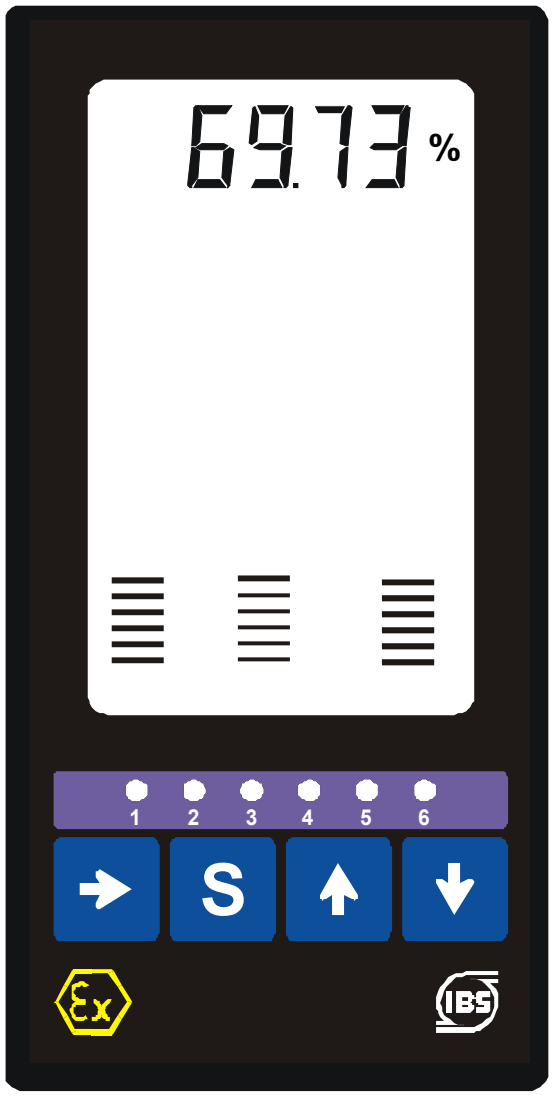
Intrinsically Safe Bargraph Indicator

BGI-200 i / BGI-210 i

Operating and Programming Instructions



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General

Please read the **installing and operating instructions** from cover to cover before installing this instrument. Qualified personnel that is authorized from the operating company should only install the bargraph indicator.

Please read this **operating and programming instructions** from cover to cover before bringing this instrument into service.

The installation manual from intrinsically safe controllers is an integral part of this manual.

Validity of Operating and Programming Instructions

- These Operating and Programming Instructions are valid from software version 1.03.
- Your IBS agent will be able to give you information about any improvements or modifications.
- If the controller is damaged by inexpert using the manufacturer don't guarantee. It is not allowed to make changes.

Operational Safety

- The indicators were manufactured on our ISO 9001 / ATEX accredited premises and therefore conform to the appropriate requirements.
- The front of the compact controller is protected to IP 54. The rear is to IP 20.
- If the controller is inexpert used or not used as directed involve a certain risk. Kindly note the remarks with icons forceful.

Technical Developments

- The manufacturer reserves the right to modify technical data without notice.

Repairs, Dangerous Chemicals

A note describing the fault must always accompany instruments sent to IBS BatchControl GmbH for repair.

Important!

The following procedures must be carried out before a controller is sent in for repair:

- Remove all residues that may be present. Pay special attention to the gasket grooves and crevices where residue may collect.
- Please ensure that full precautions have been taken to remove all traces of substances that may represent a health risk before returning any instrument.

Costs of disposal of materials or of injury to personnel (acid burns etc.) arising because of defective cleaning of the equipment will be charged to the owner of the equipment.

1 Operating and Display Elements

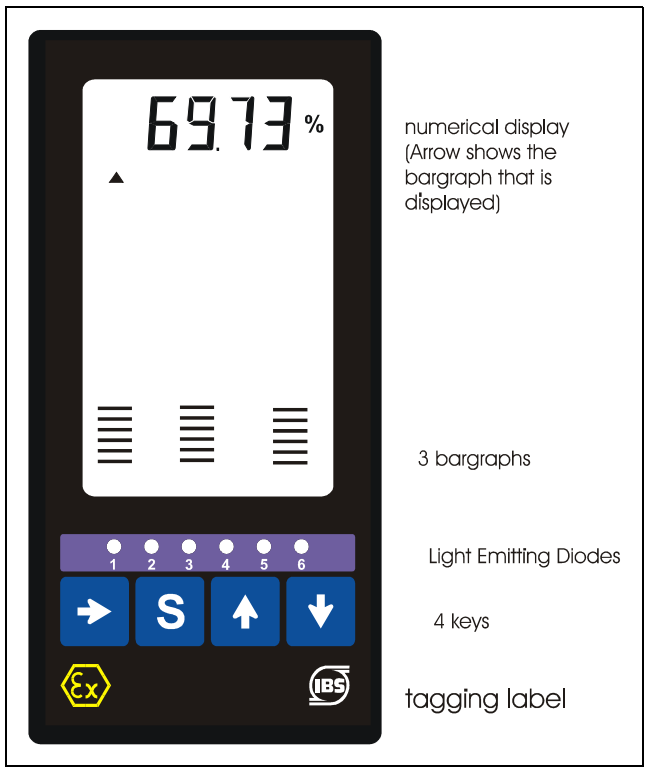


Figure 1
Front View

1.1 Display

There are three bargraphs in the display. Every bargraph could be set to an input resp. function block or alarm value. The numerical display shows the value from the dedicated bargraph. The small arrow under the numerical display shows the dedicated bargraph. With the - key you switch the displayed numerical display to a bargraph.

1.2 Keypad

The keypad consists of four short-stroke keys.

1.2.1 Programming keys

By pressing the and -keys together switches to the programming mode. The keys must be held down for approximately one second.

1.2.2 Adjustment keys

 or  enable direct adjustment of alarms if this is allowed. In programming mode, they are used to change the programming level or the displayed parameters.

 choose the displayed programming level or parameter level in programming mode.

1.2.3 'Save' key

 saves the individual sub-item. The indicator does not yet implement the setting changes. In the calibration level the calibration points are stored by pressing  and  together.

1.2.4 Save all

Pressing  and  together save all the settings you have made. The keys must be held down for approximately one second. The display clears for approximately two seconds. The settings are then implemented.


Note!

It is important that the  and  keys are both pressed simultaneously to retain setting changes permanently. If only the  key is pressed, the old settings will be retained.

