

■ Abstract

This application note describes how to setup the communication between Danfoss VLT frequency converter and UniOP operator panels.

This note will describe how to:

- Change a parameter setting
- Send a reference
- Send a start command
- Setup dynamic text via the status word
- Recipe function

■ VLT frequency converters and UniOP operator panels

EXOR UniOP operator panels now have built-in Danfoss *FC protocol* which means that all Danfoss VLT frequency converters can be connected to UniOP operator panels. This again means that you can control VLT 2800, VLT 5000, VLT 6000 and FCM 300 Drivemotor from one operator panel, as all of Danfoss VLT frequency converters have the built-in *FC protocol*.



**UniOP operator panel
ETR 16**

The Master (UniOP operator panel) is able to send reference, control word (start/stop) and new parameter settings to each connected VLT frequency converter. At the same time an actual output frequency, output current or torque can be read from the operator panel.

If the VLT frequency converter is experiencing a warning or an alarm, the operator panel can display it with a text. A warning or an alarm can be saved in the operator panel with the reason and the time for the warning, for example *High frequency warning, Tuesday 06.04.1999, 14.03 hrs.*

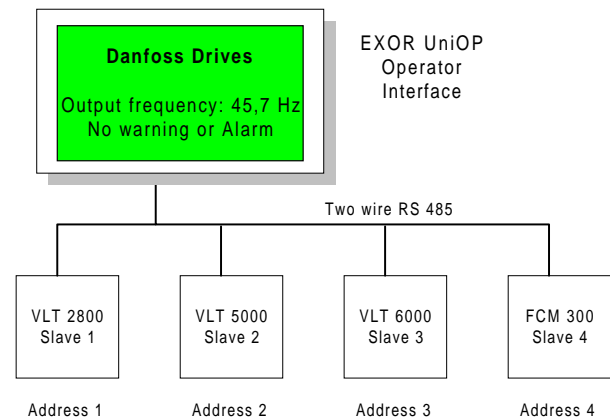
The installation between the operator panel and each VLT frequency converter is done with a two-wire RS-485 cable.

■ Communication Setup

Set the following parameter in the VLT frequency converter in order to establish the communication between the VLT frequency converter and UniOP operator panel.

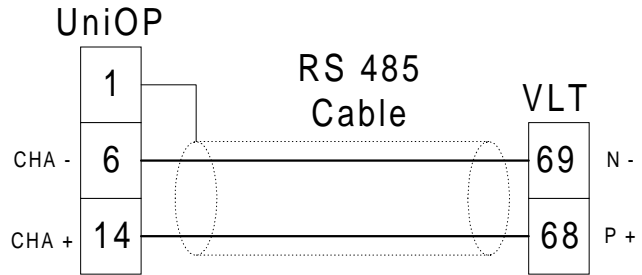
- Allocate an address in the serial communication network to each VLT frequency converter in parameter 500 *Address*.
The address in VLT 6000 is set in parameter 501 *Address*.
- The parameter 501 "Baud rate" is the programmed speed at which data is transmitted via serial communication. Set the baudrate to 9600 baud.
The baudrate in VLT 6000 is set in parameter 502 *Baudrate*.
- Choose *FC protocol* in parameter 512 *Protocol*.
The protocol select is by VLT 6000 done in parameter 500 *Protocol*.

Connect terminal 12 (+24 VDC) to terminal 27 on the control card.



■ Cable description

The drawing shows the connection between the UniOP operator panel and Danfoss VLT frequency converter.



■ Design of operator panel

UniOP panels are programmed with its programming software called *Designer*, which is a Windows™ based software.

The software is based on „what you see is what you get“, which means what you see on your PC screen is what you will actually see on your panel display.

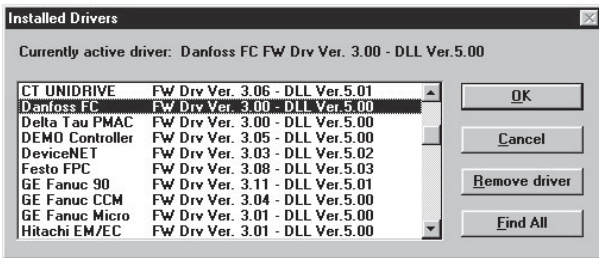
To program an operator panel you have to connect UniOP to a personal computer running Designer. The Designer project will be downloaded to the panel via the PC serial communication port.

