Ditech Control Card Manual

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DI-800 Flammable Gas Card

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1. GENERAL

The DI-800 flammable gas control card is designed for use with the Crowcon range of pellistor gas detectors, Flamgard-EXE and Flamgard-D. It supplies power to the sensing element and forms the second half of the Wheatstone bridge circuit used to monitor the small changes in signal proportional to the flammability of the atmosphere.

The card contains all the necessary circuitry required to monitor the field cabling for open and short circuit faults, to process and amplify the signal from the sensor, and to use that information to display a gas flammability valve and to trigger alarm outputs if certain adjustable thresholds are exceeded.

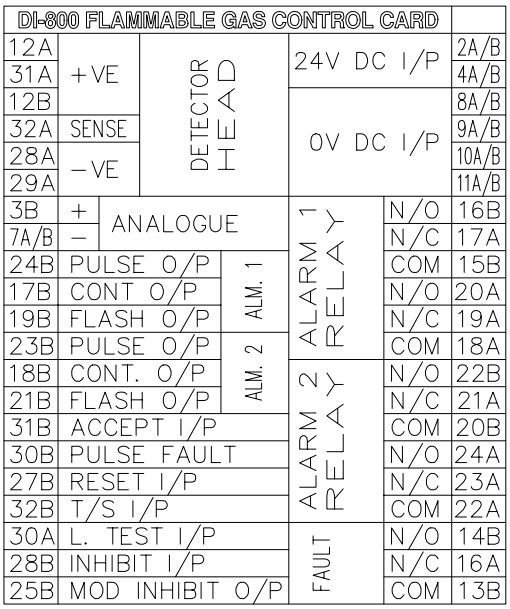
The facility to calibrate the sensor to particular gases without tripping alarms is included, as is the ability to set two alarm levels over the range 5% LEL to 95% LEL.

1.1 LOWER EXPLOSIVE LIMIT EXPLANATION

Explosions occur when a flammable gas or the vapour from a flammable liquid comes into contact with a source of ignition such as a spark or hot surface. The power of the explosion depends on the fuel and its concentration in the atmosphere. Not all concentrations of flammable gas or vapour in air will burn or explode. The *lower explosive limit*, or LEL, is the lowest concentration of fuel in air which will burn. For most flammable gases and vapours this is less than 5% by volume. This means that there can be a large risk of explosion even when relatively small concentrates of gas or vapour escape into the atmosphere.

The DI-800 will be calibrated for the most likely gas hazard to be present. Obviously this depends wholly on the application and environment being monitored. The card will measure gas or vapour concentration in % LEL up to 99%, thus giving early warning of an impending flammable hazard.

2. INPUTS AND OUTPUTS



2.1 POWER SUPPLY

The unit is powered from a nominal 24 V dc supply and is internally regulated to 12 V to provide a stable reference for the internal components. The power input is protected against reverse voltage and over voltage situations, the latter causing the fuse to blow should the supply become greater than 35 V dc.

2.2 PRIMARY INPUTS

Detector input

There are three connectors for the three wires in the detector. One is positive, one is negative and one is for the signal. The circuitry controlling the head voltage is set for constant current operation and so will be independent of line resistance - up to a point. The maximum loop resistance is 40 Ω. This is equivalent to approximately 2.5 km of 2.5 mm^2 cable, 1.5 km of 1.5 mm^2 cable or 1.0 km of 1.0 mm^2 cable.

The supply to the detector is sufficient to develop the required voltage across the pellistor. The exact voltage that it must be set to is entirely dependent on the type of sensing element used.

NOTE: When the card has no load on it then the detector output will rise to the maximum output of the device, approximately one volt below the supply rail.

Throughout the life of a particular detector the head voltage should never have to be adjusted. If, however, either the detector or the card is replaced then the card will have to be set up again to match the connected detector.

The signal connection is the mid-point of the bridge. Under zero flammability conditions the bridge is balanced. Any offset, be it positive or negative, will be amplified and displayed on the module.

All these connections are monitored for open and short circuit faults between themselves providing an indication on the card should a fault be detected.

2.3 SECONDARY INPUTS

These are primarily associated with internal system logic functions. They are not normally directly accessible externally from the control rack. All inputs are active low and will rise to 12 V when inactive.

