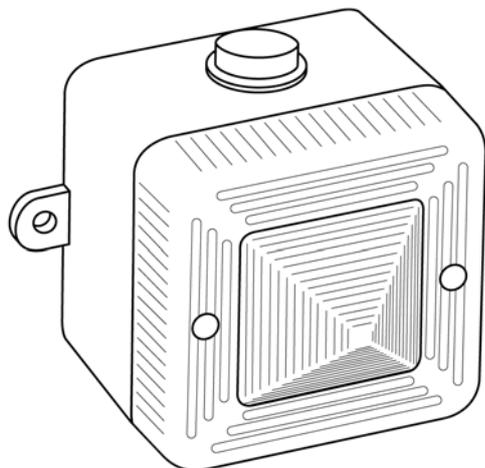


BA386 Flashing intrinsically safe LED beacon



Issue 9 21st Nov 2018

The BA386 beacon is CE marked to show compliance with the European Explosive Atmospheres Directive 2014/34/EU and the European EMC Directive 2014/30/EU

1. INTRODUCTION

The BA386 is an ATEX, IECEx and FM certified intrinsically safe flashing beacon which produces a visual warning in a hazardous area. Five different colours are available. The beacon colour is shown on the external order code label and by the colour of the matching reflector behind the lens.

Order code	Colour
BA386R	Red
BA386A	Amber
BA386G	Green
BA386B	Blue
BA386W	White

The BA386 flashing beacon has been designed and certified to work alone or in conjunction with a BEKA intrinsically safe sounder, enabling an intrinsically safe combined audio and visual alarm to be constructed. The BA386 flashing beacon also contains an alarm accept facility which allows an operator to silence the sounder for a predetermined time while leaving the beacon flashing at twice its normal rate.

An intrinsically safe steady state beacon is also available, see BA386S datasheet.

2. DESCRIPTION

Fig 1 shows a simplified block diagram of a BA386 beacon. The device will start to flash when power is applied to terminals 1 and 2. Terminals 3 & 4 are for the connection of an optional BR385 sounder, which will operate immediately power is applied to the beacon. The sounder may be silenced for a predetermined time by momentarily connecting terminals 5 & 6 together. The silence time may be adjusted between 1 and 30 minutes by a potentiometer inside the beacon. When used alone, i.e. without a sounder connected, two flash frequencies may be selected. With terminals 5 and 6 disconnected the beacon will produce two flashes in quick succession once per second. The flash frequency can be doubled by permanently connecting terminals 5 and 6 together.

When used with a sounder, the beacon produces two flashes in quick succession once per second. When the sounder is silenced the flash frequency is automatically doubled.

3. SUPPLY VOLTAGE

The BA386 beacon has been designed to operate in a hazardous area via a Zener barrier or galvanic isolator. The beacon may be tested or used in safe areas without a Zener barrier or galvanic isolator, but at supply voltages above 16V the internal current limit will function and the brightness may be reduced. The beacon should not be continuously operated without a barrier or isolator with a supply voltage greater than 16V.

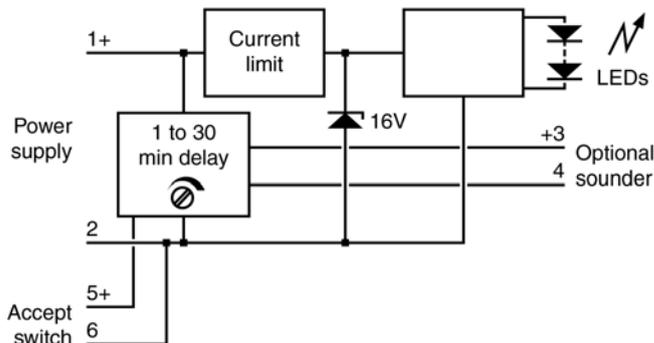


Fig 1 Simplified block diagram

4. INTRINSIC SAFETY CERTIFICATION

The BA386 has IECEx, ATEX and FM certification. IECEx and ATEX intrinsic safety certification is described in this section and FM intrinsic safety and nonincendive approval in Appendix 1.

