Velocity®
DETECTION OVER TIME

Analogue Addressable Fire Alarm System

Architectural Specification Document

CONTENTS

1 SCOPE OF WORK

1a To design, supply and install a Modular Analogue Addressable (24Vdc) UL864 10th Edition certified Fire Alarm Control System.

1b The Velocity system is totally modular which enables it to satisfy any size building fire alarm needs. (utilising Velocity Fire Detectors) in accordance with the details specified within this document.

1c The Velocity Fire Alarm Control Panels (FACP) shall be powerful and intelligent, incorporating a 32-bit microcontroller (MCU) forming the heart of Velocity.

1d The Velocity FACP shall be able to provide pinpoint detection locations when configuring the system to meet the output mapping requirements of the building.

1d The multifunctional Velocity FACP shall interrogate the receiving signals from various types of fire sensors and initiate audible and visual operating information. The FACP shall rapidly process logical decisions based on the status of the fire sensors and other initiating devices to control the system outputs.

1e The Velocity FACP shall perform full system tests and maintenance, providing commissioning functions via comprehensive on-board installation programming and diagnostic tools.

1f The Windows based software configuration tool Velocity Connect is used to configure the system's operation based on the customer specified operating requirements, reducing commissioning and installation times.

2 STANDARDS AND REGULATIONS

2.1 Where applicable, the FACP shall comply fully with the following Underwriters Laboratories (UL) and/or other nominated rules and regulations. The manufacturer shall confirm compliance with the standards.

2.2 The system shall meet the building and fire code requirements of the local authority having jurisdiction and shall be installed, tested and documented in accordance with the requirements of NFPA 72.

2.3 The FACP shall be designed to comply with UL864: Control Units for Protective Signaling ystems 10th Edition, 20XX

2.4 All devices, appliances, systems, equipment, and materials furnished and installed shall be of types or models approved for use in systems and occupancies of this type in accordance with the codes identified.

- UL 864, Control Units for Fire Protective Signaling Systems, 10th Edition, 2014.
- ANSI/UL 268 – Safety for Smoke Detectors for Fire Alarm Systems.
- ANSI/UL 521 – Safety for Heat Detectors for Fire Protective Signaling Systems.
- UL 464, Audible Signal Appliances, 10th Edition, 2003,
- UL 1971 Signaling Devices for the Hearing Impaired, 3rd Edition, 2002.
- UL 1481, Power Supplies for Fire Protective Signaling Systems, 5th Edition, 2006.

3 VELOCITY MMP FIRE ALARM CONTROL PANELS

3.1 Key Features

3.1.1 The analogue addressable FACP(s) shall be:
- Modular in system construction
- Flexible
- Multi-functional
- Multi-configurable
- Networkable

3.1.2 Standard Fire Panels - The FACP(s) shall be supplied in 3 standard models
- Velocity 6 Port Panel - accommodates up to 6 internal 'Quick Connect' panel modules
- Velocity 10 Port Panel - accommodates up to 10 internal 'Quick Connect' panel modules
- Velocity 26 Port Panel - accommodates up to 26 internal 'Quick Connect' panel modules

3.1.3 A selection of 10 Internal Panel Modules -The FACP(s) shall accommodate and communicate with internal 'Quick Connect' panel modules, up to the quantity of ports specified within the panel product description.
example – Panel Description : Velocity 6 Port Panel - this panel has 6 available ports, accommodating up to 6 modules.
- The quantity and configuration of the modules is completely flexible.
  (10 available internal panels modules – refer to section 3.8 Internal Panel Modules)

3.1.4 254 Device Detection Loop – Each loop module shall support up to 254 addressable loop devices using the Velocity protocol and can be in any combination (Detectors, MCP/Pull Station, Loop Interface Modules).
- 500mA current – Each loop SLC shall be capable of providing 500mA current & to maintain a minimum of 24 volts on the loop up to the full extent of the battery standby period.
- Compatible - with all detectors and loop modules listed (refer to sections 3.9 Detection Devices, 3.10 Manual Call Points / Pull Stations, 3.11 Addressable Loop Modules).
- Soft Addressing – Using a hand-held programming device, in the event device changes post installation, the loop address ID's are all independent and non-sequence critical.
- Wiring Installation - Each loop shall be 2 wire Class - A (circuit starting at and returning to the same set of terminals on the SLC module) and also have the ability to be wired as Class-X using the short circuit isolator loop modules.

3.1.5 Loop Device Interrogation – The FACP shall interrogate each individual addressable detection device and provide alarm indication within 3 seconds from a pull station/manual call point and 10 seconds for all other devices.

3.1.6 254 Programmable Zones

3.1.7 TCP/IP Connectivity – The FACP shall have the ability to provide an interfacing connection into a Local Area Network (LAN) to allow remote monitoring via a PC graphics system.

3.1.8 Networking & Remote Annunciator - The FACP shall operate as part of a networked system of up to 64 panels peer-to-peer or as a standalone. When networked the system allows any authorised installer or user to make any required actions / amendments to the system from any panel on the network, this also includes the Velocity Remote Annunciator.

3.1.8 Auto Synchronisation – The FACP shall have the built-in ability to synchronise NAC output devices that are configured on either Class A or Class B circuits

3.1.9 Full System Redundancy – Each panel has 2 built in microprocessors, the secondary microprocessor is there as back-up, this will take over if required ensuring the basic functions of the FACP are maintained.

3.1.10 8032 Events Log - The FACP shall have an event log which has the capability of storing up to the last 8032 events. These events can be reset at engineer level.

- Date and Time - on-board real-time clock and date referencing facility running in conjunction with the events log. The user has the option to change the clock and date settings if required.

3.1.11 Cause and Effect programming - The FACP shall have full Cause and Effect programming from the front of the panel or the Velocity Connect PC software. This functionality will allow isolation of a group of selected detectors in an area(s) of a building prior to any maintenance work being carried out.
Other cause and effect features:

- Shall allow extensive day/night mode programming.

