
Software description

SIMATIC® Profibus-DP
Interface Modules

AG02

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1. General Remarks

This description explains the possibility to integrate one or more positioning drives AG02, AG03 or AG04B from SIKO into a SIMATIC S7® program without Profibus programming skills.

Therefore the enclosed S7 project and included function blocks will be used.

Depending on selected operating mode and the requirement to read and write parameter via Profibus interface the corresponding function block has to be used.

The function blocks are executable on all S7-CPU, which are able to handle system function 14 (SFC14) and 15 (SFC15) and comes with corresponding Profibus interface.

The function blocks have been tested with CPU 315-2DP.

The interface modules were engineered with *SIEMENS Simatic Manager*® V 5.3 + SP3.

1.1 Limits of this document

This document does not claim to describe any detail. Basic skills of handling and programming of S7 systems will be presumed. Please refer to hand book for detailed information of AG02, AG03 or AG04B.

1.2 Liability

For damages, which through failure in the software or through faulty use accrue, SIKO assume no liability.

1.3 Version Overview

The function block and its actual version can be used with actuators with the same or higher software release (firmware) with the limitation, that some functions or parameter of the higher actuator firmware can not be used or activated respectively.

Contrariwise the use of a higher version function block with a lower version actuator firmware is not possible (Failure by reading or writing parameter).

Firmware version	Description
V. 2.00	First- or Basis Version

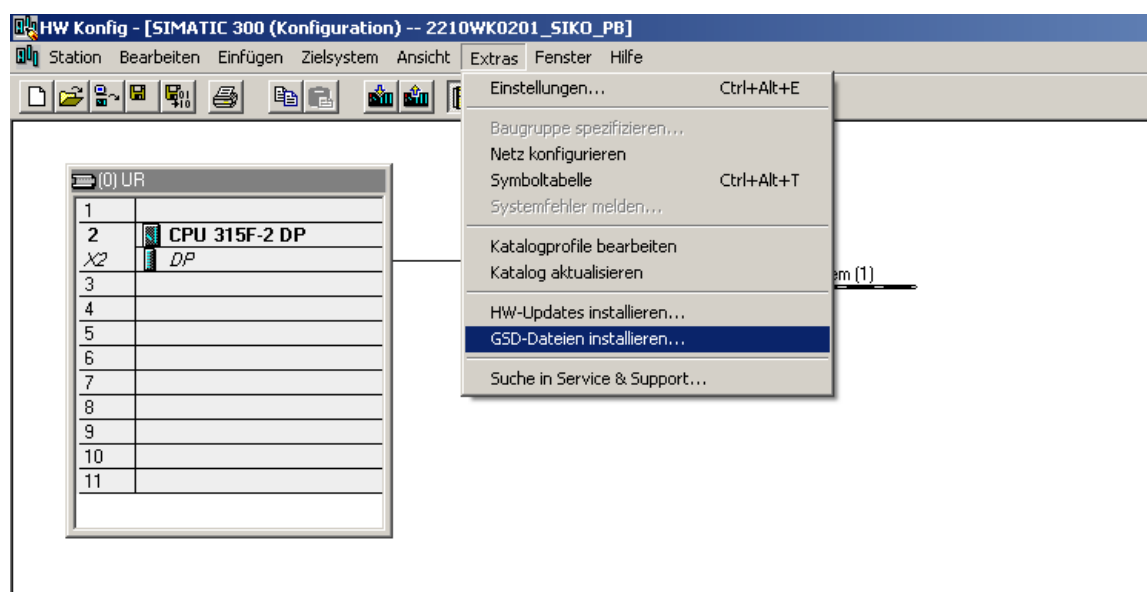
2. Abbreviation Dictionary

ZSW	Status word
STW	Control word
HSW	Target value
HIW	Actual value
PB	Profibus

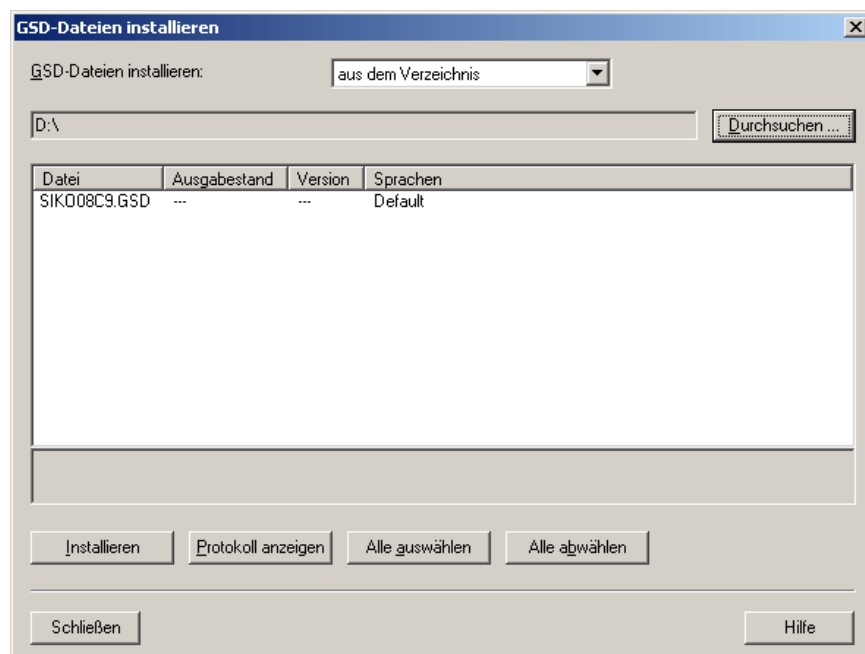
3. Hardware Configuration

3.1 Integrate GSD File

Start the "HW Config" and from the „Options” menu, select the command „Install new GSD”.



