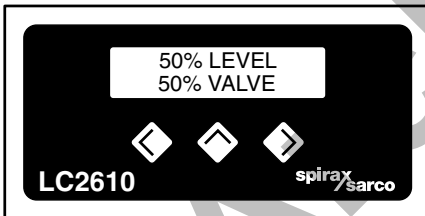


LC2610**Level Controller****Installation and Maintenance Instructions**

1. *General safety information*
2. *General product information*
3. *Typical applications*
4. *Setting the voltage*
5. *Mechanical installation*
6. *Electrical installation and wiring diagrams*
7. *Menu familiarisation*
8. *Commissioning - change mode*
9. *Maintenance*
10. *Fault finding*
11. *Settings table*
12. *Simplified menu flow chart*

1. General safety information

Your attention is drawn to Safety Information Sheet IM-GCM-10 as well as to any National or local regulations.

Safe operation of the product depends on it being properly installed, commissioned and maintained by a qualified person in compliance with the operating instructions. It is essential to comply with general installation and safety instructions for pipeline and plant construction, as well as to make proper use of tools and safety equipment. The product is designed and constructed to withstand the forces encountered during normal use. Use of the product for any other purpose, or failure to install the product in accordance with these Installation and Maintenance Instructions, could cause damage to the product, will invalidate the CE marking, and may cause injury or fatality to personnel.

Additional Safety Notes:

Level control and level limiting/alarm products in steam boilers

Products/systems must be selected, installed, operated, and tested in accordance with:

- Local or National standards and regulations.
- Guidance Notes, (Health and Safety Executive PM5 in the UK).
- The requirements of Approvals Authorities.
- Boiler inspection bodies.
- Boiler manufacturer's specifications.

Two independent low water limiting/alarm systems must be installed on steam boilers. Level probes must be installed in separate protection tubes/chambers, with sufficient clearance between the tips, and earth.

Each probe must be connected to an independent controller. The alarm relays must isolate the boiler heat supply at low alarm status.

A high water alarm may be part of the water level control, or a separate system. An independent high water alarm system must be fitted if it is considered a safety requirement. In this case, the relays must simultaneously isolate the feedwater supply and the boiler heat supply at high alarm status. All boiler water limiters/alarms require regular functional testing.

A suitable water treatment regime must be used to ensure continuous safe and correct operation of the control and limiter/alarm systems. Consult the above authorities and a competent water treatment company.

Warning

Isolate the mains supply before removing the controller back since hazardous voltages will be exposed on the controller terminals. This product complies with the requirements of Electromagnetic Compatibility Directive 89/336/EEC by meeting the standards of:

- EN 61326 : 1997 A1 + A2 Emissions Class B equipment Table 4.
- EN 61326 : 1997 A1 + A2 Immunity for Industrial locations Annex A.

The following conditions should be avoided as they may create interference above the limits specified in EN 61326 (Immunity) if:

- The product or its wiring is located near a radio transmitter.
- Excessive electrical noise occurs on the mains supply. Power line protectors (ac) should be installed if mains supply noise is likely. Protectors can combine filtering, suppression, surge and spike arrestors.
- Cellular telephones and mobile radios may cause interference if used within approximately 1 metre (39") of the product or its wiring. The actual separation distance necessary will vary according to the surroundings of the installation and the power of the transmitter.

If this product is not used in the manner specified by this IMI, then the protection provided may be impaired.

— 2. General product information —

2.1 General

The LC2610 controller is a panel-mounted instrument for controlling the level of conductive liquids.

The minimum conductivity when used with the LP20/PA20 is 5 μ S/cm or 5 ppm.

All options (apart from the voltage) are selected from a menu on the LCD display using the three buttons on the controller front panel. The buttons are also used to select and set operating parameters.

Direction arrows are displayed, indicating which button to press to select a particular option.

Note: For additional information see the LC2610 Technical Information Sheet.

2.2 Inputs

The LC2610 controller can accept a signal from a level probe or transmitter and can be configured to operate with voltage or current devices.

Note: The probe must be long enough to sense over the complete level range.

The LC2610 incorporates automatic compensation for the 'wave motion' that can occur in steam boilers. (The wave height is measured approximately every 2 minutes and an appropriate dead band is included in the control loop to minimise valve movement).

In addition the LC2610 can accept signals from steam and water meters for two and three element control applications (see Section 3).

2.3 Function

The LC2610 compares the signal it receives (from the level probe and steam / water meter) with the set point selected by the user. It then changes its output signal to control the water level in the boiler or tank.

2.4 Outputs

The LC2610's control signal can be configured / wired to work with a pump or a modulating control valve. It also provides relay outputs for high and low level alarms and can provide a 4 - 20 mA retransmission output.

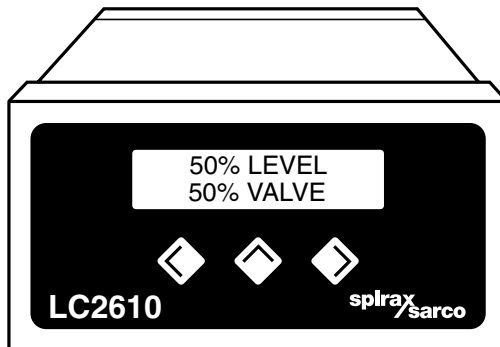


Fig. 1

3. Typical applications

The LC2610 can be configured to control the level of a boiler, tank or vessel, by operating a pump, valve or solenoid. The following diagrams show some typical applications:-

3.1 On/off control:

- Pump control.
- Two alarm outputs.
- 4 - 20 mA level output.

Note: A solenoid valve may be used instead of a pump.

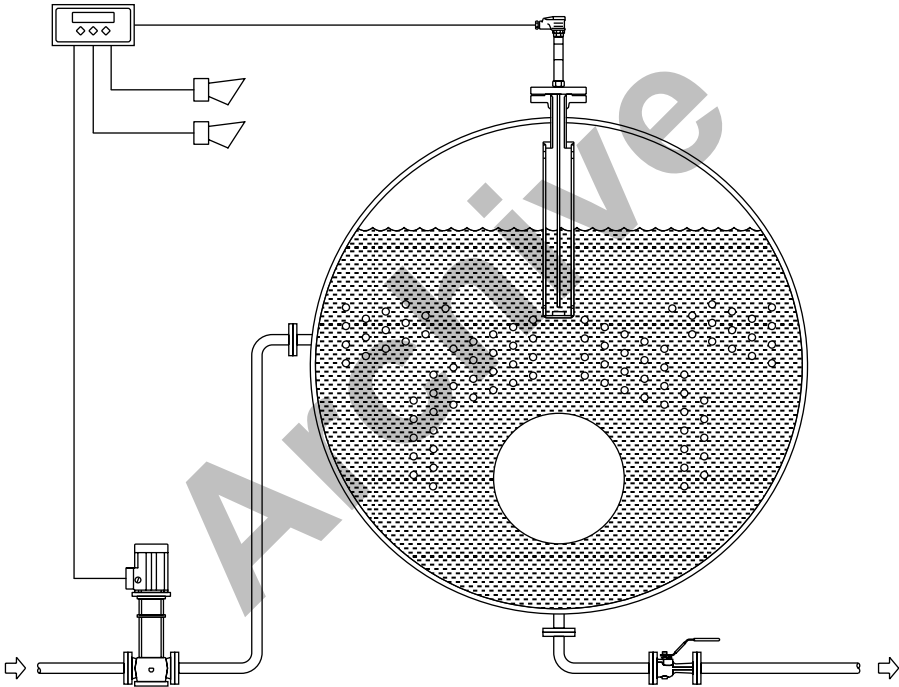


Fig. 2

3.2 Modulating control:

- Modulating valve control using valve motor drive or 4 - 20 mA control signals.
- Two alarm outputs.
- 4 - 20 mA level output.

Note: The 4 - 20 mA level output is only available when the LC2610 is configured for valve motor drive systems.

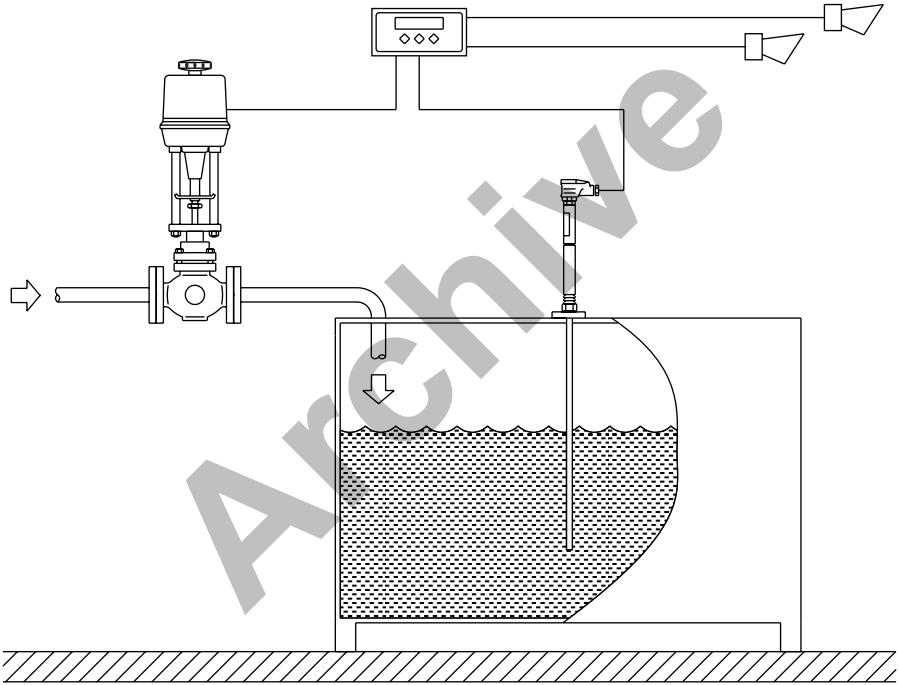


Fig. 3

3.3 Two or three element modulating control:

- Modulating valve control using valve motor drive or 4 - 20 mA control signals.
- Two alarm outputs.
- 4 - 20 mA level output.
- Probe mounted in boiler (in protection tube), or in external chamber.
- Feedback from steam meter.
- Feed forward from water meter.

Note: The 4 - 20 mA level output is only available when the LC2610 is configured for valve motor drive systems.

