

TOC-903-X5 TRANSMITTER



Version 3
Software Versions 1.019 and later



TOCSIN 903-X5 SERIES

Advanced Gas Detection Transmitter

Introduction

The TOCSIN 903 X5 gas detector transmitter is a standalone detector approved for zone 1, 2, 21 or 22 ATEX environments that can also be integrated onto our 2-Wire addressable gas detection systems.

TOCSIN 903-X5 is approved to both European, UK ATEX and international IECEx standards.

The transmitter features a non-intrusive calibration, one or two independent detectors, 2 analogue outputs, relays and 2-Wire digital communication. There are sensor options for over 400 gases and vapours covering: flammable, toxic, oxygen, VOC's and refrigerants.

The transmitter features our non-intrusive calibration method using our magnetic "wand" to perform one-man calibrations while in an ATEX zoned area.

The 903-X5 updates itself when detectors are fitted for gas type, range, measurement type and alarm levels. No need to spend time setting the unit up, 903-X5 does this for you. In addition detectors utilise our industry leading long-life sensor technology. With sensor options for a wide variety of gases including toxic gases, 5-year Oxygen and Ammonia sensors, leading PID technology, 5-year IR sensors and our patented, long life poison resistant Pellistor sensors for flammable gases.

About this manual

This manual is intended for use by competent installation and or service engineers. This manual relates to software versions V1.019 and later. The manual can also be used by end users to familiarise themselves with day to day operation, screen indications etc. Competence can be demonstrated in a number of ways but in this instance would be taken to mean manufacturer training and training as to installation into ATEX zoned areas, BS EN 60079-14 refers.

When installing as an addressable unit please read in conjunction with the addressable 2-wire system installers guide. This can be downloaded from the IGD website.

Note that gas detection systems require regular calibration to ensure correct operation. Calibration periods are affected by the environment into which the detector is fitted. IGD recommend 6 monthly calibration periods at which point calibration stability and the calibration period can be reviewed. Extremes of temperature, vibration, humidity and the frequency of exposure to hazardous or corrosive gases and vapours can all work to reduce calibration periods.

Failure to observe the requirements published in IGD's manuals and in local and international standards may compromise the installed system. In particular:

- BS 60079-14 Explosive atmospheres - Electrical installations design, selection and erection
- BS 60079-17 Explosive atmospheres - Electrical installations inspection and maintenance
- BS 60079-19 Explosive atmospheres - Equipment repair, overhaul and reclamation
- BS 60079-29-2 Explosive Atmospheres - Selection, Installation, use and maintenance of detectors for flammable gases

Warnings and Performance Statements

This Transmitter can be located in a classified Ex area zone 1,2, 21,22, devices installed in an Ex area can be connected to this unit but shall be protected with one of the types of protection listed in IEC 60079-0 corresponding to their own category. We recommend users read the procedures described in IEC 60079-29-2 for reference.

Equipment to be installed into ATEX zoned areas must be installed by competent persons trained to do so.

Service of the 903X5 and its connected detectors must be undertaken by competent persons training to undertake the necessary procedures.

This product must be earthed in accordance with local safety regulations. Cabling must be screened.

Refer to the equipment ratings published in this manual. Exceeding specifications can result in damage to the transmitter.

Should the control panel be used in conjunction with portable generating equipment, care should be taken to ensure that the electrical supply is within the tolerance band described above.

The transmitter may be stored at temperatures between -25°C and 60°C . If stored at low temperatures and then brought into a warmer environment care should be taken to ensure that condensation does not form or enter critical electrical components, for example the power supply. Allow 24 hours to stabilise extremes of temperature.

The transmitter is designed to operate within specification for ambient temperature between -20°C and 55°C , relative humidity up to 90% (non-condensing). Sensor specifications may differ.

Do not use a transmitter for protection applications that has not been fitted with a calibrated detector. If calibration seals are missing from the control panel or have been tampered with or broken, then the control panel must be re-calibrated and sealed by a trained engineer.

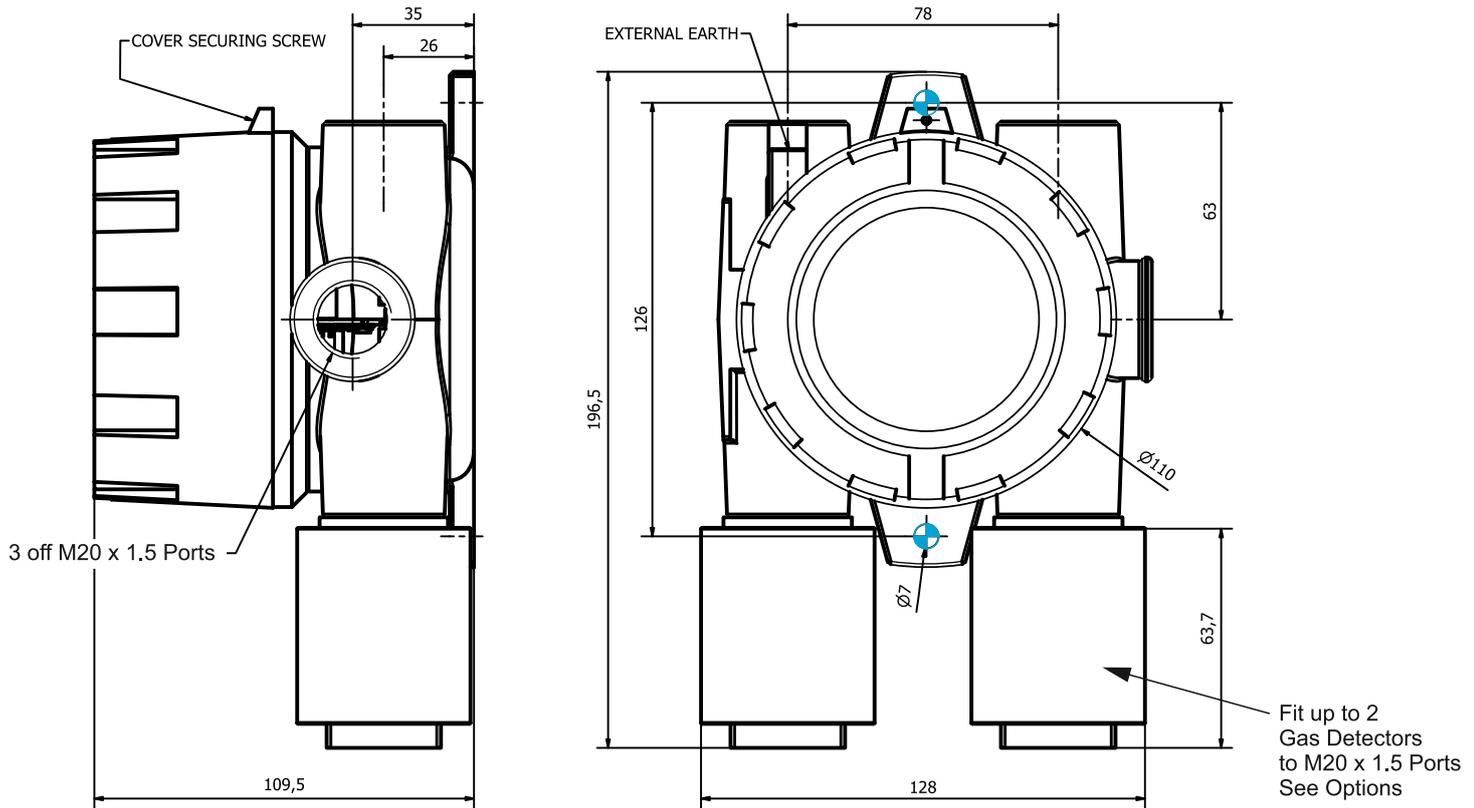
Substances and interfering gases can cause adverse effects on the performance or electrical safety of the gas detection systems. Care should be taken to limit exposure to these substances, for example corrosive atmospheres, for further advice and information contact head office

The response time of the entire system is determined by the time of response of all the parts of the equipment within the gas detection system.

The relationship between the output signal and the gas concentration is linear, the control panel interprets the signal and the gas level is displayed on the HMI display. IGD hold evidence of this linear performance which is available upon request.

Whilst detectors heads TOC-102-xxx Series are shipped calibrated this does not obviate the unit being checked on site for zero and calibration as part of the commissioning process.

Specifications



Power	18 TO 30V DC.
Electrical Outputs	2 off independent 4-20mA outputs auto ranged to suit fitted detector(s) 2-Wire Sentinel+ Addressable input/output(s) 1 Single Pole Fault Relay 2 SPCO Alarm Relays Relays 4A at 24V DC Non Inductive Aux Power Connection 0.5A Max
JB Housing Material	Junction Box, Copper Free Aluminium Alloy Epoxy Coated Option for 316 Stainless Steel and Marine Paint Finishes
Sensor Housing Material	Sensor, Stainless Steel 316 S16
Explosion Protection	Junction Box, EEx d IIC T6 I I2 D G
Housing Dimensions (mm)	See Drawing
Cable Entry	5 x M20 x 1.5 See Drawing
Temperature	-20 Deg Celsius to +55 Deg Celsius
Humidity	20-90% RH Non-Condensing
Sealing	IP66
Mounting	Wall Mount
Weight	1.1Kg (Plus Fitted Detectors)



JB3/903
 II 2G Ex db IIC T6/T5 Gb
 II 2D Ex tb IIIC T85°C/ T100°C Db
 Ta = -20°C to +40°C/+55°C
 IECEx EXV 16.0002X
 ExVeritas 16 ATEX 0140X
 ExVeritas 21UKEX0913X
 IP66 M20 x 1.5 Entries 12-32V DC
 Compliant to IEC 60079-29-1



102 Series Detector
 II 2G Ex db IIC T6 Gb
 II 2D Ex tb IIIC T85°C Db
 Ta = -20°C to +40°C
 II 2G Ex db IIC T5 Gb
 II 2D Ex tb IIIC T100°C Db
 Ta = -20°C to +55°C
 Rating 12-32VDC 2W
 IECEx EXV16.0003X
 ExVeritas 16ATEX0141X
 ExVeritas 21UKEX0914X

JB3

INSTALLATION INSTRUCTIONS

Serial		TOCSIN
D.O.M		903
	II 2G Ex db IIC T6/T5 Gb II 2D Ex tb IIC T85°C/ T100°C Db Ta = -20°C to +40°C/+55°C IECEx EXV 16.0002X ExVeritas 16 ATEX 0140X ExVeritas 21UKEX0913X IP66 M20 x 1.5 Entries 12-32V DC Compliant to IEC 60079-29-1 Web: www.internationalgasdetectors.com Tel: +44(0) 161 483 1415	Oliver IGD Ltd Crosby St Stockport SK2 6SH UK UK CA 2585 2804
	WARNING ! DO NOT OPEN WHEN ENERGISED OR IF IN THE PRESENCE OF A FLAMMABLE ATMOSPHERE	

The following information is provided to enable safe installation and operation of the Model JB3 Junction Box.

The junction box can be fitted with either two or three wire flammable gas sensor.

It is vitally important for correct and safe operation that appropriate cable types and sizes are used and all earth bonding points observed. It is also important to observe all instructions for entry terminations. Failure to follow these instructions may result in a system which may be dangerous or fail to operate correctly.

The housing must be grounded to a minimum 20A ground. If the JB3 is to be used in a zoned hazardous area ensure the certification marks on the side of the main housing match the zones certification requirements. In such cases do not operate the JB3 without the cover correctly screwed in place.

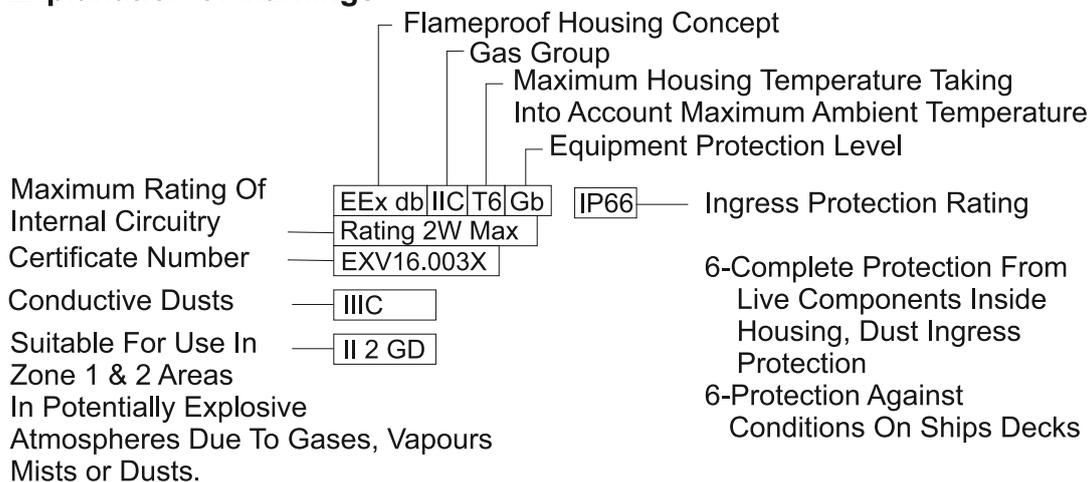
It is imperative to use cabling which suits the environment in which the JB3 and its sensor is to be used. The following is intended as a guide.

Cables need to be circular and compact and must be screened. Cable conductor sizes must be correctly sized for current carrying capacity.

Steel Wire Armoured cable to BS6724, BS5467, EN 50288-7 are examples that can be used other types may be suitable. Refer to current revisions of the ATEX 60079- standards for full installation requirements in particular: 60079-14

Note in all cases the JB3 Housing must be earthed and used in conjunction with correctly zoned cable glands and sealing for safe operation in a hazardous area.

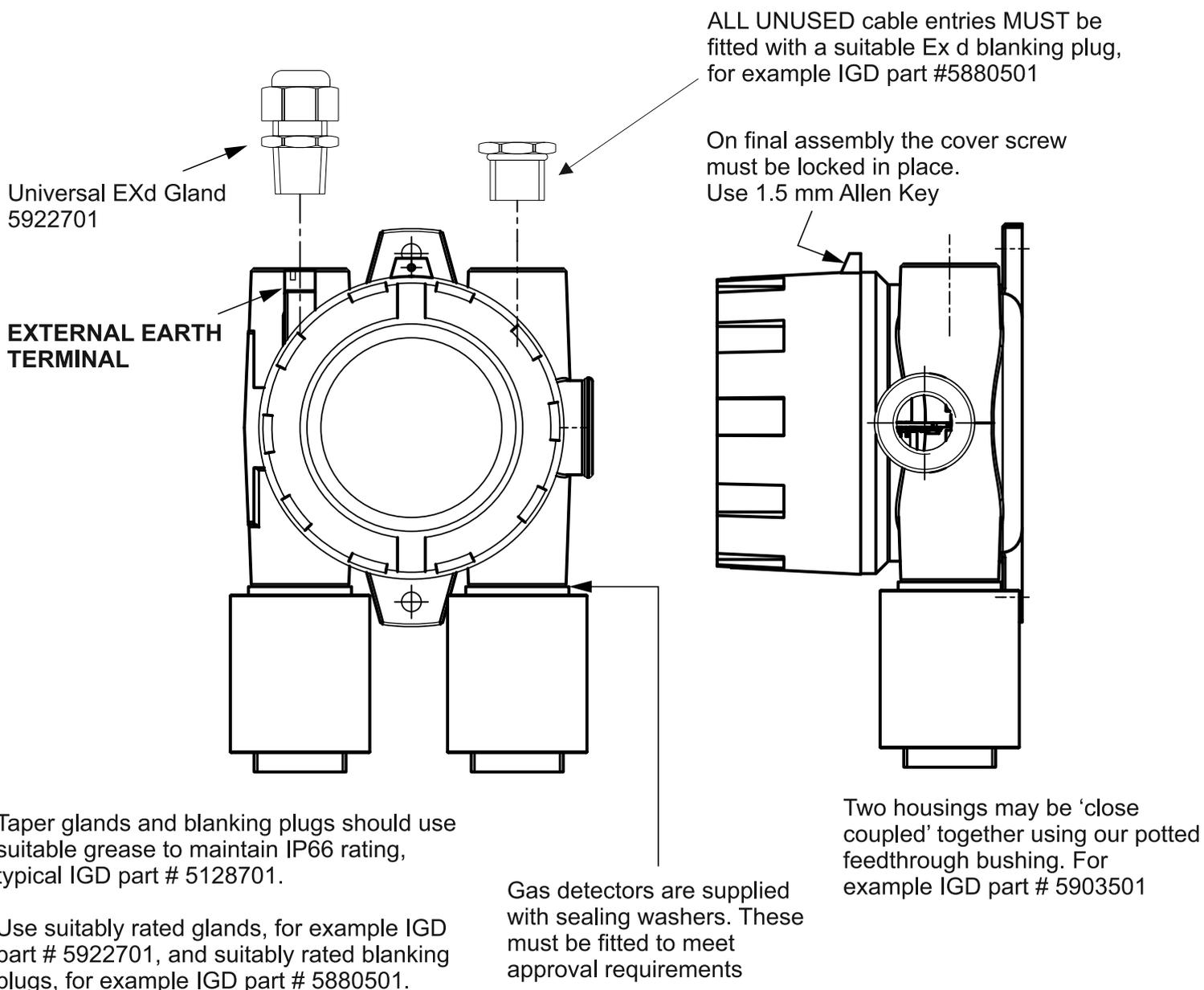
Explanation of Markings



Customer Sealing and Earthing Requirements

The JB3 is designed for use in Zone 1 and Zone 2 hazardous areas and is ATEX & IECEx certified. To maintain compliance it is imperative the installer of the equipment observes the following installation guidelines. Failure to do so could compromise the protection concept of the equipment.

