zellweger analytics

midas®

OPERATING INSTRUCTIONS

TOXIC, FLAMMABLE
AND OXYGEN GAS DETECTOR

mda scientific

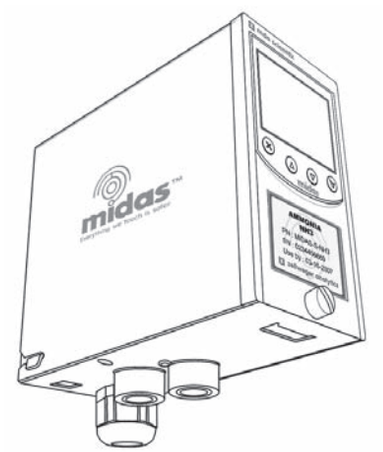
TABLE OF CONTENTS

2 GENERAL DESCRIPTION

The MIDAS® gas detector is an extractive gas sampling system that draws a sample locally or from a remote point to a sensor cartridge that is located inside the detector's chassis. A wide range of toxic, flammable and oxygen gas sensor cartridges are available that enable detection of gases used or generated in the Semiconductor and other manufacturing industries.

MIDAS® is wall mounted and displays gas concentration, alarm, fault and status information via its backlit LCD and LEDs. A simple to use 4-button keypad located under the display provides the facility to set-up, review, operate and make changes to the detector's configuration.

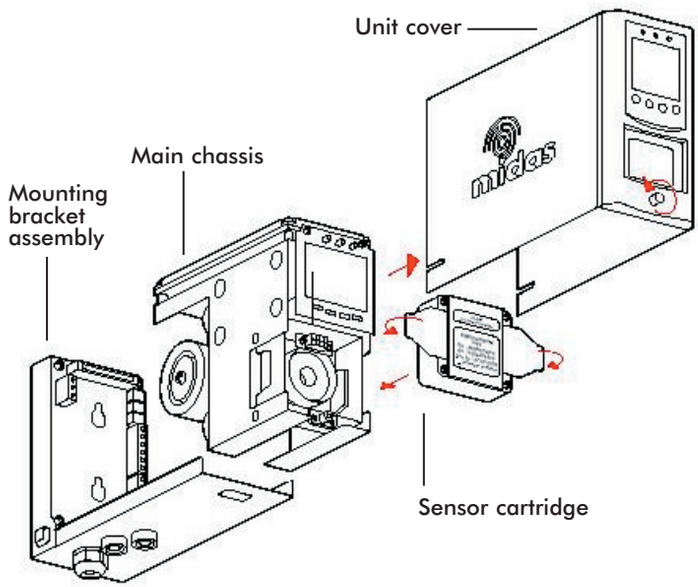
MIDAS® has flexible power and communications capabilities built in as standard. These include 3 on board relays, 0-22 mA analog output, Modbus/TCP outputs for signal and service connectivity as well as the innovative Power over Ethernet (PoE) protocol that enables a single Ethernet connection to be made for all power, control and communication requirements.



3 PRODUCT OVERVIEW

The MIDAS® gas detector comprises of 4 parts: the main chassis, the mounting bracket assembly, the sensor cartridge and the unit cover. Diagram 1 details the MIDAS® general arrangement. Additionally, there is an optional Pyrolyzer module required for the detection of NF_3 and an optional Analog module for the connection of external 4-20 mA devices. Please refer to section 10 and 11 respectively for details of these options.

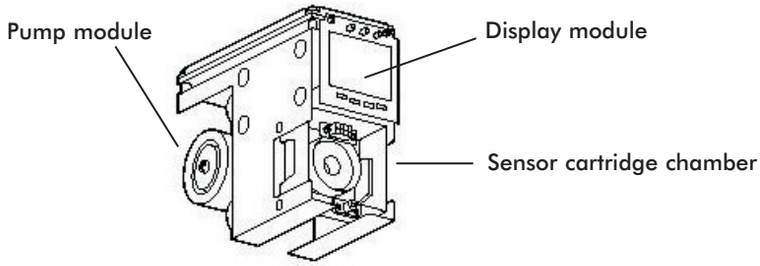
Diagram 1. MIDAS® general arrangement exploded view



3.1 Main Chassis

The main chassis comprises of the display module, pump assembly, and plug in sensor cartridge chamber.

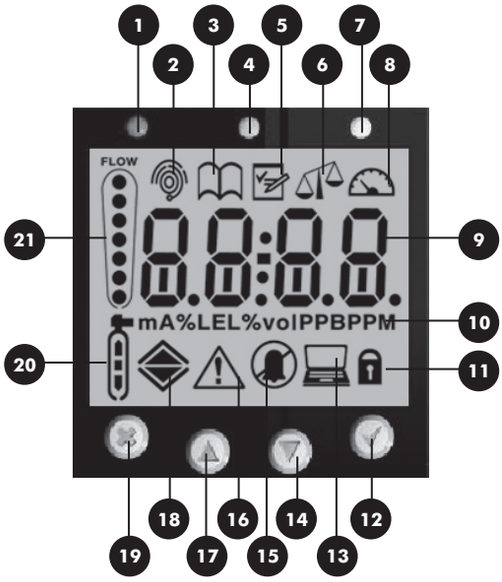
Diagram 2. Main chassis



3.1.1 Display module

The display module is located at the front of the main chassis and consists of a large alphanumerical and graphical backlit LCD, 3 LED indicators and a 4-button keypad. Under normal operation the LCD and LEDs display gas concentration, alarm and system status. In set-up, review, calibration and test modes, the LCD shows the relevant menu options. These menus are simply navigated using the '▲' up, '▼' down, '✓' accept and 'X' cancel buttons.

Diagram 3. MIDAS® display module layout



1. Red alarm LED
2. Normal operation icon
3. Review mode icon
4. Green power LED
5. Set-up mode icon
6. Calibration mode icon
7. Yellow Fault LED
8. Test mode icon
9. Gas concentration and message display area
10. Displayed units
11. Pass code icon
12. Accept button
13. Address icon
14. Network icon
15. Inhibit icon
16. Fault icon
17. Up button
18. Alarm level 1 icon ▲
    Alarm level 2 icon
    (For flammable and toxic)
    O_2 deficiency alarm icon ▼
    O_2 excess alarm icon ▲
19. Cancel button
20. Zero and Span calibration icons
21. Flow indicator

3.1.2 Pump Module

The pump module is located at the back of the main chassis. It draws the gas sample from the inlet port located at the bottom of the mounting bracket assembly via an inline filter to the sensor cartridge chamber located at the front of the main chassis. The sample is then exhausted via the exhaust port located at the bottom of the mounting bracket assembly. The pump and filter assemblies are designed for easy replacement. For replacement details refer to sections 9.2 and 9.4 respectively.

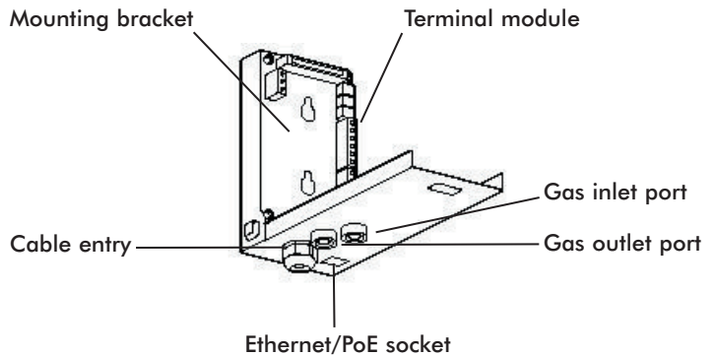
3.1.3 Sensor Cartridge Chamber

The sensor cartridge chamber is located at the front of the main chassis below the display module. The plug in sensor cartridge is fitted into this area which makes the electrical connection between the sensor cartridge and the rest of the electronics as well as providing the chamber where the sensor cartridge is exposed to the sampled gas. For details of fitting sensor cartridge refer to section 5.9.

3.2 Mounting Bracket Assembly

The mounting bracket assembly comprises of the detector mounting bracket, the terminal module, the gas sample inlet and outlet ports, the cable/conduit entry and Ethernet communications socket.

Diagram 4. Mounting bracket assembly



3.2.1 Mounting Bracket

The metal mounting bracket has two slots that allow the detector to be easily mounted to a wall using two suitable screw fixings. For further details of mounting the detector refer to section 5.

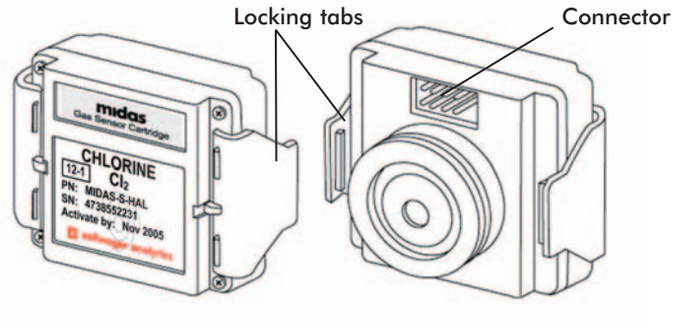
3.2.2 Terminal Module

The terminal module is located on the mounting bracket. All electrical connections to MIDAS® are made via this module. Wire entry to the terminal module area is via the PG16 cable entry/conduit entry located at the bottom of the mounting bracket assembly.

3.3 Sensor Cartridge

A wide range of toxic, flammable or oxygen sensor cartridges can be fitted to MIDAS®. The plug in sensor cartridges are fitted in the sensor cartridge chamber at the front of the main chassis. To access the chamber the unit cover is removed by unscrewing the thumbscrew located at the front of the detector. The pre calibrated smart sensor cartridges can easily be fitted or replaced as they simply plug into the detector without the need for any tools. The sensor cartridge is firmly held in place by two locking tabs.

Diagram 5. Sensor cartridge



3.3.1 Biased Sensor Cartridges

Some sensor cartridges are shipped with a battery powered electrical supply in order to keep the cell effectively 'warmed up' and ready to monitor once installed in the MIDAS® unit. Bias cells are supplied for TEOS, NO and O_3. The bias circuit is removed just before insertion into the MIDAS® system and the sensor cartridge is thus ready for effective gas detection.

Should a bias voltage not be applied (e.g. during a power failure) then the cell will take a longer time to recover before effective gas detection can take place. The longer the loss of applied power, the longer the recovery time. Refer to the relevant sensor cartridge data sheet for information on each sensor cartridge.

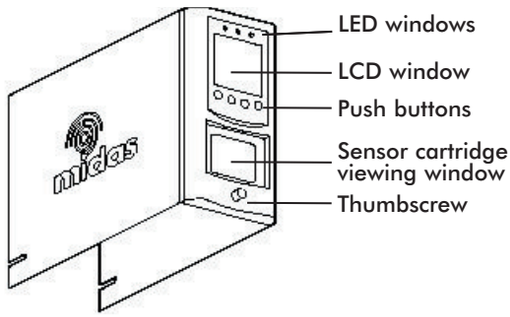
In order to avoid the risk of loss of gas detection due to unforeseen power loss, we recommend that a power management solution such as uninterruptible power supplies, battery back ups etc. are used.

NOTE: Sensor warranty is void if the sensor cartridge is opened by unauthorized user.

3.4 Cover

The cover provides environmental protection and fits over the top, front and sides of the main chassis. The front panel has viewing windows for the LCD, LEDs and sensor cartridge fitted in the sensor cartridge chamber. Underneath the LCD window are the 4 push buttons used for navigating the detector's software menus. The cover is easily removed to allow access to the chassis by unscrewing the thumbscrew on the front panel and pulling the cover forwards off the main chassis.

Diagram 6. MIDAS® cover



4 DEFAULT CONFIGURATION

As standard, the MIDAS® gas detector is factory configured as below:

Table 1. MIDAS® default configuration

Current source with:	0 mA	Fault (open circuit)	
	1.0 mA	Fault	
	3.0 mA	Maintenance Fault	
	4.0 to 20.0 mA	Gas reading (normal operation)	
	2.0 mA	Inhibit (test mode)	
	21.0 mA	Over range	
	Toxic Gas	Flammable Gas	Oxygen
Full Scale (FS)	Typically 4 x Toxic Threshold Limit (TLV)	100% Lower Explosive Limit (LEL) [1]	25% Volume (v/v)
Lowest Alarm Level (LAL)	Typically 1/2 TLV	10% LEL	5% v/v
Lower Detectable Limit (LDL)	Typically 0.4 TLV	9% LEL	0% v/v
	The LDL is the minimum level that is reliably distinguishable from zero.		
Alarm Relay 1	Alarm level 1 of 1/2 TLV	10% LEL	23.5% v/v (Rising)
	Normally de-energized, energizes on alarm. Contact Normally Open (NO), closes on alarm.		
Alarm Relay 2	Alarm level 2 of TLV	20% LEL	19.5% v/v (Falling)
	Normally de-energized, energizes on alarm. Contact Normally Open (NO), closes on alarm.		
Fault Relay	Normally energized, de-energizes on fault. Contact Normally Open (NO).		
Latching	Non latching. Alarm and fault relays automatically reset when reading falls below alarm thresholds or fault clears.		
Pass code	No pass code set.		

[1] MIDAS® detectors are not ETL approved for monitoring in or sampling from classified areas above 25% LEL

5 INSTALLATION

For ease of installation MIDAS® has been designed to allow the installation of the mounting bracket assembly and terminal module separately from the other parts of the detector. The detector location and hard wiring can therefore be completed before fitting the detector's main chassis and sensor cartridge.

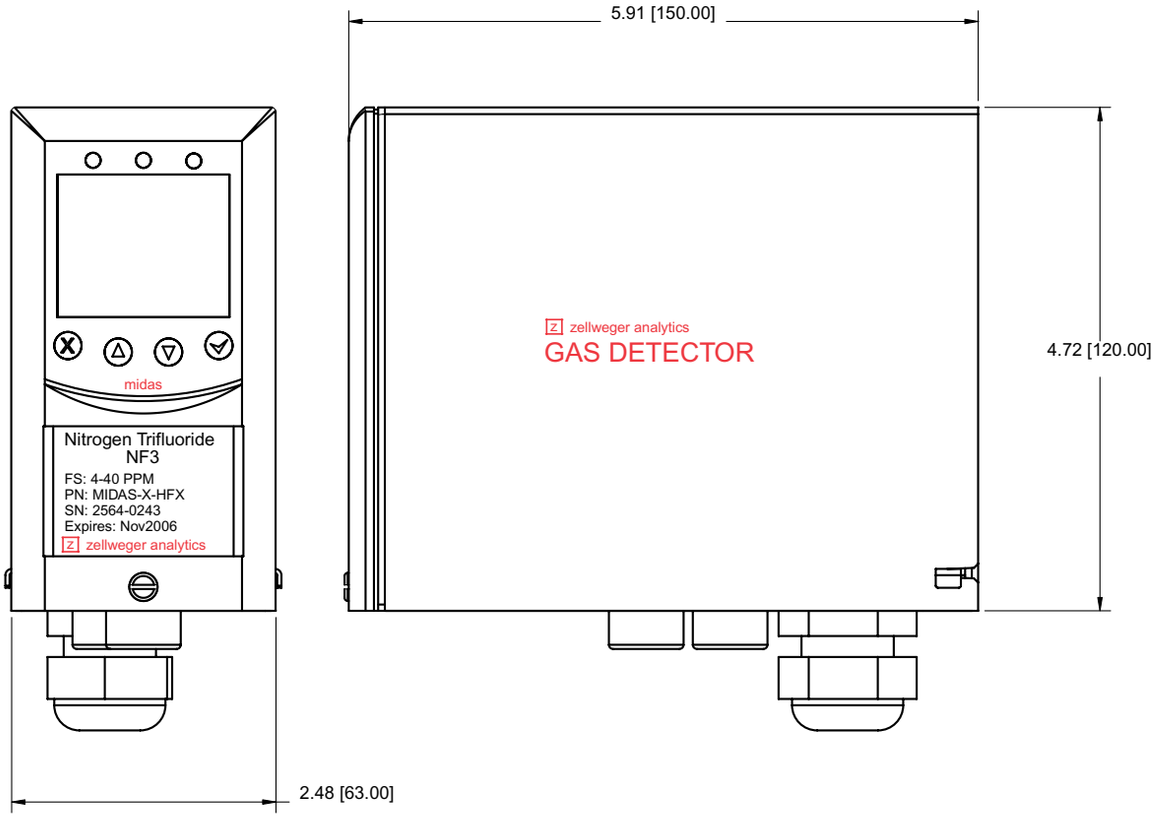
WARNING

MIDAS® is designed for installation and use in indoor safe area non-explosive atmospheres. Installation must be in accordance with the recognised standards of the appropriate authority in the country concerned. Prior to carrying out any installation ensure local regulations and site procedures are followed.

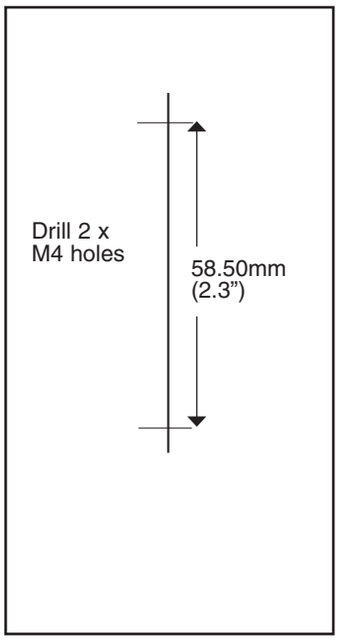
5.1 Mounting and Location of Detector

The MIDAS® gas detector has an integral mounting bracket assembly that is easily mounted to a suitable vertical surface such as a wall, tool housing, mounting plate on a pole etc.

Diagram 7. MIDAS® outline dimensions



Drill Template



Below are some considerations when installing the MIDAS® Gas Detector:

1. Mount the detector on a surface that is flat, firm and suitable for its size and weight.
2. Use the drill template supplied to drill the holes for the fixings.
3. Use fixings appropriate for the surface being mounted to.
4. Ensure the head size of fixings used will not snag the terminal PCB.
5. Consider the conduit/cable weight and its stress on the installation.
6. Position the detector so that it can be easily accessed.
7. Position the detector so that it is at a suitable height (normally eye level) for the display to be clearly seen.
8. Take into consideration the space required to remove the detector's cover and locking/unlocking the sensor cartridge locking clips.
9. Take into consideration the space required for sample inlet and exhaust tubing (for remote monitoring), and for the inlet filter (for local monitoring).
10. Take into consideration the space required for cable or conduit access.

5.2 Mechanical Installation

The following steps and diagrams show how to separate the mounting bracket assembly from the main chassis and mount it on a vertical flat surface.

1. Unscrew the thumbscrew located on the front panel.
2. Remove the cover by pulling it forwards off the main chassis.
3. Unscrew the two retaining screws located at the bottom front of the chassis.
4. Holding the mounting bracket assembly with one hand use the other to carefully pull the main chassis forwards to disconnect it from the mounting bracket assembly.
5. Using the drill template provided drill two holes 58.50 mm vertically apart for 2 x round head M4 fixing screws.
6. Partially screw the fixings into the mounting surface.
7. Place the mounting bracket assembly over the screws so they pass through the mounting holes and then slide down to locate in the slots.
8. Tighten the screws to secure the mounting bracket assembly.

Diagram 8. Mechanical installation

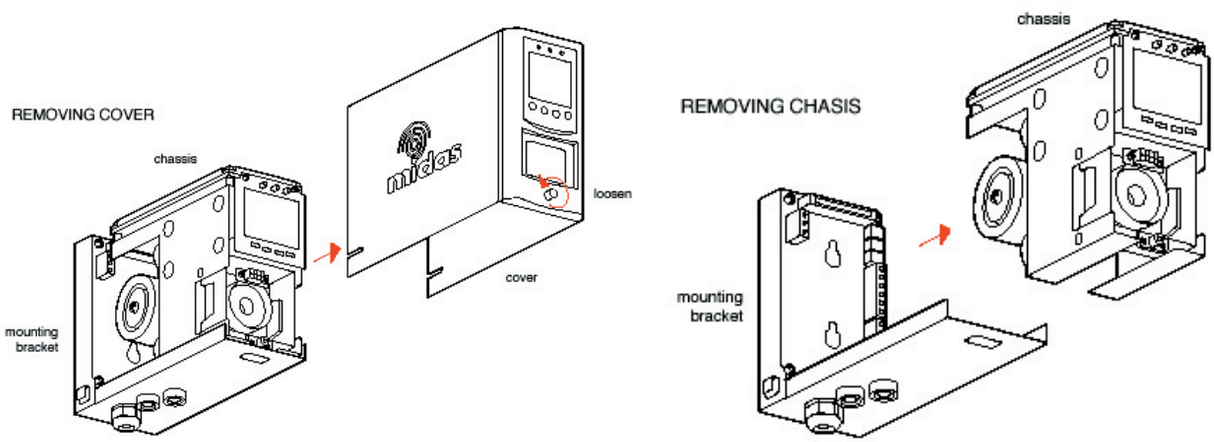
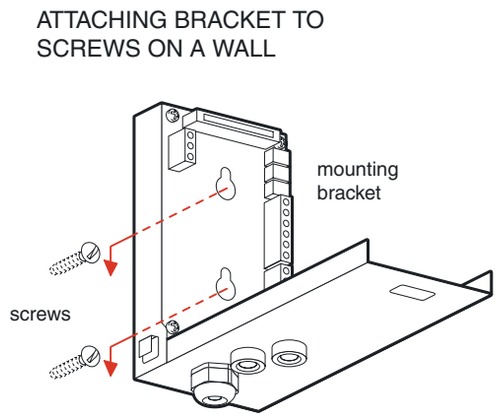


Diagram 8. Mechanical installation



5.3 Sample and exhaust tubing calculations

The following tables show the flow rate, tubing length, transport time, and maximum pressure and vacuum at the inlet and exhaust points.

Table 2. Inlet sample specifications

Inlet Sample Specifications:				
	Maximum			
Tubing Length, m (ft)	30 (100)	20 (66)	10 (33)	0
Transport Time (sec)	28	19	10	1
Sample Point Vacuum (Negative pressure)	-25.4 cm H_2O (-10 in H_2O) Maximum			
Flow rate, cc/min.	500 (Flow is constant) [1]			
Tubing OD, mm (in)	6.35 (0.25)			
Tubing ID, mm (in)	3.18 (0.125)			

[1] NOTE: The flow rate is electronically maintained at 500 cc/min

Table 3. Outlet sample specifications

Outlet Sample Specifications:				
	Maximum			
Tubing Length, m (ft)	30 (100)	20 (66)	10 (33)	0
Back Pressure at Exhaust Point (Excluding tubing)	20.3 cm H_2O (8 in H_2O) Maximum			
Tubing OD, mm (in)	6.35 (0.25)			

5.4 In-line filters

External filters must be used to protect the tubing from contamination. Use particulate filter part number 0780248 for normal gases and 1830-0055 for corrosive gases. Replace the filter every 3 months. Refer to the table below for specific gases.

Table 4. In-line filter recommendations

Target Gas	Recommended maximum sample line (m)	End of line particulate filter (P/N 0780248)	End of line particulate Teflon filter (1830-0055)
Ammonia	10	YES	**
Arsine	30	YES	**
Boron Trichloride	5*	NO	YES
Boron Trifluoride	5*	NO	YES
Bromine	10	NO	YES
Carbon Dioxide	30	YES	**
Carbon Monoxide	30	YES	**
Chlorine	10	NO	YES
Chlorine Dioxide	10	NO	YES
Chlorine Trifluoride	5*	NO	YES
Diborane	30	YES	**
Dichlorosilane	5*	NO	YES
Disilane	10	YES	**
Fluorine	10	NO	YES
Germane	30	YES	**
Hydrogen (% LEL)	30	YES	**
Hydrogen (ppm)	30	YES	**
Hydrogen Bromide	5*	NO	YES
Hydrogen Chloride	5*	NO	YES
Hydrogen Cyanide	10	YES	**
Hydrogen Fluoride	5*	NO	YES
Hydrogen Selenide	30	YES	**
Hydrogen Sulfide	30	YES	**
Methane (% LEL)	30	YES	**
Nitrogen Dioxide	30	NO	YES
Nitrogen Oxide	30	YES	**
Nitrogen Trifluoride	30	YES	**
Oxygen Proficiency & Deficiency	30	YES	**
Ozone	5	NO	YES
Phosphine	30	YES	**
Phosphorous Oxychloride	5*	NO	YES

Table 4. In-line filter recommendations (cont.)

Target Gas	Recommended maximum sample line (m)	End of line particulate filter (P/N 0780248)	End of line particulate Teflon filter (1830-0055)
Silane	30	YES	**
Silane (low level)	30	YES	**
Sulfur Dioxide	30	NO	YES
Sulfur Tetrafluoride	5*	NO	YES
Tetra Ethyl Ortho Silicate	30	YES	**
Tungsten Hexafluoride	5*	NO	YES

* Recommend to keep the sample lines as short as possible where the RH condition at the sample point is high (above <50%RH); there will be some sample loss due to absorption onto the sample line.

** These gases can use either filter.

5.5 Local Detector Option

The MIDAS® gas detector can also be used to monitor for gas at the location of the detector. To do this an inline filter is simply connected to the sensor cartridge gas inlet port. The external dust filter part number is 780248 for normal gases and 1830-0055 for corrosive gases. The area around the detector is then being monitored as opposed to a sample being drawn from a remote location.

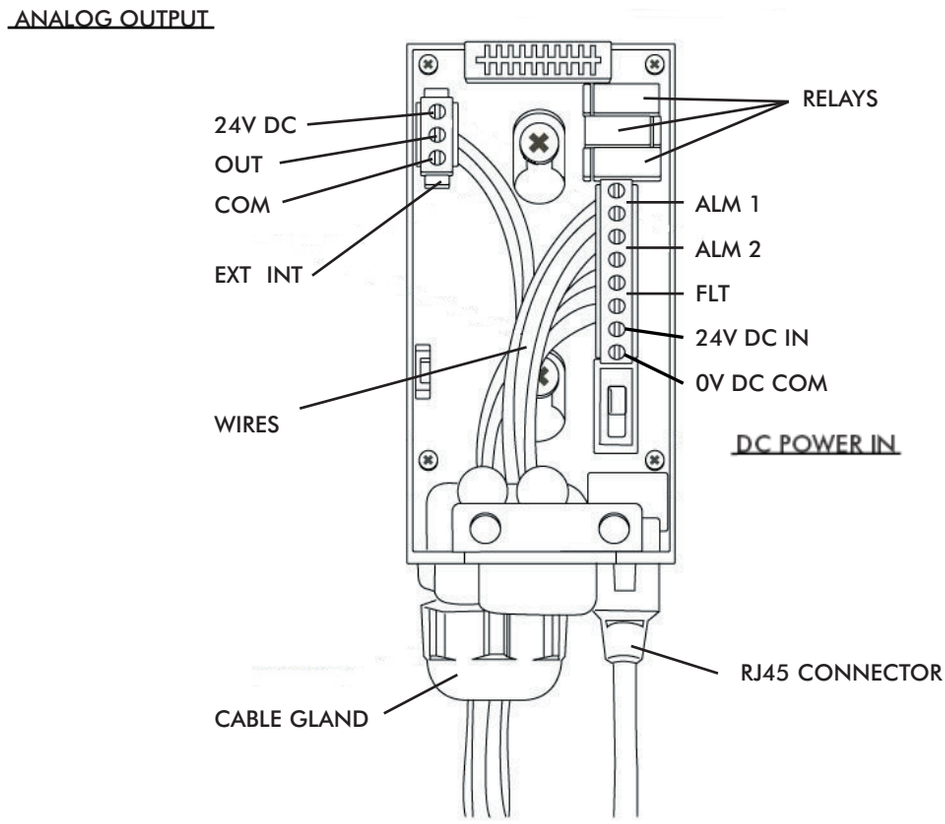
Diagram 9. Local gas detector option

MIDAS-T-001 transmitter installed with in line particulate filter for local ambient monitoring mode

5.6 Electrical Installation

Access for the electrical wires to the terminal module is made via the PG16 cable gland located at the bottom of the mounting bracket assembly. The cable gland can be removed and replaced with a suitable conduit fitting if required. The wire routing of a typical installation is shown in the diagram below.

