Firmware Tde Macno

User's manual

Positioning System n°03

Cod. MW00601E00 V_1.5

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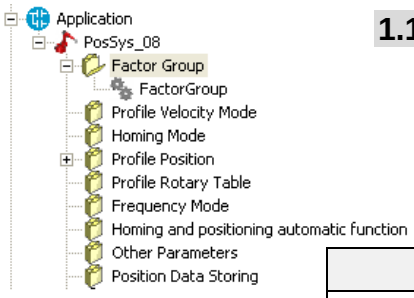


1.1 FACTOR GROUP

Name	Description	Min	Max	Default	UM	Scale
pSELOVRDVEL	E50 – Override velocity selection	Range		0		1
		0	Digital Override			
		1	Analog 1 Imput 1 Override			
		2	Analog 1 Imput 2 Override			
		3	Analog 1 Imput 3 Override			
		4	Analog 1 Imput 16 Override			
OverrideVel	E214 – Override velocity	0	100	100	%	0
pANTRQLIMIT	E52 – Select analog torque limit	Range				1
		0	No torque limit			
		1	Analog Input 1 torque			
		2	Analog Input 2 torque			
		3	Analog Input 3 torque			
		4	Analog Input 4 torque			
pENANTRQLIMIT	E01 – Enable analog torque limit			No		1
FG_Feed	E 160-161 Feed Factor Group	1	2147483647	1	Eng.Unt.	1
FG_MotorShaftRev	E 162-163 Motor Shaft Revolution	1	2147483647	1	Rev	1
FG_DrivingShaftRev	E164-165 Driving Shaft Revolution	1	2147483647	1	Rev	1
Rd_ActualPos	E190-191- Actual Position			0	Eng.Unt.	1
Rd_ActualVel	E192-193 – Actual Velocity			0	Eng.Unt./s	1
vACTUALPOS	d66-d67 – Position actual value			0	ie	1
vACTUALVEL	d68-d69 – Velocity actual value			0	ie/s	1
OVRRIDEVEL	d70 – Override velocity			0		1
FG_EncShaftRev	E186-187 Encoder shaft revolution	1	2147483647	1	Rev	1
FG_EncDrvShaftRev	E188-189 Encoder driving shaft revolution	1	2147483647	1	Rev	1
pSELOVRDVEL	E51 – Enable second sensor			No		1
pENMULTICORRECT	E16 – Enable correction for absoulute multi-turn sensor			No		1
pMODULEAX	E95 – Enable Module Position			No		1
MODULE_AXIS	D74 – 75 – Module Axis				ie	1
MA_SPEED_EU	D76 – 77 – Driving Shaft Max. Speed in Eng. Unt (P65)				Eng. Unt.	1
ZERO_POS	D78 – 79 – Internal Zero Position				ie	

Table 1: Factor Group Elements

The fundamental elements of the Factor Group are in table 1. They all must be correctly configured before starting the Positioning System set up as they determine the meaning of all the Parameters of the Positioning System function.

FG_Feed(DW) : it expresses the measured distance (in Engineering Units) per one revolution of the Driving Shaft.

Example: 1 revolution of the Driving Shaft covers 800 mm. We want to express the Engineering Units in 1/10mm. The FG_Feed must be set to 8000.
FG_MotorShaftRev(DW) (Motor Shaft Revolutions) and **FG_DrivingShaftRev(DW)** (Driving Shaft Revolutions) must be set thus to match the Gear Ratio of the machine:
Gear Ratio = Motor Shaft Revolutions / Driving Shaft Revolutions.

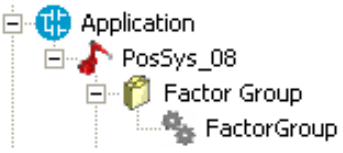
pSELOVRDVEL defines the input for velocity override. The inputs can be analogs or digitals:

- 0 - Velocity override is set with a profibus object, *OvrVelocity* (0x3015, see **Table 14**);
- 1 - Velocity override is set with the analog input 1;
- 2 - Velocity override is set with the analog input 2;
- 3 - Velocity override is set with the analog input 3;
- 4- Velocity override is set with the analog input 4 (AI16);

Velocity override adjusts the motor speed without change speed parameters in position mode or velocity mode. Velocity override has a value range from 0 to 100 %. For negative value, velocity override is the absolute value.

Parameter **E214- OverrideVel** allows to act on the Velocity Override directly by modbus.

1.1.1 Axis's Module



In Factor Group folder is possible to enable the detection of the position on the axis's module with the parameter **E95 – pMODULE_AX**. The axis module must be enabled when the user want to works with **Profile Rotary Table mode**.
In this way the position is always referred to the parameter **FG_Feed – E160-161**, for example if E160-161 = 360, the position (in degrees) is available on the motor single turn.
The internal variable **d74-d75 MODULE_AXIS** shows the module calculated in electrical pulses (i.e., 1 mechanical turn = 65536 i.e.).

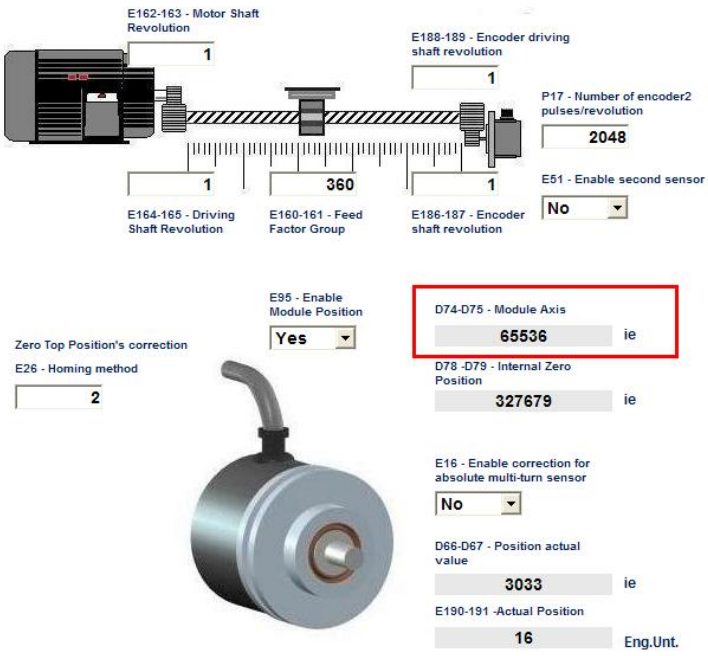
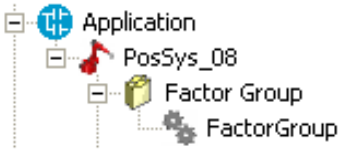


Figure 1: User interface for Factor Group's parameters

After setting the parameters **E160-161 - FG_Feed , E162-163 - FG_MotorShaftRev, E164-165 - FG_Driving Shaft –**and **E95- pMODULE_AX** save, switch off and the switch on the drive.
Internal value **d76-d77 – MAX_SPEED_EU** shows the maximum motor speed calcultaed in Engineering Unit.



1.2 SECOND SENSOR

This function allows to close the position loop on a second sensor.
The parameters **FG_Feed**, **FG_MotorShaftRev, FG_DrivingShaftRev** have the same meaning (see **Table 2**).

Name	Description	Min	Max	Default	UM	Scale
FG_Feed	E 160-161 Feed Factor Group	1	2147483647	1	Eng.Unt.	1
FG_MotorShaftRev	E 162-163 Motor Shaft Revolution	1	2147483647	1	Rev	1
FG_DrivingShaftRev	E164-165 - Driving Shaft Revolution	1	2147483647	1	Rev	1
FG_EncShaftRev	E186-187 - Encoder shaft revolution	1	2147483647	1	Rev	1
FG_EncDrvShaftRev	E188-189 Encoder driving shaft revolution	1	2147483647	1	Rev	1
pENMULTICORRECT	E16 – Enable correction for absoulute multi-turn sensor			No		1

Table 2: Factor Group Elements for PosSys

The parameter **E16- pENMULTICORRECT** if enabled consent to correct the overflow for absolute sensor multi-turn when the high mechanical position (number of turns) reach the maximum number of turn.
For example for ENDAT-BISS 12bit after 4095 turns high position goes to zero value, this could be a problem.
There are two parameters **FG_EncShaftRev E186-E187,** e **FG_EncDrvShaftRev E188-E189** which allows a possible reduction ratio for the encoder shaft (see the following graphic interface (**Figure 1**).

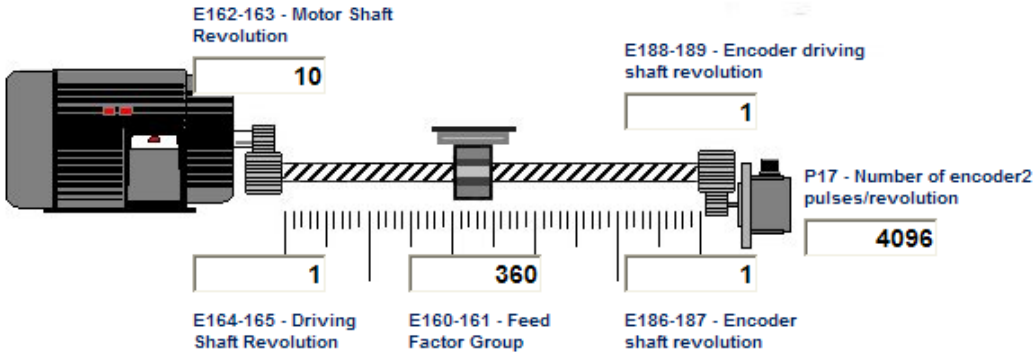


Figure 2: User interface for Factor Group's parameters

This example regards a system with a reduction ratio **10:1** between the motor shaft and the driving shaft, with a revolution of the driving shaft that is equal to **360** engineering unit (in this example, 1 degree) and there isn't any reduction ratio between the encoder shaft and the encoder driving shaft (**1:1**). The second sensor is an encoder with 4096 pulses/revolution set in the parameter **P17-ENC2_PPR**.
This parameter is located in this directory:

All Parameters > Application I/O Parameters > Input > Second Sensor

The internal software realizes a possible "*automatic correction*" for incremental sensor's which have zero pulse (zero top). In these kind of sensor when comes the zero pulse signal the position goes to zero. For the homing method's which doesn't use index pulses (metods 17---30 + 35, see **1.4** for more informations) take place the correction when the zero pulse comes and the position doesn't go to zero (**Figure 3 – 4**). The "correction" is allowed for both sensors (first or second).

1.2.1 Position Internal Variables

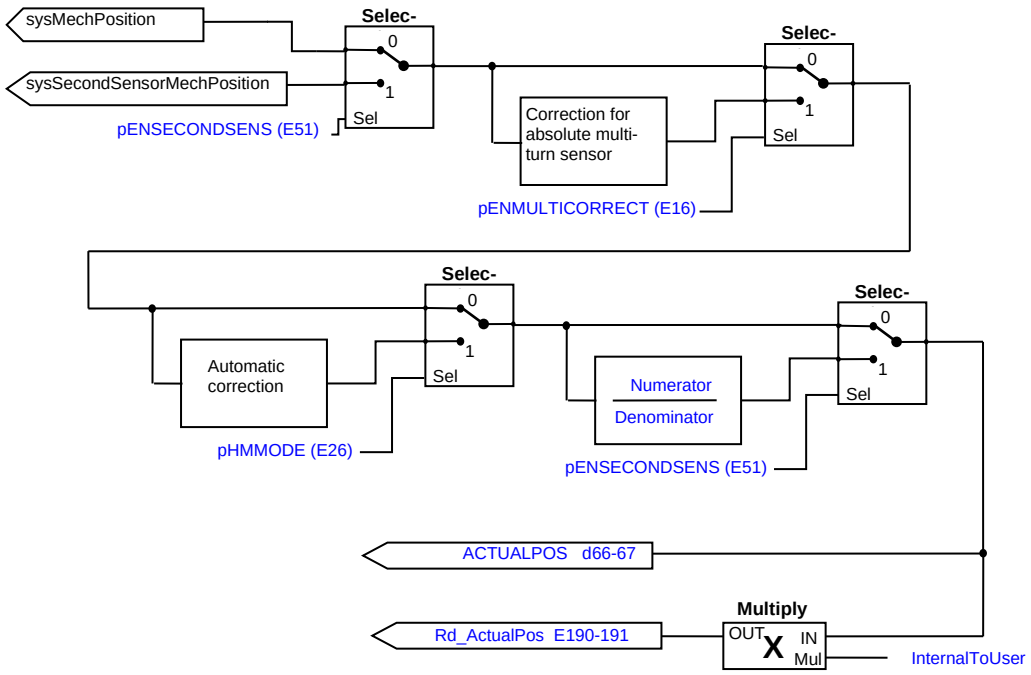


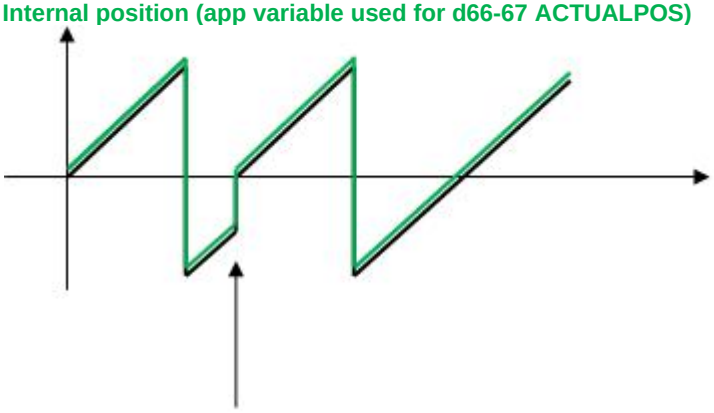
Figure 3: Internal position variables

The position is read from a 32 bits core variables: **sysMechPositition** or **sysSecondSensor-MechPosition**. These two variables works in this way: the 16 LSB are the position on the single turns, the 16 MSB are the numbers of turns. After the eventual "*correction for absolute multi-turn*" the "*automatic correction* " take place. The next paragraphs shows this situation (for example **sys-MechPosition** is enabled).

Case a) With homing's methods which uses index pulses and sensor with Zero Top:

The following pictures are referred to the 16 LSB of the variables

Black signal: sysMechPosition (core variable, read by sensor if first sensor is enabled)
Green signal: Internal position (app variable used for d66-67 ACTUALPOS)



Zero Top

Figure 4: Internal position without correction

In this case the **internal position** is equal to core variable **sysMechPosition.**

Case b) With homing's methods which don't uses index pulses, there is an automatic correction:

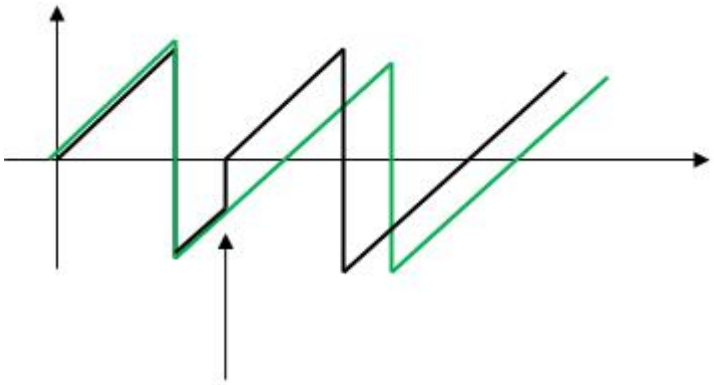


Figure 5: Internal position with correction

In this case **internal position** is automatically corrected.
The 16 MSB of the variables works in this way:

If Zero Top is found after more than ½ turn (32768 ie) the msb go to 1 (65536 ie).

