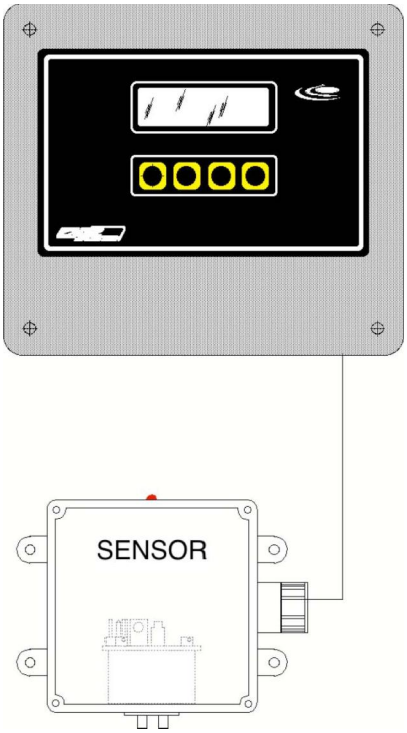
GD-1000 GAS DETECTOR

S-VERSION

TECHNICAL REFERENCE MANUAL



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FIRMWARE VERISON >= 5.00 *REVISED: 2019-04-08*

SPECIFICATIONS

Power Supply	115/230 VAC switch selectable
Power Consumption	12W
Battery Backup	OPTION: short-term (15-min) or long-term (24-hr) available
Display	LCD, back-lit, 16-characters by 2-line, 5mm character height, 5x8 character matrix
Push buttons	Four, tactile dome.
Relays	Four or six (optional), Mechanical (AC or DC)
Relay rating	3A @ 250VAC, 3A @ 32VDC (board revision 0644 or higher)
Buzzer	2.7kHz, 103 dB internal
Analog Input	Two, 4 to 20mA.
Analog Output	Isolated 4 to 20mA, 0-650ohm load, active.
	Optional PS-1000-AOUT adds second 4-20mA output
Communications	RS-232/RS-485 (standard)
WiFi	Available as an option

INTRODUCTION

The GD-1000 (meter) series of microprocessor based transmitters are used to monitor and transmit a 4-20mA analog signal for gas detection applications. There are two set points (danger and critical) set by the user.

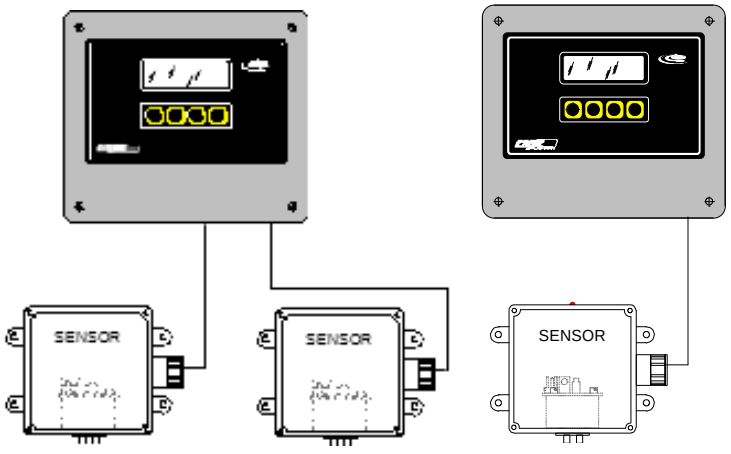
NOTE: The meter is powered by 115VAC or 230VAC, which is selected by switch, S1, mounted on the power supply board (PS-1000S-CPU upper-left hand side).

PACKING LIST

Notify your carrier immediately if there are any signs of damage to the GD-1000 or its parts. Contact your distributor if any parts are missing. The GD-1000 series transmitter shipping carton should contain the following:

- GD-1000 meter
- One or two gas sensor modules
- Two, 8.4V (9V), NiMH batteries (optional)
- Cable glands (installed or in a bag inside the enclosure).

DUAL SENSOR SINGLE SENSOR

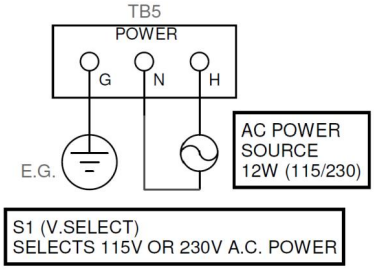


INSTALLATION

The A.C. power should be wired into the GD-1000 (TB5) by a qualified electrician. This is not covered by Eagle Microsystems, Inc. or its distributors.

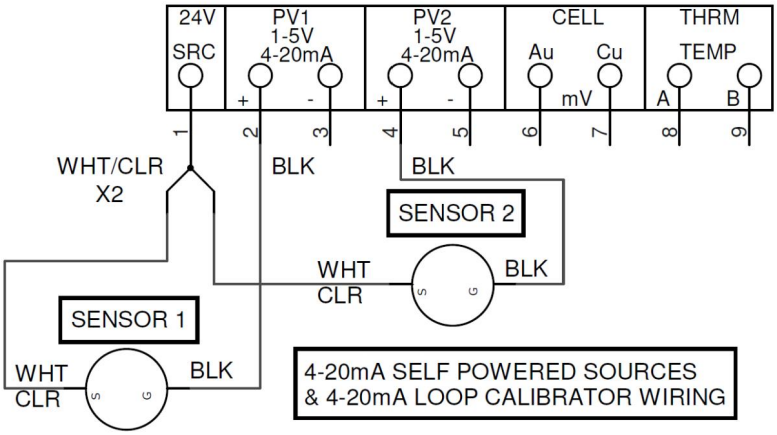
The GD-1000 gas sensor can be separated from the GD-1000 meter 1000ft or more if the appropriate cable is used. The resistance of the cable should be less than 200 ohms total (both wires).

QUICK START INSTALLATION

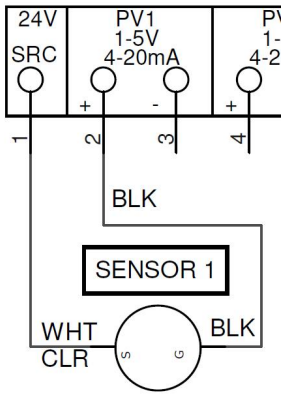


- Mount the GD-1000 meter at eye level. Mount the sensor(s) 12" off the floor. The GD-1000 is provided with 12' of cable each sensor.
- Wire the cable from the GD-1000 to the sensor (see below).
- Sensor 1 wiring:
  - Clear/white connects to TB3-1 (24V SRC)
  - Black connects to TB3-2 (PV1+)
- Sensor 2 wiring:
  - Clear/white connects to TB3-1 (24V SRC). This is the same as sensor one.
  - Black connects to TB3-4 (PV2+)
- Install the NiMH 9V batteries if supplied. *Do not substitute the battery with alkaline, lithium, carbon-zinc, etc types. Only use the 8.4V NiMH battery type supplied. NiCd types are not recommended, either.*
- Select the appropriate supply voltage (115V/230V) by S1 (upper left of PS-1000S-CPU).
- A qualified electrician should wire the AC power to the GD-1000, see TB5 above.
- The red LED on each sensor box will illuminate if the sensors are wired properly and when the meter is powered by the mains or battery.
- Remove the calibration plug on each sensor and store it in a safe place. **One can store it inside the GD-1000 or sensor enclosure.**
- After proper installation and a calibration verification, the monitor is ready to operate.

