WACHENDORFF
Automation GmbH & Co. KG

Quickstart Class 2

WDGA absolute rotary encoders with Profibus interface

EnDra® Technology

PROFIBUS®

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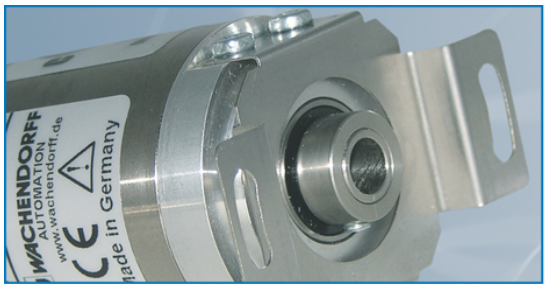
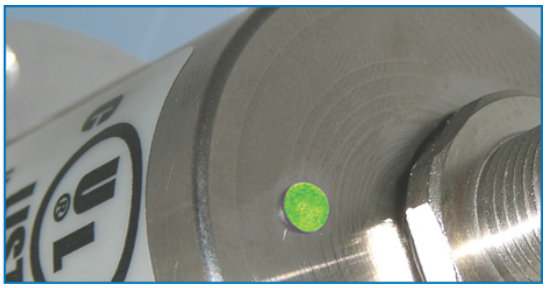
Industrie ROBUST

Imprint





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Comments:

Feel free to send us any corrections, notes or change requests. Please e-mail your comments to: wdg@wachendorff.de

1 General

The following examples are based on the ”STEP 7” program (version 5.5). If not already available you need the respective hardware, a DPM1 master, a DPM2 master, a DP slave (WDGA encoder with PROFIBUS) with the corresponding GSD file.

The quickstart guide is only a short basic projecting instruction, further information on the product can be found in the PROFIBUS manual.

- Please note that the contents and programs described in the quickstart guide are only examples. Wachendorff Automation does not assume any liability or warranty for the correctness of the quickstart guide nor for any direct or indirect damage arising from it.
- Please ensure the diagnosis evaluation in order to guarantee the validity of the values.

2 Installing the GSD file

The GSD file of the WDGA encoder with PROFIBUS is installed in the ”HW Config” hardware configurator (see Figure 2.1).

- The GSD file for class 2 (WDGA0E87.GSD) can be found on our website:
  download – GSD file
- Close any open hardware projects.
- Select the required storage location under ”Tools”, ”Install GSD files . . . ”
- Install GSD file.

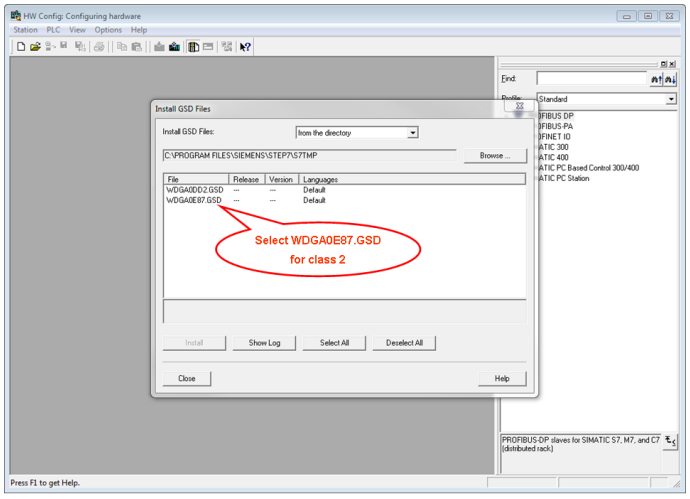


Figure 2.1: GSD file – STEP 7

Then update the ”Hardware catalog”

- The WDGA encoder appears in the ”Hardware catalog” under ”PROFIBUS-DP”, ”Other field devices”, ”encoder”, ”Wachendorff Automation”, ”WDGA PROFIBUS Class2” (see Figure 2.2).
- The ”WDGA PROFIBUS Class2” modules appear here.
- The selectable modules correspond to the configuration data of class 2 (see PROFIBUS manuel or Table 3.1).

