

IR200
INFRARED HCFC & AMMONIA (NH₃)
REFRIGERANT SENSOR

User Manual

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Enmet Canada Ltd is a Division of Arjay Engineering LTd.

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www.arjaygasdetection.com/

TABLE OF CONTENTS

GENERAL	3
APPLICATIONS	3
SPECIFICATIONS	3
MOUNTING INSTRUCTIONS	4
Sensor Placement	4
Mounting.....	5
For NEMA 3R Housing.....	5
CABLE RUNS	6
OPERATION	6
Components Description and Use	6
CALIBRATION	8
Zero Offset Calibration	8
Calibration Gas Bump Test.....	8
MAINTENANCE SCHEDULE.....	9
SENSOR EMERGENCY RESET TO ORIGINAL FACTORY SETTING.....	10
TROUBLESHOOTING	11

GENERAL

The non-dispersive IR refrigerant gas sensor was designed to detect for the presence of certain refrigerant gases within an enclosed space. The sensor is mounted within the space to be monitored and connected by cable to a monitoring device. Each sensor is calibrated to monitor for a specific refrigerant gas. There are two models of IR sensors depending upon the monitoring environments; machine room and low temperature refrigeration applications. The standard enclosure is NEMA 3R Aluminum while an optional , water-tight ABS fiberglass housing for wash down protection (NEMA 3R), and Stainless Steel enclosures available for special applications.

The IR sensor is a reliable method of monitoring for refrigerant gas leaks in environments that have air quality problems. The IR sensor will eliminate many false alarms in environments that contain gasoline, diesel and propane exhaust and fumes from solvents, paints, cleaners and others.

WARNING: The infrared sensor is not to be applied into all refrigerated storage applications where other toxic gases are used in the same room. Some installations are not suitable for infrared technology. Misapplication may result in damage to sensor. Contact factory for a specific list of approved applications.

APPLICATIONS

Typical applications include:

- Wineries
- HVAC Chiller Equipment Rooms
- Refrigeration Mechanical Rooms
- Bakeries
- Food Process Plants
- Refrigeration Rooms

SPECIFICATIONS

Enclosure Rating

Standard NEMA3R Aluminum Black Powder Coated	12.9" x 4.8" x 2.4"
Optional NEMA 3R ABS fiberglass	12.0" x 7.5" x 6.0"
Optional NEMA 3R Stainless Steel	12.75" x 5.0 x 2.75"

Operating Environment Temperature

Machine Room Model	32° to 100° F (0 to 43.3° C)
Freezer Room Model	-40° to 110° F (-40° to 43.3° C)

Power Input 10VDC-32VDC, 0.4A Max/

Output (standard) 4-20 mA (standalone sensor)

Effective Range	0 to 1032ppm (Effective Range 15-1000ppm)
Sensitivity	±1ppm at 25° C, 45% RH
Resolution	1ppm
Accuracy	±5ppm plus 2% over Full Scale
Response Time	Under 30 sec.
Humidity	0 to 90% RH Non-Condensing
Linerity	Liner over full scale
Calibration	Every 6 months
Ambient Air flow	Less than 3ft/sec
Warm Up Time	Readings will stabilize in 6 to 7 hours (Recommend 24Hrs before Calibration)
Life Expectancy	Average 5 to 7 years under normal environments

MOUNTING INSTRUCTIONS

SENSOR PLACEMENT

The IR Refrigerant Gas Sensor must be placed in locations that a refrigerant gas leak is likely to occur and where refrigerant gas is likely to concentrate so as to provide warning of a potential hazardous condition. Mounting locations are dependent upon the application and the refrigerant gas to be monitored. The housing has a 3/4" conduit knockout hole in the bottom so the sensor must be mounted vertical.

All mounting locations must be a fixed, well supported wall, pole or frame with little or no vibration. Sensors must be placed in locations that will prevent damage from fork trucks, carts and other moveable devices.

For Halocarbon Refrigerants such as R11, R22, R134 & R123 place the sensor 18 to 24 inches off the floor. For Ammonia, place the sensor 18 to 24 from the ceiling.

HVAC/Refrigeration Machinery Room – prior to placement of the IR leak Sensor, the room air currents need to be determined. Air currents can be determined through the use of smoke candles or any other accepted field-expedient method. The air currents of every potential condition should be analyzed. The maximum air flow rate past the sensor should not exceed 3 feet per second. Air velocity past the sensor can be determined by lighting a match close to the sensor. If the match is blown out by the air current, mounting the sensor inside a pull box with knockouts opened slightly or some other method of damping the air must be used.

