



# **Sentry Lite**

**SOUND LEVEL CONTROL**

**USERS MANUAL**

# SENTRY LITE

## SOUND LEVEL CONTROL SYSTEM

### FUNDAMENTALS

**All mains wiring must be installed in accordance with IEEE Regulations by a qualified electrician.**

Where artists (such as DJ's or Bands) bring in their own sound equipment the only way to control sound levels as required by noise nuisance legislation is to control the mains power supply.

The Sentry Lite consists of the display unit, which contains a microphone and indicates the sound level in the room, and a contactor which is to be wired into the ring main to be controlled (for two mains rings a double contactor version is available). A low voltage cable connects the display unit and the contactor.

The maximum sound level required is set on the display unit and if this is exceeded for a length of time the Sentry Lite trips the contactor. There is a short (about 3 seconds) delay before the system can be reset, before pushing the reset button always check that it is safe to do so as amplifiers will need to be turned down to avoid speaker damage.

The length of time the set sound level can be exceeded before cut off is adjustable between 10 – 70 seconds, the factory setting of 20 seconds is considered long enough for performers to notice they are exceeding the set sound level and short enough not to cause a noise nuisance.

The display unit should be mounted opposite the performing area and visible to performers. It should be on a solid wall away from doors and some distance from where speakers will be mounted.

If the display unit is to be mounted on a wooden or plasterboard wall an external microphone is likely to be required as wooden/plasterboards are prone to vibration which will be picked up by the internal microphone. If the display unit is mounted too close to the speakers an external microphone may be required.

If an external microphone is required choose a low impedance omni directional boundary microphone such as the Audio Technica ES945. A phantom power source (18V) is set by a jumper if required.

At low sound level settings (below 90dB) it may be necessary to use the +6dB gain setting (set by a jumper).

A permanent power feed is required to the display unit, the display unit when powered and set then supplies the control voltage to the contactor to hold it in. **Only use the contactor supplied.**

The Sentry Lite has a choice of linear or Bass weighting.

There is a security loop facility which when broken will cause the unit to trip, this may be linked to fire doors or a fire alarm for example.

The Sentry Lite has a remote reset option (either push button or key switch) allowing the reset control to be mounted in any required location (for example behind the bar or in a managers office).

Details of position of the internal settings are shown on drawings 425PCB and 755SL towards the back of the manual.

## Mounting Position

The Sentry Lite should be mounted on a flat **solid** surface preferably where it can be seen by the performers (DJ, band, etc.) and away from doors.

It should be located in a position where it cannot be tampered with, e.g ideally 8 feet (2.5 metres) from the floor and on a wall facing the sound source.

Avoid positions that are too close to the sound source e.g. in a typical concert room with the stage area at one end the Sentry Lite display unit should be positioned centrally away from the stage at a **minimum** distance equal to the stage width. If there is more than one source of sound, e.g. several instruments in a band or a number of speakers the display unit should ideally be at a position equal distance from each instrument (see Fig1).

## Ideal Position

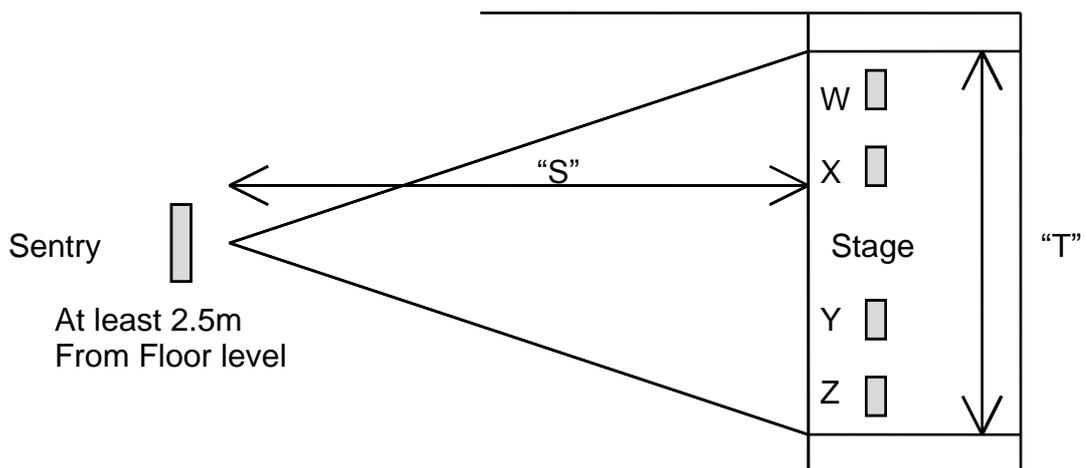


Fig 1

Distance "S" should never be less than distance "T".

