FireNET Vapor VPR-15

Product Guide

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Document Conventions

The following typographic conventions are used in this document:

Convention	Description
Bold	**Used to denote:** emphasis. Used for names of menus, menu options, toolbar buttons
Italics	**Used to denote:** references to other parts of this document or other documents. Used for the result of an action.

The following icons are used in this document:

Convention	Description
	**Caution:** This icon is used to indicate that there is a danger to equipment. The danger could be loss of data, physical damage, or permanent corruption of configuration details.
	**Warning:** This icon is used to indicate that there is a danger of electric shock. This may lead to death or permanent injury.
	**Warning:** This icon is used to indicate that there is a danger of hazardous laser radiation exposure.
	**Warning:** This icon is used to indicate that there is a danger of inhaling dangerous substances. This may lead to death or permanent injury.

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Codes and Standards Information for Air Sampling Smoke Detection

We strongly recommend that this document is read in conjunction with the appropriate local codes and standards for smoke detection and electrical connections. This document contains generic product information and some sections may not comply with all local codes and standards. In these cases, the local codes and standards must take precedence. The information below was correct at time of printing but may now be out of date, check with your local codes, standards and listings for the current restrictions.

FDA

This FireNET Vapor product incorporates a 658 nm laser device with an average power less than 10 mW, and is classified as a Class 1 laser product that complies with FDA regulations 21 CFR 1040 with deviations pursuant to Laser Notice 50, and with IEC / EN 60825-1. Access to the laser chamber is on the underside of equipment and is restricted by cover. The cover may only be removed by qualified personnel. The laser emits visible light and can be hazardous if viewed with the naked eye.

CAUTION - Use of controls or adjustments of performance or procedures other than those specified herein may result in hazardous radiation exposure.

Regional Regulatory Requirements and Notices

UL

For open area applications at maximum dilution, when using obscuration/foot, the Fire 1 threshold must be set within 0.04 to 0.70 % obs /ft.

Approvals

- UL

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Table of Contents

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1 Introduction

Welcome to the FireNET Vapor VPR-15 Product Guide. This document is written to provide you with information on technical specifications, cabling, and how to install, configure and operate these detectors.

The VPR-15 is an aspirating smoke detector that provides early warning of fire by analyzing air drawn through microbore tubes. A highly sensitive detection chamber is able to detect smoke at very low concentrations.

Figure 1-1: FireNET Vapor VPR-15

Embedded and PC software enable the configuration of a wide range of user defined parameters and reporting capabilities and extended input and output functionality is achieved through the addition of plug-in modules.

VPR-15 detectors incorporate a rotary valve as a method of sampling individual microbore tubes and providing addressability. This unique feature is described in Chapter 2.

The aspiration systems use an internal vacuum pump (high pressure system) and air flow is monitored through the microbore tubes by a differential pressure sensor. As high pressure systems are capable of drawing air samples through microbore tubes, they are often preferred when installations need to be unobtrusive.

VPR-15 detectors are primarily designed for applications where pin point addressability of fire source is required. For the purpose of calculating sampling point spacing, the equivalent maximum area coverage for the VPR-15 is 16,150 ft² (1,500 m²) with 15 sampling tubes.

The basic system includes RS232, RS485 and TCP/IP interfaces for connecting to the FireNET Vapor Explorer software.

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2 Principle of Operation

Air samples are drawn from the protected area through a microbore pipe network towards the detector. Microbore systems normally sample air from the end of the microbore tube via a microbore sampling point.

The pump draws air from the microbore tubes into the detector inlets where the samples are combined, filtered, and directed to the laser detection chamber. VPR-15 detectors have an Overall position which draws air equally from all sectors.

The detection chamber consists of a laser beam directed across an optical chamber, through which the subsample flows. A photodetector built into the optical chamber measures the amount of light scattering from smoke particles in the air. A clean air sample will cause very little scattering but as the smoke density of the sample increases, the amount of light directed onto the photodetector will also increase. The light signal is processed such that it becomes a direct measurement of the amount of light scatter caused by smoke. Information about laser chamber safety can be found in Appendix C.

If the detected smoke is higher than the preset alarm thresholds in the detector (Alert, Action, Fire 1 and Fire 2), an alarm will be reported. One or more Alarm relays, preset to activate at an alarm threshold will signal the host panel after a preset time delay. Alarm states are also shown on the display panel, and an audible warning is given. An optional alarm beacon can also be fitted.

VPR-15 detectors have an additional preset trigger level, Trace, which must be set below the Alert level. When Trace is activated, the rotary valve will sequentially scan the sectors, in order to determine the source of the event. While in Trace mode, the default levels for Alert, Action, Fire 1 and Fire 2 are the same as used for Overall monitoring. If required, different levels for Alert, Action, Fire 1 and Fire 2 may be set for each sector in the Sector Alarms menu.

2.1 Flow Monitoring

VPR-15 detectors perform flow monitoring of individual sectors and of the combined airflow.

While scanning, the control system monitors for blockages or disconnections of the microbore tubes for each sector by detecting when the air flow is above or below acceptable flow thresholds. Flow thresholds are dependant on air flows measured during normalization.

The normalization process enables the detector to learn typical air flow characteristics of the system and sets these expected flow readings to 100% for each sector. A normalization sequence must be performed at installation. The detector has default high and low limits and associated delay times, which may be changed in the Configure menu.

The design of the pipe network should be considered carefully prior to installing the system.

2.2 Alarms and Trace Mode

The default settings of the four alarm states (Alert, Action, Fire1 and Fire2) and Trace are shown in the following table.

Table 2-1: Default Behavior of Alarm States and Trace Mode

Level	Latched / Unlatched	Default Threshold	Delay	Beacon Pulse (On:Off)	Sounder
Trace	Latched	0.009% obs/ft (0.03% obs/m)	3 secs	-	Continuous
Alert	Latched	0.012% obs/ft (0.04% obs/m)	n/a	0.5 secs : 2 secs	Continuous
Action	Latched	0.018% obs/ft (0.06% obs/m)	n/a	0.5 secs : 1 sec	Continuous
Fire1	Latched	0.024% obs/ft (0.08% obs/m)	n/a	0.5 secs : 0.5 secs	Continuous
Fire2	Latched	0.305% obs/ft (1.0% obs/m)	n/a	Continuous	Continuous

Trace parameters apply when the rotary valve is in the Overall position and all sectors are being monitored. If latched, the Trace indicator will remain illuminated after the initiating event has ceased. It does NOT mean that the unit will continue indefinitely in Trace (scan) mode. The system will only continue in Trace mode if the detected smoke level is above the Trace threshold after scanning. The Alert relay may be programmed to be activated by the Trace threshold. Its action will then follow that of the Trace indicator.

If any alarms are unlatched, all resultant actions (relay contacts, display panel indicators, sounder and beacon) will clear if and when the triggering event ceases. If it is latched, all the warning mechanisms are maintained until action is taken by the user (refer to Section 2.3). These alarm states are global and will be set depending on the smoke density being measured, regardless of which sector is being sampled. Once in Trace mode, each sector has an alarm indicator associated with it. These individual sector alarms pulse progressively, depending on the degree of alarm status, in the same way as the Beacon (refer to Table 2-1).

2.2.1 Trace Relay

If Trace Relay is enabled, an all-sector Fire1 alarm will be generated if the all-sector smoke level is above the All-Sector diluted Sector Fire1 threshold.

The All-Sector diluted Fire1 threshold is calculated by dividing the lowest of all the active Sector Fire1 thresholds by the number of active sectors.

- If the resultant threshold is less sensitive than Trace Threshold, then Trace Threshold will be used as all sector Fire1 Threshold. This enables faster reporting of a Fire1 alarm without having to wait for scanning to complete.
- If the resultant threshold is more sensitive than Trace Threshold, then the diluted Sector 1 Fire1 threshold is used.

If Trace Relay is disabled, the detector uses sector-based alarm reporting.

Example:

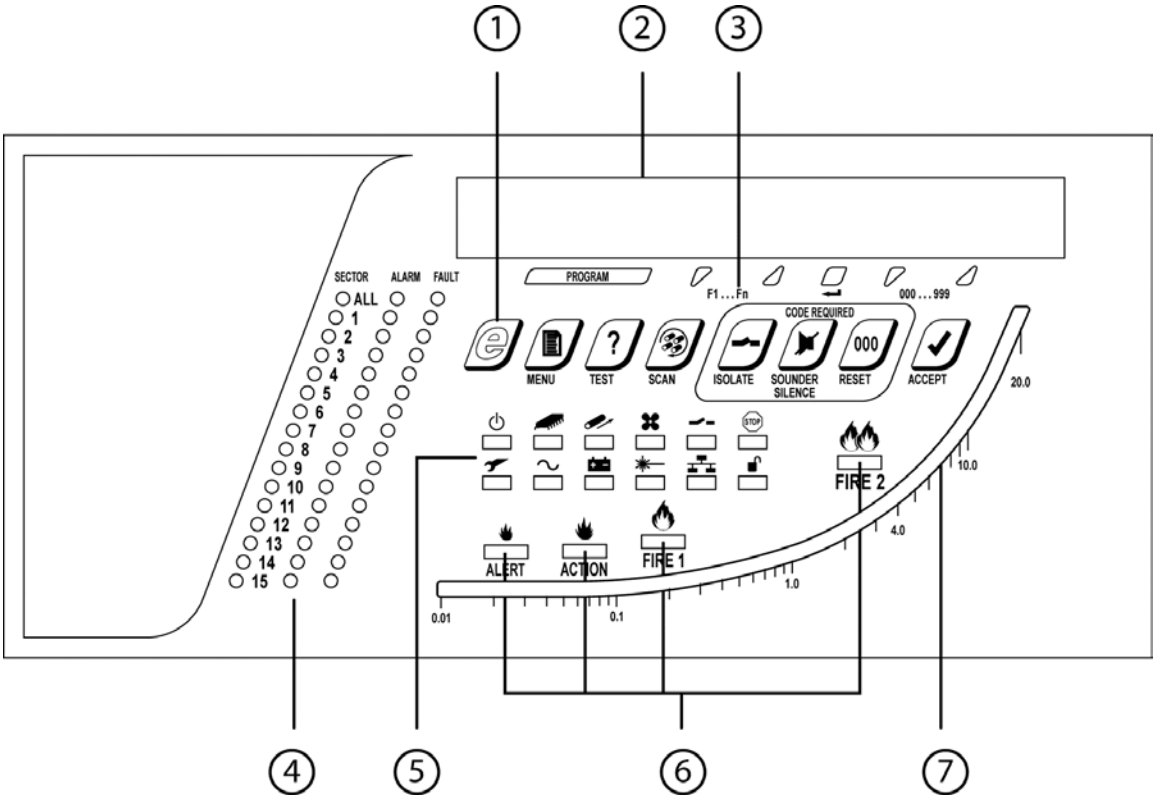
- Trace Relay = Enabled
- Trace Threshold = 0.03 %obs/ft (0.100 %obs/m)
- End Sector = 6
- Active Sectors = 1, 2, 3, 4, 5, 6
- Fire1 Thresholds for Active Sectors %obs/ft = 0.458, 0.305, 0.610, 1.068, 0.458, 0.763 (%obs/m = 1.5, 1.0, 2.0, 3.5, 1.5, 2.5)
- All-Sector diluted Fire 1 Threshold = 1.0/6 = 0.305/6 = 0.051% obs/ft (0.167 %obs/m)
- All-Sector diluted Fire 1 Threshold Fire1 Alarm will be reported when All-Sector smoke level reaches 0.051%obs/ft (0.167%obs/m)

2.3 Detector Display Panel

VPR-15 detectors have a full display panel fitted to the main system. The display panel is used for annunciating the detector status and smoke levels, and can also be used to configure the detector.

