AG24 PROFINET®

Siemens S7-1500® Interface Module for TIA Portal® V14 SP1 in SCL

Software Description

V1.0

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1 General Information

1.1 Trademarks

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1.3 Limitations

The library and its function were tested with a Siemens S7-1500 1511-1PN. The module was programmed using Siemens TIA Portal® V14 SP1.
There is also a library available for Siemens S7-1200 systems.
The method described in this document is the same for S7-1200 systems.

1.4 Requirements

- Basic knowledge of handling and programming Siemens systems.
- Familiarity with PROFINET®.

1.5 List of Abbreviations

Abbreviation	Definition
FB	Function block
CW	Controlword
EPN	PROFINET®
PLC	Programmable logic controller
SW	Statusword

1.6 Versions Overview

This manual is related to the following library.

- AG24_1200_TIA_V14_SP1_Upd5_1.00.zal14
- AG24_1500_TIA_V14_SP1_Upd5_1.00.zal14

1.7 Video-Tutorial

On our homepage in the area "Video and Tutorial" or on our YouTube channel, we have film instructions ready in which we demonstrate the use and functionality of the libraries.

SIKO - Adding AG24 PROFINET® to TIA Portal V14:

Environment	Link
SIKO Homepage	https://www.siko-global.com/video/34771/hinzufuegen-von-ag24-profinet-zum-tia-portal-v14-beschleunigte-und-vereinfachte-integration-mit-fb-en.mp4
SIKO YouTube Channel	https://www.youtube.com/watch?v=P8hl2xbD-U8

SIKO - Modify Module Parameters in TIA Portal V14:

Environment	Link
SIKO Homepage	https://www.siko-global.com/video/34772/andern-von-baugruppen-parameter-in-tia-portal-v14-vereinfachter-parameterzugriff-bei-ag24-profinet-en.mp4
SIKO YouTube Channel	https://www.youtube.com/watch?v=n6xPbyLwHFM

1.8 Document History

Version	Date	Description
1.0	31.01.2022	Document created

2 Description of AG24_COM Function Block

2.1 General

This function block is used to establish communication between one of the above-mentioned PLCs from Siemens and the SIKO AG24 PROFINET® device via cyclic data exchange (IO Data CR). It extracts the input data from the device in each PLC cycle and makes it available at its outputs. The inputs of the function block are combined and transferred to the device as output data in each PLC cycle.

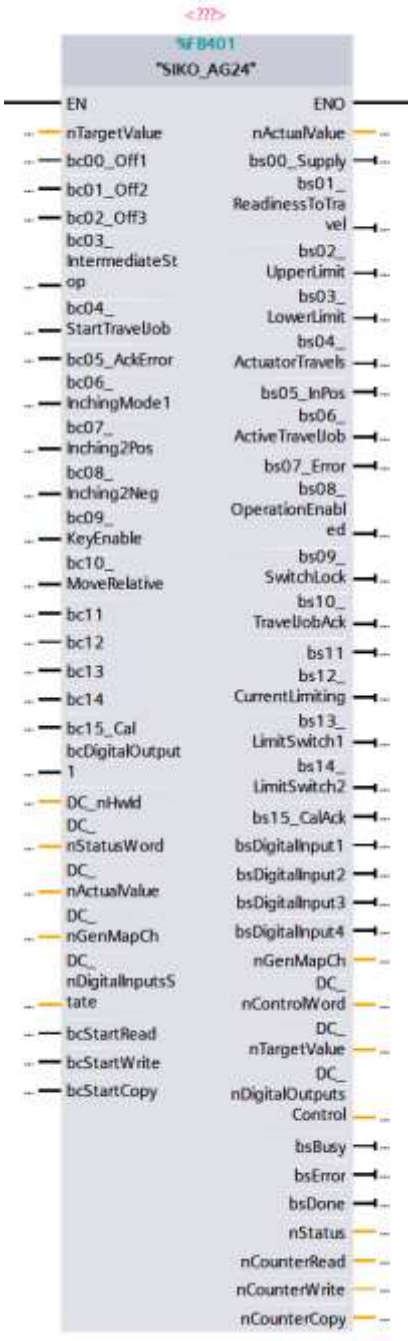

Fig. 1: FB SIKO_AG24

The function block is supporting the naming of the control and status word bits of the SIKO AG24 PROFINET® device in positioning mode.

Further this function block is used to read and write parameters from and to the SIKO AG24 PROFINET® device via acyclic data exchange (Record Data CR). A read or write command takes several PLC cycles. The function block can read all or write parameter differences acyclic. For this purpose, an instance must be passed to the function block.

