1. GENERAL & APPLICATION

The 601P Optical Smoke Detector forms part of the Series 600 range of plug in detectors for ceiling mounting. The detector plugs into the Minerva MUB, 5B 5" Universal Base or 5BD 5"

Conventional Continuity Base and is intended for two-wire operation with the majority of control equipment currently manufactured by the company.

The 601P-M is the Marine version of the 601P Optical Smoke Detector.

The 601P operates by sensing the optical scatter from smoke particles generated in a fire. While the optical scatter detector can give good detection performance for the majority of fires, some fast burning fires produce little visible smoke and some produce very black smoke, neither of which are easily detected by the optical scatter detector. (Such fires are represented in EN 54 Part 7 by Wood Crib and Heptane type fires respectively).

The 601P detects visible particles produced in fires by using the light scattering properties of the particles. The detector uses the optical arrangement shown diagrammatically in Fig. 1.

The optical system consists of an infra-red emitter and receiver, so arranged, that their optical axes cross in the sampling volume. The emitter produces a narrow beam of light which is prevented from reaching the receiver by the baffles. When smoke is present in the sampling volume a proportion of the light is scattered, some of which reaches the receiver. For a given type of smoke, the light reaching the photodetector is proportional to the smoke density.

The 601P uses a unique measuring system shown in Fig. 2. Unlike most other optical scatter detectors the 601P does not use vertical chevrons to exclude ambient light, but uses concentric baffles. This approach gives a better signal to noise ratio and allows the detector to be used in its high sensitivity enhanced mode. The chamber is the subject of a patent application.

The emitter (see Fig. 1) is a GaAlAs solid state type operating in the near infra-red at 880nm, while the sensor is a matched silicon photodiode. These devices are held in place by the labyrinth mouldings. The design of the labyrinth is such that the presence of small insects such as thrips should not cause false alarms.
The sampling volume is enclosed within a measuring chamber. The optical design of the chamber provides a very low background signal and is the subject of a patent application.

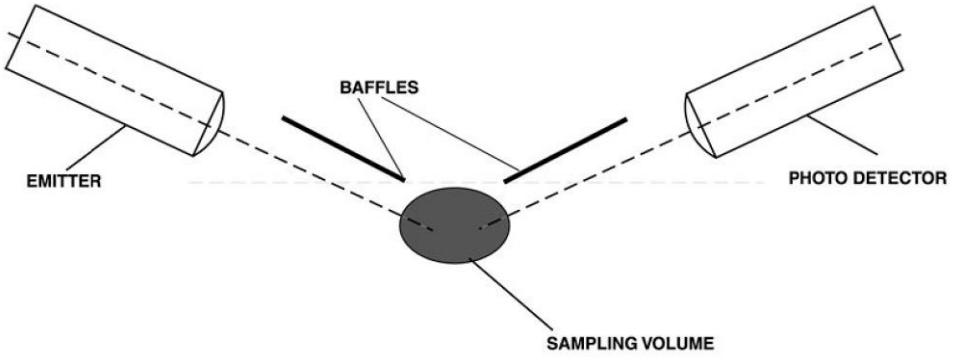


Fig. 1 Optical System Schematic

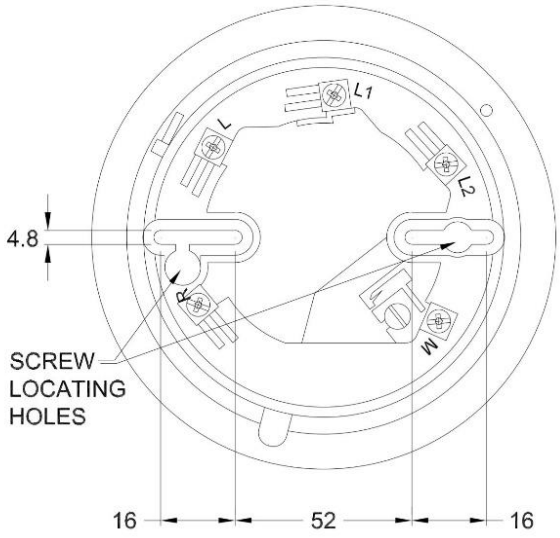
2. INSTALLATION

I. Loop cabling is connected to base terminals as follows: L -VE IN/OUT
II. L1 +VE IN
III. L2 +VE OUT
IV. R Remote LED Drive

