
PGSi

Programmable Gas Sampling System



Installation, Operation and Maintenance Manual

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 **CROWCON**
Gas Detection You Can Trust

INTRODUCTION

PGSi is a programmable gas sample system designed for monitoring toxic or flammable gases such as Methane, Carbon Dioxide, Carbon Monoxide, Hydrogen Sulphide or Oxygen levels within air samples taken from up to 32 remote points.

This manual includes a system description, operation and maintenance details. It is intended to compliment the equipment and is therefore tailored to the specifications and operation procedure of the system supplied.

WARNING

The equipment described in this instruction manual has mains voltages applied to it. Ensure correct safety procedures are adopted before working on the equipment.

The equipment described in this manual is designed for detection of flammable and/or toxic gases. Ensure local safety procedures are adopted before carrying out any maintenance or calibration work.

The equipment described in this manual may be connected to remote alarms and/or shutdown systems. Ensure that local operating procedures are adopted before carrying out any maintenance or calibration work.



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Crowcon reserves the right to change the design or specification of this product without notice.

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1. OVERVIEW

The PGSi Programmable Sample System is designed to monitor levels of hazardous gases present in air samples taken from up to 32 remote points. Samples are drawn via 10mm (6mm optional) sample tubes which are sequentially monitored. The air samples are conditioned by filters before passing over up to 4 gas sensors. The gas levels are monitored by the GasScan program, which will operate output relays if any gases exceed pre-defined levels. A modem can be fitted to provide dial-out facilities using PC Anywhere software.

The system is supplied fully configured as per the specification sheets supplied with each system. If any parameters need changing to suit site conditions (i.e. sample/purge times, alarm levels etc.) please consult the Crowcon Commissioning Engineer. Alternatively, all information needed to implement any changes are included in this manual.

2. INTRODUCTION

The PGSi Programmable Sampling System is a microprocessor-controlled system for monitoring gas concentrations from up to 32 remote points by means of sample draw techniques. The system utilises a Windows XP based PC which controls all sampling and alarming functions including pump operation, sampling sequence, and alarm relay drives. The operating PC can either be supplied by the customer, or can be factory fitted by Crowcon. Minimum system requirements for the PC are shown in section 4.

The system is supplied complete with all necessary sample-conditioning components, such as particulate filters and water barriers, to ensure a consistently clean and dry sample at the detectors.

3. SYSTEM DESCRIPTION

3.1 ENCLOSURE

The system is housed in a sheet steel enclosure designed for wall mounting and measures 1000mm high x 600 mm wide x 400 mm deep. A removable cable gland panel is fitted at the top of the enclosure for connection of all incoming and outgoing electrical signals. All terminals will accept up to 2.5-mm² cable.

The enclosure houses the mechanical sampling system complete with detectors, left hand entry bulkhead fittings for incoming sample lines, air purge inlet, calibrate inlet, and drain connections. The exhaust connections are made on the right hand side of the cabinet. All inlet and exhaust connections are 10-mm o/d (6mm fittings can be provided as an option), except the Calibration inlet and Drain, which are 6mm o/d.

A cooling/extract fan ensures that the internal operating temperature remains stable and prevents the unit overheating. For systems detecting flammable gases, an internal cabinet gas detector is also provided which will shut down the system pumps in the event of gas being detected within the cabinet.

3.2 HARDWARE

The system is capable of accepting up to 32 sample lines, each of which can be up to 1 km in length. The sample pipe material used should be suitable for the application and, where necessary, laid in conduit for physical protection.

Gas samples are presented from each sample line in turn to the gas sensor(s) via the sampling pump and filters. The configuration of sample line sequence and the sampling times for each inlet are set in software during commissioning and stored on the PC. Up to 99 different configurations can be selected. A vacuum transducer and flow fail switch monitors for flow fail conditions (blocked sample line, pump failure etc).

The sample system contains up to four eight-way valve blocks, each valve is connected to a sample inlet bulkhead compression fitting. The sample outlet from the valve blocks is fed through particulate and condensate filters with an automatic drain, through the pump and then a flow regulator. From the flow meter it passes across the detectors and out to exhaust. A backing pump is also used to present fresh samples at the manifold ready for sampling by the main system.

An MCB is provided for connection of a 230V ac supply (110V ac optional). One 8-way relay module is fitted as standard; which contains four DPCO 5A and four SPCO 10A relays. Access to relay contacts is provided via removable connectors.

3.3 PC SYSTEM (OPTIONAL)

A PC running Windows XP is required to operate the PGSi system. The PC can either be supplied by the customer or by Crowcon. PC's supplied by the customer can either be located at the base of the PGSi cabinet (ie small lap-top PC's), within 3 metres adjacent to the cabinet (ie a desktop PC) or remote from the system using the RS-485 interface. Industrial PC's supplied by Crowcon will be mounted on the enclosure door along with a keyboard / mouse-pad,

The PC is connected via a serial port to the systems interface control module for communicating with the detectors and other analogue devices, such as pressure transducers.

3.4 SOFTWARE

The software which runs the system is called *GasScan*. This system software controls the operational characteristics of the system, signals alarms, displays data, creates databases and operates output relays. Systems intended for use with a customers PC will be supplied with a CD containing all necessary *GasScan* files. Section 7 of this manual details requirements for software installation.

As an option, *Symantec PC Anywhere* may be supplied for use on systems where a modem is fitted. This option enables system interrogation and log file uploading to a remote PC via a telephone link.

The system accepts up to 11 analogue inputs via the control module. As standard these would comprise the gas sensors, the vacuum transducer (line blockage), flow switch and internal gas detector. The remaining inputs can be used for a combination of parameters such as atmospheric pressure or ambient temperature.

Data received from these transducers can be displayed in tabular, graphic or mimic format, the mimic can be produced by the user using *Paintbrush* or by Crowcon at an additional cost. In addition historical data is stored on the internal PC hard drive. Each data point comprises readings from each of the analogue inputs plus a time and date stamp. Using the optional package of the modem and the *PC Anywhere* software, this data can be accessed from a remote PC either on demand or be programmed to automatically download at regular intervals. System alarms can also be logged and transmitted to the remote PC.

All logged data is available for transfer to almost all current spreadsheet packages using the .CSV (comma separated variable) file format, as well as being available to print direct to hard copy. A Browse application allows viewing of stored data and graphs, etc.

Also included as part of the software is a maintenance package that allows functions such as manual sampling and zero and calibration adjustments to be carried out.

4. TECHNICAL SPECIFICATION

| | | | | | | | | | | | | | |
|---|--|--|------------|------------|--------------|---------|-----------|-------------|------|-----------|---|--------------|--|
| Sample System | Sample Lines: | 1-32 10mm o/d, 8mm i/d-reinforced nylon, (HDPE or PTFE or PVDF for reactive/absorbent gases), ideally installed in a protective pipe. | | | | | | | | | | | |
| | Max. line length: | Up to 1 km | | | | | | | | | | | |
| | Exhausts: | 10 mm o/d compression fitting | | | | | | | | | | | |
| | Drains: | 6 mm o/d compression fitting | | | | | | | | | | | |
| | Flashback arrestors: | 90 µm, 1.6 mm thick sinter, 303 stainless steel body | | | | | | | | | | | |
| Cabinet | Overall dimensions: | 1000mm (H) x 600mm (W) x 400mm (D) | | | | | | | | | | | |
| | Weight: | 100 KGs (220 IBS)approximately | | | | | | | | | | | |
| | Temperature range: | 0 to 35°C (50 to 95°F) | | | | | | | | | | | |
| | Ingress Protection | Indoor use only: do not hose-down. | | | | | | | | | | | |
| Electrical | Power: | 230 V ac 50/60 Hz 110V ac version optional | | | | | | | | | | | |
| | Current consumption: | Typically 2Amps AC | | | | | | | | | | | |
| | Inputs/Outputs: | Control module: 11 x 4-20mA analogue inputs Relay modules: 1 to 4 Relay Modules can be fitted. Each module contain 8 output relays: 4 x SPCO 10 A and 4 x DPCO 5 A 250 V ac, non-inductive load. | | | | | | | | | | | |
| | Sensors | 1 to 4 Infrared, Catalytic Bead or Electrochemical. Refer to specification sheet supplied with system for details of sensors fitted. | | | | | | | | | | | |
| | Pump | Dual-diaphragm pump capable of sampling from environments from -600mbar (g) to +250mbar (g). | | | | | | | | | | | |
| PC Requirements Any PC may be used that meets the following minimum requirements: | <table border="0"> <tr> <td>Operating system:</td> <td>Windows XP</td> </tr> <tr> <td>Processor:</td> <td>1GHz minimum</td> </tr> <tr> <td>Memory:</td> <td>128Mb RAM</td> </tr> <tr> <td>Hard Drive:</td> <td>20GB</td> </tr> <tr> <td>PC comms:</td> <td>RS-232 (max. cable length 3 metres) or RS-485</td> </tr> <tr> <td>Serial Port:</td> <td>9-way D Type or USB Port with a USB to Serial converter. USB Port/Converter must be configured as COM1 or COM 2.</td> </tr> </table> <p>Note: If a laptop type PC is used it is recommended that a model is selected that can operate with the screen/lid closed.</p> | Operating system: | Windows XP | Processor: | 1GHz minimum | Memory: | 128Mb RAM | Hard Drive: | 20GB | PC comms: | RS-232 (max. cable length 3 metres) or RS-485 | Serial Port: | 9-way D Type or USB Port with a USB to Serial converter. USB Port/Converter must be configured as COM1 or COM 2. |
| Operating system: | Windows XP | | | | | | | | | | | | |
| Processor: | 1GHz minimum | | | | | | | | | | | | |
| Memory: | 128Mb RAM | | | | | | | | | | | | |
| Hard Drive: | 20GB | | | | | | | | | | | | |
| PC comms: | RS-232 (max. cable length 3 metres) or RS-485 | | | | | | | | | | | | |
| Serial Port: | 9-way D Type or USB Port with a USB to Serial converter. USB Port/Converter must be configured as COM1 or COM 2. | | | | | | | | | | | | |
| Standards | EMC | EN 50270 Note: this equipment is certified only for use with PC's that comply with current EMC legislation. | | | | | | | | | | | |

