INSTRUCTIONS

Type EMR-12

57451 - 09/05 (BJ)

English

The **EMR** temperature controller is designed to operate with several different types of control requirement, and these MODES are selected on the 6 dipswitches on the top of the unit. The following explains how each MODE operates and the sensors that are used. The heating installer must select the appropriate mode for the installation and set the dipswitches accordingly.

To control the heating flow temperature, the EMR will operate a 24V powered modulating control valve via a 0-10V DC control signal. The valve can be a three or four port valve that allows water to be mixed from the boiler circuit down to the underfloor circuit in the correct proportion.

Mode 1 is a system where there is a single area of underfloor heating, and control is required via a room temperature sensor (not a thermostat).

Mode 2 is a system where there may be multiple areas of underfloor heating, each controlled by a room thermostat, wired via an EZC MICROCENTER, and where the demand signal from the Microcenter is used to start and stop the EMR.

MODE 3 is an advanced system whereby two water temperature sensors are used and where the return water temperature is controlled with the additional benefit of a high limiting action sensed on the flow water temperature.

In each mode the **EMR** will provide two relay (volt free) outputs to start both a pump and a boiler. Further information on this switching facility is shown below.

CE MARKING
OJ declare under their own responsibility that this product meets the requirements of the European Council's directive 89/336 and successive modifications as to electro-magnetic compatibility and the Council directive 73/23 as to electrical equipment to be applied within certain voltage ranges.

Standards applied
EN 61 000-6-4, EN 61 000-6-2, EN 60 730-1 and EN 60730-2-9.

If the product has been exposed to damage e.g. in transport, it must be checked and overhauled by qualified staff before the product is connected to the power.

TECHNICAL DATA
Power supply . . . . . .230V AC ±10%
Temperature setting:
Control temperature . . . . . .10-50°C
Limit temperature . . . . . .+35 to +75°C
Setback (NSB) . . . . . .+10/ + 50°C
DC-output . . . . . .0-10V DC (max. 10 mA)
AC output . . . . . .24V AC (max. 6VA)
Ambient temperature . . . . . .-10/+40°C
Output relay S.P.C.O. . . . . .max. 250V /
. . . . . .5A resistive or inductive

Control pollution degree: 2
Pollution degree 2 is representative of normal household air circulation

Overvoltage category: III
Rated Impulse voltage 4 kV according to IEC 60664-1

SETTING & INSTALLATION
MODE 1 Dip-switch #1 ON (up), all other dip-switches OFF (down)
The controller should have a room temperature sensor ETF 999 connected to terminals 27 & 28 or an EMRF 99 connected to terminals 25, 26, 27, & 28. A clamp on pipe sensor ETF 1899A is connected to terminals 29 & 30. The EMR will control the motorised control valve to the temperature selected on the CONTROL TEMP KNOB (A), and will open and close this valve to maintain the level of heat required. However, should the temperature of the water entering the system exceed the setting on the LIMIT SETPOINT KNOB (B), then the control valve will close to prevent the floor becoming overheated. In this mode there is no provision for demand signalling from a multi zone wiring centre. Boiler and Pump relays will be ON if the control valve is open, (see below).

MODE 2 Dipswitch #2 ON (up), all other dip-switches OFF (down).
The controller should have a clamp on pipe sensor ETF 1899A connected to terminals 29 & 30. A demand signal from a multi zone controller EZC should be connected to terminals 35 & 36 (in place of the link, see fig. 7). When the demand signal is present, the EMR will monitor the water temperature entering the system and will modulate the control valve to prevent the temperature exceeding the setting on the LIMIT SETPOINT KNOB (B). Boiler and Pump relays will be ON if the control valve is open, (see below).

If the demand signal from the multi zone controller is removed, the control valve will close and the boiler and pump relays will switch OFF.

MODE 3 Dipswitch #3 ON (up) all other dipswitches OFF (down).
The controller should have an ETF 1899A sensor connected to terminals 31 & 32 and this sensor should be placed on the return pipe immediately after the ufh manifold. A second ETF 1899A sensor should be connected to terminals 29 & 30, and this sensor is placed on the flow pipe immediately before the ufh manifold.

