User Guide

Multipipe Units CMAA / RTMA

WARNING

Supply the unit at least 24 hours before the initial startup to heat the compressor oil. In conditions of low water temperature, the pumps could start in order to avoid freezing conditions. In order to avoid the breaking of heat exchangers due to water hammer be sure to keep to water valves open.

Failure to follow these instructions will void the warranty.

Contents

1.   Advanced Electronics

The control logic allows to satisfy the thermal and cooling loads of the plant. When these are contemporary, the unit exchanges heat of evaporation and condensation, respectively with the cold circuit and the hot system. When, instead, the thermal loads are not balanced or one of the two is not required, the unit occurs, automatically, to a third heat source, which can be the air or water, depending on the unit model, to yield or absorb heat necessary to ensure the functioning.

The multi-functional unit for 4-pipe systems are equipped with two completely independent circuits, controlled by 2 controllers, each handles a single circuit. The two devices are in communication with each other via Modbus protocol.

1.1. Technical Specifications

Below are the main hardware features and the wiring diagram of the controller:

Power supply

24V AC/DC

Digital inputs

20 opto-insulated with 24Volt AC current on the contact

Analogue inputs

10 configurables: 0÷5V, 4÷20mA, NTC, PTC, digital input

Analogue outputs Opto-Insulated

2 configurable: 0÷10V, external relay driving, PWM signal

4 configurables: 0÷10V signal, external relay driving

Relay outputs

10 x 5(2) A @ 250V SPST + 5 SSR type

Remote terminal

1 output for connection of up to two remote terminals (100M)

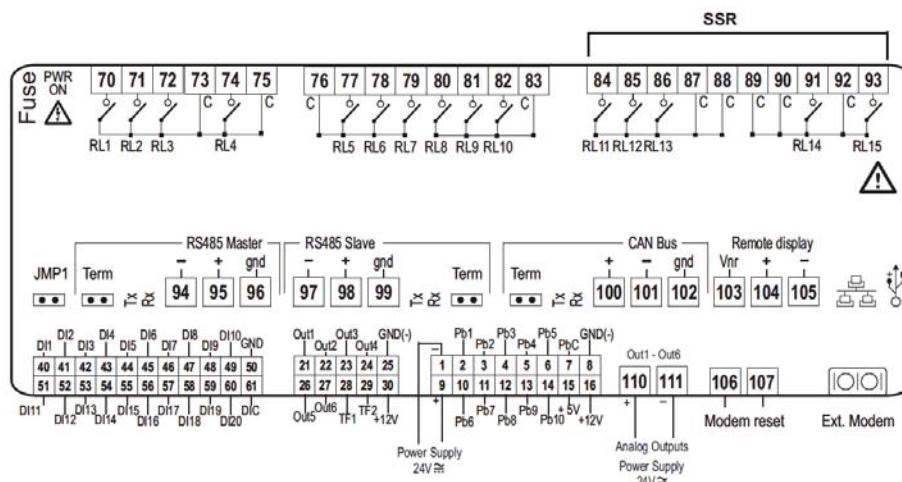**RTC**

Serial outputs

1 USB

1 Ethernet with Bacnet TCP/IP communication protocol

1 connector for/GSM modem /XWEB modem

1 RS485 master with Mod_BUS communication protocol

1 RS485 slave with Mod_BUS or Bacnet MSTP communication protocol

1 CANbus to connect I/O expansion modules

2. Display Description

Through the visual keyboard LCD, you can monitor and modify the status of the unit, using the 8 buttons located at the bottom of the keypad.

