801HEx INTRINSICALLY SAFE ADDRESSABLE HEAT DETECTOR PRODUCT APPLICATION & DESIGN INFORMATION

1. INTRODUCTION

The 801HEx Intrinsically Safe Heat Detector forms part of the 800Ex Intrinsically Safe Series of MX Addressable Fire Detectors. The detector plugs into an MUBEx 4" Universal Base or 5B 5" Universal Base.

The detector is designed to transmit, to a remote Minerva MX/ T2000 fire controller, digital signals which represent status of the heat element of the detector.

Software within the controller is used to interpret the returned heat values to raise an alarm or other appropriate response according to the type of detector configured in 'MX CONYS.

The mode of detector may be:

- EN54-5 A1R, rate-of-rise normal ambient
- EN54-5 A2S, fixed 60^{o}C
- EN54-5 CR, rate-of-rise high ambient

Note: The heat detection grades are to EN54-5.

1.1 DAY/NIGHT SWITCHING

Two modes of detector operation are selectable from the list of possible modes as follows:

- 'Normal' mode, ie, night time operation in which the detector will be evaluated most of the time.
- 'Day' mode in which the detector can be switched under certain circumstances, eg, during daytime when the building is occupied with people being able to detect a fire manually. Switching to the 'daytime' mode can be done either by user action (pressing the DAY/ NIGHT switch on the controller), or event or time driven.

2. INTRINSIC SAFETY

The detectors are for use in potentially explosive gas and dust atmospheres (zone 0 gas, zone 20 dust).

The detectors are designed to comply with EN/IEC 60079-0:2006, EN/IEC 60079-11:2007 and EN/IEC61241-11:2006 for Intrinsically Safe apparatus. They are certified:

ATEX code:	**⟨Ex⟩ II 1 GD**
Certificate:	**BAS01ATEX1394X**
Gas/Dust code:	**Ex ia IIC T5**
	Ex iaD 20 T100°C
IECEx Certificate:	**IECEx BAS 07.0063X**

These detectors are designed and manufactured to protect against other hazards as defined in paragraph 1.2.7 of Annex II of the ATEX Directive 94/9/EC.

2.1 DETECTOR USE

The detectors may only be used in conjunction with an IF800Ex Interface Module and a Pepperl+Fuchs KFD0-CS-Ex1.54 galvanic isolator.

2.2 SPECIAL CONDITIONS OF SAFE USE

The apparatus has a plastic enclosure which constitutes a potential electrostatic hazard. The enclosure must be cleaned only with a damp cloth.

3. OPERATING PRINCIPLE

The heat element of the detector uses a single thermistor to produce an output proportional to temperature. Rate of change of temperature is determined by the controller, by using differences between consecutive temperature values returned to the controller.

3.1 CIRCUIT DESCRIPTION

A simplified block schematic of the circuit is given in Fig. 1.

The negative temperature coefficient thermistor produces an analogue output which is fed to an analogue input on the common circuit.

3.2 COMMON CIRCUIT

Refer to Fig. 1.

Communications between the controller and detector uses the Frequency Shift Keying (FSK) method.

The 'Discrimination Circuit' filters the FSK signal from the +ve line voltage and converts it to a digital square wave input for the 'Communications ASIC'.

The 'Communications ASIC' decodes the signal and when its own address is decoded, the analogue inputs received from the heat sensing elements are converted to corresponding digital values. These digital values are then passed to the 'Tx Driver Circuit/Current Sink' which applies them to the +ve line for transmission to the controller.

3.3 WIRING

Loop cabling is connected to base terminals L (-ve) and L1 (+ve).

