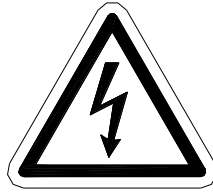# Operation and Maintenance Manual

PROTECTOR P8XA Eight Channel System Controller
PRELIMINARY RELEASE

GDS Corp.

1245 Butler Road • League City, TX 77573

409-927-2980 • 409-927-4180 (Fax) • www.gdscorp.com

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   2/25/24 Initial Release

CONTENTS

TABLE OF FIGURES

1   SAFETY INFORMATION

Important – Read Before Installation

Users should have a detailed understanding of *PROTECTOR P8XA* System Controller operating and maintenance instructions. Use the *PROTECTOR P8XA* System Controller 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

- The *PROTECTOR P8XA* System Controller 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 *PROTECTOR P8XA* System Controller is suitable for the intended use.
- Do not paint controller assembly.
- Do not operate the *PROTECTOR P8XA* System Controller 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 *PROTECTOR P8XA* System Controller to electrical shock or continuous severe mechanical shock. Protect *PROTECTOR P8XA* System Controller from dripping liquids and high-power sprays.
- Periodically evaluate controller and gas detectors for correct end-to-end operation of the system's alarm events.

WARRANTY

GDS Corp. 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   OVERVIEW

The GDS Corp *PROTECTOR P8XA* System Controller is designed to provide power for and monitor gas values from one to eight wired gas monitors via industry-standard 4-20mA analog inputs.

The *PROTECTOR P8XA* features a 4.3" diagonal high-contrast, sunlight-readable color LCD display that provides immediate feedback on alarm status and input values.

The *PROTECTOR P8XA* includes six programmable SDPT dry-contract alarm relays that support channel grouping, alarm source selection, voting and normal or FAILSAFE operation. When latched, the RESET / ESC button can be used to clear the latched alarm.

Key features include:

- Easy to use, intuitive touch-screen user interface.

- Standard eight analog inputs with ground and excitation terminals.

- Standard two or optional four analog outputs (6 total).

- Color coded, graphical display of input value and alarm status.

- Standard 50-watt power supply; 40 watts available to power remote sensors.

- Four (4) SPDT dry-contact alarm relays plus two wet-contact dedicated relays for local strobe and horn.

- Alarm relay configuration supports voting, channel grouping and normal or FAILSAFE operation.

3   INSTALLATION

COMPONENT LAYOUT

The P8XA controller is designed to monitor up to 8 industry-standard 4-20mA analog input channels. In addition, the P8XA features either two or six analog output channels and inputs for auxiliary / remote Alarm Acknowledge normally open buttons.

The hardware layout is shown below. If installed, the AC power supply is in the upper right corner of the enclosure. The Analog Input module and (optional) Analog Output module is in the lower right side of the enclosure as shown.
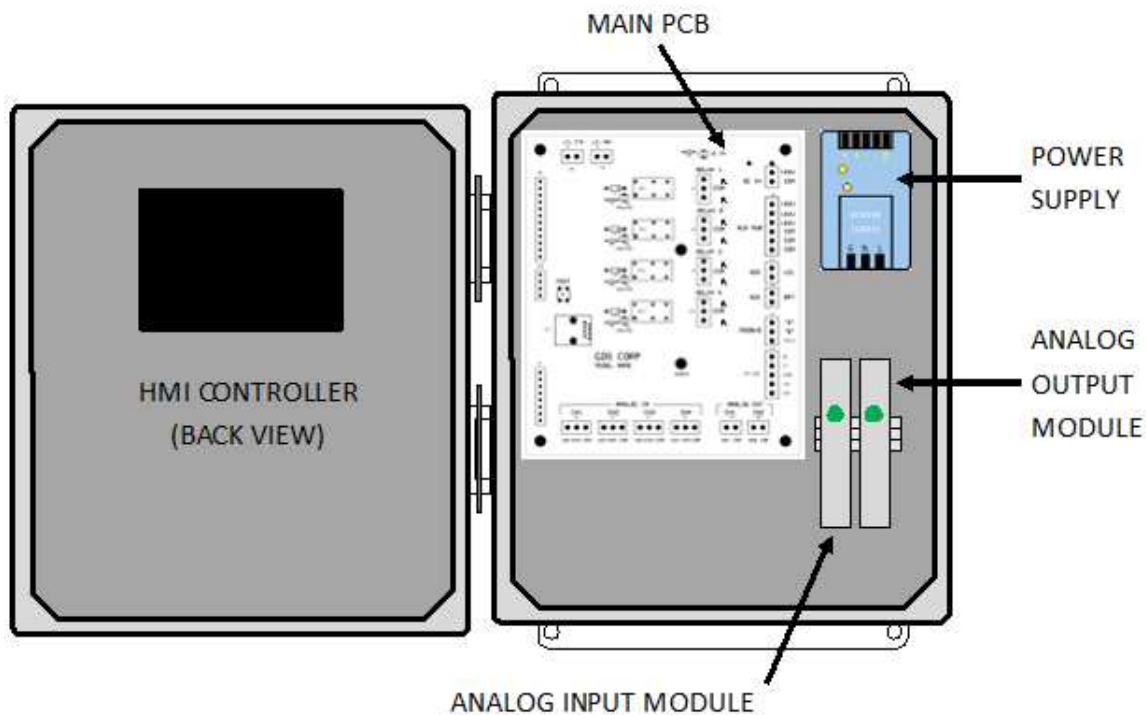

Figure 3-1: P8XA Component Layout

POWER INPUT CONNECTION

When using the optional AC power supply, the *PROTECTOR P8XA* is designed to operate on a clean source of 110VAC / 60 HZ or 220VAC / 50 Hz power. Up to 40 watts of power is available at the AUX PWR outputs.
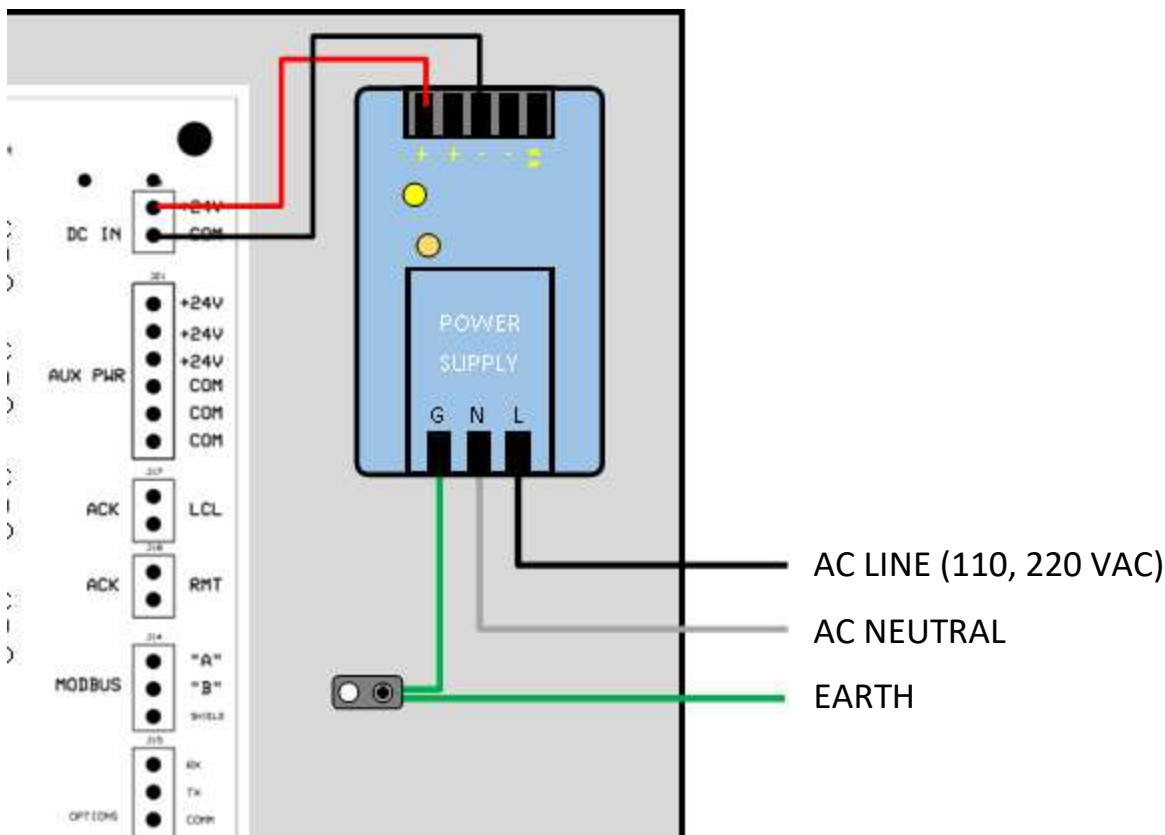
Figure 3-2: AC Power Supply Connections

