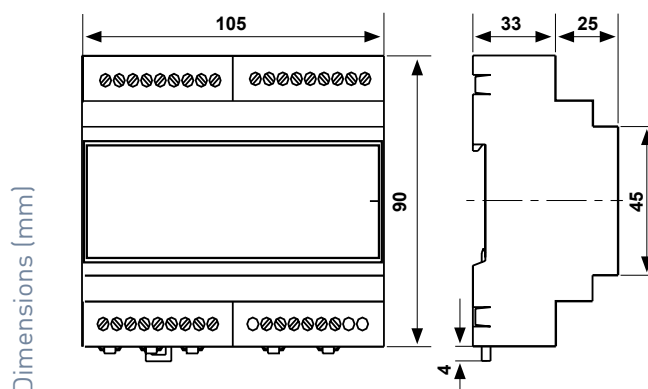# EV91C

Compensator module for 2 or more boilers in cascade SLAVE

It is suitable for all heating systems types where it is necessary to spread the capacity over several boilers connected in cascade. The module allows to completely manage 2 boilers in cascade, commanding automatically both butterfly valves and burners. For controlling more than 2 boilers, it is necessary to add more EV91C modules in order to meet the requirements. Maximum 4 modules may be connected for a total of 8 boilers in cascade.

Dimensions (mm)

	Power supply	Contacts rating	Operating admissible temperature °C	Protection degree
EV91C	230V 50 Hz	5A 250Vca	0 ÷ 50	IP40 (back panel)

ELECTRICAL FEATURES

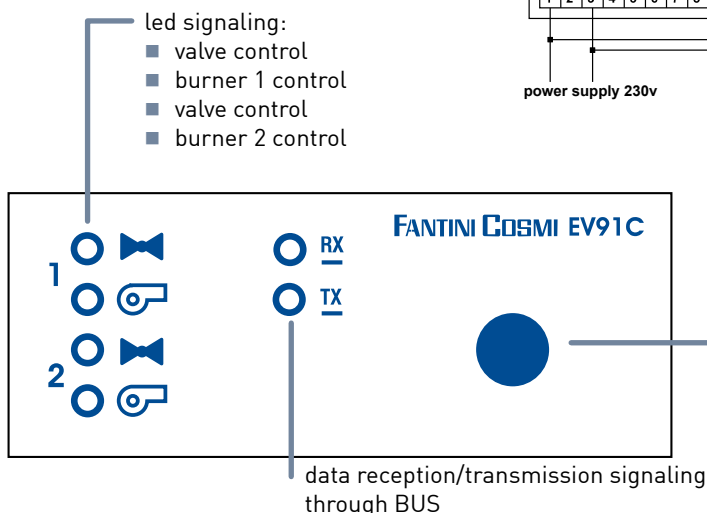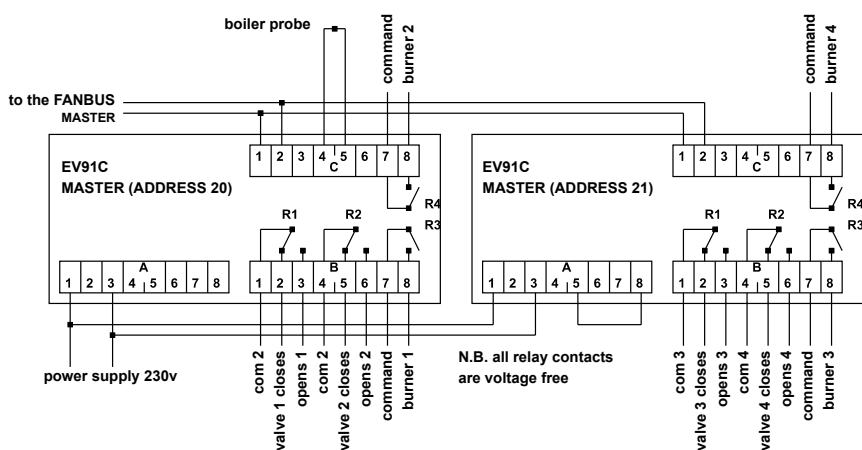Power supply: 230V 50Hz.
Consumption: 5 VA.
4 output relays:
  ■ 2 for butterfly valve control.
  ■ 2 for burner control.
1 communication channel - FANBUS.
1analog input for delivery temperature (NTC type probes - EC15 or EC16).
Voltage free contacts.

