RDM ENGINEERING PRODUCT GUIDE

RDM

Radio linked detectors and interfaces

apollo
FIRE DETECTORS LIMITED

RDM

Radio-linked detectors with base and interfaces

- **combines radio and hard wired system technology**
- **an extension to XP95 analogue systems**
- **up to 16 devices per loop**
- **simple installation and set up**
- **operates with Apollo compatible analogue addressable panels**

CONTENTS

RADIO DETECTOR MONITORING

The Apollo Radio Detector Monitoring (RDM) range of products consists of a radio base, an ionisation smoke detector, an optical smoke detector, a heat detector, and a radio interface.

The interface is connected to an XP95 loop and appears to the system as a zone monitor unit, responding to the XP95 communication protocol described in the Apollo Communication System Engineering Design Guide, PP1036. The interface includes the radio receiver, and can service up to eight radio linked devices.

A radio transmitter is built into the radio base which also houses a microcontroller and interface circuits, and a DIL-switch for address setting.

Two integral batteries provide power to the detector and the radio base for over a year under normal circumstances. Each battery is monitored and a low battery fault report is sent to the interface if the voltage of either battery falls below a preset limit.

In normal operation, each radio base sends a signal to the interface at twenty minute intervals to verify that it is present and operative. If for any reason no signal is received for one hour from a base, the interface sends a fault report to the control panel.

The radio base contains a 'tamper switch' which is activated if the base is removed from its back plate. If the tamper switch is activated, or the detector is removed from the base, a fault report is sent to the interface which in turn reports the incident to the control panel.

All RDM detectors have an integral LED which flashes when the device is in alarm condition.

A functional test of the detector and base can be carried out by placing a magnet on the detector body to operate the internal reed switch. This simulates a fire condition within the detector and causes the base to transmit an alarm signal to the interface. *(Note: The signal sent from the interface to the control panel will be seen as an alarm signal and not as a test.)*

The interface can be tested independently if the control panel has a test facility. This test mode will cause the interface to display "tSt" and a reading of the background signal strength, and return an analogue value of 64.

When a Radio Detector Monitoring system is to be installed, a site survey must be carried out to check that RF noise levels are sufficiently low and that detector and antenna positions can be found that will give reliable communication.

It is recommended that installation of any component of a Radio Detector Monitoring system should be done at a time when the site is in a state of maximum electrical activity, so that RF levels are high. This allows the installer to adjust, within limits set by the system design, the position of antennae and avoid or minimise the effect of interference caused by sources of RF radiation such as computers, intercom equipment and electrical machinery.

RDM IONISATION SMOKE DETECTOR

RDM Ionisation Smoke Detector ▲ **Part Number 55000-580**

page 2

OPERATING PRINCIPLES

The detector has a moulded self-extinguishing white polycarbonate case with wind resistant smoke inlets. Nickel plated wiper contacts connect the detector to the radio base. Inside the detector case a printed circuit board has the ionisation chamber mounted on one side and the signal processing electronics on the other.

The ionisation chamber consists of a reference chamber contained inside a conductive smoke chamber (Figure 1). The outer smoke chamber has inlet apertures fitted with insect

An Americium 241 radioactive source mounted within the reference chamber irradiates the air in both chambers, producing positive and negative ions. The radioactive source holder and the smoke chamber form positive and negative electrodes respectively. A voltage applied across the electrodes produces an electric field.

Ions are attracted to the electrode of the opposite sign to their own charge; many recombine but a small electric current flows between the electrodes. At the junction between reference and smoke chambers, the sensing electrode converts variations in chamber current into voltage changes.

When smoke particles enter the ionisation chamber, ions become attached to them with the result that the current flowing through the chamber decreases. This effect is greater in the smoke chamber than in the reference chamber, and the imbalance causes the sensing electrode to become more positive.

The voltage at the sensor electrode is buffered by an ultra low leakage amplifier. After a filter circuit which removes noise and transients the buffered signal is fed to a comparator.

The voltage is compared with a factory-set clean air reference voltage. If the monitored voltage exceeds the reference voltage, an alarm signal is generated.

The detector signals the alarm condition to the base by pulling terminal L1 OUT low. The alarm condition is not latched in the detector and will reset automatically when the smoke level falls below the alarm threshold.

An output from the radio base, connected to terminal -R, illuminates the integral LED in the alarm condition.

A reed switch in the circuit of the detector can be magnetically activated from outside the case to produce an alarm condition for test and commissioning purposes.

