Danfoss

Drives and Controls

Frequency converters

VLT® 5000

Interbus manual

Serial Communication

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VLT® 5000 INTERBUS

Contents

Introduction

■ **About this manual**

This manual is intended to be used both as an instructional and as a reference manual. It only briefly touches on the basics of the INTERBUS protocol whenever it is necessary for gaining an understanding of the DRIVECOM implementation of the DRIVECOM Profile 21

The manual is also intended to serve as a guideline when you specify and optimize your communication system.

If you are not completely familiar with INTERBUS, PCP or the Profile for Variable Speed Drives, it may be advisable to read some of the material provided on these subjects.

Even if you are an experienced INTERBUS programmer, we suggest that you read this manual in its entirety before you start programming, since important information can be found in all chapters.

Chapter 5 gives details on the INTERBUS Option Card and how to establish the physical connection.

In chapter 6 you will find information about VLT Process Data.

Chapter 7 and 8 describe the two different statemachine, implemented in the INTERBUS option: Drivecom 21 and FC Drive.

Chapter 9 has all the relevant VLT and INTERBUS parameters listed.

Chapter 10 contains information on Timing on a INTERBUS system and on the INTERBUS option

Chapter 11 describes display messages, warning and alarm messages.

In chapter 12 you will find a glossary explaining abbreviations, words and phrases you must know to understand this manual. This chapter also contains a complete parameter list with parameter designations, default settings, setting ranges etc.

Chapter 13 lists the VLT5000 Parameters.

If you want to know more about the INTERBUS protocol in general, please refer to the vast amount of literature provided for this purpose.

■ **Assumptions**

This manual assumes that you are using a DANFOSS INTERBUS Option Card in conjunction with a DANFOSS VLT 5000 Series. It is also assumed that you, as a master, are using a PLC or PC that is equipped with a serial communication card supporting all the INTERBUS communication services required by your application, and that all requirements stipulated in the INTERBUS standard as well as those set up in the DRIVECOM Variable Speed Drives Profile and its company-specific implementation, as well as those pertaining to the VLT Variable Speed Drive are strictly observed as well as all limitations therein fully respected.

■ **What you should already know**

The DANFOSS INTERBUS Option Card is designed to communicate with any master abiding by the INTERBUS standard. It is therefore assumed that you have full knowledge of the PC or PLC you intend to use as a master in your system. Any questions pertaining to hardware or software produced by any other manufacturer is beyond the scope of this manual and is of no concern to DANFOSS.

If you have questions about how to set up master - master communication or communication to a non-Danfoss slave, the appropriate manuals should be consulted.

■ **Available literature**

The chart below gives an overview of the literature
available for the VLT 5000 Series.
Please note that variations may occur from one
country to the next.

Instructions for VLT 5000 Series	Var. literature for VLT 5000 Series	Instructions for VLT 5000 Series	Communication for VLT 5000 Series
Operating Instructions MG.50.AX.YY	Design Guide MG.50.CX.YY	Brake instructions MI.50.DX.YY	VLT Software Dialog MG.50.EX.YY
	VLT 5000 Data sheet MD.50.AX.YY	LCP remote-mounting kit IP 20 MI.56.AX.51	PROFIBUS Manual MG.10.EX.YY
Quick Setup MG.50.DX.YY	Syncron. and positioning MG.10.JX.02 MG.10.JX.03	LCP remote-mounting kit IP 54 MI.56.GX.52	Gateway InterBus MG.10.G1.51
Quick Setup MG.50.FX.YY	VLT 5300-5500 Installation guide MG.56.AX.YY	LC-filter VLT 5001-5011 MI.56.DX.51	LonWorks Manual
Quick Setup MG.50.GX.YY		LC-filter VLT 5016-5250 MI.56.FX.51	DeviceNet Manual
Bookstyle IP 20 Compact IP 20 Compact IP 54		IP 20 terminal cover MI.56.CX.51	Modbus Plus Manual
		Loadsharing instructions MI.50.NX.YY	Interbus Manual
		RCD Instructions MI.66.AX.YY	

X = version number
YY = language
01 = Danish
02 = English
03 = German
04 = French
05 = Spanish
06 = Italian
07 = Swedish
10 = Dutch
20 = Finnish
28 = Brazilian Portuguese
51,52 = Danish, English, German

Interbus introduction

Technical overview.

The INTERBUS system is divided into two different system: remote and local. The remote system enables the user to connect up to 256 stations on a single system wiht a maximum of 400m Cable between each station.

The locale bus system enables the user to establish communication to Input/output devices throuhgt a single twisted pair of Cables. This type of comunication is typical used the simple devices E.g. Digital I/O devices.
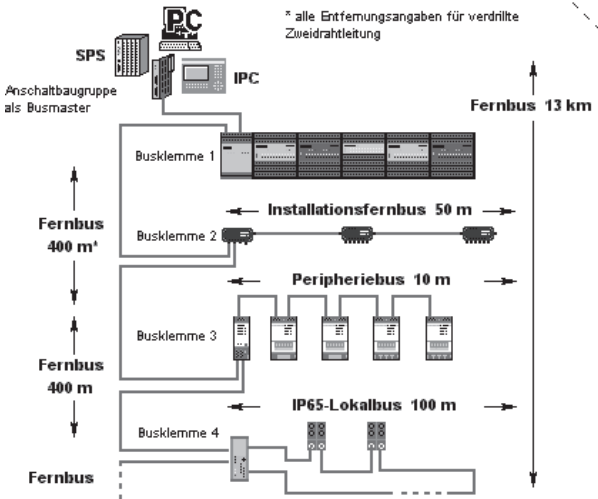
For Communication on the remote bus the INTERBUS system provides two different types of communication Process Data and PCP (Peripherals Communication Protocol). The Process Data is cyclic communication to devices with high priority. This type of communication typically takes between few milliseconds and up to 100 milliseconds, depending on the size of the system. Example of this type of communication is digital & analogue I/O or control word & reference to frequency converters.

PCP communication are used for communications needs that does not require high speed and and typically only are activated on request from the user writen program. Typical time to read/write a single value is 100 to 200 millisecond. Example of this type of communication is configurating Data, read of service parameter such as running hours, number power up and KWh.

Technical Data

Topology	Ring system - one dual twisted pair
Physics	RS-485
Protocol	InterBus, total frame message transfer
Method	Master/Slave
Transmission	Asynchronous, full duplex
Trans. Rate	500 Kbits/sec.
Error Check	CRC-16
Hamming distance	4
Number of I/O	Max. 4096 bits
No. of Nodes	Max. 256
Scan Speed	1024 I and 1024 O in less than 4 ms
Total Distance	Max.12.8 km (Cu)
Segm. Length	Max. 400 m(~1200 ft.) between 2 nodes
Cable	Belden #8103 or equivalent

Cable lengths/number of nodes

The maximum length of the Cable is only provided, if the bus cable has the following properties :

- Impedance: 135 to 165 ohm at a measuring frequency from 3 to 20 MHz

- Resistance: < 110 ohm/km

- Capacity: < 30 pF/m

- Damping: max. 9 dB over the whole wire length

 -Cross sect. max. 0.34mm^2, corresponding to AWG 22

-Cable type: twisted in pairs, 3 x 2, wires

-Screening: Copper-braided screen or braided screen and foil screen

It is recommended to use the same cable type in the entire network to avoid impedance mismatch.

■ Ordering number.

The Interbus option for the VLT®5000, is available in 2 different versions, one option that serves the purpose of enabling a VLT®5000 to communicate on a INTERBUS remote bus as a slave, and one version that enables the VLT®5000 that is equip with a Syncronising and positioning option to communicate on a INTERBUS remote bus as a slave. As upgrade kit there is also a set of Eproms available.

Field installation:
INTERBUS Option for field installation, complete set including Interbus Communication unit, Memory option, EMC Bracket, installation instruction, manuals. This kit is intended for field installation in VLT5000 series, that enables a VLT5000 to communicate on a INTERBUS remote bus.
Ordering number: 175Z3122

Synchronizing and positioning option:
INTERBUS Communication Option, as above, but wihtout memory option. This option is intended as and INTERBUS Option to the Synchronizing and positioning option, that does not need a memory option and as a spare part for damaged INTERBUS Option.
Ordering number: 175Z2900

Upgrade Kit:
INTERBUS Memory set. This set contains a full memory set (3 Pcs.) for the INTERBUS option and the Memory board. This Option serves as an upgrade to the latest version of the VLT5000 software and the INTERBUS Communication option.This options will not upgrade of the Synchronising and positioning option. Please refere to the Synchronising and positioning option Manual for detailed information on how to upgrade this option.
Ordering number: 175Z3123

Factory Installed:
The INTERBUS option can be ordered from Danfoss Drives, factory installed in a VLT®5000. Please consult your Danfoss represenstive for order number of a given VLT5000 and INTERBUS combination.

The INTERBUS Option Card is connected to the remote bus line via MK 100A or MK 101A for the incomming INTERBUS cable. terminals 62, 63, 64, 65, and 66. to the bus line via MK 100B or MK 101B for the outcomming INTERBUS, terminals 62, 63, 64, 65, 66 and RB.

EMC precautions

The following EMC precautions are recommended to obtain interference free operation of the INTERBUS network. Additional information on EMC can be found in the VLT 5000 Series design guide (MG.50.CX.YY). Please also consult the manual of the INTERBUS master for further installation guidelines.

Relevant national and local regulations, for example regarding protective earth connection, must be observed.

- Cable routing
  The INTERBUS communication cable must be kept away from motor and brake resistor cables to avoid coupling of high frequency noise from one cable to the other. Normally a distance of 200 mm is sufficient, but it is generally

recommended to keep the greatest possible distance between the cables,or use fiber optic Cables, especially where cables are running in parallel over long distances.
If the INTERBUS cable has to cross a motor or brake resistor cable they must cross each other at an angle of 90° to ensure the minimum of interfrence.

- Connection of the cable screen
  The screen of the INTERBUS cable must always be connected to ground at both ends, that means the screen must be connected to ground in all stations connected to the INTERBUS network. It is of high importance to have a low impedance ground connection of the screen, also at high frequencies.This can be obtained by connecting the surface of the screen to ground, for example by means of a cable clamp or a conductive cable gland.

Cable routing and connectors
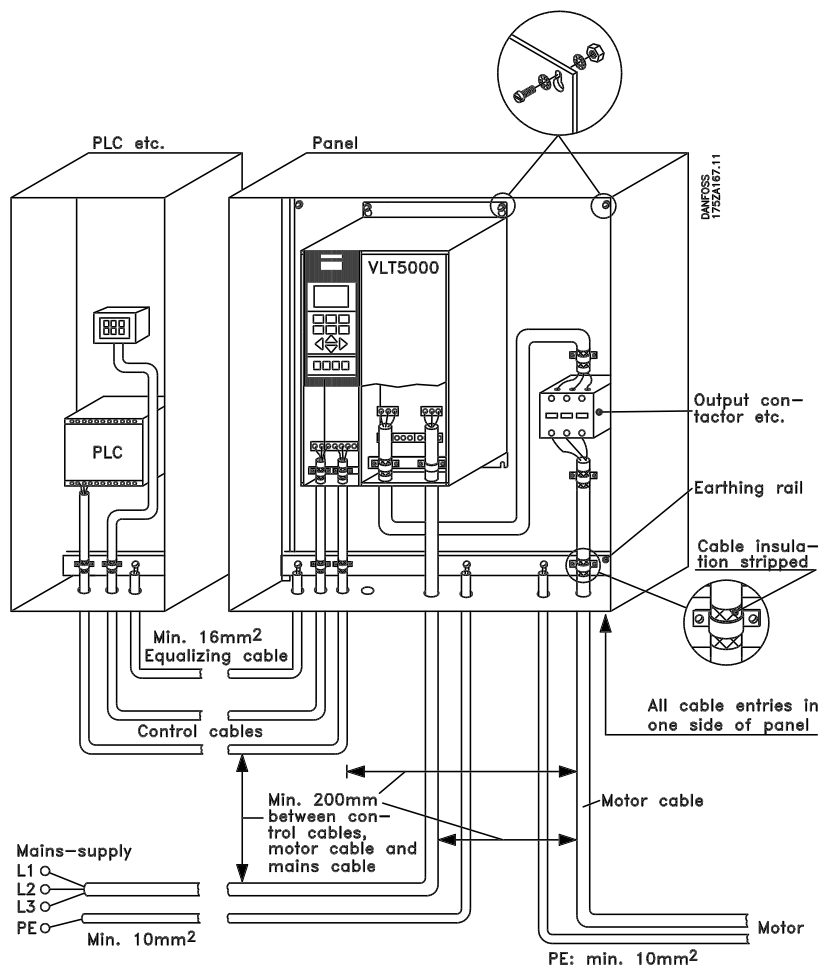
VLT 5000 Series is provided with different clamps and brackets to enable a proper ground connec-aLso at high frequency. low HF (high frequency) impedance. This can be achived by connecting a large surface area of the cabinet to Ground, for example by mounting the VLT 5000 series on a conductive rear plate.

Especially when having long distances between the stations in a INTERBUS network it can be necessary to use additional potential equalizing cables, connecting the individual stations to the same Ground potential.

■ **LEDs**

There are 10 LEDs on the INTERBUS option card. The LED's are organized in two sets each having 5 LED's. One set is visible through the top air outlet if installed in a VLT®5000 bookstyle, the second set is visible if installed in a VLT5000 Compact version.