3.1.12 Conventional System capability - The FACP shall have the ability to accommodate conventional detection devices by utilising the Zone monitor modules. The FACP has the flexibility to be an analogue addressable panel, a combination of both addressable and conventional or just as a conventional panel.

3.1.13 Printer - The FACP shall have an optional internal RS-232 interface module to allow connection to either an on-board UL approved printer or to a PC and a printer – (refer to section 3.8.4 RS232 Module)

3.1.14 Touch Screen - The FACP shall incorporate a 4.3" front of panel, colour touch screen LCD display to enable users to access the various built-in functions and interact with the information displayed. For security reasons, the FACP shall require a password code for entry to access level 2 (authorised user) and access level 3 (engineer).

3.1.15 Monitoring & Control - The FACP shall be capable of monitoring and controlling remote site devices, such as relays for the control of auxiliary equipment such as Lifts, ventilation systems etc.

3.1.16 Alarm Verification Sequence – The FACP shall have the ability annunciate an alert or pre-alarm condition designed to give the earliest possible warning of a potential fire evacuation condition with causing an unwanted false alarm.

- Retard Time - Up to 30 seconds to verify pre-alarm
- Period Time – Up to 60 seconds to await secondary verification.

3.1.17 Automatic Drift Compensation – The FACP shall have as standard, automatic drift compensation to prevent false trigger alarms due to detector head contamination, signalling a warning when the compensation limit has been reached.

3.1.18 Periodic System Testing – The FACP shall be have the ability to initiate full audible and visual warning output test in accordance with NFPA72 and or local regulations.

3.1.19 Power Supply – The FACP shall have a 30Vdc integral UL approved power supply – (refer to section 3.18 Power Supply Specification)

3.1.20 Periodic System Testing – The FACP shall be have the ability to initiate full audible and visual warning output test in accordance with NFPA72 and or local regulations.

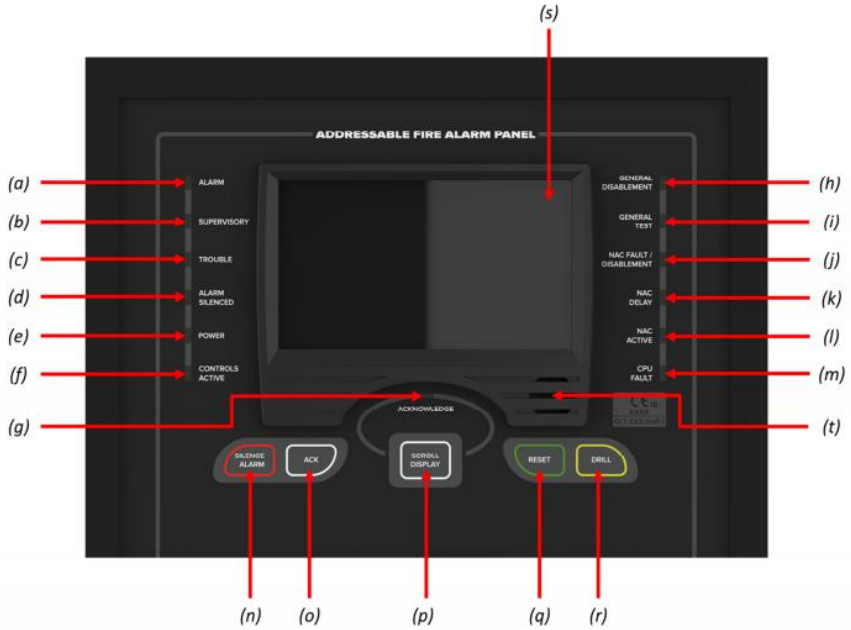
3.2 Fire Alarm Panel Indications

3.2.1 Status Reporting - The FACP shall continuously monitor and report the status of all addressable devices programmed on any of the installed loops for the following:
• Fire • Double address • Short circuit fault • Open circuit fault • Detector head contamination
• Unauthorised removal or exchange a device • Pre-alarm condition.

3.2.2 The FACP shall also monitor the status of internal connections and interfaces including the charger and batteries.

3.2.3 The FACP shall provide the following LED indication as a minimum
Figure #1 below shows the control buttons, LED indicators and switch locations

Figure #1



3.2.4 A - Alarm - Red LED.

- Flashes when there is an active alarm event present.
- On steady once acknowledged.
- Off when the alarm condition is cleared, and when the panel has been reset.

3.2.5 B - Supervisory - Yellow LED.

- Flashes when there is a supervisory event present.
- On steady once acknowledged.
- Off when the supervisory condition is cleared
  (some supervisory inputs may require a system reset if they are latched).

3.2.5 C - Trouble - Yellow LED.

- Flashes when there is a fault with a monitored circuit or system component when a circuit is disabled or when the panel is in an off-normal condition.
- On steady once acknowledged.
- Off when the trouble condition has been cleared
  (some trouble signals may require a system reset if they are latched).

3.2.6 D - Alarm Silenced - Yellow LED.

- Flashes to indicate that the Notification Alarm Circuits and the Notification Alarm Devices are deactivated, but the panel is still in alarm.
- Off if the panel re-enters alarm, the system is reset, or if a drill is carried out.

3.2.7 E -Power - Green LED.

- On steady when the panel has power.
- Off when the panel has no source of power applied.

3.2.8 F -Controls Active - Yellow LED.

- Indicates the user now has access to use either the function buttons or the LCD touchscreen display (depending on access level).
- On when the user has entered the access level 2 user password, or when the user has entered the access level 3 engineers password.
- Off when either the access has timed out, or when the user/engineer has locked the panel.

3.2.9 G - Acknowledge - Yellow LED.

- Flashes when there are unacknowledged events.
- On steady when all current events have been acknowledged.
- Off when there are no events.

