

VACON LIFT

USER'S MANUAL
APSPFF61
(APSPFF61_RV10_EN_BM)



Vacon Lift Application (Software APSPFF61)

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Lift Application

1. Introduction

Lifts Application is specially designed to achieve the best performances on Permanent Magnet Motors, along the start, travel and stop, talking about confort and noises. Moreover this application could control induction motors too.

In the application, constant speeds are presented in [m/s] and also in [Hz], acceleration and deceleration are presented in [m/s^2] and jerks are presented in [s].

All outputs are freely programmable. Digital input functions are freely programmable to any digital input. Start forward and reverse signals are fixed to input DIN1 and DIN2 (see next page). If more number of input signals are needed, we can installed optional boards to extend (NXOPTB1).

With Auto Curve Compesation function, the application can be used in high speed lift systems. The converter knows all the time where the lift is, thanks to the encoder information, and which is the next floor to landing. This function enable to have floors with differents heights, and ensure the correct deceleration process to stop in the distance available, improving the cicle time having always the same time in levelling speed the lift. The feature can be used in close loop installations.

The hardware will be always the Vacon NXP converter. If you we want to control an induction motor in Close Loop, will need Encoder Boards NXOPTA4 or NXOPTA5. If motor to control is Permanent Magnets, then wil be necessary to use NXOPTBB if the Encoder used is an EnDat (Heidenhein ECN 413 or 1313), or NXOPTBE if the Encoder is EnDat or SSI.

2. Control I/O

NXOPTA1			
Terminal	Signal	Description	
1	+10V _{ref}	Reference output	Voltage for potentiometer, etc.
2	AI1+	Analogue input, voltage range 0—10V DC (Calibration)	Voltage input frequency reference
3	AI1-	I/O Ground	Ground for reference and controls
4	AI2+	Analogue input, current range 0—20mA	Current input frequency reference
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 forward (programmable)	Contact closed = start forward
9	DIN2	Start reverse (programmable)	Contact closed = start reverse
10	DIN3	Emergency Stop FEdg (programmable)	Contact open = no action Contact closed = stop by coasting
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	Speed reference selection (FULL SPEED)	Programmable speed reference for Inputs DIN4, DIN5, and DIN6: Activity reference Activity reference with direction Binary Reference
15	DIN5	Speed reference selection (INSPECTION SPEED)	
16	DIN6	Free programmable (Lower PreEnd)	
17	CMB	Common for DIN4—DIN6	Connect to GND or +24V
18	AO1+	Output frequency	Programmable
19	● AO1-	Analogue output	Range 0—20 mA/R _L , max. 500Ω
20	DO1	Digital output RUN	Programmable Open collector, I _L ≤50mA, U _L ≤48 VDC
NXOPTA2			
21	RO1	Relay output 1 RUN	Programmable
22	RO1		
23	RO1		
24	RO2	Relay output 2 MECHANICAL BRAKE	Programmable
25	RO2		
26	RO2		

Table 1. Standard application default I/O configuration.

Note: See jumper selections below.
More information in Vacon NX User's Manual, Chapter 6.2.2.2.

**Jumper block X3:
CMA and CMB grounding**

- CMB connected to GND
CMA connected to GND
- CMB isolated from GND
CMA isolated from GND
- CMB and CMA internally connected together, isolated from GND

= Factory default

3. EASY START UP (M8)

The application has a special Menu for Easy Start Up (M8)

In this Menu there are the basic parameters needs in a normal commisioning.

Depending on this parameters tuning, the menú will show us the parameters related with this motor control or motor.

In the following box we can see the parameters list that we can find depending on the control which we want to make:

COMMON PARAMETERS
P8.1 – Motor Model
P8.2 – Motor Nominal Voltage
P8.3 – Motor Nominal Frequency
P8.4 – Motor Nominal Speed
P8.5 – Motor Nominal Current
P8.6 – Motor Cos phi
P8.7 – Motor Type
P8.8 – Motor Control Mode
P8.28 – Nominal Linear Speed (Installation)
P8.29 – Levelling Speed
P8.30 – Full Speed
P8.31 – Inspection Speed
P8.32 – Acceleration 1
P8.33 – Deceleration 1
P8.34 – Acceleration Increment (Jerk S1)
P8.35 – Aceleración Decrement (Jerk S2)
P8.36 – Deceleration Increment (Jerk S3)
P8.37 – Deceleration Decrement (Jerk S4)
P8.38 – Speed Control Kp1
P8.39 – Speed Control Kp2
P8.40 – Speed Control Ti1
P8.41 – Speed Control Ti2
P8.42 – Motor Direction
P8.43 – Password

Some parameters only appears depending from the Control Mode and the Motor:



PERMANENT SYNCHRONOUS MOTOR	MAGNET	CLOSE LOOP. INDUCTIVE MOTOR	OPEN LOOP. INDUCTIVE MOTOR
P8.9 – Encoder Type		P8.11 – Encogger Pulse	P8.15 – Identification
P8.10 – Invert Direction		P8.12 – Magnetizing Current	P8.16 – U/f Ratio Select
P8.13 – Enable Angle Com			P8.17 – U/f Optimization
P8.14 – 0 Pos Angle LoWo			
P8.18 – Load Cell		<i>Activate the Start Control with a Load Cell.</i>	
P8.19 – Tune Load Cell		<i>Load Cell Auto Tune, if it's in use.</i>	
P8.20 – RollBack Controller		<i>Rollback controller Activation, from the software.</i>	
P8.21 – Brake Previous Time		<i>Rollback tuning parameters, from the software controllers.</i>	
P8.22 – Alter Brake open time			
P8.23 – Kp Initial			
P8.24 – Ti Initial			
P8.25 – High RollBack Gain			
P8.26 – High RollBack Time			
P8.27 – High RollBack Sens.			

If we need more adjustments, then we will go to the M2 menu (Parameters), where we can find all the parameters to can tune the drive.

4. Lift Application – Parameter lists

On the next pages you will find the lists of parameters within the respective parameter groups. The parameter descriptions are given on pages 19 to 49.

Column explanations:

Code	= Location indication on the keypad; Shows the operator the present parameter number
Parameter	= Name of parameter
Min	= Minimum value of parameter
Max	= Maximum value of parameter
Unit	= Unit of parameter value; Given if available
Default	= Value preset by factory
Cust	= Customer's own setting
ID	= ID number of the parameter (used with PC tools)
	= Apply the <i>Terminal to Function</i> method (TTF) to these parameters.
	= On parameter code: Parameter value can only be changed after the frequency converter has been stopped.

4.1 Monitoring values (Control keypad: menu M1)

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

See [Vacon NX User's Manual, Chapter 7](#) for more information.

Code	Parameter	Unit	ID	Description
V1.1	Output frequency	Hz	1	Output frequency to motor
V1.2	Frequency reference	Hz	25	Frequency reference to motor control
V1.3	Motor speed	rpm	2	Motor speed in rpm
V1.4	Motor current	A	3	
V1.5	Motor torque	%	4	In % of the nominal motor torque
V1.6	Motor power	%	5	Motor shaft power
V1.7	Motor voltage	V	6	
V1.8	DC link voltage	V	7	
V1.9	Unit temperature	°C	8	Heatsink temperature
V1.10	Terminal 8 State		1820	Function of this terminal and state
V1.11	Terminal 9 State		1821	Function of this terminal and state
V1.12	Terminal 10 State		1819	Function of this terminal and state
V1.13	DIN1, DIN2, DIN3		15	Digital input statuses
V1.14	Terminal 14 State		1821	Function of this terminal and state
V1.15	Terminal 15 State		1822	Function of this terminal and state
V1.16	Terminal 16 State		1823	Function of this terminal and state
V1.17	DIN4, DIN5, DIN6		16	Digital input statuses
V1.18	Terminal 20 State		1824	Function of this terminal and state
V1.19	Terminals 22-23 State		1825	Function of this relay and state
V1.20	Terminals 25-26 State		1826	Function of this relay and state
V1.21	DO1, RO1, RO2		17	Digital and relay output statuses
V1.22	Voltage input	V	13	A11
V1.23	Current input	mA	14	A12
V1.24	Lift Speed	m/s	1630	Lift speed in m/s
V1.25	Encoder Speed	Hz	1631	Lift speed measured from encoder
V1.26	Speed State		1833	At speed, accelerating, decelerating or stop
V1.27	Working as		1834	Stopped, Motor or Generator

V1.28	Lift in floor		1805	Number of floor that lift is stopped (only with ACC)
V1.29	Actual Height	cm/mm	1847	Actual Height in cm from ground floor (only ACC)
V1.30	Total Height	cm/mm	1848	Total height of bulding
V1.31	Ramp Down Distance	m	1634	Distance when decelerated from any speed to levelling speed (or zero speed).
V1.32	Number of Calibrations	/day	1877	Number of calibrations per day
V1.33	Number of Starts	/day	1878	Number of starts per day
V1.34	End RampDown Time	s	1908	Time between Run signals disappears and Stop Cycle finish.
V1.35	Change Distance	cm/mm	1961	Show the distance between the speed change detector and stop floor.
V1.36	Evacuation Speed	m/s	1999	Show the elevator speed in mode evacuation.
G1.37	Multimonitor			Three different value can be monitored at the same time

Table 2. Monitoring values

Basic parameters (Control keypad: Menu M2 → G2.1)

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.1.1	Nominal voltage of the motor	180	690	V	NX2: 230V NX5: 400V NX6: 690V		110	
2.1.2	Nominal frequency of the motor	30,00	320,00	Hz	50,00		111	Check the rating plate of the motor
P2.1.3	Nominal speed of the motor	300	20 000	rpm	1440		112	Check the rating plate of the motor
P2.1.4	Nominal current of the motor	1 x I _L	2,5 x I _L	A	I _L		113	Check the rating plate of the motor
P2.1.5	Motor cosφ	0,30	1,00		0,85		120	Check the rating plate of the motor
P2.1.6	Current limit	0,1 x I _L	2,5 x I _L	A	1,5 x I _L		107	Maximum Current Enable
P2.1.7	Motor Type	0	1		0		1650	0 = Inductive Asynchronous Motor 1 = Permanent Magnet Synchronous Motor
P2.1.8	Motor Model	0	3		0		1935	0 = Without data 1 = DIANA 450 2 = DIANA 630

Table 3. Basic parameters G2.1

4.3 Speed Control Parameters (Control keypad: Menu M2 → G2.2)

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.2.1	Nominal Linear Speed	0,20	5,00	m/s	1,00		1500	
P2.2.2	Speed Reference Selection	0	6	s	0		117	0 =Activity Reference 1 =Activ ref. With direction 2 =Binary reference 3 =AI1 (Voltage input) 4 =AI2 (Current input) 5 =Fieldbus 6 =Keypad 7 =Timing
P2.2.3.x	Speed Reference [m/s]							
P2.2.3.1	Levelling Speed	0,00	par2.2.1	m/s	0,10		1501	Parameters correspond to parameters in group 2.2.4. They will be updated automatically if parameters are changed. These arameters are also updated when P2.2.1 is changed.
P2.2.3.2	Full Speed	0,00	par2.2.1	m/s	1,00		1502	
P2.2.3.3	Limited Speed	0,00	par2.2.1	m/s	0,25		1503	
P2.2.3.4	Inspection Speed	0,00	1,5xP2.2.1	m/s	0,50		1504	
P2.2.3.5	Intermediate Speed	0,00	par2.2.1	m/s	0,50		1505	
P2.2.3.6	Speed Reference 5	0,00	par2.2.1	m/s	1,00		1506	
P2.2.3.7	Speed Reference 6	0,00	par2.2.1	m/s	0,25		1507	
P2.2.3.8	Speed Reference 7	0,00	par2.2.1	m/s	0,50		1508	
P2.2.3.9	Override speed	0,00	1,5xP2.2.1	m/s	0,10		1613	
Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.2.5.x	SPEED CURVE 1							
P2.2.5.1	Acceleration	0,20	2,00	m/s ²	0,50		103	
P2.2.5.2	Deceleration	0,20	2,00	m/s ²	0,65		104	
P2.2.5.3	Acceleration increase jerk 1	0,01	1,00	S	1,00		1540	
P2.2.5.4	Acceleration Decrease jerk 1	0,01	1,00	S	1,00		1541	
P2.2.5.5	Deceleration increase jerk 1	0,01	1,00	S	0,40		1542	
P2.2.5.6	Deceleration decrease jerk 1	0,01	1,00	S	1,0h0		1543	
P2.9.10	Lineal Speed Source	0	1		0		1897	0 =from parameter 1 =from mechanics

Table 4. Speed control parameters G2.1

Mechanical Brake control parameters (Control keypad: Menu M2 → G2.3)

