EV87

## Multifunction expandable digital controller for heating systems with remote control, with 4-20mA input-MASTER

The controller is suitable for the climatic thermoregulation via remote management of all heating systems types. To control more complex systems, EV87 can be connected to any other controller of EV series (defined as SLAVES) by means of a bus called FANBUS. In this case EV87 acts as a MASTER controller.

105   33   25

90   45   4

Dimensions (mm)
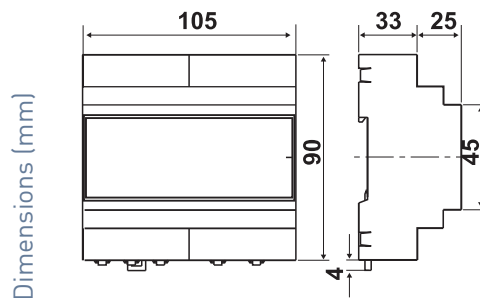
EXPANSION MODULES (SLAVES)
- 1 FANBUS communication channel for connecting the Slaves with Master EV87.
- All parameters are displayed and modified via EV87 Master controller.
- DIN-rail mounting, 6 modules.
- Power supply - 230V 50Hz.
- Consumption: 7 VA.
- Removable terminal block for easy wiring.

EV91A TEMPERATURE CONTROL MODULE WITH EXTERNAL PROBE
- Regulation curve broken in 4 temperatures.
- Weekly programming with 6 on and off schedules for each day.
- Switch-on time optimization.
- 4 relays 5A-250Vac
- 1 analog input for the external temperature (opt.).
- 1 analog input for the delivery temperature.

EV91B FIXED POINT TEMPERATURE CONTROL MODULE FOR SANITARY HOT WATER
- Weekly programming with 6 on and off schedules for each day.
- Water temperature control: 0 ÷ 100°C.
- 3 relays 5A - 250V c.a.
- 1 analog input for temperature measuring.

EV91C CONTROL MODULE FOR TWO CASCADE BOILERS
- Water temperature control: 0 ÷ 100°C.
- Boiler minimum and maximum temperature limits.
- Can be connected up to 8 boilers.
- 4 relays 5A - 250V c.a.
- 2 analog inputs for temperature measuring.

EV91D GENERIC OUTPUT MODULE
- Configuration of each of the 4 relays:
- Relay ON - OFF - timed relay
- Daily programming for each of the 8 outputs.
- 4 relays 5A - 250V c.a.

EV92 DIGITAL INPUTS MODULE
- Active status setting for each of the 8 inputs:
- opening - closing
- Configuration setting for each of the 8 inputs:
- breakdown on-breakdown off-timed breakdown
- Daily programming for each input.
- 8 voltage free digital inputs.

	Power supply	Contacts rating	Operation admissible temperature	Protection degree
EV87	230Vac 50 Hz	5A - 250Vac	0 ÷ 50 °C	IP40

ELECTRICAL FEATURES

Power supply: 230Vac.
Consumption: 5 VA.
4 output relays:

