FC460
Detectors

Product Application & Design Information

FC-D-A

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Contents

1 About this Guide

This guide is aimed at suitably qualified technicians experienced in the design and specification of fire detection and alarm systems, who have also received training.

1.1 What this Guide Covers

This guide is for use when designing a fire detection system using addressable detectors, or replacing addressable detectors in an existing system.

Guidance notes cover the features of the detectors, pointers to information on detector choice, and detector siting.

This guide is an overall guide to the FC460 addressable detectors.

This guide only includes information common to all FC460 detectors. There are more specific leaflets available covering particular types of FC460 detector. These specific leaflets include ordering information.

1.2 What this Guide does not Cover

This guide does not provide installation information. This is because the detectors simply dock to detector bases, and installation details are provided for the bases.

Operating modes of the detectors are set using system application and configuration tools, so only a brief overview is provided in this guide.

This guide does not provide information where this is covered by local regulations. For example specific detector siting stipulations are expected to be covered by local regulations, so they are excluded from the guide (however brief guidelines are provided).

Reference Guides

There are a number of system level guides available for download from the fire-class.co.uk website. These support the design, installation and use of fire alarm systems.

2 Introduction to the Detectors

The detectors are for use in an addressable system which uses the FireClass Digital Protocol, where a number of detectors are placed in key areas around the building.

The function of the detector is simply to quantify environmental variables and provide the resulting numerical value to the fire alarm control panel.

The fire alarm control panel processes the detector values and assesses whether an alarm needs to be issued.

Depending on the detector variant, the environmental variables monitored will be either one or a combination of the following:

- Temperature.
- Smoke density.
- Concentration of Carbon Monoxide (CO).

Figure 1 shows a typical detector and highlights some of the features that are discussed later in the document.

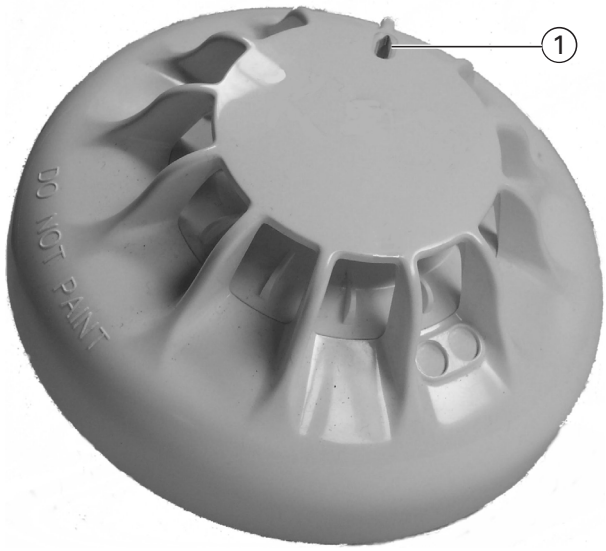

Fig. 1: Detector Communications
1 – Status Indicator

2.1 Detection Capability Suffixes

The capabilities of detectors are indicated with a suffix to the detector number. So for example the FC460H is a heat only detector, while the FC460P is an optical smoke detector. These suffixes are shown in Table 1.

Suffix	Heat	Smoke	CO
PH	✓	✓(optical)	
P		✓(optical)	
H	✓		
PC	✓	✓(optical)	✓

Table 1: Suffixes

2.2 Replacement Detector Compatibility

The FC460 series detectors are compatible with the FC400 series detectors.

Reference Guides
Refer to the detector base product information document for compatible bases and installation/mounting of bases.

2.3 Functionality

Table 2 shows the types of functionality that are present in the various detectors.

Functionality	Detector Types 460 Series			
	PH	P	H	PC
Self Monitoring	✓	✓	✓	✓
Self-Test	✓	✓	✓	✓
Status Indicator	✓	✓	✓	✓
Remote LED	✓	✓	✓	✓
Functional Base Compatibility	✓	✓	✓	✓
Threshold Compensation	✓	✓		✓

Table 2: Functionality of the Detectors

2.3.1 Self Monitoring

"Self Monitoring" refers to the characteristics or design features of the detector that allow faults to be detected. For the various sensors these are as follows:

- For the heat (temperature) sensor there is a normal output level to be expected, around "ambient" temperature.

- For the CO sensor, the integrity of the sensor cell is constantly checked.
- For the optical (smoke) sensors, the optical chamber is periodically stimulated.

2.3.2 Self Testing

The detectors support a self-test feature.

For the self test, fire conditions are artificially simulated within the detector. The detecting sensors will then react as if there were an actual fire.