At the unit startup, the main screen will be as follows:

In case the unit is controlled by remote or during shutdown by time slot, the main screen will be:

Through the selection keys you can enter in the sub-sections of the main screen, where you can view respectively:

- **"PROBES"**: displays readings of all the sensors connected to the unit;
- **"SET"**: displays set point of utilities;
- **"ALARM"**: displays of active alarms;
- **"SERVICE"**: allows entry in the menu of the instrument;
- **"CIRC"**: displays the screens of the state of circuits and working conditions of each components.
- **"M/S"**: a pressure of 2 seconds allows you to switch the keypad from the circuit 1 board to that of the circuit 2, thus giving the opportunity to interact with the device **"Slave"**. In the main screen you will see the label **"Master"** if you are connected to the circuit 1 board, **"Slave"** for that of the second circuit.

In addition to the submenus input buttons mentioned above, in the main screen there is also the key showing a sun ![sun icon] to activate the unit.

2.1. Submenu

The LCD display provides a simple and immediate interaction with the unit.

Pressing the **"SERVICE"** button, you can enter in the screens dedicated to the displaying and/or to the configuration of components and user parameters of the unit.
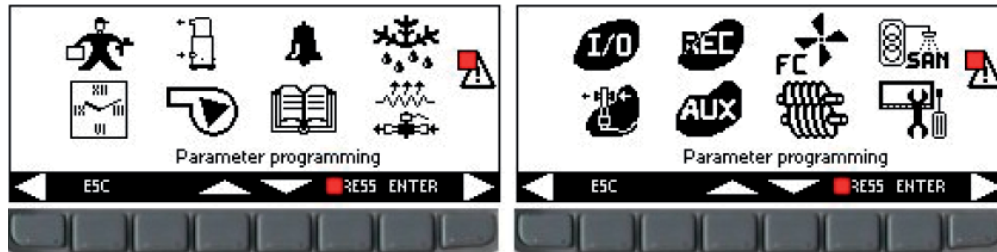
Using the arrow keys you can select the below areas reserved for displaying the features of each component. The areas used for this application are:

- Parameters programming
- Time bands programming
- Current compressors parameters display
- Fans and pumps current parameters display
- Alarm display
- Alarm history display
- Defrost status display
- Inputs and outputs status display
- Auxiliary outputs status display
- Hot water parameters display
- Display setting and di log files management

Access to the link mentioned above is carried out by pressing the **"ENTER"** key after highlighting the desired icon using the or buttons. By pressing the **"ESC"** anytime you return to the main screen.

2.2. *Operating Variables*

Pressing the **"Circ"** button, you can see the status of all unit components and the value read by the pressure transducers.

In this way it is possible to make a quick check on how the unit is working.

In these screens, you can see, at first, the state of all the compressors, with the status indication of any capacity control or the percentage of the 0-10V signal supplied from the device to the continuous modulation with frequency and if preventive functions **"unloading"** are actives.

Using the arrow keys, you can enter in the screen where is display the pressure status of the unit, in order to make a check on the status of the unit and the refrigerant charge, according to refrigerant gas and the external conditions: air temperature and water temperature.
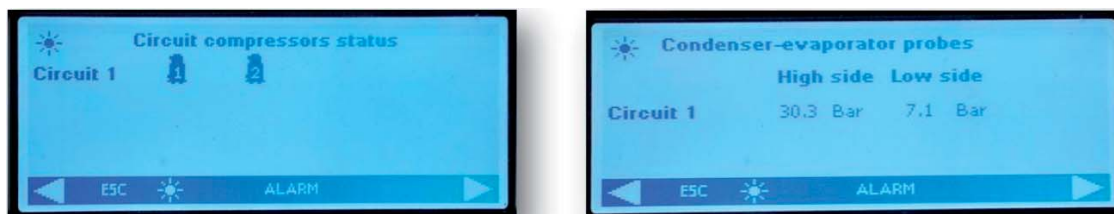
The next two screens show, respectively, the pumps and fans activation status.