The display consists of a range of configuration and control buttons (Item 1 in Figure 2-1) and LEDs to indicate Alarms, Faults, Power, Reset and other operational status (Items 4 to 6 in Figure 2-1). When configuring the detector via the display panel, some of these configuration and control buttons will have a dual function to allow the user to enter parameter values, scroll through configuration items, or enter an Access Code. Alternate functions are indicated by LEDs located above the buttons (Item 3 in Figure 2-1) and are activated when the associated button can be used for the alternative function.

More information about button functionality, Access Codes and how to setup the detector with the Main Menu can be found in Chapter 5. A flowchart illustrating how to navigate through the display panel can be found in Appendix A.



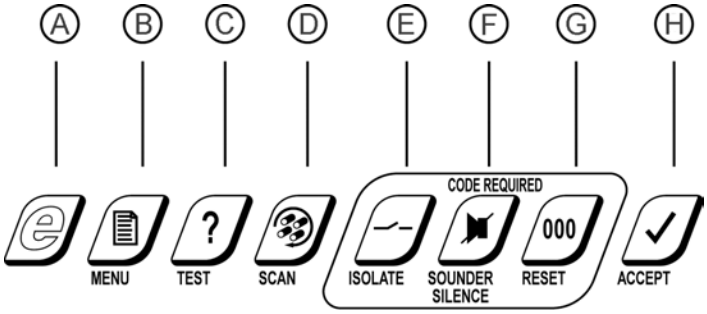
1. Control and Configuration Buttons
2. Status Display
3. Alternate Button Function Indicators
4. Sector, Alarm and Fault Indicators
5. Display LEDs
6. Alert, Action, Fire1 and Fire2 Indicators
7. Logarithmic smoke density bargraph

Figure 2-1: VPR-15 Display Panel

The following describes the display panel for the VPR-15 detector.

1. Control and Configuration Buttons

All local user-interface options are done using these buttons.



A. Not used for VPR-15 detectors
B. Menu key
C. Test key
D. Scan / parameter scroll down key
E. Isolate / parameter scroll up key
F. Sounder silence / enter key
G. Reset / value scroll down key
H. Accept / value scroll up key

Figure 2-2: Control and configuration buttons

2. Status display

This will normally show the smoke density value. Also used for all Setup and Configure procedures.

3. Alternate button function indicators

When the unit is in a mode accessed by the Main Menu, the five right-most buttons can change to Scroll and Enter functions.

4. Sector, Alarm and Fault Indicators

Individual Sample, Alarm, and Fault indicators for each sector. The All alarm is the Trace indicator.

5. Display LEDs

Table 2-2: LED Descriptions

LED		Description
	Power	Indicates that the power supply is ON. If the system processor is faulty, the General Fault, Power and Comms LEDs will be activated simultaneously.
	General Fault	The detector has one or more faults, which will also be shown by other specific fault indicators. The Fault relay contacts always follow the state of this indicator. Isolated will also show as General Fault. If the system processor is faulty, the General Fault, Power and Comms LEDs will be activated simultaneously.
	Processor Reset	This indicator activates briefly during the powerup initialization sequence.
	Mains Fault	This indicator may activate due to an incorrect device configuration. To prevent this from occurring, ensure that Pin 2 and Pin 5 on CN2 are linked. Refer to page 13 for further information.
	Flow Fault	The flow rate for any sector is outside the bounds set by the High and Low flow limits.
	Battery Fault	This indicator may activate due to an incorrect device configuration. To prevent this from occurring, ensure that the STANDBY parameter in the Configuration menu is set to 0. For more information, refer to Table 5-4.
	Aspiration Fault	The rotary valve has a fault.
	Detector Fault	The laser smoke detector has developed a fault.
	Isolated	This has been put into Isolated mode when the unit functions normally, but alarm reporting via the relays is disabled. **Note:** General Fault will also be shown.
	Comms Fault	An element of the internal RS485 communication link or remote display is faulty. If the system processor is faulty, the General Fault, Power and Comms LEDs will be activated simultaneously.
	Hold	Flashes when a manual scan is being performed.
	Unlock	The Panel is unlocked - meaning that an access code has been entered. It will clear when normal operation is resumed.

6. Alert, Action, Fire1, and Fire2 Indicators

These operate in tandem with corresponding relays on the I/O board to indicate progressive levels of smoke and are programmable for obscuration level.

7. Logarithmic smoke density bar graph

Displays 0 - 6.09 %obs/ft (0 to 20 % obs/m) with a resolution of 0.0003% obs/ft (0.001 % obs/m) at the lower end.

3 Installation

The detector shall be installed in accordance with the following installation instructions and in a manner acceptable to the local Authority Having Jurisdiction (AHJ). The detector is also intended to be installed in accordance with local installation codes such as the NFPA 72 National Fire Code and FIA Code of Practice.

Warning: Use of controls or adjustments of performance or procedures other than those specified herein may result in hazardous radiation exposure.

The following steps should be carried out in order to correctly install the system:

1. Securely mount the back box to a suitable wall or support using the three points shown in the fixing diagrams in Section 3.1. M6 or M8 screws are suitable.
2. Connect the cables for the power supply and any I/O modules. Ferrite cores should be fitted to the power cable.
3. Fit the microbore tubes to the system. For details on how to install microbore tube networks, refer to the FireNET Vapor Pipe Installation Manual or refer to www.hochiki.com.

3.1 Mounting the Detector

Careful consideration should be given to the mounting location of the detector to ensure that it is:

- Positioned at an accessible height to facilitate commissioning, routine testing and maintenance.
- Positioned in an area where the exhaust air pipe will remain clear of obstacles at all times.
- Not installed above a heat source such as a radiator or in direct air flow source such as Air Conditioners.
- Secure and free from operation by unauthorized personnel.

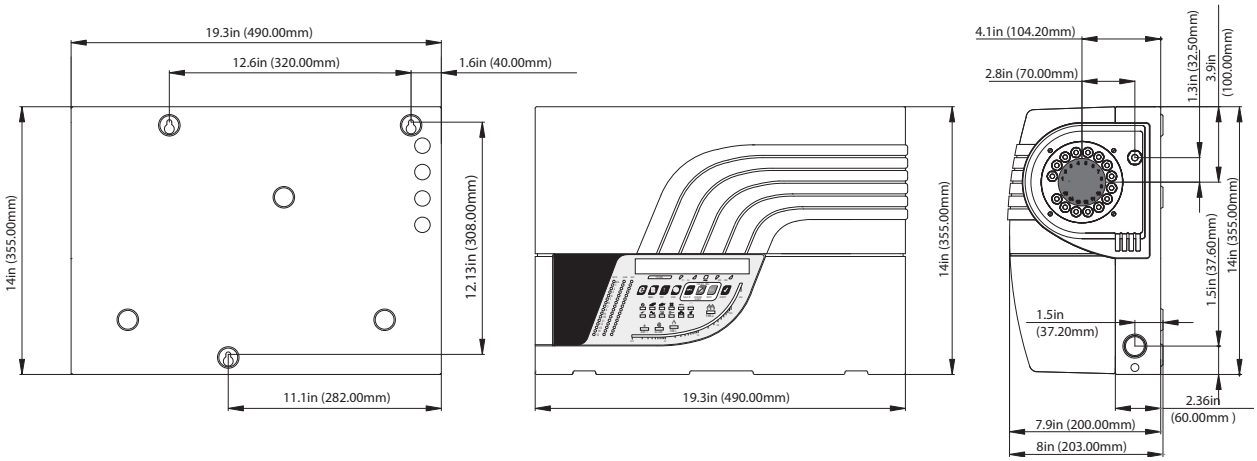


Figure 3-1: Mounting Diagram and Dimensions

3.2 Cable Connections

Note: All work carried out on the VPR-15 detector should be performed by fully qualified personnel. The molded chamber is serviceable.

Caution: Before carrying out any work that requires the removal of any board ensure that the power supply is disconnected.
A fused junction box may be used as an external disconnect device.

3.2.1 Main Board Connections

This section describes the power, input / output and communications connections for the VPR-15 detectors and how to access the interfaces for the connections. A summary of these interfaces is shown in the following table.

Table 3-1: Standard Connections

Category	Name	Description
Power	24 VDC Input	24 VDC power input from external power supply. Refer to page 13 for further information.
	Auxiliary 24 VDC Output	24 VDC power output rated to 1A for powering an external sounder, addressable I/O devices etc.
Input / Output	Fault Relay Output	Activates when a Fault is detected.
	Alarm Relay Outputs	Alarm relays for each Alarm level (Alert, Action, Fire 1, Fire 2) that are activated when the corresponding alarm level is detected.
	Remote Reset / Isolate Input	Dual action input for remote reset and isolate. **Remote Reset**: Activated by applying 24 VDC. **Remote Isolate**: Activated by applying 24 VDC for 8 seconds or more. Once 24 VDC is removed, the system reverts to normal operation. The function of this input is programmed in the Setup Menu. More information can be found in Section 5.3.8.
Communications	RS 485	Enables the following connections: • Connection to a remote Display Panel or; • Connecting up to 30 detectors on an RS 485 multi-drop network • Connection to a PC with FireNET Vapor Explorer via a RS232-RS485 converter.
	Ethernet	Enables TCP/IP connections to a PC with FireNET Vapor Explorer via LAN/WAN.
	RS 232	Enables a direct serial connection to a PC with FireNET Vapor Explorer for configuration and monitoring.

More information on connecting and using the communications interfaces can be found in the FireNET Vapor Communications Guide.

Detector Access

To gain access to the interior of the detector, first disconnect the power supply then remove the front cover. It is secured by two screws underneath and hinged at the top, allowing complete removal. If the beacon option is fitted, a cable-loom is attached; this may be unplugged at either end, but it may be easier to detach/reattach the plug connecting to the main unit.

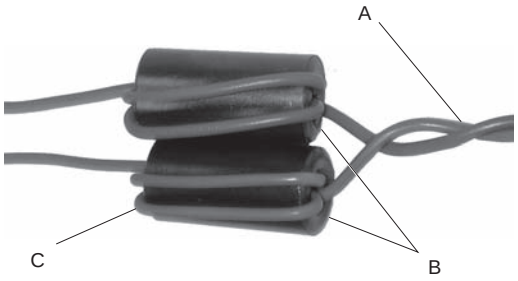
To access the Fault Relay and other I/O Module connections, the front panel must be dropped down by loosening the two knurled screw fixings at either side.

Knock-out cable entry points are provided at the top and left-hand side of the metal back box. Where the field wiring to the unit is not via conduit tubing, strain-relief type cable glands of a suitable size to fit the 25 mm diameter holes must be fitted to all used cable entry holes. These cable glands shall be fitted so as to provide strain relief and ensure that the protective earth connection (where used) is the last conductor to take any strain.

External Power Supply Connection

VPR-15 detectors are powered by an external 24 VDC power supply.

