DOCUMENT CONTROL NUMBER /

MD601Ex/MD611Ex INTRINSICALLY SAFE HEAT DETECTORS

PRODUCT APPLICATION AND DESIGN INFORMATION

1. INTRODUCTION

The MD601Ex/MD611Ex Intrinsically Safe Heat Detectors form part of the M600Ex series of plug in detectors for ceiling mounting. The detector plugs into the Minerva MUBEx base and is intended for two-wire operation with the majority of control equipment currently manufactured by the company.

2. INTRINSIC SAFETY

The detectors are designed to comply with EN 50 014 and EN50 020 for Intrinsically Safe apparatus. They are certified:

ATEX code: ⟨Ex⟩ II 1 G

Cenelec code: EEx ia IIC T5

under ATEX certificate number BAS01ATEX1134X.

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

It is recommended that the detector is used in conjunction with a suitable isolator or shunt diode safety barrier in a certified Intrinsically Safe system, ie, System 601.

3. OPERATING PRINCIPLE

The MD600Ex range of heat detectors includes both Rate-of-Rise and Static (fixed temperature) types. These detect abnormally high rates of rise of temperature and abnormally high temperatures respectively. One of each type is offered within the range to cater for differing applications. The basic operating principles and construction are described below.

3.1 CIRCUIT DESCRIPTION - EN54-5 CLASSIFICATION A1R

A simplified block schematic of the Rate-of-Rise detector is given in Fig. 1.

Two negative temperature coefficient thermistors, Rsens and Rref are used in a bridge configuration as shown. One thermistor, Rsens, is exposed to the air whilst the other, Rref, is thermally lagged inside the detector body. If the temperature of the air around the detector rises quickly, a temperature difference will be established between Rsens and Rref. The values of the bridge components are chosen such that, if a particular rate of change of temperature is sustained for sufficient time, the comparator will change state and the detector will signal an alarm condition.

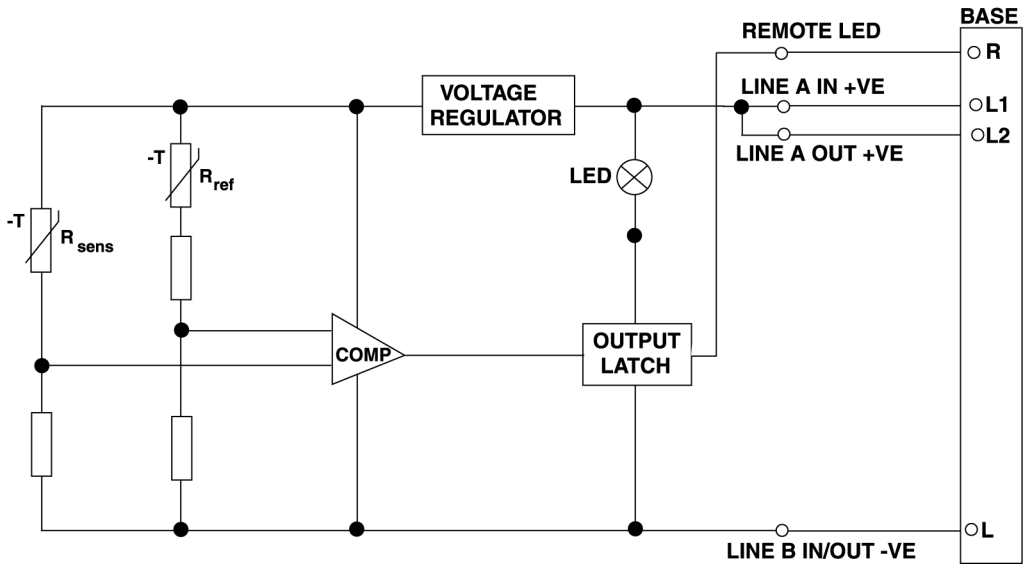

Fig. 1 Simplified Block Schematic Diagram

If the rate of temperature increase is very slow, then the temperatures of the sensing and reference thermistors will be more nearly equal. Under these conditions the bridge components ensure that the comparator changes state when the predetermined fixed temperature is reached.

The Rate-of-Rise detector has a rate sensitivity and fixed (static) temperature setting to suit a particular type of application.

3.2 FIXED TEMPERATURE EN54-5 CLASSIFICATION A1S

The Fixed Temperature detector 'A1S' is similar to the 'A1R' detector except that the reference thermistor is replaced by a fixed resistor. The detector, therefore, responds more slowly to Rate-of-Rise of temperature. The bridge components are chosen instead to cause the comparator to change state when the sensing thermistor reaches a predetermined temperature irrespective of the rate of change.

The static temperature is 54^{o}C to 65^{o}C.

3.3 WIRING

Loop cabling is connected to base terminals as follows:

L	-VE
L1	+VE IN
L2	+VE OUT
R	Remote LED Drive

4. MECHANICAL CONSTRUCTION

The major components of the detector are:

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

4.1 ASSEMBLY

The body assembly consists of a plastic moulding which has four embedded detector contacts aligning 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, then the underside of the PCB is epoxy encapsulated.

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.

4.2 FINAL ASSEMBLY

The sensor housing is fitted to the body assembly. Finally, the outer cover is snapped into position on the body to provide mechanical protection to the otherwise exposed sensing thermistor.

5. TECHNICAL SPECIFICATION

The detectors in the MD600Ex range differ mainly in their response characteristics. Unless otherwise specified, the information given below applies to all types.

