VACON® NX
AC DRIVES

DC/DC CONVERTER PROGRAMMING GUIDE

VACON®

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NOTE! You can download the English and French product manuals with applicable safety, warning and caution information from http://drives.danfoss.com/knowledge-center/technical-documentation/.

REMARQUE Vous pouvez télécharger les versions anglaise et française des manuels produit contenant l'ensemble des informations de sécurité, avertissements et mises en garde applicables sur le site http://drives.danfoss.com/knowledge-center/technical-documentation/ .

1. INTRODUCTION

This manual describes the DC/DC converter application software that can be used with Vacon NX products.

By default the control place (P3.1) of the DC/DC converter is keypad.

This application requires the NXP3 control board and the VB761D version.

The capacitor and voltage measurements are optional, depending on the process requirements. The measurement itself can be given via analogue input or trough fieldbus by the power management system. The measurement is used to smoothen the start, because the voltage control can be started at the correct level when it is known before start.

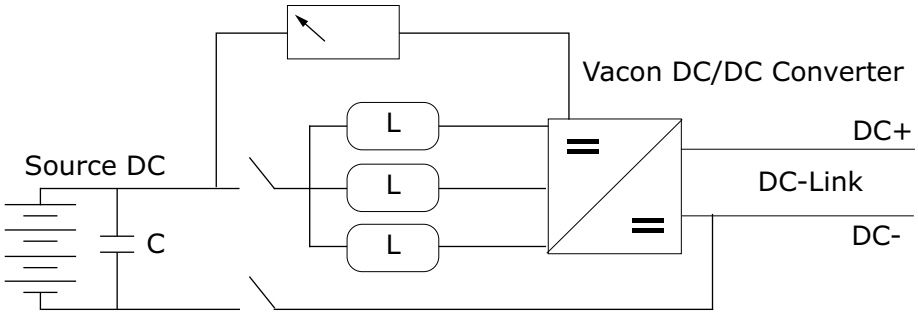

Figure 1. DC/DC connection

2. DC/DC APPLICATION COMPATIBILITY ISSUES

V015

-No compatibility issues.

NOTE! When updating the application, do not use the parameter downloading function of the NCDrive. Instead, upload the parameters from the drive and make a comparison to the old parameter file. The application is constantly developed, and the parameter default values are changed. If the parameters are directly downloaded to the drive, the improved default values will be lost.

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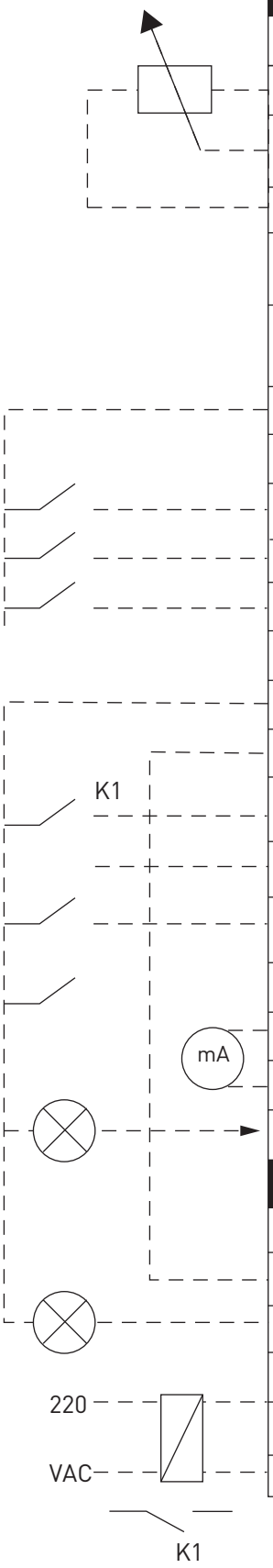
3. CONTROL I/O

Table 1. Default I/O configuration



Terminal		Signal	Description
NXOPTA1			
1	+10 Vref	Reference voltage output	Voltage for potentiometer, etc.
2	AI1+	Analogue input 1. Range 0-10 V, R_i= 200 Ω Range 0-20 mA, R_i= 250 Ω	Analogue input 1Input range selected by jumpers. Default range: Voltage 0–10 V
3	AI1-	I/O ground	Ground for reference and controls
4	AI2+	Analogue input 2. Range 0-10 V, Ri= 200 Ω Range 0-20 mA, Ri= 250 Ω	Analogue input 2 Input range selected by jumpers. Default range: Current 0 – 20 mA
5	AI2-		
6	+24V	Control voltage output	Voltage for switches, etc. max 0.1 A
7	GND	I/O ground	Ground for reference and controls
8	DIN1	Start Request Programmable G2.3.1	Contact closed = Start Request
9	DIN2	Programmable G2.3.1	No function defined as default
10	DIN3	Fault reset Programmable G2.3.1	Rising edge will reset active faults.
11	CMA	Common for DIN 1—DIN 3	Connect to GND or +24V
12	+24V	Control voltage output	Voltage for switches (see #6)
13	GND	I/O ground	Ground for reference and controls
14	DIN4	Programmable G2.3.1	Contact closed = MCC Closed
15	DIN5	Programmable G2.3.1	No function defined as default
16	DIN6	Programmable G2.3.1	No function defined as default
17	CMB	Common for DIN4—DIN6	Connect to GND or +24V
18	AOA1+	Analogue output 1 Programmable P2.3.1	Output range selected by jumpers. Range 0—20 mA. R_L, max. 500 Ω Range 0—10 V. R_L > 1 kΩ
19	AOA1-		
20	DOA1	Digital output Ready / Warning (Blinking)	Programmable Open collector, I≤50mA, U≤48 VDC
NXOPTA2			
21	RO 1	Relay output 1 Programmable G2.4.1	Switching capacity 24 VCD / 8 A 250 VAC / 8 A 125 VDC / 0.4 A
22	RO 1		
23	RO 1		
24	RO 2	Relay output 2	
25	RO 2		
26	RO 2		

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4. THE MONITORING VALUES OF THE DC/DC APPLICATION

This chapter includes lists of monitoring values within the respective monitoring value groups.

Instructions on how to read the parameter tables:

Code	= Location indication on the keypad; shows the operator the present parameter number
Parameter	= Name of the parameter
Min	= Minimum value of the parameter
Max	= Maximum value of the parameter
Unit	= Unit of the parameter value; given if available
Default	= Value preset by factory
Cust	= Customer's own setting
ID	= ID number of the parameter
	= The parameter value can only be changed after the drive has been stopped
	= It is possible to control the monitoring value from fieldbus by ID number

The manual also presents signals that are not normally visible for monitoring. These are not parameters or standard monitoring signals. These signals are marked with [a letter], e.g. [FW]MotorRegulatorStatus. See the list below.

[V]	= Normal monitoring signal
[P]	= Normal parameter in application
[FW]	= Firmware signal, can be monitored with NCDrive when the signal type “firmware” is selected.
[A]	= Application signal, can be monitored with NCDrive when the signal type “application” is selected.
[R]	= Reference type parameter on keypad
[F]	= Function. Signal is received as an output of function.
[DI]	= Digital input signal

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4.1 MONITORING VALUES

The monitoring values are actual values of parameters and signals as well as statuses and measurements. The monitoring values cannot be edited.

4.1.1 MONITORING VALUES 1

Table 2. Monitoring values 1

Code	Signal	Unit	ID	Description
V1.1	Source current	V	1104	
V1.2	Active Current Reference	%	1704	
V1.3	Active Current	%	1125	Active current of the drive in percentage of source nominal current > 0 Current from DC-Link To Source < 0 Current from Source to DC-Link
V1.4	Source voltage	V	1107	Run state calculated
V1.5	Source DC Ref.	%	606	Estimated run state
V1.6	Source DC Act.	%	1873	Run state calculated, scaled.
V1.7	DC-link current	%	1861	
V1.8	DC-link voltage	V	1108	Measured DC-link voltage in volts, filtered
V1.9	DC-link Act.	%	7	Percentage of source nominal voltage
V1.10	Unit temperature	°C	1109	Heatsink temperature
V1.11	Status word		43	

4.1.2 MONITORING VALUES 2

Table 3. Monitoring values 2

Code	Signal	Unit	ID	Description
V1.12.1	DC Voltage	V	44	Unfiltered
V1.12.2	Current	A	1113	Unfiltered
V1.12.3	IU Current	%	1851	
V1.12.4	IV Current	%	1852	
V1.12.5	IW Current	%	1868	
V1.12.6	Power kW	kW	1508	
V1.12.7	Discharging Limit	%	1855	
V1.12.8	Charging Limit	%	1854	
V1.12.9	Mindex	%	1856	
V1.12.10	Power	%	5	
V1.12.11	Voltage Meas.	%	1866	Connect external measurement to this monitoring value by analogue ID funtion.
V1.12.12	DIN Status Word 1		56	
V1.12.13	DIN Status Word 2		57	
V1.12.14	Measured Temperature Max		42	

4.1.3 FIELDBUS MONITORING VALUES

Table 4. Fieldbus Monitoring values

Code	Signal	Unit	ID	Description
V1.13.1	FB Control Word		1160	
V1.13.2	FB Status Word		68	
V1.13.3	Warning No.		74	
V1.13.4	Fault No.		37	
V1.13.5	Fault Word 1		1172	
V1.13.6	Fault Word 2		1173	
V1.13.7	Warning Word 1		1174	

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4.2 MONITORING VALUE DESCRIPTION

4.2.1 MONITORING VALUES 1

V1.1 SOURCE CURRENT A ID1104

The sum current of all phases.

V1.2 ACTIVE CURRENT REFERENCE % ID1704

Active current reference of the drive in percentage of Source Nominal Current.

Active Curr. Ref > 0: Current flow from drive DC-Link to source.

Active Curr. Ref < 0: Current flow from source to drive DC-Link.

V1.3 ACTIVE CURRENT % ID1125

Active current of the drive in percentage of Source Nominal Current

Active Current > 0: Current flow from drive DC-Link to source.

Active Current < 0: Current flow from source to drive DC-Link.

V1.4 SOURCE VOLTAGE V ID1107

Estimated source voltage. Value is update when drive is in run state.

V1.5 SOURCE DC REF. % ID606

DC reference for the DC source voltage. Percentage of Source Nom Voltage.

V1.6 SOURCE DC ACT. % ID1873

DC actual of the DC source in percentage of Source Nom Voltage. Value is update when drive is in run state.

V1.7 DC-LINK CURRENT % ID1861

Calculated DC-Link current in percentage.

V1.8 DC-LINK VOLTAGE V ID1108

Measured DC-link voltage in Vdc.

V1.9 DC-LINK ACT. % ID7

Measured DC-Link voltage in percentage of Source Nom Voltage.

V1.10 UNIT TEMPERATURE °C ID1109

The highest measured temperature of the drive.

V1.11 STATUS WORD ID43

The application Status Word combines different drive statuses to one data word.

Table 5. Application Status Word ID43

	FALSE	TRUE
b0		
b1	Not in ready state	Ready
b2	Not running	Running
b3	No fault	Fault
b4	Discharging disabled, low voltage	Discharging allowed
b5	Charging disabled, high voltage	Charging allowed
b6	Run disabled	Run enable
b7	No warning	Warning
b8		Charging switch closed (internal)
b9		Over voltage regulator active
b10		Under voltage regulator active
b11		
b12	No run request	Run request
b13		One or more regulators active
b14	Current control mode	Voltage control mode
b15	Discharging (Active current < 0)	Charging (Active current > 0)

4.2.2 MONITORING VALUES 2

V1.12.1 DC VOLTAGE V ID44

Unfiltered DC-link voltage in volts.

V1.12.2 CURRENT A ID1113

Unfiltered source DC current in amperes.

V1.12.3 IU CURRENT % ID1851

Unfiltered U phase current.

V1.12.4 IV CURRENT % ID1852

Unfiltered V phase current.

V1.12.5 IW CURRENT % ID1853

Unfiltered W phase current.

V1.12.6 POWER KW ID1508

Calculated kW value of the power flow.

V1.12.7 DISCHARGE LIMIT % ID1855

Percentage of source nom. current.

V1.12.8 CHARGING LIMIT % ID1854

Percentage of source nom. current.

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V1.12.9 MINDEX % ID1856

Voltage reference in percentage of the nominal voltage of the drive (500 V / 690 V).

V1.12.10 POWER % ID5

The power value in percentage scaled to Source Nominal Power.

V1.12.11 VOLTAGE MEAS. % ID1866

The measured source DC voltage. If source DC voltage is available by external measurement, make an ID connection to this monitoring value by fieldbus control or analogue input ID control. Scaling: 100.00 (10000) = Source Nominal Voltage.

V1.12.12 DIN STATUS 1 ID56

V1.12.13 DIN STATUS 2 ID57

Table 6. DIN Status

	DIN Status Word 1	DIN Status Word 2
b0	DIN: A.1	DIN: C.5
b1	DIN: A.2	DIN: C.6
b2	DIN: A.3	DIN: D.1
b3	DIN: A.4	DIN: D.2
b4	DIN: A.5	DIN: D.3
b5	DIN: A.6	DIN: D.4
b6	DIN: B.1	DIN: D.5
b7	DIN: B.2	DIN: D.6
b8	DIN: B.3	DIN: E.1
b9	DIN: B.4	DIN: E.2
b10	DIN: B.5	DIN: E.3
b11	DIN: B.6	DIN: E.4
b12	DIN: C.1	DIN: E.5
b13	DIN: C.2	DIN: E.6
b14	DIN: C.3	
b15	DIN: C.4	

V1.12.14 MEASURED TEMPERATURE °C ID 42

The maximum temperature of the measurement board that was used first.

4.2.3 FIELDBUS MONITORING VALUES

V1.13.1 FB CONTROL WORD ID 1160

The control word from fieldbus. The table below is for the bypass operation for such fieldbus boards that natively support this or can be parameterized to the bypass mode. See details from Chapter 7 Fieldbus profile for Vacon DC/DC converter.

Table 7. FB Control Word

FB Control Word ID1160		
Bit	Signal	Comment
B00	DC Charge	0 = 1 = Charge DC
B01		
B02		
B03	Run	0 = The DC/DC converter is stopped 1 = The DC/DC converter is started
B04		
B05		
B06		
B07	Reset	0 >1 Reset fault
B08		
B09		
B10	PLC Control	0 = Disable FB control 1 = Enable FB control
B11	FB DIN1 / WD	Can be used to control the RO or the parameters directly by ID number. G2.4.1
B12	FB DIN2	Can be used to control the RO or the parameters directly by ID number. G2.4.1
B13	FB DIN3	Can be used to control the RO or the parameters directly by ID number. G2.4.1
B14	FB DIN4	Can be used to control the RO or the parameters directly by ID number. G2.4.1
B15		

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V1.13.2 FB STATUS WORD ID 68

The status word to fieldbus. The table below is for the bypass operation for such fieldbus boards that natively support this or can be parameterized to the bypass mode.

