MAXA®

HEATING & COOLING

CE

V.415

R32

Chiller and Inverter Air/Water heat pumps with axial fans

Controller Manual
Model

i-32V506A	i-32V514
i-32V508A, i-32V5SL08A	i-32V514T
i-32V510	i-32V516, i-32V5SL16
i-32V510T	i-32V516T, i-32V516T
i-32V512, i-32V5SL12	i-32V518T
i-32V512T, i-32V5SL12T	

56.5

❄ ☀ ⌖ ⊘
❄ ⊛ ▲ -Ɱ-

MODE ESC　PRG　⋀　⋁

An Italian Company

www.maxa.it

f in

08	10-2022	M.S.	A.B.	Parameter visibility alignment, insertion of GI module chapters
07	05-2022	E.G.	A.B.	Update sizes 06A, 08A, elimination of GI module chapters
06	12-2021	M.S.	A.B.	Elimination cap. 9.1
05	03-2021	A.B.	A.B.	Update chap. 8-9.1-10.15-10.16-10.17-14.3
04	09-2020	M.S.	A.B.	Compressor shutdown activation logic update
03	06-2020	M.S.	A.B.	Adding flowmeter chapter
02	03-2020	M.S./K.G.	A.B.	Modification of the chapters 6, 9,11, 12 and 15
01	10-2019	M.S.	A.B.	Updating
Rev	**Data**	**Redatto**	**Approvato**	
Catalogo / Catalogue / Katalog / Catalogue				Serie / Series / Serie / Serie / Série
MCO01020120001_08				**CONTROLLER FOR AIR/WATER INVERTER-CONTROLLED CHILLERS AND HEAT PUMPS WITH AXIAL FANS**

INDEX

1. HOW TO KEEP THE MANUAL

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

The company reserves the right to modify its products and related manuals without necessarily updating previous versions of the reference material. We also decline any responsibility for possible inaccuracies in the manual if due to printing or transcription errors.

The customer shall store any updated copy of the manual or parts of it delivered by the manufacturer as an attachment to this manual.

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

1.1 GRAPHIC SYMBOLS USED IN THE MANUAL

🚫	**Indicates prohibited operations.**
⚠️	**Indicates operations that can be dangerous for people and/or disrupt the correct operation of the unit.**
⚡	**Hazardous electrical voltage - Electrocution hazard**
❗	**Indicates important information that the operator has to follow in order to guarantee the correct operation of the unit in complete safety. Also indicates some general information.**

2. PERMITTED USED

- The company excludes any contractual and extra contractual liability for damage caused to persons, animals or objects, by incorrect installation, setting and maintenance, improper use of the equipment, and the partial or superficial reading of the information contained in this manual.
- These units are built for the heating and/or cooling of water. Any other use not expressly authorised by the manufacturer is considered improper and therefore not allowed.
- All the work must be executed by skilled and qualified personnel, competent on the existing regulations in country of installation.
- This appliance is intended to be used by expert or trained operators in shops, light industry and in factories, or for commercial use by non-expert personnel.
- The appliance may be used by children at least 8 years old and by persons with reduced physical, sensory or mental capabilities or without experience or the necessary knowledge as long as they are supervised or after they themselves have received instructions on the safe use of the appliance and understand the relevant dangers. Children must not play with the appliance. The cleaning and maintenance which the user is expected to carry out on the unit cannot be done by children without supervision.

3. GENERAL SAFETY GUIDELINES

Before starting any type of operation on the unit, every user and operator must have perfect knowledge of operation of the machine and of its controls and have read and understood all of the information in this manual and in the user-installer manual.

3.1 PERSONAL PROTECTIVE EQUIPMENT

Refer to the user-installer manual which accompanies the unit.

3.2 WORKERS' HEALTH AND SAFETY

Refer to the user-installer manual which accompanies the unit.

🚫	**IT IS PROHIBITED:**
	To remove and/or to tamper with any safety device.
	For unauthorised personnel to access the electric panel.
	To work on live systems.
	To touch the systems if not authorised to do so
	To allow children or unassisted disabled persons to use the appliance.
	To touch the appliance when barefoot or parts of the body are wet or damp.
	To perform any cleaning operation when the master switch is 'ON'.
	To pull, detach or twist the appliance's electric cables.
	To step on, sit down on and/or place any type of object on the appliance.
	To spray or pour water directly on the unit.
	To dispose of, abandon or leave within reach of children packaging materials (cardboard, staples, plastic bags, etc.) as they may represent a hazard for the environment and one's life.
	To tamper with or replace parts of the unit without the specific consent of the manufacturer. The manufacturer shall have no responsibility whatsoever in case of unauthorised operations.
⚠️	**CAUTION:**
	Refer to the user-installer manual which accompanies the unit before proceeding.
	All the operation described below must be done by QUALIFIED PERSONNEL ONLY.
	The electrical wiring to the terminal blocks has to be done only by qualified personnel.
	Any routine and/or extraordinary maintenance operation must be carried out with the machine stopped and disconnected.
	Do not place your hands or introduce screwdrivers, spanners or any other tools on moving parts.
	The machine operator and maintenance personnel must receive suitable training for the performance of their tasks in safety.
	Only authorised personnel are allowed to have access to the electric panel.
	Operators must know how to use personal protective equipment and the accident-prevention rules of national and international laws and regulations.
	The operator's workplace has to be kept clean, tidy and clear of objects that may hinder free movement. Appropriate lighting of the work place shall be provided so as to allow the operator to carry out the required operations safely. Poor or excessive lighting can cause risks.
	Ensure that work places are always adequately ventilated and that the extraction systems are working, in good condition and in compliance with the requirements of the laws in force.
	Not all of the configurations described can be activated and/or modified at the same time.
	Values other than the default values can jeopardise proper operation of the unit. If in doubt on which value to set, contact our headquarters.
	The company excludes any contractual and extra contractual liability for damage caused to persons, animals or objects, by incorrect installation, setting and maintenance, improper use of the equipment, and the partial or superficial reading of the information contained in this manual.

	The power supply has to respect the limits shown on the unit's technical label: failing this, the warranty will terminate immediately. Before beginning any type of operation, make sure that power is disconnected.
	Connect the conductors in order: phase, neutral and earth.
	Dimensioning of the power cables must take into consideration the TECHNICAL DATA provided in the user-installer manual accompanying the unit. Also consider any auxiliary heating devices.
	Effective earthing is mandatory; the manufacturer is not responsible for damage caused in case of lack thereof.
	When undergoing maintenance, the unit must be disconnected from the power supply, and it must be unplugged in such a way that the operator can verify from wherever he accesses that the plug remains disconnected.
	Use cables that meet the regulations in force in the different countries.
	After the unit has been running for 10 minutes, make sure that the screws on the power terminal block remain secured.

	Install upstream of each unit a suitable QF protective device and power disconnector, with delayed characteristic curve, with at least 3 mm contact opening and adequate breaking capacity and residual current protection. The size of the circuit breaker must comply with absorption of the unit. See the TECHNICAL DATA in the user-installer manual which accompanies the unit. Also consider any auxiliary heating devices.
	Before performing any operations on the electric panel, IT IS MANDATORY:
	To switch off the unit from the control panel ("OFF" displayed).
	To place the general residual current device QF at "OFF".
	To wait 15 seconds before accessing the electric panel.
	To check the grounding before performing any operation.
	To remain well isolated from the ground, with dry hands and feet, or using insulated platforms and gloves.
	To keep foreign materials away from the systems.

4. PURPOSE AND CONTENTS OF THE MANUAL

The manual is intended to provide the essential information to configure the controller of the units.
It is addressed to the installer and operators of the appliance and it enables them to use the equipment efficiently, even if they do not have any previous specific knowledge of it.
Not all of the functions described can be activated and/or selected at the same time. Contact our headquarters for further information.
The manual describes the machine at the moment it was sold. It must therefore be considered adequate with respect to the state-of-the-art in terms of potentiality, ergonomics, safety and functionality.
The company also performs technological upgrades and does not consider itself obliged to update the manuals of previous machine versions which could even be incompatible. Therefore make sure to use the supplied manual for the installed unit. Contact our headquarters in case of updates or doubts.
The user is recommended to follow the instructions contained in this booklet, especially those concerning safety and routine maintenance.

5. USER INTERFACE - CONTROLLER

MODE ESC	Select the operating mode and manually reset any alarms. Each time you press the key you have the following sequence: OFF -> COOL -> HEAT -> OFF If DHW is enabled, the sequence is the following: OFF -> COOL -> COOL+SAN -> HEAT -> HEAT+SAN -> OFF While setting the parameters, this key has the function of sending BACK by one level.
PRG	Grants access to the parameter setting menu and allows you to set the summer, winter and sanitary setpoint.
∧	UP key. In the parameter setting mode, it allows you to move to a higher menu or to increase the parameter value when in "edit" mode.
∨	DOWN key. In the parameter setting mode, it allows you to move to a lower menu or to decrease the parameter value when in "edit" mode.

5.1 MENU

The following are the main features for navigating the menus, especially describing functions which are not obvious. The main menu has the following items:

MENU	LABEL	PASSWORD LEVEL	OTHER CONDITIONS
Setpoint	**Set**	User	Not accessible if connected to Hi-T2
Probes	**tP**	Installer	---
Alarms	**Err**	User	Only if active alarms
Digital input	**Id**	Installer	---
Parameters	**Par**	Installer	---
Password	**PSS**	User	---
Hours of operations	**oHr**	Installer	---
USB	**USb**	Installer	Only with pen drive with relevant update files
Versione Firmware	**Fir**	Installer	Version, Revision and Sub
Alarm log	**Hist**	Installer	Only if the log contains data

The PSS menu is accessed to enter the service password and to enable access with a higher user permission. When you have exited the menus, the password must be entered once again to re-enter.

5.2 SETPOINT MENU

The various setpoints can be viewed and edited.

SETPOINT	DESCRIPTION	UNIT	DEFAULT	RANGE
Coo	First Summer setpoint	°C	7.0	5 ÷ Co2
Hea	First Winter setpoint	°C	45.0	25 ÷ 60
*San	Sanitary setpoint	°C	48.0	25 ÷ 60
Coo2	Second Summer setpoint	°C	18.0	Coo ÷ 25
Hea2	Second Winter setpoint	°C	35.0	25 ÷ Hea
San2	Second Sanitary setpoint	°C	35.0	25 ÷ Hea
**rCoo	Mixing valve Summer setpoint	°C	15.0	0.0 ÷ 80

SETPOINT	DESCRIPTION	UNIT	DEFAULT	RANGE
**rHEA	Mixing valve Winter setpoint	°C	30.0	0.0 ÷ 80

(*) If the DHW function is enabled, see par. 10.2
(**) If Gi accessory is included, access is only possible with installer password.

5.3   PASSWORD MENU [PSS]

Enter the password according to the desired access level. Confirming the value automatically activates the access level and the items of the menus enabled at that level will appear.

5.4   PROBES MENU [tP]

The value of the different probes appears. The number of visible probes depends on whether or not the I/O expansion modules are present. Particular situations:

- Err = probe faulty
- --- = probe not used (no function associated to that probe)

Entering the "tP" analogue inputs menu with the installer password allows you to read the values of the probes present:

tP	DESCRIPTION	Unit of measurement
t01	Inlet water temperature	°C
t02	Outlet water temperature	°C
t03	Compressor intake temperature	°C
t04	Compressor discharge temperature	°C
t05	Outdoor air temperature	°C
*t06	DHW probe temperature	°C
*t07	Plant remote probe temperature	°C
t09	Low pressure	(bar)
t10	High pressure	(bar)
t11	Water flow	(l/min)
**t15	Mixer probe temperature	°C
**t16	Solar storage tank probe temperature	°C
**t17	Solar collector probe temperature	°C

(*) If enabled
(**) If Gi accessory present and enabled.
Please note that the menu is password-protected.

5.5   ALARMS MENU [Err]

This menu is only displayed if there are triggered alarms. All of the active alarms can be seen.

5.6   DIGITAL INPUTS MENU [Id]

The status of the digital inputs are displayed:
0=deactivated
1=active
----=input not configured
Please note that the menu is password-protected.

5.7   PARAMETERS MENU [Par]

The parameters are gathered into groups. Each group is identified by a three-digit code, while the index of each parameter is preceded by a letter.

DESCRIPTION	IDENTIFICATION CODE OF THE GROUP	PARAMETER INDEX	VISIBILITY
Configuration	CnF	H01-	INSTALLER
Compressor	CP	C01-	INSTALLER
Alarms	ALL	A01-	INSTALLER
Regulation	rE	b01-	INSTALLER
Pump	PUP	P01-	INSTALLER
Electric heaters	Fro	r01-	INSTALLER
Defrost	dFr	d01-	INSTALLER
Hz min / max	LbH	L0-	INSTALLER
*Solar	SUn	S01-	INSTALLER

DESCRIPTION	IDENTIFICATION CODE OF THE GROUP	PARAMETER INDEX	VISIBILITY
*Mixer valve	rAD	i01-	INSTALLER

(*) To configure if Gi module present
To access the installer parameters: PRG -> PSS -> PRG -> (enter Service password) ->PRG ->PAr -> PRG
Please note that the menu is password-protected.

5.8 OPERATING HOURS MENU [oHr]

This displays the operating hours of the compressor (oH1) and of the circulator (oHP1)
Pressing ESC for 3 seconds resets the currently displayed count.
Please note that the menu is password-protected.

5.9 MENU VERSIONE FIRMWARE [Fir]

Firmware Version (uEr), Firmware revision (rEu) and sub (SUb) can be displayed.
Please note that the menu is password-protected.

5.10 LOG MENU [HiSt]

It is only displayed if there are triggered alarms.

5.11 USB MENU [USB]

Only visible with pen drive with related files
The following are the functions available by using the USB pen drive connected the board.
Please note that the menu is password-protected.

⚡	**CAUTION**
	All the operations with INSTALLER visibility must be carried out by QUALIFIED PERSONNEL.
	The company excludes any contractual and extra contractual liability for damage caused to persons, animals or objects, by incorrect installation, setting and maintenance, improper use of the equipment, and the partial or superficial reading of the information contained in this manual.

5.11.1 FIRMWARE UPDATE [UPdF]

In case of firmware update, it is possible to make the upgrade by means of a USB pen drive, using the USB port in the controller.
For the upgrade:

1. Copy the upgrade files in the root directory of a USB pen-drive;
2. Set the unit in Standby and shut it down by placing the master switch at OFF;
3. Insert the pen-drive into the USB port of the controller;
4. Power on the unit, placing the master switch at ON;
5. Access the parameters PRG -> PSS -> PRG -> (enter Service password) -> PRG -> USB -> UPdF -> PRG. Selecting this item starts the automatic firmware upgrade procedure. The display shows a count indicating the transferred Kbytes. At the end of the procedure, "boot" appears on the screen and 4 LEDs light up in sequence;
6. When the installation is complete, the board returns to normal operation and the machine is ready to be activated;
7. Switch off the unit, placing the master switch at OFF;
8. Remove the pen drive from the USB port;
9. Power on the unit, placing the master switch at ON.