Exhaust Fan On – The air currents within the machinery room exhaust fan must be determined. Identify locations that are "downwind" of the potential leak source. Locate one sensor near the air intake duct of the exhaust fan, but not directly in the duct so the sensor is not subject to the full force of the duct air.

Exhaust Fan Off – In applications where machinery room exhaust fan can be shut off, identify air currents of the machine room with the fan off. Locate a position "downwind" of the potential leak source with the fan off. This location may be omitted if the exhaust fan is to be operated continually.

Refrigerated Room – Determine the direction of the discharge air from the evaporator coil.

Halocarbon Refrigerant Systems – Mount the sensor on the wall near the return air vents of the evaporator coil or within between ten to twenty feet of a doorway exiting the room to a space.

Ammonia Refrigeration System – Mount the sensor on the wall in a downward air path of the discharge air, at least 20 feet or more from the coil or on the wall on the opposite side of the room 18 to 24 inches from ceiling. Do not place the sensor closer than 10 feet from the coil or directly in the discharge air path to avoid reading fluctuations due to defrost and violent air velocity.

MOUNTING

The sensor must be mounted with the wire terminal blocks oriented to the lower right and sampling chamber in a vertical position. Failure to mount the sensor in this fashion may result in false or inaccurate readings and can allow moisture to enter the housing and destroy the sensor.

FOR NEMA 3R HOUSING

Wall Mount. Use locally available wall mounting hardware such as molly-bolts or toggle bolts to firmly affix the sensor to the wall. It is best to use standoffs so there is a slight air gap between the sensor and the wall. The sensor can be mounted using available screw holes or a combination of the keyhole and the two bottom screw holes.

Pole Mounting – The sensor can be mounted to a support pole by utilizing Uni-Strut C braces. Attach the C braces to the back of the housing, perpendicular to the sensing chamber direction. Attach clamps to the C brace and run stainless steel band straps around the pole and through the straps.

Use only watertight fittings, either conduit fittings or cable retention fittings. Mount conduit on the bottom side of the housing to prevent moisture from dripping on the control board.

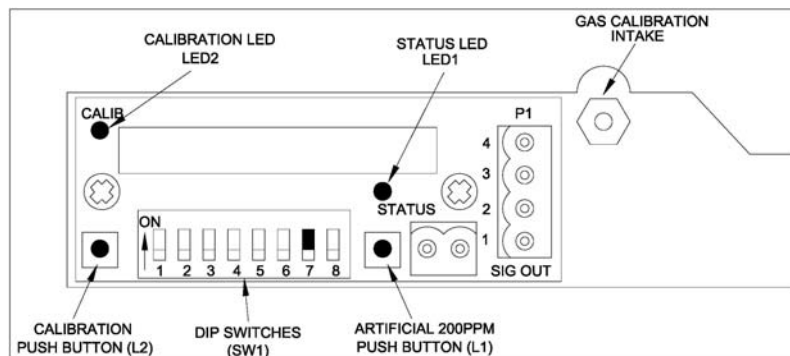
CABLE RUNS

All cabling must avoid running parallel to high voltage (48VDC or greater or any AC voltage wiring). Cable must be greater than 12 inches from high voltage wiring or conduit. Avoid running cable near all inductive loads such as motors, fluorescent fixtures, and transformers. Depending upon local codes, sensor cabling may be run loose or be placed into conduit used exclusively for low voltage control wiring.

Sensor cable shall have the minimum specifications:

- For Stand Alone sensor applications of any length - 18awg, 4 wire, 2 Pair, Twisted, Shielded (i.e. Belden 9552 or equivalent)

OPERATION



COMPONENTS DESCRIPTION AND USE

With the exception of Switch 7 all dip switches should be in off position.

Dip Switches 1, 2 and 3 – Switches 1, 2 and 3 are for communications port addressing and have no function in the field at this time.

Dip Switch 4 – Switch 4 is for auto term offset compensation. It will re-calibrate up to 10ppm every 7 days. No more than 100ppm between manual calibrations. Disable for low level detection.

On Zero Compensation	SW4 = OFF
Disabled	SW4 = ON

Dip Switch 5 – Switch 5 is for field testing at set level

Normal	SW5 = OFF
Fixed 200ppm output	SW5 = ON

Dip Switch 6 – Switch 6 is for factory calibration

Normal	SW6 = OFF
Default Factory Setting	SW6 = ON

Dip Switch 7 – Switch 7 is used to tell the microprocessor on board the sensor that the sensor will be utilized as a stand-alone sensor. This is typically ON for most applications.

