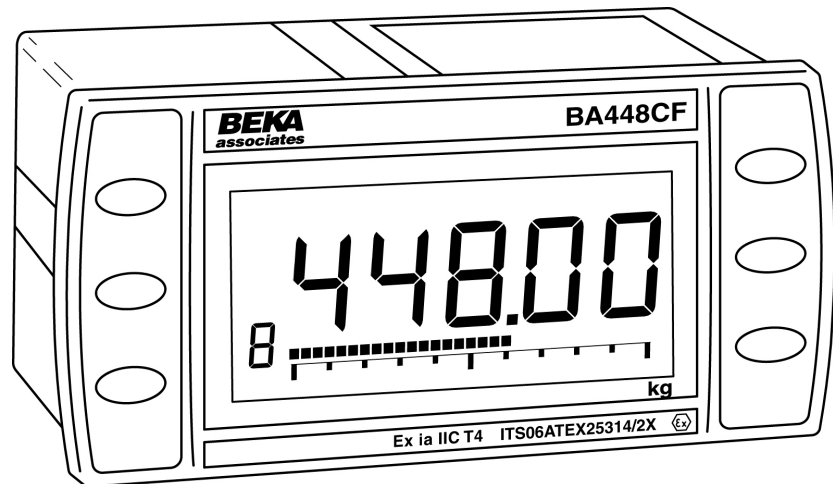


**BA448CF-F**  
**FOUNDATION™ fieldbus**  
**Intrinsically safe**  
**Panel mounting**  
**8 variable**  
**Fieldbus Indicator**  
Issue 3



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**The BA448CF-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 BA448CF-F fieldbus indicator is an intrinsically safe FOUNDATION™ fieldbus instrument that may be configured as a fieldbus node or as a fieldbus listener. It can display up to eight fieldbus process variables on a five digit LCD and 31 segment analogue bargraph. The instrument is bus powered so no additional power supply is required.

As a fieldbus node the indicator is configured via the fieldbus host.

Communication Protocol	Fieldbus Function Blocks
FOUNDATION™ fieldbus	Input Selector (2 x IS) Digital input (6 x DI)

Device Description files may be downloaded from the Fieldbus Foundation or from the BEKA associates websites.

When configured as a fieldbus listener the BA448CF-F is not visible to the fieldbus host and can only be configured using the push buttons on the front of the instrument.

Housed in a robust 72 x 144 panel mounting DIN enclosure, the BA448CF-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 is intrinsically safe and has been certified by European Notified Body Intertek Testing and Certification Ltd (ITS) to harmonised ATEX explosive gas standards, which has been used to confirm compliance with European ATEX Directive 94/9/EC.

The BA448CF-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 BA448CF-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. There is an alternative version of the fieldbus display, order code BA448CF-P for use on PROFIBUS PA networks.

## 1.1 Documentation

This instruction manual describes ATEX system design and installation of the BA448CF-F fieldbus indicator. System design information for non-ATEX approvals is shown in appendices to this manual.

## 2. OPERATION

The BA448CF-F fieldbus indicator can display up to eight pre-configured FOUNDATION™ fieldbus process variables designated in-1 to in-8. The operator can select which variable is displayed using the ▼ and ▲ push buttons which scroll the display through the eight inputs. A numeric annunciator on the left hand side of the display shows which of the eight inputs is currently being displayed.

### 2.1 Error messages

When the BA448CF-F is configured as a listener the following error messages may be displayed:

'no ConF'	No inputs have been configured or are enabled.
'no dAtA'	No data is being received with the current configuration.

## 3. INTRINSIC SAFETY CERTIFICATION

### 3.1 ATEX certificate

The BA448CF-F has been issued with an EC-Type Examination Certificate by Notified Body Intertek Testing and Certification Ltd (ITS) that has been used to confirm compliance with the European ATEX Directive 94/9/EC for Group II, Category 1G, gas atmospheres, Ga Ex ia IIC T4. The instrument bears 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 in Hazardous Areas. When designing systems for installation outside the UK, the local Code of Practice should be consulted.

### 3.2 Zones, gas groups and T rating

The BA448CF-F has been issued with EC Type Examination certificate ITS06ATEX25314/2X which has been used to confirm compliance with the requirements for Group II Category 1G Ga Ex ia IIC T4 (Tamb -40 to 70°C) specified in the ATEX Directive. When connected to a suitable certified system the BA448CF-F may be installed in:

- Zone 0 explosive gas air mixture continuously present.  
**Note:** Special conditions for safe use apply see section 5.1
- 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

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.

**Note:** minimum guaranteed operating temperature is -20°C.

### 3.3 Fieldbus connection

The BA448CF-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) defined in EN 60079 Part 27 and have separate entity parameters shown below:

	<b>FISCO</b>	<b>Entity</b>
Ui =	17.5V dc	22.0V dc
Ii =	380mA dc	250mA dc
Pi =	5.32W	1.2W

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

$$\begin{aligned} C_i &= 0 \\ L_i &= 8\mu\text{H} \end{aligned}$$

### 3.4 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 panel adjacent to the terminals.



## 4. SYSTEM DESIGN FOR HAZARDOUS AREAS

### 4.1 FISCO Systems

The BA448CF-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 to EN 60079 part 27.

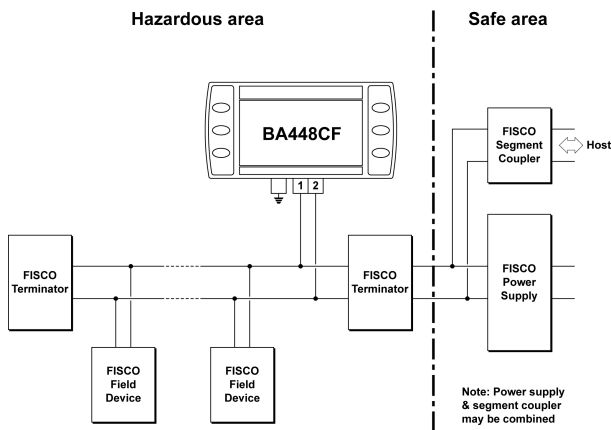


Fig 1 FISCO fieldbus system

### 4.2 Non-FISCO Systems

For non-FISCO applications the BA448CF-F Fieldbus Indicator has a higher voltage entity intrinsic safety input parameter allowing connection to a wide range of fieldbus segments.

