

830/850 Detectors

**Product Application &
Design Information**

MZX-D-A

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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 830/850 addressable detectors.

This guide only includes information common to all 830/850 detectors. There are more specific leaflets available covering particular types of 830/850 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 TycoEMEA web site. 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 Tyco MX 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.

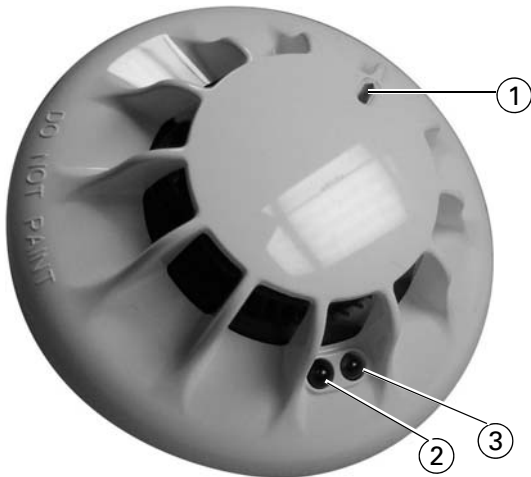


Fig. 1: Detector Communications
 1–Status Indicator
 2–Infrared transmitter
 3–Infrared receiver



Detector Position

Ensure that the detector is fitted such that, it has not been directly exposed to the sunlight.

2.1 Detection Capability Suffixes

The capabilities of detectors are indicated with a suffix to the detector number. So for example the 850H is a heat only detector, while the 850OP 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 830/850 series detectors are backwards compatible with the 800 series detectors.



Reference Guides

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

Functionality	Detector Types							
	830 Series				850 Series			
	PH	P	H	PC	PH	P	H	PC
Self Monitoring	✓	✓	✓	✓	✓	✓	✓	✓
Self-Test	✓	✓	✓	✓	✓	✓	✓	✓
Status Indicator	✓	✓	✓	✓	✓	✓	✓	✓
Remote LED	✓	✓	✓	✓	✓	✓	✓	✓
Functional Base Compatibility	✓	✓	✓	✓	✓	✓	✓	✓
Short-Circuit Line Isolator					✓	✓	✓	✓

Table 2: Functionality of the Detectors

Functionality	Detector Types							
	830 Series				850 Series			
	PH	P	H	PC	PH	P	H	PC
Remote Programming	✓	✓	✓	✓	✓	✓	✓	✓
Loop Continuity (Base)					✓	✓	✓	✓
CO Toxic Gas Mode				✓				✓
Threshold Compensation	✓	✓		✓	✓	✓		✓
Fast Logic	✓	✓			✓	✓		

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 or isolation. 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 and relay bases. Table 3 summarizes the bases that are compatible with the 830 and 850 series of detectors.

	830 Series	850 Series
Standard Base 4B and 5B	Fully compatible	<ul style="list-style-type: none"> ■ Detector line isolator will not function. ■ Recommend changing to a 4B-C continuity base.
Isolator Base 4BI and 5BI	Fully compatible	<ul style="list-style-type: none"> ■ Detector line isolator will not function. ■ Base isolator will continue to function. ■ Recommend changing to a 4B-C continuity base.

Table 3: Functional Base Compatibility

2.3.6 Short-Circuit Line Isolator

A built-in short-circuit line isolator incorporated into the 850 series devices means that when a single short circuit fault occurs on a loop, all the detectors will continue to operate.

The 830 series detectors can be used with an isolator base to provide protection against short circuit faults.

2.3.7 Remote Programming

The detectors can be remotely addressed via an integral bi-directional infrared transceiver, which communicates with the 850EMT. Alternatively, the detectors can be plugged into the 850 EMT to be addressed.



Reference Documents

For further information on how to program the address into the detectors, refer to the 850EEMT User Manual.

2.3.8 Loop Continuity

When a 850 detector is removed from its base, loop continuity is maintained (as a function of the base).

2.3.9 CO Toxic Gas Mode

The PC variant detectors can also be used to guard against the toxic effects of CO. There is a dedicated mode for this. A CO sensor can only be used for toxic gas or fire detection, not both simultaneously.

2.3.10 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.

2.3.11 Fast Logic

The detectors support Fastlogic algorithms, which further improve immunity to false alarms.

