Gas Detection (Australia) Pty Ltd

GD 2400

Multi Channel (1-8)

OPERATING MANUAL

GAS DETECTION FOR AUSTRALIA

PROPRIETARY RIGHTS

WARNINGS, CAUTIONS AND NOTES

Warnings identify an operating or maintenance procedure, practice, condition, or statement that, if not strictly followed, could result in death or injury to personnel.

Cautions, which appear elsewhere in this manual, identify an operating or maintenance procedure, practice, condition, or statement that if not strictly followed could result in equipment damage or serious impairment of system operation.

Notes highlight certain operating or maintenance conditions or statements that are essential but not of known hazardous nature as indicated by Warnings and Cautions.

Warnings, Cautions and Notes are included throughout this manual, as required. Additionally, this section contains important Warnings that may not be contained elsewhere within this instruction manual.

- **FOR SAFETY REASONS, THE GD2400 MUST BE INSTALLED, OPERATED AND SERVICED BY QUALIFIED PERSONNEL ONLY. READ AND UNDERSTAND THIS INSTRUCTION MANUAL COMPLETELY BEFORE OPERATING THE GD4020**

- **THE OPERATION DESCRIBED IN THIS DOCUMENT IS THE INTENDED USE OF THE GD4020. GDA CANNOT BE HELD RESPONSIBLE IF THE GD4020 IS USED FOR ANY OTHER PURPOSE OTHER THAN THAT STATED. ANY OTHER USE OF THE GD4020 WILL RENDER ANY CERTIFICATES ISSUED INAPPLICABLE.**

System Specification

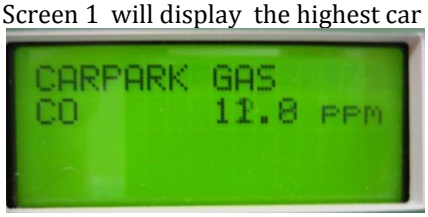
Power requirements	Inside Components: 24V DC, <25mv ripple 0.5A. Power Supply: 240VAC +- 10%	This can be supplied by plug in mains power supply or via plug jack on side of unit
No of sensors	1-8	4-20ma source 2 wire or three wire
Display	4 x16 char line back lit LCD	
Alarm relays	3 Per Sensor Input Channel	Alarm levels are programmable levels and can be rising or falling latched or non latched with delays for coming on and holding them on
Alarm relay specification	2A non inductive 240V AC	
Alarm delay	0-300 seconds	The time the gas level has to be above the alarm level before the alarm relay activates
Relay time on	0-20 Minutes	The time the relay is kept on after an alarm. If 0 is set the alarm resets when the gas level falls below the alarm threshold
Alarm hysteresis	0-50% of range of sensor	The figure is expressed in units of the gas being measured
Fault relay	Energised when controller is powered	The fault relay switches when: Power to the controller is lost, A sensor is faulty or disconnected, The watch dog is tripped
Analogue outputs	3	0-10v ; 4-20mA ; 0-20mA
Types of outputs	Sensor In = output	This is configured to o/p (output) 1 for sensor 1 and o/p 2 for senor 2
	Max of sensor 1 & sensor 2 (same range for sensor 1 & 2)	This is the highest reading from either sensor available as an o/p
	Min of sensor 1 & sensor 2 (same range for sensor 1 & 2)	This is the lowest reading from either sensor available as an o/p
	Average of sensor 1 and sensor 2 (same range for sensor 1 & 2)	This is the average value of the two inputs
	Scaled o/p of sensor 1	This is an o/p that is scaled between two fixed points of the sensor 1 i/p range
	Scaled o/p of sensor 2	This is an o/p that is scaled between two fixed points of the sensor 2 i/p range
	Scaled o/p of Max of sensor 1 & sensor 2 (same range for sensor 1 & 2)	This is an o/p that is scaled between two fixed points of the maximum of sensors 1 & 2's i/p range (chan 1 & 2 range are same)
	Scaled o/p of Min of sensor 1 & sensor 2 (same range for sensor 1 & 2)	This is an o/p that is scaled between two fixed points of the minimum of sensors 1 & 2's i/p range (chan 1 & 2 range are same)
Output Update Period	0-10mins	This the frequency that the 4-20mA or 0-20mA o/p is updated . if 0 is set the o/p follows the i/p . If a time is set o/p is updated with the last level prior to the update period timing out. That o/p is then o/p for the next timing period.
Mimic serial Interface	RS485 serial interface to M2001 mimic panel	This transmits via two wire interface the level and alarm status of each channel. The M2001 contains relays to drive local equipment
Internal buzzer	93db 0.5M	
User interface	4 push button keys	

Overview of Operation:

- The 2400 operates from a 240VAC±10% 1.5A Power Supply mounted inside the 2400 .
- The 2400 can monitor up to 8x 4-20ma loop powered or 3 wire gas sensors .
- The field wiring for the sensors are wired to the AM001 board in the 2400 unit.
- The sensors must be wired in a cable that has a continuous screen and the screen must be earthed inside the 2400 as per the diagram.
- The input board (AM001) selects the highest (or lowest 'JP18 L\H') reading from the sensors and passes it to the main board which houses the front panel display and the alarm relays.
- The 2400 can be field programmed to provide volt free contacts at various alarm levels and also various types of analogue outputs (4-20mA ; 0-20mA; 0-5V; 0-10V).
- The voltage o/ps need an external resistor which will be provided if this option is required. This resistor **MUST** be fitted at the equipment end of the line **NOT** at the o/p on the 4020.

NORMAL OPERATION

- In normal operation the display will alternate between two screens
- The pushbuttons on the front panel have **no effect** in NORMAL OPERATION
- Screen 1 will display the highest car park gas level



- **Screen 2 will display**

ALARM CONDITION

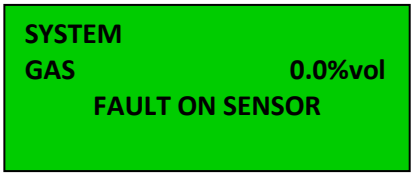
Screen 1 will show

When the gas level is above the alarm threshold the system will remain in alarm.

- The sensor may not go into alarm as soon as it reaches the alarm threshold as there is a delay set into the system via the set up menu.
- The alarm relays may stay on for a period of time after the gas level has dropped below the threshold level by the hysteresis amount (set into the system via the set up menu) .
- The alarm relays may remain on for a period of time after the gas level goes below the alarm threshold. This over run time is set into the system via the set up menu

SENSOR FAULT CONDITION

Screen 2 will show



When the Fault message is displayed on the screen it means that there is a sensor related problem with the system

- If one of the sensors connected to the AM001 board has an output which falls below the prescribed level (Normally 3mA) it will cause this error message to appear.
- If one of the sensors is disconnected it will cause this message to appear.
- If one of the sensors has become open circuit it will cause this message to appear.

DRIVING VSD'S

- IT IS STRONGLY RECOMENDED THAT ANY APPLICATION USING THE 4-20mA, 0-5V or 0-10V USES A GALVANIC ISOLATOR EQUAL OR SIMILAR TO THE GD690
- In systems that are using the 4-20mA to drive VSD 's it is highly recommended that the unit is fitted with a galvanic isolator type GD690 . This prevents noise from the VSD entering the monitoring system and also prevents any induced voltage spikes causing damage to the system.
- If using the GD690 in the 0-10V or 0-5V o/p it will be non linear from the 0v – 0-7v on the 0-10v range and from 0v to 0.5V on the 0-5V range
- When using voltage o/p's the termination resistor **MUST** be fitted at the equipment end of the line not at the 2400 end.