Regarding IP ratings Parallel glands and blanking plugs should have O Ring seals or sealing washers to maintain IP66 rating use Atex rated glands and blanking plugs. Loctite 577 can be used as a thread sealant as an additional aid. If using thread sealant additional measures may need to be taken to ensure all parts earth together effectively.



Also see notes on page 5 & 6 of this manual.

EXTERNAL EARTH	STRANDED CABLE USE	4.0mm ² CSA	SOLID CORE CABLE USE	6.0mm ² CSA
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WARNING

Glands and cable must be of a suitable type to match the zone of application of the equipment, see later notes in this manual

The following notes on equipment selection and installation are taken from applicable standards. They are not intended to replace adequate knowledge and skill on the part of those using them. Also any and all applicable local regulations should be considered when deciding on installation methods and materials.

Selection of cables

In accordance with EN 60079-14, cables connected to Ex d enclosures should satisfy one of the following:

- Have ALL the following characteristics:
 - Sheathed with thermoplastic, thermosetting or elastomeric material
 - Any bedding or sheathing must be extruded
 - Any fillers must be non-hygroscopic (meaning resistant to the absorption of moisture)

or;

- Mineral insulated & metal sheathed

or;

- Special cables, for example flat cables with appropriate glands

It is worth noting that many PVC sheathed and insulated cables do not satisfy these requirements.

Also if an armoured cable is used, then the gland should be of a type that clamps the armour, and provides a compression seal on the inner sheath.

For these purposes armoured can refer to armoured OR braided (SWA or SY), and should be clamped accordingly.

If using a fine braided cable with strands of less than 0.15mm, where the braid covers at least 70% of the surface of the cable, then compression sealing only on the outer sheath, is permitted. In such instances the braid should be brought into the enclosure, and handled accordingly.

Fire Proof cable, such as FP200 can be used with the recommended IGD gland. The aluminium tape which forms the outer metal jacket can be clamped in the armour clamping ring.

Selection of cable glands

In accordance with EN 60079-14, cable glands used with Ex d enclosures should satisfy one of the following:

- Certified barrier glands

or;

- Cables and glands meeting ALL of the following:
 - Certified Ex d glands
 - Connected cable length is at least 3m
 - Cable having ALL the following characteristics:
 - ◆ Sheathed with thermoplastic, thermosetting or elastomeric material
 - ◆ Any bedding or sheathing must be extruded
 - ◆ Any fillers must be non-hygroscopic (meaning resistant to the absorption of moisture)

or;

- Certified Ex d bushing and Ex e junction box

or;

- Mineral insulated cable and suitable, certified glands

or;

- Other certified barrier device

It should be noted that the use of tapes, heat shrink or other devices to enlarge the diameter of the cables sheath to make the gland compression seal grip the cable, is explicitly forbidden.

To satisfy the above requirements we recommend using IGD part # 5922701, with at least 3m of cable left before the next gland, and a cable which complies with the above requirements.

Unused cable entries

It is critical to the safety integrity of the system that all unused cable entries MUST be fitted with a suitably certified Ex d stopping plug. We recommend using IGD part # 5880501.

Un-used cores of a multi-core cable

Any un-used cores in a multi-core cable must be either terminated to earth, or effectively isolated from other cores and terminations. We recommend terminating to the internal earth stud.

Maintenance

Whilst the maintenance of installations is the responsibility of the site operator, EN 60079-17 gives guidance on what should be checked and when. Included at the back of this manual is a chart based on that found in section 6 of EN 60079-17, for a Periodic Close Inspection. This chart is intended to be used by qualified personnel in conjunction with the EN 60079-17.

Commissioning

When commissioning a system for use in a zoned area, EN 60079-17:2014 4.3 mandates that, it shall be given an initial inspection. Included at the back of this manual is a chart based on that found in section 6 of EN 60079-17, for an Initial Detailed Inspection. This chart is intended to be used by qualified personnel in conjunction with the EN 60079-17.

Qualification of personnel

Personnel involved in installation and commissioning of equipment in Zoned areas should be suitably qualified. The qualifications required are detailed in various parts of the EN 60079 standard. Qualification can be purely internal or can involve a third party. It is the responsibility of each individual organisation to decide upon the most appropriate way to implement these requirements.

As well as the mandatory qualifications in the standard personnel must of received adequate training in the gas detection equipment. To comply with EN 60079 such training must be documented.

Installation, commissioning, maintenance and operation by unqualified personnel could lead to serious equipment malfunction and/or unsafe operation.

Installation location

It is important that the detector is mounted in accordance with EN 60079-14, clause 14.2 which states that flameproof joints must be a minimum distance away from solid obstacles, (eg structural steelwork) which is not part of the equipment.

Note that if the detector is mounted to a flat surface then the joints where the cables and detectors go into the housing are closer than the minimum, but this has been taken account of during testing and hence does not need to be considered.

For a IIA installation the minimum distance is 10mm, for a IIB it is 30mm and for IIC it is 40mm.

Earthing

Both internal and external earth studs are provided, and can be used as the installation requires. The external earth point provides a means for connecting the enclosure, which is considered to be an 'exposed conductive part', to the bonding system. There is no specific requirement in 60079 to run a separate earth bond to this stud, but we recommend that one is connected. This is inline with best practice and many local requirements, for example equipment going offshore from Aberdeen. The minimum size conductor for such bonds is 4mm² as per EN60079-14 clause 6.4.1.

To summarise, as a minimum we recommend that:

- The internal earth stud be used to:
 - Connect any unused cores
 - Connect any earth core internal to the cable
- The external earth stud be used to bond the enclosure to the any steel-work, on which the gas detector is mounted.

Greases and assembly compounds

EN 60079-14 allows for the use of grease when assembling flameproof joints, such as threaded cable glands, but stipulates that it must be, non-setting, non-metallic and non-combustible, and, in the case of cable entries, also that earth continuity must be maintained. We recommend conductive carbon grease such as IGD part # 5128701.

 International Gas Detectors <small>Innovative Gas Detection since 1917</small>			
Initial detailed inspection check-list to EN 60079-17:2014 Part 6. Table 1 Ex d & Ex tD			
System name			
Inspection date		Doc template #	
Equipment type	Ex d gas detector	Detector serial #	
Site name			
Check that:			Y,N or NA
Comments			
A	General		
1	Equipment is appropriate to the ELP/Zone requirements of the location		
2	Equipment group is correct		
3	Equipment temperature class is correct		
4	Equipment maximum surface temperature is correct		
5	Degree of protection (IP grade) of equipment is appropriate for the level of protection/group/conductivity		
6	Equipment circuit identification is correct		
7	Equipment circuit identification is available		
8	Enclosure glass parts and glass -to-metal sealing gaskets and/or compounds are satisfactory		
9	There is no damage or unauthorised modifications		
11	Bolts, cable entry devices (direct or indirect) and blanking elements are of the correct type and are complete and tight. Physical check		
12	Threaded covers on enclosures are of the correct type, are tight and secured. Physical check		
13	Joint surfaces are clean and undamaged and gaskets, if any, are satisfactory and correctly positioned		
14	Conditions of gaskets is satisfactory		
15	There is no evidence of ingress of water or dust in the enclosure in accordance with the IP rating		
17	Electrical connections are tight		
25	Breathing and draining devices are satisfactory		
26	Items 26 – 31 refer to motors and lighting so hence are not relevant and have been omitted		
B	Installation – General		
1	Type of cable is appropriate		
2	There is no obvious damage to cables		
3	Sealing of ducts, pipes and/or conduits is satisfactory		
4	Stopping boxes and cable boxes are correctly fitted		
5	Integrity of conduit system and interface with mixed system maintained		
6	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are satisfactory (for example connections are tight and conductors are of sufficient cross-section). Physical check.		
7	Fault loop impedance (TN systems) or earthing resistance (IT systems) is satisfactory		
8	Automatic electrical protective devices are set correctly (auto reset not possible)		
9	Automatic electrical protective devices operate within permitted limits		
10	Specific conditions of use (if applicable) are complied with		
11	Cables not in use are correctly terminated		
12	Obstructions next to flameproof joints are in accordance with IEC 60079-14:2014 14.2. See explanatory note on Page 6 of the 903 manual		
14	Items 14-23 refer to heating systems and motors, hence they have been omitted		
C	Environment		
1	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors		
2	No undue accumulation of dust and dirt		
3	Electrical insulation is clean and dry		

Signature

Print name



International Gas Detectors
Innovative Gas Detection since 1917

Periodic close inspection check-list to EN 60079-17:2014 Part 6. Table 1 Ex d & Ex tD

System name			
Inspection date		Doc template #	
Equipment type Ex d gas detector		Detector serial #	
Site name			
Check that:			Y,N or N/A
A	General		
1	Equipment is appropriate to the ELP/Zone requirements of the location		
2	Equipment group is correct		
3	Equipment temperature class is correct		
4	Equipment maximum surface temperature is correct		
5	Degree of protection (IP grade) of equipment is appropriate for the level of protection/group/conductivity		
7	Equipment circuit identification is available		
8	Enclosure glass parts and glass -to-metal sealing gaskets and/or compounds are satisfactory		
10	There is no evidence of unauthorised modifications		
11	Bolts, cable entry devices (direct or indirect) and blanking elements are of the correct type and are complete and tight. Physical check		
12	Threaded covers on enclosures are of the correct type, are tight and secured. Physical check		
25	Breathing and draining devices are satisfactory		
26	Items 26 – 31 refer to motors and lighting so hence are not relevant and have been omitted		
B	Installation – General		
2	There is no obvious damage to cables		
3	Sealing of ducts, pipes and/or conduits is satisfactory		
6	Earthing connections, including any supplementary earthing bonding connections are satisfactory (for example connections are tight and conductors are satisfactory (for example connections are tight and conductors are of sufficient cross-section). Visual check.		
12	Obstructions next to flameproof joints are in accordance with IEC 60079-14:2014 14.2. See explanatory note on Page 6 of the 903 manual		
14	Items 14-23 refer to heating systems and motors, hence they have been omitted		
C	Environment		
1	Equipment is adequately protected against corrosion, weather, vibration and other adverse factors		
2	No undue accumulation of dust and dirt		
3	Electrical insulation is clean and dry		

Signature

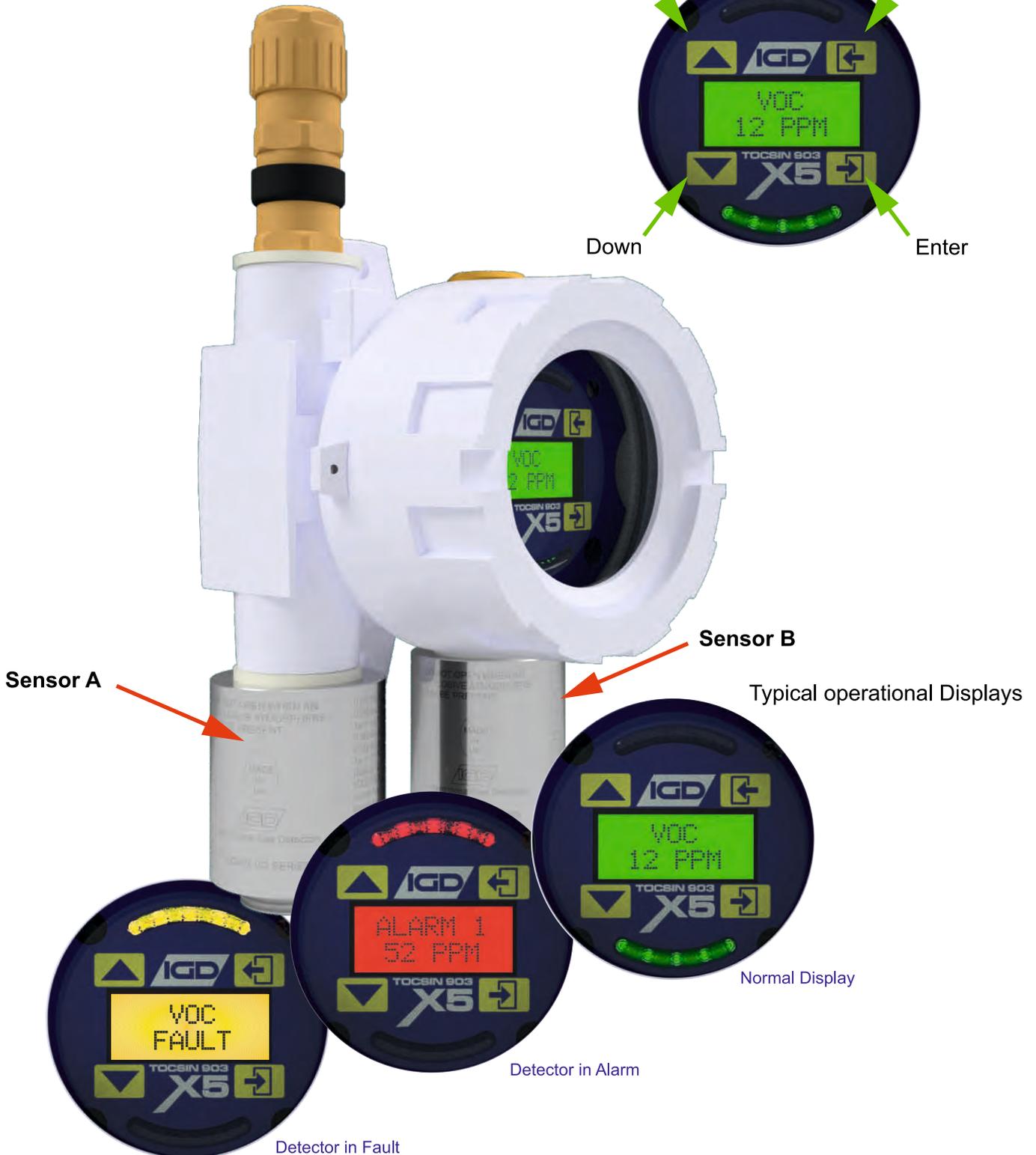
Print name

Overview



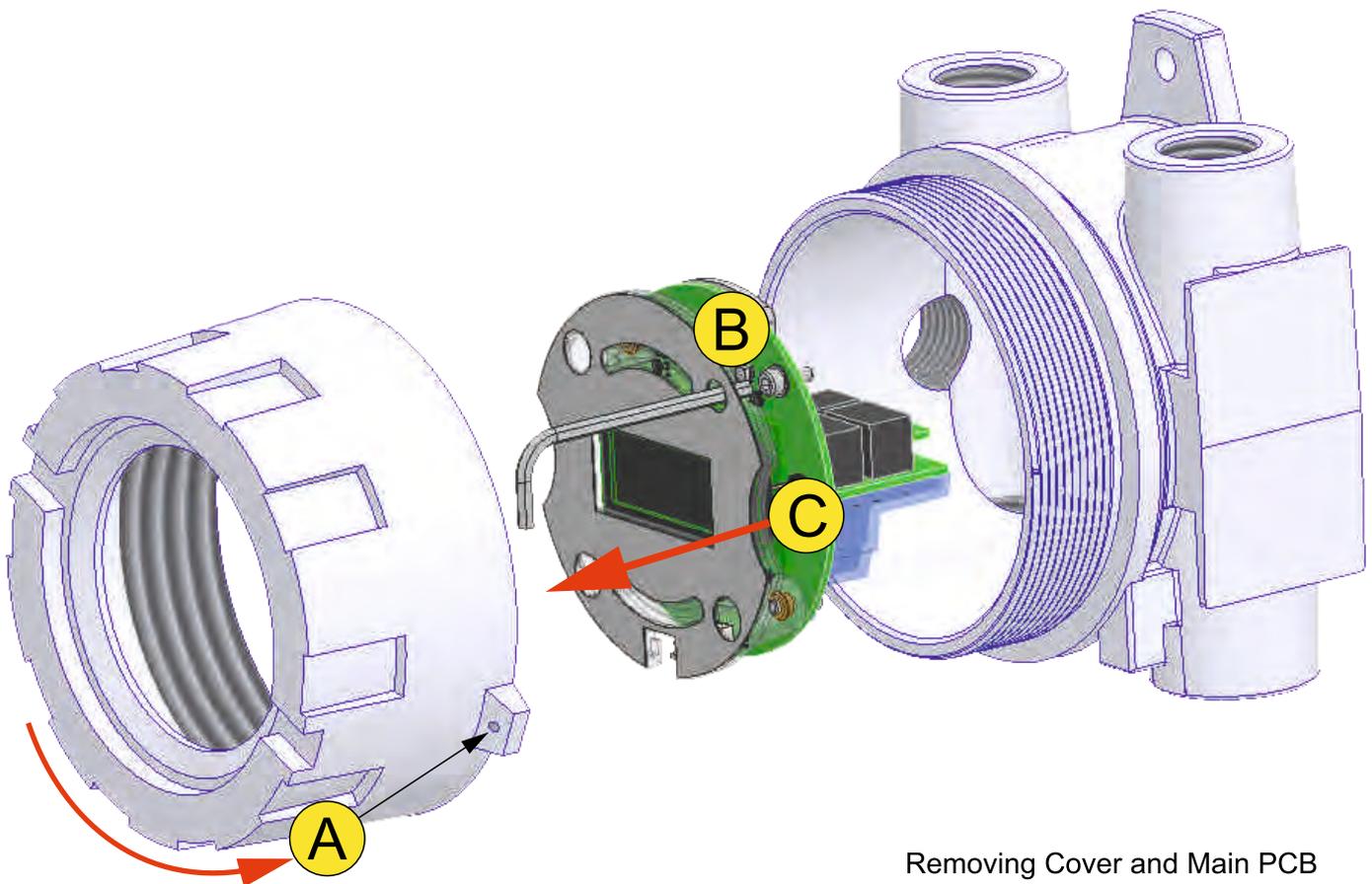
903X5 has 5 20mm x 1.5 threaded entries. Two of these can be used to mount 102 series gas detectors. Which port is used for each detector has an impact on how it is displayed on screen (sensor A or B). Menus can be accessed using the magnetic wand provided. The following pages show the internal base PCB and terminal functions.

