EV91A - SLAVE
TEMPERATURE REGULATION MODULE
WITH OUTSIDE PROBE

USE

The EV91A module is suitable to be used on all types of centralised heating plants like those installed in housing estates, schools, hospitals, factories, etc. Each setting may be controlled by a temperature regulation module of the EV91A type for a maximum of eight rooms.
The EV91A module enables to fully manage a mixing valve, a circulation pump and an auxiliary output.

OPERATION

The EV91A is designed to obtain a certain AMBIENT TEMPERATURE by measuring the water delivery temperature and the outside temperature. The required ambient temperature is set by the user through a configuration menu shown on the MASTER EV90 display, and it may take on various values depending on the selected program.

When the device recognis-es a program type, it calculates the WATER DELIVERY TEMPERATURE required to obtain the ambient temperature associated with the program. This is calculated through interpolation by using the values set for water delivery temperature for four outside temperature values (20°;10°; 0°;-10°).

This curve represents the water delivery temperature values based on the external temperature required to obtain an ambient temperature of 20°C.

For other ambient temperatures, the broken regulation curve moves along the straight line "+Ta -Ta".

The EV91A module works properly only when it is connected through a two-wire serial bus (FANBUS) to a Master device called MASTER EV90 which arbitrates bus data and checks the conditions of all devices connected to it.

The EV91A module receives from the MASTER control unit all information required to perform regulation like: time, current date, etc.
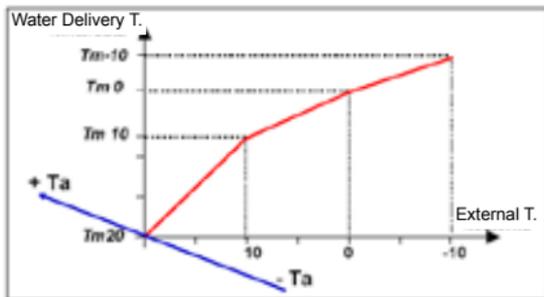
DESIGN CHARACTERISTICS
6-module DIN container; removable terminal boards facilitate replacement.

ValveOpens command indication

ValveCloses command indication

Pump command indication

Auxiliary command indication

Indication of data reception through BUS

Indication of data transmission through BUS

BUTTON to reset factory settings
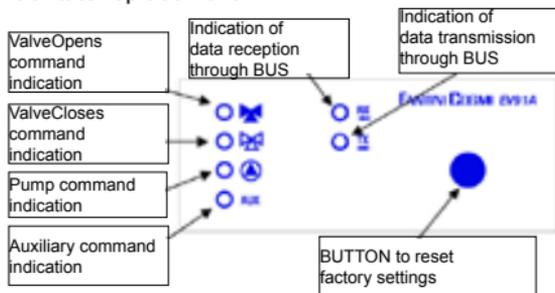
OUTPUT RELAYS
The four output relays have the following functions:
Circulation pump command
Valve opening command
Valve closing command
Auxiliary command

CIRCULATION PUMP (If fitted).
It is activated to circulate water inside the heating plant and it is turned off when the water delivery temperature calculated by the control unit falls below the minimum value set by the user.

MIXING VALVE
The mixing valve is opened/closed by the two relevant relays to allow the water delivery temperature to reach the temperature value calculated by the control unit.

AUXILIARY OUTPUT
The auxiliary relay just follows the operating mode. More particularly, the relay is closed when the operating mode is "DAYTIME", "FORCED" or "TEMPORARY". In all other cases it is opened.

OPERATING PROGRAMMES
The unit works with different programmes selectable by the user.
- Valve Opens

The circulation pump is started and the mixing valve is opened manually.

- Valve Closes

The circulation pump is shut down and the mixing valve is closed manually.

- Antifreeze

The ANTIFREEZE temperature set for calculating the water delivery temperature is used.

- Nighttime

The NIGHTTIME temperature set for calculating the water delivery temperature is used.

- Daytime

The DAYTIME temperature set for calculating the water delivery temperature is used.

- Automatic

The ambient temperature to be used for calculating the water delivery temperature is selected according to the programming done.

