MICRO THERMO TECHNOLOGIES

Refrigerant Leak Detector Technician Manual

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Table of Contents

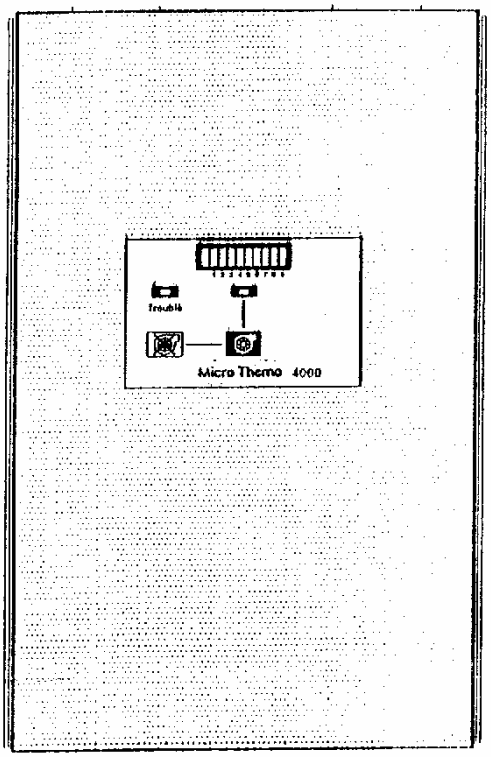
1 Description

The series 023-0139, 023-0014, 023-0071 are entirely solid state electronic sensors that have proven to be the most reliable method of detecting refrigerant leaks for the price. The catalytic semiconductor responds quickly to refrigerant in very low concentrations. It has very low cross-contamination by other gases as catalytic elements are selected for specific types of gases. Sensor life is in excess of ten 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.

The sensor (023-0014) covers a nominal range of 0 to 1000 PPM R22 refrigerant. Units are fairly linear in the center region of the scale and are guaranteed at 500 ppm. Sensor units are factory calibrated when delivered and are also easily calibrated in the field without disconnecting the unit. The enclosure is splash proof in the event of walls being washed with hoses.

023-0139, 023-0014, 023-0071 Standard Ranges for Gas Concentration

Model Number	Type of refrigerant	Sensor Range (0-100%)
023-0139	R11	0-2000 ppm
(not standard)	R12	0-2200 ppm
	R113	0-1000 ppm
	R225	0-2000 ppm
023-0014	R21	0-600 ppm
	R22	0-1000 ppm
	R141b	0-900 ppm
	R142b	0-800 ppm
023-0071	R23	0-1000 ppm
	R123	0-1400 ppm
	R134a	0-2000 ppm
	R152a	0-600 ppm
	R402a (HP-80)	0-600 ppm
	R404a (HP-62)	0-800 ppm
	R407a	0-1400 ppm
	R410a	0-1400 ppm
	R500	0-800 ppm
	R502	0-800 ppm
	R507	0-800 ppm



2 023-0014 Specifications

023-0139, 023-0071 same but scales are per gas type

Coverage	50 feet max. (each direction)
Installation	1-2 feet from floor install away from diffusers and air intakes
Input Voltage	24 Vac (20-28 Vac), or 21-31 Vdc
Connections	3 wire: AC in (V+), Common/ AC in (V-), Signal out (Vs)
Power consumption	4 VA max
Line regulation	less than 0.5% error over voltage range
Output	2-10 Vdc (max output 20ma) per jumper on board or 4-20 mA (into 500 ohms or less, including output wires)
Relay contact	32V/5A resistive
Recommended threshold	Half of the range (JP4 position 6)
Gas Range	see chart on first page
Maximum Overload	10,000 ppm
Repeatability	less than 1% error
Long term drift	less than 3% percent/ 6 months
On response time	30 seconds to 95 % reading
Off response time	100 seconds to 95% reading
Relative Humidity	
Operating Range	10-97 % RH
Gas Required for 100 ppm	120 ppm @ 35% RH 110 ppm @ 55% RH 100 ppm @ 65% RH 90 ppm @ 100% RH
Temperature	
Operating Range	-15 deg C to + 45 deg C
Low temp option LT	-45 deg C to +45 deg C
Compensation range	-15 deg C to 35 deg C = + - 3% at 100 ppm
Sensor Life	10 years typical
Calibration Interval	12 months recommended
Sensor Type	Solid State Catalytic Semiconductor

3 Interfacing

3.1 Outputs available

Analog output (15): A jumper (6) must be at 10V position to select 2-10V signal. See Physical installation section.

