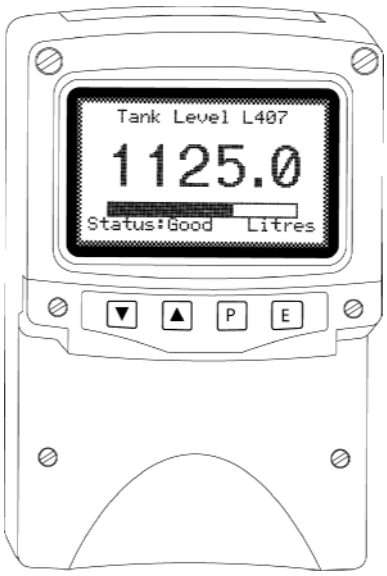
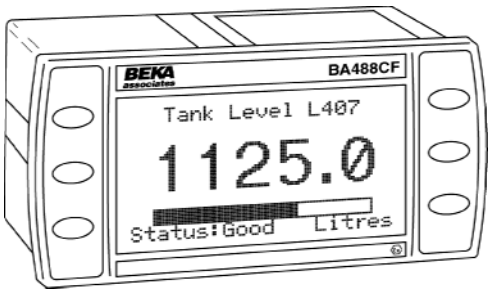
Foundation Fieldbus
Fieldbus Display and
Fieldbus Indicator

Fieldbus Interface Guide





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This guide applies to the following models:

Multiple Variable Fieldbus Display

BA488CF - *Panel mounted, Intrinsically Safe*
BA484DF - *Field mounted, Intrinsically Safe*
BA688CF - *Panel mounted, Safe Area*
BA684DF - *Field mounted, Safe Area*

Single Variable Fieldbus Indicator

BA414DF - *Field mounted, Intrinsically Safe*
BA614DF - *Field mounted, Safe Area*

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Introduction

This guide gives all the necessary information to use our Fieldbus Displays on a Foundation Fieldbus installation.

Several other protocols are commonly used in industry which we may choose to support as market demand rises. This guide and others will periodically be updated, so please come back to our website regularly for the latest information.

For hardware installation information, please refer to the separate instruction manuals available for each model.

For information on customising the screen displays of the Fieldbus Display, please refer to the "Programming Guide".

What's in this Fieldbus Interface Guide

- An overview of each instrument
- A description of the parameters that are applicable to each instrument.
- Instructions on how to use the instrument in its standard non-programmed modes

What's in the Programming Guide

- A description of the Fieldbus Display
- An overview of the protocol
- Specific information on more advanced features
- A command summary, where the commands are grouped together by function and presented in a series of tables
- A command reference, where each command is listed in alphabetical order and covered in detail. The information is presented in a consistent layout and examples given to demonstrate the use of the command in context.

What's in the Instruction Manuals

- An overview of the instrument
- Intrinsic Safety Certification information
- System Design and Installation
- Configuration
- Maintenance

Other sources of information

Our website at ***www.beka.co.uk*** is kept up to date with the latest literature and information

After reading through this guide, if you still have a problem getting the results you need then email us at ***support@beka.co.uk*** and we will do our best to help you

Product Overview

A detailed overview of the instrument is given in the instruction manual for each product. This should be read before implementing any system using these instruments. However it is useful to summarise the main features of the product before attempting to design any controlling software application.

Multiple Variable Fieldbus Display

Display

The instrument display is organised as 120 pixels horizontally by 64 pixels vertically. Each pixel is approximately 0.7mm square which makes it ideal for displaying text and simple graphics. The size of the pixels improves the contrast and hence the readability at greater distances.

The display is also backlit by an ultra-efficient green LED module which enables the screen to be viewed in all conditions, from bright sunlight to total darkness.

Analogue Input Display

The primary purpose of this instrument is to display variables that exist on the fieldbus. Nine pre-programmed screen layouts are available to display one, two or four variables simultaneously. A total of eight (8) variables can be accessed by using the front panel push buttons.

For applications that require a customised display, the unit can be programmed by following the instructions in the "Fieldbus Display - Programming Guide" (available from BEKA associates). It is possible to map a number of fieldbus variables to a corresponding set of formatted text strings such that they are automatically updated without any further intervention. As this guide concentrates on the non-programmed modes of operation such advanced use is outside the scope of this document.

Switch Inputs

The multiple variable models have six switches on the front of the panel mounted instrument, and four on the field mounted instrument. Both instruments have the option of overriding these with up to six external switches which can be sized and labelled to suit the application.

Switch Outputs

As an optional accessory (available only at the time of ordering), the multiple variable models can be fitted with six switch outputs. These are totally isolated and can be energised or de-energised independently of each other. They can be driven either by direct commands from the fieldbus, or alarm set-point values can be assigned so that they operate automatically. Note that they are not intended to be used as conventional Foundation Fieldbus Alarms and should be used for indication only. They are under the control of the local application and are actioned on received values and stored setpoints. There is no communication of status across the fieldbus other than reading the appropriate parameters directly.

Single Variable Fieldbus Ind icator

Display

The instrument display is organised as a 5 digit (plus sign) display with a 31 segment bargraph. Although the size of the digits is fixed at 20mm, the displayed precision may be changed. The bargraph and its associated scale may be turned off for those applications where it is deemed inappropriate.

General Operation

The primary purpose of a BEKA fieldbus display is to enable local indication of up to 8 fieldbus process variables. This is normally achieved using cyclic data writes to the appropriate function block.

The configuration of the display can be manually carried out using the local configuration menus, or acyclic data transfers can be sent to parameters in the custom transducer blocks.

The multiple variable version accepts acyclic data transfers to parameters in the custom transducer blocks for several purposes:

- Display of text and simple graphics. This permits the use of the display as a basic operator terminal. Keypad button presses are latched and can be read over the fieldbus.
- Design of custom screens that contain text, graphics and embedded fieldbus variables that are automatically updated from received cyclic data.
- For hosts that do not support the included function blocks, it is possible to simply update the process variables acyclically and not use cyclic data.

Full details of how to use the more advanced text and graphics capabilities of the display are contained in the "Fieldbus Display - Programming Guide".

Supported Models and Device Revisions

There are two basic models available: a multiple variable version and a single variable version:

- The multiple variable version is available with support for either the Foundation Fieldbus or Profibus PA protocol
    - The Foundation Fieldbus version is available in two device revisions: Device Revision 1 uses a single eight-input MAO (Multiple Analogue Output) function block, whereas Device Revision 2 uses two four-input IS (Input Selector) function blocks. These two revisions are necessary to accommodate the various requirements of differing host systems.

      Note: To ease the commissioning of the display, both device revisions are built into the Foundation Fieldbus Display – the installer can easily select between the two using the local configuration menu.
    - The Profibus PA version uses eight AO (Analogue Output) function blocks
- The single variable version is only available with the Foundation Fieldbus protocol, and uses the first input of a single four-input IS (Input Selector) function block.

As there are numerous differences between these versions, each model variant has its own section in this manual. The appendix at the rear gives common information about the blocks, data structures and numeric formats in detail.

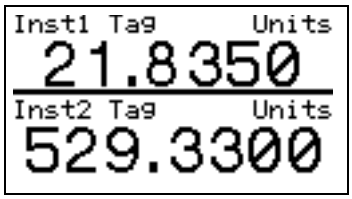
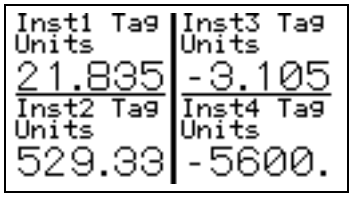
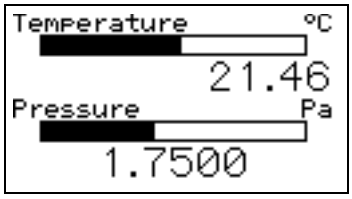
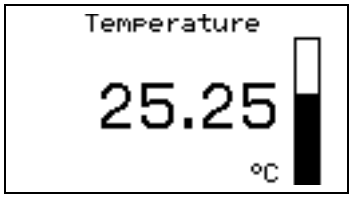
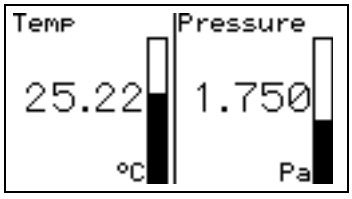
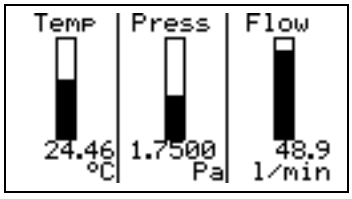
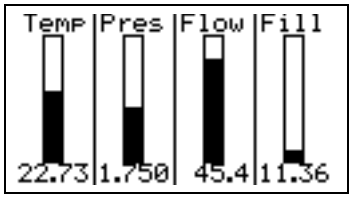
Standard Screens

(Multiple Variable Displays only)

There are nine standard screens available which require no application programming. They are capable of displaying a selection of up to eight process variables, together with their units of measure and tag description. Once a screen format has been chosen, each input variable can be brought into view by pressing the up and down arrow keys.

