FireNET Vapor VPR-1P

Product Guide

October 2012
Document: 21519_00
Part Number: HA-06-332

HOCHIKI america corporation

Intellectual Property and Copyright

This document includes registered and unregistered trademarks. All trademarks displayed are the trademarks of their respective owners. Your use of this document does not constitute or create a licence or any other right to use the name and/or trademark and/or label.

Disclaimer

The contents of this document is provided on an “as is” basis. No representation or warranty (either express or implied) is made as to the completeness, accuracy or reliability of the contents of this document. The manufacturer reserves the right to change designs or specifications without obligation and without further notice. Except as otherwise provided, all warranties, express or implied, including without limitation any implied warranties of merchantability and fitness for a particular purpose are expressly excluded.

General Warning

This product must only be installed, configured and used strictly in accordance with the General Terms and Conditions, User Manual and product documents available from Hochiki. All proper health and safety precautions must be taken during the installation, commissioning and maintenance of the product. The system should not be connected to a power source until all the components have been installed. Proper safety precautions must be taken during tests and maintenance of the products when these are still connected to the power source. Failure to do so or tampering with the electronics inside the products can result in an electric shock causing injury or death and may cause equipment damage. Hochiki is not responsible and cannot be held accountable for any liability that may arise due to improper use of the equipment and/or failure to take proper precautions. Only persons trained through an Hochiki accredited training course can install, test and maintain the system.

Liability

You agree to install, configure and use the products strictly in accordance with the User Manual and product documents available from Hochiki.

Hochiki is not liable to you or any other person for incidental, indirect, or consequential loss, expense or damages of any kind including without limitation, loss of business, loss of profits or loss of data arising out of your use of the products. Without limiting this general disclaimer the following specific warnings and disclaimers also apply:

Fitness for Purpose

You agree that you have been provided with a reasonable opportunity to appraise the products and have made your own independent assessment of the fitness or suitability of the products for your purpose. You acknowledge that you have not relied on any oral or written information, representation or advice given by or on behalf of Hochiki or its representatives.

Total Liability

To the fullest extent permitted by law that any limitation or exclusion cannot apply, the total liability of Hochiki in relation to the products is limited to:

i. in the case of services, the cost of having the services supplied again; or
ii. in the case of goods, the lowest cost of replacing the goods, acquiring equivalent goods or having the goods repaired.

Indemnification

You agree to fully indemnify and hold Hochiki harmless for any claim, cost, demand or damage (including legal costs on a full indemnity basis) incurred or which may be incurred arising from your use of the products.

Miscellaneous

If any provision outlined above is found to be invalid or unenforceable by a court of law, such invalidity or unenforceability will not affect the remainder which will continue in full force and effect. All rights not expressly granted are reserved.

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.

Contact Us

Hochiki America Corporation
7051 Village Drive, Suite 100
Buena Park, CA 90621-2268

Ph: +1 800 845 6692
www.hochiki.com
technicalsupport@hochiki.com

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.

Laser Chamber Safety

VPR-1P 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 2-1: 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.

Regional Regulatory Requirements and Notices

UL

For open area protection the Fire 1 alarm threshold (signal) must be set within the limits specified by the following conditions:

- VPR-1P detectors must have a Fire 1 threshold set within 0.04 to 0.29% obs/ft

Through validation testing Underwriters Laboratories Inc. has verified that GS Series gas detectors, when installed within the sample pipe network, present no significant effects on the smoke detection performance of FireNET Vapor systems. The use of the FireNET Vapor Design calculation software is required to verify system design performance with all devices included in the design.

- Special applications sensitivity range is 0.0003 %/ft to 0.50 %/ft (0.001 %/m – 1.6 %/m). (For Special Application it is required obtain approval from the Local Authority Having Jurisdiction.)
- Open Area applications sensitivity range is (0.5 %/ft to 4 %/ft) or 1.6 %/m – 12.0 %/m.

Listings / Approvals

- UL

Table of Contents

This page is intentionally left blank.

1 Description and Operation

1.1 Introduction

Welcome to the FireNET Vapor VPR-1P Product Guide. This document is written to provide you with information on technical specifications, cabling, and how to install, configure and operate the VPR-1P detector.

The FireNET Vapor VPR-1P is an aspirating smoke detector that provides early warning of fire by analyzing air drawn through an air sampling pipe network. A highly sensitive detector chamber is able to detect smoke at very low concentrations.

1.2 Principle of Operation

Air samples are drawn through the pipe network from the protected area through wide bore pipe systems. Wide bore tubes generally have sampling holes drilled at intervals within the protected area.

The aspirator draws air from the pipe network into the detector inlets where the samples are combined, filtered, and directed to the laser detection chamber. The VPR-1P uses a T-piece of pipe to combine air sampled from two inlet pipes.

The VPR-1P has flow monitoring on both pipes. The detection chamber consists of a laser beam directed across an optical chamber, through which the air sample flows. A photodetector built into the optical chamber measures the amount of light scattering from 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 to become a direct measurement of the amount of light scatter caused by smoke. Information about laser chamber safety can be found on page iii.

If the smoke detected 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. The time delays can be changed as required. Alarm states are also shown on the display panel.

1.3 Flow Monitoring

The control system monitors for blockages or disconnection of the pipe network by detecting when the air flow is above or below acceptable flow thresholds. Flow thresholds are dependent 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%. 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.

Detailed information on how to design and install an effective pipe network can be found in FireNET Vapor Pipe Network Design Guide and FireNET Vapor Pipe Network Installation Guide.

1.4 Alarms

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

Table 1-1: Default Behavior of Alarm States

Level	Latched / Unlatched	Threshold Class A/B/C	Delay
Alert	Latched	0.012% obs/ft (0.04% obs/m)	3 secs
Action	Latched	0.018% obs/ft (0.06% obs/m)	3 secs
Fire1	Latched	0.024% obs/ft (0.08% obs/m)	3 secs
Fire2	Latched	0.03% obs/ft (0.1% obs/m)	3 secs

If any alarms are unlatched, all resultant actions (relay contacts and display panel indicators) 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.

