

# AP20(S) PROFINET®

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

Software Description



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## **1 General Information**

### **1.1 Trademarks**

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### **1.2 Liability**

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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.

- AP20\_AP20S\_1200\_TIA\_V14\_SP1\_Upd7\_1.01.zal14
- AP20\_AP20S\_1500\_TIA\_V14\_SP1\_Upd5\_1.01.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 SIKO AP20(S) PROFINET® to TIA Portal V14:

Environment	Link
SIKO Homepage	<a href="https://www.siko-global.com/video/35857/adding-siko-ap20s-profinet-to-tia-portal-v14-accelerated-and-simplified-integration-with-fb.mp4">https://www.siko-global.com/video/35857/adding-siko-ap20s-profinet-to-tia-portal-v14-accelerated-and-simplified-integration-with-fb.mp4</a>
SIKO YouTube Channel	<a href="https://www.youtube.com/watch?v=7l0JVGN6BMU">https://www.youtube.com/watch?v=7l0JVGN6BMU</a>

## 1.8 Document History

Version	Date	Description
1.0	19.10.2021	Document created
1.01	24.11.2021	Minor text correction

## 2 Description of AP20\_AP20S\_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 AP20(S) 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. The naming of the inputs and outputs is independent of the operating mode.

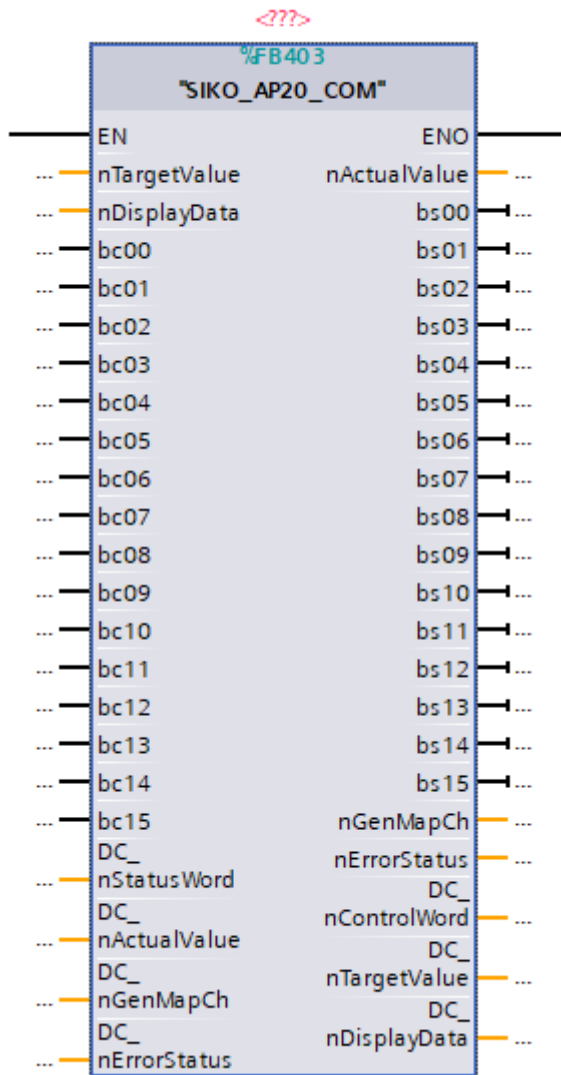


Fig. 1: FB SIKO\_AP20\_COM

## 2.2 Input Parameter

Name	Type	Description
bc00	BOOL	Controlword Bit 0
bc01	BOOL	Controlword Bit 1
bc02	BOOL	Controlword Bit 2
bc03	BOOL	Controlword Bit 3
bc04	BOOL	Controlword Bit 4
bc05	BOOL	Controlword Bit 5
bc06	BOOL	Controlword Bit 6
bc07	BOOL	Controlword Bit 7
bc08	BOOL	Controlword Bit 8
bc09	BOOL	Controlword Bit 9
bc10	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	BOOL	Controlword Bit 15
nTargetValue	DINT	Target Value
nDisplayData	DINT	Text Value
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_nErrorStatus	INT	Reference to the Error Status

