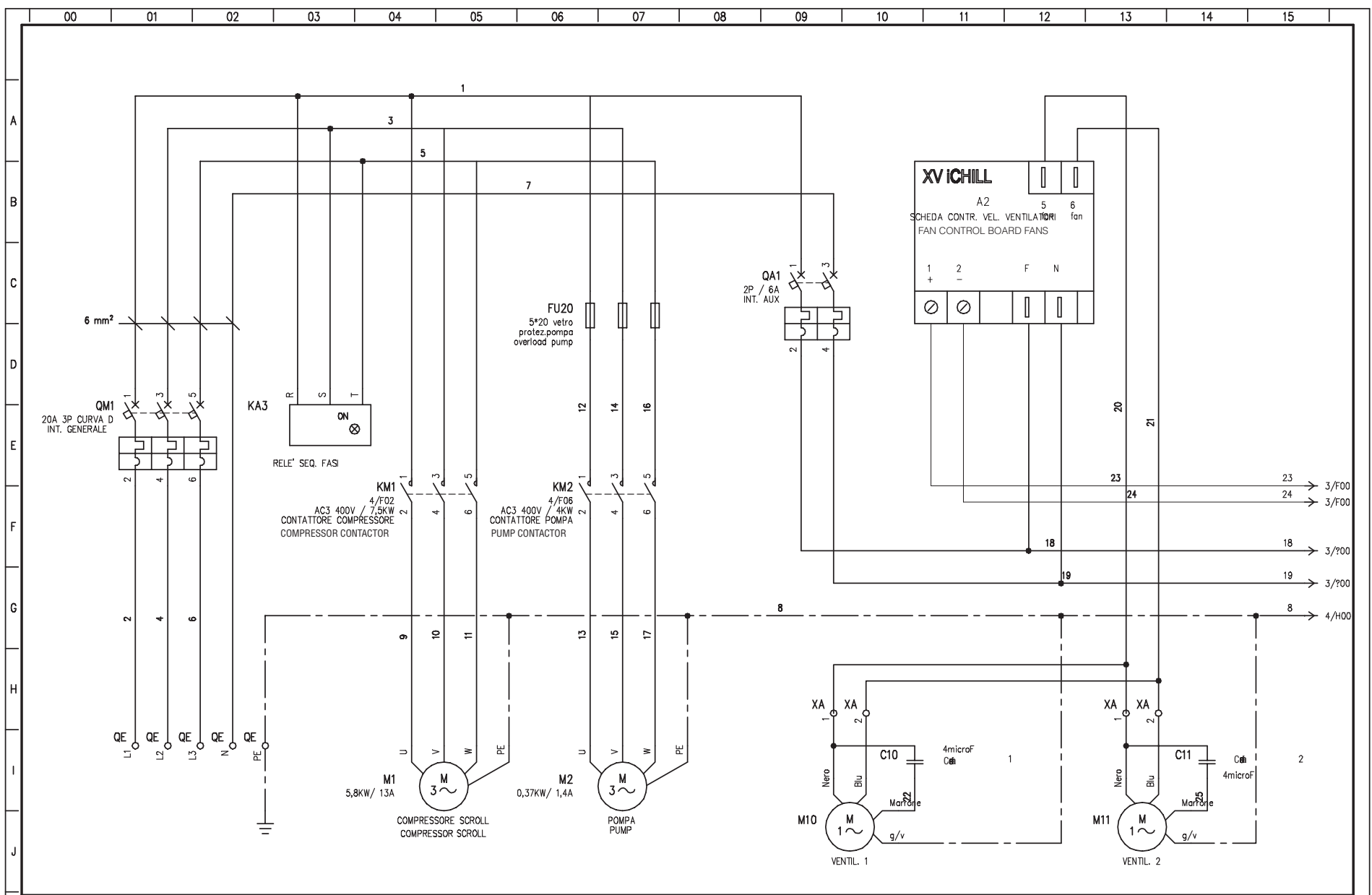
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REV.	CHANGE	DATE	SIGNATURE	REF. CUSTOMER				07200.DWG	CONTINUED 5

