Software description

SIMATIC® Profibus-DP
Interface Modules

AG02

Contents

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
V. 3.04	New added: Par.-Nr. $1021_{(dez)}$, Stop-Mode Inch 2

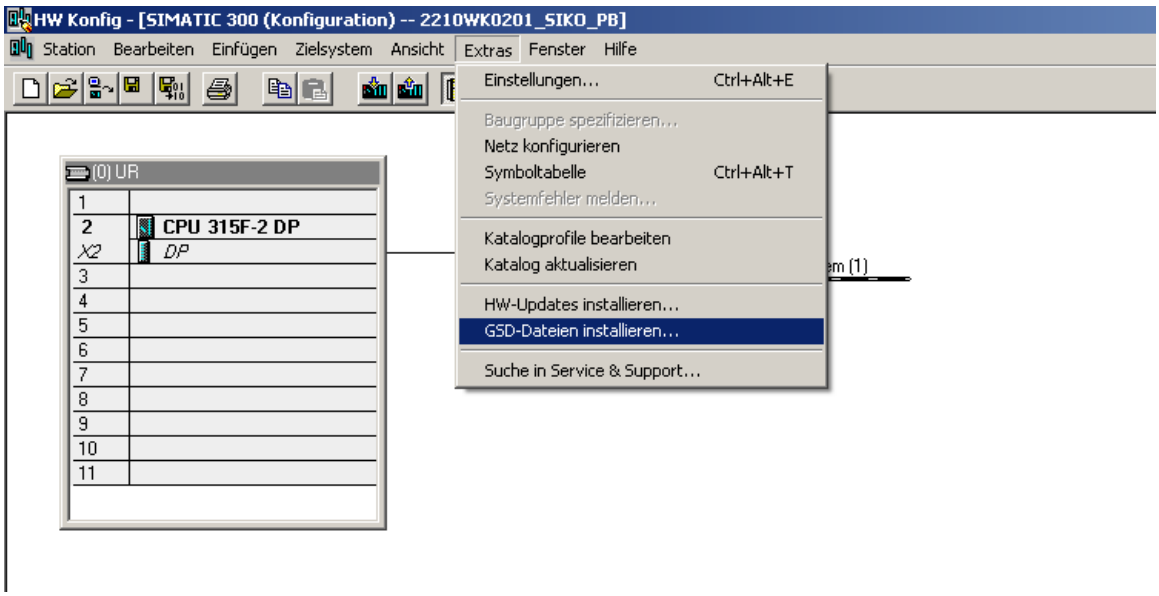
2. Abbreviation Dictionary