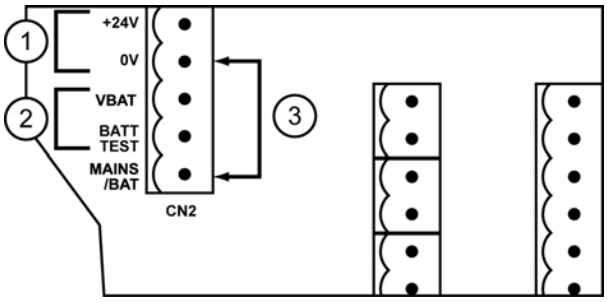
The power supply cable cores should be fitted individually with ferrite cores, close to the cable gland inside the equipment case. To fit the cables with the ferrite cores, insert the 24V and 0V conductors through the ferrite cores and wrap around once to provide maximum effectiveness.



Legend	
A	Power Supply Cables
B	Two Turns
C	Ferrite Core

Figure 3-2: Ferrite Core

Connect the 24 VDC power supply to the 5-way connector (CN2) on the I/O board under the control panel as shown in Figure 3-3.



1. External Power Supply
2. No Connection
3. Link

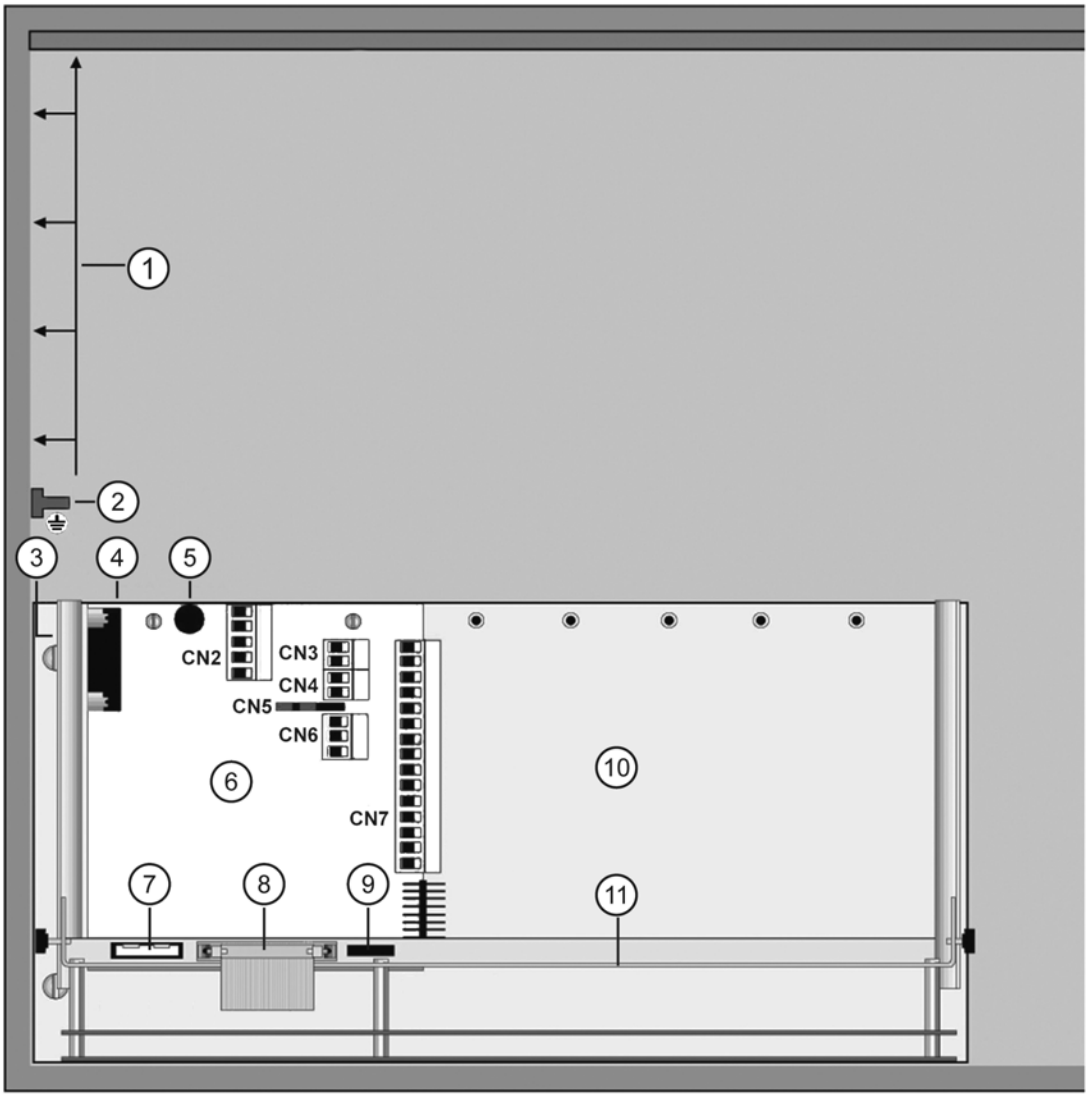
Figure 3-3: 24 VDC connection for VPR-15 Detectors

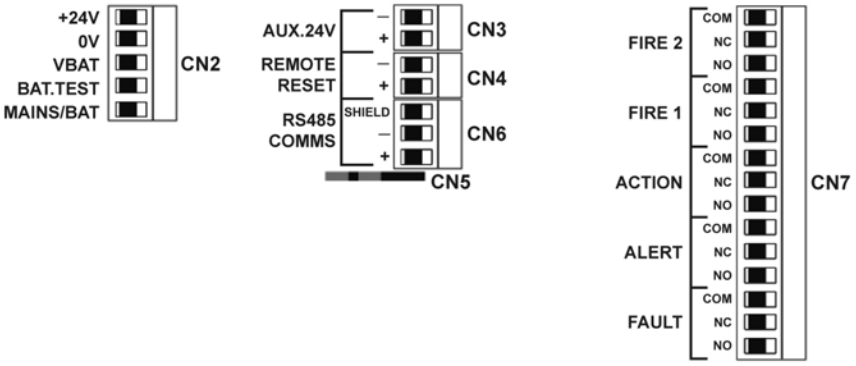
The MAINS/BAT terminal must be linked to 0V. Failure to do so may result in a Mains Fault. The VBAT and BATT TEST terminals should be left unconnected.

Ensure that in the Configuration menu, the STANDBY parameter is set to 0. For more information about Configuration mode, refer to Section 5.3.4.

Grounding and Fuse Protection

An M5 chassis earthing stud is provided for the grounding of the unit using a suitable gauge of wire or earth braiding (0.03 in² (0.75 mm²) minimum) to a primary earth point (i.e. copper water pipe or an earth-stake etc.). This chassis earth should be connected on all DC powered installations.





1. Knock-out cable entry holes
2. M5 Chassis grounding stud
3. RS232 connector
4. Ethernet connector
5. Fuse (1 A)
6. Main I/O board
7. Beacon connector
8. Display & valve connector
9. Programming connector
10. Optional I/O modules
11. Drop-down display panel

Figure 3-4: Input and Output Interfaces

Note: CN13 and CN14 are fitted (below CN6) but are not used.

3.2.2 Connection Interfaces

The following tables define input and output connections for the VPR-15.

Table 3-2: Connections for i602 I/O Board

CN1: RS232 Interface		
2	Receive Data	Requires a null modem cable, up to a maximum distance of 50ft (15m). **Notes:** • The null modem cable should have female DB9 connectors on both ends and the transmit and receive lines crossed, i.e. pins 2 and 3. • Only intended for local programming.
3	Transmit Data	
5	0 V	
1, 4, 6, 7, 8, 9	N/C	
Shell	Earth (Screen)	

CN2: DC Supply		
1	24 VDC in	Requires 18 AWG (16 x 0.25-15 A) cable (0.75mm² minimum IEC60227 H05 W-F/H05 WH2-F2 for EC). **Notes:** • Link Pin 2 (0 V) and Pin 5 (MAINS/BAT). Refer to page 13 for further information.
2	0 VDC in	
3	N/C	
4	N/C	
5	Mains/Battery	

CN3: Auxiliary Supply Output Interface		
1	0 VDC	Requires 24 AWG (7 x 0.2 - 6 A) cable (1 A maximum load).
2	24 VDC	

CN4: Remote Reset Interface		
1	- input	Opto isolated input. 24 VDC low current signal.
2	+ input	

CN6: RS485 Interface		
1	Shield	Belden 9842 cable (or suitable equivalent) **Notes:** • Ensure that jumper links are fitted across pins 1-2, 4-5 and 7-8 of CN 5 when the unit is terminating a RS485 network. At all other times, place the jumpers across pins 2-3, 5-6 and 8-9. Refer to Section B.1 for further details on RS485 connections.
2	RS485 -	
3	RS485+	

CN7: Output Relay Interface			
1	FIRE 2	C	Requires 24 AWG (7 x 0.2 - 6 A) cable **Notes:** • Maximum relay contact rating is 2 A @ 30 VDC. • Refer to Section 5.4.1 for details of individual sector relay options.
2		NC	
3		NO	
4	FIRE 1	C	
5		NC	
6		NO	
7	ACTION	C	
8		NC	
9		NO	
10	ALERT	C	
11		NC	
12		NO	
13	FAULT	C	
14		NC	
15		NO	

Note: Connection CN14 is only used for special applications.

Table 3-3: Connections to Processor Board

Connector	Pin Description	Description
8-pin RJ45	Standard Ethernet connections	Standard Ethernet cable. **Notes:** • Refer to Section B.1 for further details.

Table 3-4: Connections from 4 Channel Relay Board (Optional Module)

Output Relay Interface (i606)			
1	RELAY 1	C	Requires 24 AWG (7 x 0.2 - 6 A) cable **Notes:** • Maximum relay contact rating is 2 A @ 30 VDC. • Refer to Section 5.4.1 for full operational details.
2		NC	
3		NO	
4	RELAY 2	C	
5		NC	
6		NO	
7	RELAY 3	C	
8		NC	
9		NO	
10	RELAY 4	C	
11		NC	
12		NO	

Table 3-5: Connections from Current Output Board (Optional Module

Output Connections (i624)			
1	Output 1	+	All outputs have the following specifications: • 20 VDC max. • 4 - 20 mA output current (optional 0 - 20 mA) • 24 AWG (7 x 0.2 - 6 A) cable Refer to Section 5.4.2 for full operational details
2		-	
3	Output 2	+	
4		-	
5	Output 3	+	
6		-	
7	Output 4	+	
8		-	
9	Output 5	+	
10		-	
11	Output 6	+	
12		-	
13	Output 7	+	
14		-	
15	Output 8	+	
16		-	

Table 3-6: Connections to Remote Panel (Optional) - from i620 Control Board

RS485 Remote Control Data		
1	+24 VDC (Supply Out)	Belden 9842 (24 AWG) cable (or equivalent) **Notes:** • Ensure that a jumper link is fitted across pins 1-2 of CN 6. • Refer to Sections 3.4 and B.1 for further details.
2	0 V (Supply Common)	
3	RS485 +	
4	RS485 -	

Notes:

- Refer to Section 3.4 for details.

3.3 Air Sampling Network

The FireNET Vapor VPR-15 detector uses Microbore tubing to provide air sampling points.

For reliable smoke detection and flow monitoring performance, the detector must be connected to a balanced network comprised of between 1 and 15 equal length tubes. Two types of Microbore tube can be used, as listed below in Table 3-7. Normal diameter tubes are used in the default configuration detailed in Section 3.3.1, while a combination of normal and reduced diameter tubes can be used in the alternate configurations detailed in Section 3.3.2.