Table 8. FB Status Word

FB Status Word ID68		
	Signal	Comment
B00	Ready On	0 = Drive not ready to switch on 1 = Drive ready to start charging
B01	Ready Run	0 = Drive not ready to run 1 = Drive ready and main contactor is ON
B02	Running	0 = Drive not running 1 = Drive in Run state (Modulating)
B03	Fault	0 = No active fault 1 = Faults active
B04	Run Enable Status	0 = Run Disabled. Drive in STOP state 1 = Run Enabled. Drive can be started.
B05		
B06	Inhibit	0 = Drive in operating condition. 1 = Run disabled or Drive in Fault state.
B07	Warning	0 = No active warnings 1 = Warnings active
B08		
B09	Fieldbus Control Active	0 = Fieldbus control not active 1 = Fieldbus control active
B10		
B11		
B12		
B13		
B14		
B15	WD Pulse	Feedback from FB Control Word B11

V1.13.3 WARNING NO. ID 74

The number of the last active warning.

V1.13.4 FAULT NO. ID 37

The number of the last active fault.

V1.13.5 FAULT WORD 1 ID 1172

Table 9. Fault Word 1

	FALSE	TRUE
b0		F1 Over current, F31 IGBT, F41 IGBT
b1		F2 Over Voltage
b2		F9 Under Voltage
b3		
b4		F3 Earth Fault
b5		
b6		F14 Unit Over temperature
b7		Temperature fault from measurements F56 PT100, F29 Thermistor
b8		
b9		
b10		
b11		F52 Keypad or OC communication fault
b12		F53 Fieldbus fault
b13		
b14		F54 Slot Communication fault
b15		F50 4 mA fault

V1.13.6 FAULT WORD 2 ID 1173

Table 10. Fault Word 2

	FALSE	TRUE
b0		
b1		
b2		
b3		
b4		
b5		
b6		F51 External fault
b7		
b8		
b9		F31 IGBT, F41 IGBT
b10		
b11		
b12		
b13		
b14		
b15		

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V1.3.5 WARNING WORD 1 ID 1174

Table 11. Warning Word 1

	WARNING	COMMENT
b0		
b1	W29 Thermistor	Not implemented
b2		
b3		
b4		
b5		
b6	F53 FB Warning Slot D	
b7		
b8	W14 Unit Temperature	
b9		
b10		
b11		
b12		
b13		
b14		
b15		

5. PARAMETER LISTS

5.1 BASIC PARAMETERS

Table 12. Basic parameters

Code	Parameter	Min	Max	Unit	Default	ID	Note
P2.1.1	Source Nom Current	0.0	Varies	A	Varies	113	Capacity of supply
P2.1.2	Source Nom Voltage	200	1099	V	Varies	110	
P2.1.3	Source Nom Power	0	32000	kW	0	116	
P2.1.4	Control Mode	0	1		0	1858	**0** = Current **1** = Voltage
P2.1.5	Identification	0	1		0	631	**0** = No Action **1** = Current, Meas, Offset

5.2 REFERENCE HANDLING

5.2.1 VOLTAGE REFERENCE

Table 13. Voltage reference handling

Code	Parameter	Min	Max	Unit	Default	ID	Note
P2.2.1.1	Voltage Reference	0	320	%	100	1462	
P 2.2.1.2	Drooping	0	100	%	0	620	
P 2.2.1.3	Voltage Reference Ramp Rate	-1	320	%/s	5	1867	
P2.2.1.4	Voltage Reference At Start	0	2		3	1864	**0** = Reference **1** = Start Voltage Reference **2** = Measurement **3** = 80%
P2.2.1.5	Start Voltage Reference	0	320	%	90	1865	

5.2.2 CURRENT REFERENCE

Table 14. Current reference handling

Code	Parameter	Min	Max	Unit	Default	ID	Note
P2.2.2.1	Current Reference	-150	150	%	0	1860	Common reference for all phases.
P 2.2.2.2.1	Phase Reference Mode	0	1		0	1859	**0** = Common **1** = Individual
P 2.2.2.2.2	IU Current Reference	-300	300	%	0	128	
P2.2.2.2.3	IV Current Reference	-300	300	%	0	129	
P2.2.2.2.4	IW Current Reference	-300	300	%	0	130	

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5.2.3 I/O REFERENCE HANDLING

Table 15. I/O reference handling

Code	Parameter	Min	Max	Unit	Default	ID	Note
P2.2.4.1	I/O Control Mode	0	2		0	1856	**0** = Control Mode P2.1.4 **1** = Current Control **2** = Voltage Control
P 2.2.4.2	Constant Reference 1	-320	320	%	0,0	1239	
P 2.2.4.3	Constant Reference 2	-320	320	%	0,0	1240	

5.3 INPUT SIGNALS

5.3.1 DIGITAL INPUTS

Table 16. Digital input parameters

Code	Parameter	Min	Max	Unit	Default	ID	Description
P2.3.1.1	Start Signal 1	0	59	DigIn	10	403	
P2.3.1.2	Run Enable	0	59	DigIn	1	407	
P2.3.1.3	Fault Reset	0	59	DigIn	12	414	
P2.3.1.4	External Fault	0	59	DigIn	0	405	
P2.3.1.5	Enable Constant Ref	0	E.10	DigIn	0	532	
P2.3.1.6	Constant Ref 1	0	E.10	DigIn	0	530	
P2.3.1.7	Constant Ref 2	0	E.10	DigIn	0	531	
P2.3.1.8	I/O Term Control	0	E.10	DigIn	0	409	
P2.3.1.9	Keypad Control	0	E.10	DigIn	0	410	
P2.3.1.10	Fieldbus Control	0	E.10	DigIn	0	411	
P2.3.1.11	DC CB State	0	E.10	DigIn	0	1453	
P2.3.1.12	Thermal Switch	0	E.10	DigIn	1	1179	

5.3.2 ANALOG INPUT 1

Table 17. Analog input 1

Code	Parameter	Min	Max	Unit	Default	ID	Note
P2.3.2.1	AI1 Signal Selection	0	59		0	377	
P2.3.2.2	AI1 Filter Time	0.000	32.000	s	0.000	324	
P2.3.2.3	AI1 Custom Minimum Setting	-160.00	160.00	%	0.00	321	
P2.3.2.4	AI1 Custom Maximum Setting	-160.00	160.00	%	100.00	322	
P2.3.2.5	AI1 Signal Inversion	0	1		0	387	
P2.3.2.6	AI1 Reference Scaling, Minimum Value	-32000	32000		0	303	

Table 17. Analog input 1

Code	Parameter	Min	Max	Unit	Default	ID	Note
P2.3.2.7	AI1 Reference Scaling, Maximum Value	-32000	32000		0	304	
P2.3.2.8	AI1 Controlled ID	0	10000		0	1507	

5.3.3 ANALOG INPUT 2

Table 18. Analog input 2

Code	Parameter	Min	Max	Unit	Default	ID	Note
P2.3.3.1	AI2 Signal Selection	0.1	E.10		0.1	388	
P2.3.3.2	AI2 Filter Time	0.000	32.000	s	0.000	329	
P2.3.3.3	AI2 Custom Minimum Setting	-160.00	160.00	%	0.00	326	
P2.3.3.4	AI2 Custom Maximum Setting	-160.00	160.00	%	100.00	327	
P2.3.3.5	AI2 Signal Inversion	0	1		0	398	
P2.3.3.6	AI2 Reference Scaling, Minimum Value	-32000	32000		0	393	
P2.3.3.7	AI2 Reference Scaling, Maximum Value	-32000	32000		0	394	
P2.3.3.8	AI2 Controlled ID	0	10000		0	1511	

5.3.4 ANALOG INPUT 3

NOTE! The selections marked in gray are not in use.

Table 19. Analog input 3

Code	Parameter	Min	Max	Unit	Default	ID	Note
P2.3.4.1	AI3 Signal Selection	0.1	E.10		0.1	141	
P2.3.4.2	AI3 Controlled ID	0	10000		0	1509	
P2.3.4.3	AI3 Custom Minimum Setting	-160.00	160.00	%	0.00	144	
P2.3.4.4	AI3 Custom Maximum Setting	-160.00	160.00	%	100.00	145	
P2.3.4.5	AI3 Signal Inversion	0	1		0	151	
P2.3.4.6	AI3 Reference Scaling, Minimum Value	-32000	32000		0	1037	
P2.3.4.7	AI3 Reference Scaling, Maximum Value	-32000	32000		0	1038	

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5.3.5 ANALOG INPUT 4

Table 20. Analog input 4

Code	Parameter	Min	Max	Unit	Default	ID	Note
P2.3.5.1	AI4 Signal Selection	0.1	E.10		0	152	
P2.3.5.2	AI4 Controlled ID	0	10000		0	1510	
P2.3.5.3	AI4 Custom Minimum Setting	-160.00	160.00	%	0.00	155	
P2.3.5.4	AI4 Custom Maximum Setting	-160.00	160.00	%	100.00	156	
P2.3.5.5	AI4 Signal Inversion	0	1		0	162	
P2.3.5.6	AI4 Reference Scaling, Minimum Value	-32000	32000		0	1039	
P2.3.5.7	AI4 Reference Scaling, Maximum Value	-32000	32000		0	1040	

5.4 OUTPUT SIGNALS

5.4.1 DIGITAL OUTPUTS

Table 21. Digital output parameters

Code	Parameter	Min	Max	Unit	Default	ID	Description
P2.4.1.1	Ready	0.1	E.10	DigOut		432	
P2.4.1.2	Running	0.1	E.10	DigOut		433	
P2.4.1.3	Fault	0.1	E.10	DigOut		434	
P2.4.1.4	Fault, Inverted	0.1	E.10	DigOut		435	
P2.4.1.5	Warning	0.1	E.10	DigOut		436	
P2.4.1.6	FB DIN 1 Par ID	0.1	E.10	DigOut		891	
P2.4.1.7	FB DIN 2 Par ID	0.1	E.10	DigOut		892	
P2.4.1.8	FB DIN 3 Par ID	0.1	E.10	DigOut		893	
P2.4.1.9	FB DIN 4 Par ID	0.1	E.10	DigOut		894	
P2.4.1.10	Charge DC	0.1	E.10	DigOut		1668	
P2.4.1.11	DC Ready	0.1	E.10	DigOut		1218	

5.4.2 ANALOG OUTPUT 1

Table 22. Analog Output 1 parameters

Code	Parameter	Min	Max	Unit	Default	ID	Description
P2.4.2.1	Iout 1 Signal	0.1	E.10	AnOUT		464	
P2.4.2.2	Iout 1 Content	0				307	**0** = 4 mA. **1** = ±2*Active Current
P2.4.2.3	Iout 1 Filter Time	0	10	s		308	
P2.4.2.4	Iout 1 Invert	0	1			309	
P2.4.2.5	Iout 1 Minimum	0	1			310	
P2.4.2.6	Iout 1 Scale	10	1000	%		311	
P2.4.2.7	Iout 1 Offset	-100	100	%		375	

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5.5 LIMIT SETTINGS

5.5.1 CURRENT LIMIT

Table 23. Current Limit

Code	Parameter	Min	Max	Unit	Default	ID	Note
P2.5.1.1	Current Limit	0	Varies	A	Varies	107	Total current limit
P2.5.1.2	Charging Limit	0	300	%	105	1290	A percentage of nom current
P2.5.1.2	Discharging Limit	0	300	%	105	1289	A percentage of nom current

5.5.2 UNDER VOLTAGE CONTROL FOR DC-LINK VOLTAGE

Table 24. Under voltage control for DC-link voltage

Code	Parameter	Min	Max	Unit	Default	ID	Note
P 2.5.2.1	Under Voltage Reference	0	320	%	65	1567	A percentage of the nominal DC-link voltage of the drive. 500 Vac unit: 675 Vdc 690 Vac unit: 931 Vdc
P 2.5.2.2	Under Voltage Droop	0	100	%	3	1863	
P2.5.2.3	Under Voltage Kp	0	32000		50	1468	
P2.5.2.4	Under Voltage Ti	0	32000		15	1409	
P2.5.2.5	Under Voltage Kp Add	0	32000		50	1425	

5.5.3 OVER VOLTAGE CONTROL FOR DC-LINK VOLTAGE

Table 25. Over voltage control for DC-link voltage

Code	Parameter	Min	Max	Unit	Default	ID	Note
P 2.5.3.1	Over Voltage Reference	0	320	%	118	1528	A percentage of the nominal DC-link voltage of the drive. 500 Vac unit: 675 Vdc 690 Vac unit: 931 Vdc
P 2.5.3.2	Over Voltage Droop	0	100	%	3	1862	
P2.5.3.3	Over Voltage Kp	0	32000		50	699	
P2.5.3.4	Over Voltage Ti	0	32000		15	698	
P2.5.3.5	Over Voltage Kp Add	0	32000		50	697	

5.5.4 SOURCE VOLTAGE

Table 26. Source voltage

Code	Parameter	Min	Max	Unit	Default	ID	Note
P2.5.4.1	Source Min Voltage	50.0	1100.0	Vdc	200/345	1893	Discharge limit
P2.5.4.2	Source Max Voltage	50.0	1100.0	Vdc	749/1099	1895	Charge limit
P2.5.4.3	Source Voltage Hysteresis	0.0	100.0	Vdc	5.0	1896	

5.6 DRIVE CONTROL PARAMETERS

Table 27. Drive control parameters

Code	Parameter	Min	Max	Unit	Default	ID	Description
P2.6.1	Switching Frequency	3.6	Varies	kHz	5.0	601	Switching frequency
P2.6.2	Control Options 1	0	65535		0	1707	
P2.6.3	DC/DC Options	0	65535	kHz	0	1463	
Identification G2.6.3							
P2.6.4.1	IU Offset	-32000	32000		10000	668	
P2.6.4.2	IV Offset	-32000	32000		0	669	
P2.6.4.3	IW Offset	-32000	32000		0	670	
P2.6.4.4	Source Resistance	0	10000		1	662	
System Test G2.6.12 (Vacon internal)							
P2.6.5.1	Modulation Limit	0	250		100	1515	
P2.6.5.2	Advanced Options 1	0	65535		0	1560	
P2.6.5.3	Advanced Options 2	0	65535		0	1561	
P2.6.5.4	Inverse Synch	0	1		0	1857	
P2.6.5.5	DCRip. Comp Kp	0	1000		0	1897	
P2.6.5.6	DCRip. Comp Phase	-360	360		0	1898	
P2.6.5.7	DCRip. Comp Freq	0	1000	Hz	300	1899	

5.7 MASTER FOLLOWER PARAMETERS

Code	Parameter	Min	Max	Unit	Default	ID	Description
P2.7.1	MF Mode	0	2		0	1324	
P2.7.2	Follower Ref Sel	0	1		0	1081	

