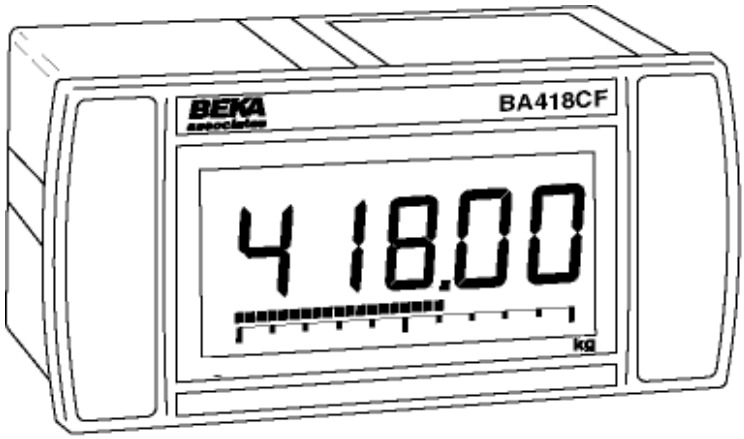
BA418CF-F
FOUNDATION™ fieldbus
Intrinsically safe
Panel mounting
Fieldbus Indicator

Issue: 7



Issue: 7
8th December 2015

CONTENTS

The BA418CF-F is CE marked to show compliance with the European Explosive Atmospheres Directive 94/9/EC and the European EMC Directive 2004/108/EC

1. DESCRIPTION

The BA418CF-F Fieldbus Indicator is an intrinsically safe, FOUNDATION™ fieldbus instrument that can display one fieldbus process variable on a five digit LCD and 31 segment analogue bargraph. The instrument is bus powered so no additional power supply is required.

Communication Protocol	Fieldbus Function Block
FOUNDATION™ fieldbus	Input Selector (1 x IS)

The Device Description files may be downloaded from The Fieldbus Foundation or the BEKA associates web site.

Housed in a robust 72 x 144 panel mounting DIN enclosure, the BA418CF-F fieldbus indicator has an IP66 front panel and is supplied with a gasket to seal the joint between the instrument and the panel.

The instrument has been ATEX certified intrinsically safe by European Notified Body Intertek Testing and Certification Ltd (ITS) for use in explosive gas atmospheres.

The BA418CF-F also has intrinsic safety and nonincendive FM and cFM Approval allowing installation in the USA and Canada - see Appendix 1.

For international applications the BA418CF-F fieldbus indicator has IECEx intrinsic safety approval – see Appendix 2.

The instrument's communication protocol is shown on the rear of the instrument. The '-F' order code suffix also indicates the protocol but is not shown on the instrument certification label.

1.1 Documentation

This instruction manual describes ATEX system design and installation of the BA418CF-F Fieldbus Indicator. For commissioning information please refer to:

FOUNDATION™ fieldbus
Fieldbus Interface Guide
for
Fieldbus Displays and
Fieldbus Indicators

which can be requested via the BEKA web site www.beka.co.uk

System design information for FM, cFM and IECEx is shown in separate appendices to this manual.

2. INTRINSIC SAFETY CERTIFICATION

2.1 ATEX certificate

The BA418CF-F has been issued with an EC-Type Examination Certificate by Notified Body Intertek Testing and Certification Ltd (ITS) confirming compliance with harmonised European standards. The BA418CF-F fieldbus indicator has Ex ia FISCO and Ex ia entity parameter certification, plus Ex ic entity parameter certification for use in Zone 2 with high supply voltages.

The EC-Type examination certificate has been used to confirm compliance with the ATEX Directive 94/9/EC. The BA418CF-F 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 Switzerland.

This manual describes ATEX installations in explosive gas atmospheres that conform with EN 60079:Part14 *Electrical installation design, selection and erection*. When designing systems for installation outside the UK, the local Code of Practice should be consulted.

2.2 Ex ia Zones, gas groups and T rating

The BA418CF-F has Group II Category 1G Ex ia IIC T4 Ga Ta = –40 to 70°C FISCO and entity parameter approval. When connected to a suitable certified system the BA418CF-F may be installed in:

Zone 0	explosive gas air mixture continuously present. **Note:** Special conditions for safe use apply see section 4.1
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 which may be used with equipment having a temperature classification of:

T1	450°C
T2	300°C
T3	200°C
T4	135°C

At an ambient temperature between –40 and +70°C.

2.3 Ex ic Zones, gas groups and T rating

The BA418CF-F also has Group II Category 3G Ex ic IIC T4 Gc Ta = –40 to 70°C entity parameter approval with a higher Ui input voltage than the Ex ia approval. When connected to a suitable certified system the BA414DF-F may be installed in:

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 which may be used with equipment having a temperature classification of:

T1	450°C
T2	300°C
T3	200°C
T4	135°C

At an ambient temperature between –40 and +70°C.