DEA R. 2004



REV.	CHANGE	DATE	SIGNATURE	RESPONSIBLE	DRAWN	CHECKED	SYSTEM HYDRA	1:1 mm	N.ARCHIVIE 6705	REV.	DIAGRAM 07200
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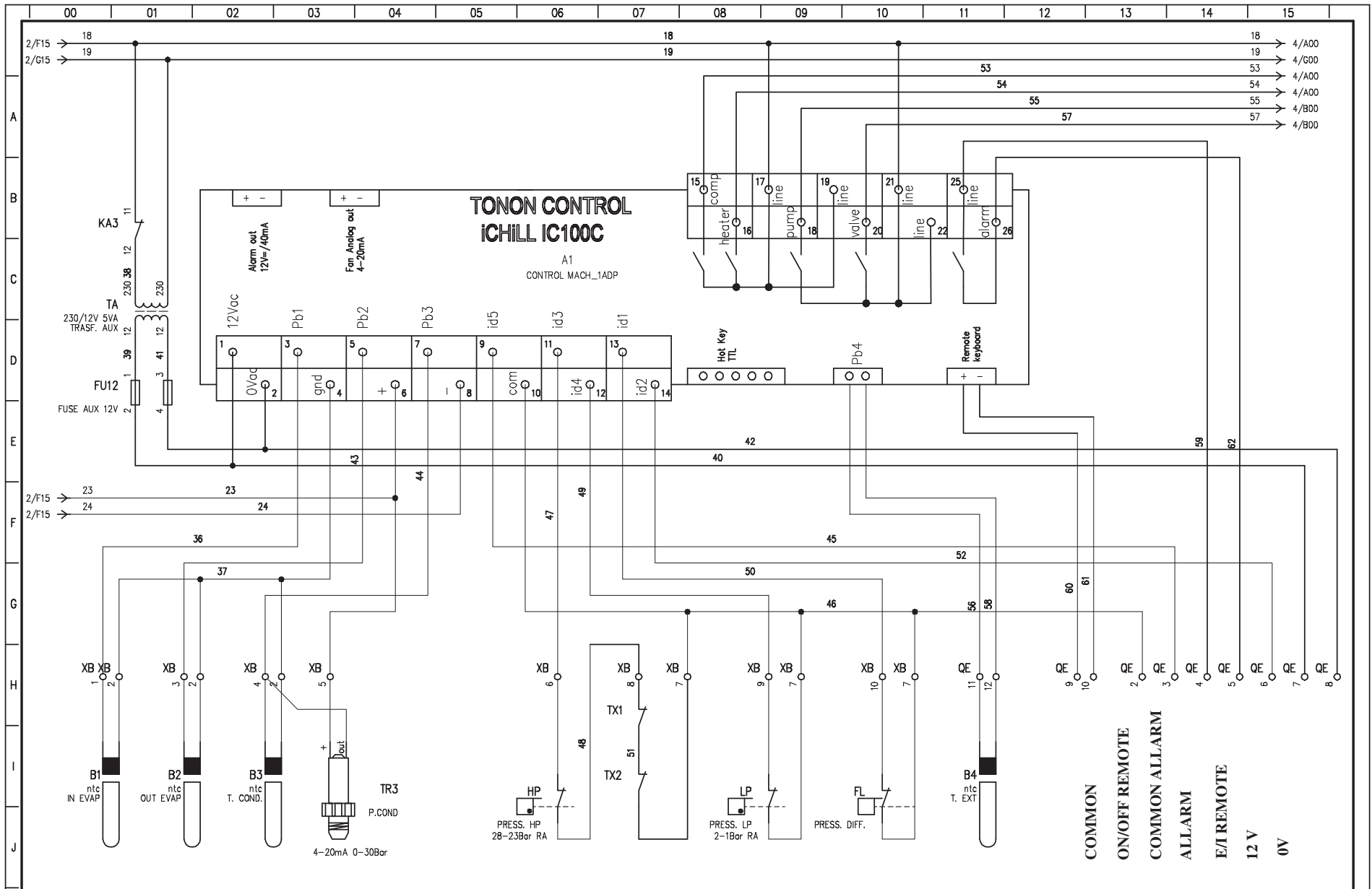
DEA R. 2004



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				REF.CUSTOMER	---		07210.DWG	CONTINUED 3

