

Operation and Maintenance Manual

GDS-58BX Sample Draw Monitor

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CAUTION: FOR SAFETY REASONS THIS EQUIPMENT MUST BE OPERATED AND SERVICED BY QUALIFIED PERSONNEL ONLY. READ AND UNDERSTAND INSTRUCTION MANUAL COMPLETELY BEFORE OPERATING OR SERVICING.

ATTENTION: POUR DES RAISONS DE SÉCURITÉ, CET ÉQUIPEMENT DOIT ÊTRE UTILISÉ, ENTRETENU ET RÉPARÉ UNIQUEMENT PAR UN PERSONNEL QUALIFIÉ. ÉTUDIER LE MANUE D'INSTRUCTIONS EN ENTIER AVANT D'UTILISER, D'ENTRETENIR OU DE RÉPARER L'ÉQUIPEMENT.

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1 SAFETY INFORMATION

Important – Read Before Installation

Users should have a detailed understanding of GDS-58BX operating and maintenance instructions. Use the GDS-58BX only as specified in this manual or detection of gases and the resulting protection may be impaired. Read the following WARNINGS prior to use.

WARNINGS

- The GDS-58BX sample draw system must be installed, used, and maintained in accordance with information contained herein. Installation in any hazardous area must follow all applicable restrictions, requirements, and guidelines for said hazardous areas. It is the end user customer's final decision to ensure that the GDS-58BX is suitable for the intended use.
- The GDS-58BX is designed and constructed to measure the level of certain gases in ambient air. Accuracy in atmospheres holding steam or inert gases cannot be guaranteed.
- Do not paint transmitter or sensor assembly.
- Do not run the GDS-58BX if its enclosure is damaged or cracked or has missing components. Make sure the cover, internal PCB's and field wiring are securely in place before applying power.
- Do not expose the GDS-58BX to electrical shock or continuous severe mechanical shock. Protect the GDS-58BX from dripping liquids and high-power sprays.
- Calibrate with known target gas at start-up and check on a regular schedule, at least every 90 days. More frequent inspections are encouraged to spot problems such as dirt, oil, paint, grease or other foreign materials in the sample tubing or in the sensor head.
- Periodically test for correct operation of the system's alarm events by exposing the sample extraction point to a calibration gas concentration above the High Alarm set point.

WARRANTY

GDS Corp. UPS products carry a 2-year limited repair or replacement warranty on electronics and workmanship and one year warranty on sensors. GDS Corp. reserves the right to void warranty claims based on evidence of misuse, abuse, or misapplication. The warranty period starts on the date of shipment.

IF YOU HAVE QUESTIONS

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2 PRODUCT OVERVIEW

The GDS-58BX is designed for reliably detect hazardous levels of toxic or combustible gas in locations where the environment is not suitable for the installation of traditional ambient sensors. The GDS-58BX combines a reliable brushless DC sample pump, low flow detection switch, visual flow meter and GASMAX DSX gas detector into a single unit that provides 4-20mA analog output, programmable relays including system FAULT and a MODBUS slave interface. The integrated Run/Cal switch and GASMAX DSX userprompted calibration procedure make normal maintenance quick and easy.

The GDS-58BX consists of a gas detector coupled with an integrated pump / flow switch and wiring junction box. The Run / Cal valve selects between the sample input and local calibration gas input. The Visual Flow Indicator shows GREEN if flow is OK, and RED if flow is blocked or the pump fails. The Wiring Junction Box provides an easy and convenient way for the user to attach power and signal wiring.



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Sample gas enters the unit through the Run/Cal valve where it is drawn into the explosion proof enclosure by the pump after passing through the first of two flame arrestors. Output from the pump is directed through the low flow switch and exits the explosion proof enclosure through the second flame arrestor where it travels to the flow meter and sensor flow cell and then exits the flow cell at ambient atmospheric pressure. In the event of a pump failure or if flow is blocked for some reason, the 4-20mA output of the GDS-58BX will drop to zero.

Flow Switch



Figure 2-2: GDS-58BX Flow Diagram

GDS-58BX SENSOR TECHNOLOGY

For toxic gases, the GDS-58BX supports a range of electrochemical ("echem") sensors for toxic gases and oxygen levels. These sensors use chemical reactions to sense the presence of gases such as hydrogen sulfide, sulfur dioxide and others. Each sensor has an amount of chemical electrolyte that reacts with the target gas to create free electrons that are amplified and measured. Once the electrolyte is depleted, sensor output will diminish, and the sensor must be replaced.

IMPORTANT: TOXIC SENSORS ARE SUBJECT TO ACCELERATED DETERIORATION IF POWER IS NOT APPLIED WITHIN 3 MONTHS OF SHIPMENT FROM GDS CORP.

For combustible gases, the GDS-58BX uses a GDS-IR infrared sensor. These sensors can be calibrated for many different combustible gases.

Infrared sensors use the fact that hydrogen-carbon bonds found in all hydrocarbon gases absorb infrared light at certain frequencies. When the target gas passes between a source of infrared light and a suitable detector, a reduction in detector output indicates the presence of gas. Infrared sensors cannot be poisoned or damaged by chemicals in the target gas and typically have a long and stable operational life. GDS-IR sensors carry a 5-year warranty on the electronics and a 12-year warranty on the IR source.