- mixing valve and pump;
- boiler with multistage burner (from 2 to 4);
- boilers in cascade (2 to 4) with choice of main boiler rotation;
- 2 cascade boilers with two-stage burner with choice of main boiler rotation.
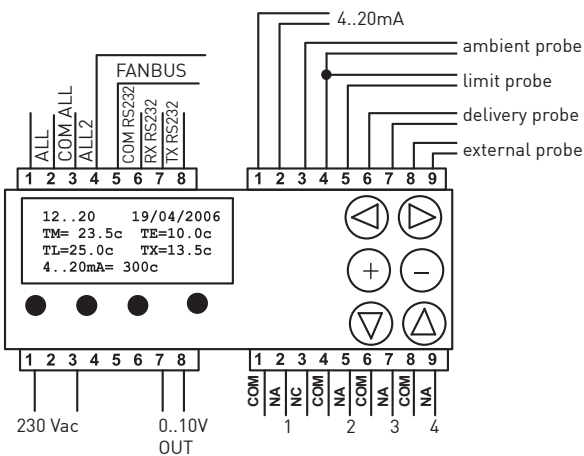
2 digital inputs can be used as alarms.
1 4..20mA input can also be used to drive the configurable relay.
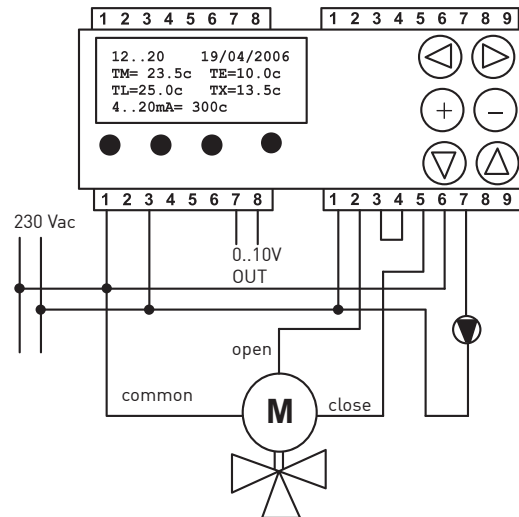1 output 0..10V (3mA maximum load) with proportional regulation.
1 configurable relay (auxiliary probe - 4..20mA sensor).
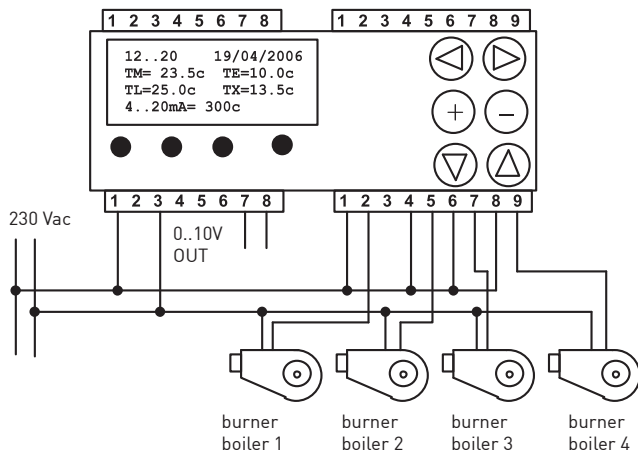Contacts rating: 5A - 250Vac (resistive load).
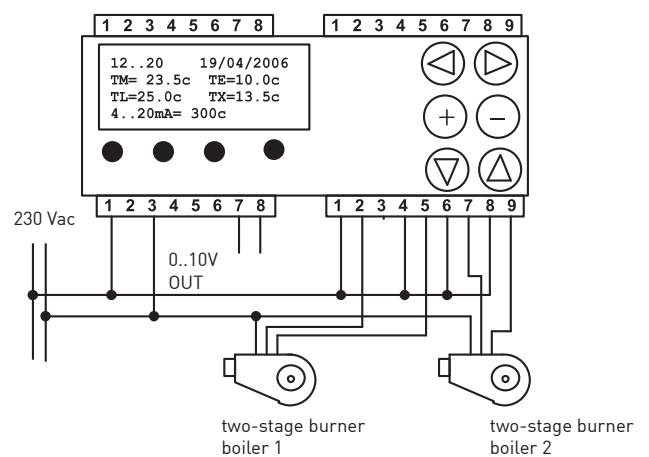
TERMINAL BOARD ELECTRICAL WIRING

