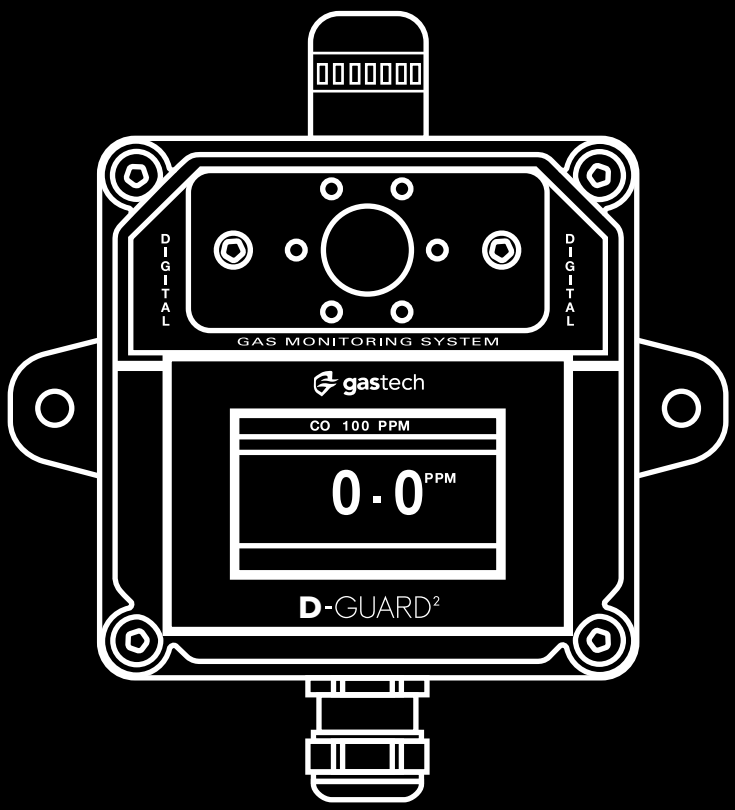
D-GUARD²S

INSTRUCTION MANUAL



t +61 8 6108 0000 e info@gastech.com w gastech.com

1 Introduction

The D-Guard²S is a single gas fixed detector with a large range of available sensors and an easy to use interface. The D-Guard²S features alarm relays and a sounder / strobe.

Figure 1. D-Guard²S.

2 Method of Operation

The D-Guard²S detects toxic or flammable gas and can interface with external equipment to trigger alarms or operate additional equipment. The D-Guard²S can be fitted with an oxygen sensor to measure the oxygen concentration in the environment.

The D-Guard²S detects gas via diffusion to the sensor at normal atmospheric pressure.

3 For Your Safety

Warning: Do not make changes to this D-Guard²S without the express written permission of Gastech Australia Pty Ltd. Changes that are not approved can cause death or injury to personnel.

4 Further Information

Please tell us if you want help with this equipment.

Head Office: Gastech, 24 Baretta Road, Wangara, WA 6065, Australia.

Phone: +61 8 6108 0000 Email: info@gastech.com Website: gastech.com

Table of Contents

1 Introduction 2
2 Method of Operation 2
3 For Your Safety 2
4 Further Information 2
5 List of Figures 5
6 Keywords and Symbols Used in This Manual 6
7 Intended use 7
8 Safety Precautions 7
9 Models covered by this instruction manual 7
10 What is in the Box? 8
11 Installation Information 9
11.1 D-Guard²S Mechanical Installation 9
12 Electrical Installation 10
13 Response Test 11
14 Operation 12
14.1 Power up 13
14.2 Home screen features 14
14.3 Unlock the menu screen 14
14.4 Passcode Requested 15
15 Calibration 16
15.1 Go to the calibration menu 16
15.2 Attach the calibration gas to the D-Guard²S 17
15.3 Calibration Modes 18
15.4 Calibration Trend Bar 18
15.5 Auto Zero Calibration. 19
15.6 Auto Span Calibration 20
15.7 Manual Zero Calibration 21
15.8 Manual Span Calibration 22
16 System Information 23
17 Status 24
17.1 Clear Latched Alarms 24
18 Sensor Settings 25
18.1 Go to the Sensor Settings Menu 25
18.2 Set Detector Full Scale 26
18.3 Set Span Gas Concentration 27
18.4 Set Zero Gas Concentration 28
18.5 Set Suppression Band 29
18.6 Sensor Gain 30

19 Alarm Settings 31
19.1 Go to the Alarm Settings menu 31
19.2 Alarm Direction 32
19.3 Alarm Level 33
19.4 Alarm Relay state 34
19.5 Alarm Latch 35
19.6 Latched Alarm Examples 36
20 System Settings 37
20.1 Access the System Settings 37
20.2 Isolate 38
20.3 Set Passcode 39
20.4 Disable Passcode 40
21 Advanced Settings 41
21.1 Go to the Advanced Settings Menu 41
21.2 System Calibration 42
21.3 4-20mA Output Test 43
21.4 Relay Function Test 44
21.5 Reset Sensor Life 45
21.6 Sensor Presets 46
22 Error Codes 47
23 4-20mA Output Fault Conditions 47
24 Specifications 48
24.1 Enclosure Specifications 48
24.2 Mechanical Specifications 50
24.3 Environmental Specifications 50
24.4 General Specifications 51
24.5 Wiring Specifications 51
24.6 D-Guard²S Versions, Gas, Range, and Resolution 52
25 Warranty 53
25.1 Sensor Warranty periods 53
26 Replacement Parts 54
26.1 Replacement Parts - exploded view 54
26.2 Replacement parts - list 55
26.3 Replacement parts - Oxygen Sensor Orientation 55
27 PCBA Configuration Jumpers 56
27.1 Main PCBA 57-0028 Jumper Settings 56
27.2 Relay PCBA 57-1011 Jumper Settings 57
28 Maintenance 58
28.1 Calibration Interval 58
28.2 Cleaning 58
28.3 Visual Inspection 58
29 Gastech Policy Statements 59

5 List of Figures

Figure 1. D-Guard²S. 2
Figure 2. Keywords and symbols used in this manual. 6
Figure 3. List of supplied items. 8
Figure 4. D-Guard²S mounting dimensions in millimetres. 9
Figure 5. Arrows show magnetic sensor positions. 12
Figure 6. D-Guard²S menu icons. 12
Figure 7. D-Guard²S splash screen. 13
Figure 8. D-Guard²S at sensor warm up. 13
Figure 9. D-Guard²S normal operating screen. 13
Figure 10. Main display layout. 14
Figure 11. Menu locked. 14
Figure 12. Menu unlocked. 14
Figure 13. Trend Bar states. 18
Figure 14. Sensor Gain Warning. 26
Figure 15. Span Gas Concentration Warning. 27
Figure 16. Zero Gas Concentration Warning. 28
Figure 17. Sensor gain warning. 30
Figure 18. Minimum alarm level warning. 33
Figure 19. Maximum alarm level warning. 33
Figure 20. AL1 and AL2 Latched. 36
Figure 21. AL1 Latched. 36
Figure 22. AL2 Latched. 36
Figure 23. D-Guard²S home screen when isolated. 38
Figure 24. Error codes. 47
Figure 25. 4-20 mA output loop fault currents. 47
Figure 26. D-Guard²S dimensions in millimetres (front view). 48
Figure 27. D-Guard²S dimensions in millimetres (side view). 49
Figure 28. D-Guard²S Mechanical specifications. 50
Figure 29. D-Guard²S Environmental specifications. 50
Figure 30. D-Guard²S General Specifications. 51
Figure 31. D-Guard²S Electrical connections. 51
Figure 32. D-Guard²S versions. 52
Figure 33. Sensor warranty periods in months. 53
Figure 34. D-Guard²S replacement parts - exploded view. 54
Figure 35. D-Guard²S replacement parts list. 55
Figure 36. 65-8000-O2-A3 Sensor locating pin. 55
Figure 37. PCBA 57-0028 jumper locations. 56
Figure 38. PCBA 57-0028 jumper settings. 56
Figure 39. PCBA 57-1011 jumper locations and settings. 57
Figure 40. Splash Guard. 58

6 Keywords and Symbols Used in This Manual

Symbol	Keyword	Description
No Symbol	Warning	Warning: Do not (warning text). Can cause injury or death to personnel.
No Symbol	Caution	Caution: Do not (caution text). Can cause damage to parts or equipment.
	Service tool	Combined magnetic wand and hex key service tool
	Calibration plug	Calibration adapter
No Symbol	Full Scale	The user selectable range of the detector. This cannot exceed the maximum range of the sensor.
No Symbol	Suppression Band	The suppression band prevents the D-Guard²S from displaying small changes in the detected gas level close to zero.
No Symbol	Sensor Gain	The sensor gain adjusts the amplification of the sensor output.
No Symbol	AL1	User configurable Alarm 1
No Symbol	AL2	User configurable Alarm 2
No Symbol	IP	Ingress Protection Rating

Figure 2. Keywords and symbols used in this manual.

7 Intended use

The D-Guard²S is designed as a fixed gas detector with a 4-20 mA current loop output. The detector can interface with external equipment to transmit gas levels and trigger external alarm devices.

Warning: The D-Guard²S detects toxic and flammable gases and oxygen concentrations. These gases can cause injury or death to personnel.

Warning: The D-Guard²S is not a personal gas detector. If you do not use a personal gas detector this can cause injury or death to personnel.

Warning: Do not use the D-Guard²S in an explosive or oxygen rich atmosphere. An explosion can cause injury or death to personnel.

8 Safety Precautions

Warning: You must obey all caution and warning statements in this instruction manual. Failure to obey can result in injury or death to personnel.

Warning: You must do a response test before first use. Incorrect calibration can result in injury or death to personnel.

9 Models covered by this instruction manual

Caution: This manual is intended for the non-certified D-Guard²S. The D-Guard²S features alarm relays and a sounder / strobe. Do not use this manual for other models in our range.

Please refer to the D-Guard²S Versions for a list of all models covered by this manual.

10 What is in the Box?

Item	Description
	D-Guard²S gas detector
	D-Guard²S Service Tool. The service tool activates the internal menu magnetic sensors and includes an integrated 4mm hex key to open the enclosure.
	The Quick Start Guide (QSG) provides a brief overview of the installation and operation of the D-Guard²S gas detector.
	Calibration Certificate. The D-Guard²S is factory calibrated before dispatch.
	Calibration plug

Figure 3. List of supplied items.

11 Installation Information

Warning: The D-Guard²S must be installed by an approved person. Incorrect installation can cause injury or death to personnel.

11.1 D-Guard²S Mechanical Installation

The D-Guard²S should be mounted vertically to a suitable flat surface. Make sure the cable gland faces the ground. Use the two mounting eyes with M6 fasteners suitable for the surface type. Make sure the data plate, on the right hand side, remains visible after installation.

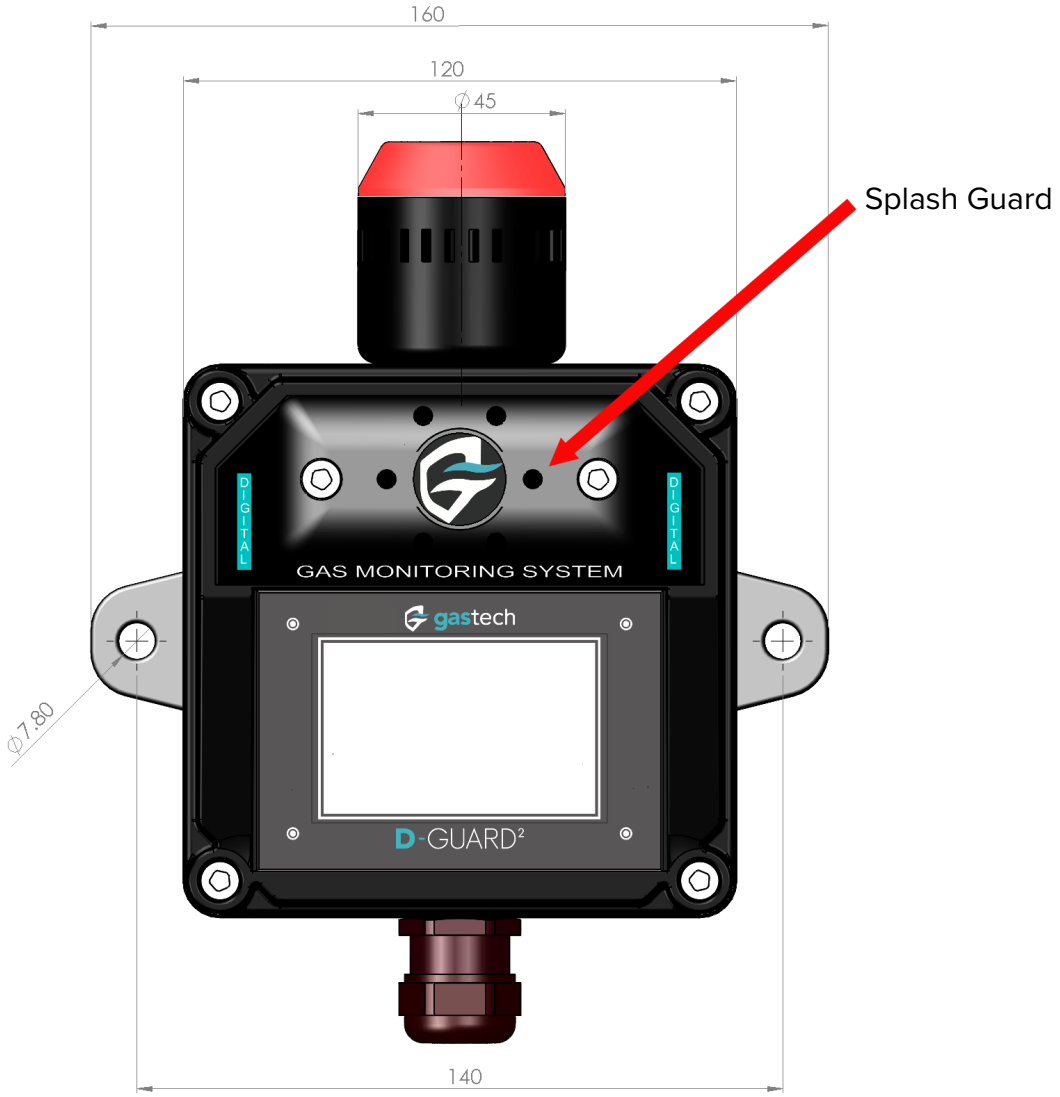


Figure 4. D-Guard²S mounting dimensions in millimetres.

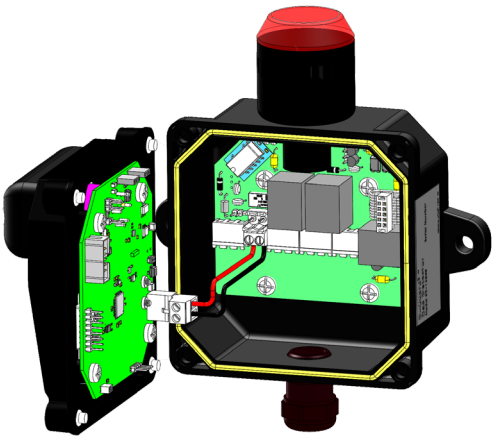
Caution: Do not over tighten the M6 fasteners as this can cause distortion of the enclosure.

Caution: Water or dust on the Splash Guard can interfere with gas detection.

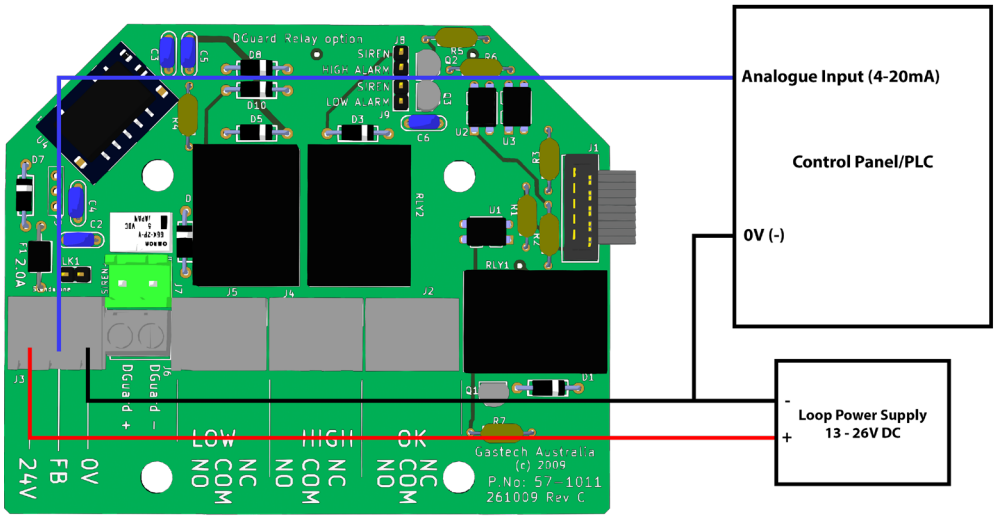
12 Electrical Installation

Warning: The D-Guard²S must be installed by an approved person. Incorrect installation can cause injury or death to personnel.

Step 1. Loosen the 4 screws holding the top case on.



Step 2. Open the D-Guard²S enclosure.



Step 3. Connect the D-Guard²S as shown. The DC supply voltage is 13 - 26 V.

Step 4. You must use suitable cable. Refer to the Wiring Specifications.

13 Response Test

Warning: You must do a response test before first use. Incorrect calibration can result in injury or death to personnel.

The D-Guard^{2}S has been calibrated before dispatch.

The D-Guard^{2}S must be response tested when it is first commissioned and as necessary during use.

Step 1. Apply gas to the D-Guard^{2}S.

Step 2. Apply the gas for at least 3 minutes or until the indicated concentration is within ±10% of the applied gas concentration. Gas flow rate must be greater than or equal to 1L/min.

Caution: You must recalibrate the D-Guard^{2}S if its results do not agree with this specification. Go to the Calibration menu.

14 Operation

The D-Guard²S menu system is controlled by the D-Guard²S Service Tool (supplied). Four magnetic sensors, located behind the display window, are activated by the Service Tool. The four marks on the D-Guard²S display match the magnetic sensor positions.

The menu system uses custom icons and text to give information to the user. To access a function, use the Service Tool on the magnetic sensor that is next to the icon displayed on the screen.

Note: **If an icon is not shown, that adjacent magnetic sensor has no function on that screen.**

Figure 5. Arrows show magnetic sensor positions.

Icon	Description	Icon	Description	Icon	Description	Icon	Description
	Locked		Alert		Alarm		Increase
	Calibrate		Home		Alarm muted		Decrease
	Information		Settings		Alarm latched		Skip
	Down		Up		Accept		Start
	Left		Right				

Figure 6. D-Guard²S menu icons.

14.1 Power up

Connect power to D-Guard²S and energise the unit.

Figure 7. D-Guard²S splash screen.

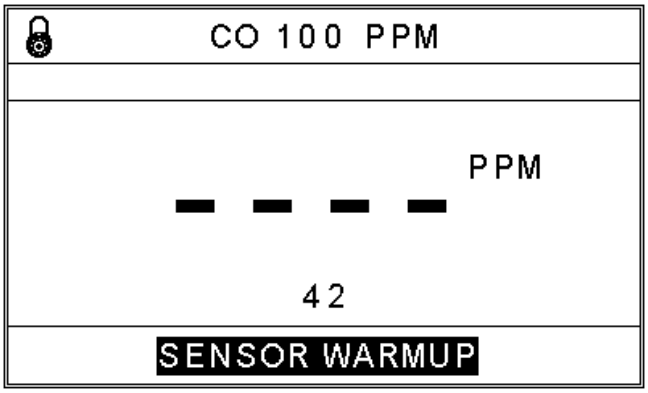


Figure 8. D-Guard²S at sensor warm up.

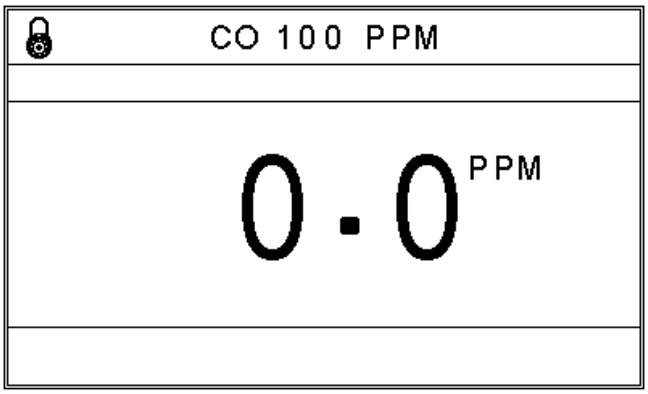


Figure 9. D-Guard²S normal operating screen.

Caution: You must wait 30 minutes for the D-Guard²S to become stable. You can calibrate it after 30 minutes.

Caution: Some sensors may need up to 24 hours to become stable before calibration is tried.

14.2 Home screen features

The home screen is the main display that will be visible. It shows the installed gas sensor, range and the current reading. System alerts are displayed at the bottom.

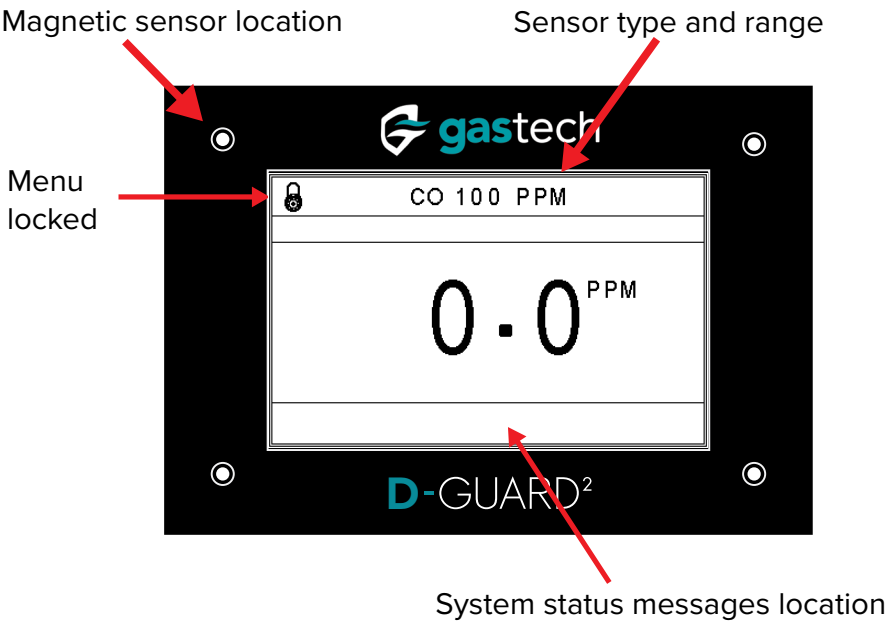


Figure 10. Main display layout.