The AC input is located on the lower front of the power supply (see figure above). **The AC ground conductor must be connected to the GROUND LUG provided on the back panel**. The power supply accepts either 110 or 220VAC and does not require settings changes.

The Protector P8XA can also be powered directly from a source of DC voltage **between +22VDC and +26VDC.** GDS Corp always recommends that DC power be provided by an Uninterruptable Power Supply (UPS) to ensure a clean and reliable power source. Even short interruptions can result in system startup delay and the need for gas sensors to reestablish their equilibrium and come back on-line.

NOTE: TO ENSURE USER SAFETY, ALWAYS PROVIDE A SOLID EARTH GROUND CONNECTION AS SHOWN BELOW.
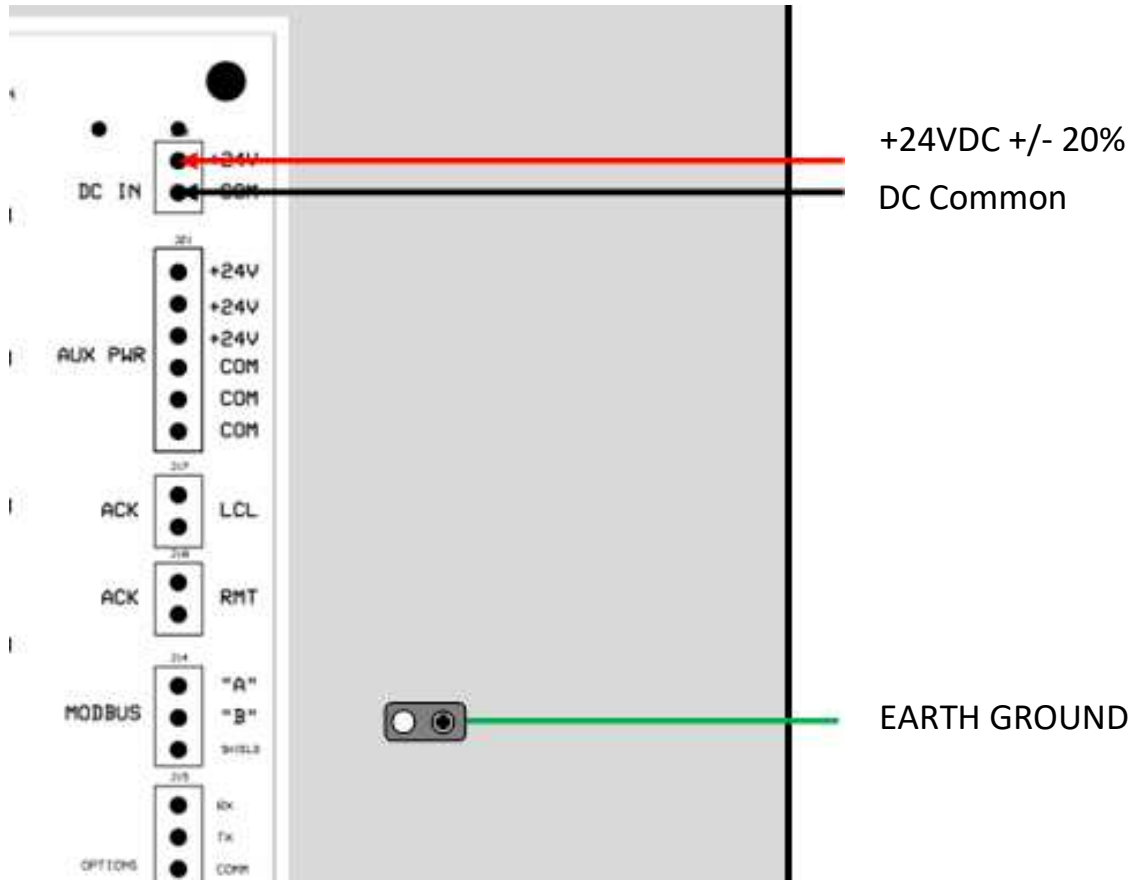
Figure 3-3: DC Power Connections

