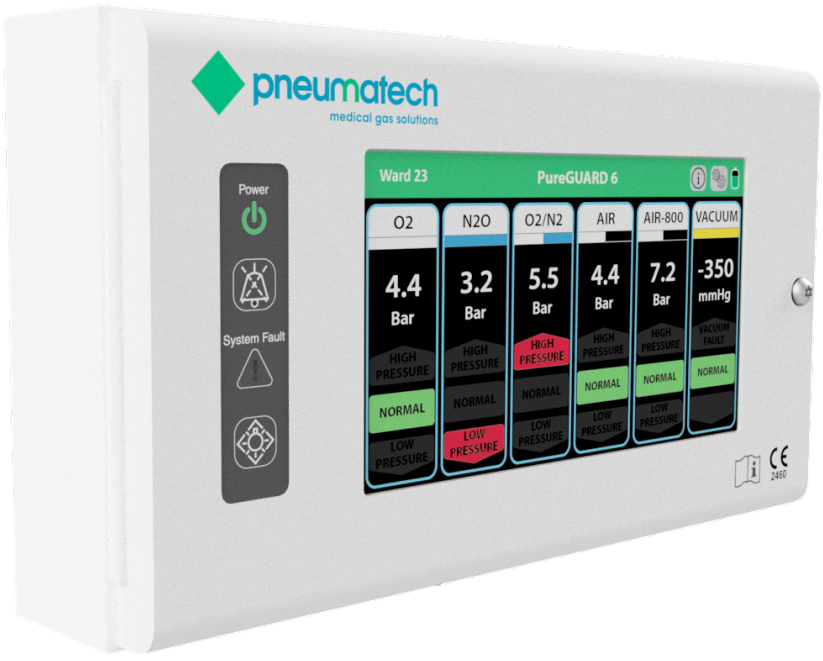
pneumatech
medical gas solutions

PureGUARD 6 Area Alarm - HTM02-01

Medical Gas Alarm

Operation and Maintenance Manual



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Important
Personnel must make themselves familiar with the contents of this manual and the function of the unit before installing, operating or maintaining any Manifold System.

Information contained in this manual is correct at the date of publication. The policy of Pneumatech Medical Gas Solutions is one of continuous product improvement. Pneumatech Medical Gas Solutions reserves the right to make changes that may affect instructions in this manual without prior notice.

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Products covered within this manual.

Part Number	Description
Main Product group	
8102371402	PureGUARD 6 Digital Alarm
1826481	Medical Gas Alarm 1st Fix backbox
1826484	Medical Gas Alarm Bezel
4233400417	Pressure & Vacuum Sensor
Related Products	
1824433	Minimum leak tee adaptor - 15 mm
1824434	Minimum leak tee adaptor - 22 mm
1826284	Minimum leak tee adaptor - 28 mm
1826285	Minimum leak tee adaptor - 35 mm
1826286	Minimum leak tee adaptor - 42 mm
1826287	Minimum leak tee adaptor - 54 mm

Safety Precautions

⚠ **WARNING! DO NOT USE OIL OR GREASE on any parts in contact with the medical gases for any reason. This could lead to a FIRE or an EXPLOSION. Only use approved OXYGEN COMPATIBLE lubricants, which can be purchased from Pneumatech if necessary.**

Operator should have carefully read and become familiar with the contents of this manual before maintaining the PureGUARD 6 Digital Alarm.

Operator is expected to use common sense safety precautions, good workmanship practices and follow any related local safety precautions.

Component descriptions and parts lists are available on request.

Identification of symbols

The following symbols apply to this product and are used in these instructions and on the product in question. The meanings of these symbols are as specified below: -

	Read instructions
	Ambient temperature range
	Ambient humidity range
	Ambient pressure range
	Date of manufacture
	Do not dispose of in general waste

Electromagnetic Interference

The panel has been tested to BS EN 61326-1- Electromagnetic compatibility - Requirements and tests.

Environmental Transport and Storage Conditions

All products are separately packaged and stored in controlled conditions.

Environmental Operating Conditions

Adverse environmental conditions and harsh abrasives or chemicals may cause damage to the unit.

Environmental Protection

Discard the unit and/or components in any standard refuse facility. The unit does not contain and hazardous substances.

Cleaning

The alarm cover should be wiped over with a damp cloth frequently to remove any dust or foreign substances.

Electrical Details

⚠ CAUTION! It is necessary to check the integrity of the power source for safety at regular intervals. These checks should be carried out annually and replacement power supplies used as necessary.

Power source

Mains operated using 110V-230V, 50/60Hz, alternating current.

Cable size:

Frequency	Voltage	Minimum Cable Size
50 Hz	230 V	3 x 1.5 mm^2
60 Hz	110 V	3 3 AWG14

Current requirements - 3.0 amps

Type of protection against electric shock.

Class 1 (Mains supplied equipment using a protected earth).

Relative Humidity 90% max.

Altitude up to 2000m

Pollution Degree 2

Mode of operation:

- Indoor use.
- Continuous (equipment may be left switched on indefinitely).

Note - A double pole fused isolation switch or circuit breaker must be installed locally to the medical gas alarm. The isolation point must be clearly marked for the equipment it is intended for, and within easy reach. The switch must require a tool or key to operate to prevent unauthorized isolation of the device.

Safety Notice

Persons undertaking any installation and/or maintenance must be fully trained in specialist work of this nature.

The "PERMIT TO WORK" procedure must be adhered to for all installations once commissioned.

The alarm is designed and built in accordance with HTM 02-01 and ISO 7396-1 regulations and therefore should be installed as such.

1. General Information.

1.1 Introduction.

The Pneumatech PureGUARD 6 digital medical gas area alarm is suitable for both the United Kingdom and International markets, and fully satisfies the requirements of the HTM02-01, HTM2022 and ISO7396-1 applications.

The Alarms is defined in ISO 7396-1 as 'Emergency Clinical Alarms'. The intention of the alarm is to indicate to technical and clinical staff that there is a deviation from a monitored parameter within the Medical Gas Pipeline System that requires an immediate response.

The alarm is designed to monitor a maximum of six medical gas services in normal, high- and low-pressure conditions. Typically, Area Alarms are used to provide a warning of abnormal operating pressure downstream of departmental Area Valve Service Units (AVSUs).

Each alarm panel requires a standard AC electrical power supply of 115/230 volts ±10% at 50 or 60 Hz, and fused at 3 Amps.

Displays are controlled by printed circuit boards and are displayed by an LCD touch screen. The alarm panel is operated by pressure sensors fitted in the medical gas pipeline normally downstream of a Zone Service Unit. The sensors provide a 4-20 mA signal to the alarm panel and initiate a flashing display in both failure modes, accompanied by an audible warning. MUTE and TEST switches mute the audible warning and enable testing of the alarm circuits, displays and audible warning (see figure 1).

The PureGUARD 6 can also be configured to monitor any alternative 4-20 mA sensors.

Facilities are provided to interconnect any PureGUARD 6 to any central alarm system or building management system. A POWER ON and SYSTEM ALARM LED are clearly visible through the alarm panel fascia. In the event of

PureGUARD 6 consists of: -

No.	Description
Control Fascia	
1	Power on LED
2	Temperary mute button
3	System Fault LED
4	Test button
LCD Touch Screen	
5	Information screen
6	Settup Menus
7	Alarm service location
8	Alarm Type
9	Emergency battery supply status
10	Gas service type
11	Gas service colour identification bar
12	Gas service pressure/units
13	Gas service status

Figure 1 - PureGUARD 6 Digital Alarm.

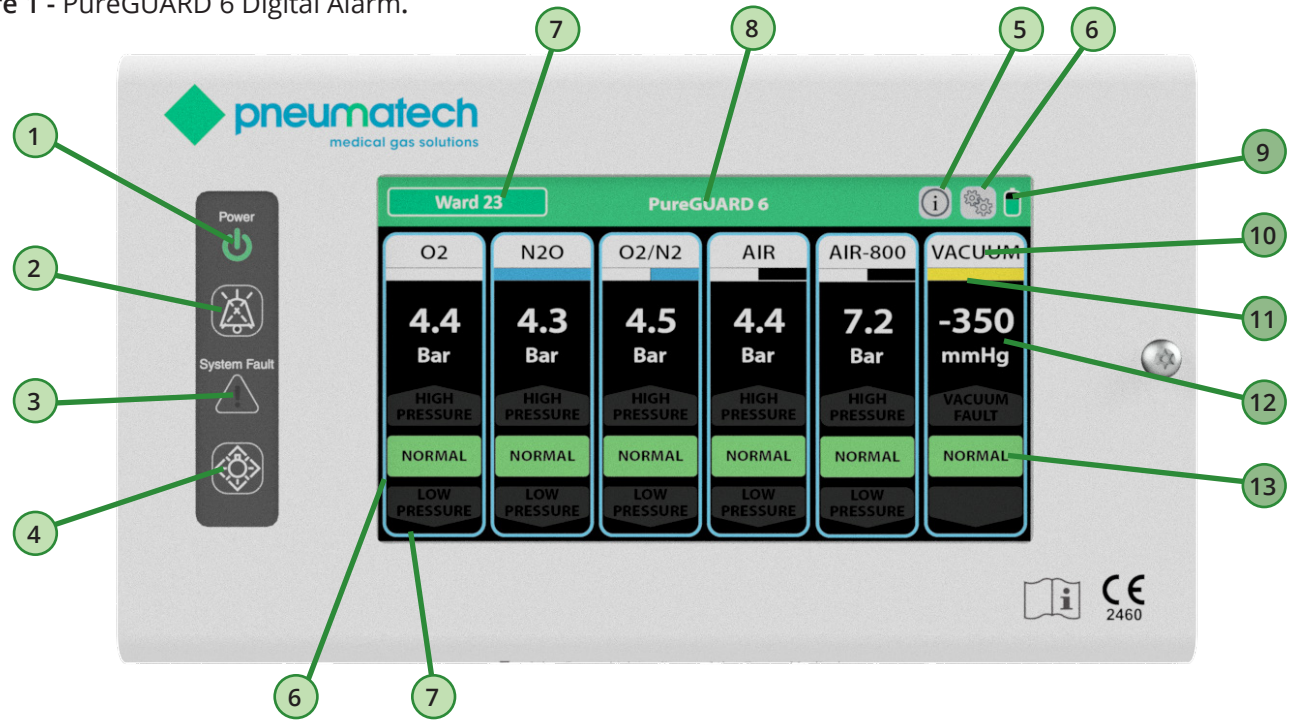
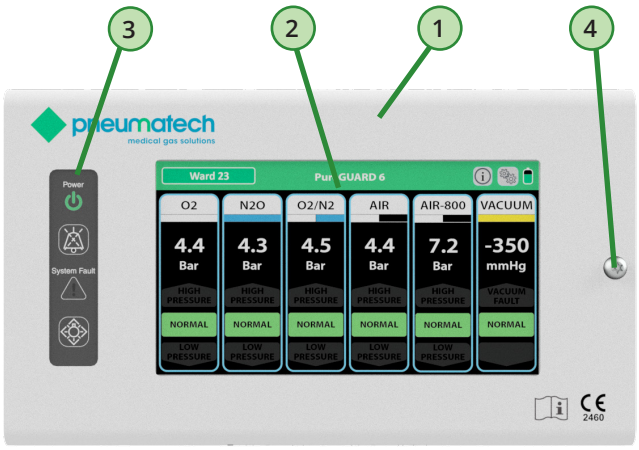


Figure 2 - PureGUARD 6 Digital Alarm Components.



PureGUARD 6 consists of: -

No.	Description
1	Alarm enclosure hinged door
2	LCD touch screen
3	Control fascia
4	Security access fastener
5	Enclosure backbox
6	Power supply PCB
7	Processor PCB
8	Speaker
9	Control fascia mounting plate
10	LCD screen clamp
11	PCB ribbon cable connections
12	LCD screen cable connection
13	Speaker connection
14	Control fascia connection
15	Battery pack connection
16	Earth bonding points
17	Maintenance mute button

an electrical power failure at the panel, the POWER ON LED is extinguished and powered by a standby battery, the SYSTEM ALARM LED illuminates (flashing) and the audible warning sounds (see figures 1).

The alarm panel also constantly monitors the integrity of the internal circuits, interconnected wiring and system monitoring pressure sensors. In the event of any defect within the monitored functions, the SYSTEM ALARM LED illuminates (flashing) accompanied by the audible warning, and the defective gas service alarm display illuminates red. When a communication fault is detected between alarm and pressure sensor the pressure value changes to ERROR, the system fault LED flashes and audible warning is sounded.

An internal maintenance push-button is provided for use when the plant or pipeline is shut-down for prolonged periods (see See figure 2). This facility enables 'permanent' muting of the audible warning for a particular gas service and is automatically reset when pipeline pressure returns to NORMAL or a new fault status occurs.

See figure 2 for identification of main components.

Figure 3 shows the electrical connections.

1.2 Standards

Area alarm panels are fully tested prior to dispatch and packed to provide maximum protection during transit. The alarm panels are designed to operate in an ambient temperature of between 0°C and +40°C. Component assemblies must be stored in their packaging in dry conditions and storage temperatures must be between -10°C and +50°C. Alarm panel enclosures can only be accessed with the use of a tool, mains terminals have recessed screws to prevent finger contact even with the door open, and electrically bonded to earth is provide to backbox and door for a safe installation.

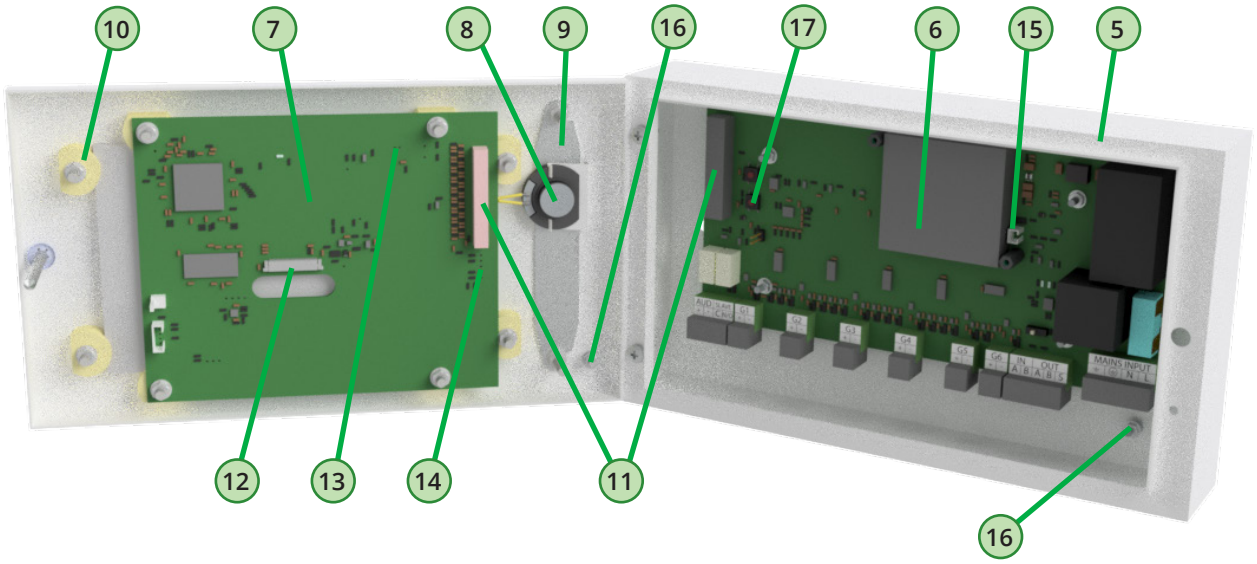
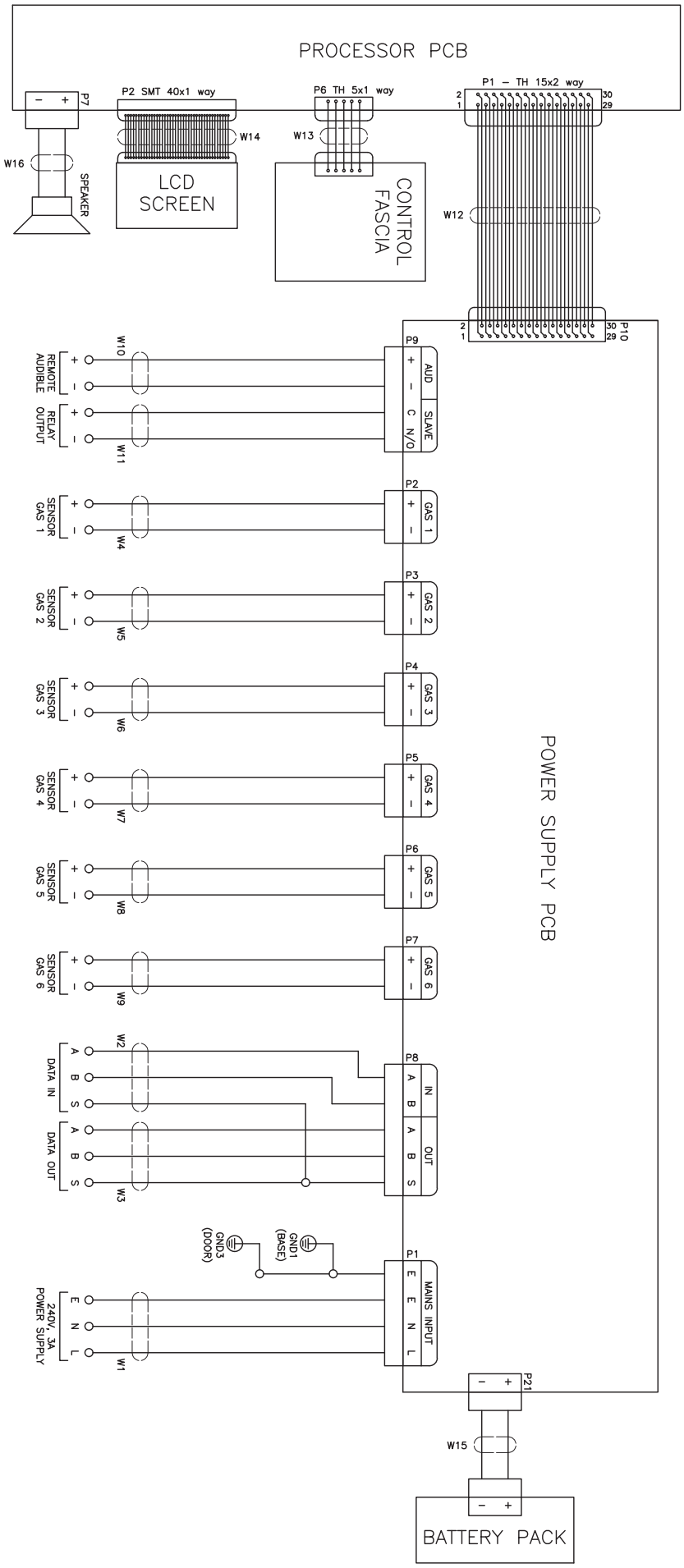


Figure 3 - Electrical Schematic Diagram



1.3 Alarm Panels

Each alarm panel consists of a first and second fix assembly, and are suitable for use with either surface or concealed installations. A bezel plate is provided for use with concealed installations and is fitted to the first fix assembly to give a neat appearance by covering the plaster joint. The front cover of the enclosure is hinged and retained by a security fastener, which prevents unauthorised access (see figure 4).