Table 3-7: Microbore Tube Properties

Microbore Tube	Outer Diameter	Inner Diameter
Normal diameter	0.25 in (6 mm)	0.17 in (4 mm)
Reduced diameter	0.16 in (4 mm)	0.096 in (2.5 mm)

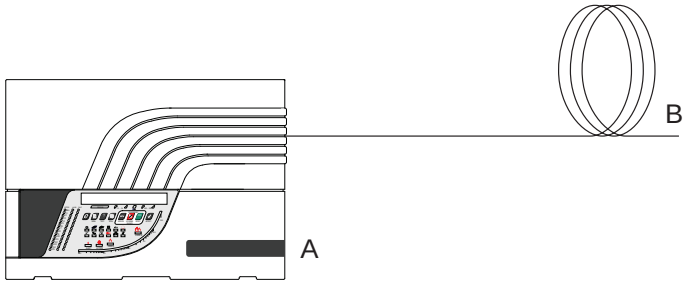
Caution: Do not insert ANY object into the inlet ports other than the normal diameter tube. This is to avoid damage to delicate electronic flow sensor components mounted just inside each port opening.

Ensure that Microbore tubes are never glued to the inlets of the detector.

Note: For more details refer to the FireNET Vapor Pipe Installation Guide.

3.3.1 Default Microbore Tube Configuration

The default configuration requires between 1 and 15 normal diameter Microbore tubes, each 164 feet (50 meters) in length. It is recommended that excess tubing be coiled close to the sampling point end.



Legend	
A	Detector
B	Normal diameter Microbore tube with excess coiled close to the sampling point end. Total length: 164 ft (50 m)

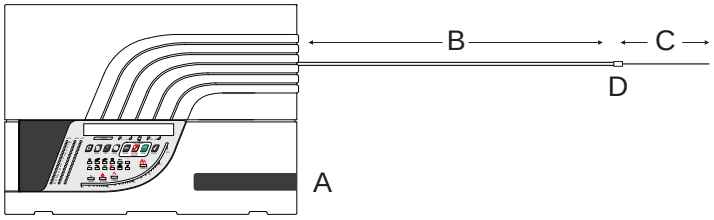
Figure 3-5: Default configuration with coiled normal diameter Microbore tube

Unused inputs on the detector should be looped to one another using short lengths of normal diameter Microbore tube. For example, if the VPR-15 detector has unused inputs 9 to 15, one way of connecting the unused inputs would be to use short pieces of microbore to connect inputs 9 to 12, 10 to 13, 11 to 14 and have input 15 capped off.

3.3.2 Alternate Microbore Tube Configurations

A set of alternate Microbore tube configurations is provided below to reduce or eliminate coiling of excess tubing while maintaining a balanced network for reliable and consistent detector performance.

These tube configurations use a shorter length normal diameter Microbore tube connected to reduced diameter Microbore tube using a reducer connector, as shown in Figure 3-6. These configurations have shorter overall length but impose the same airflow impedance as the default configuration that uses 164 ft (50 m) length tubes.



Legend	
A	Detector
B	Normal diameter Microbore tube
C	Reduced diameter Microbore tube
D	Reducer connector

Figure 3-6: Configuration with reduced diameter Microbore tube

Table 3-8 below lists the length requirements for the normal and reduced diameter tubes for different distances between the detector and the sampling location (hole).

Table 3-8: Tube Length Requirements

Distance between Detector and Sampling Location (Hole)	Microbore Tube Length	
	Normal Diameter	Reduced Diameter
25 ft (7.5 m)	0 ft (0 m)	25 ft (7.5 m)*
52 ft (16 m)	33 ft (10 m)	20 ft (6 m)
80 ft (24.5 m)	66 ft (20 m)	15 ft (4.5 m)
108 ft (33 m)	98 ft (30 m)	10 ft (3 m)
136 ft (41.5 m)	131 ft (40 m)	5 ft (1.5 m)
164 ft (50 m)	164 ft (50 m)	0 ft (0 m)

* 0.33ft (0.1m) normal tube is required to connect the reduced diameter tube to the detector inlet port

Unused inputs on the detector should be looped to one another using short lengths of normal diameter Microbore tube. For example, if the VPR-15 detector has unused inputs 9 to 15, one way of connecting the unused inputs would be to use short pieces of microbore to connect inputs 9 to 12, 10 to 13, 11 to 14 and have input 15 capped off.

Example: Determine New Tube Configuration for a 108 ft (33 m) distance to sampling location (hole)

Solution (as per Table 1):

- Normal diameter Microbore: 98 ft (30 m)
- Reduced diameter Microbore: 10 ft (3 m)

Note: When the sampling hole is fitted with a metallic meshed plate an additional reducer connector is required to transition from reduced diameter tube to normal tube. The normal tube length connecting to the metallic sampling hole should be 0.33ft (0.1m).

To check for leakage use FireNET Vapor Explorer to set the FireNET Vapor VPR-15 to sample from one port and follow the steps below:

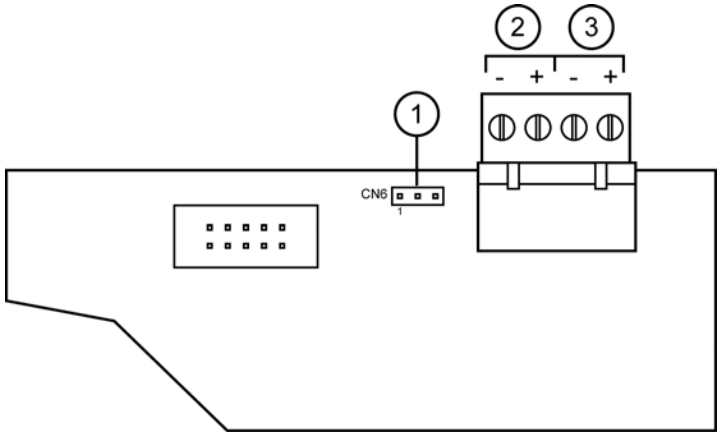
1. Connect a 164 ft (50 m) length normal tube and record detector Relative Pressure. This forms the baseline pressure for comparison with the alternate tube configurations.
2. Record detector Relative Pressure for new tube configuration(s).
3. Difference between points 1 and 2 must be less than 3%. If above 3%, inspect to ensure tubes are tightly fit to connector.

Before leakage testing, ensure that the FireNET Vapor VPR-15 detector is in operation for at least 30 minutes.

3.4 Remote Display Panel

An installation kit is available for mounting a display panel up to 1 km away from the detector. It contains:

- 1 Blanking plate
- 1 Mounting Box
- 1 Fixing kit



1. Jumper Link
2. RS485
3. 24 VDC power

Figure 3-7: Display board and terminal for remotely connecting the Display Panel

Note: Ensure that a jumper link is fitted across pins 1-2 on CN 6.

Suitable 2 pair twisted pair cable (e.g. Belden 9842) for connecting RS485 communications and 24 VDC power must be used. More information may be found in Section B.1. Ensure that the electrical characteristics of the cable connected are appropriate for the distance between the detector and display module.

When using the cable, use one pair for RS485 communications, the other pair for 24 VDC supply, and ensure that matching signals are connected at each end.

To use the Display Panel remotely, the main unit must also be configured for remote display operation by following these steps (refer to Figure 5-1 for User Function buttons):

1. Press **MENU**
2. Use Parameter **UP** & **DOWN** to reach **SETUP** (Scan and Isolate buttons)
3. Press **ENTER**
4. Enter Level 2 Access Code (693). Refer to Section 5.1 for details on the Access Code.
5. Use Parameter **UP** & **DOWN** to reach **REMPANEL**
6. If the display shows REMPANEL 0 then press Value **UP** to get REMPANEL 1
7. Press **ENTER**
8. Press **MENU** twice to revert to normal operation

4 Starting Up

After installation, it will be necessary to power up the system for configuring the detector according to site requirements and also to ensure that the detector and associated microbore tubes are properly installed.

- The system takes approximately 30 seconds to power up.
- If the system or any detector on the network fails to power up, re-check that all power wires are securely connected to their respective terminals and the polarity is correctly maintained.

During power-up, the following sequence of events occurs:

- Sounder beeps
- Pump starts
- Display shows a rolling text message showing:
  - IFT
  - Software version: VERSION *.**
  - Optional text 1
  - Optional text 2
  - Optional text 3
- Fault indicators are activated for current faults
- Current smoke background level (% obs/m) is displayed

Optional text information are user definable options differing from the factory default settings:

1. REM PANEL - the unit may be configured to operate the display panel remotely using the RS485 communications.
2. NO DET FLOW - the flow measurement through the detector chamber itself may be disabled

The detector may show faults immediately after power up and this is normal. Reset the detector to unlatch the relays and fault LEDs. The Fault LEDs on any display connected to the system will light up (this is normal).

4.1 Flow Normalization

Flow normalization should be carried out as a result of a new installation or after changes or maintenance to the system or microbore tubes. It is necessary for the detector to learn the air flow characteristics of the system.

Microbore systems rely on the pump to provide the vacuum rates in the system. The pump speed should not be altered from the factory default value under any circumstances.

To normalize the air flow for a detector using the display:

1. Ensure that the Front Cover is fitted.
2. Leave the detector powered up for a minimum of 60 minutes. Ensure that the detector is stable during this time.
3. Press **MENU**.
4. Use Parameter **UP** & **DOWN** (Scan or Isolate buttons) to scroll to **CONFIGURE**.
5. Press **ENTER** (Sounder silence button).
6. Enter Level 1 Access Code (260). Refer to Section 5.1 for more information on Access Codes.
7. Use Parameter **UP** & **DOWN** to reach **TESTTIM**.
8. Press **ENTER**.
   A rolling text message shows progress. When complete, the display resumes at OBSC/M 0.00% and all displayed flow rates will be set to 100%.
   Normalization takes about 10 minutes. It is advised that the user does not try to change any settings or revert to the menu during the normalization process.

On completion of the flow calibration process, document the values identified in the following procedure.

1. Enter the Maintenance list to display REL in.
2. Record REL IN with system monitoring in overall position. Reset the unit to initiate a scan.
3. Record REL IN values for each sector.
4. Record the ABS IN value which is also in the Maintenance list.

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5 Setup and Button Functionality

The configuration of the detector is achieved by using a PC loaded with FireNET Vapor Explorer software or through the display panel.

This section provides information on the button functionality in the display panel, and how to setup the detector and navigate through the Main Menu options. A flow chart that shows a summary of these navigation options may be found in Appendix A.

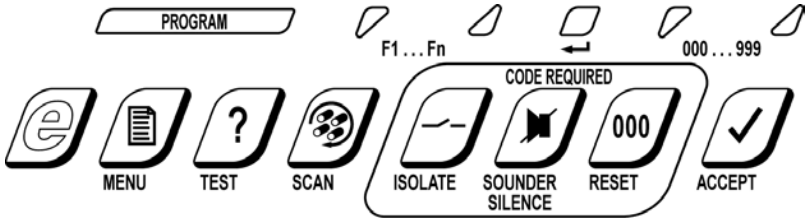


Figure 5-1: Detector buttons for user functions

5.1 Access Codes

Access to some modes in the Main Menu and other configuration and control functions requires the user to enter an Access Code.

There are several different access levels. Higher levels provide access to additional administration features.

The Operator Access Code is changeable as a parameter in Configuration Mode, which requires Level 1 Access. The default Access Codes are shown below.

Table 5-1: Detector Access Codes

Access Level	Access Code
Operator	0 = Not required
Level 1	260
Level 2	693
Level 3	Factory Use Only

5.1.1 How to Enter an Access Code via the Display Panel

When entering an Access Code, the alternative function LEDs above the ACCEPT and RESET buttons will be lit, enabling these buttons to be used as UP and DOWN buttons to enter a 3-digit number.