External Reset

This input is used to attempt a reset on the control card. If the gas concentration measured by the control card is above either of the preset alarm set points then the reset signal will have no effect. If the gas concentration is below a particular alarm set point then only that alarm level will reset. In a similar way, a fault condition may only be reset once the fault has been cleared.

Accept Alarm

This input accepts a momentarily 0 V signal and is used as an acknowledgement that an alarm condition is present. In the event of an alarm condition, the red alarm LED(s) on the front panel will flash and the *flashing alarm* output associated with the particular alarm level will pulse in synchronism with the clock pulse signal. This will continue until the *accept alarm* input signal is received, then the red alarm LED(s) will remain steady and the appropriate *flashing alarm* output will be constantly active. This condition will remain until a reset is received.

Clock Pulse

The clock pulse is a nominal 1 Hz oscillating signal which is usually generated by the DI-952 Audio card. It is used to synchronise all flashing alarms on the control cards within a control system. The clock pulse input expects to be toggled continually between 0 V and 12 V dc. When required, the

signal will be ANDed with the appropriate card logic to let the operators visually differentiate between alarms which have been acknowledged and those that have not.

External Inhibit
This input causes the card to operate as normal with respect to indications, but alarms are not latched, and all alarm outputs are not activated for the duration of the inhibit condition. In addition to this the *module inhibited* output goes to 0 V to allow remote annunciation, or subsequent logic, as a result of the inhibit.

External Lamp Test
When this input goes active, all LEDs on the front panel relating to the zone illuminate, so verifying their operation. The same operation can be performed locally with the Reset button on the front panel.

2.4 PRIMARY OUTPUTS

Outputs are of two types. Volt free outputs from relay contracts and active low current sinking transistor outputs. The transistor outputs can sink up to 500 mA each.

Alarm 1 Relay
This output is a double pole change over type which is de-energised in the normal state and energised when in alarm. It operates when the concentration displayed on the control card is greater than the set output for the first level of alarm. The contacts are isolated from all other circuits on the control card and are rated for 2 amps at 30 V dc, non-inductive. This output will latch until the measured concentration has dropped below the alarm set point and the card reset.

Alarm 1 Continuous Output
This is an active low output capable of sinking 500 mA to 0 V when the concentration shown on the control card is greater than the set point for the first level of alarm. The output will latch until the measured concentration has dropped below the alarm set point and the card reset.

Alarm 1 Flashing Output
This is an active low output capable of sinking 500 mA to 0 V. When the concentration shown on the display rises above the threshold for the first level of alarm then the output will oscillate on and off in synchrony with the *clock pulse* input. Once the card has received an accept pulse then the output will turn on and function in the same way as the Continuous Alarm 1 output.

Alarm 2 Relay
This works in exactly the same way as the alarm 1 relay output, only that it responds to the threshold set for the alarm 2 condition.

Alarm 2 Continuous Output
This is an active low output which operates in exactly the same way as the continuous alarm 1 output, but that it reacts to the second level of alarm rather than the first.

Alarm 2 Flashing Output
This is an active low output oscillation on and off in time with the clock pulse input when the second level of alarm is reached. As with the alarm 1 flashing output it will go steady when the alarm has been accepted.

2.5 SECONDARY OUTPUTS

Fault Relay Output
This relay output consists of a single pair of contacts electrically isolated from the rest of the card which under non-fault conditions are normally closed. If a fault or a power failure should occur, these contacts open. Once the fault condition has been cleared, the contacts can be closed again by resetting the card.

Pulse Fault

This output pulses active low once only when the fault relay de-energises. Normally the output is at a nominal 12 V dc. The pulse duration is approximately 1 second and is usually combined with other control cards and used to notify the DI-952 Audio card that a fault has just occurred.

NOTE: The way by which the pulse fault output is generated relies on faults occurring at intervals of no less than two minutes.

Pulse Alarm 1 and 2

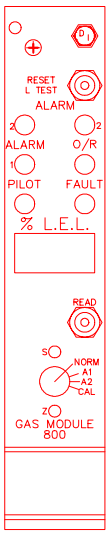
This output pulses low once only when an alarm condition is detected. When the first level of alarm is recorded then the *pulse alarm 1* output operates. When the second level of alarm is reached then the *pulse alarm 2* operates. The pulse duration is approximately 1 second and is normally combined with other control cards into a common alarm bus which notifies the DI-952 audio card that an alarm has just occurred.

NOTE: The way by which the pulse fault output is generated relies on faults occurring at intervals of no less than two minutes.