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.3.1.x	OPEN LOOP PARAMETERS							
P2.3.1.1	Current limit	0	1,5 x I _n	A	0,0		1551	Value is changed when parameter 2.1.4 is set.
P2.3.1.4	Brake open delay	0	1,00	s	0,50		1554	
P2.3.1.5	Freq. Limit close	0	20,00	Hz	0,50		1555	
P2.3.1.6	Brake close delay	0	5,00	s	0,30		1556	
P2.3.1.9	DC braking current	0,15 x I _n	1,5 x I _n	A	I _{n motor}		507	
P2.3.1.10	DC braking time at start	0,00	60,00	s	0,510		1559	0=DC brake is off at start
P2.3.1.11	DC braking time at stop	0,00	60,00	s	1,000		1560	0=DC brake is off at stop
P2.3.1.12	Frequency to start DC braking during ramp stop	0,10	10,00	Hz	0,50		515	
P2.3.2.x	CLOSED LOOP PARAMETERS							
P2.3.2.4	Brake open delay	0	1,00	s	0,30		1564	
P2.3.2.5	Freq. Limit close	0	20,00	Hz	0,01		1565	
P2.3.2.6	Brake close delay	0	5,00	s	0,50		1566	
P2.3.2.8	0Hz time at start	0	2,000	s	0,700		615	
P2.3.2.9	0Hz time at stop	0	2,000	s	0,800		616	
P2.3.2.10	Smooth start time	0	1,00	s	0,70		1568	
P2.3.2.11	Smooth start freq.	0	5,00	Hz	0,05		1569	
P2.3.2.14	Torque RampDown Time	0,00	1,00	s	0		1898	Torque Rampdown
P2.3.2.15	Auto Start StopTime	0	1		1		1963	Auto Start StopCalculation
P2.3.3.x	DIGITAL INPUTS							
P2.3.3.1	Ext. brake control				0.2		1601	
P2.3.3.2	Ext. brake supervision				0.2		1602	
P2.3.4.x	BRAKE SUPERVISION							
P2.3.4.1	External brake supervision time	0,00	5,00	s	1,00		1603	
P2.3.4.2	External brake supervision inversion	0	1		0		1902	0 = No inverted 1 = Inverted

Table 5. Mechanical brake control parameters, G2.4

Drive control parameters (Control keypad: Menu M2 → G2.4)

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.4.2	Stop function	0	1		2		506	0=Coasting 1=Ramping 2=Stop by Freq. Limit
P2.4.3	Frequency limit	0	MaxFreq	Hz	1,50		1624	Used only if par 2.4.2=2
P2.4.7	Half Floor Function	0	2		0		1801	0 = Normal 1 = Capture Floors 2 = AutoCurve Compensation
P2.4.8	Half Floor Sensibility	0,00	5,00	Hz	0,10		1905	Ffrequency offset to detect half floor
P2.4.9	Inspection Stop Mode	0	1		0		1903	0 = Coasting 1 = Stop by ramping
P2.4.10	Compensation Frequency	0	MaxFreq	Hz	0,00		1990	For short floors, enabling P2.2.6.3 and P2.2.6.5

Table 6. Drive control parameters, G2.5

Motor control parameters (Control keypad: Menu M2 → G2.5)

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.5.1	Motor control mode	0	1		1		1572	0=Frequency control 1=Speed control, (OL) 2=Speed control, (CL)
P2.5.2.x	U/f CURVE POINTS FOR OPEN LOOP							
P2.5.2.1	U/f ratio selection	0	3		0		1574	0=Linear 1=Squared 2=Programmable 3=Linear with flux optim.
P2.5.2.2	U/f curve midpoint frequency	0,00	P2.6.4	Hz	5,00		1575	
P2.5.2.3	U/f curve midpoint voltage	10,00	200,00	%	10,00		603	n% x U _{nmot} Parameter max. value = par. 2.6.7
P2.5.2.4	Output voltage at zero frequency	0,00	40,00	%	2,00		1577	n% x U _{nmot}
P2.5.2.5	U/f optimisation	0	1		0		1573	0=Not used 1=Automatic torque boost
P2.5.15	Motor Direction	0	1		0		1974	0 = No Inverted 1 = Inverted

Table 7. Motor control parameters, G2.6

Input signals (Control keypad: Menu M2 → G2.6)

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.6.7.x	DIGITAL INPUTS							
P2.6.7.1	External Fault, closing contact				0.1		1513	Programmable: AI1 = 0.10 AI2 = 0.09 AI1 = 0.10 AI1 = 0.10
P2.6.7.2	External fault, opening contact				0.2		1514	
P2.6.7.3	Fault reset				0.1		1515	
P2.6.7.4	Run enable				0.2		1516	
P2.6.7.5	Acceleration/Decel time selection				0.1		1517	
P2.6.7.6	Stop by coast, closing contact				A.3		1518	
P2.6.7.7	Stop by coast, opening contact				0.2		1519	
P2.6.7.8	Override speed				0.1		1520	
P2.6.7.9	Forced I/O control				0.1		1521	
P2.6.7.10	Speed selection input 1				A.4		1521	
P2.6.7.11	Speed selection input 2				A.5		1522	
P2.6.7.12	Speed selection input 3				A.6		1523	
P2.6.7.13	Calibration				0.1		1698	
P2.6.7.14	Stop Coasting Falling Edge				0.1		1812	
P2.6.7.15	PhotoMonitor				0.1		1829	
P2.6.7.16	Shortcircuit C				0.1		1950	
P2.6.7.17	Shortcircuit O				0.2		1951	
P2.6.7.18	Door Flag				D.2		1724	
P2.6.7.19	Lower PreEnd				A.6		1723	

P2.6.7.20	Higher PreEnd				D.4		1728	
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Table 8. Input signals, G2.2

Output signals (Control keypad: Menu M2 → G2.7)

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.7.6	Digital output 1 function	0	20		3		312	<ul style="list-style-type: none"> 0=Not used 1=Ready 2=Run 3=Fault 4=Fault inverted 5=FC overheat warning 6=Ext. fault or warning 7=Ref. Fault or warning 8=Warning 9=Reversed 10=Preset speed 11=At speed 12=Mot. Regulator active 13=OP freq. Limit superv. 14=Control place: IO 15=ThermalFit/Wrn 16=FB DigInput1 17=Speed below limit 18=Torque above limit 19=Mech. Brake ctrl 20=Mech. Brake ctrl inv. 21=Open Doors 22=AutoCalibration
P2.7.10	Relay output 1 function	0	14		2		313	As parameter 2.7.6
P2.7.14	Relay output 2 function	0	14		19		314	As parameter 2.7.6
P2.7.21	Speed Open Doors	0,00	0,50	m/s	0,30		1815	
B2.7.24.x	MANUAL TEST OUTPUTS							
B2.7.24.1	Test DO1							Pressing Enter test Digital Output
B2.7.24.2	Test RO1							Pressing Enter test Relay 1
B2.7.24.3	Test RO2							Pressing Enter test Relay 2

Table 9. Output signals, G2.7

Protections (Control keypad: Menu M2 → G2.8)

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.8.4.x	LIFT SUPERVISION							
P2.8.4.2	Shaft speed fault	0	2		0		1581	0=No action 1=Warning 2=Fault
P2.8.4.3	Shaft speed supervision time	0	1,00	s	0,40		1582	
P2.8.4.4.x	SHAFT SPEED SUPERV. LIMIT							
P2.8.4.4.1	Shaft speed superv. Limit[m/s]	0	P2.2.1	m/s	0,30		1583	Same parameters with different units
P2.8.4.4.2	Shaft speed superv. Limit [Hz]	0	P2.1.2	Hz	15,00		1584	
P2.8.4.7	Response to control conflict	0	2		2		1587	0=No action 1=Warning 2=Fault
P2.8.4.8	Minimum current	0	P1.1.4	A	0,05% In _{motor}		1588	0=No action
P2.8.4.9	Sensibility Minimum Current	0	5,00	s	0,50		1839	Delay to detect minimum current
P2.8.4.10	0 Hz speed response	0	3		0		1589	0=Not used 1=Warning 2=Warning+Stop 3=Fault
P2.8.4.11	Encoder Fault	0	2		2		1803	0=Fault 1=No Action
P2.8.4.12	Brake Mode Warning	0	1		1		1804	0=No response 1=Warning
P2.8.4.13	Start-Stop Sequence Fault	0	2		2		1810	0=No response 1=Warning 2= Fault,stop by coasting
P2.8.4.14	Sensibility Start-Stop Sequence	0	9,00	s	2,00		1811	Delay to detect fault in Start-Stop sequence
P2.8.4.15	Encoder Direction AutoInversion	0	1		1		1885	0 = Disable 1 = Enable
P2.8.4.16	Absolute Speed Fault	0	2		2		1899	0=No response 1=Warning 2= Fault,stop by coasting
P2.8.4.17	Absolute Speed Limit	NomSpd	5,00	m/s	1,20		1900	
P2.8.4.21	Ends Safety Speed	0	5,00	m/s	0,70		1725	Speed Superv. in limits
P2.8.4.22	Ends Safety Decel.	1	2,00	s	0,5		1726	Time from MaxFreq-0Hz
P2.8.4.23	Slip Timer Intermediate Speed	0	999,9	s	0		1730	Timer for Slip Supervision when intermediate speed
P2.8.4.24	Slip Timer Nominal Speed	0	999,9	s	0		1731	Timer for Slip Supervision when nominal speed

Table 10. Protections, G2.8

Autorestart parameters (Control keypad: Menu M2 → G2.9)

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.9.1	Wait time	0,10	10,00	s	0,50		717	
P2.9.2	Trial time	0,00	60,00	s	30,00		718	
P2.9.4	Number of tries after undervoltage trip	0	10		0		720	
P2.9.11	Number of tries Start-Stop Sequence trip	0	10		5		1809	

Table 11. Autorestart parameters, G2.9

Evacuation parameters (Control keypad: Menu M2 → G2.10)

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.10.3	Control mode	0	3		0		1592	0=Frequency control 1=Speed control
P2.10.4	Direction change delay	0	20,00	s	5,00		1593	
P2.10.5	Test time	0	20,00	s	3,00		1594	
P2.10.6	Current read delay	0	20,00	s	1,50		1595	
P2.10.11.x	MAX SPEED IN EVACUATION							
P2.10.11.1	Max speed in evacuation [m/s]	0	0.4 x P2.2.1	m/s	0,10		1616	Same parameters with different units. Max value is 40% of nom. Value.
P2.10.11.2	Max speed in evacuation [Hz]	0	0.4 x P2.1.2	Hz	5,00		1617	
P2.10.x	EVACUATION PARAMETERS							
P2.10.13	Motor Limit	0	100%		30		1911	0 = No 1 = Yes 0 = No 1 = Yes
P2.10.15	Evacuation Start Delay	0	20,00	s	3,00		1913	
P2.10.16	Evacuation Stop delay	0	20,00	s	1,00		1914	
P2.10.17	Disable Rollback Controller	0	1		1		1719	
P2.10.18	Disable Noise Reduction	0	1		1		1737	

Table 12. Evacuation parameters, G2.10

Closed loop parameters (Control keypad: Menu M2 → G2.11)

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.11.3	Invert Encoder Direction	0	1		0		1886	0 = No 1 = Yes
P2.11.4	Speed control limit 1	0	Par. 2.11.5		5,00		1618	
P2.11.5	Speed control limit 2	Par. 2.11.4	0.01Hz		10,00		1619	
P2.11.6	Speed control Kp 1	0	1000		30		1620	
P2.11.7	Speed control Kp 2	0	1000		30		1621	
P2.11.8	Speed control Ti 1	0	500	ms	30,0		1622	
P2.11.9	Speed control Ti2	0	500	ms	30,0		1623	
P2.11.17	Fixed End Ramp	0	1		1		1835	0 = Not Active 1 = Active
P2.11.18.X	FIXED EN RAMP							
P2.11.18.1	Deceleration	0,20	2,00	m/s ²	0,80		1836	
P2.11.18.2	Deceleration increase jerk	0,01	3,00	s	1,50		1837	
P2.11.18.3	Deceleration decrease jerk	0,01	3,00	s	2,50		1838	
P2.11.19	Encoder Type	0	0		0		1717	0 = EnDat

Table 13. Closed loop parameters, G2.11
Open loop parameters (Control keypad: Menu M2 → G2.12)

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.12.1	Identification	0	1		0		631	Motor Identification in (OL), Motor Standstill
P2.12.3	IrAddGenScale	0	200	%	0		665	Only active if P2.5.2.5 = 1
P2.12.4	IrAddMotorScale	0	200	%	100		667	Only active if P2.5.2.5 = 1
P2.12.8	Soft Start	0	1		0		1889	0 = Active 1 = Inactive

Table 14. Open loop parameters, G2.12

Permanent Magnet Synchronous Motors (Ctrl.K Menu M2 → G2.13)

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P2.13.1	Enable Angle Com	0	1		0		1695	Find position 0 of encoder
P2.13.3	0 Pos Angle LoWo0	0	65535		0		1696	
P2.13.4	0 Pos Angle HiWo0	0	65535		0		1697	
P2.13.5	Load Cell	0	1		0		1893	0 = Inactive 1 = Active
P2.13.8	Roll Back Controller	0	3		0		1969	0 = No action 1 = Slow Roll Back 2 = High RollBack 3 = Full Rollback
P2.13.9	Time before open brake	0	2,00	s	0,10		1933	Negative RB window
P2.13.10	Time after open brake	0	1,00	s	0,10		1932	Positive RB windows
P2.13.11	Mecanical Brake delay	0	1,00	s	¿?		1958	Not writeable. Only Monitor
P2.13.12	Kp Initial	0	100		50		1931	Speed Gain for Rollback controller
P2.13.13	Ti Initial	0	500,0	ms	10,0		1930	Speed Ti for Rollback controller
P2.13.14	Smoother	0	0	s	1,00		1973	
P2.13.15	Rollback Gain	0	327,67	%	1,00		1970	Position Gain for Rollback controller
P2.13.16	Rollback Timing	0	-0,10	1,00	0,10		1971	Extra actuation time position controller
P2.13.17	RB Sensibility	0	-100	100	-10		1972	Wake movement for position controller

Table 15. Permanent Magnet Synchronous Motors parameters, G2.13

Automatic Profile Compensation (Control keypad: Menu M2 → G2.14)

