C1859 Issue D
Manual No. 367D4C

GasVac® Solo/Solo+

OPERATING HANDBOOK

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Contents

Notes:

1. *For gas type and settings – see unit calibration certificate.*
2. *For Ammonia gas monitoring, the system should be gas checked following any gas alarm.*
3. *Factory default settings:*
   Sample time – 2 minutes (switch No. 7 PCB identification 2)
   Purge time – OFF – all switches off (adjust for environmental conditions)
   Drain cycle – OFF – all switches off (adjust for environmental conditions)
4. *Where the drain/purge features are not required item 11 condensation trap (see system components) may be bypassed, this will improve the response time to the sample line target gas, see page 3.*
5. *No reduction in system exhausts should be made.*

System Overview

The unit has a unique system controller which enables the three main functions to be adjusted according to site conditions and sampling requirements.

SAMPLE TIME (minutes) See Fig.1

Is the period were the sensors are exposed to the sample gas.

Following an initial 45 second sample draw period, sensor readings (4~20mA) are taken at 5 second intervals indicating each connected sensor and its value.

PURGE TIME (minutes) See Fig.1

A period following each full multiple sample cycle periods, during this purge period the pump draws air from within the equipment enclosure, which is then passed across the sensors helping to keep the cells dry and allowing rejuvination by exposure to clean air, readings from each sensor are held until refreshed during the next sample period.

DRAIN CYCLE / TIME See Fig.2

The catch pot drain period starts and finishes with the purge time period but can be selected to skip a number of these purge periods and perform this operation in cycles. A sealed system is maintained during the drain operation.

SAMPLE / PURGE TIME (minutes)

Switches / Time

8 = 1	4 = 16
7 = 2	3 = 32
6 = 4	2 = 64
5 =8	1 = 128

Fig.1

BUTTONS (see PCB image on page 5)

Hold and Sample buttons must be held down for 3 seconds to register as a button press.

Hold
This button overrides the current sample time on the selected sample line for 15 minutes. When the hold time is completed, (or if it is canceled by pressing the hold button again), the system reverts to the programmed sample time.

Sample
If the system is purging this button overrides the current purge and continues the sampling sequence.

Reset
This button resets the system.

DRAIN CYCLES

Switches / Cycles

1 = 8 cycles	3 = 2 cycles
2 = 4 cycles	4 = 1 cycle

Fig.2

Setting

sample / purge / drain cycles

The unit must be powered down, the new switch selections will be stored during the power up initialisation process.

Example:

Sample time – 3 minutes = switch 7 and 8

Purge time – 10 minutes = switch 5 and 7

Drain cycles – 4 = switch 2

For single line sampling without purge, all purge and drain switches off and all sample time switches on.

For sequential sampling without purge, select sample time with all purge and drain switches off.

The 4~20mA sensor outputs may be checked at translator PCBs inputs (1), (2), (3), (4), (5) by measuring mV across a 1–ohm resistor, 4mV=4mA at test points (TP) 3/4 5/12 13/14 15/16 17/18, this can be repeated for the outgoing signals across TP 21/22 11/20 23/24 25/26 27/28

Supply voltage: 24VDC ± 15% or 100 to 240vAC

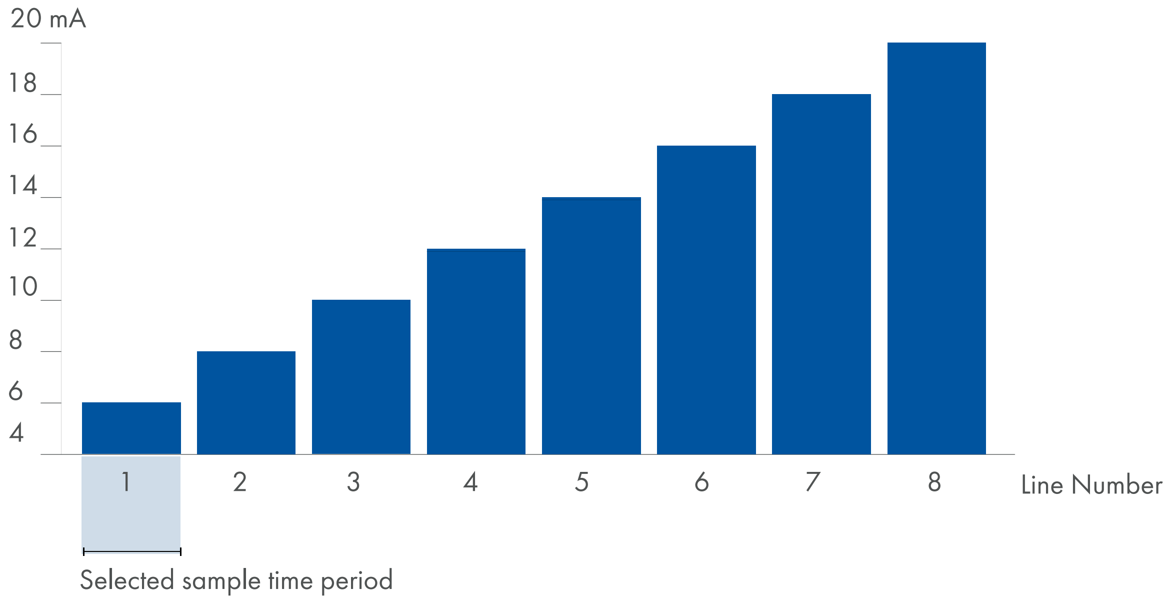
Outputs: 4~20mA –Nominal 250 ohms load, 500 ohms max.

Pump flow rate:
0.4 ~ 0.6 litres/min – ASU1
4.0 ~ 5.0 litres/min –ASU2

Sample Line Identification – Solo+

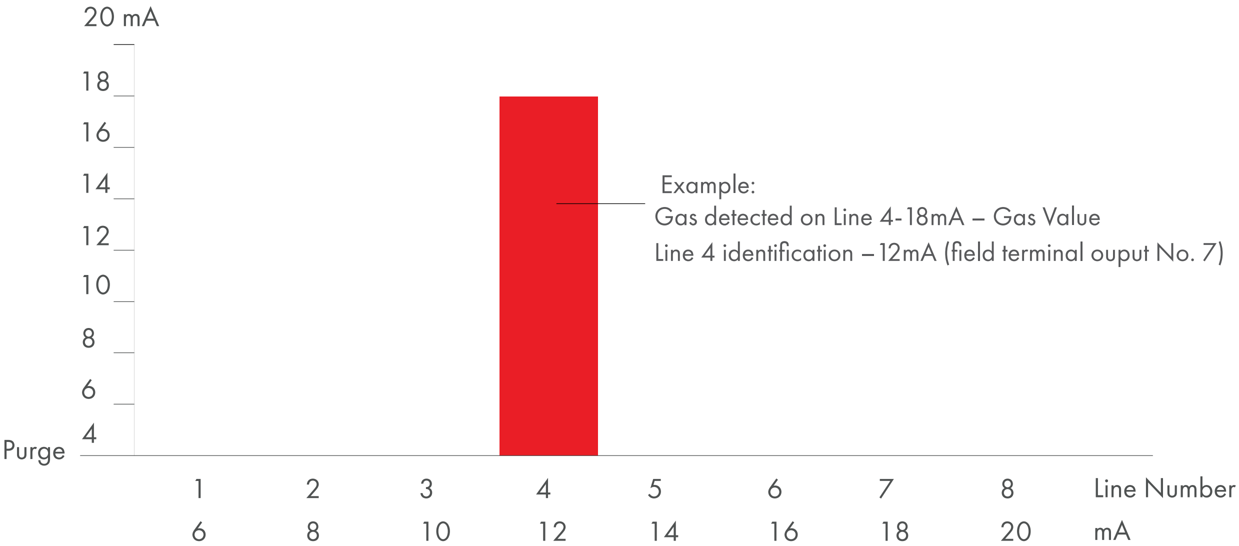
Line Identification 4 – 20mA Signal Output. Sensor output 5 translator board (2mA Increments)