IMPORTANT: INFRARED COMBUSTIBLE GAS SENSORS CANNOT DETECT COMBUSTIBLE HYDROGEN GAS

SAMPLING APPLICATIONS

When sampling from a static area, mount the GDS-58BX as close as possible to the extraction point. Try to keep the unit above the sampling point so that any moisture that condenses inside the tubing flows back to the source.



Figure 2-3: GDS-58BX Ambient Air Sampling

For stainless steel tubing runs (typically ¼" OD) GDS Corp recommends the installation of #1200-0387 end-of-line dust filter at the pickup point if the area has significant amounts of dust or particulates (See Fig. 2-3).

For tubing runs that can use flexible tubing, GDS Corp recommends the #20-0198 filter kit that includes a non-metallic end-of-line filter / silencer with replaceable filter element and 50 feet of Tygon tubing.

If water may be present at the sample inlet point, GDS Corp recommends the #20-0186 Float Probe Kit with 50' of Tygon tubing or the #20-0187 Float Probe Kit with 100' of Tygon Tubing. The float probe ensures that the pickup point stays above the liquid level under most circumstances. The sample pump used on the GDS-58BX can lift liquid water to a height of 15 ft / 5m, and if the end of the sample line is placed in liquid water, the pump will draw water through the inlet filter, flame arrestors, sample pump, flow switch and flow meter and sensor flow cell, resulting in damage to the components.

In addition to end-of-line filters & probes, the GDS-58BX offers three choices for inlet filters that are directly integrated into the unit. These filters are mounted on the left side, in-between the flame arrestor and Run/Cal valve.

Filter option #1 ("FIL" = 1) includes a coalescing / dust filter with integrated drain valve. This filter is best for use in areas that do not have corrosive or acidic gases. The filter element is designed to remove particles that are larger than 5 microns.





Filter option #2 ("FIL" = 2) includes a stainless-steel coalescing filter with stainless steel drain valve. This filter is recommended if there are any corrosive or acidic gases present that are not compatible with materials such as plastics or mild steel. The filter element used in this filter is designed to remove particles that are larger than 0.1 microns.



Filter option #3 ("FIL" = 3) includes a Pyrex clear coalescing filter with stainless steel drain valve. This filter is recommended if there are any corrosive or acidic gases present and if the sample air or gas may contain high levels of moisture.

Front View



Figure 2-6: Filter Option #3

IMPORTANT: WHEN DRAINING AN INLET FILTER, BLOCK THE SAMPLE FLOW BY REMOVING POWER FROM THE UNIT OR SETTING THE RUN/CAL VALVE TO A POSITION BETWEEN RUN AND CAL.

Sampling inside air conditioning ducts presents several problems for ambient sensors. Rapid air flow can damage the sensor, access for calibration or maintenance is difficult, and non-linear gas distribution can result in errors. Using a GDS-58BX with a #20-0141 Duct Sample Kit simplifies installation, maintenance and calibration and samples a larger cross-section of the duct stream.



Duct Sample Kit



3 HARDWARE

The GDS-58BX consists of two NEMA 7 explosion-proof enclosures that contain the sample pump and flow switch (left side) and GASMAX DSX gas monitor, sensor, and flow cell (right side). Gas enters the left side enclosure via explosion proof flame arrestors, passes through the flow meter and into the sensor.



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4 INSTALLATION

SELECTING A LOCATION

As compared to a fixed-point gas detector, the GDS-58BX sample draw system offers a great deal of flexibility when choosing a mounting location. Consider the following when considering where to install the GDS-58BX:

- Locate the GDS-58BX where it will be easy to service and calibrate.
- Minimize the length of sample tubing.
- Mount the GDS-58BX at or above the sample point, if possible, to minimize condensation
- Keep the sample pickup from becoming submerged in liquid. The sample pump is capable of drawing water to a height of 15 feet. *If liquid enters the flame arrestor or sample pump, damage will occur.*
- If it is necessary to tie the sample outlet back to the sample source, make sure there are no obstructions or restrictions. Any increase in pressure inside the sensor flow cell *will result in reading errors*.

MOUNTING THE GDS-58BX

The GDS-58BX standard configuration is a dual aluminum explosion-proof enclosure and is available standalone, on a 21" x 21" painted steel plate or in a 24" x 24" non-metallic or stainless-steel enclosure. The GDS-58BX must be mounted vertically for the flow switch and flow meter to operate properly.

INLET TUBING

Specifications for the inlet tubing depend on the target gas. Long runs of sample tubing will cause a significant delay between the appearance of gas and the resulting warning. Small diameter stainless steel (1/4" OD) is ideal for most gases. Flexible tubing or tubing manufactured from Teflon or PTFE may also be used.

Inlet Delay Calculation For ¼" OD tubing, allow 5 seconds delay for every ten feet of sample line.

