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BEKA *associates*

BA326B
intrinsically safe
2-wire 4/20mA
combined indicator

Instruction manual

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1 Description

The BA326B is an intrinsically safe, panel mounting loop-powered 4/20mA combined analogue and digital indicator for use in hazardous areas. The one hundred segment vertical bargraph provides a quick indication of input current and trend, supported by an accurate digital display which may be calibrated in engineering units.

An optional square root extractor may be fitted so that the indicator can display the output from differential flow transmitters in linear units.

The BA326B has been certified intrinsically safe by BASEEFA to the CENELEC standard. The instrument complies with the requirements for simple apparatus and the certificate permits it to be connected to almost any certified 4/20mA loop without the need for additional certification.

2 Application

2.1 Explanation of intrinsic safety certification

The BA326B combined indicator has been certified intrinsically safe by BASEEFA to BS5501:Part 1:1977 EN50 014 and BS5501:Part 7:1977 EN50 020. The indicator bears 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, Luxembourg, The 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 use outside the UK, the local Code of Practice should be consulted.

A reduced copy of the BASEEFA apparatus certificate for the BA326B is included in Appendix 2 of this manual, full size copies are available from BEKA Associates.

The BA326B intrinsic safety certificate states 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 1:1977 EN50 014 says:

'Devices in which none of the values 1.2V, 0.1A, 20µJ or 25mW are 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 BA326B contains energy-storing components, the indicator has been designed such that the energy which can be released via the input terminals is less than that specified in Clause 1.3 of EN50 014. The indicator may therefore be installed into certified intrinsically safe loops without invalidating the original systems certificate for the loop. For this reason the BA326B only has an apparatus certificate, no systems certificate has been issued, or is required, because the systems certificate of the loop into which the indicator is connected remains valid.

The BASEEFA apparatus certificate allows the BA326B indicator to be connected to any intrinsically safe circuit whose output parameters do not exceed the following:

I_{max}:out 200mA
W_{max}:out 0.85W

The circuit parameters are determined by the Zener barrier or the intrinsically safe isolator powering the loop. The certification documents and manufacturers literature for the barrier or isolator will specify the output parameters, it is only necessary to check that these figures are below the maximum permitted parameters for the BA326B shown above. In practice, the parameters are not restrictive and allow the instrument to be connected to almost any 4/20mA intrinsically safe loop.

When two single channel Zener barriers each of the same polarity are connected to a two wire 4/20mA loop, the output parameters of each channel must be below the permitted parameters shown above.

2.2 Zones and gas groups

The BA326B has been certified EEx ia IIC T5 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 while.

and may be used above ground (group II) with gases or vapours in gas groups:

Group IIA	propane
Group IIB	ethylene
Group IIC	hydrogen

having a temperature classification of:

T1	450°C
T2	300°C
T3	200°C
T4	135°C
T5	100°C

This means that the BA326B may be installed in all Zones and may be used with most common industrial gases.

NOTE: If the certification of the system to which the indicator is connected is more restrictive, then these restrictions also apply to the indicator eg. if the system is certified for use with gas groups IIA & IIB, then the indicator may only be in these gas groups.

2.3 Cable parameters

The BA326B BASEEFA certificate specifies the maximum equivalent capacitance and inductance between the terminals of the indicator.

These are:

$$C_{eq} = 20nF$$
$$L_{eq} = 2\mu H$$

These figures must be subtracted from the maximum cable capacitance and inductance permitted by the system certificate of the loop into which the BA326B is connected. Both reactances are small compared with the permitted cable parameters for most Zener barriers and isolators. Only when 28V devices are used with IIC gases will the permitted cable capacitance, and hence the cable length, be significantly reduced.

2.4 Electrical system design

In addition to the intrinsic safety requirements described in the previous sections, the electrical system design must be considered. The BA326B is connected in series with the 4/20mA current loop and introduces a voltage drop less than 1.1V at all currents between 4 and 20mA. When designing a loop it is therefore necessary to add this voltage to the other voltage drops caused by Zener barriers and loads, and to ensure that the sum of these voltages is less than the minimum power supply voltage. Fig 1 shows a typical hazardous area measurement loop protected by a two channel Zener barrier. Considering the voltage drops around the loop.