Parameters that can be changed (read/write) exist in programming as actual value (_r) and as target value (_w) as well. Furthermore, it is differentiated between pure read parameters (only indicated as actual value) and pure write parameters (only indicated as target value). A rising edge must be applied either to the ”bcStartRead” or to the ”bcStartWrite” input on the module described here in order to enable a read or write process of one of the variables. For a clear assignment, all parameter instances have a prefix followed by the PNU in hexadecimal number format (pXXXX_...).

If a rising edge is applied to the ”bcStartRead” input, then all parameters will be read and can be used for further programming. If “nCounterRead” value is not reset to "0" the read cycle was interrupted by read failure. This indicates to a communication failure.

If a rising edge is applied to the “bcStartWrite” input of the module, then all target value parameters which differ from corresponding actual value parameters will be transferred to the module. If “nCounterWrite” value is not reset to "0" the write cycle was interrupted by a write failure. This indicates to a communication failure or parameter value is beyond range of value acceptance.

If a rising edge is applied to the “bcStartCopy” input of the module, then all actual values (_r) are copied to their corresponding target values (_w).

2.2 Input Parameter

Name	Type	Description
nTargetValue	DINT	Target Value
bc00_Off1	BOOL	Controlword Bit 0
bc01_Off2	BOOL	Controlword Bit 1
bc02_Off3	BOOL	Controlword Bit 2
bc03_IntermediateStop	BOOL	Controlword Bit 3
bc04_StartTravelJob	BOOL	Controlword Bit 4
bc05_AckError	BOOL	Controlword Bit 5
bc06_InchingMode1	BOOL	Controlword Bit 6
bc07_Inching2Pos	BOOL	Controlword Bit 7
bc08_Inching2Neg	BOOL	Controlword Bit 8
bc09_KeyEnable	BOOL	Controlword Bit 9
bc10_MoveRelative	BOOL	Controlword Bit 10
bc11	BOOL	Controlword Bit 11
bc12	BOOL	Controlword Bit 12
bc13	BOOL	Controlword Bit 13
bc14	BOOL	Controlword Bit 14
bc15_Cal	BOOL	Controlword Bit 15
bcDigitalOutput1	BOOL	Control of the Digital Output 1 (by default)
DC_nHwId	HW_IO	Hardware identifier
DC_nStatusWord	WORD	Reference to the Statusword
DC_nActualValue	DWORD	Reference to the Actual value
DC_nGenMapCh	DWORD	Reference to the Generic Mapping Channel
DC_nDigitalInputsState	WORD	Reference to the Digital Input State
bcStartRead	BOOL	FB control - Rising edge executes command, if nCounterWrite = “0” AND nCounterCopy = “0”
bcStartWrite	BOOL	FB control - Rising edge executes command, if nCounterRead = “0” AND nCounterCopy = “0”
bcStartCopy	BOOL	FB control - Rising edge executes command, if nCounterRead = “0” AND nCounterWrite = “0”

2.3 Output Parameter

Name	Type	Description
nActualValue	DINT	Actual value
bs00_Supply	BOOL	Statusword Bit 0
bs01_ReadinessToTravel	BOOL	Statusword Bit 1
bs02_UpperLimit	BOOL	Statusword Bit 2
bs03_LowerLimit	BOOL	Statusword Bit 3
bs04_ActuatorTravels	BOOL	Statusword Bit 4
bs05_InPos	BOOL	Statusword Bit 5
bs06_ActiveTravelJob	BOOL	Statusword Bit 6
bs07_Error	BOOL	Statusword Bit 7
bs08_OperationEnabled	BOOL	Statusword Bit 8
bs09_SwitchLock	BOOL	Statusword Bit 9
bs10_TravelJobAck	BOOL	Statusword Bit 10
bs11	BOOL	Statusword Bit 11
bs12_CurrentLimiting	BOOL	Statusword Bit 12
bs13_LimitSwitch1	BOOL	Statusword Bit 13
bs14_LimitSwitch2	BOOL	Statusword Bit 14
bs15_CalAck	BOOL	Statusword Bit 15
bsDigitalInput1	BOOL	Status of the Digital Input 1 (by default)
bsDigitalInput2	BOOL	Status of the Digital Input 2 (by default)
bsDigitalInput3	BOOL	Status of the Digital Input 3 (by default)
bsDigitalInput4	BOOL	Status of the Digital Input 4 (by default)
nGenMapCh	DINT	Generic Mapping Channel
DC_nControlWord	WORD	Reference to the Controlword
DC_nTargetValue	DWORD	Reference to the Target Value
DC_nDigitalOutputsControl	WORD	Reference to the Digital Outputs
bsBusy	BOOL	FB status - busy
bsError	BOOL	FB status – error
bsDone	BOOL	FB status – done
nStatus	DWORD	Record Data CR error code
nCounterRead	UInt	Process step of the read cycle
nCounterWrite	UInt	Process step of the write cycle
nCounterCopy	UInt	Process step of the copy cycle

2.4 Counter Value

If “nCounterRead” value is not "0" a read cycle is in process. If “nCounterWrite” value is not "0" a write cycle is in process. The respective processed step or parameter can be assigned according to the following table.