Standalone (4-20mA)

SW7 = ON

Dip Switch 8 – Switch 8 is not used.

Push Buttons – Located just on either side of the DIP Switch.

Push Button 1 (Located to the right of the Dip Switch) – (Status LED) It is used for testing the sensor with a 200ppm false signal. Dip switch 5 can be used for the same function.

Push Button 2 (Located to the left of the Dip Switch) – It is used for sensor calibration and is used in conjunction with LED 2.

Light Emitting Diodes

LED L1 – (Status LED) LED L1 will indicate if the sensor microprocessor is operating and if the sensor is in test mode. When the microprocessor goes through a start-up, it will turn on L1 and keep it on unless switch 5 is on or pushbutton 1 is depressed.

Status	Condition
OFF	Sensor is not powered up
	Microprocessor detects an error in the sensor hardware
	Microprocessor failure
ON Steady	Sensor is operating properly
ON Flashing	Switch 5 is set to on or pushbutton 1 is depressed or microprocessor error.

LED L2 – (Calibration LED) LED L2 is used for zero calibration. When pushbutton 2 is pressed, LED 2 will light after 8 seconds and turn off once the button is released.

Status	Condition
OFF	Normal Operation
ON Steady	Factory Calibrated setting. Turn switch 6 off
ON Flashing	Microprocessor error. Call Factory

Stand-Alone Sensor – In this configuration the IR Sensor has an effective sensing range of 0 to approximately 1032ppm

4-20mA Sensor -	0-3.95mA	-	sensor malfunction
	4mA	-	0ppm
	19.5mA	-	1000ppm

The performance equation is: **mA reading = ppm * 0.01551 + 4.0**

CALIBRATION

Prior to shipment all sensors are factory calibrated. The calibration method will set the base level (or zero Level) and gain (or Slope). As the sensor gets older or the ambient condition changes drastically, the Zero Level may drift upward or downward. The Gain (Slope) will not normally change.

ZERO OFFSET CALIBRATION

Adjustments of the zero level are necessary to ensure that the sensor is reading accurately. This should be done every 6 months. Locate the Calibration Push Button (L2) on the sensor located to the left of the dip switch.

- 1) Make sure the unit is properly wired up and all dip switches with exception of 7 is in the off position and allow 6-7 hours of warm up time. Overnight is preferable. For low temperature applications, 18 hours minimum is recommended. The ambient temperature should be stable and within the desired operating range. Make sure no refrigerant gas is present during of zero offset calibration.
- 2) Depress and hold down the push button L2 (located to the left of DIP SW1) for at least 8 seconds until the calibration LED 2 red light comes ON. Release the push button.
- 3) The LED red light will go off . If not, make sure switch 6 is off . Consult factory if calibration LED light stays on or keeps flashing after calibration or during normal operation.

CALIBRATION GAS BUMP TEST

Equipment required

Part# E90783 IR200 Refrigerant Sensor calibration and test kit which includes:

- a) Flow regulating valve – 0.5 LPM for 17L canister.
- b) Vinyl tubing for IR sensor
- c) Carrying case.

Note: Calibration gas cylinder – Nitrogen balance/Calibrated concentration of Refrigerant Gas (Span Gas) sold separately. Must specify type of refrigerant gas in chiller at time of order.

The calibrated gas bump procedure may be used as a double check of sensor accuracy and to verify that the sensor is working properly. This procedure involves changing the

air currents drastically inside the sensing chamber, so use the procedure listed below as a bump test only. Since the gas is forced into the sensor the reading will not be as accurate as a normal factory reading. At the factory we allow for normal airflow that would occur in a real leak when we calibrate the sensor and set the zero gas measured gas because of the unusual air currents involved.

- 1) After at least 6-7 hours of warmup, press the calibration push button (L2) on the sensor left of the dip switches (SW1) for 8 seconds. This will be the zero offset level.
- 2) Place the vinyl tubing that comes with the calibration kit over the gas calibration intake on the right of the terminal block and connect the flow regulating valve to the calibration gas canister specified for the chiller in the room. E.G. 1000ppm R134A.
- 3) Allow the calibrated refrigerant gas into the sensor cell for about 5 minutes. The difference between the calibration gas concentration and the actual reading should be close however the way the gas is pumped in will create errors in the accuracy of the reading. E.G. 1000ppm gas should read ~19.5mA

MAINTENANCE SCHEDULE

It is recommended that infrared sensors are zero offset calibrated every 6 months to insure accuracy. Most of the time zero calibration is all that is needed to re zero the sensor and keep it from false alarming. Calibrated gas bump test should also be used every 6 months for testing accuracy and if the sensor fails to pick up a leak and is suspected of being damaged or faulty.