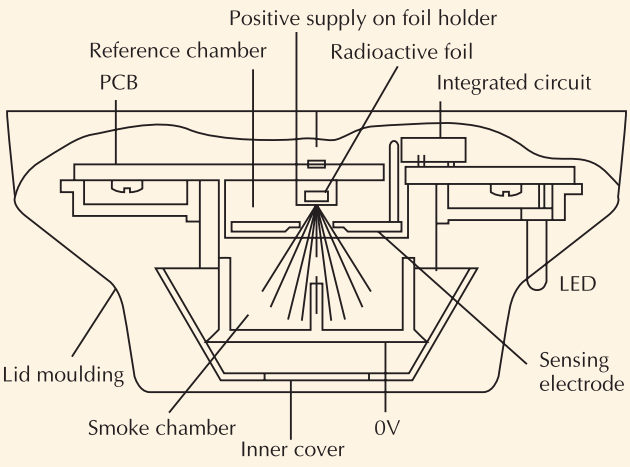

Fig.1 Sectional view, RDM Ionisation Smoke Detector.

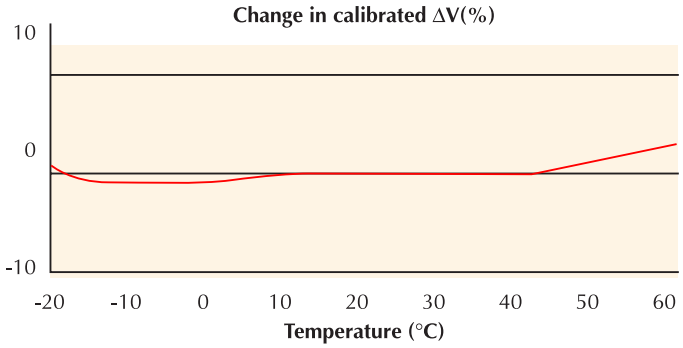

Fig.2 Typical temperature response, RDM Ionisation Smoke Detector

SAFETY NOTE

In the United Kingdom, ionisation smoke detectors are subject to the requirements of the Radioactive Substances Act 1960 and to the Ionising Radiations Regulations 1985 made under the provisions of the Health and Safety at Work Act 1974.

The detectors, independently tested by the National Radiological Protection Board (NRPB), conform to all the requirements specified in the 'Recommendations for ionisation smoke detectors in implementation of radiation standards' published by the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (OECD) 1977.

There is no limit to the number of ionisation smoke detectors which may be installed in any fire protection system.

Up to 500 detectors may be stored in any premises, although there are stipulations on storage facilities if more than 100 ionisation detectors are stored in one building. At the end of their useful life of ten years, RDM ionisation smoke detectors should be returned to Apollo for safe disposal.

Guidance on storage and handling can be given by Apollo Fire Detectors and full details can be requested from:

Radioactive Substances
Regulation Function
Environment Agency
Rio House, Waterside Drive
Aztec West
Almondsbury, Bristol

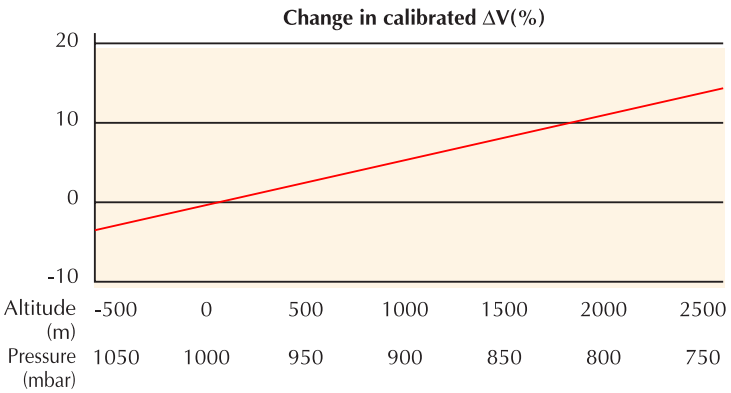

Fig.4 Typical Pressure Response, RDM Ionisation Smoke Detector

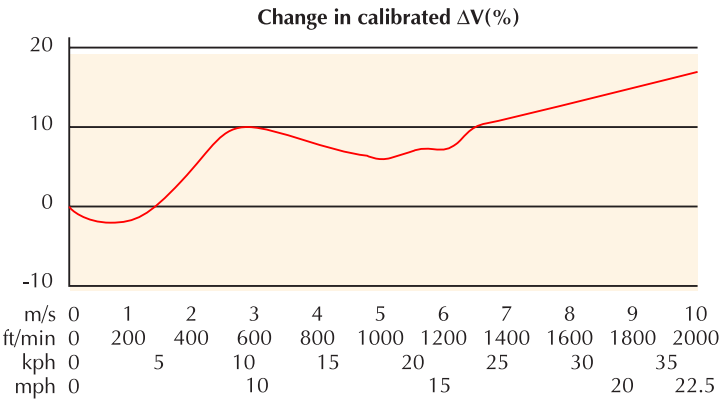

Fig.3 Typical wind speed response, RDM Ionisation Smoke Detector

ENVIRONMENTAL CHARACTERISTICS

The detector operates over a temperature range -10°C to +55°C. Figure 2 shows the effect of temperature on a typical detector.

Performance of ionisation detectors in air currents is of significance to the installer and user. RDM ionisation smoke detectors are virtually unaffected by wind speeds in the range 0-10m/s (22.5 m.p.h. or 36 km/hr.), as shown in Figure 3.