1.5 Detector Display Panel

The display panel has LEDs to indicate the Action and Fire 1 alarm states, OK / Fault conditions and power status.

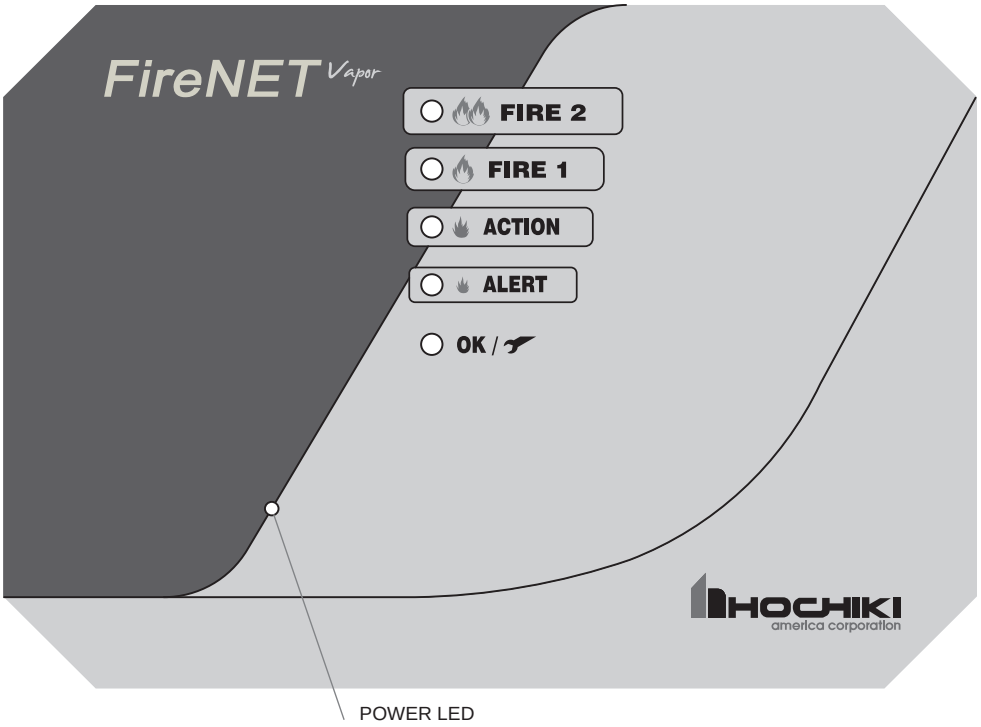


Figure 1-1: Display Panel

The following table describes the display panel LEDs.

Table 1-2: LED Descriptions

LED	Description
FIRE 2	This Red LED is activated when the Fire 2 alarm threshold is exceeded.
FIRE 1	This Red LED is activated when the Fire 1 alarm threshold is exceeded.
ACTION	This Red LED is activated when the Action alarm threshold is exceeded.
ALERT	This Red LED is activated when the Alert alarm threshold is exceeded.
OK /	This bi-color LED is Green when there is no fault, and Yellow when fault condition is detected.
Power LED	This Blue LED is activated when POWER is supplied to the detector.

1.6 Communications Interface

VPR-1P 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.

This page is intentionally left blank.

2 Installation and Configuration

The units should be installed in accordance with the following installation instructions and in a manner acceptable to the local Authority Having Jurisdiction (AHJ). The units are also intended to be installed in accordance with NFPA 72 National Fire Alarm Code.

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 mounting diagrams. Refer to Figure 2-1 for further information. 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. Refer to section 2.2.1 for further information.
3. Fit the pipe network to the system.

2.1 Mounting the Detectors

Careful consideration should be given to the mounting location of the detector unit 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.

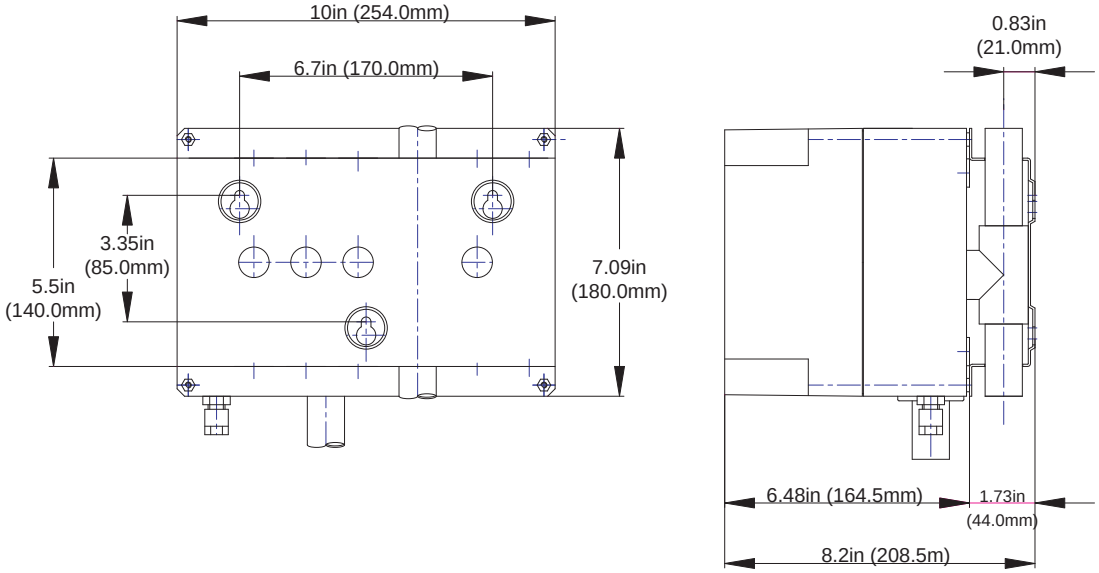


Figure 2-1: VPR-1P Mounting Diagram and Dimensions

2.2 Cable Connections

Note: All work carried out on these units should be performed by fully qualified personnel. There are no user serviceable parts inside.