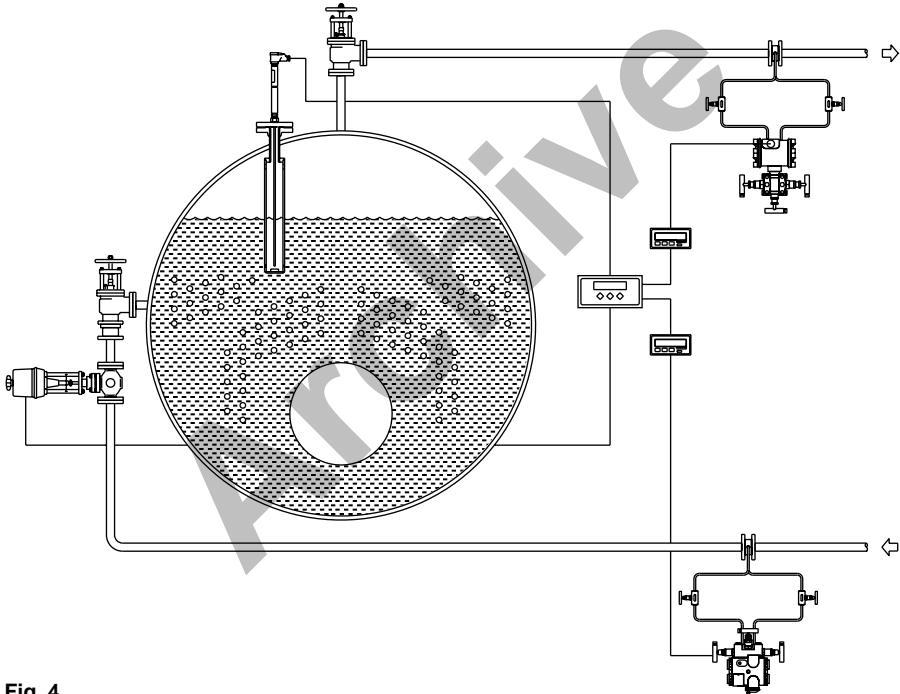


Fig. 4

4. Setting the voltage

The controller is supplied with the voltage switch set to 230 V.
The controller is suitable for operation at the following voltages (50 - 60 Hz):-

230 V setting	198 V - 264 Vac
115 V setting	99 V - 132 Vac
Fuse type	20 mm cartridge
Fuse rating	100 mA anti-surge (T)
Maximum power consumption	6 VA
Overvoltage category	II

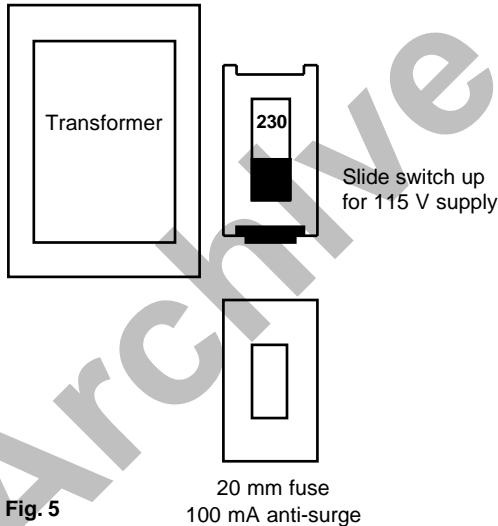


Fig. 5

To change the voltage:

- Disconnect the mains supply.
- Unplug the two connector sockets from the back of the unit.
- Remove the four back panel screws and the panel itself.
- Slide out the PCB. The two-way mains switch is fitted on the PCB next to the transformer.
- Select the required working voltage, (shown on the switch slider).
- Refit the PCB, making sure that the two 10-way plugs engage with the sockets on the display PCB.
- Refit the back panel.
- Refit the two connector sockets.

Fuse

The fuse is next to the mains switch, as shown.

Fuse type

The controller is fitted with an internal 20 mm cartridge, 100 mA anti-surge (T) fuse. For the UL version, replacement fuses must be UL recognised to maintain the integrity of the approval.

5. Mechanical installation

Maximum ambient temperature	55°C	(131°F)
Minimum ambient temperature	0°C	(32°F)
Indoor use only		
Altitude up to	2 000 m	(6 561 ft)
Humidity	Maximum relative humidity 80% for temperatures up to 31°C (87.8°F) decreasing linearly to 50% relative humidity at 40°C (104°F)	
Maximum cable length - controller to probe	100 m	(330 ft)

The controller must be installed in a suitable industrial control panel or enclosure to provide impact and environmental protection (pollution degree 2).

The protection rating is IP65, but note that this only applies to the front panel. The panel must have a smooth surface to maintain this protection rating. Minimum pollution degree 2.

The back of the case is open and unprotected, so the degree of protection will depend on the protection rating of the housing used. Additional sealing is also required between the LC2610 and the panel to maintain the IP65 rating. LC2610 terminals must be enclosed within the panel. For the UL version, this must be a 'Type 1' enclosure.

The LC2610 fits into a 137 x 67 mm panel cut-out, and is retained by the two clips and screws supplied:

- Ensure that the panel has sufficient depth to install the LC2610 and its wiring, including the space required to withdraw the wiring connectors.
- Ensure that there is sufficient clearance at each side of the case to fit the retaining clips and screws.
- Make a cut-out in the panel (final size to be 137 x 67), and remove any burrs on the cut edges to allow the unit to seat properly. We recommend that the cut-out is made slightly undersize at first, and filed to fit, as there is only a small lip on the LC2610 case.
- Fit the LC2610 into the panel, and slot the side clips into place on the sides of the case.
- Tighten the retaining screws against the back of the panel, but do not over-tighten.

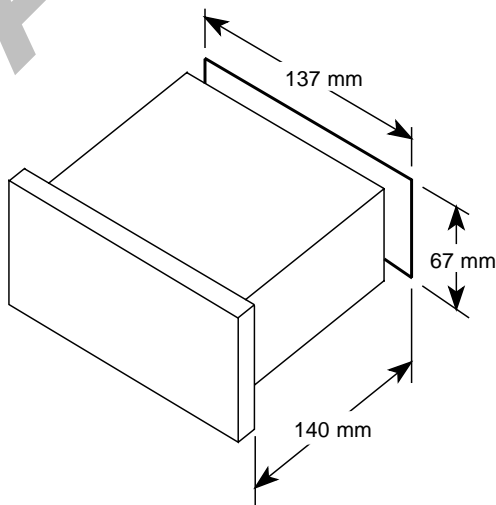


Fig. 6

6. Electrical installation and wiring diagrams

6.1 General wiring diagram (All relays shown in the power off position)

Note:

It is essential to select the correct sensitivity on the PA20 preamplifier, (see the PA20 Installation and Maintenance Instructions for details). Tighten the terminals to 0.8 N m (7 lbf in).

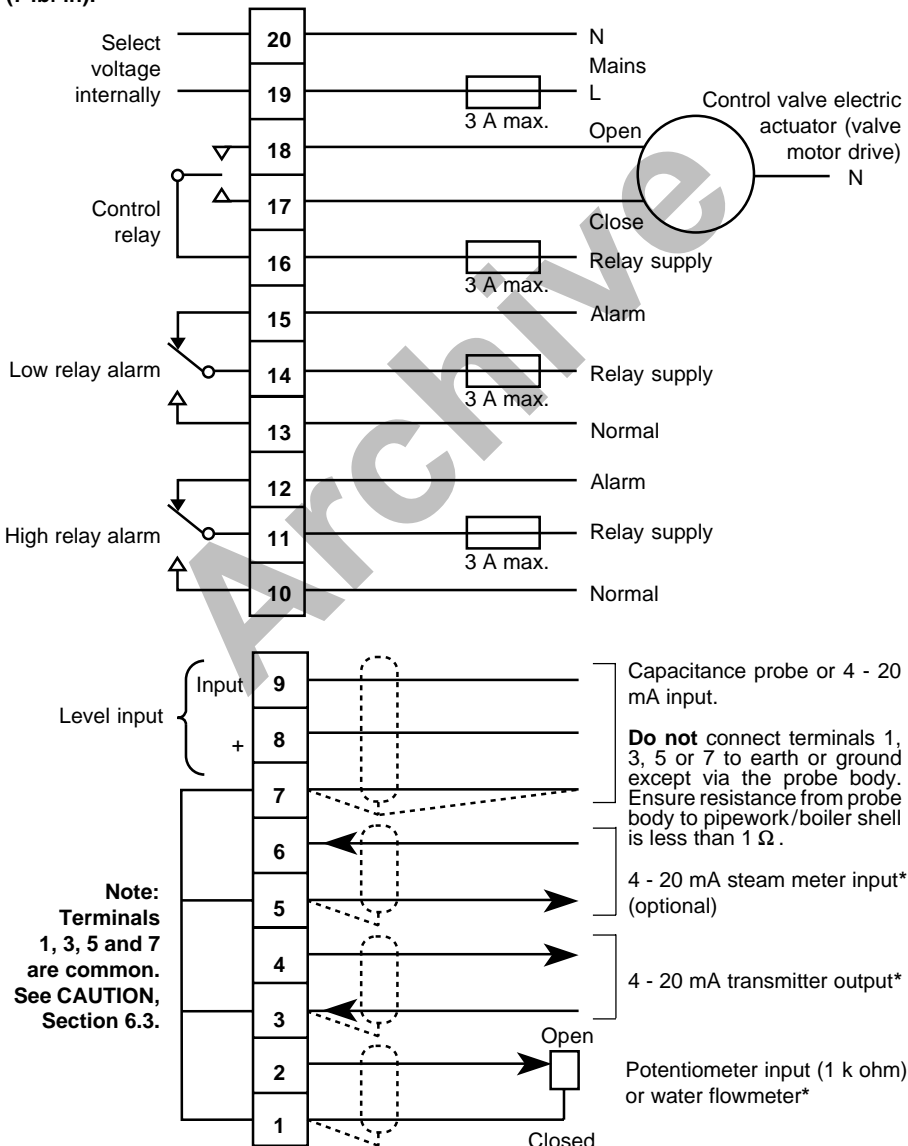


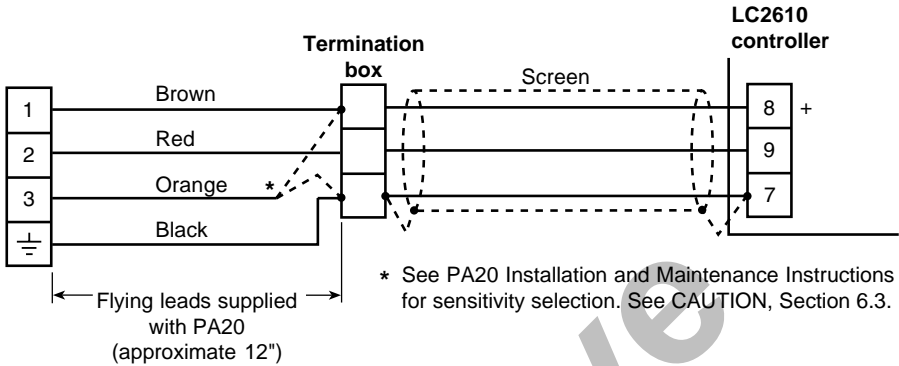
Fig. 7

* These units must be isolated from earth.

6.2 Wiring diagram UL version

PA20 preamplifier and LP20 capacitance probe

(see PA20 and LP20 Installation and Maintenance Instructions)



Do not connect terminals 1, 3, 5 or 7 to earth or ground except via the probe body. Ensure resistance from probe body to pipework/boiler shell is less than 1 Ω .

Fig. 8

Relay rating table:

Version	Relay load type	Rating
Standard	Resistive at 250 Vac	3 A
	Inductive at 250 Vac	1 A
	Lamp or resistive at 240 Vac	3 A
	Tungsten filament at 240 Vac	1 A
UL listed	AC motor at 240 Vac	¼ HP (2.9 A)
	AC motor at 120 Vac	1/10 HP (3 A)
	Pilot duty (control circuits/coils)	C300 (2.5 A)

* Cabling should be installed in accordance with BS 6739 - Instrumentation in process control systems: Installation design and practice or local equivalent.

For the US and Canadian markets the controller must be wired in accordance with the National and Local Electrical code (NEC) or Canadian Electrical Code (CEC).

Note:

Screened high temperature, 3 core, 1 mm² (18 - 16 AWG) copper cable is required for the probe wiring. The maximum permitted length is 100 metres (328 ft). Use cable with a suitable temperature rating for the installation. Pirelli FP200 or Delta Crompton Firetuf OHLS are suitable cables for the standard version. Use NEC Class 1 wiring for the UL version. Connect the screens as shown in the wiring diagrams.

6.3 Screen connection

To avoid damage to the product, screens must be installed as follows:

- An earth current loop is created if a wire or screen is connected between two earth points, which are at different potential (voltage).
- The preamplifier and controller screen are only connected to earth at one end, i.e. at the PA20 earth terminal.

Note: The PA20 earth terminal is a functional earth rather than a protective earth.