### 2.3 Output Parameter

Name	Type	Description
bs00	BOOL	Statusword Bit 0
bs01	BOOL	Statusword Bit 1
bs02	BOOL	Statusword Bit 2
bs03	BOOL	Statusword Bit 3
bs04	BOOL	Statusword Bit 4
bs05	BOOL	Statusword Bit 5
bs06	BOOL	Statusword Bit 6
bs07	BOOL	Statusword Bit 7
bs08	BOOL	Statusword Bit 8
bs09	BOOL	Statusword Bit 9
bs10	BOOL	Statusword Bit 10
bs11	BOOL	Statusword Bit 11
bs12	BOOL	Statusword Bit 12
bs13	BOOL	Statusword Bit 13
bs14	BOOL	Statusword Bit 14
bs15	BOOL	Statusword Bit 15
nActualValue	DINT	Actual value
nGenMapCh	DINT	Generic Mapping Channel
nErrorStatus	INT	Error status of FB
DC_nControlWord	WORD	Reference to the Controlword
DC_nTargetValue	DWORD	Reference to the Target Value
DC_nDisplayData	DWORD	Reference to the Text Value

### 3 Description of AP20\_AP20S\_CSW\_POS Function Block

#### 3.1 General

This function block is used to control and receive status information of the SIKO AP20(S) PROFINET® device in positioning mode. It extends the functionality of the SIKO\_AP20\_COM function block by supporting the naming of the control and status word bits according to the positioning mode. It requires an existing instance of the SIKO\_AP20\_COM, created as data block.

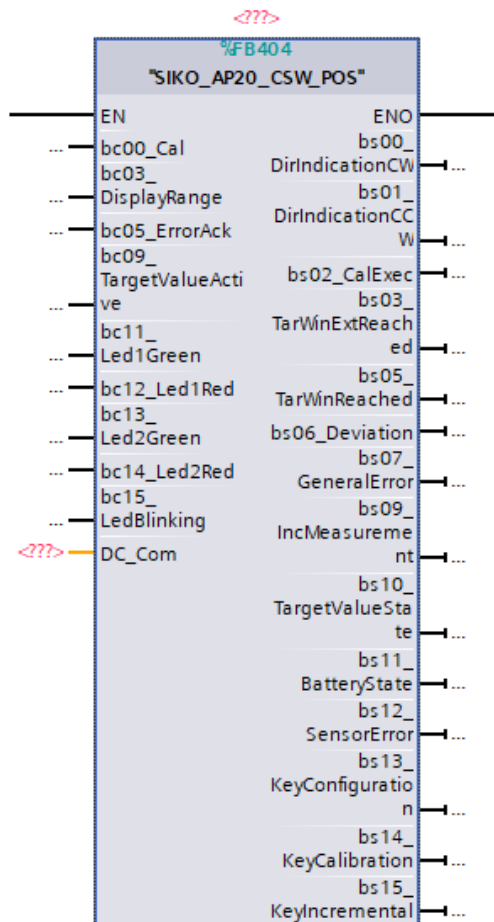


Fig. 2: FB SIKO\_AP20\_CSW\_POS

### 3.2 Input Parameter

Name	Type	Description
bc00_Cal	BOOL	Calibration execute
Bc01_Reserved	BOOL	Reserved
bc02_Reserved	BOOL	Reserved
bc03_DisplayRange	BOOL	Display range
bc04_Reserved	BOOL	Reserved
bc05_ErrorAck	BOOL	Error acknowledge
bc06_Reserved	BOOL	Reserved
bc07_Reserved	BOOL	Reserved
bc08_Reserved	BOOL	Reserved
bc09_TargetValueActive	BOOL	Target value activation
bc10_Reserved	BOOL	Reserved
bc11_Led1Green	BOOL	LED1 green
bc12_Led1Red	BOOL	LED1 red
bc13_Led2Green	BOOL	LED2 green
bc14_Led2Red	BOOL	LED2 red
bc15_LedBlinking	BOOL	LED blinking