The D-Guard²S is normally locked and must be unlocked with the supplied Service Tool.

14.3 Unlock the menu screen

Put the Service Tool over the magnetic sensor location closest to the padlock icon for at least one second to unlock the D-Guard²S.

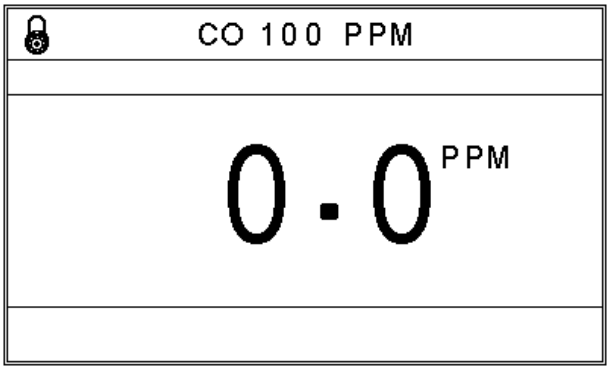


Figure 11. Menu locked.

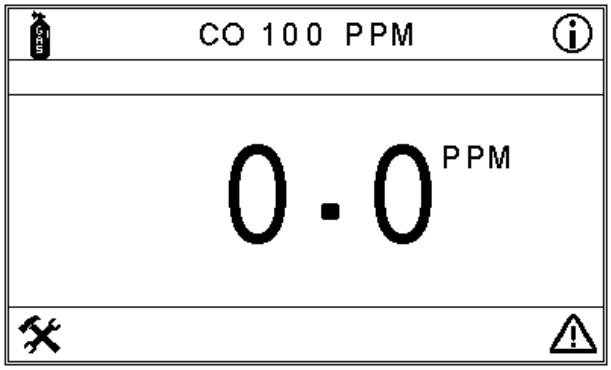


Figure 12. Menu unlocked.

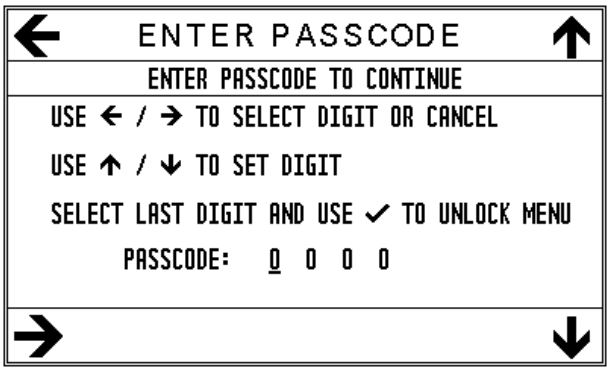
Note: **If no passcode is set the menu system will unlock.**

14.4 Passcode Requested

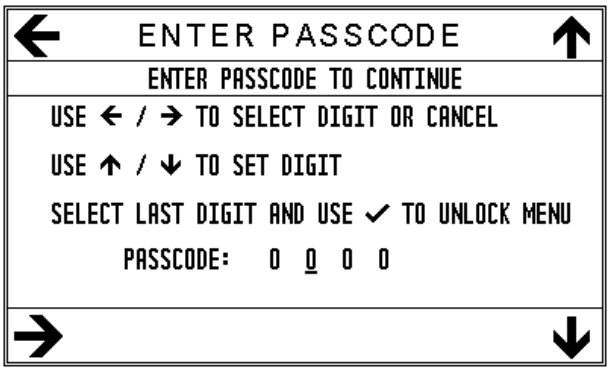
You must enter the passcode when prompted.

Caution: **The Enter Passcode screen only appears when a passcode has been set.**

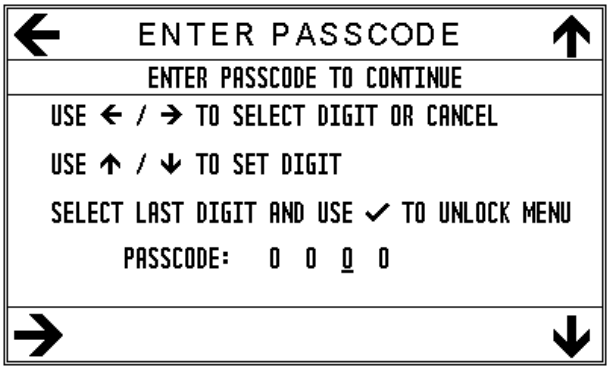
Note: **The line below the number indicates which digit will change.**



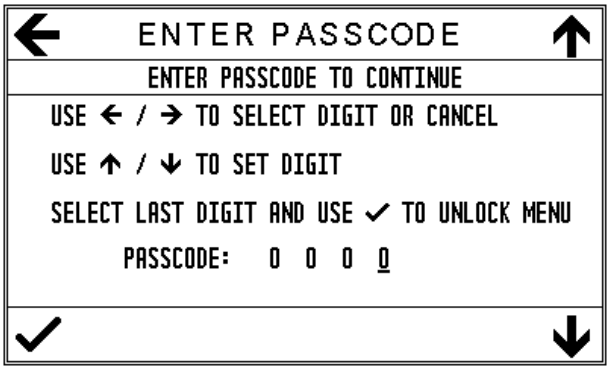
Step 1. Change the value with the ↓↑ keys.



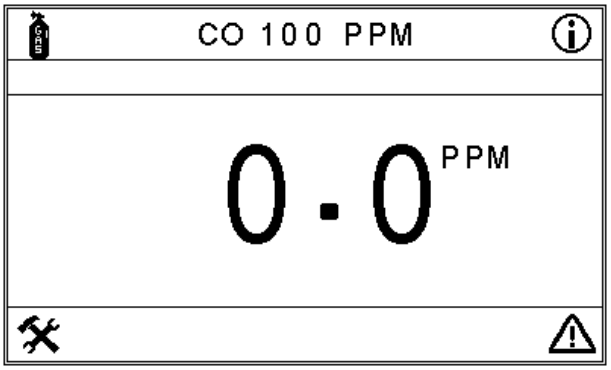
Step 2. Accept the value with the → key.



Step 3. Accept the value with the → key.



Step 4. Accept the value with the ✓ key.



Step 5. The menu is unlocked.

Caution: **If you forget the passcode, you must return the D-Guard²S to a Gastech Service Centre.**

15 Calibration

The D-Guard²S is factory calibrated before dispatch. You must calibrate the D-Guard²S regularly. Calibration adjusts the response of the D-Guard²S to known concentrations of gas at two points, zero and span.

Zero calibration uses zero-grade air or fresh air, which does not contain any trace of the detectors intended target gas. You can set the concentration of zero calibration gas.

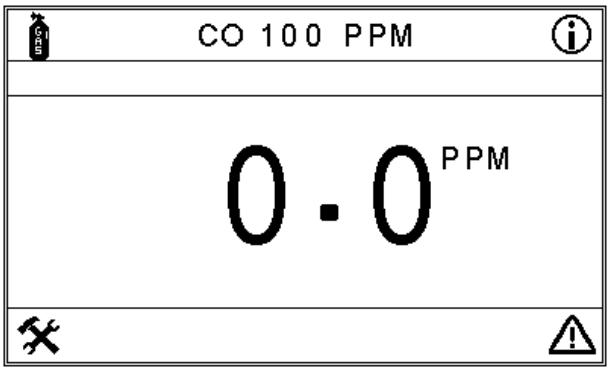
Span calibration uses a known concentration of the intended target gas. You can set the concentration of span calibration gas.

Warning: Use the calibration plug for each calibration or bump test. Incorrect calibration can result in injury or death to personnel.

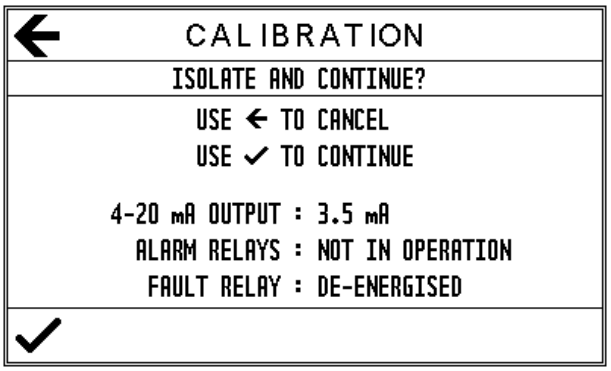
15.1 Go to the calibration menu

Make sure the menu screen is unlocked.

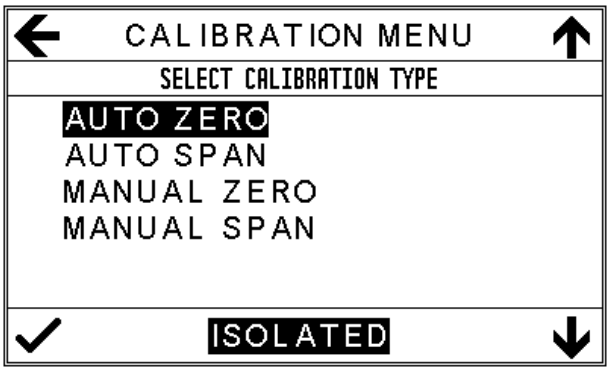
Put the Service Tool over the magnetic sensor location closest to the gas cylinder icon for one second to access the calibration menu.



Step 1. Use to enter the calibration menu.



Step 2. Use ✓ to continue or ← to go back.



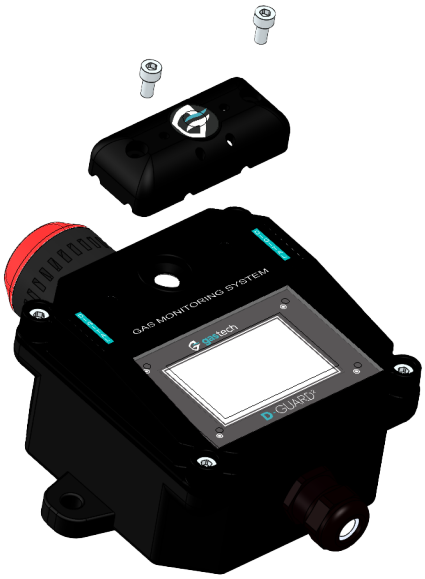
Step 3. Calibration menu.

Note: If CANCEL was selected, the D-Guard²S will auto lock after a ten second delay.

Warning: A competent person must calibrate the D-Guard²S. Incorrect calibration can cause injury or death to personnel.

15.2 Attach the calibration gas to the D-Guard²S

The D-Guard²S is a normally aspirated gas detector that operates at normal atmospheric pressure. A calibration plug is provided to make sure that gas is applied correctly to the sensor.



Step 1. Remove the splash guard.

Step 2. Fit the calibration plug.

Step 3. Attach tubing to the calibration plug.

Step 4. Use a 1L / min fixed flow regulator.

15.3 Calibration Modes

The D-Guard²S has two calibration modes, Auto and Manual.

The Auto calibration mode checks that the rate of change of the detected gas has decreased to less than ± 0.1% of full scale per second, and adjusts the D-Guard²S response automatically.

The Manual calibration mode allows the user to adjust the D-Guard²S calibration when the response has stabilised.

Use the Trend Bar to determine when the rate of change of the detected gas has decreased to less than ± 0.1% of full scale per second.

15.4 Calibration Trend Bar

The D-Guard²S has a trend bar to show the detected rate of change of the applied gas. The trend bar has seven different positions and provides a clear visual indication of the rate of change of the detected gas concentration levels.

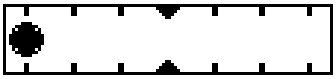
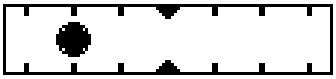
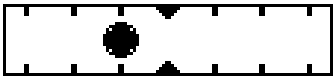
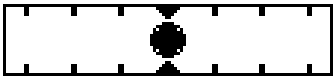
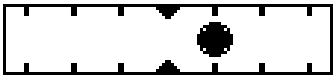
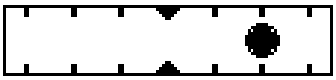
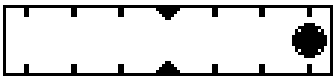
Trend Bar State	Concentration	Percentage full scale Rate of change / second
	Falling	> 3%
	Falling	1% < x ≤ 3%
	Falling	0.1% ≤ x ≤ 1%
	Stable	< ± 0.1%
	Rising	0.1% ≤ x ≤ 1%
	Rising	1% < x ≤ 3%
	Rising	> 3%

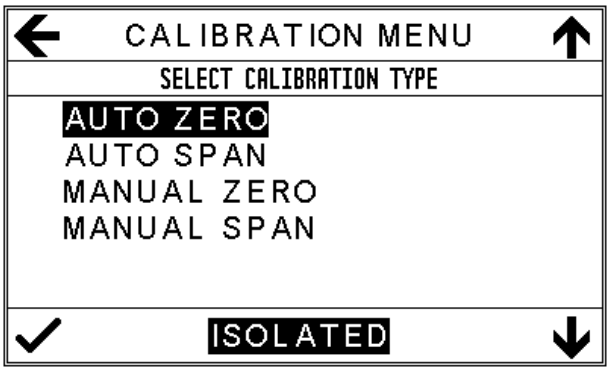
Figure 13. Trend Bar states.

Warning: A competent person must calibrate the D-Guard²S. Incorrect calibration can result in injury or death to personnel.

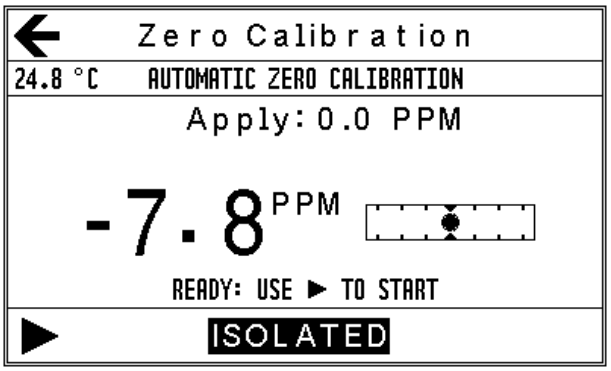
15.5 Auto Zero Calibration.

Auto zero calibration is part of the Calibration menu.

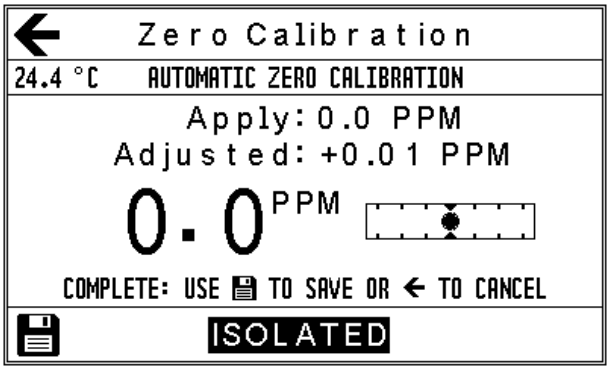
Note: **Fresh air can be used in place of zero-grade air.**



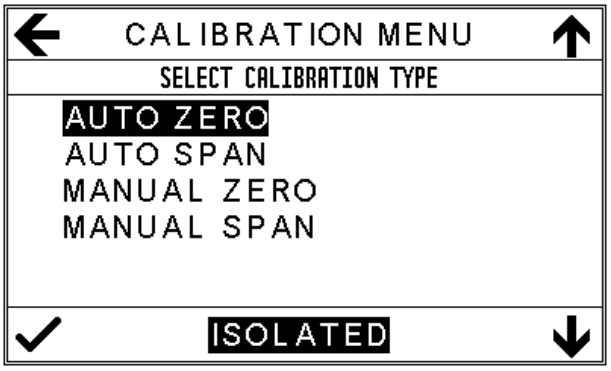
Step 1. Use ✓ to go into the auto zero calibration.



Step 2. Apply the correct gas. Use ▶ to start.

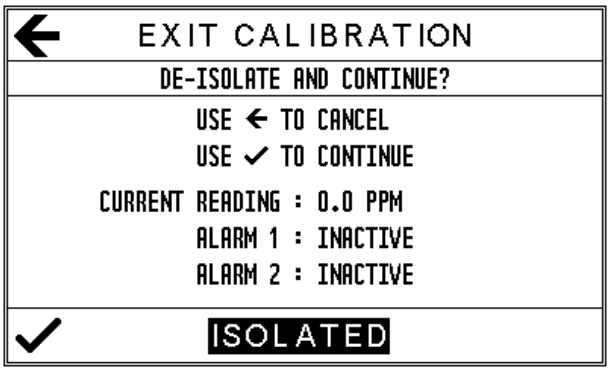


Step 3. Use 💾 to save or ← to cancel.

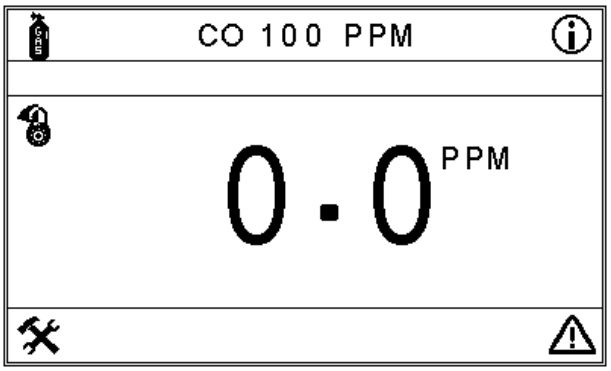


Step 4. Use ← to go back or ✓ to continue.

Caution: **You must monitor the alarm states before you exit the calibration menu. Alarms can remain active until the calibration gas has been removed from the sensor.**



Step 5. Use ✓ to go back or ← to cancel.



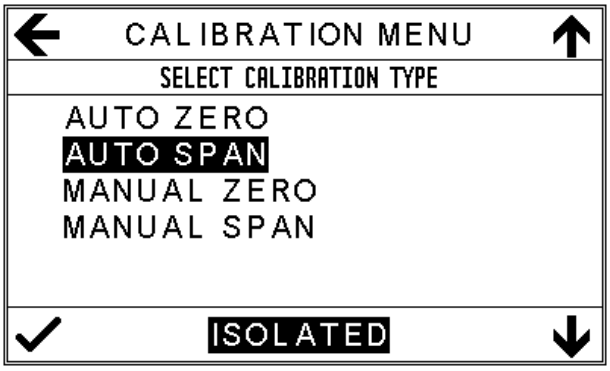
Step 6. Calibration completed.

Note: **The D-Guard²S Auto Calibration mode determines when the rate of change of the applied gas has decreased to less than ± 0.1% of full scale per second.**

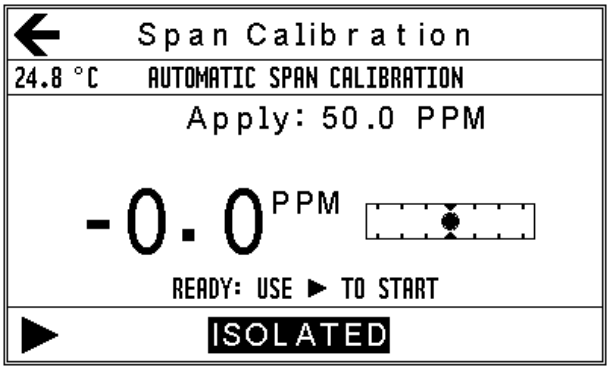
Warning: **A competent person must calibrate the D-Guard²S. Incorrect calibration can result in injury or death to personnel.**

15.6 Auto Span Calibration

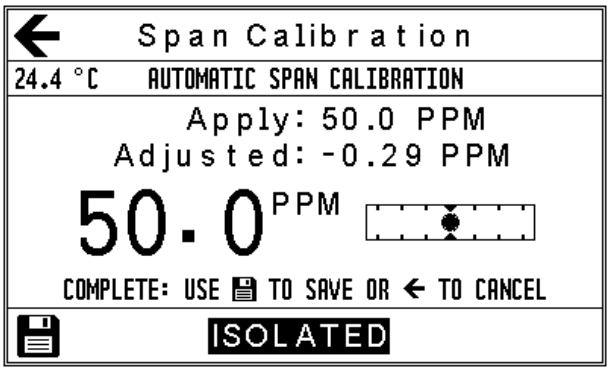
Auto span calibration is part of the Calibration menu.



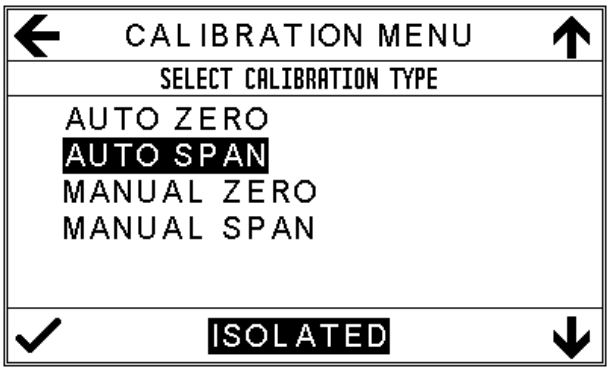
Step 1. Use ✓ to go into the auto span calibration.



Step 2. Apply the correct gas. Use ▶ to start.

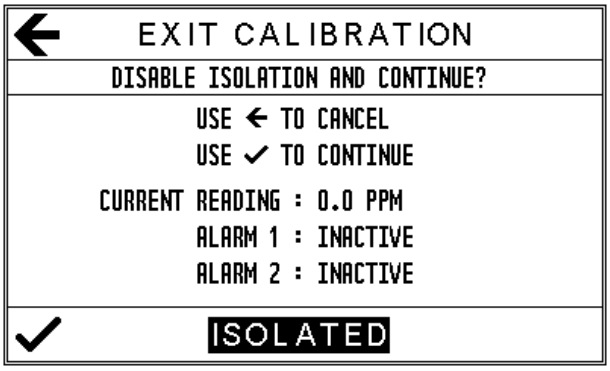


Step 3. Use to save or ← to cancel.