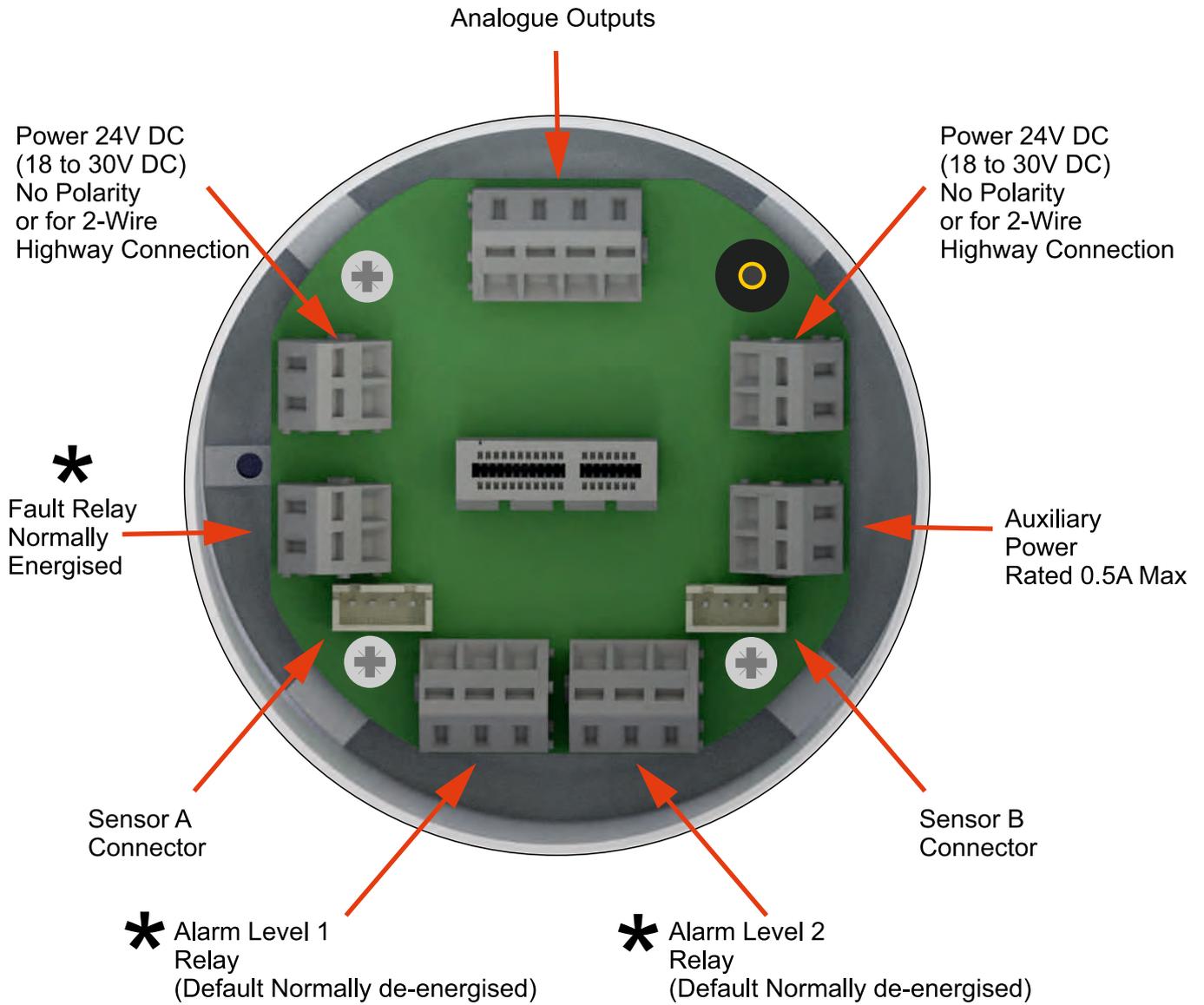
Buttons that can be accessed using the supplied Magnetic wand



On first delivery it will be necessary to connect a sensor or sensors to the 903X5 and check the 903X5 correctly registers and installs them.

- a) Unscrew the 903X5 cover noting that it may be necessary to loosen the locking screw.
- b) With the lid unscrewed, unscrew the PCB retention screw using the Allen key provided.
- c) Using the finger points unplug the main PCB assembly
- d) If only one sensor is to be fitted then use Port A on the housing.
- e) When screwing the sensor onto the 903X5 make sure the sensor cable does not snag or 'corkscrew'.
- f) Plug the sensor into the corresponding port on the base PCB (A or B)
- g) Power can be applied to either power port and is not polarity specific, do not apply power without first refitting the main PCB assembly, to do so may cause damage to the PCB.





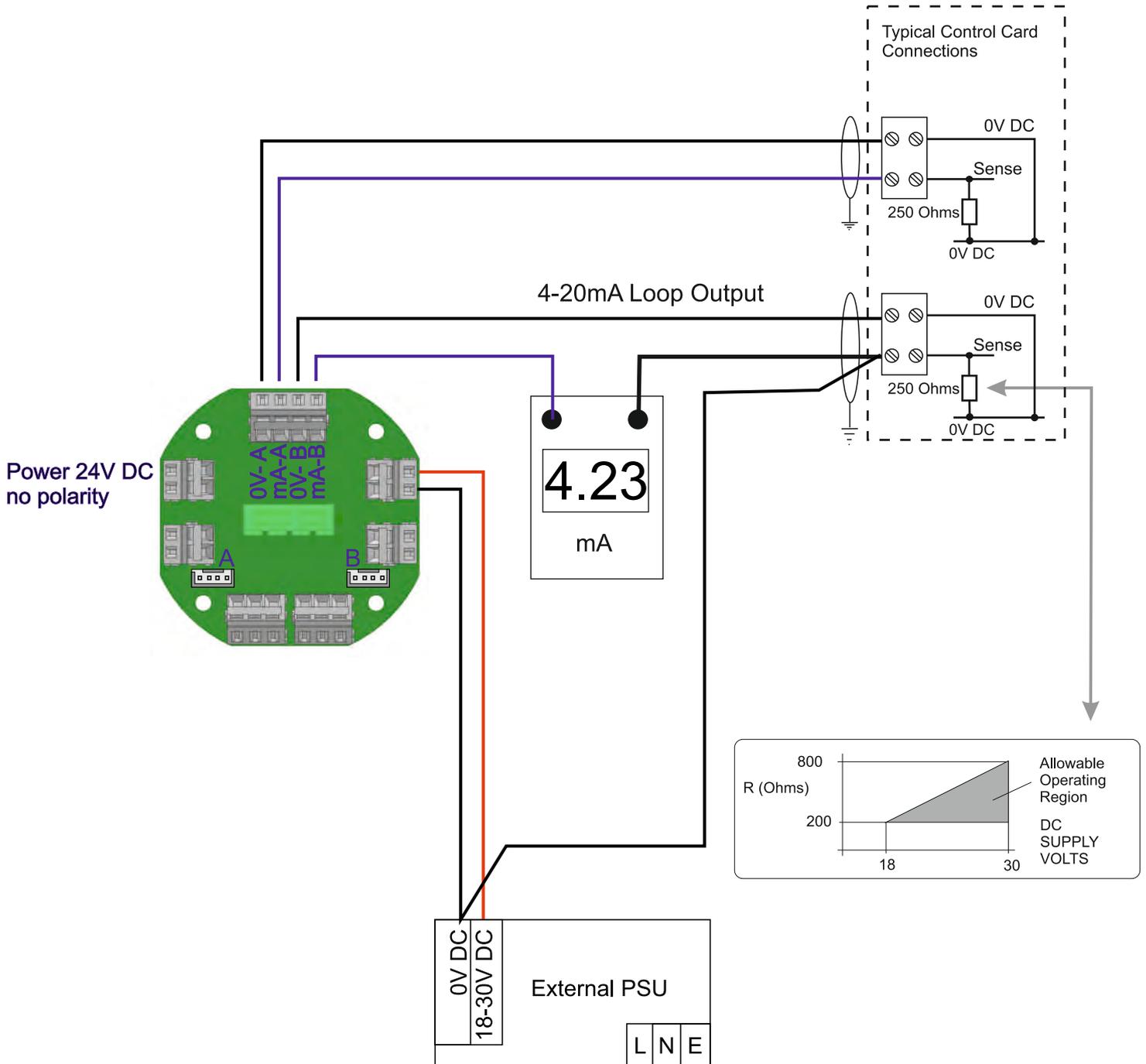
View on Base PCB With Main PCB Removed

* Note relays are rated for 12/24V DC Operation at up to 4A

Power and Analogue Output Connections

The following diagram shows typical connection for a 24V DC power 903X5 with both its analogue 4-20mA output connected to a host system. The ammeter is shown in circuit if required for test purposes. Cables must be screened types. See selection types.

In this instance the 903X5 is powered from an external PSU separate to the monitoring system.



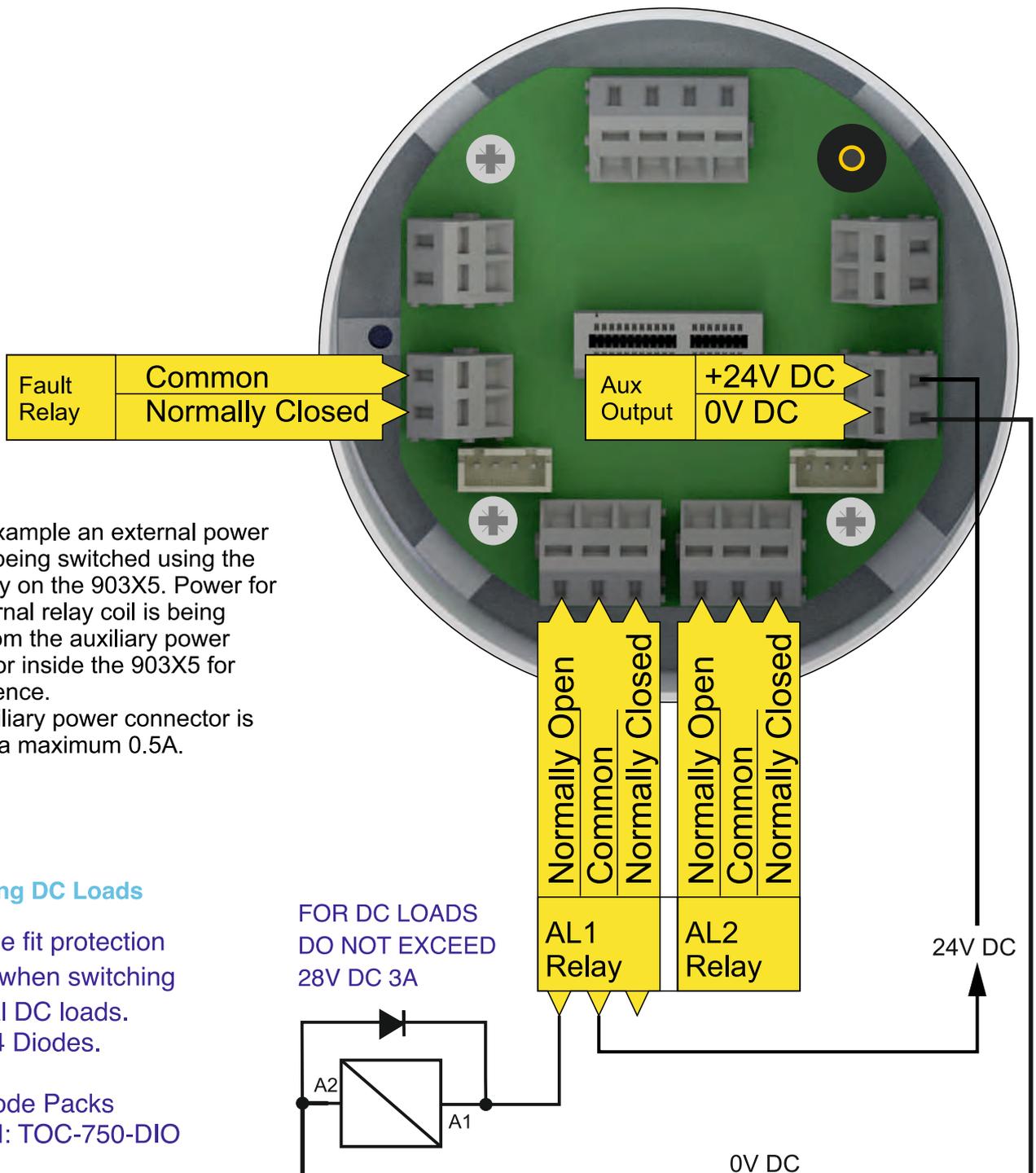
Relays

903X5 has 3 relays on-board.

Fault Relay: This is normally energised in operation providing a closed connection that opens (de-energises) if a fault condition is detected.

AL1 & AL2 Relays: By default these are normally de-energised and energise on breaching an alarm level. Note that alarm levels are automatically set based on the range and gas type of the detector(s) fitted. The menu system can be used to alter the defaults and alarm action.

Do not exceed the relay ratings or this may result in damage to the 903X5.



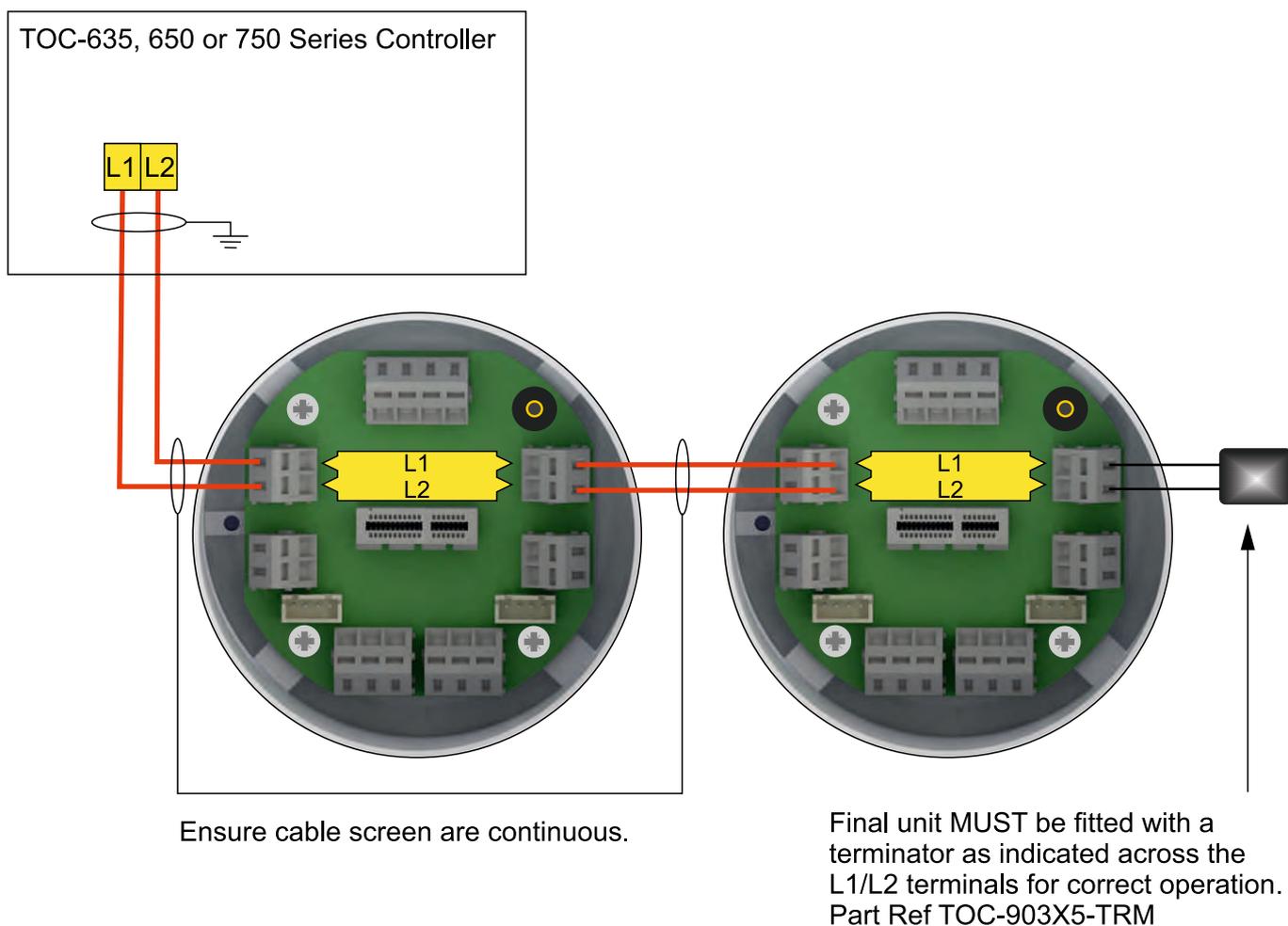
In this example an external power relay is being switched using the AL1 relay on the 903X5. Power for the external relay coil is being taken from the auxiliary power connector inside the 903X5 for convenience. The auxiliary power connector is rated at a maximum 0.5A.