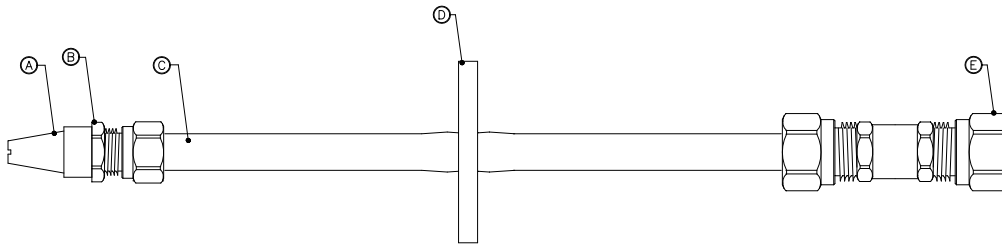
5. MECHANICAL INSTALLATION

Mechanical installation of the system is in three major parts:

1. Optional end of line probes
2. Sample pipes exhaust and drain lines
3. System cabinet

5.1 OPTIONAL END OF LINE BOREHOLE PROBES

These provide coarse particulate filtering and a water barrier to prevent dirt and moisture, being drawn into the sampling system. A typical arrangement is shown in the figure below. The filter assembly should, if possible be mounted facing downward to avoid ingress of rain, spray, etc. There is no limitation on the distance between the filter and the water barrier, however it is advisable to mount them as close as possible to minimise any accumulation of water in the pipe. The part number for the complete assembly as shown is: C01370.



| Stock Number | Part | Description |
|--------------|------|---------------------|
| M02-190 | A | Sinter Filter |
| M02-191 | B | Compression Fitting |
| M04-273 | C | 10mm HDPE Tubing |
| M04-274 | D | Water Barrier |
| M02-193 | E | Compression Fitting |

5.2 SAMPLE PIPES, EXHAUST AND DRAIN LINES

The sample cabinet is supplied complete with a 10-mm compression fitting for each incoming sample line. All sample pipes should therefore be 10-mm o/d, 8 mm i/d. Pipe material should be suitable for the application, both in terms of the gas being sampled and the ambient atmosphere.

Maximum sample pipe length is 1 km. In any applications where the sample pipes are likely to be exposed, they should be installed in protective conduit, preferably metallic. Wherever possible, pipe lengths should be single pieces rather than joined. Joints are a potential leak source and can be particularly troublesome, especially when buried underground.

In applications where pipes, out of necessity, are joined or are back filled after laying, pressure testing should be undertaken prior to starting up the system to ensure that the pipes are not leaking or blocked.

Pipe runs should be designed with a minimum number of bends to reduce pressure drops. Piping manufacturers or suppliers should be contacted for information regarding minimum bend radii.

Each sample cabinet includes one or more sample exhaust connections, depending on the configuration of the system. Exhaust lines should be either returned to the process from which they were drawn, or vented to atmosphere. If the exhausts are to be vented to atmosphere, it is recommended to do so at high level and in a location that will not pose a gas exposure risk to plant or personnel. Exhausts use 10-mm compression fittings.

5.3 SYSTEM CABINET

Drawing PGSi-01 in Appendix B shows the dimensioned General Arrangement for the enclosure, including fixing hole details. When installing the system, allow a minimum clearance of 0.5 metre underneath and either side of the enclosure for external connections and in order not to impede fan inlet and outlet plates.

6. ELECTRICAL INSTALLATION

Drawing PGSi-04 shows the customer electrical connections to the sample cabinet.

The 250V ac supply should be fed via a dedicated fused spur.

All relay contacts are volt-free, rated for 5 A for DPCO relays and 10 A for SPCO relays at 250 V.

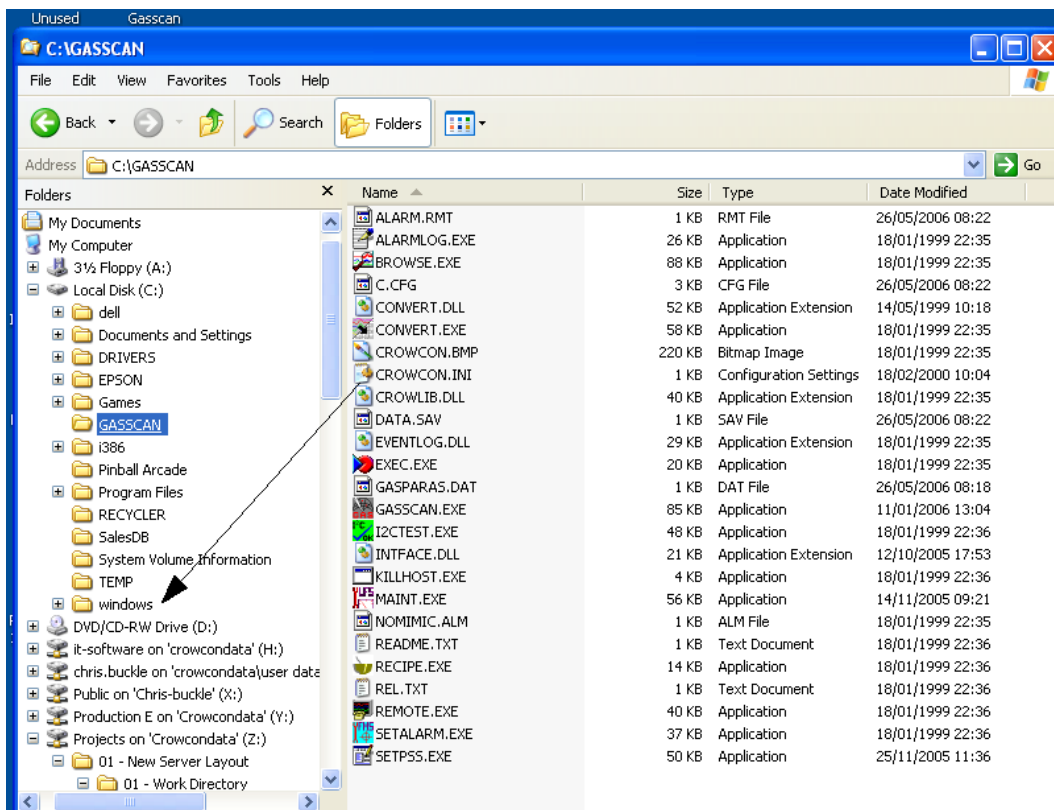
A 9-way D-type connector is fitted to the system cabinet for connection of the operating PC. If operating in RS-232 mode, the maximum PC to PGSi cable length is 3 metres. PC's that are to be located further than 3 metres from the PGSi must be connected to the RS485 input on the control module. An RS485-RS232 converter will be required at the PC. PC connection details are shown on drawing PGSi-04

If a modem is fitted, it should be connected to a high integrity phone line. It must be a direct line, not via a switchboard.

Note: Prior to switch on; check that all electrical connections are correct.