These standard screens are ideal for many simple applications and can be implemented very quickly. However, where a unique display format is required these can be built up using the commands that can be found in the “Fieldbus Display – Programming Guide”

The screen format is selected by either using the local menu (as described in the Instruction Manual) or by using the BEKA Protocol <SO> Screen Option command. One of nine standard display formats can be selected as shown in the following table:

Screen Option 1		Screen Option 2	
Screen Option 3		Screen Option 4	
Screen Option 5		Screen Option 6	
Screen Option 7		Screen Option 8	
Screen Option 9		Screen Option 0	Custom screens

Setting the Screen Option to a value of 0 will allow custom screens to be displayed by using BEKA protocol commands.

Multiple Variable Fieldbus Display : Device Revision 1

The following section applies to the BA484DF, BA488CF, BA684DF and BA688CF models when set to device revision 1.

Block Identifiers

FF blocks	Block ID
Resource block	0
MAO function block	1
MAO transducer block	2
GRAPHIC transducer block	3
BATCH transducer block	4

Putting the Fieldbus Display into service

In accordance with Foundation Fieldbus requirements, a new unit supplied from the factory will have all its blocks set to OOS (Out Of Service). The ***TARGET_MODE*** parameter of EVERY block must be set to AUTO before the display can be used. The bitstring values are shown in the table below:

Target Mode and Actual Mode	Value
MODE_AUTO	0x08
MODE_OOS	0x80

When a higher priority block is set to OOS then this will affect the output status of all lower priority blocks. In this instrument, the resource block has the highest priority and each transducer block and function block the lowest. Therefore, turning the resource block OOS will disable the entire instrument.

Note that unlike many other protocols, Foundation Fieldbus does not require a unique numeric addresses to be manually assigned to each device on the network.

Configuring the values to be displayed

The unit can be configured to display up to eight values. The screen format is selected via the local configuration menu or by issuing programming commands. For full details of each method refer to the Instruction Manual or Programming Guide respectively.

The MAO Function Block values ***IN_1*** to ***IN_8*** should be assigned to the variables that need to be displayed. The data structure used is DS-65 Floating Point Value + Status.

If the data has a status of **`BAD`**, or a status of **`GOOD`** but with a quality sub-status of "**`INITIATE FAULT STATE`**" or "**`FAULT STATE ACTIVE`**" then the appearance of the value will be in inverse video i.e. clear pixels on a dark background.

If local setpoints have been defined, then the displayed value will flash when that point has been reached. The appropriate output will also be activated.

Some applications require a predefined value to be displayed in the event of **`BAD`** data. These values may be assigned to the MAO Function Block values ***FSTATE_VAL1*** to ***FSTATE_VAL8.*** An associated timeout delay (in seconds) can also be defined with the ***FSTATE_TIME*** parameter. Note that the ***MO_OPTS*** parameter needs to be configured in order to enable this functionality.

Configuring Units display and Tag information

The "Tag" and "Units" displayed on each of the "standard" screens can be entered remotely by writing to the ***IDENTITY_IN1*** to ***IDENTITY_IN8*** parameters in the MAO Transducer Block. The DS-BEKA-3 data structure (Index 257) has a 16 byte Visible String ***DESCRIPTOR*** parameter which corresponds to the Tag value, and a 8 byte Visible String ***UNITS*** parameter. Each input can therefore be given its own unique data.

Information written in this way is saved to non-volatile memory and is retained if the power is cycled.

To simplify temperature display, the **`** character (alt+096) is mapped to the degrees symbol.
For example, the string **Temp `C** is displayed as **Temp °C**

Reading the keypress status

The ***KEY_STATUS*** parameter in the GRAPHIC Transducer Block returns information on the keys pressed since the parameter was last read

Bit	Description
0 (LSB)	Key 1 pressed (at least once since last read)
1	Key 2 pressed (at least once since last read)
2	Key 3 pressed (at least once since last read)
3	Key 4 pressed (at least once since last read)
4	Key 5 pressed (at least once since last read)
5	Key 6 pressed (at least once since last read)
6	Always set to 0
7(MSB)	Always set to 0

Each time the parameter is read it will be reset to all zeros (0x00). Care must be taken in the configuration of the host application such that keypresses are not missed by polling at inappropriate times.

The unit has the facility to connect external switches in addition to the front panel buttons. By selecting the appropriate "Keys" configuration in the local menu these external switches can be simple normally open or closed contacts that can be used for a variety of basic signalling tasks.

Controlling the (optional) alarm outputs

The ***OUTPUT_STATUS*** parameter in the GRAPHIC Transducer Block is used to directly control the local alarm output circuits.

Bit	Description
0 (LSB)	Alarm Output 1
1	Alarm Output 2
2	Alarm Output 3
3	Alarm Output 4
4	Alarm Output 5
5	Alarm Output 6
6	Always set to 0
7(MSB)	Always set to 0

The outputs can only be controlled if NO setpoints have been configured for ANY of the six outputs. Attempting to write to this parameter when a setpoint is active will cause the command to be rejected. However if the application requires such a combination, it is possible to address each output individually by sending text display commands. Refer to the "Programming Guide" for further details.

The ***OUTPUT_STATUS*** parameter can also be read to determine the status of the outputs at any time. This applies even if setpoints have been configured.

Configuring setpoints

The setpoints are primarily intended for local indication uses, and the normal method of setting these up is to use the local configuration menu. However it is possible to set the setpoint values via the fieldbus by sending text display commands. Refer to the "Programming Guide" for further details.

Reading the approximate ambient temparture

The Batch Transducer Block is not used in this product except that the approximate temperature (+/- 5°C) of the display in degrees Celcius is returned in the ***RATE*** parameter as a read-only 4-byte float.

Transmitting Text Display Commands

Please refer to the "Programming Guide" which describes the commands in detail and gives practical examples of their use. A summary of the basic procedures are shown below:

The command format is: <AB[param1],[param2]…,[paramN]>

where:

AB is the command.
[ ] indicates optional parameters separated by comas

example:

<CS>	Clear Screen
<CM4,90>	Cursor Move to Row 4 Column 90
<CI>	Command Implement

The commands are written to the ***COMMAND_STRING*** parameter in the GRAPHICS Transducer Block. They may be written either singly, or several may be grouped together into one long string. The maximum length of a command string is 118 bytes.

N.B. Every command (or group of combined commands) has to be followed with the <CI> Command Implement command. The reception of this command causes the unit to process the contents of its input buffer. No action will be taken if the <CI> is omitted.

The Result format is: 0,1,2,4,8 or 128
where:

0x00 indicates that the previous command/command set has been accepted.
0x01 indicates a parameter or communications error has been detected in the previous command string.
0x02 indicates the command is unrecognised.
0x04 indicates that a message has been received but NOT actioned because the unit is in programming mode
0x08 indicates that no BEKA command has yet been actioned.
0x80 indicates that a previous command is still being processed.

The result is obtained by reading the ***RESULT*** parameter in the GRAPHICS Transducer Block

As many commands may be passed and actioned during a screen update, a mechanism has been provided to ensure the host knows which command the result refers to. Two parameters in the GRAPHICS Transducer Block have been added to provide a method of matching commands to their results. The sequence of events should be as follows

1. Write a numeric value 'n' into the ***COMMAND_ID*** parameter.
2. Write the command string (including the terminating <CI> command) to the ***COMMAND_STRING*** parameter
3. Continually read the ***RESULT_ID*** parameter until it equals the value 'n' set in the ***COMMAND_ID*** parameter
4. Read the ***RESULT*** parameter: This is the result given by the command string

Transmitting and Receiving Graphic Data

Please refer to the "Programming Guide" which describes the commands in detail and gives practical examples of their use. A summary of the basic procedures are shown below:

A graphics file to be download must first be loaded into the ***GRAPHIC_DATA*** parameter in the GRAPHICS Transducer Block. The size of this block is only 118 bytes, which is the maximum allowed by the fieldbus protocols. Therefore, files must be split and loaded in segments of 118 bytes.