DUAL SENSORS (TB3)



SINGLE SENSOR



MAIN SCREEN

After the sign-on screens show the company name, firmware version, check-sum, and the time and date, the stabilize delay timer is displayed (see left display above). Alarms associated with the gas sensors are inhibited, which are loss of signal and set point alarms (danger and critical). One can exit this screen by pressing ESC. The stabilization delay timer will continue counting down, which is indicated on the main screen display. “DLY” is briefly displayed on the left side of the screen. During the stabilize delay timer count down, any gas concentration values displayed are not considered valid. The 4-20mA analog outputs are held to 4mA.

After the stabilization delay timer has expired, the main screen is displayed. The gas type, channel number, gas concentration, and units are displayed. If only one gas sensor is active, the bottom line displays a bar graph scaled to the 4-20mA PO1 output level. Press any one of the four push-buttons to display the MAIN MENU. The alarm status for each channel is indicated by flashing DGR (danger) or CRT (critical) on the left side of the display (see right display image above).

Note: The alarm will sound only when the main screen is displayed is so it will not activate during calibration, alarm set point adjustments, etc. This is the reason many screens will time out and return to a previous screen until the main screen is again displayed. The danger and critical set point outputs will remain active regardless of the screen that is displayed with one exception: All sensor alarms are deactivated during calibration (i.e., when one is accessing one of the calibration screens or menus). The 4-20mA outputs are forced to 4mA during the sensor calibration.

MAIN MENU SCREEN

TST: Press and hold this selection to access the relay/horn test screen.
LOG: Access the clock, hour meter and log screens.
STAT: View the status of the switch inputs (if active) and the current alarm status.
MNU: Access the calibration, configuration and alarm selection menu.

(TST) RELAY (HORN) TEST SCREEN

When this screen is activated by pressing TST in the main menu screen, all relays are de-energized for ¼ second and then powered one-by-one until all six are energized. If the internal horn is enabled, it will sound for ½ second. This screen is displayed until TST (PB4) is released.

LOG (Event log)
See the EVENT LOG SECTION later in this manual. The LOG sub menu is where one can view the event log, view and set the time and date, and view the hour counter.

(STAT) RELAY STATUS SCREEN

This screen displays the monitor input and output status for troubleshooting in the field.

The information displayed includes the danger (DGR) and critical (CRT) set point status for each channel, loss of signal, active switch inputs (IN0 and IN1), auto-dialer output is active, and failure output is active.

Screen time-out is two-minutes (returns to main screen).

(MNU) SETUP MENU

This screen allows one access to the calibration, configuration, and alarm set point screens. All selections require one to enter a password before access is allowed.

CAL: Access the sensor inputs and analog output calibration menu
CFG: Access the configuration parameters (full-scale, relay assignments, etc.)
ALM: Access the danger and critical alarm set points for each channel.
ESC: Return to the main screen.

Screen time-out is ten-seconds (returns to main screen).

(CAL) CALIBRATE ANALOG MENU SCREEN (password protected)

If CAL is selected under the SETUP MENU, the CAL ANALOG MENU is displayed.
SNS: Access the CAL GAS SENSOR INPUT selection screen.
OUT: Access the CAL OUT SELECT screen.

NOTE: When this menu and sub screens are accessed, the sensor alarms are deactivated and the analog outputs are forced to 4mA.

Screen time-out is two-minutes (returns to the setup menu and then the main screen).

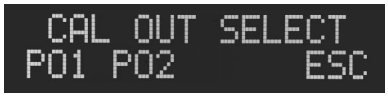
(SNS) CALIBRATE GAS SENSOR 4-20mA INPUT SCREEN

CH1/CH2: Select channel one (CH1/PV1) or channel two (CH1/PV2).
mA: Calibrate the inputs using a 4-20mA calibrator (accesses sub menu).
ESC: Return to the last menu.

Screen time-out is two-minutes (returns to the CAL ANALOG MENU).
Gas sensor calibration is documented later in this manual.

(OUT) CALIBRATE ANALOG OUTPUTS SCREEN

Select channel one (CH1/PO1) or channel two (CH2/PO2).
Press ESC to return to the last menu.



Screen time-out is two-minutes (returns to the CAL ANALOG MENU).
Analog output (4-20mA) calibration is documented later in this manual.

(CFG) CONFIGURATION (password protected)

Configuration is documented later in this manual.

(ALM) DANGER/CRITICAL ALARM SET POINTS *(password protected)*

Pressing ALM will access the danger (DGR) and critical (CRT) alarm set points for each channel.

NXT: Select next set point
LST: Select last set point
ADJ: Adjust set point – see below

ESC: Return to the SETUP MENU screen.
INC/DEC adjusts the set point value.

When adjusting the set point, one must press ENT to accept the new value entered. If ESC is pressed, any change to the set point will be ignored and the original set point value will be restored.

CONFIGURATION

From the SETUP MENU screen, press CFG to access the configuration parameters. The default password is 0000, and the push buttons operate as follows:

ADJ: Make adjustments to the parameter value.
ENT: Accept the change to the parameter.
ESC: Normally returns to the previous screen. When adjusting a parameter, the adjustment to the parameter value is discarded and the original value is restored.
NXT/LST: Select next/last parameter.
INC/DEC: Increase or decrease the parameter value.

Parameter: UNITS
Select the engineering units for both channels. Choices are “ppm” and “mgl.”
Default is “ppm.”

Parameter: CH1 GAS
Select the gas sensor type for channel one. Choices are Cl_2, SO_2, O_3, NH_3, CO, H_2S, and ClO_2.

Parameter: CH1 MAX
Set the maximum value for the set points and decimal point position for channel one.
The adjustment range is from 10 to 5000 graduations (not including decimal point).
Decimal point selections are 0, 0.0, 0.00, & 0.000. Default is 30.0 (ppm)

Parameter: CH1 AVG
Set the display update rate in seconds for channel one. Higher values yield a more stable display.
The selections are 0.2s, 0.5s, 1s, 2s, 3s, 5s, 8s, or 10s. Default is 1s.