Fig.3



Gas Signal mA

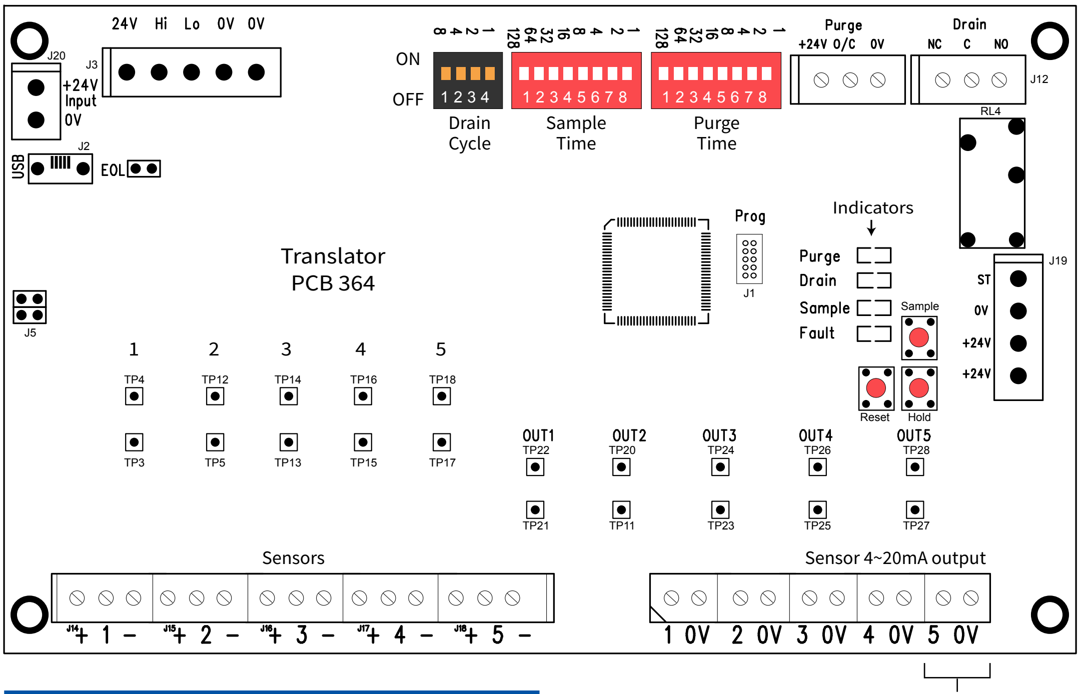
Fig.4



Following a sample line gas reading (No 4) the line number mA reference and mA gas value would require to be recorded and latched as required by the end user. SUBSEQUENT LINE SAMPLING WILL CLEAR PREVIOUS READINGS

Translator Control PCB

Fig.5

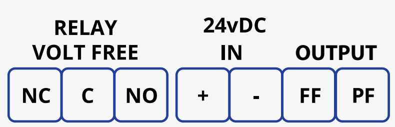


This output used for sample line valve identifier – Solo+
1~8 valve 6~20mA signal
(2mA increments)

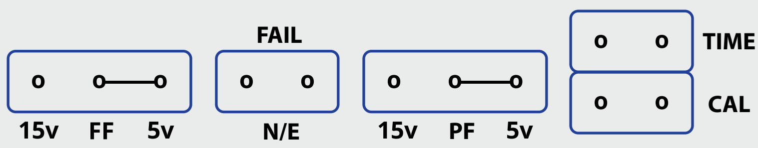
Spares	
Picking List 008-002	Part No.
ASU1 pump unit	48-0088
ASU2 pump unit	48-1030
Peristaltic Pump 24vDC	10-0513
Filter	28-0013
Sensor Sealing Rings	28-0078
Translator PCB 364	48-1096

PUMP/FLOW MONITOR	ASU-1	ASU-2
Input	24v DC ±20% 70mA	24v DC ±20% 170mA
Flow Rate	0.4~1.0 litres/min	1~5 litres/min
Continuous Running	Pump Motor – 6 years expected Diaphragm – 3 years in air	
Flow Fail Monitor	Green LED – normal operation RED LED – fault – pipe blockage (FF) pump fail (PF) Sounder – not less than 85dB @ 30cm	
Outputs	Relay S.P.C.O 4Amp @ 24vDC – NE/ND fail (N/D) Selectable (FF) output 5/15v DC Factory set – open drain 5v	
Sample Line	Max Length – 50m, min 1m 6mm OD 4mm ID Material – nylon, polypropylene, PTFE	Max Length – 100m, min 1m 6mm OD 4mm ID Material – nylon, polypropylene, PTFE
Couplings	In/Out – push fit – barbed, enclosure base/rear	

FIELD TERMINALS



JUMPER SELECTION



System Components

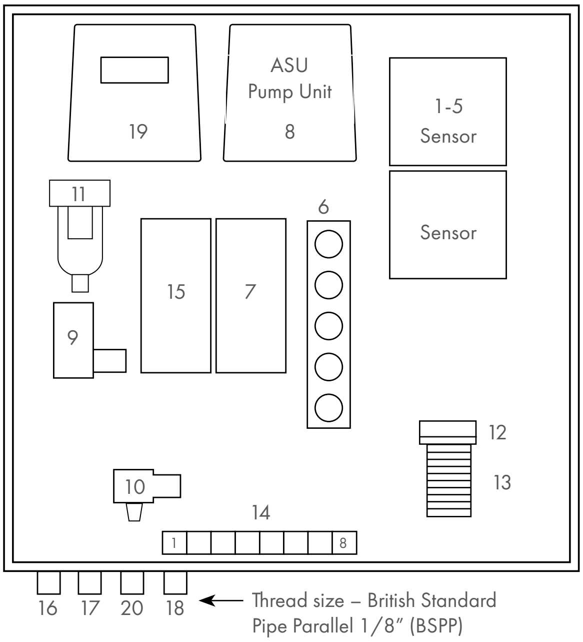
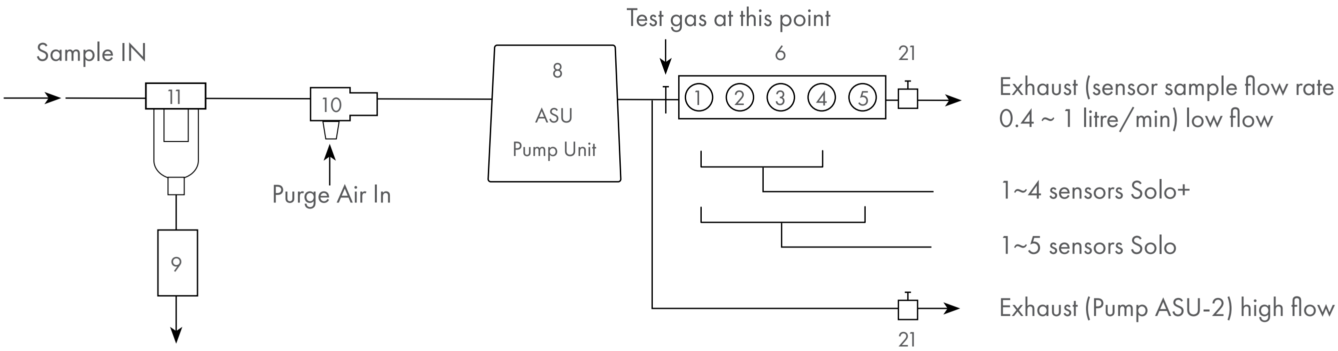