The <GB*n*> command is used to specify the segment that a subsequent write to the ***GRAPHIC_DATA*** parameter goes into. The value *n* can be in the range of 0 to 9. The file to be downloaded must start at the beginning of segment 0 and fill as many segments as necessary to download all of the .BMP file. Once the desired number of segments are filled with data, the <DS>, <DG> or <DF> command is then issued; The downloaded object is then processed and displayed.

Note that any data at the end of the file and in higher numbered segments is ignored.

The <US> command works in a similar way, but graphics data is made available by the display in 118 byte segments.

BLOCK_ERR and XD_ERROR Parameters

The unit is able to report any error conditions via these parameters.

The ***BLOCK_ERR*** parameter can return the following values:

Block	Reason Code	Comment
Resource	0 = Other	Not currently set *(Reserved for future use)*
Resource	6 = Device Needs Maintenance Soon	Not currently set *(Reserved for future use)*
Resource	10 = Lost Static Data / EEPROM error	An EEPROM error has been detected. All EEPROM contents are reset to its initial values. (The EEPROM check is done one time during device startup)
Resource	13 = Device Needs Maintenance Now	Not currently set *(Reserved for future use)*
Resource	15 = Out-of-Service	Actual mode of block is *Out-of-Service*
MAO	1 = Block Configuration Error	
MAO	4 = Local Override	The block is in mode *Local-Override*. The block switches to this state when the FAULT_STATE parameter of the RESB is set to ACTIVE. (The FAULT_STATE parameter is not modified locally it is always set by a remote host device.)
MAO	15 = Out-of-Service	Actual mode of block is *Out-of-Service*
Transducer	15 = Out-of-Service	Actual mode of block is *Out-of-Service*

XD_ERROR returns 0x00 indicating that no error condition is present.

The use of these parameters is may change in future versions of this product.

Multiple Variable Fieldbus Display : Device Revision 2

The following section applies to the BA484DF, BA488CF, BA684DF and BA688CF models when set to device revision 2.

Block Identifiers

FF blocks	Block ID
Resource block	0
IS 1 function block	5
IS 2 function block	6
DISP8 transducer block	7

Putting the Fieldbus Display into service

In accordance with Foundation Fieldbus requirements, a new unit supplied from the factory will have all its blocks set to OOS (Out Of Service). The ***TARGET_MODE*** parameter of EVERY block must be set to AUTO before the display can be used. The bitstring values are shown in the table below:

Target Mode and Actual Mode	Value
MODE_AUTO	0x08
MODE_OOS	0x80

When a higher priority block is set to OOS then this will affect the output status of all lower priority blocks. In this instrument, the resource block has the highest priority and each transducer block and function block the lowest. Therefore, turning the resource block OOS will disable the entire instrument.

Note that unlike many other protocols, Foundation Fieldbus does not require a unique numeric addresses to be manually assigned to each device on the network.

Configuring the values to be displayed

The unit can be configured to display up to eight values. The screen format is selected via the local configuration menu or by issuing programming commands. For full details of each method refer to the Instruction Manual or Programming Guide respectively.

The IS_1 Function Block values ***IN_1*** to ***IN_4*** and IS_2 Function Block values ***IN_1*** to ***IN_4*** should be assigned to the variables that need to be displayed. The data structure used is DS-65 Floating Point Value + Status. Note that IS_1 inputs are mapped to display values 1-4 and IS_2 inputs are mapped to display values 5-8. The ***DISPLAY_CHANNEL*** parameter in each IS Function Block is enumerated to show these mappings to the host user.

If the data has a status of **`BAD`**, or a status of **`GOOD`** but with a quality sub-status of "**`INITIATE FAULT STATE`**" or "**`FAULT STATE ACTIVE`**" then the appearance of the value will be in inverse video i.e. clear pixels on a dark background.

If local setpoints have been defined, then the displayed value will flash when that point has been reached. The appropriate output will also be activated.

Using Acyclic transfers to display data

It is possible to use the display with hosts that do not support the IS Function Block, by writing valid data directly to the DISP8 transducer block instead. To achieve this, both IS Function Blocks should be set to OOS (Out Of Service). Values can then be directly written to the ***IN_DATA_n*** parameters in the DISP8 Transducer Block. The DS-BEKA-4 data structure (Index 258) has a 4 byte float ***IN_VALUE*** parameter which corresponds to the value, and a single byte ***IN_VALUE_STATUS*** parameter which corresponds to the status. The DISP8 Transducer block has a read-only

CYCLIC_ON parameter which is set to 0xFF if cyclic data transfers are taking place, or 0x00 if not. this can be used by the host to verify that the display it is set up appropriately.

Configuring Units display and Tag information

The "Tag" and "Units" displayed on each of the "standard" screens can be entered remotely by writing to the ***IN_DATA_n*** parameters in the DISP8 Transducer Block. The DS-BEKA-4 data structure (Index 258) has a 16 byte Visible String ***DESCRIPTOR*** parameter which corresponds to the Tag value, and a 8 byte Visible String ***UNITS*** parameter. Each input can therefore be given its own unique data.

Information written in this way is saved to non-volatile memory and is retained if the power is cycled.

To simplify temperature display, the **`** character (alt+096) is mapped to the degrees symbol.
For example, the string **`Temp 'C`** is displayed as **`Temp °C`**

Setting The Display Format

Each value displayed on standard screens may have its format changed to suit the intended application. This is achieved by writing to the ***IN_DATA_n*** parameters in the DISP8 Transducer Block. The DS-BEKA-4 data structure (Index 258) has a single byte ***DISPLAY_FORMAT*** parameter which is enumerated as follows:

DISPLAY_FORMAT	Meaning
0	No Decimal Places
1	One Decimal Place
2	Two Decimal Places
3	Three Decimal Places
4	Four Decimal Places
5	Auto Format

Information written in this way is saved to non-volatile memory and is retained if the power is cycled.

Setting Bargraph Limits

The upper and lower limits for each bargraph displayed on the "standard" screens can be entered remotely by writing to the ***IN_DATA_n*** parameters in the DISP8 Transducer Block. The DS-BEKA-4 data structure (Index 258) has 4 byte float ***BARGRAPH_MIN*** and ***BARGRAPH_MAX*** parameters for each input.

Information written in this way is saved to non-volatile memory and is retained if the power is cycled.

Gain and Offset Factors

Many applications require that the process variables are displayed in different units to those used by the host. The facility to scale a value before it is displayed is incorporated into the display. Each input value can be scaled independently by writing to the ***IN_DATA_n*** parameters in the DISP8 Transducer Block. The DS-BEKA-4 data structure (Index 258) has 4 byte float ***ZERO_OFFSET*** and ***GAIN_FACTOR*** parameters for each input.

Information written in this way is saved to non-volatile memory and is retained if the power is cycled.

Scaling is applied to the specified input data prior to its display. Both numeric display and bargraphs are affected on both custom and standard screens.

The scaling calculation is as follows:

Displayed Value = (Input Value x Gain Factor) + Zero Offset

Reading the keypress status

The ***KEY_STATUS*** parameter in the DISP8 Transducer Block returns information on the keys pressed since the parameter was last read

Bit	Description
0 (LSB)	Key 1 pressed (at least once since last read)
1	Key 2 pressed (at least once since last read)
2	Key 3 pressed (at least once since last read)
3	Key 4 pressed (at least once since last read)
4	Key 5 pressed (at least once since last read)
5	Key 6 pressed (at least once since last read)
6	Always set to 0
7(MSB)	Always set to 0

Each time the parameter is read it will be reset to all zeros (0x00). Care must be taken in the configuration of the host application such that keypresses are not missed by polling at inappropriate times.

The unit has the facility to connect external switches in addition to the front panel buttons. By selecting the appropriate "Keys" configuration in the local menu these external switches can be simple normally open or closed contacts that can be used for a variety of basic signalling tasks.

Controlling the (optional) alarm outputs

The ***OUTPUT_STATUS*** parameter in the DISP8 Transducer Block is used to directly control the local alarm output circuits.

