



Surefire

**Surefire
INSTALLATION
& USER MANUAL**



bright new energy world
tomorrow's energy today

Packing List

Open the outer carton and check all parts listed below are enclosed and undamaged. If any parts are missing or damaged please contact bnew.

A BOILER MANAGER INSTALLATION TEST SET may also be used to speed up test of the installation.

1 x User Manual	1 x 3-way 5A plastic terminal block
2 x pipe sensors with 1.5 metre cables	5 x Cable ties
3 x Cable grommets	3 x box hole blanks
2 x No.12 c/s wood screws	2 x Red plastic rawlplugs



Introduction

The Boiler Manager is designed to reduce the energy consumption of gas and LPG domestic hot water boilers, thus saving running costs and reducing CO2 emissions. It does this by eliminating the unnecessary firing cycles associated with conventional boiler systems. Unnecessary firing cycles are prevalent when boilers are not operating at full demand, and as most heating systems are designed to cater for worst-case weather conditions, it is only on rare occasions that a system will not experience efficiency savings from the Boiler Manager.

In a conventional heating system, the boiler and room thermostats determine when the boiler will start a firing cycle. The boiler thermostat will typically be set at the safety limit to protect the boiler from overheating, but provide maximum output when the weather is cold. This allows the boiler to come on when the returning water already has enough heat, causing the boiler to run inefficiently by heating water that is already hot enough.

The room thermostat requires heat to be transferred from water to radiator and then to air before it can respond. Temperatures will tend to overshoot due to the large thermal capacity of the radiators (and the high temperature setting of the boiler thermostat), and then undershoot as air temperature continues to fall while the radiators take time to warm up again.

The Boiler Manager uses temperature sensors on the flow and return water pipes to ensure the boiler only provides heat when the returning water is sufficiently cool. The positioning of sensors close to the heat source, and the ability to determine demand by comparing outgoing temperature with returning temperature, provides a more closely coupled feedback mechanism than is possible with a room thermostat, and results in more efficient and comfortable control of the heating system.

The Boiler Manager has an optional third temperature sensor for use with combination boilers that have a separate hot water circuit. This sensor enables the Boiler Manager to respond to the additional intermittent demands from the hot water cylinder.

CONTROLS & DISPLAY/ INSTALLATION

Economy Mode

In Economy Mode the Boiler Manager uses a number of strategies to save energy while maintaining the desired room temperature. A Firing Delay is introduced to control the time between firings and this delay is adjusted according to the heating demand determined from the RETURN sensor. By only firing when the RETURN temperature is sufficiently low, the Boiler Manager saves energy and reduces running costs.

If the heating demand has remained steady for a while, the Firing Delay will be an indication of that demand and can be viewed with a press of the BOILER CONTROL button.

A gradual increase in heating demand will lower the Firing Delay in Economy Mode and may eventually cause a transition to Boost Mode. A sudden large increase in demand will put the Boiler Manager back into Boost Mode.

If the optional combination boiler sensor is fitted and demand for hot water suddenly rises (e.g. someone runs a hot bath), the Boiler Manager will revert to Boost Mode.

Installation

The Boiler Manager must always be installed in series with the existing boiler thermostat, which will protect the boiler from overheating. It may not be used to replace the boiler thermostat.

The Boiler Manager is not suitable for use with:

- Systems where an economising controller is already in place
- Warm air heating systems
- Oil fired burners
- Other, non instant-ignition, burners that require special control systems

Installation must be performed by qualified personnel in accordance with local regulations. To carry out any works on Gas, Water or Electrical services the installer must be qualified to the appropriate standards as governed by HSE. A Gas Safe registered installer must inspect a gas boiler and confirm that it is safe before any modifications are carried out. The Gas Safe registered installer must certify that the modifications do not interfere with the safe operation of the boiler when the work is completed.