The sensors life expectancy is approximately 5 to 7 years under normal conditions.

SENSOR EMERGENCY RESET TO ORIGINAL FACTORY SETTING

SENSOR READING NOT KEEPING STEADY

If the sensor reading is floating, ie. not staying at “0”, which can sometimes happen when the sensor push button calibration is done before the recommended warm-up time of at least 6-7 hours (24hours preferred), or if there is bad data in the sensor microprocessor, a factory reset may be necessary.

WARNING! FOLLOW INSTRUCTIONS EXACTLY!

- 1) Flip Switch 6 Up, “Factory Calibration”.
- 2) Hold Down Calibration Push Button. If LED is ON, it may go out when the button is pressed. Hold the button down for at least 8 seconds. The LED will come on.
- 3) Release the button.
- 4) Wait 2 Minutes
- 5) Switch Dip Switch 6 Off.
- 6) Disconnect Power From the Sensor.
- 7) Re-Connect Power.
- 8) Wait a minimum of 6-7 hours (24 hours is preferable).
- 9) Attempt the Push Button procedure again.
- 10) Do control calibration

TROUBLESHOOTING

LED L1 – LED L1 will indicate if the sensor microprocessor is operating and if the sensor is operating in the correct temperature environment. When the microprocessor goes through start up, it will turn on L1 and keep it on unless the microprocessor detects a failure of any sensor components or detects an incorrect temperature range.

LED L2 – LED L2 is used for calibration of the sensor and is normally off. When the Push Button Calibration is done, L2 will turn on in about 8 seconds then turn off when the push button is released.

LED Status	Condition	Solution
L1 Off	Sensor is not powered up	<p>Check power connector. Ensure that the sensor is being powered by 10-32 Volts DC.</p> <p>Ensure that the wire connects are secure and are correct polarity.</p> <p>Microprocessor detects an error in the sensor hardware or Microprocessor Failure. Call factory.</p>
L1 On Steady	Sensor is operating properly	Sensor is working within acceptable limits
L1 On Flashing	<p>Switch 5 is on and there is a 200PPM reading on the sensor</p> <p>Microprocessor detects Error in the sensor signal</p>	<p>Switch Dip Switch SW5 to other position</p> <p>If Switch SW5 does not work, call factory.</p>
L2 Off	Sensor is operating properly	Sensor is working within acceptable limits
L2 On Flashing	Microprocessor failure	Call factory
L2 On Steady	<p>Sensor is on factory Calibration Setting</p> <p>Sensor Reading shows the presence of gas</p>	<p>Turn Dip Switch 6 off and wait at 1 minute for L2 to turn off and do Push Button calibration again.</p> <p>Was the calibration followed. First attempt Push Button procedure. Check area around sensor with a hand held leak detector for a leak. If no leak, move sensor to another location or swap</p>

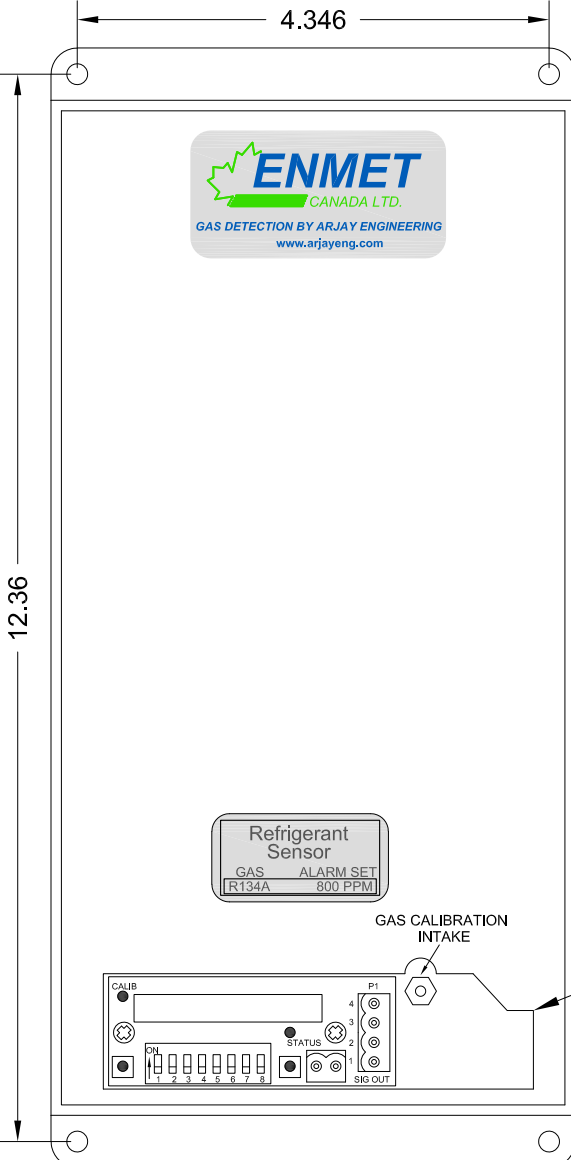
positions with another sensor. If readings move with sensor call factory. If reading stay at original location, check for wiring problems or the presence of gas.