Ionisation detectors can be affected by variations in atmospheric pressure. A typical pressure response curve is shown in Figure 4.

RDM ionisation smoke detectors are supplied in individual packing and are fitted with snap-on red covers. These can be left in place after fitting to prevent ingress of foreign material prior to commissioning. The covers must be removed before the system is put into use.

TECHNICAL DATA

RDM Ionisation Smoke Detectors

Specifications are typical and apply at temperature 23°C and relative humidity 50% unless otherwise stated.

Detector type:
Products of combustion (smoke)

Part No:
55000-580

Detection principle:
Ionisation chamber

Chamber configuration:
Twin compensating chambers using one single sided ionising radiation source

Radioactive isotope:
Americium 241

Activity:
33.3 kBq (0.9 µCi)

Alarm indicator:
Red Light Emitting Diode (LED)

Sensitivity:
Nominal threshold y-value of 0.7 to EN54 Part 7 1984 (BS 5445 Part 7 1984)

Operating voltage:
Nominal 9V DC; minimum for correct operation of detector 6.3V DC

Supply current, quiescent and alarm states:
75µA

LED current:
Typically 3mA with +5V applied to -R

Radiated emissions:
To BS EN 50081-1 and -2

Radiated immunity:
To BS EN 50082-1 and -2 and BS EN 50130-4

Temperature range:

Max. continuous operating	+55°C
Min. continuous operating	0°C
Min. operating (no condensation/icing)	-10°C
Storage	-30°C to +80°C

Temperature compensation:
Automatic compensation by dual chambers

Humidity:
0 to 95% relative humidity (no condensation)

Atmospheric pressure:
Automatic compensation by dual chambers to maintain sensitivity to a height of 2000m above sea level.

Wind speed:
10 m/s maximum

Vibration, Impact and Shock:
To EN54 Part 7 1984 (BS 5445 Part 7 1984)

Dimensions:
100mm diameter; 42mm height

Weight:
105 grams

Materials:
Housing: White polycarbonate V-O rated to UL94
Terminals: Nickel plated stainless steel

technical data

RDM Optical Smoke Detector ▲ **Part Number 55000-680**

OPERATING PRINCIPLES

The detector has a moulded self-extinguishing white polycarbonate case with wind resistant smoke inlets.

Nickel plated wiper contacts connect the detector to the radio base.

Inside the case a printed circuit board has the optical system mounted on one side and the signal processing electronics on the other.

The sensing chamber is a black moulding configured as a labyrinth which prevents penetration of ambient light. The labyrinth has a fine gauze insect resistant cover.

The chamber houses an infrared light emitting diode (LED) and a photo-diode which has an integral infrared filter as extra protection against ambient light.

Every 4 seconds the LED emits a burst of collimated light, modulated at 4 kHz. In clear air, light from the LED does not fall directly on the diode because the LED is positioned at an obtuse angle to the diode (as shown in Figure 5).

When smoke enters the chamber, a fraction of the collimated light is scattered onto the photo-diode. If the resulting signal from the photo-diode is above a preset threshold on three consecutive pulses, the detector signals an alarm state by pulling terminal L1 OUT of the PCB to logic LOW. The alarm condition is not latched in the detector and will reset automatically when the smoke level falls below the alarm threshold.

An output from the radio base, connected to terminal -R, illuminates the integral LED in the alarm condition.

A reed switch in the circuit of the detector can be magnetically activated from outside the case to produce an alarm condition for test or commissioning purposes.

ENVIRONMENTAL CHARACTERISTICS

The detector operates over the temperature range -10°C to +55°C. Fig 6 gives the typical variation in sensitivity over this range.

Optical detectors are not affected by air currents or by changes in atmospheric pressure.

RDM optical smoke detectors are supplied in individual packing and are fitted with snap-on red covers. These can be left in place after fitting to prevent ingress of foreign material prior to commissioning. The covers must be removed before the system is put into use.