Select and open drive of AG02 folder with GSD file



Now the AG02 is available in the hardware catalogue under "Field devices".

3.2 Configuration Positioning Drives

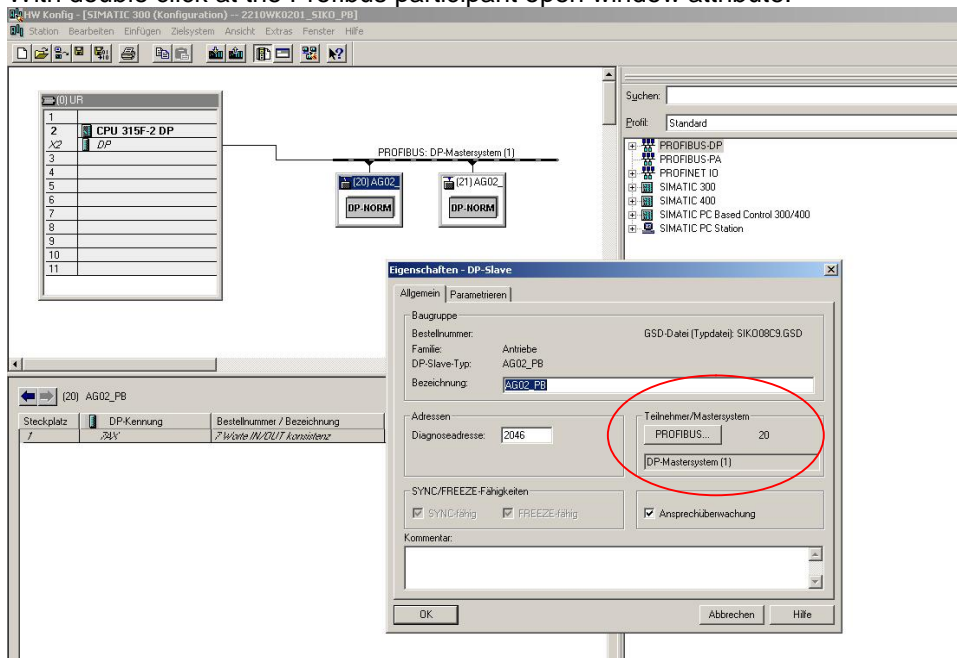
For this example two positioning drives (Profibus address 20 and 21) will be configured (Precondition: DP master has already been configured). Select AG02 PB from the hardware catalogue window and attach it to the (symbolised) Profibus line (by drag and drop).

The screenshot shows the SIMATIC HW Config interface. On the left, a rack (UR) is shown with slots 1 to 11. Slot 2 contains a CPU 315F-2 DP, and slot 3 contains a DP-MORM module. A Profibus DP-Mastersystem (1) is connected to the DP-MORM module. On the right, the hardware catalogue is displayed, showing various modules. The AG02_PB module is highlighted in the catalogue, and a red arrow points from it to the DP-MORM module in the system diagram.

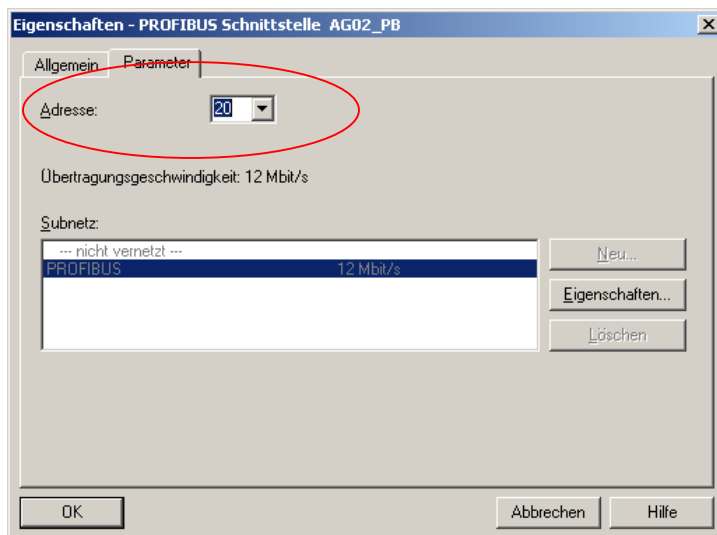
Steckplatz	DP-Kennung	Bestellnummer / Bezeichnung	E-Adresse	A-Adresse	Kommentar
1	24X	7 Werte IN/OUT Konsistenz	256...269	256...269	

3.2.1 Configuration Profibus Address

With double click at the Profibus participant open window attribute.



With the button "PROFIBUS" the dialog for address adjustment can be open and free address can be entered. The same address has to be entered into the AG02 (please refer to user manual).