2.4 Fieldbus connection

The BA418CF-F Indicator is powered and communicates via the fieldbus, which is connected to terminals 1 and 2. These are non-polarised, comply with the Fieldbus Intrinsically Safe Concept (FISCO) and have separate Ex ia and Ex ic entity input parameters as shown below:

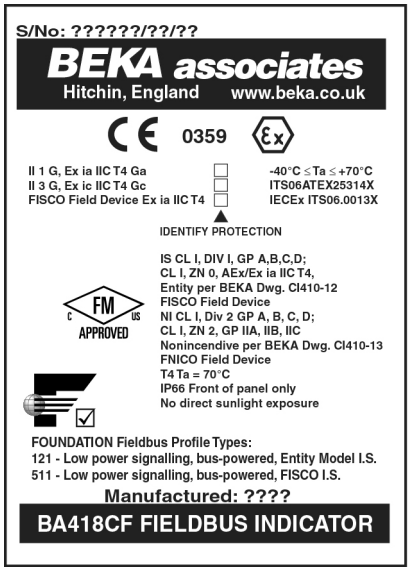
		FISCO	Ex ia entity	Ex ic entity
Ui	=	17.5V	22.0V	32V
Ii	=	380mA	250mA	125mA
Pi	=	5.32W	1.2W	1W

The maximum equivalent capacitance and inductance at terminals 1 & 2 is:

Ci = 0
Li = 8µH

2.4 Certification Label Information

The certification information label is fitted to the top outer surface of the enclosure. It shows details of the ATEX certification and a statement that the instrument is a FISCO Field Device, plus BEKA associates name and location. IECEx approval information is also included. The label may also contain non-European certification information.
The instrument serial number and year of manufacture are shown on the rear of the instrument adjacent to the terminals



The label includes boxed areas which should be marked by the installer to show which of the three certifications are being used.

3. SYSTEM DESIGN FOR HAZARDOUS AREAS

3.1 FISCO Systems

The BA418CF-F may be connected to any ATEX certified FISCO compliant fieldbus segment, providing the segment can supply the additional 13mA required to power the instrument. Fig 1 shows a typical fieldbus segment. To comply with FISCO requirements, the power supply, terminators, field devices and the interconnecting cables must conform with the FISCO requirements defined in EN 600079-11.

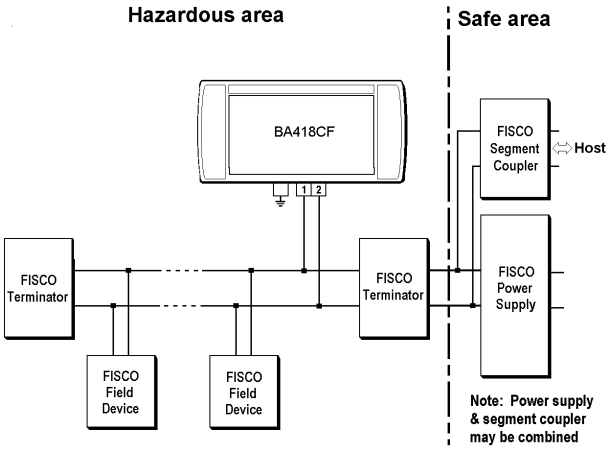


Fig 1 FISCO fieldbus system

3.2 Ex ia entity systems

The BA418CF-F Fieldbus Indicator has Ex ia certification with entity parameters for applications in Zone 0, 1 and 2.

The BA418CF-F Fieldbus Indicator may be connected to any intrinsically safe segment providing:

The device powering the fieldbus segment is ATEX Ex ia certified for Zone 0, 1 or 2 applications, or Ex ib certified for application in Zone 1 or 2. The output parameters should be equal to or less than:

Uo = 22V dc
Io = 250mA dc
Po = 1.2W

The segment can provide an additional 13mA to power the Fieldbus Indicator.

The equivalent capacitance Ci of the BA414DF-F Fieldbus Indicator is zero and the equivalent inductance is insignificant. Therefore these BA414DF-F parameters do not need to be considered.

3.3 Ex ic entity systems

The BA418CF-F Fieldbus Indicator also has Ex ic certification with entity parameters for applications in Zone 2. The high Ui voltage allows the indicator to be used with Power-i and intrinsically safe segment couplers powered from Ex e fieldbus trunks.

When mounted in Zone 2 the BA418CF-F Fieldbus Indicator may be connected to any intrinsically safe segment providing:

The device powering the fieldbus segment is ATEX Ex ia, ib or ic certified and has output parameters equal to or less than:

Uo = 32V dc
Io = 125mA dc
Po = 1W

The segment can provide an additional 13mA to power the Fieldbus Indicator.

The equivalent capacitance Ci of the BA418CF-F Fieldbus Indicator is zero and the equivalent inductance is insignificant. Therefore these BA418CF-F parameters do not need to be considered.

4. INSTALLATION

4.1 Location

The BA418CF-F is housed in a robust aluminium enclosure with a toughened glass window mounted in a Noryl bezel. The front of the instrument provides IP66 protection and a gasket seals the joint between the instrument enclosure and the panel. The instrument may be installed in any panel providing the environmental limits shown in the specification are not exceeded.