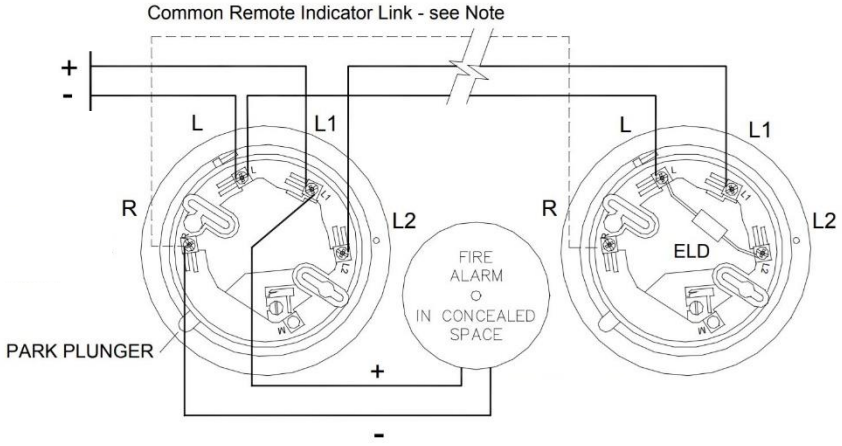
2.1. DETECTOR BASE

The base should be fixed such that the park plunger faces toward the door or trafficable area. This ensures the detector LED will be visible from the direction of entry, in accordance with AS1670.1-2004. The 5B base should be located as shown on the site plan, fixed to a suitable flat surface strong enough to take the weight of the base and detector.

Two pan head screws 4.8mm diameter (max.) are required (not supplied) for fixing the base. The base may be fixed directly to the ceiling, to a conduit box, DHM5B deckhead mount or Euro Mount base. To aid fixing, there are enlarged holes in the base allowing a screw to be started, then the base inserted over the screw head and rotated on the screw to be held loosely on the ceiling. The second screw can then be installed and both screws tightened. The 5B base has four electrical contacts which align with the contacts on the detector once the latter is fitted and fully latched into position.



WIRING—Collective Cables are connected to base terminals L (–In/Out) and L1 (+ In) and L2 (+Out) for Collective systems. A Remote Indicator may be connected between positive L1 (+) and R (–).



5B Base Wiring—Collective Systems

3. TECHNICAL PROPERTIES

3.1. CICUIT OPERATIONS

A simplified block schematic of the detector is given in Fig. 2.
The emitter is subjected to a pulse stream only every 10s in order to reduce the quiescent current. The pulse signal received by the photodiode is fed to a high-gain amplifier. If smoke is present, the pulse signal received varies in proportion to the smoke density.

The amplifier output is fed via an integrator, the output of which is compared to a preset threshold level. Sophisticated synchronous detection techniques are used to reduce the effects of noise and spurious transients.

If the signal amplitude exceeds a threshold level, then the emitter samples the smoke every two seconds. The sample period remains at two seconds if the signal is above the threshold. When the counter has counted three consecutive pulses above the threshold, the output stage is latched into the alarm condition. If however, the amplitude of the second or third pulse is below the threshold, then the pulse period reverts to 10 seconds and the counter resets. The switching of the output stage lights the alarm LED and provides drive for an remote LED indicator.

The critical front end of the circuit is run off a 9.5V regulator to make it independent of supply voltage.