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

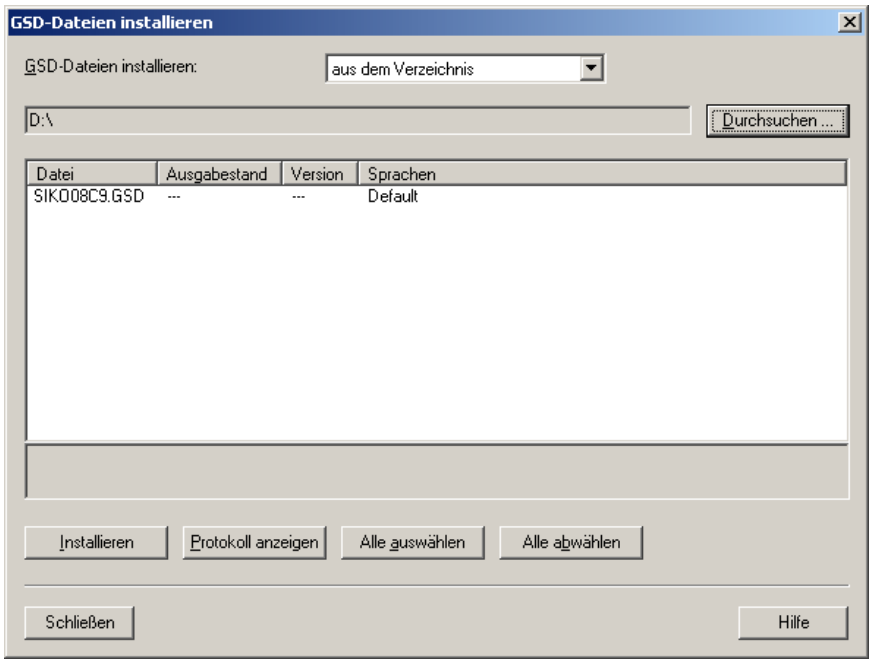
3. Hardware Configuration

3.1 Integrate GSD File

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



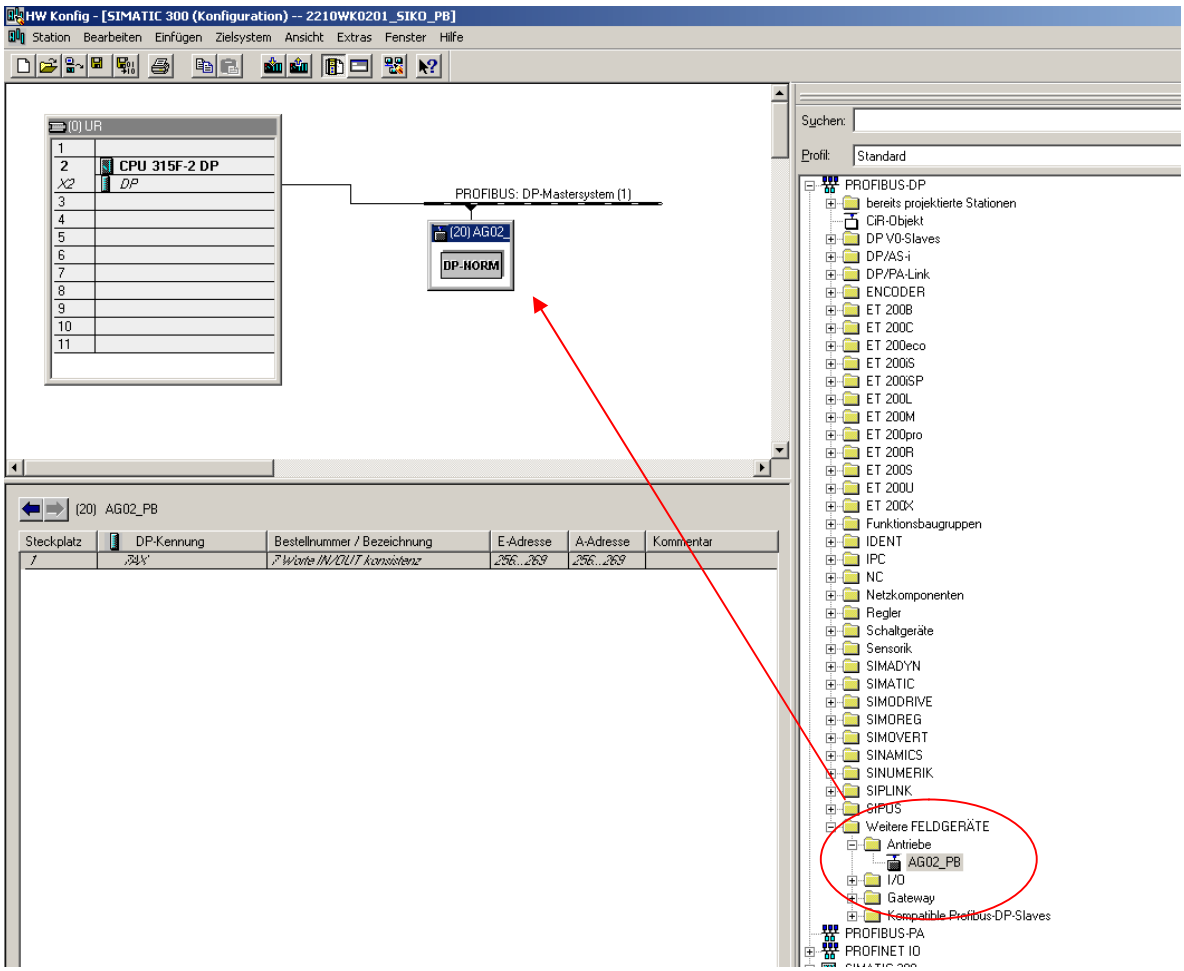
Select and open drive of AG02 folder with GSD file