Parameter: PO1 FS
Set the amount of gas that represents a 20mA analog output signal for channel one.
The analog output always sends a 4mA (or 0mA) signal for a zero gas level.
The adjustment range is 10 to 5000 graduations (not including decimal point). Default is 30.0 in ppm.

Parameter: CH2 EN
This parameter enables gas channel two.
Set to YES if the monitor is a two-channel unit or NO if only one sensor is connected to the monitor.
If channel two is not used, all channel two configuration parameters and alarm set points will be hidden. However, the channel two sensor and 4-20mA (PO2) calibration will still be accessible for factory calibration. Default is ON.

Note: Channel two parameters CH2 GAS, CH2 MAX, CH2 AVG, and PO2 FS have the same function as channel one.

Parameter: SP DLY
This parameter sets the danger and critical set point alarm activation delay to avoid false alarms.
The range is from zero (0) to 3600 seconds. Default is 3s.

Parameter: CH1 DGR RLY
This parameter sets the relay output for the channel one, danger level set point.
Choices are K1, K2, K3, K4, K5, K6, and OFF. The relay can be shared with any other alarm.
The default relay is K1 (shared with CH2 DGR RLY).

Parameter: CH1 CRT RLY
This parameter sets the relay output for the channel one, critical level set point.
Choices are K1, K2, K3, K4, K5, K6, and OFF. The relay can be shared with any other alarm.
The default relay is K2.

Parameter: CH2 DGR RLY
This parameter sets the relay output for the channel two, danger level set point.
Choices are K1, K2, K3, K4, K5, K6, and OFF. The relay can be shared with any other alarm.
The default relay is K1 (shared with CH1 DGR RLY).

CONFIGURATION (continued)

Parameter: CH2 CRT RLY
This parameter sets the relay output for the channel two, critical level set point.

Choices are K1, K2, K3, K4, K5, K6, and OFF. The relay can be shared with any other alarm.
The default relay is K3.

The internal buzzer and external horn (if enabled) are activated by the following events:

- Channel 1 & 2 danger/critical alarms
- Channel 1 & 2 signal loss
- Battery missing, short and low alarms (if enabled).

Parameter: TMP BZR OFF (internal horn/buzzer)
This parameter temporarily silences the internal 103dB beeper (set to YES). It is typically used during field installation and testing. When the user returns to the main screen and after one hour, the internal beeper is no longer silenced. Any alarms that occur during the time this parameter is enabled (YES) are automatically silenced.

Parameter: HORN RLY (external horn)
This parameter assigns a relay to a remote horn device. The horn relay output operates exactly the same as the internal horn and both can be enabled at the same time.

Choices are K1, K2, K3, K4, K5, K6, and OFF. The relay can be shared with any other alarm.
The default relay is OFF.

Parameter: FAIL RLY
The failure relay is activated for any condition that is regarded as a hardware problem.

- loss of signal for channel one and/or channel two
- Battery missing or short (Note: A low battery is not a failure condition.)

This alarm will not activate the horn output or the auto-dialer output unless the relay selected matches the relay assignments for those other functions.

Choices are K1, K2, K3, K4, K5, K6, and OFF. The relay can be shared with any other alarm.
The default relay is K6.

Parameter: FAIL DLY
This parameter sets the failure alarm activation delay to avoid false alarms.

The range is from zero (0) to 3600 seconds. The default is five seconds (5s).

Parameter: A-DIAL RLY
The auto-dialer relay output is energized after an adjustable delay (A-DIAL DL) when a channel's danger or critical set point has been met or exceeded. A failure condition does not activate the auto-dialer output (see parameter FAIL RLY for more information). Set the failure relay to the same relay as "A-DIAL RLY" if the site should auto-dial for all failure conditions.

Choices are K1, K2, K3, K4, K5, K6, and OFF. The relay can be shared with any other alarm.
The default relay is K6.

CONFIGURATION (continued)

Parameter: A-DIAL DL
This parameter sets the auto-dialer activation delay to avoid false alarms. This delay is added to the set point delay (SP DLY) time.

The range is from zero (0) to 3600 seconds. The default is ten seconds (10s).

Parameter: BATTERY OPT
This parameter controls the optional battery backup options.

OFF: No battery option (deactivates all battery alarms).
NiMH: Internal short-term battery option is installed (2, 8.4V, NiMH internal batteries)
BBU BBU1000 is the power source, see the EXTERNAL LONG-TERM BATTERY BACKUP section of this manual.

Parameter: BATTERY ACK
The parameter enables (ON) or disables (OFF) battery faults activating the horn/beeper alarms.
The alarms are "BATTERY MISSING," "BATTERY SHORT," and BATTERY LOW."

Parameter: AC LOSS RLY
Selects the AC loss relay output that is activated when the monitor is running on batteries (DC).

Choices are K1, K2, K3, K4, K5, K6, and OFF. The relay can be shared with any other alarm.
The default relay is OFF.

Parameter: K6 OPER
Selects normally open (N/O) or normally closed (N/C) K6 relay operation.
If N/C, the relay is normally closed when there are no fault conditions.

Parameter: LATCH ACK
If set to ON, the audible alarms (internal beeper and external horn) are not automatically cleared when the alarm condition no longer exists (e.g., danger or critical alarm).
Press ACK on-screen or temporarily activate IN1 via an external push button to silence the alarm.

Parameter: POx MODE
This parameter sets the analog outputs (POx) signal range.
"0-20mA" Allows one to use a 500 ohm resistor to produce a 0-10V signal for some data loggers.
"4-20mA" Standard 4-20mA signal compatible with most if not all site installations… Default setting.

Parameter: WLAN EN
This parameter enables the optional WLAN module (PS-1000-EXP-WLAN) if it's installed on the PS-1000S-CPU board. The module provides wireless Ethernet (Wifi) communications.

Parameter: BAUD RATE
This parameter sets the RS-232 and RS-485 baud rate. The serial port is used to communicate with remote devices and update the installed PS-1000S firmware. There is no RS-485 node addressing at this time, so only one PS-1000 can connect to an RS-485 connection. This parameter is not available if the WLAN EN parameter is set to YES.

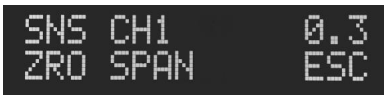
Choices are 1200, 2400, 4800, 9600, 19200, and 38400.

Parameter: CHANGE SETUP PW (password)
Allows one to change the set up password.

Parameter: CHANGE ALARM PW (password)
Allows one to change the alarm password.

4-20mA ANALOG INPUT (GAS SENSOR INPUT) CALIBRATION USING A GAS

IMPORTANT: The gas sensor should be calibrated to the meter using the gas calibration procedure on this page.



The gas sensor calibration allows one to calibrate the gas sensor input using air (zero ppm or mg/L) and a calibration gas, which is within the gas sensor range.

