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## ■ Product Overview

### ■ Product and Environment

The DeviceNet Option Card is an interface between the DeviceNet serial communication bus and the VLT frequency converter from Danfoss. The option card will function as an integrated part of the drive.

DeviceNet is a distributed control network. The DeviceNet protocol is embedded in the controller option card and is a communication protocol conforming to the Open DeviceNet Vendor Association (ODVA) standard.

The option card allows DeviceNet compatible controllers, sensors, and network management tools to control, monitor, and supervise the VLT frequency converter. The option is designed to the DeviceNet System Protocol for Vendors as a slave device.

### ■ Overall Function

A DeviceNet compatible device has the ability to perform the following operations with the VLT frequency converter over the DeviceNet network:

1. Control speed references and send drive control commands.
2. Monitor the status of the drive, access alarm and warning messages, and monitor drive and motor information.
3. Upload and download drive settings, configure drives, and also perform the operations defined in 1 and 2.

Therefore, the level of control and flexibility of the VLT frequency converter over the network depends on the capabilities built into the controlling device.

The application program has the following functions:

1. Support interger parameters through the dual ported RAM.
2. Manipulate the dual ported RAM parameters to interface with the CAN.
3. Monitor network activity "watchdog" function to determine Master Slave communication continuity.

### ■ Network

The VLT frequency converter will function as a slave on the DeviceNet network. All addressing and linking to nodes is done at installation time by a network manager tool. The network installer and the network management master have a significant influence on how the node functions on the network. A DeviceNet network can support up to 64 nodes.

### ■ User Profile

The end-user is a network manager programmer or a controller who see the DeviceNet control card as a transparent bridge to the VLT frequency converter. Control and supervision of the VLT frequency converter will still be possible through the standard parameter set.

### ■ Interface to DeviceNet Network

The Interface connection to the DeviceNet network is implemented through a CAN chip. Four different I/O Assembly is available in the VLT 2800 DeviceNet interface, which can be configured by the user. The I/O assembly can handle Polled mode, Bit Strobe, Change of state (COS) and Cyclic. For explicit messages, the interface has two Unconnected Messages Manager (UCMM) available. This allows two nodes on the DeviceNet to directly access parameters in the VLT2800 without involving a pre-configured master.

### ■ Data Communication Interface

No direct data communication interface (e.g. via a serial port) other than the DeviceNet interface and the VLT frequency converter interface is considered.

### ■ Initialization of VLT frequency converter Interface

The VLT frequency converter interface is initialized in three phases. The first two phases are initiated and controlled by the VLT which will write commands to the option card through the dual port RAM.

Phase 1:
Is the initialization of the communication system. During this phase the option card must respond correctly to the VLT frequency converter initialization command or else the VLT will not function and display a "No Option Init" message.

Phase 2:
Is the interface watchdog function performed by the option card as the first operational action. After completion of this phase, data can be passed between the VLT frequency converter and the option card through the command channel in the dual port RAM.

Phase 3:
The VLT frequency converter will write to the Initialization Channel of the dual port RAM which will set the displacement values of the various channels (Control Channel, Status Channel, Command Channel 1, Command Channel 2, Command Channel 3, Warning Channel, and Spontan Channel), and the DeviceNet option card software will read these displacements and return a response to the VLT frequency converter notifying that the initialization was successful or an error was obtained in the process.

During operation (after initialization) the dual port RAM interface is supervised by a watch-dog in the VLT frequency converter. The VLT frequency converter will be kept "alive" by cyclic writing to a channel in the dual port RAM by the watch-dog handler of the option card.

## ■ Network Variable Handling

The parameter access network variable is a structure containing parameter number, data, value, and a function code containing a read or write command. The application program shall receive the data, validate the data, convert the data to the format of the VLT frequency converter, process the read or write of the parameter, then send the information back in an output network variable of the same structure. This output variable would contain the parameter number, error code information in the event of an exception, and parameter value.

## ■ Error Handling

The option card will stop sending a watchdog signal to the VLT frequency converter when:

1. The node has been disconnected from the network
2. A network management tool has the Option Card go Off-line
3. A hardware fault on the DeviceNet Option Card PCB prevents reliable operation

By withholding the watchdog message, the VLT frequency converter can detect a "Bus Time-out" and enter secure, pre-defined state.

For recoverable errors such as [1] and [2] the option card shall re-send the watchdog message when the fault or condition has disappeared such as after re-connection of the node to the network.

For unrecoverable errors such as [3] the application program shall permit logging of network errors without resetting or restarting the microprocessor. This will send information to a network management tool that will allow appropriate actions to be taken. The only way to recover from a serious error is to re-initialize the VLT frequency converter DeviceNet option card by cycling power.

In case of serious VLT frequency converter fault, the DeviceNet processor shall hold the CAN chip reset, thereby disabling any communication to the node until the VLT frequency converter has been re-initialized.

## ■ Overall Function

DeviceNet is a low-level network that standardizes communications between industrial devices (sensors, limit switches) and high level devices (controllers). The communication network can be peer to peer or master/slave. DeviceNet uses CAN technology for Media Access Control and Physical Signaling and it supports up to 64 nodes. DeviceNet also defines device profiles for devices belonging to specific classes. For other devices, a custom class must be defined in order to make it DeviceNet compatible. This further enhances the interchangeability and interoperability of the network. Each node on the network has its own unique media access control identifier (MAC ID) to distinguish it on the network. The MAC ID is stored in the header of the message which is split into four different message groups. However, DeviceNet only makes use of three message groups keeping the fourth one for future use. If two nodes attempt to get control of the network bus simultaneously, the CAN protocol

resolves the issue by arbitration. A dominant bit (0) will win arbitration over a recessive bit (1).

For the VLT frequency converter, the option card will be slave node on the DeviceNet network. The option card will be a message server that will request and set parameters in the VLT via a dual ported RAM interface. The option card has an embedded CAN controller that will screen all network messages with a Mask and Match register. This feature allows the option card to filter out any unwanted messages from the network. The option card will receive group 2 and group 3 messages. Group 2 messages allows the option card to use the predefined Master/Slave connection set which identifies a use for all group 2 message identifiers. The ability to receive Group 3 messages allows the option card to also be an Unconnected Explicit Message Manager (UCMM) with the UCMM request and response message identifier. Explicit message connections are unconditionally point-to-point. Point-to-point connections exist between two devices only.

## ■ Technical Data

### ■ Identity Object

This object is used to provide identification and general information about the device. This object is required by all DeviceNet products.

This object requires no class attributes. Its instance attributes are the following:

| | |
|---|---|
| Vendor | 97 |
| Device Type | 2 |
| Product Code | Depends of the Drive |
| Revision - Major, Minor | Depends of option |
| Status | |
| Serial Number | |
| Product Name | VLT 5000 |

### ■ Message Router

The Message Router object provides a messaging connection point through which a Client may address a service to any object class or instance residing in the physical device.

This object requires no class attributes. Its instance attributes are the following:

1. Object List - Number of Classes

### ■ General Information

Parameter 502 = BUS.
Otherwise terminals 12 and 27 of the control card must be connected, before motor start. In parameters 502508 it is possible to define how to gate the control commands from the DeviceNet with the equivalent control commands of the digital inputs.