5.11.2 PARAMETERS UPDATE [UPPA]

In case of parameters update, it is possible to make the upgrade by means of a USB pen drive, using the USB port in the controller.
For the upgrade:
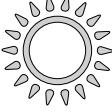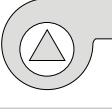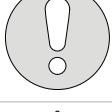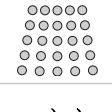
1. Copy the upgrade parameter files in the root directory of a USB pen-drive;
2. Set the unit in Standby and shut it down by placing the master switch at OFF;
3. Insert the pen-drive into the USB port of the controller;
4. Power on the unit, placing the master switch at ON;
5. Access the parameters PRG -> PSS -> PRG -> (enter service password) -> PRG -> USB -> UPPA -> PRG. Selecting this item starts the automatic parameters upgrade procedure. The display shows a count indicating the transferred Kbytes;
6. When the count is over, switch off the unit, placing the master switch at OFF;
7. Remove the pen drive from the USB port;
8. Power on the unit, placing the master switch at ON.

5.12 DISPLAY

In standard operation, the display shows the water outlet temperature in tenths of Celsius degrees or the alarm code if at least one is active. If several alarms are triggered, the first one is displayed while the second one will be displayed as soon as the first one is reset. In menu mode, the display depends on the current position.

5.12.1 LED

	Cooling mode LED	• LED ON if unit is in cooling mode.
	Heating mode LED	• LED ON if unit is in heating mode.
	Pump LED	• LED ON if pump running.
	Alarm LED	• LED ON if an alarm is triggered.
	Defrost LED	• ON if defrosting enabled • OFF if defrosting disabled or finished • FLASHING if defrosting time interval count in progress
	Compressor LED	• ON if the compressor is running • OFF if the compressor is off • FLASHING if pending the timed compressor start
	Domestic hot water LED	• ON if sanitary mode enabled • OFF if sanitary mode disabled • FLASHING if DHW production in progress (sanitary valve on)
	Antifreeze heater LED	• LED ON if antifreeze heater on.

5.13 TERMINAL BLOCK

The following is the list of I/O (inputs and outputs) that can be set to activate the functions of the controller.

Resource	Parameter	Terminal block X	Factory configuration		Description
			Default value	Function	
ST 6	**H17**	17.1 / 17.2	0	Not set	Analogue input configurable with an NTC-10kΩ probe at 25°C β 3435
ST 7	**H18**	19.1 / 19.2	0	Not set	Analogue input configurable with an NTC-10kΩ probe at 25°C β 3435
ST 11	**H22**	22.1 (gnd) 22.2 (un-der-voltage)	0	Not set	0-10Vdc under-voltage input
ID 2	**H46**	16.1 / 16.2	0	Remote summer/winter mode change (see paragraph 10.3.2)	Voltage-free digital input. To activate the function par. 10.3.2
ID 3	**H47**	15.1 / 15.2	2	Remote on/off, (see paragraph 10.3.1)	Digital input, voltage-free contact. Default function active.
ID 9	**H53**	20.1 / 20.2	0	Not set	Voltage-free digital input
DO 3	**H81**	6.1 (phase) 6.2 (neutral)	22	Plant integration heater control	230Vac, 50Hz, 2A (AC1) live output (see paragraph 10.5.1)
DO 6	**H84**	11.1 (phase) 11.2 (neutral)	6	DHW valve control (see paragraph 10.2)	230Vac, 50Hz, 2A (AC1) single-phase live output
DO 7	**H85**	14.1 (phase) 14.2 (neutral)	25	Double setpoint valve control (see paragraph 10.14)	230Vac, 50Hz, 2A (AC1) live output
Modbus RTU/RS4825 communication	--	4.1 (gnd) 5.1 (R-) 5.2 (R+)	--	--	Factory enabled with CM accessory

Example of single phase unit terminal block
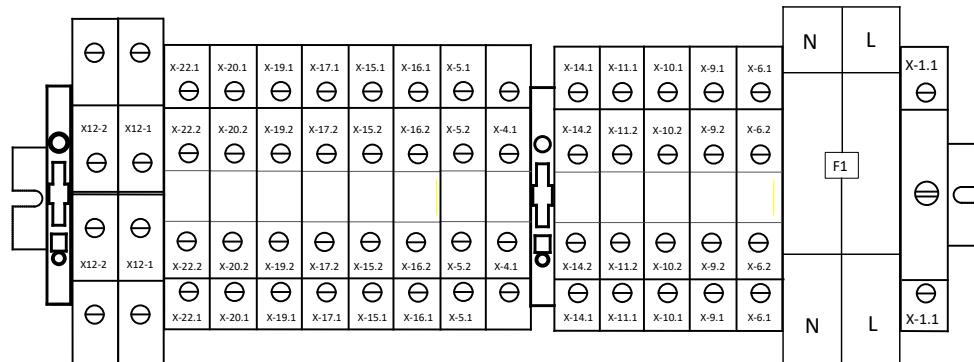
6. EDITING DYNAMIC SET-POINT

The regulator allows you to modify the set-point by adding up the value according to the temperature of the outdoor air probe. To use this function, edit the values from parameter **b08** to **b14** following the information below (edited by the installer).
Parameters of regulator **PAr** -> **rE**

- **b08** enable = 1/disable=0 dynamic set-point.
- **b09** = maximum cooling offset.
- **b10** = maximum heating offset.
- **b11** = Cooling outdoor temperature setting.
- **b12** = Heating outdoor temperature setting.
- **b13** = Cooling temperature delta.
- **b14** = Heating temperature delta.

Edit the setpoint depending on the outdoor temperature:

HEATING	COOLING
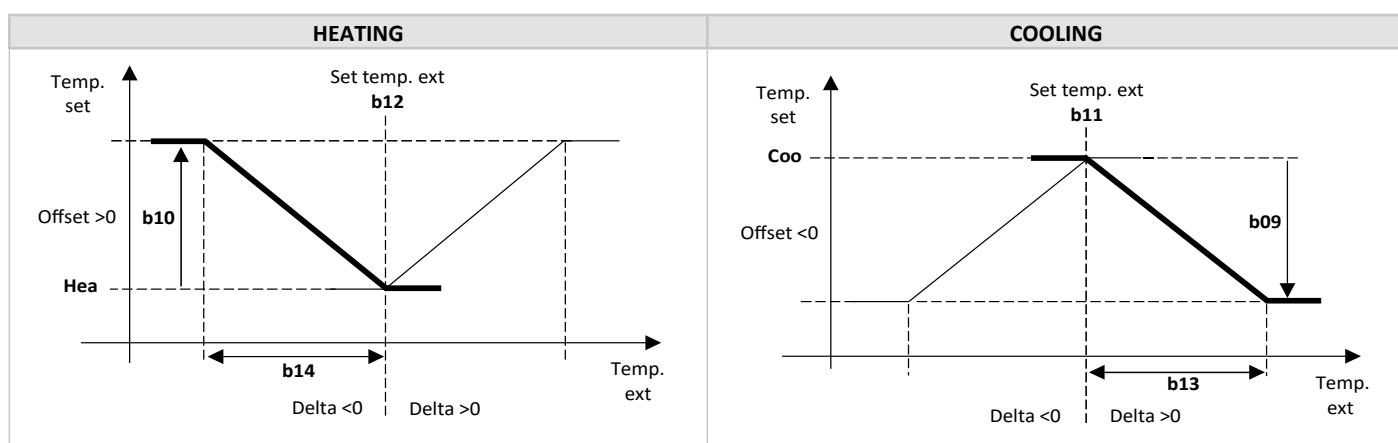
6.1   SETTINGS FOR STANDARD CLIMATIC CURVES

HEATING	COOLING
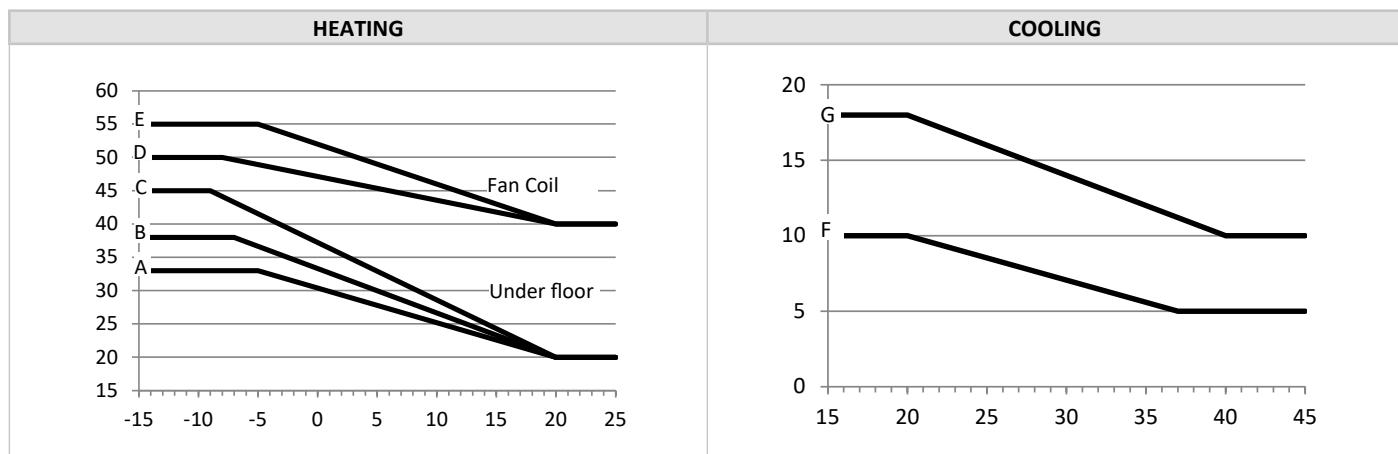
CURVE	Setpoint Heat	Setpoint Cool	b08	B09	b10	B11	b12	B13	b14
A	20°C	--	1	--	13°C	--	20°C	--	-25°C
B	20°C	--	1	--	18°C	--	20°C	--	-27°C

13

CURVE	Setpoint Heat	Setpoint Cool	b08	B09	b10	B11	b12	B13	b14
C	20°C	--	1	--	25°C	--	20°C	--	-29°C
D	40°C	--	1	--	10°C	--	20°C	--	-28°C
E	40°C	--	1	--	15°C	--	20°C	--	-25°C
F	--	5°C	1	5°C	--	37°C		-17°C	--
G	--	10°C	1	8°C	--	40°C		-20°C	--

6.2   EDIT THE SET-POINT FROM 0-10V INPUT OR FROM RATIOMETRIC INPUT

Another type of adjustment allows you to edit the setpoint by adding (or subtracting) a value depending on the 0-10V input (if enabled). To enable the function, set **H22=40**, and, if appropriate, edit the value of the parameter **b15** (range 0-10), keeping in mind that if **b20**=0, 0-10Volt input, if **b20**=1, ratiometric input.
-**b20** = 0 with input at 0 Volt, the current setpoint: (Coo/Hea) setting – b15/2
-**b20** = 0 with input at 5 Volt, the setpoint will be that set (Coo/Hea)
-**b20**= 0 with input at 10 Volt, the current setpoint: (Coo/Hea) setting + b15/2
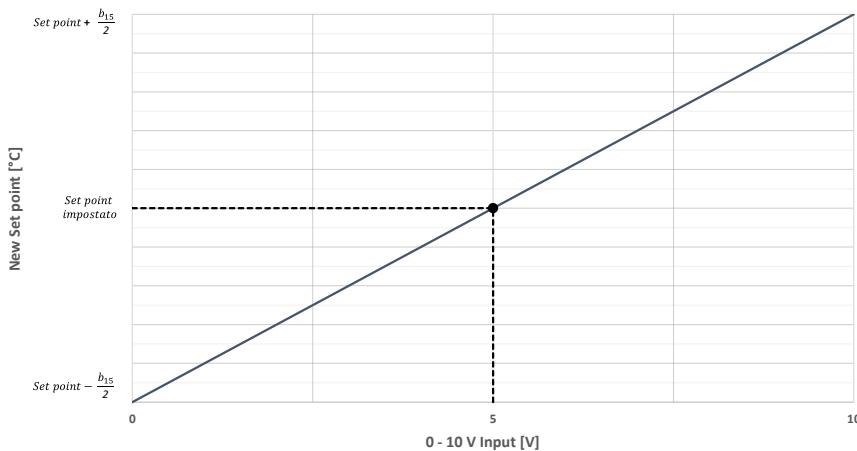
The signal must be applied to terminals X-22.1 and X-22.2- (see wiring diagrams).
-**b20** = 1 with input at 0%, the current setpoint: (Coo/Hea) setting – b15/2
-**b20** = 1 with input at 50%, the setpoint will be that set (Coo/Hea)
-**b20** = 1 with input at 100%, the current setpoint: (Coo/Hea) setting + b15/2
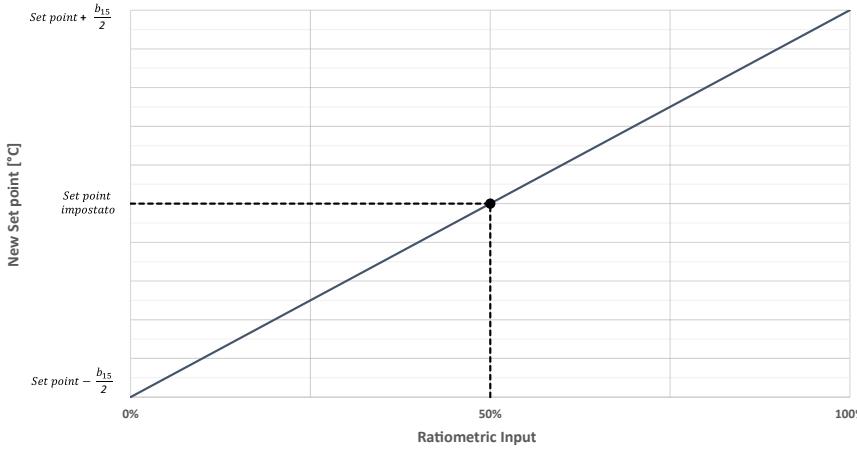
Through the terminal block, connect X-22.1 and X-22.2, while for +5V connect it directly to pin 3 of CN7 (pin 28 of the controller).

Connector	PIN 1	PIN 2	PIN 3
CN7	GND	Undervoltage input	+5V
Terminal block	X-22.1	X-22.2	Connect it directly to pin 3 of CN7 of the controller

NOTE: in "cooling" mode, having considered that the default cooling setpoint is 7°C, the parameter **b15** must not have a value of 6 or higher to prevent the new setpoint set by 0-10V input from being lower than the antifreeze triggering threshold (4°C).

7. CIRCULATOR

The circulator of the heat pump can be set in the following operating modes:
- operation on call by temperature controller

- operating on call by temperature controller with periodic activation;
- continuous operation (default);

The circulator is switched off immediately if:

- There is a manual reset pump block alarm, including the flow switch alarm;
- With remote input in standby or off, the pump (if running) is always switched off with a delay equal to **P02** in tenths of a minute (default P02=2)

The circulator can be configured with **P03** to operate independently from the compressor or on call.
0=continuous operation in heating/cooling mode(default P03=0)
1=operating on call by temperature controller
Note: with automatic reset flow switch alarm triggered, the circulator is on even if the compressor is off. The circulator is always on when the antifreeze heaters are running and if operation of the hydraulic pump in antifreeze is enabled. Antifreeze operation is enabled if the regulation temperature drops below **P04** °C (default 5°C), and disables if the regulation temperature rises above **P04+P05** °C (Default value **P05**=2,0°C).

7.1 CONTINUOUS OPERATION [P03=0] - Default

The circulator is only off with the unit OFF, in all other cases it is always on.