4.1 ATEX and IECEx certification

Notified Body Intertek Testing and Certification Ltd have issued the BA386 beacon with an IECEx Certificate of Conformity IECEx ITS 17.0052X and with an EU-Type Examination Certificate number ITS02ATEX2006X. The ATEX certificate confirms compliance with harmonised European standards and this has been used to confirm compliance with the European ATEX Directive for Group II, Category 1G equipment. The BA386 beacon carries the community mark and subject to local codes of practice may be installed in any of the European Economic Area (EEA) member countries. ATEX certificates are also acceptable for installations in some non EU countries such as Switzerland.

This instruction sheet describes IECEx and ATEX installations which conform with IEC/EN 60079-14 *Electrical installations design, selection and erection*. When designing systems the local code of practice should be consulted.

4.2 Zones, gas groups and T rating

The BA386 beacon has been certified Ex ia op is IIC T4 Ga. $-40^{\circ}\text{C} \leq T_a \leq 60^{\circ}\text{C}$. When connected to a suitable system the BA386 may be installed in:

Zone 0	explosive gas air mixture continuously present.
Zone 1	explosive gas air mixture likely to occur in normal operation.
Zone 2	explosive gas air mixture not likely to occur, and if it does will only exist for a short time.

Be used with gases in groups:

Group A	propane
Group B	ethylene
Group C	hydrogen

In gases that may be used with equipment having a temperature classification of:

T1	450°C
T2	300°C
T3	200°C
T4	135°C

Although certified -40 and +60°C, the operating temperature of the beacon is -20 to +60°C.

4.3 Special conditions for safe use

The IECEx and ATEX certificates have an 'X' suffix indicating that special conditions apply, please see certificates.

CAUTION

When the BA386 beacon is installed in Zone 0, the installation shall be such that even in the event of rare incidents, an ignition source due to impact or friction between the aluminium label and iron/steel is excluded.

4.4 Certification label information

The certification label is fitted to the side of the beacon. It shows the model number, certification information and BEKA associates address. The year of manufacture is shown on an internal label. The beacon order code and the serial number are on a separate external label.



4.5 Terminals 1 & 2 - power supply

Power is supplied to the beacon via terminals 1 & 2 which have maximum input safety parameters of:

U _i	=	28V
I _i	=	110mA dc
P _i	=	0.8W

BA386 beacons may be powered from any certified Zener barrier or galvanic isolator with output parameters equal to, or less than, these parameters.

The equivalent internal capacitance and inductance C_i and L_i at terminal 1 & 2 of the beacon are both zero, the maximum permitted cable parameters are therefore C_o and L_o specified by the certificate for the barrier or isolator powering the beacon.

4.6 Terminals 3 & 4 - connection for optional sounder

These terminals have the same maximum output safety parameters as the Zener barrier or isolator powering the beacon,

A BEKA BR385 intrinsically safe sounder may be connected to these terminals providing the intrinsically safe output parameters of the barrier or isolator powering the BA386 flashing beacon are equal to or less than:

U _o	=	28V dc
I _o	=	93mA dc
P _o	=	0.66W

If the beacon and sounder are mounted apart, for intrinsic safety assessment the capacitance and inductance of the interconnecting cable should be added to that of the cable connecting the barrier or isolator to the beacon. The total cable capacitance and inductance should be less than C_o and L_o specified by the certificate for the barrier or isolator powering the beacon.

4.7 Terminals 5 & 6 - accept switch

The output safety parameters of these terminals are:

U _o	=	16.8V
I _o	=	1.6mA
P _o	=	7mW

They may be connected to any mechanically operated switch in the same hazardous area as the beacon providing the switch has IP20 protection and can withstand a 500V rms insulation test to earth for 1 minute.