Bit	Description
0 (LSB)	Alarm Output 1
1	Alarm Output 2
2	Alarm Output 3
3	Alarm Output 4
4	Alarm Output 5
5	Alarm Output 6
6	Always set to 0
7(MSB)	Always set to 0

The outputs can only be controlled if NO setpoints have been configured for ANY of the six outputs. Attempting to write to this parameter when a setpoint is active will cause the command to be rejected. However if the application requires such a combination, it is possible to address each output individually by sending text display commands. Refer to the "Programming Guide" for further details.

The ***OUTPUT_STATUS*** parameter can also be read to determine the status of the outputs at any time. This applies even if setpoints have been configured.

Configuring setpoints

The setpoints are primarily intended for local indication uses, and the normal method of setting these up is to use the local configuration menu. However it is possible to set the setpoint values via the fieldbus by sending text display commands. Refer to the "Programming Guide" for further details.

Reading the approximate ambient temparture

The DISP8 Transducer Block contains an ***INSTRUMENT_TEMPERATURE*** parameter which shows the temperature of the fieldbus display in degrees Celcius (+/- 5°C), returned as a read-only 4-byte float.

Transmitting Text Display Commands

Please refer to the "Programming Guide" which describes the commands in detail and gives practical examples of their use. A summary of the basic procedures are shown below:

The command format is: <AB[param1],[param2]…,[paramN]>

where:

AB is the command.
[ ] indicates optional parameters separated by comas

example:

<CS>	Clear Screen
<CM4,90>	Cursor Move to Row 4 Column 90
<CI>	Command Implement

The commands are written to the data structure of the ***TEXT_DISPLAY*** parameter in the DISP8 Transducer Block. The DS-BEKA-5 data structure (Index 259) has a 32 byte Visible String ***COMMAND_STRING*** parameter which is used for sending command strings. They may be written either singly, or several may be grouped together into one long string. The maximum length of a command string is 32 bytes.

N.B. Every command (or group of combined commands) has to be followed with the <CI> Command Implement command. The reception of this command causes the unit to process the contents of its input buffer. No action will be taken if the <CI> is omitted.

The Result format is: 0,1,2,4,8 or 128
where:

0x00 indicates that the previous command/command set has been accepted.
0x01 indicates a parameter or communications error has been detected in the previous command string.
0x02 indicates the command is unrecognised.
0x04 indicates that a message has been received but NOT actioned because the unit is in programming mode
0x08 indicates that no BEKA command has yet been actioned.
0x80 indicates that a previous command is still being processed.

The result is obtained by reading the ***RESULT*** parameter from the ***TEXT_DISPLAY*** data structure in the DISP8 Transducer Block.

As many commands may be passed and actioned during a screen update, a mechanism has been provided to ensure the host knows which command the result refers to. Two parameters within the ***TEXT_DISPLAY*** data structure have been added to provide a method of matching commands to their results. The sequence of events should be as follows

5. Write a numeric value 'n' into the ***COMMAND_ID*** parameter.

6. Write the command string (including the terminating <CI> command) to the ***COMMAND_STRING*** parameter

7. Continually read the ***RESULT_ID*** parameter until it equals the value 'n' set in the ***COMMAND_ID*** parameter

8. Read the ***RESULT*** parameter: This is the result given by the command string

Transmitting and Receiving Graphic Data

Please refer to the "Programming Guide" which describes the commands in detail and gives practical examples of their use. A summary of the basic procedures are shown below:

A graphics file to be download must first be loaded into the ***GRAPHIC_DATA*** parameter in the ***TEXT_DISPLAY*** data structure of the DISP8 Transducer Block. The size of this block is only 64 bytes, requiring files to be split and loaded in multiple segments.

The <GB*n*> command is used to specify the segment that a subsequent write to the ***GRAPHIC_DATA*** parameter goes into. The value *n* can be in the range of 0 to 16. The file to be downloaded must start at the beginning of segment 0 and fill as many segments as necessary to download all of the .BMP file. Once the desired number of segments are filled with data, the <DS>, <DG> or <DF> command is then issued; The downloaded object is then processed and displayed.

Note that any data at the end of the file and in higher numbered segments is ignored.

The <US> command works in a similar way, but graphics data is made available by the display in 64 byte segments.

BLOCK_ERR and XD_ERROR Parameters

The unit is able to report any error conditions via these parameters.

The ***BLOCK_ERR*** parameter can return the following values:

Block	Reason Code	Comment
Resource	0 = Other	Not currently set *(Reserved for future use)*
Resource	6 = Device Needs Maintenance Soon	Not currently set *(Reserved for future use)*
Resource	10 = Lost Static Data / EEPROM error	An EEPROM error has been detected. All EEPROM contents are reset to its initial values. (The EEPROM check is done one time during device startup)
Resource	13 = Device Needs Maintenance Now	Not currently set *(Reserved for future use)*
Resource	15 = Out-of-Service	Actual mode of block is *Out-of-Service*
IS	1 = Block Configuration Error	
IS	4 = Local Override	The block is in mode *Local-Override*. The block switches to this state when the FAULT_STATE parameter of the RESB is set to ACTIVE. (The FAULT_STATE parameter is not modified locally it is always set by a remote host device.)
IS	15 = Out-of-Service	Actual mode of block is *Out-of-Service*
Transducer	15 = Out-of-Service	Actual mode of block is *Out-of-Service*

XD_ERROR returns 0x00 indicating that no error condition is present.

The use of these parameters is may change in future versions of this product.

Single Variable Fieldbus Indicator

The following section applies to the BA414DF and BA614DF models only.

Block Identifiers

FF blocks	Block ID
Resource block	0
IS (Input Selector) function block	5
DISP1 transducer block	8

Putting the Fieldbus Indicator into service

In accordance with Foundation Fieldbus requirements, a new unit supplied from the factory will have all its blocks set to OOS (Out Of Service). The ***TARGET_MODE*** parameter of EVERY block must be set to AUTO before the indicator can be used. The bitstring values are shown in the table below:

Target Mode and Actual Mode	Value
MODE_AUTO	0x08
MODE_OOS	0x80

When a higher priority block is set to OOS then this will affect the output status of all lower priority blocks. In this instrument, the resource block has the highest priority and each transducer block and function block the lowest. Therefore, turning the resource block OOS will disable the entire instrument.

Note that unlike many other protocols, Foundation Fieldbus does not require a unique numeric addresses to be manually assigned to each device on the network.

Configuring the value to be displayed

The unit is limited to the display of one value, together with a bargraph.

The IS Function Block value ***IN_1*** should be assigned to the variable that needs to be displayed. The data structure used is DS-65 Floating Point Value + Status.

The "**SELECT_TYPE**" parameter in the IS function block must be initialised to any valid type for data to be passed to the display. If the IS block is otherwise unused, select a type of "First good".

If the data has a status of **BAD**, or a status of **GOOD** but with a quality sub-status of "**INITIATE FAULT STATE**" or "**FAULT STATE ACTIVE**" then the value will be alternated with the word "**bAd**" on the display

Using Acyclic transfers to display data

It is possible to use the indicator with hosts that do not support the IS Function Block, by writing valid data directly to the DISP1 transducer block instead. To achieve this, the IS Function Block should be set to OOS (Out Of Service). Values can then be directly written to the ***IN_DATA*** parameter in the DISP1 Transducer Block. The DS-65 data structure has a 4 byte float ***VALUE*** and a single byte ***STATUS*** parameter which must be set accordingly. The DISP1 Transducer block has a read-only ***CYCLIC_ON*** parameter which is set to 0xFF if cyclic data transfers are taking place, or 0x00 if not. this can be used by the host to verify that the display it is set up appropriately.

Setting The Display Format

The displayed value may have its format changed to suit the intended application. This is achieved by writing to the ***DISP_FORMAT*** parameter in the DISP1 Transducer Block. This single byte value is enumerated as follows:

DISP_FORMAT	Meaning
0	No Decimal Places
1	One Decimal Place
2	Two Decimal Places
3	Three Decimal Places
4	Four Decimal Places
5	Auto Format

This parameter is saved to non-volatile memory and is retained if the power is cycled.

Setting Bargraph Limits

The upper and lower limits for the bargraph display can be entered remotely by writing to the ***BARGRAPH_MIN*** and ***BARGRAPH_MAX*** parameters in the DISP1 Transducer Block.

Note that the bargraph may be turned on and off by writing to the ***BARGRAPH_ENABLE*** parameter in the DISP1 Transducer Block.

Information written in this way is saved to non-volatile memory and is retained if the power is cycled.