SIGNAL & RELAY CONNECTIONS

The P8XA back panel PCB hosts all the signal & relay inputs and outputs. Note that the four analog inputs along the bottom of the PCB are DISABLED in the P8XA configuration. However, these do provide convenient sources of +24V for remote gas detectors or powered sensors. Additional terminals for +24V are located at the AUX PWR outputs.
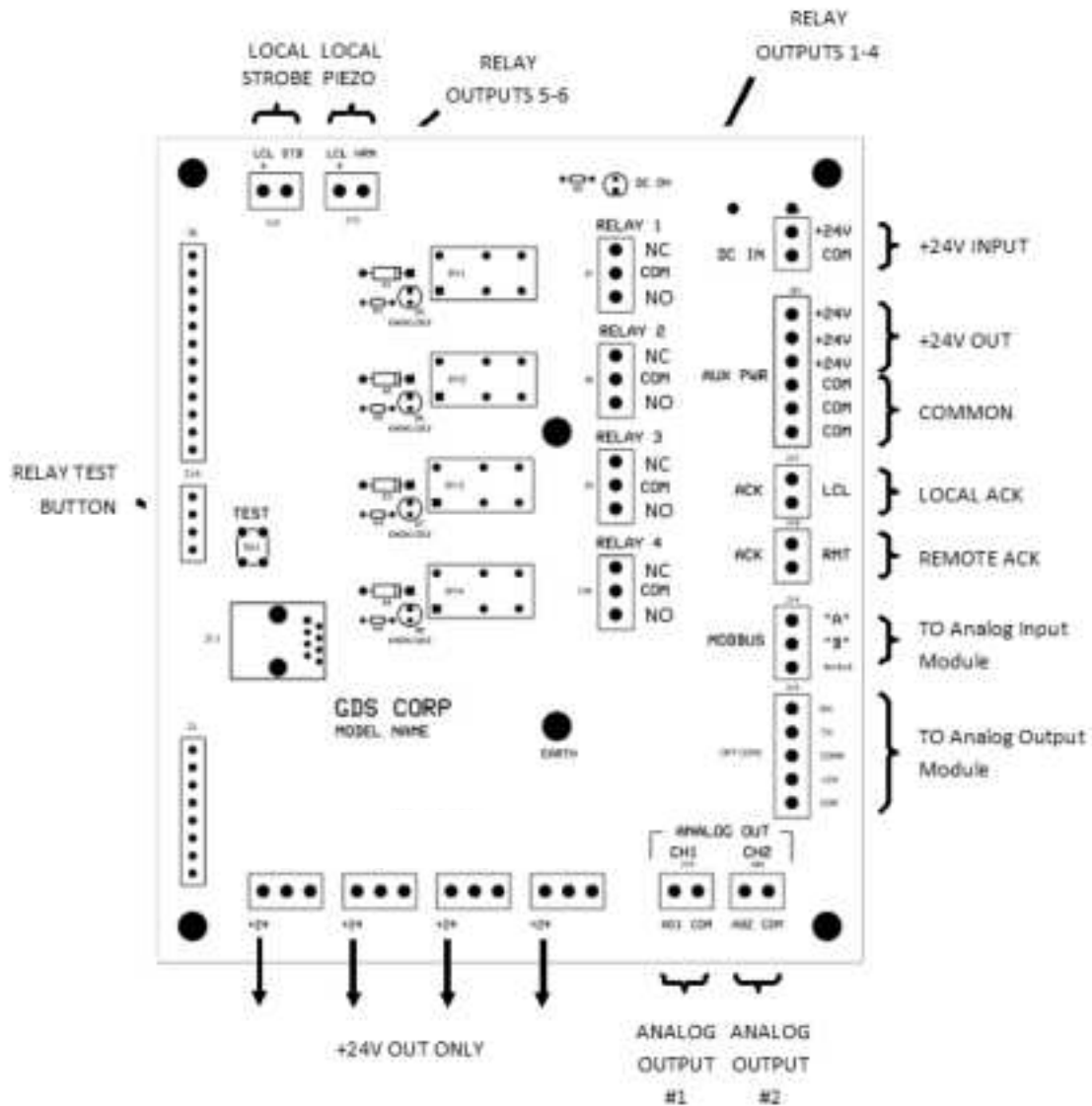
Figure 3-4: P8XA Signal & Relay Connections

ANALOG INPUT CONNECTIONS

The eight analog input terminals are located along the top of the ANALOG INPUT MODULE. Each input covers the full range of 0-20mA, allowing the P8XA to recognize problems with remote sensors that use "less than 4.0 mA" fault values to indicate trouble.

A total of 40 watts of DC power is available for remote sensors.

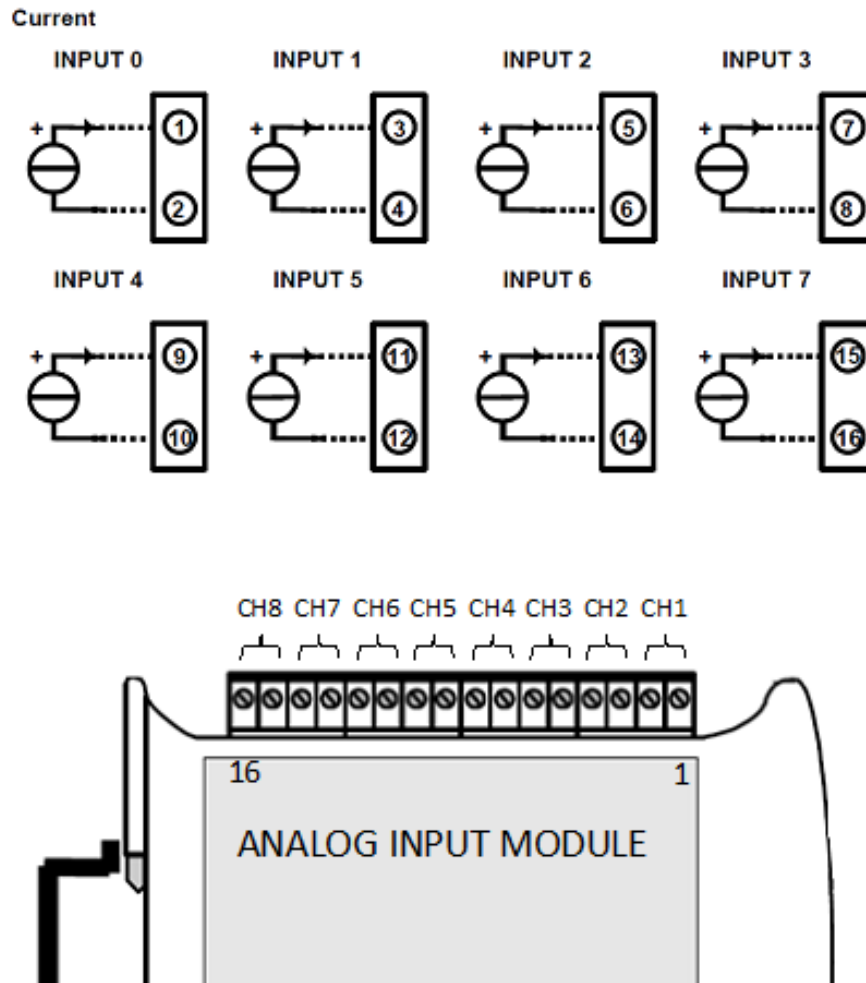**Figure 3-5: P8XA Analog Input Connections**

Most remote sensors require a source of +24VDC to operate. The P8XA provides four terminals for +24V along the bottom of the PCB and an additional three in the AUX POWER terminals located at the upper right side of the main PCB.

To connect a remote DC-powered 4-20mA output sensor, see example below for Channel 1.
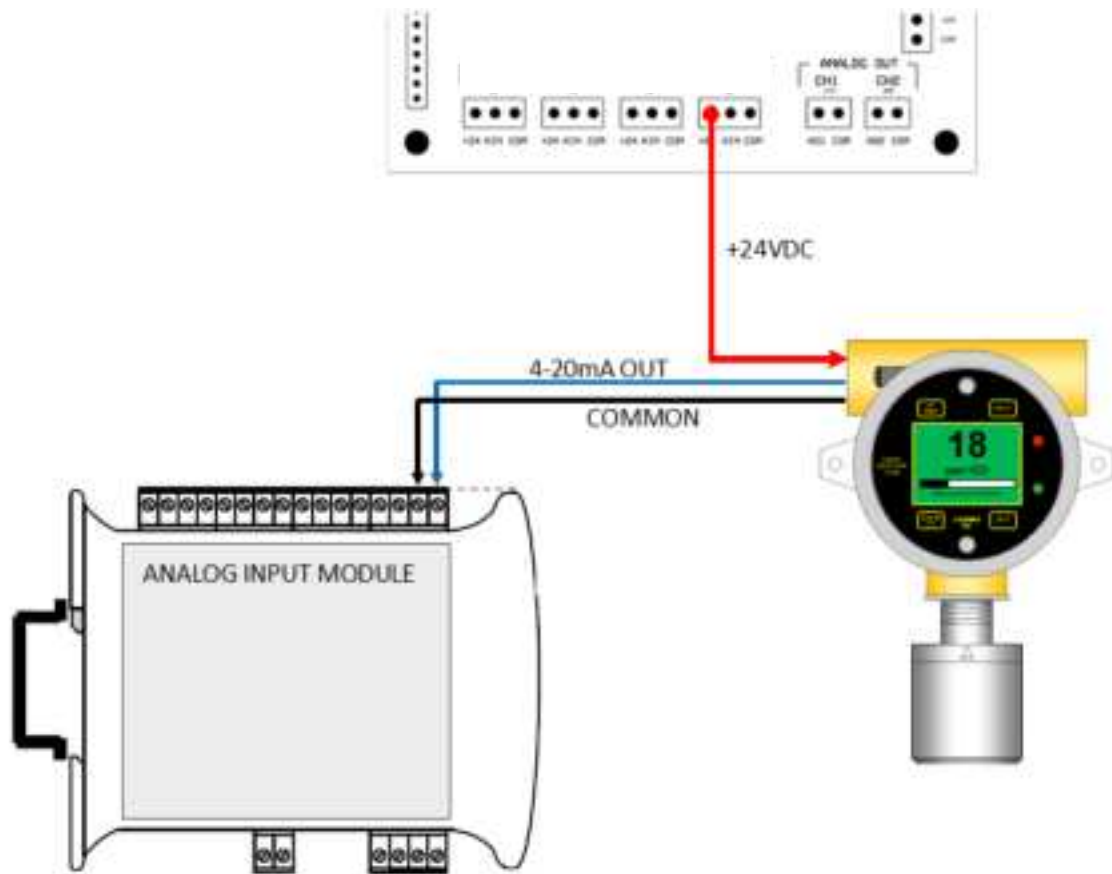