A demand signal from the multi zone controller EZC should be connected to terminals 35 & 36 (in place of the link, (see fig 7.) When the demand signal is present, the EMR will monitor the water temperature returning from the system and will modulate the control valve to maintain the temperature set on the "control" setting of the EMR. At the same time, the EMR will also monitor the sensor on the flow pipe and if the temperature at that point starts to exceed the temperature set at the "limit" setting of the EMR, the valve will again be modulated to prevent that temperature being exceeded. Boiler and pump relays will only be ON if a demand exists via terminals 35 & 36 and the mixing valve is more than 10% open. If the valve is closed by the action of the control sensor, but a heating demand still exists, the pump will run continuously. If the valve is closed by the action of the limit sensor, the pump will continue running for 20 minutes and then switch off. This is a safety feature and will help to prevent overheating, should the valve be incorrectly positioned, or if it should fail to close. In both cases the boiler signal will be removed when the controller closes the valve.

NOTE The temperature setting of the "control" sensor should be always 15C less than that for the "limit" setting, and should not exceed 40°C under normal circumstances.

In addition to the above the EMR can be used in Mode 0 where hot water for the system does not need to be controlled to avoid excessive temperatures in the pipe work. Thus the EMR will then work as a modulating room temperature controller only.

MODE 0 All dip-switches in the off position (down)
The controller should have a room sensor ETF 999 connected to terminals 27 & 28 or EMRF same as mode 1. The EMR will now control to the temperature selected on the CONTROL SETPOINT KNOB (A), and will open and close the control valve to maintain the level of heat required. In this mode there is no limitation of the flow temperature, and no remote signalling from a multi zone wiring centre. Boiler and pump relays will be ON if the control valve is open, (see below).

AUXILIARY OUTPUTS

BOILER RELAY (see fig 2) Applicable in all modes.
A dedicated boiler relay R1 is provided to enable the boiler to run if there is a demand for heat. The boiler relay will be ON once the control valve has reached 20% open, and will remain on until the control valve is 90% closed. A built in delay action creates a 30-sec pause between off/on actions to prevent short cycling of the boiler.

The boiler relay is a 5-amp switch, and is volt free. LED "relay 1" will be lit when the relay is ON. A circuit between terminals 3 & 4 will be made when there is a requirement for the boiler to run.

PUMP RELAY (see fig 3)
A dedicated Pump relay R2 is provided to enable the secondary (underfloor) pump to be started when there is a demand for heat. The Pump relay will be ON once a requirement for heat is present via the output signal to the control valve, and will remain on whilst this signal exists. When the demand signal is turned off it will remain running for 2 minutes to circulate any residual heat entering the system, and, in the event of a high limit action, it will remain running for continuously (mode 1) or for 20 minutes (mode 2 & 3) to circulate water past the limit sensor. If the high limit state has not been removed within 20 minutes, the pump will be shut off to prevent any possible circulation of additional heat into the system.

The Pump relay is a 5-amp switch, and is volt free. LED "relay 2" will be lit when the relay is ON. A circuit between terminals 6 & 7 will be made when the pump is required to run.

If Mode 2 is being used with a single underfloor

pump, this pump should be connected to the EMR. However, if more than one pump is being used for circulation of separate zones of heating, and a microcenter is used with each individual zone, the pumps should then be connected to the EZC microcenter and not to the EMR.

Pumps on boiler primary circuits or supplied within the boiler casing should normally be controlled simultaneously with the boiler. They can be connected in parallel with the secondary pump from the EMR, but only if the boiler is totally dedicated to producing hot water for the underfloor system.

SENSOR OPTIONS (see fig 4)

ROOM SENSOR
The room sensor supplied will be an OJ ETF-944/99-H sensor. This is of the NTC pattern and is not adjustable. Should the client wish to have a sensor that can be adjusted then the ETF944/99-H should be disconnected from terminals 27 & 28, and instead sensor EMRF-99 connected as per fig 4.
ETF944/99-H & EMRF-99 should be fixed to an internal wall and should not be influenced by direct sunlight or any heat emissions from other equipment.