Diagram 10. Typical wire routing



The terminals used are suitable for conductors of 24 to 14 AWG (0.5 to 1.8mm Dia.). The use of 16 AWG (1.5 mm Dia.) conductors is recommended.

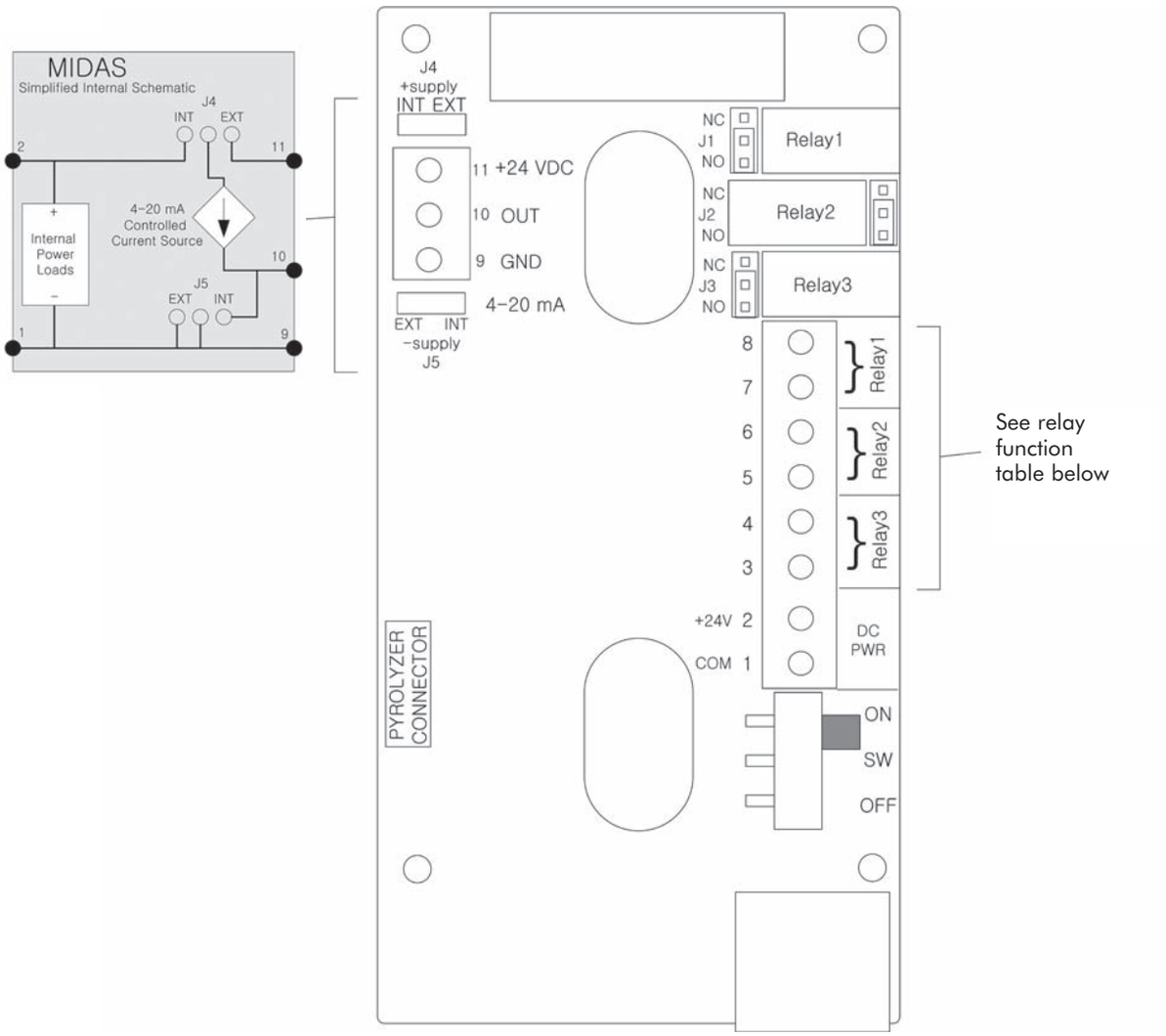
NOTE: When powered by Power over Ethernet (PoE) the 3 on board relays do not require separate 24 VDC to be energized

If Power over Ethernet (PoE) is used to power the device, then 24 VDC power must not also be connected to the device, (or conversely if 24 VDC is used to power the MIDAS®, then electrical power via the Ethernet port must not be applied). Failure to observe this requirement may cause damage to the gas detection system and will not be covered by the standard warranty.

When connecting the wires ensure that the power switch is in the off position.

Diagram 11 shows the terminal module layout and terminal identification as well as the jumper locations. Diagnostic LED lamps are positioned on the internal main chassis for ease of viewing. These indicate that Ethernet communication activity is active. In some versions of MIDAS® the rear mounted Power over Ethernet port has two LED status lamps; note that these are not utilized and do not illuminate.

Diagram 11. MIDAS® terminal layout and identification



NOTE: EARTHING REQUIREMENTS

If the MIDAS® unit metal chassis is not connected directly to a metal surface for earthing purposes, an additional earth wire will be required. Connect a wire via the PG16 gland to the dedicated earth tag (screw terminal) located on the bottom bracket and connect the other end of the wire to a dedicated external earthing point.

If Power over Ethernet (PoE) power supply is being used, shielded CAT5 ethernet cable is recommended.

Please ensure that your wiring avoids earth ground loops that may affect the performance of your equipment.

Display	Description	Relay 1	Relay 2	Relay 3
1FLt	Instrument Fault Only	Alarm 1	Alarm 2	Instrument Fault
2Flt	Separate Fault Relays	Any Alarm	Maintenance Fault	Instrument Fault
CmbF	Combined Fault Relay	Alarm 1	Alarm 2	Any Fault

5.7 Electrical Connections

MIDAS® can be powered by either 24 VDC via traditional discrete wiring or by approximately 48 VDC delivered through the Ethernet cable from a PoE source. In either case the 4-20 mA analog output can be used. This can be configured for sinking, sourcing or isolated operation. Below are some schematic diagrams of typical electrical connection configurations.

NOTE:

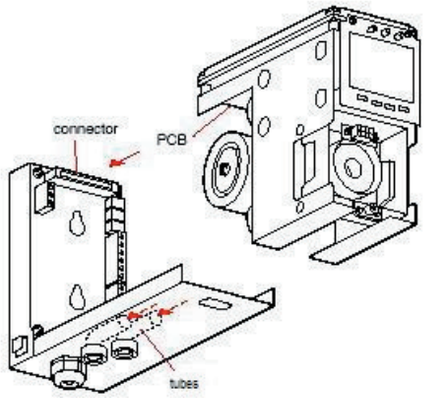
See Zellweger Analytics Technical Note 1998-0587 for proper wiring instructions. This Technical Note is available at www.zelana.net or by contacting your local ZA representative.

5.8 Refitting the Main Chassis

The main chassis can be refitted to the mounting bracket assembly using the following steps.

1. Align the PCB at the top rear of the main chassis with the connector located at the top of the mounting bracket assembly
2. At the same time align the two tubes at the bottom rear of the main chassis with the two tubes located on the bottom of the mounting bracket assembly.
3. Slide the chassis backwards on the mounting bracket assembly so that the PCB and connector and tubes engage simultaneously. (See diagram below).
4. Ensure the PCB, connector and tubes are fully engaged by firmly pushing the main chassis horizontally backwards on the mounting bracket assembly
   (WARNING: DO NOT PUSH ON THE LCD AS THIS MAY CAUSE DAMAGE).
5. Align the two fixing screws located at the bottom of the chassis with the screw threads on the mounting bracket assembly.
6. Tighten the screws to secure the chassis to the mounting bracket assembly.

Diagram 19. Refitti

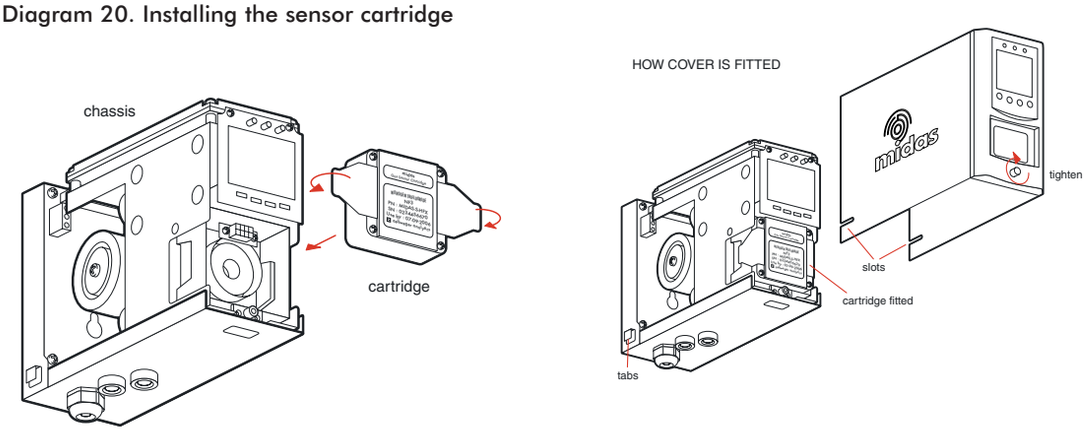


5.9 Installing the Sensor Cartridge

The MIDAS® sensor cartridge is supplied separately and needs to be fitted to the detector's main chassis. The following steps and diagrams detail the procedure for installing the sensor cartridge for the first time. This procedure is carried out with the power off and the detector cover removed.

1. Remove sensor cartridge from packaging
2. Check the part number and type of sensor cartridge is correct.
3. Check the activate by date.
4. Align the pins at the top of the sensor cartridge with the socket in the sensor cartridge chamber.
5. Carefully push the sensor cartridge into the sensor cartridge chamber until fully home.
6. Lock the sensor cartridge in place using the tabs either side of the sensor cartridge to lock the sensor cartridge to the main chassis.
7. Switch the power switch located on the terminal module to the 'on' position.
8. Refit the detector's cover by aligning the slots either side with the locating tabs on the mounting bracket assembly.
9. Push the cover horizontally until home.
10. Tighten the thumbscrew located on the front panel.

Diagram 20. Installing the sensor cartridge



6 DETECTOR START UP PROCEDURES

WARNING

Prior to carrying out any work ensure local and site procedures are followed. Ensure that the associated control panel is inhibited so as to prevent false alarms.

The following procedure should be followed carefully and only performed by suitably trained personnel.

1. Ensure the detector is wired correctly according to sections 5.6 and 5.7.
2. Ensure that the correct sensor cartridge is fitted. (If the cartridge has not been stored at room temperature, allow one hour for equilibration.)
3. Ensure the on/off switch on the mounting bracket assembly is in the on position.
4. Apply power to the system.
5. After the start up routine the detector will display normal operating mode as shown in section 7.
6. If using a multi gas sensor cartridge refer to section 8.2.2 to ensure the correct gas id code is selected.
7. Allow the detector to stabilize using the table over to determine the maximum sensor cartridge warm up time.

Table 5. Sensor cartridge warm up times

Sensor Cartridge Family	Sensor Cartridge Part No.	Gas Name	Maximum Warm-up Time (minute)
Ammonia	MIDAS-S-NH3	Ammonia	10
Hydrides	MIDAS-S-ASH	Arsine	20
	MIDAS-S-HYD	Diborane, Germane	20
	MIDAS-S-PH3	Phosphine	20
	MIDAS-S-SHX	Silane (20 ppm), Disilane	20
	MIDAS-S-SHL	Silane (2 ppm)	20
	MIDAS-S-HSE	Hydrogen Selenide	20
Mineral Acid (HF)	MIDAS-S-HFX	Hydrogen Fluoride, Boron Trifluoride, Nitrogen Trifluoride, Tungsten Hexafluoride	20
	MIDAS-S-SF4	Sulfur Tetrafluoride, Chlorine Trifluoride	20
Mineral Acid (HCl)	MIDAS-S-HCL	Hydrogen Chloride, Boron Trichloride, Dichlorosilane, Hydrogen Bromide	20
	MIDAS-S-POC	Phosphorous Oxychloride	20
Halogens	MIDAS-S-HAL	Chlorine, Fluorine	10
	MIDAS-S-BR2	Bromine, Chlorine Dioxide	20
Carbon Dioxide	MIDAS-S-CO2	Carbon Dioxide	20
Carbon Monoxide	MIDAS-S-COX	Carbon Monoxide	10
Hydrogen	MIDAS-S-H2X	Hydrogen	10
Hydrogen Cyanide	MIDAS-S-HCN	Hydrogen Cyanide	10
Hydrogen Sulfide	MIDAS-S-H2S	Hydrogen Sulfide	10
Nitric Oxide	MIDAS-S-NOX	Nitric Oxide	10
Nitrogen Dioxide	MIDAS-S-NO2	Nitrogen Dioxide	10
Oxygen	MIDAS-S-O2X	Oxygen	30
Ozone	MIDAS-S-O3X	Ozone	10
Sulfur Dioxide	MIDAS-S-SO2	Sulfur Dioxide	10
TEOS	MIDAS-S-TEO	TEOS	10
Flammables	MIDAS-S-LEL	Hydrogen, Methane	30

7 GENERAL OPERATION

After applying power to the detector, the display will go through a start up test routine illuminating in sequence all the LEDs, icons and digits of the display. The display will show the message 'WAIT' and 'LOAD' as it checks for cartridge data. It will then display the message 'WARM' until the sensor cartridge to reaches operating temperature. When complete the detector will enter normal monitoring mode indicated by the ' ' icon on the display cycling through three states (2 rings, 3 rings, 4 rings). The measured gas concentration will be shown on the display and transmitted on the 4-20 mA output. The green LED will flash once every second indicating power and the sample flow rate indicator will be displayed. If monitoring is interrupted due to a fault, a test or calibration process or a user requested inhibit, the ' ' icon will flash. For details of fault and maintenance fault codes refer to section 12.

Final Start Up Routine Screen

Normal Operation

7.1 Normal Operation Mode

In this mode the detector displays gas concentration, alarm, fault and status information via its backlit LCD and front panel LEDs. Typical normal operation display and output states are shown below. See Section 12 for a full list of fault codes.

NOTE: The examples below are for a linear 4-20 mA output over a full scale range of 2 ppm. The current output for a given gas concentration will be different for other full scale ranges (linear 4 mA = 0 % full scale to 20 mA = 100 % full scale).

See section 12 for a full list of fault codes.

Table 6. Normal operation display and output states.

Operational State	Relay status	4-20 mA output (for 2ppm range)	LEDs	Display*
Normal operation	Alarm relay 1 de-activated Alarm relay 2 de-activated Fault relay activated	4 mA	Green slow flash	
Alarm 1	Alarm relay 1 activated Alarm relay 2 de-activated Fault relay activated	6 mA	Green slow flash Red on	

Table 6. Normal operation display and output states. (cont.)

Operational State	Relay status	4-20 mA output (for 2ppm range)	LEDs	Display*
Alarm 2	Alarm relay 1 de-activated Alarm relay 2 activated Fault relay activated	8 mA	Green slow flash Red fast flash	
Greater than full scale	Alarm relay 1 activated Alarm relay 2 activated Fault relay activated	21 mA	Green slow flash Red fast flash	
Inhibit	Alarm relay 1 de-activated Alarm relay 2 de-activated Fault relay activated	2 mA	Green slow flash	
Low flow rate	Alarm relay 1 de-activated Alarm relay 2 de-activated Fault relay activated	3 mA	Green slow flash Yellow on	
Low flow fault	Alarm relay 1 de-activated Alarm relay 2 de-activated Fault relay de-activated	1.0 mA	Green slow flash Yellow fast flash	

7.1.1 Resetting Alarms, Faults and Maintenance Faults

The alarm relay function of MIDAS® can be set to latching (see set-up mode) so that when an alarm occurs the associated relay remains activated even if the gas reading has dropped below the alarm level. To reset the latched alarm relay press the 'X' cancel button for 2 seconds. If the gas level is still above the alarm point you can reset the associated relay but it will activate again after the elapse of any alarm on delay that has been set.

The fault relay function can also be set to latching. It can be reset by pressing the 'X' cancel button only if the fault condition has cleared. The fault relay cannot be reset if the fault condition is still present.

The maintenance faults that are displayed on the LCD follow the latching or non-latching function set for the fault relay. If the fault relay operation is set to non-latching, the display will automatically clear a maintenance fault message when the maintenance fault condition is cleared. If set to latching the maintenance fault message can be cleared by pressing the 'X' cancel button only if the maintenance fault condition has cleared.

7.2 Review Mode 🕮

The detector settings can be reviewed safely without the possibility to make changes by using review mode. To select review mode press the '▲' up or '▼' down button once. The review mode icon '🕮' will show on the display and the first review mode menu icon is displayed.

7.2.1 Review Mode Menu Overview

The menu is simply navigated by using the '▲' up and '▼' down buttons to select the required menu, and then using the '✓' accept button to enter that submenu and scroll through to view the settings. The 'X' cancel button can be used to exit the submenu and allow selection of a different submenu, or can be pressed again to exit to normal operating mode. When in review mode the unit will automatically return to the main normal operation status display if either an alarm level is exceeded or no button is pressed for 60 seconds.

The table below shows an overview of the different review menus and how they are navigated. For a detailed step-by-step instruction of how to review the detector setting in review mode refer to section 8.1.

Table 7. Review menu overview.

Review Submenu	OK	⇨	OK	⇨	OK	⇨	OK	⇨	OK	⇨	OK	
Software SW	✓	Displays software revision	✓	Displays software checksum	✓	Press ▲ or ▼ to select next menu or X to exit						
Alarms	✓	Displays sensor cartridge ID (X) and gas ID code (Y) in format (X -Y)	✓	Level 1 (L1) rising (U) or falling (d) alarm type followed by set point then same for level (L2) alarm	✓	Alarm time delay (secs)	✓	Alarm relays latching (L) or non latching (nL)	✓	Alarm relays normally energized (nE) or normally de-energized (nd)	✓	Press ▲ or ▼ to select next menu or X to exit
Faults	✓	Fault relay configuration	✓	Fault relay latching (L) or non latching (nL)	✓	Fault relay normally energized (nE) or normally de-energized (nd)	✓	Press ▲ or ▼ to select next menu or X to exit				
Calibration	✓	Days remaining to next calibration due	✓	Year of last calibration	✓	Month and day of last calibration	✓	Press ▲ or ▼ to select next menu or X to exit				
Date/Time timE	✓	Year	✓	Date	✓	Time	✓	Press ▲ or ▼ to select next menu or X to exit				
Address	✓	Auto address detect (AU Y) or manual set (AU n)	✓	IP address segments (x4)	✓	Sub net address segments (x4)	✓	Press ▲ or ▼ to select next menu or X to exit				
Event Log	✓	Number of dots on display shows number of viewable events (0-7)	✓	Date of first event	✓	Time of event	✓	Icon and event code	✓	Repeat for next event or X to exit		
▲ ▼	OK	⇨	OK	⇨	OK	⇨	OK	⇨	OK	⇨	OK	

7.3 Overview of Set-up, Calibration and Test Mode

WARNING: Set-up, calibration and test modes are intended for use by trained personnel or service engineers only. Access to these modes can be pass code protected by following the procedure in section 8.2.7.

Set-up, calibration and test modes are used to make setting changes, calibrate and test the detector. To select set-up, calibration and test mode press and hold the '▲' up button or '▼' down button for a second. The unit will automatically go to the main normal operation status display from setup/calibration/test menus (but not from inside a setup/calibration/test function) if no button is pressed for 5 minutes or if an alarm level is exceeded.

PASS CODE: If a pass code has been set the display will show 0000 with the first 0 flashing. Use the '▲' up or '▼' down buttons to set the first digit of the pass code. Press '✓' to enter the first digit. The second digit will then flash. Repeat the process until all four pass code digits have been entered. Please record your pass code in a separate archive that can be securely retrieved. Failure to be able to retrieve your pass code may lead to delays in gaining access to all the protected functions in each MIDAS® unit. If an incorrect code is entered the display will show 'Err' and return to the normal operation mode. If a pass code is forgotten contact your local Zellweger Analytics service department.

After successfully entering the pass code (if set) the first menu '  SET' set-up icon will show on the display. The ' CAL' calibration or '  tESt' test menu can also be selected using the '▲' up or '▼' down buttons. Press the '✓' accept button to enter the selected menu or the 'X' cancel button to return to normal operation mode.

7.3.1 Set-up Menu Overview 

The set-up menu allows changes to be made to the detector alarm, fault, calibration interval, date/time and digital address settings. The menu is simply navigated using the '▲' up and '▼' down buttons to select the required submenu and then using '✓' accept button to enter that submenu. The '▲' up and '▼' down buttons are used to make changes to the selected setting and are confirmed using the '✓' accept button. The 'X' cancel button can be used to exit the submenu and allow selection of a different submenu, or can be pressed again to exit to the main set-up, calibration and test menu. Pressing the 'X' cancel button again returns the detector to normal operating mode.

NOTE: All settings in a submenu are accepted when the '✓' accept button is pressed after the last submenu setting. This saves the changes and is indicated by displaying 'UPdt' on the LCD. If however the 'X' cancel button is pressed at any time before the changes are accepted, this will cause any changes to be cancelled in that particular submenu.

The table opposite shows an overview of the set-up submenus and how they are navigated. For a detailed step-by-step instruction of how to change the detector settings using the set-up menu refer to section 8.2.

Table 8. Set-up menu overview.

Set up Submenu	OK	▲ ▼	OK	▲ ▼	OK	▲ ▼	OK	▲ ▼	OK	▲ ▼	OK	▲ ▼	
Alarms	✓	Change gas ID code (only for multi gas sensor cartridge)	✓	Set level 1 (L1) rising (U) or falling (d) alarm type. Set alarm set point. Repeat for level (L2) alarm	✓	Set alarm time delay (X-X secs)	✓	Set alarm relays latching (L) or non latching (nL)	✓	Set alarm relays normally energized (nE) or normally de-energized (nd)	✓	Press ▲ or ▼ to select next menu or X for set-up, calibration and test menu	
Faults	✓	Set fault relay configuration (1FLt, 2FLt, CmbF)	✓	Set fault relay latching (L) or non latching (nL)	✓	Set fault relay normally energized (nE) or normally de-energized (nd)	✓	Press ▲ or ▼ to select next menu or X for set-up, calibration and test menu					
Calibration	✓	Set calibration interval (0-365 days)	✓	Press ▲ or ▼ to select next menu or X for set-up, calibration and test menu									
Date/Time timE	✓	Set date format (dd: mm or mm: dd)	✓	Set year (2003-2030)	✓	Set month (1-12)	✓	Set day (1-31)	✓	Set hours (00-23)	✓	Set minutes (0-59)	Press ▲ or ▼ to select next menu or X for set-up, calibration and test menu
Set Address	✓	Set auto address detect (AU Y) or manual set (AU n)	✓	If AU Y, address is detected, then returns to set-up, calibration and test menu. If AU n, set the first part of the IP address (0-255)	✓	Repeat setting address for 2nd, 3rd and 4th segments of IP address.	✓	Set the 4 sub net addresses (0-255) using same method	✓	Press ▲ or ▼ to select next menu or X for set-up, calibration and test menu			
Set Pass Code	✓	Press ▲ or ▼ to set pass code 1st digit	✓	Press ▲ or ▼ to set pass code 2nd digit	✓	Press ▲ or ▼ to set pass code 3rd digit	✓	Press ▲ or ▼ to set pass code 4th digit	✓	Repeat to confirm pass code	✓	Pass code saved if both entries are the same	
▲ ▼	OK	▲ ▼	OK	▲ ▼	OK	▲ ▼	OK	▲ ▼	OK	▲ ▼	OK	▲ ▼	

7.3.2 Calibration Menu Overview 'CAL'

The calibration menu allows calibration of the detector zero, span, flow and 4-20 mA. The menu is simply navigated using the '▲' up and '▼' down buttons to select the required submenu and then using '✓' accept button to enter that submenu. The '▲' up and '▼' down buttons are used to make any changes to a selected setting and are confirmed using the '✓' accept button. The 'X' cancel button can be used to exit the submenu and allow selection of a different submenu, or can be pressed again to exit to the main set-up, calibration and test menu. Pressing the 'X' cancel button again returns the detector to normal operating mode.

The table below shows an overview of the calibration submenus and how they are navigated.
For a detailed step-by-step instruction of how to change the detector calibration settings refer to section 8.2.

Table 9. Calibration menu overview.

Calibration submenu	OK	▲▼	OK	▲▼	OK	▲▼	OK	▲▼	OK	▲▼	OK
Zero	✓	Icon flashes alerting user to prepare to apply zero gas	✓	Level 1 (L1) rising (U) or falling (d) alarm type followed by set point then same for level (L2) alarm	⇨	If ok ''PASS'' is displayed. If fail fault code is displayed.	✓	Press ▲ or ▼ to select next menu or X for set-up, calibration and test menu			
Span	✓	Select gas ID code of calibration gas (for multi gas ID sensor cartridges only)	✓	Select if humidified 'HUm' or dry 'drY' calibration gas	✓	Adjust value to display span gas concentration being used	⇨	Display goes steady and displays span gas reading. The dots indicate span progress. If ok ''PASS'' is displayed. If fail fault code is displayed	✓	Press ▲ or ▼ to select next menu or X for set-up, calibration and test menu	
Flow	✓	Icon flashes and display shows '0' indicating that flow zero will be set	✓	Unit counts down from 10 to 0 and sets flow zero. Display shows 1st set point target flow rate. Use ▲ or ▼ to make reading on external flow meter 350cc/min +/- 50cc/min	✓	Use ▲ or ▼ to change the flashing display to the actual reading from the external flow meter	✓	Unit counts down from 10 to 0 and sets 1st set point. Icon flashes and displays 2nd set point target. Repeat process to set.	✓	Press ▲ or ▼ to select next menu or X for set-up, calibration and test menu	
4-20 mA mA	✓	4 mA is displayed indicating analog output should be 4 mA	⇨	Adjust until analog output is 4 mA	✓	20 mA is displayed indicating analog output should be 20 mA	⇨	Adjust until analog output is 20 mA	✓	Press ▲ or ▼ to select next menu or X for set-up, calibration and test menu	
▲▼	OK	▲▼	OK	▲▼	OK	▲▼	OK	▲▼	OK	▲▼	OK

7.3.3 Test Menu Overview 'tEST'

The test menu is used to test the detector gas reading using bump test gas, and for simulation of alarm and fault display and output operation. The test menu also contains the detector Inhibit facility. Use the '▲' up and '▼' down buttons to select either bump test or alarm/fault test. Press the '✓' accept button to enter that submenu.