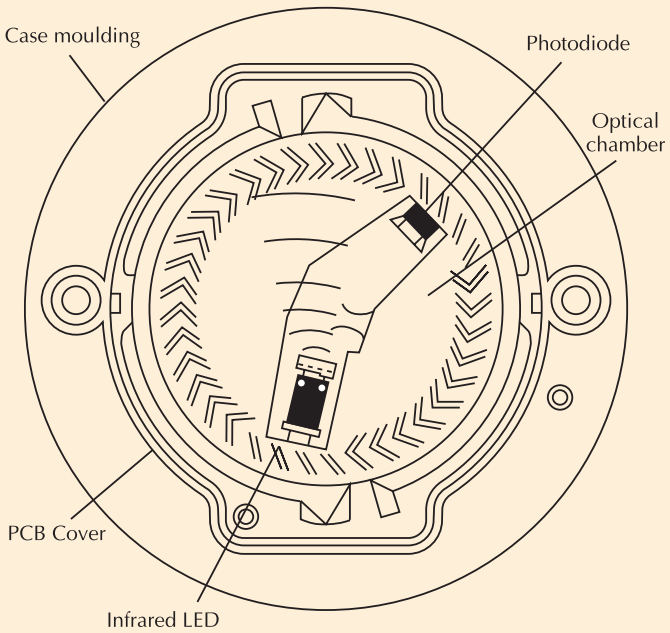

Fig.5 Top section, RDM Optical Smoke Detector

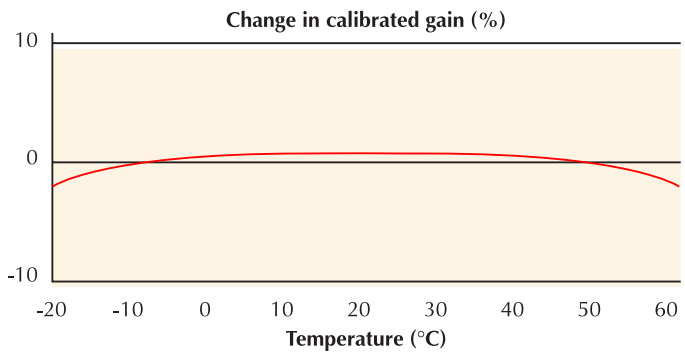

Fig.6 Typical temperature response, RDM Optical Smoke Detector

TECHNICAL DATA

RDM Optical Smoke Detectors

Specifications are typical and apply at temperature 23°C and relative humidity 50% unless otherwise stated.

Detector type:
Products of combustion (smoke)

Part No:
58000-680

Detector principle:
Photoelectric detection of light scattered by smoke particles

Chamber configuration:
Horizontal optical bench housing infrared emitter and sensor, arranged radially to detect scattered light

Sensor:
SIlicon PIN photo-diode

Emitter:
GaAs infrared light emitting diode

Sampling frequency:
Once every four seconds

Number of consecutive sensed alarm signals needed to trigger alarm:
3

Alarm indicator:
Clear Light Emitting Diode (LED) emitting red light

Sensitivity:
Nominal threshold of 3.0% per metre light grey smoke obscuration (typically 0.12 dB/m to EN54 Part 7 1984)

Operating voltage:
Nominal 9V DC, minimum for correct operation of detector 6.3V DC

Supply current, quiescent and alarm states:
28µA

LED current:
Typically 3mA with +5V applied to -R

Radiated emissions:
To BS EN 50081-1 and -2

Radiated immunity:
To BS EN 50082-1

Temperature range:

Max. continuous operating	+55°C
Min. continuous operating	0°C
Min. operating (no condensation/icing)	–10°C
Storage	–30°C to +80°C

Humidity:
0 to 95% relative humidity (no condensation)

Atmospheric pressure:
Insensitive to atmospheric pressure

Wind speed:
Insensitive to wind

Vibration, Impact and Shock:
To EN54 Part 7 1984 (BS5445 Part 7 1984)

Dimensions:
100mm diameter;
42mm height

Weight:
100grams

Materials:
Housing: White polycarbonate V-O rated to UL94
Terminals: Nickel plated stainless steel

technical data

RDM Heat Smoke Detector ▲ **Part Number 55000-480**

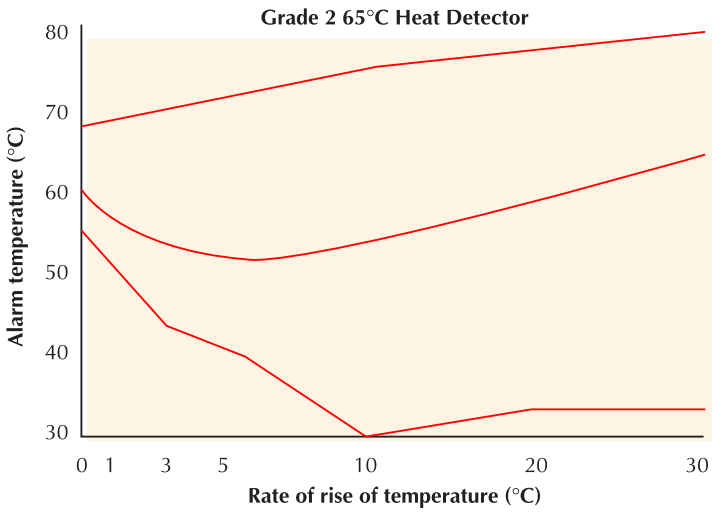

Fig.7 Response limits and typical curve, RDM Heat Detector

Rate of rise °C/min	EN54 lower limit	Apollo RDM heat detector	EN54 upper limit
	mins : secs	mins : secs	mins : secs
1	29 : 00	38 : 41	45 : 40
3	7 : 13	10 : 29	15 : 40
5	4 : 09	6 : 03	9 : 40
10	0 : 30	3 : 01	5 : 10
20	0 : 22.5	1 : 46	2 : 55
30	0 : 15	1 : 20	2 : 08

Table 1 EN54 response time limits and RDM heat detector typical response times.