CONTROL - LIMIT SENSOR

The control and limit sensors supplied will be OJ ETF 1899A, and these are supplied with a cable tie to attach them to pipework. The limit sensor is attached to the pipe immediately before the manifold (modes 1, 2, & 3). The control sensor, used in mode 3 is placed on the return pipe from the manifold. (see fig. 1)

If secondary high limit is required, the EMR should be set to mode 3, and both ETF 1899A sensors should be employed as described above and shown in fig. 1

LED indications
GREEN LED
- Flashing long ON short OFF:
Room or limit sensor temperature below 10˚C.

- Flashing short ON long OFF:
Terminal 35 & 36 disconnected (no heat demand signal from EZC).

- Constant green:
Terminal 35 & 36 connected (heat demand signal from EZC).

RED LED 1
- Flashing long ON short OFF:
Room sensor error (terminal 27-28 not connected when unit in Mode 1).

- Flashing long ON short OFF:
See note below.

- Constant red:
Boiler relay ON.

Red LED 2:
- Flashing long ON short OFF:
Limit sensor error (terminal 29-30 not connected, modes 1 or 2).

- Flashing long ON short OFF:
See note below.

- Constant red:
Pump relay ON

YELLOW LED
- Flashing
Sensor error (terminal 31 - 32)

Constant yellow:
The system high limit has been exceeded and the control valve is operating under the control of the high limit sensor.

NOTE:
If set for Mode 3: The high limit LED will be on when the flow of water into the system is being restricted by the action of the high limit sensor. Once the high limit condition is removed, the LED will go off.
Both RED LED's will flash when either the room or limit settings are turned to maximum or minimum. This provides the installer with a manual override to send the valve fully open (if the setting is at the maximum) or fully closed (if the setting is at the minimum position). Maximum and minimum positions are not shown on the scale but will occur if the settings knobs are turned to their fullest extent.

CONTROL VALVE OUTPUT (see fig 5)
EMR uses a 24V AC powered control valve that is positioned via a 0-10V DC signal. The 24V power is provided from the EMR from terminals 21 (live) and 22 (ground). The maximum power available from the EMR is 6VA. The 0-10v signal wire is connected to terminal 24 on the EMR. The LED marked "0-10" will be lit when the 0-10V output is operative and will increase in intensity as the voltage increases.

Using the MIX301024/B actuator with a 3 and 4 port valve, the connections are:
EMR terminal 21 to control valve actuator brown wire terminal 2
EMR terminal 22 to control valve actuator blue wire terminal 1
EMR terminal 24 to control valve actuator black wire terminal 3

NIGHT SETBACK (see fig 6)
EMR has the facility for automatically reducing the room temperature during a night-time period, or when the heating is not required. The reduced temperature setting should be set on the setback (NSB) knob (C). The link between terminals 33 & 34 on the EMR should be removed, and a time switch or programmer connected across these terminals. When the time switch contact opens, the EMR will reduce the room temperature to the setting on the NSB knob if the EMR is set to Mode 1. If the EMR is set to Mode 2, the operation of the time switch contact will reduce the flow limit temperature to the setting on the NSB knob.

ON/OFF ACTION (see fig 7)
Terminals 35 & 36 on the EMR are for use with an ON/OFF function. These terminals have a factory fitted link. If the EMR is used in Mode 2, the demand terminals on the EZC microcenter should be connected to these terminals in place of the link. When there is a demand for heat from the thermostats connected to the EZC a 'GO' signal is passed to the EMR.

If the EMR is being used in Mode 1, and night setback is not required, a time switch can be connected across terminals 35 & 36 in place of the link. If the time switch is ON the EMR will operate. If the time switch is OFF the EMR will be shut down.

FROST PROTECTION
The EMR has automatic frost protection in all modes. If the room temperature as measured by the room sensor in mode 1 falls below 10C, or if the flow temperature as measured by the limit sensor falls below 10˚C in Modes 1 or 2, the EMR will open the control valve and turn on the boiler and pump. If separate protection of the boiler plant is required when a time switch turns the system OFF via terminals 35 & 36, a frost thermostat mounted in the boiler house should be connected in parallel with the time switch contacts. The frost stat action should be to close contact on detection of a frost condition.

POWER
The EMR should be powered from a 240V supply connected to the terminals marked "SUPPLY". We recommend that the supply be taken from a 5 amp spur, although this may need to be increased to 10 amps if pumps and boilers with a total power consumption of in excess of 4 amps are employed.

