



SYNTEC
TECHNOLOGY CO., LTD.

SYNTEC CNC Parameters.

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1 Common.

- (廢棄)Pr3830 Automatic Gantry Calibration Function
- Pr1 *Motion board base address
- Pr3 I/O board base address
- Pr5 *I/O type
- Pr9 *Servo board type
- Pr10 *Servo alarm contact type
- Pr11 Servo board clock source
- Pr12 Servo6 board highest clock
- Pr13 *Number of servo card
- Pr14 Absolute encoder type
- Pr15 I/O board digital filter method
- Pr17 *Control precision
- Pr18 HSHP chord error tolerance
- Pr21~Pr40 * Axis corresponding axis card port number
- Pr41~Pr60 Axial motor polarity.
- Pr61~Pr80 Axial encoder resolution
- Pr81~Pr100 Axial encoder scaling factor
- Pr101~Pr120 Axial motor gain
- Pr121~Pr160 Axial screw side gear number/motor side gear number
- Pr161~Pr180 Axial pitch amount (BLU)
- Pr181~Pr200 Axial servo loop gain
- Pr201~Pr220 Axial sensor type.
- Pr221~Pr240 Axial type
- Pr241~Pr260* Axial dual feedback related to port number
- Pr261~Pr280 Axial dual feedback resolution
- Pr281~Pr300 Axial dimension type (radius or diameter axis)
- Pr301~Pr320 Axial dual feedback scaling factor
- Pr321~Pr340 Axis name
- Pr341~Pr380 Axial command multiplier/divisor
- Pr381~Pr400 Axial position servo mode
- Pr401 Cutting acceleration time
- Pr402 Acceleration accelerated to 1G time (Jerk)
- Pr404 Post acceleration bell-shaped time
- Pr405 Maximum cutting feedrate
- Pr406 Maximum corner reference feedrate
- Pr407 HPCC smoothing tolerance(um)
- Pr408 Arc cutting reference speed of radius 5mm
- Pr409 Thread cutting acceleration time of 1m/min (ms)
- Pr410 MPG acceleration time
- Pr411 Rapid travel (G00) type
- Pr412 tool length compensation restoration mode
- Pr413 G92 coordinate persist mode
- Pr414 Workpiece coordinate persist mode
- Pr415 Reserve current tool length after reset
- Pr416 Rigid tapping coupling time
- Pr417 Rigid tapping velocity gain
- Pr418 Rigid tapping acceleration/deceleration gain
- Pr419 Rigid tapping spindle deceleration time
- Pr421~Pr440 Axial cutting in-position window
- Pr441~Pr460 Axial rapid travel (G00) acceleration time

- Pr461~Pr480 Axial maximum rapid travel (G00) feedrate
- Pr481~Pr500 Axial rapid travel in-position window
- Pr501~Pr520 Axial rapid travel (G00) F0 speed
- Pr521~Pr540 Axial JOG speed
- Pr541~Pr560 Axial cutting acceleration time
- Pr561~Pr580 Axial loss pulse check window
- Pr581~Pr600 Axial velocity feed forward percentage
- Pr601~Pr620 Axial maximum corner reference feedrate
- Pr621~Pr640 Axial maximum cutting feedrate
- Pr641~Pr660 Axial acceleration accelerated to 1G time (Jerk)
- Pr661~Pr680 Axial MPG speed
- Pr681~Pr700 *Axis Dual Feedback Mode
- Pr701~Pr720 *Axial associate axis groups
- Pr721~Pr730 Axis group MST channel No.
- Pr731 *The number of axis group in CNC
- Pr732 *MST channel rules of multi-programs
- Pr733~Pr734 *Loader axis group
- Pr737 * Woodworking labeling axis group
- Pr741 *The rule of non-primary axis group
- Pr742 *The rules of the axis group shared axis.
- Pr801 *Manually set zero speed check window
- Pr803 Home Dog signal
- Pr821~Pr840 Axial homing feedrate
- Pr841~Pr860 Axial second travel homing feedrate
- Pr861~Pr880 Axial homing direction
- Pr881~Pr900 Axial home offset
- Pr901~Pr920 Axis zero speed check window
- Pr921~Pr940 Home dog polarity
- Pr941~Pr960 Enable axis home grid function
- Pr961~Pr980 Axial home search method
- Pr981~Pr1000 Axis homing 2nd protect revolution (encoder type)
- Pr1001~Pr1020 Axial fast return home
- Pr1021~Pr1040 Position offset check window during power off (BLU)
- Pr1041~Pr1060 Syntec M3 axial power-off Tool auto retract distance (BLU)
- Pr1221~Pr1240 Enable axial backlash compensation
- Pr1241~Pr1260 Axial G00 backlash
- Pr1261~Pr1280 Axial G01 backlash
- Pr1281~Pr1300 Backlash critical speed
- Pr1301~Pr1320 Pitch error compensation type
- Pr1321~Pr1340 Pitch error compensation Interval
- Pr1341~Pr1360 Table index for reference (home)
- Pr1361~Pr1380 Axis quad-peak error compensation from negative to positive direction
- Pr1381~Pr1400 Axis quad-peak error second hold time
- Pr1401~Pr1420 Axis mechanical compensation time constant
- Pr1421~Pr1440 Axis max. static dual error
- Pr1441~Pr1460 Axis quad-peak error compensation from positive to negative direction
- Pr1461~Pr1480 Axis quad-peak error hold time
- Pr1481~Pr1490 Straightness offset moving axis number and compensating axis number
- Pr1521~Pr1540 Axial rapid traverse (G00) deceleration time ratio
- Pr1621~Pr1630 Axis ID or Port Number for Spindle
- Pr1631~Pr1640 Spindle bias for zero speed
- Pr1641~Pr1650 Spindle encoder polarity
- Pr1651~Pr1660 Spindle encoder resolution

- Pr1661~Pr1670 Spindle encoder scaling factor
- Pr1671~Pr1680 Spindle gain
- Pr1681~Pr1700 Spindle 1st gear number at screw side and motor side
- Pr1711~Pr1720 *Spindle pos. sensor exist or not
- Pr1721~Pr1730 Spindle zero floating speed(RPM)
- Pr1731~Pr1740 Spindle minimum speed
- Pr1741~Pr1750 Spindle speed for orientation stop.
- Pr1751~Pr1760 Spindle S.O.S. reference offset.
- Pr1761~Pr1770 Spindle orientation stop deceleration time.
- Pr1771~Pr1780 Spindle home reference offset.
- Pr1781~Pr1790 Minimum speed for orientation stop
- Pr1791~Pr1800 Spindle motor type.
- Pr1801~Pr1810 Spindle maximum speed.
- Pr1811~Pr1820 Spindle encoder mount location
- Pr1821~Pr1830 Spindle servo differential gain
- Pr1831~Pr1840 Spindle motor acceleration time.
- Pr1841~Pr1850 Spindle motor fundamental frequency speed.
- Pr1851~Pr1860 Spindle acceleration accelerated to 1000RPM/s time
- Pr1861~Pr1870 Spindle synchronize direction
- Pr1871~Pr1880 *Spindle initial speed
- Pr1881~Pr1890 Spindle speed control integral time (V type spindle)
- Pr1891~Pr1900 Second Weak Flux Start Speed
- Pr1901~Pr1960 Spindle 2nd~4th gear number at screw side and motor side
- Pr1961~Pr1965 The axis couple with spindle for tapping spindle
- Pr1971~Pr1980 Spindle acceleration time when tapping
- Pr1981~Pr1990 Spindle Acceleration Accelerated to 1000 RPM/s time when tapping
- Pr1991 Check spindle speed arrival.
- Pr1992 Spindle cutting speed arrival range.
- Pr1993 Spindle threading speed arrival range.
- Pr1994 *Spindle enable control parameters switch.
- Pr1995 Spindle mode of acceleration calculation.
- Pr2001 MPG 4th scaling factor.
- Pr2002 MPG program simulation smoothing time
- Pr2003 MPG program simulation handwheel No.
- Pr2021~Pr2030 *Port number or register number for MPG
- Pr2024~Pr2027 *Continued I-Bit no. for MPG
- Pr2031~Pr2040 MPG related axis ID
- Pr2041~Pr2050 MPG resolution (Pulse/rev)
- Pr2051~Pr2060 MPG scaling factor
- Pr2061~Pr2080 MPG gear number at screw side, motor side
- Pr2401~Pr2440 Axial position coordinate of stroke limit 1 (BLU)
- Pr2441~Pr2480 Axial position coordinate of stroke limit 3 (BLU)
- Pr2481 *Persistent of stroke limit 3
- Pr2482 Protect range of stroke limit 3
- Pr2501~Pr2540 Axial position coordinate of stroke limit 2 (BLU)
- Pr2542 Protect range of stroke limit 2
- Pr2801~Pr2860 2nd~4th reference point
- Pr2901~Pr2902 *Servo station ID for master & slave axis of tension control couple axes
- Pr2903 Target Tension Value of Tension Control.
- Pr2904 Proportional Gain of Tension Control
- Pr2921~Pr2940 Axial quad-peak compensation method
- Pr3201 Machine Type
- Pr3202 I_O scan time

- Pr3203 Interpolation time interval
- Pr3204 PLC scan time
- Pr3205 *Function key type
- Pr3207 C/S interface version number
- Pr3209 Language.
- Pr3211 *Display type
- Pr3213 Floppy Name
- Pr3215 *Enable T code call mode.
- Pr3217 *Control panel type
- Pr3219 *System configuration
- Pr3220 Folder Path Limitation
- Pr3221 Debug level
- Pr3223 *Enable System Manager
- Pr3224 Spindle Position Display
- Pr3225 Screen Saver Time Latency.
- Pr3227 *Screen resolution
- Pr3228 *Enable tool manager
- Pr3229 *Disable workpiece coordinate
- Pr3230 *Disable lathe tool length setting screen
- Pr3231 *COM1 Remote Device
- Pr3232 *COM2 Remote Device
- Pr3234 *Open Modbus Slave
- Pr3235 *Modbus Slave Station ID
- Pr3236 *Network Station ID
- Pr3237 *Network whiteboard R register start number
- Pr3238 *Network whiteboard R register length
- Pr3241 *Decimal point type
- Pr3243 *Keyboard reset process by PLC
- Pr3245 Max increment value of input for tool wear compensation(BLU)
- Pr3247 Feedrate display method
- Pr3249 *MLC Alarm ID Expansion
- Pr3251 *Touch (screen)
- Pr3252~Pr3255 *Touch Screen side
- Pr3261~Pr3263 *M3-IO Station No
- Pr3266~Pr3267 Select the drive signal to be monitored
- Pr3270 *Tolerated time when Wireless portable box disconnects
- Pr3271 *Enables SRI in IO mapping table
- Pr3281~Pr3288 *EtherCAT-IO Station No
- Pr3401~Pr3460 MLC Register parameter
- Pr3581~Pr3588 Pre/Post-program of the independent mode group
- Pr3599 *Register M code for Advanced Look-Ahead mode
- Pr3600 *Register custom Macro interrupt M code
- Pr3601~Pr3610 *M code Macro call registry
- Pr3701~Pr3710 *G code Macro call registry
- Pr3721~Pr3722 *Axis of 1st axis exchange
- Pr3723~Pr3724 Offset of 1st axis exchange
- Pr3725 Mirror of 1st axis exchange
- Pr3726~3740 *2nd~4th axis exchange parameters
- Pr3741 Axis ID of 1st rotary axis auxiliary brake
- Pr3742 M code of 1st rotary axis auxiliary brake
- Pr3743~Pr3744 Parameters of 2nd rotary axis auxiliary brake
- Pr3751 *Orthogonal axis ID of inclined Axes control
- Pr3752 *Incline axis ID of inclined Axes control

- Pr3753 *Inclined angle of inclined Axes control
- Pr3761 *Indexing Axis ID
- Pr3762 Function of Indexing Axis
- Pr3763 Minimum Precision Angle of Indexing Axis
- Pr3764 Braking M code of Indexing Axis
- Pr3801 Feed tight couple with spindle position under G95
- Pr3802 Default feedrate control mode
- Pr3804 Part count M code
- Pr3805 Static dual feedback error timeout
- Pr3806 Second auxiliary code
- Pr3807 Destination not on arc check window
- Pr3808 High Precision Smoothness(SPA)
- Pr3809 *Are UVW incremental command of XYZ axes
- Pr3810 *Paralleled executing multiple M code in one block.
- Pr3811 *Start address of persist working global variable
- Pr3812 Optional skip mode selection
- Pr3813 Number of extended global variables
- Pr3814 Rapid traverse compensation mode.
- Pr3815 Tool radius compensation mode
- Pr3816 *Tool length compensation mode
- Pr3817 Fatal dual feedback error
- Pr3818 Dual feedback self-detect error (pulse)
- Pr3819 Overcut check mode
- Pr3820 Minimal deceleration ratio for inner circular cutting
- Pr3821~Pr3822 *1st coupling master/slave axis number
- Pr3823~Pr3824 *1st coupling master/slave axis ratio factor
- Pr3825 *1st coupling type
- Pr3826~Pr3827 1st coupling couple/decouple time
- Pr3829 *Support multi-axis group tool length compensation
- Pr3831 *Discharge resolution
- Pr3832 *Discharge ignition delay
- Pr3835 Initial Machining Condition
- Pr3836 *Initial Feed Mode
- Pr3837 *Initial Command Mode
- Pr3838 *Initial Mode of 2nd Stroke limit
- Pr3841~Pr3844 Contact surface position of tool probe
- Pr3850 *Feedforward compensation selection (0: SPA2.0, 1: SPA3.0)
- Pr3851 Tool break handle program No.
- Pr3852 *Enable halted point return
- Pr3853 Enable NC program error examination (0:No;1:Yes)
- Pr3854 G10.6 Tool Retract speed
- Pr3855 G10.6 Tool Retraction and repositioning speed
- Pr3858 *Motion setting of Master-Slave mode
- Pr3859 *High Precision Pitch Error Compensation
- Pr3861~Pr3890 *2nd~4th axis coupling setting parameter
- Pr3901 DC protocol role
- Pr3903 File transfer port number
- Pr3905 Macro program port number
- Pr3921 COM1 baud
- Pr3922 COM1 data bit number
- Pr3923 COM1 exchange code type
- Pr3924 COM1 control code
- Pr3925 COM1 end-of-block output code

- Pr3926 COM1 DC3 control code parity
- Pr3927 COM1 flow control
- Pr3928 COM1 parity check
- Pr3929 COM1 stop bit number
- Pr3930 COM1 communicate error timeout(ms)
- Pr3941~Pr3949 COM2 communication
- Pr3951 Axis no. for chopping axis
- Pr3952 Chopping reference machine position
- Pr3953 Chopping upper dead machine position
- Pr3954 Chopping lower dead machine position
- Pr3955 Chopping feedrate
- Pr3956 Chopping compensation factor
- Pr3957 *High precision advanced chopping stopping position
- Pr3961~Pr3970 COM3 communication
- Pr3971 Modbus TCP Communication Error Timeout
- Pr3972 Enable driver delay compensation.
- Pr3980 *Simulation feedback order setting
- Pr3981 Smooth level of post-accelerated filter of the cutting command
- Pr3983 Common to rapid traverse (G00) and cutting commands post acceleration time(ms)
- Pr3984 Rapid traverse (G00) commands post acceleration time(ms)
- Pr3985 *Axis enable control parameters switch
- Pr3986 Switch of the intelligent contour error control
- Pr3987 Tolerance of intelligent contour error control(um)
- Pr3989 Axial rapid travel trajectory planning strategy
- Pr5001~Pr5500 User parameter.
- Pr6001~Pr6640 Extended software stroke limit parameter (1 ~ 64 group)
- Pr7001~Pr7025 Straightness offset moving axis position
- Pr7026~Pr7050 Straightness offset moving axis position compensation amount
- Pr7051~Pr7125 Straightness offset moving axis position
- Pr7126~Pr7200 Straightness offset moving axis position compensation amount
- Pr8001~Pr10000 Axis pos./neg. abs. comp. pitch err. table

1.1 (廢棄)Pr3830 Automatic Gantry Calibrtn Function

No	Descriptions	Range	Unit	Default	Effective
3830	Automatic Gantry Calibration Function	[0 ~ 1]	-	0	Press Reset

0: Off

1: On

After the automatic gantry calibration function is turned on,

the gantry calibration action will be executed immediately after all the axes(except axes in spindle mode or watch mode) of CNC system are in servo-on state.

Note:

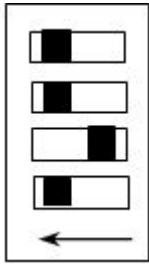
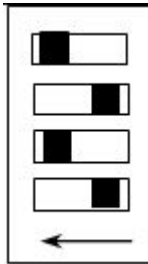
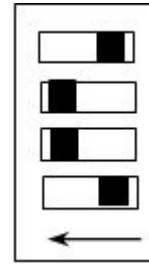
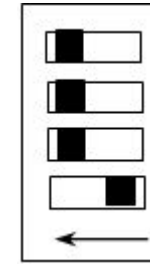

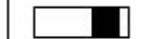







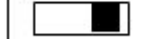
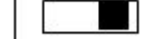
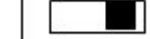
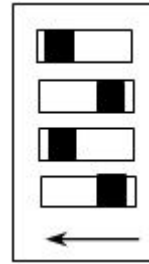
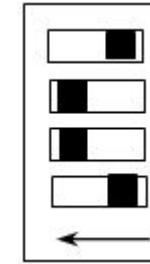
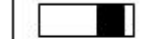




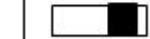
1. The automatic gantry calibration function will be enabled if the following conditions are met
 - a. It is in the coupling state.
 - b. Axis coupling master axis_slave axis component. Set all to 1.
 - c. Axis coupling type. Set peer-to-peer synchronization coupling to 2.
2. After the automatic gantry calibration is completed, other axis movements can be moved.

3. If the mechanical coordinate feedback difference of the two axes is greater than Pr3828 ~ the allowable value of coupling error, automatic gantry calibration is disable.
4. S291 ~ S294 is the gantry calibration complete signal of the gantry set
5. Need to use the S291 ~ S294 to stop the action that needs to be calibrated

1.2 Pr1 *Motion board base address

No	Descriptions	Range	Unit	Default	Effective
1	*Motion board base address	[512~65535]	-	800	restart

- Servo4 card mapping I/O base address and jump wire rule:

NO. of axle card		4	3	2	1
Mapping axle NO.		13~16	9~12	5~8	1~4
Above 8 axles	I/O base address	0X280(640)	0X340(832)	0X320(800)	0X300(768)
	JP16(4)				
	JP15(3)				
	JP14(2)				
	JP13(1)				
Under 8 axles (included)	I/O base address			0X340(832)	0X320(800)
	JP16(4)				
	JP15(3)				
	JP14(2)				
	JP13(1)				
If the number of the cards is ≤2 then Pr1=800; if >2 then Pr1=768.					

- If there are multiple axle cards, ISR jumper should be short for first axle card, the ISR jumper for the rest axle cards should be open.

ISR jumper short for first axle card	ISR jumper open for the rest axle cards
<input type="checkbox"/>	<input type="checkbox"/>

- Servo6: the address of the first card is 768 (can only be insert one Servo6 in controller, cannot mix with Servo4.)

NO. of axis card	1
Mapping axis NO.	1~6
I/O base address	0X300(768)
JP16(4)	<input type="checkbox"/>
JP15(3)	
JP14(2)	
JP13(1)	

- Embedded: the address of the first card is 512.
- If use serial axle cards, pr1 indicates base address of axle cards.

1.3 Pr3 I/O board base address

No	Descriptions	Range	Unit	Default	Effective
3	*I/O board base address	[512~65535]	-	512	restart

- I/O board base address is 512.