HEATING

When in the Automatic operating mode, during the heating period set, the control unit will calculate the water delivery temperature based on Daytime, Nighttime, Antifreeze, Reduced ambient temperatures set in Set Temperature.

TEMPORARY PROGRAM

Four temporary programs are available, each program being associated with the desired ambient temperature, with the switch-on time (starting month and ending month) and with the possibility of overriding them. When in the Automatic operating mode, during temporary periods, the heating period requirements specified above are ignored and the ambient temperature required by this programming is set.

OPERATING MODES

Operating modes are selected automatically by the control unit according to the program selected and they determine pump operation and system condition.

- DAYTIME MODE

It is obtained by setting the DAYTIME program or the AUTOMATIC program. If the automatic program is set, the following conditions must be observed:

- The current day must be within the heating period set.
- The current time must be within the periods set in the time programming menu.

The circulation pump keeps running except when the water delivery temperature read falls below the minimum temperature set.

- NIGHTTIME MODE

It is obtained by setting the NIGHTTIME program or the AUTOMATIC program. If the automatic program is set, the following conditions must be observed:

- The current day must be within the heating period set in the heating period menu.
- The current time must be out of the time schedule set in time programming menu.

The circulation pump keeps running except when the water delivery temperature read falls below the minimum temperature set.

– TEMPORARY MODE

It is obtained by setting the AUTOMATIC program and it is within the period set in the temporary program menu. The circulation pump keeps running except when the water delivery temperature read falls below the minimum temperature set.

– MANUAL MODE

It is obtained by setting the VAL. OPENS or VAL. CLOSES program. The circulation pump keeps running if the program set is VAL. OPENS whereas it is shut down if the program set is VAL. CLOSES.

– STAND-BY MODE

It is obtained by setting the AUTOMATIC program and it is outside the heating period and the temporary program.

The circulation pump is shut down and the valve is closed.

– ANTIFREEZE MODE

The antifreeze mode can be selected if the ANTIFREEZE program is set. The circulation pump keeps running except when the water delivery temperature read falls below the minimum temperature set.

– REDUCED MODE

It is obtained by setting the AUTOMATIC program and the following conditions must be observed:
- The current day must be within the heating period set.
- The current time must be within the first and the second period or within the second and the third one set in the time programming menu.

– FORCED MODE

The forced operating mode can be set when the following conditions are met:
- Program set: AUTOMATIC
- The current day must be within the heating period set in the heating period menu.
- The advance switch-on time must be set in the optimisation menu.
- The first switch-on time of the next day must be set.

The water delivery temperature will be the one set in the optimisation menu. The circulation pump keeps running except when the water delivery temperature read falls below the minimum temperature set.

4

SWITCH-ON TIME OPTIMIZATION

Like with the water delivery temperature, the advance switch-on time is calculated automatically by interpolation using the advance switch-on time values set for four external temperature values (20°;10°; 0°;-10°).
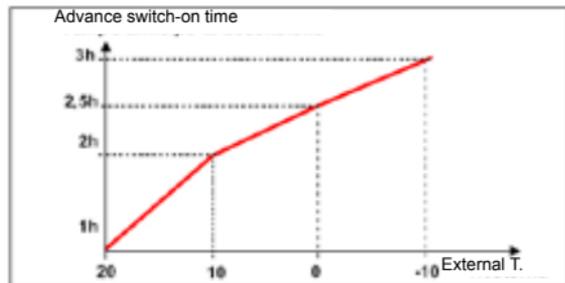
EXTERNAL PROBE

Use of the EC14 external probe is optional since although this probe is not connected, the device is preset for receiving the external temperature value from the MASTER EV90 through the FANBUS. Local use of the external probe may be necessary if the device has to regulate the temperature in a room with an external temperature that on average is higher than that of the other premises (e.g.: it is directly exposed to sunlight).