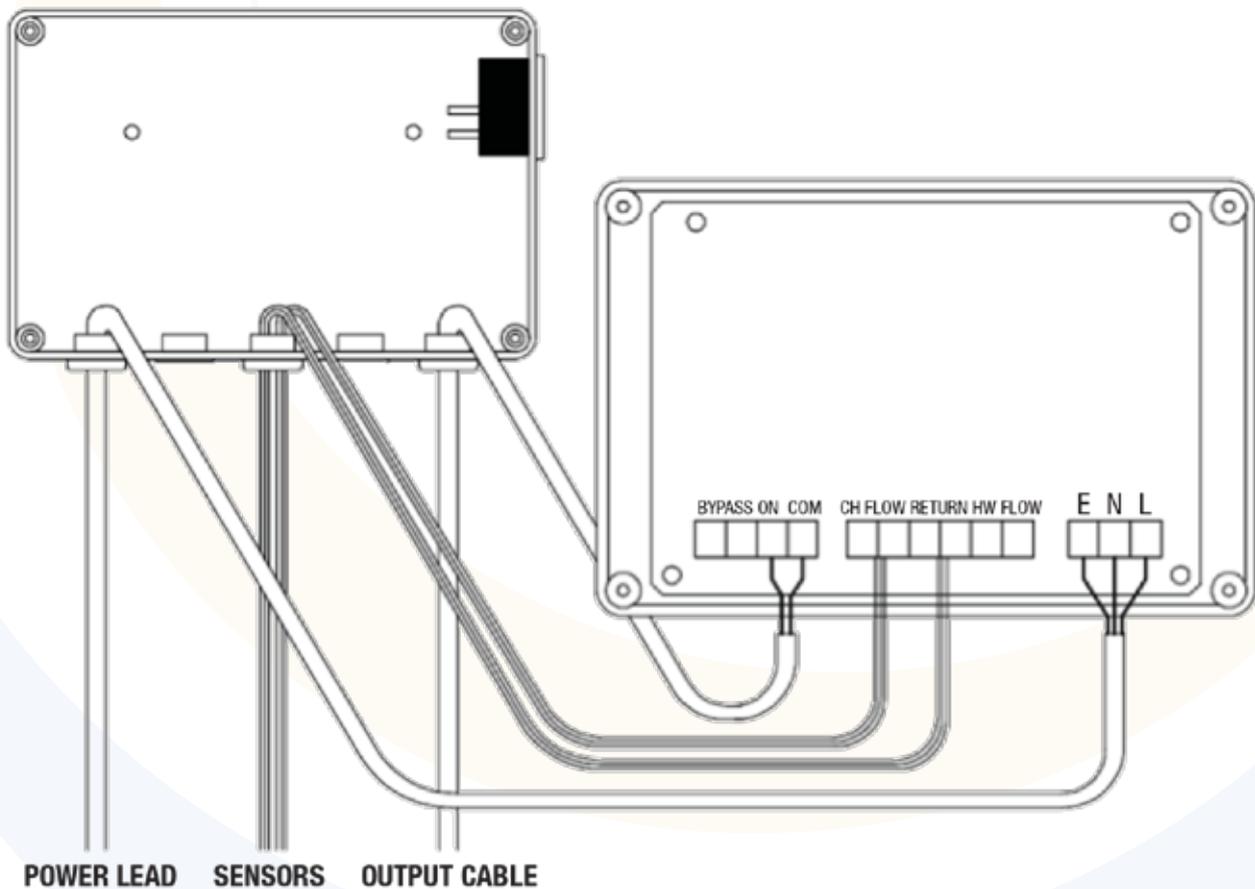
INSTALLATION

1. MOUNT THE BASE BOX

The Boiler Manager must be positioned in an indoor, non-drip location, away from high temperatures and excessive levels of moisture. This must be a maximum of 1.5 metres away from the boiler to allow for the sensor leads to be attached to the pipes.

Remove the four screws on the front of the Boiler Manager and tip the fascia forward to reveal the two switch wires to the BYPASS switch. Remove the two spade connections from the switch itself to detach the fascia completely. Mount the back box to the wall in the orientation shown in *Figure 1* using the screws and rawlplugs supplied.

FIGURE 1: TERMINAL IDENTIFICATION



CONTROLS AND DISPLAY

Controls and Display

The Boiler Manager has a simple user-interface consisting of a single push-button switch labelled BOILER CONTROL and a liquid crystal display.

In normal operation the display shows the current operating mode, BOOST or ECONOMY, and three temperatures in degrees Celsius: the SETTING temperature, the outgoing FLOW temperature, and the RETURN temperature. It also indicates when the boiler is on or off with the drawbridge icons `___` and `_/_`

Pressing the BOILER CONTROL button changes the display to show the current SETTING temperature on the top line, with other system information on the second line. Pressing the button again within 5 seconds increases the temperature setting by two degrees. Sixteen settings are available from 50°C to 80°C and on reaching 80°C the next press of the button cycles back to 50°C. Five seconds after the last button press, the display will revert to normal.