1.4 Pr5 *I/O type

No	Descriptions	Range	Unit	Default	Effective
5	*I/O type	[0~100]	-	7	restart

- Refer to Table 1 for non-SUPER/SUPER-X/SUPER-X5, and Table 2 for SUPER/SUPER-X/SUPER-X5 slots.
- When using custom IO comparison table, please set 100 (refer to Customized I/O Chart Manual), valid version:

- IO, MPG, HK, RIO, M3-IO: starting at 10.116.38F/10.116.54D/10.118.0B/10.118.2
- SRI: starting at 10.118.9
- HK2:
 - M3(Pr9=105)starting at 10.118.23T,10.118.28H, 10.118.33
 - EtherCAT(Pr9=110)starting at 10.118.40
- When the Next-generation controller is not connected to the HK-IO adapter module, please set Pr5 to 100, and then set the hardware such as RIO, HK and MPG to -1 (Disable) in the I/O mapping table, otherwise, an alarm OP-005 will occur.
- Simulator or special needs for **virtual axis card, please set 9.** (Note: Virtual IO means any IO (including serial IO) will have no physical effect.)
- For the communication specifications of M3-IO, please refer to [Pr3261~Pr3263 *M3-IO Station No.](#)
- At 10.118.38 and latter version, when I/O related alarm (as listed below) occurs, all I/O pin will be disabled (no longer updating) and system I/O value will be turned off.
 - OP-005 I/O transmission error
 - OP-051 M3-IO communication error
 - OP-052 M3-IO device status error
 - OP-050 SRI status error (if enabled SRI in IO mapping table)

1.4.1 Table 1: Non-SUPER/SUPER-X Setting

Model	Pr5 Setting	IO Definition	Function	M3-IO Support
Any model	9	N/A	No Physical IO Effect	X
	100	Customized		Support M3 controller only
EZ/10A	7	I0~31; O0~31	IO	X
		I56~62	MPG	
		I64~119; O64~119	HK	
10B/10F/11B/11R	7	I0~63; O0~63	RIO1	X
		I120~126	MPG	
		I64~119; O64~119	HK	
	8	I0~63; O0~63	RIO1	
		I120~126	MPG	

Model	Pr5 Setting	IO Definition	Function	M3-IO Support
		I64~119; O64~119	HK	
		I128~191; O128~191	RIO2	
11-X series	Not Applicable	I0~63; O0~63	RIO1	X
		I120~126	MPG	
		I64~119; O64~119	HK	
20/21/30/200 Series HC-B Series HC-E Series 21R Series 20A-R 21-X/200-X/200-X5 Series	7	I0~31; O0~31	IO	X
		I56~62	MPG	
		I64~119; O64~119	HK	
		I128~191; O128~191	RIO	
	11	I0~31; O0~31	IO	
		I56~62	MPG	
		I64~119; O64~119	HK	
60PB 3B/11A/6 Series HC-A Series	11	I0~31; O0~31	IO	X
		I56~62	MPG	
		I64~119; O64~119	HK	
6A-E Series / 6MB-E / 6TD-E 6D-H Series	11	I0~31; O0~31	IO	O
		I56~62	MPG	
		I64~119; O64~119	HK	


Model	Pr5 Setting	IO Definition	Function	M3-IO Support
21-H 21A-E series / 21TB-E	7	I0~31; O0~31	IO	O
		I56~62	MPG	
		I64~119; O64~119	HK	
		I128~191; O128~191	RIO	
	11	I0~31; O0~31	IO	
		I56~62	MPG	
I64~119; O64~119		HK		
70CB 70CB-5 210-H / 610-H Series 210-E / 610-E Series 60PE	7	I0~31; O0~31	IO	O
		I56~62	MPG	
		I64~119; O64~119	HK	
		I128~191; O128~191	RIO	
		I192~I217; O192~O206、O211	RF-HHB	
	11	I0~31; O0~31	IO	
		I56~62	MPG	
		I64~119; O64~119	HK	
I192~I217; O192~O206、O211		RF-HHB		
FC-A 60CA	12	I63	HHB-EStop	X

Model	Pr5 Setting	IO Definition	Function	M3-IO Support
FC-B FC-B-5 FC-C 71SA 710SA 710CA 60DB (FC model) 60WA (FC model) 60CB (FC model) 600WA 60PA 60WB	13	I56~62	MPG	O
		I63	HHB-EStop	
		I192~I217; O192~O206、O211	RF-HHB (Note: Only for i.MX6)	
HC-80GM 80S 60DB (SCD model) 60WA (SCD model) 70CA	14	I63	HHB-EStop	O
		I192~I217; O192~O206、O211	RF-HHB	
70SB	15	I0~31; O0~31	IO	O
HC-8S	16	I0~31; O0~3	IO	X
3A	Not Applicable	I0~15; O0~15	IO	X
		I56~62	MPG	
		I64~119; O64~119	HK	
81R Series HC-7C	19	I231	HHB-EStop	O
		I232~277; O232~273	HHB-HK	







Model	Pr5 Setting	IO Definition	Function	M3-IO Support
22/220 Series HC-C Series 60PC 7A Series	7	I0~63; O0~63	RIO or iTB terminal board If iTB is used, I/O number begins from 0 according to the hardware specification. (EX: iTB-3232 supports 32 I/O, so the numbers are 0~31.)	O
		O120~124	PANEL-EX	
		I120~126	MPG	
		I64~119; O64~119	HK	
		I128~191; O128~191	HK2(only valid when setting Pr9=105, 110)	
		I192~I217; O192~O206; O211	RF-HHB	
	11	I120~126	MPG	
		O120~124	PANEL-EX	
		I64~119; O64~119	HK	
		I128~191; O128~191	HK2(only valid when setting Pr9=105, 110)	
		I192~I217; O192~O206、O211	RF-HHB	
72BA 720BA	13	I0~15; O0~11	IO	O
		I56~62	MPG	

1.4.2 Table 2: SUPER/SUPER-X/SUPER-X5 Setting

Pr5 Setting	Hardware	Address	Connector	I/O board type	Input (X)	Output (Y)
0		EIO80_1			X00~X39	X00~X39
		EIO80_2			X40~X79	X40~X79
1	PIO3_1		CN1(Female)	Relay 1	X00~X07	Y00~Y14
			CN2(Male)	Relay 1	X08~X15	Y16~Y30
	PIO3_2		CN1(Female)	Relay 1	X80~X87	Y80~Y94
			CN2(Male)	Hard key	X40~X79	Y40~Y79
2	PIO3_1		CN1(Female)	Relay 2	X00~X39	Y00~Y11
			CN2(Male)	Hard key	X40~X79	Y40~Y79
	PIO3_2		CN1(Female)	Relay 1	X80~X87	Y80~Y94
			CN2(Male)	Relay 1	X88~X95	Y96~Y110
3	PIO3_1		CN1(Female)	Relay 2	X00~X39	Y00~Y11
			CN2(Male)	Relay 1	X40~X47	Y40~Y54
	PIO3_2		CN1(Female)	Relay 1	X80~X87	Y80~Y94
			CN2(Male)	Relay 1	X88~X95	Y96~Y110

	PIO3_3		CN1(Female)	Relay 2	X120~X159	Y120~Y131
			CN2(Male)	Relay 1	X48~X55	Y56~Y70
4	PIO3_1		CN1(Female)	Relay2	X00~X39	Y00~Y11
			CN2(Male)	Hardkey2	X40~X136	Y40~Y76
	PIO3_2		CN1(Female)	Relay1	X160~X167	Y160~Y174
			CN2(Male)	Relay1	X168~X175	Y176~Y190
5	PIO3_1		CN1(Female)	Relay2	X00~X39	Y00~Y11
			CN2(Male)	Hard key	X40~X79	Y40~Y79
	PIO4_1				X80~X111	Y80~Y95
	PIO4_2				X120~X151	Y120~Y135
	PIO4_3				X160~X191	Y160~Y191
	PIO4_4				X200~X231	Y200~Y231

6	PIO5_1		XI1	TB16IN	X00~X15	
			XI2	TB16IN	X16~X31	
			XI3	TB16IN	X32~X47	
			XO1	TB16OUT		Y00~Y15
			XO2	TB16OUT		Y16~Y31
			XO3	TB16OUT		Y32~Y47
			XO7	P to P out	X48~X55	Y48~Y62
			XO8	MPG port	X56~X63	
7	PIO5_1		XI1	TB16IN	X00~X15	
			XI2	TB16IN	X16~X31	
			XI3	TB16IN	X32~X47	
			XO1	TB16OUT		Y00~Y15
			XO2	TB16OUT		Y16~Y31
			XO3	TB16OUT		Y32~Y47
			XO7	Hard key	X64~X98 X100~X111	Y64~Y103
			XO8	MPG port	X56~X63	

8	PIO5_1		XI1	TB16IN	X00~X15	
			XI2	TB16IN	X16~X31	
			XI3	TB16IN	X32~X47	
			XO1	TB16OUT		Y00~Y15
			XO2	TB16OUT		Y16~Y31
			XO3	TB16OUT		Y32~Y47
			XO7	Hard key	X64~X98 X100~X111	Y64~Y103
			XO8	MPG port	X56~X63	
	PIO5_2		XI1	TB16IN	X128~X143	
			XI2	TB16IN	X144~X159	
			XI3	TB16IN	X160~X175	
			XO1	TB16OUT		Y128~Y143
			XO2	TB16OUT		Y144~Y159
			XO3	TB16OUT		Y160~Y175
XI1			TB16IN	X00~X15		
XI2			TB16IN	X16~X31		

Note: When using use 2 POI5 boards, set Pr5 =8 for ver 9.242.13 and later; set Pr5=7 before ver 9.242.13.

1.5 Pr9 *Servo board type

No	Descriptions	Range	Unit	Default	Effective
9	*Servo board type	[0~9]	-	3	restart

- The parameter is used to set servo board type, instructions are in sections below.

The parameter value setting corresponding to the communication type:

Setting	Communication	Pulse Servo Port Alarm Type	Note
0	Pulse EMP2 (ERK6)		
1	Pulse Servo4	Not Checked	
2	Pulse Servo4	Normal Open	
3	Pulse Servo4	Normal Close	
5	Pulse Servo6	Decided by Pr10	
6	Pulse (60A)		
7/11	Pulse (ARM Controller)	Decided by Pr10	
9	Virtual		<ul style="list-style-type: none"> Virtual Servo Board, the following communication functions are disabled: <ul style="list-style-type: none"> SRI, M3, M2, ECAT, RTEX
102	M2 Serial	Decided by Pr10	
103	M3 Serial	Decided by Pr10	
104	M3 Serial (71SA, 710SA Only)		
105	M3 Serial(expanded HK2, without SRI)		<ul style="list-style-type: none"> HK2 is supported after the software versions 10.118.23T, 10.118.28H, 10.118.33 and above. P.S. If using the newer hardware, the function of SRI could be reserved.
110	EtherCAT Serial	Decided by Pr10	

Setting	Communication	Pulse Servo Port Alarm Type	Note
111	EtherCAT Serial (71SA, 710SA, 720SA Only)		<ul style="list-style-type: none"> 720SA support after the software versions 10.118.66M, 10.118.70G, 10.118.77 and above.
120	RTEX Serial	Decided by Pr10	<ul style="list-style-type: none"> RTEX support ended after the software versions 10.118.30E, 10.118.32E, 10.118.40I, 10.118.41I, 10.118.45 and above.
121	RTEX Serial(71A, 710SA Only)		

1.5.1 The parameter value setting corresponding to the controller model:

Lathe Controller

Machine Type	Model Number	Pr9 Setting
Lathe	6A / 6B	7
	6A-E	103, 110, 120*
	6D-E	103, 110
	6D-H	102, 103, 110
	7A	103, 105, 110
	11A	7
	11B	11
	21A / 21B	102
	21A-H / 21B-H / 210B-H / 210B-H5	102, 103, 110, 120*
	21A-E / 21B-E / 210B-E / 210B-E5	103, 110, 120*
	200A / 200B / 21A-X / 21B-X / 200A-X / 200B-X	102

	22A / 22B / 220B / 220B-5	103, 105, 110, 120*
	10 Series / EZ Series / 11A-X / 11B-X	1, 2, 3
	SUPER / SUPER-X	1, 2, 3, 5

Milling Machine Controller

Machine Type	Model Number	Pr9 Setting
Mill	6A / 6B	7
	6A-E / 6B-E	103, 110, 120*
	6D	102
	6D-H	102, 103, 110, 120*
	11A	7
	11B	11
	21A	102
	21A-H / 210A-H / 210A-H5 / 210B-H / 210B-H5 / 610A-H5	102, 103, 110, 120*
	21A-E / 210A-E / 210A-E5 / 210B-E / 210B-E5 / 610A-E5	103,110,120*
	200A / 200B / 21A-X / 200A-X / 200A-X5 / 200B-X / 200B-X5	102
	22A/ 220A / 220A-5 / 220B / 220B-5	103, 105,110,120*
	10 Series / EZ Series / 11A-X / 11B-X	1,2,3
SUPER / SUPER-X / SUPER-X5	1,2,3,5	

Industry-Specific Equipment Controller

Machine Type	Model Number	Pr9 Setting	Note
GlassGrind	6B	7	Glass Grinding
	6A-E / 21A-E	103, 110, 120*	Glass Polishing
	7A / 22A	103, 105, 110, 120*	Glass Polishing
Mill	6D-H	102, 103, 110, 120*	Metal Polishing
Cutting	6A / 6B	7	

Woodworking machine products

Machine Type	Model number	Pr9 Setting
Print	60A	103, 110, 120*
	60B	102
	60C	103, 105, 110
	60E	103, 110, 120*
Wood	60A / 60B	103,110
	600A	103, 110
	60-E	103, 110, 120*
	610A-H / 610B-H	102, 103, 110, 120*
Drill	60B	103, 110
Cutting	60A	7
	60B	103, 110

P.S. When the hardware of 60WA and 60DB is SCD (Servo Drive Embedded Controller),M3 is the only supported protocol; Pr9 is supposed to set 103.

Automation product

Machine Type	Model Number	Pr9 Setting
FC	A	7
	B / B-5 / C	103, 110, 120*
HC	8A / 10A / 12A / 15A	7
	8B / 10B / 12B / 15B	102
	7C / 8C / 10C / 15C	103, 105, 110, 120*
	8E / 10E / 15E	103, 110, 120*
	8S	7
	80GM	103
Mill	30GM	7

Robot Controller

Machine Type	Model Number	Pr9 Setting
ARTIC / DELTA / GANTRY / SCARA	81R	103, 110, 120*

Laser Products

Machine Type	Model Number	Pr9 Setting
Scanning	70A	7
	70B	104, 111
	71A / 710A	104, 111, 121*
	720A	111



Cutting	70B / 70B-5 / 710A	103, 110
	70A	103

Spring machines

Machine Type	Model Number	Pr9 Setting
Spring	SUPER-X5	1,2,3,5

Bending Machines

Machine Type	Model Number	Pr9 Setting
Bending	72A / 720A	103, 110

1.6 Pr10 *Servo alarm contact type

No	Descriptions	Range	Unit	Default	Effective
10	*Servo alarm contact type	[0~1]	-	0	restart

- Set the servo alarm type of all servo ports of Super(Servo6)/3/6/11 series controller and spindle port of 20/21 series.
0: Servo alarm is Normal Open;
1: Servo alarm is Normal Close;
2: Disable the servo alarm checking.
- Function of disable servo alarm checking is available in version:
Super(Servo6)/20 Series: 10.114.50P/10.114.56K/10.116.0H and later
3 Series: after 3.4.11 and later
6/11/21 Series: 1.0.11 and later
- For Pulse Spindles, if Pr1791~(Spindle motor type) is 0 (inverter motor) or 2 (V speed control motor), servo alarm checking is also disabled.

1.7 Pr11 Servo board clock source

No	Descriptions	Range	Unit	Default	Effective
11	*Servo board clock source	[0~2]	-	2	restart

- Set the servo board clock source:
0: The clock source of Embedded is from servo board;
1: The clock source of 486 motherboard is from shared IPC Bus;
2: For non-embedded controllers, the clock source is from share motherboard VIA clock.

1.8 Pr12 Servo6 board highest clock

No	Descriptions	Range	Unit	Default	Effective
12	*Servo6 board highest clock	[50~4000]	Kpps	500	restart

- Set the Servo6 board highest clock.
- With command format CW/CCW, set Pr12=500.
- With command format A/B Phase, set Pr12=2000.

1.9 Pr13 *Number of servo card

No	Descriptions	Range	Unit	Default	Effective
13	*Number of servo card	[0~6]	-	1	Restart

- Set the number of servo card in the controller.

1.10 Pr14 Absolute encoder type

No	Descriptions	Range	Unit	Default	Default
14	*Absolute encoder type	[0~1]	-	0	restart

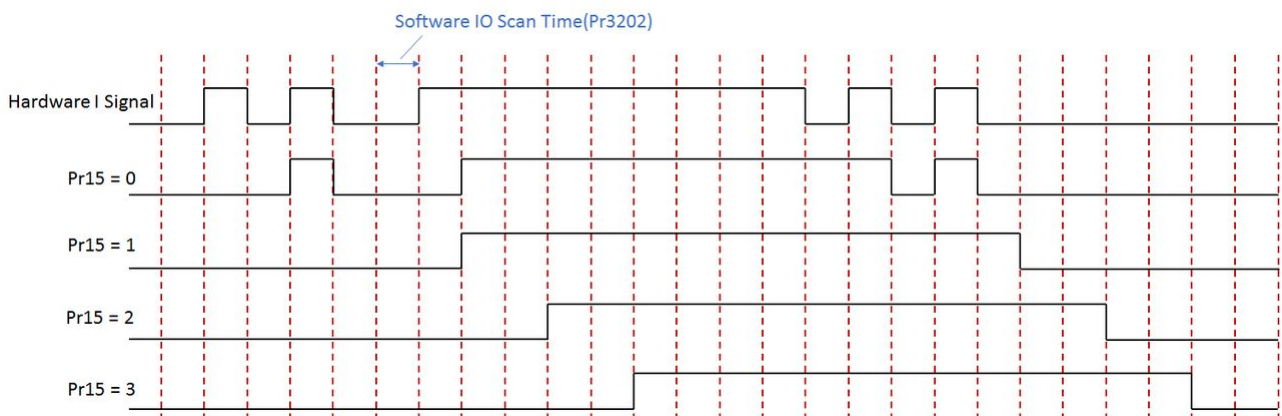
- Set the absolute encoder type:
0: Mitsubishi;
1: SANYO.
- Note: This parameter is effective only when Pr201~Pr220 all set to "3: absolute encoder type".
- **Because the discontinuation of adapter board, SANYO absolute encoder is no longer supported.**

1.11 Pr15 I/O board digital filter method

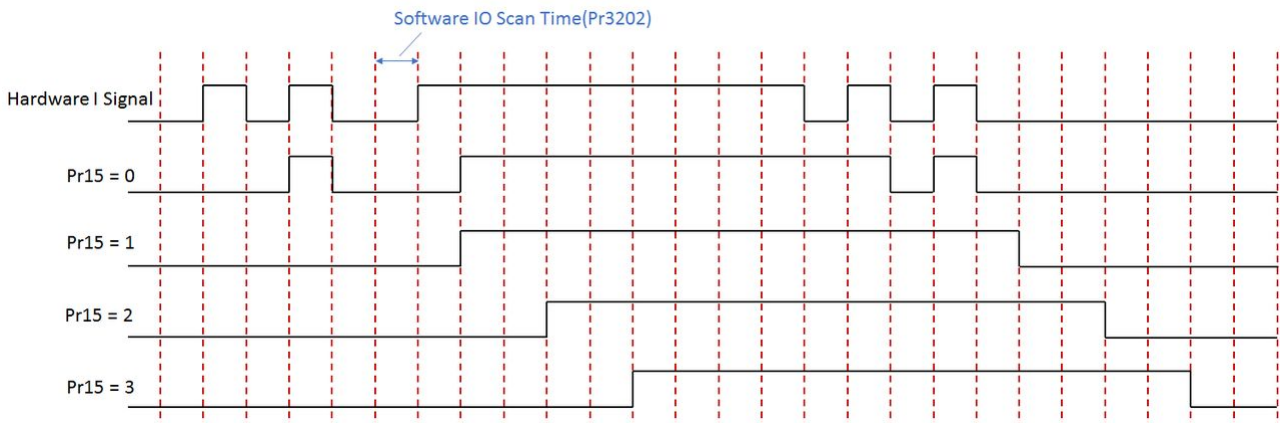
No	Descriptions	Range	Unit	Default	Effective
15	I/O board digital filter method	[0~3]	-	3	reset

- I/O board digital filter type. Larger value allows better noise filtering but reduces I/O signal sensitivity.
- Pr15 = 0:
 - Version 10.118.22Z(4th), 10.118.24E, 10.118.28R, 10.118.39 and after:
 - **Cancel** filtering, I signal data will be received directly.
 - Version 10.118.22Z(3rd), 10.118.24D, 10.118.28Q, 10.118.38 and before:
 - When system input state is ON → If an OFF signal is received, system will check **the previous two signals**. If **any of the signals** is OFF then system changes the input state to OFF.
 - When system input state is OFF → If an ON signal is received, system will check **the previous two signals**. If **any of the signals** is ON then system changes the input state to ON.
- Pr15 = 1:
 - Version 10.118.22Z(4th), 10.118.24E, 10.118.28R, 10.118.39 and after:
 - When system input state is ON → If an OFF signal is received, system will check **the previous two signals**. If **any of the signals** is OFF then system changes the input state to OFF.
 - When system input state is OFF → If an ON signal is received, system will check **the previous two signals**. If **any of the signals** is ON then system changes the input state to ON.
 - Version 10.118.22Z(3rd), 10.118.24D, 10.118.28Q, 10.118.38 and before:
 - When system input state is ON → If an OFF signal is received, system will check **the previous signal**. If **the previous signal** are OFF then system changes the input state to OFF.
 - When system input state is OFF → If an ON signal is received, system will check **the previous signal**. If **the previous signal** are ON then system changes the input state to ON.
- Pr15 = 2:
 - When system input state is ON → If an OFF signal is received, system will check **the previous three signals**. If **all three signals** are OFF then system changes the input state to OFF.
 - When system input state is OFF → If an ON signal is received, system will check **the previous three signals**. If **all three signals** are ON then system changes the input state to ON.
- Pr15 = 3:
 - When system input state is ON → If an OFF signal is received, system will check **the previous five signals**. If **all five signals** are OFF then system changes the input state to OFF.
 - When system input state is OFF → If an ON signal is received, system will check **the previous five signals**. If **all five signals** are ON then system changes the input state to ON.

Version 10.118.22Z(4th), 10.118.24E, 10.118.28R, 10.118.39 and after:



Version 10.118.22Z(3rd), 10.118.24D, 10.118.28Q, 10.118.38 and before:



1.12 Pr17 *Control precision

No	Descriptions	Range	Unit	Default	Effective
17	*Control precision	[1~3]	-	2	restart

- Set the parameter to control precision: basic length unit(BLU) and time unit. This unit will not change with metric or inch system:

Unit of data	Parameter value	Basic length unit
mm deg. sec	1	0.01
	2	0.001
	3	0.0001

- This parameter also affects the least input unit (LIU) of NC files:

Unit of data	Parameter value	Least input unit
mm deg. sec.	1	0.01
	2	0.001
	3	0.0001
inch	1	0.001
	2	0.0001

	3	0.00001
--	---	---------

- When this parameter is changed, the following parameters in unit BLU or LIU must be reset.
 - Common Parameters:
PR18/PR161~/PR421~/PR481~/PR881~/PR1021~/PR1241~/PR1261~/PR1321~/PR1361~/PR1421~/PR1441~/PR2001/PR2401~/PR2441~/PR2501~/PR2801~/PR3245/R3807/PR3817/PR3841~/PR3952/PR3953/PR3954/PR7001~/ PR7026~/ PR8001~
 - Milling Machine Parameters:
PR4002/PR4004/PR4055/PR4056
 - Lathe Parameters:
PR4002/PR4005/PR4011/PR4012/PR4013/PR4015/PR4016/PR4041/PR4045/PR4046/PR4047/PR4051

- When this parameter is changed, the display and input units of Workpiece Coordinate Offset and Tool Compensation Screen will also change.

--EZ/SUPER/10s/20s/200s Controller:

F1 Machine Setting→ F5 Set Workpiece Coordinate

F4 Perform machining→F5 Tool Setting

--3s/6s/11s/21s Controller:

F3 Offset/Setting→F2 Tool Set;

F3 Offset/Setting→F5 Workpiece Shift;

F4 Monitor→F5 Tool Wear Set

- This parameter affects the maximum distance of linear movement of a single block, regardless of metric or inch unit:

Parameter Value	Max. Moving Distance
1	5000 (m)
2	500 (m)
3	50 (m)

A move command cannot exceed this value.