## ■ Cable Lengths

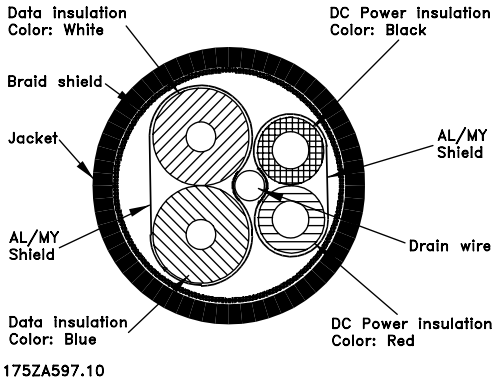
| Baud Rate | Max. total cable length [m] | Drop Length | |
|---|---|---|---|
| | | Maximum | Cumulative |
| 125k baud | 500 meters (1640 ft.) | 6 meters (20 ft.) for one drop | 156 meters (512 ft.) |
| 250k baud | 250 meters (820 ft.) | | 78 meters (256 ft.) |
| 500k baud | 100 meters (328 ft.) | | 39 meters (128 ft.) |

## ■ Cable Specifications

| **Physical Characteristics** | **Specification** |
|---|---|
| Two shielded pairs | Common axis with drain wire in center |
| Overall braid shield | 65% coverage 36 AWG Cu braid. (individually tinned) |
| Drain wire | # 18 (19 x 30 AWG) Copper (individually tinned) |
| Outside diameter | 0.475 ± 0.015 inches (round), roundness - radius delta to be within 15% of 0.5 O.D.* |
| Jacket insulation * | 0.040 inches minimum |
| Jacket marking * | Vendor Name & Part # 1 Pr 18 and 1 Pr 15 AWG shielded, additional markings are acceptable |
| **Electrical Characteristics** | **Specification** |
| DRC (braid + tape + drain) | 1.75 Ohms/1000 ft. (nom. @ 20°C) |
| **Applicable Environmental Characteristics** | **Specification** |
| Agency Certifications (U.S. and Canada) | NEC (UL) type, CL2/CL3 (min.) |
| Bend radius - installation / fixed | 20 x diameter / 7 x diameter |
| Operating ambient temperature | -20° to + 60°C @ 8 amps; de-rate current linearly to zero @ 80°C |
| Storage temperature | -40° to + 85°C |
| Pull tension | 190 lbs max |

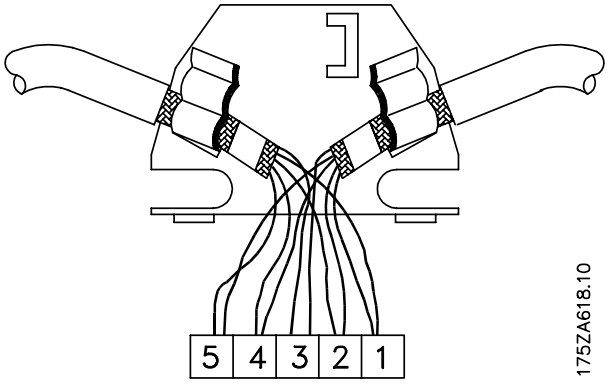
* Other types of jacket insulation are allowable provided that internal construction and electrical charactersitics adhere to this specification.

## ■ Cable Cross Section




## ■ Connection of the Cable Screen

The screen of the DeviceNet 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 DeviceNet network. It is very important 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. VLT frequency converter Series are provided with different clamps and brackets to enable a proper ground connection of the DeviceNet cable screen. The screen connection is shown in the drawing.




## ■ Earth Connection

It is important that all stations connected to the DeviceNet network are connected to the same earth potential. The earth connection must have a low HF (high frequency) impedance. This can be achieved by connecting a large surface area of the cabinet to ground, for example by mounting the VLT frequency converter on a conductive rear plate. Especially when having long distances between the stations in a DeviceNet network it can be necessary to use additional potential equalizing cables, connecting the individual stations to the same earth potential.

## ■ DeviceNet Connection

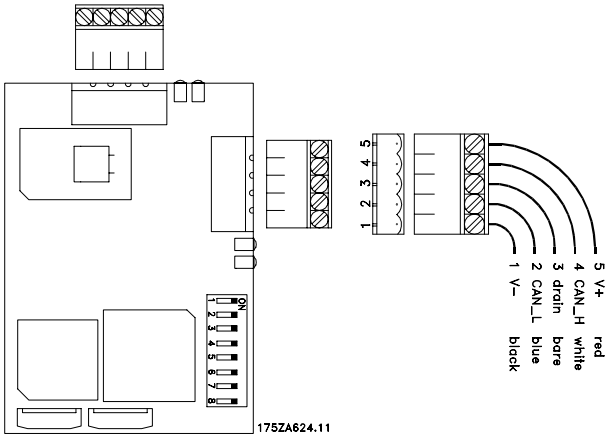
It is essential that the bus line be terminated properly. A mismatch of impedance may result in reflections on the line that will corrupt data transmission.

The DeviceNet Option Card is provided with a pluggable screw connector.

By using a pluggable screw connector as a splice between two trunk lines, removal of devices will not sever the network. Strain relief, if required, must be provided by the developer. In current installations of this type of connector, the strain relief is attached to the product.

**NOTE**

Wires should not be installed while the network is active. This will prevent problems such as shorting the network supply or disrupting communications.




## ■ User Interface

The DeviceNet option card contains two bi-color (green/red) LEDs for each connector hookup port, to indicate the state of the device and network, respectively.

For the device status LED:

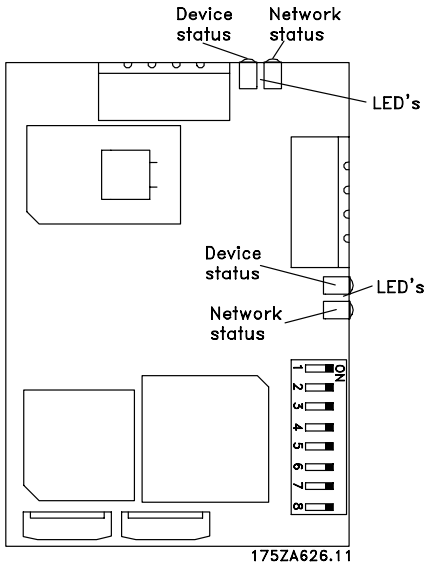
1. when the LED is off, the device is off
2. when the LED is green, the device is operational
3. When the LED is flashing green, the device is in standby

4. when the LED is flashing red, the device detects a minor fault
5. when the LED is red, the device detects an unrecoverable fault
6. when the LED is flashing red/green, the device is self testing

For the network status LED:

1. when the LED is off, the network is non-powered/not online
2. when the LED is flashing green, the network is online but not connected
3. when the LED is green, the network is online and connected
4. when the LED is flashing red, the network has a connection time-out
5. when the LED is red, the network has a critical link failure. No further direct user interface is considered

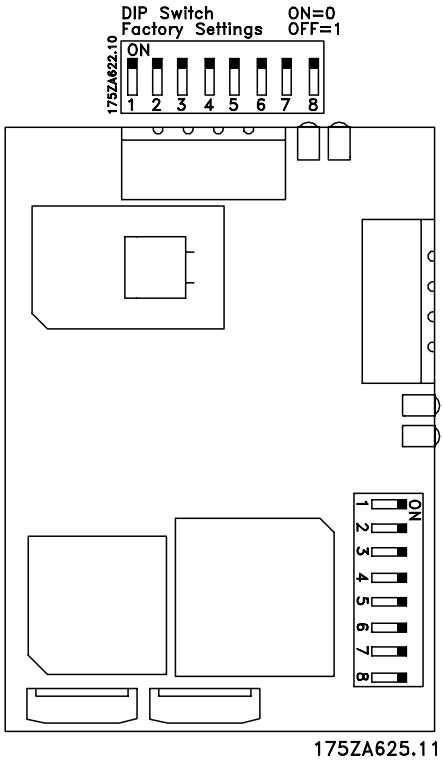
No further direct user interface is considered.



## ■ Understanding Module Configuration Switches

The DeviceNet Communication modules DIP switch settings determine:

- DeviceNet node address
- DeviceNet baud rate




When you make changes to the switch settings, use a pointed instrument such as a ball point pen. DO NOT use a pencil because damage may occur

Unpredictable operation may occur if you fail to check connections and DIP switch settings for compatibility with your application. Unpredictable operation may result in death, personal injury, and equipment damage.

Hazard of injury or equipment damage may occur due to unintended or incorrect machine motion. When a system is configured for the first time, the motor must be disconnected from the machine or process during initial system testing.

**NOTE**

When setting the Communication Modules addressing Dip Switches, you must ensure that each serial device on the network has a unique address. Also, all devices connected to the network must be set at the same baud rate.