Connectors

There are 4 connectors, arranged in groups of two. MK100A and MK100B is to be used if installed in a VLT®5000 Compact. MK101A and MK101B is used if the INTERBUS Option is installed in a VLT®5000 Bookstyle. Only one group of connectors may be used at a time.

Name	Indicates	Color	On	OFF
CC/CR:	Cable Check.	Green	Incomming bus active	Incomming 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 permissable range	No Voltage
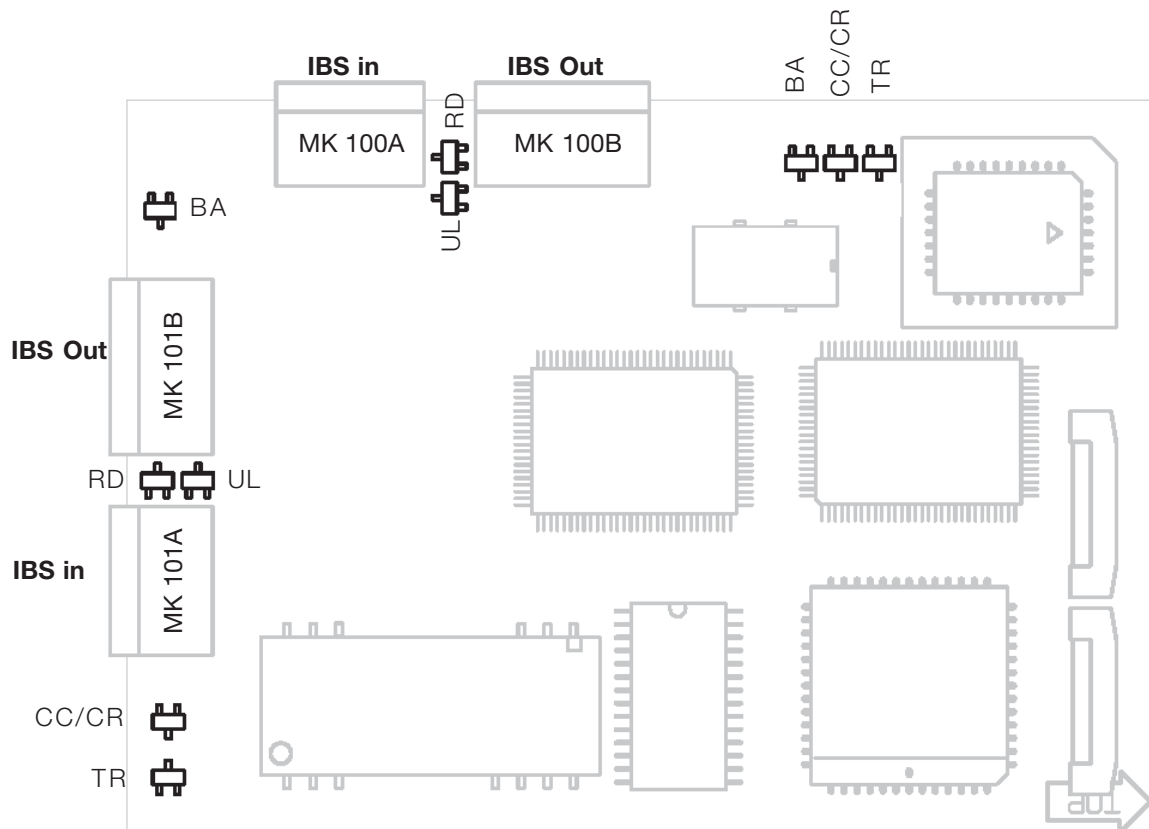
Preperation of the Cable for the VLT5000 Connector.

Step 1:

Step 2:

30 mm.

8 mm
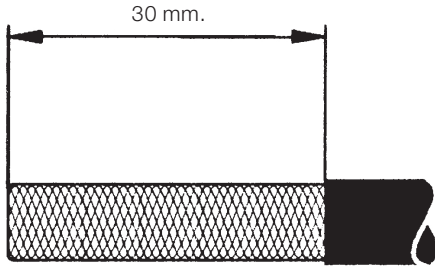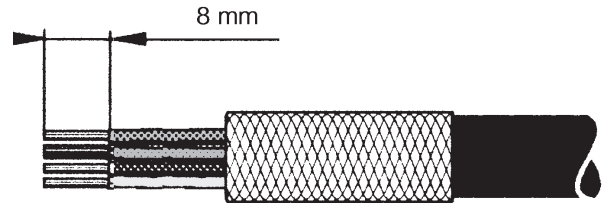
Interbus Cable VLT5000 to VLT5000:

RB	RBST
66	COM
62	DI
63	/DI
64	DO
65	/DO

IBS Out

Green /DO 65
Gray DO 64
Pink /DI 63
Yellow DI 62
Brown COM 66

IBS In
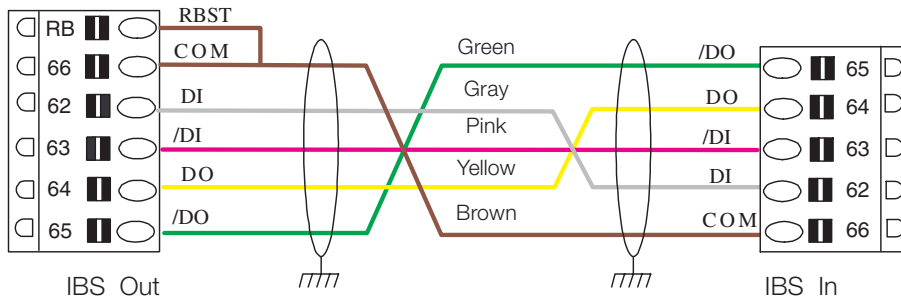
Interbus Cable DB9 to VLT5000:

9	
5	
6	/DO
1	DO
7	/DI
2	DI
3	COM

IBS Out
(Male)

Green /DO 65
Yellow DO 64
Pink /DI 63
Gray DI 62
Brown COM 66

IBS In

Interbus Cable VLT5000 to DB9:

RB	RBST
66	COM
62	DI
63	/DI
64	DO
65	/DO

IBS Out

Brown COM 3
Gray DI 2
Pink /DI 7
Yellow DO 1
Green /DO 6

IBS In
(Female)
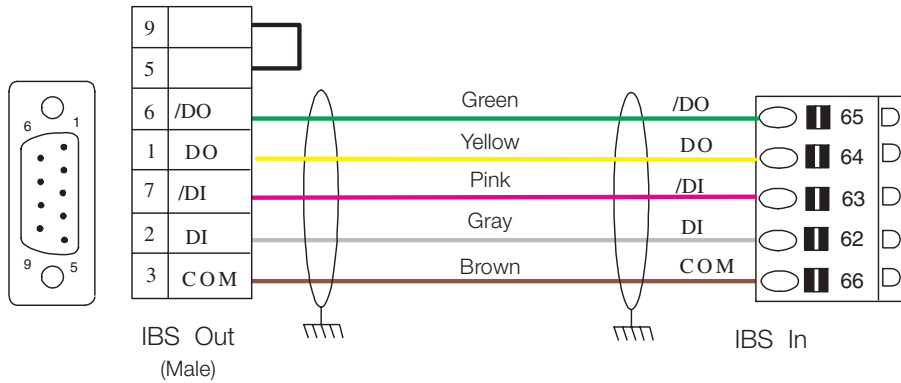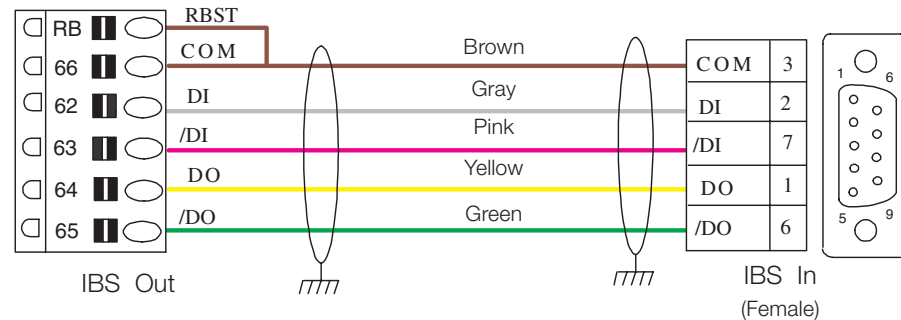
Interbus Cable VLT©5000 Bookstyle:

IBS In   IBS Out
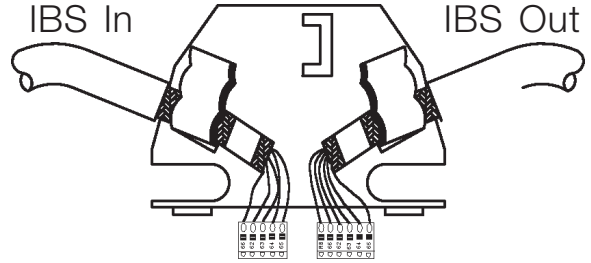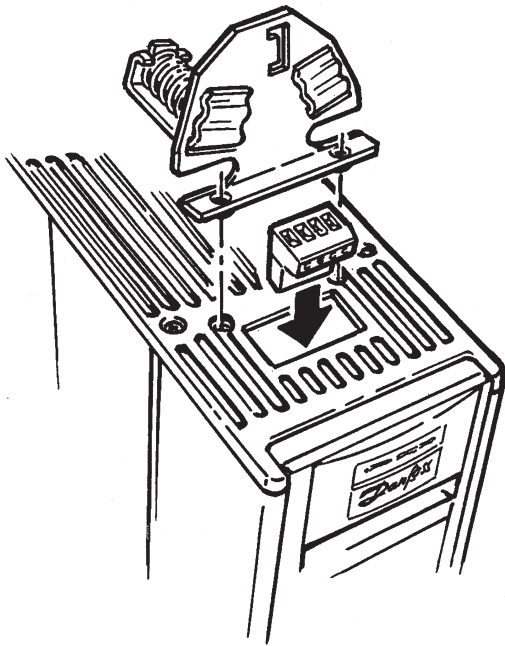
Interbus Cable VLT©5000 Compact:
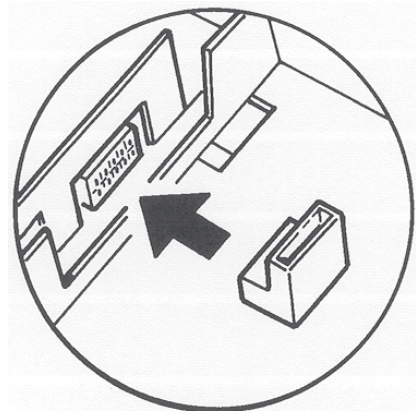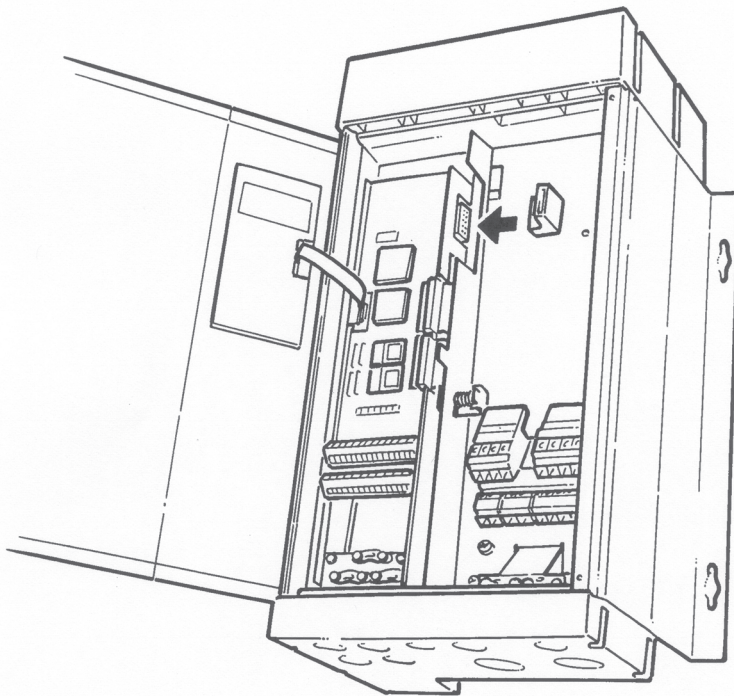
Note: Only ingoing connector set is showed.

Routing the bus Cable VLT©5060-VLT©5300 IP20 :

Note: Only ingoing cable set is showed.