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
B2.14.1	Capture Height	0	1					Capture total height of bulding
P2.14.2	Calibration Sensor Position	0	2		0		1881	0 = ? 1 = Ground Floor 2 = Top Floor
P2.14.3	Distance at Levelling Speed	0	99	cm	15		1802	Distance to being in levelling speed before landing
P2.14.5	Offset Compensation	-90	90	%	10		1808	Offset in speed corrections
P2.14.6.X MECHANICAL DATAS								
P2.14.6.1	Gear Box Relation	1	500		1		1754	
P2.14.6.2	Pulley Diameter	1	1000	mm	1		1755	
P2.14.7.X CAPTURE FLOORS								
P2.14.7.1	Ground Floor	0	0	cm/mm	0		1846	Appears if calibration sensor is in ground floor
P2.14.7.3	Floor 1	0	65535	cm/mm	0		1757	First floor from sensor floor
P2.14.7.4	Floor 2	0	65535	cm/mm	0		1758	Second floor from sensor floor
P2.14.7.5	Floor 3	0	65535	cm/mm	0		1759	
P2.14.7.6	Floor 4	0	65535	cm/mm	0		1760	
P2.14.7.7	Floor 5	0	65535	cm/mm	0		1761	
P2.14.7.8	Floor 6	0	65535	cm/mm	0		1762	
P2.14.7.9	Floor 7	0	65535	cm/mm	0		1763	
P2.14.7.10	Floor 8	0	65535	cm/mm	0		1764	
P2.14.7.11	Floor 9	0	65535	cm/mm	0		1765	

P2.14.7.12	Floor 10	0	65535	cm/mm	0		1766	
P2.14.7.13	Floor 11	0	65535	cm/mm	0		1767	
P2.14.7.14	Floor 12	0	65535	cm/mm	0		1768	
P2.14.7.15	Floor 13	0	65535	cm/mm	0		1769	
P2.14.7.16	Floor 14	0	65535	cm/mm	0		1770	
P2.14.7.17	Floor 15	0	65535	cm/mm	0		1771	
P2.14.7.18	Floor 16	0	65535	cm/mm	0		1772	
P2.14.7.19	Floor 17	0	65535	cm/mm	0		1773	
P2.14.7.20	Floor 18	0	65535	cm/mm	0		1774	
P2.14.7.21	Floor 19	0	65535	cm/mm	0		1775	
P2.14.7.22	Floor 20	0	65535	cm/mm	0		1776	
P2.14.7.23	Floor 21	0	65535	cm/mm	0		1777	
P2.14.7.24	Floor 22	0	65535	cm/mm	0		1778	
P2.14.7.25	Floor 23	0	65535	cm/mm	0		1779	
P2.14.7.26	Floor 24	0	65535	cm/mm	0		1780	
P2.14.7.27	Floor 25	0	65535	cm/mm	0		1781	
P2.14.7.28	Floor 26	0	65535	cm/mm	0		1782	
P2.14.7.29	Floor 27	0	65535	cm/mm	0		1783	
P2.14.7.30	Floor 28	0	65535	cm/mm	0		1784	
P2.14.7.31	Floor 29	0	65535	cm/mm	0		1785	
P2.14.7.32	Floor 30	0	65535	cm/mm	0		1786	
P2.14.7.33	Floor 31	0	65535	cm/mm	0		1787	
P2.14.7.34	Floor 32	0	65535	cm/mm	0		1788	
P2.14.9.X	SKIIP FLOORS							
P2.14.9.1	Change distance	0	5	cm	1,40		1959	Distance between the Speed change flags and floors.
P2.14.9.2	Skiip frequency	0	10	Hz	3,00		1960	At this frequency the elevator has to skip the floor.
P2.14.9.4	Error Distance	0	2000	cm/mm	100		1735	If real distance of speed change flag is lower than P2.14.9.1 – P2.14.9.3 , then skip floor is activated
P2.14.8.X	AUTOMATIC CURVE COMPENSATION							
P2.14.10	Aut. Curve Compensation	0	1		0		1962	Make the Aut. Curve Compensation in all the floors.
P2.14.11	Accuracy	0	1		1		1727	0 = cm 1 = mm
P2.14.12	Maximum Frequency when no positioning	0	MaxFre _q	Hz	10,00		1729	When system is not positioning that's the maximum speed possible
P2.14.13	Lost Distance	0	5000	cm/mm	500		1734	If real distance of speed change flag is higher P2.14.9.1 + P2.14.13, then positioning is disabled

Table 6. AutoCurve Compensation parameters, G2.14

4.16 Keypad control (Control keypad: Menu M3)

The parameters for the selection of control place and direction on the keypad are listed below. See the Keypad control menu in the Vacon NX User's Manual.

Code	Parameter	Min	Max	Unit	Default	Cust	ID	Note
P3.5	Programming Level	0	2		0		1806	0 = Basic 1 = Medium 2 = High
P3.6	PhotoMonitor Trigger	0	4		0		1827	0 = Fault 1 = Digital Input (Programmable P2.6.7.15) 2 = DO1 3 = RO1 4 = RO2
B3.7	Reset Counters	0	1					Pressing Enter resets the starts/day and calibrations/day counters

Table 16. Keypad control parameters, M3

4.17 System menu (Control keypad: 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 Chapter 7.3.6 in the Vacon NX User's Manual.

4.18 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 Chapter 7.3.7 in the Vacon NX User's Manual.

4.19 Easy Start Up (Control keypad: Menu M8)

This Menu helps to make an easy commissioning, showing only the more basic parameters needed to start up the system.

4.20 Photo Monitor (Control keypad: Menu M9)

This menu have all the information related with system, captured by trigger signal. The trigger has two different ways to be executed (working at same time):

- 1- from selection P3.6
- 2- Pressing "Enter" in Monitor menu. That's help us to capture all the information while we are viewing some of the variables of monitor menu.

The information that Photo Monitor captures in every trigger are:

Code	Parameter	Unit	ID	Description
V9.1	Output frequency	Hz	1851	Output frequency to motor
V9.2	Frequency reference	Hz	1873	Frequency reference to motor control
V9.3	Motor speed	rpm	1852	Motor speed in rpm
V9.4	Motor current	A	1850	
V9.5	Motor torque	%	1849	In % of the nominal motor torque
V9.6	Motor power	%	1853	Motor shaft power
V9.7	Motor voltage	V	1876	
V9.8	DC link voltage	V	1854	
V9.9	Terminal 8 State		1855	Function of this terminal and state
V9.10	Terminal 9 State		1856	Function of this terminal and state
V9.11	Terminal 10 State		1857	Function of this terminal and state
V9.12	DIN1, DIN2, DIN3		1858	Digital input statuses
V9.13	Terminal 14 State		1859	Function of this terminal and state
V9.14	Terminal 15 State		1860	Function of this terminal and state
V9.15	Terminal 16 State		1861	Function of this terminal and state
V9.16	DIN4, DIN5, DIN6		1862	Digital input statuses
V9.17	Terminal 20 State		1863	Function of this terminal and state
V9.18	Terminals 22-23 State		1864	Function of this relay and state
V9.19	Terminals 25-26 State		1865	Function of this relay and state
V9.20	DO1, RO1, RO2		1866	Digital and relay output statuses
V9.21	Lift Speed	m/s	1867	Lift speed in m/s
V9.22	Encoder Speed	Hz	1868	Lift speed measured from encoder
V9.23	Speed State		1869	At speed, accelerating, decelerating or stop
V9.24	Working as		1870	Stopped, Motor or Generator
V9.25	Lift in floor		1871	Number of floor that lift is stopped (only with ACC)
V9.26	Actual Height	cm/ mm	1872	Actual Height in cm from ground floor (only ACC)
V9.27	Fault triggered		1874	0 = No 1 = Yes If the Photo Monitor has been triggered by fault
V9.28	Trigger Fault Code		1875	Fault code that triggered the Photo Monitor

Table 178. Photo Monitor Menu, M9

5- Description of parameters

5.1 BASIC PARAMETERS

2.1.1 **Nominal voltage of the motor**

INDUCTION MOTORS: Find this value U_n on the rating plate of the motor. This parameter sets the voltage at the field weakening point ([parameter 2.5.5](#)) to $100\% \times U_{n\text{motor}}$.

PERMANENT MAGNET MOTORS: This value must be programmed with the main line voltage. This is not fixing the field weakening point like in induction motors.

2.1.2 **Nominal frequency of the motor**

Find this value f_n on the rating plate of the motor. This parameter sets the field weakening point ([parameter 2.5.4](#)) to the same value.

Nominal frequency of the motor correspond the nominal lift speed ([parameter 2.2.1](#))

2.1.3 **Nominal speed of the motor**

Find this value n_n on the rating plate of the motor.

2.1.4 **Nominal current of the motor**

Find this value I_n on the rating plate of the motor.

2.1.5 **Motor cos phi**

Find this value "cos phi" on the rating plate of the motor.

2.1.6 **Current limit**

This parameter determines the maximum motor current from the frequency converter. To avoid motor overload, set this parameter according to the rated current of the motor. The current limit is 1.5 times the rated current (I_L) by default.

2.1.7 **Motor Type**

Select the motor type AC inductive Asynchronous motor or Permanent Magnet Synchronous motor.

2.1.8 **Motor data**

This parameter is only used if we are working with a Permanent Magnet Synchronous motor and it tune automatically some parameters.

0 = Without Data.
1 = DIANA 450
2 = DIANA 630

5.2 SPEED CONTROL

2.2.1 Nominal Linear Speed

Nominal linear speed corresponds to the lift speed at nominal frequency of the motor ([parameter 2.1.2](#))

Speed parameters in group 2.2.3 are entered in linear magnitudes and parameters in group 2.2.4 are entered in Hz. There is an internal scaling between linear speeds and frequencies. Parameters in both groups correspond to each other. If the value of the nominal linear speed is changed the parameters in group 2.2.3 are recalculated accordingly.

2.2.2 Speed reference selection

Defines which frequency reference source is selected when controlled from the I/O control place. Default value is 0.

- 0 = Activity coding
- 1 = Activity coding with direction
- 2 = Binary coding
- 3 = Voltage Input (AI1)
- 4 = Current Input (AI2)
- 5 = Fieldbus
- 6 = Keypad
- 7 = Timing

Speed reference can be determined in three different ways with digital inputs. Digital inputs are programmable.

The first column contains the state of the digital inputs (marked as default values DIN4, DIN5 and DIN6). The correct input signal can be programmed with parameters [2.6.7.10](#), [2.6.7.11](#) and [2.6.7.12](#).

The second column contains the parameter and the next column the corresponding speed reference. The priority column defines which speed is activated if more than one digital input is activated. If Speed reference is different when running to different direction the direction is defined in direction column.

0 = Activity coding

Four different constant speeds can be selected.

DIN [4,5,6]	Parameters	SpeedRef	Priority	Direction
[0;0;0]	2.2.3.1/2.2.4.1	(levelling speed)	0 low	irrelevant
[1;0;0]	2.2.3.2/2.2.4.2	(full speed)	1 medium	irrelevant
[0;1;0]	2.2.3.3/2.2.4.3	(limited speed)	2 high	irrelevant
[0;0;1]	2.2.3.4/2.2.4.4	(inspection speed)	3 highest	irrelevant

Table 18. Activity reference.

1 = Activity coding with direction

The constant speeds are selected according to the state of digital inputs and motor direction. Four different speeds per direction are available.

DIN [4,5,6]	Parameters	SpeedRef	Priority	Direction
[0;0;0]	2.2.3.1/2.2.4.1	(levelling speed)	0 low	forward
[1;0;0]	2.2.3.2/2.2.4.2	(full speed)	1 medium	forward
[0;1;0]	2.2.3.3/2.2.4.3	(limited speed)	2 high	forward
[0;0;1]	2.2.3.4/2.2.4.4	(inspection speed)	3 highest	forward
[0;0;0]	2.2.3.5/2.2.4.5	(preset speed 4)	0 low	reverse
[1;0;0]	2.2.3.6/2.2.4.6	(preset speed 5)	1 medium	reverse
[0;1;0]	2.2.3.7/2.2.4.7	(preset speed 6)	2 high	reverse
[0;0;1]	2.2.3.8/2.2.4.8	(preset speed 7)	3 highest	reverse

Table 19. Activity reference with direction.

2 = Binary coding

Eight different constant speeds are selected according to binary word formed through digital inputs.

DIN [4,5,6]	Parameters	SpeedRef	Priority	Direction
[0;0;0]	2.2.3.1/2.2.4.1	(levelling speed)	-	irrelevant
[1;0;0]	2.2.3.2/2.2.4.2	(full speed)	-	irrelevant
[1;1;0]	2.2.3.3/2.2.4.3	(limited speed)	-	irrelevant
[0;1;0]	2.2.3.4/2.2.4.4	(inspection speed)	-	irrelevant
[0;0;1]	2.2.3.5/2.2.4.5	(preset speed 4)	-	irrelevant
[1;0;1]	2.2.3.6/2.2.4.6	(preset speed 5)	-	irrelevant
[0;1;1]	2.2.3.7/2.2.4.7	(preset speed 6)	-	irrelevant
[1;1;1]	2.2.3.8/2.2.4.8	(preset speed 7)	-	irrelevant

Table 20. Binary reference.

Speed reference [m/s] parameters (M2 -> G2.2.3)

Parameters in group 2.2.3 define the speed reference in linear magnitudes [m/s]. Parameters correspond to the parameters of group 2.2.4 and they will be updated automatically if values are changed in the other group. They will also be updated if the value of [parameter 2.2.1](#) is changed.

- 2.2.3.1** *Levelling Speed*
- 2.2.3.2** *Full Speed*
- 2.2.3.3** *Limited Speed*
- 2.2.3.4** *Inspection Speed*
- 2.2.3.5** *Intermediate Speed* (Considered as full speed for short floors)
- 2.2.3.6** *Speed reference 5*
- 2.2.3.7** *Speed reference 6*
- 2.2.3.8** *Speed reference 7*
- 2.2.3.9** *Override Speed*

Speed Curve 1 parameters (M2 -> G2.2.5)

Speed curve 1 is used as the default values for acceleration and deceleration and jerks.