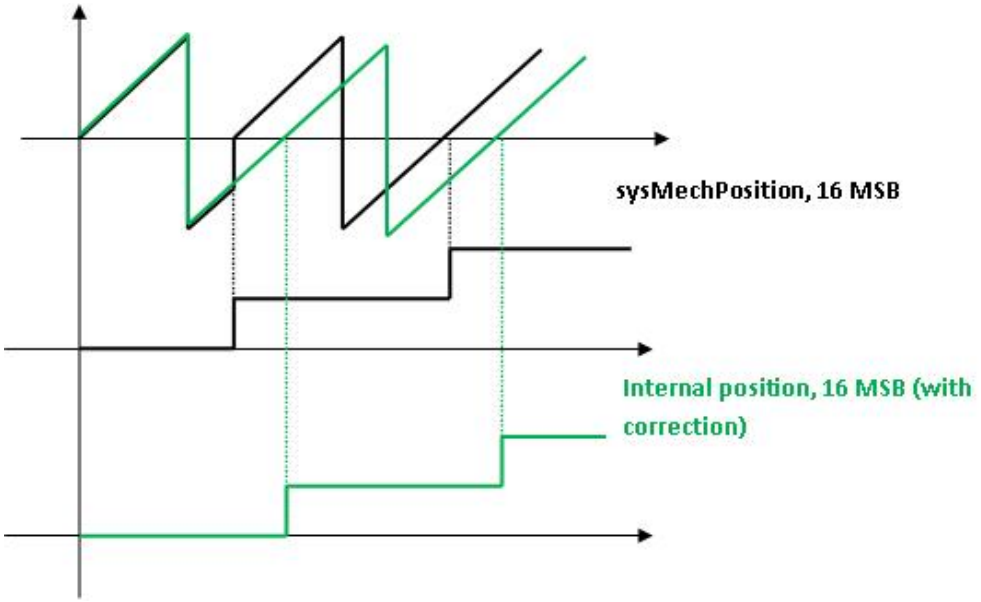


Figure 6: Internal position LSB and MSB

If Zero Top is found before than ½ turn (32768 ie) the MSB remains to 0.

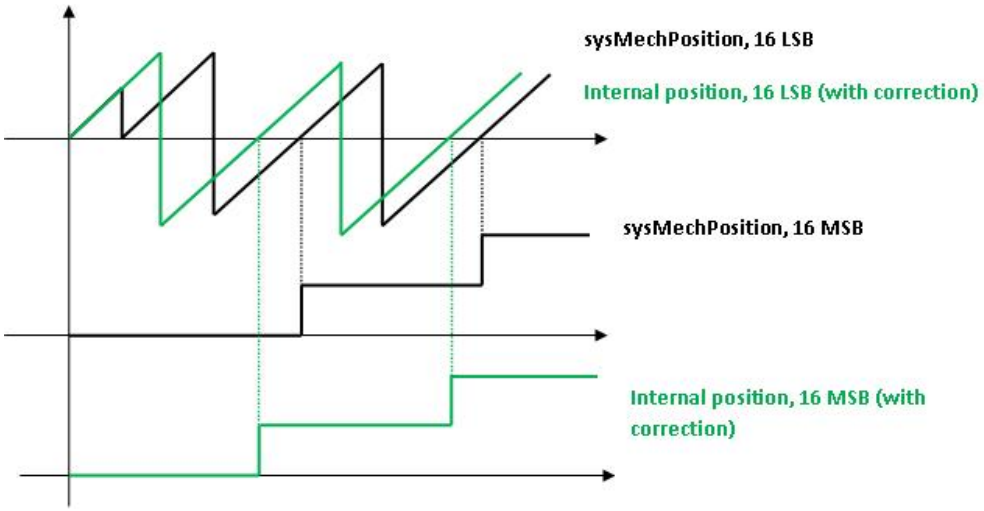
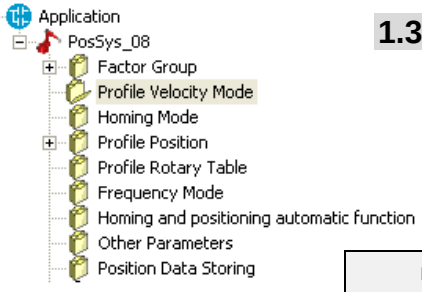


Figure 7: Internal position LSB and MSB

The parameter **E51**, **pENSECONDSENS = Yes** allow to select the second sensor. The mechanical position is calculated from the core second sensor's position (**sysSecondSensorMechPosition**). The value is corrected (if pHHMODE 17---30 + 35) and then is scaled by a ratio ***Numerator/Denominator*** (**Figure 3**) which depends on the reduction ratios motor shaft/driving shaft and encoder shaft/encoder diving shaft.
For each PWM period a pulses difference is calculated (delta pulses), depending on the mechanical position. This value is reported to motor side by relationship:

$$\textit{motor delta pulses} = \frac{\textbf{\textit{FG\_MotorShaftRev}} \cdot \textbf{\textit{FG\_EncShaftRev}}\ \textit{(Num)}}{\textbf{\textit{FG\_DrivingShaftRev}} \cdot \textbf{\textit{FG\_EncDrvShaftRev}}\ \textit{(Den)}} \cdot \textit{delta pulses sec. sensor}$$

This relationship is performed both for the variables of the core in which a mechanical revolution corresponds to 16 bits (**Figure 3**), and for those in which one revolution corresponds to 32 bits.
The pulses are summed in the motor side and the mechanical position from the second sensor is so available, allowing the possibility of using the positioning system in all its functionality by selecting the desired sensor.
Finally the user can check the actual position of the motor in i.e. (**d66-67 ACTUALPOS**) or in Eng. Unt. (multiply by **InternalToUser E190-191 Rd_ActualPos**).

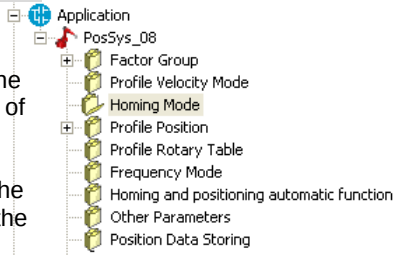


1.3 PROFILE VELOCITY MODE (OPMODE=3)

Name	Description	Min	Max	Default	UM	Scale
OpMode	E135 - S. Operating Mode Selector	Range		1		1
		1	Profile positione mode			
		2	Homing mode			
		3	Profile Velocity mode			
		5	Profile Frequency mode			
MODE_OF_OP_DIS	d65 Mostra il modo di funzionamento					1
TargetVel	E180-181 – Target Velocity	-2147483648	2147483647	0	Eng.Unit/s	1
VelAcc	E182-183 – Velocity Acceleration	1	2147483647	1	Eng.Unit/s^2	1
VelDec	E184-185 – Velocity Deceleration	1	2147483647	1	Eng.Unit/s^2	1
Rd_ActualPos	E190-191 – Actual Position			0	Eng.Unt.	1
Rd_ActualVel	E192-193 Actual Velocity			0	Eng.Unit/s	1
Rd_FinStateAutom	E194 – Finite State Automation			0		1
vACTUALPOS	d66-d67 – Position actual value			0	ie	1
vACTUALVEL	d68-d69 – Velocity actual value			0	ie/s	1
pTHRVEL	E18-E19 – Velocity threshold	0	2147483647	10000	ie/s	1
pTIMEVEL	E20 – Velocity threshold time	0	65535	0	ms	1
pWINVEL	E22-E23 – Velocity window	0	2147483647	0	ie/s	1
pWTIMEVEL	E24- Velocity window time-out	0	65535	0	ms	1
p_QSOPTC	E38 – Quick Stop Option Code	0	8	2		1
pENSPDFDW	E36 - Enable Speed Feed-forward			Yes		1
pSWLIMITMIN	E40-E41 Min Position limit	-2147483648	2147483647	-2147483648	ie	1
pSWLIMITMAX	E42-43 Max Position limit	2147483647	-2147483648	2147483647	ie	1

Table 3: Profile Velocity Mode Parameters

1.4 HOMMING MODE (OPMODE=2)



Homing Mode describes the method by which the drive seeks the home position (or zero point). The methods implemented to achieve this are different. Some of them refer to limit switches at the end of the travel, or to home switch at mid-point travel.
In some cases the index pulse train from the sensor is used, in other it is not used at all.
The user may specify the Homing Speed , the Homing Acceleration, the Homing End Speed and the Homing Method. The Homing Offset must also be specify, it allows the user to display the zero in the user's coordinate system from the home position.
Two different homing speeds must be set, the faster (Homing Speed) is used to find the home switch, the slower (Homing End Speed) is used to find the index pulse.

Name	Description	Min	Max	Default	UM	Scale
OpMode	E135 - S. Operating Mode Selector	Range		1		1
		1	Profile positione mode			
		2	Homing mode			
		3	Profile Velocity mode			
		5	Profile Frequency mode			
MODE_OF_OP_DIS	d65 - Modes of operation display			0		1
pHMMODE	E26 - Homing method			35		1
HM_HmSpd	E174-175 -Homing speed during search for switch	1	2147483647	1	Eng.Unt./s	1
HM_HmAcc	E172-173 -Homing Acceleration	1	2147483647	1	Eng.Unt./s^2	1
HM_SpeedEnd	E176-177 -Homing speed during search for zero	1	2147483647	1	Eng.Unt./s	1
HM_HmOffset	E170-171 -Homing Offset	-2147483648	2147483647	0	Eng.Unt.	1
Rd_ActualPos	E190-191 -Actual Position			0	Eng.Unt.	1
Rd_ActualVel	E192-193 -Actual Velocity			0	Eng.Unt./s	1
Rd_FinStateAutom	E194 -Finite State Automation			0		1
pQSOPTC	E38 - Quick Stop Option Code	0	8	2		1
pPOS_REG_KP	E39 - Kv position loop proportional gain	0.0	100.0	4.0		10
pENSECONDSENS	E51 - Enable second sensor			0		1

Table 4: Homing Mode Parameters

The Homing Method is selected by the Parameter E26- pHMMODE, the following methods are implemented according to the CiA DS402.

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* limit switch becomes inactive.

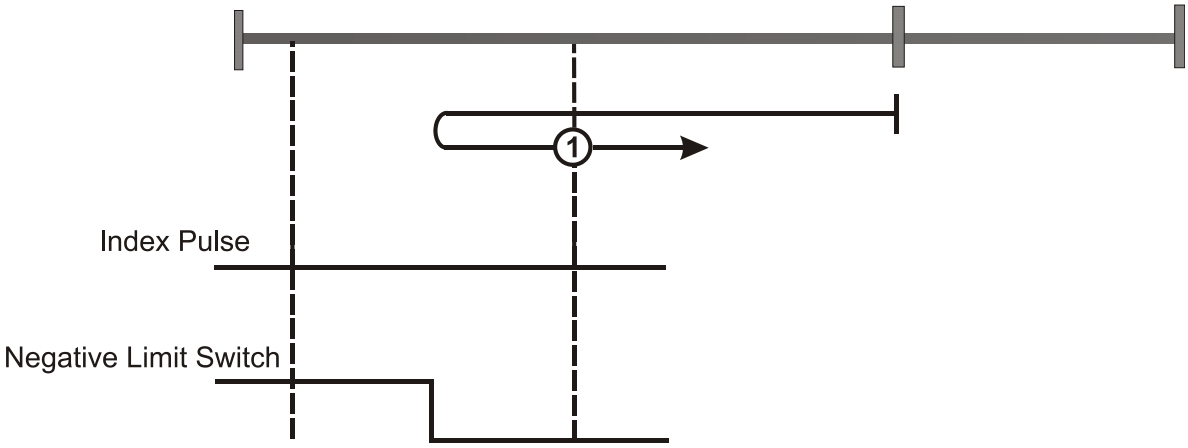


Figure 8 : Homing on Negative Limit Switch and Index pulse

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.

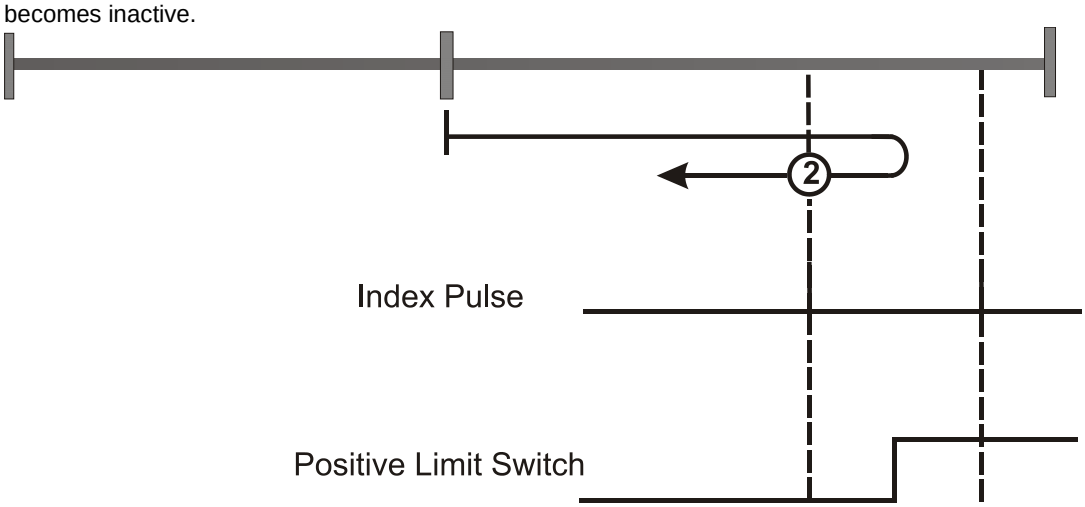


Figure 9: Homing on Positive Limit Switch and Index pulse

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.