2 Programming

It is easy to adapt the indicator to the various requirements. No previous knowledge of programming languages is required.

The function of key was described earlier in section 1.2.

You access the programming level by pressing → and ↑ together. ALAr (Alarm level) then appears at the top of Display. The alarm level is always the first level to be displayed. You can move between the individual levels with the ↑ - or ↓ -key.

Pressing the S-key select the programming level. If a code number protects a level, you will first be required to enter the code number. The code is entered using the two arrow keys. When the correct code has been entered, confirm it by pressing the S key; the indicator will then allow access to the selected level.

If you enter a wrong code, the indicator returns to the selection level.


Note!

Changes are confirmed with S.

The changes are saved by pressing → and S together.

You can save from every Level or Under-Level with → and S. The Indicator is back to operating mode.

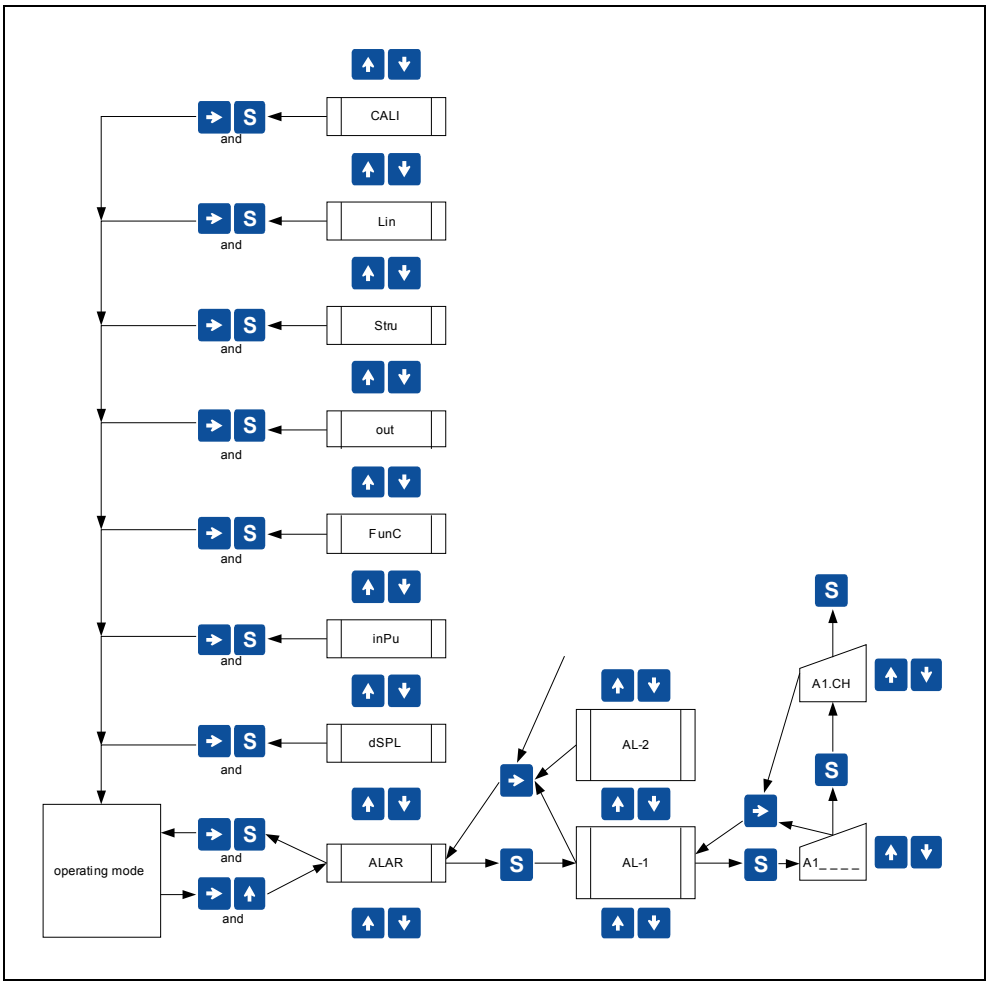


Figure 2 Overview Programming Levels

3 Calibration Level

The controller is calibrated via the software. All settings are stored in an FRAM and are retained even if the power supply falls.

The indicator may only be calibrated if doing so will not cause a malfunction in the plant. Note that the indicator blocks the analog outputs or sets them to various current values when you enter the calibration level. Take care that this does not cause a fault or malfunction in the plant.

You access the calibration level in the same way as the setpoint level. First enter the programming level by pressing the → and ↑ keys. The alarm level is always shown first. You access the calibration level by pressing the ↑ or ↓ keys several times.

You enter the CAL level with the S key. If a code number has been specified for this level, this will first be requested (see section 2). The calibration level is protected at the factory with Code 0001. This is to prevent unintentional alteration of the calibration parameters.

3.1 Calibration of Analog Inputs

Analog input 1 is calibrated first.

To calibrate an analog input, first connect a calibration source to input 1. Use a current source for a mA input and a Pt100 simulator for a Pt100 input. Note the type of circuit for a Pt100 input (2- or 3-wire circuit).

By pressing the S key you access the first menu item [In1 0%]. The indicator first requests the 0% value for analog input 1. If the applied current value (e. g. 4 mA) is to be stored as the 0% value, confirm this by pressing the ↑ and ↓ keys. Press the S key to access the next calibration point.

Now apply the 100% value (e.g. 20 mA) with the current source. Confirm this current value by pressing the ↑ and ↓ keys together. Press the S key to access the next calibration point.

The indicator requests all analog inputs in numerical order. Do not forget to reconnect the calibration source to the next input. You can skip inputs that are correctly calibrated or do not need to be calibrated by pressing the S key.

3.2 Calibration of Analog Outputs

To calibrate analog output 1, at first connect a multi meter to terminals 13 (+) and 14 (-) of the indicator.

With the S key you enter the calibration menu (out1 0%). The current is adjusted with the ↑ and ↓ keys. When the current is set to the correct value (e.g. 4 mA), confirm it by pressing the ↑ and ↓ keys together.

Press the S key to access the next calibration point (out1 100 %).
The current is adjusted with the ↑ and ↓ keys. When the current is set to the correct value (e.g. 20 mA), confirm it by pressing the ↑ and ↓ keys together.

Press the S key to access the next calibration point (out2 0 %). Now you calibrate the analog output 2. Connect a multi meter to terminals 15 (+) and 16 (-) of the indicator. Note, that the power supply 2 is connected to terminals 17 (+) and 18 (-). The progress of calibration is the same as for analog input 1.