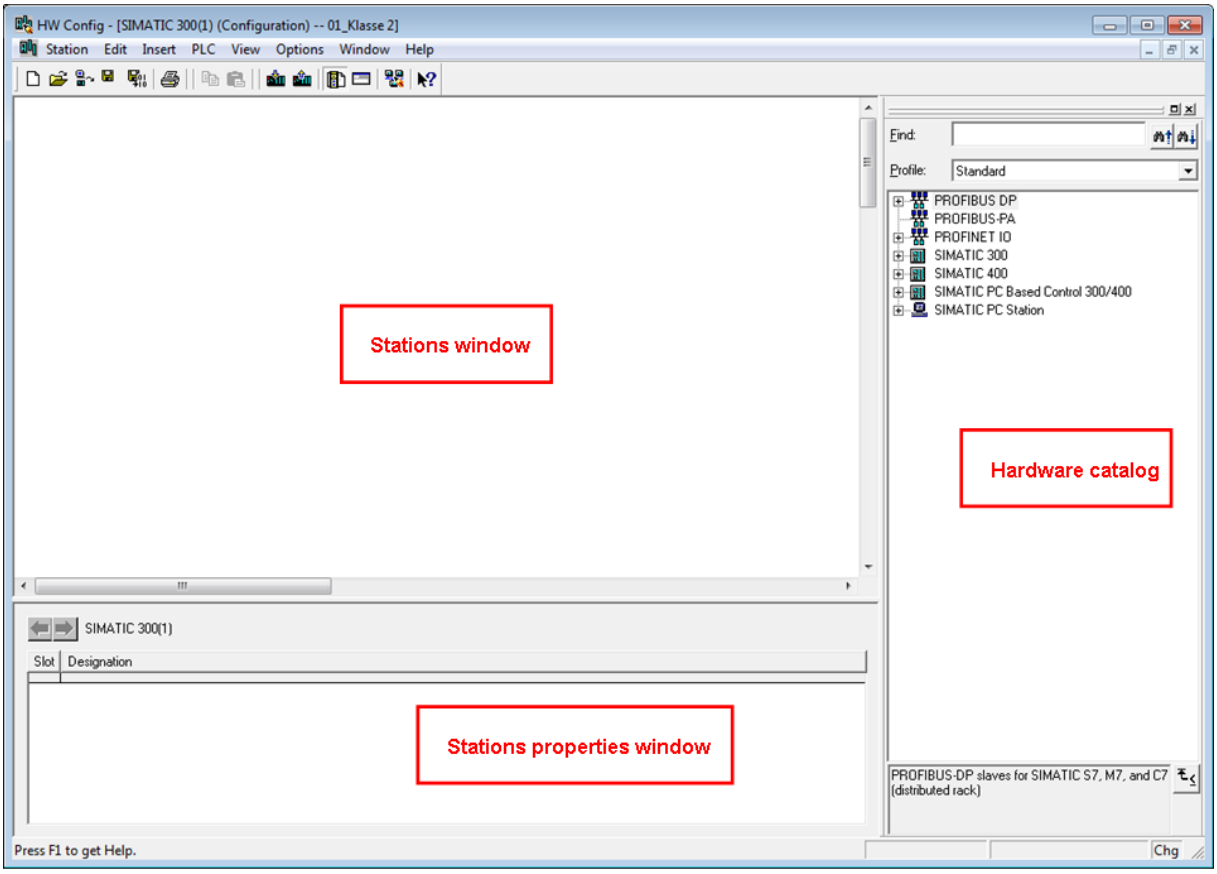


Figure 2.2: Hardware configurator – STEP 7

3 Configuration data

The selectable ”WDGA PROFIBUS Class2” modules in ”HW Config” after integration of the GSD file for the class 2 WDGA encoder are contained in Table 3.1.

Table 3.1: WDGA PROFIBUS Class2 modules

Designation	Word	1	2	3	4
”16bit position, no preset”	data output				
	data input	16-bit position			
”16bit position, with preset”	data output	16-bit preset			
	data input	16-bit position			
”32bit position, no preset”	data output				
	data input	32-bit position			
”32bit position, with preset”	data output	32-bit preset			
	data input	32-bit position			
”32bit position, preset, speed”	data output	32-bit preset			
	data input	32-bit position		32-bit speed	
”32bit position, preset, debug”	data output	32-bit preset			
	data input	32-bit position		debug	

4 Integrating the WDGA

If not already available, configure a DPM1 master in the hardware configurator. The different areas of ”HW Config” are marked in Figure 4.1.

- Go to the ”Hardware catalog”, click on the ”WDGA PROFIBUS Class2” component and drag it into the ”Stations window” to the fieldbus (here: ”PROFIBUS(1): DP master system(1)”).
- Then click the ”WDGA icon” once. The component is displayed in the ”Station properties window”.
- Drag the required ”WDGA PROFIBUS Class2” module from the ”Hardware catalog” into the ”Station properties window” to ”Slot 1”.