- A protective earth provides protection from electric shock under a single fault condition.
- This product has double insulation and therefore does not require a protective earth.
- A functional earth is used in order for the product to operate.
- In this application, the earth (tank/boiler shell) is used as the common of the probe/preamplifier.
- It also provides a sink/drain for any electrical interference.
- Ensure that the screen is connected to the common of the LC2610 (terminal 7) and to the earth terminal of the PA20.
- The LC2610 common terminal is internally isolated from earth.
- The common terminal must only be earthed via the PA20.

CAUTION:

Do not connect the common terminals (1, 3, 5 and 7) to an earth local to the controller. To do so may induce an earth current loop, which may reduce the performance or damage the product.

Archive

6.4 Level inputs - options (All relays shown in the power off position)

Note: It is essential to select the correct sensitivity on the PA20 preamplifier, (see the PA20 Installation and Maintenance Instructions for details).

Fig. 9
PA20 preamplifier (0 - 6 V) input
 (Links on preamplifier provide sensitivity selection - see the preamplifier IMI for more information).

The earth terminal is internally connected to the PA20 body, and earthed by the LP20 probe. **Do not connect this earth terminal to any other earths.**

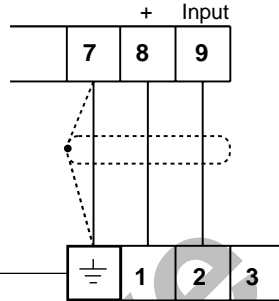


Fig. 10
Loop powered 4 - 20 mA input
 (e.g. Two wire differential pressure transmitter)

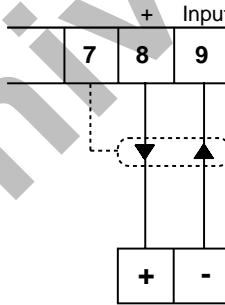
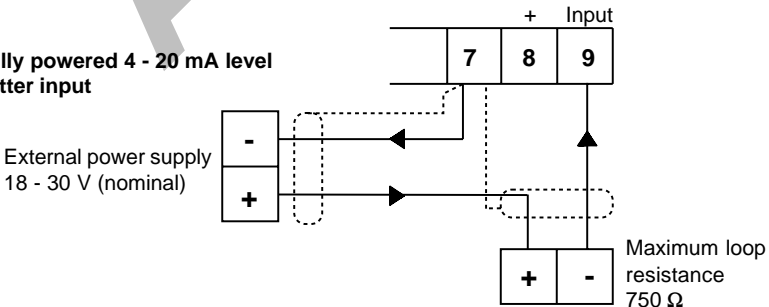


Fig. 11
Externally powered 4 - 20 mA level transmitter input



4 - 20 mA transmitter wiring notes

1. Terminals 7, 5, 3 and 1 are linked inside the controller.
2. Terminal 8 provides loop power of 18 - 30 Vdc.
3. Input resistance between terminals 7 and 9 is 100 Ω .

LP20 / PA20 wiring notes

1. Terminals 7, 5, 3 and 1 are linked inside the controller and are earthed via the LP20/PA20.
2. Terminal 8 provides a drive voltage 18-30 Vdc.
3. Input resistance between terminals 7 and 9 is 13 k Ω .

6.5 Wiring - on/off control (All relays shown in the power off position)

Note: It is essential to select the correct sensitivity on the PA20 preamplifier, (see Installation and Maintenance Instructions for details).

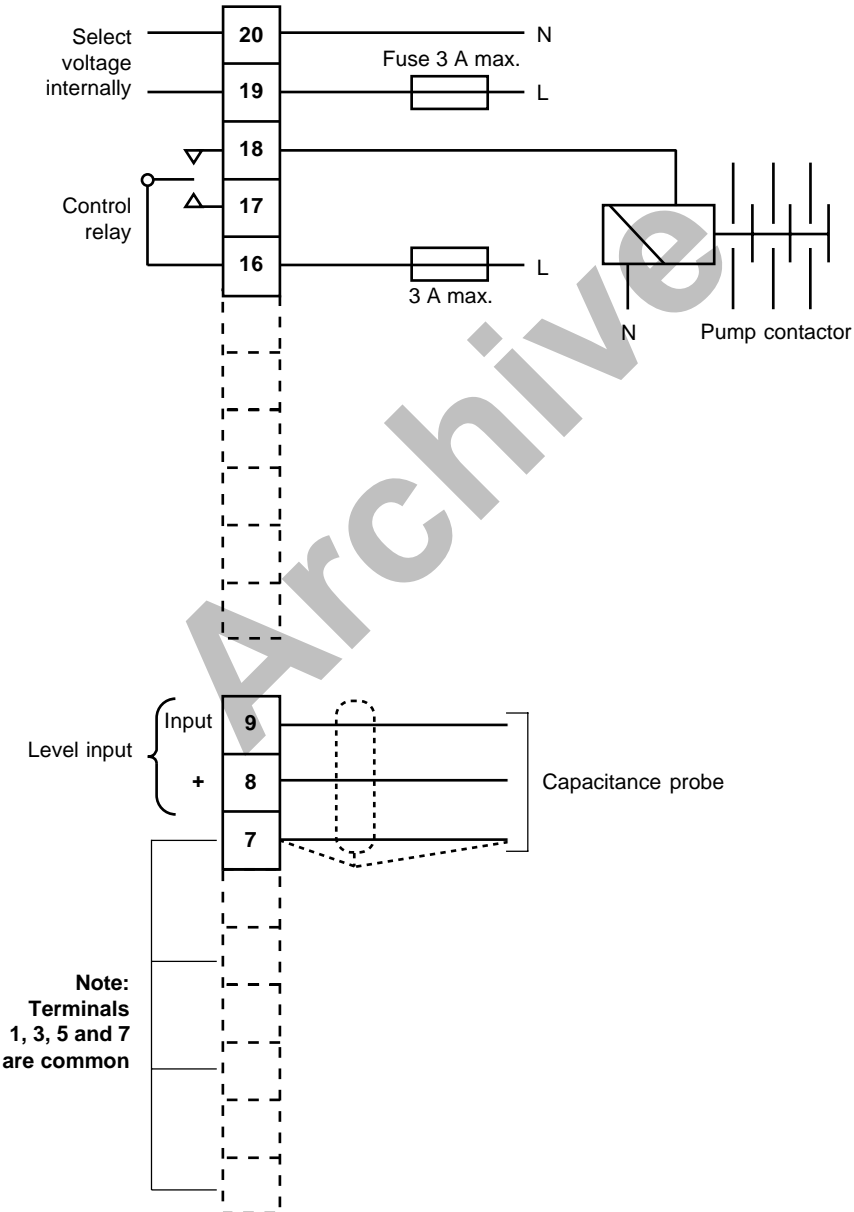


Fig. 12

6.6 Wiring - modulating control with 4 - 20 mA positioner

(All relays shown in the power off position)

Note: It is essential to select the correct sensitivity on the PA20 preamplifier, (see Installation and Maintenance Instructions for details). 4 mA always represents valve closed, and 20 mA represents valve open, regardless of whether 'pump in' or 'pump out' is selected.

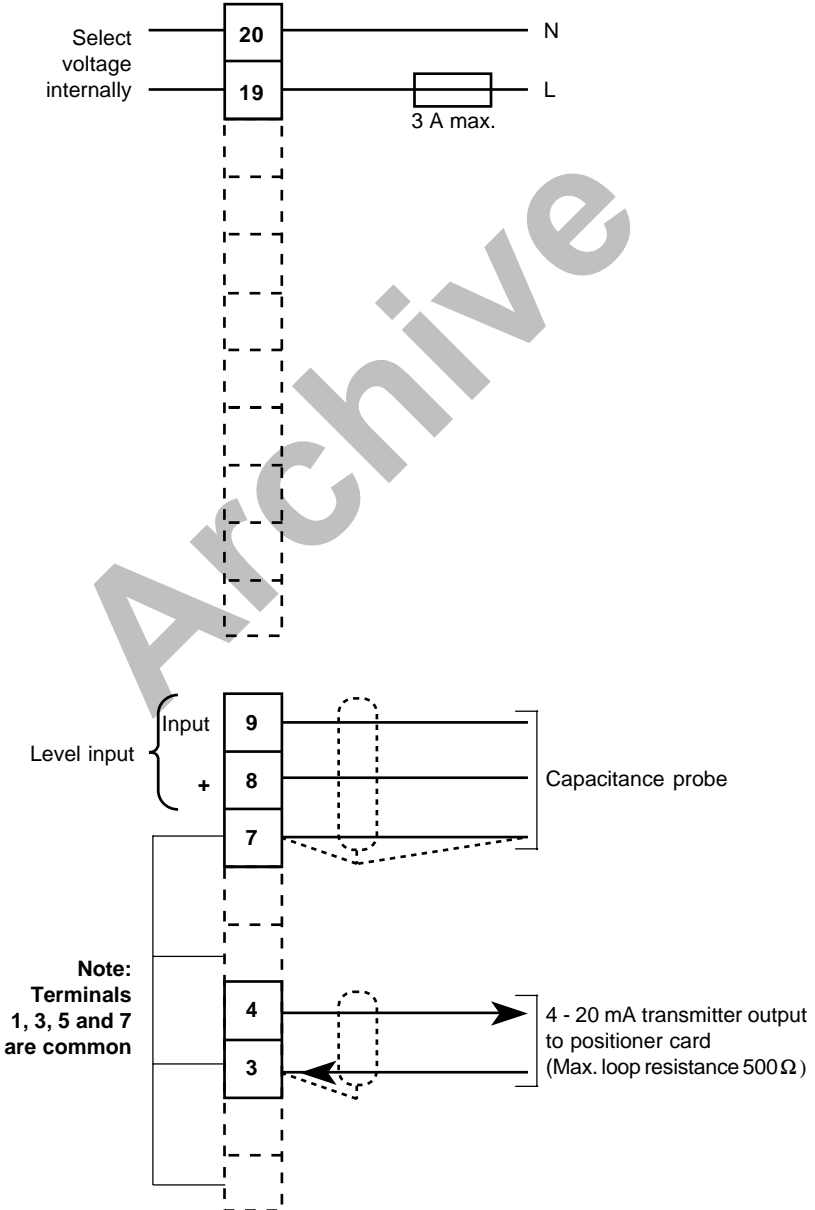


Fig. 13

6.7 Wiring - modulating control (electric actuator with feedback potentiometer) (All relays shown in the power off position)

Note: It is essential to select the correct sensitivity on the PA20 preamplifier, (see Installation and Maintenance Instructions for details).