2.2.5.1 **Acceleration time 1**

2.2.5.2 **Deceleration time 1**

Acceleration and deceleration of the lift car are presented in [m/s²]. Acceleration and deceleration curves are affected by the jerk time settings, too.

2.2.5.3 **Acc inc jerk 1**

Acceleration increase jerk1.
Jerk times are presented in [ms].

2.2.5.4 **Acc dec jerk 1**

Acceleration decrease jerk 1.

2.2.5.5 **Dec inc jerk 1**

Deceleration increase jerk 1.

2.2.5.6 **Dec dec jerk 1**

Deceleration decrease jerk 1.

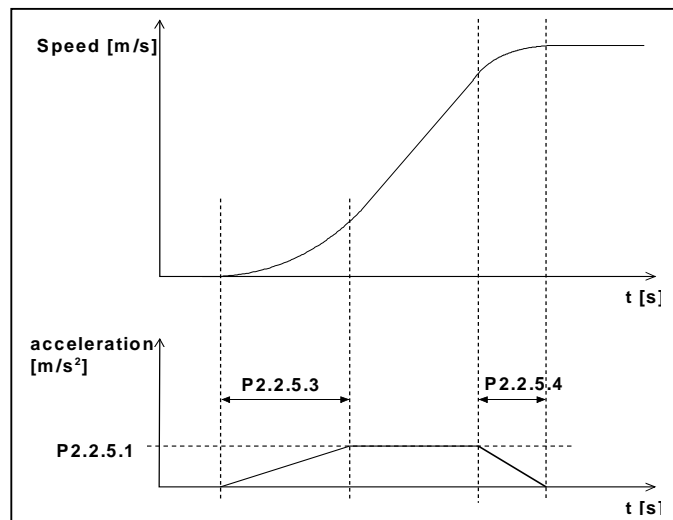


Figure 1. Jerks related to speed and acceleration

Speed Curve 1 parameters (M2 -> G2.2.6)

Parameters in group Speed curve 2 are used when internal ramp switch function is activated (see parameter P2.2.6.1). Then the Speed curve 1 parameters will be replaced by Speed curve 2 parameters.

2.2.10 Lineal Speed Source

0 = from parameter P2.2.1 (O.L and C.L)

1 = from mechanics P2.14.6.1 and P2.14.6.2 (L.C)

The monitoring of lineal lift speed (V1.24) takes the calculation source from P2.2.1 introduced, or from real speed from encoder and mechanic relation.

5.3 MECHANICAL BRAKE CONTROL

The mechanical brake control parameters affect the mechanical brake control, the smooth start and stop function and the safety functions.

The mechanical brake can be set to release on current, on torque, on frequency or on external input. The closing can be performed by frequency, by external input or by Run request signal. In case of fault the brake closes immediately without delay.

The mechanical brake control in open loop and in closed loop control mode is different. The parameters are divided in two different groups. The parameters of closed loop control group are not valid in open loop mode and vice versa. There are also some common parameters. Figure 2 and Figure 3 give a graphical presentation of the control logic of the brake control

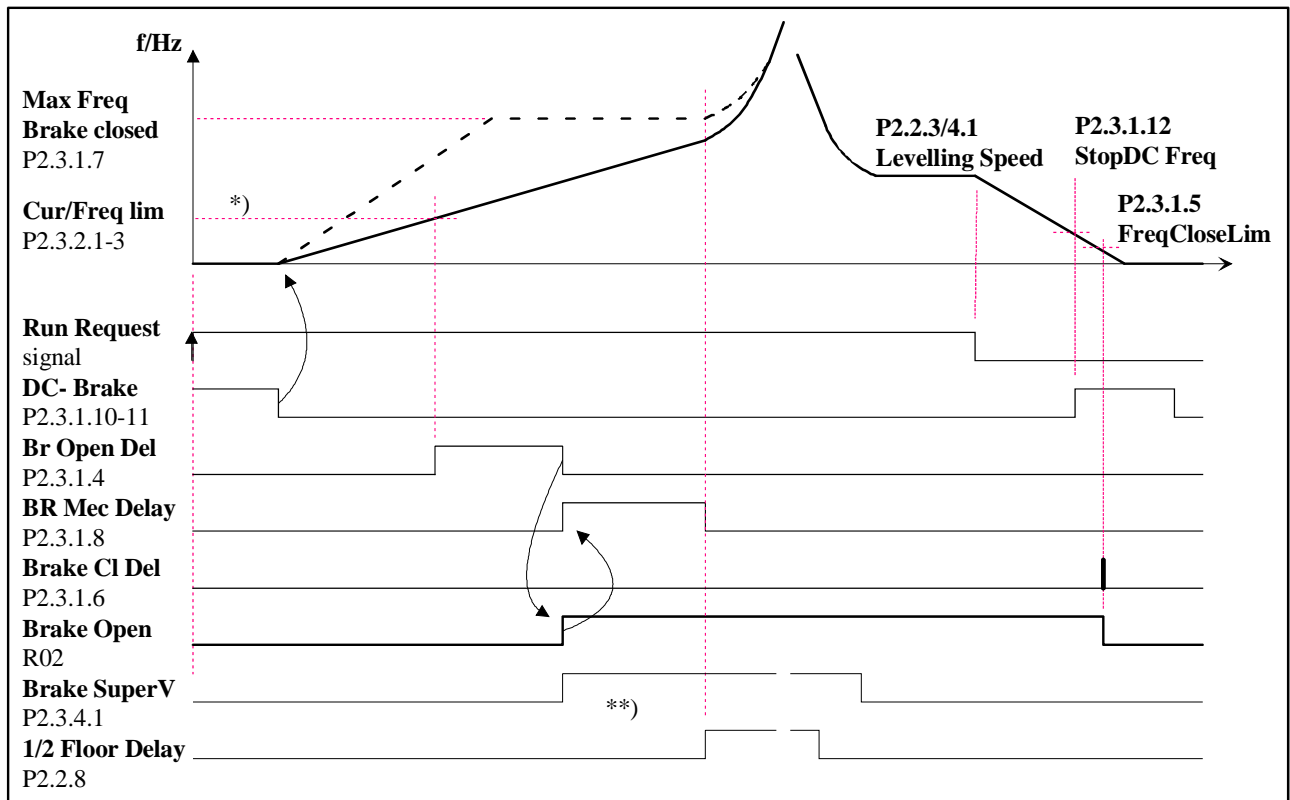


Figure 2. Mechanical brake control logic in open loop.

*) Start signal to Brake open delay when current, freq. and torque exceed limits defined by parameters. External input must be ON if used.

**) During the Brake supervision time the digital input must be switched ON if used.

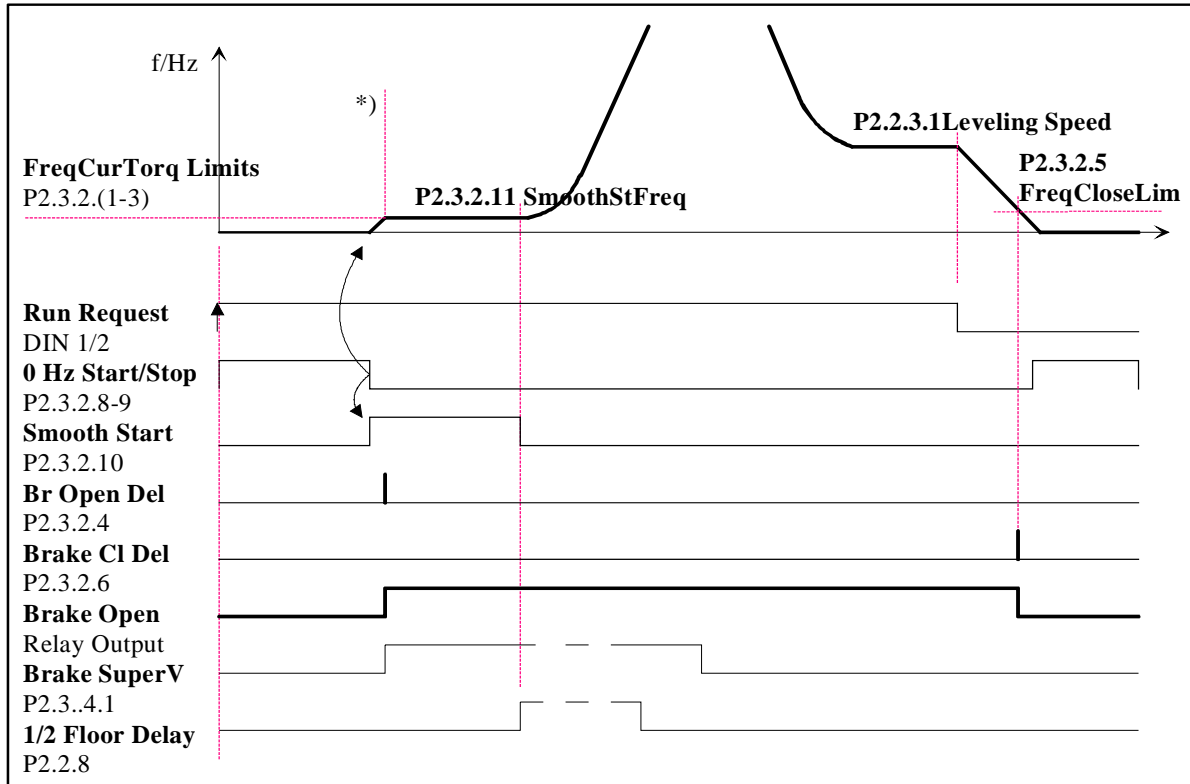


Figure 3. Mechanical brake control logic in closed loop.

*) Start signal to Brake open delay when current, freq. and torque exceed limits defined by parameters. External input must be ON if used.

**) During the Brake supervision time the digital input must be switched ON if used

Mechanical Brake Control Logic

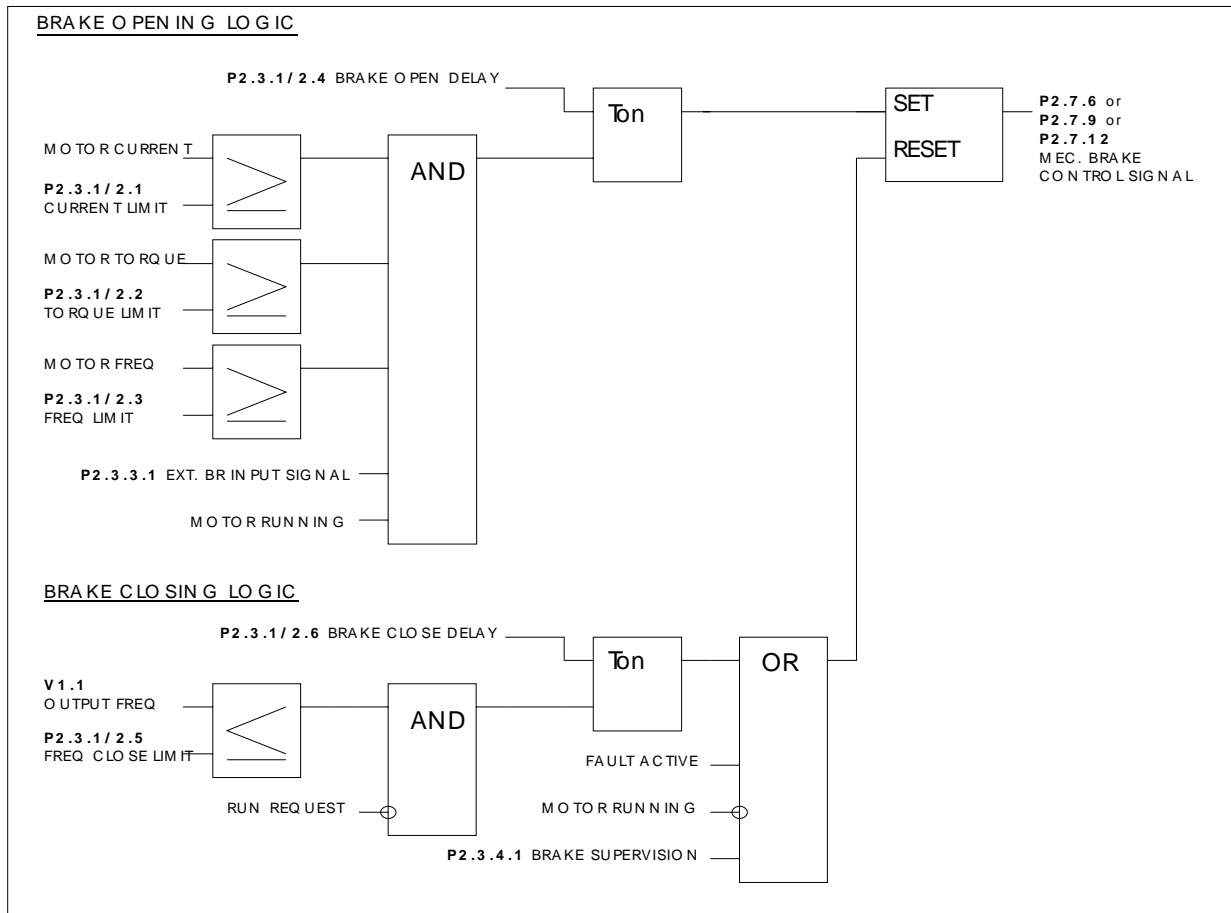


Figure 4. Mechanical brake control logic in open loop.

Mechanical brake control signal can be selected to any digital or relay output to control the external mechanical brake.