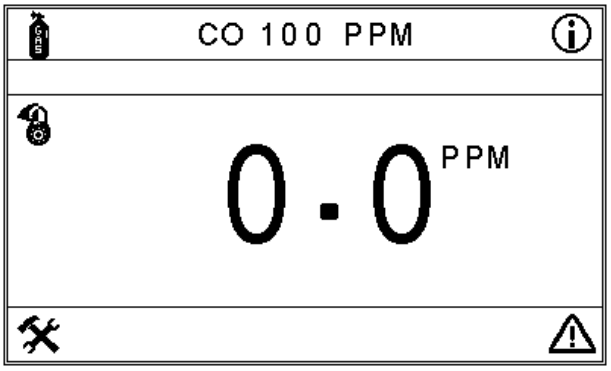


Step 4. Use ← to go back or ✓ to continue.

Caution: **You must monitor the alarm states before you exit the calibration menu. Alarms can remain active until the calibration gas has been removed from the sensor.**



Step 5. Use ✓ to go back or ← to cancel.



Step 6. Calibration completed.

Note: **The D-Guard²S Auto Calibration mode determines when the rate of change of the applied gas has decreased to less than ± 0.1% of full scale per second.**

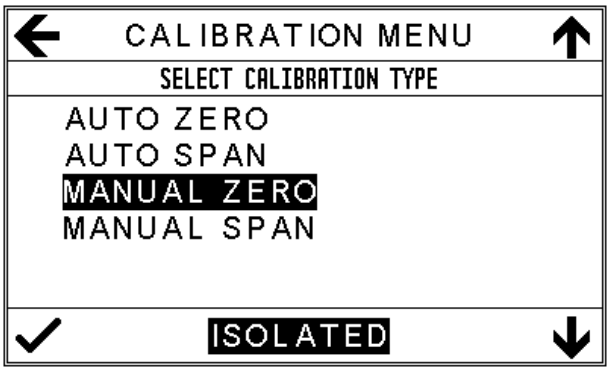
Warning: **A competent person must calibrate the D-Guard²S. Incorrect calibration can result in injury or death to personnel.**

15.7 Manual Zero Calibration

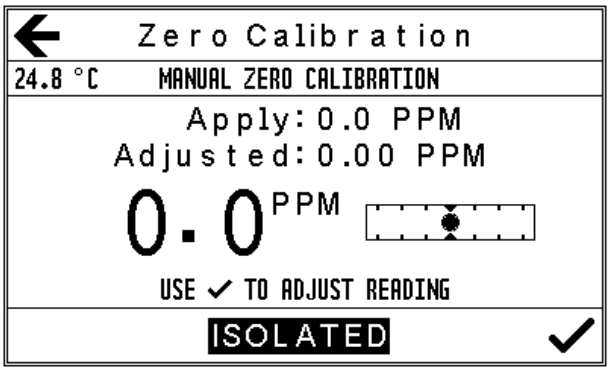
Manual zero calibration is part of the Calibration menu.

Note: **Fresh air can be used in place of zero-grade air.**

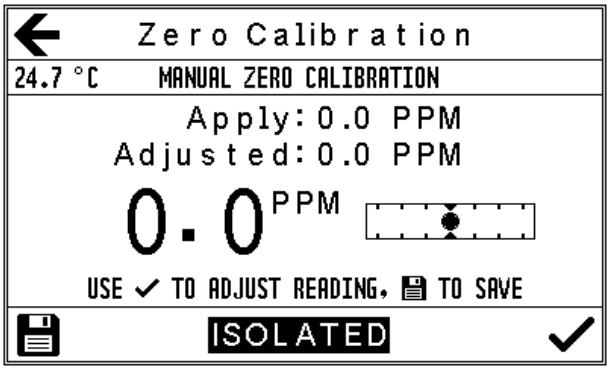
Note: **The D-Guard²S Trend Bar is used to determine when the rate of change of the applied gas has decreased to less than ± 0.1% of full scale per second.**



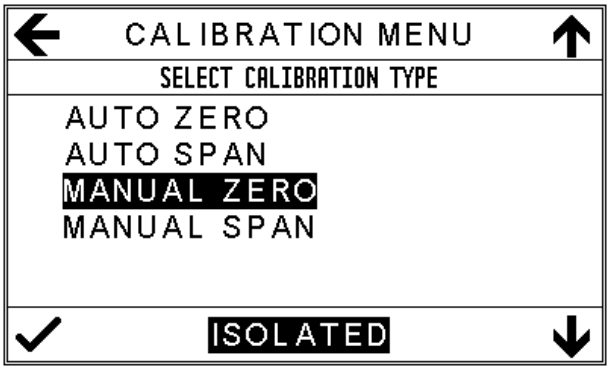
Step 1. Use ✔ to go into the manual zero calibration.



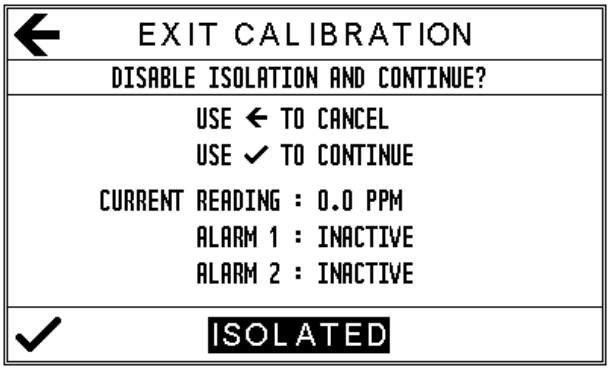
Step 2. Apply the correct gas. Use ✔ to adjust.



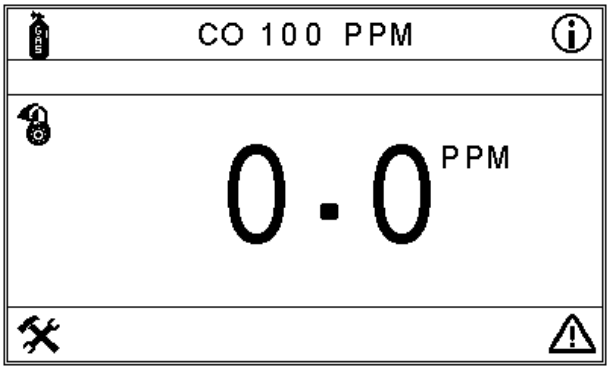
Step 3. Use ✔ to adjust or to save.



Step 4. Use ← to go back or ✔ to continue.



Step 5. Use ✔ to go back or ← to cancel.



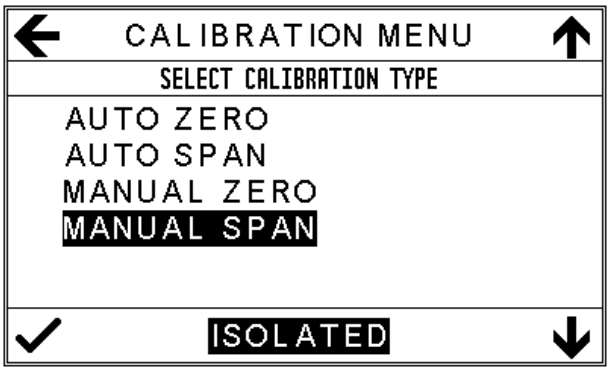
Step 6. Calibration completed.

Warning: **A competent person must calibrate the D-Guard²S. Incorrect calibration can result in injury or death to personnel.**

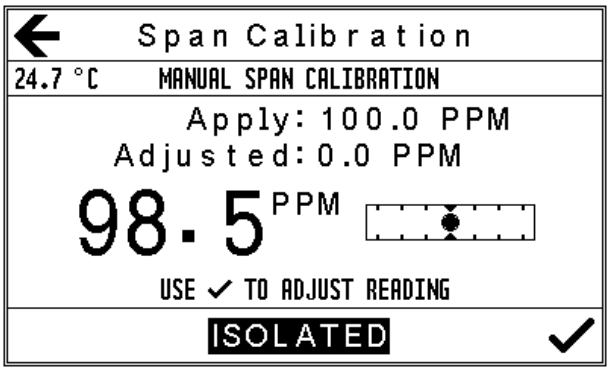
15.8 Manual Span Calibration

Manual span calibration is part of the Calibration menu.

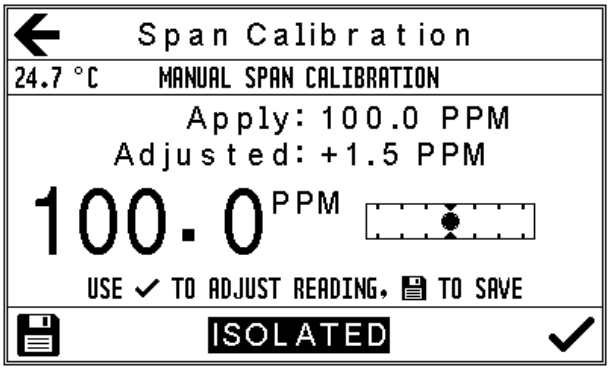
Note: **The D-Guard²S Trend Bar is used to determine when the rate of change of the applied gas has decreased to less than ± 0.1% of full scale per second.**



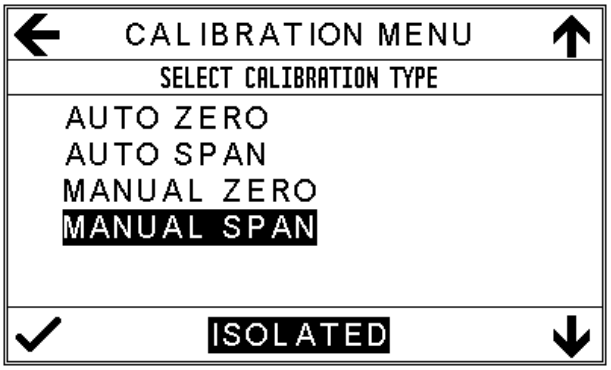
Step 1. Use ✓ to go into the manual span calibration.



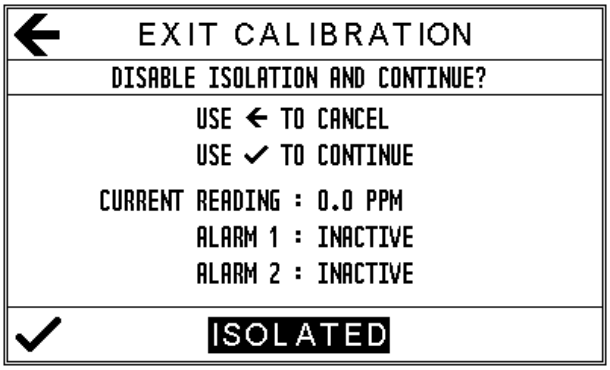
Step 2. Apply the correct gas. Use ✓ to adjust.



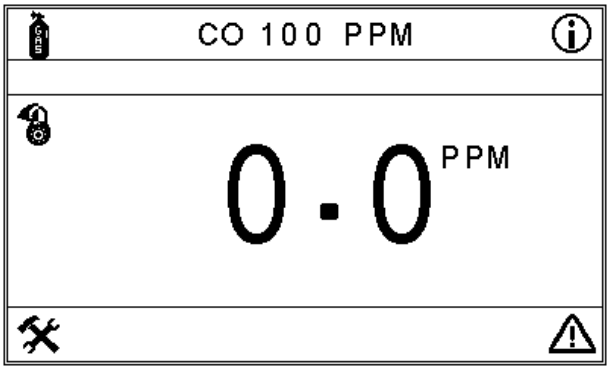
Step 3. Use ✓ to adjust or to save.



Step 4. Use ← to go back or ✓ to continue.



Step 5. Use ✓ to go back or ← to cancel.

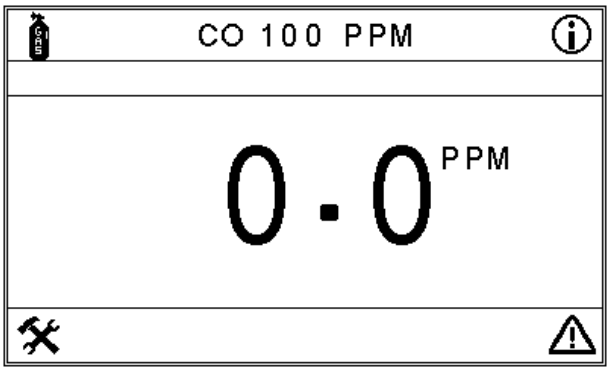


Step 6. Calibration completed.

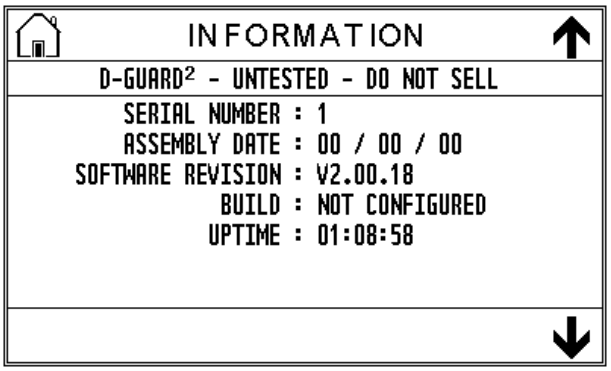
Warning: **A competent person must calibrate the D-Guard²S. Incorrect calibration can result in injury or death to personnel.**

16 System Information

The system information screens provide information about the hardware and firmware installed in the D-Guard²S. The sensor information screen contains useful diagnostic information about the installed sensor and its present and previous calibration information. Make sure the menu system is unlocked.

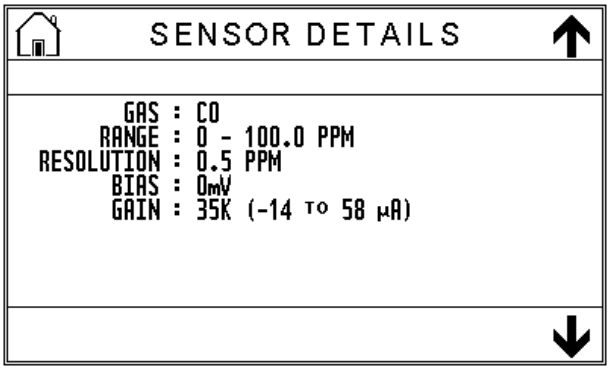


Step 1. Use ⓘ to go into the information screen.

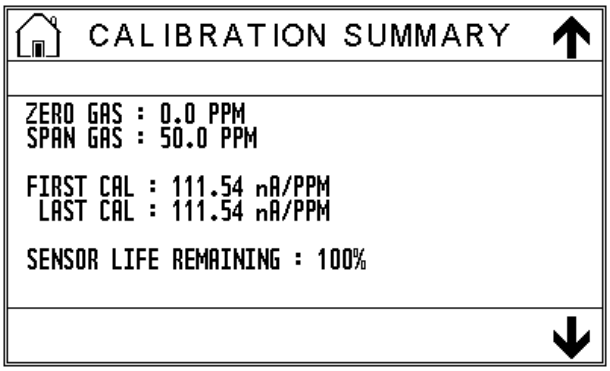


Step 2. Use ↓ to scroll.

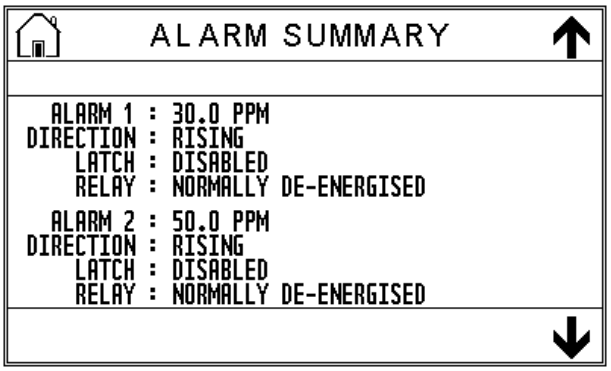
Step 3. Use ↓ to scroll.



Step 4. Use ⌂ to return to the home screen.



Step 5. Use ↓ to scroll.

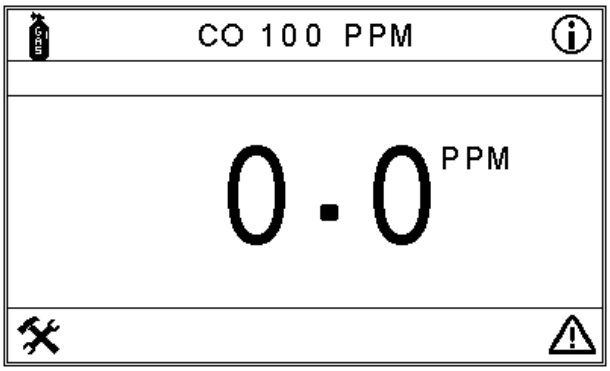


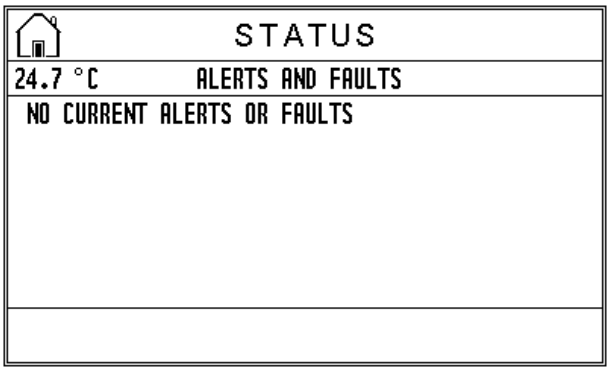
Step 6. Use ⌂ to return to the home screen.

Note: **The information screens can be scrolled in both directions.**

17 Status

The status screen gives information on any system status messages generated by the D-Guard²S. Make sure the menu system is unlocked.



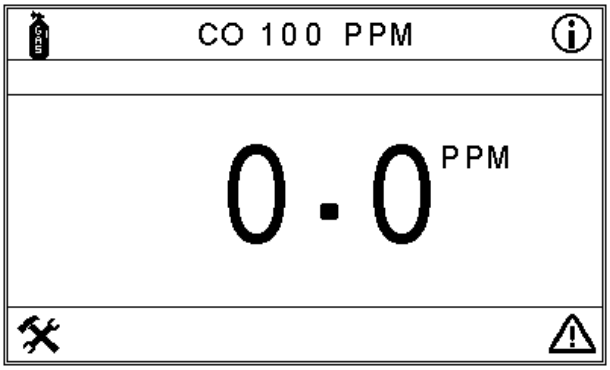


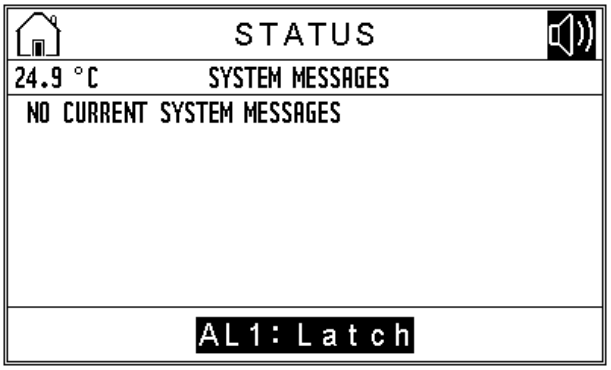
Step 1. Use ⚠ to go into the information screen.

Step 2. Use 🏠 to return to the home screen.

17.1 Clear Latched Alarms

Latched alarms must be cancelled manually.





Step 1. Use ⚠ to go into the status screen.

Step 2. Use 🔊 to cancel the alarm.

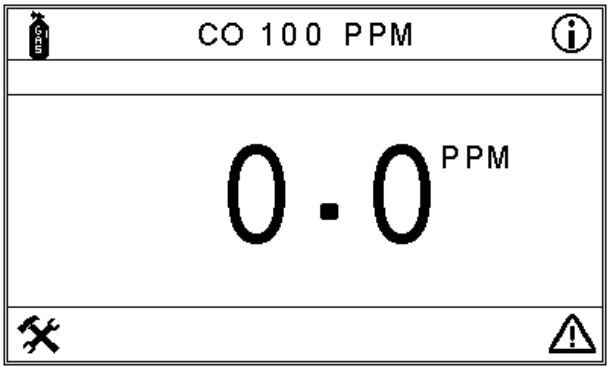
Note: All latched alarms are cancelled.

18 Sensor Settings

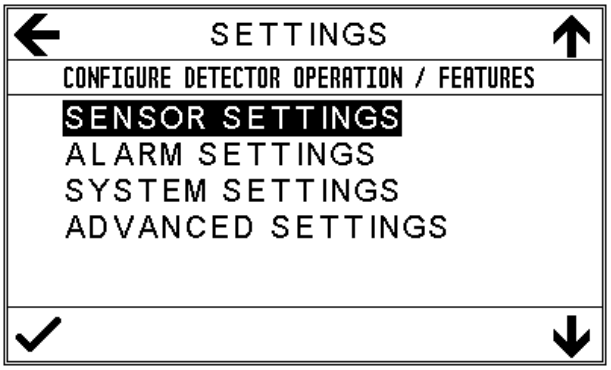
The D-Guard²S is factory configured when received. Use the Sensor Settings menu to change the user configurable parameters.

18.1 Go to the Sensor Settings Menu

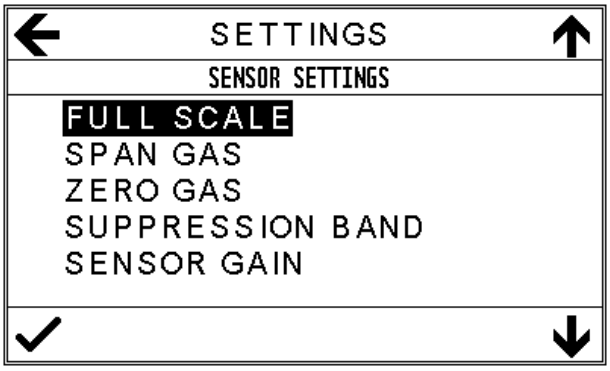
Make sure the menu screen is unlocked.