Minimum operating voltage of 2-wire Tx	10.0V
Maximum voltage drop caused by 250 Ω load	5.0V
Maximum voltage drop caused by 28V 300 Ω barrier (340 Ω end to end resistance x 20mA)	6.8V
Maximum voltage drop caused by 10V 50 Ω barrier (85 Ω end to end resistance x 20mA)	1.7V
Maximum voltage drop caused by cable resistance (10 Ω x 20mA)	0.2V
Maximum voltage drop caused by BA326B	1.1V
Total maximum voltage drop around the loop	24.8V

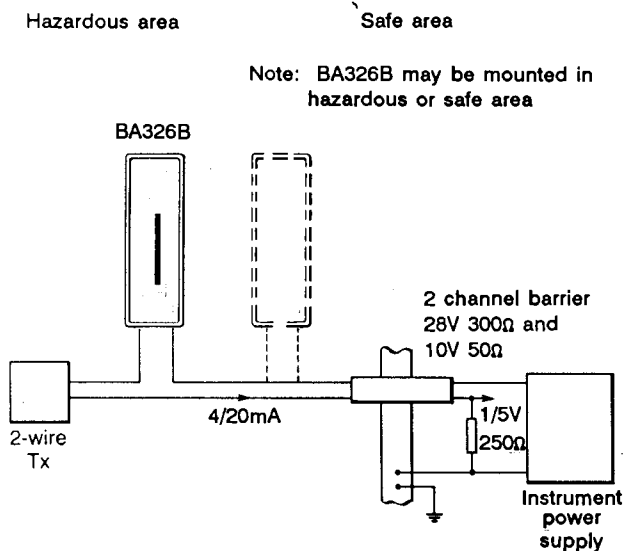


Fig 1 Hazardous area measuring loop

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 Ω channel of the Zener barrier.

The Zener barrier may be replaced by a certified intrinsically safe galvanic isolator which eliminates the need for a high integrity earth connection. Again the voltage drops around the loop should be added together to ensure that there is sufficient voltage to operate the transmitter and the indicator.

The BA326B may also 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 interface may be a Zener barrier or intrinsically safe galvanic isolator providing that it complies with the requirements specified in the BA326B certificate which are explained in sections 2.1, 2.2 & 2.3 of this manual.

If one side of the 4/20mA signal may be earthed a single channel Zener barrier provides the lowest cost solution. If the 4/20mA signal is not isolated, two Zener barriers or a galvanic 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 the voltage drops introduced by the Zener barrier(s) or isolator.

Fig 2 shows the alternative circuits which may be used.