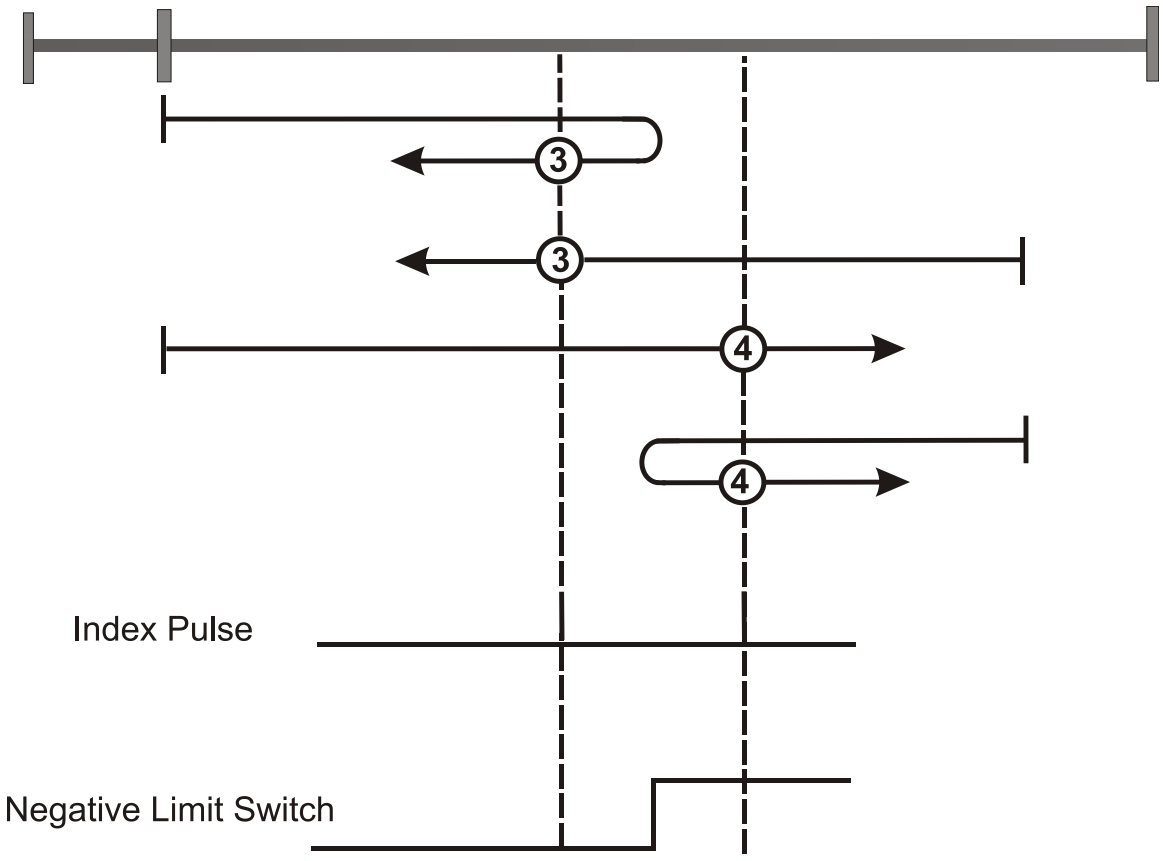


Figure 10: Homing on Home Switch and Index pulse

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.

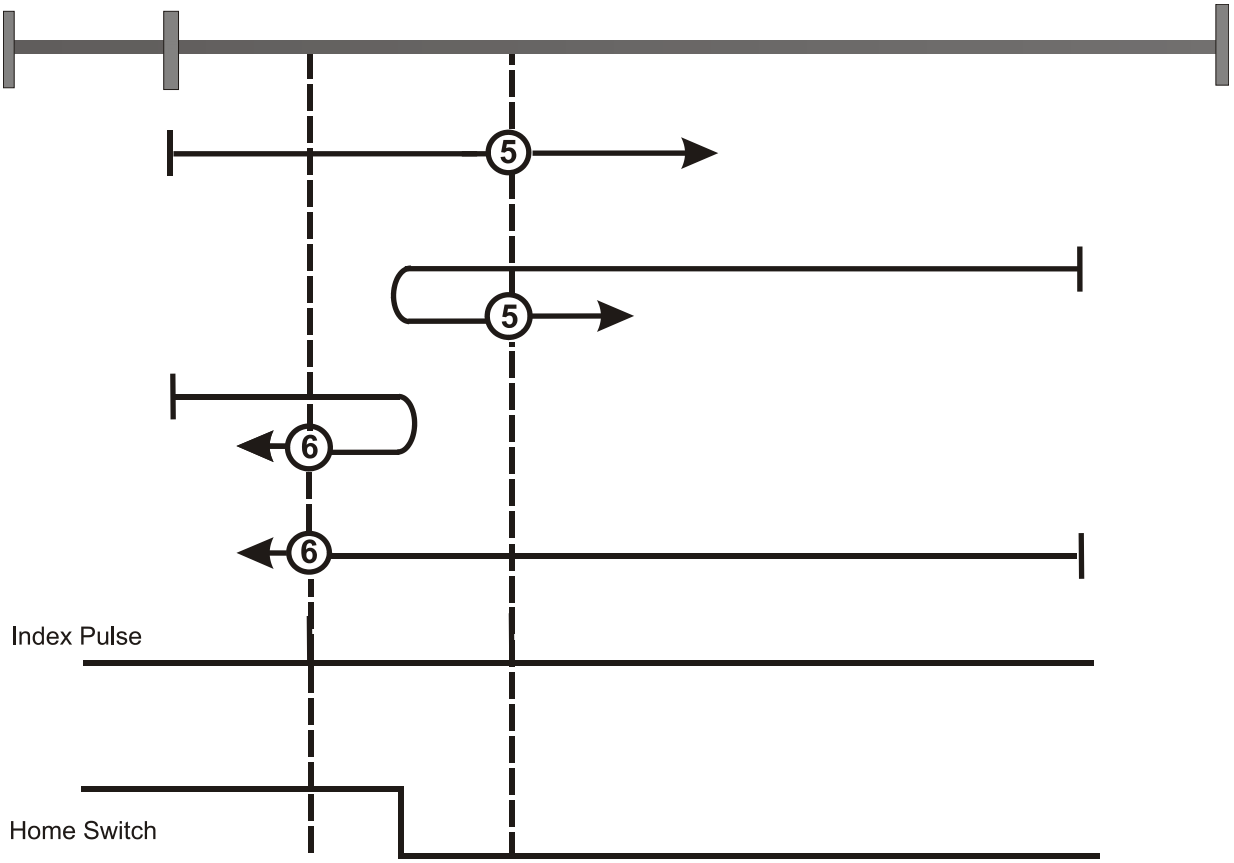


Figure 11: Homing on Home Switch and Index pulse

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.

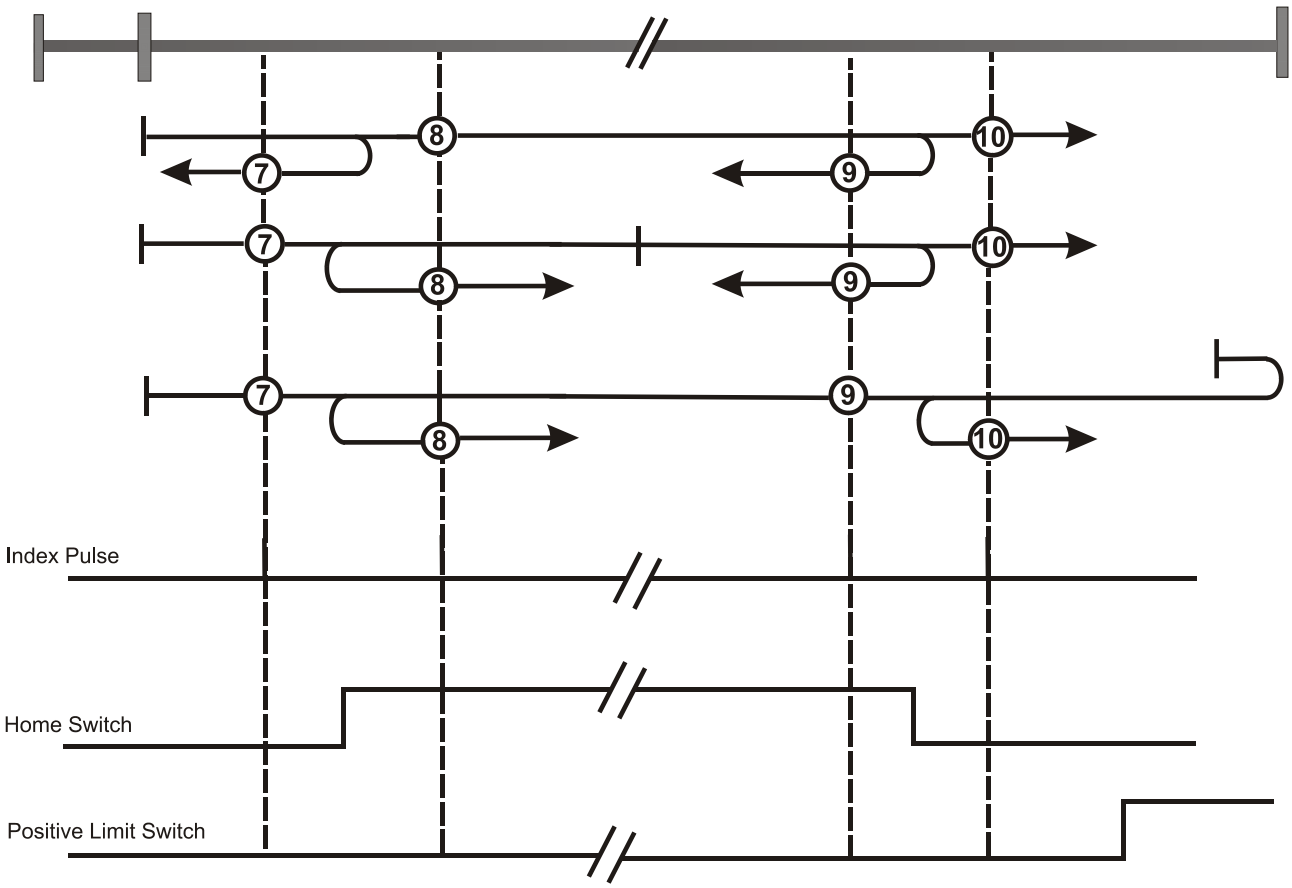


Figure 12: Homing on Home Switch and Index pulse – positive initial motion

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.

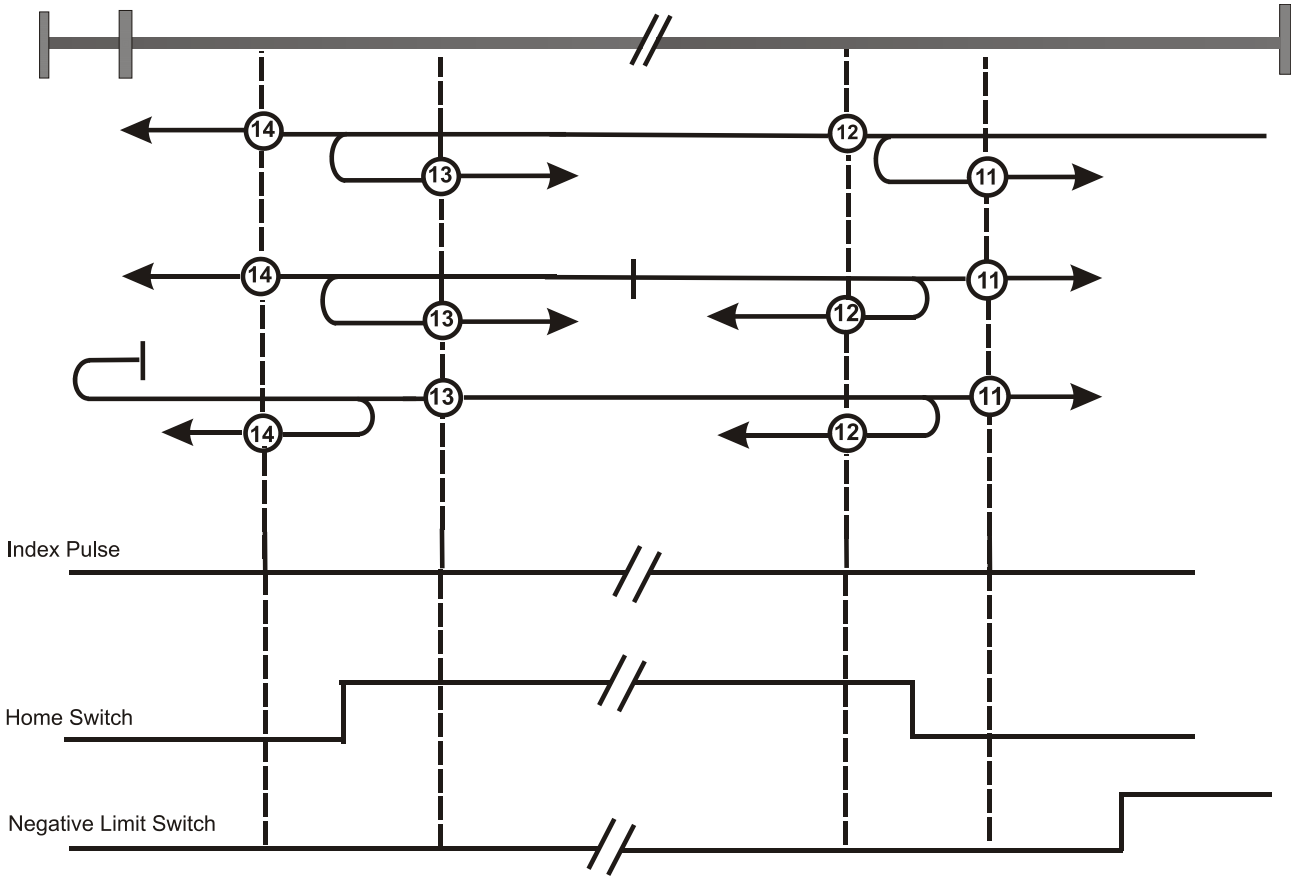


Figure 13: Homing on Home Switch and Index pulse – negative initial motion

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.

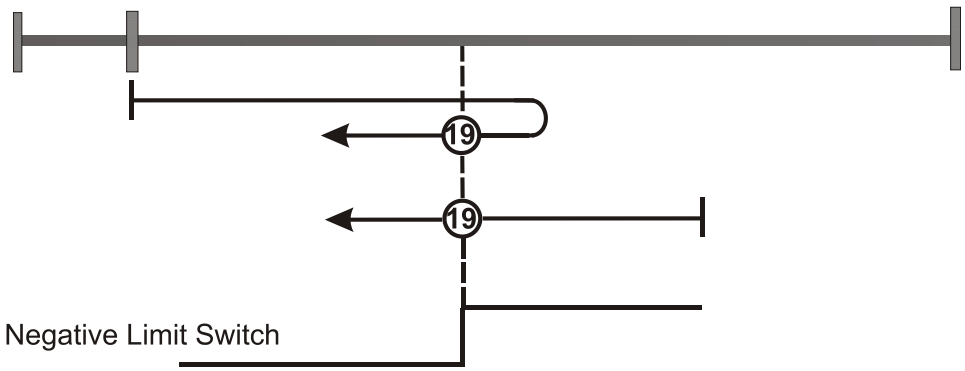


Figure 14: Homing without index pulse

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.

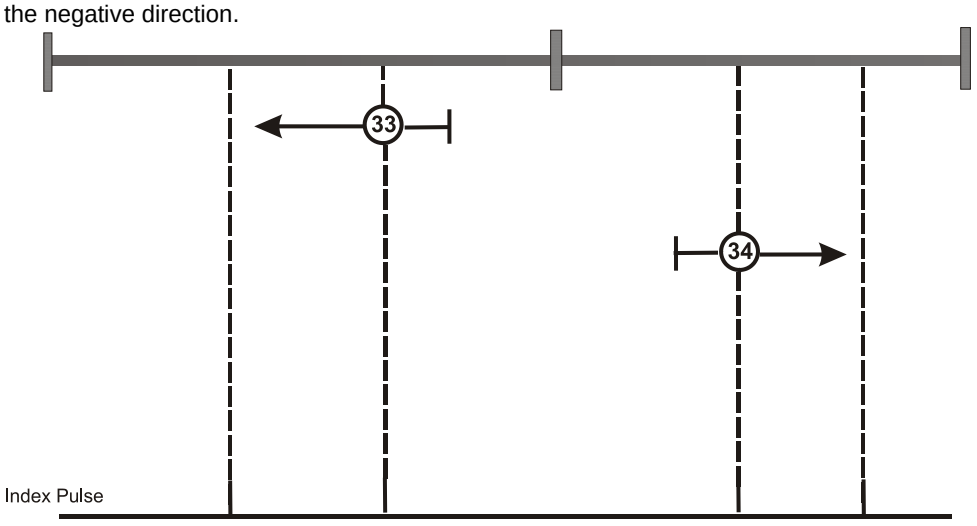
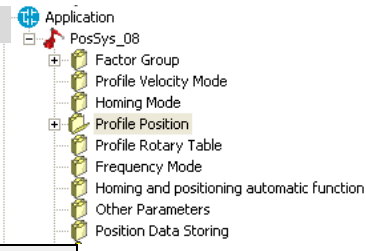


Figure 15: Homing on index pulse

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).

