



VLT[®] 5000



VLT® 5000 and Interbus CMD

Abstract

This application note describes how to set up Interbus communication between a Danfoss VLT 5000 frequency converter and Interbus CMD G4. CMD stand for Configuration Monotoring and Diagnostics. This note will describe:

- Configuring of the VLT 5000 and CMD
- Drivecom profile
- PCP communication

All examples in this instruction are shown with a PLC card as an Interbus master, but they are also relevant to a PC system with an Interbus Master.

■ VLT 5000 Interbus card

The photo shows the Interbus card which can be installed in VLT 5001 - 5500.



LED identification

Name	Indicates	Color	On	OFF
CC/CR:	Cable Check.	Green	Incoming bus active	Incoming bus swicthed off
BA	Bus Active.	Green	Bus active	Bus stopped
RD:	Status of outgoing bus.	Red	Outgoing bus stopped	Outgoing bus active
TR:	Transmit/Receive.	Green	PCP Communication running	NO PCP Communication running
UL:	Power OK.	Green	Voltage within permissible range	No Voltage

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■ Configuring of the CMD and VLT 5000

The first step is to connect all Interbus slaves to the master and power up all units.

Start the IBS CMD software and choose a new project from *File* and *New*. The screen should now look like this:



Next step is to read the slaves on the bus system. Click on *Configuration frame* and click on the right mouse button. Select *Read In* and choose *Startup without PDP*.

Execute Parameterization
Parameterizations
Parameterizations
Startup with PDP
Startup without PDP
Startup with physical addressing
Comment: Startup without PDP
<u>OK</u> <u>Cancel</u> <u>Help</u>

The state will be changed from Offline to Online when the Read In is finished. Please look at the bottom of the screen.

After the Read In, CMD will indicate each VLT frequency converter with a DriveCom symbol, a station number and an ID number.



Next step is to configuring the Interbus system. This is done by clicking on the VLT symbol and pressing the right mouse button. Select *Description*.

	Change Device Description
Device Description	
Consecutive Number:	Inter <u>f</u> ace Type
Device Number:	1.0 Presentation
<u>G</u> roup Number:	Parameter Channel
Station Name:	: Plant 1
Service Information:	Assign Individually
D <u>e</u> vice Name:	: VLT 5004
Manufacturer Name:	
Device Type:	
Order No.:	Undefined
Ident Code:	227 dec. Profile Number: 0 hex.
Process Data	32 Bit Parameter Channel: 1 Word 🛞
C <u>R</u> :	2
Gray out device	Box-Presentation
<u>о</u> к	<u>C</u> ancel <u>H</u> elp

Here you can type a Station name, Device name and a Device number.

Click on Parameter Channel.

Parameter Channel
Message Lengths
Iransmit: 246 Byte Standard
Receive: 246 Byte
Supported Parameter Channel Services
Client Services of Controller Board
🕅 Read
X Write
Get-OD (long format) Start, Stop, Resume, Reset
Download
🗂 Upload
Request-Domain-Upload
Information-Report Read/Write-With-Name
80 30 00 Stan <u>d</u> ard
Comment:
<u>O</u> K <u>C</u> ancel <u>H</u> elp

By message lenght transmit and receive enter 246 Byte and select Get-OD (long format). The message length now corresponds to the internal buffer in the VLT frequency converter. Get-OD (long format) means that the master will read the English parameter description text from the VLT frequency converter.

Press OK twice.



The VLT frequency converter is now set up and the program can be downloaded to the PLC master. This is done by clicking with the right mouse button on the *Controller board*.

Select Parameterization and Execute.



After the parameterization is done, the master will start to run. If you are using a Siemens S7 or S5 master, the LCD will look like this:



Drivecom profile

VLT 5000 has implemented the Drivecom profile in the Interbus software. In order to be able to run with the Drivecom profile, VLT parameter 512 *Telegram profile* must be set to *Fieldbus option*.

If you change the operating state from *Online* to *Monitor* you can write the control word and reference to the VLT frequency converter. In Monitor state you can also read and write to parameters.