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

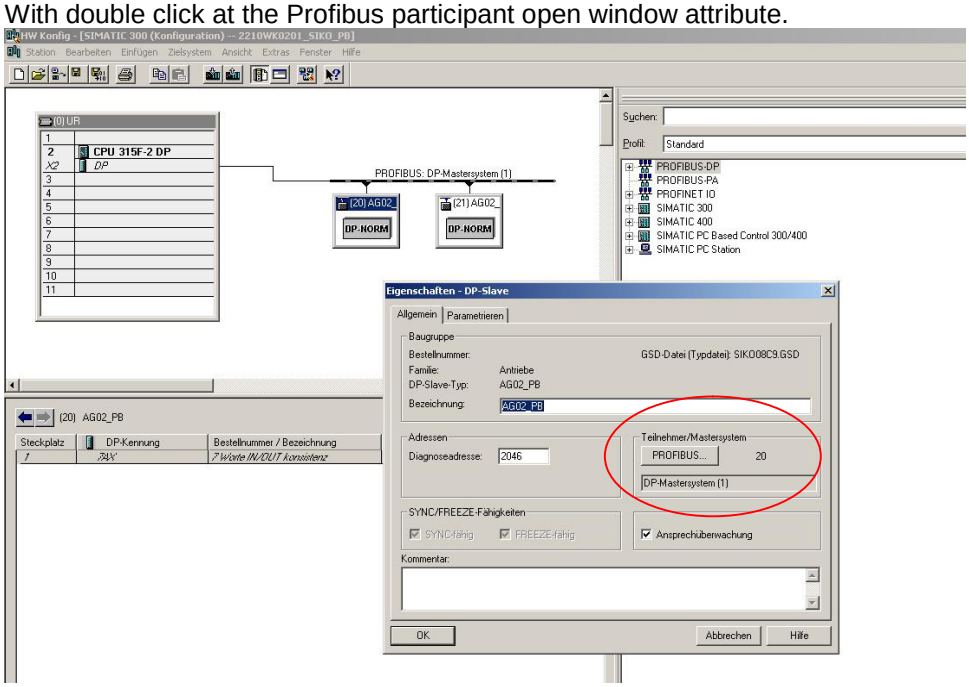
3.2 Configuration Positioning Drives

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).

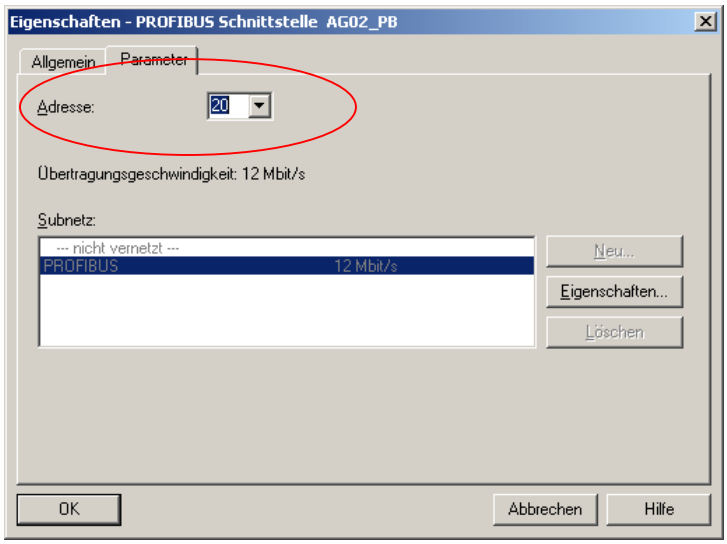


3.2.1 Configuration Profibus Address

With double click at the Profibus participant open window attribute.