Was proper 7-6 hour warm-up time done before Zero cal?
Perform sensor emergency reset to original factory setting. On page 10.

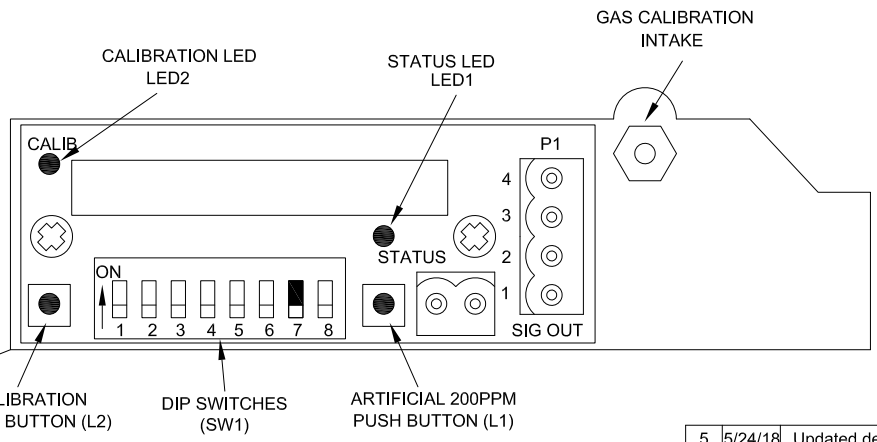
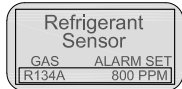
How old is the sensor?

Sensor output indicates a full scale reading.

Check for wiring problems. Turn Dipswitch 5 to on. If the control reads about 200 there could be a sensor problem and contact factory. If it still reads full scale double check for proper wiring. How old is sensor?



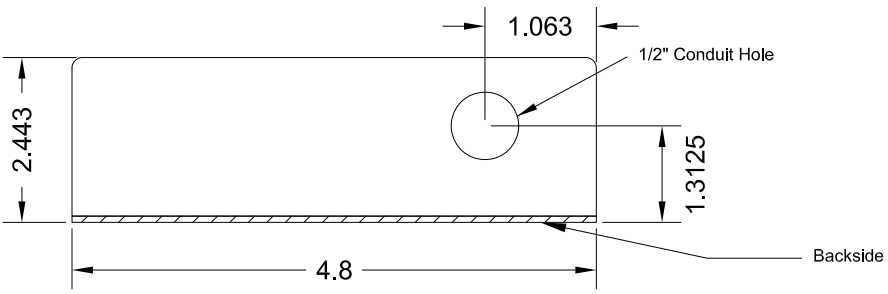
.206" DIA
4 HOLES



GAS TYPE	PART #
R123	E90654
R134A	E90654A
R22	E90654B
R11	E90654C
R12	E90654D
NH3	E90654E

CONNECTOR P1

	4-20 MillAmp
P1-4	V return
P1-3	V+ in (10-36VDC)
P1-2	MA return
P1-1	MA output



REV	DATE	DESCRIPTION	CHK'D	APP'D
5	5/24/18	Updated detail view.		
4	8/14/14	Updated mounting dimensions.		
3	8/22/07	Updated connector P1 description		
2	7/24/05	Removed note "R123/NH3"		
1	7/17/06	Added Ammonia Series		

