



MICRO THERMO TECHNOLOGIES™

Refrigerant Leak Detector Manual

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1 Description

The series 023-034X 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. 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 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.

023-0342, 023-0343

Standard Ranges for Gas Concentration

| Model Number | Type of refrig. | Sensor Range (0-100%) |
|--------------|--------------------------------------|-----------------------|
| 023-0342 | HFC | |
| | R23 | 0-1000 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 |
| | R408a | 0-800 ppm |
| | R409a | 0-600 ppm |
| | R410a | 0-1400 ppm |
| | R500 | 0-800 ppm |
| | R502 | 0-800 ppm |
| | R507 (AZ-50) | 0-800 ppm |
| 023-0343 | HCFC | |
| | R21 | 0-600 ppm |
| | R22 | 0-1000 ppm |
| | R141b | 0-900 ppm |
| | R142b | 0-800 ppm |
| | R401a (MP-39) | 0-1200 ppm |
| | (023-0342 recommended) R402a (HP-80) | 0-1500 ppm |
| | (023-0342 recommended) R408a | 0-1500 ppm |
| | (023-0342 recommended) R409a | 0-1500 ppm |
| | (023-0342 recommended) R502 | 0-1500 ppm |



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, 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) | 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) |

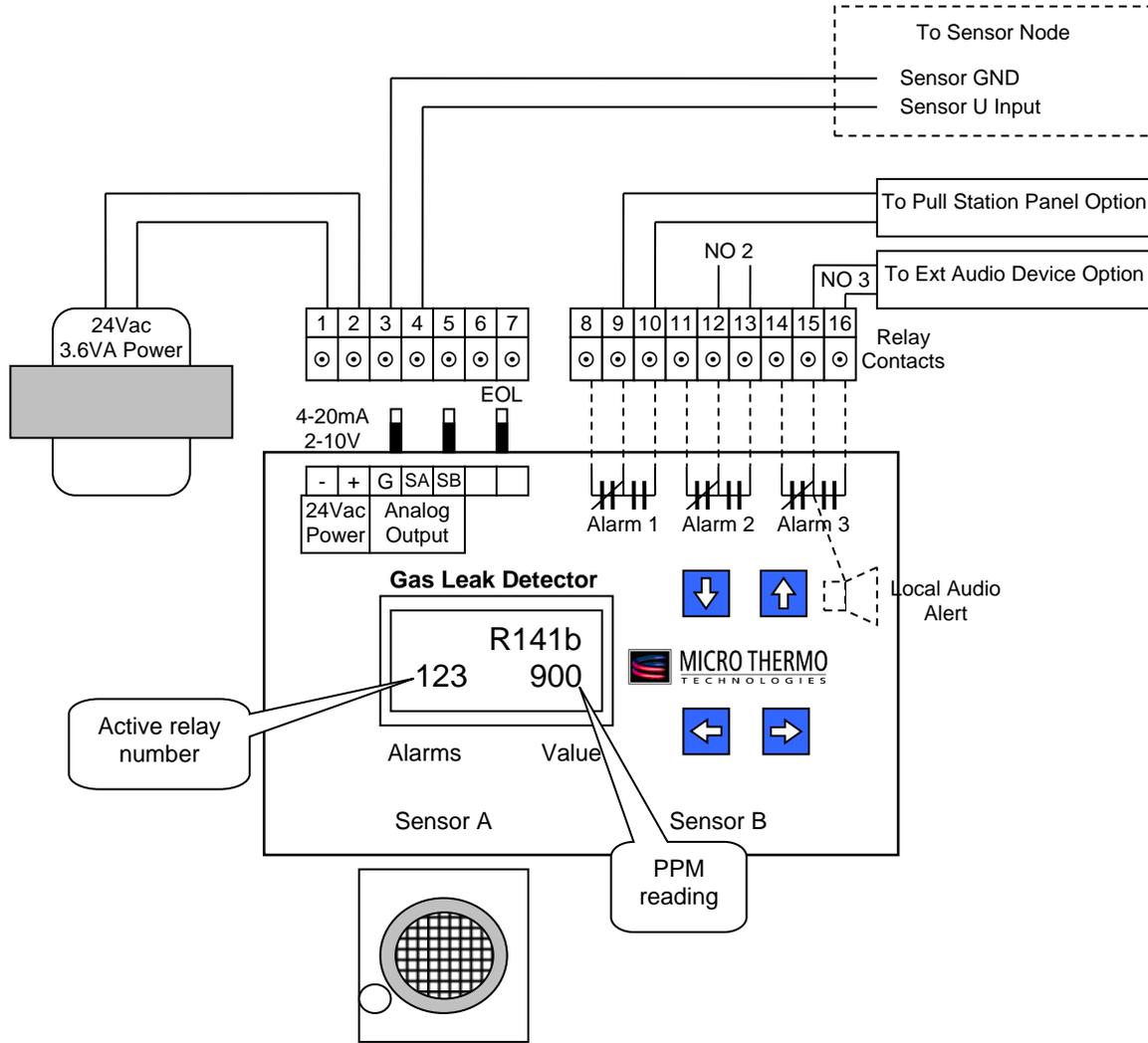
Maintenance guide

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 |
| 023-0342 | HFC Refrigerant | 10-30cm from floor |
| 023-0343 | HCFC Refrigerant | 10-30cm from floor |
| 023-0344 | Ammonia | 10-30cm from ceiling |

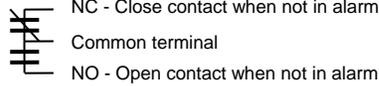
Open a nock-out hole for wiring.

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.



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 | sensor A refrigerant ppm scale | RFA Refrig list | Rx |
| P58 | sensor B refrigerant ppm scale | RFB Refrig list | Rx |

Where Rx is R507 for 023-0342 and R22 for 023-0343

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

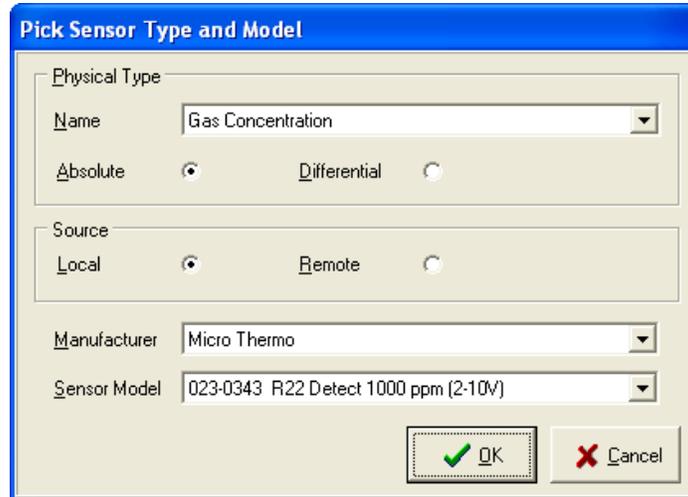
Log into MT Alliance. You must have **technician refrigeration configuration** permissions.

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

OK Cancel Delete

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
 Low Limit: 0 ppm
 Recall Time: 0 h 30 m
 Priority Level: High
 Relay: None

