MSA
The Safety Company

Model 10K NFPA 72 Compliant
Fire and Gas Detection System Description
Product Specification

The NFPA 72 Compliant Fire and Gas Detection System shall be a modular system built using state-of-the-art industrial automation/control equipment to perform the functional requirements of:

- NFPA 72 Compliant Fire Alarm Monitoring and Gas Detection System
- Special Hazards Releasing and Control for FM200, Water Mist and CO_2 Extinguishing Equipment
- Combustible Gas and Toxic Gas Monitoring System
- Redundant and Fault Tolerant Fire Alarm Communication Network
- Proprietary Central Station Monitoring of Fire and Gas Alarm Systems

Each of the above listed system functions shall be NRTL (UL or FM) certified to comply with NFPA 72 (2002) standards and requirements.

The principle elements of the system shall include (a) one or more local control panels, (b) a computer based Proprietary Central Station Monitoring Terminal (PCSMT), (c) a dual media (either coaxial cable or fiber optic) fault tolerant communication network which allows communication from the local panels to remote monitoring terminals or the PCSMT and (d) DC power sources typically a charger and gel-cell battery system sized to meet the 24 hr backup standards of NFPA 72.

Local Panel Description

Hardware Description

The local panel shall be a modular system consisting of a NEMA 12 rated enclosure custom selected to accommodate the desired system I/O which houses the local panel components including:

- Allen Bradley PanelviewPlus Industrial Touchscreen Terminal with 10.4" diagonal measured TFT Color Touchscreen. The screen resolution is 640 x 400 pixels
- Allen Bradley Contrologix Programmable Logic Controller fitted with rack-mounted processor, communication modules and input/output modules as required for the design system configuration
- Controlnet Taps for communication connections to the system

- Optional Fiber Optic converters for long distance communication
- Optional MODBUS or Ethernet communication output modules
- DC to DC power converter to isolate Panelview DC power input
- Signal conditioning components including fuse blocks and swing-link terminal blocks for distributing power in the panel and to allow customer connection of field circuits to the Local Panel
- Panel shall be fitted with a duplex 120 VAC receptacle
- Primary Power inputs for the system are 120 VAC or 220 VAC to supply power to the remote mounted 24 VDC Power Supply/Gel Cell Battery System
- System shall be fully integrated with all utilized I/O points being wired down to swing link terminal blocks

System Fire and Gas System response time to any alarm event input and its corresponding output shall never exceed 1 second.

Fire Alarm Functions

Fire Alarm Functions performed by the local panel shall include the following:

- Supervision dry contact IDC (Input Device Circuit) devices (manual fire alarm stations, thermal detectors, etc.)
- Supervision of loop powered smoke detectors and self contained smoke detectors
- Supervision of Optical Flame Detectors
- Supervision/actuation of NAC (Notification Appliance Circuit) devices including horns, bells, strobes and warning lights (2 amp per circuit maximum at 24 VDC)
- Supervision/actuation of Special Hazard fire extinguishing equipment including solenoids, main/reserve switches, abort controls, blocking valve monitors, cylinder pressure monitors, selector valves and discharge pressure switches
- Local display of all alarm, supervisory and fault conditions
- Alarm logging of alarm, supervisory and fault conditions
- Logic solving requirements such as zoning, timer, counters, cross-zone, coincident zone, test and inhibit functions required for system operation
- Ground fault detection
- Supervision of 24 VDC Power Supply/Gel Cell Battery System
- Supervision of communication network functionality

Gas Controller Functions

Gas Controller Functions performed by the local panel shall include the following:

- Monitoring of combustible gas, toxic gas detectors via 4-20 mA

- Display concentration levels of combustible gases in % LEL or LEL Meter ranges. Display concentration of toxic gases in PPM. Display oxygen deficiency values in $\% O_2$
- Easily Adjustable detector alarm setpoints from the touchscreen
- Activation of alarm inhibits from the touchscreen
- Activation of alarm outputs as required for fault, low alarm and high alarm
- Logic solving requirements such as zoning, voting, test and inhibit of devices
- Supervision/actuation of NAC devices in coordination with fire panel cause and effect design
- Support of tabular gas detection alarm status, bar chart gas detector displays and gas level trending over time

Local Panel Operator Interface

All operator controls for the fire and gas alarm system shall be accessed by a three level password authority system. This password authority ensures that only properly authorized personnel are able to access the detailed configuration functions of the system.

The primary operator interface shall be the Panelview Plus terminal. This terminal shall feature default alarm status screen with menu driven touchkeys to select secondary display screens.

The default alarm status screen shall be designed around the requirements for the "Standard Fire Service Interface" as outlined in NFPA 72 Section A7-10. Additionally, the default screen has "go to" touchkeys allowing navigation to the following additional screens:

- Current Alarm/Supervisory/Fault Summary Screen
- Gas Detector Value Display/Alarm Status Screens
- Alarm/Supervisory/Fault History Screen
- Active Alarms Screen
- Active Faults Screen
- Communication Monitoring Screen
- Gas Detector Setpoint Adjustment Screen (subject to password protection)
- Fire Device Enable/Disable Screen (subject to password protection)
- Gas Device Enable/Disable Screen (subject to password protection)
- Power System Monitoring Screen
- Customized Optional Screens with support for custom plot plan graphics with detector locations and status
- Gas Trending screens

All screens shall be provided with "one touch" return to the default alarm status screen.