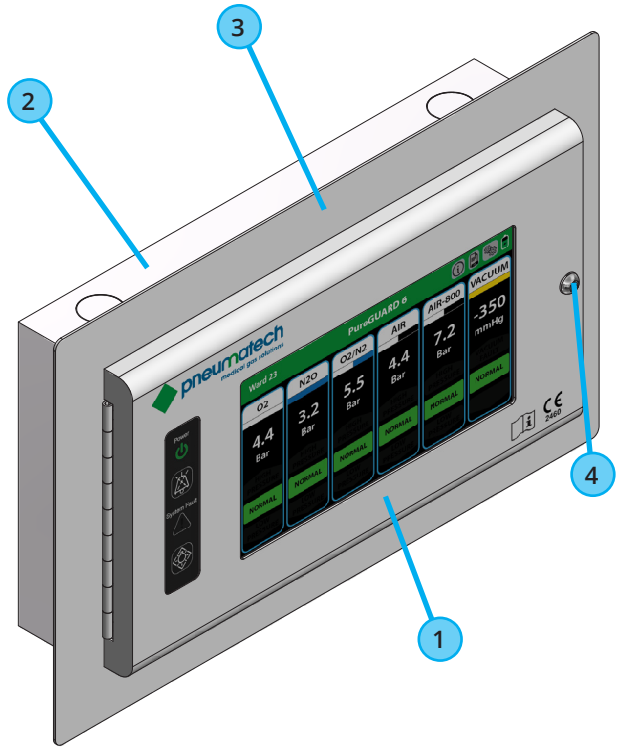
The assembly contains two printed circuit boards and provides a gas service display from the LCD touch screen. Each gas service is displayed in the NORMAL (green, steady) and HIGH or LOW PRESSURE (red, flashing) alarm conditions to show the gas service status. All alarm conditions are illuminated by a flashing display and accompanied by an audible warning. Each alarm panel locates all electrical components on either the power supply or processor printed circuit boards, which are interconnected by a ribbon cable.

Overall dimensions are detailed at Table 1 & Figure 3.

TABLE 1: PureGUARD 6 – DIMENSIONS

	Alarm Panel	Bezel
Height (mm)	150.0	200.0
Length (mm)	260.0	310.0
Depth (mm)	61.8	1.2
Chase depth (mm)	45.0	-

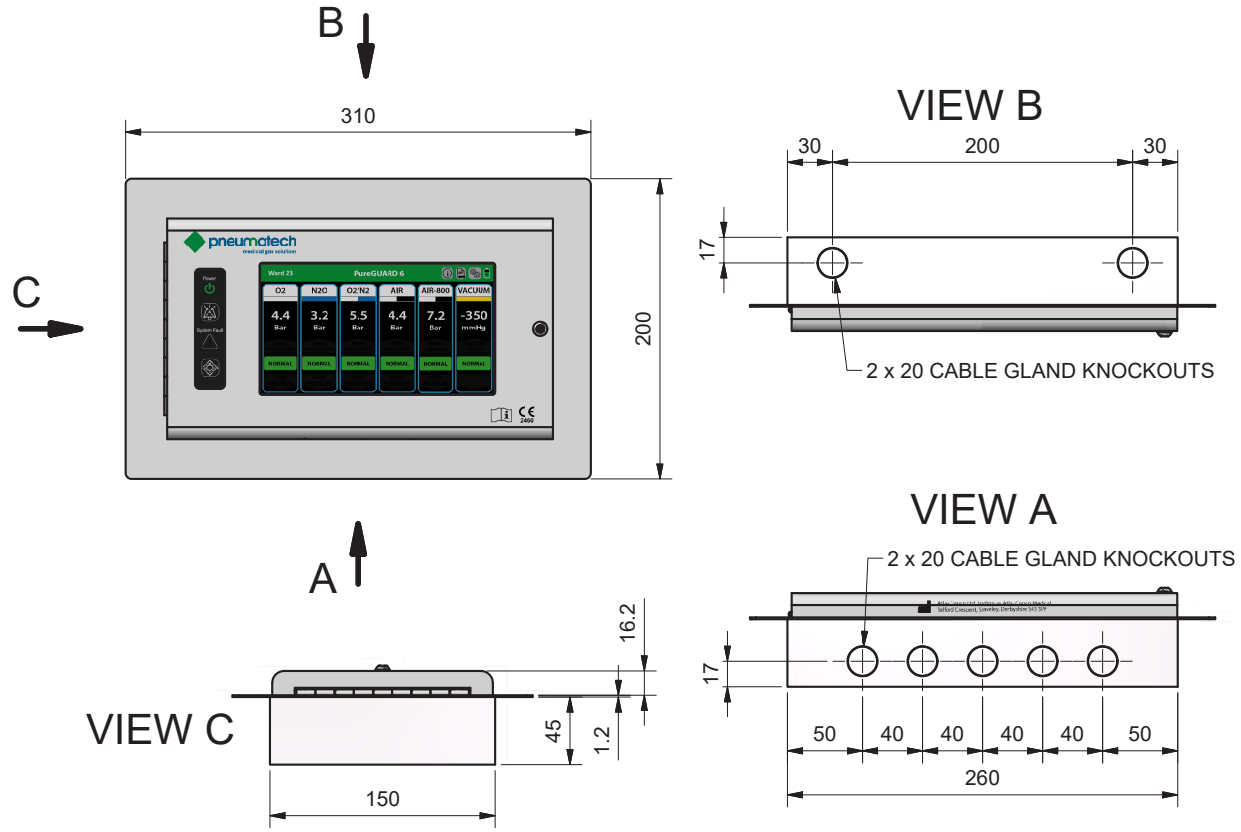
Figure 4 -PureGUARD 6 assembly



PureGUARD 6 consists of: -

No.	Description
1	2nd fix alarm Panel.
2	1st fix backbox.
3	Flush mounted bezel.
4	Security access fastener.

Figure 5 - PureGUARD 6 dimension drawing



1.4 Visual displays

Colour LCD touch screen display provides the visual display detailed in paragraph 1.1, figure 1. All flashing displays flash at a rate of 0.4 seconds on, 0.4 seconds off in accordance with ISO7396-1 and HTM02-01/HTM2022 .

1.5 Audible warning

The audible warning speaker fitted to the inside of the alarm panel door and connected to the processor PCB by plug and socket (see figure 2) operates simultaneously with any HIGH PRESSURE, LOW PRESSURE or SYSTEM ALARM indication. The audible warning may be muted by pressing the MUTE switch (see figure 1). If following a mute condition another alarm condition occurs, the audible warning will operate simultaneously with the indication. Following a mute condition and a continuing alarm indication, the audible warning will resound after 15 minutes in accordance with HTM02-01/HTM2022 and C11. When the audible re-sounds further operation of the MUTE switch is necessary to cancel the audible.

If following an alarm condition no action is taken to MUTE the audible, the audible warning will automatically switch off when the alarm condition reverts to NORMAL. The audible tone consists of a modulation between two tones (F1 and F2). F1 = 440 Hz and F2 = 880Hz. The modulation rate is 4 Hz in accordance with HTM02-01/ HTM2022 and C11.

1.6 Printed circuit boards

Two printed circuit boards are fitted inside a medical gas area alarm; a power supply PCB and a processor PCB. All components are mounted on these PCB's, which are interconnected by means of a multi-way ribbon cable and polarised connector (see figure 2 & 3). The area alarm internal electrical installation complies with all relevant British Standard specifications, IET wiring regulations and current UK legislation.

1.6.1 Processor printed circuit board

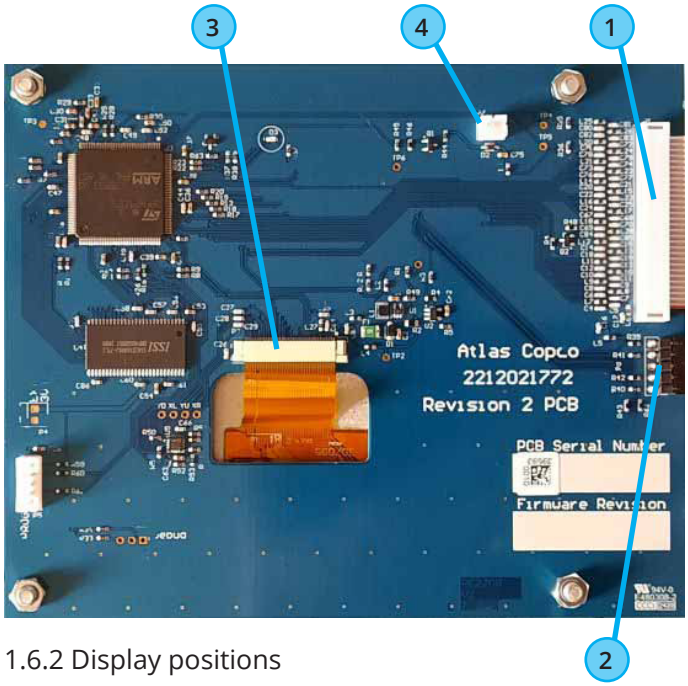
The Processor PCB is retained inside the alarm panel front cover with four retaining studs. This PCB is supplied with a ribbon cable for connection to the power supply PCB, and connector for linking to the control fascia, LCD touch screen and internal speaker (see figure 6).

The block indicator is a plug-in component enabling easy replacement or subsequent updating of the installation. The ribbon cable is permanently attached to the rear face of the light display PCB and enables interconnection of circuits with the power supply PCB. The audible warning speaker is connected by plug and socket to the light display PCB and locates within the alarm panel front cover when installed.

Figure 6 - Processor PCB

PureGUARD 6 consists of: -

No.	Description
1	Process to power supply PCB ribbon cable
2	Control fascia connector
3	LCD touch screen connector
4	Audible speaker connector

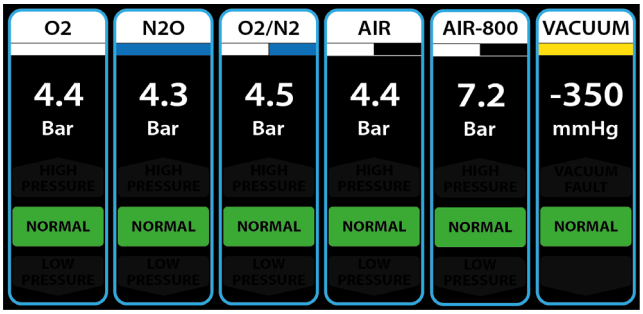


1.6.2 Display positions

To provide an aesthetic display and maintain consistency in accordance with recognised and established medical gas service sequencing, it is recommended that displays are positioned in the following sequence on each alarm panel commencing with from left to right on the top row 1st, followed by the 2nd row, (see figure 7 example):-

Gas Type	Legend
Medical Oxygen	O2
Nitrous Oxide	N2O
Oxygen/Nitrous Oxide Mix (50/50)	O2/N2O
Medical Air 400 kPa	Air
Medical Air 700 kPa	Air-800
Medical Vacuum	Vacuum

Figure 7 - Gas source layout example.



1.6.2 Power supply printed circuit board

The power supply PCB is retained inside the alarm panel back box with four retaining studs and connects to the processor PCB multi-way ribbon cable by polarised connectors. The power supply PCB incorporates four mains terminals (2 Earth, Neutral and Live, see figure 8) connected to a matching plug/socket combination to accept the mains electrical power supply, which preferably should be from an essential circuit, and enables connection of flying earth leads which electrically bond the assembly.

A filter protects the alarm system from possible spikes or disturbances of the incoming electrical power supply and an integral transformer provides 24 V d.c. Supplies to operate the alarm circuits and power the pressure sensors. A 5x20mm fuses to BS EN 60127 protect the power supply circuits. F1 is rated at 500mA for 230V supplies and (see figure 8).

In order to prevent inadvertent cross connection, the mains electrical power supply plug and socket is not mechanically compatible with any other connection to the PCB.

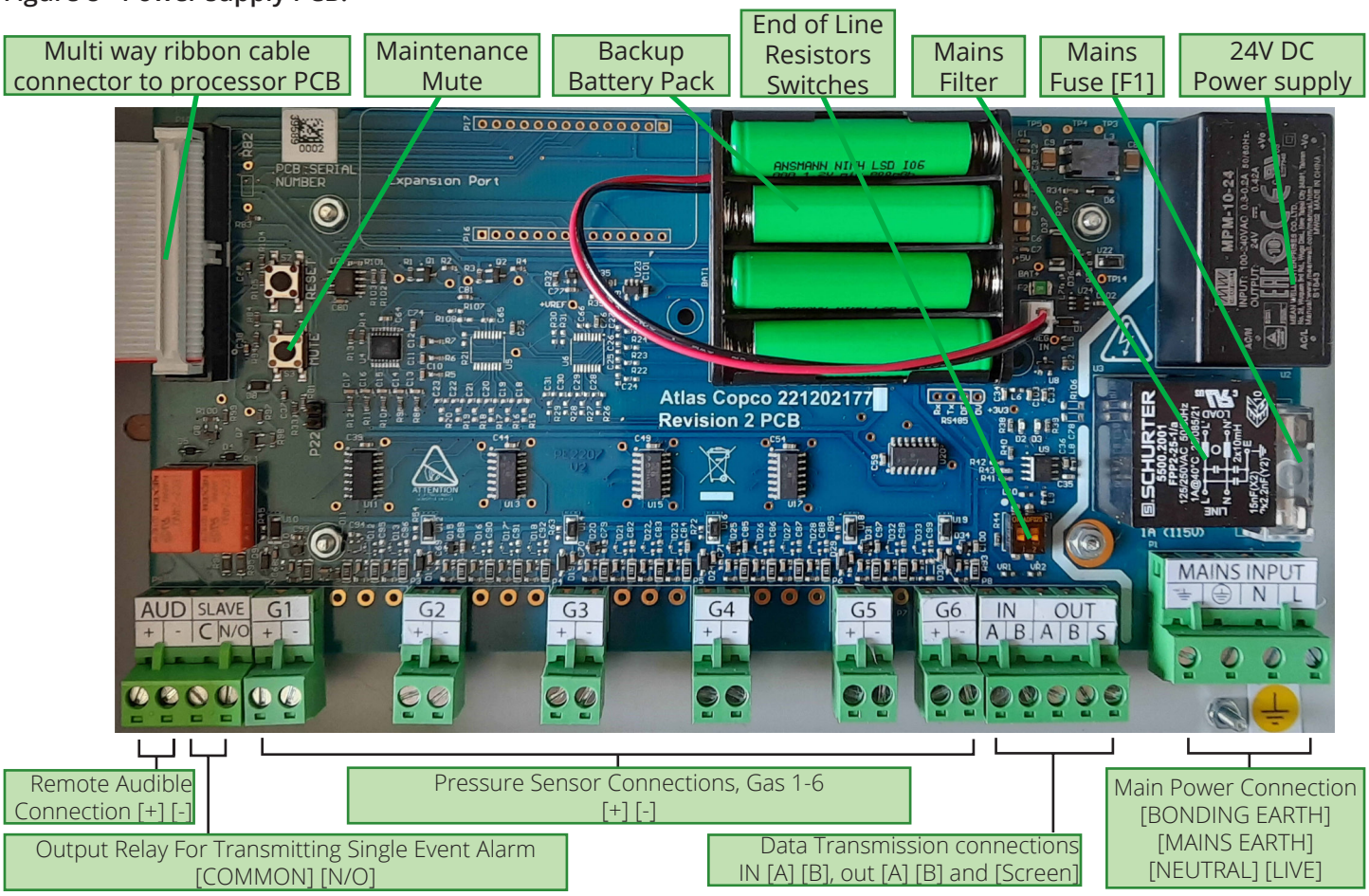
A miniature 'Maintenance Mute' push button (see figure 8) is fitted on the power supply PCB and is accessible with the alarm panel front cover open. With an alarm condition displayed, operation of this button 'permanently' disables audible reinstatement for that particular displayed alarm condition only. This facility is designed for use when the plant or pipeline is shut-off for a prolonged period. On returning the pipeline pressure to NORMAL this feature automatically re-sets without further manual selection.