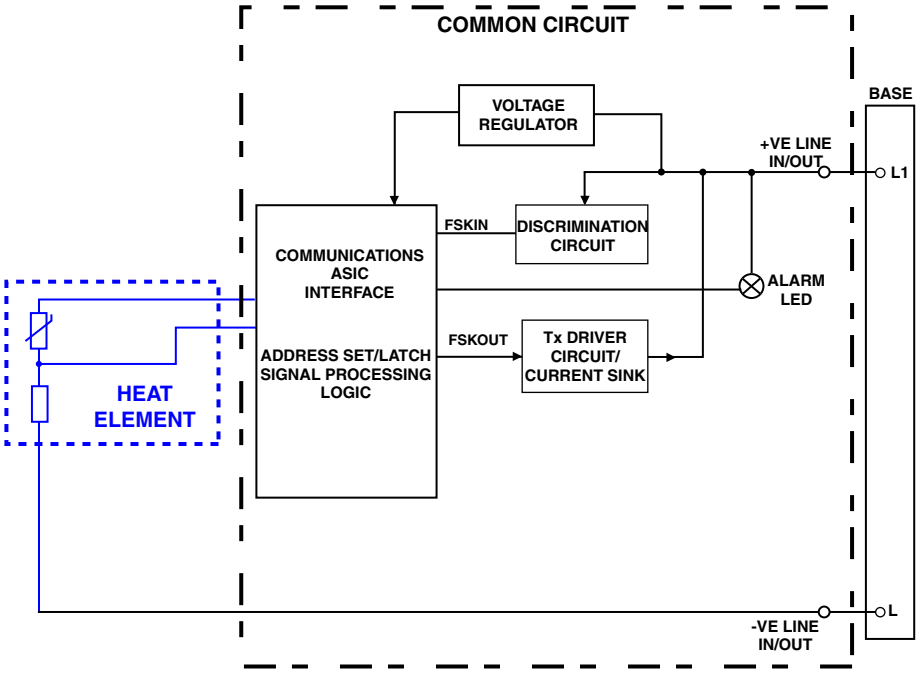

Fig. 1 Simplified Block Schematic Diagram

4. MECHANICAL CONSTRUCTION

The major components of the detector are:

- Body Assembly
- Printed Circuit
- Thermistor
- Light Pipe
- Inner Cover
- Outer Cover

Fig. 2 801HEx Heat Detector & Base

4.1 ASSEMBLY

The body assembly consists of a plastic moulding, which has four embedded detector contacts, that align with contacts in the MUBEx base. The moulding incorporates securing features to retain the detector in the base.

The PCB is soldered to the body contacts. These contacts act as a mechanical fixture during assembly and provide electrical contact between the contacts and the PCB. The PCB is then potted.

The light pipe is slotted into the inner cover, which is then clipped to the body. Finally, the outer cover is clipped to the body.

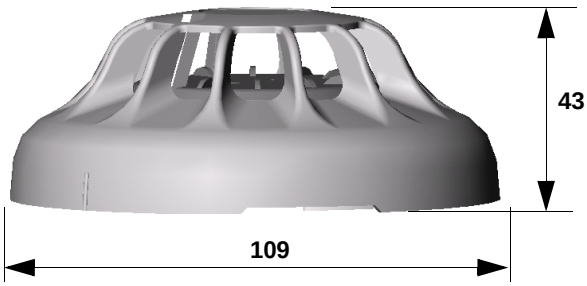

Fig. 3 Overall Dimensions of 801HEx detector

5. TECHNICAL SPECIFICATION

5.1 MECHANICAL

Dimensions

The overall dimensions are shown in Fig. 3 (less base).

Materials

Body, cover, and closure: FR110 'BAYBLEND' flame retardant.

Weight

Detector: 0.118 kg
Detector + Base: 0.184 kg

5.2 ENVIRONMENTAL

Temperature

Storage: -40°C to +70°C
Operating long-term: -25°C to +70°C
short-term: to +90°C

Note: The operating temperatures quoted exceed the ATEX Certification limits

Relative Humidity: 95% (non-condensing)

Shock:
Vibration: EN54 Pt. 5
Impact:

Corrosion: EN54 Pt. 5

The detectors comply with Lloyd's Register Test Specification Number 1 (1996). Environmental Category ENV5.

5.3 ELECTROMAGNETIC COMPATIBILITY

The detector complies with the following:

Product family standard EN50130-4 in respect of Conducted Disturbances, Radiated Immunity, Electrostatic Discharge, Fast Transients and Slow High Energy

EN 61000-6-3 for Emissions

5.4 ELECTRICAL CHARACTERISTICS

The following characteristics (Table 1) apply at 25°C and nominal supply voltage of 22V unless otherwise specified.