Smaller diameter tubing results in faster response because of the smaller total volume of gas that must be drawn from the sample point. Tests have shown that it takes approximately 3.5 minutes for a sample to be drawn through 500 feet of 1/4" OD flexible tubing; this gives a delay rate of roughly 0.4 seconds per foot of tubing. Larger diameter tubing with higher internal volume will result in a longer delay, while smaller tubing may be subject to blockage from condensed water droplets or dirt particles.

NOTE: THE SAMPLE PUMP IS CAPABLE OF PULLING UP TO 7.0 PSI VACUUM, ENOUGH TO LIFT WATER OVER 15 FEET. CARE SHOULD BE TAKEN NOT TO SUBMERGE THE SAMPLE EXTRACTION POINT IN LIQUID

Recommended Wire Gauge

AS THE PUMP WILL QUICKLY FILL THE FLAME ARRESTORS, FLOW SWITCH, FLOW METER AND SAMPLE FLOW CELL WITH LIQUID.

SAMPLE EXHAUST

Changes in ambient pressure will affect the output from most sensors and allowing the sample to exhaust directly to the atmosphere will minimize these affects. Long runs of tubing connected to the sample outlet may increase the backpressure inside the sensor flow cell and cause higher than normal readings. Returning a sample to a process stream may be desirable and will work if the process stream is only slightly above ambient (< 5" of water column) and has a relatively constant pressure.

IMPORTANT: DO NOT RESTRICT THE SAMPLE EXHAUST OUTLET.

DC POWER & SIGNAL CONNECTIONS

To access signal and power connections, remove the cover on the wiring junction box mounted on the right side of the GDS-58BX. Power, ground (common) and signal outputs are shown below. Connect power to TB1 pin 1or pin 2 and ground to TB1 pin 5 or pin 6. Additional+24V and Common connections are available for local strobes or horns. The "DC ON" LED is connected across the DC input wiring and can be used to confirm the existence of properly polarized DC power.

		< 100 ft 100 to 500 ft 500 to 1000 ft	#18 GA #16 GA #14 GA
	Analog Out (2x)	TB2 – 1: +24VD	c
+540 +540 +540 +540 +540 +540 +540 +540		TB2 – 2: +24VD	A Ch1 Out
	DC +24V In	TB2 – 4: 4-20m	A Ch2 Out
		TB2 – 5: Comm TB2 – 6: Comm	on on

Figure 4-1: Power and Signal Wiring Connections

RELAY / MODBUS CONNECTIONS

Wiring terminals for the Serial MODBUS interface and single alarm relay are also located in the wiring junction box as shown below. The relay is rated for 5A non-inductive load. When driving large inductive loads such as fans or compressors, be sure to install an interposing relay between the GDS-58BX and load.



Figure 4-2: Relay & MODBUS Connections

Relays 1 can be programmed to trigger above or below a certain value, work as normal or 'failsafe' and can be made to latch if desired.

WARNING: CONTACTS ARE RATED FOR RESISTIVE LOADS ONLY! INDUCTIVE LOADS, SUCH AS COILS, MOTORS OR SOLENOID VALVES MAY CAUSE ARCING AND INTERFERE WITH SENSOR DATA.

SERIAL MODBUS CONNECTION

The GDS-58BX provides a single non-isolated MODBUS RTU slave interface that allows remote controllers or PLCs to monitor many aspects of operation, including real-time data, range and alarm setpoints and alarm and fault status bits. The GDS-58BX operates at 9600 baud using an industry standard RS-485 signal. Cable choice for MODBUS systems is important for both signal integrity and power distribution. MODBUS / RS-485 transmissions use low-voltage differential signaling to achieve reasonable data rates over long distances, up to 4000 feet without a repeater. For MODBUS data signals, GDS Corp recommends 20GA to 24GA shielded cable. Daisy-chain power distribution may require larger gauge wire since it is critical that the supply voltage for the GDS-58BX at the far end of the string not fall below 22VDC during power-up.

OPTIONAL MODBUS WIRING JUNCTION BOX [MJBJ]

If the GDS-58BX is to be used in a MODBUS daisy chain configuration, GDS Corp recommends the addition of the MODBUS Wiring Junction Box (see Fig. 4-3). This option minimizes the need to access wiring inside the GDS-58BX, provides individual wire landing points for incoming and outgoing MODBUS and power wiring and shields, and makes it easy to temporarily disconnect the GDS-58BX power or MODBUS connections without affecting any other MODBUS device.



Figure 4-3: GDS-58BX with Optional Modbus Wiring Junction Box (MBJB)

EXPLOSION PROOF INSTALLATION

The GDS-58BX is designed for use in Class 1 Division 1 hazardous areas. Installation in these areas should follow the best industry standard practices and all appropriate electrical codes. Generally, these codes require rigid metal conduit, poured seals and other installation elements necessary to ensure safety. For maximum protection against RF interference or electrical surge, the GDS-58BX enclosure and interconnecting conduit must be properly grounded.

INTRINSICALLY SAFE INSTALLATION

The GDS-58BX is not certified for use as an Intrinsically Safe device.

5 CALIBRATION

Calibration is critically important to ensure correct operation of the GDS-58BX. The built-in CAL MODE function is designed to make calibration quick, easy and error free; a successful ZERO and SPAN calibration requires only four keystrokes.