### 3.3 Output Parameter

Name	Type	Description
bs00_DirIndicationCW	BOOL	Direction indication CW
bs01_DirIndicationCCW	BOOL	Direction indication CCW
bs02_CalExec	BOOL	Calibration executed
bs03_TarWinExtReached	BOOL	Target window extended reached
bs04_Reserved	BOOL	Reserved
bs05_TarWinReached	BOOL	Target window reached
bs06_Deviation	BOOL	Deviation
bs07_GeneralError	BOOL	General error
bs08_Reserved	BOOL	Reserved
bs09_IncMeasurement	BOOL	Actual value = incremental measurement
bs10_TargetValueState	BOOL	Target value activation
bs11_BatteryState	BOOL	Battery state
bs12_SensorError	BOOL	Sensor error
bs13_KeyConfiguration	BOOL	Key Configuration
bs14_KeyCalibration	BOOL	Key Calibration
bs15_KeyIncremental	BOOL	Key Incremental

### 3.4 InOut Parameter

Name	Type	Description
DC_Com	SIKO_AP20_COM	Instance of SIKO_AP20_COM, created as data block

## 4 Description of AP20\_AP20S\_CSW\_TXT Function Block

### 4.1 General

This function block is used to control and receive status information of the SIKO AP20(S) PROFINET® device in alpha-numeric display mode. It extends the functionality of the SIKO\_AP20\_COM function block by supporting the naming of the control and status word bits according to the alpha-numeric display mode. It requires an existing instance of the SIKO\_AP20\_COM, created as data block.

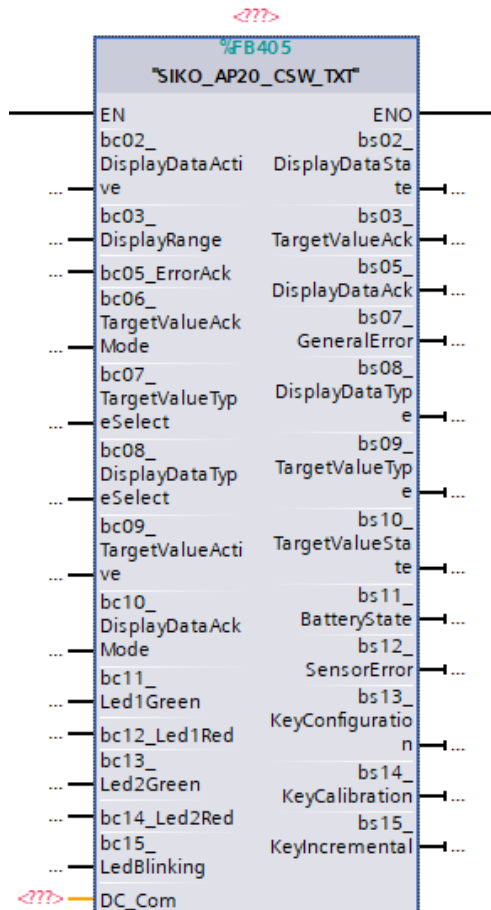


Fig. 3: FB SIKO\_AP20\_CSW\_TXT

## 4.2 Input Parameter

Name	Type	Description
bc00_Reserved	BOOL	Reserved
Bc01_Reserved	BOOL	Reserved
bc02_DisplayDataActive	BOOL	Display data activation (display line 1)
bc03_DisplayRange	BOOL	Display range
bc04_Reserved	BOOL	Reserved
bc05_ErrorAck	BOOL	Error acknowledge
bc06_TargetValueAckMode	BOOL	Target value acknowledgment mode (display line 2)
bc07_TargetValueTypeSelect	BOOL	Target value data type (display line 2)
bc08_DisplayDataTypeSelect	BOOL	Display data type (display line 1)
bc09_TargetValueActive	BOOL	Target value activation (display line 2)
bc10_DisplayDataAckMode	BOOL	Display data acknowledgment mode
bc11_Led1Green	BOOL	LED1 green
bc12_Led1Red	BOOL	LED1 red
bc13_Led2Green	BOOL	LED2 green
bc14_Led2Red	BOOL	LED2 red
bc15_LedBlinking	BOOL	LED blinking

