Products Tde Macno

Application Manual

OPDE N18 Flying Cutter

Cod. MW02001E00 V_0.0

SUMMARY

VERSION APPLICATION: 18.02

1 INTRODUCTION

1.1 INTENDED AUDIENCE

The manual is intended for those persons who are responsible for commissioning and using an OPDE with Flying Cutter Application. The reader should have some basic knowledge of networking, electrical fundamentals, electrical wiring practices and how to work the OPDE drive and OPD Explorer.

1.2 UNIT MEASURING SYSTEM

The units of measurement used by Flying Cutter are the following:

- Positions are expressed in “mm” (with one decimal point). Some visualization variables are expressed in i.e. (electrical pulses). One mechanical motor revolution is 65536 ie (or encoder pulses, default);
- Speed are expressed in “mm/s” (with one decimal point). Some visualization variables are expressed in ie/s.
- Accelerations are expressed in “mm/s^2”. Some visualization variables are expressed in ie/s^2.

2 FLYING CUTTER PROFILES

2.1 FLYING CUTTER PROFILES SUPPORTED

In OPDE drive are implemented the following CAN profiles:

- **Device Control;**
- **Profile Velocity Mode;**
- **Profile Position Mode;**
- **Homing Mode;**
- **Flying Cut Mode;**

The operative modes are automatically changed by an internal state machine when System is in Operation Enable state.

2.2 OVERVIEW OF THE MAIN CYCLE

Application has been developed with internal state machine of DS402. The jumping from the internal states are command directly by the application. Internal Variable D64 – STATUS_WORD shows the state of the drive.

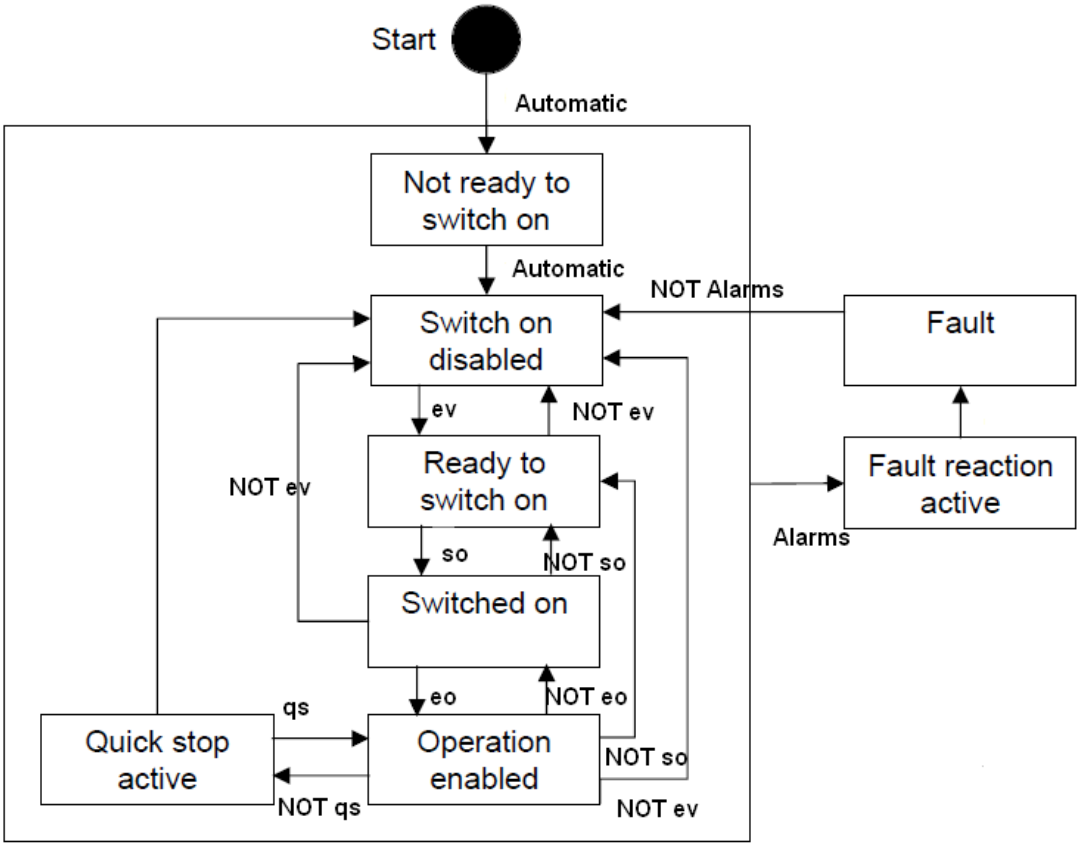


Figure 1: DS402 operative mode

When system is in **Operation Enabled**, one operative mode can be enabled.

Following picture shows the sate machine associated to different state of Flying Cutter. At the beginning, system needs the Homing, so after enable **I00 – Run Command** user has to enable **I07 - Homing Start.** When homing ends output **O38 - Homing Attained** is enabled and system automatically jump to **Profile Position** to move to Zero Position. Homing Position could be different to Zero Position due to **E28-29 – HMOFFSET** which can be applied.
After moving to Zero Position, system jumps to Flying Cutter mode and can starts all the cutter procedure. If user enables the **I11 - Autotmatic / Manual input,** system enables the "**Manual mode**" which is a Profile Velocity mode where a **I03 – Jog Plus** or **I04 – Jog Minus** can move the axis in speed mode.
After that user can repeat the Homing with input **I07 – Homing Start** or move to zero point with **I06 – Move to Zero Point**. Then Flying Cutter mode can starts again.

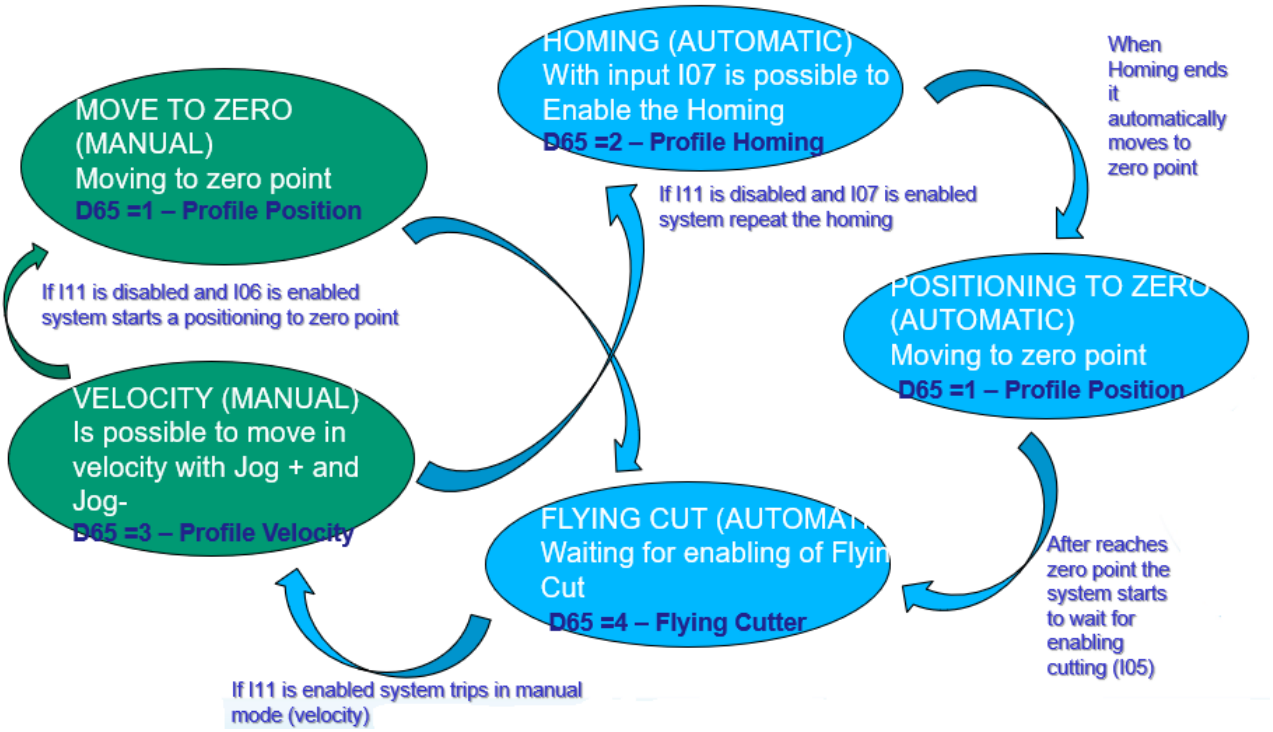
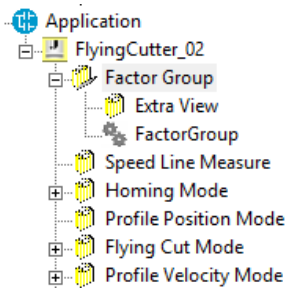


Figure 2: Flying Cutter state



2.3 FACTOR GROUP

Factor group represent the initial setting for the axe: **E48-49-FEED_CONST** is how many mm correspond to one turn of driving shaft revolution. **E50-51-GEAR_BOX_NUM** and **E52-53-GEAR_BOX_DEN** is the gear ratio for gear box.

Example: if one driving shaft revolution correspond to 1000.0 mm and gear ratio is 12:1 is necessary to set:

- **E48-49 - FEED_CONST = 1000.0,**
- **E50-51 - GEAR_BOX_NUM = 12,**
- **E52-53 - GEAR_BOX_DEN = 1,**

Parameter **E94-pCYCLICPERIOD** allows to set the synchronization for cyclic task (default 0.8 – 1.0 ms).

User can choose the resolution of the sensor with parameter **E98-pPOS_FRAC_SENS1** (first sensor resolution) or **E99-pPOS_FRAC_SENS2** (second sensor resolution)**.** The default value is 16 which means 1 mechanical turn = 65536 (2^{16}) i.e.

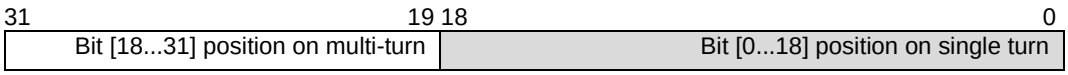
If the value is different, the value of 1 mechanical turn is 2^{pPOS_FRAC} i.e.

Example: E98-pPOS_FRAC = 16,

31 … 16	15 … 0
Bit [15...31] position on multi-turn	Bit [0...15] position on single turn

One mechanical turn is 2^{16} = 65536 ie,

E98-pPOS_FRAC = 19,



One mechanical turn is 2^{19} = 524288 ie,

Name	Description	Min	Max	Default	UM	Scale
RD_STATE_MACHINE	E101 – Finite State Automation					
MODE_OF_OP_DIS	d65 – Modes of operation display					
FEED_CONST	E48-49 – Feed Constant	1.0	200000000.0	1000.0	mm	10
GEAR_BOX_NUM	E50 – 51 – Motor Shaft Revolution			0	rev	
GEAR_BOX_DEN	E52 – 53 – Driving Shaft Revolution			0	rev	
QSDEC	E08 – 09 – Quick stop deceleration	1.0	200000000.0	1000.0	mm/s^2	1
QSJERK	E10 – 11 – Quick stop Jerk	0.0	200000000.0	0.0	mm/s^2	1
pQSOPTC	E38 – Quick Stop Option Code	**Range** 0 2 – Switch On Disabled 6 – Stay in Quick Stop 8				1
pTHRVEL_FILTER_TF	E19- First order filter time constant on actual velocity	0.1	200.0	100.0	ms	
pRESETRISEDGE	E44 – Reset on rising edge			No		
ACTUALPOS_IE	d66-67 – Position actual value			0	ie	
ACTUALVEL_IE	d68-69 – Velocity actual value				ie/s	
ACTUALPOS	D78-79 – Position actual value				mm	
ACTUALVEL	D80 – 81 – Velocity actual value				mm/s	
pENSECONDSENS	E54 - Enable Second Sensor			No		
LINE_SPD_MAX_LATCH	D64 – Line speed Maximum during Latch/Unlatch			0.0	m/min	
pCYCLICPERIOD	E94 - Cyclic Period Duration	0.2	10.0	1.0	ms	
pPOS_FRAC_SENS1	E98 – First sensor's fractional position	16	25	16	Bit	1
pPOS_FRAC_SENS2	E99 – Second sensor's fractional position	16	25	16	Bit	1
MAX_SPEED_IE	D74-75 – Maximum speed (P65) in i.e.			0	ie/s	
MAX_SPEED_EU	D76 – 77 – Maximum speed (P65) in mm/s			0.0	mm/s	
MAX_ACC_EU	D82 – 83 – Maximum accaeleration in mm/s^2			0.0	mm/s^2	

Tab. 1- Device Control Parameters and Objects

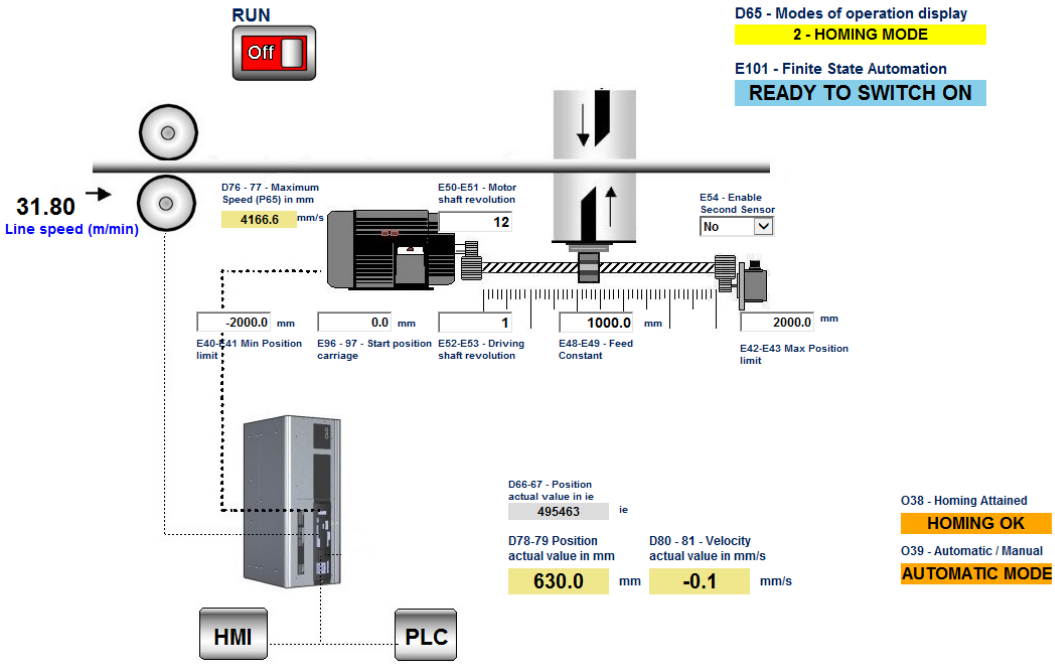
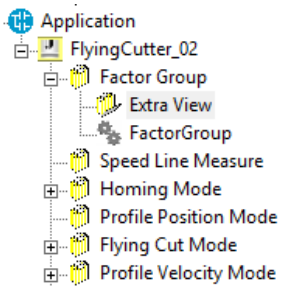


Figure 3: Factor Group interface

If first sensor is enabled, the position variables works in this way:

D66-67- ACTUALPOS_IE = sysMechPosition - - diZeroPos

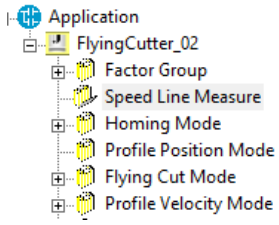
Actual position is calculated un electrical pulses (where 1 turn = 2^pPOS_FRAC_SENS1(or 2)) is the difference between the position read directly form the sensor and the position diZeroPos, which is zero position found after Homing.