Each channel (designated Gas 1 to Gas 6) incorporates two terminals (+ & -, see figure 8) which are for connecting to the pressure sensor.

A relay (complete with optional line contact monitoring circuit) suitable for switching 50V and a maximum of 0.5 Amps is fitted to the power supply PCB (see figure 8). The relay has volt free, normally open contacts and two terminals (N/O and C) enable connection by a matching plug/socket combination to either a central alarm system or other suitable system. The line contact monitoring circuit can be from the on screen setup menus. The relay is de-energised and contacts open when any of the twelve alarm conditions are initiated. Terminals are also provided to enable connection of a remote audible warning device (AUD+ and AUD-) (see figure 8).

It is recommended that the input cables from the pressure switches and data transmission are installed separate from the mains cable.

Figure 8 - Power supply PCB.



Communication terminals IN [A][B], OUT [A][B] and Screen [S] are provided to link the input alarm to repeater units. End of line resister dip switches are mounted on the PCB to be set to ON for the first and last alarm in the network chain.

1.6.3 Standby battery

The power supply PCB also contains a standby battery (see figure 8), battery charging and power fail detection circuits. The battery provides power for both the SYSTEM ALARM indication and the audible warning in the event of an electrical power failure. The battery is fully charged after 72 hours and provides sufficient power to operate the specific alarm indications for a minimum of 4 hours. The battery is expected to have a minimum 5 year life.

1.7 Alarm contact line fault

Integrity of the interconnecting wiring and pressure sensors are constantly monitored by the fault detection circuits. The fault detection circuit is designed to detect an wiring fault or pressure sensor fault resulting in loss of communication between sensor and board as well as normal operation of the pressure sensor. In the event of a line fault the Power LED remains illuminated, the SYSTEM ALARM indicator will illuminate (flashing) and the audible warning sounds. The affected gas service badge status bar will turn red (steady), state “Fault” and pressure reading is replaced by “ERR”. When a line contact fault is detected the flash rate of the affected gas fault slows to half speed when the TEST switch is operated.

1.8 Pressure Sensors

The gas sensor provides a 4-20mA signal to the alarm panel with a pressure range of -1 to 16 bar to cover all medical gas pipeline services with one sensor type. The alarm receives the pressure reading from the sensor and determines the gas pressure status based on the alarms predefined default settings or customers preference which can be defined within the gas service setup menus.

The pressure sensor is connected to the terminals G1 through to G6 by the cable provided with the sensor assembly. See table 2 and figure 9.

TABLE 2: PRESSURE SENSOR TO ALARM CONNECTIONS

	Sensor Wire Colour	Alarm Terminal
Positive (24 V DC)	Red	[+]
Negative (0 V DC)	Green	[-]
Not Used	Black	N/A

Figure 9 - Pressure sensor.

No.	Description
1	G1/4” thread, complete with seal
2	Cable gland
3	Alarm connections

1.9 Data Connection

The power supply PCB incorporates a data connection that allows repeater area alarms to be connected with data cable. These repeater panels will repeat the signals received from the master panel, allowing additional panels to be installed on nurses bases, or inside operating theatre panels (see figure 8).

1.10 Remote audible warning devices

Remote audible warning devices may be fitted in locations where warnings are necessary and alarm panels are not fitted. Remote audible warning devices are housed in a surface mounted enclosure containing a warning buzzer. The audible warning device is connected by input cable to the power supply PCB within the alarm panel (alarm terminals AUD+ and AUD-) (see figure 8). When the alarm panel audible sounds the remote audible also sounds. A maximum of four remote audible warning devices can be fitted to an alarm panel and the total cable length should not exceed 50 metres.

2. Installation

2.1 Installation of a first fix panel

The alarm panel backbox is suitable for both surface and concealed installation and is annotated 'TOP' inside to ensure correct orientation. With a concealed installation a chase depth of 45mm is required and a bezel is fitted to cover the plaster joint. The procedure to install a first fix alarm panel backbox is as follows: -

2.1.1 Backbox. Locate (see figure 10).

Ensure the backbox is the correct way up. Locate the backbox at the correct position and mark out for securing screws.

2.1.2 Wall. Fit anchors.

Drill wall and fit anchors in position.

⚠ CAUTION! Ensure selected wall anchors are suitable for the type of wall and weight of the alarm panel. Alarm panel weight is 1.5kg.

2.1.3 Backbox. Fit (see figure 10).

Select cable entry/exit points and remove the desired knock-out segments from the inside. Fit suitable grommets/cable glands as required by the contract specification. Feed cables into the box leaving 400mm to enable connection to printed circuit board. Secure back box to wall with suitable screws.

Select cable entry/exit points and remove the desired knock-out segments from the inside. Fit suitable grommets/cable glands as required by the contract specification. Feed cables into the box leaving 400mm to enable connection to printed circuit board. Secure back box to wall with suitable screws.

⚠ CAUTION! With a concealed installation, the plaster depth must be flush with the box surface, leaving the water channel proud of the plaster.

2.2 Installation of a Second Fix Assembly

⚠ **WARNING! Ensure that the electrical power supply to the alarm is off and remains isolated until required during the commissioning procedure.**

2.2.1 Backbox. Check.

Ensure that the inside of the backbox is clean and free from debris.

Fit bezel plate to backbox and retain with securing screw engaged in right hand anchor nut.

Concealed installation. Fit bezel plate (see figure 11).

Figure 10 - Back Box details.

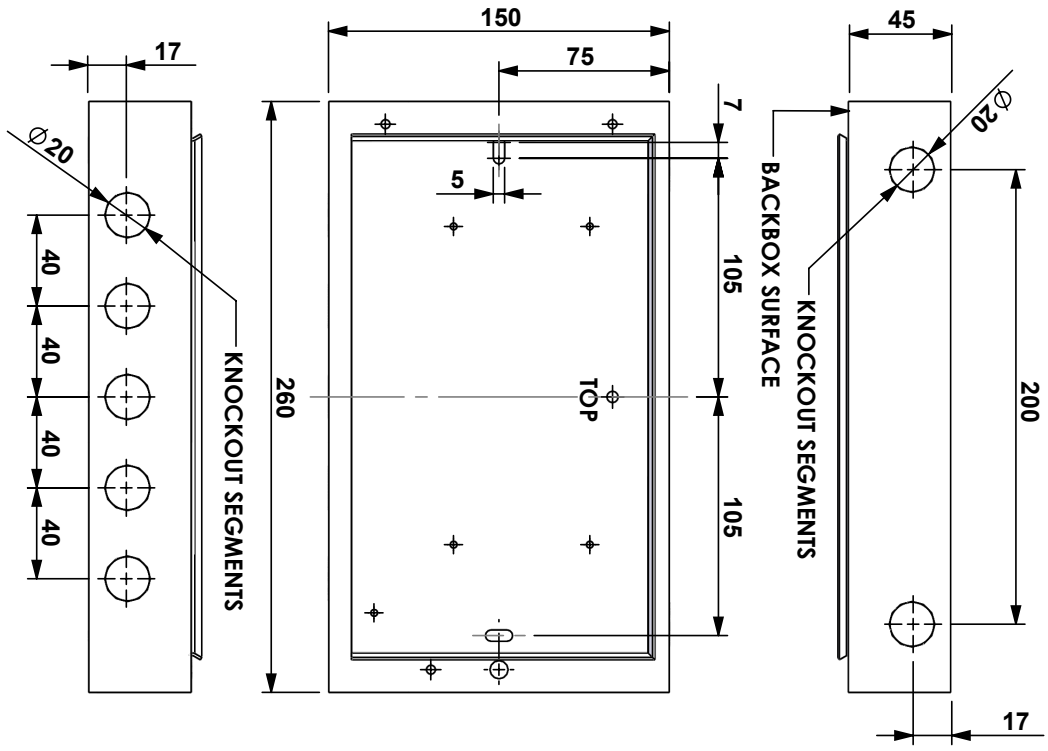


Figure 11 - Bezel details.

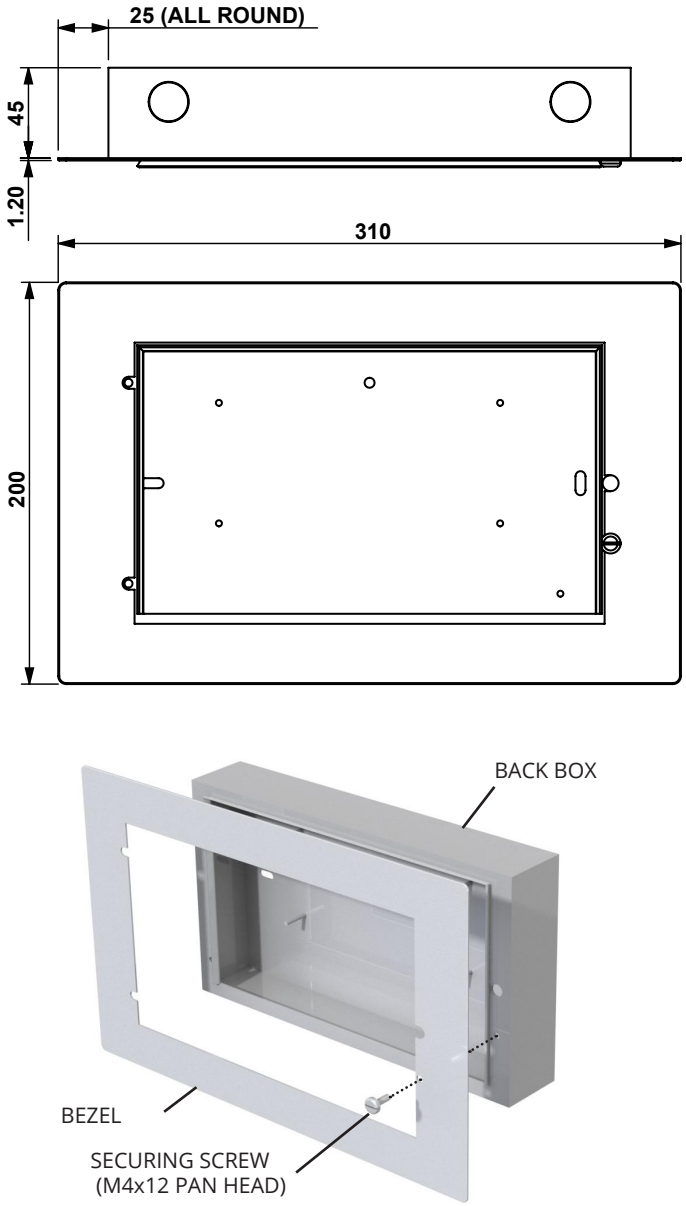
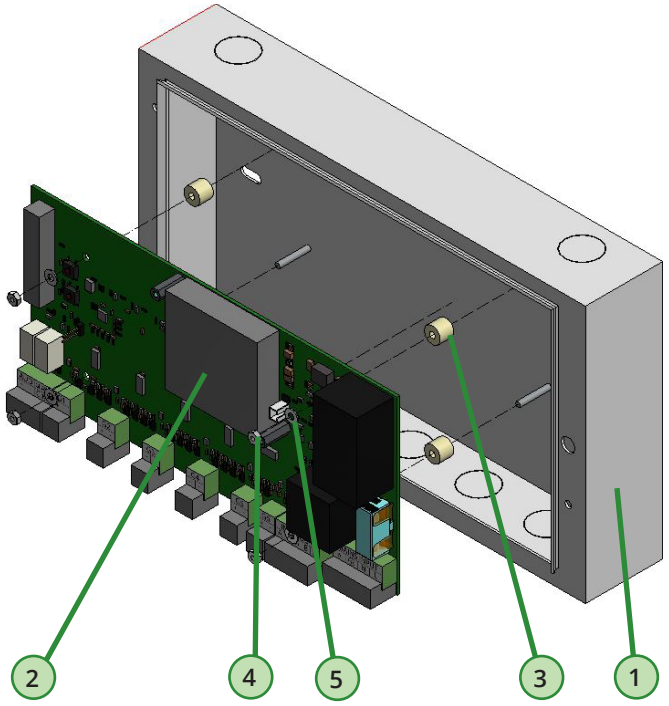


Figure 12 - Power supply PCB installation.



No.	Description	QTY
1	Back Box (1st fix supply)	N/A
2	Power supply PCB (2nd fix, supplied loose)	1
3	PCB Spacer (2nd fix, supplied loose)	4
4	M3 Nut (2nd fix, supplied loose)	4
5	M3 Washer (2nd fix, supplied loose)	4

2.2.2 Power supply circuit board. Fit (see figure 12).

Fit a plastic spacer over each of the four retaining studs in the backbox and locate the board on the studs. Fit the washers and tighten nuts in place just enough to hold the board.

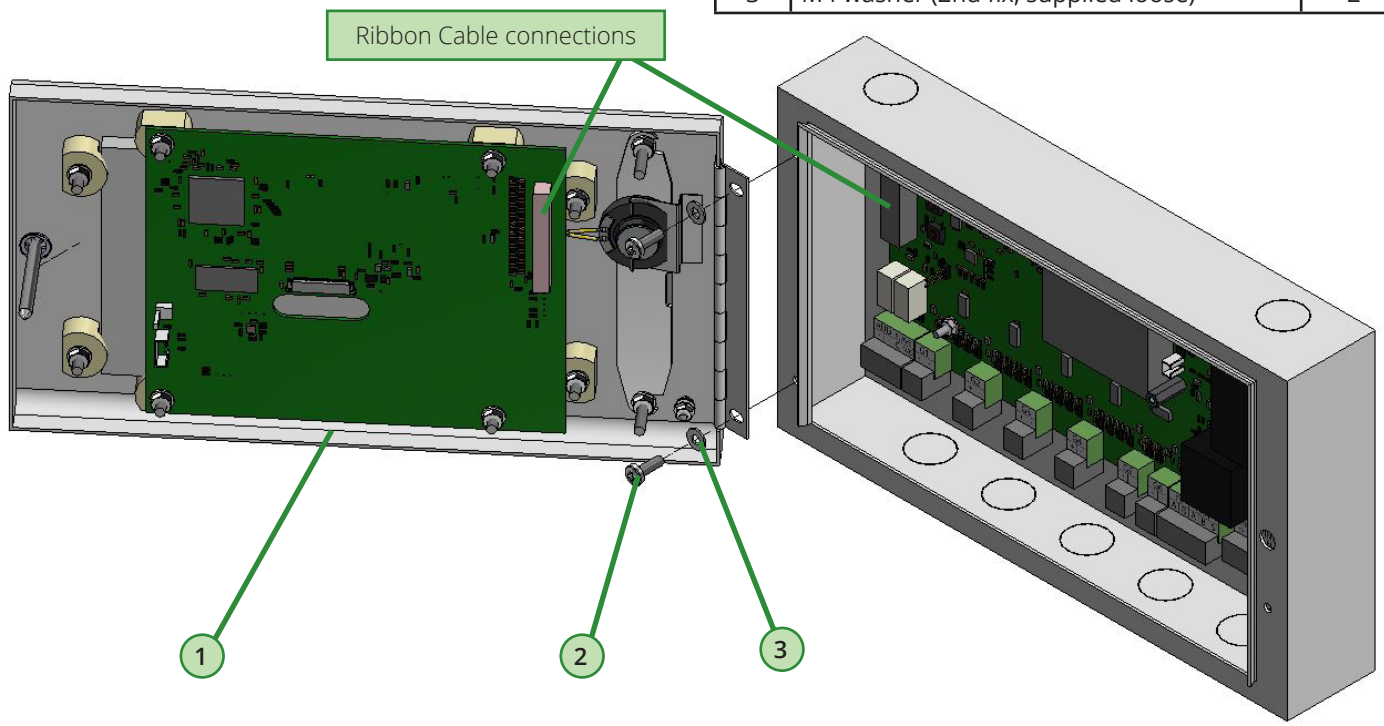
⚠ **CAUTION! Printed circuit boards are susceptible to damage by static electricity and must remain enclosed in their anti-static packaging until immediately required for use. Removed printed circuit boards must be placed in their anti-static packaging immediately on removal. To prevent damage to printed circuit boards, handle with care and do not over torque retaining nuts.**

2.2.3 Alarm panel front cover. Fit (see figure 13).

Secure the 2nd fix door to backbox flange by securing hinge to backbox with screws provided. Plug in the ribbon cable from the processor PCB to the power supply PCB

No.	Description	QTY
1	2nd Fix door (2nd fix supplied assembled)	1
2	M4x12 pan head (2nd fix, supplied loose)	2
3	M4 washer (2nd fix, supplied loose)	2

Figure 13 - 2nd fix door installation.