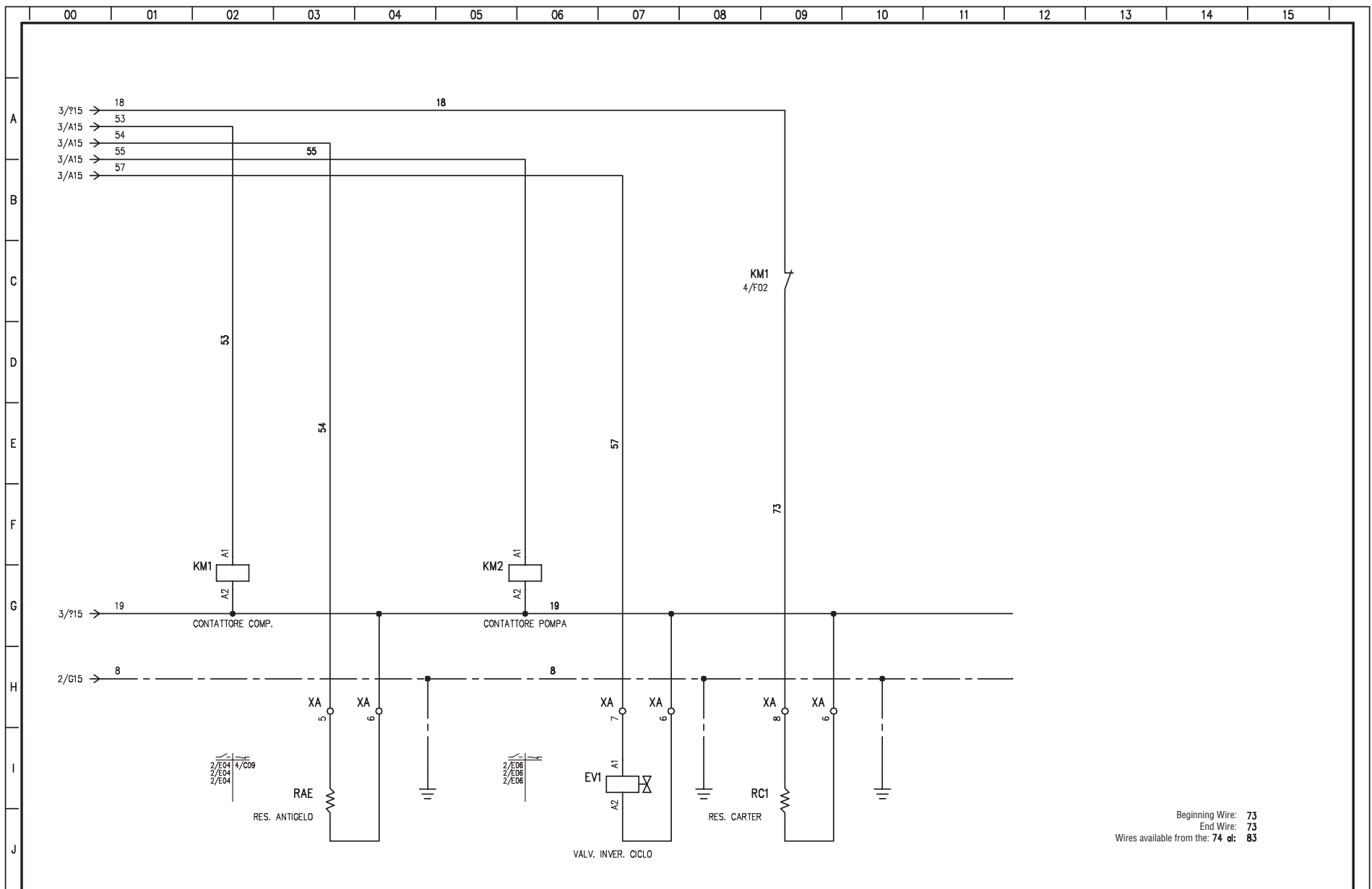
DEA R. 2004

DIAGRAM 670507210



REV.	CHANGE	DATE	SIGNATURE	REF. CUSTOMER	RESPONSIBLE	DRAWN	CHECKED	SYSTEM HYDRA	1:1 mm	N.ARCHIVIE 6705.DWG	REV.	DIAGRAM 07210