Note: Although certified for safe use between –40 and +70°C, the guaranteed operating temperature range of the BA418CF-F Fieldbus Indicator is –20 to +70°C.

Fig 2 shows the overall dimensions of the BA418CF-F and the panel cut-out. To achieve an IP66 seal between the instrument enclosure and the panel, the smaller cut-out must be used and the instrument secured with four panel mounting clips.

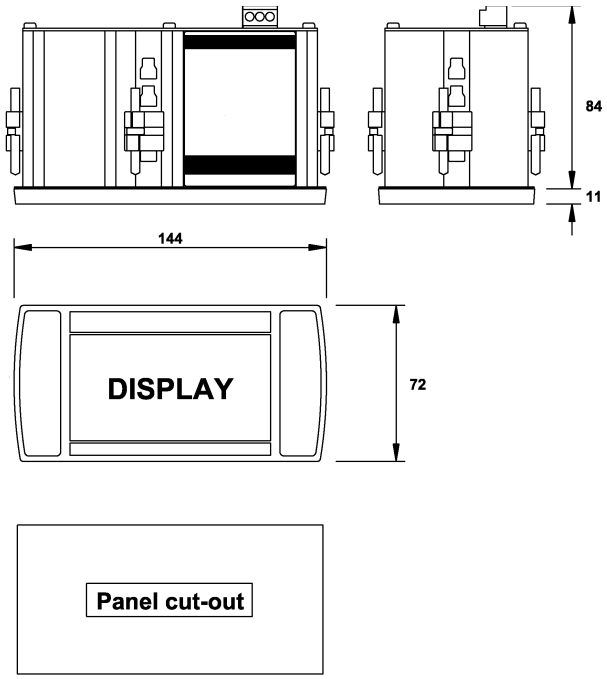
CAUTION

Installation in Zone 0

When installed in a Zone 0 potentially explosive atmosphere requiring apparatus of Category 1G, the indicator shall be installed such that even in the event of rare incidents, an ignition source due to impact or friction between the aluminium enclosure at the rear of the instrument mounting panel and iron/steel is excluded.

No special conditions apply when the indicator is installed in Zone 1 or in Zone 2.

The BA418CF-F liquid crystal display has maximum contrast when viewed from directly ahead and slightly below the centre line of the instrument.



Cut-out Dimensions

DIN 43 700
138.0 +1.0/-0.0 x 68.0 +0.7/-0.0

To achieve an IP66 seal between instrument enclosure and panel
136.0 +0.5/-0.0 x 66.2 +0.5/0.0

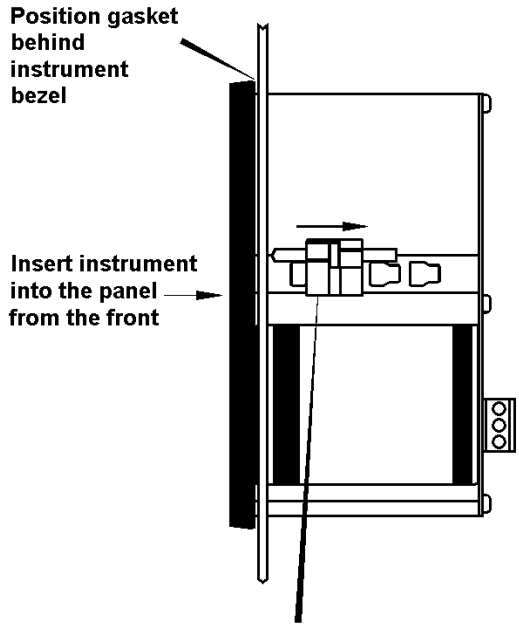
Fig 2 BA418CF-F dimensions

4.2 Installation Procedure

a. Insert the BA418CF-F into the instrument panel cut-out from the front of the panel.

b. Fix panel mounting clips to opposite sides of the instrument and tighten. Recommended tightening torque is 22cNm (1.95lbf in). **Do not over tighten**. Four clips are required to achieve an IP66 seal between the instrument enclosure and the panel.

c. Connect the panel wiring to the rear terminal block as shown in Fig 3. To simplify installation, the terminals are removable so that panel wiring can be completed before the instrument is installed. To prevent vibration damage **ensure that panel wirng is supported.**



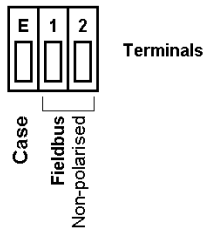


Fig 3 Installation and terminal connections

4.3 EMC

The BA418CF-F complies with the requirements of the European EMC Directive 2004/108/EC. For specified immunity, all wiring should be in screened twisted pairs with the screens earthed at one point in the safe area.