3.2.10 H - General Disablement - Yellow LED.

- On steady when any part of the system has been disabled.
- Off when there are no current disablements.

3.2.11 I - General Test - Yellow LED.

- On steady when any part of the system is in test mode.
- Off when there are no current circuits/devices in test mode.

3.2.12 J - NAC Trouble/Disablement - Yellow LED.

- On steady if there is a fault detected on an NAC circuit.
- On steady when an NAC has been disabled.
- Off when the NAC's are in the normal condition.

3.2.13 K - NAC Delay - Yellow LED.

- On when an NAC has been configured to delay its output.
- Off when there is no configured delay to the NAC's output.

3.2.14 L - NAC Active - Red LED.

- On when the output of any NAC is currently active.
- Off when there are no NAC's with their outputs active.

3.2.15 M - CPU Trouble - Yellow LED.

- On when there is an abnormal microprocessor running condition due to various unexpected phenomena.
- Off when the microprocessor is running correctly.

3.3 Touch Screen LCD Display

3.3.1 In addition to the forementioned LED indications detailed in section 3.2.1, the FACP shall also have an integral 4.3" full colour resistive touch screen LCD.

The touch screen LCD shall provide detailed information and display system status for the following conditions:

- Normal conditions
- Trouble Condition
- Alarm Condition
- Supervisory Condition
- Disablement Condition
- Test Condition
- Multiple Conditions:

  Priority: Alarms > Supervisory > Trouble > Disablement/Test
- Alarm Verification Conditions
- 3 Access levels: Passcode Required

  1. Basic User access 2. Full User access 2. Engineer access

3.4 Additional Control Buttons

3.4.1 The FACP shall incorporate as a minimum requirement the following pushbutton controls. Figure #1 below shows the control buttons (page 5)

N -Function Button: Silence Alarm

- A minimum of Level 2 access (By entering the user password) is required.
- When the SILENCE ALARM key is pressed, the panel's Notification Alarm Appliances will be silenced.
- The Alarm Silenced LED will start flashing and remain until either the panel is reset, or until another alarm retriggers the notification appliances.
  The RED ALARM LED shall be maintained.
- NOTE: to silence the panels internal buzzer, the alarm must be acknowledged.
- It also sends a SILENCE SOUNDERS' message to the printers and history log.

O - Function Button: ACK (Acknowledge)

- A minimum of Level 2 access (By entering the user password) is required.
- When the ACKNOWLEDGE button is pressed, the control panel will silence its internal sounder (buzzer)
- Change all related active LED indicators from flashing to steady.
- Sends acknowledgment confirmation the LCD status screen.
- The acknowledge message is sent to the printer and the history log.
- The button is used to acknowledge and silence the internal buzzer for Alarm, Supervisory and Trouble events.

P - Function Button: Scroll (Scroll Acknowledge Display)

- If there is an event waiting to be acknowledged, then the Acknowledgment LED will be lit.
- Press the scroll button to view each current Alarm, Supervisory and trouble event on the panel.
- The priority will be (Alarm, Supervisory, and then Trouble).

Q - Function Button: Reset

- A minimum of Level 2 access (By entering the user password) is required.
- Pressing the RESET button will return the panel to normal operating mode, clear any off-normal condition from the status display; restore the alarm and trouble relays to their normal states; extinguish all status LEDs except the GREEN POWER LED, and yellow test/disablement/delay LED's.
- If any alarm or trouble still exists after you press the SYSTEM RESET button, all NACs, control outputs, and panel audio and visual indicators will reactivate.
- The reset message is sent to the printer and the history log.

R - Function Button: Drill

- A minimum of Level 2 access (By entering the user password) is required.
- To start a drill, press the Drill button.
- Using the DRILL button will manually activate all silenceable outputs and Notification Appliance Circuits.
- It will not activate the alarm relays.
- It creates a history log entry of the drill and also sends it to installed printers.
- The drill can be cancelled via a press of the SILENCE ALARM button, and will also cancel if the panel receives an ALARM or SUPERVISORY event.

T - Internal Buzzer

- Gives an audible indication if there is an alarm, trouble, or supervisory event.
- Audible distinction between alarm and trouble provided.

3.5 General User Functions

3.5.1 The FACP shall provide Basic User access (Access level 2a)

3.5.2 The FACP shall incorporate the following Basic User functions, as a minimum:

- Allow the user to have access to the main control panel buttons
- Allow the user to silence the alarms
- Allow the user to acknowledge events
- Allow the user to reset the panel

3.6 Authorised User Functions

3.6.1 The FACP shall provide Full User Access (Access Level 2b) via a password code, or key, to restrict entry to access level 2a functions (for an authorised user).

3.6.2 The FACP shall incorporate the following authorised user functions, as a minimum:

All functions as listed in section 3.5.2

- Set the time and date
- Print/display/reset event log functions
- Disable/enable detection zones
- Disable/enable fire sounders
- Disable/enable outputs
- Disable/enable relays
- Disable/enable devices
- Disable/enable fault relay
- Disable/enable output delays.

3.7 Engineer Functions

3.7.1 The FACP shall provide a password code to restrict entry to Engineer Access (level 3a - for an engineer).

3.7.2 The FACP shall incorporate the following engineer functions, as a minimum:

All disablements as listed in section 3.6.2

Disable/enable earth faults

Set up passwords

Connect to PC

Network functions

Perform a loop learn

Find new devices

Display fitted devices

Assign zone/group

Calibrate devices

Commission loops

Display calibration problems

Display duplicate addresses

Set day/night times

Perform a clean start

Monitor a point

Test device outputs

Test output sets

Test sounder groups

Test panel relays

Put detection zone(s) into walk-test mode

Blink detector LEDs

Intensive device monitor

Perform a loop test

Display the database

Display the panel's software version and checksum

Display status of the panel's PSU and standby battery

Display loop current.