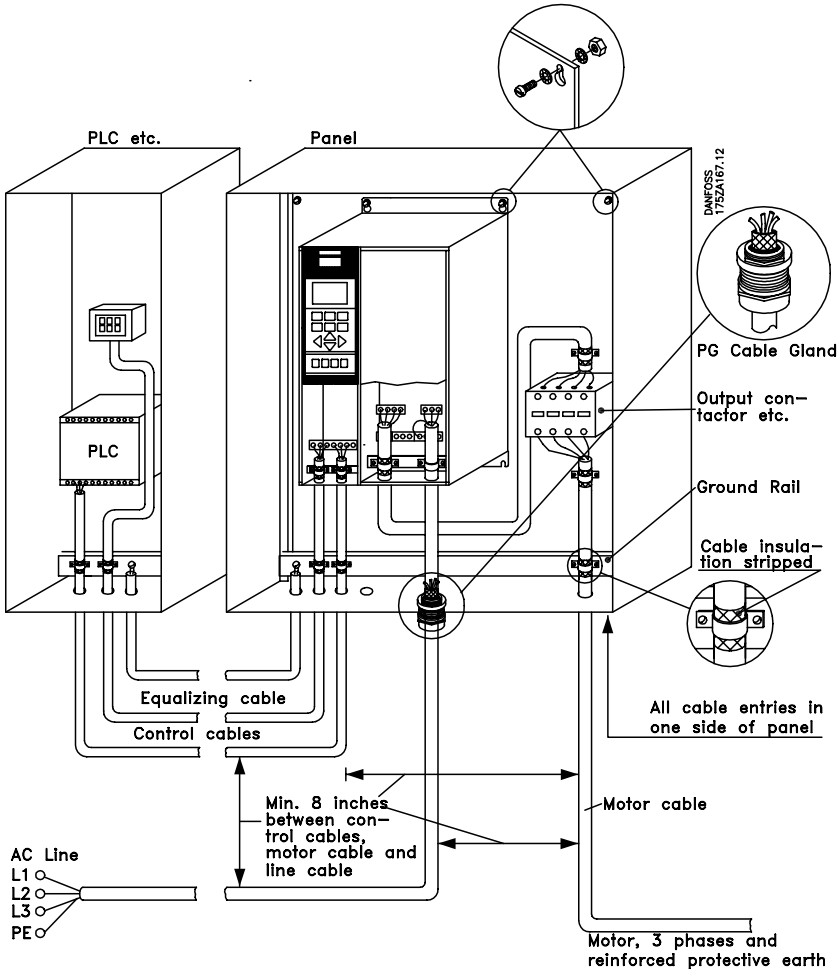
## ■ EMC Precautions

EMC precautions The following EMC precautions are recommended to obtain interference free operation of the DeviceNet network. Additional information on EMC can be found in the VLT 5000 Series Instruction Manual.

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

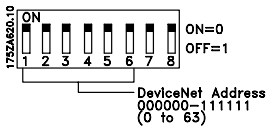
The DeviceNet communication cable must be kept away from motor and brake resistor cables to avoid coupling of high frequency noise from one cable to the other. Normally a distance of 8 inches (200 mm) is sufficient, but it is generally recommended to keep the greatest possible distance between the cables, especially where cables are running in parallel over long distances.

If the DeviceNet cable has to cross a motor and brake resistor cable they must cross each other at an angle of 90°.



## ■ Setting the DeviceNet Node Address

Dip switches 6 through 1 set the modules node address using binary addressing.




## ■ Switch Settings for DeviceNet Node Addressing

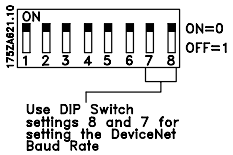
Follow these steps to set the DeviceNet node address:

1. Refer to the table below for the switch settings of a specific address.
2. Using your finger or a pointed object, slide switches 6 through 1 to the appropriate ON/OFF positions.

| DeviceNet Address | Switch Settings 6 ⇐ 1 | DeviceNet Address | Switch Settings 6 ⇐ 1 | DeviceNet Address | Switch Settings 6 ⇐ 1 | DeviceNet Address | Switch Settings 6 ⇐ 1 |
|---|---|---|---|---|---|---|---|
| 0 | 000000 | 16 | 000010 | 32 | 000001 | 48 | 000011 |
| 1 | 100000 | 17 | 100010 | 33 | 100001 | 49 | 100011 |
| 2 | 010000 | 18 | 010010 | 34 | 010001 | 50 | 010011 |
| 3 | 110000 | 19 | 110010 | 35 | 110001 | 51 | 110011 |
| 4 | 001000 | 20 | 001010 | 36 | 001001 | 52 | 001011 |
| 5 | 101000 | 21 | 101010 | 37 | 101001 | 53 | 101011 |
| 6 | 011000 | 22 | 011010 | 38 | 011001 | 54 | 011011 |
| 7 | 111000 | 23 | 111010 | 39 | 111001 | 55 | 111011 |
| 8 | 000100 | 24 | 000110 | 40 | 000101 | 56 | 000111 |
| 9 | 100100 | 25 | 100110 | 41 | 100101 | 57 | 100111 |
| 10 | 010100 | 26 | 010110 | 42 | 010101 | 58 | 010111 |
| 11 | 110100 | 27 | 110110 | 43 | 110101 | 59 | 110111 |
| 12 | 001100 | 28 | 001110 | 44 | 001101 | 60 | 001111 |
| 13 | 101100 | 29 | 101110 | 45 | 101101 | 61 | 101111 |
| 14 | 011100 | 30 | 011110 | 46 | 011101 | 62 | 011111 |
| 15 | 111100 | 31 | 111110 | 47 | 111101 | 63 | 111111 |

## ■ Setting the Baud Rate

Dip switches 7 and 8 set the baud rate at which the Communication Module communicates on the network. The factory default setting is 125K BPS.



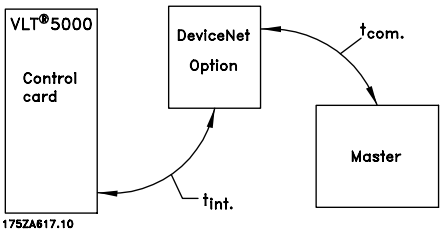

Switch Settings for DeviceNet Module Baud Rate:

| Baud Rate | Switch Setting 8 | Switch Setting 7 |
|---|---|---|
| 125 kBPS | 0 | 0 |
| 250 kBPS | 0 | 1 |
| 500 kBPS | 1 | 0 |
| 125 kBPS | 1 | 1 |

## ■ VLT Response Time

The update time via the DeviceNet connection can be divided into two parts:

1. The communication time, which is the time it takes to transmit data from the master to the slave (VLT with DeviceNet option).
2. The internal update time, which is the time it takes to transmit data between the VLT 5000 control card and the DeviceNet option card.




Communication time ($t_{com}$) depends on the actual transmission speed (baudrate) and the type of master in use. More data or lower transmission speed will increase the communication time.

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 (part of PPO) | 2 msec |
| Status word/Actual output frequency (part of PPO) | 2 msec |
| Parameter read via PCD-part of PPO | 2 msec |
| Parameter write via PCD-part of PPO | 83 msec |
| Parameter read/write via explicite message | 22 msec |

## ■ General Purpose Discrete I/O

The General Purpose Discrete I/O device I/O assemblies consist of:

- five predefined input assemblies with single status bits
- one productspecific input assembly with a single status bit
- five predefine input assemblies with multiple status bits
- one productspecific input assembly with multiple status bits
- five predefined output assemblies
- one productspecific output assembly

## ■ I/O Assembly Instances

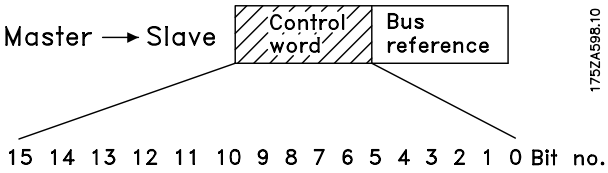
The I/O Assembly Instance definitions in this section define the format of the "data" attribute (attribute 3) for I/O Assembly Instances. I/O Assemblies support a hierarchy of motor control devices. The device hierarchy includes motor starters, soft starters, AC and DC drives, and servo drives. Assembly Instances are numbered within the hierarchy so that each device type is assigned a range of Assembly Instance numbers, with higher functionality devices supporting higher instance numbers. Devices in the hierarchy can choose to support instance numbers that are lower than theirs in the hierarchy. For example an AC drive may choose to support some I/O Assemblies in the starter profile to make it easier to interchange starters and drives within the system.

| Parameter 904 | Decimal | WRITE | | | | Decimal | READ | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| PP01 | 20 | | SPEED | | | 70 | | | | |
| PP02 | 100 | CTW | REF | | | 150 | ST | AC Ref | | |
| PP03 | 101 | CTW | REF | 915.1 | 315.2 | 151 | | | | |
| PP04 | 102 | 915.1 | 915.2 | 915.3 | 915.4 | 152 | | | | |

