
Gas Detection Device

IVA301EM User Manual

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Symbol Definitions

The following table lists the symbols used in this document to denote certain conditions:

Symbol	Definition
	ATTENTION: Identifies information that requires special consideration
	TIP: Identifies advice or hints for the user, often in terms of performing a task
	REFERENCE _ INTERNAL: Identifies an additional source of information within the bookset.
CAUTION	Indicates a situation which, if not avoided, may result in equipment or work (data) on the system being damaged or lost, or may result in the inability to properly operate the process.
	CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. CAUTION: Symbol on the equipment refers the user to the product manual for additional information. The symbol appears next to required information in the manual.
	WARNING: Indicates a potentially hazardous situation which, if not avoided, could result in serious injury or death. WARNING symbol on the equipment refers the user to the product manual for additional information. The symbol appears next to required information in the manual.

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Introduction

Description

The result of extensive research and design, the IVA301EM uses the latest in infrared technology. The IVA301EM can have up to 20 sensors connected to allow for accurate monitoring of even the lowest gas concentration.

The IVA301EM (with an LCD display and keypad) can be installed in a location separate from the detection area, making it safer to monitor gas readings.

The IVA301EM also offers 4-20mA outputs, relay outputs, Modbus communication, audible alarm options and is compatible with our IVA301C controller.

Intended Use

The availability and costs associated with refrigerant gases make monitoring a necessity for managing equipment rooms. This refrigerant detector provides early warning of refrigerant leaks, which enhancing the refrigerant conservation strategy by monitoring equipment room refrigerant gas concentrations. Toxic and combustible sensors can be linked to the IVA301EM, allowing it to meet the broadest range of customer requirements. The IVA301EM Expansion Module has been carefully designed with several factory programmed configurations that meet or exceed ASHRAE B-52 or 15-2201 standards.

Unpacking

After opening the package, remove the equipment and components. Please make sure that all the items described on the order form or bill of lading are actually in the box and are undamaged.

Installation Instructions

Installation Guidelines

These guidelines must be strictly observed to ensure that the equipment will work properly.

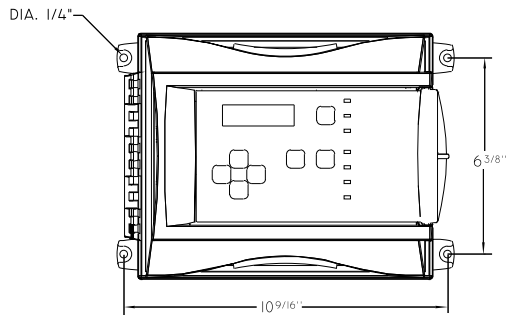
Make sure to locate all units easily accessible for proper service.

- Avoid any location where units could be subject to vibrations.
- Avoid any location close to any electromagnetic interference.
- Avoid any location where there are large temperature swings.
- Verify local requirements and existing regulations which may affect the choice of location.

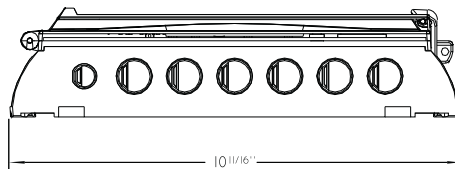
Wall Mount Installation

We recommend installing the monitor at a height of 1.5 m (4.9 ft) from the ground (eye level).

- Mark two holes 162mm (6 3/8") apart in height
- Mark two holes 268.3mm (10 9/16") apart in width
- Drill 6.35mm (1/4") holes and prepare as necessary
- Mount unit with appropriate screws



Remember to pass all wiring through knock-outs at base of unit, using the appropriate conduit.



Recommended Sensor Installation Heights

The installation heights recommended represent general guidelines. Always confirm with local laws and regulations before proceeding, as these take precedence over manufacturer's recommendations.

Detected Gas		Relative Density (air = 1)	Installation Height
CO	Carbon Monoxide	0.968	1 - 1.5 m (3 - 5 ft.) from floor
*NO2	Nitrogen Dioxide	1.58 (cold)	30 cm -1 m (1-3 ft.) from ceiling
H2	Hydrogen	0.07	30 cm (1 ft.) from ceiling
CL2	Chlorine	2.50	30 cm (1 ft.) from floor
H2S	Hydrogen Sulfide	1.19	30 cm (1 ft.) from floor
O2	Oxygen	1.43	1 - 1.5 m (3 - 5 ft.) from floor
HCL	Hydrogen Chloride	1.30	30 cm (1 ft.) from floor
HCN	Hydrogen Cyanide	0.932	30 cm (1 ft.) from ceiling
ETO	Ethylene Oxide	1.50	30 cm (1 ft.) from floor
SO2	Sulfur Dioxide	2.25	30 cm (1 ft.) from floor
R11	Refrigerants	5.04	30 cm (1 ft.) from floor
R12	Refrigerants	4.20	30 cm (1 ft.) from floor
R13B1	Refrigerants	5.14	30 cm (1 ft.) from floor
R114	Refrigerants	5.9	30 cm (1 ft.) from floor
R22	Refrigerants	3.11	30 cm (1 ft.) from floor
R123	Refrigerants	5.27	30 cm (1 ft.) from floor
R125	Refrigerants	4.14	30 cm (1 ft.) from floor
R134A	Refrigerants	3.52	30 cm (1 ft.) from floor
R227	Refrigerants	5.90	30 cm (1 ft.) from floor
R245A	Refrigerants		30 cm (1 ft.) from floor
R404A	Refrigerants	3.43	30 cm (1 ft.) from floor
R407C	Refrigerants	3.0	30 cm (1 ft.) from floor
R410A	Refrigerants	3.0	30 cm (1 ft.) from floor
R507	Refrigerants	3.43	30 cm (1 ft.) from floor
R508b	Refrigerants		30 cm (1 ft.) from floor
COMB	Most combustibles are heavier than air, with the exception of methane, hydrogen, ethylene and acetylene. Sensors for gases that are heavier than air should be installed approximately 30 cm (1 foot) from the floor. For combustibles that are lighter than air, sensors should be installed 30 cm (1 foot) from the ceiling, close to the potential leak source.		

* May differ in certain applications. Hot NO₂ from exhaust systems is lighter than ambient air.

Installation Instructions

Determining the Number of Transmitters

Determining the Number of Transmitters

The number of units required to protect an area is determined by the unit's detection radius, which depends on the type of gas detected, as shown in the following table.

