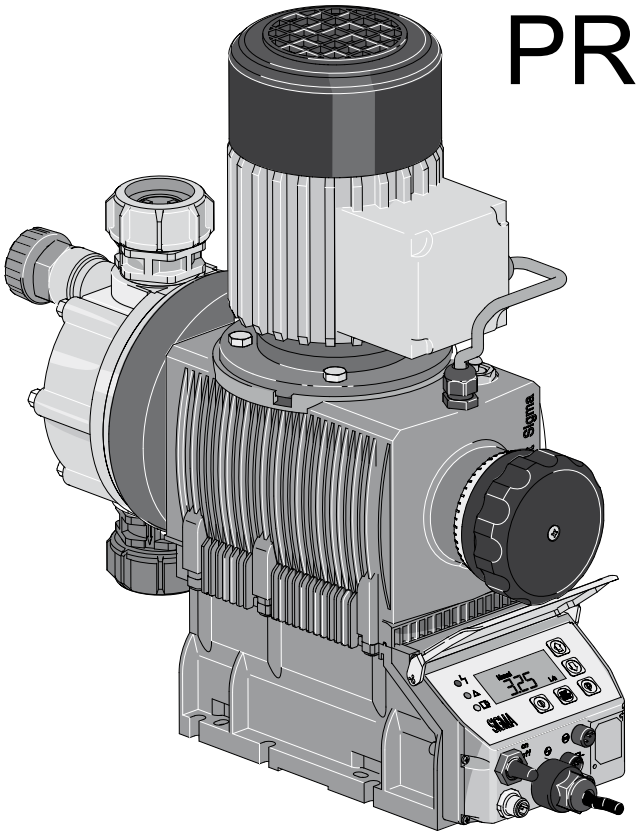
Installation and configuration manual

gamma/ L and Sigma with PROFIBUS®
Function blocks

PROFIBUS®



B0288

Please carefully read these operating instructions before use! · Do not discard!
The operator shall be liable for any damage caused by installation or operating errors!
Technical changes reserved.

Parts no. 985968

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1 Installation of the GSD file in Step 7 Manager

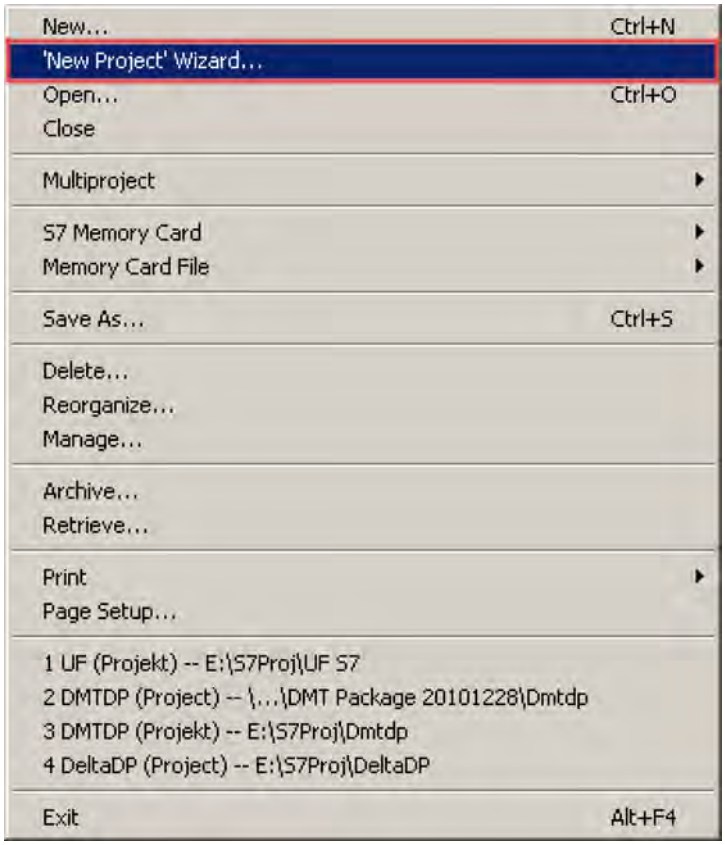
This installation manual is only for persons who are familiar with the Siemens Simatic S7 PLC.

Prerequisites:

The installation package (such as “Delta_S7_function_block” or Gamma-Sigma_S7_function_block”), with the GSD file (such as prom0B02.gsd”) must have been downloaded from the *www.prominent.com* website. (The installation package for the respective product is there.)

The installation package must be open on the PC and the GSD must be copied from the installation package into a folder.

1.1 Creating a project

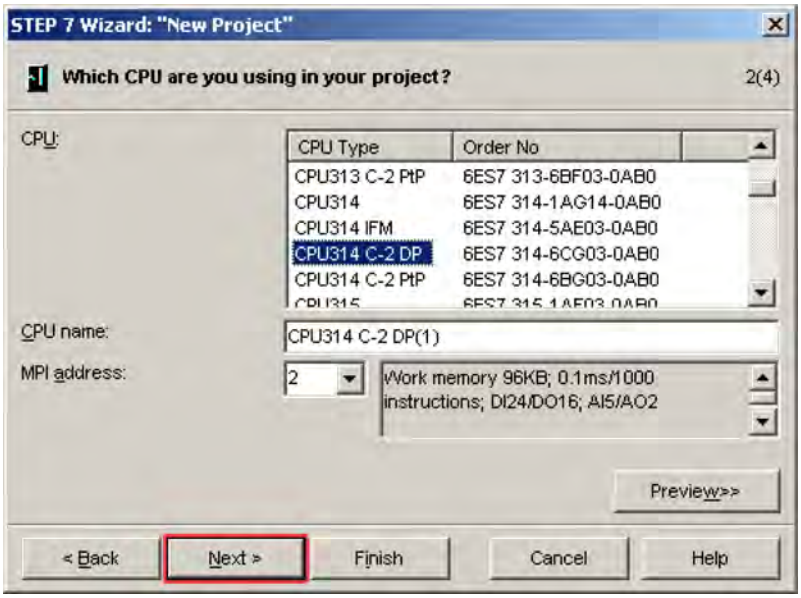


1. Follow the path *"File ➔ 'New Project' Wizard..."* and click with the mouse.

   ⇨ The *"Introduction"* window will be displayed:

2. Click the *[Next>]* button.

   ⇨ The window *"Which CPU are you using in your project?"* will be displayed:

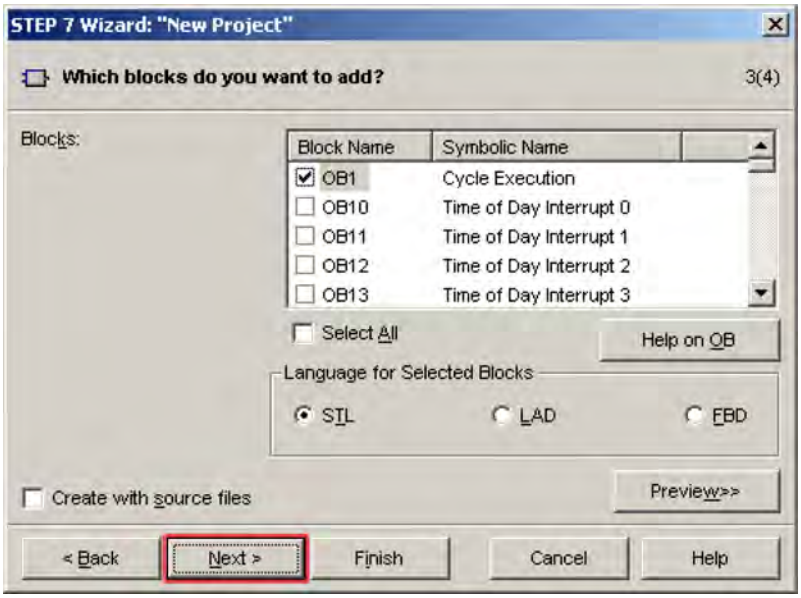


3. Select the correct CPU.

When selecting the correct CPU the software version that is imprinted on the CPU and the order number help.

Click the *[Next>]* button.

⇨ The window *"Which blocks do you want to add?"* will be displayed:



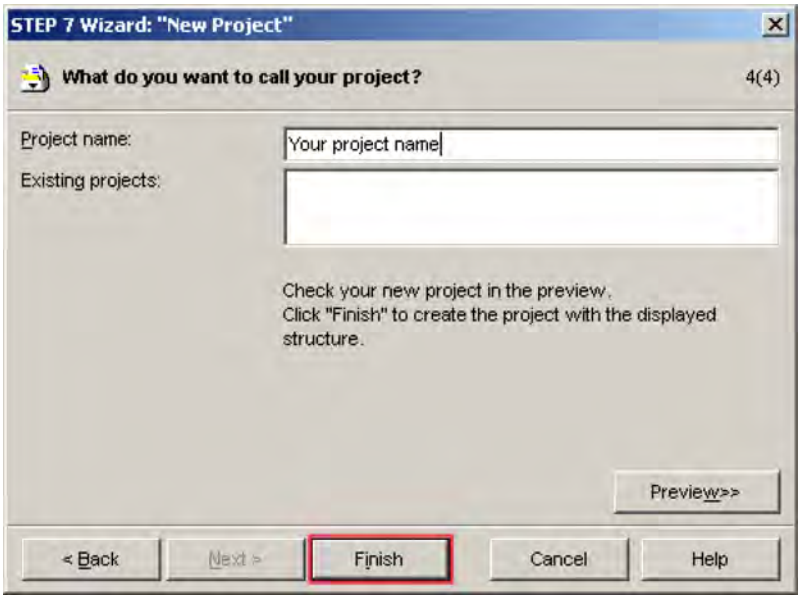
4. Always place a check mark for option block OB1.

5. If the function will be called in selectable time intervals, in addition select OB35 with a check mark (the operation blocks can vary depending on CPU).

A more precise description of the performance scope of the CPU is in your operating manual.

6. Click the *[Next>]* button.

   ⇨ The window *"What do you want to call your project?"* will be displayed:



7. After a project name has been entered (in this case "Profibus_Delta"), click the *[Finish]* button.

   ⇨ The Simatic Manager window will open - see the following chapter.

1.2 Install GSD file

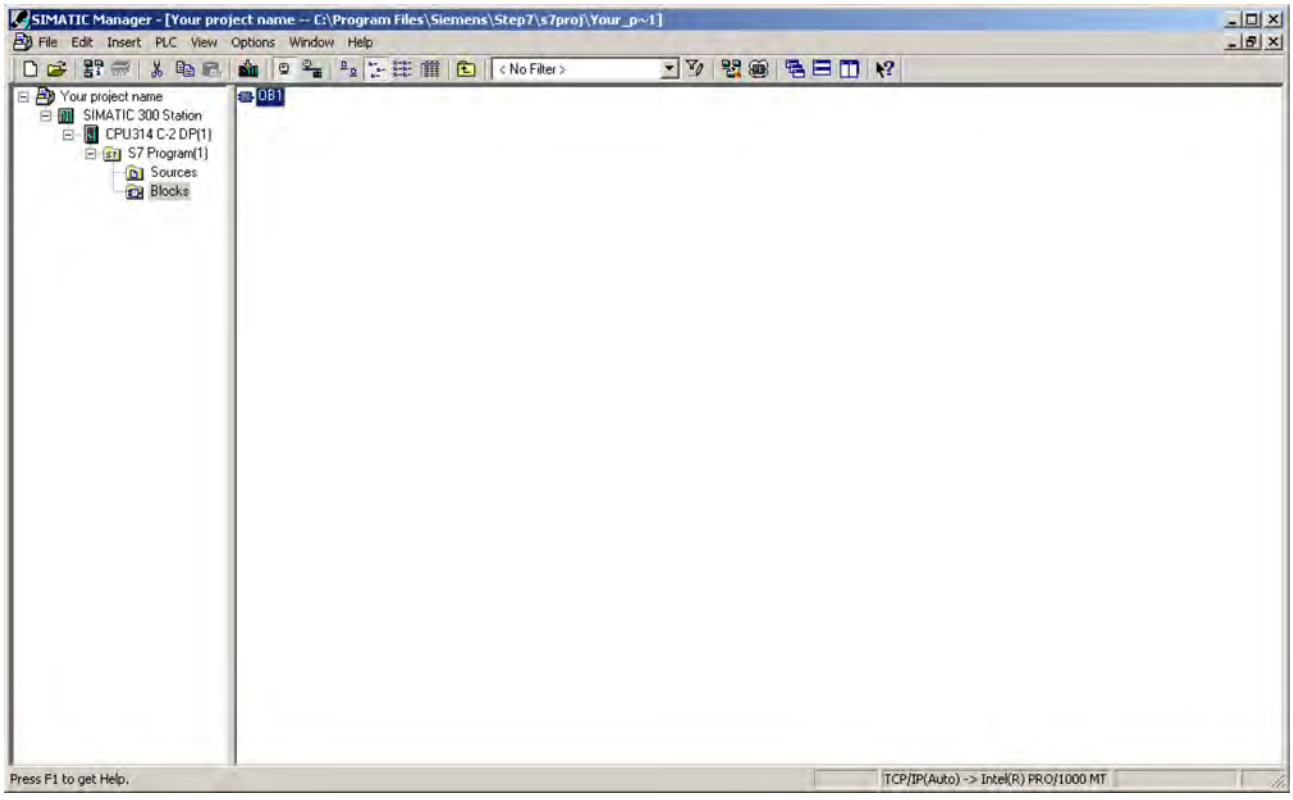


Fig. 1: Simatic Manager with main window with navigation bar

1. In Simatic Manager, in the navigation bar (left) select *"Simatic 300 Station"*.
   ⇨ In the main window a symbol *"Hardware"* is displayed.
2. Double click the *"Hardware"* symbol.
   ⇨ The Hardware Configurator will open:

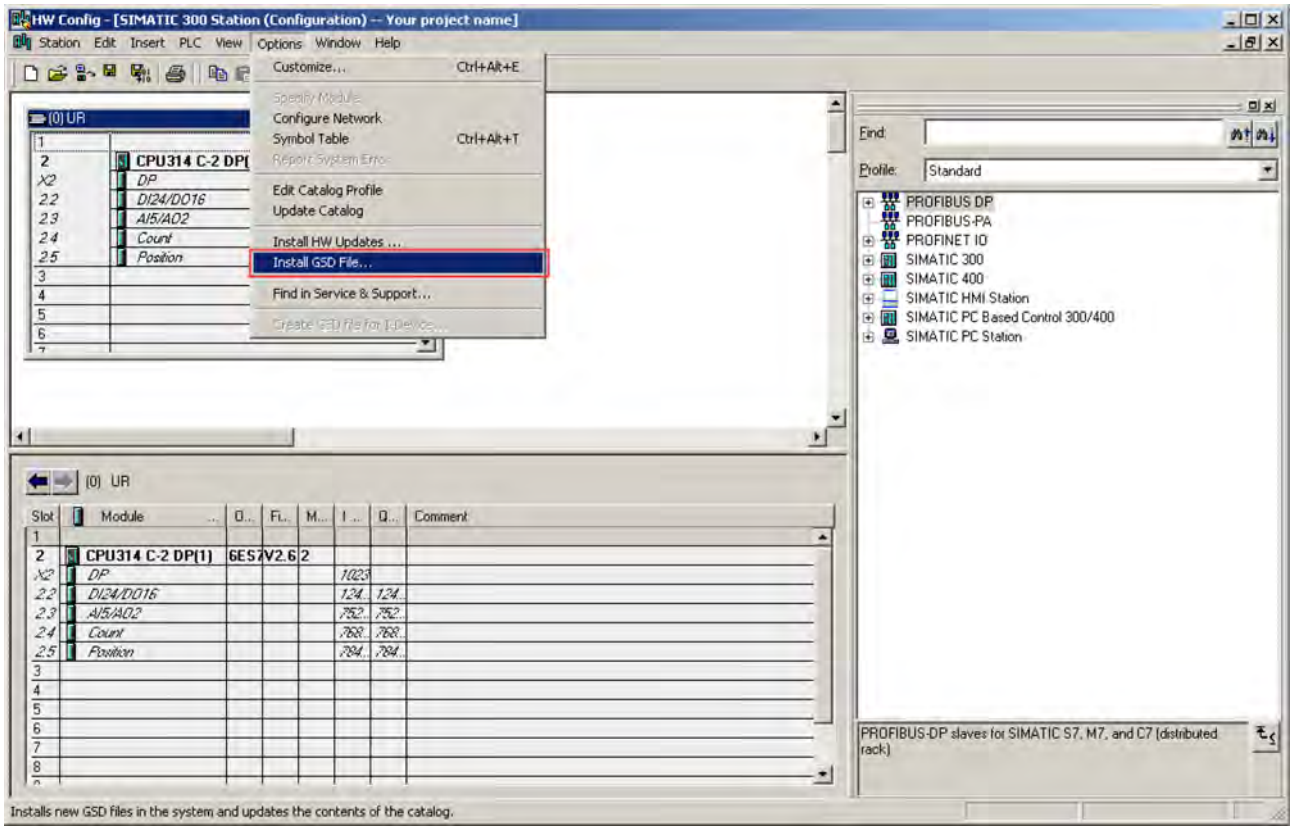
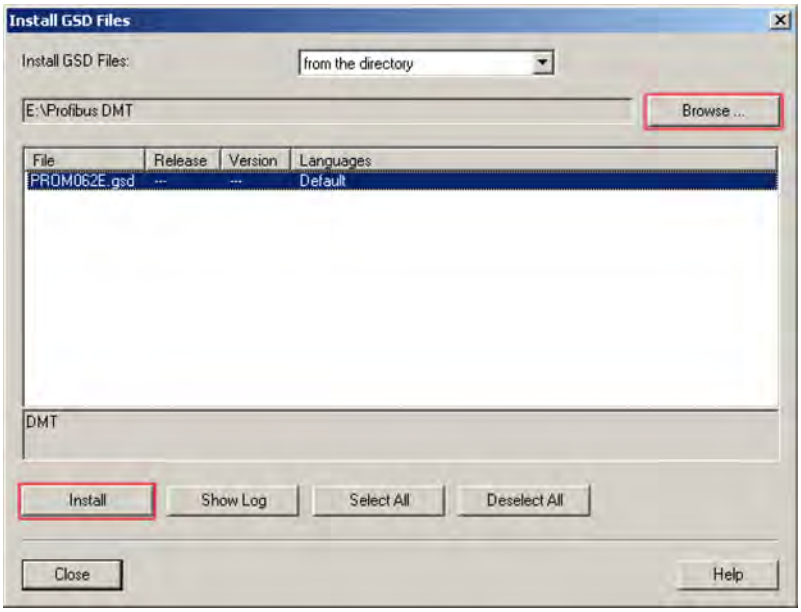


Fig. 2: The Hardware Configurator

3. Follow the path *"Options* ➔ *Install GSD File"* and click with the mouse.
   ⇨ The *"Install GSD File"* window will open:

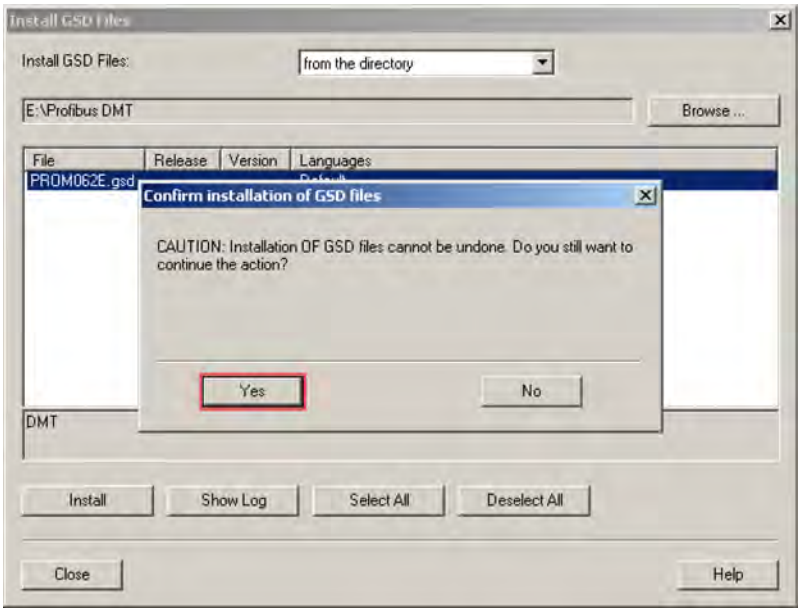


4. Use the *[Browse]* button to select the folder into which you have copied the GSD file. (In this screenshot the folder "Profibus Delta" is on drive "E:").

5. If the path was correct, the GSD file will be displayed in the window. In this screenshot, this is the file “PROM0B02.gsd” for the delta (for gamma/ L or Sigma it would be the file “PROM0596.gsd”).

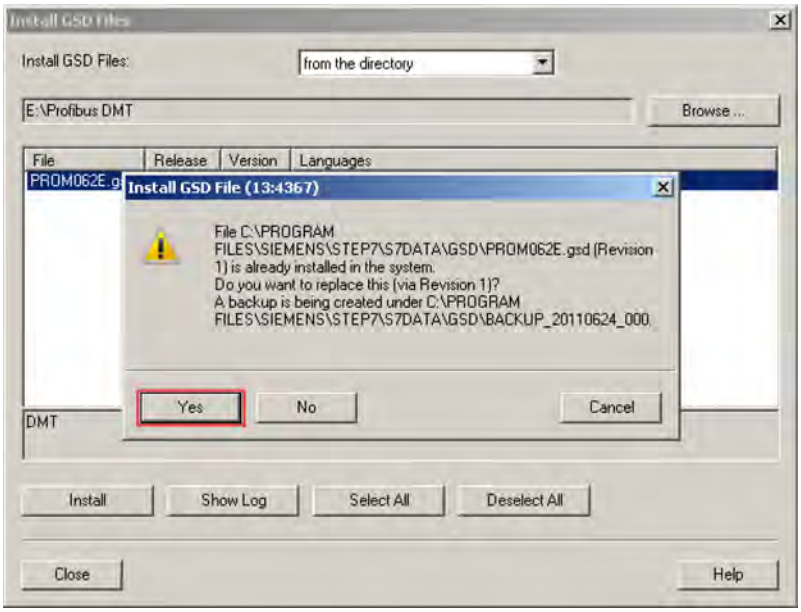
6. Select the file and press the *[Install]* button.

   ⇨ A warning will be displayed stating that the action cannot be undone:



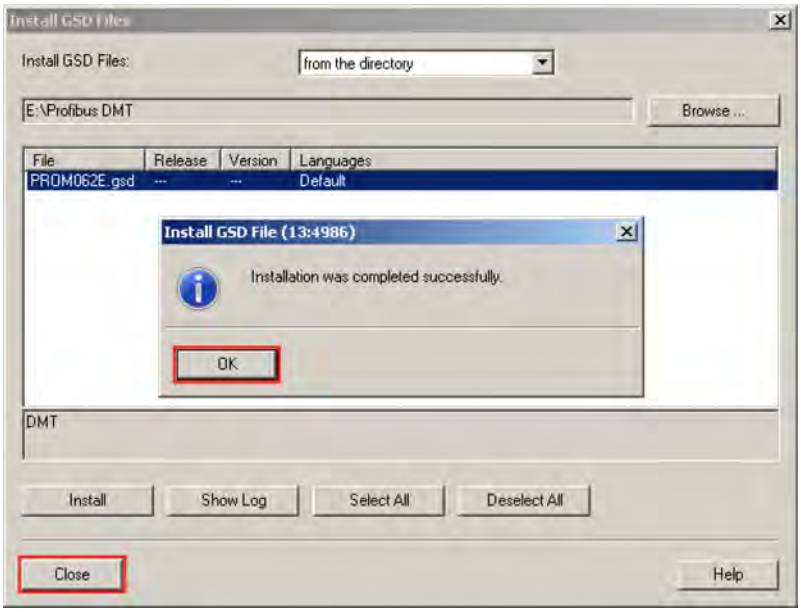
7. Click *[Yes]*.

   ⇨ If this GSD file is already present, the following message will be displayed:



8. Click *[Yes]* to install the GSD file.

   ⇨ The following message will be displayed:



9. Click *[OK]* to conclude the installation.

10. Click *[Close]* to close the window.

The next chapter shows how you can integrate the ProMinent device (pump, measuring transducer, etc.) into your own project.

2 Integrating the device and the function block into your own project

Note: This description cannot go into all the details of PROFIBUS® communication.

If necessary attend an appropriate training course.

2.1 Add PROFIBUS® Master System

This section describes how to add a PROFIBUS® Master System into your own project and how to generate a PROFIBUS® subnet:

1. Double click to open your own project (shown here with a red border) that you created in chapter 1.1:

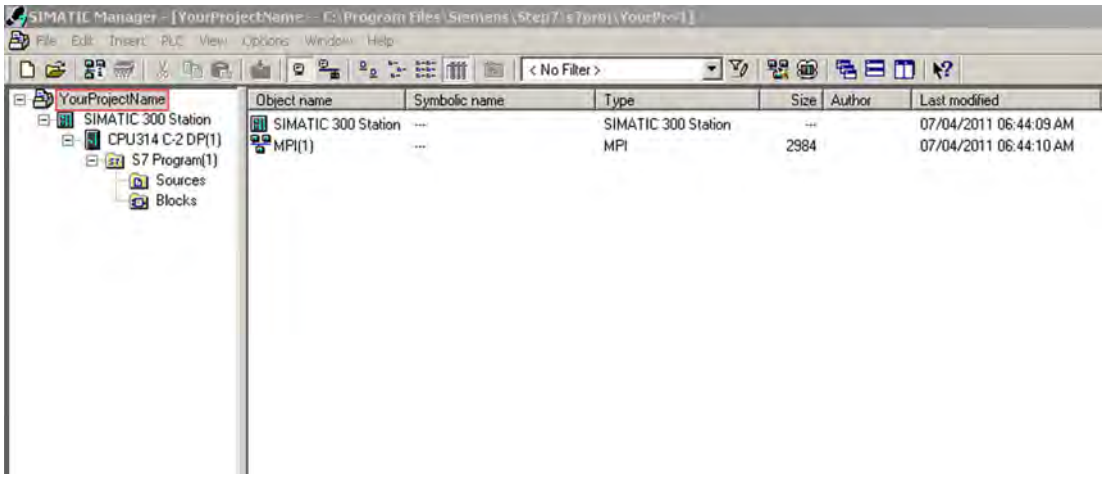


Fig. 3

2. Double click the *"Hardware"* symbol to open the Hardware Configurator:

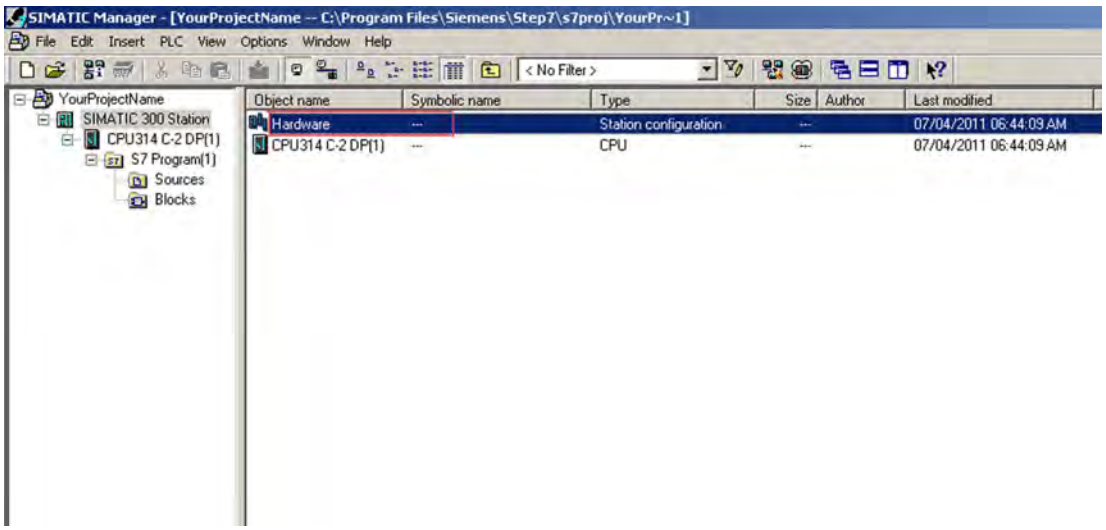


Fig. 4

3. Add a Master System for the CPU: For example, for CPU 314C-2DP, right click slot X2 “DP”.

   ⇨ The context menu will open:

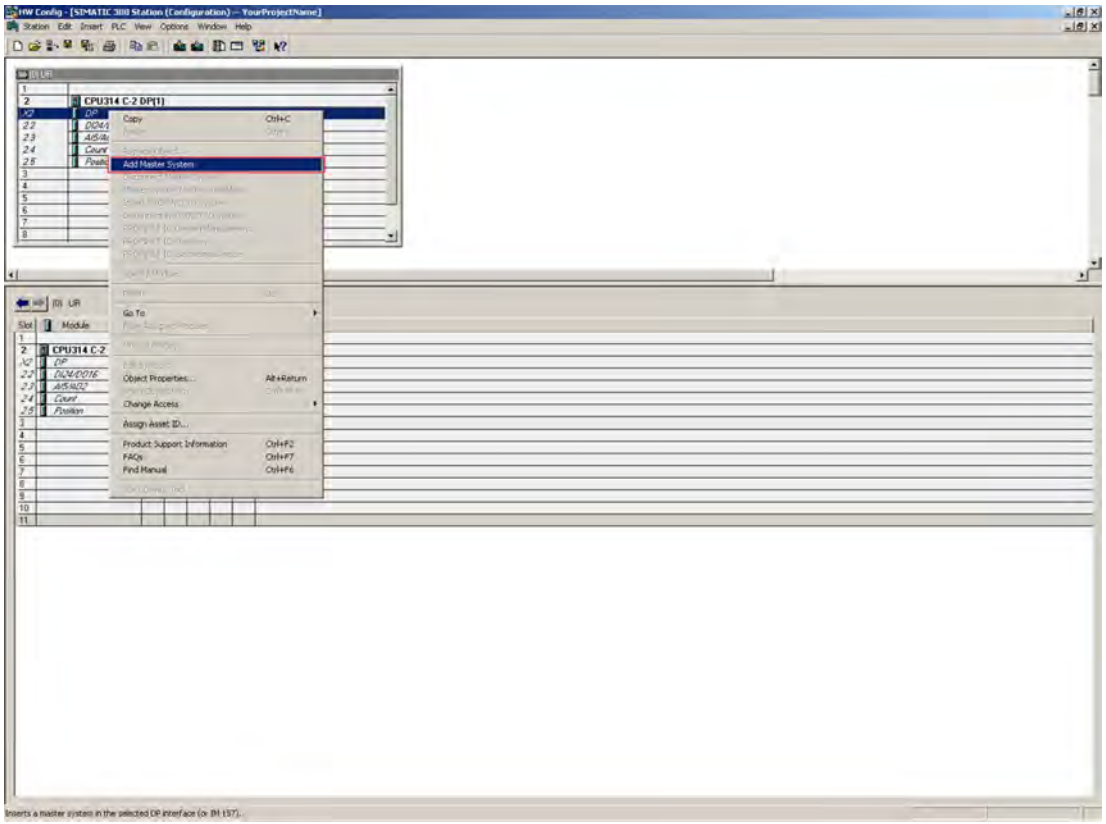


Fig. 5

4. Here select *“Add Master System”*.

   ⇨ The window *“PROFIBUS Interface DP”* will be displayed:

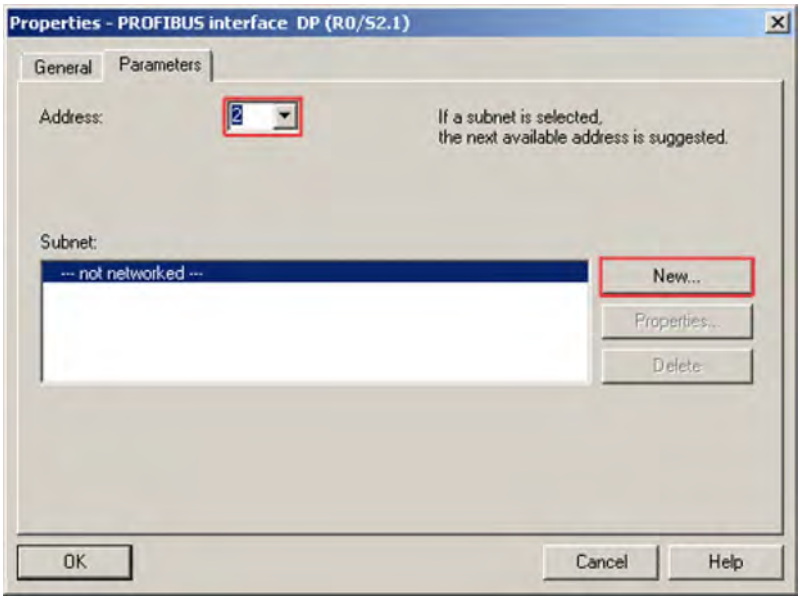


Fig. 6

5. In the *“Parameters”* tab under *“Address”* enter the PROFIBUS® address of the CPU used.

6. Click *[New]*.

⇨ The *"New Subnet PROFIBUS"* will be displayed:

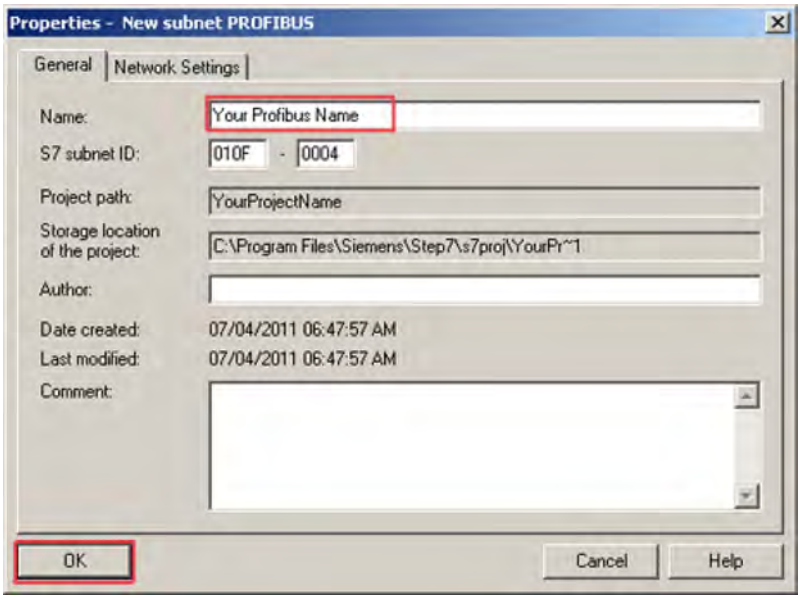


Fig. 7

7. Under *"Name"* enter a name for the subnet of the PROFIBUS and click *[OK]*.

⇨ The window *"PROFIBUS Interface DP"* will be displayed again:

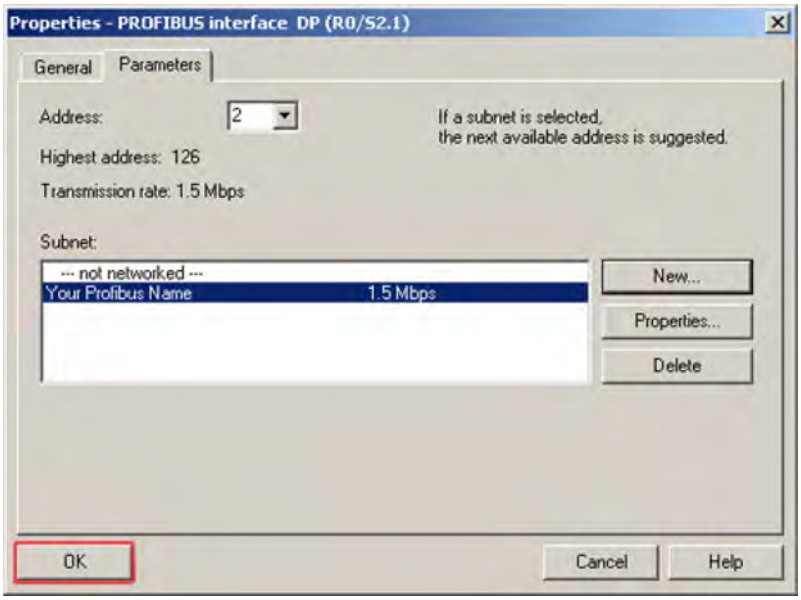


Fig. 8

8. (If necessary via *"Properties"* special PROFIBUS® parameters can be adjusted.)

9. Mark the PROFIBUS® subnet and click *[OK]*.

⇨ The Hardware Configurator connects the CPU (the Master System) with the Subnet of the PROFIBUS®, which the Hardware Configurator now displays in this manner:

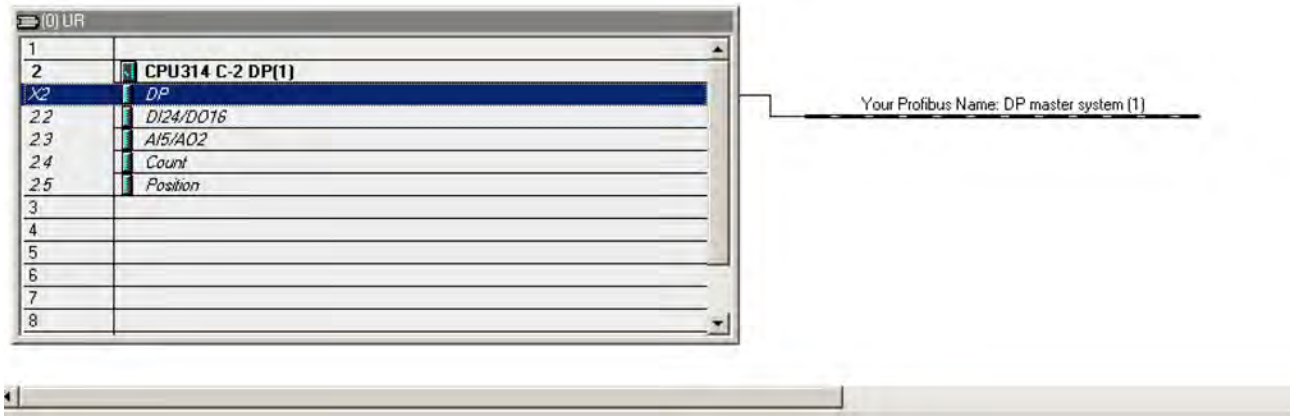


Fig. 9: Graphic presentation: Connection CPU (Master System) with the subnet of the PROFIBUS® in the Hardware Configurator (excerpt)

2.2 Connecting the device to the PROFIBUS® Master System

As soon as the PROFIBUS® master system has been added to the project and the PROFIBUS® subnet is created, the gamma/ L or Sigma metering pump can be connected to the PROFIBUS®:

1. Call the catalog via *"Options ➔ Display Catalog"*.

⇨ To the right in the window you will see:

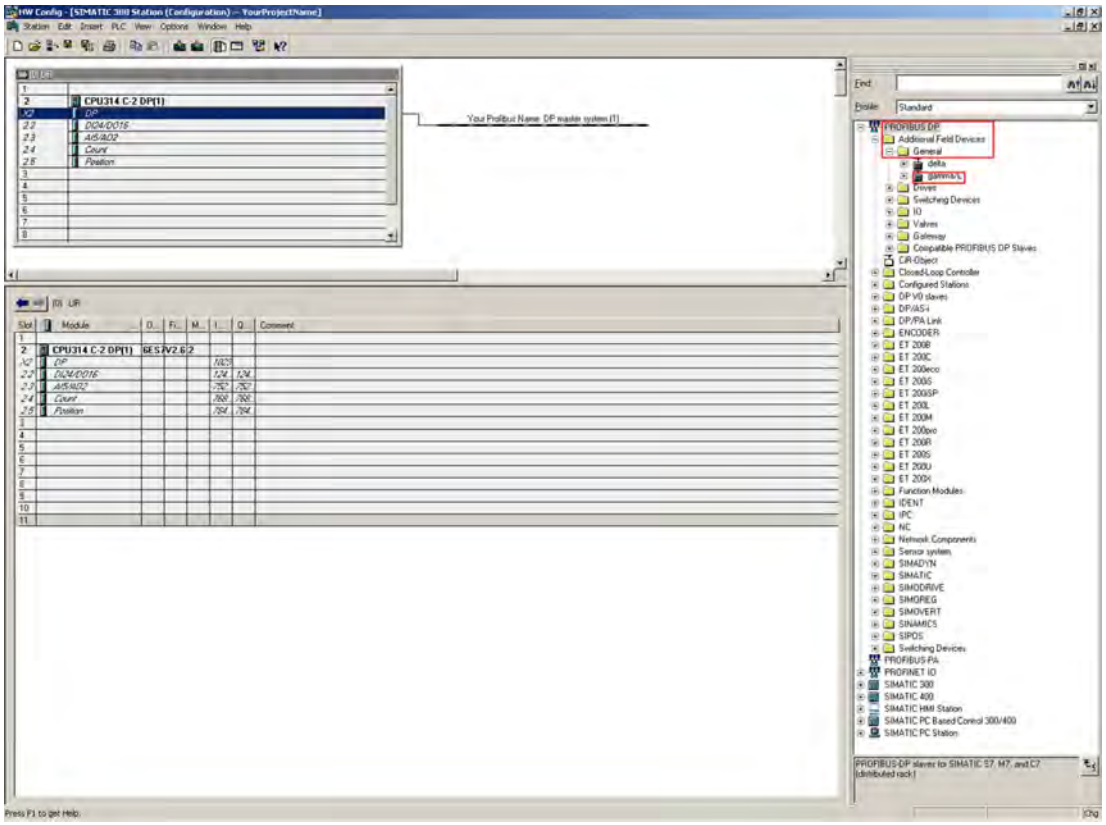


Fig. 10

2. Select the file *"gamma/ L"* under *"Profibus-DP ➔ Additional Field Devices ➔ General"*.

> *If the entry is not present, the GSD file is not correctly installed.*

3. Drag the *"gamma/ L"* file with the mouse to the Master System - see the orange arrow in the screenshot below.

   ⇨ A small "+" will appear as soon as the cursor is on "Your name PROFIBUS DP Master System".

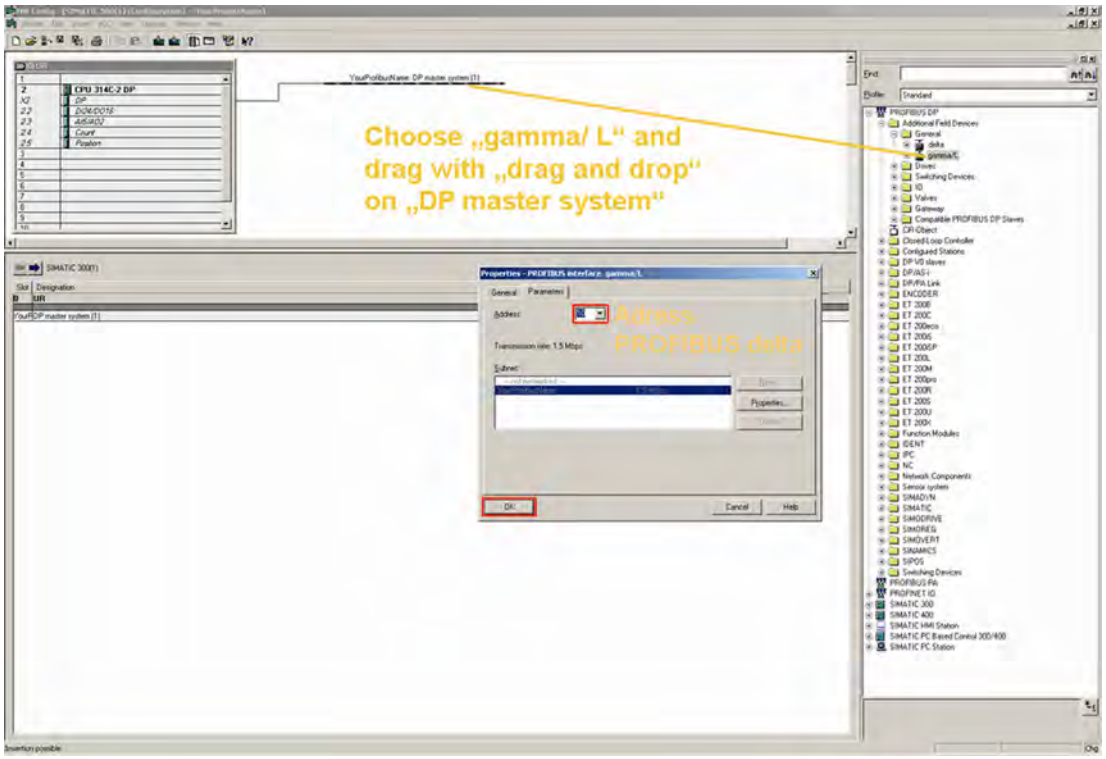


Fig. 11

4. As soon as the mouse button is released a pop-up window will be displayed - see illustration above.

5. Under *"Address"* set the PROFIBUS® that is set on your gamma/ L or Sigma - see supplemental instructions delta with PROFIBUS® - and click *[OK]*.

> *If this address is not displayed (already allocated), enter a new address. Then enter this address on your actual gamma/ L or Sigma, as well.*

⇨ The Hardware Configurator will then connect the gamma/ L or Sigma to the PROFIBUS® Master System (red box, right) via the subnet, which the Hardware Configurator displays in this manner:

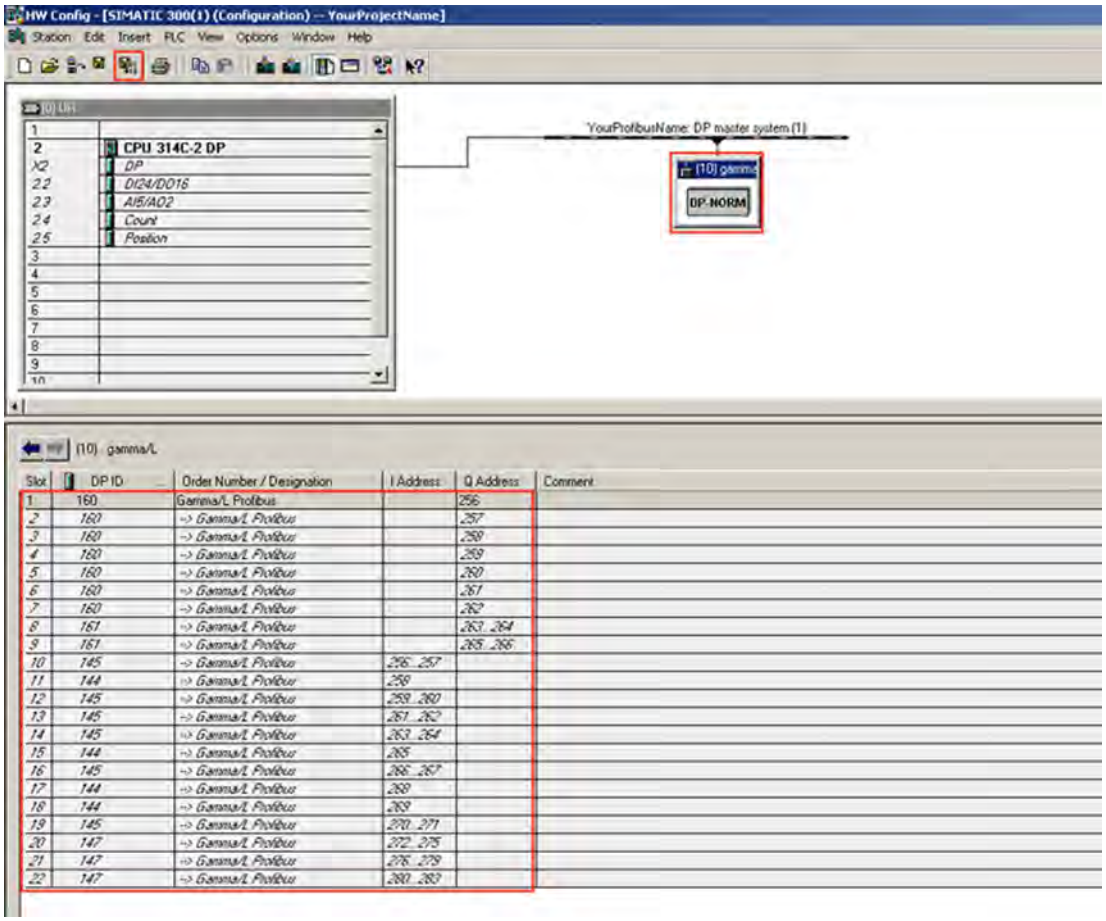


Fig. 12: Connection of the Master System to the delta via the subnet (graphic presentation in the Hardware Configurator)

In the lower window area (red box) the individual slots and their I-addresses and O-addresses (input addresses and output addresses) of the gamma/L or Sigma are displayed.