2.6 ANALOGUE OUTPUT

The analogue output is a voltage output operating in the range 1 to 5 V dc. 1 V dc corresponds to 0% LEL and 5% corresponds to 100% LEL. During fault conditions the analogue output is clamped to 0 V. Negative drift on a sensor will result in a proportional drop in voltage. For example +10% LEL will equate to approximately 1.4 V and -10% LEL will equate to approximately 0.6 V on the analogue output. The analogue output is enabled by fitting link 1 and is trimmed to meet the parameters of the equipment being connected to by adjusting RV4.

2.7 FRONT PANEL INDICATIONS



Alarm 2 LEDs

When a second level of alarm is registered then the two alarm 2 LEDs will flash in synchrony with the *clock pulse* input. Once an accept signal has been received by the card, the LEDs will change from f lashing to steady. They will remain illuminated until the measured gas concentration drops the second level of alarm set point and the card has been reset.

Alarm 1 LED

A second level of alarm cannot happen without there having been a first level of alarm. As with the second level LEDs, the first level LED will flash as soon as the measured gas concentration exceeds that set for the alarm 1 set point. Once an accept signal has been registered by the card the LED will turn on continuously. It can only be extinguished once the measured concentration of gas is below the level 1 set point and the card has been reset.

Over Range LED

Should the gas concentration measured by the card continue to rise beyond 99% LEL then the card will trigger an over range condition. The 100% LEL threshold represents a concentration of gas or vapour which is sufficiently high as to make the atmosphere at the point of measurement flammable, i.e. a spark or flame will cause an explosion. Under these circumstances the control card will trigger a fault to the system and turn off the power being supplied to the sensor. The “O/R” LED on the control card will be illuminated to indicate the over range condition and the fault light will turn on and the pilot light will turn off to indicate that the card is in fault. The over range condition can only be cleared once the card has been reset.

NOTE: When the head power is turned off during an over range condition the displayed gas concentration will drop to zero. Here when the card is reset to clear the over

range state, both levels of alarm will also be reset. Should the gas concentration be interpreted by the card as being >99 % LEL then the over range shut down will be re-started.

NOTE: Under circumstances of unusually high sensitivity settings on the span adjustment (see later) the card may go into the over range condition. This is most likely to happen when setting the card up for the first time. The reset will have to be applied to the card continuously whilst the span adjustment is reduced. For further details see the section on trouble shooting.

Pilot LED

The green pilot LED will normally be illuminated. The only circumstances that it should be extinguished, baring indicator failure, are if the card is in fault or if power has failed, for example a fuse failure. The operation of the LED, as with all the LEDs may be proved by pressing the reset/lamp test button.

NOTE: This button will also attempt to reset the card. Should the pilot have been extinguished as a result of a resettable fault, this action will clear it.

Fault LED

The yellow fault LED will illuminate under two circumstances. Firstly, if it is illuminated and the pilot LED is illuminated too, then this shows that the card is in its inhibit mode. Alarm LEDs will operate as described above, but no alarm outputs will operate. Secondly, if it is illuminated and the pilot LED is not illuminated, then the card is in fault. A fault condition may be caused by a number of conditions shown in the trouble shooting section. The inhibit condition may be induced by:

a) Card power up
b) Resetting the card after a fault
c) External inhibit input becoming active

Two Digit % LEL Display

This display shows that the measured concentration of flammable gas as detected by the remote sensing element. Below a preset threshold, typically ±5% LEL, the display is turned off to conserve power. Once the concentration has exceeded this limit, in a positive or negative direction, the display will turn on again. However, as the display rises beyond ±99% LEL the over range will be triggered and the display blanked again.

NOTE: Negative readings are indicated by a small dot in the bottom left of the display. Negative reading will not trip alarms.

Lamp Test / Reset Button

This button will illuminate all the LEDs on the card (excluding the display) and also attempt to reset the card. The card will only reset if the measured concentration has dropped below the thresholds (alarm 1, alarm 2 or over range) or in the case of faults, the fault has been cleared.

Read Button

When the display is less than the blanking threshold, typically ±5 % LEL then it is turned off. The read button will force it back on again. When the display is blanked as a result of an over range condition the read button as no effect.

Rotary Mode Switch

This is a four position rotary switch. Its positions are labelled norm for normal, *A1* for *alarm 1*, *A2* for *alarm 2,* and *cal* for *calibrate*.