## ■ Fieldbus Profile

### ■ Control Word

Control Word as per Profidrive standard
(parameter 512 = Fieldbus Profile). The control word is used for transmitting commands from a master (e.g. a PC) to a slave (VLT frequency converter).




| Bit | Bit = 0 | Bit =1 |
|---|---|---|
| 00 | OFF 1 | ON 1 |
| 01 | OFF 2 | ON 2 |
| 02 | OFF 3 | ON 3 |
| 03 | Motor coasting | Enable |
| 04 | Quick stop | Ramp |
| 05 | Freeze output frequency | Ramp enable |
| 06 | Ramp stop | Start |
| 07 | No function | Reset |
| 08 | Jog 1 OFF | ON |
| 09 | Jog 2 OFF | ON |
| 10 | Data not valid | Valid |
| 11 | No function | Slow down |
| 12 | No function | Catch |
| 13 | Choice of Setup (lsb) | |
| 14 | Choice of Setup (msb) | |
| 15 | No function | Reversing |

Bit 00, OFF1/ON1:
An ordinary ramp stop which uses the ramp time in parameters 207/208 or 209/210. Bit 00 = "0" leads to a stop and leads to output relay 01 or 04 being activated, the output frequency is 0 Hz, provided Relay 123 has been selected in parameter 323 or 326. Bit 00 = "1" means that the adjustable frequency drive will be able to start if the other conditions for starting have been fulfilled.

Bit 01, OFF2/ON2:
Coasting stop. Bit 01 = "0" leads to a coasting stop and leads to output relay 01 or 04 being activated, when the output frequency is 0 Hz, provided Relay 123 has been selected in parameter 323 or 326. Bit 01 = "1" means that the adjustable frequency drive is able to start provided the other conditions for starting are fulfilled.

Bit 02. OFF3/ON3:
Quick-stop, which uses the ramp time set in parameter 212. Bit 02 = "0" leads to a quick stop and leads to output relay 01 or 04 being activated, when the output frequency is 0 Hz, provided Relay 123 has been selected in parameter 323 or 326. Bit 02 = "1" means that the adjustable frequency drive is able to start, provided the other conditions for starting are fulfilled.

Bit 03, Coasting/enable:
Coasting stop. Bit 03 = "0" leads to a stop. Bit 03 = "1" means that the adjustable frequency drive is able to stop, provided the other conditions for starting are fulfilled. 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 adjustable frequency drive is able to start, provided the other conditions for starting are fulfilled. Note: In parameter 503 the choice is made as to how dit o4 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 adjustable frequency drive 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 ) Hz, provided Relay 123 has been selected in parameter 323 or 326. Bit 06 = "0" leads to a stop. Bit 06 = 1" means the adjustable frequency drive is able to start, provided the other conditions for starting are fulfilled. 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, 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 09, Jog 2 OFF/ON:
Activation of pre-programmed speed in parameter 510 (Bus Jog 2). JOG 2 is only possible when Bit 04 = "0" and bits 00-03 = "1". If both JOG 1 and JOG 2 are activated (bits 08 and 09 = "1"), JOG 1 has the higher priority, which means that the speed programmed in parameter 509 will be used.

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, No function/slow down:
Used for reducing the speed reference by the value in parameter 219. Bit 11 = "0" means that there is no change of the reference. Bit 11 = "1" means that the reference is reduced.

Bit 12, No function/catch-up:
Used for increasing the speed reference by the value of parameter 219. Bit 12 = "0" means that the reference is increased. If both slow down and catch-up are activated (bits 11 and 12 = "1"), slow down has the higher priority, i.e. the speed reference is reduced.

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

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

This function is only possible if Multi-Setups have been selected in parameter 004.

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

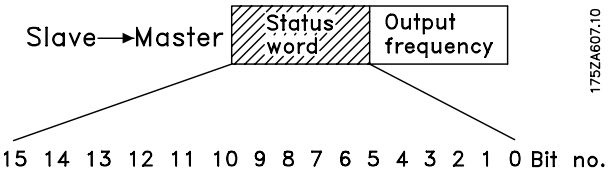
Bit 15, No function/reversing:
Reversing of the direction of rotation of the motor. Bit 15 = "0" leads to no reversing, bit 15 = "1" leads to reversing.

Note that as a point of departure reversing has been selected as Digital in parameter 506. Bit 15 only leads to reversing if bus, logical or or logical and has been selected (logical and, however, only together with terminal 19).

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

## ■ Status Word

Status Word (according to Profidrive standard (parameter 512 = Fieldbus Profile). The status word is used for informing the master (e.g. a PC) of the condition of a slave (VLT frequency converter).




| Bit | Bit = 0 | Bit =1 |
|---|---|---|
| 00 | Control not ready | Ready |
| 01 | VLT not ready | Ready |
| 02 | Motor coasting | Enable |
| 03 | NO fault | Trip |
| 04 | ON 2 | OFF 2 |
| 05 | ON 3 | OFF 3 |
| 06 | Start enable | Start disable |
| 07 | No warning | Warning |
| 08 | Speed - reference | Speed = ref. |
| 09 | Local control | Bus control |
| 10 | Out of operating range | Freq. limit OK |
| 11 | Not running | Running |
| 12 | VLT OK | Stalls, auto-start |
| 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 bit 00, 01 or 02 of the control word is "0" (OFF1, OFF2 or OFF3), or that the adjustable frequency drive has tripped. Bit 00 = "1" means that the adjustable frequency drive is ready, but that there is not necessarily any supply to the power component (in case of external 24 V supply to the controls).

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

Bit 02, Coasting/enable:
Bit 02 = "0" means that the control word bit 00, 02 or 03 is "0" (OFF1, OFF2, OFF3 or Coasting), or the VLT 5000 Series unit has tripped. Bit 02 = "1" means that the control word bits 00, 01, 02 or 03 are "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 VLT 5000 Series has tripped and needs a reset signal in order to run.

Bit 04, ON2/OFF2:
Bit 04 ="0" means that control word bit 01 ="1". Bit 04 ="1" means that control word bit 01 ="0".

Bit 05, ON3/OFF3:
Bit 05 ="0" means that control word bit 02 ="1". Bit 05 -"1" means that control word bit 02 ="0".

Bit 06, Start enable/start disable:
Bit 06 is always "0" if Danfoss has been selected in parameter 512. If Profidrive has been selected in parameter 512, bit 06 will be "1" after reset of a trip, after activation of OFF2 or OFF3 and after connection of mains voltage. Start disable is reset, setting control word bit 00 to "0" and bits 01, 02 and 10 to "1".

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 described in the VLT 5000 instruction manual will set bit 07 to "1".

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 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 adjustable frequency drive via the serial port.

Bit 10, Out of operating range/Freq. 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/runs:
Bit 11 = "0" means that the motor is not running. Bit 11 = "1" means that VLT 5000 Series has a start signal of that the output frequency is greater than 0 Hz.

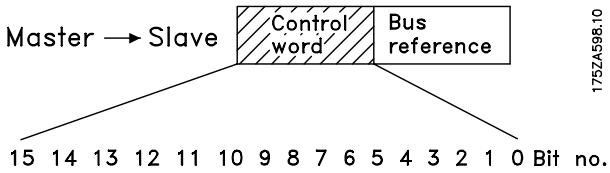
Bit 12, VLT OK/stalling, autostart:
Bit 12 = "0" means that there is no temporary overtemperature on the inverter. Bit 12 = 1" means that the inverter has stopped because of overtemperature, but that the unit has not tripped and will continue, once the overtemperature stops.

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 the motor thermal protection and VLT thermal protection, respectively, have not exceeded 100%. Bit 15 = "1" means that one of the timers has exceeded 100%.

