

# **Drive Note**

Incorporating a VLT<sup>®</sup> 5000 Profibus, Siemens Simatic S7

VLT<sup>®</sup> 5000

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### Incorporating a VLT 5000 Profibus into a Siemens Simatic S7-315-2 DP PLC system

This document is an instruction which will help you to incorporate a VLT 5000 with a Profibus card into a Siemens Simatic S7-315-2 DP PLC system. Only the steps which are required in order to establish communication between the VLT 5000 Profibus and the Simatic S7-315-2 DP PLC are shown. It is assumed that you are already familiar with the Simatic S7 system. In this instruction, the STEP 7 software version 5.0 is used.

## Step 1 Install GSD/GSE file

First step is to import the GSD/GSE of VLT 5000 into Siemens S7 Manager. S7 Manager requires a GSD/GSE file for every DP slave on a Profibus network.

In the VLT 5000 GSD/GSE file all the properties of our DP slave are described in a database. The file can be ordered from your local Danfoss representative.

Start a new project and click on Simatic 300 station. Now double click on *Hardware*. In *Hardware* the Profibus DP network is configurated.



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## Step 1 Install GSD/GSE file

Go to *Option* and choose *Install New GSE* to read in VLT 5000 GSD/GSE to the "Hardware Catalog".

ig -	g - [SIMATIC 300 Station (1) (Configuration) VLT_I								
<u>E</u> dit	Insert	<u>P</u> LC	⊻iew	<u>Options</u>	<u>W</u> indow	<u>H</u> elp			
		6		Custon	ni <u>z</u> e	Ctrl+Alt+E			
5307 PU :	7 <u>2</u> A 315-2			Speci <u>f</u> Configu Symbo <u>R</u> eport	y Module ure <u>N</u> etworl I Table System Err	< Ctrl+Alt+T ror			
7 <i>F M</i>	<i>aster</i> 08x24			<u>E</u> dit Ca <u>U</u> pdate	atalog Profil e Catalog	e			
032	«DC24			<u>Install</u> I <u>m</u> port	New GSE Station GS	E			

Step 2 Insert the VLT 5000

Insert the VLT 5000 by double clicking on the VLT 5000.

HW Config - [SIMATIC 300 Station (1) (Configuration) -- VLT\_PP01] \_ 🗗 🗙 🛍 Station Edit Insert PLC Yiew Options Window Help 12 × 💼 🛍 🗖 🚯 🔡 🕺 . Profile Standard -10 □ ₩ PROFIBUS DP PS307 2A 1 🔄 🧰 Additional Field Devices 2 Section: 12-2 PROFIBUS: (1) 🗄 🚞 1/0 72 DP Master 🗄 🦲 General 🗄 🦲 Drives DI8/D08x24 4 5 D032xDC24 Encoders 6 🗄 🚞 PLC 🗄 🚞 Gateway 8 E- Compatible PROFIBUS DF 9 Closed-Loop Controller 10 E Configured Stations 11 🗄 🦲 CP 342-5 as DP Master ⊕- 🔁 DP/AS-i ⊕- 🧰 DP/PA Link 🗄 🚞 ENCODER 🗄 🧰 ET 200B F 🗄 🦲 ET 200C PROFIBUS: (1) 🗄 🚞 ET 2005 PROFIBUS address Order number Diagnostic ad... C. Module 1 🗄 🛅 ET 200U

The "Hardware Catalog" must be updated before the VLT 5000 GSD/GSE file is active. Go to *Option* and choose *Update Catalog*.

The VLT 5000 GSD/GSE file is now available under the following path:



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### Step 3 PPO type

Insert the VLT 5000 by double clicking on the VLT 5000. Chose a PPO type and click on OK.

Selection of the Preset Configuration	
PPO 1 Module consistent PCD	
PPO 1 Word consistent PCD	
PPO 2 Module consistent PCD	
PPO 2 Word consistent PCD	
PPO 3 Module consistent PCD	
PPO 3 Word consistent PCD	
PPU 4 Module consistent PCD	
PPU 4 Word consistent PLU	
PPU 5 Module consistent PLD	
OK Cancel Help	Т

■ Step 4 Address

Next is the setting of the VLT 5000 address. The choice here must correspond to the setting in parameter *918 Station address*.

Properties	s - PROFIBL	JS interface	VLT • 5000/6000
General	Parameters	1	
Address	5.	E	
Transmi	ission rate:12	Mbit/s	
Subnet:			
no	)t networked -		
PROFI	BUS		12 Mbit/s

The choice here must correspond to the setting in parameter *904 PPO type*.

Module consistent data means that all the data exchange between the master and slave is transfer at one time. By Word consistent the data exchange between the master and slave is split up in words. The first 4 words of PPO type 1, type 2 and type 5 consist of a PCA part (Parameter Characteristic) and this is always module consistent.



# Siemens S7 PLC and VLT<sup>®</sup>5000 Profibus

# Step 5 I/O mapping

The VLT 5000 can now be seen on the Profibus network.



Select an I/O address in your Simatic S7 PLC. By double clicking the first module (4AX in the DP-Slave) in the Slave Station, you can either select the address in the Simatic S7 PLC or use the default addresses.

In this example we have chosen the start address to be 256 dec. for PPO type 1 for communication with VLT 5000.