-	Operating State
Cha	ange to
0	Configuration (Offline)
0	Configuration (Online)
(Monitoring
0	Diagnostics
	<u>O</u> k <u>C</u> ancel <u>H</u> elp

Now you can start the built in Drivecom monitor in CMD by clicking on the *Controller board* and clicking on the right mouse button. Select *Drivecom*.

-				DRIVECOM	l Monitor					-
DANFOSS, V	LT-5000,	Profile: 21								
Analog Disp	lay			Control Word			Statu	ıs Word		
_		<u>A</u> 120	<u>B</u> 120	Address:	P20			ress: ice Statu:	P20	
		2	•	Sh	utdown				On Disabled	
		Ŧ	+	Reset	Malfunction		4:	/oltage d	isabled	0
+0.7 s		-120	-120	4: 0 RFG-Dis	able	0	7:	₩arning		0
				5: 0 RFG-Sto)p	0	8: 1	dessage		0
Valu <u>e</u> A		<u>V</u> alue E	3	6: 0 HLG-Ze	ro	0	9:	Remote		1
Actual spee	ed 🛨	Set speed	±				10:	Face Valu	e reached	0
P22	Adr.	P22		11: 0		0	11:	Remote		0
0	Val.	0		12: 0		0	12:	Reserved	1	0
rpm	lloit	rpm	-1	13: 0		0	13:	Reserved	1	0
1.bu	Unit	- Pin		14:0		0	14:			0
Set mode	of operati	ion:		15:0		0	15:			0
Speed set	ting 1									
		Writ	e	U <u>n</u> do	Setting	S		<u>D</u> evice	Control	
				Close	Help					

The Drivecom monitor will now show *Danfoss, VLT* 5000, *Profile: 21*, in the upper left corner. The Drivecom monitor is spilt up in three parts: Analog Display, Control Word and Status word. In the Analog Display part you can set a reference and in the Control word part you can start and stop the VLT frequency converter. In the Status word part you can see the actual status word from the VLT frequency converter.



VLT® 5000 and Interbus CMD

Drivecom profile, cont.

By clicking Settings you can setup the Drivecom monitor.

In *Manufactured Specific Control bits* Danfoss have choosen to implement Jog, Setup select and Reversering, and in *Manufactured Specific Status* the Running Status bit is implemented.

Press OK when the Monitor settings are done.



The *Manufactured Specific bits* are now added to the Drivecom monitor.

Type a reference in rpm below *Set Speed* and click on Write to send the reference to the VLT frequency converter. The rpm value can now be seen in the VLT display as a reference from 0 - 100 %.

-			DRIVECOM Monitor			-
DANFOSS, VLT-6	000, Profile: 21					
Analog Display			Control Word		Status Word	
	A	B	Address: P20		Address: P20	
-	1500	1500			Device Status:	
		1 ±	Initialization		Switch On Disabled	-
		H	Shutdown			
				_		
			Reset Malfunction	1		
	-	+		_	4: Voltage disabled	0
+0.7 s	-1500	-1500	4: 0 RFG-Disable	0	7: Warning	0
	1000	1000	5: 0 RFG-Stop	0	8: Message	0
Valu <u>e</u> A	<u>V</u> alue	В	6: 0 HLG-Zero	0	9: Remote	1
Actual speed	Set speed	i 🛓			10: Face Value reached	0
P22	Adr. P22		11: 8 Jog	0	11: Remote	0
0	Val. 1425	_	12: n Reserved	0	12: Reserved	0
		_	13: 0 Setup 1	0	13: Reserved	0
rpm	Unit rpm		14: 0 Setup 2	0	14: Running	0
Set mode of op				0	15: Reversing	0
			15: D Reversing	U	15: Reversing	U
Speed setting	1 					
	Wri	ţe	U <u>n</u> do <u>S</u> ett	ings	Device Control	
			Close Help			ſ

Click on Device Control for controlling the VLT frequency converter. Please notice that the control word will change when you change the states.