If the unit is equipped with EC fans or otherwise, AC fans regulated by continuous signal is shown the percentage of the value of the 0-10V signal provided by the controller for their modulation.
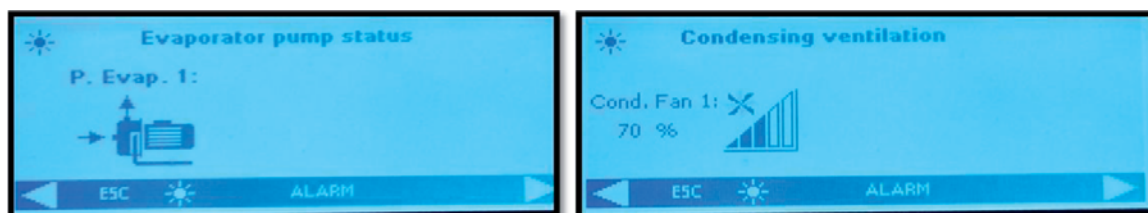
3.   *Unit Startup*

The unit is set to satisfy in an completely autonomous way, any plant request by changing the work cycle without any intervention by the operator.

To activate the unit press for more than 2 seconds the button indicated by the symbol of the sun ☀, until the label **"Unit Stand-by"** is displayed.

This operation must be done for both circuits.

Following the activation, on the main screen, independently of the cycle in which the starts, the label **"Unit ON: Cooling"** is displayed.

At the start up, first of all, the pumps will run and, at the same time, the compressor icon 🗜 "compressor enable" will begin to flash for a set time, after that, the compressor will run and the related icon will displayed fix.

The cycles are easily recognizable by the icons of the active components, which appear on the main screen, in particular for air-water versions:

- **Chiller** 🗜✲🖳ᴇ
- **Chiller** + **Recovery** 🗜🎙🖳ᴇ
- **Recovery** 🗜🎙✲
- **Defrost** 🗜🖳ᴇ ❄

For water-water unit, instead:

- **Chiller** 🗜🖳ᶜᴇ
- **Chiller** + **Recovery** 🗜🎙🖳ᴇ
- **Recovery** 🗜🎙🖳ᶜ

As for the activation, you can turn off the unit by simply pressing for more than 2 seconds the button indicated by the symbol of the sun ☀.

Following the shutdown of the unit, on the main screen the label **"Unit Stand-by"** will display.

In the case that the unit is controlled by remote or during the time slot shutdown, on the main screen will display the label, respectively **"Unit Remote Off"** or **"Unit Off by Clock"**.

This operation must be done on both circuits.

4.   SetPoint

Pressing the **"SET"** button on the main screen, you enter in the screen shown below.

In this menu you can set the cold **"Chiller"** and the hot **"Recovery"** set point.

To change the value, highlight the set point to be changed using the arrow keys, press the **Set** button to enable editing, take it to the desired value using the **UP** o **Down** buttons and press **Set** again to confirm.

Change the set point only on the **"Master"**, the other will automatically acquire it.

This screen also shows an indication of the state of activation of the functions **Energy Saving** and **Dynamic Set Point**.

During this operation, the **"Real Set"** label is displayed; if the **Energy Saving** or the **Dynamic Set Point** is active, the **"Real Set"** is the set point value including the variation for **Energy Saving** or for dynamic set; while the set point represents the real set when the **Energy Saving** or the **Dynamic Set Point** are not active.

An example below is shown in the pictures below.
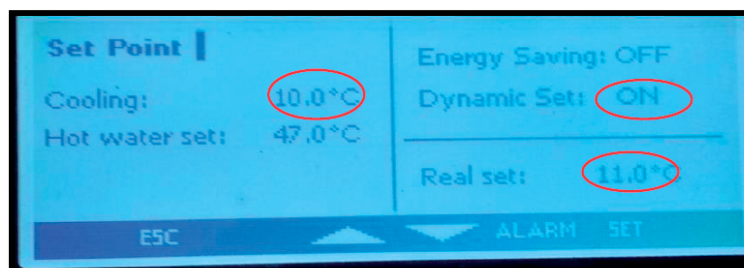
4.1. Energy Saving & Auto On/Off

Enabling the **Energy Saving** and setting the appropriate time slots within the sub-menu **"Time bands"** marked with the icon ![icon], and the parameters **ES**, table in Chapter 9, for the increase or decrease in the set point, the unit will follow a new value of **"Real Set"** calculated by an algorithm based on the parameters set according to the desired temperature curve, at the times you want.