In the upper section of Figure 4 you can find the mechanical brake opening logic. Five signals and the delay are required for the mechanical brake to open. If current, torque or frequency signal is not needed for brake opening, then these parameters can be set to zero. The external brake input signal is programmable and any digital input can be used for that purpose.

In the lower section of Figure 4 you can find the mechanical brake closing logic. The brake close circuit has higher priority than the open circuit. So if closing signal is active the mechanical brake will be closed.

The brake will be closed immediately in case of fault or an external supervision signal or when the motor is stopped.

In normal operation the brake will be closed when frequency falls below the Frequency close limit (P2.3.1.5 or P2.3.2.5) and the Run Request signal is switched OFF. If the Frequency close limit signal is not needed for the closing logic it can be set to zero. After the conditions are true there is a brake close delay (P2.3.1.6/P2.3.2.6) after which the brake will be closed.

Open Loop Parameters (M2 -> G2.3.1)

Parameters in group 2.3.1.x are valid in open loop control mode only.
(parameter 2.5.1= 0 or 1).

2.3.1.1 Current Limit

Parameter defines the actual current limit that has to be exceeded for a brake release. If set to zero this condition is excluded. The value is updated always when the nominal current of the motor (parameter 2.1.4) is set (see Figure 4).

2.3.1.4 Opening delay

Delay which starts when the opening conditions (see parameters 2.3.1.1-2.3.1.3) are TRUE (see Figure 4).

2.3.1.5 Frequency limit closing

The output frequency limit for the brake closing. The run request signal needs to be disabled to allow the signal to affect.

2.3.1.6 Closing delay

The brake closing is delayed with defined time. If set to zero there is no delay between the brake closing condition and the actual brake closing.

2.3.1.9 DC-brake current

Defines the current injected into the motor during DC-braking.

2.3.1.10 DC-braking time at start

DC-brake is activated when the start command is given. This parameter defines the time before the brake is released.

2.3.1.11 DC-braking time at stop

Determines if braking is ON or OFF and the braking time of the DC-brake when the motor is stopping. The function of the DC-brake depends on the stop function, parameter 2.4.2.

- 0** DC-brake is not used
- >0** DC-brake is in use and its function depends on the Stop function, (par. 2.4.2). The DC-braking time is determined with this parameter

Par. 2.4.2 = 0; Stop function = Coasting:

After the stop command, the motor coasts to a stop without control of the frequency converter.

With DC-injection, the motor can be electrically stopped in the shortest possible time, without using an optional external-braking resistor.

The braking time is scaled according to the frequency when the DC-braking starts. If the frequency is \geq the nominal frequency of the motor, the set value of parameter 2.3.1.11 determines the braking time. When the frequency is $\leq 10\%$ of the nominal, the braking time is 10% of the set value of parameter 2.3.1.11.

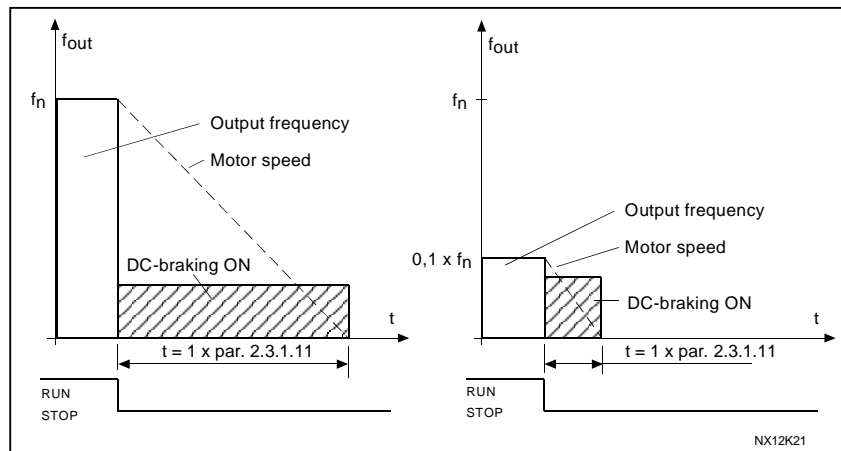


Figure 5. DC-braking time when Stop mode = Coasting.

Par. 2.4.2 = 1; Stop function = Ramp

After the Stop command, the speed of the motor is reduced according to the set deceleration parameters, as fast as possible, to the speed defined with parameter 2.3.1.12, where the DC-braking starts.

The braking time is defined with parameter 2.3.1.11. If high inertia exists, it is recommended to use an external braking resistor for faster deceleration. See Figure 6.

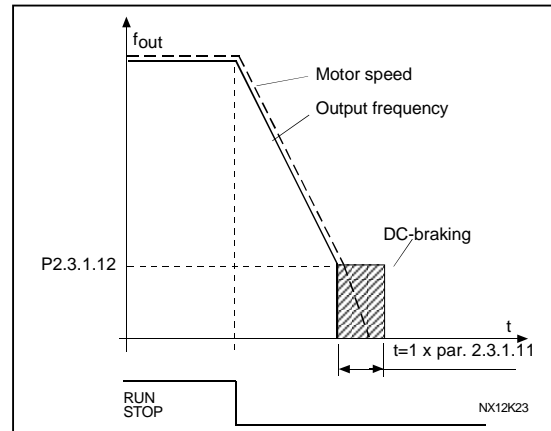


Figure 6. DC-braking time when Stop mode = Ramp

Par. 2.4.2 = 2; Stop function = Stop by frequency. limit

Stop mode depends on the actual frequency of the motor. If frequency is above the frequency limit (par. 2.4.3) then the stop mode is coasting (see Figure 5). If frequency is even or below the frequency limit then the stop mode is ramp (see Figure 6).

2.3.1.12 DC-braking frequency at stop

The output frequency which the DC-braking is applied. See Figure 6

Closed Loop Parameters (M2 -> G2.3.2)

Parameters in group 2.3.2.x are valid in closed loop motor control mode (parameter 2.5.1 =2) only.

2.3.2.4 Opening delay

Delay which starts when the opening conditions (see parameters 2.3.2.1-2.3.2.3) are TRUE (See Figure 4).

2.3.2.5 Frequency limit closing

The output frequency limit for the brake closing. The run request signal needs to be disabled to allow the signal to affect.

2.3.2.6 Closing delay

The brake closing is delayed with defined time. If set to zero there is no delay between the brake closing condition and the actual brake closing.

2.3.2.8 Zero Hz time at start

2.3.2.9 Zero Hz time at stop

Zero hertz time during start and stop. Motor can be magnetised and torque generated during that time. In closed loop mode, this time should be used. Smooth start time (par 2.3.2.10) will commence straight after zero hertz time. The mechanical brake should be set to release when this change takes place (see Figure 3).

2.3.2.10 Smooth start time

The smooth start time function is used in closed loop mode. It cannot be used in open loop. After the start command has been given the drive is rotating the motor shaft with a very low frequency (par 2.3.2.11) to overcome the static friction.

Smooth start time will commence straight after zero hertz time (par 2.3.2.8). The mechanical brake should be set to release when this change takes place. This is achieved through setting the same value for the frequency limit (par 2.3.2.3) and the smooth start frequency (par 2.3.2.11).

When smooth start time has elapsed the frequency will be released.

2.3.2.11 Smooth start frequency

Smooth start frequency is a reference frequency that is used with the smooth start time operation. Value should be set very low.

2.3.2.14 Torque Rampdown time

Active when the valule is different from 0:

- If we are working with external brake supervision (P2.3.3.2), in stop process, when converter gets the closed brake feedback, the torque rampdown is generated.
- If we are not working with external brake supervision, when stopping, after the close brake command of the drive, the timer P2.3.2.17 starts to count. When this time is reached, the torque rampdown is generated.

2.3.2.15 Auto Start Time

If we select this function, the drive calculates automatically the Start and Stop Sequence, so the P2.3.2.8 and P2.3.2.9 can't be written, because are internally updated.

Digital Inputs (M2 -> G2.3.3)

All digital inputs (except DIN1 and DIN2) are programmable.

2.3.3.1 External brake control

Programmable digital input for external brake control. If digital input is selected it must be ON before brake can be opened. If input is not used set it to default value (=0.2).

2.3.3.2 External brake supervision

Programmable digital input for external brake supervision. After the mechanical brake is released, the selected input can be used to verify the brake open state. If the input is not used, set it to default value (=0.2).

If the digital input is used it must be activated during the defined time ([parameter 2.3.4.1](#)) from the brake release. If it is not activated, external brake fault is generated.

The response to external brake fault can be set with [parameter 2.8.4.1](#).

Brake Supervision Parameters (M2 -> G2.3.4)**2.3.4.1 External brake supervision time**

A time window within which the external brake supervision input (par2.3.3.2) has to be activated after the brake is released.

2.3.4.2 External brake supervision inversion

Makes the inversion of external brake supervision.

Invert logic: brake opened = 0
 brake close = 1

5.4 DRIVE CONTROL

2.4.2 Stop function

Coasting:

- 0** The motor coasts to a halt without any control from the frequency converter, after the Stop command.

Ramp:

- 1** After the Stop command, the speed of the motor is decelerated according to the set deceleration parameters.
If the regenerated energy is high it may be necessary to use an external braking resistor for faster deceleration.

Frequency limit

- 2** Coasting Stop if the motor frequency is above the frequency limit (par. 2.4.3) when stop request is given. Stop by ramp if the motor frequency is the same or below this parameter when stop request is given.

2.4.3 Frequency limit

Defines the frequency limit for the stop function if selected as the frequency limit (par. 2.4.2=2). This value is always automatically changed when levelling speed is changed, with 2Hz over the levelling speed.

If the motor frequency is above the frequency limit the motor costs to stop and if it is below or the same as the frequency limit the stop function is ramp.


2.4.7 Half Floor Function

0 = Normal

When detect a half floor, make the necessary corrections on speed to ensure that lift will stop correctly at next landing, stopping at correct floor level.

1 = Capture Floors

This option is selected when we want to use the AutoCurve Compensation function.

This is the first step to start to configure this special function, when we select this parameter to 1, automatically starts a Wizard that guides us through the parameters and actions that we have to do. While we have this parameter in 1, in panel is blinking .

Steps to configure the AutoCurve Compensation function:

- 1) Program Mechanical Datas of machine in P2.14.6.1 (Gear Box Relation), P2.14.6.2 (Pulley Diameter).
- 2) Program situation of calibration sensor in P2.14.2
- 3) Send lift to sensor floor
- 4) Make a trip to the extreme floor (If sensor is ground floor, move the lift to top floor).
- 5) Capture the total height of bulding pressing "Enter" in B2.14.1
- 6) Check in Monitoring V1.30 the total height
- 7) Send lift to sensor floor again
- 8) Move lift to first floor from sensor
- 9) Capture height of this floor with P2.14.7.3 (Editing and Pressign "Enter")
- 10) Move lift to the next floor (second floor from sensor).
- 11) Capture height of this floor with P2.14.7.4 (Editing and Pressign "Enter")
- 12) Repeat steps 10-11 capturing all the floors, in correct parameter P2.14.7.X

13) When last floor will be captured, go to P2.4.7 = 2, then blinking **Auto** will be stop, remaining in panel remembering you are working with **AutoCurve Compensation** function.

2 = AutoCurve Compensation. (Explained in step 13)

2.4.8 **Half Floor Sensibility**

Limit under nominal speed, to detect a half floor to reduce S2. Only active when P2.4.7 = 0.

Example: P2.4.8=0,10Hz and P2.1.2 = 10,00Hz

Then system works as follows:

Under 9,90Hz the S2 is reduced, avoiding problems to stop at floor level.
Over 9,90Hz, the system works without any changes.

2.4.9 **Inspection Stop mode**

0 = Coasting

1 = Ramping Stop

2.4.10 **Compensation Frequency**

When changing from nominal speed to levelling, if the frequency is under P2.4.10, then P2.2.6.3 (Deceleration 2) and P2.2.6.5 (S₂) are activated in the main profile

5.5 MOTOR CONTROL

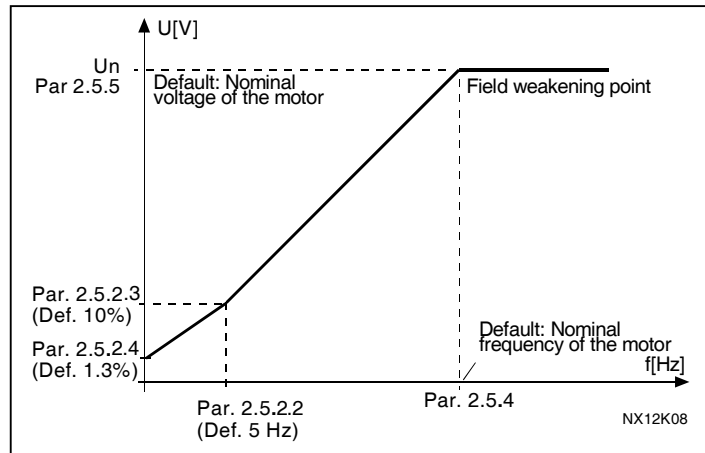
2.5.1 **Motor control mode**

- 0 Frequency control: The I/O terminal and keypad references are frequency references and the frequency converter controls the output frequency (output frequency resolution = 0.01 Hz)
- 1 Speed control: The I/O terminal and keypad references are speed references and the frequency converter controls the motor speed (accuracy $\pm 0,5\%$).
- 2 Speed control CL: Closed loop speed control mode. The I/O terminal and keypad references are speed references and the frequency converter controls the motor speed. Encoder is required. Closed loop parameters in group G2.11 must be set accordingly

2.5.2.1 **U/f ratio selection**

Linear: The voltage of the motor changes linearly with the frequency in the constant flux area from 0 Hz to the field weakening point where the nominal voltage is supplied to the motor. Linear U/f ratio should be used in constant torque applications. This default setting should be used if there is no special need for another setting.