Step 1. Use 🛠 to go into the settings menu.



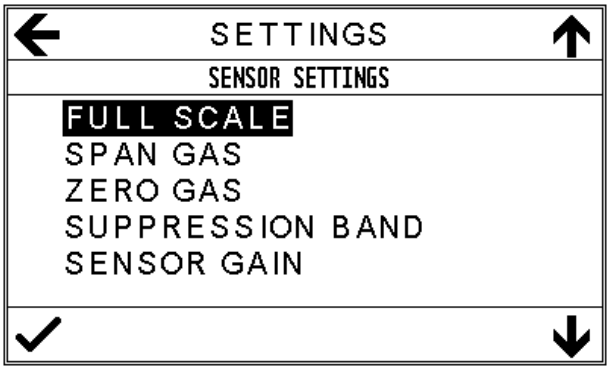
Step 2. Use ✓ to go into the sensor settings.



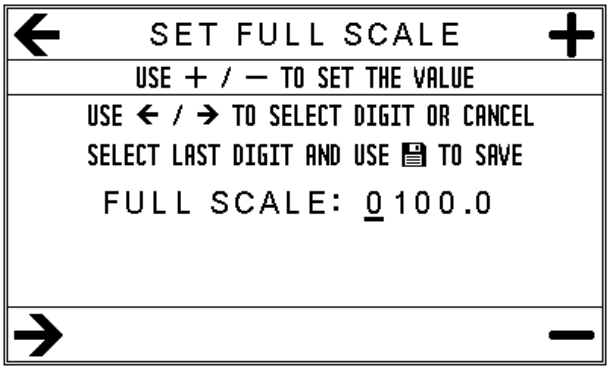
Step 3. Use ✓ to go into the full scale menu.

18.2 Set Detector Full Scale

The full scale setting is part of the Sensor settings menu.

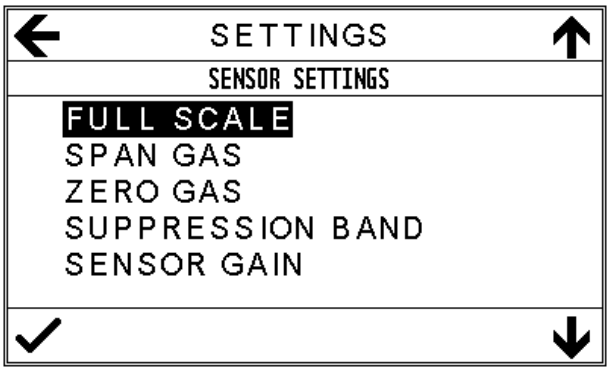


Step 1. Use ✓ to go into the full scale menu.

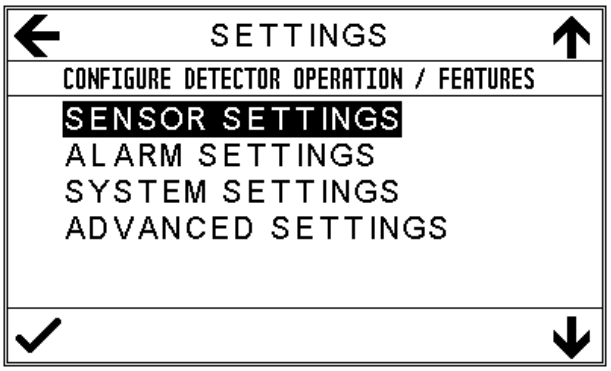


Step 2. Use + — to adjust then to save.

Caution: The full scale reading cannot be greater than the range of the fitted sensor.



Step 3. Use ← to return to the settings menu.



Step 4. Use ← to go back or ↓↑ to continue.

Caution: You must adjust the sensor gain if the maximum measurable signal error occurs.

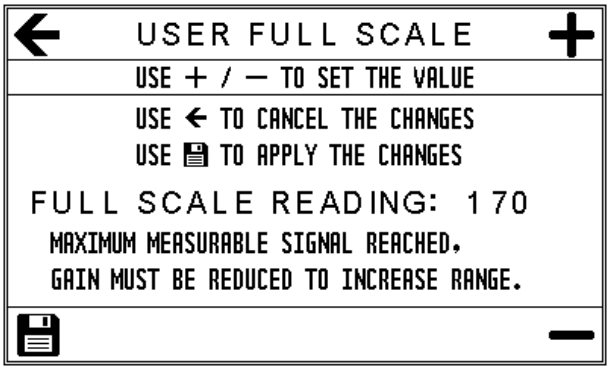
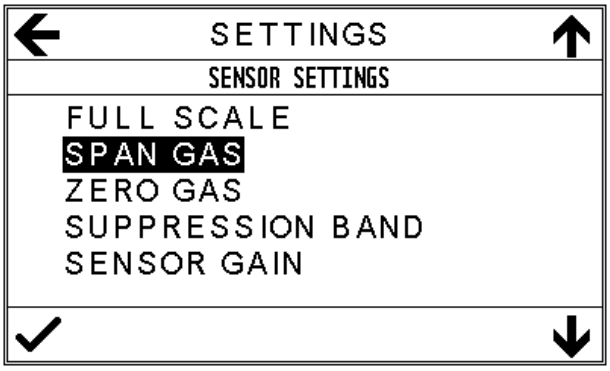


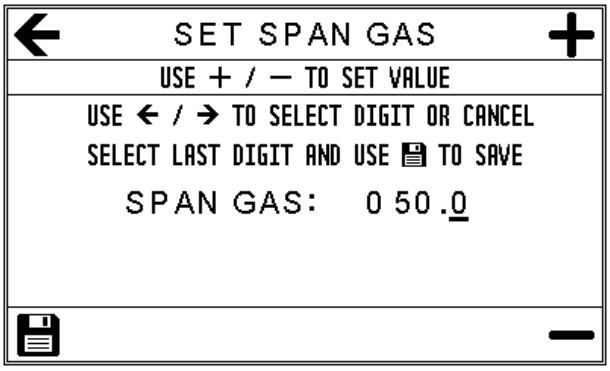
Figure 14. Sensor Gain Warning.

18.3 Set Span Gas Concentration

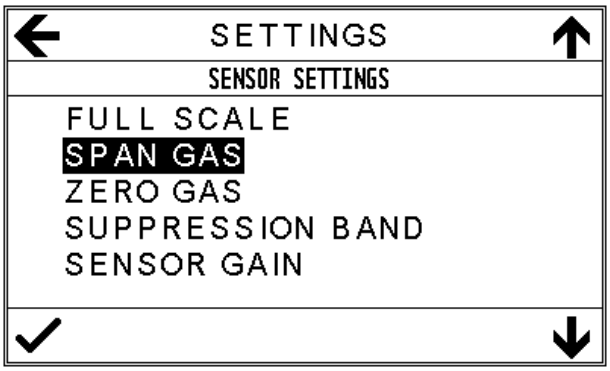
The span gas concentration value is part of the Sensor Settings Menu.



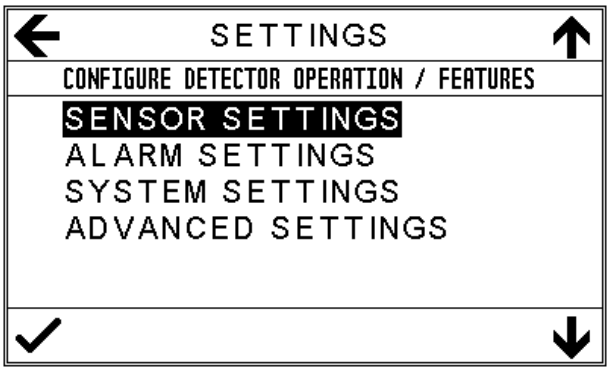
Step 1. Use ← to go back or ✓ to set the span gas.



Step 2. Use + — to adjust then 💾 to save.



Step 3. Use ← to return to the settings menu.



Step 4. Use ← to go back or ↓↑ to continue.

Caution: The span gas must be less than or equal to the full scale range. If you try to set the span gas concentration higher the D-Guard²S will show you.

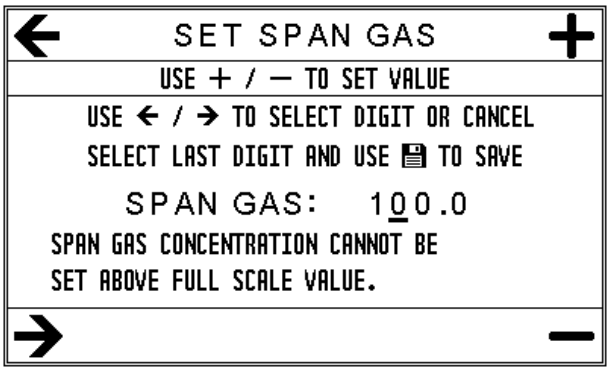
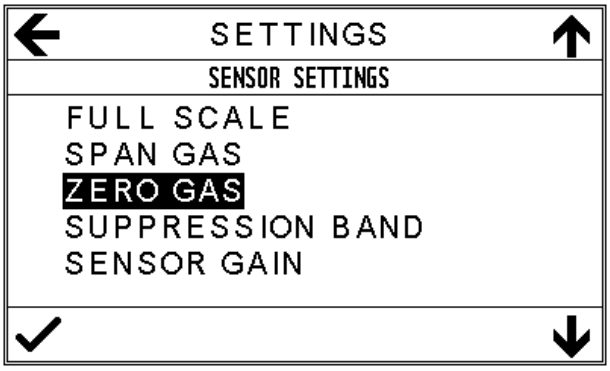


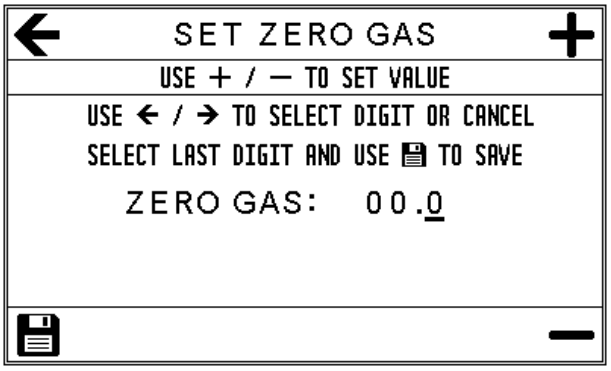
Figure 15. Span Gas Concentration Warning.

18.4 Set Zero Gas Concentration

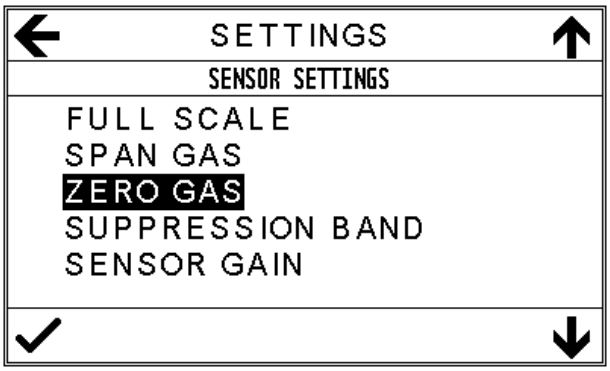
The zero gas concentration is part of the Sensor Settings Menu.



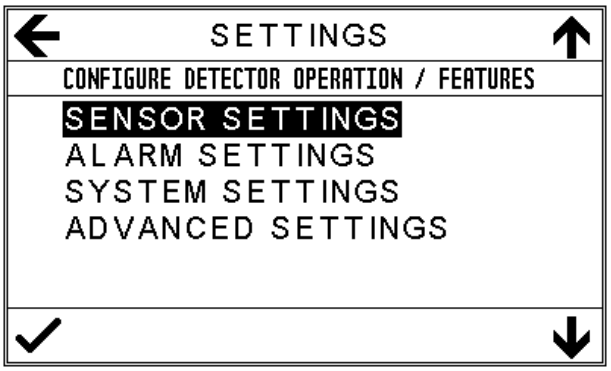
Step 1. Use ← to go back or ✓ to set the zero gas.



Step 2. Use + — to adjust then 💾 to save.



Step 3. Use ← to return to the settings menu.



Step 4. Use ← to go back or ↓↑ to continue.

Caution: **The zero gas must not be less than zero. If you try to set the zero gas concentration less than zero the D-Guard²S will show you.**

Note: **Fresh air can be used in place of zero-grade air.**

Caution: **Do not use fresh air for carbon dioxide sensor zero calibration. Fresh air contains low levels of carbon dioxide. You must use zero grade air or nitrogen instead.**

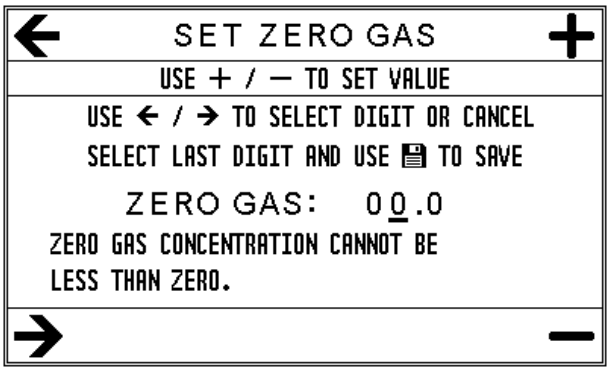
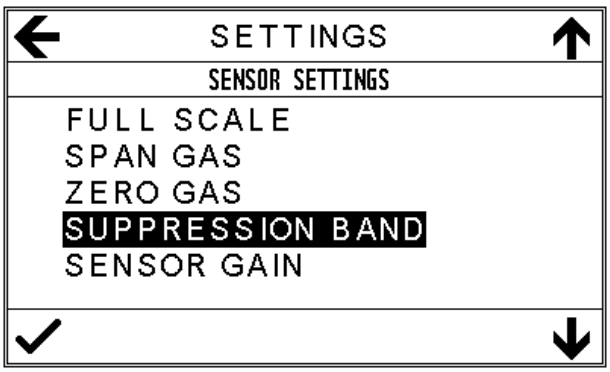


Figure 16. Zero Gas Concentration Warning.

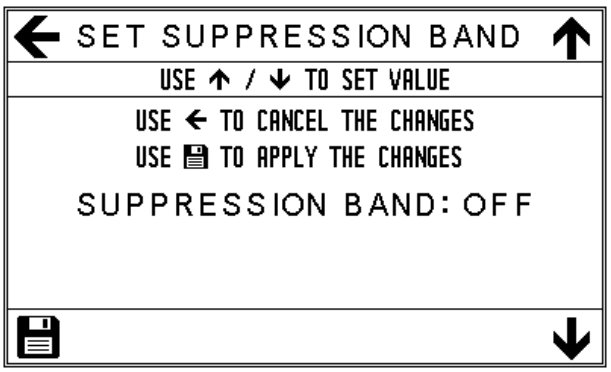
18.5 Set Suppression Band

The suppression band prevents the D-Guard²S from displaying small changes in the detected gas level close to zero. It is set to 1% of the full scale value and can be on or off.

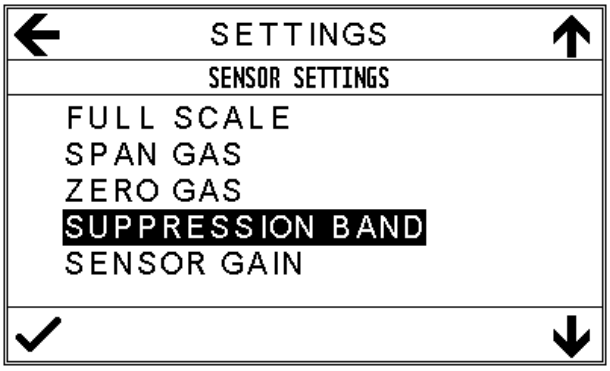
The suppression band setting is part of the Sensor Settings Menu.



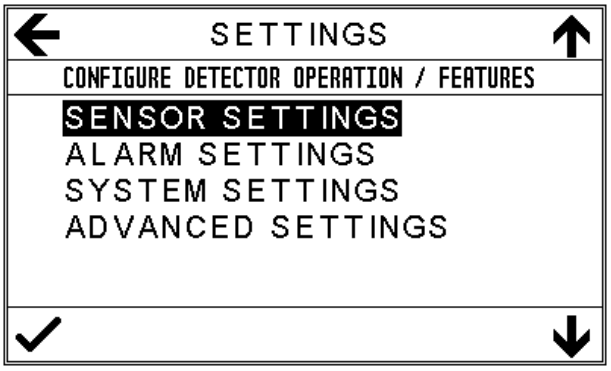
Step 1. Use ← to go back or ✓ to set the suppression band.



Step 2. Use ↓↑ to adjust then to apply.



Step 3. Use ← to return to the settings menu.



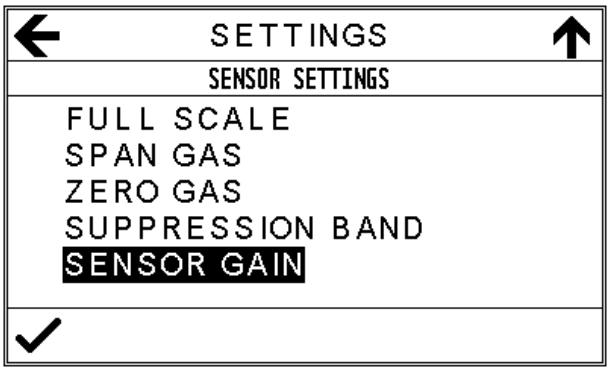
Step 3. Use ← to go back or ↓↑ to continue.

18.6 Sensor Gain

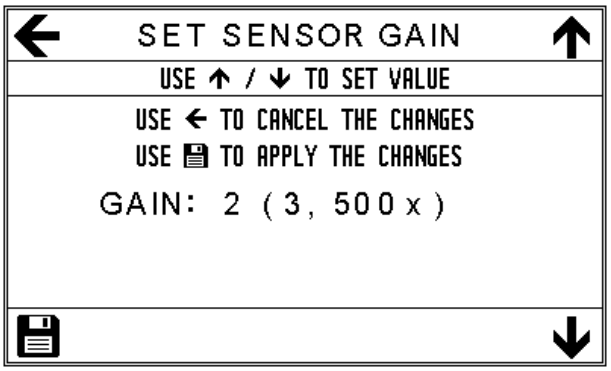
You can select a sensor type from the Sensor Presets menu. The sensor gain is automatically set.

You can adjust the sensor gain to compensate for differences between sensors of the same type or to change the full scale value for a sensor.

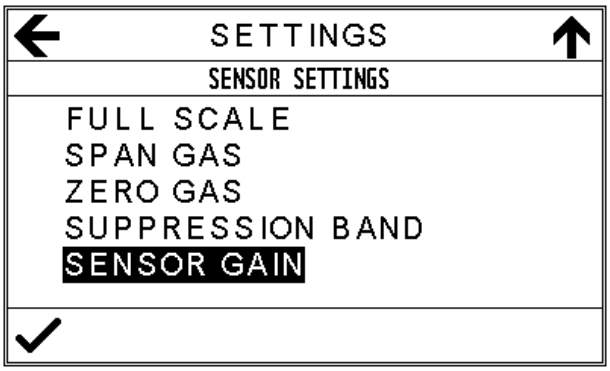
The sensor gain setting is part of the Sensor Settings Menu.



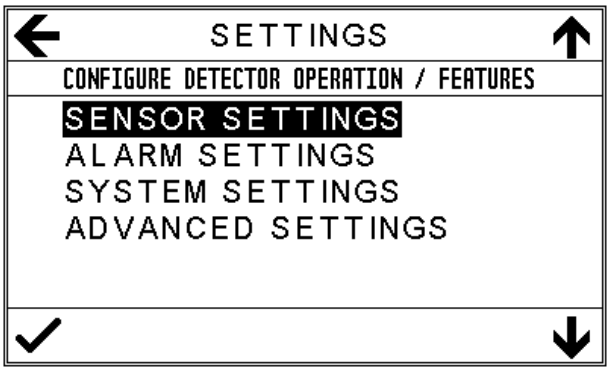
Step 1. Use ← to go back or ✓ to set the sensor gain.



Step 2. Use ↓↑ to adjust then to apply.



Step 3. Use ← to go back to the settings menu.



Step 3. Use ← to go back or ↓↑ to continue.

Caution: The sensor gain and the full scale value effect each other. If you try to set the gain too high the D-Guard²S will show you.

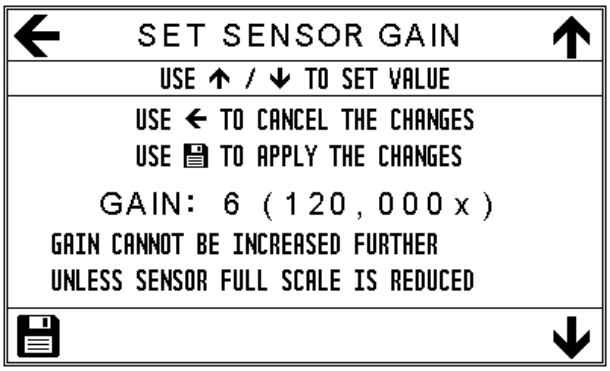


Figure 17. Sensor gain warning

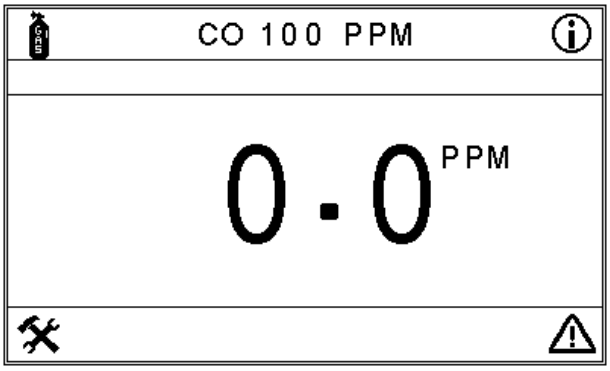
19 Alarm Settings

You can configure the D-Guard²S alarms. The D-Guard²S has two alarms: Alarm 1 (AL1) and Alarm 2 (AL2).