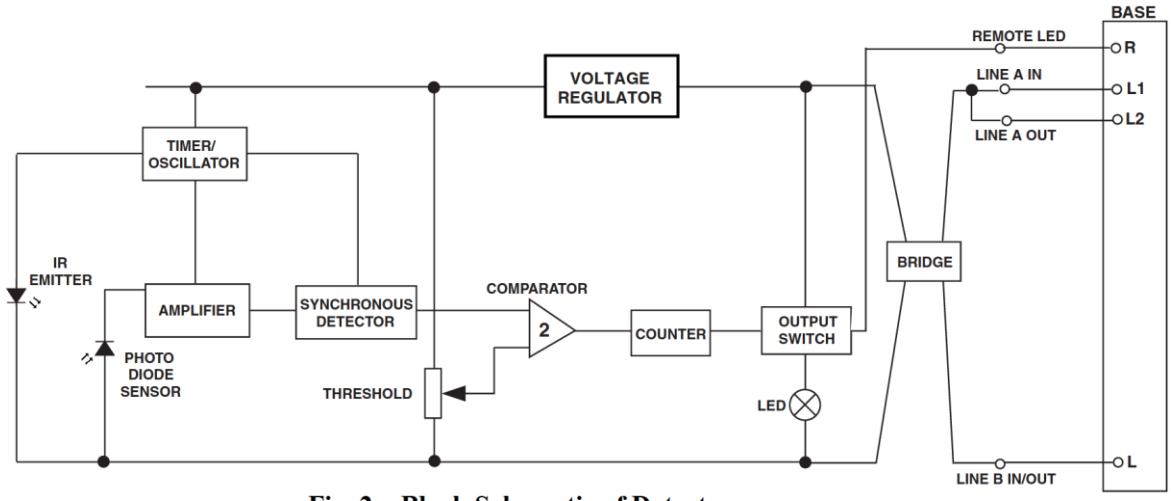


Fig. 2 Block Schematic of Detector

3.2. ELECTRICAL CHARACTERISTICS

The alarm load presented to the controller is shown in Fig. 4.The following characteristics shown in Table 1 are taken at 25oC with a supply voltage of 24V unless otherwise specified.

Characteristics	Min.	Typ.	Max.	Unit
Operating Voltage (d.c.)	10.5	24	33	V
Average Quiescent Current	62	65	70	|1A
Switch-on-Surge	110	130	150	|1A
Stabilisation Time		30		sec
Alarm Current	See Fig. 4			mA
Holding Voltage			2	V
Holding Current			0.4	mA
Reset Time		2		sec
Remote LED drive	Remote LED via 1k			

Table. 1 Electrical Characteristics

3.3. ENVIRONMENTAL

Operating Temperature: -20oC to +70oC (please see note below).

Storage Temperature: -25oC to +80oC

Note: 1) Operation below 0oC is not recommended unless steps are taken to eliminate condensation and hence ice formation on the detector.

Relative Humidity: 95% non-condensing

Shock: To EN54-7

Vibration: To EN54-7

Impact: To EN54-7

Corrosion: To EN54-7

3.4. PERFORMANCE CHARACTERISTICS

The fundamental parameter used to define the sensitivity of an optical smoke detector is the level of smoke which will just produce an alarm under 'ideal' conditions. This parameter, known as the response threshold value, is normally measured in a smoke tunnel and is defined in terms of the obscuration produced by the smoke over a one metre path. The response threshold value is normally given in dB/ m, (or % per m).

Interpretation of response threshold value is somewhat complicated by the fact that the measurement is given in terms of obscuration, whereas the detector works by scattering from the smoke particles. The response threshold (m) value will therefore, depend on the colour of the smoke. Black smokes give less scattering than light smokes for given values of obscuration as shown in Fig. 5.

Sensitivities are invariably specified for 'grey' smokes as produced by typical smouldering fires.
The sensitivity of the 601P is typically 0.21dB/m or 4.8%/m.

The time taken by the fire to reach equilibrium depends on the initial temperature of the fuel. If diesel is pre-heated to a temperature above its flash point, then it behaves the same as n-heptane at 25oC.
The fire test data presented in Section 5.2 refers to fires which have reached their equilibrium condition. The range specified is that obtained with the detector axis horizontal and with the fire on the detector axis.