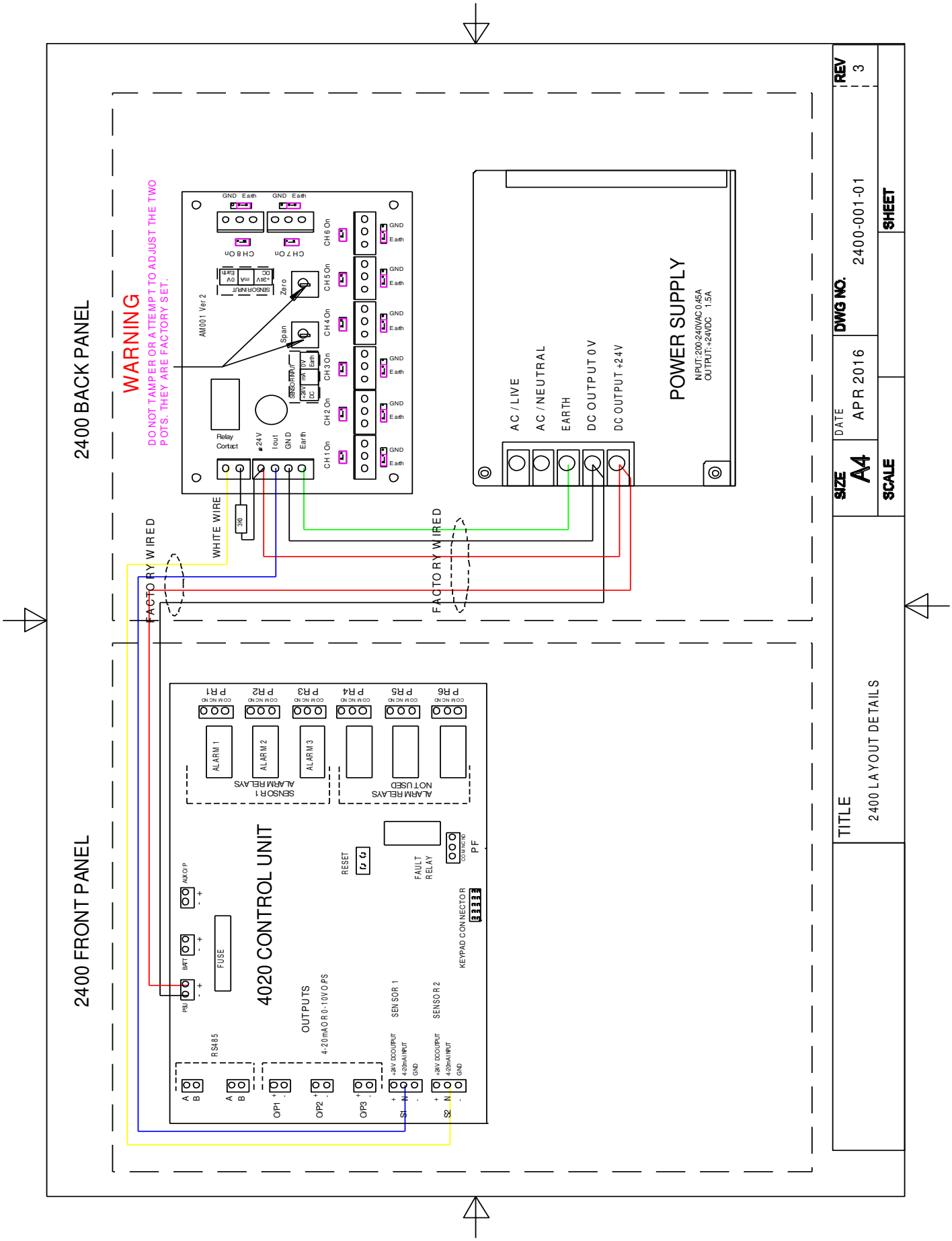
ALARM RELAYS

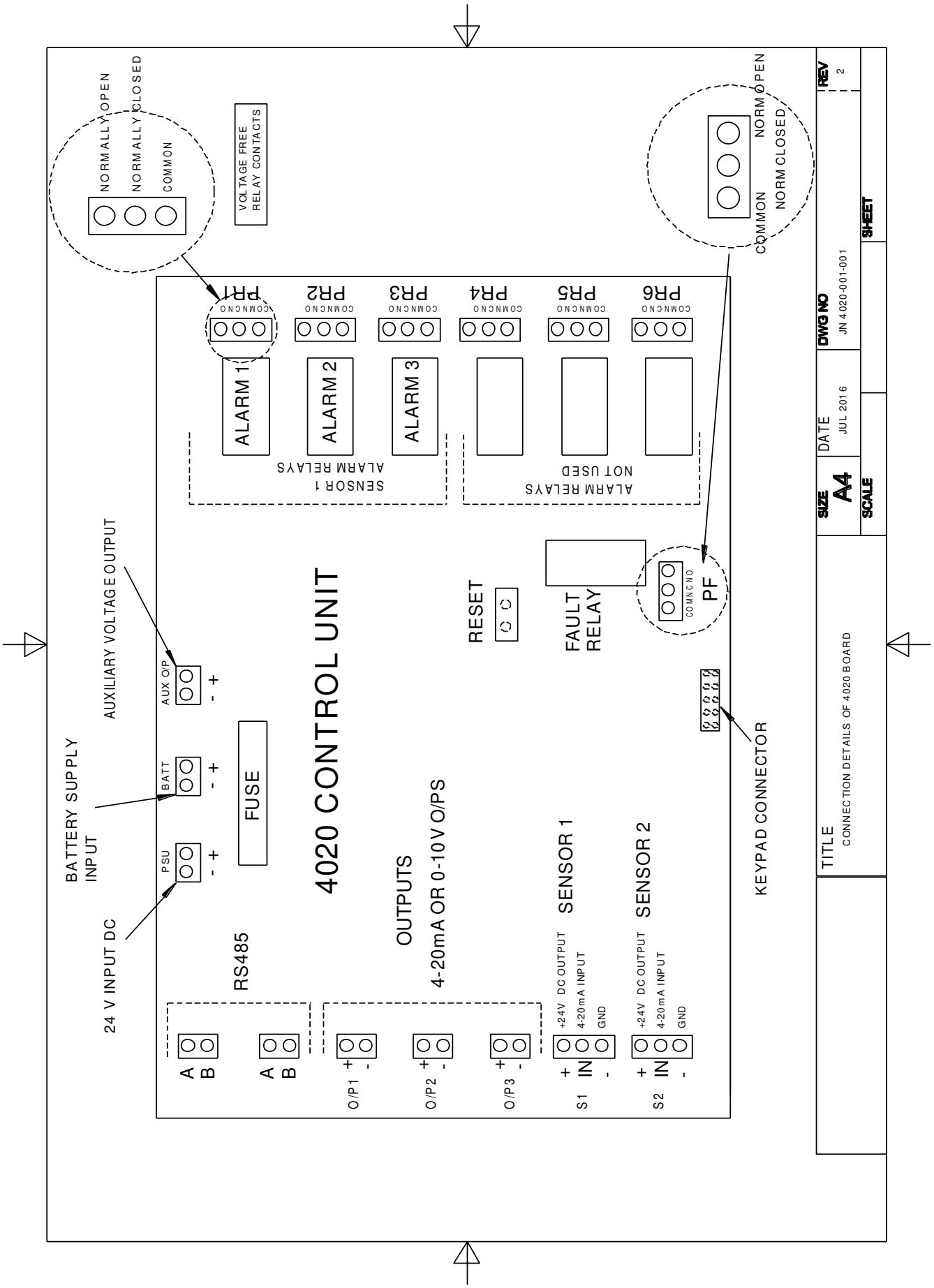
- The alarm relays for alarm level 1 ,2, 3 are on the 4020 board
- Their connections are shown in the non alarmed condition NC, NO and Comm
- It is advisable NOT to switch 240v inductive loads through these relays .
- If contactors are being switched use a 24V dc coil contactor.

Installation

1. Locate the mounting holes in the base of the unit. Pay special attention to ensure that swarf or dust does not enter the PCB area.
2. Drill out the required number of cable glands in the box base
3. Fit the gas detection control unit to the wall in the appropriate position. The GDA 2400 can be fixed in any position to allow cable entry top or bottom. It is recommended that the unit be situated away from heavy electrical loads or equipment that emits high levels of RFI.
4. The sensors must be connected to the instrument in accordance with drawings in the manual Check all wiring before connecting mains. All units are configured for 240V, 50Hz unless marked otherwise on the power supply.
5. On power up, the unit will inhibit its' alarms. This lasts for 90 seconds and allows the sensors to stabilise. This inhibit mode may be terminated prematurely by pressing the RUN button on the main front panel.
6. The 2400 is factory set up .

Photograph shows standard 2400 with NO VSD drive (GD690)


2400 BACK PANEL
2400 FRONT PANEL
WARNING
DO NOT TAMPER OR ATTEMPT TO ADJUST THE TWO POTS. THEY ARE FACTORY SET.
AM001 Ver 2
Zero
Span
Relay Contact
WHITE WIRE
FACTORY WIRED
FACTORY WIRED
POWER SUPPLY
AC / LIVE
AC / NEUTRAL
EARTH
DC OUTPUT 0V
DC OUTPUT +24V
4020 CONTROL UNIT
ALARM 1
ALARM 2
ALARM 3
SENSOR 1 ALARM RELAYS
ALARM RELAYS NOT USED
RESET
FAULT RELAY
KEYPAD CONNECTOR
FUSE
OUTPUTS
4-20mA O/P 0-10V O/P S
SENSOR 1
SENSOR 2
RS485
REV 3
DWG NO. 2400-001-01
SHEET
DATE APR 2016
SIZE A4
SCALE
TITLE
2400 LAYOUT DETAILS


4020 CONTROL UNIT
NORMALLY OPEN
NORMALLY CLOSED
COMMON
VOLTAGE FREE RELAY CONTACTS
COMMON
NORM OPEN
NORM CLOSED
PR1
PR2
PR3
PR4
PR5
PR6
COMM
NO
ALARM 1
ALARM 2
ALARM 3
SENSOR 1 ALARM RELAYS
ALARM RELAYS NOT USED
AUXILIARY VOLTAGE OUTPUT
AUX O/P
BATTERY SUPPLY INPUT
BATT
PSU
24 V INPUT DC
FUSE
RESET
FAULT RELAY
PF
KEYPAD CONNECTOR
RS485
A
B
OUTPUTS
4-20mA OR 0-10V O/PS
O/P1
O/P2
O/P3
SENSOR 1
SENSOR 2
+24V DC OUTPUT
4-20mA INPUT
GND
S1
S2
IN
SIZE
A4
SCALE
DATE
JUL 2016
DWG NO
JN 4020-001-001
REV
2
SHEET
TITLE
CONNECTION DETAILS OF 4020 BOARD

WARNING

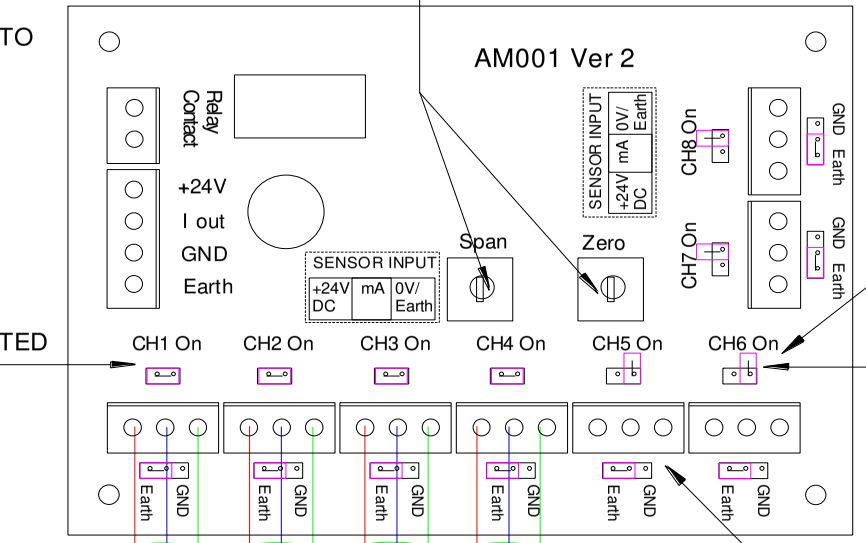
DO NOT TAMPER OR ATTEMPT TO ADJUST THE TWO POTS. THEY ARE FACTORY SET.