Follow these GDS-58BX calibration guidelines:

- CALIBRATION ACCURACY IS ONLY AS GOOD AS THE CALIBRATION GAS ACCURACY. GDS CORP
 CALIBRATION GASES ARE TRACEABLE TO NIST (NATIONAL INSTITUTE OF STANDARDS AND
 TECHNOLOGY) STANDARDS.
- NEVER USE CALIBRATION GAS THAT HAS PASSED ITS EXPIRATION DATE.
- CHECK THE SPAN GAS VALUE SETTING AND MAKE SURE IT MATCHES THE CALIBRATION GAS.
- BE SURE TO USE A CYLINDER OF ZERO AIR, A MIXTURE OF 21% OXYGEN AND 79% NITROGEN, AS
 A ZERO REFERENCE UNLESS YOU ARE CERTAIN THAT NO TARGET GAS EXISTS IN THE AREA.

 AMBIENT AIR WITH MINUTE AMOUNTS OF TARGET GAS MAY RESULT IN AN 'ELEVATED ZERO'
 CONDITION THAT MAY CAUSE A FAULT TO OCCUR ONCE THE AMBIENT GAS IS NO LONGER

 PRESENT.
- ALWAYS CALIBRATE A NEW SENSOR BEFORE DEPENDING ON THE GDS-58BX FOR PERSONNEL
 OR EQUIPMENT SAFETY
- CALIBRATE ON A REGULAR SCHEDULE. GDS CORP RECOMMENDS A FULL CALIBRATION EVERY 3 MONTHS, WITH PERIODIC 'BUMP TESTS' ON A MORE FREQUENT BASIS TO ENSURE THAT THE SENSOR HAS NOT BEEN AFFECTED BY TEMPERATURE EXTREMES OR THE PRESENCE OF INCOMPATIBLE GASES.
- BE SURE TO RETURN THE RUN / CAL VALVE BACK TO THE RUN POSITION ONCE CALIBRATION IS COMPLETE. IF THE VALVE IS NOT SET PROPERLY, THE GDS-58BX WILL NOT PULL GAS FROM THE REMOTE LOCATION AND THERE WILL BE NO INDICATION TO THE USER.

CALIBRATION PROCEDURE

Before beginning calibration, make sure you have the following items: A cylinder of calibration gas, fixed flow regulator and a length of flexible tubing. A cylinder of 'zero air' may be necessary if the absence of target gas cannot be confirmed in the sample area.



Figure 5-1: GDS-58BX Calibration Setup

CALIBRATION PROCEDURE FLOWCHART

To start a calibration, use the NEXT key to show the Main Channel Display for the desired channel and then press the DOWN/CAL key. If the channel is in WARMUP or if calibration is disabled, a warning message will appear. Calibration can be enabled or disabled in the appropriate Channel Calibration menu.



Figure 5-2: Calibration Flowchart

CALIBRATION PROCEDURE STEP-BY-STEP

	PROCEDURE	
1	Use the NEXT key to exit any menu and show the Main Channel Display for the desired channel.	ppm H2S Channel 1
2	Attach the cal adapter and cylinder or Zero Air to the GDS- 58BX as shown in Figure 5-1 and Press the DOWN/CAL key to initiate calibration mode.	See Figure 5-1
3	Verify the proper channel and desired Cal Span value as shown on the Calibrate screen. Press EDIT to proceed or CANCEL to skip calibration.	CALIBRATE CHANNEL 1 USING 50 ppm H2S CANCEL OK
4	Turn on the Zero Air and press EDIT to proceed or CANCEL to skip the Zero Air measurement.	APPLY ZERO AIR TO SENSOR CANCEL OK
5	The GASMAX will automatically measure and record the sensor's response to Zero Air. This will take up to 30 seconds to complete.	MEASURING ZERO
6	When the Zero Air measurement is complete, a Cal Success message will appear. If the input is out of range for a zero measurement, an error message will appear.	ZERO CALIBRATION SUCCESSFUL
7	Disconnect the cylinder of Zero Air and attach the cylinder of Span Gas. Open the regulator and press EDIT to proceed or CANCEL to skip the span measurement step.	APPLY 50 ppm H2S TO SENSOR CANCEL OK
8	The GASMAX will automatically measure and record the sensor's response to the Span Gas. This will take up to 5 minutes to complete.	MEASURING SPAN 24 PLEASE WAIT
9	When the Span gas measurement is complete, a Cal Success message will appear. If the input is out of range for a span measurement, an error message will appear.	SPAN CALIBRATION SUCCESSFUL

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10	If the Zero Air and Span gas response is acceptable, a message will appear asking the user to remove the Span gas and calibration adapter. Calibration will fail if the resting zero value is greater than +5% of scale or less than -5% of scale. For example, if the resting value is >5.0 on a scale of 0-50.0 the zero calibration will fail. Calibration will also fail if the newly calculated GAIN value is greater than 2X or less than 0.5X times the original GAIN calculated in the first factory calibration. For example, if the span value is "50" and the sensor either does not reach "25" or reads more than "100" then span calibration will fail.	CALIBRATION COMPLETE REMOVE SPAN GAS PRESS ANY KEY
11	The GASMAX will then enter a Cal Purge delay mode to allow the span gas to dissipate and the reading to return to zero. This delay is programmable.	CAL PURGE 6 PLEASE WAIT
12	Once the Cal Purge delay is complete, a Calibration Successful message will appear and the GASMAX will resume normal operation.	CALIBRATION SUCCESSFUL