## Poor Positioning

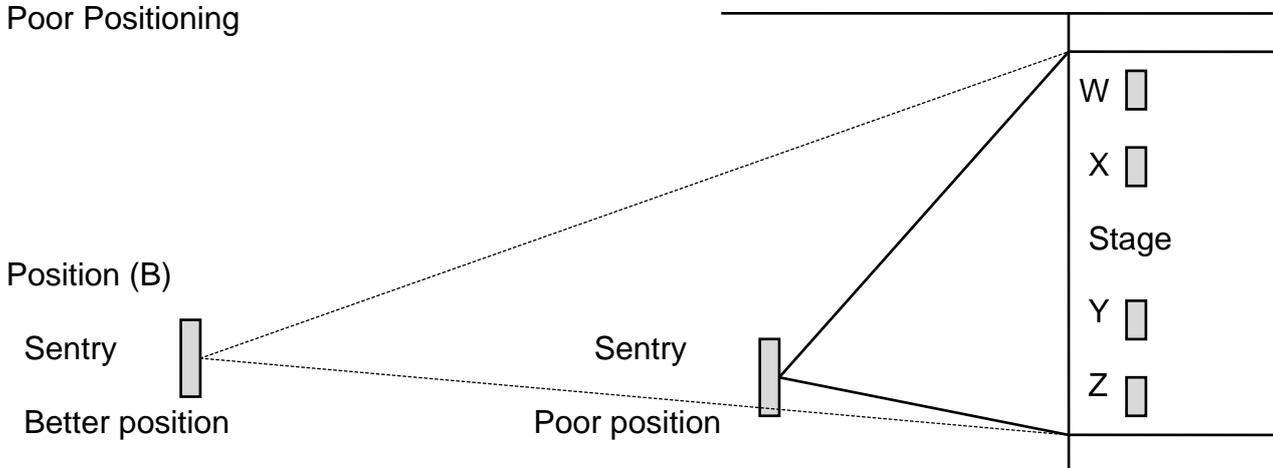


Fig 2

In Fig 2 the instruments Y & Z will appear louder to the display unit than instruments W & X. Moving the display unit back away from the stage to position (B) will minimise the problem.

To solve difficult location problems or if the mounting wall is not solid an external microphone may be required.

## **Planning**

In the room that is to be controlled identify all mains sockets and establish which mains ring (or rings) they are on and identify where the contactor will be mounted (often adjacent to the mains fuse panel).

Choose the mounting position of the display unit and decide if you are to use an external microphone, if you do need to use an external microphone it will probably be ceiling mounting and its position should follow the mounting guidelines for the display unit (FIG 1 above).

If you are installing a remote reset box then choose where this is to be located.

If you are using a security loop (eg for fire doors or fire alarm) then work out where the loop will run.

Establish where the mains power for the Sentry Lite display unit will be run from ( 240V, 1A), the route for the low voltage connection cable between display unit and contactor and the routing for any other connecting cables required (ie remote reset, security loop and external microphone).

## **Cable Entry and Fixing**

**All mains wiring must be installed in accordance with IEEE Regulations by a qualified electrician.**

**Customising the box.** Cable entry knock outs are provided on the rear and bottom faces of the display unit, using the rear cable entry's can result in a very neat installation. Select the cable entry positions to be used and remove the appropriate knock outs (a small flat blade screwdriver on the perimeter of the hole will assist prizing out the blanking plugs). Remove any sharp edges that may damage cables or use protective grommets (not supplied).

NOTE: - Use a separate cable entry for the mains connections. **Always keep low voltage cables away from mains cables and connections.**

The Sentry Lite display unit will require a mains power supply that is not controlled by the contactor, this should be in place before fastening the unit to the wall. The mains power will be attached to a connector in the bottom right hand corner of the display unit (drawing 425PCB ref K).

**Fastening the unit.** The display unit is secured to a wall by 3 screws (not supplied). The top centre screw locates in a key hole slot on the back of the unit.