Gain and Offset Factors

Many applications require that the process variables are displayed in different units to those used by the host. The facility to scale the value before it is displayed is incorporated into the display. The input value can be scaled by writing to the ***ZERO_OFFSET*** and ***GAIN_FACTOR*** parameters in the DISP1 Transducer Block.

Information written in this way is saved to non-volatile memory and is retained if the power is cycled.

Scaling is applied to the input data prior to its display. Both numeric display and bargraph are affected.

The scaling calculation is as follows:

Displayed Value = (Input Value x Gain Factor) + Zero Offset

where Input Value is taken from ***IN_DATA*** or ***IN_1***

Reading the instrument ambient temparture

The DISP1 Transducer Block contains an ***INSTRUMENT_TEMPERATURE*** parameter which shows the temperature of the fieldbus indicator in degrees Celcius (+/- 1°C), returned as a read-only 4-byte float.

BLOCK_ERR and XD_ERROR Parameters

The unit is able to report any error conditions via these parameters.

The ***BLOCK_ERR*** parameter can return the following values:

Block	Reason Code	Comment
Resource	0 = Other	Not currently set *(Reserved for future use)*
Resource	6 = Device Needs Maintenance Soon	Not currently set *(Reserved for future use)*
Resource	10 = Lost Static Data / EEPROM error	An EEPROM error has been detected. All EEPROM contents are reset to its initial values. (The EEPROM check is done one time during device startup)
Resource	13 = Device Needs Maintenance Now	Not currently set *(Reserved for future use)*
Resource	15 = Out-of-Service	Actual mode of block is *Out-of-Service*
IS	1 = Block Configuration Error	
IS	4 = Local Override	The block is in mode *Local-Override*. The block switches to this state when the FAULT_STATE parameter of the RESB is set to ACTIVE. (The FAULT_STATE parameter is not modified locally it is always set by a remote host device.)
IS	15 = Out-of-Service	Actual mode of block is *Out-of-Service*
Transducer	15 = Out-of-Service	Actual mode of block is *Out-of-Service*

XD_ERROR returns 0x00 indicating that no error condition is present.

The use of these parameters is may change in future versions of this product.

Appendix

Foundation Fieldbus

Reference Information

Data structures

All structures used are Foundation Fieldbus standard definitions apart from the four special structures given below:

Data Structure Identifier	Index in Virtual Field Device (VFD) Object Dictionary (OD)
DS-BEKA-2	256
DS-BEKA-3	257
DS-BEKA-4	258
DS-BEKA-5	259

DS-BEKA-2 - Batcher-State structure

	Parameter	Data Type	Size
1	STATUS	Unsigned8	1
2	DESCRIPTION	VisibleString	20

DS-BEKA-3 - Identity structure

	Parameter	Data Type	Size
1	DESCRIPTOR	VisibleString	16
2	UNITS	VisibleString	8

DS-BEKA-4 - Display structure

	Parameter	Data Type	Size
1	BARGRAPH_MIN	Float	4
2	BARGRAPH_MAX	Float	4
3	DISPLAY_FORMAT	Unsigned8	1
4	ZERO_OFFSET	Float	4
5	GAIN_FACTOR	Float	4
6	DESCRIPTOR	VisibleString	16
7	UNITS	VisibleString	8
8	IN_VALUESTATUS	Unsigned8	1
9	IN_VALUE	Float	4

The **DISPLAY_FORMAT** parameter is enumerated as follows:

DISPLAY_FORMAT	Meaning
0	No Decimal Places
1	One Decimal Place
2	Two Decimal Places
3	Three Decimal Places
4	Four Decimal Places
5	Auto Format

DS-BEKA-5 – Text Display structure

	Parameter	Data Type	Size
1	COMMAND_STRING	VisibleString	32
2	GRAPHIC_DATA	Unsigned8	64
3	COMMAND_ID	Unsigned16	2
4	RESULT_ID	Unsigned16	2
5	RESULT	Unsigned8	1

The **RESULT** parameter is enumerated as follows:

RESULT	Meaning
0	No Error
1	Parameter Error
2	Command Error
4	Unit In Configuration Menu
8	No Command Yet

The standard Foundation Fieldbus data structures used in BEKA products are given below:

DS-64 – Block Structure

	Parameter	Data Type	Size
1	Block_Tag	VisibleString	32
2	DD Member Id	Unsigned32	4
3	DD Item Id	Unsigned32	4
4	DD Revision	Unsigned16	2
5	Profile	Unsigned16	2
6	Profile Revision	Unsigned16	2
7	Execution Time	Unsigned32	4
8	Period of Execution	Unsigned32	4
9	Number of Parameters	Unsigned16	2
10	Next FB to Execute	Unsigned16	2
11	Starting Index of Views	Unsigned16	2
12	Number of View 3	Unsigned8	1
13	Number of View 4	Unsigned8	1

DS-65 - Value & Status – Floating Point Structure

	Parameter	Data Type	Size
1	Status	Unsigned8	1
2	Value	Float	4

DS-69 - Mode Structure

	Parameter	Data Type	Size
1	Target	Bitstring	1
2	Actual	Bitstring	1
3	Permitted	Bitstring	1
4	Normal	Bitstring	1

DS-70 – Access Permissions

	Parameter	Data Type	Size
1	Grant	Bitstring	1
2	Deny	Bitstring	1

DS-72 – Alarm Discrete Structure

	Parameter	Data Type	Size
1	Unacknowledged	Unsigned8	1
2	Alarm State	Unsigned8	1
3	Time Stamp	Time Value	8
4	Subcode	Unsigned16	2
5	Value	Unsigned8	1

DS-73 – Event Update Structure

	Parameter	Data Type	Size
1	Unacknowledged	Unsigned8	1
2	Update State	Unsigned8	1
3	Time Stamp	Time Value	8
4	Static Revision	Unsigned16	2
5	Relative Index	Unsigned16	2

DS-74 – Event Update Structure

	Parameter	Data Type	Size
1	Current	Bitstring	2
2	Unacknowledged	Bitstring	2
3	Unreported	Bitstring	2
4	Disabled	Bitstring	2

DS-85 – Test Structure

	Parameter	Data Type	Size
1	Value 1	Boolean	1
2	Value 2	Integer8	1
3	Value 3	Integer16	2
4	Value 4	Integer32	4
5	Value 5	Unsigned8	1
6	Value 6	Unsigned16	2
7	Value 7	Unsigned32	4
8	Value 8	Float	4
9	Value 9	Visible String	32
10	Value 10	Octet String	32
11	Value 11	Date	7
12	Value 12	Time of Day	6
13	Value 13	Time Difference	6
14	Value 14	Bitstring	2
15	Value 15	Time Value	8

Floating Point Format

Many values are given as 4 byte floating point numbers. This is defined in IEEE 754 as the Single-Precision format.

Visible String Format

It is very important that no non-printing characters are used in variables defined with the VisibleString format. Specifically, only ASCII values between 0x20 and 0x7E may be used.

Status-Byte

Measurement values are usually transferred as data structure DS-65 – Value & Status. In this structure a value is a four byte floating point number and the status information is one byte.

The status byte is made up of the following sections:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Quality		Quality Substatus				Limits	

Quality	Quality Substatus	Limits
00: Bad	**0000**: Non-specific **0001**: Configuration Error **0010**: Not Connected **0011**: Device Failure **0100**: Sensor Failure **0101**: No Communication (last usable value) **0110**: No Communication (no usable value) **0111**: Out of Service	**00**: Not limited **01**: Low limited **10**: High limited **11**: Constant
01: Uncertain	**0000**: Non-specific **0001**: Last Usable Value **0010**: Substitute **0011**: Initial Value **0100**: Sensor Conversion not Accurate **0101**: Engineering Unit Range Violation **0110**: Sub-normal	
10: Good (Non-Cascade)	**0000**: Non-specific **0001**: Active Block Alarm **0010**: Active Advisory Alarm (priority < 8) **0011**: Active Critical Alarm (priority > 8) **0100**: Unacknowledged Block Alarm **0101**: Unacknowledged Advisory Alarm **0110**: Unacknowledged Critical Alarm	
11: Good (Cascade)	**0000**: Non-specific **0001**: Initialisation Acknowledge **0010**: Initialisation Request **0011**: Not Invited **0100**: Not Selected **0101**: Local Override **0110**: **0111**: Fault State Active **1000**: Initiate Fault State	