5.8 DC CONTROL PARAMETERS

Table 28. DC control parameters

Code	Parameter	Min	Max	Unit	Default	ID	Description
P2.8.1	Current Control Kp	1.00	320.0	%	20.00	617	
P2.8.2	Current Control Ti	0.1	3200.0	ms	1.5	657	
P2.8.3	Voltage Control Kp	1	32000		200	1870	
P2.8.4	Voltage Control Ti	1	32000		50	1871	

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5.9 FIELDBUS PARAMETERS

Table 29. Fieldbus parameters

Code	Parameter	Min	Max	Unit	Default	ID	Description
P2.9.1	FB Actual Selection	0	10000		1125	1853	Choose monitoring data with parameter ID
P2.9.2	GSW ID	0	10000		68	897	
P2.9.3	Fieldbus Data Out 1 Selection	0	10000		0	852	
P2.9.4	Fieldbus Data Out 2 Selection	0	10000		0	853	
P2.9.5	Fieldbus Data Out 3 Selection	0	10000		0	854	
P2.9.6	Fieldbus Data Out 4 Selection	0	10000		0	855	
P2.9.7	Fieldbus Data Out 5 Selection	0	10000		0	856	
P2.9.8	Fieldbus Data Out 6 Selection	0	10000		0	857	
P2.9.9	Fieldbus Data Out 7 Selection	0	10000		0	858	
P2.9.10	Fieldbus Data Out 8 Selection	0	10000		0	859	
P2.9.11	FB Reference Selector	0	10000		0	1850	Choose controlled data with parameter ID
P2.9.12	Fieldbus Data In 1 Selection	0	10000		0	876	
P2.9.13	Fieldbus Data In 2 Selection	0	10000		0	877	
P2.9.14	Fieldbus Data In 3 Selection	0	10000		0	878	
P2.9.15	Fieldbus Data In 4 Selection	0	10000		0	879	
P2.9.16	Fieldbus Data In 5 Selection	0	10000		0	880	
P2.9.17	Fieldbus Data In 6 Selection	0	10000		0	881	
P2.9.18	Fieldbus Data In 7 Selection	0	10000		0	882	
P2.9.19	Fieldbus Data In 8 Selection	0	10000		0	883	
P2.9.20	State Machine	0	2		0	896	**0** = Basic **1** = Standard

5.10 PROTECTIONS (CONTROL KEYPAD)

5.10.1 GENERAL

Table 30. General protections parameters

Code	Parameter	Min	Max	Unit	Default	ID	Description
2.10.1.1	FB Communication	0	2		2	733	
2.10.1.2	Response To External Fault 1	0	3		2	701	
2.10.1.3	Max Charge Time	0.00	10.00	s	5.00	1522	Charging time limit when drive charging options are used.

5.10.2 TEMPERATURE SENSORS

Table 31. Temperature sensor parameters

Code	Parameter	Min	Max	Unit	Default	ID	Description
P2.10.2.1	No. Of Used Inputs On Board 1	0	5		0	739	**0** = Not used (ID write) **1** = Sensor 1 in use **2** = Sensors 1 & 2 in use **3** = Sensors 1 & 2 & 3 in use **4** = Sensors 2 & 3 in use **5** = Sensor 3 in use
P2.10.2.2	Response To Temperatue Fault	0	3		2	740	**0** = No response **1** = Warning **2** = Fault, stop acc. to 2.3.2 **3** = Fault, stop by coasting
P2.10.2.3	Board 1 Warning Limit	-30.0	200.0	°C	120.0	741	
P2.10.2.4	Board 1 Fault Limit	-30.0	200.0	°C	130.0	742	

5.10.3 THERMAL PROTECTION

Table 32. Thermal protection parameters

Code	Parameter	Min	Max	Unit	Default	ID	Description
P2.10.3.1	Response To Temperature Fault	0	3		2	740	
P2.10.3.2	Thermal Fault Delay	0	1800	s	0	707	

5.10.4 PROTECTION PARAMETERS

Table 33. Protection parameters

Code	Parameter	Min	Max	Unit	Default	ID	Description
P2.10.4	Fault Simulation	0	65535		0	1569	
P2.10.5	Reset Data Logger	0	1		0	1849	

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5.11 ID CONTROL FUNCTIONS

5.11.1 VALUE CONTROL

Table 34. Power reference input signal selection, G2.2.8

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.11.1.1	Control Input Signal ID	0	10000	ID	0		1580	
P2.11.1.2	Control Input Off Limit	-32000	32000		0		1581	
P2.11.1.3	Control Input On Limit	-32000	32000		0		1582	
P2.11.1.4	Control Output Off Value	-32000	32000		0		1583	
P2.11.1.5	Control Output On Value	-32000	32000		0		1584	
P2.11.1.6	Control Output Signal ID	0	10000	ID	0		1585	
P2.11.1.7	Control Mode	0	5		0		1590	**0** = SR ABS **1** = Scale ABS **2** = Scale INV ABS **3** = SR **4** = Scale **5** = Scale INV
P2.11.1.8	Control Output Filtering Time	0.000	32.000	s	0.000		1721	

5.11.2 DIN ID CONTROL 1

Table 35. DIN ID control parameters

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.11.2.1	ID Control DIN	0.1	E.10		0.1		1570	Slot board input no.
P2.11.2.2	Controlled ID	0	10000	ID	0		1571	Select ID that is controlled by digital input
P2.11.2.3	False Value	-32000	32000		0		1572	Value when DI is low
P2.11.2.4	True Value	-32000	32000		0		1573	Value when DI is high

5.11.3 DIN ID CONTROL 2

Table 36. DIN ID control parameters

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.11.3.1	ID Control DIN	0.1	E.10		0		1574	Slot board input no.
P2.11.3.2	Controlled ID	0	10000	ID	0		1575	Select ID that is controlled by digital input
P2.11.3.3	False Value	-32000	32000		0		1576	Value when DI is low
P2.11.3.4	True Value	-32000	32000		0		1577	Value when DI is high

5.11.4 DIN ID CONTROL 3

Table 37. DIN ID control parameters

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.11.4.1	ID Control DIN	0	E.10		0		1578	Slot board input no.
P2.11.4.2	Controlled ID	0	10000	ID	0		1579	Select ID that is controlled by digital input
P2.11.4.3	False Value	-32000	32000		0		1587	Value when DI is low
P2.11.4.4	True Value	-32000	32000		0		1588	Value when DI is high

5.12 KEYPAD CONTROL

Table 38. Keypad control parameters M3

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Description
P3.1	Control Place	0	4		2		125	**0** = Fieldbus **1** = I/O terminal **2** = Keypad (Default)
P3.2	License Key	0	65535		0		1995	

5.13 SYSTEM MENU (CONTROL KEYPAD: MENU M6)

For parameters and functions related to the general use of the frequency converter, such as application and language selection, customised parameter sets or information about the hardware and software, see the Vacon NX User's Manual.

5.14 EXPANDER BOARDS (CONTROL KEYPAD: MENU M7)

The M7 menu shows the expander and option boards attached to the control board and board-related information. For more information, see the Vacon NX User's Manual and Vacon I/O boards user manual.

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6. DESCRIPTION OF THE PARAMETERS

6.1 BASIC PARAMETERS

P2.1.1 SOURCE NOM CURRENT ID113

This parameter defines the current value that is used as the 100% current for e.g. charging current limit.

P2.1.2 SOURCE NOM VOLTAGE ID110

This parameter defines the absolute voltage value that is used as the 100 % voltage for e.g. the voltage reference.

P2.1.3 SOURCE NOM POWER ID116

This parameter is used for scaling the percentage power monitoring value.

P2.1.4 CONTROL MODE ID1858

This parameter is used to select the control mode of the drive.

0 = Current control mode

1 = Voltage control mode

P2.1.5 IDENTIFICATION ID631

This parameter is used to calibrate the current measurement.

0 = No Action

1 = Current measurement offset

When the identification is finished, the drive must be connected to the battery system or the used DC power source. There should also not be any load on the DC-link.

Select the identification run and give the DC/DC converter a start command within 20 seconds after the identification mode is selected.

6.2 REFERENCE HANDLING

6.2.1 VOLTAGE REFERENCE HANDLING

P2.2.1.1 DC VOLTAGE REFERENCE ID1462

Voltage reference in percentage of Source Nom Voltage.

P2.2.1.2 DROOPING ID620

Voltage reference drooping. Used when parallel DC/DC converters are used.

P2.2.1.3 VOLTAGE REFERENCE RAMP RATE ID1867

Voltage reference ramp rate in in percentage or in seconds.

P2.2.1.4 VOLTAGE REFERENCE AT START ID1864

This parameter is used to define how the voltage reference starting value is handled in a start. The start will be smoother when the value is close to the actual source voltage.

0 = Reference

Starting voltage is a directly given reference P2.2.1.1 Voltage Reference.

1 = V Ref Start

Starting voltage is defined by parameter P2.2.1.5 Start Voltage Reference and ramped to actual reference with set ramp rate.

2 = Measurement

Starting voltage is taken from measured voltage V1.12.11 Voltage Meas. ID1866. This monitoring value can be written by analogue ID function or from fieldbus.

3 = 80

Drive will start as a initial guess of 80% of source voltage.

P2.2.1.5 START VOLTAGE REFERENCE ID1865

The voltage value that is used for the initial start voltage when P2.2.1.4 Voltage Reference At Start is 1 / V Ref Start.

6.2.2 CURRENT REFERENCE HANDLING

P2.2.2.1 CURRENT REFERENCE ID1860

The active current reference of the drive in percentage of Source Nominal Current parameter.

Active Curr. Ref > 0: Current flow from drive DC-Link to source.

Active Curr. Ref < 0: Current flow from source to drive DC-Link.

P2.2.2.2.1 PHASE REFERENCE MODE ID1859

This parameter is used to select if the same current reference is used for all phases or if the current is controlled individually.

0 = Common

P: Current reference is used for all phases.

1 = Individual phase control

Each phase is controlled separately with G2.2.2.2 parameters.

Used when each phase have a separate DC source.

P2.2.2.2.2 IU CURRENT REFERENCE ID128

The U phase current reference on an individual mode.

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P2.2.2.2.3 IV CURRENT REFERENCE ID129

The V phase current reference on an individual mode.

P2.2.2.2.4 IW CURRENT REFERENCE ID130

The W phase current reference on an individual mode.

6.2.3 I/O REFERENCE HANDLING

P2.2.4.1 I/O CONTROL MODE ID1856

When forced control place is used, this parameter can be used to change the control mode.

0 = Control Mode P2.1.4

1 = Current control mode

Enable Constant Current Reference

The constant current reference, which is activated by digital input, also starts the drive directly at the reference. If other start commands are active, the constant reference is not activated. If the control mode is "voltage" by default, it is recommend to use the same input to change the control mode to "current" as is used for Enable Constant Current Reference.

P2.2.4.2 I/O CONSTANT REFERENCE 1 ID1239

Constant reference 1 activated by parameters ID530 and ID532.

P2.2.4.3 I/O CONSTANT REFERENCE 2 ID1240

Constant reference 2 activated by parameters ID530 and ID531.

6.3 INPUT SIGNALS

6.3.1 DIGITAL INPUTS

P2.3.1.1 START SIGNAL 1 ID403

The signal selection for the start/stop logic. This parameter is used to select the input for the Run Request signal.

P2.3.1.2 RUN ENABLE ID407

When the signal is inactive, the drive loses the READY status.

Contact open: the start of the drive disabled.

Contact closed: the start of the drive enabled.

P2.3.1.3 FAULT RESET ID414

Contact closed: all faults are reset. The rising edge will reset the faults.

P2.3.1.4 EXTERNAL FAULT ID405

Contact open: the fault (ID 51) is shown and the motor stopped. The function can be inverted by using the input inversion control.

P2.3.1.5 ENABLE CONSTANT REF ID532

The digital input is used to enable constant reference operation. When the reference digital input is given, the drive starts.

P2.3.1.6 CONSTANT REF 1 ID530

This digital input activates the constant reference 1 if the constant reference function is enabled by a digital input. NOTE! The function will start the drive without a separate start command.

P2.3.1.7 CONSTANT REF 2 ID531

This digital input activates the constant reference 2 if the constant reference function is enabled by a digital input. NOTE! The function will start the drive without a separate start command.

P2.3.1.8 I/O TERM CONTROL ID409

This digital input forces the control place to "I/O".

P2.3.1.9 KEYPAD CONTROL ID410

This digital input forces the control place to "keypad".

P2.3.1.10 FIELDBUS CONTROL ID411

This digital input forces the control place to "fieldbus".

P2.3.1.11 DC CB STATE ID1453

This digital input gives feedback from the DC circuit breaker.

P2.3.1.12 THERMAL SWITCH ID1179

This digital input gives information on any temperature monitoring. An inactive signal creates the selected response.

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6.3.2 ANALOG INPUTS 1-4

P2.3.2.1 AI1 SIGNAL SELECTION ID377

P2.3.3.1 AI2 SIGNAL SELECTION ID388

P2.3.4.1 AI3 SIGNAL SELECTION ID141

P2.3.5.1 AI4 SIGNAL SELECTION ID152

Connect the AI3/AI4 signal to the analogue input of your choice with this parameter. When the AI Signal Selection is set to 0.1, you can control the analog/analogue input monitoring variable from fieldbus. This is done by assigning the ID number of the process data input to a monitoring signal, which allows scaling in the drive side to the PLC input signals.

P2.3.2.2 ANALOG INPUT 1 SIGNAL FILTERING TIME ID324

P2.3.3.2 ANALOG INPUT 2 SIGNAL FILTERING TIME ID329

P2.3.4.2 ANALOG INPUT 3 SIGNAL FILTERING TIME ID1509

P2.3.5.2 ANALOG INPUT 4 SIGNAL FILTERING TIME ID1510

First order filtering is used for analog input signals 3 and 4.