OPERATING PRINCIPLES

The detector has a moulded self-extinguishing white polycarbonate case. Nickel plated wiper contacts connect the detector to the radio base. Inside the case a printed circuit board holds the signal processing electronics.

Two matched negative temperature coefficient thermistors are mounted on the PCB in such a way that one thermistor is exposed to give good thermal contact with the surrounding air while the other thermistor is thermally insulated.

Under stable conditions both thermistors are in thermal equilibrium with the surrounding air and have the same value of resistance. If air temperature increases rapidly the resistance of the exposed thermistor becomes less than that of the insulated thermistor. The ratio of the resistance of the thermistors is monitored electronically and an alarm is initiated if the ratio exceeds a factory preset level. This feature determines the 'rate of rise' response of the detector.

If air temperature increases slowly, no significant resistance difference develops between the thermistors, but at high temperatures a fixed value resistance connected in series with the insulated thermistor becomes significant.

When the sum of the resistance of the insulated thermistor and the fixed resistor compared to the resistance of the exposed thermistor reaches a preset value, an alarm is initiated. The value of the fixed resistor is selected to set the detector into alarm state at a specified fixed temperature.

Terminal L1 OUT of the detector is normally high impedance and is connected to a 2.2MΩ pull-up resistor in the base. In the alarm condition the terminal is pulled low by the detector circuit. The alarm condition is not latched in the detector and will reset automatically when the heat level falls below the alarm threshold

An output from the radio base, connected to terminal -R, illuminates the integral LED in alarm and manual test conditions.

A reed switch in the circuit of the detector can be magnetically activated from outside the case to produce an alarm condition for test or commissioning purposes.

RESPONSE CHARACTERISTICS

page 7

European Standard EN54-5 (1984) (BS5445:Part 5:1984) categorises heat detectors according to their response times and fixed upper temperature limit.

The RDM heat detector falls within the Grade 2 response times, and has a fixed upper limit temperature of 65°C.

Figure 7 shows the EN54-5 limits for Grade 2 and a typical response curve for RDM Heat Detectors.

The detector also complies with the response time requirements of the draft revision of EN54-5 for Class A2 detectors.

TECHNICAL DATA

RDM Optical Heat Detectors

Specifications are typical and apply at temperature 23°C and relative humidity 50% unless otherwise stated.

Detector type:
Rate of rise heat detector

Part No:
58000-480

Detector principle:
Resistance imbalance between thermistors

Alarm indicator:
Red Light Emitting Diode (LED)

Operating voltage:
Nominal 9V DC, minimum for correct operation of detector 6.3V DC

Supply current, quiescent and alarm states:
20µA

LED current:
Typically 3mA with +5V applied to -R

Radiated emissions:
To BS EN 50081-1 and -2

Radiated immunity:
To BS EN 50082-1 and -2 and BS EN 50130-4

Temperature range:

Max. application temperature	+50°C
Max. continuous operating	+55°C
Min. continuous operating	0°C
Min. operating (no condensation/icing)	–10°C
Storage	–30°C to +80°C

Humidity:
0 to 95% relative humidity (no condensation)

Vibration, Impact and Shock:
To EN54 Part 5 1984 (BS5445 Part 5 1984)

Weight:
100grams

Dimensions:
100mm diameter;
42mm height

Materials:
Housing: White polycarbonate V-O rated to UL94
Terminals: Nickel plated stainless steel

technical data

OPERATING PRINCIPLES

The base has a white self-extinguishing polycarbonate body containing the power supply batteries, an anti-tamper switch and a PCB carrying the radio transmitter and control circuits. The base is fitted to the mounting surface using a moulded back-plate. The base attaches to the back-plate using a bayonet action to simplify installation and servicing.

The base accepts any of the three types of radio detector (ionisation and optical smoke, or heat). Connection between the detector and the base is through stainless steel contacts.

Power for the base and detector is provided by two 9V alkaline batteries in the base housing. The batteries are effectively connected in parallel so that the one with the higher voltage supplies the base and detector. Battery voltages are individually monitored and a fault signal is generated if either falls below 6.3V.

Operation of the base is controlled by a microcontroller with interface circuits to monitor the status of the detector, the condition of the batteries, and the status of the tamper switch. The microcontroller is responsible for generating the data which is passed to the on-board radio transmitter.

The transmitter is a narrow-band FM module operating at 173.225mhz. The transmitter is coupled to an integral antenna. The transmitter does not require a licence for operation in the UK.

Each base in a system must have a unique address, which is set using an 8-segment DIL switch. Six segments of the switch set the detector address, which consists of site code (1 segment), RDM zone code (2 segments) and device number (3 segments). The other two segments must be set to OFF. Switch settings are read by the microcontroller when generating the message for transmission.

Under normal conditions the base transmits verification signals consisting of the RDM zone code, site code, detector address, a status report and a 16-bit checksum. The signals, which have a duration of 1.2 seconds, are sent at twenty minute intervals.