Control Word under VLT standard
(parameter 512 = FC Profile). The control word is used for sending commands from a master (e.g. a PC) to a slave (VLT frequency converter).




| Bit | Bit = 0 | Bit =1 |
|---|---|---|
| 00 | Preset reference choice lsb | ON 1 |
| 01 | Preset reference choice msb | ON 2 |
| 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 |

**NOTE**
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 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.

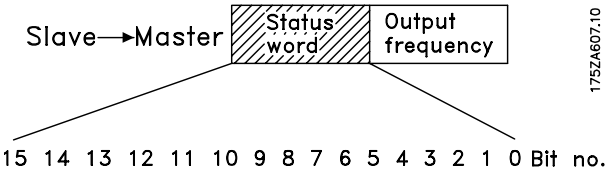
Bit 09, Choice of ramp 1/2:
Bit 09 = "0" means that ramp 1 is active (parameters 207/208). Bit 09 = "1" means that ramp 2 (parameters 209/210) is active.

Bit 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.
See the description of other bits under control word for Profidrive standard.

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

Status Word under VLT standard
(parameter 512 = FC Profile). The status word is used for informing the master (e.g. a PC) about the condition of the slave (VLT frequency converter).

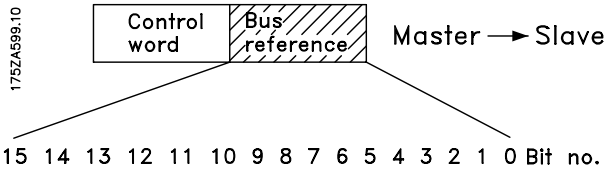



| Bit | Bit = 0 | Bit =1 |
|---|---|---|
| 00 | Control not ready | Ready |
| 01 | VLT not ready | Ready |
| 02 | Coasting | Enable |
| 03 | NO fault | Trip |
| 04 | Reserved | |
| 05 | Reserved | |
| 06 | Reserved | |
| 07 | No warning | Warning |
| 08 | Speed - reference | Speed = ref. |
| 09 | Local control | Bus control |
| 10 | Out of range | Frequency OK |
| 11 | Not running | Running |
| 12 | VLT OK | Stalling, auto-start |
| 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 adjustable frequency drive has tripped. Bit 00 = "1" means that the adjustable frequency drive controls are ready, but the power component is not necessarily receiving any power supply (in case of external 24 V supply to controls).

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.
See the description of other bits under status word for the Profidrive standard.

Bus reference value:



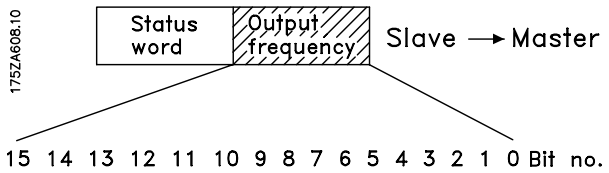

The frequency reference value is transmitted to the adjustable frequency drive in the form of a 16-bit word. The value is transmitted as a whole number (0-32767). 16384 (4000 Hex) corresponds to 100%. (Negative figures are formatted by means of 2s complement.)
The bus reference has the following format:
Parameter 203 = "0"

$$ref_{MIN} - ref_{MAX}$$
$$0\text{-}16384\ (4000\ Hex) \sim 0\text{-}100\% \sim ref_{MIN} - ref_{MAX}$$

Parameter 203 = 1

$$- ref_{MIN} - + ref_{MAX}$$
$$- 16384\ (...Hex) - + 16384\ (4000\ Hex) \sim$$
$$- 1000 - + 100\% \sim - ref_{MAX} - + ref_{MAX}$$

Actual output frequency




The value of the actual output frequency of the adjustable frequency drive 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 2s complement).

## ■ Control Word and Status Word under Instance 20/70

Set parameter 904 *PPO type 1*(900) to choose Instance 20/70.

The control word in Instance 20 is defined as following:

| Instance | Byte 0 | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|---|
| 20 | 0 | | | | | | Fault Reset | | Run Fwd |
| | 1 | | | | | | | | |
| | 2 | Speed reference (low byte) | | | | | | | |
| | 3 | Speed reference (high byte) | | | | | | | |

Bit 0, Run Fwd:
Bit 0 = 0 means that the VLT frequency converter has a stop command.
Bit 0 = 1 leads to a start command and the VLT frequency converter will start to run the motor.

Bit 2, Fault Reset
Bit 0 = 0 means that there is no reset of a trip.
Bit 0 = 1 means that a trip is reset.

The Speed reference in Instance 20 is defined as a word. See description by *Bus reference Value.*

The status word in Instance 70 is defined as following:

| Instance | Byte 0 | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|---|
| 70 | 0 | | | | | | Run-ning | | Fault |
| | 1 | | | | | | | | |
| | 2 | Speed actual value (low byte) | | | | | | | |
| | 3 | Speed actual value (high byte) | | | | | | | |

Bit 0,Fault:
Bit 0 = 0 means that there is no fault on the VLT frequency converter.
Bit 0 = 1 means that there is a fault on the VLT frequency converter.

Bit 2, Running
Bit 0 = 0 means that there is no active start command.
Bit 0 = 1 means that there is an active start command.

The Speed Actual value in Instance 70 is defined as a word. See description by *Actual Output frequency*

## ■ Quick Setup

For how to program the ordinary VLT parameters refer to the VLT 5000 Series Instruction Manual. Communication is established by setting the following parameters:

Parameter 904:
Select the PPO type to be applied.

Parameter 918:
Readout of the actual address of the DeviceNet option via dip switch.

Parameter 801:
Readout the transmission speed in bit/sec. The default setting is 125 kbaud, which means the VLT automatically detects the transmission speed of the connected bus. If you set a fixed value it must be the same as that selected in the master.

## ■ Special Attention

Special attention must be given to the following parameters described in the VLT 5000 Series Instruction Manual:

- 002:

If operation site = Local, then control via DeviceNet is not possible.

- 502-508:

Selection of how to gate DeviceNet control commands with control commands on the digital inputs of the control card.

- 512:

Selects DeviceNet profile.

- 515-538:

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

### 801 Baud rate selection (BAUD RATE SELECT)

**Value:**

| | |
|---|---|
| 125 kBaud (125 KBAUD) | [20] |
| 250 kBaud (250 KBAUD) | [21] |
| 500 kBaud (500 KBAUD) | [22] |

**Function:**

This parameter displays the actual Baud rate of the devicenet option.

### 803 Time after bus error (BUS TIME OUT)

**Value:**

| | |
|---|---|
| 1 - 99 sec | ✯ 1 sec |

### 804 Response after bus error (TIME OUT FUNCT.)

**Value:**

| | |
|---|---|
| ✯Off (OFF) | [0] |
| Freeze output frequency (FREEZE OUTPUT) | [1] |
| Stop with auto restart (STOP) | [2] |
| Output frequency = JOG frequency (JOGGING) | [3] |
| Output frequency = Max. freq. (MAX SPEED) | [4] |
| Stop with trip (STOP AND TRIP) | [5] |
| Control without DeviceNet (NO DEVICENET CONTROL) | [6] |
| Select set up 4 (SELECT SETUP 4) | [7] |

**Function:**

The time out counter is triggered at the first reception of a valid control word i.e. bit 10 = ok.

1. CTW is not updated within the specified time
2. Parameter 805 = "bit 10 = 0 ⇒ time out" and bit 10 = "0"

The VLT remains in the timeout state until one of the following four conditions occurs:

1. Valid control word (Bit 10 = ok) is received and 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 DeviceNet 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.
4. Parameter 804 = Off ⇒ control via DeviceNet is resumed, with the control word used last being taken.

**NOTE**
The time out counter is reset and needs to be triggered by a valid control word before a new timeout can be activated

✯ = factory setting. () = display text [] = value for use in communication via serial communication port

**Description of choice:**

- Save output frequency: Save (freeze) the output frequency until communication resumes.
- Stop with auto restart: Stop with automatic restart on resumption of communication.
- Output frequency = Fixed speed frequency: Motor runs with fixed speed frequency until resumption of communication.
- Output frequency = max. frequency: Motor runs with the maximum frequency until resumption of communication.
- Stop with trip: Motor has stopped, a reset is necessary for a restart, see explanation above.
- Control without DeviceNet: Control via DeviceNet is inactive; control is possible via the terminals and/or the RS 485 standard interface until communication resumes.
- Selection parameter setup 4: Parameter setup 4 is selected in parameter 004; the settings of parameter setup 4 are used. Parameter 004 is not reset to the original value upon resumption of communication.