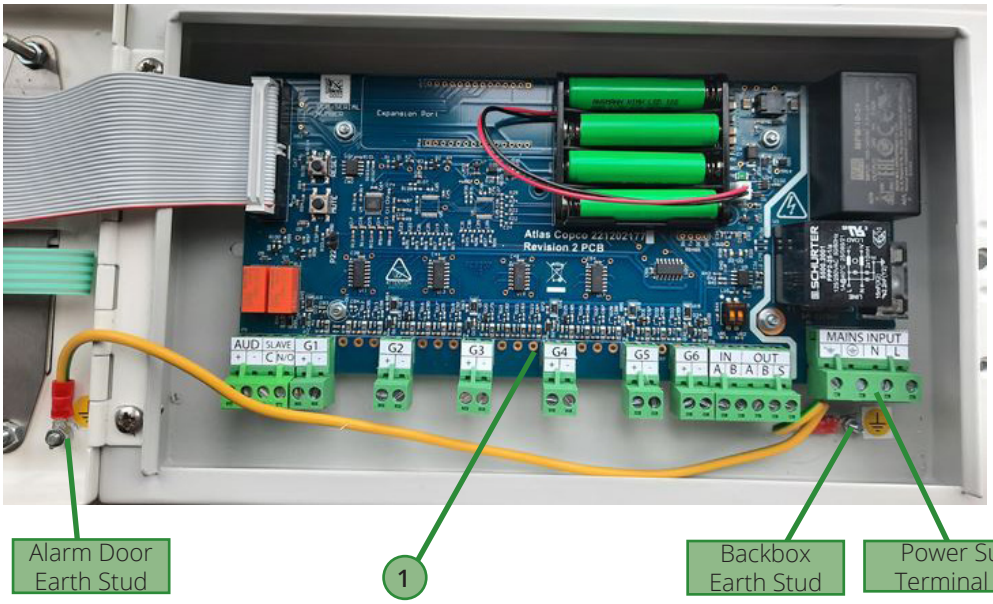


2.

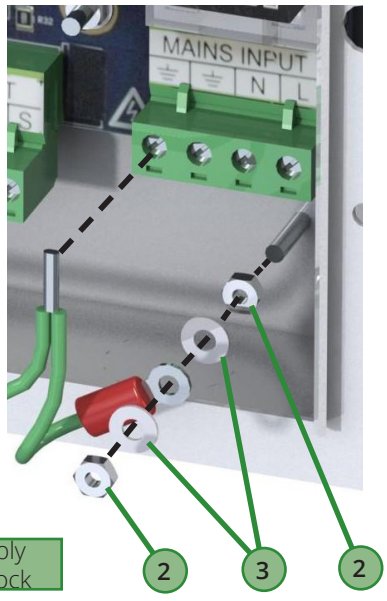
Connection the earth cable assembly to the power supply terminal block and earth stud on the backbox and alarm door assembly. See figure 14.

No.	Description	QTY
1	Earth cable (2nd fix, supplied assembled)	1
2	M3xNut (2nd fix, supplied loose)	4
3	M3 washer (2nd fix, supplied loose)	4

Figure 14 - Earth bonding connections



Typical earth stud assembly



2.2.5 Multiple Panel Data Connection (see figure 15 and table 3).

For multi-panel installations link the alarms together using the IN [A][B] and OUT [A][B] in a chain as shown in figure 15.

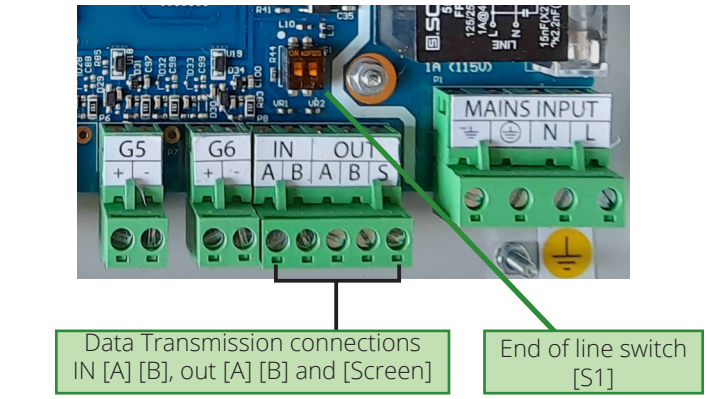
For the two panels at the endpoints of the network the termination resistor should be switched “ON” with S1. For all other panels, S1 should be switched “OFF”. See figure 15.

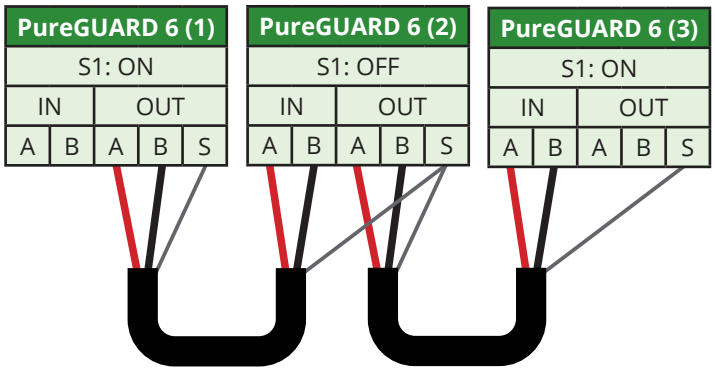
The alarm uses the EIA/TIA-485 (RS-485) data communications specification. Cable used for the alarm data must be suitable for these signals. The follow cable types are recommends, see table 3.

TABLE 3: RECOMMENDED DATA CABLE

Manufacturer / Reference	Part Number
Belden 8132 (2 pr, Non-Plenum)	2005421
Belden 82842 (2 pr, Plenum)	
Alphawire 6455 (2 pr, Non-Plenum)	

Figure 15 - Alarm data connection.



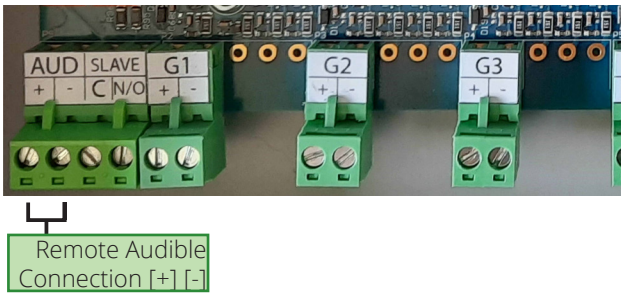


Note - “S” terminal is for connecting the screen cable.

2.2.6 Remote audible(s). Connect (see figure 16).

Connect remote audible device(s), if fitted, to power supply PCB plug (terminals + and -).

Figure 16 - Remote audible connection.



2.2.7 Alarm output fault relay connection (see figure 17)

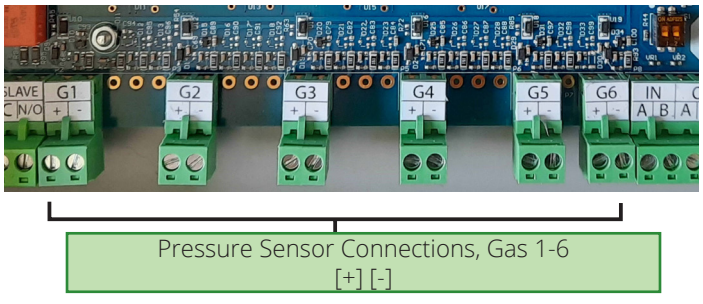
For outputting an alarm fault to another PureGUARD 6 or alternative alarms connect to the “Salve” power supply plug.

Figure 17 - Output alarm relay signal connection.

2.2.8 Pressure sensor connections, or alternative 4-20 mA sensors (see figure 18)

Pressure sensors (or any alternative 4-20mA) are connected to G1 through to G6 power supply plugs.

Figure 18 - Pressure sensor electrical connections



	Sensor Wire Colour	Alarm Terminal
Positive (24 V DC)	Red	[+]
Negative (0 V DC)	Green	[-]
Not Used	Black	N/A

The pressure sensor G1/4" thread should be fitted to the medical has pipeline using a minimum leak connections. The sensor comes complete with rubber seal. Minimum leak tee assemblies clean for use with medical gases are available from the Pneumatech range, see following part numbers in table 4 for reference. See figure 19 for typical pressure sensor to pipeline connection.

TABLE 4: PRESSURE SENSOR & MINIMUM LEAK TEE ASSEMBLIES

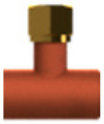
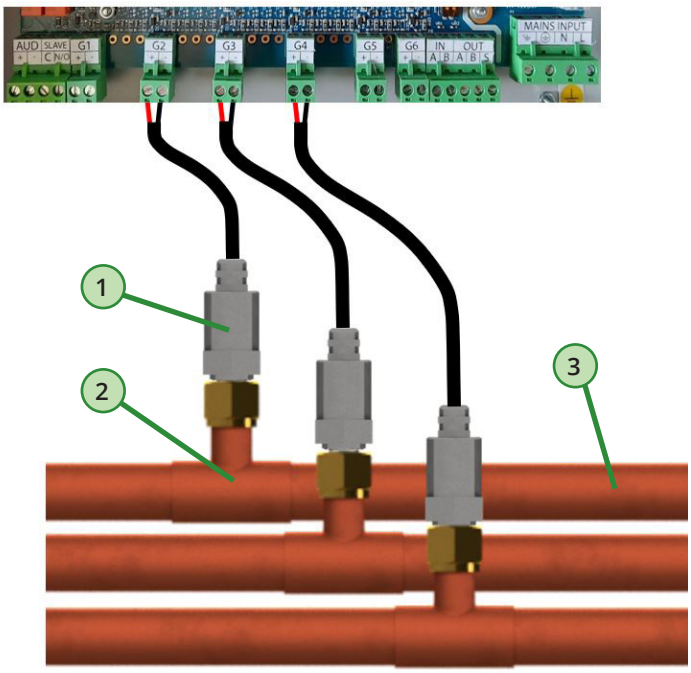
Part No.	Description	Pipe Size
4233400417	Pressure sensor	ALL
1824433	Pressure sensor minimum leak tee assemblies 	15 mm
1824434		22 mm
1826284		28 mm
1826285		35 mm
1826286		42 mm
1826287		54 mm

Figure 19 - Pressure sensor connections to pipeline



No.	Description
1	Pressure sensor (Supplied separately)
2	Minimum leak tee (Supplied separately)
3	Medical gas pipeline

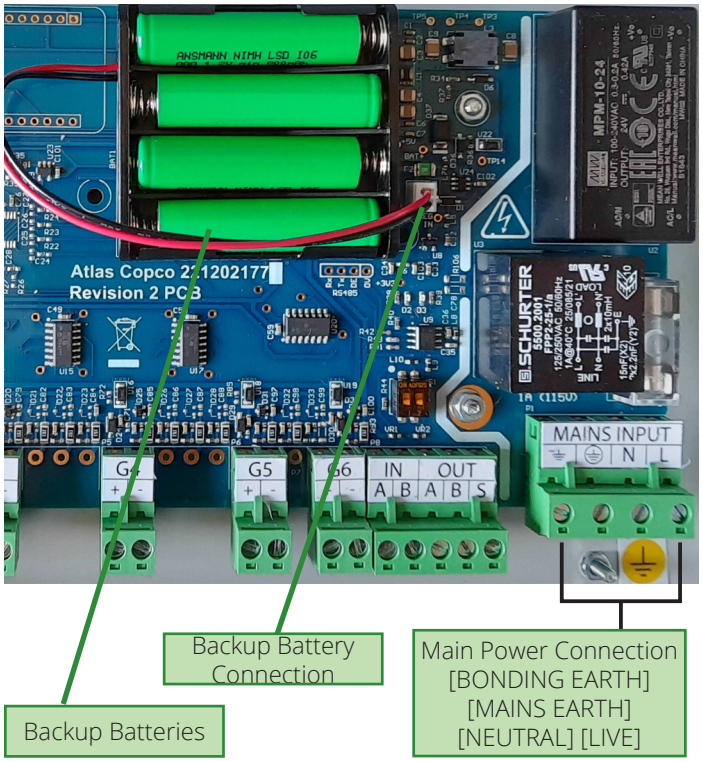
2.2.9 Electrical power supply. Connect (see figure 20).

If the alarm panel is not to be commissioned immediately, disconnect the standby battery.

Connect electrical power supply wires to electrical power supply plug (terminals E, N and L).

⚠ WARNING! The connection to the electrical power supply should only be carried out by a suitably qualified electrician, and tested in line with national electrical safety standards before the unit is powered up.

Figure 20 - Electrical power supply connection.



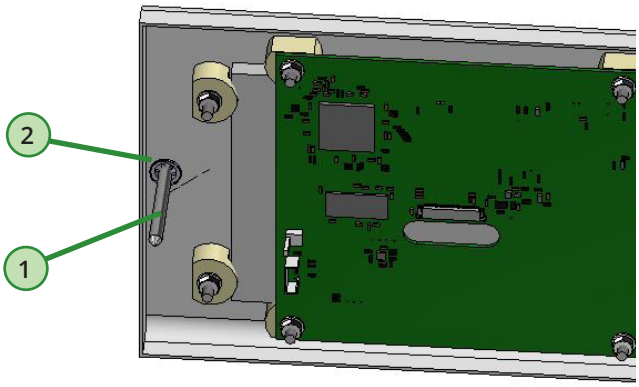
2.2.10 Back up batteries (Figure 20).

Fit the 4 AAA rechargable batteries.

2.2.11 Security Fastener. Fit (figure 21)

Fit the special fastener and retaining piece to the cover. Close the front cover and secure with special fastener.

Figure 21 - Alarm door security fastener.



No.	Description	QTY
1	Security fastener (2nd fix, supplied loose)	1
2	Retaining washer (2nd fix, supplied loose)	1

3. Alarm Configuration.

⚠ WARNING! Personnel carrying out the following procedure must be qualified and fully conversant with the information contained in this manual.

⚠ WARNING! Before commencing the alarm configuration ensure that all installation procedures are complete and that all wiring is correctly connected. Before switching on the mains electrical power supply, ensure the supply is correctly fused.

All configuration functions are setup within the software setup screens using the LCD touch screen.

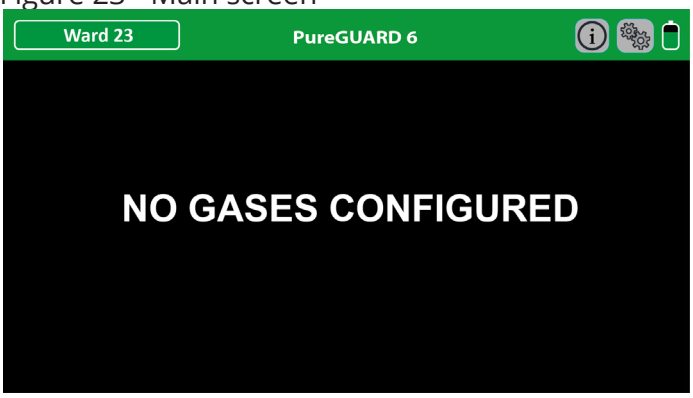
After completing all points within section 2 the alarm can be powered up.

See section 3.8 for an overview of the setup configuration menu map.

3.1 Main Screen (Figure 23).

From the main screen you can access the setup menus, log screen and info screen.

Figure 23 - Main screen



Special Characters/Icons:

Icon	Description
	Info Icon. Takes you to the info screen.
	Settings Icon. Takes you to the settings menu screens.

From the main screen press on the “Info Icon” to go to the Info screen (Detailed in the operating instructions section).

Press on the “Logs Icon” to go to the Logs Screen (Detailed in the operating instructions section).

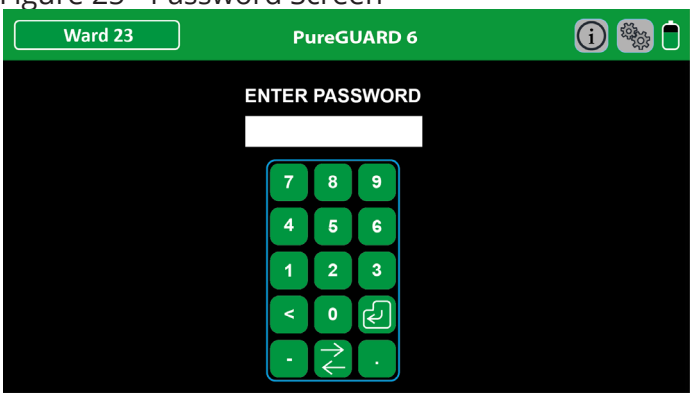
Press on the “Settings Icon” to go to the setup menus (Detailed in the following sections).

3.2 Alarm Setup menus.

Press the “Settings icon” to go to the alarm setup menu screen.

This will take you to the Password Screen. See figure 25.

Figure 25 - Password Screen

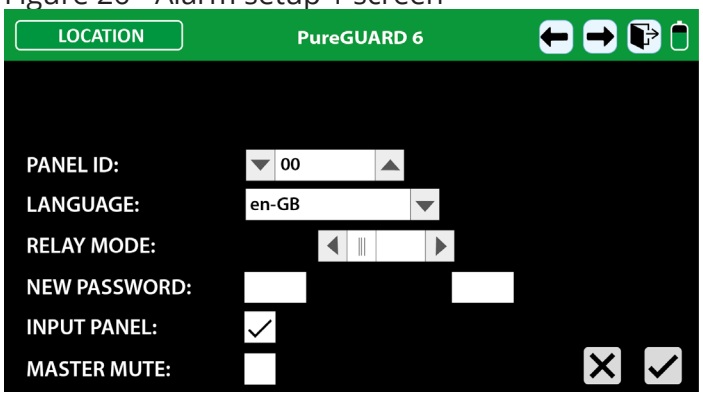


Use the num-pad to enter the 4 digit numerical password (Default: 1234).

Press the ENTER key to confirm the password and take you to the setup menus.

Settup menus start on the Alarm setup 1 screen.

Figure 26 - Alarm setup 1 screen



Special Characters/Icons:

Icon	Description
	Previous Icon. Takes you to the previous menus screen.
	Next Icon. Takes you to the next menus screen.
	Exit Icon. Takes you back to the main screen.
	Reject Icon. Rejects changes.
	Accept Icon. Accepts Changes.