Fig.6

1-5 Gas sensor transmitters (1-4 Solo+)
6 Sensor cell flowblock
7 Translator PCB (PCB 364)
8 Sample pump unit – page 5
9 Auto drain unit (peristaltic pump)
10 Solonoid valve / purge
11 Condensate trap
12 Power supply
13 Field terminals
14 1-8 sample line valves (Solo+)
15 Valve driver unit (Solo+) (PCB 374)
16 Drain point
17 Pump exhaust
18 Sample line input (Solo)
19 CAN status indicator (option)
20 Senor Exhaust
21 Sensor sample flow rate adjust

Gas Flow Path

Fig.7



Field Terminals

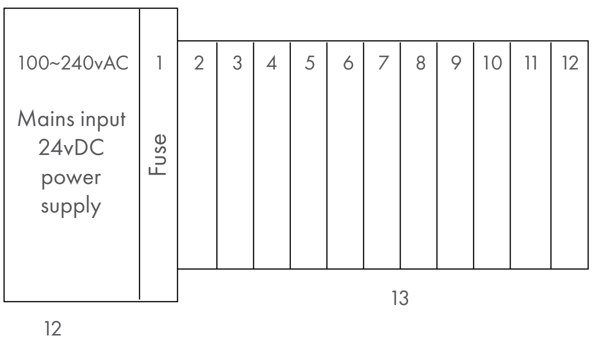


Fig.8

1 24v DC IN fuse – 2A (T2-20mm)
2 Ov.
3 Sensor Signal 1 output (4~20mA)
4 Sensor Signal 2 output (4~20mA)
5 Sensor Signal 3 output (4~20mA)
6 Sensor Signal 4 output (4~20mA)
7 Sensor Signal 5 output (4~20mA)
line indentifier (Solo+)
8 Ov. Signal
9 Cab Gas (4~20mA) – option
10 N/C
11 C Flow Fail – see page 5
12 N/O

GasVac® Solo+

MULTI LINE GAS SAMPLE UNIT

GDS TECHNOLOGIES

Specification Sheet
C1856Av.4

- Low cost, high reliability
- Monitor up to 4 gas types
- 1~8 sample lines
- Switch selectable, sample, purge and drain times
- Peristaltic drain pump as standard
- Easily installed
- Low maintenance requirement
- Line blockage and pump fail monitoring
- CAN status indicator for internal or remote gas readouts C1829 *(option)*
- Cabinet gas monitoring with auto shutdown (option)
- Patented micropore sampling for multi-point mixed lighter and heavier than air gases (MPS option) C1814
- Hazardous area sampling *(option)*
- Data link – full remote monitoring C1550 *(option)*

Internal view

Operation

Multi-function multi-application multi line flow sample system, continuously monitoring up to 4 gas types from the harshest of environments. The GasVac® Solo+ has a unique system controller which enables three main functions to be selected according to site conditions and sampling requirements: sampling time, clean air purge time and condensate drain cycle time. The GasVac® Solo+ offers low cost, high reliability with proven technology, the complete package for any application.

Sensors

1~4
Infrared, Electrochemical, PID
Covering over 700 gas types

Measurements

Combustible Gas – LEL / % Vol
Toxic gas – ppm / % Vol
Oxygen – % Vol. depletion / enrichment
Refrigerant – ppm
Any 4~20mA source input signal

Power Supply

230/115v AC/24v DC

Outputs

Sample 1~8 line indication 4~20mA
(2mA increments)

Gas level readings 4~20mA / CANbus
Pump fail line blockage S.P.C.O
Individual sensor alarm relays (optional)
Low / High / Over-range – Fault S.P.C.O
Cabinet sensor – S.P.C.O (optional)
Supply fail – S.P.C.O (optional)

Internal Main PCB Indicators

Power, Purge, Sampling, Drain ON

General

Sample line size 6mm OD 4mm ID – push fit

Maximum length ASU-1 50m
ASU-2 100m

Sample line, Nylon, PTFE, Polypropylene

Specials

Storage tank – full perimeter cover
Long line monitoring 500m
Large area monitoring

Enclosure

Sheet steel 1.5mm
IP66 NEMA 4
Base gland plate

Dimensions

600mm (W) x 600mm (H) x 210mm (D)

Finish

RAL 7035 textured powder coat

Specification Sheet
C1856Av.4

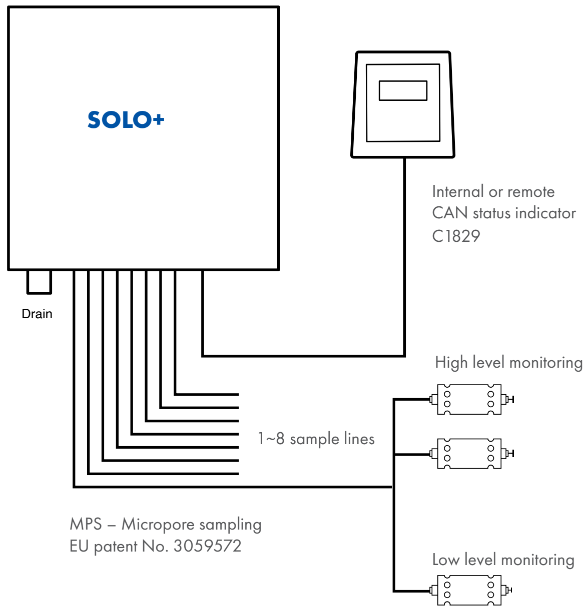
Weight
25kg

Selectable purge/sample times – minutes
1, 2, 4, 8, 16, 32, 64, 128

Selectable drain cycles
1, 2, 4, 8

A sample is extracted from the target area for a timed period during which gas readings are taken at 5 second intervals. Following a full sample line cycle a selected purge period flushes the gas path with clean air, rejuvenating the sensor cells while drying out any moisture produced within the system components.

Moisture produced and drawn along the sample line is removed by the peristaltic pump during the selected drain cycle which corresponds with the chosen purge period.



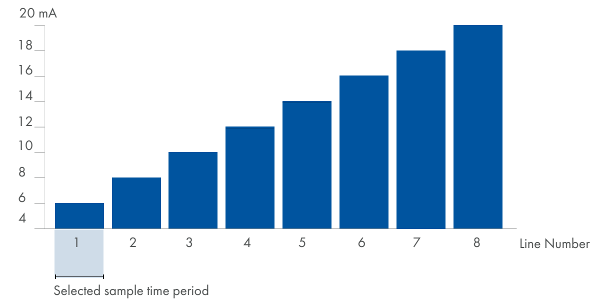
Application

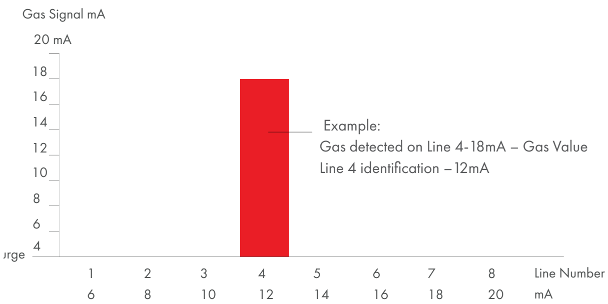
- Biogas Recovery & Processing
- Bio Fuel Storage
- Odour Monitoring
- Water Treatment
- Tank Farm Monitoring – Storage
- Waste Storage
- Composting
- Air Quality
- Abattoirs
- Air Conditioning Plant
- Battery Rooms
- Bore Holes
- Breweries & Distilleries
- Chilled Water Plants
- Chiller Plant Rooms
- Clean Rooms
- Cold Stores
- Distribution Centres
- Farming & Agricultural
- Food – Mixed Waste
- Food Manufacture, Processing & Packaging
- Gas flaring
- Horticulture
- Hospital Operating Theatres
- Hotel Accommodation
- Inaccessible Target Areas
- Incubation
- IT Server Farms
- Landfill Perimeter
- Marine
- Provisions Stores
- Refrigerant Leak Detection – Retail, Machinery
- Remediation – Contaminated Land
- Security
- Sewage & Waste
- Sump
- Underground Car Parking

Sample line and gas reading 4-20mA signal outputs

Following a sample line gas reading (No 4) the line number mA reference and mA gas value would require to be recorded and latched as required by the end user. Subsequent line sampling will clear previous readings.