All changes are saved with pressing with → and S together.

3.3 Digital Input and Output Test

In the level test the activated digital input switches the associated digital output and LED (ligth emitting diode).

3.4 Overview Calibration Level

CALI	Function		Example
In1 0%	Calibration Analog Input 1	0 %	Input 4 mA
In1 100%	Calibration Analog Input 1	100 %	Input 20 mA
in2 0%	Calibration Analog Input 2	0 %	Input 4 mA
in2 100%	Calibration Analog Input 2	100 %	Input 20 mA
in3 0%	Calibration Analog Input 3	0 %	Input 4 mA
in3 100%	Calibration Analog Input 3	100 %	Input 20 mA
out1 0%	Calibration Analog Output 1	0 %	Set 4 mA
out1 100%	Calibration Analog Output 1	100 %	Set 20 mA
out2 0%	Calibration Analog Output 2	0 %	Set 4 mA
out2 100%	Calibration Analog Output 2	100 %	Set 20 mA
test	Test Digital Input and Output, Test LED (Front)	Digital input 1 to 6 switches digital outputs 1 to 6 (LED 1 to 6), Hex-value displayed to the LCD	
rel		Software Release displayed	
d-no		Device-No.	

4 Linearisation

With the linearisation table you are able to linearise non-linear input signals.

In the function block level is set which analog input is to be linearise.

There are 25 linearisation interpolation points. These are distributed in 5% steps across the range from –10% to +110%. These linearisation interpolation points sets the actual value at this point. In the middle Display is shown the point which is set.

Example:

The current signal is non-linear with following values:

Current Input in [%]	Actual Value in [%]
5	5
10	7,5
15	10
20	12,5
25	20
30	30

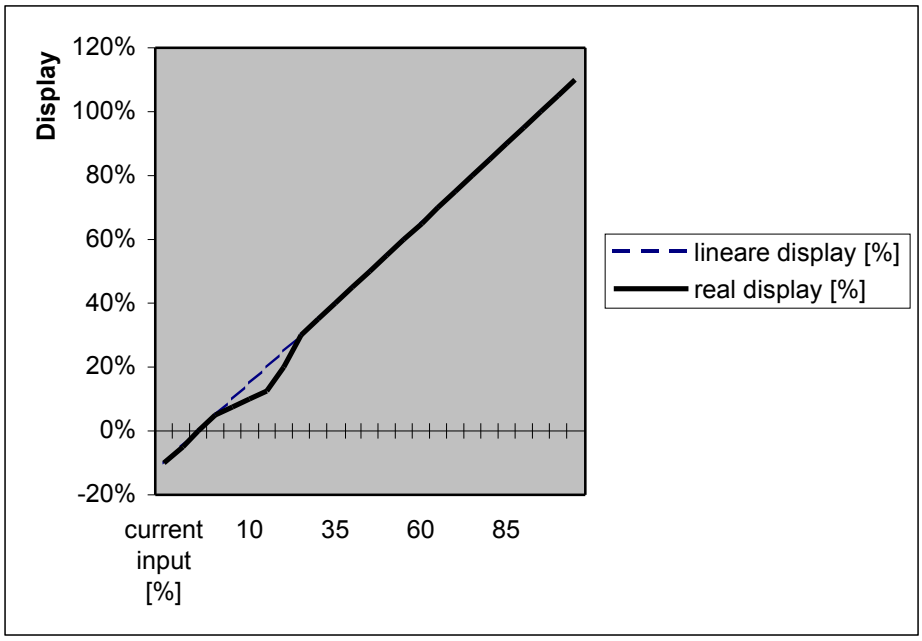


Figure 3
Linearisation

This illustration shows the effect that occurs with the linearisation from the table above.

5 Alarm Level

To configure alarms use the alarm level (ALAr). You access the alarm level in the same way as the other levels.

Operation and selection takes place as described in Sections 1.2 and 2.

5.1 Select the Alarm

Display: AL-1 to AL-6

You choose the alarm to configure. After alarm selection, the upper display shows alternating the alarm function and the setting.

5.1.1 Select the Minimum or Maximum Alarm or Sense Break

Display: A1_ _ _ _ , A1 ¯¯¯¯, Fub, A2_ _ _ _, to A6 Fub

The selected alarm is configured as minimum alarm, maximum alarm or sense break.

5.1.2 Set the Alarm to Bargraph

Display: A1.CH, A2.CH to A6.CH

The selected alarm is configured to a bargraph (channel). You can choose between CH1 to CH3 or oFF.

5.1.3 Set the Alarm Value

Display: AL-1, AL-2, to AL-6

You set the value the alarm is active.

5.1.4 Set the Alarm Hysteresis

Display: A1.hY, A2.hY to A6.hY

The alarm hysteresis is set.

5.1.5 Direction of action from the digital output

Display: A1.dr, A2.dr to A6.dr

The alarm direction of action is set. In the setting *dir* *the alarm output is normally open, in the setting* inu *the output is normally closed.*

6 Display Level

The display is configured in the display level (dSPL). You access the display level in the same way as the other levels.

Operation and selection takes place as described in Sections 1.2 and 2.

6.1 Select the Bargraph

Display: dSP1, dSP2, dSP3

You select the bargraph to configure. After selection from the bargraph the upper display alternating displayed d1.in respective d2.in or d3.in with the functions to set. You can set the analog inputs, the alarms or function blocks to the bargraph.

6.1.1 Set Function

6.1.1.1 Analog Input

Display: in-1, in-2, in-3

A analog input is set to the bargraph.

6.1.1.2 Alarm

Display: AL-1 to AL-6

A alarm is set to the bargraph.

6.1.1.3 Function block

Display: Fun1 to Fun9

A function block is set to the bargraph.

6.1.2 Set the unit

Display: unit

The to shown decimal value is set to a unit. You can choose between %, °C and without unit.

6.1.3 Set Start Value

Display: d1.St, d2.St, d3.St

You set the value for the 0% input.

6.1.4 Set End Value

Display: d1.En, d2.En, d3.En

You set the value for the 100% input.

6.1.5 Set Scale

Display: d1.SC, d2.SC, d3.SC

You set the scale to the left of bargraph. You can choose between Full, 0-100 and oFF.

If you set to Full, every 20% mark is shown with percentage value without percent sign. If 0-100 is set, only the 0% and 100% mark is displayed. No mark is in the setting oFF.