From the "Alarm setup 1" screen click the "Next Icon" to go to the "Gas service setup" screen, press the "Previous Icon" to go to the "Alarm setup 2" screen, or press the "Exit Icon" to go back to the main operating screen.

3.3 Alarm Setup Screen 1 (Figure 26).

The following steps describes the setup process for the alarm setup screen 1.

3.3.1 Panel ID:

This field sets the alarm ID number used for identification within an alarm network. All alarms connected within a network must have a unique ID number.

Press the up arrow to increase the ID number, down arrow to reduce the ID number.

3.3.2 Language:

Press on the down arrow to show the drop down list. Pressure on the language of choice to select.

Note - Currently English only is available.

3.3.3 Relay Mode.

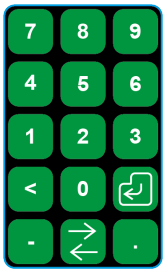
This field sets the repeater relay output condition to either normally open or Line Contact Monitoring (LCM), see section 2.2.7.

Press on the left or right arrow to switch between the two options.

3.3.4 New Password & Confirm.

This field sets the new password for accessing the setup menus screens and data log screens.

Press on the first field (New password), the num-pad will appear.



Use the num-pad to enter the new numerical password.

Press the TAB key, or press the next field to go to the next field (Confirm). Use the num-pad to enter the password again.

Press the ENTER key or press anywhere on the screen away from the NUM-PAD to remove the NUM-PAD.

3.3.5 Input Panel.

This option determines if the alarm panel is an input panel (Pressure sensors connected) or a repeater panel (gases communicated from an input panel). The default setting is ticked.

Select the tick box to select accordingly.

3.3.6 Master Mute.

This option determines if the master mute function as per HTM is activated on this panel.

If the master mute is active and the mute button is pressed during a fault condition, all fault conditions stop flashing on all alarm panels on the network. This is to indicate to all areas on the network that the fault has been detected and being attended too. The default setting is unchecked.

Select the tick box to select accordingly.

3.3.7 Confirm/reject changes.

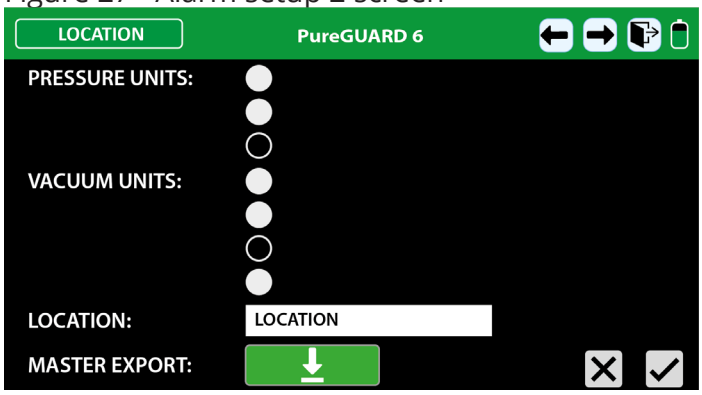
Click the tick to confirm and save the changes. Click the cross to cancel the changes. The following message box will appear to confirm the changes have been saved or rejected accordingly.

Click the window to close the confirmation message.

3.4 Alarm Setup Screen 2 (Figure 27).

The following steps describes the setup process for the alarm setup 1 screen.

Figure 27 - Alarm setup 2 screen



Special Characters/Icons:

Icon	Description
	Previous Icon. Takes you to the previous menus screen.
	Next Icon. Takes you to the next menus screen.
	Exit Icon. Takes you back to the main screen.
	Reject Icon. Rejects changes.
	Accept Icon. Accepts Changes.

3.4.1 Pressure Units.

Press on the Dot next to the unit to be used for gas pressure reading.

3.4.2 Vacuum Unit.

Press on the Dot next to the unit to be used for vacuum pressure reading.

3.4.3 Location.

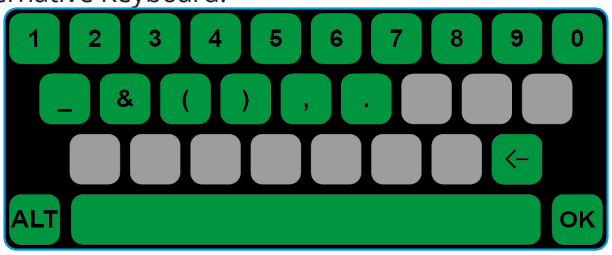
This field is for setting the area being monitored by the alarm.

Press on the field (Location), the main keyboard will appear.

Main Keyboard.

The ALT key will toggle to the alternative keyboard, and back to the main.

Alternative Keyboard.



Type the name of the location the alarm will be monitoring. Press the Delete to backspace to correct errors. Press within the field to place to cursor to edit from that place. Hold down within the field to highlight all text, the next keypress will overwrite the selection.

When complete press the OK key or anywhere on the screen away from the keyboard to remove the keyboard.

3.4.4 Master Export.

This option allow the export of the alarm gas service setup to be mirrored onto a repeater alarm panel.

Make sure the repeater panel has been installed completed all of section

3.4.5 Confirm/reject changes.

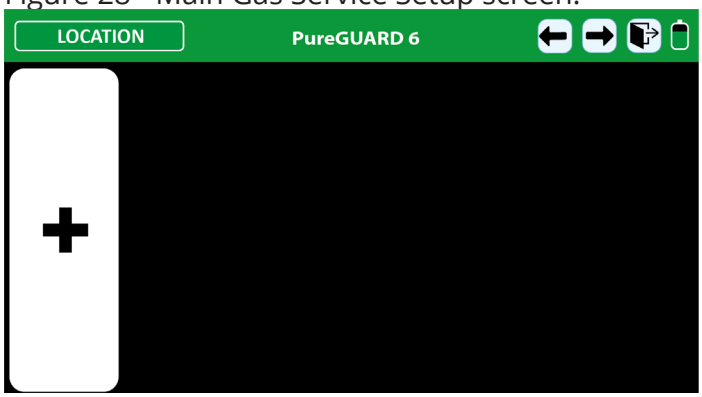
Click the tick ✓ to confirm and save the changes. Click the cross ✗ to cancel the changes. The following message box will appear to confirm the changes have been saved or rejected accordingly.

Click the window to close the confirmation message.

3.5 Gas service setup main screen (figure 28).

The following steps describes the setup process for the main gas service setup screen.

Figure 28 - Main Gas Service Setup screen.



Special Characters/Icons:

Icon	Description
←	Previous Icon. Takes you to the previous menus screen.
→	Next Icon. Takes you to the next menus screen.
	Exit Icon. Takes you back to the main screen.
+	Add Gas service Badge. Takes you back to the gas service setup screen.

3.5.1 Gas Service Badge Setup Screen (Figure 29).

The following steps describes the setup process for each gas service badge.

With the "Input Panel" check box on the "Alarm setup 1 screen" ticked the Gas service badge screen will be as per Figure 29a (Input panel), with the check box blank this setup screen will be as per 29b (Repeater Panel).

Figure 29a - Gas Service badge Setup screen.
Input Panel.
Input panel selected, see section 3.4.7

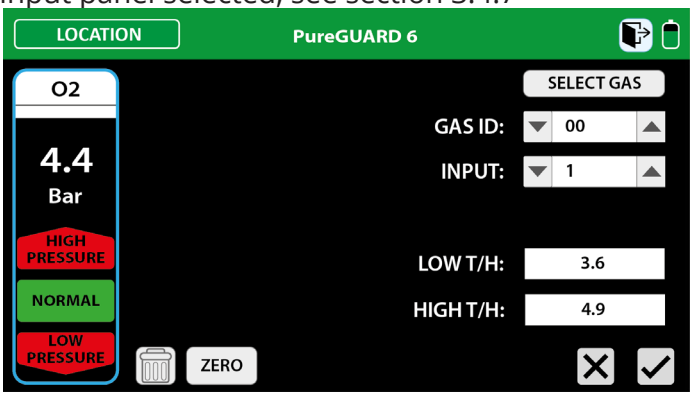
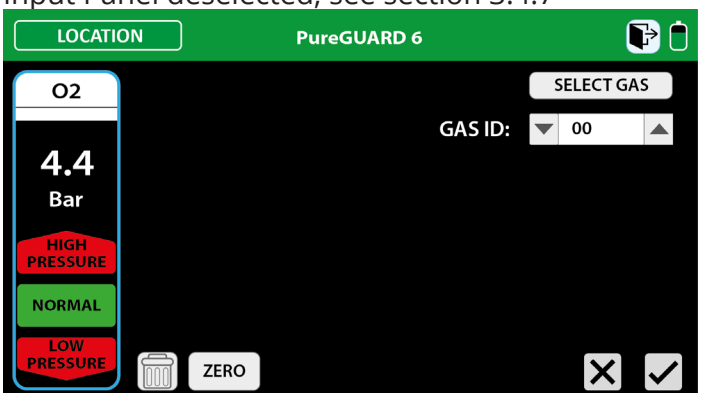


Figure 29b - Gas Service badge Setup screen.
Repeater panel
Input Panel deselected, see section 3.4.7



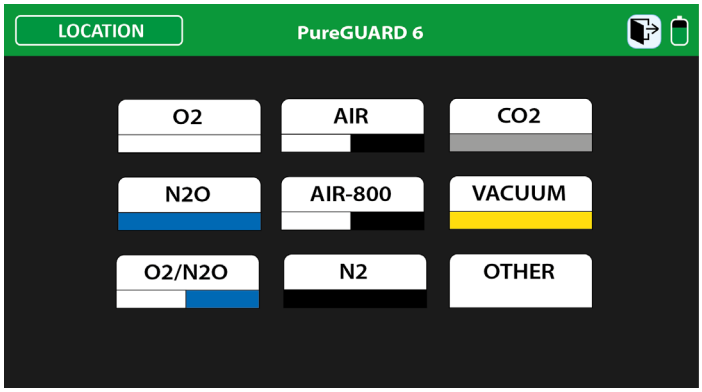
Special Characters/Icons:

Icon	Description
	Exit Icon. Takes you back to the main screen.
	Remove Gas Badge. Removes gas badge and returns to main gas badge screen.
✗	Reject Icon. Rejects changes.
✓	Accept Icon. Accepts Changes.

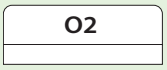
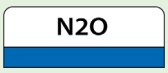
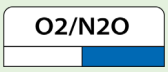
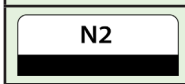
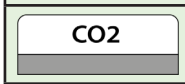
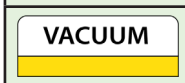
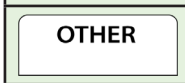
3.5.2 Gas Type Selection (Figure 30).

Press on the "Select Gas Icon" SELECT GAS to open the Gas Type Selection Screen

Figure 30 - Gas Type Selection screen.



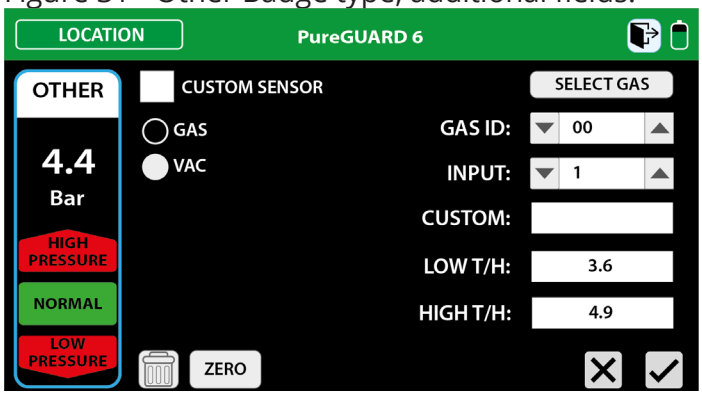
Special Characters/Icons:

Icon	Description
	Exit Icon. Takes you back to the main screen.
	Oxygen Gas Selection. Takes you back to Badge setup Screen
	Nitrous Oxide Gas Selection. Takes you back to Badge setup Screen
	Oxygen/Nitrous Oxide Gas Selection. Takes you back to Badge setup Screen
	Medical Air Gas Selection. Takes you back to Badge setup Screen
	Surgical Air Gas Selection. Takes you back to Badge setup Screen
	Nitrogen Gas Selection. Takes you back to Badge setup Screen
	Carbon Dioxide Gas Selection. Takes you back to Badge setup Screen
	Vacuum Gas Selection. Takes you back to Badge setup Screen
	Alternative Gas Selection. Takes you back to Badge setup Screen

Press the gas service type to be setup, which will select and take you back to the Gas Service Badge setup screen.

If "Other" gas badge is selected additional field will appear in the Gas Service Badge setup screen to allow the user to enter the alternative gas badge name, or setup a customised sensor. See figure 31.

Figure 31 - Other Badge type, additional fields.



3.5.3 Gas ID

This field sets the Gas Service ID number used for identification within an alarm network. All gas services connected within a network must have a unique ID number.

Press the up arrow to increase the ID number, down arrow to reduce the ID number.

3.5.4 Input.

This field sets the Gas Input number, which matches up with the pressure switch connections G1 to G6.

Press the up arrow to increase the ID number, down arrow to reduce the ID number.

3.5.5 Custom.

This field will only be displayed if "Other" gas was selected as the "Gas Selection".

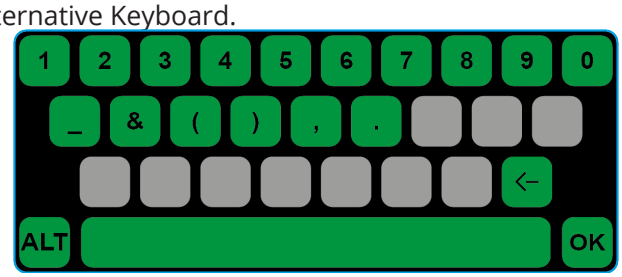
This field is for setting the custom gas service name being monitored by the alarm.

Press on the field (Custom), the main keyboard will appear.

Main Keyboard.

The ALT key will toggle to the alternative keyboard, and back to the main.

Alternative Keyboard.



Type the name of the custom gas service the alarm will be monitoring. Press the Delete key to backspace to correct errors. Press within the field to place to cursor to edit from that place. Hold down within the field to highlight all text, the next keypress will overwrite the selection.

When complete press the OK key or anywhere on the screen away from the keyboard to remove the keyboard.

3.5.6 Low T/H (Threshold), (Input panel only).

This field is to set the low pressure alarm trigger valve, or alternative sensor. See table 4 & 5 for typical set points.

⚠ CAUTION! Hospital policy or national standards may vary, consult installation specification.

Note...

- For alternative sensors for monitoring only, that do not require a low threshold alarm, set the LOW T/H value to the lower limit of the sensor scale.

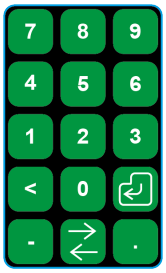
TABLE 4: HTM02-01 Low Pressure Alarm Set Points

Nominal Pressure	Gas Type								Low Alarm Set point
	O2	N2O	O2/N2O	Air	Air-800	N2	CO2	VAC	
4 Bar	✓	✓	✓	✓			✓		3.6 Bar
7 (8) Bar					✓	✓			6.5 Bar
300 mmHg								✓	N/A

TABLE 5: ISO 7396-1 Low Pressure Alarm Set Points

Nominal Pressure	Gas Type								Low Alarm Set point
	O2	N2O	O2/N2O	Air	Air-800	N2	CO2	VAC	
400 kPa	✓	✓	✓	✓			✓		320 kPa
800 kPa					✓	✓			640 kPa
-40 kPa								✓	N/A

Press on the field (LOW T/H), the num-pad will appear.



Hold down to highlight current text ready to overwrite. Use the num-pad to enter the valve.

Press the ENTER key or press anywhere on the screen away from the NUM-PAD to remove the NUM-PAD.

3.5.7 High T/H (Threshold), (Input panel only)

This field is to set the high pressure alarm trigger valve, or alternative sensor. See table 6 & 7 for typical set points.

⚠ CAUTION! Hospital policy or national standards may vary, consult installation specification.

Note...

- For alternative sensors for monitoring only that do not require a high threshold alarm, set the HIGH T/H value to the upper limit of the sensor scale.

TABLE 6: HTM02-01 HighPressure Alarm Set Points

Nominal Pressure	Gas Type								High Alarm Set point
	O2	N2O	O2/N2O	Air	Air-800	N2	CO2	VAC	
4 Bar	✓	✓	✓	✓			✓		4.9 Bar
7 (8) Bar					✓	✓			10.5 Bar
300 mmHg								✓	-275 mmHg

TABLE 7: ISO 7396-1 High Pressure Alarm Set Points

Nominal Pressure	Gas Type								Low Alarm Set point
	O2	N2O	O2/N2O	Air	Air-800	N2	CO2	VAC	
400 kPa	✓	✓	✓	✓			✓		480 kPa
800 kPa					✓	✓			960 kPa
-40 kPa								✓	-32 kPa

Press on the field (HIGH T/H), the num-pad will appear.

Hold down to highlight current text ready to overwrite. Use the num-pad to enter the valve.

Press the ENTER key or press anywhere on the screen away from the NUM-PAD to remove the NUM-PAD.

3.5.8 Gas/Vac.

This field will only be displayed if "Other" gas was selected as the "Gas Selection".

This field is for setting the custom units for pressure (GAS) or Vacuum (VAC).

Press between the appropriate setting to toggle the value.