6. If necessary, adjust the I-address ranges and O-address ranges. To do this double click on the appropriate row.

⇨ A window will open.

7. Here, enter the desired, changed address range and click *[OK]*.

> *The Hardware Configurator will supplement the address range automatically.*
>
> *The Hardware Configurator prevents the address from being allocated twice. It handles I-addresses and O-addresses separately.*

8. Save the addresses via the special diskette symbol with "0110" in the toolbar.

9. Close the Hardware Configurator.

2.3 Copying and linking a function block

The supplied function blocks are embedded in the ProMinent sample project “Gammadp.zip”; this is the only way that they can be transported.

The principle steps:

1 - Download the zipped installation package (such as “Gamma-Sigma_S7_Funktionsblock.zip”) from the website (prerequisite).

2 - Drag the ProMinent sample project “Gammadp.zip” out of the installation package (prerequisite).

3 - Create a function in your own project (here FC1).

4 - Save the zipped ProMinent sample project “Gammadp.zip” in the Simatic Manager and open it - in this process it will simultaneously be unzipped - retrieved.

5 - Copy the function block or the function blocks from this location into your own project.

6 - Link the required function blocks into your own function (in this case FC1).

7 - Generate a data block.

8 - Enter the addresses in the function block.

9 - Enter the function parameters in the function block.

1. In the Simatic Manager in the Navigation window, on the left, select “Blocks” and highlight it.

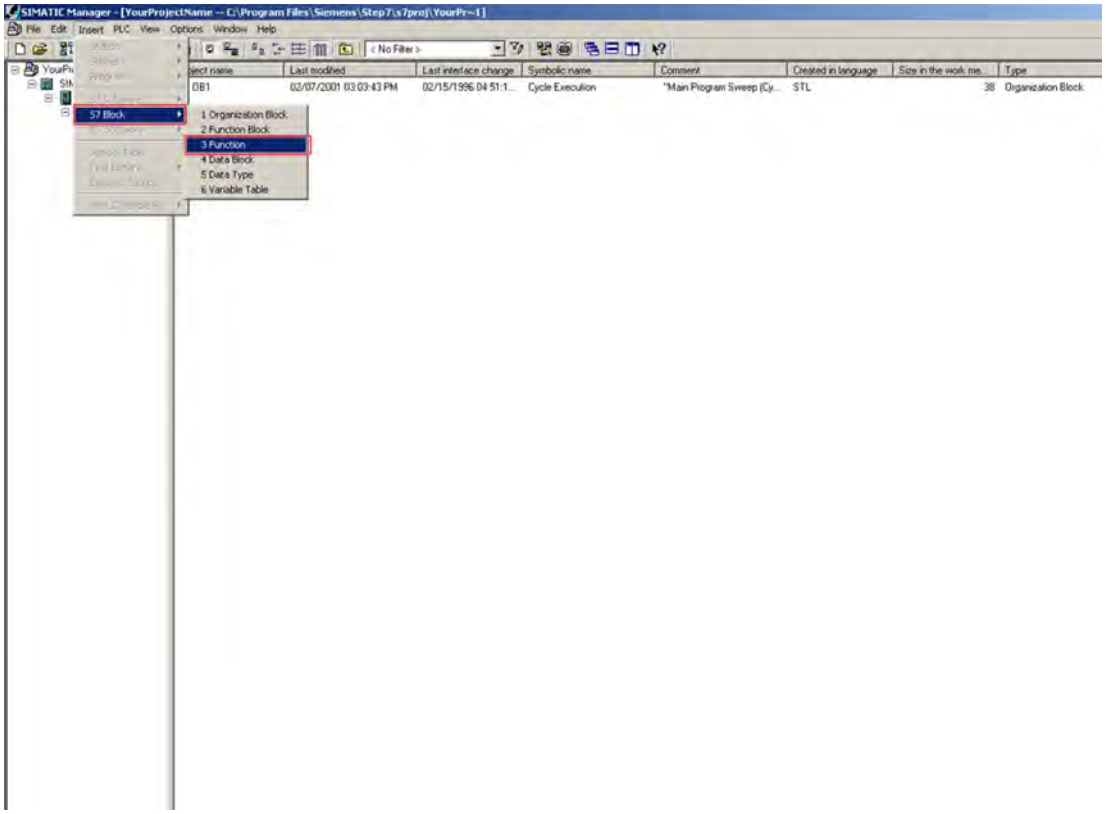


Fig. 13

2. Follow the path *“Insert ➔ S7 Block ➔ 3 Function”* and click with the mouse.

   ⇨ The window *“Properties - Function”* will open

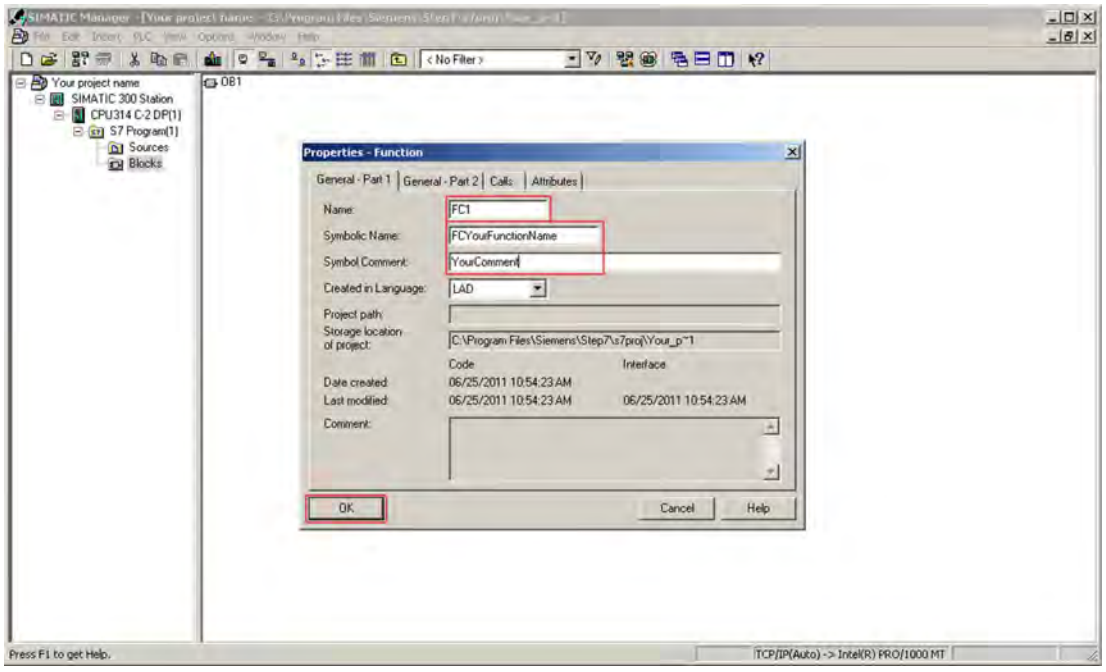


Fig. 14

3. To create the function, here enter a *“name”* (e.g. FC1) and a *“symbolic name”* and under *“Symbol Comment”* enter its meaning. Then click *[OK]*.

   ⇨ In the main window the new function (e.g. FC1) will additionally be displayed.

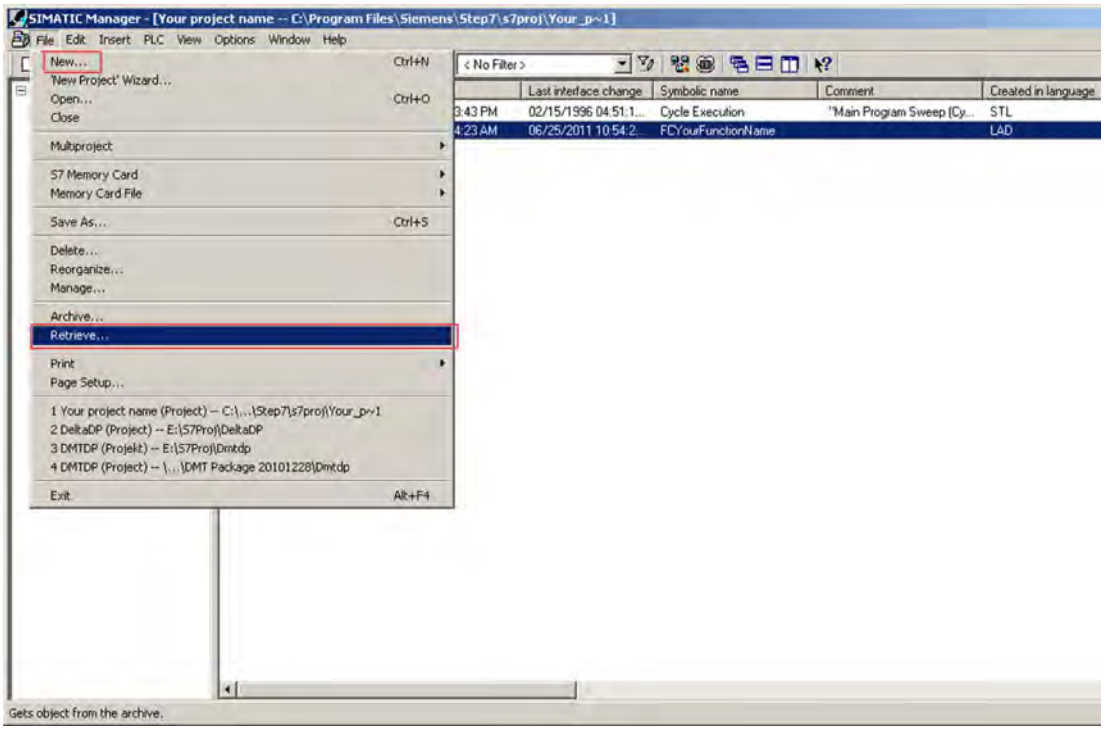


Fig. 15

1. Follow the path *"File ➔ Retrieve ..."* and click with the mouse.

⇨ The window *"Retrieving - Select an archive"* will be displayed:

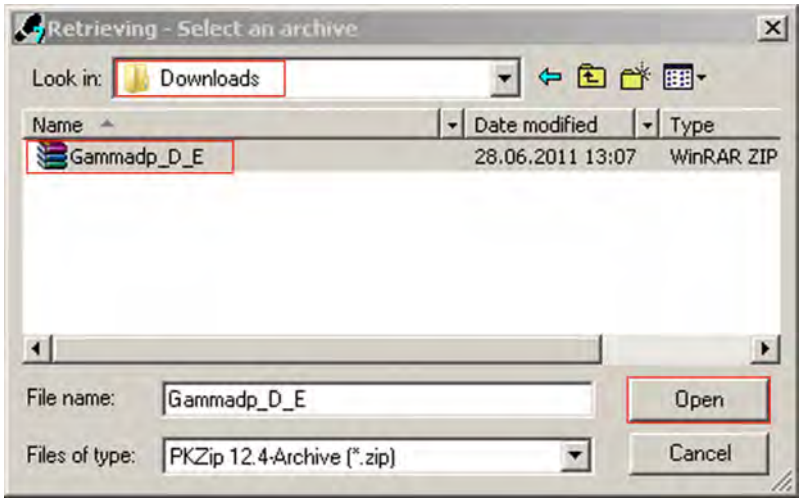


Fig. 16

Archive = ZIP file

Archive = pack (zip)

Retrieve = unpack (unzip)

2. Here select your folder with the packed ProMinent sample project “Gammadp”, and click *[Open]*.

   ⇨ The window *“Select destination directory”* will be displayed.

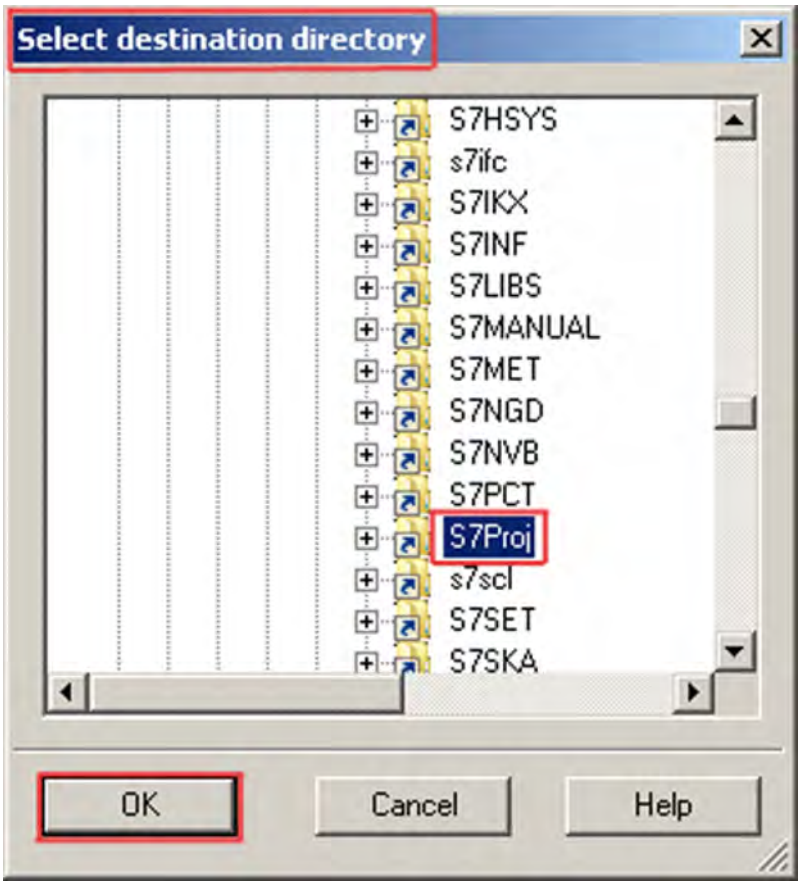


Fig. 17

3. Here select the directory into which the ProMinent sample project will be unzipped, and click *[OK]*.

   ⇨ First a DOS Window (with black background) will be displayed, in which the ProMinent sample project will be unzipped. Then *“Retrieve”* window will be displayed:

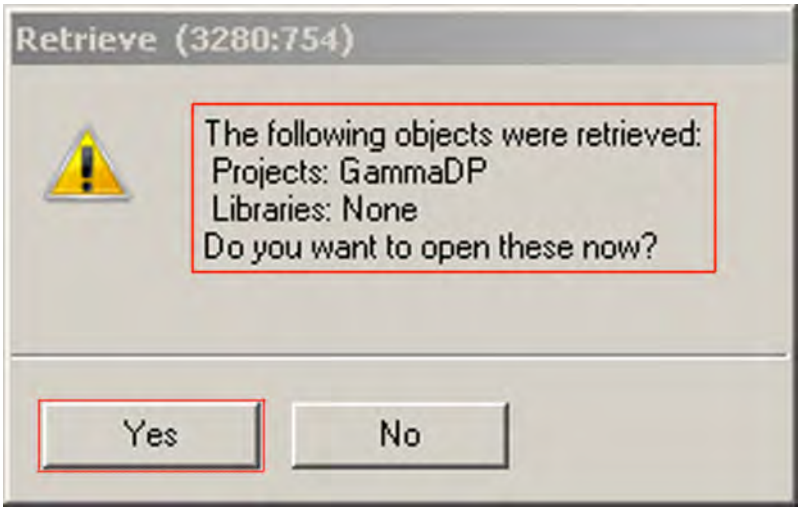
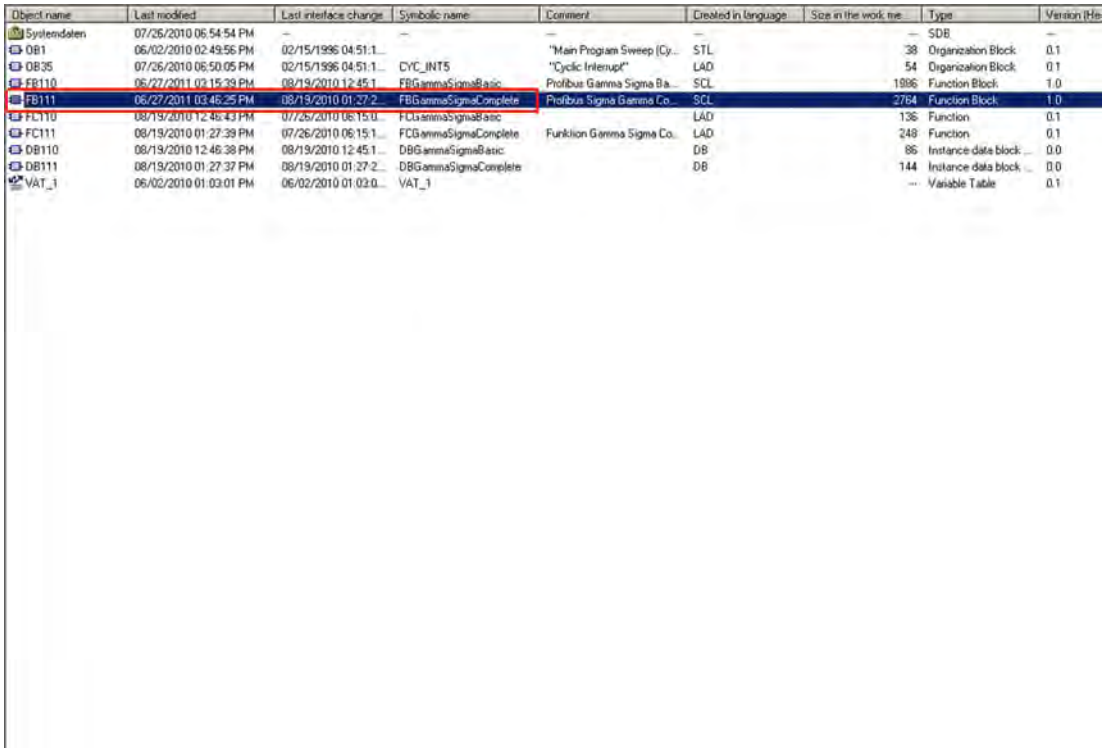


Fig. 18

4. To unpack Click *[Yes]*.

⇨ The SIMATIC Manager now displays the unpacked project:



Object name	Last modified	Last interface change	Symbolic name	Comment	Created in language	Size in the work me...	Type	Version (He
Systemdaten	07/26/2010 06:54:54 PM	–	–	–	–	–	SDB	–
OB1	06/02/2010 02:49:56 PM	02/15/1996 04:51:1...		"Main Program Sweep (Cy...	STL	38	Organization Block	0.1
OB35	07/26/2010 06:50:05 PM	02/15/1996 04:51:1...	CYC_INT5	"Cyclic Interrupt"	LAD	54	Organization Block	0.1
FB110	06/27/2011 03:15:39 PM	08/19/2010 12:45:1...	FBGammaSigmaBasic	Profibus Gamma Sigma Ba...	SCL	1986	Function Block	1.0
FB111	06/27/2011 03:46:25 PM	08/19/2010 01:27:2...	FBGammaSigmaComplete	Profibus Sigma Gamma Co...	SCL	2764	Function Block	1.0
FC110	08/19/2010 12:46:43 PM	07/26/2010 06:15:0...	FCGammaSigmaBasic		LAD	136	Function	0.1
FC111	08/19/2010 01:27:39 PM	07/26/2010 06:15:1...	FCGammaSigmaComplete	Funktion Gamma Sigma Co...	LAD	248	Function	0.1
DB110	08/19/2010 12:46:38 PM	08/19/2010 12:45:1...	DBGammaSigmaBasic		DB	86	Instance data block ...	0.0
DB111	08/19/2010 01:27:37 PM	08/19/2010 01:27:2...	DBGammaSigmaComplete		DB	144	Instance data block ...	0.0
VAT_1	06/02/2010 01:03:01 PM	06/02/2010 01:03:0...	VAT_1			...	Variable Table	0.1

Fig. 19

In this project you will find the 2 standard function blocks FB110 and FB111 (FB110 for the basic version or FB111 for the complete version).

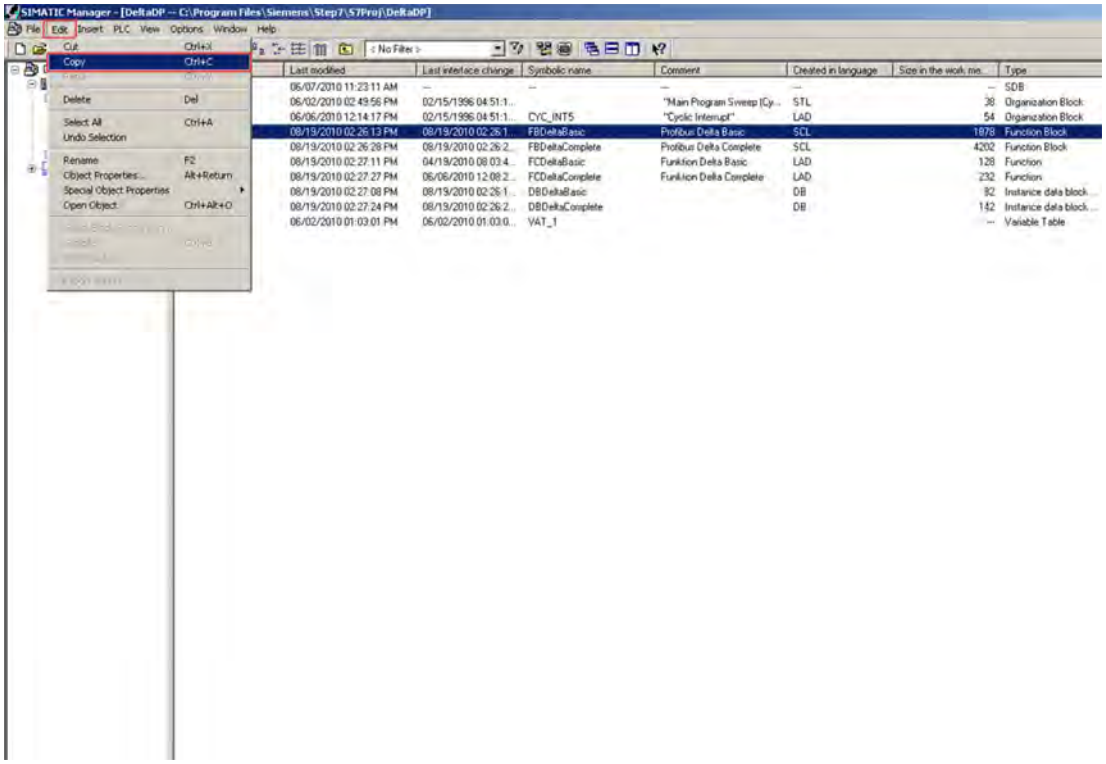


Fig. 20

5. Select the desired function block and copy it via *"Edit ➔ Copy"*, for example.

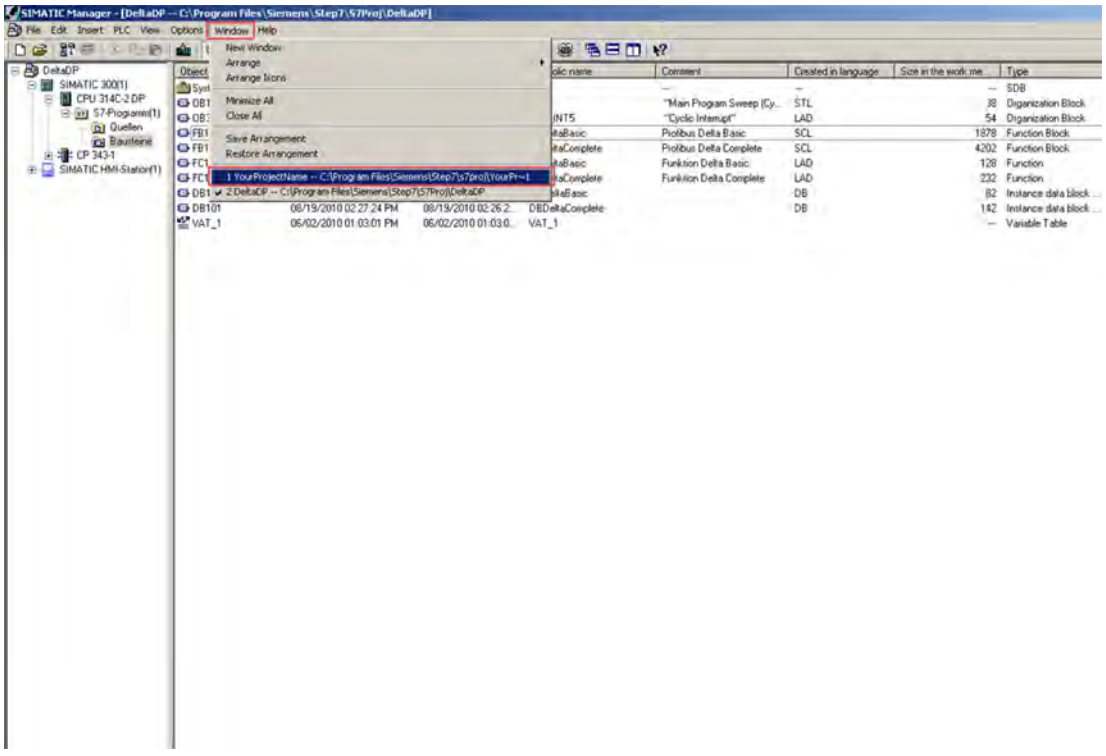


Fig. 21

6. Select your own project in the *"Window"* menu.

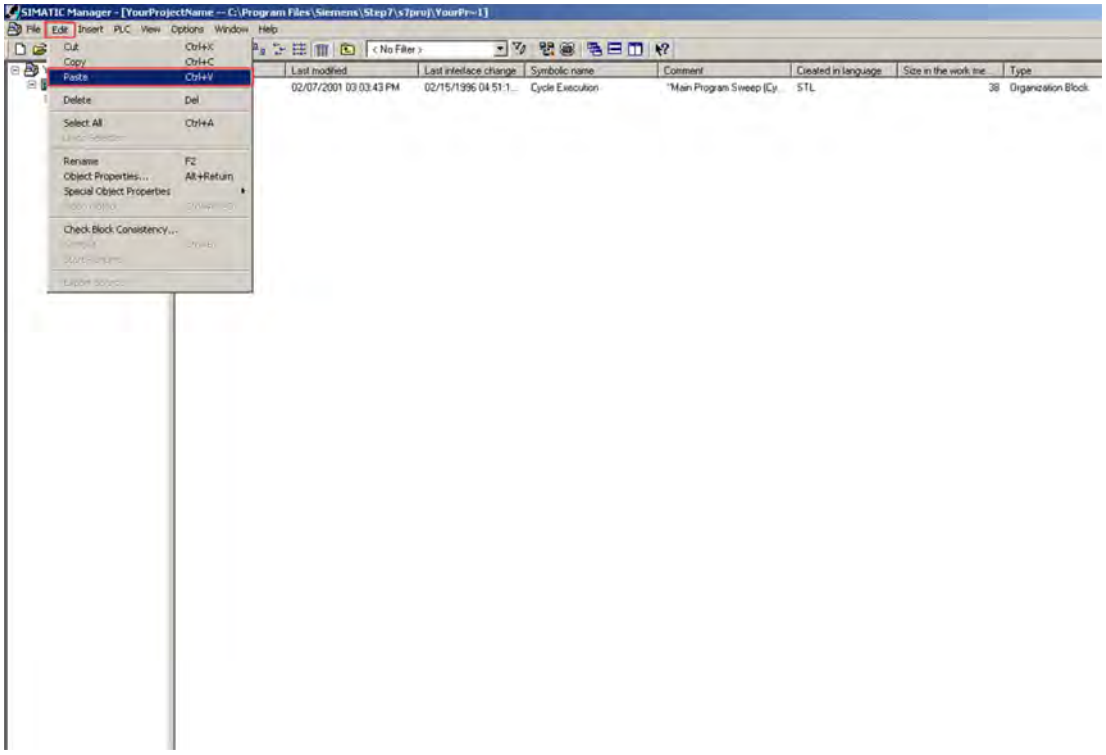


Fig. 22

7. Copy the desired function block into your own project via the *"Edit ➔ Paste"*.

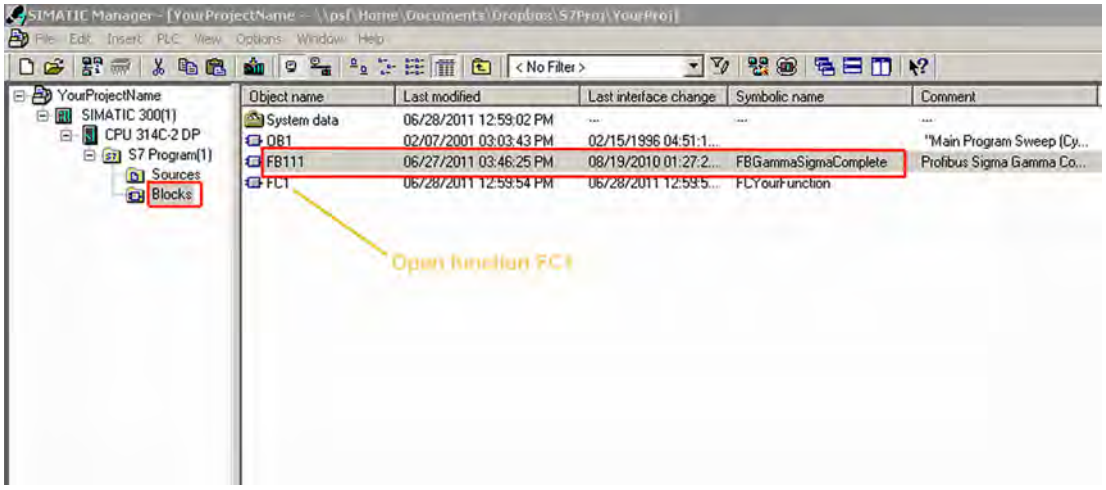


Fig. 23

8. To link the function block into your own function, open the function by clicking it (here, FC1).

⇨ The following window will be displayed:

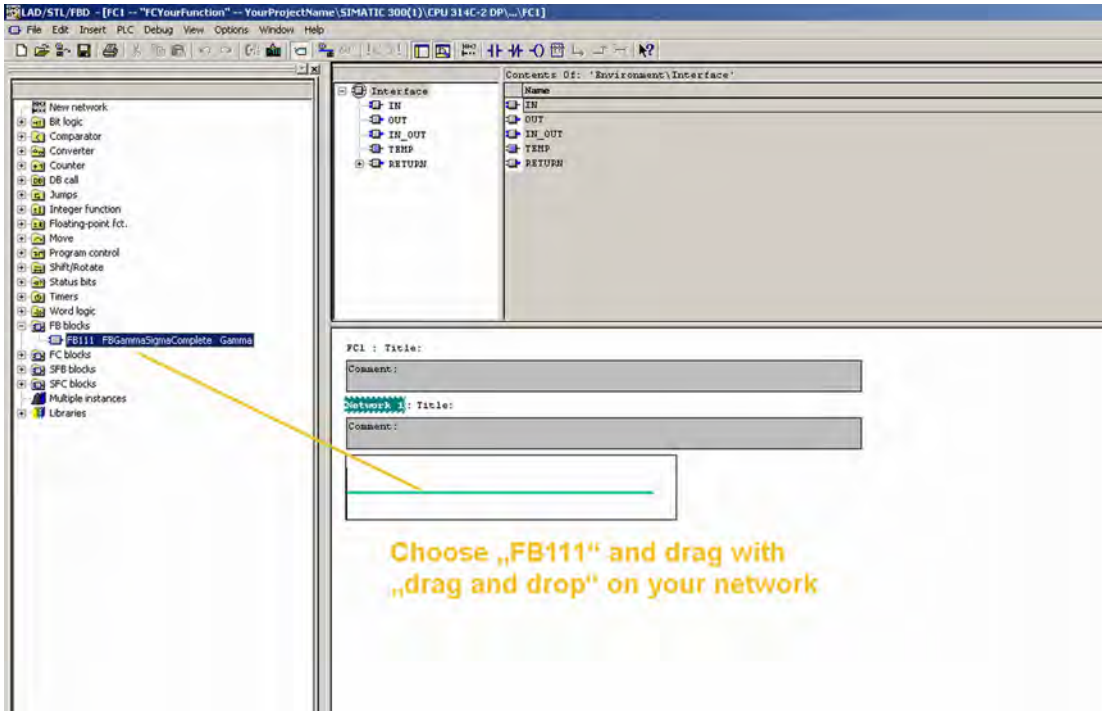


Fig. 24

9. Now drag the function block (here FB110) out of the function block catalog, left, with the mouse into the network shown above - see the orange arrow in the screen shot above.

