

BALLUFF

Software-Description

BNI IOL-803-

Function Block S7-300/400/1200/1500



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1 INTRODUCTION

This function block is an example for the communication with a SmartLight Indicator and a Siemens 300/400/1200/1500 PLC. The example is free of charge. Please test carefully if the FB is suitable for your application!

This function block allows a communication between a Balluff SmartLight Indicator **BNI IOL-803** and a Simatic® S7-300/400/1200/1500 PLC.

The following operating modes are supported:

- Segment mode
- Level mode
- Runlight mode
- Color wheel mode

ATTENTION

Please test carefully whether the used commandos are supported by SmartLight Indicator.

ATTENTION

For the S7-300/400 in TIA Portal special function blocks from the library folder S7_300_400 have to be used. The cyclic In- and Outputs of the SmartLight Indicator have to start at the same address for S7-300/400.

1 INTRODUCTION

1.1 General Data

Function block name:	BNI_IOL_803_Indicator
Instance data block:	an own instance data block has to be setup for each SmartLight Indicator
Invoked blocks:	StrBitConvByte[FC8030], BitConvByte[FC8031] for S7 300/400 StrBitConvByte[FC803], BitConvByte[FC804]
PLC Datatypes:	ColorWheelMode, LevelMode, Mode, RunlightMode, SegmentMode
Reserved memory bits:	none
Reserved Timers:	none
Reserved Counters:	none
I/O length:	32 byte (16 Byte for S7 300/400)
Invoke:	absolute
Device compatibility:	Siemens Simatic® S7 300/400/1200/1500
Software version:	TIA Portal V13 SP1

1.2 Recommendations of FB invoke

The function block should be called only once for each SmartLight Indicator. Multiple calls of the function lock at the same time are not allowed.

If the function block is conditionally called and the calling condition is false before FB sets it Ready output, the **Init** input has to be set.

If the PLC restarts the **Init** input has to be set for one cycle. FB parameters could be attached dynamic if necessary.

ATTENTION

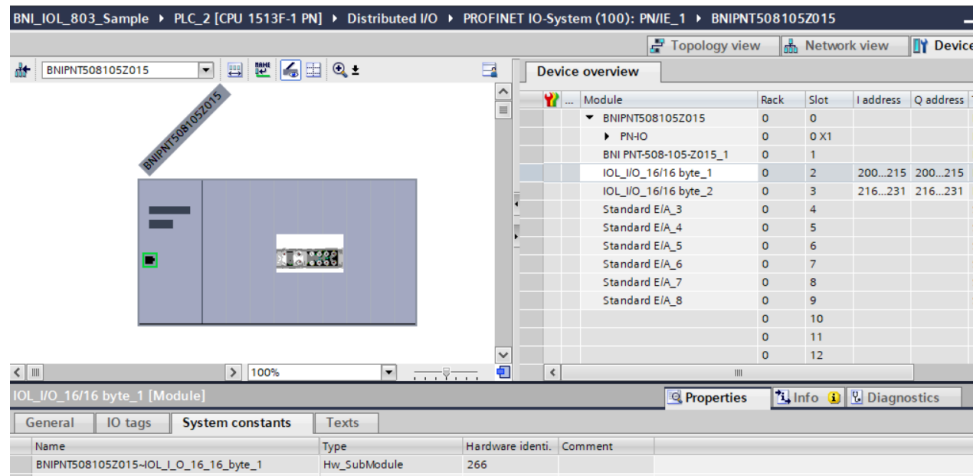
Please insert the functions StrBitConvByte[FC8030] and BitConvByte[FC8031] also in your project. The functions are called by the functionblock BNI_IOL_803_Indicator aufgerufen.

The PLC datatypes: ColorWheelMode, LevelMode, Mode, RunlightMode, Segment-Mode have also be available in the Projekt.

2 COMMISSIONING

2.1 Commissioning IOL Master

Commissioning of IO-Link process data-modules and Hardware identifier:



A minimum module size with 2 Byte input data and 16 Byte Output data have to be used. The connection between function block process data module is established by the hardware identifier.

2.2 Data types

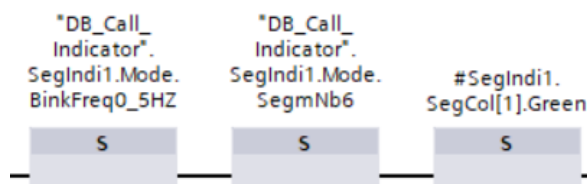
There is a PLC data type for each of the for four operation available

- Segment mode **SegmentMode**
- Level mode **LevelMode**
- Runlight mode **RunlightMode**
- Color Wheel mode **ColorWheelMode**

The PLC data types provide Boolean variables for colour- and mode configuration. To switch between the modes the datatype **Mode** is provided. All the datatypes have to be present in the TIA project.