## 4.3 Output Parameter

Name	Type	Description
bs00_Reserved	BOOL	Reserved
bs01_Reserved	BOOL	Reserved
bs02_DisplayDataState	BOOL	Display data activation (display line 1)
bs03_TargetValueAck	BOOL	Target value acknowledged (display line 2)
bs04_Reserved	BOOL	Reserved
bs05_DisplayDataAck	BOOL	Display data acknowledged (display line 1)
bs06_Reserved	BOOL	Reserved
bs07_GeneralError	BOOL	General error
bs08_DisplayDataType	BOOL	Display data format (display line 1)
bs09_TargetValueType	BOOL	Target value format (display line 2)
bs10_TargetValueState	BOOL	Target value activation (display line 2)
bs11_BatteryState	BOOL	Battery state
bs12_SensorError	BOOL	Sensor error
bs13_KeyConfiguration	BOOL	Key Configuration
bs14_KeyCalibration	BOOL	Key Calibration
bs15_KeyIncremental	BOOL	Key Incremental

#### 4.4 InOut Parameter

Name	Type	Description
DC_Com	SIKO_AP20_COM	Instance of SIKO_AP20_COM, created as data block

## 5 Description of AP20\_AP20S\_PRM Function Block

### 5.1 General

This function block is used to read and write parameters from and to the SIKO AP20(S) PROFINET® device via acyclic data exchange (Record Data CR). A read or write command takes several PLC cycles. The function block can read or write an individual parameter acyclically. For this purpose, an instance must be passed to the function block. The input value is transformed to a DINT (nReceiveValue) and the output value nWriteValue is converted from a DINT to the native format of the parameter.

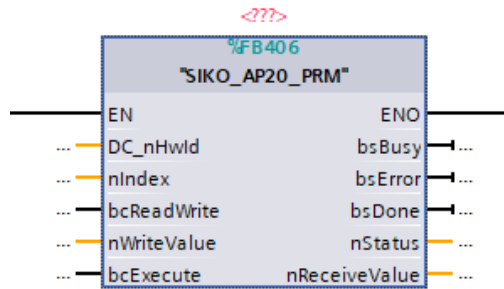


Fig. 4: FB SIKO\_AP20\_PRM

### 5.2 Input Parameter

Name	Type	Description
DC_nHwId	HW_IO	Hardware identifier
nIndex	DINT	PROFINET® instance "0" AND NOT bcExecute = Reset FB
bcReadWrite	BOOL	Command type 0 = read / 1 = write
nWriteValue	DINT	Value to write
bcExecute	BOOL	Rising edge executes command

### 5.3 Output Parameter

Name	Type	Description
bsBusy	BOOL	FB status - busy
bsError	BOOL	FB status – error
bsDone	BOOL	FB status – done
nReceiveValue	DINT	Value read
nStatus	DWORD	System function block error code

## 5.4 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.

## 5.5 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 nReadValue 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.

## 6 Description of AP20 PLC Tag Table

### 6.1 General

The library contains operating mode independent plc tag table that can be used Reference to 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_AP20	Process data input and output

### 6.2 SIKO\_AP20 Tags

Name	Type	Description
Indicator1ControlWord	UINT	Tag Q address ControlWord
Indicator1TargetValue	DINT	Tag Q address TargetValue
Indicator1DisplayData	DINT	Tag Q address DisplayData
Indicator1StatusWord	UINT	Tag I address StatusWord
Indicator1ActualValue	DINT	Tag I address ActualValue
Indicator1GenericMappingChannel	DINT	Tag I address GenericMappingChannel
Indicator1ErrorStatus	INT	Tag I address ErrorStatus

Compare the address settings with module I address and Q address in the device overview and adjust them in the tag table "SIKO\_AP20" if necessary.

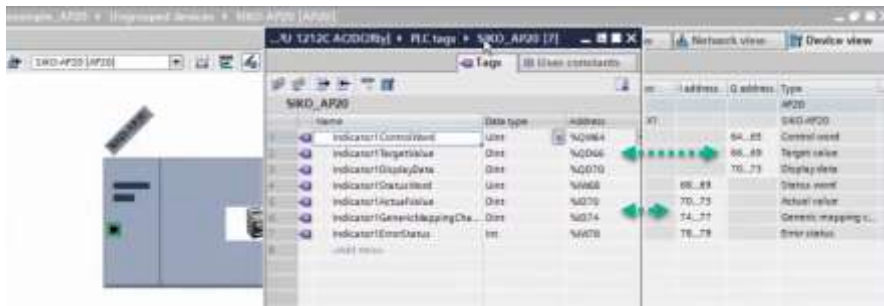


Fig. 5: I- / Q-addresses comparison with those of the tag table



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