Gas Detected		Surveillance Radius	Area Covered
CO	Carbon monoxide	15 m (50 ft)	707 m ² (7610 ft ²)
NO2	Nitrogen dioxide	15 m (50 ft)	707 m ² (7610 ft ²)
	Others	7 m (23 ft)	154 m ² (1658 ft ²)

Range and Alarm Levels

	Gas Detected	Range	Alarm A	Alarm B	Alarm C
CL2	Chlorine	0-15 ppm	0.5 ppm	1 ppm	13,5 ppm
CO	Carbon monoxide	0-250 ppm	25 ppm	200 ppm	225 ppm
H2S	Hydrogen sulfide	0-50 ppm	10 ppm	15 ppm	45 ppm
NO2	Nitrogen dioxide	0-10 ppm	0.72 ppm	2 ppm	9 ppm
O2	Oxygen	0-25% Vol.	19.5% Vol.	22% Vol.	22,5% Vol.
SO2	Sulfur dioxide	0-10 ppm	2 ppm	5 ppm	9 ppm
R-123	Refrigerant	0-1000 ppm	50 ppm	500 ppm	900 ppm
R-11	Refrigerant	0-1000 ppm	250 ppm	500 ppm	900 ppm
R-12	Refrigerant	0-1000 ppm	250 ppm	500 ppm	900 ppm
R13B1	Refrigerant	0-1000 ppm	250 ppm	500 ppm	900 ppm
R114	Refrigerant	0-1000 ppm	250 ppm	500 ppm	900 ppm
R-22	Refrigerant	0-1000 ppm	250 ppm	500 ppm	900 ppm
R-125	Refrigerant	0-1000 ppm	250 ppm	500 ppm	900 ppm
R134A	Refrigerant	0-1000 ppm	250 ppm	500 ppm	900 ppm
R227	Refrigerant	0-1000 ppm	250 ppm	500 ppm	900 ppm
R245A	Refrigerant	0-1000 ppm	250 ppm	500 ppm	900 ppm
R404A	Refrigerant	0-1000 ppm	250 ppm	500 ppm	900 ppm
R407C	Refrigerant	0-1000 ppm	250 ppm	500 ppm	900 ppm
R410A	Refrigerant	0-1000 ppm	250 ppm	500 ppm	900 ppm
R507	Refrigerant	0-1000 ppm	250 ppm	500 ppm	900 ppm
R508b	Refrigerant	0-1000 ppm	250 ppm	500 ppm	900 ppm
Comb	Combustibles	0-100% LEL	25% LEL	50% LEL	90% LEL

A different alarm level may have been programmed in order to satisfy the constraints of a particular application.

Deadband and Accuracy

(Refrigerant detection)

The deadband is the area of signal or detection range where no action occurs. The IRF deadband is 20 ppm.

Installation Instructions

Determining the Number of Transmitters

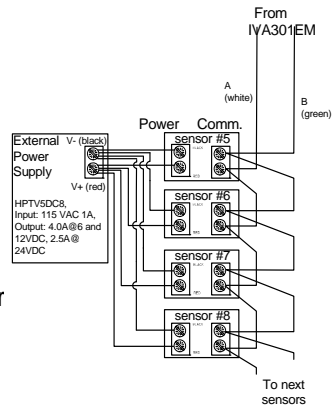
Installing Optional Remote Sensors

IVA301IRFS Sensor

The refrigerant sensor should be installed at the recommended height, which is 30 cm (1 foot) from the floor.

Communication cables should be 2-24 AWG, twisted and shielded (Belden 9841 or equivalent), which should be connected in a daisy chain from the IVA301EM (as shown).

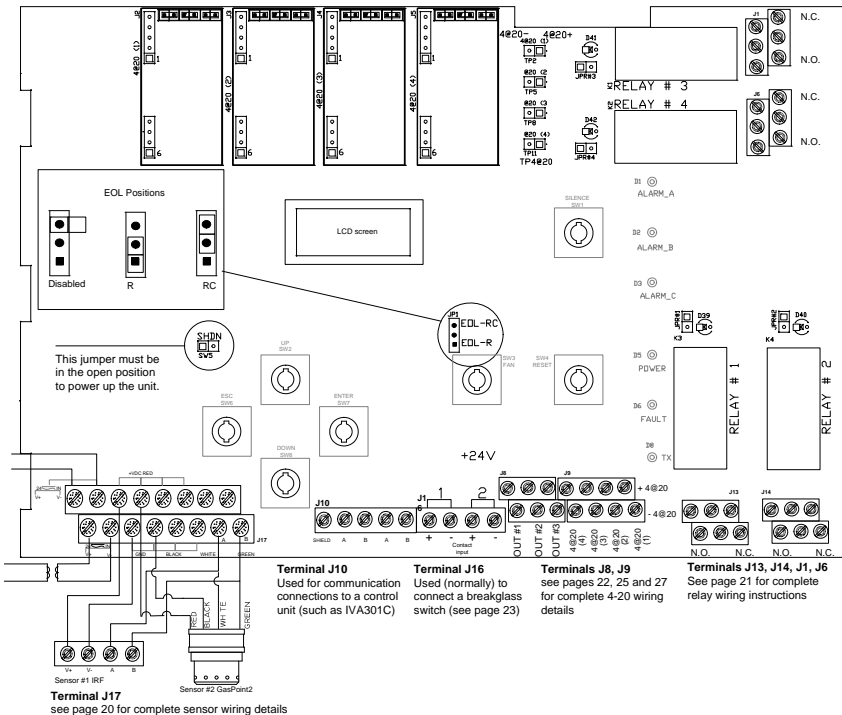
Power cables should be 14 AWG cable, maximum length of 60 m (200 ft). The first four sensor power cables may be wired directly to the IVA301EM. Additional sensor require an external power supply (one per group of four sensors, to a maximum of 20 sensors in total), using the same rated cable as units wired to the IVA301EM.



WIRING DETAILS

System Wiring

Both GasPoint II (301D2) and IRFS sensors can be linked to the IVA301EM system. The drawing below illustrates an overview of PCB terminal wiring.



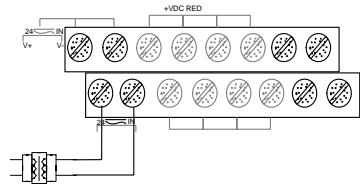
Power Connections

The power requirement range is 22-27 Vac, 29-38 Vdc, 2.0 A max. The polarity is not important. The system must be grounded on the transformer.

A dedicated circuit-breaker must be used.

Separate power supplies must be provided for each group of 4 sensors

Note: Jumper switch labeled SHDN must be in the open position to power up unit.