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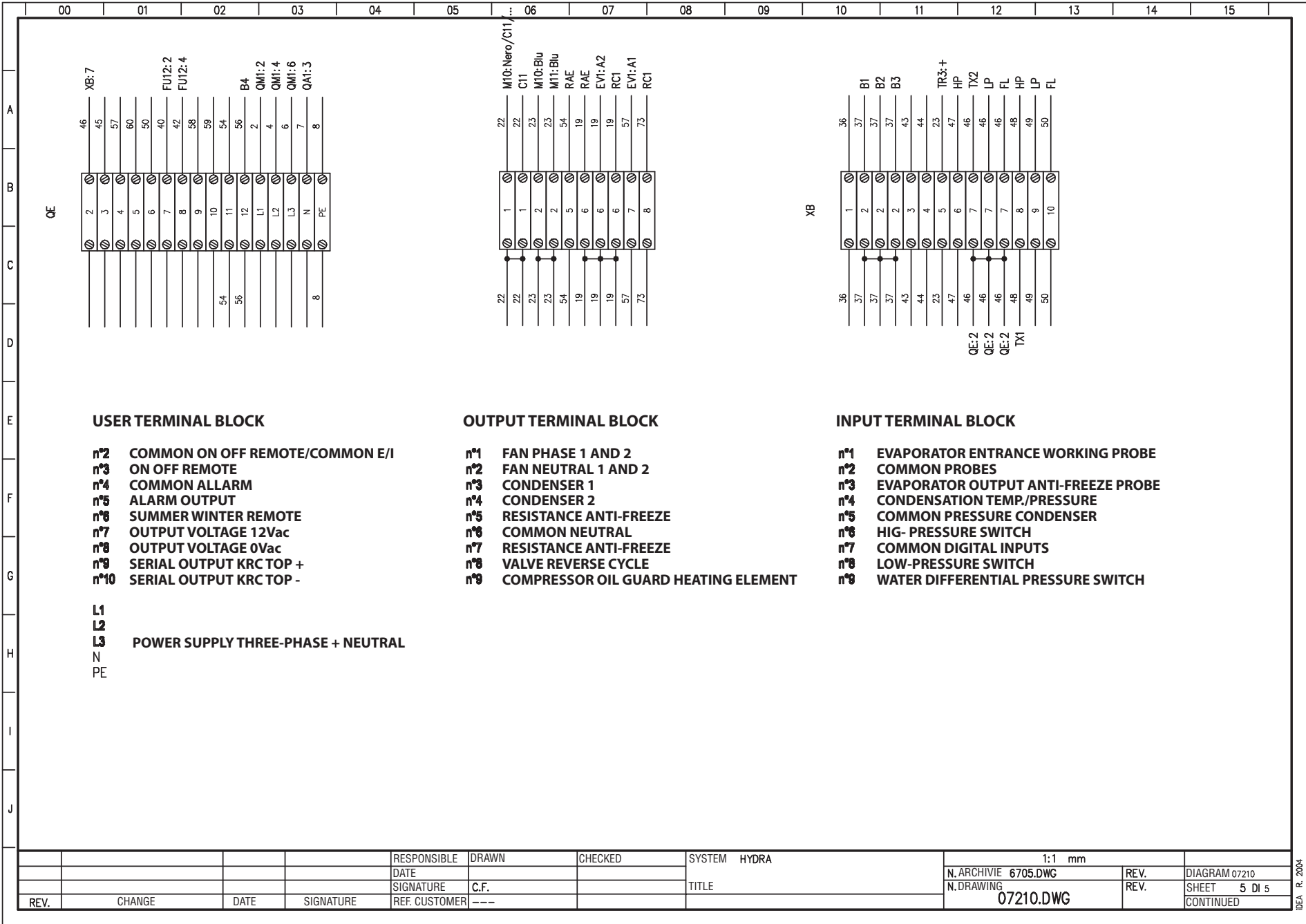
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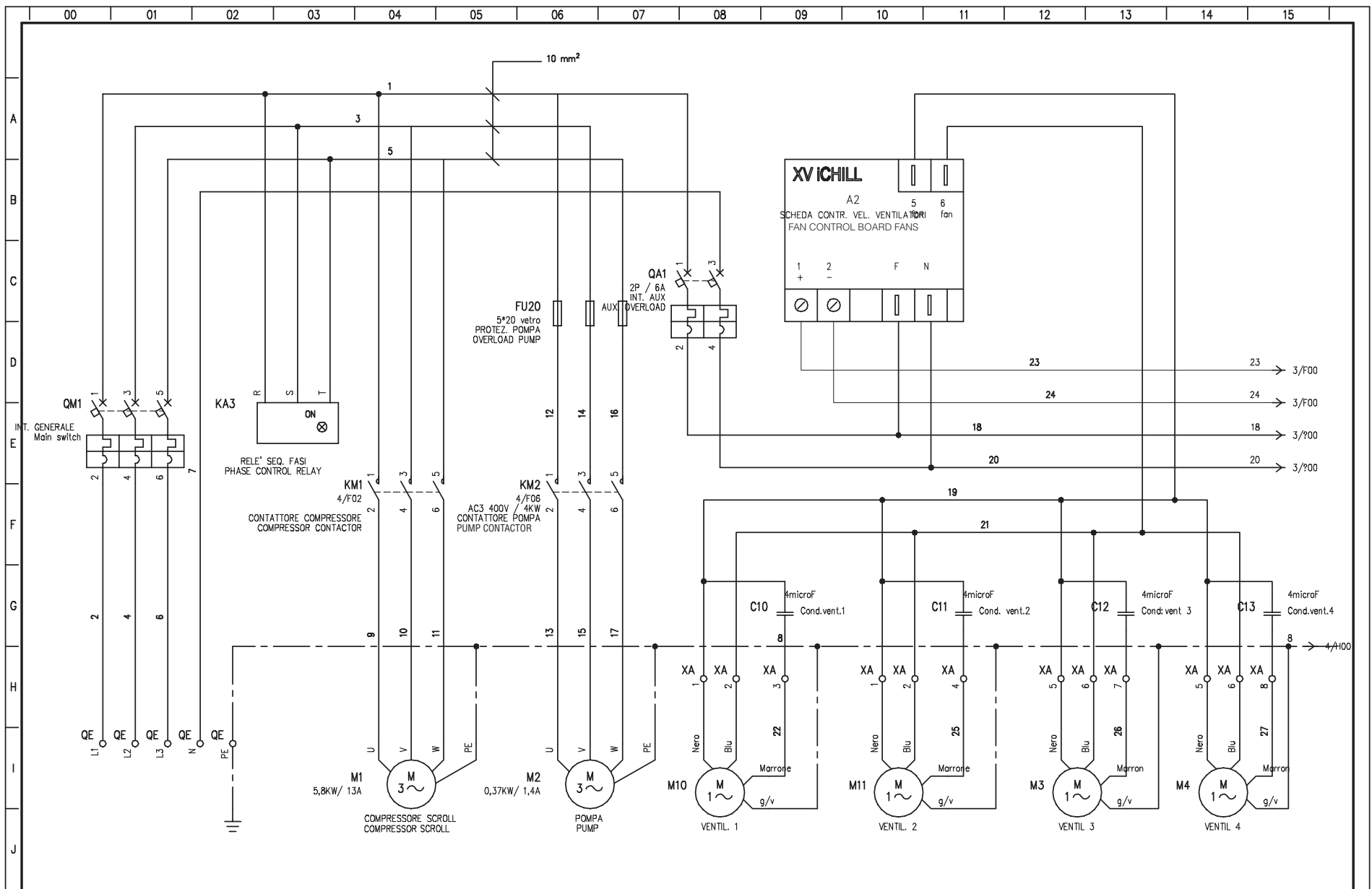