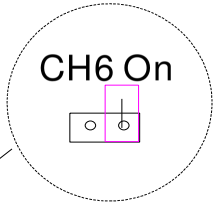
LINK = ——

THIS DIAGRAM SHOWS A FOUR SENSOR SYSTEM.
CH On LINKS 1 TO 4 ARE IN TO ENABLE CHANNELS 1 TO 4.
CH On LINKS 5 TO 8 ARE OUT TO DISABLE CHANNELS 5 TO 8.

REMOVE CONNECTOR TO ACCESS LINK

LINKS TO BE IN TO ENABLE EACH CHANNEL IF LINK LEFT IN AND NO SENSOR CONNECTED FAULT WILL ACTIVATE

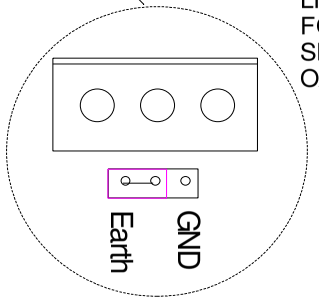




LINKS TO BE OUT TO DISABLE UNUSED CHANNELS

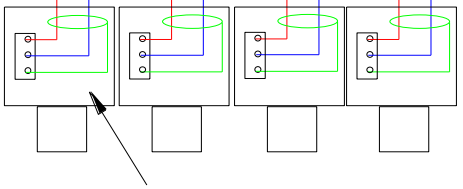
(WHEN LINK IS REMOVED PLACE ON ONE PIN SO IT DOES NOT GET LOST)

LINK TO BE IN POSITION SHOWN FOR ALL LOOP POWERED 2500 SERIES TOXIC AND OXYGEN SENSORS



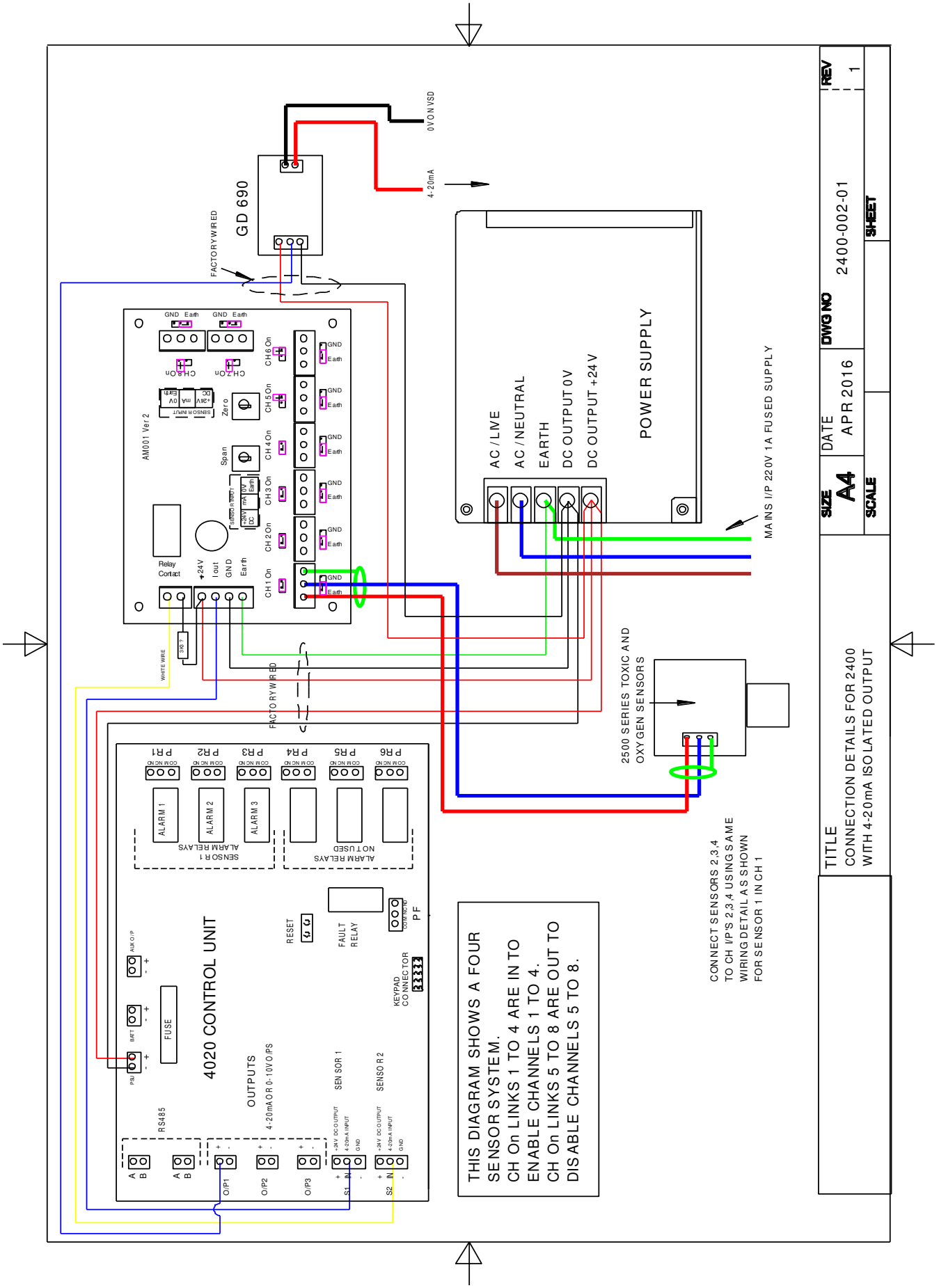
TWIN CORE SCREENED CABLE

CONNECT SENSORS 2,3,4 TO CH I/P'S 2,3,4 USING SAME WIRING DETAIL AS SHOWN FOR SENSOR 1 IN CH 1



2500 SERIES TOXIC AND OXYGEN SENSORS

	TITLE	SIZE	DATE	DWG NO	REV
	CONNECTION DETAIL FOR AN AM001 (FOUR 4-20mA 2 WIRE SENSORS)	A4	MAY 2016	AM001-001-02	3
		SCALE			SHEET


GD 690
FACTORY WIRED
0V ON VSD
4-20mA
POWER SUPPLY
AC / LIVE
AC / NEUTRAL
EARTH
DC OUTPUT 0V
DC OUTPUT +24 V
MAINS I/P 220V 1A FUSED SUPPLY
AM001 Ver2
Span
Zero
Relay Contact
CH 1 On
CH 2 On
CH 3 On
CH 4 On
CH 5 On
CH 6 On
CH 7 On
CH 8 On
GND Earth
WHITE WIRE
FACTORY WIRED
2500 SERIES TOXIC AND OXYGEN SENSORS
4020 CONTROL UNIT
RS485
OUTPUTS
4-20mA OR 0-10V O/PS
SENSOR 1
SENSOR 2
FUSE
RESET
FAULT RELAY
KEYPAD CONNECTOR
ALARM 1
ALARM 2
ALARM 3
SENSOR 1 ALARM RELAYS
NOT USED
ALARM RELAYS
PR1
PR2
PR3
PR4
PR5
PR6
THIS DIAGRAM SHOWS A FOUR SENSOR SYSTEM.
CH On LINKS 1 TO 4 ARE IN TO ENABLE CHANNELS 1 TO 4.
CH On LINKS 5 TO 8 ARE OUT TO DISABLE CHANNELS 5 TO 8.
CONNECT SENSORS 2,3,4 TO CH I/P'S 2,3,4 USING SAME WIRING DETAIL AS SHOWN FOR SENSOR 1 IN CH 1
TITLE
CONNECTION DETAILS FOR 2400 WITH 4-20mA ISOLATED OUTPUT
SIZE A4
DATE APR 2016
DWG NO 2400-002-01
REV 1
SCALE
SHEET

GDA 2400 Setup and Configuration

Most systems are factory set up with the sensors ordered and this section will not have to be followed

The GDA 2400 can be configured via a menu system. The menu system is navigated using the buttons on the GDA 2400 front panel or keyboard interface.

Most systems are factory set up with the sensors ordered and this section will not have to be followed.

The GDA 4020 sensor inputs can be configured via a menu system. The menu system is navigated using the four buttons on the GDA 4020 front panel or keyboard interface. The screen is divided into 4 lines. The bottom line relates to the button underneath the display, or if using a keypad, the button position on the key pad.

The following parameters are programmable by the user:-

1. **Select** Chan 1 **or** Chan 2
2. **Select if it is** ON **or** OFF
3. **Input** Location **name**
4. **Input** Gas **name from list provided page 11.**
5. **Input the** Units **of measurement (**ppm, %LEL, % VOL**)**
6. **Select if the display is to show** Value **of gas level or** OK **whilst it is 20 % away from the alarm level**
7. **Input the sensor** Range
8. Alarm level 1 **in preselected units (ppm, %LEL, % VOL)**
9. Alarm level 2 **in preselected units (ppm, %LEL, % VOL)**
10. Alarm level 3 **in preselected units (ppm, %LEL, % VOL)**
11. Hysteresis
12. **Sign** Rising **or** Falling
13. **Alarm** Latched **or** unlatched
14. Alarm delay **(seconds)**
15. Relay on time **(minutes)**

ALL THE ABOVE IS REPEATED FOR BOTH CHANNELS IF BOTH SENSORS ARE ON

The analogue outputs can be set to a number of functions as shown below.

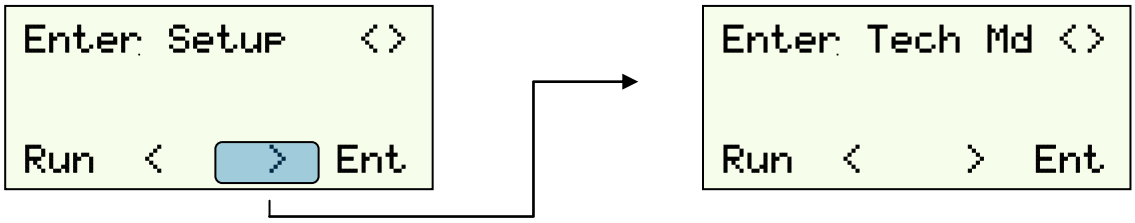
OP	SENSOR 1	SENSOR 2	SCALED SENSOR 1	SCALED SENSOR 2	MAXIMUM OF SENSOR 1 &2	AVERAGE OF SENSOR 1 &2
OP1	YES	NO	YES	YES	YES	YES
OP2	NO	YES	YES	YES	YES	YES
OP3	NO	NO	YES	YES	YES	YES

- In the scaled mode the 4-20mA update period can be set from 0-10 minutes. It will update the 4-20mA at the end of each update period with the value at the end of the period.
- Each of the outputs can be set as a 4-20ma; 0-20ma or 0-10v.
- IF 0-10v is used a 500R resistor must be connected across the output pins.
- The above functions are set up on the Outputs menu (see page 16).