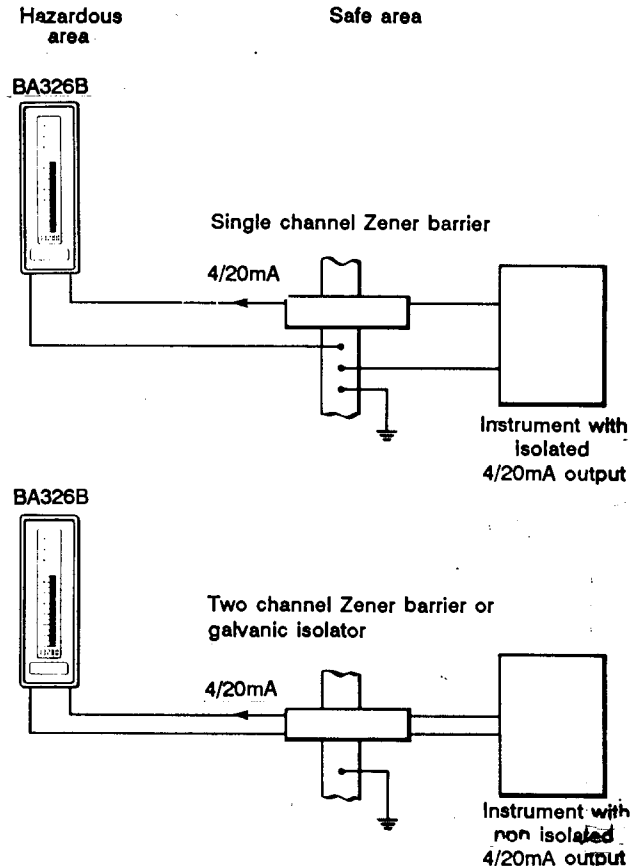


Fig 2 Alternative circuits for remote indication in hazardous area

3 Installation

3.1 Location

The BA326B is housed in a standard DIN case which may be installed into any panel providing the environmental limits shown in the specification are not exceeded. The instrument front panel provides IP65 protection which prevents the ingress of dust and liquids. When the joint between the instrument and the mounting panel must also be sealed, great care should be taken to ensure that the panel aperture is within the tolerances shown in Fig 3 and that the edges of the aperture are flat. The neoprene gasket supplied with the BA326B will seal this joint, however if conditions are not ideal we recommend that the interface is sealed with a liquid gasket such as silicone rubber.

When sealing between the front and rear of the panel is not required the larger aperture specified in DIN43700 may be used.

For maximum mounting density without panel sealing, any number of instruments may be mounted in a common aperture ((N x 42) -3)mm wide, where N is the number of indicators.

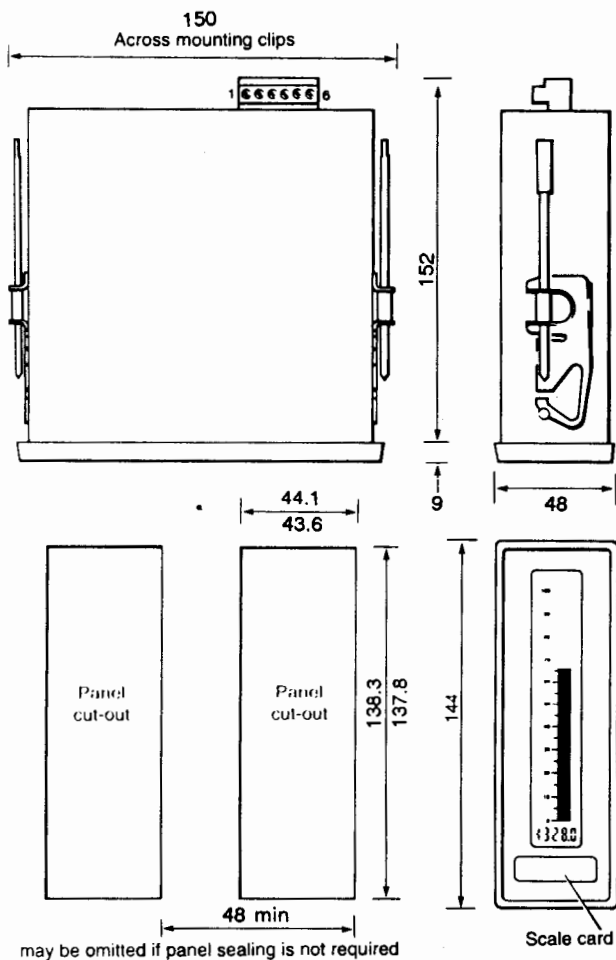


Fig 3 Dimensions

3.2 Installation procedure

1. Insert the indicator into the panel from the front ensuring that the gasket is correctly positioned.
2. Fit a panel mounting clip to the top and bottom of the instrument and tighten until the indicator is secure.
3. Connect the loop wiring to the terminal block as shown in Fig 4. To ease installation the terminal block can be removed from the instrument by gently pulling.

Terminals 2 & 4 internally linked for joining return 4/20mA wire.
Terminals 5 & 6 internally linked for joining cable screens.

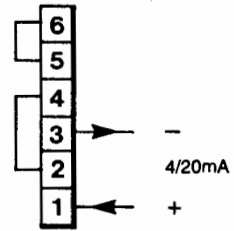


Fig 4 Terminal connections

4 Calibration

The calibration of the digital display is fully adjustable so that the instrument can be set to display in engineering units any variable represented by the 4/20mA current. A dummy trailing zero may be selected to increase the maximum display to 19990.

The analogue bargraph is preset to display 0% with 4mA input and 100% with 20mA input. A small amount of adjustment is available which may be used to compensate for any drift or change in span when a root-extractor board is added or removed.

The span and zero potentiometers for the digital display are accessible through two holes in the rear panel, recalibration not requiring changes to the position of links can therefore be accomplished in situ without removing the indicator from its case.

