

ENGINEERING
TOMORROW



Programming Guide

VLT® FC 301/302 Addendum

Software version 8.60



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1 Before You Begin

1.1 Introduction to the Programming Guide

Introduction

This chapter describes the purpose of the programming guide, intended audience, disclaimer, safety conventions, and additional resources.

Purpose of this programming guide addendum

N O T I C E
This programming guide is an addendum to VLT® AutomationDrive FC 301/302 Programming Guide (M00131). This guide contains all the new parameters and recent additions made to existing parameters for software version 8.60. Use this addendum along with VLT® AutomationDrive FC 301/302 Programming Guide (M00131) while configuring the drive.

The guide provides an overview of parameters and value ranges for operating the drive. Installation and operating instructions are not in scope of the programming guide.

Intended audience

The intended audience of the programming guide is trained personnel, automation engineers, and programmers with experience in operating with parameters and with basic knowledge of Danfoss AC drives.

Safety symbols

The following symbols are used in this manual:

⚠ D A N G E R ⚠
Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ W A R N I N G ⚠
Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ C A U T I O N ⚠
Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

N O T I C E
Indicates information considered important, but not hazard-related (for example, messages relating to property damage).

Additional resources

Additional resources are available to help you understand related information.

Technical documentation for various product options is available via the Danfoss home page in the Service and Support/Documentation section.

1.2 Reading the Parameter Table

This programming guide includes parameter and options tables. These descriptions explain how to read the parameter and options tables.

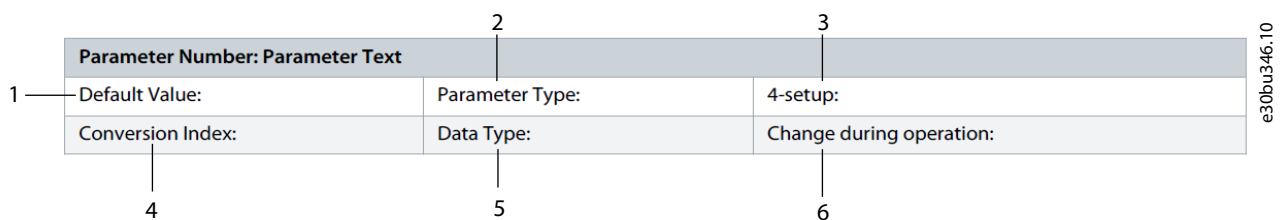


Illustration 1: Parameter Table

1 indicates the value set in factory.

2 indicates whether the parameter type is option or range.

3 indicates the manner of parameter set-ups. *All setups* means that the parameter can be set individually in each of the 4 setups. For example, 1 single parameter can have 4 different data values. *1 setup* indicates that the data value is the same in all setups.

4 refers to the conversion index. Parameter values are transferred as whole numbers only. Conversion factors are therefore used to transfer decimals. If a value is transferred as 100 and a conversion index of -1, the real value is 10.0.

5 indicates the different data types for the parameters.

6 indicates whether the parameter value can be changed while the drive is in operation. False indicates that the drive must be stopped before a change can be made.

Table 1: Conversion Table

Conversion index	Conversion factor
100	1
75	3600000
74	3600
70	60
67	1/60
6	1000000
5	100000
4	10000
3	1000
2	100
1	10
0	1
-1	0.1
-2	0.01
-3	0.001
-4	0.0001
-5	0.00001
-6	0.000001

Table 2: Data type

Data type	Description	Type
2	Integer 8	Int8
3	Integer 16	Int16
4	Integer 32	Int32
5	Unsigned 8	UInt8
6	Unsigned 16	UInt16
7	Unsigned 32	UInt32

Data type	Description	Type
9	Visible string	VisStr
33	Normalized value 2 bytes	N2
35	Bit sequence of 16 boolean variables	V2
54	Time difference w/o date	TimD

2 Parameter Descriptions

2.1 Parameters: 0-** Operation and Display

Parameter 0–20: Display Line 1.1 Small

Table 3: Parameter Information

0-20: Display Line 1.1 Small		
Default Value: <i>Size related</i>	Parameter Type: Option	4-setup: <i>All set-ups</i>
Conversion Index: -	Data Type: Uint16	Change during operation: True

Select a variable for display in line 1, left position. The following are new options:

Option Number	Option Name	Description
[1688]	Fieldbus Torque FF	
[1899]	Speed PID Torque FF. [Nm]	
[4521]	Status	
[4522]	Progress	

Parameter 0–21: Display Line 1.2 Small

Table 4: Parameter Information

0-21: Display Line 1.2 Small		
Default Value: <i>Motor current</i>	Parameter Type: Option	4-setup: <i>All set-ups</i>
Conversion Index: -	Data Type: Uint16	Change during operation: True

Select a variable for display in line 1. The following are new options:

Option Number	Option Name	Description
[1688]	Fieldbus Torque FF	
[1899]	Speed PID Torque FF. [Nm]	
[4521]	Status	
[4522]	Progress	

Parameter 0–22: Display Line 1.3 Small

Table 5: Parameter Information

0-22: Display Line 1.3 Small		
Default Value: <i>Power [kW]</i>	Parameter Type: Option	4-setup: <i>All set-ups</i>
Conversion Index: -	Data Type: Uint16	Change during operation: True