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.

2.2.1 Detector Connections

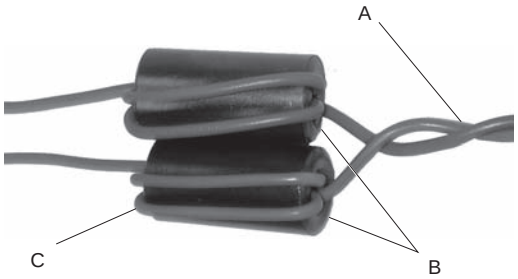
VPR-1P units are powered by an external 24 VDC power supply.

Access to the interior of the unit is gained by removal of the front cover. This is secured by four screw lock fixings (one at each of the four corners), releasing these fixings allows the removal of the cover complete with the 'self-retained' fixings.

The Fault Relay and other I/O Module connections are all located on the (i602) printed circuit board immediately on the front face of the internal metal sub-chassis.

The DC Supply fuse (FS1), TR5 style fuse 250V 2A Time Delay, is located on the (i602) printed circuit board.

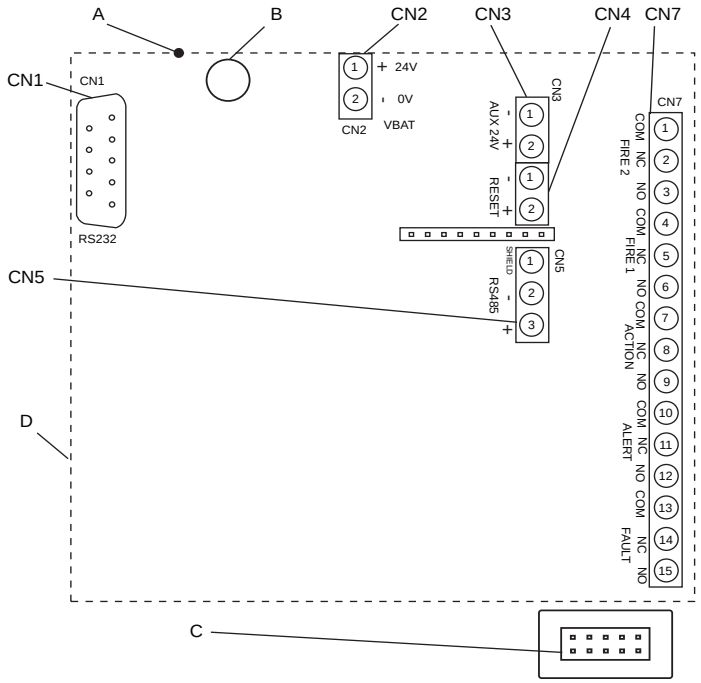
A cable entry gland is provided on the rear of the bottom casing for entry of the DC Supply Cabling and the field wiring cables. This cable gland is fitted so as to provide strain relief. The power supply cable cores should be fitted individually with ferrite cores, provided for the purpose, close to the cable gland inside the detector case. The 24 V and 0 V conductors are fed through separate ferrite cores and wrapped round twice to provide maximum effectiveness.



Legend	
A	Power Supply Cables
B	Two Turns
C	Ferrite Core

Figure 2-2: Ferrite Core

A second cable entry hole is provided, fitted with 0.2 to 2 mm grommet, to facilitate the Ethernet cable (if used).



Legend	
A	Ethernet
B	Fuse 1A
C	Programming Connector
D	I/O Board

Figure 2-3: Diagram of the I/O board for the VPR-1P detector

Note: Refer to Appendix A for further information.

2.2.2 Connection Interfaces

The following tables define input and output connections for the VPR-1P.

Ethernet

Enables TCP/IP connections to a PC with FireNET Vapor Explorer via LAN/WAN.

CN1 - RS232 Interface

Pin	Name	Description
2	Receive Data	Enables a direct serial connection to a PC with FireNET Vapor Explorer for configuration and monitoring. 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 & 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

Pin	Name	Description
1	24 VDC Input	Requires 18 AWG (16 x 0.25-15 A) cable (0.75mm² minimum IEC60227 H05 W-F/H05 WH2-F2 for EC). 24 VDC power input from external power supply.
2	0 VDC Input	

CN3 - Auxiliary Supply Output Interface

Pin	Name	Description
1	0 VDC	Requires 24 AWG (7 x 0.2 - 6 A) cable (1 A maximum load). 24 VDC power output rated to 1 A for powering an external sounder, addressable I/O devices etc.
2	24 VDC	

CN4 - Remote Reset Interface

Pin	Name	Description
1	- input	Opto isolated input. 24 VDC low current signal. 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 using FireNET Vapor Explorer or the Setup Menu of the optional Remote Display Unit. Refer to Appendix B for further information.
2	+ input	

CN5 - RS485 Interface

Pin	Name	Description
1	Shield	Belden 9842 cable (or suitable equivalent) Enables the following connections: • Connection to a remote Display Panel • 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. **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 information. • Not tested for UL Fire Alarm connection application.
2	RS485 -	
3	RS485+	

CN7 - Output Relay Interface

Group	Pin	Name	Description
FIRE 2	1	COM	Requires 24 AWG (7 x 0.2 - 6 A) cable 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. **Notes:** • Maximum relay contact rating is 2 A @ 30 VDC. • Refer to Section 1.1 for further information. • NC (Normally CLOSED) and NO (Normally OPEN) refers to unpowered state of relay. In normal non-fault condition the FAULT relay is powered so NC is OPEN and the NO is CLOSED. Refer to Appendix A for further information.
	2	NC	
	3	NO	
FIRE 1	4	COM	
	5	NC	
	6	NO	
ACTION	7	COM	
	8	NC	
	9	NO	
ALERT	10	COM	
	11	NC	
	12	NO	
FAULT	13	COM	
	14	NC	
	15	NO	

Note: Connection CN14 is only used for special applications.