Switching DC Loads

Example fit protection diodes when switching external DC loads. 1N4004 Diodes.

For Diode Packs IGD PN: TOC-750-DIO

Addressable Connection



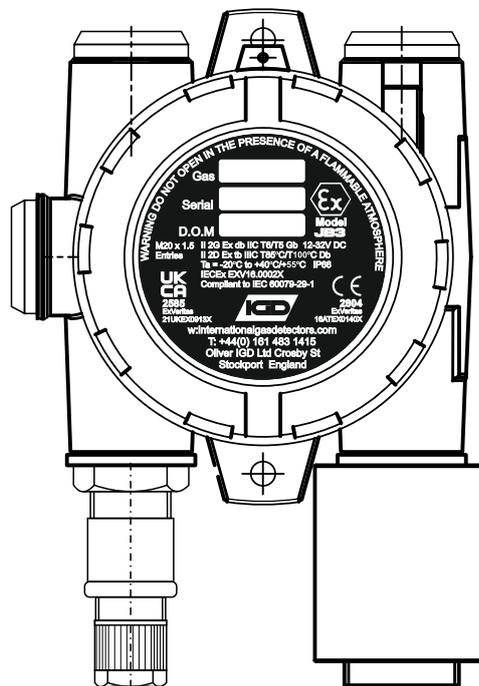
The diagram above shows two 903X5 modules connected in series in addressable mode. This allows units to digitally communicate to a host controller using IGD's Sentinel+ protocol. In overview:

1. There is no polarity to the L1/L2 terminals
2. Cabling MUST be screened for correct operation
3. Cable Screens MUST be continuous back to the system controller
4. Final unit MUST be fitted with a terminator (supplied) for correct operation
5. Each unit MUST have a unique address to be able to communicate (see setting addresses)
6. In addressable mode the internal relays can still be used, these also have addresses and are controlled by the programmed cause and effect in the system controller.
7. Analogue outputs continue to operate and can be used in conjunction with the addressable connection if required, consider separately screened cabling.
8. In addressable mode alarm levels and relay actions are set from the control panel and NOT the 903X5

Remote Connection of One or Both Detectors

903X5 allows one or both detectors to be remotely connected to the 903X5 head unit. The following drawings indicate general arrangement and wiring requirements. This allows the 903X5 to be in a convenient location with detectors at low or high level as required.

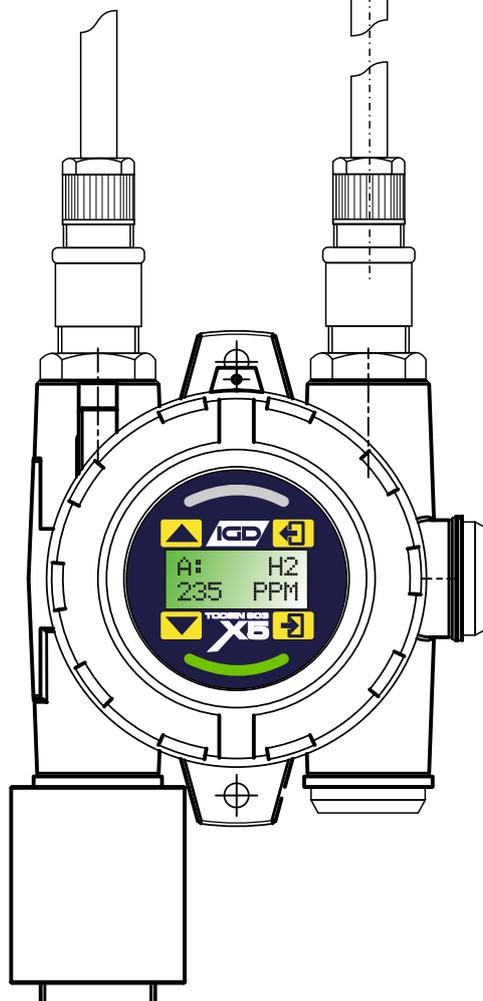
Note this arrangement is only for use where 903X5 is a stand alone unit. This arrangement cannot be used where 903X5 is also addressable connected to an IGD controller.



Remote JB3 ATEX Junction Box with 102 Series Gas Detector. For Example part number:

TOC-750X-MK8

For addressable 2-Wire series ATEX Flammable. See Data Sheet SL006 for Part Numbers and Gases



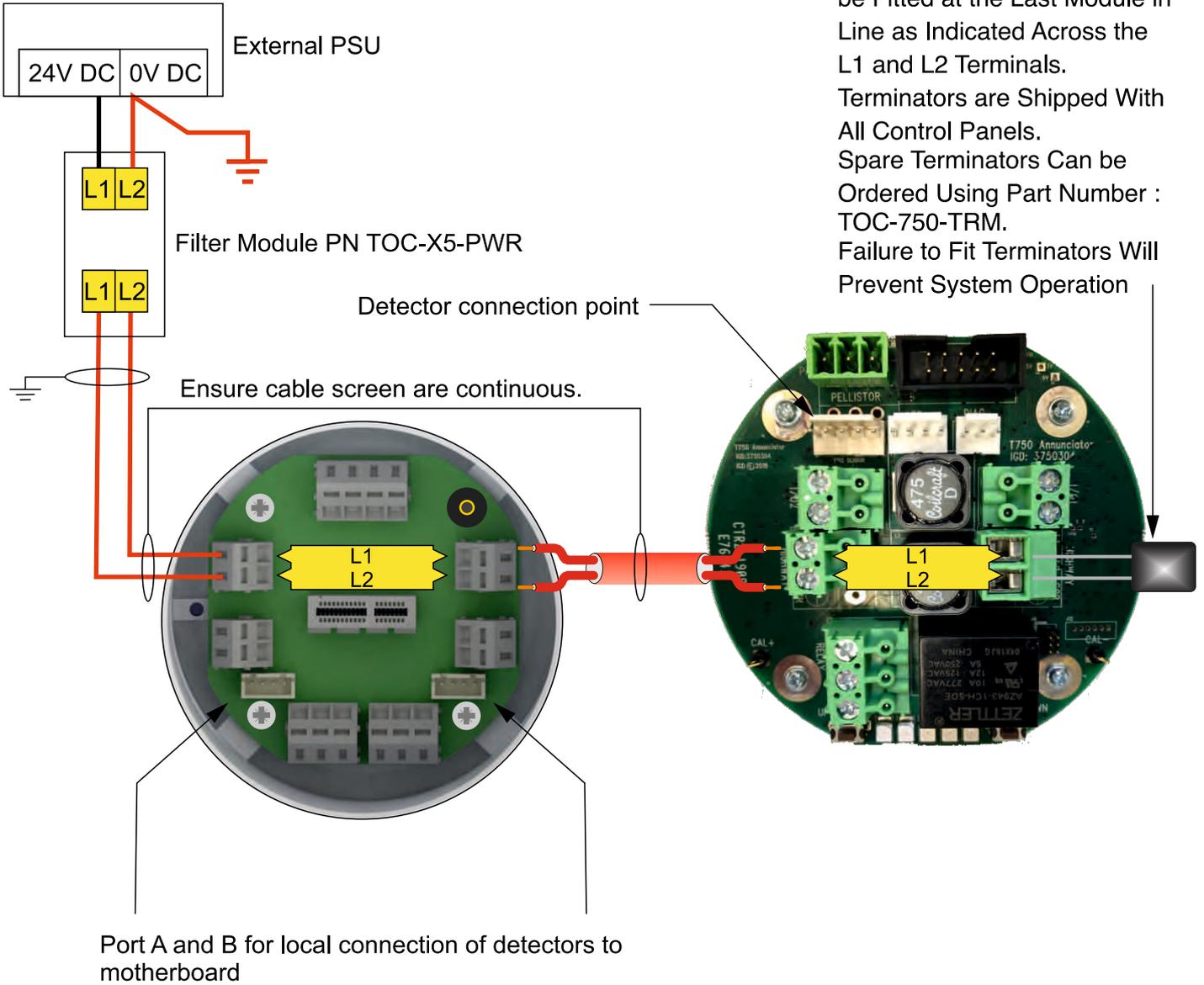
Refer to 903/JB3 Manual for correct ATEX/IECEX Installation requirements also refer to 2-Wire installers guide.

Tocsin 903 X5 Series Junction box with Transmitter display and locally connected 102 series gas detector. Example part numbers:

TOC-903-X5 Junction box and display
TOC-102-H2S Direct connected 102 series H2S Detector

See data sheet SL008 for part numbers and gases.

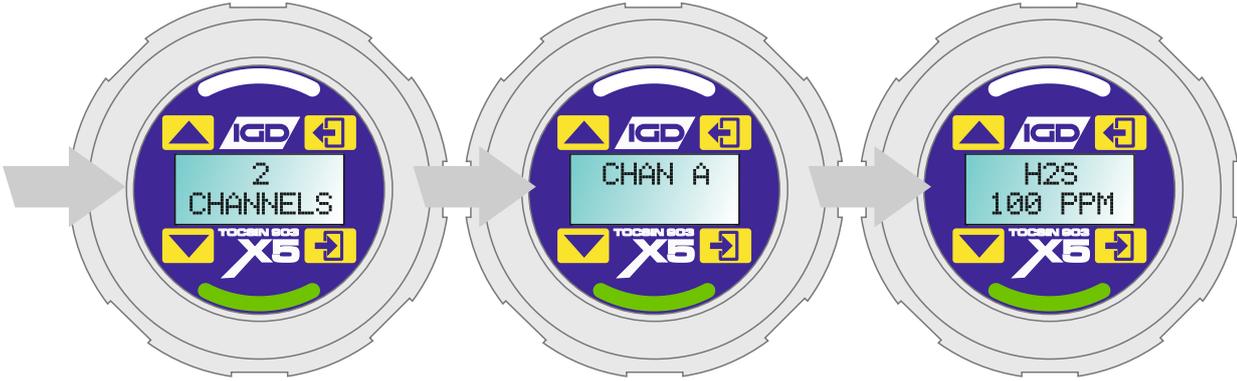
Remote Connection of One or Both Detectors



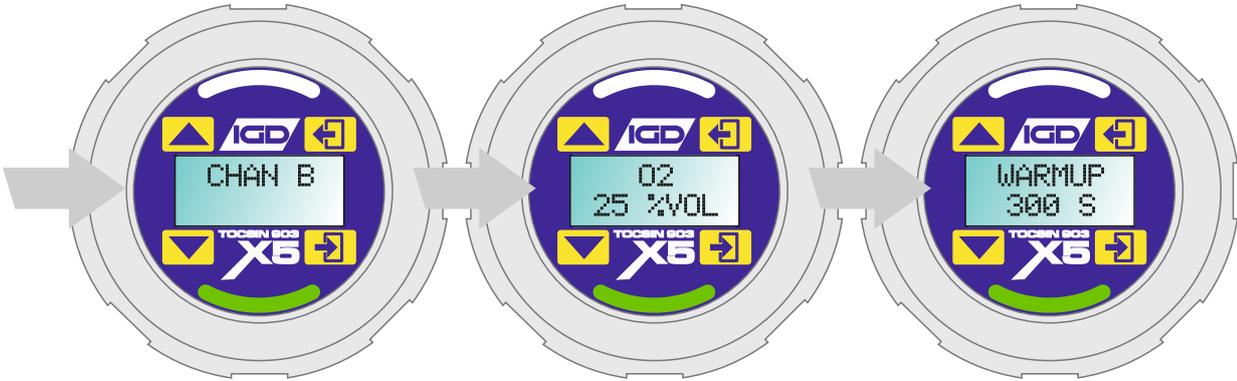
On Start Up



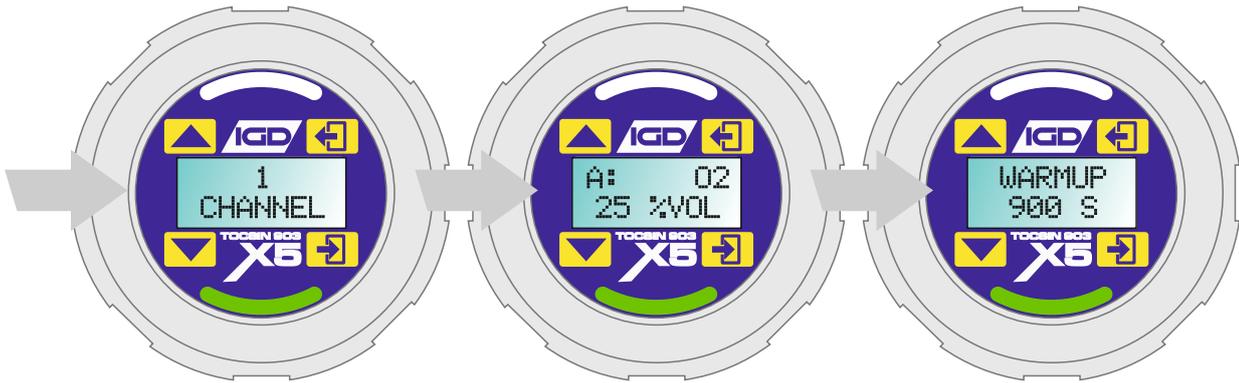
On power up the display back light will show blue with the status indicators cycling red, yellow, green. The display shows the software version and serial number



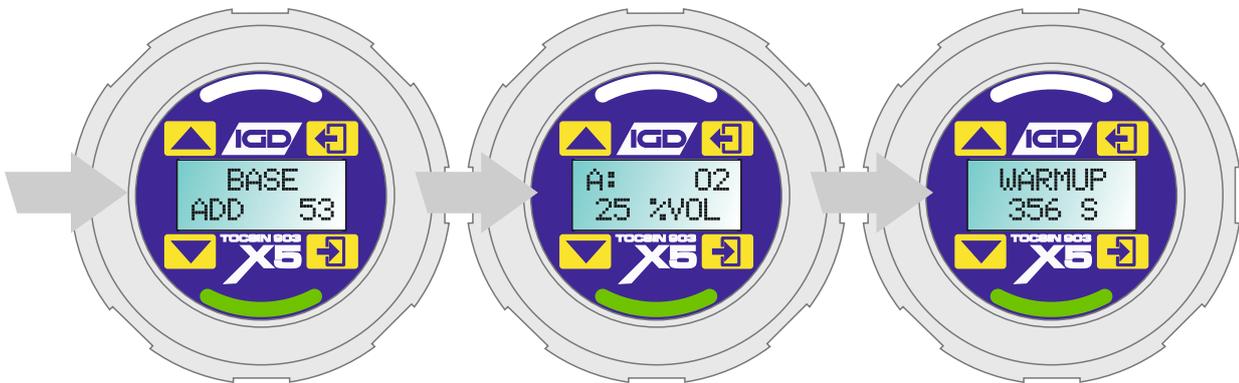
The status indicator stays green if the gas detectors are connected otherwise a channel fault is indicated for the affected channel. The display shows the number of channels and then their type and range



On Start Up

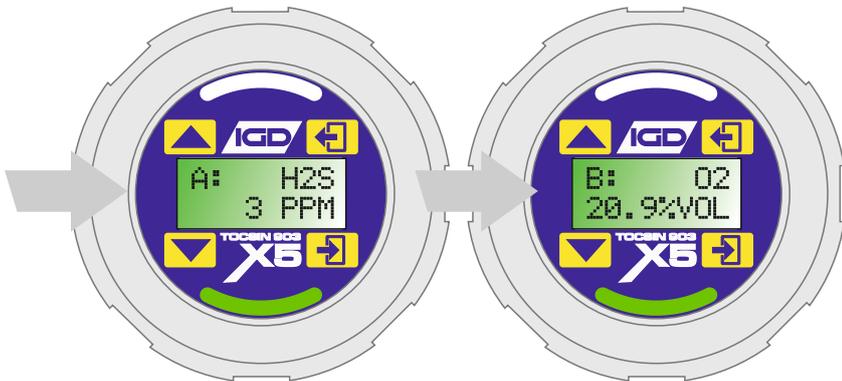


During warm up information is displayed to show the setup of the 903X5. If two channels are fitted information is displayed sequentially.

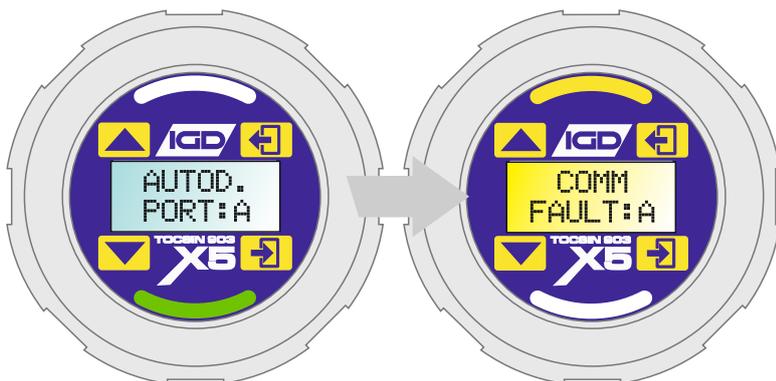


If addressable mode is active then the base address for the unit is also displayed sequentially

The display then indicates the warm up time, this is variable depending on detector type. After the warm up time the display sequentially shows each detector and its readings.