Select a variable for display in line 1, right position. The following are new options:

Option Number	Option Name	Description
[1688]	Fieldbus Torque FF	
[1899]	Speed PID Torque FF. [Nm]	
[4521]	Status	

Option Number	Option Name	Description
[4522]	Progress	

Parameter 0–23: Display Line 2 Large

Table 6: Parameter Information

0-23: Display Line 2 Large		
Default Value: <i>Frequency</i>	Parameter Type: Option	4-setup: <i>All set-ups</i>
Conversion Index: -	Data Type: Uint16	Change during operation: True

Select a variable for display in line 2. The following are new options:

Option Number	Option Name	Description
[1688]	Fieldbus Torque FF	
[1899]	Speed PID Torque FF. [Nm]	
[4521]	Status	
[4522]	Progress	

Parameter 0–24: Display Line 3 Large

Table 7: Parameter Information

0-24: Display Line 3 Large		
Default Value: <i>None</i>	Parameter Type: Option	4-setup: <i>All set-ups</i>
Conversion Index: -	Data Type: Uint16	Change during operation: True

Select a variable for display in line 1, left position. The following are new options::

Option Number	Option Name	Description
[1688]	Fieldbus Torque FF	
[1899]	Speed PID Torque FF. [Nm]	
[4521]	Status	
[4522]	Progress	

2.1.1 0-2* LCP Display

Parameter 0-20: Display Line 1.1 Small

Table 8: Parameter Information

0-20: Display Line 1.1 Small		
Default Value: <i>Size related</i>	Parameter Type: Option	4-setup: <i>All set-ups</i>
Conversion Index: -	Data Type: Uint16	Change during operation: True

Select a variable for display in line 1, left position. The following are new options:

Option Number	Option Name	Description
[1688]	Fieldbus Torque FF	

Option Number	Option Name	Description
[1899]	Speed PID Torque FF. [Nm]	
[4521]	Status	
[4522]	Progress	

Parameter 0-21: Display Line 1.2 Small

Table 9: Parameter Information

0-21: Display Line 1.2 Small		
Default Value: <i>Motor current</i>	Parameter Type: Option	4-setup: <i>All set-ups</i>
Conversion Index: -	Data Type: Uint16	Change during operation: True

Select a variable for display in line 1. The following are new options:

Option Number	Option Name	Description
[1688]	Fieldbus Torque FF	
[1899]	Speed PID Torque FF. [Nm]	
[4521]	Status	
[4522]	Progress	

Parameter 0-22: Display Line 1.3 Small

Table 10: Parameter Information

0-22: Display Line 1.3 Small		
Default Value: <i>Power [kW]</i>	Parameter Type: Option	4-setup: <i>All set-ups</i>
Conversion Index: -	Data Type: Uint16	Change during operation: True

Select a variable for display in line 1, right position. The following are new options:

Option Number	Option Name	Description
[1688]	Fieldbus Torque FF	
[1899]	Speed PID Torque FF. [Nm]	
[4521]	Status	
[4522]	Progress	

Parameter 0-23: Display Line 2 Large

Table 11: Parameter Information

0-23: Display Line 2 Large		
Default Value: <i>Frequency</i>	Parameter Type: Option	4-setup: <i>All set-ups</i>
Conversion Index: -	Data Type: Uint16	Change during operation: True

Select a variable for display in line 2. The following are new options:

Option Number	Option Name	Description
[1688]	Fieldbus Torque FF	
[1899]	Speed PID Torque FF. [Nm]	
[4521]	Status	
[4522]	Progress	

Parameter 0-24: Display Line 3 Large

Table 12: Parameter Information

0-24: Display Line 3 Large		
Default Value: <i>None</i>	Parameter Type: Option	4-setup: <i>All set-ups</i>
Conversion Index: -	Data Type: Uint16	Change during operation: True

Select a variable for display in line 1, left position. The following are new options::

Option Number	Option Name	Description
[1688]	Fieldbus Torque FF	
[1899]	Speed PID Torque FF. [Nm]	
[4521]	Status	
[4522]	Progress	

2.2 Parameters: 5-** Digital In/Out

The 2 solid-state digital outputs are common for terminals 27 and 29.

Set the I/O function for terminal 27 in *parameter 5-01 Terminal 27 Mode*, and set the I/O function for terminal 29 in *parameter 5-02 Terminal 29 Mode*.

For more information on the options which are not mentioned in this addendum, refer VLT Programming Guide (M00131).

