Orbis

I.S. Heat Detector

Product overview

Product	Orbis I.S. Heat Detector	Oris I.S. Heat Detector with flashing LED
	Part No.	Part No.
Class A1R	ORB-HT-51145-APO	ORB-HT-51146-APO
Class A1S	ORB-HT-51157-APO	ORB-HT-51158-APO
Class A2S	ORB-HT-51147-APO	ORB-HT-51148-APO
Class BR	ORB-HT-51149-APO	ORB-HT-51150-APO
Class BS	ORB-HT-51151-APO	ORB-HT-51152-APO
Class CR	ORB-HT-51153-APO	ORB-HT-51154-APO
Class CS	ORB-HT-51155-APO	ORB-HT-51156-APO

Approvals

Lloyd's Register, DNV·GL, Bureau Veritas, ABS, CCS China Classification Society 中國船級社, KR Korean Register, VdS, BOSEC, IECEx, ATEX, SBSC Intygad Produkt, FG

Note: *Not all detector variants have VdS or SBSC approval. This can be checked at www.apollo-fire.co.uk*

Product information

The Orbis Intrinsically Safe (I.S.) Heat Detector range incorporates seven heat detector classes to suit a wide variety of operating conditions in which smoke detectors are unsuitable.

Technical data

All data is supplied subject to change without notice. Specifications are typical at 24 V, 23°C and 50% RH unless otherwise stated.

Detection principle	*Measurement of heat by means of a thermistor.*
Sampling frequency	*Once every two seconds*
Supply voltage	*14 V dc to 28 V dc*
Supply Wiring	*Two wire supply, polarity sensitive*
Polarity reversal	*Not allowed*
Power up time	*< 20 seconds*
Minimum 'detector active' voltage	*12 V*
Power-up surge current at 24 V	*105 µA*
Average quiescent current at 24 V	*80 µA*
Alarm load	*325 Ω in series with a 1.0 V drop*
Minimum holding voltage	*5 V*
Minimum voltage to light alarm LED	*6 V*
Alarm reset voltage	*< 1 V*
Alarm reset time	*One second*
Alarm indicator	*Integral indicator with 360° visibility*
Remote output LED (-) characteristic	*4.7 kΩ connected to negative supply*
Operating and storage temperature	*-40°C to +70°C* *Operating temperature is restricted by the intrinsic safety gas classification.* *Class T5: -40°C to +45°C* *Class T4: -40°C to +60°C* *The detector must be protected from conditions of condensation or icing.*
Humidity (no condensation or icing)	*0% to 98% RH*
Effect of atmospheric pressure on optical sensor	*Insensitive to pressure*
Effect of wind speed	*Unaffected by wind*
Designed to IP Rating	*IP23D*
Standards & approvals	*EN54-5, CPD, LPCB, MED, LR, DNV-GL, BV, ABS, CCS, KRS, VdS, BOSEC, IECEx, ATEX, PESO, SBSC and FG*
BASEEFA Certification	*Bas06ATEX0007X*
Dimensions	*100 mm diameter x 42 mm height* *100 mm diameter x 50 mm height in base*
Weight	*70 g detector* *130 g detector with base*
Materials	*Housing: White flame-retardant polycarbonate* *Terminals: Nickel plated stainless steel*

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The European Standard EN 54-5 classifies heat detectors to the highest ambient temperature in which they can safely be used without risk of false alarm.

The classes are identified by the letters A to G (Class 1 is sub-divided into A1 and A2). In addition to the basic classification, detectors may be identified by a suffix to show that they are rate-of-rise (suffix R) or fixed (static) temperature (suffix S) types.All heat detectors in the Orbis I.S. range are tested as static or rate-of-rise detectors and are classified as A1R, A1S, A2S, BR, BS, CR and CS.

Operation

Orbis I.S. Heat Detectors have an open-web casing which enables air to flow freely across a thermistor which measures the air temperature every two seconds. A microprocessor stores the temperatures and compares them with pre-set values to determine whether a fixed upper limit - the alarm level - has been reached. In the case of rate-of-rise detectors the microprocessor uses algorithms to determine how fast the temperature is increasing.

