

Advantech SE Technical Share Document

Date	2019 / 03/ 10									
Category	□ FAQ ■SOP	Related Produ	uct	CODESYS						
	Driver Tech Note									
Abstract	How to set Profile Posi	tion via EtherCA	T on (CODESYS?						
Keyword	Profile Position Mode, PDO, EtherCAT									
Related OS	S Windows									
		Revision History	/							
Date	Version	Author		Reviewer	Description					
2020/02/10	V1 0	Owen Chang		NickLin	Softmotion 4.6.0.0 with					
2020/03/10	V1.0 C	wen.chang		NICK.LIU	CODESYS SP15					

Problem Description & Architecture:

In Profile Position, Profile Velocity and Profile Torque modes, the master station only write related parameters such as speed, acceleration, deceleration, and emergency stop deceleration to the servo and the servo is mainly responsible for the trajectory planning

This FAQ shows how to set Profile Position mode via EtherCAT master on CODESYS.

Brief Solution - Step by Step:

We take Shihlin SDP-010E2C servo as example, you could download the manual from the website: <u>Shihlin SDP Servo English Manual V1.03</u>

In chapter 5.1, it shows the operation steps of Profile Position(PP) mode control.

- 1. Set object 6060h(Mode of operation) as 0x01.
- 2. Set object 607Ah(Target position) a destination in pulse unit.
- 3. Set object 6081h(Profile velocity) to define the profile velocity in pulse per second unit.(pulse/s).
- 4. Define the acceleration: and deceleration by setting the object 6083h and 6084h.(pulse/s2)
- 5. Modify the Controlword(6040h) from 0x06 to 0x07, then to 0x0F. So that, the Servo On state of drive is activated. When the transient state from 0x0F to 0x1F is done, it triggers the position mode.
- 6. Use the object 6067h(Position window) setting value to define the allowable tolerance of in position. Besides, set the object 6068h(Position window time) to duration time that the final location remains in the position window range. The above conditions are completed, it means that "Target Reached".

7. Object 6065h(Following error window) defines the detection range for the following error. Object 6068h is used to specify the duration time that the final position remains in the following error window setting range.

Mode of operation, Target position, Profile velocity, Profile acceleration, Profile deceleration and Controlword is demanded for PP mode. The following shows how to use CODESYS write the parameter to servo and control the Controlword.



1. Enable expert settings in servo's page



2. Insert item from Object Directory



3. Select the required item and click OK

elect Item from Ob	ject Directory					
Index:Subindex	Name		Flags	Туре	Default	^
+ 16#607D:16#0	0 Software position lim	it				
16#607F:16#0	0 Max profile velocity		RW	UDINT	16#7FFFFFFF	
16#6080:16#0	0 Max motor speed		RW	UDINT	16#FFFFFFFF	
- 16#6081:16#0	0 Profile velocity		RW	UDINT	16#0	
16#6082:16#0	0 End velocity		RW	UDINT	16#0	
16#6083:16#0	0 Profile acceleration		RW	UDINT	16#989680	
16#6084:16#0	0 Profile deceleration		RW	UDINT	16#989680	
16#6085:16#0	0 Quick stop decelerat	tion	RW	UDINT	16#989680	
16#6086:16#0	0 Motor profile type		RW	INT	16#0000	
16#6087:16#0	6#6087:16#00 Torque slope		RW	UDINT	16#3E8	
16#6088:16#0	0 Torque profile type		RW	INT	16#0000	
16#6098:16#0	0 Homing method		RW	SINT	16#23	
16#6099:16#0	0 Homing speeds					
- 16#609A:16#0	0 Homing Acceleration		RW	UDINT	16#989680	
16#6080:16#0	0 Position offset		RW	DINT	16#0	
16#6081:16#0	0 Velocity offset		RW	DINT	16#0	~
Name	Profile deceleration					
Index: 16#	6084	Bit length	32		•	ОК
SubIndex: 16#	0		1000000)	*	Cancel
		Data type	UDINT		~	



4. The demanded items are added in Output PDO Assignment.



5. Please double confirm that you really add the item in Outputs PDO.

EtherCAT_Servo	General	Select the Outputs			Select the Inputs		
IA Device (Advantech SoftMotion x86 RTE V3 x64 If) PLC Logic Application	Expert Process Data	Name	Туре	Index	Name	Туре	Index
Library Manager POU SetControllerMode (PRG)	Process Data	Controlword Target position	UINT	16#6040:00 16#607A:00	Statusword Position actual value	UINT DINT	16#6041:00 16#6064:00
□ I ask Configuration □ I there is a state of the state of	Startup Parameters	Target velocity Target torque	DINT INT	16#60FF:00 16#6071:00	Torque actual value Following error actual value	INT DINT	16#6077:00 16#60F4:00
POU_SetControllerMode System_Diagnosis (System Diagnosis)	EtherCAT I/O Mapping	Max torque Modes of operation	UINT SINT	16#6072:00 16#6060:00	Modes of operation display Digital Inputs	SINT UDINT	16#6061:00 16#60FD:00
EtherCAT_Master (EtherCAT Master) EtherCAT_Master (EtherCAT Master) SDP_E_CoE_Drive (SDP-E CoE Drive) SM_Drive_GenericDSP402 (SM_E Stat	EtherCAT IEC Objects	 Touch probe function	UINT	16#6088:00	Touch probe status Touch probe pos1 pos value	UINT DINT	16#60B9:00 16#60BA:00
	Status	16#1601 2nd Receive PDO Mapping		✓ 16#1A01 2nd Transmit PDO Map			
 SoftMotion General Axis Pool SM_Drive_Virtual (SM_Drive_Virtual) 	Information	Modes of operation Controlword	SINT	16#6060:00 16#6040:00	Statusword Position actual value	UINT DINT	16#6041:00 16#6064:00
		Profile velocity Profile acceleration Profile deceleration	UDINT UDINT UDINT	16#6081:00 16#6083:00 16#6084:00	16#1A02 3rd Transmit PDO Map Statusword Position actual value	UINT	16#6041:00 16#6064:00
		Target position	DINT	16#607A:00	Digital Inputs	UDINT	16#60FD:00
		16#1602 3rd Receive PDO Mapping			16#1A03 4th Transmit PDO Map		
		Controlword	UINT	16#6040:00	Statusword	UINT	16#6041:00
		Target velocity	DINT	16#60FF:00	Torque actual value	INT	16#6077:00
		16#1603 4th Receive PDO Mapping	1178.07	15-550-00	Position actual value	DINT	16#6064:00
		Target torque	INT	16#6071:00	Digital inputs	ODINI	10=00FD:00