2.3.1 EXTRA VIEW

Name	Description	Min	Max	Default	UM	Scale
REV_HISTORY	E200 – Application Revision History					
FG_ERR_WORD0	E102 – Cut Status Word 0					
FG_ERR_WORD1	E103 – Cut Status Word 1					
CUT_STATUS_WORD	E112 – 113 – Cut Status Word					
MIN_CTLGTH_MAXSPD	E118-119 – Minimum cut length at maximum speed				mm	10
STARTPOS_MAXSPD	E120-121- Max Start position at maximum speed				mm	10
STARTPOS_ACTSPD	E122 – 123 – Max Start position at actual line speed				mm	10
MIN_CTLGTH_STARTPOSMAX	E124 – 125 – Minimum Cut Length at start position for maximum line speed				mm	10
MIN_CTLGTH_STARTPOSACT	E126 – 127 – Minimum Cut Length at start position for actual line speed				mm	10
DYN_START_POS	E128-129 – Dynamic Start position carriage applied				mm	10
MAX_POS_CARR_MIS_IE	E132 – 133 – Maximum carriage position measured in ie				ie	1
T_SYNCH_MEAS	E134 – 135 – Synchronous time measured				ms	1
CUT_ERR_MAX	E136 – 137 – Cut Error Maximum				mm	10
CUT_ERR_MIN	E138 – 139 – Cut Error Minimum				mm	10
CUT_ERR_MAX_IE	E140 – 141 – Cut Error Minimum				ie	1
CUT_ERR_MIN_IE	E142 – 143 – Cut Error Minimum				ie	1

Tab. 2- Extra View Folder



2.4 SPEED LINE MEASURE

Speed line measure folder contains the parameters for set the speed line. The main parameter is **E60-61 – LINE_PPM** which is the number of pulses for one meter. Parameter **E62 – EN_TIME_DEC_LINE_SPD** is used to Enable time decoding of line speed. With parameter **E63 – EN_INV_SPD_LINE** is possible to reverse the value of line speed.
Parameter **E64 – LINE_SPD_MAX** is used for some internal calculation inside Flying Cutter profile, while **E66 – LINE_SPD_MIN** is used for choosing the minimum line speed.
With the selection E67 – LINE_SPD_SEL is possible to choose the source of line speed (this could be **0-Simulated,** referred to parameter **E68 – LINE_SPD_SIM**, **1-Encoder**, 2..4 – analogue input 1..3).
Internal variables **D73 – LINE_SPD_MAX_TH** is the theoretical maximum line speed calculated with the factor group data and the line Encoder pulses for meter.
Internal variable **D72 – LINE_SPD** is the Filtered speed line reading by drive.

Name	Description	Min	Max	Default	UM	Scale
LINE_PPM	E60-61- Pulses for meter	99	200000	1024	ie	1
LINE_PPM2	E46-E47 – Pulses for meter 2	99	200000	1024	ie	1
LINE_PPM_SCALING	E69 – Line ppm 1 and ppm 2 scaling			x1		
SET_LINE_PPM	E45 – Set Line ppm			0		
EN_TIME_DEC_LINE_SPD	E62 – Enable Time decoding of line speed	0	1	0		1
EN_INV_SPD_LINE	E63 – Line input signal inversion	0	1	0		1
LINE_SPD_TF	E64 – Line speed filtered time constat	0.0	3000.0	10.0	ms	10
LINE_SPD_MAX	E65 – Maximum Line Speed	0.0	3000.0	100.0	m/min	10
LINE_SPD_MIN	E66 – Minimum Line Speed	0.0	3000.0	100.0	m/min	10
LINE_SPD_SEL	E67 – Input line selection	**Range** 0 – 0 - Simulated 1 – 1 - Encoder 2 – 2 – AI1 3 – 3 – AI2 4 – 4 – AI3		0		1
LINE_SPD_SIM	E68 – Simulated line speed	0.0	0.0	3000.0	m/min	1
LINE_SPD_MAX_TH	D73 – Maximum Theoretical line speed calculated				m/min	1
LINE_SPD_MAX_LATCH	D64 – Line Speed Maximum during Latch/Unlatch				m/min	
LINE_SPD	D72 – Filtered speed				m/min	

Tab. 3- Line speed Parameters

Is important to see that there are two limit for the line speed, the first is **D73 - LINE_SPD_MAX_TH** and refers to the maximum motor speed P65. The second is **D64 - LINE_SPD_MAX_LATCH** and refers to the maximum acceleration the system can have in Latch/Unlatch function. If **D64 - LINE_SPD_MAX_LATCH < D73 - LINE_SPD_MAX_TH,** the first one becomes the limit.

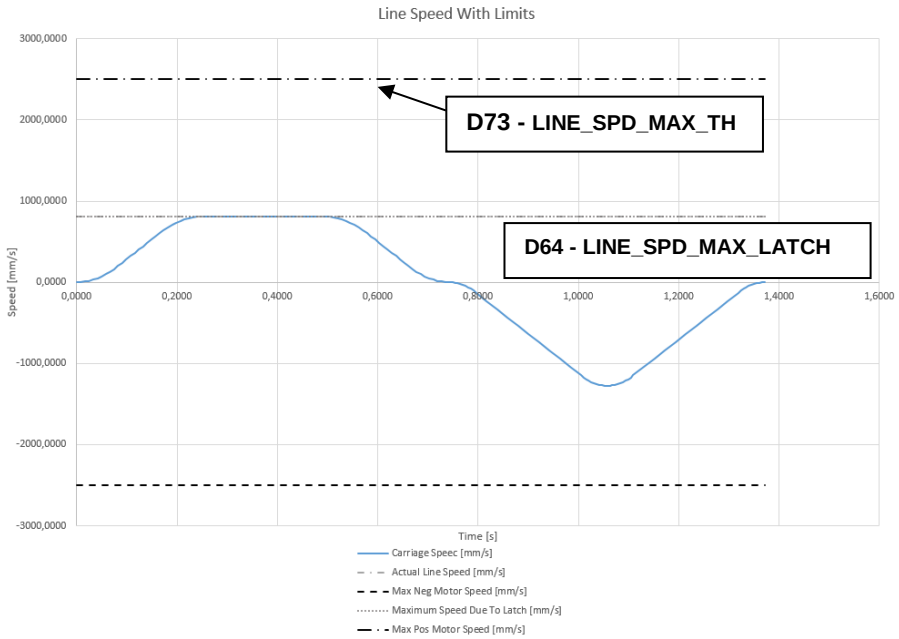


Figure 4: Maximum Line Speed

If actual line speed **D72 – LINE_SPD** is equal to **D64 –LINE_SPD_MAX_LATCH** the system reaches acceleration limit during latch function.

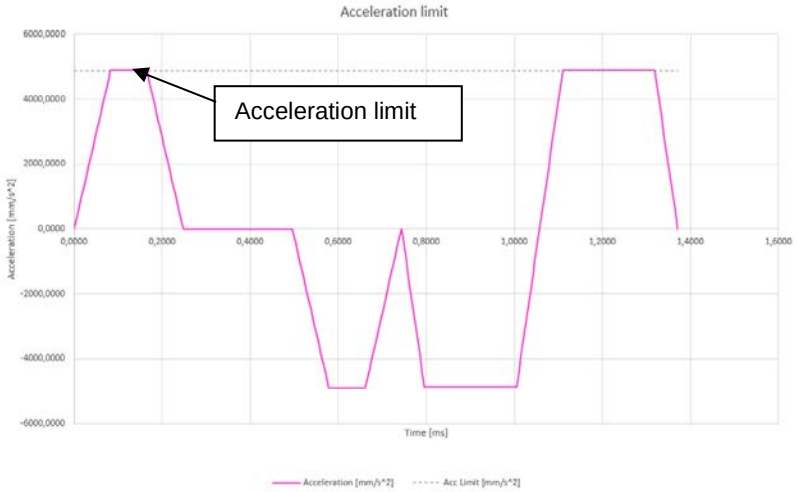
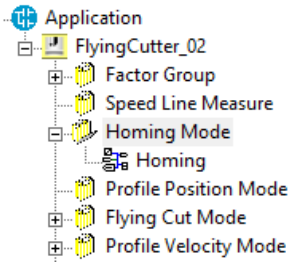


Figure 5: Acceleration limit



2.5 HOMING MODE

Homing is used to found the zero point of the axis. There are up to 39 Homing Method for search the zero point (parameter **E26-HMMODE**). Some of these methods uses the zero index of sensor, other methods don't use it. Homing methods 1-35 refers to Standard CAN DS402. User can eventually set a position offset with parameter **E28-29 – HMOFFSET**. Parameters for speed are **E30-31 – HMSPD, E32-33 – HMSPDEND,** acceleration is **E34-35 – HMACC**, and Jerk is **E92-93 – PROFJERK.**

Name	Description	Min	Max	Default	UM	Scale
RD_STATE_MACHINE	E101 – Finite State Automation					1
MODE_OF_OP_DIS	D65 – Modes of operation display	0	1			1
HMMODE	E26 – Homing method					1
HMOFFSET	E28 – 29 – Homing Offset	-200000000.0	200000000.0	0.0	mm	10
HMSPD	E30-31 – Homing Speed	-200000000.0	200000000.0	1000.0	mm/s	10
HMSPDEND	E32 – 33 – Homing speed during search for zero	-200000000.0	200000000.0	1000.0	mm/s	10
HMACC	E34-35 – Homing acceleration	1.0	200000000.0	1000.0	mm/s^2	10
PROFJERK	E92 – 93 – Profile Jerk	1.0	200000000.0	1000.0	mm/s^3	1
pHMMAXTRQ	E75 – Homing Max Torque	0.00	400.00	400.00	%MOT_T_NOM	
QSDEC	E08 – 09 – Quick stop deceleration	1.0	200000000.0	1000.0	mm/s^2	1
QSJERK	E10-11 – Quick stop Jerk	0.0	200000000.0	0.0	mm/s^2	
LINE_SPD_MAX_LATCH	D64 – Line Speed Maximum during Latch/Unlatch			0.0	m/min	
pQSOPTC	E38 – Quick Stop Option code	**Range** 0 – 0 - Simulated 2 – 2 – Switch On Disabled 6 – 6 – Stay in Quick Stop 8		2		1
ACTUALPOS_IE	D66-67 – Position actual value in ie				ie	
ACTUALVEL_IE	D68 – 69 – Velocity actual value in ie/s				ie/s	
MAX_SPEED_IE	D74-75 – Maximum speed (P65) in i.e.				ie/s	

Tab. 4- Homing Mode parameters

1. Homing on Negative Limit Switch and Index pulse

The initial direction of movement shall be *leftward* (if the *negative* limit switch is inactive -low-). The home position shall be at the first index pulse to the *right* of the position where the *negative* l imit switch becomes inactive.

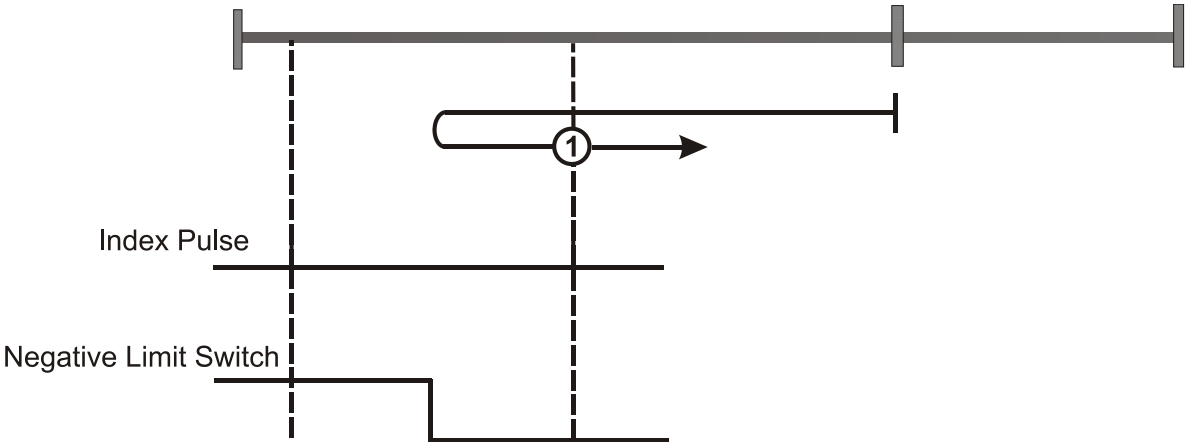


Figure 6 : Homing on Negative Limit Switch and Index pulse

2. Homing on Positive Limit Switch and index pulse

The initial direction of movement shall be rightward (if the positive limit switch is inactive -low-). The home position shall be at the first index pulse to the left of the position where the positive limit switch becomes inactive.