3.8 Internal Panel Modules

3.8.1 The FACP shall provide the ability to operate, control and monitor the system by means of interchangeable modules.

3.8.2 The FACP shall not limit any configuration or quantity of the internal panel modules, providing a bespoke central processing unit for the system suitable for its requirements

3.8.3 The FACP shall have the ability to incorporate any of the below listed internal panel modules onto internally mounted din rails by means of a "Quick Connect" plug and play system.

3.8.4 Available Internal Panel Modules - Designed to meet UL864 10th Edition requirements.
Quick and easy to install by plugging the RJ45 cable into the module and control panel (cable supplied with unit).

Single Line Circuit module

Provides power for & handles communications to the analogue addressable devices. The SLC continuously monitors the analogue values of all devices & displays this value on the control panel as a percentage of the alarm threshold value

- Supports up to 254 addresses.
- 500mA max load (20 ohms loop resistance), or 200mA (50 ohms loop resistance.
- Supports Class X & Class A wiring configurations.
- "Heartbeat LED" that shows communication between the module & motherboard.
- Extensive front unit status indications.
- Time saving AUTO-LEARN facility.
- Double address detection

Notification Appliance Circuit – Class A

Provides power for and handles communications to the non addressable notification appliances. It hasone notification appliance circuit that can be wired in the class-A configuration.
Up to a maximum of 1A can be connected to a single class A circuit. The circuit is supervised for open, short and earth trouble conditions & will report this status back to a Velocity MMP fire alarm control panel**.**

- Built-in synchronization circuitry (only compatible with Velocity devices).
- Can be programmed for either unsynchronized bells or synchronised horns/chimes & beacons.
- 1 x Class a NAC output circuit (1A maximum load).

- Extensive front unit status indications.
- Can be programmed as a 24v auxiliary (1A maximum load).
- Power Limited

Notification Appliance Circuit – Class B

Provides power for and handles communications to the non addressable notification appliances. It has two notification appliance circuits' that can be wired in the class B configuration.
Up to a maximum of 500mA can be connected to each class B circuit. Each circuit is supervised for open, short and earth trouble conditions and will report this status back to a Velocity MMP fire alarm control panel.

- Built-in synchronization circuitry (only compatible with Velocity devices).
- Can be programmed for either unsynchronized bells or synchronised horns/chimes & beacons.
- 2 x Class B NAC output circuit (500mA max load per circuit).
- Extensive front unit status indications.
- Each circuit can be programmed as a 24v auxiliary (500mA max load per circuit).
- Power Limited

RS-485 Network Module

Has the facility to monitor, indicate and control the functions of a fire alarm installation, thus allowing signals to be distributed around a large site. The network uses RS485 data communication and a total network cable length of up to 10km is possible.

All panels will continue to function in stand-alone mode, even if the network fails.
On a Velocity MMP running in a network, all events are reported at all panels and all panels are able to remotely program other MMP panels sitting on the network.
Operation of outputs over the network is determined by the programmed cause & effects.

- Peer-to-peer networking.
- Comprehensive cross network cause & effects.
- Up to 64 panels may be networked together.
- Remote programming over the network.
- The network can be configured with either a ring or bus topology fault tolerant design.
- Extensive front unit status indications.

Multi-Relay Output Module

The module has three form C relays which can be typically used to control lift operation during an alarm, start fire pumps or stop ventilation fans etc.
Each relay output can be configured as a common alarm, common trouble, common supervisory or a programmable output via the Velocity MMP settings.

- 3 x Form C relay outputs.
- Each relay can be programmed to activate on alarm, supervisory, or trouble.
- Extensive front unit status indications.

Multi-Input Module (VL-MIM)

The module has six class B inputs that are commonly used to monitor and raise alarms from any ancillary equipment such as sprinkler flow switches, aspiration detectors, secondary fire control panels, beam detectors, and external power supplies etc.
The module monitors and transmits the status (normal, open, short, or alarm) of inputs to a control panel. Each input can be programmed to either give a supervisory or alarm signal when active.

- 6 x Class B input circuits.
- Each input is monitored for open & short circuits.
- Extensive front unit status indications.
- Each input can be configured as either Alarm or Supervisory

TCP/IP LAN Module

The Local area network module provides a Velocity Panel with a TCP/ IP connection that allows the panel to report events to an external monitoring system, such as Datalog.

- TCP/IP output via RJ45
- Remote monitoring via a desktop PC or smartphone via the cloud.
- Remote control via the cloud
- Responsive web interface
- "Heartbeat LED" that shows communication between the module & motherboard.
- Extensive front unit status indications.

RS-232 Interface Module

Gives a velocity panel the ability to interface to RS232 serial equipment and devices. This is most commonly used to connect the Velocity MMP to an RS232 panel printer, or a desktop printer for real time event log printing.
The module also has a 5V aux output that is used to provide power to the panel's internal printer.

- Use to interface to RS232 devices.
- 5V aux output (for use with panel printer only).
- Extensive front unit indications

Conventional Multi Zone Monitor Module

The module has three class A zone monitors which can be typically used for conventional devices and/or for special detectors that are not available in addressable form such as UV detectors, aspiration and beam detectors etc. The module monitors and transmits the status (normal, open, short, or alarm) of zones with the detectors to a control panel. Each zone input can be programmed to either give a supervisory or alarm signal when active.

- 3 x Class A initiating device circuits
- Each zone is monitored for open & short circuit.
- Extensive front unit status indications.
- Each zone input can be configured as either Alarm or Supervisory

Conventional Multi Zone Monitor Module

The module has six class B zone monitor's which can be typically used for conventional devices and/or for special detectors that are not available in addressable form such as UV detectors, aspiration, and beam detectors etc. The module monitors and transmits the status (normal, open, short, or alarm) of a zone with the detectors to a control panel. Each zone input can be programmed to either give a supervisory or alarm signal when active.