7. SOFTWARE INSTALLATION

- 1 Insert Gasscan CD into CD drive
- 2 Run Windows Explorer and create a new folder called Gasscan on the C: drive
- 3 Copy all the files from the Gasscan CD into the new Gasscan folder on the C: drive



- 4 Copy the Crowcon.ini file into the windows folder (the crowcon.ini file will have been configured to suit the system by Crowcon, Refer to Appendix C for details).
- 5 It is strongly recommended that GasScan is added to the Windows XP start-up menu. This will ensure that the system will automatically run whenever the PC is

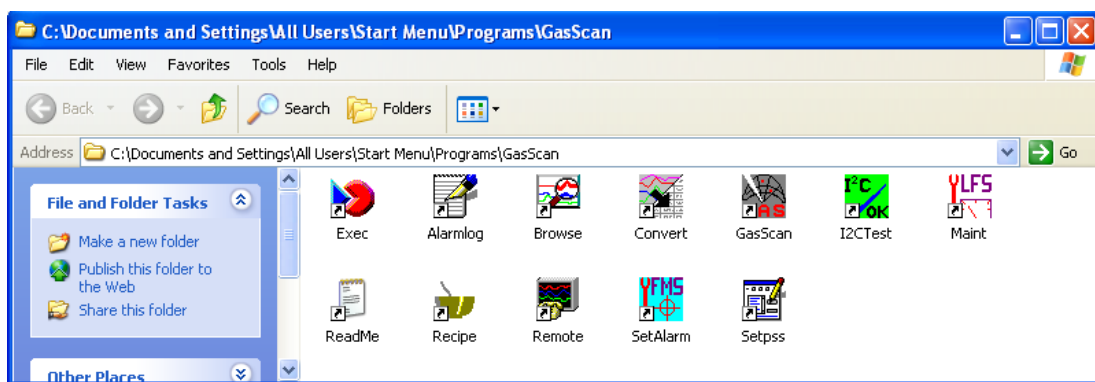
re-started. To do this click 'Start' on the desktop then select 'Settings' then 'Taskbar and Start Menu' (use 'Classic Mode'). Select the 'Start Menu' tab then click 'Customise' and follow instructions to add GasScan to the Start-up folder.

8. START-UP

Once all work described in previous chapters has been carried out and power is applied, the system should be fully functioning. Configuration of the system was accomplished at the factory during the production and test phase of the system, and was set up to conform to the sampling system specification supplied with the system.

When powered up, the internal PC should automatically start Windows and open the GasScan program installed on the system.

The **GasScan** program group is shown below.



8.1 GASSCAN



This is the main operating program used for routine operation of the system. It is responsible for controlling, monitoring, displaying, alarming and logging functions on the system.

GasScan displays the gas levels for each sample line, plus the current operating mode and system status:

| Channel | CH4 | CO2 | CO | Channel | Values |
|---------|------|------|------|---------|----------|
| 1 | 0.00 | 0.00 | 0.00 | | 32007.01 |
| 2 | 0.00 | 0.00 | 0.00 | Ptx | 39758.71 |
| 3 | 0.00 | 0.00 | 0.00 | Flow | 32007.01 |
| 4 | 0.00 | 0.00 | 0.00 | Int Gas | 32007.01 |
| 5 | 0.00 | 0.00 | 0.00 | IAS | 32007.01 |
| 6 | 0.00 | 0.00 | 0.00 | | |
| 7 | 0.00 | 0.00 | 0.00 | | |
| 8 | 0.00 | 0.00 | 0.00 | | |
| 9 | 0.00 | 0.00 | 0.00 | | |
| 10 | 0.00 | 0.00 | 0.00 | | |
| 11 | 0.00 | 0.00 | 0.00 | | |
| 12 | 0.00 | 0.00 | 0.00 | | |
| 13 | 0.00 | 0.00 | 0.00 | | |
| 14 | 0.00 | 0.00 | 0.00 | | |
| 15 | 0.00 | 0.00 | 0.00 | | |
| 16 | 0.00 | 0.00 | 0.00 | | |
| 17 | 0.00 | 0.00 | 0.00 | | |
| 18 | 0.00 | 0.00 | 0.00 | | |
| 19 | 0.00 | 0.00 | 0.00 | | |
| 20 | 0.00 | 0.00 | 0.00 | | |
| 21 | 0.00 | 0.00 | 0.00 | | |
| 22 | 0.00 | 0.00 | 0.00 | | |
| 23 | 0.00 | 0.00 | 0.00 | | |
| 24 | 0.00 | 0.00 | 0.00 | | |

Scan rate 60 Seconds
SCANNING Point 5

Voting

| | | | | | | | |
|----|----|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 |

In normal 'Fastscan' operating mode each sample line is sampled for 60 seconds. At the end of each sample period the gas levels recorded by each sensor plus the pressure transducer reading (indicates if lines are becoming blocked) are displayed and logged against the sample line. The gas level reading will be held until individual lines are re-sampled. The sample point being sampled at any time is displayed.

If any gas level is recorded above (or below for oxygen) the preset alarm level a red icon appears adjacent to the sample line. A fault relay is then activated (depending on configuration). Alarms may be accepted using the Alarm 1 and Alarm 2 menu's, but alarm relays will only reset if configured as 'user cleared' (refer to 8.2.17). Alarm icons and non-latching relays will automatically reset only when the sample line has been re-scanned and gas levels recorded are below alarm thresholds.

The '**Channels**' and '**Values**' shown at the top-right of the screen represent fault monitoring devices:

- **Ptx**: pressure transducer reading for the last line sampled. Rising and falling alarms are set to indicate sample line blockage or pump failure. A higher figure indicates lines becoming blocked.
- **Flow**: indicates when flow across the sensor has failed.
- **Int Gas**: indicates that flammable gas has been detected within the system cabinet. An audible alarm will sound and pumps will be shut-down.
- **IAS**: indicates that the high pressure air supply for sample line back-purge has failed (this function is optional)

A red icon will appear adjacent to each if a failure occurs. All are configured to activate Relay 8 of Relay Module 1 to indicate a system fault. '**SysAlarm**' enables these alarms to be reset if configured to be 'user-cleared'. The values shown for 'Flow', 'Int Gas' and 'IAS' are arbitrary figures and do not represent any scaled value.

The **Voting** table indicates if any voted relays have been activated by one or more inputs. Operation will depend on system configuration. See 8.2.19 for more details.

The fault monitoring device data can also be viewed as a live graph by selecting '**View**', '**Live**'. The gas level for each sample line can be viewed as a live graph (and scanned historically) using '**View**', '**Point 1**' etc. A site mimic can be created and displayed by selecting '**View**', '**Mimic**'.

GasScan can be made to scan each line in sequence ('**Select**', '**Scan**'), lock on to a particular sample line permanently ('**Select**', '**Lock on**', the system will update the gas value every 60 seconds), or scan lines in an alternative sequence as set in a Recipe ('**Select**', '**Recipe**', see 8.3 for more details). '**Select**', '**Convert**' enables logged data to be converted to a '.csv' file to enable it to be viewed using Excel.

8.2 SETPSS

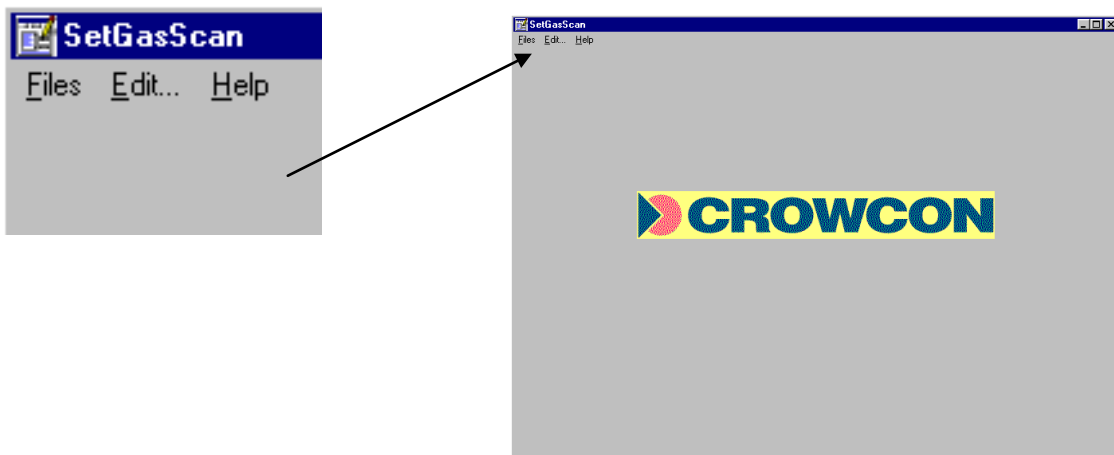


Setpss allows the configuration of sensors, ranges, alarms etc. The program produces a file with the extension .cfg, which contains almost all of the information necessary for the system to operate. The following list contains the information entered in Setpss.

1. Recorder name. This appears as the title in the GasScan program window.
2. Number of analogue input channels that the system requires. Maximum of 11 inputs.
3. Number of sample points. Maximum of 32.
4. Output relay operation.
5. Analogue input channel configuration.

6. Alarm thresholds.

The Setpss icon is located in the GasScan program group. Double click the icon and the following screen will appear.



From the File option the following options are available.

8.2.1 New

This allows a new configuration to be created.

8.2.2 Open

This option displays a list of existing configuration files that are contained in the GasScan directory. From this a configuration can be selected for viewing and editing. The factory configured file for a particular system will be provided with the system and will use the system serial number (for example 0579SS.cfg).

8.2.3 Save

This should be used to save existing configurations that have been edited. The original filename will be retained.

8.2.4 Save As

This allows a configuration to be saved under a different or new filename, leaving the original file unaffected. Also to be used for new configurations.

8.2.5 The Edit Function

The Edit function will display the following window, and is used to configure the system.

