INSTRUCTION MANUAL

BA307B & BA308B
2-wire 4/20mA digital indicators

BEKA associates

BEKA Associates Ltd. PO Box 39, Hitchin, Herts. SG5 2DD Tel: Hitchin (0462) 38301

DEC 87

INSTRUCTION MANUAL

for

BA307B and BA308B

Intrinsically Safe 2-wire 4/20mA

Panel Mounting Digital Indicators

C O N T E N T S

BEKA Associates Ltd, PO Box 39, Hitchin, Herts. SG5 2DD. UK
Tel: Hitchin(0462)38301

1. Description

The BA307B and BA308B are 2-wire digital indicators, which display the current flowing in a 4/20mA process loop in engineering units. The BA307B has a 12.5mm high display and the BA308B has a 25mm high display; apart from display and case size, the two indicators are identical.

Both indicators are loop powered and only cause a 1.1V drop which allows them to be installed into almost any 4/20mA current loop. No additional power supply or battery is required.

The main application of the BA307B/BA308B is to display a measured variable or control signal in the process area. The zero and span of the display are independently adjustable so that the indicator can be calibrated to display any linear variable represented by the 4/20mA signal. For example, temperature, pressure, level or actuator position.

Both indicators have been certified intrinsically safe by BASEEFA to the latest CENELEC standard. Because the indicators are virtually non energy-storing, the intrinsic safety certificates permit them to be connected to almost any certified intrinsically safe 4/20mA loop, without the need for additional certification.

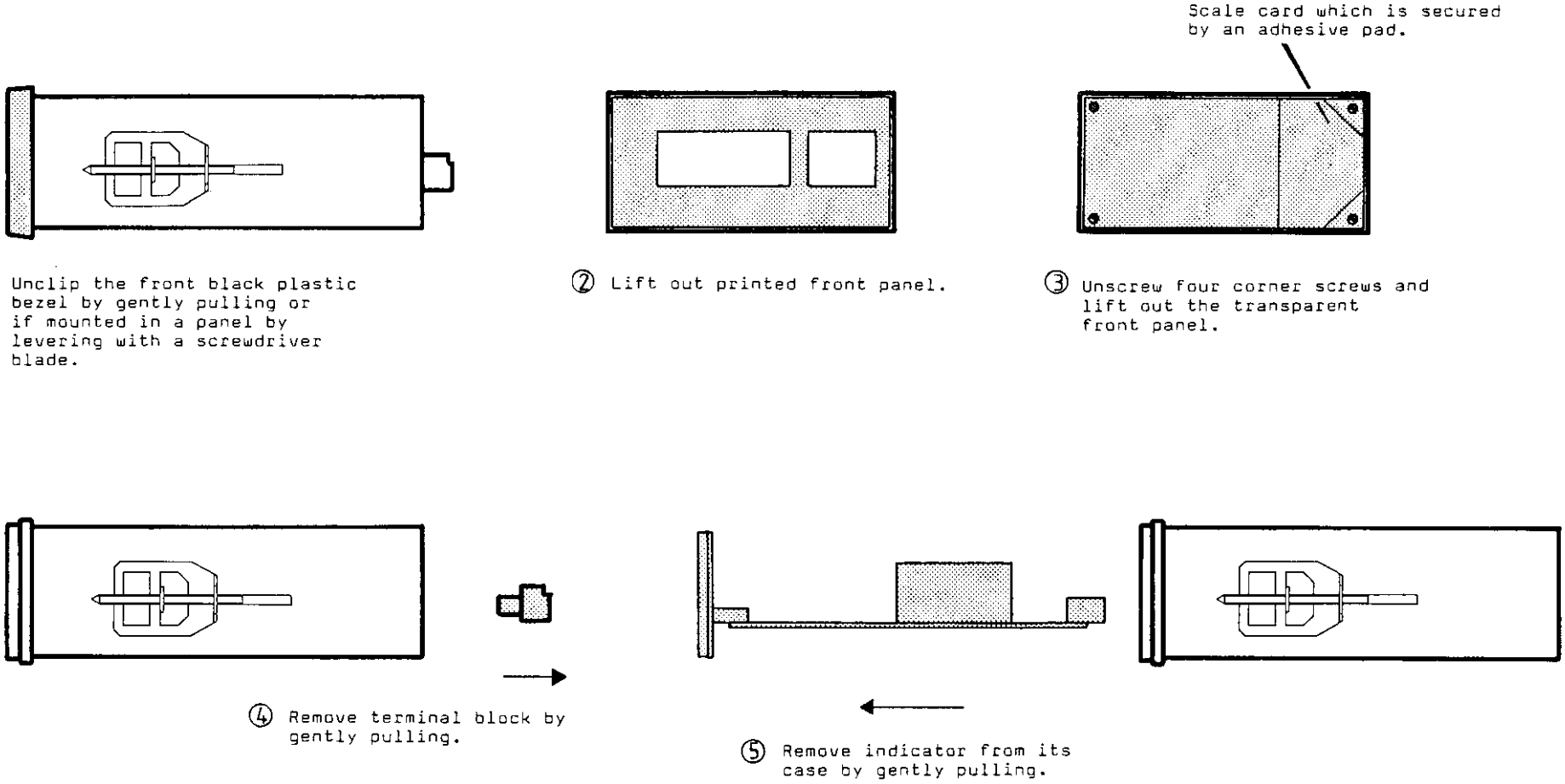


Fig 1 Simplified exploded view of BA307B/BA308B showing disassembly sequence

2. Operation

The BA307B/BA308B indicator is a 2-wire device which is powered by the current it is measuring, it therefore does not require an additional power supply and may be used like a conventional moving coil meter. Fig 2 shows a simplified block diagram of the indicator.