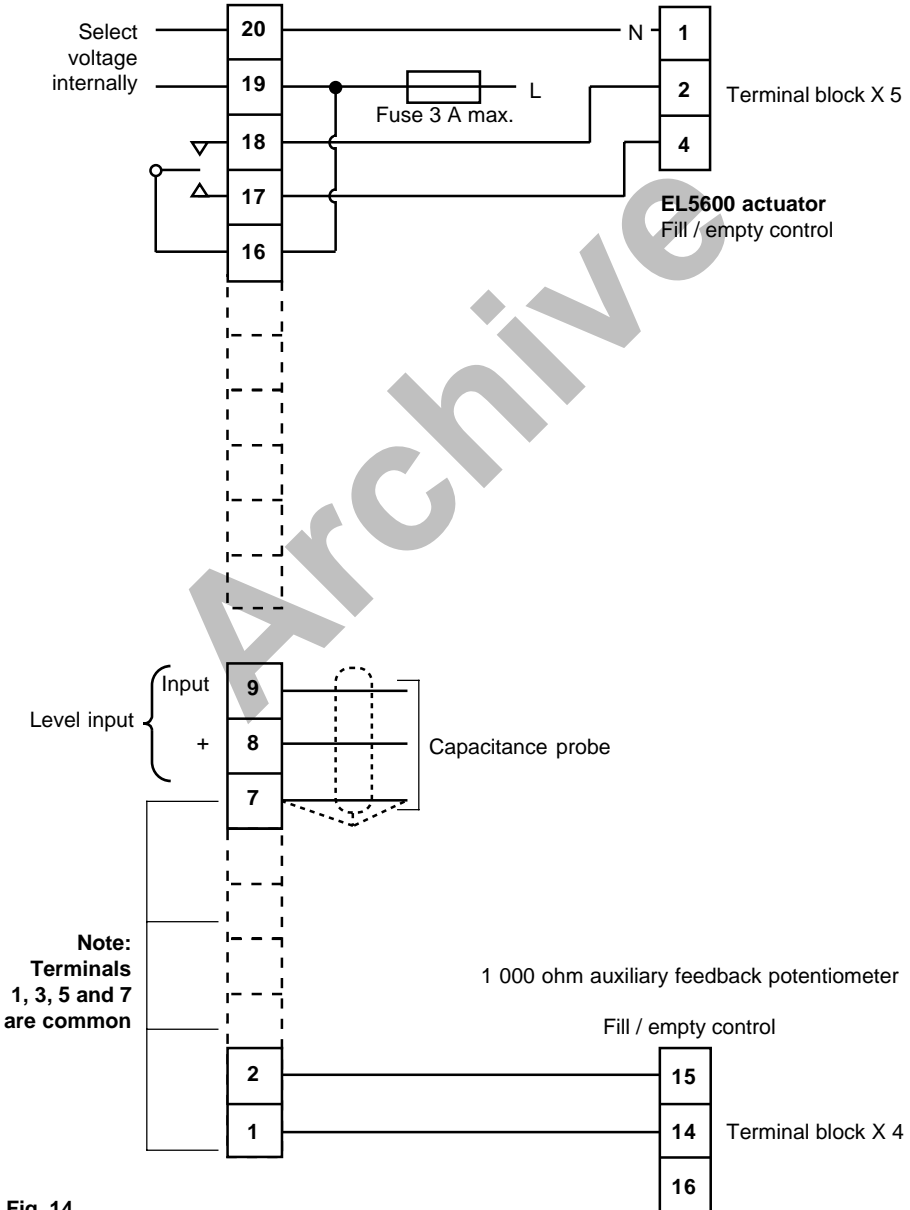


Fig. 14

6.8 Steam meter input for 2 and 3 element control systems

Externally powered 4 - 20 mA steam flowmeter

CAUTION: Controller terminal 5 (steam meter -ve) may be earthed by level probe.

Resistance between terminals 5 and 6 is 100 Ω .

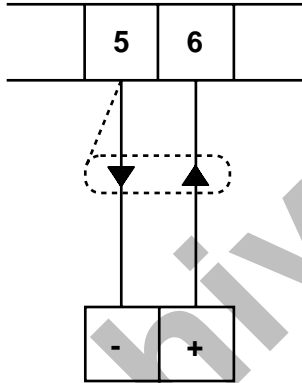


Fig. 15

6.9 Water meter input for 3 element control systems

Can be used with valve motor drive or 4 - 20 mA positioning.

Externally powered 4 - 20 mA water flowmeter.

CAUTION: Controller terminal 1 (water meter -ve) may be earthed by level probe.

Resistance between terminals 5 and 6 is 100 Ω .

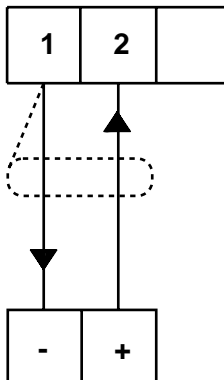


Fig. 16

6.10 Alarm relays (All relays shown in the power off position)

Figures 17 and 18 are typical alarm circuit wiring diagrams.

The fuse rating must not exceed 3 A.

Controller and all relay mains supplies must be on the same phase.

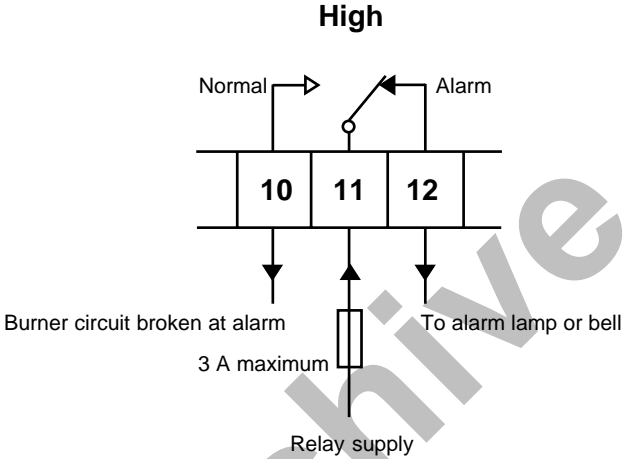


Fig. 17

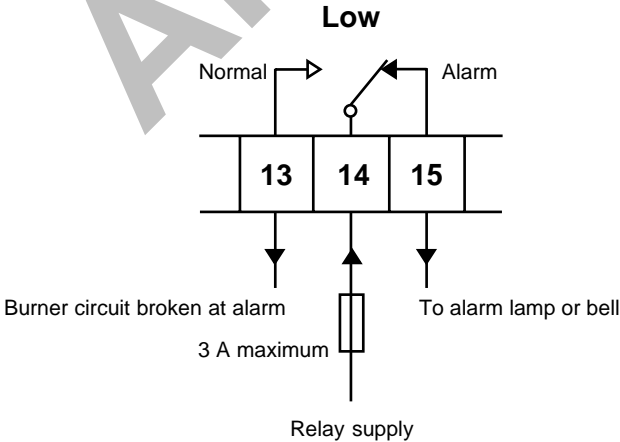


Fig. 18

7. Menu familiarisation

This Section explains how the controller functions are organised and enables the first time user to understand the purpose of the controller modes and settings. These are:-

7.1 Run mode

This is the mode used for normal daily operation, and has two settings:-

AUTO: This is the normal setting used once the controller has been commissioned.

DISPLAY: Used to view the controller settings without making any changes, and best for familiarisation.

7.2 Set-up mode

This mode is used for commissioning, and consists of:

Manual

Allows the user to take manual control of the valve, and is normally only used during commissioning.

Change

Used to commission the controller. It allows the controller to be configured to suit the type of input, the type of control, as well as the type of control device (pump or valve) that will be used in the system. **Be careful not to inadvertently make any changes until you understand the system layout.**

7.3 Using the buttons to select options

The display shows the name of the menu on the top line and the available options on the lower line. A flashing item on the display means that the user has a choice, and may change the menu item or the setting by pressing one of the buttons. An arrow on the display shows the user which button to press to make a particular change. The status of the unit is shown on the lower line of the display at all times - **A** = Automatic control, **M** = Manual control.

Note:- Some of the diagrams show 'X' instead. This is because either 'A' or 'M' may be displayed on the screen depending on options previously selected.

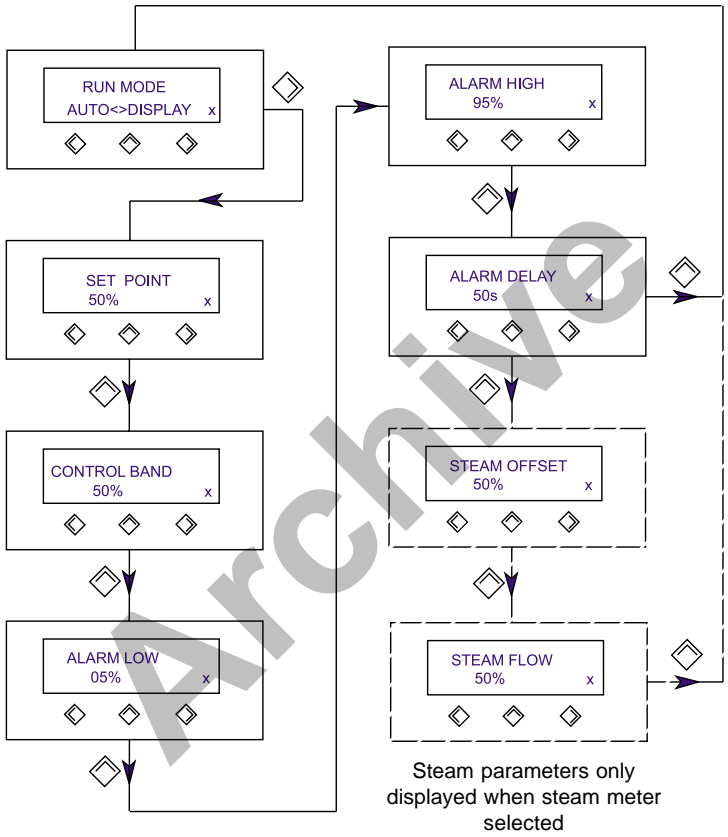
7.4 Entering the INPUT CODE

When the controller is switched on for the first time the two digit **INPUT CODE** (security code) '00' must be entered. This code must be entered each time the controller is used, apart from when entering display mode. Use the buttons as shown to enter the code.

Note: The display will show the software issue, e.g. '*E' when this menu is entered.

The operating modes are accessed as shown in the diagram. Use 'RUN MODE' 'DISPLAY' for familiarisation.

Display settings:-



The controller is supplied with the following default settings:-

• Security code	00
• Control type	Proportional
• Pump action	In (boiler water level control, for example)
• Input level	0 - 6 V
• Lvlinput O/rngdet (level input out of range detect)	No
• Set point	50 %
• Control band	50 %
• Alarm low	00 %
• High alarm	99 %
• Alarm delay	00 s
• Lockout on alarm	No
• Valve drive	Relay
• Water meter	No
• Steam meter	No

Archive

— 8. Commissioning - change mode —

8.0 'Change' mode

This mode is only used to commission the controller. It allows the controller to be configured to suit the type of input, the type of control, as well as the type of control device (pump or valve) that will be used in the system.

Note 1 :- If the controller has previously been switched off while in **MANUAL**, an input code will be requested when the unit is switched on again. If the controller is switched off while in **AUTO**, one of the normal operational displays will appear when the unit is switched on again, and actual control will resume.

Note 2 :- 'xxxxxxxx' is shown on the diagram opposite. This will, in reality, show the word '**VALVE**' if valve control is selected, '**FLOW**' if a water meter is selected, or by '**PUMP ON / PUMP OFF**' if on / off control is selected.