The screenshot shows a window titled "Set Parameters" with a close button (X) in the top right corner. The window contains the following fields and buttons:

- Recorder Name:** An empty text input box.
- Data Type:** An empty text input box.
- Close password:** An empty text input box.
- No. of Analog Channels:** A text input box containing the number "8". To its right is a button labeled "Channels".
- No of Sample Points:** A text input box containing the number "8". To its right is a button labeled "Points".
- Number of scanned channels:** A text input box containing the number "0".
- Scanned display scale:** A text input box containing "100.0000".
- Live display scale:** A text input box containing "0.000000".
- Output sense A:** A button.
- Output sense B:** A button.
- Voted outputs:** A button.
- Options:** A button.
- Record Speed:** A text input box containing the number "5".
- Fault relay:** A text input box containing the number "0".
- Common Alarm:** A text input box containing the number "0".
- Archiving:** A button.
- Finished:** A button.

Recorder Name

The text entered in this box will be displayed at the top of the GasScan window when the system is operating. The system serial number is normally entered (for example 0579SS).

Data Type

This provides the text required for the correct labelling of axis on graphs produced by the system. Usually this would be %, lel, ppm etc.

Close Password

If a password is entered in this field, Gasscan is prevented from being closed without the correct password. This prevents unauthorised personnel from stopping the system. Up to 6 characters can be used.

No. of Analogue Channels

The total number of analogue inputs (gas sensors and fault monitoring devices etc) should be entered here, maximum of 11.

No. of Sample Points

The total number of sample points is to be entered here, maximum of 32.

No. of Scanned Channels

The total number of gas sensors only should be entered here, do not include other input devices such as pressure transmitters etc.

Scanned Display Scale

The display scale for the scanned channels should be entered here. This is the value of the highest range of gas being detected. For example if a system contained a 0-100% l_{el} CH₄ sensor and a 0-25% volume O₂ sensor, the value of 100 would be entered.

Live Display Scale

As above but for all non-gas sensor channels (ie fault monitoring devices). Normally this value will be 1000 as the pressure transmitter is a 0-1000mBar device.

Record Speed

Is the time between readings in seconds. For systems operating in Fastscan mode (see 8.2.25) this should be set to 60 (ie a one-minute sample time per line). For systems operating in Slowscan mode the setting will depend on the sample time set for the longest sample line. The normal setting may be 180 (two minutes purge, one minute sample) but this may have to be increased for longer sample lines.

Fault Relay

Relay 8 on the first Relay module is the designated System Fault relay. This relay is energised when the system is healthy, and will de-energise if any of the following occur:

- GasScan software stops running
- Sample flow failure
- Internal gas leak (systems fitted with flammable gas sensors only)
- Instrument air failure (on systems fitted with sample line back-purge function)

Common Alarm Relay

A common alarm relay may be set to operate if any selected sensor goes into alarm. The input channels (ie sensors) that are to operate the common alarm relay must have the **Report** box checked in their configuration (see 8.2.17). Enter the Relay Sense value to match the relay which is to operate as the common alarm relay.

| Relay Number | Relay Sense Value |
|--------------|-------------------|
| 1 | 1 |
| 2 | 2 |
| 3 | 4 |
| 4 | 8 |
| 5 | 16 |
| 6 | 32 |
| 7 | 64 |
| 8 | 128 |

Output Sense A & B

Output sense enables each relay to be either energized or de-energized. Output Sense A refers to relay banks 0 and 1 (ie relay modules 1 and 2). Output Sense B refers relay banks 2 and 3 (ie relay modules 2 and 3). To select a relay to operate in normally-energized mode check the required box.

Set Norm. Closed [X]

Bank 0 and 1

Outputs

| | |
|---------------------------------------|-----------------------------|
| <input type="checkbox"/> 1 | <input type="checkbox"/> 9 |
| <input type="checkbox"/> 2 | <input type="checkbox"/> 10 |
| <input type="checkbox"/> 3 | <input type="checkbox"/> 11 |
| <input type="checkbox"/> 4 | <input type="checkbox"/> 12 |
| <input type="checkbox"/> 5 | <input type="checkbox"/> 13 |
| <input type="checkbox"/> 6 | <input type="checkbox"/> 14 |
| <input type="checkbox"/> 7 | <input type="checkbox"/> 15 |
| <input checked="" type="checkbox"/> 8 | <input type="checkbox"/> 16 |

Finished

Relay 8 on bank 0 (ie relay module 1) is normally energized by default: this relay is dedicated to give a system fault output.

8.2.6 Channels

This allows the analogue input channels to be configured one at a time. The required channel is selected by means of the **Previous** and **Next** buttons. The selected channel is shown at the top.

Edit Analog Channels [X]

Editing Channel Number 1

Previous **Next**

Channel Name

Scale **Offset**

| | |
|---|---|
| <p>Alarm 1</p> <p><input type="checkbox"/> Enable</p> <p><input type="checkbox"/> Falling alarm</p> <p><input type="checkbox"/> Latching</p> <p>Value <input type="text" value="0.000000"/></p> <p>Output <input type="text" value="0"/></p> <p><input type="checkbox"/> User cleared</p> <p><input type="checkbox"/> Report</p> | <p>Alarm 2</p> <p><input type="checkbox"/> Enable</p> <p><input type="checkbox"/> Falling alarm</p> <p><input type="checkbox"/> Latching</p> <p>Value <input type="text" value="0.000000"/></p> <p>Output <input type="text" value="0"/></p> <p><input type="checkbox"/> User cleared</p> <p><input type="checkbox"/> Report</p> |
|---|---|

Finished

Channel Name is that used in displays and reports (eg CH4 for a methane sensor).

Scale and **Offset** convert the physical value read from the sensor into the appropriate scaled readings. The following formula is used to calculate the scale:

$$Scale = \frac{Maximum\ value\ for\ display\ scale}{Maximum\ input\ value - Minimum\ input\ value}$$

$$Offset = -Minimum\ input\ value \times Scale$$

The *minimum input value* and *maximum input value* are expressed as values that are a proportion of 1000: minimum= 200, maximum= 1000.

The *maximum value for display scale* is typically the full-scale range of the detector, e.g. for 0-50 PPM, enter 50. *Example: The channel needs to be set for 4-20 mA detector scaled 0-50 PPM.*

$$Scale = \frac{50}{1000 - \left(\frac{4}{20} \times 1000\right)} = 0.0625$$

$$Offset = -200 \times 0.0625 = -12.5$$

| Table of commonly used values | | | |
|---|---------|--------|---|
| Range | Scale | Offset | Typical alarm settings |
| 250 | 0.3125 | -62.5 | CO: 30/200 ppm rising |
| 100 | 0.125 | -25 | CH4: 20/40% lcl rising |
| 30 | 0.0375 | -7.5 | - |
| 25 | 0.03125 | -6.25 | O2: 19/17% falling H2S: 5/10 ppm rising |
| 5 | 0.0063 | -1.26 | CO2: 0.5/1.5% rising |
| 3 | 0.0038 | -0.76 | CO2: 0.5/1.5% rising |
| 1000 | 1.25 | -250 | Ptx: 50 falling, 600 rising |
| Digital input i.e. flow switch, internal gas alarm, IAS pressure switch | 1 | 0 | Flow switch: 50 falling Int gas: 50 rising IAS switch: 50 falling |

Alarm 1 and **Alarm 2** groups set relevant elements of the alarms:

Enable activates the alarm

Falling alarm is only checked when the alarm is activated by a falling, rather than rising, gas concentration. Typically this is only normally required for oxygen deficiency alarms.

Latching holds the output relay on until the alarm is accepted manually.

Value sets alarm threshold values (see table above for suggested values).

Output allocates the alarm to a specific relay, numbered from 1 to 8 on the relay module.

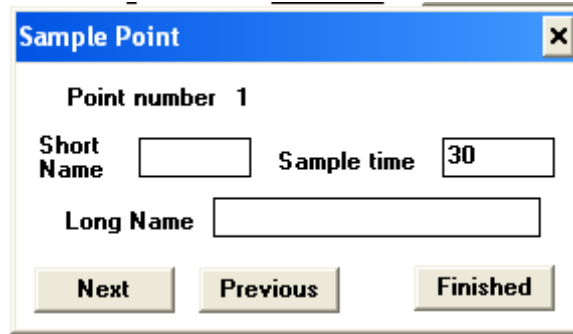
User cleared. When checked this will allow the user to reset the alarm while the alarm condition is still present. This is useful for audible outputs.

Report activates the common alarm relay (8.2.15).

Finished ends the setting of channels

8.2.7 Points

Displays the Sample Point dialogue box. Names and times for each sample line can be set:



The image shows a 'Sample Point' dialog box with a blue title bar and a close button (X). The dialog contains the following fields and buttons:

- Point number 1**: A label indicating the current point being configured.
- Short Name**: A text input field for a four-character descriptor.
- Sample time**: A text input field containing the value '30'.
- Long Name**: A text input field for a twelve-character descriptor.
- Next**, **Previous**, and **Finished**: Three buttons at the bottom of the dialog.

Short Name allows the user to enter a four character descriptor that is used to define the sample point in truncated fields such as drop-down lists.