- 3 x Class A initiating device circuits
- Each zone is monitored for open & short circuit.
- Extensive front unit status indications.
- Each zone input can be configured as either Alarm or Supervisory

3.9 Detection Devices (General)

3.9.1 Detectors shall comply with or type certified to UL864 10th Edition

- ANSI/UL 268 – Safety for smoke detectors for fire alarm systems
- ANSI/UL 521 – Safety for heat detectors for fire protective signaling systems

3.9.2 Detectors shall be designed to connect to a 24vdc supply with an operating range of 20 vdc to 38vdc peak

3.9.3 Detector shall have 5 response modes which cover a range of sensitivities as well as response times. The mode for each individual detector shall be set via the FACP during the polling cycle. The response mode of any detector maybe changed from the control panel at anytime.

3.9.4 The Detectors shall be intelligent and addressable devices and shall connect with two wires to the FACU's Signal Line Circuit (SLC) loop.

3.9.5 Up to 254 detectors shall be connected to a single loop.

3.9.6 The Detectors shall operate on a digital Frequency Shift Key (FSK) protocol loop to give reduced power consumption.

3.9.7 Loop isolation capability shall be available in the form of an SCI base, on which to mount the detector.

3.9.8 The Detectors shall have a self-test function to send a trouble signal to the FACU when any trouble occurred on the device.

3.9.9 The Detectors shall be ceiling-mounted using a twist-lock type fitting base. There shall be a locking grub-screw on the base to ensure they cannot be removed without the appropriate tool.

3.9.10 Functional Bases with relays or built-in sounder shall be available where required.

3.9.11 The Detectors shall be Soft addressed using a handheld Programming tool, which possibility of installation error, systems that use rotary switches, binary jumpers or DIP switches to set the detector address are not acceptable.

3.9.12 Each detector head shall occupy any one of 254 possible addresses on the SLC loop.

3.9.13 The Detectors shall provide an Omni-view indicating ring, illuminated by Red and Green LED's, so it may be seen from any angle. This will allow the detector base to be installed in any orientation.

3.9.14 The Omni-view ring shall indicate device Alarm status in steady Red and also indicate in flashing Green that the Detector is operational and in regular communication with the FACU.

3.9.15 The colour for the indication of normal operation shall be Green to comply with NFPA 79, in order to prevent occupants from misrecognition the status as Alarm or Trouble.

3.9.16 If required, the flashing mode operation of the Detector LED's shall be controlled to turn off through the FACU configuration.

3.9.17 An output connection shall also be provided in the base to connect an external remote alarm LED.

Addressable Smoke Detector:

3.9.18 Smoke Detectors shall use the photoelectric (light-scattering) principle to measure smoke density and shall, on command from the FACU, send data to the panel digitally representing the analogue level of smoke density.

3.9.19 The Detector sensitivity shall be set through the FACU configuration.

3.9.20 Sensitivity shall be automatically adjusted by the panel on a time-of-day basis.

3.9.21 The Detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance.

3.9.22 Smoke Detectors shall have a chemically etched, stainless steel insect screen to prevent ingress of insects and airborne contaminants, which may cause false alarms.

Addressable Heat Detector:

3.9.23 Heat Detectors shall use a thermistor element to measure thermal conditions caused by a fire and shall, on command from the FACU, send data to the panel representing the analogue or digital level (the temperature) at the detector.

3.9.24 The Detectors shall be a combination rate-of-rise and 57 °C (135 °F) fixed temperature heat detector, in order to react quickly in the event of a fire situation or for high temperature applications, the Detectors shall be 83 °C (181 °F) fixed temperature heat detector.

3.9.25 The combination heat detector shall initiate an alarm when either the rate of ambient temperature increase exceeds an 8.3 °C (15 °F) per a minute or the ambient temperature reaches up to a 57 °C (135 °F) fixed temperature.

3.9.26 The fixed temperature heat detectors for high temperature application shall initiate an alarm when the ambient temperature reaches up to a 83 °C (181 °F) fixed temperature.

3.9.27 The high temperature heat detector shall be used only for the installation where the maximum expected ambient ceiling temperature exceeds 47 °C (115 °F).

Addressable Smoke and Heat Detector:

3.9.28 The Detector shall be comprised of two sensing elements, including a photoelectric (light-scattering) smoke sensor and a thermistor heat sensor.

3.9.29 The Detector shall be able to indicate distinct smoke and heat alarms.

3.9.30 The Detector shall include the ability via the FACU's configuration to combine the signal of the photoelectric signal with the heat sensing element in order to react quickly in the event of a fire situation. It shall also include the inherent ability to distinguish between a fire condition and a nuisance alarm condition.

3.9.31 Smoke detection portion shall be able to measure smoke density and shall, on command from the FACU, send data to the panel digitally representing the analogue level of smoke density.

3.9.32 The smoke sensitivity shall be set through the FACU configuration, and shall be automatically adjusted by the panel on a time-of-day basis.

3.9.33 The smoke detection portion shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance.

3.9.34 The smoke detection portion shall have a chemically etched, stainless steel insect screen to prevent ingress of insects and airborne contaminants, which may cause false alarms.

3.9.35 Heat detection portion shall, on command from the FACU, send data to the panel representing the analogue or digital level (the temperature) at the detector.

3.9.36 The heat detection portion shall be a combination rate-of-rise and fixed temperature heat detector, in order to react quickly in the event of a fire situation.

3.9.37 The heat detection portion shall initiate an alarm when either the rate of ambient temperature increase exceeds an 8.3 °C (15 °F) per a minute or the ambient temperature reaches up to a 57 °C (135 °F) fixed temperature.

Addressable Dual Photoelectric Smoke and Heat Detector:

3.9.38 Addressable Dual Photoelectric Smoke and Heat Detector shall be used in areas prone to steam and dust, including hotels, hospitals and other areas of multiple occupancy.

3.9.39 The Detector shall use an Infra Red and Blue LED (light-scattering principle) and a specialized algorithm to measure smoke density and actual particle size.