Line Identification 4 – 20mA Signal Output. Sensor output 5 translator board (2mA Increments)





GasVac® Solo

SINGLE LINE GAS SAMPLE UNIT

GDS TECHNOLOGIES

Specification Sheet
C1814 Issue Av.4

- Low cost, high reliability
- Monitor up to 5 gas types
- Single line sampling
- Continuous monitoring
- Switch selectable, sample, purge and drain times
- Peristaltic drain pump as standard
- Easily installed
- Low maintenance requirement
- Line blockage and pump fail monitoring
- CAN status indicator for internal or remote gas readouts *(option)*
- Cabinet gas monitoring with auto shutdown (option)
- Patented micropore sampling for multi-point mixed lighter and heavier than air gases *(MPS option)* C1814
- Hazardous area sampling *(option)*
- Data link – full remote monitoring C1550 *(option)*

Internal view

Operation

Multi-function multi-application single line flow sample system, continuously monitoring up to 5 gas types from the harshest of environments. The GasVac® Solo has a unique system controller which enables three main functions to be selected according to site conditions and sampling requirements: sampling time, clean air purge time and condensate drain cycle time. All sensor 4~20mA signals are maintained during purge periods, therefore enabling continuous gas readouts regardless of the selected function time periods. The GasVac® Solo offers low cost, high reliability with proven technology, the complete package for any application.

Sensors
1~5
Infrared, Electrochemical, PID
Covering over 700 gas types

Measurements
Combustible Gas – LEL / % Vol
Toxic gas – ppm / % Vol
Oxygen – % Vol. depletion / enrichment
Refrigerant – ppm
Any 4~20mA source input signal

Power Supply
230/115v AC – 24v DC

Outputs
Gas level readings 4~20mA / CANbus
Relay – Flow pump fail – S.P.C.O
Individual sensor alarm relays (optional)
Low / High / Over-range – Fault S.P.C.O
Cabinet sensor – S.P.C.O (optional)
Supply fail – S.P.C.O (optional)

Internal Main PCB Indicators
Power, Purge, Sampling, Drain ON

General
Sample line size 6mm OD 4mm ID – push fit

Maximum length ASU-1 50m
ASU-2 100m *(MPS option)*

Sample line, Nylon, PTFE, Polypropylene

Enclosure
Sheet steel 1.5mm
IP66 NEMA 4
Base gland plate

Dimensions
600mm (W) x 600mm (H) x 210mm (D)

Finish
RAL 7035 textured powder coat

Weight
25kg

GasVac® Solo

SINGLE LINE GAS SAMPLE UNIT

Specification Sheet
C1814 Issue Av.4

MPS Module Network
Maximum number – 10
All weather – IP66
Orientation – any
Module size – 100mm (L) x 32mm (D)
Specials – unlimited *(see Micropore Sampling data sheet C1593)*

Selectable purge/sample times – minutes
1, 2, 4, 8, 16, 32, 64, 128

Selectable drain cycles
1, 2, 4, 8

A sample is extracted from the target area for a timed period during which gas readings are taken at 5 second intervals. This is followed by a selected purge period where the system is flushed through with clean air, rejuvenating the sensor cells while drying out any moisture produced within the system components.

Moisture produced and drawn along the sample line is removed by the peristaltic pump during the selected drain cycle which corresponds with the chosen purge period.

Option: 19'' Rack.

Application

- Biogas Recovery & Processing
- Bio Fuel Storage
- Odour Monitoring
- Water Treatment
- Tank Farm Monitoring – Storage
- Waste Storage
- Composting
- Air Quality
- Abattoirs
- Air Conditioning Plant
- Battery Rooms
- Bore Holes
- Breweries & Distilleries
- Chilled Water Plants
- Chiller Plant Rooms
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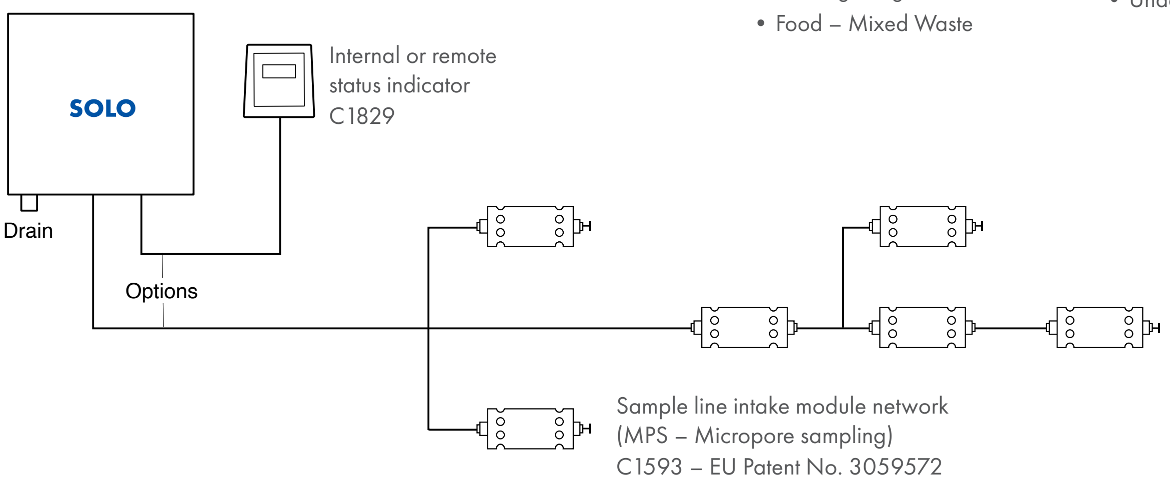
- Cold Stores
- Distribution Centres
- Farming & Agricultural
- Food – Mixed Waste
- Food Manufacture, Processing & Packaging
- Gas flaring
- Horticulture
- Hospital Operating Theatres
- Hotel Accommodation
- Inaccessible Target Areas
- Incubation
- IT Server Farms
- Landfill Perimeter
- Marine
- Provisions Stores
- Refrigerant Leak Detection – Retail, Machinery
- Remediation – Contaminated Land
- Security
- Sewage & Waste
- Sump
- Underground Car Parking



XDI(win)–15/30J(win)

FLAMMABLE GAS SENSOR – TRANSMITTER

Catalytic / Semiconductor / PID / IR cells /
Transmitter: PCB 326 | Software version: V2.2.5 → | Single magnet setup

Technical Sheet ref C1883Dv1
Doc No. 194D29C

Reference documents

C1144 Equipment Installation Guidelines
C1770 Wiring & Terminations for Sensors and Panels
G973 Gas Sensor Locations
C1548 Aspirated Sensor

Sensors

The positioning of sensors depends upon the type of gas to be monitored and its density with respect to air. See G973

Heavy Gases (Propane, Butane) – locate at 15 to 20 cm from floor level.