5. INSTALLATION

In addition to the certification requirements shown in section 4 the environmental conditions must be within the limits shown on the product specification. The beacon enclosure provides IP66 protection and is suitable for installation in a sheltered exterior location if an appropriate sealed cable entry is used. Please contact BEKA associates if high vibration is anticipated.

CAUTION

Potential electrostatic charging hazard, do not rub beacon case or lens.

5.1 Mounting

The BA386 beacon may be secured to any flat surface using the two 6mm diameter fixing holes. The lens should be aimed towards the area where maximum visibility is required.

5.2 Installation procedure

- Remove the beacon lens assembly by unscrewing the two captive 'A' screws; carefully pull the assembly away from the back-box.
- Fit an IP66 M20 cable gland or conduit entry into one of the holes in the back-box and surface mount the back-box using the 6mm diameter holes in the two fixing lugs.
- Thread the field wiring through the cable gland or conduit entry in the back-box and connect the cable to the removable terminals on the lens assembly. Carefully replace the lens assembly and tighten the two 'A' screws.

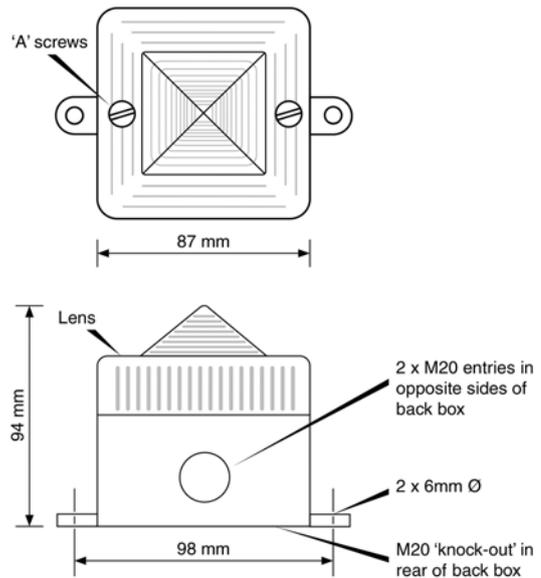
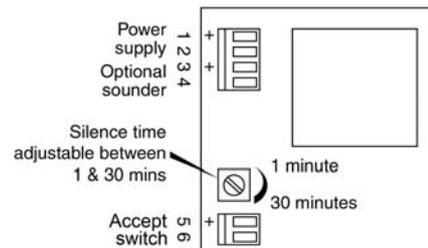


Fig 2 BA386 dimensions



When the beacon is used alone i.e. without a sounder, terminals 5 & 6 should be connected together

Fig 3 Location of field terminals and controls.

6. ELECTRICAL SYSTEM DESIGN FOR INSTALLATION IN HAZARDOUS AREAS USING ZENER BARRIERS

6.1 Stand alone operation

If the beacon is controlled by a switch in the positive supply, or the power supply is being turned *on* and *off*, only a single channel Zener barrier is required as shown in Fig 4. This circuit may also be used if the beacon is being controlled by a mechanically activated switch on the hazardous area side of the barrier. The power supply voltage should be between 20V and the maximum working voltage of the barrier. The circuit will continue to work at lower voltages, but the beacon brilliance will be reduced.

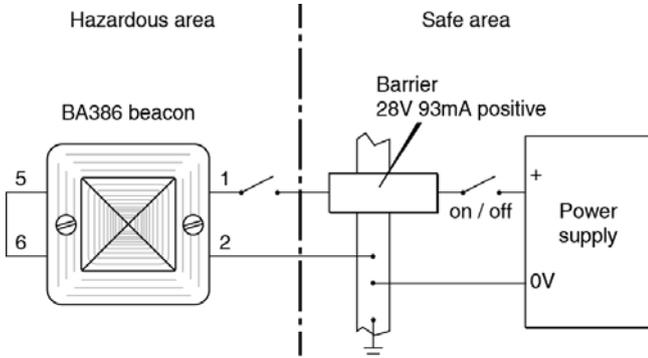


Fig 4 Using a single channel barrier.