The SETTING temperature determines the output from the boiler and therefore room temperature. This is the only control the user needs in order to select a comfortable room temperature. Occasional adjustments may be necessary to suit changes in heating requirements.

The second line of the SETTING display shows the current 'Firing Delay' in minutes and seconds. (See the 'Operation' section below for further details of this parameter). If the optional hot water temperature sensor is fitted, the second line will also show the current temperature of this sensor and the maximum temperature that was detected during BOOST mode.

A BYPASS switch on the side of the enclosure can be used to return control to the conventional heating system. The display will continue to show sensor temperatures but the Boiler Manager will not be able to actively control the boiler output. This switch must be set to RUN for normal use.

Operation

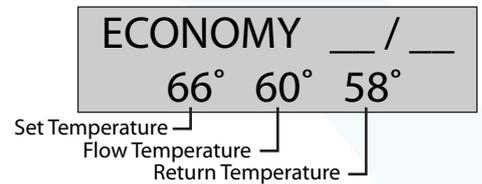
The Boiler Manager has two modes of operation, Boost and Economy.

Boost Mode

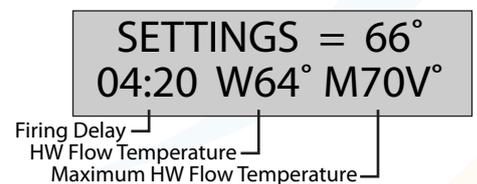
The Boiler Manager starts in Boost Mode and may return to this mode whenever demand on the heating system is high. The main objective of Boost Mode is to allow the heating system to reach operating temperatures and there will be little or no efficiency savings in this mode, although the close coupling of the temperature sensors to the heating source may result in reduced overshoot compared with room thermostat control and thereby improve comfort and save some wasted energy.

The boiler is fired until the FLOW temperature reaches the SETTING temperature. The boiler is then turned off and on to maintain the FLOW temperature within a few degrees of the SETTING temperature.

After a fixed time, and if the heating demand is not too high (as determined by the RETURN temperature), the Boiler Manager will enter Economy Mode.



SETTINGS = 66°
Firing dly 04:20



INSTALLATION

2. WIRING THE BOILER MANAGER



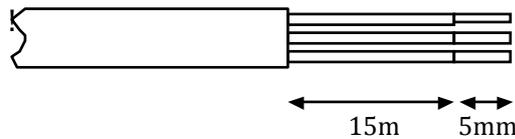
Before attempting any wiring work, ensure the electrical supply is isolated.

2.1 Connect the Power Wires

The Boiler Manager must be connected to a +24V supply to power the unit. This source must be live whilst the timer/programmer is on for either central heating or hot water, regardless of roomstat, boilerstat & cylinderstat activity. Prepare the wire ends of the cable as shown in Figure 2 and connect to the Boiler Manager terminals marked +24V, 0V. ignore the E connection, feeding the cable through the LH hole in the back box (see Figure 1).

FIGURE 2: WIRE PREPARATION

LH hole in the back box (see Figure 1).



2.2 Connect the Output Wires

The Boiler Manager output is a set of volt-free contacts. These must be connected to the existing system so their operation mimics the boilerstat. i.e. When switched 'off', they too must turn off the solenoid valve. Three types of system are most common.

- If the existing control system has a power connection directly from the timer/programmer to the gas valve/boilerstat inside the boiler cabinet and nothing else once in the cabinet, the Boiler Manager can be installed 'in-line'. See the wiring diagram in Figure 3.
- If the boiler is not powered directly from the timer or has additional equipment inside the cabinet, the Boiler Manager output contacts must be connected to the solenoid valve feed, on the "switched +24V" side. See the wiring diagram in Figure 4. This will in the majority of cases mean the modification of the internal boiler wiring.
- In fault-sensing systems with intelligent control boards, the Boiler Manager output contacts must be connected to a feed or control input on the board that turns off the gas valve whilst the switch is open. See the wiring diagram in Figure 5. Refer to the manufacturer's instructions for connection identification on the control unit.

Connect the other end of the output cable to the Boiler Manager terminals marked 'COM' and 'ON', passing the cable through the 5th hole in the back box (see Figure 1).

Maximum switching load is 5A resistive (2A inductive). Contact suppression is necessary with highly inductive loads.