The table below shows an overview of the test submenus and how they are navigated.
For a detailed step-by-step instruction of how to test the detector operation refer to section 8.2.

Table 10. Test Submenu

Test Submenu	OK	▲ ▼	OK	▲ ▼	OK	▲ ▼	OK	▲ ▼	OK	▲ ▼
Bump	✓	Apply bump test gas and display shows measured gas concentration with all alarm outputs inhibited	⇨	Press 'X' to exit to test menu	⇨	Press ▲ or ▼ to select next submenu or X for to return to the set-up, calibration and test menu				
Alarm/fault	✓	Display shows 'Sim' and the A1 '▲' symbol. Select either A1, A2 '⛰' or Fault '⚠' for simulation	✓	Display shows 'SuRE'.	✓	Display flashes 'on' and simulates the selected A1, A2 or Fault display and output.	⇨	Press x to exit and select another simulation or x again to return to test submenu	⇨	Press ▲ or ▼ to select next sub menu or X for set-up, calibration and test menu
Inhibit	✓	Press ▲ or ▼ to select ALm, ALm-Ft, ALL or nonE inhibit state	✓	Set inhibit timeout period	✓	UPdt is displayed and unit enters selected inhibit state. Display returns to submenu	⇨	Press ▲ or ▼ to select next sub menu or X for set-up, calibration and test menu		
▲ ▼	OK	▲ ▼	OK	▲ ▼	OK	▲ ▼	OK	▲ ▼	OK	▲ ▼

8 DETAILED PROCEDURES FOR NAVIGATING REVIEW, SET-UP, CALIBRATION AND TEST MODE SUBMENUS

The following sections provide step-by-step procedures for navigating all the modes and submenus.

8.1 Review Mode

Review mode allows the settings of the detector to be reviewed safely without any changes being made. Review mode consists of 7 submenus as shown in the table below:

Table 11. Review mode submenus.

Review submenu	Icon	Settings Displayed
Software	SW	Revision and checksum
Alarms		Sensor cartridge and gas ID codes, Alarm 1 and alarm 2 configuration and set points, time delay, latching/non latching, energized/de-energized
Faults		Configuration, Latching/non latching, energized/de-energized
Calibration		Days left to next calibration due and date of last calibration
Time/Date	timE	Current year, date and time
IP address		Auto address selection on/off, IP address, sub net mask values.
Event log		View the date, time and details of the last seven alarm, fault and maintenance fault events

Review mode allows the settings of the detector to be reviewed safely without any changes being made. Review mode consists of 7 submenus as shown in the table below:

To select review mode from normal operation, press the '▲' up or '▼' down button once. The icon will be displayed along with the first submenu icon. Press the '▲' up or '▼' down buttons to select a different submenu icon.

8.1.1 Review Software 'SW'

1. Select the software 'SW' submenu and press '✓' to accept.
2. The software version number is displayed.
3. Press '✓' to display the software checksum
4. Press '✓' to return to step 1.
5. Repeat steps 1 through 4 to view the information again or press '▲' up or '▼' down to select another submenu.
6. Press 'X' to return to normal operation

8.1.2 Review Alarms ' ALm'

1. Select the alarms 'Alm' submenu and press '✓' to accept.
2. The sensor cartridge ID (X) and the set gas ID code (Y) are displayed in the format (X – Y). (See section 8.2.2 for a list of sensor cartridge and gas ID codes).
3. Press '✓' to display if the level 1 alarm (L1) type is rising (U) or falling (d).
4. Press '✓' to display the alarm 1 value along with the A1 icon'▲'.
5. Press '✓' to display if the level 2 alarm (L2) type is rising (U) or falling (d).
6. Press '✓' to display the alarm 2 value along with the A2 icon '▲'.
7. Press '✓' to display the alarm on delay (seconds).
8. Press '✓' to display if the alarm relays are set to latching (L) or non latching (nL).
9. Press '✓' to display if the alarm relays are set to normally energized (nE) or normally de-energized (nd).
10. Press '✓' to return to step 1.
11. Repeat steps 1 through 7 to view the settings again or press '▲' up or '▼' down to select another submenu.
12. Press 'X' to return to normal operation.

8.1.3 Review Faults ' FLt'

1. Select the faults 'FLt' submenu and press '✓' to accept.
2. The fault relay configuration (1FLt, 2 FLt or CmbF) is displayed. (See section 8.2.3 for details of fault relay configurations).
3. The fault relay latching (L) or non latching (nL) setting is displayed.
4. Press '✓' to display the fault relay normally energized (nE) or normally de-energized (nd) setting.
5. Press '✓' to return to step 1.
6. Repeat steps 1 through 4 to view the settings again or press '▲' up or '▼' down to select another submenu.
7. Press 'X' to return to normal operation.

8.1.4 Review Calibration ' CAL'

1. Select the review calibration 'CAL' submenu and press '✓' to accept.
2. The number of days remaining to the next calibration due date is displayed.
3. Press '✓' to display the year and press '✓' again to display the month and day of the last calibration.
4. Press '✓' to return to step 1.
5. Repeat steps 1 through 4 to view the settings again or press '▲' up or '▼' down to select another submenu.
6. Press 'X' to return to normal operation.

8.1.5 Review Date and Time 'timE'

1. Select the review date and time 'timE' submenu and press '✓' to accept.
2. The current year setting is displayed.
3. Press '✓' to display the current month and day
4. Press '✓' again to display the current time.
5. Press '✓' to return to step 1.
6. Repeat steps 1 through 5 to view the settings again or press '▲' up or '▼' down to select another submenu.
7. Press 'X' to return to normal operation.

8.1.6 Review Detector Address '💻 nET'

1. Select the review address '💻 nEt' submenu and press '✓' to accept.
2. 'AU Y' or 'AU n' is displayed depending on if auto address detection is on (AU Y) or off (AU n).
3. Press '✓' to display the first part of the IP address preceded by the letter 'A'.
4. The dot on the upper left indicates that the first part of the IP address is being displayed.
5. Press '✓' to display the second part of the address. The two dots on the upper left indicate the 2nd portion of the address.
6. Press '✓' again to display the third part and again to display the last part of the address.
7. Press '✓' and the first part of the sub net mask values will be displayed preceded by the letter 'n'.
8. Press '✓' to scroll through the second, third and forth sub net values. The number of dots in the upper left indicate which part of the sub net address is being viewed.
9. Press '✓' to return to step 1.
10. Repeat steps 1 through 9 to view the settings again or press '▲' up or '▼' down to select another submenu.
11. Press 'X' to return to normal operation.

8.1.7 Review Event Log '◈⚠ Hi St'

1. Select the review event log ' ◈⚠Hi St' submenu.
2. The number of logged data events available is indicated by the number of dots (0-7) shown on the left of the display.
3. Press '✓' to view the date of the last recorded event.
4. Press '✓' to display the time of the event.
5. Press '✓' again to display the relevant alarm icon and event code.
6. Repeat to view next logged event details.
7. Press 'X' to return to normal operation.

Note: More detailed event log information can be viewed using the web browser feature. Refer to section 14 for further details

8.2 Set-up, Calibration and Test Modes

WARNING: Set-up, calibration and test modes are intended for use by trained personnel or service engineers only. Access to these modes can be pass code protected by following the procedure in section 8.2.7.

Set-up, calibration and test modes are used to make setting changes, calibrate and test the detector. To select set-up, calibration or test mode press and hold the '▲' up button or '▼' down button for a second. The unit will automatically go to the main normal operation status display from setup/calibration/test menus (but not from inside a setup/calibration/test function) if no button is pressed for 5 minutes or if an alarm level is exceeded.

PASS CODE: If a pass code has been set the display will show 0000 with the first 0 flashing. Use the '▲' up or '▼' down buttons to set the first digit of the pass code. Press '✓' to enter the first digit. The second digit will then flash. Repeat the process until all four pass code digits have been entered. If an incorrect code is entered the display will show Err and return to the normal operation mode. If a pass code is forgotten contact your local Zellweger Analytics service department.

Zellweger Analytics is not responsible for any costs associated with the recovery of the passcode in the event that the user has forgotten or cannot access their unique passcode. It is strongly advised that the user records all pass codes with the instrument serial number in a secure and separate location to the MIDAS® unit. Delays in recovering the lost passcodes may be experienced and are not the responsibility of Zellweger Analytics.

NOTE: Should the passcode be activated, the unit will continue to detect gas and indicate maintenance and instrument faults.

After successfully entering the pass code (if set) the first menu '✎SET' set-up icon will show on the display. The ' CAL' calibration or 'tESt' test menu can also be selected using the '▲' up or '▼' down buttons. Press the '✓' accept button to enter the selected menu or the 'X' cancel button to return to normal operation mode.

8.2.1 Set-up Menu 'SEt'

The set-up menu allows the settings of the detector to be changed. The set-up menu consists of 6 submenus as shown in the table below.

Table 12. Set-up mode submenus.

Set-up submenu	Icon	Changeable settings
Alarms		Gas ID, Alarm 1 and alarm 2 configuration, set points, time delay, latching/non latching, energized/de-energized
Faults		Configuration, Latching/non latching, energized/de-energized
Calibration		Calibration interval (days)
Time/Date	timE	Date format mm:dd or dd:mm, current year, month, day, hours, minutes
IP address		Auto address selection on/off, IP address, sub net mask values.
Pass code		Set pass code

NOTE: All settings in a submenu are accepted when the '✓' accept button is pressed after the last submenu setting. This saves the changes and is indicated by displaying 'UPdt' on the LCD. If however the 'X' cancel button is pressed at any time before the changes are accepted, this will cause any changes to be cancelled in that particular submenu.

To select the set-up menu from normal operation, press the '▲' up button for a few seconds. Enter the pass code (if set). Use the '▲' up or '▼' down buttons to select the set-up menu 'SEt' icon and press the '✓' accept button.

8.2.2 Set Alarms 'ALm'

1. Use the '▲' up or '▼' down buttons to select the set alarms 'ALm' submenu and press '✓' to accept.
2. The flashing gas id code is displayed along with the gas cylinder and alarms icon ''.
3. Use the '▲' up or '▼' down buttons to change the gas ID number (only applicable on multi gas sensor cartridges- see table below).
4. Press '✓' to accept.
5. The flashing level 1 (L1) alarm type is displayed (U) rising or (d) falling.
6. Use the '▲' up or '▼' down buttons to change the alarm type.
7. The flashing alarm 1 value is displayed along with the icon '▲'.
8. Use the '▲' up or '▼' down buttons to change the value.
9. Press '✓' to accept.
10. The flashing level 2 (L2) alarm type is displayed (U) rising or (d) falling.
11. Use the '▲' up or '▼' down buttons to change the alarm type.
12. Press '✓' to display the flashing alarm 2 value along with the icon ''.
13. Use the '▲' up or '▼' down buttons to change the A2 value.
14. Press '✓' to display the flashing alarm on time delay (seconds).

15. Use the '▲' up or '▼' down buttons to change the alarm on time delay (seconds).

16. Press '✓' to display the flashing alarm relay latching (L) or non latching (nL) setting.

17. Use the '▲' up or '▼' down buttons to change between the settings.

18. Press '✓' to display the flashing alarm relays normally energized (nE) or normally de-energized (nd) setting.

19. Use the '▲' up or '▼' down buttons to change between the settings.

20. Press '✓' to update all the changes (UPdt displayed) and return to step 1.

21. Press '▲' up or '▼' down to select another submenu.

22. Press 'X' to return to set-up, calibration and test menu selection.

23. Press 'X' again to return to normal operation.

Note: When replacing a single gas sensor cartridges with the same type single gas sensor cartridge, no change of gas confirmation is required. When changing a multi gas sensor cartridge with the same type multi gas sensor cartridge, the new sensor cartridge will assume the same previously set gas ID and will not request a change gas confirmation.

Table 13. Set-up mode submenus.

Sensor cartridge Part No.	Gas Name	Range	Sensor cartridge ID	Gas ID
MIDAS-S-NH3	Ammonia	0-100 ppm	01	Not applicable
MIDAS-S-ASH	Arsine	0-0.2 ppm	02	Not applicable
MIDAS-S-HYD	Diborane	0-0.4 ppm	03	1
	Germane	0-0.8 ppm	03	2
MIDAS-S-PH3	Phosphine	0-1.2 ppm	04	Not applicable
MIDAS-S-SHX	Silane(20)	0-20 ppm	05	1
	Disilane	0-20 ppm	05	2
MIDAS-S-SHL	Silane(2)	0-2 ppm	06	Not applicable
MIDAS-S-HSE	Hydrogen Selenide	0-0.4 ppm	07	Not applicable
MIDAS-S-HFX	Hydrogen Fluoride	0-12 ppm	08	1
	Boron Trifluoride	0-8 ppm	08	2
	Nitrogen Trifluoride	0-40 ppm	08	3
	Tungsten Hexafluoride	0-12 ppm	08	4
MIDAS-S-SF4	Sulfur Tetrafluoride	0-0.8 ppm	09	1
	Chlorine Trifluoride	0-0.8 ppm	09	2
MIDAS-S-HCL	Hydrogen Chloride	0-8 ppm	10	1
	Boron Trichloride	0-8 ppm	10	2
	Dichlorosilane	0-8 ppm	10	3
	Hydrogen Bromide	0-8 ppm	10	4

MIDAS-S-POC	Phosphorous Oxychloride	0-0.8 ppm	11	Not applicable
MIDAS-S-HAL	Chlorine	0-2 ppm	12	1
	Fluorine	0-4 ppm	12	2
MIDAS-S-BR2	Bromine	0-0.4 ppm	13	1
	Chlorine Dioxide	0-0.4 ppm	13	2
MIDAS-S-CO2	Carbon Dioxide	0-2% Vol	14	Not applicable
MIDAS-S-COX	Carbon Monoxide	0-100ppm	15	Not applicable
MIDAS-S-H2X	Hydrogen	0-1000 ppm	16	Not applicable
MIDAS-S-HCN	Hydrogen Cyanide	0-20 ppm	17	Not applicable
MIDAS-S-H2S	Hydrogen Sulfide	0-40 ppm	18	Not applicable
MIDAS-S-NOX	Nitric Oxide	0-100 ppm	19	Not applicable
MIDAS-S-NO2	Nitrogen Dioxide	0-12 ppm	20	Not applicable
MIDAS-S-O2X	Oxygen	0-25% Vol	21	Not applicable
MIDAS-S-O3X	Ozone	0-0.4 ppm	22	Not applicable
MIDAS-S-SO2	Sulfur Dioxide	0-8 ppm	23	Not applicable
MIDAS-S-TEO	TEOS	0-40 ppm	24	Not applicable
MIDAS-S-LEL	Hydrogen	0-100% LEL [1]	25	1
	Methane	0-100% LEL [1]	25	2

[1] MIDAS® detectors are not ETL approved for monitoring in or sampling from classified areas above 25% LEL

8.2.3 Set Faults '⚠FLt'

The set-up menu allows the settings of the detector to be changed. The set-up menu consists of 6 submenus as shown in the table below.

1. Use the '▲' up or '▼' down buttons to select the set faults '⚠FLt' submenu and press '✓' to accept.
2. The flashing fault relay configuration (1FLt, 2 FLt or CmbF) is displayed.
3. Use the '▲' up or '▼' down buttons to change the configuration.
   (See the table below for details of fault relay configurations)
4. Press '✓' to display the flashing fault relay latching (L) or non latching (nL) setting is displayed.
5. Use the '▲' up or '▼' down buttons to change between the settings.
6. Press '✓' to display the flashing fault relay normally energized (nE) or normally de-energized (nd) setting.
7. Use the '▲' up or '▼' down buttons to change between the settings.
8. Press '✓' to update all the changes (UPdt displayed) and return to step 1.
9. Press '▲' up or '▼' down to select another submenu.
10. Press 'X' to return to set-up, calibration and test menu selection.
11. Press 'X' again to return to normal operation.

Table 14. Fault relay configuration options.

Fault Relay Configuration	Relay 1	Relay 2	Relay 3
Instrument Fault Only (1FLt)	Alarm 1	Alarm 2	Instrument Fault
Separate Fault Relays (2FLt)	Any Alarm	Maintenance Fault	Instrument Fault
Combined Fault Relay (CmbF)	Alarm 1	Alarm 2	Any Fault

8.2.4 Set Calibration Interval 'CAL'

1. Select the set calibration interval 'CAL' submenu and press '✓' to accept.
2. The flashing display shows the number of days interval after a calibration that a calibration due maintenance fault will be displayed.
3. Use the '▲' up or '▼' down buttons to change the number of days. (If the calibration interval is set below '001' then 'OFF' will be displayed and no calibration interval will be activated and no reminders displayed)
4. Press '✓' to update the change (UPdt displayed) and return to step 1.
5. Press '▲' up or '▼' down to select another submenu.
6. Press 'X' to return to set-up, calibration and test menu selection.
7. Press 'X' again to return to normal operation

8.2.5 Set Date and Time 'timE'

1. Select the set date and time 'timE' submenu and press '✓' to accept.
2. The flashing display will show the current date format mm:dd or dd:mm.
3. Use the '▲' up or '▼' down buttons to change the date format.
4. Press '✓' to display the flashing current year setting.
5. Use the '▲' up or '▼' down buttons to change the year setting (between 2003 and 2030).
6. Press '✓' to display the flashing current month setting.
7. Use the '▲' up or '▼' down buttons to change the month setting (between 1 and 12)
8. Press '✓' to display the flashing current day setting.
9. Use the '▲' up or '▼' down buttons to change the day setting (between 1 and 31)
10. Press '✓' to display the flashing hours of current time.
11. Use the '▲' up or '▼' down buttons to change the hours setting (between 00 and 23).
12. Press '✓' to display the flashing minutes of current time.
13. Use the '▲' up or '▼' down buttons to change the minutes setting (between 00 and 59).
14. Press '✓' to update the changes (UPdt displayed) and return to step 1.
15. Press '▲' up or '▼' down to select another submenu.
16. Press 'X' to return to set-up, calibration and test menu selection.
17. Press 'X' again to return to normal operation.

8.2.6 Set Address '  nET'

1. Select the set address '  nEt' submenu and press '✓' to accept.
2. A flashing 'n' or 'Y' is displayed depending on if auto address detection is on (AU Y) or off (AU n).
3. If automatic address detection (AU Y) is selected then the detector will automatically appoint a valid IP address and return to the submenu.
4. If manual address setting (AU n) is selected press '✓' to display the flashing first part of the IP address. The dot on the upper left indicates that the first part of the IP address is being displayed.
5. Use the '▲' up or '▼' down buttons to change the address setting (between 0 and 255)
6. Press '✓' to display the second part of the address. The two dots on the upper left indicate the 2nd portion of the address.
7. Use the '▲' up or '▼' down buttons to change the address setting (between 0 and 255).
8. Repeat for the third and forth parts of the IP address.
9. Press '✓' to display the flashing first part of the sub net mask value.
10. Use the '▲' up or '▼' down buttons to change the address setting (between 0 and 255).
11. Press '✓' accept and repeat for the second, third and forth sub net values. The number of dots in the upper left indicates which part of the sub net address is being viewed.
12. Press '✓' to update the changes (UPdt displayed) and return to step 1.
13. Press '▲' up or '▼' down to select another submenu.
14. Press 'X' to return to set-up, calibration and test menu selection.
15. Press 'X' again to return to normal operation.

NOTE: If the IP address is changed the new settings will not be implemented until the MIDAS® unit is powered down and back on again.

8.2.7 Set pass code 'PWd'

1. Select the set pass code 'PWd' submenu and press '✓' to accept.
2. Press '▲' up or '▼' down to set the first pass code value.
   (Note holding down the button will increase the increment speed).
3. Press '✓' to enter the first value and move to setting the second value.
4. Press '▲' up or '▼' down to set the second value.
5. Press '✓' to enter and repeat for the third and forth values in the passcode.
6. To confirm the pass code re enter it again using the same procedure.
7. The new pass code will be saved after the last entry if the two entered passcodes are the same.

NOTE: Pass codes can be set between 0001 and 9999. Setting the pass code to 0000 will switch off the pass code. If a pass code is forgotten contact your local Zellweger Analytics service department. In the event that a pass code is forgotten by the user, Zellweger Analytics is not liable for any costs associated with the recovery process nor for any inconvenience incurred while the user is unable to access protected settings. Please ensure secure records are kept for all pass codes implemented on MIDAS® units.

8.3 Calibration Menu 'CAL'

The calibration menu allows the calibration settings of the detector to be changed. The calibration menu comprises of 4 submenus as shown in the table below.

Table 15. Calibration mode submenus.

Calibration submenu	Icon	Calibration setting
Zero		Set detector zero
Span		Set detector span
Flow		Calibrate detector sample flow rate
mA	mA	Calibrate detector analog output

To select the calibration menu from normal operation, press the '▲' up button for a few seconds. Enter the pass code (if set). Use the '▲' up or '▼' down buttons to select the calibration menu 'CAL' icon and press the '✓' accept button.

8.3.1 Zero Calibration '0CAL'

1. Use the '▲' up or '▼' down buttons to select the zero calibration '0CAL' submenu and press '✓' to accept.
2. The zero calibration icon starts flashing in order to tell the user to prepare to apply zero gas.
3. The inhibit '' icon is also displayed indicating that no alarm outputs will be generated during this process.
4. Press '✓' to confirm when ready and the icon goes steady.
5. Apply the zero gas (or ambient air).
6. The dots on the left of the display indicate progress to a successful zero.
7. The display will show the zero gas reading and if measured to be stable for an appropriate period of time will display 'PASS'.
8. If the zero calibration is unsuccessful then the display will show an error code (see table oppersite)
9. Press '✓' to exit.
10. Press '▲' up or '▼' down to select another submenu.
11. Press 'X' to return to set-up, calibration and test menu selection.
12. Press 'X' again to return to normal operation.

8.3.2 Span Calibration 'SPAn'

1. Use the '▲' up or '▼' down buttons to select the span calibration ' SPAn' submenu and press '✓' to accept.
2. The span calibration icon starts flashing in order to tell the user to prepare to apply span gas.
3. The inhibit '' icon is also displayed indicating that no alarm outputs will be generated during this process.
4. Use the '▲' up or '▼' down buttons to select the gas ID code of calibration gas (for multi gas ID sensor cartridges only) and press '¸' to accept. (Refer to section 8.2.2 for details of gas ID codes).
5. Use the '▲' up or '▼' down buttons to select if humidified 'HUm' or dry 'drY' calibration gas is being used.
6. Use the '▲' up or '▼' down buttons to change the value to the concentration of span calibration gas being used.
7. Press '✓' to confirm when ready and the icon goes steady.
8. Apply the span gas.
9. The dots on the left of the display indicate progress to a successful span.
10. The display will show the span gas reading and if measured to be stable for an appropriate period of time will display 'PASS'.
11. If the span calibration is unsuccessful then the display will show an error code (see below).
12. Press '✓' to exit.
13. Press '▲' up or '▼' down to select another submenu.
14. Press 'X' to return to set-up, calibration and test menu selection.
15. Press 'X' again to return to normal operation

NOTE: The change in the gas bottle icon's contents gives an indication as to the relative stability of the gas reading. The arrows and bars inside the cylinder indicate whether it is rising or falling as appropriate (see table below).

Table 16. Calibration codes

Code	**Code meaning**
PASS	Successful Calibration
FL:0H	Zero Calibration Timeout - Over Range
FL:0L	Zero Calibration Timeout - Under Range
FL:0U	Zero Calibration Timeout - Unstable
FL:SH	Span Calibration Timeout - Over Range
FL:SL	Span Calibration Timeout - Under Range
FL:SU	Span Calibration Timeout - Unstable

Table 17. Calibration stability icons

	Stable
	Over-Range
	Unstable-Rising
	Unstable-Flat
	Unstable-Falling
	Under-Range

8.3.3 Flow Calibration ‘ FLoW’

1. Use the ‘▲’ up or ‘▼’ down buttons to select the flow calibration ‘ FLoW’ submenu and press ‘✓’ to accept.
2. The flow icon with the dot at the bottom starts flashing in order to tell the user that the unit is ready to read the zero flow offset.
3. The inhibit ‘ ’ icon is also displayed indicating that no alarm outputs will be generated during this process.
4. Press ‘✓’ to confirm and the icon goes steady and a count down from 10 is shown as the zero flow offset is read.
5. The display will show the flashing flow icon with the dot 1/4 ways up to tell the user to set the set point 1flow (350 cc/min).
6. Press ‘▲’ up or ‘▼’ down keys to adjust the reading on the external flow meter to the setpoint 1 target value. **(NOTE: The reading must be +/- 50 cc/min of target to be accepted).**
7. Press ‘✓’ to confirm and the target value flashes.
8. Press ‘▲’ up or ‘▼’ down to enter the actual value read on the external flow meter. **(NOTE: Holding down the button will increase the increment speed).**
9. Press ‘✓’ to confirm and the icon goes steady and a count down from 10 is shown as the setpoint 1 value is read.
10. The display will show the flashing flow icon with the dot 3/4 ways up to tell the user to set the set point 2 flow (650 cc/min).
11. Press ‘▲’ up or ‘▼’ down keys to adjust the reading on the external flow meter to the set point 2 target value. **(NOTE: The reading must be +/- 50 cc/min of target to be accepted).**
12. Press ‘✓’ to confirm and the target value flashes.
13. Press ‘▲’ up or ‘▼’ down to enter the actual value read on the external flow meter. **(NOTE: Holding down the button will increase the increment speed).**
14. Press ‘✓’ to confirm and the icon goes steady and count down from 10 is shown as the setpoint 2 value is read.
15. If successful the display shows UPdt (update) and the flow calibration is complete.
16. Press ‘▲’ up or ‘▼’ down to select another submenu.
17. Press ‘X’ to return to set-up, calibration and test menu selection.

8.3.4 mA Calibration ‘mA 4-20’

1. Use the ‘▲’ up or ‘▼’ down buttons to select the mA calibration ‘ mA4-20’ submenu and press ‘✓’ to accept.
2. The display shows 4.00 mA indicating that the analog output should be reading 4 mA
3. The inhibit ‘ ’ icon is also displayed indicating that no alarm outputs will be generated during this process.
4. Use the ‘▲’ up or ‘▼’ down buttons to adjust the analog output to read 4.00 mA.
5. Press ‘✓’ to accept.
6. The display will show 20.00 indicating that the analog output should be reading 20 mA
7. Use the ‘▲’ up or ‘▼’ down buttons to adjust the analog output to read 20.00 mA.
8. Press ‘✓’ to update the changes (UPdt displayed) and return to step 1.
9. Press ‘▲’ up or ‘▼’ down to select another submenu.
10. Press ‘X’ to return to set-up, calibration and test menu selection.
11. Press ‘X’ again to return to normal operation.

8.4 Test Menu 'tEST'

The test menu is used to test the detector gas reading using bump test gas, and for simulation of alarm and fault display and output operation (relay, analog and digital). The test submenu also includes the detector inhibit facility. The test menu comprises of 3 submenus as shown in the table below.

Table 18. Test mode submenus.

Test submenu	Icon	Test
Bump		Bump test detector with inhibited alarm outputs
Alarm/Fault		Test the alarm and fault display and output operation
Inhibit		Put the unit into/out of an inhibit state and set inhibit time out

To select the test menu from normal operation, press the '▲' up button for a few seconds. Enter the pass code (if set). Use the '▲' up or '▼' down buttons to select the test menu '' icon and press the '✓' accept button.

