GDS Corp

Gas and Flame Detection

Operation and Maintenance Manual

GASMAX CX Single / Dual Channel Gas Monitor

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.

REVISION HISTORY

Revision 1.0   4/15/14 Initial Release

Revision 2.0   5/24/16 Update

Revision 2.1   7/15/16 Update

Revision 2.2   4/23/19 Update

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1 SAFETY INFORMATION

Important – Read Before Installation

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

WARNINGS

- **CAUTION**: KEEP EXPLOSION PROOF COVER TIGHT WHILE CIRCUITS ARE ALIVE

- **MISE EN GARDE :** GARDER EXPLOSION COUVERTURE PREUVE TIGHT CIRCUITS PENDANT QUE SONT ALIVE

- Unit must be installed, operated and maintained in accordance with information contained herein. Installation in any hazardous area must comply with all applicable restrictions, requirements and guidelines for said hazardous areas. It is the end user customer's final decision to ensure that the GASMAX CX is suitable for the intended use.

- The GASMAX CX is designed and constructed to measure the level of certain gases in ambient air. Accuracy in atmospheres containing steam or inert gases cannot be guaranteed.

- Always mount the sensor head vertically with the sensor head facing down. However, the GDS-IR infrared sensor may be mounted vertically or horizontally.

- Do not paint transmitter or sensor assembly.

- Do not operate the GASMAX CX 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 GASMAX CX to electrical shock or continuous severe mechanical shock. Protect the GASMAX CX and related sensor assemblies 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 on the sensor head.

- Periodically test for correct operation of the system's alarm events by exposing the monitor to a targeted gas concentration above the High Alarm set point.

- Use only for applications described within this manual

2 OVERVIEW

The GASMAX CX is a single or dual channel fixed-point gas monitor designed to provide continuous monitoring of toxic or combustible gases in hazardous areas. Gas values are displayed in calibrated engineering units as well as bar graph or 30-minute trend graph format.

The GASMAX CX supports one or two local or remote mount sensors for toxic or combustible gases. The advanced microcontroller, non-intrusive magnetic interface and superior full color graphic LCD interface offers rapid setup, simplified operation and enhanced diagnostics not found in previous generation products. On-board non-volatile memory retains all configuration data during power interruptions. Two independent 4-20 mA outputs allow for easy connection to control systems or other alarm instrumentation, and a built-in Ethernet port allows the GASMAX CX to be easily integrated into a facilities network. Additional output options include 4x alarm relays and dual channel MODBUS slave interfaces.
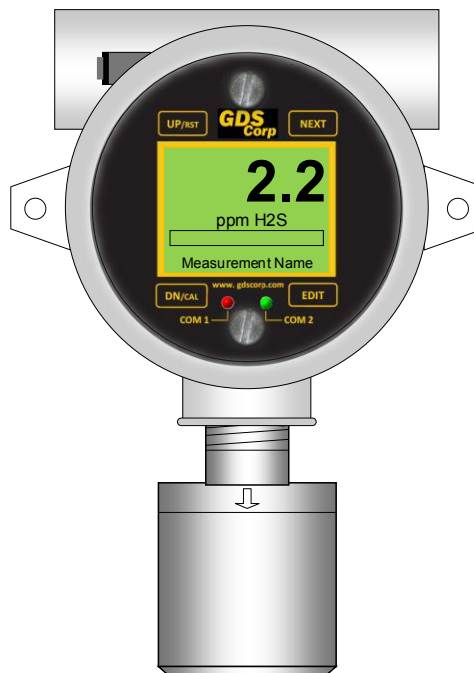
Built-in user-prompted calibration makes it easy for one person to perform calibration and maintenance without opening the enclosure or declassifying the area. A battery-powered real-time clock and event log allows the GASMAX CX to track calibration and alarm events for later recall on the LCD readout.

For toxic gases the GASMAX CX supports a wide range of electrochemical ("echem") sensors. These sensors use chemical reactions to sense the presence of gases such as hydrogen sulfide, chlorine, sulfur dioxide and many others. Unlike previous generation gas detectors, GASMAX CX sensors contain all the necessary micro-electronics needed to convert the extremely low level sensor output signals into digital values that are immune to interference and noise. When combined with state-of-the-art digital signal processing and filtering, the GASMAX is capable of gas detecting levels lower than ever before.

For combustible gases the GASMAX CX offers three different choices. In addition to traditional catalytic bead ("cat bead") sensor, the GASMAX CX supports the GDS Corp SmartIR infrared sensor and GDS-IR infrared sensor as well as the latest generation photoionization detector (PID) sensors for measurement of volatile organic compounds such as benzene or toluene.

The GASMAX CX is enclosed in a CSA / FM / IECEx certified anodized aluminum explosion proof yellow enclosure designed to protect the electronics and make it easy for workers to identify in industrial environments. The screw-on front cover is easily removed for installation and maintenance; however, built-in user interface magnetic switches allow operators and technicians to adjust, calibrate or troubleshoot the GASMAX CX without declassifying the area.

Local sensors are contained in a stainless steel sensor head, typically attached to the bottom of the GASMAX CX as shown below. The normal sensor head includes an integrated stainless steel flame arrestor

that must be removed for the detection of certain reactive gases such as chlorine or chlorine dioxide. If removed, the GASMAX CX is not certified for use in hazardous areas.
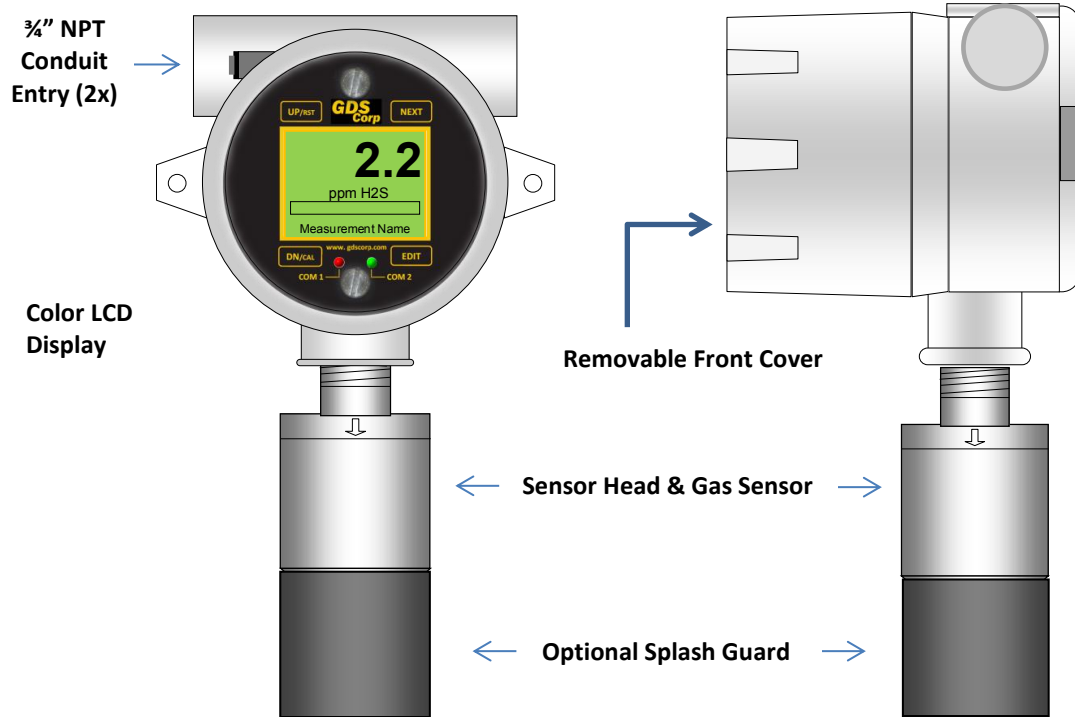
Figure 2-1 GASMAX CX GAS MONITOR

3 INSTALLATION

SELECTING A LOCATION

Factors such as prevailing winds, target gas density, potential leak sources, air movement machinery and similar environmental variables are important when selecting a location for the GASMAX CX gas monitor or gas sensor. Even though the GASMAX CX is designed for rugged service, sensors and electronics should be protected from environmental damage due to water, snow, shock, vibration and dirt. In addition, the sensor and / or display should be located such that regular maintenance and periodic sensor replacement can be readily accomplished. While there are no industry standards for gas detector placement, professional tools exist that can simulate leaks or spills and provide excellent guidance for locating gas detectors throughout a facility.

EXPLOSION PROOF INSTALLATION

GASMAX CX monitors with standard explosion-proof sensor heads are certified for use in Class 1 Division 1 hazardous areas. Installation in these areas should follow 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. In all cases, GDS Corp recommends any GASMAX sensor be mounted vertically with the sensor opening facing down. If there is a possibility that water or other liquid may be present, GDS Corp further recommends the installation of a sensor head Splash Guard (p/n 10-0205) to protect the sensor from damage. For maximum protection against RF interference or electrical surge, the GASMAX CX enclosure, all remote sensors and interconnecting conduit must be properly grounded.

INTRINSICALLY SAFE INSTALLATION

The GASMAX CX is not certified for use as an Intrinsically Safe device.

MOUNTING THE GASMAX CX INSTRUMENT ENCLOSURE

The GASMAX CX standard enclosure is a cast aluminum explosion-proof (NEMA 7) enclosure. Two channel GASMAX CX units with dual local sensor heads include a "Y" adapter. The GASMAX CX or remote sensor should always be mounted with the sensor head opening facing down.

If necessary, a Splash Guard (p/n 10-0205) should be attached if there is any chance that water or liquid spray could enter the sensor opening from below. Be sure to leave sufficient room (~ 12") below the sensor head to allow for ambient air circulation and easy access for attachment of a Calibration Cup and / or removal of the sensor head cover for sensor replacement.
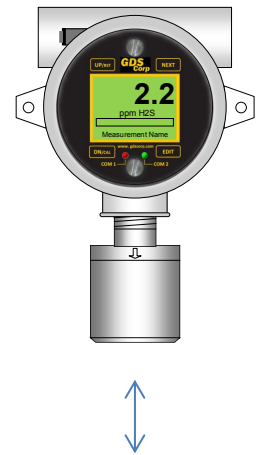
Leave 8-12" open space below gas detector for air flow, sensor maintenance and calibration

CONNECTING DC POWER & OUTPUT SIGNAL WIRING

To access the GASMAX signal and power connections, remove the cover on the GASMAX CX explosion-proof enclosure, loosen the 2 thumbscrews holding the display assembly and remove it. The display will remain connected to the IO/Power Supply PCB mounted in the back of the enclosure by a short ribbon cable. Route the power and signal wires through the conduit entry and connect to terminal block "TB1". Plus 24VDC connects to TB1-1. DC Ground connects to TB1-4. Channel One 4-20mA output is available on TB1-2 and Channel Two 4-20mA output is available on TB1-3. **GDS Corp always recommends using shielded wire for signal and power cable.**

TB1 – 1: +12-30VDC Input

TB1 – 2: Channel 1 4-20mA Out

TB1 – 3: Channel 2 4-20mA Out

TB1 – 4: Power / Signal Common
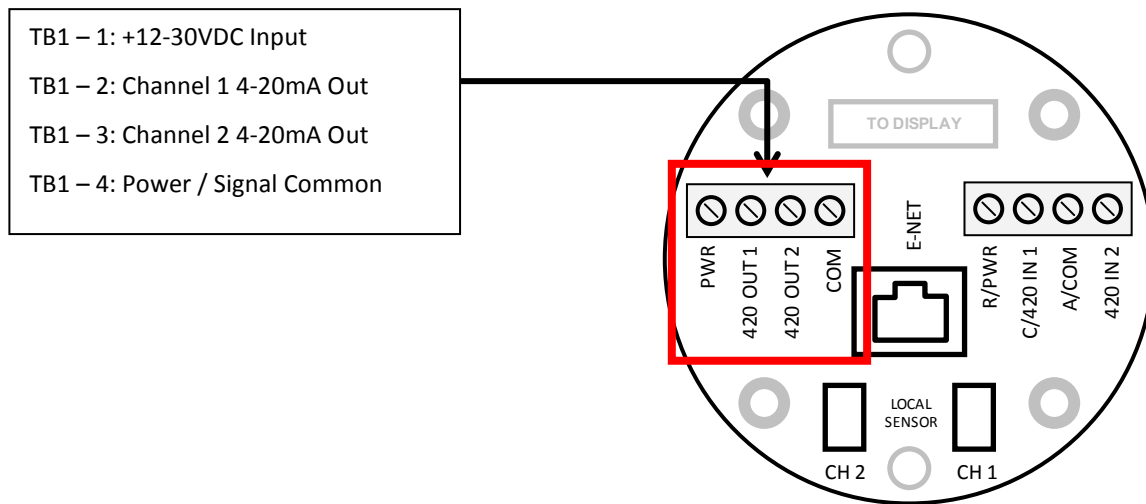
Figure 3-1: GASMAX CX I/O Power & Signal Wiring

NOTE: THE MAXIMUM DISTANCE 4-20 MA SIGNALS CAN TRAVEL IS DEPENDENT UPON CABLE GAUGE, DC POWER SUPPLY VOLTAGE LEVEL AND INPUT IMPEDANCE OF THE RECEIVING DEVICE. ASSUMING A NOMINAL 24 VDC POWER SUPPLY, 100 OHM LOAD AND MAXIMUM TOTAL LOOP RESISTANCE OF 750 OHMS:

#18GA, 0.0064 OHM/FT => 9.6 MILES / 15.5 KM

#24GA, 0.026 OHMS/FT => 2.3 MILES / 3.7 KM

NOTE: USER MENU CHANGES TO NETWORK SETUP PARAMETERS REQUIRES A DEVICE REBOOT.

NOTE: STANDARD ETHERNET CABLES WITH MOLDED STRAIN RELIEF FITTINGS ARE NOT RECOMMENDED DUE TO SPACE CONSTRAINTS.
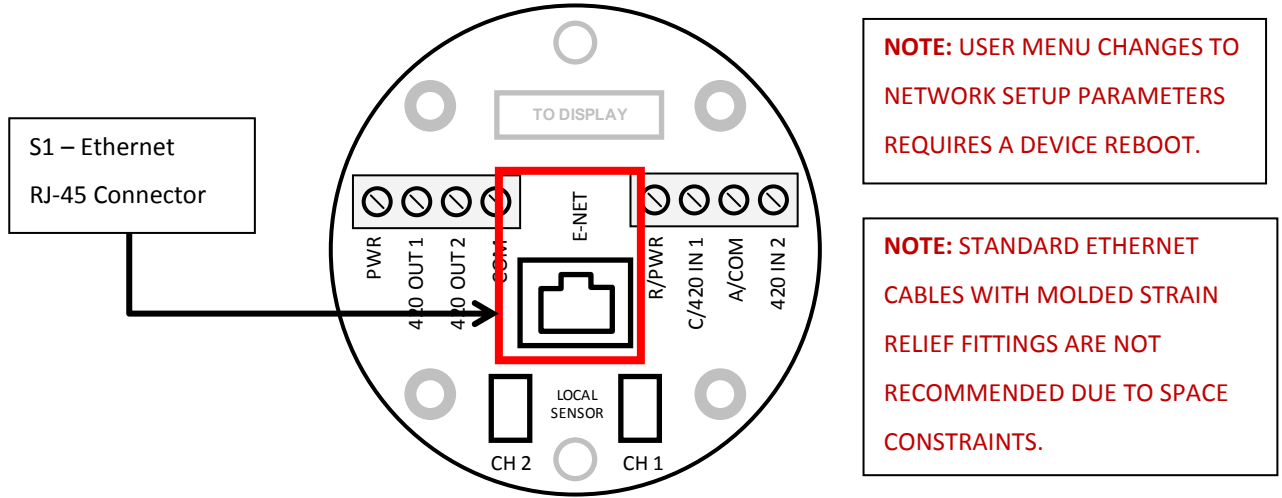
Figure 3-2 Ethernet Interface

OPTIONAL RELAY / MODBUS INTERFACE

The optional Relay / Modbus board is connected "piggyback" to the back of the GASMAX CX Display Assembly and provides three level alarm relays, a FAULT relay ("K3"), two RS-485 Modbus RTU serial ports and access to the Digital Input / Remote ACK port.
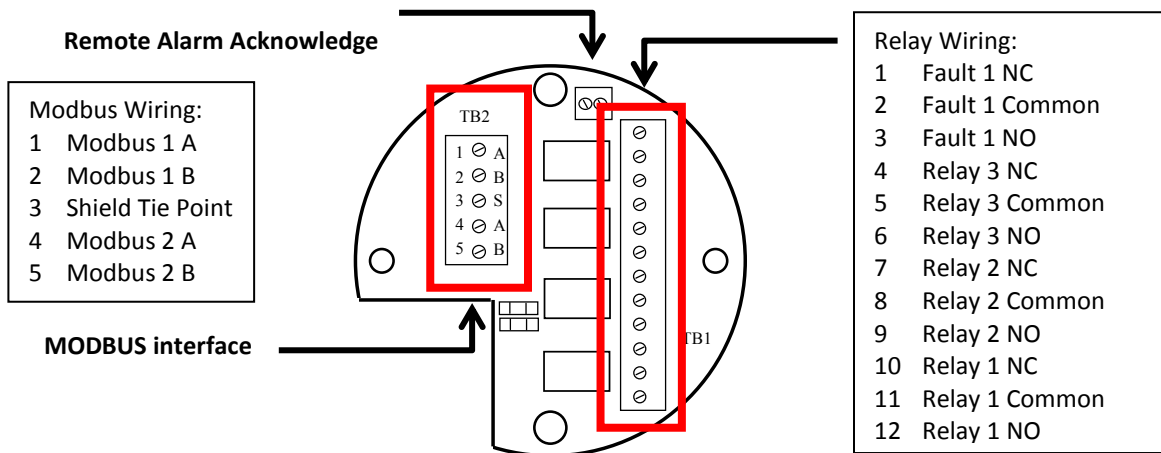
Figure 3-3 GASMAX CX Optional Relay / MODBUS Interface

NOTE: THE FAULT RELAY IS PROGRAMMED TO OPERATE IN FAILSAFE MODE ONLY; THE RELAY IS ACTIVE WHEN NO FAULT EXISTS (C->NO), AND BECOMES INACTIVE IF A FAULT IS PRESENT (C->NC).