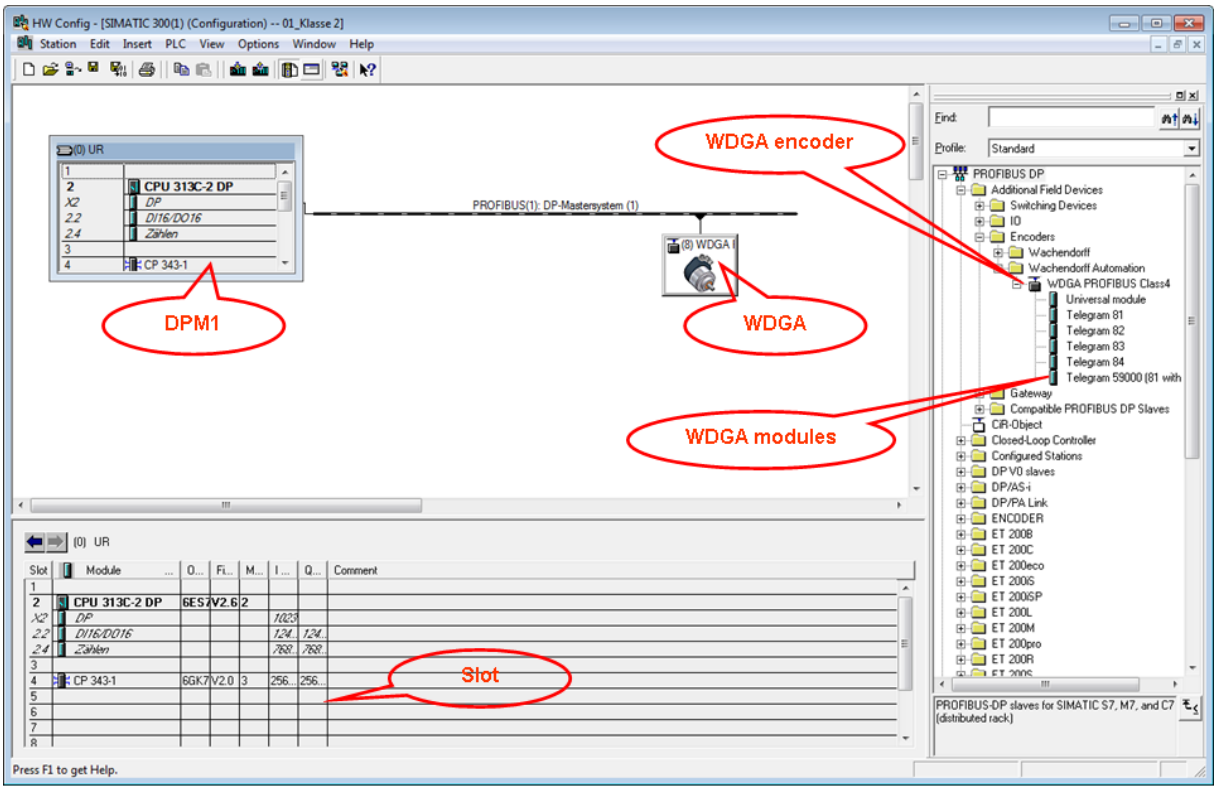


Figure 4.1: HW configuration – STEP 7

4.1 Assigning the slave address

The slave address previously set in the WDGA (see PROFIBUS manual) must be assigned in the hardware configuration (see Figure 4.2).

- Double-click on the ”WDGA icon”.
- Enter the respective slave address under ”General”, ”PROFIBUS. . . ”, ”Parameters”.
- Select your projected PROFIBUS in the ”Subnet” and confirm with ”OK”.

If you have a WDGA encoder with terminal box, please make sure that the indication of the rotary coding switches is consistent with the indication in the ”Station window”.

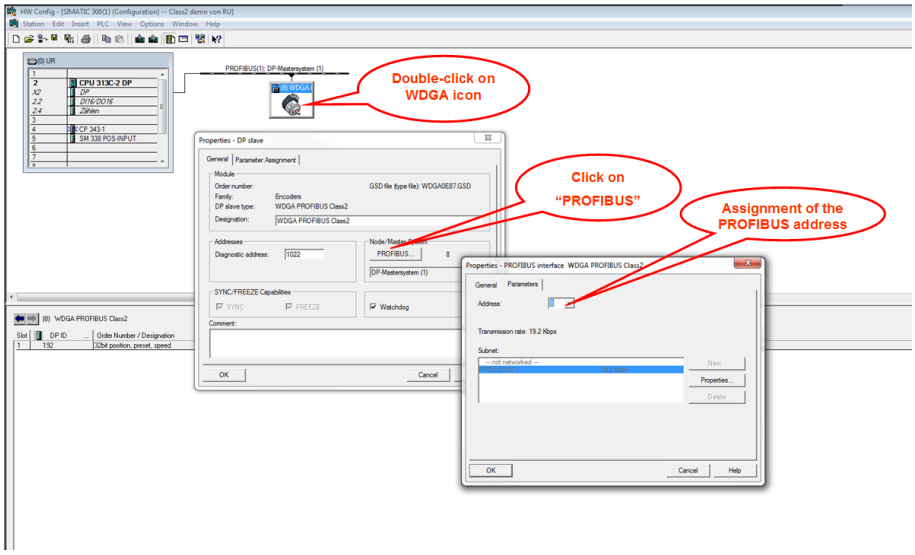


Figure 4.2: Address assignment – ”HW Konfig” STEP 7

4.2 Setting the I/O addresses

The I/O addresses are the S7 addresses via which the encoder is called in the controller. They are used by the controller to access the input and output data of the encoder. The I/O addresses are assigned via the ”Properties - DP slave” window (see Figure 4.3).

- Double-click on the line of the added ”WDGA module” in the ”Station properties window”.
- Enter the required I/O address in the ”Properties - DP slave” window and confirm by pressing ”OK”.
- Identical addresses are permissible for the I/O addresses.