8.4.1 Bump Test 'bUmP'

1. Use the '▲' up or '▼' down buttons to select the bump test 'bUmP' submenu and press '✓' to accept.
2. The inhibit '' icon is also displayed indicating that no alarm outputs will be generated during this process.
3. Apply the bump test gas and the display will show the measured gas concentration.
4. Remove the bump test gas and allow the detector reading to return to zero.
5. Press 'X' to exit.
6. Press '▲' up or '▼' down to select another submenu.
7. Press 'X' to return to set-up, calibration and test menu selection.
8. Press 'X' again to return to normal operation.

8.4.2 Alarm/Fault Test 'Si m'

1. Use the '▲' up or '▼' down buttons to select the alarm/fault test 'Si m' submenu and press '✓' to accept.
2. The display shows 'Si m' and the A1 '▲' icon.
3. Use the '▲' up or '▼' down buttons to select A1 '▲', A2 '' or Fault '' for test simulation.
4. Press '✓' to select and the displays 'SurE' to indicate that the next step will activate the selected output (relay, analog and digital)
5. Press '✓' and the display flashes 'on' indicating that the selected output is activated
6. Press 'X' to return to step 2 and select a different output for test.
7. Press 'X' to exit.
8. Press '▲' up or '▼' down to select another submenu.
9. Press 'X' to return to set-up, calibration and test menu selection.
10. Press 'X' again to return to normal operation.

8.4.3 Inhibit State '🔔I nH'

1. Use the '▲' up or '▼' down buttons to select the inhibit '🔔I nH' submenu and press '✓' to accept.
2. The display flashes 'nonE' indicating there is no inhibit currently set.
3. Use the '▲' up or '▼' down buttons to select alarm, alarm and fault or all (Alm, AL-Ft or ALL) output inhibit states. See table below for details of inhibit states.
4. Press '✓' to accept the selected inhibit state.
5. Press '▲' up or '▼' down to set the inhibit timeout (between 0 minutes and 4 hrs- default 30 minutes).
6. Press '✓' to accept (UPdt displayed).
7. The selected outputs will be inhibited until the inhibit timeout has elapsed.
   NOTE: If the inhibit timeout elapses before the inhibit state is set back to 'nonE' the maintenance fault code M12 will be displayed.
8. To take the unit out of inhibit, select the inhibit '🔔' I nH submenu and press '✓' to accept.
9. Use the '▲' up or '▼' down buttons to select 'nonE'
10. Press '✓' to return to the submenu selection.
11. Press '▲' up or '▼' down to select another submenu.
12. Press 'X' to return to set-up, calibration and test menu selection.
13. Press 'X' again to return to normal operation.

Table 19. Inhibit states.

Inhibit state	Display	Function
None	nonE	No functions are inhibited.
Alarms Inhibited	ALm	Alarm events will be detected, but alarm outputs (relays, 4-20 mA current loop and Ethernet) will be disabled.
Alarms and Faults Inhibited	AL-Ft	Alarm and fault events will be detected, but alarm and fault outputs (relays, 4-20 mA current loop and Ethernet) will be disabled.
Full Inhibit	ALL	All monitoring functions inhibited. No monitoring is performed and no alarms or faults (except for Inhibit Timeout) will be reported.

9 ROUTINE MAINTENANCE

MIDAS® is a fully serviceable product designed with modular components that can be readily replaced by trained service personnel so as to minimize the time that the gas detector is not available.

External in-line air filters should be replaced every three months or more frequently if the system is sampling in environments that have high levels of particulate matter or very acidic / wet atmospheres. Similarly the internal particulate filter should be replaced once a year or more frequently if the sample lines are prone to heavy contamination.

Every sensor cartridge is shipped with a 12 month warranty and an extended 2 year warranty is also available for purchase. All sensor cartridges are factory calibrated to traceable national standards before shipment to the end user.

Note that testing or calibrating with the wrong (incorrect, out of date, non-traceable) calibration gases, calibration equipment, methods or operating conditions can actually damage the sensor cartridge's lifetime and alter the calibration adversely. Only qualified calibration technicians should attempt to calibrate the MIDAS® gas detector.

NOTE: For details regarding sensor cartridge calibration and bump testing method refer to section 18.

The internal pump module is designed to operate for a minimum of 18 - 24 months and it is recommended that this pump module (part number MIDAS-A-007) be replaced every 2 years.

9.1 Sensor Cartridge Replacement

To avoid the possibility of unwanted alarms or faults Zellweger Analytics recommend that the sensor cartridge be replaced without power to the MIDAS® unit. If fitting a sensor cartridge to a unit that is powered, please refer to section 8.4.3 to inhibit the detectors outputs.

9.1.1 Sensor Cartridge Fitting/Replacement

1. Unscrew the thumbscrew located on the front panel and remove the cover by pulling it forwards off the main chassis (see diagram 22).
2. Ensure the power switch on the terminal module is in the off position.
3. Remove the old sensor cartridge from the unit (if fitted) by unclipping the two sensor cartridge locking tabs located either side of the sensor cartridge and using them to firmly pull the sensor cartridge out (see diagram 23).
4. Fit the new sensor cartridge by aligning the pins at the top of the sensor cartridge with the socket in the sensor cartridge chamber.
5. Carefully push the sensor cartridge into the sensor cartridge chamber until fully home and lock in place using the tabs either side of the sensor cartridge (see diagram 24).
6. Switch the power switch on the terminal module to the 'on' position.
7. Refit the detector's cover by aligning the slots either side with the locating tabs on the mounting bracket assembly and pushing the cover horizontally until home. Tighten the thumbscrew located on the front panel (see diagram 25).

NOTE: If replacing a sensor cartridge with a different gas type sensor cartridge the display will scroll the message 'CHANGE GAS?' If you are changing the sensor cartridge gas type press '✓' to accept. If not, fit the correct sensor cartridge. The pass code (if set) must be entered to change sensor cartridge gas type. To set the correct gas for a multi gas type sensor cartridge refer to section 8.2.2.

Diagram 22. Removing detector cover

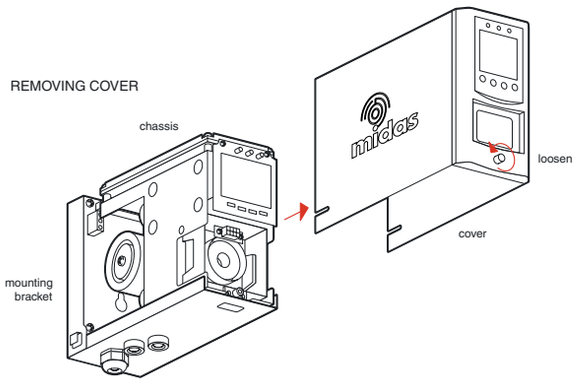


Diagram 23. Removing sensor cartridge

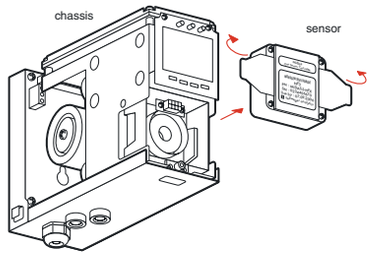


Diagram 24. Fitting/replacing sensor cartridge

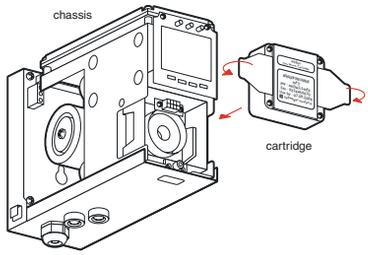
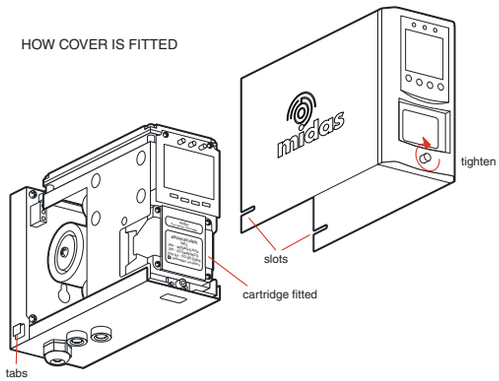


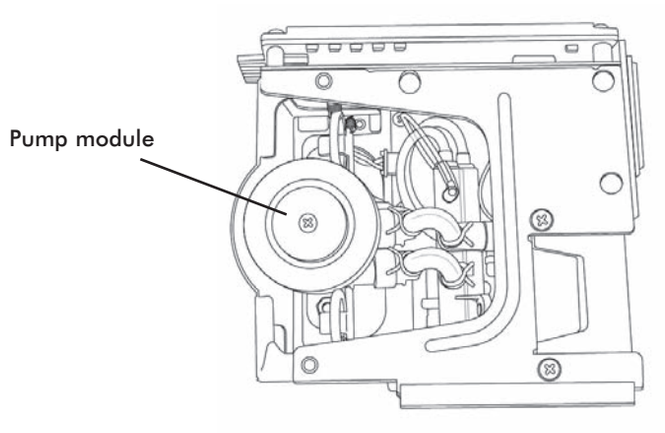
Diagram 25. Refitting detector cover



9.2 PUMP REPLACEMENT

The pump module has been designed to allow easy replacement. New pump modules are supplied with new springs, bracket and tubing pre-assembled for quick release / replacement

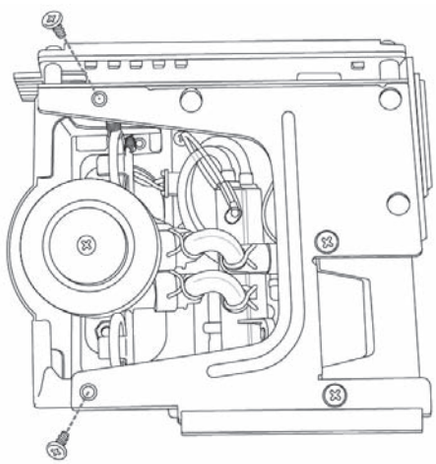
Diagram 26. Location of pump module

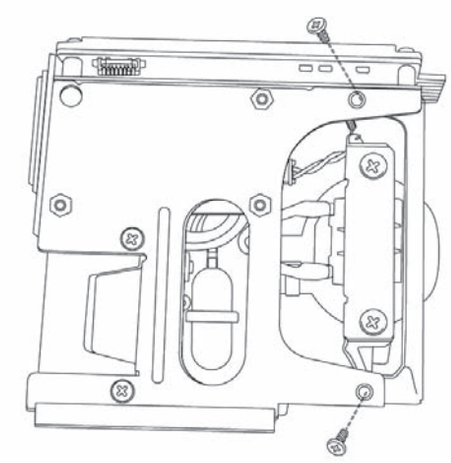


The following procedure should be followed carefully and only performed by suitably trained personnel.

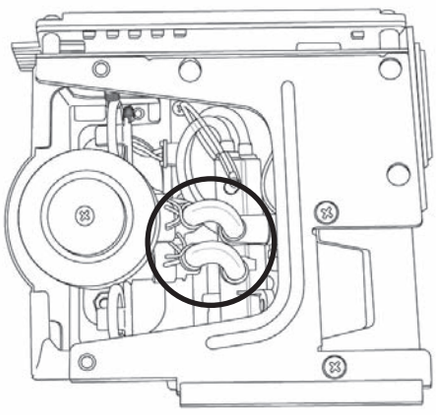
1. Isolate the power to the detector.
2. Unscrew the thumbscrew located on the front panel.
3. Remove the cover by pulling it forward off the main chassis.
4. Unscrew the two retaining screws located at the bottom front of the chassis.
5. Pull the main chassis forward to disconnect it from the mounting bracket assembly.

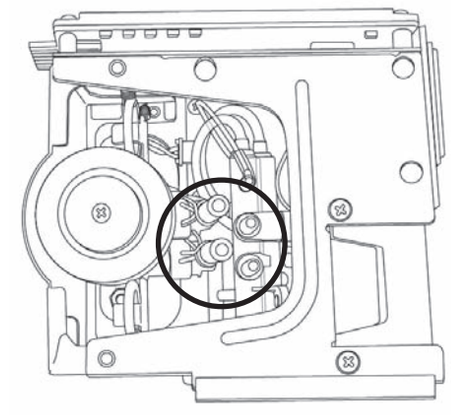
6. Remove the 4 pump module screws.



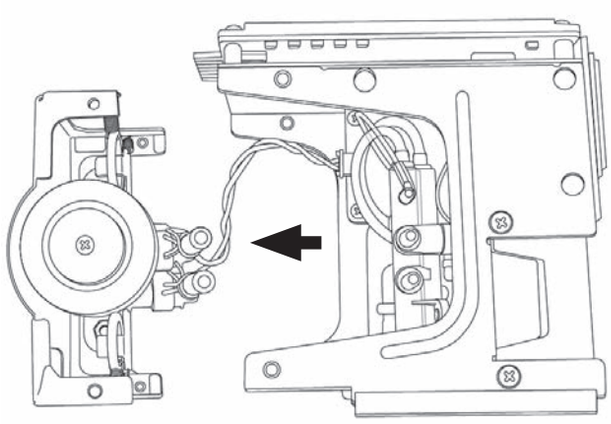


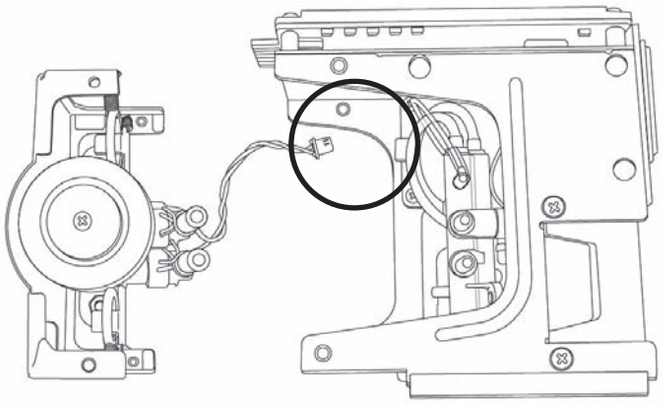
7. Remove the two fixing clips and disconnect the tubes at the manifold.





8. Slide the pump module out and disconnect the connector from the pcb.





9. Fit the new pump module following the steps above in reverse order.

9.3 Re Assembling the Detector

1. Align the PCB at the top rear of the main chassis with the connector located at the top of the mounting bracket assembly.
2. At the same time align the two tubes at the bottom rear of the main chassis with the two tubes located on the bottom of the mounting bracket assembly.
3. Slide the chassis backwards on the mounting bracket assembly so that the PCB, connector and tubes engage simultaneously.
4. Ensure the PCB, connector and tubes are fully engaged by firmly pushing the main chassis horizontally backwards on the mounting bracket assembly
   (WARNING: DO NOT PUSH ON THE LCD AS THIS MAY CAUSE DAMAGE).
5. Align the two fixing screws located at the bottom of the chassis with the screw threads on the mounting bracket assembly.
6. Tighten the screws to secure the chassis to the mounting bracket assembly.
7. Switch the power switch on the terminal module to the 'on' position.
8. Refit the detector's cover by aligning the slots either side with the locating tabs on the mounting bracket assembly.
9. Push the cover horizontally until home.
10. Tighten the thumbscrew located on the front panel.

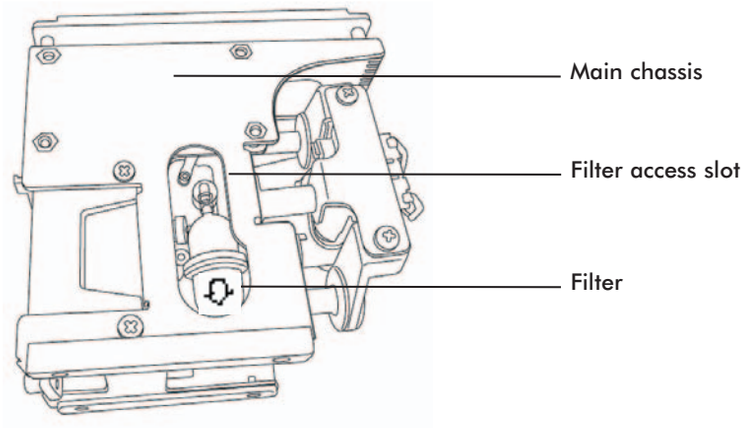
9.4 Filter Replacement

The internal filter has been designed for easy replacement.

The following procedure should be followed carefully and only performed by suitably trained personnel.

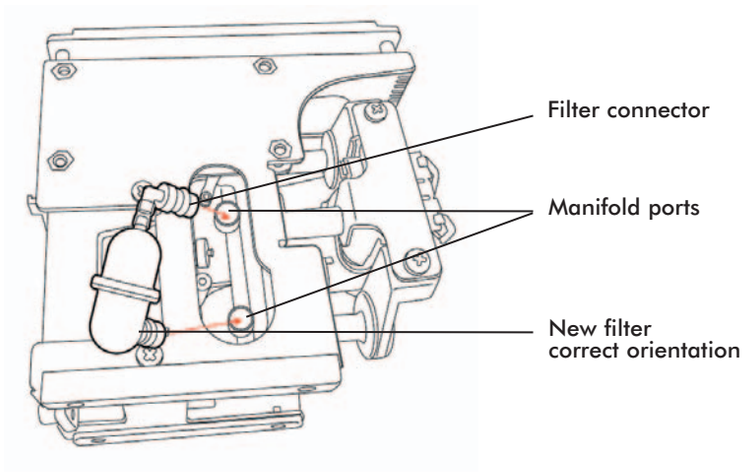
1. Isolate the power to the detector.
2. Unscrew the thumbscrew located on the front panel.
3. Remove the cover by pulling it forwards off the main chassis.
4. Unscrew the two retaining screws located at the bottom front of the chassis.
5. Pull the main chassis forward to disconnect it from the mounting bracket assembly.
6. Locate the filter access slot in the side of the main chassis.

Diagram 30. Filter location



7. Carefully disconnect both sides of the filter from the pump manifold.
8. Remove the old filter and replace with a new filter ensuring that the filter connectors are fully engaged in the manifold ports and that the filter is the correct way round (arrow pointing downwards).

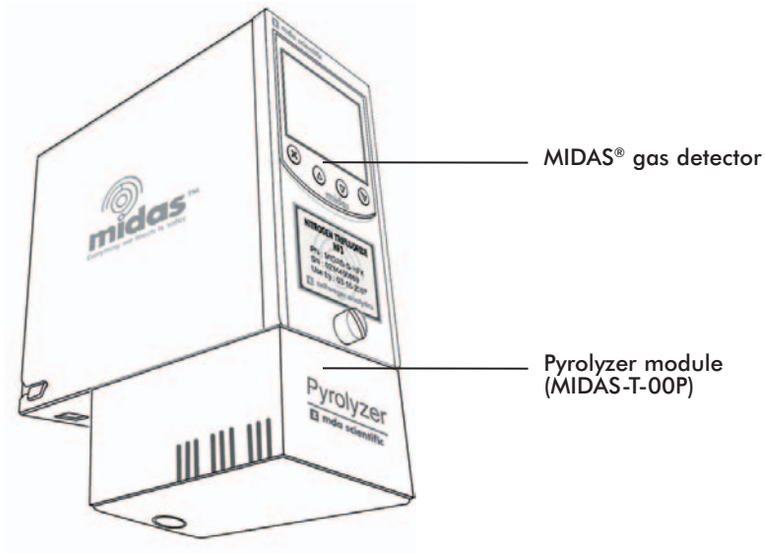
Diagram 31. Filter orientation



10 PYROLYZER MODULE OPTION

The pyrolyzer module option is installed underneath the standard MIDAS® gas detector. The air sample is drawn through the pyrolyzer to the sensor cartridge. The pyrolyzer converts Nitrogen Trifluoride (NF_3) present in the air sample into Hydrogen Fluoride (HF) by means of pyrolysis. The HF can then measured by the sensor cartridge and the concentration displayed as the equivalent reading in ppm NF_3. Contact Zellweger Analytics for the availability of other detectable gases using the pyrolyzer module.

Diagram 32. Pyrolyzer module attached to MIDAS® gas detector

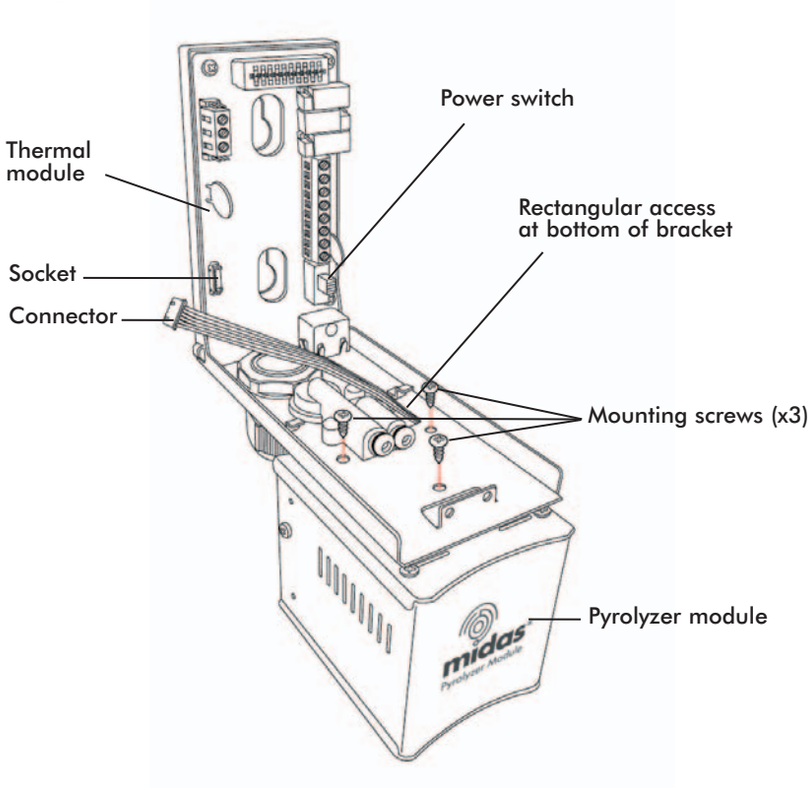


WARNING:
To maintain stated sensor performance when using the pyrolyzer, ensure the constant ambient temperature and humidity levels of the installation point do not exceed the maximum operating temperature and humidity range. This product can tolerate temporary changes in temperature and humidity, but constant exposure to higher levels of temperature and humidity will require more frequent bump testing or calibration to confirm working specification.

10.1 Fitting the Pyrolyzer Module

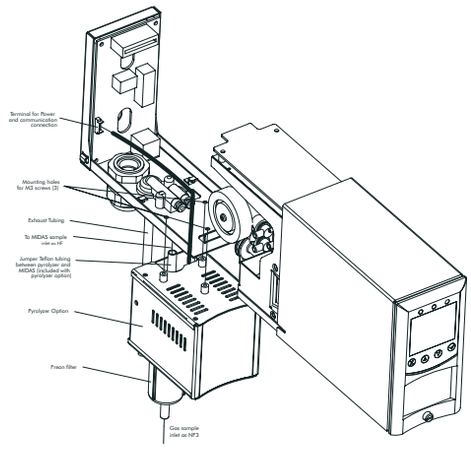
1. Isolate the power to the detector.
2. Unscrew the captive thumbscrew located on the front panel.
3. Remove the cover by pulling it forwards off the main chassis.
4. Unscrew the two captive screws located at the bottom front of the chassis.
5. Pull the main chassis forwards to disconnect it from the mounting bracket assembly.
6. Thread the connector and ribbon cable from the pyrolyzer through the rectangular access in the bottom of the mounting bracket.
7. Plug the connector into the socket (con5) at the bottom left of the terminal board.

Diagram 33. Connecting the Pyrolyzer module



8. Offer the pyrolyzer module up underneath the mounting bracket ensuring that the fitting at the top rear of the pyrolyzer mates with the sample inlet port at the bottom of the mounting bracket.
9. Align the three screw mounting bosses on the top of the pyrolyzer with the three screw holes in the mounting bracket.
10. Insert and tighten the three screws provided.

Diagram 34. Pyrolyzer main components



10.2 Re-Assembling the MIDAS® Detector

1. Align the PCB at the top rear of the main chassis with the connector located at the top of the mounting bracket assembly.
2. At the same time align the two tubes at the bottom rear of the main chassis with the two tubes located on the bottom of the mounting bracket assembly.
3. Slide the chassis backwards on the mounting bracket assembly so that the PCB and connector and tubes engage simultaneously.
4. Ensure the PCB, connector and tubes are fully engaged by firmly pushing the main chassis horizontally backwards on the mounting bracket assembly
   (WARNING: DO NOT PUSH ON THE LCD AS THIS MAY CAUSE DAMAGE).
5. Align the two fixing screws located at the bottom of the chassis with the screw threads on the mounting bracket assembly.
6. Tighten the screws to secure the chassis to the mounting bracket assembly.
7. Fit sensor cartridge MIDAS-S-HFX into the sensor cartridge chamber.
8. Switch the power switch on the terminal module to the 'on' position.
9. Refit the detector's cover by aligning the slots either side with the locating tabs on the mounting bracket assembly.
10. Push the cover horizontally until home.
11. Tighten the thumbscrew located on the front panel.
12. After applying power ensure that the sensor cartridge gas id code 08-03 is set. Refer to section 8.2.2 for details of how to set the gas id code.

The MIDAS® gas detector automatically detects the connection of the pyrolyzer module and provides all the power and signaling for the device.

Diagram 35. Pyrolyzer detail

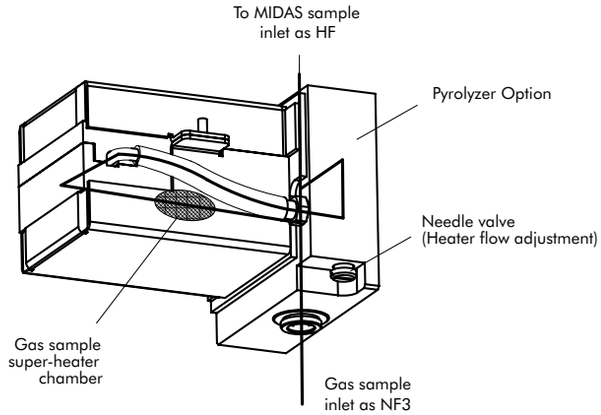


Diagram 36 shows in a simple form how the gas sample is drawn through the pyrolyzer module by the pump (located at the end of the gas path) and is first routed to the pyrolyzer via the freon filter before being resent to the gas sensor cartridge, where the gas measurement is taken. The sample continues via the flow-meter through the dust filter and is finally exhausted from the instrument. Adjustment of the gas flow through the instrument is done automatically. To perform a flow calibration refer to section 8.3.3.