OPTIONAL MODBUS JUNCTION BOX

MODBUS system architecture requires that the devices in any MODBUS loop be connected in a daisy-chain layout. This minimizes signal reflections and improves signal noise margin. A MODBUS Termination Jumper installs a load resistor across the MODBUS signal lines and should only be set to "A" (ON) at the last device in the string.

Cable selection 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 very long distances, up to 4000 feet without a repeater. For MODBUS data signals, GDS Corp recommends 20GA to 24GA twisted shielded cable. Daisy-chain power distribution may require larger gauge wire since it is critical that the supply voltage for the GASMAX CX at the far end of the string not fall below 12VDC during power-up.

Note that while the GASMAX CX has two sets of wiring terminals for MODBUS "A" and "B" signals, daisy-chain power wiring requires that two wires be installed in the "+24" and "GND" terminals on the GASMAX CX I/O Power Supply board. This can be difficult if wire sizes are larger than #18GA. For these reasons, if MODBUS is required GDS Corp recommends the addition of the MODBUS Wiring Junction Box (see Fig. 5-7). This option minimizes the need to access wiring inside the GASMAX CX, provides individual wire landing points for incoming and outgoing MODBUS and power wiring and shields, and makes it easy to temporarily disconnect the GASMAX CX power or MODBUS connections without affecting any other MODBUS device.

The MODBUS wiring junction box is attached to the GASMAX CX, either on the bottom fitting or one of the side fittings, depending on installation requirements. Specify BOTTOM, LSIDE or RSIDE when ordering (See Fig. 4-5).
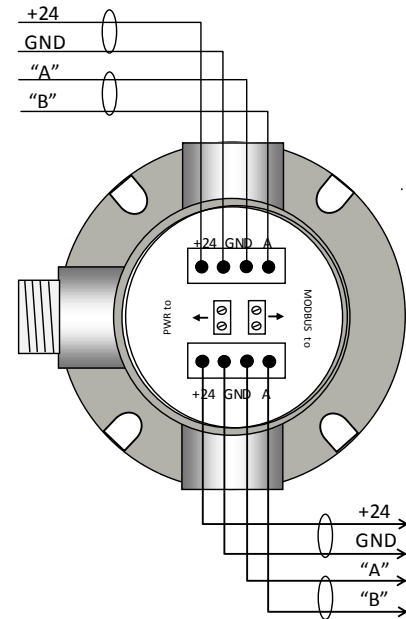
Figure 3-4: MODBUS Wiring Junction Box
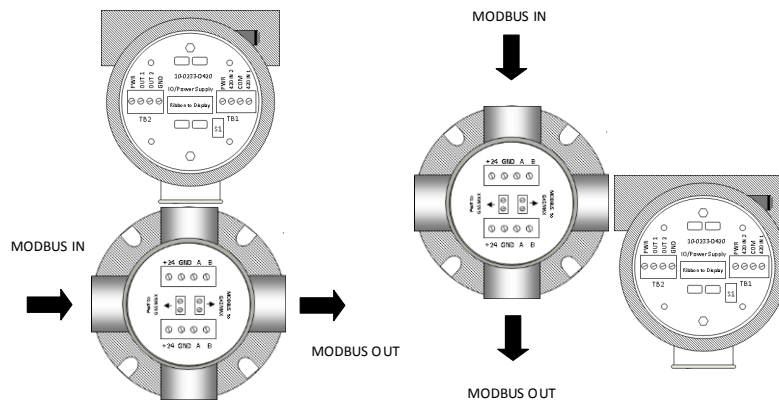
Figure 3-5: MODBUS JBOX LOCATION OPTIONS

LOCAL SMART TOXIC SENSOR

Local Smart toxic sensors are factory installed in a sensor head directly attached to the GASMAX CX enclosure. Local Smart toxic sensors and can be connected to either Channel 1 or Channel 2 sensor inputs on the I/O Power Supply board as shown below.

Smart sensors are automatically recognized on power-up and upload range, calibration and production date information to the GASMAX for use during operation and setup.

Smart TOXIC sensors can be connected to either CH1 or CH2
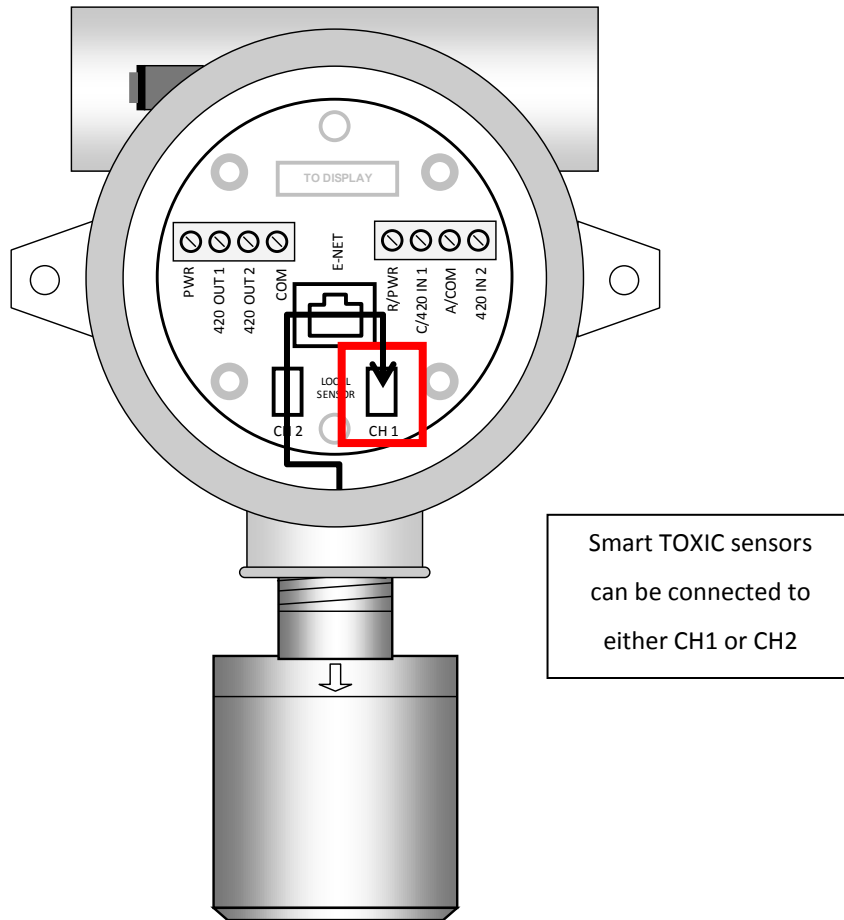
Figure 3-6: Local Smart Toxic Sensor Connection

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

CONNECTING A REMOTE TOXIC SENSOR TRANSMITTER

GASMAX CX monitors with remote-mount toxic sensor transmitters are shipped in two pieces and sensor wiring must be installed by the end user. Remote toxic sensor transmitters connect to the Channel 1 or Channel 2 4-20mA analog input connections on the Power I/O board as shown below.

Remote toxic sensor transmitters use industry standard 4-20mA signal levels and can therefore be mounted at some distance from the GASMAX CX. GDS Corp recommends a maximum distance of 500 ft. / 150 m using shielded two-wire cable sized appropriately.
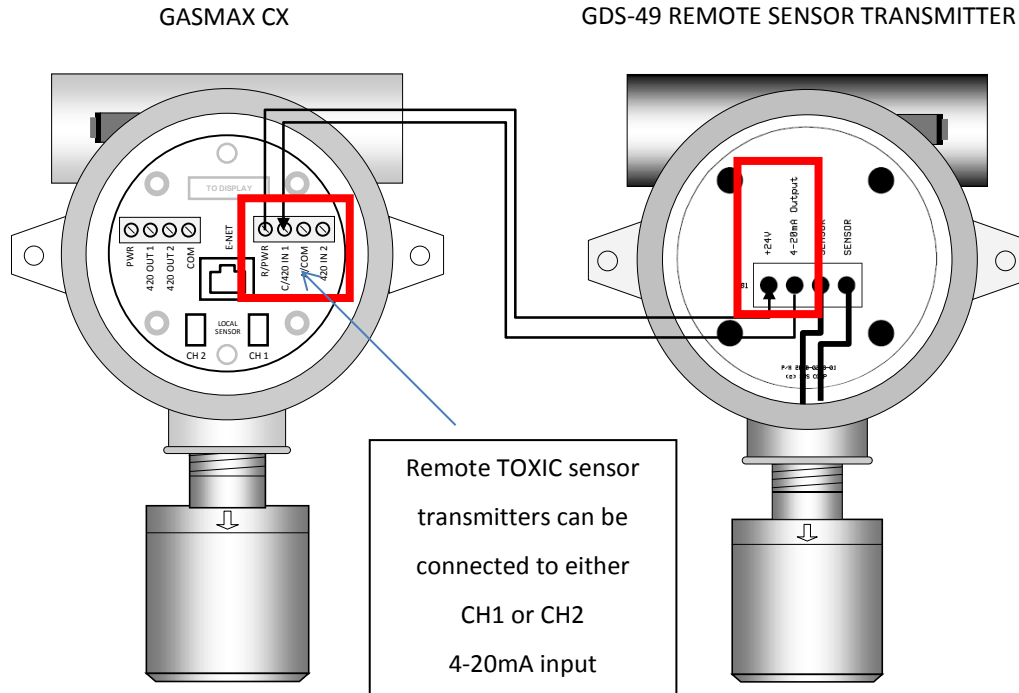
Figure 3-7: Remote Toxic Sensor Transmitter Connection

NOTE: FIELD WIRING FOR REMOTE TOXIC SENSOR TRANSMITTERS IS NOT POLARIZED AND MAY BE CONNECTED IN ANY ORDER.

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

LOCAL SMART BRIDGE SENSOR

Local bridge-type sensors, including catalytic bead, SmartIR infrared sensors for combustibles and CO2 and photoionization detectors (PID) for volatile organic compounds are factory installed and must be connected to the CH 1 Smart Sensor connector as shown below.

LOCAL SMART BRIDGE-TYPE SENSORS MUST BE CONNECTED TO CH1
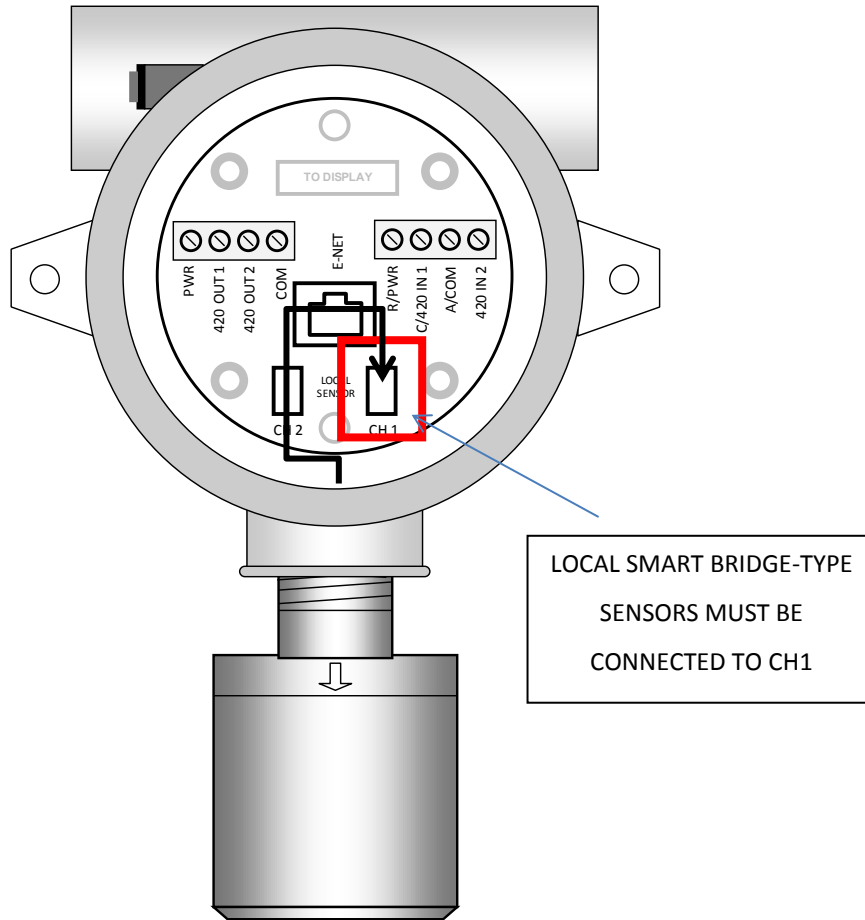
Figure 3-8: Local Smart Bridge Sensor Connection

NOTE: LOCAL SMART BRIDGE SENSORS AUTOMATICALLY ADJUST SENSOR EXCITATION VOLTAGE.

LOCAL DUAL SENSORS

The GASMAX CX supports dual local sensors. One sensor can be a bridge-type sensor such as a catalytic bead or SmartIR infrared sensor for combustibles or CO2 and photoionization detectors (PID) for volatile organic compounds and the other a toxic sensor. Alternatively, both sensors can be toxic. Sensor head #1 (left side) should be connected to Channel 1 and sensor head #2 (right side) should be connected to Channel 2.

