PARKER

MICRO THERMO TECHNOLOGIES™

Ammonia Leak Detector Manual

Document No. 70-PHW-1023-R2.5

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1   Description

The 023-0344 sensor combines solid state microprocessor-based control circuitry with a proven electro-chemical sensing element. This electro-chemical sensor has several advantages over catalytic semiconductor types (model 023-0013). They respond quickly to ammonia in very low concentrations and are extremely selective for ammonia. The sensors are unaffected by organic vapors, alcohols, vehicle exhaust and hydrogen produced from changing lift truck batteries, all of which could produce false alarms using solid state ammonia sensors at low concentrations.

Sensor life is typically in excess of two years. Because sensor life is reduced by exposure to ammonia, routine calibration and inspections recommended once per year.

The sensor (023-0344) covers a nominal range of 0 to 250 PPM refrigerant. Sensor output is linear over the entire scale. Sensor units are factory calibrated when delivered and are also easily calibrated in the field without disconnecting the unit.

A typical alarm level for ammonia would be 35 ppm to 50 ppm in work areas to protect the health and safety of occupants from possible leaks. Compressor rooms can have higher levels of ammonia so alarm levels are typically set higher, at 100-200 ppm. If ammonia levels are expected to be higher than 200 ppm and a higher alarm level is desired, a semi-conductor type sensor (model 4004) could be used with a scale of 0-500 ppm. A semi-conductor type sensor will show less interference from other gases when set to higher alarm points, above the background level of noise gases.

The 023-0344 uses a sensor stabilization system that must remain powered at all times. A new sensor will require several hours (up to 24 hours) before it reaches operating stability. During this period the gas reading will remain high. In the event of a power failure of short duration, the sensor will return to normal within a few minutes. During this warm up period, the sensor output is disabled.

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 a group as part of a twisted pair network for shared functions. Any of the sensors connected can be assigned the task of controlling alarms and fans so a dedicated central 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.

2   Specifications,   series 023-0344 Ammonia 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
Coverage	maximum 50 feet each side of sensor, with no obstructions	
Sensor Memory Module	type of gas, scale, sensor calibration points, zero, gain	S

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) RS485	O
Switching capacity	3 relays SPDT, 1/8 HP @ 125 vac 5 amp @ 125 vac non inductive	S
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	-25 to 50 deg C°

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 <u>or</u> 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
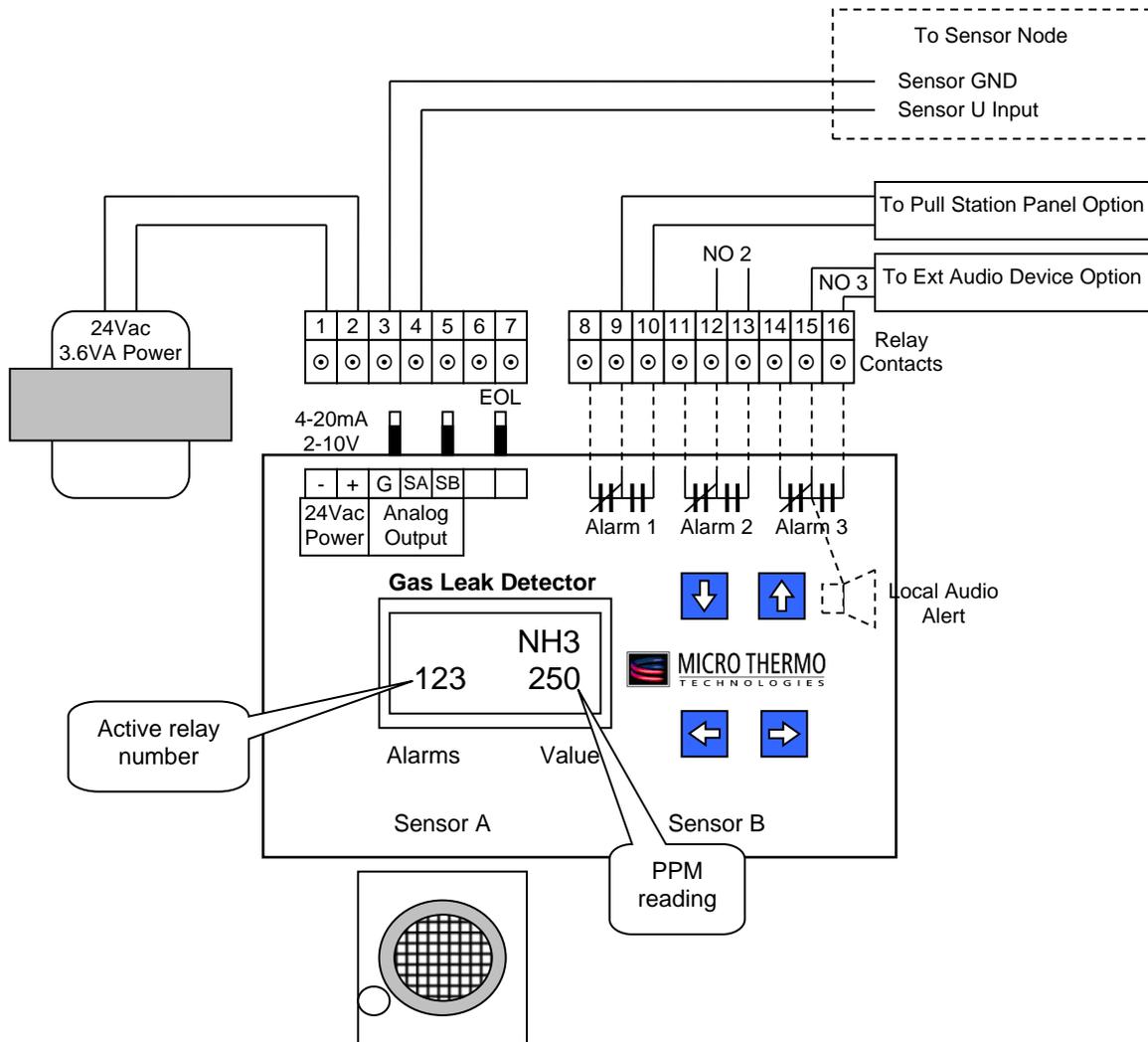
Affix the panel on the wall according to the following chart