## 805 Function control word bit 10 (BIT 10 FUNCTION)

**Value:**

| | |
|---|---|
| Without function (NO FUNCTION) | [0] |
| ✯Bit 10 = 1 ⇒ CTW active (BIT 10 = 1 ⇒ CTW ACTIVE) | [1] |
| Bit 10 = 0 ⇒ CTW active (BIT 10 = 0 ⇒ CTW ACTIVE) | [2] |
| Bit 10 = 0 ⇒Timeout (BIT 10 = 0 ⇒ TIMEOUT) | [3] |

**Function:**

This is sometimes necessary since some masters set all bits to 0 in different error situations. In these cases it makes sense to change the function of bit 10 so that the command to stop (coasting) goes to the VLT if all bits are 0.

**Description of choice:**

- Bit 10 = 1 ⇒ CTW active: If bit 10 = 0, the control word and speed reference value are ignored.
- Bit 10 = 0 ⇒ CTW active: If bit 10 = 1, the control word and speed reference value are ignored. If all bits of the control word are 0, the VLT will switch to coasting in response hereto.
- Bit 10 = 0 ⇒ Timeout: If bit 10 = 0, the timeout function selected in parameter 804 is activated.
- Without function: Bit 10 is ignored, i.e. the control word and speed reference value are always valid.

✯ = factory setting. () = display text [] = value for use in communication via serial communication port

**904 PPO selection**
**(PPO TYPE SELECT)**

**Value:**

| | |
|---|---|
| ★PPO type 1 (PPO TYPE 1) | [900] |
| PPO type 2 (PPO TYPE 2) | [901] |
| PPO type 3 (PPO TYPE 3) | [902] |
| PPO type 4 (PPO TYPE 4) | [903] |

**Function:**

The choice of PPO type has to match the input and output data of the master.

**Description of choice:**

900 = PPO type 1 (100/150):
This PPO type has a 16 bit control word and a 16 bit reference to controlling the VLT. The status word and the actual speed value will also be returned as 16 bit value. See *Fieldbus profile.*

901 = PPO type 2 (101/151):
The same structure as in PPO type 1, but with 2 additional free selectable process data.

902 = PPO type 3 (20/70):
This profile fulfill the Instance 20/70 profile. See *Control word under Instance 20/70.*

903 = PPO type 4 (102/152):
4 free selectable process data that can be chosen in parameter 915/916 *PCD configuration.*

---

**915 PCD write configuration**
**(PCD CONFIG WRITE)**

**Value:**

| | |
|---|---|
| Sub index 1 (PCD 1) | [Parameter number] |
| Sub index 2 (PCD 2) | [Parameter number] |

**Function:**

Different parameters can be assigned to PCD 1-2 if instance 101/151 is selected in parameter 904 *PPO Selection*. The values in PCD 1-2 will be written to the selected parameters in the form of data values.

**Description of choice:**

The sequence of the subindixes corresponds to the sequence of the PCD in the PPO, i.e. subindex 1 = PCD 1, subindex 2 = PCD 2 etc. Each subindex may contain the number of any VLT parameter.

Note that subindex 3 - 8 are having no function.

---

**916 PCD read configuration**
**(PCD CONFIG READ)**

**Value:**

| | |
|---|---|
| Sub index 1 (PCD 1) | [Parameter number] |
| Sub index 2 (PCD 2) | [Parameter number] |

**Function:**

Different parameters can be assigned to PCD 1-2 if instance 101/151 is selected in parameter 904 *PPO Selection*. The values in PCD 1-2 will be read from the selected parameters in the form of data values.

**Description of choice:**

The sequence of subindices corresponds to the sequence of the PCD in the PPO, i.e.subindex 1 = PCD 1, subindex 2 = PCD 2 etc. Each subindex may contain the number of any VLT parameter.

Note that subindex 3 - 8 are having no function.

---

**918 User address**
**(STATION ADDRESS)**

**Value:**

| | |
|---|---|
| 0 - 63 | ★ 63 |

**Function:**

Readout of actual address of the devicenet option.

---

**927 PCV operating authority**
**(PARAMETER EDIT)**

**Value:**

| | |
|---|---|
| Without DeviceNet (DISABLE) | [0] |
| ★With DeviceNet (ENABLE) | [1] |

**Function:**

The parameter channel PCV may be blocked so that the modification of parameters through this channel is not possible. Access through the standard RS 485 interface is still possible.

**NOTE**
When parameters 927 and 928 are deactivated, the Warning 34 in the display of the VLT will also be suppressed.

★ = factory setting. () = display text [] = value for use in communication via serial communication port

**Description of choice:**

- Without DeviceNet: Parameter processing through the DeviceNet is not active.
- With DeviceNet: Parameter processing through the DeviceNet is active

## 928 Control authority (PROCESS CONTROL)

**Value:**

Without DeviceNet (DISABLE) [0]
★With DeviceNet (ENABLE) [1]

**Function:**

The process control (adjustment of control word and speed reference value and of the following variable PCD) can be blocked. Control through the control card terminals is still possible via the terminals, depending on how the parameters 502-508 have been set. Access through the standard RS 485 is also still possible.

**NOTE**
When parameters 927 and 928 are deactivated, the Warning 34 in the display of the VLT will also be suppressed.

**Description of choice:**

- Without DeviceNet: Process control through the DeviceNet is not active.
- With DeviceNet: Process control through the DeviceNet is active

**NOTE**
The motor may start without advance warning when parameter 928 is being changed and start commands are present.

## 953 Warning messages (WARNING PARAM.)

**Value:**

Read only (16 bit binary code)
No control panel access

**Function:**

A bit is assigned to every warning (see the following list)

| Bit | | In the following cases, bit is = 1 |
|---|---|---|
| 0 | LSB | Connection to the master is not OK |
| 1 | | |
| 2 | | FDL (field bus data security layer) is not OK |
| 3 | | Command to erase data received |
| 4 | | Current value not updated |
| 5 | | FIFO overflow of the spontaneous messages |
| 6 | | DeviceNet ASIC does not transmit |
| 7 | | Initialization of the DeviceNet option is not OK |
| 8 | | Not used |
| 9 | | Not used |
| 10 | | Not used |
| 11 | | Not used |
| 12 | | Not used |
| 13 | | Not used |
| 14 | | Not used |
| 15 | MSB | Not used |

## 967 Control Word (CONTROL WORD)

**Value:**

16 bit binary code

**Function:**

Parameter 967 is dedicated to sending a control word to the VLT frequency converter when using explicit message. This parameter is not available via LCP.



★ = factory setting. () = display text [] = value for use in communication via serial communication port

## 968 Status Word (STATUS WORD)

**Value:**

Read only (16 bit binary code)

**Function:**

Parameter 968 is dedicated to read the status word from the VLT frequency converter when using explicit message. This parameter is not available via LCP.

## 970 Parameter setup selection (EDIT SETUP SELECT)

**Value:**

| | |
|---|---|
| Factory setting () | [0] |
| Parameter setup 1 (SETUP 1) | [1] |
| Parameter setup 2 (SETUP 2) | [2] |
| Parameter setup 3 (SETUP 3) | [3] |
| Parameter setup 4 (SETUP 4) | [4] |
| ✯Active set up (ACTIVE SETUP) | [5] |

**Function:**

Like parameter 005 (described in the product manual for the VLT 2800 series).

## 971 Save date values (STORE DATA VALUE)

**Value:**

| | |
|---|---|
| ✯Not active (OFF) | [0] |
| Save active setup (STORE ACTIVE SETUP) | [1] |
| Save edit setup (STORE EDIT SETUP) | [2] |
| Save all setups (STORE ALL SETUPS) | [3] |

**Function:**

Parameter values modified through DeviceNet are only saved in RAM, i.e. the modifications are lost in the event of a power failure. This parameter is used to activate a function by means of which all parameter values are saved in EEPROM, preserving them even in the case of a power failure.

**Description of choice:**

- *Not active:* The function is not active.
- *Save active setup:* All parameter setups of the active setup are saved in EEPROM. The value returns to Not active after all parameter values have been saved.
- *Save edit setup:* All parameter setups of the setup being processed are saved in EEPROM. The value returns to Not active after all parameter values have been saved.
- *Save all setups:* All parameter setups in all setups are saved in EEPROM. The value returns to Not active after all parameter values have been saved.

## 980–982 Defined parameters (DEFINED PARAM.)

**Value:**

Read only

**Function:**

The three parameters contain a list of all parameters defined in the VLT. Each of the three parameters can be read as an array by means of a explicit message.