EXAMPLE OF PLANT WITH TWO CONTROL UNITS ONE OF WHICH IS FITTED WITH EXTERNAL PROBE
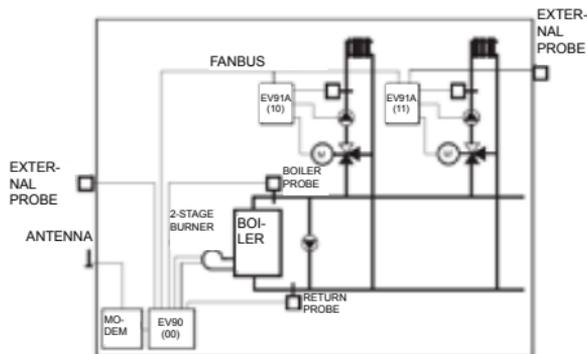
INSTALLATION

INSTALLING THE CONTROL UNIT

Mount the device onto the DIN rail inside a panel in order to provide suitable protection. Removable terminal boards facilitate wiring and replacement.
Connecting leads to the control unit must have a section of at least 1 mm2 and a length of 1000 metres.

INSTALLING THE DELIVERY PROBE EC15-EC16

Install the water delivery temperature probe EC15 onto the water pipe with the clamp provided for the purpose and with heat conducting paste interposed in order to guarantee correct heat conduction.
The immersion probe EC16 must be fitted in the elbow provided in the piping. N.B. The delivery probes must be mounted downstream the mixing valve at least 1.5 metres from the valve, preferably after an elbow. If the circulation pump is placed on the delivery side, install the probe downstream the pump.

INSTALLING THE EXTERNAL PROBE EC14

Install the external probe in a vertical position on the north or north-west wall of the building about halfway up, or in any case at least 2.5 metres from the ground. Fit the probe far from heat sources (windows, aerators, flues, etc.) and protruding parts.
NB: The control unit also works with probes: EC81 (external probe) EC82 (contact probe) and EC83 (immersion probe)

CONNECTION TO THE FANBUS

Connect the EV91A control unit to the Master EV90 through the FANBUS. Bear in mind that the bus has low voltage and it is not polarised, terminals can therefore be inverted with each other without causing malfunction.

CONTROL UNIT ADDRESS

The control units must be addressed through the terminal board to work properly. The address of the EV91A unit is made up of a high part that corresponds to number "1", and a low part that may take on a value between "0" and "7". The MASTER unit starts a progressive search of SLAVES EV91A from address 10 and it will stop if it gets no reply. It is therefore necessary that connected slaves have different consecutive addresses starting from address "10". The diagrams below show how to set the low part of the address through terminal board 'A' :

Address "10"	Address "11"	Address "12"	Address "13"
Address "14"	Address "15"	Address "16"	Address "17"
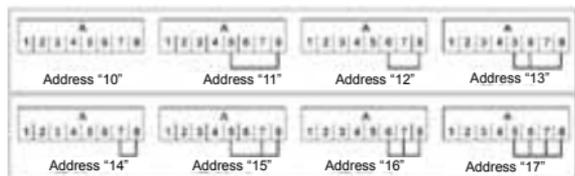
WIRING DIAGRAM
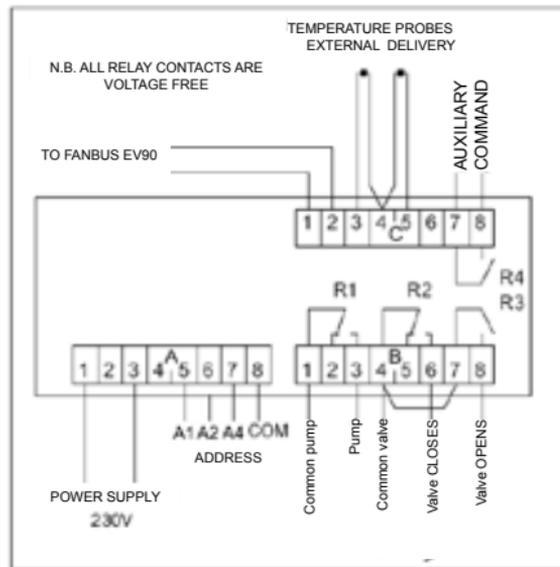
EXAMPLE OF CONNECTIONS
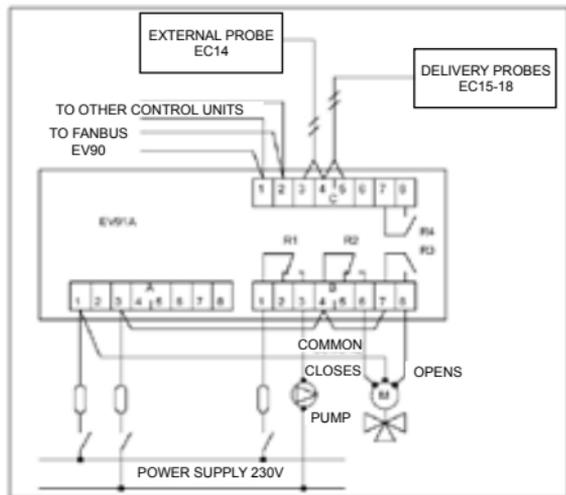
SETTINGS AND ADJUSTMENTS

