

OPERATION MANUAL

GAS MONITORING UNIT

MODEL : CO SAFE

INTRODUCTION

The CO-SAFE is a wall mounted Gas Monitoring Unit Controller system that monitors the levels of **CO** Gas Sensors. The instrument is a standalone system that can be operated independently. This advanced microcontroller based system is compatible with all the Gas Sensors from Honeywell Life Safety and can provide audio/visual alarms when the set values are exceeded.

The CO-SAFE has a central 4 DIGIT bright RED 7 segment display which sequentially indicates the CO gas level in PPM units. This Display is also used to configure the instrument, set the measured Ranges of Gas, set the required Alarm Levels, the Alarm Types and Alarm Delays, besides additional functions like Calibration, Retransmission, Drift Values, enabling or disabling Relays etc.

The instrument offers four Relay controls with three Alarm levels and one Fault output to monitor Sensor output. Besides, the CO-SAFE provides analog retransmission.

The CO-SAFE has a Five-key tactile Keyboard interface on the front panel, which allows the user to set and monitor the various Gas parameters, Acknowledge and Reset Alarms, etc. It has five LED for ALARM. The configured system menu is stored in a NVRAM which protects the data against power fluctuations and outages.

SPECIAL FEATURES

The CO-SAFE has a host of unique and special features, which include the following:-

- Microcontroller-based Gas Monitoring Unit
- Precision two wire/three wire sensor
- Large and bright four digit LED seven-segment display
- Three programmable Alarm set-points with potential free Relay change-over contacts.
- Fault control Relay output for Sensor FAULT
- Loud audio hooter and bright LED beacon flasher with independent set point setting
- Data logging
- Real Time Clock
- Analog 4 to 20mA retransmission output
- External sensor powering output.
- High accuracy and linearity to sensor signal
- Configurable range for various units (Percentage or PPM).
- Universal AC power supply 90 to 270 VAC, 50/60Hz
- Rugged, industrial grade MS enclosure

SYSTEM DESIGN

The CO-SAFE system is designed for standard wall mounting Enclosure

A tactile Membrane Keyboard forms the system interface which allows the Operator to enter process information, view the status of Gas levels on the Four digit seven segment display and monitor alarms.

The system is controlled by a Microcontroller which processes the data of the signals, displays all necessary data on the display, monitors input signal for process alarms and.

It accepts the analog input signal, provides up to four Relay control outputs for the signal level and provides analog signal retransmission of the Gas level.

The system has PG-11 CABLE GLANDS at the bottom of the enclosure which provides the cable entry to UNIT.

OPERATION AND SETTINGS

1. ALARM LEDs

Alarm LEDs

The three Red LEDs A1, A2 and A3 indicate the three Gas alarm level alarms for individual channels. Flashing of these LEDs indicate alarm condition

The OFF condition of the LED indicates that the Gas level is either within normal acceptable limits, or in Reset condition.

2. FAULT LEDs

The Fault condition occurs when the input signal drops below 1 to 3 mA DC or rises above 23.5 mA DC.

3. ALARM RELAYS

There are four Alarm Relays. Relays 1, 2 and 3 are controlled by gas limit level alarms and their status is indicated by LEDs A1, A2 & A3. Relay 4 is used as a Fault relay. The alarms for the individual Relays may be set in various monitoring modes, such as Latching / Non-Acknowledgeable. These combinations are described below:

a. LATCHING/ACKNOWLEDGABLE MODE

If the Relay is configured as LATCHING/ACKNOWLEDGABLE mode, the Relay will activate and stay latched when it's set-point is crossed in the Fall or Rise cycle (as selected), with flashing LED. The Relay will not reset to normal even when the process value regains normalcy. Since the Relay is in Acknowledgeable mode, the Alarm can be acknowledged by pressing the ACK key. The Alarm LED corresponding to this Relay will then stay continuously ON until the Alarm is reset.

b. NON-LATCHING/ACKNOWLEDGABLE MODE

If the Relay is configured as NON-LATCHING/ACKNOWLEDGABLE, the Relay will activate when its set-point is crossed in the Fall or Rise cycle (as selected) but will not stay latched when the process value returns to normal limits, with flashing LED. Since the Relay is in Acknowledgeable mode, the Alarm can be acknowledged by pressing the ACK key. The Alarm LED corresponding to this Relay will then stay continuously ON until the Alarm is reset.