If the beacon control switch is in the negative wire and the power supply 0V is earthed, the circuit shown in Fig 5 may be used. For simplicity the two barriers may be combined into one package. The power supply voltage should be between 21V and the maximum working voltage of the 28V barrier. The circuit will continue to work at lower voltages, but the beacon brilliance will be reduced.

Providing a small reduction in brilliance can be tolerated, two BA386 flashing beacons can be powered from one common Zener barrier. Each beacon can be independently controlled by a separate hazardous area switch, or from the safe area using two diode return barriers.

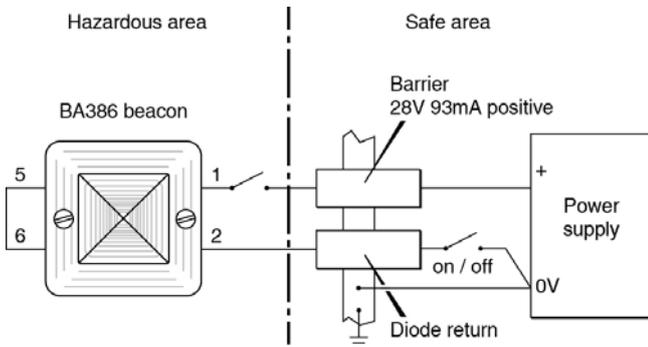


Fig 5 Single stage alarm using two channel barrier.

6.2 Use with a BEKA intrinsically safe sounder

The very low current consumption of the BA386 beacon allows it and a BEKA intrinsically safe sounder to be powered from a common Zener barrier as shown in Fig 6. This reduces the sounder output by about 2dBA.

The BA386 beacon contains an adjustable timer activated by a pair of external contacts which will silence the sounder for up to 30 minutes, but leave the beacon flashing at twice its normal frequency. The sounder silence time is set by a potentiometer inside the beacon as shown in Fig 3. An operator may therefore silence the audible alarm but be continuously reminded of the alarm condition by the beacon. If the alarm is not cleared within the silence time, the sounder will be reactivated. If the alarm is cleared during the silence time the beacon will stop flashing, but the beacon and the sounder will both be re-activated if the alarm recurs.

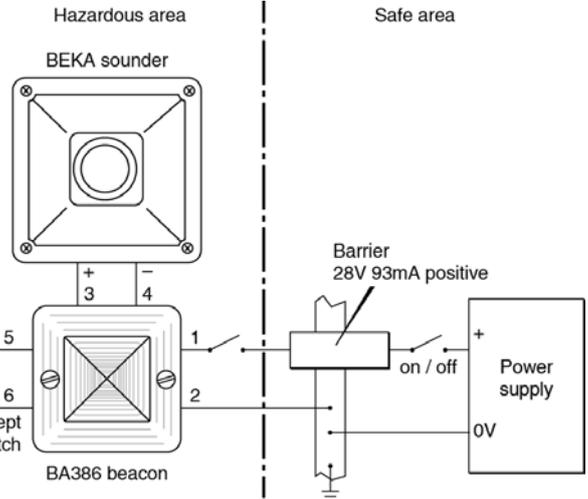


Fig 6 Combined beacon and sounder with alarm accept switch

The accept push button may be any mechanically operated IP20 switch located within the same hazardous area as the beacon, see section 4.7.

The power supply voltage should be between 21V and the maximum working voltage of the 28V barrier. The circuit will continue to work at lower voltages, but the beacon and sounder outputs will be reduced.

7. ELECTRICAL SYSTEM DESIGN FOR INSTALLATION IN HAZARDOUS AREAS USING GALVANIC ISOLATORS.

Although more expensive than Zener barriers, galvanic isolators are easier to install as they do not require a high integrity earth connection. Any certified device with output safety parameters equal to, or less than, the maximum input safety parameters of the BA386 beacon may be used – See section 4.5.