Relay output (16): A relay on each unit will close when the gas concentration read over a configurable level called threshold. This alarm level can be modified in the field via jumper settings (13). The relay is typically used to operate local exhaust ventilation through a contactor of the appropriate size for the fan used or is used to activate alarms.

3.2 Indicators and user controls

Visual Display (13): On the sensor is a 100 point visible bar graph which shows the current gas reading. As an example, for R23 the scale is 0 to 1000 ppm. Blinking light indicates ten units 0 to 90 and each steady light indicates hundred units 100, 200, 300 etc. The scale of the sensor will depend on the type of gas being detected and the application. See table on the first page of this document for all the supported sensor ranges. In all case the bar graph show 0 to 100% of the full range.

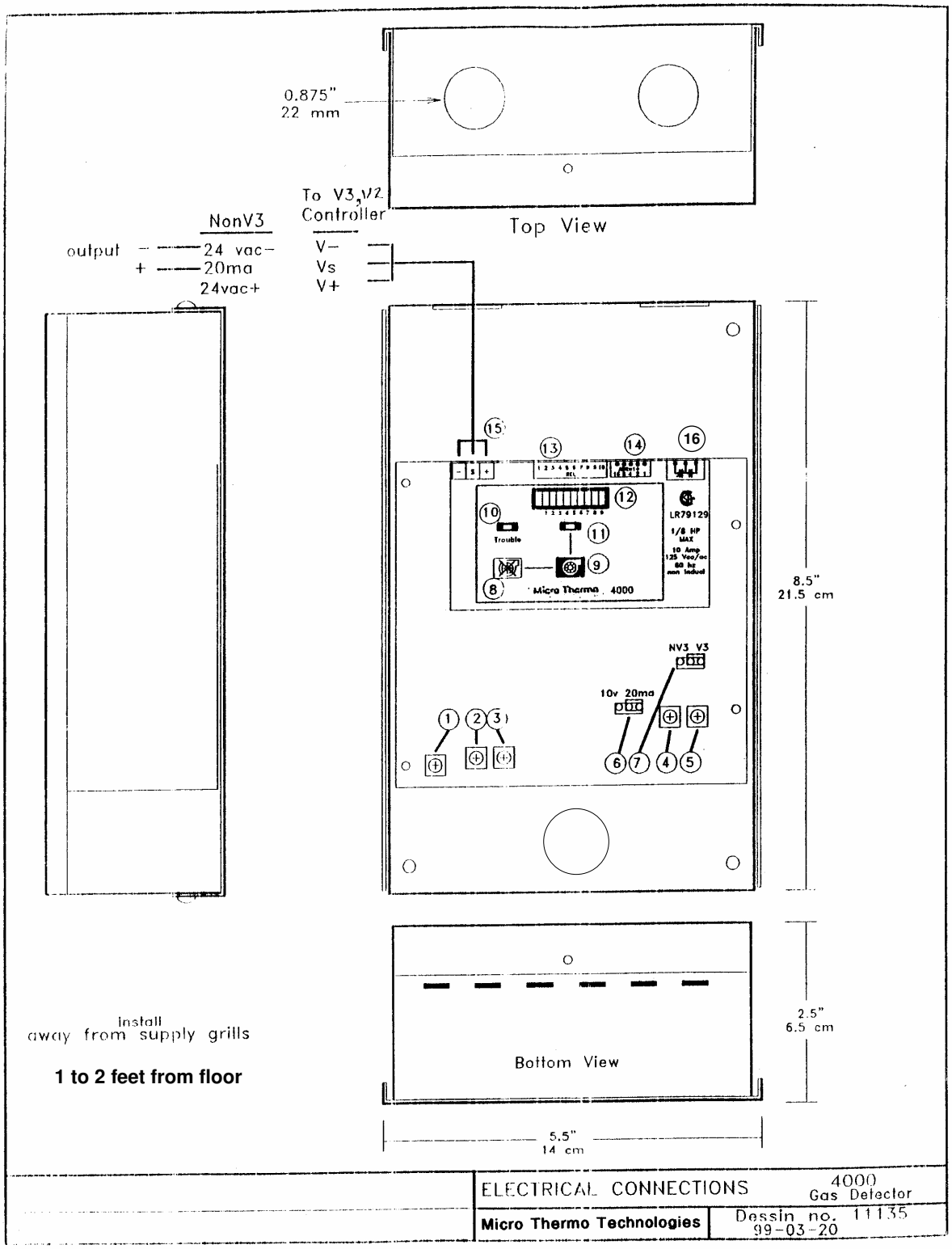
Warm Up indicator. Red (10): Will blink during sensor warm up after power up for 5 minutes. The analog output will be at a minimum during this period regardless of actual gas concentration. If input voltage is not within the acceptable range 20Vac to 28Vac the Warm Up LED will turn on steady and pressing the cancel button will not extinguish the LED.