4.1 Removal of indicator from case

To obtain access to the calibration links the indicator must be removed from its case, this can be done with or without the BA326B mounted in a panel. Unscrew the four M2 screws in the corners of the rear panel. Disconnect or unplug the field wiring and gently withdraw the instrument from the case as shown in Fig 5.

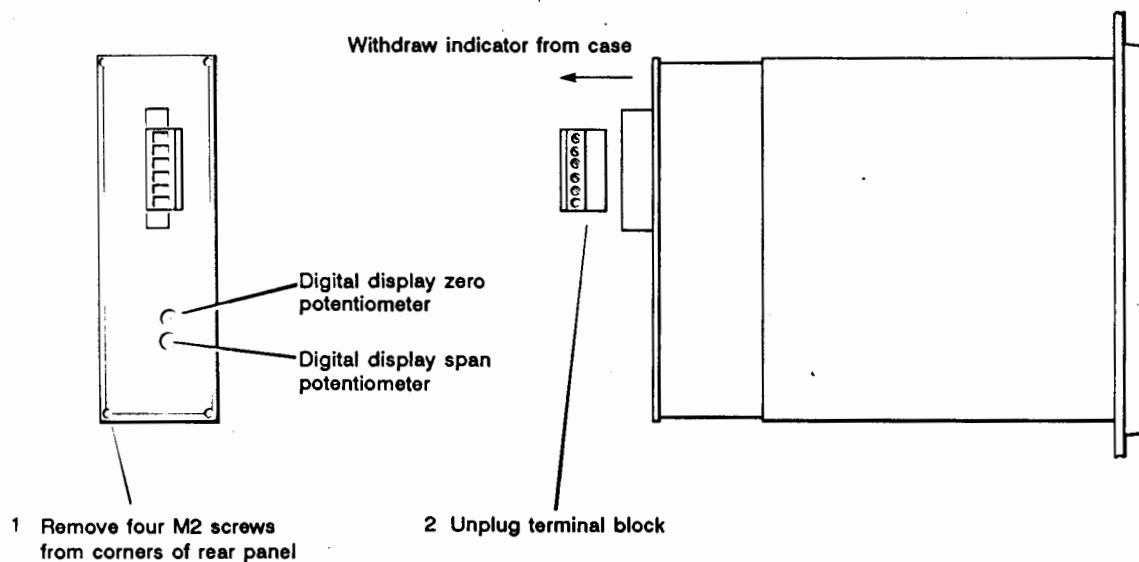


Fig 5 Removing indicator from case

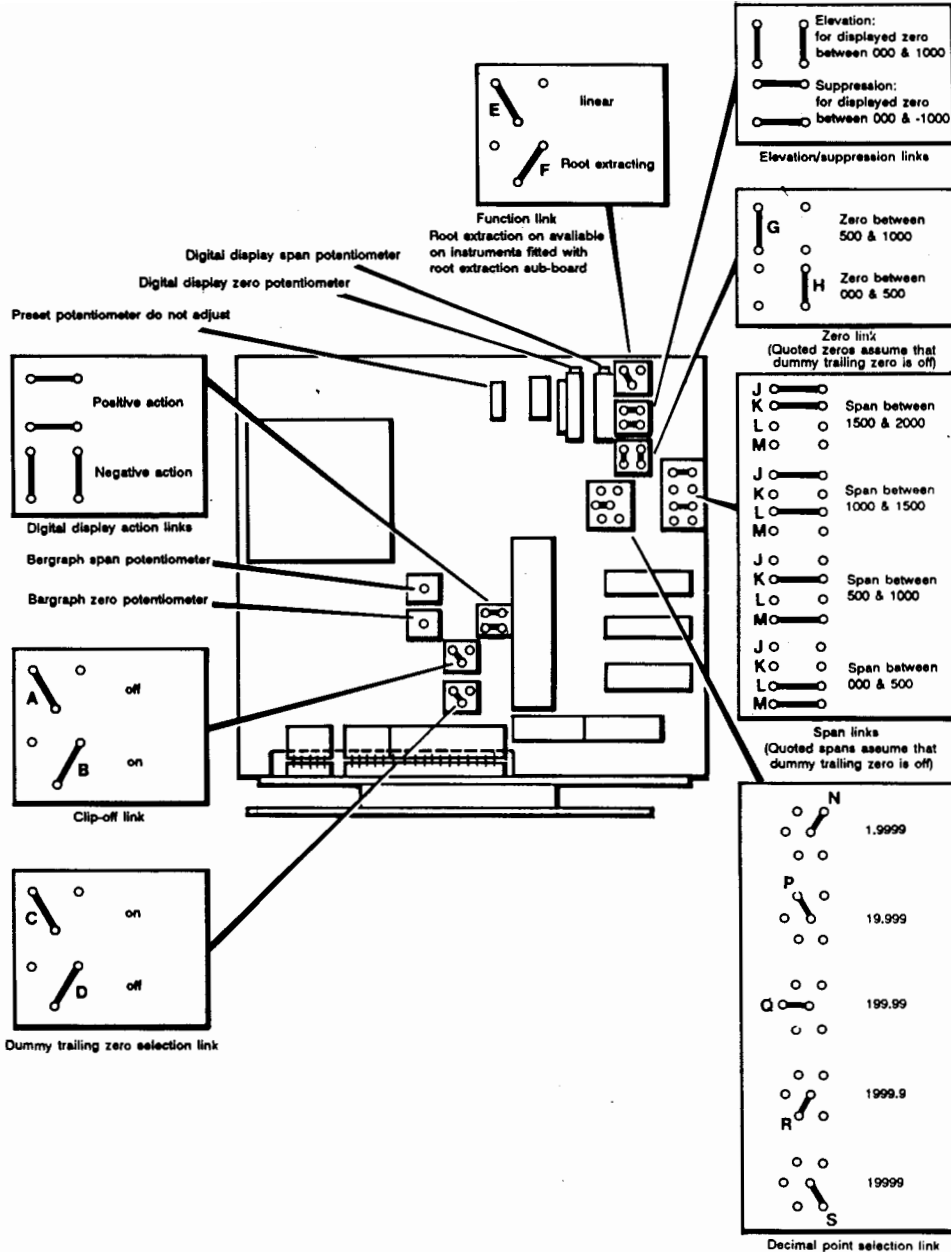


Fig 6 Positions of calibration controls and links

4.2 Calibration controls

The locations of the calibration controls and links are shown in Fig 6.

Zero Adjustment

Zero is defined as the figure displayed by the digital 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.

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

The zero potentiometer has two ranges. With the zero link in the 'H' position the zero potentiometer will adjust the figure displayed by the indicator with a 4mA input between 000 and 500. With the zero link in position 'G' 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 000 and 2000.

The span has four equal ranges which are selected by the position of links 'J', 'K', 'L' and 'M'

Display Action

The position of the display action solder-in links determine whether the digital display increases or decreases with increasing input current. The analogue bargraph is not affected by the position of these links.

Dummy Trailing Zero

A dummy trailing zero can be added after the 3½ digit display to increase the range of engineering units which can be represented.

Decimal Point

The position, or absence, of the displayed decimal point on the digital display is defined by the position of the decimal point selection link.