Connections to RABBIT Processor Board

Connector	Pin Description	Description
8-pin RJ45	Standard Ethernet connections	Standard Ethernet cable. **Notes:** • Refer to Section B.1.1 for further information. • Not tested for UL Fire Alarm connection application.

2.3 Connection of Air Sampling Network

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

There are several common guidelines that should be followed when attaching the pipe network to the VPR-1P detector:

- Pipes must NEVER be glued to the inlets of the detector
- Pipe network itself MUST be glued together
- Use removable unions where necessary

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

Other pipe and inlet specifications are addressed in the following table.

Table 2-1: Detector Inlet to Pipe Network Termination Specifications

Detector	Inlet Port	Acceptable Pipe or Adapter	Maximum Pipe Length	Other Considerations
VPR-1P	1in. (25mm) outer-diameter UPVC tubes	1in. (25mm) ; or 1.05in. (26.7mm) with 1in. (25mm) to 1.05in. (26.7mm) adaptors	2 x 328ft. (100m)	-

2.4 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 pipe network 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.

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).

2.5 Configuration

The configuration of the detector is achieved by using the following:

- PC loaded with FireNET Vapor Explorer software. Refer to the online help file.
- Remote Display Unit. Refer to Appendix B for further information.

2.5.1 Flow Normalization

Flow normalization is necessary for the detector to learn the air flow characteristics of the system.

Normalization may be achieved using FireNET Vapor Explorer software or a Remote Display Unit, and takes about 6 minutes. It is advised that the user does not try to change any settings during the normalization process.

Air-flow is directly affected by the fan speed in wide bore systems. The fan speed is programmable from 3 to 10. It is recommended that it be left at 5 unless otherwise advised (e.g. long pipe lengths).

Once the pipe work has been completed it is necessary for the unit to learn the values of flow rates at each inlet. Once done, all displayed flow rates will be normalized to 100%.

To normalize the air flow for a detector using FireNET Vapor Explorer:

1. Remove the Front Cover.
2. Connect the detector to a PC running FireNET Vapor Explorer. Refer to Section 1.6 for further information.
3. Log into the detector as the administrator (ADM) user.
4. Select Normalize Air Flow from the Device Menu.
5. Wait for 10 minutes.

To normalize the air flow for a detector using Remote Display Unit:

- Refer to Appendix B for further information.

This page is intentionally left blank.

3 Maintenance

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

3.1 Inspection

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

1. Check control panel for fault indications etc.
2. 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.

3.2 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**	
Check control panel for faults	X	X	X	X	X	X	X	X	
Using FireNET Vapor Explorer, check data logs & record main events (Faults/Alarms etc.)	X	X	X	X	X	X	X	X	
Check flow readings and record values	X	X	X	X	X	X	X	X	
Physically inspect installation (Pipework & Cabling)	X	X	X	X	X	X	X	X	
Inspect fuses and ensure correct ratings	X	X	X	X	X	X	X	X	
Replace detector filter elements & clean chamber*	X	X	X	X	X	X	X	X	
Replace internal filters*	X	X	X	X	X	X	X	X	
Inspect and clean/replace in-line & end of line filters*	X	X	X	X	X	X	X	X	
Normalize flow (due to replacement of filter elements)	X	X	X	X	X	X	X	X	
Record flow values for each channel	X	X	X	X	X	X	X	X	
Test optional accessories etc.	X	X	X	X	X	X	X	X	Remote Display, Relays etc.
Record results in system log book	X	X	X	X	X	X	X	X	
Complete servicing certificate and issue to user	X	X	X	X	X	X	X	X	

Cleaning and filter change intervals are dependent on environmental conditions. The above recommendations are based on typical office environments and the frequency may need to be increased for harsher environments.

This page is intentionally left blank.

4 Specifications

4.1 Power

Supply Voltage	20 - 30 VDC Working *
Power Consumption (min)	-
Power Consumption (max)	30W

* Product UL listed with 24 VDC Nominal Supply Voltage

4.2 Case

Dimensions	10.0 in. x 7.1 in. x 6.5 in. (254 mm x 180 mm x 165 mm)
IP Rating	IP65

4.3 Operating Conditions

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

Note: Please 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)

4.4 Sampling Network

Pipe Size	Outer Diameter: 1 in.
Pipe Length	2x328ft (2x100m) sampling pipe
Area Covered	UL: 9,150 ft² (850 m²)

4.5 Interfaces

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

4.6 Alarm

Range	0.0003 to 6.10 % obs/ft (0.001 to 20 % obs/m) **UL** • Special applications sensitivity range is 0.0003 %/ft to 0.50 %/ft (0.001 %/m – 1.6 %/m). (For Special Application it is required obtain approval from the Local Authority Having Jurisdiction). • Open Area applications sensitivity range is 0.5 %/ft to 4 %/ft or 1.6 %/m – 12.0 %/m
Levels	Alert, Action, Fire1, Fire2 Individually programmable for each level

4.7 Communication

Protocols	Modbus over RS232, RS485 and TCP/IP **Note:** Not tested for UL Fire Alarm connection application.

