Advanced

Consultant Specification

Scope of work:

To design, supply, install and commission an Analogue Addressable Fire Alarm Control System in accordance with the details specified herein and in accordance with supplied drawings

The EN54 Part 2, 4 and 13 Fire System

The system shall include all materials, equipment and wiring required to install the complete Fire Detection and Alarm System. The system shall include but not be limited to one or more control panels, repeater panels, sensors, call points, audible and visual alarm indicating devices and relays.

The system components shall be freely available from a number of sources, (i.e. not a closed protocol system), and shall support at least Apollo Discovery, Xplorer, XP95, S90 and Xpander Devices, Argus Vega, Hochiki ESP and Nittan Evolution protocol.

The installation shall include the laying of all cables required for connection of the detection, alarm indicating and other devices along with connections to the power supply as appropriate to the design. All cabling shall conform to the requirements and recommendations of the Fire Alarm Control Panel manufacturer. Any openings /chasings in walls, ceilings or floors shall be made good.

The system shall be designed such that no more than 80% of the available signalling / detection loop capacity is employed to allow for future requirements.

Normative references:

EN54-1:2011	Introduction
EN54-2:1997 +A1:2006	Control and Indicating Equipment
EN54-3:2001 +A1:2002 +A2:2006	Audible Alarm Devices
EN54-4:1997 +A1:2002 +A2:2006	Power Supply Equipment
EN54-5:2000 +A1:2002	Heat Detectors – Point Detectors
EN54-7:2000 +A1:2002 +A2:2006	Smoke Detectors – Point Detectors
EN54-11:2001 +A1:2005	Manual Call Points
EN54-13:2005	Compatibility Assessment of System Components
EN54-17:2005	Short Circuit Isolators
EN54-18:2005	Input / Output Devices
EN54-23:2010	Visual Alarm Devices
EN54-25:2008	Components using Radio Links
BS5839-1:2013	Code of practice

Standards

The fire detection system shall be designed, installed and commissioned in accordance with, and all elements shall meet the requirements of BS5839-1 Code of Practice. The responsible company should be able to demonstrate their competence to design, install and commission the system, e.g. by certification to BAFE SP203, LPS1014 or other relevant standard.

The equipment manufacturer shall operate a quality management system in accordance with ISO 9001. In addition, the equipment shall be manufactured under a recognised factory control procedure such as the Vertrauen durch Sicherheit (VDS) scheme.

All detection devices shall be independently certified as complying with the relevant EN54 standard.

The Fire Alarm Control Panel shall be independently certified as complying with requirements of EN54 Part 2, EN54 Part 4 and EN54 Part 13. The Independent approvals body shall be the British Standards Institute (BSI) and Vertrauen durch Sicherheit (VDS).

In addition to the basic requirements of EN54, the Fire Alarm Control Panel shall offer the following EN54 optional features with requirements:

Optional Functions:	EN54-2 Clause
Indication - Fault signals from points	8.3
Outputs -Outputs to fire alarm devices	7.8
Outputs -Outputs to fire alarm routing equipment	7.9
Outputs -Outputs to fire alarm protection equipment	7.10
Controls -Investigation delays to outputs	7.11
Co-incidence detection	7.12
Alarm Counter	7.13
Disablement of points	9.5
Test condition	10
Standardised I/O	11
Power Supply Equipment Functions:	EN54-4 Clause
Operation from a main power supply	5.1
Operation from a standby battery	5.2
Monitor and charge the standby battery	5.3
Recognise and notify supply faults	5.4
Compatibility of system components	EN54-13 Clause
Basic System Requirements	4.2
Network Systems	4.3
Components	4.4
Transmission Path	4.5
Input and Output Devices linked to fire protection systems	4.6

The Fire Alarm Control Panel shall also support a number of additional functions that are not covered by EN54. These additional functions shall include:

Programmable Cause / Effect on Outputs (E.g. Phased Evacuation)

Auxiliary Power Supply Output

Auxiliary Relay Outputs

Programmable Push Buttons

More Alarms Button

Printer Option

USB and RS232 Port

Fire Alarm Control Panel (FACP)

Functional Description

The FACP shall be the central controller of the complete system. It shall receive and process analogue information from the detection devices, provide audible and visual indication of alarm and other conditions to the user, automatically initiate alarm response sequences and provide the user interface for interrogation and user programming of the system.