If the base senses a fault condition, which may be activation of the tamper switch, removal of the detector, or low battery voltage, a fault signal will be transmitted immediately. This signal also has a duration of 1.2 seconds and is repeated every twenty minutes.

If the detector enters the alarm condition, terminal L1 OUT is pulled to a logic low. This is sensed by the base, and an alarm signal is transmitted immediately. The alarm message has a duration of 2.4 seconds, and is repeated every 60 seconds while the detector remains in the alarm condition.

When the base senses that the detector has entered the alarm condition it pulses the detector LED. It will continue to pulse the LED for twenty minutes after the alarm initiation, even if the detector returns to the normal condition.

While the detector is in the alarm condition all fault reporting is suppressed.

TECHNICAL DATA

RDM base

Specifications are typical and apply at temperature 23°C and relative humidity 50% unless otherwise stated.

Equipment type:
RDM Base

Part No:
45681-280

Operating voltage:
Nominal 9V DC from alkaline batteries. Minimum voltage for correct operation of detector 6.3V DC

Quiescent current (no detector fitted):
60µA pulsed every 280mS to 90µA

Battery type:
9V alkaline PP3/1604/6LR61

Transmit current:
40mA max

Operating frequency:
173.225 MHz. The RDM base is MPT1344 licence exempt when using the integral antenna; for approval number please contact Apollo

Transmitter range:
Open-field line-of-sight >250m
The range within a building depends on the construction of the building and the positions of the antennae. Site surveys must be carried out prior to installation to ensure that adequate range can be achieved.

Input from detector:
Change from high impedance to logic low on terminal L1 OUT indicates an alarm condition.

Outputs to detector:
LED drive 3.5V at 4mA on terminal -R
Power supply positive on terminal L1 IN
Power supply negative on terminal L2

Temperature ranges:

Max. continuous	+55°C
Min. continuous operating	0°C
Min. operating (no condensation/icing)	-10°C
Storage	-30°C to +45°C

Battery storage:
-30°C to +45°C

Vibration, Impact and Shock:
To EN54 Part 7 1984 (BS5445 Part 7 1984)

IP rating:
43 (with detector fitted)

Weight:
170grams

Dimensions:
103mm diameter;
46mm height

Materials:
Housing: White polycarbonate V-O rated to UL94
Terminals: Nickel plated stainless steel

technical data

RDM PULSE TRANSMISSION TEST HEAD

RDM Pulse Transmission Test Head ▲ **Part Number 55000-801**

APPLICATION

This test head is used during the commissioning of RDM detectors and bases. Full instructions for its use are given in the Installation Guide, part no. 39214-080, which is supplied with RDM bases.

RDM Interface ▲ **Part Number 55000-780**

OPERATING PRINCIPLES

The RDM interface is a loop-powered unit that allows up to eight RDM detectors to communicate with a control panel using XP95 protocol. The interface incorporates a radio receiver and converts the received data into a protocol which is acceptable to XP95 systems. The unit is connected into an XP95 loop and all radio detectors associated with the interface appear as one address on the system, with a Zone Monitor type code.

An LCD display on the interface shows the status of the interface and associated RDM detectors.

Radio Receiver

Radio reception is provided by a high sensitivity narrow band FM receiver module operating at 173.225 Mhz. A half wave, bottom loaded, stainless steel, GRP- sleeved whip antenna is supplied with the interface. The antenna is fitted with 10 metres of cable terminated in a BNC connector.

Antennae can be mounted up to 10 metres away from the interface. The recommended mounting of the receiving antenna is horizontal to coincide with the transmitter RF field. Vertical mounting is permissible, but not recommended, as it can result in range reduction.

The antenna cable should not be shortened unless absolutely necessary - if it is shortened, the connector must be refitted to factory standard.

The interface monitors the following parameters:

1. Verification signals from each radio detector
2. Removal or disconnection of the interface antenna
3. Presence of any other radio detectors not programmed into this interface
4. Presence of a radio signal of sufficient strength and duration to jam or interfere with legitimate signals from detectors.

The interface evaluates the received signals and generates the appropriate messages to transmit to the control panel.

Control and Programming

There are no user controls on the interface. Reset and alarm test operations are carried out via the loop. The interface is fitted with two 7-segment DIL switches, one of which is used to set the loop address in the range 1 to 126.

The second switch is used to set the site code (1 segment), the RDM zone code (2 segments) and the number of detectors reporting to the interface (3 segments). The seventh segment of this switch is used to enable the display of signal strength on the LCD, as an aid to commissioning and fault-finding. This function can also be enabled without opening the interface by placing a magnet on the front face to operate an internal reed switch.

When the signal strength display is enabled, the LCD displays a single digit in the range 1 to 9 on the right of the main display. This figure represents the ratio of the received signal strength of the current event to the background noise level. A level of 9 represents the highest ratio.