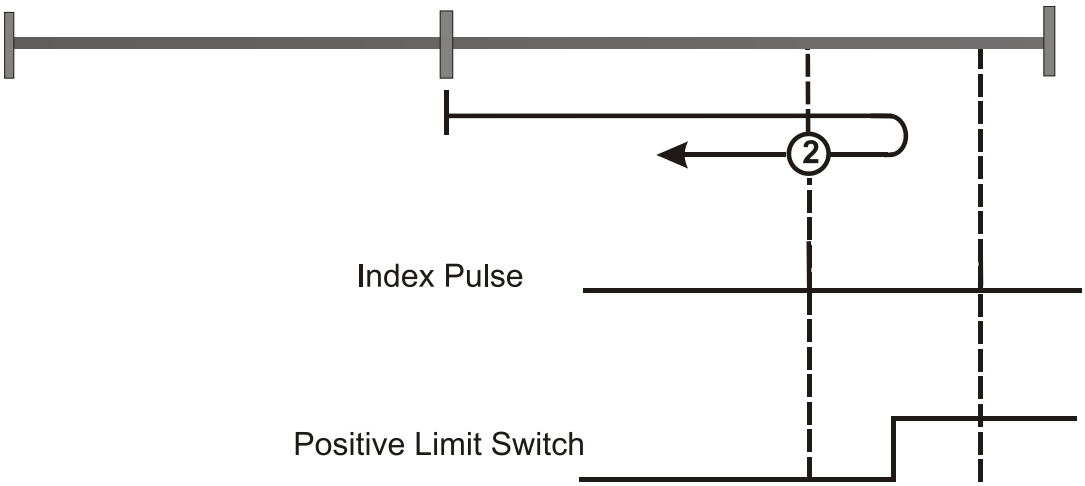


Figure 7: Homing on Positive Limit Switch and Index pulse

3. Homing on Home Switch and Index pulse

The initial direction of movement shall be dependent on the state of the home switch. *Rightward* if the home switch is inactive -low-. *Leftward* if the home switch is active -high-. The home position shall be at the first index pulse to the *left* of the position where the home switch becomes inactive.

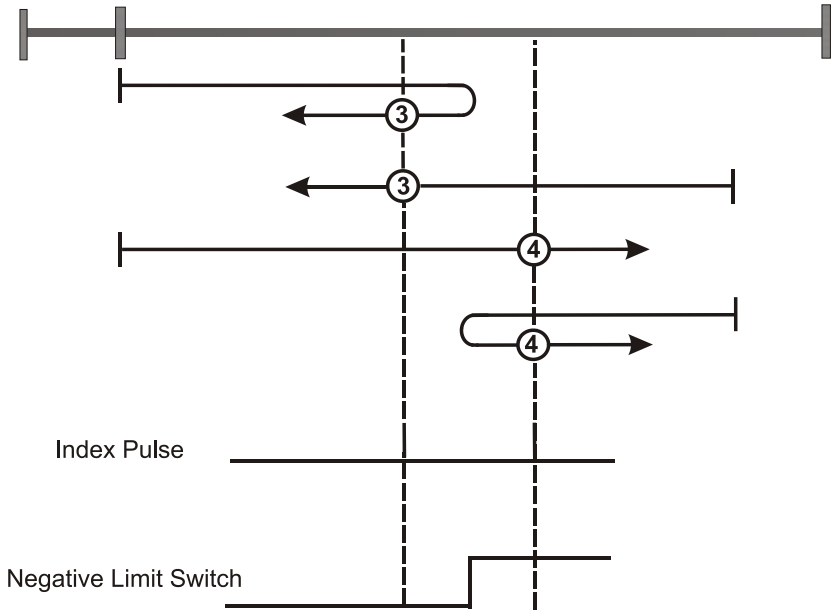


Figure 8: Homing on Home Switch and Index pulse

4. Homing on Home Switch and Index pulse

The initial direction of movement shall be dependent on the state of the home switch. *Rightward* if the home switch is inactive -low-. *Leftward* if the home switch is active -high-. The home position shall be at the first index pulse to the *right* of the position where the home switch becomes active.

5. Homing on Home Switch and Index pulse

The initial direction of movement shall be dependent on the state of the home switch. *Rightward* if the home switch is active -high-. *Leftward* if the home switch is inactive -low-. The home position shall be at the first index pulse to the *right* of the position where the home switch becomes inactive.

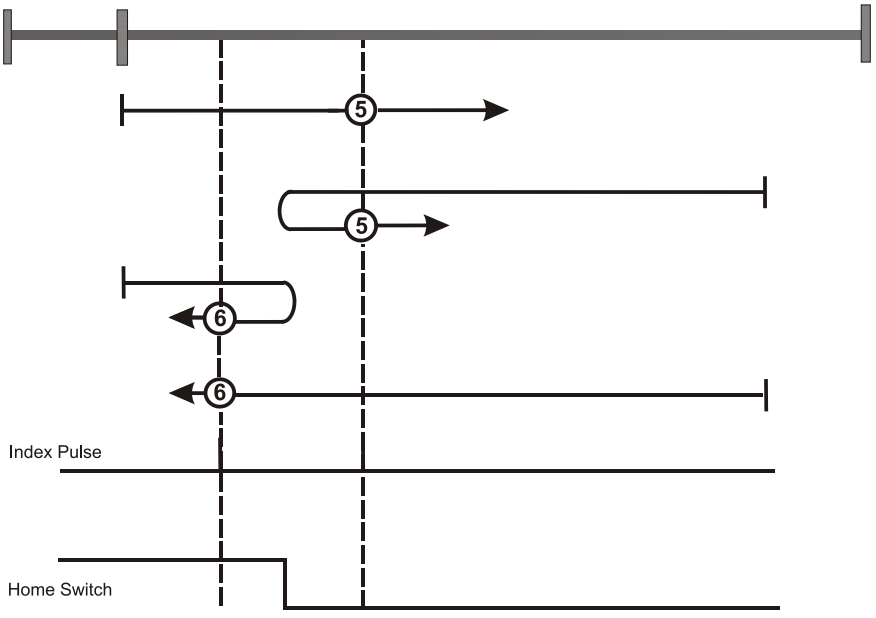


Figure 9: Homing on Home Switch and Index pulse

6. Homing on Home Switch and Index pulse

The initial direction of movement shall be dependent on the state of the home switch. *Rightward* if the home switch is active -high-. *Leftward* if the home switch is inactive -low. The home position shall be at the first index pulse to the *left* of the position where the home switch becomes inactive.

7. Homing on Home Switch and Index pulse – positive initial motion

The initial direction of movement shall be *rightward* except if the home switch is active at the start of the motion. The home position shall be at the index pulse on the left of the falling edge of the home switch. If during the movement the drive encounters the relevant limit switch, it shall reverse the direction of the movement.

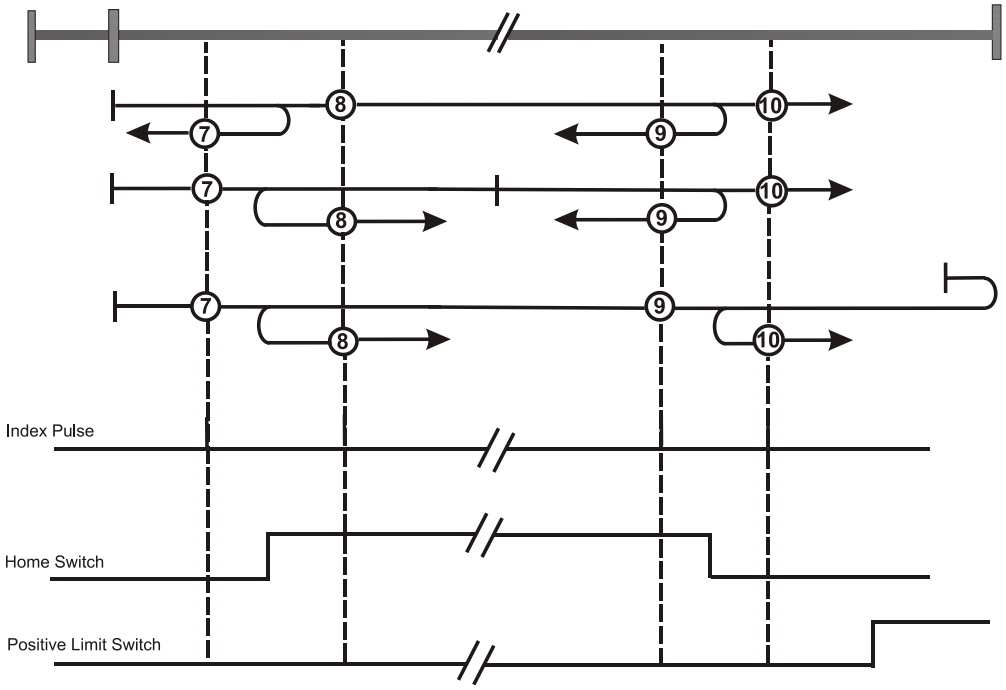


Figure 10: Homing on Home Switch and Index pulse – positive initial motion

8. Homing on Home Switch and index pulse – positive initial motion

The initial direction of movement shall be *rightward* except if the home switch is active at the start of the motion. The home position shall be at the index pulse on the right of the rising edge of the home switch. If during the movement the drive encounters the relevant limit switch, it shall reverse the direction of the movement.

9. Homing on Home Switch and index pulse – positive initial motion

The initial direction of movement shall be *rightward*. The home position shall be at the index pulse on the left of the rising edge of the home switch. If during the movement the drive encounters the relevant limit switch , it shall reverse the direction of the movement.

10. Homing on Home Switch and index pulse – positive initial motion

The initial direction of movement shall be *rightward* except if the home switch is active at the start of the motion. The home position shall be at the index pulse on the right of the falling edge of the home switch. If during the movement the drive encounters the relevant limit switch , it shall reverse the direction of the movement.

11. Homing on Home Switch and index pulse – negative initial motion

The initial direction of movement shall be *leftward* except if the home switch is active at the start of the motion. The home position shall be at the index pulse on the right of the falling edge of the home switch. If during the movement the drive encounters the relevant limit switch , it shall reverse the direction of the movement.

12. Homing on Home Switch and index pulse – negative initial motion

The initial direction of movement shall be *leftward* except if the home switch is active at the start of the motion. The home position shall be at the index pulse on the left of the falling edge of the home switch. If during the movement the drive encounters the relevant limit switch, it shall reverse the direction of the movement.

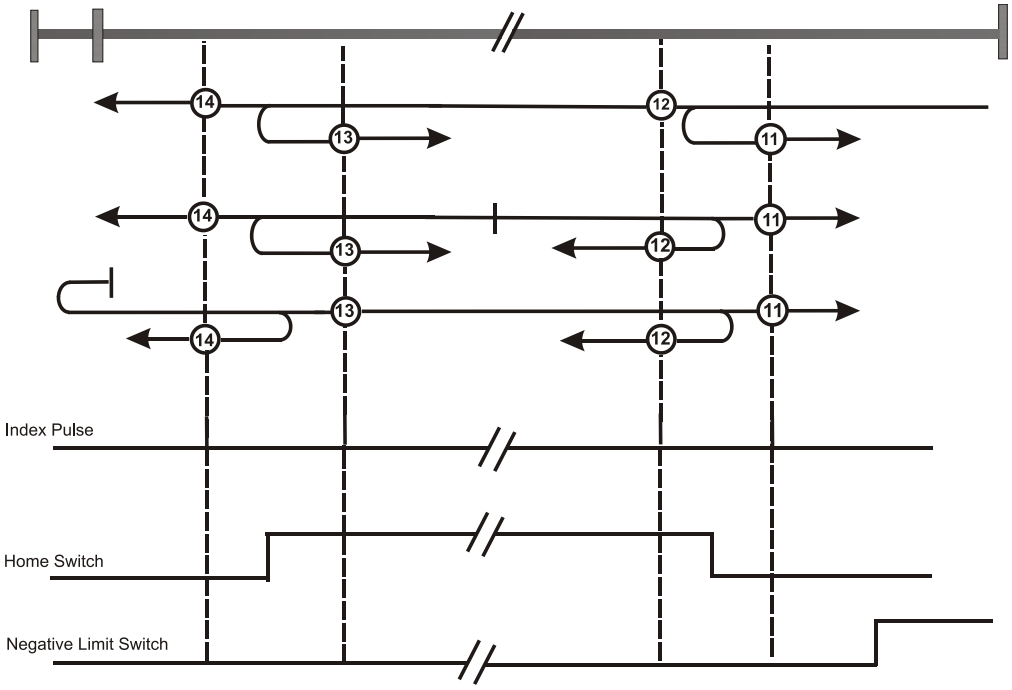


Figure 11: Homing on Home Switch and Index pulse – negative initial motion

13. Homing on Home Switch and index pulse – negative initial motion

The initial direction of movement shall be *leftward* except if the home switch is active at the start of the motion. The home position shall be at the index pulse on the right of the rising edge of the home switch. If during the movement the drive encounters the relevant limit switch , it shall reverse the direction of the movement.

14. Homing on Home Switch and index pulse – negative initial motion

The initial direction of movement shall be *leftward* except if the home switch is active at the start of the motion. The home position shall be at the index pulse on the left of the falling edge of the home switch. If during the movement the drive encounters the relevant limit switch , it shall reverse the direction of the movement.

17.Homing without index pulse

See method 1-14 except that the home position is not dependent on the index pulse but only on the relevant home or limit switch transition.

18. Homing without index pulse

See method 1-14 except that the home position is not dependent on the index pulse but only on the relevant home or limit switch transition.

19. Homing without index pulse

See method 1-14 except that the home position is not dependent on the index pulse but only on the relevant home or limit switch transition.

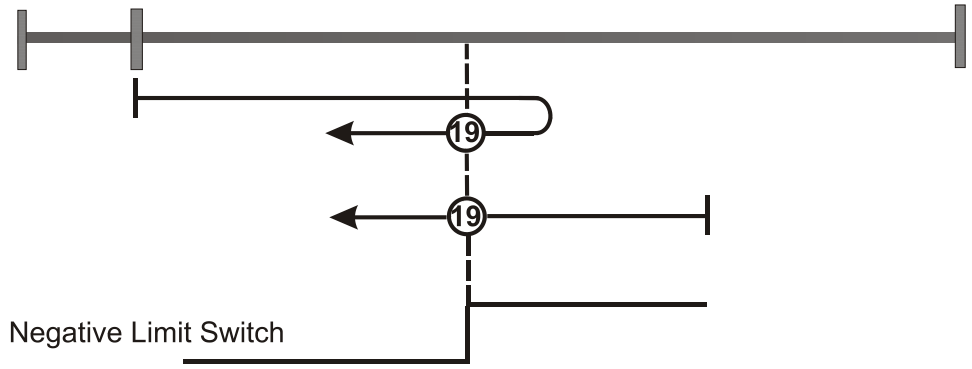


Figure 12: Homing without index pulse

21. Homing without index pulse

See method 1-14 except that the home position is not dependent on the index pulse but only on the relevant home or limit switch transition.

23. Homing without index pulse

See method 1-14 except that the home position is not dependent on the index pulse but only on the relevant home or limit switch transition.