2.3.3 Status Indicator

This indicates as follows:

- Yellow flashing indicates a detector fault. However, this behaviour can be enabled/disabled as per the settings in the panel configuration software.
- Red flashing indicates normal operation (flashes on detector poll). However, this behaviour can be enabled/disabled as per the settings in the panel configuration software.
- Red continuous indicates detector in alarm.

2.3.4 Remote LED

The detectors are capable of driving a Remote LED.

2.3.5 Functional Base Compatibility

The detectors are compatible with the range of sounder bases.

2.3.6 Threshold Compensation

The detectors support the ability to compensate for the affects of contamination due to dust and dirt. This prevents an increase in the likelihood of false alarms, extending the operational life of the detector. This function applies only to those detectors with a smoke sensor.

2.3.7 PC Modes of operation

The PC detectors can be programmed as a single point detector or as a multi I/O detector with three addresses.

As a single point detector

- Mode 0 - Universal mode - is a multi-criteria sensor designed to speedily detect a varying range of fire conditions (designed to EN 54: Part 7).
- Mode 1-Resilient Mode - High false alarm immunity multi-criteria sensor that will minimise false alarms from non-fire sources, whilst retaining the ability to detect a wide range of fire conditions.
- Mode 2- A1R (heat).
- Mode 3 - HPO (smoke) normal sensitivity.
- Mode 4 - CCO (fire gas) normal sensitivity.
- Mode 5 - Carbon Monoxide (toxic gas).
- Mode 6 - Car park monitoring, used for air quality control purposes only, (not currently available in the controller).

2.3.8 460PC unique fire detection modes

Universal

In this detection mode the optical sensitivity is set to a very low value and increased in the presence of CO. It is also temperature enhanced and is supported with an A2S heat detection element. In the absence of any visible smoke, the CO detector is capable of raising an alarm alone at around 35ppm. This covers slow smouldering fires and fires with little convection, where optical smoke level has been known to remain very low/ barely above background for a few hours.

Resilient

The detection mode operates in similar fashion to universal setting with all parameters defined specifically to provide high false alarm immunity and supported with an AIR heat detection element. In the absence of any visible smoke, the CO detector is capable of raising alarm alone at the same limit of 80ppm.

2.4 Address Programming

The detectors are addressed by using the FC490ST Loop Service Tool.

Reference Documents

For further information on how to program the address into the detectors, refer to the FC490ST Loop Service Tool User Instructions.

2.5 Approvals

The detectors comply with the following standards:

- Construction Products Regulation (CPR), fulfilling the requirements of:
  - EN 54-5:2017+A1:2018 - Heat Detectors
  - EN 54-7:2018 - Smoke Detectors
- CEA 4021 (2003) - MultiSensor Detectors
- Product family standard EN 50130-4 in respect of Conducted Disturbances, Radiated Immunity, Electrostatic Discharge, Fast Transients and Slow High Energy
- EN 61000-6-3 for Emissions
- Rated to IP44 in accordance with BS EN 60529:1992 + A2:2013 using 4B-DHM Deckhead Mount, SKU 517.050.051

3 Detector Mode Selection

3.1 Selection Guidelines

Your choice of detector will be determined by the demands of the application.

Table 3 is for guidelines only and specific situations are likely to require variations on the suggested detector types. Real situations may require detector combinations to cover all likely risks.

Tables 3 and 4 are for guidelines only and specific situations are likely to require variations on the suggested detector types. Customer knowledge of relative impact of false alarm vs undetected fires should be considered.

In Tables 3 and 4, the Night and Day columns represent low false alarm risk and high false alarm risk. Although this usually follows a day/ night pattern, it may be configured for any time. For example the car deck of a ferry would be configured for Day during vehicle loading and Night once all the passengers had left the car deck, thus achieving optimum protection for that area.