Linear/Square Root Extraction

This link selects the square root extractor sub board when fitted.

Clip-Off

Clip-off, which is intended for use with the square root extractor, forces both the analogue and digital displays to zero when the input current falls below 4.04mA (5% flow).

4.3 Calibration procedure for a linear Indicator

The first step is to interpret the required digital display calibration and determine the position of the plug-in links. It is then only necessary to set the exact zero and span of the digital display using the two potentiometers accessible through the rear panel.

For example if the indicator is required to display:

25.0 with a 4.000mA input
and 180.0 with a 20.000mA input

Ignoring the decimal place this corresponds to:

- A zero of 250 positive
- A span of 1550
- Display action positive
- Trailing dummy zero off
- A decimal point before the least significant digit
- Linear transfer function
- Clip-off off

The following adjustments are required:

Step 1

The indicator 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 'H' position.

Step 3

The required span is 1550, therefore the span links should be put into the 'J' and 'K' positions.

Step 4

The required digital display does not exceed 1999 so the dummy trailing zero is not required. The trailing zero link should therefore be put in the 'D' position.

Step 5

The decimal point is required before the least significant active digit, therefore the decimal point selection link should be put in the 'Q' position.

Step 6

The transfer function of the indicator is linear so the linear/square root-extracting link should be placed in the 'E' position.