2.2.1 5-3* Digital Outputs

Parameter 5-30: Terminal 27 Digital Output

Table 13: Parameter Information

5-30: Terminal 27 Digital Output		
Default Value: <i>Off</i>	Parameter Type: Option	4-setup: <i>All set-ups</i>
Conversion Index: -	Data Type: Uint8	Change during operation: True

The 2 solid-state digital outputs are common for terminals 27 and 29. Set the I/O function for terminal 27 in *parameter 5-01 Terminal 27 Mode*, and set the I/O function for terminal 29 in *parameter 5-02 Terminal 29 Mode*. The following are new options:

Option Number	Option Name	Description
[178]	RS Flipflop 8	
[179]	RS Flipflop 9	

Parameter 5-31: Terminal 29 Digital Output

Table 14: Parameter Information

5-30: Terminal 27 Digital Output		
Default Value: <i>Off</i>	Parameter Type: Option	4-setup: <i>All set-ups</i>
Conversion Index: -	Data Type: Uint8	Change during operation: True

The 2 solid-state digital outputs are common for terminals 27 and 29. Set the I/O function for terminal 27 in *parameter 5-01 Terminal 27 Mode*, and set the I/O function for terminal 29 in *parameter 5-02 Terminal 29 Mode*. The following are new options:

Option Number	Option Name	Description
[178]	RS Flipflop 8	
[179]	RS Flipflop 9	

Parameter 5-32: Term X30/6 Digi Out (MCB 101)

Table 15: Parameter Information

5-32: Term X30/6 Digi Out (MCB 101)		
Default Value: <i>No operation</i>	Parameter Type: Option	4-setup: All set-ups
Conversion Index: -	Data Type: Uint8	Change during operation: True

The 2 solid-state digital outputs are common for terminals 27 and 29. Set the I/O function for terminal 27 in *parameter 5-01 Terminal 27 Mode*, and set the I/O function for terminal 29 in *parameter 5-02 Terminal 29 Mode*. The following are new options:

Option Number	Option Name	Description
[178]	RS Flipflop 8	
[179]	RS Flipflop 9	

2.2.2 5-4*: Relays

Parameter 5-40: Function Relay

Table 16: Parameter Information

5-40: Function Relay		
Default Value: <i>No operation</i>	Parameter Type: Option	4-setup: All set-ups
Conversion Index: -	Data Type: Uint8	Change during operation: True

Select an option to configure the timing and the output functions for the relays. The following are new options:

Option Number	Option Name	Description
[66]	Comparator 6	
[67]	Comparator 7	
[68]	Comparator 8	
[69]	Comparator 9	
[76]	Logic Rule 6	
[77]	Logic Rule 7	
[78]	Logic Rule 8	
[79]	Logic Rule 9	

Option Number	Option Name	Description
[178]	RS Flipflop 8	
[179]	RS Flipflop 9	

2.3 Parameters: 6-** Analog In/Out

The section describes the new parameters and options for parameter group 6.

2.3.1 6-5* Analog Output 1

6-50: Terminal 42 Output

Table 17: Parameter Information

6-50: Terminal 42 Output		
Default Value: <i>No operation</i>	Parameter Type: Option	4-setup: All set-ups
Conversion Index: -	Data Type: Uint8	Change during operation: True

Select the function of terminal 42 as an analog current output. Depending on the selection, the output is either a 0–20 mA or 4–20 mA output. When the option does not specifically mention the current output, consider the output as 0-20 mA. The current value can be read out in the LCP in *parameter 16-65 Analog Output 42 [mA]*. The following options are new:

Option Number	Option Name	Description
[149]	Torq.% lim 4-20mA	
[139]	Bus ctrl	
[140]	Bus ctrl 4-20mA	
[141]	Bus ctrl t.o.	
[147]	Main act val	
[158]	Motor Volt.	

2.3.2 6-6* Analog Output 2 MCB 101

Parameter 6-60: Terminal X30/8 Output

Table 18: Parameter Information

6-60: Terminal X30/8 Output		
Default Value: <i>No operation</i>	Parameter Type: Option	4-setup: All set-ups
Conversion Index: -	Data Type: Uint8	Change during operation: True

Analog outputs are either current outputs 0–20 mA or 4–20 mA. When the option does not specifically mention the current output, consider the current output as 0-20 mA. Common terminal (terminal X30/8) is the same terminal and electrical potential for analog common connection. Resolution on analog output is 12 bit. The following are new options:

Option Number	Option Name	Description
[117]	Shaft Power	
[118]	Shaft Power 4-20mA	
[139]	Bus ctrl	
[140]	Bus ctrl 4-20mA	

Option Number	Option Name	Description
[141]	Bus ctrl t.o.	
[147]	Main act val	
[148]	Main act val 4-20mA	
[158]	Motor Volt.	
[159]	Motor Volt. 4-20mA	

2.3.3 6–7* Analog Output 3 MCB 113

Parameter 6–70: Terminal X45/1 Output

Table 19: Parameter Information

6-70: Terminal X45/1 Output		
Default Value: <i>No operation</i>	Parameter Type: Option	4-setup: All set-ups
Conversion Index: -	Data Type: Uint8	Change during operation: True

Select the function of terminal X45/1 as an analog current output. When the option does not specifically mention the current output, consider the current output as 0-20 mA. The following are new options:

Option Number	Option Name	Description
[134]	Torq.% lim 4-20mA	
[139]	Bus ctrl	
[140]	Bus ctrl 4-20mA	
[141]	Bus ctrl t.o.	
[147]	Main act val	
[158]	Motor Volt.	

