

MODEL 4200-IR-2 (Up to 2 Sensors)
MODEL 4200-IR-4 (Up to 4 Sensors)
MODEL 4200-IR-6 (Up to 6 Sensors)

Refrigerant Monitor User Manual

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<i>MODEL:</i>	
<i>HARDWARE NO.:</i>	
<i>SOFTWARE NO.:</i>	
<i>SERIAL NO.:</i>	

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1.0 INSTRUMENT OVERVIEW

The Arjay Model 4200-IR monitors for refrigerant leaks in Mechanical Equipment Rooms (MER) and chiller rooms.

The monitoring system is comprised of three main components: One main control panel (4200-IR-MP), a minimum of one remote alarm panel and a minimum of one remote sensor.

Depending on the installation requirements, there may be up to 3 remote alarm panels with HMI display (Model: 4200-IR-RP) for indoor use or 6 remote panels with mechanical switch for outdoor use (Model: 4200-IR-N4-RP) and up to 6 remote sensors

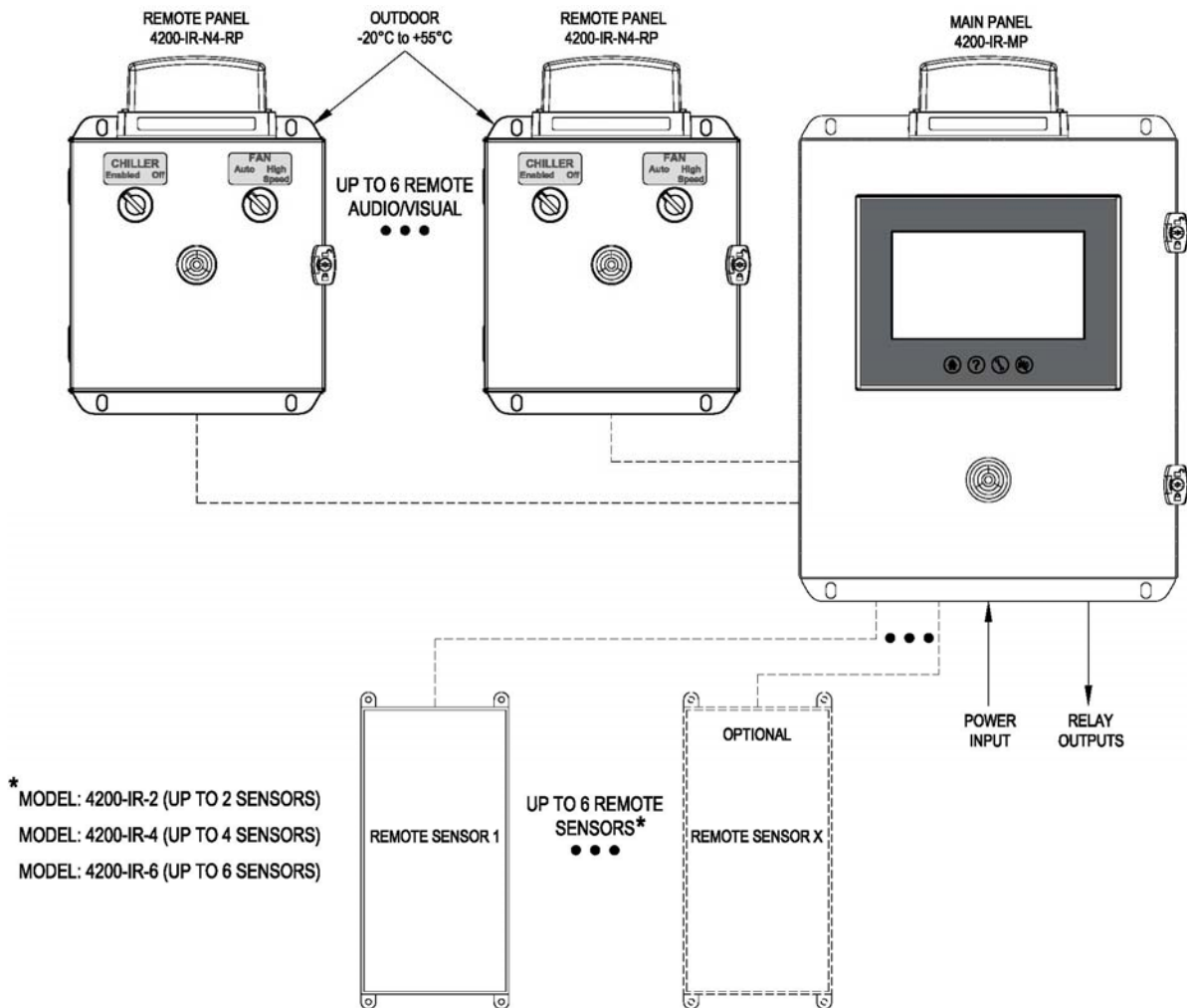
Main control Panel Models:

- 4200-IR-MP-2 Up to 2 Sensors
- 4200-IR-MP-4 Up to 4 Sensors
- 4200-IR-MP-6 Up to 6 Sensors (With Separate Power Supply)

Note: For additional remote panel and sensors, consult factory.

The Model 4200-IR is designed in accordance with guidelines indicated by ASHRAE Standard 15 and CSA B52. Local or site specific regulations may apply to your application. Be aware and compliant with all applicable regulations for your installation.