- Connect a gas sensor apparatus that connects to the calibration plug (figure A) that will permit a 0ppm (mg/L) and a calibration gas of known concentration to be passed over the sensor.
- Enter calibration mode from the main operating display by pressing any push button, MNU, CAL, enter password (default 0000), and then SNS.
- Select channel one or two (do not select the mA option).The active gas sensor input will be displayed, see “SNS CHx” display image above. The value displayed is in ppm & mg/l (both are equivalent).
- Apply a zero ppm (mg/L), concentration to the sensor and allow sufficient time for the display to stabilize. The display may not settle to a zero ppm (mg/L)reading.
- Press the ZRO push button to store the zero reference. This value is not adjustable to any non-zero value
- Apply a known ppm (mg/l) concentration gas to the sensor and allow sufficient time for the display to stabilize.
- Press the SPAN push button to select the SPAN adjustment mode (see CHx ADJ screen above).
- Set the correct gas concentration value by using the INC and DEC push buttons.
- Press the ENT to accept the new span value, and the display will again display the active gas concentration value.
- To permanently store calibration, press the ENT push button. Press ESC to restore the original calibration.
- The user is returned to the “CAL GAS SENSOR” menu. Select the other channel or press ESC until the main screen is displayed.

Notes:

- Be sure to store the calibration plug in a safe place so another calibration can be carried out at a later time (figure A).
- The sensor should be calibrated at least twice a year.
- ***The sensor life expectancy is two years when exposed to air (see the GAS SENSOR SPECIFICATIONS FROM THE MANUFACTURER section).***

Figure A

GAS INPUT CALIBRATION WITH A 4-20mA CALIBRATOR

IMPORTANT: The gas sensor should be calibrated to the meter using the gas calibration procedure on the previous page.

The user can calibrate or check the (milliampere) mA signal input. Enter the mA calibration mode from the main operating display by pressing any push button, MNU, CAL, enter password (default 0000), SNS, mA, and then select CH1 or CH2. **This mode also sets the gas calibration to zero (4mA) and sensor full-scale/SPAN (20mA).**

NOTE: When this screen and sub screens are accessed, the sensor alarms are deactivated and the analog outputs are forced to 4mA.

4mA: Press to set the 4mA point. This also sets the zero point in the gas calibration mode.
20mA: Press to set the 20mA point. This also sets the span point in the gas calibration mode to the full-scale setting (CH1/2 MAX).
ENT: Press to permanently store the new calibration. ENT will only be displayed if the 4mA and/or 20mA points were set.
ESC: The calibration will be canceled and the last calibration will be restored.

Basic calibration procedure:

- Connect the calibrator to channel one or two and enter the mA calibration mode. See the **4-20mA POWERED (ACTIVE) CALIBRATOR WIRING** wiring diagram (see WIRING section) in this manual.
- Apply a 4mA signal. Allow time for the reading to settle.
- Press 4mA to set the display to 4.00mA.
- Apply a 20mA signal. Allow time for the reading to settle.
- Press 20mA to set the display to 20.00mA.
- Repeat the 4mA and 20mA cal points if desired.
- Press ENT to accept and store the new calibration, or press ESC to restore the original calibration.

4-20mA OUTPUT CALIBRATION

Select a PO channel from the CAL OUT SELECT screen. To calibrate the process output (PO1/PO2), one must connect either a DMM (mA input) or other device that can read the PO1/PO2 current output. The device should have, at least, 0.01mA precision. The 4mA and 20mA points are set regardless of the POx MODE selection.

1. Press the PO1/PO2 push button to enter the CAL ADJUST POx screen.
2. Press the 4mA push button and the mA meter should read around 4.00mA.
3. Use the INC & DEC push buttons to set the output to exactly 4.00mA.
4. Press ENT to accept the new value or ESC to discard the new value.
5. Press the 20mA push button; the mA meter should read around 20.00mA.
6. Use the INC & DEC push buttons to set the output to exactly 20.00mA.
7. Press ENT to accept the new value or ESC to discard the new value.
8. The two points are not interactive so one should not need to readjust each point again.
9. Press the ESC push button to go back to the POx selection menu.

RELAYS
The four or six relays are at least 3A @ 250VAC and 3A @30VDC.

RELAY SUPPRESSION
If the relay connects to an inductive load, one should suppress the relay contacts with a “snubber” circuit, see wiring diagrams.

115V/230V OPERATION
The PS-1000S-CPU (PCB REV 0644 or above) board contains a voltage selection switch that permits one to select either 115V to 230V in the field. Be sure to check this switch, as the typical setting is 115V.

ENABLING THE SECOND CHANNEL IN THE FIELD

From the main gas screen, press the right-most push button and then the MNU push button. In the set up menu, press CFG and then enter the SETUP password (default 0000). Press NXT until “CH2 EN” is displayed. Press ADJ and press INC until ON is displayed. Press ENT to accept the change to the parameter. Set the remaining parameters to their correct settings and calibrate the sensor. Also be sure to set the channel two (2) danger and critical alarm set points.

CHANNEL TWO 4-20mA OUTPUT
An optional PS-1000(S)-AOUT daughter board is used to furnish the second analog output.

POWER UP FUNCTIONS
Press and hold the push button(s) while applying power to the GD-1000.

PB1	PB2	PB3	PB4	DESCRIPTION
X	X			I/O test
		X	X	Factory default

EVENT LOG AND TIME & DATE

An event log function is available that allows one to view certain events (danger and critical alarm) that occurred. Up to 250 events are stored.

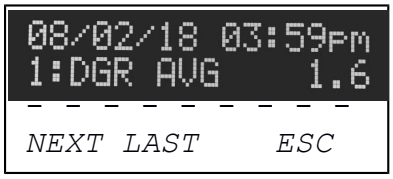
To view the log, from the main operating screen, press any push button and then LOG.

LOG MENU SELECTIONS

VIEW Access the event log selection menu.
TIME View and possibly change the time and date. Also, the power up timer (hour-meter) is under this selection.
ESC Go back to the main screen.

CH1 View the event log for channel one
CH2 View the event log for channel two (if enabled).
ESC Go back to the main screen.

While viewing the event log screens, there is no push button legend, so the push buttons operate as follows (left to right): NEXT, LAST, (no function) & ESC. This is consistent with the other screens. See the text box to the right; the top two lines are displayed and the bottom line (not displayed) shows the push button assignments.



The instrument logs danger and critical alarms (whichever occurs). The average gas exposure (AVG in ppm or mg/l), maximum gas exposure (MAX in ppm or mg/l) and duration the alarm condition occurred (Ti) are logged after the event no longer exists. The time is displayed as hours, minutes, and seconds (HH:MM:SS); the maximum time duration (Ti) is 99:59:59.