c. LATCHING/NON-ACKNOWLEDGABLE MODE

If the Relay is configured as LATCHING/NON-ACKNOWLEDGABLE, the Relay will activate and stay latched when it's set-point is crossed in the Fall or Rise cycle (as selected), with flashing LED. The Relay will not reset to normal even when the process value regains normalcy. Since the Relay is in Non-Acknowledgeable mode, the Alarm cannot be acknowledged by pressing the ACK key. The Alarm LED corresponding to this Relay will then stay continuously flashing until the process value returns within normal limits.

4. ALARM LEVELS

The Alarm Levels for each of the three Alarm Relays A1, A2 and A3 can be set between 0000 and 9999. The status of these Relays is indicated by LEDs A1, A2 & A3 when the set levels on the Rising or Falling trail are crossed.

5. RISING AND FALLING ALARM LEVELS

The Alarm Levels for each of the three Alarm Relays A1, A2 and A3 can be configured to activate on the rising graph or on the falling graph. In RISING condition, the corresponding Relay will activate above the set limit level, with flashing LED, while in FALLING condition, the corresponding Relay will activate below the set limit level, with flashing LED. The status of these Relays is indicated by LEDs A1, A2 & A3 when the set levels on either the Rising or the Falling graph are crossed.

6. ALARM HYSTERESIS

The Hysteresis for each Relay is the gap between an Alarm trip level and the Alarm Reset level. This is also called as Dead band. The Hysteresis for each Relay in each channel can be set independently. The status of the Relays is indicated by LEDs A1, A2 & A3 when the set levels on either the Rising or the Falling graph are crossed and the Relay is in Alarm condition.

7. DISABLE ALARM RELAYS

Any of the three Alarm Relays A1, A2 and A3 in any channel can be disabled, or in other words, be prevented from getting activated. In the Disabled condition, the Relay will not alter it's state when an Alarm occurs. The status of the Relays of any channel can be reviewed in the Page mode, as described in this manual.

8. FAULT ALARM

Fault condition means when input signal goes below 3 mA or above 21 mA, then the 4th Relay will energize and the LED will be flashing.

INSTALLATION

The instrument is housed in a IP65 weatherproof enclosure which makes it suitable for field mounting.. All interconnections to the instrument should be made through PG-11 Cable Glands. The ends of the wires should be properly ferruled and suitable lugs must be used for effective termination.




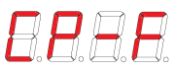





The cables carrying the input signal from the Sensor should be routed separately and properly isolated from the power line cables, to prevent any electromagnetic interference in the input signal readings from the mains power line. The instrument operates on 90-270VAC, 50Hz power supply. The Relay contacts are potential free and may be powered as per customer's requirements with the desired voltage.















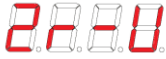






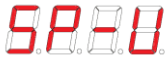







SYSTEM CONFIGURATION

POWER ON SCREEN




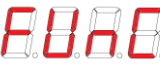





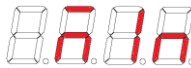







When the system is powered on, the Display will initialize and during this time has been provided for power supply stabilization within the instrument. The power ON screen shows the current process value of Gas Sensor.





























MAX-CO MENU

KEY PRESSED	MAIN DISPLAY	ALTERNATE DISPLAY	SETTING	FUNCTION
POWER ON			--	Initialization
				If input is below 1 mA or gas sensor is not connected to the unit then display will show "OPEN" If memory card is not there the slot then display will show "CP-F"
				If input is in between 1 to 3 mA or above 23.5 mA then display will show "FLT"
				If input is in between 3 to 3.7 mA then display will show "LO"
				If input is in between 4.0 to 3.7 mA then display will show "00.00" process value
				Process value as per input
				If input is in between 20.1 to 23.5 mA then display will show "OVER"