Static heat detectors respond only when a fixed temperature has been reached. Rate-of-rise detectors also have a fixed upper limit but they also measure the rate of increase in temperature. A fire might thus be detected at an earlier stage than with a static detector so that a rate-of-rise detector is to be preferred to a static heat detector unless sharp increases of heat are part of the normal environment in the area protected by the heat detector

Where to use heat detectors

Heat detectors are used in applications where smoke detectors are unsuitable. Smoke detectors are used whenever possible since smoke detection provides earlier warning of fire than heat detection.

Heat detectors should be used if there is a danger of nuisance alarms from smoke detectors.

Choosing the correct class of heat detector

Heat detectors have a wide range of response characteristics and the choice of the right type for a particular application may not always seem straightforward. It is helpful to understand the way that heat detectors are classified as explained earlier and to memorise a simple rule: use the most sensitive heat detector available consistent with avoiding false alarms.

In the case of heat detectors it may be necessary to take an heuristic approach, i.e., trial and error, until the best solution for a particular site has been found. The flowchart will help in choosing the right class of heat detector.

If the fire detection system is being designed to comply with BS 5839-1 heat detectors should be installed at heights of less than 12 metres with the exception of Class A1 detectors, which can be installed at heights of up to 13.5 metres.

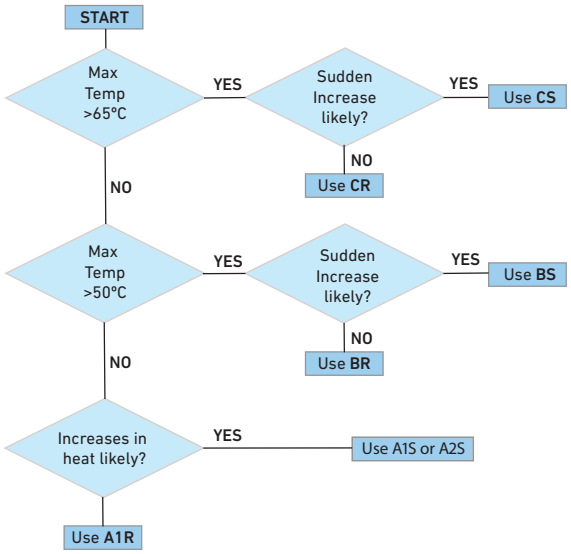
EMC Directive 2014/30/EU

The Orbis I.S. Heat Detector complies with the essential requirements of the EMC Directive 2014/30/EU, provided that it is used as described in this datasheet.

A copy of the Declaration of Conformity is available from the Apollo website: www.apollo-fire.co.uk

Conformity of the Orbis I.S. Heat Detector with the EMC Directive, does not confer compliance with the directive on any apparatus or systems connected to them

Choosing a heat detector



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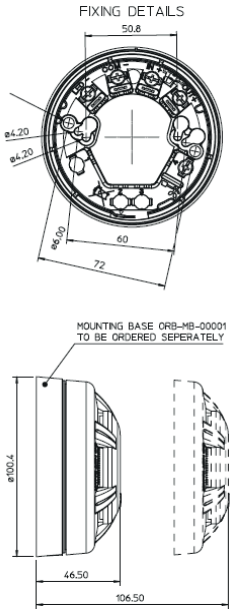
Orbis I.S. Heat Detector dimensional drawing



Construction Products Regulation 305/2011/EU

The Orbis I.S. Heat Detector complies with the essential requirements of the Construction Products Regulation 305/2011/EU.

A copy of the Declaration of Performance is available from the Apollo website: www.apollo-fire.co.uk

Marine Equipment Directive 2014/90/EU

The Orbis I.S. Heat Detector complies with the essential requirements of the Marine Equipment Directive 2014/90/EU.