If the UP or DOWN buttons are continually pressed, the 'units' digit on the Status Display will increment, then the 'tens' digit, then the 'hundreds' digit. If the button is released, the flashing digit (units, tens or hundreds) is the one that will change with further use of the UP and DOWN buttons. When the hundreds digit is correct, wait about three seconds for the flashing digit to move to the tens digit, then set the tens to the required value. Repeat for the units digit.

5.2 User Functions

User functions associated with some configuration and control buttons are described in this section. For more information on setup and configuration, refer to Chapter 5.

Table 5-2: Description of User Functions for the Display Panel

Function	Access Level	Description
ACCEPT	None	Acts only on the internal sounder. Acknowledges all current Alarm states. All other warning mechanisms continue unchanged. Sounder operation changes from continuous to 1 second ON: 15 seconds OFF. New Alarm events cause the sounder to revert to continuous operation.
SOUNDER SILENCE	Operator	Acts only on the internal sounder. The Sounder is switched off until one or more new Alarm events.
RESET	Operator	Clears all latched Alarms and Faults. Current Alarms or Faults will remain.
ISOLATE	Operator	Used when diagnosing faults, testing new installations, et cetera. All alarm relays are disabled, so that Alarm conditions will not be reported back to the Host Panel. The Isolate button toggles the unit between Isolated and Normal operation, as shown by the Isolated indicator, but see note below. **Notes:** • If the unit is isolated then returned to the Normal, Locked state (by pressing the **MENU** button) the Operator will need to re-enter Operator Access Code in order to cancel the isolated state. • If a power cycle is applied to the detector the detector will not remain in an isolated state. • The Sounder and alarm LED indicators will operate as normal. • The fault relay will indicate a fault condition while the detector is isolated.
TEST	None	Successive presses of the Test button show: 1. Date on the Status Display 2. Time on the Status Display 3. IP address on the Status Display 4. Subnet net mask on the Status Display 5. Media Access Control (MAC) address on the Status Display 6. All LEDs on the panel and LED segments on the Status Display and the Sounder operates. 7. Normal display The TEST button does not operate when the detector is in an unlocked state.
SCAN	None	Initiates a scan of the sectors in the detector. If the Scan button is pressed once, it will start by scanning the 1st sector for 60 seconds, then scan subsequent sectors for a time set by the MIN DWELL parameter. The STOP LED indicator flashes during this time. Subsequent presses of the Scan button will advance the scan to the next adjacent sector, where it will scan the sector for 60 seconds, then continue scanning subsequent sectors for the time set by MIN DWELL.

The VPR-15 detector can also be reset remotely by applying 24 VDC to the remote reset input on the Main I/O PCB (refer to Section 3.2).

Note: When the Operator Access Code is entered (default = 0), the Sounder Silence, Reset and Isolate user functions are enabled and the unit is placed in the Unlock state, as shown by the flashing Unlock indicator. If the unit is isolated, then returned to the Normal, Locked state (by pressing the Main Menu button) the Operator will need to re-enter Operator Code in order to cancel the Isolated state. If any button is not pressed to lock the panel the unit will self-timeout and lock in 5 minutes.

5.3 Main Menu Modes

To enter one of the Main Menu Modes follow these steps:

1. Press **MENU**
2. Use Function **UP** & **DOWN** buttons (SCAN and ISOLATE buttons) to reach required main menu item
3. Press **ENTER** (SOUNDER SILENCE button)
4. Use Value **UP** & **DOWN** buttons (RESET and ACCEPT buttons) to enter the appropriate Access Code
5. Press **ENTER**

Notes:

- Access Code Entry may be aborted by pressing the **MENU** button.
- All of the following settings can be entered using the FireNET Vapor Explorer configuration software and a PC. This can reduce the time taken to enter certain values and parameters.
  To obtain this software contact Hochiki or visit the website www.hochiki.com.
- The cover must be removed to gain access to the RS232 port at the side of the detector. It must be replaced for a minimum of 60 minutes prior to flow normalization.

The following sections show how to enter the Main Menu Modes and what parameters are available in each of these modes.

5.3.1 FAULTS: Fault List

Minimum Access Level Required: **None**

This menu item shows a list of the current faults that are not already annunciated via a Display Panel LED.

Use the Function UP & DOWN buttons (Isolate and Scan) to inspect any current faults in the list.

5.3.2 OPERATOR: Operator Mode

Minimum Access Level Required: **Operator**

This menu item enables the user to specifically enter Operator Mode, and permits the usage of the Isolate, Sounder Silence and Reset buttons. Once the user has successfully entered the Operator Access Code, the Unlock LED should activate.

5.3.3 ENGINEERING: Engineering Mode

Minimum Access Code Required: **None**

Certain engineering values may be inspected, primarily for diagnostic purposes. Use the UP & DOWN buttons (Isolate and Scan) to inspect any parameter in the list.

Table 5-3: Engineering Parameters and Values

Parameter	Value	Description
VERSION	*.**	Version of Software in the processor module in the Main Unit. The software can be upgraded using a PC and a special interconnect lead.
BUILD NO	*.**	Reference to specific software build.
GENERAL FAULT	*.**	Fault list that generates fault number codes.
DETFLOW	**.*%	Sample flow through the detector. This measurement may be enabled/disabled under Configuration.
FLOWnn	**.*%	Measurements of Sample flow rates for each sector. The number will vary depending on the number of actual sectors sampled. The flow rates should be normalized to 100% at installation. High pressure systems measure pressure for each sampled sector.
BATTERY	**.*V	Measurement of backup battery voltage. Applies to internal power supply units only.
OBS/M or OBSC/FT	*.**%	Obscuration value in meters or feet. This is the same as the normal display. To change from metric to imperial see Section 5.3.8.
REFDENS	*.**%	For special applications only.
MODn	1 to 5	Shows the module types that are fitted. These are read directly from the Modules.

5.3.4 CONFIGURE: Configuration Mode

Minimum Access Code Required: **Level 1**

The VPR-15 detector uses many configuration parameters, and is shipped with factory default values. The Configuration Mode allows changes to be made to these parameters. Below is a list of user definable parameters, and their Factory Default values. The Parameter **UP** and **DOWN** buttons (Isolate and Scan) navigate through the list; the Value **UP** and **DOWN** buttons (Accept and Reset) change the value. The **ENTER** button (Sounder Silence) saves the new value, and moves to the next parameter.

Table 5-4: Configuration Mode Parameters and Values

Display Panel Shorthand	Parameter	Range	Factory Default
OPCODE	Operator Function Access Code	0 to 999	0
ENDSCTR	End Sector (number of sectors used)	1 - 15	15
DENSLOG	Log of density change	0.01 to 20.00	0.02
F2LTCH	Fire 2 Latch	0 or 1	1
F1LTCH	Fire 1 Latch	0 or 1	1
ACTLTCH	Action Latch	0 or 1	1
ALTLTCH	Alert Latch	0 or 1	1
TRCLTCH	Trace Latch	0 or 1	1
FLTLTCH	Fault Latch	0 or 1	1
TRCRLY	Trace Relay 1	0 or 1	0
REFCOMP	Not Used (Leave at default setting)	0.000-2.000	0.05
REFDEL	Not Used (Leave at default setting)	5 to 60s	15s
FLOWLOG	Log of flow change	5.0 to 200.0	5.0
FLOWDEL	Flow Fault Delay	1 to 100s	5s
FLOWHI2	Flow High 2 Limit	105 to 200%	130%
FLOWHI1	Flow High 1 Limit	105 to 200%	120%
FLOWLO1	Flow Low 1 Limit	0 to 95%	80%
FLOWLO2	Flow Low 2 Limit	0 to 95%	70%
DFLOWHI2	Detector Flow High 2 Limit	105 to 200%	120%
DFLOWHI1	Detector Flow High 1 Limit	105 to 200%	115%
DFLOWLO1	Detector Flow Low 1 Limit	0 to 95%	85%
DFLOWLO2	Detector Flow Low 2 Limit	0 to 95%	80%
SETFAN	Pump Speed	1 to 10	7
STANDBY	Backup Battery Monitoring	0 or 1	0
PWRDEL	Power Fault Delay	1 to 1000s	10s
BUZZER	Internal Sounder Enable	0 or 1	1
BEACON	Beacon Enable	0 or 1	1
ADDRESS	RS485 Address	0 to 30	31 (off)
TESTTIM	Time between automatic scans **Note:** TESTIM is also used for VPR-15 Flow normalization by pressing ENTER.	1 to 20160 mins	1440
MIN DWELL	Rotary valve dwell time	8 to 60s	8s
GAIN X	See description	1 - 100	1
MOD1	Set Module 1 usage		
MOD2	Set Module 2 usage		
MOD3	Set Module 3 usage		
MOD4	Set Module 4 usage		
MOD5	Set Module 5 usage		
SC DEL	Suppression Control Module Delay	1 to 120	60
NIGHSTART	Night Start time (Hour in 24 format)	12 to 23	12

Table 5-4: Configuration Mode Parameters and Values (continued...)

Display Panel Shorthand	Parameter	Range	Factory Default
NIGHSTOP	Night Stop time (Hour in 24 format)	0 to 12	12
TRC PRESS	Setup for auto Valve Scan	5 to 1000	50

Notes:

- Avoid setting to values already defined for Level 1 or 2 Access Codes.
- To revert all Configuration parameters to their factory default values go to the **LOAD DEFAULTS** menu item and press **ENTER** (Level 2 Access Code is required). The Unit will restart with default parameters.

OPCODE

This is the Operator Access Code (or Access Code Level 1 or 2) that must be entered to enable **ISOLATE, SOUNDER SILENCE and RESET** buttons. The default value is 0. It may be changed within the range 0 to 999, but 260 and 693 should be avoided as these are reserved for Level 1 and 2 access codes. A zero value removes the need to enter an Access Code.

ENDSCTR

The default value is 15. If fewer sectors are to be sampled, **ENDSCTR** should be set accordingly and the unused sample inlets should be looped to one another.

Those used should be a contiguous set beginning from the first inlet.

DENSLOG

If there is a change in density greater than or equal to this value, an entry in the log is made of the new value.

TRCLTCH, ALTLTCH, ACTLTCH, F1LTCH, F2LTCH

Defines whether Alarm events are to be latched. If not latched, the Alarm condition will clear as soon as the cause disappears. If latched, the system must be reset to clear the Alarms. Note that the ACCEPT or SOUNDER SILENCE buttons may be used to stop the internal sounder, and the ISOLATE button may be used to disable all Alarm relays. The default is 1 (Latching).

FLTLTCH

A FAULT condition will exist if any specific fault within the system is detected. It will be accompanied by closure of the Normally Closed contacts of the FAULT relay, and illumination of the GENERAL FAULT indicator. If it is made Latching, the relay contacts and indication will remain even after the originating Fault condition has ceased, and the system must be reset to clear FAULT. The default is 1 (Latching).

TRCRLY

Optionally, the ALERT relay can be re-assigned to activate when the detector goes into TRACE mode. To do this set it to 1. The default is 0. The Alert relay will then act as a Trace relay.

When the TRCRLY parameter is set to 1, an Instantaneous Fire feature is also enabled. The Instantaneous Fire feature allows an overall Fire 1 alarm to be immediately generated once the overall smoke level exceeds a diluted Fire 1 threshold. The diluted Fire 1 threshold is determined by selecting the highest of two threshold values:

1. The Trace threshold; or
2. A diluted threshold calculated from taking the lowest active Sector Fire 1 threshold and dividing it by the number of active sectors.