2.4 Parameters: 8-** Communications and Options

2.4.1 8-1* Ctrl. Word Settings

Parameter 8–10: Control Word Profile

Table 20: Parameter Information

8-10: Control Word Profile		
Default Value: <i>Normal Operation</i>	Parameter Type: Option	4-setup: All set-ups
Conversion Index: -	Data Type: Uint8	Change during operation: True

The following are new options:

Option Number	Option Name	Description
[7]	CANopen DSP 402 (vl)	

Parameter 8–13: Configurable Status Word STW

Table 21: Parameter Information

8-13: Configurable Status Word STW		
Default Value: <i>No operation</i>	Parameter Type: Option	4-setup: All set-ups
Conversion Index: -	Data Type: Uint8	Change during operation: True

This is an array parameter with 16 elements, 1 element for each bit in range 0–15. Elements 5 and 11–15 are configurable. The following are new options:

Option Number	Option Name	Description
[29]	Protection Mode	

2.4.2 8-2* Counters

Parameter 8-20: Invalid Memory Write Counter

Table 22: Parameter Information

8-20: Invalid Memory Write Counter		
Default Value: 0	Parameter Type: Range (0 - 65535)	4-setup: 1 set-up
Conversion Index: -	Data Type: Uint16	Change during operation: True

2.4.3 8-4* FC MC Protocol Set

Parameter 8-41: Parameters for Signals

Table 23: Parameter Information

8-41: Parameters for Signals		
Default Value: <i>None</i>	Parameter Type: Option	4-setup: All set-ups
Conversion Index: -	Data Type: Uint16	Change during operation: False

The following are new options:

Option Number	Option Name	Description
[702]	Speed PID Proportional Gain	
[703]	Speed PID Integral Time	
[708]	Speed PID Feed Forward Factor	
[1688]	Fieldbus Torque FF	
[1826]	Fieldbus Sync. Delta REF	
[1899]	Speed PID Torque FF. [Nm]	

2.5 Parameters 13-** Smart Logic Control

2.5.1 13-0* SLC Settings

Parameter 13-01: Start Event

Table 24: Parameter Information

13-01: Start Event		
Default Value: <i>ExpressionLimit</i>	Parameter Type: Option	4-setup: 2 set-ups

13-01: Start Event		
Conversion Index: -	Data Type: Uint8	Change during operation: True

Parameters for configuring the timing and the output functions for the relays. The following are new options:

Option Number	Option Name	Description
[228]	Comparator 6	
[229]	Comparator 7	
[230]	Comparator 8	
[231]	Comparator 9	
[232]	Logic Rule 6	
[233]	Logic Rule 7	
[234]	Logic Rule 8	
[235]	Logic Rule 9	
[238]	RS Flipflop 8	
[239]	RS Flipflop 9	

Parameter 13-02: Stop Event

Table 25: Parameter Information

13-02: Stop Event		
Default Value: <i>ExpressionLimit</i>	Parameter Type: Option	4-setup: 2 set-ups
Conversion Index: -	Data Type: Uint8	Change during operation: True

Select the boolean (true or false) input to deactivate smart logic control. The following are new options:

Option Number	Option Name	Description
[240]	SL digital output A	
[241]	SL digital output B	
[242]	SL digital output C	
[243]	SL digital output D	
[244]	SL digital output E	
[245]	SL digital output F	

2.5.2 13-1* Comparators

Parameter 13-10: Alert Trigger

Table 26: Parameter Information

13-10: Comparator Operand		
Default Value: <i>ExpressionLimit</i>	Parameter Type: Option	4-setup: 2 set-ups
Conversion Index: -	Data Type: Uint8	Change during operation: True

The following are new options:

Option Number	Option Name	Description
[136]	RS Flipflop 0	
[137]	RS Flipflop 1	
[138]	RS Flipflop 2	
[139]	RS Flipflop 3	
[140]	RS Flipflop 4	
[141]	RS Flipflop 5	
[142]	RS Flipflop 6	
[143]	RS Flipflop 7	
[144]	RS Flipflop 8	
[145]	RS Flipflop 9	

Parameter 13-15: RS-FF Operand S

Table 27: Parameter Information

13-15: RS-FF Operand S		
Default Value: <i>ExpressionLimit</i>	Parameter Type: Option	4-setup: 2 set-ups
Conversion Index: -	Data Type: Uint8	Change during operation: True

Select the boolean (true or false) input to deactivate smart logic control. The following are new options:

Option Number	Option Name	Description
[240]	SL digital output A	
[241]	SL digital output B	
[242]	SL digital output C	
[243]	SL digital output D	
[244]	SL digital output E	
[245]	SL digital output F	

Parameter 13-16: RS-FF Operand R

Table 28: Parameter Information

13-16: RS-FF Operand R		
Default Value: <i>False</i>	Parameter Type: Option	4-setup: 2 set-ups
Conversion Index: -	Data Type: Uint8	Change during operation: False

Select the boolean (true or false) input to deactivate smart logic control. The following are new options:

Option Number	Option Name	Description
[240]	SL digital output A	
[241]	SL digital output B	

Option Number	Option Name	Description
[242]	SL digital output C	
[243]	SL digital output D	
[244]	SL digital output E	
[245]	SL digital output F	

2.5.3 13-4* Logic Rules

Parameter 13-40: Logic Rule Boolean 1

Table 29: Parameter Information

13-40: Logic Rule Boolean 1		
Default Value: <i>False</i>	Parameter Type: Option	4-setup: 2 set-ups
Conversion Index: -	Data Type: Uint8	Change during operation: False