ATEX Directive 2014/34/EU

The Orbis I.S. Heat Detector complies with the essential requirements of the ATEX Directive 2014/34/EU.

Orbis detectors: LED status

Feature	Description	Red LED status	Yellow LED status
StartUp™	Confirms that the detectors are wired in the correct polarity	Flashes once per second	No Flash
FasTest™	Maintenance procedure, takes just four seconds to functionally test and confirm detectors are functioning correctly	Flashes once per second	No flash
DirtAlert™	Shows that the drift compensation limit has been reached	No flash	Flashes once per second in StartUp (Stops flashing when StartUp finishes)
SensAlert™	Indicates that the sensor is not operating correctly	No flash	Flashes every four seconds (Flashes once per second in StartUp)
Normal operation	At the end of StartUp and FasTest (without flashing LED as standard)	No flash	No flash
Flashing LED version	Detectors red LED flashes in normal operation (at the end of FasTest)	Flashes every four seconds	No flash

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About Orbis I.S.

System design

The design of an intrinsically safe (I.S.) fire detection system should only be undertaken by engineers familiar with codes of practice for detection systems and hazardous area electrical systems. The relevant standards are BS 5839-1, BS EN60079 and BS EN 60079-14 respectively.

The fire detection performance of the Orbis I.S. range is the same as that of its standard counterparts but some electrical; parameters are different.

The BASEEFA certification of Orbis I.S. devices covers their characteristics as components of an I.S. system and indicates that they can be used with a margin of safety in such systems. The certified system configurations allow for two types of safety barrier, each of which has its own advantages and disadvantages. A brief outline of each type is given in the paragraphs that follow:

Types of Safety Barrier

Single Channel 28 V/300 Ω Barrier

This is the most basic type of barrier and therefore the lowest in cost. Being passive devices, they also impose the minimum of restrictions on the operation of the fire detectors. This, single channel barriers are available either as positive or negative polarity where the polarity refers to the polarity of the applied voltage relative to earth. The significance of this is that one side of the barrier must be connected to a high-integrity (safety) earth. Although this earth connection has no effect on the operation of Orbis I.S. devices and is not needed for their correct operation, it may not be acceptable to the operation of the fire control panel. If the earth connection is not acceptable then the isolating barriers should be used.

Table 1: 28 V/300 Ω Single Channel Safety Barriers

Manufacturer	Type	Polarity	Mounting
Pepperl + Fuchs	Z728	+ve	DIN-Rail
Pepperl + Fuchs	Z828	-ve	DIN-Rail
Pepperl + Fuchs	Z428/Ex	+ve	DIN-Rail/surface
Pepperl + Fuchs	Z528/Ex	-ve	DIN-Rail/surface
MTL	MTL728+	+ve	Busbar
MTL	MTL7028+	+ve	DIN-Rail
MTL	MTL7128+	+ve	DIN-Rail

Galvanically Isolated Barrier

Galvanically isolated barriers are also referred to as 'transformer isolated dc repeaters', 'isolating interfaces' and 'transformer isolated current repeaters'. They differ from conventional shunt zener barriers in that they provide electrical isolation between the input (safe area) and the output (hazardous area). This is acheived by the use of a dc/dc converter on the input side which is connected to the hazardous area through a voltage and power limiting resistor/zener combination similar to a conventional barrier.

The galvanic isolation technique means that the circuit does not need a high integrity (safety) earth and that the I.S. circuit is fully floating. Earth leakage problems for fire control panel are therefore eliminated if this type of interface is used.

Galvanically isolated barriers are available as single or dual channel versions and are recommended for any application in which direct earth connections are not acceptable. The galvanically isolated barrier is a two-wire device which does not need an external power supply.

Table 2: Galvanic (Transformer Isolated) Barriers

Manufacturer	Type	No. of channels	Certificate No.
Pepperl + Fuchs	KDFO CS EX 1.51P	1	IECExBAS05.0004
MTL	MTL4061	2	Ex94C2040X
MTL	MTL5061	2	Ex94C2040X

Approved Safety Barriers

The system certification includes a generic specification for barriers.