The BA448CF-F Fieldbus Indicator may be connected to any intrinsically safe segment providing:

The device powering the fieldbus segment is ATEX certified and has output parameters equal to or less than:

$$\begin{aligned} U_o &= 22V \text{ dc} \\ I_o &= 250mA \text{ dc} \\ P_o &= 1.2W \end{aligned}$$

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

**Note:** The equivalent capacitance  $C_i$  of the BA448CF-F Fieldbus Indicator is zero and the equivalent inductance is insignificant. Therefore these BA448CF-F safety parameters do not need to be considered.

## 5. INSTALLATION

### 5.1 Location

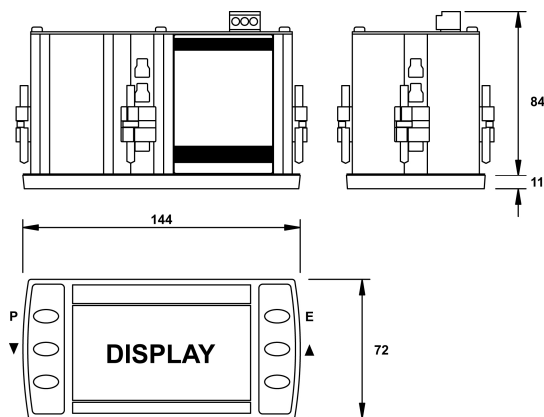
The BA448CF-F is housed in a robust aluminium enclosure with a toughened glass window mounted in a Noryl bezel. The front of the instrument provides IP66 protection and a gasket seals the joint between the instrument enclosure and the panel. The instrument may be installed in any panel providing the environmental limits shown in the specification are not exceeded.

Fig 2 shows the overall dimensions of the BA448CF-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.



#### 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 BA448CF-F dimensions

### 5.2 Installation Procedure

- Insert the BA448CF-F into the instrument panel cut-out from the front of the panel.
- Fix panel mounting clips to opposite sides of the instrument and tighten until the instrument is secure. Four clips are required to achieve an IP66 seal between the instrument enclosure and the panel.
- 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.

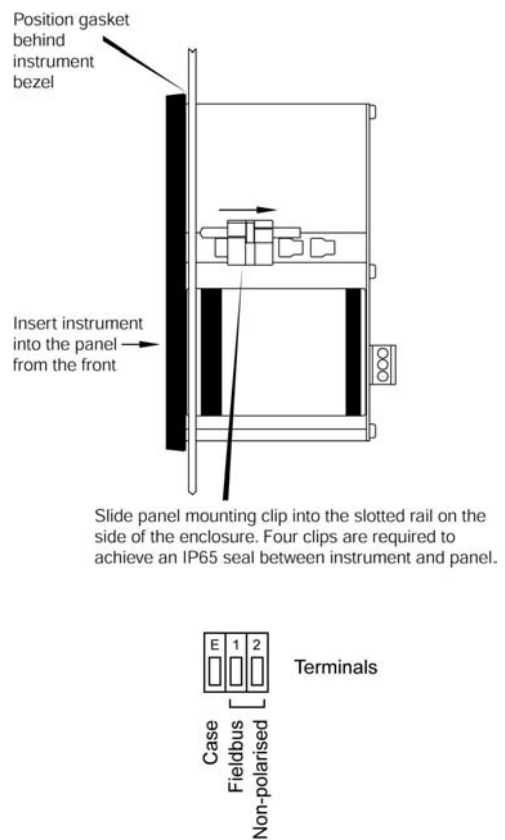


Fig 3 Installation and terminal connections

### 5.3 EMC

The BA448CF-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.

## 6. CONFIGURATION

The BA448CF-F 8 variable FOUNDATION™ fieldbus indicator may be configured as a fieldbus node or as a fieldbus listener. When used as a fieldbus node the indicator is configured via the fieldbus host. For detailed node conditioning information please refer to the BEKA FOUNDATION™ fieldbus Interface Guide which may be downloaded from [www.beka.co.uk](http://www.beka.co.uk)

As a fieldbus listener the BA448CF-F is not visible to the fieldbus host and can only be configured via the front panel push buttons using the menu shown in Fig 6.

Throughout this manual the four BA448CF-F push buttons are identified **P** **E** **▼** **▲** and legends displayed by the fieldbus indicator are shown within inverted commas e.g. 'CodE' and 'LiSt'.

### 6.1 Configuration menus

The configuration menu is separated into two sections, fieldbus node and fieldbus listener. Both contain the 'tYPE' function that enables transfer between the two. Unless otherwise requested when ordered, all FOUNDATION™ fieldbus BA448CF-F indicators are supplied as fieldbus nodes but can easily be reconfigured on-site.

### 6.2 Node configuration menu

The node configuration menu is shown in Fig 4. Access to the menu is obtained by operating the **P** and **E** buttons simultaneously. If the BA448CF-F is not protected by an access code the first parameter 'rESEt' will be displayed\*. If the instrument is protected by an access code, 'CodE' will be displayed first. Pressing **P** will allow the four digit security code to be entered digit by digit using the **▼** or **▲** button to adjust the flashing digit and **P** to move control to the next digit. When the correct code has been entered, pressing **E** will cause the first parameter 'rESEt' to be displayed\*. If an incorrect code is entered, or no button is pressed for ten seconds, the BA448CF-F will automatically return to the display mode.

\* If the indicator displays 'SCAn' it is conditioned as a fieldbus listener, see section 6.3.13 to change it to a fieldbus node.

### 6.2.1 Reset the indicator to node factory defaults 'rESEt'

The BA448CF-F may be reset to the factory defaults that are shown below:

Security Code	0000 (disabled)
Device address	Unconfigured
Last variable	8

For each of the eight inputs:

Decimal point	XXX.XX
Bar Type	Left
Bar lower limit	0.0
Bar Upper limit	100.0
Gain	1.0
Offset	0.0

To reset the BA448CF-F select 'rESEt' in the configuration menu by operating the **▼** or **▲** button. To enter the function press **P** which will reveal '0000' with the left hand digit flashing. To prevent accidental use of this function, '5urE' must be entered to confirm that the instrument is to be reset.

Using the **▼** or **▲** button set the flashing digit to '5' and press the **P** button to move control to the next digit which should be set to 'u'. When the four letters of '5urE' have been entered operating the **E** button will reset the BA448CF-F to the factory defaults.