26. Homing without index pulse

See method 1-14 except that the home position is not dependent on the index pulse but only on the relevant home or limit switch transition.

27. Homing without index pulse

See method 1-14 except that the home position is not dependent on the index pulse but only on the relevant home or limit switch transition.

30. Homing without index pulse

See method 1-14 except that the home position is not dependent on the index pulse but only on the relevant home or limit switch transition.

33. Homing on index pulse

The direction of the homing is negative. The home position shall be at the first index pulse found in the negative direction.

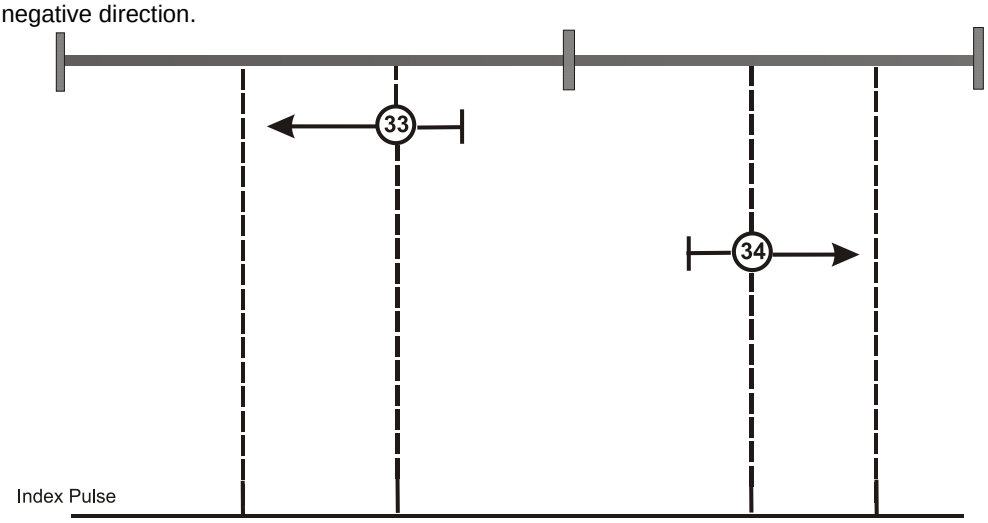


Figure 13: Homing on index pulse

34. Homing on index pulse

The direction of the homing is positive. The home position shall be at the first index pulse found in the positive direction.

35.Homing on index pulse

The current position shall be taken to be the home position. (Operational enabled state not required).

36.Homing on mechanical beat and index pulses

The initial direction of movement shall be rightward. The home position shall be at the first index pulse to the left of the position where the mechanical beat is found. User can limit the torque during homing with parameter **E75 – pHMMAXTRQ**.

37.Homing on mechanical beat and index pulses

The initial direction of movement shall be leftward. The home position shall be at the first index pulse to the rigth of the position where the mechanical beat is found. User can limit the torque during homing with parameter **E75 – pHMMAXTRQ**.

38.Homing on mechanical beat without index pulses

The initial direction of movement shall be rightward. The home position shall be at the left of the position where the mechanical beat is found. User can limit the torque during homing with parameter **E75 – pHMMAXTRQ**.

39.Homing on mechanical beat without index pulses

The initial direction of movement shall be leftward. The home position shall be at the rigth of the position where the mechanical beat is found. User can limit the torque during homing with parameter **E75 – pHMMAXTRQ**.

When **E28-29 – HMOFFSET** is applied, the zero position is overwrite with this value and axis position will be referred to this value.

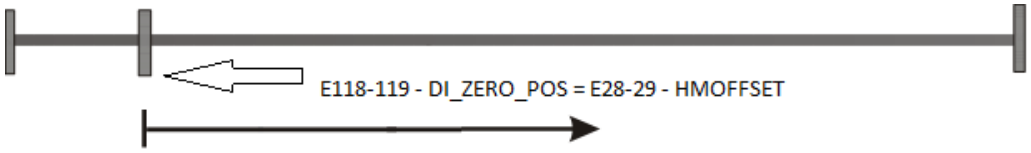


Figure 14: Offset Position

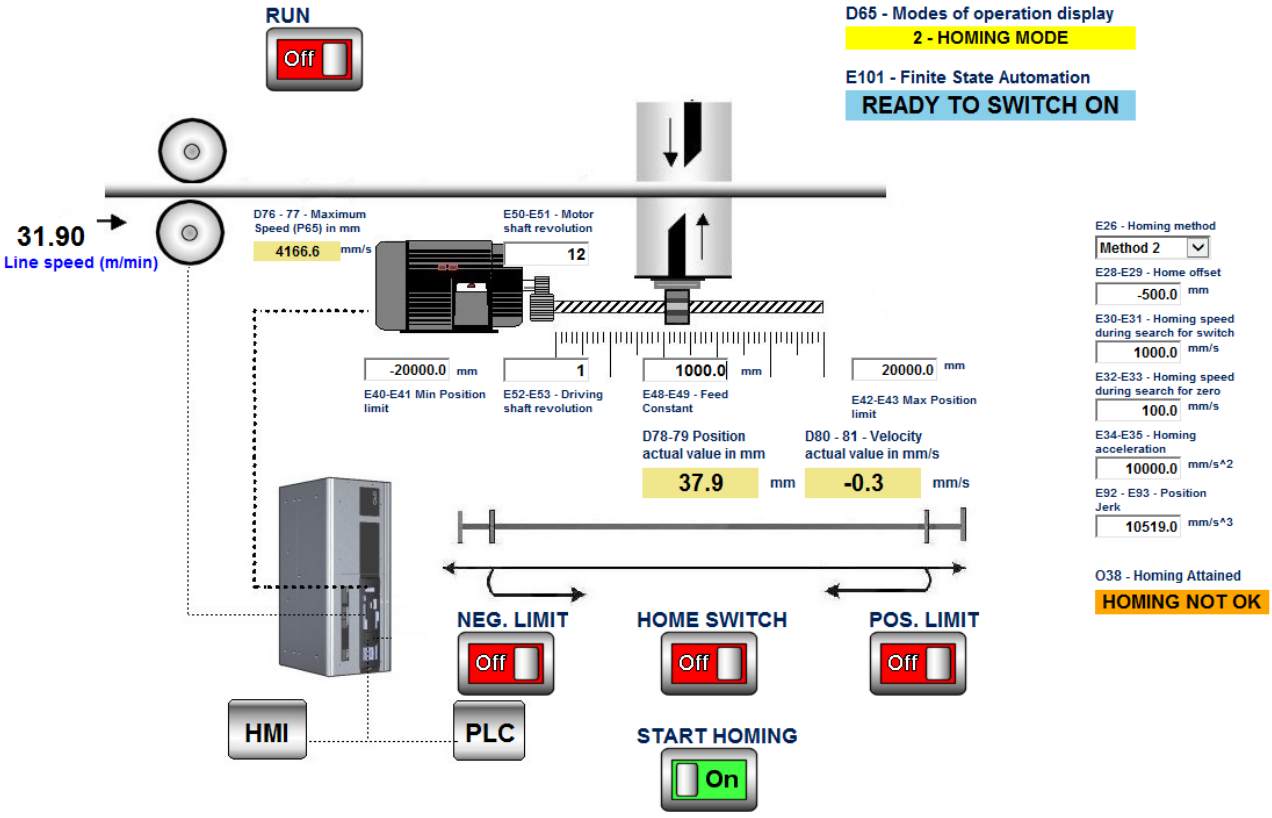
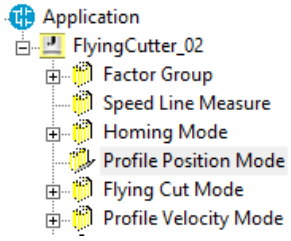


Figure 15: Homing Interface

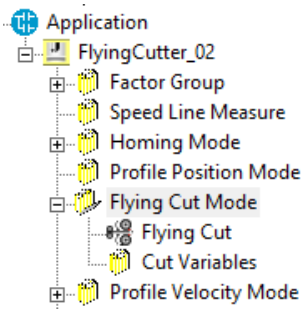


2.6 PROFILE POSITION MODE

Profile position mode is set when drive have to move the motor to zero position or after Homing or after manual mode if input **I06 - ID_MOVE_ZERO** is enabled. User can chose Acceleration **E04-05 – PROFACC,** Deceleration **E06-07 – PROFDEC,** Speed **E12-13 – VELPOS,** Jerk **E92 – 93 – PROFJERK.**

Name	Description	Min	Max	Default	UM	Scale
RD_STATE_MACHINE	E101 – Finite State Automation					1
MODE_OF_OP_DIS	D65 – Modes of operation display	0	1			1
PROFACC	E04-05 – Profile Acceleration	1.0	200000000.0	1000.0	mm/s^2	10
PROFDEC	E06-07 – Profile Deceleration	1.0	200000000.0	1000.0	mm/s^2	10
VELPOS	E12 – 13 – Profile Velocity	1.0	200000000.0	1000.0	mm/s	10
PROFJERK	E92 – 93 – Profile Jerk	1.0	200000000.0	1000.0	mm/s^3	1
QSDEC	E08 – 09 – Quick stop deceleration	1.0	200000000.0	1000.0	mm/s^2	10
QSJERK	E10-E11 – Quick Stop Jerk	0.0	200000000.0	0.0	mm/s^2	
pQSOPTC	E38 – Quick Stop Option code	**Range**		2		1
		0	0 - Simulated			
		2	2 – Switch On Disabled			
		6	6 – Stay in Quick Stop			
		8				
WINPOS	E14 – 15 – Position Window	1.0	200000000.0	100.0	mm	10
FOLLERR	E16-17 – Following Error window	0.0	200000000.0	10000.0	mm	10
ERRORPOS	D70 – 71 – Following error window				ie	1
pENSPDFDW	E36 – Enable Speed Feed-forward	0	1			1
pENTRQFDW	E37 – Enable Torque Feed-forward	0	1			1
pPOS_REG_KP	E39 – Kv position loop proportional gain	0.0	400.0	4.0		10
ACTUALPOS_IE	D66-67 – Position actual value in ie				ie	
ACTUALVEL_IE	D68 – 69 – Velocity actual value				ie/s	
LINE_SPD_MAX_LATCH	D64-Line speed maximum during Latch/Unlatch				m/min	
SWLIMITMIN	E40-41 – Minimum Position Limit	-200000000.0	200000000.0	-2000.0	mm	10
SWLIMITMAX	E42-43 – Maximum Position Limit	-200000000.0	200000000.0	2000.0	mm	10
MAX_SPEED_IE	D74-75 – Maximum speed (P65) in i.e.				ie/s	

Tab. 5- Profile Position Mode



2.7 FLYING CUT MODE

After Homing and positioning to zero-point, drive jumps in Flying Cut mode. Following table shows all the parameters for this Operative Mode.

Name	Description	Min	Max	Default	UM	Scale
RD_STATE_MACHINE	E101 – Finite State Automation					1
MODE_OF_OP_DIS	D65 – Modes of operation display	0	1			1
CUT_STATE	D94 – Flying Cut State	0				1
EN_CUT_DEMO	E00 – Enable Demo Cut			0		
CUT_DEMO_TIME	E01 – Cut Demo Time	0	65000	0		
POS_LATCH	E80-81 – Latch Position Carriage side	0.0	200000000.0	50.0	mm	10
CUT_TRQMAX	E82 – Cutter Maximum Torque	0.0	400.00	100.00	% MOT_T_NOM	40.96
TARR_LATCH	E83 – Rounded Time Latch	0.0	100.00	40.00	%	100
POS_UNLATCH	E84-85 – Unlatch position carriage side	0.0	200000000.0	50.0	mm	10
TARR_UNLATCH	E87 – Rounded Time Unlatch	0.0	100.00	40.00	%	100
MAX_POS_CARRIAGE	E88 – 89 – Maximum Carriage Position	0.0	200000000.0	50.0	mm	10
CUT_LENGTH	E90-91 – Cut Length	0.0	200000000.0	50.0	mm	10
POS_BACK_SEL	E70 – Positioning Back selection	**Range**		0		1
		0	0 – Trap. And const speed with override			
		1	1 – Trap. And speed E65 with override			
		2	2 – Trap. And const speed D73 with override			
		3	3 – Trap. And const speed			
		4	4 – Trap. And speed E65			
		5	5 – Trap. And speed D73			
		6	6 – S. Ramps and const speed			
		7	7 – S. Ramps and speed E65			
		8	8- S. Ramps and speed D73			
		9	9- Pos Back in Frequency			
POS_BACK_CST_SPD	E71 – Positioning Back Const Speed	0.00	100.00	0.0	%	100
TARR_POSBCK_FRQ	E56 – Rounded time for positioning back in frequency	0.00	100.00	100.00	%	
CUTTER_MODE	E72 – Cutter Mode	**Range**				1
		0	0 – Simulation Cut			
		1	1 – Ramp Down After Cut			

Name	Description	Min	Max	Default	UM	Scale
		2	2 – Reach Max Pos after Cut			
CUT_INPUT_DET	E59 – Cut input detection selection	**Range**				1
		0	0 – Cut Input Rising and Falling			
		1	1 – Cut Input only Rising			
IMM_CUT_DET	E55 – Immediately cut input detection	**Range**				1
		0	0 – Immediately Cut on Rising Edge			
		1	1 – Immediately Cut on Falling Edge			
LINE_SPD_MAX	E65 – Maximum Line Speed	0.0	3000.0	100.0	m/min	10
START_MODE	E95 – Selection of start point	**Range**				1
		0	0- Start from 0			
		1	1- Start from E96-97			
		2	2- Dynamic start			
START_POS_CARRIAGE	E96-97 – Start position carriage	-200000000.0	200000000.0	0.0	mm	10
POS_THR	E73 – Position Threshold to estimate positioning back	0.0	6500.0	0.0	mm	10
POS_THR_UN	E76 – Position Threshold Unlatch	0.0	6500.0	0.0	mm	10
T_SYNCH	E74 – Synchronous Time (Sim. mode)	0	65000	0	ms	1
WINPOS	E14 – 15 – Position Window	1.0	200000000.0	100.0	mm	10
FOLLERR	E16-17 – Following Error window	0.0	200000000.0	10000.0	mm	10
ACTUALPOS	D78-79 – Position actual value in mm				mm	10
ACTUALVEL	D80 – 81 – Velocity actual value				mm/s	10
LINE_SPD	D72 – Filtered speed				m/min	10
LINE_SPACE_MOD	E78-79 – Line space position module	0.0	200000000.0	0.0	Mm	10
ACTUALPOS_IE	D66 – 67 – Actual Position in ie				ie	1
ACTUALVEL_IE	D68-69 – Velocity actual value				ie/s	1
MAX_POS_CARR_MIS	D92 – 93 – Max position Carriage				mm	10
T_SYNCH_MEAS	E134 – 135 -Synchronous time measured				ms	
CUT_STATUS_WORD	E112 – 113 – Cut Status Word					
SWLIMITMIN	E40 – 41 – Min Position Limit	-200000000.0	200000000.0	-2000.0	mm	10
SWLIMITMAX	E42 – 43 – Max Position Limit	-200000000.0	200000000.0	2000.0	mm	10
EN_MIN_CUT_ALR	E57 – Enable minimum cut length alarm			0		