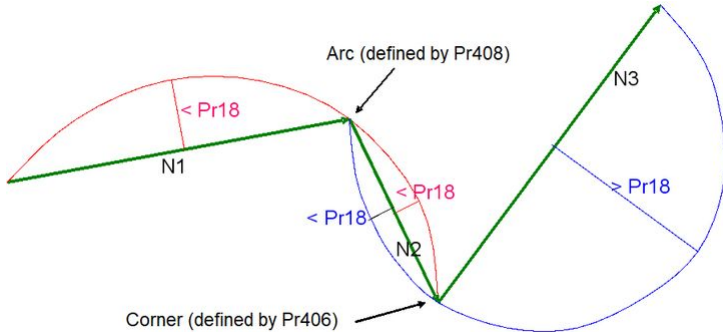
For example: Pr17 = 2, unit in metric, Pr3241 = 0

G00 X600000 // will cause an overflow error

1.13 Pr18 HSHP chord error tolerance

No	Descriptions	Range	Unit	Default	Effective
18	HSHP chord error tolerance	[1~100]	BLU	15	reset

- This parameter determines the maximum permissible tolerance by using virtual arc to approach block path. The larger the parameter, the more block junctions will be regarded as arcs; the smaller the parameter, the more block junctions will be regarded as corner.



- For related application, please refer to "EMC2_C009_High Speed and High Precision Parameter Settings".
- This parameter is no longer available in versions 10.114.52 and later.

1.14 Pr21~Pr40 * Axis corresponding axis card port number

No	Descriptions	range	unit	Default	Effective
21~40	*Port number of corresponding axis	[0~16010]	-	0	restart

- **This parameter defines the axis board port (or bus communication station number) of command output and encoder signal input of corresponding axes.**
- Only the port numbers 17 & 18 (virtual axes) can be repeatedly set. In multi-axis drives, the port number is set to 1 & 1000 or 2 & 2000 are duplicate settings.
- For 6D series (include -H), 20 series, 21 series (include -H), 200 series serial controller: parameter =19 means Spindle Port (SPD); parameter = 20 means MPG Port.
- Pulse Controllers:
This parameter is set to MM, which represents the axis card port number corresponding to the axis (MM=0~20).
- Serial Controllers:
 - When using **single-axis drive**, this parameter is set to MM, which represents the corresponding drive station number (MM=0~22). The corresponding number is as follows:

Pr21~Pr40 Parameter Setting Value									
Comm unicati on	1~16		17	18	19	20	21	22	

M3	Servo Axis	Virtual Axis	Pulse Spindle	M PG	Servo Axis
M2	Servo Axis	Virtual Axis	Pulse Spindle	M PG	Not Supported
RTEX/ECAT	Servo Axis	Virtual Axis	Pulse Spindle	M PG	Not Supported

Attention:

Servo Axis: For actual supported axis number, please refer to [Pr3203 Interpolation time interval](#).

Pulse Spindle: For RTEX/ECAT, at least one Servo Axis should be connected to enable Pulse Spindle.

Virtual Axis: For RTEX/ECAT, at least one Servo Axis should be connected to enable Virtual Axis.

Axis Type	Support Virtual Axis	Attention
CNC Axis	O	
Spindle	O	Setting Pr1791~ as 4(Syntec Spindle) will issue alarm: SPD-022 Pr1791~ sets as 4. Only support Syntec Inverter Module.
SerialPLC Axis	X	
ATC Axis	X	
ROT Axis	X	
Setpoint Axis	X	

- b. When using the **multi-axis drive**, this parameter is set to MMnnn, which means the following:

MM: Primary station number (1~16), refer to the **drive DIP switch setting** instructions in the Attention section.

nnn: Secondary station number (000~010)

Example: When using the Syntec M3 four-in-one drive, the axes function defined in Slave station is as follows:

- 0:** The 1st servo axis of the primary station number
- 1:** The 2nd servo axis of the primary station
- 2:** The 3rd servo axis of the primary station
- 3:** The 4th servo axis of the primary station
- 7:** The 1st monitoring axis of the primary station (the 1st servo axis of the primary station must be enabled), serve as the second encoder feedback to the 1st servo axis.
- 8:** The 2nd monitoring axis of the primary station (the 2nd servo axis of the primary station must be enabled), serve as the second encoder feedback to the 2nd servo axis.
- 9:** The 3rd monitoring axis of the primary station (the 3rd servo axis of the primary station must be enabled), serve as the second encoder feedback to the 3rd servo axis.
- 10:** The 4th monitoring axis of the primary station (the 4th servo axis of the primary station must be enabled), serve as the second encoder feedback to the 4th servo axis.

If the DIP switch sets the Primary Station Number is 1, then the parameter and the corresponding axis functions are as follows:

- 1st servo axis: **1000**
- 2nd servo axis: **1001**
- 3rd servo axis: **1002**
- 4th servo axis: **1003**
- 1st monitor axis: **1007**
- 2nd monitor axis: **1008**
- 3rd monitor axis: **1009**
- 4th monitor axis: **1010**

Note: When using 3-in-1 drives, there are two types of setting of 3rd axis:

- a. For a mini 3-in-1 drive (same power for 3 axes), set station number of 3rd axis as x002 (x is primary station number).
- b. For a large 3-in-1 drive (3rd axis has different power than other axes), set station number of 3rd axis as x003 (x is primary station number).

- The SUPER controller can install up to four Servo4 axis cards at the once. Each axis card can control 4 axes; therefore up to 16 axes can be controlled at the same time. The corresponding port number on each axis card is as follows:

Forth Axis Card		Third Axis Card		Second Axis Card		First Axis Card	
Port	Pr21~40 setting	Port	Pr21~40 setting	Port	Pr21~40 setting	Port	Pr21~40 setting
P4	20 (for MPG)	P4	15 (for MPG)	P4	10 (for MPG)	P4	5 (for MPG)
	19		14		9		4

P3	18	P3	13	P3	8	P3	3
P2	17	P2	12	P2	7	P2	2
P1	16	P1	11	P1	6	P1	1

• **Attention**

1. **Before 10.116.36P version, the secondary station number must be set from 0 for multi-axis drive due to hardware specification. Otherwise the controller will trigger OP-054 all-in-one device initialization fail alarm.**
 (For example: When the controller only enables the 1st & 2nd axes, set Pr21 = 1001 and Pr22 = 1002 which secondary station number does not begin from 0, the OP-054 all-in-one device initialization failure alarm will be triggered.)
This restriction is solved after this version, and the secondary station number is allowed to start from 0.

2. To use monitor axis function correctly, Syntec controller and servo drive must be upgraded to the versions listed below.

Controller Version	Drive Version	Function	Description
10.116.24V, 10.116.36B, 10.116.37, 10.117.37	2.0.22	External axis monitor function	The multi-axis drive can monitor the external axial feedback signal through the setting of the second encoder

3. Drive DIP Switch Settings:

• **Yaskawa Drive**

[M3]

When using Yaskawa M3 servo drives, the DIP switch consists of two knobs: S1 and S2. The physical diagram is shown below.



In general, S1 should be fixed to 2, and S2 has different meanings in single-axis and 2-in-1 drive.

Yaskawa single-axis drive: S2 represents the drive port number. For example: If S2 is set to 3, the corresponding axis Pr21~Pr40 is set to 3. (To use drive port number 16, change S1 to 3 and S2 to 0.)

Yaskawa two-in-one drive: S2 represents the Primary Station Number. For example: If S2 is set to 3, then the corresponding two axial Pr21~Pr40 are set to 3000 and 3001 respectively. (To use the Primary Station Number 16, set S1 to 3 and S2 to 0.)

[M2]

When using the Yaskawa M2 drive, the DIP switch consists of a knob and a toggle switch. The physical diagram is shown below.

[Yakawa Sigma 5 Drive]



S1 represents the drive port number. For example, if S1 is set to 3, the corresponding axis Pr21~Pr40 is set

to 3.

The toggle switch S2 is set according to the following table

S2 Toggle Switches				Drive Port No.
1	2	3	4	
ON	ON	OFF	OFF	1~15
ON	ON	ON	OFF	16

[Yaskawa Sigma 7 Drive]



S2 represents the drive port number. For example, if S2 is set to 3, the corresponding axis Pr21~Pr40 is set to 3.

The toggle switch S3 is set according to the following table.

S3 Toggle Switches				Drive Port No.
1	2	3	4	
ON	ON	OFF	OFF	1~15
ON	ON	ON	OFF	16

• Syntec Drive

When using Syntec drivers, the physical diagram of the dip switch on the preamp version is as follows.



The DIP switch has a total of 4 toggles, each toggle has two options: ON and OFF. Thus this DIP switch can indicate 16 different primary station numbers.

The primary station number corresponding to the DIP switch toggle position is shown in the table below.

Toggle State of DIP Switch	Primary Station No.	Toggle State of DIP Switch	Primary Station No.
----------------------------	---------------------	----------------------------	---------------------

1	2	3	4		1	2	3	4	
ON	ON	ON	ON	1	ON	ON	ON	OFF	9
OFF	ON	ON	ON	2	OFF	ON	ON	OFF	10
ON	OFF	ON	ON	3	ON	OFF	ON	OFF	11
OFF	OFF	ON	ON	4	OFF	OFF	ON	OFF	12
ON	ON	OFF	ON	5	ON	ON	OFF	OFF	13
OFF	ON	OFF	ON	6	OFF	ON	OFF	OFF	14
ON	OFF	OFF	ON	7	ON	OFF	OFF	OFF	15
OFF	OFF	OFF	ON	8	OFF	OFF	OFF	OFF	16

For example: If the primary station number is 1, the controller parameters should be set as follows:

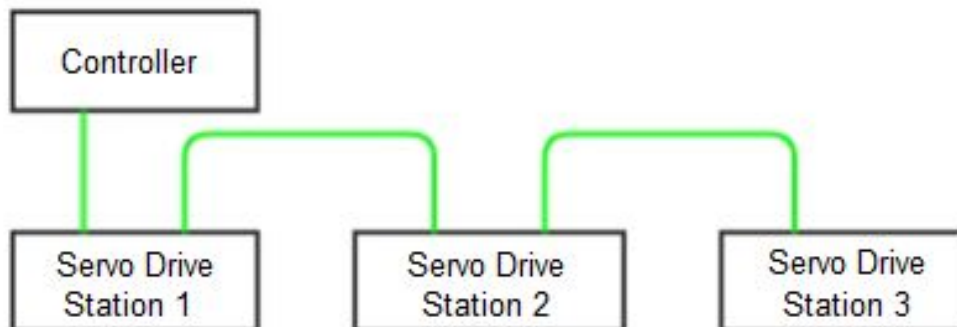
Parameter	Value
Pr21	1000
Pr22	1001
Pr23	1002
Pr24	1003

If the main station number is 2, then the parameters are changed as: Pr21=2000, Pr22=2001, Pr23=2002, and Pr24=2003. Follow similar rule for other primary station numbers to set Pr21~Pr40.

- **EtherCAT**

When using the ECAT drive, the station number cannot be set freely (DIP switches are invalid), and the drive

station number is defined by connection order as the diagram below.



1.15 Pr41~Pr60 Axial motor polarity.

No	Descriptions	Range	Unit	Default	Effective
41~60	Axial motor polarity	[0~1]	-	0	Press reset

- This parameter can set the movement direction of motor on each axis:
0: do not reverse
1: reverse
- If the bench movement direction is opposite to the command, change this parameter to correct polarity of the axis card feed command; therefore to change the bench movement direction.
- If the axis is the spindle and the spindle type (Pr1791~Pr1800) is one of the following settings, this parameter must be set to 0.
 - 2: V speed control spindle
 - 4: Syntec spindle

1.16 Pr61~Pr80 Axial encoder resolution

No	Descriptions	Range	Unit	Default	Effective
61~80	Axis encoder resolution (Encoder: pulse/rev; Scale: pulse/mm)	[10~67,108,864]	-	1250	Reset

- Encoder resolution: When the sensor type (Pr20x) is rotary encoder, unit is Pulse/Rev; when the sensor type is optical scale, the unit Pulse/mm (for rotary optical scale, this parameter is in units of Pulse/deg).
- Please note that the parameter value is the single-phase (A or B-phase) signal resolution before scale factor.
- Assume that the optical scale resolution is 1um/pulse (1mm/1000pulse), and the feedback scaling factor is set to 4x (Pr8x=4). Set this parameter to 1000/4=250.;
- Assume that the optical scale resolution is 10um/pulse (1mm/100pulse), and the feedback scaling factor is set to 4x (Pr8x=4). Please set this parameter to 100/4=25.
- Compatibility change: From ver 10.116.10M/10.116.16D and later, the upper limit is increased from 2,500,000 to 67,108,864.

1.17 Pr81~Pr100 Axial encoder scaling factor

No	Descriptions	Range	Unit	Default	Effective
81~100	Axial encoder scaling factor	[1~4]	-	4	Press Reset

- The scaling factor of the encoder feedback, can be set to 1x, 2x, and 4x.

1.18 Pr101~Pr120 Axial motor gain

No	No	Range	Unit	Default	Effective
101~120	Axial motor gain	[1~8000]	RPM/V	200	Press Reset

- The motor command gain, which is the motor RPM change per 1 volt of speed command change.
- Note: Valid in voltage control mode

1.19 Pr121~Pr160 Axial screw side gear number/motor side gear number

No	Descriptions	Range	Unit	Default	Effective
121~160	Axial screw side gear number/motor side gear number	[1~99999999]	-	1	Press reset

- To setup the gear ratio between the screw side to the motor side of transmission mechanism that allow system to determine the speed ratio of the motor to the screw.
- Number of gear tooth on screw side: Number of gear tooth on motor side = 2:1 → Motor speed: Screw speed = 2:1.

1.20 Pr161~Pr180 Axial pitch amount (BLU)

No	Descriptions	Range	Unit	Default	Effective
161~180	Axial pitch amount (BLU)	[1~1000000]	BLU	5000	Press Reset

- Set the linear feed of the screw of one revolution.
- If it is a rotary axis, this parameter represents the rotation feed of one revolution
- When changing the control accuracy (Pr17), the set value must be corrected too.
- The setting of this parameter will affect the spindle positioning angle ([Pr1771~Pr1780 Spindle home reference offset.](#))

1.21 Pr181~Pr200 Axial servo loop gain

No	Descriptions	Range	Unit	Default	Effective
181~200	Axial servo position loop gain	[1~1000000]	1/sec	30	Press reset

- Axial servo position loop gain:
 - a. This parameter setting must be the same as the position loop gain value on the corresponding axial drive (recommended for all feed axis).
 - b. The system can calculate a reasonable servo tracking error through this parameter setting.
 - c. When the output command is pulse (the drive is position control), this setting is only for the system to monitor whether the motor motion is normal.
 - d. When the output command is voltage (the drive is speed control), this set value is the position loop control gain value of the servo system.
 - e. When this parameter is greater than 1000, the system will divide this value by 1000 then input; and it will remain unchanged when it is less than 1000 (EX: 78500 stands for 78.5). Refer to System Data No. 352 to No. 367, these values are the actual position loop gain in steady state.

- Under the pulse command mode(Pr381~ Pr400≠1), this parameter has two main functions:

$$F_c = \frac{V_{cmd}}{K_p (Pr181\sim)}$$

- a. Use equation $F_c = \frac{V_{cmd}}{K_p (Pr181\sim)}$ to calculate a reasonable following error (System Data No. 32 to No. 35), and compare with actual following error (System Data No. 8 to No. 11). When the difference between the two is too large, a following error alarm will be triggered.
 - b. When feed-forward compensation and SPA functions are enabled, the controller will use this parameter to calculate the corresponding compensation to adjust the following and achieve better control.
- Under the voltage command mode(Pr381~ Pr400=1), if the mechanical rigidity is better, the parameter can be set higher to achieve better the machining accuracy. However, if the setting is too large, it may cause the machine to vibrate.
 - In addition, the position loop gain of feed axes are generally set higher than the spindle. Therefore, to achieve better accuracy during synchronous/fast tapping, the controller will automatically reduce servo response of feed axes to match the position loop gain of spindle.

1.22 Pr201~Pr220 Axial sensor type.

No	Descriptions	Range	Unit	Default	Effective
201~220	Axis sensor type	[0~5]	-	0	Restart

- Sensor Type:
 - a. The Syntec controller can set the position feedback type to "0: General Encoder", "1: Optical Scale (Ruler)", "2: No Feedback", "3:Absolute Encoder", "4:Single Track Absolute Encoder" or "5:Absolute Optical Scale (Ruler)".
 - b. To use absolute encoders, on pulse controllers (10 series, SUPER series, non-20 series) must use Mitsubishi J2S/J3S/J4, and controller hardware required RS422 port; on serial controllers (20A/20B) must use Yaskawa SIGMA-V.

- c. When this parameter is set 4 (to use single track absolute encoder), axis type(Pr221~) must be set to 5(rotary axis type E).
- Notice:
 - a. Under Absolute Encoder setting (Pr201~=3/4), dual feedback (PR241~≠0) function is not supported. Only general encoder or optical scale (Pr201~=0/1) setting allow dual feedback function.
 - b. When using the servo spindle, if the corresponding Pr201~Pr220 Axial sensor type is "No Feedback" and Pr1711~Pr1720 Spindle sensor existence is "Yes", then Pr1811~Pr1820 Spindle encoder mount location have to be "Motor Side".
 - c. The first soft stoke limit must be activated while using single-track absolute encoder; The parameter setting of the First soft stoke limit must be less than the encoder resolution(BLU), relating to Pr61~, Pr121~, Pr161~. Otherwise, alarm MOT-072 will be triggered.
 - d. Single Track Absolute Encoder is supported by the following communication protocol type: M2(SYNTEC、Yaskawa)、M3(SYNTEC、Yaskawa)、RTEX(Panasonic A6N)、EtherCAT。
- Controller Version:
 - a. In controller version from 10.116.15 to 10.116.16O, 10.116.24I, and 10.116.29, Pr201~220 "Axis sensor type" can be set to "4: Syntec Encoder (positive) " and "5: Syntec Encoder (reverse)". This function is a special option dedicated to the chopping axis of the grinding machine which only applies to specific machines. To avoid misuse, in 10.116.16P, 10.116.24J, 10.116.30 and versions after, this parameter is limited to [0-3]. Only the dedicated grinding software pack can use 4 and 5 to avoid user confusion.
 - b. "4:Single Track Absolute Encoder" is supported from 10.118.28E and 10.118.32.
 - c. "5:Absolute Optical Scale (Ruler)" is supported from 10.118.42Q, 10.118.48B and 10.118.49.

1.23 Pr221~Pr240 Axial type

No	Descriptions	Range	Unit	Default	Effective
221~240	Axial type	[0~5]	-	0	Press Reset

- Set to 0: Linear axis type
 - a. Both the machine coordinates and the absolute coordinates are linear axis type.
 - b. Accepts the metric/inch coordinate conversion function.
 - c. The G28 and G30 reference point return commands are reset to the machine origin of the home position return action.
 - d. Support backlash compensation, pitch compensation and homing grid check function.
- Set to 1: Rotary axis type A
 - a. Both the machine coordinates and the absolute coordinates are in the rotary axis type.
 - b. The coordinate value is always within 0 and +pitch.
 - c. The absolute coordinate (G90) movement command +/- represents the position orientation.
 - d. Unit is always in "degree" in the metric/inch unit system.
 - e. The G28 and G30 reference point return commands will move the axis back to machine coordinate zero in one revolution.
 - f. Support backlash compensation, pitch compensation and homing grid check function.
 - g. The absolute coordinate (G90) movement command supports automatic selection of the shortest path function.
- Set to 2: Rotary axis type B
 - a. Both the machine coordinates and the absolute coordinates are in the rotary axis type.
 - b. The coordinate value is always within 0 and +pitch.

- c. Absolute coordinates (G90) move command +/-, + means forward (turn to positive angle), - represents reverse (turn to equivalent angle of the negative angle).
- d. Incremental (G91) movement command +/-, + means forward rotation, - represents reverse rotation
- e. Examples:

	G90	G91
Starting angle	X=30.	X=30.
Result	X=270. (equivalent to -90)	X=300. (equivalent to -60)
Move command	X-90.	X-90.

	G90	G91
Starting angle	X=30.	X=30.
Result	X90.	X90.
Move command	X=90.	X=120

- f. Unit is always in "degree" in the metric/inch unit system.
- g. The G28 and G30 reference point return commands will move the axis back to machine coordinate zero in one revolution.
- h. Support backlash compensation, pitch compensation and homing grid check function.
- Set to 3: Rotary axis type C
 - a. Both the machine coordinates and the absolute coordinates are in the rotary axis type.
 - b. The coordinate value is always within -pitch and +pitch.
 - c. Unit is always in "degree" in the metric/inch unit system.
 - d. The G28 and G30 reference point return commands will move the axis back to machine coordinate zero in one revolution.
 - e. Support backlash compensation, pitch compensation and homing grid check function.
 - f. Absolute encoder does not support this type.
- Set to 4: Rotary axis type D
 - a. The machine coordinates are in rotary axis type and the absolute coordinates are linear axis type.
 - b. The mechanical coordinate value is always within 0 and +pitch.
 - c. Unit is always in "degree" in the metric/inch unit system.
 - d. The G28 and G30 reference point return commands are reset to the machine origin of the home position return action.
 - e. Support backlash compensation, pitch compensation and homing grid check function.
- Set to 5: (rotary axis type E)
 - a. Both the machine coordinates and the absolute coordinates are linear axis types.
 - b. Unit is always in "degree" in the metric/inch unit system.
 - c. The G28 and G30 reference point return commands are reset to the machine origin of the home position return action.
 - d. Support backlash compensation, pitch compensation and homing grid check function.