LOCAL SMART BRIDGE-TYPE SENSORS MUST BE CONNECTED TO CH1
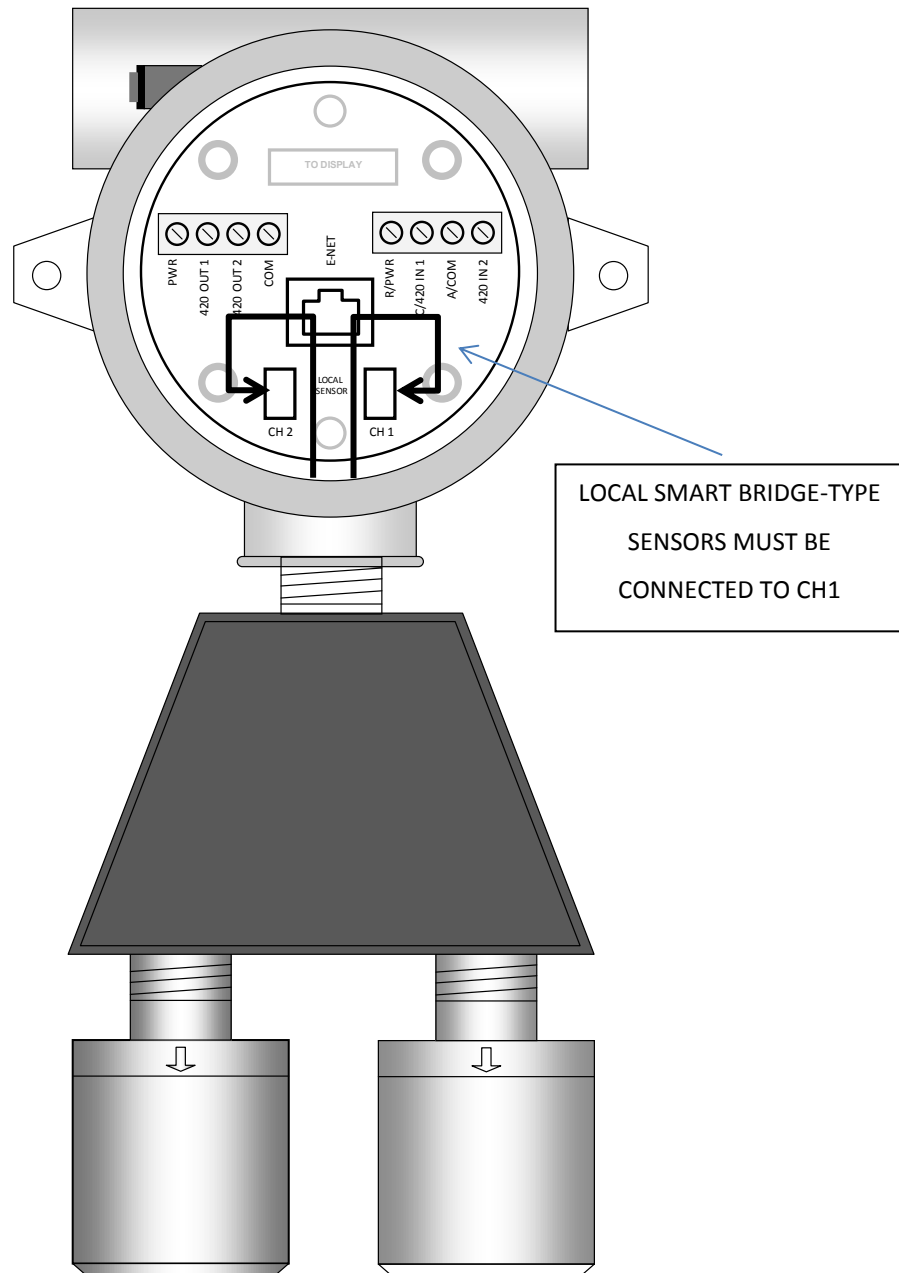
Figure 3-9: Local Dual Sensor

CONNECTING AN EXTERNAL 4-20MA INPUT DEVICE

The GASMAX CX supports two general purpose, non-isolated 4-20mA inputs as shown below. The amount of voltage and current available for the remote 4-20mA device is determined by the GASMAX DC supply connected to TB1. Both channels support local calibration if necessary; if the devices are pre-calibrated, or are calibrated at the source, the calibration feature on each channel can be disabled.

INPUT:

TB2 – 1: +24VDC Excitation Out

TB1 – 2: Channel 1 4-20mA Input

TB1 – 3: Common

TB1 – 4: Channel 2 4-20mA Input

OUTPUT:

TB1 – 1: +24VDC Input

TB1 – 2: Channel 1 4-20mA Out

TB1 – 3: Channel 2 4-20mA Out

TB1 – 4: Power / Signal Common
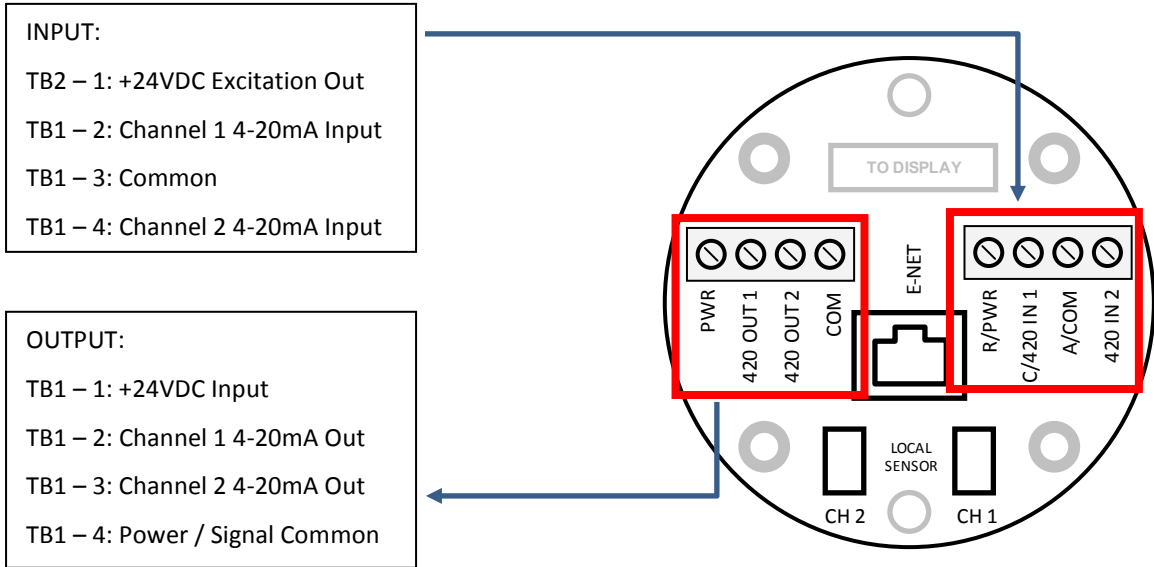
Figure 3-10: Remote 4-20mA Input

4 INITIAL STARTUP

When power is applied to the GASMAX CX, the screen will show 'GASMAX CX" followed by one or two Smart Sensor information screens if the sensor(s) are locally connected. Certain sensors may initially indicate off-scale high or low values, but should quickly return to zero within a few minutes if no target gas is present. During this warm-up delay period, the 4-20mA output is held at 4.0 mA to eliminate false alarms in any receiving devices.

GASMAX USER INTERFACE

The GASMAX CX display is shown in Figure 5-1. There are four magnetic switches on the face of the GASMAX CX, arranged in a quadrant around the LCD display; these are labeled NEXT, EDIT, DOWN/CAL and UP. 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.
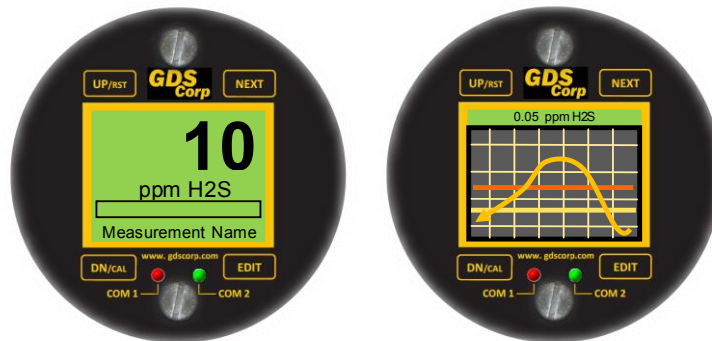
Figure 4-1: Gasmax Single Channel Display

Pressing the NEXT key causes the GASMAX display to switch display screens. In single channel mode, the display will switch between DATA and TREND. In dual channel systems, the sequence will be: DATA 1, DATA 2, TREND 1, TREND 2, DUAL CHANNEL, followed by DATA 1.

Figure 4-2: Gasmax Dual Channel Display

Press the EDIT key to access the USER MENU display mode. When in user menu display mode, use UP and DOWN to select an item, EDIT to change an item, and NEXT to exit the menu or function and return the GASMAX CX to display mode. See Chapter 8 for more information on User Menus.

Figure 4-3: User Menu Screen

NOTE: TAKE CARE WHEN CHANGING GASMAX MENU SETTINGS – INCORRECT SETTINGS COULD CAUSE THE GASMAX TO BECOME INOPERATIVE AND MAY COMPROMISE THE SAFETY OF THE GAS DETECTION SYSTEM. BE SURE TO UNDERSTAND WHAT TO CHANGE AND WHY BEFORE ENTERING THE USER MENU.

Press the DN/CAL key, followed by the EDIT key, to access CALIBRATION MODE. Regular calibration is critically important to the continued safe operation of any gas detection system. See Chapter 6 for more information on calibration.

To access Cal Mode, press the DN/CAL key first

Then press the EDIT key to confirm Calibration Mode

Figure 4-4: Accessing Cal Mode

NOTE: TAKE CARE WHEN APPLYING CALIBRATION GAS TO THE GASMAX WHILE NOT IN CALIBRATION MODE. THIS WILL CAUSE AN INCREASE IN THE 4-20MA OUTPUT SIGNAL AND MAY RESULT IN UNINTENDED AND UNEXPECTED ALARM CONDITIONS.

MORE INFORMATION ON DISPLAY SCREENS

The DATA display screen shows a single channel's information. The current value is shown in calibrated engineering units. A horizontal bargraph tracks the current value and shows the Alarm 1 and Alarm 2 values in graphical form. The user-programmable Engineering Units ("Eunits") and Measurement Name text strings are shown below the real-time reading.

Above the LCD display, three LEDs indicate the status of the level and fault alarms. If relays are installed, the LEDs indicate whether the relays are active. Note that if any relay is set for FAILSAFE operation, if LED is ON the relay will be <u>de-energized</u>. In dual channel mode, if either channel is in alarm the corresponding A1 or A2 indicator LED (and relay) will be energized.
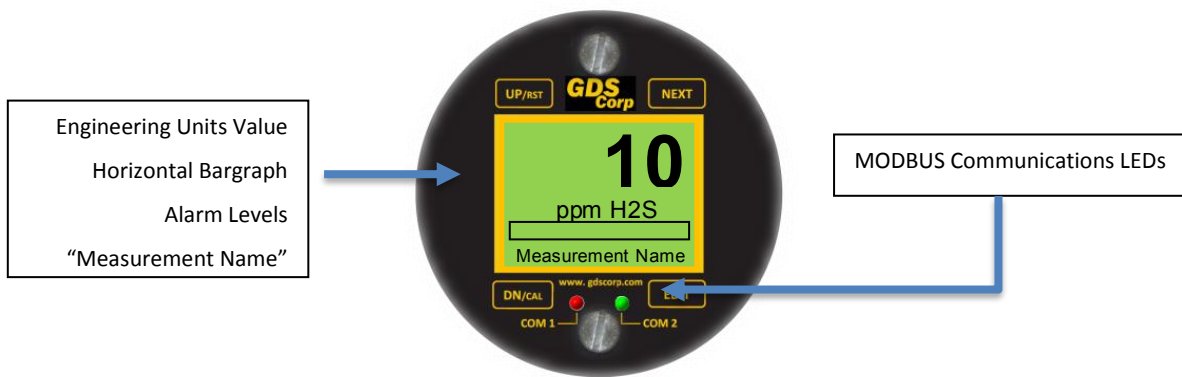
Figure 4-5: GASMAX Data Display

Two LEDs monitor the MODBUS RS-485 transmit (TXD) and receive (RXD) buffers. Flashing indicates sent or received data. RXD will flash whenever a message from the MODBUS master is received and TXD will flash when any response message is transmitted from the GASMAX.
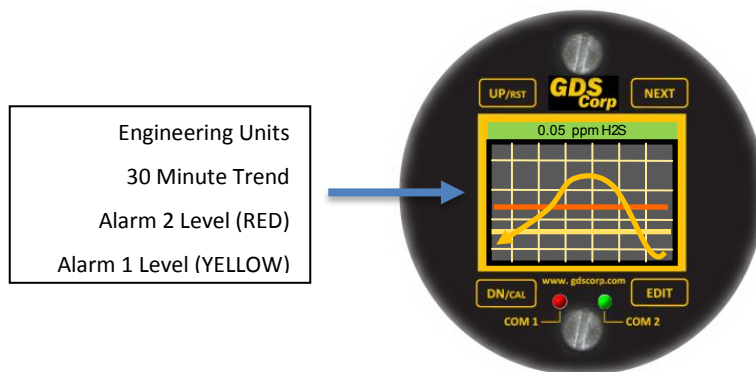
Figure 4-6: GASMAX Trend Display

The TREND screen displays a graph with the last 30 minutes of live readings. The EUNITS value is shown at the top and Alarm 1 and Alarm 2 levels are shown as dotted (A1) and dashed (A2) lines.

TOXIC SENSOR SETUP

Toxic sensors need few adjustments but require time to stabilize properly before they can be calibrated and made operational.

Local Smart Toxic Sensors: The GASMAX CX automatically loads all necessary setup information from locally connected toxic sensors via the 10-pin sensor cable. No user setup is required. Initial field calibration is always required.

Remote Toxic Sensor Transmitters: GASMAX CX units with remote 4-20mA toxic sensor transmitters do not automatically load sensor settings, but when ordered with remote toxic sensor transmitters the GASMAX CX is pre-configured, calibrated and tested at the factory. No user setup is required. Initial field calibration is always required.

IMPORTANT: TOXIC SENSORS MAY FAIL TO OPERATE PROPERLY IF POWER IS NOT APPLIED WITHIN 6 MONTHS OF SHIPMENT. CONTACT GDS CORP FOR RECOMMENDATIONS IF THIS SITUATION MAY OCCUR.

BRIDGE SENSOR SETUP

Bridge sensors require a very specific excitation voltage and must be balanced prior to operation.

Local Smart Bridge Sensors: The GASMAX CX automatically loads all necessary setup information from locally connected bridge sensors via the 10-pin sensor cable. Voltage adjustment is not necessary, but Balance adjustment may be required due to changes in the sensor that may have occurred during shipping and storage (See Balance adjustment procedure below).

Remote Bridge Sensors: GASMAX CX units with remote bridge sensors do not automatically load sensor settings. Remote bridge sensors require both Voltage and Balance adjustment prior to operation.

BRIDGE SENSOR "VOLTS" ADJUSTMENT

Bridge sensors require specific excitation voltages to operate properly. See table below for recommended operating voltages for catalytic bead, SmartIR infrared and PID sensors.

Sensor Type	Excitation Voltage	Expected Current	Recommended Warmup
Catalytic Bead ("7x")	2.0 ± 5%	300 mA	3 hrs
SmartIR (Type "5x")	4.5 ± 10%	85 mA	1 hr
PID (Type "6x")	3.3 ± 5%	35 mA	12 hrs

To adjust sensor excitation voltage, do the following:

1. Access the Channel 1 *Data From* Menu on the GASMAX (See User Menus)
2. Select Set Voltage menu item.
3. If the sensor is LOCAL, use the UP and DOWN keys to set the voltage to the proper value. No sensor cable length compensation is required.
4. If the sensor is REMOTE, the sensor voltage MUST BE MEASURED AT THE SENSOR, not at the GASMAX CX to compensate for the voltage drop in the intervening wiring. Connect a voltmeter across the

sensor "R" and "A" connections and have an assistant use the UP and DOWN keys to set the voltage to the proper value.

WARNING: EXCEEDING THE EXCITATION VOLTAGE WILL DAMAGE OR DESTROY THE SENSOR.

WARNING: IF YOU ARE NOT CERTAIN THAT SENSOR VOLTAGE IS ADJUSTED PROPERLY, FIRST DISCONNECT THE REMOTE SENSOR **BEFORE APPLYING POWER TO THE GASMAX CX**. SECOND, APPLY POWER AND ADJUST THE EXCITATION VOLTAGE AT THE SENSOR JUNCTION BOX TO THE TARGET VALUE. FINJALLY, RECONNECT THE REMOTE SENSOR AND INCREASE THE SENSOR VOLTAGE TO COMPENSATE FOR VOLTAGE DROP IN THE INTERVENING CABLE.