Select the first boolean (true or false) input for the selected logic rule. The following are new options:

Option Number	Option Name	Description
[240]	SL digital output A	
[241]	SL digital output B	
[242]	SL digital output C	
[243]	SL digital output D	
[244]	SL digital output E	
[245]	SL digital output F	

Parameter 13-42: Logic Rule Boolean 2

Table 30: Parameter Information

13-42: Logic Rule Boolean 2		
Default Value: <i>False</i>	Parameter Type: Option	4-setup: 2 set-up
Conversion Index: -	Data Type: Uint8	Change during operation: False

Select the 2nd boolean (true or false) input for the selected logic rule. The following are new options:

Option Number	Option Name	Description
[240]	SL digital output A	
[241]	SL digital output B	
[242]	SL digital output C	
[243]	SL digital output D	
[244]	SL digital output E	
[245]	SL digital output F	

Parameter 13-44: Logic Rule Boolean 3

Table 31: Parameter Information

13-44: Logic Rule Boolean 3		
Default Value: <i>False</i>	Parameter Type: Option	4-setup:
Conversion Index: -	Data Type: Uint8	Change during operation: False

Select the 3rd boolean (true or false) input for the selected logic rule. The following are new options:

Option Number	Option Name	Description
[240]	SL digital output A	
[241]	SL digital output B	
[242]	SL digital output C	
[243]	SL digital output D	
[244]	SL digital output E	
[245]	SL digital output F	

For more information on the parameter, see VLT programming guide.

2.5.4 13-5* States

Parameter 13-51: SL Controller Event

Table 32: Parameter Information

13-51: SL Controller 1 Event		
Default Value: <i>False</i>	Parameter Type: Option	4-setup: 2 set-ups
Conversion Index: -	Data Type: Uint8	Change during operation: False

Select the boolean input (true or false) to define the smart logic controller event. The following are new options:

Option Number	Option Name	Description
[240]	SL digital output A	
[241]	SL digital output B	
[242]	SL digital output C	
[243]	SL digital output D	
[244]	SL digital output E	
[245]	SL digital output F	

Parameter 13-53: SL Controller 2 Event

Table 33: Parameter Information

13-53: SL Controller 2 Event		
Default Value: <i>False</i>	Parameter Type: Option	4-setup: 2 set-ups
Conversion Index: -	Data Type: Uint8	Change during operation: False

The following are new options:

Option Number	Option Name	Description
[240]	SL digital output A	
[241]	SL digital output B	
[242]	SL digital output C	
[243]	SL digital output D	
[244]	SL digital output E	
[245]	SL digital output F	

Parameter 13-55: SL Controller 3 Event

Table 34: Parameter Information

13-55: SL Controller 3 Event		
Default Value: <i>False</i>	Parameter Type: Option	4-setup: 2 set-ups
Conversion Index: -	Data Type: Uint8	Change during operation: False

Select the boolean (true or false) input to deactivate smart logic control. The following are new options:

Option Number	Option Name	Description
[240]	SL digital output A	
[241]	SL digital output B	
[242]	SL digital output C	
[243]	SL digital output D	
[244]	SL digital output E	
[245]	SL digital output F	

Parameter 13-57: SL Controller 4 Event

Table 35: Parameter Description

13-57: SL Controller 4 Event		
Default Value: <i>False</i>	Parameter Type: Option	4-setup: 2 set-ups
Conversion Index: -	Data Type: Uint8	Change during operation: False

Select the boolean (true or false) input to deactivate smart logic control. The following are new options:

Option Number	Option Name	Description
[240]	SL digital output A	
[241]	SL digital output B	
[242]	SL digital output C	
[243]	SL digital output D	
[244]	SL digital output E	
[245]	SL digital output F	

2.6 Parameters: 14-** Special Functions

The section describes new parameters and options for parameter group 14.

2.6.1 14-1* Mains On/Off

Parameter 14-12: Response to Mains Imbalance

Table 36: Parameter Information

14-12: Response to Mains Imbalance		
Default Value: <i>Trip Lock</i>	Parameter Type: Option	4-setup: <i>All set-ups</i>
Conversion Index: -	Data Type: Uint8	Change during operation: True

Operation under severe main imbalance conditions reduces lifetime of the motor. Conditions are considered severe if the motor is operated continuously near nominal load (for example, a pump or a fan running near full speed). Select the level of operation when main imbalance conditions occur. Options [5] - [7] is based on a principle which ensures detection of a missing mains phase within 2 seconds, and responds according to the selection. See *parameter 14-17 Fast Mains Phase Loss Level* and *parameter 14-18 Fast Mains Phase Loss Min Power*. Settings in *Parameter 0-03 Regional settings* should match actual grid frequency to avoid false alarms. A minimum load on the drive of 2% of nominal power is required for detection of missing mains phase. The following are new options:

Option Number	Option Name	Description
[0]	Trip Lock	Trip lock upon mains phase imbalance
[1]	Warning	Warning is issued upon mains phase imbalance
[2]	Disabled	Mains failure detection disabled.
[3]	Derate	Derates upon mains phase imbalance.
[4]	Trip	Trips the frequency converter.
[5]	Fast Trip Lock	Trip lock when a motorphase is missing.
[6]	Fast Trip	Trip when a motorphase is missing.
[7]	Fast Warning	Warning when a motorphase is missing.