#### CAUTION

**All the instrument's node configuration and links will be lost when it is reset.**

### 6.2.2 Change from node to listener 'tYPE'

This function enables the instrument to be changed from a fieldbus node to a fieldbus listener. Select 'tYPE' in the node configuration menu using the **▼** or **▲** button. To enter the function press **P** which will show that the instrument is configured as a fieldbus node, to change to a fieldbus listener press the **▼** or **▲** button which will toggle the display to 'LStnr'. To prevent accidental changes this request must be confirmed by operating the **P** button and entering '5urE'. The instrument will display '0000' with the first digit flashing, using the **▼** or **▲** button set the flashing digit to '5' and press the **P** button to move control to the next digit which should be set to 'u'. When the four letters of '5urE' have been entered, operating the **E** button will cause the instrument to restart as a fieldbus listener in the display mode.

#### CAUTION

**All the instrument's node configuration and links will be lost when it is changed from a fieldbus node to a fieldbus listener.**

### 6.2.3 Access code for node configuration menu 'CodE'

Access to the node configuration menu may be protected by a four digit security code which must be entered to gain access. New instruments are supplied configured with the default code 0000 which disables this protection and allows unrestricted access to the configuration menu.

To enter a new access code select 'CodE' in the configuration menu by operating the ▼ or ▲ button. To enter the function press P which will reveal the current access code with one digit flashing. The code may be changed using the ▼ or ▲ button to adjust the flashing digit and the P button to move control to the next digit. When the required code has been selected, press E to enter the selection and return to the 'CodE' prompt in the configuration menu. The revised access code will be activated when the indicator is returned to the display mode.

If the access code is lost please contact BEKA associates.

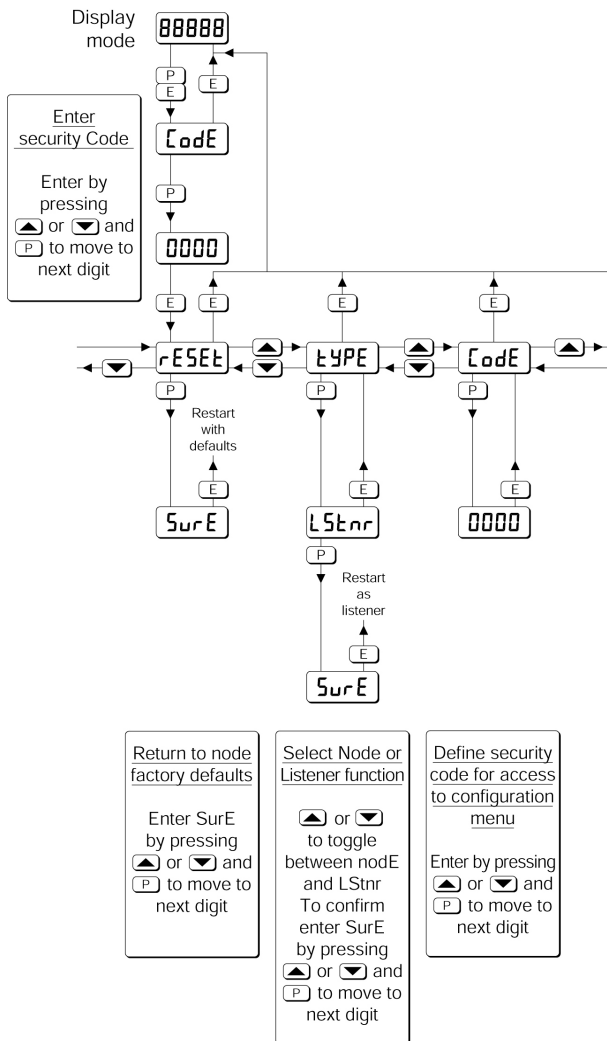


Fig 4 Node configuration menu

### 6.3 Listener configuration menu

The listener configuration menu is separated into three sections, 'SCAN', 'LIST' and 'Edit', plus three housekeeping functions 'CodE', 'tYPE' and 'rESEt' as shown in Fig 6.

'SCAN' is the simplest method of configuration if the fieldbus Device Address and Variable Identity of the data to be displayed by the BA448CF-F listener are not known.

In the 'SCAN' function pressing the P button causes the BA448CF-F indicator to search the fieldbus segment to which it is connected for all publishers. Fig 5 shows how the indicator displays the hexadecimal Device Address and Variable Identity associated with each publisher.

A **Publisher** is a device that places its output data onto the bus as part of a cyclical pre-determined data exchange schedule.

The **Device Address** is a unique address that identifies each fieldbus instrument connected to the bus.

The **Variable Identity** is the fieldbus device Data Link Connection End Point (DLCEP) which identifies each Function Block output (process variable) transmitted by a fieldbus device such as flow and temperature transmitted by a fieldbus flowmeter.

The ▼ and ▲ push buttons scroll the display through all the publishers on the segment showing the Device Address and Variable Identity for each one - see Fig 5. To aid identification, operating the P button will preview the value of the data at each selected address, if required it may then be allocated to one of the eight BA448CF-F listener inputs in-1, to in-8 by operating the P button again. If the format of the data at the selected Device Address and Variable Identity is not DS-65 (float + status) 'no dAt' will be displayed.

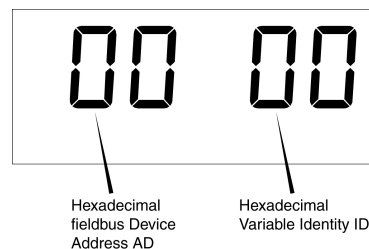


Fig 5 Device Address and Variable Identity

If the Device Address and Variable Identity of the process variable to be displayed by the BA448CF-F indicator are known, they may be directly entered via the edit sub-menu. This sub-menu also provides full control of both the numeric and bargraph display parameters.