BRIDGE SENSOR "BALANCE" ADJUSTMENT

Bridge sensor output for a zero reading is a fixed voltage that varies from sensor to sensor. The Balance setting allows the GASMAX CX to adjust its internal reference to match the sensor's zero set point.

To adjust sensor balance, do the following:

1. Access the Channel 1 *Data From* Menu on the GASMAX (See User Menus)
2. Select Set Balance menu item.
3. Use the Up and DOWN keys to adjust the displayed reading to zero. (Note: a reading of "0" corresponds to a counts value of 512).

NOTE: BRIDGE SENSORS DRIFT DURING WARMUP AND REQUIRE TIME TO STABILIZE. ALWAYS ALLOW AT LEAST ONE FULL HOUR BETWEEN POWER-UP AND FINAL BALANCE ADJUSTMENT.

NOTE: MAKE SURE **NO TARGET GAS** IS PRESENT WHEN ADJUSTING BALANCE.

ALARM SETUP – ALARM 1, 2 AND 3

Each channel can be programmed for up to three independent alarm levels, and can be set to alarm ABOVE the target value for BELOW the target value. All programming is done in engineering units that correspond to the channels ZERO and SPAN settings. Alarm processing will trigger an alarm condition when the input exceeds the programmed value, and includes hysteresis to keep the alarm from rapidly switching ON and OFF if the input remains close to the programmed alarm value.

NOTE: ALARM RELAYS ARE NORMALLY TRIGGERED IF EITHER CHANNEL 1 OR CHANNEL 2 ALARM THRESHOLDS ARE EXCEEDED.

NOTE: IF THE OPTIONAL ALARM RELAYS ARE NOT INSTALLED, ALARM SETTINGS AFFECT THE OPERATION OF THE FRONT PANEL DISPLAY ONLY. SEPARATE ALARM SETTINGS MAY NEED TO BE PROGRAMMED IN THE 4-20MA RECEIVING DEVICE.

ALARM OPERATION – FAULT

FAULT is typically used to indicate FAULT conditions that suggest sensor failure or "out of measurement range" conditions.

SYSTEM SETUP

Once operational, the user should verify the following settings <u>prior to initial calibration</u>:

1. Local time and date: Check date value and adjust time for proper time zone.
2. Tag name or Engineering Units settings: Edit values as necessary.
3. CAL SPAN GAS value: Set to match concentration of calibration gas cylinder.
4. CAL MARKER value: Adjust desired output mA during calibration.
5. ALARM 1, ALARM 2, ALARM 3 settings: Set for desired levels. NOTE: If relays are not installed, GASMAX CX programmable alarm levels affect operation of display color only (Sec 7-3).

5 CALIBRATION

CALIBRATION OVERVIEW

Calibration is critically important to ensure correct operation of the GASMAX CX. 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. During CAL MODE zero and span, the sensor output is disconnected and the GASMAX CX transmits a fixed mA value, called the CAL MARKER, to notify the receiving device that a calibration is in progress. During the following CAL PURGE DELAY time, the GASMAX CX transmits a fixed 4.0 mA signal to prevent external alarms during calibration. In the case of local or remote Oxygen sensors, during CAL PURGE DELAY the output simulates a typical atmospheric reading of 20.8%. CAL MODE automatically exits if no keystrokes are detected after 5 minutes. Follow these GASMAX CX 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).
- **Never use calibration gas that has passed its expiration date.**
- Check the SPAN GAS VALUE setting and make sure it matches the calibration gas. (See Fig. 6-2)
- Always use a GDS Corp calibration cup that completely surrounds the sensor head.
- Be sure to use 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 gas may result in an 'elevated zero' condition that will cause a FAULT to occur once the ambient gas is no longer present.
- **Always calibrate a new sensor before depending on the device 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.

The flow chart shown in Figure 5-1 illustrates the above procedure. UP, CAL, NEXT & EDIT labels indicate keystrokes using the magnetic wand. ZERO or SPAN calibration will fail if the readings exceed built-in limits for maximum allowable zero or minimum allowable span.
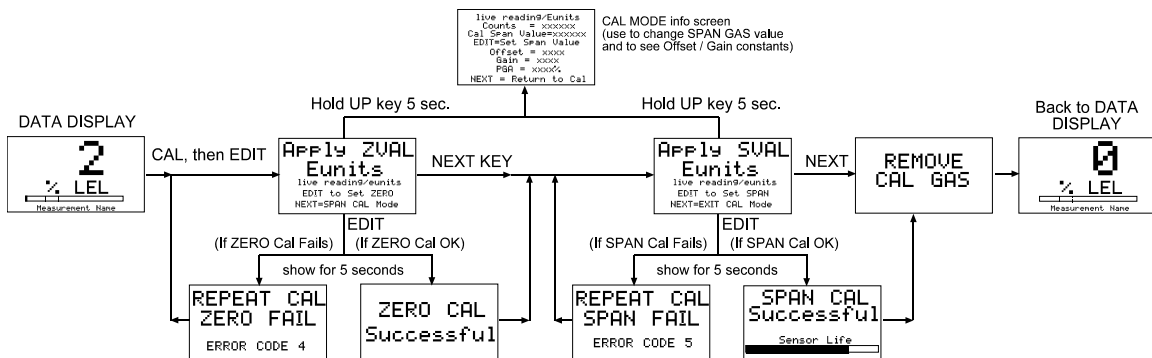
Figure 5-1: Calibration Flowchart

CALIBRATION PROCEDURE

Before beginning calibration, make sure you have the following items: A cylinder of calibration gas, fixed flow regulator and an appropriate calibration cup connected to the regulator via a length of flexible tubing. If necessary, a cylinder of 'zero air' may be necessary if the absence of target gas cannot be confirmed. GDS Corp recommends a flow rate of 0.5 liters / minute for standard gases and a flow rate of 1.0 liters / minute for highly reactive gases such as chlorine or chlorine dioxide.
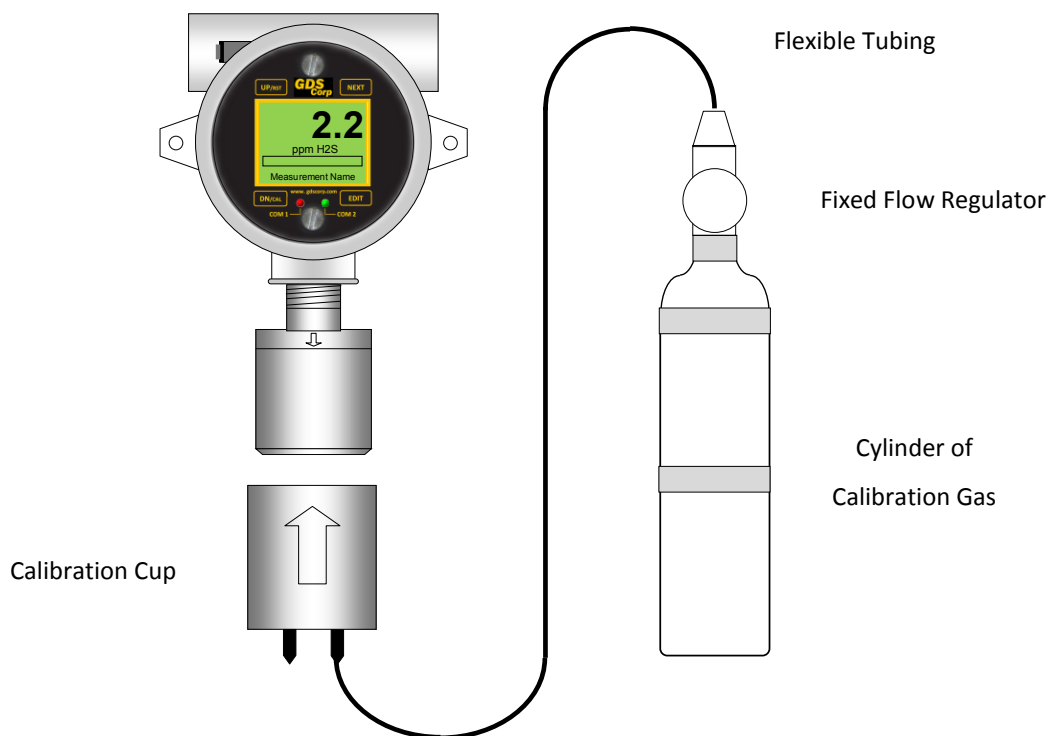
To calibrate a GASMAX CX detector:

1. For dual channel units, press the NEXT key until that the DATA Display screen for the desired channel is shown.
2. To enter CAL MODE, press the DOWN / CAL key and within 5 seconds press the EDIT key.
3. The screen will display an APPLY ZERO message. Using the setup shown in Fig. 5-1, apply clean ZERO air unless it can be guaranteed that no target gas is present. After the reading stabilizes, press the EDIT key to complete the ZERO calibration.
4. If the ZERO CAL SUCCESSFUL message is displayed, an APPLY SPAN message will appear. Apply the correct SPAN gas. After the reading is stable, (approximately 1 minute) press the EDIT key to complete the SPAN GAS calibration. If the SPAN calibration is successful, the display flashes REMOVE CAL GAS and starts the CAL PURGE delay.
5. Immediately shut off the regulator and remove the calibration cup. At the end of the CAL PURGE delay, the GASMAX EC output is re-enabled and the unit is fully operational.

6 MAINTENANCE

NORMAL MAINTENANCE

Normal maintenance for the GASMAX CX primarily involves periodic calibration on standard intervals. 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.

SENSOR REPLACEMENT

If a local toxic sensor shows FAULT, does not respond to gas or can no longer be calibrated, it should be replaced. If a remote direct toxic sensor shows FAULT, does not respond to gas or can no longer be calibrated, before replacing the sensor check the wiring between the sensor and GASMAX CX for electrical continuity. In addition, check for signs of moisture or corrosion in any of the cabling or junction boxes.

To physically replace a GASMAX sensor, perform the following steps:

1. Declassify the area or remove power to the GASMAX CX.
2. Unscrew the sensor head cover. If unable to open the cover by hand, use a Sensor Head Replacement Tool (p/n 10-0187).
3. Remove the old sensor by <u>pulling straight down</u>. DO NOT TRY TO UNSCREW THE SENSOR!
4. Carefully install the replacement sensor by aligning the arrow on the sensor with the arrow engraved on the sensor head. <u>Push straight up</u> until the sensor connector seats firmly into the sensor connector.
5. Reinstall the sensor head cover by CAREFULLY screwing the cover onto the sensor head.

NOTE: IF THE SENSOR FALLS OUT OF THE SOCKET DURING THIS STEP, IT CAN BE DAMAGED. USE CAUTION WHEN REINSTALLING THE COVER.

1) UNSCREW SENSOR HEAD COVER

2) REMOVE OLD SENSOR: **PULL STRAIGHT DOWN**

3) INSTALL NEW SENSOR: ALIGN ARROWS **PUSH STRAIGHT UP** *DO NOT ROTATE*

4) CAREFULLY REATTACH SENSOR HEAD COVER
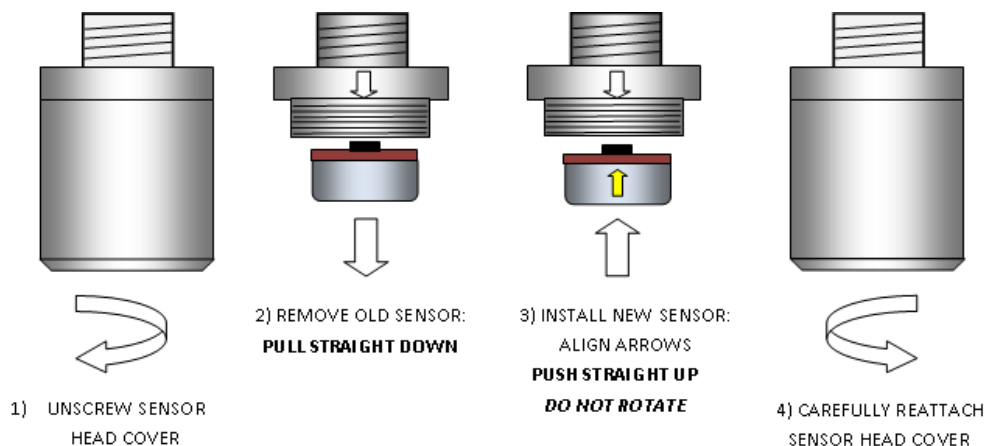
Figure 6-1: GASMAX Sensor Replacement

SENSOR REPLACEMENT – LOCAL TOXIC SMART SENSORS

For local toxic sensors use GDS Corp type 10-98XX-RYYYY sensors, where "XX" is the gas type and "YYYY" is the full scale range. For example, a replacement H2S ("15") sensor for 0-100 ppm ("0100") connected directly to the GASMAX CX would be part number "10-9815-R0100".

Local Toxic Smart Sensors are automatically recognized by the GASMAX CX when installed. If the sensor is the same gas type as was previously installed, the sensor's calibration data ("Gain" and "Offset") will be uploaded into the GASMAX CX memory. All other parameters stored in the GASMAX CX will be retained.

SENSOR REPLACEMENT – REMOTE TOXIC SENSOR TRANSMITTERS

GASMAX CX remote toxic sensor transmitters use GDS Corp type 10-90XX-RYYYY toxic sensors, where "XX" is the gas type and "YYYY" is the full scale range. For example, a replacement sensor for a toxic sensor transmitter for 0-100 ppm would be part number "10-9015-R0100".

Remote toxic sensors are not automatically recognized by the GASMAX CX. After installing the sensor, execute the "Install New Sensor" command found on the GASMAX CX SENSOR SETUP/INFO menu page. This will erase previous calibration values and reset the Sensor Life value to 100%.

SENSOR REPLACEMENT – LOCAL BRIDGE SENSORS

GASMAX CX monitors use GDS Corp type 10-98XX-RYYYY bridge sensors, where "XX" is the sensor type and "YYYY" is the full scale range. For example, a replacement catalytic bead sensor for 0-100% LEL methane would be part number "10-9870-R0100".

Local Bridge Smart Sensors are automatically recognized by the GASMAX CX when installed. If the sensor is the same gas type as was previously installed, the sensor's calibration data ("Gain" and "Offset") will be uploaded into the GASMAX CX memory. All other parameters stored in the GASMAX CX will be retained.

Although the sensor balance value is uploaded from the sensor during initialization, GDS Corp recommends a Balance adjustment prior to full operation.

SENSOR REPLACEMENT – REMOTE BRIDGE SENSORS

GASMAX CX monitors use GDS Corp type 10-98XX-RYYYY bridge sensors, where "XX" is the gas type and "YYYY" is the full scale range. For example, a replacement catalytic bead sensor for 0-100% LEL methane would be part number "10-9870-R0100".

Remote bridge sensors are not automatically recognized by the GASMAX CX. After installing the sensor, execute the "Install New Sensor" command found on the GASMAX CX SENSOR SETUP/INFO menu page. This will erase previous calibration values and reset the Sensor Life value to 100%.

When replaced, bridge sensor excitation Voltage should be checked to ensure it is within required tolerance. After allowing time for warm-up, the bridge sensor Balance adjustment should be performed prior to calibration.

7   USER MENUS

The GASMAX CX gas monitor used in the GDS-68XP has a menu-driven user interface that allows the operator to review and adjust a wide range of settings. In the GDS-68XP, channel 1 of the GASMAX CX measures the "raw sensor" gas level and channel 2 provides continuous display, output and alarming on the stored value retained in the sequencer memory.