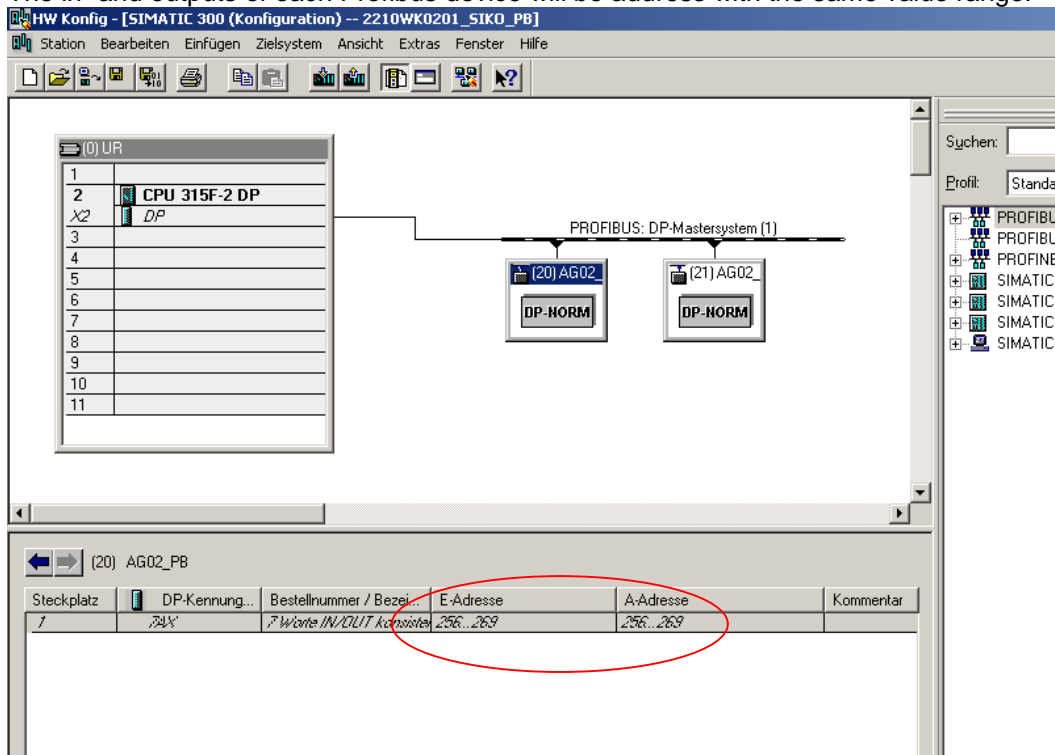
Please proceed analogue with the second positioning drive.

3.2.2 Configuration Peripheral Address

The peripheral address will be used within S7 program to identify the corresponding positioning drive. The address will be assigned automatically by S7. It can be modified manually, but in most cases it is not necessary.

Duplicates will be prevented automatically by Simatic Manager.

The in- and outputs of each Profibus device will be address with the same value range.



Steckplatz	DP-Kennung...	Bestellnummer / Bezeichnung	E-Adresse	A-Adresse	Kommentar
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					

The address will be displayed as decimal number within the hardware manager. For the later use in the program it has to be converted into hexadecimal format.

Drive/PB - Address	Address decimal	Address hexadecimal
20	256	100
21	270	10E

4. Software Configuration

4.1 General

The here described program blocks are function blocks with integrated data management. At the call of function block (FB) it is necessary to assign an instance data block (DB) or to enable the call within the function block as multi-instances.

The data (process/parameter values) can be monitored/modified within the assigned DB. The input interface (STW/HSW) and output interface (ZSW/HIW) can be interlaced by user depending on application. The different types of data have to be considered.

For each positioning drive a call has to be assigned.

Regarding the different functionality of control and status word please refer to the positioning drive user manual.

4.2 Selection of Program Block

Depending on the application the corresponding program block has to be selected.

The selection is depending on the required operating mode (positioning/velocity mode).

For program block selection please refer to the following matrix.

The number and symbolic name of FB can be modified by user according to requirements.

Program	Positioning Mode	Velocity Mode	Parameter read/write
SIKO_DRV_POS_PAR_AG02 (FB90)	X		X
SIKO_DRV_ROT_PAR_AG0x (FB91)		X	X

The following example describes the use of program based on the two drives configured in chapter 3.

Hardware Configuration. The adoption to further drives can be executed analogue.

The two described program blocks can be used common within one S7 program but assigned only to one drive.

4.3 Software Example

For this example drive 1 shall be configured for **positioning mode** (address 20) and drive 2 for **velocity mode** (address 21).

Thus for drive 1 is used FB90 (SIKO_DRV_POS_PAR_AG02) and for drive 2 FB91 (SIKO_DRV_ROT_PAR_AG0x).

In this example the FB's will be called directly out of the OB1 and each FB will be assigned a own data block (DB90/DB91). The data blocks are also multi-instances capable. Please refer to documentation of Simatic Manager.

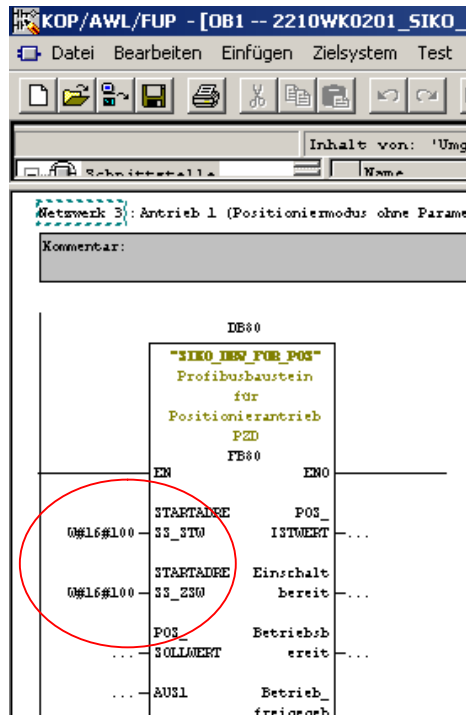
4.3.1 Structure of Call

OB1	FB90	DB90
	FB91	DB91

4.3.2 Call for Drive 1 in OB 1:

Support the input interface with hexadecimal address from chapter 3.2.2 Configuration Periphery Address.