Cable routing and connectors

Routing the bus Cable VLT©5060-VLT©5300 IP54
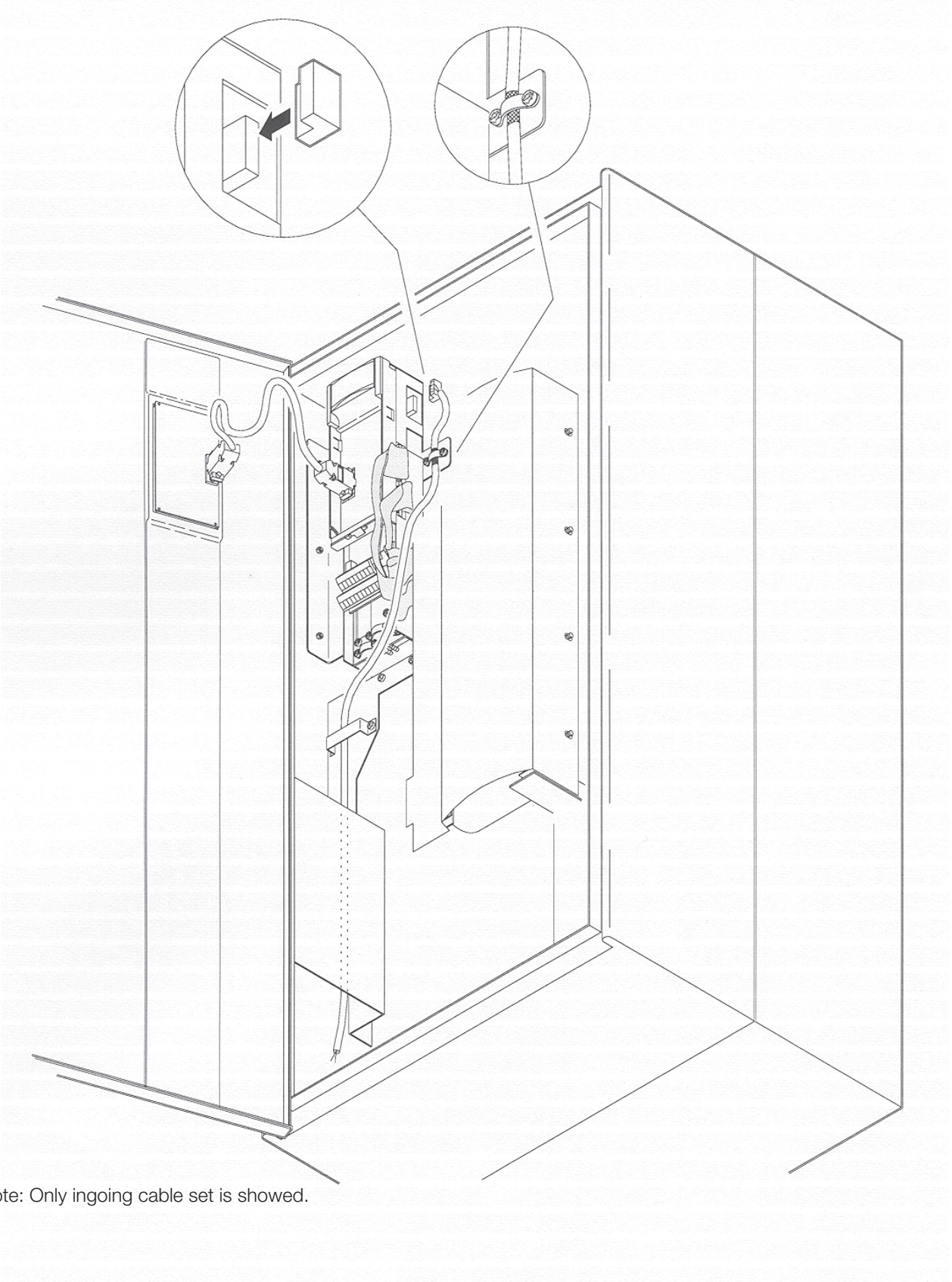
Note: Only ingoing cable set is showed.

■ **Process Data.**

The VLT®5000 INTERBUS option, offers a flexible way for the user to customize the number of Process Data. The process Data of the VLT®5000 is split in two main parts: The first two words that is reserved for the Drive profile and the user definable Process data (PCD1 to PCD7).

PQ

Fixed		User definable					
CTW	MRV	PCD1	PCD2	PCD3	PCD4	PCD5	PCD

PI

Fixed		User definable					
STW	MAV	PCD1	PCD2	PCD3	PCD4	PCD5	PCD
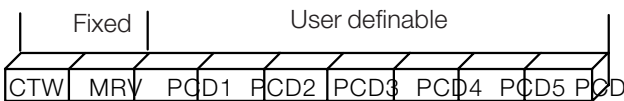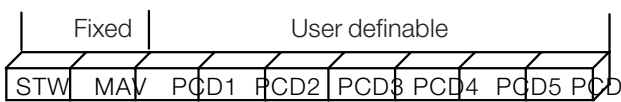
The first two words are fixed on the VLT®5000 option, whereas the input and output PCD1 to PCD7 can be selected by the user. The number of PCD's active in a system is user selectable from 0 (zero) up to 7 words. The number of PCD's is always selected in pairs (input and output). For the first 2 fixed words of Data, in the PQ and PI Data, the Danfoss VLT®5000 offers two different types of profiles: Drivecom and Danfoss. The Drivecom profile fullfills the requirement of Drivecom 21, speed setting 1. The Drivecom and Danfoss profiles will be explained in detail in chapter 7 & 8.

PCD1 to PCD7 can be used in a flexible way to read and write the VLT®5000 parameters, or high speed transfer of data to the Syncronizing and positioning Card (Sync/Pos Card). Changing the number of PCD's can be done by accesing the VLT®5000's Parameter 807. The Parameter can be changed at any time, but the changes wil first take place at the next powerup, or if the Master sends out a Bus reset command.

☞ Please note that changing the number of PCD's also may change the mapping of the Masters I/O Area (PC/PLC).

The VLT®5000 INTERBUS option features the disabling of PQ Data. PQ can be made inactive, this means that the VLT®5000 ingnores the content of all PQ Data, but the VLT®5000 continues to update the PI Data. This feature is used during reconfiguration of a running VLT®5000 system and ensures that no parameter is changed by mistake.

The drawing below shows the default setting of a system with no PCD words. The system only consist of control word and main reference for the PQ Data, and status word and main actual value for the PI Data. In this system the Control word is mapped into the PLC's output memory QW000 and the reference is mapped to the output memory QW002. The status word of the VLT®5000 is mapped into the input word IW000 of the PLC and the feedback (main actual value) is mapped to IW002.
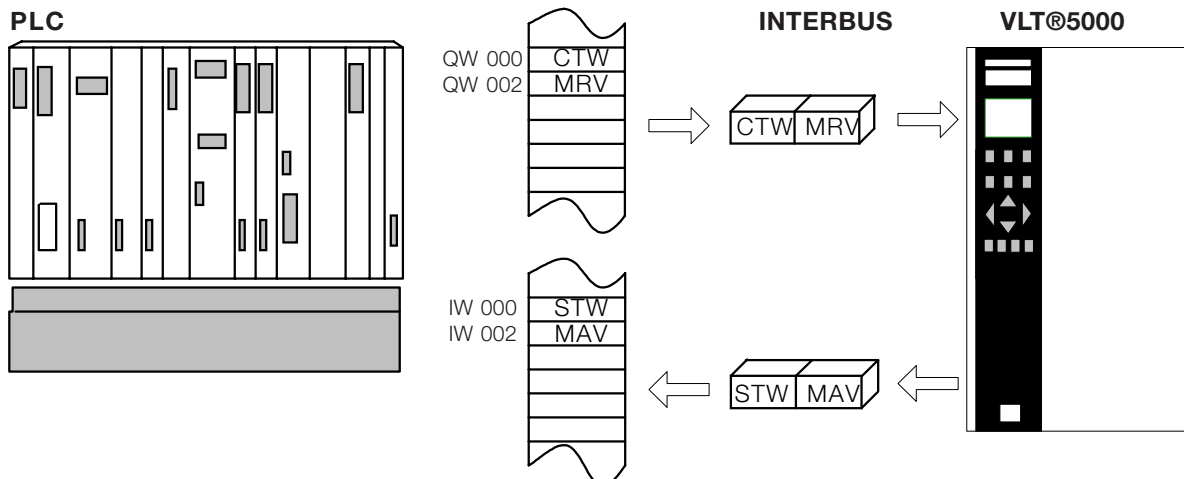
Process Data

■ **Process Data, PCD.**

To enable the use of PCD data, of the VLT®5000 INTERBUS option, the amount of PCD Datawords has to be configured in Parameter 807, where as the contents of each single PCD word has to be configured in Parameter 915 and 916. This can be done in two different ways: setting parameter 915 and 916, or by using the the INTERBUS object 6000_H and 6001_H.

After setting parameter 807 to match the desired amount of PCD Data, the VLT®5000 needs to be configured, for assigning Parameters to each single PCD words. The VLT®5000 stores this information in Parameter 915 and 916. The INTERBUS objects 6000_H and 6001_H are images of the two Parameters. Changing Parameter 915/916 has immidiatly effect on the PCD data.

The drawing below shows the relation between the INTERBUS object 6000_H/6001_H and VLT®5000 Parameter 915/916.

The INTERBUS Object 6000_H and 6001_H is an Array of words that has following structure:

Sub index	Data type	Description
1	Unsigned 8	Bytes of PQ/PI Data
2	Unsigned 16	Object number
3	Unsigned 8	Sub Index
4	Unsigned 16	Object number
5	Unsigned 8	Sub Index
6	Unsigned 16	Object number
7	Unsigned 8	Sub Index
8	Unsigned 16	Object number
9	Unsigned 8	Sub Index
⋮	⋮	⋮
37	Unsigned 8	Sub Index

The sub Index number 1 contains the number of process data bytes. For each byte of process data 2 sub indexes are used. Sub index 2 contains the Object number, sub index 3 is the index of the object, if the object is of type array. The next two indexes are for the next byte of process data. If a Object is of type Word it uses 4 Sub indexes, wheras the three last Sub indexes are not used, and must be set to zero.

The 6000_H 6001_H Objects can have from 9 up to 37 Sub indexes depending on how many PCD words there has been assigned. The drawing below shows a configuration with 2 PCD words assign for reading parameter 520 (Current) and parameter 528 (digital input). For writing parameter 204 (minimum reference) and parameter 221 (Torque limit) is used.

The output data to the VLT®5000 can be disabled by Interbus Object 6002_H. By setting the Interbus object 6002_H to 00_H all imcomming process data wil not be transimitted to the VLT5000. Setting Interbus object 6002_H to FF_H reactivates the updating of output data. After a power up the option always sets objects 6002_H to FF_H .

Writing to Interbus Object 6001_H automaticly sets object 6002_H to 00_H an thereby disables the inputs. The user has to write $0FF_H$ to Object 6002_H manually.
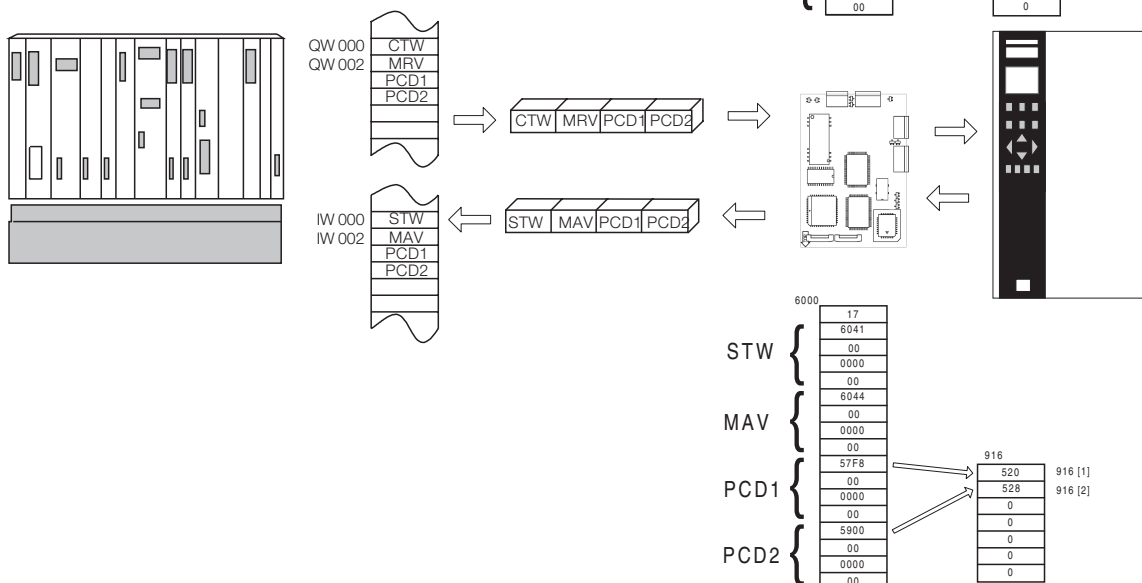
Drivecom State machine

The state machine describes the device status and the possible control sequence of the drive. A status represents a specific internal and external response. By means of device control commands and/or internal events, the status can be changed and a control sequence thus executed. The current status can be read out by way of the VLT®5000 status word. In the flowchart to the right, this explanation may help you understanding the **drawing: to change from state A to state B, the condition Controlword bit 1 has to be set equal to 0. The coarses the transition 0 to be exequted. In state B the statusword is equal to $xx01_H$.**

State A

condition xxxx xx0x **0** ⟶ transition 0

State B
STW = xx01h

Power on

0

Not ready to switch on
STW = xx00h

1

Disable Voltage xxxx xx0x

9

Switch on disabled
STW = xx40h

2 Shutdown xxxx x110

Shutdown xxxx x110

8

7 Disable Voltage xxxx xx0x or Qiuck stop xxxx x01x

Ready to switch on
STW = xx31h

3 Switch on xxxx x111

6 Stop xxxx x110

Switched on
STW = xx33h

4 Enable operation xxxx 1111

5 Disable operation xxxx x01x

Operation enabled
STW = xx37h

10 Disable voltage xxxx xx0x or Quick stop xxxx x01x

12 Disable voltage xxxx xx0x

11 Qiuck stop xxxx x01x

Quick stop active
STW = xx17h

13

Malfunction reaction active
STW = xxxx xxxx x1xx 1xxx

14

Malfunction
STW = xx38h

15 Reset malfunction 0xxx xxxx ↓ 1xxx xxxx

Drivecom 21

Danfoss specific

Enabled Ramp
STW = xx37h

JOG 1
STW = xx37h

No Freeze
STW = xx37h

Start
STW = xx37h

Drivecom 21 Profile.