To access the Main Menu, activate the EDIT key with a magnetic wand.

```
   Main Menu
Alarm Outputs    →
Channel Settings →
Comm Settings    →
Security         →
System           →
Diagnostics      →
```

```
   Alarm Outputs
Relay 1          →
Relay 2          →
Relay 3          →
```

Alarm Output Menu – contains settings that control the four optional alarm relays (if installed). These setting include relay programming, on and off delay, failsafe mode and specific input override.

```
  Channel Settings
Channel 1        →
Channel 2        →
```

Channel Settings Menu – contains settings specific to each channel. These include tag names, range, calibration settings and alarm levels.

```
   Comm Settings
COMM 1 Settings  →
COMM 2 Settings  →
ModbusTCP        →
Network Settings →
Troubleshooting  →
```

Comm Settings Menu – contains settings specific to the Ethernet network interface, MODBUS/TCP interface and optional RS-485 serial ports (if installed).

```
    Security
Code to Lock
              ****
Modbus/Web Code
              1234
     Contact Info
```

Security Settings Menu – allows the user to restrict operation for some or all of the features as well as provide a programmed contact name.

```
    System
Version     v1.00
Configure        →
Digital Input    →
View Event Log   →
Clear Event Log  →
View Sensor Life →
```

System Settings Menu – contains settings that are unit specific. These include unit name. time and date, warm-up and calibration delay settings, and Event Log.

```
   Diagnostics
Relays           →
Analog Inputs    →
Analog Outputs   →
LED Test         →
Serial Ports     →
ADC Readings     →
```

Diagnostics Menu – comprehensive set of tools that can be used to activate relays, simulate output values and test serial ports.

Figure 7-1: Main Menu Tree

ALARM OUTPUTS MENU

The Alarm Outputs Menu controls the four optional alarm relays (if installed). These setting include relay programming, acknowledge, failsafe mode and specific input override options.

NOTE: The Alarm / Modbus board containing the 3x alarm relays and 1x fault relay is optional on the GDS-68XP.

```
   Alarm Outputs
Relay 1          →
Relay 2          →
Relay 3          →
```

All three relay outputs are identical and can be set to respond to channel 1 or channel 2 events. The fault relay is always dedicated to

```
       Relay x
Alarm 1          Off
Alarm 2          Off
Alarm 3          Off
Fault            Off
Acknowledge       No
Failsafe          No
Override
               None
```

Alarm 1, 2, 3 and Fault – Determines which channel or combination of channels can activate the relay. Options are "Off", "Ch1", "Ch2", "Ch1 and Ch2", and "Ch1 or "Ch2".

Acknowledge – Determines if the alarm can be reset by an Acknowledge command (YES) or not (NO).

Failsafe – Determines if the relay is OFF when inactive (NO) or ON when inactive (YES). Failsafe connections thru the Normally Open connection will open automatically if the alarm activates or if power is lost.

Override – Allows the relay to be dedicated to a specific channel alarm level or function such as calibration. Settings that involve calibration allow the relay to be connected to a cylinder of calibration gas via a solenoid valve to enable automatic application of calibration gas if the unit is placed in Cal Mode.

```
None
Ch1 Alarm 1
Ch1 Alarm 2
Ch1 Alarm 3
Ch1 Fault
Ch2 Alarm 1
Ch2 Alarm 2
Ch2 Alarm 3
Ch2 Fault
Ch1/2 Cal Zero
Ch1 Cal Span
Ch2 Cal Span
1/2 Cal Zero/Span
```

Figure 7-2: Alarm Outputs Menu Tree

CHANNEL SETTINGS MENU

The Channel Settings Menu allows the user to adjust individual channel or sensor-specific features. Data in the Channel Settings Menu is uploaded from Smart Sensors, and written back to any local Smart Sensor if changed in the menu.

```
Channel Settings
Channel 1        →
Channel 2        →
```

All three relay outputs are identical and can be set to respond to channel 1 or channel 2 events. The fault relay is always dedicated to fault events.

```
        Channel x
Alarm 1          →
Alarm 2          →
Alarm 3          →
Fault Alarm      →
Data From        →
Temp. Comp.      →
Configure        →
Calibrate        →
```

Both channel setup menus are identical so only one is shown.

Alarm X menu (all three alarm setting menus are identical)

Set Point is the engineering unit value where the alarm trips. It may be negative or positive.

Latching YES causes the alarm to remain active even after the event clears. NO clears the alarm automatically.

Trip On HIGH causes the alarm to activate if the value goes above the setpoint. Trip On LOW activates the alarm if the value goes below the setpoint.

On / Off Delay adjusts the time delay between the time when the event occurs and when the alarm is activated.

Deadband prevents alarm cycling when the value is close to the alarm level.

```
         Alarm x
Setpoint      20.00
Latching         No
Trip On        High

Fault           Off
On Delay(sec)     0
Off Delay(min)    0
Dead Band %       1
```

```
       Fault Alarm
Setpoint     -10.00
```

Fault Alarm setpoint is typically set at -10% of full scale.

```
        Data From
         EC Sensor
Remote Sensor  No
Min Raw        800
Max Raw       4000
Filter Samples 20
Polarity      POS
PGA Gain        →
Heater Enabled No
Heat(degC)   10.0
```

Data From Menu

Data From determines the source of the data for this channel.

Min Raw / Max Raw – Set the range of the input A/D converter. Normally set to 800 (min) and 4000 (max). Useful if a sensor's output does not provide a full range signal.

Filter Samples – Number of samples used by the smoothing filter.

PGA Gain – sets the analog amplification level in the smart sensor interface circuit. **WARNING: Changing PGA gain resets calibration data.**

Heater Enabled – Determines if the internal sensor heater is ON or OFF.

Heat(degC) – Heater thermostat setting.

Figure 7-3: Channel Settings Menu Tree (1)

```
        Temp. Comp.
Temp Gain Offset
-40  1.00  +0.00
-30  1.00  +0.00
-20  1.00  +0.00
-10  1.00  +0.00
  0  1.00  +0.00
+10  1.00  +0.00
+20  1.00  +0.00
+30  1.00  +0.00
+40  1.00  +0.00
+50  1.00  +0.00
```

Temperature Compensation compensates for changes in sensor output (gain) and zero value (offset) as sensor temperature changes. Individual values for gain and offset can be entered for eleven points ranging from minus 40C to +60C. Gain and offset values are linearly interpolated between points by the internal microprocessor.

NOTE: These values are typically set by the sensor manufacturer and should not be changed.

```
        Configure
Hydrogen Sulfide
E. Units    ppmH2S
Zero          0.00
Span         100.0
Decimal Points  0
Channel On?    Yes
Deadband (%) 0.00
Backup/Restore  →
```

Configure Menu

Measurement Name – User-programmable character string to describe the channel. Otherwise called "tag name".

E. Units – User-programmable character string that describes the engineering units value.

Zero – Channel zero value, typically "0".

Span– Channel full scale value. Max value is "9999".

Decimal Points – Determines the number of displayed digits to the right of the decimal point.

Channel On? – Channel ON or OFF setting. An "OFF" channel will have no effect on any alarm or output value.

Deadband (%) – The value, around zero, for which the screen will show "0.0". Eliminates display of small values around zero due to sensor drift.

```
        Calibrate
Offset        1.73
Gain          1.00
Cal Zero      0.00
Cal Span     100.0
Set Unity Gain  →
```

Calibrate Menu

Offset – Shows the computed offset value based on the latest calibration.

Gain – Shows the computed gain value based on the latest calibration.

Cal Zero – The value for the zero point calibration

Cal Span – The value for span calibration, typically 50% of full scale.

Set Unity Gain – Clears gain and offset to "1.00" and "0.00" respectively.

WARNING: Set Unity Gain resets calibration data.

Figure 7-4: Channel Settings Menu Tree (2)

COMM SETTINGS MENU

The Comm Settings Menu allows the user to configure the Ethernet interface, MODBUS/TCP slave and

two optional RS-485 serial interfaces.

```
   Comm Settings
COMM 1 Settings   →
COMM 2 Settings   →
ModbusTCP         →
Network Settings →
Troubleshooting  →
```

```
    COMMx Settings
      Modbus Slave
BaudRate       9600
Parity         None
Slave ID         42
Byte Order     BADC
Enable LEDs     Yes
```

```
      ModbusTCP
Slave
 Byte Order   BADC
Master
 Timeout(ms)   500
 Poll Dly(ms)  250
Enable LEDs    Yes
```

```
   Network Settings
DHCP Enabled   Yes
Hostname
     Unit-44-1000
Ip Address
    169.254.100.10
Netmask
    254.254.0.0
```

```
  Troubleshooting
View Error Count
Clear Error Count
```

Comm X Menu (both comm port setting menus are identical)

Type ("Modbus Slave") determines whether the MODBUS port is a master or slave.

Baud Rate – Sets the baud rate for the serial port. Options are 9600, 19200, 38400, 57600 and 115200 baud.

Slave ID - Sets the MODBUS slave ID for the serial port.

Byte Order – sets the byte order for words larger than 16 bits.

Enable LEDs – If YES, front panel LEDs indicate MODBUS transmission.

MODBUS TCP Menu

Slave Settings:

Byte Order – sets the byte order for words larger than 16 bits.

Master Settings:

Timeout – Length of time (in mSec) that master will wait for a reply before indicating a comm timeout.

Poll Delay – Length of time (in mSec) between sequential read requests.

Enable LEDs – if YES, front panel LEDs indicate MODBUS / TCP transmission

Network Settings Menu

DHCP Enabled – If YES, uses a remote DHCP server to establish a network address. If NO, uses fixed address.

Hostname – Character string that defines device network name

IP Address – Network address. If DHCP enabled, will show address assigned by DHCP server. If DHCP disabled, is IP address programmed by user.

Net mask – Network mask value. See above.

Gateway – Network gateway value. See above.

Troubleshooting Menu

View Error Count – View a menu that tracks the number of network errors

Clear Error Count – Resets number of network errors to zero.

Figure 7-5: Comm Settings Menu

SYSTEM SETTINGS MENU

The Comm Settings Menu allows the user to configure the Ethernet interface, MODBUS/TCP slave and two optional RS-485 serial interfaces.

```
      System
Version      v1.00
Configure        →
Digital Input    →
View Event Log   →
Clear Event Log  →
View Sensor Life →
```

```
      Configure
        Unit-44-1000
Date      01/25/2013
Time        04:33:05
Warmup(m)          1
Cal Purge(m)       1
Block Neg         No
Send SensrLife    No
InCal mA        0.00
Alm Refresh(m)     0
```

```
    Digital Input
Mode   Flt Override
Normally       Open
Channel  Ch. 1 & 2
```

```
Hh:mm Ch     Event
01/25/2013
03:35 2 Fault Out
03:34 2 Fault In
03:33 2 Fault Out
03:32 2 Fault In
```

```
Ch.1 Sensr Found
Life:  100%
_____
Ch.2 No Sensor
```

Configure Menu

Date & Time – Sets the system date and time. Used for display and event log entries.

Warm Up Delay – Sets length of time (in minutes) from power on to output signals active. During Warmup Delay the 4-20mA outputs are set to 4mA.

Cal Purge Delay - Sets length of time (in minutes) that outputs are disabled following a zero or span calibration

Block Negative – If YES, blocks screen from showing negative values.

Send Sensor Life – If YES, enables transmission of sensor life data across 4-20mA output (see GASMAX CX manual for more details).

InCal mA – Sets the 4-20mA output value to be transmitted during a calibration sequencer. Enables remote devices to track "In Cal" status.

Alarm Refresh – See GASMAX CX manual.

Digital Input Menu

Mode – Determines action if digital input (fault ack input) is activated.

Normally – If Normally OPEN the action will occur if the contacts close; if normally CLOSED the event will occur if the contacts open.

Channel – Determines which channel output is affected.

Event Log

Event Log Format – The event log includes the date, time and list of events that occur. Events include cold boot, system boot, alarm reset, remote alarm reset, log cleared, config edit, A1, A2 and A3 in and out, fault in and out, calibration in and out, calibration fail, communications error, config error and marker event.

Clear Event Log – Clears all entries in the event log.

View Sensor Life Menu

Life – Computed value based on initial stored 'gain' value when sensor was first calibrated. If new gain equals original gain, sensor life = 100%. If new gain equals twice original gain, sensor life = 0%.

Figure 7-6: System Settings Menu Tree

DIAGNOSTICS MENU

The Diagnostics page provides tools for use during setup or testing. Tests for optional features are not available if the feature is not installed.

```
    Diagnostics
Relays          →
Analog Inputs   →
Analog Outputs  →
LED Test        →
Serial Ports    →
ADC Readings    →
```

```
    !! Warning !!

Diagnostic mode.
Alarms will not
Be processed.

     Edit (OK)
    Next (Cancel)
```

WARNING – ENTERING DIAGNOSTICS MODE DISABLED ALARM FUNCTION AND REQUIRES A DEVICE REBOOT ON EXIT.

```
       Relays
Relay 1       Off
Relay 2       Off
Relay 3       Off
Fault Relay    On
```

Relays Menu

Allows individual relays to be turned on or off under user control. Only available if optional Relay / Modbus board is installed.

```
Ch.1 EC - Loc
Counts: 856
Temp: 24.5 degC
_____
Ch.2 4-20mA
Counts: 0
Current:  0.00mA
```

Analog Inputs Menu

Shows current input readings for channel 1 and channel 2.

```
  Analog Outputs
4-20mA Out1     0mA
4-20mA Out2     0mA

Out1 Fdbk    0.07
Out2 Fdbk    0.06
```
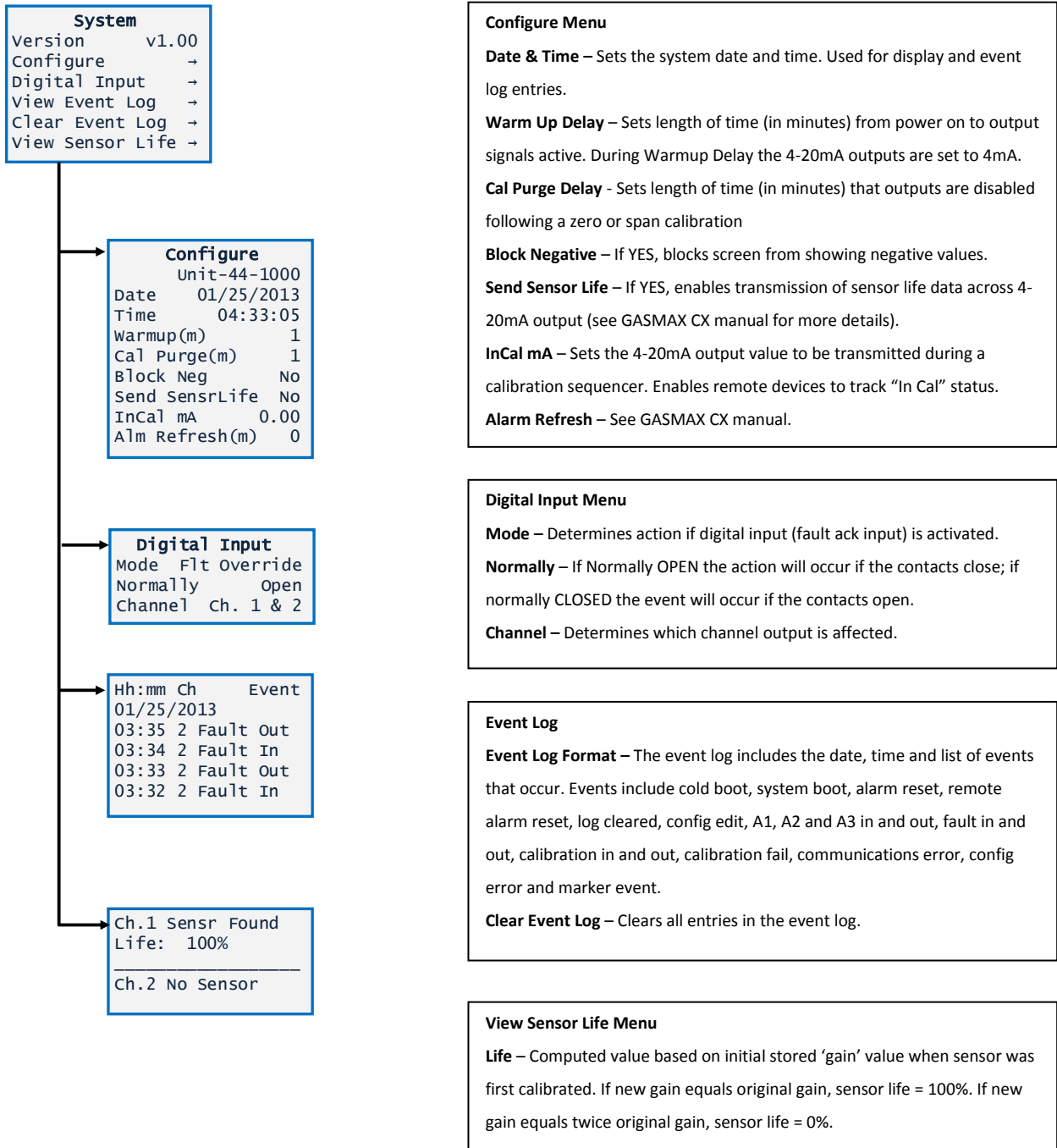
Analog Outputs Menu