Beginning Wire: 73
End Wire: 73
Wires available from the: 74 of: 83

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				SIGNATURE	C.F.		TITLE	N. DRAWING	REV. SHEET 4 DI 5
REV.	CHANGE	DATE	SIGNATURE	REF. CUSTOMER	---			07210.DWG	CONTINUED 5

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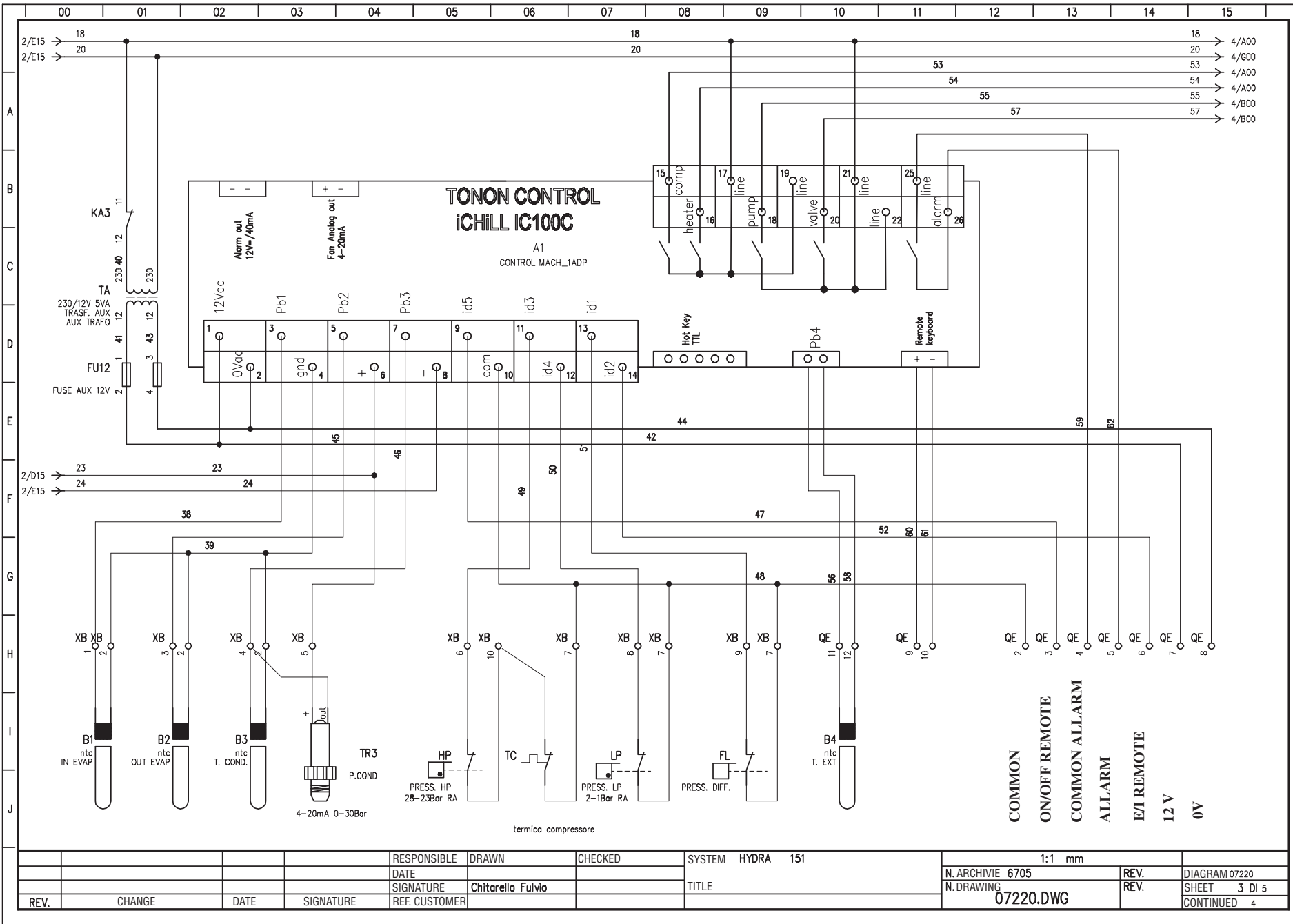