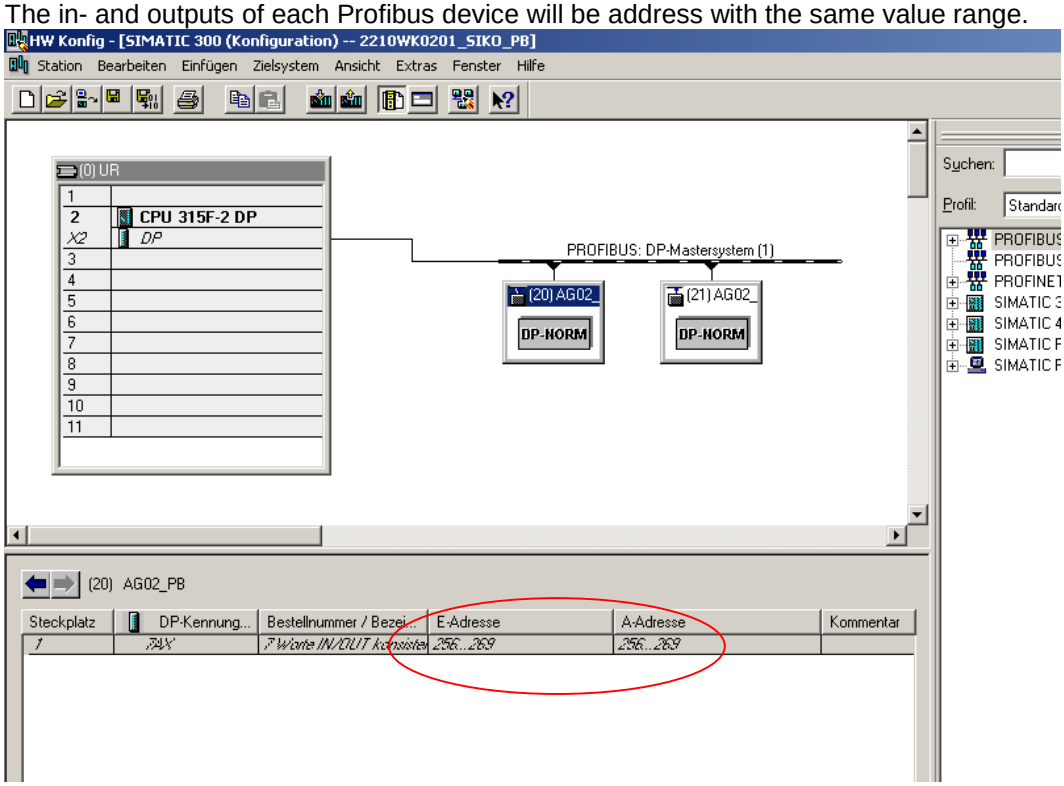
With the button "PROFIBUS" the dialog for address adjustment can be open and free address can be entered. The same address has to be entered into the AG02 (please refer to user manual).



Please proceed analogue with the second positioning drive.

3.2.2 Configuration Periphery Address

The periphery 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.



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

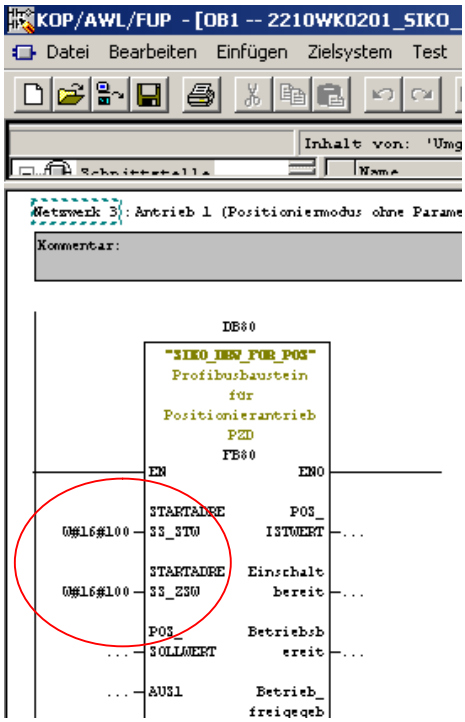
For this example drive 1 shell be configured for **positioning mode** (address 20) and drive 2 for **velocity mode** (address 21).
Thus for drive 1 is used FB90 (SIKO_DRV_POS_PAR_AG02) and for drive 2 FB91 (SIKO_DRV_ROT_PAR_AG0x).
In this example the FB's will be called directly out of the OB1 and each 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

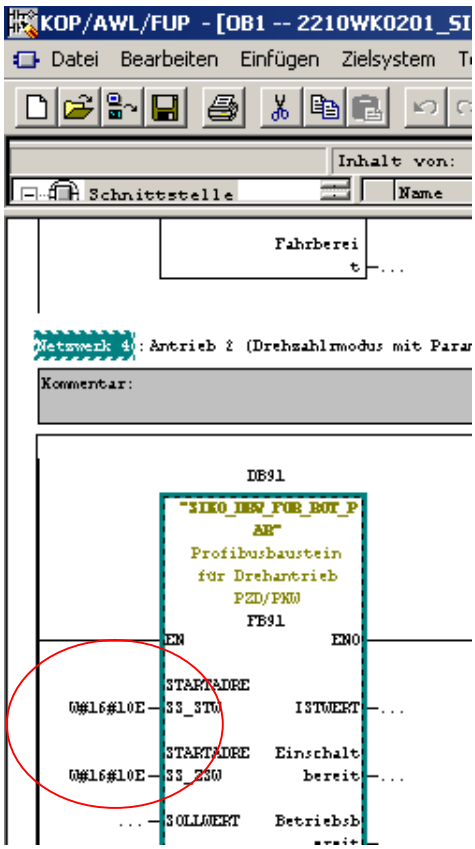
4.3.2 Call for Drive 1 in OB 1:

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.



