

PLC modulo function use

Test Device

Controller: Q1-1200-D
Servo driver: Y7EB040A-S (firmware version 3904)

Parameter setting

Servo parameter setting

Driver-side parameter setting
Without enabling the modulo function, set the 6091 electronic gear ratio to the desired ratio multiple, and set Pn790.3 to write all parameters into the EEPROM parameters (to prevent the position shifting after the 6064 overflow)
Note: There is no need to enable the servo modulo function.

Pn78A	Analog/Digital function position u...	-	0
Pn78C	6091-GearRatioNum	-	1
Pn78E	6091-GearRatioDen	-	1
- Pn790	EcatFunctionSwitch 0	-	0000
0	Second Encoder feedback	-	0
1	Second Encoder single-loop valu...	-	0
2	Node address function switch	-	0
3	Parameter write to EEPROM swit...	-	0
- Pn791	EcatFunctionSwitch 1	-	0000
0	ECAT force DOoutput state	-	0
1	Speed interpolation function	-	0
2	F28 Alarm Function	-	0
3	Frame loss compensation function	-	0
- Pn792	EcatFunctionSwitch 2	-	0000

i Parameter write to EEPROM switch

Range of value: 0-2
Effective method: Effective immediately
Factory settings:0
0: Parameters write toEEPROM◦ (Except for the 60 set of parameters)
1:All Parameters not write to EEPROM◦
2: All parameters write to EEPROM◦

Controller parameter setting

Axis scale mapping is set to encoder resolution: modulo value and axis rotation is set to the same resolution as scale mapping for modulo axis.

Axis type:Rotatory axis type

Unit conversion formula:

Re
fer
en
ce

Pulse number(pulse) =

(1) Command pulses number of motor rotation per circle[DINT]

(2) Working stroke of workbench rotation per circle[LREAL]

*

(4) Numerator of gear ratio [DINT]

(3) Denominator of gear ratio[DINT]

*

Movement distance[User Unit]

M:motor W:workbench

Working stroke of workbench rotation per circle:

(2) 1080

Denominator of gear ratio (Number of gears):

(3) 1

Command pulses number of motor rotation per circle:

(1) 16#800000 (Command Pulse per circle)

Numerator of gear ratio (Number of gears):

(4) 1

Axis type and limits

☐ Virtual mode
☒ Modulo
☐ Finite

Modulo settings
 Modulo value [u]: 1080

Software error reaction
 Deceleration [u/s²]: 0
 Max. distance [u]: 0

Dynamic limits
 Velocity [u/s]: 30
 Acceleration [u/s²]: 1000
 Deceleration [u/s²]: 1000
 Jerk [u/s³]: 10000

Velocity ramp type
☒ Trapezoid
☐ Sin²
☐ Quadratic
☐ Quadratic (smooth)

Identification
 ID: 4

Position lag supervision
 deactivated

Lag limit [u]: 1.0

The normal operation of 864 turns, the unit stroke 108,000, running to the final feedback position of 1079.9, for many consecutive runs position Feedback is still 1079.1 (1079.1 because of the position fluctuations caused by disable the servo). Drive power off and on, the position display is still 1079.1. When the controller is powered off and on, the position is still 1079.1.



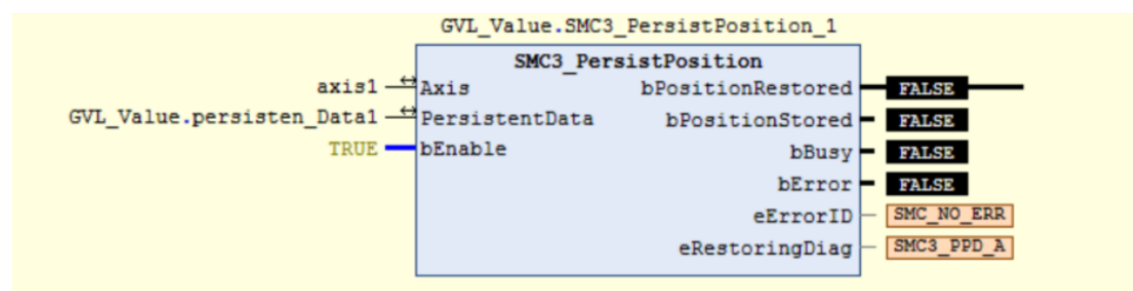
Other condition

If it is necessary not to set the 6091 electronic gear ratio, set the ratio in the axis scale mapping. Need to set the power-down hold parameter on the EtherCAT type for remembering axis1.dwPosOffsetForResiduals. This is achieved by setting the power-down holding area parameters **smc3_persistposition_data** (structure), and **smc3_persistposition** (function block) and calling them in the program.

```

VAR_GLOBAL PERSISTENT RETAIN
    persisten_data1: smc3_persistposition_data;
    smc3_persistposition_1: smc3_persistposition;
END_VAR

```



Rotary mode (Modulo)

In this mode, the actual position `Axis.fActPosition` is calculated in a different way, and the variables involved in the calculation are:

A: Object dictionary `0x6064` (actual user feedback pulse units).

B: `Axis.dwPosOffsetForResiduals` (the remaining position offset).

C: `Axis.dwRatioTechUnitsDenom` (proportional units denominator).

D: `Axis.iRatioTechUnitsNum` (proportional units numerator).

E: `Axis.fOffsetPosition` (position offset).

Calculation formula:

$$fActPosition = (((DwORD)0x6064) - dwPosOffsetForResiduals) * iRatioTechUnitsNum / dwRatioTechUnitsDenom)) - fOffsetPosition$$