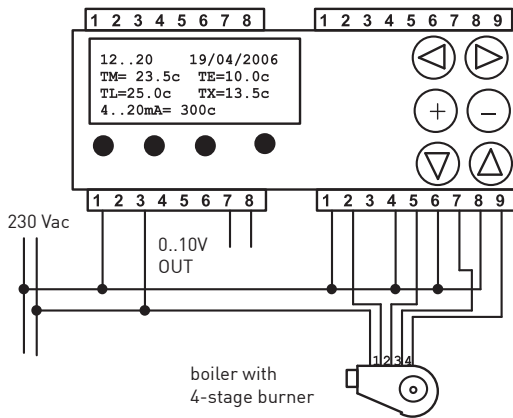## MIXING VALVES CONTROL WITH SERVOCONTROL AT 230VAC

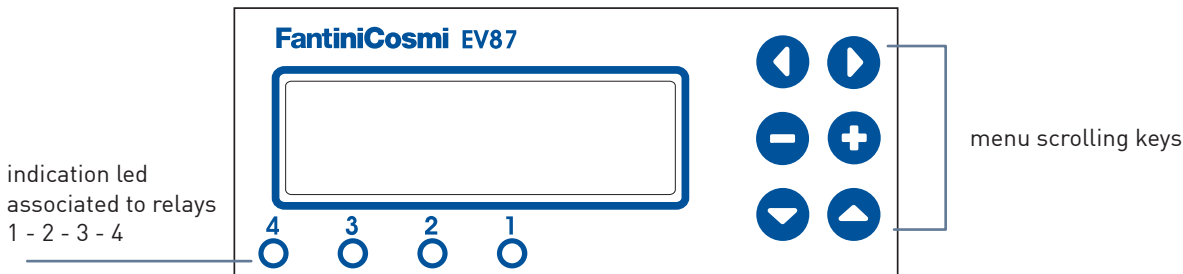## SCHEME FOR ON-OFF CONTROL OF 4 SINGLE-STAGE BOILERS

SCHEME FOR ON-OFF CONTROL OF 2 TWO-STAGE BOILERS

OPERATION

EV87 controller can be set as climatic controller of a heating system through a mixing valve control or through 1 to 4 boilers control

indication led associated to relays 1 - 2 - 3 - 4

menu scrolling keys

MIXING VALVE

Three-point control of the mixing valve OPEN/CLOSE/STOP.

Circulation pump control with switch off delay.

Control of an auxiliary relay for a DHW storage tank control or for a single-stage boiler control.

Delivery temperature correction as a function of the min/max limits (adjustable).

Delivery temperature correction as a function of the measured ambient temperature (adjustable).

BOILERS

The operating modes for boilers control are:

- boiler control with a 2 to 4 stage burner;
- control of two boilers in cascade;
- control of three boilers in cascade;
- control of four boilers in cascade;
- control of two boilers in cascade with two-stage burner.

Boiler control provides the setting of the main boiler rotation days.

Boiler temperature can be controlled as a function of the external temperature or according to a preset fixed point or as a function of the maximum delivery temperature required by the slaves. EV87 controller features two digital inputs that can be used as alarms. Furthermore, the possibility of connecting to a modem through a serial line allows the control unit to communicate any malfunctions to a remote centre (a mobile phone or a personal computer). It can also be remotely controlled via SMS messages or by means of a DATA communication system.

BROKEN REGULATION CURVE

The regulation curve represents the delivery temperature as a function of the external temperature to achieve an ambient temperature of 20°C. The curve is used for temperature adjustment. For other required ambient temperatures, the curve moves along the line +Ta -Ta.

The relation that establishes the delivery temperature value as a function of the external temperature depends of the thermal features of the building, and for optimum comfort, must be found experimentally.

N.B. For panel systems, it is advisable to limit the delivery temperature values to 45°C.
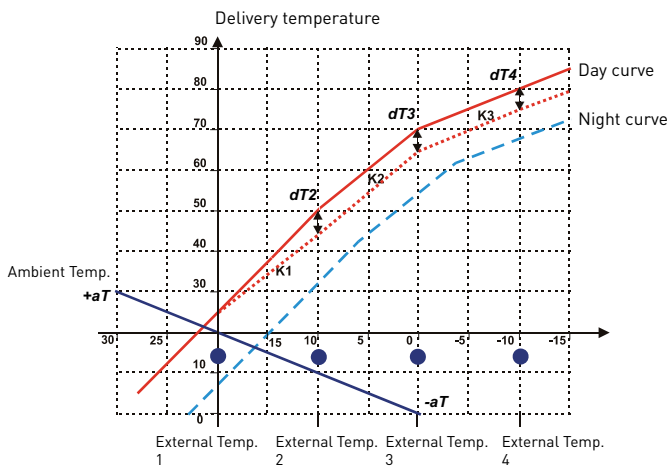
Default curve values	External T1	External T2	External T3	External T4
External Temp °C	20	10	0	-10