7.1 Stand alone operation

Fig 7 shows the basic circuit that is used for all stand alone applications. The control arrangement will vary depending upon the isolator chosen. The galvanic isolator must be able to supply an output of 25mA at about 16V. This circuit may also be used if the beacon is controlled by a mechanically activated switch on the hazardous area side of the isolator.

Providing a small reduction in brilliance can be tolerated, two BA386 flashing beacons can be powered from one galvanic isolator.

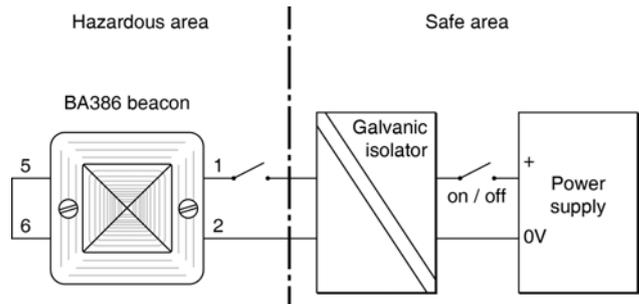


Fig 7 Basic circuit for use with a galvanic isolator.

7.2 Use with a BEKA intrinsically safe sounder

The very low current consumption of the BA386 beacon allows it and a BEKA intrinsically safe sounder to be powered from a common galvanic isolator as shown in Fig 8. This reduces the sounder output by about 2dBA.

The BA386 beacon contains an adjustable timer activated by a pair of external contacts which will silence the sounder for up to 30 minutes, but leave the beacon flashing at twice its normal frequency. The sounder silence time is set by a potentiometer inside the beacon as shown in Fig 3. An operator may therefore silence the audible alarm but be continuously reminded of the alarm condition by the beacon. If the alarm is not cleared within the silence time, the sounder will be reactivated. If the alarm is cleared during the silence time the beacon will stop flashing, but the beacon and the sounder will both be re-activated if the alarm recurs.

The accept push button may be any mechanically operated IP20 switch within the hazardous area, see section 4.7.

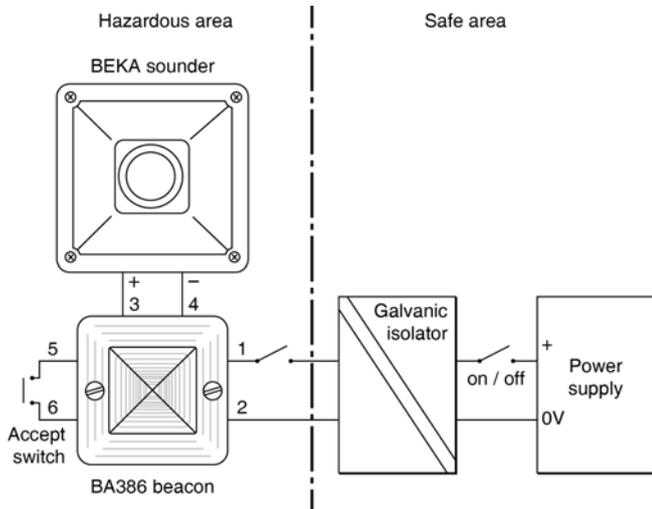


Fig 8 Combined beacon and sounder with alarm accept switch

The chosen galvanic isolator must be able to supply an output of 40mA at about 11V.

8. ACCESSORIES

8.1 Tag number

The BA386 flashing beacon can be supplied identified by a tag number thermally printed on a self adhesive label.

8.2 Beacon to sounder joining kit

Comprises an M20 plastic conduit coupler and gasket enabling the beacon to be mounted onto a BR385 sounder. This kit is supplied free of charge when a beacon and sounder are purchased at the same time.

9. MAINTENANCE

The beacon should be regularly inspected to ensure that it has not been damaged. Frequency of inspection depends upon environmental conditions.

No attempt should be made to repair a faulty BA386 beacon. Suspect beacons should be returned to BEKA associates or our local agent for repair.

10. GUARANTEE

Beacons which fail within the guarantee period should be returned to BEKA associates or our local agent. It is helpful if a brief description of the fault symptoms is provided.