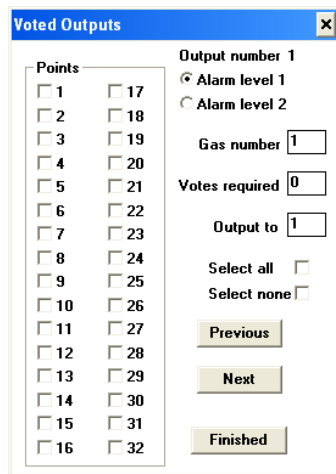
Sample time defines the sampling time for that point in seconds. For systems running in Fastscan mode (refer to 8.2.9) the default setting is 60. For Slowscan systems times should be set according to individual sample line lengths: enough time must be given for the sample gas to travel along the line plus 30 seconds.

NOTE: When setting sample times, due consideration should be given to factors such as transit time of the sample in the pipe (on systems where no backing pump is used) and the response time of the detectors.

Long Name allows the user to enter a twelve character descriptor that is shown on the GasScan window, and is used to define the sample point in reports and system configuration printouts.

8.2.8 Voted Outputs

Voting outputs allow for greater flexibility by enabling a combination of single alarms and multi alarms (e.g. 3 Points need to see gas before alarm is raised). Up to 32 pages of voting alarms can be created (*Output number* at the top of the page refers to the page of voting).



Points Are the individual sample lines

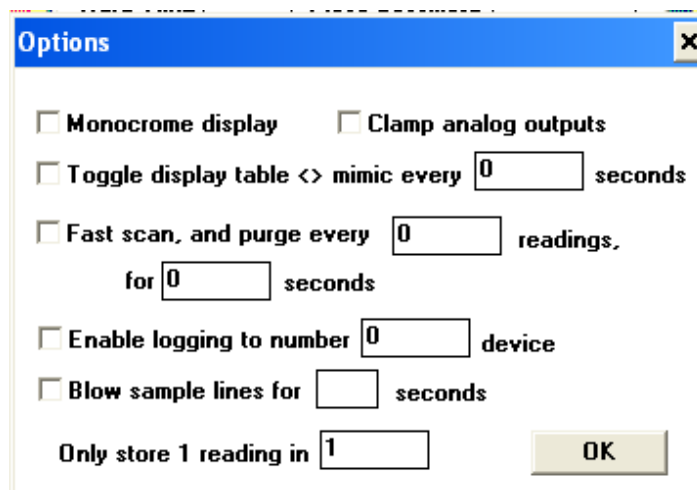
Output Number Alarm 1 and Alarm 2 are the two gas alarm levels set in the Edit Analogue channels section (8.2.9). Select which level of alarm is required to trigger the output.

Gas Number This is the sensor required to trigger the output. Number 1 will be the sensor in position 1 on the control module. See drawing PGS-04 for sensor positioning.

Votes Required Number of sample lines that need to be in alarm before the output is triggered (e.g. 1 = any point in alarm will activate output, 2 = any two points need to be in alarm before the output is given).

Output The output refers to the required relay that needs to be activated upon an alarm condition (eg 1 is the first relay on relay module 1).

8.2.9 Options



Toggle Display

When a Mimic panel is used, check box and add time for how long the mimic panel and table is shown on the screen.

Fastscan

Fastscan samples each line in turn then purges the system after the required number of readings. The system is normally purged after all points have been sampled once, but this can be altered to suit site requirements. If the Fastscan box is not selected the system will run in slow scan where the sample points times are used (see 8.2.7). Each sample is followed by a purge in Slowscan mode.

As a general rule systems used for borehole gas level monitoring on landfill sites will be configured to run in Slowscan mode, systems used for detecting gas hazards in buildings or processes will run in Fastscan mode.

Enable logging to number

For reporting alarm, faults etc. to an external device or file. Enter the required number (normal entry is 5):

- 1= Trigger remote alarming.
- 2= Output to a parallel printer.
- 3= Output to a serial port.
- 4= Short form output to a serial port.
- 5= Output to a text file (Eventlog.txt)

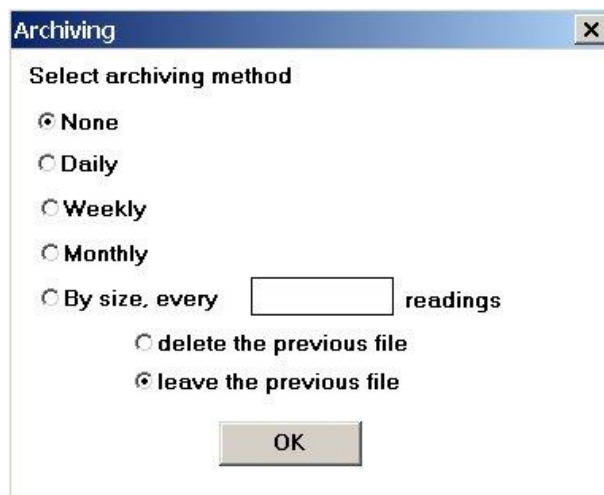
Blow sample lines

For system with Instrument Air fitted for clearing sample lines during the purge cycle. The number of seconds entered is the time for which air is blown down each line. Ensure the purge time entered in seconds' box is long enough to allow all lines to be back-purged.

Only store 1 reading in

The system records each reading in a datalog file. This option allows for alternate readings or 1 in (for example) 10 readings to be stored to reduce file sizes.

8.2.10 Archiving



Saves the datalog files in convenient sized units, the file format will depend on the selection:


None will cause a continuously growing file (ie all logged data will be saved in a single file)

Daily will start a new log file each day. Each file will be named *****.nnn**

Weekly will start a new log file each week. Each file will be named ****.Wnn*

Monthly will start a new log file each month. Each file will be named ****.Mnn*

8.3 RECIPE

 By default systems sample each sample line in sequence. If required, a flexible pre-programmed sequence can be followed instead whereby lines can be sampled in any sequence and selected lines can be sampled more frequently than others. Up to two hundred entries of the available sampling points, freely mixed, may be configured into a recipe. Up to 99 recipes can be available for operator selection.

8.3.1 Producing A Recipe

A recipe is made using a text editor (such as *Notepad*). The numbers of the sampling points required are entered, separated by commas, line feeds, spaces or other convenient symbol.

The contents will look like this:

12,06,13,03,12,16,15,12,14,01, etc.

The file is then saved as a .txt file in the GasScan folder with an appropriate name.

8.3.2 Installing a Recipe

A text file produced as above is installed as an available recipe as follows:

Start the *Recipe* application. Use **File Open...** to select the text file. The head of the window display will indicate the file in use. Select **File Save...** and save the recipe with a number between 1 and 99. This is the recipe number that the operator will select.

To activate a recipe in GasScan use the *Select* option and select *Recipe* (see section 8.1) and choose the required recipe number.

8.3.3 Recipe Errors

Recipe will not accept files with more than 200 entries and will truncate files that are longer. Entries outside the size of the sampling system will cause sample point 1 to be selected. Recipes should be held in the GASSCAN folder. Failure to locate a recipe will be reported by the system when an attempt is made to load it.

8.3.4 Restart

If *Recipe* was in operation when the system is shutdown, the same recipe will be re-loaded when the system re-starts. The very first reading, however, may not match the first entry.

8.4 BROWSE



BROWSE

The *Browse* module is an off-line viewer of datalog files. It allows log file data to be viewed and exported for use in spreadsheets.

To access the *Browse* function, double click on the **Browse** program icon. Menu functions are as follows:

File menu includes the two items as listed below:

Open Config...

Opens a configuration file (eg 0579SS.cfg) that matches the store file to be browsed. The configuration file is that used by the system for its basic operating parameters.

Open Store

Opens the store file to be browsed. The store file (****.sav) is where the historical data from the system is stored. Where installed, the mimic will also be loaded, if the name is the same as the configuration file.

To **Browse** any data select **Open Config...** from the **File** menu, then select the correct .cfg file. Select **Open Store...** from the **File** menu and select the .sav file with the same name as the selected .cfg file.

View

The **View** menu gives access to three of the four different formats in which the data may be displayed, as in the *GasScan* module. A scrollbar at the bottom of the screen allows moving forward and back through the recorded data. You may select a point in one display (extreme left of line in graphical display) and switch to another display to see the same point in another format.

The options within **View** are as follows:

Table

This is the default display and gives a 'snapshot' of the data at a particular reading. The scanned channels are displayed in columns at the left with sample points numbered down the left-hand side and channel names at the head of the columns.

Auxiliary inputs are named and shown in the columns on the right.

The scan rate and sample point that was being scanned are shown beneath the auxiliary inputs.

Live

This displays a line graph of the actual channels that were read. The auxiliary channels are a valid record of the values read. The sample point values are a 'mix' of all the sample point readings in scan order. The channel colours are shown at the left of the display, timing information at the bottom. A display of the value and time at the point being pointed to by the mouse are shown at the top.

Mimic

The mimic will be displayed for reference purposes, although no data will be included.

Sample

This produces a menu option for each sample point on the system. A graphic display appears similar to that given by the **Live** option, but showing the readings for only the selected point.

Display

The options within **Display** are as follows.

Update

This causes **Browse** to periodically check if the store file it is currently using has been added to.

Invert

Exchanges the graphical display between black or white background. This makes some traces more easily visible, and aids screen capture of graphs with some capture programs.