Multiple Output Function Blocks options

MO_OPTS Parameter

Bit	Description
0 (LSB)	Fault state to value 1
1	Fault state to value 2
2	Fault state to value 3
3	Fault state to value 4
4	Fault state to value 5
5	Fault state to value 6
6	Fault state to value 7
7	Fault state to value 8
8	Use fault state value on restart 1
9	Use fault state value on restart 2
10	Use fault state value on restart 3
11	Use fault state value on restart 4
12	Use fault state value on restart 5
13	Use fault state value on restart 6
14	Use fault state value on restart 7
15 (MSB)	Use fault state value on restart 8

FSTATE_STATUS Parameter

Bit	Description
0 (LSB)	Fault state 1
1	Fault state 2
2	Fault state 3
3	Fault state 4
4	Fault state 5
5	Fault state 6
6	Fault state 7
7(MSB)	Fault state 8

Table Abbreviations:

SIZE	All sizes are given in bytes
READ / WRITE	RO – Read Only R/W – Read Write X – Don't Care Mix – Multi-Byte Records have a mix of the above types
STORE DEFINITIONS	S – Static A parameter which must be remembered through a power cycle. Writing to the parameter changes the static revision counter ST_REV. N – Non-volatile. A parameter which must be remembered through a power cycle, but which is not under the static update code. D – Dynamic. The value is calculated by the block, or read from another block. May be retained by the display processor. Mix – Multi-Byte Records have a mix of the above types

Resource Block Parameter List

Parameter	Index	Description	Type	Size	Store	Read / Write	Default
RESOURCE_BLOCK_2	0		DS-64	62		RO	
ST_REV	1	The revision level of the stati c data associated with the function block. To support tracking changes in static parameter attributes, the associated block's static revision parameter will be incremented each time a static parameter attribute value is changed. Also, the associated block's static revision parameter may be incremented if a static parameter attribute is written but the value is not changed.	Unsigned16	2	S	RO	
TAG_DESC	2	The user description of the intended application of the block.	Octet_String	32	S	R/W	
STRATEGY	3	The strategy field can be used to identify grouping of blocks.. This data is not checked or processed by the block.	Unsigned16	2	S	R/W	
ALERT_KEY	4	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.	Unsigned8	1	S	R/W	
MODE_BLK	5	The actual, target, permitted, and normal modes of the block.	DS-69	4	Mix	Mix	
BLOCK_ERR	6	This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown.	Bit_String	2	D	RO	
RS_STATE	7	State of the function block application state machine.	Unsigned8	1	D	RO	
TEST_RW	8	Read/write test parameter - used only for conformance testing.	DS-85	112	D	R/W	
DD_RESOURCE	9	String identifying the tag of the resource which contains the Device Description for this resource.	Visible_String	32	S	RO	
MANUFAC_ID	10	Manufacturer identification number - used by an interface device to locate the DD file for the resource.	Unsigned32	4	S	RO	0x00004241 ASCII = BA
DEV_TYPE	11	Manufacturer's model number associated with the resource - used by interface devices to locate the DD file for the resource.	Unsigned16	2	S	RO	0x0488
DEV_REV	12	Manufacturer revision number associated with the resource - used by an interface device to locate the DD file for the resource.	Unsigned8	1	S	RO	0x01
DD_REV	13	Revision of the DD associated with the resource - used by an interface device to locate the DD file for the resource.	Unsigned8	1	S	RO	0x01
GRANT_DENY	14	Options for controlling access of host computer and local control panels to operating, tuning and alarm parameters of the block.	DS-70	2	S	R/W	
HARD_TYPES	15	The types of hardware available as channel numbers.	Bit_String	2	S	RO	
RESTART	16	Allows a manual restart to be initiated. Several degrees of restart are possible. They are 1: Run 2: Restart resource 3: Restart with defaults 4: Restart processor.	Unsigned8	1	D	R/W	
FEATURES	17	Used to show supported resource block options.	Bit_String	2	S	RO	0x000E
FEATURE_SEL	18	Used to select resource block options.	Bit_String	2	S	R/W	0x000E
CYCLE_TYPE	19	Identifies the block execution methods available for this resource.	Bit_String	2	S	RO	0x0003
CYCLE_SEL	20	Used to select the block execution method for thi s resource.	Bit_String	2	S	X	0x0003
MIN_CYCLE_T	21	Time duration of the shortest cycle interval of which the resource is capable.	Unsigned32	4	S	RO	0x12C0 = 4800
MEMORY_SIZE	22	Available configuration memory in the empty resource. To be checked before at tempting a download.	Unsigned16	2	S	RO	0
NV_CYCLE_T	23	Minimum time interval specified by the manufacturer for writing copies of NV parameters to non-volatile memory. Zero means it will never be automatically copied. At the end of NV_CYCLE_TIME, only thos e parameters which have changed (as defined by the manufacturer) need to be updated in NVRAM	Unsigned32	4	S	RO	
FREE_SPACE	24	Percent of memory available for further configuration. Zero in a preconfigured resource.	Floating Point	4	D	RO	

Parameter	Index	Description	Type	Size	Store	Read / Write	Default
FREE_TIME	25	Percent of memory available for further configuration. Zero in a preconfigured resource.	Floating Point	4	D	RO	
SHED_RCAS	26	Time duration at which to give up on computer writes to function block RCas locations. Shed from RCas shall never happen when SHED_RCAS = 0.	Unsigned32	4	S	R/W	
SHED_ROUT	27	Time duration at which to give up on computer writes to function block ROut locations. Shed from Rout shall never happen when SHED_ROUT = 0.	Unsigned32	4	S	R/W	
FAULT_STATE	28	Condition set by loss of communicatio n to an output block, fault promoted to an output block or a physical contact. When Fault State condition is set, Then output function blocks will perform their FSTATE actions.	Unsigned8	1	N	RO	
SET_FSTATE	29	Allows the Fault State condition to be manuall y initiated by selecting Set.	Unsigned8	1	D	R/W	
CLR_FSTATE	30	Writing a Clear to this parameter will clear the device fault state if the field condition, if any, has cleared.	Unsigned8	1	D	R/W	
MAX_NOTIFY	31	Maximum number of unconfirmed notify messages possible.	Unsigned8	1	S	RO	
LIM_NOTIFY	32	Maximum number of unconfirmed alert notify messages allowed.	Unsigned8	1	S	R/W	
CONFIRM_TIME	33	The time the resource will wait for confirmation of receipt of a report before trying again. Retry shall not happen when CONFIRM_TIME = 0.	Unsigned32	4	S	R/W	
WRITE_LOCK	34	If set, no writes from anywhere are allowed, except to clear WRITE_LOCK. Block inputs will continue to be updated.	Unsigned8	1	S	R/W	
UPDATE_EVT	35	This alert is generated by any change to the sta tic data.	DS-73	14	D	RO	
BLOCK_ALM	36	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status attribute. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.	DS-72	13	D	R/W	
ALARM_SUM	37	The current alert status, unacknowledged states, unreported states, and disabled states of the alarms associated with the function block.	DS-74	8	Mix	R/W	
ACK_OPTION	38	Selection of whether alarms associated with the block will be automatically acknowledged.	Bit_String	2	S	R/W	
WRITE_PRI	39	Priority of the alarm generated by clearing the write lock.	Unsigned8	1	S	R/W	
WRITE_ALM	40	This alert is generated if the write lock parameter is cleared.	DS-72	13	D	R/W	
ITK_VER	41	Major revision number of the interoperability tes t case used in certifying this device as interoperable. The format and range of the version number is defined and controlled by the Fieldbus Foundation. Note: The value of this parameter will be zero (0) if the device has not been registered as interoperab le by the FF.	Unsigned16	2	S	RO	4