Step 7

Clip-off is not required for a linear indicator so this link should be placed in the 'A' position.

Step 8

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

Step 9

With 20.000mA input current adjust the span potentiometer until the indicator displays 180.0

Step 10

Repeat steps 8 and 9 until both calibration points are correct. The span and zero controls are almost independent, so it should only be necessary to repeat each adjustment two or three times.

4.4 Square root extractor

The square root extractor sub board enables the BA326B to display square law flow signals in linear engineering units. The root extractor provides linearisation between 4.16 and 20mA, so the indicator will accurately display the flow in linear units between 10 and 100% of full flow. The linearisation continues to operate with slightly reduced accuracy down to 2.5% of maximum flow. To mask flowmeter inaccuracies the link selectable clip-off forces both displays to zero when the flow falls below 5% (4.04mA).

Most flowmeters and the square root extractor in the BA326B operate with reduced accuracy below 10% of maximum flow. The indicator zero control should therefore be adjusted to give the required display at 4.16mA, which corresponds to 10% of maximum flow. The zero control must not be adjusted to give a zero display at 4mA.

For reference the following table shows the output current from a non-linearised flowmeter.

% of full flow	Current output mA
2.5%	4.01mA
10%	4.16mA
25%	5.00mA
50%	8.00mA
75%	13.00mA
100%	20.00mA

4.5 Calibration procedure for an Indicator with square root extractor

As with a linear indicator it is first necessary to interpret the required digital display calibration and determine the position of the plug-in links. It is then only necessary to adjust the zero and span potentiometers to give the required display at 10 and 100% of flow.

For example, if the BA326B is required to display the 20mA output from a flowmeter as 18000 Litres per minute, this corresponds to:

- A span of 18000 (1800 plus dummy trailing zero)
- Display action positive
- Dummy trailing zero on
- Decimal point absent
- Square root transfer function
- Clip-off on

The following adjustments are required:

Step 1

When root extraction is used the BA326B may not have zero suppression or elevation. The zero suppression/elevation links must always be put in the elevation position and the zero link in the 'H' position.

Step 2

The required span is 1800 plus a dummy trailing zero, therefore the span links should be put into the 'J' and 'K' positions.

Step 3

The required digital display exceeds 1999 so the dummy trailing zero is required. The dummy trailing zero link should therefore be put in the 'C' position.

Step 4

No decimal point is required therefore the decimal point selection link should be put in the 'S' position.

Step 5

Square root extraction is required so the linear/root-extracting link should be placed in the 'F' position.

Step 6

Clip-off is required so this link should be placed in the 'B' position.

Step 7

With 4.160mA input current adjust the zero potentiometer until the indicator displays 1800

Step 8

With 20.000mA input current adjust the span potentiometer until the indicator displays 18000

Step 9

Repeat steps 7 and 8 until both calibration points are correct.

4.6 Over and under-range

If the digital display range is exceeded ie. below -1999 or above 1999 ignoring the dummy trailing zero, the three least significant active digits will be blanked. Under-range is indicated by -1bbb and over-range by 1bbb, or -1bbb0 and 1bbb0 respectively if the dummy trailing zero has been selected. Note: A blank digit on the display is denoted by 'b' in this manual.

The bargraph displays an arrow pointing upwards when the input current exceeds 20.08mA. Below 4mA a single negative segment is activated between 3.76 and 3.92mA, below 3.76mA the bargraph is blanked.

4.7 Calibration of the bargraph

Two preset potentiometers allow the span and zero to be adjusted by a few percent to compensate for drift and variations in span when changing between linear and root extraction.

4.7.1 Linear Indicator

The following adjustments are required:

Step 1

With 3.92mA input current adjust the bargraph zero potentiometer until the bargraph just starts to make a transition from 0% to -1%.

Step 2

With 19.92mA input current adjust the bargraph span potentiometer until the bargraph just starts to make a transition from 100% to 99%.

Step 3

Repeat steps 1 and 2 until both calibration points are correct.

4.7.2 Indicator with square root extraction

The following adjustments are required:

Step 1

With 4.16mA input current which is equivalent to ten

percent of maximum flow, adjust the bargraph zero potentiometer until the 10% bar of the bargraph is on.

Step 2

With 19.92mA input current adjust the bargraph span potentiometer until the bargraph just starts to make a transition from 99% to 100%.