Name	Description	Min	Max	Def ault	UM	Scale
LAST_CUT_LGTH	D88-89 – Last Cut Length				mm	10
CUT_LGT_EST_ACT	D86-87 – Cut length Est with actual line speed				mm	10
CUT_ERR_MAX	E136 – 137 - Cut Error Maximum				mm	10
CUTT_ERR_MIN	E138 – 139 – Cut Error Minimum				mm	10

Tab. 6- Flying Cutter Mode

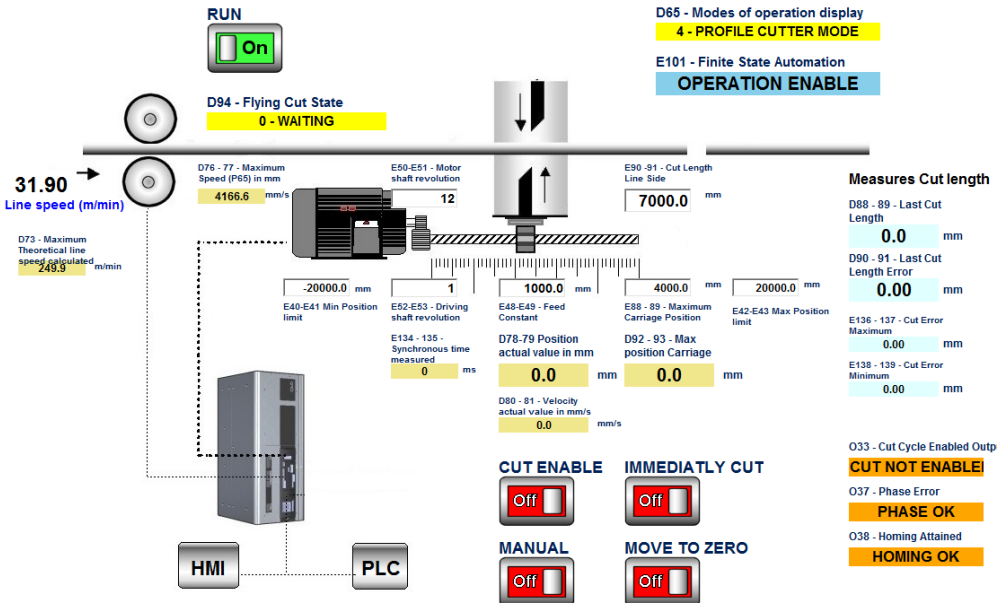


Figure 16: Flying Cut Interface

First of all is necessary to set the software limits for the carriage, they are **E40-41 – SWLIMITMIN E42-43-SWLIMITMAX**. Parameter **E90-91-CUT_LENGTH** is the cut length setting. Parameter **E88-89 – MAX_POS_CARRIAGE** is the maximum position reaches by the carriage when system is control to reach the maximum position after cut (**E72 – CUTTER_MODE = 2 – Reach The Max Pos After Cut**).

2.7.1 OVERVIEW OF FLYING CUTTER MODE

The Flying cutter mode is divided in 5 Phases. User can check actual phases with parameter **D94 – CUT_STATE**. The mains state are **0-Waiting**, **1-Latch**, **2-Synchronous**, **3-Unlatch**, **4-Positioning Back**. In the following picture blue signal is speed reference, red signal is actual speed, green signal is following error actual value, violet signal is frequency input counter.

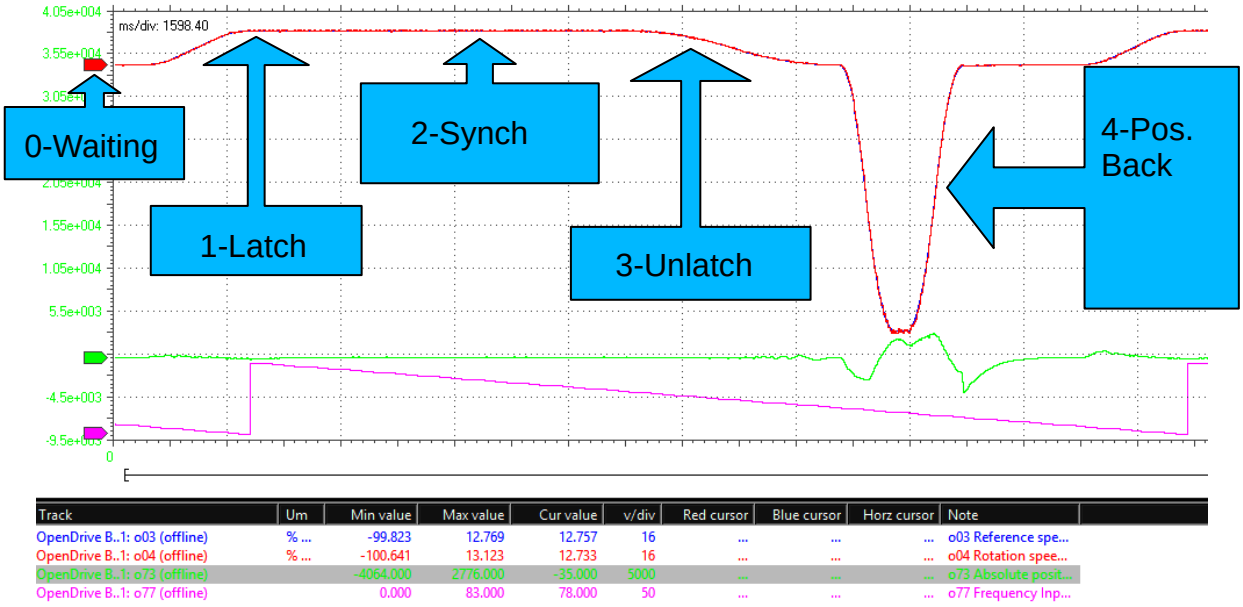


Figure 17: Flying Cut state

2.7.2 WAITING STATE

After Homing Position and after reaching zero-point, system is ready to starts the Flying Cutter mode. When **I05 - ID_CUT_EN** is enabled, drive starts to count the pulses coming from the line. In this phases drive is waiting to match the threshold value in order to reaches line speed.

2.7.3 IMMEDIATELY CUT

If **I01 - ID_IMMCUT** is enabled, user can force the immediately starting of a cut. With this condition the Unlatch phase after cut is enabled immediately. The frequency counter is overwritten with the counter calculate for reaches the next cut with the correct value.

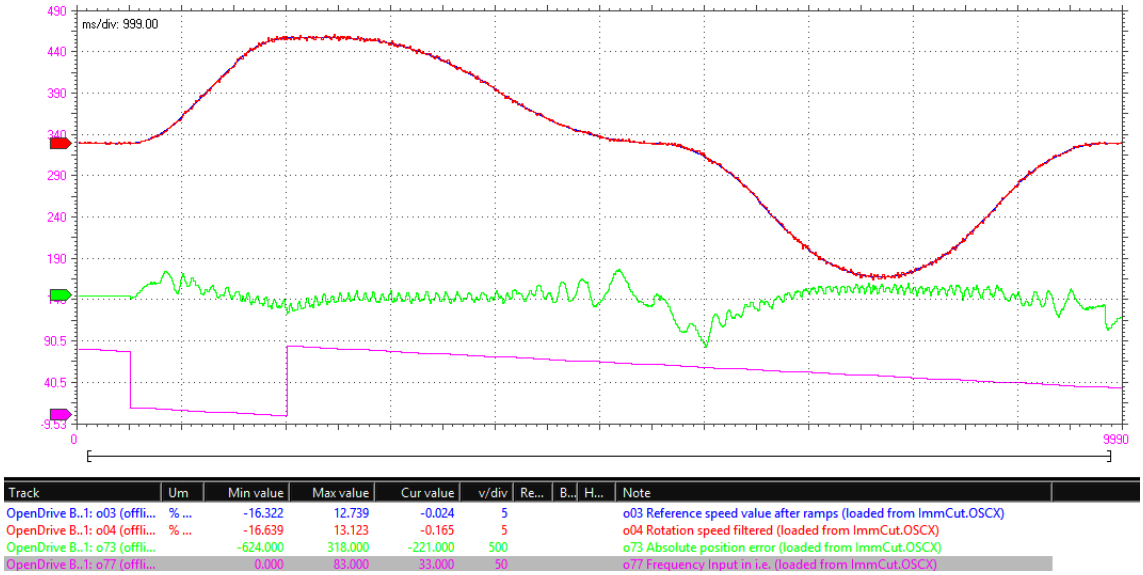


Figure 18: Immediately Cut

2.7.4 LATCH PHASE

Parameter **E80-81 – POS_LATCH** is the space covered by carriage during latch phase. When system reaches the threshold value (**E90-91 - CUT_LENGTH** – (2***E80-81 – POS_LATCH**)), drive starts to move the motor in order to reaches the line speed (**D72 - LINE_SPD**).

User can set the percent value of rounded with parameter **E83 - TARR_LATCH**.
The following example has been realized with parameter E83 = 50%, that means that 50% of time of latch time is use for acceleration (25% for increasing acceleration, 25% decreases deceleration, 50% constant acceleration).

At the end of Latch Function **O32-OD_SYNCH_OUT** is enabled. During Latch Phase Outputs **O34-35-36** and bits 4-5-6 of Status Word shows the state 001 (1_{dec} means Latch Phase). User can also check it on variable **D94 – Flying Cut State**.

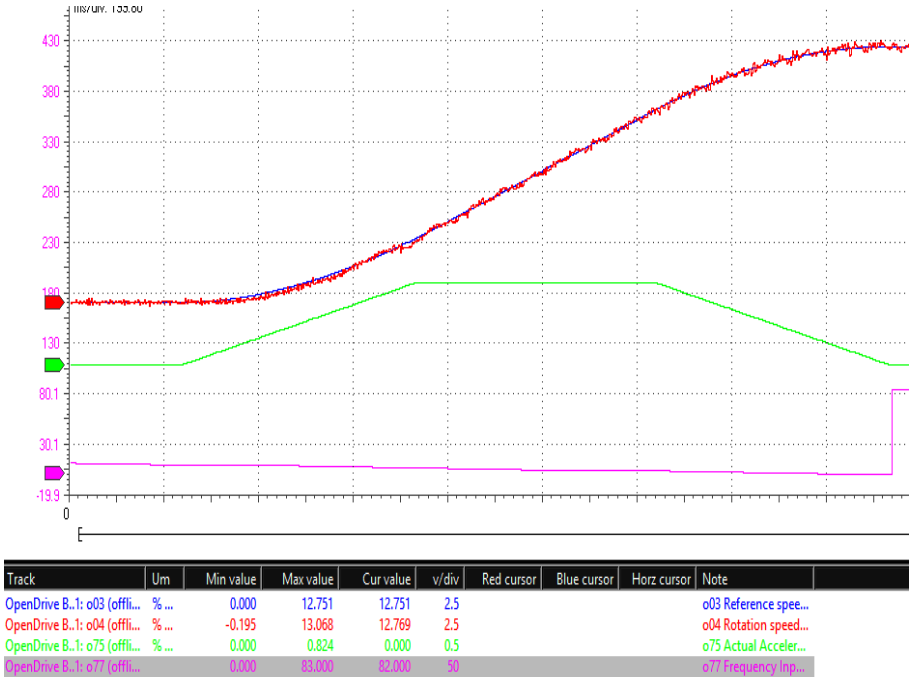


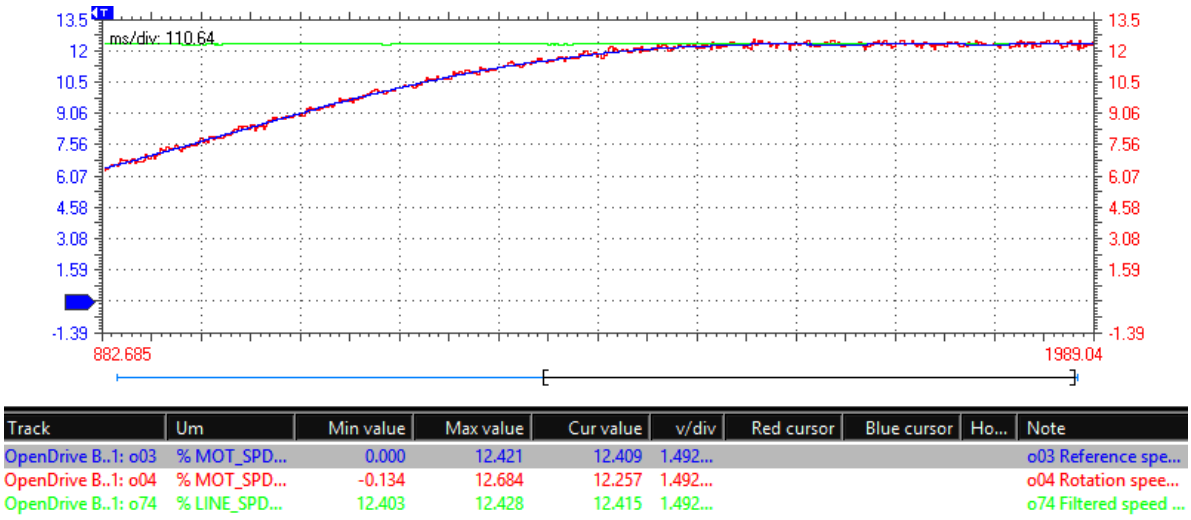
Figure 19: Latch Phase

2.7.5 SYNCHRONOUS PHASE

After Latch phase the carriage runs at the same speed of Line Speed. Drive enables **O32-OD_SYNCH_OUT** and waits for input **I10 - Cut Ok**. This input has to be enabled and disabled in order to confirm that cut without problem. Then, there are three kind of management of deceleration after cut (parameter **E72 – CUTTER_MODE**):

- **0 – Simulation cut**. Drive keeps the carriage to the same speed of line until is reached a time E74 – T_SYNCH,
- **1** – **Ramp Down After Cut**. Drive starts immediately to ramp down the carriage to zero speed,
- **2** – **Reach Maximum position after Cut**. Drive keeps the carriage to the same speed of line and starts to ramp down in order to reaches **E88-89 – MAX_POS_CARRIAGE**.