FACTORY SETTINGS
The EV91A leaves the factory with all parameters set for standard operation. Should it be necessary to reset factory parameters (default data), turn off the power supply, then turn it on again while pressing the key on the front panel. All data entered will be lost, whereas factory parameters will be reset.

INITIALISING THE DEVICE
Each time the control unit is powered, the LEDs set on the front panel will start flashing simultaneously until the Master EV90 starts communicating with the relevant device by selecting its address or transmitting time data through the bus. As from this moment the control unit will start working regularly.

SETTINGS AND ADJUSTMENTS
To modify EV91A data it is necessary to use the Master EV90 that will act like the display and the remote keyboard of the EV91A. Data is entered through special menus provided for the purpose which may contain a number of submenus. Press the "MORE" "LESS" "FORWARD" "BACK" "UP" and "DOWN" keys to scroll the different menus and to modify parameters.

COMMANDS ON THE FRONT PANEL OF MASTER EV90 FOR CONTROLLING SLAVE EV91A
The highlighted cursor indicates which menu item is currently selected. Each item has a number of pages that can be scrolled through by keys "Forward/Back" (MASTER).

Use keys "UP" and "DOWN" to move over a page and to go from one parameter to another.

Use keys "<" and ">" to go from one page to another.

Use keys "+" and "-" to change parameters

EV91A CONTROL UNIT MENUS

Device Type	
EV90	00
GYM	10
BUILDING SOUTH SIDE	11
SANITARY	40
BOILERS 1-2	20
BOILERS 3-4	21
INPUTS	50
OUTPUTS	30

EV91A control unit
List of submenus

EV91A MENU -->
>Program
>Information
>Set Temperature
>Prog. Times
>Temporary Prog.
>Heating
>Regul. Curve
>Optimisation
>Configuration

PROGRAM SUBMENU:
Select this submenu to select the device operating mode.
Use keys "+" or "-" to select the program type.

EV91A
Program Type
-> AUTOMATIC
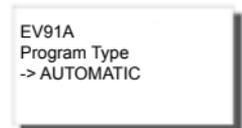
INFORMATION SUBMENU:
It consists of five submenus which mainly describe the system conditions:
Use keys "MORE" "LESS" "UP" and "DOWN" to change the text of the system description, which is a 16-character string that is sent to the MASTER when it searches the SLAVES on the bus. ASCII characters that may be entered include numbers 0 to 9, letters A to Z, and other characters. Signs < and > are not included. The last two characters identifying the SLAVE address cannot be changed.

DATA READ
Water delivery T: xx.x c
External T. : xx.x c

If the delivery probe is not connected, dashes " --,--" will be displayed

CALCULATED TEMP.
Delivery : xx.x c
Ambient: xx.x c
Mode: AUTOMATIC

Displays the calculated water delivery T., the ambient T. used for calculation and the current operating mode

OPTIMISATION
Time ON: --,--

Displays the advance switch-on time if optimisation has been sete

DESCRIPTION
EV91A REV.:00 1x

System description that can be modified by the user, it is useful for identifying the system controlled by the control unit.