Lighter Gases (Methane, Natural Gas, Ammonia, Hydrogen) – locate at 5 to 10cm from the ceiling.

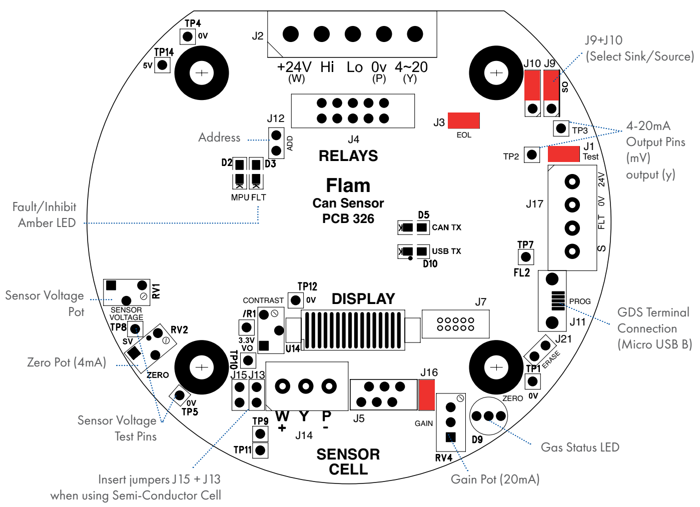
All equipment should be mounted away from direct heat and in accordance with its IP rating.

Cell replacement / transmitter calibration — A

New sensors are supplied ready to connect to the system with all jumpers inserted. This procedure shows how to recalibrate as part of a routine maintenance or cell replacement.

1. If bench testing the PCB see section E4.
2. Check the sensor voltage at TP5 (0v) and TP8 (SV) and adjust RV1 if necessary (see section H Sensor Supply). DO NOT EXCEED THE REQUIRED VOLTAGE OTHERWISE PERMANENT DAMAGE WILL OCCUR)
3. Using a digital mV meter measure across test pins TP2/3 and adjust Zero pot RV2 (coarse adjust) until LED D9 goes green for 4mA (zero) = 4mV (sensor bridge zero).
4. Apply a known span gas to the sensor (56% LEL = 2.5% vol methane) for 1 minute at a flow rate of 1 litre to give a 13mA = 13mV across test pins TP2/3, adjust gain pot RV4 for correct mV reading.
5. For display and relay set up see sections B or E

Fig. 1 Transmitter



Setting/adjusting using display board push buttons or single magnet — B

On power up the unit will be inhibited for a 120 second warm up period displayed as a countdown on the display (this may be overridden by pressing 1).

Carry out procedure A. To access the menu press 2 (equipment SN will be displayed) followed by the entry code 231, pressing 1 or 3 will allow travel through the menu and adjustment of settings, pressing 2 enables access into the selected menu field and on completion pressing 2 will confirm your selection.

Menu

1. Exit
2. Inhibit – relays and 4~20mA signal output to 2mA
3. Address – CANbus sensor address (Combi)
4. Zero/span(fine adjust)
5. Alarm levels set – valve/direction (rising/falling)
6. Exit
7. Delay to alarm (relays) 0~255s
8. Relay off delay 0~255s
   Default setting 0 seconds
9. Normally energised/de-energised relays
   Default setting de-energised
10. LED/relay test
11. Exit
12. Set 4 and 20mA output – calibrate
13. Display gas reading decimal point setting
14. Gas type selection
15. Gas range select
16. Exit
17. Dead band setting, OFF, Display only, full signal ± 2.5% of scale reading. Default setting OFF
18. Relay operation select – relay 1, 2, 3
19. Software version / product serial number

Power supply — C

15 to 30Vdc 24v nominal
Initial power ON – 120s inhibit warm up period

Outputs

3 wire 4~20mA (Direct)/4 wire CANbus (Addressable)

Logging	Intervals – variable time Roll over/stop Storage – 2,880 readings
Requires	USB A to USB micro B cable *(GDS part No. 160-511)* PC or laptop (dedicated) **GDS Terminal** **(download from GDS website)**
Options	3 Relays SPCO 3A (none inductive) @ 30vDC

D

GDS Terminal Commands *(see sections B8 and C)*

Command	Use
A = Set CAN address	Sets the CAN address
G = Select gas type	Select the gas type from a list
Z = Zero	Press when no gas on sensor to give zero
S = Span H and L change reading	Use when calibration gas applied,
D = Enter calibration date	Enter the calibration date
Y = Toggle auto zero	Auto zero is ON or OFF, small drift is cleared
H = Set high alarm	Sets the high alarm threshold
L = Set low alarm	Sets the low alarm threshold
O = Set over range alarm	Sets the over range alarm threshold
P = List command	List these commands on screen
X = Exit calibration mode	Exit this PC mode
$ = Initialise this sensor	Use on new PCB to set gas type to Flam
U = Alarm direction	Sets rising or falling alarms
R = Range	Allows a change in maximum value
N = Decimal points	Toggles between 1 and 2 decimal places
E = Edit user gas text	Choose gas description
B = Toggle deadband	Deadband of 2.5% can be on or off
F = Toggle fault Input	External fault input contact can be disabled
K = Select Input	Used to select the input from between Input J6 to input J14 (Toxic Only)
# = Local Relay Setup	Used to change the function of the 3rd relay from Fault to Over-Range
V = View gas log	From current log, display how many historical readings to display, up to 2880
% = Clear gas log	Set all 2880 log readings to 0.00
I = Log interval log	Choose how many seconds between each reading and whether the log will roll over or stop at 2880 (60 second interval and 2880 readings = 48 hours)
Space Bar = Enter Data / Load Data	Used to load sensor information after connecting to GDS Terminal
W = Set 4-20mA output	Adjusts the digital 4-20mA Output values
* = Toggle Baud Rate	Switches the Baud rate between 20kBits and 40kBits.

F

An example of continuous data output to the PC from a Flammable sensor is shown below and is the format for all gas types.

O, **H** and **L** represent the Over Range High and Low alarms respectively.

D indicates if a duplicate address is detected

F indicates a fault present

I shows that this sensor has its alarms inhibited

```
Flam %LEL
OHLDFI
^^v
-*--*-Gas val = 35.6
```

under the **O H L** the ^ ^ v represent the direction of the alarms. **L** is falling and **H** and **O** are rising. A(*) under the letter(s) OHLDFI represents a detected state so in this example the sensor would be in high alarm and a fault present.

'Gas val 35.6' represents the value of the gas present at the sensor head. Pressing (R) on the PC causes a reset to occur. Gas type with address and serial number are then output to the PC together with alarms and calibration date. A full command list via PC is available by pressing the letter (P) which will relist on the PC.