In the section of Cutter Mode there will be more information.



Track	Um	Min value	Max value	Cur value	v/div	Red cursor	Blue cursor	Ho...	Note
OpenDrive B..1: o03	% MOT_SPD...	0.000	12.421	12.409	1.492...				o03 Reference spe...
OpenDrive B..1: o04	% MOT_SPD...	-0.134	12.684	12.257	1.492...				o04 Rotation spee...
OpenDrive B..1: o74	% LINE_SPD...	12.403	12.428	12.415	1.492...				o74 Filtered speed ...

Figure 20: Starts of Synchronous phase

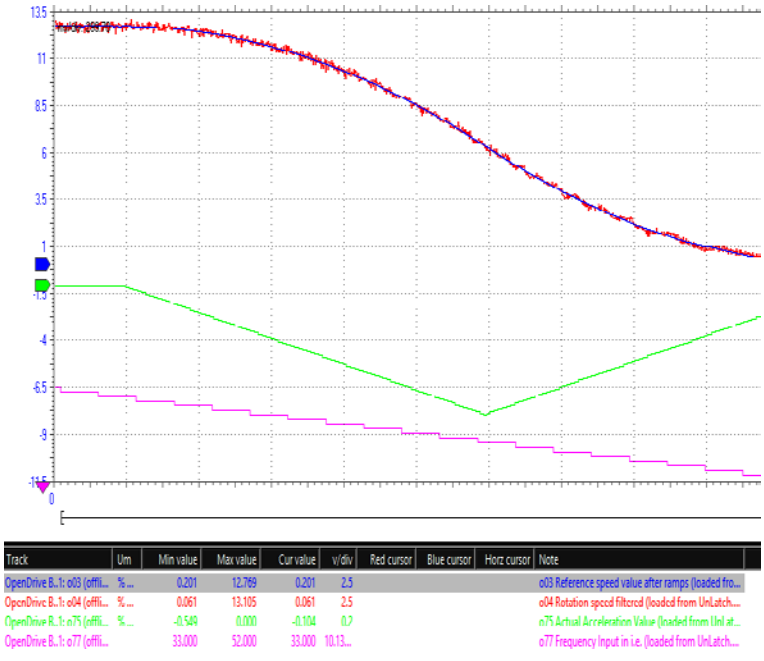
During Latch Phase Outputs **O34-35-36** and bits 4-5-6 of Status Word shows the state 010 (2_{dec} means Synch Phase).

If the input **I10 - Cut Ok** doesn't come until the system reaches the **MAX_POS_CARRIAGE – POS_UNLATCH** Drives ramps down speed to zero and enables a bit of status word.

2.7.6 UNLATCH PHASE

After reaches the position threshold depending by parameter **E72 – CUTTER_MODE,** and if the input **I10 – Cut Ok** has been detected drive starts to ramp down the motor to zero speed. Parameter **E80 – 81 – POS_UNLATCH** is the space covered by carriage during Unlatch Phase. Parameter **E87 – TARR_UNLATCH** is the percentual of rounding of acceleration. At the end of this phase, carriage reaches its maximum position measured **D92-93 – MAX_POS_CARR_MIS**. If **E72 – CUTTER_MODE = 2** the variables will be closed to parameters **E88-89 -MAX_POS_CARRIAGE.**

The following example has been realized with parameter E87 = 50%, that means that 100% of time of latch time is use for acceleration (50% for increasing acceleration, 50% decreases deceleration, 0% constant acceleration).



Track	Um	Min value	Max value	Cur value	v/div	Red cursor	Blue cursor	Horz cursor	Note
OpenDrive B..1: o03 (offli...	% ...	0.201	12.769	0.201	2.5				o03 Reference speed value after ramps (loaded fro...
OpenDrive B..1: o04 (offli...	% ...	0.061	13.105	0.061	2.5				o04 Rotation speed filtered (loaded from UnLatch....
OpenDrive B..1: o75 (offli...	% ...	-0.549	0.000	-0.104	0.7				o75 Actual Acceleration Value (loaded from Unl at...
OpenDrive B..1: o77 (offli...		33.000	52.000	33.000	10.13...				o77 Frequency Input in i.e. (loaded from UnLatch....

Figure 21: Unlatch Phase

During Unlatch Phase Outputs **O34-35-36** and bits 4-5-6 of Status Word shows the state 011 (3_{dec} means Unlatch Phase).

2.7.7 POSITIONING BACK

When Unlatch phase ends the Carriage Profile doesn't depends any more from the Line Speed, until the next Phase. Obviously, the drive continues to count the pulses coming from line speed, the goal for the Carriage is to come back to zero position after the next Latch Phase starts. The positioning Back Profile is realised by a time-generator profile.

There are 9 different kind of Positioning Back:

- **0 – Trapezoidal and constant speed with override.** Trapezoidal speed applied with speed depending on the time requested to come to zero position. An override is applied.
- **1 – Trapezoidal and constant speed E65 with override.** Trapezoidal speed applied, speed can be set by parameter E65-LINE_SPD_MAX. An override is applied.
- **2 – Trapezoidal speed and D73 with override.** Trapezoidal speed applied, speed is set like maximum 73 – LINE_SPD. An override is applied.
- **3- Trapezoidal and constant speed without override.** Like 0 but no override is applied.
- **4 – Trapezoidal and constant speed E65**. Like 1 but no override is applied.
- **5 – Trapezoidal speed and D73**. Like 2 but no override is applied.
- **6 – S-Ramps and constant speed**. S-Ramps profile generator is applied. The profile data are estimated.
- **7- S-Ramps and speed E65**. S-Ramps profile generator is applied. The speed applied is equal to E65.
- **8 – S-Ramps and speed D73**. S-Ramps profile generator is applied. The speed applied is equal to the maximum (D73).
- **9** – **Positiong Back in frequency**.

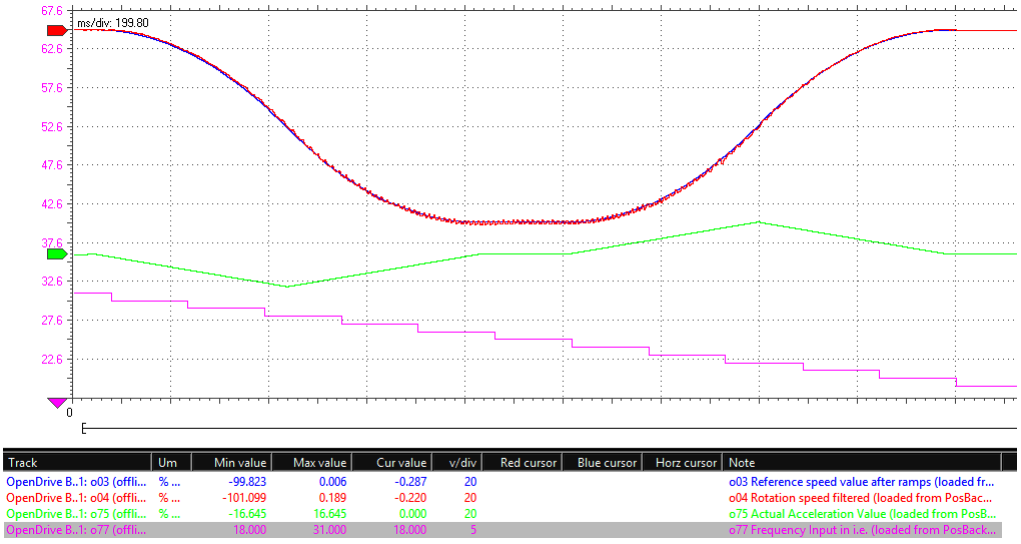


Figure 22: Positioning Back Phase

During Positioning Back Phase Outputs **O34-35-36** and bits 4-5-6 of Status Word shows the state 100 (4_{dec} means Pos Back Phase).

From the application version FlyingCutter_02 is possible to enable the Positiong Back in frequency (**E70 – POS_BACK_SEL = 9 – Pos Back in frequency**), this allows to modulates the positioning back depending by the frequency, in order to minimize the waiting time.
For this option the parameters **E71 – POS_BCK_CST_SPD** and **E56 – TARR_POSBCK_FRQ** are used.

The following picture shows a cycle with **E70 – POS_BACK_SEL = 9 – Pos Back in frequency.** Is possible to see that changing the line speed (green signal), also the positioning back profile is modulated.

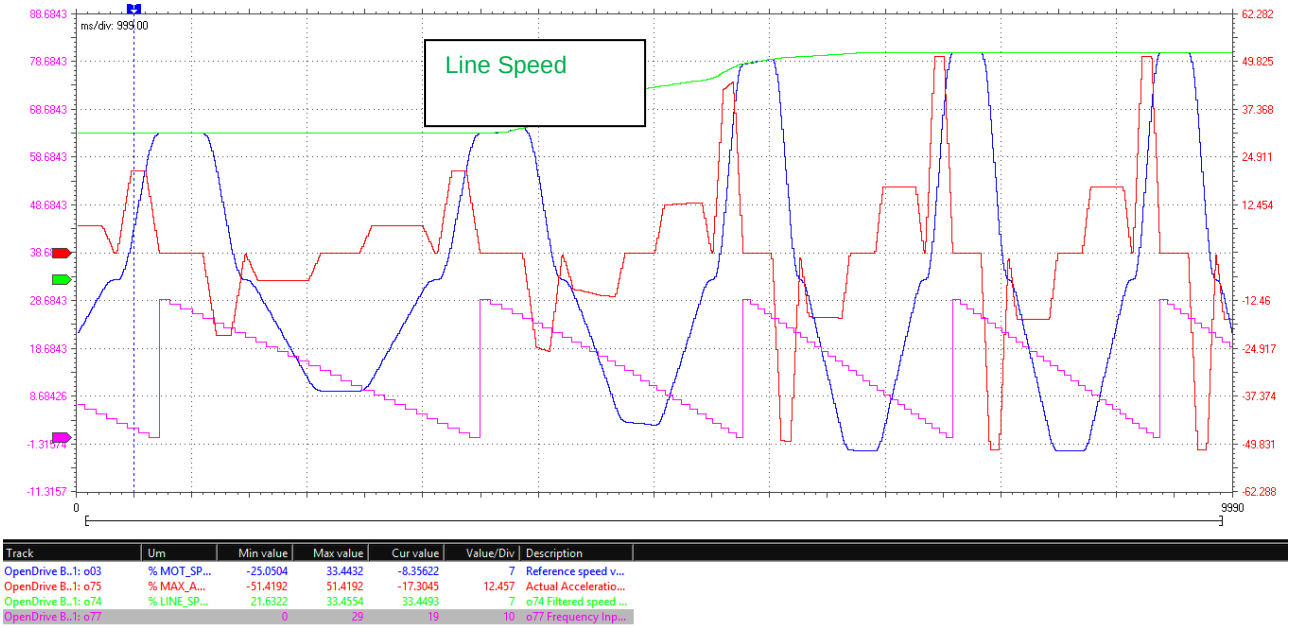


Figure 23: Positioning Back modulation by Line Speed

2.7.8 LOSING OF PHASE

Obviously, all the calculation are realised from theoretical point of view. In the real machine will be necessary consider the real speed so the speed regulators will be very important. If for some reason the system can not reached the zero position until a new Latch Phase is request, the application enables "**O37 - Phase Error**" output.
When cycle is ok and there isn't any Phase Error the Frequency Counter (violet signal, o76-o77) is updated at the start of Synchronous Phase (end of Latch Function), like to following picture.

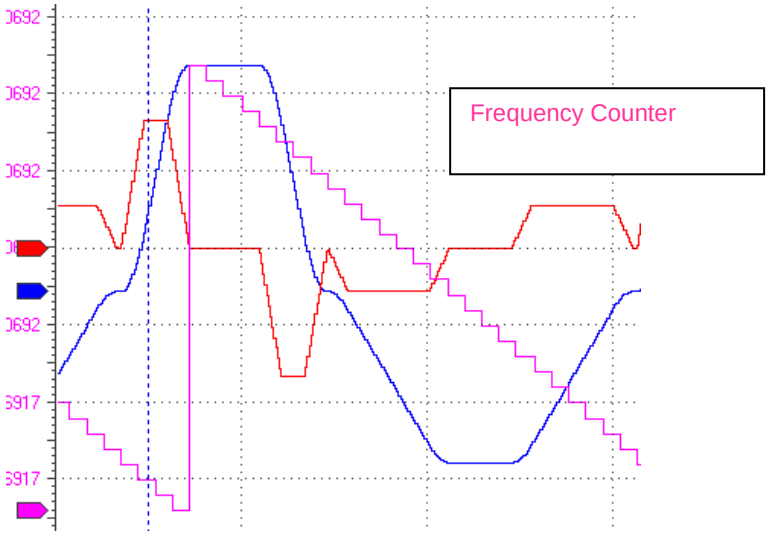


Figure 24: Frequency counter detection for correct cycle

2.7.9 CUT MODE

With parameter **E72 – CUTTER_MODE** is possible to choose up to 3 cutting mode. The first (0 – Simulation cut), is used only for simulation, in this case a time of synchronous zone is applied (**E74 – T_SYNCH**).
In the second system ramp down immediately after cut.
Third is used to reach the maximum position **E88-89 – MAX_POS_CARRIAGE,**