ARJAY ENGINEERING LIMITED

PROJECT: _____

**REFRIGERANT&AMMONIA
SENSOR PART # E90654 SERIES**

DWG. STATUS	BY	DATE	TITLE
DRAWN	V.H.	07 03 05	REFRIGERANT&AMMONIA SENSOR PART # E90654 SERIES
CHECKED			
APPROVED			
SCALE	REF. DWGS.	DWG. NO.	SHT. REV.
N.T.S.		20050122	1 5



WARRANTY STATEMENT

with options for: Extended Warranty by Purchase
 Extended Warranty by Start-Up Service
 New Home Warranty Act

Seller's Express Warranty. Seller warrants the Purchased Items to be free from defects in materials and workmanship under normal use and service for a period of one year from time of purchase. Seller further warrants that it will perform the Services in a professional and workmanlike manner. Buyer agrees that it has the sole responsibility for the proper selection, application, installation, and/or use of the Purchased Items and for instructions to ultimate users, if any, concerning use, application, periodic maintenance, and cautions regarding the Purchased Items. Buyer agrees that the warranties provided herein shall not apply to any Purchased Item which: (1) has been repaired or altered outside of Seller's factory in any way so as, in Seller's judgment, to affect such Purchased Item's reliability; (2) has been subject to misuse, negligence, or accident; (3) has been operated other than in accordance with the applicable printed instructions provided by Seller; or (4) has been subject to wear of wetted or reactive parts caused by Buyer's application of the Purchased Items.

Seller's Exclusive Obligations Under Warranty. Seller may, at its option, repair or replace, or refund the purchase price of Purchased Items which shall be returned to Seller, no later than one month after the expiration of the applicable warranty period in the manner set forth in this clause, and which Seller's examination shall disclose to Seller's satisfaction to be defective as specified in the warranty clause hereof.

All such Purchased Items shall be returned to Seller at Oakville, Canada; freight, duty and brokerage prepaid, accompanied, or preceded by a particularized statement of the claimed defect. Under such circumstances and if confirmed warranty applicable by Seller, Seller shall bear the cost of repair or replacement and the risk of loss while the Purchased Items are in Seller's possession at Seller's plant. Seller will return warranty product to Buyer prepaid by a freight method of Seller's discretion. SELLER'S OPTION TO REPAIR, REPLACE, OR REFUND THE PURCHASE PRICE FOR PURCHASED ITEMS IS BUYER'S EXCLUSIVE REMEDY AGAINST SELLER WITH RESPECT TO THE PURCHASED ITEMS. SELLER SHALL NOT BE LIABLE TO BUYER, ITS AGENTS, EMPLOYEES, OFFICERS, OR DIRECTORS, FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES, LOSS OF REVENUE OR PROFIT, OR ANY OTHER INDIRECT DAMAGES RELATED TO THE PURCHASED ITEMS OR SERVICES.

Fee based extension:

For an additional fee, the standard factory warranty can be extended. To initiate this process please contact an Arjay Representative to determine price and time allotment.

Start-up Services extension:

The basic factory warranty of one year will be extended if the Arjay Start-up services are purchased along with the instruments on the original order. An additional one year of warranty will apply in addition to the standard one year warranty supplied. Carbon Monoxide sensors cells are included in this extended warranty. All other consumable gas sensor cells are excluded from this additional warranty.

New Home Warranty Act extension:

If the Arjay Start-up services are purchased along with the instruments on the original order and the instrument is further maintained and calibrated a minimum of once per year during the warranty period by an Arjay Authorized Service company, an additional two years of warranty will apply in addition to the standard one year warranty supplied. This warranty extends to Arjay supplied equipment and includes carbon monoxide sensing cells. All other consumable gas sensor cells are excluded from this additional warranty.

Arjay Engineering Ltd.
arjayeng.com



Gas Detection Calibration Services

- single visit calibration and repair
- multi-visit contracts with discounts on multi-year
- on-site or in-shop (Oakville, Ontario) services

We provide:

- ✓ fully trained technicians
- ✓ WSIB Certificates
- ✓ full insurance (2 million liability)
- ✓ Calibration Certificates
- ✓ Stock parts in vehicles and Oakville facility
- ✓ Calibration gas certified to NIST Standards

Our Technicians have:

- ✓ Dangerous Goods Handling Certification
- ✓ St. Johns First Aid Training
- ✓ Fall Arrest Training
- ✓ Confined Space Training (special request)
- ✓ WHMIS Training

Call for a no obligation quote

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