CAUTION

The IVA301EM requires a 100VA transformer that must be installed near the unit to prevent voltage loss. If there is no transformer, or if the transformer capacity is insufficient, 24 Vdc outputs will not have sufficient power, which will have an impact on RFS/RFSA and other device options.

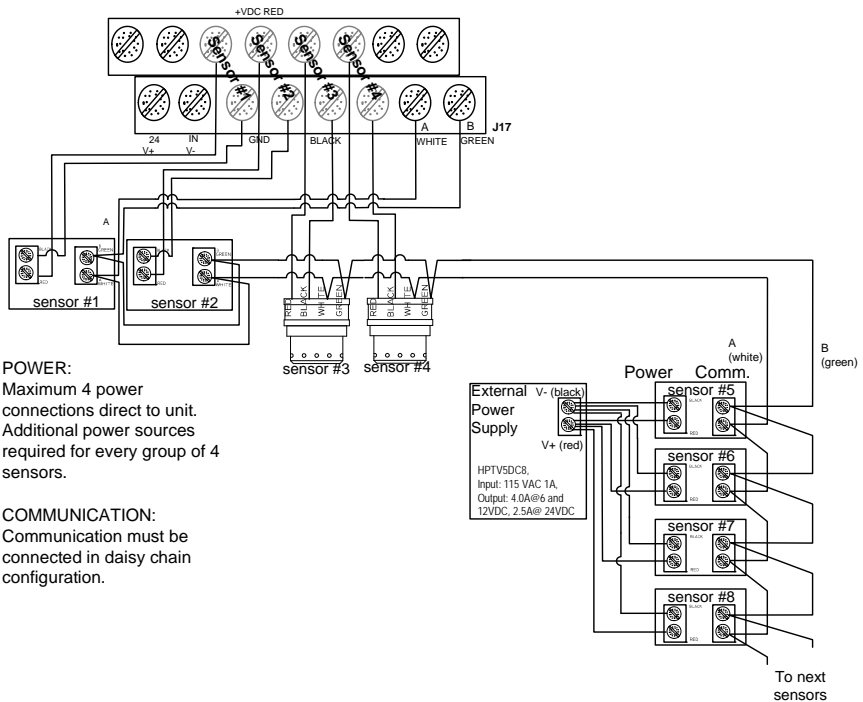
WIRING DETAILS

System Wiring

Connecting sensors to transmitter

Connect the sensor to the transmitter as shown in the diagram below. The maximum distance between sensor and power supply is 200 ft. (60 m) for refrigerant and 500 ft. (160 m) for toxic and combustible gases. Color coding (black, red, green, white) must be respected.

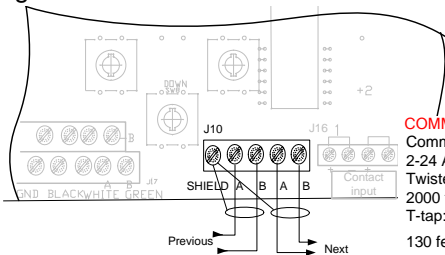
The first four sensors can be connected directly to the IVA301EM. Additional sensors must have external power supplies (T300VA, 120/24Vac-300VA Transformer) for every group of 4 sensors and communication must be in daisy-chain connection



Note: Use 2-18 AWG wire gauge for toxic and explosives sensor power wiring. Use 14 AWG wire gauge for refrigerant sensor power wiring.

Communication to Controller

Terminal J10 is for communication connections from the IVA301EM to the IVA301C Controller. The cables must be grounded using the shield terminal. The network can be up to 2000 ft. (609 m) per channel. The length of a T-tap can be a maximum of 65 feet (20 m). A maximum of 130 ft. (40 m) for all the T-taps must be respected. This diagram illustrates network communication wiring on terminal J10; wires come in from a previous device and go out to the next device.



COMMUNICATION

Communication Wire Gauge:
2-24 AWG (Belden 9841)
Twisted and shielded cable
2000 feet (600 m) per channel
T-tap: 65 feet (20 m) / T-tap
130 feet (40 m) total

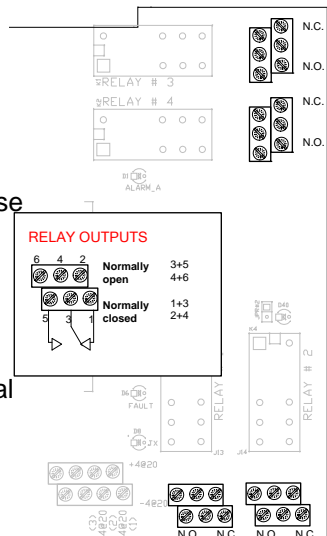
Relay Outputs

The relay outputs will withstand up to 5 amps at 30 Vdc or 250 Vac (resistive load only). They can be used to activate horns, strobes, etc. Refer to the drawing for proper wiring.

Failsafe Relay Outputs

When power is applied to the IVA301EM, these relays are also powered up. The devices connected to these outputs will be triggered when power is cut, which allows detection of power failures or interruptions.

The IVA301EM is factory configured in Normal mode, which means that the relay outputs are not in failsafe mode.



See the APPENDIX section for more details about B-52 and ASHRAE 15 standard configurations.

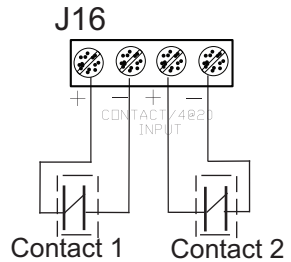
Contact Input, J16

The contact input is mainly used to connect a manual break glass switch to comply with the mechanical code. It is also possible to connect a third break glass switch in series if needed.

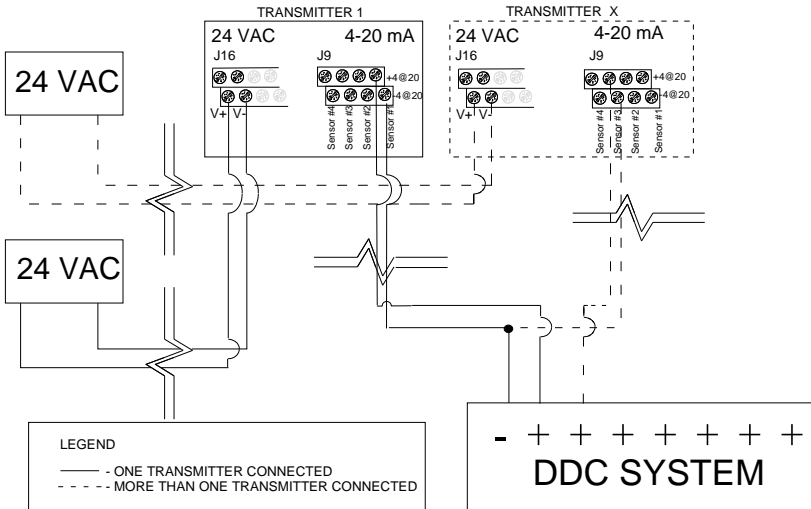
The drawing illustrates the ASHRAE 15 configuration where:

Contact 1 = Electrical shut down (ASHRAE 15 config.)