7 Input Level

The analog inputs are configured in the input level (InPu).You access the input level in the same way as the other levels.

Operation and selection takes place as described in Sections 1.2 and 2.

7.1 Select Analog Input

Display: inP1, inP2, inP3

You select the analog input to configure. After selection from the input the upper display alternating displayed the functions with the settings.

7.1.1 Set Filter Time

Display: FIL

The selected analog input is provided with a filter. The filter time is set in this level.

7.1.2 Set Sense Break

Display: Fub

The selected analog input is sense break controlled. You can select between on or off.

7.1.3 Set Sense Break Low Value

Display: FubL

You set the minimum value for sense break.

7.1.4 Set Sense Break High Value

Display: FubH

You set the maximum sense break value.

8 Function Block Level

The function blocks are set in this level (FunC). You access the function block level in the same way as the other levels. There are nine function blocks to realise several mathematical functions.

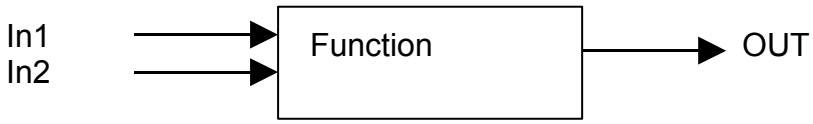
Operation and selection takes place as described in Sections 1.2 and 2.

8.1 Select the Function Block

Display: Fun1, Fun2, to Fun9

You select the function block to configure. After selection from the function block the upper display alternating displayed the functions with the settings.

There are two input and one output in every function block.



The calculation is done in percent and not with physical units.

8.1.1 Set Function

Display: F1.Fu, F2.Fu, to F9.Fu

You set the function from the function block. In the following descriptions the inputs are called In1 and In2. The output is called OUT. F1 and F2 are factors for multiplication by the inputs. O is the input and output offset.

8.1.1.1 Off-state

No function is set to the function block.

8.1.1.2 Adding Function

The function block adds In1 to In2.

OUT = In1*F1 + In2*F2 + o1

8.1.1.3 Multiply Function

The function block multiply In1 by In2:

OUT = (In1*F1+o1) * (In2*F2+o2) + o3

8.1.1.4 Divide Funktion

The function block divide In1 by In2.

OUT = (In1*F1+o1) / (In2*F2+o2) + o3

8.1.1.5 Root extraction Function

The function block extract the square root from In1. There is only one input in this function.

OUT = SQRT(In1*F1+o1) +o2

8.1.1.6 Linearisation Function

This function block linearise In1. There is only one input in this function.

OUT = LIN(In1) as linearisation table

8.1.2 Set the Inputs from Function Blocks

Display: F1.i1, F1.i2, F2.i1, to F9.i2

You set the signals from the function block inputs. In1 is set in the menu Fx.i1 and in2 in the menu Fx.i2.

You can choose between following settings:

- Off
- In1 to In3
- AL-1 to AL-6
- Fun1 to Fun9

8.1.3 Set the Factors

Display: F1.F1, F1.F2, F2.F1, to F9.F2

You set the factor for multiplication the input value. The setting range is from –99,99 to 99,99.

8.1.4 Set the Offset

Display: o1 to o3

You set the offset from the function. The setting range is from –200,0 to 200.0%.

9 Output Level

The analog outputs are configured in the output level (out). You access the output level in the same way as the other levels.

Operation and selection takes place as described in Sections 1.2 and 2.

9.1 Select Analog Output

Display: o1.in, o2.in

You select the analog output signal.

9.1.1 Switch Off Analog Output

Display: oFF

There is no function to analog output.

9.1.2 Analog Input to Analog Output

Display: in-1, in-2, in-3

The analog output displayed the value from the selected analog input without changes.

9.1.3 Alarm Value to Analog Output

Display: AL-1 to AL-3

The selected alarm value is displayed to the analog output.

9.1.4 Function Block Output to Analog Output

Display: Fn1 to Fn9

The selected function block output is displayed to the analog output.

9.1.5 Set Analog Output Start Value

Display: o1.St, o2.St

You set the current start value. So it is possible to show an input signal from 0 to 100% only from 10% to 100% at the analog output.

9.1.6 Set Analog Output End Value

Display: o1.En, o2.En

You set the current end value. So it is possible to show an input signal from 0 to 100% only from 0% to 90% at the analog output.

9.1.7 Set Analog Output Start Current

Display: o1.iS, o2.iS

You set the start current at the start values o1.St resp. o2.St. With this function it is possible to invert the input signal.

9.1.8 Set Analog Output End Current

Display: o1.iE, o2.iE

You set the end current at the end values o1.En resp. o2.En. With this function it is possible to invert the input signal.

10 Structure Level

In the structure level (STru) you configure the alarm settings and the interface. Further on you set the code for the levels. You access the structure level in the same way as the other levels.

Operation and selection takes place as described in Sections 1.2 and 2.

10.1 Set Alarm Adjustment

Display: AL-1 to AL-6

The alarm normally is set to Para. The value could be set only in the alarm level. If the alarm is set to USER the alarm is shown directly after pressing the S-key in the display and can be set. You must not enter the programming level.

10.2 Set the Protocol

Display: Prot

You can choose between Modbus RTU and Modbus ASCII.

10.2.1 MODBUS-RTU

Display: *rtu*

The indicator works with MODBUS-RTU Protocol. The communication works with 8 data bits, parity even.

10.2.2 MODBUS-ASCII

Display: *ASCI*

The indicator works with MODBUS-ASCII Protocol. The communication works with 7 data bits, parity even.

10.3 Interface Address

Display: *Adr*

You set the desired interface address.

Setting range: 1 to 255

10.4 Data Transmission Speed

Display: b*aud*

You can connect the indicator to a serial interface using an interface isolation card. The desired transmission speed is entered in this structure item.

Setting range: 2400, 4800, 9600, 19200 (displays 1920) baud

10.5 Coding the Levels

Display: Cod1 to Cod6

You have the options of restriction access to the individual levels by using a four-figure code. The code is requested before entering the respective level.

10.5.1 Code number for the structure, display and output Level

Display: Cod1

10.5.2 Code number for the linearisation level

Display: Cod2

10.5.3 Code number for the calibration level

Display: Cod3

10.5.4 Code number for the input level

Display: Cod4

10.5.5 Code number for the alarm level

Display: Cod5

10.5.6 Code number for the function block level

Display: Cod6

11 Example Function Block

From two input values is a third value to calculate by the indicator.