PLC data types	19	FP_BN_Init	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Add new data type	20	SegIndi1	"SegmentMode"		Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
ColorWheelMode	21	Mode	Struct		Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
LevelMode	22	SegCol	Array[1..6] of Struct		Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Mode	23	LevIndi1	"LevelMode"		Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
RunlightMode	24	RunIndi1	"RunlightMode"		Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
SegmentMode	25	ColvIndi1	"ColorWheelMode"		Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Watch and force tables	26	ModeIndi1	"Mode"		Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Online backups	27	ModeIndi2	"Mode"		Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

For connecting the FB inputs in example static variables corresponding to each mode can be assigned in the calling function block. Unused node inputs do not need to be assigned. The individual elements of the structure can then be changed by a bit access in the program.



2 COMMISSIONING

2.2.1 SegmentMode

Name	Datentyp	Defaultwert	E
Mode	Struct		
SegmNb1	Bool	false	
SegmNb2	Bool	false	
SegmNb3	Bool	false	
SegmNb6	Bool	false	
BlinkSeg1	Bool	false	
BlinkSeg2	Bool	false	
BlinkSeg3	Bool	false	
BlinkSeg4	Bool	false	
BlinkSeg5	Bool	false	
BlinkSeg6	Bool	false	
BinkFreq0_5HZ	Bool	false	
BinkFreq1HZ	Bool	false	
BinkFreq2HZ	Bool	false	
BinkFreq5HZ	Bool	false	
BinkFreq10HZ	Bool	false	
SegCol	Array[1..6] of Struct		
SegCol[1]	Struct		
Green	Bool	false	
Red	Bool	false	
Yellow	Bool	false	
Blue	Bool	false	
Orange	Bool	false	
UserColour	Bool	false	
White	Bool	false	
Blinking	Bool	false	

Mode Setup:

SegmNb = Number of segments

BlinkSeg = Blink mode

BlinkFreq = Blink frequency

SegCol[1] - SegCol[6]

Segment colour 1 - 6

2.2.2 LevelMode

Name	Datentyp	Defaultwert	E
LevelValue	Int	0	
LevelColour	Array[1..3] of Struct		
LevelColour[1]	Struct		
Green	Bool	false	
Red	Bool	false	
Yellow	Bool	false	
Blue	Bool	false	
Orange	Bool	false	
UserColour	Bool	false	
White	Bool	false	
Blinking	Bool	false	
LevelColour[2]	Struct		
LevelColour[3]	Struct		
Mode	Struct		

LevelValue = Level value

LevelColour[1]-[3] = Colour of the levels 1-3

LevelCntClockwise = Level dircetion clocwiese or counter-clockwiese.

LevelFade = 0 not active, 1 Fade active

Function Block description for SmartLight Indicator

2 COMMISSIONING

2.2.3 RunlightMode

RunlightMode				
Name	Datentyp	Defaultwert	E	
▼ BackgroundColor	Struct			
Green	Bool	false		
Red	Bool	false		
Yellow	Bool	false		
Blue	Bool	false		
Orange	Bool	false		
UserColour	Bool	false		
White	Bool	false		
Blinking	Bool	false		
▶ RunningColor	Struct			
▼ Mode	Struct			
SegmNb1	Bool	false		
SegmNb2	Bool	false		
SegmNb3	Bool	false		
SegmNb4	Bool	false		
SegmNb5	Bool	false		
SegmNb6	Bool	false		
RunCntClockwise	Bool	false		
LoadingMode	Bool	false		
Speed0_5HZ	Bool	false		
Speed1HZ	Bool	false		
Speed2HZ	Bool	false		
Speed5HZ	Bool	false		
Speed10HZ	Bool	false		
Fade1Edge	Bool	false		
Fade2Edge	Bool	false		