Remove the cover below the display to expose the two bottom mounting screw holes, these are located in the bottom corners of the case. Fit the top centre screw 30 mm down from the required top of case position, leave this screw approximately 1.5mm proud of the mounting face.

Use No. 10 or 12 screws with round heads 1.5" (38mm) minimum length. Brick or masonry walls will require drilling and plugging in the usual manner.

The unit may now be suspended on top centre screw while the two bottom mounting screw positions are marked out (ensure that the unit is captive on the screw head so it cannot fall). Fit the bottom two mounting screws.

Check that the unit is secure, cannot fall, and is not loose on the screws.

In high risk areas security screws should be utilised to prevent the unit from being removed.

## **Display unit connections**

All connections to the display unit are located beneath the lower removable front cover (below the display). On this cover is also mounted the reset button which connects to the printed circuit board via a 2 pin plug (and temporarily may be disconnected). See Drg No 425PCB for more details.

Connect the display to mains power using the terminals labelled "MAINS IN" (drawing 425PCB ref K) and ensure that the earth is connected. The mains consumption is approximately 1 Amp at 240V - a 5 Amp lighting feed could be utilised. Connect via an isolating switch or removable plug socket arrangement so that the unit can be isolated when necessary.

For use on 120V the consumption will be approximately 2 Amps

ENSURE THAT THE MAINS SUPPLY IS NOT THE SAME AS THAT CONTROLLED BY THE CONTACTOR.

## **Contactor Installation**

In the room that is to be controlled identify all mains sockets and establish which mains ring (or rings) they are on. Install the contactor in that mains ring, if there are two rings you will require a double contactor. See drawing 755SL for details of connections.

In large installations 1 contactor can be used to control others of whatever current rating is required.

Connect the contactor control line back to the Sentry Lite display unit using appropriate cable (cable will carry maximum 18Vdc and 50mA). Contactor end see Drawing 755SL ref J, display unit end see drawing 425PCB ref J.

## **External Microphone connection (if required)**

If an external microphone is to be used it attaches to the display unit on connector ref C shown on drawing 425PCB using microphone cable, the jumpers ref C must be moved to the "EXT MIC" position, if phantom power is required move the jumper ref A to the "ON" position.

Test the microphone by lightly tapping it, some of the LED's on the display should light up (providing the display unit is powered). It may be necessary to adjust ADJ1 on the bottom left of the display unit to get LED's to light, ADJ1 is a multi-turn pot and a few turns anticlockwise will increase the microphone level on the display.

## **Security Loop (if required)**

The security loop may for example be used to detect open doors or windows that would impair the sound proofing of a building or trip the unit when the fire alarm operates.

Magnetically operated reed switches of the type used in intruder alarms are effective for doors and windows, for fire alarm connection an isolated normally closed set of relay contacts is required (call Formula Sound if advice is required).

On the display unit the security loop connects to the terminals shown on drawing 425PCB ref H (a wire link is fitted at the factory to allow the Sentry to work normally and this must be removed to use the security loop).

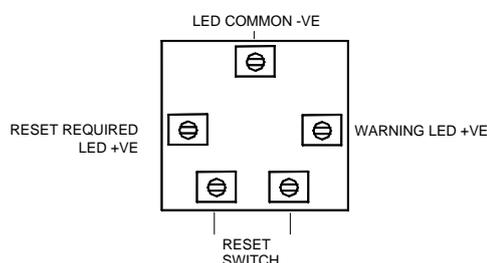
When the security loop is opened the Sentry Lite trips the contactor and a front panel LED indicator marked "Security loop" illuminates.

## **Remote Reset (if required)**

A remote reset facility can be added by connecting a momentary action push button or key switch. This may be located in a Manager's office or behind the bar or other suitable location.

Formula Sound offer both remote push button (074P) and remote keyswitch (074K) options in a grey plastic lighting style surface mount box. Connection of either 074P or 074K is as follows:

Open the remote reset box and the connections are on the back of the front panel as shown below.



The box contains LED's that show if the Sentry Lite is tripped (reset required) or if the sound level is near the limit (warning).

To connect LED's and switch a 5 core wire is required (low voltage dc and low current), a 6 core microphone cable would be suitable.

Connect the "RESET SWITCH" terminals to the display unit terminals marked "I" (Remote reset switch) on drawing 425PCB.

Connect the LED terminals to the display unit terminals marked "G" (LED drive) on drawing 425PCB, note LED COMMON -VE is connected to the display unit terminal marked "EARTH".