5.1 MECHANICAL

Dimensions

The overall dimensions are shown in Fig. 2

Material

Body and cover:	FR110 'BAYBLEND' fire resistant

Weight

Detector:	0.116kg
Detector plus Base:	0.180kg

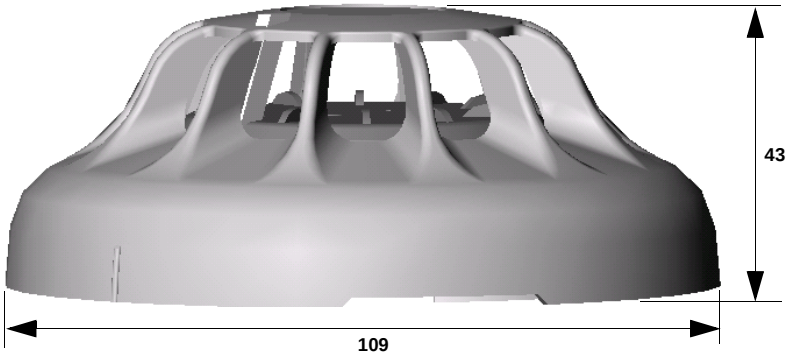

Fig. 2 MD600Ex Series - Overall Dimensions

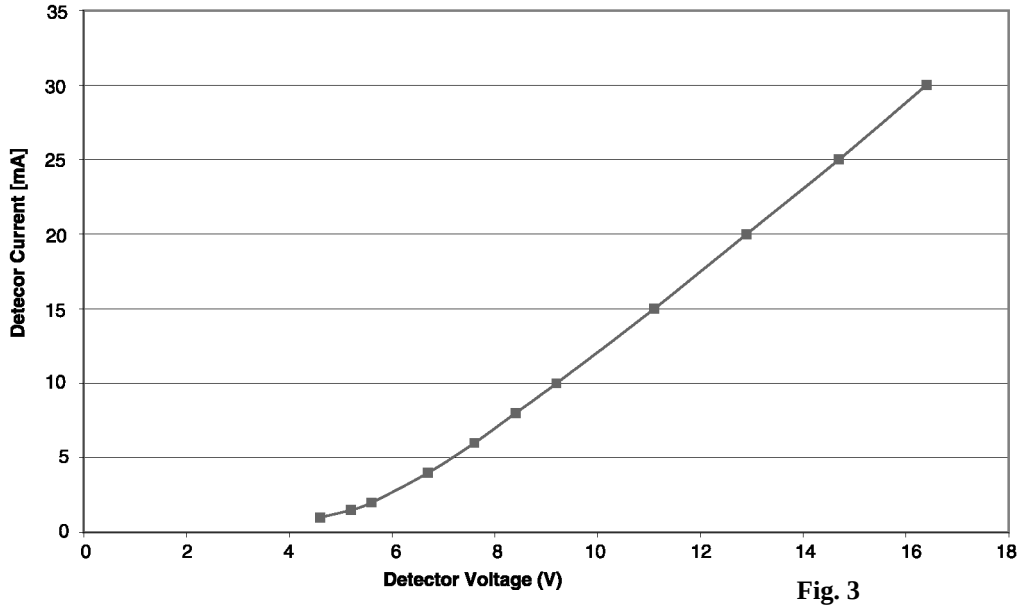

Fig. 3

5.2 ENVIRONMENTAL

Storage Temperature:	-25°C to +80°C
Temperature Long-Term:	-20°C to +70°C
Temperature Short-Term (<3min.):	-40°C to +120°C

Note:

1) ***The operating temperatures quoted exceed the ATEX Certification limits.***

2) *The maximum temperatures quoted are those at which the detector may sustain permanent damage. Maximum ambient temperatures at which detectors may be used, without high false alarm rates, are dependent upon detector type.*

Relative Humidity:	95% non-condensing
Shock:	
Vibration:	
Impact:	To EN54-7
Corrosion:	

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

EN50081-1 for Emissions

5.4 ELECTRICAL CHARACTERISTICS

Table 1 shows the electrical characteristics. These are taken at 25°C with an operating voltage of 20V unless otherwise specified. The alarm load presented to the controller by the detector is shown in Fig. 3.

5.5 PERFORMANCE CHARACTERISTICS

5.5.1 GENERAL

The performance of Heat Detectors is normally specified in two ways. These are:

a) The MD601Ex meets the requirements for the EN54-5 classification for A1R.

b) The MD611Ex meets the EN54-5 classification A1S.

CHARACTERISTIC	MIN.	TYP.	MAX.	UNIT
Operating Voltage (dc)	16		28	V
Quiescent Current	40		45	µA
Switch-on Surge	-	-	200	µA
Stabilisation Time	-	-	1	sec
Alarm Current	See Fig. 3			mA
Holding Current			1	mA
Holding Voltage			5	V
Reset Time	$^1/_2$	1	2	sec
Remote Led Drive	via 3.4k resistor			

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

6. DETECTOR IDENTIFICATION

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

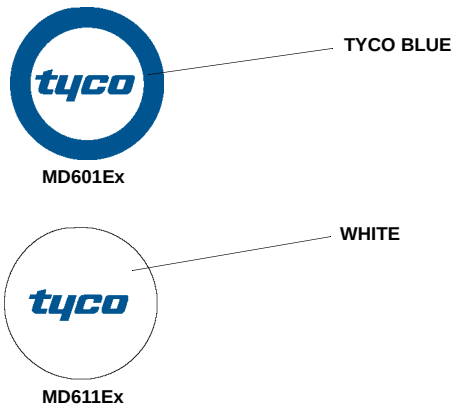

Fig. 4 Detector Identification

7. ORDERING INFORMATION

Heat Detector Type MD601Ex (A1R):	516-052-051.Y
Heat Detector Type MD611Ex (A1S):	516-052-041.Y
MUBEx Base for use with Ex Detectors:	517.050.610

JM/em

2nd July 2002