Contact 2 = Fan activation (ASHRAE 15 config.)



Current Sourcing Output Configuration



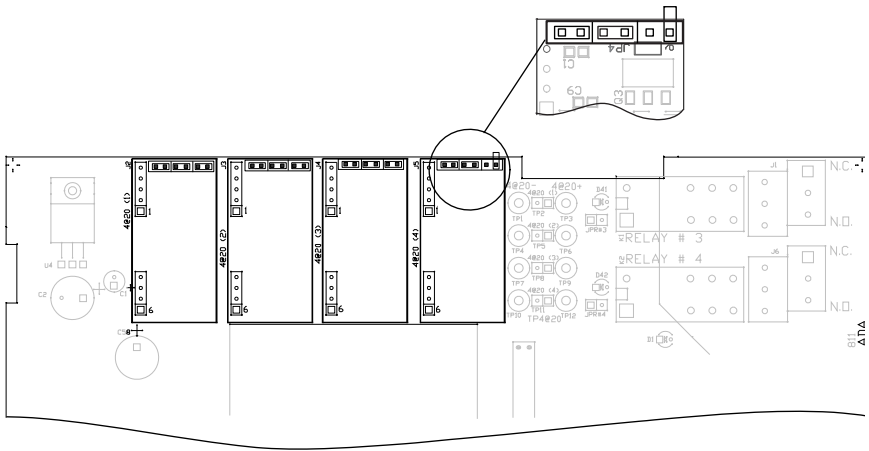
WIRING DETAILS

System Wiring

Output Loop-Powered Operation

(Factory Setting)

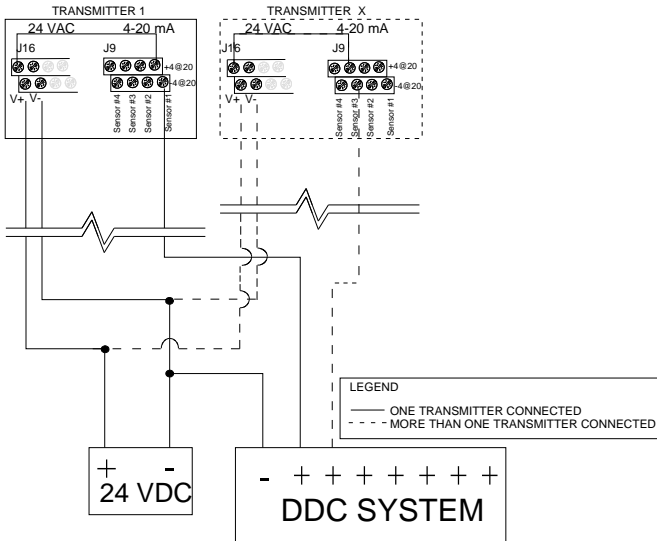
The 4-20 mA output is factory set for loop-powered operation and requires a power source of 12 Vdc to 30 Vdc. The overall impedance depends on the voltage supplied at the 4-20 mA loop. Set jumpers on JP4 at 2-3, 4-5 and 6 for this type of configuration.



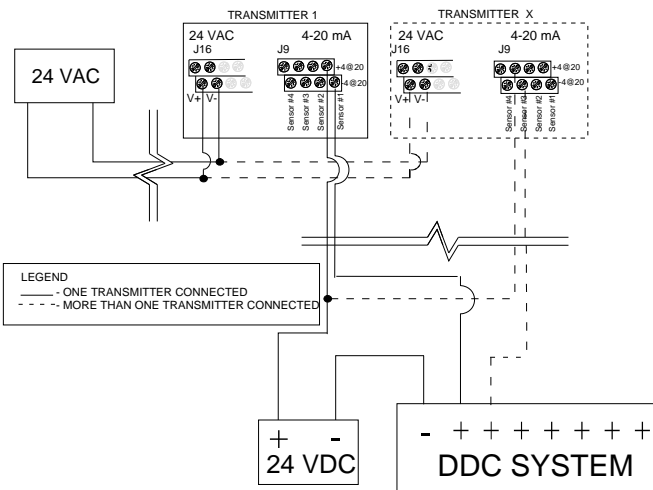
Permitted Impedance in the 4-20 mA Loop

Voltage Source Applied	Total Impedance
12 Vdc	400 Ohms
16 Vdc	600 Ohms
20 Vdc	800 Ohms
24 Vdc	1,000 Ohms
30 Vdc	1,300 Ohms

3 Wire Configuration



4 Wire Configuration



Programming and Calibration

User Interface

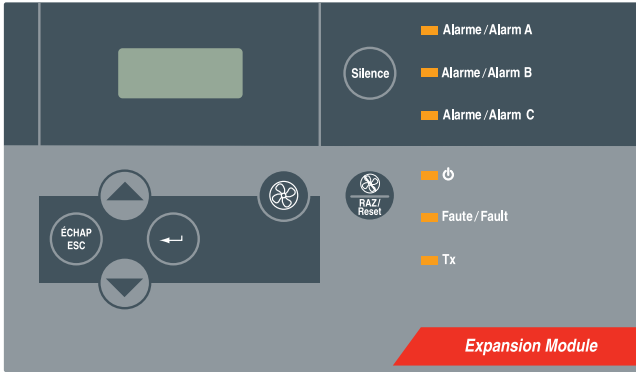
When power is initially applied, the unit's LCD screen will display the product's name and firmware version.







Operating Mode

Normal Mode	When the IVA301EM is in Normal mode, no user intervention is required. The display will scroll to display (gas and concentration) readings from up to 20 sensors. The Tx LED will blink when there is a transmission on the communication channel (if the unit is connected to a controller)
Alarm Mode	Red LEDs light according to the alarm level detected (Alarm A, B or C). If the unit is equipped with a horn or strobe, these will also be activated with the corresponding alarm.
Fault Mode	If a sensor has communication problems, the yellow Fault LED lights. This LED will also light when the service alarm is activated.
Programming Mode	The programming mode is password protected. Only qualified technicians should access this mode. The enter key provides access to programming and confirms an entry, while the arrow keys allow technicians to increase or decrease values and scroll throughout the menus.