1.5 PROFILE POSITION MODE (OPMODE=1)



Name	Description	Min	Max	Default	UM	Scale
OpMode	E135 - S. Operating Mode Selector	Range 1 2 3 5	 Profile positione mode Homing mode Profile Velocity mode Profile Frequency mode	1		1
MO-DE_OF_OP_DIS	d65 - Modes of operation display			0		1
ChSetImm	E140 - C. ChangeSetImmediately			0		1
AbsRel	E141 - C. Absolute Relative Positioning			0		1
NumTarget	E145 - C. Target Number	0	31	0		1
FollErr	E150-151 - P. Following Error Window	0	2147483647	360	Eng.Unt.	1
WinPos	E152-153 - P. Position Window	0	2147483647	360	Eng.Unt.	1
QSDec	E154-155 - P. Quick Stop Deceleration	1	2147483647	1	Eng.Unt./s^2	1
FG_Feed	E160-161 - Feed Factor Group	1	2147483647	360	Eng.Unt.	1
FG_MotorShaftRev	E162-163 - Motor Shaft Revolution	1	2147483647	1	Rev	1
FG_DrivingShaftRev	E164-165 - Driving Shaft Revolution	1	2147483647	1	Rev	1
Rd_ActualPos	E190-191 -Actual Position			0	Eng.Unt.	1
Rd_ActualVel	E192-193 -Actual Velocity			0	Eng.Unt./s	1
Rd_FinStateAutom	E194 -Finite State Automation			0		1
Rd_NTarget	E195 -Target Number			0		1
Rd_bTgtReached	E210 -Target Reached			0		1
Rd_bSetPointAch	E211 -Set Point Achnoledge			0		1
Rd_bFollowingErr	E212 -Following Error			0		1
PosJerk	E214 – 215 - PosJerk		2147483647	0	Eng.Unt./s^2	1
pTHRVEL	E18-E19 - Velocity threshold	0	2147483647	10000	ie/s	1
pTIMEVEL	E20 - Velocity threshold time	0	65535	0	ms	1
pENSPDFDW	E36 - Enable Speed Feed-forward			1		1
pENTRQFDW	E37 - Enable Torque Feed-forward			0		1
pQSOPTC	E38 - Quick Stop Option Code	0	8	2		1
pPOS_REG_KP	E39 - Kv position loop proportional gain	0.0	100.0	4.0		10
pENSECONDSENS	E51 - Enable second sensor			0		1
POSITIONTOGO	d72-d73 - Remained position			0		1
pSWLIMITMIN	E40-E41 Min Position limit	-2147483648	2147483647	-2147483648	ie	1
pSWLIMITMAX	E42-E43 Max Position limit	-2147483648	2147483647	2147483647	ie	1

Table 5: Positioning System (General)

Table 5 helps the user to set the Parameters and Selectors to work with the Positioning System application.

OpMode: must be set to select the Mode of Operation. The values it can assume are:

OpMode 1: Profile Position Mode
2: Homing Mode
3: Profile Velocity Mode
4: Profile Frequency Mode

Note: OpMode can be changed only if Operation is NOT Enabled (see I20) or Drive Switched Off (see I00).

ChSetImm: (Change Set Immediately). This function determines the way of processing the set-point of the Positioning System. Enabling this function it is possible to process a new position set point immediately.

AbsRel: (Absolute Relative). The Selector defines if the position is absolute (1-Yes) or relative (0-No).

EnSpdFFW: (Enable Speed Feed Forward) Must be set if Speed Feed Forward is required.

EnTrqFFW: (Enable Torque Feed Forward) Must be set if Torque Feed Forward is required.

Ntarget: (Target Number) Select the target value (selectable among 32 different profiles).

FollErr(DW): (Following Error) This Parameter defines the following error tolerance accepted symmetrically around the reference position. It is expressed in Engineering Units (see Factor Group).

WinPos(DW): (Position Window) This Parameter defines the Position Window accepted around the target position. It is expressed in Engineering Units (see Factor Group).

QsDec: Quick Stop Deceleration expressed in Engineering Units/second.

1.5.1 Analog positioning function

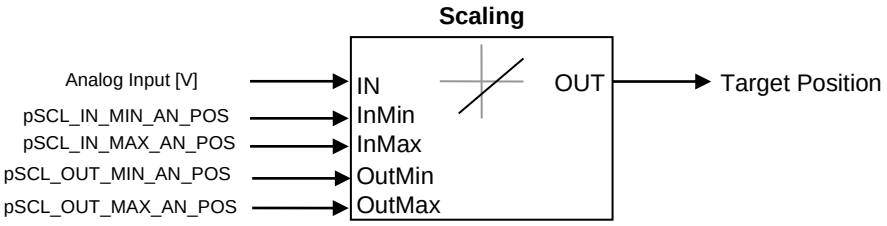
The analog positioning function allows to select a value for the target position depending on the analog input value at the moment of the start for a new positioning (**I10-New Set Point**). The additional parameters for this function can be sets in the **Profile Position** and can be seen in the following table.

Name	Description	Min	Max	Default	UM	Scale
pANPOSITION	E02 - Select analog position	Range		0		1
		0	No analog position			
		1	Analog Input 1 position			
		2	Analog Input 2 position			
		3	Analog Input 3 position			
		4	Analog Input 4 position (AI16)*			
pENANPOSITION	E03 - Enable analog position function			0		1
pSCL_IN_MIN_AN_POS	E04 - Scaling IN Min Value of Analog Input	-300.00	300.00	0	%	100
pSCL_IN_MAX_AN_POS	E05 - Scaling IN Max Value of Analog Input	-300.00	300.00	100.00	%	100
pSCL_OUT_MIN_AN_POS	E06 - E07 - Scaling OUT Min Value of Position	-2147483648	2147483647	0	Eng.Unt	1
pSCL_OUT_MAX_AN_POS	E08 - E09 - Scaling OUT Max Value of Position	-2147483648	2147483647	3600	Eng.Unt	1
pSCL_IN_MIN_AN_OUT	E10 - E11 - Scaling IN Min value of Positin for Analog Output	-2147483648	2147483647	0	Eng.Unt	1
pSCL_IN_MAX_AN_OUT	E12 - E13 - Scaling IN Max value of Positin for Analog Output	-2147483648	2147483647	3600	Eng.Unt	1
pSCL_OUT_MIN_AN_OUT	E14 - Scaling OUT Min value of Analog Output	-300.00	300.00	0	%	100
pSCL_OUT_MAX_AN_OUT	E15 - Scaling OUT Max value of Analog Output	-300.00	300.00	100.00	%	100

Table 6: Additional parameters for analog input position

*Available from app release 3.07 (PosSys_07)

To enable the analog position function, set the parameter **E02-pANPOSITION** to **Yes** or set the logical input **I09 (Enable Analog Position)** to the active level.
The parameter **E03-pENANPOSITION** defines the input of the analog positioning function.
A scaling function is used to scale the analog input and set the full-scale range of the analog positioning system. This operation is obtained setting the parameters **E04 - pSCL_IN_MIN_AN_POS, E05 - pSCL_IN_MAX_AN_POS**, that scale the analog input voltage (0÷100%) and **E06-E07 - pSCL_OUT_MIN_AN_POS, E08-E09- pSCL_OUT_MAX_AN_POS**
that set the range of the positioning (in engineering unit).



The result of the scaling is given by the following equation:

$$OUT = \frac{(IN - InMin)\cdot(OutMax - OutMin)}{(InMax - InMin)} + OutMin$$

These parameters has no a limitation meaning. the following settings are provided by way of example:

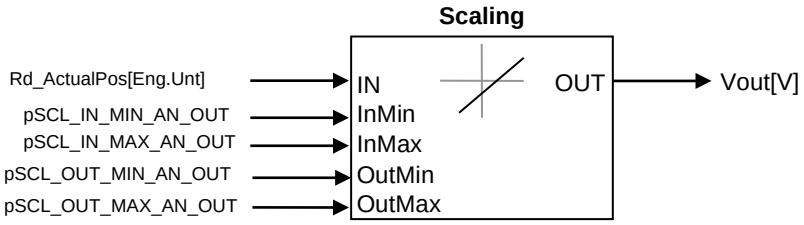
E04 = 0%, E05 = 100%, E06-E07 = 0 Eng. Un., E08-E09= 3600 Eng. Un.

If analog input has a value of -5 Volt (-50% of the full scale range, 0÷10V), the output position is -1800 Eng. Un.
A same analog input can't be configured to different meaning (override velocity, analog torque limitation and analog positioning).

In other words **E50- pSELOVRDVEL, E52-pENANTRQLIMIT, E02-pANPOSITION,** can't have the same value.
The target position is obtained when start a new position profile (**I10, New Set Point** goes to the high level). In this moment the position is calculated from the current value of the analog input selected through the scaling function, as seen above.
An analog input change that take place during a positioning has no effect on the current value of the target position, this will be update when a New Set Point will start. In this way, if a positioning is concluded and the analog input is change the motor don't follow a new target position until a new set point command take place.
For analog positioning function, target velocity, acceleration and deceleration corresponding to the same for target position current number.

Analog output (±10V)

It's possible to set an analog output with the value of the voltage (-10V÷+10V) equivalent to the position in engineering unit. The input range (position in engineering unit) and the output range (scaling of the output voltage) are setting, respectively in the following parameters:
E10-E11 - pSCL_IN_MIN_AN_OUT, **E12-E13 - pSCL_IN_MAX_AN_OUT** (for the input) and
E14 -pSCL_OUT_MIN_AN_OUT, **E15 – pSCL_OUT_MAX_AN_OUT** (for the output).



The scaling equation is the same seen previously.
Is important to observe the different meaning of the position range for the input (single positioning) and the full positioning range for the output.
In this case the parameters have not a limitation meaning (if the input is higher than ±10V) but only a scaling meaning. the following settings are provided by way of example:

E10-E11= 0 Eng.Unt, E12-E13 = 3600 Eng.Unt , E14 = 0%, E15=100%.

It's possible to observe the actual position, reading the parameter **E190-E191-Rd_ActualPos** in engineering unit.
If the position is 1800 Eng.Unt, the analog output is +5V. If the position goes to -1800 Eng.Unt. the analog position will be -5V (no limitation).

Is important that the actual position does not exceed the maximum input **E12-E13** otherwise the output voltage goes to negative value (for a circular notation).

The analog output function has the value **o99.** For enable that function is necessary to chose the value **o99** for one of the two analog output (**Vout A- C15-AO1_SEL** or **Vout B- C16-AO2_SEL**).
To have a correct scaling is necessary to set the parameter **P57-AO1_10V** (or **P58-AO2_10V**, depending on the output chosen) to 100%.

1.6 SET-POINT TIMING

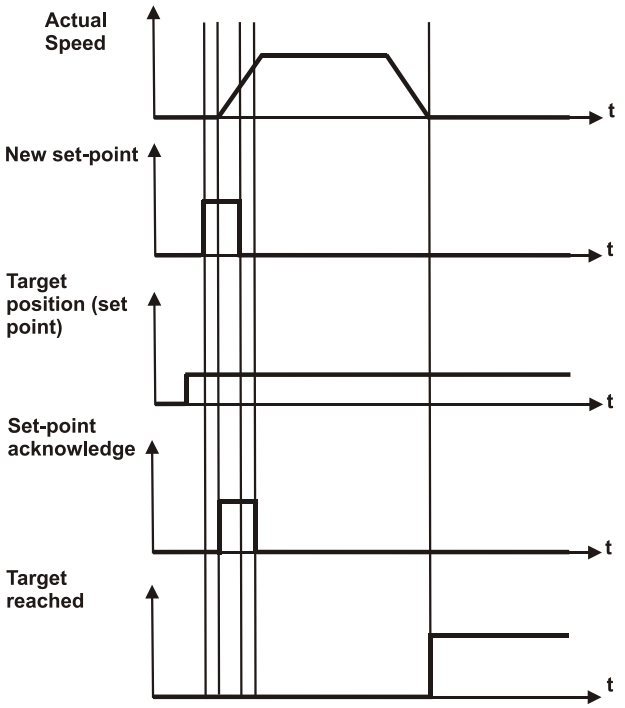


Figure 16: Timing of Set Point

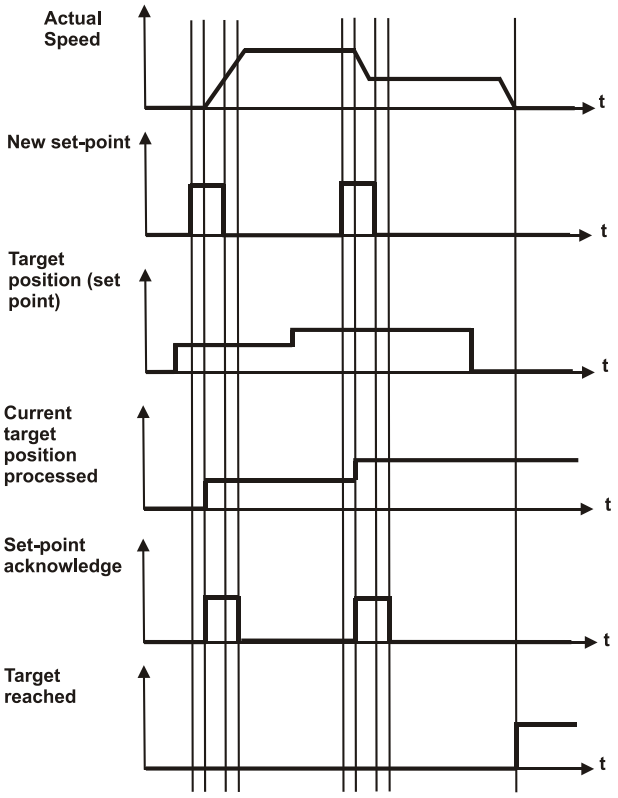


Figure 17: Timing of Set Point with Change Set Immediately option

1.7 QUICK STOP

When the quick stop command is activated (**I22 - Quick Stop**) a deceleration ramp is applied to stop the motor. The value of the deceleration (in Eng. Unt) can be set in the parameter **E154-155 – QSDec.** With the parameter **pQSOPTC** is possible to set if the drive slows down on quick stop ramp and stay in Quick Stop Active (**E38 – pQSOPTC** is set to 6, run state) or stay in Switch On Disabled (**E38 – pQSOPTC ≠ 6** drive not in run state).