Diagram 36. Pyrolyzer configuration gas flow

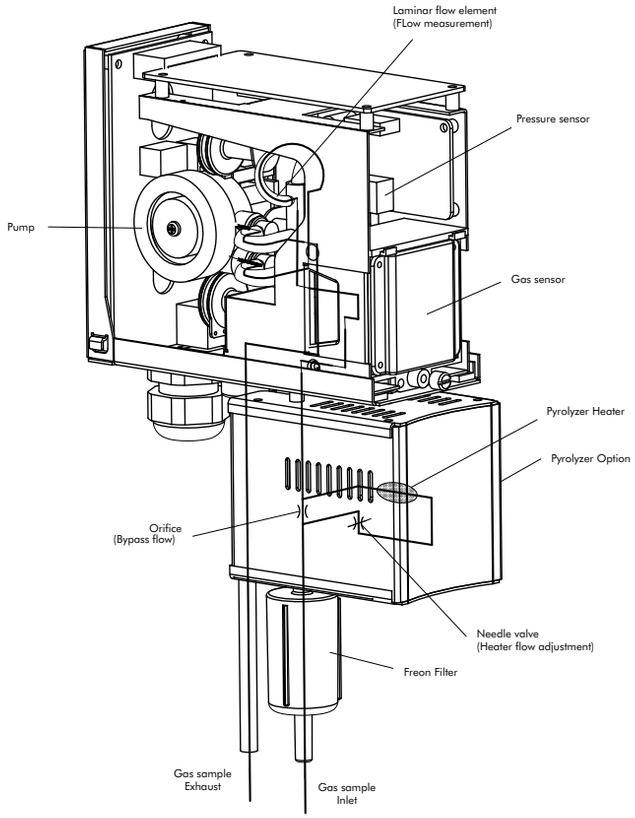
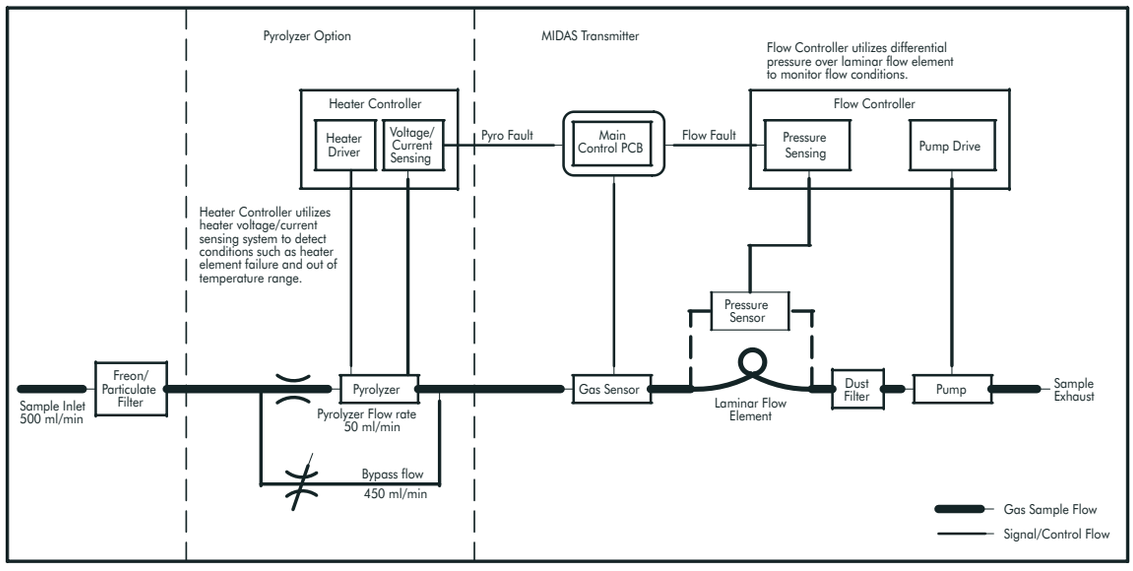


Diagram 37 shows in diagrammatic form how the gas sample flows through the various components. It shows how the instrument controls, monitors and measures the gas sample flow and signals any fault conditions to the user via the LCD screen, e.g. due to flow problems caused by pump failure, or failure of the pyrolyzer unit, etc.

Diagram 37. Pyrolyzer option flow diagram

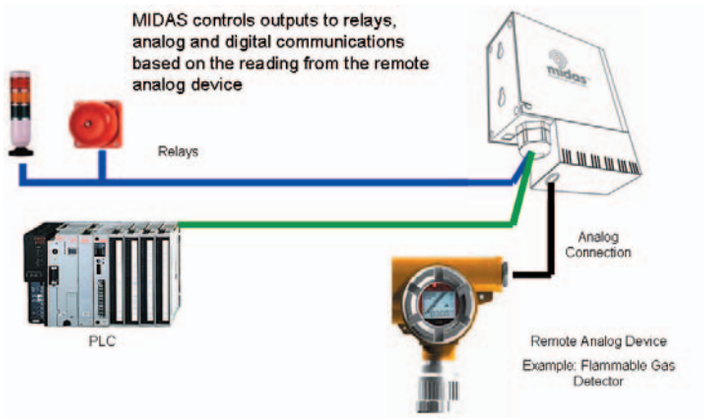


11 ANALOG INPUT MODULE

MIDAS® can be fitted with an analog module (MIDAS-T-00A) that allows it to be used as a control 'hub' for other remotely connected 4-22 mA analog detection devices such as other gas detectors, flow sensor cartridges and other industrial monitoring apparatus.

NOTE: Not all analog devices will be compatible with the MIDAS® Analog Input module. Zellweger Analytics is not responsible for ensuring the compatibility of the MIDAS® transmitter and analog input module with other manufacturers' analog output devices. Please contact your local Zellweger Analytics representative prior to ordering this option.

Diagram 38. Analog module configuration



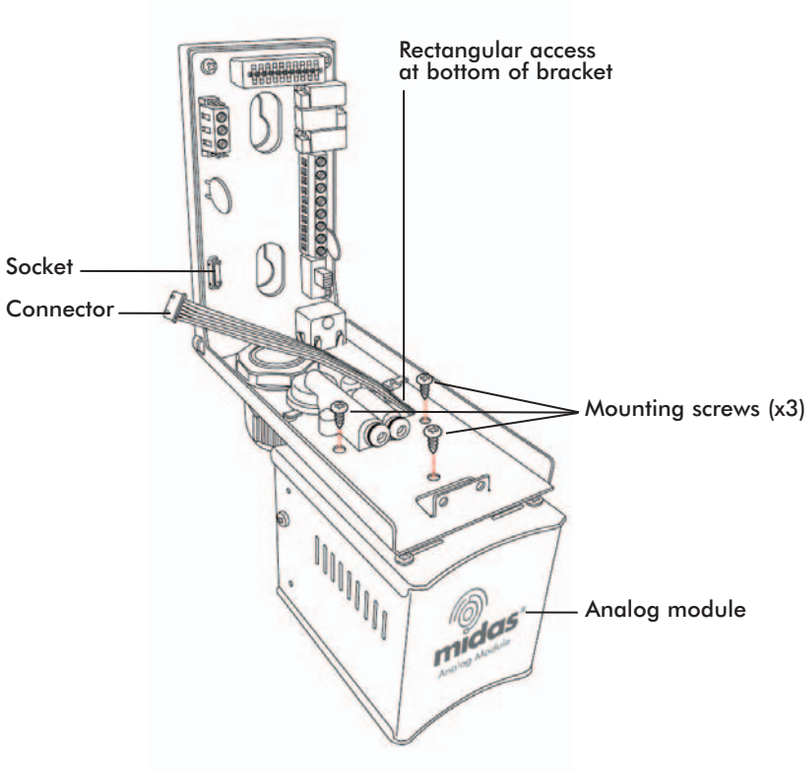
Any MIDAS® detector can be fitted with the optional analog input module that accepts the analog signal from a remote device. MIDAS® can then be configured to display the remote system's analog reading on the local LCD, trigger relays and provide a digital output via Modbus/TCP Ethernet.

For full installation and wiring instructions please refer to the separate MIDAS® Analog Input module Quick Start Guide (MIDAS-A-023) available on request from Zellweger Analytics.

11.1 Fitting the Analog Module

1. Isolate the power to the detector.
2. Unscrew the thumbscrew located on the front panel.
3. Remove the cover by pulling it forwards off the main chassis.
4. Unscrew the two retaining screws located at the bottom front of the chassis.
5. Pull the main chassis forwards to disconnect it from the mounting bracket assembly.
6. Thread the connector and ribbon cable from the analog module through the rectangular access in the bottom of the mounting bracket.
7. Plug the connector into the socket (con5) at the bottom left of the terminal board.
8. Offer the analog module up underneath the mounting bracket ensuring that the three screw mounting bosses on the top of the module align with the three screw holes in the mounting bracket.
9. Insert and tighten the three screws provided.

Diagram 39. Analog module connection.



11.2 RE-ASSEMBLING THE MIDAS® DETECTOR

1. Align the PCB at the top rear of the main chassis with the connector located at the top of the mounting bracket assembly.
2. At the same time align the two tubes at the bottom rear of the main chassis with the two tubes located on the bottom of the mounting bracket assembly.
3. Slide the chassis backwards on the mounting bracket assembly so that the PCB, connector and tubes engage simultaneously.
4. Ensure the PCB connector and tubes are fully engaged by firmly pushing the main chassis horizontally backwards on the mounting bracket assembly
   (WARNING: DO NOT PUSH ON THE LCD AS THIS MAY CAUSE DAMAGE).
5. Align the two fixing screws located at the bottom of the chassis with the screw threads on the mounting bracket assembly.
6. Tighten the screws to secure the chassis to the mounting bracket assembly.
7. Fit the dummy sensor (optional accessory MIDAS-A-013) as per Section 9.1.1
8. Switch the power switch on the terminal module to the 'on' position
9. Refit the Detector's cover by aligning the slots either side with the locating tabs on the mounting bracket assembly.
10. Push the cover horizontally until home.
11. Tighten the thumbscrew located on the front panel.

12 TROUBLE SHOOTING AND FAULT DIAGNOSIS

General trouble shooting guide and specific fault code table.

Table 20. Fault code descriptions

Fault code	Description	Condition	Recovery
m10	Over range.	A large concentration has been detected. The MIDAS® requires an independent confirmation that the gas hazard is gone.	Supply known clean air to the MIDAS® and clear this fault.
m11	Calibration expires soon.	The user specified calibration interval has elapsed.	Perform zero and span calibrations. Increase span calibration period.
m12	Cartridge expires soon.	Cartridge is old and will expire soon.	Replace the cartridge with a new cartridge.
m13	Flow low.	MIDAS® is no longer able to regulate flow.	Check filters and pump.
m14	Interferent present.	An interferent is degrading the ability of the MIDAS® to detect gas.	Check application.
m15	Temperature near limit.	Temperature within 2 Celsius of limit.	Check installation environment.
m16	BaseLine fault.	Sensor baseline has drifted.	Check for background gas concentration, temperature or humidity fluctuations. Perform zero calibration. Replace cartridge.
m17	Inhibit timeout.	Transmitter has been in inhibit mode too long.	Resume monitoring or increase timeout value.
F40	Sensor overdosed.	Sensor has been exposed to high gas concentrations for long periods.	Replace cartridge.
F41	BaseLine fault.	Sensor baseline has drifted.	Check for background gas concentration, temperature or humidity fluctuations. Perform zero calibration. Replace cartridge.
F42	Calibration expired.	Too long since last calibration.	Replace or calibrate the cartridge.
F43	Cartridge expired.	Cartridge is too old.	Replace cartridge.
F44	Cell failure.	Cartridge has failed Reflex™ check.	Replace cartridge.
F45	Stabilization timeout.	Cartridge has failed to stabilize.	If temperature or humidity shocks exist, precondition the cartridge. Check for background gas concentration. Replace cartridge.
F46	Cartridge analog failure.	Various reasons.	Replace cartridge.
F47	Cartridge memory invalid.	Checksum error.	Replace cartridge.
F48	Cartridge absent.	No communications.	Reseat cartridge. Replace cartridge.
F49	Cartridge wrong type.	Cartridge type found to be incorrect after boot-up.	Replace cartridge.
F80	Temperature limits Exceeded.	Temperature is outside limits	Check installation environment.
F81	Flow fail.	Flow < 70% of nominal for 15 seconds.	Check filters. Check for kinked tubing, Replace pump.
F82	Excessive electrical noise.	Internal electronics repeatedly noisy.	Check grounding of MIDAS® chassis. Check termination of cable shields. Relocate the MIDAS® further from noise sources. Add ferrite inductors to cables.
F83	Pyrolyzer fail.	Pyrolyzer fails to heat.	Check electrical connection to pyrolyzer. Replace heater. Replace pyrolyzer.
F84	Misc. transmitter fault.	Transmitter is defective.	Service or replace MIDAS®.

13 REFLEX®

MIDAS® uses patented Zellweger Analytics technology to continuously monitor the health check status of specific electrochemical cells and alert the user if a cell enters a variety of fault conditions (such as open or short circuit etc.) which would leave the cell unable to detect gas and raise an appropriate alarm signal.

REFLEX® overcomes this unseen failure mode by applying periodically a special electronic pulse to the cell and reviewing the 'echo' from the cell as it responds to the applied signal. If the cell is deteriorating within certain pre-set limits based on the received signals then MIDAS® will decrease the REFLEX® sampling interval in order to establish the actual viability of the cell. Within a relatively short time, MIDAS® will be able to alert the user via fault codes that the electrochemical cell is likely to be requiring replacement and is possibly unable to correctly detect gas.

REFLEX® is not required for pellistors or oxygen electrochemical cells as these sensor cartridges provide alternative electronic means to indicate open circuits and other sensor cartridge damage issues.

14 INTERNAL WEB SERVER

The MIDAS® gas detector unit utilizes an Ethernet port with the TCP/IP protocol as standard. The MIDAS® can function as a HTML web page server and these web pages can be viewed on external computer equipment (PC, PocketPC etc.). These web pages replicate the user interface on the front panel of the MIDAS® in a more flexible and friendly format for diagnostic and data entry purposes. The web pages also contain additional features not available via the keypad.

This procedure explains how to view web pages for a single MIDAS® which is connected to a single PC only. In this example the MIDAS® is separately powered by 24 VDC. Of course it is possible to connect hundreds of MIDAS® units to an Ethernet network which is part of the end user's process LAN and more information may be required from the local IT department and Zellweger Analytics as appropriate.

14.1 Physical Network Components

The Ethernet 100BaseT physical network is intended to connect computers to other computers through hubs. For this reason, a MIDAS® cannot communicate directly with a PC using a standard cable. This problem can be overcome by using a special "cross-over" Ethernet cable or by using a 'hub' or 'switch' and two standard (straight through wire connections) Ethernet cables. An example of a cross-over cable is the Belkin A3X126 family. An example of an Ethernet switch is the Linksys SD205. These or similar parts are commonly available from local IT equipment suppliers.

14.2 Internet Settings

Communications requires knowledge of the IP address and netmask of both the MIDAS® and the PC. Unless the MIDAS® is connected to a large network with a DHCP server, the addresses must be set manually. To view or set the IP address of the MIDAS®, see section 8.2.6. The procedure for setting the IP address of a PC is detailed in the following example using a PC loaded with Microsoft™ Windows XP and Internet Explorer version 5.0 or higher as illustrated by Diagram 40. In the usual case the netmask for both computers should be set to 255.255.255.0. The most-significant three bytes of the IP address must be identical and the least-significant byte must be unique. For example, if the IP address of the MIDAS® was set to 169.254.60.1 then an appropriate IP address for the PC would be 169.254.60.42.

14.3 Running the Web Browser

Start Microsoft™ Internet Explorer or similar web browser. Set the URL to "http://xxx.xxx.xxx.xxx" where the "xxx" fields are replaced with the IP address of the MIDAS®. A screen similar to Diagram 41. should be displayed. The status and configuration of the MIDAS® can be viewed and set by clicking on the appropriate links.

Diagram 40 - IP Address setting in Windows XP

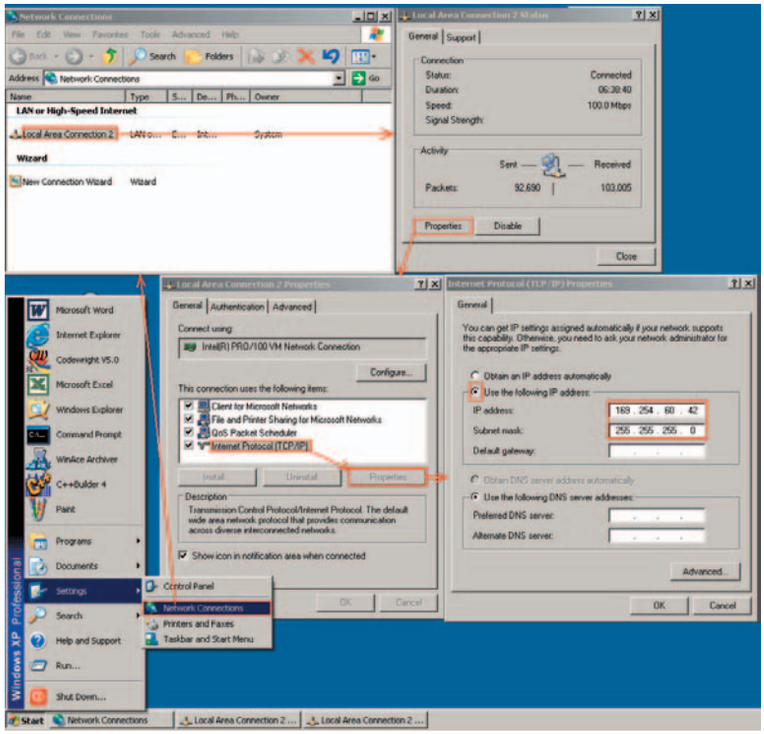
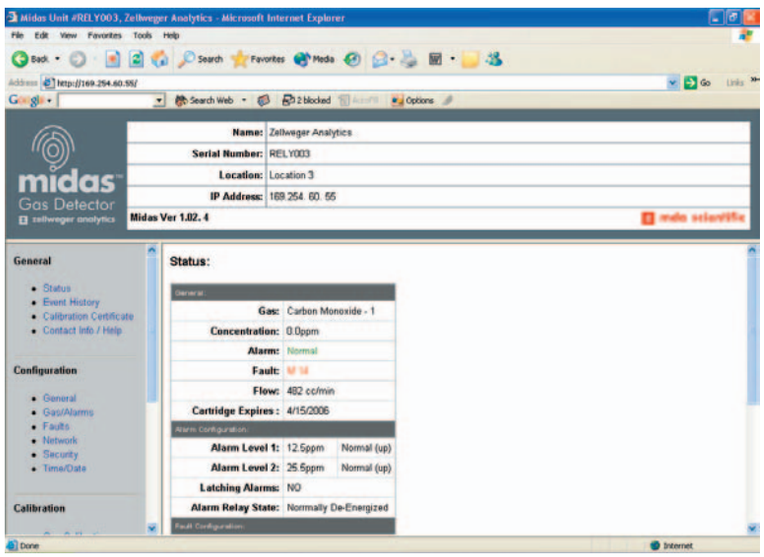


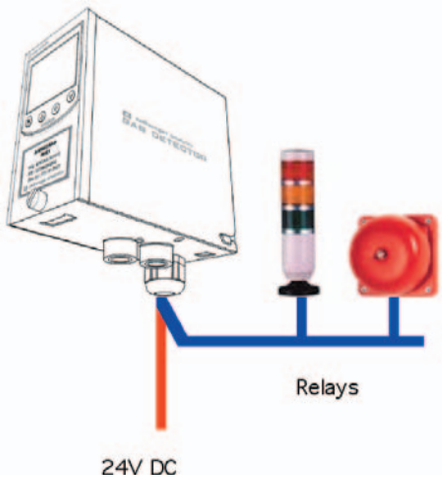
Diagram 41 - Sample MIDAS® web page

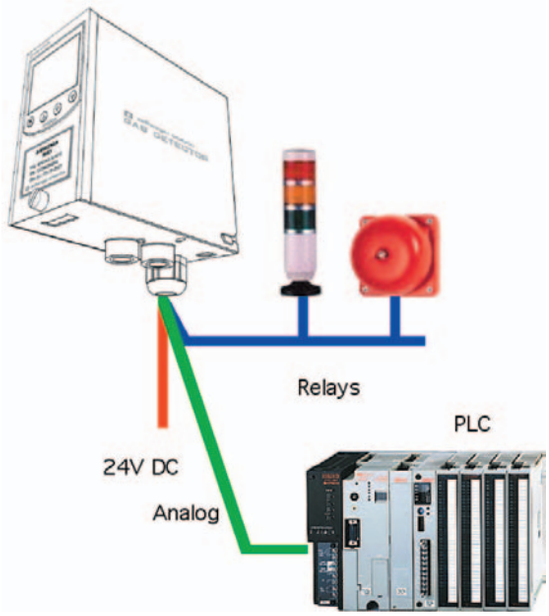


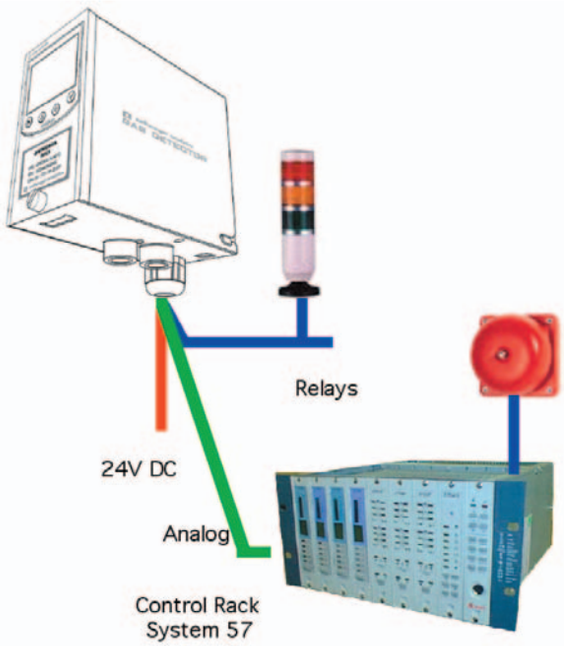
15 TYPICAL INSTALLATION TOPOLOGIES

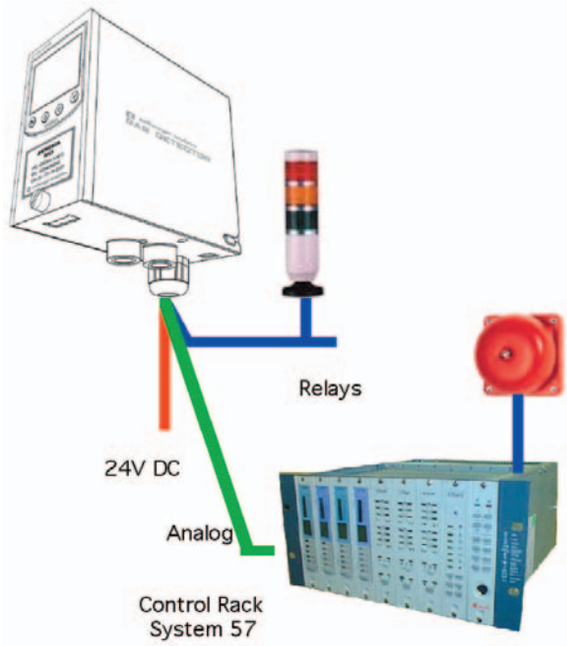
MIDAS® has very flexible installation options to allow the user to select the one most suitable for their specific application.

15.1 Conventional Installation

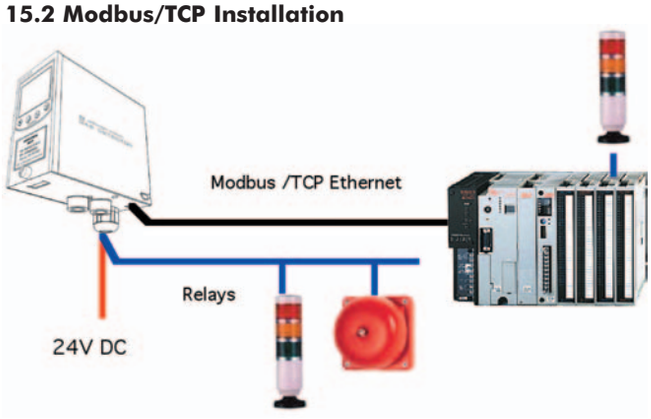




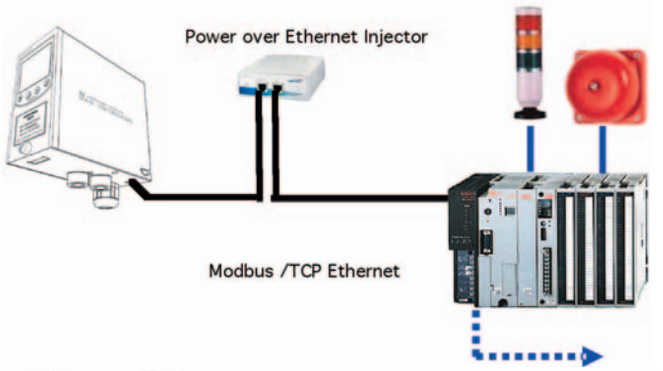


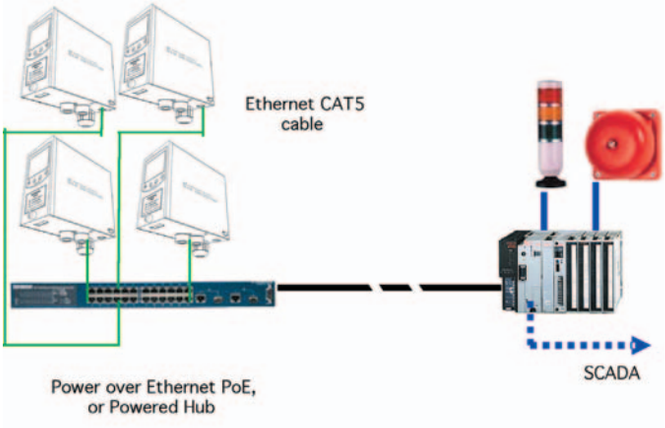


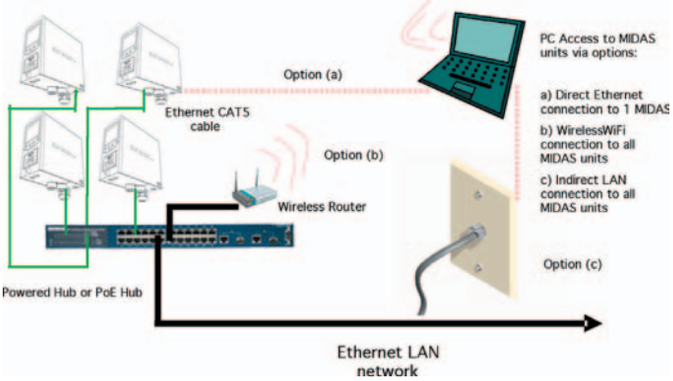
15.2 Modbus/TCP Installation



15.3 Power over Ethernet (POE) Installation







16 ORDERING INFORMATION

This section contains details of how to order complete MIDAS® detector and sensor cartridge kits, separate transmitters and sensor cartridges as well as spares and accessories.