Step 3

Repeat steps 1 and 2 until both calibration points are correct.

5 Maintenance

5.1 Fault finding during commissioning

If a BA326B Indicator fails to function during commissioning the following procedure should be followed:

Symptom	Cause	Solution
No displays	Incorrect wiring to indicator	Correct wiring error, indicator will not be damaged by reversed connections.
Indicator displays 1 or 1bbb0 if dummy zero is activated	Positive over-range	The digital indicator has been incorrectly calibrated & is trying to display a number greater than 1999 or 19990 if the dummy zero is activated.
Indicator displays -1 or -1bbb0 if dummy zero is activated	Negative over-range	The digital indicator has been incorrectly calibrated & is trying to display a number less than -1999 or -19990 if the dummy zero is activated
Unstable analogue or digital display	4/20mA input current contains large ripple current	Reduce ripple current
	Insufficient voltage to operate indicator ie. less than 1.1V loop	Check supply voltage & drops caused by all components in the loop

5.2 Fault finding after commissioning

If a BA326B indicator fails after it has been operating correctly, the following procedure should be followed.

ENSURE PLANT SAFETY BEFORE STARTING MAINTENANCE

Symptom	Cause	Solution
No displays, no voltage across indicator terminals	Short or open circuit in loop wiring, or fault in indicator	Check all wiring
Unstable analogue or digital display	4/20mA current has developed a large ripple current	Check supply voltage & drops caused by all components within the loop

If the above procedure does not reveal the cause of the fault, it is recommended that the indicator is removed from the panel and replaced with another BA326B. This can be achieved quickly by unplugging the terminal block from the suspect indicator and plugging it into a replacement.

5.3 Servicing

The BA326B can be easily calibrated on site, so a single spare indicator may be used to replace any instrument which is damaged or fails.

We recommend that except under exceptional circumstances faulty indicators are returned to our factory or local agent for repair. However, if this is not possible we will provide service information for the instrument.

5.4 Warranty

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

6 Accessories

6.1 Scale Card

The BA326B has a window below the digital display to hold a card showing the units of measurement eg. Litres. The BA326B can be supplied with any legend specified by the customer at the time of ordering.

If a printed scale card is not requested, a blank scale card will be supplied which can easily be marked on site by removing the indicator from its enclosure as shown in Fig 5.

6.2 Tag strip

The BA326B can be supplied with a thermally printed tag strip screwed to the rear of the indicator case. This tag is not visible from the front of the instrument after installation.

7 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: Product specification

Input

Current	4 to 20mA
Voltage at 4mA	Less than 0.7V at 20°C
20mA	Less than 1.0V at 20°C
	1.1V at -20°C
Overrange	±200mA will not cause damage

Display

Type	Multiplexed liquid crystal
Analogue	103 segment bargraph 95mm long
Digital	3½ active digits 5.5mm high, plus dummy trailing zero selected by a plug-in link.
Span (without dummy zero)	For 4 to 20mA input adjustable between: 000 and ±1999
Zero (without dummy zero)	Adjustable between: 000 and ±1000
Polarity	Automatic minus sign
Decimal point	1 of 4 positions or absent, selected by internal plug-in link.
Overrange	3 least significant active digits blanked.

Accuracy

At 20°C including non-linearity & hysteresis	±0.5%
Analogue display	±1 digit ignoring dummy trailing zero.
Digital display	
Temperature effect on:	Typ ±0.5% between -10 & +55°C
Analogue display	
Digital display	
Span	Typ 50ppm, max 100ppm/°C
Zero	Typ 0.05 digit ±100ppm/°C
Series mode rejection	
Analogue display	Typ ±0.5% error for 1mA pk to pk 50° or 60Hz signal.
Digital display	Typ 1 digit error for 1mA pk to pk 50 or 60Hz signal.
Radio frequency rejection	Less than 1% error for 10V/m field strength between 27MHz and 1GHz ERA test report 5044/6V4

Intrinsic safety

Europe (BASEEFA)	
Standard	BS5501:Part 7:1977:EN50 020
Code	EEx ia IIC T5
Certificate No.	Ex 93C2181
Output parameters	
U _{max} :out	1.12V
I _{max} :out	73mA
W _{max} :out	20mW
C _{eq}	15nF
L _{eq}	2µH
Location	Zone 0, 1 or 2