To enter the menu system power down the 4020 control board, hold in the two middle buttons (< and >) then power up the control board while still holding the two buttons until two beeps are heard.
The functionality of the buttons changes slightly in some sub menus.

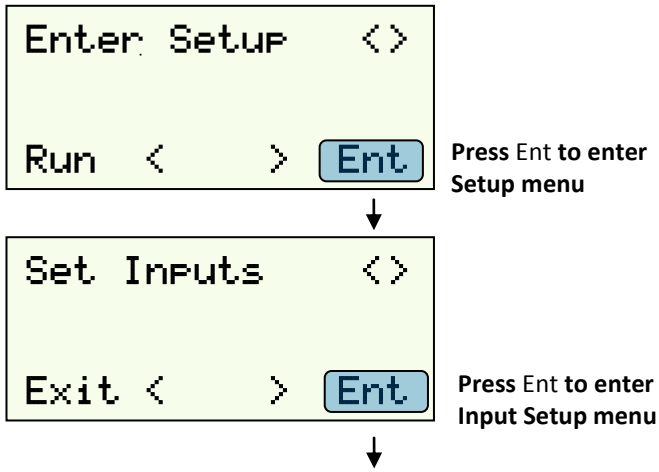
For purpose of clarity the button to be pressed is marked -

The first screen after entering menu system.



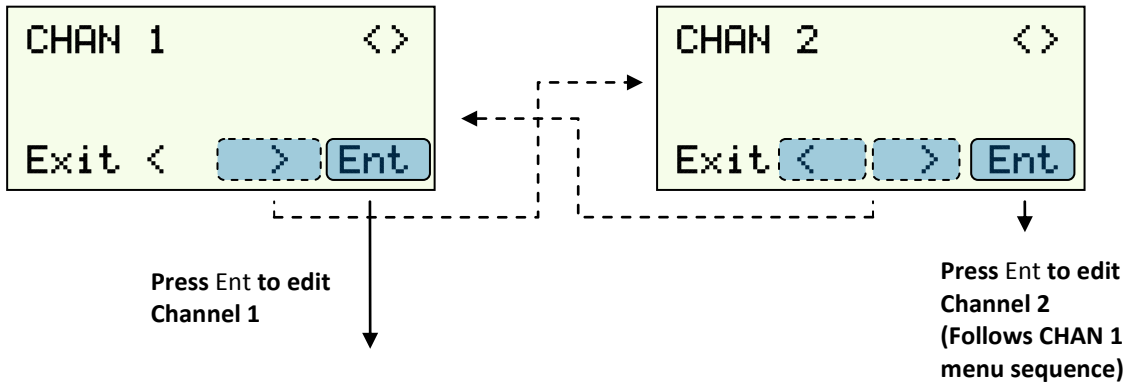
DO NOT ENTER TECH MODE: - A PASSWORD IS NEEDED. PLEASE CONTACT GDA.
IT IS FOR USE BY GDA TRAINED OPERATIVES

To Configure Sensor Inputs.

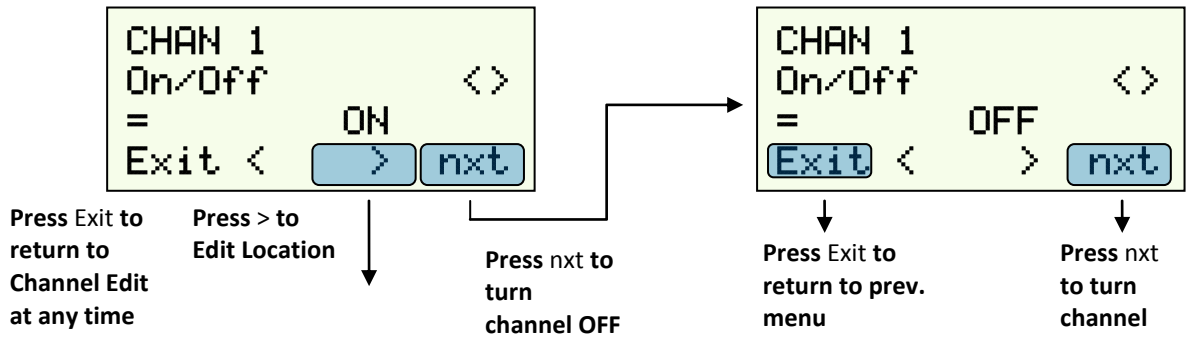


Enter Set Inputs **to change all the sensor information required along with the alarm relay information.**

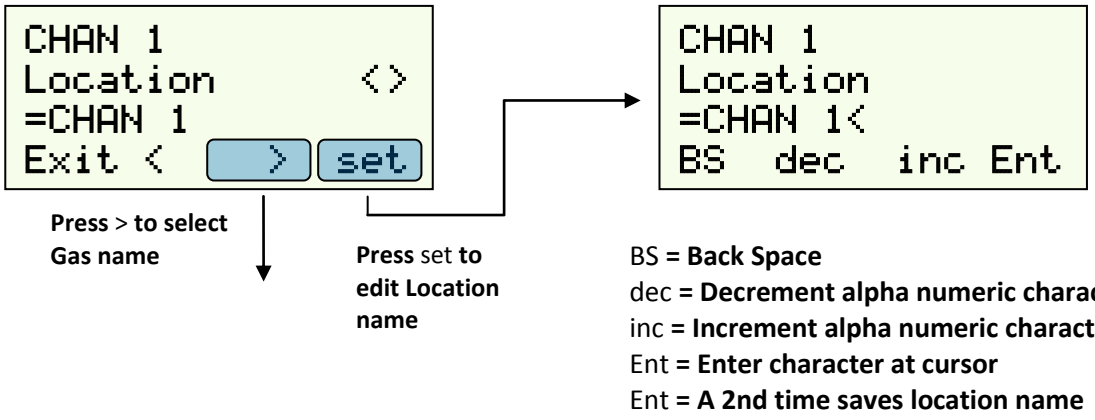
Select Channel Number



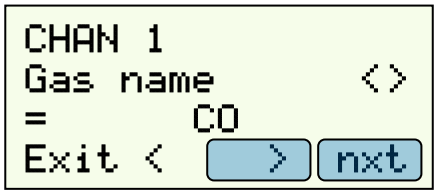
Select Channel On/Off



Edit Location Name



Select Gas Name

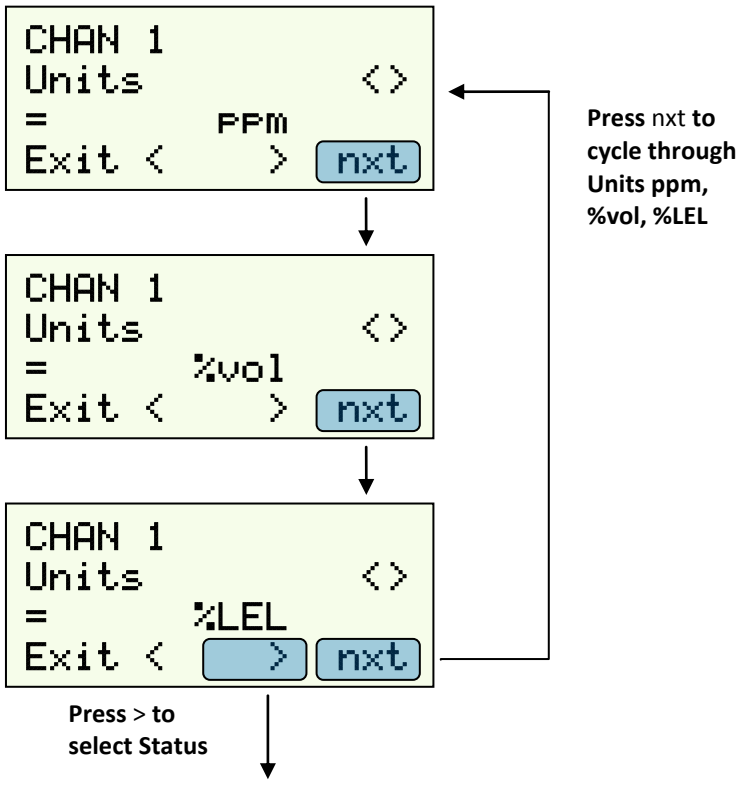


Press nxt **to cycle through the 14 available gases**

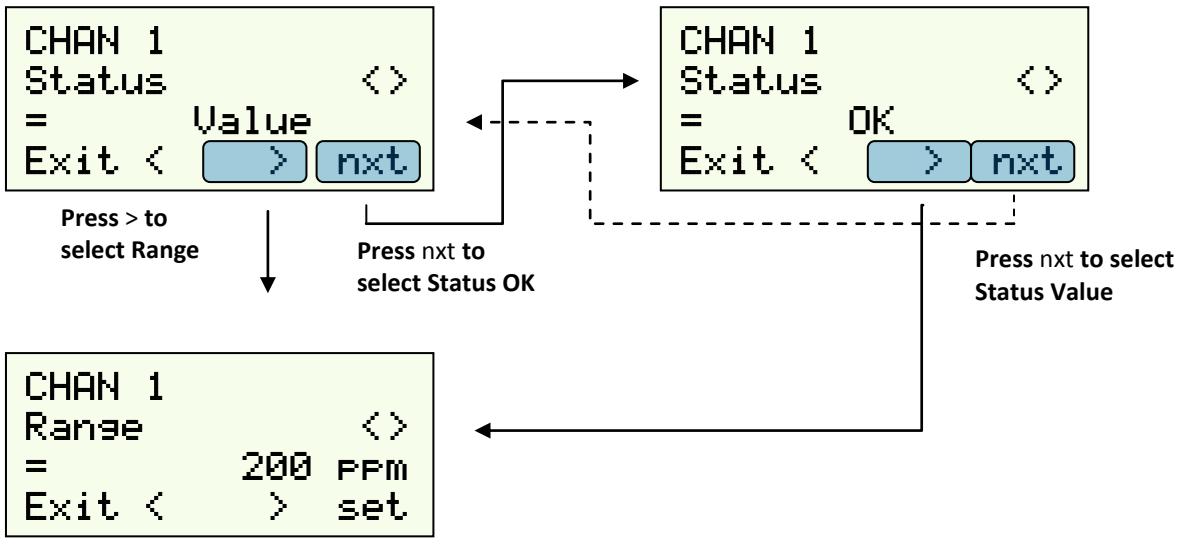
Press > to select Units

Selectable Gases	Gas Name	Chemical Formula
CO	**Carbon monoxide**	**CO**
FLM	**Flammable**	
H2S	**Hydrogen sulphide**	**H_2S**
NH3	**Ammonia**	**NH_3**
NO2	**Nitrogen dioxide**	**NO_2**
Gas	**Gas**	
R22	**R22 Refrigerant**	
R123	**R123 Refrigerant**	
R134	**R134a Refrigerant**	
R407c	**R407c Refrigerant**	
R410	**R410a Refrigerant**	
Refrg	**Refrigerant**	
O2	**Oxygen**	**O_2**
CO2	**Carbon dioxide**	**CO_2**