7.2 OPERATION ON CALL BY TEMPERATURE CONTROLLER [P03=1]

In this operating mode, the circulator is active on demand by the temperature controller, after a delay time of **P01** seconds (default **P01=30**) from when the pump switched on, the compressor switches on as well.
Whereas when switching off, the pump is deactivated after a delay time of **P02** minutes (default P02=2) from when the compressor switches off.
With automatic reset flow switch alarm triggered, the circulator is on even if the compressor is off.
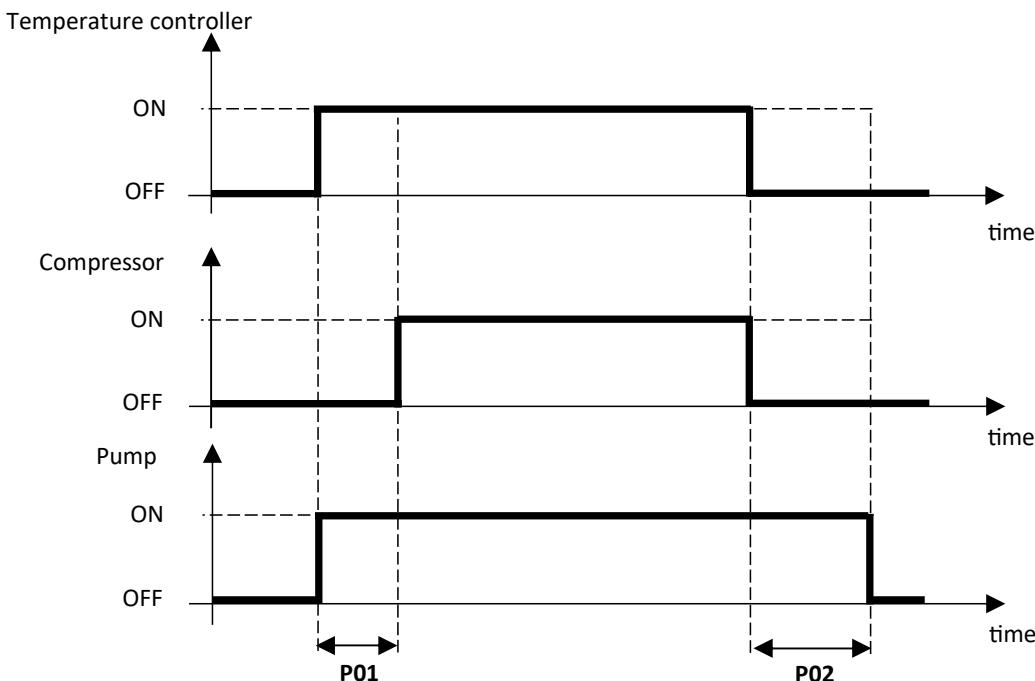
7.3 OPERATING ON CALL BY TEMPERATURE CONTROLLER WITH PERIODIC ACTIVATION

The function is disabled if **P17=0** (default).
If **P03=1**, the circulator turns on periodically for a time defined by the parameter **P17** (in seconds) after a count, lasting a time set by parameter **P16** (in minutes), activated when the pump switches off because temperature control fulfilled.
With automatic reset flow switch alarm triggered, the pump is on even if the compressor is off.
The periodical function is a suspended if the antifreeze protection trips.

7.4 OPERATION WITH HEATER ACTIVE

See paragraph 10.8.

7.5 PROPORTIONAL REGULATION OF THE CIRCULATOR

The speed of the circulator changes depending on the temperature difference between the inlet water and outlet water of the heat exchanger, according to the diagram below, where:

- **P07**: Maximum speed = 100%
- Minimum speed = 75%
- **P09**: modulating pump inlet/outlet water Delta T setting (°C) (according to model)
- **P10**: Modulating pump Delta = 3°C (default)
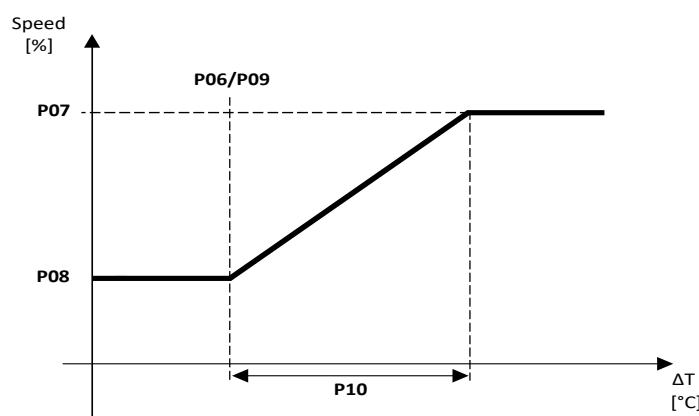
The circulator is at maximum speed in DHW production.
Note: If the parameter r33 > 0, then the circulator can be running on call even to activate the system and/or sanitary heater, see par.10.8.

7.6   SYSTEM VENTING

Function used to vent the system, with the circulator at maximum speed.
To enable the function:

- Controller **OFF**
- Access the parameters PRG ->PSS ->PRG -> (enter Service password)
- Press the **UP and DOWN** keys simultaneously for **3 seconds**

The circulator switches on at maximum speed, and then switches off after **5 minutes**.
The system venting cycle can be exited manually by pressing the **MODE/ESC** key, or by pressing the **UP and DOWN** keys simultaneously for 3 seconds.
During this function, the flow switch alarm is disabled, the maintenance technician must guarantee that there is water inside the system.

8. COMPRESSOR OR ACTIVATION LOGIC

The restart of compressors is in operation of a set point refered to the inlet water temperature. It is based on calculation of   Si basa sul calcolo di **ΔT,set** which is the difference between outlet water temperatures and inlet water temperatures, detected while the compressor for thermo-regulation is turning off.

8.1   REGULATION IN COOLING MODE

- **Tw,out,set** = adjusted setpoint in cooling
- **ΔT,set** = Tw,out,set – Tw,in,set
- **b05** = compressor delta cut-off set= 0,2°C (default)
- **b25** = delta cut-on compressor set= 2°C
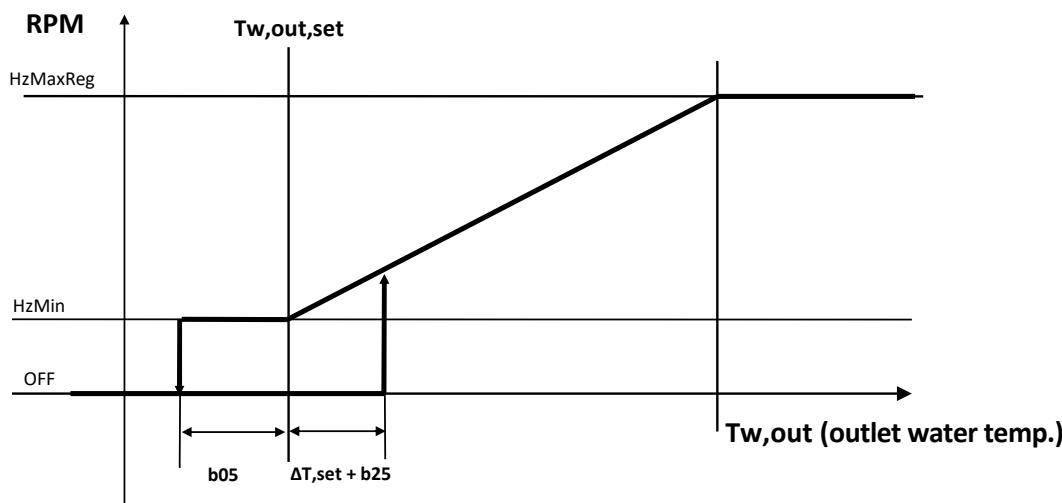
- The compressor shutdown is set by the parameter b05: the compressor shutdown when **Tw,out < Tw,out,set - b05**
- The compressor restart starts when **Tw,out > (Tw,out,set + ΔT,set + b25)**

EXCEPTION: if **ΔT,set > 8°C**, the compressors restart when the discharge probe temperature is lower than the setpoint 10°C: **Tw,out > (Tw,out,set + 10°C).**

8.2   REGULATION IN HEAT MODE

- **Tw,out,set** = setting setpoint in heat mode
- **ΔT,set** = Tw,out,set – Tw,in,set

- **b05** = compressor regulation delta cut-off = 0,2°C (default)
- **b25** = compressor regulation delta cut-on = 2°C
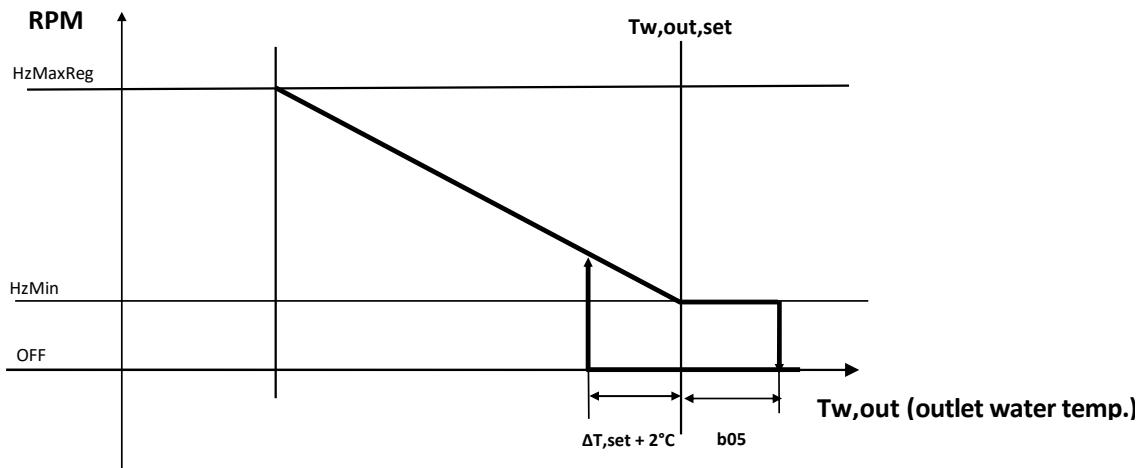
- The compressor shutdown is regulated by parameter b05: the compressor shutdown when is regulated by parameter b05 **Tw,out > Tw,out,set + b05**
- The compressor restart when: **Tw,out < (Tw,out,set - ΔTset – b25)**

EXCEPTION: if **ΔT,set > 8°C**, the compressors restart when the discarge probe temperatureis lower than the setpoint 10°C: **Tw,out < (Tw,out,set - 10°C)**

9. DISSIPATION FAN CONTROL

The dissipation control depends on the condensing pressure in chiller mode, while it depends on the evaporation pressure in heat pump mode. Ventilation control depends on operation of the compressor.
A pre-ventilation occurs every time the compressor switches on and off.

10.   CONTROLLER FUNCTIONS

The following is a list of the functions which can be activated in the machine controller; not all of them can be selected simultaneously.
Values other than the default values can jeopardise proper operation of the unit. If in doubt on which value to set, contact our headquarters.

10.1   ANTIFREEZE PROTECTION HEATERS (IF KA ACCESSORY IS AVAILABLE)

If the optional KA kit is present, the function is active by default.
The water antifreeze heaters on the faces of the evaporator plates even activate with the machine off (but powered) when the delivery water temperature drops below **r02** °C (default 4°C) in "heating" mode or below **r03** °C (default 4°C) in "cooling" mode or when switched "OFF". The heaters are switched off when the temperature measured by the outlet water probe exceeds **r02+r06** in "heating" or **r03+r06** in "cooling" or when "**OFF**" (default value r06=2.0 °C).
The heating cable at the base of the machine activates when the outdoor air temperature drops below 3°C. It deactivates when the outdoor temperature rises above 5°C.

10.2   ENABLING DOMESTIC HOT WATER PRODUCTION

To activate the domestic hot water functions, connect a probe to be placed inside the tank to terminals **X17.1-X17.2** (enabled as analogue input).
The sanitary function must be enabled after positioning and connecting the temperature probe.

I/O resource - Parameter	VALUE	Function
H10	0 (default)	Function disabled
	1	Function active in **heating** and **cooling** mode. The remote on-off function **does not disable** DHW production.
	2	Function active in **heating** and **cooling** mode. The remote on-off function **disables** DHW production.
	3	Function active in **heating** mode. The remote on-off function **does not disable** DHW production.
	4	Function active in **heating** mode. The remote on-off function **disables** DHW production.
	5	Function active in **cooling** mode. The remote on-off function **does not disable** DHW production.
	6	Function active in **cooling** mode. The remote on-off function **disables** DHW production.
ST6 can be activated via H17	6	DHW temperature probe enabling
DO6 can be activated via H84	6	DHW valve control

If the domestic hot water temperature is lower than its setting (set by default at 48°C, edited by accessing the menu **PRG->Set->SAN**) the machine activates the DHW valve and the compressor is set at maximum frequency, starting modulation one degree before the setting and switching off one degree after. When the set point is reached, the valve goes back to the rest condition and the compressor starts to regulate normally.

Switching from utility water to domestic hot water, the working probe changes from "water outlet probe" to "DHW tank probe". Switching from winter mode to sanitary mode, the compressor does not switch off and is brought to the maximum frequency established by the controller, whereas switching from summer mode to domestic hot water, the compressor is switched off and waits a safety time.
Defrosting is always carried out in winter mode on the utility side, and never on the domestic hot water tank.
NOTE:
-If **H10** = 1/3/5. Switching off the unit by remote control (remote on-off, see paragraph 10.4.1) does not affect domestic hot water operation. The unit goes to priority sanitary mode just powered on. The display on the machine shows the temperature detected by the probe inside the DHW tank. When the sanitary cycle has finished, the display goes back to showing the water outlet probe temperature.
If the remote ON-OFF digital input (terminals 15.1 / 15.2) is open, with sanitary function enabled (H10=1 and H20=6), the wording "SAN" will appear on the machine display. When the sanitary cycle has finished, the display goes back to showing "E00" indicating that the remote ON-OFF contact is open.
-If **H10** = 2/4/6, the remote on-off function disables domestic hot water production and operation of the heat pump in heatin and cooling mode, system side.

10.2.1   MEMORISING THE PROBE IN HEATING MODE

Switching from utility water to domestic hot water, the working probe changes from "water outlet probe" to "DHW tank probe". For this reason, in heating mode, before entering sanitary mode, the last value read by the heat pump delivery probe is stored.
When sanitary temperature control is fulfilled, the system side temperature of reference goes back to that previously stored. The memory function interrupts:

- when the temperature read by the probe becomes lower than the stored value;
- or when a time equal to **b06** seconds (default b06 = 45) has elasped.

10.2.2   HEATING MODE ON DHW STORAGE TANK

If the parameter **H130=1**, the machine exploits the DHW storage tank even for central heating. In these conditions, the outlet of the DHW valve is also enabled during operation in heating mode and not only in sanitary mode. The valve is deactivated during defrosting and in cooling mode.
When **H130=1**, the DHW integration heater can be enabled also to act as system integration heater: to do this, set **r10=1** e **r15=2** (for other **r15** settings see Paragraph 10.6.3); furthermore no digital output must be set as system integration heater.