Interface Display

The interface status is displayed on the integral LCD. The display indications are:

On The RDM zone is functioning correctly and there are no abnormal conditions

FirE Fire condition. All fault indication is suppressed

bAtt Low detector battery

tPr Tampering with a base or detector has occurred

VEr A detector/base has failed to send a verification signal to the interface for a period of one hour

duAL A verification signal from a specific detector has been received twice within normal verification time, indicating that it is possible there are two or more detectors with the same address in reception range of the interface

Ant The antenna is not connected to the interface

int A strong signal which could interfere with reception of detector signals is present.

rSt The control panel is resetting the unit

tSt The control panel is testing the unit. In this condition the display will also show a single digit representing the background noise level seen by the receiver.

rEC The interface receiver has failed.

A blank screen indicates a software, processor, or power fault.

In fire or detector fault conditions, the display shows alternately the relevant message and the address of the detector concerned. If more than one detector is in a fire or fault condition then the display will scroll through the relevant detector address. Each message is displayed for 1.5 seconds.

Fire and fault conditions are latched by the interface and can only be reset from the control panel.

page 11

PROTOCOL BIT USAGE

The control equipment transmits a 10-bit message to the RDM Interface:

The **output (or forward command) bits** from the control equipment have the following functions:

Output bit 2 is not used.

When **output bit 1** is set to logic 1 on two or more consecutive polling cycles an internal test of the interface is initiated and an analogue value of 64 is sent to the control equipment.

When **output bit 0** is set to logic 0 on two or more consecutive polling cycles the Interface is restored to normal operation.

The next **seven bits** transmitted correspond to the address (as set on the DIL switch) of the device to be polled.

A response message is then sent by the RDM Interface to the control equipment:

The interrupt bit is always set to logic 0

The seven analogue bits are set to return an analogue value of 16 in normal conditions. A value of 64 is sent if any of the detectors serviced by the RDM interface changes to an alarm state. If any fault condition occurs, or a reset is in progress, the RDM Interface returns a pre-set analogue value of 4.

The input bits confirm execution of the commands given in the output bits as follows;

Input bit 2 is always set to logic 0

Input bit 1 is set to logic 1 when the RDM Interface has accepted a command to perform an internal self test.

Input bit 0 is set to logic 1 when the RDM Interface has accepted a command to reset latched alarms and/or faults.

The type bits are used to identify the type of unit making the response. The type code of the RDM Interface is set to 100 00 (bits 2, 1, 0, 4, 3 respectively) which is the same as that of the Zone Monitor. Bits 2, 1, 0, are sent immediately after the input bits. Bits 4 and 3 are sent in the XP95 protocol extension.

The RDM Interface sends seven bits of data to confirm its address and then one bit (XP95 flag) to confirm that the device can use the XP95 protocol.

The RDM Interface sets an alarm flag if its analogue value is 64 and the device has not been polled for one second. This flag is set on the data stream of another device, as described in the XP95 Protocol Guide, PP1036).

The next two bits returned by the device are bits 4 and 3 of the type code.

The next five bits are the second analogue block and are not used by the RDM Interface.

The parity bit is set to logic 1 or logic 0 so that the RDM Interface always responds with an even number of data bits.

The final seven bits are used to transmit the alarm address if the alarm flag is set.

SITE SURVEY

It is strongly recommended that a thorough site survey is carried out prior to installation to confirm that acceptable signal and background noise levels can be achieved on the site. The notes below give guidance on site surveys which can be carried out using an RDM detector and interface.

Detector Locations

These notes refer to the selection of the detector positions to achieve satisfactory radio performance. It must be remembered, however, that the ultimate purpose of the installation is fire detection. Detector positions chosen should therefore satisfy the requirements of BS5839:Part 1, or applicable local codes, to achieve adequate fire detection performance.

To achieve reliable radio communication, detector locations should be selected carefully, bearing in mind the effect of short and long term changes in the environment. For example:

Doors, particularly those with wired glass panels, should be closed during the survey if they are on the transmission path

Shelves empty at the time of the survey could be loaded with material which attenuates radio waves

Cupboard doors, especially if metal, could be left open for long periods and block signals

Walls, floors and ceilings made of reinforced concrete contain a lot of metal, but if a satisfactory signal is obtained during the survey it is unlikely to change

Vehicles entering, leaving, or parked in loading bays can block signals

If a detector must be located in a separate building, the effect of passing or stationary traffic should be considered. Also, where remote detectors are used, seasonal variations in vegetation (such as trees with and without leaves) and other conditions like build-ups of

TECHNICAL DATA

RDM Interface

Specifications are typical and apply at temperature 23°C and relative humidity 50% unless otherwise stated.

Equipment type:
RDM Interface

Part No:
55000-780

Supply wiring:
Two wire supply, polarity insensitive

Supply voltage:
14 to 28V DC

Quiescent current:
15mA typical, 20mA maximum

Protocol amplitude:
5-9V

Radio receiver frequency:
173.225 Mhz (other frequencies may be available for use outside the UK)

Temperature ranges:

Max. continuous operating	+55°C
Min. continuous operating	0°C
Min. operating (no condensation/icing)	-10°C
Storage	-30°C to +45°C

IP rating:
43

Dimensions and weight:
143x90x47mm
(length x height x depth)
270 grams.