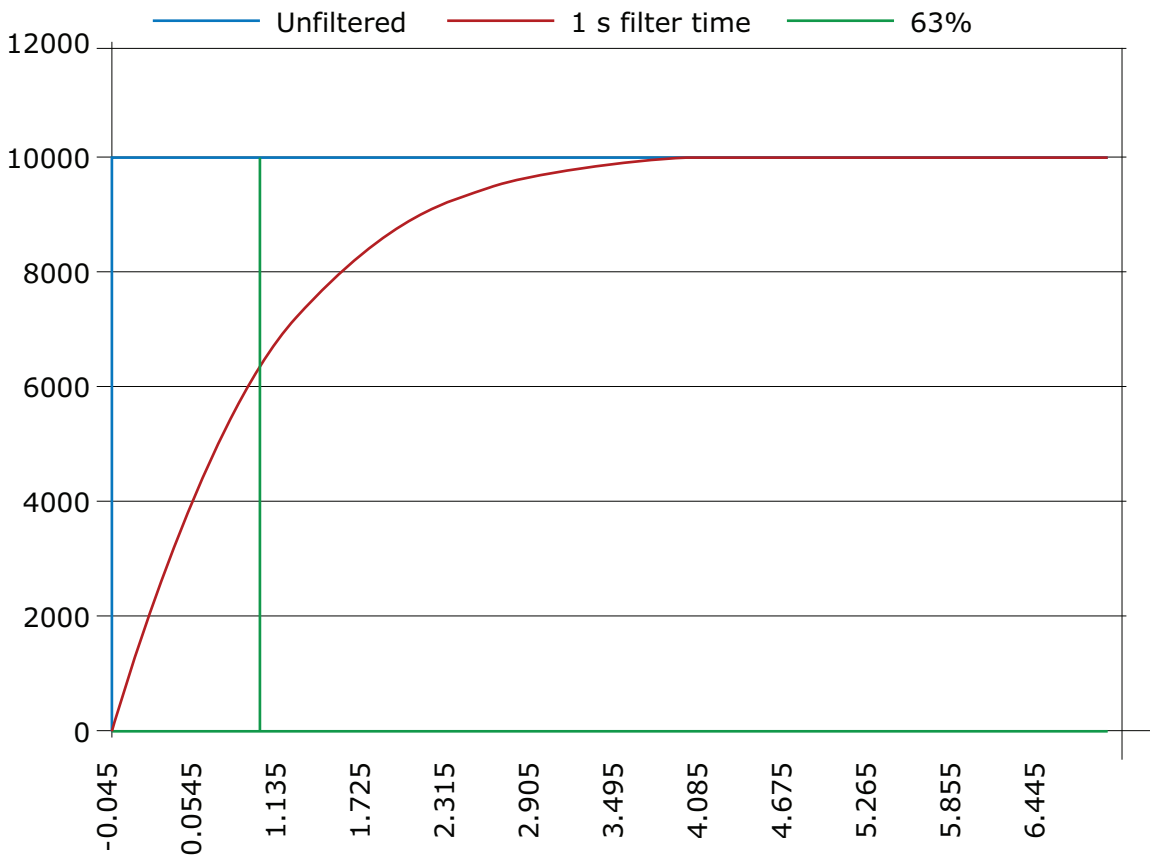

Figure 2. Signal filtering

P2.3.2.3 AI1 CUSTOM SETTING MINIMUM ID321

P2.3.2.4 AI1 CUSTOM SETTING MAXIMUM ID322

P2.3.3.3 AI2 CUSTOM SETTING MINIMUM ID326

P2.3.3.4 AI2 CUSTOM SETTING MAXIMUM ID327

P2.3.4.3 AI3 CUSTOM SETTING MINIMUM ID144

P2.3.4.4 AI3 CUSTOM SETTING MAXIMUM ID145

P2.3.5.3 AI4 CUSTOM SETTING MINIMUM ID155

P2.3.5.4 AI4 CUSTOM SETTING MAXIMUM ID156

Set the custom minimum and maximum input levels for the AI3 signal within -160...160%.

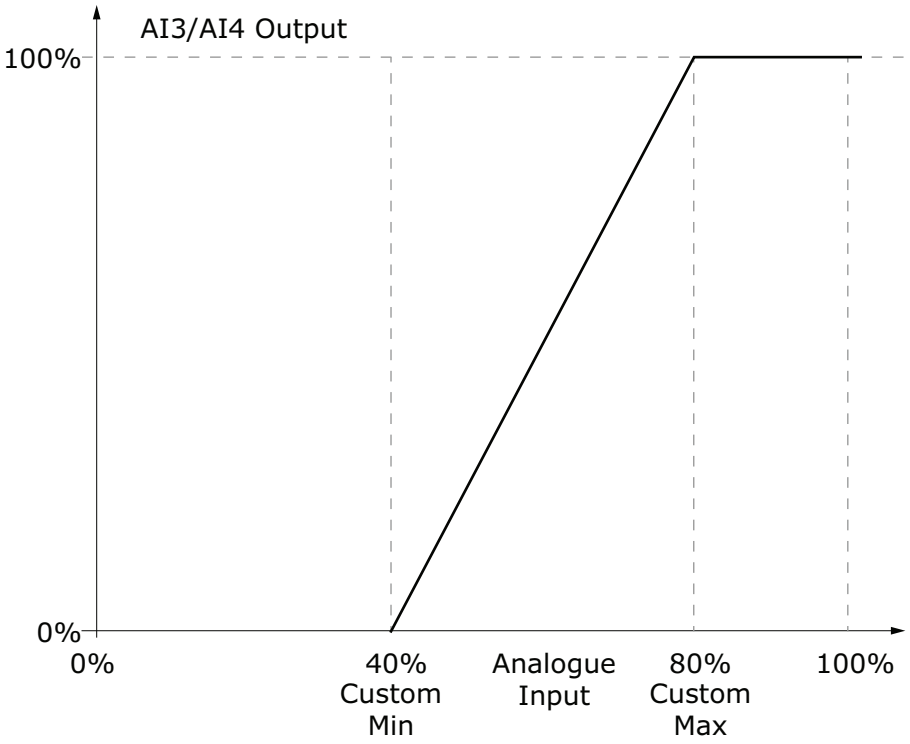

Figure 3. Custom signal setting

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P2.3.2.5 AI1 SIGNAL INVERSION ID387

P2.3.3.5 AI2 SIGNAL INVERSION ID398

P2.3.4.5 AI3 SIGNAL INVERSION ID151

P2.3.5.5 AI4 SIGNAL INVERSION ID162

The AI signal inversion function is useful e.g. when the PLC is sending power limit to the drive by using analogue inputs. If the PLC is unable to communicate to the drive, the power limit would normally be zero. By using inverted signal logic, a zero value from the PLC would mean the maximum power limit, thus allowing the running of the drive e.g. from keypad without changing the power limit function parameters.

0 = No inversion

1 = Signal inverted

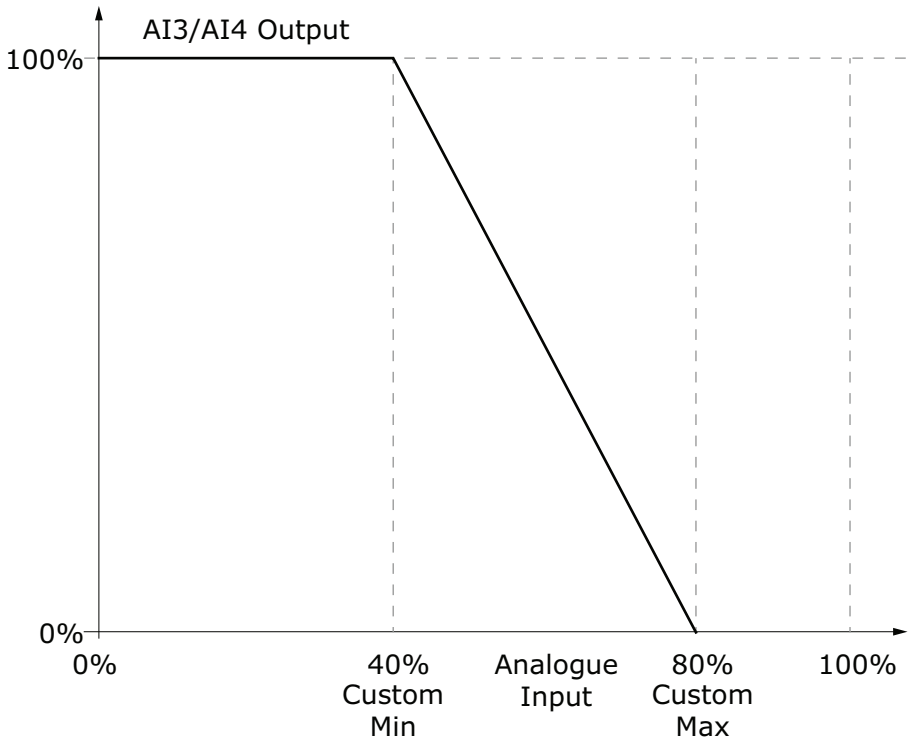

Figure 4. Signal inversion

Analogue input to any parameter

This function allows the control of any parameter by using an analogue input. The range of the control area and the ID number of the parameter that is the controller are selected with the parameters.

P2.3.2.6 ANALOGUE INPUT 1, MINIMUM VALUE ID303

P2.3.2.7 ANALOGUE INPUT 1, MAXIMUM VALUE ID304

P2.3.3.6 ANALOGUE INPUT 2, MINIMUM VALUE ID393

P2.3.3.7 ANALOGUE INPUT 2, MAXIMUM VALUE ID394

P2.3.4.6 ANALOGUE INPUT 3, MINIMUM VALUE ID1037

P2.3.4.7 ANALOGUE INPUT 3, MAXIMUM VALUE ID1038

P2.3.5.6 ANALOGUE INPUT 4, MINIMUM VALUE ID1039

P2.3.5.7 ANALOGUE INPUT 4, MAXIMUM VALUE ID1040

These parameters define the range for the controlled parameter. All the values are considered to be integers, and that is why when controlling FWP as in the example, you must set numbers for the decimals too. For example, FWP 100.00 must be set as 10000.

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P2.3.2.8 AI1 CONTROLLED ID (ID1507)

P2.3.3.8 AI2 CONTROLLED ID (ID1511)

P2.3.4.8 AI3 CONTROLLED ID (ID1509)

P2.3.5.8 AI4 CONTROLLED ID (ID1510)

These parameters are used to define the controller parameter.

Example:

You want to control the field weakening point voltage by an analogue input from 70.00% to 130.00%.

Set Scale min to 7000 = 70.00%

Set Scale max to 13000 = 130.00%

Set Controlled ID to 603 Voltage at Field weakening point voltage.

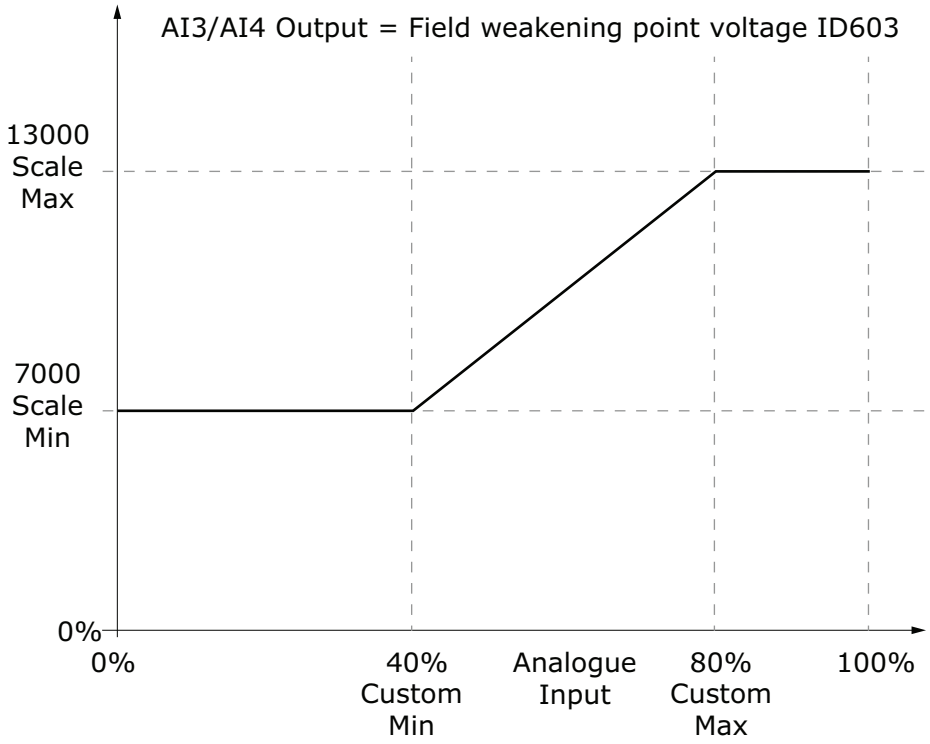

Figure 5. Controlling parameter

Now analogue input 3 signal 0 V to 10 V (0 mA to 20 mA) will control the field weakening point voltage between 70% and 130%. When you are setting a value, the decimals are handled as integer.

6.4 OUTPUT SIGNALS

6.4.1 DIGITAL OUTPUTS

P2.4.1.1 READY ID432

The drive is ready to operate.

P2.4.1.2 RUNNING ID433

The drive operates (the drive is modulating).

P2.4.1.3 FAULT ID434

Drive is in FAULT state.

P2.4.1.4 FAULT, INVERTED ID435

No active faults.

P2.4.1.5 WARNING ID436

A warning is active.

P2.4.1.6 FB DIN 1 PAR ID ID891

P2.4.1.7 FB DIN 2 PAR ID ID892

P2.4.1.8 FB DIN 3 PAR ID ID893

P2.4.1.9 FB DIN 4 PAR ID ID894

With these parameters you can define the parameter to be controlled by using an FB digital input.

Example:

All option board inputs are already in use, but you want to assign a digital input with External Fault 1 (ID405) and the drive has a fieldbus board.

Set parameter ID892 (Fieldbus digital input 2) to 405. Now you are able to control External Fault 1 command from the fieldbus with the profibus control word (bit 11).

It is possible to control any parameter in the same way if values 0 = FALSE and 1 = TRUE are significant for that parameter. For example, P2.1.5 Parallel AFE (ID1501) can be switched on and off using this function (Parallel AFE: 0 = No, 1 = Yes).

P2.4.1.10 CHARGE DC ID1668

A dgital output for a DC-Link charge control.

P2.4.1.11 DC READY ID1218

The DC-link voltage is high enough to close the DC breaker. If the source DC voltage is monitored, the DC-Link voltage must be higher than source DC voltage.

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6.4.2 ANALOGUE OUTPUTS

P2.4.2.1 IOUT 1 SIGNAL ID464

Connect the AO signal to the analogue output of your choice with this parameter.

P2.4.2.2 IOUT 1 CONTENT ID307

0 = Not used

1 = ±2*Active Current

P2.4.2.3 IOUT 1 FILTER TIME ID308

Defines the filtering time of the analogue output signal. Setting this parameter to value 0 will deactivate the filtering. First order filtering is used for the analogue output signals.