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

DB90
DB91
FB90
FB91
OB1

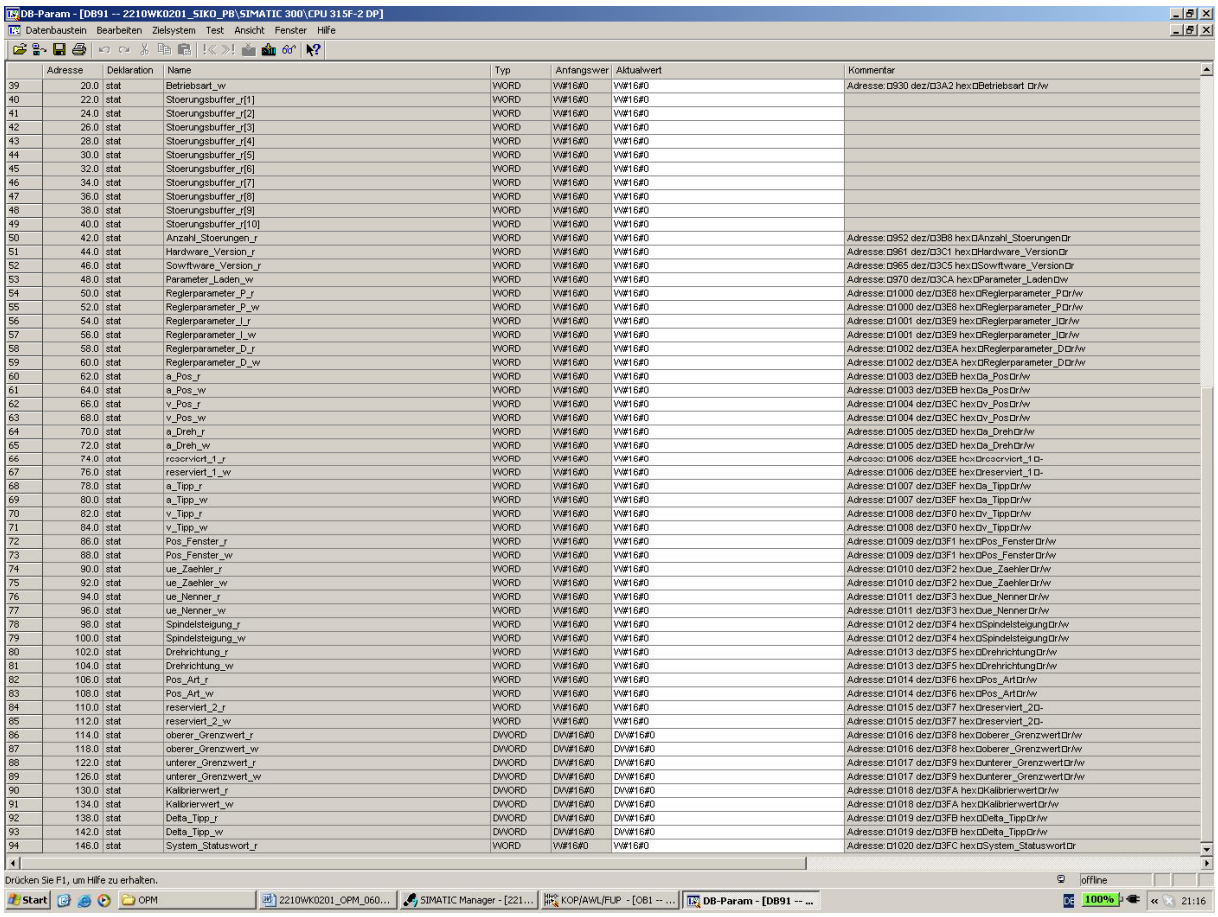
The in- and output interface of the program blocks will be explained in chapter 4.4 Drive Parameter Change Positioning Mode FB90 respectively 4.5 Drive Parameter Change Velocity Mode FB91.