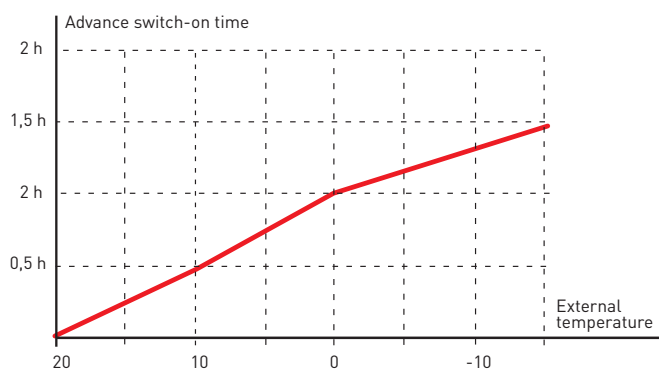|	Delivery dT1	Delivery T2	Delivery T3	Delivery T3
Delivery Temperature Limits °C	20	40	60	80

SWITCH-ON TIMES OPTIMIZATION

As for the delivery temperature, the advance switch-on time is calculated automatically thanks to an interpolation, using the set advance switch-on time values for four external temperatures.
The advance switch-on times are set in the same menu where had been set the four values of the delivery temperature.

The maximum programmable time is 10.00 hours. Optimization is excluded by setting every advance switch-on time to 00.00 h. Also in this case, the value of a time must always be included between its highest and lowest values:
0h <= H1 < H2 < H3 < H4 <= 10 h

Depending on the external temperature, the controller calculates when to switch on the system on the basis of the first ON time of the present day. During the entire advance switch-on time, the adjustable delivery temperature value is the value set in the "Configuration" menu (as delivery temperature value in forced mode).

SWITCH-ON TIMES OPTIMIZATION

LIMIT PROBE

The limit probe can be used to limit the value of the delivery temperature. When the temperature measured by the probe decreases below a certain value (minimum limit used to prevent condensation) or rises above a set value (maximum limit used in radiating panel systems) the controller proportionally reduces the value of the calculated delivery temperature.
N.B. The function is excluded when the programmed set-point is excluded by the dashes (---). If a set-point is set incorrectly and the probe is not connected, an alarm is triggered.

AUXILIARY REGULATION

The auxiliary probe can be used as an on-off thermostat to control, for example, a storage water heater or to detect the ambient temperature and process this data to optimize the delivery temperature, or can be used as simple remote control to correct the day temperature.

4..20mA PROBE

The 4..20mA input can be used to control any physical measurement (temperature, humidity, pressure, etc.), with the possibility to associate it to an output relay.

0..10V OUTPUT

The controller is equipped with a proportional 0..10V output, used for example to control a servo-controlled valve in order to keep the calculated delivery temperature value constant.

CIRCULATION PUMP CONTROL

The circulation pump is controlled automatically. The pump is switched off when the delivery temperature decreases below a set value.

SANITARY WATER PRECEDENCE

When the auxiliary control is programmed as an auxiliary sensor it is possible to enable the sanitary water precedence function. When the temperature read by the auxiliary sensor decreases below the set value, the mixing valve is going to close.

2 - 4 STAGE OR CASCADE BOILERS OPERATION

The controller compares the calculated delivery temperature value with the temperature measured by the temperature sensor and if this last value drops below the set differential value, the first stage or the first boiler is switched on; if the difference is equal to double differential, the second stage or the second boiler is switched on, and so on for stages/boilers 3 and 4.

To achieve a balanced boiler consumption when are operating boilers in cascade, it is possible to set an automatic rotation time for the main boiler which varies from 0 days to a maximum of 20 days.