- Note: pitch = Pr161~ / 1000 (Ref.: Pr161~Pr180 Axial pitch amount (BLU))
 (The denominator 1000 in the above equation might vary according to the ratio between BLU and IU. Ref.: Pr17 *Control precision)

Pr Value	1	2	4	5	3 (Note 1)
Absolute Coordinate	0~+pitch		0~±pitch * 1000		0~±pitch beyond ±pitch back to 0°
Machine Coordinate	0~+pitch			0~±pitch * 1000	0~±pitch beyond ±pitch back to 0°
Absolute Command	The shortest distance (within 1/2 rev)	Use command (+) or (-) signs as direction, move to the closest equivalent angle position of command (within one circle)	Same as linear axis motion, move to command position (maybe >1 rev)		Direct move to command position (within 2 rev)
Increment Command	Use command (+) or (-) signs as direction. Do increment movement.				
Reference Point Return	Move to mid-point by increment or absolute type command, then return to origin from mid-point as Machine coordinate positioning.				
Machine Coordinate Positioning	The shortest distance (within 1/2 revolution)			Same as linear axis motion, move to command position (maybe >1 rev)	Direct move to command position (within 2 rev)

Note1: Type C (parameter value = 3) is for special purpose machine, not for standard CNC.

1.24 Pr241~Pr260* Axial dual feedback related to port number

No	Descriptions	Range	Unit	Default	Effective
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241~260	Axis dual feedback related to port no.	[0~20]	-	0	Restart
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- This parameter sets the corresponding axis port number or subscription channel of the input signal of linear scale or second encoder.
- Setting specification limit
 - Pulse system, using dual feedback control mode, which is Pr681~ set as 0, this parameter sets the port number of each axis, can refer to the description of Pr21~Pr40.
 - Serial system, using dual feedback detection mode, which is Pr681~ set as 1, this parameter sets the subscription channel number 100+nnn, meaning as below;
 - nnn (001~004) choose the desired subscription channel, must confirm the subscribed data is feedback info.
 - Dual feedback control mode is only for pulse board port , Pr681 should be set as 1 for serial axis.
- If parameter setting is not supported by the system, alarm OP-093 **【Incorrect dual feedback setting】** will be issued.

1.25 Pr261~Pr280 Axial dual feedback resolution

No	Descriptions	Range	Unit	Default	Effective
261~280	Axial dual feedback resolution	[10~2500000]	pulse/mm or pulse/rev	250	Press Reset

- The dual feedback resolution is used to set the optical scale feedback resolution of each servo axis. Please note that the parameter setting value is the single-phase (A-phase or B-phase) signal resolution before scaling factor.
- When the corresponding axis is a linear axis, the unit of this parameter is pulse/mm; if it is a rotary axis, the unit is pulse/rev.
- Example:
 - Assume the optical scale resolution is 1um/pulse, i.e. 1mm/1000pulse, and the feedback scaling factor is set to 4 times (Pr30x=4); then please set Pr26x to 1000/4=250;
 - Assume the optical scale resolution is 10um/pulse, i.e. 1mm/100pulse, and the feedback scaling factor is set to 4 times (Pr30x=4); then please set Pr26x to 100/4=25.
 - Assume the optical scale resolution is 1mdeg/pulse, i.e. 1 turn/360000pulse, and the feedback scaling factor is set to 4 times (Pr30x=4); then please set Pr26x to 360000/4=90000.

1.26 Pr281~Pr300 Axial dimension type (radius or diameter axis)

No	Descriptions	Range	Unit	Default	Effective
281~300	Axial dimension type	[0~1]	-	0	Press Reset

- This parameter is for a specific axis of the lathe system is controlled as diameter positioning.
 - EX: Generally the X-axis of a standard lathe is controlled as diameter axis.
- If the diameter positioning is turned on, the machine coordinate displayed on the main screen will be twice of the actual movement distance. But System Data 72~ shows the coordinates of the actual movement.
 - EX: If the X axis is the diameter axis and a G01 X20. command is executed, System Data 72 and the actual movement amount are both 10, but the machine coordinate is displayed as 20.

- Pay more attention to pitch compensation of the lathe under diameter positioning. The correct compensation amount should be entered according to the "actual movement distance" instead of using the "machine coordinate" value directly.

1.27 Pr301~Pr320 Axial dual feedback scaling factor

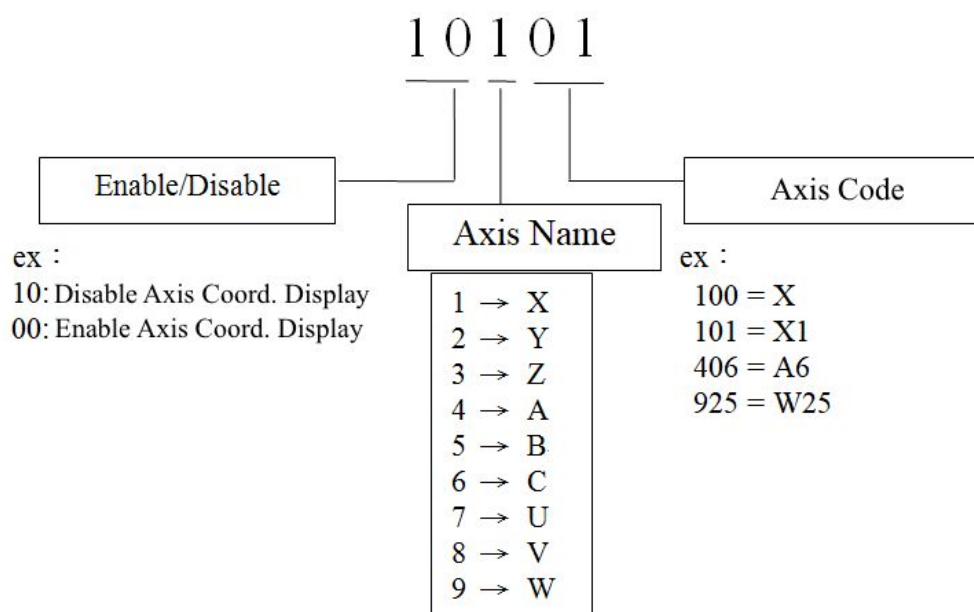
No.	Description	Range	Unit	Default	Effective
301~320	Axial dual feedback scaling factor	[1~4]	-	4	Press Reset

- The dual feedback scaling factor is used to set the optical scale feedback scaling factor of each servo axis, and can set factor of one, two and four.

1.28 Pr321~Pr340 Axis name

No	Descriptions	Range	Unit	Default	Effective
321~340	Axis name	[100~10999]	-		Restart

- The axis name is a five-digit code, and its function is as followed:



1.29 Pr341~Pr380 Axial command multiplier/divisor

No	Descriptions	Range	Unit	Default	Effective
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341~360	Axial command multiplier	[1~ 999999999]	-	1	Press Reset
361~380	Axial command divisor	[1~ 999999999]	-	1	Press Reset

- Axial command multiplier & axial command divisor:
 - a. These two parameters are for special functions. The system can change the resolution ratio between "output command" and "encoder feedback" according to parameter ratio.
 - b. Different setting value of two parameters will cause the number of command pulses and feedback pulses unequal. For general machine without special purpose, it is recommended to set both parameters to 1.

1.30 Pr381~Pr400 Axial position servo mode

No	Descriptions	Range	Unit	Default	Effective
381~400	* Axial position servo mode	[0~4]	-	0	restart

- This parameter is used to determine the axial servo control mode
 - 0: CW/CCW position control mode (3/21 series do not support);
 - 1: Voltage position control mode;
 - 2: A/B Phase position control mode (轴向轴向 card version must be Servo4-O-2.2 or above).
 - 3: Sign+Pulse Positive logic (supported model: eHMC/30GM)
 - 4: Sign+Pulse Negative logic (supported model: eHMC/30GM)

1.31 Pr401 Cutting acceleration time

No	Descriptions	Range	Unit	Default	Effective
401	Cutting acceleration and deceleration time	[0~60000]	ms	300	Press reset

- Set the time required for each axis to accelerate to the maximum speed Pr405 in G01/G02/G03/G31 mode. In other words, this parameter and Pr405 determine the maximum combined acceleration as:

$$A_{max} = \frac{No405/60}{No401/1000} \left(\frac{mm}{sec^2} \right)$$

1.32 Pr402 Acceleration accelerated to 1G time (Jerk)

No	Descriptions	Range	Unit	Default	Effective
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402	Time required for accelerate to increase to 1G	[1~500]	ms	150	Press Reset
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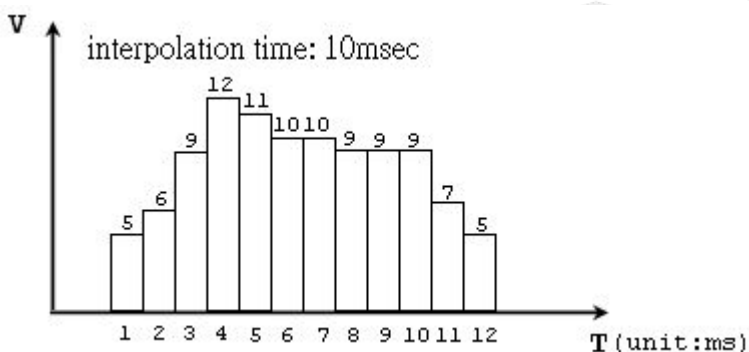
- Set the time required for the acceleration of each axis to increase to 1G in G01/G02/G03/G31 modes. In other words, this parameter will determine the maximum combined jerk as:

$$J_{max} = \frac{9.8}{No402/1000} \left(\frac{m}{sec^3} \right)$$

1.33 Pr404 Post acceleration bell-shaped time

No	Descriptions	Range	Unit	Default	Effective
404	Post acceleration bell-shaped time	[0~100]	ms	20	Press Reset

- This parameter can smoothen the speed command profile according to the current acceleration and deceleration setting to reduce the fluctuation of speed command as well as machine shaking. The recommended value is 10ms ~ 30ms.
- Example:



The above figure shows the speed versus time diagram after the system acceleration profiling. If the acceleration/ deceleration time is set to zero, it means that this function is not activated. Non-zero value means that the command profile is smoothened according to the specified time. Such as: Pr404 = 5ms (the command is averaged 5ms before and after)

Interpolation (ms)	Original speed profile (pulse)	Post-acceleration speed profile (pulse)
0	0	0
0	0	0

0	0	0
0	0	0
1	5	$(0+0+0+0+5)/5=1$
2	6	$(0+0+0+5+6)/5=2.2$
3	9	$(0+0+5+6+9)/5=4$
4	12	$(0+5+6+9+12)/5=6.4$
5	11	$(5+6+9+12+11)/5=8.6$
6	10	$(6+9+12+11+10)/5=9.6$
7	10	$(9+12+11+10+10)/5=10.4$
8	9	$(12+11+10+10+9)/5=10.4$
9	9	$(11+10+10+9+9)/5=9.8$
10	9	$(10+10+9+9+9)/5=9.4$
11	7	$(10+9+9+9+7)/5=8.8$
12	5	$(9+9+9+7+5)/5=7.8$
13	0	$(9+9+7+5+0)/5=6$
14	0	$(9+7+5+0+0)/5=4.2$
15	0	$(7+5+0+0+0)/5=2.4$
16	0	$(5+0+0+0+0)/5=1$
0	0	0

From the above table, it can be found that the speed curve has been smoothed compare to original speed profile. Therefore, the post-acceleration time provides a linear method to smoothen the motor output command and moderate speed change.

1.34 Pr405 Maximum cutting feedrate

No	Descriptions	Range	Unit	Default	Effective
405	Maximum cutting feedrate	[6~3600000]	mm/min	5000	Press Reset

- Set the maximum combined feedrate of all axes.

1.35 Pr406 Maximum corner reference feedrate

No	Descriptions	Range	Unit	Default	Effective
406	Maximum corner reference feedrate	[6~3600000]	mm/min	500	Press reset

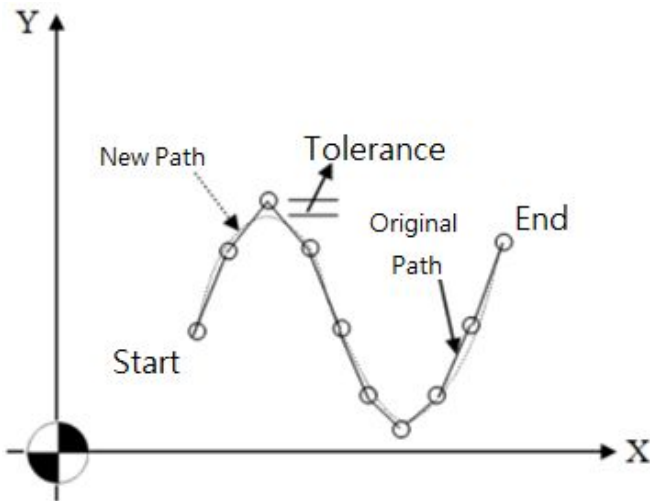
- Before turning from straight line to a corner, system can begin deceleration base on corner geometry and slow down to a speed set by this parameter.
- Before version 10.112.X, this reference speed is the maximum allowed turning speed for a 90 degree corner. The recommended value was 500 mm/min.
- After version 10.114.X, this reference speed is the maximum allowed turning speed for a 120 degree corner. The recommended value is 200 mm/min.
- After version 10.118.26, set this parameter to zero means disabling the corner speed limit function.
- The higher the speed, the faster the machining program finishes; but the corners precision is worse. The smaller the setting, the slower the corner speed is; but the corner precision is better.
- Special Attention :
 - a. If G61 or G09 in-position check are executed, the controller will automatically disable the corner deceleration mechanism.
 - b. If the corner deceleration function is not required, use maximum value for Pr406 and 408 to allow machine to turn at a higher speed. But Pr404 Post-acceleration time need to be increased (i.e. for Pr406=3000, increase Pr404 to 50 ms) to prevent excess acceleration & jerk to machine.
 - c. If a program block includes auxiliary axis or rotary axis, user must set proper Pr601~620 to avoid machine shaking due to excess acceleration. Suggested setting: 500 ms.
 - d. Pr406 =0 means disabling the "combined" corner speed limit function, user must also set proper Pr601~620 to avoid machine shaking due to excess acceleration. Suggested setting: 500 ms.

1.36 Pr407 HPCC smoothing tolerance(um)

No	Descriptions	Range	Unit	Default	Effective
407	HPCC smoothing tolerance	[2~20]	um	3	Press Reset

- This parameter is valid only for G05, G06.2, and Smooth RTCP.

- The user needs to enable the Option 11. This parameter is used to set the maximum tolerance between the new path and the original path after the Nurbs fitting.



1.37 Pr408 Arc cutting reference speed of radius 5mm

No	Descriptions	Range	Unit	Default	Effective
408	Arc cutting reference speed of radius 5mm	[0~3600000]	mm/min	500	reset

- When cutting in a circular arc, the servo lag will cause the radius to shrink. The amount of shrinkage is:

$$E = \frac{T^2 V^2}{2R}$$

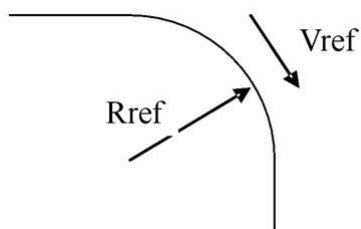
(T is the servo system time constant; V is the tangent speed; R is the radius)

- With this relationship, the feed rate of any radius can be found under fixed internal shrinkage and the servo characteristics. The relationship is as follows:

$$\frac{V}{V_{ref}} = \sqrt{\frac{R}{R_{ref}}}$$

(The arc speed is direct proportional to the square root of the arc radius)

- The reference circle radius of the controller is $R_{ref} = 5\text{mm}$, and the arc feed rate V_{ref} (Pr408) is set according to R_{ref} . The general machine tool recommended value $V_{ref} = 1500\sim 2500\text{ mm/min}$.



Note

- On the path with large curvature, the servo lag will decrease due to the deceleration; therefore the path error is reduced, and the high precision is achieved. To meet higher need of precision, consider using SPA or HPCC to further reduce errors or adjusting paths.
- When using SPA (Pr3808), the command output of the controller contains the compensation of the servo lag, so the machine will have larger acceleration. It is recommended to prolong the acceleration/deceleration time (Pr401).
- When moving on arc, the excess centrifugal force due to high turning speed often cause the structure to skew and create wavy texture. Therefore, please check the rigidity of the structure before setting Pr408 to prevent low surface quality.

1.38 Pr409 Thread cutting acceleration time of 1m/min (ms)

No	Descriptions	Range	Unit	Default	Effective
409	Thread cutting acceleration time of 1m/min	[0~60000]	ms	10	Press Reset

- The parameter defines how much time required to accelerate to 1m/min speed under threading.
- The acceleration setting during threading (G33 command) is defined by this parameter instead of Pr401 or Pr541~.

1.39 Pr410 MPG acceleration time

No	Descriptions	Range	Unit	Default	Effective
410	MPG acceleration time	[10~60000]	ms	200	Press Reset

1.40 Pr411 Rapid travel (G00) type

No	Descriptions	Range	Unit	Default	Effective
411	Rapid travel G00 type	[0~1]	-	0	Press Reset

- This parameter is used to set the G00 movement mode of each axis:

- 0: Linear synchronous movement of all axes;
- 1: Each axis independently moves at the highest speed.

1.41 Pr412 tool length compensation restoration mode

No	Descriptions	Range	Unit	Default	Effective
412	Tool length compensation restoration mode (0: not restore; 1: restore)	[0,1]	-	0	Press Reset

- When G28 or G53 commands are executed, system will do machine coordinate positioning (cancel tool length compensation). If Pr412 is 0, the next block will cancel the tool length compensation; if Pr412 is 1, the next block will restore the tool length compensation.

1.42 Pr413 G92 coordinate persist mode

No	Descriptions	Range	Unit	Default	Effective
413	G92 coordinate persist mode	[0~2]	-	0	Press Reset

- This parameter is used to set the G92 (G92.1) coordinate persist mode:
 - 0: Press "Reset" does not preserve the work coordinate offset defined by G92 (G92.1);
 - 1: Press "Reset" preserves the work coordinate offset defined by G92 (G92.1), but reset after reboot (power off);
 - 2: Pressing "Reset" or power off will not reset the work coordinate defined by G92 (G92.1).

1.43 Pr414 Workpiece coordinate persist mode

No	Descriptions	Range	Unit	Default	Effective
414	Workpiece coordinate persist mode	[0~2]	-	0	Press Reset

- This parameter is used to set the workpiece coordinate persist mode:
 - 0: Press "Reset" will switch to default workpiece coordinate system (G54);
 - 1: Press "Reset" preserves the current workpiece coordinate system but switch to G54 when reboot (power off);
 - 2: Pressing "Reset" or power off will preserve current workpiece coordinate system

1.44 Pr415 Reserve current tool length after reset

No	Descriptions	Range	Unit	Default	Default
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415	* Reserve current tool length after reset	[0~1]	-	0	Restart
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- This parameter is used to set the current tool length data persist mode:
 - 0: Pressing "Reset" or power OFF will reset the current tool length data
 - 1: The current tool length data is preserved after pressing "Reset" or Power OFF.

1.45 Pr416 Rigid tapping coupling time

No	Descriptions	Range	Unit	Default	Effective
416	Rigid tapping coupling time	[0~6000]	0.001rev	1000	Press Reset

- This parameter is only applicable to inverter tapping (Pr1791=0). It determine the number of spindle revolutions required for the feed axis to catch up with the spindle speed during tapping. The smaller the parameter value, the higher the acceleration of the feed axis is, and more machine shaking can happen. Otherwise, large set value reduces the accuracy of synchronous movement when entering the thread.

1.46 Pr417 Rigid tapping velocity gain

No	Descriptions	Range	Unit	Default	Effective
417	Rigid tapping velocity gain	[0~200]	-	0	Press Reset

- This parameter is for "following tapping" (Pr1791<3), its purpose is to adjust the feed axis following strength (velocity loop gain) when spindle is in constant speed. The smaller the value, the more the feed axis falls behind the spindle; otherwise, the feed axis fall behind less or even ahead of spindle axis.

1.47 Pr418 Rigid tapping acceleration/deceleration gain

No	Descriptions	Range	Unit	Default	Effective
418	Rigid tapping acceleration loop gain	[0~200]	-	0	Press Reset

- This parameter is for "following tapping" (Pr1791<3) before version 9.x, its purpose is to adjust the feed axis following strength (acceleration loop gain) when spindle accelerates or decelerates. The smaller the value, the more the feed axis falls behind the spindle; otherwise, the feed axis fall behind less or even ahead of spindle axis.

1.48 Pr419 Rigid tapping spindle deceleration time

No	Descriptions	Range	Unit	Default	Effective
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419	Rigid tapping spindle deceleration time	[0~6000]	ms	0	Press Reset
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- This parameter for inverter tapping (Pr1791=0), its purpose is to adjust the depth of the feed axis of the tapping. The larger the setting value, the shallower the depth; otherwise, depth overcut can occur.
- In version 10.111.3 and before, this parameter applies to non-inverter tapping (Pr1791≠0). It is used to calculate constant acceleration (A_{max}) limit profiling when tapping, the definition is:

$$A_{max} = \frac{\text{Tapping Feedrate}}{\text{Pr419} / 1000}$$

1.49 Pr421~Pr440 Axial cutting in-position window

No	Descriptions	Range	Unit	Default	Default
421~440	Axial cutting in-position window	[0~300000]	BLU	30	Press Reset

- This parameter sets the cutting position detection range defined by G09 or G61 blocks when machining.
- Within 2 seconds after the system stops the output command of the block, the system will continuously check if the encoder feedback position is in the setting range. If within the range, system will immediately send out the movement command of the next block; if outside the range after 2 seconds, system will trigger alarm COR-75 "Exact Stop wait timeout".