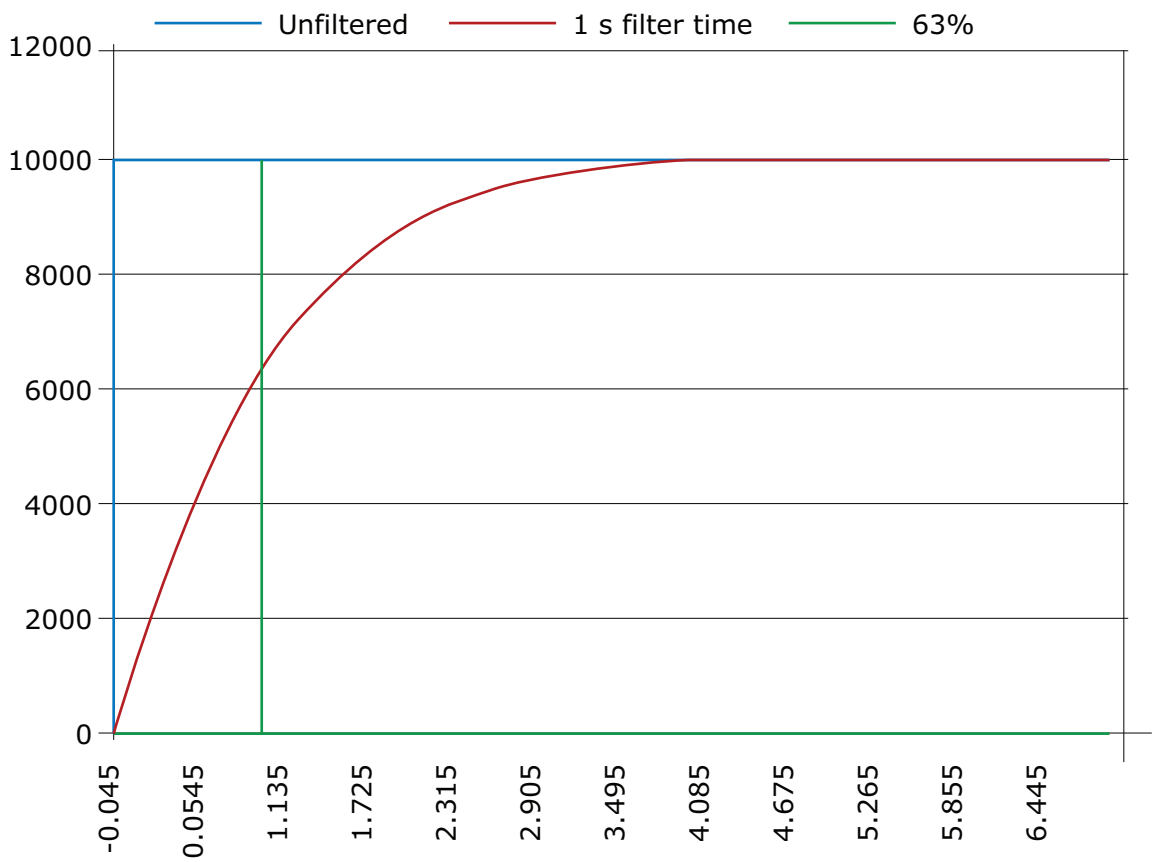

Figure 6. Analogue output filtering

P2.4.2.4 IOUT 1 INVERT ID309

This parameter inverts the analogue output signal:

- Maximum output signal = Minimum set value.
- Minimum output signal = Maximum set value.

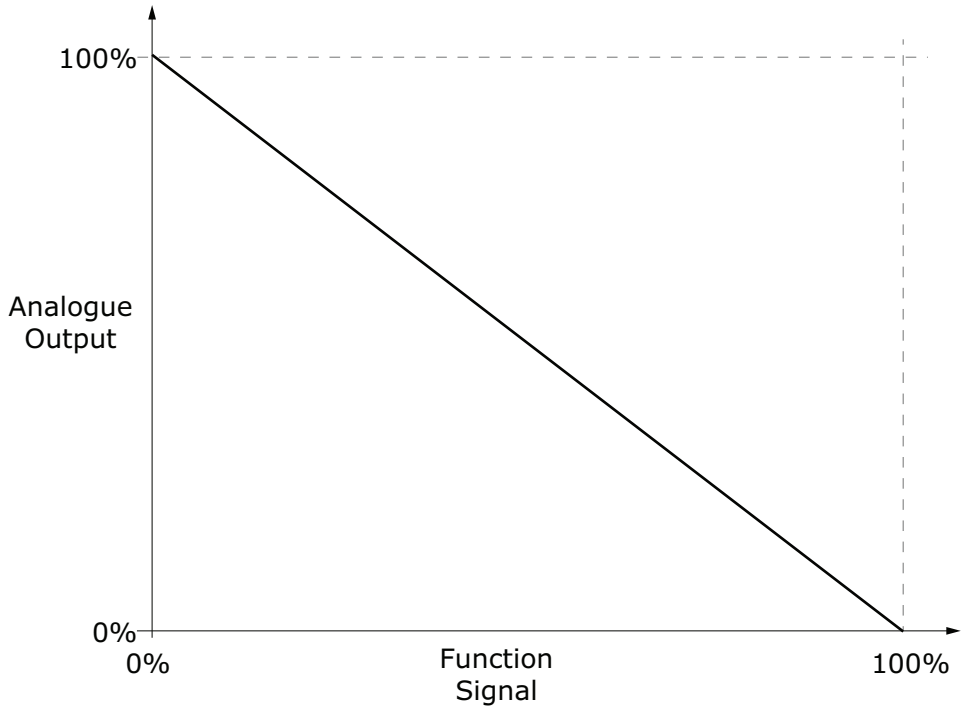

Figure 7. Inverting output signal

P2.4.2.5 IOUT 1 MINIMUM ID310

0 = Set minimum value to 0 mA (0%)

1 = Set minimum value to 4 mA (20%)

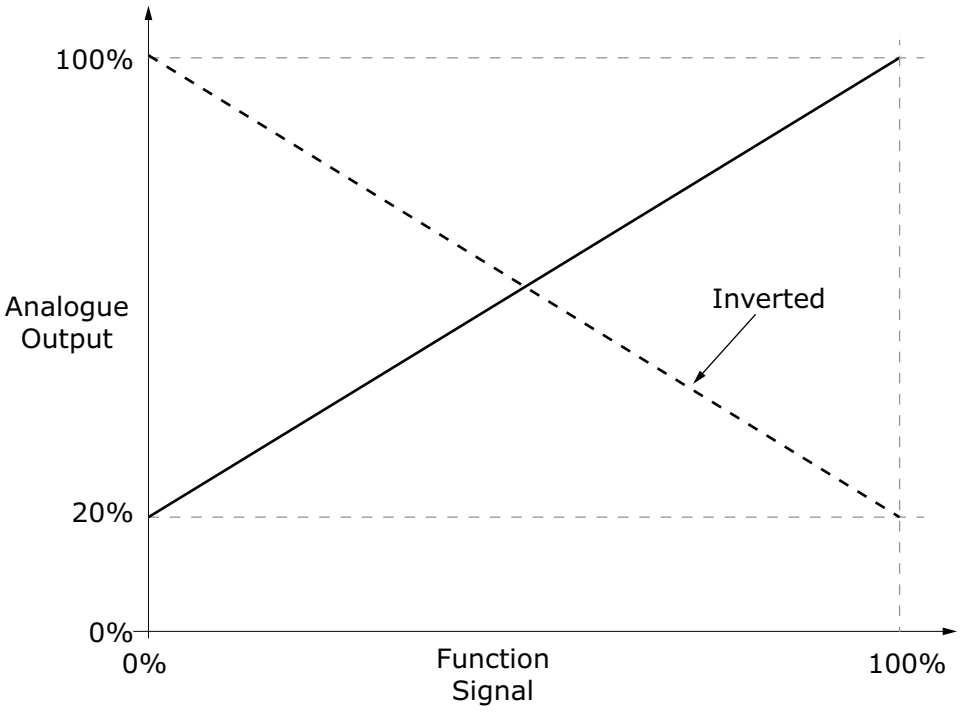

Figure 8. Customizing output signal

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P2.4.2.6 IOUT 1 SCALE ID311

This parameter provides a scaling factor for an analogue output

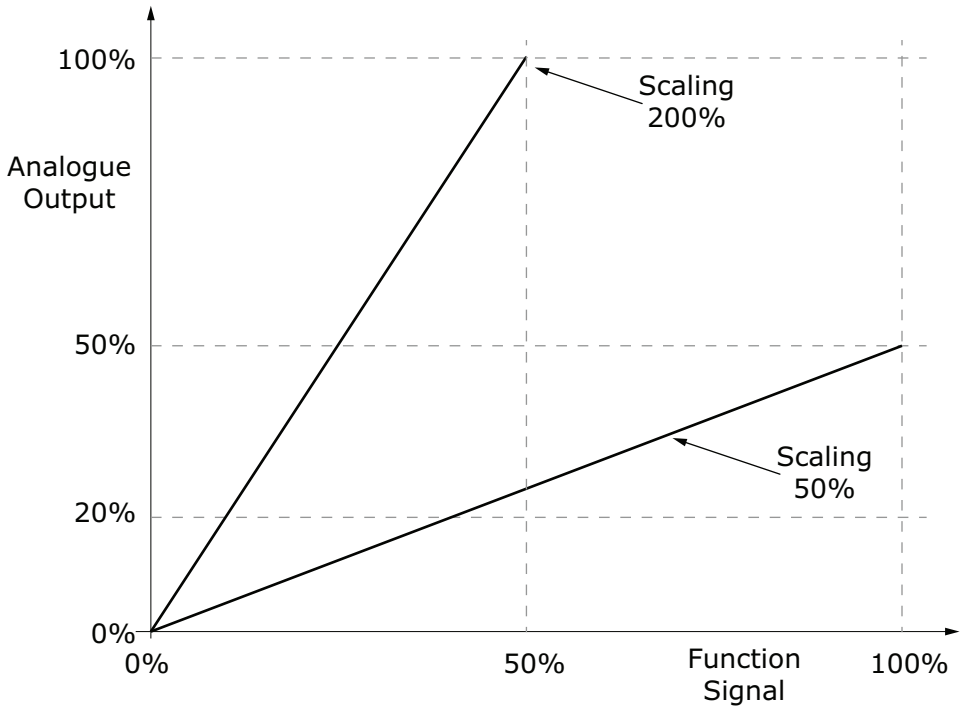

Figure 9. Scaling factor for analogue output

P2.4.2.7 IOUT 1 OFFSET ID375

With this parameter, you can add -100.0 to 100.0% to the analogue output.

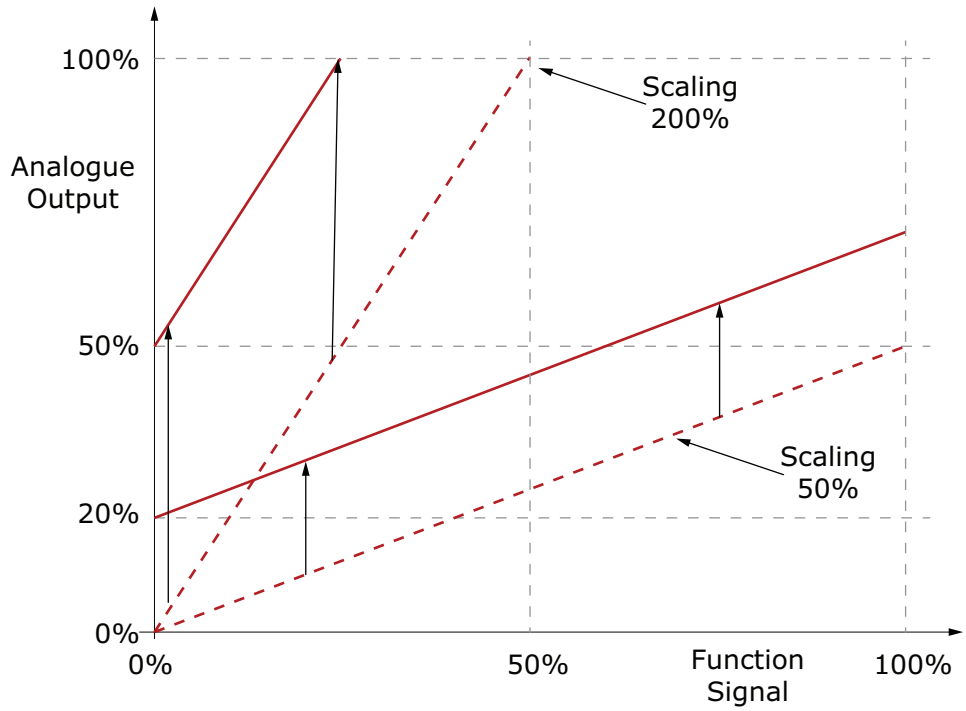

Figure 10. Offset for analoque output

6.5 LIMIT SETTINGS

6.5.1 CURRENT LIMITS

P2.5.1.1 CURRENT LIMIT ID107

The current limit in amperes.

P2.5.1.2 CHARGING LIMIT ID1290

The charging current limit in percentage of Source Nom Current.

P2.5.1.3 DISCHARGE LIMIT ID107

The discharging current limit in percentage of Source Nom Current.

6.5.2 UNDER VOLTAGE CONTROL

The under voltage controll starts to feed DC-Link when the limit is reached. Discharging is limited by the discharge current limit and the minimum source voltage limit.

P2.5.2.1 UNDER VOLTAGE REFERENCE D1567

The under voltage reference in percentage of Nominal DC Voltage of the drive.

P2.5.2.2 UNDER VOLTAGE DROOP ID1863

The under voltage reference drooping. The set drooping is reached when the active current is 100%.

This parameter is used to tune parameters for under voltage control. there is no need for adjustment unless recommended by factory.

P2.5.2.3 UNDER VOLTAGE KP ID1468

P2.5.2.4 UNDER VOLTAGE TI ID1409

P2.5.2.5 UNDER VOLTAGE KP ADD ID1425

6.5.3 OVER VOLTAGE CONTROLL

The over voltage controll starts to limit the source current to the DC-link when limit is reached and when reference makes the drive to discharge. When the DC-link voltage rises to the over voltage level from the external power, the drive starts to charge source, until the charging current limit or the maximum source voltage is reached.

P2.5.3.1 OVER VOLTAGE REFERENCE ID1528

The over voltage reference in percentage of Nominal DC Voltage of the drive.

P2.5.3.2 OVER VOLTAGE DROOP ID1862

The over voltage reference drooping. The set drooping is reached when the active current is 100%.

This parameter is used to tune parameters for under voltage control. There is no need for adjustment unless recommended by factory.

P2.5.3.3 OVER VOLTAGE KP ID699

P2.5.3.4 OVER VOLTAGE TI ID698

P2.5.3.5 OVER VOLTAGE KP ADD ID697

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6.5.4 SOURCE DC VOLTAGE LIMITS

P2.5.4.1 SOURCE MIN VOLTAGE ID1893

If Source DC voltage reaches this minimum value, discharging is disabled.

P2.5.4.2 SOURCE MAX VOLTAGE ID1895

If Source DC voltage reaches this maximum value, charging is disabled.

P2.5.4.3 SOURCE VOLTAGE HYSTERESIS ID1896

The hysteresis for the limiting functions.