5. MAINTENANCE

5.1 Fault finding during commissioning

If a BA418CF-F fails to function during commissioning the following procedure should be followed:

Symptom	Cause	Check:
No Display	Instrument not correctly connected or powered.	Between terminals 1 & 2: FISCO 9 & 17.5V Ex ia 9 to 22V Ex ic 9 & 32V
Display shows '9.9.9.9.9' with all decimal points flashing; all bargraph segments activated and bargraph scale flashing.	Value over-range	Variable source Decimal point configuration.
Display shows '-9.9.9.9.9' with all decimal points flashing; no bargraph segments activated and bargraph scale flashing.	Value under-range	Variable source Decimal point configuration
Display alternates between value and the word 'bAd'. Bargraph flashes.	Status of fieldbus variable has a quality of 'BAD' or a fault state is active. Display has not yet received data.	Variable source Fieldbus configuration.
Bargraph scale flashes.	Variable is outside the limits defined for the bargraph.	Bargraph configuration.
All display segments activated.	Display is initialising.	This is normal operation, after a few seconds the firmware version will be displayed prior to entering the operational mode.

5.2 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 test equipment should be used unless a gas clearance certificate is available.

If a BA418CF-F fails after it has been functioning correctly, the table shown in section 5.1 may help to identify the cause of the failure.

If this procedure does not reveal the cause of the fault, it is recommended that the instrument is replaced.

5.3 Servicing

We recommend that faulty BA418CF-F Fieldbus Indicators be returned to BEKA associates or to our local agent for repair.

5.4 Routine maintenance

The mechanical and electrical condition of the instrument should be regularly checked. Initially annual inspections are recommended, but the inspection frequency should be adjusted to suit the environmental conditions.

5.5 Guarantee

Instruments 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.

5.6 Customer comments

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

6. ACCESSORIES

6.1 Scale marking

BA418CF-F indicators are fitted with a blank escutcheon around the liquid crystal display. If specified when the instrument is ordered, this can be supplied printed with units of measurement and a scale for the horizontal bargraph.

6.2 Tag number

The BA418CF-F can be supplied with a thermally printed tag number on the rear panel adjacent to the terminals.

6.3 Fieldbus Interface Guide

The *FOUNDATION™ fieldbus Interface Guide for Fieldbus Displays & Fieldbus Indicators* contains commissioning information for the BA418CF-F. A copy may be requested from the BEKA sales office or downloaded from the BEKA web site at www.beka.co.uk

APPENDIX 1
FM approval for use in the USA and cFM Approval for use in Canada

A1.0 Factory Mutual Approval
For installations in the USA and Canada the BA418CF-F has FM and cFM intrinsic safety and nonincendive approvals, project identification 3027031 and 3027031C. Copies of the Certificates of Compliance are available from BEKA associates sales office and www.beka.co.uk.

A1.1 Intrinsic safey approval
The BA418CF-F is approved to FM Class 3610 intrinsic safety standard for use in hazardous (classified) locations. Installations must comply with BEKA associates Control Drawing CI410-12, which is attached to this Appendix, ANSI/ISA RP12.06.01 'Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations' and with the National Electrical Code ANSI/NFPA70.

Canadian installations must comply with the Canadian Electrical Code C22.2 and with BEKA associates Control Drawing CI410-12 which is attached to this Appendix.

The BA418CF-F has a T4 rating at ambient temperatures up to +70°C and may be used with the following gases:

Intrinsic Safety	
Division 1 or 2	
Class I	Group A & B Group C Group D
Zone 0, 1 or 2	
Class 1	Group IIC Group IIB Group IIA

The FM and CFM entity parameters are identical to the ATEX parameters and, like the ATEX certification, confirm that the BA418CF-F complies with the FISCO Field Device requirements specified in IEC60079-27. The intrinsically safe system shown in Fig 1 of this manual may therefore be used for installations in the USA and Canada, providing the fieldbus power supply, terminators, Zener barriers and galvanic isolators are FM Approved for US installations and CFM or CSA Approved for Canadian installations. All installations must comply with BEKA associates Control Drawing CI410-12.

FM and CFM Approval also allows the BA418CF-F to be connected to non-FISCO systems using the entity concept – see section 3.2 of this manual.

A1.2 Nonincendive approval
The BA418CF-F is also Class 3611 nonincendive approved by Factory Mutual allowing it to be installed in Division 2 hazardous (classified) locations without the need for Zener barriers or galvanic isolators. US installations must comply with the BEKA associates Control Drawing CI410-13, which is attached to this Appendix, and with the National Electrical Code ANSI/NFPA70.

Canadian nonincendive installations must comply with the Canadian Electrical Code C22.2 and with BEKA associates Control Drawing CI410-13 which is attached to this Appendix.

The FM and CFM Nonincendive Approvals also allow the BA418CF-F fieldbus indicator to be connected to any appropriately certified FNICO compliant fieldbus segment.