10.2.3   INSUFFICIENT HEAT EXCHANGE IN A DHW SYSTEM

During DHW production, if the heat pump flow probe detects a temperature higher than 60°C, the DHW valve output is de-energised (DO6), and the value of the DHW probe at this time is recorded (Tsan,set).
-if the operation is San or Cool+San the compressor is stopped.
-If the operation is Heat+San, the system evaluates for b06 seconds whether there is a demand for heating from the system. If the system requires it, the compressor continues to work on the system, otherwise it is switched off.
-If the DHW resistor is present (e.g. DO3, H81=26), r15 = 0 or 1 and r24=2 or 3 it is activated until the DHW setpoint detected by the DHW probe is met (and any offset).
The compressor restarts when the flow temperature of the heat pump falls below 60°C again and the temperature measured by the DHW probe is lower than Tsan,set - 4°C.

10.3   REMOTE-CONTROLLED FUNCTIONS

Not all of the configurations can be activated and/or modified at the same time
The terminal block has digital inputs to control the unit via an external consent.

10.3.1   ON/OFF

The function is enabled by default on digital input ID 3 (terminals X15.1/X15.2).
Remove the terminal block jumper to place the unit in standby (the text "**E00**" appears on the controller display). When the contact closes, the machine comes out of standby and the circulator switches on for 2 minutes.
Function enabled by default (Parameter **H47=2**).

I/O Resource- Parameter	Function
ID3 can be activated via H47	Enables remote On /Off function

If the unit is switched off by remote control during defrosting, the heat pump finishes defrosting and then places itself in off mode via remote control.

10.3.2   SUMMER/WINTER MODE CHANGE

The function can be set on digital input ID 2 (terminals X16.1/X16.2).
Heating or cooling mode of the heat pump can be managed by remote control.

I/O resource - Parameter	Value	Function
ID2 can be activated via H46	3	Open contact -> heat pump in cooling mode. Closed contact -> heat pump in heating mode.

The poles of the digital input can be swapped by setting H75 = 2

10.3.3   DHW ENABLE FROM DIGITAL INPUT

Function which can be activated instead of managing the double setpoint.
If DHW mode is enabled, instead of using the temperature probe, the domestic hot water function can be activated by the opening/closing of a digital input on the unit. This function is recommended when using two or more heat pumps in cascade hydronically connected to the same domestic hot water storage tank; this way activation of the domestic hot water function is controlled by the tank probe connected to the first unit, while the other units are enabled automatically by digital consent.
The system goes to sanitary mode when the digital input closes and exits DHW production when it opens.

I/O resource - Parameter	Value	Function
ID9 can be activted via H53	28	Closed contact -> active DHW call. Open contact -> inactive DHW call.

The poles of the digital input can be swapped by setting H76=1

The SAN setpoint of the heat pump is not considered, the designer is in charge of managing this setpoint, taking into account domestic hot water protection and configuration of the entire system.

10.4   SYSTEM WATER REMOTE PROBE

In some engineering solutions (e.g. heat pump in parallel to boiler on same hydronic circuit and shut off diverter valve) it could be necessary to enable a system remote temperature probe so that the controller can correctly process the management.

I/O resource- Parameter	Value	Description
ST7 can be activated via H18	41	Enables plant remote probe

In the presence of the system remote probe, if the storage tank temperature is satisfied, it is avoided to activate the compressors even if the regulation probe requires it.
The conditions for the application of thermoregulation lockout are as follows:
- the heat pump is not performing DHW
- the heat pump is not defrosting
- all compressors are switched-off
The blocking conditions are as follows:

Operating mode		Blocking conditions of thermoregulation
	heating	System remote probe > setpoint - b22
	cooling	System remote probe < setpoint + b22

Nota: b22=5°C. See paragraph 13.

10.5   AUXILIARY HEATERS

In certain engineering solutions, it could be necessary to use an additional heater for the plant or for domestic hot water.
Parameter **r24** must be set to define the operating mode of the additional heaters:
- **r24=0** integration heaters not used;
- **r24=1** only plant integration heater used;
- **r24=2** only DHW integration heater used;
- **r24=3** both plant and DHW integration heaters used.

10.5.1   PLANT HEATER

If the regulation temperature remains below **water setpoint in heating (Hea) – 0.5°C** for a time equal to **r12** the integration heater is activated according to operation of the machine in joint time slots or in substitution, as indicated in Paragraph 10.11.
The heater switches off when the setpoint is reached (also taking into account an offset set with parameters **r29** or **r30**).
If the regulation temperature remains below the **water setpoint minus r11** (°C) and the machine is blocked due to triggering of an alarm, the heater switches on. It switches off when the machine exits the alarm block.

I/O resource - Parametro	Value	Function
r10	1	Function enabling
r11	0.5°C (default)	Heaters in heating integration delta
r12	10 minutes (default)	Heaters in heating integration delta
r24	1/3	Type of use of heaters
D03 can be activated via H81	22	Plant integration heater

10.5.2   PLANT HEATER IN DEFROST

During the **defrost cycle** (see Paragraph 10.12.2), setting **r21=1** (in addition to **r10=1** and **r24=1** or **3**) activates the plant side electric heater, if requested (regulation temperature lower than **water setpoint -r11**(°C), without waiting the time defined by **r12**.

10.5.3   DHW HEATER

Function which can be activated instead of managing the plant heater
This is an additional resource for heating the domestic hot water storage tank if the compressor alone is not capable of fulfilling the request in a reasonable time.

If domestic hot water production lasts longer than **r16** (minutes) or if the machine blocks due to triggering of an alarm, the heater switches on. It switches off when the unit finishes domestic hot water production (also taking into account an offset on the setpoint with parameter **r31**, as explained in Paragraph 10.11.1).

I/O resource - Parameter	Value	Function
r15	1	Function enabling
r16	10 minutes (default)	DHW integration activation delay
r24	2/3	Type of use of heaters
D03 can be activated via H81	26	Plant integration heater

Note: The domestic hot water function must be enabled (see paragraph 10.2)

10.5.4   SINGLE PLANT/DHW INTEGRATION HEATER

By configuring the DHW integration heater, it is possible to use this heater declared also as plant integration heater, setting the parameter **r15**=2 and **r24**=3.
In case of plant integration demand, the heater declared as DHW integration is activated, thus allowing to have a single integration heater for plant, domestic hot water and plant under defrost.

10.6   INTEGRATION HEATER SELECTION MODE

The priority can be set in the order to activate the plant side and sanitary side integration heaters; specifically the configurations are:
1. **r14=0** (default), the heaters can be activated simultaneously, if present;
2. **r14=1**, the heaters can be activated, excluding one another:
2.1. **r20=0**, priority to the plant (the DHW heater only switches on if the temperature control for the plant side heater is fulfilled);
2.2.**r20=1**, priority to DHW (the plant side heater only switches on if the temperature control for the sanitary side heater is fulfilled).

10.7   CIRCULATOR MANAGEMENT WITH HEATER ON

The circulator of the heat pump can be activated when the plant and/or DHW integration heaters are active with the compressors not running (by substitution, by alarm or by integration in bracket II or III).
-r33 = 0: The circulator of the heat pump is activated on demand of the compressors or boiler,
-r33 = 1: The circulator of the heat pump is activated if the plant heater is active.
-r33 = 2: 2: The circulator of the heat pump is activated if the DHW heater is active.
-r33 = 3: The circulator of the heat pump is activated if the plant or DHW heater is active.
The circulator switches off after post-pumping (**P02**).

10.8   BOILER ENABLING

Function which can be activated instead of managing the double setpoint.
This is an additional resource to enable the boiler in integration or substitution of the heat pump.
Define the use mode by setting the parameter **r23**:

- **r23=0** (default) boiler not used (operating priority of heaters);
- **r23=1** only boiler on plant used (operating priority of heaters);
- **r23=2** only DHW boiler used (operating priority of heaters);
- **r23=3** DHW and plant boiler used (operating priority of heaters);
- **r23=4** only boiler on plant with priority used (no heater operating priority);
- **r23=5** only boiler in sanitary with priority used (no heater operating priority);
- **r23=6** boiler on plant and in sanitary with priority used (no heater operating priority);

Define the supply of the boiler, setting parameter **r32**:

- **r32** = 0: boiler without circulator with temperature control by heat pump,
- **r32** = 1: boiler with autonomous circulator with temperature control by heat pump;
- **r32** = 2: boiler without circulator with autonomous temperature control;
- **r32** = 3: boiler with circulator with autonomous temperature control.

I/O resource- Parameter	Value	Function
r10	1	Plant integration enabling
r12	10 minutes (default)	Plant integration activation delay
r15	1	DHW integration enabling
r16	10 minutes (default)	DHW integration activation delay
r23	1÷6	Type of use of boiler
r32	1÷3	Boiler supply
DO3 can be activated via H81	29	Boiler enabling

10.9   ACTIVATION OF INTEGRATION HEATERS AND BOILER IN JOINT OPERATION AND IN SUBSTITUTION OF HEAT PUMP COMPRESSOR

The auxiliary parts that can be used for joint operation or for operation in substitution are:

- **boiler**
- **plant integration heater**
- **DHW integration heater**

Considering the operating modes in heating and/or DHW, there are 4 operating areas:
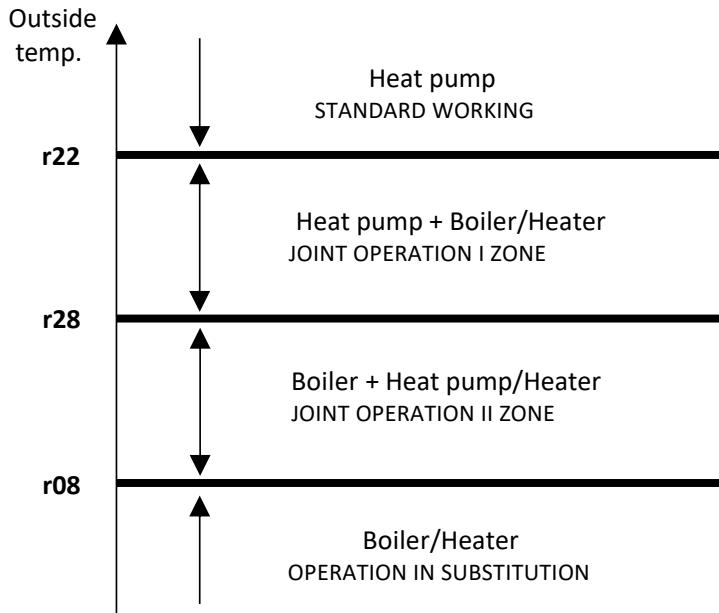
If you need to change the values of the parameters **r22, r28, r08**, follow **r22 ≥ r28 ≥ r08**.
Setting **r22=r28** allows you to eliminate the zone relative to joint operation bracket I; setting **r28=r08** allows you to eliminate the zone relative to joint operation bracket II; setting **r22=r28=r08** allows you to eliminate both brackets relative to joint operation.
Do not modify value r08, as it could jeopardise operation of the unit

10.9.1   OPERATION IN HEAT PUMP MODE

Normale operation of the heat pump in which the integration heaters and-or the boiler only intervene when a heat pump alarm is triggered.

10.9.2   JOINT OPERATION (I BRACKET)

If the outdoor temperature is between **r22** and **r28**, the compressor operates in synergy with the auxiliary heaters in winter or DHW mode.
In this operating bracket, first the heat pump is activated and after **r12** minutes the plant side auxiliary heaters, or after **r16** minutes the sanitary side auxiliary heaters.
The intervention priorities are defined by the parameters **r14**, **r20**, **r23**, **r24**.
It goes back to **normal** operation if the outdoor temperature is greater than **r22**+1.0 (°C).
NOTE: In the joint operating bracket, the boiler is temperature controlled by the plant water remote probe (if enabled). In particular, if the temperature detected by the remote probe is lower than the **Hea** setpoint, the boiler is switched on and then will go off when the temperature detected by the remote probe is higher than the **Hea** setpoint. The heat pump follows the activation logic described in paragraph 10.5.
If the remote plant water probe is not enabled, the boiler will be managed by the delivery probe of the heat pump.

10.9.3   JOINT OPERATION (II BRACKET)

If the outdoor temperature is between **r28** and **r08**, the compressor operates in synergy with the auxiliary heaters.
In this operating bracket, first the boiler is activated, then the heat pump and auxiliary heaters intervene after a time defined by **r12** (minutes) for the plant side and **r16** (minutes) for the sanitary side
The intervention priorities are defined by the parameters **r14**, **r20**, **r23**, **r24**.
It goes back to normal operation if the temperature rises above **r28**+1.0 (°C).
Note: In the joint operating bracket, the boiler is temperature controlled by the plant water remote probe (if enabled). In particular, if the temperature detected by the remote probe is lower than the **Hea** setpoint, the boiler is switched on and then will go off when the temperature detected by the remote probe is higher than the **Hea** setpoint. The heat pump follows the activation logic described in paragraph 10.5.
If the remote plant water probe is not enabled, the boiler will be managed by the delivery probe of the heat pump.

10.9.4   OPERATION IN SUBSTITUTION

If the outdoor temperature drops below **r08** use of the heat pump compressor will be inhibited.
- If the auxiliary system is composed of plant and/or DHW heaters, they are active in substitution of the compressor with defined times, **r12** (minutes) for plant side and **r16** (minutes) for sanitary side.
Whereas in the operation in substitution bracket, the integrations do not need to be enabled with **r10** or **r15** as the heaters need to operate in substitution (and not in integration) of the heat pump (therefore simply select the type of use with the parameter **r24**).
- If the auxiliary system is a boiler with autonomous circulator (**r32** = **1** or **3**).
The circulator of the heat pump is off, after **P01** (default 30 seconds) the boiler is enabled.
NOTE: With water side antifreeze protection, the pump used is activated (or remains active) anyhow.
- If the auxiliary system in substitution is a boiler with autonomous temperature control (**r32** = **0** or **2**).
The boiler is enabled regardless of the temperature control of the heat pump.
- If the auxiliary system in substitution is a boiler without circulator (**r32** = **0** or **2**).
The circulator of the heat pump is on when the boiler is enabled.
The compressor switches back on if the temperature rises above **r08**+ **r09** (°C) (r09=1.0 °C by default).

10.10   OPERATING BRACKETS - ACTIVATION OF INTEGRATION HEATERS (PLANT REMOTE WATER PROBE NOT ENABLED)

The possible configurations of the integration parameters are listed in tables 1,2,3 and 4 shown below, divided by operating brackets (the operating modes and possible values of the parameters are indicated in the "STATUS" boxes and in the parameters "**rxx**" so that a given order

of intervention of the integrations occurs in a certain operating mode of the unit; other statuses and values of the parameters can be selected instead and therefore they are provided in the same cell separated by the symbol "/").