ELECTRICAL WIRING OF THE SYSTEM WITH 4 BOILERS IN CASCADE

led signaling:
  ■ valve control
  ■ burner 1 control
  ■ valve control
  ■ burner 2 control

data reception/transmission signaling through BUS

button to set
factory configuration parameters of the control unit
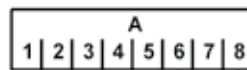
CONTROL UNIT ADDRESS

The control units must be addressed through the terminal board in order to work properly and to be questioned by remote management (see auxiliary control units). EV91C address is composed of a high part "2" and a low part that may assume a value from "0" to "3", which is set with the jumpers on terminal board A5-A8. The diagrams below indicated show how to set the low part of the address.
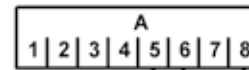
A	A	A	A
1 2 3 4 5 6 7 8	1 2 3 4 5 6 7 8	1 2 3 4 5 6 7 8	1 2 3 4 5 6 7 8
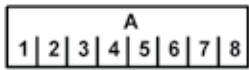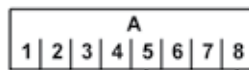
ADDRESS "20" (BOILERS 1-2)   ADDRESS "21" (BOILERS 3-4)   ADDRESS "22" (BOILERS 5-6)   ADDRESS "23" (BOILERS 7-8)

OPERATION

Through a measuring probe, EV91C detects the temperature value of the delivery collector. If the temperature value falls below a preset value for a certain period of time, the device opens the butterfly valve and turns on the relevant burner to switch on the first auxiliary boiler.
If after a certain period of time one boiler is not enough to bring the temperature below the required threshold, EV91C inserts the second boiler and so on.
In case, the collector temperature should remain at the set values, the controller will disconnect the boilers, first switching off the burner and, after an adjustable delay, closing the butterfly valves.

CALCULATED BOILER TEMPERATURE

The boiler temperature the control unit calculates may be fixed or sliding. When it is fixed, the set value will not be changed, but when it is sliding, the set value is added to the maximum temperature value required by the connected slaves. In this way it is possible to regulate the boiler with a temperature that continuously varies according to the requirements of the entire system.
N.B.: when it is set the desired boiler temperature value, note that with fixed point regulation it is the value the control unit uses, and with sliding regulation, it represents an increase with respect to the maximum value decided by the various control units of the system.

LIMITS

It is possible to set the maximum and minimum boiler temperature limits within which the calculated temperature may vary. The control unit will ensure that these values are not exceeded.

REGULATION

The device automatically commands the burners and the relevant butterfly valves; the valve of the main boiler is always open. When the auxiliary boiler is needed, the valve and the burner will open in sequence.
The value of the temperature calculated by the control unit (which may be fixed or sliding) is used as the maximum boiler temperature value. If this value is exceeded, all burners are turned off, while the butterfly valve of the main boiler remains open and those of the auxiliary boiler will be opened or closed depending of the needs.
When the measured temperature drops below Differential 1, the main burner switches on and switches off when the TCC calculated value is exceeded.
If the temperature drops below Differential 2 and remains like this for a certain period of time (may be set on the control unit), an auxiliary boiler is switched on (in addition to any already operating boiler).
When a new boiler is turned on, the butterfly valve opens and after some time, which may be set on the control unit, the burner is turned on.
When the measured temperature exceeds Diff. 1 and remains there for a certain period of time, the auxiliary boilers are excluded (always one at a time).