NORM	Display shows measured gas concentration all alarms outputs will operate as described above
A1	Allows visual check of the alarm 1 set point
A2	Allows visual check of the alarm 2 set point
CAL	Display shows measured gas concentration No blanking between ±5% LEL No alarm outputs will operate Inhibit condition induced Gas may be applied to a sensor without fear of inadvertently activating an alarm

Zero Potentiometer - RV2

The zero potentiometer, labelled "z", is used to adjust the display to read 00 when there is no discernible amount of flammable gas or vapour at the detector. It may also be used to offset the display to simulate gas being detected by the control card.

NOTE: Adjustments to the zero potentiometer must only be done by a qualified personnel. It can affect the way the card responds to genuine flammable gas alerts and could put lives at risk.

Span Potentiometer - RV3

The span potentiometer, labelled "s", is used to adjust the level of flammable gas or vapour present at the detector. When a known concentration of test gas is applied to the detector, assuming the card has been correctly zeroed, then the span setting is used to adjust the display so that it reads the same as the concentration of test gas in % LEL. This procedure is called "calibration" and is described in full later.

NOTE: Adjustments to the span potentiometer must only be done by a qualified personnel. It will affect the way the card responds to genuine flammable gas alerts and could put lives at risk.

3. OPERATION

3.1 LINK SETTINGS AND ADJUSTMENTS

Analogue Output (Link 1)

When fitted the analogue output of the card follows the display reading as a linear 1 V to 5 V output, where 00 on the display is represented by 1 V and 99 on the display is represented by 5 V. Faults, including over range, are represented by a 0 V output.

Permanent Display (Link 2)

When fitted the blanking function associated with the concentration display is overridden. Under this condition the only time the display will blank will be when an over range is detected.

Head Volts (RV1)

This potentiometer is used to set the bridge voltage for the pellistor sensor attached to the card. This must only be adjusted when the card is powered and attached to a 64 way uncommitted extender card (stock no. C03233). It must only be adjusted by qualified personnel when a new detector and/or card is being set up.

NOTE: Clockwise turns will increase the head volts output. Anti-clockwise turns will decrease the head volts output.

Zero Adjust (RV2)

This potentiometer adjusts the zero setting of the measured concentration display, as described earlier.

Span Adjust (RV3)

This potentiometer adjusts the sealing of the card to a particular calibration gas, as described earlier.

Analogue Output (RV4)

The analogue output is set for a 1 V to 5 V output when the display reads between 0% LEL and 99% LEL. The 0% LEL = 1 V relationship is fixed, but due to component tolerances and calibration scaling the 5 V output may require to be trimmed. The potentiometer allows this to be done.

Alarm 1 Set Point (RV5)

With the card powered through a 64 way uncommitted extender card (stock no. C03233) allowing access to RV5, and the four position mode switch on the front panel in the “A1” position, the set point for the first level of alarm may be adjusted. As the potentiometer is altered so the display will change.

NOTE: The alarm 1 threshold must always be set lower than the alarm 2 threshold.

Alarm 2 Set Point (RV6)

With the card powered through a 64 way uncommitted extender card (stock no. C03233) allowing access to RV6, and the four position mode switch on the front panel in the “A2” position, the set point for the second level of alarm may be adjusted. As the potentiometer is altered so the display will change.

NOTE: The alarm 2 threshold must always be set higher than the alarm 1 threshold.

Blanking Threshold (RV7)
As standard the card is set up to blank the display when the reading is less than ±5 % LEL. This may be adjusted by altering RV7. To set up accurately the zero setting must also be adjusted.

NOTE: This procedure must only be carried out by a qualified personnel.

1. Confirm there is 0% LEL shown on the display.
2. Put the card onto a 64 way uncommitted extender card (stock no. C03233).
3. Put the four position switch into the “CAL” position.
4. Adjust the zero potentiometer, RV2, to whatever blanking set point is required.
5. Assuming this set point is below any alarm levels, move the four position switch rack to the “NORM” position.
6. Adjust RV7 until the display blanks.
7. Switch the four position switch back to the “CAL” position.
8. Adjust the zero potentiometer, RV2, back to read zero on the display.
9. Remove the 64 way extender card and re-fit the card.
10. Confirm that the display still reads zero before switching the four position switch back to the “NORM” position.