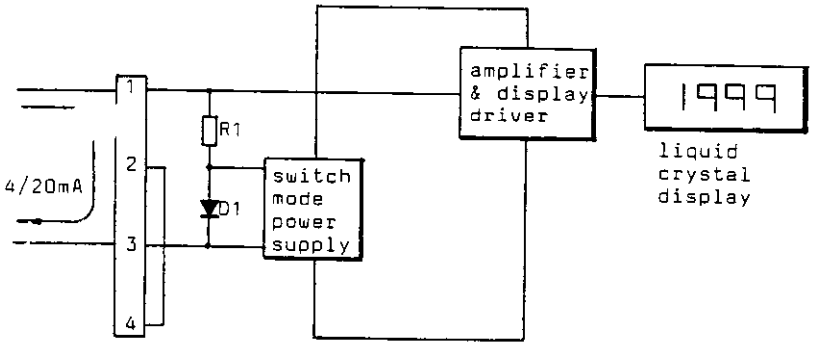


Fig 2 Simplified block diagram of BA307B/BA308B indicator

The 4/20mA current flows through resistor R1 and forward biased diode D1. The voltage developed across D1 is multiplied by the switch mode power supply and used to power the amplifier and liquid crystal display. The voltage developed across R1, which is proportional to the 4/20mA input current, provides the input signal to the display amplifier. Low power MOS semiconductors are used throughout the indicator. The total power consumption is less than 3 milliwatts which enables the voltage drop introduced into the 4/20mA loop to always be less than 1.1V.

3. Application

The BA307B/BA308B indicator will operate in any non-hazardous 4/20mA current loop providing that the loop can tolerate the additional 1.1V drop introduced by the indicator. For hazardous area applications it is also necessary to ensure that the intrinsic safety output parameters of the loop do not exceed those specified on the BA307B/BA308B certificate. These limits are not restrictive and in practice the BA307B/BA308B may be connected to almost any certified 4/20mA current loop without the need for additional certification. However, it is necessary to consider each hazardous area application carefully to ensure that the installation of either indicator will not degrade the safety of the loop.

The following example illustrates some common applications.

3.1 Electrical system design for non-hazardous area installations

The BA307B/BA308B is connected in series with the 4/20mA current loop and introduces a voltage drop, or burden, of up to 1.1V at 20mA. When designing a loop it is therefore necessary to add this voltage to the other voltage drops caused by transmitters and loads and to ensure that the sum of all the voltage drops is less than the minimum power supply voltage. Fig 3 shows a process loop where a 2-wire transmitter is driving a controller.

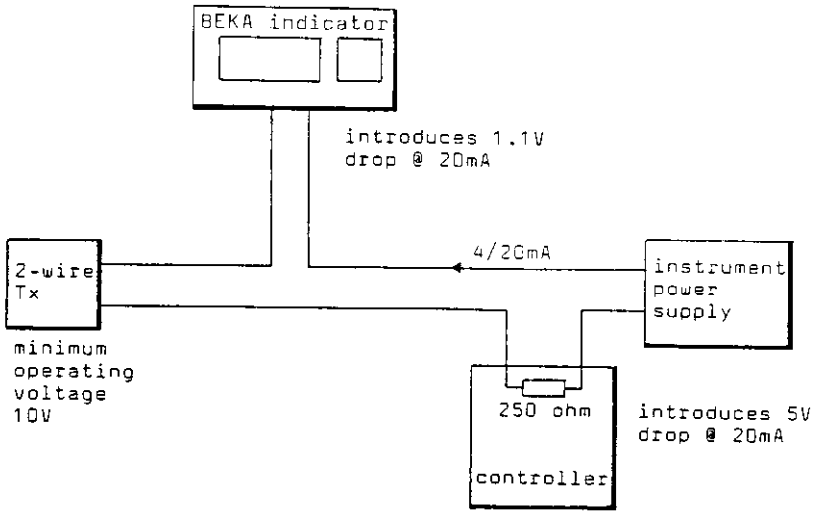


Fig 3 Non hazardous area control loop

Considering the total voltage drop around the loop:

Minimum operating voltage of 2-wire Tx	10.0V
Maximum voltage drop across controller	5.0V
Maximum voltage drop caused by BA307B/BA308B	1.1V
Maximum voltage drop caused by cable resistance	0.4V
	16.5V

The instrument power supply must therefore have a minimum output voltage at 20mA of greater than 16.5V.

The BA307B/BA308B may also be driven directly from any instrument with a 4/20mA output to provide a remote indication. Fig 4 shows a BA307B/BA308B connected to the auxiliary 4/20mA output of a gas analyser. Again it is only necessary to ensure that the voltage capability of the auxiliary 4/20mA output is greater than the voltage drop of the indicator plus any voltage drops caused by cable resistance.

The BA307B/BA308B incorporates protective components to prevent it being damaged by non-repetative transient currents of up to 30A for 15mS. However, when connected to long overhead or underground cables it may be necessary to install a surge protection unit close to the indicator, if it is considered that the cable is likely to be subjected to high transient currents from lightning or electrical switch gear.

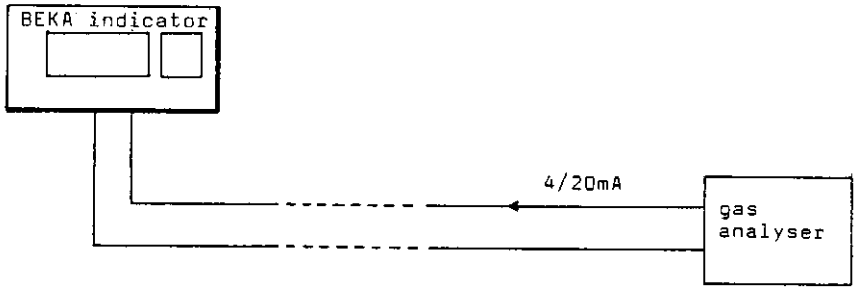


Fig 4 BA307B/BA308B providing remote indication of gas analyser output

3.2 Explanation of intrinsic safety certification

The BA307B/BA308B digital indicators have been certified intrinsically safe by BASEEFA to BS5501:Part 1:1977 EN50 014 and BS5501:Part 7:1977 EN50 020. The indicators bear the Community Mark and subject to local Codes of Practice, may be installed in any of the CENELEC member countries i.e. Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxemburg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom. This instruction manual describes installations which conform with the UK Code of Practice BS5345:Part 4:1977. When designing systems for installation outside the UK, the local Code of Practice should always be consulted.

Reduced copies of the BASEEFA apparatus certificates for the BA307B/BA308B are included as Appendix 1 of this manual. Full size copies are available from BEKA Associates Limited.