N°	INTEGRATIONS INTERVENTION ORDER (with set-point not reached and machine blocked by alarm)	STATUS	OPERATION	r10	r15	r12	r16	r23	r24
	TABLE 1. NORMAL OPERATION IN HEAT PUMP MODE								
1	1) **Plant integration heater**	HEAT/ HEAT+SAN	HEAT	1	0/1/2	/	/	0/2/5	1/3
2	1) **Boiler**	HEAT/ HEAT+SAN	HEAT	0/1/2	0/1/2	/	/	1/3/4/6	0/2
3	1) **Plant integration heater** 2) After 12 mnutes, **boiler**	HEAT / HEAT+SAN	HEAT	1	0/1/2	Set the minutes	/	1/3	1/3
4	1) **Boiler** 2) After r12 minutes, **plant integration heater**	HEAT / HEAT+SAN	HEAT	1	0/1/2	Set the minutes	/	4/6	1/3
5	1) **DHW integration heater**	HEAT+SAN	DHW	0/1	1	/	/	0/1/4	2/3
6	1) **Boiler**	HEAT+SAN / COOL+SAN	DHW	0/1	0/1/2	/	/	2/3/5/6	0/1
7	1) **DHW integration heater** 2) After r16 minutes, **boiler**	HEAT+SAN	DHW	0/1	1	/	Set the minutes	2/3	2/3
8	1) **Boiler** 2) After r16 minutes, **DHW integration heater**	HEAT+SAN	DHW	0/1	1	/	Set the minutes	5/6	2/3
9	1) **Plant/DHW integration heater**	HEAT / HEAT+SAN	HEAT/DHW	1	1	/	/	0	3
10	1) **Boiler**	HEAT / HEAT+SAN	HEAT/DHW	0/1	0/1/2	/	/	3/6	0
11	1) **Plant/DHW integration heater** 2) After r12 minutes, **boiler**	HEAT / HEAT+SAN	HEAT/DHW	1	1	Set the minutes	Set the minutes	3	3
12	1) **Boiler** 2) After r12 minutes, **plant/DHW integration heater**	HEAT / HEAT+SAN	HEAT/DHW	1	1	Set the minutes	Set the minutes	6	3

N°	INTERVENTION ORDER (with setpoint not reached)	STATUS	OPERATION	r10	r15	r12	r16	r23	r24
	TABLE 2. JOINT OPERATION, BRACKET 1								
1	1) **Heat pump** 2) After r12 minutes, **plant integration heater**	HEAT / HEAT+SAN	HEAT	1	0/1/2	Set the minutes	/	0/2/5	1/3
2	1) **Heat pump** 2) After r12 minutes, **boiler**	HEAT / HEAT+SAN	HEAT	0/1	0/1/2	Set the minutes	/	1/3/4/6	0/2
3	1) **Heat pump** 2) After r12 minutes, **plant integration heater** 3) After further r12 minutes, **boiler**	HEAT / HEAT+SAN	HEAT	1	0/1/2	Set the minutes	/	1/3	1/3
4	1) **Heat pump** 2) After r12 minutes, **boiler** 3) After further r12 minutes, **plant integration heater**	HEAT / HEAT+SAN	HEAT	1	0/1/2	Set the minutes	/	4/6	1/3
5	1) **Heat pump** 2) After r16 minutes, **plant integration heater**	HEAT+SAN	DHW	0/1	1	/	Set the minutes	0/1/4	2/3
6	1) **Heat pump** 2) After r16 minutes, **boiler**	HEAT+SAN/	DHW	0/1	0/1/2	/	Set the minutes	2/3/5/6	2/3
7	1) **Heat pump** 2) After r16 minutes, **plant integration heater** 3) After further r16 minutes, **boiler**	HEAT+SAN	DHW	0/1	1	/	Set the minutes	2/3	2/3
8	1) **Heat pump** 2) After r16 minutes, **boiler** 3) After further r16 minutes, **DHW integration heater**	HEAT+SAN	DHW	0/1	1	/	Set the minutes	5/6	2/3
9	1) **Heat pump** 2) After r12 minutes, **plant/DHW integration heater**	HEAT / HEAT+SAN	HEAT/DHW	1	1	Set the minutes	Set the minutesi	0	3

22

	TABLE 2. JOINT OPERATION, BRACKET 1								
N°	**INTERVENTION ORDER (with setpoint not reached)**	**STATUS**	**OPERATION**	**r10**	**r15**	**r12**	**r16**	**r23**	**r24**
10	1) **Heat pump** 2) After r12 minutes, **boiler**	HEAT / HEAT+SAN	HEAT/DHW	0/1	0/1/2	Set the minutes	Set the minutes	3/6	0
11	1) **Heat pump** 2) After r12 minutes, **plant/DHW integration heater** 3) After further r12 minutes, **boiler**	HEAT / HEAT+SAN	HEAT/DHW	1	1	Set the minutes	Set the minutes	3	3
12	1) **Heat pump** 2) After r12 minutes, **boiler** 3) After further r12 minutes, **plant/DHW integration heater**	HEAT / HEAT+SAN	HEAT/DHW	1	1	Set the minutes	Set the minutes	6	3

	TABLE 3. JOINT OPERATION, BRACKET 2								
N°	**ORDINE INTERVENTO (with setpoint not reached)**	**STATUS**	**OPERATION**	**r10**	**r15**	**r12**	**r16**	**r23**	**r24**
1	1) **Boiler** 2) After r12 minutes, **heat pump**	HEAT / HEAT+SAN	HEAT	0/1	0/1/2	Set the minutes	/	1/3/4/6	0/2
2	1) **Boiler** 2) After r12 minutes, **plant integration heater** 3) After further r12 minutes, **heat pump**	HEAT / HEAT+SAN	HEAT	1	0/1/2	Set the minutes	/	1/3	1/3
3	1) **Boiler** 2) After r12 minutes, **heat pump** 3) After further r12 minutes, **plant integration heater**	HEAT / HEAT+SAN	HEAT	1	0/1/2	Set the minutes	/	4/6	1/3
4	1) **Plant integration heater** 2) After r12 minutes, **heat pump**	HEAT / HEAT+SAN	HEAT	1	0/1/2	Set the minutes	/	0/2/5	1/3
5	1) **Boiler** 2) After r16 minutes, **heat pump**	HEAT+SAN	DHW	0/1	0/1/2	/	Set the minutes	2/3/5/6	0/1
6	1) **Boiler** 2) After r16 minutes, **DHW integration heater** 3) After further r16 minutes, **heat pump**	HEAT+SAN	DHW	0/1	1	/	Set the minutes	2/3	2/3
7	1) **Boiler** 2) After r16 minutes, **heat pump** 3) After further r16 minutes, **DHW integration heater**	HEAT+SAN	DHW	0/1	1	/	Set the minutes	5/6	2/3
8	1) **DHW integration heater** 2) After r16 minutes, **heat pump**	HEAT+SAN	DHW	0/1	1	/	Set the minutes	0/1/4	2/3
9	1) **Boiler** 2) After r12 minutes, **heat pump**	HEAT / HEAT+SAN	HEAT/DHW	1	1	Set the minutes	Set the minutes	3/6	0
10	1) **Boiler** 2) After r12 minutes, **plant/DHW integration heater** 3) After further r12 minutes, **heat pump**	HEAT / HEAT+SAN	HEAT/DHW	1	1	Set the minutes	Set the minutes	3	3
11	1) **Boiler** 2) After r12 minutes, **heat pump** 3) After further r12 minutes, **plant/DHW integration heater**	HEAT / HEAT+SAN	HEAT / SANITARIO	1	1	Set the minutes	Set the minutes	6	3
12	1) **Plant/DHW integration heater** 2) After r12 minutes, **heat pump**	HEAT / HEAT+SAN	HEAT/DHW	1	1	Set the minutes	Set the minutes	0	3

	TABLE 4. OPERATION IN SUBSTITUTION								
N°	**INTERVENTION ORDER (with setpoint not reached)**	**STATUS**	**OPERATION**	**r10**	**r15**	**r12**	**r16**	**r23**	**r24**
1	1) **Boiler** 2) After r12 minutes, **Plant integration heater**	HEAT / HEAT+SAN	HEAT	0/1	0/1/2	Set the minutes	/	4/6	1/3
2	1) **Plant integration heater** 2) After r12 minutes, **boiler**	HEAT / HEAT+SAN	HEAT	0/1	0/1/2	Set the minutes	/	1/3	1/3
3	1) **Boiler** 2) After r12 minutes, **DHW integration heater**	HEAT+SAN	DHW	0/1	0/1/2	/	Set the minutes	5/6	2/3
4	1) **DHW integration heater** 2) After r12 minutes, **boiler**	HEAT+SAN	DHW	0/1	0/1/2	/	Set the minutes	2/3	2/3
5	1) **Boiler** 2) After r12 minutes, **Plant/DHW integration heater**	HEAT / HEAT+SAN	HEAT/DHW	0/1	0/1/2	Set the minutes	Set the minutes	6	3

23

TABLE 4. OPERATION IN SUBSTITUTION									
N°	INTERVENTION ORDER (with setpoint not reached)	STATUS	OPERATION	r10	r15	r12	r16	r23	r24
6	1) **Plant/DHW integration heater** 2) After r12 minutes, **boiler**	HEAT / HEAT+SAN	HEAT/DHW	0/1	0/1/2	Set the minutes	Set the minutes	3	3
7	1) **Boiler**	HEAT / HEAT+SAN	HEAT	0/1	0/1/2	Set the minutes	/	1/3/4/6	0/2
8	1) **Plant integration heater**	HEAT / HEAT+SAN	HEAT	0/1	0/1/2	Set the minutes	/	0/2/5	1/3
9	1) **Boiler**	HEAT+SAN	DHW	0/1	0/1/2	/	Set the minutes	2/3/5/6	0/1
10	1) **DHW integration heater**	HEAT+SAN	DHW	0/1	0/1/2	/	Set the minutes	0/1/4	2/3
11	1) **Boiler**	HEAT / HEAT+SAN	HEAT/DHW	0/1	0/1/2	Set the minutes	Set the minutes	3/6	0
12	1) **Plant/DHW integration heater**	HEAT / HEAT+SAN	HEAT/DHW	0/1	0/1/2	Set the minutes	Set the minutes	0	3

Table 5 shows the settings to be configured to enable the integrations in "summer and sanitary" mode (in this case the only activation that can be activated is the DHW integration heater and the division into operating brackets does not apply).

TABLE 5. OPERATION IN COOL+SAN (DHW RUNNING)									
N°	INTEGRATIONS INTERVENTION ORDER -With setpoint not reached after r16 minutes from the start-up of the compressor or with setpoint not reached with machine blocked by alarm.	STATUS	OPERATION	r10	r15	r12	r16	r23	r24
1	1) DHW integration heater	COOL+SAN	DHW	0/1	1	/	Set the minutes	0/1/2/3/4/5/6	2/3

Table 6 shows the behaviour of the plant and DHW integration heaters in all the operating modes of the unit.

TABLE 6. INTEGRATION HEATERS OPERATION				
N°	STATUS	OPERATION	PLANT INTEGRATION HEATER	DHW INTEGRATION HEATER
1	HEAT+SAN	HEAT	Works as indicated in TABLE 1,2,3 and 4.	In "HEAT+SAN", by default sanitary temperature control has priority over that of the plant, therefore if required by the temperature control, the unit goes to "SANITARY" mode and the DHW integration heater acts as indicated in TABLES 1,2,3 and 4.
2	HEAT+SAN	DHW	Only if all 3 of the following conditions are met: -the output is configured for Plant integration heater; -**r24=1/3**; -**plant water temperature remote probe present and configured**; the plant integration heater is activated in the following situations: - **r12** minutes after the start of its count activated in "HEAT" mode previously running (see line 1); - if its count is not already activated in the previous "HEAT" mode, **r12** minutes after the temperature control demand. - In SANITARY mode, with remote probe not configured, the plant integration heater is deactivated or any of its counts are interrupted. - With "remote on-off" contact open, the Plant integration heater is deactivated.	Works as indicated in TABLES 1,2,3 and 4.
3	COOL+SAN	DHW	Cannot be activated	Works as indicated in TABLE 5.
4	COOL+SAN	COOL	Cannot be activated	Cannot be activated

10.10.1 AUXILIARY SYSTEMS OFFSET MANAGEMENT

Lastly you may establish that the boiler and/or integration heaters (according to the resources and selected priorities) have a setpoint in heating mode and in sanitary mode higher than that of the heat pump. This is achieved by setting an offset on the following setpoints:

- **r29** = First setpoint temperature offset for boiler and plant heaters (**G02**);
- **r30** = Second setpoint temperature offset for boiler and plant heater (**G05**);
- **r31** = Temperature offset for boiler and DHW heaters (**G03**);

This way the heat pump stops at the setpoint (**G02,G03,G05**) and the temperature difference, according to the set outset, will be supplied by the boiler and/or heaters.

10.11   WARNINGS

If the double setpoint function is **not** active, **one** of the following warnings can be configured.

10.11.1   PLANT SEASON

A digital output can be configured indicating the operating season of the unit, plant side.
The output is active in summer mode, while it is deactivated in OFF or heating mode.
During DHW production and defrosting, the output maintains the setting of the source season.

I/O Resource (Parameter)	Value	Function
DO7 can be activated via H85	31	Plant season warning

10.11.2   ALARM

È possibile configurare un'uscita in tensione che segnali la presenza di un allarme.

I/O Resource Parameter	Value	Function
DO7 can be activated via H85	24	Alarm warning

10.11.3   MACHINE BLOCK

A live output can be configured signalling the presence of an alarm.

I/O Resource Parameter	Value	Function
DO7 can be activated via H85	47	Alarm warning

10.11.4   DEFROST

A digital output can be configured signalling defrosting in progress.

I/O Resource Parameter	Value	Function
DO7 can be activated via H85	21	Defrost in progress warning

10.12   DEFROST CYCLE

The defrost cycle is only active in heat pump mode and is used to prevent the formation of ice on the surface of the air/air coil. The formation of ice on the evaporator, which is quite frequent with very low outdoor temperatures, in addition to considerably downgrading the thermodynamic performance of the unit, also risks damaging the unit itself.

If the unit is switched off by remote control during defrosting, the heat pump finishes defrosting and then places itself in off mode via remote control.

10.13   COMPRESSOR CRANKCASE HEATER

The crankcase heater is activated if the compressor has been off for at least 30 minutes and if the discharge temperature is below a certain threshold of 20 °C (with hysteresis of 2.0°C). The crankcase heater is disabled when the compressor starts back up.

10.14   DOUBLE SET-POINT

This function introduces a second working set-point on the plant side, both in cooling and heating mode.
The user terminal board allows a consent to be connected to switch from the first to the second set-point and configured at digital input ID9 with parameter **H53 = 26**. The valve, on the other hand, is connected in the terminal board to digital output DO7 and is configured via parameter **H85**.

Parameter	VALUE	Function
H53	26	Second set-point call
H85	25	3-way valve for radiant panels
H129	0	Function disabled (default)
	1	Function configured but not active
	2	Enabled only in cooling mode
	3	Enabled only in heating mode
	4	Enabled in cooling and heating mode
H138	0	DHW second setpoint function disabled (default)
	1	Enabled the second DHW set point in cooling mode
	2	Enabled the second DHW set point in heating mode
	3	Enabled the second DHW set point in cooling and heating mode

10.15   MINIMUM HZ FUNCTIONALITY

Configuring parameter L02=1 and L03≠0 reduces the nominal operating Hz of the compressor.

Parameter	VALUE	Function
L02	0	Function not active
	1	Enabling minimum Hz
L03	0	Function not active
	1	Function active only in cooling mode
	2	Function active only in heating mode
	3	Function active only in sanitary mode
	4	Function active in cooling and sanitary mode
	5	Function active in heating and sanitary mode
	6	Function active in cooling and heating mode
	7	Function always active

With the function active, the output and power of the unit are limited, for additional information see the installer user manual.
Configuring a digital input ID9 with parameter H53=21, the function can be managed.

Parameter	VALUE	Function
H53	0 (default)	Function disabled
	21	Open contact -> standard mode Closed contact -> mode Hz min/max

10.16   MAXIMUM HZ FUNCTIONALITY

Activating the function increases the power of the unit, please contact us for information.