The "RESET" button on the display unit front panel can be disabled if required by pulling the connector off the PCB and taping the lead to the back of the panel, reset will then only be by remote panel.

## **Setting the maximum sound Level**

On power up the system will start in the tripped condition, check the LED's on the left of the display unit marked "Security loop" and "Mic tamper" are not illuminated.

If "Security loop" is illuminated the loop is broken, if you are not using this facility a wire link should be fitted on the display unit across the security loop terminals shown on drawing 425PCB ref H.

If "Mic tamper" is illuminated and you are using an external microphone there is a problem with the microphone connection and you should check the wiring. If "Mic tamper" is illuminated and you are using the internal microphone then there is a fault and you should contact Formula Sound.

If the LED's marked "Security loop" and "Mic tamper" are not illuminated then you can press the "RESET" button and the unit should reset. Check there is power on the ring main controlled by the contactor, if there is no power check the connection to the contactor (it is around 15Vdc).

When the contactor operates it makes an audible "clunk" sound, if you are getting the "clunk" sound but no power on the ring main then switch off the power for that ring at the fuse box and check the mains wiring.

If you have power on the ring main then check the weighting selection is correct, position of the jumpers for LINEAR or BASS (LP filter @ 300Hz 12dB per octave slope) is shown on drawing 425PCB ref D.

Adjustment of allowable sound level is made by adjusting the pre-set ADJ 1. This is located beneath the removable cover at the left hand end of the unit. It is a 10-turn pre-set to provide fine adjustment. Take care when making adjustments and use a small screw driver. Try to make adjustments when the sound level is displayed on the bar graph meter as you will be able to see the changes displayed on the meter.

The adjustment pre-set has a slipping clutch at the end of travel to prevent damage. But this can cause confusion if the pre-set is at the end of travel as it then appears to do nothing.

The actual sound pressure level (SPL) at which the unit operates can only be determined by measuring the sound level using a calibrated sound pressure level meter and adjusting the unit accordingly.

Play music at the maximum allowable level (as shown on the sound pressure level meter) and set ADJ1 so that the "limit" LED's are coming on and going off (the music level will fluctuate), make a small increase in the music level and the Sentry Lite will trip after about 20 seconds. The level is now set.

If the required the time delay before tripping can be adjusted, see drawing 425PCB ref F, however the factory setting of 20 seconds is considered long enough for performers to notice they are exceeding the set level and short enough not to cause a noise nuisance.

Check sound levels are acceptable at neighbours premises if possible and at the outside boundary of the venue, with music playing at the set maximum in the venue.

Where the required threshold is below 90dB it may be necessary to select the high gain setting by moving the jumper marked +6dB (ref E on drawing 425PCB).

Alternatively the unit may be adjusted using trial and error but this should be used only as a temporary measure or last resort. Measuring the sound level and setting to a limit agreed with the local area official is the only recommended method.

NOTES:- If the unit is to be used in an entertainment venue to control a band or disco use a meter with either a linear scale or bass weighting response.

**SECURITY LABELS ARE PROVIDED. THESE SHOULD BE FITTED TO COVER THE SCREW HEADS HOLDING THE REMOVABLE COVER IN PLACE AND WILL REVEAL ANY UNAUTHORISED ATTEMPT TO CHANGE THE THRESHOLDS**

ALWAYS FIT SECURITY LABELS AFTER ADJUSTMENTS HAVE BEEN MADE.  
EXTRA LABELS ARE AVAILABLE FROM FORMULA SOUND IF REQUIRED.

Remember that the acoustic characteristics of a venue will change depending on the number of people in it. Our experience has shown that it is always advisable to take readings when the venue is in use. It would be a sensible precaution to allow in your costings for a site visit during opening hours to take measurements and make final adjustments.

## Operation

The display unit features a large bar-graph VU meter with 23dB range to give a good visual indication of the sound level in a venue. This has the advantage over other units in that anyone can see the volume level and can see how their actions are contributing to this level.

While the meter is operating in the green section, with even an occasional peak into the red, there is no cause for concern. Factory set the Sentry Lite has about 20 seconds delay when the limit is just exceeded before the power is removed to allow performers time to reduce sound levels.

The Sentry will operate within the range 70dB - 120dB and may be pre-set to anywhere in this range.