Fire and Gas System shall support custom plot plan graphics, allowing graphical representation and display of the protected area with sensor locations and sensor status.

Proprietary Central Station Monitor Terminal Description

Hardware Description

The proprietary central station equipment shall be used to remotely monitor the operation of one or more local fire and gas alarm panels. The equipment shall consist of a UL864 certified computer workstation with touchscreen interface and a Controlnet Network

Computer Equipment

The computer is a Comark Corporation UL 864 Industrial PC fitted with Touchscreen. Equipment Specifications are:

> Pentium 2.8 GHz Pentium IV, 512M Ram, 40GB Hard Drive, CDRW, Internal Video, NIC and Sound Board, 1.44MB Floppy Disk, Windows XP Pro with keyboard and mouse.

Computer shall be running Allen Bradley RSView32 HMI Software on a dedicated basis. Computer can be equipped with a parallel or USB port interface dot matrix line printer for hardcopy logging of alarm/supervisory and fault history.

Communication Equipment

The computer shall communicate with the Local Panels via Controlnet. Controlnet is a 5 MBit, redundant media high level communication protocol supported by PLC and HMI equipment.

Controlnet media can be RG6 Quad Shield Coaxial cable and can handle node-to-node distances of up to 3280 ft/1000 meters. Controlnet media can also be converted to either multi-mode or single mode fiber optic cable using Phoenix Digital fiber optic modems. Multi-mode fiber is capable of maximum distances of 3.7mi/6km and Single-Mode fiber is capable of maximum distances of up to 15.5mi/25km.

Central Station Monitoring Terminal Functionality (PCSMT)

Normal Operating Mode

The primary Central Station Terminal interface shall be the UL864 listed computer. This terminal will feature default alarm status screen with menu driven touchkeys to select secondary display screens. Color TFT LCD Touchscreen resolution will be 1280 x 1024 pixels

The default alarm status screen is designed around the requirements for the "Standard Fire Service Interface" as outlined in NFPA 72 Section A7-10. Additionally, the default screen has "go to" touchkeys allowing navigation to the following additional screens:

- Current Alarm/Supervisory/Fault Summary Screen
- Gas Detector Value Display/Alarm Status Screens
- Alarm/Supervisory/Fault History Screen
- Communication Monitoring Screen
- Power Supply Alarm Monitoring Screen
- Customized Optional Screens including trending

All screens will be provided with "one touch" return to the default alarm status screen.

Offline Programming Mode

The computer workstation is capable of providing software update and editing to the Contrologix and PanelviewPlus equipment located in each Local Fire and Gas Alarm Panel over Controlnet.

Editing of all programmable equipment shall be subject to multi-level password protection to prevent unauthorized changes to the programming of the equipment.

Power Supply/Battery Backup System

Hardware Description

Power Supply shall be a LaMarche Model A12B equipped with 16Q Accessory package, input AC circuit breaker and dual pole DC output breaker. Power supply and battery backup sizing will be based on a power consumption calculation for the system. System power and battery sizing shall be done in accordance with the requirements of NFPA 72. System sizing calculation will include all devices connected to the system including gas detection equipment.

LaMarche A12B shall receive power from a 120 VAC or 220 VAC distribution circuit located in the local panel. The AC distribution should be fused in panel and the charger is fitted with a factory installed single pole circuit breaker. The A12B unit will be fitted with Model Number 16Q option package which includes local controls for battery equalization, current and voltage display, and diagnostic signals related to power supply operation including ground fault detection. These signals will be transmitted to the respective Local Panel. All power supply status information should be available at the Local Panel PanelviewPlus and the PCSMT.

The current flow between the Charger and the Batteries shall be monitored using a DC Current Shunt monitored by a locally mounted millivolt transmitter which will send a 4-20 mA signal to the respective Local Panel for display on the Local Panel Panelview Plus terminal and the PCSMT.

Panel load shall be driven directly from the Power Supply with the Gel Cell Battery Backup connected to the same terminals. In the event of AC power failure, the Local Panel load will be transferred to the Battery Backup without bump or power interruption. Power supply diagnostic signals will be transmitted to the Local Panel PanelviewPlus and PCSMT.

Gel Cell Batteries should be sized in accordance with the backup time requirements of the NFPA 72 Standard. Gel Cell Batteries should be provided with optional battery racks and enclosed two-pole local disconnect switch if the batteries are mounted in a location remote from the Power Supply.

In the case of the PCSMT, the supported load is 120 VAC. When backup power requirement is 120 VAC, a suitable 120 VAC commercial style self contained UPS should be provided.