SYSTEM WITH OUTDOOR REMOTE PANEL



SYSTEM WITH INDOOR REMOTE PANEL

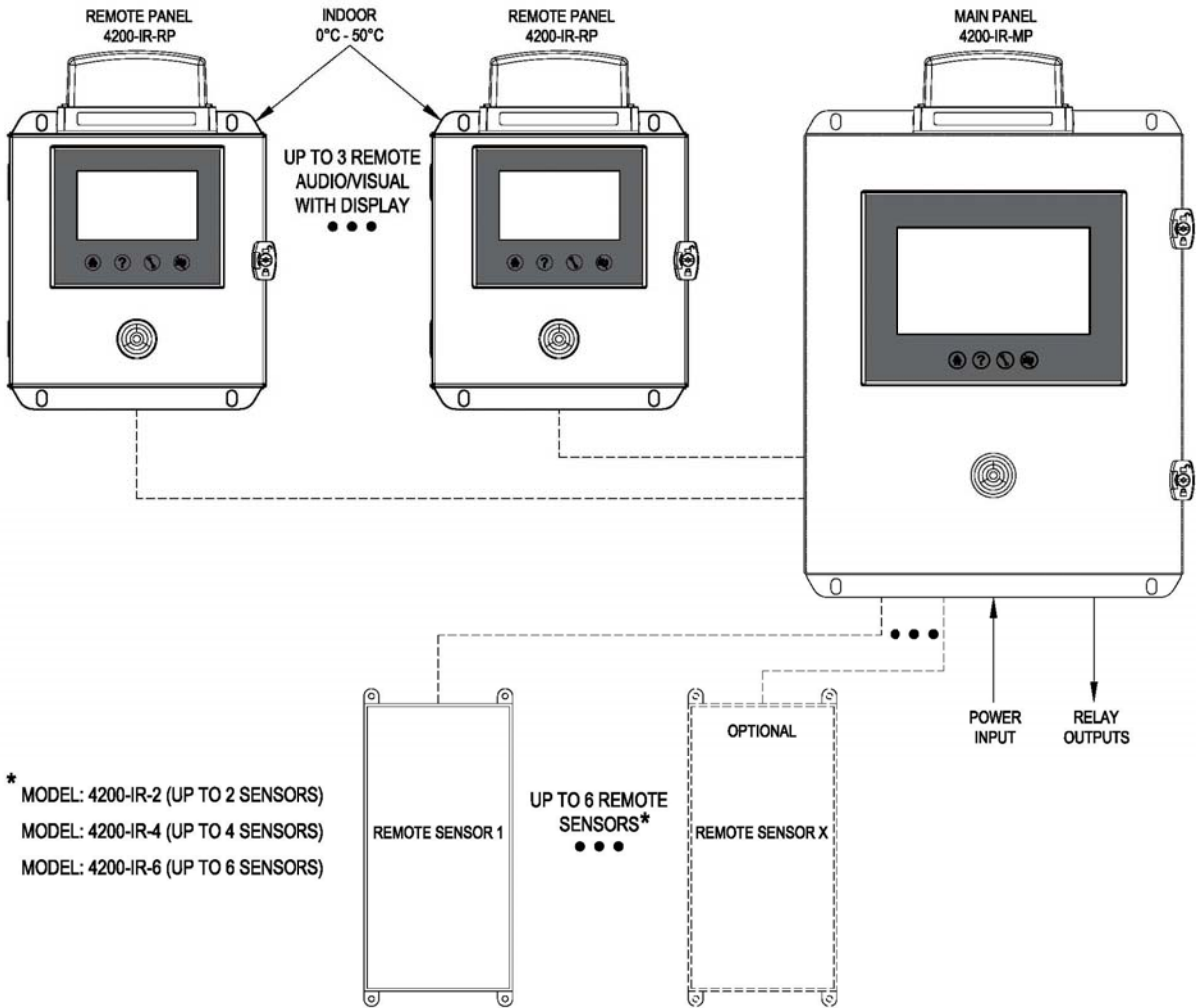


Figure 1 – System Overview

Main Panel

The main panel is located inside the machinery room and is typically installed near a main door for ease of access and observation of alarms. In large rooms, you may want to consider additional remote alarms.

A warning alarm is activated at a low level setpoint and is indicated by the touch screen flashing yellow. The screen text also shows a low alarm and indicates the ppm refrigerant level. Typically, no action is required at this level; it is a warning only. R1 relay can be set as Low Alarm or Fault.

High alarm relays are activated above the TWA-TLV ppm level determined for the refrigerant gas being monitored. One DPDT relay each is provided for BAS or Boiler, Chiller and Ventilation Fan.

During a high alarm, the main panel provides a visual flashing amber beacon and an audio buzzer.

The buzzer can be silenced during an alarm condition but the beacon will only turn off when a gas alarm has cleared and the alarm condition has been acknowledged at the panel.

The main panel screen provides a Push-to-Test and additional user interface menus for diagnostics, set-up and general Help information.

Remote Panel

A remote panel is located outside of each 'entranceway' to the machinery room. Remote Panels are required to indicate an alarm condition to warn of entry into the room. Arjay remote panels include an amber flashing beacon and buzzer in addition to the screen display. For outdoor application it is recommended to use Model: 4200-IR-RP-N4 version. This model replaces the HMI display and uses mechanical switches. This model can operate in temperature of -20°C to +55°C.

A buzzer is not required by code but is included on the standard Arjay remote panel. It can be silenced during an alarm condition and will reset when the alarm condition is cleared.

The touch screen display indicates the ppm concentration and will flash at warning and high alarm levels.

A Push-toTest can be accessed on the remote panel by passcode (not applicable for outdoor versions). Diagnostic and Help menus are also accessible on the remote screens.

Fan and Chiller Override Switches

Although chiller switches are not required as part of the refrigerant monitoring panels, code guidelines require Ventilation Fan ON switches to be available inside and outside a refrigeration machinery room. Arjay panels include Ventilation ON switches and Chiller OFF switches on all panels. These will override the corresponding relay within the Main Control Panel. The switches on the remote panel are passcode protected or Keylocked (outdoor version).

Since the codes do not require the chiller to be interlocked with Refrigerant Panel, the Chiller OFF switch is not shown on the factory shipped screen. This can be enabled in alarm setup.

Remote Sensor

The sensor is a non-dispersive infrared technology designed to selectively target the refrigerant gas type.

The sensor continuously monitors the air and sends a signal to main control panel. The signal is proportional to the ppm refrigerant concentration at the sensor. Routine testing and calibration is recommended to ensure the sensor is responsive and accurate. Calibration is done at the sensor (see sensor manual).

Fan Running Indication

A fan running icon appears in the main screen when the fan operating input voltage (24VDC) is connected thru the auxillary starter contacts to the main panel. The icon will indicate low fan and/or high fan speed. Refer to ventilation light wiring diagram for more detail.