FANTINI COSMI
Via Dell'Osio,6
Caleppio MILANO
EV91A Rev.:00

Device code and revision

SET TEMPERATURE SUBMENU

This submenu shall be used to change the ambient temperatures used by the AUTOMATIC program when the heating period is ON. For instance, to cut off heating at night set a value less than zero; dashes " --.--" will automatically be displayed.

```
SETTING
Daytime T.: xx.x c
Reduced T. : xx.x c       SETTING
Nighttime T. : Xx.x c     Antifr. T.: xx.x c
```

PROGRAMMING TIMES SUBMENU

It consists of seven submenus (one for each day of the week), that allow for heating programming in the AUTOMATIC program.

Three on and three off periods for each day can be programmed. At switch-on, the DAYTIME ambient temperature programmed in the previous menu is used to regulate temperature. The REDUCED ambient temperature is used in the time interval between a switch-off time and the following switch-on time, except when the second and third time bands are absent. In this event the NIGHTTIME ambient temperature is used, just like for the period between the switch-off time of the third time band and the switch-on time of the first time band of the next day.

To cancel a time band set a value less than zero; dashes "--.--" will automatically be displayed. The advance switch-on time is only calculated on the first ON time. In the intermediate periods ON always coincides with the switch-on time.
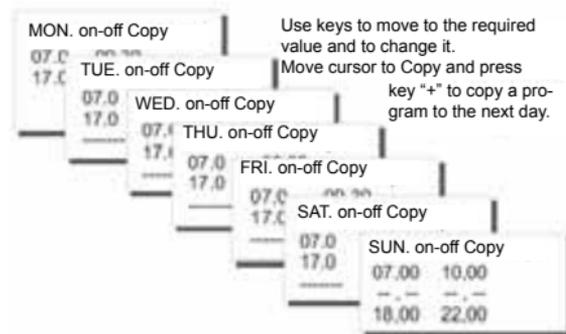
TEMPORARY PROGRAM SUBMENU

Four submenus enable to set four temporary programs to be used when the AUTOMATIC program is selected. For each of them it is possible to program the starting and ending dates, the ambient temperature to be used in the time interval, and whether or not to override it.

Temporary programs have higher priority with respect to heating, starting from the first to the last one. If

the programmed period of one of them overlaps the programmed period in the Heating menu, the temperature is regulated using the ambient temperature coinciding with the temporary program. Programming times are not examined.

TEMPORARY P. 1
Start: 01/JAN
End: 31/DEC
T.:20,0c OFF

TEMPORARY P. 2
Start: 01/JAN
End: 31/DEC
T.:20,0c OFF

TEMPORARY P. 3
Start: 01/JAN
End: 31/DEC
T.:20,0c OFF

TEMPORARY P. 4
Start: 01/JAN
End: 31/DEC
T.:20,0c OFF

HEATING SUBMENU

It consists of just one page where it is possible to set the starting and ending dates of heating. If no temporary period overlaps this period, the ambient temperatures set in the Set Temperature menu are used as reference.

Heating period

Start: 01/JAN
End: 31/DEC
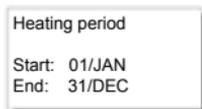
REGULATION CURVE SUBMENU

It consists of four pages corresponding to four external temperature values <20°C>, <10°C>, <0°C> and <-10°C>. For each of these values, set the most suitable regulation curve for the type of system to control. The relation that establishes the water delivery temperature value as a function of the external temperature depends on the thermal properties of the building and, for optimum comfort, must be found by experimenting.

Regulation Curve
With EXT. T.: 20°
Water
Delivery T.: 20,0°

Regulation Curve
With EXT. T.: 10°
Water
Delivery T.: 50,0°

Regulation Curve
With EXT. T.: 0°
Water
Delivery T.: 70,0°

Regulation Curve
With EXT. T.: -10°
Water
Delivery T.: 80,0°
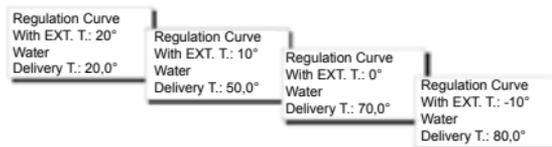
OPTIMISATION SUBMENU

It consists of five submenus that enable to set advance switch-on times based on the four external temperatures stated above, and the water delivery temperature to regulate when within the advance period. To cut out advance times, just select 00.00h.