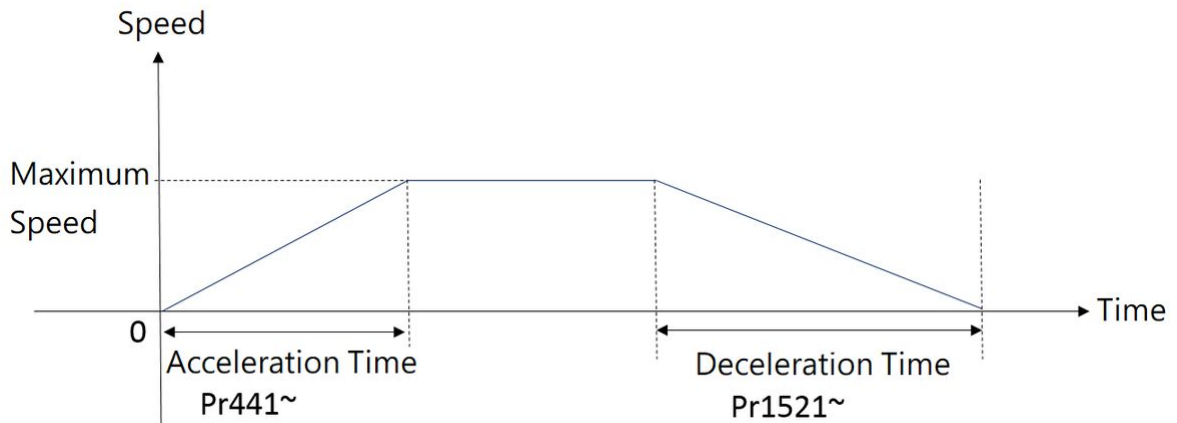
1.50 Pr441~Pr460 Axial rapid travel (G00) acceleration time

No	Descriptions	Range	Unit	Default	Effective
441~460	Axial rapid travel (G00) acceleration time	[0~60000]	ms	200	reset

- Set the time required for each axis to accelerate to its maximum speed Pr461~ in G00 mode. I.e., this parameter and Pr461~ decide the maximum acceleration when each axis G00 accelerates as:

$$A_{max} = \frac{No461 \sim / 60}{No441 \sim / 1000} \left(\frac{mm}{sec^2} \right)$$

- The deceleration time in G00 mode (time required to decelerate from maximum speed Pr461~ to zero) is based on Pr1521~ setting, factory setting of deceleration time is the same as acceleration time.



- This parameter set the time required for each axis to accelerate to Pr461~ under Jog, Incremental jog, and Homing mode. The maximum acceleration equals to the acceleration of G00.
Note: Acceleration and deceleration share this same maximum acceleration
- The PLC axis control component calculates the acceleration and deceleration of Move Component also refers to this parameter, but does not consider Pr461~.
Note: Acceleration and deceleration share this same maximum acceleration

1.51 Pr461~Pr480 Axial maximum rapid travel (G00) feedrate

No	Descriptions	Range	Unit	Default	Effective
461~480	Axial maximum rapid travel feedrate	[6~360000]	mm/min	10000	Press Reset

- This parameter sets the maximum moving speed with G00 override under non-F0 G00 mode.
- For rotary axis, the unit is deg/min.

1.52 Pr481~Pr500 Axial rapid travel in-position window

No	Descriptions	Range	Unit	Default	Effective
481~500	Axial rapid travel in-position window	[0~300000]	BLU	30	reset

- This parameter sets the cutting position detection range defined by G09 or G61 blocks when machining.
- Within 2 seconds after the system stops the output command of the block, the system will continuously check if the encoder feedback position is in the setting range. If within the range, system will immediately send out the movement command of the next block; if outside the range after 2 seconds, system will trigger alarm COR-75 "Exact Stop wait timeout".

1.53 Pr501~Pr520 Axial rapid travel (G00) F0 speed

No	Descriptions	Range	Unit	Default	Effective
501~520	Axis rapid travel (G00) F0 speed	[0~15000]	mm/min	0	Press Reset

- Set the maximum movement speed when each axis is in G00 mode and G00 Override set to F0.
- To protect the machine, the axial speed will not exceed 5 times of Pr461~Pr480 max. axial rapid travel feedrate regardless of the Pr501~ value.
- For rotary axis, the unit is deg/min.

1.54 Pr521~Pr540 Axial JOG speed

No	Descriptions	Range	Unit	Default	Effective
521~540	Axial JOG speed	[6~360000]	mm/min	6000	Press Reset

- Set the maximum travel speed of each axis in JOG mode.
- When in MPG mode and Pr661~680 are 0, the MPG movement will also be limited by this speed.
- For rotary axis, the unit is deg/min

1.55 Pr541~Pr560 Axial cutting acceleration time

No	Descriptions	Range	Unit	Default	Default
541~560	Axial cutting acceleration time	[0~5000]	ms	50	Press Reset

- Set each axis to accelerate to its maximum speed Pr621~ under G01/G31 mode. I.e., this parameter and Pr621~ decide the maximum acceleration of each axis as:

$$A_{\max} = \frac{No621 \sim / 60}{No541 \sim / 1000} \left(\frac{mm}{sec^2} \right)$$

1.56 Pr561~Pr580 Axial loss pulse check window

No	Descriptions	Range	Unit	Default	Effective
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561~580	Axial loss pulse check window	[1~300000]	BLU	100	Press Reset
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- After the controller stops sending movement commands, the system will check if the error between position feedback and the command exceeds the range set by this parameter.
 - If the error exceeds the range, MOT-008 "Lost Pulse" alarm will be triggered at the pulse drive.
 - If the error exceeds the range, MOT-087 "Inaccurate stop position. Please check if there are any mechanisms are stuck" alarm will be triggered at the serial drive.

1.57 Pr581~Pr600 Axial velocity feed forward percentage

No	Descriptions	Range	Unit	Default	Effective
581~600	Axial velocity feed forward percentage	[0-100]	%	0	Press Reset

- The controller will use parameter value to adjust speed command to improve motor's tracking of command, then to reduce the servo error. The larger the set value, the smaller the error is; but notice it may cause the machine to resonate.

compatibility:

- 10.118.60L, 10.118.66F, 10.118.70 and later version, this parameter is only supported in Laser Scanning products.

1.58 Pr601~Pr620 Axial maximum corner reference feedrate

No	Descriptions	Range	Unit	Default	Effective
601~620	Axial maximum corner reference feedrate	[6~3600000]	mm/min	360000	Press Reset

- Before turning into a corner from straight movement, system can decelerate according to corner geometry and turn at the speed set by this parameter.
- Before version 10.112.X, this reference speed was the maximum allowed turning speed at a 90 degree corner. The recommended value was 500 mm/min.
- After version 10.114.X, this reference speed is the maximum allowed turning speed at a 120 degree corner. The recommended value is 500 mm/min.
- The higher the speed, the faster the machining program finishes; but the corners precision is worse. The smaller the setting, the slower the corner speed is; but the corner precision is better.
- If it is a rotary axis, the unit is deg/min
- Special Attention :
 - a. If G61 or G09 in-position check are executed, the controller will automatically disable the corner deceleration mechanism.
 - b. If the corner deceleration function is not required, use maximum value for Pr406 and 408 to allow machine to turn at a higher speed. But Pr404 Post-acceleration time need to be increased (i.e. for Pr406=3000, increase Pr404 to 50 ms) to prevent excess acceleration & jerk to machine.

- c. If a program block includes auxiliary axis or rotary axis, user must set proper Pr601~620 to avoid machine shaking due to excess acceleration. Suggested setting: 500 ms.
- d. Pr406 =0 means disabling the "combined" corner speed limit function, user must also set proper Pr601~620 to avoid machine shaking due to excess acceleration. Suggested setting: 500 ms.

1.59 Pr621~Pr640 Axial maximum cutting feedrate

No	Descriptions	Range	Unit	Default	Effective
621~640	Axial maximum cutting feedrate	[6~3600000]	mm/min	5000	reset

- Set the maximum cutting feedrate of each axis under G01/G31 mode.
- For rotary axis, the unit is deg/min.

1.60 Pr641~Pr660 Axial acceleration accelerated to 1G time (Jerk)

No	Descriptions	Range	Unit	Default	Effective
641~660	Axial acceleration accelerated to 1G time (Jerk)	[1~500]	ms	10	Press Reset

- Set the time required for the acceleration of each axis to increase to 1G in G01/G02/G03/G31 modes. In other words, this parameter will determine the maximum jerk of a single axis as:

$$J_{max} = \frac{9.8}{No641 \sim /1000} \left(\frac{m}{sec^3} \right)$$

1.61 Pr661~Pr680 Axial MPG speed

No	Descriptions	Range	Unit	Default	Effective
661~680	Axial MPG speed	[0~3600000]	mm/min	6000	Press Reset

- When moving with MPG, this parameter defines the maximum speed of the axis movement. When the parameter is set to 0, the maximum speed will be defined by Pr521~540 (axial JOG speed).
- For rotary axis, the unit is deg/min.

1.62 Pr681~Pr700 *Axis Dual Feedback Mode

No	Descriptions	Range	Unit	Default	Effective
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681~700	*Axis Dual Feedback Mode	[0~1]	-	0	Restart
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- This parameter determines the way in which the secondary feedback (if any) is treated:
 0: CONTROL. The controller brings the secondary feedback into the control loop and hence the axis will be under dual-feedback control.
 1: DETECTION. The controller only takes the secondary feedback as an additional information (e.g. for detection) and does NOT use it in the control loop.

1.63 Pr701~Pr720 *Axial associate axis groups

No	Descriptions	Range	Unit	Default	Effective
701~720	*Axial associate axis groups	[1~15]	-	1	restart

- Set the axis group (path) to which each axis belongs, where each axis group is represented in binary:
 Bit 0 is the 1st axis group
 Bit 1 is the 2nd axis group
 Bit 2 is the 3rd axis group
 Bit 3 is the 4th axis group
- For example, Pr701=1 means that the X axis is only controlled by the 1st axis group; Pr701=3 means that the X axis is controlled by the 1st/2nd axis group.
- Notes:
 - When an axis belongs to multiple axis groups, prevent the case of multiple axis groups controlling one axis at the same time when all axis groups are in Running state. The preferred case is to allow only one axis group in Running state at once. For example, the X axis is controlled by 1st and 2nd axis groups, first assign R21=1 and only run 1st axis group until it finish; then assign R21=2 and run 2nd axis group.
 - If Pr742 is set to 0 and the axis group independent function is enabled (That is, [Pr732 *MST channel rules of multi-programs](#) is set to 2), the system will not allow one axis to belong to multiple axis groups, otherwise the alarm OP-099 Illegal Setting for Independent Axis Groups (Pr732=2) will be triggered.

1.64 Pr721~Pr730 Axis group MST channel No.

No	Descriptions	Range	Unit	Default	Effective
721~730	* Axis group MST channel No.	[1~4]	-	1	Restart

- Set the MST channel corresponding to each axis group:
 1: 1st MST channel
 2: 2nd MST channel
 3: 3rd MST channel

4: 4th MST channel

- Note: This parameter is only valid when [Pr732 *MST channel rules of multi-programs](#) is set to zero. If Pr732 is not zero, the Nth axis group is fixed to correspond to the Nth MST channel.

1.65 Pr731 *The number of axis group in CNC

No	Descriptions	Range	Unit	Default	Effective
731	*The number of axis group in CNC	[1~4]	-	2	Restart

- Set the number of axis groups (paths) controlled by CNC main system. Other axis groups controlled by the non-CNC main system can only be enabled by the PLC.
- For example: Pr731=2 means that the CNC main system controls the 1st and 2nd axis groups, and the user should follow the rules below to program:
 - In NC program, \$1 and \$2 are required to distinguish the sections for each axis group.
 - For the need of synchronizing two axis groups, G04.1 is the command.

1.66 Pr732 *MST channel rules of multi-programs

No	Descriptions	Range	Unit	Default	Effective
732	*MST channel rules of multi-programs	[0~2]	-	0	Restart

- Set the rules for the multi-program MST channels.
- When the parameter is 0, the MST channels of axis groups are "Pr721~Pr730 * MST channel corresponding to the axis group"; the details are as follows:
 - Only the 1st MST channel supports M00/M01/M02/M30.
 - When the 1st MST channel executes M00/M01 and become Block Stop state, the state is valid for all main system axis groups.
 - When the 1st MST channel executes M02/M30 and Reset, the state is valid for all axis groups.
 - When the main program executes M99, it returns to the program start; but multi main system axis groups return separately. To have them return together, use G04.1 to synchronize.
- When the parameter is 1, each axis group has independent MST channel: 1st MST channel for 1st axis group, and 2nd MST channel for 2nd axis group, and so on. The details are as follows:
 - All MST channels support M00/M01/M02/M30.
 - When the 1st MST channel executes M00/M01 and become Block Stop state, only the axis group of the 1st MST channel is affected. Same to other channels.
 - Each channel's M01 uses the same C44 signal.
 - When the 1st MST channel performs M02/M30 and Reset, only the axis group of the 1st MST channel is affected. and so on. Same to other channels.
 - The 2nd to 4th MST channels support M00/M01/M02/M30 read flags:
 - M00 read flag of 2nd to 4th MST channels: R615.12/R619.12/R623.12。
 - M01 read flag of 2nd to 4th MST channels: R615.13/R619.13/R623.13。

- M02 read flag of 2nd to 4th MST channels: R615.14/R619.14/R623.14。
 - M30 read flag of 2nd to 4th MST channels: R615.15/R619.15/R623.15。
- f. M30 Description:
- When C15 is ON, the main program M30 will support the function to return to start and continue.
- g. Notice:
- Multiple main system axis groups can use different program ending M codes (e.g. \$1 uses M30, \$2 uses M99); but it is not recommended to program in this way. In more complex cases, each axis group may have unexpected actions.
 - [Example] There are two main system axis groups, 1st axis group ends with M30, 2nd axis group ends with M99; Pr3804 workpiece count M code number is 30, enable C039 to enter Block Stop with workpiece count M code.
 - Case 1: If C15 is OFF, M30 performs "Reset" and "C039 to enter Block Stop with workpiece count M code" is disabled. When the 1st axis group executes M30 to reset the 1st axis group, The 2nd main system axis group will still resume program processing.
 - Case 2: If C15 is ON, M30 executes "Return program start", use G04.1 to have axis groups wait for each other before the ending M code; when the first main system axis group executes M30 to enter Block Stop state with workpiece counts M code, the Block Stop position of the 2nd axis group may not be as expected.
 - It is not supported when the Halted point return function is enabled (Pr3852=1), i.e., the M code in pause point return Macro (O888801) is invalid.
- When the parameter value is 2, whether it is the main system axis group or the non-main system axis group, each axis group will operate completely independently. The detailed description is as follows:
- a. The first axis group uses the first MST channel; the second axis group uses the second MST channel, and so on.
 - b. All MST channels support M00/M01/M02/M30.
 - c. When the Nth MST channel executes M00/M01 and enters the single-block stop state, only the axis group of the Nth MST channel is valid.
 - d. Each channel has its own interface control M01 selective stop (the first to fourth axis groups are C44, R530.8, R540.8, R550.8 in order).
 - e. When the Nth MST channel executes M02/M30 and Reset, only the axis group of the Nth MST channel is valid.
 - f. The second to fourth MST channels support M00/M01/M02/M30 reading flags:
 - The M00 read flag of the second to fourth MST channels: R615.12/R619.12/R623.12.
 - The M01 reading flags of the second to fourth MST channels: R615.13/R619.13/R623.13.
 - The M02 reading flags of the second to fourth MST channels: R615.14/R619.14/R623.14.
 - The M30 reading flags of the second to fourth MST channels: R615.15/R619.15/R623.15.
 - g. The mode of each axis group is independent. (The first to fourth axis groups use R13, R537, R547, and R557 to switch modes respectively)
 - h. The status of each axis group is independent.
 - Processing/pause/single block stop of the first axis group: S0, S1, S2.
 - Processing/pause/single block stop of the second axis group: R531.0, R531.1, R531.3.
 - The third axis group is processing/pause/single block stop: R541.0, R541.1, R541.3.
 - Processing/pause/single block stop of the fourth axis group: R551.0, R551.1, R551.3.
 - i. The auto mode magnification of each axis group is independent. (The first to fourth axis groups use R16, R533, R543, and R553 respectively to control G01/G02/G03 magnification; use R18, R534, R544, R554 to control G00 magnification)
 - j. The workpiece counts of each axis group are independent.
 - k. The alarms of each axis group are independent: an alarm occurs in the A axis group, and only the A axis group will be affected (enter Feedhold or not ready), and other axis groups continue to operate.

- l. When the axis group independent function is enabled, the controller only displays the processing information of one axis group, and does not display the multi-axis group split screen. The user needs to switch the display through R781.
- m. Precautions:
- When this parameter is set to 2, the system will ignore the setting of Pr741 *non-primary system axis group rule. That is, the main system axis group and the non-main system axis group will operate independently.
 - If Pr742 is set to 0, one axis is not allowed to belong to multiple axis groups, otherwise the alarm OP-099 independent axis group check error will be skipped.
 - It is not allowed to use the axis exchange and axis coupling functions across axis groups, otherwise the alarm OP-099 independent axis group check error will be skipped.
- n. Supported version: 10.118.41M, 10.118.47 and later versions. If you use the 10.118.41M, 10.118.47 version and set the parameter to 2, and then return to the old version, there will be no axis group independent function, and Pr732 will be changed back to the default value 0.
- o. Supported models:
- i. Lathe (8 Models): 21TA-E、21TB-E、210TB-E、210TB-E5、22TA、22TB、220TB、220TB-5。
 - ii. Mill (11 Models): 21MA-E、210MA-E、210MA-E5、210MB-E、210MB-E5、610MA-E5、22MA、220MA、220MA-5、220MB、220MB-5。
 - iii. HC & FC (11 Models): HC-8A、HC-10A、HC-8C、HC-10C、HC-15C、HC-8E、HC-10E、HC-15E、FC-A、FC-B、FC-C。
 - iv. Robot (1 Model): 81RG。
 - v. Wood (5 Models): 60W-E、600WA、60WA、610WA-H、610WB-H。
 - vi. GlassGrind (2 Model): 21GA-E、22GA。

1.67 Pr733~Pr734 *Loader axis group

No	Descriptions	Range	Unit	Default	Effective
733~734	*Loader axis group	[0~4]	-	0	restart

- This parameter assigns axis groups to the Loader axis groups. If value is 0, then disable Loader axis group function.
 - Example: When Pr733 or Pr734 is 2, the 2nd axis group is assigned as Loader axis group.
- Before using the Loader axis group, Option-20 must be activated to enable the five additional axes in the parameter screen. But the max number of controller axes is still 18.
 - Example: The controller already has 14 axes. Only 18 axes are visible in parameters after activating Option-20, not 19.
- The Loader axis group can be the main system axis group or the non-main system axis group, and the setting is the same as the multiple main axis groups.
 - If the Loader axis group is a non-main system axis group, use PLC to trigger its action.
- If the axis belongs to Loader axis group is shared with the general system axis group, and the number of axes exceeds the upper limit the model can have, "OP-029 CNC axis over system support" alarm will be triggered.
 - Example: The 21TA supports four axes in main axis group, and the 2nd axis group is assigned as the Loader axis group. When the main system has four axes (Pr701~704=1), if any axis in the Loader axis group is shared by both 1st and 2nd axis groups (Pr705=3), the OP-029 alarm will be triggered.
- Loader axis group has limits as follows:
 - Only G00, G01, G02, G03, G04, G04.1, G09, G10, G17/18/19, G22/23, G31, G52, G52.1, G52.2, G53, G54.x/55/56/57/58/59/59.x, G90/91, G92 are supported.
 - The default is G94 mode (feed per minute)
 - Does not support High Speed and High Precision related functions

- G code MACRO function not supported
- If this parameter is not displayed in the parameter screen, then this model does not support Loader function.
- The following models support this function:
 - Mill: 6A-E, 6B-E, 6D, 6D-H, 7A, 21A, 21A-H, 21A-E, 21A-X, 22A, 200A-X, 200A-X5, 200B-X, 200B-X5, 210A-E, 210A-H, 210A-E5, 210A-H5, 210B-E, 210B-H, 210B-E5, 210B-H5, 220A, 220A-5, 220B, 220B-5, 610A-E5, 610A-H5, x86 series.
 - Lathe: 6A-E, 7A, 21A, 21A-H, 21A-E, 21A-X, 21B, 21B-H, 21B-E, 21B-X, 22A, 22B, 200A-X, 200B-X, 210B-E, 210B-H, 210B-E5, 210B-H5, 220B, 220B-5, x86 series.
 - Wood: 60A, 60B, 600A, 610A-H, 610B-H
 - Drill: 60B
 - GlassGrind: 6A-E, 21A-E
 - Cutting: All series.
 - Print: All series.
 - Scanning: All series.
 - FC: All series.
 - eHMC: All series.
 - Bending: All series.

1.68 Pr737 * Woodworking labeling axis group

No	Descriptions	Range	Unit	Default	Effective
737	* Woodworking labeling axis	[0~4]	-	0	restart

- This parameter determines which axis group is set as the woodworking labeling axis group. If parameter is 0, the woodworking labeling axis group function is disabled.
 - Example: When Pr737 is 2, it means the 2nd axis group is designated as the woodworking labeling axis group.
- The woodworking labeling axis group can be used with Option-37 "Woodworking Automatic Labeling Function" to enable the additional two-axis, but notice the controller's max number of axes is still 18.
 - Example: The controller has been expanded to 18 axes. After Option-37 is enabled, there are still 18 usable axes, not 20.
- The woodworking labeling axis group can be a main system axis group or the non-main system axis group, and the setting is the same as the multi-axis group.
 - If the woodworking labeling axis group is set to a non-main system axis group, use PLC to trigger relevant action
- If an axis belongs to the woodworking labeling axis group is shared with other general system axis group (Pr701~Pr720 Axis associated axis group), and exceeds the max allowed axis number of the model, alarm "OP-029 The number of CNC axes exceed system specification" will be triggered.
 - Example: The 21TA supports four general axes, and the 2nd axial group is designated as a woodworking labeling axis group. Set axis 1~4 as the main system axis group (Pr701~704=1), and then set any axis in the woodworking labeling axis group (assume axis 5) to be shared by the 1st and 2nd axis groups (Pr705=3), OP-029 alarm will be triggered.
- The Woodworking Labeling Axis Group has limits are as follows
 - Only G00, G01, G02, G03, G04, G04.1, G09, G10, G17/18/19, G22/23, G31, G52, G52.1, G52.2, G53, G54.x/55/56/57/58/59/59.x, G90/91, G92 are provided.
 - The default is G94 mode (feed per minute)
 - Does not support High Speed and High Precision related functions
 - Milling machine G code MACRO function is not provided
- If Pr737 is not displayed in the parameter page, then this function is not supported by this model.