Read	Write	Prefix	Description	Type
1	1	p0221_	Service Interface Baud Rate	USINT
2	2	p0222_	Generic Mapping Parameter	USINT
3	3	p0241_	Peak Current Limit	INT
4	4	p0242_	Peak Current Time	INT
5	5	p0243_	Continuous Current	INT
6	6	p0301_	Digital Output 1 Functionality	USINT
7		p0302_	Digital Output Functionalities State	UDINT
8	7	p0303_	Digital Outputs Polarity	USINT
9	8	p0401_	Digital Input 1 Functionality	USINT
10	9	P0402_	Digital Input 2 Functionality	USINT
11	10	p0403_	Digital Input 3 Functionality	USINT
12	11	p0404_	Digital Input 4 Functionality	USINT
13		p0405_	Digital Input Functionalities State	UDINT
14	12	p0406_	Digital Inputs Polarity	USINT
15	13	p0601_	Controller Parameter P	INT
16	14	p0602_	Controller Parameter I	INT
17	15	p0603_	Controller Parameter D	INT
18	16	p0604_	A-Pos	INT
19	17	p0605_	V-Pos	INT
20	18	p0606_	D-Pos	INT
21	19	p0607_	A-Rot	INT
22	20	p0608_	A-Inch	INT
23	21	p0609_	V-Inch	INT
24	22	p060A_	Pos Window	INT
25	23	p060B_	Gear Ratio Numerator	INT
26	24	p060C_	Gear Ratio Denominator	INT
27	25	p060D_	Spindle Pitch	DINT
28	26	p060E_	Calibration Value	DINT
29	27	p060F_	Software Limit 1	DINT
30	28	p0610_	Software Limit 2	DINT
31	29	p0611_	Delta Inch	DINT
32	30	p0612_	Sense of Rotation	USINT
33	31	p0613_	Pos Type	USINT
34	32	p0614_	Operating Mode	USINT
35	33	p0615_	Inching 2 Stop Mode	USINT
36	34	p0616_	Inpos Mode	USINT
37	35	p0617_	Loop Length	INT

Read	Write	Prefix	Description	Type
38	36	p0618_	Contouring Error Limit	INT
39	37	p061A_	Inching 2 Offset	USINT
40	38	p061B_	Inching 2 Acceleration Type	USINT
41	39	p061C_	Offset Value	DINT
42	40	p0701_	Display Divisor	USINT
43	41	p0702_	Display Divisor Application	USINT
44	42	p0703_	Display Orientation	USINT
45	43	p0704_	Decimal Places	USINT
46	44	p0705_	Direction Indication Function	USINT
47	45	p0706_	Displayed Value 2nd Line	USINT
48	46	p0707_	Key Enable Time	USINT
49	47	p0708_	Key Function Enable	USINT
50	48	p0709_	PIN change	DINT
51	49	p0801_	Travel Against Load Trigger	INT
52	50	p0802_	Travel Against Load Direction	USINT
53	51	p0922_	PCM Position 1	DINT
54	52	p0923_	PCM Position 2	DINT
55	53	p0924_	PCM Position 3	DINT
56	54	p0925_	PCM Position 4	DINT
57	55	p0926_	PCM Position 5	DINT
58	56	p0927_	PCM Position 6	DINT
59	57	p0928_	PCM Position 7	DINT
60	58	p0942_	PCM Acceleration 1	INT
61	59	p0943_	PCM Acceleration 2	INT
62	60	p0944_	PCM Acceleration 3	INT
63	61	p0945_	PCM Acceleration 4	INT
64	62	p0946_	PCM Acceleration 5	INT
65	63	p0947_	PCM Acceleration 6	INT
66	64	p0948_	PCM Acceleration 7	INT
67	65	p0962_	PCM Velocitiy 1	INT
68	66	p0963_	PCM Velocitiy 2	INT
69	67	p0964_	PCM Velocitiy 3	INT
70	68	p0965_	PCM Velocitiy 4	INT
71	69	p0966_	PCM Velocitiy 5	INT
72	70	p0967_	PCM Velocitiy 6	INT
73	71	p0968_	PCM Velocitiy 7	INT
74	72	p0982_	PCM Deceleration 1	INT
75	73	p0983_	PCM Deceleration 2	INT
76	74	p0984_	PCM Deceleration 3	INT
77	75	p0985_	PCM Deceleration 4	INT
78	76	p0986_	PCM Deceleration 5	INT
79	77	p0987_	PCM Deceleration 6	INT