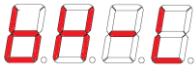


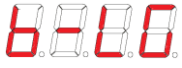







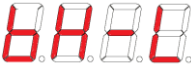


 (INC)			--	Display reads RTC (Real-time clock)
 (INC), and  (DEC)			Use  (DEC) to select digit and  (INC) to change value from 0- 9.	Password setting- Enter Password as- 0001 (for calibration)
OR				
 (INC), and  (DEC)			Use  (DEC) to select digit and  (INC) to change value from 0- 9.	Password setting- Enter Password as- 0002 (for user setting)
CALIBRATION MODE (WHEN PASSWORD IS ENTEREDAS 0001)				
PROG			Use  (DEC) key to save the ADC counts.	Zero setting Apply 4mA input
PROG			Use  (DEC) to select digit and  (INC) to change value from 0- 9.	Span gas setting or applied gas percentage setting. e.g If SGAS set as 50 then apply 50% gas value means 12 mA input and save the calibration e.g If SGAS set as 100 then apply 100% gas value means 20 mA input and save the calibration
PROG			Use  (DEC) key to save the ADC counts.	Span setting Apply span value as per "SGAS" set value
PROG			Use  (DEC) to select digit and  (INC) to change value from 0- 9.	Sensor calibration setting It can be set from 1.000 to 1.500
PROG			--	Display will show process value as per connected sensor input
USER SETTING (WHEN PASSWORD IS ENTEREDAS 0002) Or (Rotating keylock Clockwise-Anticlockwise for once)				

PRESS ▲ (INC) And ▼ (DEC)			Use ▼ (DEC) to select digit and ▲ (INC) to change value from 0-9.	Password setting- Enter Password as- 0002 (for user setting)
KEYLOCK ROTATED IN CW & Anti- CW DIRECTION OR PROG KEY (After entering password)			Use ▼ (DEC) to select digit and ▲ (INC) to change value from 0-9.	Menu and range setting
PROG			Adjust the dP point by pressing ▲ (INC), or ▼ (DEC).	Decimal point setting. Options are- <ul style="list-style-type: none"> • 1000 • 1.000 • 10.00 • 1.000
PROG			Use ▼ (DEC) to select digit and ▲ (INC) to change value from 0-9.	Set gas value low range. This value is corresponding to the 4 mA.
PROG			Use ▼ (DEC) to select digit and ▲ (INC) to change value from 0-9.	Set gas value high range. This value is corresponding to the 20 mA.
FOR RTC, ALARM, 4-20mA RETRANSMISSION, RS-485 ID and INTERNAL DATA LOG SETTINGS				
PROG			Press PROG Key to enter this setting	Menu and range setting
PROG			Press PROG Key to enter this setting	Real time clock setting
PROG			Press PROG Key to enter this setting	Relay and alarm logic settings

PROG			Press PROG Key to enter this setting	4-20mA retransmission setting
PROG			Press PROG Key to enter this setting	Settings to check current log, maximum log and clear the internal log.
PROG			Press PROG Key to exit to the main screen	Main Screen
FOR RTC SETTINGS				
Enter Menu			Press PROG Key to enter this setting	Real time clock setting
PROG			Use ▲ (INC), or ▼ (DEC) to set a value.	Hour setting. It can be set from 0000 to 0023.
PROG			Use ▲ (INC), or ▼ (DEC) to set a value.	Minute setting. It can be set from 0000 to 0059.
PROG			Use ▲ (INC), or ▼ (DEC) to set a value.	Date setting It can be set from 0001 to 0031.
PROG			Use ▲ (INC), or ▼ (DEC) to set a value.	Month setting. It can be set from 0001 to 0012.
PROG			Use ▲ (INC), or ▼ (DEC) to set a value.	Year setting. It can be set from 2000 to 2099

PROG			Press PROG Key to enter this setting	Real time clock setting
FOR ALARM SETTINGS				
Enter Menu			Press PROG Key to enter this setting	Relay and alarm logic settings
PROG			--	Alarm Status setting. The Alarm Levels for each of the three Alarm Relays A1, A2 and A3 can be configured to activate on the rising graph or on the falling graph. In RISING condition, the corresponding Relay will activate above the set limit level, with flashing LED, while in FALLING condition, the corresponding Relay will activate below the set limit level, with flashing LED. The status of these Relays is indicated by LEDs A1, A2 & A3 when the set levels on either the Rising or the Falling graph are crossed.
PROG		 OR 	PRESS  (INC) or  (DEC) to select RISE OR FALL	Select RISE or FALL whether the relay should turn on above (RISE) the setpoint or it should turn on below (FALL) the setpoint.
PROG		 OR 	PRESS  (INC) or  (DEC) to select RISE OR FALL	Select RISE or FALL whether the relay should turn on above (RISE) the setpoint or it should turn on below (FALL) the setpoint.
PROG		 OR 	PRESS  (INC) or  (DEC) to select RISE OR FALL	Select RISE or FALL whether the relay should turn on above (RISE) the setpoint or it should turn on below (FALL) the setpoint.
PROG			--	Select the delay time for turning the relay on.
PROG			Use  (DEC) to select digit and  (INC) to change value from 0-9.	Relay delay time setting in seconds.
PROG			--	Alarm mode selection. The alarms for the individual Relays may be set in various monitoring modes, such as Latching / Non-Latching and Acknowledgeable / Non-Acknowledgeable.*

PROG		 OR OR 	PRESS or (INC) or (DEC) to select NACK, LACK or ACK logic for relay.	Select NACK, LACK or ACK logic for the relay.
PROG		 OR OR 	PRESS or (INC) or (DEC) to select NACK, LACK or ACK logic for relay.	Select NACK, LACK or ACK logic for the relay.
PROG		 OR OR 	PRESS or (INC) or (DEC) to select NACK, LACK or ACK logic for relay.	Select NACK, LACK or ACK logic for the relay.
PROG			--	Alarm set point setting. The Alarm Levels for each of the three Alarm Relays A1, A2 and A3 can be set between 0000 and 9999. The status of these Relays is indicated by LEDs A1, A2 & A3 when the set levels on the Rising or Falling trail are crossed.
PROG			Use (DEC) to select digit and (INC) to change value from 0- 9.	Set Alarm-1 set point
PROG			Use (DEC) to select digit and (INC) to change value from 0- 9.	Set Alarm-2 set point
PROG			Use (DEC) to select digit and (INC) to change value from 0- 9.	Set Alarm-3 set point

PROG		 OR 		Beacon logic selection
If select  sub-menu in  main menu then-				
PROG		 OR 	Use ▼ (DEC) to select digit and ▲ (INC) to select the logic	Beacon logic selection. If select "FALL" then beacon will flash below set point If select "RISE" then beacon will flash above set point
PROG			Use ▼ (DEC) to select digit and ▲ (INC) to change value from 0-9.	Set Alarm set point for Beacon
PROG		 OR 	Use ▼ (DEC) to select digit and ▲ (INC) to select the logic	Hooter logic selection. If select "FALL" then hooter will ON below set point If select "RISE" then hooter will ON above set point
PROG			Use ▼ (DEC) to select digit and ▲ (INC) to change value from 0-9.	Set Alarm set point for Hooter
If select  sub-menu in  main menu then-				
PROG			Use ▼ (DEC) to select digit and ▲ (INC) to change value from 0-9.	Low alarm Set point for Beacon e.g If set 030.0 then beacon will flash below 030.0
PROG			Use ▼ (DEC) to select digit and ▲ (INC) to change value from 0-9.	High alarm Set point for Beacon e.g If set 080.0 then beacon will flash above 080.0

PROG			Use ▼ (DEC) to select digit and ▲ (INC) to change value from 0-9.	Low alarm Set point for Hooter e.g If set 030.0 then beacon will flash below 030.0
PROG			Use ▼ (DEC) to select digit and ▲ (INC) to change value from 0-9.	High alarm Set point for Hooter e.g If set 080.0 then beacon will flash above 080.0
PROG			--	Hysteresis Setting- The Hysteresis for each Relay is the gap between an Alarm trip level and the Alarm Reset level. This is also called as Dead band. The Hysteresis for each Relay in each channel can be set independently. The status of the Relays is indicated by LEDs A1, A2 & A3 when the set levels on either the Rising or the Falling graph are crossed and the Relay is in Alarm condition.
PROG			Use ▼ (DEC) to select digit and ▲ (INC) to change value from 0-9.	Hysteresis setting for Alarm-1 It can be set from 000.1 to 010.0
PROG			Use ▼ (DEC) to select digit and ▲ (INC) to change value from 0-9.	Hysteresis setting for Alarm-2 It can be set from 000.1 to 010.0
PROG			Use ▼ (DEC) to select digit and ▲ (INC) to change value from 0-9.	Hysteresis setting for Alarm-3 It can be set from 000.1 to 010.0
PROG			Use ▼ (DEC) to select digit and ▲ (INC) to change value from 0-9.	Hysteresis setting for Beacon It can be set from 000.1 to 010.0
PROG			Use ▼ (DEC) to select digit and ▲ (INC) to change value from 0-9.	Hysteresis setting for Hooter It can be set from 000.1 to 010.0
PROG			--	Relay status setting- Each of the 3 alarm relays can be individually enabled or disabled.

PROG		 OR 	PRESS (INC) or (DEC) to ENABLE OR DISABLE relay	Relay status for Alarm-1
PROG		 OR 	PRESS (INC) or (DEC) to ENABLE OR DISABLE relay	Relay status for Alarm-2
PROG		 OR 	PRESS (INC) or (DEC) to ENABLE OR DISABLE relay	Relay status for Alarm-3
PROG		 OR 	PRESS (INC) or (DEC) to ENABLE OR DISABLE relay	Relay status for Fault
4-20mA RETRANSMISSION SETTINGS				
Enter Menu			--	4-20mA retransmission setting
PROG			Set counts for 4-mA reading by pressing (INC) or (DEC) keys.	4mA count setting
PROG			Set counts for 20-mA reading by pressing (INC) or (DEC) keys.	20mA count setting
INTERNAL LOG SETTINGS				
Enter Menu			Press PROG Key to enter this setting	Settings to check current log, maximum log and clear the internal log.
PROG		 OR 	Use (DEC) to select digit and (INC) to select the logic	Logic selection for data logging feature. If select "FALL" then data logging will start below set point and if select "RISE" then data logging will start above set point

PROG			Use ▼ (DEC) to select digit and ▲ (INC) to change value from 0-9.	Set point for data logging feature. As per selected logic data logging will start below or above the set point
PROG		 OR 	Use ▲ (INC), or ▼ (DEC) to select YES or NO.	To copy the log from internal EEPROM to Micro-SD card select yes and press PROG key
If Select 				
PROG				Display will show copy message till internal data get copied to Micro-SD Card e.g. If 100 log stored in internal memory then display will show 0001 to 0100 while copy data to the external SD card
PROG			--	Logging Interval can be set between 10 - 240 seconds
				Present Log Display will show number of log stored in the internal memory. Maximum 4000 log can stored in the internal memory. If display shows 4000 then clear the data.
PROG		 OR 	Use ▲ (INC), or ▼ (DEC) to select YES or NO.	Select Yes or No to clear logs in the internal eeprom

d. LATCHING/ACKNOWLEDGABLE MODE-

If the Relay is configured as LATCHING/ACKNOWLEDGABLE mode, the Relay will activate and stay latched when it's set-point is crossed in the Fall or Rise cycle (as selected), with flashing LED. The Relay will not reset to normal even when the process value regains normalcy. Since the Relay is in Acknowledgeable mode, the Alarm can be acknowledged by pressing the ACK key. The Alarm LED corresponding to this Relay will then stay continuously ON until the Alarm is reset manually.

e. NON-LATCHING/ACKNOWLEDGABLE MODE-

If the Relay is configured as NON-LATCHING/ACKNOWLEDGABLE, the Relay will activate when it's set-point is crossed in the Fall or Rise cycle (as selected) but will not stay latched when the process value returns to normal limits, with flashing LED. Since the Relay is in Acknowledgeable mode, the Alarm can be acknowledged by pressing the ACK key. The Alarm LED corresponding to this Relay will then stay continuously ON until the Alarm is reset manually.

f. NON-LATCHING/NON-ACKNOWLEDGABLE MODE-

If the Relay is configured as NON-LATCHING/NON-ACKNOWLEDGABLE, the Relay will activate with flashing LED when its set-point is crossed in the fall or Rise cycle (as selected).

In this mode, the Alarm cannot be acknowledged by pressing the ACK key. The Alarm LED corresponding to this Relay will stay continuously flashing only until the process value returns within normal limits. User can't reset alarm manually before alarm clears.

NOTE: One can exit to the main screen from anywhere in between the menu and range settings by using ESC key.

The data will be stored in Xcel format and it will look as shown in Fig.1.

	A	B	C	D	E	F	G	H	I
1									
2			MAX-CO	DATA	LOGGER				
3	Date:	30-12-2014	Time:	03:56:13	GAS VALUE (PPM):	32	ALARM3 ON	ACK KEY PRESSED	
4									
5	Date:	30-12-2014	Time:	03:56:14	GAS VALUE (PPM):	32	ALARM3 ON	ACK KEY PRESSED	
6									
7	Date:	30-12-2014	Time:	03:56:15	GAS VALUE (PPM):	32	ALARM3 ON	ACK KEY PRESSED	
8									
9	Date:	30-12-2014	Time:	03:56:17	GAS VALUE (PPM):	33	ALARM3 ON	ACK KEY PRESSED	
10									
11	Date:	30-12-2014	Time:	03:56:21	GAS VALUE (PPM):	630	ALARM3 ON	-----	
12									
13	Date:	30-12-2014	Time:	03:56:25	GAS VALUE (PPM):	HI	FAULT ON	-----	
14									
15	Date:	30-12-2014	Time:	03:56:28	GAS VALUE (PPM):	HI	FAULT ON	-----	
16									
17	Date:	30-12-2014	Time:	03:56:31	GAS VALUE (PPM):	600	ALARM3 ON	-----	
18									
19	Date:	30-12-2014	Time:	03:56:39	GAS VALUE (PPM):	489	ALARM3 ON	MANUAL DATA LOG	
20									
21	Date:	30-12-2014	Time:	03:56:41	GAS VALUE (PPM):	489	ALARM3 ON	MANUAL DATA LOG	
22									
23	Date:	30-12-2014	Time:	03:56:44	GAS VALUE (PPM):	489	ALARM3 ON	MANUAL DATA LOG	
24									
25	Date:	30-12-2014	Time:	03:56:50	GAS VALUE (PPM):	LO	FAULT ON	-----	

Fig.1. Example of file stored in the pen-drive or internal memory

This completes the entire settings of the CO-SAFE.

TERMINAL DIAGRAM

The rear terminals of the GAS DIGIGUARD are localized for every channel along with one set of common terminals:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
L	N	E	X		ALARM-1			ALARM-2			ALARM-3			FAULT			4-20 mA DC OUT		X			24 V AUX. OUT		4-20 mA DC INPUT	
90-270 VAC, 50 Hz					NO	C	NC	NO	C	NC	NO	C	NC	NO	C	NC	+	-				+	-	+	-

Note:

Use "ACK" key to MUTE the hooter sound.

TECHNICAL SPECIFICATIONS

Model	:	CO-SAFE
Type	:	Micro-controller based monitoring of Gas Sensors.
Input Signals	:	4 to 20 mA from Gas Sensors.
Indications	:	<ol style="list-style-type: none"> 1. Four Digit 7-Segments Display with indication of process parameters and system configuration. 2. LEDs for Alarm status and annunciation.
Operator interface	:	Five-key Tactile Keyboard with embedded LEDs.
Control outputs	:	Four control Relay outputs - three for Alarms and one for Fault.
Contact Rating	:	10 Ampere @ 230 VAC for non-inductive loads.
Alarm Annunciation	:	Flashing Beacon and Audible Hooter.
Analog Outputs	:	4 to 20 mA DC retransmission signals.
Load Driving Capacity	:	600 Ohms
Aux. output	:	24 VDC (To Power Gas Sensor)
Data Logging	:	Downloadable through Micro-SD Card
Termination	:	On display board
Power Supply	:	90-270 V AC, 50Hz.
Enclosure	:	Wall mounted Enclosure
Enclosure Dimensions	:	350 mm x 250 mm x 125 mm