If the sound level is high enough to light the "OVER LIMIT" section of the meter (three red sections) the sound level has exceeded the allowable limit. If this is allowed to continue for more than the set time period (about 20 seconds factory set) the unit will trip and remove the power to the contactor. Visual indication of this is provided above the reset button.

When the unit is first powered up the RESET indicator will be lit - wait for a few seconds and press the reset button. The Sentry Lite will now be reset and ready for normal operation.

The action of the timing circuit means that continually exceeding the limit even for short periods may eventually trip the unit.

The unit has to be manually reset to restore power and this will only be possible after a short time. The reset time is determined by the amount by which the unit is driven over limit. e.g. tripping the unit by just exceeding the limit will result in a short period of a few seconds before reset is possible. Tripping the unit by grossly exceeding the limit will require a longer period before reset is possible.

**NOTE. It is important that a check is made before the unit is reset, amplifiers need to be turned down. Before pressing RESET check that it is safe to do so.**

Audio systems generally need to be powered up in a specific order. In an audio system comprising of different components amplifiers, mixers, etc. a general rule is to switch power amplifiers off first and on last to avoid possible loudspeaker damage. Therefore a band or D.J. may need to turn off amplification equipment to protect loudspeakers before the power is restored.

There is the facility to connect an external microphone, remote reset and security loop if required. Trip delay may be adjusted and there is a choice of linear or bass weighting.

All connections and adjustments are located beneath the removable cover plate (below the display). Non reusable security labels are supplied with each unit to help ensure that unauthorised tampering is detected.

## Tampering

If you find that you have problems with unauthorised persons **security screws are available to replace the cover retaining screws**, a special key is also supplied for the fitting and removal of these screws. Contact FORMULA SOUND sales office for more details.

## Led Indicators

Outputs are provided for remote led indicators: - WARNING and RESET REQUIRED. LED current limiting resistors are not required. LED's may be connected directly, see drawing 425PCB ref G.

## Summary

The Sentry Lite will monitor sound levels and provide a trigger when a set sound level has been exceeded for about 20 seconds, the trigger will operate the contactor.

In an audio application (music) the Sentry Lite will normally be used where performers bring in their own equipment, the mains power supply for this equipment will be put under the control of the Sentry Lite by means of the mains contactor.

Where mains power is to be controlled the mains ring(s) are identified and the contactor(s) is installed (by a qualified electrician) to control those rings.

The Sentry Lite should be mounted on a solid wall, away from doors and opposite the source of the sound. The display should be visible to performers or machine operators. If the Sentry cannot be mounted on a solid wall away from doors then an external microphone can be used.

The security loop may be used to trip the system if for example fire doors are opened.

There is a choice of filters, for music either Linear or Bass will be used (Bass tends to travel and therefore is a greater cause of noise nuisance).

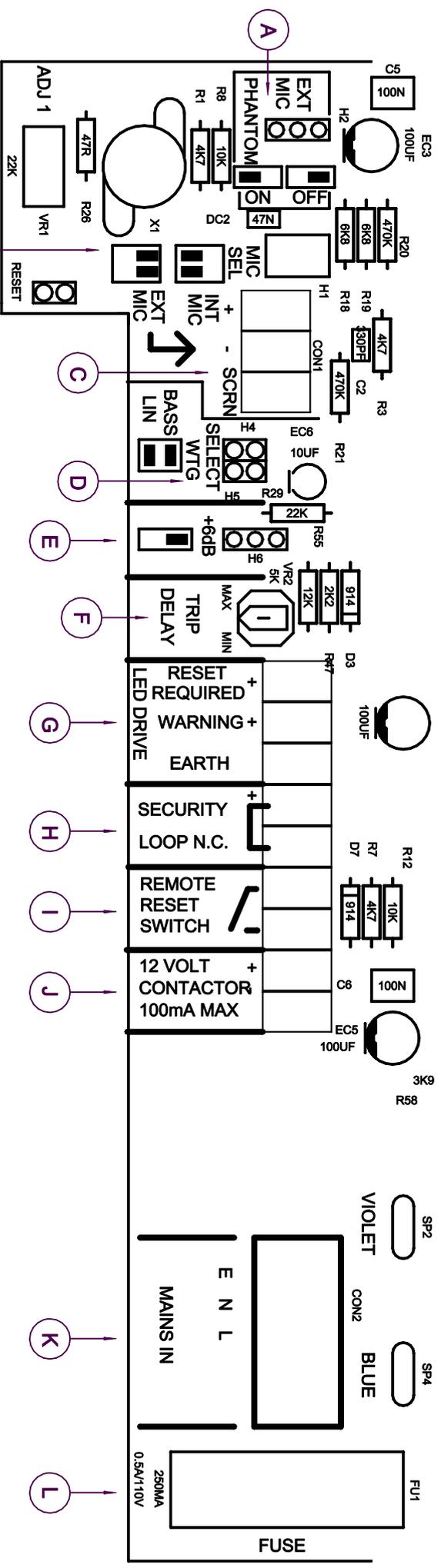
A simple method of setting the level for a music venue is to play music at the maximum allowable level (ensure speakers are where visitors will place them), the maximum allowable level is determined by the environmental health officer but will typically be either a level just audible in a neighbours premises or a set level at the boundary of the premises.