MAO Function Block Parameter List

Parameter	Index	Description	Type	Size	Store	Read / Write	Default
MAO_BLOCK	0		DS-64	62		RO	
ST_REV	1	The revision level of the static data associated with the function block - incremented each time a static parameter attribute value is changed.	Unsigned16	2	S	RO	
TAG_DESC	2	The user description of the intended application of the block.	Octet_String	32	S	R/W	
STRATEGY	3	The strategy field can be used to identify grouping of blocks.. This data is not checked or processed by the block.	Unsigned16	2	S	R/W	
ALERT_KEY	4	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.	Unsigned8	1	S	R/W	
MODE_BLK	5	The actual, target, permitted, and normal modes of the block.	DS-69	4	Mix	Mix	
BLOCK_ERR	6	This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown.	Bit_String	2	D	RO	
CHANNEL	7		Unsigned16	2	S	R/W	
IN_1	8	Assign to the first PV to be displayed	DS-65	5	D	R/W	0 + 0x1C
IN_2	9	Assign to the second PV to be displayed	DS-65	5	D	R/W	0 + 0x1C
IN_3	10	Assign to the third PV to be displayed	DS-65	5	D	R/W	0 + 0x1C
IN_4	11	Assign to the fourth PV to be displayed	DS-65	5	D	R/W	0 + 0x1C
IN_5	12	Assign to the fifth PV to be displayed	DS-65	5	D	R/W	0 + 0x1C
IN_6	13	Assign to the sixth PV to be displayed	DS-65	5	D	R/W	0 + 0x1C
IN_7	14	Assign to the seventh PV to be displaye d	DS-65	5	D	R/W	0 + 0x1C
IN_8	15	Assign to the eighth PV to be displayed	DS-65	5	D	R/W	0 + 0x1C
MO_OPTS	16	Options that the user may select to alter multiple output block processing.	Bit_String	2	S	R/W	
FSTATE_TIME	17	Number of seconds to wait before showung failtate value	Floating_Point	4	S	R/W	0
FSTATE_VAL1	18	The preset analog SP value to use when fault occurs. This value will be used if the I/O option Fault State to value is selected.	Floating_Point	4	S	R/W	0 + 0x00
FSTATE_VAL2	19	As Above	Floating_Point	4	S	R/W	0 + 0x00
FSTATE_VAL3	20	As Above	Floating_Point	4	S	R/W	0 + 0x00
FSTATE_VAL4	21	As Above	Floating_Point	4	S	R/W	0 + 0x00
FSTATE_VAL5	22	As Above	Floating_Point	4	S	R/W	0 + 0x00
FSTATE_VAL6	23	As Above	Floating_Point	4	S	R/W	0 + 0x00
FSTATE_VAL7	24	As Above	Floating_Point	4	S	R/W	0 + 0x00
FSTATE_VAL8	25	As Above	Floating_Point	4	S	R/W	0 + 0x00
FSTATE_STATUS	26	If set, no writes from anywhere are allowed, except to clear WRITE_LOCK. Block inputs will continue to be updated.	Bit_String	2	S	RO	0x00
UPDATE_EVT	27	This alert is generated by any change to the static data.	DS-73	14	D	RO	
BLOCK_ALM	28	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status attribute. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.	DS-72	13	D	R/W	

MAO Transducer Block Parameter List

Parameter	Index	Description	Type	Size	Store	Read / Write	Default
MAOTB	0		DS-64	62		RO	
ST_REV	1	The revision level of the static data associated with the function block - incremented each time a static parameter attribute value is changed	Unsigned16	2	S	RO	
TAG_DESC	2	The user description of the intended application of the block.	Octet_String	32	S	R/W	
STRATEGY	3	The strategy field can be used to identify grouping of blocks.. This data is not checked or processed by the block.	Unsigned16	2	S	R/W	
ALERT_KEY	4	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.	Unsigned8	1	S	R/W	
MODE_BLK	5	The actual, target, permitted, and normal modes of the block.	DS-69	4	Mix	Mix	
BLOCK_ERR	6	This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown.	Bit_String	2	D	RO	
UPDATE_EVT	7		DS-73	14	D	RO	
BLOCK_ALM	8		DS-72	13	D	R/W	
TRANSDUCER_DIRECTORY	9		Array of Unsigned 32	4	N	RO	
TRANSDUCER_TYPE	10		Unsigned16	2	N	R/W	
XD_ERROR	11		Unsigned8	1	D	R/W	
COLLECTION_DIRECTORY	12		Array of Unsigned 32	4	N	RO	
FINAL_VALUE_1	13	Latest valid data received into IN_1	DS-65	5	N	RO	0 + 0x00
FINAL_VALUE_2	14	Latest valid data received into IN_2	DS-65	5	N	RO	0 + 0x00
FINAL_VALUE_3	15	Latest valid data received into IN_3	DS-65	5	N	RO	0 + 0x00
FINAL_VALUE_4	16	Latest valid data received into IN_4	DS-65	5	N	RO	0 + 0x00
FINAL_VALUE_5	17	Latest valid data received into IN_5	DS-65	5	N	RO	0 + 0x00
FINAL_VALUE_6	18	Latest valid data received into IN_6	DS-65	5	N	RO	0 + 0x00
FINAL_VALUE_7	19	Latest valid data received into IN_7	DS-65	5	N	RO	0 + 0x00
FINAL_VALUE_8	20	Latest valid data received into IN_8	DS-65	5	N	RO	0 + 0x00
IDENTITY_IN_1	21	Tag Description & Units Display for IN_1	DS-BEKA-3	24	D	R/W	“Inst1 Tag” + “Units”
IDENTITY_IN_2	22	Tag Description & Units Display for IN_2	DS-BEKA-3	24	D	R/W	“Inst2 Tag” + “Units”
IDENTITY_IN_3	23	Tag Description & Units Display for IN_3	DS-BEKA-3	24	D	R/W	“Inst3 Tag” + “Units”
IDENTITY_IN_4	24	Tag Description & Units Display for IN_4	DS-BEKA-3	24	D	R/W	“Inst4 Tag” + “Units”
IDENTITY_IN_5	25	Tag Description & Units Display for IN_5	DS-BEKA-3	24	D	R/W	“Inst5 Tag” + “Units”
IDENTITY_IN_6	26	Tag Description & Units Display for IN_6	DS-BEKA-3	24	D	R/W	“Inst6 Tag” + “Units”
IDENTITY_IN_7	27	Tag Description & Units Display for IN_7	DS-BEKA-3	24	D	R/W	“Inst7 Tag” + “Units”
IDENTITY_IN_8	28	Tag Description & Units Display for IN_8	DS-BEKA-3	24	D	R/W	“Inst8 Tag” + “Units”

GRAPHIC Transducer Block Parameter List

Parameter	Index	Description	Type	Size	Store	Read / Write	Default
GRATB	0		DS-64	62		RO	
ST_REV	1	The revision level of the static data associated with the function block - incremented each time a static parameter attribute value is changed.	Unsigned16	2	S	RO	
TAG_DESC	2	The user description of the intended application of the block.	Octet_String	32	S	R/W	
STRATEGY	3	The strategy field can be used to identify grouping of blocks.. This data is not checked or processed by the block.	Unsigned16	2	S	R/W	
ALERT_KEY	4	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.	Unsigned8	1	S	R/W	
MODE_BLK	5	The actual, target, permitted, and normal modes of the block.	DS-69	4	Mix	Mix	
BLOCK_ERR	6	This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown.	Bit_String	2	D	RO	
UPDATE_EVT	7	This alert is generated by any change to the static data.	DS-73	14	D	RO	
BLOCK_ALM	8	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status attribute. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.	DS-72	13	D	R/W	
TRANSDUCER_DIRECTORY	9		Array of unsigned32	4	N	RO	
TRANSDUCER_TYPE	10		Unsigned16	2	N	R/W	
XD_ERROR	11		Unsigned8	1	D	R/W	
COLLECTION_DIRECTORY	12		Array of unsigned32	4	N	RO	
COMAND_STRING	13		VisibleString	118	D	R/W	
GRAPHIC_DATA	14		Octet String	118	D	R/W	
COMMAND_ID	15		Unsigned16	2	D	R/W	
RESULT_ID	16		Unsigned16	2	D	RO	
RESULT	17	00 – No Error 01 – Parameter Error 02 – Command Error 04 – Unit in Configuration Menus 08 – No Command Yet 80 – Previous Command is still being processed	Unsigned8	1	D	RO	
KEY_STATUS	18		Unsigned8	1	D	RO	
OUTPUT_STATUS	19		Unsigned8	1	D	R/W	