The output has a transient voltage suppressor diode across the terminals to suppress switching noise from inductive main-voltage loads and additional suppression devices should not be required.

2.3 Sensor Connection

Attach a temperature sensor tightly to each of the outgoing flow and return pipes using the cable ties provided (2 per sensor). Ensure good thermal contact with the pipe. Connect the outgoing sensor to terminals labelled 'CH FLOW' and the return sensor to terminals labelled 'RETURN', passing both leads through a hole in the back box. Fasten a tie-wrap around the pair of cables inside the box, 3cm from the terminal block to prevent them slipping out through the cable gland.

For non-combinational boilers leave the HW FLOW terminals unconnected. For combinational boilers attach a 3rd sensor to the hot water pipe and connect to the 'HW FLOW' terminals.

INSTALLATION

3. SYSTEM TEST

Test can be quickly performed with a simulated input connected in place of the sensors. Reconnect the spade terminals to the BYPASS switch. With the switch set to the 'RUN' position, connect the 'BOILER MANAGER INSTALLATION TEST BOX' to the system, following the instructions supplied. This tests power and output cable wiring and unit functionality. Vary the boilerstat whilst the system is running to make sure it too can still turn off the boiler.

Note: The Boiler Manager can only inhibit the boiler from firing and cannot switch the boiler on when other conditions prevent it. e.g. If roomstat & cylinderstat are not calling for heat, or the water temperature is already up to the boilerstat setting.



WARNING! Isolate power again before opening the case!

4. REASSEMBLY

Replace the fascia and the four retaining screws. Gently retrieve any slack or wound cable from the inside of the case back through the open cable gland holes. Install cable glands and blank grommets into the appropriate knock outs within the back box, feeding about 10mm of cable back into the case with each cable clamp. Turn on power and ensure operation is as predicted by the user manual.

Important: Install the cable clamps and hole blanks provided, covering all holes on the underside of the box. These are important for safe operation, preventing access to mains voltages inside the box and providing strain relief so that wires are not secured by screw terminals alone. Feed about 10mm of cable back into the case with each cable clamp.

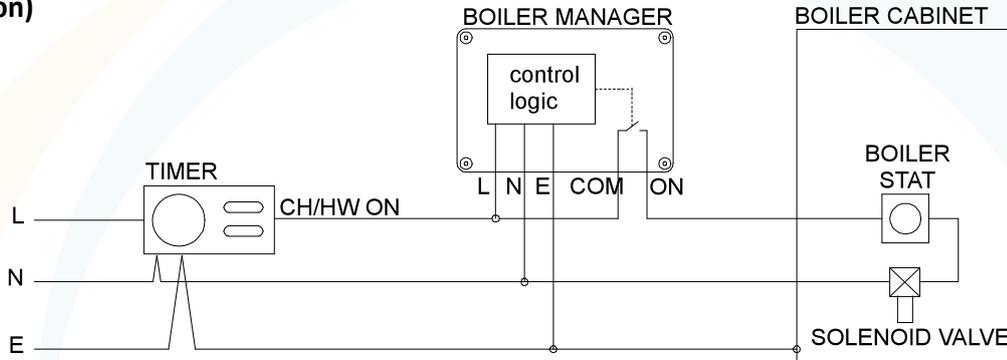
Turn on power and ensure operation is as described under the 'Controls and Display' and 'Operation' sections of this manual or see the troubleshooting section below.

INSTALLATION NOTE (NON-COMBINATION BOILERS):

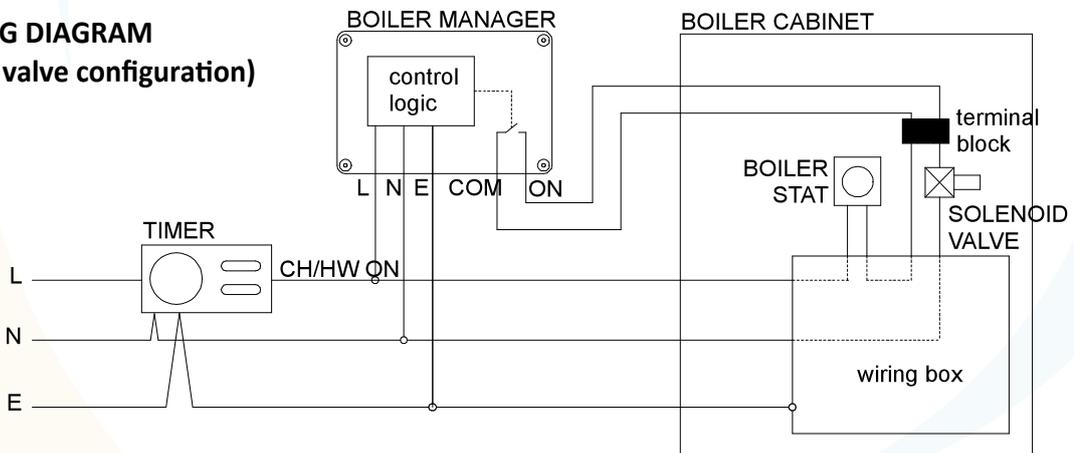
Install as combi boilers but attach the 3rd sensor to the HW flow pipe and connect to the 'HWFLOW' terminals, also through the 3rd hole in case.