- The following controller models support the woodworking labeling axis group function:
 - Wood: 60A, 610A-H, 610B-H
 - Cutting: 60B

1.69 Pr741 *The rule of non-primary axis group

No	Descriptions	Range	Unit	Default	Effective
741	*The rule of non-primary axis group	[0~1]	-	0	Restart

- **Set the operation rule for non-primary axis group**
- **0: Default;** the details are as follows:
 - a. Remain the original rule. When the system has normal axis type (including servo driver type) alarm, it will stop all axis group movement. Furthermore, if the system has critical alarm, then the system status will be not ready.
- **1: Independent loader (woodworking labeling) axis group;** the details are as follows:
 - a. This parameter value allows loader (woodworking labeling) axis group of non-primary to be independent operation, and others remained following the original rule.

	Primary	Non-primary
Normal axis group	Original rule	Original rule
Loader (woodworking labeling) axis group	Original rule	Independent operation

- b. The "loader (woodworking labeling) axis group of non-primary" has normal axis type (including servo driver type) alarm, it will stop only itself axis group movement. Furthermore, if independent axis group has critical alarm, then only itself status will be not ready. The independent axis group do not impact on others axis group status, and others axis group also do not impact on its status.
- c. **Attention note**
 - i. The axis group of independent operation is inhibited to do "one axis for multiple axis groups", "axis exchange", "axis coupling", "spindle synchronization" applications, and is also inhibited to use setpoint axis. Otherwise, the system triggers **【OP-097 Independent axis group check error】** alarm.
 - ii. The axis group of independent operation do not use R791~ to select machining spindle for axis group. In the other word, the R791~ setting is not effective.
 - iii. The axis group of independent operation, which command and state reference "R520~ Command Register" and "R521~ State Register".
 - iv. The ready, not ready and busy status... for system display, which only represents current status of primary axis group, excluding the axis group of independent operation. The user has to write PLC ladder for independent axis group, and use Rbit of above description to make a decision and perform.
 - v. When the axis group of independent operation has alarm, only display alarm message box. The alarm light at bottom right corner of system main page, which only represents "Primary axis group + Normal axis group of Non-primary" whether has in alarm or warning, excluding independent axis group.

- e.g. When Pr741 is 1, there may be alarm message box for axis group of independent operation, but coordinates of primary axis group are still updating and status is busy.

1.70 Pr742 *The rules of the axis group shared axis.

No	Descriptions	Range	Unit	Default	Effective
742	*The rules of the axis group shared axis	[0~1]	-	0	Restart

- This parameter determines the rules of the axis belonging to multiple axis groups:
 - 0: The axis is regarded as a general axis, and the axis group that owns this axis can directly command it.
Use the enable bits of [Pr701~Pr720 *Axial associate axis groups](#) to set which axis groups own the axis.
 - 1: The axis is regarded as a roaming axis, and the axis group must successfully borrow the axis before it can be commanded. The roaming axis can be borrowed by only one axis group at the same time.
Use the enable bits of [Pr701~Pr720 *Axial associate axis groups](#) to set which axis groups can borrow this axis.

Precautions:


- This parameter only affects the setting of axes belonging to multiple axis groups. The setting of axes belonging to only one axis group will be regarded as a general axis and will not be affected by this parameter.
- About roaming axis:
 - If the axis group or PLC Rn subprogram component has not successfully borrowed the roaming axis, issue a movement command to the axis and an alarm COR-365 Issue a movement command to the unborrowed roaming axis will be issued.
 - For the method of borrowing and returning, as well as the response actions of the axis group when borrowing and waiting, please refer to program manual of G52.1/G52.2.
 - If the PLC MoveAx component is triggered and the axis is being borrowed by another axis group or PLC Rn subprogram component, an alarm MOT-085 Trigger PLC MoveAx component for the roaming axis in borrowing will be issued.
 - After CNC reset or restart, the axis group will release all roaming axes.
 - M30 in the program file will trigger CNC reset, so it will also release of all roaming axes.
 - The following offsets will be borrowed to each axis group following the roaming axis:
 - External coordinate offset
 - Handwheel offset
 - Tool length, tool radius compensation length and wear
 - The offset of the origin of the workpiece coordinate system of the roaming axis in each axis group is determined according to the workpiece coordinate system (G54, G55, ...) enabled by the axis group; The offset of the origin of the roaming axis in each workpiece coordinate system will not change with the axis group to which it belongs.
 - For example: the X-axis origin offset of the G54 coordinate system is set to 10.0, no matter which axis group borrows the X axis and activates the G54 workpiece coordinate system, the X-axis origin offset is 10.0.
- If Pr742 is set to 0 and the axis is set to belong to multiple axis groups, it may cause unexpected movement behavior due to different axis groups sending commands to the same axis at the same time; It is recommended to set Pr742 to 1 and use the roaming axis.
- If the axis group independent function is enabled(That is, [Pr732 *MST channel rules of multi-programs](#) is set to 2), the axis can only be used by one axis group at the same time.

- When there are axes belonging to two or more axis groups at the same time and Pr732=2, Pr742 must be 1, otherwise the alarm **OP-099 Illegal Setting for Independent Axis Groups (Pr732=2)** will be triggered.
- Supported version: 10.118.42R, 10.118.48C, 10.118.52I, 10.118.56C, 10.118.58 and later versions.

The specifications for moving commands issued by different sources to general axes or roaming axes are as follows:

Source	General axis	Roaming axis
CNC axis group Loader or woodworking labeling axis group PLC Rn subprogram component	When any of the following conditions are true, the axis is regarded as a general axis: 1. Set Pr742 to 0; 2. Pr742 is set to 1, and the setting value of Pr701~ is that the axis belongs to only one axis group. There is no need to borrow the axis before issuing the moving command.	Pr742 is set to 1, and the setting value of Pr701~ is that the axis belongs to multiple axis groups, then the axis is regarded as a roaming axis. Before issuing a movement command, the axis must be borrowed successfully, At the same time, only one source can issue a moving command to the axis.
PLC MoveAx component		Pr742 is set to 1, and the setting value of Pr701~ is that the axis belongs to multiple axis groups, then the axis is regarded as a roaming axis. The PLC MoveAx component must follow the rule that only one source can issue a moving command to the axis at the same time.
Halted point return	The axis is regarded as a general axis, and does not supported as a roaming axis. There is no need to borrow the axis before issuing the moving command.	
Graphical simulation	The axis is regarded as a general axis, and does not supported as a roaming axis. (The G52.1, G52.2 command will be ignored directly without processing, and no alarm will be issued.)	
Background Running Component	It does not support issuing movement commands to the axis. (It does not support the execution of G code commands other than G04, G10 L1000, G10 L1801, G11.99, so executing G52.1, G52.2 commands will issue BGND-502 【Invalid program command】)	

1.71 Pr801 *Manually set zero speed check window

 中文版本Chinese version: Pr801 *開啟手動設定零速檢查視窗

No.	Descriptions	Range	Unit	Default	Effective
801	*Manually set zero speed check window	[0~1]	-	0	restart

Parameter explanation:

In default situation, the controller will automatically calculate the value of zero speed check window based in effective resolution rather than using Pr901~Pr920.

When Pr801 was set as "1", the controller will readopt Pr901~Pr920.

Value explanation:

0 : Automatic setting. The controller will automatically calculate the value. At this time, the parameter setting of Pr901~Pr920 has no effect.

1 : Manual setting. The controller will adopt Pr901~Pr920.

Version information:

- Pr801 is supported in 10.118.44A, 10.118.46A, 10.118.48F, 10.118.52 and later versions.

Note1: In Automatic setting, the value of zero speed check window will be set as 389 arc second for axis and 950 arc second for spindle and adapt to effective resolution.

Note2: The effective resolution is listed below:

Object	effective resolution
Axis	Pr61~Pr80 Axial encoder resolution * Pr81~Pr100 Axial encoder scaling factor
Spindle	Pr1651~Pr1660 Spindle encoder resolution * Pr1661~Pr1670 Spindle encoder scaling factor

1.72 Pr803 Home Dog signal

No	Descriptions	Range	Unit	Default	Effective
803	*Home Dog signal	[0~1]	-	0	restart

0: I/O Card;

1: Axis Card

1.73 Pr821~Pr840 Axial homing feedrate

No	Descriptions	Range	Unit	Default	Effective
821~840	Axial homing feedrate	[0~240000]	mm/ min	10000	Press Reset

- This parameter is used to determine the maximum moving speed of the homing motion toward the direction of the Home Switch.
- If it is a rotary axis, the unit is deg/min.

1.74 Pr841~Pr860 Axial second travel homing feedrate

No	Descriptions	Range	Unit	Default	Effective
841~860	Axial second travel homing feedrate	[0~240000]	mm/min	2000	reset

- This parameter is used to determine the maximum moving speed of all motions after leaving the Home Switch during homing motion.
- If it is a rotary axis, the unit is deg/min.

1.75 Pr861~Pr880 Axial homing direction

No	Descriptions	Range	Unit	Default	Effective
861~880	Axial homing direction (0: positive; 1: negative)	[0,1]		0	Press Reset

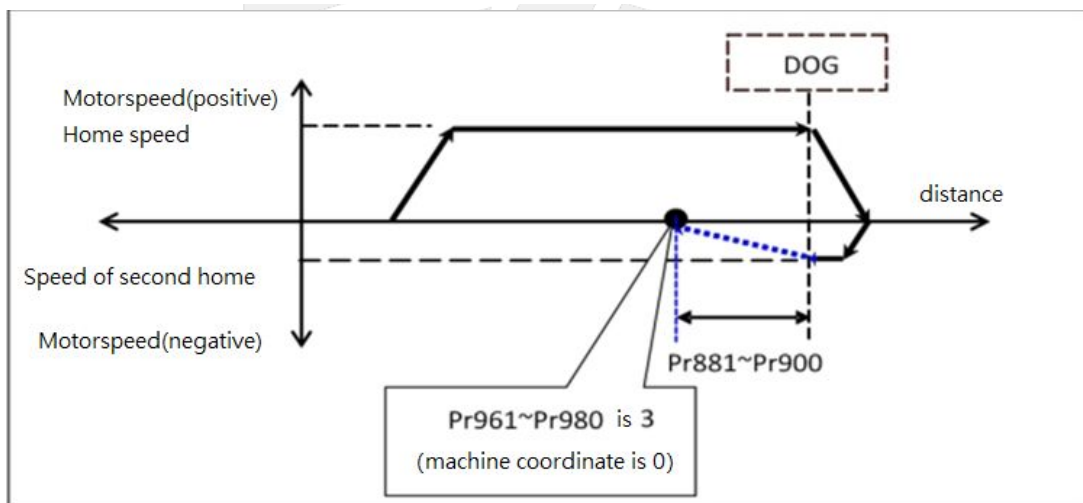
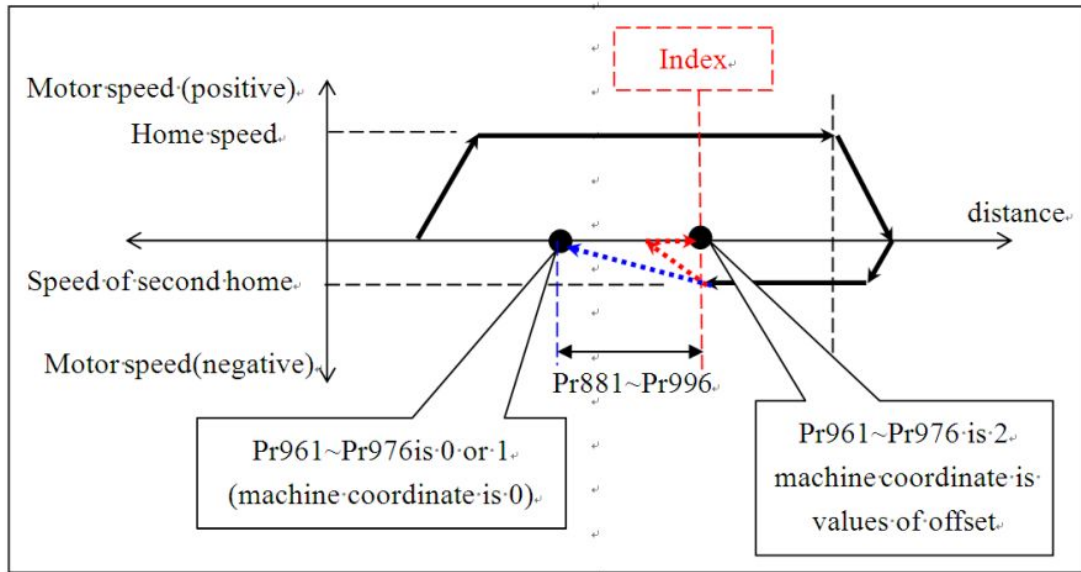
- During Homing, this parameter will determine the direction of Home Switch.

1.76 Pr881~Pr900 Axial home offset

No	Explanation	Range	Unit	Default	Effective
881~900	Axial home offset	[-99999999 ~99999999]	BLU	0	Press Reset

- This parameter must be used with Pr961~Pr980 Axial home search method.
 - Pr961~Pr980 is 0, 1, 5: When a axis finds the encoder index signal, the system will move the axis to the position according to the home offset, and then set Machine Coordinate as "Zero" at this position.
 - Pr961~Pr980 is 2: When a axis finds the encoder index signal, the system will move the axis to the encoder index signal position, and then set Machine Coordinates according to the offset.
 - Pr961~Pr980 is 3: When a axis leaves the Home Switch (DOG), the system will move the axis to the position according to the home offset, and then set Machine Coordinate as "Zero" at this position.
 - Pr961~Pr980 is 4: the home offset has no effect.

Home offset function action diagram



- For serial drives, note the home offset of the spindle and C axis (Pr1771~, Pr881~) must be the same. For example, when axis 6 is used as 1st spindle, the value of Pr886 must be the same as Pr1771. Otherwise the position the spindle positioning (C61) and the axis homing will be different.
- For absolute encoders, if Pr961~Pr980 is 4, this function is invalid; if Pr961~Pr980 is 5, the corresponding axis needs to redo homing again after modifying this parameter;
- For incremental encoders, the corresponding axis needs to redo homing after modifying this parameter. (for ver. 116.26D, 116.360 and later, the corresponding S16~ and S140~ will be cleared).

1.77 Pr901~Pr920 Axis zero speed check window

No	Descriptions	Range	Unit	Default	Effective
901~920	Axis zero speed check window (count)	[3~10000]	Pulse	3	Press Reset

- Controller will check if the motor is at zero speed after all position commands are finished, and its check standard is based on the parameter setting range. If the encoder feedback value is within this range, the motor is judged as stationary; If it is exceeded, system will trigger an alarm and stop the subsequent action.
- The resolution of the pulse-feedback and serial encoders are different, and the unit of this parameter is pulse. Therefore the parameter value should match different encoder resolution, and the conversion formula is as follows:
 - a. (Spindle) Pr901 of Serial= Pr901 of Pulse * Serial encoder resolution / 4096
 - b. (Axial) Pr901 of Serial = Pr901 of Pulse * Serial encoder resolution / 10000

Note: The resolution of the encoder is fixed. The parameters are often set as : Axis encoder resolution (Pr61~) * Axial feedback scaling factor (Pr81~), i.e. the resolution after scaling factor.
- The following is a general-to-serial conversion table:

Serial-Pulse Conversion Table				
Communication	Spindle		Axial	
	Encoder Resolution (unit: pulse/rev, ppr)	Pr901~920 (unit: pulse)	Encoder Resolution (unit: pulse/rev, ppr)	Pr901~920 (unit: pulse)
Pulse	4096	3 (initial value)	10000	3 (initial value)
Serial	16384	12	16384	4
Serial	65536	48	65536	19
Serial	262144	192	262144	78
Serial	335872	246	335872	100
Serial	417792	306	417792	125
Serial	507904	372	507904	152
Serial	663552	486	663552	199
Serial	991232	726	991232	297
Serial	1048576	768	1048576	314
Serial	4194304	3072	4194304	1258

Serial	16777216	10000	16777216	5033
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- Example:
The pulse feedback initial value of Pr901=3, how to set the corresponding value of Pr901 if converted to serial encoders?
 - a. If the drive is Yaskawa M2 Sigma 5 as general axis, the encoder resolution is 1048576. The corresponding Pr901 = 314 (= 3 *1048576 / 10000) from table above.
 - b. If the drive is Syntec M2 as spindle, 124-pole magnet ring encoder, the resolution is 507904. The corresponding Pr901 = 372 (= 3 *507904 / 4096) from the table above.
- Version information:
 1. In 10.118.44A, 10.118.46A, 10.118.48F, 10.118.52 and the following versions, zero speed check window values will be calculated automatically by controller. The Pr901~Pr920 will not be used.
If the customization of zero speed check window value is needed, please adjust Pr801 *Manually set zero speed check window to readopt Pr901~Pr920.

1.78 Pr921~Pr940 Home dog polarity

No	Descriptions	Range	Unit	Default	Effective
921~940	Home dog polarity (0: positive; 1: negative)	[0~1]	-	0	reset

- Set HOME DOG polarity, normal mechanical switches are usually NORMAL CLOSE, but proximity switches are NORMAL OPEN.

1.79 Pr941~Pr960 Enable axis home grid function

No	Descriptions	Range	Unit	Default	Effective
941~960	Enable axis home grid function	[0-1]	-	0	reset

- Enable axis home grid function
 - 0: Disable
 - 1: Enable
- After enabling axis home grid function, if the grid value is smaller than 50% (half rev of motor), controller will ignore this index signal and find the next index as axis home position.
- Definition of Home Grid:
The revolution number of motor when it leaves Home Dog and reaches the first index. It is shown on System Data 56~59, unit is %. That is, 25 is 1/4 rev and 50 is 1/2 rev.
- When home search method (Pr961~) is 3, this function is disabled.

1.80 Pr961~Pr980 Axial home search method

No	Descriptions	Range	Unit	Default	Effective
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961~980	Axial home search method	[0~6]	-	0	Press Reset
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- This parameter decides the home search (homing) method of each axis:

0: With Home Dog switch, suitable for linear axis or rotary axis with integer gear ratio. After **reaching Index signal**, the axis is moved to a position according to Home Offset, and then set Machine Coordinate to zero.

1: With Index Signal, suitable for linear axis with gear ratio of 1; or rotary axis with table-motor gear ratio is a integer ≥ 1 . After **reaching Index signal**, the axis is moved to a position according to Home Offset, and then set Machine Coordinate to zero after position arrived.

2: With Home Dog switch, suitable for linear axis or rotary axis with integer gear ratio. After **reaching Index signal**, the axis will stay on Index position and set corresponding Machine Coordinate according to Home Offset value.

3: With Home Dog switch but no Index signal, suitable for rotary axis with gear ratio $\neq 1$. After **reaching Home Dog switch**, the axis is moved to a position according to Home Offset, and then set Machine Coordinate to zero.

4: Absolute encoder index. Users have to move the axis to the marked position made beforehand before triggering home searching. After **reaching Index signal**, the axis will stop at the index signal. The Machine Coordinate will then be set to zero. Note that the Home Offset is INVALID.

5: Absolute encoder with Home Dog switch. After **reaching Index signal**, the axis is moved to a position according to Home Offset, and then set Machine Coordinate to zero after offset position arrived.

6: Absolute encoder index with offset supported. Users have to move the axis to the marked position made beforehand before triggering home searching. After **reaching Index signal**, the axis will continue to move by the amount of Home Offset. The Machine Coordinate will then be set to zero.

- In 116.10K, 116.16B and later versions, if encoder type is absolute (Pr201~=3), the axial homing action mentioned above will NOT be executed.

- Home searching with an absolute encoder is supported in the following versions. In these cases Pr201~ MUST be set to 3 and the home searching process can ONLY be triggered by pressing **F1-Search/Set Machine Zero** on page "Absolute Home Setup". For more information, please refer to 1. Serial Parameter Screen (10.116.54L~):

- Case 4 (Setting Pr961~ to 4) is supported in 116.54L, 118.0G, 118.7 and later.
- Case 5 (Setting Pr961~ to 5) is supported in 116.54S, 118.12 and later.
- Case 6 (Setting Pr961~ to 6) is supported in 118.28A and later.

1.81 Pr981~Pr1000 Axis homing 2nd protect revolution (encoder type)

No	Descriptions	Range	Unit	Default	Effective
981~1000	Axis homing 2nd protect revolution (encoder type)	[1~999999]	Rev	5	Press Reset

- This parameter is used to determine the number of protective revs of the second travel of axis homing. If the axis has not left Home Dog switch after the number of revolutions during second travel of homing, alarm MOT-036 "Can't leave home dog" will be triggered.

- This parameter is only valid under the following parameter settings:
 - Pr201~Pr220 Axial sensor type is 0 (encoder), and the Pr961~Pr980 home searching method is set to 0, 2, 3 (with DOG switch)
 - Pr201~Pr220 Axial sensor type is 3 (absolute encoder), and the Pr961~Pr980 homing method is set to 5 (absolute type DOG switch)
- After version 10.114, homing 2nd protect revolution is no longer checked when the Pr201~ Axial sensor type is set to 1 (optical scale).

1.82 Pr1001~Pr1020 Axial fast return home

No	Descriptions	Range	Unit	Default	Effective
1001~1020	Axial fast return home (0: OFF; 1: ON)	[0~1]	-	0	Restart

- This parameter is used to determine whether the fast return home function is enabled for each axis. The default is OFF for the compatibility of homing function. The action specifications of enabling fast return home function (Pr100x=1) is as follows:
 - Before the machine has executed the first homing, i.e. when the machine zero is not established (S16~S19/S140~S151 Off), if homing is triggered (in Home mode R13=7 and press JOG), then the controller will perform homing based on home searching method (Pr961~) setting and first & second homing speeds (Pr821~ and Pr841~ respectively).
 - After the machine has executed the first homing, i.e. when the machine zero is established (S16~S19/S140~S151 On), if homing is triggered (in Home mode R13=7 and press JOG), the machine will not repeat homing action to return to machine zero again, but will return directly to the machine zero at the G00 rapid travel speed (Pr461~), and this speed is affected by the G0 override.

1.83 Pr1021~Pr1040 Position offset check window during power off (BLU)

No	Descriptions	Range	Unit	Default	Effective
1021~1040	Position offset check window during power off (BLU)	[0~99999999]	BLU	0	Press Reset

- This parameter will take effect only when the absolute zero has been set. If it is set to 0, it will not be checked.
- If the movement of the CNC axis during power off exceeds the range set by this parameter, the corresponding bit of R940 will be ON when controller boots up, and the bit can only be turn release by triggering C84.
- The parameter unit is BLU. Modifying Pr17 or switching metric/imperial unit will also affect the actual protection range.
- Valid version starts at 10.116.36l

Examples:

1. Confirm that the absolute zero has been set and functions normally.
2. Set Pr1021~Pr1040 for each axis according to machine condition, this function will be automatically valid after parameter set. The position offset will be checked according to the setting at next boot up.