Figure 3-6: Example Sensor Connection (Channel 1)

LOCAL ANALOG OUTPUTs

The Protector P8XA provides two standard non-isolated 4-20mA outputs that can be associated with channels 5-8. See the Analog Out screen for more information.

Pressing the MA1 or MA2 Override button on the DIAGNOSTICS screen will force the associated output to 12 mA (1/2 scale) for testing and verification purposes.

NOTE: THE TWO LOCAL ANALOG OUTPUT PORTS SUPPORT THE FULL 4-20MA OUTPUT RANGE BUT CANNOT PROVIDE REMOTE FAULT WARNINGS BY TRANSMITTING VALUES BELOW 4.0 MA.

NOTE: PRESSING THE OVERRIDE BUTTON CAN TRANSMIT ALARM SIGNALS TO MONITORING DEVICES! USE CAUTION WHEN ACTIVATING THE OVERRIDE FUNCTION.
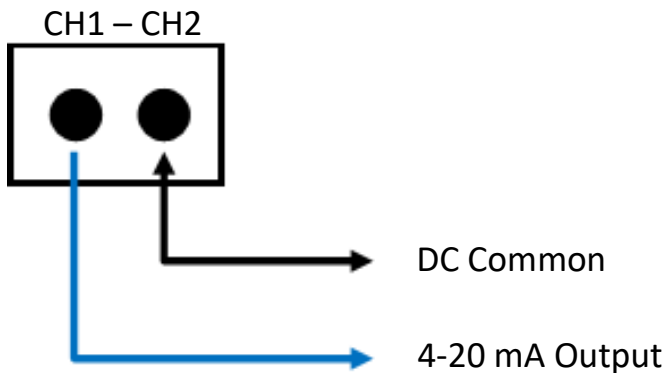
CH1 – CH2

DC Common

4-20 mA Output

Figure 3-7: Local Analog Output Wiring

RELAY OUTPUT CONNECTIONS 1-4

The *PROTECTOR P8XA* has four dry-contact five-amp (5A) alarm relays that are wired to provide NORMALLY OPEN and NORMALLY CLOSED contacts. When not energized, the COMMON terminal is connected to the NORMALLY CLOSED contact. When the relay is energized, the COMMON terminal is connected to the NORMALLY OPEN terminal.

All relays can be used in both NORMAL and FAILSAFE mode. In NORMAL mode, the relay is in the non-energized state until an alarm occurs, and then is energized while the alarm is present. In the FAILSAFE mode, the relay is energized when no alarm is present, and becomes de-energized while an alarm is occurring. FAILSAFE mode allows the remote monitoring device to detect power failures or wiring failures in addition to gas alarms.

All relays are isolated from the DC supply and are isolated from each other.
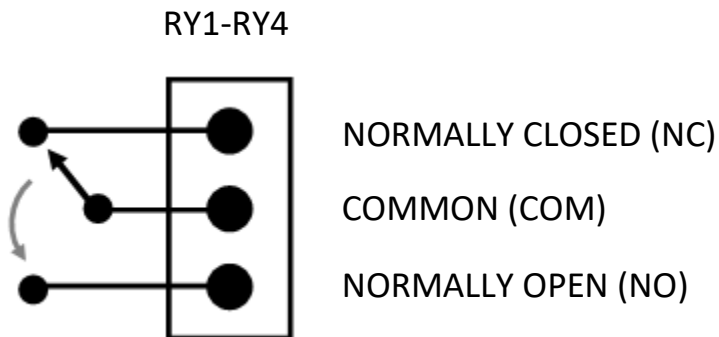
RY1-RY4

NORMALLY CLOSED (NC)

COMMON (COM)

NORMALLY OPEN (NO)

Figure 3-8: Alarm Relay 1-4 Wiring

NOTE: RELAYS ARE RATED <u>FOR 5A NON-INDUCTIVE LOADS ONLY.</u> WHEN OPERATING DC INDUCTIVE LOADS SUCH AS RELAYS OR DIRECT CURRENT MOTORS, ALWAYS CONNECT AN APPROPRIATELY SIZED REVERSE VOLTAGE PROTECTION "SNUBBER" DIODE ACROSS THE TERMINALS OF THE LOAD TO PROTECT THE RELAY FROM TRANSIENT VOLTAGE SPIKES THAT OCCUR WHEN THE RELAY OPENS UNDER LOAD.

RELAY OUTPUT CONNECTIONS 5-6

The *PROTECTOR P8XA* has two wet-contact alarm relays that are wired to provide switched +24V to local strobes or piezo buzzers. Output current is limited to 500 mA (12 watts) per output.

These outputs are designed to drive local devices but can be used to drive remote DC resistive or inductive loads so long as their current requirements do not exceed the specified 500 mA limitation. If driving an inductive load, always install a reverse voltage protection diode between the +24 and common leads to protect the internal relay from transient voltage spikes that occur when the relay opens under load.
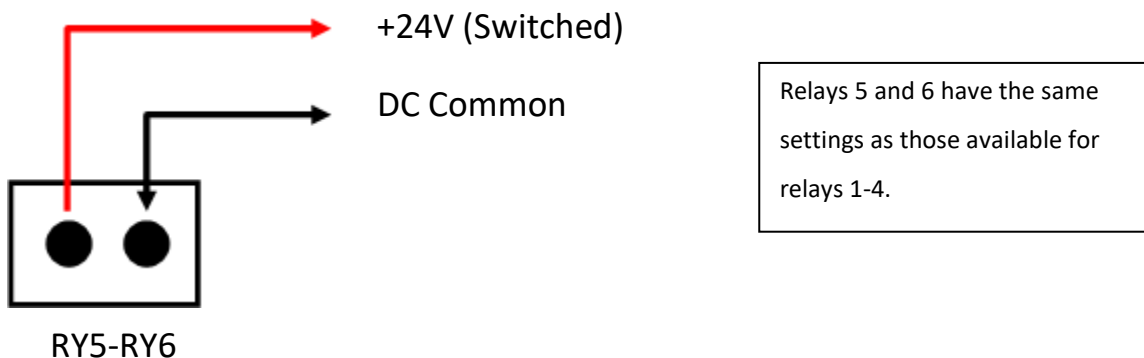
+24V (Switched)

DC Common

Relays 5 and 6 have the same settings as those available for relays 1-4.