3.9.40 The Detector shall also incorporate a thermistor sensor to accurately measure the temperature to certainly detect the real fire risk.

3.9.41 The Detector shall effectively discriminate between the presence of Steam, Aerosol and dust particles within the chamber, in order to provide increased immunity to false alarm, whilst maintaining the earliest warning of real fire condition.

3.9.42 The Detector shall be able to indicate distinct smoke and heat alarms.

3.9.43 The Detector shall include the ability via the FACU's configuration to combine the signal of the photoelectric signal with the heat sensing element in order to react quickly in the event of a fire situation. It shall also include the inherent ability to distinguish between a fire condition and a nuisance alarm condition.

3.9.44 The smoke detection portion shall be able to measure smoke density and shall, on command from the FACU, send data to the panel digitally representing the analogue level of smoke density.

3.9.45 The smoke sensitivity shall be set through the FACU configuration, and shall be automatically adjusted by the panel on a time-of-day basis.

3.9.46 The smoke detection portion shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance.

3.9.47 The smoke detection portion shall have a chemically etched, stainless steel insect screen to prevent ingress of insects and airborne contaminants, which may cause false alarms.

3.9.48 Heat detection portion shall, on command from the FACU, send data to the panel representing the analogue or digital level (the temperature) at the detector.

3.9.49 The heat detection portion shall be a combination rate-of-rise and fixed temperature heat detector, in order to react quickly in the event of a fire situation.

3.9.50 The heat detection portion shall initiate an alarm when either the rate of ambient temperature increase exceeds an 8.3 °C (15 °F) per a minute or the ambient temperature reaches up to a 57 °C (135 °F) fixed temperature.

Addressable Sounder Base

3.9.51 The Sounder Base shall be listed to UL 268 and UL 464.

3.9.52 The Sounder Base shall operate on a digital Frequency Shift Key (FSK) protocol

loop to give reduced power consumption.

3.9.53 Up to 127 bases shall be connected to a single loop.

3.9.54 Each Sounder Base shall occupy any one of 254 possible addresses on the SLC loop.

3.9.55 The Sounder Base shall be Soft addressed using a hand held Programming tool, which is capable of displaying the address by 7 segment LED's. Because of the possibility of installation error, systems that use rotary switches, binary jumpers or DIP switches to set the detector address are not acceptable.

3.9.56 The Sounder Base shall be able to switch its sound pattern between a temporal three-pattern, temporal four-pattern, non-temporal (continuous) or march time pattern.

3.9.57 The Sounder Base shall be a ceiling-mounted, twist-lock type base. There shall be a Locking grub-screw on the base to ensure the detector on the base cannot be removed without the appropriate tool.

3.9.58 The sound pressure level at 3 m (10 ft.) from the sounder shall be over 85 dBA.

3.9.59 The alarm current shall not exceed 20 mA at 24VDC.

3.9.60 The Sounder Base shall operate up to 95% relative humidity.

3.10 Manual Call Points / Manual Pull Stations

Manual Call Point

3.10.1 The Manual Call Points / Pull stations shall be conventional and be connectable to addressable input devices.

3.10.2 The Manual Call Points shall be made of UL approved listed polycarbonate and is compatible with its own surface back box if requested and shall be compatible with standard single gang back boxes.

3.10.3 Manual Call Points shall be available in either single or double action configurations with SPST contacts and terminal strip connections.

3.10.4 Single action manual call points shall be activated by depressing the frangible element marked with an "Arrow & Dot with Hand" operating logo.

Double action manual call points shall be activated by firstly lifting the integral clear protective cover and then by depressing the frangible element marked with an "Arrow & Dot with Hand" operating logo.

3.10.5 The manual call point shall require a "Reset Key" to restore the frangible element. The "Reset Key" shall be accessible to controlled person(s) only

Pull Station

3.10.6 Pull stations shall be made of die-cast metal and be compatible with standard single gang back boxes.

3.10.7 Pull stations shall be available in either single or double action configurations with SPST contacts and terminal strip connections.

3.10.8 Single action pull stations shall be activated by pulling a handle marked "PULL HANDLE".

Double action pull station shall require pushing a bar first to free the handle. Bar shall be marked "PUSH BAR" before then pulling on a handle marked "PULL HANDLE"

3.10.9 The pull stations shall require a key to restore the handle the normal position.

3.11 Addressable Loop Modules

General Requirements:

3.11.1 The Loop Modules shall be intelligent and addressable devices and shall connect with two wires to the FACP Signal Line Circuit (SLC) loop.

3.11.2 Up to 127 Loop Modules shall be connected to a single loop.

3.11.3 The Loop Modules shall operate on a digital Frequency Shift Key (FSK) protocol loop to give reduced power consumption.

3.11.4 Loop isolation capability shall be available in the form of a built-in SCI for Class X (Style 7) operation, in order to ensure the operational capability continuing past a single open or short on the SLC. Short-circuit shall be automatically detected and isolated. The Loop Module shall restore loop connection upon removal of fault.

3.11.5 The Loop Modules shall be Soft addressed using a handheld Programming tool, which is capable of displaying the address by 7 segment LED's. Because of the possibility of installation error, systems that use rotary switches, binary jumpers or DIP switches to set the detector address are not acceptable.

3.11.6 Each loop module shall occupy any one of 254 possible addresses on the SLC loop.

3.11.7 The Loop Modules shall provide three coloured status indicators, illuminated by Red, Yellow and Green LED's.

3.11.8 The LED's shall indicate device Activation status in steady Red, SCI Trouble status in steady Yellow and also indicate in flashing Green that the device is operational and in regular communication with the FACU.

3.11.9 The colour for the indication of normal operation shall be Green to comply with NFPA 71, in order to prevent occupants from misrecognition the status as Alarm or Trouble.

3.11.10 If required, the flashing mode operation of the Loop Module LED's shall be controlled to turn off through the FACU configuration.