SENDING THE EVENT LOG TO A REMOTE SYSTEM (COMPUTER)

Serial command **EVL** will send the following information to a computer RS-232/RS-485 port. The channel number is specified (1 or 2). A header is sent, which contains the channel number and gas sensor type.
The data sent is the date and time of the event, event type (DGR or CRT), maximum (peak) exposure (in ppm/mgl units), average exposure (in ppm/mgl units), and the duration (time in hours:minutes:seconds) of the event. Up to 250 events are logged, and when the log memory is full, the oldest event is replaced by the latest event. See the serial command section of this manual for more information.

CLEARING THE EVENT LOG

The event log cannot be cleared from the front panel. There is a serial command that will clear the event log (EVLCLR). See the serial command section of this manual for more information.

TIME MENU SELECTIONS

View and set the internal clock.One can set the time and date by pressing SET. Screen time-out is thirty-seconds (returns to main screen).

HOUR METER

Displays the hours:minutes that the monitor has been powered. This counter cannot be reset and is maintained by a capacitor-backed memory and EEPROM when the monitor is powered down. Screen time-out is thirty-seconds (returns to main screen). This counter cannot be reset.

RS-232/RS-485/WLAN SERIAL COMMANDS

The RS-232 or RS-485 port can communicate with a remote computer (e.g., SCADA) system. The danger and critical set points are purposely not able to be set over the serial interface. All commands must be terminated by a carriage-return <CR>. A line-feed <LF>, if sent, is ignored. The responses from the GD-1000 are all terminated by a carriage-return <CR> and a line-feed <LF>.

The optional WiFi (WLAN) communications module, if installed, has separate documentation not included here.

Command: **MSV** n

Read Measured Values – Reads up to two gas sensor readings. “n” is the channel number. If “n” is not specified, both channels are transmitted and are separated by a comma. The alarm status is also transmitted.

```
CH1 (Cl2) =  0.1ppm,OK, CH2 (SO2) =  10.0ppm,CRT,<CR><LF>
```

The gas type is in parenthesis (Cl2, SO2, O3, NH3, CO, H2S, or ClO2).
The gas unit is either “ppm” or “mgl,” which is set by CFG parameter UNITS.
STATUS: OK (no alarms), DGR (danger), CRT (critical) or DLY (power up stabilization time delay).

When the power up sensor stabilization time delay is active, the sensor concentration sent is forced to zero (0).

Command: **ACK**
Acknowledge the audible alarm if active.

Command: **CLK {yyyy-MM-ddThh:mm:ss}**
Read/set the real time clock using the ISO 8601 standard.

Read response (send CLK<CR>): CLK 2008-10-17T07:46:45<CR><LF>
The clock is set using the same serial format.

Command: **RFW**
Read the firmware version number.
Response: RFW5.00<CR><LF>

Command: **EVL** n
Download the event log. The “n” is the channel number, which is either a 1 (0x31) or 2 (0x32). See the EVENT LOG section of this manual for more information.

Send: EVL1<CR> and then EVL2<CR> to list the events for both channels.

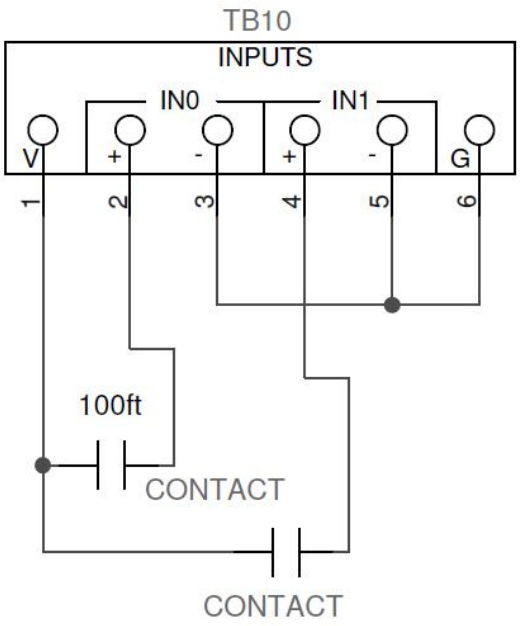
```
LOG REPORT: CH1          GAS SENSOR TYPE: Chlorine
2018/08/06,13:27:49,CRT,MAX=   3.5,AVG=   3.3,DURATION=00:01:16
2018/08/06,13:20:06,CRT,MAX=   3.5,AVG=   3.5,DURATION=00:04:59
2018/08/06,13:05:50,CRT,MAX=   3.5,AVG=   3.4,DURATION=00:11:33
2018/08/02,13:08:26,CRT,MAX=   4.4,AVG=   1.9,DURATION=00:00:16
2018/08/02,13:07:33,CRT,MAX=   4.4,AVG=   3.9,DURATION=00:00:08
2018/08/02,11:53:31,DGR,MAX=   2.0,AVG=   1.6,DURATION=00:00:01
END
LOG REPORT: CH2          GAS SENSOR TYPE: Sulfur Dioxide
2018/08/06,13:27:49,CRT,MAX=   3.3,AVG=   2.7,DURATION=00:01:14
2018/08/06,13:20:06,CRT,MAX=   3.3,AVG=   3.3,DURATION=00:04:59
2018/08/06,13:05:50,CRT,MAX=   3.3,AVG=   3.2,DURATION=00:11:55
2018/08/02,15:14:31,CRT,MAX=   3.2,AVG=   0.9,DURATION=00:42:54
2018/08/02,15:13:47,CRT,MAX=   4.1,AVG=   2.3,DURATION=00:00:11
2018/08/02,15:13:12,DGR,MAX=   1.2,AVG=   1.1,DURATION=00:00:13
2018/08/02,15:12:59,CRT,MAX=   6.0,AVG=   3.8,DURATION=00:00:10
2018/08/02,11:49:54,DGR,MAX=   1.4,AVG=   1.2,DURATION=00:00:01
END
```

Command: **EVLCLR**
Clear up to 250 event log entries.

WIRING

EXTERNAL PUSH BUTTON INPUT

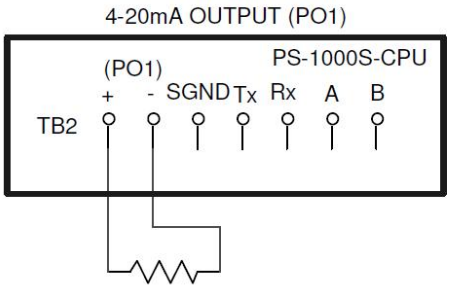
Use IN1 to silence alarm remotely.
IN0 is not used at this time.