Data transitions of the device control
The following describes each transaction that the Drivecom statemachine follows, by a given command.

0 Input of the state machine ➠ NOT READY TO SWITCH ON
Event: - Reset
Action: - Start self test
- Start initialisation

1 NOT READY TO SWITCH ON ➠ SWITCH ON DISABLED
Event: - Error-free self test
- Initialisation completed without errors occurring
Action: - Activate communication and process data monitoring

2 SWITCH ON DISABLED ➠ READY TO SWITCH ON
Event: - "Shutdown" command
Condition: - Depending on the manufacturer-specific requirements (e.g. power section ready)
Action: - None

3 READY TO SWITCH ON ➠ SWITCHED ON
Event: - "Switch-on" command
Action: - The power section is switched on if it is not already switched on.

4 SWITCHED ON ➠ OPERATION ENABLED
Event: - "Enable-Operation" command
Action: - Enable drive function

5 OPERATION ENABLED ➠ SWITCHED ON
Event: - "Disable-Operation" command
Action: - Execute the parameter-definable "Drive-Disable-Function"

6 SWITCHED ON ➠ READY TO SWITCH ON
Event: - "Shutdown" command
Action: - The power section can be switched off

7 READY TO SWITCH ON ➠ SWITCH ON DISABLED
Event: - "Quick-Stop" or "Disable-Voltage" command
Action: - None

8 OPERATION ENABLED ➠ READY TO SWITCH ON
Event: - "Shutdown" command
Action: - Execute the parameter definable "Drive-Disable-Function"

- The power section can be switched off

9 OPERATION ENABLED ➠ SWITCH ON DISABLED
Event: - "Disable-Voltage" command
Action: - Disable drive function
- The power section can be switched off

10 SWITCHED ON ➠ SWITCH ON DISABLED
Event: - "Disable-Voltage" command
or
- "Quick-Stop" command
Action: - The power section can be switched off

11 OPERATION ENABLED ➠ QUICK STOP ACTIVE
Event: - "Quick-Stop" command
Action: - Trigger the parameter-definable "Quick-Stop-Function"

12 QUICK STOP ACTIVE ➠ SWITCH ON DISABLED
Event: - Quick stop has been completed
or
- "Disable-Voltage" command
Action: - Disable drive function
- The power section can be switched off

13 All states ➠ MALFUNCTION REACTION ACTIVE
Event: - Drive malfunction detected
Action: - Trigger malfunction reaction depending on the fault

14 MALFUNCTION REACTION ACTIVE ➠ MALFUNCTION
Event: - Malfunction reaction concluded
Action: - Disable drive function
- The power section can be switched off

15 MALFUNCTION ➠ SWITCH ON DISABLED
Event: - "Malfunction-Reset" command
Condition: - Malfunction is no longer present
Action: - Malfunction reset is executed

Control word as per Drivecom 21 Standard
(parameter 512 = Drivecom)

Master→Slave
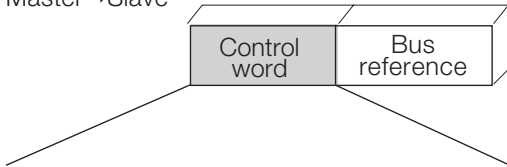
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 Bit no.

Bit	Bit = 0	Bit =1
00	Switch off	Switch on
01	Disable voltage	Enable voltage
02	Quick stop	Run
03	Disable operation	Enable operation
04	Disable Ramp	Enable Ramp
05	Freeze	Run enable
06	Ramp stop	Start
07	No function	Reset
08	Drivecom reserved	
09	Drivecom reserved	
10	Drivecom reserved	
11	Jog 1 OFF	Jog 1 ON
12	Danfoss reserved	
13	Choice of Setup 1 (lsb)	
14	Choice of Setup 2 (msb)	
15	Forward	Reversing

Bit 00, Switch OFF/ON:
Bit 00= "0" execute transition 2, 6 or 8
Bit 00 = "1" execute transition 3

Bit 01, Disable/Enable Voltage:
Bit 01= "0" execute transition 9, 10 or 12
Bit 01 = "1" = "Enable Voltage"

Bit 02, Quick stop/Run:
Bit 02= "0" execute transition 7, 10 or 11.
Bit 02 = "1" = Quick stop not active.

Bit 03, Disable/enable Operation:
Bit 03= "0" execute transition 5.
Bit 03 = "1" = "Enable operation"

Bit 04, Quick-stop/ramp:
Bit 04= "0" execute transition 7 or 11, Quick stop
Bit 04 = "1" = Enable ramp.

Bit 05, Freeze output frequency/ramp enable:

Bit 05 = "0" means that the given output frequency is maintained even if the reference is changed.
Bit 05 = "1" means that the frequency converter is again able to regulate, and the given reference is followed.

Bit 06, Ramp stop/start:
Bit06= "0" The VLT controls the motor down to stop.
Bit 01 = "1" = Start command to the VLT is given

Bit 07, No function/reset
Reset of trip. Bit 07 = "0" means that there is no reset. Bit 07 = "1" means that a trip is reset.

Bit 08, 09 and 10 :
Drivecom reserved.

Bit 11, Jog 1 OFF/ON:
Activation of pre-programmed speed in parameter 509 (Bus JOG 1). JOG 1 is only possible when Bit 04 = "0" and bit 00-03 = "1".

Bit 12,:
Danfoss reserved.

Bits 13/14, Choice of Setup:
Bits 13 and 14 are used for choosing among the four menu Setups in accordance with the following table:

Setup	Bit 14	Bit 13
1	0	0
2	0	1
3	1	0
4	1	1

Bit 15, No function/reversing:
Reversing of the direction of rotation of the motor. Bit 15 = "0" leads to no reversing, bit 15 = "1" leads to reversing.
Please note that, in the factory setting, reversing has been chosen as digital in parameter 506, which means that bit 15 will only lead to reversing if *bus, logic or* or *logic and* (however, *logic and* only together with terminal 19) has been selected.

NB!

Unless otherwise mentioned, the control word bit is combined (gated) with the corresponding function on the digital inputs as a logical "or" function.

Drivecom 21 Profile.

<u>Status word (according to Drivecom standard)</u>
The status word is used for informing the master (e.g. a PC) of the condition of the VLT 5000.

Slave→Master

| Status word | Output frequency |

15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 Bit no.

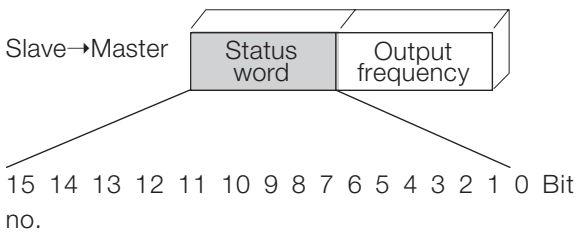| Bit	Bit = 0	Bit =1
00	Not ready to switch on	Ready to switch on
01	Switched off	Switched on
02	Operation disabled	Operatin enabled
03	No malfunction	Malfunction
04	Voltage disabled	Voltage Enable
05	Quick stop	Run
06	Switch on disable	Switch on enable
07	No warning	Warning
08	Danfoss reserved	
09	Remote disabled	Remote enabled
10	Setpoint not reached	Setpoint reached
11	Speed limit not active	Speed limit active
12	Drivecom reserved	
13	Drivecom reserved	
14	Not running	Running
15	Danfoss reserved	

<u>Bit 00, Not ready to switch on/Ready to switch on:</u>
Bit 00 = "0" state less than ″Ready to switch on″
Bit 00 = "1" state at least = ″Ready to Switch on″″

<u>Bit 01, Switch off/Switch on:</u>
Bit 00 = "0" state less than ″Switched on ″
Bit 00 = "1" state at least = ″Switched on″

<u>Bit 02, Operation disable/Operation enable:</u>
Bit 00 = "0" state less than ″Operation enable″
Bit 00 = "1" state at least = ″Operation enable″

<u>Bit 03, No fault/trip:</u>
Bit 03 = "0" means that VLT 5000 Series is not in a fault condition. Bit 03 = "1" means that VLT 5000 Series has tripped and needs a reset signal in order to run.

<u>Bit 04, Voltage disable/Voltage enable:</u>

Bit 04 = "0" means that control word bit 01 = "1".
Bit 04 = "1" means that control word bit 01 = "0".

<u>Bit 05, Quick stop/Run:</u>
Bit 05 = "0" means that control word bit 02 = "1".
Bit 05 = "1" means that control word bit 02 = "0".

<u>Bit 06, Start enable/start disable:</u>
Bit 06 = "0" state not ″Switch on disable″
Bit 06 = "1" state = ″Switch on enable″

<u>Bit 07, No warning/warning:</u>
Bit 07 = "0" means that there is no unusual situation. Bit 07 = "1" means that an abnormal condition has arisen for the VLT 5000 Series. All warnings are described in the Operating Instructions.

<u>Bit 08, Danfoss reserved:</u>

<u>Bit 09, Remote disable/ Remote enable:</u>
Bit 09 = "0" means that VLT 5000 Series has been stopped by means of the stop key on the control panel, or that *Local operation* has been selected in parameter 002. Bit 09 = "1" means that it is possible to control the frequency converter via the serial port.

<u>Bit 10, Setpoint not reached/Setpoint reached:</u>
Bit 10 = "0" means that the actual motor speed is different from the speed reference set. This can be the case i.a. while the speed is ramped up/down during start/stop. Bit 10 = "1" means that the present motor speed equals the speed reference set.

<u>Bit 11, Speed limit not active/speed limit active:</u>
Bit 11 = "0" means that the output frequency is out of the range set in parameter 225 (Warning: Low frequency) and parameter 226 (Warning: High frequency). Bit 11 = "1" means that the output frequency lies within the mentioned range.

<u>Bit 12, Drivecom reserved</u>

<u>Bit 13, Drivecom reserved</u>

<u>Bit 14, Running/Not running:</u>
Bit 14 = "0" means that the motor is not running.
Bit 14 = "1" means that VLT 5000 Series has a start signal or that the output frequency is greater than 0 Hz.

<u>Bit 15, Danfoss reserved.</u>

Bus reference value (Drivecom Profile):

| Control word | Bus reference | Master→Slave

15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 Bit no.
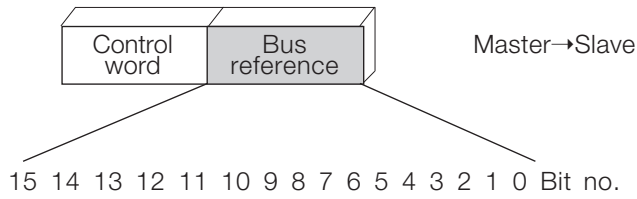
The bus reference value is transmitted to the frequency converter in the form of a 16-bit word. The value is transmitted as a whole number (-32768 to 32767). The value is handled as RPM.

Actual output RPM
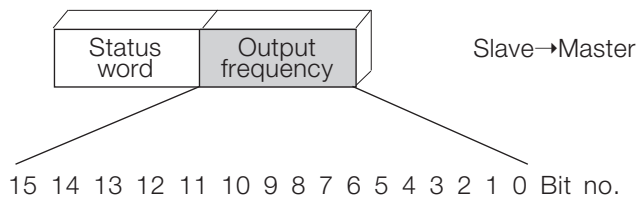
| Status word | Output frequency | Slave→Master

15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 Bit no.

The value of the actual output RPM of the Motor, is transmitted in the form of a 16-bit word. The value is transmitted as a whole number (-32768 to 32767).

Drivecom 21 Objects

■ **Drivecom 21 objects.**

The VLT®5000 supports 9 Drivecom specific objects. The objects can be access by PCP communication. 4 of these objects can also be accessed as process data.

Object 6040$_H$, Control Word:
This object is the same as the Drivecom Control Word

Object 6041$_H$, Status Word:
This object is the same as the Drivecom status word .

Object 6042$_H$, Nominal-Speed-Value :
This object is the same as the Bus reference (MRV).

Object 6043$_H$, Reference-Speed-Variable:
This is the reference after the Ramp. This value is read only (-32768 to 32767) .

Object 6044$_H$, Actual-Speed-Value:
This object is the same as the Actual output RPM. The value of the actual output RPM of the Motor, is transmitted in the form of a 16-bit word. The value is transmitted as a whole number (-32768 to 32767).

Object 6046$_H$, Speed-min-max-amount:
The Speed-Min-Max-Amount Object is composed of the Speed-Min-Amount and Speed-Max-Amount sub objects. These subobjects have no unit and have values within a range from 0 to 4 294 967 295 (unsigned 32).The Interbus Option translates these two indexes into the VLT®5000 parameter 204 and 205. Based on Parameter 106 (Motor Norminal Speed) the option calculation new values for P.204 & P.205.