About

Gives current version information about the module.

8.5 CONVERT



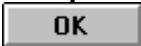
This module performs two main functions:


Printing of data in tabular format.

Producing page(s) of data labelled at the column top with sample line and gas names and in the first column with times. Units of measure, such as LEL or percentage, may be inserted.

Conversion of data to spreadsheet format

Convert produces a .csv format file suitable for almost all spreadsheets. Headings are included and time converted to the common floating point representation. The normal sequence of operation with *Convert* is as follows.

Select **Open Config...** from the **File** menu and select the required file to convert. Click on the  button

Select **Open Store...** from the **File** menu and select the conversion required. Click on the  button

The options available within *Convert* are as follows.

File

Open Config...

Opens a configuration file (.cfg) that matches the store file to be converted (see above)

Open Store...

Opens the store file (.sav) to be converted.

Save As...

Saves the data in spreadsheet format

Print

Prints the data in tabular form.

Convert

Selecting this option gives access to the conversion settings dialogue box, as below:

CONVERT SELECTION

From reading number

To reading number

Choose one line per reading or one line per complete scan

One line per scan

Do what with non scanned readings?

Last

Average

Maximum

From reading number is the first reading of the block that will be converted.

To reading number is the last reading of the block that will be converted.

Both of the above settings are initially set to the whole of the file selected. They may be set to concentrate on a particular area of interest if so desired.

One line per scan gives one line (in the spreadsheet file or printout) for a complete set of sample lines. This gives all the sample point data in the most compact form. To produce one line per reading uncheck this box. If '**One line per scan**' is selected, then not all the data from auxiliary channels (ie fault device inputs) will be produced. Selects how *Convert* should compress this data.

Do what with non scanned readings? Non-scanned readings refers to fault monitoring devices (flow switch etc). Select as required.

OK completes the selection.

NOTE: No data is produced until Print or Save As... is selected.

Save spreadsheet file OR **Print** results.

About

This displays current version information about the module.

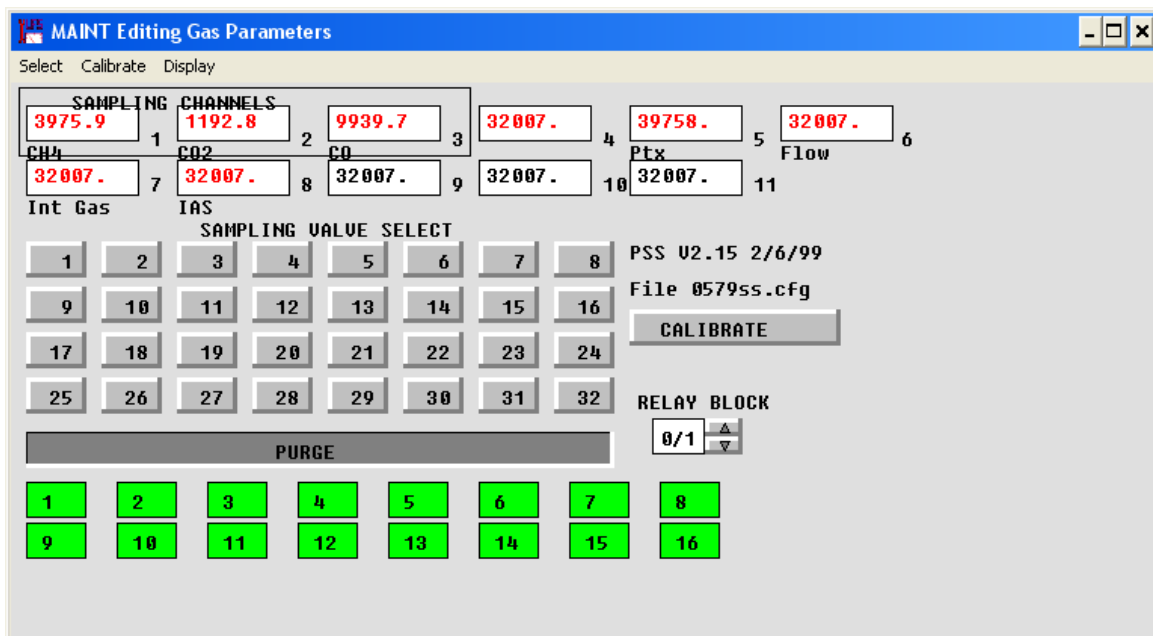
9. ROUTINE MAINTENANCE

It is essential that the PGSi system is calibrated and maintained. The minimum recommended period for maintenance and calibration is every **6 months**. Warranty will be voided if the system is not maintained as instructed.

9.1 MAINT



This program is provided to enable all sensor readings, valves and relays to be manually checked. To use, GasScan must first be shut down.



Always begin by using the *Select* option to *Load Config*. This ensures the correctly scaled sensor readings will be applied

Select allows the configuration file to be loaded and saved.

Calibrate is now defunct and cannot be used to calibrate any part of the system.

Display will toggle the sensor readings between scaled signals (ie that correspond directly to the gas concentration) or raw digital values. It is recommended that this option is left unchecked.

The eleven boxes at the top of the screen show the reading for each of the eleven analogue inputs. *Sampling Channels* are the gas sensors, the remaining boxes show readings from the fault devices (pressure transducer, flow switch etc). These readings are used to test and calibrate the system.

Sampling Valve Select each icon represents a sample valve. Click the required icon to open any desired line.

Purge closes all sampling valves and opens the purge valve. Fresh air is then passed across the sensors and the filters are drained.

Calibrate places the system in purge mode and opens the calibration valve. All sensors are isolated from the sample pump to enable calibration gas to be applied to the Calibrate inlet. Gas should be applied from a regulated gas bottle at a flow rate of 1 litre per minute.

Calibration instructions: Each gas sensor fitted to the system will have a Zero and Span potentiometer. To calibrate first ensure the system is in Purge mode by clicking the *Purge* bar. Ensure also that only clean air is present at the Purge inlet. Adjust the zero potentiometer so that the she sensor signal reads zero (oxygen sensor will need to be zeroed using nitrogen).

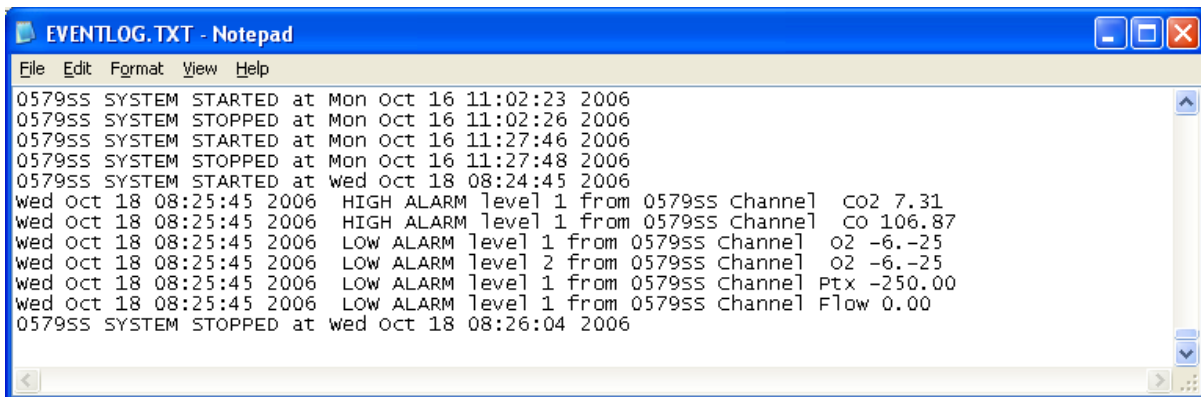
Click the *Calibrate* icon and apply the calibration gas to the inlet. Ensure that the gas is reaching the sensors by observing the flow meter in the system, wait until the sensor reading stabilises and adjust the Span potentiometer until the correct gas concentration is displayed. Repeat for each sensor. Oxygen sensors may be set to the correct level (20.9%) using air.

Remove the calibration gas, return to *Purge* mode and re-check the zero readings.