With this function it is possible, therefore, to reduce the work of the unit during hours when the plant requires less cooling and heating capacity, or increase the operation in the hours when the electricity has a lower cost.

In the main screen the ![icon] symbol will appear to indicate that the unit is operating within the band **Energy Saving**.

Simply enable the **Energy Saving** only on the **"Master"** controller, because **"Slave"** controller will automatically acquires the new value.

Enabling the **Auto On/Off**, always within the sub-menu marked with the icon ![icon], instead, you will force the unit in off at the times set.

The 3 time periods are unique and if both of these functions were enabled for the same time slot, the controller will give preference to automatic turn off.

Otherwise from **Energy Saving**, this feature must be enabled on both controllers.

Below are shown the screens as an example.
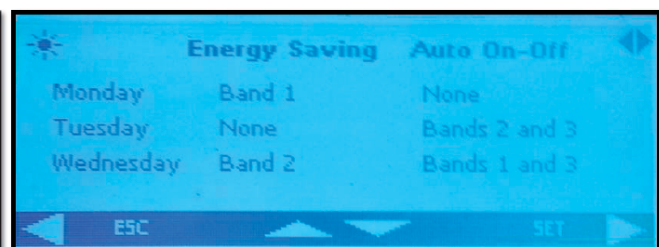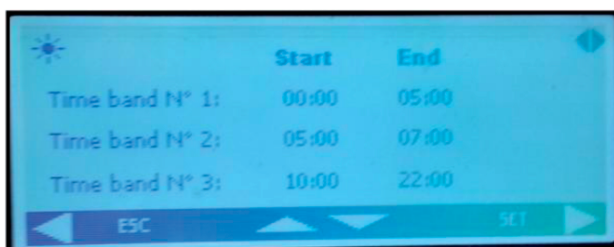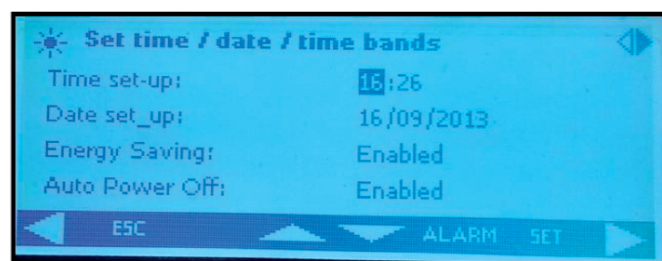
4.2. Dynamic Set Point

Enabling the **Dynamic Set Point** and setting the appropriate parameters for the increase or decrease of the set point and the range of outdoor temperatures in which this feature must be active, the table in Chapter 9 under **SD** the controller will change the set point continuously according to a law proportional.

With this function you can change the set point in order to ensure, to changing external conditions, increased comfort or higher efficiency of the unit.

Below there is an example about the increase in efficiency achieved by enabling this function.

In the main screen, as for the **Energy Saving**, the will appear if this function is enabled.