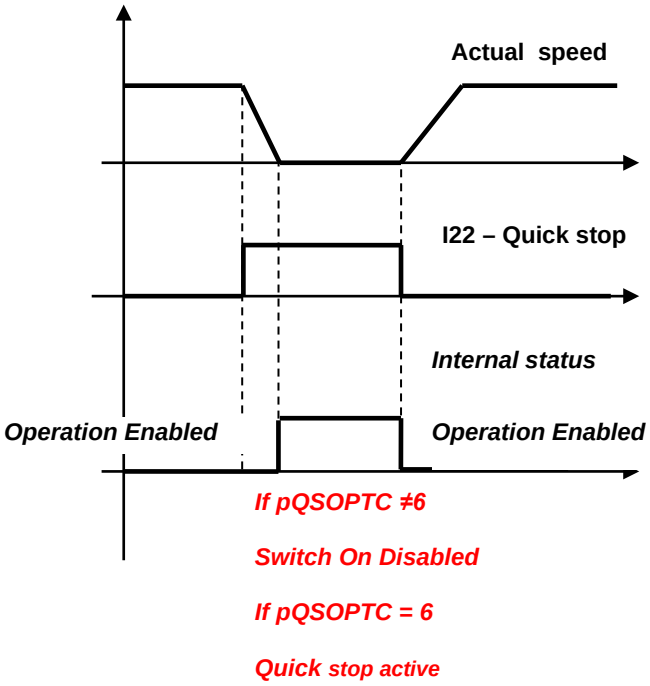


Figure 18: Quick stop

1.8 POSITION TARGETS

It is possible to set independently up to 32 different targets (Target00 .. Target31). Each target must be configured with TargetPos, VelPos, ProfAcc and ProfDec.

TargetPos$_{(sDW)}$ is expressed in User's Units and represents the Target Position.
VelPos$_{(DW)}$ is expressed in User's Units/second and represents the Position Velocity limit.
ProfAcc$_{(DW)}$ is expressed in User's Units/second^2 and represents the Profile Acceleration.
ProfDec$_{(DW)}$ is expressed in User's Units/second^2 and represents the Profile Deceleration.

For each different target the 4 parameters must be set.

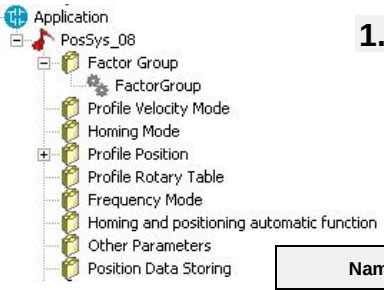
Name	Description	Min	Max	Default	UM	Scale
TG00_TargetPos	E300-301 -Target Position 00	-2147483648	2147483647	0	Eng.Unt.	1
TG00_VelPos	E302-303 -Position Velocity 00	1	2147483647	1	Eng.Unt./s	1
TG00_ProfAcc	E304-305 -Profile Acceleration 00	1	2147483647	1	Eng.Unt./s^2	1
TG00_ProfDec	E306-307 -Profile Deceleration 00	1	2147483647	1	Eng.Unt./s^2	1

Table 7: Position Targets Table for Target 00

Name	Description	Min	Max	Default	UM	Scale
TG00_TargetPos	E300-301 -Target Position 00	-2147483648	2147483647	0	Eng.Unt.	1
TG00_VelPos	E302-303 -Position Velocity 00	1	2147483647	1	Eng.Unt./s	1
TG00_ProfAcc	E304-305 -Profile Acceleration 00	1	2147483647	1	Eng.Unt./s^2	1
TG00_ProfDec	E306-307 -Profile Deceleration 00	1	2147483647	1	Eng.Unt./s^2	1
TG01_TargetPos	E308-309 -Target Position 01	-2147483648	2147483647	0	Eng.Unt.	1
TG01_VelPos	E310-311 -Position Velocity 01	1	2147483647	1	Eng.Unt./s	1
TG01_ProfAcc	E312-313 -Profile Acceleration 01	1	2147483647	1	Eng.Unt./s^2	1
TG01_ProfDec	E314-315 -Profile Deceleration 01	1	2147483647	1	Eng.Unt./s^2	1
TG02_TargetPos	E316-317 -Target Position 02	-2147483648	2147483647	0	Eng.Unt.	1
TG02_VelPos	E318-319 -Position Velocity 02	1	2147483647	1	Eng.Unt./s	1
TG02_ProfAcc	E320-321 -Profile Acceleration 02	1	2147483647	1	Eng.Unt./s^2	1
TG02_ProfDec	E322-323 -Profile Deceleration 02	1	2147483647	1	Eng.Unt./s^2	1
TG03_TargetPos	E324-325 -Target Position 03	-2147483648	2147483647	0	Eng.Unt.	1
TG03_VelPos	E326-327 -Position Velocity 03	1	2147483647	1	Eng.Unt./s	1
TG03_ProfAcc	E328-329 -Profile Acceleration 03	1	2147483647	1	Eng.Unt./s^2	1
TG03_ProfDec	E330-331 -Profile Deceleration 03	1	2147483647	1	Eng.Unt./s^2	1
TG04_TargetPos	E332-333 -Target Position 04	-2147483648	2147483647	0	Eng.Unt.	1
TG04_VelPos	E334-335 -Position Velocity 04	1	2147483647	1	Eng.Unt./s	1
TG04_ProfAcc	E336-337 -Profile Acceleration 04	1	2147483647	1	Eng.Unt./s^2	1
TG04_ProfDec	E338-339 -Profile Deceleration 04	1	2147483647	1	Eng.Unt./s^2	1
TG05_TargetPos	E340-341 -Target Position 05	-2147483648	2147483647	0	Eng.Unt.	1
TG05_VelPos	E342-343 -Position Velocity 05	1	2147483647	1	Eng.Unt./s	1
TG05_ProfAcc	E344-345 -Profile Acceleration 05	1	2147483647	1	Eng.Unt./s^2	1
TG05_ProfDec	E346-347 -Profile Deceleration 05	1	2147483647	1	Eng.Unt./s^2	1
TG06_TargetPos	E348-349 -Target Position 06	-2147483648	2147483647	0	Eng.Unt.	1
TG06_VelPos	E350-351 -Position Velocity 06	1	2147483647	1	Eng.Unt./s	1
TG06_ProfAcc	E352-353 -Profile Acceleration 06	1	2147483647	1	Eng.Unt./s^2	1
TG06_ProfDec	E354-355 -Profile Deceleration 06	1	2147483647	1	Eng.Unt./s^2	1
TG07_TargetPos	E356-357 -Target Position 07	-2147483648	2147483647	0	Eng.Unt.	1
TG07_VelPos	E358-359 -Position Velocity 07	1	2147483647	1	Eng.Unt./s	1
TG07_ProfAcc	E360-361 -Profile Acceleration 07	1	2147483647	1	Eng.Unt./s^2	1
TG07_ProfDec	E362-363 -Profile Deceleration 07	1	2147483647	1	Eng.Unt./s^2	1
TG08_TargetPos	E364-365 -Target Position 08	-2147483648	2147483647	0	Eng.Unt.	1
TG08_VelPos	E366-367 -Position Velocity 08	1	2147483647	1	Eng.Unt./s	1
TG08_ProfAcc	E368-369 -Profile Acceleration 08	1	2147483647	1	Eng.Unt./s^2	1
TG08_ProfDec	E370-371 -Profile Deceleration 08	1	2147483647	1	Eng.Unt./s^2	1
TG09_TargetPos	E372-373 -Target Position 09	-2147483648	2147483647	0	Eng.Unt.	1
TG09_VelPos	E374-375 -Position Velocity 09	1	2147483647	1	Eng.Unt./s	1
TG09_ProfAcc	E376-377 -Profile Acceleration 09	1	2147483647	1	Eng.Unt./s^2	1
TG09_ProfDec	E378-79 -Profile Deceleration 09	1	2147483647	1	Eng.Unt./s^2	1
TG10_TargetPos	E380-381 -Target Position 10	-2147483648	2147483647	0	Eng.Unt.	1
TG10_VelPos	E382-383 -Position Velocity 10	1	2147483647	1	Eng.Unt./s	1
TG10_ProfAcc	E384-385 -Profile Acceleration 10	1	2147483647	1	Eng.Unt./s^2	1

Name	Description	Min	Max	Default	UM	Scale
TG10_ProfDec	E386-387 -Profile Deceleration 10	1	2147483647	1	Eng.Unt./s^2	1
TG11_TargetPos	E388-389 -Target Position 11	-2147483648	2147483647	0	Eng.Unt.	1
TG11_VelPos	E390-391 -Position Velocity 11	1	2147483647	1	Eng.Unt./s	1
TG11_ProfAcc	E392-393 -Profile Acceleration 11	1	2147483647	1	Eng.Unt./s^2	1
TG11_ProfDec	E394-395 -Profile Deceleration 11	1	2147483647	1	Eng.Unt./s^2	1
TG12_TargetPos	E396-397 -Target Position 12	-2147483648	2147483647	0	Eng.Unt.	1
TG12_VelPos	E398-399 -Position Velocity 12	1	2147483647	1	Eng.Unt./s	1
TG12_ProfAcc	E400-401 -Profile Acceleration 12	1	2147483647	1	Eng.Unt./s^2	1
TG12_ProfDec	E402-403 -Profile Deceleration 12	1	2147483647	1	Eng.Unt./s^2	1

Table 8: Position Targets Table for Target00 – Taget12



1.9 PROFILE ROTARY TABLE MODE (OPMODE =4)

Name	Description	Min	Max	Default	UM	Scale
OpMode	E135 - S. Operating Mode Selector	Range 1 2 3 4 5	 Profile positione mode Homing mode Profile Velocity mode Profile Rotary table mode Profile Frequency mode	1		1
MO-DE_OF_OP_DIS	d65 - Modes of operation display			0		1
ChSetImm	E140 - C. ChangeSetImmediately			0		1
AbsRel	E141 - C. Absolute Relative Positioning			0		1
NumTarget	E145 - C. Target Number	0	31	0		1
FollErr	E150-151 - P. Following Error Window	0	2147483647	360	Eng.Unt.	1
WinPos	E152-153 - P. Position Window	0	2147483647	360	Eng.Unt.	1
QSDec	E154-155 - P. Quick Stop Deceleration	1	2147483647	1	Eng.Unt./s^2	1
ACTUALPOS	D66-67 – Position Actual Vaue				ie	
ACTUALVEL	D68 – 69 – Velocity Actual Value				ie/s	
Rd_ActualPos	E190-191 -Actual Position			0	Eng.Unt.	1
Rd_ActualVel	E192-193 -Actual Velocity			0	Eng.Unt./s	1
PosJerk	E214-215 – Positining Jerk	0	2147483	0	Eng. Unt./s^3	1
pPOS_REG_KP	E39 - Kv position loop proportional gain	0.0	100.0	4.0		10
pSTOP_POS	E94 – Stop position direction	0	0-Minimum track 1-Same direction positive 2-Same direction negative	0		1

This new operation mode allows to enable positioning on the module axis (enabled with **E95-pMODULE_AX**). Zero internal value is automatically calculated when position reached the modul position.
The 32 target position are the same of Profile Position mode (Position Target 0....31).
If Profile Rotary Table and Absolute positioning are enabled, the position target can not exceed the module axis.

If **E95-pMODULE_AX** is enabled, **1-Profile Position Mode** can not be enabled otherwise the operation mode is automatically set to **4-Profile Rotary Table mode**.
If **E95-pMODULE_AX** is not enabled **4-Profile Rotary Table mode** can not be enabled, otherwise the operation mode is automatically set to **1-Profile Position Mode.**

Parameters **E140-141 – ChSetImm, E141 – AbsRel, E145 – NumTarget, E150-151 – FollErr, E152-153- WinPos, E154-155 – QSDec** and the other of Positioning System have the same meaning of **1-Profile Position Mode.**

Parameter **E94 – pSTOP_POS** allows to enable the positioning (for **Rotary Table mode**) on minimum track, positive or negative.

Example: if **E94 = 0-Minimum track**, the shortest positioning way is chosen.

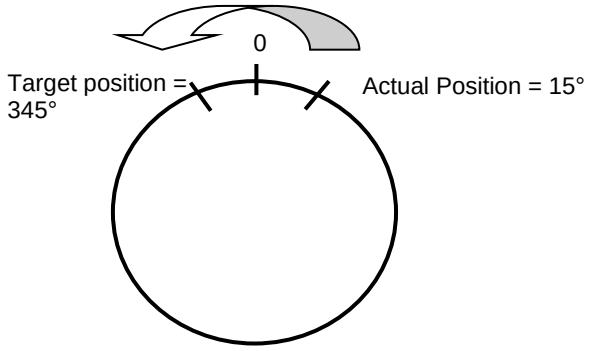


Figure 19: Minimum track

If **E94 = 1-Same Direction positive,** the positive positioning way is chosen.

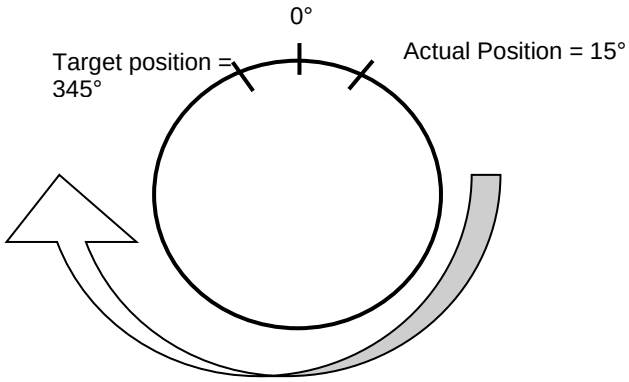


Figure 20: Same direction positive

If **E94 = 1-Same Direction negative,** the negative positioning way is chosen.

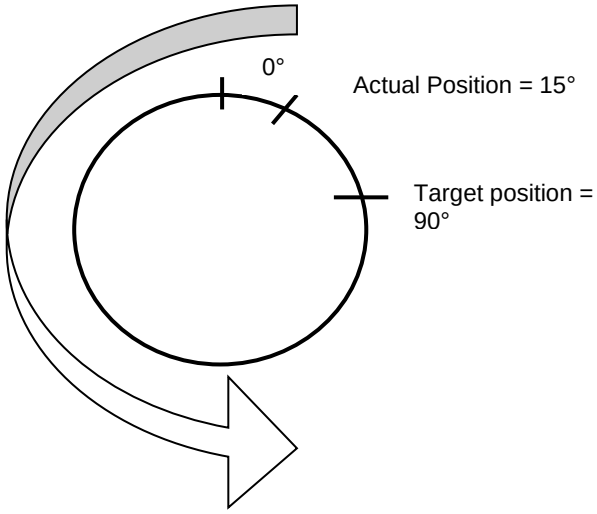


Figure 21: Same direction negative

1.10 S-RAMPS

S-Ramps can be enabled with the following operative mode: **1-Profile Position mode**, **2-Homing mode**, **3-Profile velocity mode**, **4-Profile Rotary Table mode**.
Parameter **E214-215 – PosJerk** set the value of the jerk and enable the S-Ramps, if this parameters is equal to zero trapezoidal profile generator is automatically enabled.