16.1 MIDAS® Transmitter

Description	Part no.
MIDAS® transmitter. Complete with manual and quick start guide. (1) PG16 gland fitting for power in and relays out, 1/4" O.D. x 1/8" I.D. sample inlet tubing (10') [3m], 3/16" I.D. exhaust tubing (10') [3m], and a sample line tubing duct adapter. Order a sensor cartridge separately for each transmitter.	MIDAS-T-001

16.2 MIDAS® Pyrolyzer

Description	Part no.
MIDAS® Pyrolyzer Module. Pyrolyzer MIDAS® transmitters provide detection of NF3 specifically. Unit includes a snap on pyrolyzer module that operates with and universal MIDAS® Extractive Transmitter (order separately) and (1) Freon in line filter. Units are powered via direct connection to transmitter unit. Consult ZA for additional gases that may become available via pyrolysis. Pyrolyzer includes Pyrolyzer Quick Start Guide and installation screws. Order the NF_3 cartridge (MIDAS-S-HFX) separately.	MIDAS-T-00P

16.3 MIDAS® Analog INPUT Module

Description	Part no.
MIDAS® Analog Input Module. For use with the MIDAS® gas detector for connection of external 4-20 mA inputs from other 4-20 mA analog transmitter devices to be displayed on the local MIDAS® display; activation of the 3 on board relays and transmission of the signal output via 0-22 mA and TCP Modbus Ethernet output. In this configuration the transmitter cannot be configured to measure gas directly with a separate MIDAS® cartridge, which should not be installed.	MIDAS-T-00A

16.4 MIDAS® Plug in Sensor Cartridges (Standard Warranty)

The plug in sensor cartridges for the MIDAS® Gas Transmitter are sold separately with a 1 year (12 month) standard warranty. For extended warranty sensor cartridges see the section 16.5. Some sensor cartridges can be configured to detect more than 1 target gas. Details of the gases, ranges and part numbers for the standard warranty sensor cartridges available are listed below.

Description	Range	Part no.
Ammonia	0-100 ppm	MIDAS-S-NH3
Arsine	0-0.2 ppm	MIDAS-S-ASH
Boron Trichloride	0-8 ppm	MIDAS-S-HCL
Boron Trifluoride	0-8 ppm	MIDAS-S-HFX
Bromine	0-0.4 ppm	MIDAS-S-BR2
Chlorine	0-2 ppm	MIDAS-S-HAL
Chlorine Dioxide	0-0.4 ppm	MIDAS-S-BR2
Chlorine Trifluoride	0-0.8 ppm	MIDAS-S-SF4
Carbon Dioxide	0-2.0% vol	MIDAS-S-CO2
Carbon Monoxide	0-100 ppm	MIDAS-S-COX
Diborane	0-0.4 ppm	MIDAS-S-HYD
Dichlorosilane	0-8 ppm	MIDAS-S-HCL
Disilane	0-20 ppm	MIDAS-S-SHX
Fluorine	0-4 ppm	MIDAS-S-HAL
Germane	0-0.8 ppm	MIDAS-S-HYD
Hydrogen*	0-1000 ppm	MIDAS-S-H2X
Hydrogen	0-100% LEL [1]	MIDAS-S-LEL
Hydrogen Bromide	0-8 ppm	MIDAS-S-HCL
Hydrogen Chloride	0-8 ppm	MIDAS-S-HCL
Hydrogen Cyanide	0-20 ppm	MIDAS-S-HCN
Hydrogen Fluoride	0-12 ppm	MIDAS-S-HFX
Hydrogen Selenide	0-0.4 ppm	MIDAS-S-HSE
Hydrogen Sulfide	0-40 ppm	MIDAS-S-H2S
Methane	0-100% LEL [1]	MIDAS-S-LEL
Nitric Oxide	0-100 ppm	MIDAS-S-NOX
Nitrogen Dioxide	0-12 ppm	MIDAS-S-NO2
Nitrogen Trifluoride	0-40 ppm	MIDAS-S-HFX
Oxygen	0-25% v/v	MIDAS-S-O2X
Ozone	0-0.4 ppm	MIDAS-S-O3X
Phosphine	0-1.2 ppm	MIDAS-S-PH3
Phosphorous Oxychloride	0-0.8 ppm	MIDAS-S-POC
Silane	0-20 ppm	MIDAS-S-SHX
Silane low level	0-2 ppm	MIDAS-S-SHL
Sulfur Dioxide	0-8 ppm	MIDAS-S-SO2
Sulfur Tetrafluoride	0-0.8 ppm	MIDAS-S-SF4
TEOS Tetraethyl Orthosilicate	0-40 ppm	MIDAS-S-TEO
Tungsten Hexafluoride	0-12 ppm	MIDAS-S-HFX

[1] MIDAS® detectors are not ETL approved for monitoring in or sampling from classified areas above 25% LEL

16.5 MIDAS® Plug in Sensor Cartridges (Extended Warranty)

The plug in sensor cartridges for the MIDAS® Gas Transmitter are available with an extended 2 year (24 month) warranty. Some sensor cartridges can be configured to detect more than 1 target gas. Details of the gases, ranges and part numbers for the extended warranty sensor cartridges available are listed below.

Description	Range	Part no.
Ammonia	0-100 ppm	MIDAS-E-NH3
Arsine	0-0.2 ppm	MIDAS-E-ASH
Boron Trichloride	0-8 ppm	MIDAS-E-HCL
Boron Trifluoride	0-8 ppm	MIDAS-E-HFX
Bromine	0-0.4 ppm	MIDAS-E-BR2
Chlorine	0-2 ppm	MIDAS-E-HAL
Chlorine Dioxide	0-0.4 ppm	MIDAS-E-BR2
Chlorine Trifluoride	0-0.8 ppm	MIDAS-E-SF4
Carbon Dioxide	0-2.0% vol	MIDAS-E-CO2
Carbon Monoxide	0-100 ppm	MIDAS-E-COX
Diborane	0-0.4 ppm	MIDAS-E-HYD
Dichlorosilane	0-8 ppm	MIDAS-E-HCL
Disilane	0-20 ppm	MIDAS-E-SHX
Fluorine	0-4 ppm	MIDAS-E-HAL
Germane	0-0.8 ppm	MIDAS-E-HYD
Hydrogen	0-1000 ppm	MIDAS-E-H2X
Hydrogen	0-100% LEL [1]	MIDAS-E-LEL
Hydrogen Bromide	0-8 ppm	MIDAS-E-HCL
Hydrogen Chloride	0-8 ppm	MIDAS-E-HCL
Hydrogen Cyanide	0-20 ppm	MIDAS-E-HCN
Hydrogen Fluoride	0-12 ppm	MIDAS-E-HFX
Hydrogen Selenide	0-0.4 ppm	MIDAS-E-HSE
Hydrogen Sulfide	0-40 ppm	MIDAS-E-H2S
Methane	0-100% LEL [1]	MIDAS-E-LEL
Nitric Oxide	0-100 ppm	MIDAS-E-NOX
Nitrogen Dioxide	0-12 ppm	MIDAS-E-NO2
Nitrogen Trifluoride	0-40 ppm	MIDAS-E-HFX
Oxygen	0-25% v/v	MIDAS-E-O2X
Ozone	0-0.4 ppm	MIDAS-E-O3X
Phosphine	0-1.2 ppm	MIDAS-E-PH3
Phosphorous Oxychloride	0-0.8 ppm	MIDAS-E-POC
Silane	0-20 ppm	MIDAS-E-SHX
Silane low level	0-2 ppm	MIDAS-E-SHL
Sulfur Dioxide	0-8 ppm	MIDAS-E-SO2
Sulfur Tetrafluoride	0-0.8 ppm	MIDAS-E-SF4
TEOS Tetraethyl Orthosilicate	0-40 ppm	MIDAS-E-TEO
Tungsten Hexafluoride	0-12 ppm	MIDAS-E-HFX

[1] MIDAS® detectors are not ETL approved for monitoring in or sampling from classified areas above 25% LEL

16.6 MIDAS® Complete Gas Detector Kits

A complete kit including a universal MIDAS® transmitter (MIDAS-T-001) and a selected MIDAS® sensor cartridge can be ordered as a combined package. Each sensor cartridge is supplied with an extended 2 year warranty. Sensor cartridge and gas detector are packaged separately for ease of installation. Note that to detect NF_3 a separate pyrolyzer module (MIDAS-T-00P) must also be ordered.

Complete detector kit and sensor cartridge description	Kit part no.
Ammonia 0-100 ppm kit	MIDAS-K-NH3
Arsine 0-0.2 ppm kit	MIDAS-K-ASH
Boron Trichloride 0-8 ppm, Dichlorosilane 0-8 ppm, Hydrogen Bromide 0-8 ppm, Hydrogen Chloride 0-8 ppm	MIDAS-K-HCL
Boron Trifluoride 0-8 ppm, Hydrogen Fluoride 0-12 ppm, Nitrogen Trifluoride 4-40 ppm and Tungsten Hexafluoride 0-12 ppm kit	MIDAS-K-HFX
Bromine 0-0.4 ppm and Chlorine Dioxide 0-0.4 ppm kit	MIDAS-K-BR2
Chlorine 0-2 ppm and Fluorine 0-4 ppm kit	MIDAS-K-HAL
Carbon Dioxide 0-2.0% v/v kit	MIDAS-K-CO2
Carbon Monoxide 0-100 ppm kit	MIDAS-K-COX
Diborane 0-0.4 ppm and Germane 0-0.8 ppm kit	MIDAS-K-HYD
Hydrogen 0-1000 ppm kit	MIDAS-K-H2X
Hydrogen 0-100% LEL and Methane 0-100% LEL kit [1]	MIDAS-K-LEL
Hydrogen Cyanide 0-20 ppm kit	MIDAS-K-HCN
Hydrogen Selenide 0-0.4 ppm kit	MIDAS-K-HSE
Hydrogen Sulfide 0-40 ppm kit	MIDAS-K-H2S
Nitric Oxide 0-100 ppm kit	MIDAS-K-NOX
Nitrogen Dioxide 0-12 ppm kit	MIDAS-K-NO2
Oxygen 0-25% v/v kit	MIDAS-K-O2X
Ozone 0-0.4 ppm kit	MIDAS-K-O3X
Phosphine 0-1.2 ppm kit	MIDAS-K-PH3
Phosphorous Oxychloride 0-0.8 ppm kit	MIDAS-K-POC
Silane 0-20 ppm and Disilane 0-20 ppm kit	MIDAS-K-SHX
Silane low level 0-2 ppm kit	MIDAS-K-SHL
Sulfur Tetrafluoride 0-0.8 ppm and Chlorine Trifluoride 0-0.8 ppm kit	MIDAS-K-SF4
Sulfur Dioxide 0-8 ppm kit	MIDAS-K-SO2
TEOS 0-40 ppm kit	MIDAS-K-TEO

[1] MIDAS® detectors are not ETL approved for monitoring in or sampling from classified areas above 25% LEL

16.7 Accessories and Spares

Description	Part no.
Sample Line Tubing Duct Adapter	1283K1090
Heater Element for NF_3 Pyrolyzing Module	MIDAS-A-006
Replacement Pump Assembly for MIDAS® Gas Detector	MIDAS-A-007
Replacement Internal Air Filter for MIDAS® Gas Detector	MIDAS-A-009
Replacement RJ45 restraining strap	MIDAS-A-010
PoE Ethernet Injector	MIDAS-A-011
PoE 24 point Ethernet Hub	MIDAS-A-012
Dummy Sensor (for use with analog module)	MIDAS-A-013
IPA Scrubber Kit for CO applications	1283K2220
Replacement IPA Filter	1830-0080
Freon Filter for NF_3 Pyrolyzing Gas Detector	1830-0027
Flexible Conduit 21" - length	0235-0128
Flexible Conduit 27" - length	0235-0163
Flexible Conduit 36" - length	0310-2055
Operating Instructions and Quick Start Guide for MIDAS® Gas Detector - English	MIDAS-A-001
End of line particulate filter	0780248

17 General Specifications

Physical	
Size (unit with Sensor cartridge)	120 mm(H) x 63 mm(W) x 145 mm (D) (4.72 x 2.48 x 5.71 in)
Weight (unit with Sensor cartridge)	0.8 kg (1.76 lb)
Pyrolyzer Dimensions	
Size	70 mm (H) x 63 mm (W) x 80 mm (D) (2.75 x 2.48 x 3.15 in)
Weight	0.41 kg (0.9 lb)
Power Requirements:	
Operating Voltage	24 V Nominal +10 to -15%
Operating Voltage with Power over Ethernet	36-57 Vdc via PoE, 48 V Nominal
Power Consumption:	
Transmitter unit	< 5 W
With pyrolyzer	< 12.95 W
Outputs:	
Visual	Alarm, power and fault LEDs plus LCD with all gas readings and events.
Relays	Alarm1, Alarm2, Fault Relays (3) rated 1.0 A @ 30Vdc or 0.5 A @ 125 Vac, configurable as normally open or closed, latched or unlatched.
Analog	2 wire Isolated 0-22 mA, Sink or Source
Digital Communications	Modbus / TCP Ethernet / Power over Ethernet (PoE)
Service Port	RS232C / PPP protocol
Certification & Specification:	
European	CE Marked for sale in European Community Meets EN 50270:1999 (Type 2) and EN55011:2000
Environmental	ETL approved UL61010B-1 and CSA-C22.2 No. 1010.1-92
Performance	Designed to meet UL2075 (pending 2004)
Electrical	IEEE 802.3af-2003
Response Times:	
Typically	Toxic T90 < 30 seconds Catalytic T90 < 10 seconds
Transport System:	
Flow Rate	500 cc / min
Transport Time	2 – 30 seconds maximum
Performance	LDL < LAL LAL = ½ TLV (typically 12% FSD) FSD = Typically 4 x TLV
Sampling Distance:	
Tubing Length	Up to 30 m (100 feet) with FEP tubing
Ambient Point	In line air filter required
Exhaust Length	Up to 30 m (100 feet)
Operating Temperature:	
Unit with sensor cartridge	0°C to 40°C (32°F to 104°F)
Tubing Requirement:	
Sample	6.35 mm OD (1/4") x 3.18 mm (1/8"), FEP, 30 m (100 feet) maximum dependent on gas type
Exhaust	6.35 mm (1/4") OD x 4.76 mm (3/16"), FEP, 30 m
Wiring Requirement:	
4- 20mA	2 wire, 14 AWG maximum
Digital	CAT5 cable or equivalent; RJ45 connector

Gas Concentration Display & Interface:	
Instrument	4-digit alphanumeric display with separate units, flow rate bar graph and other icon driven indicators. 4 button interface membrane keypad
Remote	Option for PC / PDA internet browser access via Ethernet or other Bus system
Warranty:	
Transmitter Unit	1 year
Sensor cartridge	1 year standard, 2 years with extended warranty program
Expected lifetime of pump	2 years
Mounting:	Wall mounted using pre-drilled holes on chassis
Case Material:	Painted steel

18 Calibration and Bump Testing

All MIDAS® sensor cartridges are pre-calibrated by Zellweger Analytics using traceable gas standards and approved calibration methods to a proven ISO 9000 quality controlled procedure. The MIDAS® sensor cartridge design is very robust and resistant to long term drift; in fact in a normal operating environment it is possible to extend the calibration interval with MIDAS® up to 24 months (subject to local requirements concerning calibrations). This design feature is another element that supports MIDAS® as a long term cost effective gas detection solution.

NOTE: It is the sole responsibility of each user to determine their own calibration and bump test schedule based on their own safety assessments and understanding of local requirements.

Calibration of an electrochemical sensor cartridge is a relatively complex discipline to master and it is possible that in less ideal field conditions the calibration can be far less accurate than under laboratory conditions and therefore substantial inaccuracies can be introduced. In the absence of any formal calibration policy by the end user and due to the low drift and long lifetime of the MIDAS® equipment, it is acceptable that the original factory calibrations can be retained where appropriate thereby ensuring a high degree of accuracy of calibration

Care must be taken to ensure that the correct materials for an extractive application are obtained from reputable suppliers and are of proven quality and composition. Inappropriate calibration equipment will lead to under - or over-presenting the wrong concentration of gas to the sensor cartridge during the calibration period. Likewise contaminated or inadequately flushed tubing and other gas-wet surfaces can also introduce errors into the calibration process. Only qualified, trained personnel should attempt to perform gas calibrations; contact your local Zellweger Analytics Service Representative for further details on calibration services

Bump tests are also used as a quick, low cost and approximate means to present a controlled gas release to the sensor cartridge in order to verify that the transmitter does respond accordingly. Bump testing is popular as typical experiences show that a smaller list of cheaper and easier to handle gases can be used to provide functional tests on a wider range of gas types. In the absence of a formal calibration policy from the end user, Zellweger Analytics would recommend a minimum annual schedule of at least one 'bump test' per sensor with the appropriate test gas (see details below).

The risks of bump testing are that it may reduce sensor cartridge lifetime and the accuracy of the calibration if applied incorrectly or too frequently. Testing sensor cartridges with non target gases can also lead to errors and drift related effects.

MIDAS® sensor cartridges have their calibration and bump test gases documented in data sheets that are readily available from Zellweger Analytics.

WARNING:
To maintain stated sensor performance when using the pyrolyzer, ensure the constant ambient temperature and humidity levels of the installation point do not exceed the maximum operating temperature andhumidity range. This product can tolerate temporary changes in temperature and humidity, but constant exposure to higher levels of temperature and humidity will require more frequent bump testing or calibrationto confirm working specification.

The following table indicates the recommended calibration or bump test gas for the MIDAS® sensor cartridges:

Please consult with your Zellweger Analytics Service Representative for approved methods and materials before commencing calibrations and bump tests.

Gas Name	Chemical Formula	Range	Sensor Cartridge Part Number	Calibration Gas	Recommended Bump Test Gas
Ammonia	NH_3	0-100 ppm	MIDAS-S-NH3	Ammonia	Ammonia
Arsine	AsH_3	0-0.2 ppm	MIDAS-S-ASH	Arsine	Phosphine
Boron Trichloride	BCl_3	0-8.0 ppm	MIDAS-S-HCL	Hydrogen Chloride	Chlorine
Boron Trifluoride	BF_3	0-8.0 ppm	MIDAS-S-HFX	Hydrogen Fluoride	Chlorine
Bromine	Br_2	0-0.4 ppm	MIDAS-S-BR2	Chlorine	Chlorine
Carbon Dioxide	CO_2	0-2.0% vol	MIDAS-S-CO2	Carbon Dioxide	Carbon Dioxide
Carbon Monoxide	CO	0-100 ppm	MIDAS-S-COX	Carbon Monoxide	Carbon Monoxide
Chlorine	Cl_2	0-2.0 ppm	MIDAS-S-HAL	Chlorine	Chlorine
Chlorine Dioxide	ClO_2	0-0.4 ppm	MIDAS-S-BR2	Chlorine	Chlorine
Chlorine Trifluoride	ClF_3	0-0.8 ppm	MIDAS-S-SF4	Hydrogen Fluoride	Chlorine
Diborane	B_2H_6	0-0.4 ppm	MIDAS-S-HYD	Diborane	Phosphine
Dichlorosilane	H_2SiCl_2	0-8.0 ppm	MIDAS-S-HCL	Hydrogen Chloride	Chlorine
Disilane	Si_2H_6	0-20 ppm	MIDAS-S-SHX	Silane	Hydrogen Sulfide
Fluorine	F_2	0-4.0 ppm	MIDAS-S-HAL	Chlorine	Chlorine
Germane	GeH_4	0-0.8 ppm	MIDAS-S-HYD	Diborane	Phosphine
Hydrogen (% LEL)	H_2	0-100% LEL [1]	MIDAS-S-LEL	Hydrogen	Hydrogen
Hydrogen (ppm)	H_2	0-1000 ppm	MIDAS-S-H2X	Hydrogen	Hydrogen
Hydrogen Bromide	HBr	0-8.0 ppm	MIDAS-S-HCL	Hydrogen Chloride	Chlorine
Hydrogen Chloride	HCl	0-8.0 ppm	MIDAS-S-HCL	Hydrogen Chloride	Chlorine
Hydrogen Cyanide	HCN	0-20 ppm	MIDAS-S-HCN	Hydrogen Cyanide	Carbon Monoxide
Hydrogen Fluoride	HF	0-12 ppm	MIDAS-S-HFX	Hydrogen Fluoride	Chlorine
Hydrogen Selenide	H_2Se	0-0.4 ppm	MIDAS-S-HSE	Silane	Hydrogen Sulfide
Hydrogen Sulfide	H_2S	0-40 ppm	MIDAS-S-H2S	Hydrogen Sulfide	Hydrogen Sulfide
Methane (% LEL)	CH_4	0-100% LEL [1]	MIDAS-S-LEL	Hydrogen	Hydrogen
Nitrogen Dioxide	NO_2	0-12 ppm	MIDAS-S-NO2	Nitrogen Dioxide	Nitrogen Dioxide
Nitrogen Oxide	NO	0-100 ppm	MIDAS-S-NOX	Nitric Oxide	Nitric Oxide
Nitrogen Trifluoride	NF_3	0-40 ppm	MIDAS-S-HFX	Hydrogen Fluoride	Chlorine
Oxygen Proficiency & Deficiency	O_2	0-25% vol	MIDAS-S-O2X	Oxygen	Air
Ozone	O_3	0-0.4 ppm	MIDAS-S-O3X	Ozone	Chlorine
Phosphine	PH_3	0-1.2 ppm	MIDAS-S-PH3	Phosphine	Phosphine
Phosphorous Oxychloride	$POCl_3$	0-0.8 ppm	MIDAS-S-POC	Hydrogen Chloride	Chlorine
Silane	SiH_4	0-20 ppm	MIDAS-S-SHX	Silane	Hydrogen Sulfide
Silane (low level)	SiH_4	0-2.0 ppm	MIDAS-S-SHL	Silane	Hydrogen Sulfide
Sulfur Dioxide	SO_2	0-8.0 ppm	MIDAS-S-SO2	Sulfur Dioxide	Sulfur Dioxide
Sulfur Tetrafluoride	SF_4	0-0.8 ppm	MIDAS-S-SF4	Hydrogen Fluoride	Chlorine
Tetra Ethyl Ortho Silicate	TEOS	0-40 ppm	MIDAS-S-TEO	TEOS	Carbon Monoxide
Tungsten Hexafluoride	WF_6	0-12 ppm	MIDAS-S-HFX	Hydrogen Fluoride	Chlorine

[1] MIDAS® detectors are not ETL approved for monitoring in or sampling from classified areas above 25% LEL

Bump Testing MIDAS®

A bump test is not intended to be an accurate calibration, but is used as a confidence check to ensure that the gas detection system is functional. Since some of the target gases are difficult to handle, bump testing often makes use of cross sensitivities so that more convenient gases can be used.

Equipment

The following items are required:

Test gas (see table)

Special regulator for extractive use (if using field calibration cylinder) or suitable sample bag (if not sampling directly from cylinder)

Tubing (suitable for gas being applied)

Preparation

Most of the test gases are highly toxic. It is essential that personnel using these toxic gases be trained in their use. Ensure that the test gas will be vented safely.

Applying test gas may cause alarm, fault or maintenance fault indications on the 4-20 mA loop, relays or digital outputs. Before starting a test, ensure that suitable steps have been taken to prevent these indications from triggering unwanted actions. The MIDAS® has a special mode for bump testing where the alarm outputs are inhibited (see section 8.4.1).

To test extractive systems we recommend the use of a gas sample bag and allow the extractive unit to draw a sample of gas at its normal working flow rate. Suitable sample bags are available from SKC Inc. (www.skcinc.com). Special regulators for extractive applications to use with field calibration cylinders are also available.

If non-PTFE-lined tube has to be used, response times may be longer than expected, especially when using chlorine. In this case, it is especially important to keep the tubing short.

The pyrolyzer should be tested in the same way as an extractive system, but using NF_3 as the test gas. If NF_3 is not available, chlorine can be used at a concentration of 5 ppm. If using chlorine, the freon filter must be removed from the unit before the test and replaced after the test.

NOTE: A test with chlorine operates the electrochemical cell and the unit's electronics, but does not test the pyrolyzer module itself.

Target Gas	Formula	Cartridge Part No.	Range (ppm)	Recommended Bump Test Gas	Conc. (ppm)	Flow Rate (cc/min)	Max. Time
Ammonia	NH_3	MIDAS-S-NH3	100	Ammonia	50	500	120
Arsine	AsH_3	MIDAS-S-ASH	0.2	Phosphine	0.5	500	120
Boron Trichloride	BCl_3	MIDAS-S-HCl	8	Chlorine	5	500	120
Boron Trifluoride	BF_3	MIDAS-S-HFX	8	Chlorine	5	500	120
Bromine	Br_2	MIDAS-S-BR2	0.4	Chlorine	Low	500	120
Carbon Dioxide	CO_2	MIDAS-S-CO2	2% v/v	Carbon Dioxide	2% v/v	500	120
Carbon Monoxide	CO	MIDAS-S-COX	100	Carbon Monoxide	100	500	120
Chlorine	Cl_2	MIDAS-S-HAL	2	Chlorine	2	500	120
Chlorine Dioxide	ClO_2	MIDAS-S-BR2	0.4	Chlorine	Low	500	120
Chlorine Trifluoride	ClF_3	MIDAS-S-SF4	0.8	Chlorine	Low	500	120
Diborane	B_2H_6	MIDAS-S-HYD	0.4	Phosphine	0.5	500	120
Dichlorosilane	SH_2Cl_2	MIDAS-S-HCl	10	Chlorine	5	500	120
Disilane	Si_2H_6	MIDAS-S-SHX	20	Hydrogen Sulfide	< 25	500	120
Fluorine	F_2	MIDAS-S-HAL	4	Chlorine	5	500	120
Germane	GeH_4	MIDAS-S-HYD	0.8	Phosphine	0.5	500	120
Hydrogen	H_2(ppm)	MIDAS-S-H2X	1,000	Hydrogen	1000	500	120
Hydrogen	H_2(%LEL)	MIDAS-S-LEL	100% LEL	Methane		500	120

Target Gas	Formula	Cartridge Part No.	Range (ppm)	Recommended Bump Test Gas	Conc. (ppm)	Flow Rate (cc/min)	Max. Time
Hydrogen Bromide	HBr	MIDAS-S-HCl	8	Chlorine	5	500	120
Hydrogen Chloride	HCl	MIDAS-S-HCl	8	Chlorine	5	500	120
Hydrogen Cyanide	HCN	MIDAS-S-HCN	20	Sulfur Dioxide	15	500	120
Hydrogen Fluoride	HF	MIDAS-S-HFX	12	Chlorine	5	500	120
Hydrogen Selenide	H_2Se	MIDAS-S-HSE	0.4	Hydrogen Sulfide	Low	500	120
Hydrogen Sulfide	H_2S	MIDAS-S-H2S	40	Hydrogen Sulfide	25	500	120
Methane	CH_4	MIDAS-S-LEL	100% LEL	Methane		500	120
Nitric Oxide	NO	MIDAS-S-NOX	100	Nitric Oxide	50	500	120
Nitrogen Dioxide	NO_2	MIDAS-S-NO2	12	Nitrogen Dioxide	10	500	120
Nitrogen Trifluoride	NF_3	MIDAS-S-HFX	40	Chlorine	5	500	120
Oxygen	O_2	MIDAS-S-O2X	25% v/v	Air		500	120
Ozone	O_3	MIDAS-S-O3X	0.4	Chlorine	Low	500	120
Phosphine	PH_3	MIDAS-S-PH3	1	Phosphine	0.5	500	120
Phosphorus Oxychloride	$POCl_3$	MIDAS-S-POC	0.8	Chlorine	Low	500	120
Silane	SiH_4	MIADS-S-SHX	2	Hydrogen Sulfide	< 25	500	120
Silane	SiH_4	MIDAS-S-SHL	20	Hydrogen Sulfide	< 25	500	120
Sulfur Dioxide	SO_2	MIDAS-S-SO2	8	Sulfur Dioxide	8	500	120
Sulfur Tetrafluoride	SF_4	MIDAS-S-SF4	0.8	Chlorine	Low	500	120
TEOS	TEOS	MIDAS-S-TEO	40	Carbon Monoxide	100	500	120
Tungsten Tetrafluoride	WF_6	MIDAS-S-HFX	12	Chlorine	5	500	120

Notes

1. If Phosphine is not available, Hydrogen Sulfide can be used to test these sensors. Use a concentration of 2 ppm. Important: this should only be done once to avoid the danger of poisoning the sensor.
2. The ambient Oxygen level is typically 20.9% by volume. If there is a serious problem with an Oxygen sensor, the reading will not be 20.9%. As an extra check, the sensor can be breathed on or temporarily blocked. In either case the reading should decrease.
3. The flow rate is regulated by the Midas unit.