Shows the live output values on analog channel 1 and analog channel 2. Also shows the feedback monitor reading for both channels.

```

      LED Test

```

LED Test Menu

Cycles the external LED.

```
    Comm Test
Connect Loopback

Port 1 => 2: Bad

Port 2 => 1: Bad
```

Comm Test Menu

Performs a loopback test to verify proper operation of the serial components. Only available if optional Relay / Modbus board is installed.

```
420 Out1:   4.60mA
  Fdbk 1:   4.57mA
420 Out2:   4.05mA
  Fdbk 2:   4.14mA
Sensor V:  0.01V
SensrAmp:  0.78V
     PSU:  22.93V
```

ADC Readings

Displays values monitored by internal analog-to-digital converters.
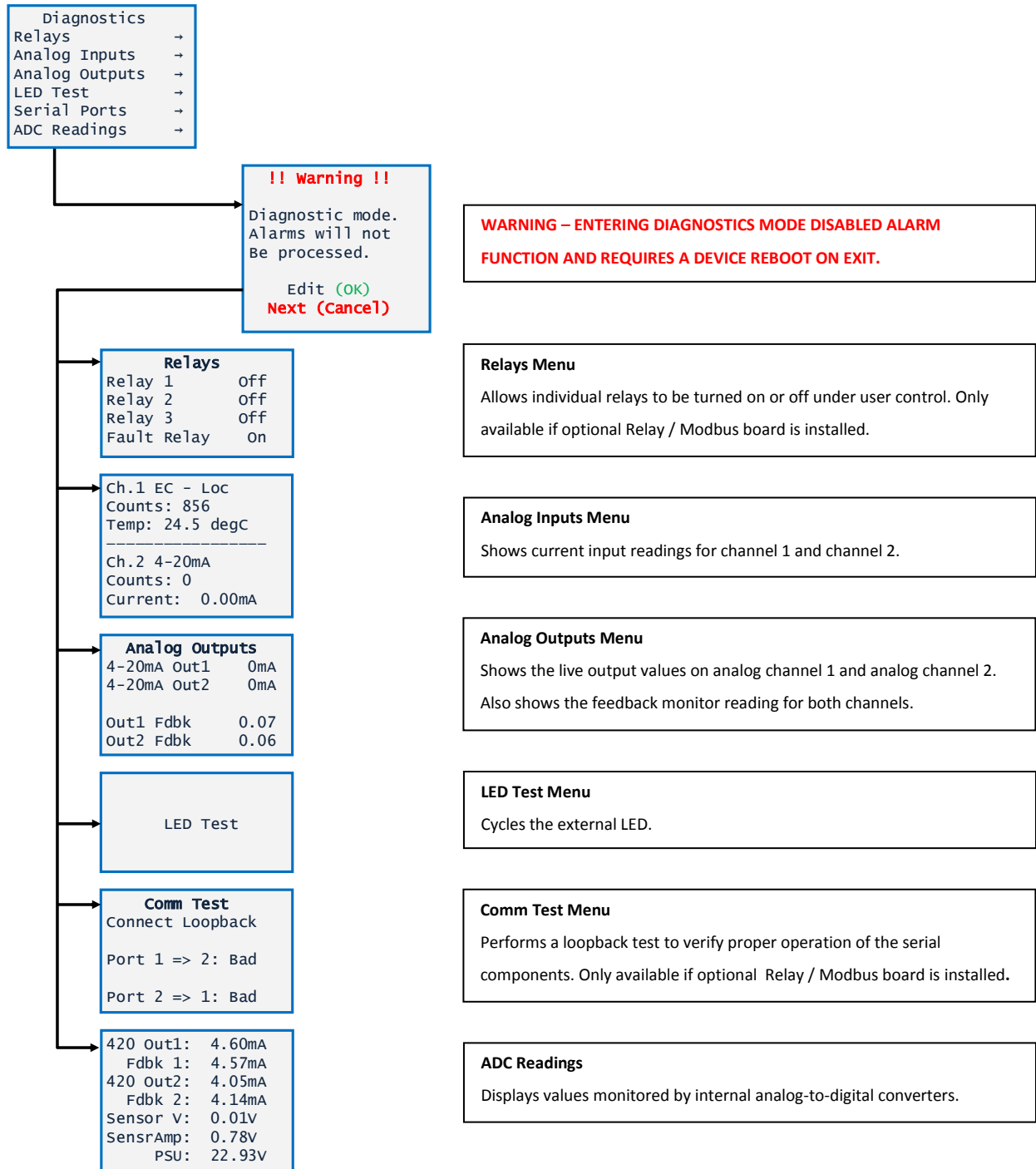
Figure 7-7: Diagnostics Menu Tree

8 TROUBLESHOOTING

TOXIC SENSOR INDICATES FAULT OR OVERRANGE

- Certain toxic sensors indicate off-scale low or high at power up and quickly drift towards zero. This is normal behavior.
- 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 too low – sensor may be defective. However, it may be possible to _temporarily_ continue operation by increasing PREAMP GAIN.

BRIDGE SENSOR INDICATES FAULT OR OVERRANGE

- Catalytic bead combustible sensors generally indicate off-scale high at power up and quickly drift towards zero as they reach operating temperature. This is normal behavior.
- Combustibles sensors showing constant OVERRANGE may have defective bead. If remote, check wiring for correct excitation voltage at sensor. Replace sensor.

BRIDGE SENSOR WILL NOT CALIBRATE

- Sensor reading during zero calibration exceeds limits – readjust SENSOR BALANCE to reset zero if possible. If not, sensor is defective and should be replaced.
- Sensor reading during span calibration too low – sensor may be defective. However, it may be possible to _temporarily_ continue operation by increasing PREAMP GAIN. See Section 8.2 for more details.

RECEIVING DEVICE AND GASMAX DISPLAYED VALUES DON'T MATCH

- Check that zero and full scale range values match between GASMAX and receiving device (controller). Use DIAGNOSTICS menu to force GASMAX CX output to 12mA (1/2 scale) and verify appropriate half-scale reading on controller.
- Check for high impedance shorts to ground on 4-20mA wiring.
- If 4-20mA output is off-scale low or high and cannot be adjusted using DIAGNOSTICS mode, IO/Power Supply board may be defective and should be replaced.

CONTROLLER MODBUS DATA INCORRECT

- Verify the MODBUS master is requesting data from registers 31001 for CH 1, 31002 for CH 2.
- Verify that controller MIN and MAX count settings are correct. MIN counts should be "800" which corresponds to 4mA and MAX counts should be "4000" which corresponds to 20 mA.

- Verify that the GASMAX 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: 31001 for CH 1, 31002 for CH 2.
- Verify that there are no other MODBUS slave devices with identical MODBUS address.

GASMAX DISPLAY BLANK

- Verify DC power at IO/Power Supply board, TB1, terminals 1 (+24) and 4 (Gnd).
- Verify ribbon cable connected between IO/Power Supply board and Display Assembly.

SOFTWARE RESET ("COLD BOOT")

If the GASMAX display shows 'nonsense' characters or one or more of the settings appear to be corrupted, performing a "Cold Boot" will restore the default values in the non-volatile memory and may clear the problem. To perform a 'Cold Boot', hold the magnetic wand over the EDIT key while applying power.

Note that a COLD BOOT will reset certain values to their default setting, including the MODBUS address value. If a Smart Sensor is connected to a local sensor head, the GASMAX will reload the sensor type, range, cal span value and other sensor –related values automatically.

9   MODBUS & ETHERNET INTERFACE

MODBUS REGISTERS

The GASMAX CX features a full complement of user-accessible MODBUS registers that can provide a complete snapshot of the gas detector configuration. This includes all real-time data, preset zero, span and calibration values and user-programmable text.

Variable Name	Alias	Read	Write	Notes
Ch 1 Analog Output Raw	31001	4	N/A	12 bit value; 800 = 4mA, 4000 = 20mA
Ch 2 Analog Output Raw	31002	4	N/A	12 bit value; 800 = 4mA, 4000 = 20mA
Ch 1 A2D Raw Counts	31003	4	N/A	12 bit value from A/D converter
Ch 2 A2D Raw Counts	31004	4	N/A	12 bit value from A/D converter
Ch 1 Sensor Life	31009	4	N/A	16 bit signed integer ranging from -1 to 100 where -1 indicates Cal Required
Ch 2 Sensor Life	31010	4	N/A	16 bit signed integer ranging from -1 to 100 where -1 indicates Cal Required
Ch 1 Sensor Temp	31011	4	N/A	16 bit integer from 1 to 4095 scaled for -55°C to +125°C
Ch 2 Sensor Temp	31012	4	N/A	16 bit integer from 1 to 4095 scaled for -55°C to +125°C
Ch 1 4-20mA Out FP	31210	4	N/A	32 bit floating point
Ch 2 4-20mA Out FP	31212	4	N/A	32 bit floating point
Ch 1 Output Feedback FP	31214	4	N/A	32 bit floating point
Ch 2 Output Feedback FP	31216	4	N/A	32 bit floating point
12V Input FP	31218	4	N/A	32 bit floating point
Sensor Volts FP	31220	4	N/A	32 bit floating point
Bridge Amp FP	31222	4	N/A	32 bit floating point
Bridge Out FP	31224	4	N/A	32 bit floating point
Product ID	32001	4	N/A	Factory use only
Version	32002	4	N/A	Factory use only
Custom Feature	32003	4	N/A	Factory use only
Customer ID	32004	4	N/A	Factory use only
Lock Status	32005	4	N/A	
Boot Year	32006	4	N/A	Last power-up time & date
Boot Month	32007	4	N/A	Last power-up time & date
Boot Day	32008	4	N/A	Last power-up time & date
Boot Hour	32009	4	N/A	Last power-up time & date
Boot Minute	32010	4	N/A	Last power-up time & date
Boot Second	32011	4	N/A	Last power-up time & date

SR 1 State	32020	4	N/A	True if relay #1 active
SR 2 State	32021	4	N/A	True if relay #2 active
SR 3 State	32022	4	N/A	True if relay #3 active
FR State	32023	4	N/A	True if fault relay active
Warmup	32025	4	N/A	True if unit in warm-up
SR 1 Flashing	32026	4	N/A	True if relay #1 flashing
SR 2 Flashing	32027	4	N/A	True if relay #2 flashing
SR 3 Flashing	32028	4	N/A	True if relay #3 flashing
FR Flashing	32029	4	N/A	True if fault relay flashing
DI State	32034	4	N/A	Digital input status
Ch 1 Fixed Point	33001	4	N/A	Compatible with GASMAX CX
CH 2 Fixed Point	33002	4	N/A	Compatible with GASMAX CX
Ch 1 Floating Point	33010	4	N/A	32 bit IEEE 754 float
Ch 1 Value String	33012	4	N/A	6 character string, zero terminated
Ch 1 Temperature Float	33015	4	N/A	Sensor temperature
Ch 1 A1 Status	33017	4	N/A	True if alarm 1 active
Ch 1 A1 Flashing	33018	4	N/A	True if alarm 1 indicator flashing
Ch 1 A2 Status	33019	4	N/A	True if alarm 2 active
Ch 1 A2 Flashing	33020	4	N/A	True if alarm 2 indicator flashing
Ch 1 A3 Status	33021	4	N/A	True if alarm 3 active
Ch 1 A3 Flashing	33022	4	N/A	True if alarm 3 indicator flashing
Ch 1 Fault Status	33023	4	N/A	True if fault active
Ch 1 Comm Error	33024	4	N/A	True if comm error
Ch 1 Config Error	33025	4	N/A	True if config error
Ch 1 I/O Error	33026	4	N/A	True if input/output error
Ch 1 Cal Flag	33027	4	N/A	True if calibration in progress
Ch 1 Marker Flag	33028	4	N/A	True if marker active
Ch 1 Linearize	33029	4	N/A	True if linearization table active
Ch 1 Err Flashing	33030	4	N/A	True if channel error
Ch 2 Floating Point	33040	4	N/A	32 bit IEEE 754 float
Ch 2 Value String	33042	4	N/A	6 character string, zero terminated
Ch 2 Temp Float	33045	4	N/A	Sensor temperature
Ch 2 A1 Status	33047	4	N/A	True if alarm 1 active
Ch 2 A1 Flashing	33048	4	N/A	True if alarm 1 indicator flashing
Ch 2 A2 Status	33049	4	N/A	True if alarm 2 active
Ch 2 A2 Flashing	33050	4	N/A	True if alarm 2 indicator flashing
Ch 2 A3 Status	33051	4	N/A	True if alarm 3 active
Ch 2 A3 Flashing	33052	4	N/A	True if alarm 3 indicator flashing
Ch 2 Fault Status	33053	4	N/A	True if fault active
Ch 2 Comm Error	33054	4	N/A	True if comm error

Ch 2 Config Error	33055	4	N/A	True if config error
Ch 2 I/O Error	33056	4	N/A	True if input/output error
Ch 2 Cal Flag	33057	4	N/A	True if calibration in progress
Ch 2 Marker Flag	33058	4	N/A	True if marker active
Ch 2 Linearize	33059	4	N/A	True if linearization table active
Ch 2 Err Flashing	33060	4	N/A	True if channel error
Alarm Reset	40001	N/A	3	Write to acknowledge alarm
System Name	40010	4	N/A	16 character ASCII text
Date Year	40020	3	N/A	Current time & date
Date Month	40021	3	N/A	Current time & date
Date Day	40022	3	N/A	Current time & date
Date Hour	40023	3	N/A	Current time & date
Date Minute	40024	3	N/A	Current time & date
Date Second	40025	3	N/A	Current time & date
Refresh Time	40026	3	N/A	Alarm refresh (minutes)
Warmup Time	40027	3	N/A	Warm up delay (minutes)
Cal Purge Time	40028	3	N/A	Cal purge delay (minutes)
Block Negative Flag	40029	3	N/A	True if prohibit display of neg values
Comm 1 Function	40030	3	N/A	MODBUS serial port #1
Comm 1 Baud Rate	40031	3	N/A	MODBUS serial port #1
Comm 1 Parity	40032	3	N/A	MODBUS serial port #1
Comm 1 Slave ID	40033	3	N/A	MODBUS serial port #1
Comm 1 Timeout	40034	3	N/A	MODBUS serial port #1
Comm 1 Poll Delay	40035	3	N/A	MODBUS serial port #1
Comm 1 Byte Order	40036	3	N/A	MODBUS serial port #1
Comm 1 Wireless T/O	40037	3	N/A	MODBUS serial port #1
Comm 1 LED Enable	40038	3	N/A	MODBUS serial port #1
Comm 2 Function	40040	3	N/A	MODBUS serial port #2
Comm 2 Baud Rate	40041	3	N/A	MODBUS serial port #2
Comm 2 Parity	40042	3	N/A	MODBUS serial port #2
Comm 2 Slave ID	40043	3	N/A	MODBUS serial port #2
Comm 2 Timeout	40044	3	N/A	MODBUS serial port #2
Comm 2 Poll Delay	40045	3	N/A	MODBUS serial port #2
Comm 2 Byte Order	40046	3	N/A	MODBUS serial port #2
Comm 2 Wireless T/O	40047	3	N/A	MODBUS serial port #2
Comm 2 LED Enable	40048	3	N/A	MODBUS serial port #2
DHCP Enabled	40050	3	N/A	Ethernet port; DHCP or fixed address
Host Name	40051	3	N/A	Ethernet port: 16 ASCII characters
IP Address	40066	3	N/A	Ethernet port: xxx.xxx.xxx.xxx