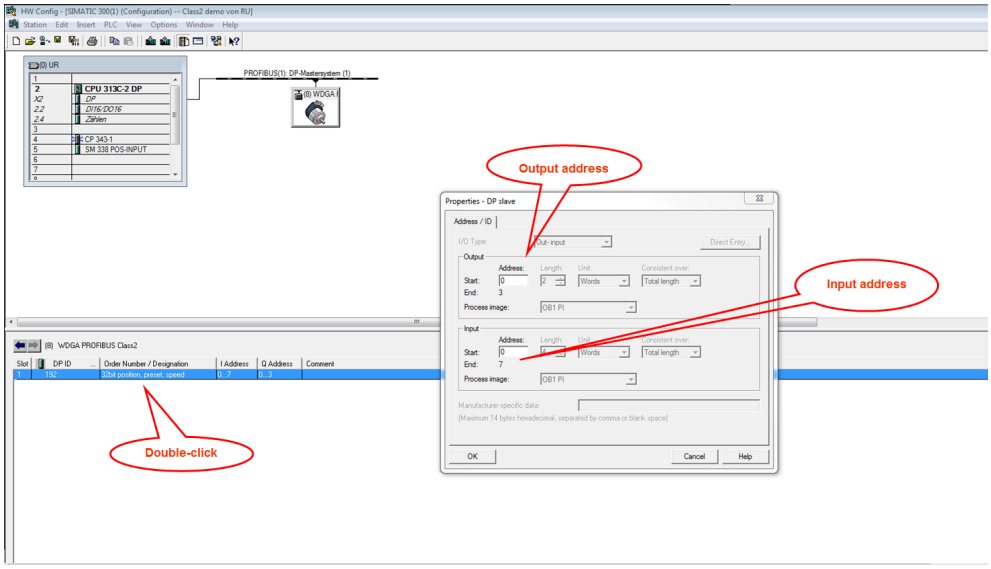


Figure 4.3: I/O addresses – STEP 7

Depending on the controller type, there can be restrictions for the permissible range of values of the I/O addresses which do not directly result in error messages. If access to the data is not possible via the addresses Ixxx or Oxxx but only via PIxxx and POxxx, you might have set values beyond the permissible range. Avoid overlapping with other slaves!

4.3 Parameterizing the WDGA

The parameterization can be effected via the ”Properties - DP slave” window (see Figure 4.4).

Click on the parameters for parameterization:

- ”code sequence” – changes the direction of rotation
- ”class 2 functionality” – activates the class 2 functionalities
- ”scaling function control” – activates the scaling
- ”measuring units per revolution” – enter the ST resolution
- ”total measuring range” – enter the total resolution
- ”speed measuring unit” – sets the speed value unit

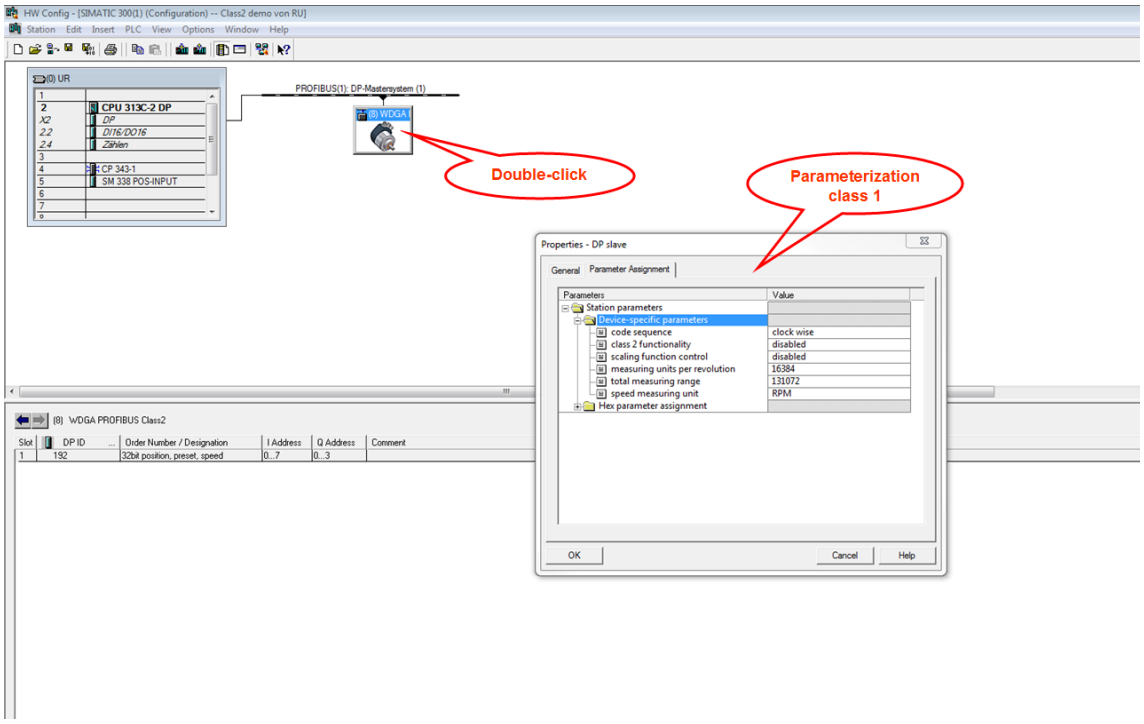


Figure 4.4: Parameterization – STEP 7

- When the hardware configuration is complete, it can be compiled and loaded into the target system (DPM1).
- Please make sure that you have compiled and not only saved the configuration.

4.4 Setting the diagnosis address

The assignment of a diagnosis address is required in order to evaluate diagnosis messages of the encoder (see Figure 4.5).

Enter the diagnosis address in the ”Properties – DP slave” window.