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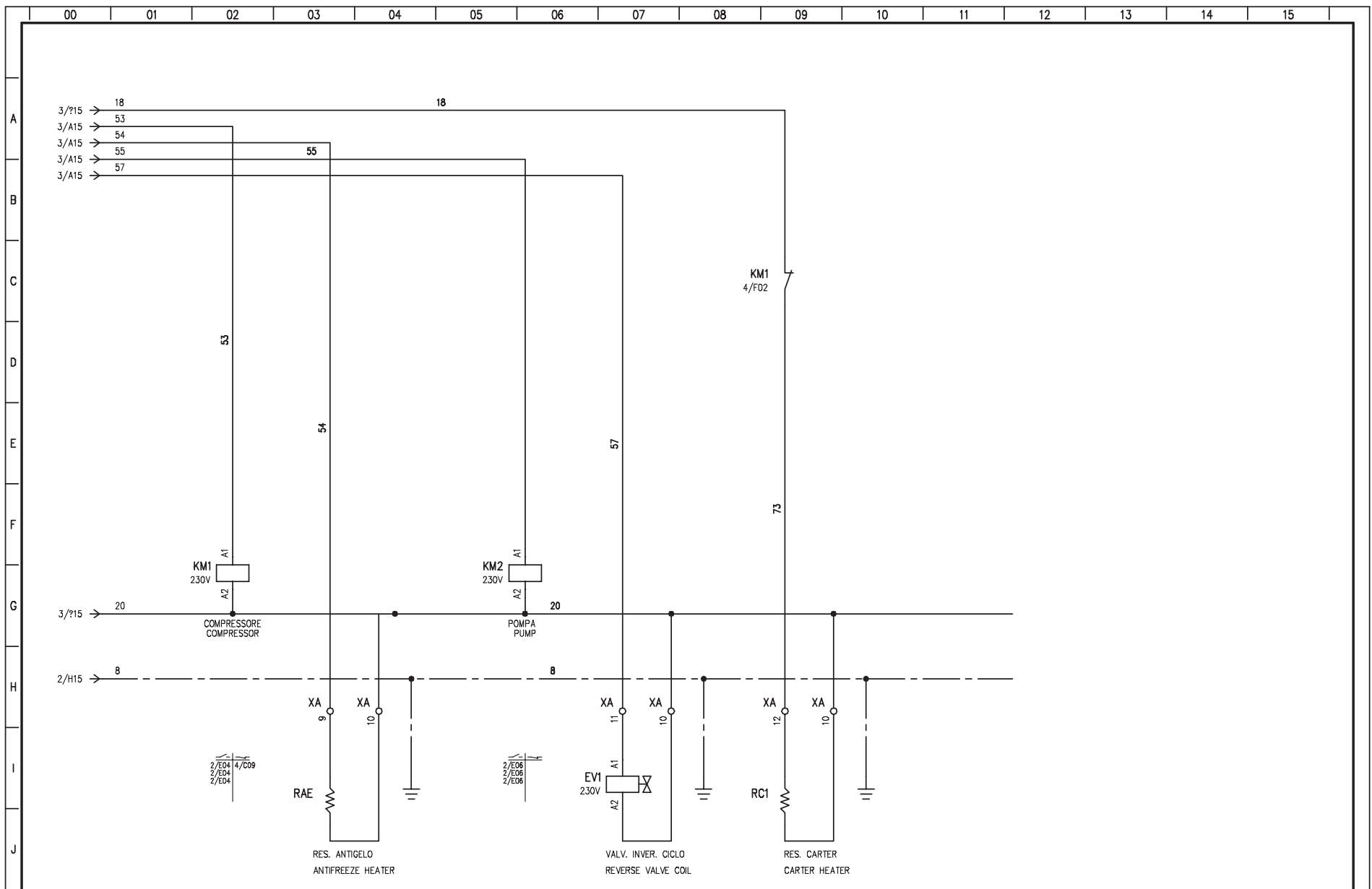
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DIAGRAM 670507220