A Detector Wiring Diagram Examples

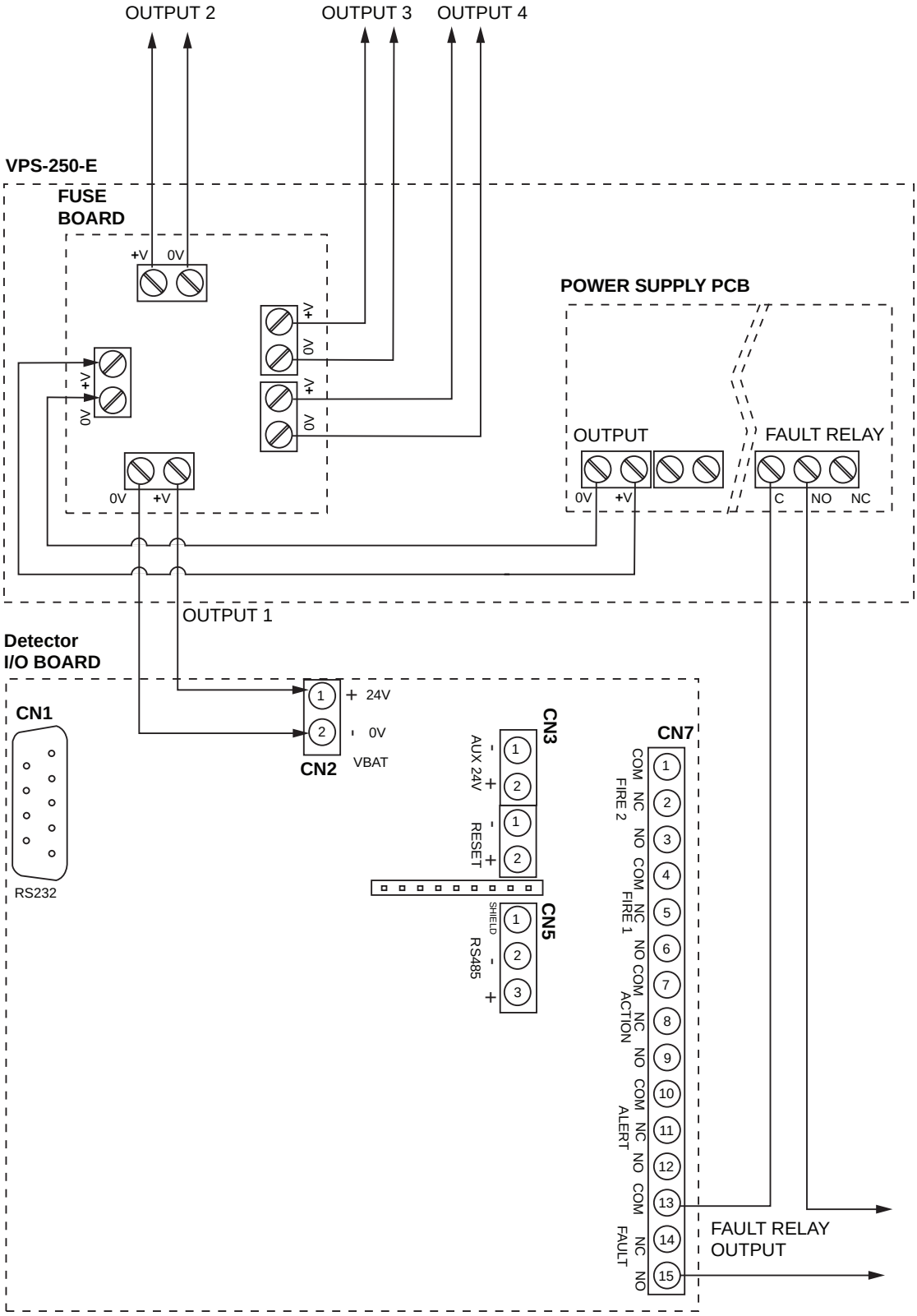


Figure A-1: Fault Relay - Closed for Normal

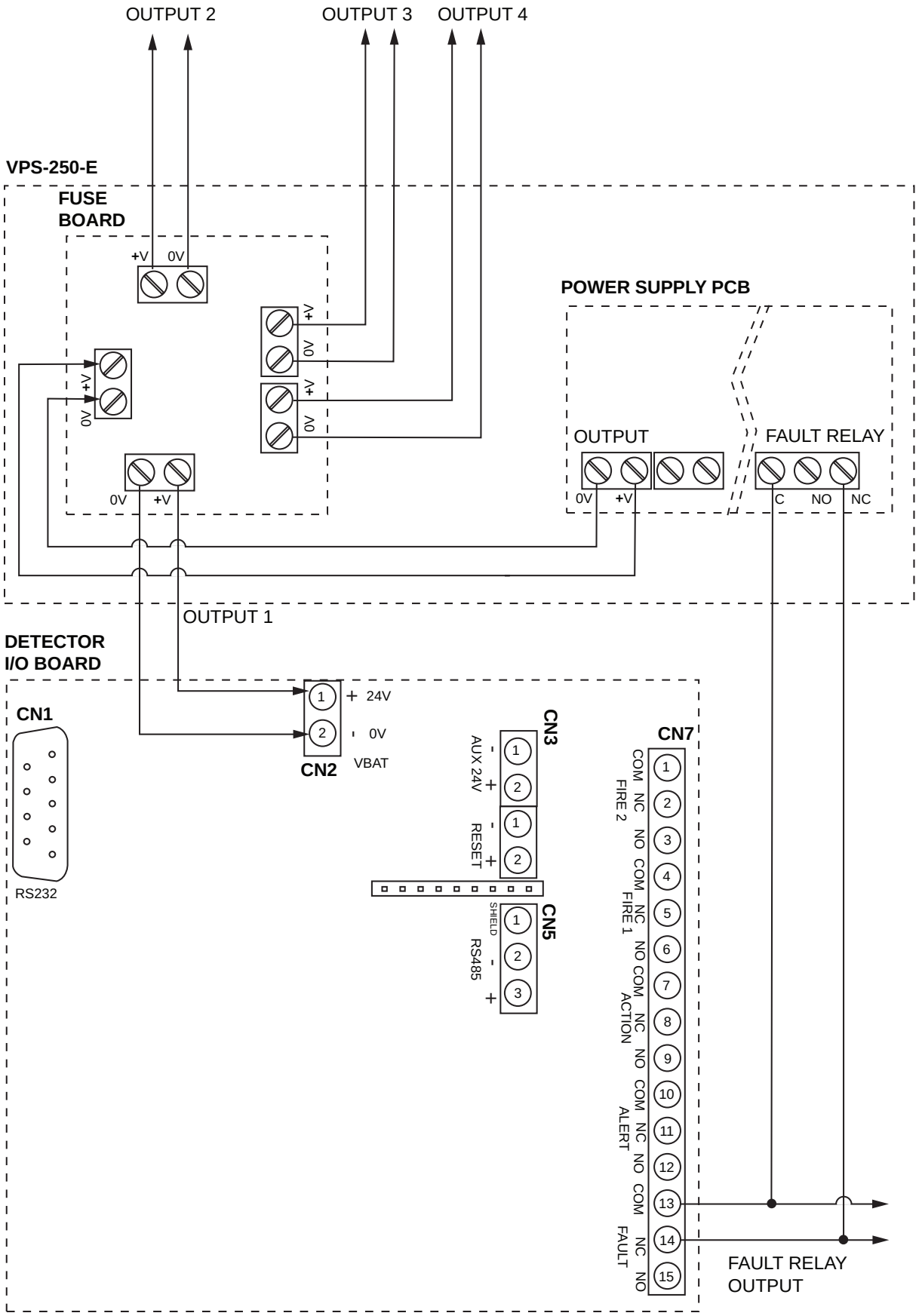


Figure A-2: Fault Relay - Open for Normal

B Remote Display Unit

The Remote Display Unit (RDU) allows the VPR family of aspirated smoke detection systems to be monitored, controlled and programmed remotely. RS485 communication is used between the detector and the remote display unit. The remote display unit can be simply configured to monitor any one of the detectors on the network.

Figure B-1: Remote Display Unit

B.1 Installation and Configuration

B.1.1 Cabling Requirements

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.

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.

Cable Material

RS485 communication is 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
- 100Ω to 120Ω 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.

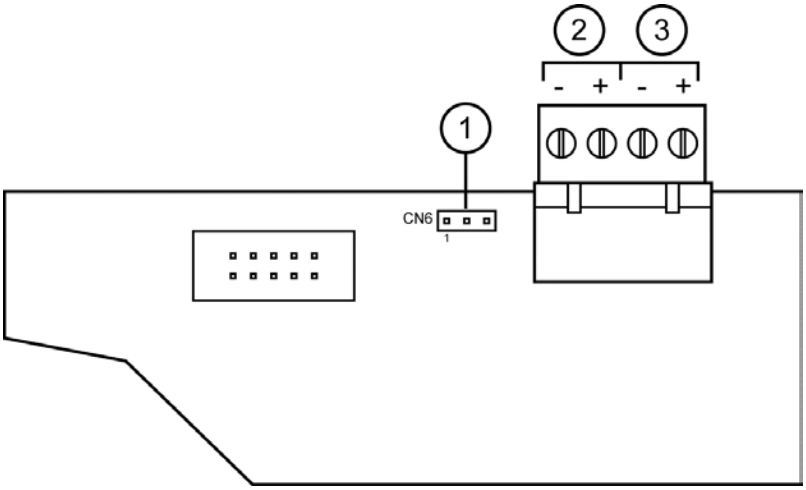
The outer sheath and screen must not be cut-back for a distance of more than 4 in. (100 mm) from the termination.

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.
  Please ensure that electrical characteristics are sufficient for the distance of connection between devices.

B.1.2 Remote Display Unit Connection



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

Figure B-2: Display board and terminal for remotely connecting the Remote Display Unit

Table B-1: Connections to Remote Panel (Optional) i620 Control Board

RS485 Remote Control Data		
1	+24 VDC (Supply Out)	Belden 9842 (24 AWG) cable (or equivalent)
2	0 V (Supply Common)	Notes: • Ensure that a jumper link is fitted across pins 1-2 of CN 6. • Refer to Section B.1.2 for further information.
3	RS485 +	
4	RS485 -	

Notes:

- Refer to Appendix B for further information.
- Not tested for UL Fire Alarm connection application.

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 can also be supplied. Refer to Section B.1.1 for further information. 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.

B.1.3 Starting Up

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

- Sounder beeps
- Aspirator or 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

B.1.4 Remote Display Operation

The VPR-1P must be configured to communicate with the Remote Display Unit using the FireNET Vapor Explorer. Refer to the FireNET Vapor Explorer online help for further information.