Updates to the FACP operating software shall be simple to undertake and shall not require the use of replaceable components. The operating program and configuration memory shall be stored in non-volatile memory and shall not rely on batteries for retention. The FACP shall incorporate separate microprocessors for signalling loop control and central operation.

The FACP shall provide a user interface from which; controls can be operated, manual operations can be carried out, indications are audible and/or visible and system information can be obtained. It shall also be capable of unambiguously indicating the following functional conditions: Quiescent condition, fire alarm condition, fault warning condition and disablement condition. Furthermore, the fire alarm condition shall always be capable of clearly being indicated without any prior manual intervention at the FACP.

The FACP shall be easy to configure all basic operating characteristics and variables through the user interface on the FACP to satisfy the detection zone and output mapping of the premises. A PC Tool operating under the Windows ™ operating system shall also be available to fully program the panel.

The FACP shall support up to 126/127 Devices (Apollo/Hochiki) or 240 Devices for AV or 254 Devices for Nittan on the signalling loop. The FACP shall fully support the sub-addressing capabilities of the relevant input and output devices.

The FACP shall contain one, one to two, or one to four signalling loop drivers depending on the system design requirements. Each signalling loop shall be capable of supplying at least 500mA of power for loop-based sounders or other output devices. The Fire Alarm Control Panel software and hardware loop driver, without modification, shall be compatible with the analogue detection, call points, input and output devices available from, at least, the following manufacturers:

Apollo   S90, XP95, Discovery, Xplorer and Xpander ranges

AV   Argus Vega Range

Hochiki   Enhanced System Protocol 'ESP' Range

Nittan   Evolution Range

The FACP shall fully support the sub-addressing capabilities of loop devices incorporating this feature and any radio based devices within each protocol.

The FACP must provide system integrity and is to be approved to EN54 Part 13 thus ensuring:-

- Enhanced monitoring of ALL circuits including Sounder circuits and loop circuits

- The FACP can detect a fault which may not be visible until an alarm condition

- Can be selected / programmed for specified current consumption for individual circuits

The FACP shall provide 2 or 4 monitored outputs to fire alarm devices, each rated at 1-ampere. An auxiliary supply output shall also be available to provide power for internal option modules.

The FACP shall provide a diagnostic monitoring feature for all signalling loop, alarm device output and auxiliary supply output circuits to monitor voltage, current load, etc. This information shall be documented and available to view at Level 2. In addition, diagnostic monitoring of the signalling loop return current pulses shall be provided at Level 3.

The FACP shall provide an internal 'Scope' for all signalling loop devices. This information shall be captured and available to view at Level 3 menu only.

The FACP shall incorporate a real-time clock for time stamping of events in the event history log and for scheduling of time related functions.

It shall be possible to install a network communications card to allow connection of up to 200 control panels, remote terminals, mimic displays or other peripheral devices. The network shall offer peer-to-peer operation and have a fault tolerant capability. The time to propagate a fire alarm condition across the network shall not exceed 3 seconds.

A single FACP shall have the capability for configuration and operation of 200 fire alarm zones. In a network system, the overall system shall have the capability for up to 2000 zones.

It shall be possible to adjust sensitivity settings for all detection devices based on a time clock. It shall be possible to select device modes for both active and inactive time periods for multi-sensor detectors.

It shall be possible to configure the panel for Stage 1/ Stage 2 Investigation operation based on a time clock. It shall be possible to configure the devices used for investigation on an individual basis. This shall also include call point type devices.

It shall be possible to configure up to 10 independent time clocks. Each time clock shall be capable of up to two active time periods for each day of the week.

All fault conditions (except CPU System Fault) shall be non-latching.

All input devices shall have the capability of being latching or non-latching (except when configured for Fire Alarm input).

It shall be possible to configure complex cause and effect operation for phased evacuation and output control operations at the panel. It shall be possible to assign each output device to one of 200 output groups, each output group operation being programmable as to response on a zone by zone basis for fire, double knock fire, pre-alarm, fault, enablement or disablement conditions and shall be capable of up to 40 programmable ringing styles with programmable delays, pulsing tones and selectable pre-programmed tones.