Squared: The voltage of the motor changes following a squared curve form with the frequency in the area from 0 Hz to the field weakening point where the nominal voltage is also supplied to the motor. The motor runs under



magnetised below the field weakening point and produces less torque and electromechanical noise. Squared U/f ratio can be used in applications where torque demand of the load is proportional to the square of the speed, e.g in centrifugal fans and pumps.

Figure 7. Linear and squared change of motor voltage

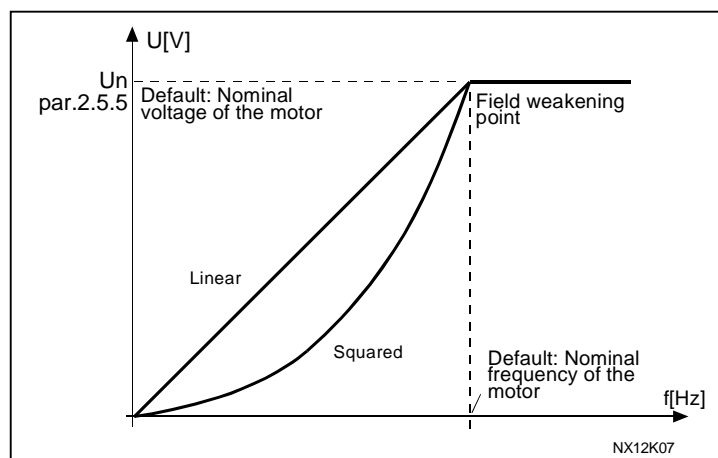
Programmable U/f curve:

- 2 The U/f curve can be programmed with three different points. Programmable U/f curve can be used if the other settings do not satisfy the needs of the application.

Figure 8. Programmable U/f curve.

Linear with flux optimisation:

- 3 The frequency converter starts to search for the minimum motor current in



order to save energy, lower the disturbance level and the noise. This function can be used in applications with constant motor load, such as fans, pumps etc.

2.5.2.2 U/f curve, middle point frequency

If the programmable U/f curve has been selected with the parameter 2.5.2.1 this parameter defines the middle point frequency of the curve. See Figure 8.

2.5.2.3 U/f curve, middle point voltage

If the programmable U/f curve has been selected with the parameter [2.5.2.1](#) this parameter defines the middle point voltage of the curve. See Figure 8.

2.5.2.4 Output voltage at zero frequency

If the programmable U/f curve has been selected with the parameter [2.5.2.1](#) this parameter defines the zero frequency voltage of the curve. See Figure 8.

2.5.2.5 U/f optimisation**Automatic torque boost**

The voltage to the motor changes automatically which makes the motor produce sufficient torque to start and run at low frequencies. The voltage increase depends on the motor type and power. Automatic torque boost can be used in applications where starting torque due to starting friction is high, e.g. in conveyors.

NOTE!

In high torque - low speed applications - it is likely that the motor will overheat. If the motor has to run a prolonged time under these conditions, special attention must be paid to cooling the motor. Use external cooling for the motor if the temperature tends to rise too high.

2.5.15 Motor Direction

0 = No Inverted
1 = Inverted

We can change the direction of motor turning without changing any cable.

Digital Inputs (M2 -> G2.6.7)

All digital inputs (except DIN1 and DIN2) are programmable. See instructions on page

- 2.6.7.1 External Fault closing contact**
- 2.6.7.2 External Fault opening contact**
- 2.6.7.3 Fault Reset**
- 2.6.7.4 Run Enable**
- 2.6.7.5 Acc/Dec time selection**
- 2.6.7.6 Stop by coast, closing contact**
- 2.6.7.7 Stop by coast, opening contact**
- 2.6.7.8 Override Speed**
- 2.6.7.9 Forced I/O control**
- 2.6.7.10 Speed selection input 1**
- 2.6.7.11 Speed selection input 2**
- 2.6.7.12 Speed selection input 3**

Parameters 2.6.7.10-2.6.7.12 are speed reference selection inputs (see also [parameter 2.2.2](#)).

2.6.7.13 Calibration

If we want to use the Automatic Profile Compensation, we have to program one digital Input as calibration of position, to make reset of encoder counter.

The sensor must be in reset lift floor (floor where the lift is sent after some malfunction, or logic control reset)

After switch on the converter, the first trip must be to calibration sensor, to start to work with Automatic Profile Compensation function.

2.6.7.14 Stop by coast, Falling Edge

2.6.7.15 Photo Monitor

If P3.6=1, then in this parameter we decide what of digital inputs trigger the Photo Monitor

2.6.7.16 Shortcircuit C.

When the motor is shortcircuited below the contactors, then the drive can give a signal from a close contact.

2.6.7.17 Shortcircuit O.

When the motor is shortcircuited below the contactors, then the drive can give a signal from an open contact.

2.6.7.18 Door Flag

Signal that lift controller send to the drive, when the lift car is in doors area.
Door Flag + Lower PreEnd = Calibration

2.6.7.19 Lower PreEnd

Signal that lift controller send to the drive, when the lift car is in the lower end limit.

2.6.7.20 Higher PreEnd

Signal that lift controller send to the drive, when the lift car is in the higher end limit.

5.7 OUTPUT SIGNALS

2.7.6 Digital output function

Setting value	Signal content
0 = Not used	Out of operation
1 = Ready	The frequency converter is ready to operate
2 = Run	The frequency converter operates (motor is running)
3 = Fault	A fault trip has occurred
4 = Fault inverted	A fault trip <u>not</u> occurred
5 = Vacon overheat warning	The heat-sink temperature exceeds +85°C
6 = External fault or warning	Fault or warning depending on par. 2.7.3
7 = Reference fault or warning	Fault or warning depending on par. 2.7.1 - if analogue reference is 4—20 mA and signal is <4mA
8 = Warning	Always if a warning exists
9 = Reversed	The reverse command has been selected
10 = Preset speed	The preset speed has been selected with digital input
11 = At speed	The output frequency has reached the set reference
12 = Motor regulator activated	Overvoltage or overcurrent regulator was activated
13 = Output frequency supervision	The output frequency goes outside the set low limit/high limit (see parameters 2.7.19 and 2.7.20)
14 = Control from I/O terminals	I/O control mode selected (in menu M3)
15 = Thermal fault/warning	Thermal fault/warning active
16 = Fieldbus DIN1	
17 = Speed below limit	Lift speed goes below limit (par 2.7.16)
18 = Torque limit supervision	Motor torque goes beyond the set supervision low limit/high limit (see par. 2.7.17 and 2.7.18) Error! Reference source not found.Error! Reference source not found.
19 = Mechanical brake control	External brake ON/OFF control (see parameter Group G2.3)
20 = Mech. brake control inverted	External brake ON/OFF control (see parameter Group G2.3). Output active when brake control is OFF.
21 = Open Doors	Signal to open doors when stopping under the speed programmed in P2.7.21
22 = AutoCalibration	If positioning system is disable by one of the conditions, in every stop is given a 2sc pulse.

Table 21. Output signals via DO1 and output relays RO1 and RO2.

2.7.10 Relay output 1 function

See parameter 2.7.6.

2.7.14 Relay output 2 function

See parameter 2.7.6.

2.7.21 Speed Open Doors

When stopping and speed is under this parameter, the output is activated to open doors. This signal remains active up to we make the next start.

B2.7.24.1–3 Manual Test Outputs

Pressing “Enter” in the every parameter we can active the different outputs. If we remain pressing the Enter key, the output is only activated one second (for safety).

5.8 PROTECTIONS

I/O Faults parameters (M2 -> G2.8.1)

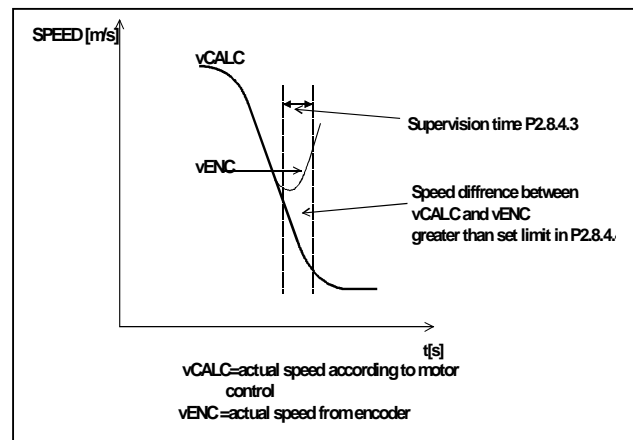
Lift Supervision parameters (M2 -> G2.8.4)

2.8.4.2 Shaft speed fault

- 0 = No response
- 1 = Warning
- 2 = Fault, stop mode after fault always by coasting

Actual shaft speed according to encoder and calculated shaft speed from motor control are compared and in case the speed difference is more than the set limit (parameter 2.8.4.4) per a defined time (parameter 2.8.4.3) the set action is taken.

This fault is generated only when the mechanical brake is open. i.e. if running against mechanical brake this fault is not generated. In open loop motor control mode this fault is not generated.



2.8.4.3 Shaft speed supervision time

If the speed difference in shaft speed supervision is greater than the set limit (parameter 2.8.4.2) for a defined supervision time the shaft speed warning or fault is generated.

2.8.4.4 Shaft speed supervision limit

The speed difference between the actual and the calculated lift speed, which will cause tripping..

Parameter 2.8.4.4.1 is the Shaft speed supervision limit in [m/s] and
Parameter 2.8.4.4.2 is the Shaft speed supervision limit in [Hz].

2.8.4.7 Response to control conflict

- 0 = No response
- 1 = Warning
- 2 = Fault, stop mode after fault always by coasting

Status of the DIN1 and DIN2 switches is supervised by the application. If they are active at the same time a control conflict fault will be generated. The response to fault is given with this parameter.

2.8.4.8 Minimum current

If actual current of the motor is below the minimum current limit fault (F58) is activated. The fault is activated only when the mechanical brake is open. 100% correspond to frequency converter nominal current.

2.8.4.9 Sensibility minimum current

Adjusting this time we can control the sensibility to appear the fault F58.

2.8.4.10 0Hz Speed response

- 0= Not used
- 1= Warning
- 2= Warning + Stop
- 3= Fault

0 Hz speed supervision is active two seconds after the start command. During that time frequency reference must increase over 0 Hz otherwise fault is activated. Response to fault is given with this parameter.

2.8.4.11 Encoder Fault

- 0 = Fault
- 1 = No Action

If the Encoder has some problem when controlling the Motor, then the defined action is taken.

2.8.4.12 Brake Mode

- 0 = No response
- 1 = Warning

If something wrong happens while the lift is decelerating in stop process, we could get a warning.

The situations that can give us a warning are:

63 → If the deceleration is very high for load in lift, and actuates the overvoltage controller. To solve, make deceleration (P2.2.5.2) lower.

64 → If the stop signal arrive before to get the levelling speed. To solve, increase deceleration, or decrease the S-curves (P2.2.5.5, P2.2.5.6).

2.8.4.13 Start-Stop Sequence

- 0** = No response
- 1** = Warning
- 2** = Fault, stop mode after fault always by coasting

This only actuates if we have programmed some input as “Stop Coasting Falling Edge”. In this case we can make a start sequence supervision. After start signal, the programmed input must received 24V. After stop signal, the programmed input must received 0V.

2.8.4.14 Sensibility Start-Stop Sequence

Delay to detect the Start-Stop sequence.

2.8.4.15 Encoder Direction AutoInversion

- 0** = Disable
- 1** = Enable

The first time that we start the motor in Close Loop, the motor and encoder directions can be inverted. Then the converter stops the motor and autocorrect the situation, showing in panel F87. We we start again, the problem won't be present and the lift will run perfectly. If this function is disable, we'll have to change manually the encoder direction in P2.11.3

2.8.4.16 Absolute Speed Fault

- 0** = No response
- 1** = Warning
- 2** = Fault

This fault appears when the lift speed is higher than P2.8.4.17 during P2.8.4.18.

2.8.4.17 Absolute speed limit

Over this limit appears the Absolute speed fault.

2.8.4.21 Ends Safety Speed

Maximum speed that liftcar can have when some of the end limits is activated.

2.8.4.22 Ends Safety Deceleration

If the end limit supervision is activated because lift speed is higher than P2.8.4.21 when some of the end limits is activated, then the lift car decelerates with the value programmed in this parameter. And the positioning system is disabled and tripping A95.

2.8.4.23 Slip Timer for Intermediate Speed

When travelling at Intermediate speed, we need to received in an interval time the flag signal of door areas. If the time between this signals is bigger that programmed here, then some kind of slip is in ropes, and then the positioning is disabled and tripping F97. Wen programmed to 0, this function is not working.

2.8.4.24 Slip Timer for Nominal Speed

Same that P2.8.4.23, but for Nominal speed.

5.9 AUTO RESTART PARAMETERS

2.9.1 **Automatic restart: Wait time**

Defines the time before the frequency converter tries to automatically restart the motor after the fault has disappeared.

2.9.2 **Automatic restart: Trial time**

The Automatic restart function restarts the frequency converter when the faults selected with parameters 2.9.4 to 2.9.9 have disappeared and the waiting time has elapsed.