Characteristic	Min.	Typ.	Max.	Unit
Loop Voltage	18	-	24	V
Quiescent Current	-	280	330	µA
Alarm Current	-	3.2	3.3	mA

Table 1: Electrical Characteristics

Intrinsic Safety Rating:

Maximum Voltage for safety (U_i): 28V
Maximum Current for Safety (I_i): 93mA
Maximum Power Input (P_i): 650mW
Equivalent Inductance (L_i): 0
Equivalent Capacitance (C_i): 0

5.5 PERFORMANCE CHARACTERITICS

5.5.1 GENERAL

The performance of heat detectors is defined by the harmonised European standard EN54-5.

It must be remembered that the alarm threshold for the 801HEx will be set in the control unit. With the range of Minerva MX Addressable controllers, the 801HEx is able to provide response characteristics complying with the following types:

EN54-5 A1R
EN54-5 A2S
EN54-5 CR

6. DETECTOR IDENTIFICATION

The detector is identified by the logo label colouring as shown in Fig. 4.

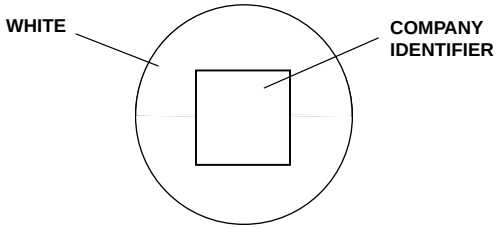

Fig. 4 Detector Identification

7. DETECTOR ADDRESS

The loop address of the detector is held in internal E^2PROM which is programmed either from the controller, or by the 801AP MX Service Tool.

A Servive Tool Dongle (supplied with the EXI800) is required to be fitted to the 'AUX' port to program 800Ex detectors.

Note: The detector must be programmed in the Safe Area when using the MX Service Tool.

8. ADDRESS FLAG

Refer to Fig. 5. The address flag is used to identify the address and zone of the detector. The address flags are supplied in one of two packs (address 1 - 127 or 128 - 255, with a different colour for each loop) and are ordered separately from the detector. The address flag is fitted to the bottom of the detector. When the detector is fitted to the base and turned until fully located, the address flag is then transferred to the base. If the detector is removed from the base, the address flag remains with the base.

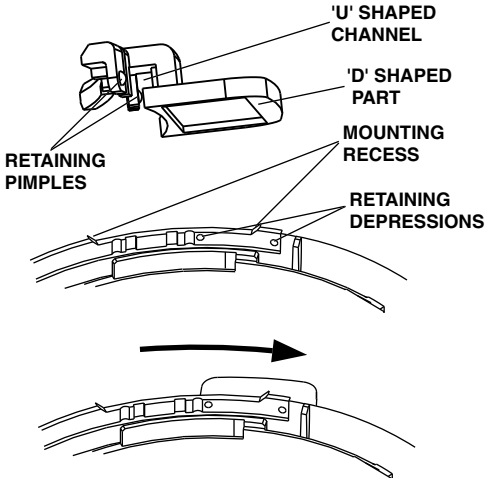

Fig. 5 Fitting Address Flag Carrier

9. ORDERING INFORMATION

801HEx Intrinsically Safe Heat detector:	516.800.532
MUBEx Base for use with Ex Detectors:	517.050.610
5BEx 5" Universal Base:	517.050.023
Address Flag Labels - Loop A (White):	516.800.931
Address Flag Labels - Loop B (Yellow):	516.800.932
Address Flag Labels - Loop C (Purple):	516.800.933
Address Flag Labels - Loop D (Green):	516.800.934
Address Flag Labels - Loop E (Grey)	516.800.935
Address Flag Labels - Loop F (Blue)	516.800.936
Address Flag Labels - Loop G (Orange)	516.800.937
Address Flag Labels - Loop H (Red)	516.800.938

JM/ds

4th September 2008