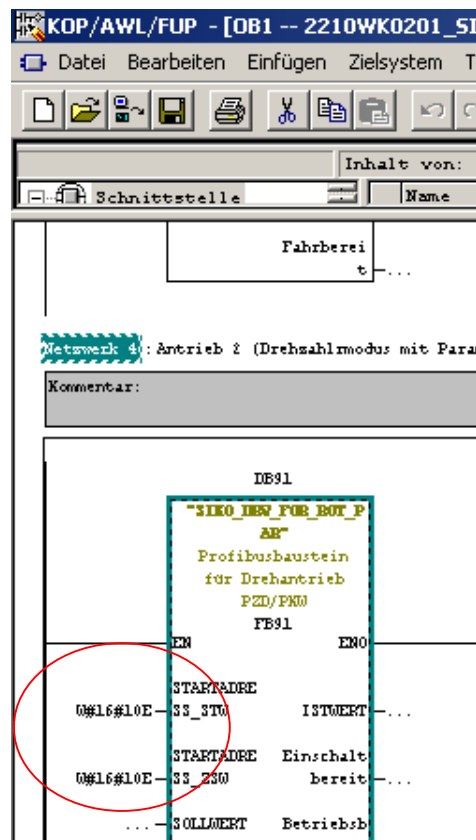
Format W#16#100 has to be considered.



4.3.3 Call for Drive 2 in OB 1:

Support the input interface with hexadecimal address from chapter 3.2.2 Configuration Periphery Address.

Format W#16#10E has to be considered.



Software description

SIMATIC® Profibus Interface Modules



After loading following program parts the drives can be operated by S7 program:

DB90
DB91
FB90
FB91
OB1

The in- and output interface of the program blocks will be explained in chapter 4.4 Drive Parameter Change Positioning Mode FB90 respectively 4.5 Drive Parameter Change Velocity Mode FB91.

4.3.4 Test and Diagnosis

The instance data block can be used for diagnosis and test of communication. Alternative to this it is possible to enter control word as well as status word in- and outputs into a variable table to monitor and control them from there. A template is included in the example project.

DB90 drive 1 in **positioning mode** (Address 20)
DB91 drive 2 in **velocity mode** (Address 21)

In the data blocks are beside the process data (STE/ZSW/HSW/HIW) additional the parameter data included. All parameter which can be modified (read/write) are available as actual value (_r) as well as target value (_w). Read parameter are only available as actual value.