1.1 Features

- Microprocessor based Controller
- Relays for Alarm Outputs:
 - *Four* Relays for 4200-IR-2-MP
 - *Five* Relays for 4200-IR -4-MP
 - *Six* Relays for 4200-IR-6-MP
- Touch Screen interface with passcode protection and display ppm value
- Diagnostic, set-up and Help menus on all screens
- Non-dispersive infrared sensor for long life and gas selectivity
- Designed in accordance with CSA B52 and ASHRAE Standard 15

1.2 Main Panel Model Number

- 4200-IR-2-MP Two Sensor Inputs
- 4200-IR-4-MP Four Sensor Inputs
- 4200-IR-6-MP Six Sensor Inputs (With separate power supply)

Maximum Remote Panel: 3 for Indoor version (consult factory if more than 3 required) **or
6 for Outdoor version for all above models

1.3 Specifications

Power Input: 100-240 vac, 50/60 Hz,
1.95A max. (for 2 and 4 sensor models) or 4A max (for 6 sensor model)

User Interface:

Touch Screen Full Colour 6 “ display on Main Panel
Monochrome 4” on Remote (Indoor Version Only)

Outputs:

Relay Output DPDT relay, 8 A @ 250 vac dry contacts
Selectable failsafe or non-failsafe
Programmable time delay: 0 – 1200 seconds ON and OFF
One relay each for:

- Low Setpoint or Fault (Selectable)
- High Setpoint Boiler or BAS interlock
- High Setpoint Fan Interlock
- High Setpoint Chiller Interlock*

*(2x DPDT for 4200-IR-4-MP and 3x DPDT for 4200-IR-6-MP)

RS485 Modbus Optional

Analog Output Optional

Bacnet Optional

Sensor Non-Dispersive Infrared
 24 vdc powered from Main Panel
 Expected life: 5-7 years under normal conditions

Environmental:

Ambient Temperature 0°C to +55 °C (Main & Remote panels with HMI displays must be installed indoor).
 -20°C to +55 °C (4200-IR-RP-N4 Remote Panel with Mechanical Switch)

Relative humidity 0 to 95% (non-condensing)

Installation Category II

Pollution Degree 2

Mechanical Specification: Refer to dimensional drawing

1.4 Gas Levels

These factory defaulted settings can be changed in the field by the customer to suit specific requirements.

GAS NAME	LOW LEVEL	HIGH LEVEL	RANGE
R123	30	50	1031
R134A	500	800	1031
R22	500	800	1031
R11	500	800	1031
R404A	500	800	1031
R407A	500	800	1031
R407C	500	800	1031
R410A	500	800	1031
R507	500	800	1031

2.0 INSTALLATION

NOTE: If any damage to the instrument is found, please notify an Arjay Engineering Ltd. representative as soon as possible prior to installation.

2.1 Main and Remote Panel Installation

Choose a mounting location in accordance with good instrument practice. Extremes of ambient temperature and vibration should be avoided (see specifications and installation drawing).

Sensors and remote panels can be mounted up to 300 meters away from the main panel.

Important Note: The controller can be set in a Failsafe mode. This means that the relays are in an energized state during normal operation. The N.O. relay contact will be held closed and the N.C. relay contact will be held open during a normal condition. This will allow the relay to return to its non-energized (shelf) state during an alarm, fault or power failure condition. **Wire accordingly.**

2.2 Sensor Installation

The sensor is to be mounted near the refrigerant leak source and protected from extremes of temperature and damage. Keep the sensor accessible for routine calibration. Do not block with equipment or store materials or containers in front of the sensor.

It should be mounted so the bottom of the sensor housing is approximately 250mm to 450mm (10" to 18") above floor grade to protect it from damage from cleaning equipment and minor wash down.

The sensor should be mounted close to the potential refrigerant leak source on the downstream side of any room ventilation currents. One sensor can often be used to monitor two adjacent chillers.

The sensor should be mounted above any risk of flooding.

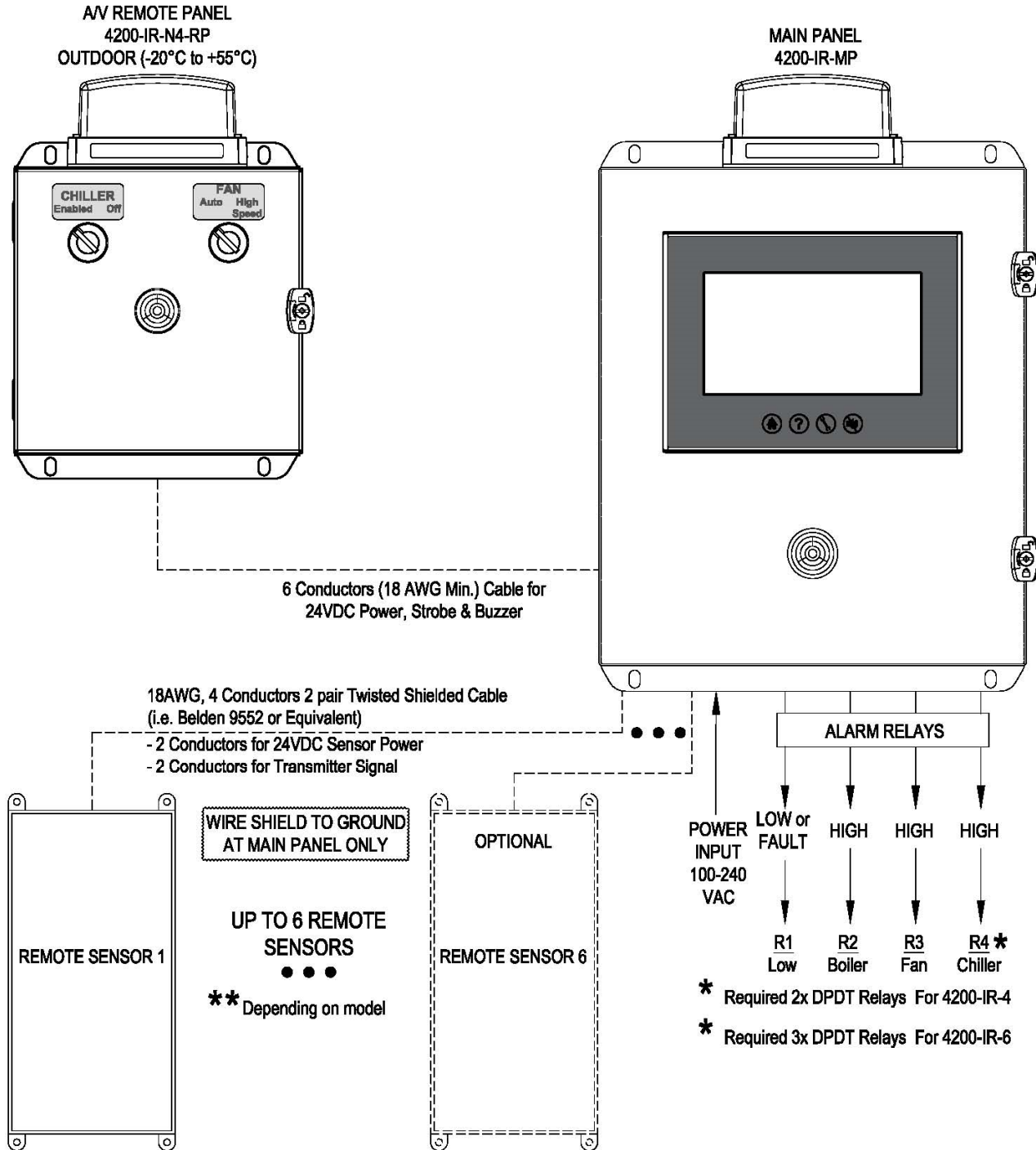
Note: Sensor cable shall have a minimum specification:

- 18 AWG, 4 Wire, 2 Pair, Twisted, Shielded Cable (i.e. Belden 9552 or equivalent).

2.3 Electrical Installation

Refer to the drawings provided by the contractual engineer for your project and the drawings included with this manual.

SYSTEM WITH OUTDOOR REMOTE PANELS



SYSTEM WITH INDOOR REMOTE PANELS

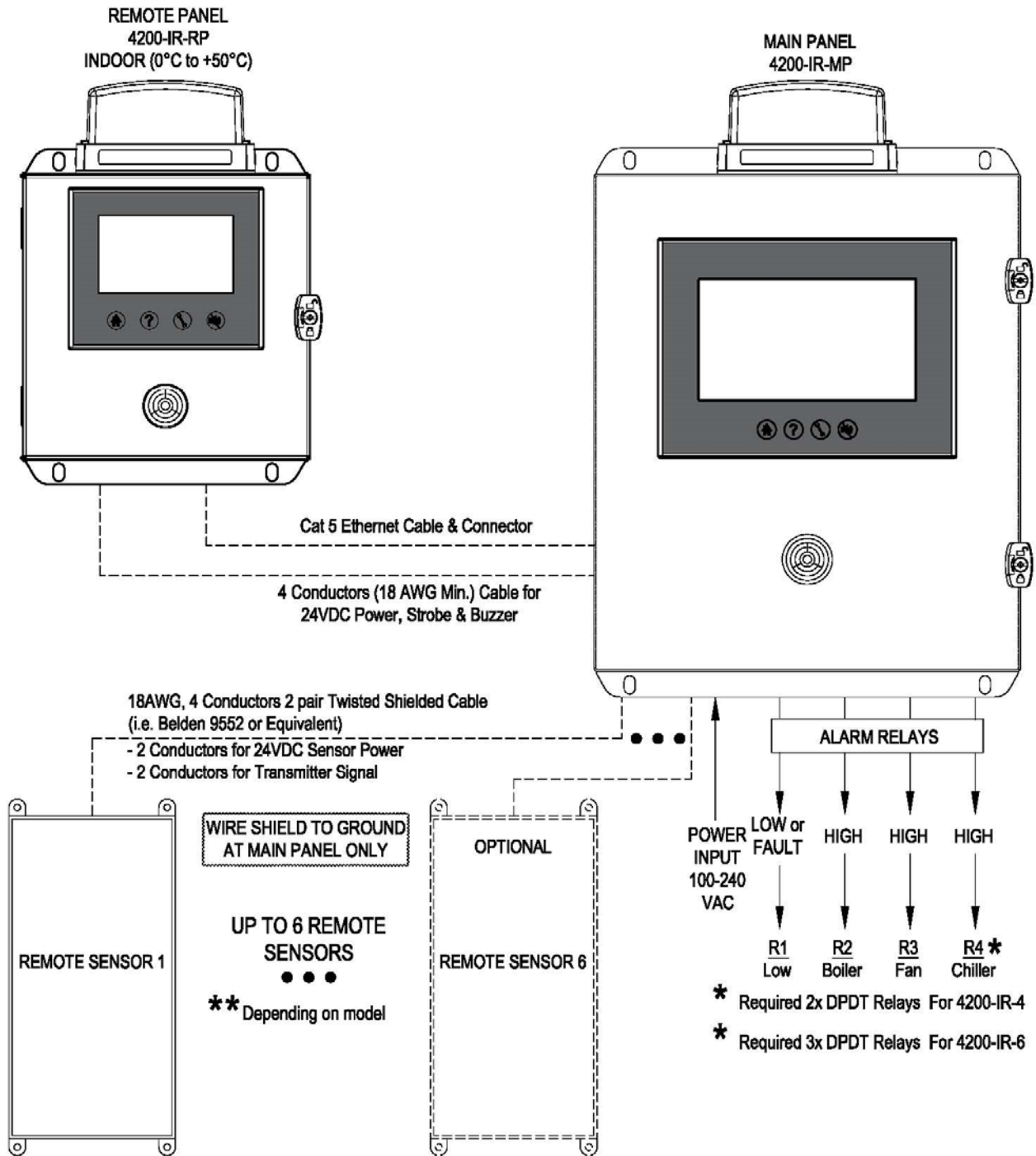


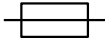
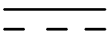






Figure 2 – Electrical Installation Overview

2.4 Glossary of Symbols

	Attention, consult accompanying documents Attention, veuillez consulter les documents ci-joints.		
	Protective Earth Terre de protection		Fuse Coupe-circuit; fusible
	Direct Current (DC) Courant continu		Normally open relay contacts Contacts travail
	Normally closed relay contacts Contacts Repos		Power off ArrÔ (mise hors tension)
	Power on Marche (mise sous tension)	L	Live Sous tension
N	Neutral Neutre	G	Ground Terre

All screen shots herein are provided for illustration purposes only. Actual screen may vary depending on control panel model.