6.6 DRIVE CONTROL

P2.6.1 SWITCHING FREQUENCY ID601

The default value of the parameter is 5.0 kHz. It is recommended to keep the default value. When all phases are connected to source, the source side will have a 15 kHz switching frequency.

P2.6.2 CONTROL OPTIONS 1 ID1707

This parameter is reserved for future needs.

B00 = Reserved

B01 = Reserved

6.6.1 IDENTIFICATION

P2.6.4.1 IU OFFSET ID668

The identified U phase current measurement offset, identified during the identification run.

P2.6.4.2 IV OFFSET ID669

The identified V phase current measurement offset, identified during the identification run.

P2.6.4.3 IW OFFSET ID670

The identified W phase current measurement offset, identified during the identification run.

P2.6.4.4 SOURCE RESISTANCE ID662

6.7 DC CONTROL

With these parameters you can adjust the current control and the voltage control. There is no need for adjustment unless recommended by factory.

P2.8.1 CURRENT CONTROL KP ID617
P2.8.2 CURRENT CONTROL TI ID657
P2.8.3 VOLTAGE CONTROL KP ID1870
P2.8.4 CURRENT CONTROL KI ID1871

6.8 FIELDBUS PARAMETERS

P2.9.1 FB ACTUAL SEL ID1853
Select a signal ID that is used as the actual value from the drive.

P2.9.2 GSW ID ID897
Select the value for FBGeneralStatusWord.

P2.9.3 - P2.9.10 FIELDBUS DATA OUT 1-8 SELECTION ID852-ID859
Using these parameters, you can monitor any monitoring or parameter value from the fieldbus. Enter the ID number of the item you wish to monitor for the value of these parameters.

P2.9.11 FB REF SEL ID1850

P2.9.12 - P2.9.19 FIELDBUS DATA IN 1-8 SELECTION ID876-ID883
Using these parameters, you can control any parameter from the fieldbus. Enter the ID number of the item you wish to control for the value of these parameters.

P2.9.20 STATE MACHINE ID896
0 = **Basic**: See the description of the basic mode in the manual of the used fieldbus board.

1 = **Standard** = A simple control word that is used in modes where the control word from the fieldbus is used as such. For some fieldbus boards, this requires bypass operation.

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6.9 PROTECTIONS

6.9.1 GENERAL

P2.10.1.1 RESPONSE TO FIELDBUS FAULT ID733

Set the response for a fieldbus fault if the active control place is fieldbus. For more information, see the related Fieldbus Board Manual.

0 = No response
1 = Warning
2 = Fault

P2.10.1.2 RESPONSE TO EXTERNAL FAULT ID701

This parameter defines a response to an external fault. If the drive monitors the state of the external fault input (value of P2.2.1.7 > 0) and a fault occurs, the drive can be set to respond to the fault.

0 = No response
1 = Warning
2 = Fault.

P2.10.1.3 MAX CHARGE TIME ID1522

When the drive charging options are used, this parameter defines the maximum time limit for the charging. Use a suitably sized DC charging resistor by checking the pulse loadability for time duration that is set in this parameter.

6.9.2 TEMPERATURE SENSORS

The temperature protection function is used to measure temperatures and issue warnings and/or faults when the set limits are exceeded. The marine application supports two OPT-BH and OPT-B8 board simultaneously. One can be used for the motor winding and one for the motor bearings.

P2.10.2.1 NUMBER OF USED INPUTS IN BOARD 1 ID739 "BOARD1 CHANNELS"

Select the used temperature sensor combination with this parameter. See also the VACON® I/O boards manual.

0 = Not used (ID Write, value of maximum temperature can be written from fieldbus)
1 = Sensor 1 in use
2 = Sensor 1 & 2 in use
3 = Sensor 1 & 2 & 3 in use
4 = Sensor 2 & 3 in use
5 = Sensor 3 in use

Note: If the selected value is greater than the actual number of the used sensor inputs, the displayed value is 200ºC. If the input is short-circuited, the displayed value is -30ºC.

P2.10.2.2 BOARD 1 TEMPERATURE RESPONSE ID740 "BOARD1 RESPONSE"

0 = No response
1 = Warning
2 = Fault, stop mode after fault according to stop function
3 = Fault, stop mode after fault always by coasting

P2.10.2.3 BOARD 1 WARNING LIMIT ID741 "BOARD1WARN.LIMIT"

With this parameter, you can set the limit at which the PT100 warning will be activated. When the individual warning and fault limits are activated, this is first board first channel (1A).

P2.10.2.4 BOARD 1 FAULT LIMIT ID742 "BOARD1 FAULT LIM."

With this parameter, you can set the PT100 fault (F56) will be activated. When the individual warning and fault limits are activated, this is first board first channel (1A).

6.9.3 THERMAL PROTECTION

P2.10.3.1 RESPONSE TO THERMISTOR FAULT ID740

0 = No response
1 = Warning
2 = Fault

Setting the parameter to 0 will deactivate the protection.

P2.10.3.2 THERMAL FAULT DELAY ID707

This parameter is used to set the delay until a fault is triggered when the switch type thermal inputs are used.

P2.10.4 FAULT SIMULATION ID1569 "FAULT SIMULATION"

With this parameter it is possible to simulate different faults without actually creating, for example, an over current situation. In the point of view of the drive interface, the operation is identical to an actual fault situation.

B00 = +1 = Simulates the overcurrent fault (F1)
B01 = +2 = Simulates the overvoltage fault (F2)
B02 = +4 = Simulates the undervoltage fault (F9)
B03 = +8 = Reserved
B04 = +16 = Simulates the earth fault (F3)
B05 = +32 = Reserved
B06 = +64 = Reserved
B07 = +128 = Simulates the over temperature warning (W14)
B08 = +256 = Simulates the over temperature fault (F14)
The warning bit must be active for a fault to appear in simulation. If the fault bit is left active, the drive will go FAULT state at the warning limit when the drive temperature rises to the warning level.
B09 = +512 = Reserved

P2.10.5 RESET DATALOGGER UD1849

This parameter is used to reset the data logger to the default values. It is recommended to reset the settings after the initial commissioning if they were changed.

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6.10 ID FUNCTION

Here are listed the functions that use the parameter ID number to control and monitor the signal.

6.10.1 VALUE CONTROL

The value control parameters are used to control an input signal parameter.

P2.11.1.1 CONTROL INPUT SIGNAL ID1580

With this parameter you can select the signal that is used to control the selected parameter.

P2.11.1.2 CONTROL OFF LIMIT ID1581

This parameter defines the limit when the selected parameter value is forced to Off value.

P2.11.1.3 CONTROL ON LIMIT ID1582

This parameter defines the limit when the selected parameter value is forced to On value.

P2.11.1.4 CONTROL OFF VALUE ID1583

This parameter defines the value that is used when the used input signal is below Off limit.

P2.11.1.5 CONTROL ON VALUE ID1584

This parameter defines the value that is used when the used input signal is above On limit.

P2.11.1.6 CONTROL OUTPUT SIGNAL ID1585

This parameter defines which parameter is forced to On and Off values when the selected input signal exceeds the set limits.

P2.11.1.7 CONTROL MODE ID1586 "CONTROL MODE"

This parameter defines the bahavior of the value control output.

0 = SR ABS
Absolute input value is used to make a step change in the output between On and Off values.

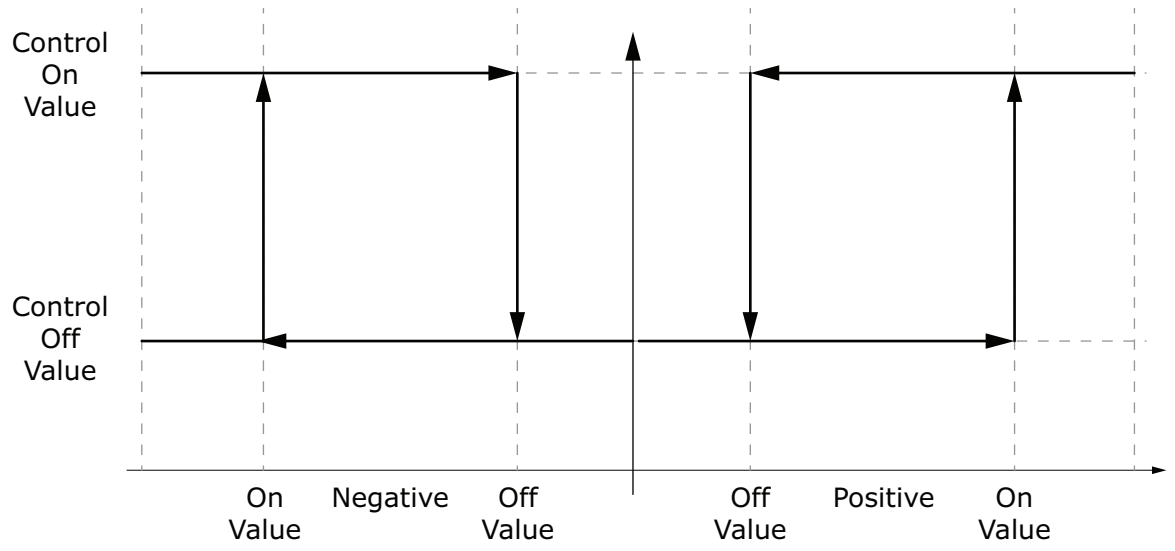

Figure 11. Control mode

1 = Scale ABS
Absolute input value is scaled linearly between On and Off values.

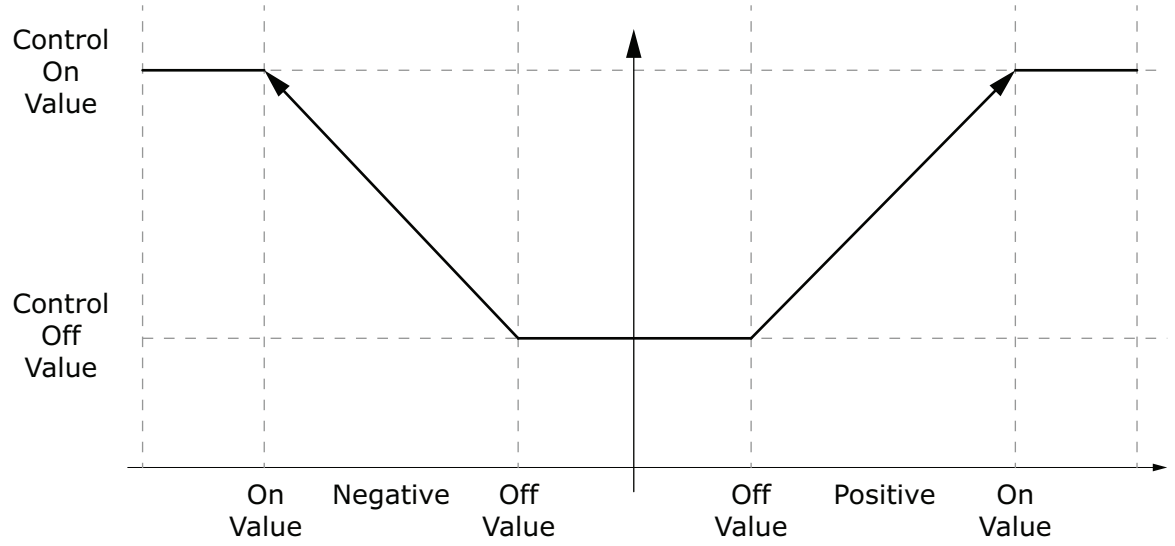

Figure 12. Scaling input value

2 = Scale ABS inverted
Inverted absolute value is scaled linearly between On and Off values.

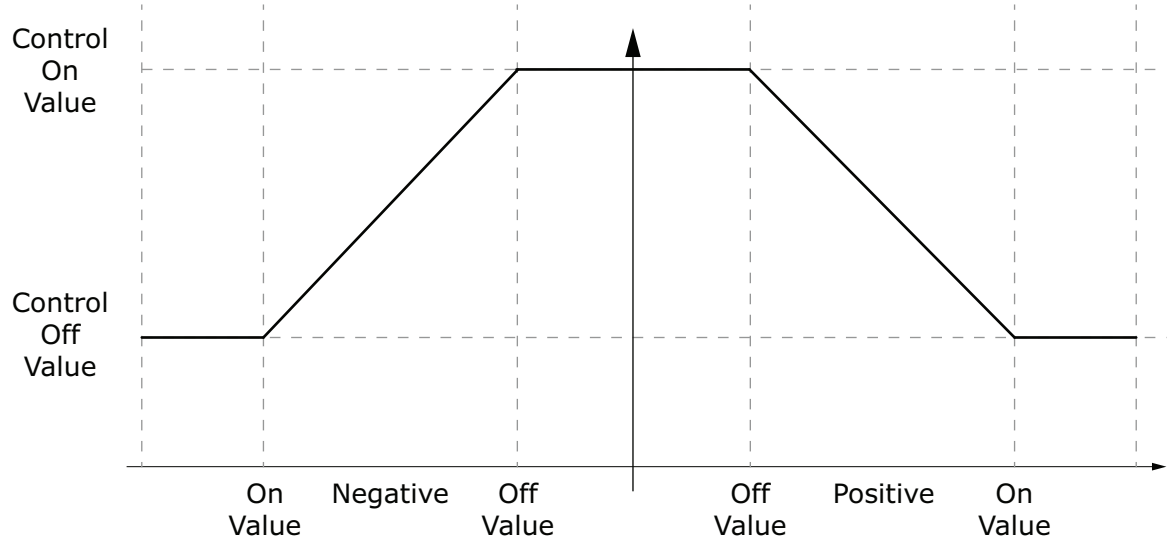

Figure 13. Inverting input value

3 = SR
Input value is used to make a step change in the output between On and Off values.

4 = Scale
Input value is scaled linearly between On and Off values.

5 = Scale inverted
Inverted value is scaled linearly between On and Off values

P2.11.1.8 CONTROL SIGNAL FILTERING TC ID1721 "CONTROL FILT TC"

This parameter is used to filter the scaling function output. Used e.g. when unfiltered torque is used to control a parameter that needs stabilization.

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6.10.2 DIN ID CONTROL

This function is used to control any parameter between two different values with a digital input. Different values are given for DI 'low' and DI 'high'.

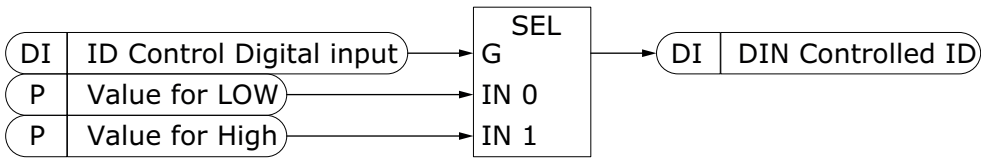

Figure 14. ID control

P2.11.2.1 ID CONTROL DIGITAL INPUT ID1570 "ID CONTROL DIN"

P2.11.3.1 ID CONTROL DIGITAL INPUT ID1590 "ID CONTROL DIN"

P2.11.4.1 ID CONTROL DIGITAL INPUT ID1578 "ID CONTROL DIN"

Select a digital input to be used for controlling the parameter selected by ID1571, ID1575 and ID1579.