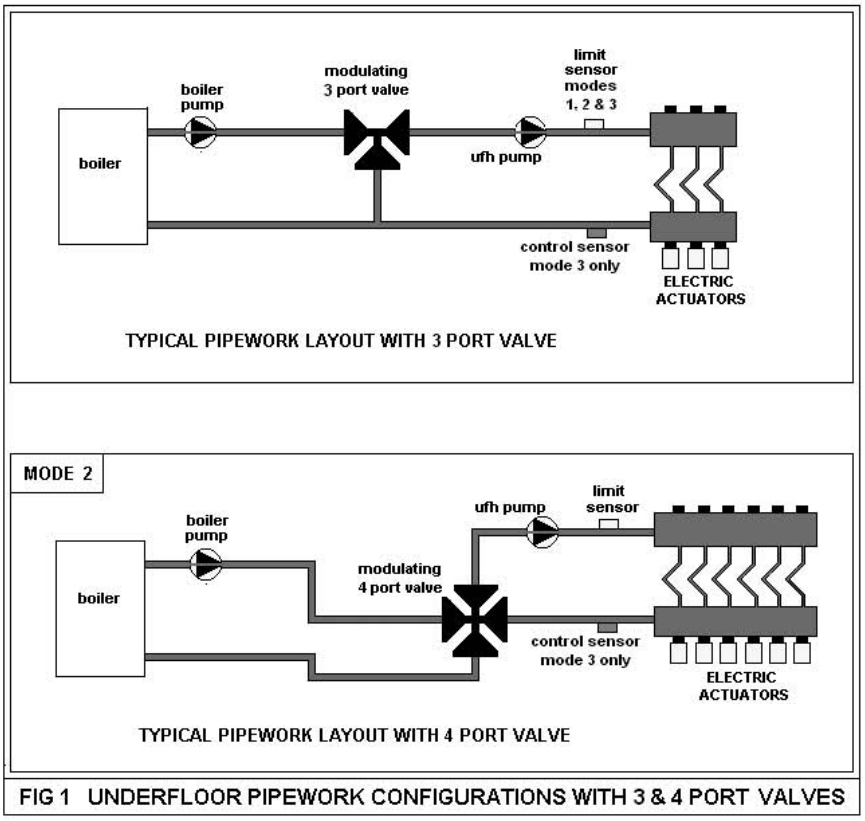


FIG 1 UNDERFLOOR PIPEWORK CONFIGURATIONS WITH 3 & 4 PORT VALVES

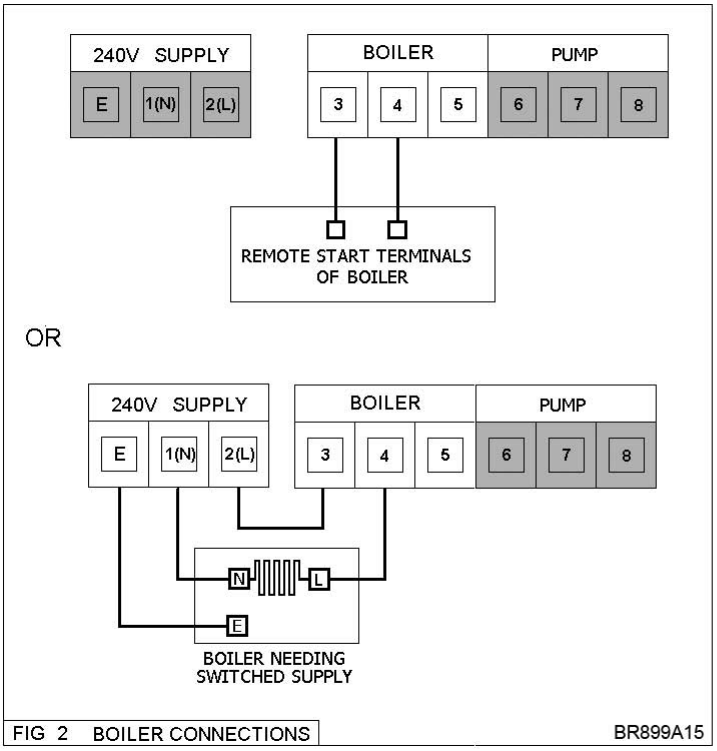


FIG 2 BOILER CONNECTIONS BR899A15

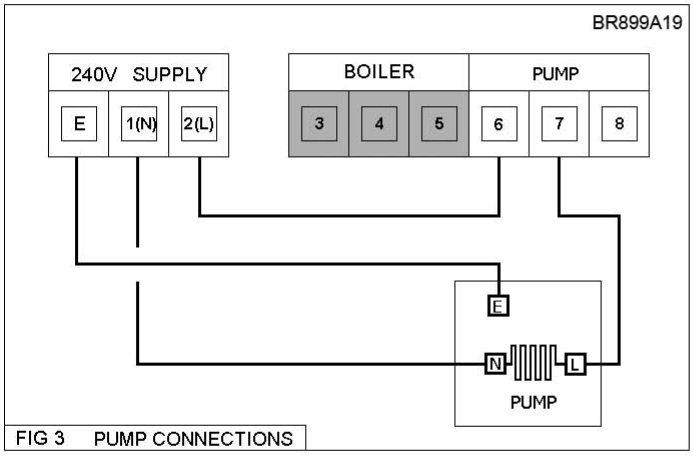