6 SETUP AND OPERATION

GASMAX USER INTERFACE

When power is applied to the GDS-58BX, the display screen will show 'GASMAX BX" followed by one or two Smart Sensor information screens if the sensor(s) are newly installed. Certain sensors may initially show off-scale high or low values but should quickly return to zero within several minutes if no target gas is present. During this warm-up delay period, the 4-20mA outputs are held at a pre-programmed value to eliminate false alarms in any receiving devices. For sensors that rest at zero, this value is 4.0 mA. For oxygen sensors, the warmup value is programmed to be 17.3 mA, which gives a reading of 20.8% Oxygen on a scale of 0-25%.

The GASMAX BX display is shown below. There are four magnetic switches on the face of the GASMAX BX, arranged in a quadrant around the display; these are labeled NEXT, EDIT, DOWN/CAL and UP/RESET. To activate, or "press" a magnetic switch, swipe the magnetic wand near the switch. For the balance of this manual, the term "press" will be used to describe activation of any key via the magnetic wand.



Figure 6-1: GASMAX BX Display

EDIT Key – Pressing the EDIT key opens the Main System Menu. From there, use the UP or DOWN keys to scroll through and select the various menu items. Pressing EDIT confirms an entry and pressing NEXT moves up one level. For most menu items, changes must be confirmed by pressing EDIT when exiting a menu. If changes are not desired, pressing NEXT will restore the menu settings to their original values.

NEXT Key – From the main channel display, pressing the NEXT key will scroll the display through the three display screens for each channel. These include the Main Channel Display, the Trend Graph Display and

the Channel / Sensor Info Display. When both channels are active, the NEXT key will scroll thought both sets of displays as well as a Dual Channel Display screen. Note that the trend graph can be programmed to cover intervals as short as 6 minutes and as long as 24 hours.



Figure 6-2: GASMAX BX Single Channel Display Sequence

UP/RESET Key – When an alarm is active, the alarm can be acknowledged by pressing the UP/RESET key. This will clear the flashing display but will not affect the status of the alarm relay (if installed).

When an alarm is not active, pressing and holding the UP/RESET key will enable BUMP TEST mode. BUMP TEST mode allows the user to confirm operation of the detector / sensor using actual test gas without generating any external alarms. See Chapter 6 for more information on BUMP TEST MODE.

DOWN Key – When the Main Channel Display is showing, pressing the DOWN Key will cause the GASMAX BX to enter CAL MODE for the selected channel. See Chapter 5 for more information on CAL MODE.

MORE INFORMATION ON DISPLAY SCREENS

The GASMAX BX display is programmed to return to the Main Channel Display after five minutes have passed since any keystroke. If both channels are enabled, the display will show the Dual Channel display.

The Main Channel Display Screen shows a single channel's information. The value is shown in calibrated engineering units. A horizontal bar graph tracks the current value and shows the Alarm values in graphical form. The user-programmable Engineering Units ("Eunits") and Channel Name text strings are shown below the real-time reading.

NOTE: To start a calibration, the display must be showing the Main Channel Display for the desired channel.

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Figure 6-3: GASMAX BX Main Channel Display

The Trend Graph screen displays a graph of the live gas readings. The scale can be programmed in the System Config menu to cover intervals of 6 minutes, 30 minutes, 60 minutes, 6 hours, 12 hours, and 24 hours. Changing the graph interval clears the graph date. The interval, current reading and channel are shown along the bottom. Dashed lines represent the current alarm level are shown in Yellow (Alarm 1) and Red (Alarm 2).



Figure 6-4: GASMAX BX Trend Graph Display

The Channel / Sensor Info screen summarizes the most important channel and sensor information.

SENSOR: The English language name of the sensor

DATA FROM: The physical location of the sensor with regards to the gas detector: Local Digital or Analog.

RANGE: The full-scale range of the sensor.

HOURS IN USE: Smart sensors keep a record of the number of hours of operation since the original manufacture date. This information is not available for analog sensors.

SENSOR HEALTH: A value calculated after each calibration from 0 to 100% where 100% is a brand-new sensor and 0% shows that sensor replacement is recommended. This value does not change between calibrations.

LAST CAL: The date and status of the more recent calibration.

CAL STATUS: Will display CALIBRATED if the most recent calibration was successful, no changes have been made to any key settings such as Range or PGA Gain and the user has not manually cleared the calibration values from the TECHNICIANS menu.