3. Monitor the R940 value with PLC. If it is non-zero when system boot up, it means that the axis has excess movement during power off. For the details of R940 value, please refer to PLC Interface.
4. Please re-confirm the zero position and confirm its position is normal. Trigger C84 to clear R940 value.

Setting Reference (select one from below):

	Setting	Suitable Condition	Calculation
1	Equal to axial screw pitch setting	Machines which always Servo-Off and completely stop before power off.	Pr1021~ = Pr161~
2	Equal to G00 deceleration distance	Machines that may power off during machining	Use constant acceleration equation to estimate the distance to decelerate to zero. Example: a metric linear axis: Pr1021~ = Precision Factor (Note) * 0.5 * Pr441~ * Pr461~ / 60
3	Custom range	Machine may be moved by external forces after power off	Pr1021~ Please set according to the possible movement distance after the power off.

Because the encoder feedback position is stored in 32-bit (ULONG) variable, this setting value should not exceed half of 32-bit otherwise protection is not effective. The calculation is as follows:

$0.5 * ULONGMAX * (Pitch / Resolution) * Gear Ratio$; that is, $0.5 * 4294967296 * (Pr161 / (Pr61 * Pr81)) * (Pr141 / Pr121)$

Use screw pitch 15mm/rev, encoder resolution 22-bit, gear ratio 1:30 as example:

$$\text{Maximum protection range} = 0.5 * 4294967296 * (15000 / 4194304) * (1/30) = 256000 \text{ (BLU)} = 256 \text{ (mm)}$$

(Note): Precision factor is determined according to Pr17

Pr17	Precision Factor
1	0.1
2	1
3	10

1.84 Pr1041~Pr1060 Syntec M3 axial power-off Tool auto retract distance (BLU)

No	Descriptions	Range	Unit	Default	Effective
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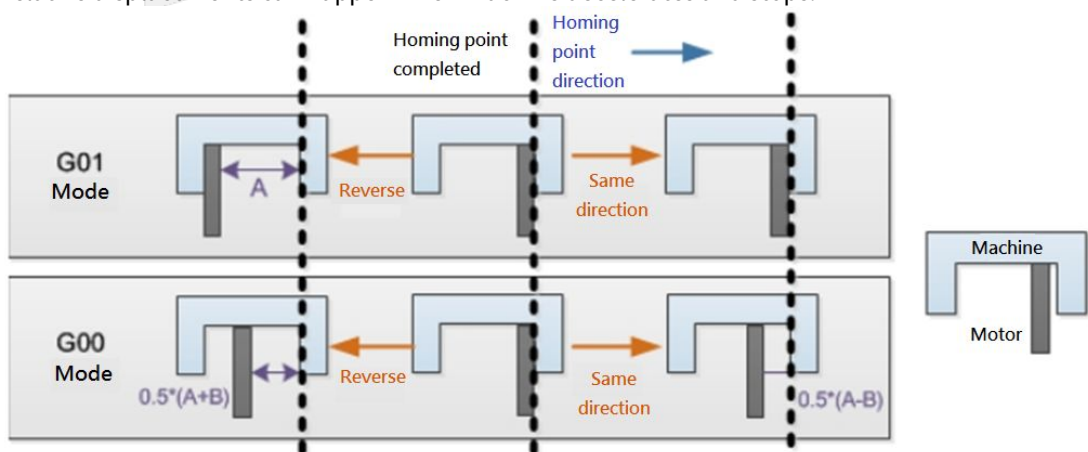
1041~1060	*Syntec M3 axial power-off Tool auto retract distance (BLU)	[-1000~1000]	BLU	0	restart
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- If parameter is not 0, when an abnormal drive power off (not an "Not Rdy" state), the axial retract will be performed, and the +/- signs represent the retract direction.
- If the power is turned off at "Not Rdy" state, retract will not happen.
- Axis will be stopped before performing retract .
- Only Syntec M3 drives support this function, and the firmware version must be 2.10, 1, 2.11.0 or above.
- If this function is enabled on an unsupported drive, MOT-65 alarm will be triggered but will not enter "Not Rdy" state.
- The power-off retract speed profile is defined by 0.1 times of M3 drive parameter Pn-306 Max Acceleration and Pn-307 Max Jerk.

1.85 Pr1221~Pr1240 Enable axial backlash compensation

No	Descriptions	Range	Unit	initial	occasion
1221~1240	Enable axial backlash compensation	[0~2]	-	0	Press Reset

- This parameter determines if the backlash compensation function is enabled.
 - 0: Disabled.
 - 1: Enable Linear Way Compensation — Only compensates additional Pr1241~ amount at the moment of reverting direction regardless in rapid traverse, cutting, or JOG mode.
 - 2: Enable Box Way Compensation —
 - In rapid traverse mode (G00), the compensation amount is calculated based on Pr1241~, Pr1261~, and current moving direction;
 - in cutting mode (G01/G02/G03) or JOG movement, compensates at the moment of reverting direction with additional Pr1261~ amount.
- Description of Box Way Compensation Mechanism
 - A relative displacements can happen when machine decelerates and stops.

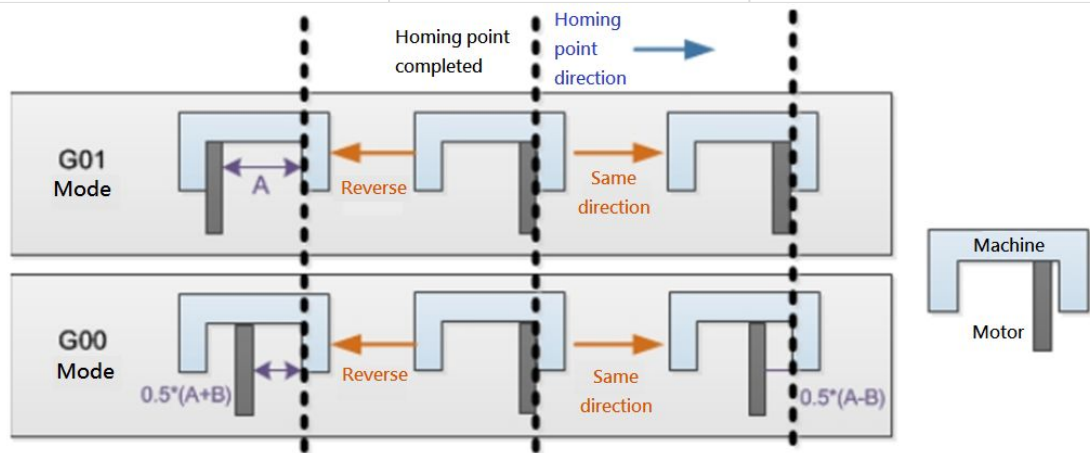


When an axis decelerate and stop under cutting mode (G01), almost no relative displacement between screw and bench has occurred due to the lower inertia.

When an axis decelerate and stop under rapid traverse mode (G00), the bench will move an extra distance after motor stop due to the higher inertia.

- An excessively large relative displacement is regarded as same directional backlash, this case can be treated with Box Way Compensation.
- The backlash compensation amount of different direction under "Rapid Traverse" and "Cutting" modes are in the table below: Assume No1241 = B, No1261 = A

	Same as Homing Direction	Opposite to Homing Direction
Rapid Traverse (G00)	$0.5*(A-B)$	$0.5*(A+B)$
Cutting (G01)	0	A



As figure above, assuming the machine completed homing and start movement or machining.
 G01 mode, moves in the **same** direction as the homing, no compensation needed due to lower speed and stopping inertia
 G01 mode, moves in the **opposite** direction as homing, A amount compensation is required to overcome backlash.
 G00 mode, moves in the **same** direction as homing, position command should subtract $0.5*(A-B)$ amount to avoid excess movement due to higher speed and stopping inertia.
 G00 mode, moves in the **opposite** direction as homing, a compensation amount of $A-0.5*(A-B) = 0.5*(A+B)$ is applied to overcome backlash and inertia.

P.s. Notice Pr1241~ is not the compensation value, but to be calculated by Pr1261 and the excess movement caused by inertia. E.g. Pr1261=10, excess movement =2, then Pr1241 =6.

• Compatibility

- From version 10.112.0 to 10.116.23, the relation between backlash compensation and speed is **exponential**. High speed (G00) backlash is Pr1241~, low speed (F10) backlash is Pr1261~, and exponential conversion constant is Pr1281~.
- In version 10.112.45 and earlier, Pr1261~ and Pr1281~ must be set 0 for Linear Way Compensation Mechanism so controller only uses Pr1241~ to compensate.

1.86 Pr1241~Pr1260 Axial G00 backlash

No	Descriptions	Range	Unit	Default	Effective
1241~1260	Axial G00 backlash	[-999999~ 999999]	BLU	0	Reset

- When Linear Way Compensation Mechanism is enabled, Pr1241~ is used to compensate backlash of Rapid Traverse, Cutting or Jog movements.
- When Box Way Compensation Mechanism is enabled, the backlash compensation is calculated base on Pr1241~, Pr1261~, and movement direction. Refer ro Pr1221~ for detail.
- Compatibility
 - From version 10.112.0 to 10.116.23, this parameter is the amount of backlash compensation when axis movement reverts under high speed (G00).

1.87 Pr1261~Pr1280 Axial G01 backlash

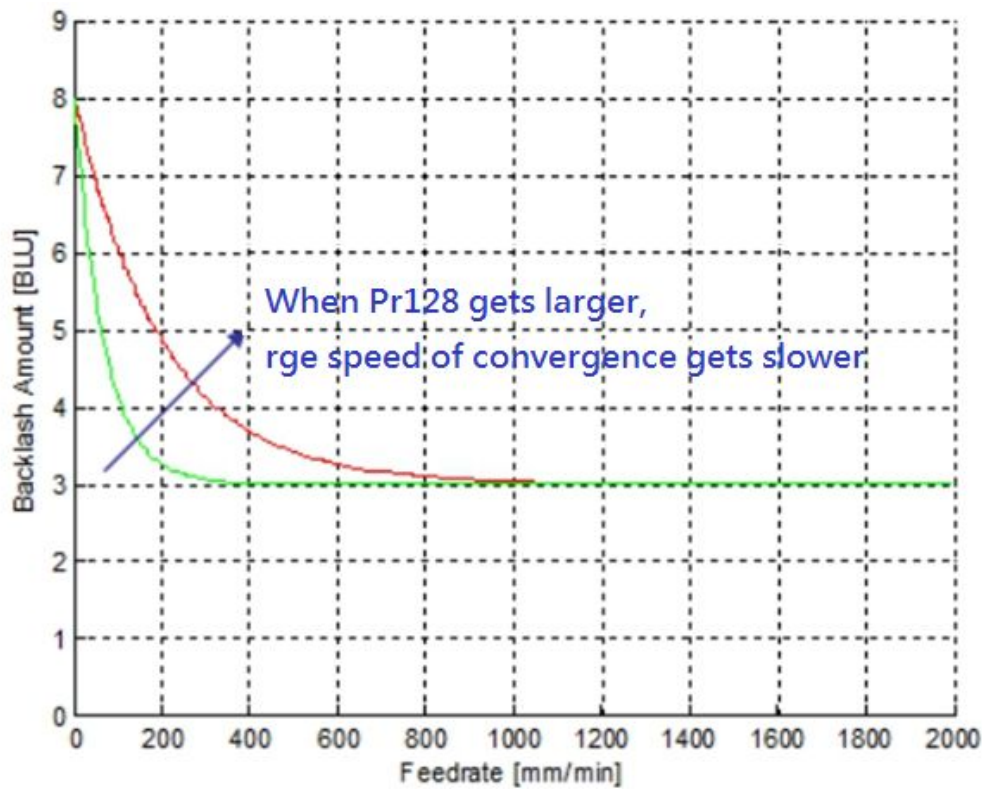
No	Descriptions	Range	Unit	Default	Effective
1261~1280	Axial G01 backlash	[-999999~ 999999]	BLU	0	Reset

- When Box Way Compensation Mechanism is enabled, this parameter is the amount of movement to compensate backlash when axis movement reverts under cutting mode (G01/G02/G03).
- Conmpatibility
 - From version 10.112.0 to 10.116.23, this parameter is the amount of backlash compensation when axis movement reverts at low speed (F10).

1.88 Pr1281~Pr1300 Backlash critical speed

No	Descriptions	Range	Unit	Default	Effective
1281~1300	Backlash critical speed	[0~3000]	mm/min	0	reset

- The backlash and the speed is a exponential relation, this parameter decides backlash converge speed. If the value is bigger, the converge speed is faster.
- When Pr1281~ are zero, controller will still follow default value 800 to process compensation amount estimation. But other values will not.
- Compatibility:
 - Valid from version 10.112.0.
 - In version 10.116.24 and later, this parameter no longer affects backlash compensation.



1.89 Pr1301~Pr1320 Pitch error compensation type

No	Descriptions	Range	Unit	Default	Effective
1301~1320	Pitch error compensation type	[0~2]	-	0	Press Reset

- Set the param to decide to start compensation or not
 0: No compensation;
 1: Uni-directional;
 2: Bi-directional.

- In 10.114.15 and before, only 6 axes are supported; after 10.114.16, supported number expanded to 10 axes.
- In 10.118.52G, 10.118.56A, 10.118.56 or above version, supported number expanded to 18 axes in high precision pitch error mode.

1.90 Pr1321~Pr1340 Pitch error compensation Interval

No	Descriptions	Range	Unit	Default	Effective
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1321~1340	Pitch error compensation interval	[1000~ 99999999]	BLU	25000	Press Reset
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- This parameter determines the unit length of pitch compensation, and also the maximum compensation length of this axis. Because each axis can have up to 100 pitch compensation intervals.
- Example: Assume Pr1321=20000, Pr17=2, it means the interval between each compensation is 20mm. Therefore the pitch compensation of first axis can cover a screw length of 20000um*100 points=2m.
- In version 10.114.15 and before, only 6 axes are supported; in version 114.16 and after, it is expanded to 10 axes.

1.91 Pr1341~Pr1360 Table index for reference (home)

No	Descriptions	Range	Unit	Default	Effective
1341~1360	Table index for reference (home)	[1~100]	-	50	Press Reset

- This parameter determines the corresponding number of the axis zero in the pitch compensation table. Default value is 50, it means cell 50~100 are positive and 1~49 are negative.
- Syntec controller provides 100 points (cells) for compensation in each axis, please adjust table index number when table cells are insufficient.
 - Example: If Pr1341=1, then cell 2~100 are positive. Therefore, 99 cells can be used for compensation.
- In version 10.114.15 and before, only 6 axes are supported; after 10.114.16, it is expanded to 10 axes.

1.92 Pr1361~Pr1380 Axis quad-peak error compensation from negative to positive direction

No	Descriptions	Range	Unit	Default	Effective
1361~1380	Axis quad- peak error compensation from negative to positive direction	[0~9999]	BLU	0	Reset

- This parameter defines the compensation amount which controller sends out at the moment when the axis moves from negative to positive. The larger the value, the quad-peak is suppress more; but excess value will cause concave.

1.93 Pr1381~Pr1400 Axis quad-peak error second hold time

No	Descriptions	Range	Unit	Default	Effective
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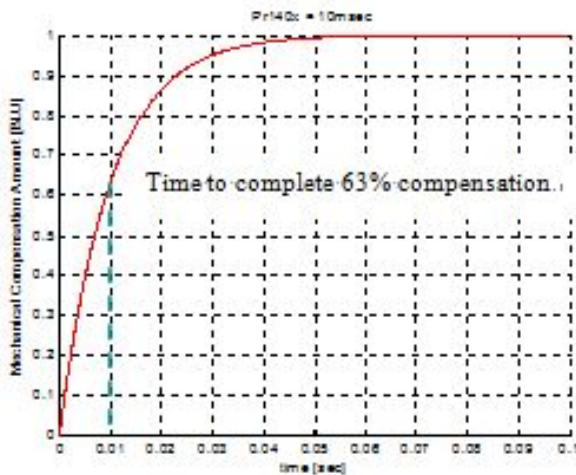
1381~1400	Axis quad-peak error second hold time	[0~60000]	ms	100	Press Reset
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- The quad-peak error second hold time prevent the 2nd time stopping occurs at the moment when quad-peak compensation command finishes. Notice excess value will cause concave, the suggest the value is 10ms.

1.94 Pr1401~Pr1420 Axis mechanical compensation time constant

No.	Description	Range	Unit	Default	Effective
1401~1420	Axis mechanical compensation time constant	[0~60000]	ms	10	Press Reset

- Mechanical compensation (backlash, pitch, temperature) commands is profiled as an **exponential curve**, this parameter determines the time constant (ms) of the curve.
- The lower the value, the less time needed to complete the compensation, but the machine is more likely to shake. The suggested setting value is 10ms.
- When set to 0, the compensation will be completed immediately, won't be profiled as an **exponential curve**.



1.95 Pr1421~Pr1440 Axis max. static dual error

No.	Description	Range	Unit	Default	Effective
1421~1440	Max. static dual error	[100~ 100000]	BLU	10000	Press Reset

- This parameter defines the maximum allowed error between 1st and 2nd feedback of an axis in static state.

1.96 Pr1441~Pr1460 Axis quad-peak error compensation from positive to negative direction

No	Descriptions	Range	Unit	Default	Effective
1441~1460	Axis quad-peak error compensation from positive to negative direction	[0~9999]	BLU	0	Reset

- This parameter defines the compensation amount which controller sends out at the moment when the axis moves from positive to negative. The larger the value, the quad-peak is suppress more; but excess value will cause concave.

1.97 Pr1461~Pr1480 Axis quad-peak error hold time

No	Descriptions	Range	Unit	Default	Effective
1461~1480	Axis quad-peak error hold time	[0~60000]	ms	0	Press Reset

- The quad-peak error hold time defines the 1st hold time of quad-peak compensation. The larger the value, the more quad-peak error is suppressed. Notice excess value will cause concave, the suggested value is 1000/Pr18~ (axis servo loop gain).

1.98 Pr1481~Pr1490 Straightness offset moving axis number and compensating axis number

No	Descriptions	Range	Unit	Default	Effective
1481~1490	Straightness offset moving axis number and compensating axis number	[0~20]	-	0	Restart

- A set of straightness compensation is composed of a moving axis and a compensation axis. A total of 5 sets of straightness compensation are available.
- Note:
 - A moving axis cannot be a compensating axis.
 - A compensation axis can correspond to only 1 moving axis.

1.99 Pr1521~Pr1540 Axial rapid traverse (G00) deceleration time ratio

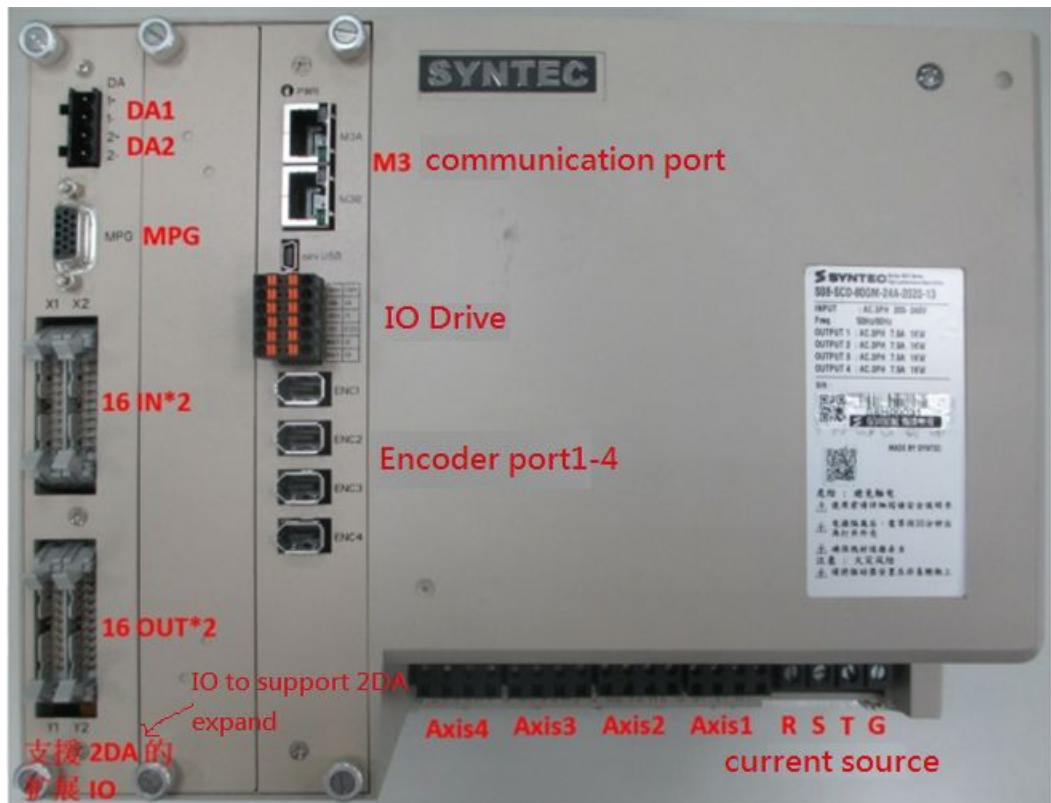
No	Descriptions	Range	Unit	Default	Effective
1521~1540	Axial rapid traverse deceleration time ratio	[50~500]	%	100	Press Reset

- The time required for each axis to be decelerated to zero from the maximum speed Pr461~ in G00 mode is called deceleration time, and the parameter defines ratio relative to acceleration time Pr441~.
- Example:
Taking the acceleration and deceleration of the first axial direction as an example
If Pr441 = 100 (ms); Pr1521 = 50 (%), deceleration time = 100 (ms) * 50 (%) = 50 (ms), deceleration is twice as fast as acceleration
If Pr441 = 100 (ms); Pr1521 = 300 (%), deceleration time = 100 (ms) * 300 (%) = 300 (ms), deceleration is three times slower than acceleration

1.100 Pr1621~Pr1630 Axis ID or Port Number for Spindle

No	Descriptions	Range	Unit	Default	Effective
1621~1630	*Axis ID or Port Number for Spindle	[0~1601002]	-	0	Restart

- When the spindle motor type is set to inverter spindle mode (Pr1791~ = 0), set this parameter to the corresponding port number on the axis card:
 - For serial controllers, acceptable values of this parameter are 17~20. Setting this parameter to 1~16 is NOT allowed.
 - For more information about the setting of DA ports, please refer to 2DA双电压主轴.
- When the spindle motor type is set to the non-inverter spindle mode (Pr1791~ = 1~4), set this parameter as axis number corresponding to the spindle
 - For Pr1791~ = 2, it is also allowed to use DA port to output command. Please refer to 2DA双电压主轴.
- When the spindle motor type is set to M3 inverter spindle mode (Pr1791~ = 5), set this parameter as the combination of corresponding M3-IO expansion card station number and DA port numbers:
(Supported controller version: 10.116.54H, 10.118.0E, 10.118.5 and later; and the Syntec multi-axis drive version 2.7.0 and later)
 - When using a Syntec multi-axis drive (SCD, see picture below) and sending spindle command through the DA port on the M3-IO expansion card, the parameter is set to MMnnnOO
 - MM: Primary station number (1~16), the setting refer to [Pr21~Pr40 * Axis corresponding axis card port number](#)
 - nnn: Secondary number (000~010), the setting depends on the secondary station number specification of the drive.
 - OO: DA port number (01~02), the setting refer to the following picture, set 1 for DA1, and set 2 for DA2.