10.17   FLOWMETER

It is possible to connect a ratiometric flowmeter to CN7 terminals of the controller respecting the table below:

Connector	PIN 1	PIN 2	PIN 3
CN7	GND	Voltage input	+5V
Terminal block	X-22.1	X-22.2	Connect it directly to pin 3 of CN7 of the controller

Enable the parameter H22=45 (configuration ST11).

I/O Resource - Parameter	Value	Function
H22	45	Water flow

The flowmeter must have the following characteristics:
- Signal range 0.5 ÷ 3.5V (0l/min at 0.25V)
- 5Vdc power supply
- Power <50mW
- Inductive load > 10kΩ

Once the flow meter is enabled, set the following parameters:

Parameter	Value	Desription
Ac09	2.0	Minimum flowmeter rate
Ac10	0.5	Flowmeter output at minimum flow
Ac11	40	Maximum flow meter
Ac12	3.5	Flowmeter outlet at the minimum flow rate

11.   FUNCTIONS THAT CAN BE ACTIVATED WITH HI-T2 ACCESSORY (OPTIONAL)

This is a touch screen remote control for centralised management of a chiller/heat pump network. It includes humidity and temperature sensors for the thermo hygrometric analysis of the environment and for the management of the double set point for radiant floor heating systems that use a dehumidification system.
The intuitive interface simplifies the use of the controller; all the functions can be easily set through the use of an easy to understand synoptic.
The Hi-T remote control allows you to manage the following functions:

- Remote management;
- Management of a network, up to 7 heat pumps;
- Zone thermostat;
- Screed function;
- Antilegionella disinfection;
- Double set-point and humidity measurement;
- Dew point control;

- Climatic compensation;
- Booster circulator management;
- Management of single pump in a network;
- Alarm diagnostic system.

12. FUNCTIONS THAT CAN BE ACTIVATED WITH GI MODULE (OPTIONAL)

The Gi module is an optional kit which allows you to manage the following functions:
- Booster circulator management with the aid of a room thermostat (not supplied);
- Management of a plant side mixer valve both in heating and cooling mode;
- Solar – thermal integration management.

12.1 I/O RESOURCES OF THE CONTROLLER

The following is the list of I/O (inputs and outputs) that can be set to activate the functions of the controller.

Resource	Parameter	Terminal block XGI	Factory configuration		Description
			Default value	Function	
ST 5E	H27	1.1 / 1.2	0	Not set	Analogue input configurable with an NTC-10kΩ probe at 25°C β 3435
ST 6E	H28	2.1 / 2.2	0	Not set	Analogue input configurable with an NTC-10kΩ probe at 25°C β 3435
ST 7E	H29	3.1 / 3.2	0	Not set	Analogue input configurable with an NTC-10kΩ probe at 25°C β 3435
ID 9E	H63	4.1 / 4.2	0	Not set	Voltage-free digital input
DO 1E	H86	5.1 (phase) 6.2(neutral)	0	Not set	230Vac, 50Hz, 2A (AC1) single-phase live output.
DO 2E	H87	5.2 (phase) 6.2(neutral)	0	Not set	230Vac, 50Hz, 2A (AC1) single-phase live output.
DO 3E	H88	7.1 (phase) 7.2(neutral)	0	Not set	230Vac, 50Hz, 2A (AC1) single-phase live output.
DO 4E	H89	8.1 (phase) 8.2(neutral)	0	Not set	230Vac, 50Hz, 2A (AC1) single-phase live output.
DO 5E	H90	9.1 (phase) 9.2(neutral)	0	Not set	230Vac, 50Hz, 2A (AC1) single-phase live output.

GI terminal block
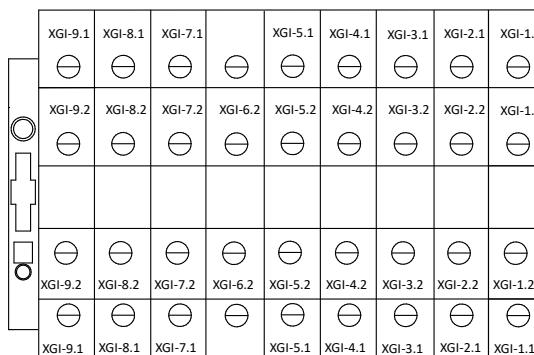
12.2 MANAGEMENT OF SECONDARY CIRCULATOR/BOOSTER PUMP (WITH ROOM THERMOSTAT)

It allows the management of a secondary or booster circulator to serve the plant.
A room thermostat (N.C.) must be appropriately configured.
- Thermostat closed contact -> The secondary circulator is activated;
- Thermostat open contact -> The secondary circulator is off with a delay given by P02 (post-pumping).

I/O Resource - Parameter	Value	Function	XGI terminals
ID9E can be activated via H63	19	Room thermostat	4.1 / 4.2
DO5E can be activated via H90	43	Secondary circulator	9.1 (phase) 9.2(neutral)

With the Heat pump in Off, the booster circulator will be off regardless of the thermostat call.
If the machine is not equipped with either a remote system probe or a secondary circulator, the room thermostat thermoregulation is as follow:

ROOM CALL	Compressor thermoregulations	
	b30=0	b31=1
Activated	Activated	Activated

ROOM CALL	Compressor thermoregulations	
	b30=0	**b31=1**
Deactivated (satisfied environment)		

12.3   MIXER VALVE MANAGEMENT

The mixer valve is regulated by means of specific PID which strives to maintain the delivery temperature of the radiant panel at the set value.
The setpoint setting can be found in the 'Set' Menu:
rCoo = Mixer flow temperature setpoint in cooling mode = 15°C (default)
rHea = Mixer flow temperature setpoint in heating mode = 30°C (default
The resources and the parameters to be setting are the following:

I/O resource - Parameter	Description	Value	Function	XGI terminals
ST 5E can be activated via H27	Analogue input	44	Mixer probe	1.1 / 1.2
ID9E can be activated via H63	Digital input	19	Room thermostat	4.1 / 4.2
DO1E can be activated via H86	Voltage output	34	Valve open command	5.1 (phase) / 6.2(neutral)
DO2E can be activated via H87	Voltage output	35	Valve close command	5.2 (phase)
DO3E can be activated vi H88	Voltage output	33		
i01	Valve opening time	Recover the value from the technical data supplied installed		
i02	Interval between two interruptions	30 seconds [1]		
i03	PID proportional band	2 °C [2]		
i04	PID integral time	300 seconds [3]		
i05	PID derivative time	0 [4]		
i06	Mixer management only active in heating mode	1		
	Mixer management only active in cooling mode	2		
	Mixer management only active in heating and cooling mode	3		

[1]Recommended value. Time interval between one corretion and the next.
[2]Recommended value. Intervention area defined by the difference between the setpoint for the mixer flow and the temperature measured by mixing flow probe.
[3]Recommended value. Time taken by the mixing valve to switch from open to closed and vice versa, when the difference between setpoint set for the flow of the mixing valve and the value read by the mixing probe is greater than or equal to proportional band. The more larger this value, the slower the change in approach to the setpoint set for the mixing valve flow.
[4] Derivate component of regulation; use only if you have a good knowledge of regulator logic.

12.3.1   Determination of setpoint

The setpoint on which to perform regulation is given by rCOO or rHEA respectively in cooling and heating mode. If dynamic compensation of the setpoint is enabled (b08=1), then the setpoint will be corrected the same way as the heat pump/chiller.
The maximum and minimum value reached by the compensation are not controlled. Therefore the parameters must be configured so that the setpoints are not brought to unwanted values outside of the allowed work ranges.

12.3.2   Mixer pump

The mixing pump (DO3E) switches on when there is a call from the digital input ambient thermostat (ID9E) and switches off with a delay of P02 from the instant the thermostat call ceases.

12.4   SOLAR INTEGRATION MANAGEMENT

To enable the function, set S01=1.

Parameter	Description	Value	Function	XGI terminals
ST6E can be activated via H28	Analogue input	39	Solar storage tank probe	2.1 / 2.2
ST7E can be activated via H29	Analogue input	38	Solar collector probe	2.1 / 2.2
DO3E can be activated via H88	Voltage output	30	Solar circulator	7.1 (phase) 7.2(neutral)
DO4E can be activated via H89	Voltage output	45	Solar exhaust valve	8.1 (phase) 8.2(neutral)

12.4.1   Activation of solar circulator

Solar management is also active with the unit off.
The solar circulator is active in both of the following conditions are met:

- The temperature of the solar collector is higher than that defined by parameter S13;

- The temperature difference between the solar collector and that of the solar storage tank is higher than the parameter S02 (default 6°C).

12.4.2   Collector protection

If the temperature of the collector exceeds parameter S04 (default 110°C), the solar circulator is periodically on intermittently with the times set in:

- S05 = time ON (default 15 seconds);
- S06 = time OFF (default 15 seconds).

As hysteresis to exit the protection condition use S08.
This protection is guaranteed even with the machine Off.

12.4.3   Collector overtemperature alarm

If the collector probe exceeds the value of parameter S12, there is an alarm condition E10 which blocks the solar circulator. The hysteresis to return from the alarm condition is given by parameter S08.
If an alarm is triggered, operation of the heat pump is guaranteed.

12.4.4   DHW overtemperature alarm

If the temperature of the DHW storage tank exceeds the parameter S10, the alarm E50 is triggered.
The hysteresis to return from the alarm condition is given by parameter S11.
If an alarm is triggered, operation of the heat pump is guaranteed.

12.4.5   Solar exhaust valve

If alarms E10 and E50 are triggered simultaneously, the solar exhaust valve will be activated.

It is recommended to connect the output of terminals 8.1 (phase) – 8.2 (neutral) to a timed relay to manage the flow of the exhaust valve.

12.4.6   Dissipation of solar tank heat

The solar circulator runs to dissipate excess heat in the storage tank by exploiting the solar collector if both of the following conditions are met:
-The temperature of the DHW storage tank is higher than parameter S15;
-The temperature of the solar collector is lower than 35°C (parameter S13 – parameter S14).

The solar collector is off when at least one of the following conditions is met:

-The temperature of the DHW storage tank is lower than parameter S15.
-The temperature of the collector exceeds the parameter S13 (default 40°C).

12.4.7   Antifreeze

Function active if the parameter S01 = 1.
If the temperature of the solar collector is lower than parameter S07 (default 5°C), the solar circulator is activated in antifreeze mode.
This protection is only enabled with the machine Off.
The function is inhibited if the temperature of the DHW storage tank is lower than the value defined in parameter S16.
Setting the parameter S01 = 2, the antifreeze function is never active (for example because the solar plant is supplied with glycol).
Be careful as enabling this function could damage the entire system.
Note:

- Solar integration is NOT managed if the controller of the unit is OFF.
- The remote digital input OFF has no effect on solar management.

13.   TABLES OF PERMITTED SETUPS FOR USER AND INSTALLER

	CAUTION
⚠	**All the operations with INSTALLER INSTALLER visibility must be carried out by QUALIFIED PERSONNEL.**
	Not all of the configurations can be activated and/or modified at the same time.
	Values other than the default values can jeopardise proper operation of the unit. If in doubt on which value to set, contact our headquarters.
	The company excludes any contractual and extra contractual liability for damage caused to persons, animals or objects, by incorrect installation, setting and maintenance, improper use of the equipment, and the partial or superficial reading of the information contained in this manual.

We shall not be held liable for any breakage or malfunctioning caused by third parties changing the default parameters if not expressly authorised to do so.
The following is the table of the allowed configurations; not all of them can be selected simultaneously.
Values other than the default values can jeopardise proper operation of the unit. If in doubt on which value to set, contact our headquarters.

Parame-ter	Description	Unit	Default	Range	Visibility	Allowed configurations: Description	Notes
Coo	First cooling setpoint	°C	7.0	25÷Coo2	U		
Hea	First heating setpoint	°C	45.0	Hea2÷H01	U		
San	Sanitary setpoint	°C	48.0	25÷H01	U		If sanitary function active. See par. 10.2
Coo2	Second cooling setpoint	°C	18.0	Coo÷25	U		
Hea2	Second heating setpoint	°C	35.0	25÷Hea	U		
*rCOO	Mixing valve summer setpoint	°C	15.0	-50÷80	U		Config if Gi accessory present
*rHEA	Mixing valve winter setpoint	°C	30.0	-50÷80	U		Config if Gi accessory present
San2	Second sanitary setpoint	°C	45.0	0÷80	I		
H01	Maximum setpoint in heating	°C	60.0	-50÷80	I		
H04	Minimum setpoint in cooling	°C	5.0	-50÷80	I		
H10	Sanitary function enabling	/	0	0÷6	I	See par. 10.2	
H17	Input configuration Analogue ST6	/	0	0÷49	I	0 = Input disabled 6 = Domestic hot water probe	
H18	Input configuration Analogue ST7	/	0	0÷49	I	0 = Input disabled 41 = Remote water temperature probe	
H22	0-10vDC live input configuration Analogue ST11	/	0	0÷49	I	0 = Input disabled 40 = Plant setpoint decalibration	
*H27	Input configuration Analogue ST5E	/	0	0÷49	I	0 = Input disabled 44 = Mixer probe	Only if Gi accessory present
*H28	Input configuration Analogue ST6E	/	0	0÷49	I	0 = Input disabled 39 = Solar storage tank probe	Only if Gi accessory present
*H29	Input configuration Analogue ST7E	/	0	0÷49	I	0 = Input disabled 38 = Solar collector probe	Only if Gi accessory present
*H30	Input configuration Analogue ST8E	/	0	0÷49	I		Only if GI accessory is present
H46	Input configuration Digital ID2	/	0	0÷30	I	0 = Input disabled 3 = Summer/winter mode change	
H47	Input configuration Digital ID3	/	2	0÷30	I	0 = Input disabled 2 = Remote On / Off	
H53	Input configuration Digital ID9	/	0	0÷30	I	0 = Input disabled 21= Hz min/max remote 25= Silenced version 26 = Double set-point call 28 = DHW thermostat call	
*H60	Input configuration Digital ID6E	/	0	0÷30	I		Only if GI accessory is present
*H61	Input configuration Digital ID7E	/	0	0÷30	I		Only if GI acessory is present
*H62	Input configuration Digital ID8E	/	0	0÷30	I		Only if GI accessory is present
*H63	Input configuration Digital ID9E	/	0	0÷30	I	0 = Input disabled 19 = room thermostat	Only if Gi accessory present
H75	Digital input polarity	/	0	0÷255	I	0 = Digital inputs N.A. 1 = ID1 polarity inverted 2 = ID2 polarity inverted 4 = ID3 polarity inverted 8 = ID4 polarity inverted 16 = ID5 polarity inverted 32 = ID6 polarity inverted 64 = ID7 polarity inverted 128 = ID8 polarity inverted	To reverse more than one polarity, do the sum of those you wish to reverse.
H76	Digital input polarity	/	0	0÷255	I	0 = Digital inputs N.A. 1 = ID9 polarity inverted 2 = ID10 polarity inverted 4 = ID1E1 polarity inverted 8 = ID2E1 polarity inverted 16 = ID3E1 polarity inverted 32 = ID4E1 polarity inverted 64 = ID5E1 polarity inverted 128 = ID6E1 polarity inverted	To reverse more than one polarity, do the sum of those you wish to reverse
H77	Digital input polarity	/	0	0÷255	I	0 = Digital input N.A. 1 = ID7E1 polarity inverted 2 = ID8E1 polarity inverted 4 = ID9E1 polarity inverted 8 = ID10E1 polarity inverted 16 = ID1E2 polarity inverted 32 = ID2E2 polarity inverted 64 = ID3E2 polarity inverted 128 = ID4E2 polarity inverted	To reverse more than one polarity, do the sum of those you wish to reverse.