The BA307B/BA308B intrinsic safety certificates state that:

> 'For intrinsic safety considerations the output parameters at the apparatus terminals do not exceed those specified in Clause 1.3 of BS5501:Part 1:1977 EN50 014'

Clause 1.3 of BS5501:Part 1 says:

> 'Devices in which none of the values 1.2V, 0.1A, 20µJ or 25mW are not exceeded need not be certified or marked'

This type of apparatus is known as non energy-storing or simple apparatus.

The BASEEFA certificate is therefore saying that although the BA307B/BA308B contains energy-storing components, it has been designed such that the energy which can be released via the two terminals is less than that specified in Clause 1.3 of EN50 014. Either indicator may therefore be installed into certified intrinsically safe loops without invalidating the original certification of the loop. For this reason the BA307B/BA308B only has an apparatus certificate, no system certificate has been issued or is required, because the system certificate of the loop into which the indicator is connected remains valid.

The BASEEFA apparatus certificate allows the BA307B/BA308B indicator to be connected to any intrinsically safe circuit whose output parameters do not exceed the following:

$$I_{max:out} = 215mA$$
$$W_{max:out} = 1.1W$$

The equivalent resistance at the BA307B/BA308B terminals is:

15.4 ohms minimum in normal operation

24.0 ohms maximum under fault conditions

In practice these requirements are not restrictive and allow the BA307B/BA308B to be connected to almost any intrinsically safe 4/20mA loop. The following example illustrates how to determine if a particular loop complies with the requirements. Fig 5 shows the equivalent circuit of an intrinsically safe measurement loop incorporating a 2-wire transmitter, BA307B/BA308B indicator and a two channel Zener barrier. Imax:out is the maximum current which can flow around the loop under fault conditions and is defined by the characteristics of the Zener barrier. In a loop protected by two barriers or by a two channel barrier, each barrier or channel should be considered separately.

The safety description of a Zener barrier specifies the maximum voltage of the terminating Zener diode and the minimum resistance of the terminating resistor. Imax:out for each barrier or channel is therefore:

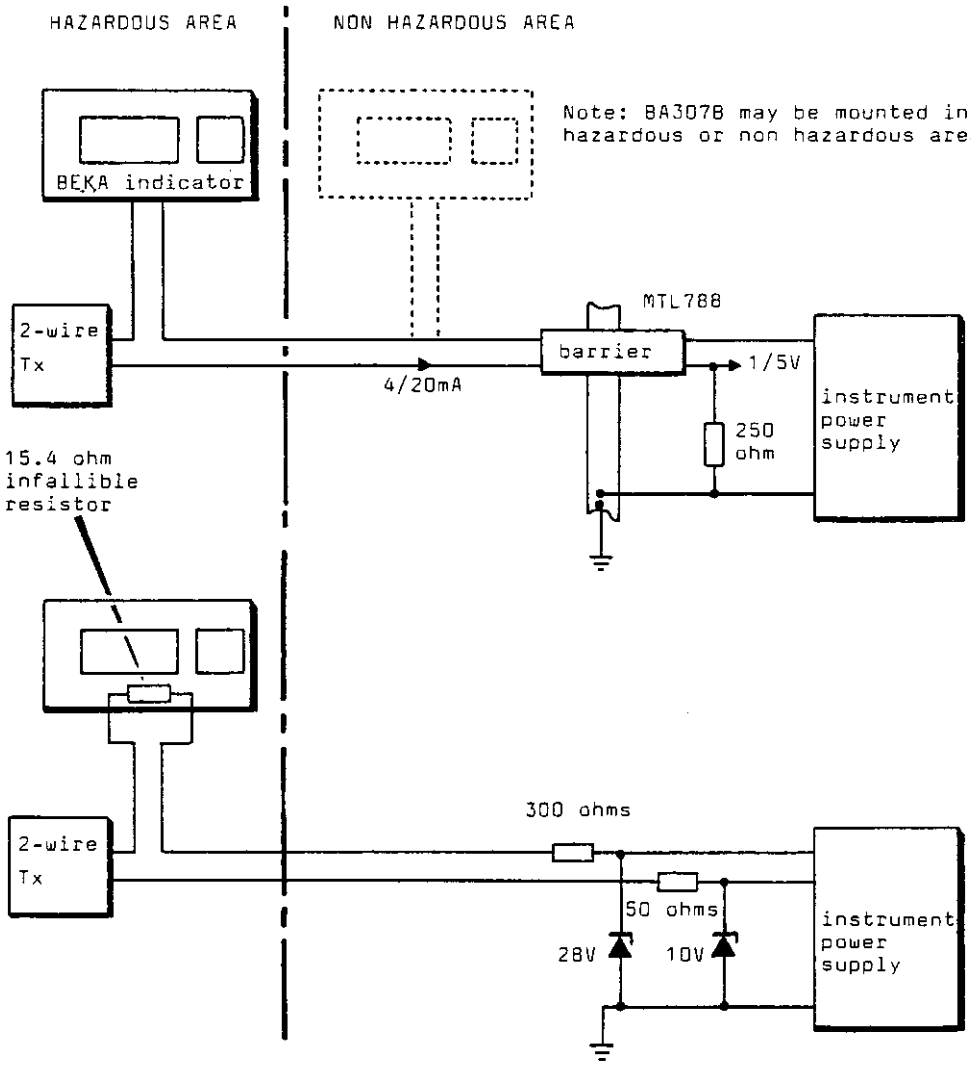
$$Imax:out = \frac{\text{maximum voltage of terminating Zener diode}}{\text{minimum resistance of terminating resistor} + 15.4 \text{ ohms}}$$

The equivalent resistance of the BA307B/BA308B may be added to the terminating resistance because it is an infallible resistance which will increase under fault conditions. The resistance of other instruments and loads in the loop must be considered to be zero unless they have also been certified as infallible.

Wmax:out is the maximum power which can be transferred into the hazardous area by each Zener barrier or channel when perfectly matched, therefore:

$$Wmax:out = \frac{\text{Maximum voltage of terminating Zener diode X Imax:out}}{4}$$

Fig 5 shows how these calculations are applied for a two channel barrier and Appendix 2 lists some of the popular barriers which may be used. Other intrinsically safe power sources should be assessed in the same way as a Zener barrier.