B.2 Remote Display Unit Navigation

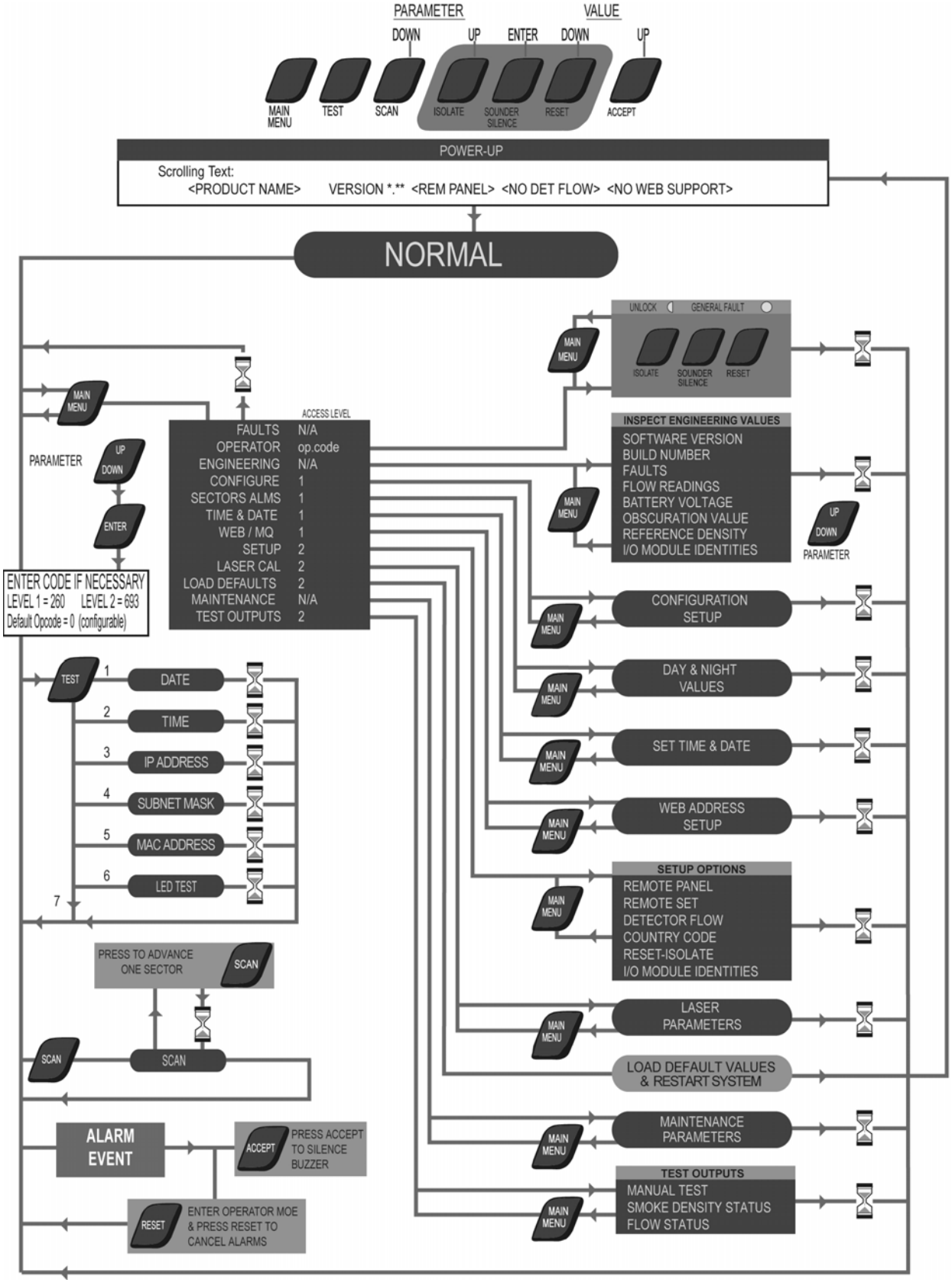


Figure B-3: Remote Display Unit Navigation

B.3 Remote Display Unit Button Functions

Note: This section covers all functions available to the Remote Display Unit. Some of these functions are not applicable to the VPR-1P.

This section provides information on the functions of the buttons in the Remote Display Unit, and how to setup the detector and navigate through the Main Menu options. Refer to Section B.2 for further information.

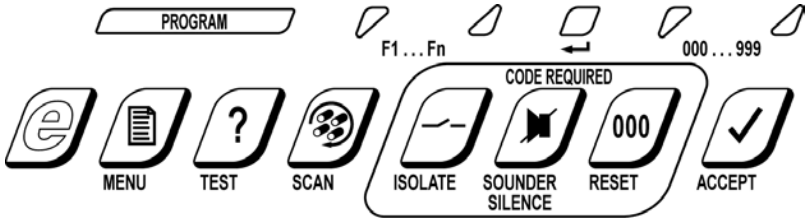


Figure B-4: Buttons for user functions

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 B-2: Detector Access Codes

Access Level	Access Code
Operator	0
Level 1	260
Level 2	693
Level 3	Factory Use Only

How to Enter an Access Code via the Remote Display Unit

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 be activated, 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 five seconds for the flashing digit to move to the tens digit, then set the tens to the required value. Repeat for the units digit.

User Functions

User functions associated with some configuration and control buttons are described in this section.

Table B-3: Description of User Functions for the Remote Display Unit

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 etc. 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.
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 activated LEDs on the panel and LED segments on the Status Display 7. Normal display

The VPR-1P detector can also be reset remotely by applying 24 VDC to the remote reset input on the Main I/O PCB. Refer to section 2.2.1 for further information.

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.

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

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 Remote Display Unit LED.

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

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.

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 B-4: 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 rate. The flow rates should be normalized to 100% at installation.
BATTERY	**.* V	N/A
OBS/M or OBSC/FT	*.**%	Obscuration value in meters or feet. This is the same as the normal display.
MODn	1 to 5	Shows the module types that are fitted. These are read directly from the Modules.

CONFIGURE: Configuration Mode

Minimum Access Code Required: **Level 1**

The VPR-1P 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 B-5: 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 - default	
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
FLOWDEL	Flow Fault Delay	1 to 60s	5s
FLOWHI	Flow High Limit	105 to 200%	120%
FLOWLO	Flow Low Limit	0 to 95%	80%
FLOWLOG	Log of flow change	0.0 to 200.0	5.0
SETFAN	Set Fan Speed	3 to 10	5
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-1P Flow normalization by pressing ENTER.	0 to 20160 mins	1440
MIN DWELL	Rotary valve dwell time	0 to 60s	0s
GAIN X	See description		
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 Delay	0 to 120	60
NIGHSTART	Night Start time (Hour in 24 format)	12 to 23	12
NIGHSTOP	Night Stop time (Hour in 24 format)	0 to 12	12
TRC PRESS	Setup for auto Valve Scan	5 to 1000	25

Notes:

- Avoid setting to values already defined for Level 1 or 2 Access Codes.
- To revert all Configuration parameters to their 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

n/a

DENSLOG

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

TRCLTCH

n/a

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

n/a

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.

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.

SETFAN

Applicable to Low Pressure systems. The Default Fan Speed is 5 (Useable Range 3 to 10). Because of the need to re-normalize the flow readings if the fan speed is changed, please note the following:

- If the display [SETFAN n] flashes, this is the speed currently set
- To Normalise the Flow readings, go to **SETFAN** press **ENTER** when the display is flashing (i.e. the speed is set to current value). Entering a new speed will not automatically initiate a re-calibration of flow measurements, and the flow readings may not be normalized. This must be initiated by returning to **SETFAN** and pressing **ENTER**. The Flow Normalisation sequence will last about six minutes, during which time, the display will report progress. This operation must be done for new installations, or if the sample tube arrangement has been modified, or if the fan speed is changed.

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.

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.

Please note that this is not applicable on the standard product.