	Device	: Control		
	Malfct. Reaction Active		Control Status	0070 0240
4	Switch On Disabled 4 2 Ready To Switch On 6 2 4 Switched On 5 6 0 peration Enabled 7	3	1 Reset Malfu 2 Activate 3 Disable Volt 4 Shutdown § Enable Oper § Disable Ope	age
	Quick Stop Active		7 Quick Stop	

Click 4	for	Ready	to	Switch	On	and	click	2	for
Switch	On	1.							

By Clicking 5 the VLT frequency converter should start the motor. Do not forget to set VLT parameter 502 Coasting to *Bus*.

-	Device Co	ntrol
	Malfct. Reaction Active	Control 007F Status 4637
	Switch On Disabled	1 Reset Malfunction
	A 3 Ready To Switch On 3	2 Activate
	Ready To Switch On 3	<u>3</u> Disable Voltage
45	Switched On	4 Shutdown
	5 6 Operation Enabled	<u>5</u> Enable Operation
		6 Disable Operation
	Quick Stop Active	7 Quick Stop
	Close	Help

The control word is now 7F Hex. Press Close.



PCP communication

Via the CMD tool you are able to read and write to parameters and read the English parameter text of each parameter.

To start PCP communication you must be in Monitor state. Click on the station number and click on the right mouse button and choose *Device Parametization*.



The dialog box will now show *Danfoss, VLT 5000, Profile: 21.* In order to be able to read in all

parameters in the VLT frequency converter select *Device* and *Read Parameter List*. The CMD tool will now start reading all parameters, this will take 3-4 minutes.

-	Device	Parameterization	1	
_File_Edit	Device Options ?			
	Read Parameter List			
F4 Read	Read Selected Parameter Des	cription		
DANFOSS,	Compare Selected Parameter	Description		
DAMI 033,	Read Selected Values	F4		
	Write Selected Values	F5		Change Value
	<u>Compare Selected Values</u>	F6		
Inde:	1000	or man or more	Status	Data Type 🖈
1 0000h	0	DEC -		

When all parameters have been read, CMD will show the first parameter 55F1 Hex *Language* at the first row.

55F1 Hex corresponds to $22001_{\rm D}$. This means that all VLT 5000 parameters simply can be accessed by adding $22000_{\rm D}$ to the VLT 5000 parameter. For example if you want to write to parameter 207 *Ramp up time 1* you must write to $22207_{\rm D}$ (56BF Hex).

The CMD tool can only indicate parameters by hexadecimal numbers.

If you want to change the value of parameter 207 Ramp up time 1 to 10 sec you must write 1000 in column next to index 56BF Hex. You have to enter 1000 because VLT parameter 207 has a conversion index of $-2 = 10^{-2}$.

F	4 Read Va	lue F5 Write	Value F12 Close				
DAI	NFOSS, VL	T-5000, Profile: 21					
							Change Value
_	Index	Name	Value	Unit	Format	Status	Data +
58	56BDh	MAX. REFERE	50000		DEC	New value	Integer3
59	56BEh	RAMP TYPE E	0		DEC	New value	Unsigne
60	56BFh	RAMP UP TIM	1000		DEC	New value	Unsigne
61	56C0h	RAMP DOWN T	300		DEC	New value	Unsigne
62	56C1h	RAMP UP TIM	300		DEC	New value	Unsigne
63	56C2h	RAMP DOWN T	300		DEC	New value	Unsigne
64	56C3h	JOG RAMP TI	300		DEC	New value	Unsigne
65	56C4h	Q STOP RAMP	300		DEC	New value	Unsigne
00	56C5h	JOG FREQUEN	100		DEC	New value	Unsigne
66							

Highlight the row by clicking on 60 and click on *F5 Write Value*. The ramp up time in parameter 207 has now been changed to 10 sec.