3.0 STARTUP AND CALIBRATION

3.1 Startup

Check that the power wiring, sensor and remote panel connections, and interfaced equipment are wired in accordance with the electrical installation drawings.

Power On the unit.

The main screen will light up and run through initialization. After any operator power start up or power interruption, an operator must acknowledge the power-up condition. The display will indicate it was non-gas power-up condition and that it must be acknowledged to proceed.

The main and remote panels are set to factory defaults or customer specifications. The sensor is factory tested prior to shipment. As such, the system will be operational upon start-up.

After the power-up is acknowledged, confirm the screen reads similar as follows.

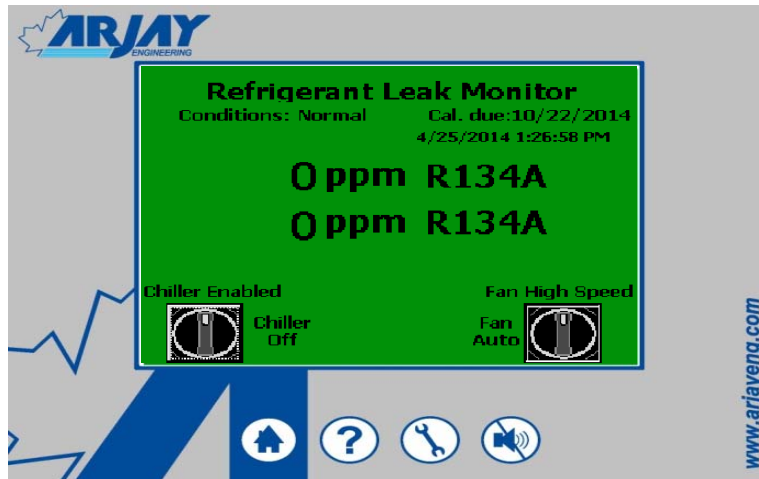


Figure 3 – Startup Main Screen View

3.2 Screen Menu Background Information

3.2.1 Keypad Main Menu Entry

Below the touch screen are 4 touch keys.



Home

At any time, you can press the Home Key to return directly to the Home Screen



Help

This provides an overview of the system operation and components. Contact details for technical help are included at the end of the text.



Tools


Access this section to view or configure the screen and control settings, view diagnostics or to do a system alarm test.



Silence

During an alarm condition the audio can be silenced. Silencing at any panel will silence all panels. The audio alarm will automatically re-set when the alarm clears.

4.0 SYSTEM CONFIGURATION

This section describes the screen, alarm and interface features accessed through the  of the Main Panel.

Press “  “

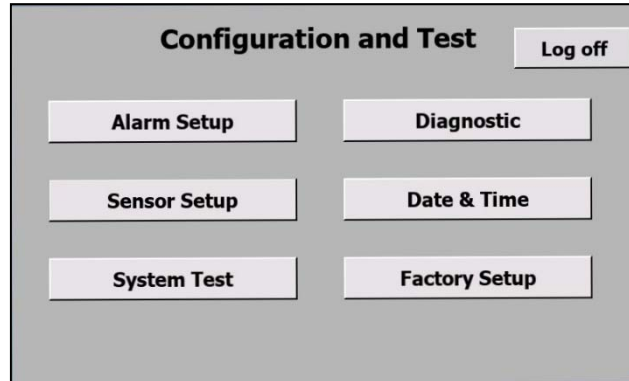


Figure 4 – System Configuration Main Screen View

Log Off: This feature is used if user wants to manually log off from passcode protected menu at any time. When user is in a passcode protected menu, it will stay logged in for 20 minutes from last activity.

4.1 Alarm Setup

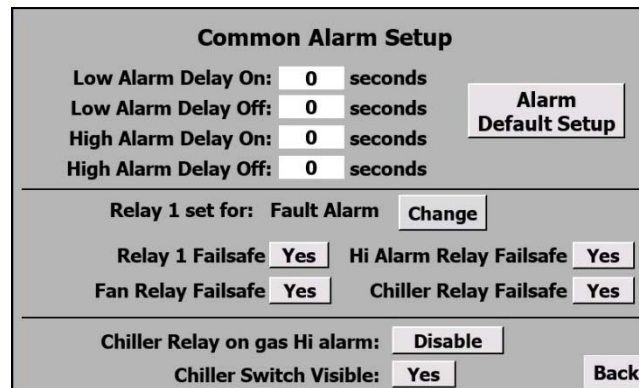


Figure 5 – Alarm Setup Screen View

The Passcode 2000 will be required to make changes in this section.

There are two alarm settings: Low alarm and High Alarm.

The low alarm is on early warning level that refrigerant gas is present. It is not unusual to have trace levels of gas present during maintenance operations on refrigerant equipment. The screen will flash yellow and conditions: Low Alarm. If required R1 relay can be set as Low Alarm instead of fault.

The high alarm is for activation of the audio/visual alarms, ventilation fans and other customer interlocks. The screen will flash red and conditions: High Alarm. Three relays are provided: Boiler/Bas alarm, Fan Relay, Chiller Relay. The Fan and Chiller relays can be overridden with a touch screen override switch.

Relay1 is factory set as Fault. If sensor is in fault, the screen will flash red and conditions: Sensor Fault.

DELAY SETUP

The low and high alarm delay settings are as follows:

Delay ON. This is the time, in seconds, that the relays will delay before activating when the ppm setpoint has been reached. Delay ON is used to suppress a nuisance alarm that may be caused by a spurious or momentary alarm of gas.