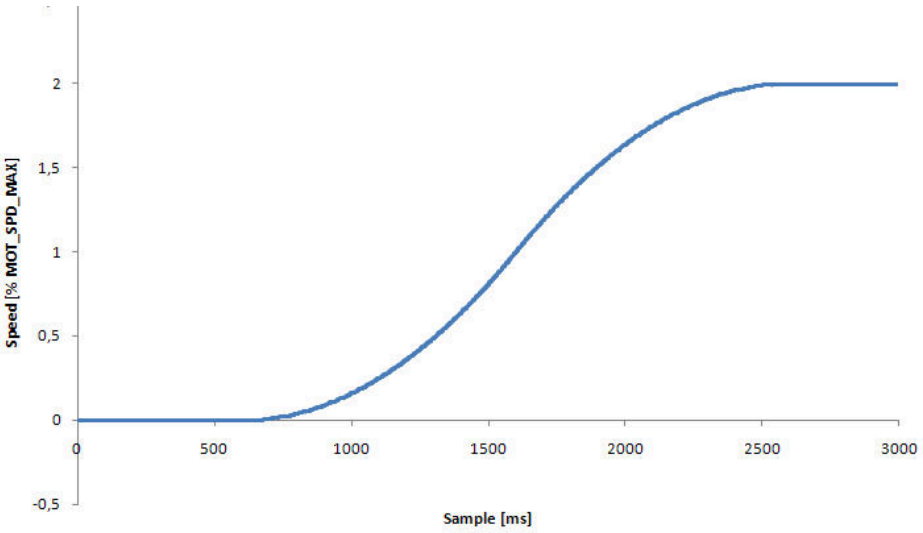


Figure 22: S-Ramp profile speed

The following example shows the speed reference of 360 Eng. Unt./s, Acceleration of 360 Eng. Unt./s^2 and different jerks (Eng. Unt./s^3).

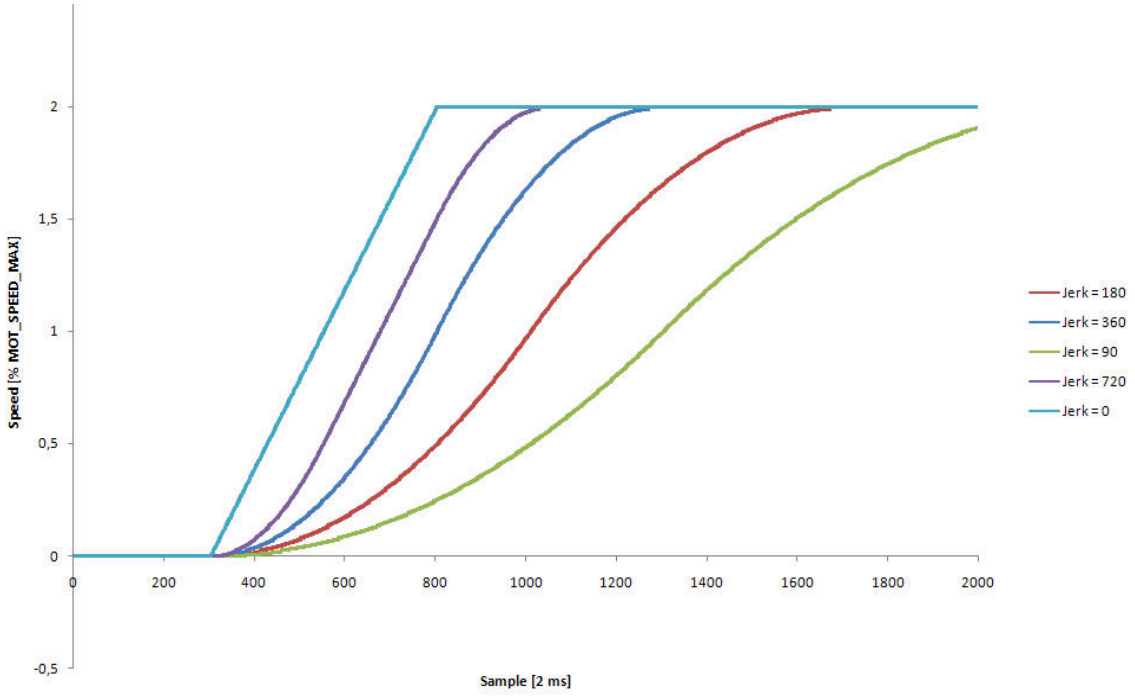


Figure 23: Profile with different jerks

The following examples shows the speed reference of 360 Eng. Unt. /s (and jerk of 360 Eng. Unt. /s^2), and different acceleration (Eng. Unt. / s^2).

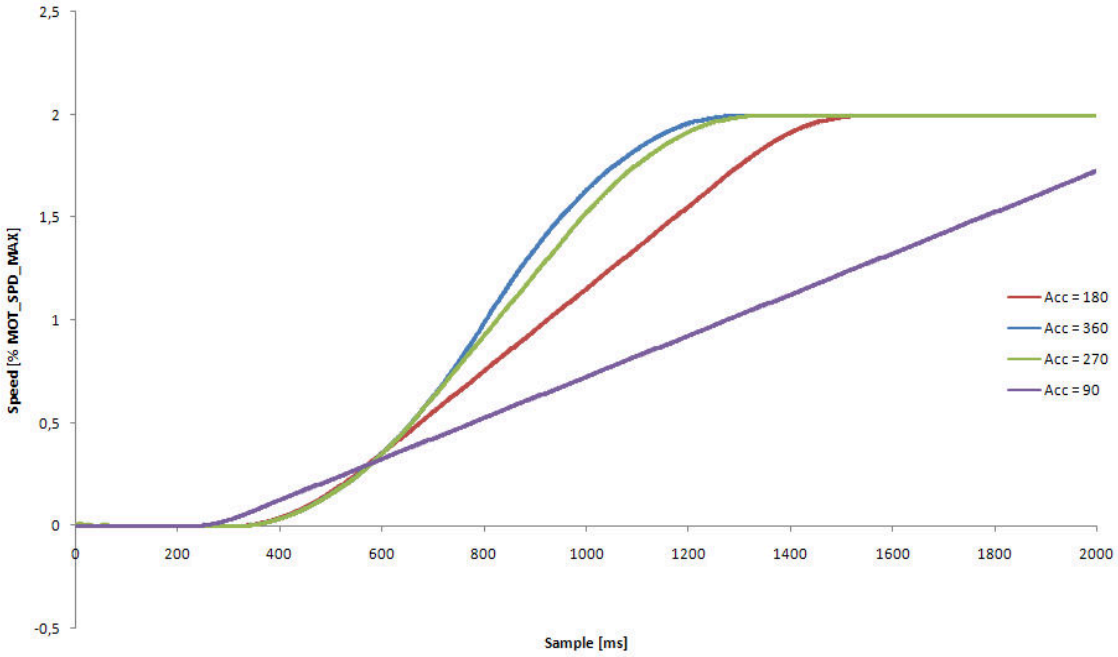
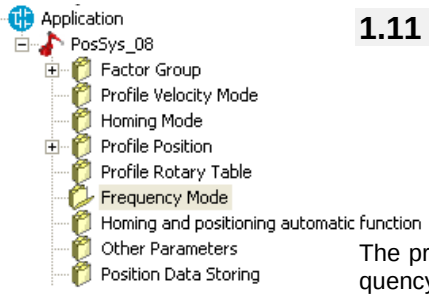


Figure 24: Profile with different acceleration



1.11 PROFILE FREQUENCY MODE (OPMODE=5)

The profile frequency mode operation allows to generate a profile position directly depending on frequency input. To enable profile frequency mode it's necessary to set the parameter **OpMode-E135** to **5-Profile Frequency Mode.**

This speed reference in pulses can be provided from a standard encoder or from a MASTER drive configured for simulated encoder exit. In both case it's necessary to configure the encoder pulse per revolution, selectable with parameter **E60-FRQ_IN_PPR_SEL.**

There are two parameters **E61-FRQ_IN_NUM** and **E62-FRQ_IN_DEN** that permit specification of the ratio between the reference speed and input frequency as a Numerator/Denominator ratio.

The reference speed pulses are used the generate the reference profile position.

It's possible to enable a filter for the frequency input, setting directly the parameters **E65-TF_TIME_DEC_FRQ** for filter time constant and **E66-KP_TIME_DEC_FRQ** for the corrective factor.

Name	Description	Min	Max	Default	UM	Scale
OpMode	E135 - S. Operating Mode Selector	Range		1		1
		1	Profile positione mode			
		2	Homing mode			
		3	Profile Velocity mode			
		5	Profile Frequency mode			
MODE_OF_OP_DIS	d65 - Modes of operation display			0		1
FRQ_IN_PPR_SEL	E60 - Encoder pulses per revolution	Range				1
		0	Not anabled			
		1	64 ppr			
		2	1280 ppr			
		3	256 ppr			
		4	512 ppr			
		5	1024 ppr			
		6	2048 ppr			
		7	4096 ppr			
		8	8195 ppr			
		9	16384 ppr			
FRQ_IN_NUM	E61 - NUM - Frequency input slip ratio	-16383	16383	100		1
FRQ_IN_DEN	E62 - DEN - Frequency input slip ratio	0	16383	100		1
TF_TIME_DEC_FRQ	E65 - Filter time constant of frequency input decoded in time	0.0	20.0	1.6		10
KP_TIME_DEC_FRQ	E66 - Corrective factor for frequency input decoded in time	0.0	200.0	100.0		100
pSWLIMITMIN	E40-E41 Min Position limit	-2147483648	2147483647	-2147483648	ie	1
pSWLIMITMAX	E42-E43 Max Position limit	-2147483648	2147483647	2147483647	ie	1

Table 9: Frequency Mode Table

1.12 ANALOG TORQUE LIMITATION FUNCTION

This function allows to limit directly the maximum torque with a variable value depending by the analog input. The analog limit is expressed in percentual value (0-100%) of the maximum torque in the positive direction (**P42-PRC_DRV_CW_T_MAX**) and in the negative direction (**P43-PRC_DRV_CCW_T_MAX**) depending on the direction of rotation.
To enable the analog torque limitation function, set the parameter **P201-pENANTRQLIMIT** to **Yes** or set the logical input **I01 (Enable Analog Torque Reference)** to the active level.
The parameter **E52-pANTRQLIMIT** defines the input of the analog torque limit. This can be:

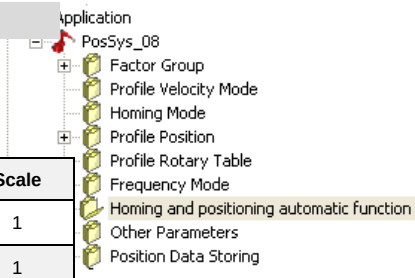
- 0 - no torque limit;
- 1- analog input 1 torque limit;
- 2 - analog input 2 torque limit;
- 3 - analog input 3 torque limit;
- 4 – analog input 4 torque limit (AI16)*;

*Available from app release 3.07 (PosSys_07)

If the function is not enabled the torque's limit are referred to the maximum and minimum value (**P42** and **P43**).

Is not possible to set the same analog input with the meaning of override velocity and analog torque limitation. The parameters **E50 – pSELOVRDVEL** and **E52-pANTRQLIMIT** must be set to different value. If this condition is not true the analog input select is confirmed to override velocity meaning. The inversion of the input value for the analog input selected has not effect, because the value limit is applied at the parameters **P42** and **P43** depending on the direction of rotation.

1.13 HOMING AND POSITIONING AUTOMATIC FUNCTION



Name	Description	Min	Max	Default	UM	Scale
pENHOMFCN	E00 - Enable homing and positioning automatic function			0		1
MODE_OF_OP_DIS	d65 - Modes of operation display			0		1
Rd_ActualPos	E190-191 -Actual Position			0	Unità ingegner.	1
Rd_ActualVel	E192-193 -Actual Velocity			0	Unità ingegner./s	1
Rd_FinStateAutom	E194 -Finite State Automation			0		1

From the software release *3.07* (*PosSys_07*) is possible to enable Homing and Positioning automatic function, it allows to realize an homing and several positioning without change operation mode (from digital inputs). This function works well with all the external controller which can set only the eight physical inputs of the drive. This function set an automatic switch from 2-homing to 1-positioning, with a lower request of number of logic inputs comparated to the standard behavior of the software.
The function can be enabled with the parameter **E00-pENHOMFCN** or the logical input **I16-Homing and positioning automatic function**.

Figure 25 shows the timing of Logical Input, Output and variables of automatic function.
At time **t1** Run Command is given and the drive automatically goes to the run state and automatically switch to the operation mode **2-Homing.** When the New Set Point command is given the application start the homing procedure, when finishes the output **o35 Homing Attained** goes to the High level and the drive automatically switch in **1-Profile position mode**. For a low time, until the Operation mode has switched, also the output **o32 Target Reached** remain to high level (from **t3** to **t4**).
Now with command **I10-New Set point** is possible to start the new positioning. When it finishes, the Output **O32-Target Reached** returns to high level (**t6**).

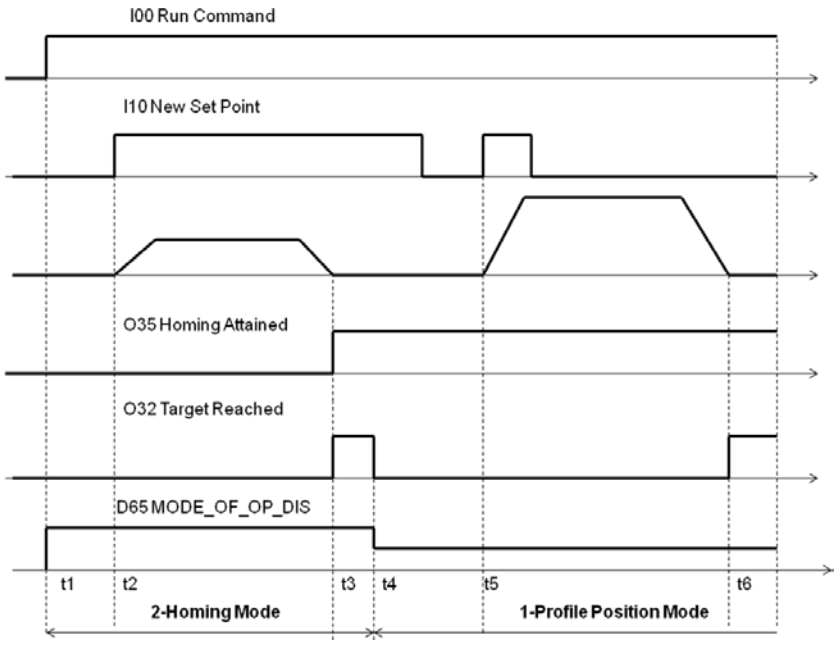


Figure 25: Automatic switch Homing-Positioning

In all the operations seen before, the **I00 Run Command** is always at high level status, if this command is switched off the application remains in the working operation mode.
In the *Homing and positioning automatic functio*n the ligical inputs: **I05-Position Mode Bit0, I06-Position Mode Bit1, I07-Position Mode Bit2** ed **I20-Enable Operation** are not used**.**

The user can recall an homing during the working of the application with the logical input **I17-Homing retrieval**. When the application see a rising edge of **I17** and when the speed decreases and becomes lower than **E18-E19 – pTHRVEL** a New Homing is enabled.