CH1 INFO	
SENSOR	Hydrogen Sulfide
DATA FROM	Local Digital
RANGE	0-100
HOURS IN U	SE 1344
SENSOR HEA	LTH 89%
LAST CAL	09-17-21 PASS
CAL STATUS	CALIBRATED

Figure 6-5: GASMAX BX Channel / Sensor Info Display

GDS-58BX COMMISSIONING

To install and commission a GDS-58BX, perform the following steps:

- 1) Find a suitable sample extraction point and mounting location.
- 2) Install the GDS-58BX in a vertical orientation, making sure there is room below for maintenance of the sensor housing and flow cell.
- 3) Install the sample inlet and exhaust tubing.
- 4) Set the Run/Cal value to the RUN position and apply power to the GDS-58BX. Verify that the flow meter shows ~0.5 liters / minute or more. Allow the unit to warm up for the recommended time.
- 5) Check date and time for proper values.
- 6) Check MODBUS communications parameters.
- 7) Set RELAY 1 alarm settings for desired levels.
- 8) Once the unit has completed the necessary warm up, perform a full zero and span calibration.
- 9) GDS Corp recommends applying calibration gas to the sample extraction point to verify end-to-end operation of the safety system and document the actual delay between gas appearing at the extraction point and gas sensor response.

NORMAL OPERATION

During normal operation, the GDS-58BX display shows the current gas reading and the 4-20mA output will transmit values that represent the % of scale shown on the display. If the sensor malfunctions or the internal microprocessor fails, the display will show FAULT.

If sample flow is blocked or the pump fails, the visual flow indicator on the left-side enclosure will show RED and the 4-20mA outputs will drop to 0.0 mA.

7 MAINTENANCE

Normal maintenance for the GDS-58BX involves verification of proper sample flow and periodic calibration using accurate gas standards. GDS Corp recommends calibration at least every three months, or more often if temperature extremes, vibration, the presence of incompatible gases or other environmental factors may accelerate the deterioration of the sensor element. Calibration should also include inspections for clogged or wet sensor heads, cracked or damaged enclosures and water incursion inside conduit or junction boxes. The sample pump is sealed and does not have any user-serviceable parts. The flow switch is sealed and does not have any user-serviceable parts.

If water or other liquid enters the GDS-58BX, the flow meter, flow switch and flame arrestors may need to be replaced or cleaned thoroughly. The flame arrestors can be cleaned and dried using compressed air or heat. The sensor should not require replacement unless the liquid level in the flow cell was excessive due to backpressure or a clogged outlet.

TOXIC SENSOR REPLACEMENT

A toxic sensor that shows FAULT, does not respond to gas, or can no longer be calibrated should be replaced. The range value should also be specified when ordering replacement sensors. Contact GDS Corp for more information on toxic sensor replacement.





8 TROUBLESHOOTING GUIDELINES

TOXIC SENSOR INDICATES FAULT OR OVERRANGE

- Certain toxic sensors indicate off-scale low or high at power up and quickly drift towards zero.
- Toxic sensors showing constant FAULT: If local, remove sensor and examine for moisture or discoloration. Replace sensor if wet or discolored. If remote, check sensor cable and junction box for moisture or standing water. Remove sensor and examine for moisture or discoloration. FAULT indication generally indicates sensor useful life is exhausted.
- Toxic sensors left unpowered for more than 3 months are subject to accelerated degradation and may demonstrate a permanent loss of sensitivity.

TOXIC SENSOR WILL NOT CALIBRATE

- Sensor reading during zero calibration exceeds upper limit of zero sensor is defective and should be replaced.
- Sensor reading during span calibration is too low sensor may be defective.

RECEIVING DEVICE (4-20mA) AND GDS-58BX DISPLAYED VALUES DON'T MATCH

- Check that zero and full-scale range values match between GDS-58BX and receiving device (controller).
- Check for high impedance shorts to ground on 4-20mA wiring.

MODBUS DATA INCORRECT

- Verify that MODBUS master is requesting data from correct registers.
- Verify that the GDS-58BX MODBUS address matches the address programmed into the controller's channel configuration.

CONTROLLER SHOWING MODBUS COMM ERROR

- Check for incorrect MODBUS polarity (swap "A" and "B" if unsure; no damage will occur).
- Verify that MODBUS master is requesting data from correct MODBUS address.
- Verify that MODBUS master is requesting correct registers.
- Verify that there are no other MODBUS slave devices with identical MODBUS addresses.

GDS-58BX DISPLAY BLANK

• Verify DC power at IO/Power Supply board.