3.5.9 Custom Sensor.

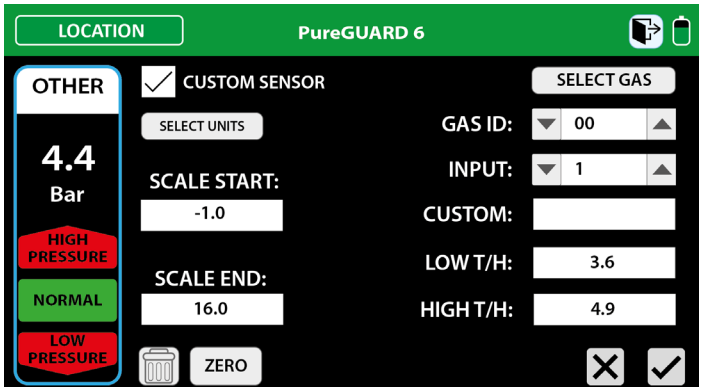
This field will only be displayed if "Other" gas was selected as the "Gas Selection".

This option is for configuring alternative 4-20 mA sensors.

Press the check box to toggle this option ON or OFF.

This this option selected additional options will appear on the setup screen. See figure 32.

Figure 32 - Alternative 4-20mA sensors, additional fields.

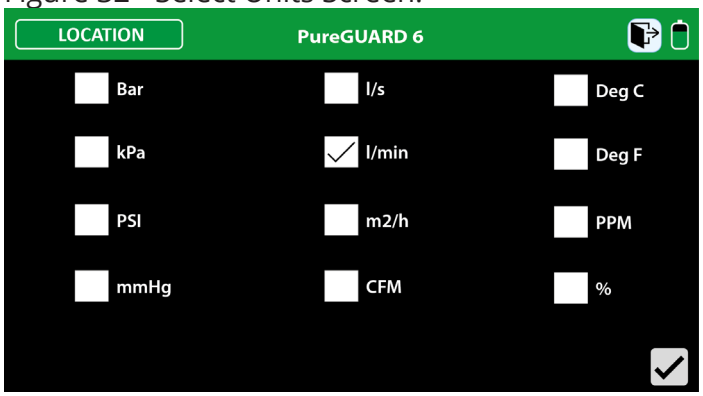


3.5.10 Select Units.

This field will only be displayed if "CUSTOM SENSOR" is selected. Custom sensor is only displayed if "Other" gas was selected as the "Gas Selection".

Press the "Selected Units" button to take you to the units selection screen. See figure 33.

Figure 32 - Select Units Screen.

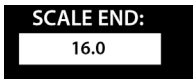


Special Characters/Icons:

Icon	Description
	Exit Icon. Takes you back to the main screen.
	Accept Icon. Accepts Selection

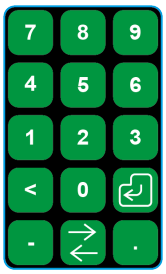
Press on the check box for the desired units, then pressure accept to confirm the selection and take you back to the Gas Badge setup screen.

3.5.11 Scale Start.



This field will only be displayed if "CUSTOM SENSOR" is selected. Custom sensor is only displayed if "Other" gas was selected as the "Gas Selection".

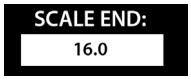
Press on the field (START SCALE), the num-pad will appear.



Hold down to highlight current text ready to overwrite. Use the num-pad to enter the valve.

Press the ENTER key or press anywhere on the screen away from the NUM-PAD to remove the NUM-PAD.

3.5.12 Scale End.



This field will only be displayed if "CUSTOM SENSOR" is selected. Custom sensor is only displayed if "Other" gas was selected as the "Gas Selection".

Press on the field (END SCALE), the num-pad will appear.

Hold down to highlight current text ready to overwrite. Use the num-pad to enter the valve.

Press the ENTER key or press anywhere on the screen away from the NUM-PAD to remove the NUM-PAD.

3.5.13 Zero.

This button is to zero the pressure (or alternative sensor) value. Before pressing this button ensure that the gas pressure is depressurised.

Note...

- The gas valve will not register until the sensor setup has been competed and saved. Therefore complete the gas badge setup, and return to this screen to zero the value if required.

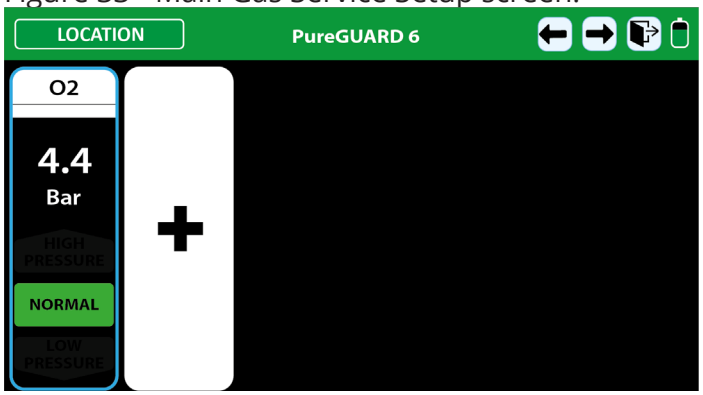
3.5.14 Delete gas Badge.

Click the "Bin" icon to delete the gas badge

3.5.15 Confirm/reject changes.

Click the tick to confirm and save the changes, which will return you back to the main gas service setup screen. The main screen will show a sample of the newly setup gas service badge, and move the new badge icon to the next location, see figure 33 example. Click the cross to cancel the changes and return to the main gas service setup screen.

Figure 33 - Main Gas Service Setup screen.



Special Characters/Icons:

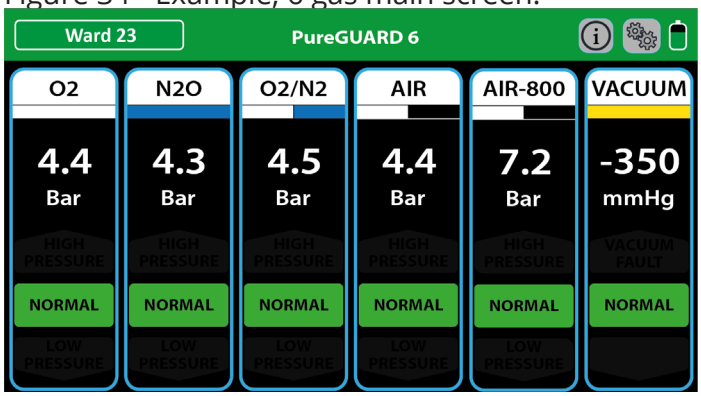
Icon	Description
	Previous Icon. Takes you to the previous menus screen.
	Next Icon. Takes you to the next menus screen.
	Exit Icon. Takes you back to the main screen.
+	Add Gas service Badge. Takes you back to the gas service setup screen.

Click on the New Gas Badge icon to start the process for setting up the next gas service badge. Follow the steps from section 3.6 until all the gas service have been setup, up to a maximum of 6.

3.6 Exit Setup Screens

Once all the gas service badges have been setup press on the "Exit" icon to return to the main operating screen. See figure 34 fro example of completed 6 gas alarm.

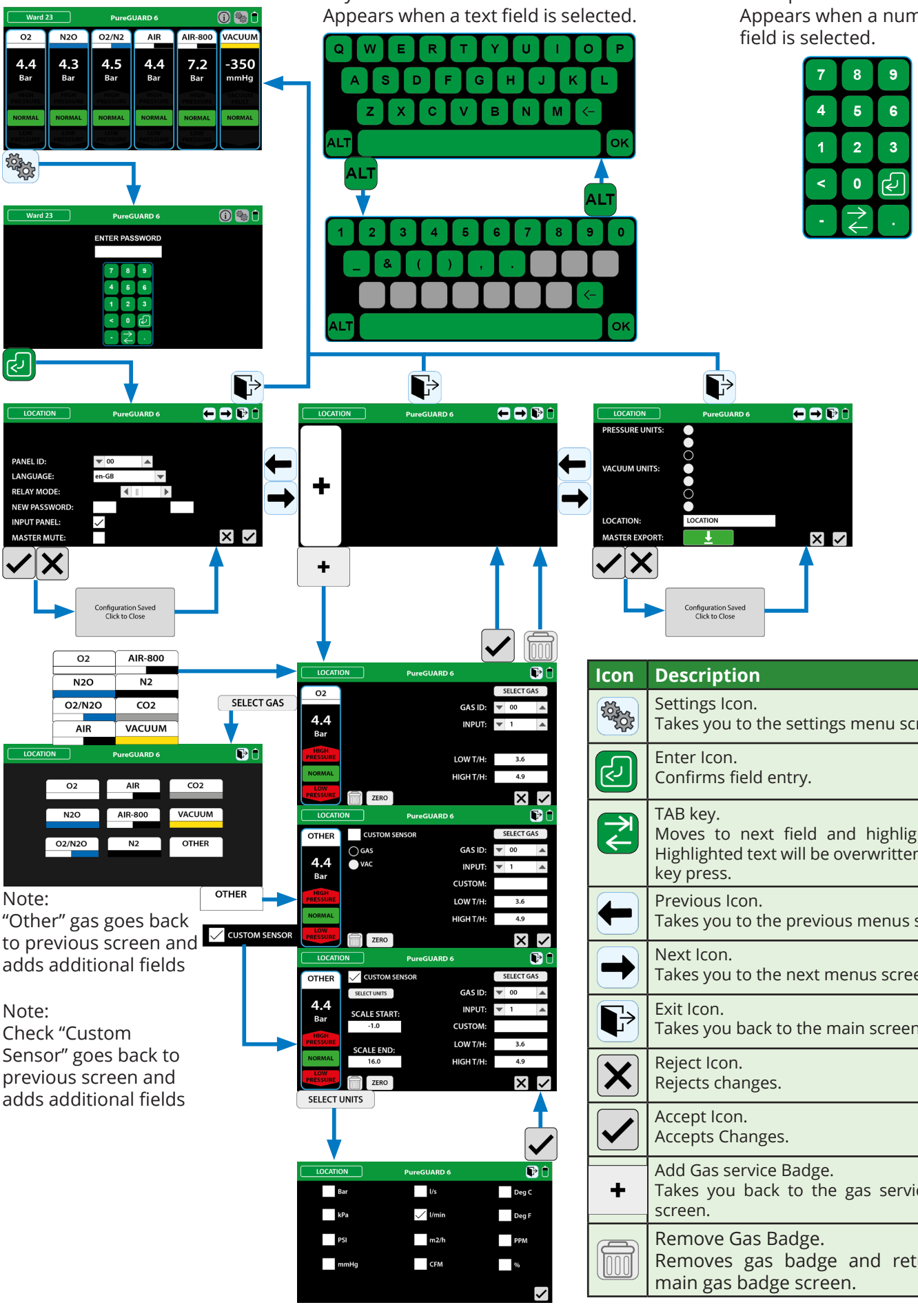
Figure 34 - Example, 6 gas main screen.



3.7 Configuration Menu Map

Keyboard:
Appears when a text field is selected.

Num-pad:
Appears when a numerical field is selected.



Note:
"Other" gas goes back to previous screen and adds additional fields

Note:
Check "Custom Sensor" goes back to previous screen and adds additional fields

Icon	Description
	Settings Icon. Takes you to the settings menu screens.
	Enter Icon. Confirms field entry.
	TAB key. Moves to next field and highlights text. Highlighted text will be overwritten on next key press.
	Previous Icon. Takes you to the previous menus screen.
	Next Icon. Takes you to the next menus screen.
	Exit Icon. Takes you back to the main screen.
	Reject Icon. Rejects changes.
	Accept Icon. Accepts Changes.
+	Add Gas service Badge. Takes you back to the gas service setup screen.
	Remove Gas Badge. Removes gas badge and returns to main gas badge screen.

4. Commissioning

Before starting the commissioning actions ensure that all points from Installation section 2 and alarm configuration section 3 have been completed.

The object of commissioning is to ensure that all components are serviceable, pressure switches operate at the correct settings and all alarm functions operate satisfactorily. The commissioning procedure also ensures that anti-confusion checks are carried out and that the correct gas service is displayed in the designated column.

⚠ WARNING! Personnel carrying out the following commissioning procedure must be qualified and fully conversant with the information contained in this manual.

⚠ WARNING! Before commencing the commissioning procedure ensure that all installation procedures are complete and that all wiring is correctly connected. Before switching on the mains electrical power supply, ensure the supply is correctly fused.

4.1 Pipeline installation

Following the installation of pipeline Tees, the medical gas pipeline must be purged to remove all traces of nitrogen with medical quality air. The pipeline must be pressure tested and checked for leaks in line with national medical gas pipeline safety standards. On completion the pipeline must be purged with the working gas, and gas identification, quality and purity checks carried out in line with national medical gas pipeline safety standards.

4.2 Alarm panel test

With the main screen displayed check that all gas services match the installation specification. See figure 35 for typical 6 gas unit with no faults.

Figure 35 - Example, 6 gas fault free.

Press the TEST switch and check all gas service indicator bars flash at the same rate, the audible warning sounds and the system fault LED flashes.

Note... Ignore "High" and "Low" pressure warnings at this stages. This test is to check sensor communication faults only. Pressure trigger points are checked in Section 4.5.

Figure 36 shows examples of potential faults.

See table 8 in section 5 "Operation of the PureGUARD 6 Digital medical gas area alarm" for troubleshooting.

Figure 36 - Alarm Test Button Sensor Error.

4.3 Checking the repeater relay output

If the repeater relay is to be used in the installation, operation of the relay can be checked by ensuring that continuity exists between the relay terminals (N/O and C) when all NORMAL indications are illuminated. Check that continuity between the relay contacts is broken, whenever an alarm condition occurs during tests in section 4.5 to 4.7.

Note...

- If the relay output is set to LCM, normal condition will be 180 Ohms and fault will be 510 Ohms.
- If the relay output is set to N/C - N/O, normal condition will be closed and fault will be open contact.

4.4 Checking the remote audible warning devices.

Whilst carrying out checks described in section 4.5 to 4.7, the opportunity should be taken to ensure that the remote audible warning operates whenever there is an alarm condition on it's parent panel.

⚠ CAUTION! The TEST and MUTE switches must only be operated by gentle finger pressure. Operation by the use of instruments, tools or other implements will cause damage to the switch and fascia.

4.5 Medical gas alarm set point.

The procedure to check the settings of a pressure sensor set points is as follows:-

4.5.1 Pressure sensor. Prepare.

Disconnect male adaptor and small bore pipe from pressure switch. Connect a remote source of regulated medical compressed air to the pressure sensor.

4.5.2 Alarm panel. Check NORMAL display.

Pressurise the pressure switch to normal gas working pressure (see section 3.6.6 & 3.6.7 for reference) and ensure that the NORMAL (green) status bar in the correct display badge is illuminated (see example of NORMAL condition in figure 35).

See table 8 in section 5 “Operation of the PureGUARD 6 Digital medical gas area alarm” for troubleshooting.

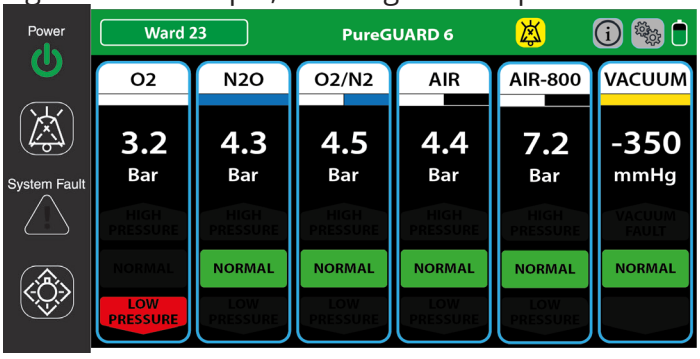
4.5.3 Pressure sensor . Check LOW PRESSURE setting.

Note - Pressure alarm triggers take 3 seconds to register to prevent pressure spikes from triggering false alarms.

Slowly decrease pressure to the sensor. Check that the green NORMAL gas status bar changes a to red flashing LOW PRESSURE at the correct setting. Adjust pressure alarm setting as necessary (see section 3.6.6 for reference).

Check that the MUTE switch operates satisfactorily. Press , the audible alarm will be silenced and the mute icon will show on screen in yellow . See figure 37.

Figure 37 - Example, muted gas 1 low pressure.

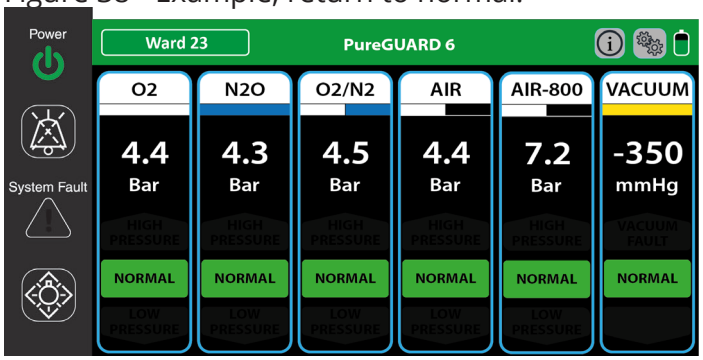


4.5.4 Pressure Sensor. Low pressure reset.

Note - Pressure alarm reset take 3 seconds to register to prevent pressure spikes from falsely resetting alarms.

Slowly increase pressure to the sensor and check that the pressure fault re-sets to green steady NORMAL, and the on screen Mute icon is removed (see section 3.6.6 for reference). See figure 38.

Figure 38 - Example, return to normal.