Note: The Instantaneous Fire feature is only available to units with Firmware Build 407 or greater.

Refer to Section 2.2.1 for further information.

REFCOMP, REFDEL

Not used. Leave at default settings.

FLOWLOG

If there is a change in flow greater or equal than this value and there is currently a flow fault, an entry in the log is made of the new value.

FLOWDEL

Flow Fault Delay. The time period in seconds for which a Flow Fault must be sustained before registering as a fault. The default is 5 seconds. The range is 1 to 60 seconds.

FLOWHI, FLOWLO

High and Low limits set for Flow Fault. Note that Flow readings are normalized to 100%. All systems must normalized at the installation stage. Refer to Section 4.1 for further information.

SETFAN

This sets the speed of the pump. The default value of 7 should be maintained to comply with VdS and UL requirements. Note that during an alarm condition the pump will increase speed to the maximum value of 10. The speed will revert back to 7 when the alarm condition has cleared.

STANDBY

This enables the monitoring of battery voltages on the internal power supply unit. It should be left to its default setting of '0' Disabled, for all other power supplies.

PWRDEL

This sets a time delay between a power supply fault being reported by the internal power supply unit and the fault condition being displayed by the detector. This would normally be left at the default value of 10s.

BUZZER

The internal sounder may be enabled or disabled on a permanent basis. The default is 1 (enabled). The sounder (if enabled) accompanies all ALARM conditions.

BEACON

The integral Beacon may be enabled or disabled on a permanent basis. The default is 1 (enabled). The beacon (if enabled) accompanies all ALARM conditions.

ADDRESS

This is the detector's RS485 address. The range is 0 to 30; a value of 31 disables RS485 communications. The default setting is 31 (off). Note that if the display panel is used remotely, communication to it is by means of this RS485 communications port, and the ADDRESS setting is not used.

Note that this is not applicable on the standard product.

TESTTIM

Set in minutes. If no rotary valve movement has been triggered within this time period then an automatic scan will be initiated. To normalize flow on a detector, scroll to the TESTTIM parameter in the Configure menu, and press enter. This should only be carried out after fitting the microbore tubes. Refer to Section 4.1 for further information.

MIN DWELL

Used for rotary valve movement control. Determines the minimum time in seconds that the valve will remain stationary between sectors. The default setting of '8' must not be changed if compliance with EN54-20 is required.

GAIN X

The GAIN X setting is used to condition output signals from the 8 channel 4 - 20 mA Output Module where it is set to measure Smoke (real time smoke density). Gain settings range from 1 to 100.

The GAIN X setting should be increased where the background smoke level is high, or decreased where background smoke is low.

Refer to Section 5.4.2 for further information.

MOD1, MOD2, MOD3, MOD4, MOD5

Some module types may be used in different ways. MOD1 to MOD5 sets the usage of these modules. See under the specific I/O module section.

SC_DEL

N/A.

NIGHSTART, NIGHSTOP

The time in hours, on a 24 hour basis, at which the values change from day to night or back again. The default value for both is 12, at this value only the day values are applicable.

TRC PRESS

Trace Pressure is used as a figure to initiate the valve into a scan routine when the required change in airflow is detected. This figure is set by monitoring the REL in value with the Rotary valve monitoring flow in the overall position.

5.3.5 SECTORS ALMS: Set Sector Day and Night Alarms

Minimum Access Code Required: **Level 1**

The display will now show DAY VALUES, use Parameter **UP** & **DOWN** to change to NIGHT VALUES.

Press **ENTER** to access the settings for all the sectors.

This function allows the user to set different values for day and night operation. The time of day when the values change over is also configurable. Values can be set for all sectors or each sector individually.

Table 5-5: Sector Alarm Parameters and Values

Parameter	Description	Range	Default
ALL F2	All Fire 2 Alarm Levels	0.024-6.25%obs/ft (0.08-20% obs/m)	0.305%obs/ft (1.00% obs/m)
ALL F1	All Fire 1 Alarm Levels	0.018-6.25%obs/ft (0.06-20% obs/m)	0.024%obs/ft (0.08% obs/m)
ALL ACTION	All Action Alarm Levels	0.012-6.25%obs/ft (0.04-20% obs/m)	0.018%obs/ft (0.06% obs/m)
ALL ALERT	All Alert Alarm Levels	0.003-6.25%obs/ft (0.01-20% obs/m)	0.012%obs/ft (0.04% obs/m)
Sn FIRE 2 n = 1 to 15	Sector 'n' Fire 2 Level	0.024-6.25%obs/ft (0.08-20% obs/m)	0.305%obs/ft (1.00% obs/m)
Sn FIRE 1 n = 1 to 15	Sector 'n' Fire 1 Level	0.018-6.25%obs/ft (0.06-20% obs/m)	0.024%obs/ft (0.08% obs/m)
Sn ACTION n = 1 to 15	Sector 'n' Action Level	0.012-6.25%obs/ft (0.04-20% obs/m)	0.018%obs/ft (0.06% obs/m)
Sn ALERT n = 1 to 15	Sector 'n' Alert Level	0.003-6.25%obs/ft (0.01-20% obs/m)	0.012%obs/ft (0.04% obs/m)
TRACE	Trace Level	0.003-6.25%obs/ft (0.01-20% obs/m)	0.009%obs/ft (0.03% obs/m)
FINAL SECTOR AS ABOVE			
TRCDEL	Trace Delay	0 to 60 secs	3 secs

By default, NIGHT VALUES are set to the same as DAY VALUES. DELAYS are automatically the same for both DAY and NIGHT.

ALL ALERT, ALL ACTION, ALL F1, ALL F2

These are the obscuration levels corresponding to the respective alarm events. Changes made should preserve their progressive relationship. The values apply equally to OVERALL sampling and to TRACE sampling.

TRACE

The obscuration level (in OVERALL sampling) which will cause the detector to begin Sector scanning.

5.3.6 TIME DATE: Set Time and Date

Minimum Access Code Required: **Level 1**

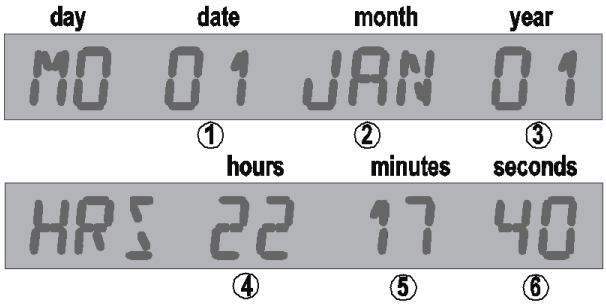


Figure 5-2: Display for setting time and date.

After accessing this menu item, the display will now show the date in the format 'day - date - month - year' (refer to Figure 5-2), with the date flashing. To change the time and date:

1. Press **UP** & **DOWN** buttons to change the date.
2. Press **ENTER** to update the date and move to the next step (month); month will flash.
3. Press **UP** & **DOWN** buttons to change the month.
4. Press **ENTER** to update the month and move to the next step (year).
5. Press **UP** & **DOWN** buttons to change the year.
6. Press **ENTER** to update the year.

Continue as above to change the time. When the **ENTER** button is pressed; the flashing element will progress from date through to seconds, with the display format changing from date to time appropriately. The day of the week is determined from the date, month and year.

The Parameter **UP** & **DOWN** buttons will switch the display between date and time.

Return to the Main Menu by pressing **MENU**.

5.3.7 WEB: Set IP Address and Mask

Minimum Access Code Required: **Level 1**

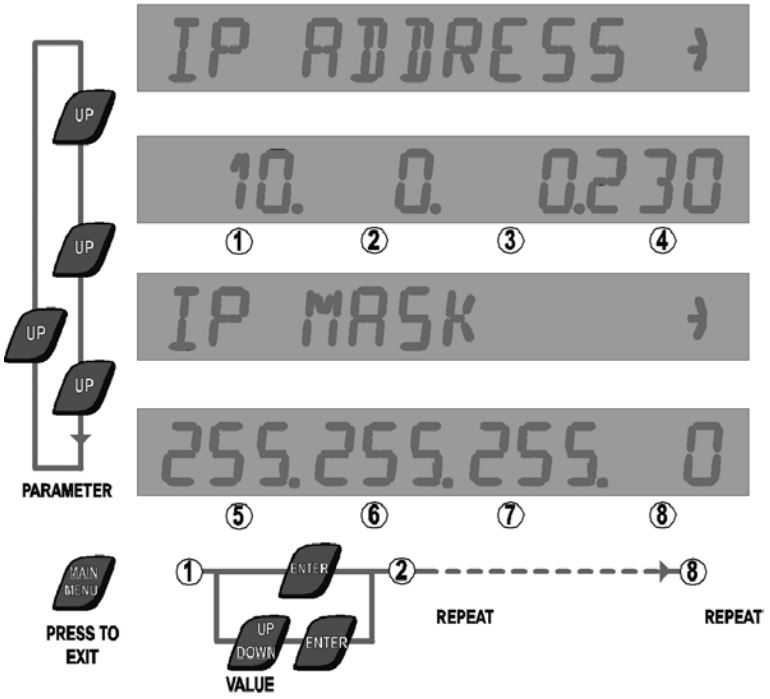


Figure 5-3: IP Address and IP Mask display - default values shown.

The display will now show the text **IP ADDRESS**. Press **UP** button to show the IP Address with the first field flashing:

1. Use Value **UP** & **DOWN** buttons to set the first field.
2. Press **ENTER** to update and move to the next field.
3. Repeat the two steps for all fields.

Once the IP Address has been updated, the display will now show **IP MASK**. Press UP to show the actual IP MASK with first field flashing:

1. Use Value **UP** & **DOWN** buttons to set the first field.
2. Press **ENTER** to update and move to the next field.
3. Repeat the two steps for all fields.

Return to the Main Menu by pressing **MENU**.

5.3.8 SETUP: Setup Menu

Minimum Access Code Required: **Level 2**

Once the Setup Mode is accessed, follow this procedure to change a parameter:

1. Press Parameter **UP** & **DOWN** buttons to reach required **SETUP** item.
2. Press **ENTER**.
3. Press Value **UP** & **DOWN** buttons to update the item.
4. Press **ENTER** to update and move to next parameter. If the value is left unchanged, **ENTER** will have no effect.

Press **MENU** to get back to the Main Menu. Press **MENU** again to get back to Normal display.

The Setup menu has the following items.

Table 5-6: Setup Menu Parameters and Values

Parameter	Value	Defaults	Description
HI RESLTN	0 or 1	0	Enables the Status Display to show standard resolution (0) or higher Resolution (1) for obscuration (switches between a resolution of 0.01 to 0.001). **Note:** It is highly recommended to leave this value at 0. Changing the value from 0 will cause some configuration values to change. Connection to the FireNET Vapor Explorer software will automatically change this value back to 0.
OBSC/FT	0 or 1	0	Set to 1 to display smoke value in % obs/ft. Normally % obs/m. **Note:** Smoke Alarm Thresholds will revert to default values when changing between % obs/ft and % obs/m and vice versa.
REMPANEL	0 or 1	0	Enables remote panel operation. A communications fault will be displayed if this is enabled without a remote display connected.
REMPOD	0, 1 or 2	0	Set to 1 if a Remote Sensing Unit is connected. **Note:** This option is not available for standard VPR-15 detectors.
DETFLOW	0 or 1	1	In addition to individual sector flow monitoring, detector flow monitoring is also incorporated. Set to 1 to enable.
CCODE	Country Code		Refer to Table 5-7.
RES-ISOL	0 or 1	1	Set to 0 to reset system with 24 V on reset line. Set to 1 to isolate system when 24 V is applied for 8 seconds or more. **Note:** Once 24 V is applied, the system will initially reset. If 24 V is still present after 8 seconds, the system will be isolated until 24 V is removed (after which it will resume normal operation). If the 24 V is removed before 8 seconds, the system will only reset and will not be isolated.
MOD1 to 5	List of available I/O modules		All I/O modules fitted at build will have this information entered. If additional I/O modules are installed, their type must be entered here.