ALARMS AND MALFUNCTIONS

EV87 controller manages the following alarms:
- Digital input alarms: two voltage-free digital inputs which can be used to detect gas leaks and boiler blocking.
- External probe and delivery probe alarms: triggered when these probes are disconnected or in short circuit.
- Limit probe and auxiliary probe alarms (set).
- Limit threshold and 4..20mA threshold exceeding.
- Failure to reach the delivery temperature in mixing valve function. This alarm can be used to signal a mixing valve malfunction.

2/4-STAGE BOILER OR 2/4 CASCADE BOILERS, OR 2 TWO-STAGE BOILERS CONTROL SEQUENCE

REMOTE CONTROL

By connecting the EV87 controller to a GSM modem it is possible to receive SMS alarm messages after switching one of the two available alarm contacts.

To connect the controller to a GSM modem, follow the instructions relative to the wiring diagram, or use the TCEV85 cable.

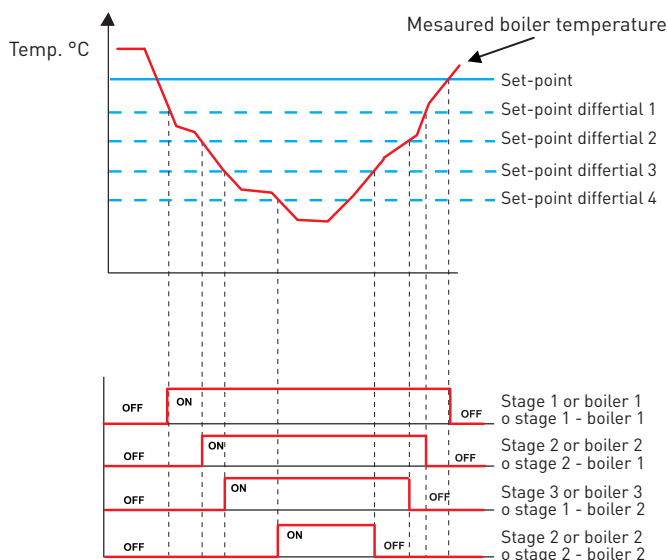N.B. The maximum length between the controller and the modem is 15 meters.

If the management takes place through a GSM modem is sufficient to use a cell phone.

If is used a GSM modem in data mode, it is necessary to use a Personal Computer with a control software available only in Italian language provided by Fantini Cosmi or downloaded via Internet.
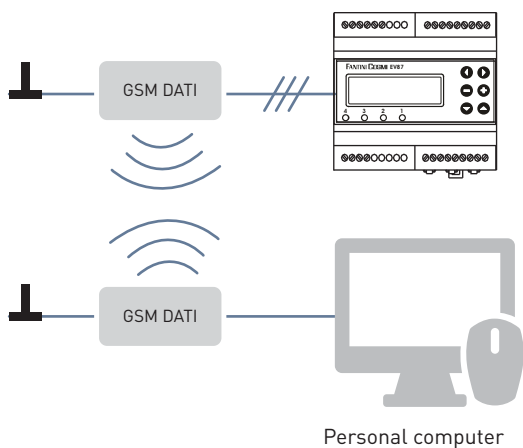
By sending appropriate SMS messages to the modem connected to the controller is possible to read and modify remotely the following parameters:
- times programming;
- day, night and antifreeze temperature settings;
- regulation broken curve values;
- auxiliary preset temperature;
- measured temperatures reading;
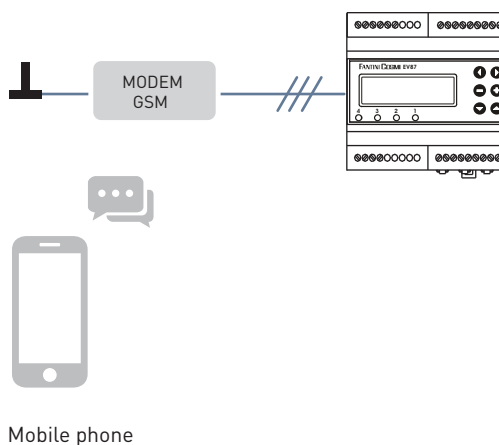- alarm calls cancellation.