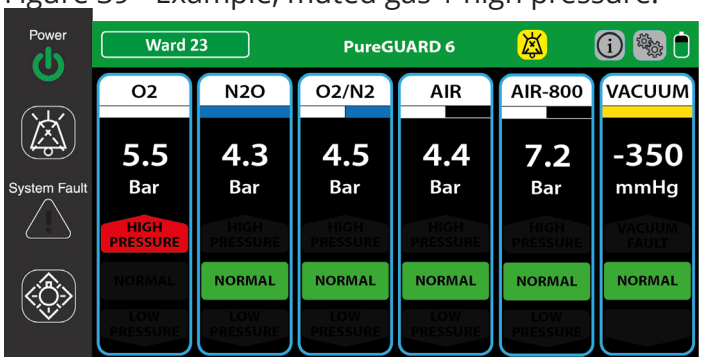
4.5.5 Pressure sensor. Check HIGH PRESSURE setting.

Note - Pressure alarm triggers take 3 seconds to register to prevent pressure spikes from triggering false alarms.

Slowly increase pressure to the sensor. Check that the green NORMAL gas status bar changes a to red flashing HIGH PRESSURE at the correct setting. Adjust pressure alarm setting as necessary (see section 3.6.7 for reference).

Check that the MUTE switch operates satisfactorily. Press , the audible alarm will be silenced and the mute icon will show on screen in yellow . See figure 39.

Figure 39 - Example, muted gas 1 high pressure.

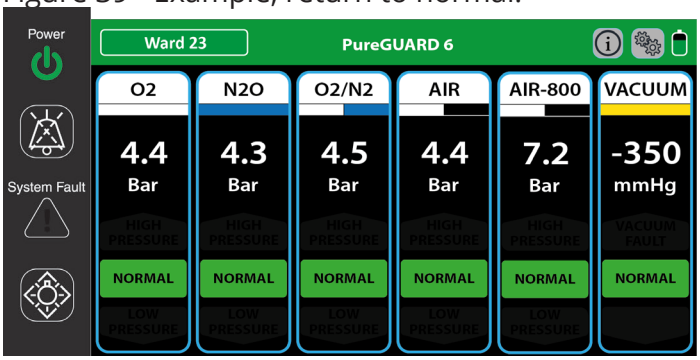


4.5.6 Pressure Sensor. High pressure reset.

Note - Pressure alarm reset take 3 seconds to register to prevent pressure spikes from falsely resetting alarms.

Slowly decrease pressure to the sensor and check that the pressure fault re-sets to green steady NORMAL, and the on screen Mute icon is removed (see section 3.6.7 for reference). See figure 39.

Figure 39 - Example, return to normal.



4.5.7 Repeat for all pressure gases.

Repeat sections 4.5.1 through to 4.5.6 for all pressure gases.

4.6 Medical vacuum alarm set point

4.6.1 Vacuum sensor. Prepare.

Using the normal vacuum system as a source, isolate the section and fit a vacuum gauge to the nearest terminal unit.

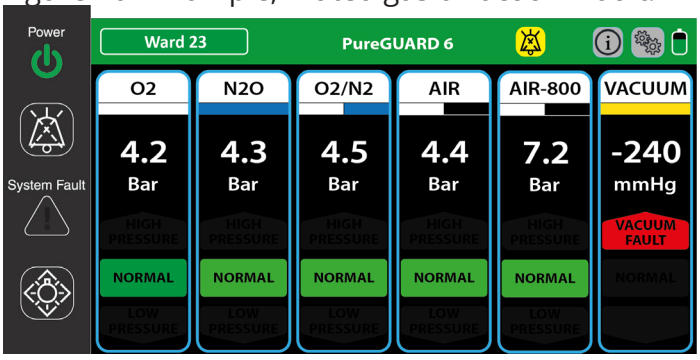
4.6.2 Vacuum sensor. Check VACUUM FAULT setting.

Note - Vacuum alarm triggers take 3 seconds to register to prevent pressure spikes from triggering false alarms.

Induce a leak to slowly decay the vacuum. Check that the green NORMAL gas status bar changes a to red flashing VACUUM FAULT at the correct setting. Adjust pressure alarm setting as necessary (see section 3.6.7 for reference).

Check that the MUTE switch operates satisfactorily. Press , the audible alarm will be silenced and the mute icon will show on screen in yellow . See figure 40.

Figure 40 - Example, muted gas 6 Vacuum Fault.

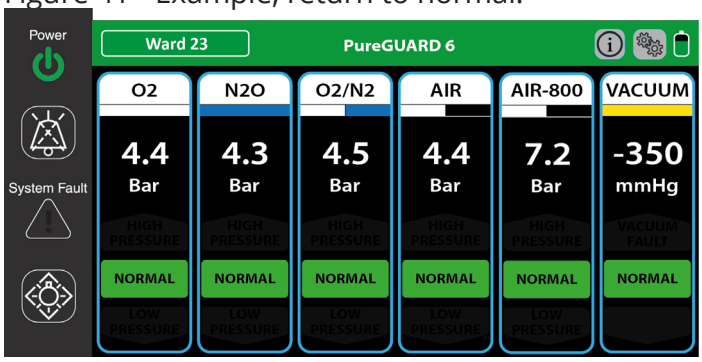


4.6.3 Pressure Sensor. Vacuum fault reset.

Note - Pressure alarm reset take 3 seconds to register to prevent pressure spikes from falsely resetting alarms.

Slowly remove the vacuum leak to the sensor and check that the vacuum fault re-sets to green steady NORMAL, and the on screen Mute icon is removed (see section 3.6.7 for reference). See figure 41.

Figure 41 - Example, return to normal.



4.6.4 Repeat for all vacuum services.

Repeat sections 4.6.1 through to 4.6.3 for all vacuum services.

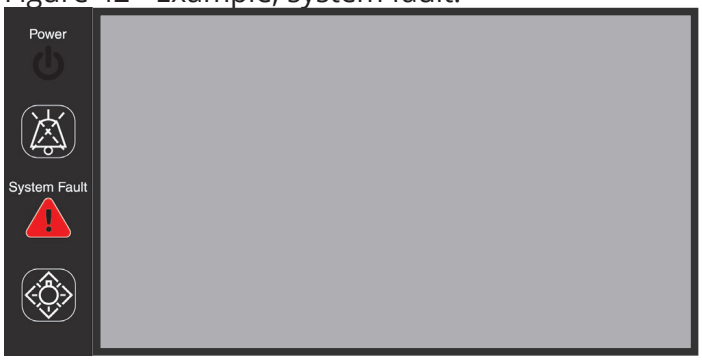
4.7 Checking the SYSTEM ALARM indication.

The procedure for checking that the SYSTEM ALARM circuits are operating correctly is as follows:-

4.7.1 Electrical power supply. Switch OFF.

Indications. Check.
Check that POWER ON LED is extinguished and SYSTEM ALARM LED is illuminated (flashing) accompanied by an audible warning. See figure 42.

Figure 42 - Example, system fault.

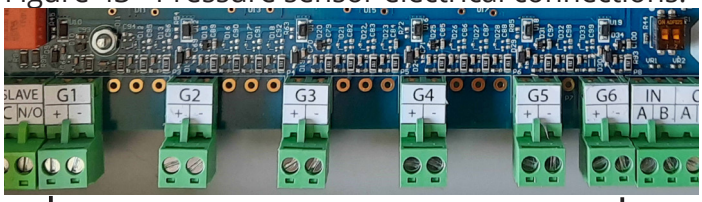


Electrical power supply. Switch ON.
Ensure that all indications return to NORMAL.

4.7.2 Line contact monitoring. Check open circuit.

Disconnect input plug from gas service channel on power supply PCB (see figure 43).

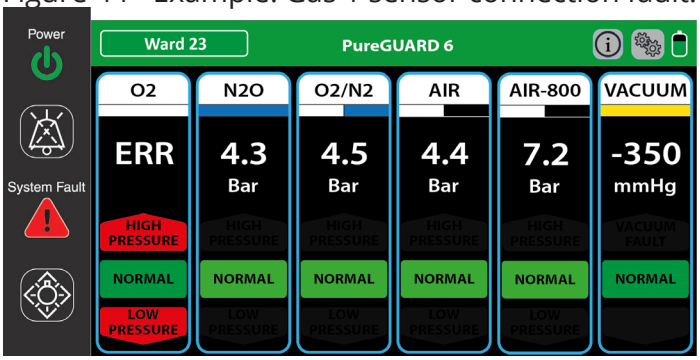
Figure 43 - Pressure sensor electrical connections.



Check the following:

- The respective gas service badge status bar is steady green.
- The status bar text has changed from NORMAL to FAULT
- The pressure/vacuum reading has changed to ERR.
- System LED is flashing red.
- The audible alarm is active. See figure 44 for example.

Figure 44 - Example. Gas 1 sensor connection fault.



4.7.3 Input. Reconnect.

Reconnect the input plug to gas channel. System will return to normal operation.

4.7.4 Repeat connection fault for all sensors.

Repeat sections 4.7.2 through to 4.7.3 for all sensors.

4.7.5 Close and secure alarm front cover.

4.8 Final Check

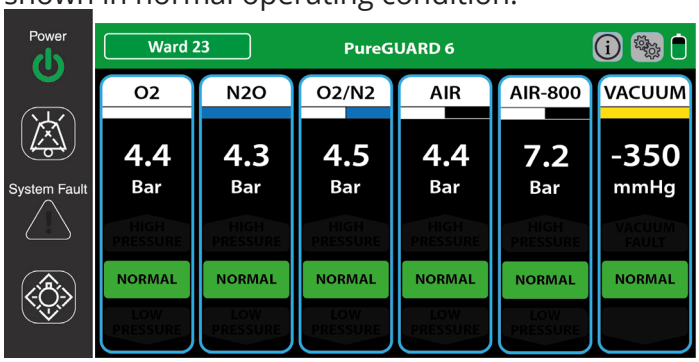
- Check that all the inputs are connected.
- Check that all alarm panels are closed and secure.
- Check that all gas services are showing normal conditions and no system faults are present.
- Ensure completion of any additional commissioning test and reports as required by national medical gas pipeline safety standards and/or hospital policies.

5. Operation of the PureGUARD 6 Digital medical gas area alarm.

5.1 User operation.

The following section details instructions for use once the alarm has been configured and fully operational. Figure 45 details the user interface for the main operating touch screen and fascia strip that contains LED indicators and push buttons.

Figure 45 - Example, 6 gas setup. User interface shown in normal operating condition.



Fascia strip - Characters/Icons:

Icon		Description
Power LED		Green, illuminated - Power On
		Black, de-energised - Power Off
Mute Button		Press to activate to silence the audible alarm.
System Fault		Black, de-energised - System Normal
		Red, illuminated - System Fault
Test Button		Press to activate the alarm test button.

Touch Screen - Indication/Warnings:

Icon		Description
O2 4.4 Bar NORMAL		Gas service Name.
		Gas service colour coded bar.
		Gas service pressure/unit.
		Gas service status bar.
Ward 23		Gas service location.
Backup Battery		Backup battery Status, charging.
		Backup battery Status, fault.

The green NORMAL status bar is a steady light, which changes to a red flashing bar during HIGH and LOW PRESSURE faults to draw attention to the failure. Pressure fault conditions are accompanied by a two tone audible warning. See table 8.

The audible warning continues until either the MUTE switch is operated or the gas pressure returns to NORMAL. If the MUTE facility is operated and the alarm condition remains, the audible warning will re-sound after 15 mins and a further MUTE selection will be required. Should a further alarm condition occur after the panel has indicated a fault and has been muted, the audible warning is re-Activated.

Operation of the TEST switch changes all status bars to flashing and sounds the audible two tone warning.

When the repeater relay connection is interconnected to either a central alarm system or other suitable system, the contacts are closed when all gas services are indicating NORMAL. In the event of any alarm condition, the relay contacts open, breaking the circuit to the remote system. The relay contacts remain open until all alarm conditions return to the NORMAL status. There is also a line contact monitor integral to the board available across the N/O and C contacts. This function is selected within the on screen setup menus see section 3.

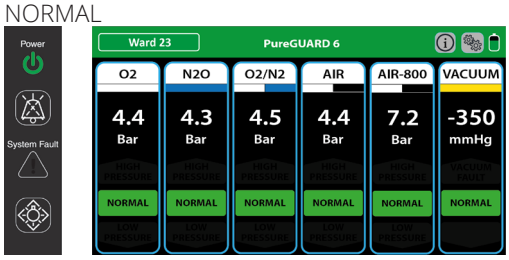
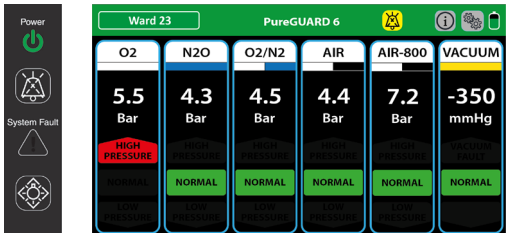
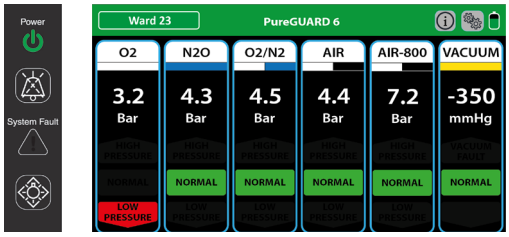
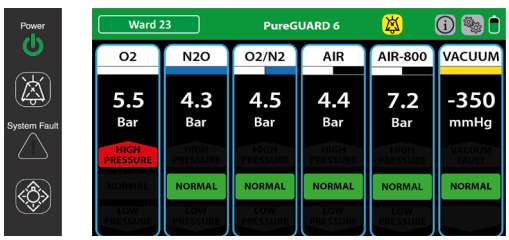
The green POWER ON LED is normally illuminated and is extinguished in the event of an electrical power failure. The red SYSTEM ALARM LED is normally extinguished and illuminates flashing together with an audible warning in the event of any of the following failures:-

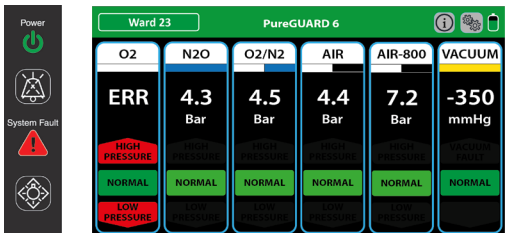
- Alarm contact line fault.
- Electrical power supply failure.
- Internal alarm circuit failure.

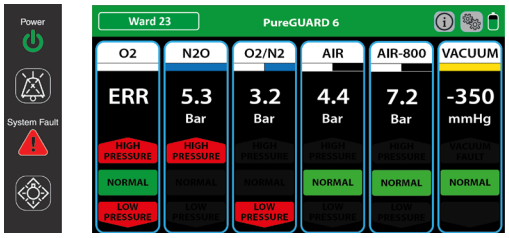
When a line contact fault is detected, the NORMAL status bar changes to red (steady) with “Fault”, and the pressure value changes to “ERR”. The SYSTEM ALARM LED illuminates (flashing) accompanied by an audible warning.

Operation of the TEST switch changes all gas status bars to Red (flashing). If there is a faulty sensor or wiring present the flashing rate will be at half speed. This facility is designed to aid fault diagnosis. The PureGUARD 6 medical gas alarm logic is detailed in Table 6.

TABLE 8: PureGUARD 6 DIGITAL - ALARM LOGIC

Condition	Alarm panel displays		
Normal	NORMAL 		
		Power LED	Green, On
		System Fault	Black, Off
	NORMAL	Gas Status Bar	Green, Steady
		Audible	Off
Alarm Condition	HIGH PRESSURE (flashing)  Example shows fault on 1st gas badge		
		Power LED	Green, On
		System Fault	Black, Off
	HIGH PRESSURE	Gas Status Bar	Red, Flashing
		Audible	Active
	LOW PRESSURE (flashing)  Example shows fault on 1st gas badge		
		Power LED	Green, On
		System Fault	Black, Off
	LOW PRESSURE	Gas Status Bar	Red, Flashing
		Audible	Active
Audible Mute	HIGH PRESSURE (flashing) Mute activated  Example shows fault on 1st gas badge		
		Audible	Silenced for 15 minutes

<table>
<tr><td>System fault</td><td colspan="3">Pressure sensor Line contact
ERR (steady)
Gas status bar (steady)
SYSTEM ALARM (flashing)
Audible
 

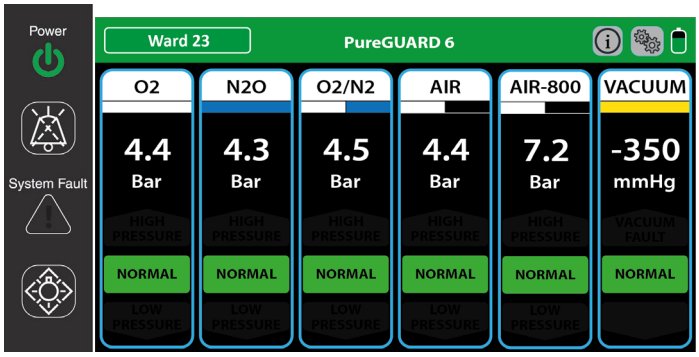
Example shows fault on 1st gas badge</td></tr>
<tr><td></td><td> </td><td>Power LED</td><td>Green, On</td></tr>
<tr><td></td><td> </td><td>System Fault</td><td>Red, On</td></tr>
<tr><td></td><td> </td><td>Gas Status Bar</td><td>High - Red, Steady
Normal - Green, Steady
Low - Red, Steady</td></tr>
<tr><td></td><td colspan="2">Audible</td><td>Active</td></tr>
<tr><td></td><td colspan="3">Press TEST switch
All alarm conditions will flash, the condition with the line contact fault will flash slower than the other gas status bars, and audible will sound.
 