Delay OFF. The time, in seconds, that the relays will stay on after the ppm has dropped below the setpoint. Delay OFF is used to keep ventilation fans running after the sensor has cleared to assist ventilating any areas that may not be clear due to poor ventilation.

FAILSAFE SETUP

Failsafe will determine if the relays are energized or de-energized during a normal operating state (no alarm condition).

If Failsafe is YES, the relay will be energized during a normal operating condition. An alarm or power failure will de-energize the relay to the alarm state.

When in Failsafe mode and during a normal condition, the N.O. contact is closed and the N.C. contacts is open. WIRE ACCORDINGLY.

CHILLER RELAY AND CHILLER OVERRIDE SWITCH

There is an option to Disable or Enable Chiller relay. If disabled, the Chiller relay can only be activated by the manual Override Switch and will not turn off automatically if there is any alarm condition.

Chiller Switch **Yes** will make the Chiller switch accessible to manually override the relay and turn off the chiller.

If the Chiller relay is not wired to turn to off Chiller, is recommended to set the Chiller Switch to **No** so that it is hidden and not mistaken as active.

ALARM DEFAULT SETUP

These keys are only activated when a unique user passcode is entered. It is used during factory setup only.

4.2 Diagnostic Information

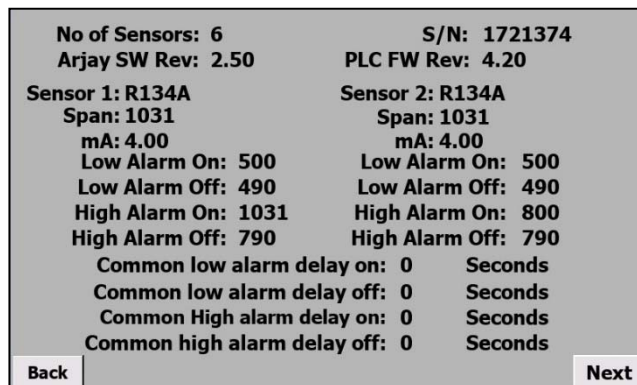


Figure 6 – Diagnostic Information Screen View

This is a View Only screen. It provides the alarm and sensor setup details that have been entered for this unit. Setup and sensor changes can be made through the passcode protected Alarm and Sensor Setup menu.

4.3 Sensor Setup

The Passcode 2000 will be required to make changes in this section.

4.3.1 Individual Sensor Setup

Select the sensor required to be setup. If the required sensor is not shown then refer to Section 4.3.2. to change quantity.

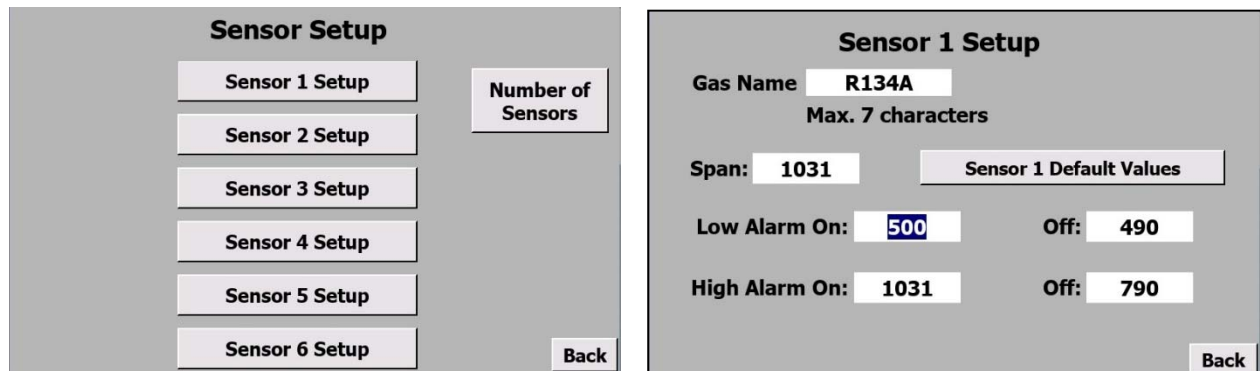


Figure 7 – Sensor Setup Screen View

Gas Name

You can enter the gas name or identifier. This will show on the main screen adjacent to the ppm concentration. This has been factory set according to the sensor shipped with this panel.

Span

This will determine the 4-20 mA output range (if ordered). This is determined by the sensor type and is factory set according to the sensor shipped with this panel.

Low Alarm ON

This will determine the ppm concentration at which the low alarm relay activates. At this setpoint, the screen will flash yellow.

Low Alarm OFF

This will determine the ppm concentration at which the low alarm will turn off. This is typically 10 ppm or more to suppress chattering of alarms if the gas concentration is hovering at the setpoint. The low alarm will clear automatically if the ppm levels drop below the alarm levels.

High Alarm ON

This will determine the ppm concentration at which the high alarm relays activate. At this setpoint, the screen will flash red, the beacon will flash at all panels, and all audio alarms will be activated.

By code, this alarm will latch. If the gas level drops below the alarm level, the audio turns off and visual alarms will remain on. The screens will indicate that the gas levels are normal. A Push to Reset button will show on the screen to manually reset the system.

High Alarm OFF

This will determine the ppm concentration at which the screen will indicate the gas condition has cleared.

Sensors default Values

These keys are only activated when a unique user passcode is entered. It is used during factory setup only

4.3.2 Number of Sensors

This button allows user to change the total number of sensors being used in the system. This feature will require factory consult level 2 passcode. Check model of controller to verify maximum number of sensors.

4.3.3 Analog Input Trim

This button allows user to trim/modify analog input values. This feature will require factory consult level 2 passcode.

- 1) Press Analog Input Trim/Modify
- 2) Select desire sensor to be trimmed (In this example we will use Sensor 1)
- 3) Connect mA generator to sensor 1 input. Set the mA generator to 4mA and press 4mA Input Trim button.
- 4) Set the mA generator to 20mA and press 20mA Input trim button.

Repeat setup 1 for each sensor.