Read	Write	Prefix	Description	Type
80	78	p0988_	PCM Deceleration 7	INT
81		p0A01_	Output Stage Temperature	INT
82		p0A02_	Voltage of Control	INT
83		p0A03_	Voltage of Output Stage	INT
84		p0A05_	Motor Current	INT
85		p0A06_	Actual Position	DINT
86		p0A07_	Actual Rotational Speed	INT
87		p0A08_	Serial Number	DINT
88		p0A09_	Production Date	DINT
89		p0A0A_	SW Motor Controller	DINT
90		p0A0B_	Gear Reduction	INT
91		p0A0C_	System Status Word	UINT
92		p0A0D_	Encoder Resolution	INT
93		p0A0E_	Device ID	USINT
94		p0A0F_	Virtual Motor Temperature	INT
95		p0A10_	Output Stage Overload	USINT
96		p0A11_	Actual Contouring Error	DINT
97		p0B01_	Number of Errors	USINT
98		p0B02_	Error Number 1	USINT
99		p0B03_	Error Number 2	USINT
100		p0B04_	Error Number 3	USINT
101		p0B05_	Error Number 4	USINT
102		p0B06_	Error Number 5	USINT
103		p0B07_	Error Number 6	USINT
104		p0B08_	Error Number 7	USINT
105		p0B09_	Error Number 8	USINT
106		p0B0A_	Error Number 9	USINT
107		p0B0B_	Error Number 10	USINT
108	79	p0B21_	Configuration	UINT
109	80	p0C01_	S-Command	USINT

2.5 System Function Block Error Codes

The status of the used SFB 52 (RDREC) or SFB 53 (WRREC) is passed on to the "nStatus" output parameter. The description of the status can, in this case, be found in the online help of the respective SFBs.

2.6 Limitations

All parameters are treated as signed integers by the function block during input and output. In the Devices, however, there are also parameters in unsigned representation. As long as

these parameters do not exceed the positive value range of a signed integer, the value in the variable is displayed correctly.

These value ranges are:

Type	Range MIN	Range MAX
int8_t	-128	127
int16_t	-32768	32767
int32_t	–2147483648	2147483647

The reading and writing of parameters of the data type Record is not supported.

3 Description of AG24 PLC Tag Table

3.1 General

The library contains operating mode independent plc tag table that can be used to reference the input data and output data. By using PLC data types symbolic access to inputs and outputs is possible.

The library contains following tag table:

Name	Description
SIKO_AG24_Tags_1	Process data input and output

3.2 SIKO_AG24_Tags

Name	Type	Description
Drive1TargetValue	DWORD	Tag Q address Target Value
Drive1ControlWord	WORD	Tag Q address Control Word
Drive1DigitalOutputsControl	WORD	Tag Q address Digital Output
Drive1ActualValue	DWORD	Tag I address Actual Value
Drive1GenericMappingChannel	DWORD	Tag I address Generic Mapping Channel
Drive1StatusWord	WORD	Tag I address Status Word
Drive1DigitalInputsState	WORD	Tag I address Digital Inputs

Compare the address settings with module I address and Q address in the device overview and adjust them in the tag table “SIKO_AG24_Tags_1” if necessary.

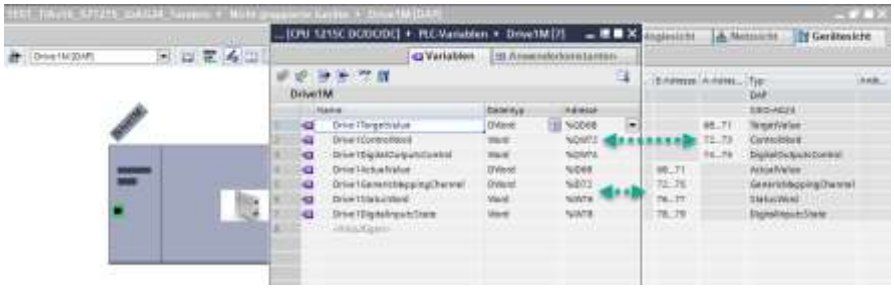

Fig. 2: I- / Q-addresses comparison with those of the tag table

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