Pushbutton Definitions

The IVA301EM has “pushbuttons” that serve as an interface to the unit’s programming functions. Below is a description for each button’s function:



Key	Description
	Used to exit the menus or cancel an input. Also used to stop the alternating reading between the connected sensors.
	Used to scroll through the sensor data displays or through menus or to change a specific value.
	Serves as an “enter” key and is used to access a programming field or to confirm a specific value.
	Fan start switch (For B-52 or ASHRAE 15 programming). See the Events table
	Used to reset all outputs after system returns to normal operating mode (linked to the Reset function in the Events menu).
	Turns off the buzzer and horns

Programming the Unit

The IVA301EM is equipped with a programming menu that allows users to modify certain parameters and to calibrate the unit.

Menu Option	Description
Password	Provides password restricted access to programming menus
Set Adr.	Lets users select a specific address for the device
Mem SD	Inactive option: Reserved for technicians' use only
Sensor	Lets users add or remove a sensor
Set #RP	Lets users add up to ten IVA301EMRP units
Service	Lets users specify different Service alarm settings
SetEvent	Lets users configure specific events for some or all sensor types
SetRelay	Lets users specify whether a relay will be set to failsafe
Buzzer	Lets users activate or deactivate the silence button
Set Alr	Lets users set specific minimum and maximum alarm levels (for alarms A, B and C)
SetAnOut	Lets users adjust the 4-20 outputs
Set Zero	Lets users adjust the sensor zero
Set Span	Lets users calibrate each sensor
Quit	Lets users exit the programming menus

Accessing the Programming Menus

Access to the IVA301EM's programming is password protected for security reasons. The password is "VA".

- Press the enter key to access the programming menus. The PASSWORD screen is displayed

PASSWORD <u>A</u> A

- The first letter is underlined. Press the up or down arrow to change the letter until V is displayed
- Press Enter to confirm. The next letter is underlined. Press the up or down arrow until A is displayed
- Press Enter to confirm the password and access the menus

Setting the Unit's Address

The IVA301EM is shipped with the default address set to 1. If you are using the unit in a network, this menu lets you select a specific address, according to your network configuration.

- Access the menu and use the arrows to scroll to the Set Adr. menu and press enter to select

Menu
Set Adr.

- The Set Adr. menu is displayed. Use the arrows to change the address and press enter when the desired address (Modbus addresses M001 to M254 and Vulbus addresses V01 to V30) is displayed.

Set ADR
M001 V01

- The screen returns to the main menu



Make certain that no two devices share an address as this may result in network conflicts

Configuring a Sensor

The Sensor menu option allows users to add a new sensor, to scan for new sensors or to remove a sensor. Access the menu and use the arrows to scroll to the **Sensor** menu and press enter to select.

Menu
Sensor

There are now 4 possible actions available: NewSens?, Chg Adr., Scan SD, Disable. Use the arrows to scroll up or down through these options and press enter to select.

Note: The NewSens? menu is reserved for and should only be used by qualified technicians.

Changer the Sensor Address

This menu lets users change the sensor's address (position) in the IVA301EM. Pay special attention when changing a sensor's address that you do not change to an address that is already in use as this will replace the existing sensor.

- Scroll to the **Chg Adr.** menu and press enter to select.

Sensor
Chg Adr.

- The screen displays the sensor gas type, sensor # and its address. Use the arrows to scroll through the sensors until the desired sensor is displayed.

NO2 #1
SD #1

- Press enter to select the sensor. The screen displays the sensor gas type and its address. Use the arrows to scroll to the address desired (between 1 and 20) and press enter to confirm.

NO2 #1
For #2 ?

The sensor's address has been changed.

Adding a new Sensor

This menu lets users add new sensors (to expand the network or to replace an expired sensor).



When adding new sensors, it is important to add one sensor at a time to ensure proper address assignment.

- Scroll to the **Scan SD** menu option and press enter to select.

Sensor
Scan SD

The device searches for any new sensor and assigns the new sensor the first available address. The screen displays a wait message while the device searches for the sensor.

When the device has found the sensor, it displays the sensor device address (its position in the IVA301EM) and its firmware version.

Scan sd
sd3 164

Removing a Sensor

This menu lets users remove a sensor from the IVA301EM.

- Scroll to the **Disable?** menu option and press enter to select.

Sensor
Disable?

Adding Remote Panels

The **Set #RP** menu lets users add up to 10 remote panels (IVA301EMRP) to the IVA301EM's network.

- Scroll to the **Set #RP** menu option and press enter to select.

Menu
Set #RP

- In the **Set #RP** screen, use the arrows to scroll the the desired number (since you can add up to ten remote panels you can select a number between 1 and 10) and press enter to select.

Set #RP
0 EMRP

Once entered into the IVA301EM's network, the remote panels will display or announce the status of the IVA301EM's sensors.

Using the Service Menu

The **Service** menu allows users to configure several service related options, such as when and how to activate service alarms. Service alarms are used to signal when a sensor needs to be replaced or calibrated.

Menu
Service

This menu contains two options: **Set Act** and **Set Time**.

Service
Set Act

The **Set Act** menu lets users select the action that will be taken. Available options are: Fault, OFF or Visual

Fault: A service alarm will be activated whenever there is a fault status

OFF: No service alarm will be triggered at any time (factory default setting)

Visual: Only a visual service alarm will be activated

The **Set Time** menu lets users configure a specific deadline at which a service alarm will be activated.

Set Time
12 Month

Use the arrows to scroll between 12 to 24 months to trigger a service alarm after the specified number of months in service. Select the Reset option to turn off the Service alarm for a period of 100 days (after the alarm was triggered).

Using the SetEvent Menu

Although the IVA301EM is fully configured with specific event configurations (see the tables in Appendix A for details on available configurations), it is nonetheless possible to modify events to suit different applications.

- Scroll to the **SetEvent** menu and press enter to select.

Menu
SetEvent

If this is the initial setup and no previous events have been configured, you must select the event configuration (Type) from the menu (see the tables in Appendix A for details).

SetEvent
Type1CND

- Use the arrows to scroll through the options and press enter to select. The available options (described in greater detail in Appendix A) are: Type1 CND, Type2 CND, Type3 US, Type # 4 and OTHER.

Note: Selecting the "OTHER" event type creates an event with all fields and events blank. Therefore, no events will appear when pressing the arrows. Events must be created before they appear in the scroll list.



Once the configuration type has been selected, it can no longer be changed without erasing **ALL** events and reconfiguring the system anew. Consult the tables in Appendix A to make certain that the appropriate event configuration is selected.