The first analog input is connected to a volume flow meter with the measuring range from 0 to 10000 l/h. The second analog input is connected to the the associated density with the range from 0.8 to 1.2 kg/l.

The mass should be shown on the display and the analog output.

Bargraph 1 shows the volume. The measuring range is set from 0 to 10.00 m³.

Bargraph 2 shows the density. The measuring range is set from 0.8 to 1.2 t/m³.

Bargraph 3 shows the function block 1. The measuring range is set from 0 to 12.00 t.

There are following settings in the function block:

A multiply function block is selected.

In1 is set to analog input 1. The associated factor is 1.
In2 is set to analog input 2. The associated factor is 0.33 and is calculated as follows:

1.2 t/m³ are according to 100%
0.8 t/m³ are according to 66,7%
the used range is 100% - 66,7 % = 33,3 %

The offset1 is set to 0, the offset2 is set to 66,7 (to show the range correctly) and offset3 is 0.

The calculated value is shown at the third bargraph. The display shows the correct decimal value if the bargraph is set to the numerical display. The analog output shows the calculated value as current.

12 Fault Indication

The indicator monitors all functions and modules. If, for instance, a change to a setting cannot be stored correctly, a fault is indicated. This is very probably a hardware fault (e.g. a defective FRAM).

A fault message appears on the display.

The indicator must be returned for repair.

13 Alarm Level

AL-1			5.1		select Alarm
	A1		5.1.1		direction of action
		_ _ _ _			minimum alarm
		¯ ¯ ¯ ¯			maximum alarm
	A1.Ch		5.1.2		set alarm to
		Ch1			bargraph 1
		Ch2			bargraph 2
		Ch3			bargraph 3
		oFF			Alarm off
	AL-1		5.1.3		Alarm value
	A1.hY		5.1.4		Alarm hysteresis
	A1.dr		5.1.5		direction of action
		dir			normally open
		inv			normally closed
AL-2			5.1		select Alarm
	A2		5.1.1		direction of action
		_ _ _ _			minimum alarm
		¯ ¯ ¯ ¯			maximum alarm
	A2.Ch		5.1.2		set alarm to
		Ch1			bargraph 1
		Ch2			bargraph 2
		Ch3			bargraph 3
		oFF			Alarm off
	AL-2		5.1.3		Alarm value
	A2.hY		5.1.4		Alarm hysteresis
	A2.dr		5.1.5		direction of action
		dir			normally open
		inv			normally closed
AL-3			5.1		select Alarm
	A3		5.1.1		direction of action
		_ _ _ _			minimum alarm
		¯ ¯ ¯ ¯			maximum alarm
	A3.Ch		5.1.2		set alarm to
		Ch1			bargraph 1
		Ch2			bargraph 2
		Ch3			bargraph 3
		oFF			Alarm off
	AL-3		5.1.3		Alarm value
	A3.hY		5.1.4		Alarm hysteresis
	A3.dr		5.1.5		direction of action
		dir			normally open
		inv			normally closed

AL-4			5.1		select Alarm
	A4		5.1.1		direction of action
		_ _ _ _			minimum alarm
		¯ ¯ ¯ ¯			maximum alarm
	A4.Ch		5.1.2		set alarm to
		Ch1			bargraph 1
		Ch2			bargraph 2
		Ch3			bargraph 3
		oFF			Alarm off
	AL-4		5.1.3		Alarm value
	A4.hY		5.1.4		Alarm hysteresis
	A4.dr		5.1.5		direction of action
		dir			normally open
		inv			normally closed
AL-5			5.1		select Alarm
	A5		5.1.1		direction of action
		_ _ _ _			minimum alarm
		¯ ¯ ¯ ¯			maximum alarm
	A5.Ch		5.1.2		set alarm to
		Ch1			bargraph 1
		Ch2			bargraph 2
		Ch3			bargraph 3
		oFF			Alarm off
	AL-5		5.1.3		Alarm value
	A5.hY		5.1.4		Alarm hysteresis
	A5.dr		5.1.5		direction of action
		dir			normally open
		inv			normally closed
AL-6			5.1		select Alarm
	A6		5.1.1		direction of action
		_ _ _ _			minimum alarm
		¯ ¯ ¯ ¯			maximum alarm
	A6.Ch		5.1.2		set alarm to
		Ch1			bargraph 1
		Ch2			bargraph 2
		Ch3			bargraph 3
		oFF			Alarm off
	AL-6		5.1.3		Alarm value
	A6.hY		5.1.4		Alarm hysteresis
	A6.dr		5.1.5		direction of action
		dir			normally open
		inv			normally closed

14 Display Level

dsp1			6.1		select bargraph
	d1.in		6.1.1		set function
		in-1	6.1.1.1		analog input 1
		in-2			analog input 2
		in-3			analog input 3
		AI-1	6.1.1.2		alarm 1
		AI-2			alarm 2
		AI-3			alarm 3
		AI-4			alarm 4
		AI-5			alarm 5
		AI-6			alarm 6
		Fun1	6.1.1.3		function 1
		Fun2			function 2
		Fun3			function 3
		Fun4			function 4
		Fun5			function 5
		Fun6			function 6
		Fun7			function 7
		Fun8			function 8
		Fun9			function 9
		off			off
	unit		6.1.2		set unit
		%			
		°C			
	d1.St		6.1.3		start value
	d1.En		6.1.4		end value
	d1.SC		6.1.5		set scale
		no			no scale
		0 100			only 0% and 100%
		Full			full scale

dsp2			6.1		select bargraph
	d2.in		6.1.1		set function
		in-1	6.1.1.1		analog input 1
		in-2			analog input 2
		in-3			analog input 3
		AI-1	6.1.1.2		alarm 1
		AI-2			alarm 2
		AI-3			alarm 3
		AI-4			alarm 4
		AI-5			alarm 5
		AI-6			alarm 6
		Fun1	6.1.1.3		function 1
		Fun2			function 2
		Fun3			function 3
		Fun4			function 4
		Fun5			function 5
		Fun6			function 6
		Fun7			function 7
		Fun8			function 8
		Fun9			function 9
		off			off
	unit		6.1.2		set unit
		%			
		°C			
	d2.St		6.1.3		start value
	d2.En		6.1.4		end value
	d2.SC		6.1.5		set scale
		no			no scale
		0 100			only 0% and 100%
		Full			full scale

dsp3			6.1		select bargraph
	d3.in		6.1.1		set function
		in-1	6.1.1.1		analog input 1
		in-2			analog input 2
		in-3			analog input 3
		AI-1	6.1.1.2		alarm 1
		AI-2			alarm 2
		AI-3			alarm 3
		AI-4			alarm 4
		AI-5			alarm 5
		AI-6			alarm 6
		Fun1	6.1.1.3		function 1
		Fun2			function 2
		Fun3			function 3
		Fun4			function 4
		Fun5			function 5
		Fun6			function 6
		Fun7			function 7
		Fun8			function 8
		Fun9			function 9
		off			off
	unit		6.1.2		set unit
		%			
		°C			
	d3.St		6.1.3		start value
	d3.En		6.1.4		end value
	d3.SC		6.1.5		set scale
		no			no scale
		0 100			only 0% and 100%
		Full			full scale