### 6.3.1 Access

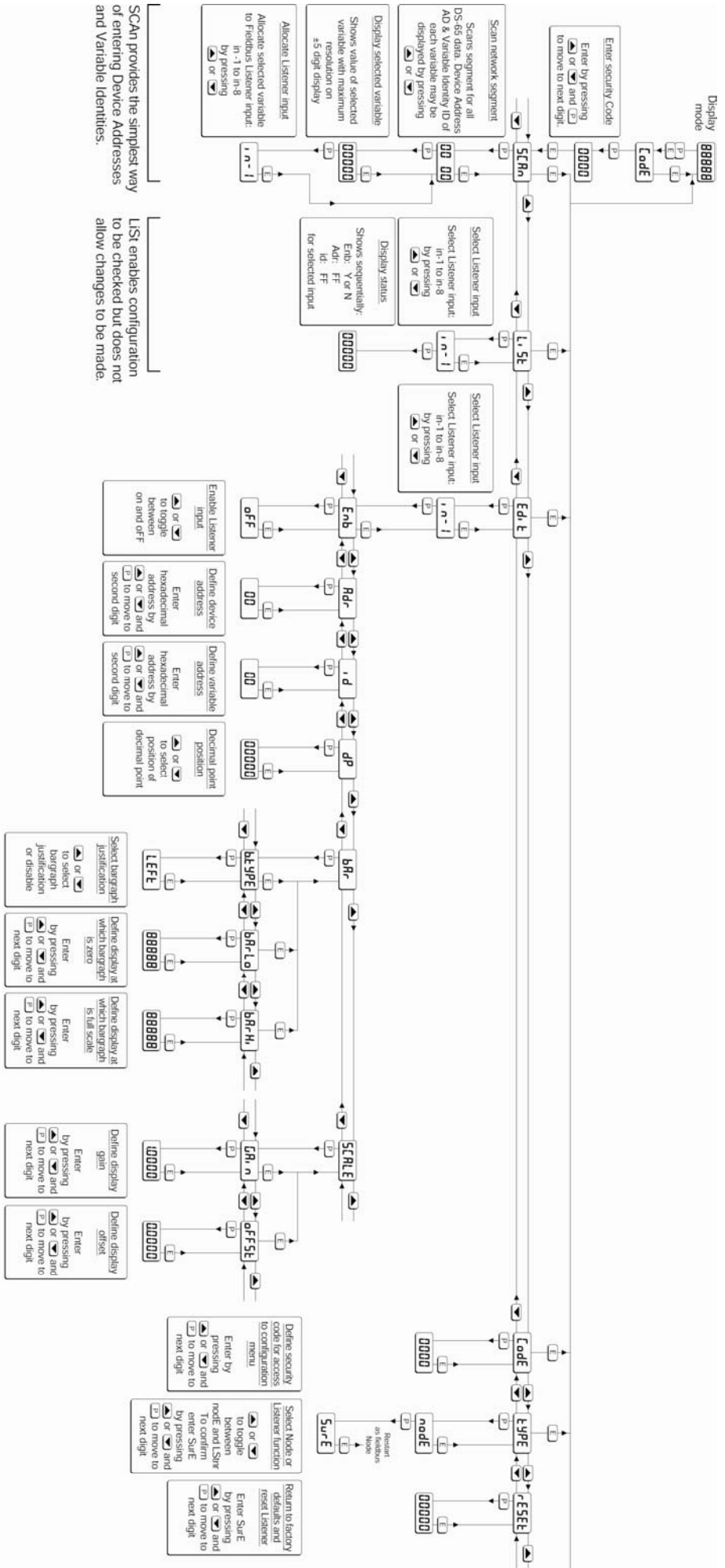
Access to the listener configuration menu is obtained by operating the **P** and **E** buttons simultaneously. If the BA448CF-F is not protected by an access code the first parameter 'SCAN' will be displayed.\* If the indicator is protected by an access code, 'CodE' will be displayed first. Pressing **P** will allow the four digit security code to be entered digit by digit using the ▼ or ▲ button to adjust the flashing digit and **P** to move control to the next digit. When the correct code has been entered, pressing **E** will cause the first parameter 'SCAN' to be displayed.\* If an incorrect code is entered, or no button is pressed for ten seconds, the indicator will automatically return to the display mode.

\* If the indicator displays 'rESET' it is conditioned as a fieldbus node, see section 6.2.2 to change it to a fieldbus listener.

### 6.3.2 Summary of listener configuration functions.

This section contains a summary of all the listener configuration functions including a reference to more detailed information. It should be read in conjunction with Fig 6.

Indicator display	Summary of function
'SCAN'	<b>Scan fieldbus segment</b> Identifies all publishers on the fieldbus segment to which the listener is connected and enables selected data to be allocated to one of the eight listener inputs. See section 6.3.3
'LiSt'	<b>List configured input parameters</b> For each of the eight BA448CF-F listener input, in-1 to in-8 shows if the input is enabled and the allocated Device Address and Variable Identity. Parameters can not be changed from within this function. See section 6.3.4
'Edit'	<b>Enter addresses and display parameters</b> Contains six sub-functions that enable known fieldbus Device Address and Variable Identity to be entered and all display parameters adjusted for each of the eight fieldbus listener inputs. See section 6.3.5
'Enb'	<b>Enable listener input</b> Each of the eight listener inputs in-1 to in-8 may be enabled or disabled without affecting any parameters. See section 6.3.6
'Adr'	<b>Enter fieldbus Device Address</b> Allows hexadecimal fieldbus device address for each of the eight listener inputs in-1 to in-8 to be entered. See section 6.3.7
'id'	<b>Enter Variable Identity</b> Allows hexadecimal Variable Identity for each listener input in-1 to in-8 to be entered. See section 6.3.8
'dP'	<b>Decimal point position</b> Defines position of displayed decimal point for each listener input in-1 to in-8. See section 6.3.9
'bAr'	<b>Configuration of bargraph display.</b> Defines bargraph type, plus digital display at which bargraph is zero and full scale for each listener input in-1 to in-8. See section 6.3.10
'SCALE'	<b>Scale numeric display</b> Applies zero offset and scale factor to the numeric display for each listener input in-1 to in-8. See section 6.3.11
'CodE'	<b>Access code for listener configuration menu</b> Enters a four digit security access code for configuration menu. Default code 0000 disables this function. See section 6.3.12
'tYPE'	<b>Change from listener to node</b> Changes the function of the fieldbus indicator from a listener to a node. See section 6.3.13
'rESET'	<b>Reset</b> Returns the BA448CF-F listener to factory defaults. See section 6.3.14



SCAN provides the simplest way of entering Device Addresses and Variable Identities.

LST enables configuration to be checked but does not allow changes to be made.

Edit allows Device Addresses and Variable Identities to be entered in hexadecimal and all parameters to be adjusted.

Fig 6 Listener Configuration menu

**6.3.3 Scan fieldbus segment ‘SCAN’**

If the Device Address and Variable Identity of a process variable are not known, the ‘SCAN’ function provides a simple way to identify them. This function scans the fieldbus segment to which the BA448CF-F indicator is connected and identifies all the publishers. To aid identification it enables the value of each process variable to be pre-viewed and, if required, allocated to one of the eight BA448CF-F Fieldbus indicator inputs.

The BA448CF-F indicator only supports DS-65 formatted data (float + status) which is the usual format for analogue process variables. The ‘SCAN’ function will identify all publishers on the segment irrespective of format, but when pre-viewed, non DS-65 formatted data will produce a ‘no dAt’ error message.