EQUIVALENT CIRCUIT

MTL788 safety description (from manufacturers specification)

	Max Zener voltage	Min terminating resistance
28V channel	28.0V	300.0 ohms
10V channel	10.0V	50.0 ohms

Considering the 28V channel

$$Imax:out = \frac{28.0}{300.0 + 15.4} = 88.78mA$$

$$Wmax:out = \frac{28.0 \times 88.78}{4} = 0.6W$$

Considering the 10V channel

$$Imax:out = \frac{10.0}{50.0 + 15.4} = 152.91mA$$

$$Wmax:out = \frac{10.0 \times 152.9}{4} = 0.38W$$

All calculated figures are below the maximum permitted output parameters specified on the BA307B certificate; the indicator can therefore be connected to the loop without the need for additional certification.

Fig 5 Example of calculations required to establish if a BA307B/BA308B may safely be connected to an intrinsically safe loop

The BA307B/BA308B has been certified EEx ia IIC T4 which means that when connected to a suitable system it 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 or vapours in gas groups:

Group IIA	propane
Group IIB	ethylene
Group IIC	hydrogen

Having a temperature classification of:

T1	$450^{o}C$
T2	$300^{o}C$
T3	$200^{o}C$
T4	$135^{o}C$

This means that the BA307B/BA308B may be installed in all Zones and used with most common industrial gases except carbon disulphide and ethyl nitrate.

Note:

If the certification of the system to which the indicator is connected is more restrictive, then these limitations also apply to the indicator e.g. If the system is only certified for use with gases in Groups IIA & IIB, then the indicator may also only be used in these gases.

The BA307B/BA308B BASEEFA certificates also specify the maximum equivalent capacitance and inductance which can occur between the two terminals of the indicator.

These are:

C_{eq}	= 15nF
L_{eq}	= 2μH

These figures should be subtracted from the maximum cable capacitance and inductance permitted by the system certificate of the loop into which the BA307B/BA308B is installed. In practice this is not restrictive as both reactances are small compared to most permitted cable parameters. Only when 'high voltage' barriers are used with IIC gases will the permitted cable capacitance and hence the cable length be significantly reduced.

3.3 Electrical system design for hazardous area installations

The BA307B/BA308B is connected in series with the 4/20mA current loop and introduces a voltage drop, or burden, of up to 1.1V at 20mA. When designing a loop it is therefore necessary to add this voltage to the other voltage drops caused by the Zener barrier and loads and to ensure that the sum of these voltage drops is less than the minimum power supply voltage - see Fig 6.

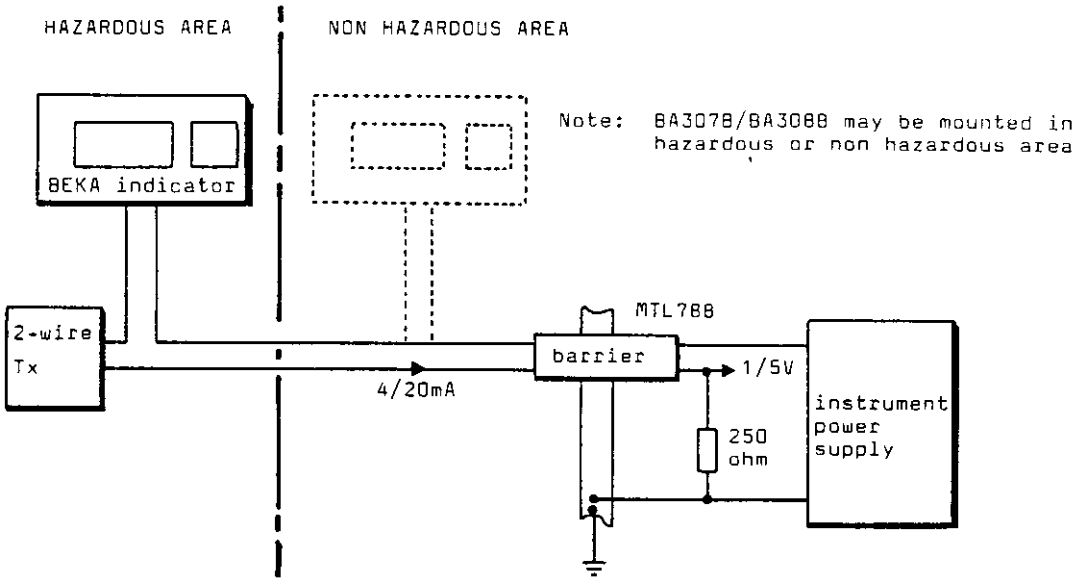


Fig 6 Hazardous area measurement loop

Total voltage drop around loop shown in Fig 6	
Minimum operating voltage of 2-wire Tx	10.0V
Maximum voltage drop caused by 250 ohm load	5.0V
Maximum voltage drop caused by 28V 300 ohm barrier (340 ohms end to end resistance X 20mA)	6.8V
Maximum voltage drop caused by 10V 50 ohm barrier (85 ohms end to end resistance X 20mA)	1.7V
Maximum voltage drop caused by cable resistance (10 ohms X 20mA)	0.2V
Maximum voltage drop caused by BA307B/BA308B	1.1V
Total maximum voltage drop around the loop	24.8V

The instrument power supply voltage must therefore be above 24.8V but below 25.5V which is the maximum working voltage of the 28V 300 ohm channel of the Zener barrier.

Note: Other types of barrier may have different maximum working voltages.

The BA307B/BA308B may be driven via an intrinsically safe interface from any instrument with a 4/20mA output to provide a remote indication in a hazardous area. The type of interface is not critical providing that it complies with the maximum output parameters specified on the BASEEFA certificate. Either a certified intrinsically safe isolator or a Zener barrier may be used.

If one side of the 4/20mA signal is, or may be earthed, then a single channel Zener barrier provides the lowest cost solution. If the 4/20mA signal is not isolated, then two Zener barriers, a two channel Zener barrier or a certified intrinsically safe isolator must be used. Again it is necessary to ensure that the voltage capability of the 4/20mA signal is sufficient to drive the indicator plus voltage drops introduced by the intrinsically safe interface.

Fig 7 shows the two alternative barrier circuits which may be used.