BOILER T.

100	
90	DIFF. 1 → CALCULATED T. + 1 BOILER AUX
80	
70	DIFF. 2
60	→ - 1 AUX. BOILER
50	
40	
30	
20	

DIFFERENTIAL 1

Differential of the main boiler: it indicates the temperature difference referred to the one calculated by the control unit below which the burner of the main boiler is turned on.

DIFFERENTIAL 2

Differential of the auxiliary boiler: it indicates the temperature difference referred to the one calculated by the control unit below which an auxiliary boiler is turned on.

BOILERS ROTATION

The main boiler is automatically rotated after a preset number of days in order to obtain a homogeneous consumption of the same boilers. When the set time expires the control unit replaces the main boiler with the next one. If this function is unnecessary, set FIXED BOILERS in the configuration menu.

MAIN CONTROL UNIT

The main control unit (or MASTER EV90 or EV87) is the one with address 20 (no address bridge) and the measuring probe must
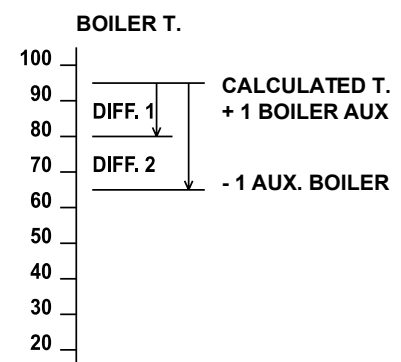
always be connected to this control unit.
The control unit performs all logical and regulation functions and is able to automatically command 2 boilers (Num. 1 and 2).
The main control unit determines through the bus the operation of all auxiliary control units in cascade.

AUXILIARY CONTROL UNITS
They are needed when there are more than 2 boilers. Their address determines the order of the boilers in sequence according to the following logic:
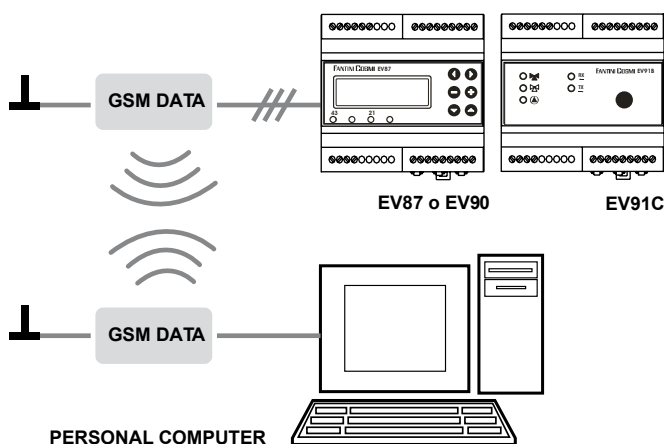- address 21: boilers 3 and 4
- address 22: boilers 5 and 6
- address 23: boilers 7 and 8

It is important that the addresses are given in ascending order without any skipping to the slave control units. No measuring probe should be connected since the master control unit does all the processing.
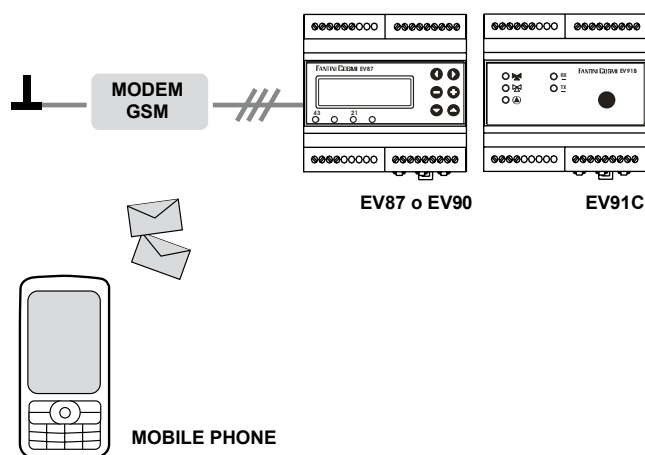
REMOTE CONTROL

When a GSM or analogue modem is connected to the MASTER EV90 or EV87, some parameters of the EV91C may be read and modified remotely. When the MASTER receives a command for EV91C from the modem it sends the command to it through the FANBUS and then is waiting for its replay. This sends the replay to the sender, which may be a mobile phone, or a GSM modem if is used in voice mode, or a PC, if an analogue modem is used in data mode.