Access the 'change' mode as shown in the diagram opposite:-

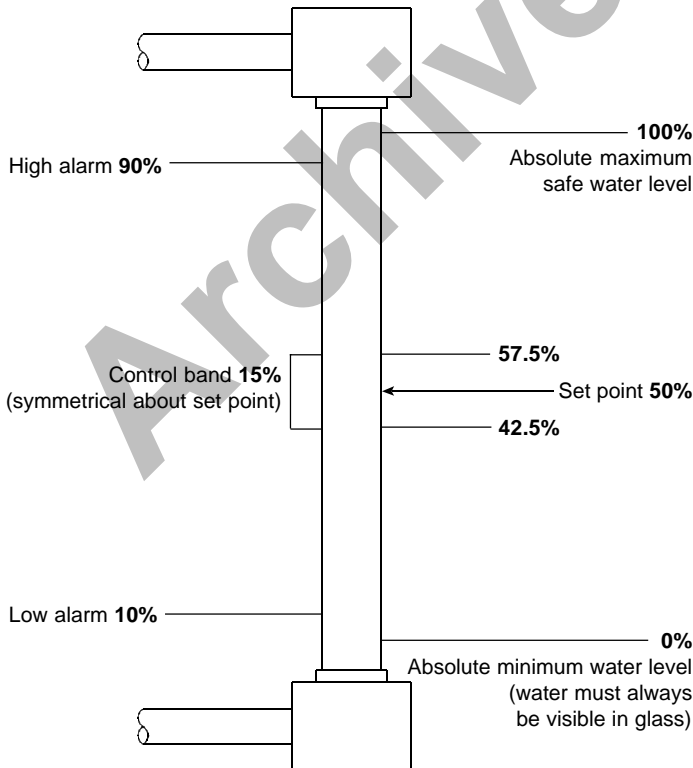
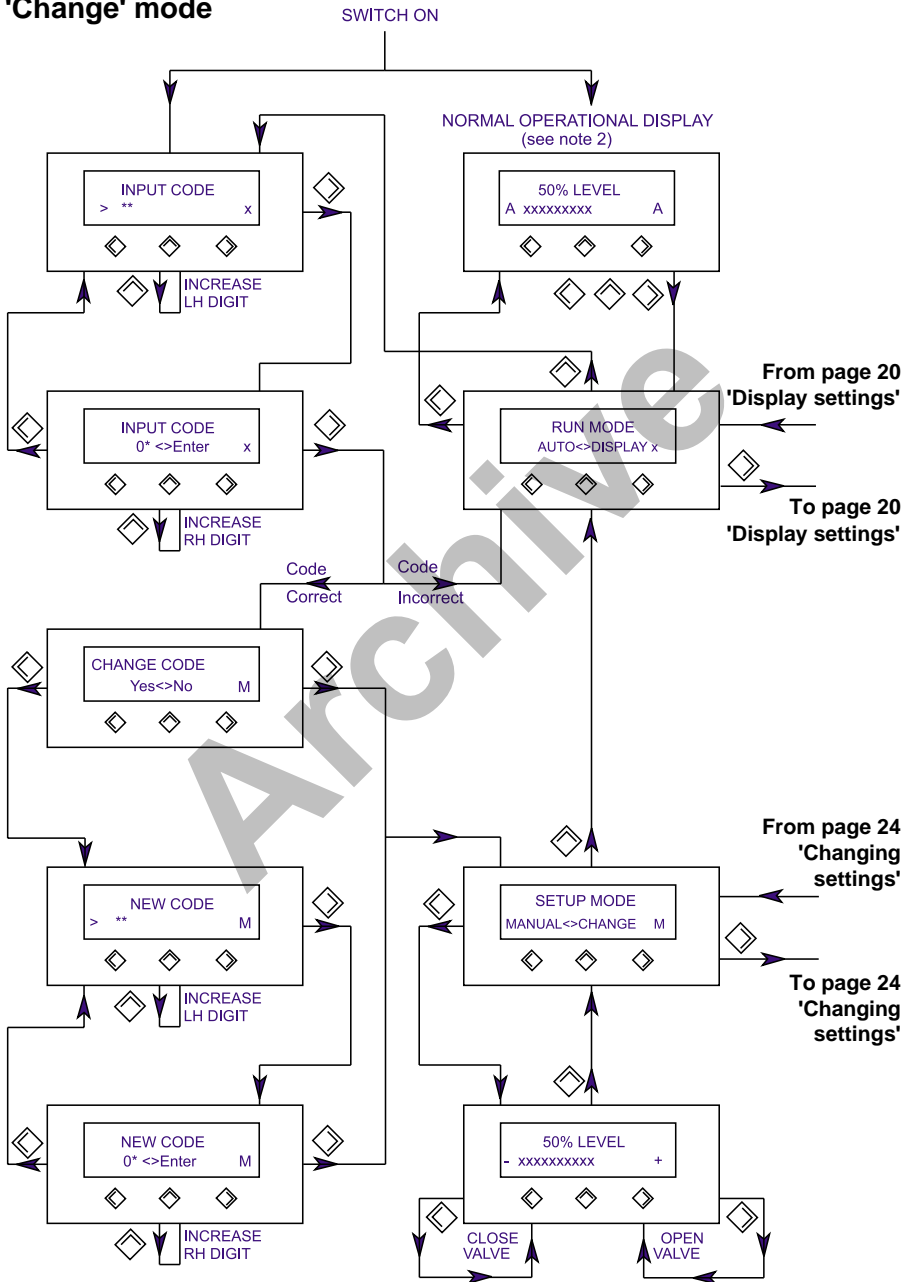


Fig. 19 Typical percentages of level settings in a gauge glass

Consult the boiler manufacturer for their recommendations

See Section 8.9 for 'Control band'
See Section 8.10 for 'Alarm low'
See Section 8.11 for 'Alarm high'

'Change' mode



Press the 'right' button to enter change mode and display the first variable, 'CONTROL TYPE'.

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8.1 Changing settings

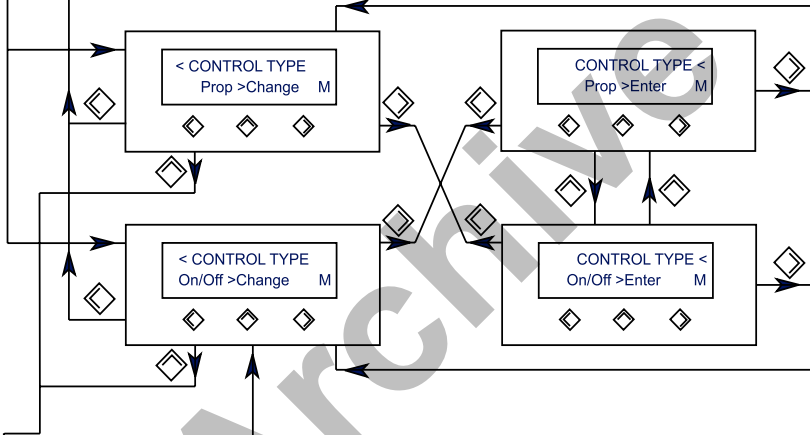
You may change any of the following variables by using the buttons. The system will not register any changes you have made until the button is pressed to 'Enter' the information. The system will always show you the last information that was entered.

i.e:- If 'On / Off' has been entered then this will be displayed instead of 'Prop' when you go back to that menu item.

8.2 Control type

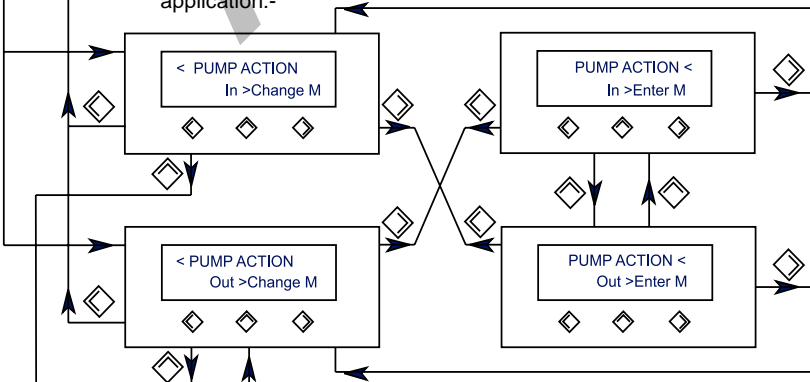
To select either 'Proportional' control or 'On / Off' control, enter the input code and select 'Change' as described in Section 8.0.

Choose the option(s) required by following the diagrams below:-



8.3 Pump action

Select 'In' for boiler feedwater valve, or 'Out' for a condensate tank or similar application:-



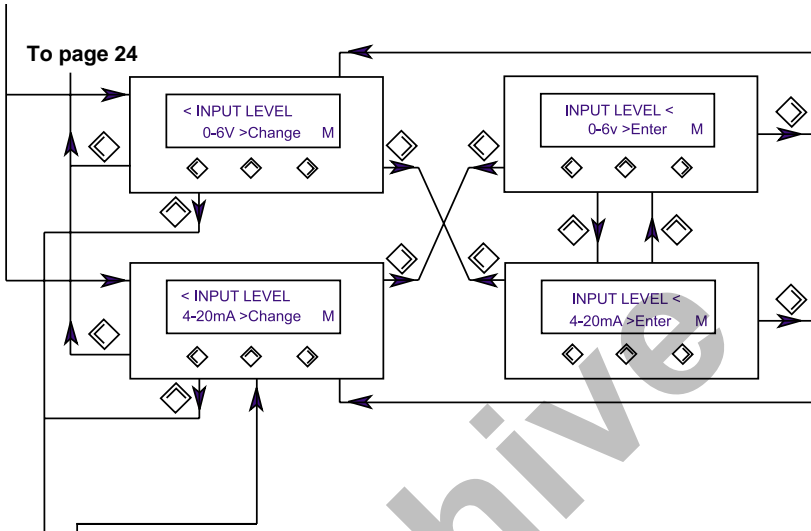
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8.4 Input level

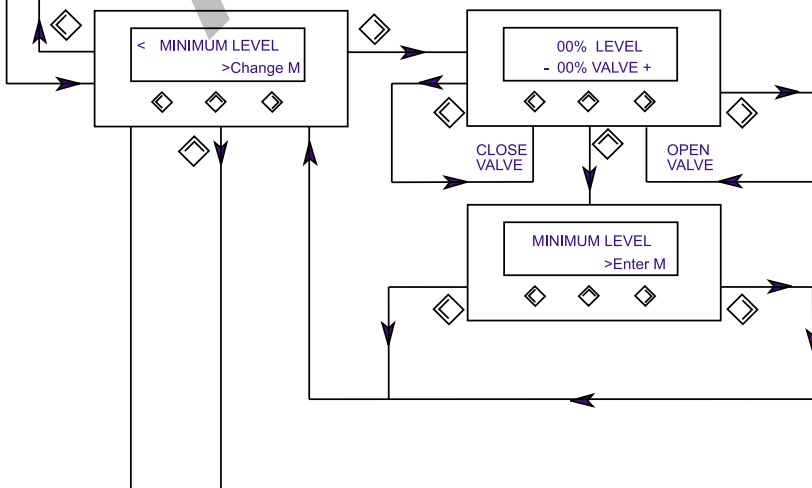
Choose '0 - 6 V' for LP20 probe, or '4 - 20 mA' if required:-



8.5 Minimum level

This is the minimum water level in the gauge glass, not the low alarm level, and defines the lowest point of reference for the system.

It is most unlikely that the level will be correct for a new system. Select 'Change' to allow manual control of the valve / pump as shown in the diagram. Use the bottom blowdown valve to lower the water level in a boiler. Press 'Enter' when the water is at the required level:-



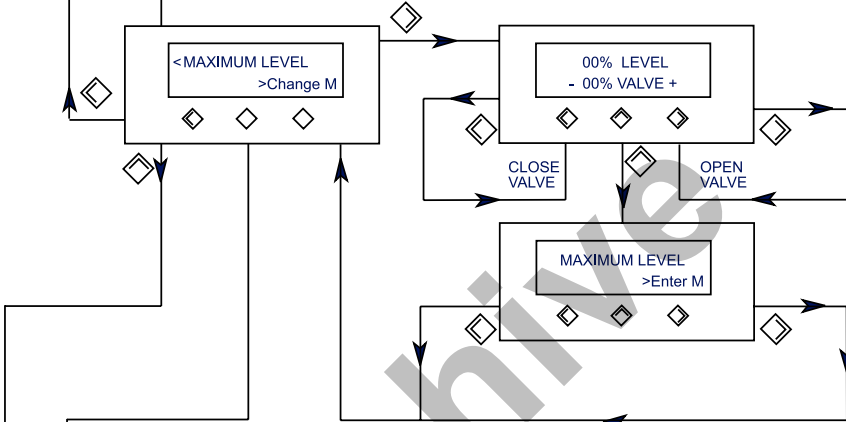
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8.6 Maximum level

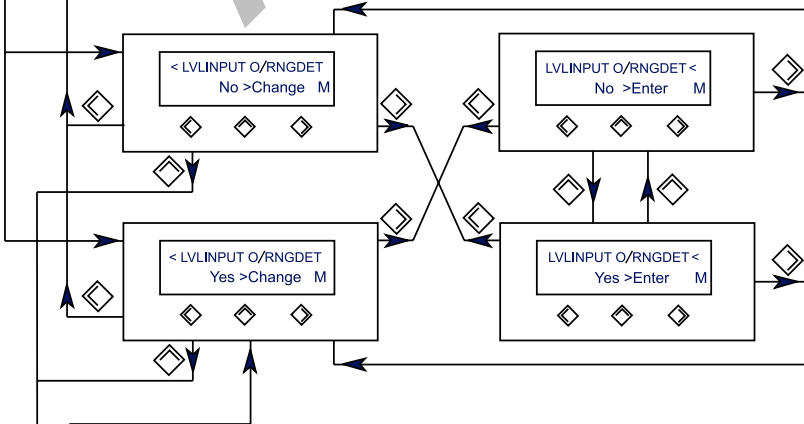
This is the maximum water level in the gauge glass, not the high alarm level, and defines the highest point of reference for the system. It is most unlikely that the level will be correct for a new system. Select 'Change' to allow manual control of the valve / pump as shown in the diagram. Press 'Enter' when the water is at the required level:-



8.7 Lvlinput O/rngdet

LeVeL INPUT Out of RaNGE DETection.