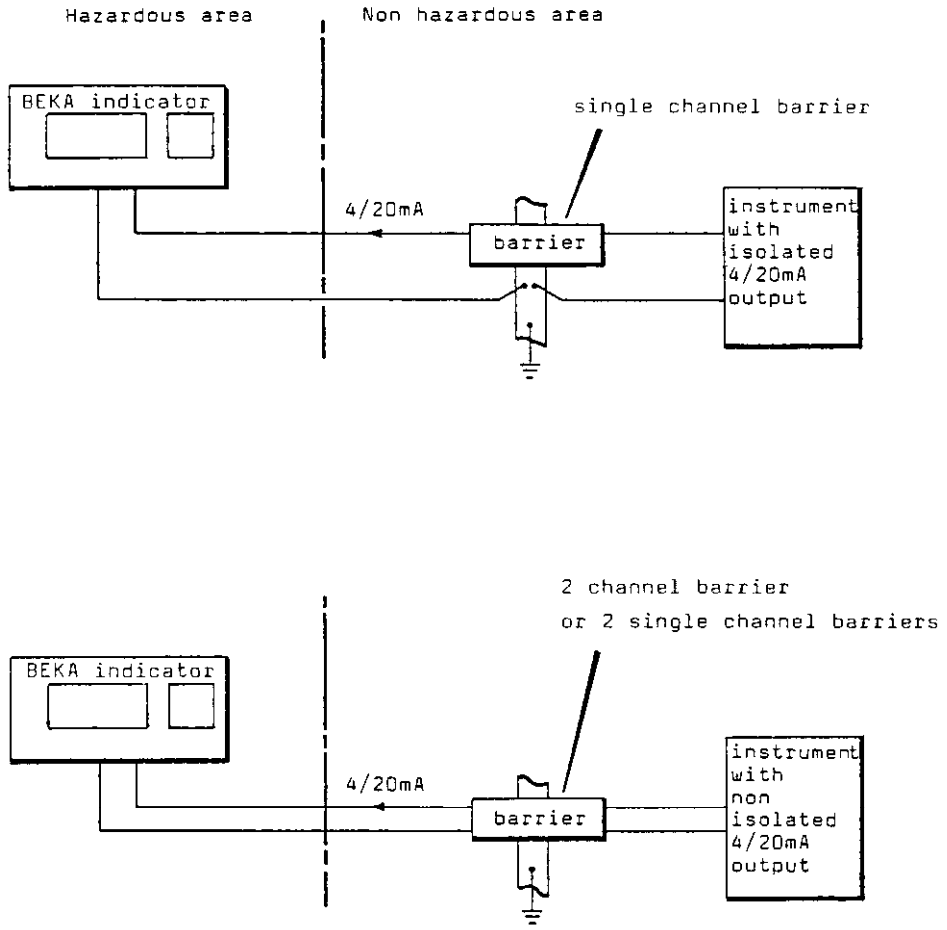


Fig 7 Alternative circuits for remote indication in hazardous area

4. Installation

4.1 Location

The BA307B 4/20mA digital indicator is housed in a standard 48x96mm panel mounting DIN case and may be installed into any panel providing that the environmental limits shown in the specification are not exceeded.

The BA308B 4/20mA digital indicator is housed in a standard 144x72mm panel mounting DIN case and may be installed into any panel providing that the environmental limits shown in the specification are not exceeded.

4.2 Installation procedure

i Insert the indicator into the panel aperture from the front of the panel

ii Clip a retaining bracket to each side of the instrument as shown in Fig 8 and tighten the two screws until the indicator is secure. Do not overtighten.

iii Connect the loop wiring to the terminal block as shown in Fig 9. To ease installation the rear terminal block can be removed from the instrument by gently pulling.

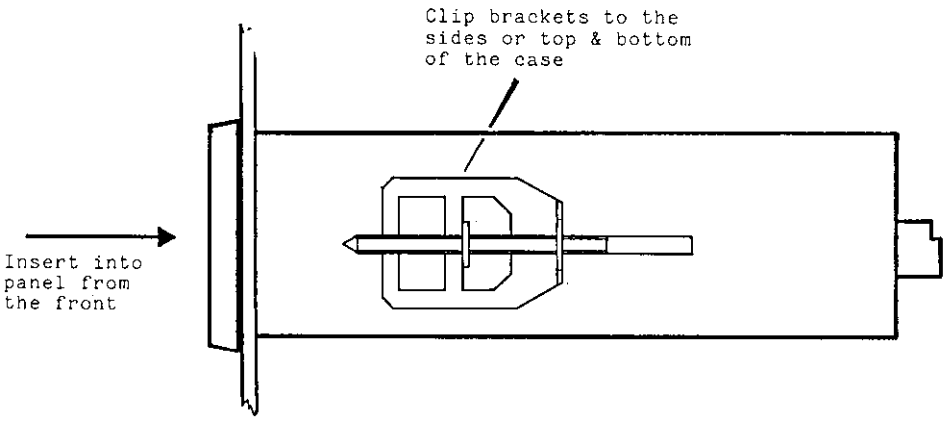


Fig 8 Mounting bracket assembly

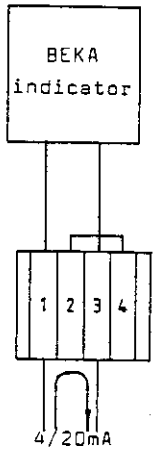


Fig 9 Terminal connections

5. Calibration

The BA307B/BA308B digital indicator will be supplied calibrated as requested at time of ordering. If calibration is not requested, the indicator will be set to display 00.0 at 4mA and 100.0 at 20mA.

5.1 Removal of indicator from case

The span and zero potentiometers are accessible through two holes in the rear panel, minor recalibration can therefore be done in situ.

To obtain access to the calibration links, the indicator must be removed from its case. This can be done with or without the unit mounted in a panel as follows:- (See Fig 1)

i Unclip the front black plastic bezel by gently levering with a screwdriver blade

ii Lift out printed front panel

iii Remove the 4 screws securing the transparent front panel

iv Remove the rear terminal block by gently pulling

v The indicator can now be withdrawn from the front of the case

5.2 Calibration controls

The location of all calibration controls and links are shown in Fig 10.

Zero adjustment

Zero is defined as the figure displayed by the indicator with a 4.000mA input current. The zero may be adjusted to any figure between -1000 and 1000. The position of the suppression/elevation links determines whether a positive or negative number is displayed, and the zero potentiometer sets the exact figure displayed.