Object 6048$_H$, Speed-Acceleration:
The Speed-Acceleration object specifies the slope of the acceleration ramp (α) The object has 2 indexes where: Index 1, is the Delta-Speed (unsigned 32) and index 2 is Delta-Time (unsigned 16). If Delta-Time is set to 0 (zero) the ramp is disabled. The VLT®5000 Interbus Option translate these two values into the VLT®5000 parameters 106, Motor norminal speed and parameter 207, ramp up time.
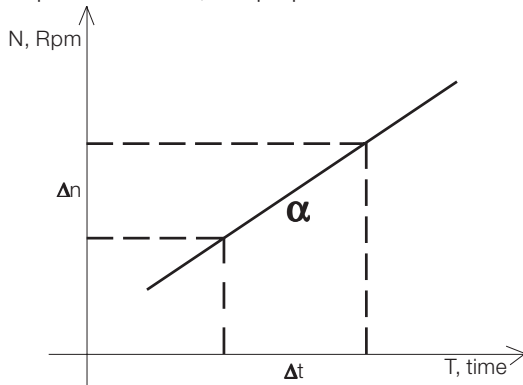
The VLT®5000 will first activate the changes when both indexes are written. Since the VLT®5000 translates the two indexes into VLT®5000 paramters, the value written to Object 6048$_H$ may be different from a following read, but the slope (α) is correct !

Object 6049$_H$, Speed-Deceleration:

The Speed-deceleration object specifies the slope of the deceleration ramp (α) The object has 2 indexes where: Index 1, is the Delta-Speed (unsigned 32) and index 2 is Delta-Time (unsigned 16). If Delta-Time is set to 0 (zero) the ramp is disabled. The VLT®5000 Interbus Option translate these two values into the VLT®5000 parameters 106, Motor norminal speed and parameter 208, ramp down time.
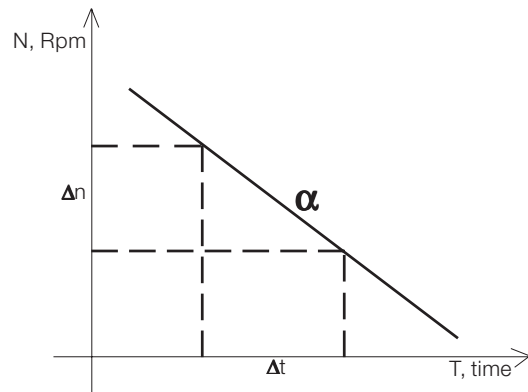
The VLT®5000 will first activate the changes when both indexes are written. Since the VLT®5000 translates the two indexes into VLT®5000 paramters, the value written to Object 6049$_H$ may be different from a following read, but the slope (α) is correct !

Object 603F$_H$, Malfunction:
This is the errors reported back to the Master system. A detailed list is on the next page.

Object 6052$_H$, Normial-Percentage :
This object is the Normial setpoint in %. . The value is transmitted as a whole number ±100% = ±4000$_H$. This value is read only.

Object 6054$_H$, Actual-Percentage :
This object is the actual speed of the motor . The value is transmitted as a whole number ±100% = ±4000$_H$

Interbus Error codes:

Meaning	VLT-Code Alarmword (Hex)	Drivecom Malfunc. Code	Drivecom Malfunc group
No alarm	0000 0000	0	No malfunction
Brake test Failed	0000 0001	7110	brake chopper
Trip locked	0000 0002	1000	general malfunction
Auto-optimisation not OK	0000 0004	5210	measurement circuit
Auto-optimisation OK	0000 0008	0	no error
Power-up fault	0000 0010	1000	general malfunction
ASIC fault	0000 0020	5200	hardware control fault
HPFB bus timeout	0000 0040	8100	monitoring communication
Standard bus timeout	0000 0080	8100	monitoring communication
Short circuiting	0000 0100	2130	short circuit
Switch mode fault	0000 0200	5115	U5 supply
Earth fault	0000 0400	2240	earth leakage
Overcurrent	0000 0800	2310	continuous over-current
Torque limit	0000 1000	8311	excess torque
Motor thermistor	0000 2000	4310	excess temperature drive
Motor overloaded	0000 4000	2312	continuous over-current 2
Inverter overloaded	0000 8000	2316	continuous over-current 1
DC Link undervoltage	0001 0000	3220	internal under-voltage
DC Link overvoltage	0002 0000	3210	internal over-voltage
Phase fault	0004 0000	3130	phase failure
Live zero fault	0008 0000	7300	sensor
Heat sink temperature too high	0010 0000	4210	excess temperature device
Motor phase U missing	0020 0000	3131	phase failure L1
Motor phase V missing	0040 0000	3132	phase failure L2
Motor phase W missing	0080 0000	3133	phase failure L3
Quick discharge not OK	0100 0000	9000	External malfunction

■ PCP Communication.

For acyclical read and writting of VLT®5000 parameters and Interbus Objects, the PCP-Channel has to be used. The Danfoss VLT®5000 option supports following services:

- •Initiate
  Establish connection between master and VLT®5000
- •Abort
  Cancel Connection between Master and VLT®5000
- •Read
  Read VLT®5000 Parameter or Interbus Objects.
- •Write
  Write VLT®5000 Parameter or Interbus Objects.
- •Get OD, both short and long are supported
  Get Object dictionary from VLT®5000.
  and
- •Identify
  Identification of the VLT®5000 to the Master.

Following entries has to be done in the Master for PCP communication:

Communication referens	2
Transmitt buffer lengh	246
Receive buffer lengh	246
Supported Service request	80 30 00$_H$
Supported Service response	00 00 00$_H$

All parameters in the VLT®5000 are mapped to the Danfoss specific objects starting from object $22000_D = 55F0_H$. The first object is 22001_D, which corresponds to read VLT®5000 parameter 001, language. 22002_D corresponds to VLT®5000 parameter 2 and so on. This means that all VLT®5000 parameters simply can be accessed by using PCP communication, just adding 22000_D to the VLT®5000 parameter.
To access the VLT®5000 objects for reading and writing, it is necesarry to set up the correct data size and index for the parameter. The option board can provide the complete list of objects to the user by using the GET OD command. Alternally the user can set up the command for the object manualy.

Control word under VLT standard (parameter 512 = FC Drive)

The control word is used for sending commands from a master (e.g. a PC) to a slave (VLT 5000 Series).

Master→Slave

Control word	Bus reference

15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 Bit no.
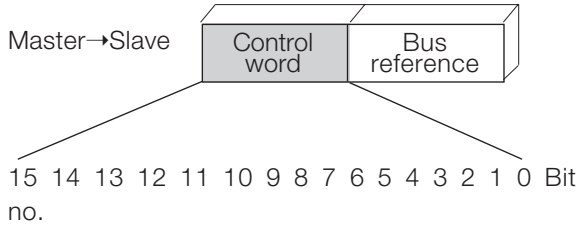
Bit	Bit = 0	Bit = 1
00	Preset reference choice lsb	
01	Preset reference choice msb	
02	DC brake	Ramp
03	Coasting	Enable
04	Quick-stop	Ramp
05	Hold	Ramp enable
06	Ramp stop	Start
07	No function	Reset
08	No function	Jog
09	Ramp 1	Ramp 2
10	Data not valid	Valid
11	No function	Relay 01 activated
12	No function	Relay 04 activated
13	Choice of Setup lsb	
14	Choice of Setup msb	
15	No function	Reversing

Bit 00/01:

Bits 00 and 01 are used for choosing among the four pre-programmed references (parameters 215-218) in accordance with the following table:

Preset ref.	Parameter	Bit 01	Bit 00
1	215	0	0
2	216	0	1
3	217	1	0
4	218	1	1

NB!
Parameter 508 is where to choose the way bits 1/12 are to be combined (gated) with the corresponding function on the digital inputs.

Bit 02, DC BRAKE:

Bit 02 = "0" leads to DC braking and stop. Braking current and duration are set in parameters 125 and 126. Bit 02 = "1" leads to *ramping*.

Bit 03, Coasting/enable:

Coasting stop. Bit 03 = "0" leads to a stop. Bit 03 = "1" means that the frequency converter is able to stop, provided the other conditions for starting are fullfilled. Note: In parameter 502 the choice is made as to how bit 03 is to be combined (gated) with the corresponding function in the digital inputs.

Bit 04, Quick-stop/ramp:

Quick-stop which uses the ramp time in parameter 212. Bit 04 = "0" leads to a quick-stop. Bit 04 = "1" means that the frequency converter is able to start, provided the other conditions for starting are fulfilled. Note: In parameter 503 the choice is made as to how bit 04 is to be combined (gated) with the corresponding function on the digital inputs.

Bit 05, Freeze output frequency/ramp enable:

Bit 05 = "0" means that the given output frequency is maintained even if the reference is changed. Bit 05 = "1" means that the frequency converter is again able to regulate, and the given reference is followed.

Bit 06, Ramp stop/start:

An ordinary ramp stop that uses the ramp time in parameters 207/208 or 209/210; in addition, output relay 01 or 04 will be activated when the output frequency is 0 Hz, provided *Relay 123* has been selected in parameter 323 or 326. Bit 06 = "0" leads to a stop. Bit 06 = "1" means that the frequency converter is able to start, provided the other conditions for starting are fulfilled. Note: In parameter 505 the choice is made as to how bit 06 is to be combined (gated) with the corresponding function on the digital inputs.

Bit 07, No function/reset

Reset of trip. Bit 07 = "0" means that there is no reset. Bit 07 = "1" means that a trip is reset.

Bit 08, Activation of Jog speed in parameter 213:

Bit 08 = "0": Jog speed not activated. Bit 08 = "1" means that the motor is running at Jog speed.

Bit 09, Choice of ramp 1/2:

Bit 09 = "0" means that ramp 1 is active (parameters 207/208). Bit 09 = "1" means that ramp 2 (parameters 209/210) is active.

Bit 10, Data not valid/valid:
Used for telling VLT 5000 whether the control word is to be used or ignored. Bit 10 = "0" means that the control word is ignored. Bit 10 = "1" means that the control word is used. This function is relevant because the control word is always contained in the telegram, regardless of the type of telegram used, i.e. it is possible to disconnect the control word if it is not to be used in connection with updating or reading of parameters.

Bit 11, Relay 01:
Bit 11 = "0": Relay 01 not activated. Bit 11 = 1: Relay 01 activated, provided *Control word bit* has been chosen in parameter 323.

Bit 12, Relay 04:
Bit 12 = "0": Relay 04 has not been activated. Bit 12 = "1": Relay 04 has been activated, provided *Control word bit* has been chosen in parameter 326.

NB!
Unless otherwise mentioned, the control word bit is combined (gated) with the corresponding function on the digital inputs as a logic "or" function.

Bits 13/14, Choice of Setup:
Bits 13 and 14 are used for choosing among the four menu Setups in accordance with the following table:

Setup	Bit 14	Bit 13
1	0	0
2	0	1
3	1	0
4	1	1

This function is only possible if *Multi-Setup* has been selected in parameter 004.

NB!
Parameter 507 is used for choosing how bits 13/14 are to be combined (gated) with the corresponding function on the digital inputs.

Bit 15, No function/reversing:
Reversing of the direction of rotation of the motor. Bit 15 = "0" leads to no reversing, bit 15 = "1" leads to reversing.

Please note that, in the factory setting, reversing has been chosen as digital in parameter 506, which means that bit 15 will only lead to reversing if *bus, logic or* or *logic and* (however, *logic and* only together with terminal 19) has been selected.

Status word under VLT standard
The status word is used for informing the master (e.g. a PC) about the condition of the slave (VLT 5000 Series).

Slave→Master

| Status word | Output frequency |

15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 Bit no.
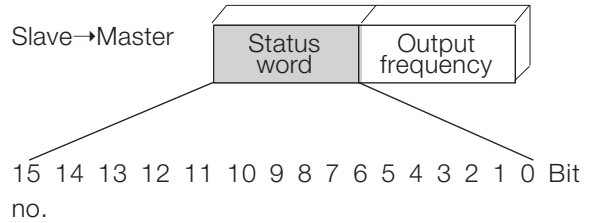
Bit	Bit = 0	Bit = 1
00	Control not ready	Ready
01	VLT not ready	Ready
02	Coasting	Enable
03	No fault	Trip
04	Reserved	
05	Reserved	
06	Reserved	
07	No warning	Warning
08	Speed ≠ ref.	Speed = ref.
09	Local control	Bus control
10	Out of range	Frequency OK
11	Not running	Running
12	VLT OK	Stalling, autostart
13	Voltage OK	Above limit
14	Torque OK	Above limit
15	Timer OK	Above limit

Bit 00, Control not ready/ready:
Bit 00 = "0" means that the frequency converter has tripped.
Bit 00 = "1" means that the frequency converter controls are ready, but that the power component is not necessarily receiving any power supply (in case of external 24 V supply to controls).

Bit 01, VLT not ready/ready:
Same meaning as bit 00; however, there is also a supply to the mains component, and the frequency converter is ready to run when it receives the necessary start signals.

Bit 02, Coasting/enable:
Bit 02 = "0" means that the control word bit 03 is "0" (Coasting) or that VLT 5000 Series has tripped. Bit 02 = "1" means that control word bit 03 is "1" and that VLT 5000 Series has not tripped.

Bit 03, No fault/trip:
Bit 03 = "0" means that VLT 5000 Series is not in a fault condition. Bit 03 = "1" means that the VLT

5000 Series has tripped and needs a reset signal in order to run.

Bit 04, Reserved.

Bit 05, Reserved.

Bit 06, Reserved.

Bit 07, No warning/warning:
Bit 07 = "0" means that there is no unusual situation. Bit 07 = "1" means that an abnormal condition has arisen for the VLT 5000 Series. All warnings are described in the Operating Instructions.

Bit 08, Speed ≠ ref/speed = ref.:
Bit 08 = "0" means that the actual motor speed is different from the speed reference set. This can be the case i.g. while the speed is ramped up/down during start/stop. Bit 08 = "1" means that the present motor speed equals the speed reference set.