DATA CONNECTION

Personal computer

SMS CONNECTION

Mobile phone

FANBUS

Thanks to the use of "FANBUS", the EV87 controller functions like a MASTER centre, to which can be connected up to 20 SLAVE control units of EV_ series. Connection between EV87 and slaves is made using a simple low voltage two-wire cable without polarity (the two wires can be inverted with each other without affecting the operation).
All slaves must be connected in parallel to the BUS.
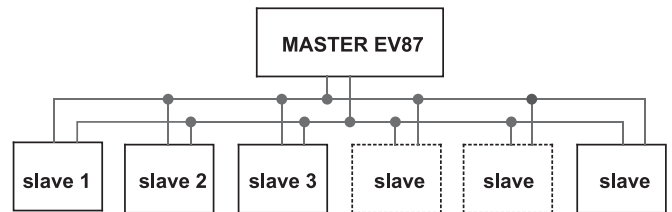
STANDARDS AND HOMOLOGATIONS

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

CE EHI

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

Graphical display with 4 lines.
Software class A.
RS232 output for modem connection.
Data storage period: 5 years.
6-module DIN housing.
Two weekly programs with three time bands per day.
A daily program with three time bands.
Clock charge lifetime: 5 years.
Measurement range of external probe: -30..+40°C.
Measurement range of delivery/limit/auxiliary probe: 0..+99°C.
Maximum 20 slaves can be connected.

ACCESSORIES

EM70S
GSM-modem with power supply unit and antenna

N70A
Power supply unit and battery charger

1590029
Rechargeable battery 12V-1,2Ah

EV91A
Temperature control module with external probe

EV91B
Fixed point temperature control module for sanitary hot water

EV91C
Control module for two cascade boilers

EV91D
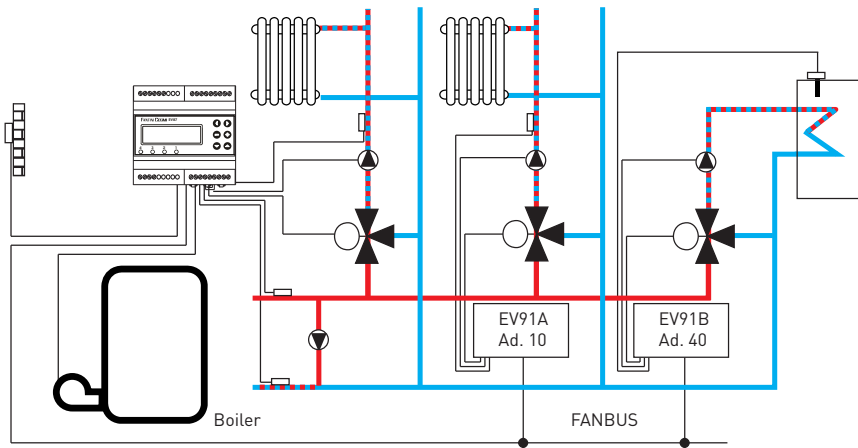Generic output module

EV92
Digital inputs module

EC10
Ambient probe

EC14
External probe

EC15
Contact delivery probe with clamp for fixing on the pipe.