3.2 SETTING UP THE CARD

Before the card can be set up and the channel calibrated it is assumed that all field cabling for the channel has been completed, the sensor installed as per the relevant manual, and that power is available on the panel although it should be isolated to start with.

To complete this procedure a 64 way uncommitted extender card (C03233) is required. This will allow adjustments to be made to the card whilst it is powered up.

Unpowered Adjustments
Principally this will set critical outputs to minimum valves so that no unexpected events occur which could damage other equipment.

1. Turn RV1 (Head Volts) fully clockwise to protect the detector.
2. Put the four position switch on the front panel into the calibrate position to inhibit the outputs.
3. If the analogue output is required ensure link 1 is fitted.
4. If the display is required to be permanently illuminated ensure link 2 is fitted.

Powered Adjustments
Before power is applied fit a 64 way uncommitted extender card in the rack. Fit the DI-800 to the extender and ensure all the connections are firm and suitably supported.

Power may then be applied. Only the yellow fault LED will be illuminated indicating that the card is in fault. This is because the head voltage is set to its minimum. Refer to the detector and its documentation to confirm the required head voltage and adjust RV1 to achieve this.

NOTE: The head voltage must be read at the detector junction box connections rather than at the card.

Press the reset button to clear the fault condition and adjust the *zero* potentiometer until the display reads **00**. Turn the four position switch to the “A2” position and adjust RV6 until the correct valve for the second level of alarm. Turn the switch to the “A1” position and adjust RV5 until the desired set point is achieved.

NOTE: When setting the alarms the alarm 2 level must always be greater than the alarm 1 level.

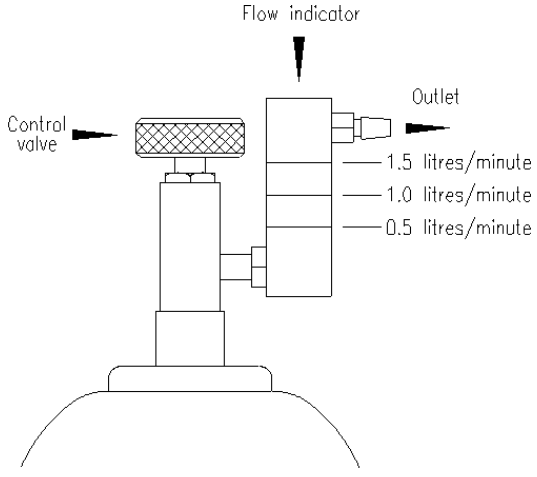
Finally turn the four position switch to the “NORM” position. The card is now ready for calibration.

3.3 CARD CALIBRATION

Periodically the gas detectors will need to be re-calibrated to ensure reliable and accurate operation. The frequency of these calibrations is very much dependent on the particular site conditions. If, for example, the sensors are in a dirty environment then they may need more attention. The recommended interval for calibrations is every six months minimum. Consideration must also be taken of the conditions during the calibration and the condition of the calibration gas itself. The engineer performing the calibration must ask themselves the following questions before performing any calibration work on a gas detection system:

- Do I have the correct calibration gas?
- Has the gas “use by” date passed?
- Have I the correct permits?
- Is the gas I am using hazardous to health?
- Is it safe to proceed?
- Do others know where I am?
- Do I know what I am doing?

The Crowcon calibration gas comes in 20 litre, 57 litre and 103 litre cans. Each of these variations needs an integrated valve and flow indicator which is available as a separate product. This should be fitted as before any calibration work can take place. The flow indicator, as shown, has graduations engraved on it. There is a small ball bearing which floats in the stream of gas, when the valve is turned on, and this should be lined up with the appropriate engraved line for the correct flow rate. It is important that the gas cylinder is kept upright at all times during the calibration so that the flow indicator can operate correctly. A keen eye should be kept on the state of the ball as it will drop quickly when the gas cylinder is almost empty.



NOTE: All gas detectors need a period of time to settle down when first powered up. A minimum of 24 hours should be allowed with the system powered before the initial commissioning calibration is performed.

The Flamgard-EXE and Flamgard-D flammable gas detectors are based on a pellistor type of sensing element which runs warm under normal operation. The following procedure assumes that the detectors are being calibrated to methane by using test gas of 50% LEL (2.5% v/v) methane in air.