Parameter 14-17: Fast Mains Phase Loss Level

Table 37: Parameter Information

14-17: Fast Mains Phase Loss Level		
Default Value: <i>100%</i>	Parameter Type: Range (0-500)	4-setup: <i>1 set-up</i>
Conversion Index: -	Data Type: Uint16	Change during operation: True

Set the level for activation of main phase loss trip or warning operation. Notice setting a lower value than the default value may cause false alarms as sensitivity increases.

Parameter 14-18: Fast Mains Phase Loss Min Power

Table 38: Parameter Information

14-18: Fast Mains Phase Loss Min Power		
Default Value: <i>2%</i>	Parameter Type: Range (0-100)	4-setup: <i>1 set-up</i>
Conversion Index: 0	Data Type: Uint16	Change during operation: True

Set the minimum power level (% of Nominal power) at which the warning or trip operation specified in *parameter 14-12 Response to Mains Imbalance* should be activated.

N O T I C E

A minimum load of 2% is a prerequisite for Fast Mains Phase Loss function.

2.6.2 14-3* Current Limit Control

Parameter 14-38: Field Weakening Controller Gain

Table 39: Parameter Information

14-38: Field Weakening Controller Gain		
Default Value: 20%	Parameter Type: Range (0 - 100 %)	4-setup: All set-ups
Conversion Index: 0	Data Type: Uint16	Change during operation: True

Set the integral gain for field weakening controller.

2.6.3 14-5* Environment

AMA and Motor Filters

The following table details the recommended AMA options when motor filters are connected between drive and motor. AMA is independent of the selection made in *parameter 1-00 Configuration Mode* and *parameter 1-01 Motor Control Principle*.

Table 40: Motor and Filter Types

Motor Construction	Filter Type	
	MCC102 du/dt filters	MCC101 (Sine-wave filters) and MCC201 (All-mode filters)
	Valid P1-29 AMA options	
ASM and SPM	[1] Complete AMA	[2] Reduced AMA
	[2] Reduced AMA	[4] Enable Reduced AMAII
	[4] Enable Reduced AMAII	-
IPM	[1] Complete AMA	[2] Reduced AMA
	[2] Reduced AMA	AMA II not available
	AMA II not available	-

Parameter 14-55: Output Filter

Table 41: Parameter Information

Default Information		
Default Value: No filter	Parameter Type: Option	4-setup: All setups
Conversion Index: -	Data Type: -	Change during operation: False

Select the type of connected output filter.

⚠ C A U T I O N ⚠

OVERHEATING OF FILTER OR AC DRIVE

Incorrect selection of *parameter 14-55* can lead to overheating and cause equipment damage and personal injury.

- Set the parameter to connected output filter.

Table 42: Options

Option	Name	Description
[0]	No filter	Set the parameter when VLT® MCC 102 du/dt filters or VLT® MCC 105 high-frequency common-mode filters are connected to the drive.
[1]	Sine-wave filter	<p style="text-align: center;">NOTICE</p> <p>COMPATIBILITY SETTING Set the option to support backward compatibility with the VLT 5000-8000 Series Drives.</p> <ul style="list-style-type: none"> Do not use the setting when VLT® MCC 101 SINE-WAVE FILTERS AND VLT® MCC 201 ALL-MODE FILTERS are connected. <p>Use the setting for backward compatibility purposes. Set <i>parameter 14-56 Capacitance Output Filter</i> and <i>parameter 14-57 Inductance Output Filter</i>. Setting the parameter does not limit the range of the switching frequency.</p>
[2]	Sine-wave filter fixed	<p style="text-align: center;">NOTICE</p> <p>SINE-WAVE FILTER FIXED SETTING Ensures the filter is operated within the safe range of switching frequencies.</p> <ul style="list-style-type: none"> Use the setting only for VLT® MCC 101 SINE WAVE-FILTERS. <p>On setting the option for VLT® MCC 101 Sine-wave filters, the parameter sets a minimum allowed limit to the switching frequency and ensures the filter is operated within the safe range of switching frequencies. The option supports all control principle operations of the filter. Set the <i>parameter 14-56 Capacitance Output Filter</i> and <i>parameter 14-57 Inductance Output Filter</i>. Setting the option allows the modulation pattern to be set to stator flux asynchronous vector modulation (SFAVM) which reduces the acoustic switching noise from the filter.</p>
[5]	All-mode filter	<p style="text-align: center;">NOTICE</p> <p>ALL-MODE FILTER SETTING Enables all-mode filter operating condition and ensures the filter is operated within the safe range of switching frequencies.</p> <ul style="list-style-type: none"> Use the setting only for VLT® MCC 201 ALL-MODE FILTERS. <p>On setting the option for VLT® MCC 201 All-mode filter, the parameter enables all-mode filter operating conditions which includes settings for a minimum allowed limit to the switching frequency and ensures the filter is operated within the safe range of switching frequencies. The option supports all control principle operations of the filter. Set the <i>parameter 14-56 Capacitance Output Filter</i> and <i>parameter 14-57 Inductance Output Filter</i>. Setting the option allows the modulation pattern to be set to stator flux asynchronous vector modulation (SFAVM) which reduces the acoustic switching noise from the filter.</p>