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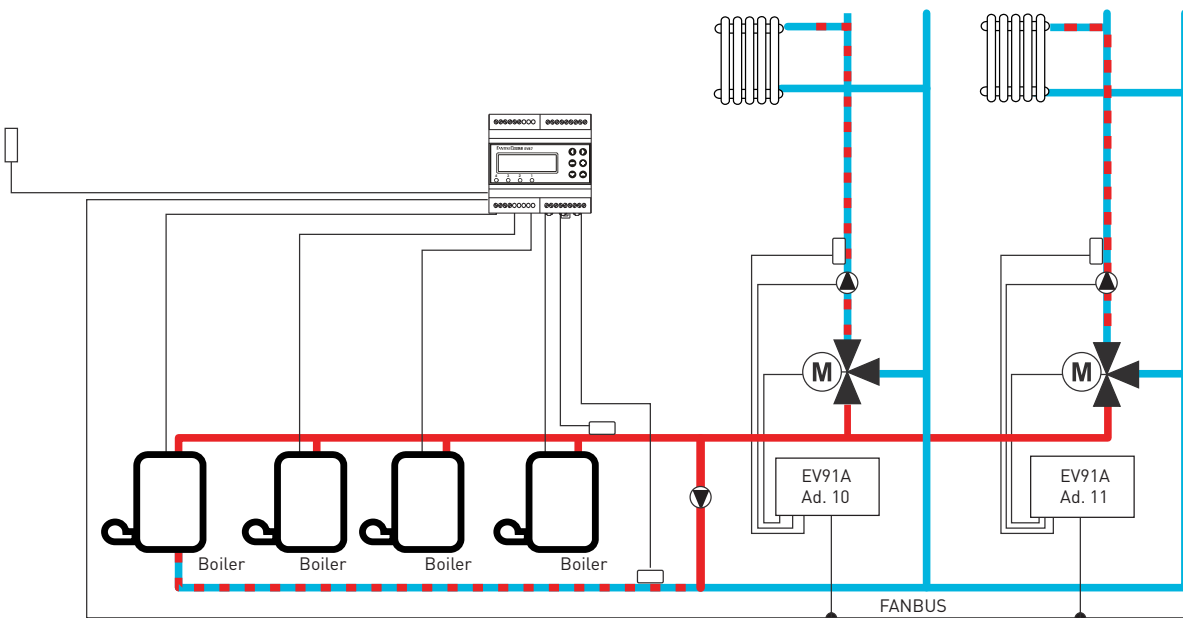
SYSTEM EXAMPLES

2-ZONE HEATING SYSTEM WITH ONE SINGLE STAGE BOILER AND ONE SANITARY WATER STORAGE TANK
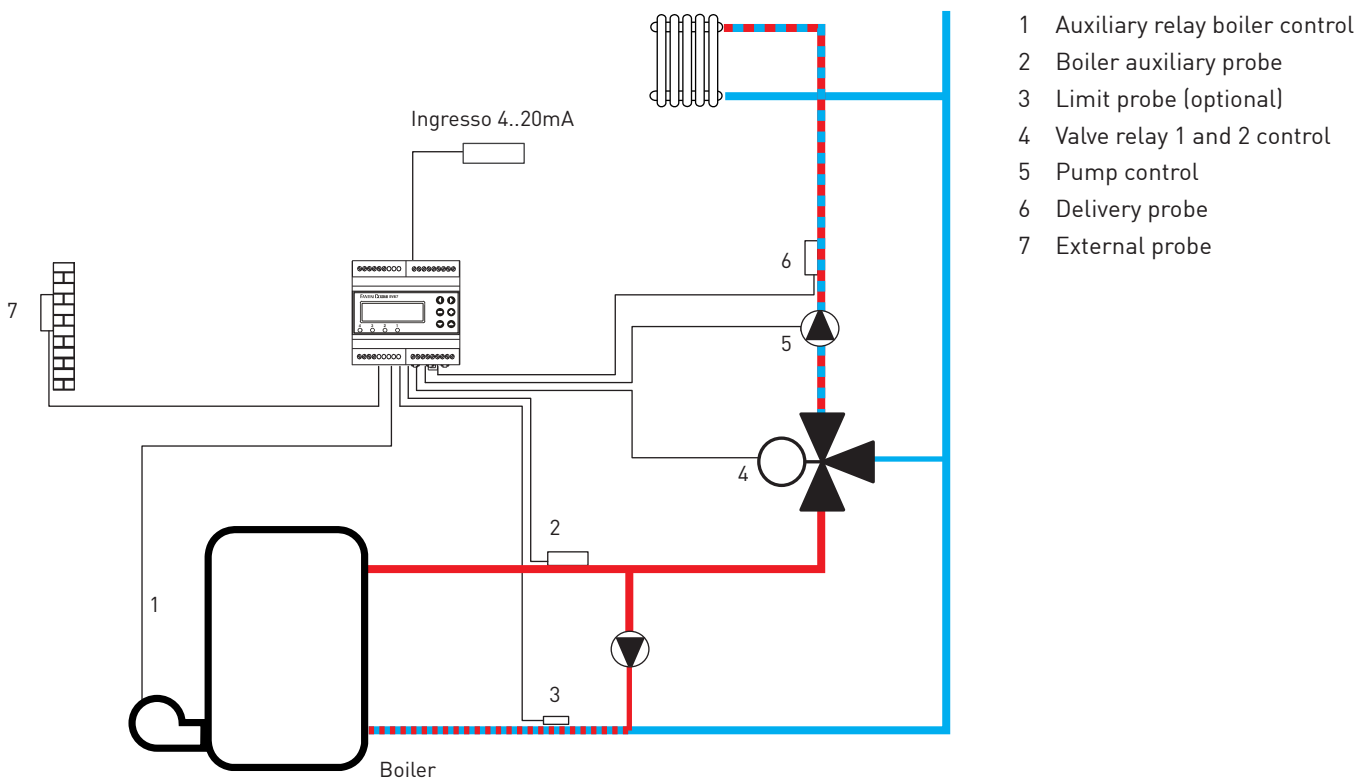