P2.11.2.2 DIN CONTROLLED ID ID1571 "CONTROLLED ID"

P2.11.3.2 DIN CONTROLLED ID ID1575 "CONTROLLED ID"

P2.11.4.2 DIN CONTROLLED ID ID1579 "CONTROLLED ID"

Select a parameter ID controlled by ID1570.

P2.11.2.3 VALUE FOR LOW DIGITAL INPUT (FALSE) ID1572 "FALSE VALUE"

P2.11.3.3 VALUE FOR LOW DIGITAL INPUT (FALSE) ID1576 "FALSE VALUE"

P2.11.4.3 VALUE FOR LOW DIGITAL INPUT (FALSE) ID1587 "FALSE VALUE"

Set the controlled parameter value when the digital input (ID1570) is LOW for the parameter selected by ID1571. The function does not recognize decimals. Give, therefore, e.g. 10.00 Hz as '1000'.

P2.11.2.4 VALUE FOR HIGH DIGITAL INPUT (TRUE) ID1573 "TRUE VALUE"

P2.11.3.4 VALUE FOR HIGH DIGITAL INPUT (TRUE) ID1577 "TRUE VALUE"

P2.11.4.4 VALUE FOR HIGH DIGITAL INPUT (TRUE) ID1588 "TRUE VALUE"

Set the controlled parameter value when the digital input (ID1570) is HIGH for the parameter selected by ID1571. The function does not recognize decimals. Give, therefore, e.g. 10.00 Hz as '1000'.

6.11 KEYPAD CONTROL

P3.1 CONTROL PLACE ID125

The active control place can be changed with this parameter.

NOTE! Keypad is the default control place.

0 = Fieldbus
1 = I/O terminal
2 = Keypad (Default)
3 = Fieldbus
4 = SystemBus Master

P3.2 LICENSE KEY ID1995

This parameter is used to set the license key to activate the DC/DC converter operation. The FR4 frame size operates without a license key.

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7. FIELDBUS PROFILE FOR VACON DC/DC CONVERTER

NOTE! The selections marked in gray are not in use.

Table 39. P2.8.20 State machine

Selection number	Selection name	Description
0	Basic	See the description of the basic mode in the manual of the used fieldbus board.
1	Standard	A simple control word that is used in modes where the control word from the fieldbus is used as such. For some fieldbus boards, this requires bypass operation.
2	Vacon DC/DC 1	This mode uses a ProfiDrive type state machine in the application level. It is possible to use this mode on fieldbus boards that do not have a state machine included or that have a possibility to bypass the state machine functionality in the option board.
3	Vacon DC/DC 2	This mode uses a ProfiDrive type state machine in the application level. It is possible to use this mode on fieldbus boards that do not have a state machine included or that have a possibility to bypass the state machine functionality in the option board.

7.1 BASIC IN BYPASS

Table 40. Signal descriptions

Main control word ID1160		
	Signal	Comment
B00	Run	**0** = DC/DC converter is stopped **1** = DC/DC converter is started
B01		
B02	Fault reset	0 >1 Reset fault
B03	FB DIN1	Can be used to control the RO or the parameters directly by ID number. G2.4.1
B04	FB DIN2	Can be used to control the RO or the parameters directly by ID number. G2.4.1
B05	FB DIN3	Can be used to control the RO or the parameters directly by ID number. G2.4.1
B06	FB DIN4	Can be used to control the RO or the parameters directly by ID number. G2.4.1
B07		
B08		
B09		
B10		
B11		
B12		
B13		
B14		
B15		

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7.2 FB CONTROL WORD

7.2.1 STANDARD

Table 41. Signal descriptions

FB control word ID1160		
	Signal	Comment
B00	DC charge	**0** = N/A **1** = Charge DC
B01		
B02		
B03	Run	**0** = DC/DC converter is stopped **1** = DC/DC converter is started
B04		
B05		
B06		
B07	Reset	0 >1 Reset fault
B08		
B09		
B10	PLC control	**0** = Disable FB control **1** = Enable FB control
B11	FB DIN1/ Watchdog	Can be used to control the RO or the parameters directly by ID number. G2.4.1 This bit is also connected to FB Status Word B15
B12	FB DIN2	Can be used to control the RO or the parameters directly by ID number. G2.4.1
B13	FB DIN3	Can be used to control the RO or the parameters directly by ID number. G2.4.1
B14	FB DIN4	Can be used to control the RO or the parameters directly by ID number. G2.4.1
B15		

B00: FALSE = Reserved, TRUE = Charge DC
Reserved: No Function, but will stop the drive.
Charge DC: Activates charging DO, will charge maximum 10 second, will stop earlier if DC CB feedback is received.

B03: FALSE = Stop Request, TRUE = Start Request
Stop Request: Drive will stop.
Start Request: Start command to the drive. Rising edge needed for start.

B07: FALSE = No significance, TRUE = Fault Acknowledge
Fault Acknowledge: The group signal is acknowledged with a positive edge.

B10: FALSE = Disable FB Control, TRUE = Enable FB Control
Disable FB Control: Drive will stop.
Enable FB Control: Start command is monitored from fieldbus if the control place is fieldbus.

7.2.2 VACON DC/DC 1 PROFILE

Table 42. Signal descriptions

FB control word ID1160		
	Signal	Comment
B00	DC charge	**0** = N/A **1** = Charge DC
B01		
B02		
B03	Run	**0** = AFE is stopped **1** = AFE is started
B04		
B05		
B06		
B07	Reset	0 >1 Reset fault
B08	DC voltage ref B00	B00 | B01 **0 | 0** = FB Reference. P2.2.1, if not FB Control & FB Ref > 50,00% **0 | 1** = 110% **1 | 0** = 115% **1 | 1** = 120%
B09	DC voltage ref B01	
B10	Fieldbus control	**0** = No control from fieldbus **1** = Control from fieldbus
B11	Watchdog	0>1>0>1...0,5 s square wave clock. This is used to check data communication between the fieldbus master and the drive.
B12	FB DIN2	Can be used to control RO or directly parameter by ID number. G2.4.1
B13	FB DIN3	Can be used to control RO or directly parameter by ID number. G2.4.1
B14	FB DIN4	Can be used to control RO or directly parameter by ID number. G2.4.1
B15		Reserved for future use

B00: FALSE = Open MCB, TRUE = Precharge DC
Open MCB: Opens main circuit breaker if it is closed, stops precharging if it is not closed.
PreCharge DC: Drive will start precharging if function is activated by a digital output and the control place is fieldbus. When the control place is not fieldbus, precharging starts with a normal start command.

B03: FALSE = Stop Request, TRUE = Start Request
Stop Request: Drive will stop.
Start Request: Start command to the drive. Rising edge needed for start.

B07: FALSE = No significance, TRUE = Fault Acknowledge
Fault Acknowledge: The group signal is acknowledged with a positive edge.

B08: FALSE = No Function, TRUE = DC Ref 1

B09: FALSE = No Function, TRUE = DC Ref 2

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Table 43. Signal acknowledgement

DC ref	FB reference	110.00%	115.00%	120.00%
B08	FALSE	TRUE	FALSE	TRUE
B09	FALSE	FALSE	TRUE	TRUE

B10: FALSE = FB Control disabled TRUE = FB Control Enabled
FB Control Disabled: Drive will not follow main control word from fieldbus. If the main control word is removed while drive is running, the drive will stop.
FB Control Enabled: Drive follows control word from fieldbus

B11: FALSE = FB WD Pulse Low, TRUE = FB WD Pulse High
Watchdog pulse: This pulse is used to monitor that PLC is operational. If there is no pulse, the drive will go to FAULT state. This function is activated by P2.7.6 FB WD Delay. When the value is zero, the pulse is not monitored.

7.2.3 VACON DC/DC 2 PROFILE

Table 44. Signal descriptions

FB control word ID1160		
	Signal	Comment
B00	DC charge	**0** = Open main MCB. **1** = Close DC charge contactor, CB closed automatically, see B01.
B01	CB close enable	**0** = Disable closing of CB **1** = Enable closing if CB
B02	Forced restart	**0** = Forced restart, DC need to go to zero before a new DC charge. **1** = Enable operation
B03	Run	**0** = AFE is stopped **1** = AFE is started
B04	Floating DC ref	**0** = Enable floating DC reference **1** = Disable floating DC reference
B05	DC drooping	**0** = Disable DC drooping (DC droop 2) **1** = Enable DC drooping (DC droop 1)
B06	Power limit	**0** = Power limited (5%) **1** = Power limit set by parameters
B07	Reset	0 >1 Reset fault
B08	DC voltage ref B00	B00 | B01 **0 | 0** = FB Reference. P2.2.1, if not FB Control & FB Ref > 50,00% **0 | 1** = 110% **1 | 0** = 115% **1 | 1** = 120%
B09	DC voltage ref B01	
B10	Fieldbus control	**0** = No control from fieldbus **1** = Control from fieldbus
B11	Watchdog	0>1>0>1...0.5 s square wave clock. This is used to check data communication between the fieldbus master and the drive.
B12	FB DIN2	Can be used to control RO or directly parameter by ID number. G2.4.1
B13	FB DIN3	Can be used to control RO or directly parameter by ID number. G2.4.1
B14	FB DIN4	Can be used to control RO or directly parameter by ID number. G2.4.1
B15		Reserved for future use

B00: FALSE = Open MCB, TRUE = Precharge DC
Open MCB: Opens main circuit breaker if it is closed, stops precharging if it is not closed.
PreCharge DC: Drive will start precharging if function is activated by a digital output and the control place is fieldbus. When the control place is not fieldbus, precharging starts with a normal start command.

B01: FALSE = (OFF 2), TRUE =
Coast Stop:
ON 2:

B03: FALSE = Stop request, TRUE = Start request
Stop Request: Drive will stop.
Start Request: Start command to the drive. Rising edge needed for start.

B07: FALSE = No significance, TRUE = Fault acknowledge
Fault Acknowledge: The group signal is acknowledged with a positive edge.

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B08: FALSE = No function, TRUE = DC ref 1

B09: FALSE = No function, TRUE = DC ref 2

Table 45. Signal acknowledgement

DC ref	FB reference	110.00%	115.00%	120.00%
B08	FALSE	TRUE	FALSE	TRUE
B09	FALSE	FALSE	TRUE	TRUE

B10: FALSE = FB control disabled TRUE = FB control enabled

FB Control Disabled: Drive will not follow main control word from fieldbus. If main control word is removed while drive is running, the drive will coast to stop.
FB Control Enabled: Drive follows control word from fieldbus

B11: FALSE = FB WD pulse low, TRUE = FB WD pulse high

Watchdog pulse: This pulse is used to monitor that PLC is operational. If there is no pulse, the drive will go to FAULT state. This function is activated by P2.7.6 FB WD delay. When the value is zero, the pulse is not monitored.

7.3 FB STATUS WORD

Table 46. Signal descriptions

	Signal	Comment
B00	Ready on	0 = Drive not ready to switch on 1 = Drive ready to start charging
B01	Ready run	0 = Drive not ready to run 1 = Drive ready and main contactor is ON
B02	Running	0 = Drive not running 1 = Drive in RUN state (modulating)
B03	Fault	0 = No active fault 1 = Faults active
B04	Run enable status	0 = Run disabled. Drive in STOP state 1 = Run enabled. Drive can be started.
B05	Quick stop active	0 = Quick stop active 1 = Quick stop not active
B06	Inhibit	0 = Drive in operating condition. 1 = Run disabled or fault state.
B07	Warning	0 = No active warnings 1 = Warning active
B08	At reference	0 = DC voltage ref and act DC voltage are not same.
B09	Fieldbus control active	0 = Fieldbus control not active 1 = Fieldbus control active
B10	Above limit	0 = DC voltage is below P2.5.5.1 level 1 = DC voltage is above the P2.5.5.1 level
B11		Reserved for the future use
B12		Reserved for the future use
B13		Reserved for the future use
B14	DC charge DO control	0 = DC not charging 1 = DC charging active
B15	Watchdog	Same as received on bit 11 of the main control word

B00: FALSE = Not ready to switch on, TRUE = Ready to switch on
Not Ready To Switch On: Faults active, DI: Run enable low
Ready To Switch On: No faults, DI: Run enabled

B01: FALSE = Not ready to operate, TRUE = Ready to operate
Not Ready To Operate: CW.B0 = FALSE, DC not ready
Ready To Operate: CW.B0 = TRUE, DC ready

B02: FALSE = Drive is not operating, TRUE = Drive is operational
Drive Is Not Operating: Drive is not in RUN state (modulating)
Drive Is Operational: Drive is in RUN state and modulating

B03: FALSE = No fault, TRUE = Fault present
No Fault: Drive is not in FAULT state
Fault Present: Drive is in FAULT state

B04: FALSE = Run disabled, TRUE = Run enabled
Run Disabled: DI: Run enable false
Run Enabled: Running enabled

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B05: FALSE = Quick stop activated, TRUE = Quick stop not activated
Quick Stop Activated: Quick stop command is active
Quick Stop Not Activated: Quick stop command is not active

B06: FALSE = Run not inhibited, TRUE = Run inhibited
Run Not Inhibited:
Run Inhibited:

B07: FALSE = No warning, TRUE = Warning present
No Warning: There is no warning or the warning has disappeared again.
Warning Present: Drive still works; warning in the service/maintenance parameter; no acknowledgement.

B08: FALSE = DC voltage out of tolerance, TRUE = DC voltage within tolerance
DC Error Out Of Tolerance Range:
DC Error Within Tolerance Range:

B09: FALSE = No control requested, TRUE = Control requested
No Control Requested: Control by the automation system is not possible.
Control Requested: The automation system is controlling.

B10: FALSE = DC not reached, TRUE = DC reached or exceeded
DC Not Reached: DC voltage is below P2.5.5.1 level
DC Reached Or Exceeded: DC voltage is above the P2.5.5.1 level

B14: FALSE = Charge DO open, TRUE = Charge DO closed
Charge DO Open: Charging command not active
Charge DO Closed: Charging command active

B15: FALSE = FB DW feedback low, TRUE = FB DW feedback high
FB DW Feedback: FB control word B11 is echoed back to the fieldbus. Can be used to monitor communication status from the drive.