   ⇨ In the window with the networks, a depiction of the function block is displayed:

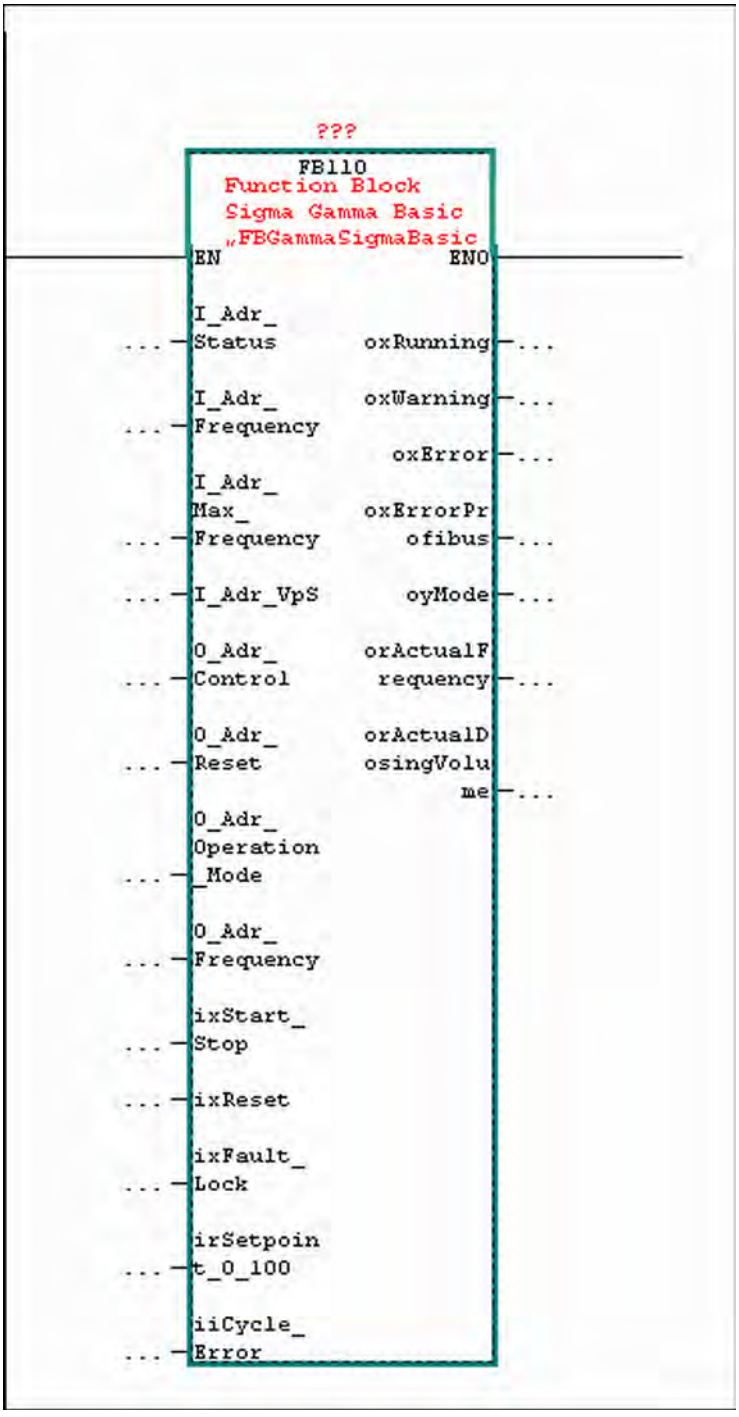


Fig. 25

Each function block needs a data block to save its data (DB ...).

For better understandability use the same number that is used for the function block when naming the data block.

10. Click the red *"???"* and assign a name for the data block of this function block (e.g. "DB110").

In this process the data block will be generated automatically in the background.

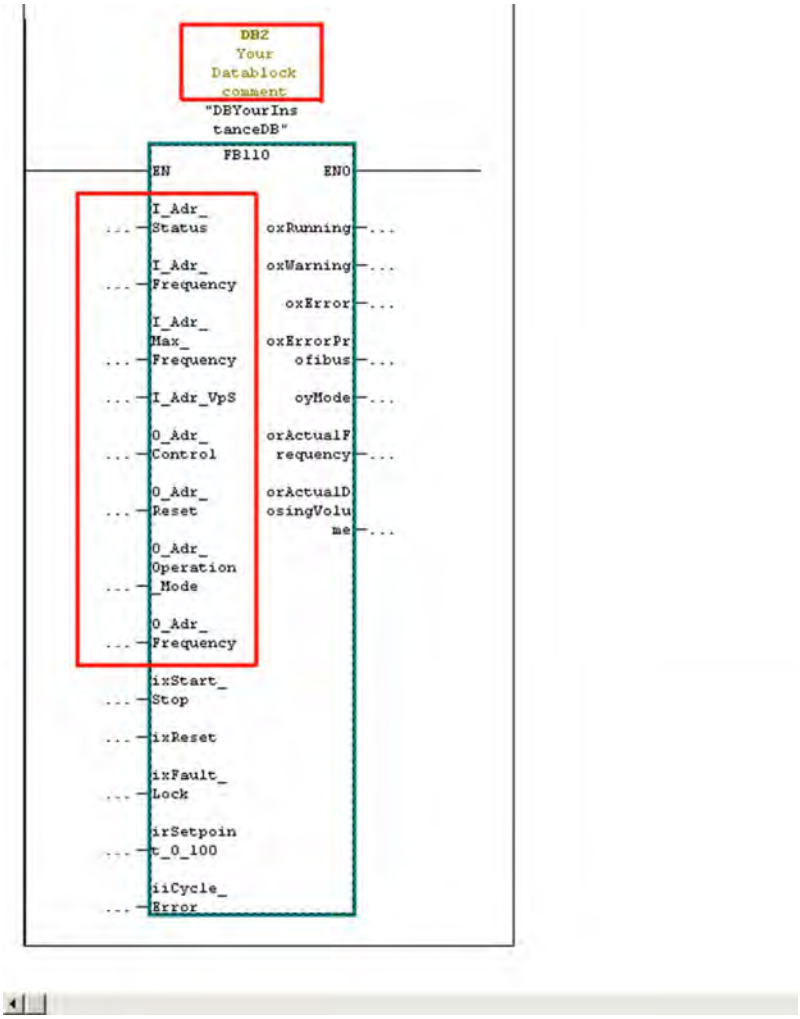


Fig. 26

⇨ Now function block FB110 has the data block DB110 - see 1st red box.

11. Now the complete addresses must still be entered on the input of the function block - see 2nd red box. Then go back to the Hardware Configurator (e.g. via the task bar on the lower edge):

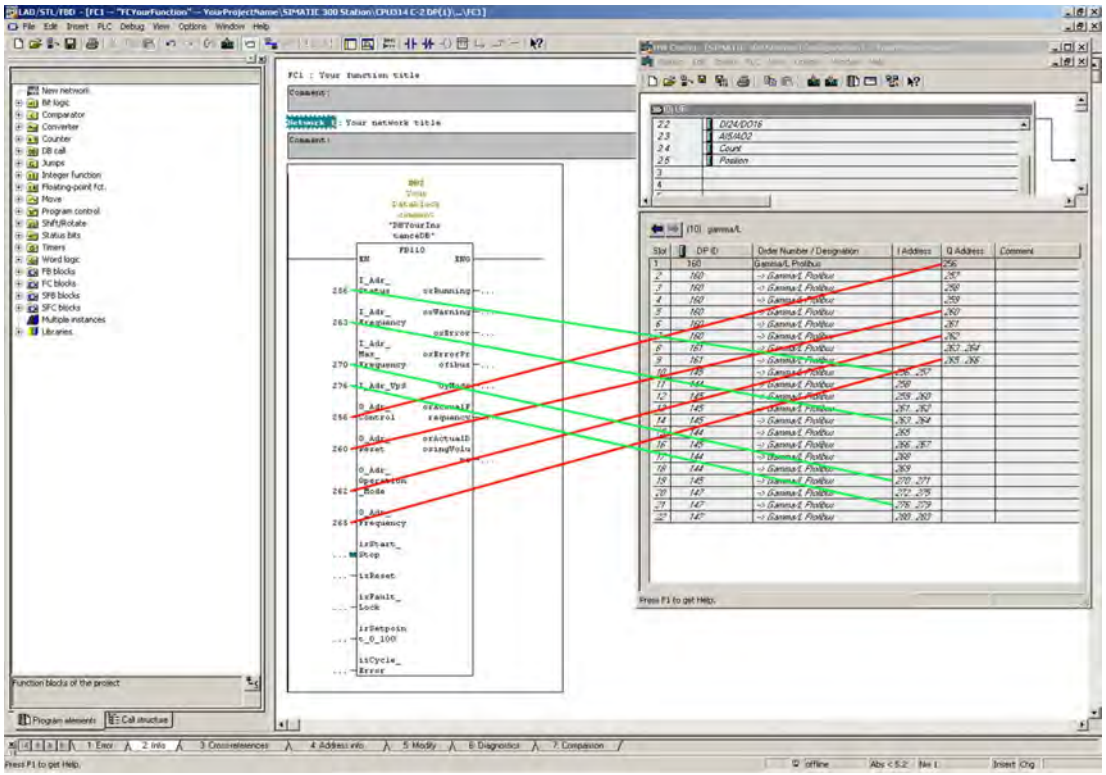


Fig. 27

⇨ The green lines that in the screenshot show the relationship between the input addresses (*"I_Adr_..."* --> *"I-address)"*). The red arrows show the relationship between the output addresses (*"O_Adr_..."* --> *"O-address)"*).

12. In the function block, click in front of the selected address name (left in Fig. 27, bordered).

13. See the table "Relationship: Address names - slots of the function block" for the associated slot of the appropriate function block, in chapter 3.

14. In the Hardware Configurator, find the start address of the appropriate address range for this slot.

15. Enter the start address in the function block and press the *[ENTER]* key.

16. Perform this step for all *"I_Adr_..."* and *"O_Adr_..."*.

17. To specify the remaining parameters, use your own operating concept for this pump and refer to the tables in chapter 3.

3 Function blocks for gamma/L and Sigmas

3.1 Introductory information

Functions of the function blocks

In the sample project there are 2 variants of function blocks:

1 - FB110 for basic functionality

2 - FB111 for complete functionality

1 FB110 for basic functionality contains the functions:

- Start/Stop
- Setpoint 0-100%
- Warning/fault message (group bit)
- Simple PROFIBUS® monitoring

2 FB111 for complete functionality contains the functions:

- Start/Stop
- Selection of setpoint specification/lot
- Batch handling
- Contact activation with specification of a factor
- Setpoint 0-100%
- Stroke counter
- Quantity counter
- Concentration output (option)
- Warning/fault message (group bit)
- Detail specification of the warning
- Detail specification of the fault message
- Simple PROFIBUS® monitoring

Explanation of the names in the standard function blocks

In the hardware address "I_ADR_Name" and "O_ADR_Name" mean ...

I_	Input
O_	Output
ADR_	Address
Name	Name

.

In the interface names “abName” means ...

a (variants)

i	Input
o	Output
stat	Statistical range of the function block

b (variants)

Variant	Type	Value range	
x	Bool	false, true	
y	Byte	0 ... 255	16#00... 16#FF
i	Int	0 ... 65535	-32768 ... 32767

Variant	Type	Value range	
d	DInt	0 ... 4294967295	−2147483648 ... 2147483647
r	Real	-3.402822E +38 ... -1.175495E-38	1.175495E-38 ... 3.402822E+38

Name

Name

3.2 Function block FB110 for basic functionality

Appearance of the function block FB110 for basic functionality

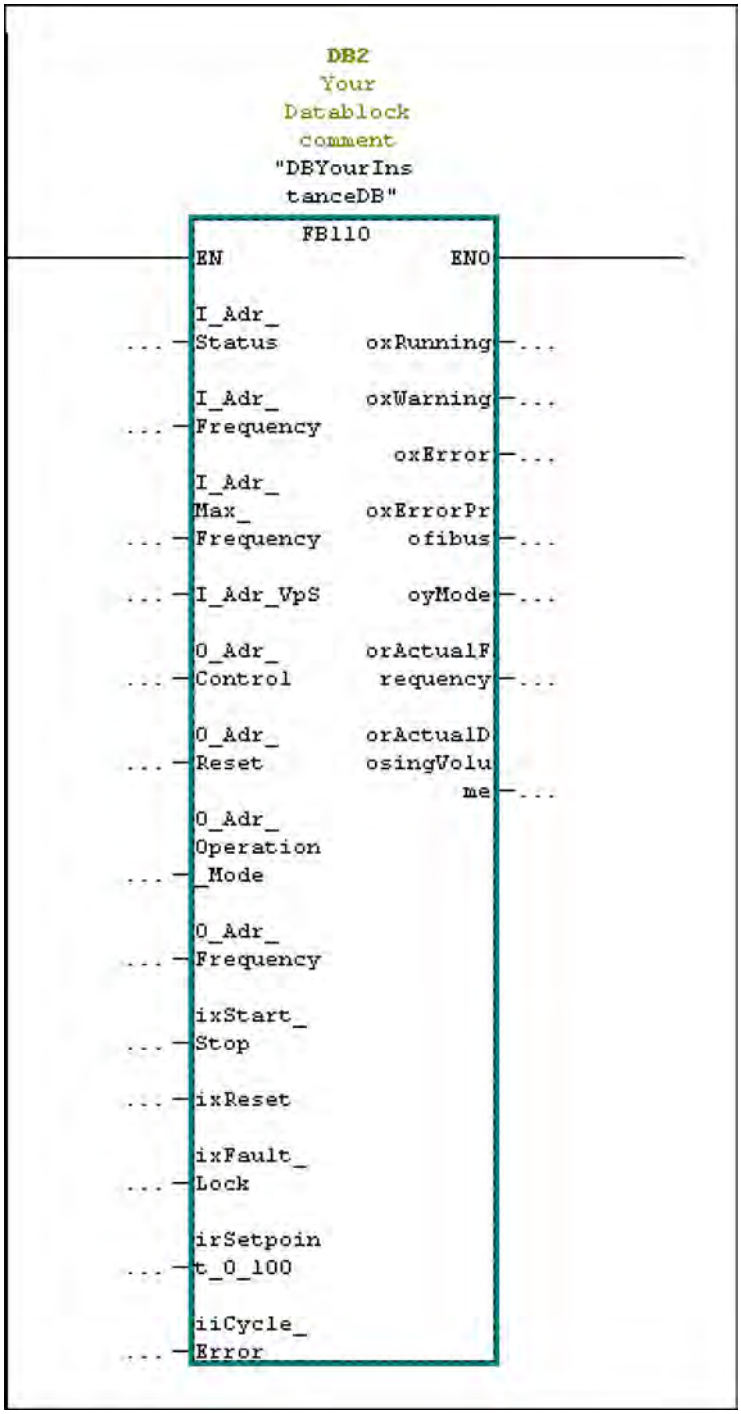


Fig. 28

Address name of the function block - slots of the function block

Address	Type	Slot
I_Adr_Status	Int	10
I_Adr_Frequency	Int	14
I_Adr_Max_Frequency	Int	19
I_Adr_VpS	Int	21