BackgroundColor = Background color of the segments

RunningColor = color of the segments

SegmNb = Number of running Segments

RunCntClockwise = Running direction clockwise or counter clockwise

LoadingMode = Running mode or loading mode

Speed = Running speed

Fade = Edge Fade

2.2.4 ColorWheelMode

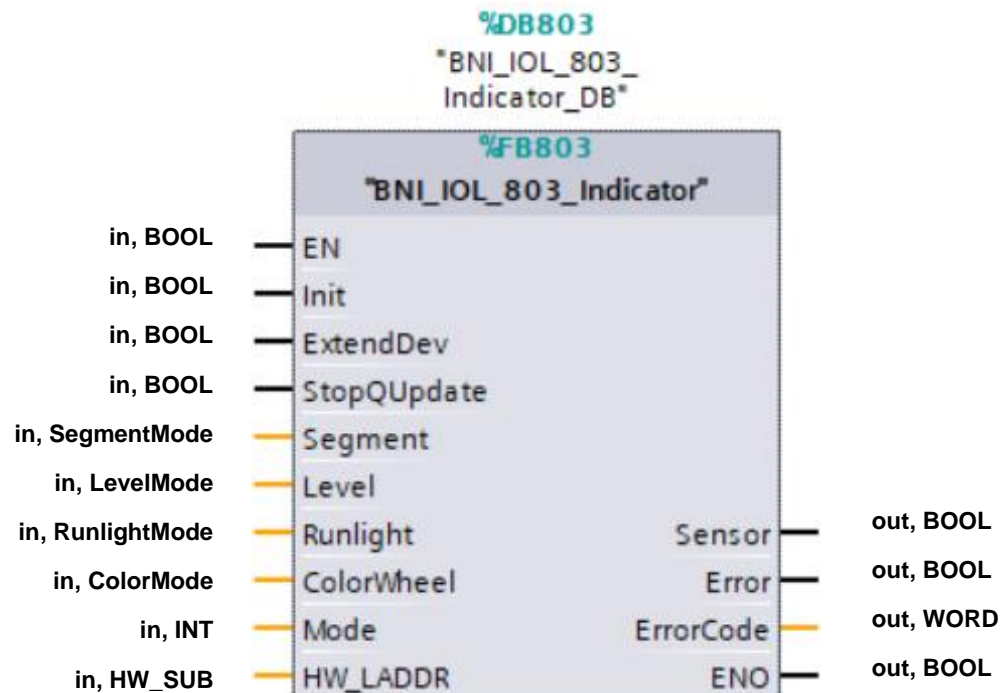
ColorWheelMode			
Name	Datentyp	Defaultwert	
▼ Mode	Struct		
CntClockwise	Bool	false	
Speed0_5HZ	Bool	false	
Speed1HZ	Bool	false	
Speed2HZ	Bool	false	
Speed5HZ	Bool	false	
Speed10HZ	Bool	false	

CntClockwise = Running direction clockwise or counter clockwise

Speed = Running speed selection

3 FB PARAMETERBESCHREIBUNG

3.1 FB illustration S7-1200/1500



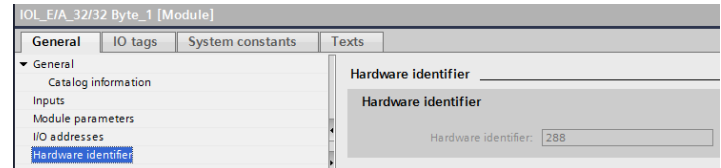
3.2 Input parameter

Init	Function block initialization. Must be set for one cycle each time the PLC is restarted. Static variables, control bits and upcoming commands are reset.
ExtendDev	Optional input to access the second SmartLight Indicator in extended mode.
StopQUpdate	Optional input for deactivation of the cyclic output data update
Segment	Optional data type input for the segment mode.
Level	Optional data type input for the level mode.
Runlight	Optional data type input for the runlight mode.
ColorWheel	Optional data type input for the color wheel mode.

3 FB PARAMETERBESCHREIBUNG

HW_LADDR

Hardware identifier of IO-Link master module which the converter is connected to. The I/O area is determined by the hardware identifier. The hardware identifier is displayed in the properties of the IO-Link Master I/O module. For S7 300/400 the start address of cyclic process image from the IO-link Master Port have to be used.



(Figure TIA-Portal: Devices & networks, properties of IO-Link Master I/O module)

3.3 Output parameter

Sensor

Optional sensor output.

Error

Error active
This output is set on true if an error has occurred.

ErrorCode

If the **Error** active is set, the error number will be displayed here as hex value.

3.4 General error codes

Error	Meaning	Effect	Remedy
00 _{hex}	No error		
01 _{hex}	Wrong mode selected	The segments are off	Check programming, start read command after DA is true.
02 _{hex}	Wrong number of segments selected	The segments are off	Check programming and content of bitheaders, assign 2.nd bitheader
03 _{hex}	Wrong frequency selected	The segments are off	Check programming, use valid command.
04 _{hex}	Wrong speed selected	The segments are off	Check programming, use valid data length
05 _{hex}	Wrong trailing edge	Wrong display	Check programming

3 FB PARAMETERBESCHREIBUNG

3.5 FB internal error codes

Error	Meaning	Effect	Remedy
50 _{hex}	No connection to IO-Link Master module	FB go to base state	Check hardware configuration and Profinet - connection. Initialize FB again
51 _{hex}	Data could not be read from IO-Link Master module	FB go to base state	Check hardware configuration and Profinet - connection. Initialize FB again
52 _{hex}	Data could not be write to IO-Link Master module	FB go to base state	Check hardware configuration and Profinet - connection. Initialize FB again
53 _{hex}	FB Internal Error	FB go to base state	Check hardware configuration and Profinet - connection. Initialize FB again

This error list is corresponding to the status codes in user's manual.

4 DIACLAIMER OF LIABILITY

This demo function block is free of charge and is a universal application example. This demo function block shall help program and configure PLC applications and shall provide possible solutions.

The user is not entitled to claim for warranty, error correction and updates. In particular there is excluded any claims against Balluff GmbH for damages that might result from the use of this demo program. Excluded from this limitation of liability shall be (a) those damages that are based on injury to life, limb or health, (b) a liability according to the Produkthaftungs-gesetz (German Product Liability Law) and (c) cases of willful intent.

Please check if the function block is intended for your application before adapting it in plants and machineries.

By using the S7 sample, made available free of charge you accept the limitation of warranty and liability!

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