G

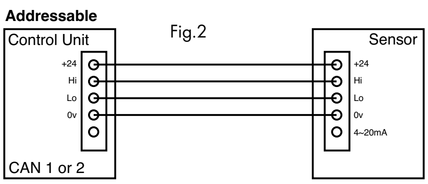


Fig.2

4 core 1.5mm

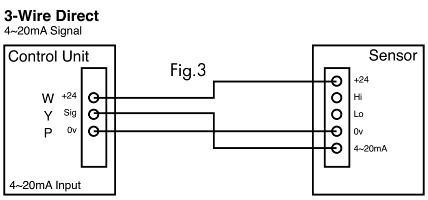


Fig.3

3core 1mm

E

Setting up a new transmitter utilising GDS Terminal (download from GDS website)

1. Insert jumpers J10 and J9 position SO mode for 4-20mA source output.
2. Turn sensor voltage potentiometer RV1anti-clockwise (minimum voltage).
3. Connect sensor to J14 terminal W-white Y-yellow P-pink.
4. For bench set up only connect 24V + and 0V to J2, connect jumper to J1 (4~20mA output test load), remove after set up.
5. Switch on – 120s warm up inhibit period
6. Measure the sensor voltage at TP5 (0v) and TP8 (SV) and adjust by turning the Sensor Voltage RV1 pot for the correct reading
   See sensor supply table section H
   DO NOT EXCEED THE REQUIRED VOLTAGE OTHERWISE PERMANENT DAMAGE WILL OCCUR)
7. Rotate Gain pot fully anti-clockwise (minimum span.)
8. Using a digital mV meter measure across test pins TP2/3 and adjust Zero pot until LED D9 goes green for 4mA (zero) = 4mV (sensor bridge zero).
9. Connect PC to sensor via GDS terminal using USB-A to USB Micro-B cable *(GDS part No. 160-511)* at 4800 baud connected to J11. The terminal output screen shows continuous data output/ commands and allows input from the PC keyboard.
10. Select COM Port – Note each new sensor connected to requires a new COM Port to be connected to.
11. Press 'Space Bar' loads sensor information. Ensure jumper J12 is fitted before programming. Press (C) to enter Calibration Mode, and Press ($) to initialize the sensor.
    To update firmware contact GDS.
    Press W to set 4-20mA parameters, use (L) and (H) to adjust 4mA, Press 'Space' to set, use (L) and (H) to adjust the 20mA, press 'Space' to set.
12. Then press (Z) on the PC to zero the reading.
13. Apply a known test gas to the sensor (56% LEL = 2.5% vol methane) for 1 minute at a flow rate of 1 litre to give a 13mA = 13mV across test pins TP2/3, adjust gain pot RV4 for correct mV reading.
14. When using a PC press (S) to enter span mode and using (H) or (L) adjust the reading to 56% LEL. Note – This adjusts the mA reading on TP2/3 when adjusted.
15. Press (space) to exit span and then (X) to exit the calibration mode.
16. Connect the sensor to an alarm panel and ensure that it reports in correctly. *Note: Fit the end of line (EOL) link J3 if the sensor is to be installed at the end of the sensor cable.*
17. If the sensor is fitted with a display – adjust the contrast using VR1 pot.
18. Remove J1 test link for normal operation.
19. Ensure J12 address link is removed (this is only used when changing address from the alarm panel).
20. On completion and when used as an addressable sensor, future calibrations may be carried out from the alarm panel.

See section D for Full list of GDS Terminal Commands

H

Sensor cell supply table

CAT300A	2v/300mA	**CAT100A**	2v/100mA
PRIME	4.0 V	**CAT165**	2.5v/170mA
Sem1 (Refrigerant)	5.0 V	**PID**	6.5 V
Sem2 (Ammonia)	4.0 V	**F6 CAT170**	2.5v/170mA

XDI (win)– 15/30J (win)

TOXIC/OXYGEN GAS SENSOR – TRANSMITTER

Electrochemical cells – Oxygen/Toxic gases
Transmitter: PCB 337 | Software version: V2.2.5 → | Single magnet setup

Technical Sheet ref C1882Cv1
Doc No. 194D28C

Reference documents

C1144 Equipment Installation Guidelines
C1770 Wiring & Terminations for Sensors and Panels
G973 Gas Sensor Locations
C1548 Aspirated Sensor

Sensors

The positioning of sensors depends upon the type of gas to be monitored and its density with respect to air. See G973

Heavier than air gases
(Carbon Dioxide, Hydrogen Sulphide) –
locate at 15 to 20 cm from floor level.

Lighter than air gases
(Ammonia, Hydrogen Cyanide) –
locate at 5 to 10cm from the ceiling.

All equipment should be mounted away from direct heat and in accordance with its IP rating.

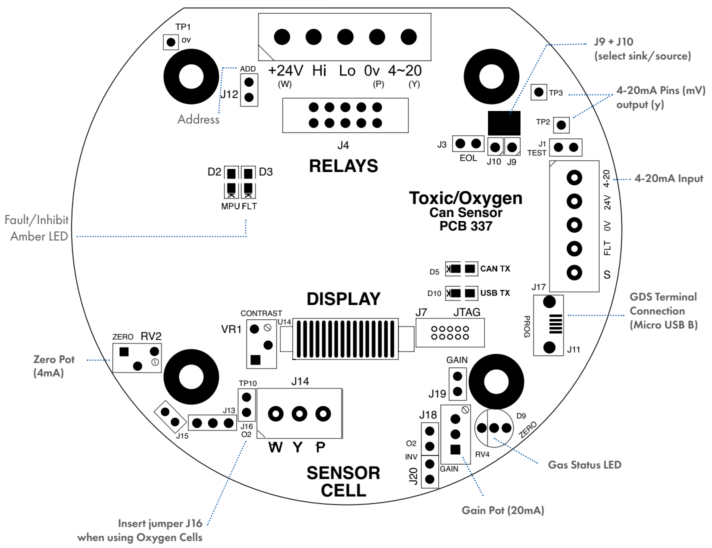
Cell replacement / transmitter calibration

A

New sensors are supplied ready to connect to the system with all jumpers inserted. This procedure shows how to recalibrate as part of a routine maintenance or cell replacement.

1. If bench testing the PCB see section E3
2. Using a digital mV meter measure across test pins TP2/3 and adjust Zero pot RV2 (course adjust) until LED D9 goes green for 4mA (zero) = 4mV (sensor bridge zero)
3. Apply a known test gas to the sensor (e.g. 100ppm CO) for 1 minute at a flow rate of 1 litre to give a 13mA = 11mV across test pins TP2/3, adjust gain pot RV4 for correct mV reading.
4. For display and relay set up see sections B or E

Fig. 1 Transmitter



Setting/adjusting using display board push buttons or single magnet

B

On power up the unit will be inhibited for a 120 second warm up period displayed as a countdown on the display (this may be overridden by pressing 1).

Carry out procedure A. To access the menu press 2 (equipment SN will be displayed) followed by the entry code 231, pressing 1 or 3 will allow travel through the menu and adjustment of settings, pressing 2 enables access into the selected menu field and on completion pressing 2 will confirm your selection.

Menu

1. Exit
2. Inhibit – relays and 4~20mA signal output to 2mA
3. Address – CANbus sensor address (Combi)
4. Zero/span (fine adjust)
5. Alarm levels set – valve/direction (rising/falling)
6. Exit
7. Delay to alarm (relays) 0~255s
8. Relay off delay 0~255s
   Default setting 0 seconds
9. Normally energised/de-energised relays
   Default setting de-energised
10. LED/relay test
11. Exit
12. Set 4 and 20mA output – calibrate
13. Display gas reading decimal point setting
14. Gas type selection
15. Gas range select
16. Exit
17. Dead band setting, OFF, Display only, full signal ± 2.5% of scale reading. Default setting OFF
18. Relay operation select – relay 1, 2, 3
19. Select mA input signal fault trip level (toxic/oxygen 4~20mA input only). Default setting 2.5mA
20. Software version / product serial number

Power supply

C

15 to 30Vdc 24v nominal
Initial power ON – 120s inhibit warm up period

Outputs

3 wire 4~20mA (Direct)/4 wire CANbus (Addressable)

Logging	Intervals – variable time Roll over/stop Storage – 2,880 readings
Requires	USB A to USB micro B cable *(GDS part No. 160-511)* PC or laptop (dedicated) **GDS Terminal** **(download from GDS website)**
Options	3 Relays SPCO 3A (none inductive) @ 30vDC