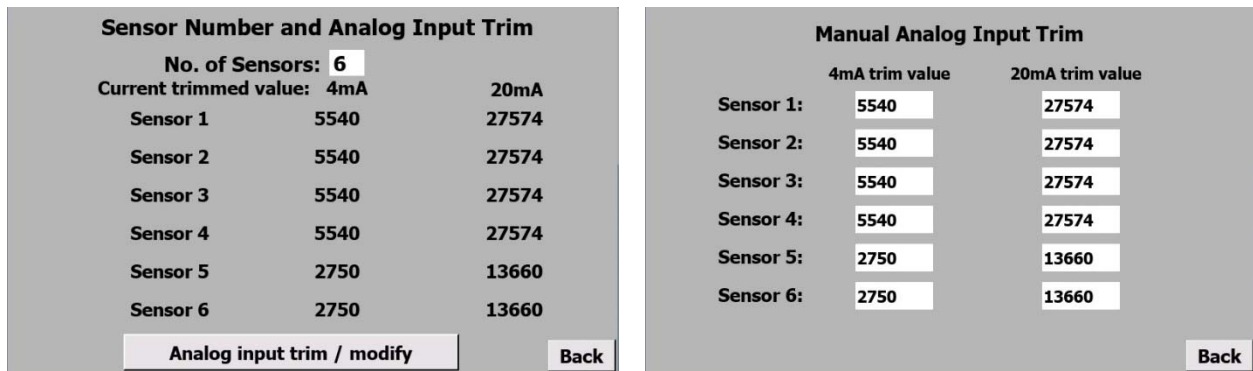


Figure 8 – Analog Input Trim Screen View

4.4 System Test

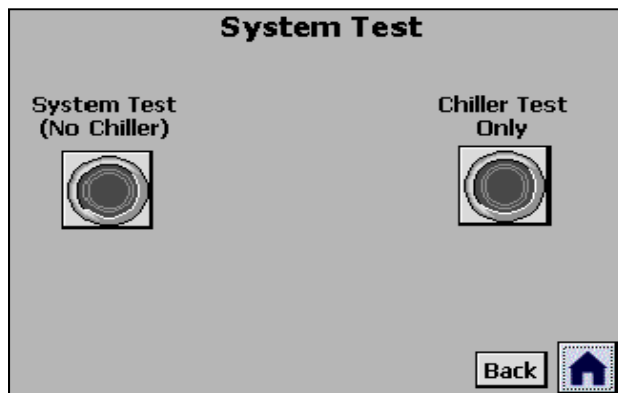


Figure 9 – System Test Screen View

The audio and visual alarm functions of the main and remote panels can be tested. Follow the screen instructions to clear the alarms after testing. The system test can be initiated from any panel, however, the remote panels are passcode protected.

System Test will activate the Low (if selected), Boiler, and Fan Relays only along with the audio/visual alarms. Chiller Test will activate the Chiller Relay only along with the audio/visual alarms.

4.5 Factory Setup

This screen is to enter the serial, firmware data and title. It is only accessible by a unique user name and passcode.

4.6 Factory Defaulted Sequence of Operation

(See section 1.4 for list of Alarm Levels)

1. Upon sensing a concentration at the sensor at the low alarm setpoint of 500 ppm for a Group A refrigerants, the main screen will flash yellow and a Low Level Warning will be indicated on all screens. No control action is activated. The alarms will automatically deactivate when the concentration falls below 490 ppm.
2. Upon sensing a concentration at the sensor at the high alarm setpoint of 800 ppm for a Group A refrigerants, the main screen will flash red and a High Level Alarm will be indicated on all screens. The buzzer can be manually silenced during the alarm condition. When the gas concentration decreases to below 790 ppm, the alarms will remain latched and must be manually acknowledged with the Reset Button to de-activate.
3. The alarm activation is instantaneous and the field settable time delays are set to 0 seconds.

These factory defaulted settings can be changed in the field by the customer to suit specific requirements. Follow the guideline presented in this manual.

4.7 Date and Time

The 4200-IR has a real time clock to remind users of impending calibration duties. The reminder frequency can be entered here. When a calibration is performed, Press the **Record** calibration icon to initiate reminder countdown timer. In order to change date and time, follow the steps below:

1. Press "tool" button.
2. Press " Date and Time" icon on HMI display.
3. Press "Change" icon.
4. Enter proper date and time.
5. Press "enter" icon