Regulation Curve
With EXT. T: 20°c
Advance

Regulation Curve
With EXT. T: 10°c
Advance

Regulation Curve
With EXT. T: 0°c
Advance

Regulation Curve
With EXT. T: -10°c
Advance

Forced op. mode
Max. Water Delivery T.
value: 99,0°
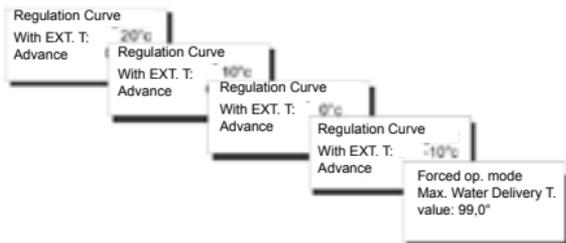
CONFIGURATION SUBMENU

It consists of three submenus that enable to set the parameters relevant to the circulation pump being used.

Valve opening time expressed in minutes, pump switch-off delay, and pump minimum operating temperature.

VALVE
Opening Time
MINUTES : 04,00

PUMP
Switch-off delay
MINUTES: 08,00

Pump OFF
Below water
delivery
Temperature: 05,0c
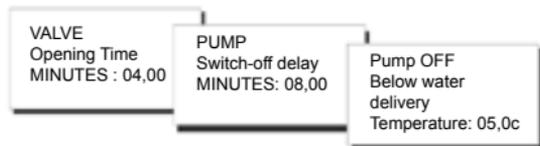
REMOTE MANAGEMENT

Like with all SLAVE devices connected to the MASTER EV90, certain EV91A parameters may be changed remotely using an analog or GSM modem connected to the MASTER EV90. When the MASTER receives a command from the modem (analog or GSM) for the EV91A unit,

it sends it back through the FANBUS. It then waits for reply and sends it to the sender, which may be a mobile phone, if a GSM modem is used or a PC if an analog modem or GSM modem in data mode is used.

In order to communicate properly with the required device, every command must be preceded by the address of the relevant SLAVE:

E.g.: to communicate with SLAVE EV91A add $10:
- "10" followed by the command
To communicate with SLAVE EV91A add $11:
- "11" followed by the command

DATA CONNECTION:
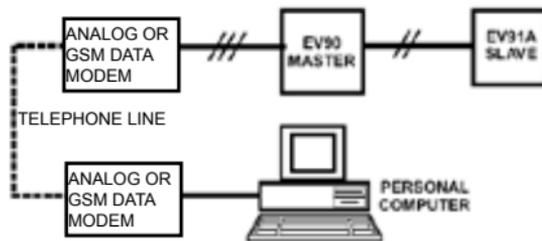
SMS CONNECTION:

N.B: Management software for Personal Computer is available in Italian language only.

REMOTE MANAGEMENT COMMANDS

??? Use this command to know which commands may be sent.
EV91A replies to this question with:
<16 characters of description>
<ORA=?>
<TA=?>
<TM=?>
<PROGx=?>
<PROGx=> 08.00-09.00 12.00-14.00 18.00-22.00>
        (example)
<TAG=xx.x>
<TAN=xx.x>
<TAA=xx.x>
<TM20=xx.x>
<TM10=xx.x>
<TM0=xx.x>
<TM-10=xx.x>

<PGIO>
<PNOT>
<PANT>
<PAUT>

TA=? Use this command to know the ambient temperatures set
EV91A replies to this question with:
<16 characters of description >
<TAG=xx.xc>   (DAYTIME)
<TAR=xx.xc>   (REDUCED)
<TAN=xx.xc>   (NIGHTTIME)
<TAA=xx.xc>   (ANTIFREEZE)

TM=? Use this command to know the four water delivery temperatures set
EV91A replies to this question with:
<16 characters of description >
<TM20=xx.xc>
<TM10=xx.xc>
<TM0=xx.xc>
<TM-10=xx.xc>

PROGx=? Use this command to know the programming times of a certain day defined as x, which must be included between 1 and 7.
EV91A replies to this question with:
<16 characters of description >

<DAY.:ON-OFF>   "Day is included between MON and SUN"
<08.00-09.00>   (example)
<12.00-14.00>   (example)
<18.00-22.00>   (example)