Address	Type	Slot
O_Adr_Control	Int	1
O_Adr_Reset	Int	5
O_Adr_Operation_Mode	Int	7
O_Adr_Frequency	Int	9

The input addresses or output addresses of gamma/ L or Sigma for the CPU can be read out in the Hardware Configurator under gamma/ L or Sigma for the appropriate slots:

Relationship: Slots - address ranges of the function block

Slot	DP ID ...	Order Number / Designation	I Address	Q Address	Co
1	160	Gamma/L Profibus		256	
2	160	-> Gamma/L Profibus		257	
3	160	-> Gamma/L Profibus		258	
4	160	-> Gamma/L Profibus		259	
5	160	-> Gamma/L Profibus		260	
6	160	-> Gamma/L Profibus		261	
7	160	-> Gamma/L Profibus		262	
8	161	-> Gamma/L Profibus		263...264	
9	161	-> Gamma/L Profibus		265...266	
10	145	-> Gamma/L Profibus	256...257		
11	144	-> Gamma/L Profibus	258		
12	145	-> Gamma/L Profibus	259...260		
13	145	-> Gamma/L Profibus	261...262		
14	145	-> Gamma/L Profibus	263...264		
15	144	-> Gamma/L Profibus	265		
16	145	-> Gamma/L Profibus	266...267		
17	144	-> Gamma/L Profibus	268		
18	144	-> Gamma/L Profibus	269		
19	145	-> Gamma/L Profibus	270...271		
20	147	-> Gamma/L Profibus	272...275		
21	147	-> Gamma/L Profibus	276...279		
22	147	-> Gamma/L Profibus	280...283		

Fig. 29

A more detailed explanation of the functions that are assigned to the slots is provided in the “Supplemental manual for gamma/ L and Sigma versions with PROFIBUS®”.

Interfaces of the function block

Interfaces	Type	Description
ixStart_Stop	Bool	If a 1 is applied on this input and if there is no fault, the pump will be activated. If the pump does not run or is not at a standstill the following causes are possible: ■ PROFIBUS® is faulty ■ Pump is not in PROFIBUS® mode ■ PROFIBUS® address is not correct ■ Configuration is not correct ■ Pump is manually set to stop ■ Setpoint is on 0% (irSetpoint_0_100) ■ ixFault_Lock = 1 and oxError = 1 or oxProfibus = 1 ■ Use Profibus Workaround Adapt iiCycle_Error
ixReset	Bool	Resets the bit messages oxWarning, oxError and oxErrorProfibus. Resets the pump (positive flank sent).
ixFault_Lock	Bool	If 0, then the pump does not include a locking mechanism for stored faults. Logical link: Start pump = ixStart_Stop i.e. because the faults oxError and oxErrorProfibus require acknowledgment, the pump automatically starts up again if there is a fault on both sides. If 1, then the pump does not include a locking mechanism via fault messages oxError or oxErrorProfibus. Logical link: Start pump = ixStart_Stop & oxError = 0 & oxErrorProfibus = 0 i.e because the faults oxError and oxErrorProfibus require acknowledgment, the pump does not automatically start up again if there is a fault on both sides.
irSetpoint_0_100	Real	Entry of the setpoint of the metering pump in %. The formula of the calculation is: Set frequency = MaxFrequency * irSetpoint / 100 Through the real number the speed on the stroke can be precisely selected, because the entry of 49.99%, for example, is possible. Likewise a direct connection of the integrated S7 controller is possible. For this the output parameter LMN must be connected on this input.

Interfaces	Type	Description
iiCycle_Error	Int	Specification of the cycles as delay of the warning and fault oxWarning, oxError and oxErrorProfibus. Through the delay short drop-outs in the PROFIBUS® system can be bridged. The delay time is calculated as follows: When using the function block in OB1: Delay = measured cycle time * iiCycle_Error When using the function block in OB35: Delay = time wake alarm * iiCycle_Errror This value uses the workaround Profibusbug. If the pump is not at a standstill, or if it does not start up on its own after a Profibus fault, adjust the value so that a value of approx. 1s is achieved. Example: Call block of pump P1 every 50 ms, then the value 20 should be set.
oxRunning	Bool	0 = pump is at standstill 1 = pump is running
oxWarning	Bool	0 = No warning 1 = Warning active
oxError	Bool	0 = no fault 1 = fault active
oxErrorProfibus	Bool	0 = Profibus OK 1 = Profibus faulty
oyMode	Byte	00 = Manual 01 = Batch 02 = Contact 03 = Analogue
orActualFrequency	Real	Actual stroke frequency in strokes/min
orActualDosingVolume	Real	For calibrated pump: Actual metering quantity in l or gallons For uncalibrated pump: Value 0

Statistical range of the instance block and flag

34.0	stat	stat_Max_Freq	REAL	0.000000e...	0.000000e	Maximum Frequency of pump in strokes/min
38.0	stat	Status.Error	BOOL	FALSE	FALSE	1=Fault, 0=No Fault
38.1	stat	Status.Warnings	BOOL	FALSE	FALSE	1=Warning, 0=No Warning
38.2	stat	Status.Intake	BOOL	FALSE	FALSE	1=Suction active, 0=Suction inactive
38.3	stat	Status.Auxiliary	BOOL	FALSE	FALSE	1=Pump is in auxiliary mode, 0=Pump is not in auxiliary mode
38.4	stat	Status.Pause	BOOL	FALSE	FALSE	1=Pause active, 0=Pause inactive
38.5	stat	Status.Stop	BOOL	FALSE	FALSE	1=Pump active, 0=Pump is stoped
38.6	stat	Status.Flow	BOOL	FALSE	FALSE	1=Flow control present, 0=Flow control not present
38.7	stat	Status.FlowActive	BOOL	FALSE	FALSE	1=Flow control active, 0=Flow control inactive
39.0	stat	Status.Reserve	BOOL	FALSE	FALSE	Reserve
39.1	stat	Status.FactorDivider	BOOL	FALSE	FALSE	1=1/100, 0=1/1
39.2	stat	Status.BatchMemory	BOOL	FALSE	FALSE	1=Batch memory active, 1=Batch memory inactive
39.3	stat	Status.Unit	BOOL	FALSE	FALSE	1=Gallons, 0=Liter
39.4	stat	Status.Calibrated	BOOL	FALSE	FALSE	1=Pump is calibrated, 0=Pump is not calibrated
39.5	stat	Status.PBWD	BOOL	FALSE	FALSE	1=Profibus connection, 0=No Profibus connection
40.0	stat	iiCycleWarning	INT	0	0	Flag cycles for Warnings
42.0	stat	iiCycleFault	INT	0	0	Flag cycles for Faults
44.0	stat	iiCycleFaultPB	INT	0	0	Flag cycles for Faults Profibus

Fig. 30

Description of the variables of the function block (statistical range)

Variable	Type	Description
stat_Max_Freq	Real	Get maximum frequency via profibus of the pump. Conversion of the number into the real format
Status.Error	Bool	Errors are present.
Status.Warnings	Bool	Warnings are present.
Status.Intake	Bool	Pump is in intake operation (higher-level function - see metering pump operating manual)
Status.Auxiliary	Bool	Pump is in auxiliary mode (higher-level function)
Status.Pause	Bool	Pump is switched to pause (higher-level function)
Status.Stop	Bool	Pump is stopped
Status.Flow	Bool	1 = Metering monitor present
Status.FlowActive	Bool	1 = Metering monitor activated
Status.FactorDivider	Bool	1 =1/100, 0=1/1
Status.BatchMemory	Bool	1 = Batch memory is activated
Status.Unit	Bool	1 = Gallons, 0 = Litres
Status.Calibrated	Bool	1 = Pump is calibrated
Status.PBWD	Bool	1 (always)

Flags of the function block

Flag name	Type	Description
iiCycleWarning	Int	Flag - for how many cycle has the warning already been queued. If this counter is > iiCycle_Error, then oxWarning will be set
iiCycleFault	Int	Flag - for how many cycle has the fault has already been queued. If this counter is > iiCycle_Error, then oxError will be set
iiCycleFaultPB	Int	Flag - for how many cycle has the fault Profibus already been queued. If this counter is > iiCycle_Error, then oxErrorProfibus will be set
iiWorkaround	Int	Internal use for workaround
iiWorkaround2	Int	Internal use for workaround

3.3 Function block FB111 for complete functionality

3.3.1 Explanations of the operating modes

An the input *"iyMode"*, these operating modes can be selected:

00 - Manual

01 - Batch

02 - Contact

03 - Analog

3.3.1.1 Manual mode

In *"manual"* mode the follow signals are relevant:

- ixStart_Stop
- irSetpoint0_100
- ixFault_Lock
- oxError
- oxErrorProfibus

The pumps starts, if:

ixStartStop = 1 & (ixFault_Lock = 0 or (ixFault_Lock = 1 & oxError = 0 & oxErrorProfibus = 0)

with metering speed (strokes / h)

Maximum frequency * irSetpoint0_100 / 100

The pump does not start up, if:

ixStartStop = 0

3.3.1.2 Mode type batch

In *"Charge"* mode the following signals are relevant:

- ixStart_Stop
- ixStartBatch_Or_Contact
- ixBatchContactMemory
- irSetpoint0_100
- idStrokesInBatch
- ixFault_Lock
- oxError
- oxErrorProfibus
- odActualStrokesInBatch
- odRemainStrokesInBatch

Without memory function: ixBatchContactMemory = 0

With the input *"ixStart_Stop"* the pump can be switched off at any time.

Recommendation for operation: *"Set ixStart_Stop"* on 1 and only on 0 if needed.

The input *"irSetpoint0_100"* specifies the metering speed.

Locking mechanism = manual mode

"ixStartStop" = 1 & (*"ixFault_Lock"* = 0 or (*"ixFault_Lock"* = 1 & *"oxError"* = 0 & *"oxErrorProfibus"* = 0)

Metering speed (strokes / h) =

Maximum frequency * *"irSetpoint0_100"* / 100

The pump does not start up, if:

"ixStartStop" = 0

The pumps starts, at:

Positive flank on input *"ixStartBatch_Or_Contact"*.

Remaining strokes will be set to the value *"idStrokesInBatch"* (*"odRemainStrokesInBatch"* = *"idStrokesInBatch"*). The metering pump runs until the remaining strokes counter is on 0.

A renewed flank on *"ixStartBatch_Or_Contact"* resets the value of the remaining strokes to *"idStrokesInBatch"*. If the flank occurs during the batch, the value will be limited to only idStrokesInBatch.

With memory function: ixBatchContactMemory = 1

Same as "Without memory function: ixBatchContactMemory = 0, but ...

The pumps starts, at:

Positive flank on input *"ixStartBatch_Or_Contact"*.

Remaining strokes will be set to the value *"idStrokesInBatch"* (*"odRemainStrokesInBatch"* = *"idStrokesInBatch"*). The metering pump runs until the remaining strokes counter is on 0.

A renewed flank on *"ixStartBatch_Or_Contact"* resets the value of the remaining strokes to *"idStrokesInBatch"*. If the flank on *"ixStartBatch_Or_Contact"* increases the value of the remaining strokes by *"idStrokesInBatch"*.

3.3.1.3 Mode type contact

In *"contact"* mode the following signals are relevant:

- ixStart_Stop
- ixStartBatch_Or_Contact
- ixBatchContactMemory
- irSetpoint0_100
- iiTransMultiplier (1_9999 = 0.01 - 99.99)
- ixFault_Lock
- oxError
- oxErrorProfibus

Without memory function: ixBatchContactMemory = 0

With the input *"ixStart_Stop"* the pump can be switched off at any time.

Recommendation for operation: *"Set ixStart_Stop"* on 1 and only on 0 if needed.

The input *"irSetpoint0_100"* specifies the metering speed.

Locking mechanism = manual mode

"ixStartStop" = 1 & (*"ixFault_Lock"* = 0 or (*"ixFault_Lock"* = 1 & *"oxError"* = 0 & *"oxErrorProfibus"* = 0)

Metering speed (strokes / h) =

Maximum frequency * *"irSetpoint0_100"* / 100

The pump does not start up, if:

"ixStartStop" = 0

The pumps starts, at:

Positive flank on input *"ixStartBatch_Or_Contact"*.

Number of strokes = *"iiTransMultiplier"*

Example 1

If *"iiTransMultiplier"* = 500 (corresponds to 5 strokes) is set,

then the number of strokes = 5.00 = 5 (per positive flank).

Example 2

If *"iiTransMultiplier"* = 50 (corresponds to 0.5 strokes) is set,

then the number of strokes = 0.5 = 2 (per positive flank), i.e. every 2 flanks the pump makes 1 stroke.

A renewed flank on *"ixStartBatch_Or_Contact"* sets the value of the remaining strokes to *"iiTransMultiplier"*.

With memory function: ixBatchContactMemory = 1

Same as “Without memory function: ixBatchContactMemory = 0, but ...

A renewed flank on *"ixStartBatch_Or_Contact"* increases the value of the remaining strokes by *"iiTransMultiplier"*.

Example	Prerequisite: Two remaining strokes are still in memory. If *"iiTransMultiplier"* = 500 (corresponds to 5 strokes) is set, then the number of strokes = 5 (per positive flank) + 2 = 7.