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

When a 0 is issued as a parameter number, the list ends.

## 990–992 Modified parameters (MODIFI. PARAM.)

**Value:**

Read only

**Function:**

The three parameters contain a list of all parameters that have been changed from the factory setting. Every one of the three parameters can be read as an array with the help of the explicit read service. The subindices begin with 1 and follow the sequence of the parameter numbers. Each parameter contains up to 116 elements (parameter numbers). The number of parameters that are in use (990, 991 and 992) depends on how many parameters have been modified in comparison with the factory setting.

Pure read parameters (Read only), such as data output parameters, are not logged as modified even if they are changing.

When a 0 is issued as a parameter number, the list ends.

✯ = factory setting. () = display text [] = value for use in communication via serial communication port

## ■ 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. 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. 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 3 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.

## ■ Factory Settings

| PNU # | Parameter description | Factory setting | 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 | 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 |

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 |

| PNU # | Parameter description | Factory setting | Changes during operation | 4-Setup | Conversion index | Data type |
|---|---|---|---|---|---|---|
| 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 | No | Yes | 1 | 6 |
| 103 | Motor voltage | Depends on the unit | No | Yes | 0 | 6 |
| 104 | Motor frequency | 50 Hz / 60 Hz | No | Yes | 0 | 6 |
| 105 | Motor current | Depends on the unit | No | Yes | -2 | 7 |
| 106 | Rated motor speed | Depends on the unit | 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 % | Yes | Yes | 0 | 6 |
| 111 | Min. frequency normal magnetizing | 1.0 Hz | Yes | Yes | -1 | 6 |
| 112 | | | | | | |
| 113 | Load compensation at low speed | 100 % | Yes | Yes | 0 | 6 |
| 114 | Load compensation at high speed | 100 % | Yes | Yes | 0 | 6 |
| 115 | Slip compensation | 100 % | Yes | Yes | 0 | 3 |
| 116 | Slip compensation time constant | 0.50 s | Yes | Yes | -2 | 6 |
| 117 | Resonance dampening | 100 % | Yes | Yes | 0 | 6 |
| 118 | Resonance dampening time constant | 5 ms | Yes | Yes | -3 | 6 |
| 119 | High starting torque | 0.0 sec. | Yes | Yes | -1 | 5 |
| 120 | Start delay | 0.0 sec. | 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 | Yes | Yes | -1 | 5 |
| 124 | DC holding current | 50 % | Yes | Yes | 0 | 6 |
| 125 | DC braking current | 50 % | Yes | Yes | 0 | 6 |
| 126 | DC braking time | 10.0 sec. | Yes | Yes | -1 | 6 |
| 127 | DC brake cut-in frequency | Off | 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 | Yes | Yes | -1 | 5 |
| 131 | Initial voltage | 0.0 V | Yes | Yes | -1 | 6 |

| PNU # | Parameter description | Factory setting | 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 | Yes | Yes | -1 | 6 |
| 202 | Output frequency high limit | 66 / 132 Hz | Yes | Yes | -1 | 6 |
| 203 | Reference/feedback area | Min - max | Yes | Yes | 0 | 5 |
| 204 | Minimum reference | 0.000 | Yes | Yes | -3 | 4 |
| 205 | Maximum reference | 50.000 | Yes | Yes | -3 | 4 |
| 206 | Ramp type | Linear | Yes | Yes | 0 | 5 |
| 207 | Ramp-up time 1 | Depends on unit | Yes | Yes | -2 | 7 |
| 208 | Ramp-down time 1 | Depends on unit | Yes | Yes | -2 | 7 |
| 209 | Ramp-up time 2 | Depends on unit | Yes | Yes | -2 | 7 |
| 210 | Ramp-down time 2 | Depends on unit | Yes | Yes | -2 | 7 |
| 211 | Jog ramp time | Depends on unit | Yes | Yes | -2 | 7 |
| 212 | Quick stop ramp-down time | Depends on unit | Yes | Yes | -2 | 7 |
| 213 | Jog frequency | 10.0 Hz | Yes | Yes | -1 | 6 |
| 214 | Reference function | Sum | Yes | Yes | 0 | 5 |
| 215 | Preset reference 1 | 0.00 % | Yes | Yes | -2 | 3 |
| 216 | Preset reference 2 | 0.00 % | Yes | Yes | -2 | 3 |
| 217 | Preset reference 3 | 0.00 % | Yes | Yes | -2 | 3 |
| 218 | Preset reference 4 | 0.00 % | Yes | Yes | -2 | 3 |
| 219 | Catch up/slow down value | 0.00 % | Yes | Yes | -2 | 6 |
| 220 | | | | | | |
| 221 | Torque limit for motor mode | 160 % | Yes | Yes | -1 | 6 |
| 222 | Torque limit for regenerative operation | 160 % | Yes | Yes | -1 | 6 |
| 223 | Warning: Low current | 0.0 A | Yes | Yes | -1 | 6 |
| 224 | Warning: High current | $I_{VLT,MAX}$ | Yes | Yes | -1 | 6 |
| 225 | Warning: Low frequency | 0.0 Hz | Yes | Yes | -1 | 6 |
| 226 | Warning: High frequency | 132.0 Hz | Yes | Yes | -1 | 6 |
| 227 | Warning: Low feedback | -4000.000 | Yes | | -3 | 4 |
| 228 | Warning: High feedback | 4000.000 | Yes | | -3 | 4 |
| 229 | Frequency bypass, bandwidth | OFF | Yes | Yes | 0 | 6 |
| 230 | Frequency bypass 1 | 0.0 Hz | Yes | Yes | -1 | 6 |
| 231 | Frequency bypass 2 | 0.0 Hz | Yes | Yes | -1 | 6 |
| 232 | Frequency bypass 3 | 0.0 Hz | Yes | Yes | -1 | 6 |
| 233 | Frequency bypass 4 | 0.0 Hz | Yes | Yes | -1 | 6 |
| 234 | Motor phase monitor | Enable | Yes | Yes | 0 | 5 |

| PNU # | Parameter description | Factory setting | Changes during operation | 4-Setup | 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 | Yes | Yes | -1 | 5 |
| 310 | Terminal 53, max. scaling | 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 | Yes | Yes | -1 | 5 |
| 313 | Terminal 54, max. scaling | 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 | Yes | Yes | -4 | 5 |
| 316 | Terminal 60, max. scaling | 20.0 mA | Yes | Yes | -4 | 5 |
| 317 | Time out | 10 sec. | Yes | Yes | 0 | 5 |
| 318 | Function after time out | Off | Yes | Yes | 0 | 5 |
| 319 | Terminal 42, output | 0 - $I_{MAX}$ ⇒ 0-20 mA | Yes | Yes | 0 | 5 |
| 320 | Terminal 42, output, pulse scaling | 5000 Hz | Yes | Yes | 0 | 6 |
| 321 | Terminal 45, output | 0 - $f_{MAX}$ ⇒ 0-20 mA | Yes | Yes | 0 | 5 |
| 322 | Terminal 45, output, pulse scaling | 5000 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. | Yes | Yes | -2 | 6 |
| 325 | Relay 01, OFF delay | 0.00 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 | Yes | Yes | 0 | 6 |
| 330 | Freeze reference/output function | No operation | Yes | No | 0 | 5 |