15 Input Level

inP1			7.1		select analog input
	Fil		7.1.1		set filter time
	Fub		7.1.2		sense break
		on			on
		oFF			off
	FubL		7.1.3		minimum value
	FubH		7.1.4		maximum value

inP2			7.1		select analog input
	Fil		7.1.1		set filter time
	Fub		7.1.2		sense break
		on			on
		oFF			off
	FubL		7.1.3		minimum value
	FubH		7.1.4		maximum value

inP3			7.1		select analog input
	Fil		7.1.1		set filter time
	Fub		7.1.2		sense break
		on			on
		oFF			off
	FubL		7.1.3		minimum value
	FubH		7.1.4		maximum value

16 Function Level

Fun1			8.1		select function block
	F1.Fu		8.1.1		set function
		oFF	8.1.1.1		off
		Add	8.1.1.2		adding function
		nult	8.1.1.3		multiplication
		div	8.1.1.4		divide function
		Sqrt	8.1.1.5		square root
		Lin1	8.1.1.6		linearise
		Lin2	8.1.1.6		linearise
		Lin3	8.1.1.6		linearise
	F1.i1		8.1.2		set inputs
		oFF			off
		in-1			input 1
		in-2			input 2
		in-3			input 3
		AL-1			alarm 1
		AL-2			alarm 2
		AL-3			alarm 3
		AL-4			alarm 4
		AL-5			alarm 5
		AL-6			alarm 6
		Fun1			function 1
		Fun2			function 2
		Fun3			function 3
		Fun4			function 4
		Fun5			function 5
		Fun6			function 6
		Fun7			function 7
		Fun8			function 8
		Fun9			function 9
	F1.i2		8.1.2		set inputs
		oFF			off
		in-1			input 1
		in-2			input 2
		in-3			input 3
		AL-1			alarm 1
		AL-2			alarm 2
		AL-3			alarm 3
		AL-4			alarm 4
		AL-5			alarm 5
		AL-6			alarm 6
		Fun1			function 1
		Fun2			function 2
		Fun3			function 3
		Fun4			function 4
		Fun5			function 5
		Fun6			function 6
		Fun7			function 7
		Fun8			function 8
		Fun9			function 9
	F1.F1		8.1.3		set factor
	F1.F2				set factor
	F1.o1		8.1.4		set offset
	F1.o2				set offset
	F1.o3				set offset

Fun2			8.1		select function block
	F2.Fu		8.1.1		set function
		oFF	8.1.1.1		off
		Add	8.1.1.2		adding function
		nult	8.1.1.3		multiplication
		div	8.1.1.4		divide function
		Sqrt	8.1.1.5		square root
		Lin1	8.1.1.6		linearise
		Lin2	8.1.1.6		linearise
		Lin3	8.1.1.6		linearise
	F2.i1		8.1.2		set inputs
		oFF			off
		in-1			input 1
		in-2			input 2
		in-3			input 3
		AL-1			alarm 1
		AL-2			alarm 2
		AL-3			alarm 3
		AL-4			alarm 4
		AL-5			alarm 5
		AL-6			alarm 6
		Fun1			function 1
		Fun2			function 2
		Fun3			function 3
		Fun4			function 4
		Fun5			function 5
		Fun6			function 6
		Fun7			function 7
		Fun8			function 8
		Fun9			function 9
	F2.i2		8.1.2		set inputs
		oFF			off
		in-1			input 1
		in-2			input 2
		in-3			input 3
		AL-1			alarm 1
		AL-2			alarm 2
		AL-3			alarm 3
		AL-4			alarm 4
		AL-5			alarm 5
		AL-6			alarm 6
		Fun1			function 1
		Fun2			function 2
		Fun3			function 3
		Fun4			function 4
		Fun5			function 5
		Fun6			function 6
		Fun7			function 7
		Fun8			function 8
		Fun9			function 9
	F2.F1		8.1.3		set factor
	F2.F2				set factor
	F2.o1		8.1.4		set offset
	F2.o2				set offset
	F2.o3				set offset

Fun3			8.1		select function block
	F3.Fu		8.1.1		set function
		oFF	8.1.1.1		off
		Add	8.1.1.2		adding function
		nult	8.1.1.3		multiplication
		div	8.1.1.4		divide function
		Sqrt	8.1.1.5		square root
		Lin1	8.1.1.6		linearise
		Lin2	8.1.1.6		linearise
		Lin3	8.1.1.6		linearise
	F3.i1		8.1.2		set inputs
		oFF			off
		in-1			input 1
		in-2			input 2
		in-3			input 3
		AL-1			alarm 1
		AL-2			alarm 2
		AL-3			alarm 3
		AL-4			alarm 4
		AL-5			alarm 5
		AL-6			alarm 6
		Fun1			function 1
		Fun2			function 2
		Fun3			function 3
		Fun4			function 4
		Fun5			function 5
		Fun6			function 6
		Fun7			function 7
		Fun8			function 8
		Fun9			function 9
	F3.i2		8.1.2		set inputs
		oFF			off
		in-1			input 1
		in-2			input 2
		in-3			input 3
		AL-1			alarm 1
		AL-2			alarm 2
		AL-3			alarm 3
		AL-4			alarm 4
		AL-5			alarm 5
		AL-6			alarm 6
		Fun1			function 1
		Fun2			function 2
		Fun3			function 3
		Fun4			function 4
		Fun5			function 5
		Fun6			function 6
		Fun7			function 7
		Fun8			function 8
		Fun9			function 9
	F3.F1		8.1.3		set factor
	F3.F2				set factor
	F3.o1		8.1.4		set offset
	F3.o2				set offset
	F3.o3				set offset