RY5-RY6

Figure 3-9: Alarm Relay 5-6 Wiring

REMOTE ACKNOWLEDGE

The *PROTECTOR P8XA* supports a remote Alarm Acknowledge pushbutton that can be installed up to 100 ft from the enclosure. The button should be MOMENTARY, NORMALLY OPEN (see diagram). In electrically noisy environments, GDS Corp recommends running shielded wiring in metallic conduit for maximum reliability.

ACK - RMT
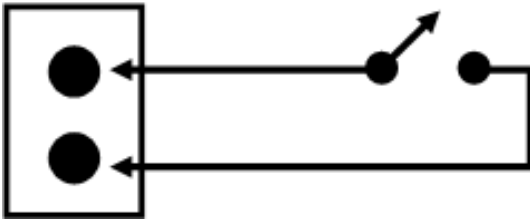
If the ACK - LCL input is not connected to an ACK button on the case, it may be used as an additional Acknowledge input

Figure 3-10: Remote Alarm ACK Interface

ISOLATED 4-20MA OUTPUTS

The *PROTECTOR P8XA* can be configured to include an optional four-channel 4-20mA isolated analog output module. If installed, each output will mirror the incoming 4-20mA signal on corresponding channels 1, 2, 3 and 4. The four-channel output module, if installed, is located on the lower right side of the enclosure. Access to the analog output high and low signals are as shown below:
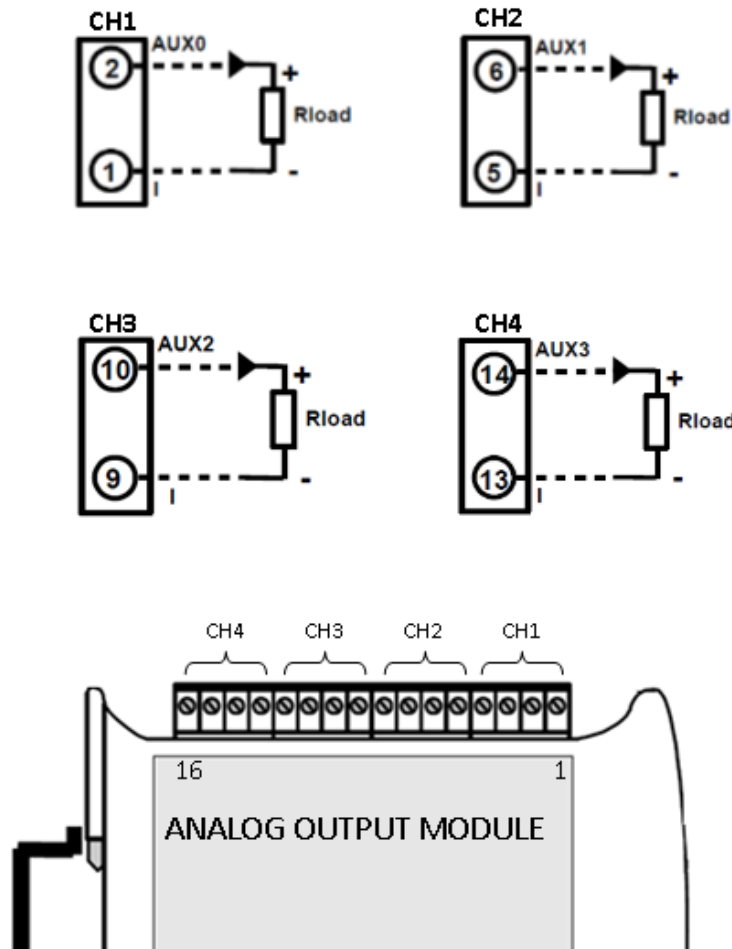

Figure 3-11: Isolated Analog Outputs

NOTE: THE FOUR ISOLATED ANALOG OUTPUT PORTS SUPPORT THE FULL 0-20MA OUTPUT RANGE AND SO CAN PROVIDE REMOTE FAULT WARNINGS BY TRANSMITTING VALUES BELOW 4.0 MA.

4   PROGRAMMING & SETUP

PROTECTOR P8XA SYSTEM CONTROLLER PROGRAMMING

After installation, unless the *PROTECTOR P8XA* System Controller has been pre-programmed for the specific application, each channel must be individually programmed to support the connected sensors. Programmable settings include channel enable / disable, full scale range, engineering units, filtering, alarm levels and more.

Channels are programmed using the CHANNEL CONFIGURATION MENU, while global settings for the entire controller are programmed using the SYSTEM SETUP MENU detailed later in this chapter.

After power-up, the *PROTECTOR P8XA* will display a start-up screen and then switch to the Primary Display.

PRIMARY DISPLAY

After power-up, the PRIMARY DISPLAY screen is activated. Once the mandatory warmup interval is complete, for each channel, the screen shows the channel name, live reading, engineering units and corresponding alarm condition where GREEN = Normal, YELLOW = Alarm 1, RED = Alarm 2, PURPLE = Alarm 3 and GRAY = FAULT or OFF.
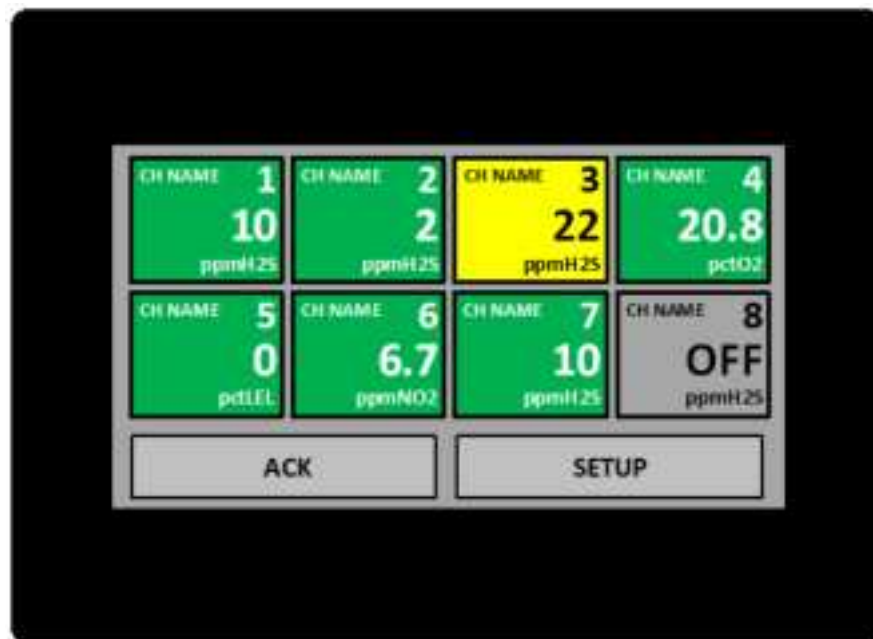

Figure 4-1: Primary Display Screen

At the bottom of the PRIMARY DISPLAY are the **ACK** (Alarm Acknowledge) button and the **SETUP** button. If any channel has exceeded one of its alarm conditions, the displayed value will flash until the ACK button is pressed to acknowledge the alarm.