1. Identify the control module associated with the gas detector to be calibrated and put it into its inhibit mode.

2. Ensure that the area in the immediate vicinity of the gas detector is free from any flammable gasses.

3. At the control panel adjust the *zero* potentiometer on the control card until the display reads 00.

4. Apply the test gas to the gas detector at the rate of between 0.5 litre/minute and 1 litre/minute.

5. Allow the reading on the control module to stabilise. This may take up to two minutes.

6. Adjust the *span* potentiometer on the control card so that the display reads up to 99.

7. If the display cannot get above 80% LEL when using 50% LEL test gas the sensor has come to the end of its life and must be replaced.

8. Confirm that all alarm LEDs are on and that the overrange LED comes on when the reading exceeds 99.

9. Hold the card reset button and wind the *span* potentiometer back to read 50 on the display.

10. Turn off the test gas and remove the calibration adapter from the detector.

11. Confirm that the display on the control card drops to 00.

12. Place the control card back into the *normal* operation mode.

13. Move on to the next detector and return to step 1.

Should it have been discovered that the sensor has lost its response to gas then it must be replaced. **Hot work permits may be required for this procedure.** This procedure assumes that the control card is still in *inhibit* mode and that the gas has been turned off.

1. At the control panel, remove the control card, install an extender board and connect the control card into the extender.

2. In the field open the orange Crowcon Junction box using a 4 mm Allen key. Care must be taken when opening the cover to avoid letting water and dirt into the junction box enclosure.

3. The gas detector has three coloured wires: one green, one black and one red.

4. Using a suitably certified voltmeter measure the head volts between the red and black wires on the gas detector.

5. At the panel adjust the *head volts* potentiometer (RV1 located at the connector end of the control card) until the voltage across the red and black wires on the gas detector are at a minimum.

6. Make a note of which terminal in the junction box each wire is connected to and disconnect the wires from their terminals.

7. Unscrew the gas detector from the junction box.

8. Remove the new gas detector from its protective packaging and put the faulty one in its place.

9. Poke the wires of the new gas detector into the junction box through the M20 mounting hole.

10. Gently screw the new gas detector into the junction box. Take care not to twist the wires or cross thread the detector.

11. With the detector hand tight in the junction box an adjustable spanner may be required to screw the detector fully home. The washer around the neck if the detector must make a good seal with the junction box. Do not over tighten.

12. Refer to the notes made earlier and reconnect the red, green and black wires on the new detector.

13. Measure the head volts again between the red and black wires on the detector (red is positive, black is negative).

14. At the panel, slowly adjust the *head volts* potentiometer, RV1, until the volt meter reads 2.0 ± 0.1 V dc between the red and black wires.

15. Remove the control card from the extender board, remove the extender board from the rack and replace the control card firmly in the rack.

16. Check the head volts at the detector again and confirm that it is still reading 2.0 ± 0.1 V dc between the red and black wires.

17. Close up the junction box. Care must be taken to avoid over tightening the junction box cover.

18. Allow the gas detector to settle with power applied for a minimum of 24 hours before attempting to calibrate it. Leave the control card in the *calibrate* position for this period of time to avoid nuisance alarms.

The life expectancy of a 96HD/FL gas detector is approximately 2 years under normal operation in a clean atmosphere. If it is found that sensors last little more than 6 months then it is likely that the detectors are becoming *poisoned* by an airborne contaminant. Such contaminants are contained in silicone based products and leaded petroleum fuel. Refer to Crowcon for queries regarding poisoning of detectors and measures that can be taken to avoid or reduce it.

3.4 TROUBLESHOOTING

The format of this section is designed so that the user picks the description which matches the problem and then follows down the list of things to do until the problem goes away.

The blanking threshold cannot be set.

1. If the display will not go out, ensure that link 2 has not been fitted.

2. If the display will not come on ensure that the card is not in the over range condition.

3. Set the blanking as per the instructions under the *Link Settings and Adjustments* section.

The detector head volts are too high (>2.5 V) and cannot be reduced.

1. If the volts are much higher than 2.5 V, i.e. about 15 V or more, then this would indicate that the detector is open circuit from the control card connections. The detector may have blown or may not be connected.

2. Head volts of above 2.5 V being measured on a good detector will damage it. Remove the card immediately and replace it with a correctly functioning replacement.

3. If the replacement exhibits the same symptoms then remove it again and check the field cabling and detector for open circuit conditions.

The detector head volts are too low (<1.5 V) and cannot be increased.