Fun4			8.1		select function block
	F4.Fu		8.1.1		set function
		oFF	8.1.1.1		off
		Add	8.1.1.2		adding function
		nult	8.1.1.3		multiplication
		div	8.1.1.4		divide function
		Sqrt	8.1.1.5		square root
		Lin1	8.1.1.6		linearise
		Lin2	8.1.1.6		linearise
		Lin3	8.1.1.6		linearise
	F4.i1		8.1.2		set inputs
		oFF			off
		in-1			input 1
		in-2			input 2
		in-3			input 3
		AL-1			alarm 1
		AL-2			alarm 2
		AL-3			alarm 3
		AL-4			alarm 4
		AL-5			alarm 5
		AL-6			alarm 6
		Fun1			function 1
		Fun2			function 2
		Fun3			function 3
		Fun4			function 4
		Fun5			function 5
		Fun6			function 6
		Fun7			function 7
		Fun8			function 8
		Fun9			function 9
	F4.i2		8.1.2		set inputs
		oFF			off
		in-1			input 1
		in-2			input 2
		in-3			input 3
		AL-1			alarm 1
		AL-2			alarm 2
		AL-3			alarm 3
		AL-4			alarm 4
		AL-5			alarm 5
		AL-6			alarm 6
		Fun1			function 1
		Fun2			function 2
		Fun3			function 3
		Fun4			function 4
		Fun5			function 5
		Fun6			function 6
		Fun7			function 7
		Fun8			function 8
		Fun9			function 9
	F4.F1		8.1.3		set factor
	F4.F2				set factor
	F4.o1		8.1.4		set offset
	F4.o2				set offset
	F4.o3				set offset

Fun5			8.1		select function block
	F5.Fu		8.1.1		set function
		oFF	8.1.1.1		off
		Add	8.1.1.2		adding function
		nult	8.1.1.3		multiplication
		div	8.1.1.4		divide function
		Sqrt	8.1.1.5		square root
		Lin1	8.1.1.6		linearise
		Lin2	8.1.1.6		linearise
		Lin3	8.1.1.6		linearise
	F5.i1		8.1.2		set inputs
		oFF			off
		in-1			input 1
		in-2			input 2
		in-3			input 3
		AL-1			alarm 1
		AL-2			alarm 2
		AL-3			alarm 3
		AL-4			alarm 4
		AL-5			alarm 5
		AL-6			alarm 6
		Fun1			function 1
		Fun2			function 2
		Fun3			function 3
		Fun4			function 4
		Fun5			function 5
		Fun6			function 6
		Fun7			function 7
		Fun8			function 8
		Fun9			function 9
	F5.i2		8.1.2		set inputs
		oFF			off
		in-1			input 1
		in-2			input 2
		in-3			input 3
		AL-1			alarm 1
		AL-2			alarm 2
		AL-3			alarm 3
		AL-4			alarm 4
		AL-5			alarm 5
		AL-6			alarm 6
		Fun1			function 1
		Fun2			function 2
		Fun3			function 3
		Fun4			function 4
		Fun5			function 5
		Fun6			function 6
		Fun7			function 7
		Fun8			function 8
		Fun9			function 9
	F5.F1		8.1.3		set factor
	F5.F2				set factor
	F5.o1		8.1.4		set offset
	F5.o2				set offset
	F5.o3				set offset

Fun6			8.1		select function block
	F6.Fu		8.1.1		set function
		oFF	8.1.1.1		off
		Add	8.1.1.2		adding function
		nult	8.1.1.3		multiplication
		div	8.1.1.4		divide function
		Sqrt	8.1.1.5		square root
		Lin1	8.1.1.6		linearise
		Lin2	8.1.1.6		linearise
		Lin3	8.1.1.6		linearise
	F6.i1		8.1.2		set inputs
		oFF			off
		in-1			input 1
		in-2			input 2
		in-3			input 3
		AL-1			alarm 1
		AL-2			alarm 2
		AL-3			alarm 3
		AL-4			alarm 4
		AL-5			alarm 5
		AL-6			alarm 6
		Fun1			function 1
		Fun2			function 2
		Fun3			function 3
		Fun4			function 4
		Fun5			function 5
		Fun6			function 6
		Fun7			function 7
		Fun8			function 8
		Fun9			function 9
	F6.i2		8.1.2		set inputs
		oFF			off
		in-1			input 1
		in-2			input 2
		in-3			input 3
		AL-1			alarm 1
		AL-2			alarm 2
		AL-3			alarm 3
		AL-4			alarm 4
		AL-5			alarm 5
		AL-6			alarm 6
		Fun1			function 1
		Fun2			function 2
		Fun3			function 3
		Fun4			function 4
		Fun5			function 5
		Fun6			function 6
		Fun7			function 7
		Fun8			function 8
		Fun9			function 9
	F6.F1		8.1.3		set factor
	F6.F2				set factor
	F6.o1		8.1.4		set offset
	F6.o2				set offset
	F6.o3				set offset

Fun7			8.1		select function block
	F7.Fu		8.1.1		set function
		oFF	8.1.1.1		off
		Add	8.1.1.2		adding function
		nult	8.1.1.3		multiplication
		div	8.1.1.4		divide function
		Sqrt	8.1.1.5		square root
		Lin1	8.1.1.6		linearise
		Lin2	8.1.1.6		linearise
		Lin3	8.1.1.6		linearise
	F7.i1		8.1.2		set inputs
		oFF			off
		in-1			input 1
		in-2			input 2
		in-3			input 3
		AL-1			alarm 1
		AL-2			alarm 2
		AL-3			alarm 3
		AL-4			alarm 4
		AL-5			alarm 5
		AL-6			alarm 6
		Fun1			function 1
		Fun2			function 2
		Fun3			function 3
		Fun4			function 4
		Fun5			function 5
		Fun6			function 6
		Fun7			function 7
		Fun8			function 8
		Fun9			function 9
	F7.i2		8.1.2		set inputs
		oFF			off
		in-1			input 1
		in-2			input 2
		in-3			input 3
		AL-1			alarm 1
		AL-2			alarm 2
		AL-3			alarm 3
		AL-4			alarm 4
		AL-5			alarm 5
		AL-6			alarm 6
		Fun1			function 1
		Fun2			function 2
		Fun3			function 3
		Fun4			function 4
		Fun5			function 5
		Fun6			function 6
		Fun7			function 7
		Fun8			function 8
		Fun9			function 9
	F7.F1		8.1.3		set factor
	F7.F2				set factor
	F7.o1		8.1.4		set offset
	F7.o2				set offset
	F7.o3				set offset