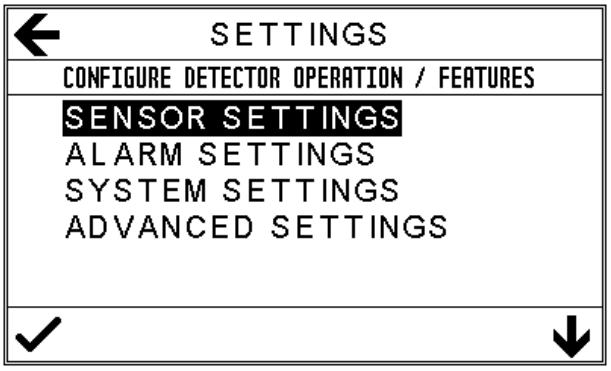
All alarm settings can be configured independently of each other.

19.1 Go to the Alarm Settings menu

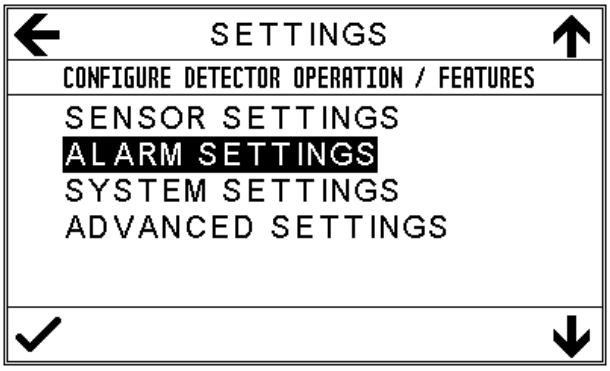
Make sure the menu system is unlocked.



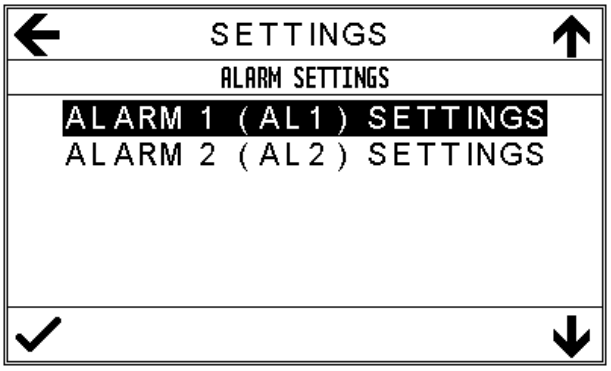
Step 1. Use 🛠 to go into the settings menu.



Step 2. Use ↓ to highlight the alarm settings.



Step 3. Use ✓ to go into the menu.

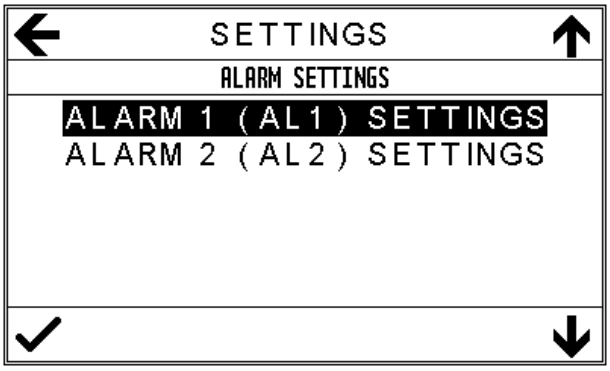


Step 4. Use ↓↑ then ✓ to continue.

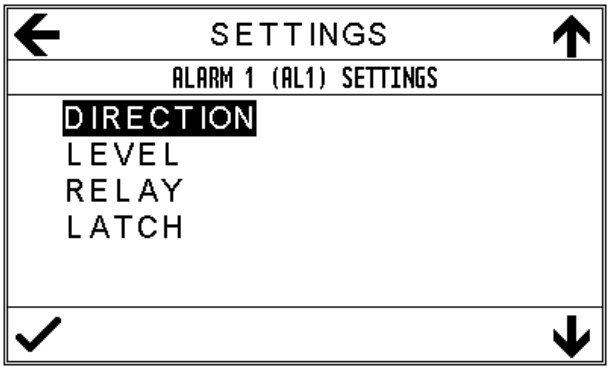
19.2 Alarm Direction

The alarm direction setting is part of the Alarm Settings Menu.

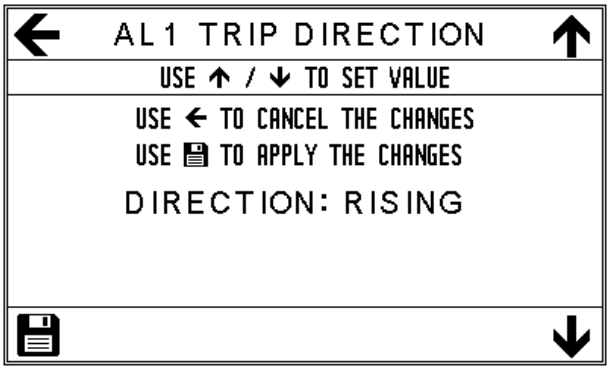
Caution: You can set the alarm direction for each alarm independently. The options are rising or falling.



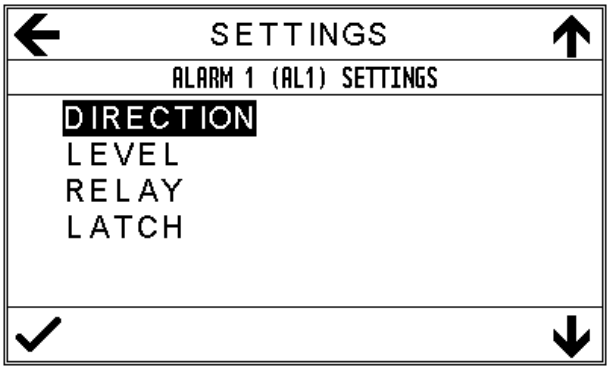
Step 1. Use ← to go back or ✓ to set the alarms.



Step 2. Use ✓ to go into the direction menu.



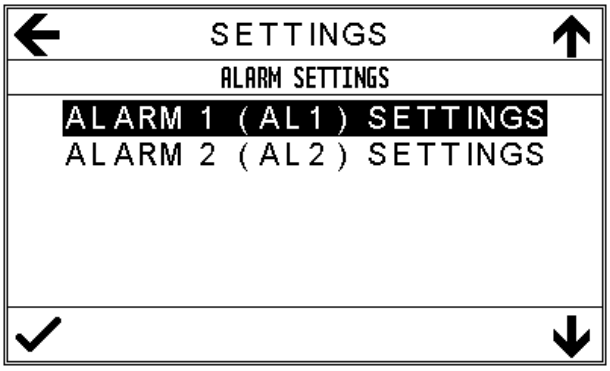
Step 3. Use ↓↑ then to apply.



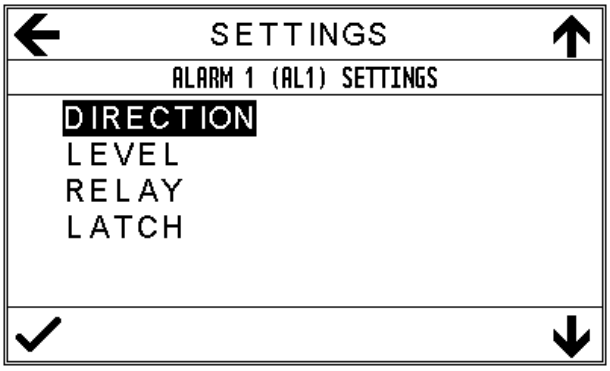
Step 4. Use ← to go back or ✓ to continue.

19.3 Alarm Level

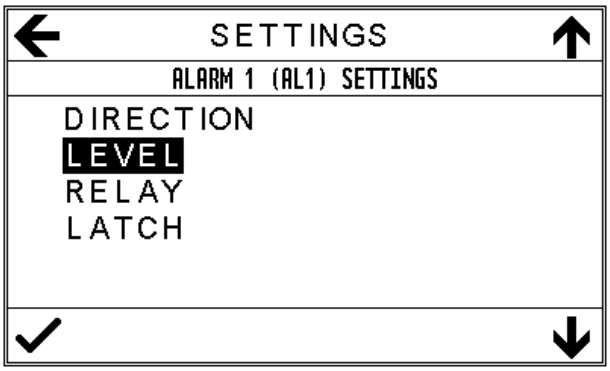
The alarm level setting is part of the Alarm Settings Menu.



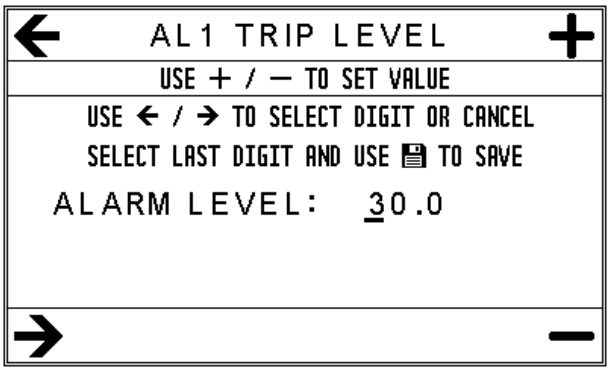
Step 1. Use ← to go back or ✓ to continue.



Step 2. Use ↓↑ to highlight the level menu.



Step 3. Use ✓ to go into the level menu.



Step 4. Use + — to adjust then 💾 to save.

Caution: You must not try to set an alarm level that is less than zero or greater than the full scale. The D-Guard²S will show these errors.

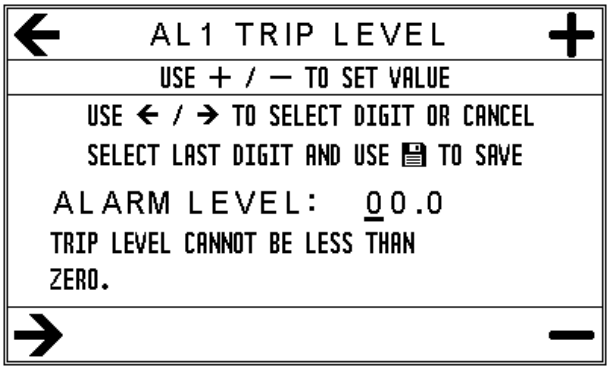


Figure 18. Minimum alarm level warning.

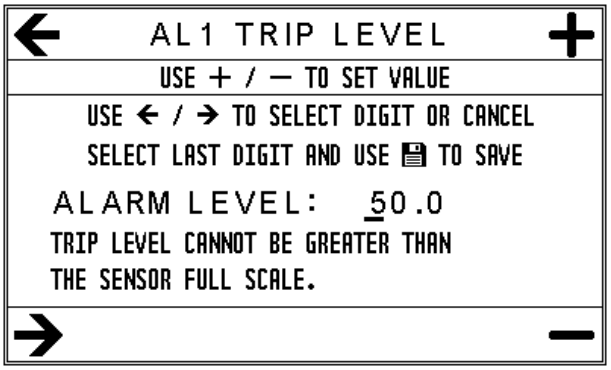


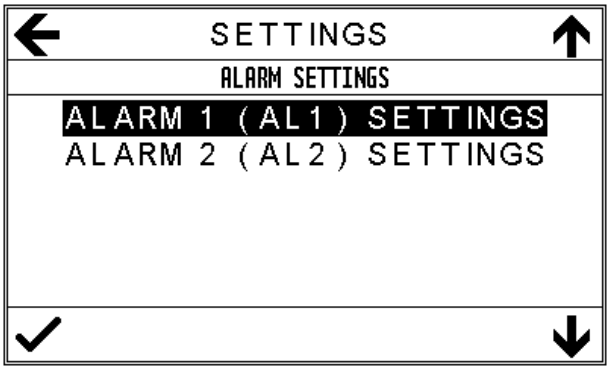
Figure 19. Maximum alarm level warning.

19.4 Alarm Relay state

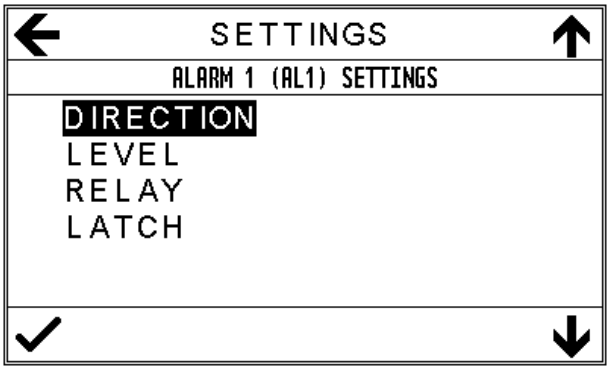
The D-Guard²S version has two user configurable relay outputs. You can adjust the initial state of the alarm relays. The options are de-energised or energised.

The D-Guard²S has an additional fault relay. This is not user configurable.

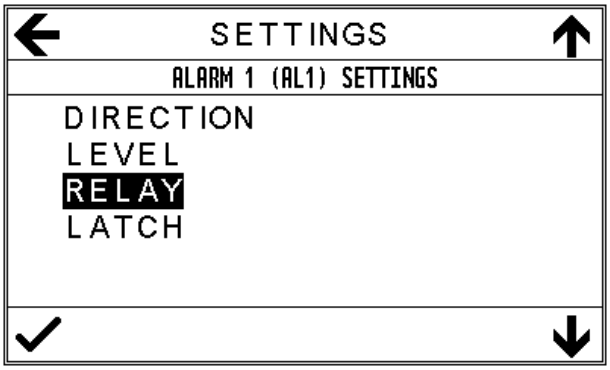
The alarm relay state setting is part of the Alarm Settings Menu.



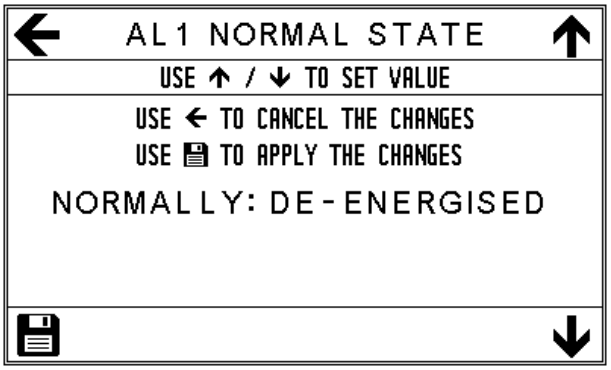
Step 1. Use ← to go back or ✓ to continue.



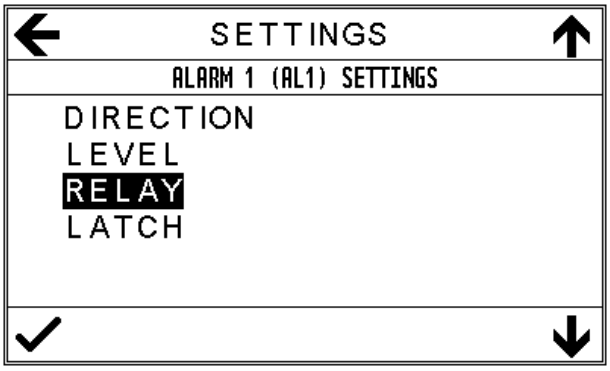
Step 2. Use ↓↑ to highlight the relay menu.



Step 3. Use ✓ to go into the relay menu.



Step 4. Use ↓↑ to adjust then to apply.

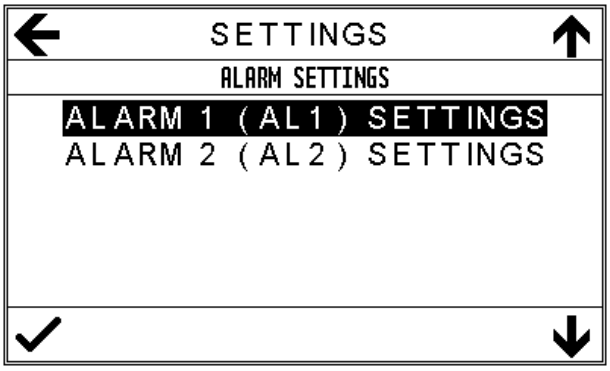


Step 5. Use ← to go back or ✓ to continue.

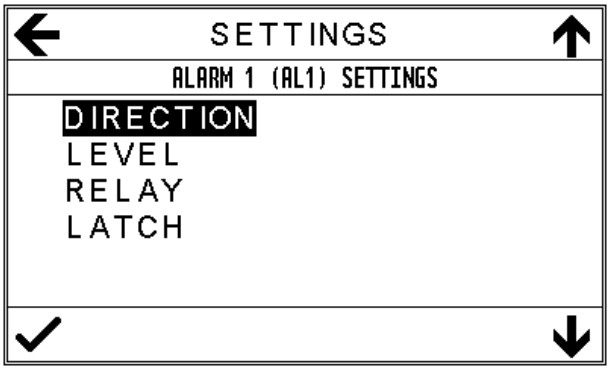
19.5 Alarm Latch

The D-Guard²S alarms can be set as latching alarms (LATCH: ENABLED) or as non-latching alarms (LATCH: DISABLED).

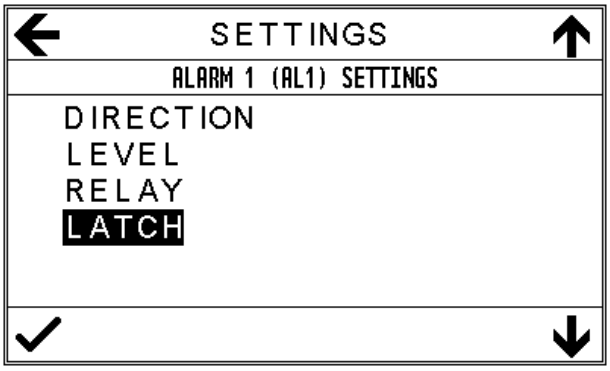
The alarm latch setting is part of the Alarm Settings Menu.



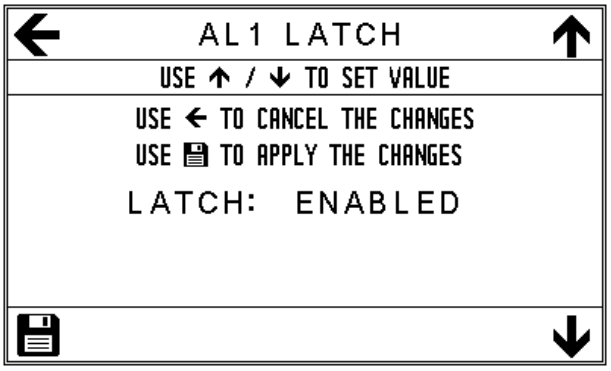
Step 1. Use ← to go back or ✓ to continue.



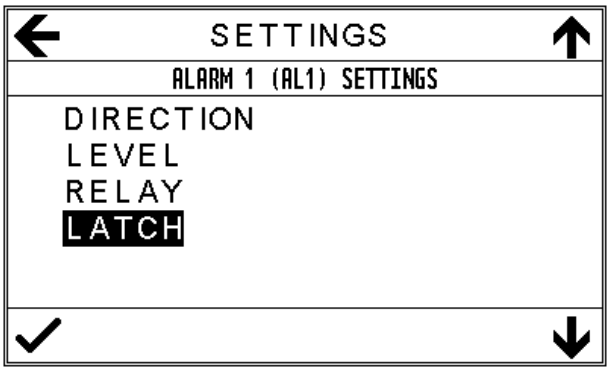
Step 2. Use ↓↑ to highlight the latch menu.



Step 3. Use ✓ to go into the latch menu.



Step 4. Use ↓↑ to adjust then to apply.



Step 5. Use ← to go back or ✓ to continue.

19.6 Latched Alarm Examples

Caution: You must clear the latched alarm manually. Alarms will not reset automatically when the detected gas concentration has fallen below the set alarm level.

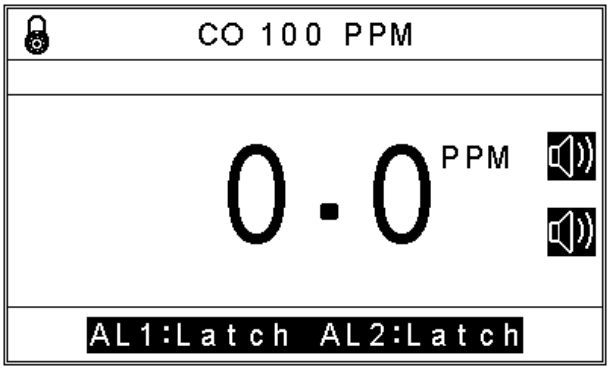


Figure 20. AL1 and AL2 Latched.

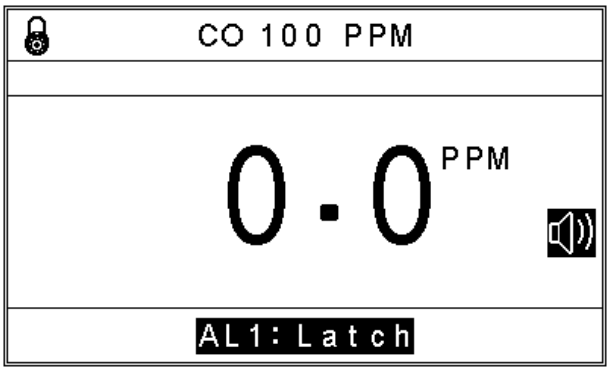


Figure 21. AL1 Latched.

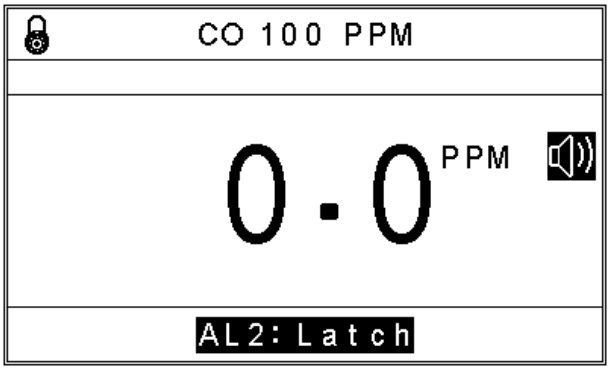


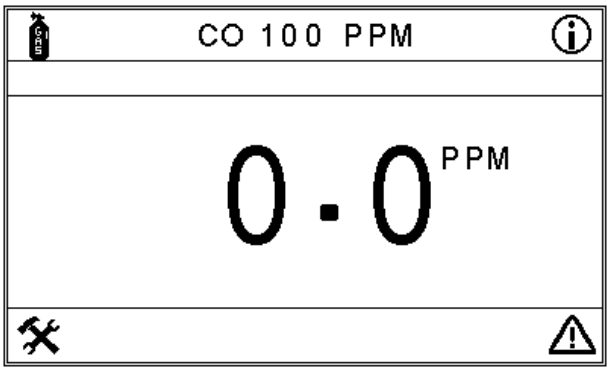
Figure 22. AL2 Latched.