All test gases must be in a balance of air, not Nitrogen.

As an alternative, the actual target gas can always be used instead of a cross-sensitive gas.

Higher concentrations than the recommended ones can be used if necessary, but extra time may be needed for the reading to recover to zero.

IMPORTANT: Do not exceed the recommended concentrations or application times where Hydrogen Sulfide is used to test Silane. Doing this can damage the cell.

Finishing

Wait for the gas reading to return to normal levels. This may take some time, especially if concentrations above the recommended levels have been used or if the test gas has been applied for an extended period of time.

Ensure that any latched faults or alarms that have been generated by the testing have been cleared.

Make sure that the gas detection system is fully restored to its normal operating state and that any control system overrides used during the testing have been removed.

The alarms generated by the testing will have created entries in the transmitter's history log.

Troubleshooting

If the test does not produce a satisfactory result, check the following points.

1. Check the gas cylinder concentration and type are correct
2. Check the expiration date of the cylinder.
3. Check that there is sufficient gas left in the cylinder.
4. Check that there are no leaks on the test system.
5. Make sure that the tubing length is as short as possible and that there are no blockages.
6. Make sure that the transmitter is not displaying a fault before the test is started.

19 Warranty Statement

All products are designed and manufactured to the latest internationally recognized standards by Zellweger Analytics under a Quality Management System that is certified to ISO 9001.

As such, this instrument (including the pump) is warranted under proper use, to the original end-user purchaser, against defects in materials and workmanship within 24 months from the date of first turn-on. Separate warranty conditions apply to the sensor cartridges limited as indicated below. During this period, Zellweger Analytics will repair or replace defective parts on an exchange basis, F.O.B. to approved service centers on a global basis.

This warranty does not cover damage caused by accident, abuse, abnormal operating conditions or extreme poisoning of the sensor cartridge.

Defective goods must be returned by the Buyer at the Buyer's own expense to Zellweger Analytics premises accompanied by a detailed report stating the nature of the defect. Returned goods must detail the Service Event Number (SE#) clearly on the package and the Buyer shall obtain an SE# by contacting Zellweger Analytics in advance.

If no such report is included then Zellweger Analytics reserves the right to charge an investigative fee (prices available upon request) before any repair or replacement is performed.

Zellweger Analytics shall not be liable for any loss or damage whatsoever or howsoever occasioned which may be a direct or indirect result of the use or operation of the Contract Goods by the Buyer or any Party.

This warranty covers the gas detector and parts sold to the Buyer only by authorized distributors, dealers and representatives as appointed by Zellweger Analytics. A warranty claim will only be accepted if a proof of purchase is submitted and all conditions obtained within this Warranty are met. When in the opinion of Zellweger Analytics, a warranty claim is valid, Zellweger Analytics will repair or replace the defective product free of charge and send it or any replacement back.

The initial warranty period is not extended by virtue of any works carried out there under.

The decision to repair or replace parts shall be determined by Zellweger Analytics.

Sensor Cartridge Warranties

All sensor cartridges are supplied with a standard 12 months (1 year) warranty; sensor cartridges purchased with an extended warranty for 24 months (2 year) cover period have the same conditions as the standard cartridge conditions as detailed below but for the longer time period of 24 months.

1. The oxygen sensor cartridge is guaranteed to operate satisfactorily for one year from the date of sale (i.e. the date of shipment) and will be replaced at no charge within that period only if it will not provide a correct reading after calibration by authorized service personnel. Physical or chemical damage, resulting from exposure to improper elements, is not covered.
2. The combustible (LEL) sensor cartridge is guaranteed to operate satisfactorily for one year from the date of sale (i.e. from date of shipment). If it will not provide a correct reading after calibration by authorized service personnel, it will be replaced at no charge within that period. This guarantee is void if it has been contaminated by some unusual substance, including but not limited to, water and/or other liquids, oily compounds, corrosives, silicones, lead vapors, extremely high concentrations of combustible gases, and various particulates which may inhibit gas flow to the sensor cartridge element.
3. The toxic sensor cartridges are guaranteed to operate satisfactorily for one year from the date of sale (i.e. the date of shipment). They will be replaced at no charge within that period only if they will not provide a correct reading after calibration by authorized service personnel, and only if the sensor cartridge membranes exhibit no physical or chemical damage resulting from exposure to improper substances.

Note that the MIDAS® sensor cartridge stores an electronic history of each individual sensor cartridge's manufacture, warranty and calibration activity that is accessible by authorized Service personnel.

Conditions and Exclusions

To maintain this warranty, purchaser must perform maintenance and appropriate testing as prescribed in the instrument operation manual, including prompt replacement or repair of defective parts and such other necessary calibration, maintenance and repair as may be required in the reasonable judgment of Zellweger Analytics. Normal wear and tear, and parts damaged by abuse, misuse, negligence or accidents are specifically excluded from the warranty.

Purchaser acknowledges that, notwithstanding any contrary term or provision in the purchaser's purchase order or otherwise, the only warranty extended by Zellweger Analytics is the express warranty contained herein. Purchaser further acknowledges that there are no other warranties expressed or implied, including without limitation, the warranty of merchantability or fitness for a particular purpose; that there are no warranties which extend beyond the description of the face hereof; that no oral warranties, representations, or guarantees of any kind have been made by Zellweger Analytics, its distributors or the agents of either of them, that in any way alter the terms of this warranty; that Zellweger Analytics and its distributors shall in no event be liable for any consequential or incidental damages, including but not limited to injury to the person or property of the purchaser or others, and from other losses or expenses incurred by the purchaser arising from the use, operation, storage or maintenance of the product covered by the warranty; that Zellweger Analytics liability under this warranty is restricted to repair or replacement of defective parts at Zellweger Analytics sole option; and that Zellweger Analytics neither assumes nor authorizes any other person to assume for it any other warranty. The warranty shall be void if serial numbers affixed to the products are removed, obliterated or defaced.

Contact Zellweger Analytics

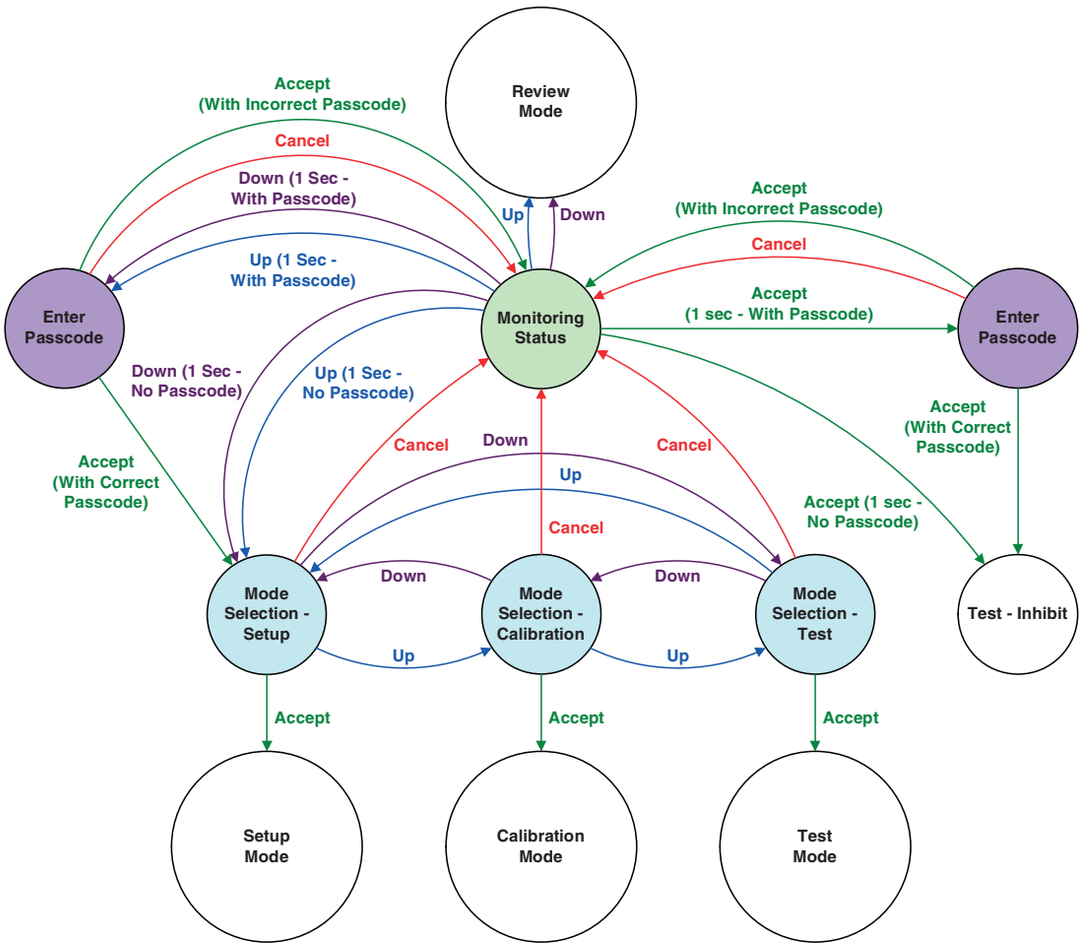
For all information on ordering, spares and other technical issues please contact the Zenter Customer Center:

Zellweger Analytics – Zenter USA
400 Sawgrass Corporate Pkwy.
Suite 100
Sunrise, FL 33325 USA
Tel: +1 954 514 2700
Toll Free: +1 800 538 0363
Fax: +1 954 514 2784
Email: sales@zelana.com
Website: www.zelana.com

Zellweger Analytics – Zenter Europe & Asia
Wilstrasse 11-U11
CH-8610 Uster
Switzerland
+ 41 (0) 1 943 4300
+41 (0) 1 943 4398
sales@zelana.co.uk

20 SOFTWARE MENU STATE CHARTS

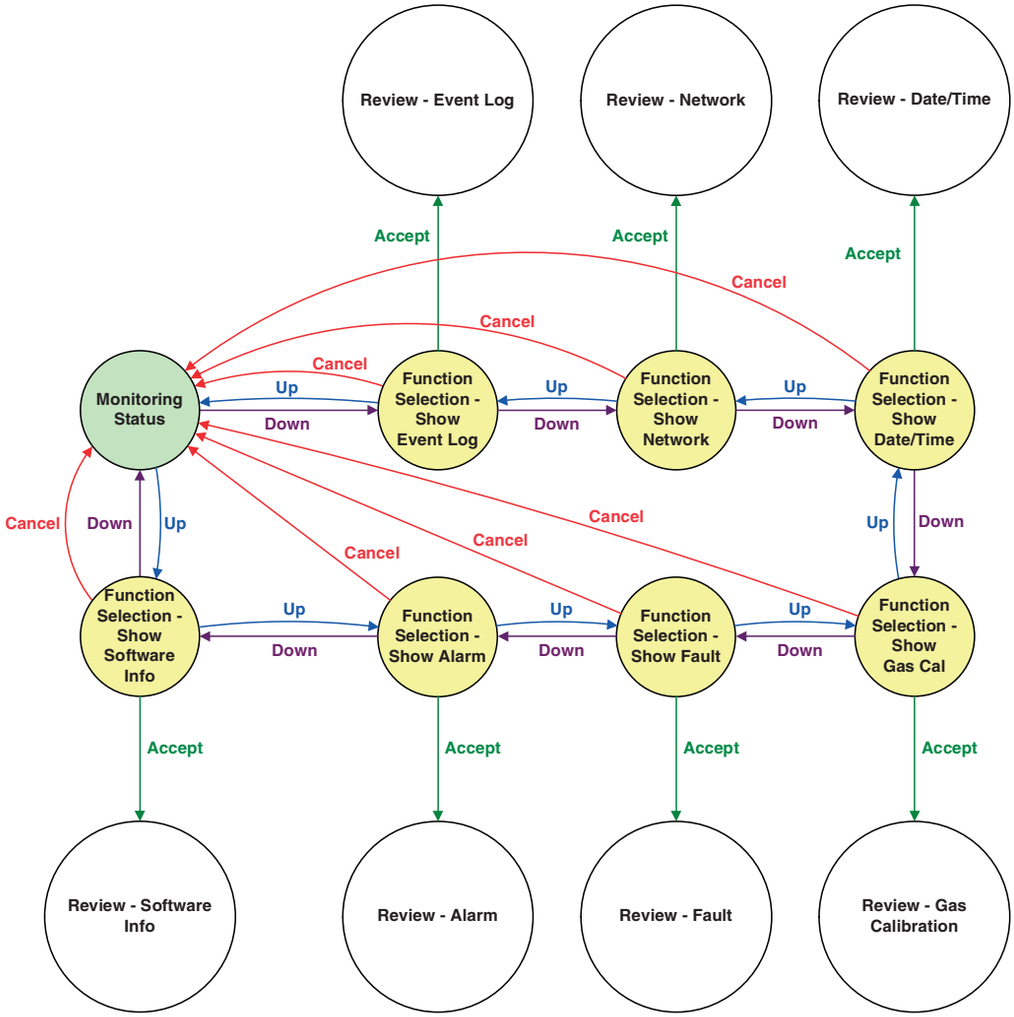
20.1 Top Level



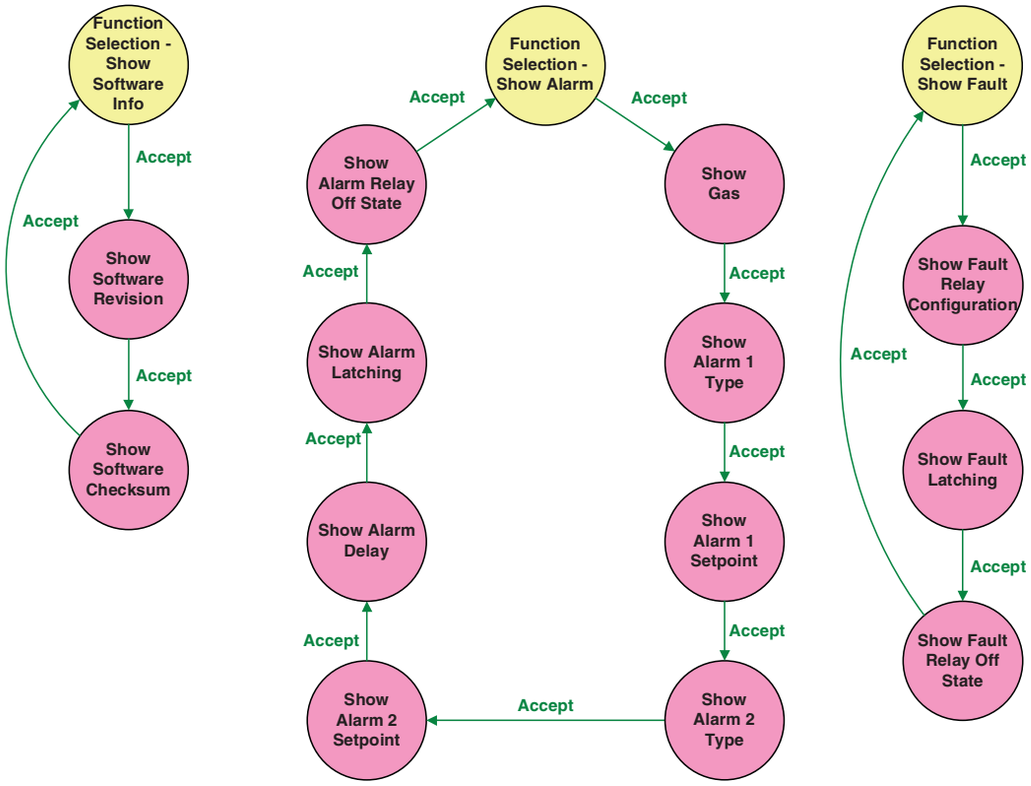
Additional Button Functions

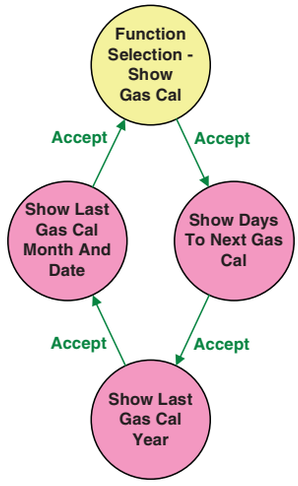
	Monitor
Accept (Check)	
Up	
Down	
Cancel (X)	Reset Alarms and Faults (2 Sec Hold)

20.2 Review Mode



20.3 Review Software Info, Alarm, Fault and Gas Calibration

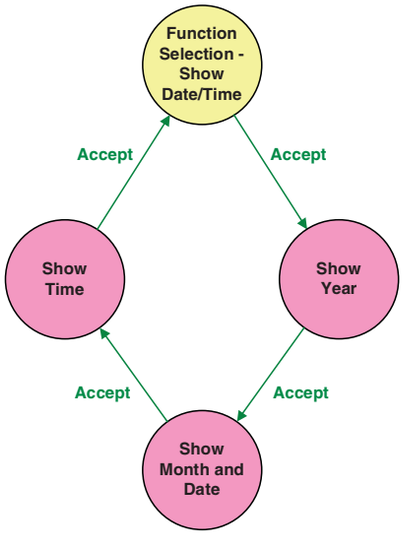


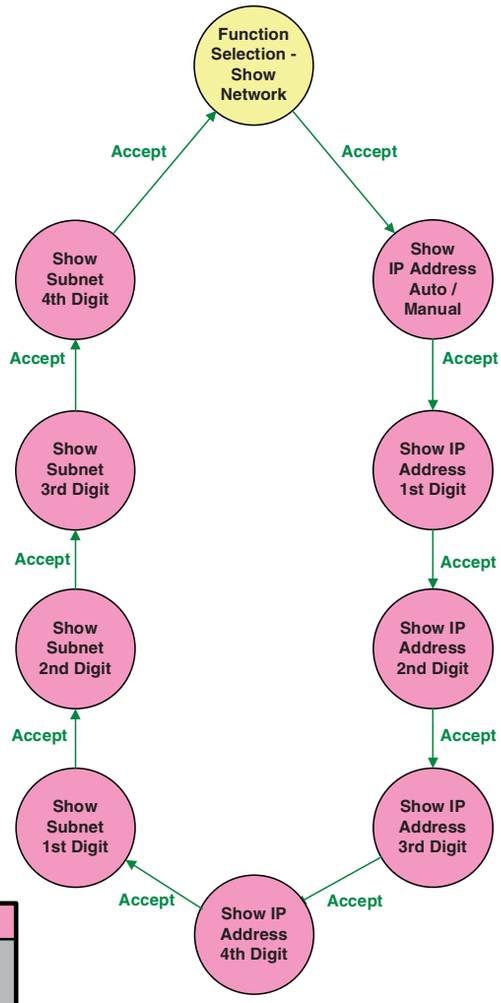


Additional Button Functions

	Review
Accept (Check)	
Up	Goes to next Function Selection state. See Review state chart for Function Selection sequence.
Down	Goes to previous Function Selection state. See Review state chart for Function Selection sequence.
Cancel (X)	Returns to Normal Operation - Monitoring

20.4 Review Date/Time and Network

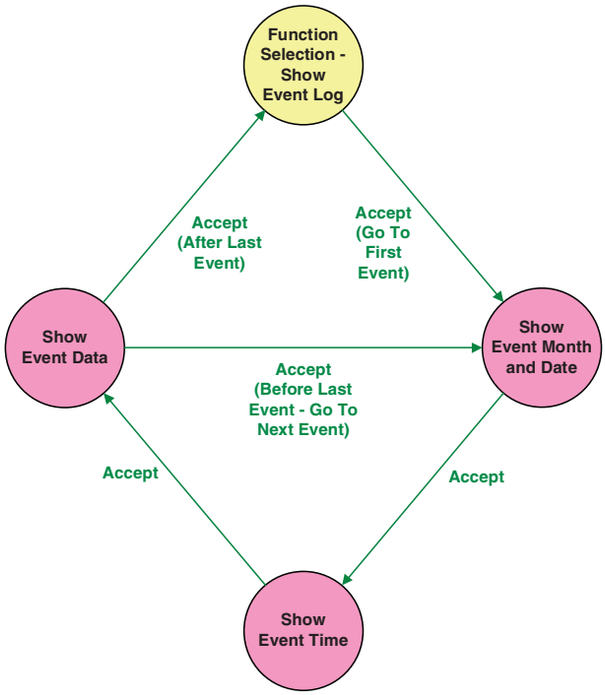




Additional Button Functions

	Review
Accept (Check)	
Up	Goes to next Function Selection state. See Review state chart for Function Selection sequence.
Down	Goes to previous Function Selection state. See Review state chart for Function Selection sequence.
Cancel (X)	Returns to Normal Operation - Monitoring

20.5 Review Event Log

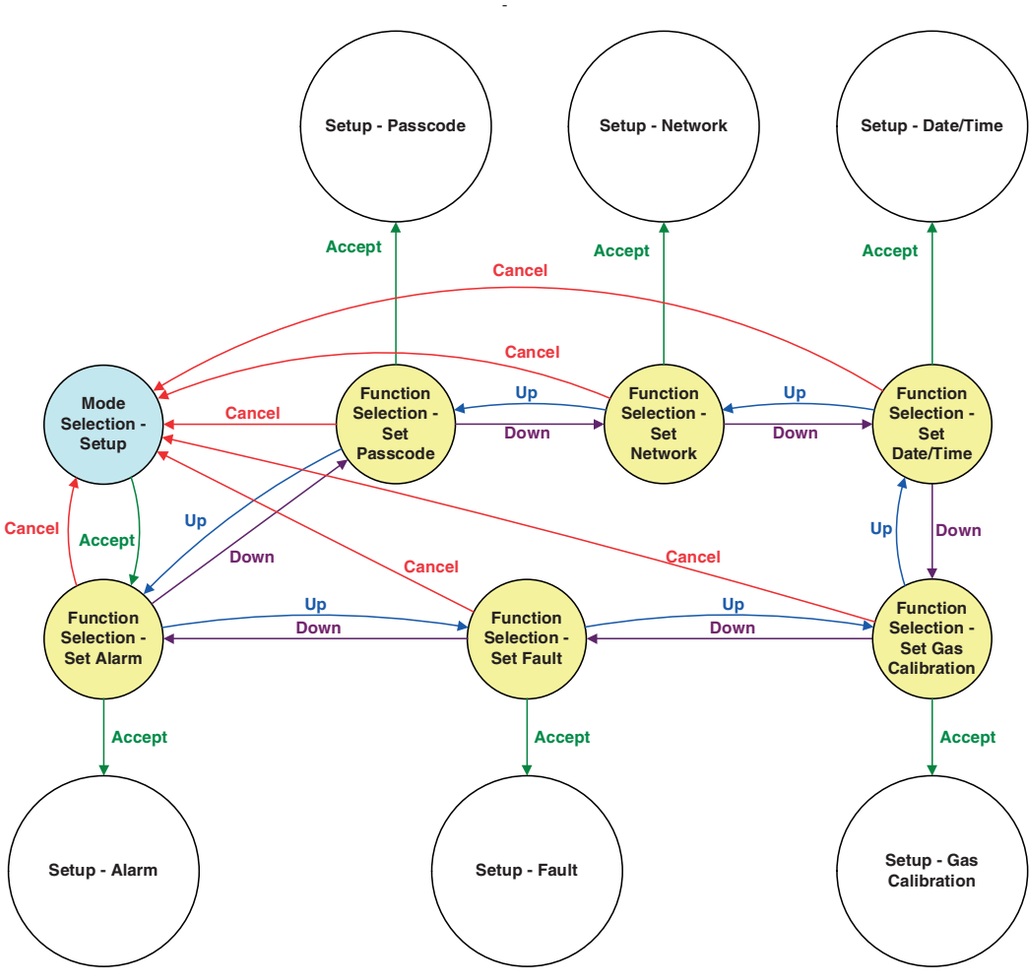


Notes:
1) Events are in chronological order starting with the newest event.
2) Maximum number of events is 7.
3) At Function Selection - Show Event Log, the dots from the flow meter show the number of events available.
4) When showing event data, the dots from the flow meter show the index of the current event.