Parame-ter	Description	Unit	Default	Range	Visibility	Allowed configurations:	
						Description	Notes
H81	Output configuration In DO3 power	/	22	0÷48	I	0 = Output disabled 22 = Plant integration heater 26 = DHW integration heater	
H82	Voltage output configuration DO4	/	14	0÷48	I	0 = Disabled output = Exchanger resistor	
H83	Voltage output configuration DO5	/	28	0÷48	I		
H84	Output configuration In DO6 power	/	6	0÷48	I	0 = Output disabled 6 = DHW valve	
H85	Output configuration In DO7 power	/	25	0÷48	I	0 = Output disabled 25 = Double set-point valve 29 = Boiler enabling 24 = Alarm warning 31 = Summer/winter operating mode warning 21 = Defrost warning 47 = Machine block warning	
***H86**	Output configuration In voltage DO1E	/	0	0÷48	I	0= Output disabled 34 = Valve open command	Only if Gi accessory present
***H87**	Output configuration In voltage DO2E	/	0	0÷48	I	0= Output disabled 35 = Valve close command	Only if Gi accessory present
***H88**	Output configuration In voltage DO3E	/	0	0÷48	I	0 = Output disabled 30 = Solar circulator	Only if Gi accessory present
***H89**	Output configuration In voltage DO4E	/	0	0÷48	I	0 = Output disabled 45 = Solar exhaust valve	Only if Gi accessory present
***H90**	Output configuration In voltage DO5E	/	0	0÷48	I	0 = Output disabled 43 = Secondary circulator	Only if Gi accessory present
H100	Digital output polarity	/	2	0÷255	I	0 = Digital input N.A. 1 = DO1 polarity inverted 2 = DO2 polarity inverted 4 = DO3 polarity inverted 8 = DO4 polarity inverted 16 = DO5 polarity inverted 32 = DO6 polarity inverted 64 = DO7 polarityinverted 128 = DOE1 polarity inverted	To reverse more than one polarity, do the sum of those you wish to reverse
H101	Digital output polarity	/	0	0÷255	I	0 = Digital input N.A. 1 = DO2E polarity inverted 2 = DO3E polarity inverted 4 = DO4E polarity inverted 8 = DO5E polarity inverted 16 = DO6E polarity inverted 32 = DO7E polarity inverted	To reverse more than one polarity, do the sum of those you wish to reverse
H124	Serial baud rate	baud	1	0÷3		0=4800 baud 1=9600 baud 2=19200 baud 3=38400 baud	
H125	Serial parity	/	2	0÷3		0=none parity, 2 stop bits 1=odd parity, 1 stop bit 2=even parity, 1 stop bit 3=none parity, 1stop bit	
H126	Serial address	/	1	0÷120	I	In the cascade configuration, assign a different address to each controller.	
H129	Enable second setpoint	/	0	0÷4	I		
H130	Heating with DHW storage tank	/	0	0÷1	I	0 = Normal operation 1 = In Heating, machine always turned towards DHW	
H136	OFF state deactivation with ID presence ON/OFF remote	/	0	0÷1	I	0 = Normal operation 1 = If H47=2, the machine cannot be in the OFF state (at most it can be in plant standby E00)	
H138	Second DHW setpoint			0÷4			
A08	Antifreeze alarm activation setting	°C	3	-127÷127	I	Different values can jeopardise proper operation of the unit	
b04	Switching time valve according to setpoint	sec	30	0÷600	I	Different values can jeopardise proper operation of the unit	
b05	Compressor cut-off delta	°C	0.2	0÷255	I		
b08	Enable dynamic setting	/	0	0÷1	I		
b09	Maximum cooling offset	°C	3.0	-50.0÷80.0	I		
b10	Maximum heating offset	°C	-3.0	-50.0÷80.0	I		
b11	Cooling outdoor temperature setting	°C	25	-127÷127	I		
b12	Heating outdoor temperature setting	°C	15	-127÷127	I		

Parame-ter	Description	Unit	Default	Range	Visibility	Allowed configurations: Description	Notes
b13	Cooling temperature delta	°C	-10.0	-50.0÷80.0	I		
b14	Heating temperature delta	°C	10.0	-50.0÷80.0	I		
b15	0-10V analogue input setting decalibration band	°C	5.0	0.0÷10.0	I		
b20	0-10V/ratiometric input enabling	/	0	0÷1	I	0-10V input Ratiometric input	
b22	Plant probe temperature control cut-off hysteresis	°C	5.0	0.0÷25.5	I		
b24	Maximum compressor cut-on ΔT	°C	8.0	0.0÷25.5	I		
b25	Compressor cut-on ΔT	°C	2.0	0.0÷25.5	I		
b30	Enabling compressor switch-off with room call satisfied	-	0	0÷1			
P01	Pump ON compressor ON delay	sec	30	0÷255	I		
P02	Pump OFF compressor OFF delay	min	2.0	0÷25.5	I		
P03	Pump operating mode	/	0	0÷1	I		The pump is always on if the anti-frezze heaters are active.
P04	Pump setting in antifreeze	°C	5	-15÷15	I		
P05	Pump hysteresis in antifreeze	°C	2.0	0.0÷15.0	I		
P06	Set ΔT water pump in heating mode	°C	4°C	0÷255	I		
P07	Maximum speed pump	%	100%	0÷600	I		
P09	Modulating pump inlet/outlet water delta T setting	°C	2.0	0÷15	I		
P16	Interval between 2 periodical activations of the pump	min	0	0÷600	I		
P17	Operating time of the pump in periodical mode	sec	0	0÷255	I		
r02	Antifreeze heaters setpoint in heating mode	°C	4	3÷6	I		Only change in the presence of glycol water. Contact our headquarters.
r03	Antifreeze heaters setpoint in cooling mode	°C	4	3÷6	I		Only change in the presence of glycol water. Contact our headquarters.
r06	Antifreeze heaters delta	°C	2.0	0.0÷25.5	I		Only change in the presence of glycol water. Contact our headquarters.
r08	Operation in substitution upper limit	°C	-20	-20÷50	I	Respect r22 ≥ r28 ≥ r08	Do not modify this value, as it could jeopardise operation of the unit
r10	Plant integration enabling	/	0	0÷1	I	0 = Function disabled 1 = Function enabled	
r11	Plant integration heater delta	°C	0.5	0,0÷25.5	I		
r12	Plant/heat pump integration heater activation delay	min	10	0÷255	I		
r13	Enabling switch-off auxiliaries in delta r11	/	0	0÷3	I	0 = Function disabled 1 = Enabled for system resistors 2 = Enabled for boiler 3 = Enabled for resistors and boiler	
r14	Exclusive heaters operation	/	0	0÷1	I	0 = Heaters can be activated simultaneously 1 = Heaters can be activated exclusively	
r15	DHW integration enabling	/	0	0÷2	I	0 = Function disabled 1 = Function enabled	
r16	DHW/heat pump integration heater activation delay	min	15	0÷255	I		
r19	Duration of tray heater activation since last defrost	min	10	0÷255	I	0= heater activation regardless of defrost.	
r20	Heaters use priority	/	1	0÷1	I	0 = Plant side priority 1 = Sanitary side priority	This parameter only needs to be set if r14=1
r21	Enables plant side mitigation with heaters in defrost mode	/	0	0÷1	I	0= Function disabled 1= Function enabled	

Parame-ter	Description	Unit	Default	Range	Visibility	Allowed configurations: Description	Notes
r22	Joint operation bracket I upper limit	°C	7	-16÷50	I	Respect r22 ≥ r28 ≥ r08	Do not modify this value, as it could jeopardise operation of the unit
r23	Type of use of boiler	/	6	0÷6	I		
r24	Type of use of integration heaters	/	3	0÷3	I		
r25	Disinfection setpoint	°C	80	0÷100	I		
r26	Disinfection duration	min	12	0÷255	I		
r27	Heat pump setpoint in disinfection	°C	55.0	-500÷800	I		
r28	Joint operation bracket II upper limit	°C	-7	-16÷50	I	Respect r22 ≥ r28 ≥ r08	Do not modify this value, as it could jeopardise operation of the unit
r29	First setpoint temperature offset for boiler and plant heaters (HEA)	°C	0	0÷100	I		
r30	Second setpoint temperature offset for boiler and plant heater (HEA2)	°C	0	0÷100	I		
r31	Temperature offset for boiler and DHW heaters (SAN)	°C	0	0÷100	I		
r32	Boiler supply	/	1	0÷3	I		
r33	Pump management with heaters active	/	3	0÷3	I		
r34	Disinfection day	/	0	0÷7	U	0 =Disabled 1 =Monday 2 =Tuesday 3 =Wednesday 4 =Thurday 5 =Friday 6 =Saturday 7 = Sunday	
r35	Disinfection time (minute of the day)	/	0	0÷1439	U		
r36	Anti-loop time on sanitary operation	min	1	0÷255	I	Control to prevent the machine remain in sanitary production indefinitely indefinitely because does not reach the set point. Control active if parameter R36 is different from 0. In this case, the time of r36 is counted since the compressor started to work in the DHW mode. If the production of the DHW is not finished within r36 minutes, then you exit forced out of sanitary production.	
r37	Boiler operation in cooling + DHW mode	/	1	0÷2	I	0 = Boiler not used 1 = Boiler used in integration 2 = Boiler does DHW and PDC does plant.	
b21	Switching time water reversing valve system	sec	0	0÷600	I		
d04	Defrost output pressure	bar	24.0	-500÷800	I		
d08	Minimum time between defrost and next	min	35	0÷255	I		
L02	User enablement for min./max. Hz function	/	0	0÷1	I		
L03	Active min./max. Hz	/	0	0÷7	I		
s01	Solar thermal enabling	/	0	0÷2	I		
s02	Solar ΔT	°C	0	0÷25.5	I		
s03	Solar hysteresis	°C	0	0÷25.5	I		
s04	Maximum solar temperature	°C	0	0÷255	I		
s05	Pump on time in maximum solar temperature	sec	0	0÷255	I		
s06	Pump off time in max. solar temp	sec	0	0÷255	I		
s07	Solar antifreeze set	°C	0	-127÷127	I		
s08	Solar antifreeze hysteresis	°C	0	0÷25.5	I		
s09	Constant for calculating solar power output	/	0	0÷999	I		

Parame-ter	Description	Unit	Default	Range	Visibility	Allowed configurations: Description	Notes
s10	Maximum solar DHW storage temperature thresold	°C	0	0÷255	I		
s11	Solar sanitary hysteresis	°C	0	0÷25.5	I		
s12	Solar collector overfill alarm threshold	°C	0	0÷255	I		
s13	Minimum temperature threshold collector for activation solar	°C	0	0÷255	I		
s14	Hysteresis for sanitary cooling	°C	0	0÷25.5	I		
s15	Sanitary cooling threshold	°C	0	0÷255	I		
s16	Minimum temperature thresold collector antifreeze storage	°C	0	0÷255	I		
L02	User enablement for min./max. Hz function	/	0	0÷1	I		
L03	Active min./max. Hz	/	0	0÷7	I		
*i01	Valve opening time	sec	0	0÷600	I		
*i02	Interval between two corrections	sec	0	0÷600	I		
*i03	PID proportional band		0	0÷80.0	I		
*i04	PID integral time	sec	0	0÷2000	I		
*i05	PID derivative time	sec	0	0÷25.5	I		
*i06	Radiant panel configuration	/	0	0÷3	I		
Ac09	Flow-meter minimum water flow rate	l/min	0.0	0÷100	I		
Ac10	Flowmeter outlet at the minium flow rate	Volt	0.0	0÷100	I		
Ac11	Maximum flow rate of the flowmeter	l/min	0.0	0÷800	I		
Ac12	Flow meter outlet at the maximum flow rate	Volt	0.0	0÷100	I	See par. 10.17	

(*) If Gi module is present

14. ALARMS

By placing the controller in OFF mode, the alarms reset and the counts of the relative hour interventions are also reset. If the alarms are still triggered when switching the unit back on, contact technical assistance. The values indicated below could be subject to updates. If you have any doubts, contact our headquarters.

14.1 [E006] FLOW SWITCH

The water side flow switch is already installed inside the unit and MUST NOT be tampered with or bypassed in any way. The flow switch is by-passed for **10 seconds** after the unit is switched on. When the bypass time has elapsed, you must evaluate the status of the digital input, if active, the flow is considered present.
If the flow is found to be missing for **5 seconds**, the alarm is triggered and the circulator switches on for **120 seconds**
If the alarm triggers more than 3 times an hour, it must be reset manually.
The alarm does not trigger in the following conditions:

- During domestic hot water production;
- During the plant venting cycle function.

14.2 [E018] HIGH-TEMPERATURE

If the water delivery probe detects a value higher than **65°C** for longer than **50** seconds, the alarm is active. It deactivates when the temperature returns below **62°C**.

14.3 [E020] INVERTER TRASDUCTORS

For compressor enabled for more than **150** seconds, the suction pressure probe detect a pressure higher than the condensation pressure probe, the alarm displayed is **E020**. The alarm is not resettable (it is necessary to cut the power supply to eliminate the alarm).
This alarm is not in defrosting mode.

14.4 [E005] ANTIFREEZE

If the outlet water probe has a value lower than **A08** (**3°C**), the alarm is active. It deactivates if the temperature recorded by the probe is higher than **+6°C**. The alarm is bypassed for **120** seconds from switch on in heating mode.

14.5 [E611÷E681] PROBE ALARMS

The alarm is triggered if any connected or enabled probe is short-circuited or interrupted.
The alarm also triggers if the upper limit (**100°C**) or the lower limit (**-50°C**) of the probes is exceeded. A probe figured as sanitary probe will not trigger any alarms if domestic hot water is not enabled.
NOTE:

If the pressure switch on the machine detects a pressure exceeding **42.8 bar** the driver and the compressor are powered off and probe error E641 is displayed (Compressor discharge probe fault).
The alarm is cleared when the pressure drops below **34 bar**.

14.6 [E801] TIMEOUT INVERTER

When the machine's controller does not communicate with the driver board of the compressor, a timeout alarm is triggered to avoid losing control of the system.

14.7 [E851 ÷E971] INVERTER

The inverter has its own list of alarms.

14.8 [E00] REMOTE ON/OFF (WARNING)

If the unit is controlled by a remote digital input. See par. 10.4.1

14.9 [E001] HIGH-PRESSURE

If the pressure transducer on the unit detects a pressure higher than **41.5 bar** the alarm is triggered.
In this case the compressor is blocked immediately. The alarm is reset when the pressure drops below **32.5 bar**. If the alarm triggers more than 3 times an hour, it must be reset manually.

14.10 [E002] LOW-PRESSURE

In chiller mode, if the pressure transducer on the unit detects a pressure lower than **3.5 bar**, the alarm is triggered.
In heat pump mode, if the pressure transducer on the unit detects a pressure lower than **1.3 bar**, the alarm is triggered.
The alarm is reset when the pressure rises **2.0 bar** above the triggering threshold.
A bypass time of 60 seconds is counted every time the compressor is activated.
When the alarm is triggered, it blocks the compressors of the circuit.
The alarm is reset manually if it triggers 3 times an hour.