With the suppression/elevation links in the suppression position, the unit can be adjusted to display any number between -1000 and 000 with a 4mA input. With the suppression/elevation links in the elevation position, the indicator can be set to display any figure between 000 and 1000 with a 4mA input.

The zero potentiometer has two ranges. With the zero link in position 'A' the zero potentiometer will adjust the figure displayed by the indicator with a 4mA input current between 000 and ±500. With the zero link in position 'B' the potentiometer will adjust the zero between ±500 and ±1000.

Span adjustment

Span is defined as the difference between the number displayed with a 4.000mA input and the number displayed with a 20.000mA input. The span may be adjusted to any figure between 100 and 1000.

The span potentiometer has two ranges. With the span link in position 'C' the span potentiometer will adjust the span to any value between 100 and 550. With the span link in position 'D' the potentiometer will adjust the span to any value between 550 and 1000.

Decimal point

The position of the displayed decimal point is defined by the position of the decimal point selection link.

All the calibration links should be extracted and inserted with a pair of long nosed pliers, taking care not to damage any nearby components.

5.3 Calibration example

The BA307B/BA308B is required to display:

	25.0 with a	4.000mA input
and	115.0 with a	20.000mA input

i.e. A zero of 250 positive
A span of 900
A decimal point at position dp3

The following adjustments are required - See Fig 10.

Step 1 The BA307B/BA308B is required to display a positive zero therefore the suppression/elevation links should be put in the elevation position

Step 2 The required zero is 250 therefore the zero link should be put into the 'A' position

Step 3 The required span is 900 therefore the span link should be put into the 'D' position

Step 4 The decimal point is required between the least two significant digits, therefore the decimal point selection link should be put in position dp3

Step 5 With 4.000mA input current adjust the zero potentiometer until the indicator displays 25.0

Step 6 With 20.000mA input current adjust the span potentiometer until the indicator displays 115.0

Step 7 Repeat steps 5 & 6 until both calibration points are correct. The span and zero controls are almost independent, it should therefore only be necessary to repeat each adjustment two or three times

5.4 Over and underrange

If the display range of the BA307B/BA308B is exceeded i.e. below -1999 or above 1999, the three least significant digits will be automatically blanked. Underrange is therefore indicated by a -1 display and overrange by a 1 display. If the display range is not exceeded the indicator will produce accurate results outside the normal 4/20mA input current range. Although not guaranteed, most BEKA indicators will operate from 3 to 25mA.

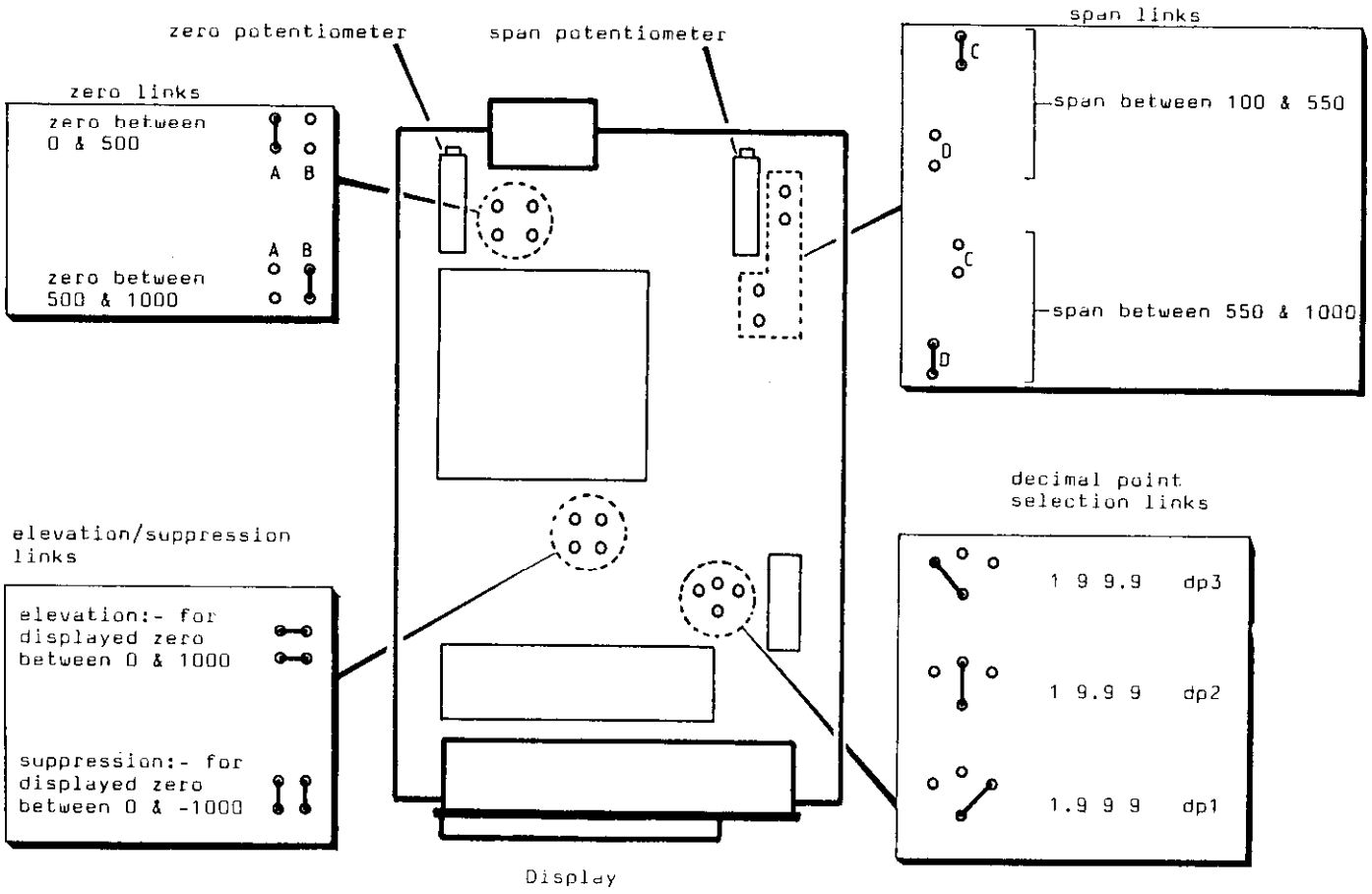


Fig 10 Location of calibration controls

6. Maintenance

6.1 Fault finding during commissioning

If a BA307B/BA308B indicator fails to function during commissioning, the following procedure should be used:

Symptom	Cause	Solution
No display	Incorrect wiring to indicator	Correct wiring error, indicator will not be damaged by reversed connections
Indicator displays 1	Positive overrange	The indicator has been incorrectly calibrated and is trying to display a number greater than 1999
Indicator displays -1	Negative overrange	The indicator has been incorrectly calibrated and is trying to display a number less than -1999
Unstable display More than ±1 digit of jitter	4/20mA input current contains large ripple current	Reduce ripple content
	Insufficient voltage to operate indicator i.e. less than 1.1V	Check supply voltage and voltage drops caused by all components within the loop

6.2 Fault finding after commissioning

> ENSURE PLANT SAFETY BEFORE STARTING MAINTENANCE
>
> Live maintenance is permitted on intrinsically safe equipment installed in a hazardous area, but only certified intrinsically safe electrical test equipment should be used unless a gas clearance certificate is available.

If a BA307B/BA308B indicator fails after it has been operating correctly the following procedure should be used:

Symptom	Cause	Solution
No display: no voltage across terminals	Short or open circuit in wiring or fault in indicator	Check all wiring
Unstable display: More than ±1 digit of jitter	4/20mA current has developed large ripple component	Find source of ripple
	Insufficient voltage to operate indicator i.e. less than 1.1V	Check supply voltage and voltage drops caused by all components within the loop

If this procedure does not reveal the cause of the fault, it is recommended that the indicator is removed from the panel and replaced with another unit. This can be achieved quickly by unplugging the terminal block from the suspect indicator and plugging it into the replacement unit.

6.3 Servicing

The BA3078/BA3088 has been designed so that the indicator can easily be replaced without disturbing the field wiring. All standard BA3078/BA3088 indicators are interchangeable and a single spare instrument is therefore able to replace any indicator which fails. BEKA Associates and most distributors maintain a stock of indicators which can be used if a customer is unable to justify a spare unit on site.

BEKA Associates recommend that, except under exceptional circumstances, faulty indicators are returned to the factory or local agent for repair. However, if this is not possible BEKA Associates will provide a service sheet for the instrument.

If a repaired indicator is to be used in a hazardous area it is essential that the servicing has not degraded the safety of the instrument. The current Code of Practice for Selection, Installation & Maintenance of Electrical Apparatus for use in Potentially Explosive Atmospheres, BS5345:1977, permits on-site maintenance providing that the repairs are inspected by a second competent person and recorded. BEKA Associates again strongly recommend that faulty units should be returned to the factory for repair to ensure that the certification requirements are complied with.

6.4 Warranty

Indicators which fail within the warranty period should be returned to BEKA Associates or the local distributor from whom the instrument was purchased. It is helpful if a brief description of the fault symptoms can be provided.

7. Accessories

7.1 Scale card

The BA307B/BA308B has a front panel window to display the indicators units of measurement e.g. ^{O}C, bar, RPM. BEKA Associates can supply scale cards printed with any information required by the customer i.e. units of measurement, instrument tag number or measurement loop number. If a printed scale card is not requested when the indicator is ordered, a blank card will be provided.

Scale cards can easily be marked on site without removing the indicator from its panel. (See Fig 1).

i Unclip the front black plastic bezel by gently levering with a screwdriver blade

ii Lift out printed front panel

iii Carefully remove scale card which is secured by an adhesive pad

iv Mark legend onto scale card using a stencil or transfer

v Replace scale card in correct position on indicator and reassemble printed front panel and bezel

7.2 Tagging

If it is not acceptable to put tagging information on the scale card, the indicator can be supplied with a separate tagging plate.

8. Customer comments

BEKA Associates is always pleased to receive comments from customers about products and services.
All communications are acknowledged and whenever possible, suggestions are acted upon.

Appendix 1 BASEEFA Certificates

The BA307B/BA308B Certificate is an extension of the certificate for the BA303B field mounting indicator. Reduced copies of these certificates are shown in this Appendix, full size copies are available from BEKA Associates and distributors.

Health & Safety Executive

BASEEFA

British Approvals Service for Electrical Equipment in Flammable Atmospheres

1. **CERTIFICATE OF CONFORMITY**

2. BAS No Ex 832399 dated 27 January 1984

3. This certificate is issued for the electrical apparatus:

   A BA303B 4/20mA DIGITAL METER

4. manufactured and submitted for certification by:

   BEKA ASSOCIATES
   of Hitchin, Herts

5. This electrical apparatus and any acceptable variation thereto is specified in the Schedule to this Certificate and the documents therein referred to.

6. BASEEFA being an Approved Certification Body in accordance with Article 14 of the Council Directive of the European Communities of 18 December 1975 (76/117/EEC) confirms that the apparatus has been found to comply with harmonised European Standards.

   BS 5501:Part 1:1977 EN50 014
   BS 5501:Part 7:1977 EN50 020

   and has successfully met the examination and test requirements which are recorded in confidential Test Report

   ERA Ref 3627/066, Rev 1 dated January 1984
   (Held on File No SFA 12/716/01)

7. The apparatus marking shall include the code

   EEx ia IIC T4 (T_{amb} = 60°C)

   File No SFA 16/263/01

   B HILL
   DIRECTOR

Sheet 1/3

158

BASEEFA Harpur Hill Buxton Derbyshire SK17 9JN Tel 0298 6211 Telex 668113 BLSD G

Certificate BAS No Ex 832399 dated 27 January 1984

8. The supplier of the electrical apparatus referred to in this certificate has the responsibility to ensure that the apparatus conforms to the specification laid down in the Schedule to this certificate and has satisfied routine verifications and tests specified therein.

9. This apparatus may be marked with the Distinctive Community Mark specified in Annex II to the Council Directive of 6 February 1979 (Doc 79/196/EEC). A facsimile of this mark is printed on sheet 1 of this certificate.

Sheet 2/3

This certificate is granted subject to conditions applicable to the Approval Service, it does not necessarily indicate that the apparatus may lawfully be used in particular industries or circumstances.

CERTIFICATE OF CONFORMITY SCHEDULE

NUMBER Ex 832399
DATED 27 January 1984

APPARATUS

A BA303B 4/20mA DIGITAL METER is designed to display the current in a 4/20mA signal loop.