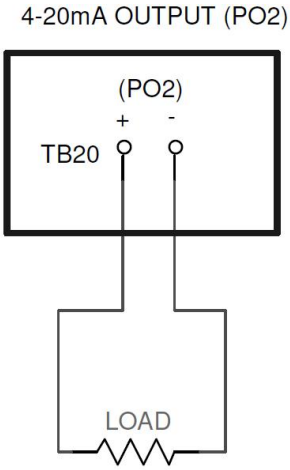


WARNING
THE CONTACT CANNOT SUPPLY ANY POTENTIAL

ANALOG OUTPUT WIRING

PO1, 4-20mA OUTPUT, TB-2, PS-1000S-CPU(-B)
PO2, 4-20mA OUTPUT, TB-20, PS-1000S-AOUT
Some PS-1000S-AOUT boards show PO2 labeled as TB-10.

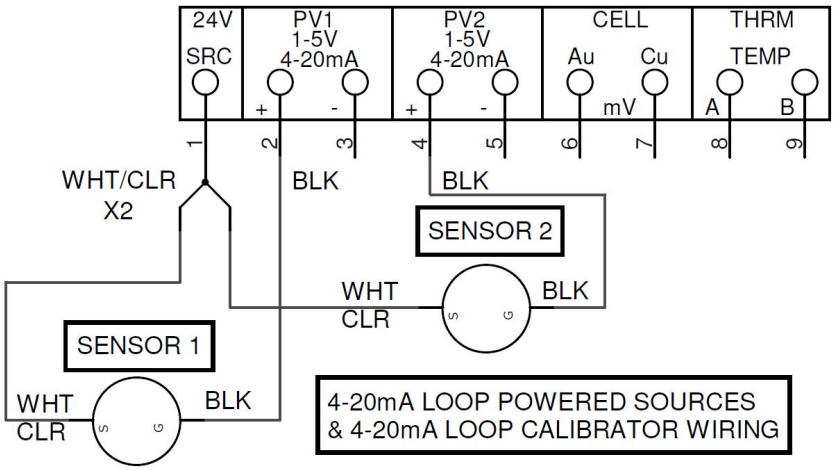




LOOP POWERED SENSORS

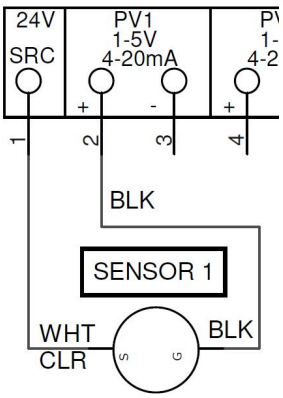
DUAL GAS SENSOR

NOTE: PV1 & PV2 share common negative (TB3-3 & 5)
if J1 and J2 both have G selected.



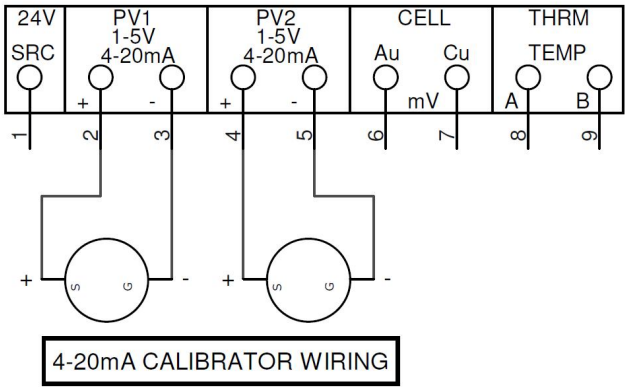
4-20mA LOOP POWERED SOURCES
& 4-20mA LOOP CALIBRATOR WIRING

SINGLE GAS SENSOR



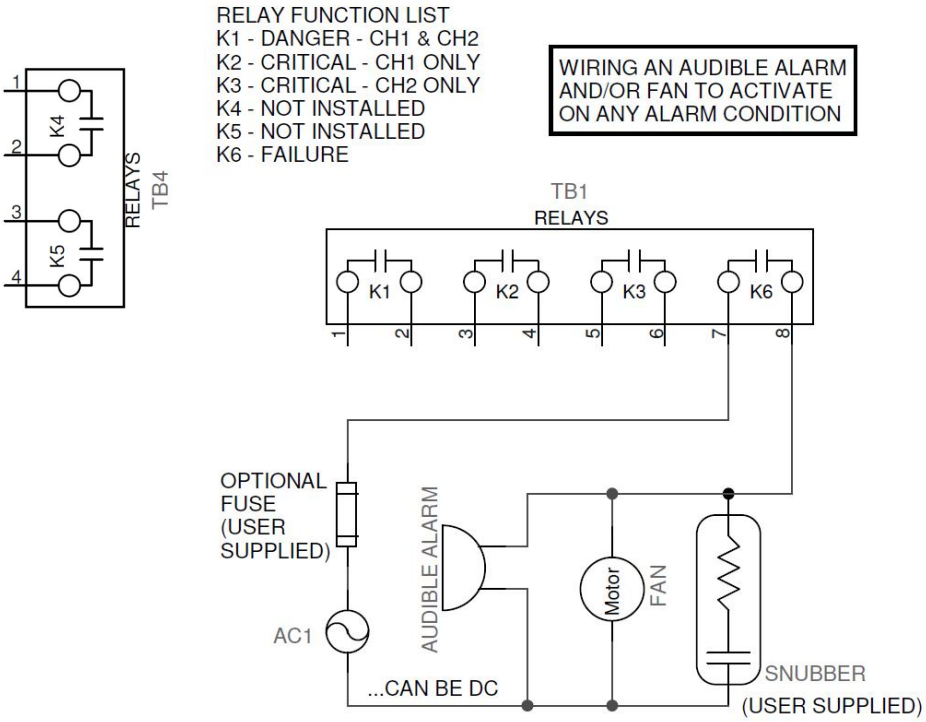
WIRING (continued)

4-20mA POWERED (ACTIVE) CALIBRATOR WIRING



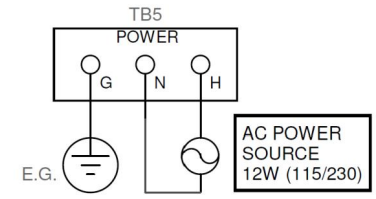
4-20mA CALIBRATOR WIRING

The relay function list below is the default, but one can reassign the relay outputs to suit the requirements of the installation. K4 & K5 (TB4) are optional relays and are not typically installed.