The generic specification is:

Any shunt zener diode safety barrier certified by BASEEFA or any EEC approved certification body to

[Ex ia] IIC

Having the following or lower output parameters:

$$Uz = 28\ V = \frac{Uz}{R}$$

I max:out = 93.3 mA

W max:out = 0.67 W

In any safety barrier used the output current must be limited by a resistor 'R' such that

$$I\ max{:}out = \frac{U_2}{R}$$

A number of shunt zener diode barriers meet this specification and examples are given in Table1.

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Safety earth

Shunt zener diode safety barriers must be connected to a high integrity earth by at least one and preferably two copper cables, each of a cross-sectional area of 4 mm² or greater. The connection must be such that the impedance from the connection point to the main power system earth is less than one Ohm.

I.S. safe circuits in the hazardous area should be insulated from earth and must be capable of withstanding a 500 V RMS ac test voltage for at least one minute. When using armoured or copper sheathed cables, the armour or sheath is normally isolated from the safe area bus-bar.

Maximum loading of I.S. circuit

Because of the finite resistance of the safety barrier, there will be a limit to the current drain which can be tolerated before the voltages on the circuit fall outside the specified limits for Orbis I.S. devices. The system certification enables up to 20 Orbis I.S. detectors to be connected to a single barrier circuit with an end-of-line resistor of not less than 1.8 kΩ. However, it must be ensured that the voltage available at each detector is above the minimum specified in the quiescent condition. It is also important to ensure that the alarm load is suitable for the fire control panel. The system certification also allows the use of remote LED indicators. These may be connected to individual detectors or may use a connection common to two or more detectors.

Table 3: Limits for energy stored in cables

Group	Capacitance µF	Inductance mH	L/R ratio µH/Ohm
IIC	0.083	4.2	55
IIB	0.65	12.6	165
IIA	2.15	33.6	440

To calculate the total capacitance or inductance for the length of cables in the hazardous area, refer to Table 4, which gives typical per kilometre capacitance and inductance for commonly used cables.

Note: *All Orbis I.S. devices have zero equivalent capacitance and inductance.*

Wiring and cable types

It is not permitted to connect more than one circuit in the hazardous area to any one safety barrier and that circuit may not be connected to any other electrical circuit. Both separate and twin cables may be used. A pair contained in a type 'A' or 'B' multi-core cable (as defined in Clause 12.2.2 of BS EN 60079-14) may also be used, provided that the peak voltage of any circuit contained within the multi-core does not exceed 60 V.

The capacitance and either the inductance or the inductance to resistance (L/R) ratio of the hazardous area cables must not exceed the parameters specified in Table 3. The reason for this is that energy can be stored in a cable and it is necessary to use cable in which the energy stored is insufficient to ignite an explosive atmosphere.

Installation

It is important that the Orbis I.S. detectors are installed in such a way that all terminals and connections are protected to at least IP20 when the detector is in the base. Special care must be taken with the rear of the mounting base where live metal parts may be accessible. Flush mounting of the base on a flat surface will provide the required degree of protection.

The conduit box, Apollo Part No. 45681-204, is also acceptable for use when mounting I.S. bases. Apollo also supply a range of deckhead mounting boxes. More information can be found in the 'Mounting Accessories' section of this publication.

Note: The earth terminal in the Orbis I.S. base is provided for convenience where continuity of a cable sheath or similar is required. It is not necessary for the correct operation of the detector, nor is it provided as a termination point for a safety earth.