‘SCAN’ is the first function displayed when entering the listener configuration menu, or it may be selected from within the menu by operating the ▼ or ▲ button. To scan the fieldbus segment to which the indicator is connected for all published data press **P** which will reveal the hexadecimal Device Address and Variable Identity of the first publisher found as shown in Fig 5. If there is more than one publisher operating the ▼ or ▲ button will scroll through all of them.

If no cyclic data is being published on the fieldbus segment the BA448CF-F indicator will display ‘noPub’.

When the Device Address and Variable Identity of a process variable is being displayed, pressing **P** will preview the value of the process variable displayed with maximum resolution on the five digit display. If this confirms that it is one of the process variables to be displayed, it may be allocated to one of the eight BA448CF-F listener inputs in-1 to in-8.

To select the required listener input press **P** to display the first input in-1, operating the ▼ or ▲ button will scroll the display through the other inputs. When the required input is displayed pressing **E** will allocate the selected process variable to the selected input and return the display to the Device Address and Variable Identity from which another process variable may be selected.

When a process variable is allocated to a indicator input any previous allocation will be overwritten.

**6.3.4 List configured input parameters ‘LiSt’**

The ‘LiSt’ function enables the Device Address and Variable Identity allocated to each lindicator input to be viewed without danger of it being accidentally changed.

The ‘LiSt’ function may be selected from within the menu by operating ▼ or ▲ button. To enter the function press **P** which will display the indicator input currently selected in the display mode, other inputs may be selected using the ▼ or ▲ button. Operating the **P** button will cause the following parameters for the selected input to be displayed sequentially:

Display	Explanation
‘Enb: Y or N’	Input Enabled yes or no
‘Adr: 00’	Device Address
‘id: 00’	Variable Identity

The display then automatically returns to the selected BA448CF-F indicator input from where another input may be selected.

If one of the eight BA448CF-F indicator’s inputs in-1 to in-8 has not had a Device Address and Variable Identity allocated to it, ‘LiSt’ will show both as invalid address FF.

**6.3.5 Enter address & display parameters**

**‘Edit’**

The ‘Edit’ function may be selected from within the menu by operating ▼ or ▲ button. To enter the function press **P** which will display the indicator input currently selected in the display mode, other listener inputs may be selected using the ▼ or ▲ button. When the required input has been selected operating the **P** button will enter the edit sub-menu at ‘Enb’ for the selected input.

**6.3.6 Enable selected input ‘Enb’**

‘Enb’ turns the indicator input selected in the Edit function on or off without affecting the conditioning. To enter the function press **P** which will reveal whether the selected input is ‘on’ or ‘oFF’. Operating the ▼ or ▲ buttons will toggle between the two conditions. When set as required operating the **E** button will enter the selection and return to the edit sub-menu.

### 6.3.7 Enter Device Address 'Adr'

This function allows a known fieldbus Device Address to be entered and allocated to the indicator input selected in the Edit function. To enter the function press **P** which will reveal the existing two digit hexadecimal address with one digit flashing which may be changed by operating the ▼ or ▲ button. When set as required operating the **P** button will transfer control to the second digit that may be adjusted in the same way. When both digits are set as required operating the **E** button will enter the selection and return to the 'Adr' prompt in the edit sub-menu.

### 6.3.8 Enter Variable Identity 'id'

Enables a known Variable Identity to be entered and allocated to the indicator input selected in the Edit function. To enter the function press **P** which will reveal the existing two digit hexadecimal address with one digit flashing which may be changed by operating the ▼ or ▲ button. When set as required operating the **P** button will transfer control to the second digit that may be adjusted in the same way. When both digits are set as required operating the **E** button will enter the selection and return to the 'id' prompt in the edit sub-menu.

### 6.3.9 Decimal point position 'dP'

Defines the position the decimal point in the numeric display. To enter the function press **P** which will reveal the existing decimal point position. Operating the ▼ or ▲ button will move the decimal point to the required position, omit it, or activate all the decimal points which automatically provides maximum resolution in the display mode irrespective of the numeric value. When positioned as required, operating the **E** button will enter the selection and return to the 'dP' prompt in the edit sub-menu.

### 6.3.10 Configuration of bargraph display 'bAr'

This function contains three sub-functions that enable the bargraph, justify its position and define the relationship between the bargraph and the instrument's numeric display.

Sub-function 'b.tYPE' allows the bargraph to be left, centre or right justified, or to be turned off. Sub-functions 'bArLo' and 'bArHi' define the listener's numeric display at which the bargraph starts and is at full scale.

The 'bAr' function may be selected from within the edit sub-menu by operating the ▼ or ▲ button. To enter the function press **P** which will display the 'b.tYPE' sub-function, pressing **P** again will reveal the existing bargraph justification.

The ▼ or ▲ button will scroll through the four options, when the required justification is displayed, pressing **E** will enter the selection and return the display to the 'b.tYPE' prompt in the edit sub-menu from which 'bArLo' may be selected using the ▼ or ▲ button.

'bArLo' defines the indicator's numeric display at which the bargraph starts, to enter the function press **P** which will reveal the existing setting. The display may be changed using the ▼ or ▲ button to adjust the flashing digit and the **P** button to move control to the next digit. When the required starting display has been selected, press **E** to return to the 'bArLo' prompt in the edit sub-menu from which the 'bArHi' function may be selected.

'bArHi' defines the indicator's numeric display at which the bargraph is full scale, to enter the function press **P** which will reveal the existing setting. The display may be changed using the ▼ or ▲ button to adjust the flashing digit and the **P** button to move control to the next digit. When the required display has been selected, press **E** twice to enter the new values and return to the 'bAr' prompt in the edit sub-menu.

**Note:** If the 'dP' function has been set to provide automatic maximum resolution irrespective of the displayed value, it may be necessary to manually position the decimal point before adjusting 'bArLo' or 'bArHi'. This can be achieved by repeatedly operating the **P** button until the activated decimal point flashes, the decimal point can then be positioned using either the ▼ or ▲ button. Pressing the **P** button again will return control to one of the digits.

### 6.3.11 Scale numeric display 'SCALE'

A scaling factor 'Gain' and an offset 'oFFSt' may be applied to the fieldbus process variable using this function, thus allowing the indicator to display the fieldbus process variable in alternative units.

The 'SCALE' function may be selected from within the edit sub-menu by operating the ▼ or ▲ button. To enter the function press **P** which will display the 'GAin' sub-function, pressing **P** again will reveal the existing gain with one digit flashing. This flashing digit may be changed by operating the ▼ or ▲ button; when adjusted the **P** button will move control to the next digit or to the decimal point which can be positioned using the ▼ or ▲ button. When 'GAin' has been set to the required value operating the **E** button will enter the selection and return to the 'GAin' prompt in the sub-menu from where the 'oFFSt' function can be selected using the ▼ or ▲ button.