Parameter 14-56: Capacitance Output Filter

Table 43: Parameter Information

14-56: Capacitance Output Filter		
Default Value: 2.0 uF	Parameter Type: Range (0.1 - 6500)	4-setup: All setups

14-56: Capacitance Output Filter		
Conversion Index: -	Data Type: Uint16	Change during operation: False

Set the C_y (capacitance) value of the output filter in uF, when using VLT® MCC 101 Sine-wave filter and VLT® MCC 201 All-mode filter. See the filter product label for the capacitance value. The value is the equivalent star-connected capacitance of the filter. The parameter setting is only required when the drive is configured for flux control operations. It is not required to set the parameter for ASM motors in VVC+ control principle.

- When the filters are installed in parallel, enter the combined capacitance value of the paralleled filter. The value is the equivalent star-connected capacitance (C_y) of the filter multiplied by the number of installed paralleled filters.

NOTICE

SETTING FOR VLT® MCC 101 SINE-WAVE FILTER AND VLT® MCC 201 ALL-MODE FILTER
 Enables accurate flux compensation when *option [2] Flux sensorless* or *option [3] Flux w/ motor feedback* is selected in *parameter 1-01 Motor Control Principle*.

- Enter the correct capacitance value of the connected filter.

Parameter 14-57: Inductance Output Filter

Table 44: Parameter Information

14-57: Inductance Output Filter		
Default Value: 7	Parameter Type: Range (0.1 - 6500)	4-setup: All setup
Conversion Index: -	Data Type: UINT	Change during operation: False

Set the inductance of the output filter in mH, when using VLT® MCC 101 Sine-wave filter and VLT® MCC 201 All-mode filter. See the product label of the filter for the value of inductance. It is not required to set the parameter for ASM motors in VVC+ control principle.

- When filters are installed in parallel, enter the combined inductance value of the installed paralleled filters. The inductance value in the parameter is the inductance value of the filter divided by the number of paralleled filters.

NOTICE

SETTING FOR VLT® MCC 201 ALL-MODE AND VLT® MCC 101 SINE-WAVE FILTERS
 Enables accurate flux control compensation when *option [2] Flux sensorless* or *option [3] Flux w/ motor feedback* is selected in *parameter 1-01 Motor Control Principle*.

- Enter the correct inductance value of the connected filter.

2.7 Parameters: 15-** Drive Information

2.7.1 15-1* Data Log Settings

Parameter 15-17: Service Log Trigger Alarm

Table 45: Parameter Information

15-17: Service Log Trigger Alarm		
Default Value: 0	Parameter Type: Range (0 - 9999)	4-setup: All set-ups
Conversion Index: 0	Data Type: Uint16	Change during operation: True

The service log is triggered by a set of factory defined critical alarms. Using the parameter, an additional alarm to trigger the service log can be defined. The service log registers 11 parameters. 8 parameters are fixed and 3 parameters are user-defined. The 3 user-defined parameters can be configured using the display line parameters *0-20 Display Line 1.1 Small*, *0-21 Display Line 1.2 Small* and *0-22 Display Line 1.3 Small*. All 11 parameters are logged upon a trigger event.

2.8 Parameters: 16-** Data Readouts

2.8.1 16-8* Fieldbus & FC Port

Parameter 16-88: Fieldbus Torque FF

Table 46: Parameter Information

16-88: Fieldbus Torque FF.		
Default Value: 0	Parameter Type: Range (-200 - 200)	4-setup: 1 set-up
Conversion Index: 0	Data Type: N2	Change during operation: True

A PCD write reference parameter. The parameter allows the PLC to adjust the Torque FF over the fieldbus continuously as percentage of motor nominal torque *parameter 1-26 Motor Cont. Rated Torque*.

2.9 Parameters: 18-** Parameter Log

The section describes all the new parameters and choices for parameter group 18.

2.9.1 18-1* Parameter Log

Parameter 18-13: Parameter Number

Table 47: Parameter Information

18-13: Parameter Number		
Default Value: 0 N/A	Parameter Type: Option	4-setup: All set-ups
Conversion Index: 0	Data Type: Uint16	Change during operation: False

Shows the parameter which is most recently changed. Index 0 shows the latest change in parameter.

Parameter 18-14: Parameter Index

Table 48: Parameter Information

18-14: Parameter Index		
Default Value: N/A	Parameter Type: N/A	4-setup: All set-ups
Conversion Index: -	Data Type: Uint16	Change during operation: False

This parameter shows the index of the parameter which was changed.

Parameter 18-15: Change Time

Table 49: Parameter Information

18-15: Change Time		
Default Value: Size related	Parameter Type: Range	4-setup: All set-ups
Conversion Index: 0	Data Type: TimeOfDay	Change during operation: False

Shows the date and time stamp when a parameter was most recently changed. It is recommended to set the time and date in the drive to ensure the right time is logged.

Parameter 18-16: Operating Hours

Table 50: Parameter Information

18-16: Operating Hours		
Default Value:0	Parameter Type: Range (0 - 2147483647)	4-setup: All set-ups
Conversion Index: 0	Data Type: Uint32	Change during operation: False

Shows operating hours of the drive at the instance when the parameter was changed.