Changing Event Configurations

The various event menus allow users to modify standard configurations or to create completely customized event configurations, based on their needs. Each event menu provides a set of four options, which also contain a subset of options, as described below.

The first screen that appears is the main event screen. Press enter to select the event displayed or use the arrows to scroll through the event numbers to select a specific event.

Type1CND
Event# 1

The first event screen lets users specify which sensors will be linked to the event. The screen displays SD All (the default value). Press enter to enable the field and use the arrows to scroll through the available options. When the desired option is displayed press enter to select.

Event# 1
SD All

- SD All: Applies the event action to all sensors
SD #1: (through SD #4) Applies the event action to only the selected sensor
ManSW#1: (through ManSW#2) Applies the event action to the selected switch
SD #---: Displays the EraseALL screen. When “Yes?” is selected from the Event #1 menu, all configuration data for events will be erased. Note that when “SD #---” is selected at any other event number, the EraseALL screen does not appear and only the data for the active event number will be erased (and events will change numbers, moving up one).

EraseALL
No?

When you have selected the option and pressed enter, the field is disabled and you can proceed to the next screen. Use the arrows to move ahead one screen.

Programming and Calibration

Using the SetEvent Menu

The second event screen lets users specify what will trigger an event. The screen displays **ALRA** (the default value).

Event# 1
= ALRA

- Press enter to enable the field and use the arrows to scroll through the options:

= ALRA: (through ALRC) Links the event to Alarm A, B or C

= Fault: Links the event to a fault condition

= ALL: Links the event to all conditions (alarm and fault)

= ---: Displays the EraseALL screen. When "Yes?" is selected from the Event #1 menu, all configuration data for events will be erased.

EraseALL
No?

Note that when "---" is selected at any other event number, the EraseALL screen does not appear and the data for the active event number will be erased (and events will change numbers, moving up one).



If ManSW#1 (or #2) was selected at the previous step this screen will only have 2 options: Open or Closed.
Set to Open if the output is set to Normally Closed, or to Closed if the output is set Normally Open.

When you have selected the option and pressed enter, the field is disabled and you can proceed to the next screen. Use the arrows to move ahead one screen.

The third event screen lets users specify the actions linked to the event. The screen displays **REL #1** (the default value).

Event# 1
REL #1

- Press enter to enable the field and use the arrows to scroll through the options:

REL #1: (through REL #4) Triggers the devices connected to the selected relay

OUT #1: (through OUT #3) Triggers the devices connected to the selected Output

BUZZER: Triggers the audible alarm for this event

---: Displays the EraseALL screen. When “Yes?” is selected from the Event #1 menu, all configuration data for events will be erased.

EraseALL
No?

Note that when “---” is selected at any other event number, the EraseALL screen does not appear and the data for the active event number will be erased (and events will change numbers, moving up one).

When you have selected the option and pressed enter, the field is disabled and you can proceed to the next screen. Use the arrows to move ahead one screen.

The final screen, **RESET**, lets users specify that an event will remain active, even after it has returned to normal.

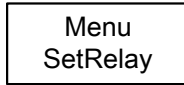
Event# 1
RESET N?

- Press enter to enable the field and use the arrows to scroll to Y?.
- Press enter once again to activate the Reset function.

Note: The Reset key on the front panel lets you deactivate the event

Using the SetRelay Menu

The **SetRelay** menu lets users specify whether the the relay for the event will be in failsafe mode and whether the Silence button on the user interface (front of housing) will be enabled for this event.



Press enter to select the menu and use the arrows to scroll through the options:

- | | |
|-----------|---|
| FAILSAFE? | Puts the relay in Failsafe mode (the default setting is no failsafe). |
| Silence | Enables the Silence button function of the user interface for this event. |

When you have selected the option and pressed enter, the field is disabled and you can proceed to the next screen. Use the arrows to move to the next menu.

Deactivating the Buzzer

The IVA301EM is shipped with the buzzer function activated by default. This menu lets you activate or deactivate the Silence button on the keypad and to silence or activate the key beep function.

- Access the menu and use the arrows to scroll to the **Buzzer** menu and press enter to select. The display moves to the next screen.

Menu
Buzzer

- The **Silence** screen displays Yes?, press enter to select (or scroll to No? to disable the Silence button). The keypad Silence button is enabled; when the buzzer sounds, pressing the silence button will turn the buzzer off.

Silence
Yes?

- The next screen, **Key Beep**, allows you to activate a sound for any key activation. Use the arrows to display either Yes or No and press enter to confirm.

Key Beep
No?

- The screen returns to the main menu

Configuring the Unit's Alarms

Although the IVA301EM is shipped with the default alarm settings, this menu allows you to set specific minimum and maximum levels for alarms A, B and C.

- Access the menu and use the arrows to scroll to the **Set Alr.** menu and press enter to select

```
Menu
Set Alr
```

- The menu displays the first sensor's information screen. Use the up or down arrows to scroll between sensors and press enter when the desired sensor is displayed.

```
H2S #1
SD #1
```

- The next six screens let you modify both the minimum and maximum alarm setting for all alarm levels (A, B, C). Use the arrows to scroll and press enter to select the desired alarm.

```
H2S #1
Min AlrA
```

- In the selected alarm screen, use the arrows to increase or decrease the value and press enter to confirm the desired value.

```
Min AlrA
9.0 PPM
```

- The screen returns to the first sensor menu

Repeat these steps for each alarm level to modify.

Setting the Unit's Analog Outputs

This menu lets you adjust each of the four analog outputs, minimum and maximum (e.g. the 4 and the 20).



Note that this menu does not display how the output is being adjusted. The Output must be connected (to an ammeter or to the DDC) for readings to be viewed.

- Access the menu and use the arrows to scroll to the **SetAnOut.** menu and press enter to select.

Menu
SetAnOut

- The **SetAnOut** menu is displayed. In this menu, you can scroll to select the output (from Min 1 to Min 4 and Max 1 to Max 4) and press enter to select.

SetAnOut
Set Min 1

- The **AdjAnOut** screen appears. Press on the up arrow to increase the analog output value or the down arrow to decrease (the IVA301EM's screen does not change or display any changes; the value will only be visible on the connected meter).

Set Min1
AdjAnOut

- When the desired output value is reached, press enter to confirm. The screen displays ***WAIT*** while the unit is reinitialized.

Set Min1
WAIT

- The screen returns to the main menu.

Repeat these steps for each output to adjust.