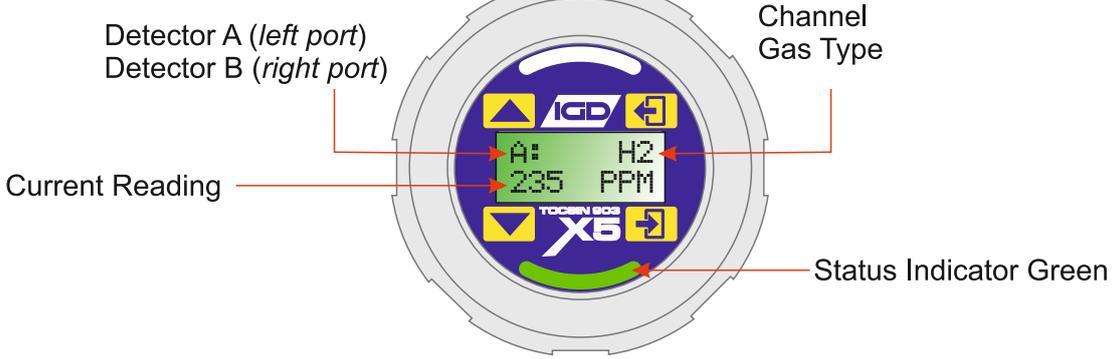


Note if the 903X5 is powered with no sensor connected (or second port enabled with no detector connected) then the controller will attempt to communicate to the port in question (either A,B or both) for 60 seconds. If no detector is connected then after that period, Comms Fault will be displayed.

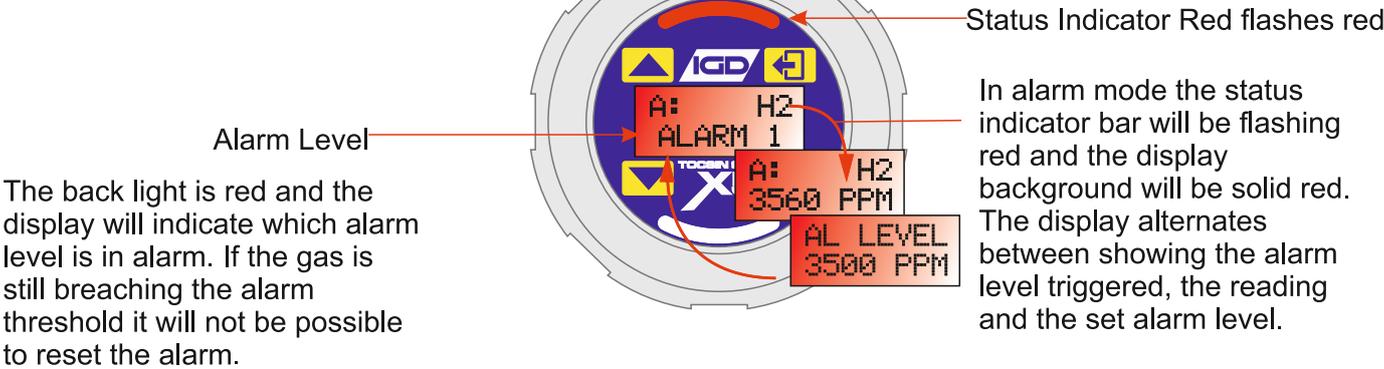


Day to Day Operation

In Alarm Condition

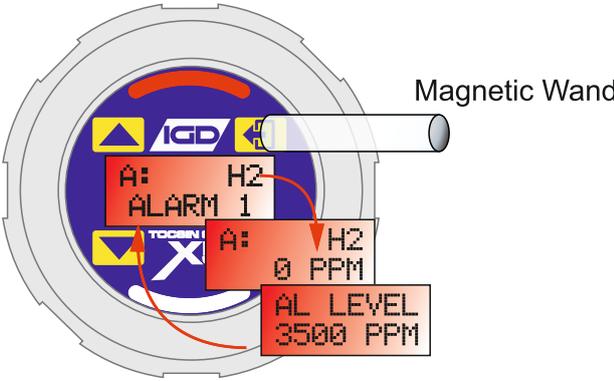


In Alarm Condition



Resetting a Latching Alarm

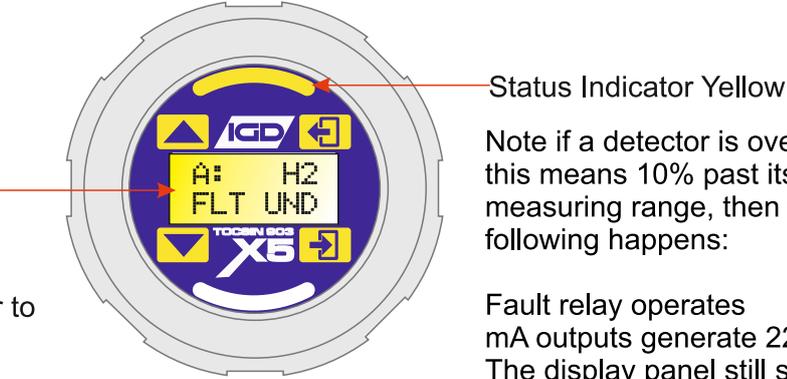
If the alarm type is set as latching the alarm condition remains set until the 903X5 is manually reset. Check that the displayed level is below the set Alarm level. If it is the alarm can be reset. To reset the alarm, hold the IGD magnetic wand over the EXIT icon for at least 5 seconds. The display will show RESET for a few seconds and then if the gas level condition allows the display will revert to a 'green' normal display.



In Fault Condition

In FAULT mode the backlight is Yellow. The bottom line of the display will indicate as follows:

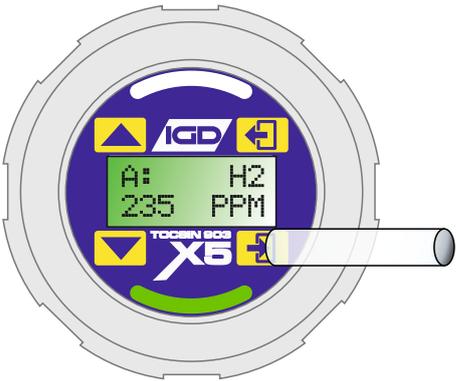
FLT COM	communication error to sensors
FLT SEN	Sensor Error
FLT OVR	Sensor Over Range. Note alternates red as technically still in alarm
FLT UND	Sensor Under Range
SELFTTEST	Voltage too low (not 4-20mA mode)



Note if a detector is over range, this means 10% past its normal measuring range, then the following happens:

Fault relay operates mA outputs generate 22mA
The display panel still shows alarm as alarms take precedence but the status indicator will alternately show yellow/red

Menu System

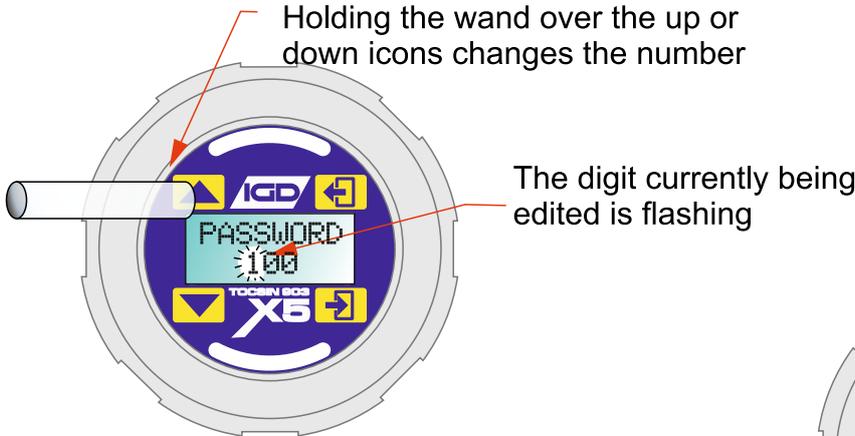
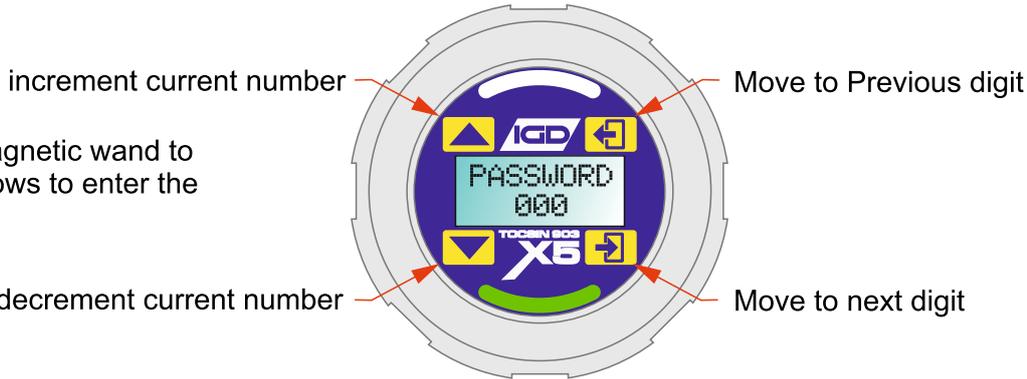


To enter the menu system hold the IGD magnetic wand over the ENTER symbol for at least 5 seconds

Data Entry

Data entry operates in the same manner for passwords, calibration data etc. At any moment you are editing one of the digits on screen. Use the up and down buttons to increase or decrease the current number. When complete use the entry and exit symbols to navigate to the next number to edit.

Use the IGD magnetic wand to navigate as follows to enter the password.



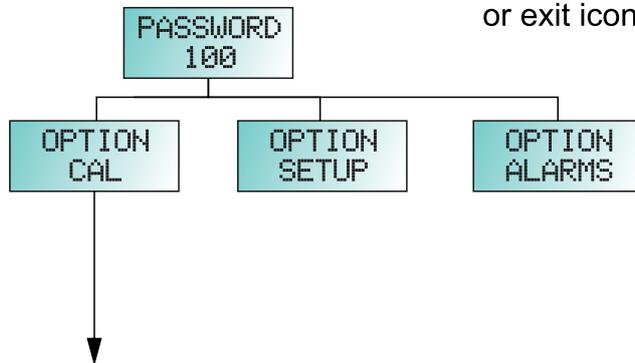
When the edited value is correct use the enter button. Move to the furthest right digit and hold the wand over the button until all digits are flashing. When you remove the wand the value is entered.



Menu selection

Enter Password 100 to access the menu system.
Use the up/down icons to navigate between the two menu options  

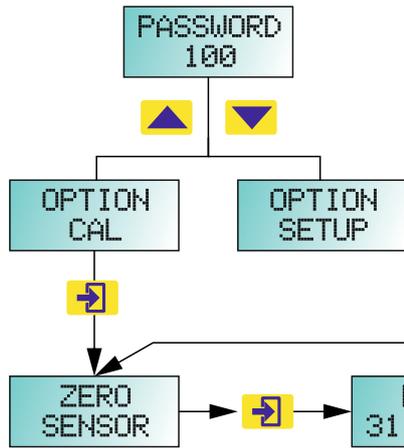
Select the enter Icon to select the option 
or exit icon to return to normal operation 



Calibration Menu

	Use the up and down icons to navigate up and down menus   Use the enter icon to select a menu option  Use the exit icon to return to a previous stage 
	Select option to zero a sensor, see later section on calibration
	Select option to calibrate a sensor, see later section on calibration
	Select option to zero a mA output reading for a sensor
	Select option to calibrate a mA output reading for a sensor
	Select option to force a gas detection level. Note that this operates exactly as if a gas level has been detected forcing the reading for as long as required. Alarm relays, transmitted data and mA outputs will all act normally in response.
	Select option to force an under range fault

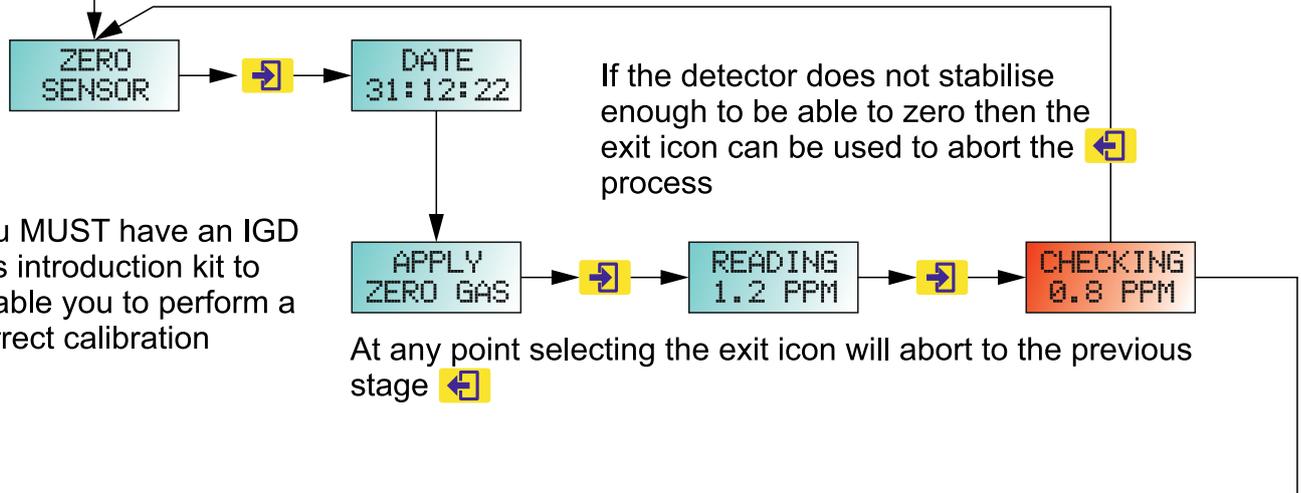
Calibration.....The Zero Routine



At the start of the cal and zero process you are asked to check and change the date if necessary. Use the data entry method previously described to do this. This information is saved into the calibration log and can be retrieved to provide a record of calibration activities.

Note the calibration option is not available unless you have successfully completed a zero within 12 hours.

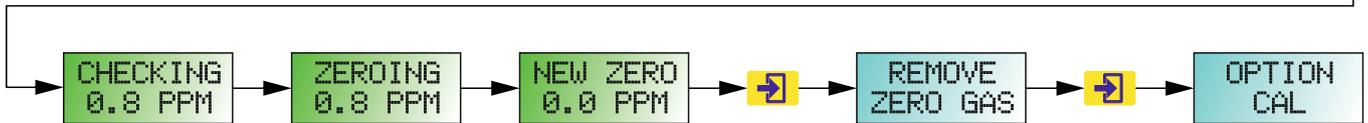
If a zero or calibration is failed then the sensor will indicate fault (SEN FLT) until a successful zero/calibration is performed



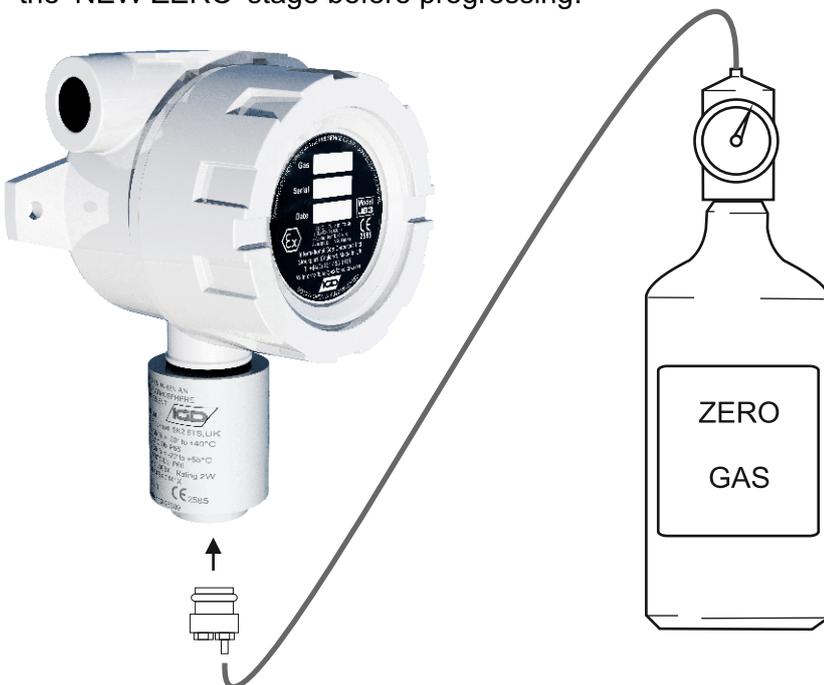
You MUST have an IGD gas introduction kit to enable you to perform a correct calibration

If the detector does not stabilise enough to be able to zero then the exit icon can be used to abort the process

At any point selecting the exit icon will abort to the previous stage



The process allows the engineer to observe the state of the existing zero, perform a zero and then observe the results. Ensure readings are back to normal levels before exiting the menu system. Whilst in the menu system alarms are inhibited. Ensure readings are back to normal levels when observing at the 'NEW ZERO' stage before progressing.