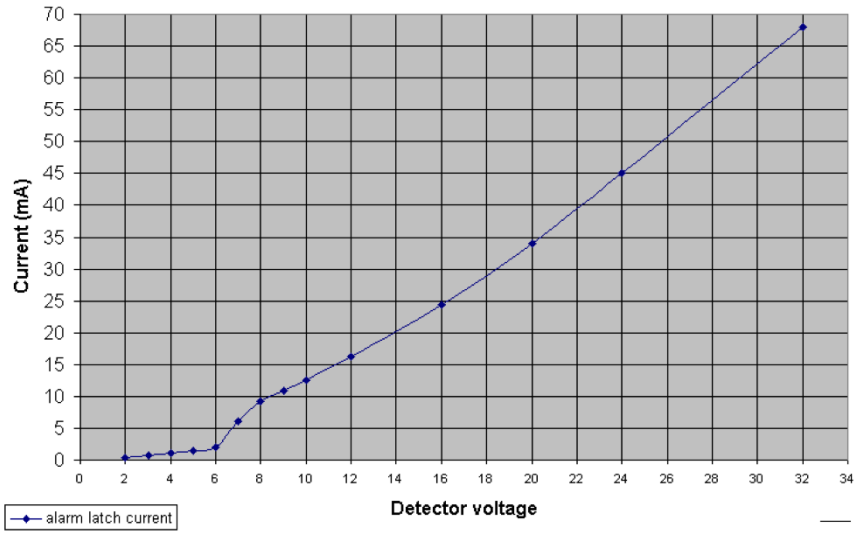


Fig. 4 Alarm Load Presented to the Controller

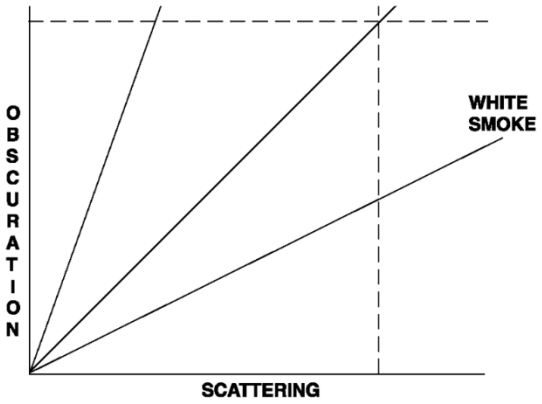


Fig. 5 Response Threshold vs Smoke Colour

3.5. FIRE TEST DATA

The response of an optical scatter detector to a particular 'real' fire will depend, to a large extent, on the colour of the smoke produced in the fire. However, the factors such as smoke entry characteristics, the rate of development of the fire and the thermal lift produced by the fire are also important. In order to evaluate the response under realistic conditions, detectors are subjected to test fires which cover a range of fire types. These tests are defined in EN54 Pt 7. The 601P passes the following Fire Tests:

4. MAINTANANCE

EVERY 3 MONTHS

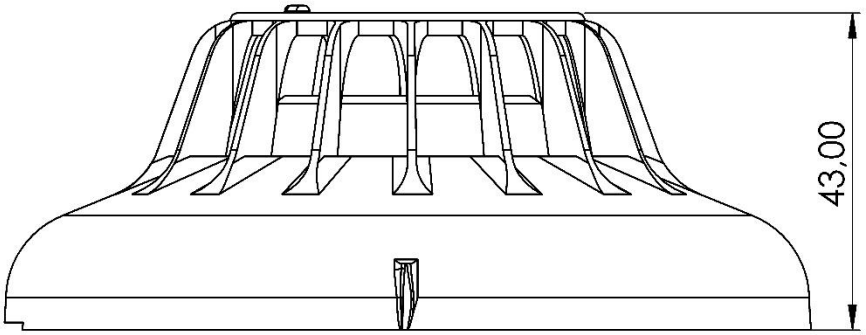
Alwayse be sure that detector is clean, no scratch, damage or broken parts.

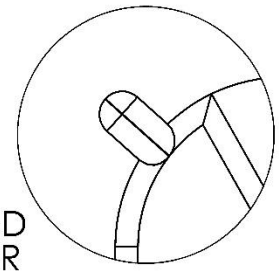
All connection must be connected properly.