If selected, this feature will flash 'ALARM HIGH / ALARM LOW' if the input signal should fall to below 0.2 V / 2 mA, or exceed 6 volts. It will also de-energise all relays:-



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8.10 Alarm low

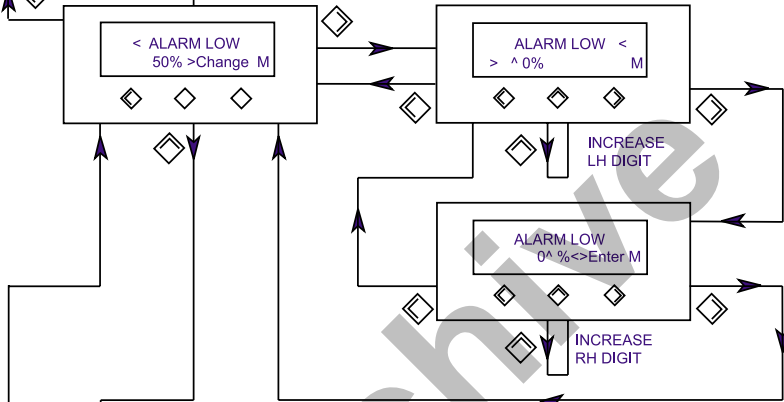
The low alarm relay is normally wired to sound an alarm, and, in many cases, to switch off the burner. Always consult the boiler manufacturer for a recommended low alarm level.

Note:- Additional low level alarms are normally fitted to the boiler.

The alarm level is normally set below the lower limit of the 'CONTROL BAND', but above the 'MINIMUM LEVEL':-

Also see Figure 19, on page 22.

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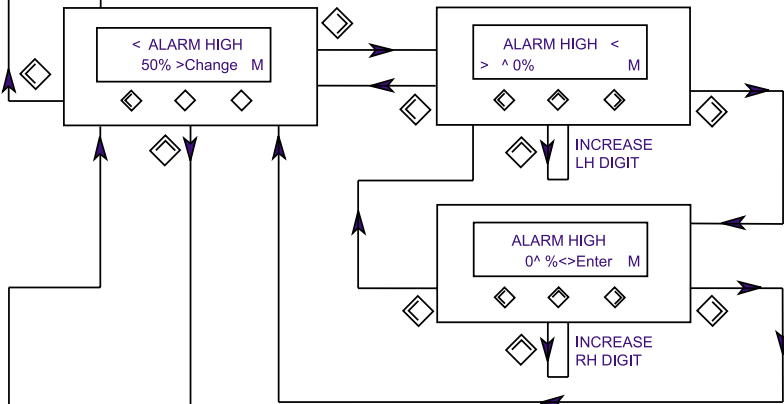
8.11 Alarm high

A high alarm warns that the boiler water level is higher than the manufacturer's specified limit, and that consequently, carryover could occur.

The high alarm relay will normally be wired to sound an alarm, and sometimes to stop the feedpump.

It is possible to wire the system so that the burner is also switched off, but we recommend that the boiler manufacturer is consulted for the preferred option, as well as to define the high alarm level for the boiler. The alarm level is normally set above the higher limit of the 'CONTROL BAND', but below the 'MAXIMUM LEVEL':-

Also see Figure 19, on page 22.



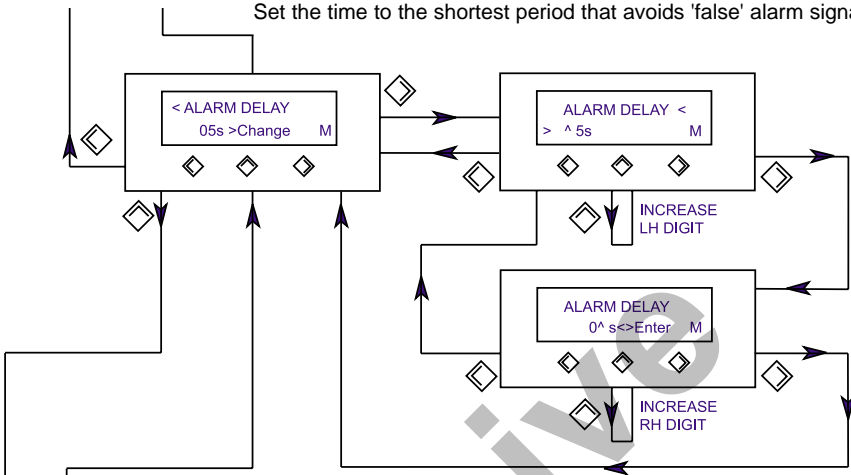
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8.12 Alarm delay

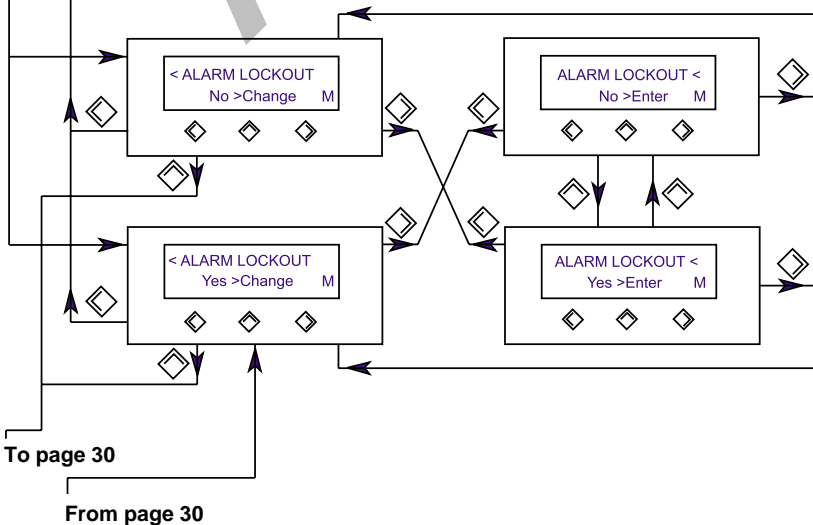
This avoids spurious alarm signals triggered by high water turbulence. Set the time to the shortest period that avoids 'false' alarm signals:-



8.13 Alarm lockout

If 'No' is selected, the low alarm relay will only be de-energised (e.g. will cause the alarm to sound), for the duration of a low water level, and will revert to normal operation as soon as normal water level is reached.

If 'Yes' is selected, the low alarm relay will stay de-energised until the 'Input Code' screen is accessed and the security code entered. See Section 12.2, page 40.



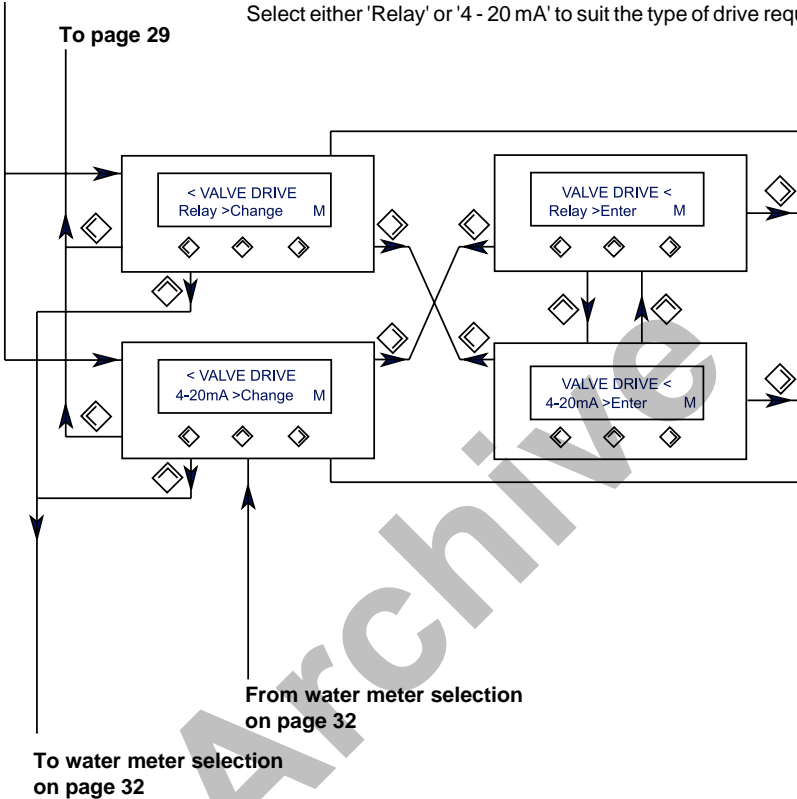
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8.14 Valve drive / 4 - 20 mA retransmission

Select either 'Relay' or '4 - 20 mA' to suit the type of drive required:-



Note: If the 4 - 20 mA is selected, to drive a valve/positioner, the controller will output 20 mA when the water level is at the bottom of the control band, and 4 mA at the top. If an inverse output is required, e.g. for a reverse acting valve, select 'pumping out'. Section 8.3, Pump action.

Note: If the 4 - 20 mA output is not used to drive the valve, the output will represent level with the following limits:-
Minimum level (page 25) = 4 mA (0%)
Maximum level (page 26) = 20 mA (100%)

8.15 Two and three element control for boilers

These notes are included at this stage because the subsequent display sequence will vary according to the selections made:-

Two element control

When a sudden increase in steam demand occurs, boiler pressure will drop, and the steam bubbles in the water will expand. This causes the water level to rise, and the feedwater valve to close. Although the measured level of water has increased, the mass of water will be decreasing, requiring the feedwater valve to open. A two element control system (probe / controller and steam flowmeter) uses the output from the steam flowmeter to alter the control action and prevent the valve closing.

For effective control, it is important to make an accurate assessment of the rise in water level under full steam flow (maximum demand). This rise in water level can vary according to operating conditions, for example steady maximum steam demand, or intermittent, sudden demand, as well as factors such as boiler pressure and water TDS level. There will also be a difference in level between the boiler and the gauge glass under different firing conditions and steam demand.

Three element control

Under certain conditions where the boiler feedwater pressure varies considerably, perhaps due to other boilers drawing water, three element control is used. A water flowmeter is added to compensate for variations in flow due to pressure variations. The diagram shows the selections available, and how they relate.

8.16 Maximum water

The water meter needs to be scaled so that it reads 100% at the maximum boiler output. For example, if the maximum boiler capacity is 60% of the maximum on the meter scale, 'Enter' 60%.