The BA418CF-F has a T4 rating at ambient temperatures up to +70°C and may be used with the following gases:

Nonincendive	
Division 2	
Class I	Group A & B Group C Group D
Zone 2	
Class I	Group IIC Group IIB Group IIA

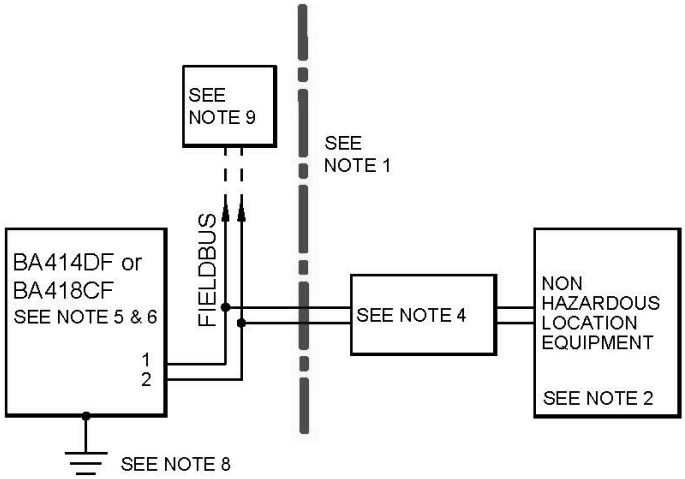
Iss.	Date	Modification	Appd.	Ckd.
1	28.03 2006	First release	.	.
2	15.09 2009	Provision for alternative instrument titles added.		

HAZARDOUS (CLASSIFIED) LOCATION

UNCLASSIFIED LOCATION

BA414DF LOCATIONS:
Class I, Division 1, Groups A, B,C, D
Class II, Division 1, Groups E, F & G
Class III
Class I, Zone 0, Group IIC

BA418CF LOCATIONS:
Class I, Division 1, Groups A, B,C, D
Class I, Zone 0, Group IIC



BA414DF and BA418CF

Terminals 1 & 2
These terminals comply with the Intrinsically Safe Concept (FISCO) defined by IEC 60079-27

Ui = 17.5V	Uo = 0
Ii = 380mA dc	Io = 0
Pi = 5.32W	Po = 0
Ci = 0	
Li = 8µH	

and have the following Entity Parameters

Ui = 22Vdc	Uo = 0
Ii = 250mA	Io = 0
Pi = 1.2W	Po = 0

Note:
No modification to be made without reference/approval from FM Approvals and BEKA Associates Design Department.

Notes:

1. The associated intrinsically safe barriers and fieldbus power supply must be FM approved and the manufacturers' installation drawings shall be followed when installing this equipment.
   For installations in Canada the associated intrinsically safe barriers and fieldbus power supply must be CFM or CSA approved and the manufacturers' installation drawings shall be followed when installing the equipment.

2. The unclassified location equipment connected to the associated intrinsically safe barriers and fieldbus power supply shall not use or generate more than 250V rms or 250V dc.

3. Installation shall be in accordance with ANSI/ISA RP 12.06.01 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and the National Electrical Code ANSI/NFPA 70.
   Installations in Canada shall be in accordance with the Canadian Electrical Code C22.2

4. Fieldbus power supply with FISCO compliant output (IEC6009-27) or galvanic isolator with entity parameters complying with the following requirements:

Uo or Vt	equal to or less than	Ui
Io or It	equal to or less than	Ii
Po	equal to or less than	Pi
La	equal to or greater than	Lcable + Li
Ca	equal to or greater than	Ccable + Ci

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Title: FM Approvals Control Drawing for Intrinsically Safe BA414DF & BA418CF Fieldbus Indicators

Drawn	Checked	Scale
RC		NTS

Drawing No. CI410–12
Sheet 1 of 3

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Iss.	Date	Modification	Ckd.	Appd.
1	28.03 2006	First release	.	.
2	15.09 2009	Provision for alternative instrument titles added.		

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5. To maintain IP66 protection between the BA418CF and the mounting panel:

   Four panel mounting clips should be used

   Minimum panel thickness should be — 2mm (0.08inches) Steel; 3mm (0.12inches) Aluminium

   Outside panel finish should be smooth, free from particle inclusions, runs or build-up around cut-out.

   Panel cut-out should be — 66.2 x 136.0mm -0.0 +0.5 (2.60 x 5.35 inches –0.00 +0.02)

   Edges of panel cut-out should be deburred and clean

   Each panel mounting clip should be tightened to between: — 20 and 22cNm (1.77 to 1.95 inLb)

6. When installed in a hazardous (classified) location the BA414DF Fieldbus Indicators shall be fitted with cable glands / conduit hubs selected from the following table

   Metallic glands and hubs must be grounded – see note 7.

Class	Permitted gland or conduit hub
Class I	Any metallic or plastic cable gland or conduit hub that provides the required environmental protection.
Class II and III	**Crouse – Hinds Myler hubs** SSTG-1 STG-1 STAG-1 MHUB-1 **O-Z / Gedrey Hubs** CHMG-50DT **REMKE hub** WH-1-G **Killark Glands** CMCXAA050 MCR050 MCX050

7. In addition to the supplied bonding plate, when 3 metallic glands or conduit hubs are fitted to a BA414DF Fieldbus Indictors, all metalic glands or conduit hubs must be connected together and grounded.

8. **CAUTION:** The BA414DF and BA418CF Fieldbus Indicator enclosures are manufactured from conductive plastic per Article 250 of the National Electrical Code the enclosures shall be grounded using the 'E' terminal on the terminal block.