DB-Param - [DB91 -- 2210WK0201_SIKO_PB/SIMATIC 300/CPU 315F-2 DP]						
Datenbaustein Bearbeiten Zielsystem Test Ansicht Fenster Hilfe						
Adresse	Deklaration	Name	Typ	Anfangswert	Actualwert	Kommentar
39	20.0 stat	Betriebsart_w	WORD	W#16#0	W#16#0	Adresse D930 dez/D3A2 hex DBBetriebsart Dr/w
40	22.0 stat	Stoerungsbuffer_r[1]	WORD	W#16#0	W#16#0	
41	24.0 stat	Stoerungsbuffer_r[2]	WORD	W#16#0	W#16#0	
42	26.0 stat	Stoerungsbuffer_r[3]	WORD	W#16#0	W#16#0	
43	28.0 stat	Stoerungsbuffer_r[4]	WORD	W#16#0	W#16#0	
44	30.0 stat	Stoerungsbuffer_r[5]	WORD	W#16#0	W#16#0	
45	32.0 stat	Stoerungsbuffer_r[6]	WORD	W#16#0	W#16#0	
46	34.0 stat	Stoerungsbuffer_r[7]	WORD	W#16#0	W#16#0	
47	36.0 stat	Stoerungsbuffer_r[8]	WORD	W#16#0	W#16#0	
48	38.0 stat	Stoerungsbuffer_r[9]	WORD	W#16#0	W#16#0	
49	40.0 stat	Stoerungsbuffer_r[10]	WORD	W#16#0	W#16#0	
50	42.0 stat	Anzahl_Stoerungen_r	WORD	W#16#0	W#16#0	Adresse D952 dez/D3B8 hex DBAnzahl_StoerungenDr
51	44.0 stat	Hardware_Version_r	WORD	W#16#0	W#16#0	Adresse D961 dez/D3C1 hex DBHardware_VersionDr
52	46.0 stat	Software_Version_r	WORD	W#16#0	W#16#0	Adresse D965 dez/D3C5 hex DBSoftware_VersionDr
53	48.0 stat	Parameter_Laden_w	WORD	W#16#0	W#16#0	Adresse D970 dez/D3CA hex DBParameter_LadenDr/w
54	50.0 stat	Reglerparameter_P_r	WORD	W#16#0	W#16#0	Adresse D1000 dez/D3E8 hex DBReglerparameter_PDr/w
55	52.0 stat	Reglerparameter_P_w	WORD	W#16#0	W#16#0	Adresse D1000 dez/D3E8 hex DBReglerparameter_PDr/w
56	54.0 stat	Reglerparameter_I_r	WORD	W#16#0	W#16#0	Adresse D1001 dez/D3E9 hex DBReglerparameter_IDr/w
57	56.0 stat	Reglerparameter_I_w	WORD	W#16#0	W#16#0	Adresse D1001 dez/D3E9 hex DBReglerparameter_IDr/w
58	58.0 stat	Reglerparameter_D_r	WORD	W#16#0	W#16#0	Adresse D1002 dez/D3EA hex DBReglerparameter_DDr/w
59	60.0 stat	Reglerparameter_D_w	WORD	W#16#0	W#16#0	Adresse D1002 dez/D3EA hex DBReglerparameter_DDr/w
60	62.0 stat	a_Pos_r	WORD	W#16#0	W#16#0	Adresse D1003 dez/D3EB hex DBa_PosDr/w
61	64.0 stat	a_Pos_w	WORD	W#16#0	W#16#0	Adresse D1003 dez/D3EB hex DBa_PosDr/w
62	66.0 stat	v_Pos_r	WORD	W#16#0	W#16#0	Adresse D1004 dez/D3EC hex DBv_PosDr/w
63	68.0 stat	v_Pos_w	WORD	W#16#0	W#16#0	Adresse D1004 dez/D3EC hex DBv_PosDr/w
64	70.0 stat	a_Dreh_r	WORD	W#16#0	W#16#0	Adresse D1005 dez/D3ED hex DBa_DrehDr/w
65	72.0 stat	a_Dreh_w	WORD	W#16#0	W#16#0	Adresse D1005 dez/D3ED hex DBa_DrehDr/w
66	74.0 stat	reserviert_1_r	WORD	W#16#0	W#16#0	Adresse D1006 dez/D3EE hex DBreserviert_1Dr
67	76.0 stat	reserviert_1_w	WORD	W#16#0	W#16#0	Adresse D1006 dez/D3EE hex DBreserviert_1Dr
68	78.0 stat	a_Tipp_r	WORD	W#16#0	W#16#0	Adresse D1007 dez/D3EF hex DBa_TippDr/w
69	80.0 stat	a_Tipp_w	WORD	W#16#0	W#16#0	Adresse D1007 dez/D3EF hex DBa_TippDr/w
70	82.0 stat	v_Tipp_r	WORD	W#16#0	W#16#0	Adresse D1008 dez/D3F0 hex DBv_TippDr/w
71	84.0 stat	v_Tipp_w	WORD	W#16#0	W#16#0	Adresse D1008 dez/D3F0 hex DBv_TippDr/w
72	86.0 stat	Pos_Fenster_r	WORD	W#16#0	W#16#0	Adresse D1009 dez/D3F1 hex DBPos_FensterDr/w
73	88.0 stat	Pos_Fenster_w	WORD	W#16#0	W#16#0	Adresse D1009 dez/D3F1 hex DBPos_FensterDr/w
74	90.0 stat	ue_Zaehler_r	WORD	W#16#0	W#16#0	Adresse D1010 dez/D3F2 hex DBue_ZaehlerDr/w
75	92.0 stat	ue_Zaehler_w	WORD	W#16#0	W#16#0	Adresse D1010 dez/D3F2 hex DBue_ZaehlerDr/w
76	94.0 stat	ue_Nenner_r	WORD	W#16#0	W#16#0	Adresse D1011 dez/D3F3 hex DBue_NennerDr/w
77	96.0 stat	ue_Nenner_w	WORD	W#16#0	W#16#0	Adresse D1011 dez/D3F3 hex DBue_NennerDr/w
78	98.0 stat	Spindelsteigung_r	WORD	W#16#0	W#16#0	Adresse D1012 dez/D3F4 hex DBSpindelsteigungDr/w
79	100.0 stat	Spindelsteigung_w	WORD	W#16#0	W#16#0	Adresse D1012 dez/D3F4 hex DBSpindelsteigungDr/w
80	102.0 stat	Drehrichtung_r	WORD	W#16#0	W#16#0	Adresse D1013 dez/D3F5 hex DBDrehrichtungDr/w
81	104.0 stat	Drehrichtung_w	WORD	W#16#0	W#16#0	Adresse D1013 dez/D3F5 hex DBDrehrichtungDr/w
82	106.0 stat	Pos_Art_r	WORD	W#16#0	W#16#0	Adresse D1014 dez/D3F6 hex DBPos_ArtDr/w
83	108.0 stat	Pos_Art_w	WORD	W#16#0	W#16#0	Adresse D1014 dez/D3F6 hex DBPos_ArtDr/w
84	110.0 stat	reserviert_2_r	WORD	W#16#0	W#16#0	Adresse D1015 dez/D3F7 hex DBreserviert_2Dr
85	112.0 stat	reserviert_2_w	WORD	W#16#0	W#16#0	Adresse D1015 dez/D3F7 hex DBreserviert_2Dr
86	114.0 stat	oberer_Grenzwert_r	DWORD	DW#16#0	DW#16#0	Adresse D1016 dez/D3F8 hex DBoberer_GrenzwertDr/w
87	116.0 stat	oberer_Grenzwert_w	DWORD	DW#16#0	DW#16#0	Adresse D1016 dez/D3F8 hex DBoberer_GrenzwertDr/w
88	122.0 stat	unterer_Grenzwert_r	DWORD	DW#16#0	DW#16#0	Adresse D1017 dez/D3F9 hex DBunterer_GrenzwertDr/w
89	126.0 stat	unterer_Grenzwert_w	DWORD	DW#16#0	DW#16#0	Adresse D1017 dez/D3F9 hex DBunterer_GrenzwertDr/w
90	130.0 stat	Kalibrierwert_r	DWORD	DW#16#0	DW#16#0	Adresse D1018 dez/D3FA hex DBKalibrierwertDr/w
91	134.0 stat	Kalibrierwert_w	DWORD	DW#16#0	DW#16#0	Adresse D1018 dez/D3FA hex DBKalibrierwertDr/w
92	138.0 stat	Delta_Tipp_r	DWORD	DW#16#0	DW#16#0	Adresse D1019 dez/D3FB hex DBDelta_TippDr/w
93	142.0 stat	Delta_Tipp_w	DWORD	DW#16#0	DW#16#0	Adresse D1019 dez/D3FB hex DBDelta_TippDr/w
94	146.0 stat	System_Statuswort_r	WORD	W#16#0	W#16#0	Adresse D1020 dez/D3FC hex DBSystem_StatuswortDr

To start a read or write cycle a positive edge at the corresponding input „Start_Read“ or „Start_Write“ is necessary. With a positive edge at „Start_Read“ all parameters will be readout and insert into the