Gas Level indicator. Yellow (11): A level 1 indicates that the output relay is energized. This may be due to three possible reasons.
1. The initial power up warm up timer has run out and the gas concentration is higher than the threshold.
2. The initial power up warm up timer has run out and the gas concentration is back below the threshold and the 10 minutes run on timer has not expired yet.
3. The fan button was pressed and the 10 minute run on timer has not expired yet

Fan on Button (9): Press this button to override the relay and set the output to high (20mA or 10V) for 10 minutes. After that time the relay will operate accordingly to the threshold and the analog output will reflect the gas concentration reading.

Cancel Button (8): This button is to cancel the fan run timer when the gas just went below the threshold or the Fan On button was depressed. It will not turn off the fan if the gas concentration is over the threshold. It will also cause the output to go to its lowest (4mA or 2V) as long as it is depressed. Remove pressure from the button and the output will return to the gas level. It is also used to cancel the warm up period and enable outputs.

4 Physical installation:



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

Affix the panel on the wall at 1 to 2 feet from floor

Open a nock-out hole for wiring.

Apply the power on V+ and the common on V-
Take the signal output from Vs and the signal ground on V-

Dry contact wiring on the terminal block NF/C COM NO

NF/C	Normalement Fermé/Closed
COM	Common
NO	Normally open

IMPORTANT! 110V: Connect the ground to the chassis terminal.

J7 (10v20ma) is factory set to 10v for (2-10V) signal type. It is not recommended to change to 4-20mA as the sensor will need recalibrating.

Make sure J1 (System select) is set to NV3 (single mode)

Place JP4 (1 2 3 4 5 6 7 8 9 10) to determined the threshold at which the relay should energize. Calculate the set point accordingly to the maximum range (ex. if the range is 0-1000 PPM each pin is a 100 PPM step). Position 1 is 0 ppm, position 2 is 100 ppm and so on. The relay stays on for 10 minutes after the gas concentration has dropped below the threshold.

The DIP-SW ADR is not used in this application and don't have any effect.

Replace the cover and screws

5 Power up sequence

The power supplied should be between 20V and 28VAC. If the power is too high or too low the red Warm-up LED will be on steady, the output signal will stay to the minimum (2V or 4mA) and the relay will be disabled.

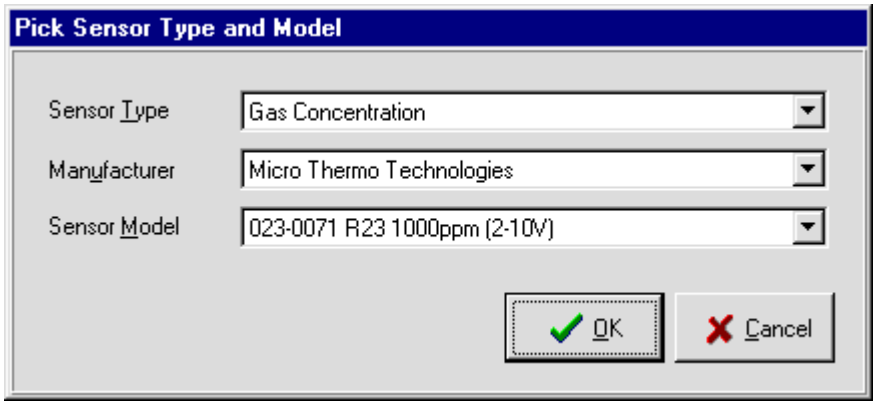
Each time the unit is powered on with proper power, the relay is disabled and the analog output is set to minimum (4mA or 2V) for 5 minutes. During the warm up time, the red Warm Up LED will blink. This is to allow time for the sensor to warm up and to avoid false high readings due to a cold sensor. The warm up timer may be cancel by pressing the cancel button. The output may take a few more minutes to stabilize as the sensor may need more time to warm-up. 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 JP4 the relay is energized. The relay will deenergized 10 minutes after the gas concentration drops below the threshold.