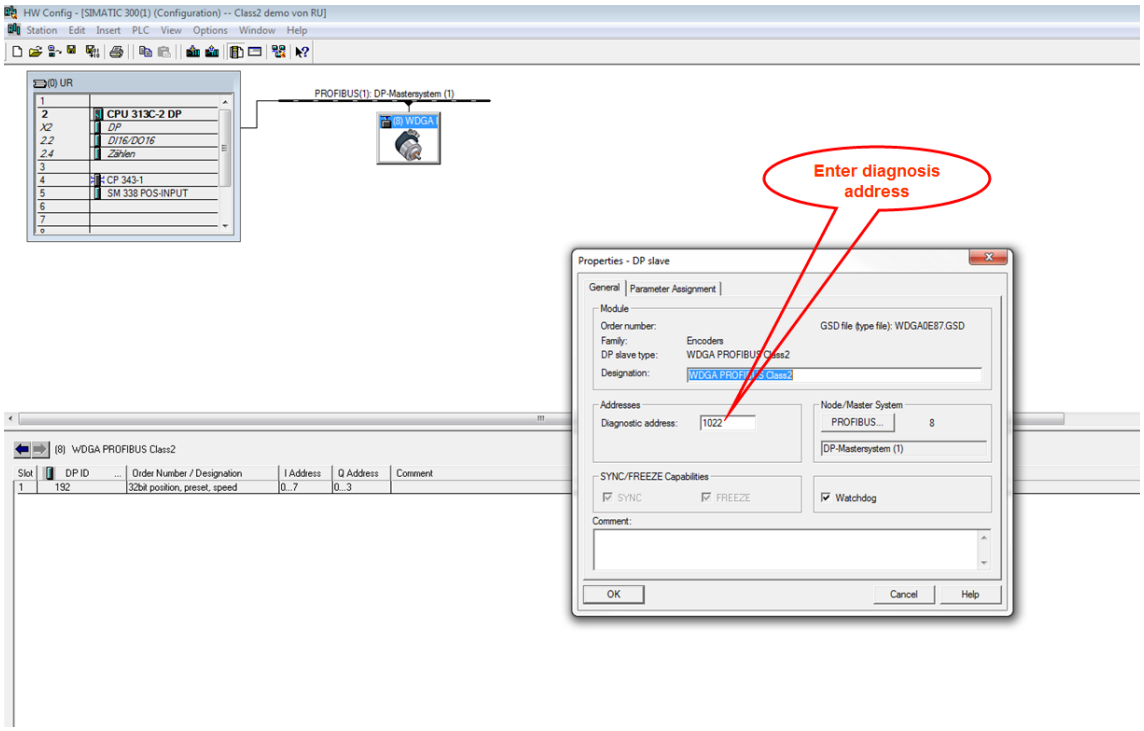


Figure 4.5: Diagnosis addresses – STEP 7

- The diagnosis address can be within the entire peripheral range of the controller.
- The diagnosis address does not occupy an I/O address.
- Assigning the diagnosis address is only required if the diagnosis functions are used (see PROFIBUS manual).
- Reading the diagnosis see section 8.

5 Creating the symbol table

Create a symbol table or amend an existing one, if necessary.

Open the symbol table according to Figure 5.1.