1. If the volts are close to zero then it is most likely to be a short circuit in the cabling has occurred. Disconnect the field cabling in the cabinet and measure the head volts there.

2. The field terminals in the cabinet should now be greater than 15 V for an open circuit.

3. Check the resistance between the three field cables for the detector for shorts (typically greater than 3 Ω should be observed).

4. If the field cables check out correctly then replace the card with one which is known to be working.

5. If the fault persists then it lies with the internal wiring of the cabinet or control rack.

The span adjustment cannot reach the required value.

1. If the test gas has been applied and the span adjustment cannot be made to reach the corresponding concentration for the display, then the detector is likely to be too insensitive and must be replaced, or the head volts are too low.

2. Check the head volts. If they are correct for the particular sensor then the detector will have to be changed.

3. Set up the new sensor as per the *Card Calibration* section.

The fault LED is on and the pilot LED is off, no other LED is illuminated.

1. Press the lamp test/reset button for one second and release.

2. Confirm that the head volts are set correctly according to the sensor specifications. Press reset after it has been set. If it cannot be set, assuming that it does not rise from zero, then a field wiring problem is indicated.

3. Check that a head voltage is getting to the terminals that the field cables attach to. Assuming the problem is a cable problem a voltage should be observed between positive and negative here. If no voltage is observed then this would indicate either a card failure or in the connectors between the control rack and the terminals.

4. Remove the card from the rack and use a resistance meter to locate the cable fault. Once it has been rectified then use the meter again to confirm that the sensor is not damaged. At the

sensor there should be approximately 3 Ω between the positive and the signal wire. Connect it all back up and try to set the head volts again.

5. If the card is still in fault then confirm return voltage from the detector. This is done by disconnecting the signal from the field terminals. The voltage between the positive and the signal field cable should be approximately half that measured between the positive and the negative. If it is and the fault will still not reset when the cable is reattached then there is an internal card or rack fault.

The over range LED is on and will not reset.

1. Confirm that the detector head volts are correct for the particular sensor.

2. Hold the reset on and observe the card to oscillate in and out of the over range condition.

3. Wind the span potentiometer anti-clockwise until the clutch in the multi-turn starts to click. Hold the reset on.

4. Release the reset. If it still goes into the over range condition and the display is blanked, hold down the reset again and turn the multi-turn zero potentiometer anti-clockwise. At some point the display should turn on.

5. If the clutch on the zero potentiometer starts to click then turn it clockwise, still holding the reset on.

6. If the display still does not come on and the over range LED is still illuminated when the clutch on the zero starts clicking again and reset is released, then the card is faulty and should be replaced.

The display will not come on and the card is not in over range.

1. If the display comes on when the read button is pressed then the blanking threshold is too high. Try turning resetting it by following the procedure in the *Link Settings And Adjustments* section.

2. If the display does not come on even when read is pressed but the LEDs illuminate when the card reset button is pressed, then the card is faulty and must be replaced.

No LEDs are illuminated and the display is not on.

1. If the problem is isolated to one card then check the fuse on the card. If it is more extensive than that then check the power to the control rack.

2. If the card fuse is intact and the power to the rack is within tolerance, the fault will lie either with the card or with the rack wiring.

All the LEDs are illuminated continuously.

1. If the green pilot light is not on then the card is in positive over range.

2. If all the LEDs are on, including the green pilot LED, then the card is receiving a permanent lamp test signal. The fault will lie with the rack wiring or with the lamp test circuit.

4. SPECIFICATIONS

Mechanical

Width	25.4 mm (5 HP)
Length	128 mm
Depth	247 mm

Connections

DIN41612 64 way A/B male connector

Electrical

Alarm Settings	Alarm 1 and alarm 2 adjustable between 5% and 95% LEL
Sensitivity	0.5 mV/% LEL to 3.0 mV/% LEL Typically 1.0 mV/% LEL
Display	Two digit, seven segment, red LED Decimal point in bottom left of display indicates negative
Output Relays	2 pole change over 1 amp, 30 V dc non-inductive Normally de-energised
Logic Outputs	500 mA sink when active 12 V when inactive
Logic Inputs	0 V to activate 12 V when inactive
Fault Relay	Single pole normally open (closed under healthy conditions) Normally energised, de-energising on fault 0.5 A non-inductive
Power	18-35 V dc input 126 mA minimum (detector attached) 410 mA full alarm (detector attached) 455 mA maximum (detector attached)