DATA CONNECTION

SMS CONNECTION

GSM DATA

EV87 o EV90   EV91C

GSM DATA

PERSONAL COMPUTER

MODEM GSM

EV87 o EV90   EV91C

MOBILE PHONE

STANDARDS AND HOMOLOGATIONS

Complies with the law 373, law n.10 dated 9 of January 1991 and D.P.R.412 dated 26 of August 1993.
In conformity with EN 60730-2-9; EN 60730-2-7 standards.

INSTALLATION

DIN-rail mounting (6 modules).
To ensure an adequate protection install the device on the DIN-rail within a framework.
The removable terminals facilitate the wiring and a possible replacement.

FEATURES

Boiler temperature minimum or maximum limits.
Boilers rotation adjustable from 1 to 99 days.
Maximum number of controlled boilers - 8 (2 boilers x 4 modules).
Parameters visualization and modification by means of FANBUS from EV90 or EV87 MASTER.
Local programming or via SMS messages (with GSM modem) or via remote computer (with analog PSTN modem) via the communication bus (FANBUS) and the MASTER EV90 or EV87.
Addressing through jumpers on the external terminal board.
TX and RX signaling LED for connection with FANBUS, butterfly valves and burners control.
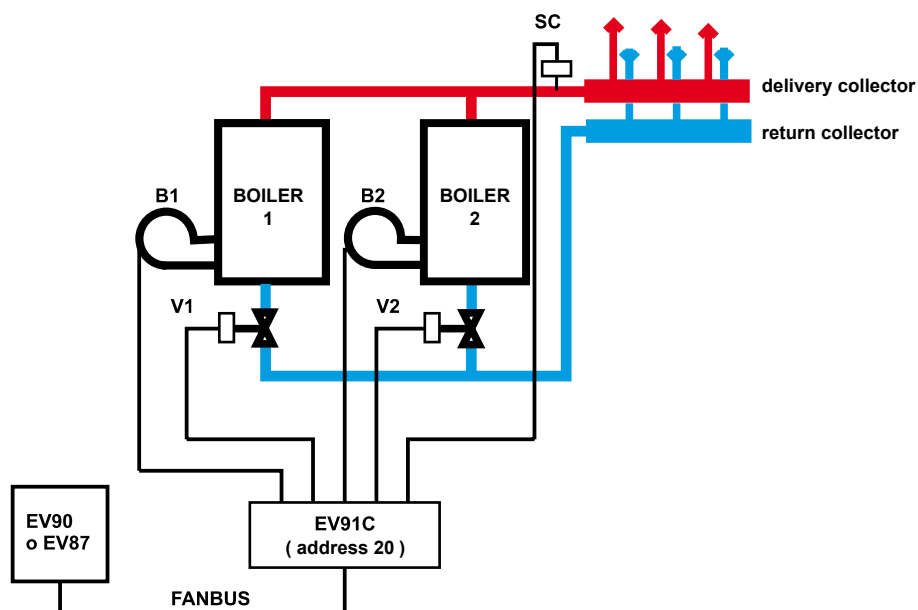
ACCESSORIES

EC15
External probe

EC16
Immersion delivery probe with protection casing and conic thread connection G 1/2.

SYSTEM EXAMPLES

EXAMPLE OF SYSTEM WITH 2 BOILERS IN CASCADE

EXAMPLE OF SYSTEM WITH 4 BOILERS IN CASCADE