INSTALLATION

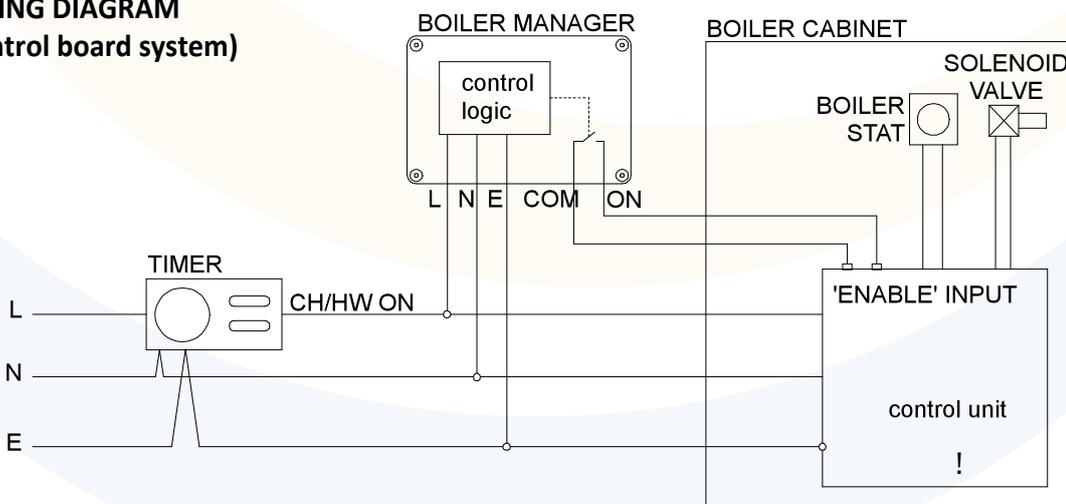
**FIGURE 3: WIRING DIAGRAM
(inline configuration)**



**FIGURE 4: WIRING DIAGRAM
(switched live to valve configuration)**



**FIGURE 5: WIRING DIAGRAM
(intelligent control board system)**



TROUBLESHOOTING

Troubleshooting

- If the display is blank, check power is present.
- The display will show 'CH-flow sensor disconnected' or 'Return sensor disconnected' if these sensors are not properly connected.
- To check that the optional HW FLOW sensor is connected, press the BOILER CONTROL button. The bottom line of the display will show temperatures when this sensor is fitted or just show the firing delay when not fitted.
- If the temperature is displayed as a pair of asterisks * * the sensor is either faulty or the screw terminals have been shorted. Makes sure there are no strands of wire bridging the pair of terminals.
- If the temperatures do not rise as expected, check that the sensors are properly attached to the water pipes.
- If the boiler is on when the drawbridge icon _ / _ indicates it should be off, check that the BYPASS switch is set to RUN.
- If increasing the SETTING temperature does not increase water temperatures, adjust the setting of the boiler thermostat.

Specifications

Controller dimensions:	156mm wide x 105mm high x 60mm deep
Supply voltage:	220-250VAC, 50/60Hz
Power consumption:	2W
Output contact rating:	250VAC, 5A resistive load, 2A inductive load
Temperature display:	1°C resolution, ±2.5°C accuracy



This product is expected to have a long service life. At the end of service life this product should be recycled according to the European Directive on Waste Electronic Equipment. Outside the EU dispose according to local recycling or waste disposal regulations. This product must not be disposed in household waste.

If any parts are missing or damaged, please contact the bnew at the address below:

Safety Warnings



- When disposing of this product, do so in accordance with your local waste disposal regulations.



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