14.11 [E008] DRIVER LIMITATION

If the compressor does not reach the speed at the intended ramp value within **30** minutes, the alarm is triggered and the compressor switches off for safety purposes.
The alarm is reset manually if it triggers 3 times an hour.

14.12 [E041] 4-WAY VALVE

Manually reset alarm, it identifies malfunctioning of the 4-way reversing valve.
The alarm does not trigger for a bypass time of approximately 180 seconds from start-up of the compressor.

- In heating and sanitary mode, the alarm is triggered when, the bypass time having elapsed, the water delivery temperature is lower than the water return temperature of the heat pump - 1°C.
- In cooling mode, the alarm is triggered when, the bypass time having elapsed, the water delivery temperature is higher than the water return temperature of the heat pump + 1°C.

14.13 POWER FAILURE

When restored:

- the instrument goes back to the condition it was in prior to the power failure
- if a defrost cycle is in progress, it is cancelled
- all of the timers in progress are cancelled and reinitialized

14.14 UTILITIES BLOCK ALARM TABLE

Code	DESCRIPTION	Block
E00	Remote off	Machine
E001	High pressure alarm	Machine
E002	Low pressure alarm	Machine
E005	Antifreeze alarm	Machine
E006	Flow alarm	Machine
E008	Compressor driver limitation alarm	Machine
E009	Discharge high temperature alarm	Machine
E010	Solar collector high temperature alarm	Solar pump
E018	Cooling high temperature alarm	Machine
E020	Inverted trasductors pressure alarm	Machine
E041	Inconsistent temperatures alarm	Macchina
E050	DHW storage tank high temperature alarm	Machine/sanitary
E101	Communication timeout with Slave 1	Machine
E611	Water inlet probe failure	Machine
E621	Water outlet probe failure	Machine
E631	Compressor intake probe failure	Machine
E641	Compressor discharge probe fault / high pressure switch trip	Machine

Code	DESCRIPTION	Block
E651	Outdoor air probe failure	Machine
*E652	Mixer probe failure	Machine
E661	DHW probe failure	Machine
*E662	Solar storage tank probe failure	Machine
E671	Plant remote probe failure	Machine
*E672	Solar collector probe failure	Machine
E691	Low pressure transducer failure	Machine
E701	High pressure probe failure	Machine
E711	0-10Vdc live input failure	Machine
E801	Pressure inverter timeout	Compressor
E851	Inverter Hardware problem	Compressor
E861	Motor current too high	Compressor
E871	Heatsink over-heat protection	Compressor
E881	Supply voltage out of limits (DC Bus Error)	Compressor
E891	Driving protection-output phase loss	Compressor
E901	Compressor driver and model mismatch	Compressor
E911	Overload protection	Compressor
E921	PFC_POE over current	Compressor
E931	Comunication error with main controller	Compressor
E941	PFC converter fault	Compressor
E951	Heatsink and/or ambient temperature sensor error	Compressor
E961	Abnormal condition	Compressor
E971	EEPROM not initialize	Compressor

(*) If Gi module present

15.   MODBUS VARIABLES

The controller is configured as follows by default:

BAUD RATE	9600
PARITY	EVEN
DATA BIT	8
STOP BIT	1
DEVICE ID	1

To configure the Modbus communication according to your requirements, you must modify the following logs:

H124 : BAUD RATE	
0	4800
1	9600
2	19200
3	38400

H125 : PARITY, STOP BIT	
0	NONE, 2 bit
1	ODD, 1 bit
2	EVEN, 1 bit
3	NONE, 1 bit

H126 : DEVICE ID	1 ÷ 200

Modbus comands:

READING	HOLDING REGISTER
WRITING	6-16

Register	Format	Bit	R/W	Range	Name	Description	Note
1	INT	-	R	-	Firmaware informa-tion	Firmaware versione	
2	INT	-	R	-		Firmware release	
3	BYTE (H)	-	R	-		Firmware sub-release	
	BYTE (L)	-	R	-		Firmware creation day	
4	BYTE (H)	-	R	-		Firmaware creation month	
	BYTE (L)	-	R	-		Firmware creation year	
80 ÷ 97	ASCII	-	R	-	Serial number	Registration number	
444	INT	-	R	0 ÷ 800	Water flow rate		
1135	INT	-	R/W	1 ÷ 200	Serial address	Modbus serial ID	
200	INT	-	R	-	Machine settings	(0) Stand by	Reading values of the machine status
		-	R	-		(1) Cooling	
		-	R	-		(2) Heating	
		-	R	-		(4)Only sanitary mode[1]	
		-	R	-		(5) Cooling + Sanitary[1]	
		-	R	-		(6) Cooling + Sanitary[1]	
7201	BIT MASK	0	R/W	-		Enablement of writing the machine status remotely	Necessary for the operation of the reg. 7200.
7200	INT	-	W	-		(0) Stand by	The writing values that are not allowed at this address can lead to unexpected operations, so keep only those values that are allowed in writing.
		-	W	-		(1) Cooling	
		-	W	-		(2) Heating	
		-	W	-		(4) Only sanitary[1]	
		-	W	-		(5) Cooling + Sanitary[1]	
		-	W	-		(6) Heating + Sanitary[1]	
7201	BIT MASK	1	R/W	-	Setpoint	Enablement of writing the machine status remotely	Necessary for the operation of the reg. 7203/7208.
7203	°C/10	-	R/W	5.0 ÷ 23.0		Cooling	
7204	°C/10	-	R/W	25.0 ÷ 55.0-		Heating	
7205	°C/10	-	R/W	25.0 ÷ 55.0		Santary	
7206	°C/10	-	R/W	5.0 ÷ 23.0		Second cooling	
7207	°C/10	-	R/W	25.0 ÷ 55.0		Second heating	
7208	°C/10	-	R/W	0.0 ÷ 80.0		DHW preparer	
7228	°C/10	-	R/W	-		Second sanitary	
242	°C/10	-	R	-		Current thermoregulation setpoint	
247	°C/10	-	R	-		Current reference temperature for ther-moregulation	
7201	BIT MASK	2	R/W	-	Second setpoint	Enabling the switching to the second setpoint	Necessary for the operation of bit 0 of reg. 7202.
7202	BIT MASK	0	W	-		0=primary setpoints, 1=secondary setpoint	Writing value
7217	BIT MASK	0	R	-		0=primary setpoints, 1=secondary setpoint	Reading value
7201	BIT MASK	3	R/W	-	Room temperature call	Enablement of remote room call writing	Necessary for the operation of bit 1 of reg. 7202.
7202	BIT MASK	1	R/W	-		Forced room temperature call remotely	
7201	BIT MASK	4	R/W	-	Sanitary call	Enablement of remote sanitary call writing	Necessary for the operation of bit 1 of reg. 7202.
7202	BIT MASK	2	R/W	-		Forced remote sanitary mode call	
7201	BIT MASK	5	R/W	-	Anti-Legionella [2]	Enablement of anti-legionella cycle remotely	Necessary for the operation of bit 3 of reg. 7202.
7202	BIT MASK	3	R/W	-		Remote anti-legionella cycle request activation	The bit must be 1 for the entire cycle period.
7216	BIT MASK	5	R	-		Anti-legionella cycle in progress	
		6				Anti-legionella cycle failed or stopped	It remains at 1 until the next cycle, or it resets itself when the board is turned off.
7202	BIT MASK	5	R/W	-	Plant air-vent	Forced plant air-vent	Only if the machine is in Stand By (0).

Register	Format	Bit	R/W	Range	Name	Description	Note
7202	BIT MASK	6	R/W	-	Santary disablig	Sanitary call prohibition (without exiting from the actual mode + SAN function)	Active only if the setting of bit 3 is 7201 (when the room temp. call is also managed remotely).
7202	BIT MASK	7	R/W	-	Defrosting	Forced defrosting	Only if the machine is in heating (2-6).
7214	BIT MASK	13	R	-		Defrosting on call	
		14				Defrosting in progress	
305	ora	-	R	-	Operating hours	Compressor 1	
307	ora	-	R	-		Compressor 2	
309	ora	-	R	-		Compressor 3	
313	ora	-	R	-		Compressor 1 circuit 2	
315	ora	-	R	-		Compressor 2 circuit 2	
317	ora	-	R	-		Compressor 3 circuit 2	
253	°C/10	-	R	-	Temperature transducer	Evaporation	
254	°C/10	-	R	-		Condensation	
626	°C/10	-	R	-		Evporation circuit 2	
627	°C/10	-	R	-		Condensation circuit2	
400	°C/10	-	R	-	Temperature [3]	Water inlet	
401	°C/10	-	R	-		Water outlet	
402	°C/10	-				External for climatic curve	
405	°C/10	-	R	-		DHW	
422	°C/10	-	R	-		Compressor inhlation	
428	°C/10	-	R	-		Outdoor	
433	°C/10	-	R	-		Compressor discharge 1	
434	°C/10	-	R	-		Compressor discharge 2	
435	°C/10	-	R	-		Compressor discharge 3	
437	°C/10	-	R	-		Solar collector	
438	°C/10	-	R	-		Solar accumulation	
440	°C/10	-	R	-		Plant remote	
443	°C/10	-	R	-		Radiant panels mixing delivery	
447	°C/10	-	R	-		DHW preparer recirculation	
20422	°C/10	-	R	-		Compressors inhalation (circuit 2)	
20433	°C/10	-	R	-		Compressor 1 discharge (circuit 2)	
20434	°C/10	-	R	-		Compressor 2 discharge (circuit 2)	
20435	°C/10	-	R	-		Compressor 3 discharge (circuit 2)	
406	bar/100	-	R	-	Pressions [3]	High pressure	
414	bar/100	-	R	-		Low pressure	
20406	bar/100	-	R	-		Circuit 2 high pressure	
20414	bar/100	-	R	-		Circuit 2 low pressure	
7000	%/10	-	R	-	Analogue output	Condensation fan	
7001	%/10	-	R	-		Circulating pump	
7229	%	-	R	-		Circulator forcing	Only with the circulator off
628	%/10	-	R	-		Condensation fan circuit 2	
950	BIT MASK	0	R	-	Alarms [4] [5]	High pressure	E001
		1				Low pressure	E002
		2				Compressor thermal protection	E003
		3				Fan thermal protection	E004
		4				Frost	E005
		5				Lack of flow	E006
		6				DHW preparer low temperature	E007
		7				Lack of lubrication	E008
		8				High discharge temperature of Cp1	E009
		9				Solar collector at high temperature	E010
		12				Compressor 2 thermal protection	E013
		13				Fan 2 thermal protection	E014
		15				Pump thermal protection	E016

Register	Format	Bit	R/W	Range	Name	Description	Note
951	BIT MASK	1	R	-	Alarms [4] [5]	High temperature	E018
		2				High discharge temperature of Cp2	E019
		3				Inverted pressure transducers	E020
		6				Compressor 3 thermal protection	E023
		7				Fan 3 thermal protection	E024
		9				Pump 2 thermal protection	E026
		11				Incongruent temperatures	E041
		12				Poor heat exchange DHW	E042
		13				DHW accumulation tank in high temperature	E050
		14				I/O module 1 disconnected	E101
		15				I/O module 2 disconnected	E102
952	BIT MASK	0	R	-	Alarms [4] [5]	Probe 1 error	E611
		1				Probe 2 error	E621
		2				Probe 3 error	E631
		3				Probe 4 error	E641
		4				Probe 5 error	E651
		5				Probe 6 error	E661
		6				Probe 7 error	E671
		7				Probe 8 error	E681
		8				Probe 9 error	E691
		9				Probe 10 error	E701
		10				Probe 11 error	E711
		11				Module 1 probe 1 error	E612
		12				Module 1 probe 2 error	E622
		13				Module 1 probe 3 error	E632
		14				Module 1 probe 4 error	E642
		15				Module 1 probe 5 error	E652
953	BIT MASK	0	R	-	Alarms [4] [5]	Module 1 probe 6 error	E662
		1				Module 1 probe 7 error	E672
		2				Module 1 probe 8 error	E682
		3				Module 1 probe 9 error	E692
		4				Module 1 probe 10 error	E702
		5				Module 1 probe 11 error	E712
		6				Module 2 probe 1 error	E613
		7				Module 2 probe 2 error	E623
		8				Module 2 probe 3 error	E633
		9				Module 2 probe 4 error	E643
		10				Module 2 probe 5 error	E653
		11				Module 2 probe 6 error	E663
		12				Module 2 probe 7 error	E673
		13				Module 2 probe 8 error	E683
		14				Module 2 probe 9 error	E693
		15				Module 2 probe 10 error	E703

Register	Format	Bit	R/W	Range	Name	Description	Note
954	BIT MASK	0	R	-	Alarms [4] [5]	Module 2 probe 11 error	E713
		1				Link inverter 1	E801
		2				Link inverter 2	E802
		3				Link inverter 3	E803
		4				Hardware fault inverter 1	E851
		5				Hardware fault inverter 2	E852
		6				Hardware fault inverter 3	E853
		7				Overcurrent inverter 1	E861
		8				Overcurrent inverter 2	E862
		9				Overcurrent inverter 3	E863
		10				High temperature inverter 1	E871
		11				High temperature inverter 2	E872
		12				High temperature inverter 3	E873
		13				Bad voltage inverter 1	E881
		14				Bad voltage inverter 2	E882
		15				Bad voltage inverter 3	E883
955	BIT MASK	0	R	-	Alarms [4] [5]	Phase sequence inverter 1	E891
		1				Phase sequence inverter 2	E892
		2				Phase sequence inverter 3	E893
		3				Model error inverter 1	E901
		4				Model error inverter 2	E902
		5				Model error inverter 3	E903
		6				Overload error inverter 1	E911
		7				Overload error inverter 2	E912
		8				Overload error inverter 3	E913
		9				Overcurrent PFC inverter 1	E921
		10				Overcurrent PFC inverter 2	E922
		11				Overcurrent PFC inverter 3	E923
		12				Internal communication error inverter 1	E931
		13				Internal communication error inverter 2	E932
		14				Internal communication error inverter 3	E933
		15				Fault PFC inverter 1	E941
956	BIT MASK	0	R	-	Alarms [4] [5]	Fault PFC inverter 2	E942
		1				Fault PFC inverter 3	E943
		2				Probe error inverter 1	E951
		3				Probe error inverter 2	E952
		4				Probe error inverter 3	E953
		5				Abnormal condition inverter 1	E961
		6				Abnormal condition inverter 2	E962
		7				Abnormal condition inverter 3	E963
		8				Inverter 1 EEPROM error	E971
		9				Inverter 2 EEPROM error	E972
		10				Inverter 3 EEPROM error	E973
		11				High discharge temperature of Cp3	E029
		12				Anti-legionella performed correctly	E060
		13				Anti-legionella failed or stopped	E061

[1] if enabled
[2] the cycle is activated only if the DHW (4-5-6) status is terminated by the machine.
[3] if the read value is equal to 32766 the probe is not configured, if 32767 the probe is faulty.
[4] reset alarms, write the value 0 with the command 6 on any of the registers of the alarms area.
[5] the alarms of circuit 2 are mapped in the same way with an offset of 20000 (e.g. 20950).

Restart control, write with command 6 the value -3856 (without sign 61680) to register 200, only with compressor stopped.