8.17 Minimum valve

The valve has a feedback potentiometer which tells the controller the valve position. Fully close the valve (physically check that it is fully closed) then press 'Enter' to calibrate the minimum potentiometer setting.

8.18 Maximum valve

The valve has a feedback potentiometer which tells the controller the valve position. Fully open the valve (physically check that it is fully open) then press 'Enter' to calibrate the maximum potentiometer setting.

8.19 Maximum steam

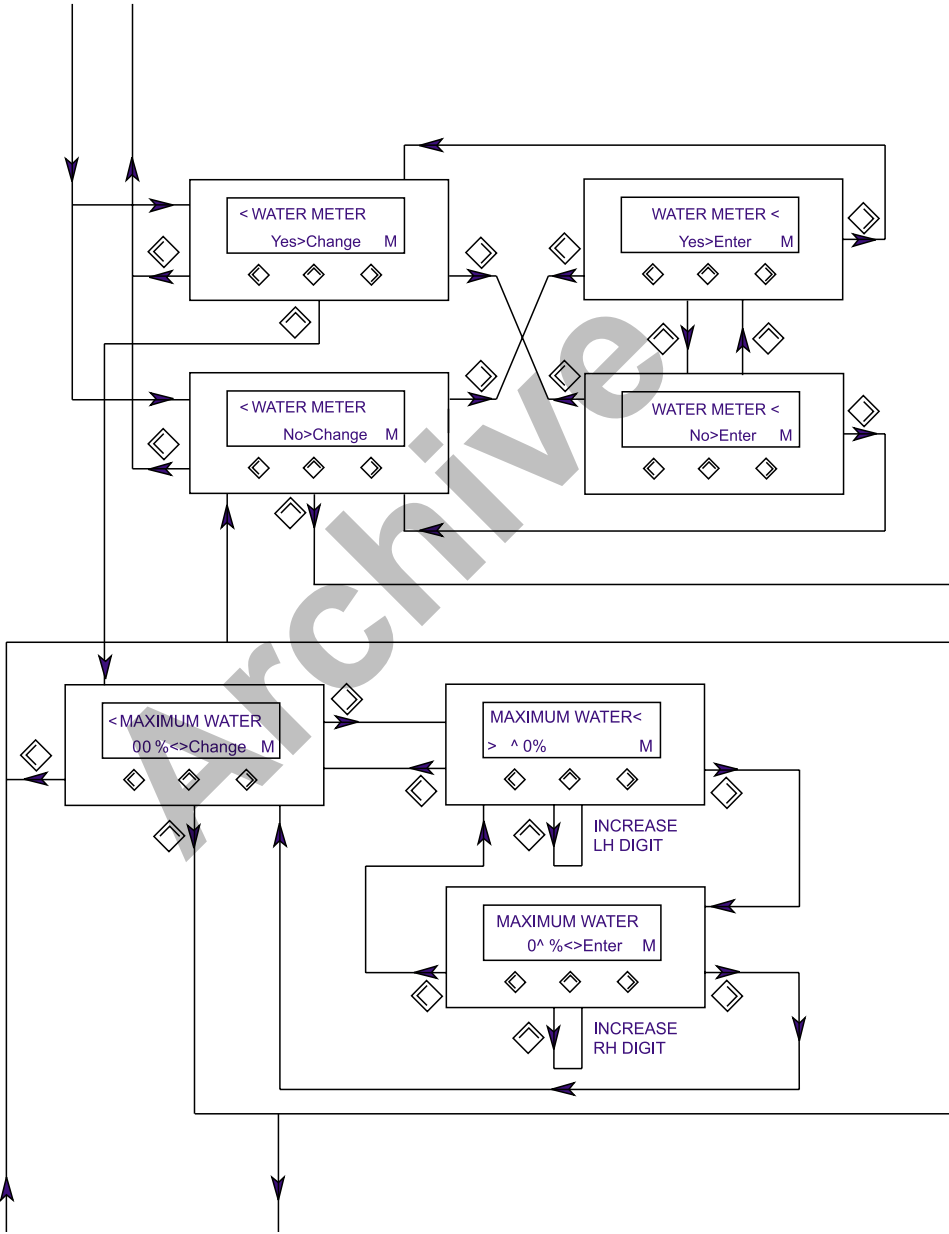
The steam meter needs to be scaled so that it reads 100% at the maximum boiler output. For example, if the maximum boiler capacity is 60% of the maximum on the meter scale, 'Enter' 60%.

8.20 Steam offset

This is the estimated rise in 'SET POINT' (as a percentage of the gauge glass) which would occur if the boiler output changed from 0 - 100%. A figure of 20% may be a good starting point for many boilers.

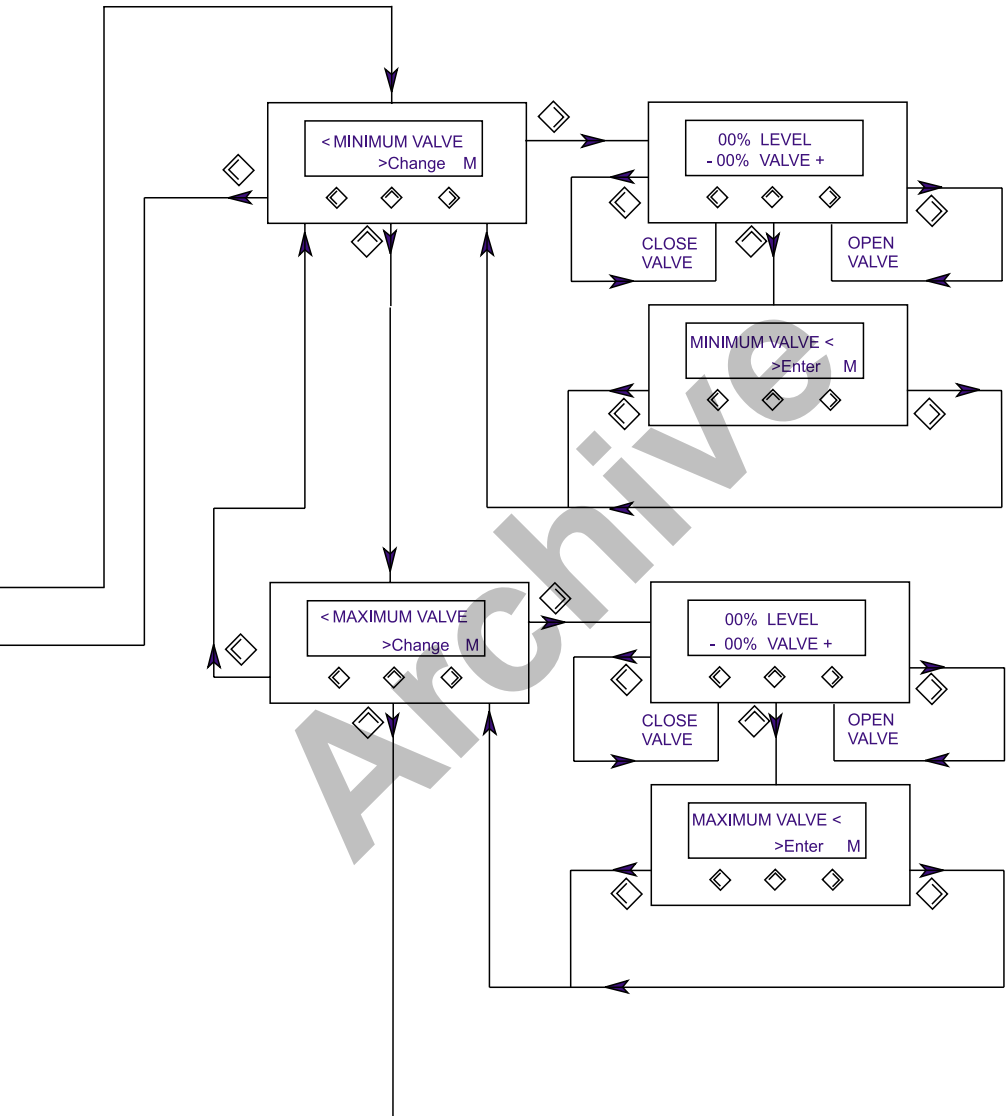
For the display sequence see pages 32 to 35.

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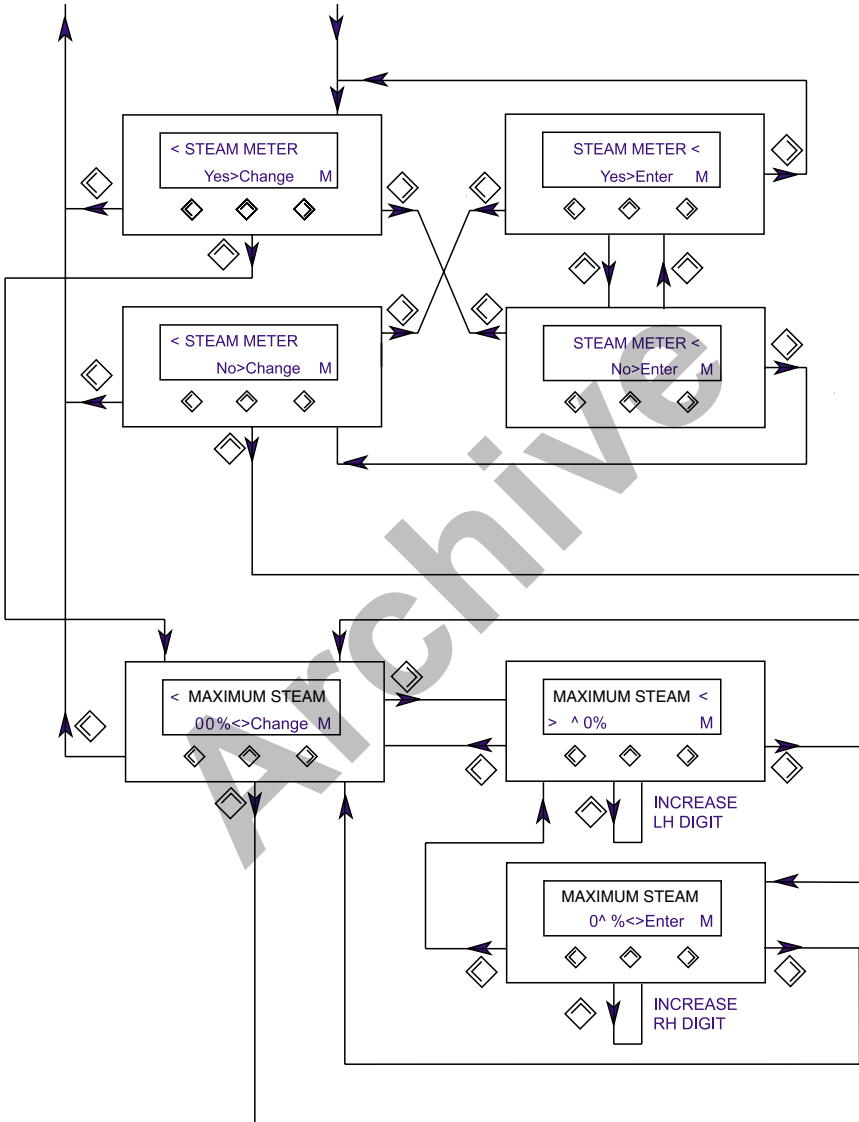
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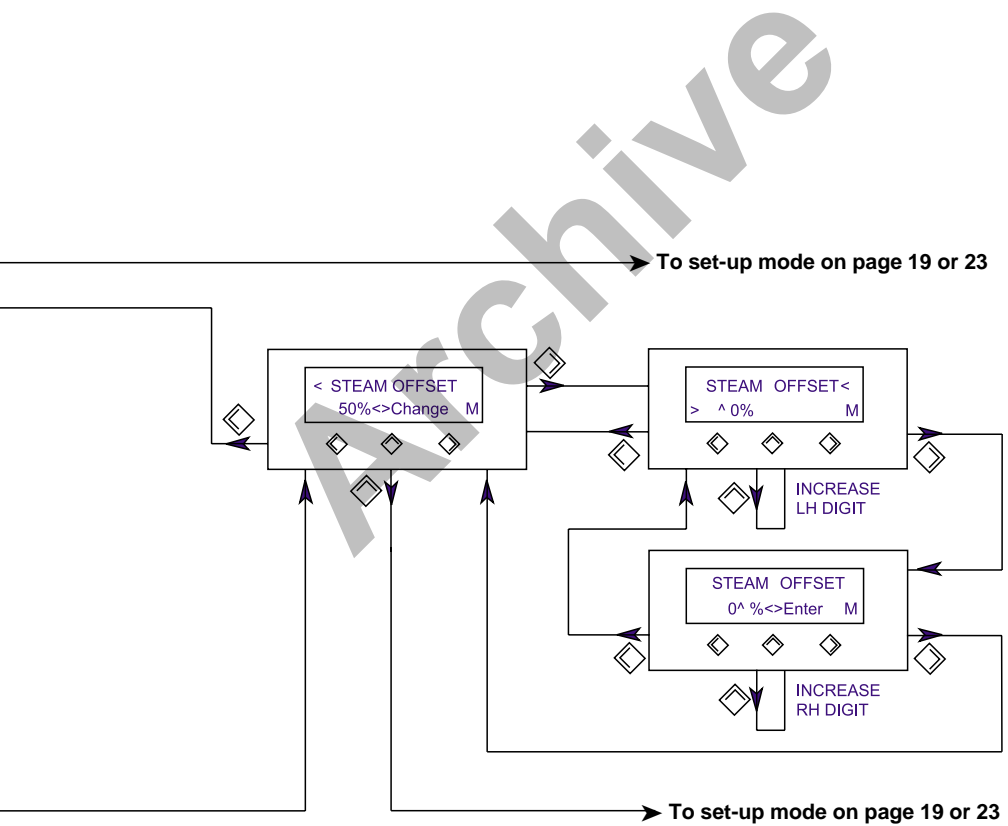
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9. Maintenance