NB!: Please note that the operator panel must be in Configuration mode to be programmed.

See UniOP *Installation Guide*.

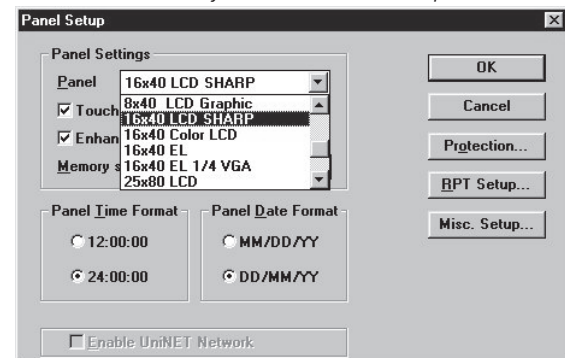
To communicate with a Danfoss VLT frequency converter you have to choose *Danfoss FC* as a driver.

This is done in *Project* and *Change controller driver*. By *Installed drivers* choose *Danfoss FC*.



Then you have to choose which operator panel you use.

This is done in *Project* and *Panel Setup*.

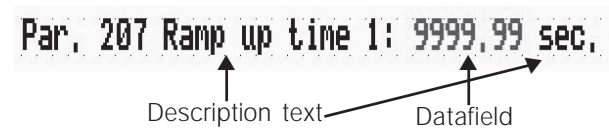


■ Write to a parameter

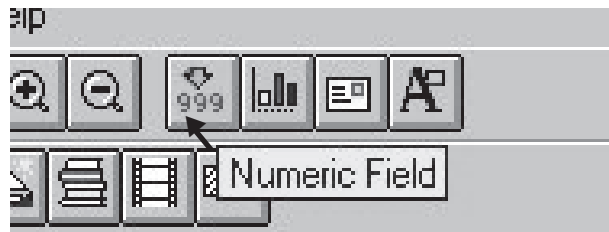
The following example will teach you what to do in order to insert parameter 207 *Ramp up time 1* in the UniOP operator page. When the program has been downloaded to operator panel it will be possible to write and read parameter 207 *Ramp up time 1* via the operator panel.

First of all write a description for par. 207, for example *Par. 207 Ramp up time 1*.

To write or read a parameter in the VLT frequency converter you have to create a datafield, i.e. place the cursor after the description text for par. 207.

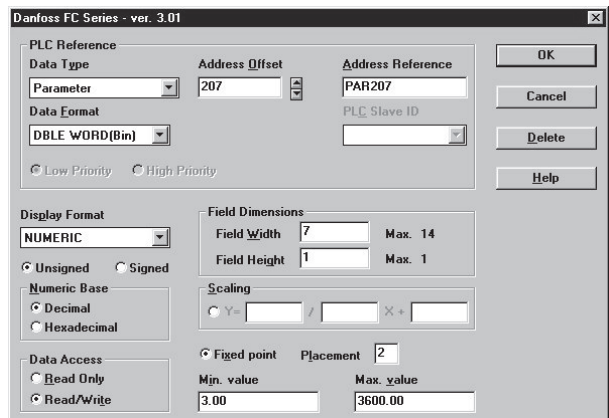


Click on Numeric Field or double click on a free space of the page and the Define Field dialog box will appear.



In *Danfoss FC series* you can setup the attributes, min and max values to each parameter. The MIN and MAX limits are assignable for each parameter.

Because we are going to access to parameter 207, select Parameter as Data Type and insert 207 as Address Offset.