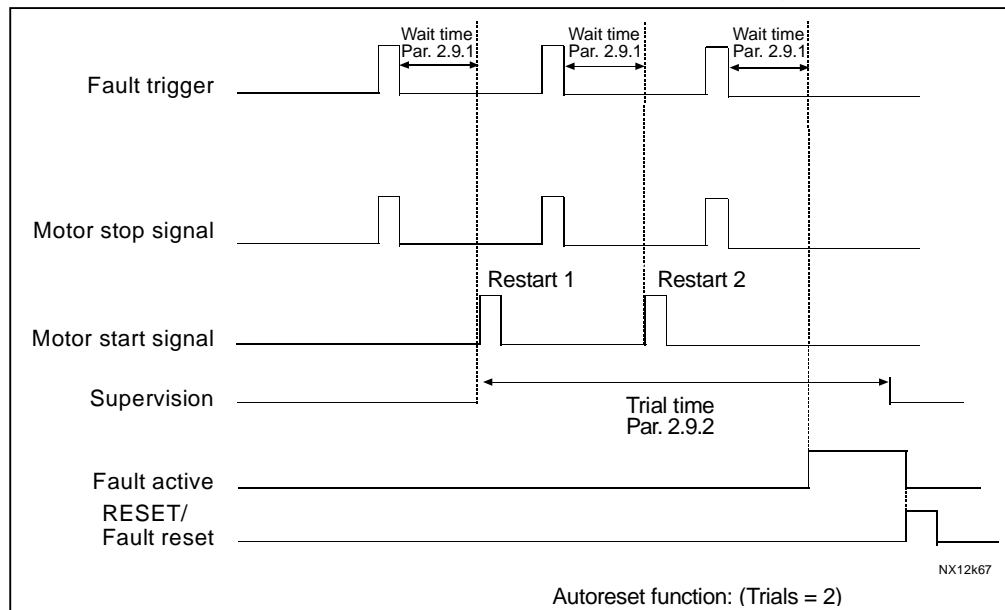


Figure 9. Example of Automatic restart with two restarts.

Parameters 2.9.4 to 2.9.10 determine the maximum number of automatic restarts during the trial time set by parameter 2.9.2. The time count starts from the first autorestart. If the number of faults occurring during the trial time exceeds the values of parameters 2.9.4 to 2.9.10, the fault state becomes active. Otherwise the fault is cleared after the trial time has elapsed and the next fault starts the trial time count again.

If a single fault remains during the trial time, a fault state is true.

2.9.4 **Automatic restart: Number of tries after undervoltage fault trip**

This parameter determines how many automatic restarts can be made during the trial time set by [parameter 2.9.2](#) after an undervoltage trip.

- 0** = No automatic restart after undervoltage fault trip
- >0** = Number of automatic restarts after undervoltage fault. The fault is reset and the drive is started automatically after the DC-link voltage has returned to the normal level.

2.9.11 **Automatic restart: Number of tries after Start-Stop Sequence fault trip**

This parameter determines how many automatic restarts can be made during the trial time set by [parameter 2.9.2](#).

- 0** = No automatic restart after start-stop sequence fault trip
- >0** = Number of automatic restarts after start-stop sequence fault trip

5.10 EVACUATION PARAMETERS

Evacuation is specially designed for power down situations. When there is power down situation then the 3-phase Mains supply must be disconnected and the 1-phase supply must be connected to Terminals L1-L2. Supply Voltage must be 1-phase 220VAC ($\pm 10\%$). The application can handle low voltages in DC-link up to 100V for a short time. The Elevator Car can be moved to nearest floor. The maximum Lift speed during the Evacuation is 40% of the Nominal Linear Speed. If Evacuation is activated then Mains supply must be correct, otherwise the Evacuation fault will occur.

2.10.3 *Motor control mode*

- 0** = Frequency control: The I/O terminal and panel references are frequency references and the frequency converter controls the output frequency.
- 1** = Speed control: The I/O terminal and panel references are speed references and the frequency converter controls the motor speed (regulation accuracy $\pm 1\%$).
- 2** = Speed control CL: Closed loop speed control mode. The I/O terminal and keypad references are speed references and the frequency converter controls the motor speed. Encoder is required. Closed loop parameters in group G2.11 must be set accordingly.

2.10.4 *Direction change delay*

Time delay between forward and reverse direction test.

2.10.5 *Testing time forward and backward*

Motor current is measured for both running directions of the elevator during automatic evacuation process. This parameter determine the test time for each direction.

2.10.6 *Current read delay*

Motor current is measured for both running directions of the elevator during automatic evacuation process. This parameter determines the point of time when current is read. Time starts simultaneously with test time.

2.10.11 *Maximum speed in evacuation*

Maximum speed during the evacuation is limited with this parameter.

Parameter 2.10.11.1 maximum speed in [m/s].

Parameter 2.10.11.2 maximum frequency in [Hz].

2.10.13 *Motor Limit (3)*

Is the input motor current tendency supervision related with the motor magnetizing current (P2.11.1).

2.10.15 *Evacuation Start Delay*

When the drive receive the evacuation signal from the controller, the evacuation function is delayed this time.

2.10.16 **Evacuation Stop Delay (2 and 3)**

When the drive receive the stop evacuation signal coming from the lift maneuver. Then the drive delay the stop output signal by DO4.4 (Slot D).

2.10.17 **Disable Rollback Controller**

Disable rollback controller during evacuation to save energy in start.

2.10.18 **Disable Noise Reduction**

Disable noise reduction during evacuation to save energy in start.

5.11 CLOSED LOOP PARAMETERS

2.11.2 **Invert Encoder Direction**

If we get F43, we can try to change the encoder direction to solve the fault.

2.11.4 **Speed Control Limit 1**

2.11.5 **Speed Control Limit 2**

Change limits for speed controller gain and integral time constant. When the output frequency is below the change point 1 (par 2.11.4) the gain value is the same as parameter 2.11.6. If the output frequency is greater than change point 2 (par 2.11.5) then the gain value is the same as parameter 2.11.7. Between these two points the change is linear. See Figure 10.

2.11.6 **Speed Control Kp1**

2.11.7 **Speed Control Kp 2**

Active Speed control gain value (%/ Hz) is P2.11.6 if the output frequency if less than P2.11.4. Active Speed control gain value is P2.11.7 if the output frequency if more than P2.11.5.

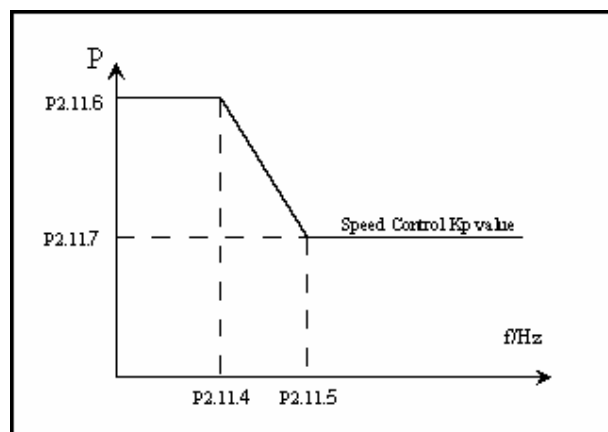


Figure 10. Proportional Speed Control Kp Curve

2.11.8 *Speed Control Ti 1*

2.11.9 *Speed Control Ti 2*

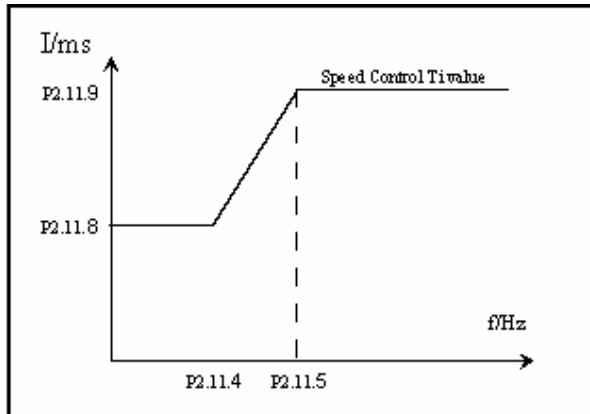


Figure 11. Proportional Speed Control Ti Curve

Active Integral time constant value for the speed controller is P2.11.8 if the output frequency is less than P2.11.4. If the output frequency is more than P2.11.5 the value is P2.11.9.

2.11.17 *Fixed en Ramp*

If is activated, the ramp after stop signal actuates with parameters P2.11.18.1 – 3

If is not activated, the ramp after stop signal actuates with parameters P2.2.5.2, P2.2.5.5, P2.2.5.6

2.11.18.1 – 3 See explanation on P2.2.5.2, P2.2.5.5, P2.2.5.6

2.11.19 *Encoder Type*

Encoder type selection.

5.12 OPEN LOOP PARAMETERS

2.12.1 *Identification*

Motor Identification in Open Loop. U/f Curve and RS Voltage Drop is included. When parameter is set to 1 motor must be started within 20 seconds. Identification is performed in standstill. The Mechanical Brake remains closed.

2.12.3 *Ir Add Generator Scale*

Scaling factor for generator side IR-compensation (0 ... 200%)

2.12.4 *Ir Add Motor Scale*

Scaling factor for Motor side IR-compensation (0 ... 200%)

2.12.8 *Soft Start*

0 = Active
1 = Inactive

Enable to Open Loop control start with a very soft start.

5.13 PERMANENT MAGNET SYNCHRONOUS MOTORS

SELF COMMISSION (parameters 2.13.1-2.13.3)

Before the very first run, the encoder absolute zero position angle with respect to the motor stator winding magnetizing direction must be found. This is done by running a shaft angle self commissioning test sequence i.e. calibration. That can be done against brake closed or empty motor shaft with brake opened.

2.13.1 Enable Angle Com

This parameter enables the encoder zero position calibration sequence if the parameter is set to Yes. Then the calibration is made after the next motor start command.

2.13.3 0 Pos Angle LoWo

This is the shaft absolute angle lowest 16-bit reading found during the calibration sequence.

2.13.4 0 Pos Angle HiWo

This is the shaft absolute angle highest 16-bit reading found during the calibration sequence.

Proceeding the encoder angle identification:

- 1) By default the angle identification is against brake closed.
- 2) Program P2.13.1 = Yes
- 3) Press "Enter"
- 4) Send from lift controller RUN command
- 5) The drive will stop in about 1sc, and P2.13.1 will come back to "No"
- 6) That means that calculation has been done
- 7) Remove RUN command from lift controller
- 8) Check the angle value in P2.13.3. Has to be different than 0.
- 9) RUN the lift inspection, to check that all is right.
- 10) If the lift runs smoothly in both directions, the identification is well done.
- 11) If the motor doesn't run properly, that means that encoder direction is not correct, so we need to change P2.11.3 = Yes
- 12) Come back to the step 2, and repeat till step 9.
- 13) If when running up physically the motor goes down, and when running down the motor goes up. Is as easy to correct as change P2.5.14 = Inverted, without need to change any cable.

2.13.5 Load Cell

0 = Inactive
1 = Active

The start process is controlled by a load cell in cabine. The load cell must send to the converter a 0-20mA or 4-20mA, and has to be connected in terminals 4-5 (AI2).

2.13.8 RollBack Controller

When the brake is open the lift can have a movement in the gravity direction due to the lift load. To solve this effect we put the RollBack Controller on:

0 = Not Used

1 = Smooth RollBack. In this mode the parameters which have effect are: P2.13.9, P2.13.10, P2.13.11, P2.13.12 and P2.13.13.

2 = Fast RollBack. In this mode the parameters which has effect are: P2.13.15, P2.13.16, P2.13.17.

2.13.9 Time before open the brake

Negative window refering to the moment where brake is opened.

2.13.10 Time afetr open the brake

Positive window refering to the moment where brake is opened.

2.13.11 Mecanichal brake delay

Is a read only parameter, because it's updated from internal logic, and shows the brake mechanical real delay.

2.13.12 Kp Initial

Speed Controller Kp, that works within the window generated with P2.13.9 – 10.

2.13.13 Ti Initial

Speed Controller Ti, that works within the window generated with P2.13.9 – 10.

2.13.14 Smoother

Time transition between Initial gains and Kp1 and Ti1 gains for low frequencies.

2.13.15 RollBack Gain

Position controller Kp. High values of this parameter can create big jumps or strikes in the start. It's recommended low values of it.

2.13.16 RollBack Timing

Time that positioning controller is working, after wake up from P2.13.17

2.13.17 RB Sensibility

Sensibility in motor shaft movement, for positioning controller is activation.

5.14 AUTOMATIC PROFILE COMPENSATION

2.14.1 *Capture Height*

Pressing “Enter” in this parameter, captures the total height of trip from calibration sensor.

2.14.2 *Calibration Sensor Position*

0 = ?
1 = Ground Floor
2 = Top Floor

Position definition of calibration sensor. The sensor must be installed

2.14.3 *Distance at Levelling Speed*

Distance to destiny floor to landing which we want to be at levelling speed.

2.14.5 *Offset Compensation*

Offset over or under the speed calculations. In next graphic you can see the effects:

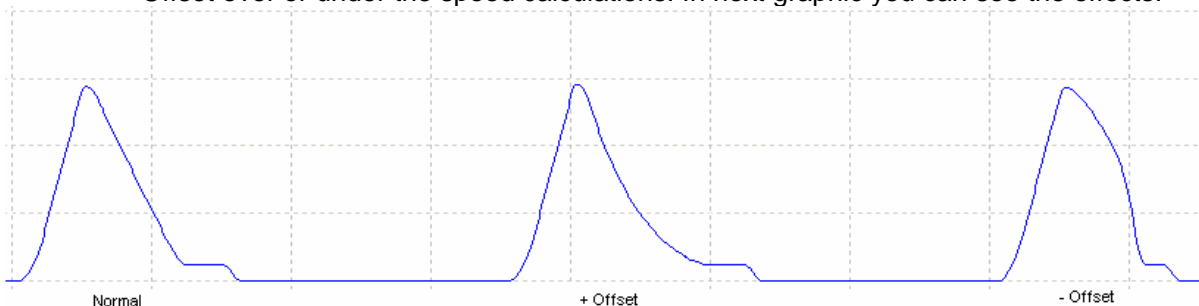


Figure30. Differences between Offset sign values.