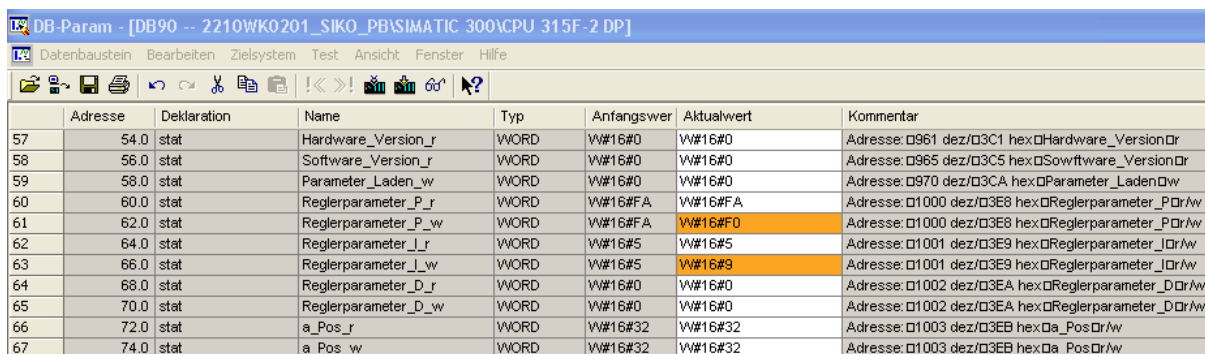
corresponding DB. The calibration will be included in a write cycle, when enabled (consider handbook chapter "calibration"). Thereby a counter starts, counter value can be read at output "Count_read". After successful transfer the counter value is "0".

If counter value is not reset to "0" the read cycle was interrupted by read failure. This indicates to a communication failure. In this case failure value at output SFC14 has to be checked. Please use for diagnosis of failure value the online help of SFC14 within Simatic Manager.

With a positive edge at „Start_Write“ all parameters, which target value differs from actual value, will be send to the drive. Thereby a counter starts, counter value can be read at output "Count_write". After successful transfer the counter value is "0".

If counter value is not reset to "0" the write cycle was interrupted by write failure. This indicates to a communication failure or a parameter value is beyond range of value accepted by drive. In this case failure value at output SFC15 has to be checked. Please use for diagnosis of failure value the online help of SFC15 within Simatic Manager.

Before the values have to be modified and transferred to the CPU. Therefore open the parameter block with program "parameterising of data block".



	Adresse	Deklaration	Name	Typ	Anfangswert	Aktualwert	Kommentar
57	54.0	stat	Hardware_Version_r	WORD	VW#16#0	VW#16#0	Adresse: 0961 dez/03C1 hex:0Hardware_VersionDr
58	56.0	stat	Software_Version_r	WORD	VW#16#0	VW#16#0	Adresse: 0965 dez/03C5 hex:0Software_VersionDr
59	58.0	stat	Parameter_Laden_vw	WORD	VW#16#0	VW#16#0	Adresse: 0970 dez/03CA hex:0Parameter_LadenDw
60	60.0	stat	Reglerparameter_P_r	WORD	VW#16#FA	VW#16#FA	Adresse: 01000 dez/03E8 hex:0Reglerparameter_PDr/w
61	62.0	stat	Reglerparameter_P_w	WORD	VW#16#FA	VW#16#F0	Adresse: 01000 dez/03E8 hex:0Reglerparameter_PDr/w
62	64.0	stat	Reglerparameter_I_r	WORD	VW#16#5	VW#16#5	Adresse: 01001 dez/03E9 hex:0Reglerparameter_IDr/w
63	66.0	stat	Reglerparameter_I_w	WORD	VW#16#5	VW#16#9	Adresse: 01001 dez/03E9 hex:0Reglerparameter_IDr/w
64	68.0	stat	Reglerparameter_D_r	WORD	VW#16#0	VW#16#0	Adresse: 01002 dez/03EA hex:0Reglerparameter_DDr/w
65	70.0	stat	Reglerparameter_D_w	WORD	VW#16#0	VW#16#0	Adresse: 01002 dez/03EA hex:0Reglerparameter_DDr/w
66	72.0	stat	a_Pos_r	WORD	VW#16#32	VW#16#32	Adresse: 01003 dez/03EB hex:0a_PosDr/w
67	74.0	stat	a_Pos_w	WORD	VW#16#32	VW#16#32	Adresse: 01003 dez/03EB hex:0a_PosDr/w

To modify a parameter, new parameter has to be entered in the corresponding line of target value (_w). The background of changed values will alternate to orange. With shortcut CTRL + L the changed parameters will be download to CPU.

After successful transfer to drive all parameters will be readout once again and the actual values will be entered into the actual value line (_r).

Attention: Use the write-/read cycle only when necessary, because EEPROM limit the number of write cycle!

For further information regarding different control and status bits please refer to user manual of drive.

4.3.5 Diagnosis Reading "Count_write"

If counter value is not reset to "0" the write cycle was interrupted by write failure. This indicates to a communication failure or a parameter value is beyond range of value accepted by drive.