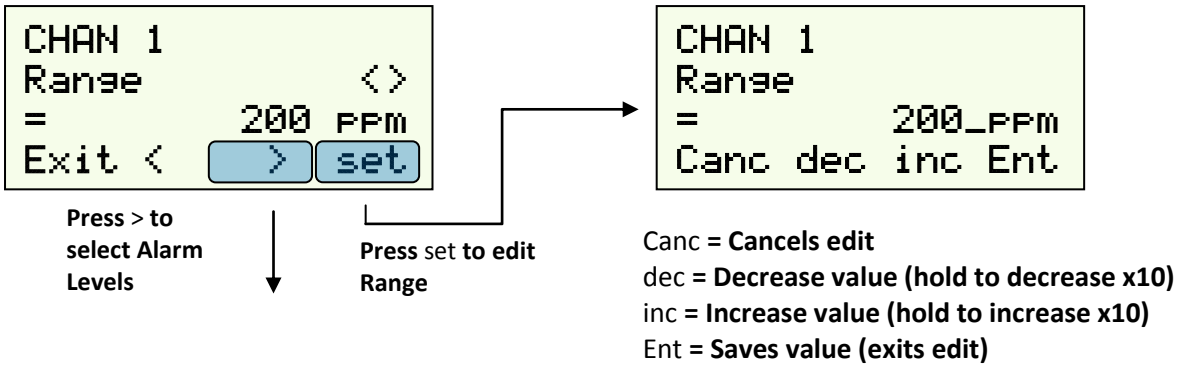
Select Units of Measurement



Select Status



Edit Range

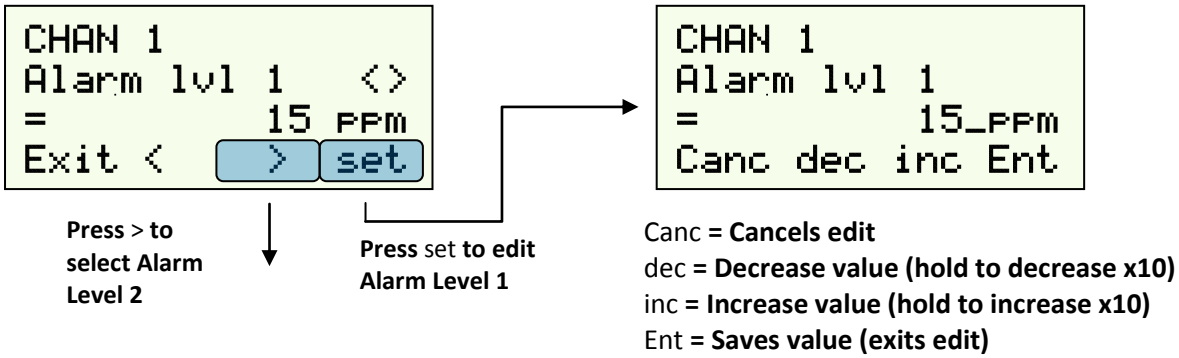


Press > to select Alarm Levels

Press set to edit Range

Canc = **Cancels edit**
dec = **Decrease value (hold to decrease x10)**
inc = **Increase value (hold to increase x10)**
Ent = **Saves value (exits edit)**

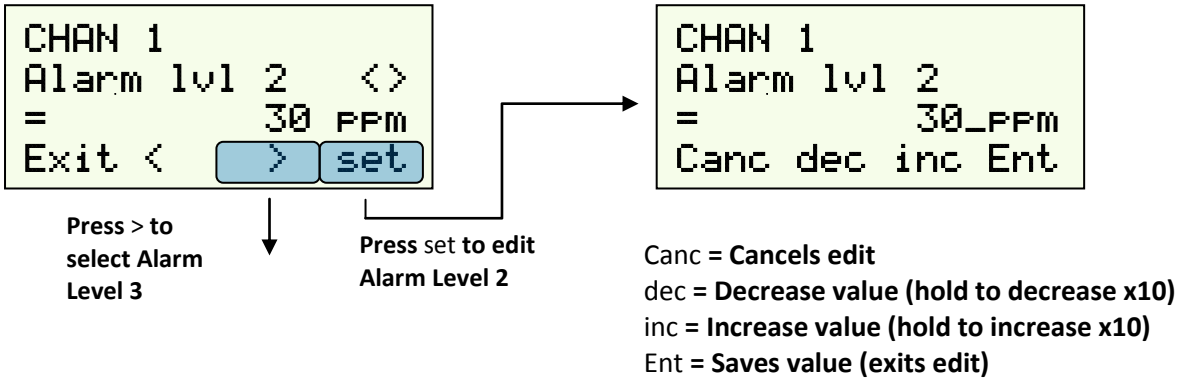
Edit Alarm Levels



Press > to select Alarm Level 2

Press set to edit Alarm Level 1

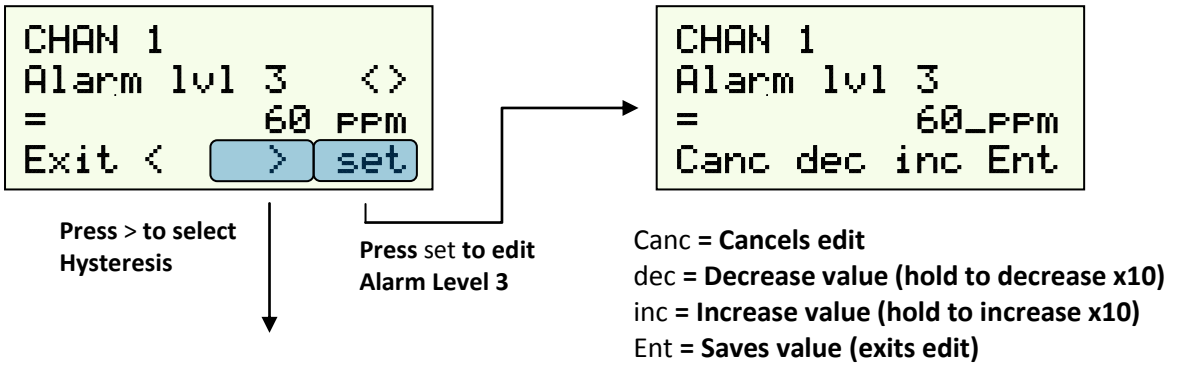
Canc = **Cancels edit**
dec = **Decrease value (hold to decrease x10)**
inc = **Increase value (hold to increase x10)**
Ent = **Saves value (exits edit)**



Press > to select Alarm Level 3

Press set to edit Alarm Level 2

Canc = **Cancels edit**
dec = **Decrease value (hold to decrease x10)**
inc = **Increase value (hold to increase x10)**
Ent = **Saves value (exits edit)**

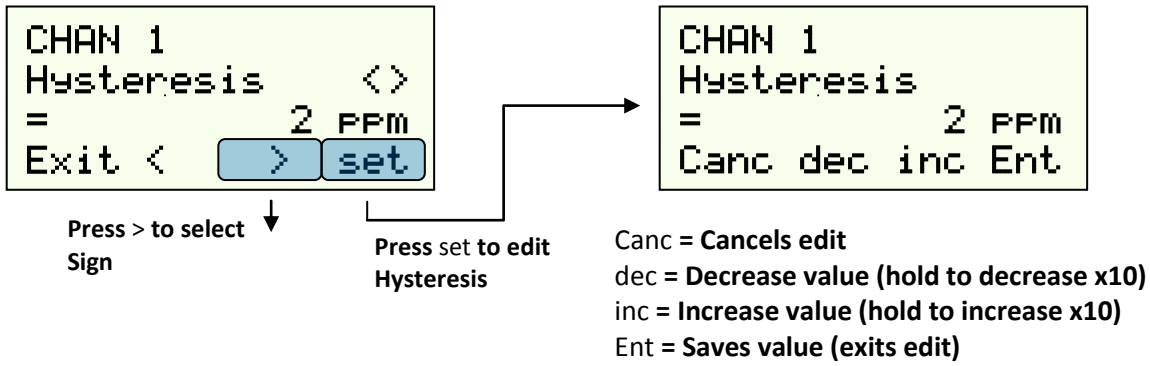


Press > to select Hysteresis

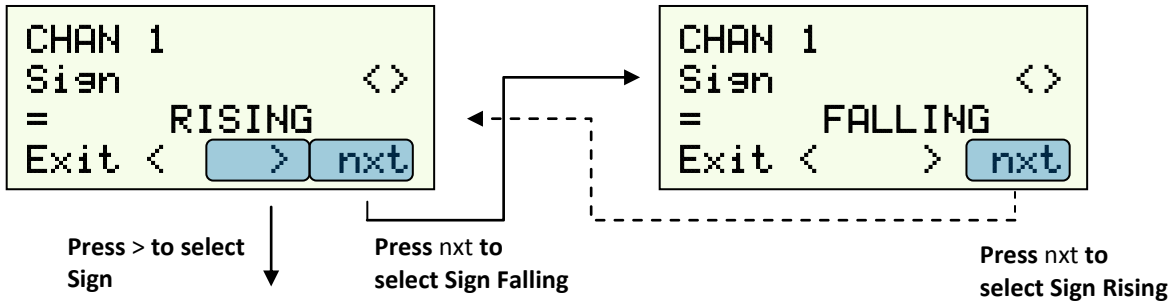
Press set to edit Alarm Level 3

Canc = **Cancels edit**
dec = **Decrease value (hold to decrease x10)**
inc = **Increase value (hold to increase x10)**
Ent = **Saves value (exits edit)**