ex h M. h R. h R.	F5 Write 000, Profile: 21 Name AX. REFERE AMP TYPE E AMP UP TIM	Value 50000 0	Unit	Format DEC DEC	Status New value New value	
ex h M. h R. h R.	Name AX. REFERE AMP TYPE E	Value 50000 0	Unit	DEC	New value	Data
h Mu h R/ h R/	AX. REFERE AMP TYPE E	50000 0	Unit	DEC	New value	
h Mu h R/ h R/	AX. REFERE AMP TYPE E	50000 0	Unit	DEC	New value	Data
h Mu h R/ h R/	AX. REFERE AMP TYPE E	50000 0	Unit	DEC	New value	Integer3
n R/ n R/	AMP TYPE E	0				
n Ra		-		DEC	New value	Unsigna
	AMP UP TIM	1				onsigne
		1000		DEC	New value	Unsigne
n R/	AMP DOWN T	300		DEC	New value	Unsigne
n R/	AMP UP TIM	300		DEC	New value	Unsigne
n R/	AMP DOWN T	300		DEC	New value	Unsigne
n JO	OG RAMP TI	300		DEC	New value	Unsigne
n Q	STOP RAMP	300		DEC	New value	Unsigne
n JO	OG FREQUEN	100		DEC	New value	Unsigne
n RE	EF. FUNCTI	0		DEC	New value	Unsigne
1 1 1	0 0 10	JOG RAMP TI Q STOP RAMP JOG FREQUEN REF. FUNCTI	JOG RAMP TI 300 Q STOP RAMP 300 JOG FREQUEN 100 REF. FUNCTI 0	JOG RAMP TI 300 Q STOP RAMP 300 JOG FREQUEN 100	JOG RAMP TI 300 DEC Q STOP RAMP 300 DEC JOG FREQUEN 100 DEC REF. FUNCTI 0 DEC	JOG RAMP TI 300 DEC New value G STOP RAMP 300 DEC New value JOG FREQUENT 100 DEC New value REF.FUNCT 0 DEC New value

At the bottom of the parameter list the Interbus Drivecom 21 objects are available. These objects are not accessible via the LCP but only via Interbus PCP communication.

Please have a look at the Interbus operating instructions for further description of these objects.

_	4 Read Val IFOSS, VL	ue F5 W T-5000, Profile		2 Close			
							<u>C</u> hange Value
	Index	Name	Value	Unit	Format	Status	Data Type
264	59C5h	DEFINED PA	328		DEC	New value	Unsigned16
265	59C6h	DEFINED PA	617		DEC	New value	Unsigned16
266	59CEh	MODIFI. PA	102		DEC	New value	Unsigned16
267	59CFh	MODIFI. P.A.	0		DEC	New value	Unsigned16
268	59D0h	MODIFI. PA	0		DEC	New value	Unsigned16
269	6000h	PI-DATA-DE			Text	New value	
270	6000h 1		4		DEC	New value	Unsigned8
271	6000h 2		24641		DEC	New value	Unsigned16
272	6000h 3		0		DEC	New value	Unsigned8
273	6000h 4		0		DEC	New value	Unsigned16
	00001-7		0		DEC	Neurophie	Unation and D



Process and PCD data

The process data is spilt up in two parts, a fixed 2 words data part for controlling the VLT frequency converter and a flexible part, called PCD, that can consist of 7 words.

Fixed	User definable
CTW MRV PC	
Fixed	User definable
STW MAV PC	D1 PCD2 PCD3 PCD4 PCD5 PCD6 PCD7

For controlling the VLT 5000 you can select between the FC profile or Drivecom profile (VLT parameter 512).

Please have a look at the Interbus operating instructions for further description of each profile.

PCD data is very useful if you need a constant update of process parametersvariables, for example motor current or torque.

Programming example

The following example will show how to set up process and PCD data.

The chosen profile is Drivecom profile and as PCD data we will readout parameter 520 *Motor current* and 518 *Motor frequency*. We will also write to parameter 207 *Ramp up time 1* as PCD data. The data for the VLT frequency converter in our PLC program starts at address 20. So we have to map address 20 to the Interbus card in the VLT frequency converter. This is done with the CMD tool.