With the music at the maximum allowable level adjust the Sentry Lite (ADJ 1) to be between "warning" and "Over limit" on the display.

Note: Reducing the amount of sound escaping from a venue will generally increase the sound level the venue is allowed to operate at, doors, windows, direction and mounting of speakers all affect sound levels from a venue.

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- A. Phantom power selector for external microphone
- B. Internal or external microphone select
- C. External microphone connection
- D. Linear or Bass weighting selector
- E. +6dB gain selector
- F. Trip delay adjustment
- G. Remote LED drive connections
- H. Security loop connections
- I. Remote reset connection
- J. Contactor connection
- K. Mains power connection
- L. Mains fuse



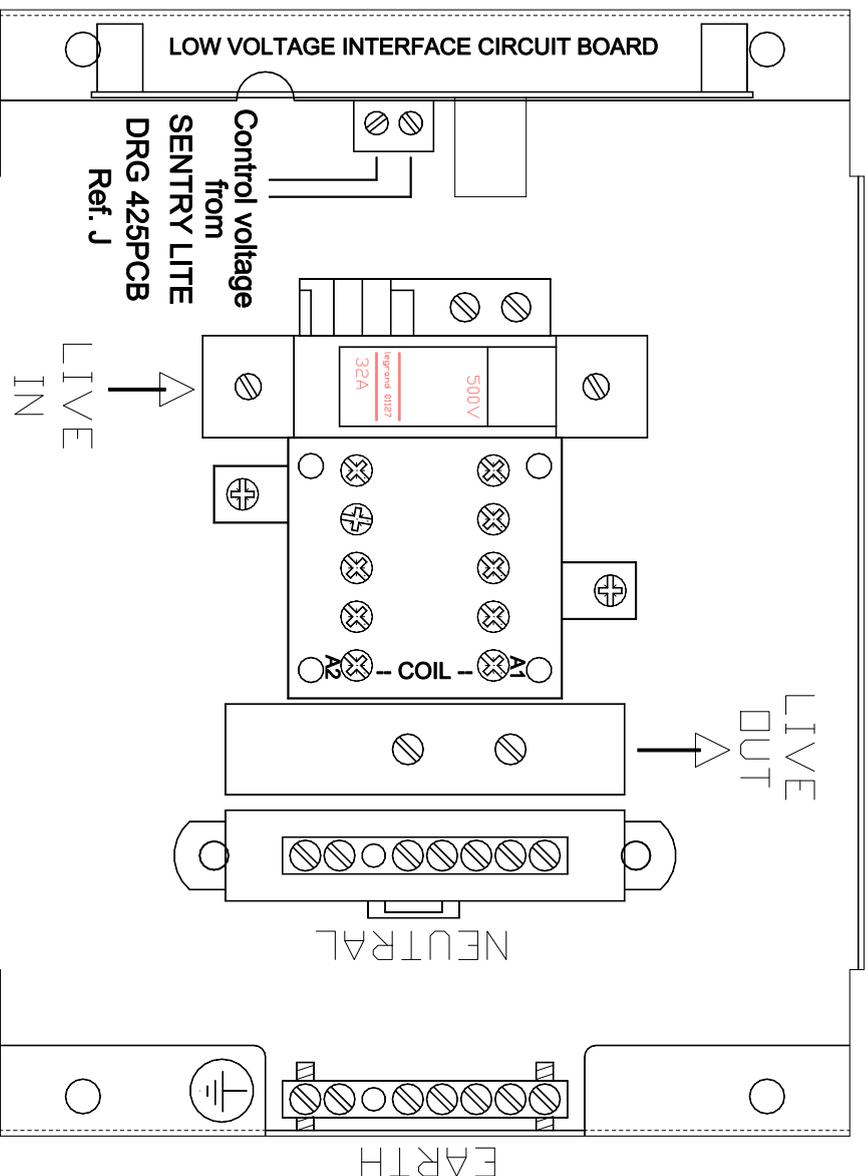
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|       |                                  |
|-------|----------------------------------|
| TITLE | SENTRY LITE INTERNAL ADJUSTMENTS |
|-------|----------------------------------|