In order to have the right readout on the operator panel, the following must be setup in *Danfoss FC series*, please also have a look at parameter 207 *Ramp up time 1* in the VLT 5000 Operating Instructions:

- Data format = *DBLE WORD(BIN)*. The data format will be two words.
- Display format = *Numeric* and *Unsigned*. Numerical readout on the operator panel and no negative value can be written from the operator panel to the VLT frequency converter.
- Numeric database = *Decimal*. You can write and read decimal numbers in parameter 207 *Ramp up time 1*.
- Data Access = *Read/write*. Parameter 207 *Ramp up time 1* can now both be written to and the value can be read from the operator panel.
- Field Width/Height = 7 / 1. Set the width to 7 as the ramp up time can be 1458.50 sec.
- Fixed point = 2. There are two digits after the decimal point. See the Operating Instructions.
- Min. Value = 3.00. Here you can set a minimum value that can be sent from the operator panel to the VLT frequency converter. The value can be no less than the parameter minimum value, here 0.05 sec.
- Max. Value = 3600.00. Here you can set a maximum value that can be sent from the operator panel to the VLT frequency converter. The value can not be larger than the parameter maximum value, here 3600 sec.

Press OK and download the program to the operator panel.

The value of parameter 207 *Ramp up time 1* can now be adjusted via the Operator Panel. If the parameter value changes, its value can be displayed on UniOP screen as well.

■ Control word

The control word is used for transmitting commands from the master (operator panel) to a slave (VLT frequency converter).

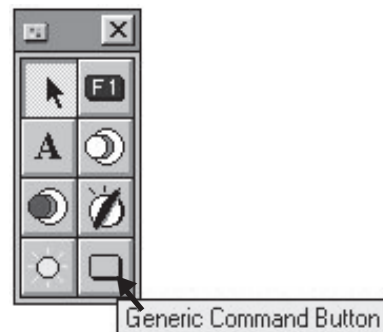
The control word in FC protocol looks like this:

Bit	Bit = 0	Bit = 1
00		Preset ref. LSB
01		Preset ref. MSB
02	DC braking	
03	Coasting stop	
04	Quick stop	
05	Freeze output frequency	
06	Ramp stop	Start
07		Reset
08		Jog
09	Ramp 1	Ramp 2
10	Data not valid	Data valid
11		Activate relay 01
12		Activate relay 04
13		Choice of Setup LSB
14		Choice of Setup MSB
15		Reversing

Please have a look at the Operating Instructions for further description of each bit.

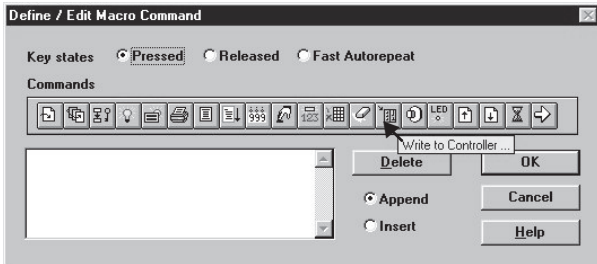
A start command can be setup in the *Designer* software via the control word, for the VLT frequency converter to start when the start button is pressed on the operator panel. The start button can be programmed as a touch screen button (require a touch screen panel) or as a function button on the operator panel. This example shows with a touch screen button.

The touch screen button is being setup if you choose *Generic Command Button*.



■ **Control word, cont.**

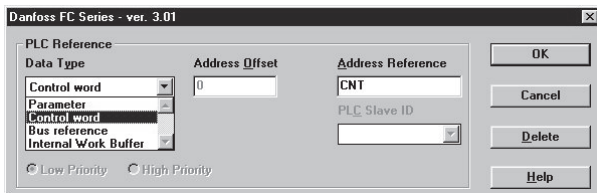
In the dialog box *Configure Touchscreen cell* you can configure the touch screen button. After you have pressed *Generic Command button*, a new dialog box is shown on the screen where you can configure buttons on the operator panel. Under *Cell functionality* choose *Macro command* and press *Configure selected function*.



From *Define / Edit Macro Command* it is possible to choose between different commands when the touch screen button is activated. You can for example *Go to page...*, show an alarm list or print out a report. For instance the macro *Go to Page* can be used to display a particular page on the panel.