See **Indicators and user controls** section for status and overrides commands.

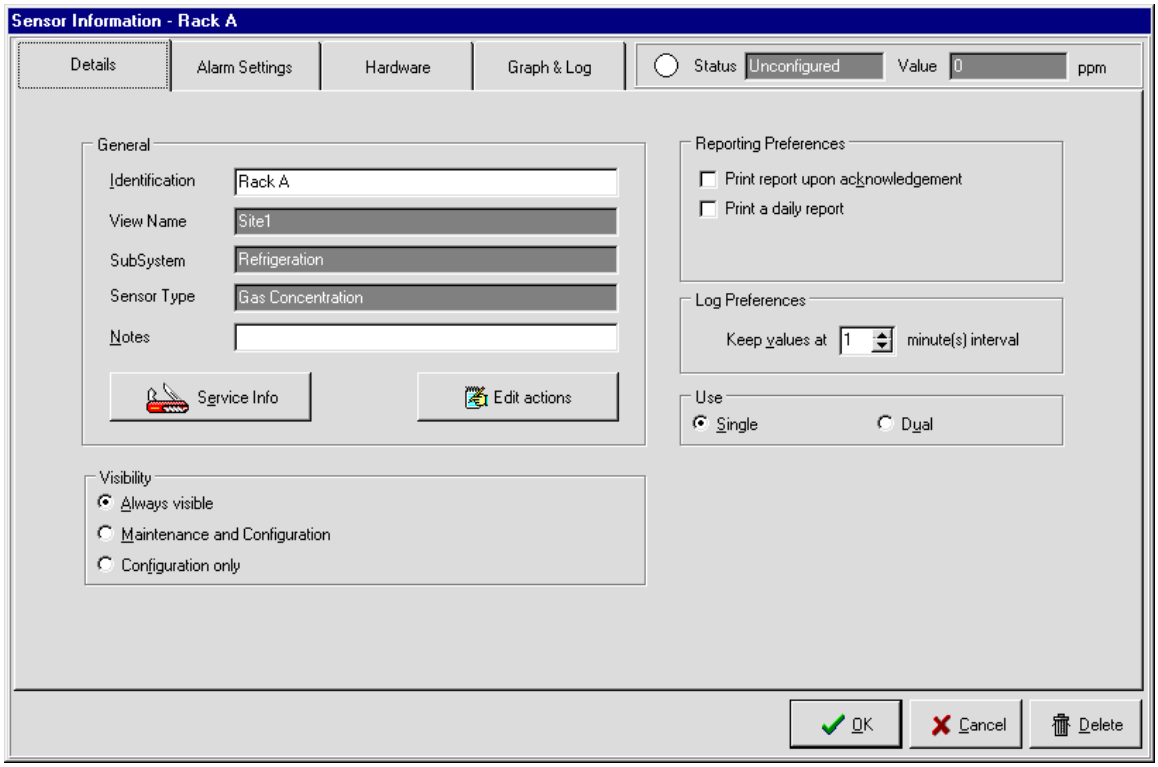
6 MTAlliance installation

Log into MTAlliance. 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

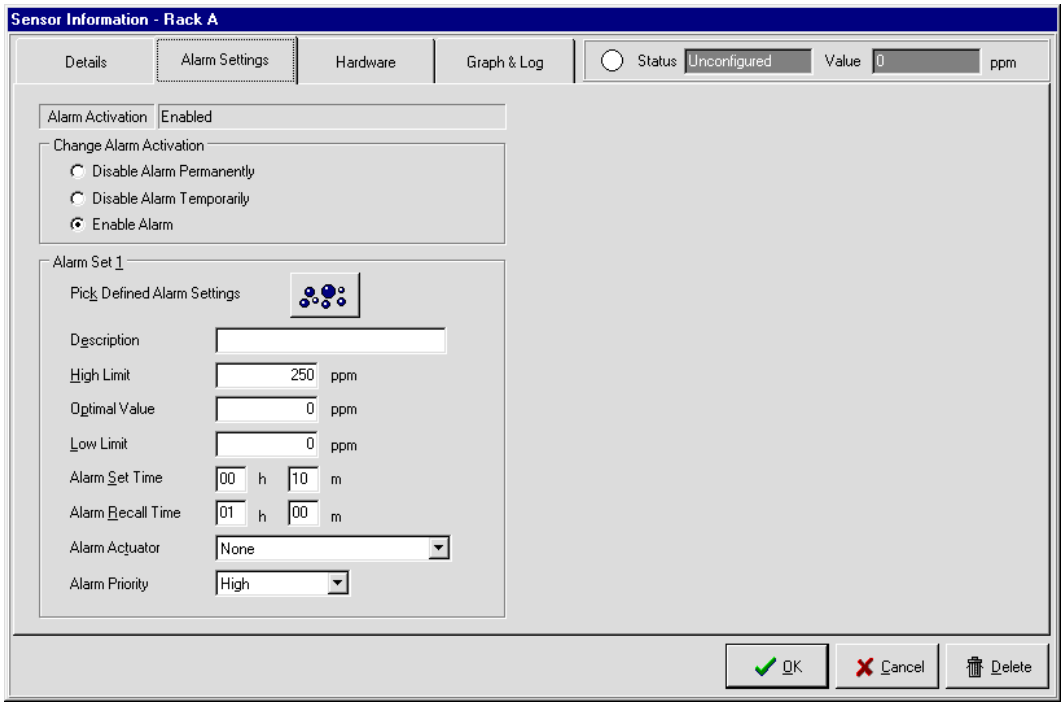
Then select Gas Concentration Type
Micro Thermo Technologies Manufacturer and
the sensor and gas type you are going to monitor