Net Mask	40070	3	N/A	Ethernet port: xxx.xxx.xxx.xxx
Gateway IP	40074	3	N/A	Ethernet port: xxx.xxx.xxx.xxx
Modbus TCP Byte Order	40080	3	N/A	MODBUS/TCP function
Modbus TCP Timeout	40081	3	N/A	MODBUS/TCP timeout (mSec)
Modbus TCP Poll Delay	40082	3	N/A	MODBUS/TCP poll delay (mSec)
Save Config	40095	N/A	3	Write command to save local config
Config Changed	40096	3	N/A	True if config changed since last read
Security Unlock	40099	3	N/A	TBD
Relay 1 A1 Votes	40101	3	N/A	Alarm relay #1 configuration
Relay 1 A2 Votes	40102	3	N/A	Alarm relay #1 configuration
Relay 1 A3 Votes	40103	3	N/A	Alarm relay #1 configuration
Relay 1 Fault Votes	40104	3	N/A	Alarm relay #1 configuration
Relay 1 Override	40105	3	N/A	Alarm relay #1 configuration
Relay 1 Ack	40107	3	N/A	Alarm relay #1 configuration
Relay 1 Failsafe	40108	3	N/A	Alarm relay #1 configuration
Relay 2 A1 Votes	40111	3	N/A	Alarm relay #2 configuration
Relay 2 A2 Votes	40112	3	N/A	Alarm relay #2 configuration
Relay 2 A3 Votes	40113	3	N/A	Alarm relay #2 configuration
Relay 2 Fault Votes	40114	3	N/A	Alarm relay #2 configuration
Relay 2 Override	40115	3	N/A	Alarm relay #2 configuration
Relay 2 Ack	40117	3	N/A	Alarm relay #2 configuration
Relay 2 Failsafe	40118	3	N/A	Alarm relay #2 configuration
Relay 3 A1 Votes	40121	3	N/A	Alarm relay #3 configuration
Relay 3 A2 Votes	40122	3	N/A	Alarm relay #3 configuration
Relay 3 A3 Votes	40123	3	N/A	Alarm relay #3 configuration
Relay 3 Fault Votes	40124	3	N/A	Alarm relay #3 configuration
Relay 3 Override	40125	3	N/A	Alarm relay #3 configuration
Relay 3 Ack	40127	3	N/A	Alarm relay #3 configuration
Relay 3 Failsafe	40128	3	N/A	Alarm relay #3 configuration
Force Sensor Upload	40141	3	N/A	Binary
Digital Input Mode	40150	3	N/A	Alarm ack or flow switch input
Digital Input Type	40151	3	N/A	Alarm ack or flow switch input
Digital Input Mode	40152	3	N/A	Alarm ACK or flow switch input
Send Sensor Life	40153	3	N/A	True if transmit sensor life value
Contact Info String	40160	3	N/A	16 ASCII characters (2 per register)
Ch 1 Measurement Name	40401	3	N/A	16 ASCII characters (2 per register)
Ch 2 Measurement Name	40409	3	N/A	16 ASCII characters (2 per register)
Ch 1 EUNITS	40423	3	N/A	10 ASCII characters (2 per register)

Ch 2 EUNITS	40428	3	N/A	10 ASCII characters (2 per register)
Ch 1 Preamp gain	40433	3	N/A	Contact factory
Ch 2 Preamp gain	40434	3	N/A	Contact factory
Ch 1 Cal Zero	42001	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Cal Span	42003	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Zero Value	42005	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Span Value	42007	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Fault Value	42009	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Alarm 1 Setpoint	42011	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Alarm 2 Setpoint	42013	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Alarm 3 Setpoint	42015	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Manual Gain	42017	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Manual Offset	42019	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Cal Zero Value	42021	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Cal Span Value	42023	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Zero Value	42025	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Span Value	42027	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Fault Value	42029	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Alarm 1 Setpoint	42031	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Alarm 2 Setpoint	42033	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Alarm 3 Setpoint	42035	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Manual Gain	42037	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Manual Offset	42039	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Alarm 1 Latch	43001	3	N/A	False = NO, True = YES
Ch 1 Alarm 1 Trip	43002	3	N/A	False = HIGH, True = LOW
Ch 1 Alarm 1 On Delay	43003	3	N/A	Activation delay in seconds
Ch 1 Alarm 1 Off Delay	43004	3	N/A	Deactivation delay in minutes
Ch 1 Alarm 1 Hysteresis	43005	3	N/A	Percent of scale
Ch 1 Alarm 2 Latch	43011	3	N/A	False = NO, True = YES
Ch 1 Alarm 2 Trip	43012	3	N/A	False = HIGH, True = LOW
Ch 1 Alarm 2 On Delay	43013	3	N/A	Activation delay in seconds
Ch 1 Alarm 2 Off Delay	43014	3	N/A	Deactivation delay in minutes
Ch 1 Alarm 2 Hysteresis	43015	3	N/A	Percent of scale
Ch 1 Alarm 2 Color	43016	3	N/A	TBD
Ch 1 Alarm 3 Latch	43021	3	N/A	False = NO, True = YES
Ch 1 Alarm 3 Trip	43022	3	N/A	False = HIGH, True = LOW
Ch 1 Alarm 3 On Delay	43023	3	N/A	Activation delay in seconds
Ch 1 Alarm 3 Off Delay	43024	3	N/A	Deactivation delay in minutes
Ch 1 Alarm 3 Hysteresis	43025	3	N/A	Percent of scale
Ch 1 Alarm 3 Color	43026	3	N/A	TBD

Ch 1 Alarm 3 Enabled	43027	3	N/A	False = NO, True = YES
Ch 1 Data From	43031	3	N/A	Selection
Ch 1 Min Raw	43032	3	N/A	Binary (800)
Ch 1 Max Raw	43033	3	N/A	Binary (4000)
Ch 1 Remote ID	43034	3	N/A	Binary
Ch 1 Interface	43035	3	N/A	Binary
Ch 1 Byte Order	43036	3	N/A	Byte order
Ch 1 Alias	43037	3	N/A	Binary, 32 bit, 2x
Ch 1 IP Address	43039	3	N/A	Binary, 4x unsigned bytes
Ch 1 Port	43041	3	N/A	Binary, 32 bit, 2x
Ch 1 Remote Sensor	43043	3	N/A	Binary
Ch 1 DP	43079	3	N/A	Number of decimal points
Ch 1 Enable	43080	3	N/A	False = NO, True = YES
Ch 1 Deadband	43081	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Marker Enable	43083	3	N/A	False = NO, True = YES
Ch 1 Marker Percent	43084	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Marker Info	43086	3	N/A	6 ASCII characters
Ch 1 Marker Life	43089	3	N/A	Binary
Ch 1 Filter Count	43090	3	N/A	Binary, 0 to 60
Ch 1 Radio Reg	43091	3	N/A	Binary
Ch 1 Coefficient	43092	3	N/A	Binary
Ch 1 Bridge Voltage	43093	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Balance	43095	3	N/A	Binary
Ch 1 Heater Enable	43096	3	N/A	False = NO, True = YES
Ch 1 Heater Setpoint	43097	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Temp Comp -40	43099	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 1 Temp Comp -30	43103	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 1 Temp Comp -20	43107	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 1 Temp Comp -10	43111	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 1 Temp Comp 0	43115	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 1 Temp Comp +10	43119	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 1 Temp Comp +20	43123	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 1 Temp Comp +30	43127	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 1 Temp Comp +40	43131	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 1 Temp Comp +50	43135	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 1 Temp Comp +60	43139	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 1 Sensor Type	43143	3	N/A	TBD
Ch 1 Send Sensor Life	43144	3	N/A	False = NO, True = YES
Ch 1 Cal mA Setting	43145	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 1 Local Cal	43147	3	N/A	False = NO, True = YES

Ch 1 AI Range	43148	3	N/A	TBD
Ch 2 Alarm 1 Latch	43201	3	N/A	False = NO, True = YES
Ch 2 Alarm 1 Trip	43202	3	N/A	False = HIGH, True = LOW
Ch 2 Alarm 1 On Delay	43203	3	N/A	Activation delay in seconds
Ch 2 Alarm 1 Off Delay	43204	3	N/A	Deactivation delay in minutes
Ch 2 Alarm 1 Hysteresis	43205	3	N/A	Percent of scale
Ch 2 Alarm 2 Latch	43211	3	N/A	False = NO, True = YES
Ch 2 Alarm 2 Trip	43212	3	N/A	False = HIGH, True = LOW
Ch 2 Alarm 2 On Delay	43213	3	N/A	Activation delay in seconds
Ch 2 Alarm 2 Off Delay	43214	3	N/A	Deactivation delay in minutes
Ch 2 Alarm 2 Hysteresis	43215	3	N/A	Percent of scale
Ch 2 Alarm 2 Color	43216	3	N/A	TBD
Ch 2 Alarm 3 Latch	43221	3	N/A	False = NO, True = YES
Ch 2 Alarm 3 Trip	43222	3	N/A	False = HIGH, True = LOW
Ch 2 Alarm 3 On Delay	43223	3	N/A	Activation delay in seconds
Ch 2 Alarm 3 Off Delay	43224	3	N/A	Deactivation delay in minutes
Ch 2 Alarm 3 Hysteresis	43225	3	N/A	Percent of scale
Ch 2 Alarm 3 Color	43226	3	N/A	TBD
Ch 2 Alarm 3 Enabled	43227	3	N/A	False = NO, True = YES
Ch 2 Data From	43231	3	N/A	Selection
Ch 2 Min Raw	43232	3	N/A	Binary (800)
Ch 2 Max Raw	43233	3	N/A	Binary (4000)
Ch 2 Remote ID	43234	3	N/A	Binary
Ch 2 Interface	43235	3	N/A	Binary
Ch 2 Byte Order	43236	3	N/A	Byte order
Ch 2 Alias	43237	3	N/A	Binary, 32 bit, 2x
Ch 2 IP Address	43239	3	N/A	Binary, 4x unsigned bytes
Ch 2 Port	43241	3	N/A	Binary, 32 bit, 2x
Ch 2 Remote Sensor	43243	3	N/A	Binary
Ch 2 DP	43279	3	N/A	Number of decimal points
Ch 2 Enable	43280	3	N/A	False = NO, True = YES
Ch 2 Deadband	43281	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Marker Enable	43283	3	N/A	False = NO, True = YES
Ch 2 Marker Percent	43284	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Marker Info	43286	3	N/A	6 ASCII characters
Ch 2 Marker Life	43289	3	N/A	Binary
Ch 2 Filter Count	43290	3	N/A	Binary, 0 to 60
Ch 2 Radio Reg	43291	3	N/A	Binary
Ch 2 Coefficient	43292	3	N/A	Binary

Ch 2 Bridge Voltage	43293	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Balance	43295	3	N/A	Binary
Ch 2 Heater Enable	43296	3	N/A	False = NO, True = YES
Ch 2 Heater Setpoint	43297	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Temp Comp -40	43299	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 2 Temp Comp -30	43303	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 2 Temp Comp -20	43307	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 2 Temp Comp -10	43311	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 2 Temp Comp 0	43315	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 2 Temp Comp +10	43319	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 2 Temp Comp +20	43323	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 2 Temp Comp +30	43327	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 2 Temp Comp +40	43331	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 2 Temp Comp +50	43335	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 2 Temp Comp +60	43339	3	N/A	32 bit FP Gain, 32 bit FP Offset
Ch 2 Sensor Type	43343	3	N/A	TBD
Ch 2 Send Sensor Life	43344	3	N/A	False = NO, True = YES
Ch 2 Cal mA Setting	43345	3	N/A	Modbus 32 bit IEEE 754 Floating Pt
Ch 2 Local Cal	43347	3	N/A	False = NO, True = YES
Ch 2 AI Range	43348	3	N/A	TBD
				Registers 45001-45022 added in V1.03
Ch 1 Value	45001	3	N/A	800 = "0", 4000 = Full Scale
Ch 2 Value	45002	3	N/A	800 = "0", 4000 = Full Scale
Ch 1 Value	45003/04	3	N/A	MODBUS 32 bit floating point
Ch 2 Value	45005/06	3	N/A	MODBUS 32 bit floating point
Ch 1 Alarm 1 Status	45007	3	N/A	"1" = Fault
Ch 1 Alarm 2 Status	45008	3	N/A	"1" = Fault
Ch 1 Alarm 3 Status	45009	3	N/A	"1" = Fault
Ch 1 Fault Status	45010	3	N/A	"1" = Fault
Ch 2 Alarm 1 Status	45011	3	N/A	"1" = Fault
Ch 2 Alarm 2 Status	45012	3	N/A	"1" = Fault
Ch 2 Alarm 3 Status	45013	3	N/A	"1" = Fault
Ch 2 Fault Status	45014	3	N/A	"1" = Fault
Ch 1 Sensor Life	45015	3	N/A	0-100 binary
Ch 2 Sensor Life	45016	3	N/A	0-100 binary
Ch 1 Sensor Temp	45017	3	N/A	Binary 0 - 4095
Ch2 Sensor Temp	45018	3	N/A	Binary 0 - 4095
Ch 1 Sensor Temp	45019/20	3	N/A	MODBUS 32 bit floating point
Ch 2 Sensor Temp	45021/22	3	N/A	MODBUS 32 bit floating point

10 SPECIFICATIONS

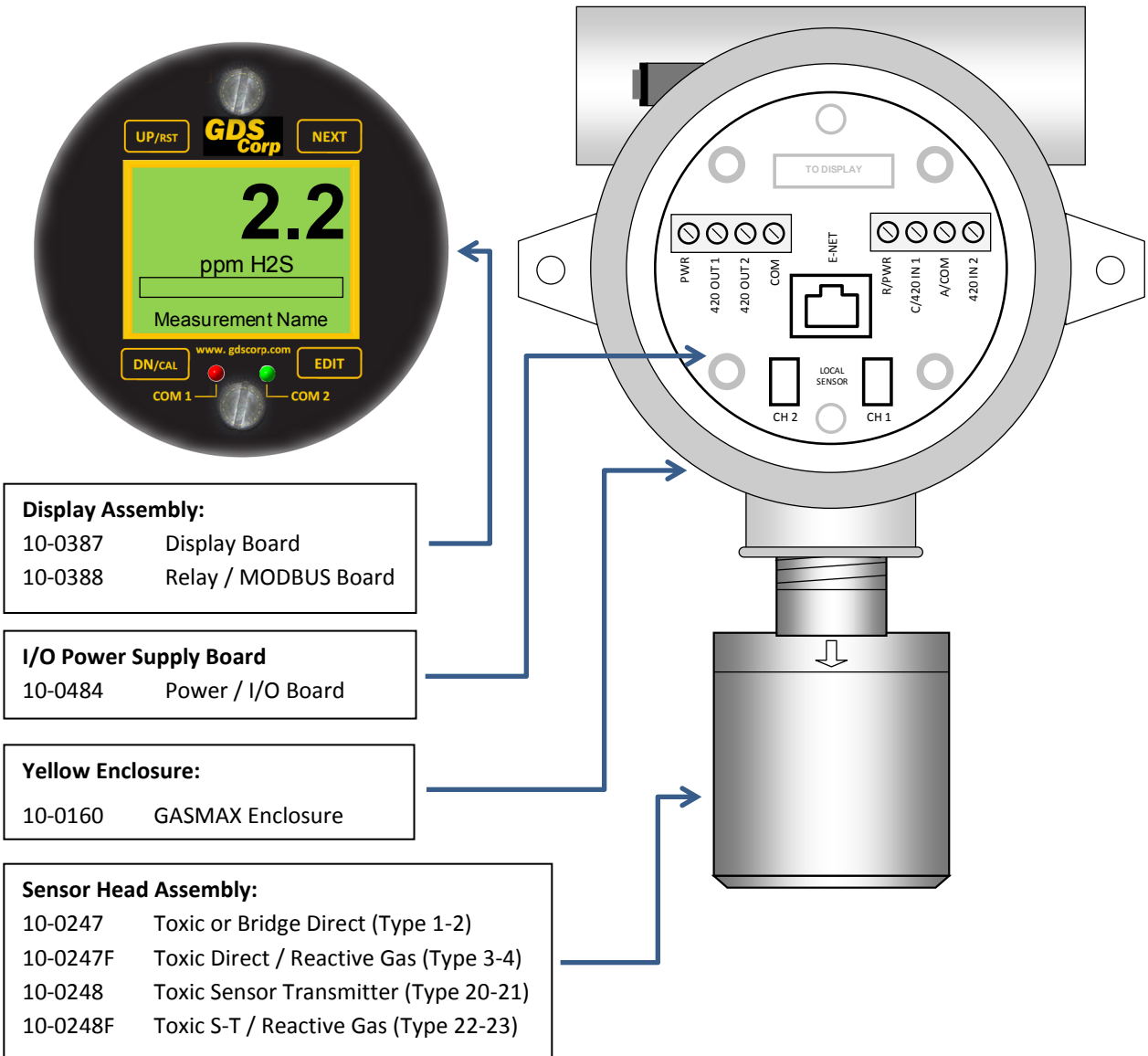|	
Model	GASMAX CX Single / Dual Channel Gas Monitor
Power Input	10-30VDC at < 10 watts with relay board. Additional power required for Extended Temp & GDS-IR option.
Display	Full color LCD with engineering units, bargraph and 30-minute trend
Channel One Input	Digital input for GDS Corp 10-98xx Smart Toxic Sensors Bridge input for GDS Corp 10-98xx Catalytic Bead, SmartIR or PID sensors Analog 4-20mA input
Channel Two Input	Digital input for GDS Corp 10-98xx Smart Toxic Sensors Analog 4-20mA input
Accuracy	+/- 5% of full scale (typical)
Standard Output	Dual three-wire 4-20mA current source outputs with fault and overrange indication. Maximum loop resistance is 750 ohms with standard 24VDC supply
Optional Output	Relay / MODBUS interface with 4x 5A SPDT programmable alarm relays Dual channel MODBUS interface
Temperature	Electronics -40°C to +60°C. See Sensor Manual for additional details
Memory	On-board non-volatile memory retains all user settings
Housing	Aluminum housing with epoxy paint standard; #316 stainless steel optional One ¾" NPT female connection for local sensor head Two ¾" NPT female connections for conduit or cable glands
Dimensions	Width 5.4" (137 mm), Height 8" (203 mm), Depth 5" (127 mm) Shipping weight 6.5 pounds (3 kg)
Approvals	CSA Certified Division 1 & 2 Groups B, C, D. Suitable for explosion-proof installations with flame arrestor
Warranty	Two years on electronics, one year on sensor