To write to the control word in the VLT frequency converter you shall choose *Write to controller* and a new dialog box comes up.

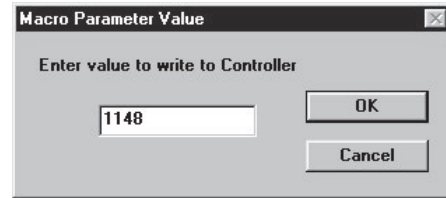
As *Datatype* choose *Control word* and press OK.



To start the VLT frequency converter you have to write 047C Hex in the control word, see schedule on the previous page. To write to the operator panel you need to convert the hexadecimal number to decimal, so 047C Hex will be 1148 decimal.

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Start (hex)						4			7							C
Stop (hex)						4			3							C

Write the start command 1148 in the dialog box *Macro parameter value*. When the start button is activated, the operator panel will send a control word with the start command to the VLT frequency converter.



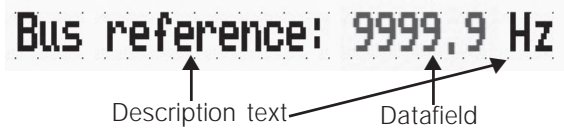
Press OK twice.

By *Edit / view* you can write a text on the touch screen button.

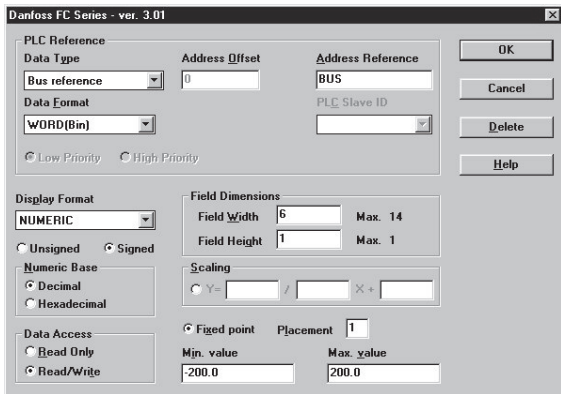
Press on OK in *Configure Touchscreen cell* and after the program is downloaded to the operator panel the VLT frequency converter will receive a start command when the touch screen button is activated.

■ **Bus reference**

To write a reference to the VLT frequency converter you have to create a datafield, i.e. place the cursor where you want the bus reference and click on *Numeric field*.



Click on *Numeric field* and *Danfoss FC series* comes up.



Under *Data type* choose *Bus reference* and set the following parameters:

- Display format = *Numeric* and *signed*. Numeric read-out on the operator panel and a negative bus reference can be sent from the operator panel to the VLT frequency converter.
- Numeric database = *Decimal*. You can write and read decimal numbers via the bus reference.
- Data Access = *Read/write*. The bus reference can now be written to the VLT frequency converter and can also be readen from the operator panel.
- Field Width/Height = 6 / 1. Set the width to 6 because the bus reference data can be -114.5%.
- Fixed point = 1. There is one decimal after the comma. See the Operating Instructions.
- Min. Value = -200.0. Here you can set a minimum bus reference that can be written from the operator panel to the VLT frequency converter.
- Max. Value = 200.0. Here you can set a maximum bus reference that can be written from the operator panel to the VLT frequency converter.

Press OK and download the program to the operator panel.

The bus reference can now be changed via the operator panel.

■ **Text message field**

With text message field it is possible to give messages to the user via the operator panel. If you want a text telling you if the VLT frequency converter is *Running* or *Not Running*, this can be done by *Text message Field*. Use the status word in *FC protocol*.

The status word is used for informing the master (operator panel) about the conditions of the slave (VLT frequency converter).