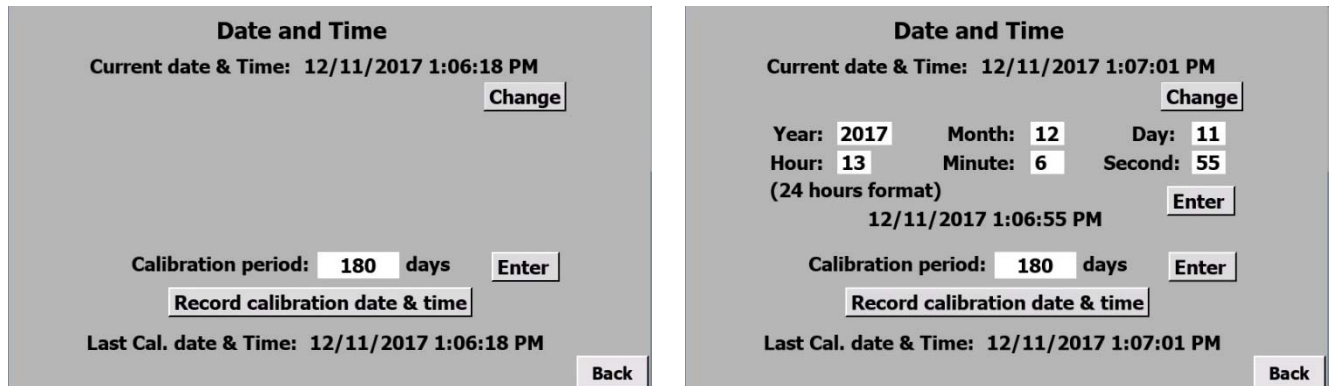


Figure 10 – Date and Time Screen View

5.0 MAIN DISPLAY

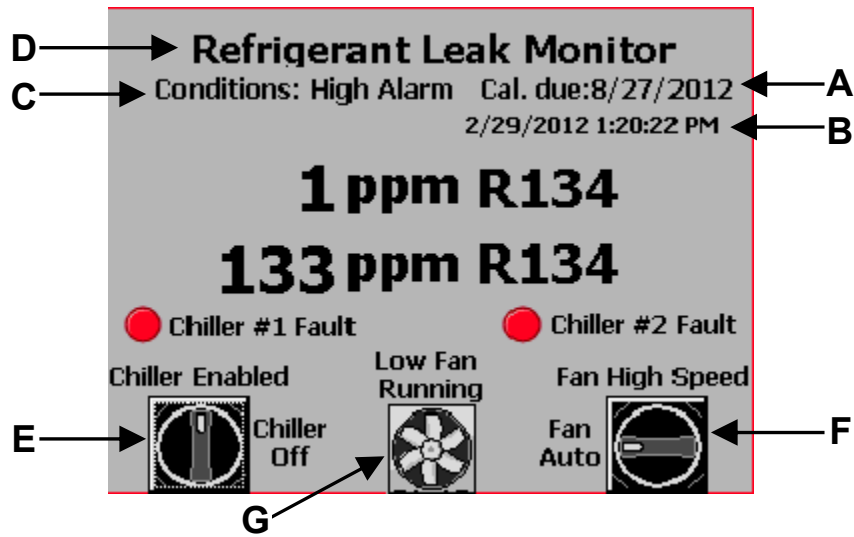


Figure 11 –Main Display Screen View

- A. Calibration Due date.
- B. Real date and time
- C. Alarm Condition
- D. Main title
- E. Chiller switch
- F. Fan Switch
- G. Fan running indication (see ventilation light wiring drawings for detail)

6.0 SENSOR CALIBRATION

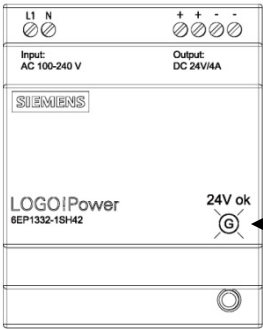
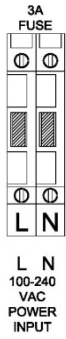
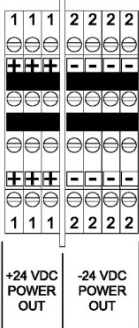
Refer to the specific sensor Instruction Manual included with this manual for the sensor calibration details.

The sensor is factory calibrated and will operate upon installation, however, the sensor response should be verified after installation with a calibration or test gas. Re-calibrate if necessary.

Routine verification of the sensor response and confirmation of the panel alarms and interlocks is recommended. Verification every 6 months is recommended. Re-calibrate as necessary.

7.0 TROUBLESHOOTING

Main Panel

 <p>Diagram of the main panel showing input and output specifications. The input is AC 100-240 V and the output is DC 24V/4A. A green LED labeled "24V ok" is shown, with an arrow pointing to it and the text "Green LED".</p>	<p>Confirm the power supply LED is active (Green).</p>
 <p>Diagram of a 3A fuse labeled "3A FUSE" and "L N". Below the fuse, it says "L N 100-240 VAC POWER INPUT".</p>	<p>Confirm the Power Input is 100-240VAC using a meter.</p>
 <p>Diagram of a terminal block with labels for "+24 VDC POWER OUT" and "-24 VDC POWER OUT". The terminal block has two columns of terminals, with the left column labeled "1 1 1" and the right column labeled "2 2 2".</p>	<p>Confirm the sensor power is 24VDC using a meter.</p>

8.0 MODBUS MAP AND DETAIL (IF ORDERED)

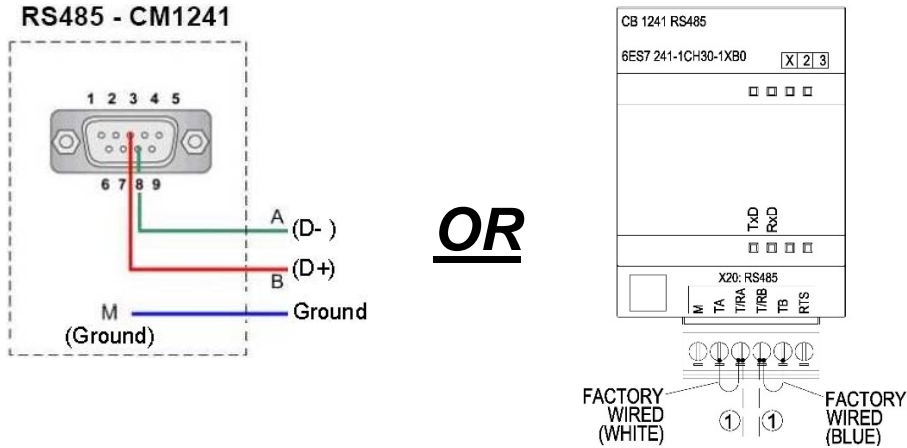
2 Wire RS-485 (1/2 Duplex)

9600 Baud, Even parity, 8 Data bits, 1 stop bit.

For connection to a PC, an RS-485 to USB converter module and modbus software (Modbus Poll, DAQfactory, etc.) can be used.

The following RS-485-USB converter has been tested with the system:

Model: UT-850 (Manufacturer: Gridconnect)



① Connect "TA" and "TB" as shown above to Terminate the Network

8.1 Modbus Commands Supported

Read Coil Status Function Code: 01. Used to read relays output from PLC
 Read Holding Registers Function Code: 03. Used to read values from PLC

8.2 Register Map

Please contact Arjay Engineering Ltd. For future detail.

9.0 DETAILED ELECTRICAL AND DIMENSIONAL DRAWINGS

Drawings are included in this section that are specific to your model ordered.

If drawings are not included here, record the serial number on the left outside wall of the main panel and contact:

ARJAY ENGINEERING TECHNICAL SUPPORT

(800) 387-9487

+1 (905) 829-2418

www.arjayeng.com



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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