It shall be possible to connect optional equipment in accordance with the requirements of EN54-2 Standardised I/O such as mimic panels and remote control terminals.

Panel Construction

The Fire Alarm Control Panel shall be of metal construction. It shall be capable of surface or semi-flush mounting. Wiring terminations are to be situated towards the top of the unit.

The housing shall meet IP30 minimum ingress protection classification finished in RAL 7035. It shall not be possible to open the enclosure without a key or special tool.

The FACP should have variants of small, medium, large and deep enclosures with the facility to also provide rack mounted options.

Panel Indications

The Fire Alarm Control Panel shall be equipped with a white backlit display (240x64 pixels) as the primary indicator giving at least 6-lines of information. The display shall illuminate upon any event (excluding mains failure) or button press. The display must provide an energy efficient software adjustment and be able to be dimmed and provide the option of giving the facility of 'More Alarms'.

The primary display shall be simultaneously capable of indicating the presence of Fire Alarms, Faults, Disablements and Tests in accordance with the requirements of EN54-2.

In addition, the following minimum LED indicators shall be provided in accordance with the requirements of EN54-2:

Power On	Green
Fire Alarm	Red
Fault	Yellow
Disabled	Yellow
Test	Yellow
Fire Routing Activated	Yellow
Fire Routing Fault	Yellow
Fire Routing Disabled	Yellow
Pre-Alarm	Yellow
Fire protection Activated	Red
Sounders Silenced	Yellow
Sounders Disabled	Yellow
Sounder Fault	Yellow
System Fault	Yellow
Delayed	Yellow

In addition, there shall be five programmable LED Indicators for application use and 4 programmable pushbuttons with associated LED's. Up to 8 operable key switches can be added with ease with the addition of providing text description once the FACP has left the factory. A monitored fault input should be included without the need of adding additional boards.

The FACP must have as standard 20 on-board zone LED's with the addition of adding further LED's (50,100 and 200 LED's). LED's shall be extendable offering both red (fire) and yellow (fault or Disablement) options that can be programmed via the pc tool. Also a dedicated 50 zone LED option should be available with slide-in labels for descriptive purposes. The zone feature can also be provided on a graphical mimic basis if required.

Panel Controls

The Fire Alarm Control Panel shall be provided with the following minimum manual controls:

Mute

Evacuate (Sound Alarms)

Silence

Resound Alarms

Reset

LED Test

More Alarms

Programmable Push buttons (x4)

In addition, the following controls shall be provided for menu operation and programming:

Navigation keys, ←→↑↓

A confirmation key, ✓

A numeric keypad, 0-9, also providing the function for letter / character programming

A cancel key

A menu select key

Networking

The Fire Alarm Control Panel shall be capable of networking up to 32 Nodes on a standard network (fig.1.) and up 200 Network Nodes on a secure network (fig.2.).

A zoning facility to allow the networked system to share up-to 2000 zones giving non-confusing indication and allowing true peer-to-peer cross panel report, control and site-wide cause and effect functionality.

Simply adding and connecting a network card will allow any node/control panel or remote terminal to be networked. All other nodes on the system will be instantly aware of a panel as soon as it is given a valid network node address, allowing additional panels to be added at any time with a minimum amount of reprogramming with the facility to prevent the transmission of fires or faults during commissioning on network systems.

For more complex systems, Windows based PC configuration software (see below) allows sector based programming for Mute, Silence, Resound and Reset control keys as well as investigation delays, group disablement and test instructions. All panels within the same sector will share common controls and each panel or remote terminal can also be programmed to show specific network information on a zonal basis.

For cause and effect, any input device can be programmed to operate any output device on any panel and, to simplify the programming, all the configuration data is contained within one user-friendly network configuration file.
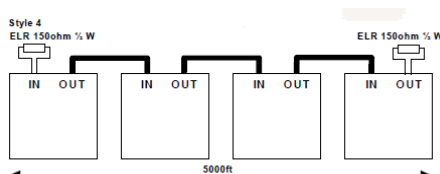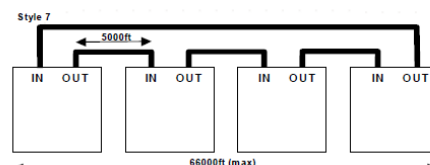

Fig.1.   Fig.2.

False Alarm Management

The fire detection and fire alarm system shall be provided with the necessary features and functions to aid in the reduction of false alarms and to meet the recommendations in BS 5839-1.

The fire detection and fire alarm system shall be capable of three types of false alarm management.

Alarm verification – automatic smoke alarm confirmation

Alarm verification – manual confirmation

Alarm verification – multiple alarms

The control and indicating equipment shall be tested and certified with the following "options with requirements" of EN54-2:1997 +A1:2006.

7.11 Delays to Outputs.

7.12 Dependencies on more than one alarm signal, Types A, B & C.

The fire detection and fire alarm system shall provide the facility to automatically confirm alarms from smoke detectors by means of; further signals from the same or other smoke detector, alternate signals sensing a different fire phenomenon (e.g. heat) from the same or other detector.

Each control and indicating equipment shall be capable of, at least, 200 separate building areas (up to 40,000 across a network) that can be configured to provide individual or group false alarm management. It shall be possible for a building area to coincide with a detection zone, be a part of a detection zone and part or all of more than one detection zone. It shall be possible for one or more detection devices to be assigned to a building area. It shall be possible to define the number of building areas that can be in simultaneous alarm verification mode across a network of panels.

The fire detection and alarm system shall provide the capability for the connection of an alarm acknowledge function located locally for each individual building area. This is to be used to provide the occupants of the building area with the facility to acknowledge potential false alarms without affecting occupants in other building areas. This local acknowledge function shall take the form of a loop powered, single gang, analogue addressable device providing both indication (visible and programmable audible) and control (acknowledge push button) functions. It shall be possible to configure the system such that the acknowledgement function can silence local, loop powered, alarm sounders.

The fire detection and fire alarm system shall provide the facility to manually, after an investigation, confirm or cancel a fire alarm signal.

The fire detection and fire alarm system shall provide the facility to confirm, by means of multiple fire alarm signals, before activation of safety critical equipment.

Software

A PC Configuration Tool shall be available for configuration of the FACP and for retention of configuration data.

The PC Configuration Tool shall be graphically based and operate under Windows ™ operating systems, ME, XP, Vista and Windows 7.

Software features shall include:-

Configuration Tool

- Permanent/timed disablements
- Re-sound buzzer daily
- Timeout from Level 2 to Level 1
- 5000 memory event log
- Investigation delays
- Disable/enable logging
- Disable by Purpose
- Disable across the network
- Sector programming
- 1500 allowable logic lines
- Virtual Terminal

Logo Tool

- Bitmap format for customer/end-user branding

Service Tool

- Download device information
- View drift status of detectors
- Provide a device history of every device – last activated, tested, disables, when created
- Extract event log information
- Be able to group data
- Provide Use defined reports

Configuration

It shall be possible to configure ALL basic configuration parameters and settings from either the FACP front panel or from the PC Configuration Tool. Both serial and USB connections from the FACP to the PC are to be available. It shall be permitted to configure enhanced / extended features and functions from the PC Configuration Tool only.

Remote Dial-up

Software shall also be available to provide full dial-up capability to the FACP using a modem. This software package should enable remote access to interrogate and inspect the operation of the FACP, retrieve panel status and historic event log.

Remote Access

It shall be possible to remotely access the Fire Alarm System via an internet based program. This facility should:-

Be configurable over the internet

Password protected

Provide event notification via e-mail

Require no propriety software

Be able to gather real time information from the fire network

Be able to enable/disable devices/zones, reset the network, silence the network, mute the network and re-sound sounders on the network.

Remote Terminals

It shall be possible to provide remote access to monitor (Remote Display Terminal) or monitor / control (Remote Control Terminal) operation of the installation.

The Remote Control Terminal shall provide the same display, indication and buttons as the FACP.

The Remote Display Terminal shall provide the same display, indication and buttons as the FACP except for the control buttons.

Remote Control shall provide the capability to silence alarms, resound alarms, evacuate and reset the system. In addition, it shall be possible to remotely enable or disable zones and points and remotely configure a zone walk test and include any programmable push buttons that may be operable on the FACP.

Power Supplies

All power supplies (integral to the fire alarm control panel or remote) shall be certified to EN54-4 and shall be capable of supporting 72 –hour standby requirements. The FACP shall have a built-in or remote battery temperature sensor.

All power supplies shall be capable of operating from a main supply of 200-240VAC 50/60Hz.

Additional System Components

The following additional system components shall be provided as optional equipment.

It shall be possible to connect the following standardised I/O equipment to the network:

Remote Control Terminals:	providing features and functions described in EN54 Part 2 clause 11

Remote Display Terminals:	providing features and functions described in EN54 Part 2 clause 11

Mimic Module:	providing a bespoke solution for graphical presentation, using LED Indicators, to indicate either zone based fires or output groups activated

Graphics Interface Module:	providing a gateway to 3rd party graphics packages with full reporting and control features and functions. It shall be possible to install multiple graphics gateways in the network and have the facility to have IP based workstations.

Touch Screen Terminals:	providing features and functions described in EN54 Part 2 clause 11, from a 10" touch screen unit that provides a graphical display and options for site schematics, zone maps and the ability for promotional / informational slide-shows.

It shall be possible to connect the following modules to the FACP for locally based input and output extensions:

Input and Output Module:	providing 16 inputs and 48 outputs connected by the FACP internal peripheral bus
Printer:	providing the capability to select and automatically print fire, alarm, fault and test events and the capability to manually print the historic log. The printer arrangement shall be such that it is not required to open the enclosure to change the paper roll. The printer shall not use replaceable ink ribbons or cartridges.
Integral Modem:	providing remote connection to the FACP.
Zone Monitoring:	Peripheral device that can monitor up to 8 conventional zones
General Routing Interface:	providing routing outputs in compliance with EN54-2clauses 7.9, 7.10 and 8.9.
ESPA Interface:	providing a serial data interface with the industry standard ESPA 4.4.4 protocol.

It shall be possible to connect the following modules for locally based input and output extensions:

Programmable Sounders:	extending the FACP on-board circuits in variants of 4 up to a maximum of 64 additional sounder circuits per multi-loop.
Programmable Relays:	providing 4 individual programmable relay output circuits per card with up to a maximum of 16 cards per multi-loop panel.
Sounder Splitter:	providing 4 additional outputs to fire alarm devices from one of the panel outputs. Operation of all additional outputs is to follow the programmed operation of the selected panel output.
Sounder Booster:	providing a 4-ampere output to fire alarm devices from one of the panel outputs. Operation is to follow the programmed operation of the selected panel output.

Service Tool

The facility shall be provided to extract information from the FACP to a PC Based Service Tool. The service tool must:-

- Download device information

- View drift status of detectors

- Provide a device history of every device – last activated, tested, disables, when created

- Extract event log information

- Be able to group data

- Provide Use defined reports

Maintenance

Maintenance features are to be included within each FACP. Each FACP should:-

- Have an in-built scope function for each loop
- Provide device history for every device
- Be able to view software versions of all pcb's on the control panel
- Provide Cross-network viewing of each panel's status
- View battery charger and temperature
- Provide drift and warning states for the devices

Apollo Detectors and Devices

The system shall be compatible with, and fully capable of using all of the features of, the following Apollo detection, alarm indicating and other devices.

(Complete or omit this section as required)

AV Detectors and Devices

The system shall be compatible with, and fully capable of using all of the features of, the following Argus Vega detection, alarm indicating and other devices.

(Complete or omit this section as required)

Hochiki ESP Detectors and Devices

The system shall be compatible with, and fully capable of using all of the features of, the following Hochiki ESP detection, alarm indicating and other devices.

(Complete or omit this section as required)

Nittan Detectors and Devices

The system shall be compatible with, and fully capable of using all of the features of, the following Nittan Evolution detection, alarm indicating and other devices.

(Complete or omit this section as required)

Advanced

Made in
the UK

A **Halma** company