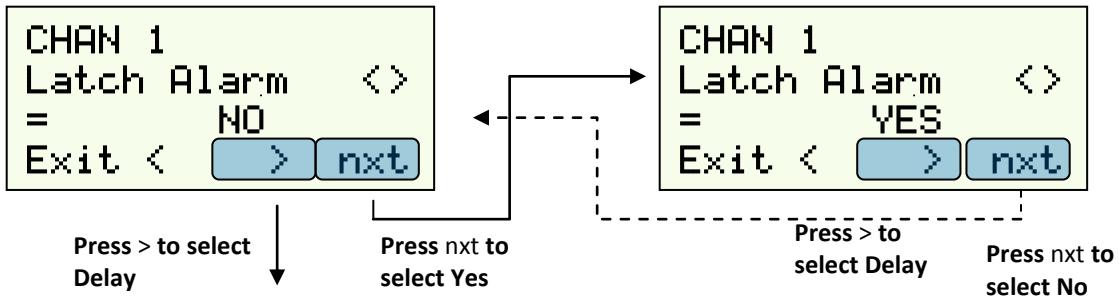
Edit Hysteresis



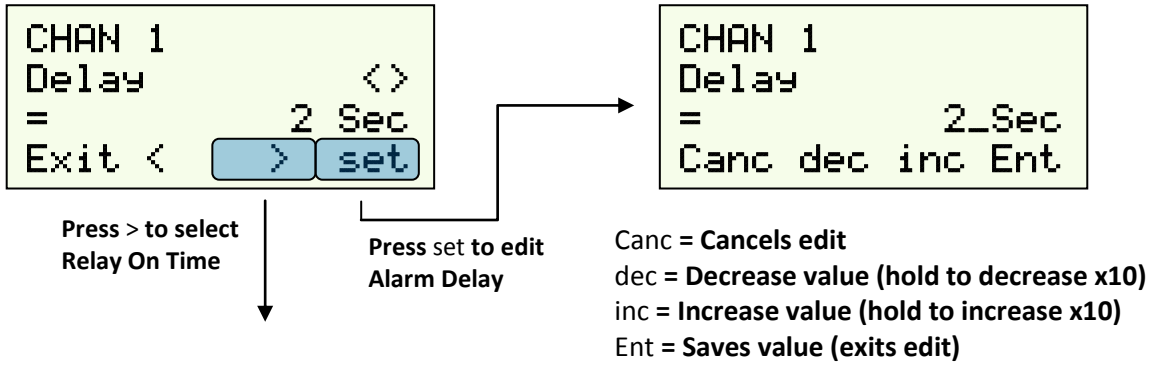
Select Sign



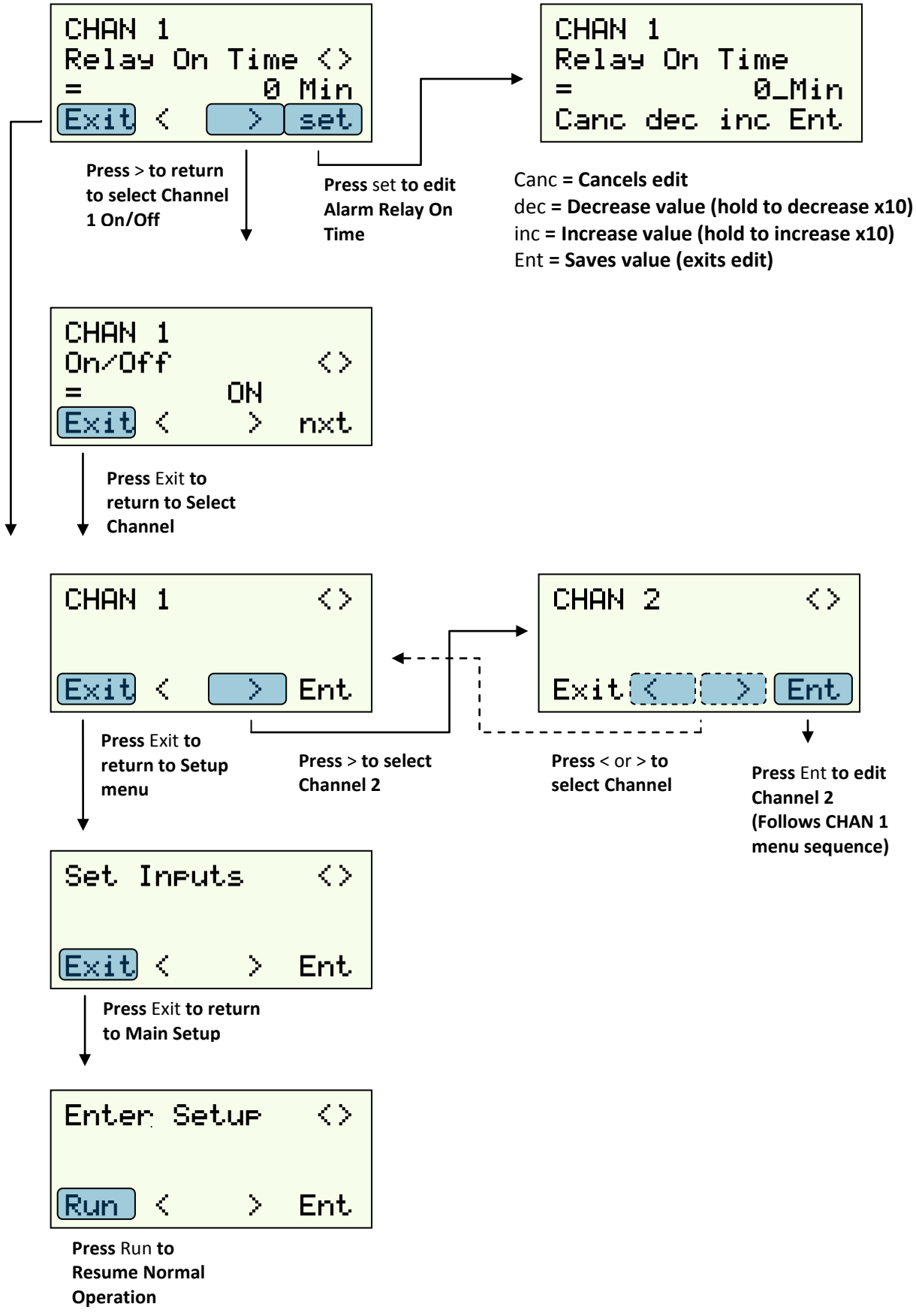
Alarm Latch



Edit Alarm Delay



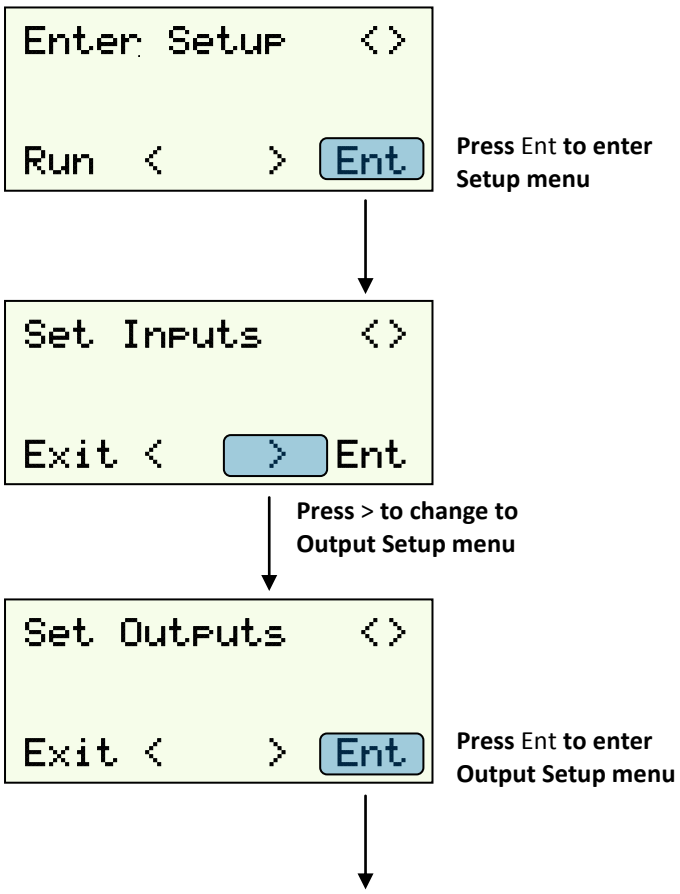
Alarm Relay On Time



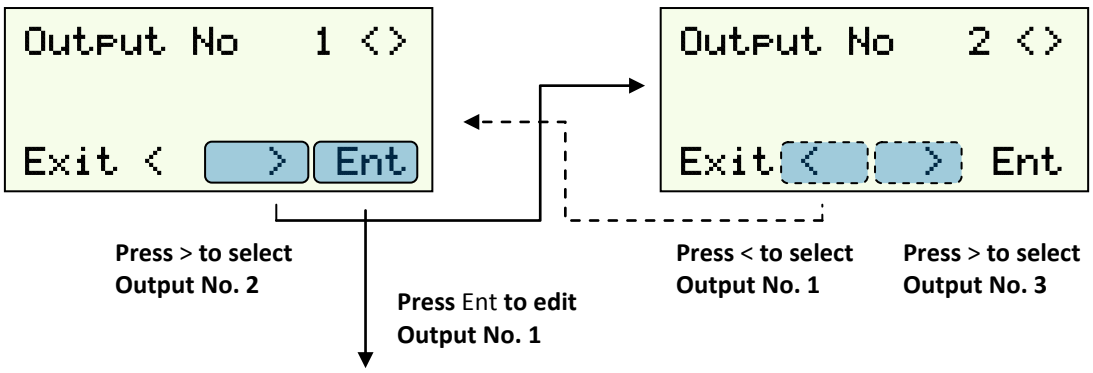
Setting up of analogue outputs

(4-20ma 0- 20ma; 0-5v; 0-10v)

The analogue outputs can be used to drive ancillary equipment such as VSD inputs or inputs into other BMS systems.