BATCH Transducer Block Parameter List

Parameter	Index	Description	Type	Size	Store	Read / Write	Default
BATTB	0		DS-64	62		RO	
ST_REV	1	The revision level of the static data associated with the function block - incremented each time a static parameter attribute value is changed.	Unsigned16	2	S	RO	
TAG_DESC	2	The user description of the intended application of the block.	Octet_String	32	S	R/W	
STRATEGY	3	The strategy field can be used to identify grouping of blocks.. This data is not checked or processed by the block.	Unsigned16	2	S	R/W	
ALERT_KEY	4	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.	Unsigned8	1	S	R/W	
MODE_BLK	5	The actual, target, permitted, and normal modes of the block.	DS-69	4	Mix	Mix	
BLOCK_ERR	6	This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown.	Bit_String	2	D	RO	
UPDATE_EVT	7	This alert is generated by any change to the static data.	DS-73	14	D	RO	
BLOCK_ALM	8	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status attribute. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.	DS-72	13	D	R/W	
TRANSDUCER_DIRECTORY	9		Array of unsigned32	4	N	RO	
TRANSDUCER_TYPE	10		Unsigned16	2	N	R/W	
XD_ERROR	11		Unsigned8	1	D	R/W	
COLLECTION_DIRECTORY	12		Array of unsigned32	4	N	RO	
STOP	13		Boolean	1	D	R/W	
START	14		Boolean	1	D	R/W	
RESET	15		Boolean	1	D	R/W	
BATCHER_STATE	16		DS-BEKA-2	21	D	RO	
SETPOINT	17		Floating_Point	4	D	R/W	
BATCHED_QUANTITY	18		Floating_Point	4	D	RO	
LAST_BATCH	19		Floating_Point	4	D	RO	
BATCH_NAME	20		VisibleString	16	D	R/W	
START_PERMISSIVE	21		Boolean	1	D	R/W	
RATE	22	Fieldbus Display: Approximate Ambient Temperature in Degrees Celsius Batch Controller: Current flowrate	Floating_Point	4	D	RO	
RATE_TIMEBASE	23	Scaling factor for the RATE parameter	Unsigned16	2	D	RO	

IS Function Block Parameter List

Parameter	Index	Description	Type	Size	Store	Read / Write	Default
IS_BLOCK	0		DS-64	62		RO	
ST_REV	1	The revision level of the static data associated with the function block - incremented each time a static parameter attribute value is changed.	Unsigned16	2	S	RO	
TAG_DESC	2	The user description of the intended application of the block.	Octet_String	32	S	R/W	
STRATEGY	3	The strategy field can be used to identify grouping of blocks.. This data is not checked or processed by the block.	Unsigned16	2	S	R/W	
ALERT_KEY	4	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.	Unsigned8	1	S	R/W	
MODE_BLK	5	The actual, target, permitted, and normal modes of the block.	DS-69	4	Mix	Mix	
BLOCK_ERR	6	This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown.	Bit_String	2	D	RO	
OUT	7		DS-65	5	N	R/W	
OUT_RANGE	8		DS-68	11	S	R/W	0-100%
GRANT_DENY	9		DS-70	2	S	R/W	
STATUS_OPTS	10		Bit_String	2	S	R/W	
IN_1	11	Assign to the first PV to be displayed	DS-65	5	N	R/W	0 + 0x1C
IN_2	12	Assign to the second PV to be displayed	DS-65	5	N	R/W	0 + 0x1C
IN_3	13	Assign to the third PV to be displayed	DS-65	5	N	R/W	0 + 0x1C
IN_4	14	Assign to the fourth PV to be displayed	DS-65	5	N	R/W	0 + 0x1C
DISABLE_1	15	0 – Enable (Use Inout) 1 – Disable (NB Does not affect display)	DS-66	2	N	R/W	
DISABLE_2	16	0 – Enable (Use Inout) 1 – Disable (NB Does not affect display)	DS-66	2	N	R/W	
DISABLE_3	17	0 – Enable (Use Inout) 1 – Disable (NB Does not affect display)	DS-66	2	N	R/W	
DISABLE_4	18	0 – Enable (Use Inout) 1 – Disable (NB Does not affect display)	DS-66	2	N	R/W	
SELECT_TYPE	19		Unsigned8	1	S	R/W	0
MIN_GOOD	20		Unsigned8	1	S	R/W	0
SELECTED	21		DS-66	2	D	R/W	
OP_SELECT	22		DS-66	2	N	R/W	
UPDATE_EVT	23	This alert is generated by any change to the static data.	DS-73	14	D	RO	
BLOCK_ALM	24	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status attribute. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.	DS-72	13	D	R/W	

DISP8 Transducer Block Parameter List

Parameter	Index	Description	Type	Size	Store	Read / Write	Default
DISP8	0		DS-64	62		RO	
ST_REV	1	The revision level of the static data associated with the function block - incremented each time a static parameter attribute value is changed.	Unsigned16	2	S	RO	
TAG_DESC	2	The user description of the intended application of the block.	Octet_String	32	S	R/W	
STRATEGY	3	The strategy field can be used to identify grouping of blocks.. This data is not checked or processed by the block.	Unsigned16	2	S	R/W	
ALERT_KEY	4	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.	Unsigned8	1	S	R/W	
MODE_BLK	5	The actual, target, permitted, and normal modes of the block.	DS-69	4	Mix	Mix	
BLOCK_ERR	6	This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown.	Bit_String	2	D	RO	
UPDATE_EVT	7	This alert is generated by any change to the static data.	DS-73	14	D	RO	
BLOCK_ALM	8	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status attribute. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.	DS-72	13	D	R/W	
TRANSDUCER_DIRECTORY	9		Array of unsigned32	4	N	RO	
TRANSDUCER_TYPE	10		Unsigned16	2	N	R/W	
XD_ERROR	11		Unsigned8	1	D	R/W	
COLLECTION_DIRECTORY	12		Array of unsigned32	4	N	RO	
IN_DATA_1	13		DS-BEKA-4	48	D	R/W	
IN_DATA_2	14		DS-BEKA-4	48	D	R/W	
IN_DATA_3	15		DS-BEKA-4	48	D	R/W	
IN_DATA_4	16		DS-BEKA-4	48	D	R/W	
IN_DATA_5	17		DS-BEKA-4	48	D	R/W	
IN_DATA_6	18		DS-BEKA-4	48	D	R/W	
IN_DATA_7	19		DS-BEKA-4	48	D	R/W	
IN_DATA_8	20		DS-BEKA-4	48	D	R/W	
TEXT_DISPLAY	21		DS-BEKA-5	101	D	R/W	
KEY_STATUS	22		Unsigned8	1	D	RO	
OUTPUT STATUS	23		Unsigned8	1	D	R/W	
INSTRUMENT TEMPERATURE	24		Floating_Point	4	D	RO	
CYCLIC_ON	25	00 – No Cyclic Data Transfer FF – Cyclic Data Transfer Occurring	Unsigned8	1	D	RO	

DISP1 Transducer Block Parameter List

Parameter	Index	Description	Type	Size	Store	Read / Write	Default
DISP1	0		DS-64	62		RO	
ST_REV	1	The revision level of the static data associated with the function block - incremented each time a static parameter attribute value is changed.	Unsigned16	2	S	RO	
TAG_DESC	2	The user description of the intended application of the block.	Octet_String	32	S	R/W	
STRATEGY	3	The strategy field can be used to identify grouping of blocks.. This data is not checked or processed by the block.	Unsigned16	2	S	R/W	
ALERT_KEY	4	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.	Unsigned8	1	S	R/W	
MODE_BLK	5	The actual, target, permitted, and normal modes of the block.	DS-69	4	Mix	Mix	
BLOCK_ERR	6	This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown.	Bit_String	2	D	RO	
UPDATE_EVT	7	This alert is generated by any change to the static data.	DS-73	14	D	RO	
BLOCK_ALM	8	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status attribute. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.	DS-72	13	D	R/W	
TRANSDUCER_DIRECTORY	9		Array of unsigned32	4	N	RO	
TRANSDUCER_TYPE	10		Unsigned16	2	N	R/W	
XD_ERROR	11		Unsigned8	1	D	R/W	
COLLECTION_DIRECTORY	12		Array of unsigned32	4	N	RO	
BARGRAPH_ENABLE	13	00 – Bargraph Disabled FF – Bargraph Enabled	Boolean	1	N	R/W	True
BARGRAPH_MIN	14		Floating_Point	4	N	R/W	0.0
BARGRAPH_MAX	15		Floating_Point	4	N	R/W	100.0
DISP_FORMAT	16		Unsigned8	1	N	R/W	2
ZERO_OFFSET	17		Floating_Point	4	N	R/W	0.0
GAIN_FACTOR	18		Floating_Point	4	N	R/W	1.0
IN_DATA	19		DS-65	5	D	R/W	
INSTRUMENT TEMPERATURE	20		Floating_Point	4	D	RO	
CYCLIC_ON	21	00 – No Cyclic Data Transfer FF – Cyclic Data Transfer Occurring	Unsigned8	1	D	RO	

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