9 SPECIFICATIONS

Model	GDS-58BX Sample Draw System
Power Input	24VDC ± 5% at < 10 watts (Toxic sensor)
	24VDC ± 5% at < 15 watts (GDS-IR sensor)
Display	LCD with engineering units display
Sensor Types	Electrochemical sensors for toxic gases Electrochemical sensors for oxygen deficiency PID sensors for detection of Volatile Organic Compounds (VOCs) SmartIR sensors for detection of methane, propane, or carbon dioxide in ppm & %v/v GDS-IR and GDS-IR2 infrared sensors for combustibles and CO ₂
Draw Distance	Demonstrated up to 500 feet of ¼" OD tubing
Accuracy	+/- 5% of full scale (typical)
Standard Output	Single or dual three-wire 4-20mA current source outputs with fault and overrange indication. Maximum loop resistance is 750 ohms with standard 24VDC supply.
	Optional Relay / MODBUS interface with 4x 4A SPDT programmable alarm relays Single channel RS-485 serial MODBUS
Flow Monitor	Low-flow warning with screen and 4-20mA output fault indication
Temperature	-20°C to +55°C Operating (dependent on sensor selected)
	Note: Ambient temperature below 0°C may keep sample pump from starting.
Memory	On-board non-volatile memory retains all user settings
Housing	Aluminum housings (2) with epoxy paint standard
	#316 stainless steel optional
Dimensions	16" x 12" x 5" for sensor types 10-70, 10 pounds
	16" x 15" x 5" for sensor types 110+, 14 pounds
	Stainless steel plate, 21" x 21", 22 pounds
	24" x 24" nonmetallic enclosure, 40 pounds
Approvals	GASMAX BX enclosure and sensor head CSA Certified Div 1 & 2 Groups B, C, D. Enclosure CSA certified for use in Class I Div 1 areas. Flame arrestors UL certified for use in Class 1 Div 1 areas.
Warranty	Two years on electronics, one year on sensors

10 MODBUS REGISTERS

MODBUS REGISTERS

The GASMAX BX features a set of user-accessible MODBUS registers that provide a snapshot of the gas detector live readings and user configuration, including real-time data, preset zero, span and calibration values, alarm status, relay status and user-programmable text.

Variable Name	Alias	Read	Write	Notes
WRITE REGISTERS				
Override Relay 1	1030	N/A	5	If Relay 1 input set to "EXTERNAL"
Override Relay 2	1040	N/A	5	If Relay 2 input set to "EXTERNAL"
Override Relay 3	1050	N/A	5	If Relay 3 input set to "EXTERNAL"
READ REGISTERS				
Ch 1 Analog Output	31001	4	N/A	12-bit value; 800 = 4mA, 4000 = 20mA
Ch 2 Analog Output	31002	4	N/A	12-bit value; 800 = 4mA, 4000 = 20mA
Ch 1 EU Float Value	31003	4	N/A	32-bit float in engineering units
Ch 2 EU Float Value	31005	4	N/A	32-bit float in engineering units
Ch1 Status Bits	31007	4	N/A	Status bits: BIT0: Alarm 1 active BIT1: Alarm 2 active BIT2: Alarm 3 active BIT3: Fault alarm active BIT4: Channel in warmup BIT5: Channel in cal mode BIT6: Channel in bump test mode BIT7: Channel enabled
Ch2 Status Bits	31008	4	N/A	Status bits: BIT0: Alarm 1 active BIT1: Alarm 2 active BIT2: Alarm 3 active BIT3: Fault alarm active BIT4: Channel in warmup BIT5: Channel in cal mode BIT6: Channel in bump test mode BIT7: Channel enabled
Ch1 Operating Mode	31009	4	N/A	Operating Modes: 2 = No Sensor 5 = Sensor Running
Ch2 Operating Mode	31010	4	N/A	Operating Modes: 2 = No Sensor 5 = Sensor Running

Variable Name	Alias	Read	Write	Notes	
SENSOR 1 CONFIG					
Ch1 Zero Value	31011	4	N/A	32-bit float in engineering units	
Ch1 Full Scale Value	31013	4	N/A	32-bit float in engineering units	
Ch1 Alarm 1 Value	31015	4	N/A	32-bit float in engineering units	
Ch1 Alarm 2 Value	31017	4	N/A	32-bit float in engineering units	
Ch1 Alarm 3 Value	31019	4	N/A	32-bit float in engineering units	
Ch1 Fault Alarm Value	31021	4	N/A	32-bit float in engineering units	
Ch1 Sensor Name	31023	4	N/A	Packed ASCII Characters (2 / register)	
Ch1 Engineering Units	31033	4	N/A	Packed ASCII Characters (2 / register)	
Ch1 Sensor Type	31043	4	N/A	Integer (Example: 15 = H2S)	
Ch1 Decimal Points	31044	4	N/A	Integer (0, 1 or 2)	
Ch1 Sensor Health	31045	4	N/A	Integer (0 to 100)	
Ch1 Preamp Gain	31046	4	N/A	Integer	
SENSOR 2 CONFIG					
Ch2 Zero Value	31061	4	N/A	32-bit float in engineering units	
Ch2 Full Scale Value	31063	4	N/A	32-bit float in engineering units	
Ch2 Alarm 1 Value	31065	4	N/A	32-bit float in engineering units	
Ch2 Alarm 2 Value	31067	4	N/A	32-bit float in engineering units	
Ch2 Alarm 3 Value	31069	4	N/A	32-bit float in engineering units	
Ch2 Fault Alarm Value	31071	4	N/A	32-bit float in engineering units	
Ch2 Sensor Name	31073	4	N/A	Packed ASCII Characters (2 / register)	
Ch2 Engineering Units	31083	4	N/A	Packed ASCII Characters (2 / register)	
Ch2 Sensor Type	31093	4	N/A	Integer (Example: 15 = H2S)	
Ch2 Decimal Points	31094	4	N/A	Integer (0, 1 or 2)	
Ch2 Sensor Health	31095	4	N/A	Integer (0 to 100)	
Ch2 Preamp Gain	31096	4	N/A	Integer	
CHANNEL 1 CONFIG					
Ch 1 Name	31111	4	N/A	Packed ASCII Characters (2 / register)	
CHANNEL 2 CONFIG					
Ch 2 Name	31131	4	N/A	Packed ASCII Characters (2 / register)	