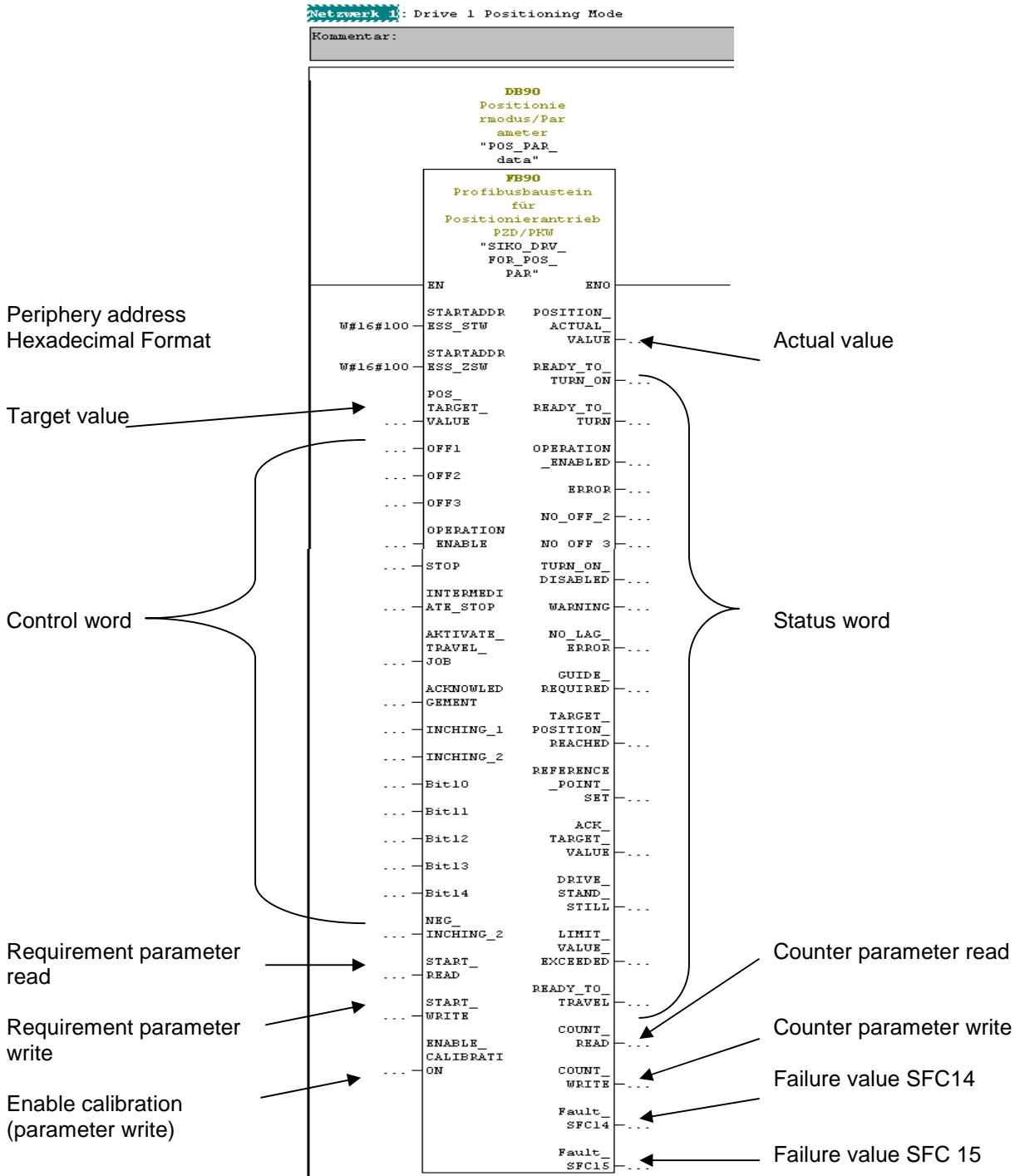
4.3.5.1 Reading at FB90 and DB90 respectively for AG02

Count_write Value	Parameter-No.	Name	Admissible values (dez)
1	930 dez 3A2 hex	Operating mode	1: Velocity mode 2: Positioning mode
2	1000 dez 3E8 hex	Controller Parameter P	Value range: 1 – 500
3	1001 dez 3E9 hex	Controller Parameter I	Value range: 0 – 500
4	1002 dez 3EA hex	Controller Parameter D	Value range: 0 – 500
5	1003 dez 3EB hex	a – Pos	Value range: 0 – 100
6	1004 dez 3EC hex	v – Pos	Value range: Gear ratio 55:1 \Rightarrow 1 – 100 Gear ratio 62:1 \Rightarrow 1 – 80 Gear ratio 135:1 \Rightarrow 1 – 35
7	1005 dez 3ED hex	a – Dreh	Value range: 0 – 100
8	1007 dez 3EF hex	a – Tipp	Value range: 0 – 100
9	1008 dez 3F0 hex	v – Tipp	Value range: Gear ratio 55:1 \Rightarrow 1 – 100 Gear ratio 62:1 \Rightarrow 1 – 80 Gear ratio 135:1 \Rightarrow 1 – 35
10	1009 dez 3F1 hex	Pos- Window	Value range: 0 – 1000
11	1010 dez 3F2 hex	ü- Numerator	Value range: 1 – 10000
12	1011 dez 3F3 hex	ü – Denominator	Value range: 1- 10000
13	1012 dez 3F4 hex	Spindle pitch	Value range: 0 – 1000
14	1013 dez 3F5 hex	Sense of rotation	0: i sense of rotation 1: e sense of rotation
15	1014 dez 3F6 hex	Pos- type	0: direct 1: loop + 2: loop –
16	1016 dez 3F8 hex	upper limit	Value range: - 9999999 ... 9999999
17	1017 dez 3F9 hex	lower limit	Value range: - 9999999 ... 9999999
18	1018 dez 3FA hex	Calibration value	Value range: - 999999 ... 999999
19	1019 dez 3FB hex	Delta Inch	Value range: - 1000000 ... 1000000
20	970 dez 3CA hex	Load parameter data record	1: Set all parameters to default values 2: Set standard parameters to default value 3: Set controller parameters to factory settings. 4: Delete fault counter and fault buffer. 5: calibrate the AG02