Addressable Zone Monitor Module

3.11.11 Addressable Zone Monitor Modules shall be provided to interface one supervised input circuit of Conventional Detectors to the SLC loop. An Alarm indication from the Initiating Device Circuit (IDC) shall raise an alarm at the FACU.

3.11.12 A range of Conventional devices, including Pull Stations shall be available.

3.11.13 The IDC shall be able to be wired for Class A (Style D & E) and Class B (Style B & C) operation.

3.11.14 The IDC power shall be provided by the SLC loop connection from the FACU. Additional connections for power are not acceptable.

3.11.15 The Zone Monitor Module shall be capable of selecting the IDC monitoring mode depending on the wiring style, including the mode for connecting Normally Closed Contact devices, enabling Open Circuit detection, enabling Short Circuit detection and enabling Priority Interrupt Communication.

3.11.16 The IDC monitoring mode selection shall be set through the FACU configuration.

Addressable Dual Input Module

3.11.17 Addressable Dual Input Modules shall be provided to respectively interface two input circuit of conventional Alarm Initiating Devices (any volt free contact device) to the SLC loop. An Alarm indication from either the Initiating Device Circuits (IDC) shall raise an alarm at the FACP. When two Alarm indications occur from both of the IDCs, the two

Inputs shall be seen by the FACP as two individual alarms.

3.11.18 The Input Module shall provide a volt free input to monitor the conditions of Pull stations, Key switches, Flow switches, Sprinkler valves etc.

3.11.19 The IDC shall be able to be wired for Class A (Style D & E) and Class B (Style B & C) operation.

3.11.20 The Input Module shall be capable of selecting the IDC monitoring mode depending on the wiring style, including the mode for connecting Normally Closed Contact devices, enabling Open Circuit detection, enabling Short Circuit detection and enabling Priority Interrupt Communication.

3.11.21 The IDC monitoring mode selection shall be set through the FACU configuration.

Addressable Mini Input Module

3.11.22 The Mini Input Module shall be available in a miniature package. This input module is designed to provide an addressable output when installed with conventional pull stations, conventional MCP, conventional beam detectors etc…

Addressable Dual Output Module

3.11.23 Addressable Dual Output Modules shall be provided to respectively interface two Relay outputs for controlling the operation of fan shutdown and other auxiliary control functions.

3.11.24 The Output Module shall provide two volt free Relays with 30 VDC, 2 Amp rated Form-C contacts. For high voltage AC controls, the High Voltage Output Module equipped with two-volt free Relays with 250 VAC, 4.8 Amp rated Form-C contacts shall be available.

3.11.25 The status of each output shall be monitored and controlled by the FACP, respectively. The two Outputs shall be capable of being individually controlled by the FACP.

Addressable Sounder Control Module

3.11.26 Addressable Sounder Control Modules shall provide supervised control and operation of one conventional alarm indicating circuit of compatible, 16 to 30 VDC powered, polarized audio/visual indicating devices.

3.11.27 Audio/visual power shall be provided by a separate supervised power circuit from the FACU or from a supervised, UL listed remote Power supply.

3.11.28 The Sounder Control Module shall monitor for the presence of the external power.

3.11.29 The indicating circuit of the Module shall be capable of powering a maximum of 2 Amps of resistive audio-visual signaling equipment.

3.11.30 The indicating circuit shall be able to be wired for Class A (Style Z) and Class B (Style Y) operation.

3.12 Sounders

3.12.1 The FACP shall support as the primary signalling, conventional Notification Appliance Circuits (NAC's) in Class A & Class B wiring configurations by means of the NAC modules (refer section 3.8.x)

3.12.2 The NAC modules will each provide 1A of power per module either as a single Class A loop or 2 x Class B circuits.

3.12.3 The FACP shall also provide a Sounder Control Module (SCM) that can be connected to the SLC loop, the indicating circuit of the Module shall be capable of powering a maximum of 2 Amps of Resistive audio-visual signaling equipment. This power will need

to be provided externally and not from the loop. (Refer to section 3.11.26)

3.12.4 The maximum number of devices per NAC loop/circuit shall be determined by the current consumption of each notification device (dependent on selected output setting) when in alarm state.

3.12.5 The conventional sounder circuits shall have an EOL allowing line monitoring for open-circuit and short-circuit faults.

3.13 Alarm Monitoring

3.13.1 The FACP shall have the ability to interrogate every addressable loop device.

3.13.2 The FACP shall have the ability to monitor for 'FIRE' and 'TROUBLE'

3.13.4 The FACP shall have the ability to display the analogue levels returned from the sensors.

3.13.5 The FACP shall have the ability to provide automatic warning that a detector has reached a level of contamination that requires it be replaced or serviced.

3.14 Auxiliary Inputs

3.14.1 The FACP shall provide a minimum of 1x programmable inputs as a minimum.

3.14.1 The FACP shall have provision to increase the number of programmable inputs using the Multi Input Module(s) see section 3.8.X

3.14.2 The auxiliary inputs shall connect to 0V to trigger volt-free, single-pole changeover contacts with a maximum switching current of 1A and a maximum switching voltage of 30Vdc.

3.15 Auxiliary Outputs

3.15.1 The FACP shall provide as a minimum the following auxiliary outputs:

1 x Trouble

1 x Alarm output

3.15.2 The auxiliary output relays listed in section 3.16.1 shall be volt-free, single-pole changeover Contacts, maximum switching current 1A @ 30Vdc.

3.15.3 The relay outputs SHALL NOT be used for switching mains voltages.

3.16 Fault / Trouble Reporting

3.16.1 The FACP shall monitor and report faults all critical system components. When a fault occurs on a critical part of the fire alarm system, the FACP shall respond by activating its internal sounder, illuminating the TROUBLE LED and other LEDs relating to the fault.

3.16.2 The FACP fault output shall also be activated (providing it has not been disabled). The active fault shall also be displayed on the LCD and provide text messages to indicate the precise location of where a fault has occurred in the system.

3.16.3 The following faults shall be reported in the manner described in sections 3.16.1 and 3.16.2:

Addressable Loop integrity fault

Detector head removal or missing

Addressable loop device failure

PSU fault

Battery fault / missing

Mains failure

Fuse fault

Battery fuse fault

Sounder wiring open-circuit

Sounder wiring short-circuit

Microprocessor / system fault

Main control PCB fault

Earth wiring fault.

3.17 Wiring

3.17.1 All wiring shall be installed in accordance with the current NFPA 72 regulations and/or other relevant national standards.

3.17.2 Cables should be protected from mechanical damage or other conditions such as moisture, excessive heat or corrosive action to Class 1 requirements

3.17.3 Use solid copper conductors and size wiring in accordance with manufacturer's recommendations and local guidelines/regulations

3.17.4 Cables shall be fire-resistant screened cable, minimum size 1mm^2.

3.17.5 Cable lengths shall be a maximum of 1Km per loop.

3.18 Power Supply Specification

3.18.1 The FACP shall operate on a mains supply voltage of:

Mains AC Supply Voltage: 240/120Va.c.
Mains AC Supply Frequency: 50/60 Hz
Power Supply DC Rating: 30Vdc 10A

3.18.2 AC power shall be monitored by the control panel, there shall be an automatic transfer of power to the back-up power source if AC voltage levels drop below the minimum required for the panel operate effectively.

Standby Power

3.18.3 Battery backup shall be used to provide 24VDC standby power if required.

3.18.4 The batteries shall be sealed lead-acid

3.18.5 The required battery output shall be calculated specific to the systems requirements

3.18.6 The on-board battery charger shall have the ability to provide full recharge of the required batteries in accordance to UL requirements

3.18.7 The FACP shall monitor the battery charger and report Trouble if the batteries are no longer being charged or if they have been disconnected.

3.19 Panel Construction

3.19.1 The housing containing the fire alarm panel shall be made of Zintec Steel

3.19.2 Steel thickness variation dependent on panel model

- Small MMP & Repeater - Back box & front door are 0.9mm
- Medium MMP & Large MMP – Back box & front door are 1.5mm

- All other internal parts for all panels are 0.9mm

3.19.3 The paint colour for the back box & front door is RAL3020 Red Leatherette (red version) or RAL9005 Black Leatherette (black version)

3.19.4 The paint colour for all internals is RAL9005 Black Leatherette.

3.19.5 The FACP shall be capable of being semi-surface or surface mount with various cable knockouts: 34 x Small Panel
38 x Medium Panel
112 x Large Panel
5x Remote Annunciator

3.19.5 Panel dimensions and weight shall be:

- Small – 535mm H x 385mm W x 150mm D WGT: 9kg
- Medium – 665mm H x 535mm W x 200mm D WGT: 15kg
- Large – 665mm H x 975mm W x 200mm D WGT: 27kg
- R/Annunciator – 230mm H x 340mm W x 96mm D WGT: 2.3kg

3.19.4 All enclosures shall have a minimum ingress protection to IP30 and will require a tool key to open the front door.

4. System Networking

4.1 The Velocity MMP networking protocol can be used to connect up to 64 FACPs / Remote Annunciators (RA) of any configuration in one loop.

4.2. The Velocity MMP RAs shall offer the same controls and functions of the FACPs.

4.2 Networking Key Features

4.2.1 The Velocity MMP system network has the facility to monitor, indicate and control the functions of a fire alarm installation from any node, thus allowing signals to be distributed around a large site.

4.2.2 On a Velocity MMP running in a network, all events are reported at all panels and all panels are able to remotely program other MMP panels sitting on the network. Operation of outputs over the network is determined by the programmed cause & effects.

4.2.3 True peer to peer

4.2.4 The connection between FACPs / Remote Annunciators shall be with 2 core (screen) cable, RS485 network and wired either as:

- Ring Network (Class A)
  In a ring network, each control panel is connected to 2 other control panels to form a ring. This has the same topology as the loops of addressable devices connected to each CIE. This has the advantage that no panels are lost if there is a single break in the network.

- Bus Network (Class B) This is similar to a ring network but wired panel to panel without a return connection from last panel to first panel. It could also be referred to as a radial or spur network.

4.2.5 The FACP network shall be capable of being wired up to 1KM of cable

4.2.6 Running the Network

All events are reported at all panels.
Accept fire & faults from any FACP / RA
All panels are able to silence & reset the system from any FACP / RA
Accept disablement commands: for zones, sounders and output from other FACPs / RA
Operation of outputs over the network is determined by the programmed cause & effect.
The cause & effect is entered at the panel that has the INPUT CAUSE connected.
Any input on the network can be programmed to operate any output.
Monitor for network wiring faults.

4.2.6 Fires detected on remote FACPs shall be displayed on all FACPs / RAs, including the point description of the alarms origin.

4.2.7 Faults detected on remote FACPs shall be displayed on all FACPs / RAs, including the point description of detectors.

4.2.9 The network shall support the programming of site data into remote FACPs from a PC connected at a local FACP.

5. Programming Tools

5.1 The FACP shall be capable of being programmed either on-board using the Touch Screen LCD or interfacing with a PC using a Velocity Connect PC Software Windows-based program for programming purposes and configuration updates.

5.2 The programming PC shall connect to the main FACP via a USB connection.

5.3 The FACP shall have the facility to allow the connection to an on-board printer or external printer using the RS-232 interface module for printing the panel's event log.

6. Key Documents

6.1 The manufacturer shall provide a complete set of documents describing the FACP setup.

6.2 The following documentation shall be provided by the manufacturer, as a minimum:

Installation Manual

Operation and Maintenance Manual

6.3 Other system information can be made available upon request, for example the Velocity "Loop Calculator" to help calculate power consumption.