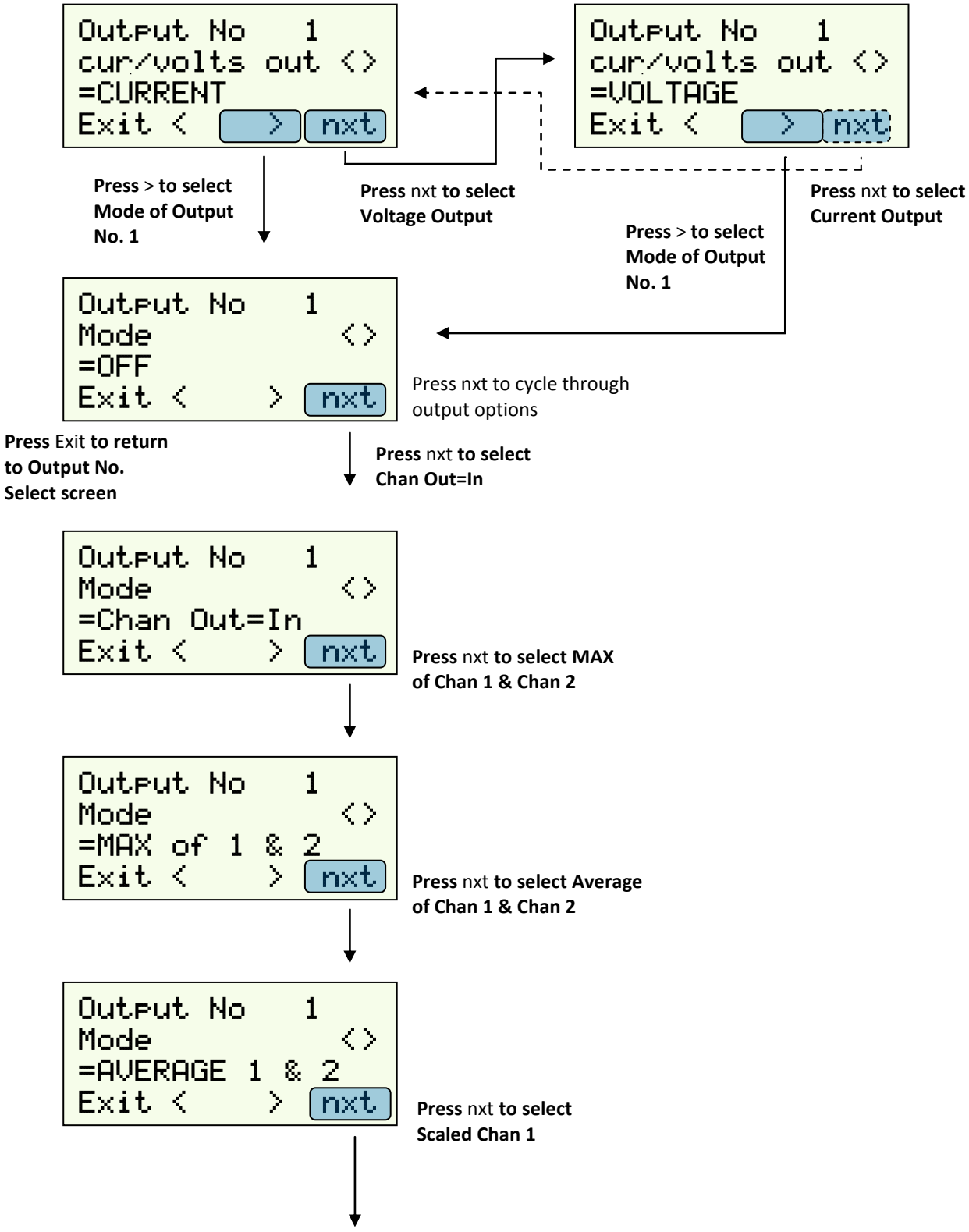


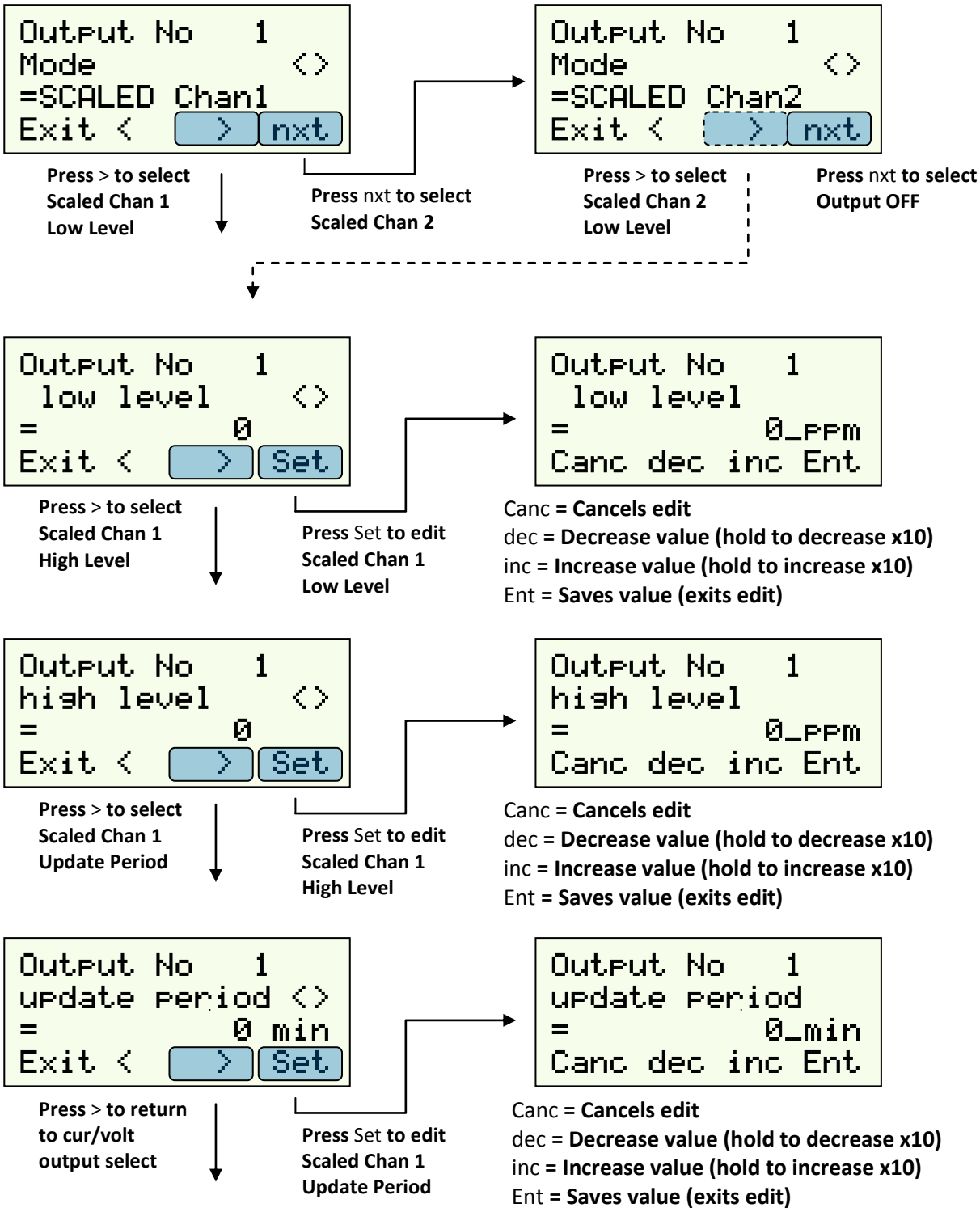
Select Output 1, 2 or 3



Select Output Type: Current or Voltage

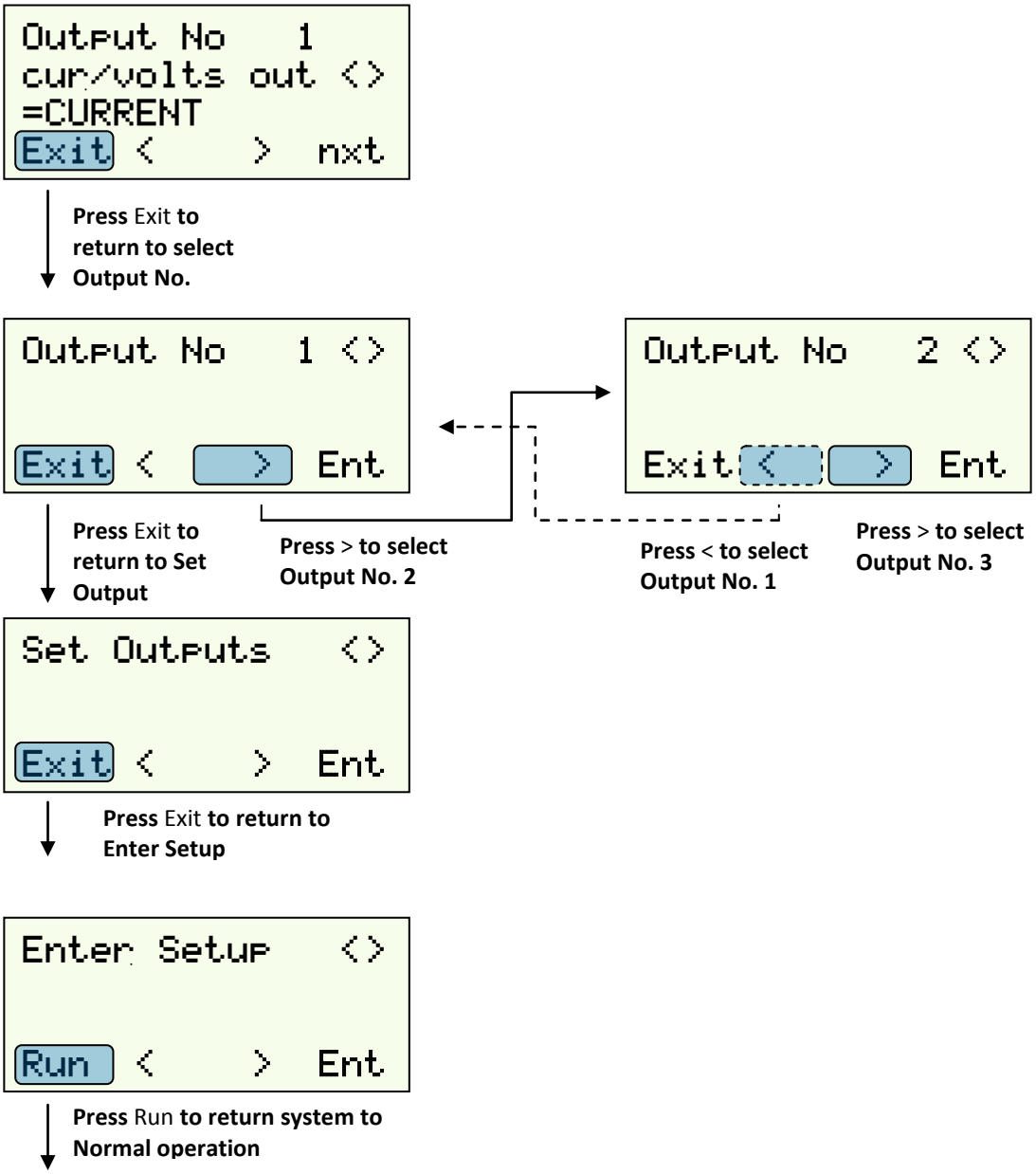
IF 0-10v is used a 500R resistor must be connected across the output pins.




Output No 1
Mode <>
=SCALED Chan1
Exit < > nxt
Output No 1
Mode <>
=SCALED Chan2
Exit < > nxt
Press > to select Scaled Chan 1 Low Level
Press nxt to select Scaled Chan 2
Press > to select Scaled Chan 2 Low Level
Press nxt to select Output OFF
Output No 1
low level <>
= 0
Exit < > Set
Output No 1
low level
= 0_ppm
Canc dec inc Ent
Press > to select Scaled Chan 1 High Level
Press Set to edit Scaled Chan 1 Low Level
Canc = Cancels edit
dec = Decrease value (hold to decrease x10)
inc = Increase value (hold to increase x10)
Ent = Saves value (exits edit)
Output No 1
high level <>
= 0
Exit < > Set
Output No 1
high level
= 0_ppm
Canc dec inc Ent
Press > to select Scaled Chan 1 Update Period
Press Set to edit Scaled Chan 1 High Level
Canc = Cancels edit
dec = Decrease value (hold to decrease x10)
inc = Increase value (hold to increase x10)
Ent = Saves value (exits edit)
Output No 1
update period <>
= 0 min
Exit < > Set
Output No 1
update period
= 0_min
Canc dec inc Ent
Press > to return to cur/volt output select
Press Set to edit Scaled Chan 1 Update Period
Canc = Cancels edit
dec = Decrease value (hold to decrease x10)
inc = Increase value (hold to increase x10)
Ent = Saves value (exits edit)

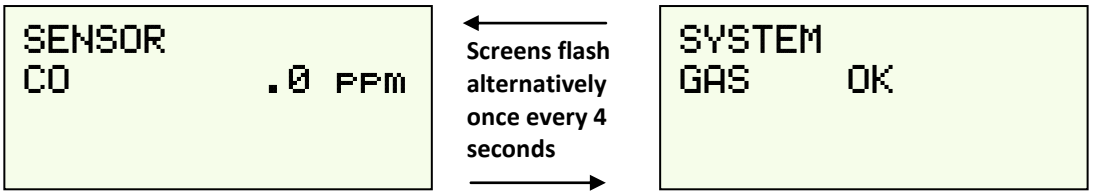
PLEASE NOTE THE VARIOUS MODES MAY ONLY BE CONNECTED TO THE O/PS SHOWN BELOW

OP	SENSOR 1	SENSOR 2	SCALED SENSOR 1	SCALED SENSOR 2	MAXIMUM OF SENSOR 1 &2	AVERAGE OF SENSOR 1 &2
OP1	YES	NO	YES	YES	YES	YES
OP2	NO	YES	YES	YES	YES	YES
OP3	NO	NO	YES	YES	YES	YES

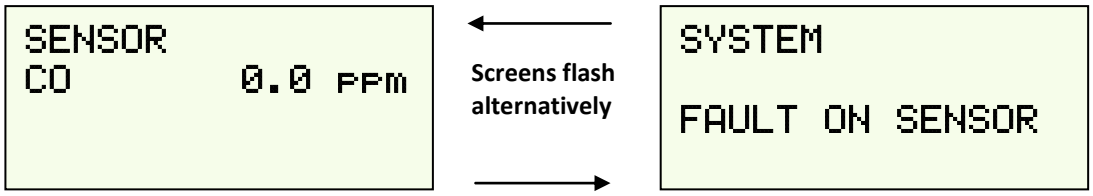


Display in normal operation when sensors are in fault or disconnected. When channel 1 and 2 are ON.

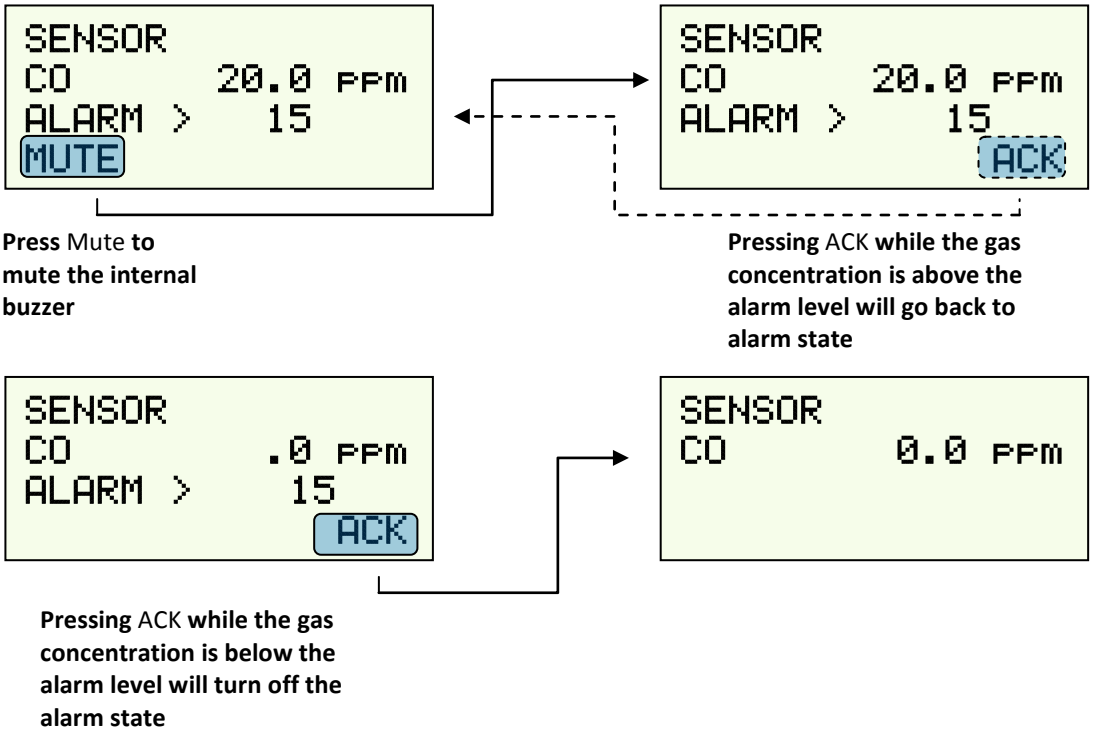
Display in normal operation when sensors are connected and operating correctly. When channel 1 and 2 are ON.