Parameter 18-17: Running Hours

Table 51: Parameter Information

18-17: Running Hours		
Default Value:0	Parameter Type: Range (0 - 2147483647)	4-setup: All set-ups
Conversion Index: 0	Data Type: Uint32	Change during operation: False

Shows running hours of the motor when the parameter is changed.

Parameter 18-18: Value Before Change as Integer

Table 52: Parameter Information

18-18: Value before change		
Default Value: 0	Parameter Type: Range (-2147483648 - 2147483647)	4-setup: All set-ups
Conversion Index: 0	Data Type: Int32	Change during operation: False

Shows the previous value of the parameter as integer, without scaling or unit conversion. The parameter only shows integer data.

Parameter 18-19: Value Before Change

Table 53: Parameter Information

Default Parameter		
Default Value: Size related	Parameter Type: Range (0-30)	4-setup: All set-ups
Conversion Index: 0	Data Type: VisStr[30]	Change during operation: False

Shows the previous value of the parameter with units. Only applicable for integer values.

2.9.2 18-9* PID Readouts

Parameter 18-99: Speed PID Torque FF. [Nm]

Table 54: Parameter Information

18-99: Speed PID Torque FF. [Nm]		
Default Value: 0 Nm	Parameter Type: Range (-200000000 - 200000000)	4-setup: All set-ups
Conversion Index: -1	Data Type: Int32	Change during operation: True

Readout of the total command torque feed forward in Nm unit. The parameter shows the sum of 16-88: *Fieldbus Torque FF.* and parameter 1-69 *Maximum Inertia* * parameter 7-08 *Speed PID Feed Forward Factor*.

2.10 Parameters: 22-** Appl. Functions

Parameter 22-03: Delay for Start Command

Table 55: Parameter Information

22-03: Delay for Start Command		
Default Value: 0 ms	Parameter Type: Range (0 - 100 ms)	4-setup: All set-ups
Conversion Index: -3	Data Type: Uint16	Change during operation: True

Set the time to delay the start command.

2.11 Parameters: 36-** Programmable I/O

The chapter describes parameters for parameter group 36.

2.11.1 36-4* Output X49/7

Parameter 36-40: Terminal X49/7 Analogue Output

Table 56: Parameter Information

36-40: Terminal X49/7 Analogue Output		
Default Value: <i>No operation</i>	Parameter Type: Option	4-setup: <i>All set-ups</i>
Conversion Index: -	Data Type: Uint8	Change during operation: True

The following are new options:

Option Number	Option Name	Description
[117]	Shaft Power	
[119]	Torque % lim	
[139]	Bus ctrl	
[141]	Bus ctrl t.o.	
[147]	Main act val	
[158]	Motor Volt.	

2.11.2 36-5* Output X49/9

Parameter 36-50: Terminal X49/9 Analogue Output

Table 57: Parameter Information

36-50: Terminal X49/9 Analogue Output		
Default Value: <i>None</i>	Parameter Type: Option	4-setup: <i>All set-ups</i>
Conversion Index: -	Data Type: Uint8	Change during operation: True

The following are new options:

Option Number	Option Name	Description
[117]	Shaft Power	
[119]	Torque % lim	
[139]	Bus ctrl	
[141]	Bus ctrl t.o.	
[147]	Main act val	
[158]	Motor Volt.	

2.11.3 36-6* Output X49/11

Parameter 36-60: Terminal X49/11 Analogue Output

Table 58: Parameter Information

36-60: Terminal X49/11 Analogue Output		
Default Value: <i>No operation</i>	Parameter Type: Option	4-setup: <i>All set-ups</i>
Conversion Index: -	Data Type: Uint8	Change during operation: True

The following options are new:

Option Number	Option Name	Description
[117]	Shaft Power	
[119]	Torque % lim	
[139]	Bus ctrl	
[141]	Bus ctrl t.o.	
[147]	Main act val	
[158]	Motor Volt.	

2.12 Parameters: 50-** License

Parameter 50-00: License Installed

Table 59: Parameter Information

50-00: License Installed		
Default Value: N/A	Parameter Type: N/A	4-setup: All set-ups
Conversion Index: 0	Data Type: VisStr[40]	Change during operation: False

Shows all the licenses activated in the drive.

Parameter 50-01: License Code

Table 60: Parameter Information

50-01: License Code		
Default Value: N/A	Parameter Type: N/A	4-setup: 1 set-up
Conversion Index: -	Data Type: VisStr[19]	Change during operation: True

Enter the license code provided by Danfoss sales representative to activate licensed feature in the drive. The license code comprises of 16 alphanumeric characters in the format (XXXX-XXXX-XXXX-XXXX). When the license is accepted by the drive, the parameter is shown as 0000-0000-0000-0000.

NOTICE

Restart the drive, after entering the new license code. Parameters relevant for configuring the new feature(s) are now shown in the drive. The new type code is reflected in *parameter 15-45 Actual typecode string*. The original type code of the drive can be viewed in *parameter 15-44 Ordered typecode string*. The activated license is shown in *parameter 50-00 License Installed*.

The license code can also be set from the factory.

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