9. The terminator on the Fieldbus must be FM or for Canadian installations CFM or CSA Approved.

10. The BA414DF and BA418CF should be mounted where they are shielded from direct sunlight.

11. The BA414DF may alternatively be titled:
    BA444DF Fieldbus Indicator
    BA444DL Fieldbus Listener
    BA424DF Fieldbus Set Point Station

cont:

Title	Drawn	Checked	Scale
FM Approvals Control Drawing for Intrinsically Safe BA414DF & BA418CF Fieldbus Indicators	RC		NTS
	Drawing No. Sheet 2	CI410–12	

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12. The BA418CF may alternatively be titled:
BA448CF Fieldbus Indicator
BA448CL Fieldbus Listener
BA428CF Fieldbus Set Point Station

FISCO Rules

The FISCO Concept allows the interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in such combination. The criterion for such interconnection is that the voltage (Vmax), the current (Imax) and the power (Pmax) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage (Uo, Voc or Vt), the current (Io, Isc or It) and the power (Po) which can be provided by the associated apparatus (supply unit). In addition the maximum unprotected residual capacitance (Ci) and inductance (Li) of each apparatus (other than terminators) connected to the Fieldbus must be less than or equal to 5nF and 10uH respectively.
In each I.S. Fieldbus segment only one active source, normally the associated apparatus, is allowed to provide the necessary power for the Fieldbus system. The allowed voltage (Uo, Voc or Vt) of the associated apparatus used to supply the bus cable must be limited to the range 14Vdc to 24Vdc. All other equipment connected to the bus cable has to be passive, meaning that the apparatus is not allowed to provide energy to the system, except a leakage current of 50µA for each connected device. Separately powered equipment needs galvanic isolation to ensure the intrinsically safety Fieldbus circuit remains passive.
The cable used to interconnect the devices needs to comply with the following parameters:
Loop resistance R': 15....150Ω/km
Inductance per unit length L':0.4....1mH/km

Capacitance per unit length C': 80....200nF/km
C' = C' line/line+0.5 C' line/screen, if both lines are floating
or
C' = C' line/line + C'line/screen, if the screen is connected to one line.
Length of spur cable: max. 30m
Length of trunk cable: max. 1km
Length of splice: max = 1m
Terminators
At the end of each trunk cable an FM Approved line terminator with the following parameters is suitable:
R= 90....100Ω
C = 0 ....2.2µF

System evaluation
The number of passive devices like transmitters, actuators, connected to a single bus segment is not limited due to I.S. reasons. Furthermore, if the above rules are respected, the inductance and the capacitance of the cable need not be considered and will not impair the intrinsic safety of the installation.

Notes.
1. The intrinsic safety FISCO concept allows the interconnection of FM Approved Intrinsically Safe devices with FISCO parameters not specifically examined in combination as a system when:
Uo or Voc or Vt ≤ Vmax, Io, Isc or It ≤ Imax, Po ≤ Pi.
For Canadian installations the intrinsic safety FISCO concept allows the interconnection of CFM or CSA Approved Intrinsically Safe devices with FISCO parameters not specifically examined in combination as a system when:
Uo or Voc or Vt ≤ Vmax, Io, Isc or It ≤ Imax, Po ≤ Pi.

Iss.	Date	Modification	Ckd.	Appd.
1	28.03 2006	First release	.	.
2	15.09 2009	Provision for alternative instrument titles added.		

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Title
FM Approvals Control Drawing for Intrinsically Safe BA414DF & BA418CF Fieldbus Indicators

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Drawing No. CI410–12
Sheet 3

File: CI410–12s3.dwg 15.09.09

Iss.	Date	Modification	Ckd.	Appd.
1	28.03.2006	First release	.	.
2	15.09.2009	Provision for alternative instrument titles added.		

HAZARDOUS (CLASSIFIED) LOCATION

UNCLASSIFIED LOCATION

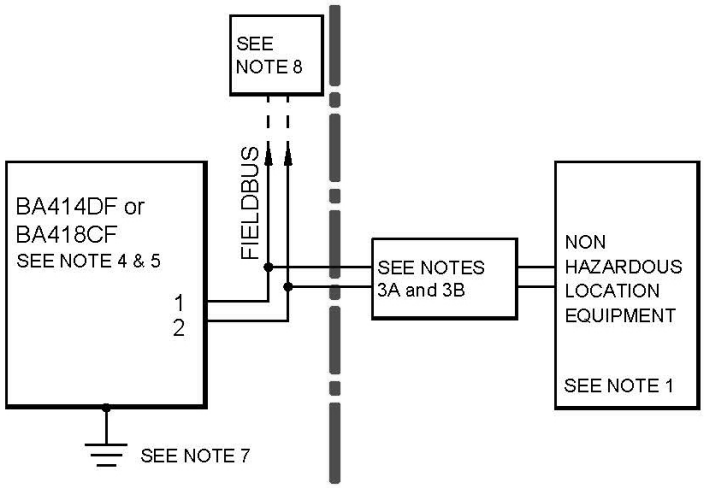
BA414DF LOCATIONS:
Class I, Division 2, Groups A, B,C, D
Class II, Division 2, Groups E, F & G
Class III
Class I, Zone 2, Groups IIC

BA418CF LOCATIONS:
Class I, Division 2, Groups A, B,C, D
Class I, Zone 2, Groups IIC

BA414DF and BA418CF
Maximum input and
output parameters

Terminals 1 & 2
These terminals comply with
The Fieldbus Nonincendive
Cincept (FNICO) defined by
IEC60079-27
(Typical current consumption
13mA)

Vmax = 32V dc
NIFW Vmax = 17.5V (FNICO)
Ci = 0
Li = 8µH



Note:
No modification to be made without reference/approval from FM Approvals and BEKA Associates Design Department.