20 System Settings

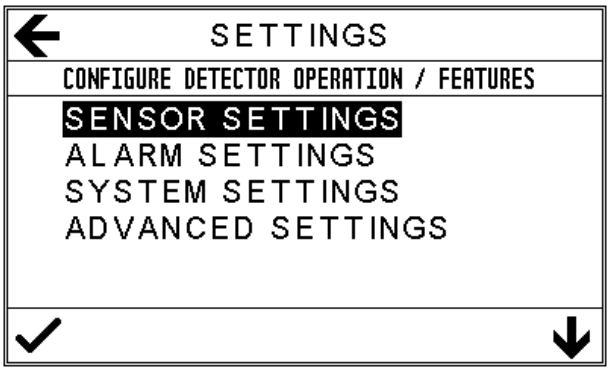
You can configure the Passcode. You can isolate the D-Guard²S if required.

20.1 Access the System Settings

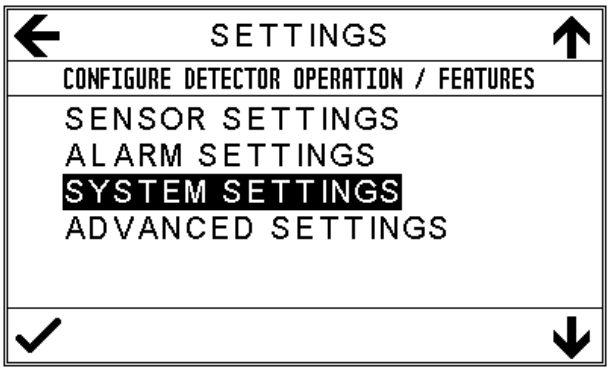
Make sure the menu system is unlocked.



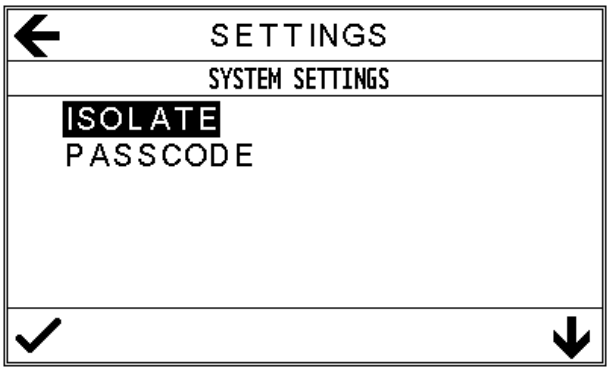
Step 1. Use 🛠 to go into the settings menu.



Step 2. Use ↓↑ to highlight the system settings menu.



Step 3. Use ✓ to go into the menu.

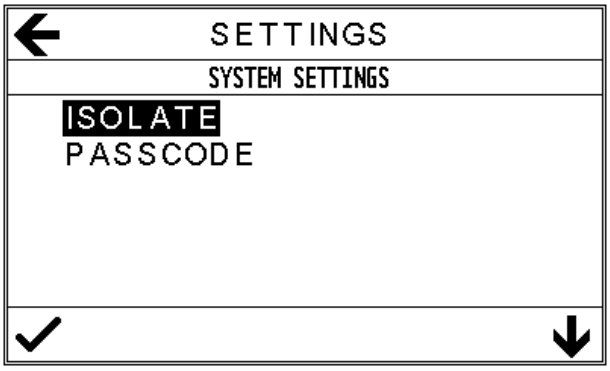


Step 4. Use ← to go back or ✓ to continue.

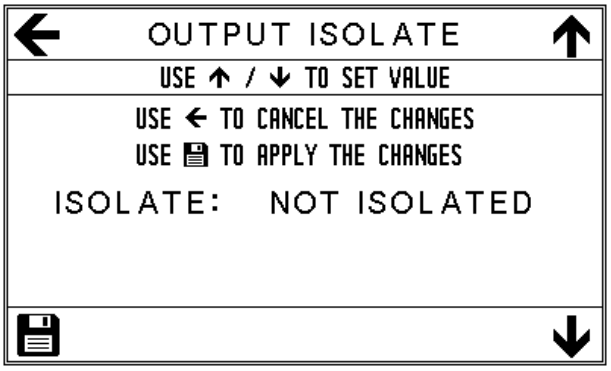
20.2 Isolate

You can isolate the D-Guard²S if required. The 4-20mA output will be set to 3.5mA when isolated.

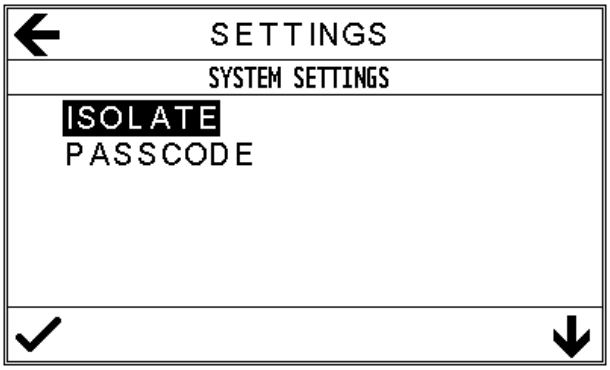
The isolate setting is part of the System Settings menu.



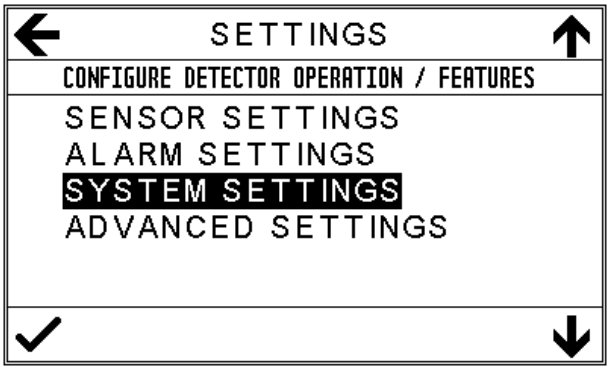
Step 1. Use ✓ to go into the isolate menu.



Step 2. Use ↓↑ to adjust then to apply.



Step 3. Use ← to go back.



Step 4. Use ← to go back.

Warning: The D-Guard²S does not transmit detected gas concentrations when isolated. This can result in injury or death to personnel.

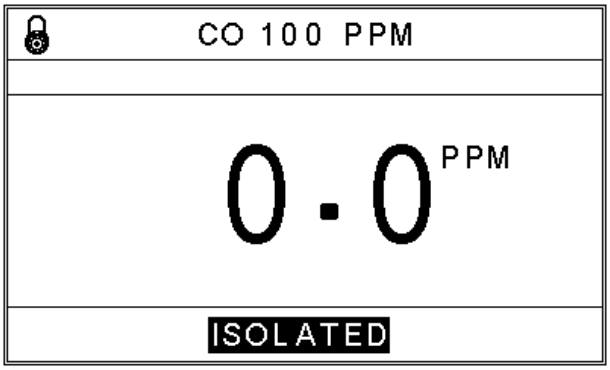


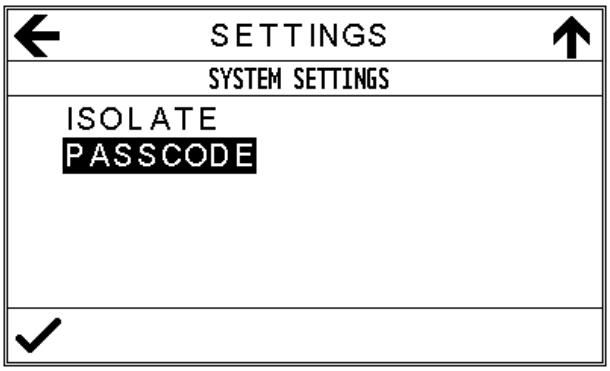
Figure 23. D-Guard²S home screen when isolated.

Caution: When the D-Guard²S is isolated the 4-20mA output is set to the fault current of 3.5mA. The screen will show the detected level of gas. External control equipment will not receive gas concentration readings.

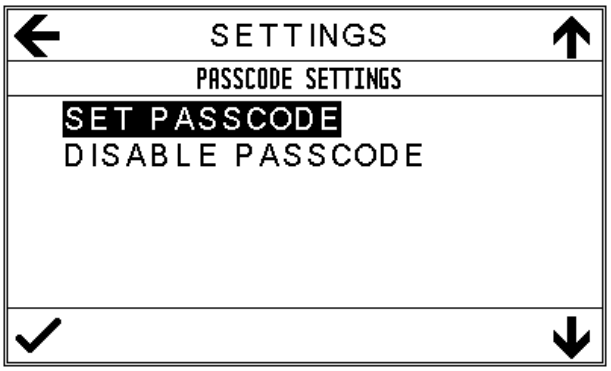
20.3 Set Passcode

You can set the D-Guard²S passcode. The passcode limits access to the configuration and operation of the D-Guard²S.

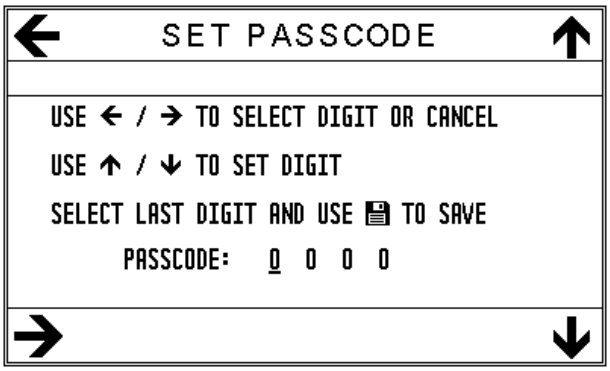
The passcode settings are part of the System Settings menu.



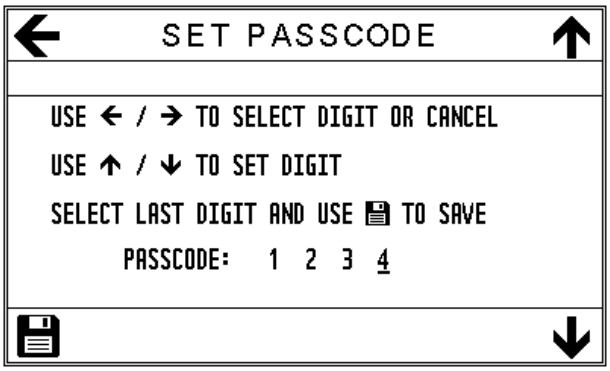
Step 1. Use ✓ to go into the passcode menu.



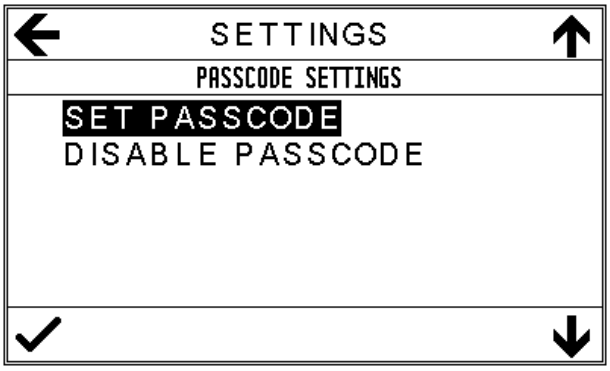
Step 2. Use ← to go back or ✓ to continue.



Step 3. Use ↓↑ to set the value of the digit then use → to apply.



Step 4. Use ↓↑ to set the value of the digit and use 💾 to save.



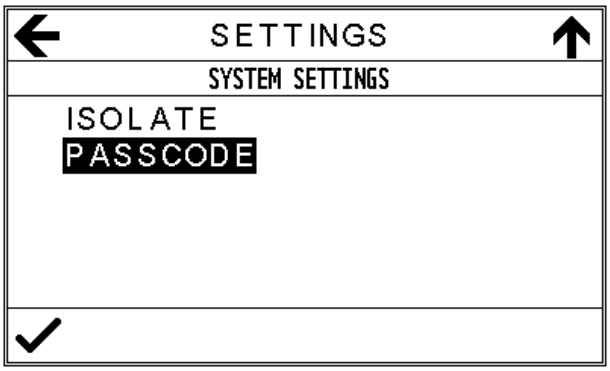
Step 5. Use ← to go back or ✓ to continue.

Caution: If you forget the passcode, you must return the D-Guard²S to a Gastech Service Centre.

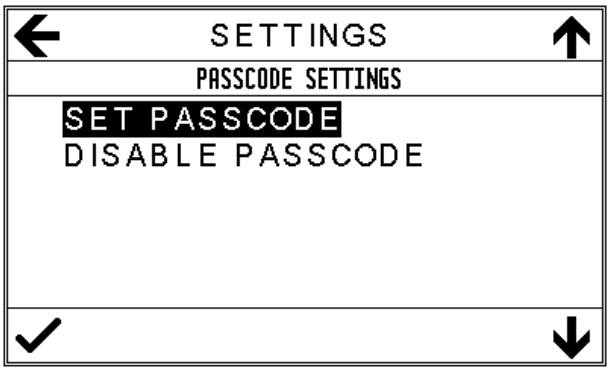
20.4 Disable Passcode

You can disable the D-Guard²S passcode. The passcode limits access to the configuration and operation of the D-Guard²S.

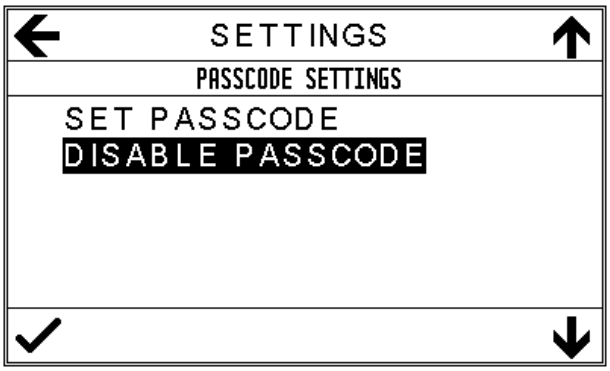
The passcode settings are part of the System Settings menu.



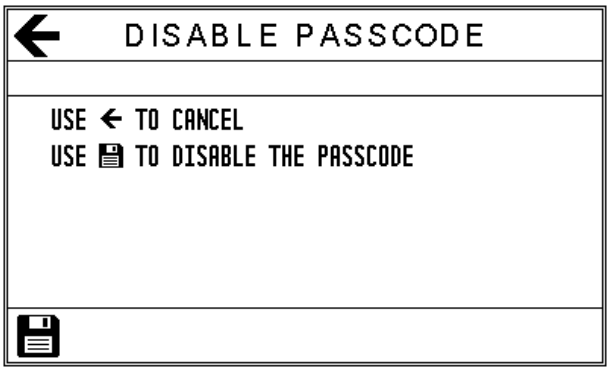
Step 1. Use ✓ to go into the passcode menu.



Step 2. Use ↓↑ to highlight the disable passcode menu.



Step 3. Use ✓ to go into the disable passcode menu.



Step 4. Use ← to go back or 💾 to disable the passcode.

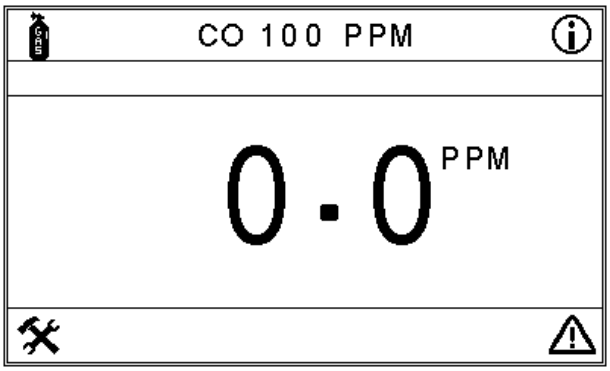
Caution: If you forget the passcode, you must return the D-Guard²S to a Gastech Service Centre.

21 Advanced Settings

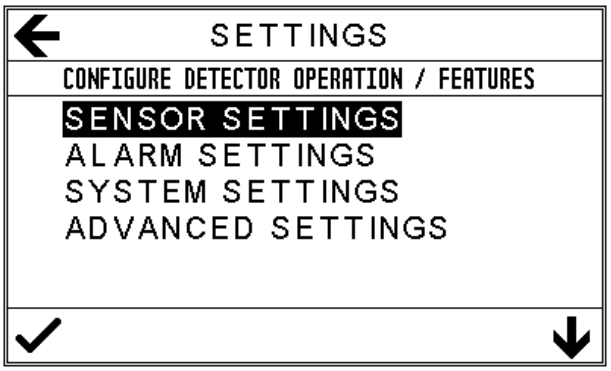
You can configure the D-Guard²S advanced settings.

21.1 Go to the Advanced Settings Menu

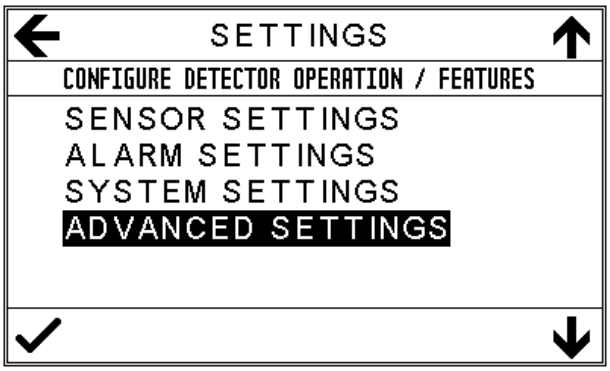
Make sure the menu system is unlocked.



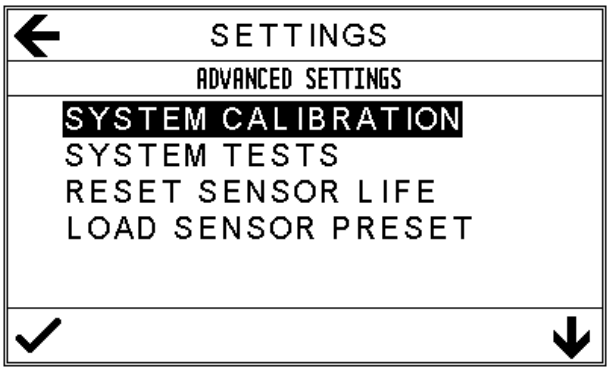
Step 1. Use 🛠 to go into the settings menu.



Step 2. Use ↓↑ to highlight advanced settings.



Step 3. Use ✓ to go into the advanced settings menu.

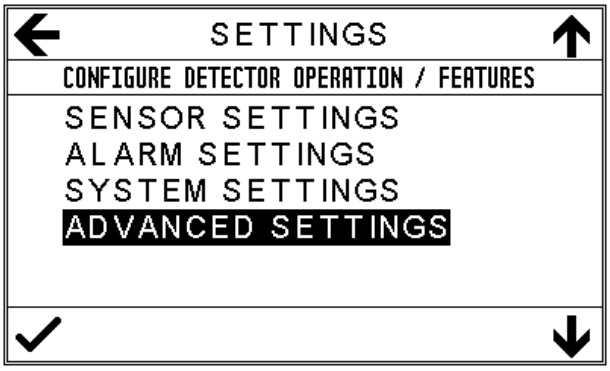


Step 4. Use ↓↑ then ✓ to continue.

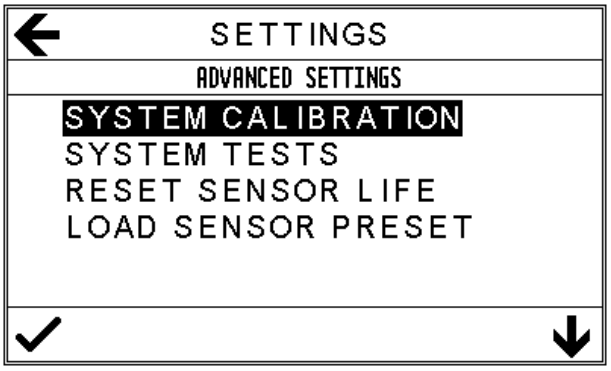
21.2 System Calibration

You can adjust the D-Guard²S 4-20mA current loop output.

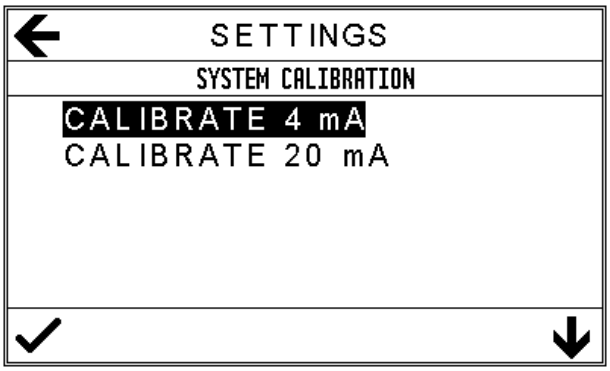
The system calibration options are part of the Advanced Settings menu.



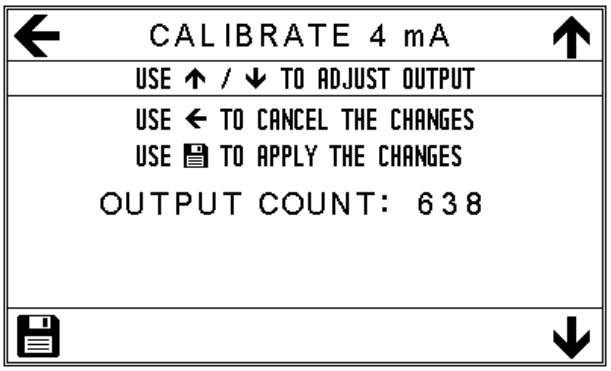
Step 1. Use ✓ to go into the advanced settings menu.