In alarm state the display will show the alarming channel for 4 seconds and the other non alarming channel for 1 second.



In Alarm Latching Mode the alarm state the display will show only the alarming channel until acknowledge (ACK) is pressed.



Fault Finding

Fault	Action	Comment
Unit does not power up	Check 24vPSU and power supply. Check fuse on main pcb	Check for short circuits on any field devices using the 24V
Display showing unreadable characters	System may need re-setting Switch power off and then back on after 5 seconds	If the system powers up correctly it will revert to normal operation
Sensor readings are incorrect levels	Check range of sensor is the same as range set inside 2400 Check sensor calibration. (new sensors are factory calibrated)	Enter input routine to check (see program set up)
Buzzer not sounding	Buzzer only sounds on LATCHED alarms	Ascertain if latched alarms required
Relays not operating	Check alarm levels set in the input program. Check that no delay has been set as if delay has been set the relay will not operate until delay has expired	Enter input routine to check (see program set up)
Voltage o/p not working (0-10v)	Check that the o/p is ON (see menu-outputs) Check it is set to VOLTS (see menu-outputs) Check that 500R resistor is fitted on the equipment end of the line NOT the 4020 end	If using the GD690 to provide isolation of the voltage o/p it will be non linear below 0.7v (0-10v o/p)
4-20ma o/p not working	Check that the o/p is ON (see menu-outputs) Check it is set to current (see menu-outputs) The input impedance seen from the o/p pins to 0V must be less than 1000R (1K)	With wires to field device disconnected measure field resistance
Screen shows SYSTEM Fault	One of the sensor either has a low 4-20ma o/p < 3.0mA or is open circuit. Check sensor connections are correct and measure current from sensors at the sensor. Consult sensor Manual GD2525,	System Fault will occur if a sensor is unplugged and its channel is still active (shorting link above the sensor i/p is IN) .If removing a sensor then this link should be removed or fault will be indicated.

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