11 SPARE PARTS

Display Assembly:
10-0387   Display Board
10-0388   Relay / MODBUS Board

I/O Power Supply Board
10-0484   Power / I/O Board

Yellow Enclosure:
10-0160   GASMAX Enclosure

Sensor Head Assembly:
10-0247   Toxic or Bridge Direct (Type 1-2)
10-0247F   Toxic Direct / Reactive Gas (Type 3-4)
10-0248   Toxic Sensor Transmitter (Type 20-21)
10-0248F   Toxic S-T / Reactive Gas (Type 22-23)

Figure 11-1: GASMAX CX + Local Sensor Spare Parts

Sensor Head Assembly (See list above):

Sensor Head Base

Sensor:

10-98xx (Toxic, combustible, SmartIR, PID)

Sensor Head Cover
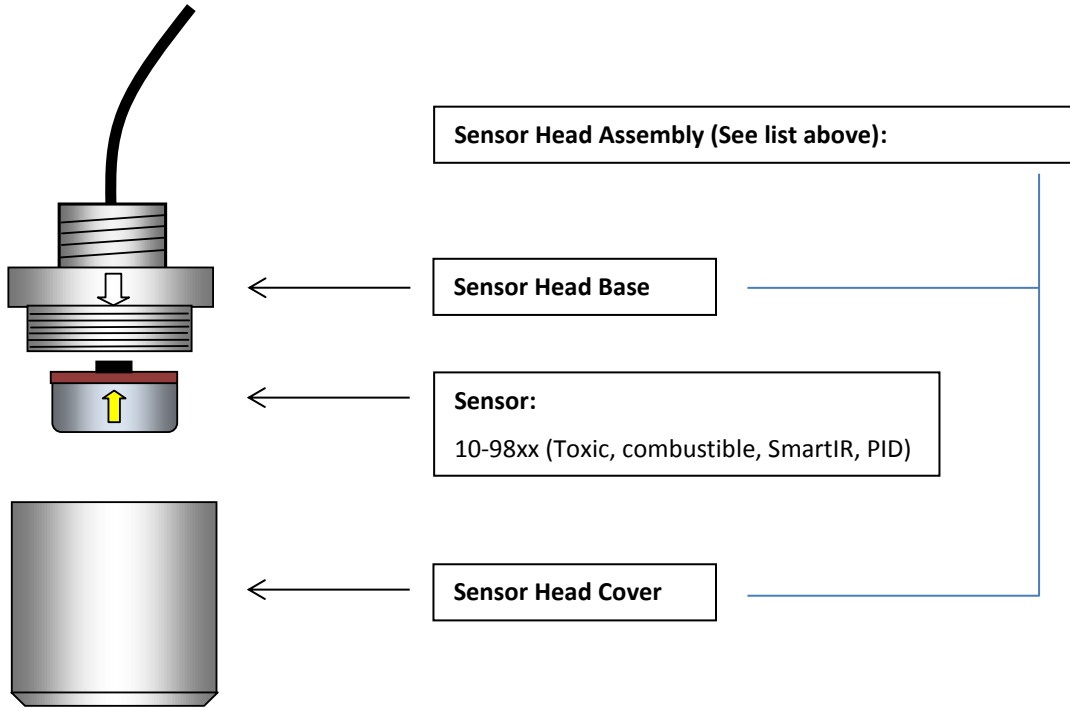
Figure 11-2: GASMAX Sensor Head

SENSOR HEAD ACCESSORIES

Sensor Head Splash Guard

10-0198   Splash Guard (Fits all sensor heads

Sensor Head Flow Cell

10-0205   Flow Cell (1/8" NPT compression fittings)

Splash Guard
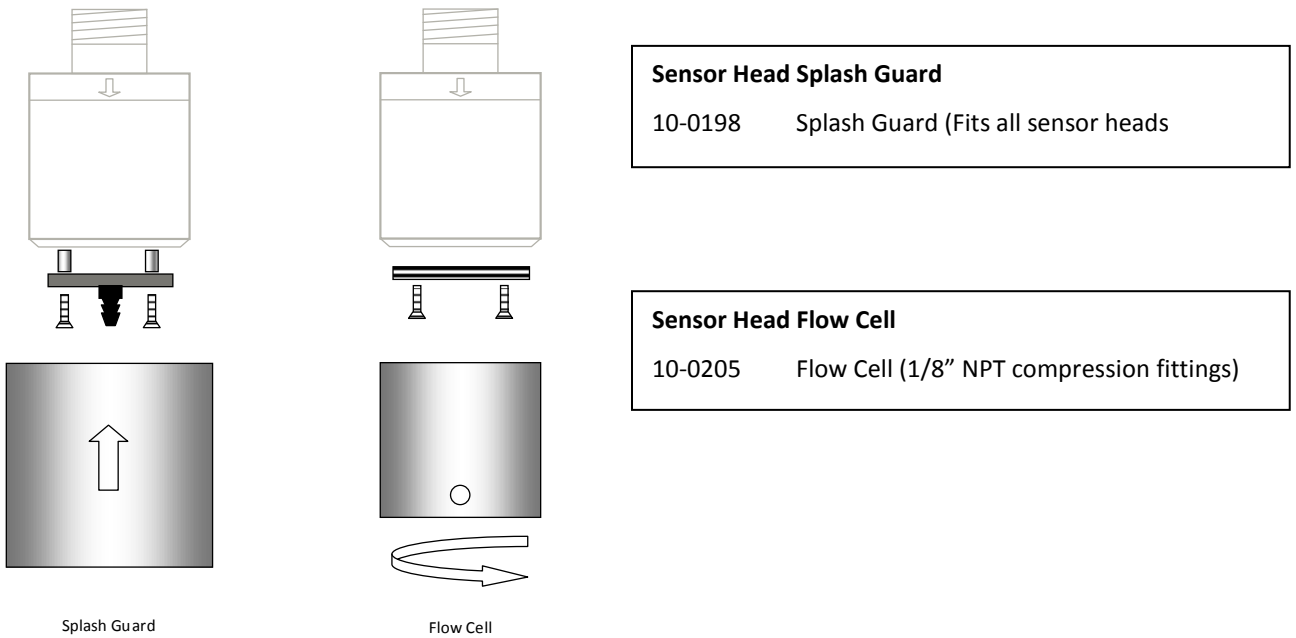
Flow Cell

Figure 11-3: GASMAX Sensor Head Splash Guard & Flow Cell
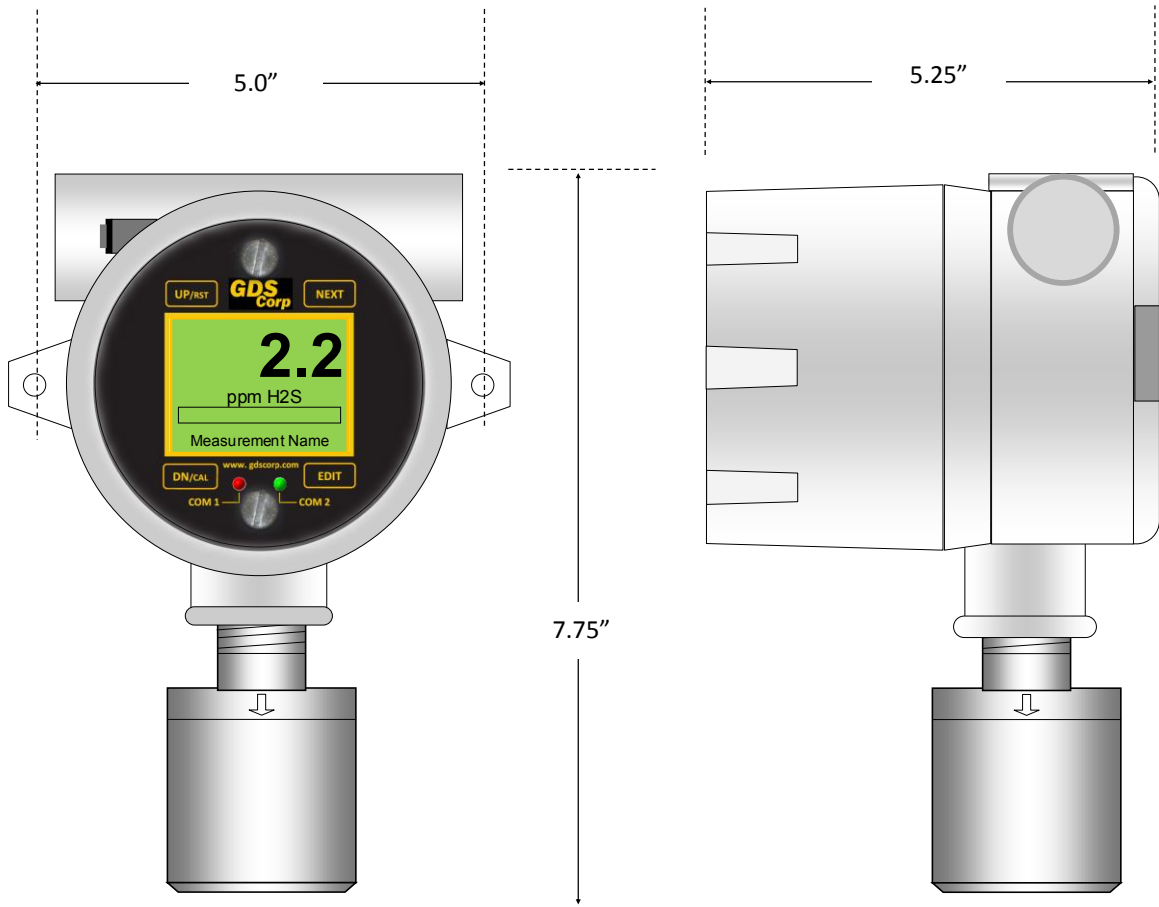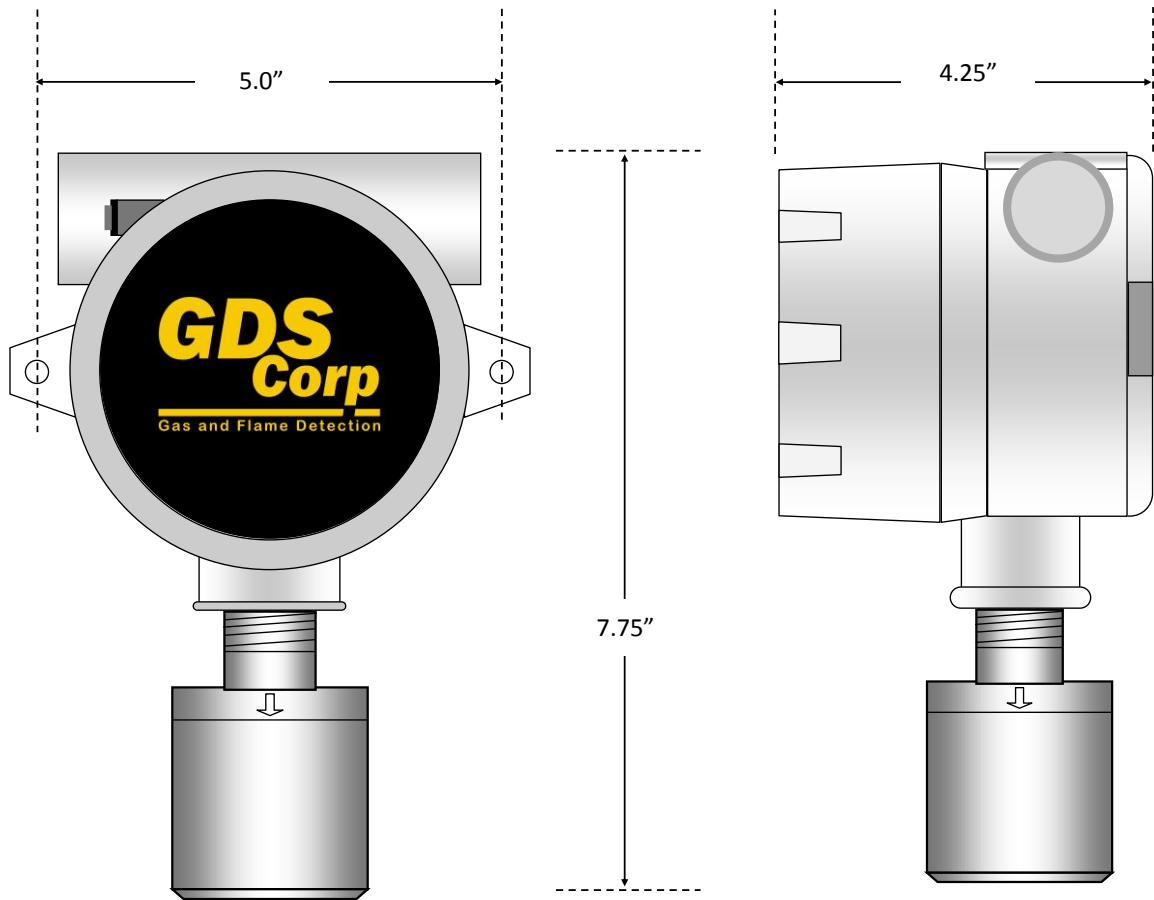
12 DRAWINGS AND DIMENSIONS

Figure 12-1 GASMAX CX DIMENSIONS

5.0"

4.25"

7.75"

Figure 12-2 GASMAX CX REMOTE SENSOR TRANSMITTER DIMENSIONS

GDS Corp

Gas and Flame Detection

GDS Corp.
1245 Butler Road • League City, TX   77573
409-927-2980 • 409-927-4180 (Fax) • ww.gdscorp.com