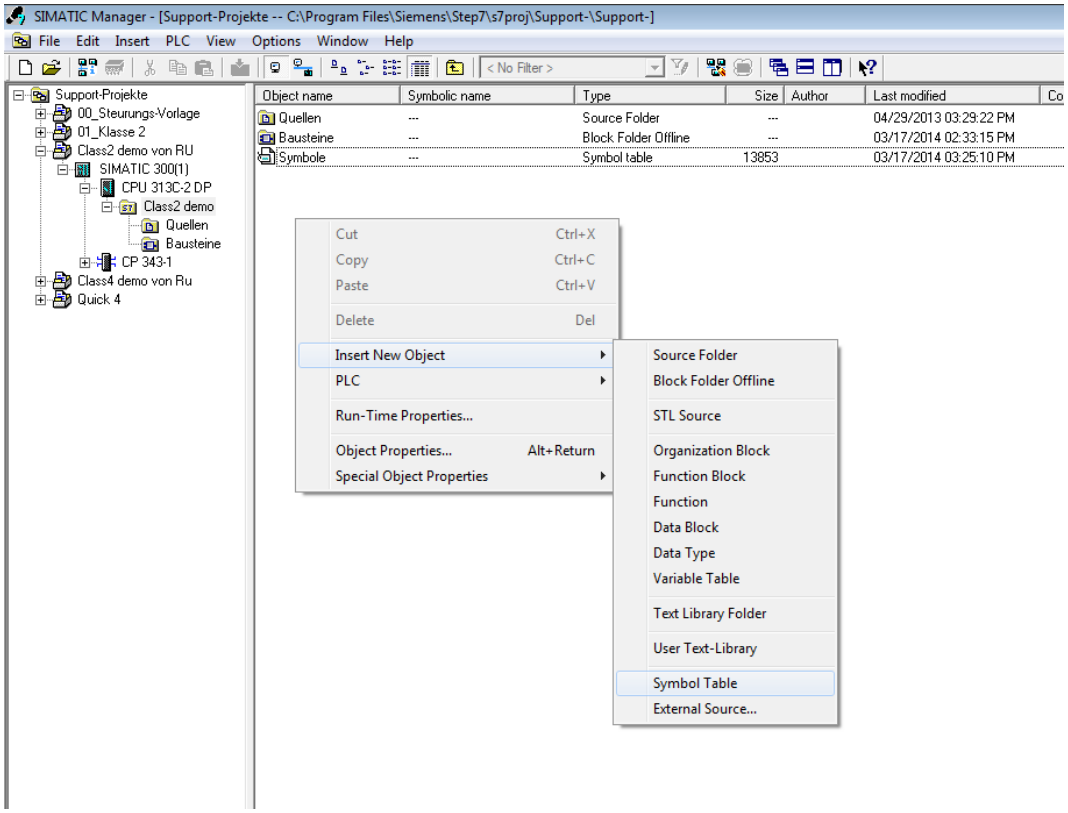
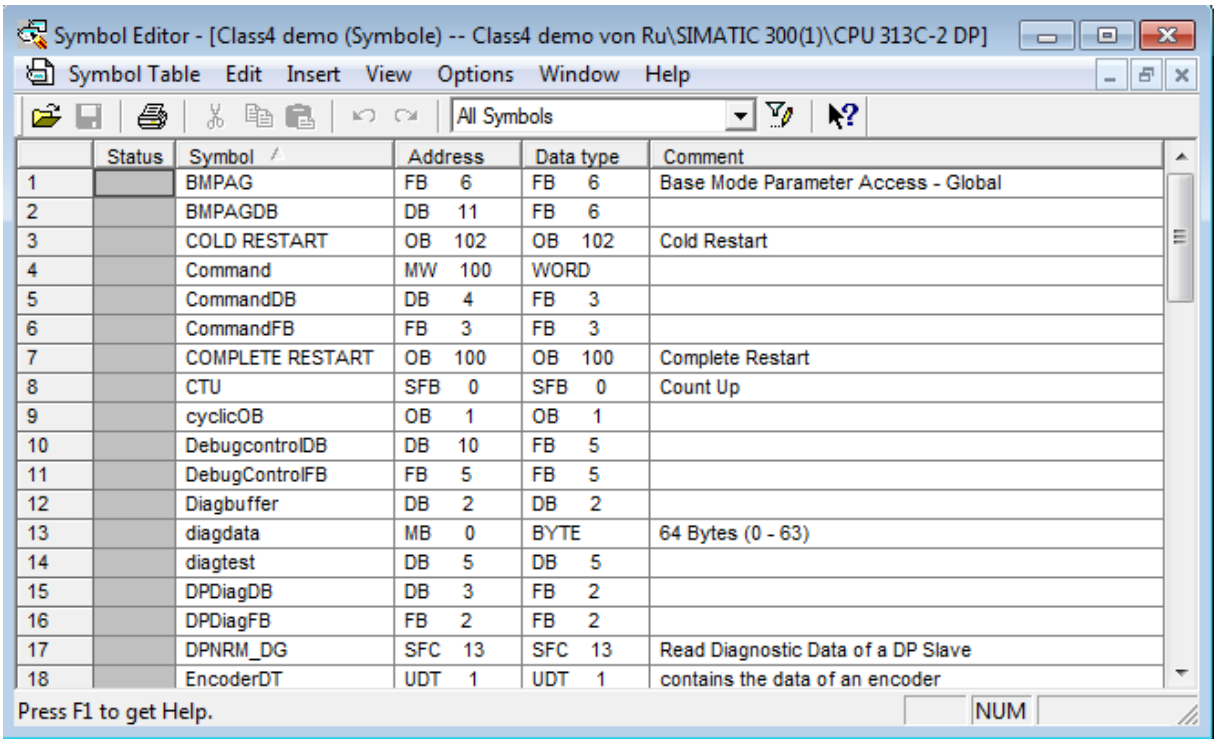


Figure 5.1: Opening the symbol table – STEP 7

- Enter your own symbol name under ”Symbol”.
- Enter your determined I/O address range via ”Address”. Please make sure to select the word sizes in accordance with the sizes of the words to be addressed (e.g. 32-bit position value see PROFIBUSmanual or Table 3.1). See example in Figure 5.2.



	Status	Symbol	Address	Data type	Comment
1		BMPAG	FB 6	FB 6	Base Mode Parameter Access - Global
2		BMPAGDB	DB 11	FB 6	
3		COLD RESTART	OB 102	OB 102	Cold Restart
4		Command	MW 100	WORD	
5		CommandDB	DB 4	FB 3	
6		CommandFB	FB 3	FB 3	
7		COMPLETE RESTART	OB 100	OB 100	Complete Restart
8		CTU	SFB 0	SFB 0	Count Up
9		cyclicOB	OB 1	OB 1	
10		DebugcontrolDB	DB 10	FB 5	
11		DebugControlFB	FB 5	FB 5	
12		Diagbuffer	DB 2	DB 2	
13		diagdata	MB 0	BYTE	64 Bytes (0 - 63)
14		diagtest	DB 5	DB 5	
15		DPDiagDB	DB 3	FB 2	
16		DPDiagFB	FB 2	FB 2	
17		DPNRM_DG	SFC 13	SFC 13	Read Diagnostic Data of a DP Slave
18		EncoderDT	UDT 1	UDT 1	contains the data of an encoder

Figure 5.2: Creating a symbol table – STEP 7

6 Position & speed

Monitoring position and speed:

- Open the variables table (analogous to Figure 5.1).
- Enter your created symbol names under ”Symbol”.
- Select your required ”Display format”.
- The current values appear under ”Status value” (e.g. position and speed) which you can monitor using the ”glasses icon”.