The Dynamic Set Point is available only for air-water versions.
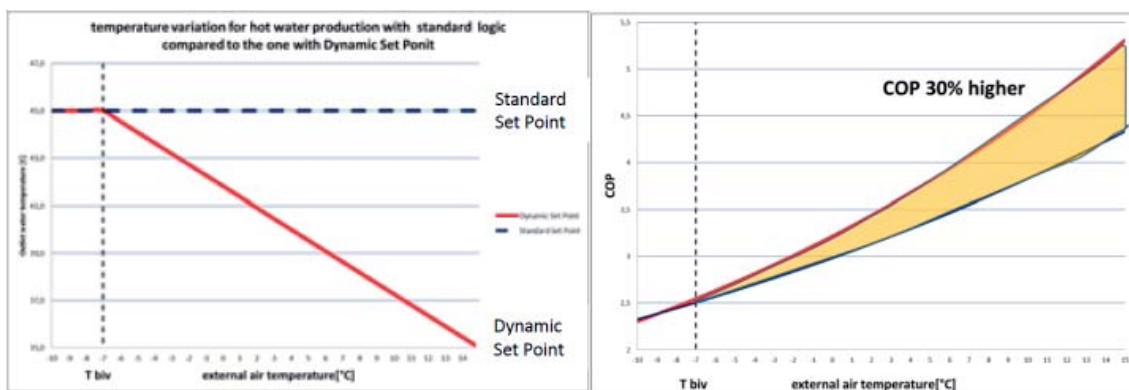
5. Alarm display

The system is able to identify all the alarms that may damage the unit.

When any type of fault or error on the unit occurs, the alarm symbol ⚠ flashes on the display and the buzzer will be on.

Press any key to turn the buzz off.

Press the **"Alarm"** button to view a brief description of the alarm.
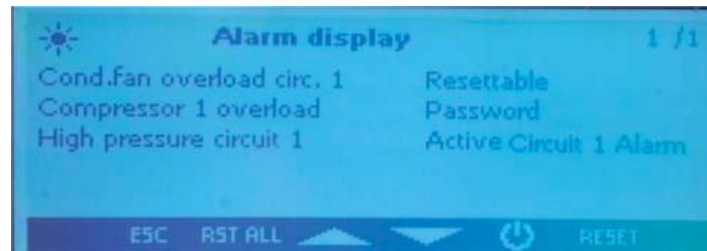
Solved the problem indicated by the alarm, on the same screen is signaled the steps to do to reset and reboot the unit.

The methodologies of alarms reset are different depending on the magnitude of the alarm, according to the sequent priority:

Resettable alarm: low priority, resettable by button;

Resettable alarm with password: high priority, resettable by service center.

To reset an alarm you must press the button identified by the symbol **"RESET"**.

Pressing this button you can reset the highlighted alarm; if you want to reset all low priority alarms, you can press the key identified by the label **"RST ALL"**.

If the remote keypad is connected to the **"Master"** device and the **"Slave"** device is in an alarm condition, the ⚠ will flash and in the alarms display stage the label **"Alarm Circuit 2"** will appear, while the **"Master"** circuit will continue to run, and vice versa.

To view the circuit 2 alarm and reset it if it is possible, you must connect the keypad to the card **"Slave"**, simply by pressing the **"M/S"** button on the main screen, and vice versa.

The occurrence of common alarms for the two circuits, of course, stops whole unit and you will need to reset them on both cards.

6. Di Log Files Management

The controller records on a non-volatile memory, approximately the last 4 days of work.

You can download these log files directly to a USB stick, or on your PC by connecting properly to the controller.

To download these files on a USB stick, plug into the USB port and navigate through the menu functions until you meet [icon].

In this menu select **"files log management"**, and inside select **"Send all logs to a USB"** and press enter.

Finished sending, inside the key will create a folder **"ipro"** with inside three files of alarms:

- *"alarm_a"* that records all water side alarms and errors probes
- *"alarm_b"* that records all circuit alarms such as high and low pressure
- *"alarm_c"* that records all serious alarms such as overload compressors alarms.

and the file *"Unit"* where the last 4 days of operation with status and main variables are recorded.

All of these files are in "txt" format and inside the recording date is in the format YY/MM/DD/hh/mm/ss.

This operation is to be performed on both cards.

N.B.: Before you do this make sure that into the USB stick there is no folder named "ipro."

7. Online Datalogger

The device is equipped with a web page where you can view and record all the main operating data with a record time that can be set from 3 to 60 seconds.