GDS Terminal Commands

D

Command	Use
A = Set CAN address	Sets the CAN address
G = Select gas type	Select the gas type from a list
Z = Zero	Press when no gas on sensor to give zero
S = Span H and L change reading	Use when calibration gas applied,
D = Enter calibration date	Enter the calibration date
Y = Toggle auto zero	Auto zero is ON or OFF, small drift is cleared
H = Set high alarm	Sets the high alarm threshold
L = Set low alarm	Sets the low alarm threshold
O = Set over range alarm	Sets the over range alarm threshold
P = List command	List these commands on screen
X = Exit calibration mode	Exit this PC mode
$ = Initialise this sensor	Use on new PCB to set gas type to Flam
U = Alarm direction	Sets rising or falling alarms
R = Range	Allows a change in maximum value
N = Decimal points	Toggles between 1 and 2 decimal places
E = Edit user gas text	Choose gas description
B = Toggle deadband	Deadband of 2.5% can be on or off
F = Toggle fault Input	External fault input contact can be disabled
K = Select Input	Used to select the input from between Input J6 to input J14 (Toxic Only)
# = Local Relay Setup	Used to change the function of the 3rd relay from Fault to Over-Range
V = View gas log	From current log, display how many historical readings to display, up to 2880
% = Clear gas log	Set all 2880 log readings to 0.00
I = Log interval log	Choose how many seconds between each reading and whether the log will roll over or stop at 2880 (60 second interval and 2880 readings = 48 hours)
Space Bar = Enter Data / Load Data	Used to load sensor information after connecting to GDS Terminal
W = Set 4-20mA output	Adjusts the digital 4-20mA Output values
* = Toggle Baud Rate	Switches the Baud rate between 20kBits and 40kBits.

Setting up a new transmitter utilising GDS Terminal (download from GDS website)

E

1. Insert jumpers J10 and J9 position SO for 4-20mA source output.
2. Connect sensor to J14 terminal W-white Y-yellow P-pink.
3. For bench setup only – connect 24V + and 0V to J2, connect jumper to J1 (4~20mA output test load) remove after set up.
4. Rotate Gain pot fully anti-clockwise (minimum span.)
5. Switch on – 120s warm up inhibit period.
6. When in clean air the sensor bridge is zeroed by adjusting zero pot until LED D9 is Green.
7. Connect PC to sensor via GDS terminal using USB-A to USB Micro-B cable at 4800 baud connected to J11. The terminal output screen shows continuous data output/ commands and allows input from the PC keyboard.
8. Select COM Port – Note each new sensor connected to requires a new COM Port to be connected to.
9. Press 'Space Bar' loads sensor information. Ensure jumper J17 is fitted before programming. Press (C) to enter Calibration Mode, and Press ($) to initialize the sensor.
   To update firmware contact GDS.
   Press W to set 4-20mA parameters, use (L) and (H) to adjust 4mA, Press 'Space' to set, use (L) and (H) to adjust the 20mA, press 'Space' to set.
10. Then press (Z) on the PC to zero the reading.
11. Apply a known test gas to the sensor (e.g. 100ppm CO) for 1 minute at a flow rate of 1 litre to give (e.g 12mV = 12mA) across test pins TP2/3, adjust gain pot for correct mV reading.
12. When using a PC press (S) to enter span mode and using (H) or (L) adjust the reading. Note – This adjusts the mA output reading on TP2/3.
13. Press (space) to exit span and then (X) to exit the calibration mode.

E

14. Connect the sensor to a Combi alarm panel and ensure that it reports in correctly. *Note: Fit the end of line (EOL) link J3 if the sensor is to be installed at the end of the sensor cable.*
15. If the sensor is fitted with a display – adjust the contrast using 'VR1' pot.
16. Remove J1 test link for normal operation, (this does not need to be removed when used as an Addressable sensor)
17. Ensure J17 address link is removed (this is only used when changing address from the alarm panel).
18. On completion and when used as an addressable sensor, future calibrations may be carried out at the Combi alarm panel.

NOTE: Oxygen cells only use the P+ and Y terminals J14.
To adjust for the 'Zero' it is normal practice to disconnect the green connector on J14 and adjust the Zero pot until LED D9 is green and 4mA across TP2/TP3. When the cell is reconnected in air at 20.9%Vol oxygen the span can be adjusted for 17.4mA reading across the same test pins using the gain pot. If an LCD option is fitted then calibration and other settings using magnets/switches instead of a PC can be achieved. See section B

See section D for Full list of GDS Terminal Commands

F

An example of continuous data output to the PC from a sensor is shown below and is the format for all gas types.

O, **H** and **L** represent the Over Range High and Low alarms respectively.

D indicates if a duplicate address is detected

Flam %LEL
O H L D F I
^^v
-*--*-Gas val = 35.6

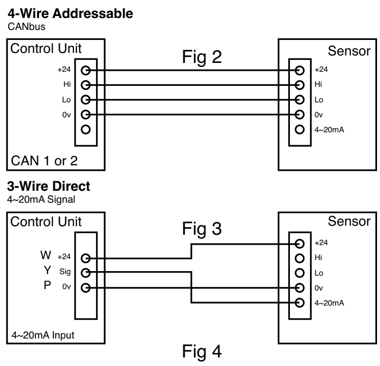
F indicates a fault present

I shows that this sensor has its alarms inhibited

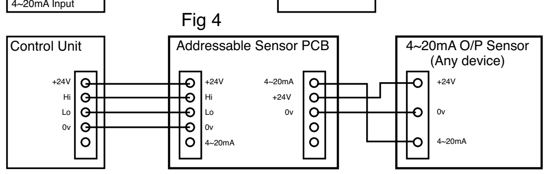
under the **O H L** the ^ ^ v represent the direction of the alarms. **L** is falling and **H** and **O** are rising. A(*) under the letter(s) OHLDFI represents a detected state so in this example the sensor would be in high alarm and a fault present.

'Gas val 35.6' represents the value of the gas present at the sensor head. Pressing (R) on the PC causes a reset to occur. Gas type with address and serial number are then output to the PC together with alarms and calibration date. A full command list via PC is available by pressing the letter (P) which will relist on the PC.

G



NOTE: for 2 Wire Direct (W/Y) transmitters PCB204 document C894 see price list G082 section M



This document is not contractual and the specification / detail may be modified at any time without prior notice.

ISO 9001
ISO 14001
ISO 45001
INTEGRATED MANAGEMENT

Gas Sensor

SAMPLE POINT LOCATIONS

A key feature of the installation is the correct location of the sensing point. Several factors must be taken into account, the most important being the density of the gas.

- Under still air conditions, a 'lighter than air' gas such as methane leaking from a small fracture at ground level will plume upwards and outwards approximating a cone shape. As the gas rises, it displaces air from the immediate vicinity creating turbulence. Consequently, rapid dilution begins to occur and unless a sensor is positioned within the plume, there may be no initial indication of a leak. As gas continues to escape, the concentration rises to ceiling level and begins to layer. In time, the concentration at ceiling level will increase, and this in turn will displace air downwards.
- Dangerous concentrations will therefore tend to occur at ceiling level and the thickness of this layer will increase from the highest point downwards with the passage of time.
- Ventilation of the room will of course alter the situation significantly, but it should be remembered that if the ventilator is not at ceiling level, a dangerous concentration can still occur between the top of the ventilator and the ceiling.
- For heavier than air gases such as propane or butane, the formation of dangerous layers occurs at ground level. These gases tend to behave like water and will run down gradients and pool at the lowest point.
- The number of sensing points required in individual rooms is determined by the number of possible hazards in the vicinity. Gas leakage may occur around valves, flanges and anywhere where gas pipes are jointed. It may be possible to cover several probable gas leaks in one room by the careful siting of a single sensor. Cable ducts, trenches and manholes are also likely places where a build-up of heavy gases may collect.
- When siting a sensor point in such places, it is most important to ensure that there is no likelihood of flooding by water, or excessive dust which may block a detector head sintered disc and prevent gas reaching the sensor cell or block up a gas sampling pipe.
- When monitoring gases outside, those lighter than air will be quickly dispersed, but gases heavier than air will tend to form in thick layers and again cause a dangerous hazard. When siting sensors outside, prevailing winds must be taken into consideration and adequate protection provided to resist wind and rain.
- A major consideration is access to sensors for gas testing and sensor cell replacement. For inaccessible high-level locations, GDS pump aspirated sensors located at chest height, having fixed sample lines to the target areas enable uncompromised sensor positioning to be achieved. As a second option, test gas fixed lines may be run from ground level directly to the sensor using an appropriate detection head adapter fitting. See document C1892.