FIG 3 PUMP CONNECTIONS

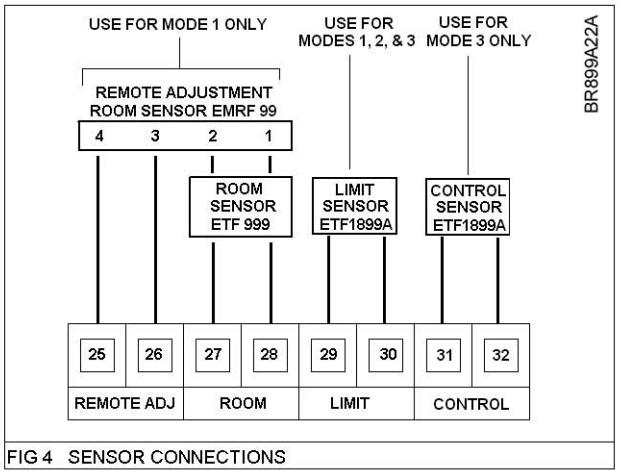


FIG 4 SENSOR CONNECTIONS

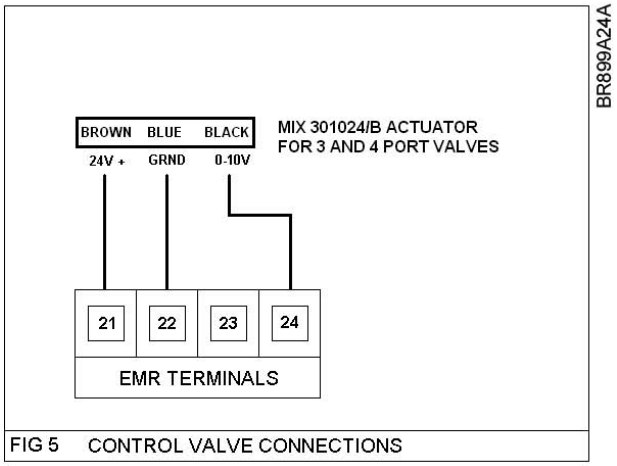


FIG 5 CONTROL VALVE CONNECTIONS

FIG 6 NIGHT SETBACK

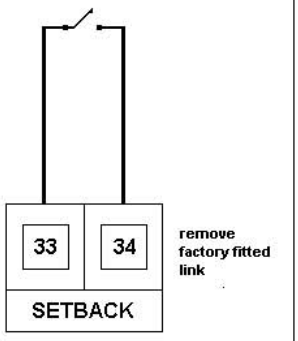