Turn detector clock wise and remove detector from detector base. On the back be sure that connectıion lugs and inside back clean(No oil, dust, undefined liquids)

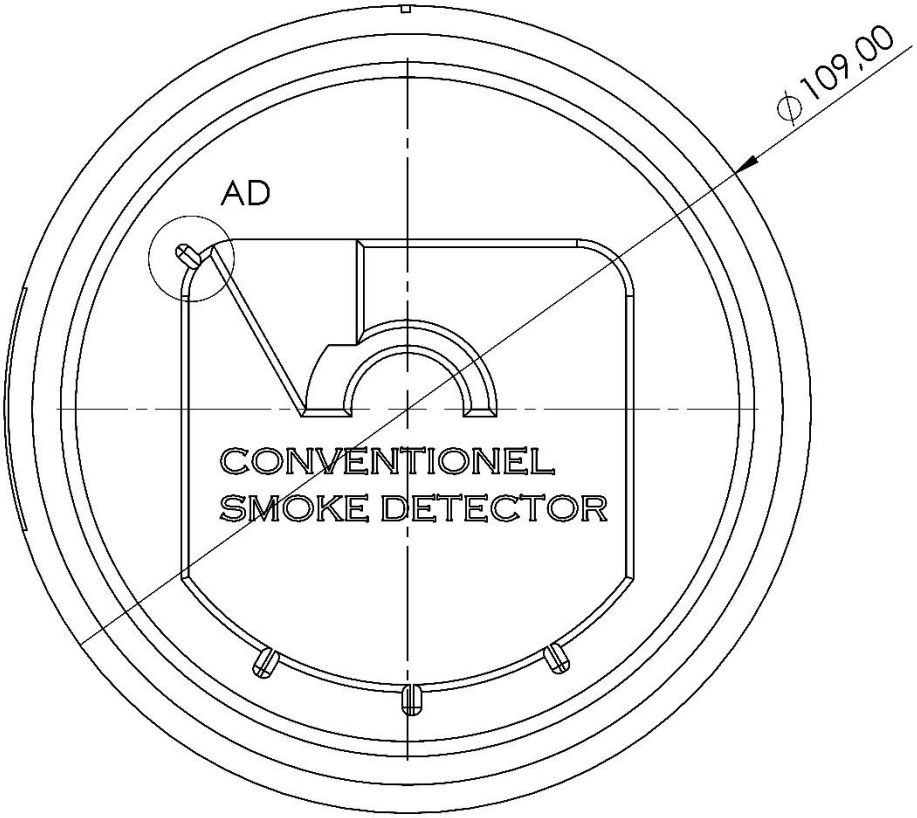
5. DIMENSION & TECHNICAL DRAWINGS

L.A.S. SMOKE DETECTOR

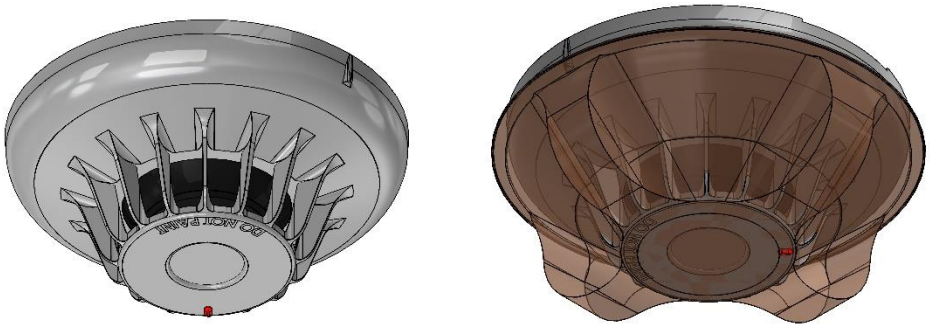




DETAIL AD
LUGS FOR
ELECTRICAL CONNECTION



REMOVE PROTECTIVE CAP



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