Notes:

1. The unclassified location equipment connected to the associated nonincendive field wiring apparatus must not use or generate more than 250V rms or 250V dc.

2. Nonincendive field wiring installations shall be in accordance with the National Electrical Code ANSI/NFPA 70. The Nonincendive Field Wiring concept allows interconnection of Nonincendive Field Wiring Apparatus with Associated Nonincendive Field Wiring Apparatus using any of the wiring methods permitted for unclassified locations.
   Canadian installations shall be in accordance with the Canadian Electrical Code C22.2

3A. Linear power supply
   A linear fieldbus power supply shall be:
   FM Approved Associated Nonincendive Field Wiring Apparatus installed in the unclassified location with parameters complying with the following requirements:
   For Canadian Installations apparatus shall be CFM or CSA approved.

   OR

   FM Approved Nonincendive Field Wiring Apparatus installed in the classified location with parameters complying with the following requirements:
   For Canadian Installations apparatus shall be CFM or CSA approved.

Voc	equal to or less than	Vmax
La	equal to or greater than	Lcable + Li
Ca	equal to or greater than	Ccable

Cont.

Title	Drawn	Checked	Scale
FM Approvals Control Drawing for Nonincendive BA414DF & BA418CF Fieldbus Indicators	RC		NTS
	Drawing No. Sheet 1 of 4	CI410–13	

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3B. FNICO non-linear power supply

A FNICO non-linear fieldbus power supply shall be:

FM Approved Associated Nonincendive Field Wiring Apparatus installed in the unclassified location complying with the following table:

For Canadian Installations apparatus shall be CFM or CSA approved.

OR

FM Approved Nonincendive Field Wiring Apparatus installed in the classified location complying with the following table:

For Canadian Installations apparatus shall be CFM or CSA approved.

Voc	Maximum current for Groups AB [IIC]	Maximum current for Groups CD [IIB, IIA]
V	mA	mA
14	274	570
15	199	531
16	154	432
17.5	121	360

4. To maintain IP66 protection between the BA418CF and the mounting panel:

Four panel mounting clips should be used

Minimum panel thickness should be 2mm (0.08inches) Steel
3mm (0.12inches) Aluminium

Outside panel finish should be smooth, free from particle inclusions, runs or build-up around cut-out.

Panel cut-out should be 66.2 x 136.0mm -0.0 +0.5
(2.60 x 5.35 inches –0.00 +0.02)

Edges of panel cut-out should be deburred and clean

Each panel mounting clip should be tightened to between: 20 and 22cNm (1.77 to 1.95 inLb)

Cont.

Iss.	Date	Modification
1	28.03 2006	First release
2	15.09 2009	Provision for alternative instrument titles added.

Appd. . Ckd. .

Title: FM Approvals Control Drawing for Nonincendive BA414DF & BA418CF Fieldbus Indicators

Drawn: RC | Checked: | Scale: NTS

Drawing No. CI410–13 Sheet 2

File: CI410–13s2.dwg 15.09.09

5. When installed in a hazardous (classified) location the BA414DF Fieldbus Indicator shall be fitted with cable glands / conduit hubs selected from the following table.

   Metallic glands and hubs must be grounded – see note 6.

Class	Permitted gland or conduit hub
Class I	Any metallic or plastic cable gland or conduit hub that provides the required environmental protection.
Class II and III	**Crouse – Hinds Myler hubs** SSTG-1 STG-1 STAG-1 MHUB-1 **O-Z / Gedrey hub** CHMG-50DT **REMKE hub** WH-1-G **Killark Glands** CMCXAA050 MCR050 MCX050

6. In addition to the supplied bonding plate, when 3 metallic glands or conduit hubs are fitted to BA414DF Fieldbus Indicators, all metallic glands or conduit hubs must be connected together and grounded.
7. **CAUTION:** The BA414DF and BA418CF Fieldbus Indicator enclosures are manufactured from conductive plastic per Article 250 of the National Electrical Code the enclosures shall be grounded using the 'E' terminal on the terminal block.
8. The terminator on the Fieldbus must be FM Approved or for Canadian Installations CFM or CSA Approved
9. The BA414DF and the BA418CF should be mounted where they are shielded from direct sunlight.
10. The BA414DF may alternatively be titled:
    BA444DF Fieldbus Indicator
    BA444DL Fieldbus Listener
    BA424DF Fieldbus Set Point Station
11. The BA418CF may alternatively be titled:
    BA448CF Fieldbus Indicator
    BA448CL Fieldbus Listener
    BA428CF Fieldbus Set Point Station

Cont.