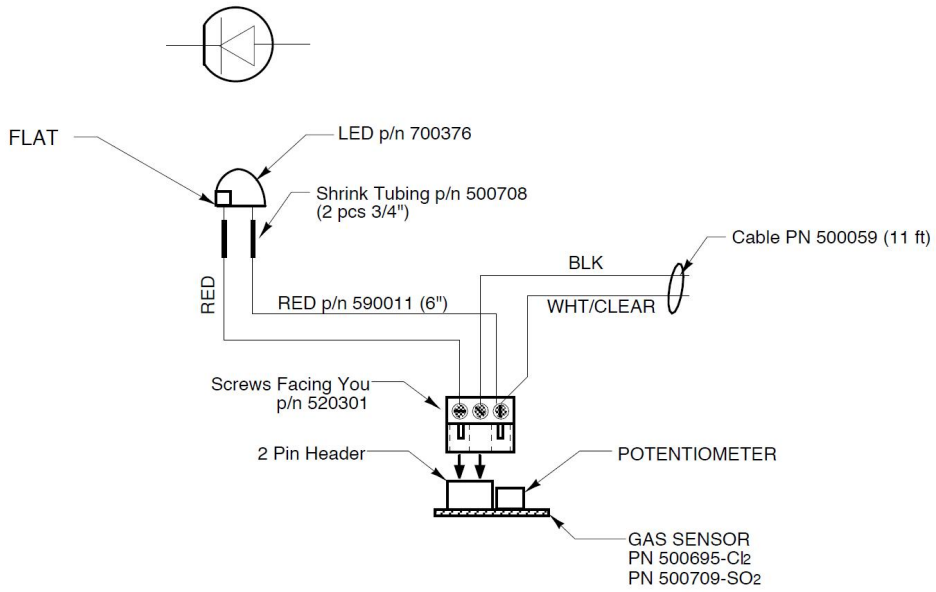
The relay contacts are “dry” (potential free), so the load power supply is external, see the example circuit above. **If the load is inductive, add a snubber (RC) circuit across the relay contact terminals to greatly extend the life of the relay contacts.** One can also connect the snubber across the load, which is typically more convenient, in lieu of the contacts, as shown above.

AC POWER WIRING



S1 (V.SELECT)
SELECTS 115V OR 230V A.C. POWER

GAS SENSOR INTERNAL WIRING (REF. ONLY)



SENSOR ASSEMBLY WIRING

BASIC SYSTEM TROUBLESHOOTING

Instrument does not light.	• Check that 115 VAC (230VAC if used) is reaching TB5. • Check that the ribbon cable to the display is plugged in at both ends and fully seated. • Make sure power is disconnected and then remove fuse and check for continuity. • Check "V SELECT" switch is set for the input voltage in use. **Never change this switch with the power on!**
Instrument lights but does not show anything on the display.	• Check everything but the fuse in the "Instrument does not light" section. • Check the "CONTRAST" pot on display board. Turn to both ends of it's travel while watching the display. It's usually turned clockwise from factory.
Light on sensor does not light but instrument powers up.	• Check instrument wiring. See "Normal wiring" for TB3 in the diagram section. • Measure between "24V (TB3-1) and PV1 –(TB3-3)". It should be between 22 & 24 VDC. • Go to "Checking sensor wiring"
Light on sensor lights but instrument doesn't respond to chlorine exposure.	• Remove any cap seals from the sensor. • Remove the calibration plug for faster response time. See the sensor data sheet for details. • Check instrument wiring(see above). The black wire from the sensor must be on PV1 (or PV2) "+". If it's on a "-" terminal this problem will result. • Go to "Checking sensor wiring"
Checking sensor wiring.	• Open sensor box (4 screws). The circuit board mounts to the sensor on three gold pins. Be sure the board is on all three pins and fully seated. • Check that the orange plug has not pulled loose from the sensor. • The sensor has a two-pin orange header but has a <u>three</u>-pin plug. From left to right with the screws facing you the wires are red, black, then red & white twisted together. The terminal with the red & white is the one not connected to the two-pin header (see GAS SENSOR INTERNAL WIRING above). • Check for broken wires on the L.E.D. The side of the L.E.D. with the flat is the one that goes to the leftmost terminal on the three-pin plug. • If no problems were found go to "Verify indicator operation".
Verify indicator operation.	• Disconnect the sensor. Wire a 4-20mA generator as shown under "4-20mA POWERED (ACTIVE) CALIBRATOR WIRING" in the diagram section. • Injecting 4mA will give a 0ppm reading and 20mA will give a 30ppm (or full-scale) reading if the unit was setup for a standard Cl_2 sensor.
Instrument shows high or drifting readings when first powered up but settles to a stable reading within a minute or two.	• This is not a problem. The sensors need to stabilize when first powered up. The alarms are disabled until the stabilize delay timer disappears from the screen. This takes about two minutes.

INTERNAL SHORT-TERM BATTERY BACKUP (BATTERY OPT = NiMH)

An internal short-term battery backup is available as an option. It can power the PS-1000 from fifteen (15) to forty-five (45) minutes (depending on alarm status) with fully charged batteries. Only use two 8.4V NiMH batteries with a capacity of 170mAh (milliamp-hour) or better. The charging time is about 24 hours. NiCd batteries can be used, but they will not last as long in this application so they are not recommended. To view the battery state, while in the main screen, press and hold PB3 (second to left-most push button), and after about three seconds, the battery state screen will be displayed.

WARNING

Do not use alkaline, lithium (any kind), carbon-cell, etc. primary batteries.
Do not install rechargeable alkaline batteries.

- When the battery capacity is depleted, the GD-1000 is powered down. To turn the GD-1000 off while running on batteries, press and hold the left-most push button until the message, “POWER DOWN?” is displayed. Pressing YES will power down the GD-1000.
- The GD-1000 cannot be powered down while running on A.C. power.

EXTERNAL LONG-TERM BATTERY BACKUP (BATTERY OPT = BBU)

The long-term battery (BBU1000) option is a separate enclosure containing a 5.4 Amp-Hr sealed lead-acid (SLA) battery and battery charger. The BBU1000 connects to TB11 which is located on the PS-1000S-DSP board. The GD-1000 can be powered for greater than 24 hours when a BBU1000 is employed.

The GD-1000 does not require the user to connect 115V/230V to it since the BBU1000 powers the GD-1000 through the three-conductor cable (supplied). The voltage selection switch, S1, located on the BBU1000 board allows the user to select either 115VAC or 230VAC (+/- 10% & 50/60Hz) power. The battery will charge when the BBU1000 is connected to AC power. The battery charge time is from 12 to 24 hours, depending on the duration of the AC power interruption.

The user can power-down the GD-1000 if it’s operating on the battery backup when the user depresses the left-most push button in the main operating screen (where the gas detector level(s) are/is displayed) for fifteen seconds until the LCD display goes blank (this is not the same as the short-term battery option above). To power the GD-1000 when A.C. power is not present, press the left-most push button. If the BBU1000 is being powered by A.C. power (mains), the user may not power down the GD-1000 meter.

Note: The BBU1000 is shipped with the battery plug, TB2, disconnected. The user must insert this plug onto the TB2 header located on the BBU1000 unit for the battery to function properly. Also, the TB3 power cable must be connected to the GD-1000 meter (The GD-1000 header is TB11). The battery is fully charged before it leaves the factory. However, the battery will loose some of its charge over time if it’s not being charged by the BBU1000.