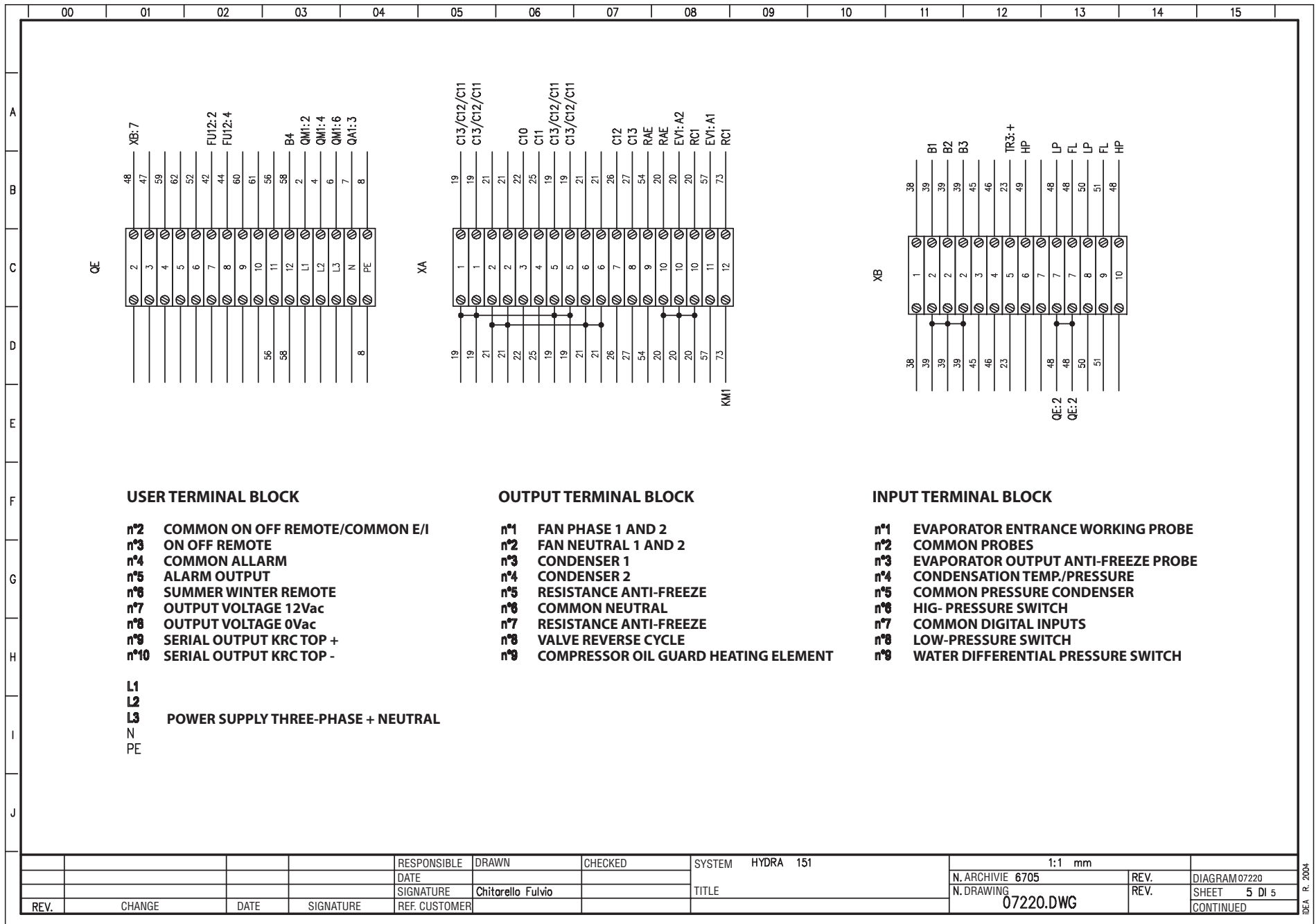
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				REF. CUSTOMER				CONTINUED 4

DEF. R. 2004



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				SIGNATURE				N. DRAWING	REV. SHEET 4 DI 5
REV.	CHANGE	DATE	SIGNATURE	REF. CUSTOMER				07220.DWG	CONTINUED 5