The VPR-15 detector can operate in a number of different languages. To change the language, the correct country code (CCODE) must be entered.

Table 5-7: Country Codes for the VPR-15

Language	Code
English (default)	44
United States (English)	1
French	33
Spanish	34
Portuguese	35
Italian	39
German	49

5.3.9 LASER CAL: Laser Detector Calibration

Minimum Access Code Required: **Level 3**

Factory use only.

5.3.10 LOAD DEFAULTS: Load Defaults

Minimum Access Code Required: **Level 2**

This menu option will enable the user to reload all factory defaults for all configuration parameters under the Configuration and Sector Alarms menus. It is recommended that the system configuration is saved prior to applying this menu option.

5.3.11 MAINTENANCE: Maintenance Mode

Minimum Access Code Required: **None**

Use the Parameter UP & DOWN buttons (Isolate and Scan) to inspect any item in the maintenance list.

Table 5-8: Maintenance Parameters

Parameter	Description
LASERIN	Current smoke value for the laser detector output
LASERHI	Additional smoke detector data (Factory Use)
LASERM	Additional smoke detector data (Factory Use)
LASERLO	Additional smoke detector data (Factory Use)
REL IN	Current Pressure Sensor reading
ABS IN	REL IN value at last flow normalization
PRSCOMP	Pressure sensor temperature compensation value (Factory Use)
S1 COIL	Suppression Control Module S1 COIL value
S1 TEST	Suppression Control Module S1 TEST value
A1 COIL	Suppression Control Module A1 COIL value
A1 TEST	Suppression Control Module A1 TEST value
P1 NORM	Suppression Control Module P1 NORM value
P1 TEST	Suppression Control Module P1 TEST value
C1 NORM	Suppression Control Module C1 NORM value
C1 TEST	Suppression Control Module C1 TEST value
S2 COIL	Suppression Control Module S2 COIL value
S2 TEST	Suppression Control Module S2 TEST value
A2 COIL	Suppression Control Module A2 COIL value
A2 TEST	Suppression Control Module A2 TEST value
P2 NORM	Suppression Control Module P2 NORM value
P2 TEST	Suppression Control Module P2 TEST value
C2 NORM	Suppression Control Module C2 NORM value
C2 TEST	Suppression Control Module C2 TEST value
MOD1 IN	Identification number of Module 1
MOD2 IN	Identification number of Module 2
MOD3 IN	Identification number of Module 3
MOD4 IN	Identification number of Module 4
MOD5 IN	Identification number of Module 5

5.3.12 TEST OUTPUTS: Testing Mode

Minimum Access Code Required: **Level 2**

This menu item enables the user to manually increase or decrease smoke and flow levels for the detector in order to simulate real fire and flow events. This enables the user to test the responses of the detector to fire and flow events without the need to conduct smoke tests or blocking/unblocking the sampling network. Note that all alarms and relays will operate as if the system is reacting to a real event.

5.4 Input-Output Modules

VPR-15 detectors have 5 relays fitted as standard. The I/O functionality may be extended by adding I/O modules. These plug onto the standard I/O module in a stackable chain of up to 5. They are recognized by the processor as Modules 1 to 5 going from left to right. When installing new modules, the type must be entered in the Setup menu in order to be correctly recognized.

5.4.1 4-Channel Relay Module

There are three steps to configuring a relay module:

1. After installing the relay module check that MODn (n = module position) in the Engineering menu has now changed to RELAY 4.
2. In Setup menu, change MODn to RELAY 4.
3. In the Configuration menu, set MODn triggering event required:
    - Alert
    - Action
    - Fire1
    - Fire2
    - Flow fault
    - General Fault

All four relays on the card will now activate for this event with respect to their corresponding sector. The following table shows how relay cards will be setup when using one or more modules.

Table 5-9: Relay Module Set-up Table

	Relay Module															
	1				**2**				**3**				**4**			
	Relay				**Relay**				**Relay**				**Relay**			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Config	**Sector**				**Sector**				**Sector**				**Sector**			
Alert	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	-
Action	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	-
Fire 1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	-
Fire 2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	-
Flow	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	-
General	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	-

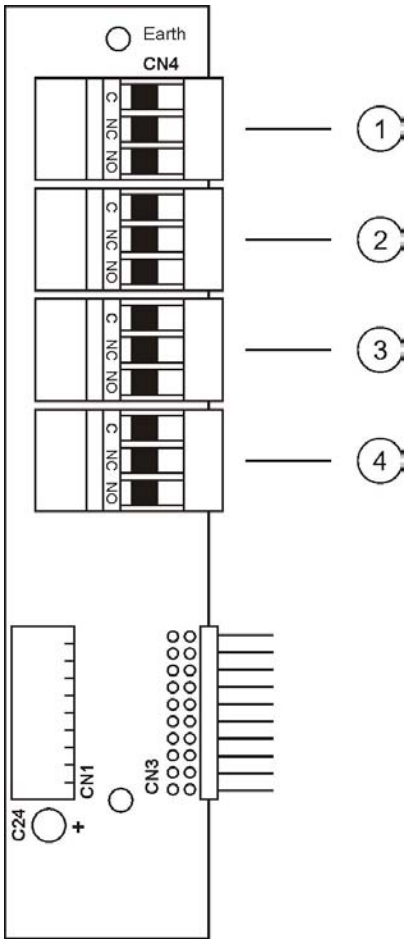


Figure 5-4: Relay Module

Single pole double throw (SPDT) contacts are used in the relay modules with a rating of 2 A at 24 VDC.

5.4.2 8-Channel, 4 - 20mA Output Module

The 8-Channel Output Module may be used for retransmission of airflow or smoke levels.

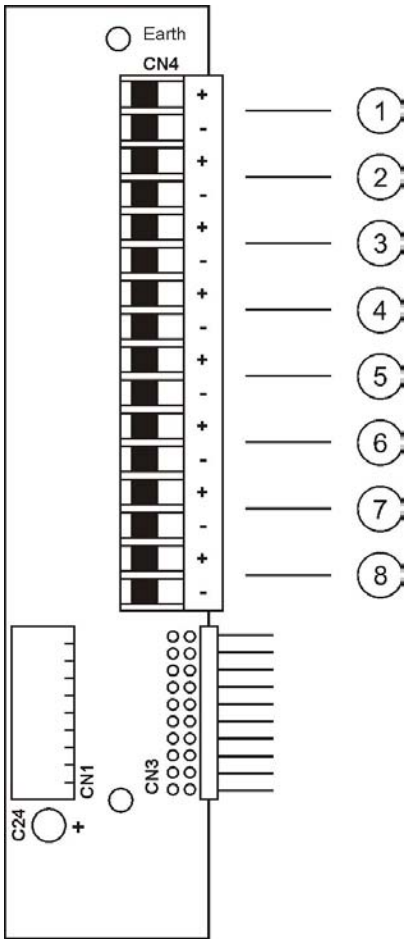


Figure 5-5: 8-Channel, 4 - 20 mA Output Module

Table 5-10: 8-Channel Module Specifications

Description	Value
Number of analog current outputs	8
Maximum output voltage	20 V
Output current	4 - 20mA (optionally 0 - 20mA)
Resolution	16 bits
Maximum Integral Nonlinearity	±0.012%
Maximum Offset	±0.05%
Maximum total output error	±0.15%
Output update rate	1 per second; all 8 outputs updated synchronously
Fault reporting	Detects a high load resistance (e.g. an open circuit) on any output.

Note: Unused outputs must have a load connected; otherwise the open circuit will be seen as a fault. A resistor value in the range from 0 to 500Ω is suitable.

To install and configure the output module, set applicable parameters according to the following table.

Table 5-11: 8-Channel Output Module Configuration Parameters

Menu Item	Parameter	Value
SETUP	(MODULE n)	Set to ANOUT 8
CONFIGURE	(MOD n)	According to Table 5-12.
	(GAIN X)	Applies to Smoke only. G = A/O where: • G = Gain • A = Maximum Output Current • O = Obscuration reading corresponding to maximum output current Examples: • Set GAIN X to 1 for 6.25%/m (1 = 20mA / 6.25%/m) • Set GAIN X to 10 for 0.625%/m (10 = 20mA / 0.625%/m) • Set GAIN X to 100 for 0.062%/m (100 = 20mA / 0.062%/m)

To access the Setup menu, follow these steps:

1. Press **MENU**.
2. Use Parameter **UP** and **DOWN** buttons to reach **SETUP**.
3. Press **ENTER**.
4. Use Value **UP** and **DOWN** buttons to enter the Level 2 Access Code.

To access the Configure menu, follow these steps:

1. Press **MENU**.
2. Use Parameter **UP** and **DOWN** buttons to reach **CONFIGURE**.

Table 5-12: 8-Channel Output Module setup table. Modules are numbered 1 to 5, left to right.

	Analog Output Module																													
	1								**2**								**3**								**4**							
	Channel								**Channel**								**Channel**								**Channel**							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Config	**Sector**								**Sector**								**Sector**								**Sector**							
FLOW X	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	D
SMOKE X	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	D

Note: D = Detector Readings (FLOW X: detector flow; SMOKE X: real time smoke density).

6 Maintenance

Note: Routine tests should be carried out by qualified personnel.

6.1 Inspection

The following steps should be carried out in accordance with local codes and standards:

1. Check control panel for fault indications etc.
2. Test the function of control panel LEDs (Not 'Blind' unit)
3. Record results in system log book & report any abnormal results

The following page gives information on the servicing tests to be carried out on the detector. Servicing must only be carried out by trained or authorized personnel.

6.2 Servicing

Note: Servicing should only be carried out by trained service contractors.

Ensure that all relevant site personnel & supervising authorities have been informed and, where necessary, the system has been isolated from the main building alarm system before undertaking any actions which may result in Alarm and/or Trouble/Fault conditions.

Service Description	Servicing Interval (Months) >											Notes
	6	12	18	24	30	36	42	48	52	56	60	
Check control panel for faults and test LEDs	X	X	X	X	X	X	X	X	X	X	X	
Check data logs and record main events (Faults/Alarms etc.)	X	X	X	X	X	X	X	X	X	X	X	
Check flow readings and record values for each channel	X	X	X	X	X	X	X	X	X	X	X	
Physically inspect installation (microbore tubes and cabling)	X	X	X	X	X	X	X	X	X	X	X	
Inspect fuses and ensure correct ratings	X	X	X	X	X	X	X	X	X	X	X	
Replace detector filter elements & clean chamber*	X	X	X	X	X	X	X	X	X	X	X	
Inspect and clean/replace filters*	X	X	X	X	X	X	X	X	X	X	X	
Replace Gaswitch				X				X				If scan interval is set to 20 minutes.
Replace pump (rotary vane)				X				X				
Replace pump (linear) (units with part number suffix "-NP")											X	
Replace exhaust filter/silencer & associated tubing				X				X				
Normalize flow (due to replacement of filter elements)	X	X	X	X	X	X	X	X	X	X	X	
Record flow values for each channel	X	X	X	X	X	X	X	X	X	X	X	
Test optional accessories etc.	X	X	X	X	X	X	X	X	X	X	X	Remote Display, Relays etc.
Carry out smoke test to BS6266 A.3 on single point	X		X		X		X		X		X	
Carry out smoke test to BS6266 A.3 on all channels		X		X		X		X		X		
Record results in system log book	X	X	X	X	X	X	X	X	X	X	X	
Complete servicing certificate and issue to user	X	X	X	X	X	X	X	X	X	X	X	

Cleaning and filter change intervals are dependent on environmental conditions.