Material:
Polycarbonate

Antenna:
Half wave, bottom loaded, stainless steel, GRP sleeved whip antenna; fitted with cable and RF connector.

technical data

snow and ice on a wall or roof have an effect on radio transmission

If possible, locate detectors so that they do not depend for a good signal on open spaces in areas like workshops and warehouses, which could be filled with new machinery or shelving at some time.

Interface Location

The interface itself can be located at any point which is convenient for wiring to the XP95 loop as long as the location allows a suitable position for the antenna.

The antenna location should be selected so that the antenna can be mounted horizontally. Vertical mounting may be acceptable but will result in reduced range. The antenna should not be close to large metal objects such as filing cabinets, or racking for shelves.

Check the composition of the antenna mounting surface: for instance, mounting the antenna on a concrete-clad girder, such as is used in steel framed buildings, may cut out all radio reception from detectors behind the girder.

Avoid placing the interface and antenna near electrical or electronic equipment such as vending machines, microwave ovens, or gaming machines. In particular, computers can be very good radiators of noise across the radio spectrum.

Maximum Number of Zones

It is recommended that no more than two interfaces (ie, 2 zones of RDM detectors) be connected to any XP95 loop and that no more than four zones of RDM detectors be connected to any XP95 system.

If two sites protected by RDM detectors are in close proximity, one should be allocated site code A and the other site code B. In this way, dual signals will be avoided.

This will, obviously, require co-operation between the operators of each site.

Checking Signal and Noise Level

Set the interface address and the configuration switch (see installation guides for Interface and Detectors & Bases, part nos 39214-080 and 39214-081).

Connect the interface to the loop and power up the loop. If after a ten second power-up interval the interface display shows 'Ant', check the antenna connections.

Once the fault has been cleared, the display shows 'An:t' (colon flashes). Reset the control panel to clear the display. (If using the XP95 test set, send a ZMU/CUM 'reset').

A blank display indicates a software or hardware fault or no power to the unit. Check the wiring and setting of address and configuration switches.

Check that the display shows 'on' in quiescent condition after the ten second power-up interval.

Use XP95 test set (or control panel if the facility is available) to remote test the interface and check the background signal. The strength should be 3 or less. Any higher value is unacceptable.

Note: subsequent to commissioning of the interface, RDM bases will be installed and commissioned. If any base is powered up but not fixed to the baseplate or has no detector head fitted, the interface will display the warning 'tPr'. If the process of commissioning lasts longer than an hour, during which time one or more of the bases is unpowered, the interface will display the warning message 'VEr' together with a detector address. The display will scroll if there is more than one message to be shown.

Remove the battery box cover of the first radio base to expose the DIL address switch. Do not install the batteries.

Set up the individual segments of the address switch, working from the left (ON=1, OFF=0).

Detector addresses must start at 1 and be consecutive. An address sequence such as 1, 2, 4, 7, for example, would not be permissible.

Fit pulse transmission test head part no 55000-801, to base **before powering up**. Check that interface signal strength is set to 'on'.

Fit two 9V PP3 batteries into the battery box. Check that the RDM interface alternately displays 'FirE' and the base address.

Fit the radio base to the mounting plate.

If 'duAL' is displayed, two or more detectors with the same address are transmitting and one of the addresses must be changed.

Use a detector removal tool to offer up base with pulse transmission test head to proposed mounting position. The signal strength of the test head with base, as shown on the interface, must be 4 or greater for satisfactory operation. If the signal strength is less than 4, the site survey must be repeated for the location in question.

*Note: after operation the batteries must be removed from each base. Bases **must** be left without power for at least two minutes for capacitors to discharge before being refitted with batteries.*

Alarm Testing

Mount RDM detectors with base and carry out an alarm test on each detector. To do this, first reset the control panel, then place a magnet outside the detector case. This operates the internal reed switch to generate a simulated alarm condition.

(A suitable magnet is available from Farnell, part no 423-142).

When testing an optical detector, wait 15 seconds for the detector to change to the alarm condition.

Check that the LED on the RDM interface displays 'FirE', the detector address and a signal strength indication number. Verify that the main control panel displays an alarm.

Remove the magnet. Reset the control panel (send ZMU/ CUM 'reset' if using XP95 test set) to clear the alarm condition. Check that the RDM interface displays the normal operating code (on), and verify that the detector LED continues to flash (LEDs are programmed to flash for 20 minutes).

Inreface Message Display

FirE	An RDM detector has changed to the alarm condition
bAtt	One or both batteries need to be replaced
tPr	A detector has been removed from its base
VEr	A verification signal has not been received for 1 hour or longer
duAL	Signals are being transmitted by two detectors with identical site codes, zone codes and addresses
int	The level of radio frequency noise is too high for reliable signal transmission
Ant	The antenna is not connected to the RDM base
tSt	The control panel has sent a remote test command to the RDM interface

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