11. CUSTOMER COMMENTS

BEKA associates are always pleased to receive comments from customers about our products and services. All communications are acknowledged and whenever possible, suggestions are implemented.

APPENDIX 1

Installation in USA

A1.1 Factory Mutual Approval

The BA386 beacon has the following Factory Mutual approval.

Intrinsic safety:

Class I Division 1 Gas groups A, B, C & D T4 Ta = 60°C

Class I Zone 0 AEx ia IIC T4 Ta = 60°C

Entity per BEKA Control drawing CI386-12

Nonincendive:

Class I Division 2 Gas groups A, B, C & D T4 Ta = 60°C

Class I Zone 2 IIC T4 Ta = 60°C

Nonincendive per BEKA Control drawing CI386-13

Intrinsically safe installations should comply with BEKA Control Drawing CI386-12 which is appended to the BA386 FM Certificate of Compliance on the BEKA website www.beka.co.uk. BEKA Control Drawing CI386-12 permits the BA386 beacon to power an FM certified BA385-IIC intrinsically safe sounder. The BA385-IIC sounder has been superseded by the FM certified BR385 which is identical to the BA385-IIC except input safety parameters are reduced to 28V, 93mA and 0.66W. See section 4.6.

All the intrinsically safe circuits shown in this instruction sheet may be used for installations in the USA, providing the Zener barriers and galvanic isolators are Factory Mutual approved and comply with the specified entity parameters. Installations must also comply with the appropriate Control Drawing, ANSI/ISA RP12.6 and the National Electrical Code ANSI/NFPA70

A1.2 intrinsic Safety Approval

The BA386 beacon has been evaluated under the entity concept. Terminals 1 & 2 of the beacon may be connected to any intrinsically safe circuit having output parameters equal to or less than:

$$\begin{aligned} V_{oc}, V_t &= 32V \\ I_{sc}, I_t &= 110mA \\ P_o &= 0.8W \end{aligned}$$

The equivalent capacitance and inductance at terminals 1 & 2 are:

$$\begin{aligned} C_i &= 30pF \\ L_i &= 0 \end{aligned}$$

C_i must therefore be subtracted from the maximum permissible cable capacitance specified for the Zener barrier or galvanic isolator powering the beacon.

The BA386 beacon has a T4 rating and may be used at ambient temperatures between -20 and +60°C.

Note: The BA386 beacon is not approved for use with Class II and III dusts and fibres.

A1.3 Terminals 3 & 4 - connection of optional sounder

BEKA Control Drawing CI386-12 permits the BA386 beacon to power an FM certified BA385-IIC intrinsically safe sounder. The BA385-IIC sounder has been superseded by the FM certified BR385 which is identical to the BA385-IIC except input safety parameters are reduced to 28V, 93mA and 0.66W. See section 4.6 of these instructions. Therefore using the entity concept, the BA386 sounder may power a BEKA BR385 sounder providing that the combined sounder and beacon is powered from an FM approved Zener barrier with output parameters equal to or less than:

$$\begin{aligned} U_o &= 28V \\ I_o &= 93mA \\ P_o &= 0.66W \end{aligned}$$

A1.4 Terminals 5 & 6 - accept switch

Factory Mutual Approval

When used with a sounder the alarm accept terminals may be connected to any mechanically operated switch that complies with the requirements for *simple apparatus* e.g. a push-button switch having IP20 protection and able to withstand a 500V rms insulation test to ground for one minute.

A1.5 Nonincendive Approval

The BA386 is also Factory Mutual approved nonincendive for Class I, Division 2 locations. This allows it to be installed in Division 2 without a Zener barrier or galvanic isolator when powered from a Factory Mutual approved associated apparatus having nonincendive output parameters equal to or less than:

$$\begin{aligned} V_{oc} &= 32V \\ I_{sc} &= 110mA \end{aligned}$$

A BA386 beacon should not be used to power a BR385 sounder in a nonincendive system.