| 023-0341	Diesel	50% of ceiling height
023-0342	HFC Refrigerant	10-30cm from floor
023-0343	HCFC Refrigerant	10-30cm from floor
023-0344	Ammonia	10-30cm from ceiling

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.

NC - Close contact when not in alarm

Common terminal

NO - Open contact when not in alarm
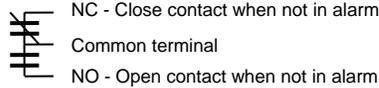
IMPORTANT! 120V: If you commute 120V equipment with the relay contact, connect the ground to the chassis terminal.

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.

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 1, 2 or 3) 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 <u>at the same time</u>. The word **OK** will appear.

Program Code		Definition	Display	Value range	Default
Sensor A (first module, plugged into the left side)					Firmware rev 1C15
	Sensor B (second module, plugged into the right side)				
P00	P18	Alarm 1 level	AL1	sensor scale	25ppm
P01	P19	Alarm 1 Delay on (seconds)	A1D+	999	5s
P02	P20	Alarm 1 Delay off (run on) (seconds)	A1D-	999	300s
P03	P21	Alarm 2 level	AL2	sensor scale	50ppm
P04	P22	Alarm 2 Delay on	A2D+	999	5s
P05	P23	Alarm 2 Delay off (run on)	A2D-	999	300s
P06	P24	Alarm 3 level	AL3	sensor scale	100ppm
P07	P25	Alarm 3 Delay on	A3D+	999	5s
P08	P26	Alarm 3 Delay off	A3D-	999	5s
P09	P27	Alarm 1 external command A	AL1X	255	1
P10	P28	Alarm 1 external command B	AL1X	255	0
P11	P29	Alarm 1 external command C	AL1X	255	0
P12	P30	Alarm 2 external command A	AL2X	255	2
P13	P31	Alarm 2 external command B	AL2X	255	0
P14	P32	Alarm 2 external command C	AL2X	255	0
P15	P33	Alarm 3 external command A	AL3X	255	3
P16	P34	Alarm 3 external command B	AL3X	255	0
P17	P35	Alarm 3 external command C	AL3X	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)	AnZA	255	
P41		sensor A analog output span (factory set)	AnSA	255	
P42		sensor B analog output zero (factory set)	AnZB	255	
P43		sensor B analog output span (factory set)	AnSB	255	
P44		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	Pass	0/1	0
P50		Temperature modify/correct	T+/-	-9/+9	
P51		High temperature alarm limit (alarm 1)	TALH	0-99 deg C	60
P52		Warm up delay, disables alarms on power up	DEL	0-99 mins	60
P55		Low temperature alarm limit (alarm 3)	TALB	0-99 deg C	0
P56		Network Display on/off (non BACnet version)	NET	0/1	0
P57		sensor A type	REFA	C	C
P58		sensor B type	REFB	C	C