Calibrating the Unit

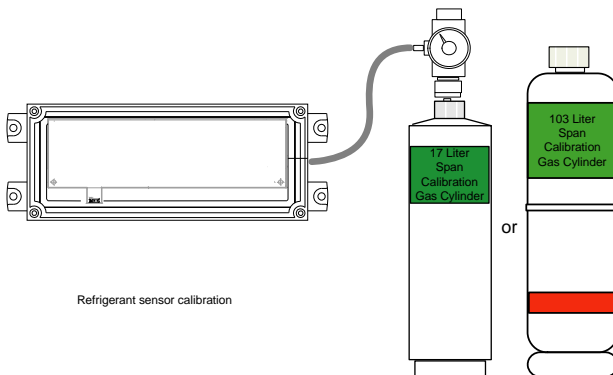
This unit is a specialized gas detection equipment. Beyond the warranty period, the systems must be maintained and calibrated on a regular basis (normally twice a year).

If unit span or zero cannot be adjusted, the sensor may be approaching its end-of-life and must be replaced. Keep an operation log of all maintenance, calibrations and alarm events.

The unit requires warm-up time before being put into service and calibrated. The warm-up time required depends on the type of sensor, however a standard minimum of fifteen (15) minutes is recommended.

Connecting the Hardware

1. Plug the calibration adaptor onto the gas sensor inlet.
2. Screw the regulator to the appropriate calibration gas cylinder (for either span or zero adjustment) and set the flow rate (see Table I on page 47).
3. Connect the tubing to the regulator outlet and to the calibration adaptor or to calibration port.



Adjusting the Zero (If Required)

When the unit displays 0 %/ppm in an area with no presence of the target gas, proceed to “Calibrating the Sensor” on the following page.

To adjust the zero, inject zero gas (nitrogen) at the specified flow rate. The gas must be allowed to flow into the unit for a minimum of 2.5 minutes before beginning and then throughout the adjustment.

1. Press enter to access the programming menu.
Since the menus are password protected you must first enter the password in the PASSWORD screen
2. Use the up or down button to change each letter until VA is displayed. Press enter after each letter to confirm and to access the menus.
3. Use the up or down arrow to scroll to the Set Zero menu screen and press enter to select.
4. Use the up or down arrow to select the sensor to be calibrated and press enter to select.
5. Press enter again when the screen displays GoCalib to start the zero adjustment
6. The Wait screen is displayed throughout the adjustment and the menu returns to the main menu screen when the adjustment is complete.
7. Use the up or down arrow to scroll to the Quit menu and press enter to exit the programming menus.

PASSWORD
AA

Menu
Set Zero

H2S #1
SD #1

H2S #1
GoCalib?

Menu
Quit

Calibrating the Sensor

To calibrate the sensor, inject the calibration gas at the specified flow rate. The gas must be allowed to flow into the unit for a minimum of 2.5 minutes before beginning and then throughout the calibration.

1. Press enter to access the programming menu.
Since the menus are password protected you must first enter the password in the PASSWORD screen

PASSWORD
AA

2. Use the up or down button to change each letter until VA is displayed. Press enter after each letter to confirm and to access the menus.

3. Use the up or down arrow to scroll to the Set Span menu screen and press enter to select.

Menu
Set Span

4. Use the up or down arrow to select the sensor to be calibrated and press enter to select.

5. The next screen, SetGas, allows users to specify a calibration gas value. Use the up or down arrow to increase or decrease the value and press enter to confirm.

H2S #1
SD #1

6. Press enter again when the screen displays GoCalib to start the calibration

SetGas
25.0 PPM

7. The gas concentration is displayed throughout the calibration and the menu returns to the main menu screen when the adjustment is complete.

8. Use the up or down arrow until the Quit menu is displayed and press enter to exit the programming menus.

Menu
Quit

Table I - Calibration Information

Gas	Scale	Warm-up	Flow Rate	Notes
Combustible	0 - 102% LEL	15 min.	500 ml/min	1% Volume CH ₄ = 20% LEL CH ₄ .
CL ₂	0 - 15.3 ppm	15 min.	500 ml/min	
CO	0 - 255 ppm	N/A	500 ml/min	
H ₂ S	0 - 51.0 ppm	15 min.	500 ml/min	
* HF	0 - 10.2 ppm	15 min.	500 ml/min	Nitrogen dioxide is a surrogate gas for HF
NO ₂	0 - 10.2 ppm	15 min.	500 ml/min	
O ₂	0 - 25.5%	N/A	500 ml/min	
SO ₂	0 -10.2 ppm	15 min.	500 ml/min	
Refrigerant Rxxx	0 - 1000 ppm	15 min	100 ml/min	Replace the xxx by the required refrigerant

* Discontinued products: Only existing sensors will be supported.

IVA301EM Specifications

Power	22-27 Vac, 50/60 Hz 29-38Vdc, 2 A @ 29 Vdc
Standard Outputs:	4 DPDT relays 3 Outputs at 24 Vdc @ 250 mA each
Optional Outputs:	4-20 mA for each sensor
Communication	RS-485: Modbus or Vulbus
Audible Alarm:	65 dBA @ 1 m (3 ft)
Display :	Backlit LCD
Visual Indicators:	Green LED: Normal operation Red LEDs: Alarm A, B and C Yellow LED: Fault/service alarm Amber LED: Tx (Activated in network mode)
Length of lines:	Up to 2000 feet (609 m) between IVA301EM and controller T-tap: 65 ft. (20 m) maximum per t-tap, to a total of 130 ft. (40 m)
Relay Output Rating:	5A, 30Vdc or 250Vac (resistive load)
Circuit Protection:	Long Time-Lag Polyswitch Type TT
Overvoltage Category:	II
Operating Environment:	Indoor Use
Operating Temperature Range:	0 to 40°C (32°F to 100°F)
Operating Humidity Range:	0 to 95% RH (non-condensing)
Operating Altitude:	Up to 3000m (9843 feet)
Enclosure:	NEMA 4X ABS - Polycarbonate indoor
Pollution Degree:	2
Size (HxWxD):	20.3 x 28 x 7 cm 7.99" x 11.02" x 2.76"
Weight:	1.02 kg (2.26 lbs)
Certifications	ANSI/UL 61010-1 CAN/CSA C22.2 No. 61010-1
Optional Horn:	105dBA, 4-28V, 2800Hz (RFSA) Min. Voltage 80 dB(A) min. @ 2 ft and 6 Vdc Max Voltage 90 dB(A) min. @ 2 ft and 28 Vdc
Optional Strobe:	STAS flashing LED