2.14.6.1 *Gear Box Relation*

2.14.6.2 *Pulley Diameter*

Lift machine's Mechanical datas.

2.14.7.1 *Ground Floor*

Only appears in panel if P2.14.2 = 1. This parameter is only for information, cannot be modified, because always must be 0,00m the position of calibration sensor.

2.14.7.3 - 34 *Floor 1 – Floor 32*

Capture the height of every floor, only pressing right arrow (edit mode) and after “Enter”, when the lift is the correct floor.

2.14.9.1 *Change Distance*

Is the distance between the speed change flags and floors.

2.14.9.2 *Skiip Frequency*

If the real change speed is under this value, the drive will stop at this floor. If the real change speed is above this value the drive will stop at the next floor.

2.14.9.4 Error Distance

If real distance of speed change flag is lower than P2.14.9.1 – P2.14.9.4 , then skip floor is activated.

2.14.10 Automatic Profile Compensation

0 = Not in use. Only makes the Automatic Profile Compensation when short floor.
1 = Activated. Make the Automatic Profile Compensation in every stop.

2.14.11 Accuracy

The positioning system can work in mm or cm. In buildings higher than 60m, the P2.14.11 has to be “cm”.

2.14.12 Maximum Frequency when no positioning

If the positioning system is activated, but OFF is in keypad, means that the positioning is disabled internally for some condition. When that happens, the maximum speed enabled is that.

2.14.13 Lost Distance

If real distance of speed change flag is higher than P2.14.9.1 + P2.14.13, then positioning is internally disabled, and OFF is activated in keypad, because the system can be lost, and is not safe positioning, and the speed profile 1 is executed.

Positioning Notes:

OFF sign: Is activated in keypad, when positioning system has been disabled internally for some condition of the system. The conditions to disabled the positioning are:

- Lift lost because of the condition in P2.14.12
- A95 (PreEnd Safety)
- F97 (Slip Timer Safety)
- A64 (Stop without levelling speed reached). Because of slip ropes risk.
- A96 (Safety Series Opened). Because of slip ropes risk.
- A89 (Slip in Ropes)
- Calibration not done after first power on.

Calibration: Calibration can be done by:

- When digital input programmed in P2.6.7.13 (Calibration) is activated
- When digital input programmed in P2.6.7.18 (Door Flag) + digital input programmed in P2.6.7.19 (Lower PreEnd), are both activated

P2.14.14 “Error in Floor”: by default 200mm. Window up and down from floor level, that we can consider that we are in floor area. Being inside the area, the V1.28 will show the floor number, and slip compensation function for that floor will be executed.

5.15 KEYPAD CONTROL PARAMETERS

3.5 *Programming Level*

0 = Basic

1 = Medium

2 = High

Depending of level selected, we have access to some parameters or anothers.

3.6 *PhotoMonitor Trigger*

We can program the trigger signal for PhotoMonitor function. Furthermore, always pressing "Enter" inside of Monitor Menu, makes trigger too.

3.7 *Reset Counters*

Pressing "Enter" resets the start/day and calibrations/day counters in Monitor Menu.

P8.43 License Key Activation

During first 15 days tha application can work without any license key. If you don't introduce it, then you'll get in keypad HAND sign blinking. After that period of time, the lift will not be READY in next stop command, and HAND will appear without blinking.

When you introduce a correct license key, HAND will disappears and READY will appears again.

6. Control Signal Logic in Lift Application

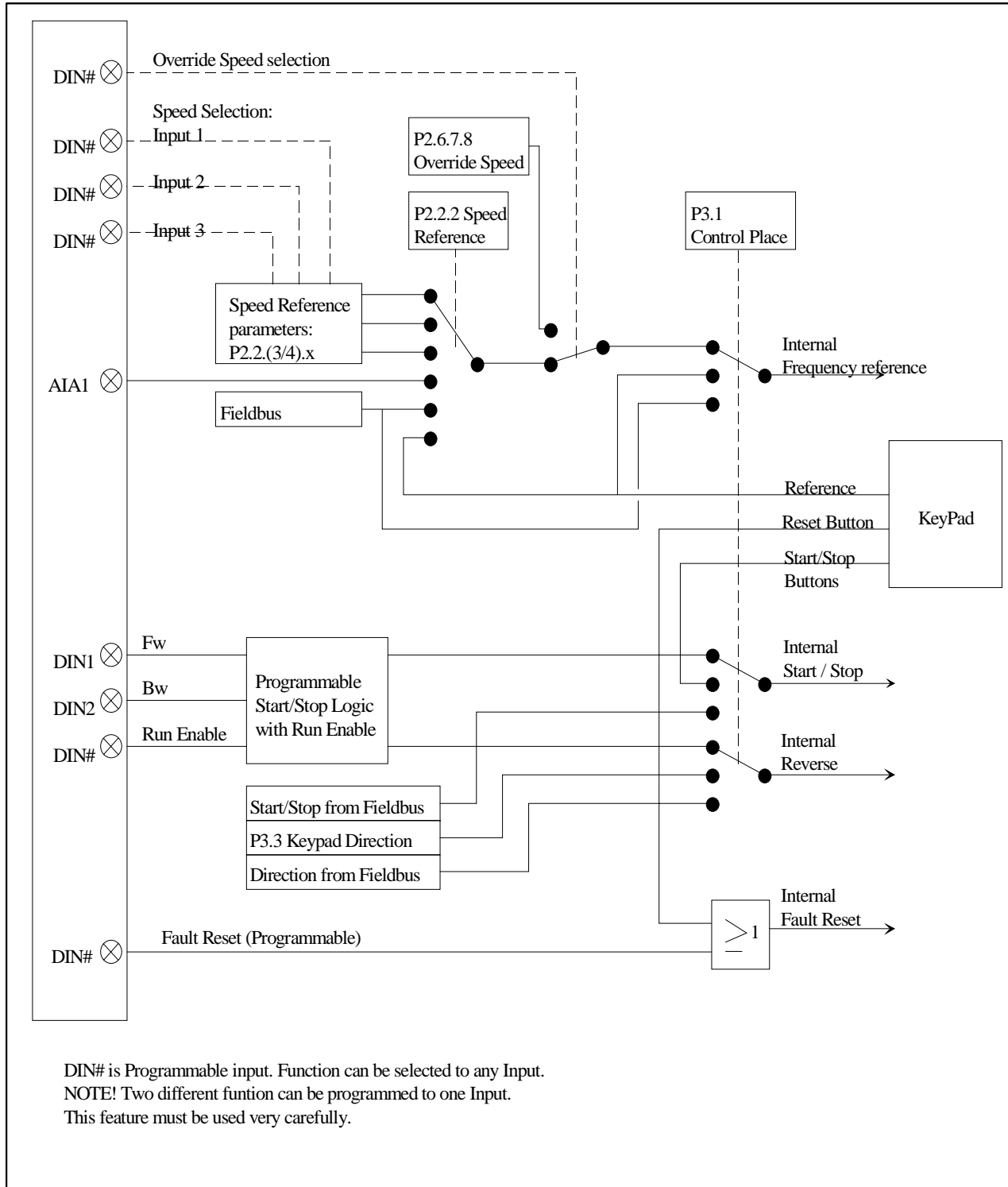


Figure 12. Control signal logic of the Lift Application

7. Fault Tracing

When a fault is detected by the frequency converter control electronics, the drive is stopped and the symbol **F** together with the ordinal number of the fault, the fault code and a short fault description appear on the display. The fault can be reset with the Reset button on the control keypad or via the I/O terminal. The faults are stored in the Fault History menu, which can be browsed. The different fault codes you will find in the table below.

The fault codes and their possible causes are presented in the table below.

Fault code	Fault	Possible cause
1	Overcurrent	Frequency converter has detected too high a current ($>4 \cdot I_n$) in the motor cable: <ul style="list-style-type: none"> - sudden heavy load increase - short circuit in motor cables - unsuitable motor
2	Overvoltage	The DC-link voltage has exceeded the limits defined in Table 4-1. <ul style="list-style-type: none"> - too short a deceleration time - high overvoltage spikes in utility
3	Earth fault	Current measurement has detected that the sum of motor phase current is not zero. insulation failure in cables or motor
5	Charging switch	The charging switch is open, when the START command has been given. <ul style="list-style-type: none"> - faulty operation - component failure
6	Emergency stop	Stop signal has been given from the option board.
7	Saturation trip	Defective component
8	Unknown fault	The frequency converter troubleshooting system is unable to locate the fault.
9	Undervoltage	DC-link voltage is under the voltage limits defined in Table 4-2 of the Vacon NX User's Manual. Most probable causes: <ul style="list-style-type: none"> - too low a supply voltage - frequency converter internal fault
10	Input line supervision	Input line phase is missing.
11	Output phase supervision	Current measurement has detected that there is no current in one motor phase.
12	Brake chopper supervision	<ul style="list-style-type: none"> - no brake resistor installed - brake resistor is broken - brake chopper failure
13	Frequency converter under-temperature	Heatsink temperature is under -10°C
14	Frequency converter overtemperature	Heatsink temperature is over 90°C . Overtemperature warning is issued when the heatsink temperature exceeds 85°C .
15	Motor stalled	Motor stall protection has tripped.
16	Motor overtemperature	Motor overheating has been detected by frequency converter motor temperature model. Motor is overloaded.
17	Motor underload	Motor underload protection has tripped.
22	EEPROM	<ul style="list-style-type: none"> - parameter save fault

Fault code	Fault	Possible cause
23	checksum fault	<ul style="list-style-type: none"> - faulty operation - component failure
24	Changed data warning	Changes may have occurred in the different counter data due to mains interruption
25	Microprocessor watchdog fault	<ul style="list-style-type: none"> - faulty operation - component failure
29	Thermistor fault	Thermistor is broken.
37	Device change	Option board changed. Different power rating of drive.
38	Device added	Option board added. Drive of different power rating added.
39	Device removed	Option board removed. Drive removed.
40	Device unknown	Unknown option board or drive.
41	IGBT temperature	
43	Encoder Fault	Error in encoder signals. See subcode: S1 = Channel A missing S2 = Channel B missing S3 = Channels A and B missing S4 = Encoder wrong direction (incremental encoder only) S5 = Encoder board not responding (incremental encoder only) S6 = EnDat communication error (DATA+, DATA-). Equal to F86. S7 = Sin/Cos signal error.
50	Analogue input I_{in} < 4mA (selected signal range 4 to 20 mA)	Current at the analogue input is < 4mA. <ul style="list-style-type: none"> - control cable is broken or loose - signal source has failed
51	External fault	Digital input fault.
52	Keypad communication fault	The connection between the control keypad and the frequency converter is broken.
53	Fieldbus communication	The connection from the fieldbus to the frequency converter is broken.
54	SPI communication fault	The connection between the component board and the control board is broken.
55	External brake control	Fault is activated by the mechanical brake control logic. Check parameters and external brake device. See parameter 2.8.4.1
56	Shaft speed	Fault is activated if calculated speed is different compared to actual speed. See parameter 2.8.4.2 .
57	Torque supervision	Actual torque above torque limits. See parameter 2.8.4.5
58	Minimum current	Motor current is less than set limit parameter 2.8.4.8
59	Direction request	Digital inputs DIN1 and DIN2 are ON at the same time. See parameter 2.8.4.7 .
60	Evacuation	Fault is generated during the evacuation process.
61	Zero speed time	Zero current measured later than 2 seconds from start command. See parameter 2.8.4.10 .
62	Evacuation Voltage	Evacuation active and voltage has exceeded the limit value. Evacuation voltage 230VAC $\pm 10\%$
63	Hard Brake	The deceleration has been very hard, and the overvoltage controller has actuate making the deceleration time longer . See parameter P2.8.4.12
64	Stop in NO Levelling Speed	The stop signal arrives before to get the levelling speed. See parameter P2.8.4.12

Fault code	Fault	Possible cause
65	Start-Stop Sequence	Having a digital input programmed as a emergency stop by falling edge, the sequence of start or stop is not correct:(See parameter P2.8.4.13) <ul style="list-style-type: none"> - After Start command the input selected for emergency by falling edge must received 24V - After Stop command the input selected for emergency by falling edge must received 0V
87	Inverting Encoder	If encoder direction is not the same that motor, autocorrect it. See parameter P2.8.4.15
88	Over Speed	The lineal speed of lift cabine reach the value of P2.8.4.17
89	Slip	Slip ropes detection from some conditions related with A64 or A96.
90	Short circuit	If the motor short-circuit logical circuit doesn't follow the correct start-stop sequence, the fault appears. The related parameters are P2.6.7.16, P2.6.7.17 and P2.8.4.19.
91	Brake desconection fault	If there is the close brake order and in the terminal n°2 there isn't the 10Vcc the the fault appears. The related parameters are P2.3.3.2, P2.3.4.2, P2.8.4.1.
93	Make Identification	This fault appears if we change the encoder direction from the parameters. If this fault appears we have to make a new identification. Until we don't make a new identification, the fault will be active in the drive.
94	Torque Ramp	Tha fault appears when the stop sequence is executed with the TorqueRamp function without the external brake supervision, and the liftcar is for sometime with torque lose. Normally is because the P2.3.2.17 is to short compared with the real mechanical disconnection brake time.
95	PreEnd Disabling	The positioning system is disabled, because the PreEnd Supervision has been activated.
96	Safety Opened	If during travel a safety series open, then this warning appears
97	Slip Timer	Trips because the time that lift car is passing by floors is bigger than programming in P2.8.4.23 - 24

Table 22. Fault codes