7.4 FAULT WORD 1

Table 47. Fault word 1

	Fault	Comment
B0		F1 Over current, F31 IGBT, F41 IGBT
B1		F2 Over voltage
B2		F9 Under voltage
B3		
B4		F3 Earth fault
B5		
B6		F14 Unit over temperature
B7		F56 Temperature fault PT100, F29 thermistor
B8		
B9		
B10		
B11		F52 Keypad or OC communication fault
B12		F53 Fieldbus fault
B13		
B14		F54 Slot communication fault
B15		F50 4 mA fault

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7.5 FAULT WORD 2

Table 48. Fault word 2

	Fault	Fault codes
B0		
B1		
B2		
B3		
B4		
B5		
B6		F51 external fault
B7		
B8		
B9		F31 IGBT, F41 IGBT
B10		
B11		
B12		
B13		
B14		
B15		

7.6 WARNING WORD 1

Table 49. Warning word 1

	Warning	Warning codes
B0		
B1	W29 Thermistor	Not implemented
B2		
B3		
B4		
B5		
B6	F53 FB Warning Slot D	
B7		
B8	W14 Unit Temperature	
B9		
B10		
B11		
B12		
B13		
B14		
B15		

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7.7 AUXILIARY CONTROL WORD

Table 50. Auxiliary control word

	FALSE	TRUE
B0		Reserved for future use
B1		Reserved for future use
B2		Reserved for future use
B3		Reserved for future use
B4		Reserved for future use
B5		Reserved for future use
B6		Reserved for future use
B7		Reserved for future use
B8		Reserved for future use
B9		Reserved for future use
B10		Reserved for future use
B11		Reserved for future use
B12		Reserved for future use
B13		Reserved for future use
B14		Reserved for future use
B15		Reserved for future use

7.8 STATUS WORD (APPLICATION) ID43

The application status word combines different drive statuses to one data word.

Table 51. Application status word

	FALSE	TRUE
B0		
B1	Not in READY state	Ready
B2	Not running	Running
B3	No fault	Fault
B4	Discharging disabled, low voltage	Discharging allowed
B5	Charging disabled, high voltage	Charging allowed
B6	Run disabled	Run enable
B7	No warning	Warning
B8		Charging switch closed (internal)
B9		Over voltage regulator active
B10		Under voltage regulator active
B11		
B12	No run request	Run request
B13		One or more regulators active
B14	Current control mode	Voltage control mode
B15	Discharging (Active current < 0)	Charging (Active current > 0)

B01: FALSE = Not ready, TRUE = Ready
Not Ready: DC voltage low, fault active.
Ready: Drive in READY state, start command can be given.

B02: FALSE = Not running, TRUE = Running
Not Running: Drive is not modulating.
Running: Drive is modulating.

B03: FALSE = No fault, TRUE = Fault active
No Faults: Drive does not have active faults.
Fault: Drive has active faults.

B04: FALSE = Discharging disabled, TRUE = Discharging allowed
Discharging disabled:
Discharging allowed:

B05: FALSE = Charging disabled, TRUE = Charging allowed
Charging disabled:
Charging allowed:

B06: FALSE = Run enable low, TRUE = Run enable high
Run Enable Low: Run enable command to motor control is low.
Run Enable High: Run enable command to motor control is high.

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B07: FALSE = No warning, TRUE = Warning active
No Warning: No warning signals active in the drive
Warning: Drive has active warning signal. Warning signal does not stop the operation.

B08: FALSE = Charging Switch Open, TRUE = Charging switch closed
Charging Switch Open: DC voltage level has not reached the closing level or has dropped below the opening level. This information is from drive motor control.
Charging Switch Closed: DC voltage level is above closing limit and no interlock is active internally.

B09: FALSE = OV control not active, TRUE = OV control active
OV Control Not Active: x.
OV Control Active: x.

B10: FALSE = UV control not active, TRUE = UV Control active
UV Control Not Active: x.
UV Control Active: x.

B12: FALSE = No Run Request, TRUE = Run Request
No Run Request: Final Run Request command has not been given to motor control.
Run Request: Final Run Request command has been given to motor control.

8. PROBLEM SOLVING

While accurate information about the problem is necessary, getting the latest software might solve your problem easily. It is recommended to download the latest application and system software versions available. The software is continuously developed and the default settings are improved. (See Chapter 2. "DC/DC application compatibility issues".

Recommended signals for NCDrive

1. Value: Status Word
2. Value: DC Voltage
3. Value: Active Current
4. Value: Active Curr. Ref
5. Value: Source DC Act.
6. Value: Source DC Ref.
7. Value: Current
8. Value: Mindex

Use the fastest communication speed (Baudrate: 57 600) and a 50 ms update interval for signals for the RS232 communication.

For the CAN communication, use a 1 Mbit communication speed and 7 ms update interval for signals.

When you contact the support, send the *.trn, *.par and Service info (*.txt) files with a description of the situation. If the situation is caused by a fault, also take the Datalogger data from the drive.

Note that Datalogger settings can be changed to catch the correct situation and it is also possible to make a manual forced trigger for Datalogger.

Before storing the parameter file, upload the parameters from the drive and save when NCDrive is in the ON-LINE state. If it is possible, do this while the problem is active.

It is also helpful to have a single line diagram from the system where the problem occured.

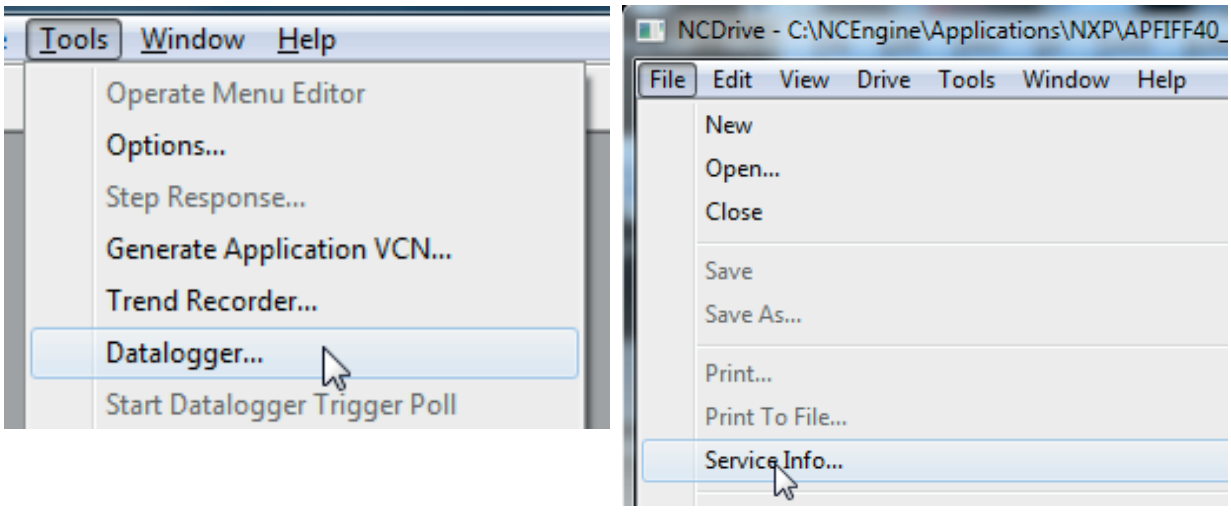

Figure 15. Accessing Datalogger and uploading the Service info

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9. FAULT CODES

The fault codes, their causes and correcting actions are presented in the table below.

NOTE: When contacting a distributor or the factory because of a fault condition, always write down all texts and codes on the keypad display. The best way is to send the parameter file and service info to Vacon technical support.

This chapter includes all fault codes that are possible. Some faults are not possible in the AFE application. Some fault descriptions may be different when compared to a standard AC drive.

Table 52. Fault codes

Fault code	Fault name	Description	Possible cause	Correcting actions
F1	Over current fault	The drive has detected a high current in the output phase. **S1 = Hardware trip**: Current above 4*Ih	Sudden increase in the load.	Check the motor load.
			A short circuit in the cables.	Check the cables.
F2	Overvoltage fault	DC-link voltage has exceeded the drive protection limits. **S1 = Hardware trip**. 500 Vac unit DC voltage above 911 Vdc 690 Vac unit DC voltage above 1200 Vdc **S2 = Overvoltage control supervision (only 690 Vac unit).** DC voltage has been above 1100 Vdc for too long.	Too short a deceleration time.	Increase the deceleration time. Use a brake chopper and a brake resistor. Use a brake chopper unit.
			High overvoltage spikes in the supply.	Check the input voltage.
F3	Earth fault	Earth fault protection ensures that the sum of the phase currents is zero. The over current protection is always working and protects the AC drive from earth faults with high currents. **S1 = Sum of output phase current is not zero**	Insulation failure in cables.	

Table 52. Fault codes

Fault code	Fault name	Description	Possible cause	Correcting actions
F5	Charge switch	The charge switch status is not correct when the start command is given. **S1 = The charge switch was open when START command was given.**	The charge switch was open when the START command was given.	Check the connection of the feedback from the charging relay Reset the fault and restart the AC drive. If the fault reoccurs, contact your local distributor.
F7	Saturation fault	**S1 = Hardware failure**		Cannot be reset from the keypad. Switch off the power. DO NOT RECONNECT THE POWER! Contact your local distributor.
F8	System Fault	A system fault indicates several different fault situations in the drive operation. **S1 = Reserved** **S2 = Reserved** **S3 = Reserved** **S4 = Reserved** **S5 = Reserved** **S6 = Reserved** **S7 = Charge switch** **S8 = No power to driver card** **S9 = Power unit communication (TX)** **S10 = Power unit communication (Trip)** **S11 = Power unit comm. (Measurement)** **S12 = SystemBus synchronization has failed in DriveSynch operation** **S30 = Safe disable inputs are in different state (OPT-AF)** **S31 = Thermistor short circuit detected (OPT-AF)** **S32 = OPT-AF board has been removed** **S33 = OPT-AF board EEPROM error**	Disturbance. A driver board or IGBT broken. FR9 and the bigger drives, which do not include a star coupler: ASIC board (VB00451) is broken. FR8 and smaller drives: the control board broken. FR8 and smaller drives: if the boards VB00449 / VB00450 are in use, the failure might be in there.	Reset the unit and try again. If there is a star coupler in the unit, check the fibre connections and the phase order.

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Table 52. Fault codes

Fault code	Fault name	Description	Possible cause	Correcting actions
F9	Undervoltage fault	The DC-link voltage is below the fault voltage limit of the drive. **S1 = DC-link too low during run** **S2 = No data from power unit** **S3 = Undervoltage control supervision**	Too low a supply voltage. An internal fault in the AC drive. One of the input fuses is broken. The external charge switch has not been closed.	In case of a temporary supply voltage break, reset the fault and restart the AC drive. Check the supply voltage. Check if the DC charge is functional. Contact your local distributor.
F10	Line Synchronization Fault	**S1 = Phase supervision diode supply** **S2 = Phase supervision active front end**	There is no input line phase.	Check the supply voltage, the fuses and the cables.
F11	Line phase supervision	The current measurement has detected that there is no current in one phase or one phase current is considerably different from the other phases.		Check the cables.
F13	Drive under temperature fault		The heatsink temperature is under -10 C.	
F14	Drive over temperature fault		The heatsink temperature is over acceptable limits. An overtemperature warning is issued before the actual trip limit is reached.	Check if the amount and flow of the cooling air is correct. Check the heatsink for dust. Check the ambient temperature. Make sure that the switching frequency is not too high in relation to the ambient temperature and the motor load.
F22	EEPROM checksum fault		A parameter saving fault. Faulty operation. A component failure.	If the fault reoccurs, contact your local distributor.
F24	Counter fault		The values shown by the counters are incorrect.	Have a critical attitude towards the values shown by the counters.

Table 52. Fault codes

Fault code	Fault name	Description	Possible cause	Correcting actions
F25	Microprocessor watchdog fault		The start-up of the drive has been prevented. The run request is ON when a new application is loaded to the drive.	Reset the fault and restart the AC drive. If the fault re-occurs, contact your local distributor.
F26	Start-up prevention		The start-up of the drive has been prevented.	Cancel the prevention of the start-up if the cancelling can be done safely.
			The run request is ON when a new application is loaded to the drive.	Remove the Run Request.
F29	Thermistor fault	The thermistor input of the option board has detected too high a motor temperature.	The motor is overheated.	Check the motor cooling and load.
			The thermistor cable is broken.	Check the thermistor connection (If thermistor input of the option board is not in use it has to be short circuited).
F31	IGBT temperature	The IGBT inverter bridge over temperature protection has detected too high a short term overload current.	Too high a load.	Check the load.
			The identification run has not been made which causes the motor to start undermagnetized.	Check the motor size.
				Make an identification Run.
F32	Fan cooling		The cooling fan of the AC drive does not start when ON command is given.	Contact your local distributor.
F37	Device changed	The option board or power unit changed.	A new device of the same type and rating.	Reset. The device is ready for use.
F38	Device added	An option board added.		Reset. The device is ready for use. The old board settings will be used.
F39	Device removed	An option board removed.		Reset. The device is no longer available.
F40	Device unknown	An unknown option board or drive. **S1 = Unknown device** **S2 = Power1 not same type as Power2**		Contact the distributor near to you.

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Table 52. Fault codes

Fault code	Fault name	Description	Possible cause	Correcting actions
F41	IGBT temperature	The IGBT inverter bridge overtemperature protection has detected too high a short term overload current.		Check the load.
F44	Device changed (default param.)		The option board or the power unit changed. A ew device of a different type or different rating from the previous one.	Reset. Set the option board parameters again if the option board was changed. Set the AC drive parameters again if the power unit was changed.
F45	Device added (default param.)		An option board of a different type added.	Reset Set the option board parameters again.
F50	4 mA supervision		The current at the analogue input is below 4mA. The signal source has failed. The control cable is broken or loose.	Check the current loop circuitry.
F51	External fault		A digital input fault.	Remove the fault situation from the external device.
F52	Keypad communication		The connection between the control keypad or NCDrive and the AC drive is broken.	Check the keypad connection and possible keypad cable.
F53	Fieldbus communication		The data connection between the fieldbus master and the fieldbus board is broken.	Check the installation. If installation is correct contact the nearest Vacon distributor.
F54	Slot fault		A defective option board or slot.	Check the board and the slot. Contact the nearest Vacon distributor.

Table 52. Fault codes

Fault code	Fault name	Description	Possible cause	Correcting actions
F56	PT100 temperature fault	The PT100 protection function is used to measure the temperature and give a warning and/or a fault when the set limits are exceeded. The marine application supports two PT100 boards. One can be used for the motor winding and the other for the motor bearings.	The temperature limit values set for the PT100 board parameters have been exceeded.	Find the cause of the temperature rise.
F60	Cooling	Protection for the liquid-cooled units. An external sensor is connected to the drive (DI: Cooling Monitor) to indicate if the cooling liquid is circulating. If the drive is in STOP state, only a warning is issued. In RUN state a fault is issued and the drive makes a coast stop.	The cooling circulation of the liquid-cooled drive has failed.	Check the reason for the cooling failure from the external system.
F62	Run Disabled	A Run disable warning signal is issued when the Run enable signal has been removed from the the I/O.		

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