The ACK button will also silence a horn if configured properly (see section on output relays). Pressing the **SETUP** button will provide access to relay settings, analog output settings, system settings and a DIAGNOSTICS screen that provides convenient ways to evaluate communications with monitoring devices.

Pressing the center of each channel display will move the screen to the associated CHANNEL SETUP screen.

CHANNEL SETUP MENU

After installation, each channel in the *PROTECTOR P8XA* system controller must be programmed to support connected sensors and other devices using the CHANNEL SETUP menu. To access the CHANNEL SETUP menu, press the center of any of the eight channel screens shown on the PRIMARY DISPLAY.
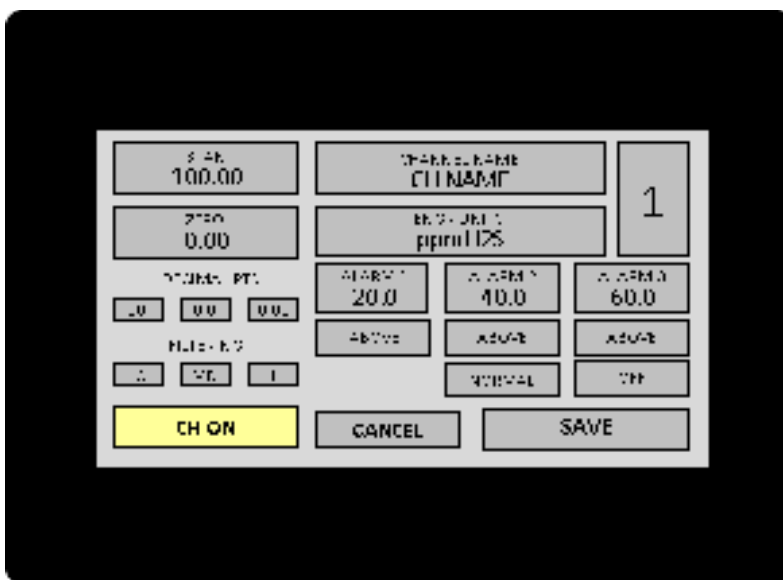

Figure 4-2: Channel Setup Menu

The CHANNEL SETUP menu allows for easy configuration of each of the eight input channels. The channel being edited is shown in the upper right-hand corner.

CHANNEL SETUP MENU		
Name	*Description*	*Default*
Span	Channel full scale value	"100"
Zero	Channel zero value	"0"

Decimal Points	"00." No decimal points (Ranges 0-100 and above) "0.0" One decimal point (Ranges 0-10.0 to 0-99.0) ".00" Two decimal points (Ranges 0-1.00 to 0-9.00)	"00."
FILTERING	LO: No filtering MD: Medium filtering HI: Maximum filtering (60 second	LO
Channel Name	Alphanumeric value assigned by user	"CH NAME"
Engineering Units	Alphanumeric value assigned by user	"ppmH2S"
Alarm 1 Value	Alarm 1 User Programmable Value	"20"
Alarm 1 BELOW	BELOW: Alarm if input is BELOW the target value ABOVE: Alarm if input is ABOVE the target value	"ABOVE"
Alarm 2 Value	Alarm 2 User Programmable Value	"40"
Alarm 2 BELOW	BELOW: Alarm if input is BELOW the target value ABOVE: Alarm if input is ABOVE the target value	"ABOVE"
Alarm 2 NORM	NORM: Alarm 2 becomes inactive if alarm condition is no longer present LATCH: Once triggered, Alarm 2 relay remains active until ACK pressed	"NORM"
Alarm 3 Value	Alarm 3 User Programmable Value	"60"
Alarm 3 BELOW	BELOW: Alarm if input is BELOW the target value ABOVE: Alarm if input is ABOVE the target value	"ABOVE"
Alarm 3 OFF	OFF: Alarm 3 not active and alarm value ignored ON: Alarm 3 active	"OFF"
CH ON / OFF	ON: Channel is being monitored for alarm conditions OFF: Channel is inactive	"ON"
CANCEL	Cancels any changes and returns to Channel Detail View	N/A
SAVE	Saves current settings to active channel and returns to Channel Detail View	N/A

SYSTEM SETUP MENU SCREEN

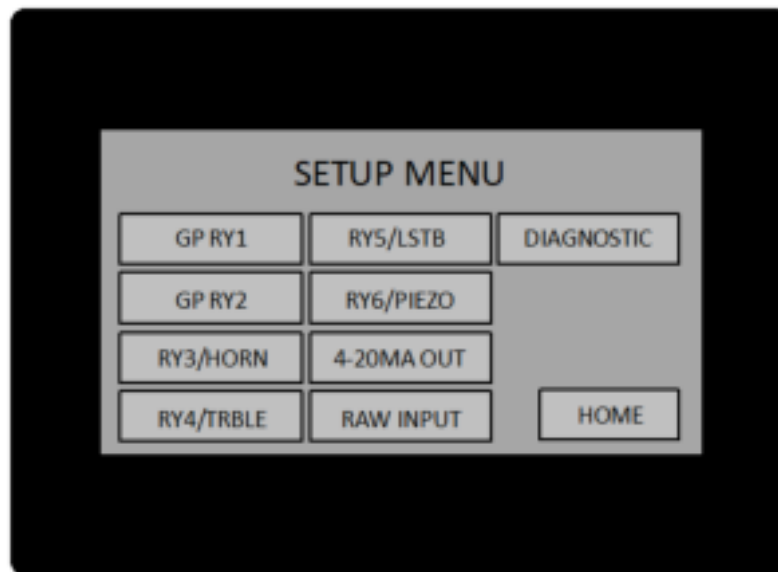The SYSTEM SETUP MENU screen allows the user to select the various system setting menus.

Figure 4-3: SETUP MENU Screen

SYSTEM SETUP MENU		
Name	*Description*	
GP RY1	View the General-Purpose Relay 1 setup screen	
GP RY2	View the General-Purpose Relay 2 setup screen	
RY3 / HORN	View the Relay 3 setup screen. Relay 3 can be configured as either a general-purpose relay or as a dedicated HORN relay	
RY4 / TRBLE	View the Relay 4 setup screen. Relay 4 can be configured as either a general-purpose relay or as a dedicated FAULT relay	
RY5 / LSTB	View the Relay 5 setup screen. Relay 5 is a wet-contact output generally connected to a local +24V strobe	
RY6 / PIEZO	View the Relay 6 setup screen. Relay 6 is a wet-contact output generally connected to a local 24V piezo sounder	
4-20mA OUT	View the Local Analog Output setup screen	
RAW INPUT	View the 'Counts' screen. Counts represent the output from the analog-to-digital (A/D) convert and are useful for troubleshooting	
DIAGNOSTIC	View the Diagnostic screen. The Diagnostic screen allows the user to activate any of the relay outputs or analog outputs for testing. The Diagnostic screen also includes the "Cold Boot" system reset.	