3.3.1.4 Analog mode

In *"analog"* mode the following signals are relevant:

- ixStart_Stop
- ixFault_Lock
- oxError
- oxErrorProfibus

The pumps starts, if:

ixStartStop = 1 & (ixFault_Lock = 0 or (ixFault_Lock = 1 & oxError = 0 & oxErrorProfibus = 0)

with metering speed (strokes / h) in accordance with setting mA:

4mA = x strokes,

20mA = y strokes * (mA on pump /(y – x) strokes)

The pump does not start up, if:

ixStartStop = 0

3.3.2 Tables for the addresses

Appearance of the function block FB111 for complete functionality

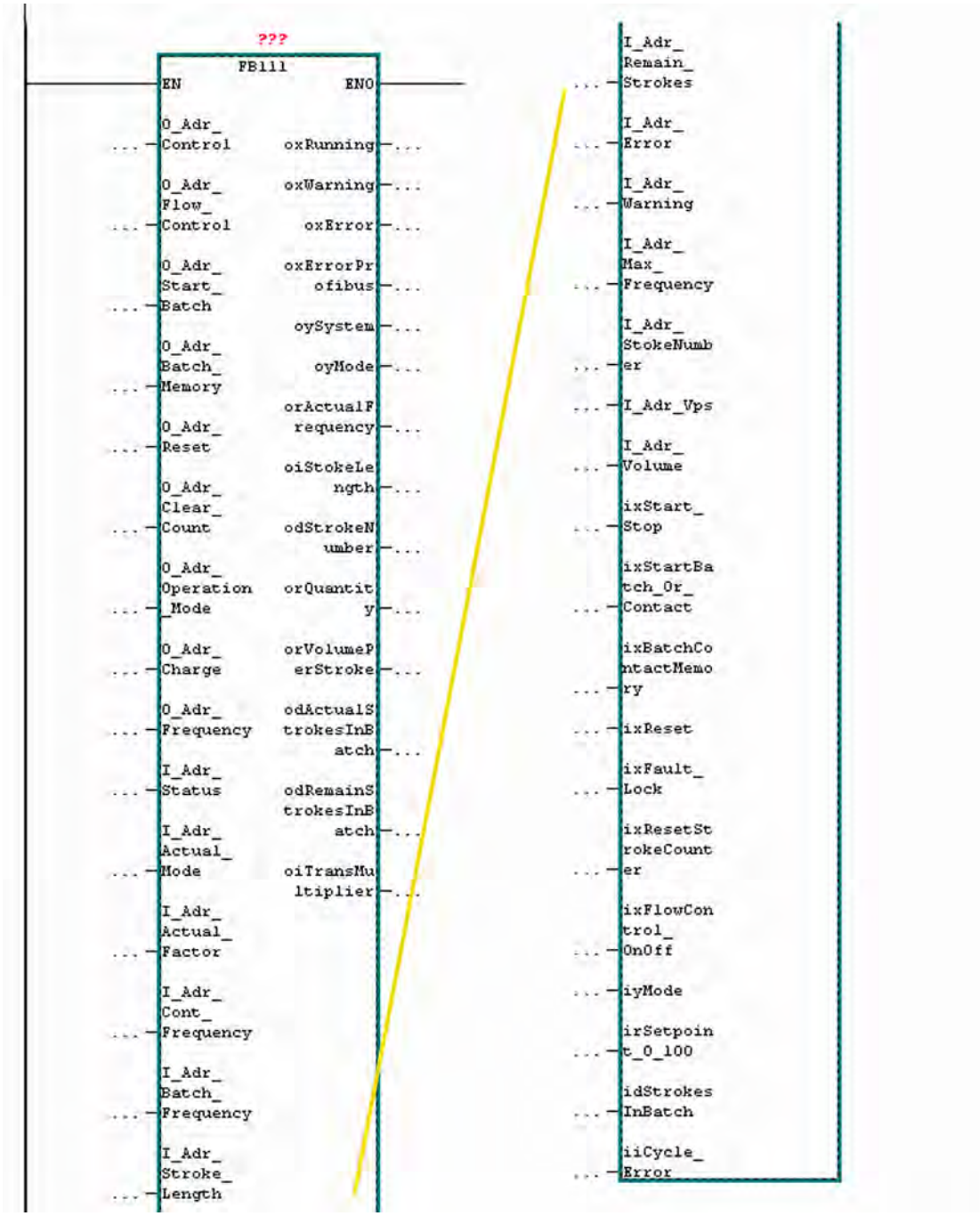


Fig. 31

Address name of the function block - slots of the function block

Address	Type	Slot
O_Adr_Control	Int	1
O_Adr_Flow_Control	Int	2
O_Adr_Max_Start_Batch	Int	3
O_Adr_Batch_Memory	Int	4
O_Adr_Reset	Int	5

Address	Type	Slot
O_Adr_Clear_Count	Int	6
O_Adr_Operation_Mode	Int	7
O_Adr_Charge	Int	8
O_Adr_Frequency	Int	9
I_Adr_Status	Int	10
I_Adr_Actual_Mode	Int	11
I_Adr_Actual_Factor	Int	12
I_Adr_Cont_Frequency	Int	13
I_Adr_Batch_Frequency	Int	14
I_Adr_Stroke_Length	Int	15
I_Adr_Remain_Strokes	Int	16
I_Adr_Error	Int	17
I_Adr_Warning	Int	18
I_Adr_Max_Frequency	Int	19
I_Adr_StrokeNumber	Int	20
I_Adr_VpS	Int	21

The input addresses or output addresses of gamma/ L or Sigma for the CPU can be read out in the Hardware Configurator under gamma/ L or Sigma for the appropriate slots:

Relationship: Slots - address ranges of the function block

Slot	DP ID ...	Order Number / Designation	I Address	Q Address	Co
1	160	Gamma/L Profibus		256	
2	160	-> Gamma/L Profibus		257	
3	160	-> Gamma/L Profibus		258	
4	160	-> Gamma/L Profibus		259	
5	160	-> Gamma/L Profibus		260	
6	160	-> Gamma/L Profibus		261	
7	160	-> Gamma/L Profibus		262	
8	161	-> Gamma/L Profibus		263...264	
9	161	-> Gamma/L Profibus		265...266	
10	145	-> Gamma/L Profibus	256...257		
11	144	-> Gamma/L Profibus	258		
12	145	-> Gamma/L Profibus	259...260		
13	145	-> Gamma/L Profibus	261...262		
14	145	-> Gamma/L Profibus	263...264		
15	144	-> Gamma/L Profibus	265		
16	145	-> Gamma/L Profibus	266...267		
17	144	-> Gamma/L Profibus	268		
18	144	-> Gamma/L Profibus	269		
19	145	-> Gamma/L Profibus	270...271		
20	147	-> Gamma/L Profibus	272...275		
21	147	-> Gamma/L Profibus	276...279		
22	147	-> Gamma/L Profibus	280...283		

Fig. 32

A more detailed explanation of the functions that are assigned to the slots is provided in the "Supplemental manual for gamma/ L and Sigma versions with PROFIBUS®".

Interfaces of the function block

Interfaces	Type	Description
ixStart_Stop	Bool	If a 1 is applied on this input and if there is no fault, the pump will be activated. If the pump does not run or is not at a standstill the following causes are possible: ■ PROFIBUS® is faulty ■ Pump is not in PROFIBUS® mode ■ PROFIBUS® address is not correct ■ Configuration is not correct ■ Pump is manually set to stop ■ Setpoint is on 0% (irSetpoint_0_100) ■ ixFault_Lock = 1 and oxError = 1 or oxProfibus = 1 ■ Use Profibus Workaround Adapt iiCycle_Error
ixStartBatch_Or_Contact	Bool	Mode batch - iyMode = 1 pump starts batch mode at a positive flank
ixBatchContactMemory	Bool	0 = Memory function is switched off 1 = Memory function is active
ixReset	Bool	Resets the bit messages oxWarning, oxError and oxErrorProfibus. Resets the pump (positive flank sent).
ixFault_Lock	Bool	If 0, then the pump does not include a locking mechanism for stored faults. Logical link: Start pump = ixStart_Stop i.e. because the faults oxError and oxErrorProfibus require acknowledgment, the pump automatically starts up again if there is a fault on both sides. If 1, then the pump does not include a locking mechanism via fault messages oxError or oxErrorProfibus. Logical link: Start pump = ixStart_Stop & oxError = 0 & oxErrorProfibus = 0 i.e because the faults oxError and oxErrorProfibus require acknowledgment, the pump does not automatically start up again if there is a fault on both sides.
ixResetStrokeCounter	Bool	At a positive flank the stroke counter will be reset.
ixResetStrokeQuantity	Bool	At a positive flank the quantity counter will be reset.
ixFlowControl_OnOff	Bool	0 = Metering monitor off 1 = Metering monitor on Prerequisite is an installed metering monitor.
iyMode	Byte	00 = Manual 01 = Batch 02 = Contact 03 = Analogue

Interfaces	Type	Description
irSetpoint_0_100	Real	Entry of the setpoint of the metering pump in %. The formula of the calculation is: Set frequency = MaxFrequency * irSetpoint / 100 Through the real number the speed on the stroke can be precisely selected, because the entry of 49.99%, for example, is possible. Likewise a direct connection of the integrated S7 controller is possible. For this the output parameter LMN must be connected on this input.
idStrokesInBatch	DInt	0-99999 can be set for batch mode. At a positive flank on the input ixStartBatch_Or_Contact, this number of strokes will be executed.
iiCycle_Error	Int	Specification of the cycles as delay of the warning and fault oxWarning, oxError and oxErrorProfibus. Through the delay short drop-outs in the PROFIBUS® system can be bridged. The delay time is calculated as follows: When using the function block in OB1: Delay = measured cycle time * iiCycle_Error When using the function block in OB35: Delay = time wake alarm * iiCycle_Errror This value uses the workaround Profibusbug. If the pump is not at a standstill, or if it does not start up on its own after a Profibus fault, adjust the value so that a value of approx. 1s is achieved. Example: Call block of pump P1 every 50 ms, then the value 20 should be set.
oxRunning	Bool	0 = pump is at standstill 1 = pump is running
oxWarning	Bool	0 = No warning 1 = Warning active
oxError	Bool	0 = no fault 1 = fault active
oxErrorProfibus	Bool	0 = Profibus OK 1 = Profibus faulty
oyMode	Byte	00 = Manual 01 = Batch 02 = Contact 03 = Analogue
orActualFrequency	Real	Actual stroke frequency in strokes/min
oiStrokeLength	Int	0 – 100 = 0-100% set stroke length on the metering pump
odStrokeNumber	DInt	Current number in the stroke counter in the metering pump
orQuantity	Real	Current quantity in the quantity counter of the metering pump
orVolumePerStroke	Real	Output volume per metering stroke (only for calibrated metering pump)

Interfaces	Type	Description
odActualStrokesInBatch	DInt	Actual number of strokes at start of batch
odRemeinStrokesinBatch	DInt	For calibrated pump: Actual metering quantity in l or gallons For uncalibrated pump: Value 0
oiTransmultiplier	Int	Not used

Statistical range of the instance block 1

88.0	stat	stat_Max_Freq	REAL	0.000000e...	0.000000e+000	Maximum Frequency of pump in strokes/min
92.0	stat	Status.Error	BOOL	FALSE	FALSE	1=Fault, 0=No Fault
92.1	stat	Status.Warnings	BOOL	FALSE	FALSE	1=Warning, 0=No Warning
92.2	stat	Status.Intake	BOOL	FALSE	FALSE	1=Suction active, 0=Suction inactive
92.3	stat	Status.Auxiliary	BOOL	FALSE	FALSE	1=Pump is in auxiliary mode, 0=Pump is not in auxiliary mode
92.4	stat	Status.Pause	BOOL	FALSE	FALSE	1=Pause active, 0=Pause inactive
92.5	stat	Status.Stop	BOOL	FALSE	FALSE	1=Pump active, 0=Pump is stoPID
92.6	stat	Status.Flow	BOOL	FALSE	FALSE	1=Flow control present, 0=Flow control not present
92.7	stat	Status.FlowActive	BOOL	FALSE	FALSE	1=Flow control active, 0=Flow control inactive
93.0	stat	Status.Reserve	BOOL	FALSE	FALSE	Reserve
93.1	stat	Status.FactorDivider	BOOL	FALSE	FALSE	1=1/100, 0=1/1
93.2	stat	Status.BatchMemory	BOOL	FALSE	FALSE	1=Batch memory active, 1=Batch memory inactive
93.3	stat	Status.Unit	BOOL	FALSE	FALSE	1=Gallons, 0=Liter
93.4	stat	Status.Calibrated	BOOL	FALSE	FALSE	1=Pump is calibrated, 0=Pump is not calibrated
93.5	stat	Status.PBWD	BOOL	FALSE	FALSE	1=Profibus connection, 0=No Profibus connection
94.0	stat	iiCycleWarning	INT	0	0	Flag cycles for Warnings
96.0	stat	iiCycleFault	INT	0	0	Flag cycles for Faults
98.0	stat	iiCycleFaultPB	INT	0	0	Flag cycles for Faults Profibus
100.0	stat	Errors.Minimum	BOOL	FALSE	FALSE	0 = no Fault, 1 = Level dosing medium too low
100.1	stat	Errors.AnalogError	BOOL	FALSE	FALSE	0 = no Fault, 1 = Fault analog signal
100.2	stat	Errors.Reserve1	BOOL	FALSE	FALSE	Reserve
100.3	stat	Errors.Reserve2	BOOL	FALSE	FALSE	Reserve
100.4	stat	Errors.DiaphragmFailure	BOOL	FALSE	FALSE	0 = no Fault, 1 = Defect diaphragm in dosing head
100.5	stat	Errors.FlowMonitoring	BOOL	FALSE	FALSE	0 = no Fault, 1 = Fault Flow control
100.6	stat	Errors.StrokeCountOverflow	BOOL	FALSE	FALSE	0 = no Fault, 1 = Fault overflow stroke counter
100.7	stat	Errors.SystemError	BOOL	FALSE	FALSE	0 = no Fault, 1 = System Fault
102.0	stat	Warnings.Minimum	BOOL	FALSE	FALSE	0 = No Warning, 1 = Level dosing medium too low
102.1	stat	Warnings.Calibration	BOOL	FALSE	FALSE	0 = No Warning, 1 = Calibration! Adjustment stroke length out of range
102.2	stat	Warnings.DiaphragmFailure	BOOL	FALSE	FALSE	0 = No Warning, 1 = Defect diaphragm in dosing head
102.3	stat	Warnings.Reserve1	BOOL	FALSE	FALSE	Reserve
102.4	stat	Warnings.Reserve2	BOOL	FALSE	FALSE	Reserve
102.5	stat	Warnings.Reserve3	BOOL	FALSE	FALSE	Reserve
102.6	stat	Warnings.Reserve4	BOOL	FALSE	FALSE	Reserve
102.7	stat	Warnings.Reserve5	BOOL	FALSE	FALSE	Reserve

Fig. 33

Statistical range of the instance block 1

Variable	Type	Description
stat_Max_Freq	Real	Get maximum frequency via profibus of the pump. Conversion of the number into the real format
Status.Error	Bool	Errors are present.
Status.Warnings	Bool	Warnings are present.
Status.Intake	Bool	Pump is in intake operation (higher-level function - see metering pump operating manual)
Status.Auxiliary	Bool	Pump is in auxiliary mode (higher-level function)
Status.Pause	Bool	Pump is switched to pause (higher-level function)
Status.Stop	Bool	Pump is stopped
Status.Flow	Bool	1 = Metering monitor present
Status.FlowActive	Bool	1 = Metering monitor activated
Status.FactorDivider	Bool	1 =1/100, 0=1/1
Status.BatchMemory	Bool	1 = Batch memory is activated
Status.Unit	Bool	1 = Gallons, 0 = Litres
Status.Calibrated	Bool	1 = Pump is calibrated
Status.PBWD	Bool	1 (always)

Flags of the function block

Flag name	Type	Description
iiCycleWarning	Int	Flag - for how many cycle has the warning already been queued. If this counter is > iiCycle_Error, then oxWarning will be set
iiCycleFault	Int	Flag - for how many cycle has the fault has already been queued. If this counter is > iiCycle_Error, then oxError will be set
iiCycleFaultPB	Int	Flag - for how many cycle has the fault Profibus already been queued. If this counter is > iiCycle_Error, then oxErrorProfibus will be set
iiWorkaround	Int	Internal use for workaround
iiWorkaround2	Int	Internal use for workaround

Name of the error messages of the function block

Name of the error messages	Type	Description
Errors.Minimum	Bool	0 = No error, 1 = Level of metering medium too low
Errors.AnalogError	Bool	0 = No error, 1 = Analog error
Errors.FlowMonitoring	Bool	0 = No error, 1 = Error metering monitor
Errors.FailureDiaphragm	Bool	0 = No error, 1 = Diaphragm break

Name of the error messages	Type	Description
Errors.StrokeCountOverflow	Bool	0 = No error, 1 = Overflow - metering stroke counter
Errors.SystemError	Bool	0 = No error, 1 = System component defective See display
Warnings.Minimum	Bool	0 = No warning, 1 = Level metering medium is too low
Warnings.Calibration	Bool	0 = No warning, 1 = Stroke length out of calibration tolerance
Warnings.FailureDiaphragm	Bool	0 = No warning, 1 = Diaphragm break