Relay Block selects whether the 16 green icons relate to relay modules 1 and 2 (ie Block 0/1) or relay modules 3 and 4 (Block 1/2). To test a relay click the required green icon: the appropriate relay will energise and the icon will turn red. **Note: any alarm function connected to the relay will be activated!**

9.2 EVENT LOG FUNCTION

PGSi automatically logs all alarm, fault and software start/stop events in a text file named 'EVENTLOG.txt' which can be found in the GasScan folder. This file is useful for viewing the alarm/fault history of the system. The text file can be deleted if required; a new file will be created once the system resumes normal operation. An example of the information shown in the event log file follows:



```

EVENTLOG.TXT - Notepad
File Edit Format View Help
0579SS SYSTEM STARTED at Mon Oct 16 11:02:23 2006
0579SS SYSTEM STOPPED at Mon Oct 16 11:02:26 2006
0579SS SYSTEM STARTED at Mon Oct 16 11:27:46 2006
0579SS SYSTEM STOPPED at Mon Oct 16 11:27:48 2006
0579SS SYSTEM STARTED at Wed Oct 18 08:24:45 2006
Wed Oct 18 08:25:45 2006 HIGH ALARM level 1 from 0579SS channel CO2 7.31
Wed Oct 18 08:25:45 2006 HIGH ALARM level 1 from 0579SS channel CO 106.87
Wed Oct 18 08:25:45 2006 LOW ALARM level 1 from 0579SS channel O2 -6.-25
Wed Oct 18 08:25:45 2006 LOW ALARM level 2 from 0579SS channel O2 -6.-25
Wed Oct 18 08:25:45 2006 LOW ALARM level 1 from 0579SS channel Ptx -250.00
Wed Oct 18 08:25:45 2006 LOW ALARM level 1 from 0579SS channel Flow 0.00
0579SS SYSTEM STOPPED at Wed Oct 18 08:26:04 2006
  
```

9.3 FILTERS

There are 4 types of filters used within the sample system:-

9.3.1 Coalescing Filter

This filter performs two functions, firstly it collects any dirt/dust particles that may be in the gas sample and secondly it collects any water in the sample line. The water/dust mix collects in the bowl of the filter before being forced out of the filter during the purge/drain cycle. Minimal maintenance of this filter is required provided there are sufficient drain cycles, as it is self-cleaning. However, Crowcon recommends that the filter element is removed every 6 months, cleaned in warm water and allowed to dry before being re-assembled.

9.3.2 Polycap Filter

This filter has a membrane fitted internally that forms a complete barrier to water but allows the gas sample to pass through. It is a disposable filter and will only need to be replaced when it is completely blocked, usually indicated by a discolouring of the internal membrane. A visual inspection on a 3 monthly basis should be sufficient.

9.3.3 Purge Filter

This filter is fitted to the Purge inlet to provide particulate filtration to protect the pump during purge or calibration. The filter element should be inspected every 3 months and replaced every 6 months.

9.3.4 Cabinet Fan Filters

These square foam filters are fitted to the cabinet fan inlet and outlet. The fans are required to regulate the internal temperature of the cabinet, by flowing air through. The filters are fitted to prevent dust from being drawn into the cabinet. It is essential that these filters are regularly replaced. If the filters become blocked by dust, the internal temperature of the cabinet will rise and the system PC may fail.

9.4 PUMP MAINTENANCE

The pump used in this system is designed to require only minimal maintenance. It incorporates oil-less operation with permanently lubricated bearings and long life Buna diaphragms with a Teflon liner. The Teflon liner protects the diaphragms from the corrosive effects of gases such as Hydrogen Sulphide.

The liners and diaphragms should be inspected regularly (every six months minimum) and replaced if necessary. The pump is at risk if the sample system filters are breached, and then it is only likely that the pump diaphragm will be punctured. If this is the case the sample flow will reduce dramatically and the pump diaphragm will require replacement by removing four screws and the cover plate. Pump life is expected to be in excess of 2 years.

9.5 FLOWMETER

It is essential that the correct sensor flow-rate is set. A flow meter is fitted which can be manually adjusted to the recommended flow rate of 0.5 to 1.0 litres per minute. A flow fail device is fitted to the system which will generate an alarm if flow across the sensors is lost.

An early warning of filter element becoming blocked is a visible reduction in the sample flow. The sample flow should be checked using the flow meter mounted inside the sample system cabinet and the flow should always remain in the range of 500cc/min to 1000cc/min.

Drawing PGSi-02 shows the main components of the programmable gas sampling system.

10. REMOTE CONTROL AND ALARM DIAL OUT



REMOTE

10.1 OVERVIEW

In the event of an alarm the system can be configured to dial out to a remote computer to inform of the event. This is achieved through a program called **Remote**, which runs on the sampling system and constantly monitors for the occurrence of an alarm. If an alarm is detected by Remote it will then proceed to dial the first of two numbers that can be set-up. This number would normally be a direct line (not through a switchboard) to a remote computer, which is running a program called **Monitor**. Monitor is a small program that can be minimised so that the computer can be used for other tasks. When Monitor receives a call from Remote it will automatically maximise and become the active window displaying a dialog box containing the alarm message. Once the message has been cleared the user can then call up the system using PcAnywhere for Windows and interrogate it to assess the degree of action necessary. Monitor keeps a record of alarms and the times that they were received in a file called alarmlog.txt. During a PcAnywhere remote control session it is also possible to transfer files to and from the system, this is especially useful for retrieving the systems data logs. The following sections describe the operation and requirements in greater detail.

10.2 HARDWARE REQUIREMENTS

The hardware required for alarm dial out and remote control is shown below. Crowcon would normally supply hardware for the sample system.

1. 2 MB of RAM minimum.
2. 7 MB of free hard disk space.
3. Hayes compatible internal or external modem.
4. A direct BT telephone line (does not go through a switchboard).
5. One free serial communications port (must be either Com1 or Com2).

10.3 CONFIGURING REMOTE ALARM DIAL OUT

As described in the overview the system can be set-up to dial out to a remote computer to inform of alarms. The program responsible for instigating this is called "**Remote**" and is found in the GasScan Windows group with the icon shown above. This program runs only on the sample system itself and not on the remote computer. Normally the Remote icon would be copied into the Windows start-up group so that it is automatically loaded with Windows.

In order for Remote to operate correctly the following parameters need to be present in the Crowcon.ini file under the **[Remote]** heading. Crowcon.ini can be edited using Windows Notepad.

10.4 CROWCON.INI

[Remote]

Site = <text> This is the text that will appear on the remote computers screen and is normally the name of the site. A maximum of sixteen characters is allowed.

Modem = n Where n = the number of the COM port that the modem is to use (either 1 or 2).

Telephone = The first number that Remote is required to dial in the event of an alarm.

Tel2= The second number for Remote to dial if the first number is unobtainable. This is optional.

10.5 OPERATION



REMOTE

Remote will only dial out on alarms that are configured as reportable in the system Config file, (see the section on "SetGas" for more information). This means that the user can be selective about which alarms are reported remotely. In the event of a reportable alarm occurring Remote will dial out using the first telephone number and on a successful connection with the remote computer will transmit the message set by the **Site=** parameter in the Crowcon.ini file. The usual response from whoever is informed of the alarm would be to dial into the system using PcAnywhere for Windows in order to investigate the nature of the alarm and determine the course of action necessary. In the event that the first telephone number is unobtainable Remote will try five times and then repeat the dial out cycle using the second telephone number. If neither of these are successful then Remote will wait for one hour and then try again. In the event that a dial out fails to connect successfully to the remote computer then an error will be reported and displayed in the Remote window. The error codes and their meanings are shown below.

| | |
|---|--|
| 1 | Communications line was in use by other software |
| 2 | Could not open communication port |
| 3 | Communication port setting error |
| 4 | Modem did not respond |
| 5 | No answer to call |
| 6 | No data request received |
| 7 | Data file not found |
| 8 | Next block request not received |
| 9 | End of data transfer not acknowledged |

10.6 MONITOR CONFIGURATION



Monitor

The **Monitor** program runs on the remote computer only, it should not be running on the sample system. The only parameter that needs to be set for Monitor is the COM port to use. The default COM port is com1 if com2 is required then place the following text in the **WIN.INI** file.

[Monitor]

Port=2

The **WIN.INI** file is found in the Windows directory and can be edited using Notepad or any text editor or word processor.

10.6.1 Operation

Monitor is a small windows program that runs on the remote computer. When it is active it monitors the serial port to which the modem is connected and on receiving an alarm message from the sample system it will maximise on the screen and display the alarm message. The user has to click the O.K box in order to accept the message. In addition to this a line will be written into a text file called alarmlog.txt this will include the name of the site and the date and time that the alarm was received as shown below.

```
Alarm Landfill Site on Fri Feb 28 10:32:47 1997
Alarm Landfill Site on Fri Feb 28 10:42:12 1997
Alarm Landfill Site on Fri Feb 28 10:49:10 1997
```

The text file Alarmlog.txt is found in the GasScan directory of the remote computer and can be viewed using Windows notepad or most word processors .

10.6.1.1 Controlling Monitor

Whilst Monitor is active the modem will be unavailable for use by any other software. Monitor has a control menu and this gives the option to suspend its operation allowing the COM port to be used by other software.

To suspend Monitor pull down the **Control** Menu and select **OFF**, the modem is now free to be used by other software such as PcAnywhere. To resume Monitors operation choose **On** from the control menu. When monitor is active **ON-AL** will be displayed on a red background in the monitor window. When Monitor is suspended **OFF** will be displayed on a green background.

10.7 SCREEN MESSAGES

A window containing text, up to approximately 10,000 words, can be triggered by any sample point alarm. Simply write a document using *Notepad* and save it in the GASSCAN directory with the name opmessNN.txt where NN is the number of the sample point (use leading zeros to make two characters e.g. sample point 3 is opmess03.txt). If any alarm for that sample point is triggered, the document will be displayed on the screen. This is ideal for giving instructions for non-technical staff.