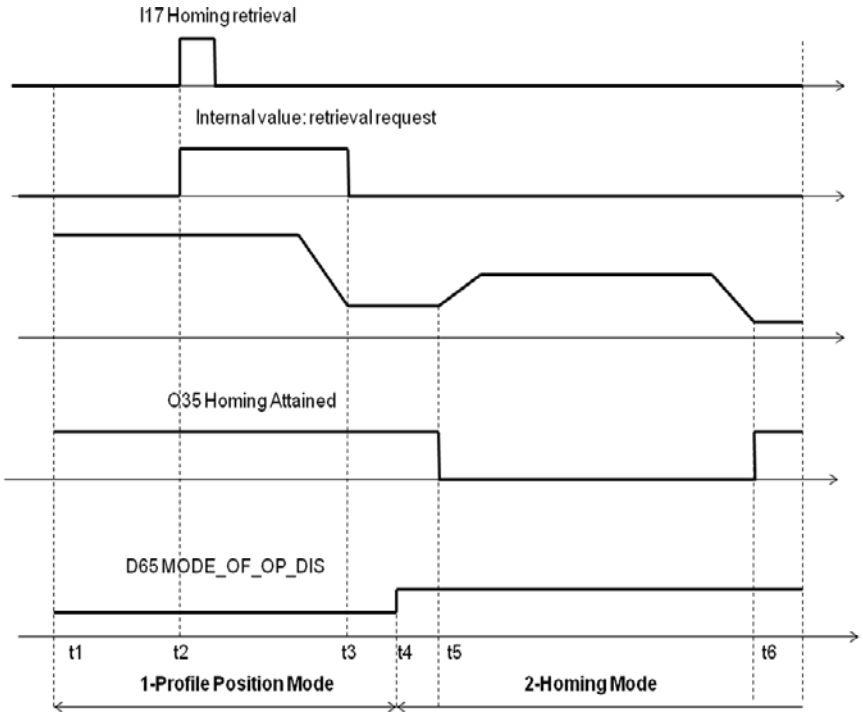


Figure 26: Homing retrieval

Referred to **Figure 26**. At the start time the system is working in a **1-Profile position mode**. At time **t2** the logical input **I17** is activated and an internal value of homing request goes to high level. When the speed became lower than **E18-E19 – pTHRVEL** an internal routine change the operative mode (**t4**) and when the **I10-New set point** is given start a new homing procedure. The command **I00-Run command** is always enabled during this cycle.
The control can verify the operative mode with the outputs **O36-Op Mode Reply Bit0** e **O37-Op Mode Reply Bit1.** The user can also select the analog output **o99** to know the position of the motor in voltage scale.
If the motor has an absolute multi-turn sensor, the homing position is saved when the drive is switched off.
The *Homing and positioning automatic function* works with all the standard function of the Positioning System like *Analog Input*, *Analog toque* and *Second sensor*.

1.14 DIGITAL INPUTS

Digital Inputs	
Name	**Description**
I00	Run command (Switch On)
I01	Enable analog torque limit function
I02	External enable
I03	Velocity: Jog+
I04	Velocity: Jog-
I05	Operative Mode Bit0
I06	Operative Mode Bit1
I07	Operative Mode Bit2
I08	Reset alarms
I09	Enable Analog Position
I10	New SetPoint
I11	Target Bit0
I12	Target Bit1
I13	Target Bit2
I14	Target Bit3
I15	Target Bit4
I16*	Homing and positioning automatic function
I17*	Homing retrieval for the automatic function
I18	Change Set Immediatly
I19	Absolute (H) or Relative (L)
I20	Enable Operation
I21	Halt
I22	Quick Stop
I23	Motor thermo-switch
I26	Enable speed regulator second bank
I27	Enable position control via CAN
I28	Positive Limit Switch
I29	Negative limit Switch
I30	Home switch

Table 10: Selector and Commands with Digital Inputs

*These inputs are available from the 3.07 software release

Particular Selectors and Commands can be given via Digital Inputs by configuring the input with the function required.

❒ Only with Digital Input

Run **(Run or Switch On),** NewSetPoint **(New Set Point command) and** Enable Operation **(Enable Operation command) can only be used via Digital Inputs.**

I00 Run (Switch On)
I10 New SetPoint
I20 Enable Operation

Important Note: Enable Operation (I20) can be configured only if required. The Default Value is Operation Enabled. To start managing I20, it must be switched to a TRUE value (H).

QuickStop **(enable Quick Stop function) and** Halt **(enable the Halt function).**

I21 Halt
I10 Quick Stop

Quick Stop options: The action to be perform when the quick stop function is executed depends on the parameter E38 as follows:

E38=2 slow down with quick stop ramp and transit into Switch On Disabled state.
E38=6 slow down with quick stop ramp and stay in Quick Stop Active.

❒ Alternately via Digital Inputs OR via Bus

Selector of the OperativeMode*, *Selector of the Target, can be done alternatively using Digital Inputs or the Bus configuration (see 1.5.Profile Position Mode (OpMode=1)).

OpMode:

I05 Operative Mode Bit0

I06 Operative Mode Bit1

I07 Operative Mode Bit2

ChSetImm: (Change Set Immediately)

I18 Change Set Immediately

AbsRel: (Absolute Relative).

I19 Absolute(H) or Relative(L)

Ntarget: (Target Number) Select the target value (selectable among 32 different profiles).

I11 Target Bit0

I12 Target Bit1

I13 Target Bit2

I14 Target Bit3

I15 Target Bit4

For the Homing Mode **the following Input can be configured:**

I28 Positive Limit Switch

I29 Negative Limit Switch

I30 Home Switch

1.15 DIGITAL OUTPUTS

Digital Outputs	
Name	**Description**
O00	Drive ready
O01	Motor thermal alarm
O02	Speed greater then minimum
O03	Drive running
O04	CW/ CCW
O05	Current/torque relais
O06	End Ramp
O07	Drive current limit
O08	Drive torque limit
O09	Incremental following error
O10	Power Soft start active
O11	Braking active
O12	No mains power
O13	Bus regeneration enabled (Support 1)
O14	Motor thermal current exceeds threshold (P96)
O15	Radiator overheating (higher than P120 Threshold)
O16	Speed reached (absolute value higher than P47)
O17	Power electronic card not supplied
O18	IPP Initial Pole position detection execut-ed
O19	Regulation card supplied and DSP not inreset state
O32	Target Reached
O33	Set Point Achnoledge
O34	Following Error
O35	Homing attained
O36	OP Mode Reply Bit0
O37	OP Mode Reply Bit1
O38	OP Mode Reply Bit2
O39	Enable operation Reply

Table 11: Digital Outputs

The Digital Output specific for the Positioning System are:

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 Enable operation Reply

1.16 ALARMS

ALARM			DESCRIPTION	CORRECTION
HEX	DEC			
A.4.0.H	A4.0	Life guarding Error	Master's time out	Check the correct time setting of the master
A.4.2.H	A4.2	Alarm following error	Following error (between reference and real position) is greater than maximum admitted error	Verify the drive's correct functioning, check the speed and current loop. Verify the position control. Increase, if possible, the maximum admitted error or increase the maximum torque limit (if analog torque limit is enabled)

Table 12: Alarm

1.17 EXAMPLE: PROFIBUS CYCLIC DATA EXCHANGE

Example of cyclic sizes Exchange via Profibus to manage the positioning system (PosSys).
The example refers to data exchange in BigEndian mode and suppose to Exchange **5 Word in transmission and 5 Word in reception**.
These objects must be set in the folder *Cyclic Mapping* (Filedbus --> Profibus --> New manage --> Cyclic Mapping). Please refer to paragraph **1.18** for the list of all mapped objects.

Cyclic Mapping

Name	Value	Um	Default	Min	Max	
MAP_ERROR_CODE	Ok		Ok			Mapping Error Code
MAP_ERROR_OBJ	0	Hex	0			Mapping Error Object
RX0_INDEX	201f	Hex	0			Receive Object0 Index
RX0_SUB_INDEX	0	Hex	0			Receive Object0 Sub-Index
RX1_INDEX	30c0	Hex	0			Receive Object1 Index
RX1_SUB_INDEX	0	Hex	0			Receive Object1 Sub-Index
RX2_INDEX	3015	Hex	0			Receive Object2 Index
RX2_SUB_INDEX	0	Hex	0			Receive Object2 Sub-Index
RX3_INDEX	0	Hex	0			Receive Object3 Index
RX3_SUB_INDEX	0	Hex	0			Receive Object3 Sub-Index
RX4_INDEX	0	Hex	0			Receive Object4 Index
RX4_SUB_INDEX	0	Hex	0			Receive Object4 Sub-Index
RX5_INDEX	0	Hex	0			Receive Object5 Index
RX5_SUB_INDEX	0	Hex	0			Receive Object5 Sub-Index
RX6_INDEX	0	Hex	0			Receive Object6 Index
RX6_SUB_INDEX	0	Hex	0			Receive Object6 Sub-Index
RX7_INDEX	0	Hex	0			Receive Object7 Index
RX7_SUB_INDEX	0	Hex	0			Receive Object7 Sub-Index
RX8_INDEX	0	Hex	0			Receive Object8 Index
RX8_SUB_INDEX	0	Hex	0			Receive Object8 Sub-Index
RX9_INDEX	0	Hex	0			Receive Object9 Index
RX9_SUB_INDEX	0	Hex	0			Receive Object9 Sub-Index
TX0_INDEX	3010	Hex	0			Transmit Object0 Index
TX0_SUB_INDEX	0	Hex	0			Transmit Object0 Sub-Index
TX1_INDEX	305a	Hex	0			Transmit Object1 Index
TX1_SUB_INDEX	0	Hex	0			Transmit Object1 Sub-Index
TX2_INDEX	2018	Hex	0			Transmit Object2 Index

Figure 27: Cyclic Mapping for Positioning System Profibus Example (5 Word RX-TX)

The following example refer to object seen in **Figure 27**.

WORDS FROM PLC TO TDE (PLC PROFIBUS OUT)

TDE Macno name = RXWord0
INDEX: 0x201F SubINDEX: 0x0
Tipe of data: Double-Word
INPUTS

.7	.6	.5	.4	.3	.2	.1	.0
	Home switch	Negative Limit switch	Positive Limit switch				

.7	.6	.5	.4	.3	.2	.1	.0
	Quick Stop	Halt	Enable Operation	Relative / Absolute			

.7	.6	.5	.4	.3	.2	.1	.0
					New Setpoint		Reset Allarms

.7	.6	.5	.4	.3	.2	.1	.0
Op Mode Bit 02	Op Mode Bit 01	Op Mode Bit 00	Velocity: Jog-	Velocity: Jog+			Run Command (Switch on)

OPERATION MODE	Bit0	Bit1	Bit2
Profile Position M. ([1])	1	0	0
Homing	0	1	0
Velocity Mode ([3])	1	1	0
Frequency Mode = GEAR	1	0	1
Preset pos.	0	1	1

TDE Macno name = RXWord1
INDEX: 0x30C0 SubINDEX: 0x0
Type of data di Dato: Double-Word
Position / Preset value requested [engineering units]
(TargetPosition0)

TDE Macno name = RXWord2
INDEX: 0x3015 SubINDEX: 0x0
Type of data: Word
Feed Override
(Multiplicative factor of velocity for Position Mode and Velocity Mode)

.7	.6	.5	.4	.3	.2	.1	.0

.7	.6	.5	.4	.3	.2	.1	.0
Feed Override (0..100%)							

WORDS FROM TDE TO PLC (PLC PROFIBUS IN)

TDE Macno name = RXWord0
INDEX: 0x3010 SubINDEX: 0x0
Type of data: Double-Word
OUTPUT for PosSys (OUTPOS)

.7	.6	.5	.4	.3	.2	.1	.0

.7	.6	.5	.4	.3	.2	.1	.0

.7	.6	.5	.4	.3	.2	.1	.0
Homing Attained	Target reached				SetPoint Acknowledge		

.7	.6	.5	.4	.3	.2	.1	.0
Op Mode Reply Bit 02	Op Mode Reply Bit 01	Op Mode Reply Bit 00	Enable Operation Reply	Drive Running	Speed Greater than Min		Drive Ready

---

TDE Macno name = TXWORD1
INDEX: 0x305a SubINDEX: 0x0
Type of data: Double-Word
Axis Current Position [Eng. Units]

TDE Macno name = TXWORD2
INDEX: 0x2018 SubINDEX: 0x0
Type of data: Word
Alarms (bitwise)

.7	.6	.5	.4	.3	.2	.1	.0
A.15	A.14	A.13	A.12	A.11	A.10	A.9	A.8

.7	.6	.5	.4	.3	.2	.1	.0
A.7	A.6	A.5	A.4	A.3	A.2	A.1	A.0

1.18 MAIN MAPPED OBJECTS

The following table shows the main mapped objects for all TDE applications. For more information please see the User's manual.

Index (hex)	Object	Type	Name	Description	PDO Mapping	Access
200D	ARRAY	INTEGER16	Tab_par[200]	Current parameter values	Yes	Reading/writing
200E	ARRAY	INTEGER16	Tab_con[100]	Current connections value	Yes	Reading/writing
200F	ARRAY	INTEGER16	Tab_Int[128]	Current internal size values	Yes	Reading
2010	ARRAY	INTEGER16	Tab_inp_dig[32]	Current values of standard input logic functions	Yes	Reading
2011	ARRAY	INTEGER16	Tab_out_dig[32]	Current values of standard output logic functions	Yes	Reading
2012	ARRAY	INTEGER16	Tab_osc[100]	Current monitorable size values	Yes	Reading
2016	ARRAY	UNSIGNED32	Out_dig_appl	Application output function reading via fieldbus	Yes	Reading
2017	VAR	UNSIGNED16	Status	Converter variable status	Yes	Reading
2018	VAR	UNSIGNED16	Alarms	Converter alarm status	Yes	Reading
201E	ARRAY	INTEGER16	Tab_dati_applicazione [100]	Available data area for application	Yes	Reading/writing
201F	VAR	UNSIGNED32	Inp_dig_field	Input logic function writing via fieldbus	Yes	Writing
2020	VAR	UNSIGNED32	Inp_dig	Input logic function reading via fieldbus	Yes	Reading/writing
2021	VAR	UNSIGNED32	Out_dig	Standard logic output reading via fieldbus	Yes	Reading

Table 13: Main standard mapped objects

Index (hex)	Object	Type	Name	Description	PDO Mapping	Access
3010	VAR	UNSIGNED32	OutPos	Positioning System Logical output.	Yes	reading
3015	VAR	UNSIGNED16	OvrVelocity	Override velocity	Yes	Reading/writing
303D	VAR	UNSIGNED32	FG_Feed	Feed Factor Group OPD Explorer Parameter: **E160-161**	Yes	Reading/writing
303F	VAR	UNSIGNED32	FG_MotorShaftRev	Motor shaft revolution OPD Explorer Parameter: **E162-163**	Yes	Reading/writing
3041	VAR	UNSIGNED32	FG_DrivingShaftRev	Driving shaft revolution OPD Explorer Parameter: **E164-165**	Yes	Reading/writing
3056	VAR	UNSIGNED32	FG_EncShaftRev	Encoder shaft revolution. OPD Explorer Parameter: **E186-187**	Yes	Reading/writing

3058	VAR	UN-SIGNED32	FG_EncDrvShaftRev	Encoder driving shaft revolution OPD Explorer Parameter: **E188-189**	Yes	Reading/writing
302D	VAR	INTE-GER8	Ntarget	Target Number OPD Explorer Parameter: **E145**	Yes	Reading/writing
3032	VAR	UN-SIGNED32	FollErr	Following error OPD Explorer Parameters: **E150-151**	Yes	Reading/writing
3034	VAR	UN-SIGNED32	WinPos	Window position OPD Explorer Parameters: **E152-153**	Yes	Reading/writing
3036	VAR	UN-SIGNED32	QSDec	Quick stop deceleration OPD Explorer Parameters: **E152-153**	Yes	Reading/writing
3050	ARRAY	SIGNED32	TargetVel	Target velocity OPD Explorer Parameters: **E180-181**	Yes	Reading/writing
3052	VAR	UN-SIGNED32	TargetAcc	Target velocity OPD Explorer Parameters: **E182-183**	Yes	Reading/writing
3054	VAR	UN-SIGNED32	TargetDec	Target velocity OPD Explorer Parameters: **E184-185**	Yes	Reading/writing
305A	VAR	UN-SIGNED32	ActualPos	Actual position OPD Explorer Parameters: **E190-191**	Yes	Reading
305C	VAR	UN-SIGNED32	ActualVel	Actual velocity OPD Explorer Parameters: **E192-193**	Yes	Reading
304A	ARRAY	UN-SIGNED32	HmSpd	Homing speed during search for switch OPD Explorer Parameters: **174-175**	Yes	Reading/Writing
3048	VAR	UN-SIGNED32	HmAcc	Homing acceleration OPD Explorer Parameters: **172-173**	Yes	Reading/Writing
304C	VAR	UN-SIGNED32	HmSpdEnd	Homing speed during search for zero OPD Explorer Parameters: **176-177**	Yes	Reading/Writing
3046	VAR	SIGNED32	HmOffset	Homing offset OPD Explorer Parameters: **170-171**	Yes	Reading/Writing

Table 14: PosSys mapped objects

A target's object is an array with four parameters: position (**DINT**), speed (**UDINT**), acceleration (**UDINT**), deceleration (**UDINT**).