2.4 Approvals

The detectors comply with the following standards:

- Construction Products Directive (CPD), fulfilling the requirements of:
 - EN 54-5:2000 + A1:2002 - Heat Detectors
 - EN 54-7:2000 + A1:2002 + A2:2006 - Smoke Detectors
 - EN 54-17:2005 - Short-Circuit Isolators
- CEA 4021 (2003) - MultiSensor Detectors
- VdS 2806 (1999) - Fire Gas 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
- SIL2 Certified

3 Detector Mode Selection

3.1 Selection Guidelines

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

Table 4 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. If Fastlogic operation is selected for optical detectors the same table applies. The chief difference being a higher resistance to false alarms, and slower response to aerosol test gas.

Tables 4 and 5 are for guidelines only and specific situations are likely to require variations on the suggested detec-

tor types. Customer knowledge of relative impact of false alarm vs undetected fires should be considered.

In Tables 4 and 5, 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.

If Fastlogic operation is selected for the optical detectors/ optical detection modes, the same tables apply. The chief difference being a higher resistance to false alarms, and slower response to aerosol test gas.

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	
	Type	Mode	Type	Mode	Type	Mode	Type	Mode	Type	Mode	Type	Mode
For example	Clean room, Data processing suite	Offices, Hospitals, Light industrial, Residential, Passenger cabin	Warehouses with diesel fork-lifts etc. Heavy industrial ferry (car deck)	Livestock pen mill, Laundry, Changing room	Kitchen, Engine room, Test beds	Atrium, Theatre, Hanger, Oil rigs, Turbine hall						
Fire loading	Opt. E+H(H) (H)	Opt. (N) (N)	Opt. (N) (N)	Opt. (N) (N)	Opt. (N) (N)	Opt. (N) (N)	Opt. (N) (N)	Opt. (N) (N)	Opt. (N) (N)	Opt. (N) (N)	Opt. (N) (N)	Opt. (N) (N)
Electronic equipment	E+H(H) (H)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)
Electrical switchgear	E+H(H) (H)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)
Electric motors	E+H(H) (H)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)
Cable conduit	E+H(H) (H)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)
Fabrics, Clothes	E+H(H) (H)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)
Soft furnishings	E+H(H) (H)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)
Paper, Cardboard	E+H(H) (H)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)
Plastic foams	E+H(H) (H)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)
Animal bedding	E+H(H) (H)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)
Wood shavings etc	E+H(H) (H)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)	(N) (N)
Flammable liquids	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)
Plants solvents	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)
Flammable glasses	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)
Unstable chemicals	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)
Food stuffs	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)
General organic waste	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)
Animal fodder	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)
Wooden structures	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)
Solid fuels	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)
Plastic	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)
Chemicals	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)
Machinery	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)
Building materials	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)
Unknown contents	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)	Opt. E+H(H) (H)

Table 4: Variations on Suggested Detector Types

E = Temperature enhanced

E + H = Temperature enhanced and heat detector together

H = Heat only part of combined detector

Opt = Callpoint protection alone
Opt. = Optical
Opt. 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		
	Toxic Gas	Mode		Toxic Gas	Mode		Toxic Gas	Mode		Toxic Gas	Mode		Toxic Gas	Mode		Toxic Gas	Mode	
		Night	Day		Night	Day		Night	Day		Night	Day		Night	Day			
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, Hanger, Oil rigs, Turbine hall												
Fire loading																		
Electronic equipment	N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Electrical switchgear		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Electric motors		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Cable conduit																		
Fabrics, clothes		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Soft furnishings		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Paper, cardboard		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Plastic foams	(3+5)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Animal bedding																		
Wood shavings etc																		
Fammable liquids		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plants Solvents		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Fammable glasses	(3+5)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Unstable chemicals																		
Food stuffs		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
General organic waste	(3+5)	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
Animal fodder		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Wooden structures		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Solid fuels																		
Plastic		0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
Chemicals		1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
Machinery	(3+5)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Building materials		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Unknown contents																		

Table 5: Type PC Variants

Mode 0 - Universal

Mode 1 - High Resilience

Mode 2 - Heat R-o-R

Mode 3 - HPO

Mode 4 - CCO

Mode 5 - Gas

Bold text indicates most likely detector/mode to meet user's requirements.



**Further information about Tyco
can be found on the Internet at
www.tycoemea.com**

Company stamp