Environment	Very clean and dry			Benign moderately clean, Regulated temperature			Dirty-smoky during the day			Dusty and/or humid			Hot and smoky when in use			Open areas		
For example	Clean room, Data processing suite			Offices, Hospitals, Light industrial, Residential, Passenger cabin			Warehouse with diesel fork-lifts etc. Heavy industrial ferry (car deck)			Livestock pen mill, Laundry, Changing room			Kitchen, Engine room, Test beds			Atrium, Theatre, Hangar, Oil rigs, Turbine hall		
	Type	Mode		Type	Mode		Type	Mode		Type	Mode		Type	Mode		Type	Mode	
Fire loading		Night	Day		Night	Day		Night	Day		Night	Day		Night	Day		Night	Day
Electronic equipment Electrical swithgear Electric motors Cable conduit	**PH.** P	**E(H)** A(H)	**B(H)** A(H)	**PH.** P	**B(H)** A(N)	**B(N)** A(N)	PH.	E(N)	A(H)	Heat	D	F	Heat.	G	X	PH.	B(H)	B(H)+X
Fabrics, Clothes Soft furnishings Paper, Cardboard Plastic foams Animal bedding Wood shavings etc	PH.	B(H)	A(N)	PH.	B(H)	A(N)	PH.	E(N)	A(L)	PH.	B(L)	A(L)	Heat	CR	X	PH.	B(H)	B(H)+X
Flammable liquids Plants solvents Flammable glasses Unstable chemicals	**PH.** P	**E(H)** A(H)	**E(H)** A(H)	**PH.** P	**E(H)** A(N)	**E(N)** A(N)	**PH** Heat	E(N)	D	**PH** Heat	**B(L)** D	**A(L)** F	Heat	D	G	PH.	B(H)	B(H)+X
Food stuffs General organic waste Animal fodder Wooden structures Solid fuels	PH.	E(H)	E(N)	**PH.** P	**E(N)** A(N)	**E(N)** A(N)	**PH.** Heat	**E(N)** D	**A(L)** F	**P** Heat	**A(L)** F	**A(L)** F	Heat	D	G	PH.	B(H)	B(H)+X
Plastic Chemicals Machinery Building materials Unknown contents	PH.	E(H)	E(N)	**PH.** P Heat	**E(H)** A(N) D	**E(N)** A(N) D	**PH.** P Heat	**B(N)** A(L) D	**E(L)** A(L) D	**P** Heat	**A(L)** D	**A(L)** F	Heat	D	G	PH.	B(H)	B(H)+X

Table 3: Variations on Suggested Detector Types
A=Optical, B=HPO, C=Optical and Fixed Heat 60C (EN54 A2S), D = Heat Rate of Rise (EN54 A1R) /Normal Ambient RoR (EN54A 1R)
E = HPO & Fixed Heat 60C (EN54 A2S) F = Fixed Heat 60C (EN54 A2S), G = High Ambient RoR (EN54 CR), X = Callpoint protection
(H) = High sensitivity, (N) = Normal sensitivity, (L) = Low sensitivity
Bold text indicates most likely detector/mode to meet user's requirements. Letters in brackets represent recommended sensitivity settings.

Environment	Very clean and dry		Benign moderately clean, Regulated temperature		Dirty-smoky during the day		Dusty and/or humid		Hot and smoky when in use		Open areas	
For example	Clean room, Data processing suite		Offices, Hospitals, Light industrial, Residential, Passenger cabin		Warehouse with diesel fork-lifts etc. Heavy industrial ferry (car deck)		Livestock pen mill, Laundry, Changing room		Kitchen, Engine room, Test beds		Atrium, Theatre, Hangar, Oil rigs, Turbine hall	
Fire loading	Mode		Mode		Mode		Mode		Mode		Mode	
	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day
Electronic equipment Electrical switchgear Electric motors Cable conduit	**0** 1	**0** 1	**0** 1	**0** 1	**0** 1	**1** 0	**0** 1	**1** 0	**1** 0	**1** 0	**0** 1	**0** 1
Fabrics, clothes Soft furnishings Paper, cardboard Plastic foams Animal bedding Wood shavings etc	**0** 1	**0** 1	**0** 1	**0** 1	**0** 1	**1** 0	**0** 1	**1** 0	**1**	**1**	**0** 1	**0** 1
Flammable liquids Plants Solvents Flammable glasses Unstable chemicals	**0** 1	**0** 1	**0** 1	**0** 1	**1**	**1**	**1**	**1**	**1**	**1**	**0** 1	**0** 1
Food stuffs General organic waste Animal fodder Wooden structures Solid fuels	**0** 1	**1** 0	**0** 1	**1** 0	**0** 1	**1** 0	**0** 1	**1** 0	**1**	**1**	**0** 1	**0** 1
Plastic Chemicals Machinery Building materials Unknown contents	**0** 1	**1** 0	**0** 1	**1** 0	**0** 1	**1** 0	**0** 1	**1** 0	**1**	**1**	**0** 1	**0** 1

Table 4: Type PC Variants; Bold text indicates most likely detector/mode to meet user's requirements.
Mode 0 - Universal
Mode 1 - High Resilience

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Further information about FIRECLASS can be found on the Internet at www.fireclass.net

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