Additional Button Functions

	Review
Accept (Check)	
Up	Goes to next Function Selection state. See Review state chart for Function Selection sequence.
Down	Goes to previous Function Selection state. See Review state chart for Function Selection sequence.
Cancel (X)	Returns to Normal Operation - Monitoring

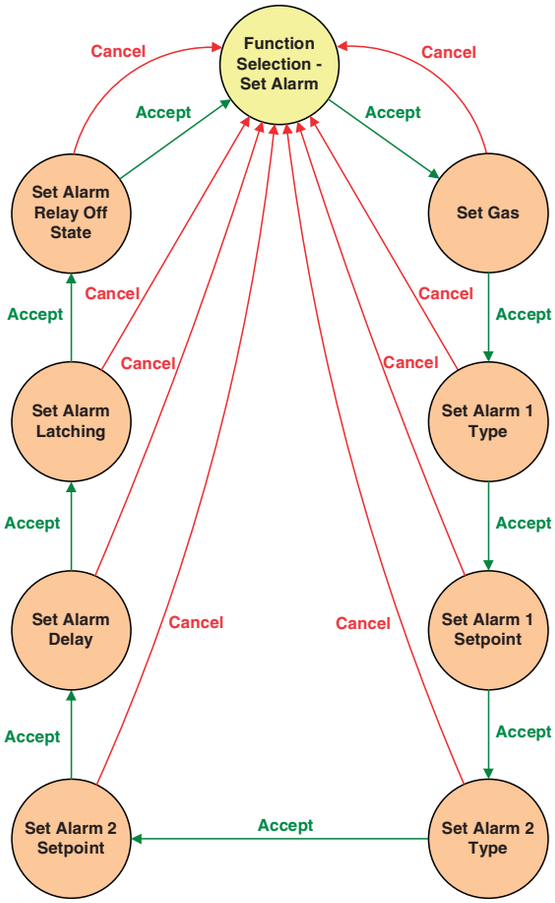
20.6 Set-up Mode

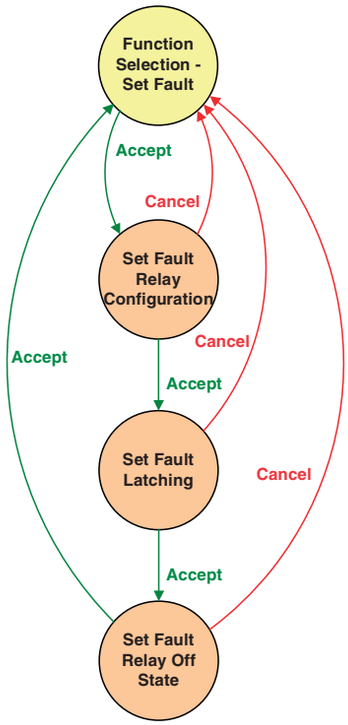


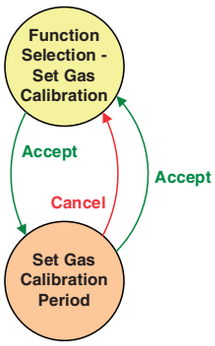
Additional Button Functions

	Setup
Accept (Check)	
Up	When at Function Selection, 1 second hold goes to Function Selection - Zero Gas Calibration in Calibration.
Down	When at Function Selection, 1 second hold goes to Function Selection - Bump Test in Test.
Cancel (X)	

20.7 Set-up Alarm, Fault and Gas Calibration



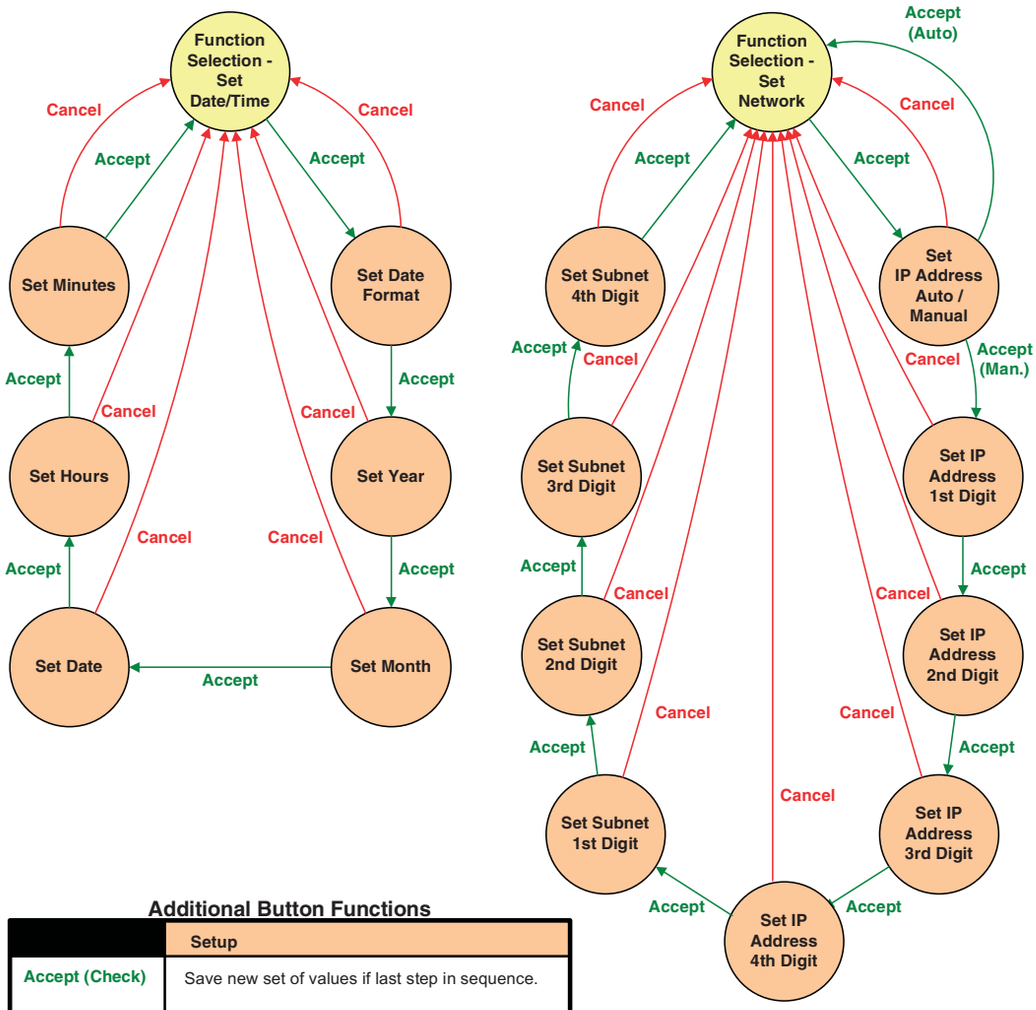




Additional Button Functions

	Setup
Accept (Check)	Save new set of values if last step in sequence.
Up	When setting value, increments or toggle value (1 second hold for faster increment).
Down	When setting value, decrements or toggle value (1 second hold for faster decrement).
Cancel (X)	Abort changes.

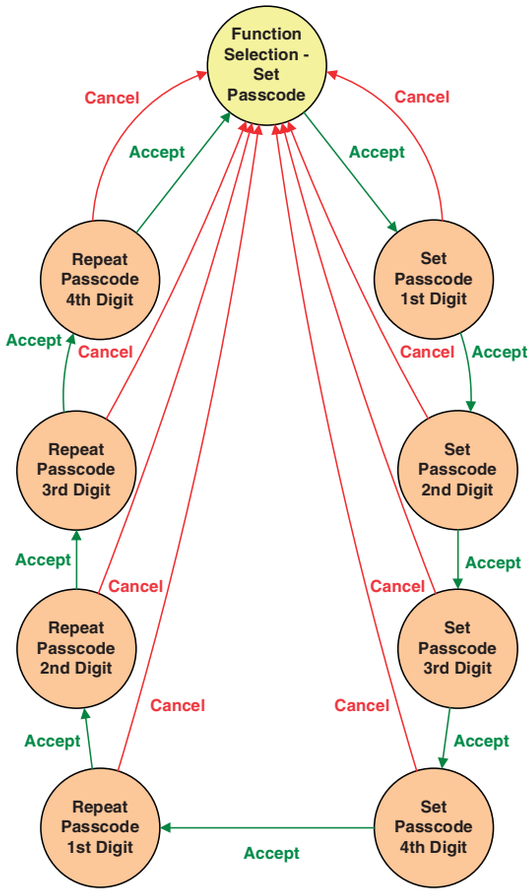
20.8 Set-up Date/Time and Network



Additional Button Functions

	Setup
Accept (Check)	Save new set of values if last step in sequence.
Up	When setting value, increments or toggle value (1 second hold for faster increment).
Down	When setting value, decrements or toggle value (1 second hold for faster decrement).
Cancel (X)	Abort changes.

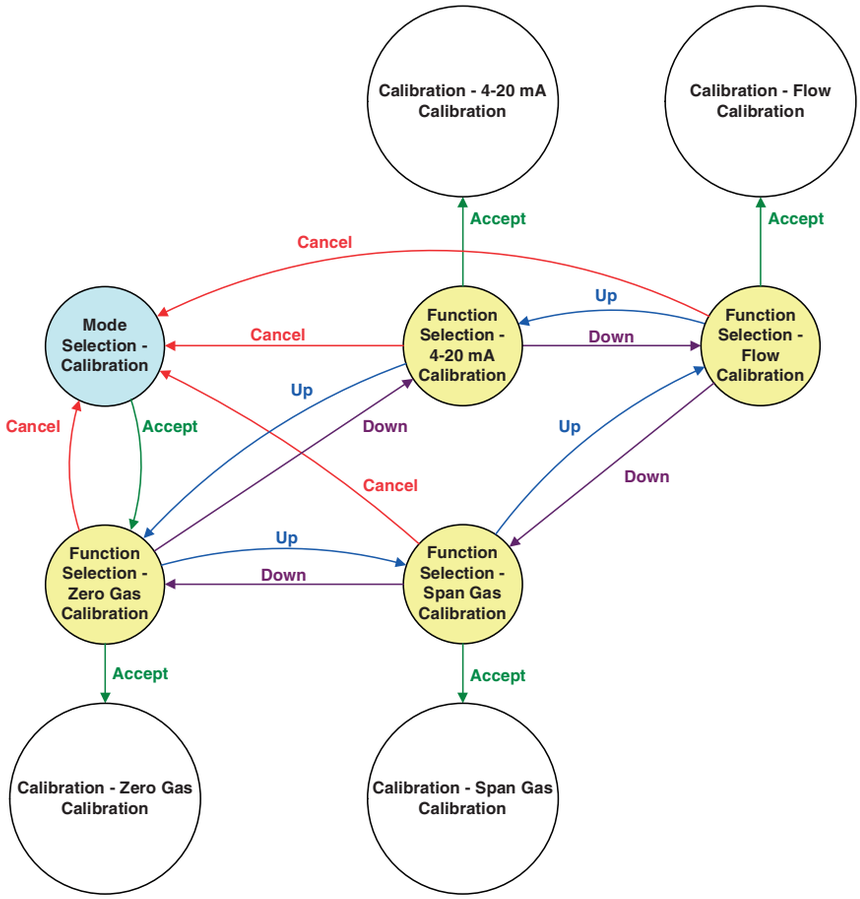
20.9 Set-up Pass Code



Additional Button Functions

	Setup
Accept (Check)	Saves new passcode after last entry if the two entered passcodes are the same.
Up	When setting value, increments value (1 second hold for faster increment).
Down	When setting value, decrements value (1 second hold for faster decrement).
Cancel (X)	Abort changes.

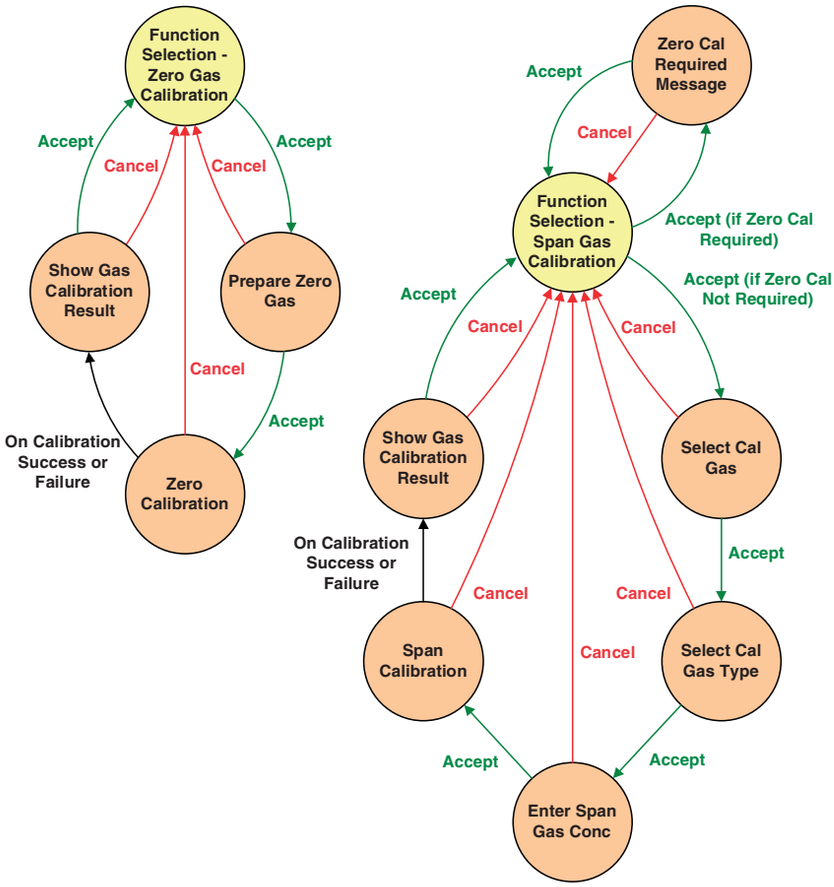
20.10 Calibration Mode



Additional Button Functions

	Calibration
Accept (Check)	
Up	When at Function Selection, 1 second hold goes to Function Selection - Bump Test in Test.
Down	When at Function Selection, 1 second hold goes to Function Selection - Set Alarm in Setup.
Cancel (X)	

20.11 Calibration Gas Zero and Span



Calibration Status Indicators In Gas Bottle Icon (based on last 5 seconds)

■	Stable
▲	Over-Range
▲ ■	Unstable -Rising
▲ ■ ▼	Unstable - Flat
■ ▼	Unstable - Falling
▼	Under-Range

Additional Button Functions

	Calibration
Accept (Check)	At Calibration Result state, saves new calibration values if calibration was successful.
Up	When setting value, increments value (1 second hold for faster increment).
Down	When setting value, decrements value (1 second hold for faster decrement).
Cancel (X)	Abort changes

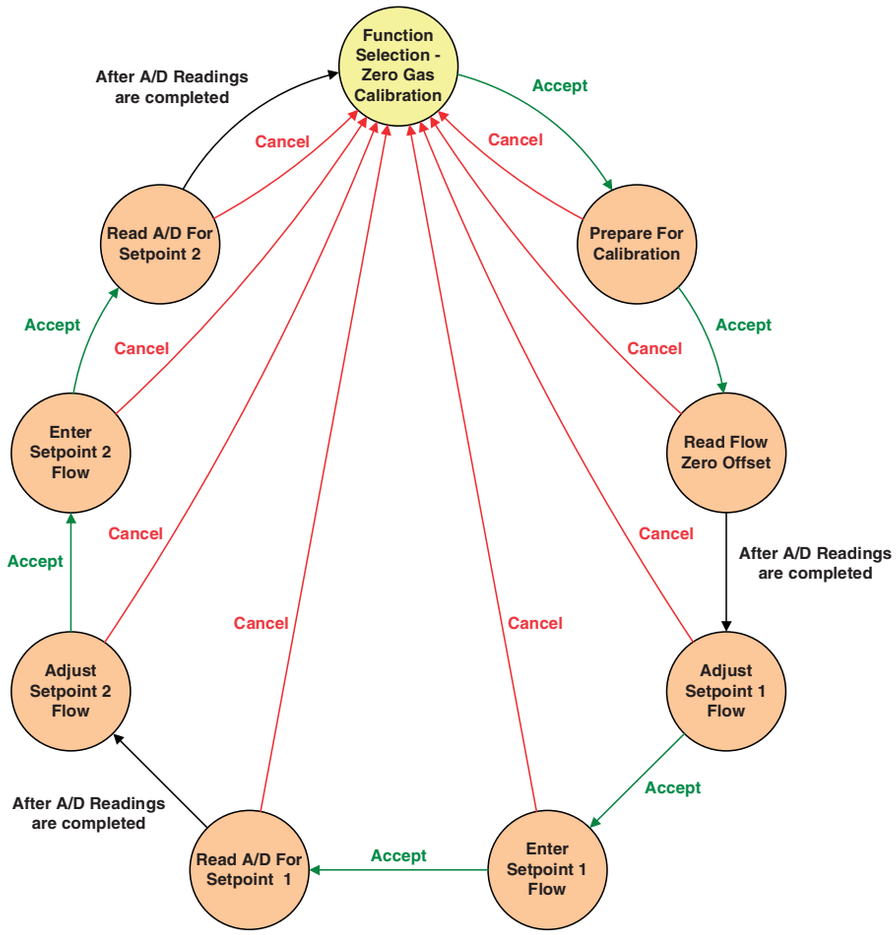
Gas Calibration Result Codes:

PASS	Successful Calibration
FL:0H	Zero Calibration Timeout - Over-Range
FL:0L	Zero Calibration Timeout - Under-Range
FL:0U	Zero Calibration Timeout - Unstable
FL:SH	Span Calibration Timeout - Over-Range
FL:SL	Span Calibration Timeout - Under-Range
FL:SU	Span Calibration Timeout - Unstable

Current Settings:

Max Delta for Stability = 2% of Full Scale
Zero Gas Range = +/- 10% of Full Scale
Span Gas Range = Target Conc +/- 20% of Full Scale
Stable Time Required For Calibration Success = 15 seconds
Calibration Timeout = 60 seconds

20.12 Calibration - Flow Calibration



Additional Button Functions

	Calibration
Accept (Check)	
Up	When adjusting flow, increases flow (simulated on flow slider). When entering flow, increments value (1 second hold for faster increment).
Down	When adjusting flow, decreases flow (simulated on flow slider). When entering flow, decrements value (1 second hold for faster decrement).
Cancel (X)	Abort changes

Notes:

1) Setpoint 1 values:
- **Target Flow: 350 cc/min**
- **Minimum Flow: 300 cc/min**
- **Maximum Flow: 400 cc/min**

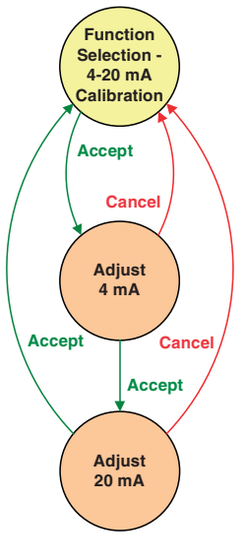
2) Setpoint 2 values:
- **Target Flow: 650 cc/min**
- **Minimum Flow: 600 cc/min**
- **Maximum Flow: 700 cc/min**

3) For "Adjust Flow" states, flow would be adjust to approximately the target flow rate using the arrow buttons and would be measured on an external flowmeter.

4) For "Enter Flow" states, the actual flow shown on the external flowmeter would be entered.

5) For "Read Flow" states, the display will count down the read process. Final values would be saved after the Read Setpoint 2 Flow state.

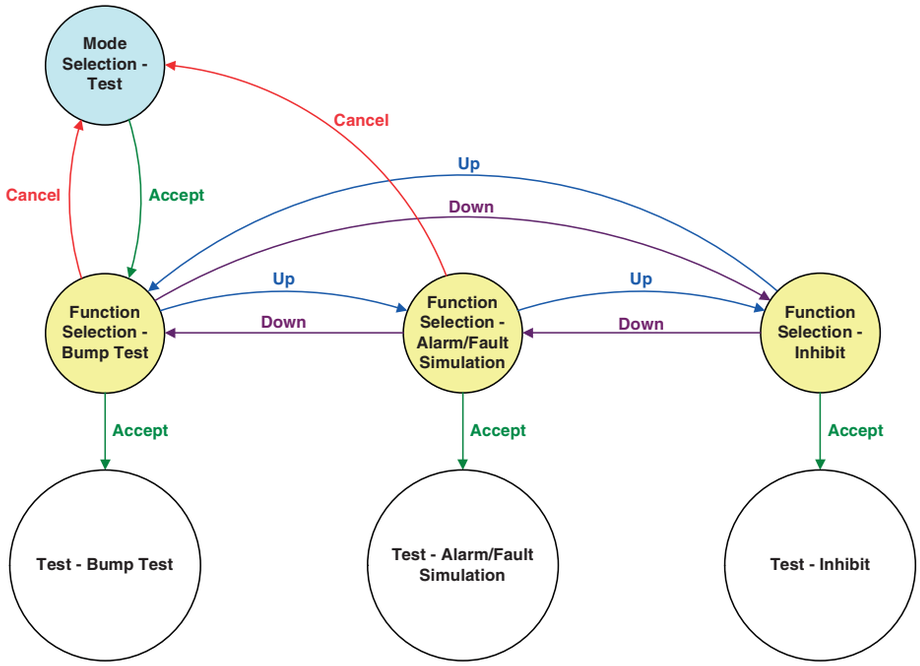
20.13 Calibration - 4-20 mA



Additional Button Functions

	Calibration
Accept (Check)	Saves new calibration values after last adjustment.
Up	When adjusting, increases output level (1 second hold for continuous increase).
Down	When adjusting, decreases output level (1 second hold for continuous decrease).
Cancel (X)	Abort changes.

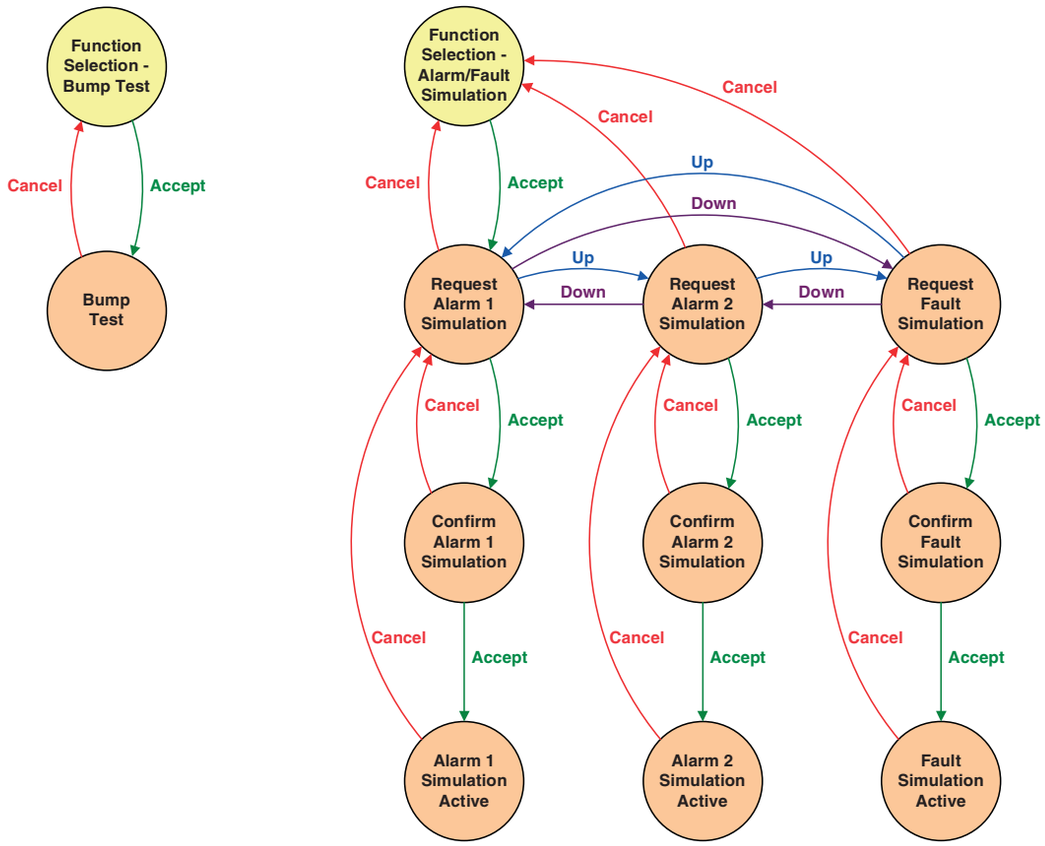
20.14 Test Mode



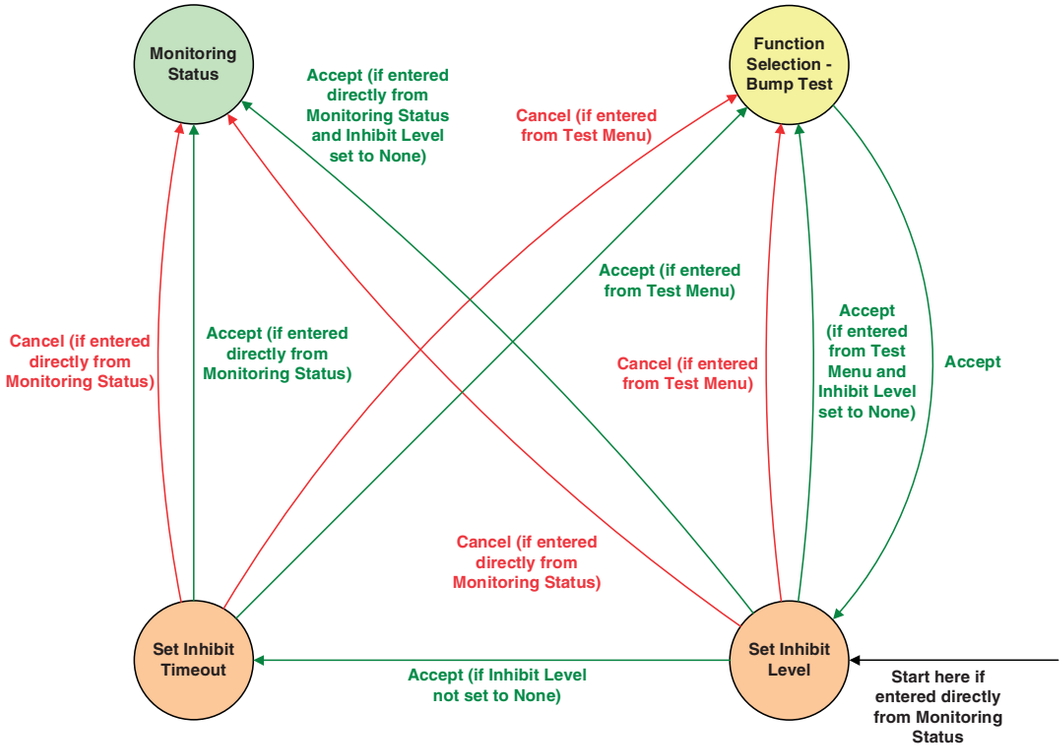
Additional Button Functions

	Test
Accept (Check)	
Up	When at Function Selection, 1 second hold goes to Function Selection - Set Alarm in Setup.
Down	When at Function Selection, 1 second hold goes to Function Selection - Zero Gas Calibration in Calibration.
Cancel (X)	

20.15 Test Bump, Alarm/Fault Simulation



20.16 Test Inhibit



Additional Button Functions

	Test
Accept (Check)	At Set Inhibit Timeout state or Set Inhibit Level state (if Inhibit is None), saves new values.
Up	When setting value, increments value (1 second hold for faster increment).
Down	When setting value, decrements value (1 second hold for faster decrement).
Cancel (X)	Abort changes

The inhibit levels are:

a) None - no functions are inhibited.

b) Alarms Inhibited - alarm events will be detected, but alarm outputs (relays, 4-20 mA current loop and Ethernet) will be disabled.

c) Alarms and Faults Inhibited - alarm and fault events will be detected, but alarm and fault outputs (relays, 4-20 mA current loop and Ethernet) will be disabled.

d) Full Inhibit - all monitoring functions inhibited. No monitoring is performed and not alarms or faults (except for Inhibit Timeout) will be reported.

21 Contact Details

Contact your local Zellweger Analytics representative or visit Zellweger Analytics' web site at: http://www.zelana.com

Specifications subject to change without notification.

MDA Scientific and MIDAS® are registered trademarks of Zellweger Analytics, Inc.

For Emergency (after hours) Service, call: +1 (847) 634-2840

zenter
customer business centre

ZENTER EUROPE
Wilstrasse 11-U11
CH-8610 Uster
Switzerland
Tel: +41 (0)1 943 4300
Fax: +41 (0)1 943 4398
sales@zelana.co.uk

zenter
customer business center

ZENTER AMERICAS
Zellweger Analytics Distribution, Inc.
400 Sawgrass Corporate Pkwy.
Suite 100
Sunrise, FL 33325
Tel: +1 954 514 2700
Toll free: +1 800 538 0363
Fax: +1 954 514 2784
sales@zelana.com

ASIA PACIFIC
Tel: +65 6862 7701
Email: za.ap@zelana.com

BELGIUM
Tel: +32 (0) 70 223 024
Email: za.be@zelana.com

CHINA
Tel: +86 21 6886 2811
Email: sales@zelana.com

FRANCE
Tel: +33 (0) 810 20 41 11
Email: za.fr@zelana.com

GERMANY
Tel: +49 (0) 89 791 920
Email: za.de@zelana.com

ITALY
Tel: +39 0248 3391
Email: za.it@zelana.com

MIDDLE EAST
Tel: +971 4 3458 338
Email: za.me@zelana.com

NETHERLANDS
Tel: +31 (0) 35 543 56 46
Email: za.nl@zelana.com

SPAIN
Tel: +34 93 379 9611
Email: za.es@zelana.com

UK
Tel: +44 (0) 1202 676161
Email: za.uk@zelana.com

www.zelana.com

PLEASE NOTE: