



MICRO THERMO TECHNOLOGIES™

CO and Diesel NO2 Gas Detector Technical Manual

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1 Description

The series 023-034X are designed to continuously send gas measurements to programmable logic devices, ventilation controls and computers. Sensor life is in excess of five years and routine calibration is needed usually once per year. A low wattage heater element in the cell performs two functions; continuous decontamination of the sensing element, and the creation of a convection air current that pulls air into the unit.

This series uses an inexpensive plug-and-play replaceable sensor tip that memorized the gas type, scale and calibration settings. So you can change the sensor tip instead of having the unit calibrated.

Units are factory calibrated when delivered but they get their best accuracy after 24 hours warm-up.

The unit can operate in stand-alone mode with 3 adjustable output relays, or with MT Alliance PC networked application. Any of the relay can be assigned the task of controlling alarms and fans so a dedicated relay controller is not necessary.

An alphanumeric display located on the front panel shows the actual reading or program values.

An analog signal (2-10V) is output from the sensor for the reading to be monitored remotely.

The enclosure is splash proof in the event of walls being washed with hoses.

023-0341, 023-0345

Standard Ranges for Gas Concentration

Model Number	Gas	Sensor Range (0-100%)
023-0345	CO	0-100 ppm
023-0341 (Diesel)	NO ₂	0-10 ppm

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2 Specifications, series 023-034X Gas sensor

Gas sensors	O=optional, S=standard
Sample frequency, one sensor	continuous, maximum 1 second S
Sample frequency, (in house network)	maximum 1 second, 1-99 units S
Response time to gas	less than 30 seconds to 90% reading S
Type of sensing element	electro-chemical for toxic gases S Semiconductor for refrigerants S fuel cell for oxygen S
Coverage	maximum 50 feet each side of sensor, with no obstructions
Sensor Memory Module	type of gas, scale, sensor calibration points, S zero, gain
Output	
Analog output (2)	4-20 ma or 2-10 v (per jumper) S
Digital output	In house network, twisted pair S BACnet MS/TP network (optional) O RS485
Switching capacity	3 relays SPDT, 1/8 HP @ 125 vac S 5 amp @ 125 vac non inductive
Delay, relay on (3)	0-999 seconds (16 minutes) S
Delay, relay off (run on) (3)	0-999 seconds (16 minutes) S
User controls and indicators	
LCD display	gas concentration, ppm or percentage S
Alarm indicators 1, 2, 3	LCD S
User keyboard	4 push buttons S ← → to access and view options ↓↑ to modify options
Security access control	6 key strokes, user set S
Internal audio alarm	on relay 3, adjustable S
Physical Characteristics	
Energy consumption	varies with type of sensor, 150 ma maximum at 24 vac, (3.6 va)
Supply voltage	16 to 29 vac, 20 to 31 vdc 3.6 va
Electrical conduit entry	4 X 0.875" two on top, one on bottom One in rear, all with hermetic seals
Dimensions	7 in. high, 4.5 in. wide, 1.7 in. deep. 17.5 cm. high, 11 cm. wide, 4.2 cm. deep.
Operating temperature range	Local display -25 to 50 °C (-13 to 122 °F) Other component -40 to 50 °C (-40 to 122 °F)

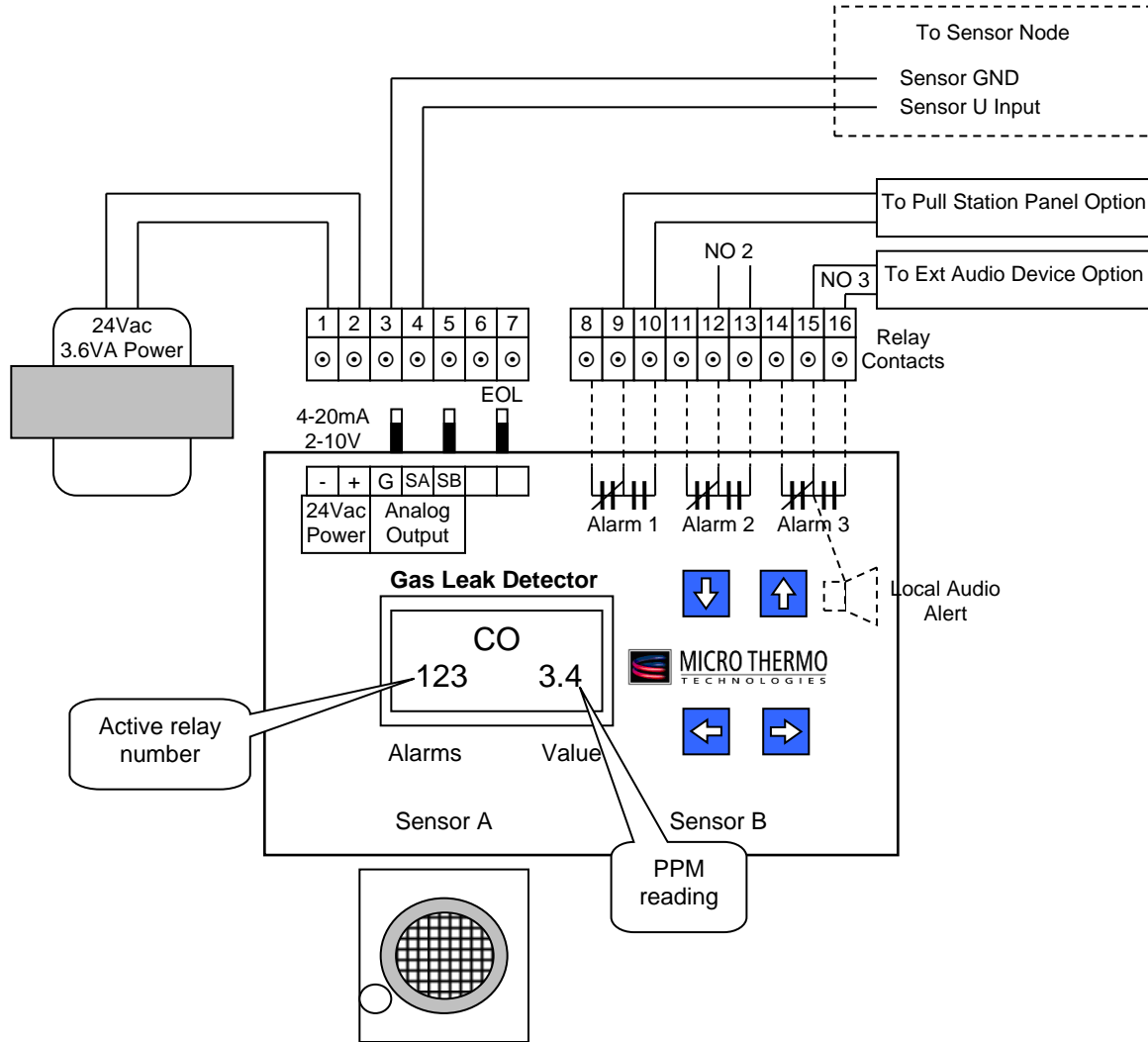
Maintenance guide

Visual verification recommended frequency: once per week. The system incorporates monitoring software which checks the operation of the circuits. This software is always running when the unit is powered on. Ensure that the unit is installed on an independent circuit. It is recommended that the unit be checked once per week to ensure that it is on, by the presence of reading on the display.

Verification of communication and calibration of sensors recommended frequency: once per year. It is recommended that sensor be verified with standardized bottled gas mixtures by the manufacturer or other qualified specialist or the sensor plug-in module be replaced with a new or factory calibrated module. The communication between the sensor and control systems should be tested. A report of compliance should be supplied and available on the site.

3 Physical installation:

This device is normally used with a Manual Pull Station, MTT number 961-0001



Affix the panel on the wall according to the following chart

023-0341	Diesel	50% of ceiling height
023-0345	Carbon monoxyd	1.2m (4ft) from floor

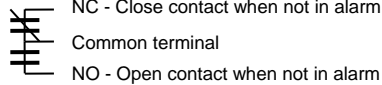
Open a nock-out hole for wiring.

Apply the power on 24V+ and the common on 24V-

Take the Sensor A signal output from SA and the signal ground on the G terminal

Make sure the SA jumper is towards down to send 2-10V signal on the SA output
Place the SB jumper towards down to send 2-10V signal on the SB output
Place the appropriate jumper towards up in the case you need to send 4-20mA signal on the output.

Dry contact wiring on the terminal block NF/C COM NO to be connected to the manual pull station.



IMPORTANT! 120V: If you commute 120V equipment with the relay contact, connect the ground to the chassis terminal.

Use **User settings** P00 to determine the threshold of SA at which the relay should operate. P01 is the set time, P02 is the reset time. Alarm reset by its own, there is no need to acknowledge an alarm.
See section 5 User settings.

The jumper EOL is not used in this application and don't have any effect.

Replace the cover and screws.

*Default display scale is R22 or R507 and it can be changed by the user.
To view the current settings on the model 023-034X, press the **right** arrows.
To modify press **up/down**. See section 5 for more information.
To save, press **up** and **left** buttons at the same time. The word ****OK**** will appear.*

*Example: To set the reading scale for R141b you have to change the gas type as follow:
Press the **right** arrows to display the value for P57 (hold arrow to speed up) then press the **up** arrow to change gas type (see available gas type and their ppm range at section 1).*

4 Operation

The power supplied should be between 16 to 29 vac or between 20 to 31 vdc. If the power is too high or too low the sensor will not work properly.

Each time the unit is powered on with proper power, the relays are disabled and the analog outputs operate normally during the warm up period. This is to allow time for the sensor to warm up and to avoid false alarm relay flip due to high readings of the cold sensor. The warm up timer may be cancel by pressing any arrow. The output may take a few more minutes to stabilize as the sensor may need more warm-up time if it was not powered for many days. The warm up time can be changed to up to 255 sec with the P52 user setting. After power up it will take 48 hours for maximum accuracy to be obtained, although accuracy is very good after an hour.

When the gas concentration is higher than the threshold set by A1 for the time A1D the relay 1 is energized. The active relay number (Alarms 123) will be displayed at the bottom left of the display. The relay will de-energized A1R seconds after the gas concentration drops below the threshold.

A1 is for relay 1 settings, A2 is for relay 2 settings and A3 is for relay 3 and buzzer settings.

Press the right arrow to change settings then up and left arrow simultaneously to save changes. See section 5 User settings.

The buzzer may sounds when relay 3 activates. To silence the buzzer press any arrow.

See section 7 **Test** for overrides and test commands.

5 User Settings Configuration

To view the current settings on the model 023-034X, press the **right** arrows.

To modify the current setting press **up/down** arrow.

To save, press **up** and **left** arrows at the same time. The word ****OK**** will appear.

Program Code	Definition	Display maximum value	default
Sensor A (first module, plugged into the left side)		Firmware rev 1C08	
Sensor B (second module, plugged into the right side)			
P00	P18 Alarm 1 level	A1 sensor scale	400ppm
P01	P19 Alarm 1 Delay on (seconds)	A1D 999	5s
P02	P20 Alarm 1 Delay off (run on) (seconds)	A1R 999	300s
P03	P21 Alarm 2 level	A2 sensor scale	400ppm
P04	P22 Alarm 2 Delay on	A2D 999	5s
P05	P23 Alarm 2 Delay off (run on)	A2R 999	300s
P06	P24 Alarm 3 level	A3 sensor scale	400ppm
P07	P25 Alarm 3 Delay on	A3D 999	5s
P08	P26 Alarm 3 Delay off	A3R 999	5s
P09	P27 Alarm 1 external command A	A1X 255	1
P10	P28 Alarm 1 external command B	A1X 255	0
P11	P29 Alarm 1 external command C	A1X 255	0
P12	P30 Alarm 2 external command A	A2X 255	2
P13	P31 Alarm 2 external command B	A2X 255	0
P14	P32 Alarm 2 external command C	A2X 255	0
P15	P33 Alarm 3 external command A	A3X 255	3
P16	P34 Alarm 3 external command B	A3X 255	0
P17	P35 Alarm 3 external command C	A3X 255	0
P36	external command for relay 1	XR1 255	1
P37	external command for relay 2	XR2 255	2
P38	external command for relay 3	XR3 255	3
P39	sensor identification address for network	ADR 255	0
P40	sensor A analog output zero (factory set)	ZA 255	
P41	sensor A analog output span (factory set)	SA 255	
P42	sensor B analog output zero (factory set)	ZB 255	
P43	sensor B analog output span (factory set)	SB 255	
P44	°C temperature display 0=off 1=on	TMP 0/1	0
P45	audio alarm off/on	AUD 0/1	1
P49	Keyboard security lock, 0=off, 1=on	SEC 0/1	0
P50	Temperature modify/correct	TMO -9/+9°C	
P51	High temperature alarm limit (alarm 1)	ATH 0-99°C	60
P52	Warm up delay, disables alarms on power up	DEL 0-99 mins	60
P55	Low temperature alarm limit (alarm 3)	ATB 0-99°C	0
P56	Network Display on/off (non BACnet version)	NET 0/1	0
P57	N/A		
P58	N/A		

Calibration To calibrate the sensor, adjust the zero and span using standardized gas mixtures.

- Press the **right** arrow to enter the program mode (as above) then press **up** and **right** at the same time to enter the calibration mode. You will see SAZ and the current gas reading on the first line plus the zero factor on the second line.
- Adjust the factor with the **up** and **down** arrows.
- To save it press **up** and **left** at the same time.
- Press the right arrow to proceed with the span factor SAS and repeat last two steps
- When finished press and hold the **left** arrow

Note: these calibrations setting are stored on the sensor plug in module and will follow the module if plugged into another gas sensor unit.

6 MT Alliance installation

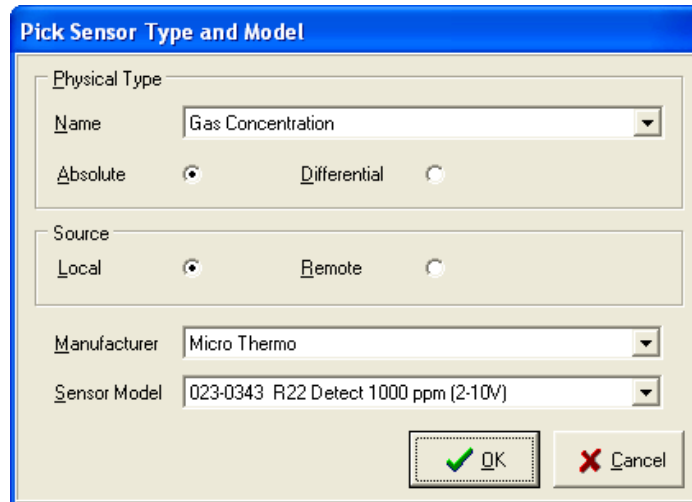
Log into MT Alliance. You must have **technician refrigeration configuration** permissions.

Enter configuration Mode.

Select and zoom in the view where the sensor is located.

Pick and drop a Custom Sensor

Then select Absolute Gas Concentration Type, Local source, Micro Thermo manufacturer and the sensor and gas type you are going to monitor



Pick Sensor Type and Model

Physical Type

Name: Gas Concentration

Absolute Differential

Source

Local Remote

Manufacturer: Micro Thermo

Sensor Model: 023-0343 R22 Detect 1000 ppm (2-10V)

OK Cancel

Click OK then click on the new button.



In the Detail tab enter a sensor name in the Identification field

Sensor Information - Rack A

Details | Alarm Settings | Hardware | Graph & Log | Status: Unconfigured | Value: N/A ppm

General

Identification: Rack A
 View Name: Main
 SubSystem: Refrigeration
 Physical Type: Gas Concentration (Absolute)
 Notes:

Service Info | Edit Actions

Reporting Preferences

Print report upon acknowledgement
 Print a daily report

Log Preferences

Keep values at 1 minute(s) interval

Source

Local | Remote

Usage

Single | Dual

Visibility

Always visible
 Maintenance and Configuration
 Configuration only

Send ALL CPs

| |

In the Alarm Settings tab
 Set the limit values and the Alarm set time inside which the monitoring should run without any alarm

Sensor Information - Rack A

Details | Alarm Settings | Hardware | Graph & Log | Status: Unconfigured | Value: N/A ppm

Global Alarm Activation

Status: N/A
 Enable Alarm | Disable Alarm Permanently
 Disable Alarm Temporarily

Cumulative Alarm

Inactive | Set 1 | Set 2

Alarm Set 1 & 2 Settings

Pick Alarm Settings | Description: Refrigerant Leak | Optimal Value: 5 ppm

Set 1

High Limit: 100 ppm | Set Time: 0 h 1 m
 Low Limit: 0 ppm | Set Time: 1 h 0 m
 Recall Time: 0 h 30 m
 Priority Level: High
 Relay: None

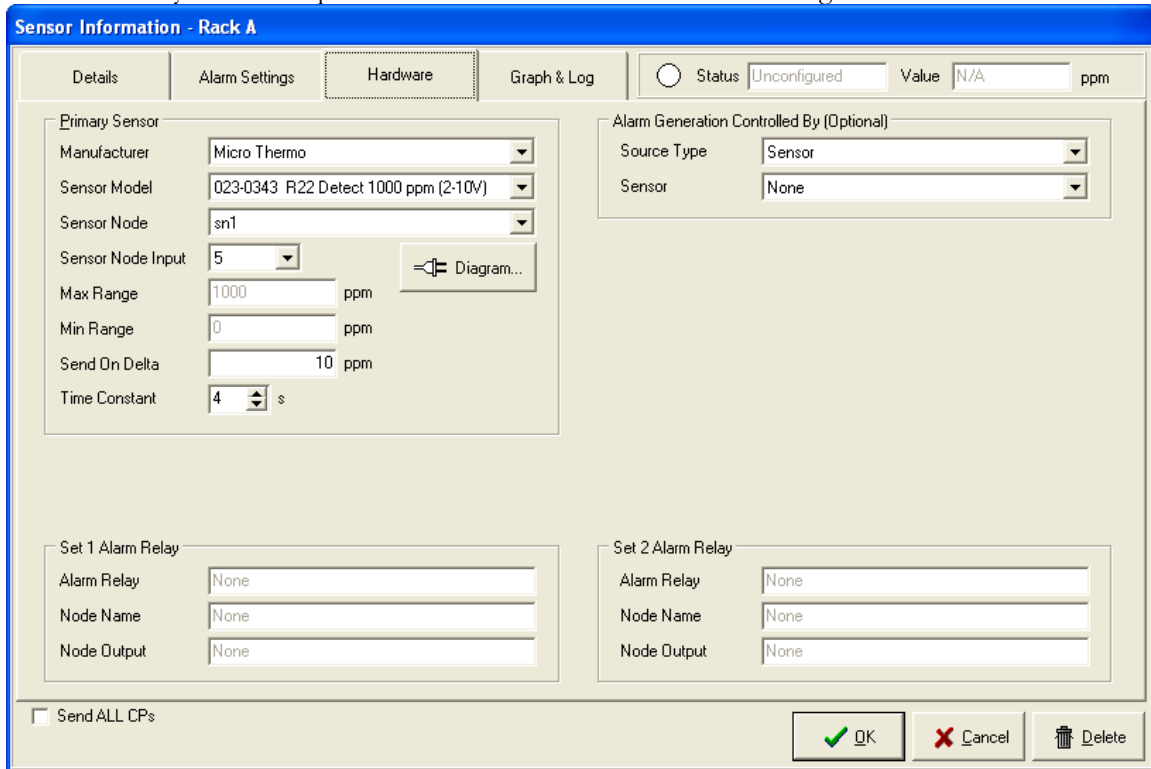
Set 2 Active

High Limit: 100 ppm | Set Time: 23 h 59 m
 Low Limit: 1 ppm | Set Time: 2 h 0 m
 Recall Time: 23 h 59 m
 Priority Level: Notice (No Relay)
 Relay: None

Send ALL CPs

| |

In the Hardware tab you can review the sensor manufacturer and model and you can select the node and input where this sensor is connected. If you need help to make the wire connections click on Diagram.



Click on OK to complete the connection. If the node is connected you should get a green status right away even if the sensor is not powered.

7 Test

Analog output

To test the output signal, power the sensor and wait for the warm-up period to expire
 Use P40 to force sensor A output to 2V (4mA) (min range 0 ppm)
 Use P41 to force sensor A output to 10V (20mA) (max range)
 Use P42 to force sensor B output to 2V (4mA) (min range 0 ppm)
 Use P43 to force sensor B output to 10V (20mA) (max range)

You can also calibrate the Zero and Span of the signal through these parameters.

Relay output

To force the relay output 1 for 5 minutes press the up arrow for more than 5 sec then press it another time. Add 5 minutes each time you press the up arrow.

“MAN” or “M” at the left of the display will tell that the relay is overridden.

To cancel the relay override, press the down arrow.

8 Revision History

REV	Description	Revised by	Date
1.1	Creation form 71-GEN-0109 r1.1	RL	20-jan-05
1.2	PUID changed from 70-GEN-1006, 023-0184 changed to 023-0284 updated for MTA V5.1	RL	1-May-07
2.3	Adapted from 70-PHW-1018 R2.3	RL	11-Juil-14
2.4	Cover page and formatting	ER	11-FEB-2015