RELAY SETUP SCREENS 1-6

The RELAY SETUP MENU allows the user to program the four dedicated alarm relays and two wet contact dedicated local strobe and horn relays.
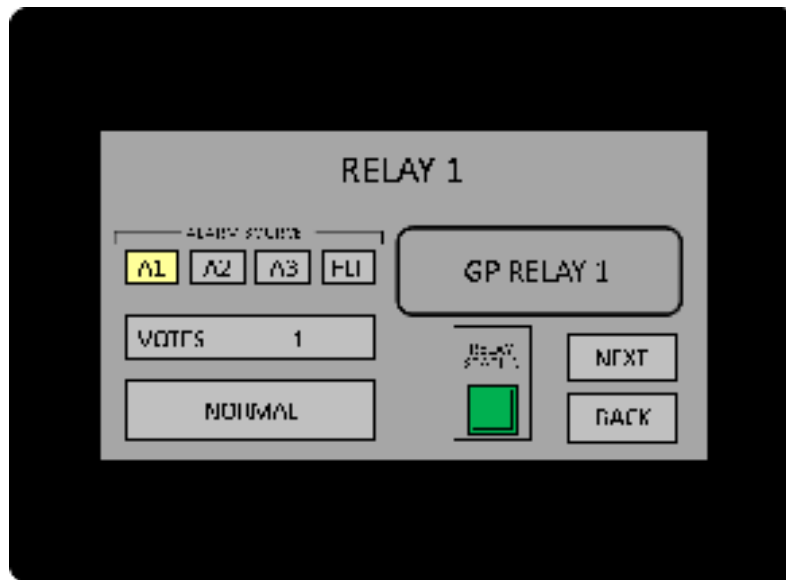

Figure 4-4: Relay Setup Screen

RELAY SETUP MENU		
Name	*Description*	*Default*
ALARM SOURCES	A1: Relay triggers if Alarm 1 is active A2: Relay triggers if Alarm 2 is active A3: Relay triggers if Alarm 3 is enabled and active FLT: Relay triggers if any FAULT is present Note: Only ONE choice is possible	R1, R5 = A1 R2, R6 = A2 R3 = A3 R4 = FLT
VOTES	Number of votes (active channels) that must be active before the relay will become active. For example, if VOTES = 3, at least three channels must be in alarm before the relay will become active.	R1-R6 = 1
LOGIC	NORMAL: Relay is OFF (not energized) with no alarm and ON (energized) when in alarm FAILSAFE: Relay is ON (energized) with no alarm and OFF (not energized) when in alarm	"NORMAL"
HORN	Relay 3 and Relay 6 can be programmed for the HORN function. If set for HORN, then if any channel's Alarm 2 is activated, the relay will also activate and remain active until either 1) the alarm condition is removed or 2) the user presses the Alarm ACK button.	"HORN"

LOCAL ANALOG OUTPUT MENU

The LOCAL ANALOG OUTPUTS menu allows the user to select whether each of the two local 4-20mA outputs are enabled, and if so, which of the input channels are used to determine the output value. If Analog Output #2 is enabled as shown, and if CH6 is then selected, then Local Analog Output #2 will track the 4-20mA input for CH6.

If the optional 4-20mA output module is installed, channels 1-4 of the output module will track the 4-20mA inputs for channels 1-4.

Note that the local analog output channels support a range of 4-20mA while the optional analog output module supports the full 0-20mA range. This allows the optional analog output module to send fault information to a remote analog device.
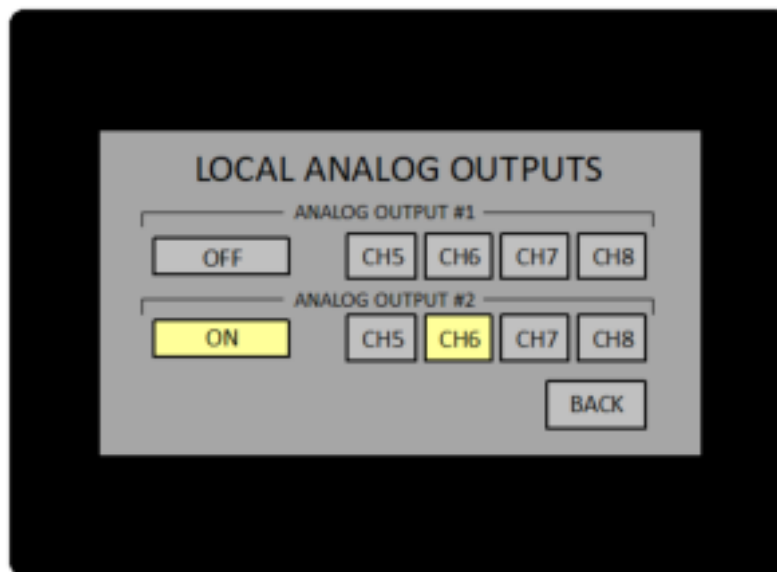

Figure 4-5: Analog Output Screen

DIAGNOSTICS MENU

Confirming proper operation of alarm systems connected to the *PROTECTOR P8XA* is critical. To support that need, the *PROTECTOR P8XA* has output override options that allows the user to manually trigger alarm relays and preset analog outputs to fixed values.
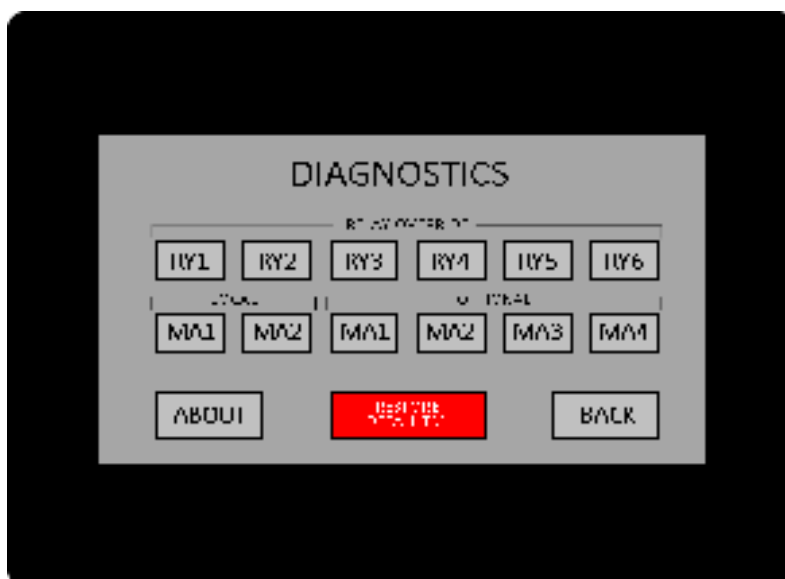

Figure 4-6: DIAGNOSTICS screen

Selecting the DIAGNOSTICS menu provides access to the relay and analog output override functions.

Pressing any of the Relay Override buttons causes that relay to change state – if not active, it will become active, and if active (Failsafe), will become inactive. Pressing the button again will cancel the override.

Pressing any of the analog (mA) override buttons will cause the associated analog output to rise to 50% of full scale (12mA). Pressing the button again will return the output to its current value.

NOTE: USE EXTREME CAUTION WHEN FORCING RELAYS OR ANALOG OUTPUTS TO OPERATE IN A MANNER INCONSISTENT WITH CURRENT ALARM CONDITIONS!

Pressing the "RESTORE DEFAULTS?" button will allow the user to reset the controller's input and output settings to factory default. This will erase all customized settings such as channel zero and span values, channel tag names and engineering units value, alarm setpoints and other user-configurable settings.

NOTE: THIS OPERATION CANNOT BE REVERSED. YOU WILL HAVE TO REPROGRAM THE ENTIRE CONTROLLER.

5   TROUBLESHOOTING GUIDE

DEVICE INOPERATIVE (NO DISPLAY)

- No AC power – check for AC power
- AC Power supply failure – measure input and output voltage on power supply
- Relays not responding to inputs after power-on – Relays disabled during warmup.