TESTTIM

n/a

MIN DWELL

n/a

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 1.1 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

n/a

SECTORS ALARMS: 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.

Table B-6: Sector Alarm Parameters and Values

Parameter	Description	Class A/B/C	
		Range	Default
ALL F2	All Fire 2 Alarm Levels	0.0003-6.25%obs/ft (0.001-20% obs/m)	0.305%obs/ft (1.00% obs/m)
ALL F1	All Fire 1 Alarm Levels	0.0003-6.25%obs/ft (0.001-20% obs/m)	0.024%obs/ft (0.08% obs/m)
ALL ACTION	All Action Alarm Levels	0.0003-6.25%obs/ft (0.001-20% obs/m)	0.018%obs/ft (0.06% obs/m)
ALL ALERT	All Alert Alarm Levels	0.0003-6.25%obs/ft (0.001-20% obs/m)	0.012%obs/ft (0.04% obs/m)
Sn FIRE 2 n = 1 to 15	Sector 'n' Fire 2 Level	0.0003-6.25%obs/ft (0.001-20% obs/m)	0.305%obs/ft (1.00% obs/m)
Sn FIRE 1 n = 1 to 15	Sector 'n' Fire 1 Level	0.0003-6.25%obs/ft (0.001-20% obs/m)	0.024%obs/ft (0.08% obs/m)
Sn ACTION n = 1 to 15	Sector 'n' Action Level	0.0003-6.25%obs/ft (0.001-20% obs/m)	0.018%obs/ft (0.06% obs/m)
Sn ALERT n = 1 to 15	Sector 'n' Alert Level	0.0003-6.25%obs/ft (0.001-20% obs/m)	0.012%obs/ft (0.04% obs/m)
TRACE	Trace Level	0.0003-6.25%obs/ft (0.001-20% obs/m)	0.009%obs/ft (0.03% obs/m)
FINAL SECTOR AS ABOVE			
F2DEL	Fire 2 Delay	0 to 60 secs	3 secs
F1DEL	Fire 1 Delay	0 to 60 secs	3 secs
ACTDEL	Action Delay	0 to 60 secs	3 secs
ALTDEL	Alert Delay	0 to 60 secs	3 secs
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.

TRACE

n/a

ALTDEL, ACTDEL, F1DEL, F2DEL

The time period for which the corresponding obscuration levels must be sustained before triggering an alarm. Prevents spurious Alarm events.

TIME DATE: Set Time and Date

Minimum Access Code Required: **Level 1**

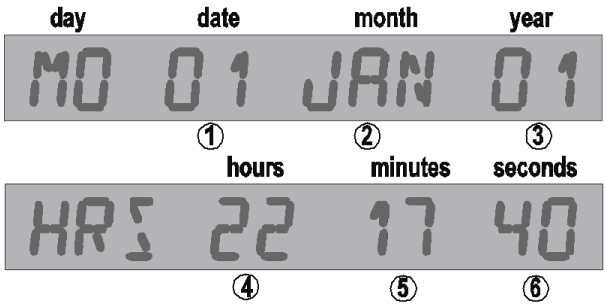


Figure B-5: Display for setting time and date.

After accessing this menu item, the display will now show the date in the format 'day - date - month - year', 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**.

WEB: Set IP Address and Mask

Minimum Access Code Required: **Level 1**

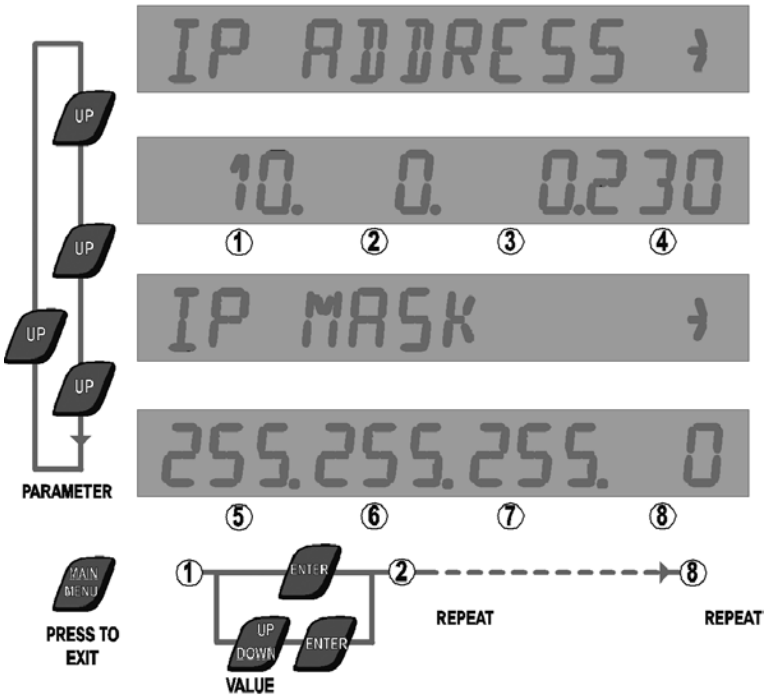


Figure B-6: IP Address and IP Mask display - default values shown.

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**.

SETUP: Setup Menu

Minimum Access Code Required: **Level 2**

Once the Setup Mode is accessed, please 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 B-7: 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 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-1P devices.
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 B-8 for further information.
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-1P detector can operate in a number of different languages. To change the language, the correct country code (CCODE) must be entered.

Table B-8: Country Codes

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

LASER CAL: Laser Calibration

Minimum Access Code Required: **Level 3**

This menu option is only available for factory use to calibrate the laser.

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.

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 B-9: Maintenance Parameters

Parameter	Description
LASERIN	Current smoke value for the laser detector output
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

TEST OUTPUTS: Testing Mode

Minimum Access Code Required: **Level 2**

This menu item enables the user to manually increase or decrease smoke levels for the detector in order to simulate a real fire event. This enables the user to test the responses of the detector to a fire event. Please note that all alarms and relays will operate as if the system is reacting to a real fire event.

This page is intentionally left blank.