The status word in *FC protocol* looks like this:

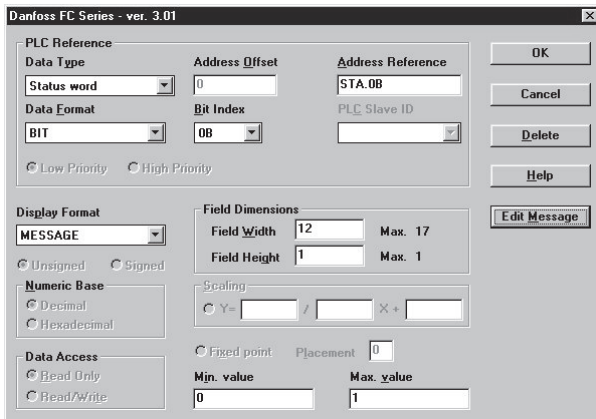
Bit	Bit = 0	Bit = 1
00	Control not ready	Ready
01	VLT not ready	VLT ready
02	Coasting	Enable
03	No trip	Trip
04	Reserved	
05	Reserved	
06	Reserved	
07	No warning	Warning
08	Speed ≠ ref.	Speed = ref.
09	Local control	Bus control
10	Out of frequency range	Frequency OK
11	Not running	Running
12	No function	No function
13	Voltage OK	Voltage warning
14	Torque OK	Above torque limit
15	Timer limit	Thermal warning

To make a *Text message Field* you have to create a datafield, i.e. place the cursor where you want the text and click on *Text message Field*.

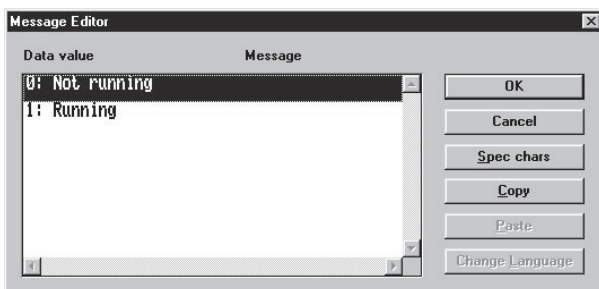


Under *Data type* choose *Status word* and set the following parameters:

- Data format = *Bit*. The text *Not running* and *running* is controlled by bit 11 in the status word.
- Bit index = *0B*. Choose bit 11 to control the text.
- Min. Value = 0. Minimum value for bit 11.
- Max. Value = 1. Maximum value for bit 11.



By *Edit message* and in *Message editor* write the text when bit 11 is '0' and '1', respectively.



Press OK and download the program to the operator panel.

The text will now change if you start and stop the VLT frequency converter.

Instead of changing text you can also change graphic pictures by choosing *Dynamic graphic*.

■ Recipe function

The recipe function makes it possible to send a complete set of parameters to the VLT frequency converter with one command.

This is a useful feature if you have to change parameter settings often.

First step is to activate the Recipe function.



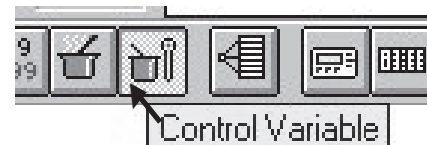
Next you have to create a Recipe group, which can include a new reference, control word and different parameter settings.

Create a field for *Bus reference* and one for a parameter as shown earlier. Notice that the data field now is indicated with a R.

```
Bus reference:          RRRR.R Hz
Par. 207 Ramp up time 1: RRR.RR Sec.
```

Next step is to create a function that controls the different settings that Bus reference and a parameter might have.

Activated *Control variable*.



Write for example *Parameter set* and click on *Numeric field*.

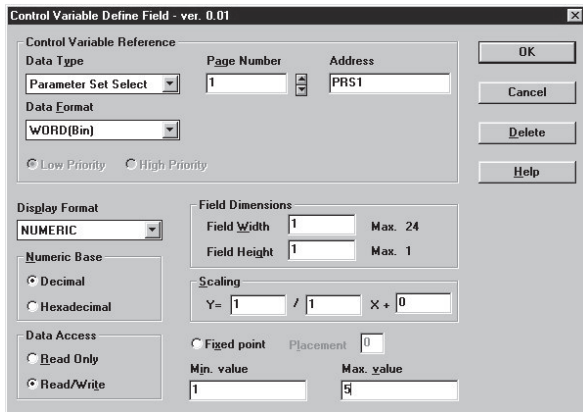
```
Parameter set: C
```


■ **Recipe function, cont.**

Under *Data type* select *Parameter set select* and set the following parameters:

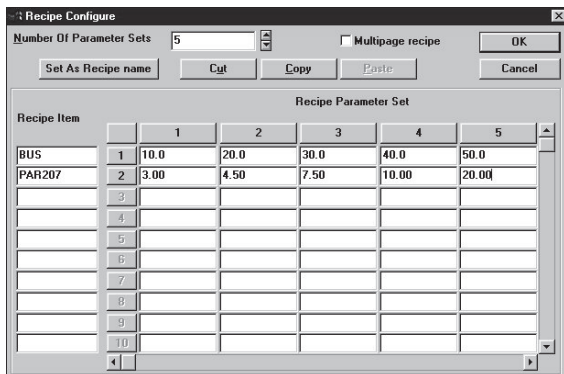
- Min. Value = 1
- Max. Value = 5

It means that you can choose between 5 parameter settings.



Now you can create the table with the 5 different parameter settings.

Select *Page* and *Recipe configuration*.



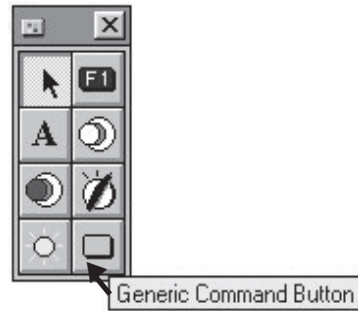
Set *Number of parameter sets* to 5.

In *Recipe Item* there are two predefined variable *Bus reference* and *Parameter 207* which can be set to 5 different values.

Press OK after you have added some values to each recipe item.

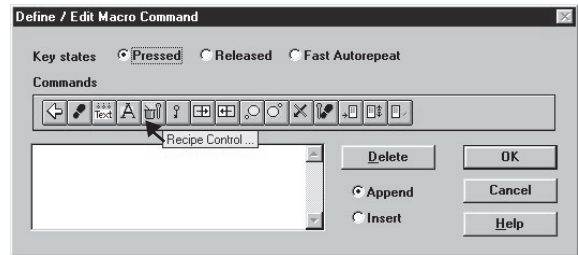
The last step in the *Recipe function* is to create a "Send" button to download the parameter settings to the VLT frequency converter.

The touch screen "Send" button is setup if you choose *Generic Command Button*.

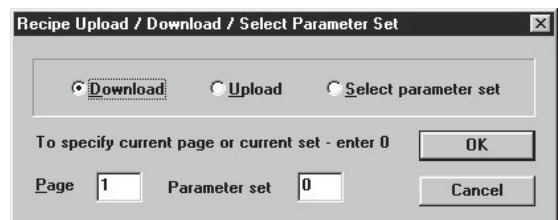


Under *Cell functionality* choose *Macro command* and press *Configure selected function*.

Choose *Recipe control* under *Define / Edit macro command*.



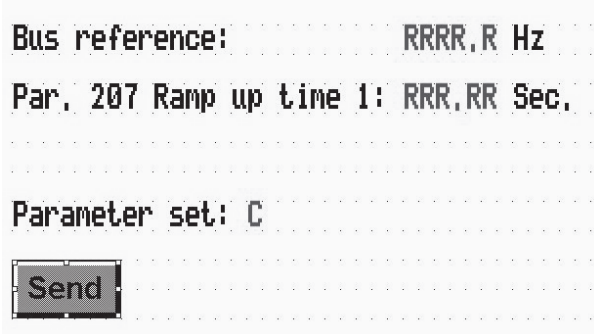
Under *Recipe Upload / download / Select parameter Set* select *download* and write the page that you are currently on, here 1. Write 0 in *Parameter set*.



Press OK three times.

■ Recipe function, cont.

The screen now looks like this:



Download the program to the operator panel.
Bus reference and parameter 207 can now be changed according to the schedule by changing the parameter set number (from 1-5).
When the "Send" button is pressed the parameter in the VLT frequency converter will change.