The BBU1000 has internal LEDs that indicate the status of the unit.

POWER	DESCRIPTION	A.C. LED	CHARGE LED
AC	Battery is charging	ON	ON
AC	Battery is not charging	ON	OFF
AC	Battery is “float” charging	ON	OFF
AC	Battery circuit is shorted	FLASHING	FLASHING
AC	Battery is not connected.	ON	FLASHING
DC	Battery is powering the GD-1000	OFF	OFF

The POWER LED is lit when the BBU1000 is powered.

See the diagram section for wiring information.

Cl_2 GAS SENSOR SPECIFICATIONS FROM THE SENSOR MANUFACTURER

Technical Specifications

MEASUREMENT

Sensor Type Used	3CLH
Filter	None
Output	4-20 mA d.c.
Response Time (T_{80})	<60 Seconds at 20°C
Resolution	0.1 ppm
Zero Shift (-20°C to +40°C)	< -0.2 ppm equivalent
Repeatability	2% of signal
Linearity	Linear

ELECTRICAL

Power Supply Required	10 - 35 VDC single-ended
Output Impedance	4 MΩ
Calibration	Via built-in span and zero potentiometers

MECHANICAL

Mounting	Via mounting nose supplied
Weight	58 g including mounting accessory
Position Sensitivty	None

ENVIRONMENTAL

Operating Temperature Range	-20°C to +50°C
Recommended Storage Temp	0°C to 20°C
Temperature Compensation	None
Operating Pressure Range	Atmospheric ± 10%
Pressure Coefficient	No data
Operating Humidity Range	15 - 90% RH non-condensing

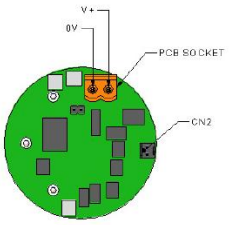
LIFETIME

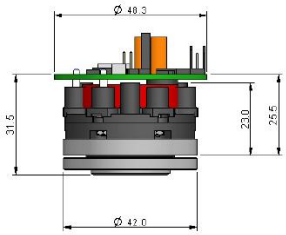
Long Term Sensitivity Drift	<2% signal loss/month
Expected Operating Life	Two years in air
Storage Life	6 months in CTL container
Standard Warranty	12 months from date of despatch

IMPORTANT NOTE:

All performance data is based on conditions at 20°C, 50% RH and 1013 mBar. For further information on the operation and calibration of City Technology 4-20mA transmitters, please refer to OP-12.

Product Dimensions





All dimensions in mm
All tolerances ±0.15 mm unless otherwise stated

RANGES AVAILABLE

3CLH CiTiceL 4-20 mA Transmitters are available with the following precalibrated ranges, and can be recalibrated to intermediate ranges.

Range	Order Code
0-5 ppm	TH3A-1A
0-10 ppm	TH3B-1A
0-20 ppm	TH3C-1A
0-30 ppm	TH3D-1A
0-50 ppm	TH3E-1A
0-100 ppm	TH3F-1A
0-200 ppm	TH3G-1A

Poisoning

CiTiceLs are designed for operation in a wide range of environments and harsh conditions. However, it is important that exposure to high concentrations of solvent vapours is avoided, both during storage, fitting into instruments and operation.
When using sensors with printed circuit boards (PCBs), degreasing agents should be used before the sensor is fitted. Do not glue directly on or near the CiTiceL as the solvent may cause crazing of the plastic.

Cross Sensitivity Table

Whilst CiTiceLs are designed to be highly specific to the gas they are intended to measure, they will still respond to some degree to various other gases. The table below is not exclusive and other gases not included in the table may still cause a sensor to react.

Gas	Concentration Used (ppm)	3CLH (ppm Cl_2)
Carbon Monoxide, CO	300	0
Hydrogen Sulfide, H_2S	15	≈ -1.5
Sulfur Dioxide, SO_2	5	0
Nitric Oxide, NO	35	0
Nitrogen Dioxide, NO_2	5	≈ 5
Hydrogen, H_2	100	0
Hydrogen Cyanide, HCN	10	0
Hydrogen Chloride, HCl	5	0
Ethylene, C_2H_4	100	0

The cross-sensitivity values quoted are based on tests conducted on a small number of sensors. They are intended to indicate sensor response to gases other than the target gas. Sensors may behave differently with changes in ambient conditions and any batch may show significant variation from the values quoted.

GD-1000 ROUTING TICKET (GAS DETECTOR)

SO#: - - DATE: _____

Program: PS-1000S-GD-1000 SERIAL #: _____

Version: 5. PCB REV: ☐ 0644 ☐ ____

CH1 sensor S/N: _____ TYPE: ☐ Cl_2 ☐ SO_2 ☐ _____

CH2 sensor S/N: _____ TYPE: ☐ Cl_2 ☐ SO_2 ☐ OFF ☐ _____

CONFIGURATION:	Default values	User Changes
UNITS	ppm	
CH1 GAS	Cl_2	
CH1 MAX	30.0	
CH1 AVG	0.5s	
PO1 FS	30.0	
CH2 EN	ON	
CH2 GAS	Cl_2	
CH2 MAX	30.0	
CH2 AVG	0.5s	
PO2 FS	30.0	
SPT DLY	3	
CH1 DGR RLY	K1	
CH1 CRT RLY	K2	
CH2 DGR RLY	K1	
CH2 CRT RLY	K3	
HORN RLY	OFF	
FAIL RLY	K6	
FAIL DLY	5	
A-DIAL RLY	OFF	
A-DIAL DL(y)	10	
BATTERY OPT	OFF	
BATTERY ACK	ON	
AC LOSS RLY	OFF	
K6 OPER	N/O	
LATCH ACK	YES	
POx MODE	4-20mA	
WLAN EN	NO	
BAUD RATE	38400	

ALARM Setup:	Default values	User Changes
CH1 CRITICAL (K2)	3.0	
CH1 DANGER (K1)	1.0	
CH2 CRITICAL (K3)	3.0	
CH2 DANGER (K1)	1.0	
Note: CH2 alarms are hidden if "CH2 " is set to OFF.		
ALARM PW	0 0 0 0	
SETUP PW	0 0 0 0	

Note: Parameters that do not need to be set, depending on the modes selected, will not be available (leave blank).
Default hardware: K1, K2, K3, K6 (four relays), RS-232, RTC (clock), single 4-20 mA output, 2 contact inputs, two 4-20 inputs

INSTALLED HARDWARE OPTIONS (except BBU1000)

INT BATTERY (¼ hr)	☐	PS-1000(S)-AOUT	☐	BUZZER	X	RS-485	X
BBU1000 (12-24hr)	☐	PS-1000-EXP-WLAN	☐		☐		☐