Bit 09, Local control/Bus control:
Bit 09 = "0" means that VLT 5000 Series has been stopped by means of the stop key on the control panel, or that *Local operation* has been selected in parameter 002. Bit 09 = "1" means that it is possible to control the frequency converter via the serial port.

Bit 10, Out of operating range/Frequency limit OK:
Bit 10 = "0" means that the output frequency is out of the range set in parameter 225 (Warning: Low frequency) and parameter 226 (Warning: High frequency). Bit 10 = "1" means that the output frequency lies within the mentioned range.

Bit 11, Does not run/running:
Bit 11 = "0" means that the motor is not running. Bit 11 = "1" means that VLT 5000 Series has a start signal or that the output frequency is greater than 0 Hz.

Bit 12, VLT OK/stalling, autostart:
Bit 12 = "0" means that there is no temporary over-temperature on the inverter. Bit 12 = "1" means that the inverter has stopped because of over-temperature, but that the unit has not tripped and will continue, once the overtemperature stops.

Bit 13, Voltage OK/above limit:
Bit 13 = "0" means that the voltage limits of VLT 5000 Series have not been exceeded. Bit 13 = "1" means that the DC voltage of the VLT 5000 Series intermediate circuit is too low or too high.

Bit 14, Torque OK/above limit:
Bit 14 = "0" means that the motor current is lower than the torque limit selected in parameter 221. Bit 14 = "1" means that the torque limit in parameter 221 has been exceeded.

Bit 15, Timers OK/above limit:
Bit 15 = "0" means that the timers for motor thermal protection (described on page 67) and VLT thermal protection, respectively, have not exceeded 100%. Bit 15 = "1" means that one of the timers has exceeded 100%.

Bus reference value (FC Profile):
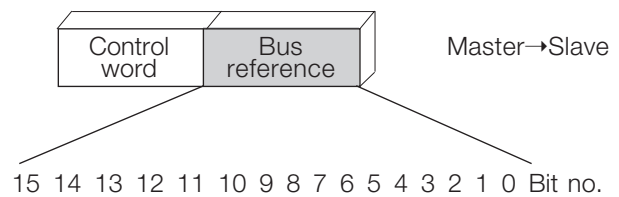
The frequency reference value is transmitted to the frequency converter in the form of a 16-bit word. The value is transmitted as a whole number (0-32767). 16384 (4000 Hex) corresponds to 100%. (Negative figures are formed by means of 2's complement.)

The bus reference has the following format:
Parameter 203 = "0"

"ref_{MIN}-ref_{MAX}"
0-16384 (4000 Hex) ~ 0-100% ~ ref_{MIN} - ref_{MAX}

Parameter   203 = "1"

-ref_{MAX} - +ref_{MAX}
-16384 (C000 Hex) - +16384 (4000 Hex) ~
-100- +100% ~ -ref_{MAX}- +ref_{MAX}

Actual output frequency
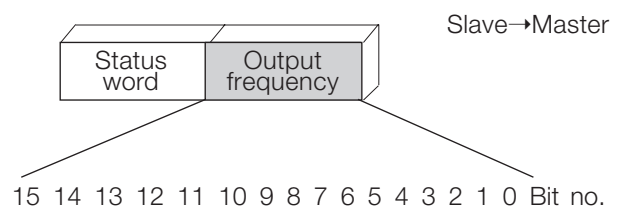
The value of the actual output frequency of the frequency converter is transmitted in the form of a 16-bit word. The value is transmitted as a whole number (0-32767). 16384 (4000 Hex) corresponds to 100%. (Negative figures are formed by means of 2's complement).

Parameters

■ **INTERBUS specific VLT parameters**

Only the INTERBUS specific parameters (800 - 807 and 915, 916, 9 . .) are described in this manual. Most VLT 5000 Series parameters and their functions are unaffected by the INTERBUS option. Refer to the parameter description in the VLT 5000 Series product manual.

Special attention must be given to the following parameters that are not described in this manual:

- 002: If operation site = Local, then control via INTERBUS is not possible

- 100: If parameter 512 is set to DRIVECOM, it is only possible to select speed open loop or speed closed loop.

- 502 - 508: Selection of how to gate INTERBUS control commands with control card digital inputs.

- 512: Control word profile, selects a control word according to DRIVECOM or a Danfoss specified control word.

- 515 - 540: Data readout parameters that can be used to read various actual data from the VLT, for example actual status of the analog and digital inputs of the control card thus using these as inputs to the master.

801 Baud rate select (BAUD RATE SELECT)		
Selection:		
★ 500 kBaud	(500 KBAUD)	[30]

Function:
Selection of the INTERBUS transmission speed.

Description of selections:
- *500 kBaud:* The INTERBUS transmission speed is fixed to 500 kBaud at this time.

803 Bus time out (BUS TIME OUT)	
Selection:	
1 - 99 sec	★ 1 sec

804 Bus time out function (TIME OUT FUNCT.)	
Selection:	
★ Off (OFF)	[0]
Freeze output frequency (FREEZE OUTPUT)	[1]

Stop with auto restart (STOP)	[2]
Output frequency = JOG freq. (JOGGING)	[3]
Output freq. = Max. freq. (MAX SPEED)	[4]
Stop with trip (STOP AND TRIP)	[5]
Control without INTERBUS (NO COM OPT CONTROL)	[6]
Select setup 4 (SELECT SETUP 4)	[7]

Function:

The time out counter is triggered at the first reception of a valid control word. When process data is used. Acyclical PCP will not trigger the time out counter. The *time out* function will be activated if CTW is not updated within the specified time, set in parameter 803.

The VLT remains in the time out state until one of the following four conditions is true:

1. Valid control word is received <u>and</u> reset (Bus, terminals or local control panel) is activated (reset is only necessary when the time out function *Stop w. trip* is selected) ⇒ control via INTERBUS is resumed with the actual control word.
2. Parameter 002 = *Local* ⇒ Local control via local control panel is enabled.
3. Parameter 928 = *Disabled* ⇒ Normal control via terminals and RS485 is enabled. The time out counter is reset and must be trigged by a valid control word before a new time out can be activated.
4. Parameter 804 = *Off* ⇒ control via INTERBUS is resumed and the most recent control word is used.

Description of selections:

- *Freeze output frequency*: Freeze output frequency until communication is resumed.
- *Stop with auto restart*: Stop with auto restart when communication is resumed.
- *Output frequency = JOG freq.*: Motor will run at JOG frequency until communication is resumed.
- *Output frequency = Max. freq.*: Motor will run at max. frequency until communication is resumed.
- *Stop with trip*: Motor is stopped, reset needed for restart, see explanation above.
- *Control without INTERBUS*: Control via INTERBUS is disabled and control is only possible via standard RS485 interface, until communication is resumed.
- *Select setup 4:* Setup 4 is selected if timeout occurs. If communication is resumed the VLT will not cange back to the setup it used before the timeout occured.

Description of selections:

807 PCD size select (PCD SIZE SELECT)

Selection:

★	0 Word (0 WORDS)	[0]
	1 Word (1 WORDS)	[1]
	2 Word (2 WORDS)	[2]
	3 Word (3 WORDS)	[3]
	4 Word (4 WORDS)	[4]
	5 Word (5 WORDS)	[5]
	6 Word (6 WORDS)	[6]
	7 Word (7 WORDS)	[7]

Function:

The PCD size select assigns the number of Process data words, the VLT is using.

Change of parameter 807 is first executed at next power up, or alarmstop from the INTERBUS Master.

915 PCD config. write (PCD IN WR-)

Selections:

Sub index 1	([1] 000)	Parameter #
Sub index 2	([2] 000)	Parameter #
Sub index 3	([3] 000)	Parameter #
Sub index 4	([4] 000)	Parameter #
Sub index 5	([5] 000)	Parameter #
Sub index 6	([6] 000)	Parameter #
Sub index 7	([7] 000)	Parameter #
Sub index 8	([8] 000)	Parameter #

Function:

Different parameters can be assigned to PCD 1-7 of the PA data (the number of PCD's depends on the setting in parameter 807). The values in PCD 1-7 will be written to the selected parameters as data values.

Description of selections:

The order of the subindexes corresponds to the order of the PCD's in the PQ + 2, i.e. subindex 1 ≈ PCD 3, subindex 2 ≈ PCD 3 and so on. Each subindex can hold the number of any of the VLT parameters.

916 PCD config. read(PCD IN RD-)

Selections:

Sub index 1	([1] 000)	Parameter #
Sub index 2	([2] 000)	Parameter #
Sub index 3	([3] 000)	Parameter #
Sub index 4	([4] 000)	Parameter #
Sub index 5	([5] 000)	Parameter #
Sub index 6	([6] 000)	Parameter #
Sub index 7	([7] 000)	Parameter #
Sub index 8	([8] 000)	Parameter #

Function:

Different parameters can be assigned to PCD 1-7 of the PPO's (the number of PCD's depends on the PPO type). PCD 1-7 will hold the actual data value of the selected parameters.

Description of selections:

The order of the subindexes corresponds to the order of the PCD's in the PI + 2, i.e. subindex 1 ≈ PCD 3, subindex 2 ≈ PCD 3 and so on. Each subindex can hold the number of any of the VLT parameters.

927 Parameter edit

Selections:

Disabled	[0]
★ Enabled	[1]

Function:

Editing parameters is possible via either INTERBUS or the standard RS485 interface, but not both at the same time. Parameter read is always possible via the local control panel.

Description of selections:

- *Disabled*: Parameter edit via INTERBUS is disabled. Parameter edit via standard RS485 is possible.
- *Enabled*: Parameter edit via INTERBUS is enabled. Parameter edit via standard RS485 port is blocked

928 Process control
Selections:

Disabled	[0]
★ Enabled	[1]

Function:
Process control (setting of control word and speed reference) is possible via either INTERBUS or the standard RS485 interface, but not both at the same time. Local control is always possible via the local control panel. Control via control card terminals is possible with either bus depending on the setting of parameters 502-508.

Description of selections:
- *Disabled*: Process control via INTERBUS is disabled. Process control via standard RS485 is possible.
- *Enabled*: Process control via INTERBUS is enabled. Process control via standard RS485 is blocked.

The motor may start without notice when parameter 928 is changed and start commands are present.

953 Warning parameter 1 (WARN. PARA)
Selections:

Read only

No LCP access

Function:
A 16 bit bitstring where each bit is associated with a specific warning according to the list below.

	Bit = "0" when:	Bit = "1" when:
0	Bus active	Bus not Active
1	Not used	
2	Not used	
3	Not used	
4	Actual value updated	Actual value not updated
5	Not used	
6	Not used	
7	No init error	Init error
8	Remote bus OK	Remote bus disable
9	Not used	
10	Not used	
11	Not used	

12	Internal SW error LSB
13	Internal SW error
14	Internal SW error
15	Internal SW error MSB

Bit 12-15 describes the Internal option error code.

971 Store data values (STORE DATA VALUE)
Selections:

★ No action (NO ACTION)	[0]
Store active setup (STORE ACTIVE SETUP)	[1]
Store all setups (STORE ALL SETUPS)	[2]
Store edit setup (STORE EDIT SETUP)	[3]

Function:
Parameter values changed via INTERBUS are only stored in RAM meaning that the changes are lost at power down. This parameter is used to activate a function that stores all parameter values in the EEPROM thus retaining changed parameter values at power down.

Description of selections:
No action: The store function is inactive.
Store active setup: All parameter values in the active setup will be stored in the EEPROM. The value returns to *No action* when all parameter values have been stored.
Store all setups: All parameter values will be stored in the EEPROM. The value returns to *No action* when all parameter values have been stored.
Store edit setup: All parameter values in the setup you are editing will be stored in the EEPROM. The value returns to *No action* when all parameter values have been stored.

980-982 Defined parameters (DEFINED PNU'S)
Selections:

Read only

Function:
These three parameters hold a list of all the parameters that are defined in the VLT. Each of the three parameters can be read as an array by means of the PCP *read* service. It is also possible to read single elements of the list by PCP Communication, by using the corresponding subindex. The subindexes start at 1 and follow the order of the parameter numbers.

Each parameter holds up to 116 elements (parameter numbers). The number of parameters (980, 981 and 982) in use depends on the actual VLT configuration.

When a 0 is returned as parameter number the list ends.

990-992 Modified parameters
(MODIFIED PNU'S)
Selections:
Read only

Function:

The three parameters holds a list of all the VLT parameters that have been changed from factory setting. Each of the three parameters can be read as an array by means of the acyclical PCP *read* service. The subindexes start at 1 and follow the order of the parameter numbers. Each parameter hold up to 116 elements (parameter numbers). The number of parameters (990, 991 and 992) in use depends on how many parameters have been changed from factory setting.

Read only parameters, as for example data read out parameters, will not be registered as modified eventhough they are changing.

When a 0 is returned as parameter number the list ends.

Timing

■ VLT response time

The update time via the INTERBUS connection can be divided in two parts:
1) The communication time, which is the time it takes to transmit data from the master to the slave (VLT 5000 with INTERBUS option), and 2) the internal update time, which is the time it takes to transmit data between the VLT 5000 control card and the INTERBUS option card.
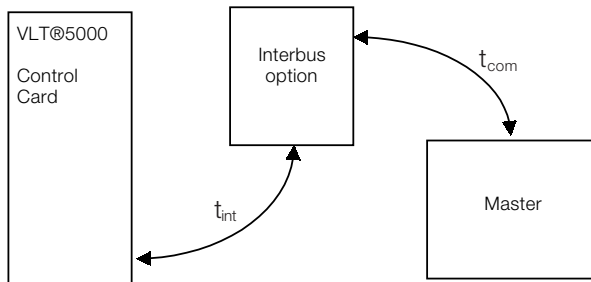
Communication time (t_{com}) depends on the type of master in use, the total number of bytes transmitet to all slaves and the total length of the INTERBUS Cable.