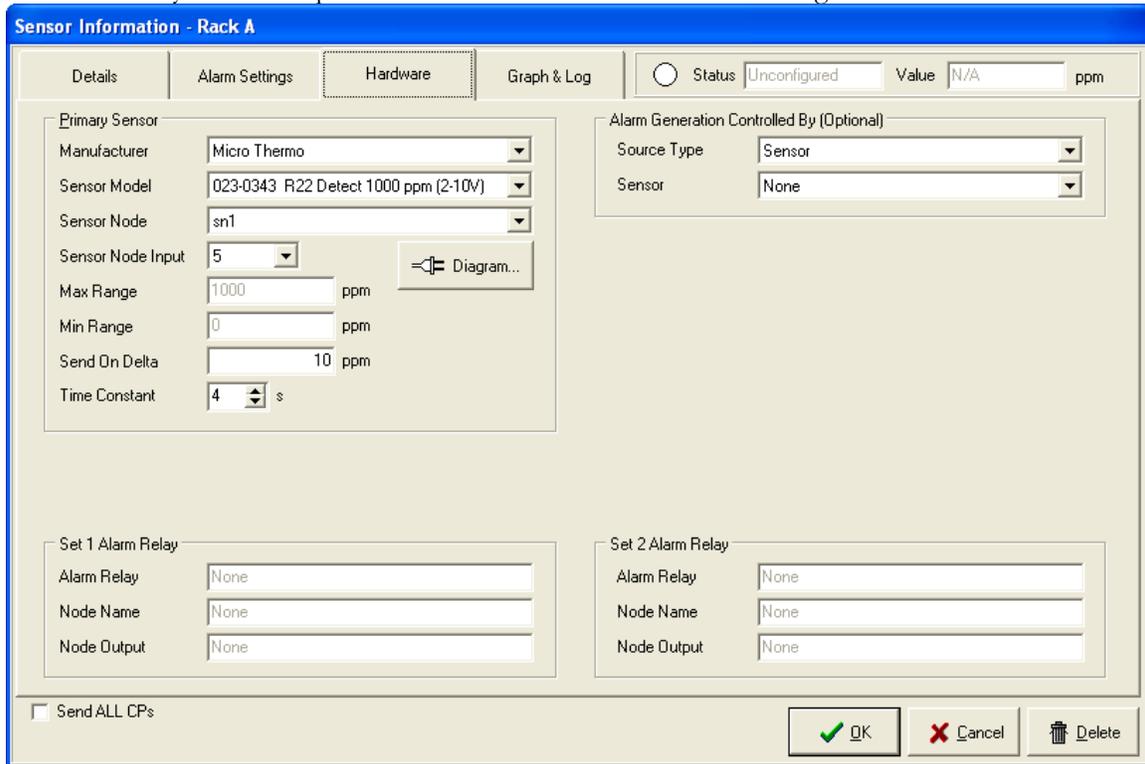
Set 2 Active

High Limit: 100 ppm
 Low Limit: 1 ppm
 Recall Time: 23 h 59 m
 Priority Level: Notice (No Relay)
 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 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 |
|-----|---|------------|-------------|
| 0.0 | Creation of the document | KR | 20-Mar-99 |
| 0.1 | Revision | RL | 9-Apr-04 |
| 0.2 | Fusion spec, installation and startup | RL | 5-May-04 |
| 0.3 | Revision | RL | 7-May-04 |
| 0.4 | Header and Physical installation added | RL | 10-May-04 |
| 0.5 | Alliance installation added | RL | 13-May-04 |
| 0.6 | Title page Revision, First Draft Publication | RL | 14-May-04 |
| 1.0 | Publication 70-GEN-1005 for MTA 4 | JG | 19-May-04 |
| 1.1 | Section 1 and 3.2 revised, new gas added | RL | 6-Dec-04 |
| 1.2 | Publication of a temporary version 70-GEN-1005 MTA 4.1 | CP | 31-Oct-06 |
| 1.3 | Update & PUID changed to 70-PHW-1018 for 023-0014, 0071 | RL | 31-Mar-08 |
| 2.A | Updated for 023-034X and MTA 5.2 | RL | 25-Aug-09 |
| 2.B | Recovered file sent to Alain Richer | RL | 1-Sept-09 |
| 2.C | Temporary version | RL | 2-Sept-09 |
| 2.0 | Published for 1C03 023-034X and MTA 5.2 | RL | 11-Sept-09 |
| 2.D | Revised temporary version | RL | 15-Sept-09 |
| 2.E | Revised again | RL | 16-Sept-09 |
| 2.1 | Published for ver 1C08 and 023-034X and MTA 5.2 | RL | 2-Oct-09 |
| 2.F | Revised (Operating temp HFC HCFC) | RL | 21-Jan-10 |
| 2.2 | Published again | RL | 2-Mar-10 |
| 2.3 | Logo changed | RL | 8-Jul-11 |
| 2.3 | Address changed | RL | 30-Nov-11 |
| 2.4 | Cover page and formatting | ER | 11-FEB-2015 |