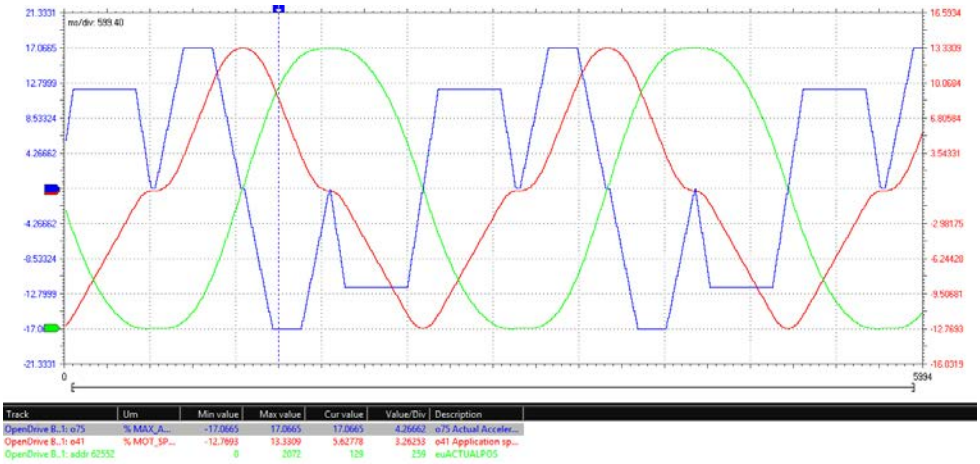


Figure 25: Ramp down after cut mode

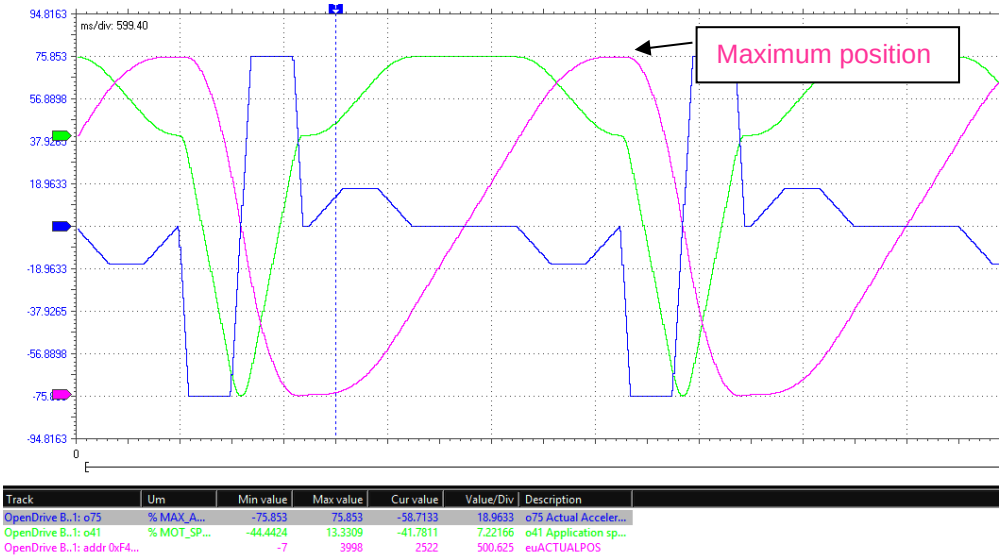


Figure 26: Reaching maximum position cut mode

The parameter **E59 – CUT_INPUT_DET** allows to choose so detect rising and falling edge (**E59 = 0**) of **I10 – Cut Ok** or only rising (**E59 = 1**). If the setting is “rising and falling” and the system doesn’t catch both condition until reaching the threshold position value for start unlatch (with threshold **E76 – POS_THR_UN**) an emergency ramp is applied (with deceleration **E08-09 – QSDEC** and jerk **E10-11 - QSJERK**). The Cut Status Word **E112-113 bit 13** (*position unlatch reached*) will shows the condition.

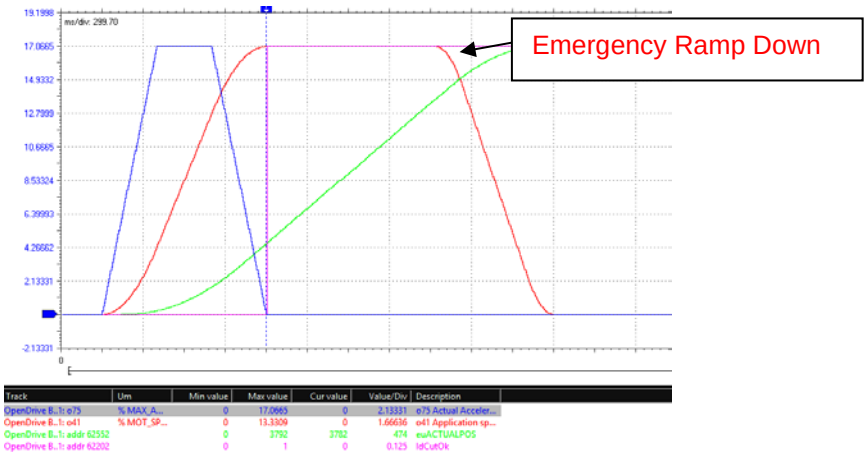


Figure 27: Ramp down after

2.7.10 START FROM A VALUE AND DYNAMIC START

With the parameter E95 – START_MODE is possible to choose the start points of the system. This can be zero position found after homing (E95 = 0), or a different value (E95 = 1, start from parameter **E96-97-START_POS_CARRIAGE**).

From the application version 18.02 is possible to choose the "Dynamic Start function" (**E95 = 2 – Dynamic Start**). With this function, is possible to decrease the cut length less than the minimum and move the start point in order to achieve maximum acceleration and maximum speed of the system.

Example:

E48-49 – FEED_CONST = 50 mm
E50-51 – GEAR_BOX_NUM = E52-53 – GEAR_BOX_DEN =1,
E80-81 = POS_LATCH = E84-85 = POS_UNLATCH = 100 mm,
E83 – TARR_LATCH = E87 – TARR_UNLATCH = 100%,
E88-89 = MAX_POS_CARRIAGE = 400 mm,
E72 – CUTTER_MODE =2 – Reach Maximum Position After Cut,
E95 – START_MODE = 2 – Dynamic Start,
E73 = POS_THR = 10 mm
P169 – START_TIME = 245 ms.
D72- LINE_SPD = 50 mt/min

With this configuration, the maximum line speed due to maximum acceleration during the latch/unlatch phase is 69,9 mt/min (**D64 – LINE_SPD_MAX_LATCH**).

OPDExplorer automatically calculates some usefully variables for Dynamic start:

CUT_LGT_EST_ACT	971.4	mm	D86 - 87 - Cut Length Est with actual line speed
MIN_CTLGTH_MAXSPD	1115.9	mm	E118-119 - Minimum Cut Length at maximum line speed
STARTPOS_MAXSPD	83.4	mm	E120-121 - Max Start position at maximum line speed
STARTPOS_ACTPD	116.7	mm	E122-123 - Max Start position at actual line speed
MIN_CTLGTH_STARTPOSMAX	976.7	mm	E124-125 - Minimum Cut Length at start position for maximum line speed
MIN_CTLGTH_STARTPOSACT	797.5	mm	E126-127 - Maximum Cut Length at start position for actual line speed

D86-87 – CUT_LGTH_EST_ACT is the cut length estimation at actual speed line, from **E96-97 – START_POS_CARRIAGE** to **E88-89 – MAX_POS_CARRIAGE**.
E118-119 – MIN_CTLGTH_MAX_SPD is like above but at maximum line speed **D64 – LINE_SPD_MAX_LATCH.**

E120-121 – STARTPOS_MAX_SPD is the maximum start position estimated (when Dynamic Start is enabled) for maximum line speed, this depends on parameter **E74 – T_SYNCH**.
E122-123 – STARTPOS_ACT_SPD is like above but at actual speed.

E124-125 – MIN_CTLGTH_STARTPOSMAX is the minimum Cut Length, for Dynamic Start at maximum line speed. The application will move the start point to **E120-121 – STARTPOS_MAX_SPD.**

E126-127 – MIN_CTLGTH_STARTPOSACT is the minimum Cut Length, for Dynamic Start at actual line speed. The application will move the start point to **E122-123 – STARTPOS_ACT_SPD.**

Changing the cut length from 975 mm to 800 mm the start position will change from 0 to 117 mm.
The first cycle, after changing the cut length, is processed with Old Length but the new Dynamic Start Position.
After this, the New Cut Length is fully applied.

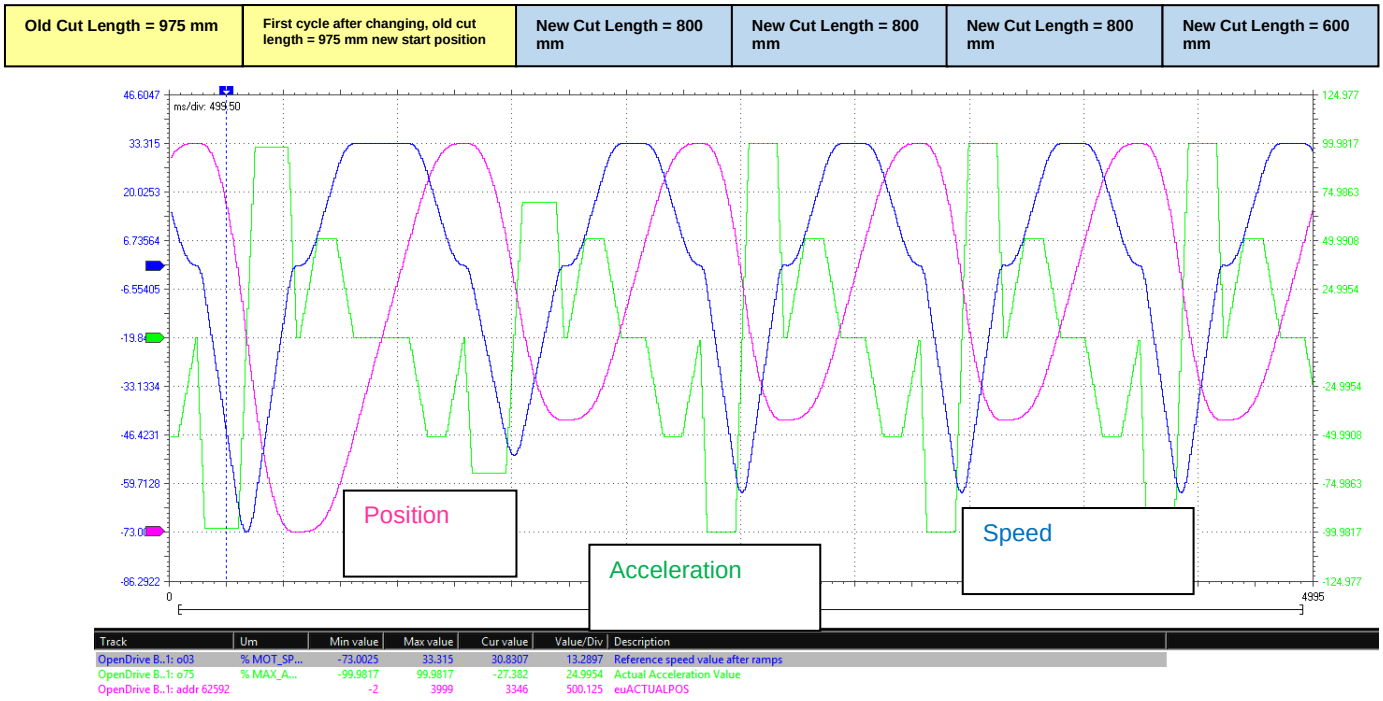


Figure 28: Dynamic Start, changing of cut length

Is possible to see, with for this example both cut length are near the limit of the system (acceleration is equal to 100% for old and new Cut Length). The first cycle after **E90-91-CUT_LENGTH** changing detetcion, is keep with the previous value but is changed the start position to **E122-123 – STARTPOS_ACT_SPD.** From the second cycle also the cut length will be changed. In this condition the system will enables the bit 18 *Low Cut Enabled*.

This function has been developed only for **E70 – POS_BACK_SEL = 9 – Pos Back in Frequency** and **E72 – CUTTER_MODE = 2 – Reach Max Pos After Cut**.

2.7.11 TORQUE FEED FORWARD

In this application is very important to minimize the position error (o73) in order to have a better profile. Is very important to realyse start up time (U01 = 1-Start Up) in order to estimate the start time P169 of motor and load. After that is necessary to tune well the speed loop gains.

Is possible also to enable torque Feed Forward (**E37-pENTRQFDW**), this will compensate the torque inertial component request.

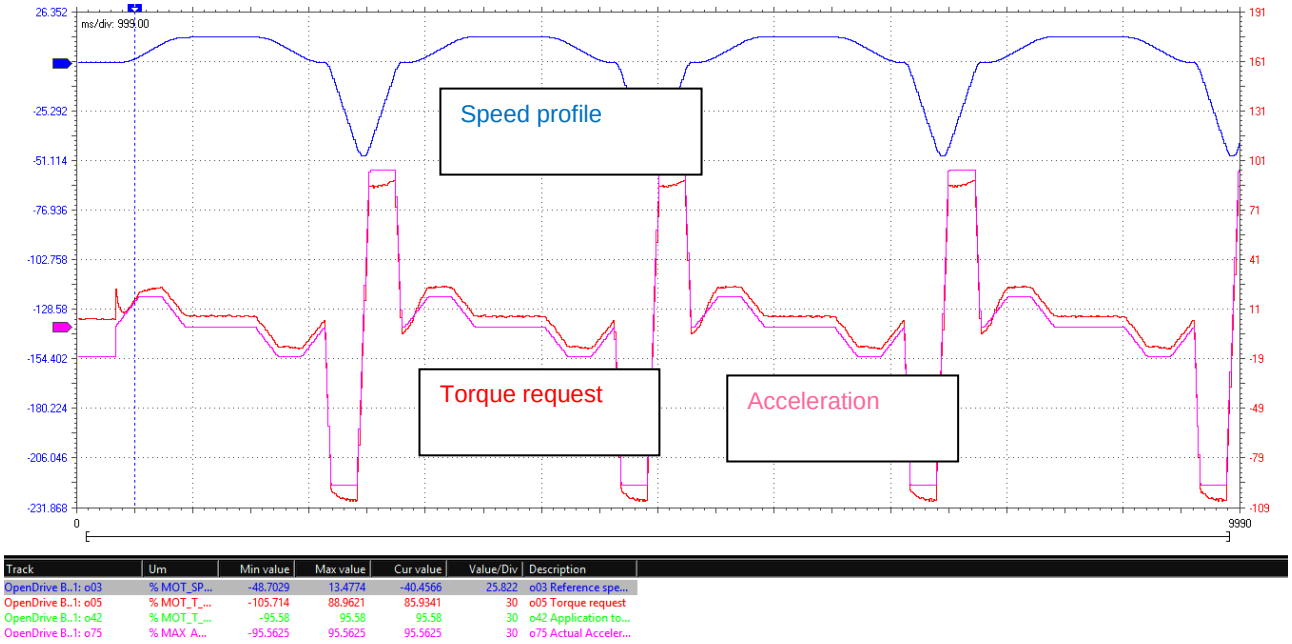


Figure 29: Torque FFW applied

2.7.12 CUT STATUS WORD

E112-113 – CUT_STATUS_WORD contains some information about cut state. If one of condition appears: Factor Group error, Following Error or Fieldbus Error appears the drive will enables *bit 14 pre-fault state*. If the speed is zero relative alarms also appears.