The internal update time (t_{int}) depends on the type of data in question as there are different channels for the data transfer where time critical data e.g. control word has highest priority. The internal update time for the different types of data are stated below.

Data	Update time, t_{int}
Control word/Main reference	2 msec
Status word/Actual speed	2 msec
Parameter read via PCD-part	2 msec
Parameter write via PCD1-2	83 msec
Parameter write via PCD3-4	165 msec
Parameter write via PCD5-7	325 msec
Parameter read via PCP	XXY msec
Parameter write via PCP	YYX msec

■ System update time

The system update time is the time it takes to update all the slaves in the network when using cyclical communication.

Actual master station delay:
- The information must be supplied by the manufacturer of the actual INTERBUS master.

Example:
- INTERBUS G4 master using 4 words of Process Data and 1 Word of PCP Data to 12 Slaves on the INTERBUS. The total length of the INTERBUS Cable is 250m.

Following Formula can be used for calculation the Cycle-time:

$$t_z = [15*(8+n) + 3*m] * t_{Bit} + t_{SW} + 2*t_{PH}$$

where

n the register size
m the total number of stations
t_{Bit} the Bit time = 2µ at 500 kBit/sec
t_{SW} software time 0,34 ms for G3 Master
            0,70 ms for G4 Master
t_{PH} the delay of the medium,
        for Cu = 0,016ms*l/Km; Lenght in Km

$$t_z = [15*(8+n) + 3*m] * t_{Bit} + t_{SW} + 2*t_{PH}$$
$$t_z = [15*104 + 3*13] *2*10^{-6} + 0,7 + 0,016 * 0,250$$

$$t_z = 3.902 \text{ ms}$$

■ **Warning and alarm messages**

There is a clear distinction between alarms and warnings. In the case of an alarm, the VLT will enter a fault condition and act as defined in the Control Word. After the cause for the alarm has been cleared, the master will have to acknowledge the alarm message for the VLT to start operating again. A warning, on the other hand may come when a warning condition appears, and disappear when conditions return to normal without interfering with the process.

Warnings
___

Any warning within the VLT is represented by a single bit within a warning word. A warning word is always an action parameter. Bit status FALSE [0] means no warning, while bit status TRUE [1] means warning. To each bit and each bit status there is a corresponding text string.

Any bit change in the warning word will result in a Spontaneous / Event Notification being issued.

In addition to the warning word message the master will also be notified through a change of bit 7 in the Status Word.

Alarms
___

Following an Alarm message the VLT will enter Fault condition. Only after the fault has been alleviated and the master has acknowledged the alarm message by setting bit 7 in the Control word, can the VLT resume operation.

Any warning within the VLT is represented by a single bit within a warning word. A warning word is always an action parameter. Bit status FALSE [0] means no fault, while bit status TRUE [1] means fault. To each bit and each bit status there is a corresponding text string.

Any bit change in the alarm word will result in a Spontaneous / Event Notification being issued.

Since several alarms may be issued as a result of a fault condition (e.g. "Overcurrent inverter trip" - "Current limit trip" - "Motor trip") it is important for subsequent troubleshooting to store the alarm messages in the sequence they occur. Parameter 615, 616 and 617 provide this service.

Warnings
___

WARN. 34

INTERBUS COMM. FAULT

-   There is no connection to the master. The reason could be that the master is stopped (or in a fault condition) or the INTERBUS connection to the VLT is interrupted.

Alarms
___

ALARM

INTERBUS OPT. FAULT

-   The option card is disturbed by electrical noise or there is a fault on the option card and it must be replaced.

■ **Additional display messages**

When VLT® 5000 is equipped with a INTERBUS interface it can display the following messages in addition to the display messages described in the VLT 5000 product manual:

■ **Abbriviations.**

English	German	Elaboration	Page
CTW	STW	Control Word	
EIA	-	Electronic Industries Association: Specifiers of the EIA Standard RS 485-A	
EMC	EMV	Electromagnetic Compatibility	
FIFO	-	First In First Out	
Hd	-	Hamming distance	
HPFB	-	High Performance Field Bus	
IND	-	Subindex	
I/O	E/A	Input/Output	
ISO	-	International Standards Organization	
LSB	-	Least Significant Bit	
MSB	-	Most Significant Bit	
MAV	HIW	Main Actual Value	
MRV	HSW	Main Reference Value	
OD	OV	Object Directory	
PI	PE	Peripherial input	
PQ	PA	Peripherial output	
PC	-	Personal Computer	
PCD	PZD	Process Data	
PCP		Peripherials Communication Protocol	
PDU	-	Protocol Data Unit	
PLC	SPS	Programmable Logic Control	
STW	ZSW	Status Word	32
TRT	-	Target Rotation Time	49
VDE	-	Association of German Electrical Technicians	4
VDI	-	Association of German Electrical Engineers	4
VSD	FU	Variable Speed Drive	18

■ VLT5000 parameter list.

The parameters setting in this list are valid for VLT
software version 3.22.

PNU #	Parameter description	Factory setting	Range	Changes during operation	4-Setup	Conversion index	Data type
001	Language	English		Yes	No	0	5
002	Local/remote control	Remote control		Yes	Yes	0	5
003	Local reference	000.000		Yes	Yes	-3	4
004	Active setup	Setup 1		Yes	No	0	5
005	Programming setup	Active setup		Yes	No	0	5
006	Copying of setups	No copying		No	No	0	5
007	LCP copy	No copying		No	No	0	5
008	Display scaling of motor frequency	1	0.01 - 100.00	Yes	Yes	-2	6
009	Display linie 2	Frequency [Hz]		Yes	Yes	0	5
010	Display line 1.1	Reference [%]		Yes	Yes	0	5
011	Display line 1.2	Motor current [A]		Yes	Yes	0	5
012	Display line 1.3	Power [kW]		Yes	Yes	0	5
013	Local control/configura	LCP digital control/as par.100		Yes	Yes	0	5
014	Local stop	Possible		Yes	Yes	0	5
015	Local jog	Not possible		Yes	Yes	0	5
016	Local reversing	Not possible		Yes	Yes	0	5
017	Local reset of trip	Possible		Yes	Yes	0	5
018	Lock for data change	Not locked		Yes	Yes	0	5
019	Operating state at power-up, local control	Forced stop, use saved ref.		Yes	Yes	0	5
100	Configuration	Speed control, open loop		No	Yes	0	5
101	Torque characteristics	High - constant torque		Yes	Yes	0	5
102	Motor power	Depends on the unit	0.18-500 kW	No	Yes	1	6
103	Motor voltage	Depends on the unit	200 - 500 V	No	Yes	0	6
104	Motor frequency	50 / 60 Hz		No	Yes	0	6
105	Motor current	Depends on the unit	0.01- $I_{VLT;MAX}$	No	Yes	-2	7
106	Rated motor speed	Depends on the unit	100-60000 rpm	No	Yes	0	6
107	Automatic motor adaptation, AMA	Adaptation off		No	No	0	5
108	Stator resistor	Depends on the unit		No	Yes	-4	7
109	Stator reactance	Depends on the unit		No	Yes	-2	7
110	Motor magnetizing, 0 rpm	100 %	0 - 300 %	Yes	Yes	0	6
111	Min. frequency normal magnetizing	1.0 Hz	0.1 - 10.0 Hz	Yes	Yes	-1	6
113	Load compensation at low speed	100 %	0 - 300 %	Yes	Yes	0	6
114	Load compensation at high speed	100 %	0 - 300 %	Yes	Yes	0	6
115	Slip compensation	100 %	-500 - 500 %	Yes	Yes	0	3
116	Slip compensation time constant	0.50 s	0.05 - 1.00 s	Yes	Yes	-2	6
117	Resonance dampening	100 %	0 - 500 %	Yes	Yes	0	6
118	Resonance dampening time constant		5 ms5 - 50 ms	Yes	Yes	-3	6
119	High starting torque	0.0 sec.	0.0 - 0.5 s	Yes	Yes	-1	5
120	Start delay	0.0 sec.	0.0 - 10.0 s	Yes	Yes	-1	5
121	Start function	Coasting in start delay time		Yes	Yes	0	5
122	Function at stop	Coasting		Yes	Yes	0	5
123	Min. frequency for activating function at stop	0.0 Hz	0.0 - 10.0 Hz	Yes	Yes	-1	5
124	DC holding current	50 %	0 - 100 %	Yes	Yes	0	6
125	DC braking current	50 %	0 - 100 %	Yes	Yes	0	6
126	DC braking time	10.0 sec.	0.0 - 60.0 sec.	Yes	Yes	-1	6
127	DC brake cut-in frequency	Off	0.0-par. 202	Yes	Yes	-1	6
128	Motor thermal protection	No protection		Yes	Yes	0	5
129	External motor fan	No		Yes	Yes	0	5
130	Start frequency	0.0 Hz	0.0-10.0 Hz	Yes	Yes	-1	5
131	Initial voltage	0.0 V	0.0-par. 103	Yes	Yes	-1	6

VLT5000 parameter list

PNU #	Parameter description	Factory setting	Range	Changes during operation	4-Setup	Conversion index	Data type
200	Output frequency range/direction	Only clockwise, 0-132 Hz		No	Yes	0	5
201	Output frequency low limit	0.0 Hz	0.0 - f_{MAX}	Yes	Yes	-1	6
202	Output frequency high limit	66 / 132 Hz	f_{MIN} - par. 200	Yes	Yes	-1	6
203	Reference/feedback area	Min - max		Yes	Yes	0	5
204	Minimum reference	0.000	-100,000.000-Ref_{MAX}	Yes	Yes	-3	4
205	Maximum reference	50.000	Ref_{MIN}-100,000.000	Yes	Yes	-3	4
206	Ramp type	Linear		Yes	Yes	0	5
207	Ramp-up time 1	Depends on unit	0.05 - 3600	Yes	Yes	-2	7
208	Ramp-down time 1	Depends on unit	0.05 - 3600	Yes	Yes	-2	7
209	Ramp-up time 2	Depends on unit	0.05 - 3600	Yes	Yes	-2	7
210	Ramp-down time 2	Depends on unit	0.05 - 3600	Yes	Yes	-2	7
211	Jog ramp time	Depends on unit	0.05 - 3600	Yes	Yes	-2	7
212	Quick stop ramp-down time	Depends on unit	0.05 - 3600	Yes	Yes	-2	7
213	Jog frequency	10.0 Hz	0.0 - par. 202	Yes	Yes	-1	6
214	Reference function	Sum		Yes	Yes	0	5
215	Preset reference 1	0.00 %	- 100.00 - 100.00 %	Yes	Yes	-2	3
216	Preset reference 2	0.00 %	- 100.00 - 100.00 %	Yes	Yes	-2	3
217	Preset reference 3	0.00 %	- 100.00 - 100.00 %	Yes	Yes	-2	3
218	Preset reference 4	0.00 %	- 100.00 - 100.00 %	Yes	Yes	-2	3
219	Catch up/slow down value	0.00 %	0.00 - 100 %	Yes	Yes	-2	6
220							
221	Torque limit for motor mode	160 %	0.0 % - xxx %	Yes	Yes	-1	6
222	Torque limit for regenerative operation	160 %	0.0 % - xxx %	Yes	Yes	-1	6
223	Warning: Low current	0.0 A	0.0 - par. 224	Yes	Yes	-1	6
224	Warning: High current	$I_{VLT,MAX}$	Par. 223 - $I_{VLT,MAX}$	Yes	Yes	-1	6
225	Warning: Low frequency	0.0 Hz	0.0 - par. 226	Yes	Yes	-1	6
226	Warning: High frequency	132.0 Hz	Par. 225 - par. 202	Yes	Yes	-1	6
227	Warning: Low feedback	-4000.000	-100,000.000 - par. 228	Yes		-3	4
228	Warning: High feedback	4000.000	Par. 227 - 100,000.000	Yes		-3	4
229	Frequency bypass, bandwidth	OFF	0 - 100 %	Yes	Yes	0	6
230	Frequency bypass 1	0.0 Hz	0.0 - par. 200	Yes	Yes	-1	6
231	Frequency bypass 2	0.0 Hz	0.0 - par. 200	Yes	Yes	-1	6
232	Frequency bypass 3	0.0 Hz	0.0 - par. 200	Yes	Yes	-1	6
233	Frequency bypass 4	0.0 Hz	0.0 - par. 200	Yes	Yes	-1	6
234	Motor phase monitor	Enable		Yes	Yes	0	5