Note: This is displayed at the end of the read cycle of the event triggering a new alarm, which may be up to two minutes after the display first shows that alarm. Care should be taken when using this feature, since the display of a large number of messages can consume system resources, slowing or even stopping the system. Messages should be closed after reading.

10.8 PC ANYWHERE FOR WINDOWS

This software is supplied only where ordered as an option. For information on using PC Anywhere for Windows please refer to the manual supplied with your copy of the software.

10.9 STORE FILES

If the [gasscan] section of the crowcon.ini file contains the message,

STOREDAYS=30

(and *Remote* is running) then files containing one month's data called <name>.mth, where .mth is the name of the month, will be created, and a new store file started. If the previous year's file is still there, then that file will be renamed to OLD*nn*.mth where *nn* is the year to which the data refers. If not removed, the OLD*nn*.mth will be overwritten the next year (two-year-old data). If *Remote* is not running then a file <name>.str will hold one month's data, and the .SAV file will hold all data after that.

11. COMMISSIONING AND SERVICE

Programmable Gas Sampling Systems are supplied factory calibrated and fully operationally checked, however Crowcon strongly recommend that gas sampling system installations are commissioned by trained Service personnel. Commissioning includes carrying out a full check of the equipment and its functions. Checks include calibration and operation verification plus integrity tests on all sample lines, ensuring that there are no leaks. System outputs are correctly configured to interface directly with any peripheral equipment.

Our Service department will also be pleased to advise on regular service and maintenance requirements and we can offer annual maintenance agreements.

12. TRAINING

Full system operating and calibration training can be arranged by our Service department. This can take the form of either on site training or a training seminar at our head office in Abingdon, Oxfordshire. Please contact our Service department for further details and a quote.

13. WARRANTY

This equipment leaves our factory fully tested and calibrated. If within the warranty period, the equipment is proven to be defective by reason of faulty workmanship or material, we undertake at our discretion either to repair or replace it free of charge, subject to the conditions below.

Warranty Procedure:

Contact our customer support team on +44 (0)1235 557711 or email 'customersupport@crowcon.com', with the following information:

- Your contact name, phone number, fax number and email address.
- Description of faulty equipment, including any accessories (audio visual alarms etc).
- Equipment serial number.
- Fault description.

If we are unable to resolve your issue by telephone, all details will be passed to our Service Department, who will contact you with the details and programme of any corrective action.

Warranty Disclaimer:

Crowcon accept no liability for consequential damages howsoever arising and all liability in respect of any third party is expressly excluded.

This warranty does not cover the accuracy of the equipment calibration or its cosmetic finish.

The warranty on replacement consumable items (such as sensors) supplied under the product warranty, will be limited to the unexpired warranty of the original supplied equipment.

Crowcon reserves the right to determine a reduced warranty period, or decline a warranty period for any sensor supplied for use in an environment or for an application known to carry risk of degradation or damage to the sensor. Sensor warranties assume normal usage, and will be rendered invalid if exposed to excessive concentrations of gas, or extended periods of exposure to gas.

Catalytic oxidation flammable sensors (pellistors) which show no signs of physical damage, but which show reduced or no response to gas, will not be accepted for warranty as such reduction in response is due to 'poisoning' effects which are specifically excluded from warranty cover.

The warranty will be rendered invalid if the equipment is found to have been altered, modified, dismantled, or tampered with. The warranty does not cover misuse or abuse of the equipment.

The warranty may be invalidated if the equipment is not serviced and maintained in accordance with our standard Operating and Maintenance Procedures. This warranty shall not affect a customer's statutory rights.

For warranty and technical support enquiries please contact:

Customer Support

Tel +44 (0) 1235 557711 Fax +44 (0) 1235 557722

Email 'warranty@crowcon.com'

14. APPENDIX A: SYSTEM DRAWINGS

| | |
|----------------|---------------------------------|
| PGSi-01 | EXTERNAL ARRANGEMENT |
| PGSi-02 | INTERNAL ARRANGEMENT |
| PGSi-03 | FLOW DIAGRAM |
| PGSi-04 | WIRING DIAGRAM |
| PGSi-05 | I²C SCHEMATIC |

15. APPENDIX B: SPARE PARTS

| Part No | Description |
|---|--|
| General Parts | |
| M02129 | Flow meter 0-1.0 litre per minute |
| M02214 | Air intake grille 120mm |
| M04408 | Fan finger guard 120mm |
| Valves | |
| E07258 | Valve connector |
| E01360 | 2 port 24v solenoid valve Brass 1/4" bsp |
| E01361 | 3 port 24v solenoid valve Brass 1/4" bsp |
| M02259 | 8 valve manifold block |
| Filters | |
| M02121 | Replacement coalescing filter element (100-12-BX) |
| M04299 | Replacement water trap (Polycap) |
| M02074 | Replacement purge inlet filter element (914) |
| C01370 | End of line probe complete with 10mm PVDF pipe fitting and filters |
| M04274 | Replacement filter for end of line probe |
| M02190 | Brass sinter cone for end-of-line probe |
| C03283 | Replacement cabinet fan filter (Pack of 5) |
| Pipe Fittings | |
| M04516 | Needle valve regulator with 6mm pipe fittings |
| C01431 | Flame arrestor |
| Electrical | |
| E01422 | Pressure transducer |
| E01748 | Internal gas alarm 24V dc |
| E01842 | Cooling fan 120mm 24V dc |
| 2616/2 | PSU 24v dc 75w |
| E01798 | Flow switch |
| E01747 | Flare relay 24Vdc |
| Pump | |
| C03280 | Teflon diaphragm protector (Type 107) |
| E01479 | Dual-head pump 240V ac |
| E01480 | Dual-head pump 110V ac |
| C03281 | Replacement pump diaphragm |
| Sensors | |
| E01807 | Oxygen 0-100% VOL (MAX 250) |
| E01041 | Hydrogen Sulphide 0-100ppm 3H (S) |
| E01040 | Carbon Monoxide CO 0-1000ppm 3E/F (S) |
| Spare sensors for 96HD flammable detector head | |
| S01637/A/M | 96 HD/FL sensor element 300P pellistor |
| S01637/C | 96 HD/FL sensor element VQ8 |
| S01637/G | 96 HD/FL sensor element VQ41 |
| S01637/H | 96 HD/FL sensor element VQ1 |

IR Benches (PCB and sensor only, does not include metal case)

- E01645 0-100% W Methane
- E01646 0-30% W Methane
- E01647 0-5% W Methane
- E01648 0-100% Carbon Dioxide
- E01649 0-30% W Carbon Dioxide
- E01650 0-3% W Carbon Dioxide

Flow Adapters/Housings

- M01436 Oxygen sensor housing (fits CN sensor, must be modified for MAX250 sensor)

- M04131 Spigot for Oxygen sensor housing
- M04184 Oxygen sensor seal (self-adhesive)
- C01339 Flow adaptor for oxygen sensor housing
- S011898 3 series cell PVC housing, complete with 6mm compression fittings

Sensor Amplifiers

- S01225 Toxic Sensor Amplifier (original header must be retained)
- S01226 Oxygen Amplifier. **Orders must state this part is for use with the MAX250 oxygen sensor.**
- S01633 Pellistor flammable sensor amplifier

PGSi General Parts

- S011986 Controller unit complete
- S01476 Relay Module
- S01477 Valve driver
- Contact I²C lead for valve drivers and relay modules. Supplied with 7 connectors fitted.
- Crowcon

16. APPENDIX C: LIST OF ITEMS IN THE CROWCON.INI FILE

The *crowcon.ini* file contains a number of parameters which control the way in which the programmable gas sample system behaves. The listing of all the valid variables followed by the list of valid values and description is shown in the table below. The active *crowcon.ini* file must be saved in the Windows folder of the operating PC for the system to operate.

Typical system *crowcon.ini* file:

```
[GasScan]
Recorders=1
Port=2
config-1=0579SS.cfg
mimic-1=Crowcon.bmp
store-1=Data.sav
MText-1=nomimic.alm
ALARM=0
```

Explanation of each line plus available options:

[GasScan]

Defines the entries below as applicable to GasScan software operation

Recorders=1

Defines the number of PGSi control modules to operate from a single PC. Maximum is 2.

Port=2

Defines the PC Serial port to which the PGSi control module is connected. Port 1 or Port 2 can be selected, if no entry is made the system will default to Port 1 (Com 1).

config-1=0579SS.cfg

Defines the configuration file (as set using SETPSS.exe), that will be used by the GasScan program. The file name must match the required configuration file; the system serial number is normally used (e.g. 0579SS.cfg)

mimic-1=Crowcon.bmp

Defines the name of the bitmap file which is to be used for the mimic screen display. A standard system will display the Crowcon logo, however custom images can be generated using MS Paintbrush or similar.

store-1=Data.sav

Defines the name of the file in which logged information will be saved.

MText-1=nomimic.alm

Defines the name of the file (created using the SetAlarm.Exe program) which is to be used to show locations of gas alarms on the mimic screen display (if used).

ALARM=0

This field shows the current status of input channels configured as 'Report' (see 8.2.6). **0** indicates that no inputs are in alarm state, **1** indicates that an input channel is in alarm.

NOTES