Gas introduction kits provided by IGD are available. They include fixed gas flow regulators to deliver test gases at the correct flow rate and calibration caps. It is imperative to use the correct flow rate and to use the correct calibration cap. The calibration cap is tested during approval to ensure it presents gas in the same manner that the detector would normally see gas and does not adversely affect readings.

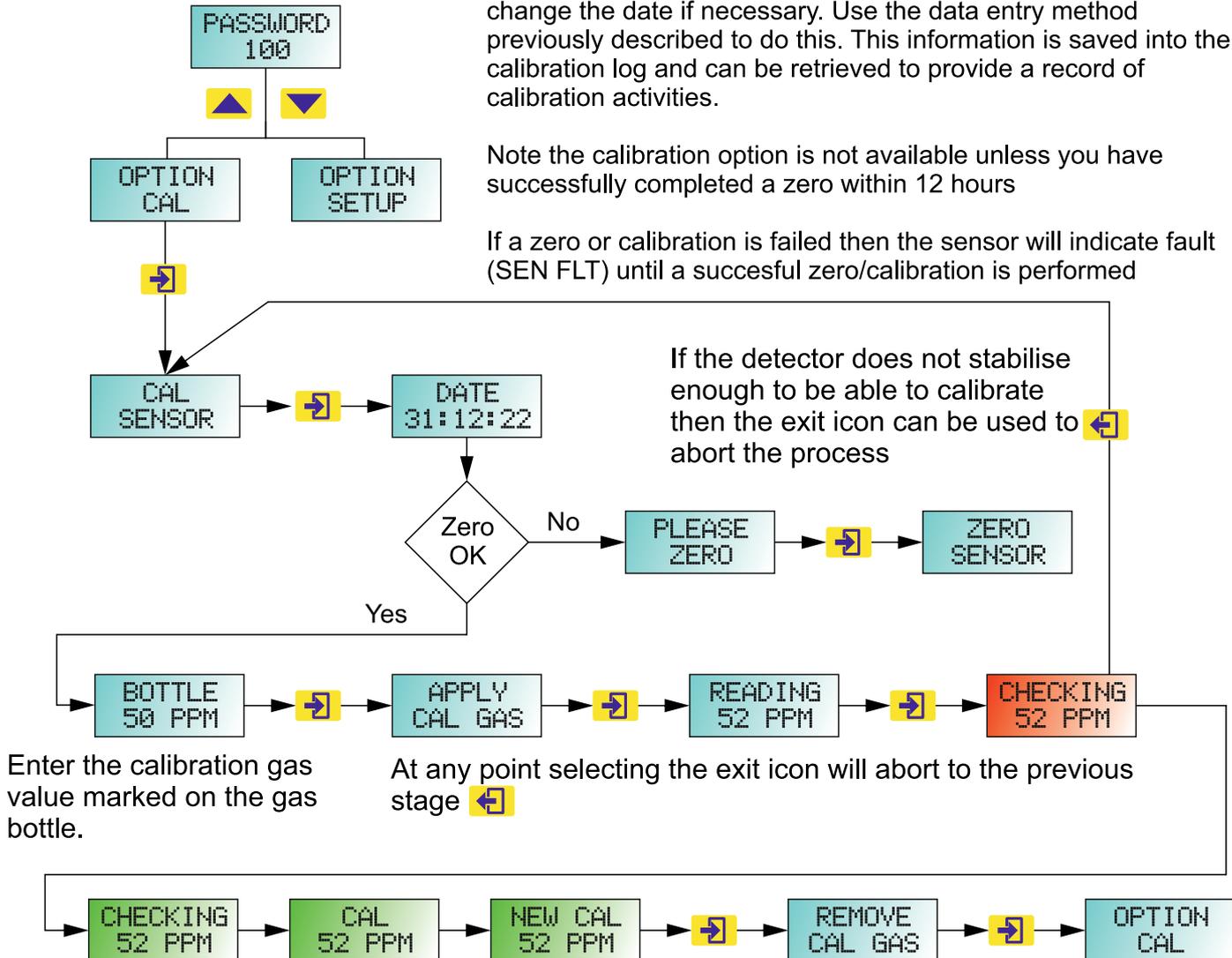
failure to use these can result in a poor calibration which will effect performance.

Calibration

At the start of the cal and zero process you are asked to check and change the date if necessary. Use the data entry method previously described to do this. This information is saved into the calibration log and can be retrieved to provide a record of calibration activities.

Note the calibration option is not available unless you have successfully completed a zero within 12 hours

If a zero or calibration is failed then the sensor will indicate fault (SEN FLT) until a successful zero/calibration is performed

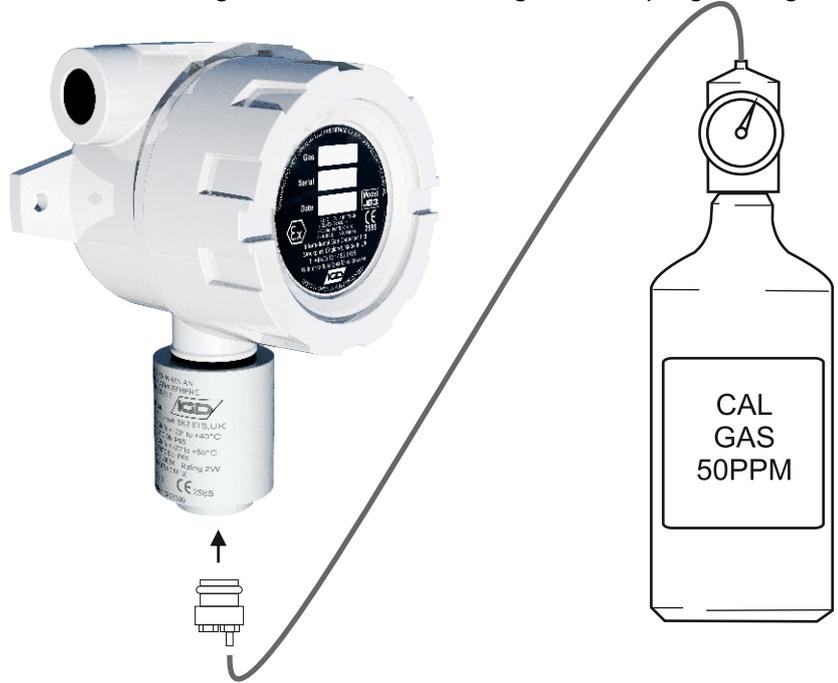


Enter the calibration gas value marked on the gas bottle.

At any point selecting the exit icon will abort to the previous stage

If the detector does not stabilise enough to be able to calibrate then the exit icon can be used to abort the process

The process allows the engineer to observe the state of the existing calibration, perform a calibration and then observe the results. Ensure readings are back to normal levels before exiting the menu system. Whilst in the menu system alarms are inhibited. Ensure readings are back to normal levels when observing at the 'NEW CAL' stage before progressing.

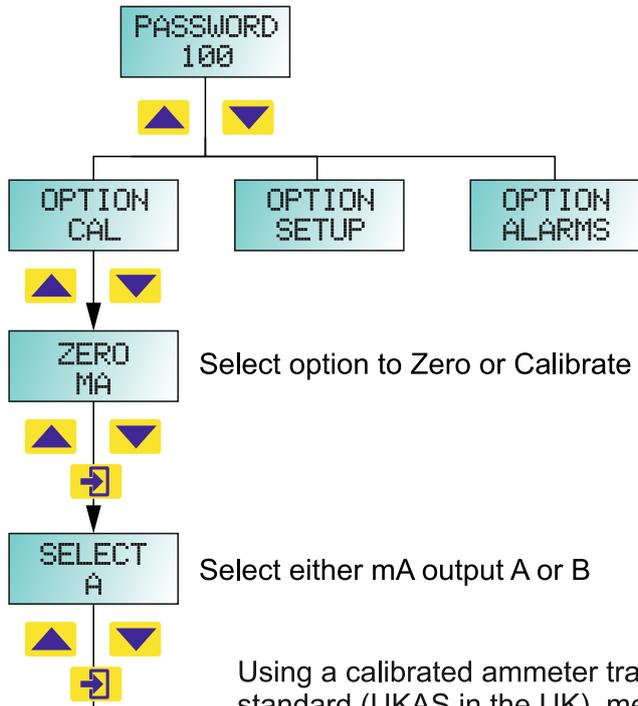


Response time of the detector can be tested using a stopwatch to check the time for the detector to reach 90% of the applied calibration gas value from first application of the calibration gas.

1. First zero and calibrate the detector.
2. Flow zero gas ensuring a stable zero
3. Fit the calibration gas bottle and time response to 90% of the bottle value.

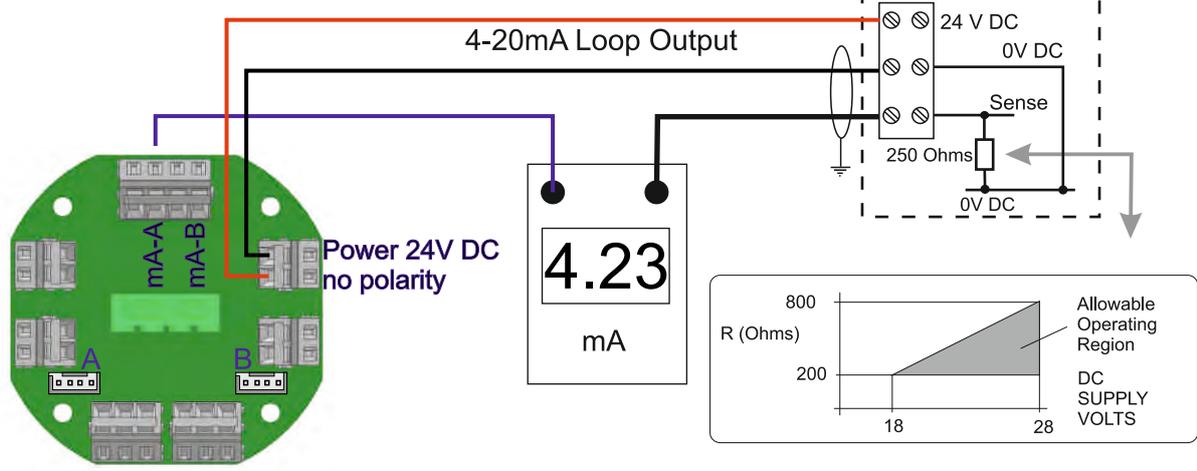
For flammable gases response time requirement to meet 60079-29-1 is less than 60 seconds and a T50 time in under 20 seconds

Cal mA

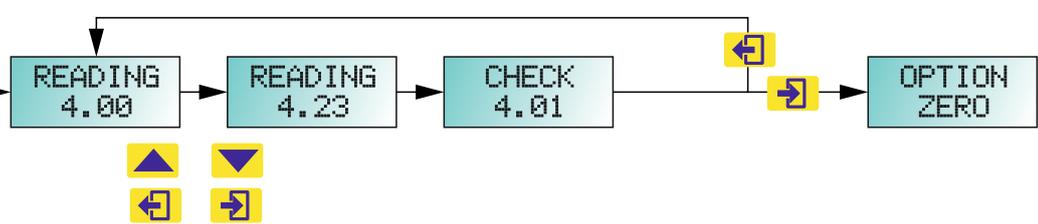


To undertake this process you will need a calibrated mA meter and either the 903X5 is connected to a suitable control input as shown or a PSU with the 'sense' resistor as indicated in circuit.

Using a calibrated ammeter traceable to a national standard (UKAS in the UK) measure the loop current.

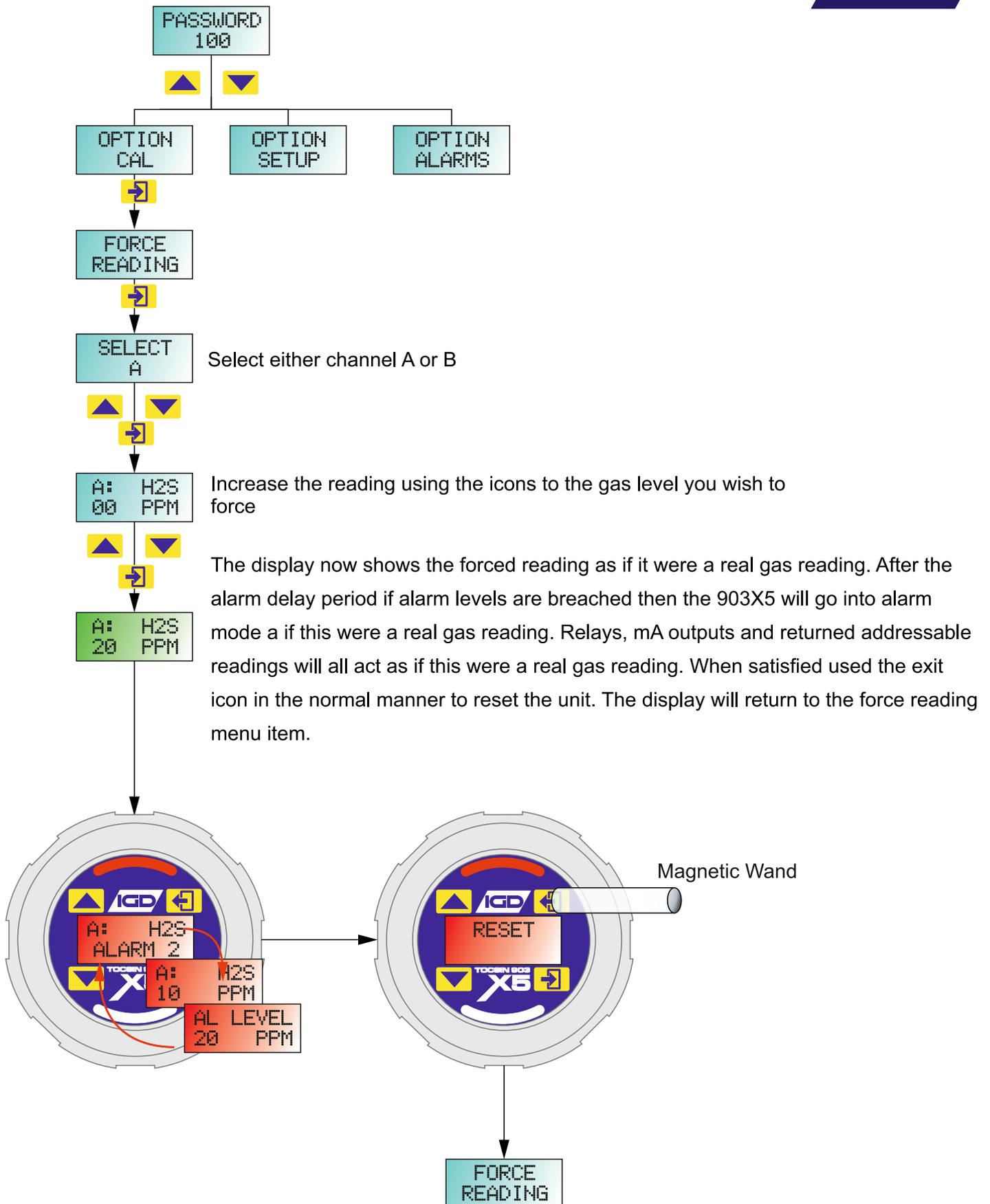


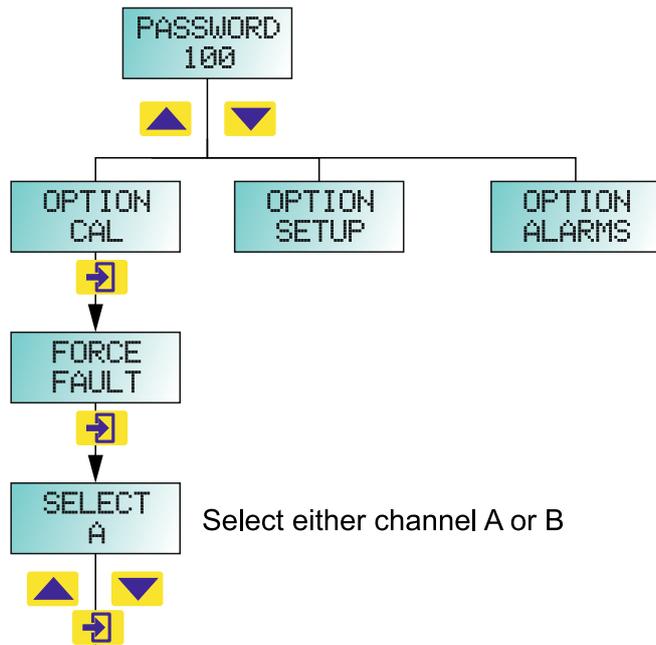
903-X5 Base PCB shown wired for one 4-20mA output (channel A)



The mA zero or cal option both work in the same manner. Select Option Zero or Option Cal from the menu. For option zero the 903X5 will generate 4mA based on its last zero. With a mA meter connected as indicated in the enclosed diagram use the icon buttons to enter meter reading as displayed. When entered the screen shows 'check' and displays the newly corrected mA output value. You then have the option to abort and go through the process again or continue and return to the 'option' menu selection. The calibration option is exactly the same routine but in this case the 903X5 will generate 20mA based on its last valid zero.

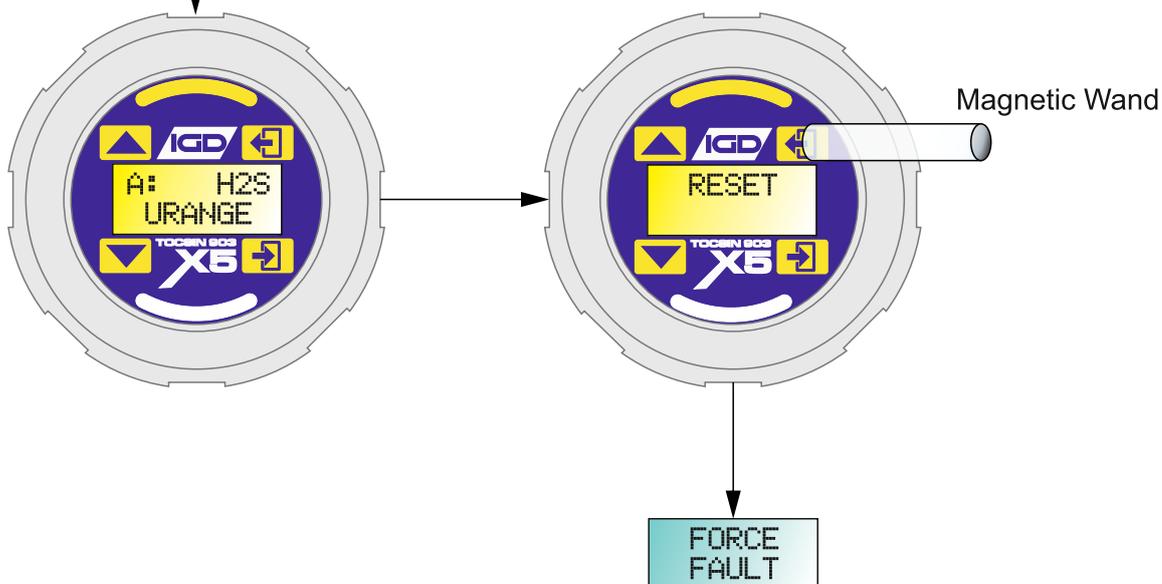
Force Reading



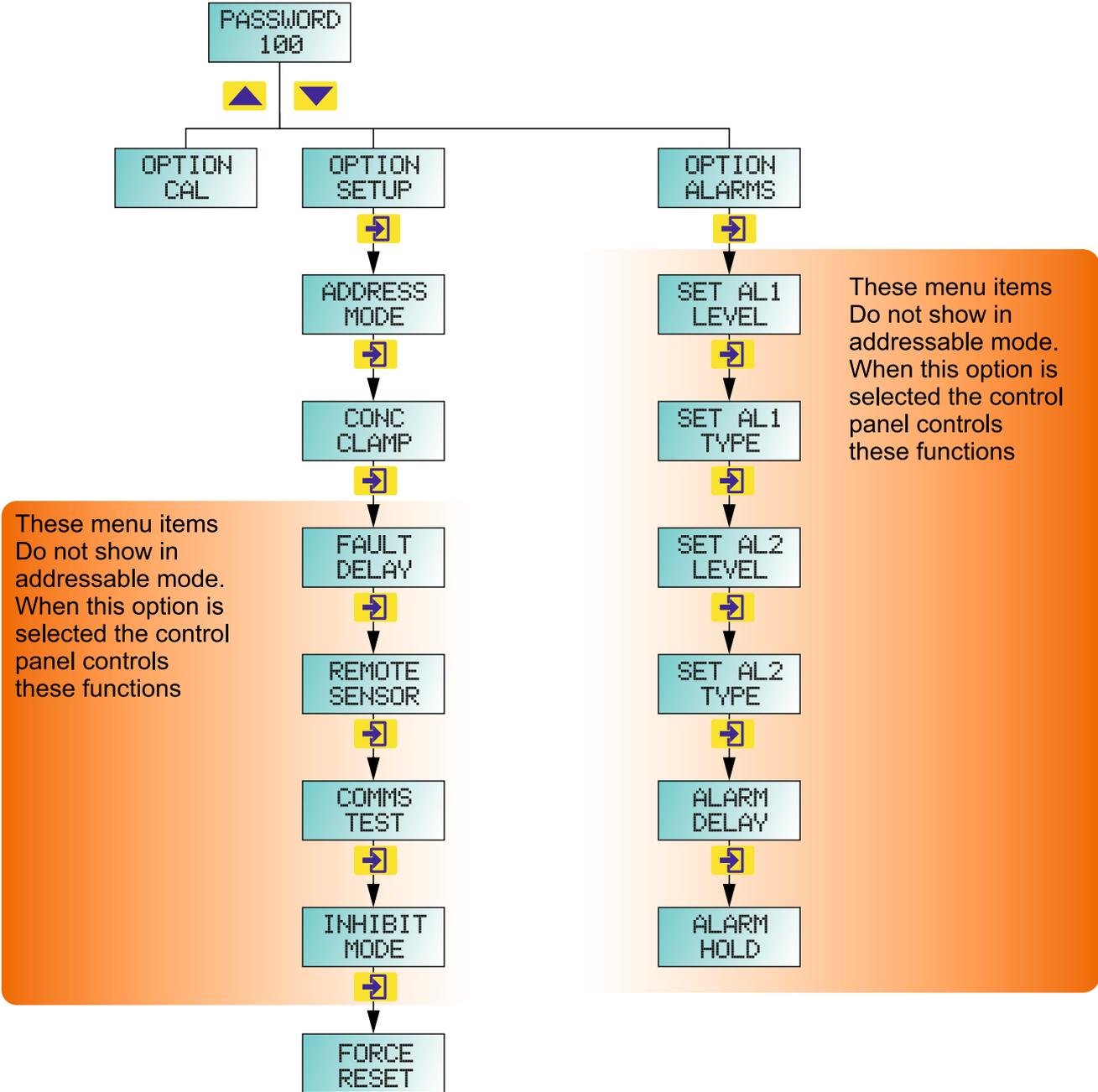


Select either channel A or B

The display now shows the forced under range fault as if it were a real fault. After the fault delay period the 903X5 will go into fault mode as if this were a real fault. Relays, mA outputs and returned addressable readings will all act as if this were a real fault. When satisfied used the exit icon in the normal manner to reset the unit. The display will return to the force fault menu item.



Setup Menu.....Engineer Functions



Setup Menu.....Engineer Functions Alarms

OPTION
ALARMS



Use the up and down icons to navigate up and down menus
Use the enter icon to select a menu option
Use the exit icon to return to a previous stage

Note if address mode is on then the alarm levels and relay actions are controlled from the host controller and the following menu options will not be displayed.

SET AL1
LEVEL

Use these menu options to set the required alarm levels and the alarm actions as either:

SET AL1
TYPE

Alarm on Rising Level, Falling Level, Latching or Non Latching

SET AL2
LEVEL

Note by default levels will be set based on the gas type and range see OIGD193 for details.

SET AL2
TYPE

The 903X5 has to have a valid alarm level set for the first stage alarm. Alarm level 2 is optional. setting alarm level 2 to zero will disable the alarm.

Relay 1 activates on a breach of alarm level 1, relay 2 activates on a breach of alarm level 2.

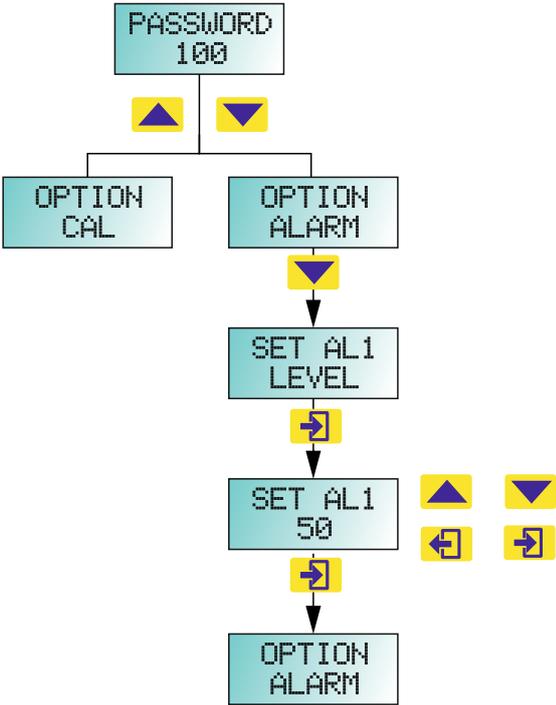
ALARM
DELAY

The alarm delay value sets, in seconds a delay before alarm between 3 to 99 seconds. Default value is 10 seconds

ALARM
HOLD

Alarm hold allows you to enter a value from 0 to 255 seconds. With the value at zero the relay hold function is disabled. With any other setting this value is used to keep an alarm relay active for the set period after a latched or unlatched reset of the alarm.

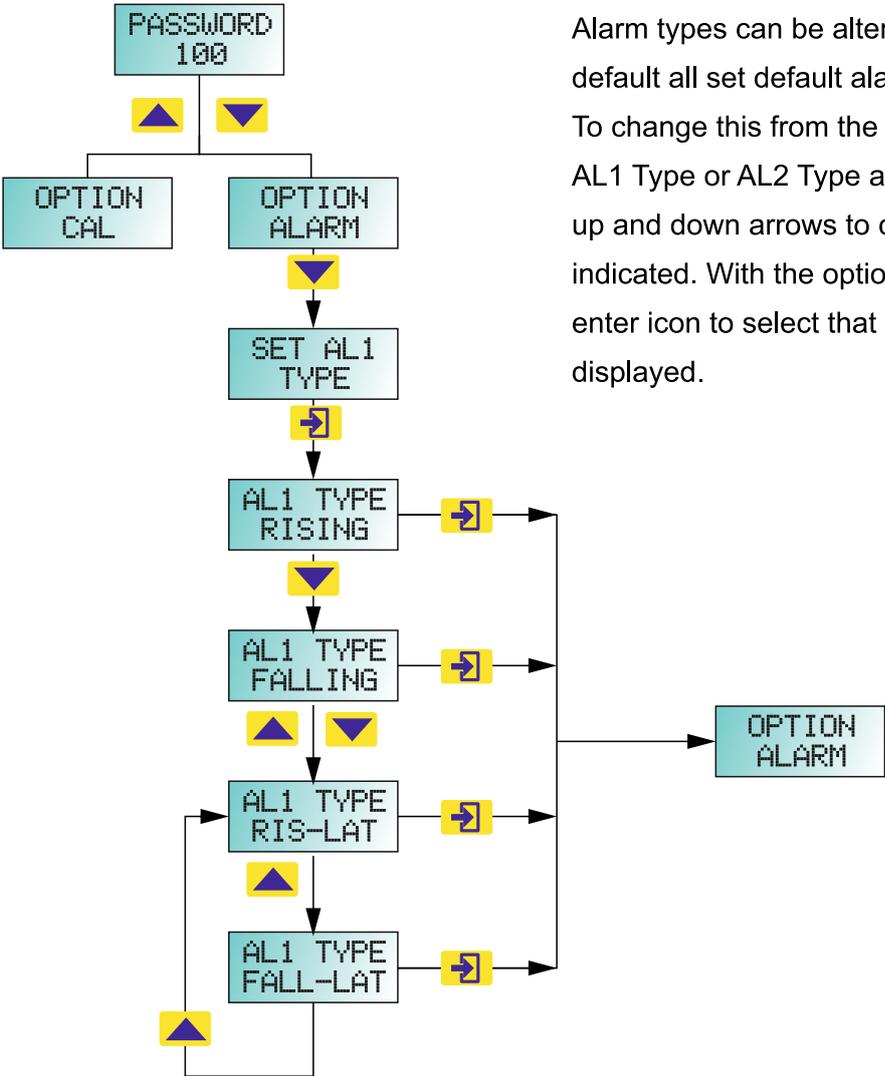
Set Alarm Level 1 or 2



Alarm levels can be adjusted from the default pre-sets. In the option menu select either set AL1 or Set AL2 as desired. The existing alarm level is displayed, note that units are not shown. You will not be able to set an alarm level outside of the detector range. use the data entry method to set the new alarm level and enter. The display returns to the option setup menu.

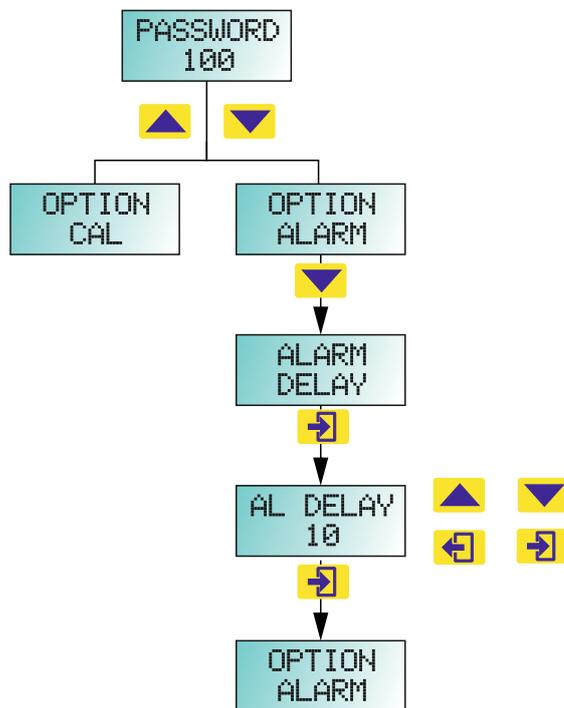
Note that if two detectors are fitted in stand alone mode then the alarm relays operate on either set of detector alarm levels. AL1 levels operate relay 1 and AL2 levels operate relay 2.

Set Alarm Type



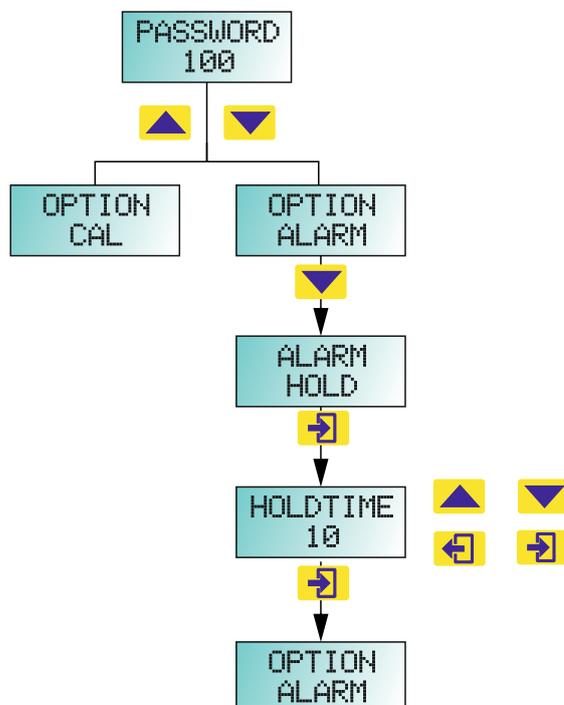
Alarm types can be altered from the system default. By default all set default alarm levels will be latching alarms. To change this from the option menu select either set AL1 Type or AL2 Type as desired. You can then use the up and down arrows to cycle through the options a indicated. With the option required displayed select the enter icon to select that type. The options menu is then displayed.

Set Alarm Delay



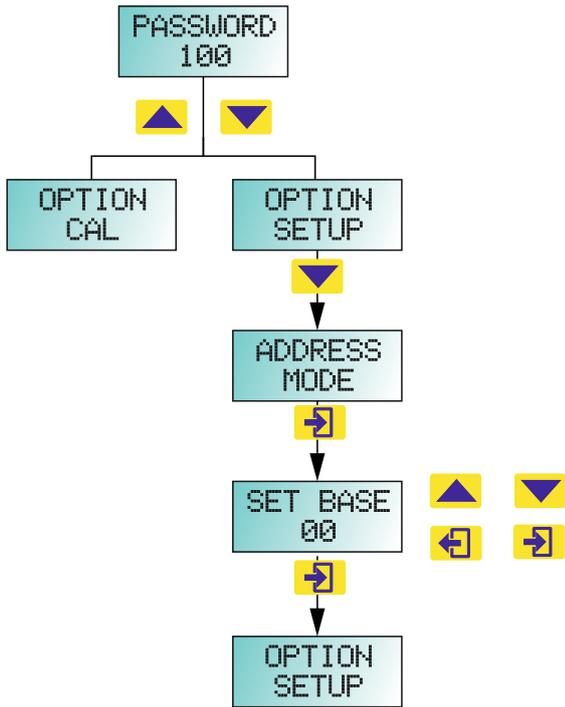
The 903X5 allows you to set an alarm delay of up to 99 seconds. The default value is 10 seconds. This value is the length of time a gas level must be above the set alarm level before the alarm operates. The setting is typically used to allow the 903X5 to ignore short duration gas releases which could cause nuisance alarms or during automatic ventilation control. Long delays should be avoided for safety critical applications. During approval the alarm delay is set at 10s careful consideration should be made before altering this default.

Set Alarm Hold



The 903X5 allows you to set a hold time for alarm relays of up to 255 seconds. In operation when an alarm level resets, either automatically or on user action, the unit then stays in alarm until the hold time period expires. Typically this setting is used in ventilation control to keep vent fans running. For example if non latching alarms are set then these will reset once levels are 10% below the set alarm level. If the alarm level is set at 50, then with the delay set to zero (default) the alarm would reset at 45. If the 903X5 is controlling the event fan it could be desirable that the fan runs for longer to clear down the level. By setting the delay to 100, the fan would then run for another 100 seconds beyond where the normal reset would be.

Address Mode and Setting Addresses



From the setup menu choose address mode. A base address of 0 is displayed. Use the data entry method to enter the required starting address for the 903X5. The following table shows how addresses are allocated from the set base address.

Setting a valid base address puts the 903X5 into addressable mode. In this mode the relays, alarm levels and relay actions are controlled from the host controller, typically a TOC-635, 650 or 750 series.

A base address set to zero puts the 903X5 into stand alone mode with alarm levels, relays, relay actions set from the 903X5.

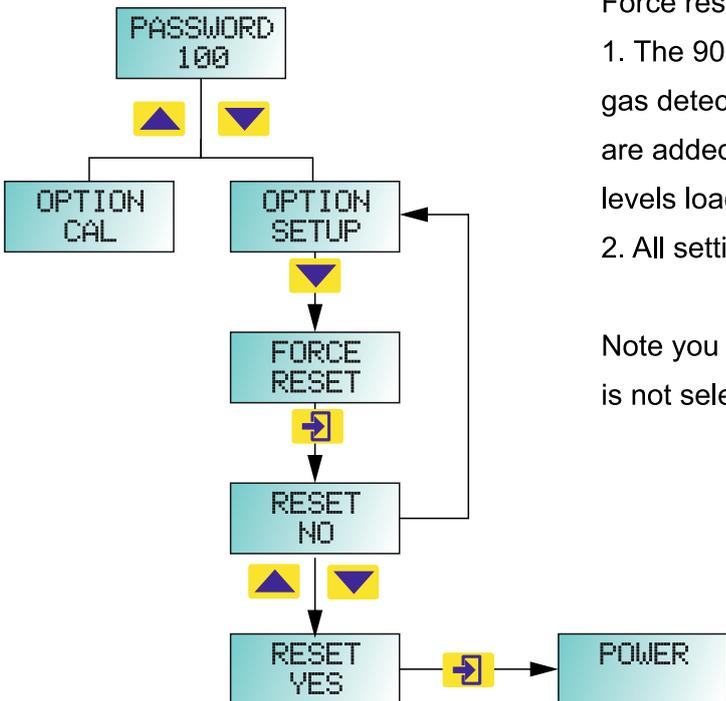
Note that mA outputs continue to operate in both modes.

** The onboard fault relay, by default will act as another alarm relay. If it is required as a fault indication relay in this mode than this must be configured via the connected addressable control panel.

Note when running a FIND from the control panel all three relays will have a default AL2 action unless edited to a different requirement.

Set Base Address 10	
Detector A address =	10
Detector B address (option) =	11
**Fault Relay address =	110
Alarm Relay 1 address =	111
Alarm Relay 2 address =	112

Force Reset



Force reset does two things

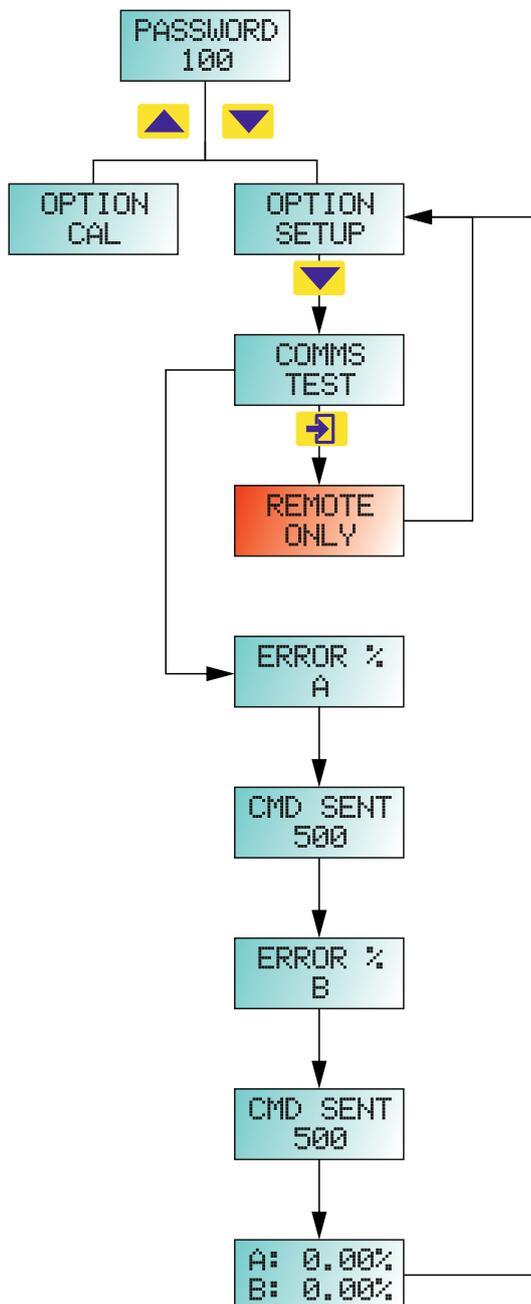
1. The 903X5 restarts and checks its inputs to see what gas detectors are fitted. Once detected the channels are added with ranges, units, gas types and alarm levels loaded from the sensor.
2. All settings on the X5 are returned to default condition.

Note you are asked Reset Yes/No to ensure this option is not selected accidentally

On reset the unit goes back through its power up cycle, setup, stored settings etc and warmup cycle.

Note this also resets the unit to stand alone operation. If an addressable option is required this will have to be set up following the menu options

Communication Test



The comm's or communications test is used to test the quality of serial communication when detectors are connected remotely from the Tocsin 903X5.

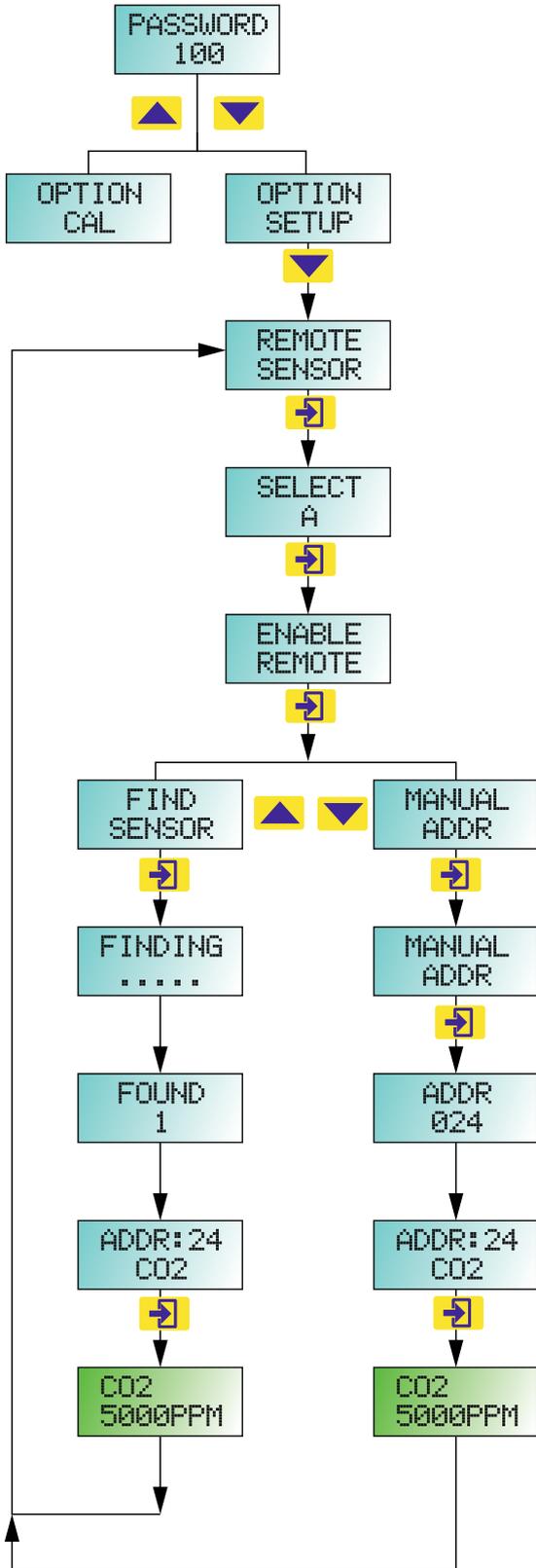
If this option is run with detector(s) in direct connection mode then the error message "REMOTE ONLY" will be displayed.

If one or both detectors are connected in remote mode (see REMOTE SENSOR option): Then the X5 will proceed to test the detectors that have been configured for remote operation.

500 data packets are transmitted to and from each remotely connected detector. Once the test is complete the percentage error rate is displayed.

For a good installation the expected error rate should be less than 0.5%

Remote Sensor



Detectors can either be directly connected to the 903X5 via the X5 motherboard or can be remotely connected on a 2-Wire addressable highway. (See section Remotely Connecting Sensors).

By default the 903X5 will have detectors directly connected to the X5 motherboard.

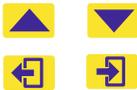
Remotely connected sensors need to have an IGD filter module fitted at the supply side of the 24V DC supply.(See section Remotely Connecting Sensors).

Select remote sensor.

select sensor port A or B to remote.

Select Enable or Disable (note the display shows current setting)

Select to either automatically FIND the sensor or to manually enter the address. IGD recommend letting the 903X5 automatically FIND the sensor.



Either enter the address or let the system FIND the sensor.

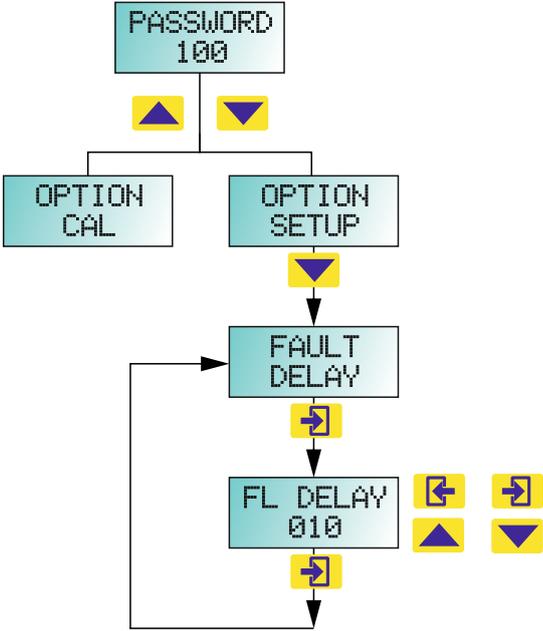
The address and gas type will be displayed.

To confirm communication the gas type and range is displayed with a green background.

The sensor is now added as a remote sensor.

NOTE: remote sensors MUST have a terminator fitted for correct operation.

Fault Delay

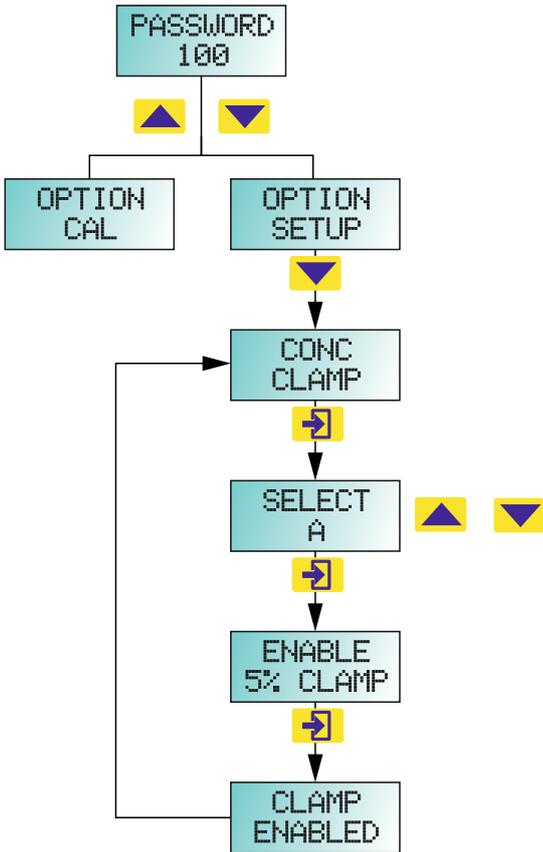


Use this menu item to set the delay period in seconds before the fault relay/indication activates.

This setting allows you to make the system more or less responsive to system faults, particularly comm's errors.

As with alarm relays the delay set means that the fault must be present for longer than the set period for the fault to be displayed.

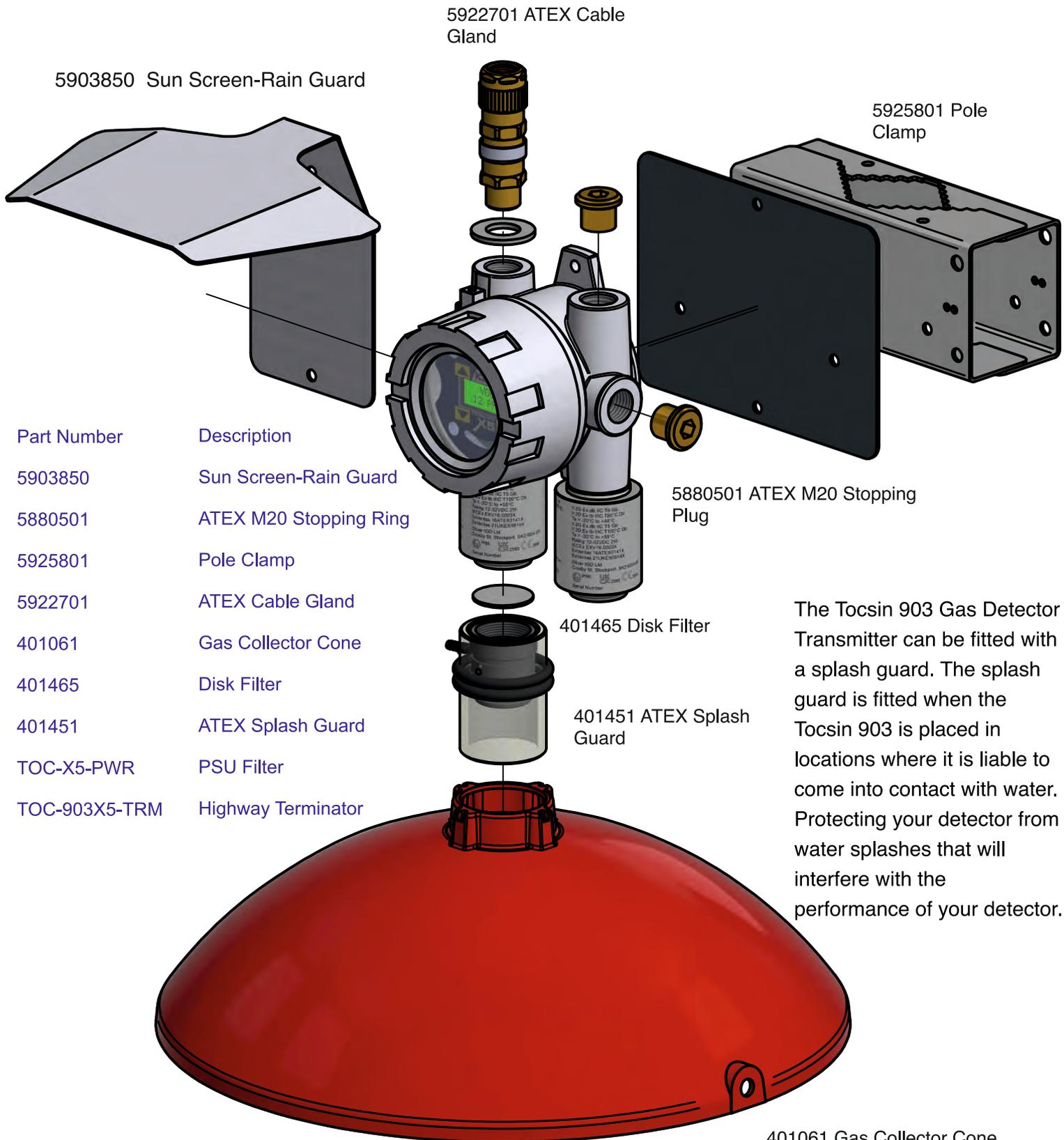
Concentration Clamp



The concentration clamp setting is either on or off for either port A or B.

When selected any reading below 5% of the detectors range will be displayed as zero.

Accessories



Part Number	Description
5903850	Sun Screen-Rain Guard
5880501	ATEX M20 Stopping Ring
5925801	Pole Clamp
5922701	ATEX Cable Gland
401061	Gas Collector Cone
401465	Disk Filter
401451	ATEX Splash Guard
TOC-X5-PWR	PSU Filter
TOC-903X5-TRM	Highway Terminator

5880501 ATEX M20 Stopping Plug

401465 Disk Filter

401451 ATEX Splash Guard

The Tocsin 903 Gas Detector Transmitter can be fitted with a splash guard. The splash guard is fitted when the Tocsin 903 is placed in locations where it is liable to come into contact with water. Protecting your detector from water splashes that will interfere with the performance of your detector.

401061 Gas Collector Cone
Note that the collector cone can only be fitted on 'single' detector versions of the 903X5