Iss.	Date	Modification	Ckd.	Appd.
1	28.03 2006	First release	.	.
2	15.09 2009	Provision for alternative instrument titles added.		

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Title: FM Approvals Control Drawing for Nonincendive BA414DF & BA418CF Fieldbus Indicators

Drawn	Checked	Scale
RC		NTS

Drawing No. CI410–13
Sheet 3

File: CI410–13s3.dwg 15.09.09

FNICO Rules

The FNICO Concept allows the interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in such combination. The criterion for such interconnection is that the voltage (Vmax), the current (Imax) and the power (Pmax) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage (Uo, Voc or Vt), the current (Io, Isc or It) and the power (Po) which can be provided by the associated apparatus (supply unit). In addition the maximum unprotected residual capacitance (Ci) and inductance (Li) of each apparatus (other than terminators) connected to the Fieldbus must be less than or equal to 5nF and 20uH respectively.
In each I.S. Fieldbus segment only one active source, normally the associated apparatus, is allowed to provide the necessary power for the Fieldbus system. The allowed voltage (Uo, Voc or Vt) of the associated apparatus used to supply the bus cable must be limited to the range 14Vdc to 17.5Vdc. All other equipment connected to the bus cable has to be passive, meaning that the apparatus is not allowed to provide energy to the system, except a leakage current of 50µA for each connected device. Separately powered equipment needs galvanic isolation to ensure the intrinsically safety Fieldbus circuit remains passive.
The cable used to interconnect the devices needs to comply with the following parameters:
Loop resistance R': 15....150Ω/km
Inductance per unit length L':0.4....1mH/km

Capacitance per unit length C': 80....200nF/km
C' = C' line/line+0.5 C' line/screen, if both lines are floating
or
C' = C' line/line + C'line/screen, if the screen is connected to one line.
Length of spur cable: max. 30m
Length of trunk cable: max. 1km
Length of splice: max = 1m
Terminators
At the end of each trunk cable an FM Approved line terminator with the following parameters is suitable:
R= 90...100Ω
C = 0....2.2µF

System evaluation
The number of passive devices like transmitters, actuators, connected to a single bus segment is not limited due to nonincendive reasons. Furthermore, if the above rules are respected, the inductance and the capacitance of the cable need not be considered and will not impair the intrinsic safety of the installation.

Notes.
1. The FNICO concept allows the interconnection of FM Approved nonincendive devices with FNICO parameters not specifically examined in combination as a system when:
Uo or Voc or Vt ≤ Vmax.

For Canadian installations the FNICO concept allows the interconnection of CFM or CSA Approved nonincendive devices with FNICO parameters not specifically examined in combination as a system when:
Uo or Voc or Vt ≤ Vmax.

Iss.	Date	Modification	Ckd.	Appd.

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Iss.	Date	Modification	Ckd.	Appd.
1	28.03 2006	First release	.	.
2	15.09 2009	Provision for alternative instrument titles added.		

Title	Drawn	Checked	Scale
FM Approvals Control Drawing for Nonincendive BA414DF & BA418CF Fieldbus Indicators	RC		NTS
	Drawing No. Sheet 4	CI410–13	

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APPENDIX 2
IECEx certification

A3.0 The IECEx Certification Scheme

IECEx is a global certification scheme for explosion protected products which aims to harmonise international certification standards. For additional information about the IECEx certification scheme and to view the BEKA associate certificates, please visit www.iecex.com

A2.1 IECEx Certificate of Conformity

The BA418CF-F Fieldbus Indicator has been issued with an IECEx Certificate of Conformity number IECEx ITS 06.0013X which specifies the following certification codes:

For gas
Ex ia IIC T4 Ga
Ex ic IIC T4 Gc
FISCO Field Device Ex ia IIC T4
Ta = -40°C to 70°C

The specified IECEx gas intrinsic safety parameters are identical to the ATEX safety parameters described in the main section of this manual.

The IECEx certificate may be downloaded from www.beka.co.uk, www.iecex.com or requested from the BEKA sales office.

A3.2 Installation

The IECEx and ATEX certificates specify identical safety parameters and installation requirements as defined by IEC 60079-14. The ATEX installation requirements specified in the main section and Appendix 1 of this manual may therefore be used for IECEx installations, but the local code of practice should also be consulted.

CAUTION installation in Zone 0

When installed in a Zone 0 potentially explosive atmosphere requiring EPL Ga apparatus, the instrument shall be installed 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.

No special conditions apply when the indicator is installed in Zone 1 or in Zone 2.

Note: Although IECEx certified for safe use between –40 and +70°C, the guaranteed operating temperature range of the BA418CF-F Fieldbus Indicator is –20 to +70°C.

A3.4 Versions of the BA414DF-F

All versions of the BA414DF-F Fieldbus Indicator have IECEx, FM and cFM certification.