PROGx= 08.00-09.00 12.00-14.00 18.00-22.00 (example) Use this command to change the 6 programming times for the relevant day. Leave a space between each time band.
EV91A replies to this question with:
<16 characters of description >
<DAY.:ON-OFF>   "Day is included between MON and SUN"
<08.00-09.00>   (example)
<12.00-14.00>   (example)
<18.00-22.00>   (example)

TAG=xx.x TAR=xx.x TAN=xx.x TAA=xx.x
Use this command to set the four ambient temperatures
EV91A replies to this question with:
<16 characters of description >
<TAG=xx.xc>   (DAYTIME)
<TAR=xx.xc>   (REDUCED)
<TAN=xx.xc>   (NIGHTTIME)
<TAA=xx.xc>   (ANTIFREEZE)

TM20=xx.x TM10=xx.x TM0=xx.x TM-10=xx.x

Use this command to set the four water delivery temperatures
EV91A replies to this question with:
<16 characters of description >
<TM20=xx.xc>
<TM10=xx.xc>
<TM0=xx.xc>
<TM-10=xx.xc>

ORA=?
EV91A replies to this question with:
<16 characters of description >
<Giorno.>
<Ora.Min>
<TMandata misurata>
<Testerna misurata>
<Programma Scelto>
<Regime in corso>

PAUT Use this command to set the automatic operation program
EV91A replies to this question with:
<16 characters of description >
<Giorno.>
<Ora.Min>
<TMandata misurata>
<TEsterna misurata>
<Programma Scelto>
<Regime in corso>

14

PNOT Use this command to set the nighttime operation program
EV91A replies to this question with:
<16 characters of description >
<Giorno.>
<Ora.Min>
<TMandata misurata>
<TEsterna misurata>
<Programma Scelto>
<Regime in corso>

PGIO Use this command to set the daytime operation program
EV91A replies to this question with:
<16 characters of description >
<Giorno.>
<Ora.Min>
<TMandata misurata>
<TEsterna misurata>
<Programma Scelto>
<Regime in corso>

PANT Use this command to set the antifreeze operation program
EV91A replies to this question with:
<16 characters of description >
<Giorno.>
<Ora.Min>
<TMandata misurata>
<TEsterna misurata>
<Programma Scelto>
<Regime in corso>

TECHNICAL DATA

Power supply	230V 50Hz
Consumption	5 VA
Contact rating	8(5)A 250Vac
Voltage free contacts	
Max ambient temperature	T45
Protection degree	IP40 (rear panel mounting)
Pollution degree	2
Impulse voltage	4000V
Class A software	
Removable terminal boards	for friendly wiring
Direct command	one mixing valve
Direct command	one circulation pump
Delivery probe	NTC 10K type EC15 or EC16 (compatible with EC82 and EC83)
External probe	NTC 1K type EC14 (optional) (compatible with EC81)
Compliance with Standards	EN60730-1 Standard

ErP classification: ErP Class II; 2% (EU Reg. 811/2013 - 813/2013)

Dimensions (mm)
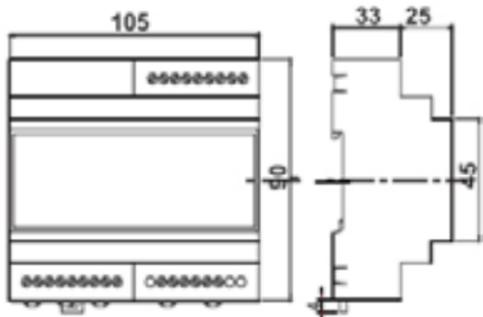
EAC CE

DISPOSAL OF PRODUCTS
The crossed out wheeled dust bin symbol indicates that products must be collected and disposed of separately from household waste. Integrated batteries and accumulators can be disposed of with the product. They will be separated at the recycling centres. The black bar indicates that the product was placed on the market after August 13, 2005. By participating in separate collection of products and batteries, you will help to assure the proper disposal of products and batteries and thus help to prevent potential negative consequences for the environment and human health. For more detailed information about the collection and recycling programmes available in your country, please contact your local city office or the shop where you purchased the product.

GB79238D