Density (air = 1)			
Acetone	2.0	n-Hexane	3.0
Ammonia	0.6	Hydrogen	0.1
Benzene	2.8	Methane	0.6
n-Butane	2.0	n-Octane	3.9
Carbon Monoxide	1.0	n-Pentane	2.5
Ethane	1.0	n-Propane	1.6
Ethyl Alcohol	1.6	Xylene	3.7

For further information see BSEN 60079-10/BS 60080
GDS Document C1954

GasVac® Sample Systems

SAMPLE AND TEST GAS LINE INSTALLATION

GDS TECHNOLOGIES

Technical Sheet ref C1892B v5
Doc. Ref. 233D12C

Sampling Systems

For sequential and single line sample systems where the sensor unit is located at the control/monitoring device, it is a requirement that the sensor be calibrated and periodically the integrity of the sample lines be confirmed.

GAS TESTING

It is expected that the sensor be gas checked at the controller by allowing test gas to be drawn directly from a gas bag until a maximum gas value read-out is obtained. Alternatively, where an adjustable high rate test gas supply is available, this can be applied directly as for fixed sensors, or by the use of an excess vent off tee union. Both methods will allow the pump to operate without restriction. Where low flow rate pumps are used (less than 1 litre/min), the sensor may be gas tested directly using the cylinder/regulator supplied with the GDS Test Gas Kit.

FIXED SENSOR TESTING

Test gas lines run from low level directly to the detector head simplifying gas testing (Fig 2B).

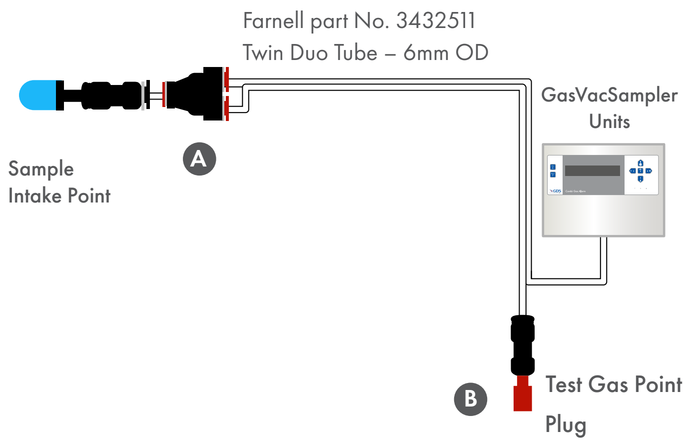


FIG 1

SAMPLE LINE INTEGRITY TEST

Sample systems are deployed generally in situations where it is not practical to use wired sensors for a variety of reasons; one of which is inaccessibility to the target area, in such situations where it is not possible to apply test gas to the sample intake point, a thorough inspection of the sample line should be made.

GDS Sample Systems are designed to monitor for sample line blockages but are not able to detect any change in the porosity of the line. In some cases, it may be prudent to incorporate a test gas injection/flowrate test point at the most extreme accessible position in the line.

Sample lines may be checked by recording each line flow rate at the control monitoring device followed by a flow rate check at the end of each line, both line readings should be identical.

Alternatively a GDS PorGauge® (porosity gauge) attached to one end of the sample line while blocking the opposite end will indicate the smallest of leaks.

For Micropore sampling networks, where sample intake modules are arranged in zones or groups and at varying heights depending upon the density of the target gas, the main sample draw line to each module group should be tested as described above with close inspection being carried out of individual intake modules.

A End of Sample Line Terminator & Filter (twin tube)
Part No. 007-105 includes 008-444

B Test Gas Tube Terminator
Part No. 007-103

C End of Sample Line Filter (single tube)
Part No. 008-444

End of line options:

Part No. 007-106	Sample line terminator box
Part No. 99-000	Sample draw point universal fitting
Part No. 99-0001	Sample draw point universal fitting + collector cone

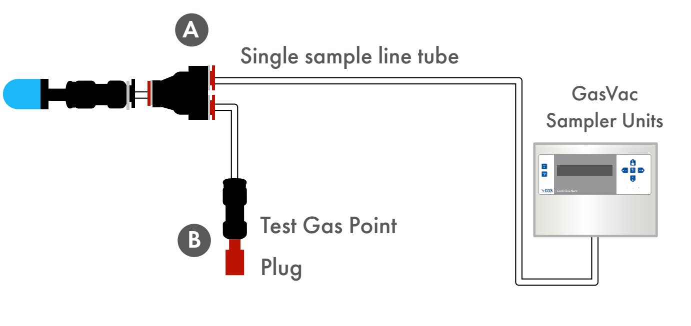


FIG 2

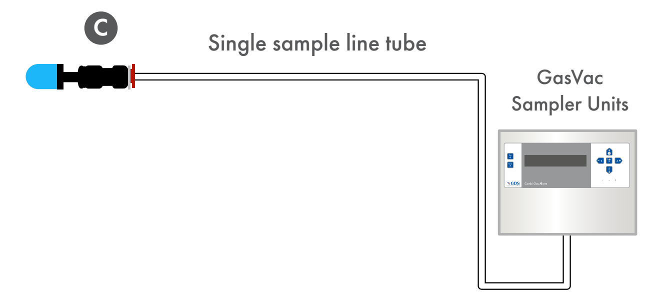


FIG 3

Service routine attention

The owner or occupier of the site should place the supervision of the system in the charge of a responsible executive, whose duty it should be to ensure the day to day operation of the system and to lay down the procedure for dealing with a gas alarm or fault warning. The operating instructions should be kept available, preferably with the control unit. All faults, service test and routine attention given should be recorded.

DAILY:	A check should be made that any fault condition which may be indicated is in fact being attended to and that all other indicators are normal.	**WEEKLY:**	Check the catch pot (where fitted) for high levels of particulate or water contamination, replace filters as necessary.
For Ammonia gas monitoring the system should be gas checked following any gas leak alarm.			

Twice yearly maintenance schedule

1. Zero check to sensor
2. Sensor to be gas tested
3. Field indicators to be tested
4. Alarm trip points checked and re-aligned
5. All faulty parts replaced where required
6. All filter elements checked and replaced as necessary (catch pot filter)
7. Power supply – voltage check
8. Visual inspection made to confirm that the sample line fittings and equipment are secure, undamaged and adequately protected

12 monthly maintenance schedule

1. Twice yearly schedule
2. Draw pump overhaul (diaphragm replacement)
3. Auto drain – pressure tube replacement (if fitted)
4. Intake module inspection

36 monthly maintenance schedule

1. Pump replacement

Calibration

1. Disable all but required sensor (Menu 2)
2. Disconnect sensor tube at point (x) and inject cylinder gas at a flow rate of approximately 1liter/min,
3. For calibration adjustments see 4~20mA adjustment Toxic/Oxygen page 8 and Flammable page 10.