To use this feature of the microprocessor is necessary to connect the PC to the card via LAN cable cross type, set the IP address of the PC in the Internet Protocol Version 4 (TCP/IPv4) LAN connection in this way:

Address IP: 192.168.0.252

Subnet mask: 255.255.255.0

Open a browser and write the IP addresses of the devices:

192.168.0.250 for the circuit 1 board,

192.168.0.251 for the circuit 2 board.

This will open a Web page where you would add the following credentials:

User = admin

Password = Dixell

Below there is an example of this web page.
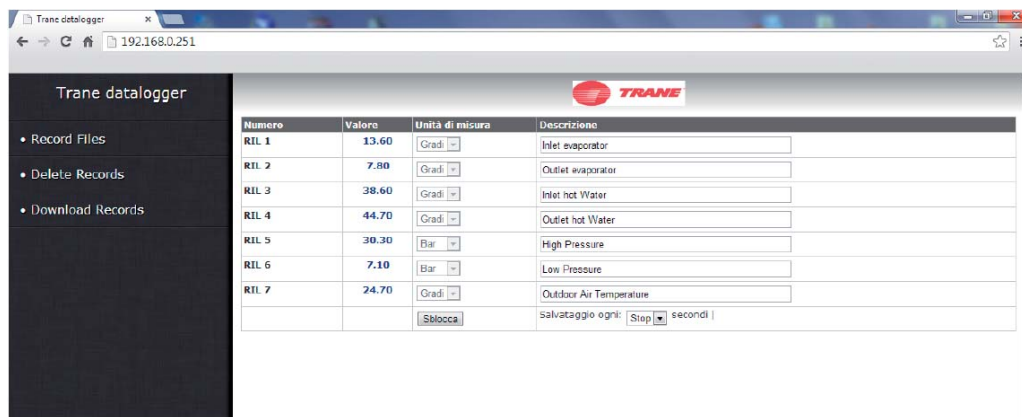
8. Remote Control

You can control the unit remotely in three different ways:

- free contacts reported in customer terminal block (X);
- Mod-Bus protocol with RS485 serial slave port;
- Remote keypad.

8.1. Remote Control via Free Contacts

On the customer terminal block (X) are reported free terminals where you can connect any type of thermostat able to provide a current pulse to close the relay to active the unit, and any boards to read an alarm state.

For the water-water and air-water versions without water kit on board, there are also terminals for enabling of the pumps.

These contacts are usually free contacts normally open.

Here below there is an example of the customer terminal block, however see the wiring diagram attached to the unit.

8.2. Remote Control via Mod-Bus Protocol

On the control unit device is available a serial port RS485 input with MODBUS protocol, to use this type of connection please respect the connection diagram below, respecting a bus connection type, avoiding the creation of stars.

You can use the RS485 port Slave, depending on the position of the instrument in the network, only if you do not already committed to control the unit.
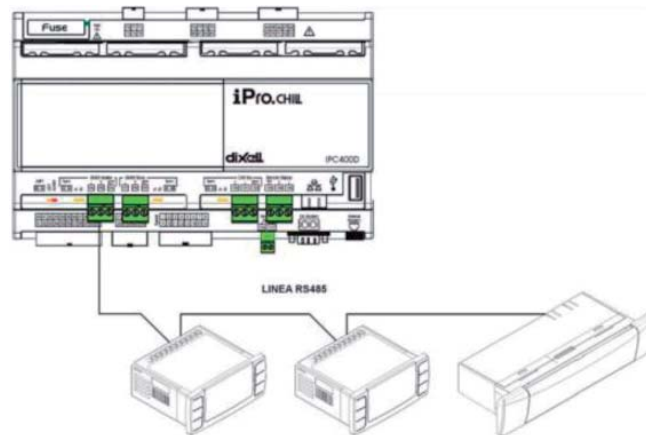
To connect the devices to check, you can use two shielded wires of 0.5 mm2; use the input GND only if you have communication problems.