Table 4: Examples of electrical characteristics of cables commonly use in fire protection systems

Cable type	Core	Size	Conductor resistance	Inductance	Capacitance µF/km		Sheath resistance
		mm²	Ohm/km/core	mH/km	core to core	core to sheath	Ohm/km
MICC Pyrotenax light duty	2	1.5	12.1	0.534	0.19	0.21	2.77
MICC Pyrotenax heavy duty	2	1.5	12.1	0.643	0.13	0.17	1.58
Pirelli FP200	all	1.5	12.1	-	0.38	0.15	-
PVC sheathed and insulated to BS 6004	all	1.5	12.1	0.77	0.09	-	-

Apollo Fire Detectors Ltd Declaration of Conformity Under UKCA Requirements
Approved Body for UKCA regulation : SGS UK Ltd 1180, Buxton, UK
Designated Standards used: EN 60079-0:2018 Electrical Apparatus, Explosive atmospheres. Equipment. General requirements and IEC 60079-11:2023 Edition 7 Electrical Apparatus, Explosive atmospheres. Equipment protection by intrinsic safety 'i', applied as state of the art / latest technical knowledge.

Provisions of the Directive fulfilled by the Equipment:

Orbis: Group II Category 1G Ex ia IIC T4 Ga (-50°C ≤ Ta ≤ +60°C) / T5 Ga (-50°C ≤ Ta ≤ +40°C)

The products listed below are manufactured at the premises of
Apollo Fire Detectors Ltd., 36 Brookside Road, Havant, Hampshire, PO9 1JR, England.

Product Name	Models Covered	UK Type Examination Certificate	Derived from Un-configured Platform
Orbis IS	Multisensor	BAS21UKEX0328X Issued 22nd November 2024	400-OH-00012
Orbis IS	Optical Smoke Detector	BAS21UKEX0328X Issued 22nd November 2024	400-OP-00013
Orbis IS	Heat Detector A1R /A1S/A2S/BR/BS/CS	BAS21UKEX0328X Issued 22nd November 2024	400-HT-00011

Directives also applicable: Electromagnetic Compatibility 2014/30/EU;
Construction Products Regulations 305/2011/EU;
Marine Equipment Directive,
European Directive On Equipment and Protective Systems Intended for the use in Potentially Explosive Atmospheres.

This declaration is valid for UKCA Regulation S.I. 2016 No 1107 from 22nd November 2024

This Declaration of Conformity is issued under the sole responsibility of the Manufacturer.

On behalf of the above named company, I declare that, on the date the equipment accompanied by this declaration is placed on the market, the equipment conforms with all technical and regulatory requirements of the above listed directives. Both Principle Engineer, Mr Rob Knight, and Systems Engineer, Mr Mark Schofield, have been designated as the responsible person(s) for the purpose of the Regulations.

R D Knight ..... Havant, 22/11/2024
Mr Rob Knight - Principle Engineer

M N Schofield ..... Havant, 22/11/2024
Mr Mark Schofield - Systems Engineer

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Intrinsically Safe (IS) Products ATEX 2014/34/EU, UKEX and IECEx Certification Guide

General
All Apollo IS devices are intended for use in hazardous area systems complying with the European ATEX directive 2014/34/EU, UKEX and IECEx regulations that deal with products used in hazardous areas. All such systems must incorporate a certified safety barrier or interface to limit the voltage and power to the circuit. Information on suitable barriers and interfaces can be obtained from Apollo.

These notes are intended to supplement the mandatory requirements of the ATEX directive or other applicable regulations They should not be taken as full instructions for the design and installation of intrinsically safe systems. These activities must be carried out only by qualified personnel.

Certification
The Orbis IS range of detectors are BASEEFA certified as components. Their component certification allows them to be used in certified intrinsically safe systems.

Each product range is covered by a system certificate issued by BASEEFA in Apollo's name. Systems installed according to Apollo system drawings will be covered by the system certification. The use of barriers, interfaces, or other components not included in the system drawing will invalidate the certification.

The system certificate number must be marked on the installed system, preferably on the barrier or interface housing. The system is certified to ATEX, UKEX and IECEx.

Explosion Protection Category

Orbis IS detector categories are:

 II IG Ex ia IIC T5 Ga -50°C ≤ Ta ≤ 40°C (T4 ≤ 60°C) Ga

The ATEX EC type examination certificate numbers applicable to Apollo IS devices are given in the table below:

Apollo Product	ATEX Certificate	IECEx Certificate	UKEX Certificate
Orbis Detectors	Baseefa06ATEX 0007X	IECEx BAS 06.0002X	BAS21UKEX0328X

Copies of all component and system certificates, and system drawings are available from Apollo on request.