7 Specifications

7.1 Power Supply

Supply Voltage	20-30 VDC Working *
Power Consumption	31.2 W Quiescent, 32 W Scanning
Current Consumption	1.30 A Quiescent, 1.33 A Scanning
In-Rush Current	1.8A

* Product UL listed with 24 VDC Nominal Supply Voltage

7.2 Case

Dimensions	19.3 in. x 14.0 in. x 7.9 in. (490 mm x 355 mm x 200 mm)
IP Rating	IP30

7.3 Operating Conditions

Tested to	14°F to 131°F (-10°C to 55°C) *
Ambient	32°F to 103°F (0°C to 39°C) *
Sampled air	4°F to 40°F (-20°C to 60°C) *
Humidity (non-condensing)	10% to 95%

Note: Consult your Hochiki office for operation outside these parameters or where sampled air is continually above 0.015% obs/ft (0.05% obs/m) under normal operating conditions.

* Product UL listed for use from 32 °F to 100 °F (0 °C to 38 °C)

7.4 Sampling Network

Air Sampling	Up to 15 Tubes
Microbore Size	**Normal Diameter** Outer Diameter: 0.25 in. (6 mm) Inner Diameter: 0.17 in. (4 mm) **Reduced Diameter** Outer Diameter: 0.17 in. (4 mm) Inner Diameter: 0.096 in. (2.5 mm) **Note:** Refer to Section 3.3 for further information.
Microbore Length	15 x 164 ft (15 x 50m) Tube Length: 164 ft (50 m) **Note:** It is recommended that excess tubing be coiled close to the sampling point end. **Alternate Configurations** Refer to Section 3.3 for further information.

7.5 Area Covered

Area	Up to 16,150 ft² (1,500 m²)

7.6 Interfaces

Power	Power In
Relays	4 Alarm Relays, 1 Fault Relay Rated 2 A @ 30 VDC NO/NC Contacts

7.7 Alarm

Range	0.0003 to 6.10 % obs/ft (0.001 to 20 % obs/m)
Levels	Trace, Alert, Action, Fire1, Fire2 Individually programmable for each level

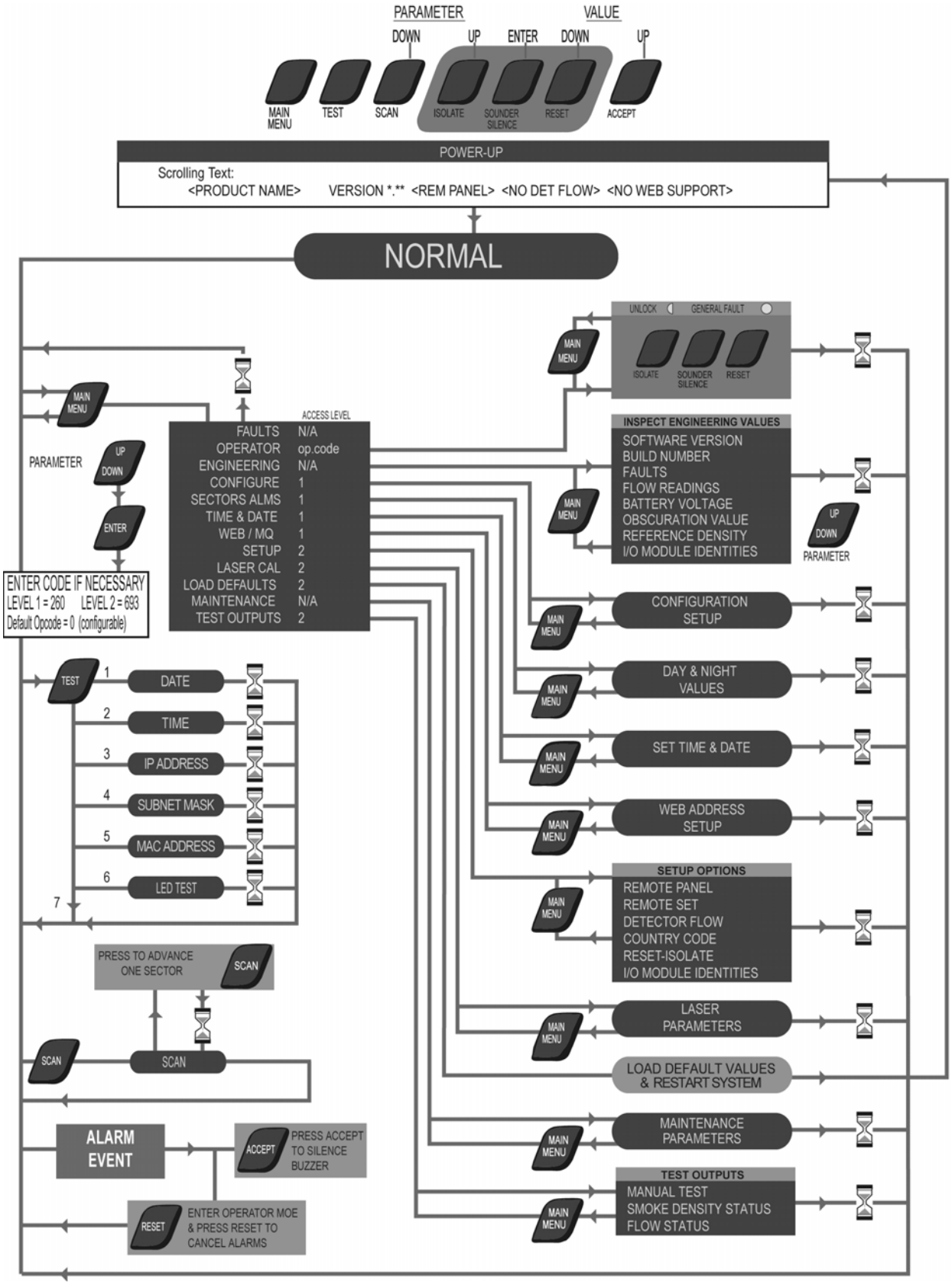
7.8 Communication

Protocols	Modbus over RS232, RS485 and TCP/IP

7.9 Event Log

Storage	Up to 20,000 events stored

A Display Panel Navigation



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B Communications Guide

VPR-15 detectors can connect to a PC with FireNET Vapor Explorer software via Ethernet, through a RS232 direct serial connection or with RS485 via a RS485/RS232 converter.

RS485 also provides the option of connecting up to 30 detectors together in a multidrop RS485 network. Some guidelines on installing RS485 connections are shown in the following sections.

B.1 Installation Guide for RS485 Equipment

Communications to RS485 standard are designed to reject a degree of interference, but care must still be taken when designing and implementing the installation to minimize the level of interference imposed on the equipment. To prevent damage due to tropical storms and other sources of large external currents and voltages, additional surge absorbing components may be required as part of the installation.

It is the responsibility of the installer to provide a suitable environment to prevent damage to the equipment, and to reduce external interference to a level within which the equipment can operate as defined by its specification. The provision of warning, caution and danger information to the end user is within the task of the installation provider, and not the instrument manufacturer.

The purpose of the guide is to assist the installation provider, but it is not intended to be a full and complete set of instructions. The installer shall be more qualified to take the relevant technical, safety and legal decisions.

B.1.1 Electrical Supply

The supply voltage and frequency must be maintained within the equipment requirement specification. Any breaks in supply or reductions in voltage below the specified minimum will result in equipment shutdown. When this problem exists, an uninterruptible power supply should be used to supply the equipment.

If the electrical supply is known, or suspected, to be subject to noise pulses produced by motors, fluorescent lamps, storms and lightning, or other causes then mains filtering must be fitted to reduce the peak amplitude to less than twice the nominal RMS voltage.

The equipment metal case must be connected to an earth. To protect personnel this earth should be free from voltages greater than 10 V peak.

It is recommended that galvanically isolated power supplies (in accordance with UL1481) are used since the RS485 inputs/outputs are not usually isolated from the equipment internal zero volt line.

The RS232/RS485 converter should also be galvanically isolated.

B.1.2 Cable Material

RS485 communication is established by current switching between a pair of wires at data rates of up to 250 kbps.

The cable construction is specified as:

- Twisted pair of nominal 10 turns per meter or yard
- 40 pF to 60 pF meter between conductors
- 100 Ω to 120 Ω characteristic impedance
- Maximum signal attenuation over total length 16 dB at 0.25 MHz
- Overall screen (to be connected at one end only)

The cable materials are not specified, but in order to meet the low capacity specification polyethylene/polyolefin/polypropylene is used as the insulator, with PVC/flame retardant PVC as the overall sheath. Other materials can be used if the impedance and capacity requirements are met.

Installation requirements may add other features, such as fire resistance, flame retardance, UL approval, low smoke and fume etc.

Also remember to check that the electrical characteristics of the cable used is appropriate for the wiring distance required for the installation.

Common Mode

The RS485 inputs/outputs are not usually isolated from the equipment internal 0 V line. The maximum potential difference between the 0 V lines of all instruments connected to an RS485 communication cable is limited by the specification to between -7 V and +12 V. If this limit is exceeded, communications will be lost.

Interference Induced onto Cable

Twisted pair construction and cable screens do not completely shield the communication link from external electromagnetic interference (EMI). Good practice should be followed when installing communication cables to eliminate EMI.

RS485 cables should not be installed in the same duct/tray as power cables, or switching cables. When RS485 cables cross power or switching cables, this should be at right angles. RS485 should not be installed in areas of high interference, where this is not possible, then electro-magnetic screening must be adopted for example, metal conduit or cable tray could be used.

The total length of the cable run must not exceed 4000 ft (1200 m). It is only possible to exceed this length by use of repeater units to re-generate the signal.

Terminating Cables

It is imperative that the cable structure is maintained to a position as close as possible to the termination. This is to maintain the interference protection and reduce losses due to changes in cable impedance.

The outer sheath and screen must not be cut-back for a distance of more than 4 in. (100 mm) from the termination.

The twisted pair must not be untwisted for a distance of more than 1 in. (25 mm) from the termination.

The recommended cable manufactured to RS485 specifications is: BELDEN 9841/9842 (or equivalent) - 24 AWG, polyethylene insulation, PVC sheath, UL style number 2919.

- 9841 Single twisted pair: communications data only
- 9842 Double twisted pair: 1 pair for communications data, 1 pair for 24 V supply.
  Ensure that electrical characteristics are sufficient for the distance of connection between devices.

C Laser Chamber Safety

VPR-15 detector laser chambers incorporate a 658 nm laser with an average power less than 10mW and are located on the underside of the detector when mounted upright on a wall. The laser chamber is identified by two safety labels shown in the following diagrams.

Figure C-1: Laser chamber safety labels

Warning: The laser emits visible light and can be hazardous if viewed with the naked eye. Under no circumstances should the detector chamber be opened except by qualified personnel.

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