The device serial address is available in the **"System Information"** in the sub menu marked with the icon.

In the screen shown in the figure are indicated, as well as ModBus address, the IP address of the controller, which it is required for the activation of the online instrument data logger, the software release and the software installed on the keypad

Changing IP and mod-bus addresses of the boards must be carried out by authorized personnel only, or the warranty can be voided.

8.3. Remote Control via Remote Keypad

You can control the unit remotely, using a second keypad, connected in parallel to the one present on the machine.

Also for this type of connection you have to respect the connection diagram below, respecting a bus connection type, thus avoiding the creation of stars.

Wrong wiring may cause serious damage to the keypad or controller.
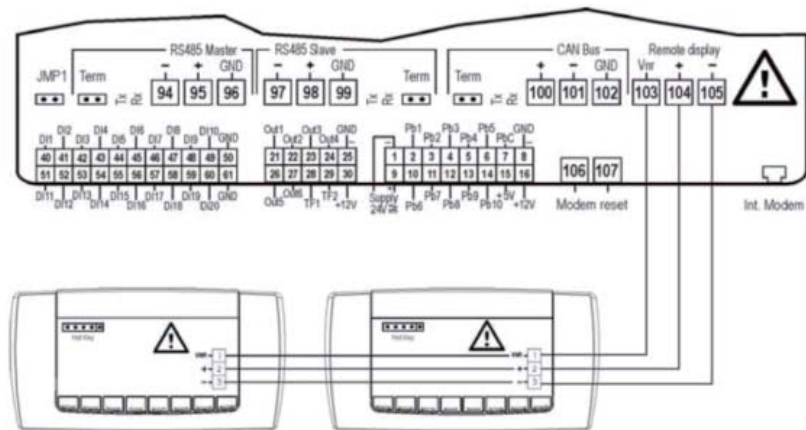
Once connected the second keypad, you will need to update the software of same.

With the unit in off, you must navigate through the menu functions until you have highlight the icon.
Within this submenu you will need select the **"Update Visograf"** command and press **"Enter"**. You will see the loading bar to indicate the progress of the update, after which the keypad will have the same functions as the one on the unit.

9.   User Parameters Table

The parameters are organized in macro groups.

Below are the areas dedicated for programming of user parameter:

ST	Thermoregulation parameters
SD	Dynamic set point parameters (only air-water unit)
ES	Energy saving parameters
FS	Hot water parameters

Thermoregulation parameters					
Parameters	**Description**	**min**	**max**	**u.m.**	**Resolution**
ST1	Summer set point	ST02	ST03	°C/°F	dec/int
Dynamic set point					
Parameters	**Description**	**min**	**max**	**u.m.**	**Resolution**
Sd1	Summer dynamic set point offset max	-50.0	110.0	°C	Dec
Sd2	Winter dynamic set point offset max	-50.0	110.0	°C	Dec
Sd3	Summer set external air temperature	-50.0	110	°C	Dec
Sd4	Winter set external air temperature	-50.0	110	°C	Dec
Sd5	Summer differential external air temperature	-50.0	110.0	°C	Dec
Sd6	Winter differential external air temperature	-50.0	110.0	°C	Dec
Energy Saving					
Parameters	**Description**	**min**	**max**	**u.m.**	**Resolution**
ES1	Time band 1 begin	0	23.50	Min	10 min
ES2	Time band 1 end	0	23.50	Min	10 min
ES3	Time band 2 begin	ES2	23.50	Min	10 min
ES4	Time band 2 end	0	23.50	Min	10 min
ES5	Time band 3 begin	ES4	23.50	Min	10 min
ES6	Time band 3 end	0	23.50	Min	10 min