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.



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

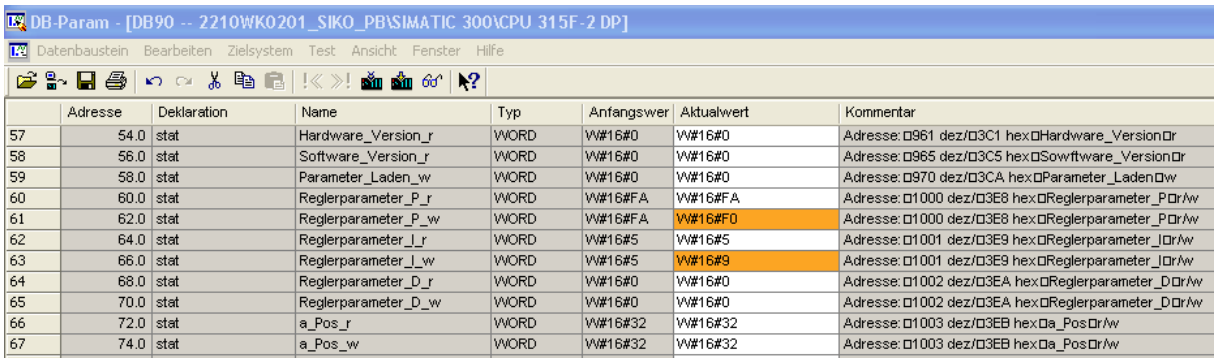
corresponding DB. The calibration will be included in a write cycle, when enabled (consider handbook chapter "calibration"). Thereby a counter starts, counter value can be read at output "Count_read". After successful transfer the counter value is "0".

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 checked. Please use for diagnosis of failure value the online help of SFC14 within Simatic Manger.

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 checked. Please use for diagnosis of failure value the online help of SFC15 within Simatic Manger.

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


DB-Param - [DB90 -- 2210WK0201_SIKO_PB\SIMATIC 300\CPU 315F-2 DP]

Datenbaustein Bearbeiten Zielsystem Test Ansicht Fenster Hilfe

	Adresse	Deklaration	Name	Typ	Anfangswer	Aktualwert	Kommentar
57	54.0	stat	Hardware_Version_r	WORD	W#16#0	W#16#0	Adresse: 961 dez/3C1 hex Hardware_Version r
58	56.0	stat	Software_Version_r	WORD	W#16#0	W#16#0	Adresse: 965 dez/3C5 hex Sowftware_Version r
59	58.0	stat	Parameter_Laden_w	WORD	W#16#0	W#16#0	Adresse: 970 dez/3CA hex Parameter_Laden w
60	60.0	stat	Reglerparameter_P_r	WORD	W#16#FA	W#16#FA	Adresse: 1000 dez/3E8 hex Reglerparameter_P r/w
61	62.0	stat	Reglerparameter_P_w	WORD	W#16#FA	W#16#F0	Adresse: 1000 dez/3E8 hex Reglerparameter_P r/w
62	64.0	stat	Reglerparameter_I_r	WORD	W#16#5	W#16#5	Adresse: 1001 dez/3E9 hex Reglerparameter_I r/w
63	66.0	stat	Reglerparameter_I_w	WORD	W#16#5	W#16#9	Adresse: 1001 dez/3E9 hex Reglerparameter_I r/w
64	68.0	stat	Reglerparameter_D_r	WORD	W#16#0	W#16#0	Adresse: 1002 dez/3EA hex Reglerparameter_D r/w
65	70.0	stat	Reglerparameter_D_w	WORD	W#16#0	W#16#0	Adresse: 1002 dez/3EA hex Reglerparameter_D r/w
66	72.0	stat	a_Pos_r	WORD	W#16#32	W#16#32	Adresse: 1003 dez/3EB hex a_Pos r/w
67	74.0	stat	a_Pos_w	WORD	W#16#32	W#16#32	Adresse: 1003 dez/3EB hex a_Pos r/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 CRTL + 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.