First we have to setup the VLT frequency converter to run with two PCD's. This is done in the respective parameter 807 *PCD size select* and parameter 915/916 *PCD config. write/read.*

PCD 1 has to be set to read the motor current via parameter 520. This is done by setting sub index 1 in parameter 916 *PCD configuration read* to 520. PCD 2 has to be set to read parameter 518 *Motor frequency*. Set sub index 2 to 518.



PCD 1 has to be set to write the ramp up time 1 via parameter 207. This is done by setting sub index 1 in parameter 915 *PCD Configuration write* to 207.



In parameter 807 *PCD size select* you have to assign the number of PCD's which the VLT frequency converter is using.

Choose 2 WORDS [2] and power down the VLT frequency converter. At next power up the PCD's will be active.





To activate the new settings with PCD, the CMD need to read the configuration from the VLT frequency converter again.

The process data should start at address 20 and this has to be assigned to the master and slave. Click on controller board and select *Process data*. The Process data should now be 64 bits, corresponding to 4 words: control word, reference, PCD 1 and PCD 2.



See *Configuring of the CMD and VLT 5000* for how to parametize the system.

When the system is running, change the state to Monitor.

Click on controller board and select Address Monitor.

P20 I P20 O P22 I P22 O P24 I P24 O P26 I	047C 047C 1 201E 0 2000 1 008D 0 03E8	Value	Assignment <part of=""> 1.0.64-Bt_Input_1 <part of=""> 1.0.64-Bt_output_1 <part of=""> 1.0.64-Bt_input_1 <part of=""> 1.0.64-Bt_output_1 <part of=""> 1.0.64-Bt_output_1</part></part></part></part></part>
P20 O P22 I P22 O P22 O P24 I P24 O P26 I	0 047C 1 201E 2000 1 008D 0 3E8		<part of="">: 1.0.64-Bit_Output_1 <part of="">: 1.0.64-Bit_Input_1 <part of="">: 1.0.64-Bit_output_1</part></part></part>
P22 I P22 O P24 I P24 O P26 I	I 201E 2000 I 008D D 03E8		<part of="">: 1.0.64-Bit_Input_1 <part of="">: 1.0.64-Bit_Output_1</part></part>
P22 O P24 I P24 O P26 I	D 2000 I 008D D 03E8		<part of="">: 1.0.64-Bit_Output_1</part>
P24 I P24 O P26 I	I 008D D 03E8		- • -
P24 O P26 I	D 03E8		<part of="">: 1.0.64-Bit_Input_1</part>
P26 I			
			<part of="">: 1.0.64-Bit_Output_1</part>
D26 0	I 00FB		<part of="">: 1.0.64-Bit_Input_1</part>
F20	0000 C		<part of="">: 1.0.64-Bit_Output_1</part>
•			•

The Address Monitor shows the I/O area.

P20 Input 0F07 Hex:

Shows the status word from the VLT frequency converter.

P20 Output 047C Hex: Here you can write the control word to the VLT frequency converter. P22 Input 201E:

Shows the actual reference from the VLT frequency converter.

P22 Output 2000 Hex:

Here you can write a reference to the VLT frequency converter.

P24 Input 008D Hex (PCD 1):

This I/O area shows the actual motor current in Hex (parameter 520 *Data readout: Motor current*). The value corresponds in decimal to 141. But as Parameter 520 has a conversion index of -2 (see Manual) the actual motor current is 1.41 Amp.

P24 Output 03E8 Hex (PCD 1):

The same I/O area as reading of motor current was set up to write to parameter 207 *Ramp up time 1*. 03E8 hex corresponds to 10 sek in ramp up time as this parameter has a conversion index of -2.

P26 Input 00FB Hex (PCD 2):

This I/O area shows the actual motor frequency in Hex (parameter 518 *Data readout: Frequency*). The value corresponds in decimal to 251. But as Parameter 518 has a conversion index of -1 (see Manual) the actual motor frequency is 25.1 Hz.

P26 Output 0000 Hex (PCD 2): This output is not configurated.







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