| PNU # | Parameter description | Factory setting | 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. | 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 | Yes | Yes | 0 | 5 |
| 410 | Trip delay-inverter | Depends on type of unit | Yes | Yes | 0 | 5 |
| 411 | Switching frequency | Depends on type of unit | 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 | Yes | Yes | -3 | 4 |
| 415 | Maximum feedback | 1500.000 | Yes | Yes | -3 | 4 |
| 416 | Process unit | % | Yes | Yes | 0 | 5 |
| 417 | Speed PID proportional gain | 0.015 | Yes | Yes | -3 | 6 |
| 418 | Speed PID integration time | 8 ms | Yes | Yes | -4 | 7 |
| 419 | Speed PID differentiation time | 30 ms | Yes | Yes | -4 | 6 |
| 420 | Speed PID diff. gain ratio | 5.0 | Yes | Yes | -1 | 6 |
| 421 | Speed PID low-pass filter | 10 ms | Yes | Yes | -4 | 6 |
| 422 | U 0 voltage at 0 Hz | 20.0 V | Yes | Yes | -1 | 6 |
| 423 | U 1 voltage | parameter 103 | Yes | Yes | -1 | 6 |
| 424 | F 1 frequency | parameter 104 | Yes | Yes | -1 | 6 |
| 425 | U 2 voltage | parameter 103 | Yes | Yes | -1 | 6 |
| 426 | F 2 frequency | parameter 104 | Yes | Yes | -1 | 6 |
| 427 | U 3 voltage | parameter 103 | Yes | Yes | -1 | 6 |
| 428 | F 3 frequency | parameter 104 | Yes | Yes | -1 | 6 |
| 429 | U 4 voltage | parameter 103 | Yes | Yes | -1 | 6 |
| 430 | F 4 frequency | parameter 104 | Yes | Yes | -1 | 6 |
| 431 | U 5 voltage | parameter 103 | Yes | Yes | -1 | 6 |
| 432 | F 5 frequency | parameter 104 | Yes | Yes | -1 | 6 |
| 433 | Torque proportional gain | 100% | Yes | Yes | 0 | 6 |
| 434 | Torque integral time | 0.02 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 | Yes | Yes | -1 | 6 |
| 440 | Process PID proportional gain | 0.01 | Yes | Yes | -2 | 6 |
| 441 | Process PID integral time | 9999.99 sec. (OFF) | Yes | Yes | -2 | 7 |
| 442 | Process PID differentiation time | 0.00 sec. (OFF) | Yes | Yes | -2 | 6 |
| 443 | Process PID diff. gain limit | 5.0 | Yes | Yes | -1 | 6 |
| 444 | Process PID lowpass filter time | 0.01 | Yes | Yes | -2 | 6 |
| 445 | Flying start | Disable | Yes | Yes | 0 | 5 |
| 446 | Switching pattern | SFAVM | Yes | Yes | 0 | 5 |
| 447 | Torque compensation | 100% | Yes | Yes | 0 | 3 |
| 448 | Gear ratio | 1 | No | Yes | -2 | 4 |
| 449 | Friction loss | 0% | No | Yes | -2 | 6 |
| 450 | Mains voltage at mains fault | Depends on unit | Yes | Yes | 0 | 6 |

| PNU # | Parameter description | Factory setting | Changes during operation | 4-Setup | Conversion index | Data type |
|---|---|---|---|---|---|---|
| 500 | Address | 1 | 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 | Yes | Yes | -1 | 6 |
| 510 | Bus jog 2 | 10.0 Hz | Yes | Yes | -1 | 6 |
| 511 | | | | | | |
| 512 | Telegram profile | FC Drive | No | Yes | 0 | 5 |
| 513 | Bus time interval | 1 sec. | 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 |

| PNU # | Parameter description | Factory setting | Changes during operation | 4-Setup | Conversion index | Data ype |
|---|---|---|---|---|---|---|
| 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-ups | | 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 |

| PNU # | Parameter description | Factory setting | Changes during operation | 4-setup | Conversion index | Data-type |
|---|---|---|---|---|---|---|
| 700 | Relay 6, function | Ready signal | Yes | Yes | 0 | 5 |
| 701 | Relay 6, ON delay | 0 sec. | Yes | Yes | -2 | 6 |
| 702 | Relay 6, OFF delay | 0 sec. | Yes | Yes | -2 | 6 |
| 703 | Relay 7, function | Motor running | Yes | Yes | 0 | 5 |
| 704 | Relay 7, ON delay | 0 sec. | Yes | Yes | -2 | 6 |
| 705 | Relay 7, OFF delay | 0 sec. | Yes | Yes | -2 | 6 |
| 706 | Relay 8, function | Mains ON | Yes | Yes | 0 | 5 |
| 707 | Relay 8, ON delay | 0 sec. | Yes | Yes | -2 | 6 |
| 708 | Relay 8, OFF delay | 0 sec. | Yes | Yes | -2 | 6 |
| 709 | Relay 9, function | Fault | Yes | Yes | 0 | 5 |
| 710 | Relay 9, ON delay | 0 sec. | Yes | Yes | -2 | 6 |
| 711 | Relay 9, OFF delay | 0 sec. | Yes | Yes | -2 | 6 |

**NOTE**
This VLT Parameter List is only valid when Relay Option is installed.

| PNU # | Parameter description | Factory setting | Changes during operation | 4-Setup | Conversion index | Data type | |
|---|---|---|---|---|---|---|---|
| 700 | System control | | 0 1 | Yes | No | 0 | 6 |
| 701 | Program number | - 1 | -1 - 127 | Yes | No | 0 | 4 |
| 702 | PID, Proportional factor | 30 | 0 - 65000 | Yes | No | 0 | 4 |
| 703 | PID, Derivative factor | 0 | 0 - 65000 | Yes | No | 0 | 4 |
| 704 | PID, Integral factor | 0 | 0 - 65000 | Yes | No | 0 | 4 |
| 705 | PID, Integral bandwidth | 1000 | 0 - 1000 | Yes | No | 0 | 4 |
| 706 | PID, BANDWIDTH | 1000 | 0 - 65000 | Yes | No | 0 | 4 |
| 707 | PID, Velocity Feed-forward | 0 | 0 - 65000 | Yes | No | 0 | 4 |
| 708 | PID, Acceleration Feed-forward | 0 | 0 - 65000 | Yes | No | 0 | 4 |
| 709 | PID, Velocity filter | 0 | 0 - 65000 | Yes | No | 0 | 4 |
| 710 | User parameter 10 | 0 | Defined by user[1] | Yes | No | 0 | 4 |
| 711 | User parameter 11 | 0 | Defined by user[1] | Yes | No | 0 | 4 |
| ... | | | | | | | |
| 778 | User patameter 78 | 0 | Defined by user[1] | Yes | No | 0 | 4 |
| 779 | User parameter 79 | 0 | Defined by user[1] | Yes | No | 0 | 4 |
| 780 | Activated dead time compensation | OFF | 0 - 1 | No | No | 0 | 4 |
| 795 | User parameter 95 (read only) | 0 | Defined by user[1] | Read only | No | 0 | 4 |
| 796 | User parameter 96(read only) | 0 | Defined by user[1] | Read only | No | 0 | 4 |
| 797 | User parameter 97(read only) | 0 | Defined by user[1] | Read only | No | 0 | 4 |
| 798 | User parameter 98(read only) | 0 | Defined by user[1] | Read only | No | 0 | 4 |
| 799 | User parameter 99(read only) | 0 | Defined by user[1] | Read only | No | 0 | 4 |

**NOTE**
This VLT Parameter List is only valid when Sync/Pos option is installed.

1) The maximum range is $-2^{32}$ to $2^{32} - 1$ (-2147483648 to 2147483647) but the actual range is specified when defining a user parameter in the application program using LINKGPAR or LINKAXPAR.

| PNU # | Parameter description | Factory setting | Changes during operation | 4-Setup | Conversion index | Data type |
|---|---|---|---|---|---|---|
| 801 | Baud rate selection | | | | -1 | 3 |
| 803 | Time after bus error | 1 sec. | | | -1 | 3 |
| 804 | Response after bus error | Off | | | -1 | 3 |
| 805 | Function control word bit Bit 10 | Bit 10 = CTW active | | | -1 | 6 |
| 904 | PPO selection for DP | 900 | | | 0 | 6 |
| 915 | PCD write configuration | | | | 0 | 6 |
| 916 | PCD read configuration | | | | 0 | 6 |
| 927 | PCV operating authority | With PROFIBUS | | | 0 | 6 |
| 928 | Control authority | With PROFIBUS | | | 0 | 6 |
| 953 | Warning Messages | | | | 0 | 35 |
| 967 | Control Word | | | | 0 | 35 |
| 968 | Status Word | | | | 0 | 35 |
| 970 | Parameter setup selection | Active setup | | | 0 | 5 |
| 971S | Save data values | Not active (OFF) | | | 0 | 5** |
| 980 | Defined parameters | | | | 0 | 6 |
| 981 | | | | | | |
| 982 | | | | | | |
| 990 | Modified parameters | | | | 0 | |
| 991 | | | | | | |
| 992 | | | | | | |

** Automatic reset to (0)
S Only in stop mode (VLT must be stopped in order to change data value)