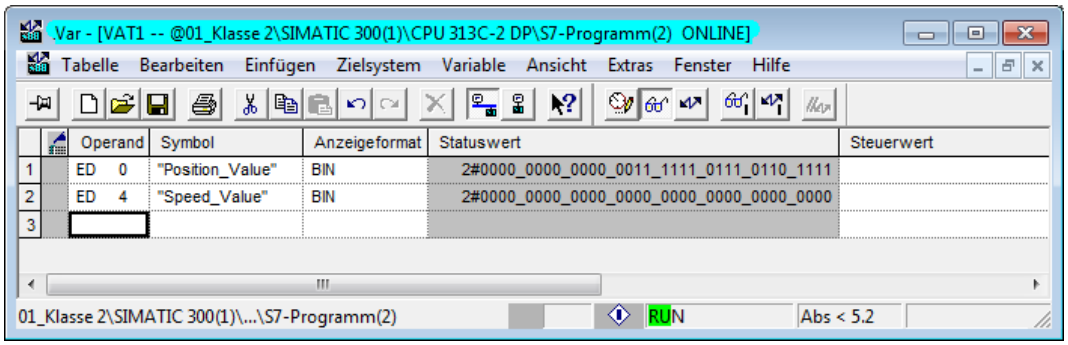


Figure 6.1: Variables table – STEP 7

Loading position and speed into the control program:

- Open your control program (”KOP/AWL/FUP” window).
- Use ”L” to load the position/speed with the symbol name assigned and use ”T” to transfer it into a flag selected by you.
- See example in Figure 6.2.

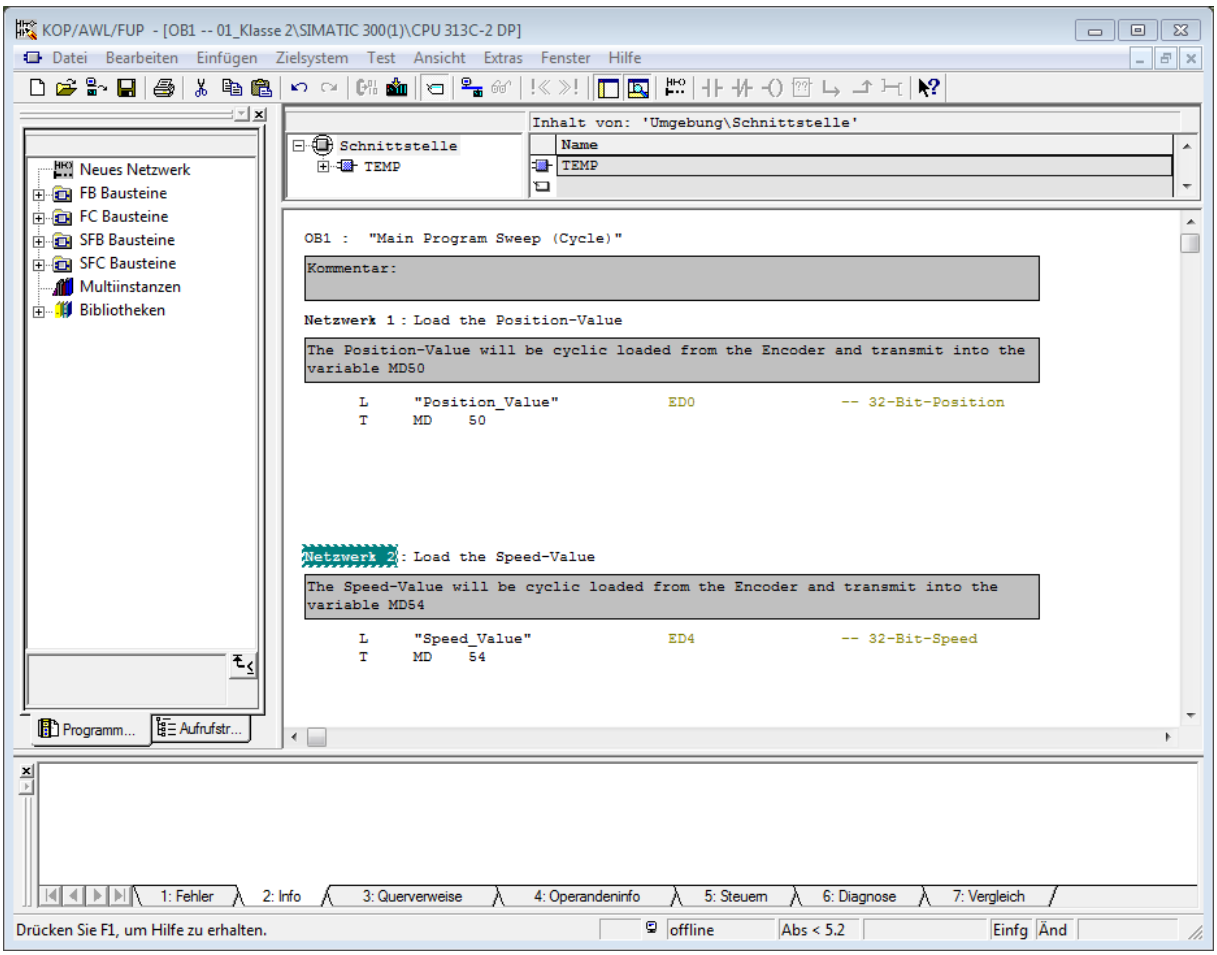


Figure 6.2: Loading values into a control program – STEP 7

7 Setting the preset value

The ”Preset value” format is displayed in Table 7.1.