To enter the 'oFFSt' function press **P** which will reveal the existing offset with one digit flashing. Again the flashing digit may be changed by operating the ▼ or ▲ button and the **P** button will move control to the next digit or to the decimal point. When 'oFFSt' has been set to the required value operating the **E** button will enter the selection and return to the 'oFFSt' prompt in the sub-menu. Three operations of the **E** button will return to the 'Edit' function in the listener configuration menu.

### 6.3.12 Access code for listener configuration menu. 'CodE'

Access to the listener menu may be protected by a four digit security code which must be entered to gain access. New instruments are supplied configured with the default code 0000 which disables this protection and allows unrestricted access to the configuration menu.

To enter a new access code select 'CodE' in the listener configuration menu by operating the ▼ or ▲ button. To enter the function press **P** which will reveal the current access code with one digit flashing. The code may be changed using the ▼ or ▲ button to adjust the flashing digit and the **P** button to move control to the next digit. When the required code has been selected, press **E** to enter the selection and return to the 'CodE' prompt in the listener configuration menu. The revised access code will be activated when the indicator is returned to the display mode.

If the access code is lost please contact BEKA associates.

### 6.3.13 Change from listener to node 'tYPE'

This function enables the instrument to be changed from a fieldbus listener to a fieldbus node by selecting 'tYPE' in the listener configuration menu using the ▼ or ▲ button. To enter the function press **P** which will show that the instrument is configured as a fieldbus listener, to change to a fieldbus node press the ▼ or ▲ button which will toggle the display to 'nodE'. To prevent accidental changes this request must be confirmed by operating the **P** button and entering '5urE'. The instrument will display '0000' with the first digit flashing, using the ▼ or ▲ button set the flashing digit to '5' and press the **P** button to move control to the next digit which should be set to 'u'. When the four letters of '5urE' have been entered, operating the **E** button will cause the instrument to restart as a fieldbus node in the display mode.

#### CAUTION

**All the instrument's listener configuration will be lost when it is changed from a fieldbus listener to a fieldbus node.**

### 6.3.14 Reset the indicator to listener factory defaults 'rESEt'

The BA448CF-F indicator may be reset to the listener factory defaults shown below:

Security Code	0000 (disabled)
---------------	-----------------

For each of the eight inputs:

Input enable	Off
Decimal point	Auto (maximum resolution)
Bar Type	Left
Bar lower limit	0.0
Bar Upper limit	100.0
Gain	1.0
Offset	0.0

To reset the BA448CF-F indicator to the listener factory defaults select 'rESEt' in the listener configuration menu by operating the ▼ or ▲ button. To enter the function press **P** which will reveal '0000' with the left hand digit flashing. To prevent accidental use of this function, '5urE' must be entered to confirm that the instrument is to be reset.

Using the ▼ or ▲ button set the flashing digit to '5' and press the **P** button to move control to the next digit which should be set to 'u'. When the four letters of '5urE' have been entered operating the **E** button will reset the BA448CF-F to the factory defaults. Any existing configuration and addresses will be lost when the indicator is reset.

**7. MAINTENANCE**

**7.1 Fault finding during commissioning**

If a BA448CF-F indicator fails to function during commissioning the following procedure should be followed:

Symptom	Cause	Check:
No Display	Instrument not correctly connected or powered.	9 to 22V between terminals 1 & 2.
When configured as a listener displays 'no ConF'	No inputs are enabled.	Configuration of each input.
When configured as a listener displays 'no dAtA'	No data being received with the current configuration.	Device Address and Variable Identities are correct.  That data has DS-65 format.
Display shows '9.9.9.9.9' with all decimal points flashing; all bargraph segments activated and bargraph scale flashing.	Value over-range	Configuration. and decimal point position.
Display shows '-9.9.9.9.9' with all decimal points flashing; no bargraph segments activated and bargraph scale flashing.	Value under-range	Configuration And decimal point position.
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.	Fieldbus configuration.
Bargraph scale flashes.	Process 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 model number followed by the firmware version will be displayed prior to entering the display mode.

**7.2 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 BA448CF-F fails after it has been functioning correctly, the table shown in section 7.1 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.

**7.3 Servicing**

We recommend that faulty BA448CF-F Fieldbus indicators are returned to BEKA associates or to our local agent for repair.

**7.4 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.

**7.5 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.

**7.6 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.

## **8. ACCESSORIES**

### **8.1 Scale marking**

BA448CF-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.

### **8.2 Tag number**

The BA448CF-F can be supplied with a thermally printed tag number on the rear panel adjacent to the terminals.

**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 BA448CF-F has FM and cFM intrinsic safety and nonincendive approval, project identifications 3027031 and 3027031C. Copies of the Certificates of Compliance are available from BEKA associates sales office and www.beka.co.uk

**A1.1 Intrinsic safety approval**

The BA448CF-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 BA448CF-F has a T4 rating at ambient temperatures up to +70°C and may be used with the following gases and dusts:

<b>Intrinsic Safety</b>	
Division 1 or 2	
Class I	Group A & B Group C Group D
Class II	Group E, F & G
Class III	
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 BA448CF-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 Approvals also allows the BA448CF-F to be connected to non-FISCO systems using the entity concept – see section 4.2 of this manual.

**A1.2 Nonincendive approval**

The BA448CF-F is FM Class 3611 nonincendive approved 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 BA448CF-F fieldbus indicator to be connected to any appropriately certified FNICO compliant fieldbus segment.