The LC2610 needs no special servicing or maintenance. Boiler water level controls and alarms do, however, need regular testing and inspection. General guidance for the UK is given in Health and Safety Executive Guidance Note PM5.

For specific instructions for Spirax Sarco systems see separate literature.

10. Fault finding

Many faults which occur on commissioning are found to be due to incorrect wiring or setting up, so we recommend that a thorough check is first carried out should there be a problem.

If this has been done and the controller is still not working, make the following checks:-

10.1 Display not lit - check:

- Correct voltage selected.
- Live supply connected.
- Neutral connected.
- Fuse not blown.

10.2 If a PA20 amplifier is used, check:

- Probe output voltage is between 0 V and 6 Vdc across terminals 7 and 9 of the controller (or terminal 2 and earth on the probe).
- Probe supply voltage is between 15 Vdc and 35 Vdc across terminals 7 and 8 of the controller (or terminal 1 and earth on the probe).
- Pre-amplifier sensitivity is correctly set. (See PA20 IMI).

10.3 If a 4 - 20mA input is used, check:

- Loop connections not reversed - (polarity incorrect).

10.4 Valve fails to function correctly when proportional (modulating) control is selected (EL5600):

- Check that the potentiometer wiring is correct. Voltage across terminals 1 and 2 of the controller should vary from 0 V (valve closed) to 2.1 Vdc (valve open). This voltage can also be measured across terminals 14 and 15 of the potentiometer.

10.5 To check that the alarms are functioning:

- Deliberately set them above / below the actual water level.

10.6 To check that the feedwater valve and relays are operating:

- Select 'Manual' and use the '<' and '>' buttons to actuate the valve.

10.7 Display indicates both ALARM HIGH and ALARM LOW at the same time:

- Alarm levels incorrectly set -
Both high and low alarms must be set to operate outside the control band.
or:-
If the LVLINPUT O/RNGDET feature has been selected:-
- Level input out of range -
This is most likely to be due to a faulty connection.

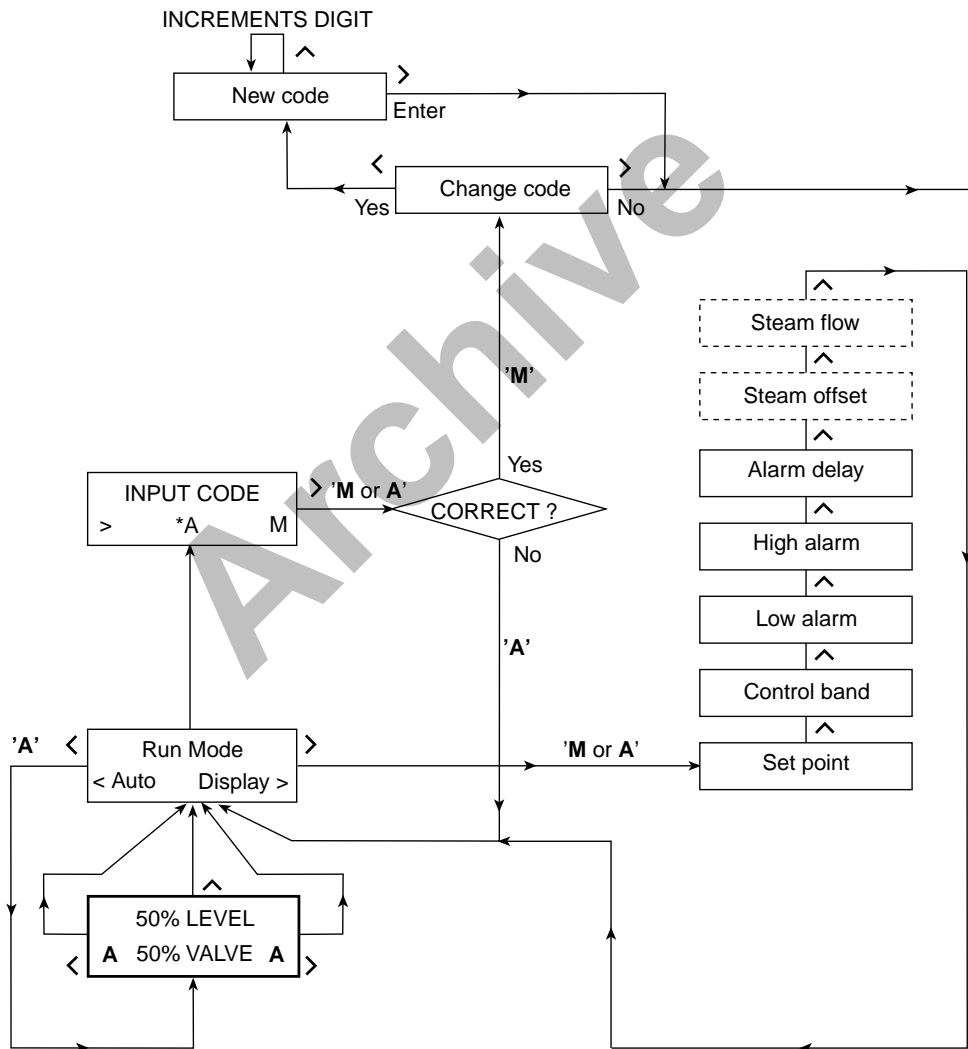
11. Settings table

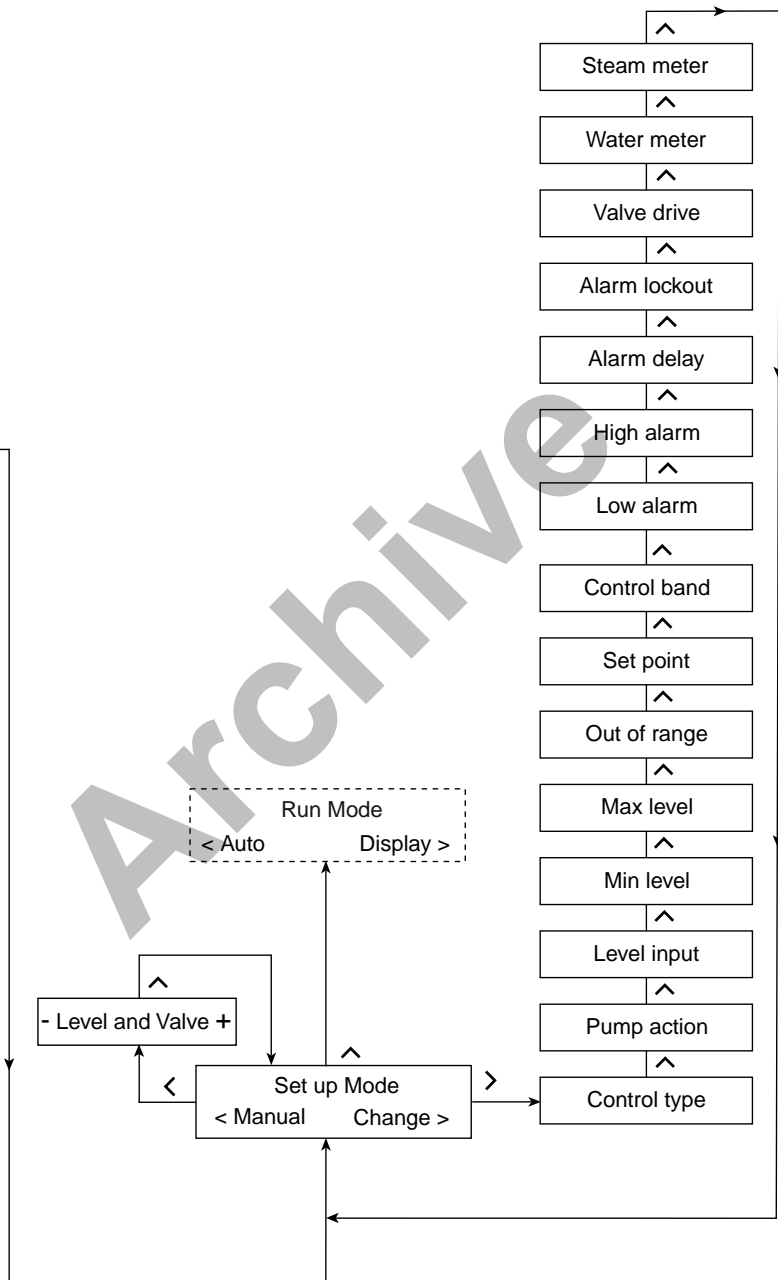
This Table shows all changeable options, and enables you to record the security code and settings you have chosen. It provides a convenient reference should future changes be required.

Changeable options	Default settings (as supplied)	Your settings	Changes
CODE (security code)	00		
CONTROL TYPE- Proportional On / off	Proportional		
PUMP ACTION- In (e.g. boiler level control) Out (e.g. condensate tank)	In		
INPUT LEVEL- 0 - 6 V (Level probe) 4 - 20 mA	0-6 V (Transmitter)		
LVLINPUT O/RNGDET (level input out of range detect)	No		
SET POINT	50 %		
CONTROL BAND	50 %		
ALARM LOW	00 %		
ALARM HIGH	99 %		
ALARM DELAY	00 s		
ALARM LOCKOUT	No		
VALVE DRIVE- Relay Relay 4 - 20 mA			
WATER METER	No		
STEAM METER	No		

— 12. Simplified menu flow chart —

12.1 Main menu flow chart





12.2 Clear alarm lock-out flow chart

See Section 8.13, page 29.