Pro	perties - C	)P slave					
A	ddress / ID	]					
	1/0 Type:		Out- inp	out	7		
	- Output						
		Addr <u>e</u> ss:	Lengt	h:	<u>U</u> nit:		Cor
	Start:	256	4	*	Words	<b>T</b>	To
	End:	263					
	E Proce	ss Image Par	tition	<u>N</u> o.:	0 +		
	- Input						
		Address:	Lengt	h:	Uni <u>t</u> :		Cor
	Start:	256	4	* *	Words	7	To
	End:	263					
	E Proce	ss Image Par	tition	N <u>o</u> .:	0 ×		



### Step 5 I/O mapping

Now your system is set up to use the PPO1 communication and the following information is available in the Simatic S7-315-2 DP PLC:

Parameter Characteristic (PCA), i.e. read an write to parameters.  $\searrow$ 

Process data, i.e write a Control word and Reference and receiving a Status word and Main Actual Value.

		2AX			
PCA	IND	PVA	PVA	CTW	MRV
PAW 256	PAW 258	PAW 260	PAW 262	PAW 264	PAW 266

		2	AX		
PCA	IND	PVA	PVA	STW	MAV
PEW 256	PEW 258	PEW 260	PEW 262	PEW 264	PEW 266

The Simatic S7-315-2 DP System can only send and receive up to 4 bytes of I/O without special commands.

The first module (4AX) cannot be handled without System Functions Call (SFCs), see example on the next page. The System Functions Calls are SFC 14 for recieving data from a slave and SFC 15 for writing data to a slave.

The second module (2AX) can be handled without the use of SFCs.

# Step 6 Downloading

Set the PLC in stop with the key on the PLC processor and download the program. Please note that the VLT frequency converter will show Warning 34 *HPFB communication fault* while the PLC is in Stop mode.

Before the PLC can be set in RUN mode ensure that the following VLT parameter corresponding to the program:

Profibus DP [1]
According to the Master
According to the Master
ess: According to the Master

Note that a change of the above parameters are first executed at next power up.

After the download of the PLC program the two LED 1 and LED 2 on the Profibus card should be solid green when the key on the S7 master is set in RUN. This indicate that the master and slave is communicating.

HW Config - [SIMA]	FIC 300 Station (1) (Configuration) -				
<u>Station</u> <u>E</u> dit <u>Insert</u>	<u>PLC</u> View Options Window Help				
) 🗃 🔓 🖳	Download to Module Ctrl+L Upload to PG				
🚍 (0) UR	Eaulty Modules				
1 S307 2A	Module Information Ctrl+D				
2 CPU 315-2	Operating Mode Ctrl+I				
X2 DP Master	Clear/Reset				
3	Set Time of Day				
4 🚺 DI8/DO8x24					
5 🚺 D032xDC24	Assign <u>P</u> ROFIBUS Address				
6					
7	DP-NORM				
9					

If the two LED's on the VLT 5000 Profibus card not are solid green the fault could be:

- Wrong parameter setting in the above mention list according to the master.

- After changing the Profibus parameters the power hasn't been recycle.

- Wrong cable connection, check the cable by the master and the VLT 5000.

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### Example of how to programme the Simatic S7-315-2 DP

Danfoss provides a small demo program. This demo program (ARJ File) can be loaded to your system and downloaded to your Simatic S7-315-2 DP PLC system.

The program copies information from DB11.0 - DB11.6 to PAW 256 -262 and from PEW 256 - 262 to DB10.0 - DB10.6.

KAD/STL/FBD - [VLT_PP01\SIMATIC 300 Station (1)\CPU315-2 DP(1)\\OB1 - <offline>]</offline>	_ 🗆 🗡
🖅 <u>F</u> ile <u>E</u> dit Insert <u>P</u> LC <u>D</u> ebug <u>V</u> iew <u>O</u> ptions <u>W</u> indow <u>H</u> elp	_ B ×
This is an example how to use the built-in function(SFC)of the Siemens S7-315DP Read and write of the Parameter-Charateristics-Value(Page 32, MG.10.E1.02)	
Network 1 : READ PCV	
Get DATA from PCV-Part of PPO1 Copy Byte 1 to 8 to DB11 Byte 0 to 8	
EN ENO	
W#16#100 - INO RET_VAL - MWO	
P#DB11.DBX 0.0 BYTE	
Network 2 · MPITE PCV	
Send DATA to PCV-Part of PP01	]
Copy DB10 Byte 0 to 8, to PCV Byte 1 to 8	
EN ENO	
W#16#100 - IN0 RET_VAL - MW2	
P#DB10.DBX	
8 –IN1	
	-

By using the above program, the following information can be found on these PLC Addresses:

	2		2AX		
PCA	IND	PVA	PVA	CTW	MRV
DBW10.0	DBW10.2	DBW10.4	DBW10.6	PAW 264	PAW 266

	4	2	2AX		
PCA	IND	PVA	PVA	STW	MAV
DBW11.0	DBW11.2	DBW11.4	DBW11.6	PEW 264	PEW 266

In order to control the VLT 5000 from the Profibus only, set parameter 502 - 509 for Serial. If reversing is required, set also parameter 200 for *132Hz Both directions*.







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