The BA448CF-F has a T4 rating at ambient temperatures up to +70°C and may be used with the following gases:



<b>Nonincendive</b>	
Division 2	
Class I	Group A & B Group C Group D
Zone 2	
Class I	Group IIC Group IIB Group IIA



Iss.	Date	Modification	Ckd.	Appd.	<p><b>HAZARDOUS (CLASSIFIED) LOCATION</b></p> <p>BA414DF LOCATIONS: Class I, Division 1, Groups A, B,C, D Class II, Division 1, Groups E, F &amp; G Class III Class I, Zone 0, Group IIC</p> <p>BA418CF LOCATIONS: Class I, Division 1, Groups A, B,C, D Class I, Zone 0, Group IIC</p>														
<p><b>BEKA associates</b> Hitchin England company confidential, copyright reserved.</p>																			
Iss.	Date	Modification	Ckd.	Appd.	<p><b>UNCLASSIFIED LOCATION</b></p>														
<p>BA414DF and BA418CF</p> <p>Terminals 1 &amp; 2 These terminals comply with the Intrinsically Safe Concept (FISCO) defined by IEC 60079-27</p> <p> <math>U_i = 17.5V</math>      <math>U_o = 0</math>  <math>I_i = 380mA</math> dc    <math>I_o = 0</math>  <math>P_i = 5.32W</math>        <math>P_o = 0</math>  <math>C_i = 0</math>  <math>L_i = 8\mu H</math> </p> <p>and have the following Entity Parameters</p> <p> <math>U_i = 22Vdc</math>      <math>U_o = 0</math>  <math>I_i = 250mA</math>      <math>I_o = 0</math>  <math>P_i = 1.2W</math>        <math>P_o = 0</math> </p>																			
<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>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</li> <li>Fieldbus power supply with FISCO compliant output (IEC6009-27) or galvanic isolator with entity parameters complying with the following requirements:</li> </ol>																			
<table style="width: 100%; border: none;"> <tr> <td style="padding-right: 20px;"><math>U_o</math> or <math>V_t</math></td> <td style="padding-right: 20px;">equal to or less than</td> <td><math>U_i</math></td> </tr> <tr> <td><math>I_o</math> or <math>I_t</math></td> <td>equal to or less than</td> <td><math>I_i</math></td> </tr> <tr> <td><math>P_o</math></td> <td>equal to or less than</td> <td><math>P_i</math></td> </tr> <tr> <td><math>L_a</math></td> <td>equal to or greater than</td> <td><math>L_{cable} + L_i</math></td> </tr> <tr> <td><math>C_a</math></td> <td>equal to or greater than</td> <td><math>C_{cable} + C_i</math></td> </tr> </table>					$U_o$ or $V_t$	equal to or less than	$U_i$	$I_o$ or $I_t$	equal to or less than	$I_i$	$P_o$	equal to or less than	$P_i$	$L_a$	equal to or greater than	$L_{cable} + L_i$	$C_a$	equal to or greater than	$C_{cable} + C_i$
$U_o$ or $V_t$	equal to or less than	$U_i$																	
$I_o$ or $I_t$	equal to or less than	$I_i$																	
$P_o$	equal to or less than	$P_i$																	
$L_a$	equal to or greater than	$L_{cable} + L_i$																	
$C_a$	equal to or greater than	$C_{cable} + C_i$																	
<p>cont:</p>																			
Date	Date	Title	Drawn	Checked	Scale														
28.03 2006	15.09 2009	FM Approvals Control Drawing for Intrinsically Safe BA414DF & BA418CF Fieldbus Indicators	RC		NTS														
Iss.	Date	Title	Drawing No.																
1	2006	FM Approvals Control Drawing for Intrinsically Safe BA414DF & BA418CF Fieldbus Indicators	CI410-12																
2	2009	Provision for alternative instrument titles added.	Sheet 1 of 3																

Includes BA444DF see note 11



Iss.		Date		Modification		Ckd.		Appd.			
1		28.03.2006		First release							
2		15.09.2009		Provision for alternative instrument titles added.							
											
<p>12. The BA418CF may alternatively be titled:                  BA448CF Fieldbus Indicator                  BA448CL Fieldbus Listener                  BA428CF Fieldbus Set Point Station</p> <p><b><u>FISCO Rules</u></b></p> <p>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 (<math>V_{max}</math>), the current (<math>I_{max}</math>) and the power (<math>P_{max}</math>) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage (<math>U_o</math>, <math>V_{oc}</math> or <math>V_t</math>), the current (<math>I_o</math>, <math>I_{sc}</math> or <math>I_t</math>) and the power (<math>P_o</math>) which can be provided by the associated apparatus (supply unit). In addition the maximum unprotected residual capacitance (<math>C_i</math>) and inductance (<math>L_i</math>) of each apparatus (other than terminators) connected to the Fieldbus must be less than or equal to 5nF and 10uH respectively.</p> <p>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 (<math>U_o</math>, <math>V_{oc}</math> or <math>V_t</math>) 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.</p> <p>The cable used to interconnect the devices needs to comply with the following parameters:                  Loop resistance <math>R'</math>: 15....150Ω/km                  Inductance per unit length <math>L'</math>: 0.4....1mH/km</p> <p>Capacitance per unit length <math>C'</math>: 80....200nF/km  <math>C' = C' \text{ line/line} + 0.5 C' \text{ line/screen}</math>, if both lines are floating                  or  <math>C' = C' \text{ line/line} + C' \text{ line/screen}</math>, 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:  <math>R = 90....100\Omega</math>  <math>C = 0 \text{ ....}2.2\mu F</math></p> <p>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.</p> <p>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:  <math>U_o</math> or <math>V_{oc}</math> or <math>V_t \leq V_{max}</math>, <math>I_o</math>, <math>I_{sc}</math> or <math>I_t \leq I_{max}</math>, <math>P_o \leq P_i</math>.                  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:  <math>U_o</math> or <math>V_{oc}</math> or <math>V_t \leq V_{max}</math>, <math>I_o</math>, <math>I_{sc}</math> or <math>I_t \leq I_{max}</math>, <math>P_o \leq P_i</math>.</p>											
Date						Title		Drawn		Checked	
28.03.2006						FM Approvals Control Drawing for Intrinsically Safe		RC			
15.09.2009						BA414DF & BA418CF Fieldbus Indicators		Scale		NTS	
1								Drawing No.		CI410-12	
2								Sheet 3			

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
Iss.	Date	Modification	Ckd.	Appd.	<p><b>BEKA associates</b> Hitchin England company confidential, copyright reserved.</p>	Iss.	Date	Modification	Ckd.	Appd.	<p>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.</p> <table border="1"> <thead> <tr> <th>Voc</th> <th>Maximum current for Groups AB [IIC]</th> <th>Maximum current for Groups CD [IIB, IIA]</th> </tr> <tr> <th>V</th> <th>mA</th> <th>mA</th> </tr> </thead> <tbody> <tr> <td>14</td> <td>274</td> <td>570</td> </tr> <tr> <td>15</td> <td>199</td> <td>531</td> </tr> <tr> <td>16</td> <td>154</td> <td>432</td> </tr> <tr> <td>17.5</td> <td>121</td> <td>360</td> </tr> </tbody> </table> <p>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)</p>	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
												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																											
1	28.03 2006	First release																											
2	15.09 2009	Provision for alternative instrument titles added.										<i>[Signature]</i>																	
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FM Approvals Control Drawing for Nonincendive BA414DF & BA418CF Fieldbus Indicators			RC			<i>[Signature]</i>			NTS																				
Drawing No.			CI410-13																										
Sheet 2																													

Cont.