|         |            |
|---------|------------|
| DRG No. | 425PCB     |
| DATE    | 12-03-2012 |
| ISSUE   | 01         |

## FUSE: 10 x 38mm HRC Type gI 32 Amp



**TO ENSURE SAFE OPERATION OF THIS UNIT AND THE EQUIPMENT CONNECTED TO IT READ THE FOLLOWING AND TAKE THE APPROPRIATE ACTION.**

Installation and connection should only be carried out by a suitably qualified person and in accordance with local wiring regulations. In the UK strict adherence to BS7671 (IEE Regulations) is essential. All low voltage wiring should be segregated from mains voltage wiring, unless cables are adequately insulated.

The unit should be connected to a single phase supply of nominally 220-240Vac. The fuse fitted is a 10mm x 38mm gI type of 32A rating, a lower current rated fuse may be fitted if required.

If a fuse needs replacing ensure the type, size & rating is correct. In the event of fuse failure, investigate the cause of failure before replacing the fuse. **POWER SHOULD BE DISCONNECTED WHILE FUSES ARE CHECKED OR REPLACED.**

### DESCRIPTION

This unit is essentially a single pole normally open switch. It allows a low voltage output from the Sentry Lite to control up to 32amps of mains power. The control voltage is about 12V dc. It is designed for European single phase supplies nominally 220-240Vac. The unit has an internal fuse to protect the contactor & outgoing cabling.

The unit should not be used free standing, it must be securely fixed before use. It is only suitable for use indoors. The unit should not be installed in an atmosphere subject to high humidity, high temperatures or excessive pollution. These units are not designed for use in a domestic environment.

### INSTALLATION

1. Remove lid of unit by removing the screws & pull off the lid earthing connector
2. Decide on fixing position & the required 20mm conduit entries. The entries are plugged with plastic bushes which can be removed with a screwdriver. There are two small diameter plugged holes on the left hand side which may be useful for the low voltage control cable. Grommets are included to bush any holes that are used.
3. The box should be fixed to a suitable surface using the four base mounting holes. A template is included to assist in fixing.
4. Make electrical connections to the unit referring to the drawing. A suitable means of isolating the unit should be provided to allow any maintenance to be undertaken safely.
5. **ENSURE THAT THERE IS ADEQUATE SEPARATION BETWEEN LOW VOLTAGE CABLES AND MAINS WIRING.**
6. Reconnect the lid earthing lead, refit the lid and securely fasten. Test for satisfactory operation. Include all tests detailed in the wiring regulations.

**DISCONNECT POWER BEFORE REMOVING COVER  
THIS UNIT SHOULD ONLY BE INSTALLED  
& MAINTAINED BY A SUITABLY QUALIFIED PERSON  
THIS EQUIPMENT MUST BE EARTHED.**



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|       |  |         |       |
|-------|--|---------|-------|
| TITLE | BOXED LOW VOLTAGE CONTROLLED CONTACTOR | DRG No. | 755SL |
| DATE  | 12-03-2012                             | ISSUE   | 01    |



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## E.U. CERTIFICATE OF CONFORMITY

We declare that the products listed conform to the following directives and standards

89/336/EEC amended by 92/31/EEC and 93/68/EEC

BS EN 50082-1 BS EN 50081-1

### PRODUCT TYPE

**Sentry Lite**

**The CE mark was first applied in 1995**

**Signed**

**B. J. Penaligon General Manager**

**Attention**

The attention of the specifier, purchaser, installer, or user is drawn to the fact that good wiring practice must be observed when connecting the above equipment. Good quality connectors and screened cables must be used for all audio connections. Twin screened cables should be used for all balanced lines.

**THIS EQUIPMENT MUST BE EARTHED**

**CONSULT THE USERS MANUAL FOR TECHNICAL DETAILS**