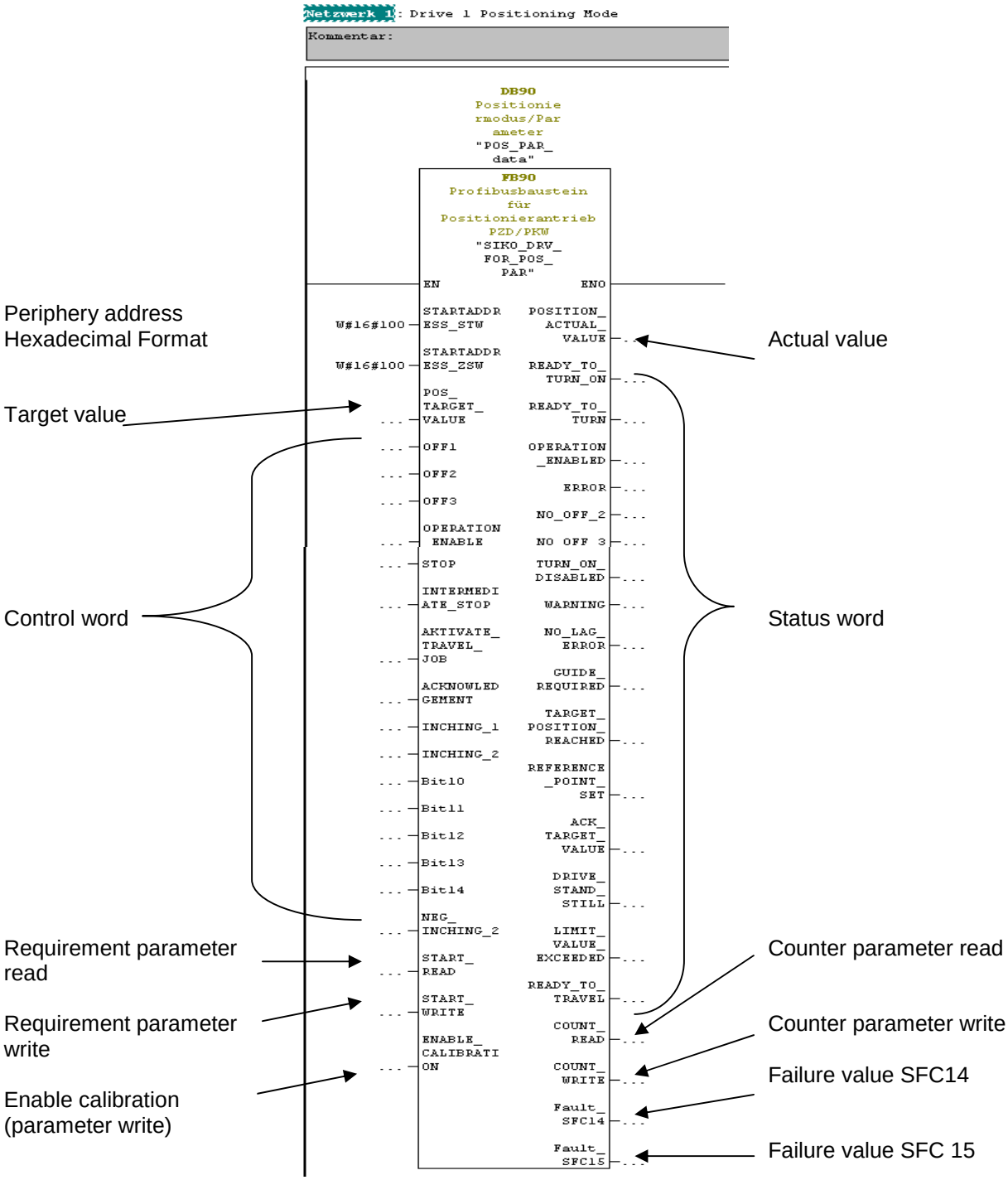
4.3.5.1 Reading at FB90 and DB90 respectively for AG02

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 ⇒ 1 – 100 Gear ratio 62:1 ⇒ 1 – 80 Gear ratio 135:1 ⇒ 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 ⇒ 1 – 100 Gear ratio 62:1 ⇒ 1 – 80 Gear ratio 135:1 ⇒ 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	1021 dez 3FD hex	Stop mode Inch2	0 = Inch2 - stop with maximum delay 1 = Inch2 - stop with pre-programmed delay
21	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