PNU #	Parameter description	Factory setting	Range	Changes 4-Setup during operation		Conversion index	Data type
300	Terminal 16, input	Reset		Yes	Yes	0	5
301	Terminal 17, input	Freeze reference		Yes	Yes	0	5
302	Terminal 18 Start, input	Start		Yes	Yes	0	5
303	Terminal 19, input	Reversing		Yes	Yes	0	5
304	Terminal 27, input	Coasting stop, inverse		Yes	Yes	0	5
305	Terminal 29, input	Jog		Yes	Yes	0	5
306	Terminal 32, input	Choice of setup, msb/speed up		Yes	Yes	0	5
307	Terminal 33, input	Choice of setup, lsb/speed down		Yes	Yes	0	5
308	Terminal 53, analogue input voltage	Reference		Yes	Yes	0	5
309	Terminal 53, min. scaling	0.0 V	0.0 - 10.0 V	Yes	Yes	-1	5
310	Terminal 53, max. scaling	10.0 V	0.0 - 10.0 V	Yes	Yes	-1	5
311	Terminal 54, analogue input voltage	No operation		Yes	Yes	0	5
312	Terminal 54, min. scaling	0.0 V	0.0 - 10.0 V	Yes	Yes	-1	5
313	Terminal 54, max. scaling	10.0 V	0.0 - 10.0 V	Yes	Yes	-1	5
314	Terminal 60, analogue input current	Reference		Yes	Yes	0	5
315	Terminal 60, min. scaling	0.0 mA	0.0 - 20.0 mA	Yes	Yes	-4	5
316	Terminal 60, max. scaling	20.0 mA	0.0 - 20.0 mA	Yes	Yes	-4	5
317	Time out	10 sec.	1 - 99 sec.	Yes	Yes	0	5
318	Function after time out	Off		Yes	Yes	0	5
319	Terminal 42, output	$0 - I_{MAX} \Rightarrow 0\text{-}20$ mA		Yes	Yes	0	5
320	Terminal 42, output, pulse scaling	5000 Hz	1 - 32000 Hz	Yes	Yes	0	6
321	Terminal 45, output	$0 - f_{MAX} \Rightarrow 0\text{-}20$ mA		Yes	Yes	0	5
322	Terminal 45, output, pulse scaling	5000 Hz	1 - 32000 Hz	Yes	Yes	0	6
323	Relay 01, output	Ready - no thermal warning		Yes	Yes	0	5
324	Relay 01, ON delay	0.00 sec.	0.00 - 600 sec.	Yes	Yes	-2	6
325	Relay 01, OFF delay	0.00 sec.	0.00 - 600 sec.	Yes	Yes	-2	6
326	Relay 04, output	Ready - remote control		Yes	Yes	0	5
327	Pulse reference, max. frequency	5000 Hz		Yes	Yes	0	6
328	Pulse feedback, max. frequency	25000 Hz		Yes	Yes	0	6
329	Encoder feedback pulse/rev.	1024 pulses/rev.	1 - 4096 pulses/rev.	Yes	Yes	0	6
330	Freeze reference/output function	No operation		Yes	No	0	5
345	Encoder loss timeout	0 sec.	0 - 60 sec	No	Yes	-1	6
346	Encoder loss function	OFF		Yes	Yes	0	5

Changes during operation:
"Yes" means that the parameter can be changed, while the VLT frequency converter is in operation. "No" means that the VLT frequency converter must be stopped before a change can be made.

4-Setup:
"Yes" means that the parameter can be programmed individually in each of the four setups, i.e. the same parameter can have four different data values. "No" means that the data value will be the same in all four setups.

Conversion index:
This number refers to a conversion figure to be used when writing or reading by means of a VLT frequency converter.

Conversion index	Conversion factor
74	0.1
2	100
1	10
0	1
-1	0.1
-2	0.01
-3	0.001
-4	0.0001

Data type:
Data type shows the type and length of the telegram.

Data type	Description
3	Integer 16
4	Integer 32
5	Unsigned 8
6	Unsigned 16
7	Unsigned 32
9	Text string

VLT® 5000 INTERBUS

VLT5000 parameter list

PNU #	Parameter description	Factory setting	Range	Changes during operation	4-Setup	Conversion index	Data type
400	Brake function/overvoltage control	Off		Yes	No	0	5
401	Brake resistor, ohm	Depends on the unit		Yes	No	-1	6
402	Brake power limit, kW	Depends on the unit		Yes	No	2	6
403	Power monitoring	On		Yes	No	0	5
404	Brake check	Off		Yes	No	0	5
405	Reset function	Manual reset		Yes	Yes	0	5
406	Automatic restart time	5 sec.	0 - 10 sec.	Yes	Yes	0	5
407	Mains Failure	No function		Yes	Yes	0	5
408	Quick discharge	Not possible		Yes	Yes	0	5
409	Trip delay torque	Off	0 - 60 sec.	Yes	Yes	0	5
410	Trip delay-inverter	Depends on type of unit	0 - 35 sec.	Yes	Yes	0	5
411	Switching frequency	Depends on type of unit	3 - 14 kHz	Yes	Yes	2	6
412	Output frequency dependent switching frequency	Not possible		Yes	Yes	0	5
413	Overmodulation function	On		Yes	Yes	-1	5
414	Minimum feedback	0.000	-100,000.000 - FB_{HIGH}	Yes	Yes	-3	4
415	Maximum feedback	1500.000	FB_{LOW} - 100,000.000	Yes	Yes	-3	4
416	Process unit	%		Yes	Yes	0	5
417	Speed PID proportional gain	0.015	0.000 - 0.150	Yes	Yes	-3	6
418	Speed PID integration time	8 ms	2.00 - 999.99 ms	Yes	Yes	-4	7
419	Speed PID differentiation time	30 ms	0.00 - 200.00 ms	Yes	Yes	-4	6
420	Speed PID diff. gain ratio	5.0	5.0 - 50.0	Yes	Yes	-1	6
421	Speed PID low-pass filter	10 ms	5 - 200 ms	Yes	Yes	-4	6
422	U 0 voltage at 0 Hz	20.0 V	0.0 - parameter 103	Yes	Yes	-1	6
423	U 1 voltage	parameter 103	0.0 - $U_{VLT, MAX}$	Yes	Yes	-1	6
424	F 1 frequency	parameter 104	0.0 - parameter 426	Yes	Yes	-1	6
425	U 2 voltage	parameter 103	0.0 - $U_{VLT, MAX}$	Yes	Yes	-1	6
426	F 2 frequency	parameter 104	par.424-par.428	Yes	Yes	-1	6
427	U 3 voltage	parameter 103	0.0 - $U_{VLT, MAX}$	Yes	Yes	-1	6
428	F 3 frequency	parameter 104	par.426 -par.430	Yes	Yes	-1	6
429	U 4 voltage	parameter 103	0.0 - $U_{VLT, MAX}$	Yes	Yes	-1	6
430	F 4 frequency	parameter 104	par.426-par.432	Yes	Yes	-1	6
431	U 5 voltage	parameter 103	0.0 - $U_{VLT, MAX}$	Yes	Yes	-1	6
432	F 5 frequency	parameter 104	par.426 - 1000 Hz	Yes	Yes	-1	6
433	Torque proportional gain	100%	0 (OFF) - 500%	Yes	Yes	0	6
434	Torque integral time	0.02 sec.	0.002 - 2.000 sec.	Yes	Yes	-3	7
437	Process PID Normal/inverse control	Normal		Yes	Yes	0	5
438	Process PID anti windup	On		Yes	Yes	0	5
439	Process PID start frequency	parameter 201	f_{MIN} - f_{MAX}	Yes	Yes	-1	6
440	Process PID proportional gain	0.01	0.00 - 10.00	Yes	Yes	-2	6
441	Process PID integral time	9999.99 sec. (OFF)	0.01 - 9999.99 sec.	Yes	Yes	-2	7
442	Process PID differentiation time	0.00 sec. (OFF)	0.00 - 10.00 sec.	Yes	Yes	-2	6
443	Process PID diff. gain limit	5.0	5.0 - 50.0	Yes	Yes	-1	6
444	Process PID lowpass filter time	0.01	0.01 - 10.00	Yes	Yes	-2	6
445	Flying start	Disable		Yes	Yes	0	5
446	Switching pattern	SFAVM		Yes	Yes	0	5
447	Torque compensation	100%	-100 - +100%	Yes	Yes	0	3
448	Gear ratio	1	0.001 - 100.000	No	Yes	-2	4
449	Friction loss	0%	0 - 50%	No	Yes	-2	6
450	Mains voltage at mains fault	Depends on unit	Depends on unit	Yes	Yes	0	6
453	Speed closed loop gear ratio	1	0.01-100	No	Yes	0	4
454	Dead time compensation	ON		No	No	0	5

PNU #	Parameter description	Factory setting	Range	Changes during operation	4-Setup	Conversion index	Data type
500	Address	1	0 - 126	Yes	No	0	6
501	Baudrate	9600 Baud		Yes	No	0	5
502	Coasting	Logic or		Yes	Yes	0	5
503	Quick-stop	Logic or		Yes	Yes	0	5
504	DC-brake	Logic or		Yes	Yes	0	5
505	Start	Logic or		Yes	Yes	0	5
506	Reversing	Logic or		Yes	Yes	0	5
507	Selection of setup	Logic or		Yes	Yes	0	5
508	Selection of speed	Logic or		Yes	Yes	0	5
509	Bus jog 1	10.0 Hz	0.0 - parameter 202	Yes	Yes	-1	6
510	Bus jog 2	10.0 Hz	0.0 - parameter 202	Yes	Yes	-1	6
511							
512	Telegram profile	Drivecom		No	Yes	0	5
513	Bus time interval	1 sec.	1 - 99 s	Yes	Yes	0	5
514	Bus time interval function	Off		Yes	Yes	0	5
515	Data read-out: Reference %			No	No	-1	3
516	Data read-out: Reference unit			No	No	-3	4
517	Data read-out: Feedback			No	No	-3	4
518	Data read-out: Frequency			No	No	-1	6
519	Data read-out: Frequency x Scaling			No	No	-2	7
520	Data read-out: Current			No	No	-2	7
521	Data read-out: Torque			No	No	-1	3
522	Data read-out: Power, kW			No	No	-1	7
523	Data read-out: Power, HP			No	No	-2	7
524	Data read-out: Motor voltage			No	No	-1	6
525	Data read-out: DC link voltage			No	No	0	6
526	Data read-out: Motor temp.			No	No	0	5
527	Data read-out: VLT temp.			No	No	0	5
528	Data read-out: Digital input			No	No	0	5
529	Data read-out: Terminal 53, analogue input			No	No	-2	3
530	Data read-out: Terminal 54, analogue input			No	No	-2	3
531	Data read-out: Terminal 60, analogue input			No	No	-5	3
532	Data read-out: Pulse reference			No	No	-1	7
533	Data read-out: External reference %			No	No	-1	3
534	Data read-out: Status word, binary			No	No	0	6
535	Data read-out: Brake power/2 min.			No	No	2	6
536	Data read-out: Brake power/sec.			No	No	2	6
537	Data read-out: Heat sink temperature			No	No	0	5
538	Data read-out: Alarm word, binary			No	No	0	7
539	Data read-out: VLT control word, binary			No	No	0	6
540	Data read-out: Warning word, 1			No	No	0	7
541	Data read-out: Warning word, 2			No	No	0	7

VLT5000 parameter list

PNU #	Parameter description	Factory setting	Range	Changes 4-Setup during operation		Conversion index	Data type
600	Operating data: Operating hours			No	No	74	7
601	Operating data: Hours run			No	No	74	7
602	Operating data: kWh counter			No	No	2	7
603	Operating data: Number of power-up's			No	No	0	6
604	Operating data: Number of overtemperatures			No	No	0	6
605	Operating data: Number of overvoltages			No	No	0	6
606	Data log: Digital input			No	No	0	5
607	Data log: Bus commands			No	No	0	6
608	Data log: Bus status word			No	No	0	6
609	Data log: Reference			No	No	-1	3
610	Data log: Feedback			No	No	-3	4
611	Data log: Motor frequency			No	No	-1	3
612	Data log: Motor voltage			No	No	-1	6
613	Data log: Motor current			No	No	-2	3
614	Data log: DC link voltage			No	No	0	6
615	Fault log: Error code			No	No	0	5
616	Fault log: Time			No	No	-1	7
617	Fault log: Value			No	No	0	3
618	Reset of kWh counter	No reset		Yes	No	0	5
619	Reset of hours-run counter	No reset		Yes	No	0	5
620	Operating mode Normal function	Normal function		No	No	0	5
621	Nameplate: VLT type			No	No	0	9
622	Nameplate: Power section			No	No	0	9
623	Nameplate: VLT ordering number			No	No	0	9
624	Nameplate: Software version no.			No	No	0	9
625	Nameplate: LCP identification no.			No	No	0	9
626	Nameplate: Database identification no.			No	No	-2	9
627	Nameplate: Power section identification no.			No	No	0	9
628	Nameplate: Application option type			No	No	0	9
629	Nameplate: Application option ordering no.			No	No	0	9
630	Nameplate: Communication option type			No	No	0	9
631	Nameplate: Communication option ordering no.			No	No	0	9
801	Baud rate selc	500 KBaud		No	No		
803	Bus time out	1 Sec		Yes	No		
804	Bus time out function	OFF		yes	No		
807	PCD Size select	0 Words		No	No		
915	PCD config. write			No	No		
916	PCD config. read			No	No		
927[4]	Parameter edit	Enable		yes	No		
928[4]	Process control	Enable		Yes	No		
971[5]	Store data values	No Action		Yes	No		
980	Defined parameters						
981	Defined parameters						
982	Defines parameters						
990	Modified parametrs						
991	Modified parametrs						
992	Modified parametrs						

*   Automatic reset to (0).

[4])   Available in all 4 setups.

[5])   Only in stop mode

XREF__BC
NOT LOADED ON RIP

VLT® 5000

Interbus manual
Serial Communication

MG10O102