NO INPUT ON CHANNEL "X"

- Check that the controller channel is turned ON.
- Check input wiring not connected to proper input terminals.
- Check remote 4-20mA sensor is current SOURCE and not current SINK.

INPUT SIGNAL SHOWING INCORRECT VALUES

- Check range of 4-20mA input; range on both devices must match.
- Check proper number of displayed decimal points.

ALARM SETTINGS

- Alarm 2 not clearing automatically – Make sure Alarm 2 is not set to "Latch".
- Alarm 3 not working – Make sure Alarm 3 is enabled.

ANALOG OUTPUT NOT FUNCTIONAL

- Check wiring connected to proper output terminals.
- Check that the controller channel is turned ON.
- Check that input mA signal is greater than zero.
- Exercise mA output using OVERRIDE menu.

RELAY OUTPUT NOT FUNCTIONAL

- Check relay assigned to proper set of channel (Default = NONE)
- Check relay assigned to proper alarm level.
- Check relay votes >= 1
- Exercise relay using OVERRIDE menu.

6   SPECIFICATIONS

|	
Power Input*	+24V (+/- 20%) or 100-240 VAC with optional AC supply
Sensor Power	40 watts DC if using optional AC power supply Limited only by external source otherwise
User Interface	4.3" Diagonal 480 x 272 resistive touch screen; intuitive display and setup menu
Analog Inputs	8x industry-standard 4-20mA analog inputs. Input impedance less than 22 ohms.
Alarm Settings	Three programmable alarm levels per channel with Alarm Above and Alarm Below options. Alarm 2 programmable latching. Alarm programmable on/off.
Alarm Acknowledge	On-screen and two local / remote dry contact closure inputs. Optional front-panel ACK button.
Analog Outputs	2x local 4-20mA outputs; optional 4x 0-20mA outputs
Relay Outputs	Four 5A programmable dry contact relays: Maximum voltage 250VAC; Maximum non-inductive current 5A Two wet-contact +24VDC relay outputs for local horn or strobe
Enclosure	Polycarbonate wall-mount with hinged cover and stainless-steel snap latch. Non-corrosive, non-conductive rigid design. UL 508A, UL 50 and UL 50E Types 1, 2, 3, 3R, 4, 4X, 12 & 13 Follows EN/IEC 60204-1 and 60529 Type IP66
Operating Temp	-10C to +60C operating range -20C to +60C storage range 95% RH non-condensing
Dimensions	12.5" High x 10.72" Wide x 7.2" Deep (Does not include strobes or horns), Designed for wall mounting
Approvals	HMI Controller: UL certified for Class I, Div. 2 Groups A, B, C, D; Class II, Division 2, Groups F & G; Class III Hazardous Locations. Indoor use only. Optional AC Power Supply: SELV (EN60950, VDE0100/T.410), PELV (EN50178); USA (UL 60950, E137006, UL508 LISTED, E198865)
Warranty	One-year limited warranty

7   DIMENSIONS
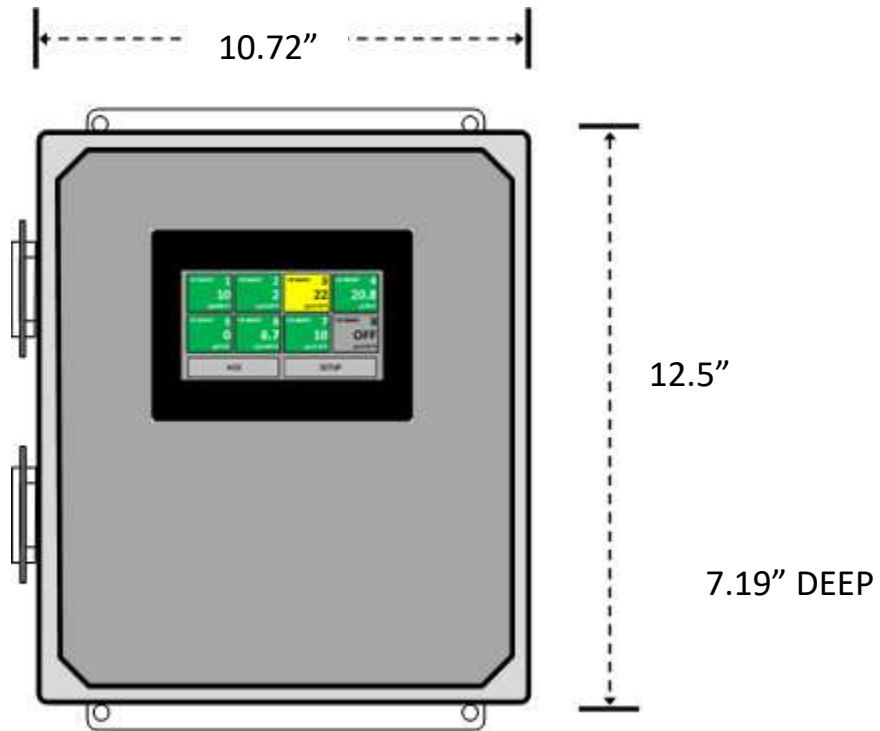
Figure 7-1: Outside Dimensions
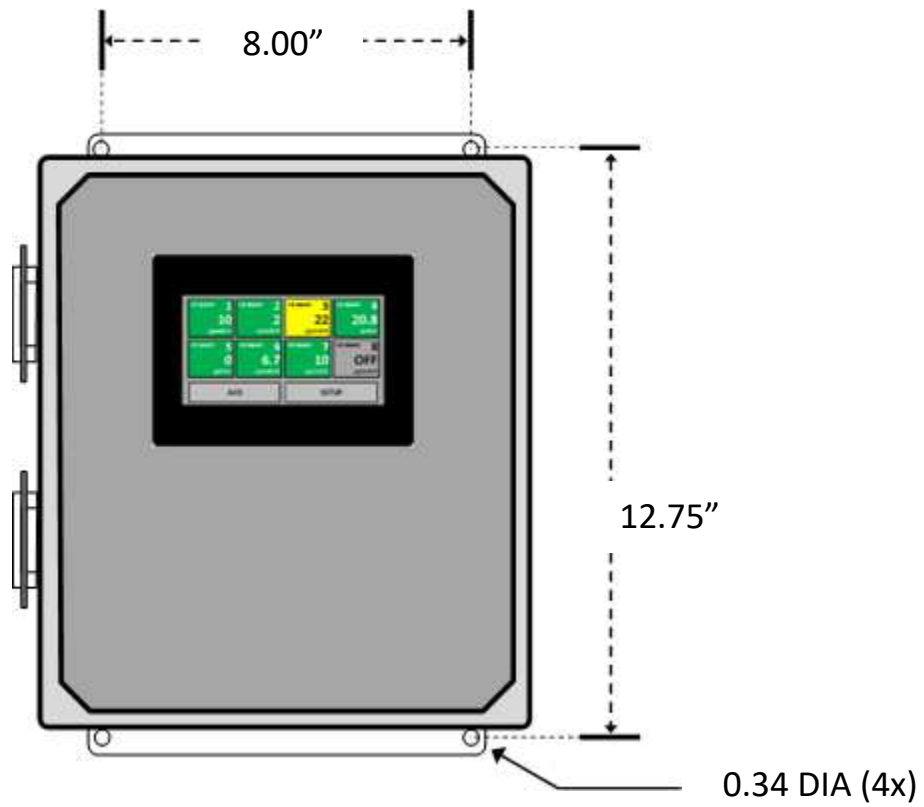
Figure 7-2: Mounting Hole Dimensions