Example Target_00:

Index (hex)	Object	Type	Name	Description	PDO Mapping	Access
30C0	ARRAY	INTE-GER32	Target position 00 (Sub-index 0)	Target position 00. OPD Explorer Parameter: **E300–E301**	Yes	Reading/writing
		UNSI-GNED32	Target velocity 00 (Sub-index 1)	Target velocity 00. OPD Explorer Parameter: **E302–E303**	Yes	Reading/writing
		UNSI-GNED32	Target acceleration (Sub-index 2)	Target acceleration. OPD Explorer Parameter: **E304-E305**	Yes	Reading/writing
		UNSI-GNED32	Target deceleration (Sub-index 3)	Target deceleration. OPD Explorer Parameter: **E306-E307**	Yes	Reading/writing

Table 15: Target 00 object

The object number values increases with the number of the target:

0x30C0 --> TARGET 00,
0x30C1 --> TARGET 01,
0x30C2 --> TARGET 02,
.....
0x30DF --> TARGET 31.

1.19 MODBUS ADDRESSES

Below there are the tables containing the information needed to gain access to the data of TDE MACNO drives via MODBUS serial communication. For more information please refer to **Modbus Protocol Manual**.

starting address (hex)	Type	Max number of registers (dec)	Type of access Modbus function	Description	Kaypad display
0x0000	INT 16	200	Reading (0x03) Writing (0x10 0x06)	Parameters table (P00 – P199)	**PAR (P.)**
0x00C8	INT 16	100	Reading (0x03) Writing (0x10 0x06)	Connections table (C00 – C99)	**CON (C.)**
0x012C	INT 16/INT 32	100	Reading (0x03) Writing (0x10 0x06)	Application Data table (E00 – E99)	**APP (E.)**
0x0380	INT 16	64	Reading (0x03)	Internal sizes (D00 – D127)	**INT (d.)**
0x0200	UINT 16	1	Reading (0x03)	Drive status	
0x0202	UINT 16	1	Reading (0x03)	Drive alarms	**ALL (A.)**
0x0203	UINT 16	1	Reading (0x03) Writing (0x10 0x06)	Alarm enabling	**ALL (A.)**
0x0300	UINT 32	2	Reading (0x03)	Digital input logical functions	**InP (I.)**
0x0320	UINT 32	2	Reading (0x03)	Standard digital outputs logical functions	**Out (o.)**
0x0340	UINT 32	2	Reading (0x03)	Applicative digital output logical functions	

0x0360	UINT 32	2	Reading (0x03) Writing (0x10 0x06)	Logic functions of digital inputs of serial c.	
0x052C	UINT 16	800	Reading (0x03)	Representation parameters table	
0x084C	UINT 16	400	Reading (0x03)	Representation connection table	
0x0C00	UINT 16	128	Reading (0x03)	Analog outputs and monitor values	
0x0D00	UINT 16	500	Reading (0x03)	Representation extra parameters table	
0x09DC	UINT 16	64	Reading (0x03)	Representation internal parame-ters table	
0x2000	INT 16/INT 32	500	Reading (0x03) Writing (0x10 0x06)	Pos. Extra Parameters (E100 – E600)	**APP (E.)**

Table 16: Modbus Addresses

Legenda:
(DW) : Double Word. The value is in the range $0 \div 2^{32}$
(sDW) : signed Double Word. The value is in the range $-2^{31} \div 2^{31}$

Extra Paremters Modbus address

To act to Extra Parameters (E100 – E600) is necessary to calculate the address in this way:

Example: **E300-301 - TG00_TargetPos** final address is 0x2000 (base address) + 0x012C (parameter number, 300) - 0x0064 (internal offset, value 100) = 0x20c8. The position parameters are referred in Double Words so the final address is 0x20c8-20c9 (8392-8393).

1.20 POSITIONING SYSTEM QUICK START UP

This paragraph help the user to realize a Positiong System application. Before starting to use the PosSys it's necessary download the application and realize the Connection Test, the Autotuning Test and the tuning of the speed loop of the drive (refer to **Quick Start up user manual**).
Then:

- Set the parameters of Factor Group and chose the sensor. These parameters are very important for all Positioning System's functions. It's necessary to set the gear ratio (for Example **10:1**) and the value of the feed.
  Example:
  If 1 revolution of the Driving Shaft covers 40 mm and we want to express the Engineering Units in mm, the FG_Feed must be set to 40. If we set FG_Feed = 400 my Engineering Units is 1/10 mm. For example we chose FG_Feed = 40. It's also necessary to set the first or the second sensor, for example **E51 – pENSECONDSENS = No.**

Factor Group

Name	Value	Um	Default	Min	Max	Description
pSELOVRDVEL	0 - Digital Override		0 - Digital Ove			E50 - Override velocity selection
pANTRQLIMIT	0 - No torque limit		0 - No torque l			E52 - Select analog torque limit
pENANTRQLIMIT	No		No			E01 - Enable analog torque limit
FG_Feed	40	Eng.Unt.	360	1	2147483647	E160-161 - Feed Factor Group
FG_MotorShaftRev	10	Rev	1	1	2147483647	E162-163 - Motor Shaft Revolution
FG_DrivingShaftRev	1	Rev	1	1	2147483647	E164-165 - Driving Shaft Revolution
Rd_ActualPos	0	Eng.Unt.	0			E190-191 -Actual Position
Rd_ActualVel	0	Eng.Unt./s	0			E192-193 -Actual Velocity
ACTUALPOS	10927	ie	0			d66-d67 - Position actual value
ACTUALVEL	38	ie/s	0			d68-d69 - Velocity actual value
OVRRIDEVEL	100.0		0.0			d70 - Override velocity
FG_EncShaftRev	1	Rev	1	1	2147483647	E186-187 - Encoder shaft revolution
FG_EncDrvShaftRev	1	Rev	1	1	2147483647	E188-189 - Encoder driving shaft revolution
pENSECONDSENS	No		No			E51 - Enable second sensor
pENMULTICORRECT	No		No			E16 - Enable correction for absoulute multi-turn sensor

Figure 28: Factor Group elements

- We suggest to set the following parameters to their default values: pTHRVEL, pTIMEVEL, pENSPDFDW, pENTRQFDW, pSWLIMITMIN, , pSWLIMITMAX.

pTHRVEL	10000	ie/s	10000	0	2147483647	E18-E19 - Velocity threshold
pTIMEVEL	0	ms	0	0	65535	E20 - Velocity threshold time
pENSPDFDW	Yes		Yes			E36 - Enable Speed Feed-forward
pENTRQFDW	No		No			E37 - Enable Torque Feed-forward
pQSOPTC	2		2	0	8	E38 - Quick Stop Option Code
pPOS_REG_KP	4.0		4.0	0.0	100.0	E39 - Kv position loop proportional gain
pENSECONDSENS	No		No			E51 - Enable second sensor
POSITIONTOGO	0		0			d72-d73 - Remained position
pSWLIMITMIN	-2147483648	ie	-2147483648	-2147483648	2147483647	E40-E41 Min Position limit
pSWLIMITMAX	2147483647	ie	2147483647	-2147483648	2147483647	E42-E43 Max Position limit

Figure 29: Parameters

- Select the homing speeds and accelerations (if homing is required). For Example:

pHMMODE	Method 2		Method 35			E26 - Homing method
HM_HmSpd	70	Eng.Unt./s	1	1	2147483647	E174-175 -Homing speed during search for switch
HM_HmAcc	700	Eng.Unt./s^2	1	1	2147483647	E172-173 -Homing Acceleration
HM_SpeedEnd	1	Eng.Unt./s	1	1	2147483647	E176-177 -Homing speed during search for zero
HM_HmOffset	0	Eng.Unt.	0	-2147483648	2147483647	E170-171 -Homing Offset
Rd_ActualPos	0	Eng.Unt.	0			E190-191 -Actual Position

Figure 30: Homing parameters

With this parameters the motor first speed (during the search for switch) is equal to:
Motor speed (HM_HmSpd) = *(70 mm/s · 60 s · FG_MotorShaftRev) / (FG_Feed· FG_DrivingShaftRev)* = 1050 rpm,
Motor acceleration = 1/10 sec,
Motor speed2 (HM_HmSpdEnd) = 15 rpm,

- Select the target position, speed, acceleration and deceleration,

Position Targets 0..9						
Name	Value	Um	Default	Min	Max	Description
TG00_TargetPos	2000	Eng.Unt.	0	-2147483648	2147483647	E300-301 -Target Position 00
TG00_VelPos	90	Eng.Unt./s	1	1	2147483647	E302-303 -Position Velocity 00
TG00_ProfAcc	900	Eng.Unt./s^2	1	1	2147483647	E304-305 -Profile Acceleration 00
TG00_ProfDec	900	Eng.Unt./s^2	1	1	2147483647	E306-307 -Profile Deceleration 00
TG01_TargetPos	4000	Eng.Unt.	0	-2147483648	2147483647	E308-309 -Target Position 01
TG01_VelPos	70	Eng.Unt./s	1	1	2147483647	E310-311 -Position Velocity 01
TG01_ProfAcc	700	Eng.Unt./s^2	1	1	2147483647	E312-313 -Profile Acceleration 01
TG01_ProfDec	700	Eng.Unt./s^2	1	1	2147483647	E314-315 -Profile Deceleration 01

Figure 31: Two target setting

for Example:
Target 0 position = 2000 mm,
Target 0 velocity (motor side) = (90 mm/s · *60 s · FG_MotorShaftRev) / (FG_Feed· FG_DrivingShaftRev)* = 1350 rpm,
Target 0 acceleration (motor side) = 1/10 sec,
Target 0 deceleration (motor side) = 1/10 sec,

- Set Profile position's parameters: Following Error, Window position, Change set Immediately, Absolute/Relative and Quick Stop (if necessary).

ChSetImm	No		No			E140 - C. ChangeSetImmediately
AbsRel	Absolute		Relative			E141 - C. Absolute Relative Positioning
NumTarget	0		0	0	31	E145 - C. Target Number
FollErr	10	Eng.Unt.	360	0	2147483647	E150-151 - P. Following Error Window
WinPos	2	Eng.Unt.	360	0	2147483647	E152-153 - P. Position Window
QSDec	5000	Eng.Unt./s^2	1	1	2147483647	E154-155 - P. Quick Stop Deceleration

Figure 32: Profile position parameters

- Enable Homing, this is the standard procedure to enable the homing (*if the homing and positioning automatic function is not enabled*). Select the homing: set **E135 = 2-Homing** OR set the target bits to 010 (2):
  I05-Position Mode bit 0 = 0,
  I06-Position Mode bit 1 = 1,
  I07-Position Mode bit 2 = 0.
  If the drive is not in the runs state the internal modes of operation is equal to **d65 = 2-Homing**;

- Enable the following logic inputs: **I20-Enable Operations**, **I00–Run command** and **I10-New Set Point.** The motor will run with Homing speed, at the end the drive will be in RUN state and the output **O35-Homing Attained** and **O32-Target Reached** will be at high level,

- Now is possible to switch in Profile position mode without disable the **I00-Run command:**

  - Set **E135 = 1-Profile position** OR set the target bits to 001 (1):

    I05-Position Mode bit 0 = 1,
    I06-Position Mode bit 1 = 0,
    I07-Position Mode bit 2 = 0.

    The internal operation mode has not changed **d65 = 2-Homing;**

  - Disable and then enable again the logic input **I20-Enable Operation.** Now the internal operative mode is **d65 = 1-Profile position;**

  - When a rising edge of **I10-New Set point** is given, the drive starts the positioning (with the target selected) and the output **O32-Target Reached** goes to low level,

  - At the end of the positioning the output **O32-Target Reached** will be at high level.

- Now is possible to change the target selected and give another rising edge of **I10-New Set point** to start a new positioning. To select the target is possible to choose the number with **E145 – NumTarget** OR set the target bits. For example if the target selected is number 26 the bits must be set to 11010:

  I11-Target Bit 0 = 0,
  I12-Target Bit 1 = 1,
  I13-Target Bit 2 = 0,
  I14-Target Bit 3 = 1,
  I15-Target Bit 4 = 1.

- If the profile velocity mode is required (**3-Profile Velocity mode**), the user have to set the speed, acceleration and deceleration in absolute value (**E180-181 – TargetVel, E182-183 VelAcc, 184-185 VelDec**) and enable the following logical inputs: **I20-Enable Operations, I00-Run Command** and **I03-Jog+** (for positive speed) or **I04-Jog-** (for negative speed).

1.21 APPLICATION REVISION HISTORY

Rev. 3.08 (25/02/2014), Minimum core target: Opendrive Brushless 22.1/ Async 12.1

Issues fixed

1	Disabled always the core's ramps (sysOnRamps). With previous versions, if the quick start up ramps were enabled and then disabled, the application's ramps didn't work correctly until the drive were switched off and switched on again.
2	Now is possible to recall the Default-value for Extended Parameters.

New Functionality

1	**S-Ramps:** S-Ramps can be enabled setting Jerk parameter E214-215.
2	**Profile rotary table mode:** New Operative mode.
3	**Maximum speed of the system:** now the application limits maximum speed in all operative mode and shows the value in D76-77.
4	**Speed override from Modbus:** with E216 is possible to use the speed override from Modbus.

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