Installation of Detectors

Detectors must be fitted to certified IS bases. Use of any other bases will invalidate the detector certification. Orbis detectors may be fitted to Series 60 systems using an Orbis IS base adaptor.

The bases must be installed in such a way that all wiring is protected to at least IP20. This requirement will be met if bases are flush mounted. If bases are mounted on BESA boxes, or other boxes having a diameter less than 85mm, they should be fitted with XP95 backplates (Apollo part number 45681-233).

Remote LED indicators may be fitted to Orbis detectors. The LEDs need not be certified but should be either 3mm or 5mm in diameter. The LED terminations must be protected to at least IP20 and the circuits must be segregated from other circuits.

Special Conditions for Safe Use

To avoid problems with electrostatic charging of the enclosure, the equipment must not be located in a dust-laden airflow or cleaned with a dry cloth or with solvents.

Dust Cover

To ensure optimal performance, leave the dust cover on the product and remove on commissioning.

Further Information

For information on Orbis see publication PP2250

Please use the link below to download the ATEX DoC in various EU Languages.

http://apollo.ly/kn

If the required Language is not displayed, please contact Apollo to request it.

Apollo Fire Detectors Ltd Declaration of Conformity Under ATEX Directive

Notified Body for EU Type Examination and Production: Fimko 0598, Helsinki, Finland
Harmonised Standards used:
IEC 60079-0:2017 Edition 7 Explosive Atmospheres - Part 0: General Requirements
IEC 60079-11:2023 Edition 7 Explosive Atmospheres - Part 11: Equipment Protection by Intrinsic Safety 'i',

Provisions of the Directive fulfilled by the Equipment:

Orbis: Group II Category 1G Ex ia IIC T4 Ga (-50°C ≤ Ta ≤ +60°C) / T5 (-50°C ≤ Ta ≤ +40°C)

The products listed below are manufactured at the premises of
Apollo Fire Detectors Ltd., 36 Brookside Road, Havant, Hampshire, PO9 1JR, England.

Product Name	Models Covered	EU Type Examination Certificate	Derived from Un-configured Platform
Orbis IS	Multisensor	BaseefaATEX0007X/6 Issued 22 November 2024 IECEx BAS 00.00002X	400-OH-00012
Orbis IS	Optical Smoke Detector	BaseefaATEX0007X/6 Issued 22 November 2024 IECEx BAS 00.00002X	400-OP-00013
Orbis IS	Heat Detector A1R /A1S/A2S/BR/BS/CS	BaseefaATEX0007X/6 Issued 22 November 2024 IECEx BAS 00.00002X	400-HT-00011

Directives also applicable: Electromagnetic Compatibility 2014/30/EU; Construction Products Regulations 305/2011/EU; Marine Equipment Directive*, European Directive On Equipment and Protective Systems Intended for the use in Potentially Explosive Atmospheres.

This declaration is valid for Directive 2014/34/EU.

This Directive has been enacted into the UK law by the Statutory Instrument No. 1996-192, The Equipment and Protective Systems Intended for the Use in Potentially Explosive Atmospheres Regulations 1996.

This Declaration of Conformity is issued under the sole responsibility of the Manufacturer.

On behalf of the above named company, I declare that, on the date the equipment accompanied by this declaration is placed on the market, the equipment conforms with all technical and regulatory requirements of the above listed directives. Both Principle Engineer, Mr Rob Knight, and Systems Engineer, Mr Mark Schofield, have been designated as the responsible person(s) for the purpose of the Regulations.

R N Knight ..... Havant, 22/11/2024
Mr Rob Knight - Principle Engineer

M W Schofield ..... Havant, 22/11/2024
Mr Mark Schofield - Systems Engineer