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Variable Name	Alias	Read	Write	Notes
SYSTEM CONFIG				
Device Type	31151	4	N/A	Packed ASCII Characters (2 / register)
Identifier	31161	4	N/A	Packed ASCII Characters (2 / register)
Serial Number	31171	4	N/A	Packed ASCII Characters (2 / register)
Manufacture Date	31181	4	N/A	Packed ASCII Characters (2 / register)
Device Name	31191	4	N/A	Packed ASCII Characters (2 / register)
Firmware Version	31201	4	N/A	Packed ASCII Characters (2 / register)
System Status Word	31205	4	N/A	Status bits: BIT0: Channel 1 enabled. BIT1: Channel 2 enabled. BIT2: Relay 1 active BIT3: Relay 2 active BIT4: Relay 3 active BIT5: MODBUS write enabled. BIT6: Wireless enabled. BIT7: Wireless write enabled

11 SYSTEM EVENTS

The GASMAX BX includes a non-volatile event log that records channel-specific and system-level events such as alarms, calibration attempts, sensor installation and much more.

Events are sourced from three sources. System events are those associated with the device and not any specific channel. These include COLD BOOT, POWER ON and others.

EVENT SOURCE	DESCRIPTION	
SYS	An event related to the entire detector (Ex: POWER ON)	
CH1	An event related to channel 1 (Ex: CH1 ALRM1 IN)	
CH2	An event related to channel 2 (Ex: CH2 ALRM2 OT)	

Channel events are associated with an individual channel. These include alarms, sensor installation / removal, over-range, calibration, and others.

EVENT NAME	DESCRIPTION	
COLDBOOT	The GASMAX BX was commanded to perform a COLD BOOT on	
	power-up to restore factory default settings.	
POWER ON	The power-up sequence was performed successfully	
NEW SENS	A new sensor was installed	
SENS OK	An existing sensor was successfully identified and checked during the	
	power-up sequence	
ALRM1 IN	Alarm 1 activate threshold exceeded	
ALRM1 OT	Alarm 1 deactivate threshold exceeded	
ALRM2 IN	Alarm 2 activate threshold exceeded	
ALRM2 OT	Alarm 2 deactivate threshold exceeded	
ALRM3 IN	Alarm 3 activate threshold exceeded	
ALRM3 OT	Alarm 3 deactivate threshold exceeded	
FLT IN	Fault alarm activate threshold exceeded	
FLT OUT	Fault alarm deactivate threshold exceeded	
OVRNG IN	Input value exceeded 105% of scale	
OVRNG OT	Input value returned below 105% of scale	
CALZ LOW	Zero calibration failed: reading too low	
CALZ HI	Zero calibration failed: reading too high	
CALZ TIM	Zero calibration failed: Length of time needed to establish the zero-	
	calibration reading exceeded the preset limits.	
CALZ OVR	Zero calibration failed: An overrange condition occurred during the	
	zero-calibration sequence	
CALZ FLT	Zero calibration failed: A fault condition occurred during the zero-	

	calibration sequence	
CALS LOW	Span calibration failed: Span reading too low	
CALS HI	Span calibration failed: Span reading too high	
CALS TIM	Span calibration failed: Length of time needed to establish the span-	
	calibration reading exceeded the preset limits.	
CALS OVR	Span calibration failed: An overrange condition occurred during the	
	span calibration sequence	
CALS FLT	Span calibration failed: A fault condition occurred during the span	
	calibration sequence	
GAIN HI	Calibration failed: New GAIN value above upper limit (2.0)	
GAIN LO	Calibration failed: New GAIN value below lower limit (0.5)	
CAL MATH	Calibration failed: Unknown math error during calibration	
BAL ERR	Calibration failed: Catalytic bead auto-balance error	
CALL PASS	Calibration passed no errors	
CAL CLR	Calibration values cleared by user	
LOG CLRD	Event log cleared by user	
SECUR LO	Security level set to LOW	
SECUR MD	Security level set to MEDIUM	
SECUR HI	Security level set to HIGH	
MALOW	Output current measured low during power-on test	
BUMPTEST	Bump test initiated by user	
SYS ERR	Unknown system error – contact GDS Corp	



Figure 12-2: GDS-58BX Dimensions (GDS-IR Sensor

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Figure 12-3: GDS-58BX Dimensions (Stainless Steel Plate, 1 Sensor)



Figure 12-4: GDS-58BX Enclosure Dimensions (Non-Metallic)

13 SAMPLE DRAW DUCT ASSEMBLY 20-0141







Figure 13-2: Sample Draw Duct Assembly Hole Mounting Pattern

NOTE: APPLY GASKET SEAL ON FACE OF PLATE WHEN INSTALLING SAMPLE DRAW DUCT ASSEMBLY

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