4.3.5.2 Reading at FB91 and DB91 respectively for AG0x

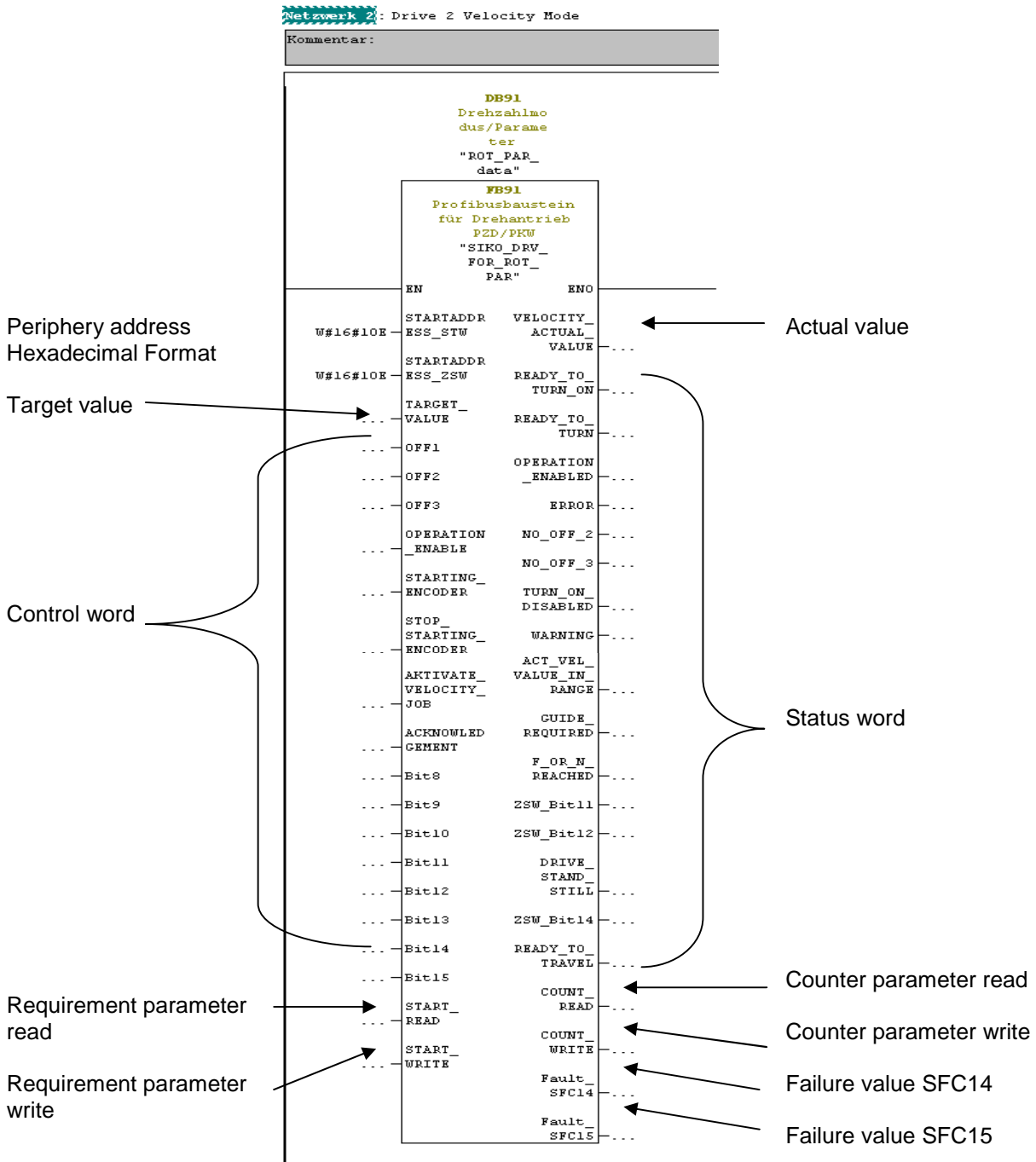
Count_write Value	Parameter-No.	Name	Admissible values (dez)
1	930 dez 3A2 hex	Operating mode	1: Velocity mode 2: Positioning mode
2	1000 dez 3E8 hex	Controller Parameter P	Value range: 1 – 500
3	1001 dez 3E9 hex	Controller Parameter I	Value range: 0 – 500
4	1002 dez 3EA hex	Controller Parameter D	Value range: 0 – 500
5	1003 dez 3EB hex	a – Pos	Value range: 0 – 100
6	1004 dez 3EC hex	v – Pos	Value range: AG02- Gear ratio 55:1 \Rightarrow 1 – 100 AG02- Gear ratio 62:1 \Rightarrow 1 – 80 AG02- Gear ratio 135:1 \Rightarrow 1 – 35
7	1005 dez 3ED hex	a – Dreh	Value range: 0 – 100
8	1007 dez 3EF hex	a – Tipp	Value range: 0 – 100
9	1008 dez 3F0 hex	v – Tipp	Value range: see v - Pos
10	1009 dez 3F1 hex	Pos- Window	Value range: 0 – 1000
11	1010 dez 3F2 hex	ü- Numerator	Value range: 1 – 10000
12	1011 dez 3F3 hex	ü – Denominator	Value range: 1- 10000
13	1012 dez 3F4 hex	Spindle pitch	Value range: 0 – 1000
14	1013 dez 3F5 hex	Sense of rotation	0: i sense of rotation 1: e sense of rotation
15	1014 dez 3F6 hex	Pos- type	0: direct 1: loop + 2: loop –
16	1016 dez 3F8 hex	upper limit	Value range: - 9999999 ... 9999999
17	1017 dez 3F9 hex	lower limit	Value range: - 9999999 ... 9999999
18	1018 dez 3FA hex	Calibration value	Value range: - 999999 ... 999999
19	1019 dez 3FB hex	Delta Inch	Value range: - 1000000 ... 1000000
20	970 dez 3CA hex	Load parameter data record	1: Set all parameters to default values 2: Set standard parameters to default value 3: Set controller parameters to factory settings. 4: Delete fault counter and fault buffer. 5: calibrate the AG02

4.4 Drive Parameter Change Positioning Mode FB90, 92, 94



For further information regarding failure value of SFC14/15 please refer to online help of Simatic Manager.

4.5 Drive Parameter Change Velocity Mode FB91



For further information regarding failure value of SFC14/15 please refer to online help of Simatic Manager.