3-ZONE HEATING SYSTEM WITH ONE SINGLE STAGE BOILER (1 EV87 + 2 EV91A)
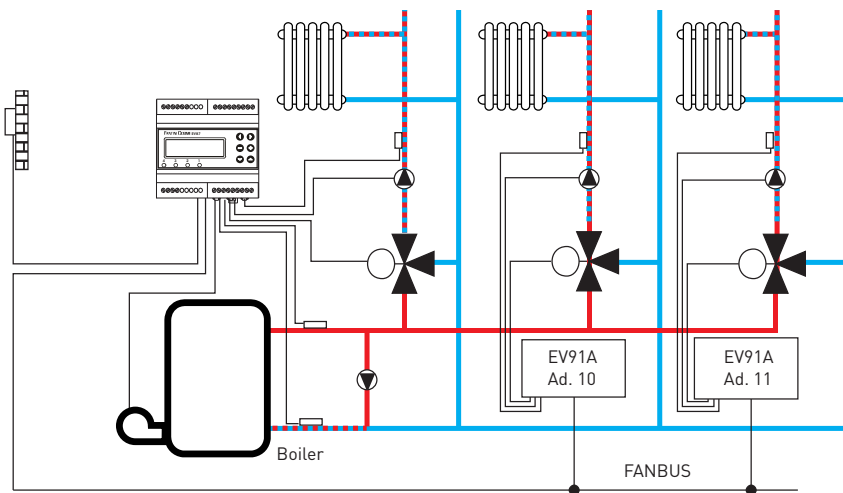
2-ZONE HEATING SYSTEM WITH 4 SINGLE STAGE BOILERS (1 EV87 + 2 EV91A)

1-ZONE HEATING SYSTEM WITH ONE SINGLE STAGE BOILER

Ingresso 4..20mA

1   Auxiliary relay boiler control
2   Boiler auxiliary probe
3   Limit probe (optional)
4   Valve relay 1 and 2 control
5   Pump control
6   Delivery probe
7   External probe

Boiler

1-ZONE HEATING SYSTEM WITH SANITARY WATER STORAGE TANK

4..20mA input

1   Auxiliary sanitary water pump control
2   Sanitary water temperature probe
3   Limit probe (optional)
4   Valve relay 1 and 2 control
5   Pump control
6   Delivery probe
7   External probe

Boiler

FartiniCosmi

4..20mA input

Boiler 1

Boiler 2

EV91A
Ad. 10

EV91A
Ad. 11

FANBUS