The circuit is arranged on five printed circuit boards in an aluminium alloy enclosure which provides a Degree of Protection of at least IP20.

Intrinsic safety is assured by limitation of capacitance, suppression of inductance by shunt components, internal voltage limitation, and limitation of input current and power.

The apparatus must be connected to an intrinsically safe circuit whose output parameters do not exceed the following :-

$I_{max:out}$ = 215mA d.c.

$W_{max:out}$ = 1.1W

The equivalent resistance of the apparatus terminals is 15.4 ohm minimum in normal operation and 24 ohm maximum under fault conditions. The internal segregation of the meter satisfies the requirements for a peak voltage of 60V.

The equivalent output parameters of the apparatus are :-

$U_{max:out}$ = 1.2V

$I_{max:out}$ = 75mA

$W_{max:out}$ = 20mW

C_{eq} = 0.015μF

L_{eq} = 2μH

For intrinsic safety considerations the output parameters at the apparatus terminals do not exceed those specified in Clause 1.3 of BS 5501 : Part 1 : 1977, EN50 014. The equivalent capacitance and inductance are the result of r.f. suppression components directly connected to the apparatus terminals.

DRAWING

Number	Issue	Date	Description
CI303-001 Sheets 1-9 & 11-16	2	Oct 1983	Certification information

Health & Safety Executive

BASEEFA

British Approvals Service for Electrical Equipment in Flammable Atmospheres

CERTIFICATE OF CONFORMITY VARIATION

THIS IS TO CERTIFY THAT

CERTIFICATE OF CONFORMITY BAS NO Ex 832399

Issued to BEKA ASSOCIATES
of Hitchin, Herts

for the BA 303B 4/20mA DIGITAL METER

is hereby extended to apply to apparatus designed and constructed in accordance with the specification set out in the Schedule of the said Certificate but having the variations specified in the attached Schedule.

Code : EEx ia IIC T4
(Tamb = 60°C)

File : SFA 16/263/01

CERTIFICATE OF CONFORMITY BAS NO Ex 832399/2

B HILL
DIRECTOR
Dated 22 April 1985
Sheet 1/2

309

BASEEFA Harpur Hill Buxton Derbyshire SK17 9JN Tel 0298 6211 Telex 668113 BLSD G

CERTIFICATE OF CONFORMITY SCHEDULE

NUMBER Ex 832399/2
DATED 22 April 1985

VARIATION TWO

To permit the following changes to form a BA 307B 4/20mA Digital Meter.

(1) Re-arrangement of the electronic components onto two printed circuit boards which are mounted in a plastics enclosure.

The enclosure may be panel mounted.

(2) The addition of four resistors R125, R126, R127 and R128 and the removal of diode D201.

The intrinsic safety parameters are not affected by these changes.

DRAWING

Number	Issue	Date	Description
CI 307-001 Sheets 1-12	2	March 85	Certification Information

Sheet 2/2

Variation two for BA307B digital indicator

Health & Safety Executive

BASEEFA

British Approvals Service for Electrical Equipment in Flammable Atmospheres

VARIATION

CERTIFICATE OF CONFORMITY

THIS IS TO CERTIFY THAT

CERTIFICATE OF CONFORMITY BAS NO Ex 832399

Issued to BEKA ASSOCIATES
of Hitchin, Herts

for the BA 308B 4/20mA DIGITAL METER

is hereby extended to apply to apparatus designed and constructed in accordance with the specification set out in the Schedule of the said Certificate but having the variations specified in the following Schedule.

VARIATION THREE

To permit the use of a larger display module housed in a larger meter enclosure to form a BA 308B 4/20mA DIGITAL METER.

DRAWINGS

Number	Issue	Date	Description
CI308-001 Sheets 1-12	-	June 85	Certification Information

Code : EEx ia IIC T4
(Tamb = 60°C)

File : SFA 16/263/01

CERTIFICATE OF CONFORMITY BAS NO Ex 832399/3

B HILL
DIRECTOR

Sheet 1/1

Dated 11 September 1985

344

BASEEFA Harpur Hill Buxton Derbyshire SK17 9JN Tel 0298 6211 Telex 668113 RLSD G

Variation three for BA308B digital indicator

Appendix 2 List of some intrinsically safe interfaces which may be used with the BA307B/BA308B.

This Appendix lists the certified Zener barriers and isolators which may be used with the BA307B/BA308B without the need for additional certification. The list is not intended to show all types which may be used, but merely to identify the industry standard devices which are suitable.

The suitability of other certified intrinsically safe interfaces can be assessed using the technique shown in Section 3.2 of this manual. If in doubt ask BEKA Associates or the distributor from whom you purchased the instrument for advice.

Products from:	Measurement Technology Limited, Power Court, Luton, Beds. LU1 3JJ Tel: Luton (0582) 23633 Telex: 825881
Zener barriers	MTL710, MTL715, MTL722, MTL728, MTL787, MTL788(R) MTL110, MTL115, MTL122, MTL128, MTL187, MTL188(R) MTL322
Isolators	MTL2441, MTL2442
Products from:	Pepperl & Fuchs (GB) Limited, 159 Huddersfield Road, Oldham, Lancs. OL1 3PP Tel: (061) 6336431 Telex: 667308
Zener barriers	Z111Ex, Z119Ex, Z123Ex, Z129Ex, Z211Ex, Z219Ex, Z223Ex, Z229Ex Z111Ex together with Z129Ex Z211Ex together with Z219Ex
Isolators	ZK28Ex
Products from:	Safety Technology Ltd Osborn Way, Station Road, Hook, Hampshire, RG27 9BR Tel: (025672)4879
Zener barriers	E82, E821, E83, E84, E841, E85, E851, E86, E82 + E85
Products from:	R. Stahl Limited, Mole Street, Sparkbrook, Birmingham. B11 1XA Tel: (021) 7728881 Telex: 339477
Zener barriers	8901/31-100/200/60, 8901/31-150/150/60, 8901/31-220/147/60, 8901/31-280/093/60, 8901/31-280/093/60 together with 8901/33-280/000/60, 8901/31-280/093/60 together with 8901/31-100/200/60, 8901/31-280/093/60 together with 8901/31-100/200/62
Isolators	9603, 9611, 9613

Manufacturers listed in alphabetical order