DEF. R. 2004



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				SIGNATURE	Chitorello Fulvio		TITLE	N. DRAWING	REV.
REV.	CHANGE	DATE	SIGNATURE	REF. CUSTOMER				07220.DWG	DIAGRAM 07220
								SHEET 5 DI 5	CONTINUED

DEA R. 2004

21.0 SPARE PARTS LIST

SPARE PARTS LIST									
INITIALS	DESCRIPTION	CODE	HYDRA-HYDRA/HP MODELS						
			051	061	081	091	101	121	151
A1	microprocessor control mach1 V 3.0	735001500	1	1	1	1	1	1	1
A2	fan speed control board	735000810	1	1	1	1	1	1	1
pb1/pb2/pb3	NTC Temperature probe	735000830	3	3	3	3	3	3	3
EV1	cycle inversion solenoid valve	418500210	1	1					
		418500130			1	1	1	1	
		418500220							1
FD	dewatering filter	435100180	1	1	1	1			
		435100190					1	1	1
FL	h2o differential pressure switch	720100280	1		1	1			
		720100270		1					
		720100260					1	1	1
HP	high-pressure safety switch	720100230	1	1	1	1	1	1	
IL	liquid indicator		n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
LP	low-pressure safety switch	720100180	1	1	1	1	1	1	
KA3	phase sequence relay	721000130	1	1	1	1	1	1	
KM1	compressor contactor 5.5KW-AC3	721100230	1	1					
	compressor contactor 7.5KW-AC3	721100220			1				
	compressor contactor 11KW-AC3	721100250				1	1		
	compressor contactor 15KW-AC3	721100270						1	
KM2	pump contactor 4KW-AC3	721100240	1	1	1	1	1	1	
M1	compressor scroll	728101380	1						
		728101390		1					
		728100470			1				
		728101260				1			
		728101400					1		
		728101410						1	
		728101220							1
M2	circulation pump	731100570	1	1	1	1	1	1	
		731100110							1
M10-M11	helical fan Ø 450	730000180	2	2				4	
	helical fan Ø 500	730000020			2	2	2	2	
QA1	auxiliary magnetothermal circuit protection	710001060	1	1	1	1	1	1	
QM1	magnetothermal protection 16AD3	710001120	1						
	magnetothermal protection 20AD3	710001140		1	1	1			
	magnetothermal protection 25AD3	710001160					1		
	magnetothermal protection 32AD3	710001170						1	
	magnetothermal protection 40AD3	710001180						1	
FU20	pump protection fuses 5*20 glass 3.15A3	712200070	3	3	3	3	3	3	
RC1	compressor guard heating element 33W	729000300	1	1					
	compressor guard heating element 50W	729000270			1			1	
	compressor guard heating element 44W	729000310				1	1	1	

SPARE PARTS LIST									
INITIALS	DESCRIPTION	CODE	HYDRA-HYDRA/HP MODELS						
			051	061	081	091	101	121	151
RLQ mod.hydra hp	liquid receiver 5l	418001000	1	1					
	liquid receiver 8l	418001010			1	1	1	1	
	liquid receiver 12l	418001020							1
SAE mod.hydra	outside air exchanger	425103310	1						
	outside air exchanger	425103320		1					
	outside air exchanger dx	425103350			1	1			
	outside air exchanger dx	425103370					1		
	outside air exchanger sx	425103380					1		
	outside air exchanger dx	425103410						1	
	outside air exchanger sx	425103420						1	
	outside air exchanger sx	425103450							1
SAE mod.hydra hp	outside air exchanger	425103330	1						
	outside air exchanger	425103340		1					
	outside air exchanger sx	425103360			1	1			
	outside air exchanger dx	425103390					1		
	outside air exchanger sx	425103400					1		
	outside air exchanger dx	425103460							1
SP1	system side plate exchanger	425200890	1	1					
		425200830			1	1	1		
		425200840						1	
		425200290							1
TA1	auxiliary transformer circuits 12V 5VA	451350270	1	1	1	1	1	1	1
VE	rectangular expansion vessel	284000100	1	1					
	round expansion vessel	426000110			1	1	1	1	1
VNR	check valve for welding	418300020	2	2	2	2			
		418300030					2	2	2
VS	safety valve 3 bar	428200010	1	1	1	1	1	1	1
VTE mod.hydra	thermostatic valve	435300340	1						
		435300930		1	1	1			
		435300900					1		
		435300910						1	
		435300920							1
VTE mod.hydra hp	thermostatic valve	435300340	2						
		435300930		2	2	2			
		435300900					2		
		435300910						2	
		435300920							2

**AZIENDA CON SISTEMA DI
GESTIONE PER QUALITÀ
CERTIFICATO DA DNV
= UNI EN ISO 9001 : 2000 =**

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