15 Hm C	14 Pf	13 Cdm	12 sy	11 pur	10 Op2	9 Op1	8 Op0	7 Hm tr	6 Ph 2	5 Ph 1	4 Ph 0	3 ce	2 man	1 f	0 oe

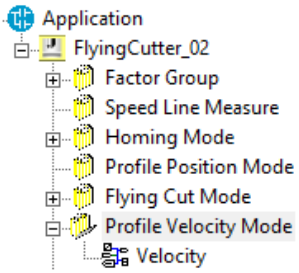
31	30	29	28	27	26	25	24	23	22	21	20	19	18 LowCut	17 Lger	16 Cut Ok

Fig. 30-Status Word (16 LSB)

0	Operation Enable State (Ds402)
1	Fault State (Ds402)
2	Automatic/Manual
3	Cycle enabled
4	Cycle Phase 0
5	Cycle Phase 1
6	Cycle Phase 2
7	Homing Target Reached
8	Operation mode bit 0
9	Operation mode bit 1
10	Operation mode bit 2
11	Position Unlatch Reached
12	Synchronous flag
13	Cut Demo
14	Pre Fault State
15	Homing attained
16	Cut Ok
17	Length Error
18	Low Cut Enabled

Tab. 7- Meaning of status word (16 LSB)

2.8 PROFILE VELOCITY MODE



When the system goes in manual mode (enabling **I11 - Autotmatic / Manual**), drive is automatically set to **3-Profile Velocity Mode.** In this condition user can move the carriage with **I03 - Jog Plus** or **I04 – Jog Minus**. User can act on the speed **E02-03 – TARGETVEL** (mm/s), acceleration **E22-23 – VELACC** (mm/s^2), deceleration **E24-25 – VELDEC** (mm/s^2), Jerk **E92 – 93 – PROFJERK** (mm/s^3).

Name	Description	Min	Max	Default	UM	Scale
RD_STATE_MACHINE	E101 – Finite State Automation					1
MODE_OF_OP_DIS	D65 – Modes of operation display	0	1			1
TARGETVEL	E02-03 – Target Velocity	1.0		0	mm/s	1
VELACC	E22 – 23 – Velocity Acceleration	1.0	200000000.0	1000.0	mm/s^2	10
VELDEC	E24 – 25 – Velocity Deceleration	1.0	200000000.0	1000.0	mm/s^2	10
QSDEC	E08 – 09 – Quick stop deceleration	1.0	200000000.0	1000.0	mm/s^2	1
QSJERK	E10-11 – Quick Stop Jerk	0.0	200000000.0	0.0	mm/s^2	1
PROFJERK	E92 – 93 – Profile Jerk	0.0	200000000.0	0.0	mm/s^3	1
pQSOPTC	E38 – Quick Stop Option code	**Range** 0 – 0 - Simulated 2 – 2 – Switch On Disabled 6 – 6 – Stay in Quick Stop 8		2		1

Name	Description	Min	Max	Def ault	UM	Scale
pTHRVEL	E18 – Velocty Threshold	100	65535	100 00	Ie/s	1
pTIMEVEL	E20 – Velocity Threshold time	0	65535	0	ms	
ACTUALPOS_IE	D66-67 – Position actual value in ie				ie	
ACTUALVEL_IE	D68 – 69 – Velocity actual value in ie/s				ie/s	
pENSPDFDW	E36 – Enable Speed Feed-forward	0	1			
SWLIMITMIN	E40-41 – Minimum Position Limit	- 20000 0000.0	200000000.0	- 200 0.0	mm	10
SWLIMITMAX	E42-43 – Maximum Position Limit	- 20000 0000.0	200000000.0	200 0.0	mm	10
LINE_SPD_MAX_LATCH	D64 – Line speed maximum during Latch/Unlatch			0.0	m/min	
MAX_SPEED_IE	D74-75 – Maximum speed (P65) in i.e.				ie/s	

Tab. 8- Meaning of status word (16 LSB)

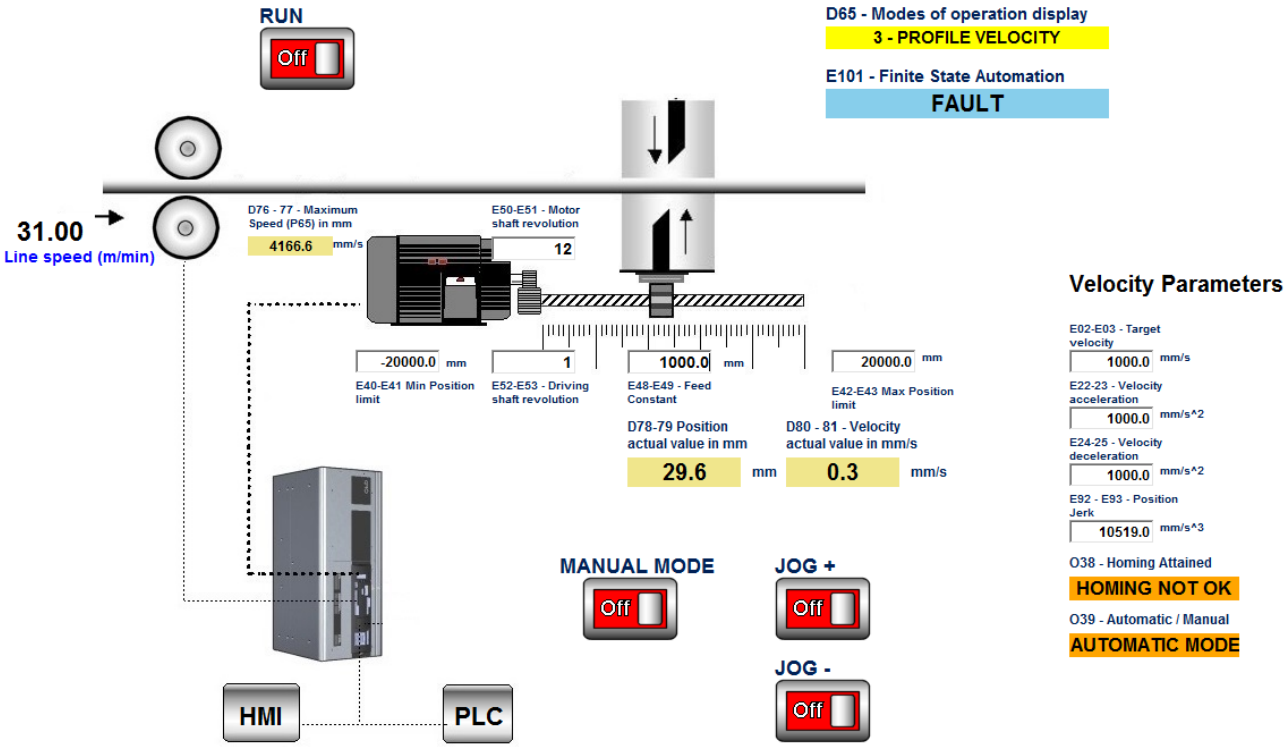


Figure 31: Manual mode

2.9 CAN OBJECTS

Index (hex)	Object	Type	Name	Description	PDO Mapping	Access
3000	VAR	UNSIGNED32	FEED_CONST	Feed Factor Group OPD Explorer Parameter: **E48-49**	Yes	reading
3001	VAR	UNSIGNED32	GEAR_BOX_NUM	Feed Gear Box Numerator OPD Explorer Parameter: **E50-51**	Yes	Reading/writing
3002	VAR	UNSIGNED32	GEAR_BOX_DEN	Feed Gear Box Denominator OPD Explorer Parameter: **E52-53**	Yes	Reading/writing
3003	VAR	UNSIGNED32	QSDEC	Quick Stop Deceleration OPD Explorer Parameter: **E08 - 09**	Yes	Reading/writing
3004	VAR	UNSIGNED32	LINE_PPM	Line pulses for meter OPD Explorer Parameter: **E60 - 61**	Yes	Reading/writing
3005	VAR	UNSIGNED32	TARGETVEL	Target Velocity OPD Explorer Parameter: **E02 - 03**	Yes	Reading/writing
3006	VAR	UNSIGNED32	VELACC	Velocity acceleration OPD Explorer Parameter: **E22 - 23**	Yes	Reading/writing
3007	VAR	UNSIGNED32	VELDEC	Velocity acceleration OPD Explorer Parameter: **E24 - 25**	Yes	Reading/writing
3008	VAR	UNSIGNED32	PROFJERK	Velocity acceleration OPD Explorer Parameter: **E92 - 93**	Yes	Reading/writing
3009	VAR	INTEGER32	SWLIMITMIN	Minimum position limit OPD Explorer Parameter: **E40 - 41**	Yes	Reading/writing
300A	VAR	INTEGER32	SWLIMITMAX	Maximum position limit OPD Explorer Parameter: **E42 - 43**	Yes	Reading/writing
300B	VAR	INTEGER32	PROFACC	Profile acceleration OPD Explorer Parameter: **E04 - 05**	Yes	Reading/writing
300C	VAR	INTEGER32	PROFDEC	Profile deceleration OPD Explorer Parameter: **E06 - 07**	Yes	Reading/writing
300D	VAR	UNSIGNED32	VELPOS	Profile velocity OPD Explorer Parameter: **E12 - 13**	Yes	Reading/writing
300E	VAR	UNSIGNED32	FOLLERR	Following Error OPD Explorer Parameter: **E16 - 17**	Yes	Reading/writing
300F	VAR	UNSIGNED32	HMOFFSET	Homing Offset OPD Explorer Parameter: **E28 - 29**	Yes	Reading/writing
3010	VAR	UNSIGNED32	HMSPD	Homing Speed OPD Explorer Parameter: **E30 - 31**	Yes	Reading/writing
3011	VAR	UNSIGNED32	HMSPDEND	Homing Speed End OPD Explorer Parameter: **E32 - 33**	Yes	Reading/writing
3012	VAR	UNSIGNED32	HMACC	Homing Acceleration OPD Explorer Parameter: **E32 - 33**	Yes	Reading/writing
3013	VAR	UNSIGNED32	POS_LATCH	Position Latch OPD Explorer Parameter: **E80 - 81**	Yes	Reading/writing
3014	VAR	UNSIGNED32	POS_UNLATCH	Position Unlatch OPD Explorer Parameter: **E84 - 85**	Yes	Reading/writing
3015	VAR	INTEGER32	MAX_POS_CARRIAGE	Maximum position carriage OPD Explorer Parameter: **E88 - 89**	Yes	Reading/writing
3016	VAR	UNSIGNED32	CUT_LENGTH	Cut Length OPD Explorer Parameter: **E90 - 91**	Yes	Reading/writing
3017	VAR	UNSIGNED32	CUT_STATUS_WORD	Cut Status Word OPD Explorer Parameter: **E112 - 113**	Yes	Reading
3018	ARRAY	UNSIGNED32	EXTRA_VIEW	Extra View	Yes	Reading

2.10 ALARMS

Alarms			Description	Correction
Hex	Dec			
A.4.0.H	A4.0	Factor Group Parameters Error	Factor Group parameter error	Verify the conditions: **E40-41 – SWLIMITMIN** must be lower than **E42-43 – SWLIMITMAX**, **E96-97 – START_POS_CARRIAGE** must be higher than **E40-41 – SWLIMITMIN** , **E88-89 – MAX_POS_CARRIAGE** must be lower than **E42-43 – SWLIMITMAX,** If above conditions are ok, please refers to **E102-103 – FG_ERR_WORD0** and **FG_ERR_WORD1**
A.4.1.H	A4.1	Fieldbus Problem	Problem with fieldbus	Check the fieldbus cable, it is ok contact BDF digital customer service
A.4.2.H	A4.2	Tracking error too big	Tracking error too big (greater than threshold **pFOLLERR E16-E17**	Check the speed and position control. Verify if the drive is in torque limit and if the feed-back position is read correctly. Eventually increase the threshold (**E16 – E17**).
A.4.6.H	A4.6	SENS2 Hardware and Firmware are incompatible	There is an incoherence between the feedback board in the second slot and parameter **C17 – SENSOR2_SEL**	Verify the feedback board and the parameter **C17 – SENSOR2_SEL**
A.4.7	A4.7	SENS2 Presence	Second sensor presence	Verify the cable

Tab. 9- Alarms table

2.11 DIGITAL INPUT AND OUTPUT

Digitals Inputs	
Name	Descriptions
I00	ID_RUN - Run command
I02	ID_IMMCUT - External enable
I03	ID_JOGP - Jog Plus
I04	ID_JOGM - Jog Minus
I05	ID_CUT_EN - Cut enable
I06	ID_MOVE_ZERO - Move to Zero point
I07	ID_HM_START - Homing Start
I08	ID_RESET_ALR - Reset alarms
I09	ID_QCK_STOP - Quick Stop
I10	ID_CUT_OK - Cut Ok
I11	ID_AUTOMAN - Autotmatic / Manual

I12	ID_CUTMODE0 - Cut Mode Input 0
I13	ID_CUTMODE1 - Cut Mode Input 1
I14	
I15	
I16	
I17	ID_POSBACK0 - Mode Position Back 0
I18	ID_POSBACK1 - Mode Position Back 1
I19	ID_POSBACK2 - Mode Position Back 2
I20	ID_POSBACK3 - Mode Position Back 3
I21	
I22	
I23	ID_TC_SWT_MOT - Motor thermo-switch
I24	
I25	
I26	ID_EN_SB - Enable speed regulator second bank
I27	
I28	ID_POS_LMN_SWT - Positive Limit Switch
I29	ID_NEG_LMN_SWT - Negative Limit Switch
I30	ID_HOME_SWT - Home switch
I31	

Tab. 10- Digital Input

Digitals Inputs	
Name	**Descriptions**
O32	Target Reached
O33	Set Point Acknowledge
O34	Following Error
O35	Homing Attained
O36	Op Mode Reply Bit0
O37	Op Mode Reply Bit1
O38	Op Mode Reply Bit2
O39	Operation Enabled

Tab. 11- Application Digital Output

OSC Variables	
Name	**Descriptions**
o69 – Position reference received (LSW)	
o70 – Position reference received (MSW)	
o71 – Actual Position (LSW)	
o72 – Actual Position (MSW)	
o73 – Actual position error	
o74 – Actual Set point PI	
o75 –Feedback PI	
o76 – Start holding cam profile flag	
o77 – Actual PI Error	
o78 – Actual PI Output	
o79 – Actual Derivate Speed FFW	

Tab. 12- Osc variables

3 APPLICATION REVISION HISTORY

Rev. 18.02.12 (31/05/2019), Minimum core target: Opendrive Brushless 22.3/ Async 12.3

Issues fixed

New Functionality

v18.02.12	Positioning back in frequency, Dynamic Start

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