ES7	Monday 0 = No time band 1 = Time band 1 2 = Time band 2 3 = Time band 1 & 2 4 = Time band 3 5 = Time band 1 & 3 6 = Time band 2 & 3 7 = All time band	0	7		
ES8	Tuesday 0 = No time band 1 = Time band 1 2 = Time band 2 3 = Time band 1 & 2 4 = Time band 3 5 = Time band 1 & 3 6 = Time band 2 & 3 7 = All time band	0	7		
ES9	Wednesday 0 = No time band 1 = Time band 1 2 = Time band 2 3 = Time band 1 & 2 4 = Time band 3 5 = Time band 1 & 3 6 = Time band 2 & 3 7 = All time band	0	7		
ES10	Thursday 0 = No time band 1 = Time band 1 2 = Time band 2 3 = Time band 1 & 2 4 = Time band 3 5 = Time band 1 & 3 6 = Time band 2 & 3 7 = All time band	0	7		
ES11	Friday 0 = No time band 1 = Time band 1 2 = Time band 2 3 = Time band 1 & 2 4 = Time band 3 5 = Time band 1 & 3 6 = Time band 2 & 3 7 = All time band	0	7		
ES12	Saturday 0 = No time band 1 = Time band 1 2 = Time band 2 3 = Time band 1 & 2 4 = Time band 3 5 = Time band 1 & 3 6 = Time band 2 & 3 7 = All time band	0	7		

ES13	Sunday 0 = No time band 1 = Time band 1 2 = Time band 2 3 = Time band 1 & 2 4 = Time band 3 5 = Time band 1 & 3 6 = Time band 2 & 3 7 = All time band	0	7		
ES14	Summer increase set energy saving	-50.0	110.0	°C	Dec
ES15	Summer differential energy saving	0.1	25.0	°C	Dec
Automatic on/off by time band					
ES18	Monday 0 = No time band 1 = Time band 1 2 = Time band 2 3 = Time band 1 & 2 4 = Time band 3 5 = Time band 1 & 3 6 = Time band 2 & 3 7 = All time band	0	7		
ES19	Tuesday 0 = No time band 1 = Time band 1 2 = Time band 2 3 = Time band 1 & 2 4 = Time band 3 5 = Time band 1 & 3 6 = Time band 2 & 3 7 = All time band	0	7		
ES20	Wednesday 0 = No time band 1 = Time band 1 2 = Time band 2 3 = Time band 1 & 2 4 = Time band 3 5 = Time band 1 & 3 6 = Time band 2 & 3 7 = All time band	0	7		
ES21	Thursday 0 = No time band 1 = Time band 1 2 = Time band 2 3 = Time band 1 & 2 4 = Time band 3 5 = Time band 1 & 3 6 = Time band 2 & 3 7 = All time band	0	7		

Parameters	Description	min	max	u.m.	Resolution
ES22	Friday 0 = No time band 1 = Time band 1 2 = Time band 2 3 = Time band 1 & 2 4 = Time band 3 5 = Time band 1 & 3 6 = Time band 2 & 3 7 = All time band	0	7		
ES23	Saturday 0 = No time band 1 = Time band 1 2 = Time band 2 3 = Time band 1 & 2 4 = Time band 3 5 = Time band 1 & 3 6 = Time band 2 & 3 7 = All time band		7		
ES24	Sunday 0 = No time band 1 = Time band 1 2 = Time band 2 3 = Time band 1 & 2 4 = Time band 3 5 = Time band 1 & 3 6 = Time band 2 & 3 7 = All time band	0	7		
Hot water parameters					
Parameters	**Description**	**min**	**max**	**u.m.**	**Resolution**
FS1	Hot Water enabling 0 = Disable 2 = Enable	0	2		
FS2	Working priority 0 = Hot water 1 = Cold water	0	1		
FS3	Hot water set point	35.0	55.0	°C	Dec.

10.   Other Connection

On the controller are also an input USB2.0 and RJ45 input, these predispositions are necessary to program and supervising the instrument.

The interaction with these inputs is restricted only to authorized personnel from Trane.

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