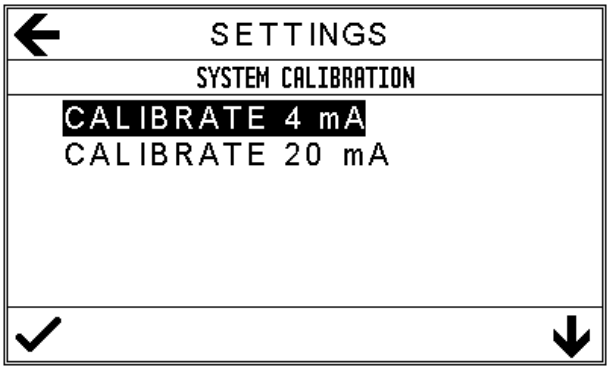
Step 2. Use ✓ to go into the system calibration menu.



Step 3. Use ↓↑ or ✓ to go into the menu.



Step 4. Use ↓↑ to adjust the output then to save.



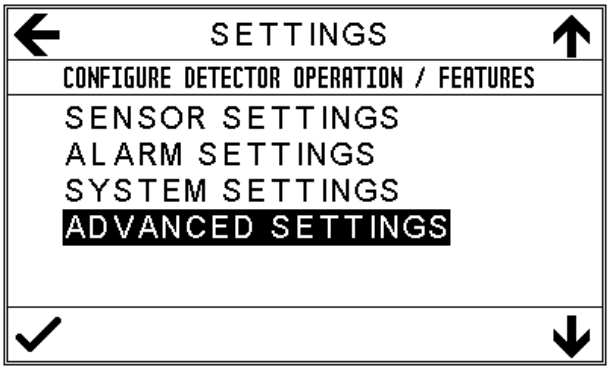
Step 5. Use ← to go back or ✓ to continue.

Note: **The Output Count value provides visual feedback as the output is adjusted.**

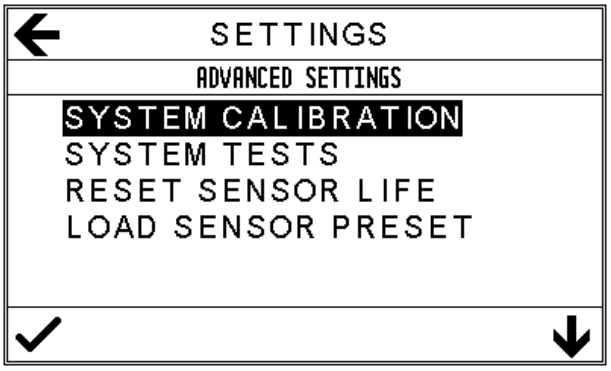
21.3 4-20mA Output Test

You can test the D-Guard²S 4-20mA current loop output.

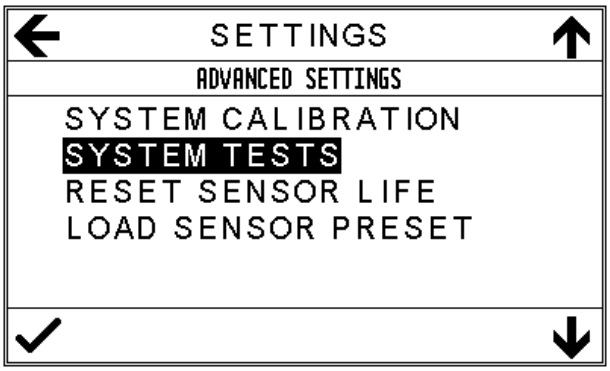
The 4-20mA output test is part of the Advanced Settings menu.



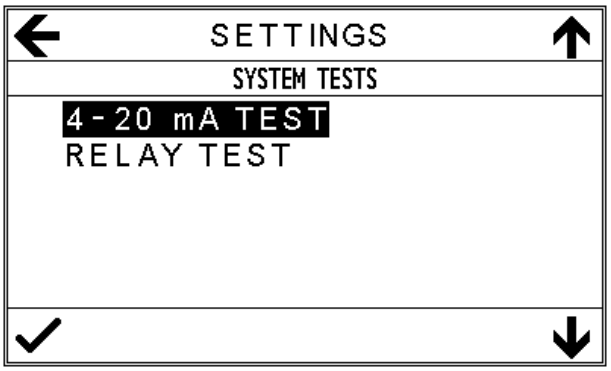
Step 1. Use ✓ to go into the advanced settings menu.



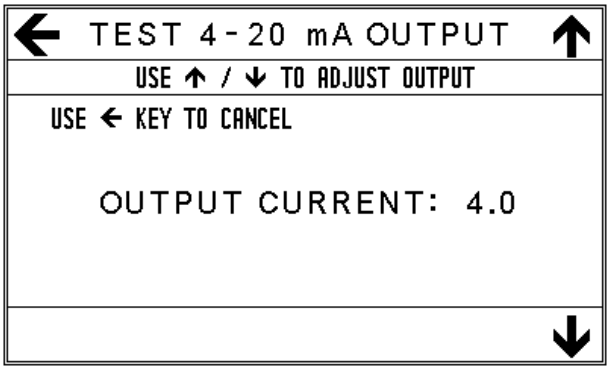
Step 2. Use ↓ to highlight the systems tests.



Step 3. Use ✓ to go into the systems tests.



Step 4. Use ✓ to go into the 4-20mA test.



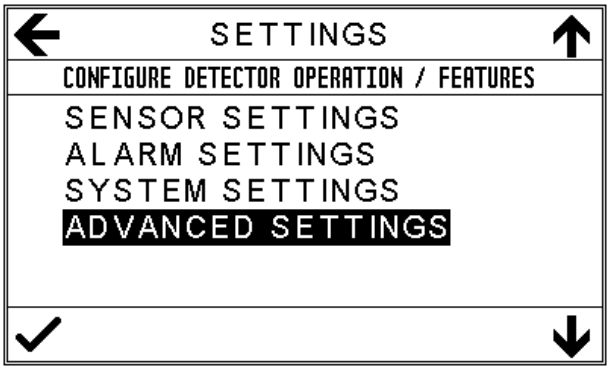
Step 5. Use ↓↑ to change or ✓ to cancel.

Caution: You must check external equipment before the output is tested. Failure to do so may trigger external control systems.

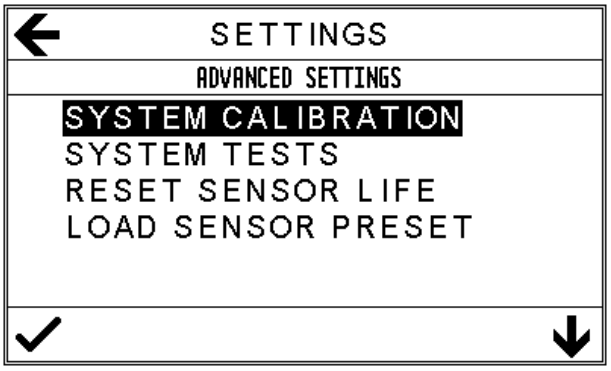
21.4 Relay Function Test

You can test the D-Guard²S relays.

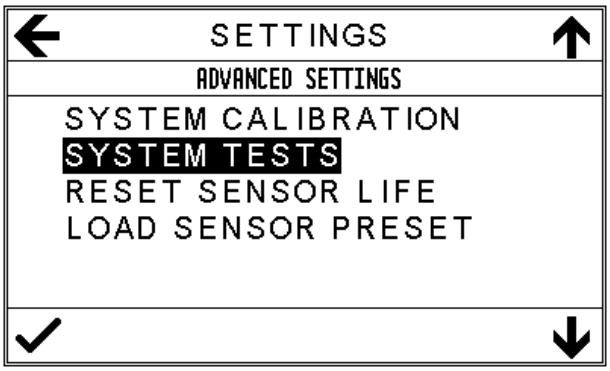
The relay function test is part of the Advanced Settings menu.



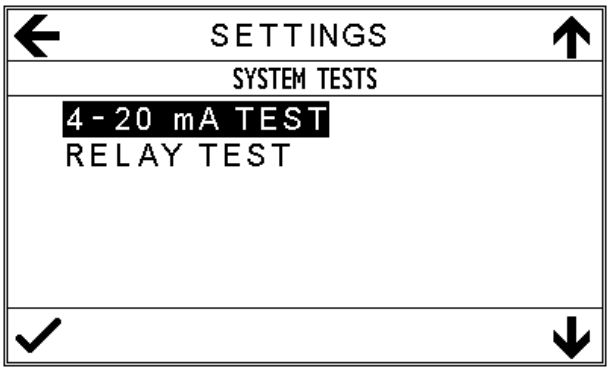
Step 1. Use ✓ to go into the advanced settings menu.



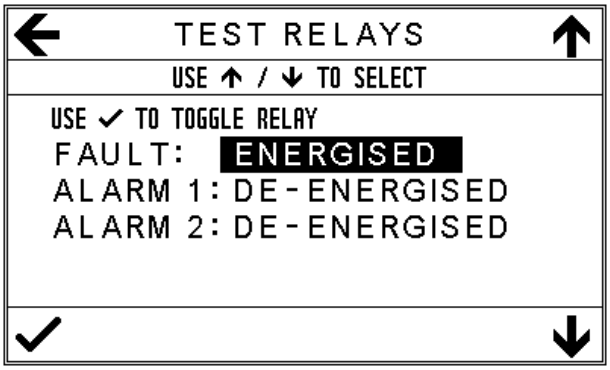
Step 2. Use ↓ to highlight system tests.



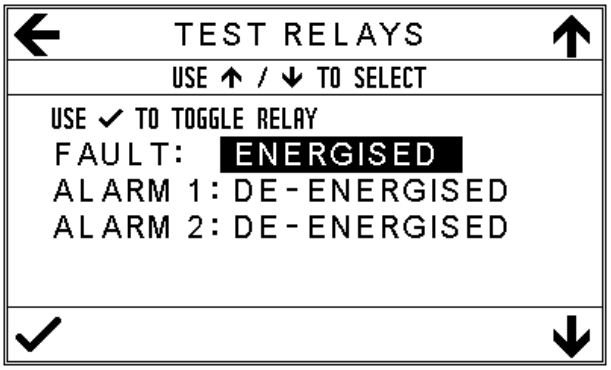
Step 3. Use ✓ to go into the system tests menu.



Step 4. Use ↓ to highlight the relay test.



Step 5. Use ✓ to toggle or ↓↑ to select the relay.

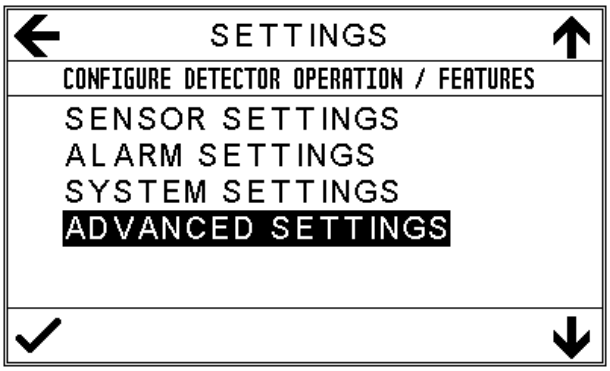


Step 6. Use ← to go back.

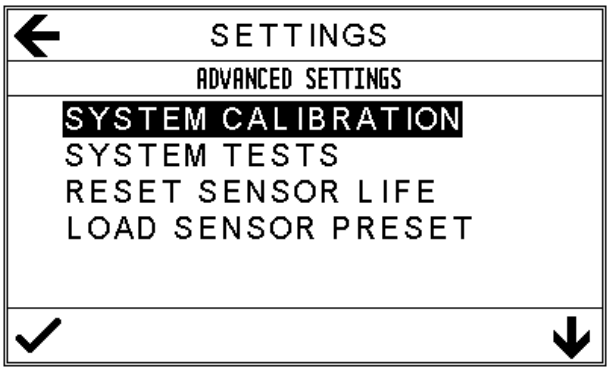
21.5 Reset Sensor Life

You can reset the D-Guard²S estimated life of the fitted sensor. You must reset the Sensor Life setting when a replacement sensor is fitted.

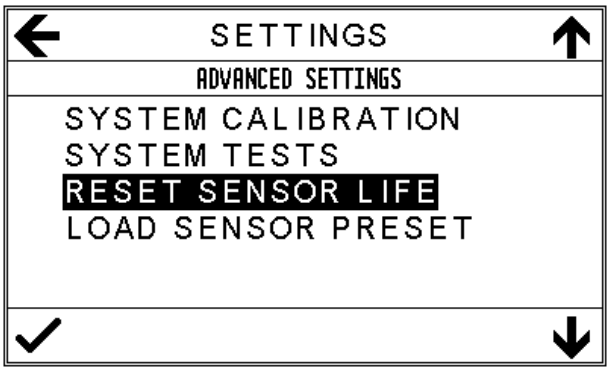
The reset sensor option is part of the Advanced Settings menu.



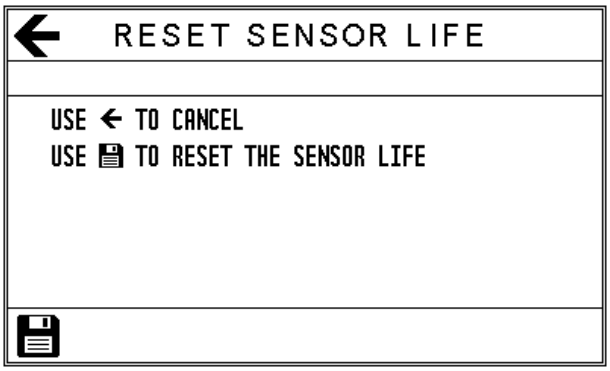
Step 1. Use ✓ to go into the advanced settings menu.



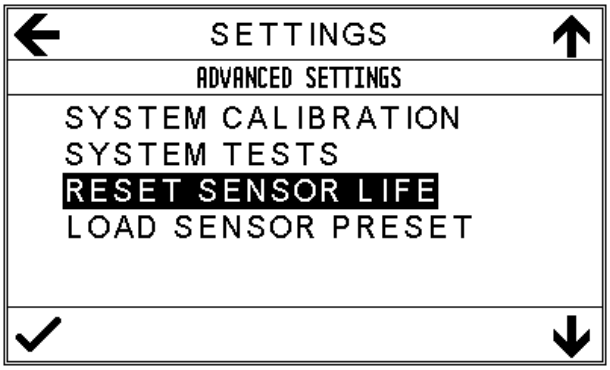
Step 2. Use ↓ to highlight the reset sensor life menu.



Step 3. Use ✓ to go into the reset sensor life menu.



Step 4. Use 💾 to reset the sensor life.



Step 5. Use ← to go back.

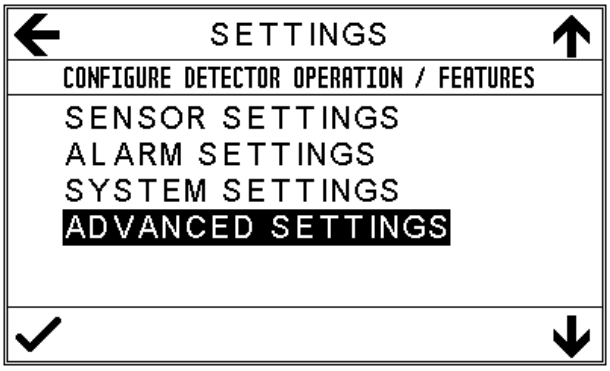
Note: **The D-Guard²S calculates the life of the sensor by comparing the most recent calibration data with the original stored calibration data.**

Caution: **The Sensor Life value is for indication purposes only. It can be viewed on the information screen.**

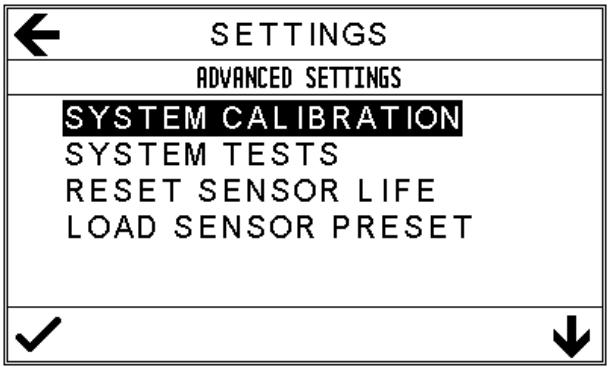
21.6 Sensor Presets

You can use this menu to load one of the D-Guard²S sensor presets.

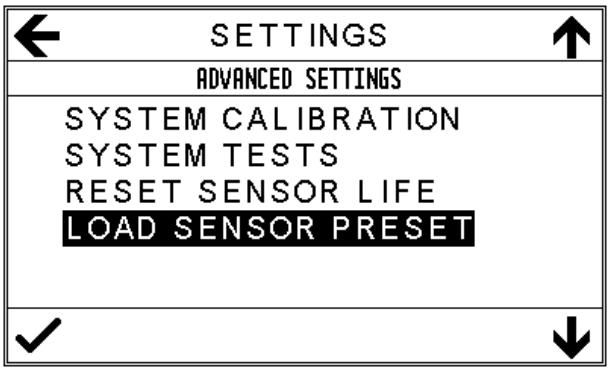
The sensor presets are part of the Advanced Settings menu.



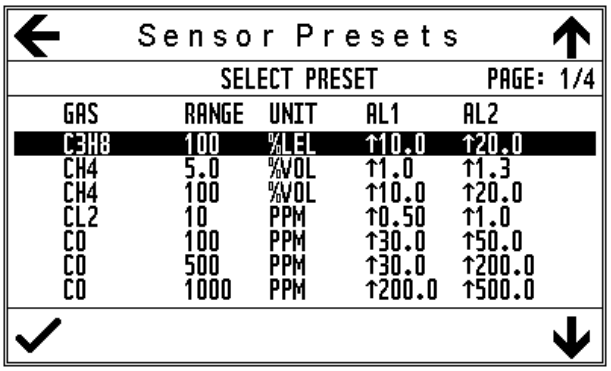
Step 1. Use ✓ to go into the advanced settings menu.



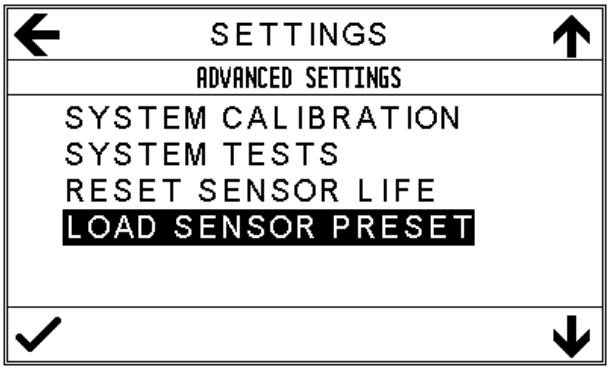
Step 2. Use ↓ to highlight the load sensor preset menu.



Step 3. Use ✓ to go into load sensor preset menu.



Step 4. Use ← to go back or ✓ to load preset.



Step 5. Use ← to go back.

Warning: If the Sensor Preset is changed the D-Guard²S must be re calibrated before use. Incorrect calibration can result in injury or death to personnel.

22 Error Codes

Go to the Status screen to view any active errors.

Code	Code Description
01	CALIBRATE ZERO
02	CALIBRATE SPAN
03	CALIBRATE 4mA
04	CALIBRATE 20mA
07	ADC OVER RANGE
08	ADC UNDER RANGE
09	SENSOR OVER RANGE
10	SENSOR UNDER RANGE
11	OVER TEMPERATURE
12	UNDER TEMPERATURE
13	SENSOR END OF LIFE
14	SENSOR FAULT
15	CALIBRATE AMBIENT °C
16	NOT CONFIGURED
17	SENSOR NOT READY
18	SENSOR WARM-UP
19	ISOLATED

Figure 24. Error codes.

23 4-20mA Output Fault Conditions

The D-Guard²S has two fault currents.

Current Output	Code Description
3.5 mA	Fault or Isolated
21 mA	Over range

Figure 25. 4-20 mA output loop fault currents.

24 Specifications

Specifications are subject to change without notice.