Fun8			8.1		select function block
	F8.Fu		8.1.1		set function
		oFF	8.1.1.1		off
		Add	8.1.1.2		adding function
		nult	8.1.1.3		multiplication
		div	8.1.1.4		divide function
		Sqrt	8.1.1.5		square root
		Lin1	8.1.1.6		linearise
		Lin2	8.1.1.6		linearise
		Lin3	8.1.1.6		linearise
	F8.i1		8.1.2		set inputs
		oFF			off
		in-1			input 1
		in-2			input 2
		in-3			input 3
		AL-1			alarm 1
		AL-2			alarm 2
		AL-3			alarm 3
		AL-4			alarm 4
		AL-5			alarm 5
		AL-6			alarm 6
		Fun1			function 1
		Fun2			function 2
		Fun3			function 3
		Fun4			function 4
		Fun5			function 5
		Fun6			function 6
		Fun7			function 7
		Fun8			function 8
		Fun9			function 9
	F8.i2		8.1.2		set inputs
		oFF			off
		in-1			input 1
		in-2			input 2
		in-3			input 3
		AL-1			alarm 1
		AL-2			alarm 2
		AL-3			alarm 3
		AL-4			alarm 4
		AL-5			alarm 5
		AL-6			alarm 6
		Fun1			function 1
		Fun2			function 2
		Fun3			function 3
		Fun4			function 4
		Fun5			function 5
		Fun6			function 6
		Fun7			function 7
		Fun8			function 8
		Fun9			function 9
	F8.F1		8.1.3		set factor
	F8.F2				set factor
	F8.o1		8.1.4		set offset
	F8.o2				set offset
	F8.o3				set offset

Fun9			8.1		select function block
	F9.Fu		8.1.1		set function
		oFF	8.1.1.1		off
		Add	8.1.1.2		adding function
		nult	8.1.1.3		multiplication
		div	8.1.1.4		divide function
		Sqrt	8.1.1.5		square root
		Lin1	8.1.1.6		linearise
		Lin2	8.1.1.6		linearise
		Lin3	8.1.1.6		linearise
	F9.i1		8.1.2		set inputs
		oFF			off
		in-1			input 1
		in-2			input 2
		in-3			input 3
		AL-1			alarm 1
		AL-2			alarm 2
		AL-3			alarm 3
		AL-4			alarm 4
		AL-5			alarm 5
		AL-6			alarm 6
		Fun1			function 1
		Fun2			function 2
		Fun3			function 3
		Fun4			function 4
		Fun5			function 5
		Fun6			function 6
		Fun7			function 7
		Fun8			function 8
		Fun9			function 9
	F9.i2		8.1.2		set inputs
		oFF			off
		in-1			input 1
		in-2			input 2
		in-3			input 3
		AL-1			alarm 1
		AL-2			alarm 2
		AL-3			alarm 3
		AL-4			alarm 4
		AL-5			alarm 5
		AL-6			alarm 6
		Fun1			function 1
		Fun2			function 2
		Fun3			function 3
		Fun4			function 4
		Fun5			function 5
		Fun6			function 6
		Fun7			function 7
		Fun8			function 8
		Fun9			function 9
	F9.F1		8.1.3		set factor
	F9.F2				set factor
	F9.o1		8.1.4		set offset
	F9.o2				set offset
	F9.o3				set offset

17 Output Level

o1.in			9.1		analog output 1
		oFF	9.1.1		
		in-1	9.1.2		analog input 1
		in-2			analog input 2
		in-3			analog input 3
		AL-1	9.1.3		alarm 1
		AL-2			alarm 2
		AL-3			alarm 3
		AL-4			alarm 4
		AL-5			alarm 5
		AL-6			alarm 6
		Fun1	9.1.4		function block 1
		Fun2			function block 2
		Fun3			function block 3
		Fun4			function block 4
		Fun5			function block 5
		Fun6			function block 6
		Fun7			function block 7
		Fun8			function block 8
		Fun9			function block 9
	o1.St		9.1.5		start value
	o1.En		9.1.6		end value
	o1.iS		9.1.7		start current
	o1.iE		9.1.8		end current

o2.in			9.1		analog output 2
		oFF	9.1.1		
		in-1	9.1.2		analog input 1
		in-2			analog input 2
		in-3			analog input 3
		AL-1	9.1.3		alarm 1
		AL-2			alarm 2
		AL-3			alarm 3
		AL-4			alarm 4
		AL-5			alarm 5
		AL-6			alarm 6
		Fun1	9.1.4		function block 1
		Fun2			function block 2
		Fun3			function block 3
		Fun4			function block 4
		Fun5			function block 5
		Fun6			function block 6
		Fun7			function block 7
		Fun8			function block 8
		Fun9			function block 9
	o2.St		9.1.5		start value
	o2.En		9.1.6		end value
	o2.iS		9.1.7		start current
	o2.iE		9.1.8		end current

18 Structure Level

AL-1			10.1		alarm 1
	PArA				
	uSEr				
AL-2					alarm 2
	PArA				
	uSEr				
AL-3					alarm 3
	PArA				
	uSEr				
AL-4					alarm 4
	PArA				
	uSEr				
AL-5					alarm 5
	PArA				
	uSEr				
AL-6					alarm 6
	PArA				
	uSEr				
dSEt					direct set
	on				
	oFF				
Prot			10.2		protocol
	rtu		10.2.1		
	ASCi		10.2.2		
Adr			10.3		address
bAUd			10.4		baud
Cod1			10.5.1		Code 1
Cod2			10.5.2		Code 2
Cod3			10.5.3		Code 3
Cod4			10.5.4		Code 4
Cod5			10.5.5		Code 5
Cod6			10.5.6		Code 6

19 Calibration Level

EIn 1 0%	3.1		analog input 1 0%
EIn 1 100%	3.1		analog input 1 100%
EIn 2 0%	3.1		analog input 2 0%
EIn 2 100%	3.1		analog input 2 100%
EIn 3 0%	3.1		analog input 3 0%
EIn 3 100%	3.1		analog input 3 100%
AuS 1 0%	3.2		analog output 1 0%
AuS 1 100%	3.2		analog output 1 0%
AuS 2 0%	3.2		analog output 2 0%
AuS 2 100%	3.2		analog output 2 0%

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