Complies with Clause 1.3 of BS5501:Part 1 1977:EN50 014 'Non energy-storing apparatus'

Environmental

Operating temperature	-10 to +55°C
Humidity	To 95% at 40°C

Mechanical

Case	48 x 144mm DIN enclosure Front IP65 Rear IP20
Terminals	Screw clamp for 0.5 to 1.5mm cables.
Weight	0.5kg

Accessories

Square root extractor	Plug-in card to linearise output from differential flow transmitters with link selectable clip-off below 4.04mA (5% flow)
Span (without dummy zero)	For 4 to 20mA input display adjustable between 000 and 1999
Zéro (without dummy zero)	At 4mA input both displays indicate zero.

Accuracy


At 20°C including nonlinearity & hysteresis between 4.16 & 20mA (10 & 100% flow)	
Analogue display	±16µA at input ±1 segment
Digital display	±16µA at input ±1 digit ignoring trailing dummy zero.

Typeset scale card

Blank scale card fitted to each indicator, can be supplied typeset with units of measurement.


Tag strip

Thermally printed tag strip screwed to rear of the indicator.



BASEEFA
British Approvals Service for Electrical
Equipment in Flammable Atmospheres


CERTIFICATE OF CONFORMITY




1. BAS No Ex 93C2181
2. This certificate is issued for the electrical apparatus:
BA326B 4/20 mA COMBINED INDICATOR
3. Manufactured and submitted for certification by:
BEKA ASSOCIATES LIMITED
Hitchin, SG5 2DD
4. This electrical apparatus and any acceptable variation thereto is specified in the Schedule to this Certificate and the documents therein referred to.
5. 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) certifies that the apparatus has been found to comply with harmonised European Standards
EN 50 014 (1977) + Amendments 1 to 5
EN 50 020 (1977) + Amendments 1 and 2
6. and has successfully met the examination and test requirements as recorded in confidential Report No ERA Ref 3627/646 dated August 1993
7. The apparatus marking shall include the code
EEx ia IIC T5
(Tamb = 60°C)

File No: EECS 0121/02/008


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4380-13D



I M CLEARE
DIRECTOR EECS
17 August 1993




Electrical Equipment Certification Service
Health and Safety Executive
Harpur Hill, Buxton, Derbyshire, SK17 9JL, United Kingdom
Tel: 0298 26211 Fax: 0298 79514 Telex: 668113 RLSD G



BASEEFA
British Approvals Service for Electrical
Equipment in Flammable Atmospheres


Certificate BAS No Ex 93C2181 dated 17 August 1993




8. The manufacturer 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 Commission Directive of 16 January 1984 (Doc. 84/47/EEC). A facsimile of this mark is printed on sheet 1 of this certificate.

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.

Sheet 2/4



Electrical Equipment Certification Service
Health and Safety Executive
Harpur Hill, Buxton, Derbyshire, SK17 9JL, United Kingdom
Tel: 0298 26211 Fax: 0298 79514 Telex: 668113 RLSD G





Schedule



Certificate of Conformity BAS No Ex 93C2181 dated 17 August 1993

APPARATUS

A BA326B 4/20 mA COMBINED INDICATOR is a panel mounted loop powered 4/20 mA indicator with a 100 segment bar graph display and a digital display.

The BA326B consists of four printed circuit boards containing electronic components all housed within a plastics enclosure which provides a degree of protection IP20 when the connectors are mated.

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 BA326B must be connected to an intrinsically safe circuit whose output parameters do not exceed the following:

$I_{max:out} = 200 \text{ mA dc}$

$W_{max:out} = 0.65 \text{ W}$

The equivalent resistance at the input 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.



Schedule



Certificate of Conformity BAS No Ex 93C2181 dated 17 August 1993

The equivalent output parameters of the apparatus are:-

$U_{max:out} = 1.2 \text{ V dc}$

$I_{max:out} = 75 \text{ mA dc}$

$W_{max:out} = 20 \text{ mW}$

$C_{eq} = 0.02 \mu\text{F}$

$L_{eq} = 2 \mu\text{H}$

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

DRAWINGS

Number	Issue	Date	Description
CI326-01 Sheets 1-19	1	Dec 92	Certification Information