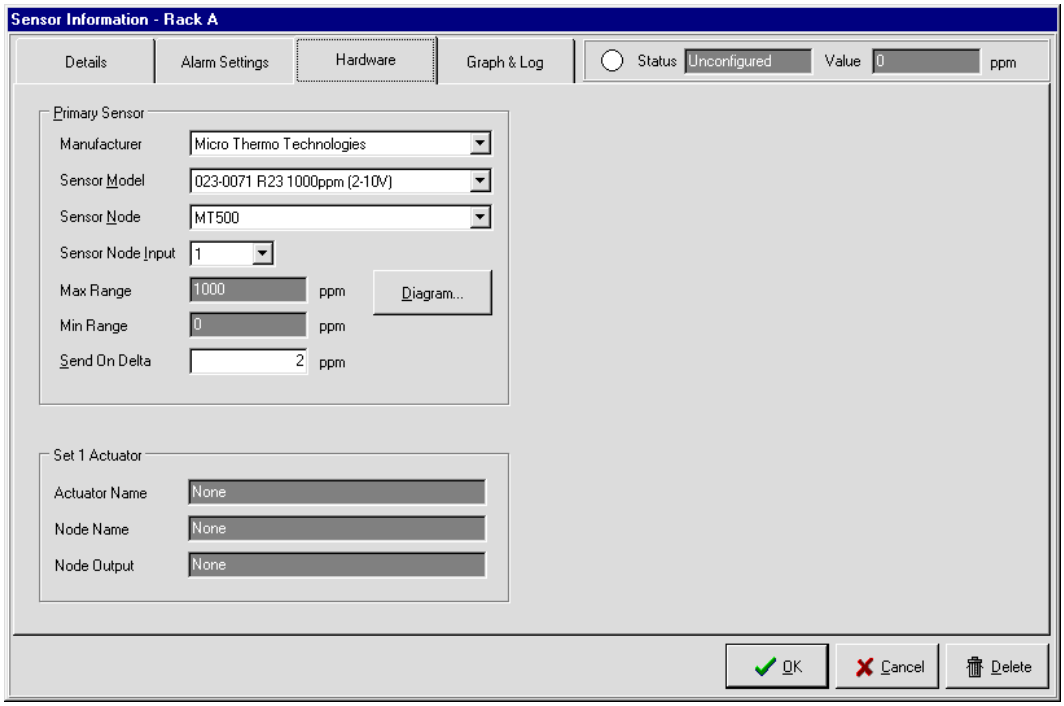
Click OK then click on the new button.
In the Detail tab enter a sensor name in the Identification field



In the Alarm Setting tab
Set the high limit value and the Alarm set time inside which the monitoring should run without any alarm



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 reading right away.

Revision History

REV	Description	Revised by	Date
0.0	Creation of the document	KR	20-mar-99
0.1	Revision	RL	9-avr-04
0.2	Fusion spec, installation and startup	RL	5-mai-04
0.3	Revision	RL	7-mai-04
0.4	Header and Physical installation added	RL	10-mai-04
0.5	Alliance installation added	RL	13-mai-04
0.6	Title page Revision, First Draft Publication	RL	14-may-04
1.0	Publication	JG	19-may-04