The ”Preset value” can only be entered within the range of values (0 to $2^{31}-1$).

Table 7.1: Preset value format

Output-Data					
Word	1			2	
Octet	1		2	3	4
Bit	31	30-24	23-16	15-8	7-0
Data	0/1	$2^{30}-2^{24}$	$2^{23}-2^{16}$	$2^{15}-2^{8}$	$2^{7}-2^{0}$
	Preset Control	Preset value - max. 31 bits			

A preset must only be carried out when the encoder is at standstill.

Figure 7.1 shows the preset process by means of the variables table.

- Open the variables table (analogous to Figure 5.1).
- Enter your created symbol names for the preset under ”Symbol”.
- Address bit 31 ”Preset control” in order to activate the preset mode (see Table 7.1).
- Enter a ”Control value” for your required preset value. (Enter the corresponding value under ”Status value”.)
- Activate bit 31 by entering 1 (”true”) in ”Status value”.
- The position value is set to the predefined preset value.
- Deactivate bit 31 after the preset process.

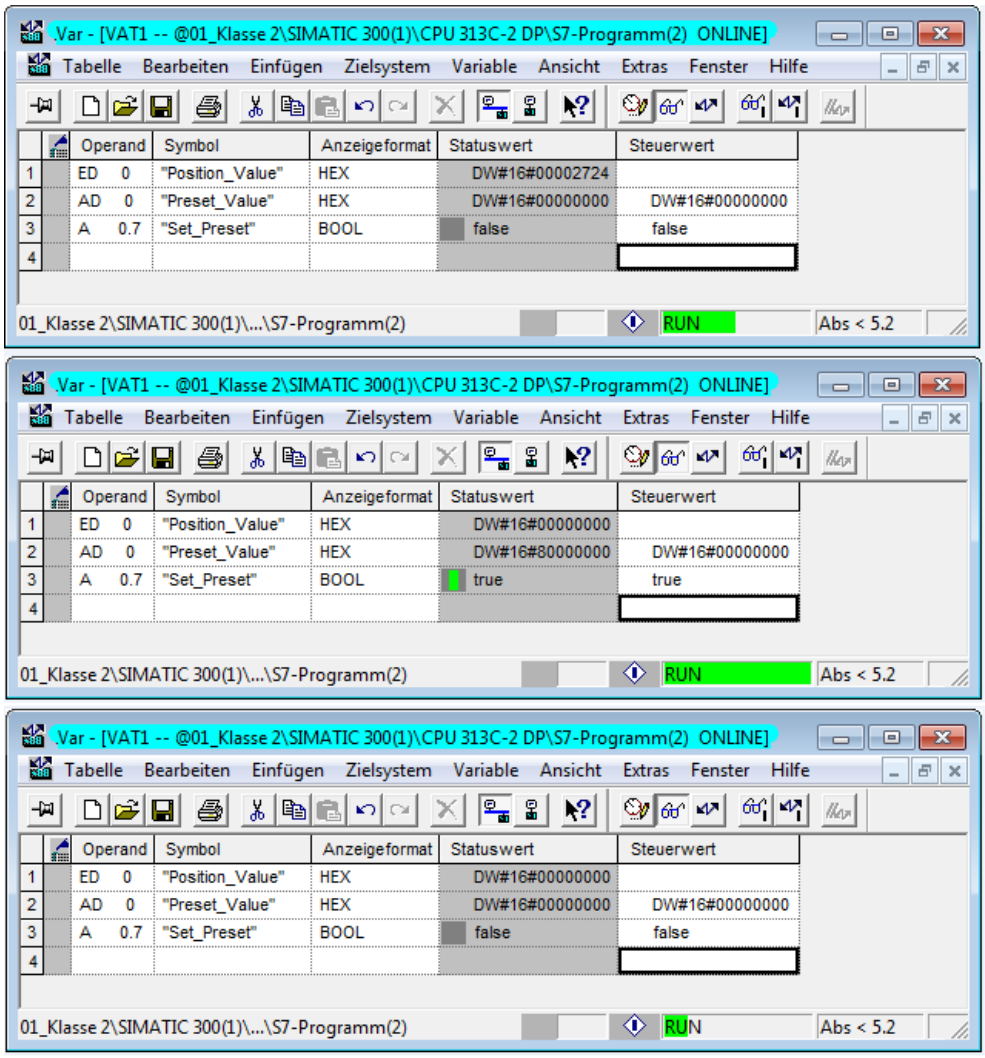


Figure 7.1: Preset – STEP 7

8 Reading the diagnosis

The DP master usually retrieves the diagnosis automatically without requiring programming. Processing and recording of occurring errors must, however, be done in the control program. If this is not done, the controller may automatically switch to a safe state.

- We advise against simply discarding the diagnosis data to avoid a stop of the controller. Measures may be necessary to ensure safe operation of a system.
- Please ensure the diagnosis evaluation in order to guarantee the validity of the values.

- For setting the diagnosis address, see section 4.4.
- Further details on the diagnosis within the control program can be seen from the S7 example.
- Further information can be found in the PROFIBUS manual.

9 S7 example program

You can download an S7 example program from our website:
S7 example