24.1 Enclosure Specifications

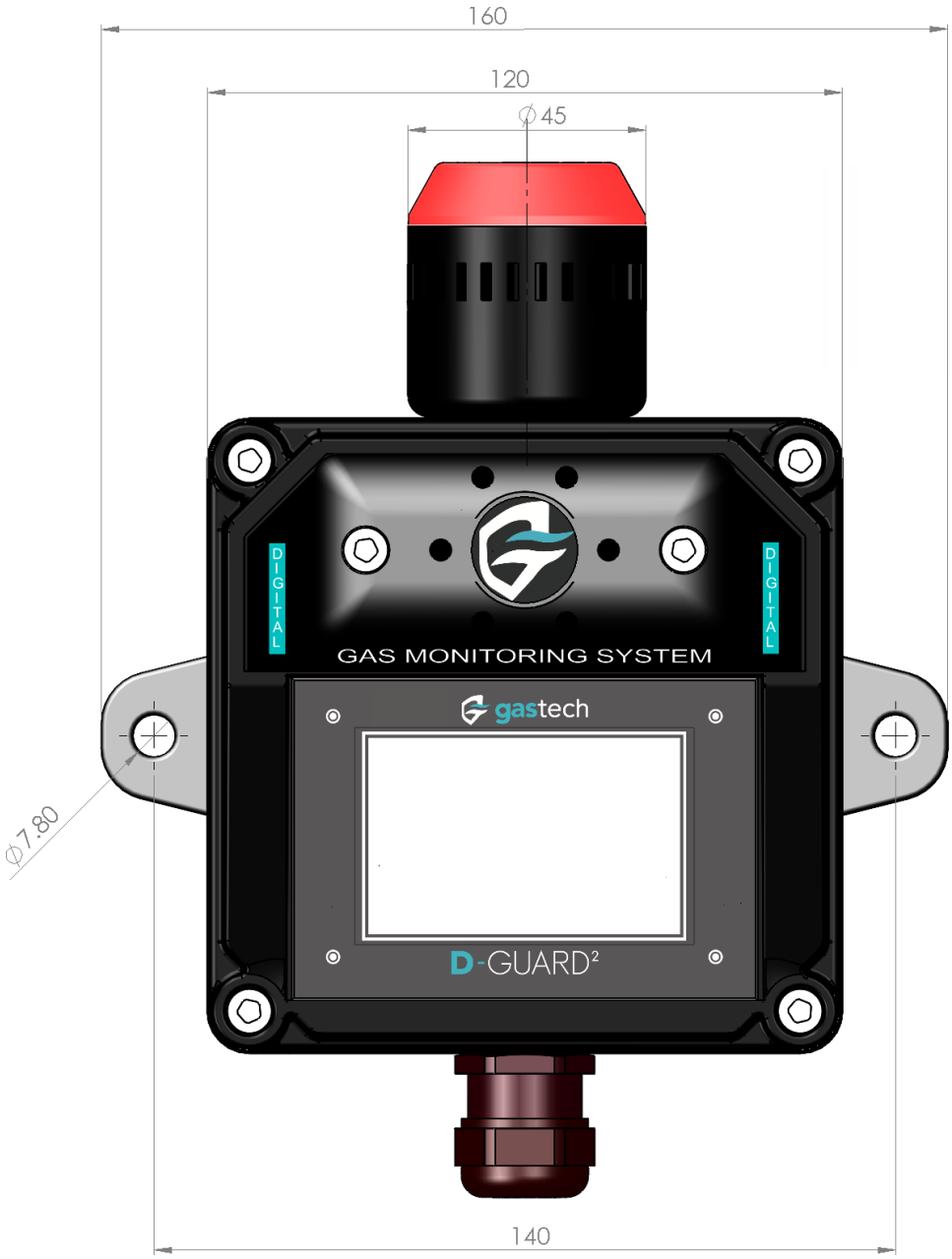


Figure 26. D-Guard²S dimensions in millimetres (front view).

Figure 27. D-Guard²S dimensions in millimetres (side view).

24.2 Mechanical Specifications

Parameter	Description	Specifications	
Enclosure material	Polyoxymethylene		
Enclosure construction	Injection molded		
Enclosure wall section	Wall thickness	6.5mm	7mm
Enclosure IP rating	IP66 & IP67/68		
Enclosure lid Retainer	Not retained		
Enclosure lid fixing	Four screws M5x12		
Cable gland	M20 Cable Gland IP68		
Enclosure footprint	Including mounting supports	195mm high	160mm wide

Figure 28. D-Guard²S Mechanical specifications.

24.3 Environmental Specifications

Parameter	Description	Specifications	
Storage temperature	Non-powered state	-20°C	60°C
Operating temperature	Temperature limits	-20°C	55°C
Operating humidity	Non-condensing	15%rh	90%rh
Operating pressure	Standard sea-level pressure 101 kPa	-10%	+ 10%

Figure 29. D-Guard²S Environmental specifications.

24.4 General Specifications

Parameter	Description	Limits	
Measurement technique	Electro chemical cell, infra-red		
Target gas	List of available gas types		
Full scale range	List of ranges by gas types		
Maximum loop current	Under any condition		25 mA
Minimum supply voltage	D-Guard²S models	13 V	
Maximum supply voltage	D-Guard²S models		26 V
Minimum supply current	D-Guard²S models		250 mA
Maximum loop resistance	At a supply voltage of 22 V		380 Ω
Loop error signal	Isolated or fault		3.5 mA
Loop error signal	Over range		21 mA
Display	2.7” (68.6mm) Monochrome LCD		

Figure 30. D-Guard²S General Specifications.

24.5 Wiring Specifications

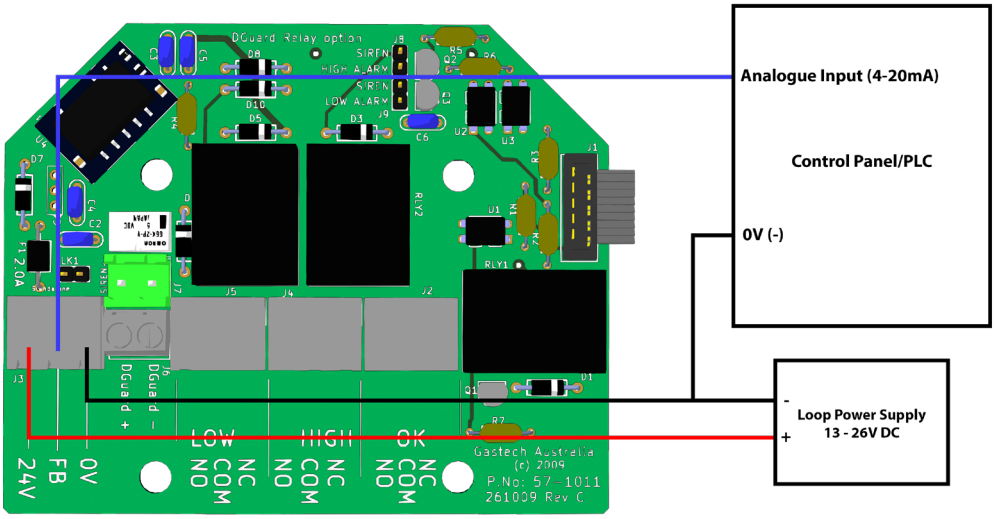


Figure 31. D-Guard²S Electrical connections.

Caution: The outside diameter of the cable must be between 10 mm and 14 mm. Use a twin core shielded cable. Make sure the cable is sealed by the M20 cable gland to prevent moisture ingress.

Caution: You must use a circular cross-section cable. Non-circular cross-section cables can leak between the sheath and the cable gland.

24.6 D-Guard²S Versions, Gas, Range, and Resolution

Gastech Item Number	Target Gas	Units	Range	Display resolution	Lower Detection Limit
65-1080SH-CL2	Cl_2	PPM	10	0.1	0.05
65-1080SH-CO-100	CO	PPM	100	1	0.5
65-1080SH-CO-500	CO	PPM	500	1	0.5
65-1080SH-CO-1000	CO	PPM	1000	1	0.5
65-1080SH-COH-200	CO (Note 1)	PPM	200	1	0.5
65-1080SH-COH-2000	CO (Note 1)	PPM	2000	1	0.5
65-1080SH-ETO	EtO	PPM	20	0.1	0.1
65-1080SH-H2S-10	H_2S	PPM	10	0.1	0.05
65-1080SH-H2S-25	H_2S	PPM	25	0.1	0.05
65-1080SH-H2S-100	H_2S	PPM	100	0.1	0.05
65-1080SH-H2S-200	H_2S	PPM	200	1	0.5
65-1080SH-HCL	HCl	PPM	100	0.1	0.7
65-1080SH-HCN-25	HCN	PPM	25	0.1	0.2
65-1080SH-HCN-50	HCN	PPM	50	0.1	0.2
65-1080SH-HF	HF	PPM	10	0.1	0.15
65-1080SH-N2H4	N_2H_4	PPM	1	0.01	0.01
65-1080SH-NH3-100	NH_3	PPM	100	0.1	1
65-1080SH-NH3-500	NH_3	PPM	500	1	n/a
65-1080SH-NH3-1000	NH_3	PPM	1000	1	12
65-1080SH-NO	NO	PPM	100	0.1	0.2
65-1080SH-NO2	NO_2	PPM	10	0.01	0.02
65-1080SH-O2	O_2	%Vol	25	0.1	n/a
65-1080SH-O3	O_3	PPM	2	0.01	0.02
65-1080SH-PH3	PH_3	PPM	5	0.01	0.015
65-1080SH-SO2	SO_2	PPM	10	0.1	0.1

Note 1: Models fitted with an H_2 tolerant CO sensor.

Figure 32. D-Guard²S versions.

25 Warranty

Gastech Australia Pty Ltd guarantees that its products, with the exception of sensors, will be devoid of any flaws in material and craftsmanship for a period of two years from the delivery date.

25.1 Sensor Warranty periods

Replacement Sensor	Target Gas	Warranty
65-9094-CL2-2	Cl_2	12
65-8001-CO-AF	CO	24
201037	CO (Note 1)	24
65-8013-ETO-A1	EtO	12
65-8008-H2S-A1	H_2S	24
65-8008-H2S-AE	H_2S	24
65-9094-HCL/HBr	HCl	12
65-9094-HCN-4	HCN	12
65-9094-HF	HF	12
65-9094-N2H4	N_2H_4	9
65-9094-NH3-5	NH_3	12
65-9094-NH3-7	NH_3	12
65-9094-NH3-6	NH_3	12
65-8002-NO-A1	NO	24
65-9094-NO2	NO_2	12
65-8000-O2-A3	O_2	36
65-9094-O3-2	O_3	12
65-8014-PH3-A1	PH_3	24
65-8003-SO2-AF	SO_2	24

Note 1: The CO sensor (Item number 201037) is H_2 tolerant

Figure 33. Sensor warranty periods in months

26 Replacement Parts

You can purchase replacement parts for your D-Guard²S from Gastech or its authorised service centres.

26.1 Replacement Parts - exploded view

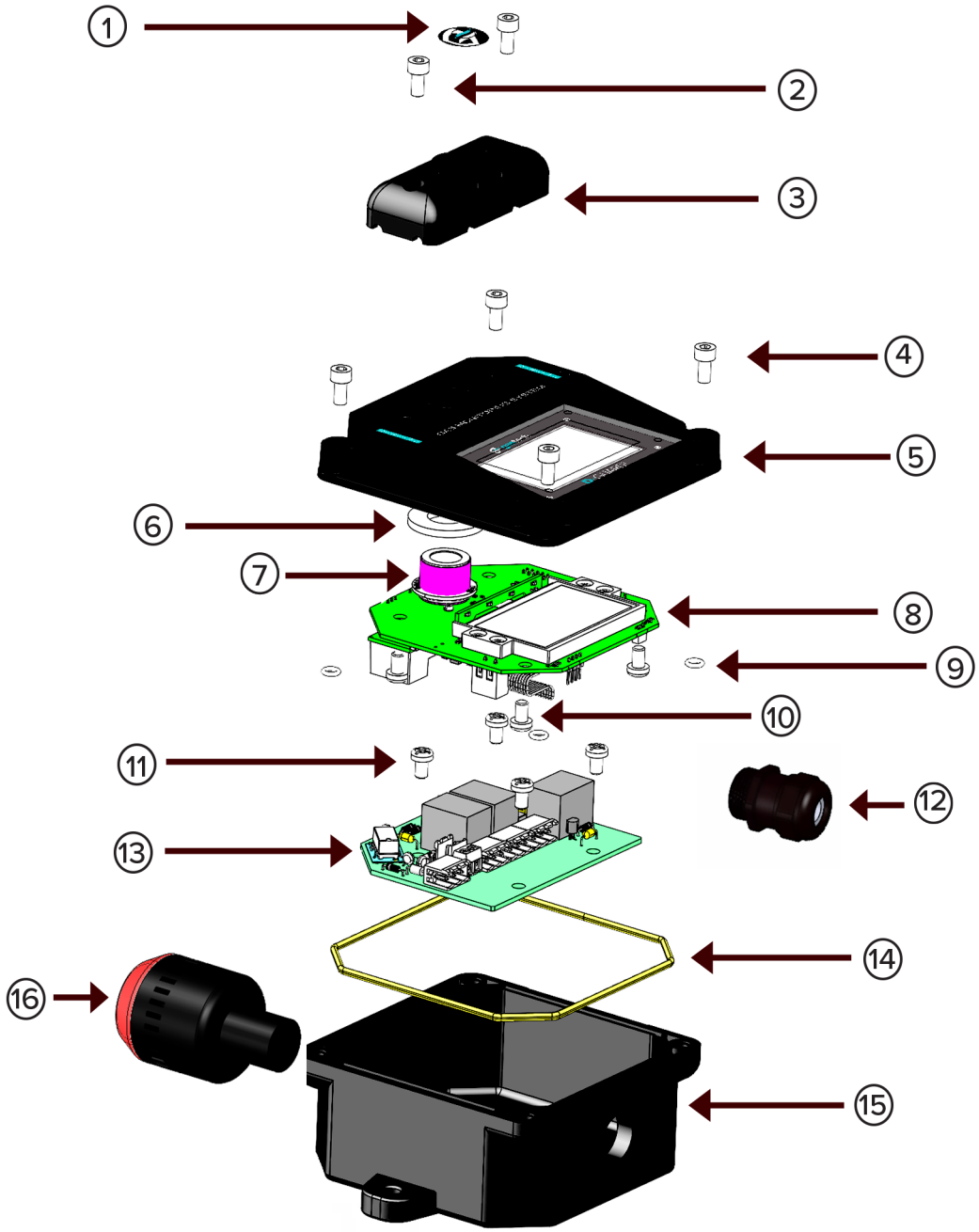


Figure 34. D-Guard²S replacement parts - exploded view.

26.2 Replacement parts - list

Key	Item Number	Description
1	29-1010-01	Decal, D-Guard²S
2	10-1010-06	Socket Head Cap Screw M5x16
3	21-1080-02	Splash Guard D-Guard²S
4	10-1010-02	Socket Head Cap Screw M5x12
5	21-1080-03	Lid, Housing, D-Guard²S
6	07-1080-01	Sensor gasket (Not for IR sensors)
7	See section 25.1	Sensor
8	57-0028	Main PCB assembly
9	07-1010-10	O ring
10	11-1080-02	Nylon bolt M5x6
11	10-1010-01	Socket Head Cap Screw M5x8
12	18-1080-01	M20 Cable Gland
13	57-1011	Relay PCBA D-Guard²S
14	07-1080-20	Main seal
15	21-1080-04	Enclosure base
16	51-1012	D-Guard²S Sounder / Strobe

Figure 35. D-Guard²S replacement parts list.

26.3 Replacement parts - Oxygen Sensor Orientation

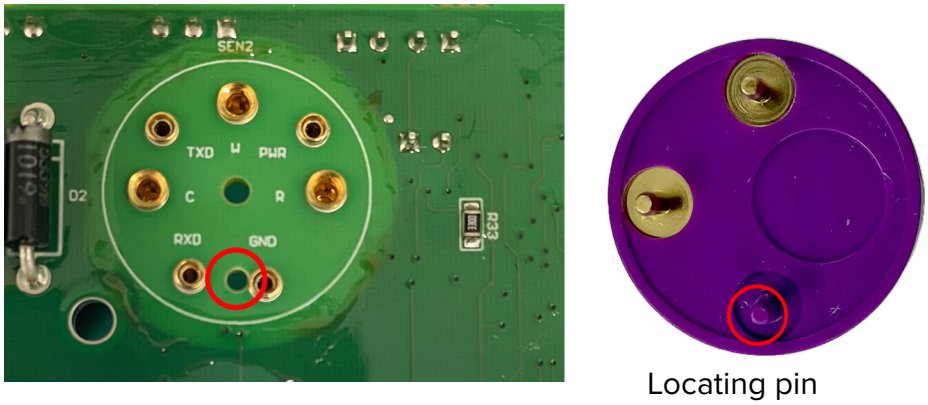


Figure 36. 65-8000-O2-A3 Sensor locating pin.

Caution: Make sure that you install the 65-8000-O2-A3 sensor with the plastic locating pin in the bottom plain hole that is circled on the PCB.

27 PCBA Configuration Jumpers

NOTE: PCBAs are configured with jumpers.

27.1 Main PCBA 57-0028 Jumper Settings

NOTE: The PCB jumpers are factory set for the installed sensor.

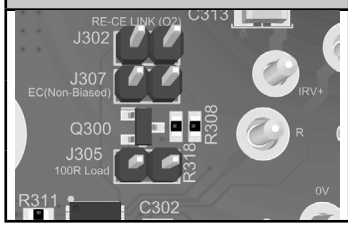
Jumper Location	Jumper Description	
	J302	Two electrode sensors
	J305	100 Ohm load
	J307	Non-biased electrochemical sensors

Figure 37. PCBA 57-0028 jumper locations.

Sensor Item Number	Target Gas	J302	J305	J307
65-9094-CL2-2	Cl_2	Do Not Fit	Do Not Fit	Link Fitted
65-8001-CO-AF	CO	Do Not Fit	Do Not Fit	Link Fitted
201037	CO (Note 1)	Do Not Fit	Do Not Fit	Link Fitted
65-8013-ETO-A1	EtO	Do Not Fit	Do Not Fit	Do Not Fit
65-8008-H2S-A1	H_2S	Do Not Fit	Do Not Fit	Link Fitted
65-8008-H2S-AE	H_2S	Do Not Fit	Do Not Fit	Link Fitted
65-9094-HCL/HBr	HCl	Do Not Fit	Do Not Fit	Do Not Fit
65-9094-HCN-4	HCN	Do Not Fit	Do Not Fit	Link Fitted
65-9094-HF	HF	Do Not Fit	Do Not Fit	Link Fitted
65-9094-N2H4	N_2H_4	Link Fitted	Do Not Fit	Do Not Fit
65-9094-NH3-5	NH_3	Do Not Fit	Do Not Fit	Link Fitted
65-9094-NH3-7	NH_3	Do Not Fit	Do Not Fit	Link Fitted
65-9094-NH3-6	NH_3	Do Not Fit	Do Not Fit	Link Fitted
65-8002-NO-A1	NO	Do Not Fit	Do Not Fit	Do Not Fit
65-9094-NO2	NO_2	Do Not Fit	Do Not Fit	Link Fitted
65-8000-O2-A3	O_2	Link Fitted	Link Fitted	Do Not Fit
65-9094-O3-2	O_3	Do Not Fit	Do Not Fit	Link Fitted
65-8014-PH3-A1	PH_3	Do Not Fit	Do Not Fit	Link Fitted
65-8003-SO2-AF	SO_2	Do Not Fit	Do Not Fit	Link Fitted

Note 1: The CO sensor (Item number 201037) is H_2 tolerant

Figure 38. PCBA 57-0028 jumper settings.

27.2 Relay PCBA 57-1011 Jumper Settings

NOTE: The PCB jumpers are factory set and can be adjusted if required.

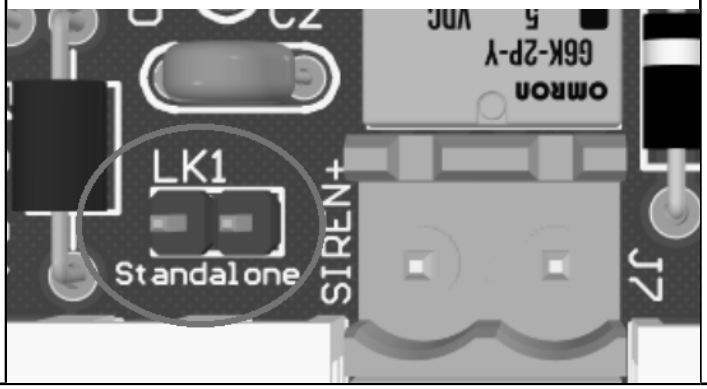
Jumper	Image	Description
J8		Fit a jumper to J8 if an external siren is connected for a high alarm
J9		Fit a jumper to J9 if an external siren is connected for a low alarm
LK1		Fit a jumper to LK1 if the D-Guard² is used in standalone mode Remove the jumper from LK1 if the D-Guard² is connected for 4-20mA output

Figure 39. PCBA 57-1011 jumper locations and settings.

28 Maintenance

The D-Guard²S must be included in your sites regular maintenance program.

28.1 Calibration Interval

Make sure the D-Guard²S is calibrated regularly. Gastech recommends at least every six months.

28.2 Cleaning

Figure 40. Splash Guard.

Step 1. Remove the Splash Guard from the D-Guard²S.

Step 2. Use a brush to remove any debris.

Step 3. Wash the Splash Guard in potable water.

Step 4. Wipe the outside of the D-Guard²S with a cloth dampened with potable water only.

Step 5. Refit the Splash Guard.

Caution: Make sure the Splash Guard is dry before use.

Caution: Do not use solvents to clean the D-Guard²S. Solvents can damage sensors.

28.3 Visual Inspection

Step 1. Make sure all fasteners and cable glands are secure.

Step 2. Inspect the inside of the D-Guard²S for moisture ingress. Replace the main seal as required.

29 Gastech Policy Statements

Statement

Gastech Australia Pty Ltd owns proprietary rights in the information disclosed within. By receiving this document, the recipient agrees that neither this document nor the information disclosed within nor any part shall be reproduced or transferred to other documents or used or disclosed to others for manufacturing or for any other purpose except as specifically authorized in writing by Gastech Australia Pty Ltd.

Copyright statement

Information contained in this document is protected by copyright. No part of this document may be photocopied, reproduced, or translated to another program or system without prior written authorization from Gastech Australia Pty Ltd.

Trademark statement

Protected through use and/or registration in the United States and many foreign countries are the trademarks and service marks of Gastech Australia Pty Ltd. The use of the ® symbol indicates registration in the United States and the ™ is in Australia; registrations may not have been issued at present in other countries. All other product names and logos are trademarks of their respective owners.

Disclaimer

Under no circumstances will Gastech Australia Pty Ltd be liable for any claims, losses, or damages resulting from or arising out of the repair or modification of the equipment by a party other than Gastech Australia Pty Ltd or its authorized service representatives, or by operation or use of the equipment other than in accordance with the documentation provided by Gastech Australia Pty Ltd, or if the equipment has been improperly maintained or subject to neglect or accident. Any of the foregoing will void the warranty.

Revisions to manual

All information contained in this manual is believed to be true and correct at the time of publication. However, as part of its continuing efforts to improve its products and their documentation, Gastech Australia Pty Ltd reserves the right to make changes at any time without notice. Any revised copies of this manual can be obtained by contacting Gastech Australia Pty Ltd.

gastech®

t +61 8 6108 0000

e info@gastech.com

w gastech.com

Support

HEAD OFFICE
24 Baretta Road
Wangara WA 6065
Phone: +61 8 6108 0000

SYDNEY OFFICE
Suite G01, 10 Tilley Lane
Frenchs Forest NSW 2086
Phone: +61 2 9451 0054

BRISBANE OFFICE
PO Box 59
Kippa-Ring QLD 4021
Phone +61 7 3160 0901