 Now we need to disable CODESY Softmotion drive to make the Outputs PDO could be controlled by users. By switching the drive to "nocontrol" with SMC_ControllerMode, the SoftMotion driver no longer writes the Outputs PDO.



7. Download and run the project





8. Execute SMC_SetControllerMode to switch the drive to "nocontrol" (SMC_nocontrol)



 Please follow the operation steps showed in servo manual. Velocity is 1 cycle/s, Acceleration and deceleration are 1 cycle/ss. Moving distance is 10 cycle. The drive is 24bit resolution (16777216), in other words, 1 turn is for 16777216 increments, Velocity/Acceleration/Deceleration is 16777216, and Target position is 282048931 (114276771 + 10*16777216).

Varia	Mapping	Channel	Address	Туре	Current Value	Prepared Value	Unit	Description
🗄 🍢		Modes of operation	%QB4	SINT	8	1		Modes of operation
B- 🍫		Controlword	%QW3	UINT	0			Controlword
B- *		Profile velocity	%QD2	UDINT	0	16777216		Profile velocity
B- 🍫		Profile acceleration	%QD3	UDINT	0	16777216		Profile acceleration
🖻 🍢		Profile deceleration	%QD4	UDINT	0	16777216		Profile deceleration
🖻 - 🍢		Target position	%QD5	DINT	114276771	282048931		Target position
÷-*>		Statusword	%IW16	UINT	112			Statusword
🗄 - 🆄		Position actual value	%ID9	DINT	114236866			Position actual value

10. Debug -> Write Values

Devices 👻	4 × 1	SDP_E_CoE_Dri	ve 🗙 🔼	Device Ethe	rCAT_Master	0	POU_SetControllerMode				
EtherCAT_Servo SoftMotion x86 RTE V3 x6 Connected] (Advantech SoftMotion x86 RTE V3 x6	▼ i4)	Find			Filter Show a	I		• 🕂 Add FB for	10 Cha	nnel 😁 Go to Instance	1 111
III PLC Logic Societation [run]		Varia ⊛– ¶ø	Mapping	Channel Modes of operation	Address %QB4	Type SINT	Current Value	Prepared Value	Unit	Description Modes of operation	
Ibrary Manager DU_SetControllerMode (PRG)		8-9 8-9		Controlword Profile velocity	%QW3 %QD2	UINT	0 16777216			Controlword Profile velocity	
= 100 Task Configuration = 100 there there are the the the the the the the the the th		8- 5 9 8- 5 9		Profile acceleration Profile deceleration	%QD3 %QD4	UDINT UDINT	16777216 16777216			Profile acceleration Profile deceleration	
POU_SetControllerMode		8- * 9 8- * 9		Target position Statusword	%QD5 %IW16	DINT	282009034 4208			Target position Statusword	
		±-*•		Position actual value	%ID9	DINT	114236967			Position actual value	
SoftMotion General Axis Pool											



11. Then change Controlword to 0x06 -> 0x07 -> 0x0F to make Servo On. When the transient state from 0x0F to 0x1F is done, it triggers the position mode.

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Solution (A Device [connected] (Advantech SoftMotion x86 RTE V3 x64)	_	Find			F	ilter Show al	1		 Add FB fo 	r IO Cha	nnel 🔭 Go to Instand
E I PLC Logic		Varia	Мар	oping	Channel	Address	Туре	Current Value	Prepared Value	Unit	Description
Application [run]		B-5			Modes of operation	%OB4	SINT	1			Modes of operation
Library Manager		0-5			Controlword	%QW3	UINT	31			Controlword
POU_SetControllerMode (PRG)		1. S	>		Profile velocity	%QD2	UDINT	16777216			Profile velocity
Task Configuration		B- 5			Profile acceleration	%QD3	UDINT	16777216			Profile acceleration
EtherCAT_Task		B- *	•		Profile deceleration	%QD4	UDINT	16777216			Profile deceleration
POU_SetControllerMode		B- 1	•		Target position	%QD5	DINT	282009034			Target position
- 😏 🚾 System_Diagnosis (System Diagnosis)		<u>+-</u> *			Statusword	%IW16	UINT	4151			Statusword
= 🧐 EtherCAT_Master (EtherCAT Master)		8-1	•		Position actual value	%ID9	DINT	274655358			Position actual value
S Soft Action Action Soft Action Soft Action Action Soft Action Action Action Soft Action	402;										

Reference:

N/A