Includes BA444DF see note 10

<b>BEKA associates</b> Hitchin England <small>company confidential, copyright reserved.</small>	Iss.	Date	Modification	Ckd.	Appd.										
1	28.03 2006	First release													
2	15.09 2009	Provision for alternative instrument titles added.			A										
<p>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.</p> <p>Metallic glands and hubs must be grounded – see note 6.</p> <table border="1" style="margin-left: 40px; border-collapse: collapse; width: 80%;"> <thead> <tr> <th style="text-align:center;">Class</th> <th style="text-align:center;">Permitted gland or conduit hub</th> </tr> </thead> <tbody> <tr> <td style="text-align:center;">Class I</td> <td>Any metallic or plastic cable gland or conduit hub that provides the required environmental protection.</td> </tr> <tr> <td style="text-align:center;">Class II and III</td> <td> <b>Crouse – Hinds Myler hubs</b>  SSTG-1   STG-1   STAG-1  MHUB-1   <b>O-Z / Gedrey hub</b>  CHMG-50DT   <b>REMKE hub</b>  WH-1-G   <b>Killark Glands</b>  CMCXAA050   MCR050   MCX050 </td> </tr> </tbody> </table> <p>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.</p> <p>7. <b>CAUTION:</b> 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.</p> <p>8. The terminator on the Fieldbus must be FM Approved or for Canadian Installations CFM or CSA Approved</p> <p>9. The BA414DF and the BA418CF should be mounted where they are shielded from direct sunlight.</p> <p>10. The BA414DF may alternatively be titled:  BA444DF Fieldbus Indicator  BA444DL Fieldbus Listener  BA424DF Fieldbus Set Point Station</p> <p>11. The BA418CF may alternatively be titled:  BA448CF Fieldbus Indicator  BA448CL Fieldbus Listener  BA428CF Fieldbus Set Point Station</p>						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	<b>Crouse – Hinds Myler hubs</b> SSTG-1   STG-1   STAG-1 MHUB-1  <b>O-Z / Gedrey hub</b> CHMG-50DT  <b>REMKE hub</b> WH-1-G  <b>Killark Glands</b> CMCXAA050   MCR050   MCX050	Cont.			
Class	Permitted gland or conduit hub														
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Date	28.03 2006	15.09 2009	Title	Drawn	Checked	Scale									
			FM Approvals Control Drawing for Nonincendive BA414DF & BA418CF Fieldbus Indicators	RC	A	NTS									
Iss.	1	2			Drawing No. Sheet 3	CI410-13									

Includes BA444DF see note 10

Iss.		Date		Modification		Ckd.		Appd.			
1		28.03 2006		First release							
2		15.09 2009		Provision for alternative instrument titles added.							
											
<p><b>FNICO Rules</b></p> <p>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 (<math>V_{max}</math>), the current (<math>I_{max}</math>) and the power (<math>P_{max}</math>) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage (<math>U_0</math>, <math>V_{oc}</math> or <math>V_t</math>), the current (<math>I_0</math>, <math>I_{sc}</math> or <math>I_t</math>) and the power (<math>P_0</math>) which can be provided by the associated apparatus (supply unit). In addition the maximum unprotected residual capacitance (<math>C_i</math>) and inductance (<math>L_i</math>) of each apparatus (other than terminators) connected to the Fieldbus must be less than or equal to 5nF and 20uH respectively.</p> <p>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 (<math>U_0</math>, <math>V_{oc}</math> or <math>V_t</math>) 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.</p> <p>The cable used to interconnect the devices needs to comply with the following parameters:</p> <p>Loop resistance <math>R'</math>: 15....150Ω/km          Inductance per unit length <math>L'</math>: 0.4....1mH/km</p> <p>Capacitance per unit length <math>C'</math>: 80....200nF/km  <math>C' = C'</math> line/line+0.5 <math>C'</math> line/screen, if both lines are floating          or  <math>C' = C'</math> line/line + <math>C'</math>line/screen, if the screen is connected to one line.</p> <p>Length of spur cable: max. 30m          Length of trunk cable: max. 1km          Length of splice: max = 1m</p> <p>Terminators</p> <p>At the end of each trunk cable an FM Approved line terminator with the following parameters is suitable:  <math>R = 90...100\Omega</math>  <math>C = 0....2.2\mu F</math></p> <p>System evaluation</p> <p>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.</p> <p>Notes.</p> <p>1. The FNICO concept allows the interconnection of FM Approved nonincendive devices with FNICO parameters not specifically examined in combination as a system when:  <math>U_0</math> or <math>V_{oc}</math> or <math>V_t \leq V_{max}</math>.</p> <p>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:  <math>U_0</math> or <math>V_{oc}</math> or <math>V_t \leq V_{max}</math>.</p>											
Title						Drawn		Checked		Scale	
FM Approvals Control Drawing for Nonincendive BA414DF & BA418CF Fieldbus Indicators						RC				NTS	
						Drawing No.		CI410-13			
						Sheet 4					

Includes BA444DF see note 10

## APPENDIX 2 IECEX Certification

### A2.0 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](http://www.iecex.com)

### A2.1 IECEx Certificate of Conformity

The BA448CF-F Fieldbus Indicator has been issued with an IECEx Certificate of Conformity number IECEx ITS 06.0013X which specifies the following certification codes and marking:

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

See below for details of safe use in Zone 0.

#### CAUTION

#### Installation in Zone 0

**When installed in a Zone 0 potentially explosive atmosphere, 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.**

When connected to an IECEx certified system the BA448CF-F may be installed in:

- Zone 0 explosive gas air mixture continuously present.  
**Note:** Special conditions for safe use apply see above.
- 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

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.

**Note:** the guaranteed operating temperature range of the BA448C Fieldbus Indicator is -20 to +70°C

The IECEx safety parameters are identical to the ATEX parameters and, like the ATEX certification, confirm that the BA448CF-F complies with the FISCO Field Device requirements specified in IEC60079-27.

The IECEx certificate may be downloaded from [www.beka.co.uk](http://www.beka.co.uk), [www.iecex.com](http://www.iecex.com) or requested from the BEKA sales office.

### A2.2 Installation

The BA448CF-F IECEx and ATEX certifications have identical intrinsic safety parameters and installation requirements. The ATEX system design requirements described in section 4 of this manual may therefore be used for IECEx installations, but the local code of practice should always be consulted.