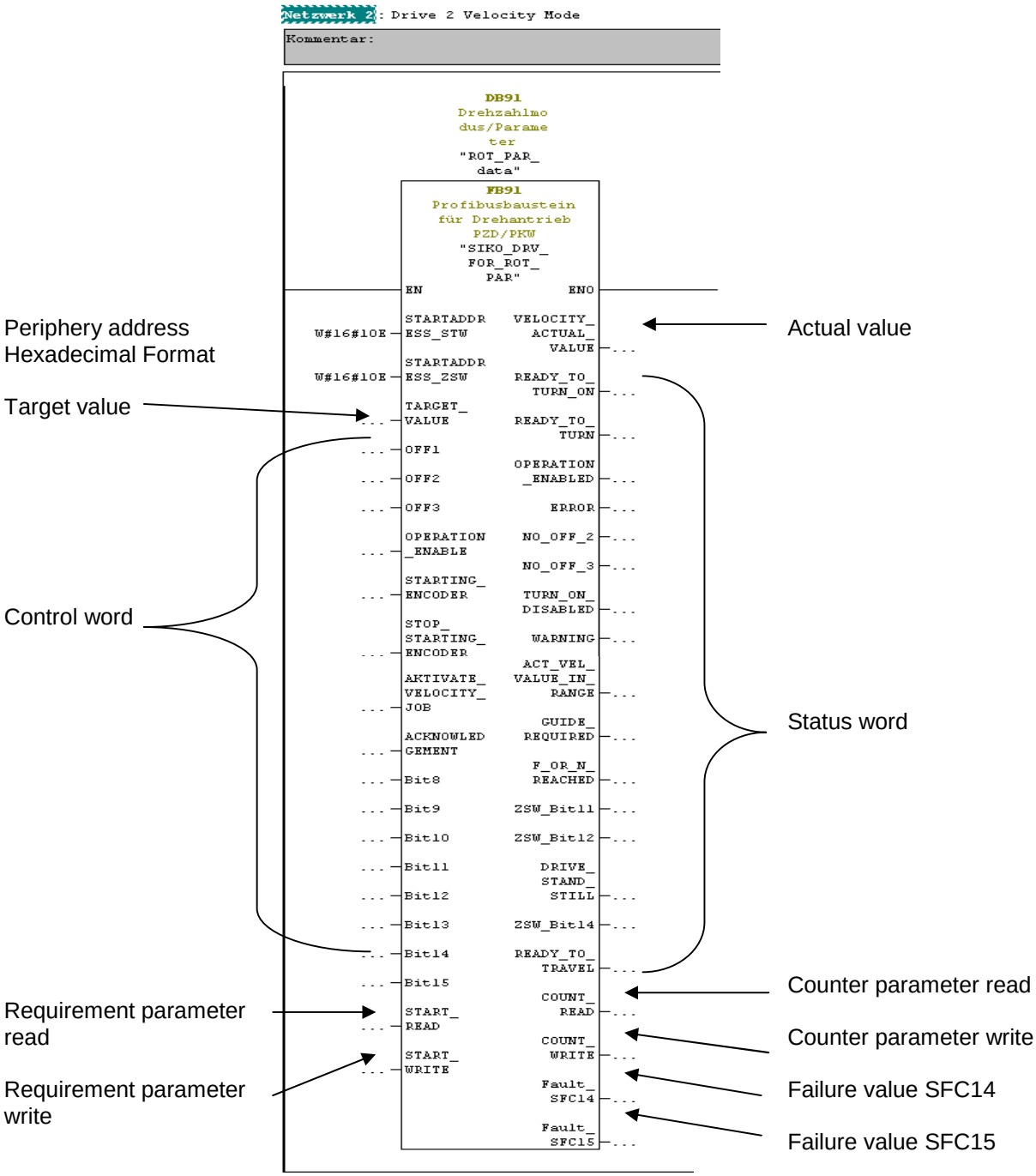
Count_write Value	Parameter-No.	Name	Admissible values (dez)
1	930 dez 3A2 hex	Operating mode	1: Velocity mode 2: Positioning mode
2	1000 dez 3E8 hex	Controller Parameter P	Value range: 1 – 500
3	1001 dez 3E9 hex	Controller Parameter I	Value range: 0 – 500
4	1002 dez 3EA hex	Controller Parameter D	Value 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 ⇒ 1 – 100 AG02- Gear ratio 62:1 ⇒ 1 – 80 AG02- Gear ratio 135:1 ⇒ 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 Manger.

4.5 Drive Parameter Change Velocity Mode FB91



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