IVA301IRFS Specifications

Gases Detected:	R11, R12, R13B1, R22, R114, R123, R125, R134a, R227, R245A, R404A, R407C, R410A, R507, R508b
Sensing Technology:	Infrared sensor
Measurement Range:	0-1000 ppm
Resolution:	1 ppm
Deadband:	20 ppm
Accuracy:	±10ppm à 50 ppm / ±40ppm à 500 ppm
Response Time (T90):	60 seconds
Warmup time	15 minutes
Operating Environment:	Indoor Use
Operating Temperature Range:	0 to 40°C (32°F to 100°F)
Operating Humidity Range:	0 to 95% RH (non-condensing)
Enclosure:	ABS - Polycarbonate
Size (HxWxD):	10.2 x 28 x 6.3 cm 4.02" x 11.02" x 2.48"
Weight:	0.603 kg (2.33 lbs)

The IVA301EM sensor LED has 2 functions. If the sensor is working properly, the LED will blink according to the sensor addresses on the IVA301EM. In that case, the LED will blink as shown:

Address 1 = The LED blinks 2 times during 2,8 seconds

Address 2 = The LED blinks 3 times during 2,8 seconds

Address 3 = The LED blinks 4 times during 2,8 seconds

Address 4 = The LED blinks 5 times during 2,8 seconds

Addresses 5 to 20 = The LED blinks once during 2,8 seconds

If the sensor is connected to a IVA301IRF, the LED will be on during 0,2 seconds and off during 2,6 seconds (blinking). If the sensor has a problem (failsense), the LED will remain on.

301D2 Sensor Specifications

Sensing technology:	Electrochemical (toxic) Catalytic combustion (combustible) Diffusion fuel cell (oxygen)
Length of lines:	Up to 160m (500 feet) between IVA301EM and sensor (toxic and combustible)
Operating Temperature Range:	Toxic: -40 to 40°C (-40°F to 100°F) Combustible: -40 to 50°C (-40°F to 112°F)
Operating Humidity Range:	0% to 95% RH, non-condensing
Operating Altitude:	Up to 3000m (9843 feet)
Enclosure:	Class 1, Division 1, Groups B, C, D

Maintenance

The IVA301EM requires no maintenance. Transmitters, however, require regular inspection and calibration.

Replacement Parts

LED replacement instructions for RFS or RFSA option:

- Turn the cap until the diamond shape aligns with the triangle outline shape
- Pull off the cap
- Use the insertion tool to remove the LED;
- Use the insertion tool to put in the new LED;
- Put the cap back on (press down firmly)
- Turn the cap until the diamond is aligned with the white triangle shape.

Due to the continuous evolution of our products, please contact our service department for ordering parts or for more details.

Technical Support Line: 858-578-7887

Cleaning

Clean the exterior with a soft, damp cloth. Do not use solvents, soaps or polishers.

APPENDIX A

Available Pre-programmed configurations

APPENDIX A

Available Pre-programmed configurations

Type 1 CND (B-52 Canadian Standard for R123)

SetEvent	Input	Status	Output	Reset	Silence
Event # 1	SD All	Alr A	Relay #1	Yes	No
Event # 2	SD All	Alr A	Relay #4	Yes	No
Event # 3	SD All	Alr A	Out 1	Yes	Yes
Event # 4	SD All	Alr A	Out 2	Yes	No
Event # 5	SD All	Alr A	Out 3	Yes	No
Event # 6	SD All	Alr A	Buzzer	Yes	Yes
Event # 7	SD All	Alr A	Relay #2	Yes	Yes
Event # 8	SD All	Alr A	Relay #3	Yes	No
Event # 9	SD All	Fault	Relay #3	Yes	No
Event #10	SD All	Alr B	Relay #1	No	No
Event #11	SD All	Alr C	Relay #1	No	No

Type 2 CND (B-52 Canadian Standard for other Refrigerants)

Event	Input	Status	Output	Reset	Silence
Event # 1	SD All	Alr A	Relay #1	Yes	No
Event # 2	SD All	Alr A	Out 1	Yes	Yes
Event # 3	SD All	Alr A	Out 2	Yes	No
Event # 4	SD All	Alr A	Out 3	Yes	No
Event # 5	SD All	Alr A	Buzzer	Yes	Yes
Event # 6	SD All	Alr A	Relay #2	Yes	Yes
Event # 7	SD All	Alr B	Relay #4	Yes	No
Event # 8	SD All	Alr A	Relay #3	Yes	No
Event # 9	SD All	Fault	Relay #3	Yes	No
Event #10	SD All	Alr C	Relay #1	No	No

Type 3 US (ASHRAE 15 Standard for Refrigerants)

Event	Input	Status	Output	Reset	Silence
Event # 1	SD All	Alr A	Relay #1	Yes	No
Event # 2	SD All	Alr A	Out 1	Yes	Yes
Event # 3	SD All	Alr A	Out 2	Yes	No
Event # 4	SD All	Alr A	Out 3	Yes	No
Event # 5	SD All	Alr A	Buzzer	Yes	Yes
Event # 6	SD All	Alr A	Relay #2	Yes	Yes
Event # 7	SD All	Alr B	Relay #4	No	No
Event # 8	SD All	Alr A	Relay #3	Yes	No
Event # 9	SD All	Fault	Relay #3	No	No
Event #10	ManSw #1*	Open	Relay #1	Yes	No
Event #11	ManSw #1*	Open	Relay #4	Yes	No
Event #12	ManSw #1*	Open	Out 1	Yes	Yes
Event #13	ManSw #1*	Open	Out 2	Yes	No
Event #14	ManSw #1*	Open	Out 3	Yes	No
Event #15	ManSw #1*	Open	Buzzer	Yes	Yes
Event #16	ManSw #1*	Open	Relay #2	Yes	Yes
Event #17	ManSw #1*	Open	Relay #3	Yes	No
Event #18	SD All	Alr C	Relay #1	No	No
Event #19	ManSw #2**	Open	Relay #1	No	No

*Mansw #1 Trigger an electrical shut down.

**ManSw #2 Trigger relay #1.

APPENDIX A

Available Pre-programmed configurations

Type 4 (Default configuration - other than B-52 and ASHRAE 15)

Event	Input	Status	Output	Reset	Silence
Event # 1	SD All	Alr A	Relay #1	No	No
Event # 2	SD All	Alr B	Relay #2	No	Yes
Event # 3	SD All	Alr C	Relay #3	No	No
Event # 4	SD All	Fault	Relay #4	No	No
Event # 5	SD All	Alr B	Out 1	No	Yes
Event # 6	SD All	Alr A	Out 2	No	No
Event # 7	SD All	Alr C	Out 3	No	No
Event # 8	SD All	Alr B	Buzzer	No	Yes