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** <u>at the same time</u> 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** <u>at the same time</u>.
- 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.
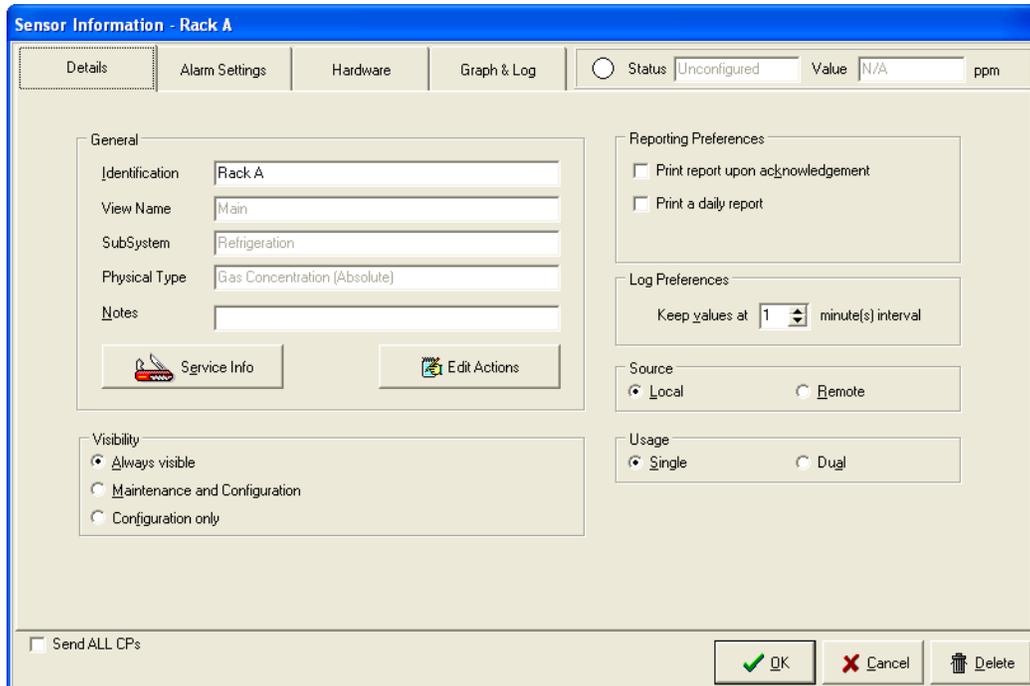Pick and drop a Custom Sensor

Then select Absolute Gas Concentration Type, Local source, Micro Thermo manufacturer and the sensor type you are going to monitor (for ammonia before MTA 6.1 use 023-0246 Ammonia EC 250 ppm (2-10V))
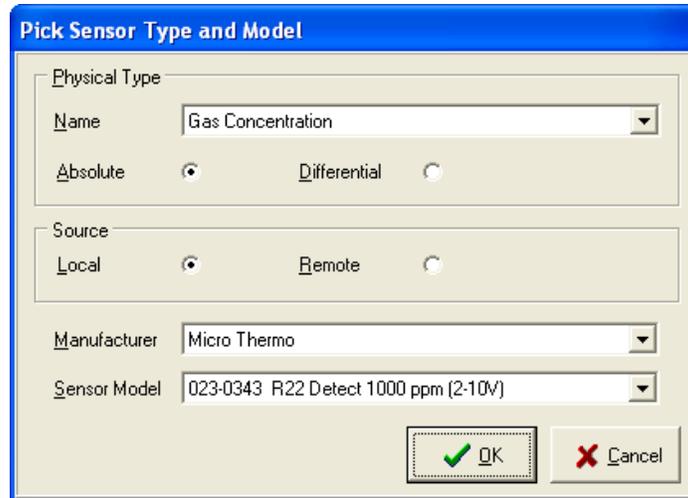
Click OK then click on the new button.

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

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 2 Active

		Set Time					Set Time	
High Limit	100 ppm	0 h	1 m	High Limit	100 ppm	23 h	59 m
Low Limit	0 ppm	1 h	0 m	Low Limit	1 ppm	2 h	0 m
Recall Time	0 h	30 m		Recall Time	23 h	59 m	
Priority Level	High			Priority Level	Notice (No Relay)		
Relay	None			Relay	None		

☐ Send ALL CPs

✔ OK   ✘ Cancel   🗑 Delete

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 until "MAN 0" is displayed 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
2.F	Creation of the document from 70-PHW-1018 R2.F	RL	15 apr 2010
2.3	Updated for R717, NH3	RL	15 apr 2010
2.G	Removed Ref type setting	RL	14 Mar 2011
2.4	Update 1C15 and logo changed	RL	18 May 2011
2.5	Cover page and formatting	ER	11-FEB-2015