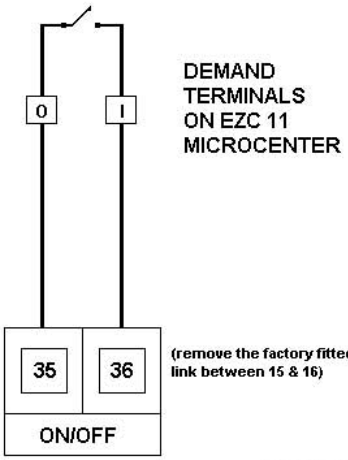
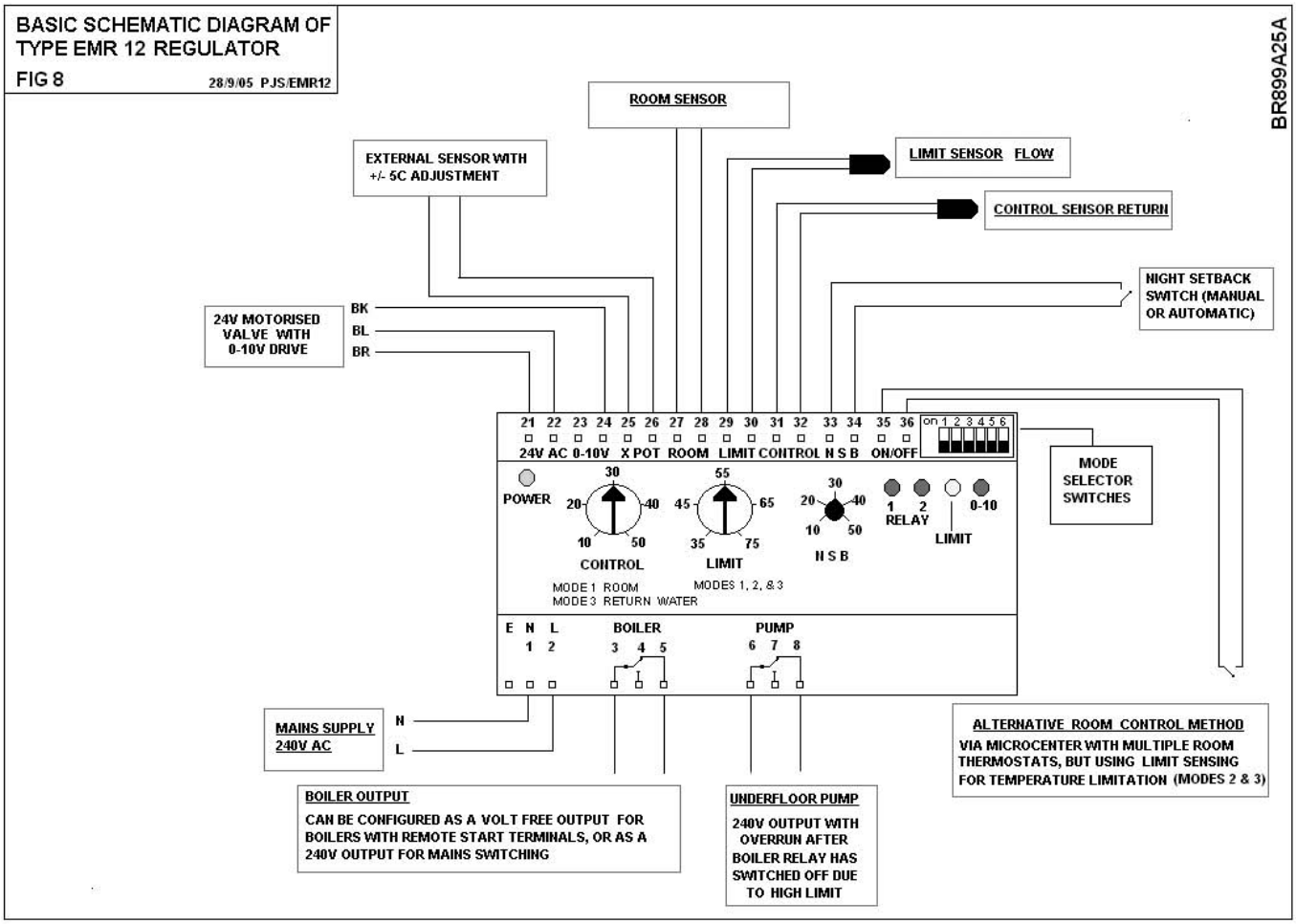


FIG 7 REMOTE ON/OFF (MODE 2)



BASIC SCHEMATIC DIAGRAM OF TYPE EMR 12 REGULATOR

FIG 8 28/9/05 PJS/EMR12



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