Alarm conditions
Test switch
Example show:
• Badge 1 wiring/sensor fault (Flash rate half speed).
• Badge 2 high pressure fault (Flash rate normal speed).
• Badge 3 low pressure fault (Flash rate normal speed).
• 2nd row all normal status (Flash rate normal speed).</td></tr>
<tr><td></td><td> </td><td>Test button</td><td>Held</td></tr>
<tr><td>Power failure to panel</td><td colspan="3"> </td></tr>
<tr><td></td><td> </td><td>Power LED</td><td>Black, Off</td></tr>
<tr><td></td><td> </td><td>System Fault</td><td>Red, On</td></tr>
<tr><td></td><td></td><td>Gas Status Bar</td><td>Not active</td></tr>
<tr><td></td><td colspan="2">Audible</td><td>Active</td></tr>
</table>

5.2 Additional Technical Functions.

The following section details instructions for technical staff for additional diagnostics. Figure 46 details the technical interface accessed from the touch screen.

Figure 46 - Example, 6 gas setup. Additional technical functions.



Touch Screen - Functional Icons:

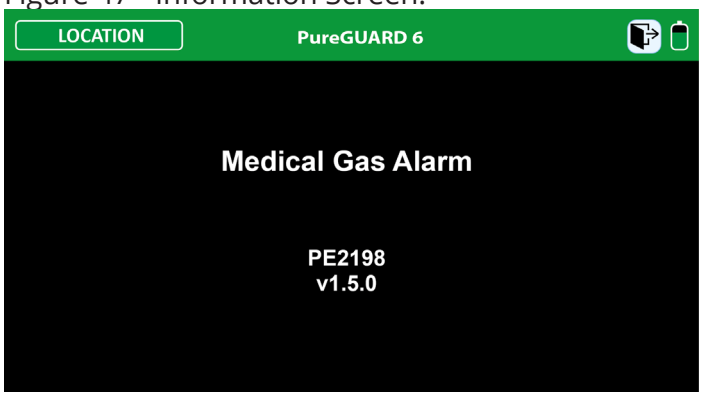
Icon		Description
Info		Press - Go to Info screen.
Logs		Press - Go to logs screen. Password controlled (Factory default "1234".
Settings		Press - Go to setup menus. Password controlled. See section 3.

5.2.1 Information Screen.

The information screen can be accessed to view the device software version. See figure 47.

Press on the Info icon from the main screen to access the information screen.

Figure 47 - Information Screen.



Special Characters/Icons:

Icon	Description
	Exit Icon. Takes you back to the main screen.

The v#.#.# number indicates the software version.

Note - Figure 47 shows an example only, not the version for the supplied device.

Press the exit icon to return back to the main screen.

Note - The system will return back to the main screen automatically if a new alarm condition becomes active, or after one minute if the alarm is not manually exited from the information screen.

6. Maintenance Procedures.

A competent person who is conversant with the maintenance of medical gas pipeline equipment and any special national safety requirements which may apply must carry out all maintenance. Preventative maintenance contracts are available from Pneumatech for installations within the U.K. Overseas distributors will be able to supply similar contracts in other areas.

⚠ CAUTION! It is essential that only genuine Pneumatech spare parts are fitted during maintenance.

⚠ **WARNING! Ensure no contaminates, oil or grease come into contact with any components that come into contact with the medical gas.**

⚠ CAUTION! When exhausting anaesthetic gases and oxygen from the pipeline, ensure that the area is well ventilated and no potential ignition sources are present.

⚠ **WARNING: Obtain a work permit (or equivalent for overseas) before commencing with any work on a medical gas installation.**

6.1 Replacement of alarm panel components.

⚠ **WARNING! Ensure the power supply is safely isolated before accessing the alarm panel for maintenance or repairs.**

⚠ **WARNING! The isolation and connection to the electrical power supply should only be carried out by a suitably qualified electrician.**

NOTE - During electrical isolation any connected repeater alarm panels will show a system fault.

6.1.1 Isolate the power supply to the alarm panel.

6.1.2 Turn the security fastener with the supplied key tool access screw counterclockwise until the hinged door can be opened.

6.1.3 See figure 51 for alarm panel assembly details for replacement of the alarm component.

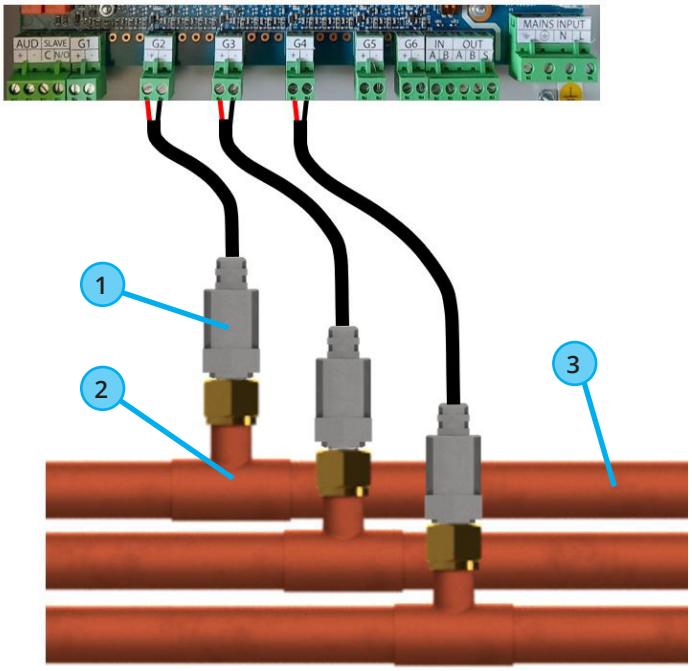
⚠ **CAUTION! Printed circuit boards are susceptible to damage by static electricity and must remain enclosed in their anti-static packaging until immediately required for use. To prevent damage to printed circuit boards, handle with care and do not over torque retaining nuts.**

6.1.4 For pressure sensor replacement, disconnect the sensor and cables as shown in figure 50. Inspect the sealing washer and re-use/replace as required, and reconnect the new sensor as shown in figure 50.

6.1.5 Close the alarm panel door and fasten the security screw by turning clockwise.

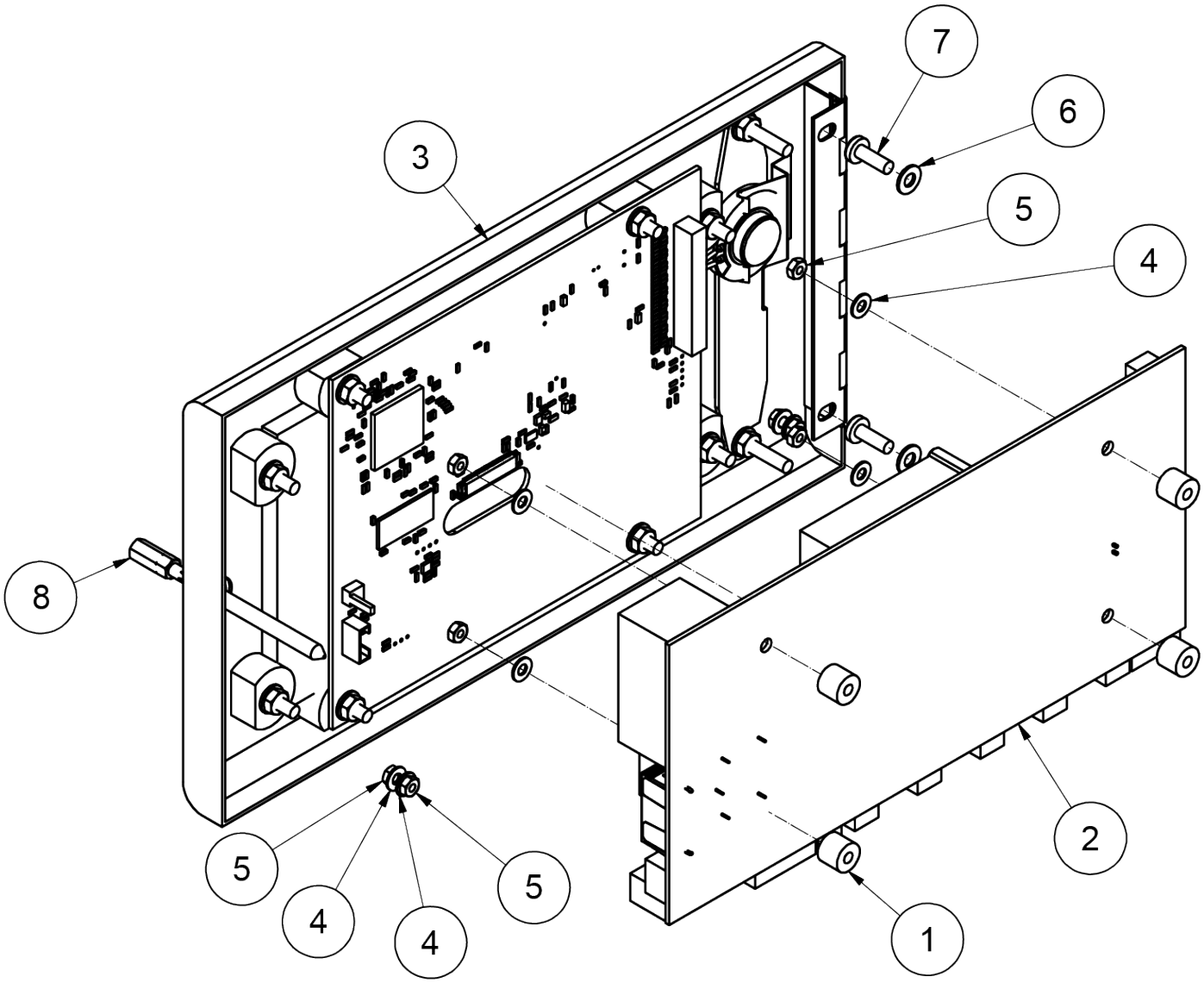
6.1.6 Return power to the alarm panel and complete the commissioning section 4.

Figure 50 - Pressure sensor connections. Example shows gas sensors connected to G1 to G3.



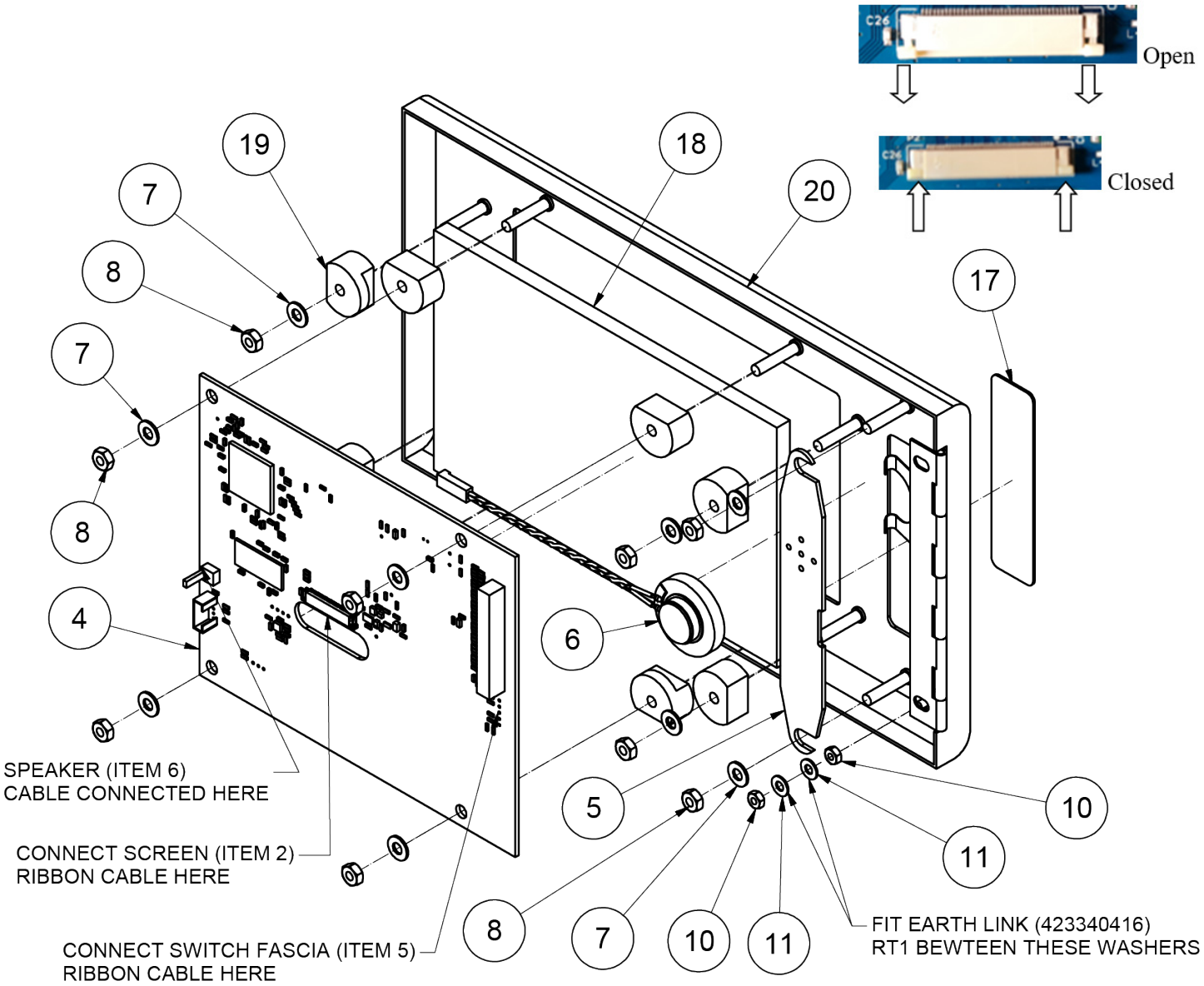
No.	Description
1	Pressure sensor (Supplied separately)
2	Minimum leak tee (Supplied separately)
3	Medical gas pipeline

Figure 51a - Alarm panel assembly details.



Parts List			
ITEM	Part Number	Description	QTY
1	4233400410	SPACER	4
2	4233400404	PureGUARD 6 input PCB - 115/230V 50/60Hz	1
3	4233400462	PMGS medical alarm 2nd fix generic (See figure 51b)	1
4	4233400414	M3 PLAIN WASHER, FORM A	6
5	4233400415	M3 PLAIN NUT	6
6	4233400413	M4 PLAIN WASHER, FORM A	2
7	4233400393	M4 x 12 POZI PAN HEAD SCREW	2
8	4233400448	MEDICAL Alarm Key Kit	1

Figure 51b - Alarm panel assembly details.



Parts List			
ITEM	Part Number	Description	QTY
4	4233400382	Medical alarm processor PCB (PE2208)	1
5	4233400392	Switch fascia back plate	1
6	4233400400	1" Miniature Speaker	1
7	4233400413	M4 PLAIN WASHER, FORM A	10
8	4233400402	M4 PLAIN NUT	10
10	4233400415	M3 PLAIN NUT	2
11	4233400414	M3 PLAIN WASHER, FORM A	2
17	4233400111	Medical alarm control fascia	1
18	4233400388	LCD 7" touch screen (800 x 480)	1
19	4233400449	LCD Screen mount	8
20	4233400461	PMGS alarm door screen printing details	1

ADDITIONAL ITEMS		
PART NUMBER	DESCRIPTION	QTY
4233400416	Earth Link Alarm	1

7. Maintenance Schedules.

The following routine inspections and maintenance are recommended:-

7.1 Weekly inspection

Press the TEST button (see LINE CONTACT FAULT, TEST SWITCH on table 8, section 5) on each alarm panel and ensure that all displays illuminate (flashing) and the audible warning sounds. If the remote audible is connected to the alarm panel, ensure that it operates simultaneously with the panel.

7.2 Quarterly inspection

The quarterly inspection proves the integrity of the interconnecting wiring from pressure switch to alarm panel, the line contact monitoring circuits and the integrity of the internal alarm panel circuits. The quarterly inspection consists of the commissioning steps detailed in paragraphs 4.2 to 4.7 inclusive.

7.3 5 year maintenance.

During the 5 year maintenance replace the LCD screen and backup butteries. See maintenance procedures in 6.1 and figures 51a & 51b for details.

8. RECOMMENDED SPARES

Table 9 details the list of recommended spares to be held for unplanned maintenance.

TABLE 9: LIST OF RECOMMENDED SPARES

Description	Part Number
Medical alarm processor PCB	4233400382
PureGUARD 6 input PCB - 115/230V 50/60Hz	4233400404
Backup batteries (x4)	4233400463
LCD 7” touch screen (800 x 480)	4233400388
Medical alarm control fascia	4233400111
Fuse 500mA	1826675
Alarm panel cover	4233400456
Pressure Sensor	4233400417

The recommended holding of spares depends upon the number of alarm panels installed and is detailed in Table 10. The number recommended for overseas customers is expressed in brackets and takes into account expected transport delays.

TABLE 10: MINIMUM RECOMMENDED SPARES SCHEDULING PER ANNUM

Part Number	Number of alarm panels installed		
	5 - 10	11 - 20	< 20
4233400382	2(4)	3 (6)	4 (8)
4233400380	2(4)	3 (6)	4 (8)
4233400463	2(4)	3 (6)	4 (8)
4233400388	2(4)	3 (6)	4 (8)
4233400111	2(4)	3 (6)	4 (8)
1826675	2(4)	3 (6)	4 (8)
4233400456	1(2)	2 (4)	3 (6)
4233400417	2(4)	3 (6)	4 (8)

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