Example:

- **Parameter Setting:** 16 010 02
 1 2 3
 - a. Drive primary station number (1~16)
 - b. Drive secondary station number (5~6)
 - c. DA port number (1~2)
- **First 5 Digits:**
 - Represent drive station number
 - Has only n005 and n006, 1st extended IO card at primary station number n & secondary station 5; and the 2nd extended IO card at primary station number n & secondary station number 6 respectively.
- **Last 2 Digits:**
 - Represents the DA port number on the extended IO card.
 - An IO card has only 2 DAs, so only 01 and 02 can be set.
- When the spindle motor type is set to M3 serial rotary spindle mode (Pr1791~=6), set this parameter as the corresponding axis card port number on the axis card.
 (Supported controller version: 10.118.8 and after)

For Example:

- **Parameter Range:** 0~16 003
 1 2
 - i. Drive primary station number(1~16)
 - ii. Drive secondary station number (0~3)
- **5 Digit:**
 - Represents drive station number

- When the spindle motor type is set to SRI DA spindle (Pr1791~=7), set this parameter as the register number of FC-PWR-2DA module.
 - This register position must not be written by PLC, otherwise it will cause spindle speed abnormal.
 - Register position must same as the register number of FC-PWR-2DA module, please setup the parameter of module in customized I/O chart or SRI Parameter.
 - If you want to setup customized I/O chart or SRI Parameter, please refer to Customized I/O Chart Manual and SRI Parameter Setting.
 - Register position must locate in user-define region. An alert will occur (OP-018 Port configuration error) if it exceeds the user-defined region.

1.101 Pr1631~Pr1640 Spindle bias for zero speed

No	Descriptions	Range	Unit	Default	Effective
1631~1640	Spindle bias for zero speed	[-100000~ 100000]	0.001 RPM	0	Press Reset

- For Inverter spindle or V type spindle, if spindle speed is not zero while S0 command is executed, use this parameter to adjust.

1.102 Pr1641~Pr1650 Spindle encoder polarity

No	Descriptions	Range	Unit	Default	Effective
1641~1650	Spindle encoder polarity (0:Pos;1:Neg)	[0~1]	-	0	reset

- When spindle motor type is Inverter spindle (Pr1791=0), this parameter can change spindle encoder polarity. Other spindle motor types are not affected.

1.103 Pr1651~Pr1660 Spindle encoder resolution

No	Descriptions	Range	Unit	Default	Effective
1651~1660	Spindle encoder resolution(pulse/rev)	[100 ~250000]	Pulse/Rev	1000	Press Reset

- Set the Spindle encoder resolution, i.e. the total pulses of one revolution. Notice that the value is the resolution of before scaling factor (A pulse or B pulse only).

1.104 Pr1661~Pr1670 Spindle encoder scaling factor

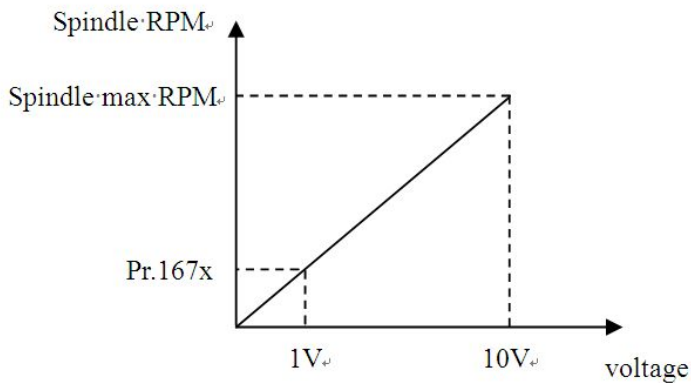
No	Descriptions	Range	Unit	Default	Effective
1661~1670	Spindle encoder scaling factor	[1~4]	-	4	Press Reset

- Spindle encoder scaling factor can be set to 1, 2, or 4.

1.105 Pr1671~Pr1680 Spindle gain

No	Descriptions	Range	Unit	Default	Effective
1671~1680	Spindle gain	[1~20000]	RPM/V	200	Press Reset

- When spindle motor type is inverter type (Pr1791=0), the parameter defines the spindle RPM increase per 1 volt. The relation is:



Example:

Pr1671 = 600. When a 600RPM spindle command is executed, controller will send 1.00 V; when 1200RPM command is sent, controller will send 2.00 V.

- When spindle type is NOT inverter type (Pr1791≠0), the parameter still defines the RPM change per 1 volt, but the max spindle RPM will be limited to 10*Pr1671~RPM.

1.106 Pr1681~Pr1700 Spindle 1st gear number at screw side and motor side

No	Descriptions	Range	Unit	Default	Effective
----	--------------	-------	------	---------	-----------

1681~1700	Spindle 1st gear number at screw side and motor side	[1~ 999999999]	-	1	Press Reset
-----------	--	----------------	---	---	-------------

- Set the gear ratio between screw (spindle side) and motor. The controller support 4 gear ratios for one spindle. PLC Registers are used to select gear.
- Spindle gear selection value of each Register:
 1: 1st gear;
 2: 2nd gear;
 3: 3rd gear;
 4: 4th gear;
 9: No gear selected;
- R024 is for first spindle gear selection; R782~R790 are for second to tenth spindles gear selection.

1.107 Pr1711~Pr1720 *Spindle pos. sensor exist or not

No	Descriptions	Range	Unit	Default	Effective
1711~1720	Spindle pos. sensor exist ? (0:No;1:Yes)	[0~1]	-	0	reset

- This parameter is used to set if spindle side encoder exist or not:
 0: No;
 1: Yes.

1.108 Pr1721~Pr1730 Spindle zero floating speed(RPM)

No	Descriptions	Range	Unit	Default	Effective
1721~1730	Spindle zero floating speed(RPM)	[0~1000]	RPM	10	Press Reset

- When flag C60 of PLC is on, the spindle RPM will change to the parameter value. Spindle override R15 and Spindle minimum speed Pr173x~ are neglected at this moment.
- 1st spindle zero floating flag: C60;
 2nd spindle zero floating flag: R585.2;
 3rd spindle zero floating flag: R585.3;
 4th spindle zero floating flag: R585.4;
 5th spindle zero floating flag: R585.5;
 6th spindle zero floating flag: R585.6.

1.109 Pr1731~Pr1740 Spindle minimum speed

No	Descriptions	Range	Unit	Default	Effective
1731~1740	Spindle minimum speed	[0~80000]	RPM	100	reset

- Set the spindle minimum speed.

1.110 Pr1741~Pr1750 Spindle speed for orientation stop.

No	Descriptions	Range	Unit	Default	Effective
1741~1750	Spindle speed for orientation stop	[1~3000]	RPM	50	Press Reset

- This parameter is used with the PLC flag; when the corresponding flag is ON, the spindle positioning (orientation stop) function is executed. Flag of 1st spindle: C61, flags of 2nd to 10th spindle: R586.2~R586.10.
- When the flag is ON, the positioning will be performed at the speed set by this parameter, and the index signal detection will begin after the positioning speed is reached.
※This speed neglects R15 Spindle Override and Pr173x~ Spindle minimum speed setting.

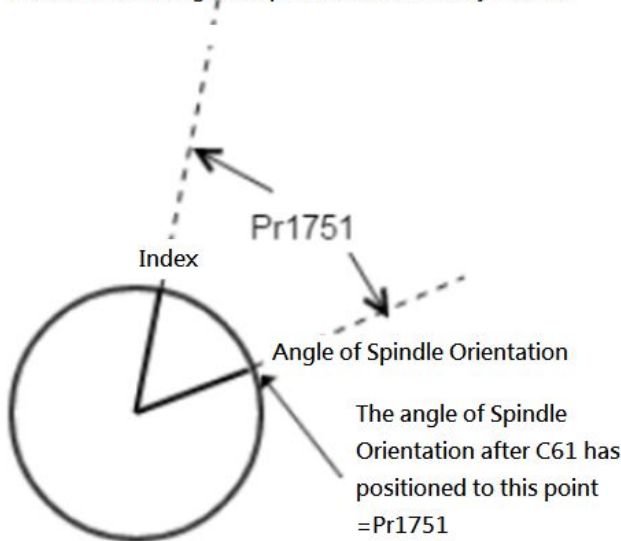
1.111 Pr1751~Pr1760 Spindle S.O.S. reference offset.

No	Descriptions	Range	Unit	Default	Effective
1751~1760	Spindle S.O.S. reference offset	[-360000~360000]	0.001 deg	0	reset

- This parameter is invalid for a **Syntec serial drive**, the spindle positioning offset is determined by Pr177x. Set Pr175x to 0, otherwise alarm SPD-26 will be triggered.
- The spindle will be positioned to the angle of the "spindle S.O.S reference offset (Pr175x)" after the Index angle is found.

Single point positioning:

Determine the angle of Spindle Orientation by Pr1751



- The spindle positioning offset is affected by [Pr17* Control precision](#) and [Pr161~Pr180 Axial pitch amount \(BLU\)](#), same as the value of [Pr1771~Pr1780 Spindle home reference offset](#).
- For a more detailed explanation and software version differences, please refer to the introduction of "Spindle Orientation(C61)".

1.112 Pr1761~Pr1770 Spindle orientation stop deceleration time.

No	Descriptions	Range	Unit	Default	Effective
1761~1770	Spindle orientation stop deceleration time	[1~60000]	ms	1000	Press Reset

- This parameter is used with the PLC flag. When the corresponding flag is ON, the spindle orientation function is executed.
Flag of the 1st spindle: C61, flags of the 2nd to the 10th spindle: R586.2~R586.10.
- When the flag is turned on and the spindle is orienting, the acceleration/deceleration profile will be set according to this parameter.

1.113 Pr1771~Pr1780 Spindle home reference offset.

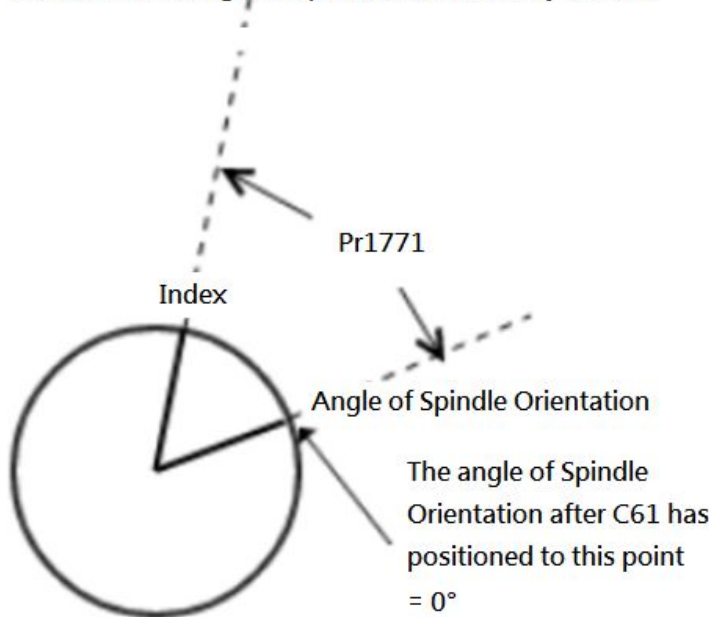
No	Descriptions	Range	Unit	Default	Effective
1771~1780	Spindle home reference offset	[-360000~360000]	0.001 deg	0	Press Reset

- This parameter is only applicable to the [Syntec serial spindles](#) and will be automatically synchronized with the P6-20 of Syntec M2 drive. The rules are as follows:
 - a. Synchronize Pr177x value with P6-20 when booting.

- b. When either of Pr177x or P6-20 is modified on the controller, the other will be synchronized.
- c. The Syntec M3 drives do not have parameter P6-20, and the spindle positioning offset is completely determined by the Pr177x~.
- If it is not a Syntec serial spindle drive, the parameter Pr177x~ setting is invalid.
- The spindle will be positioned to the "Spindle home reference offset (Pr177x~)" after the Index has passed.

Single point positioning:

Determine the angle of Spindle Orientation by Pr1771



- For a more detailed explanation and software version differences, please refer to the introduction of "Spindle Orientation(C61)".
- Spindle positioning angle

$$SpindleOrientationAngle : MinimumEquivalentAngle(360 * \frac{0.001 * Pr1771(Unit : 0.001deg)}{BasicLengthUnit * Pr161(Unit : BLU)})$$

1.114 Pr1781~Pr1790 Minimum speed for orientation stop

No	Descriptions	Range	Unit	Default	Effective
1781~1790	Min. speed for orientation stop	[0~500]	RPM	0	Press Reset

- The parameter is valid when Pr1791~1800 are set to inverter spindle mode.
- This parameter limits the minimum speed during spindle orientation to prevent the non-vector controlled spindle inverter from failing in positioning due to insufficient torque at low speed.

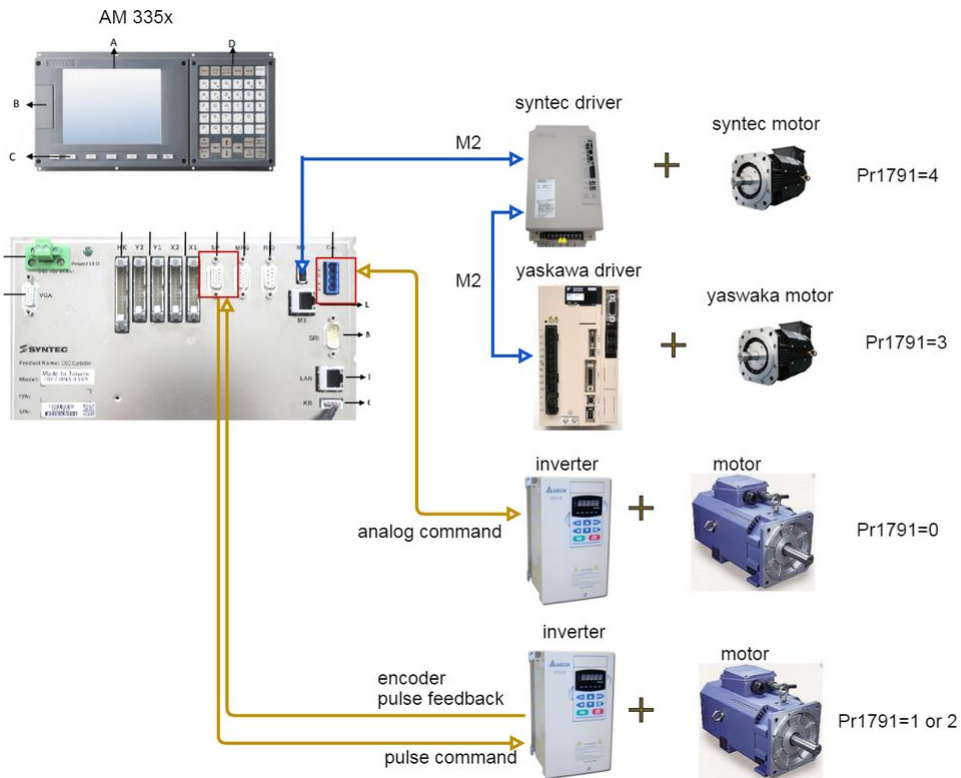
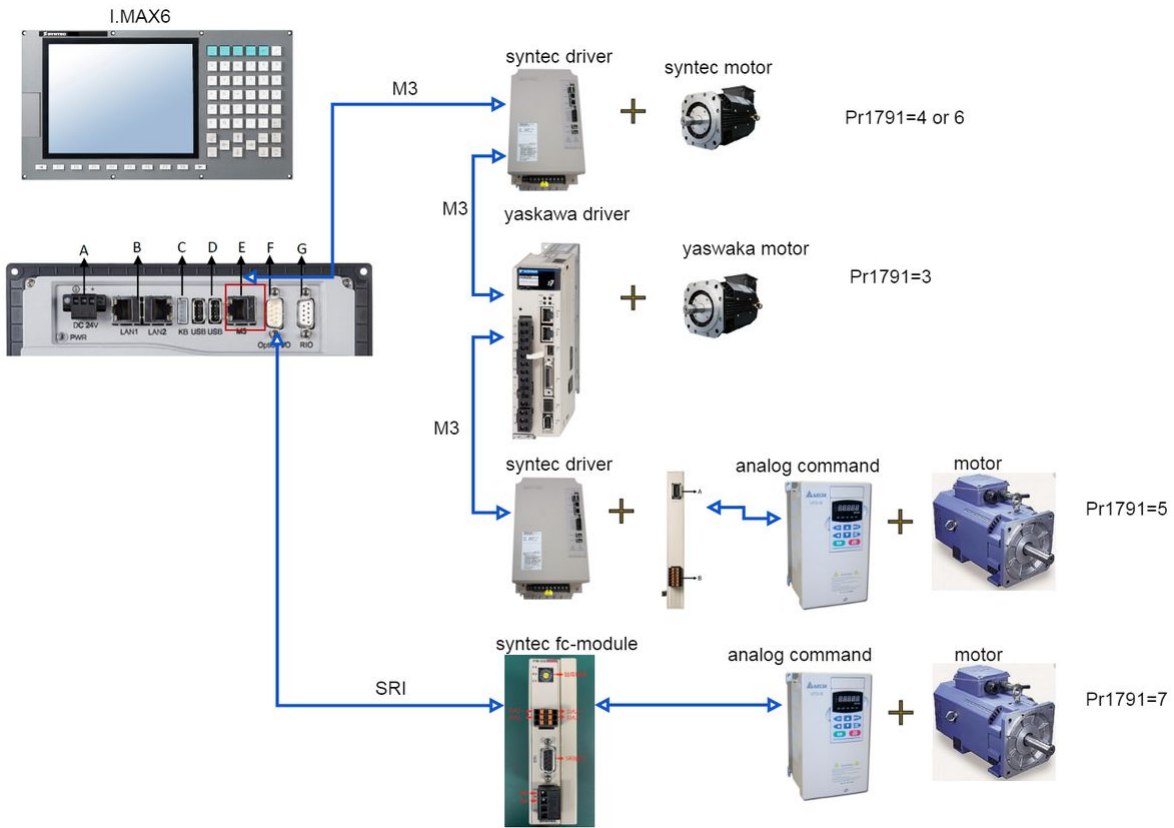
1.115 Pr1791~Pr1800 Spindle motor type.

No	Descriptions	Range	Unit	Default	Effective
1791~1800	*Spindle motor type	[0~7]	-	0	Restart

1.115.1 Spindle Functions

Pr1791	Spindle Type	Rotation	Orientation	C Axis Mode	Tapping	Threading	Synchronization	Super Imposition	Polygon Cutting
0	Inverter motor	0	0	X	0	0	X	X	X
1	P position control servo motor	0	0	0	0	0	X	0	X
2	V speed control servo motor	0	0	0	0	0	0	X	0
3	P position control servo motor	0	0	0	0	0	0	0	0
4	Syntec spindle	0	0	0	0	0	0	X	0
5	M3 Inverter motor	0	0	X	X	X	X	X	X
6	Serial rotary motor	0	X	X	X	0	X	X	X
7	SRI DA spindle/ EtherCAT DA spindle	0	0	X	X	X	X	X	X

1.115.2 Common Configuration



1.115.3 Remarks

- For pulse-driven servo spindle (Pr1791~ = 1 ~ 3)
 - a. The monitoring of following error will be suspended after 10.116.10V, 10.116.16M, 10.116.24G, 10.116.29.
- For Syntec spindle (Pr1791~ = 4)
 - a. Supporting version: 10.116.14B, 10.116.15, 10.116.16 and later version.
 - b. It's recommended to set Pr1791~ to 4 for making a distinction with pulse-driven servo spindle, even though the performance is the same with Pr1791~ = 2.
 - c. "Spindle control parameters switch function" is only valid with Syntec M3 drive and serial spindle after 10.118.28O, 10.118.38.
- For M3 inverter spindle (Pr1791~ = 5)
 - a. Supporting version: 10.116.54H, 10.118.0E, 10.118.5 and later version.
 - b. The DA output on the Syntec M3-IO expansion card is required.
 - c. A Syntec Multi-axis drive with versions 2.7.0 or later is required.
- For Serial rotary motor (Pr1791~ = 6)
 - a. Supporting version: 10.118.8 and later version.
 - b. Only supports M3 serial communication.
- For SRI DA Spindle (Pr1791~ = 7)
 - Supporting version: 10.118.22M, 10.118.28A, 10.118.29 and later version.
 - The register number (setting to Pr1621~) can not conflict with the one used in PLC ladder, otherwise it will cause spindle speed abnormal.
 - The SRI DA spindle must be used with FC-PW-2DA module. For detailed usage, please refer to FC-PWR-2DA Module Application Manual
- For EtherCAT DA Spindle (Pr1791~ = 7)
 - Supporting version: 10.118.48G, 10.118.52A, 10.118.53 and later version.
 - The register number (setting to Pr1621~) can not conflict with the one used in PLC ladder, otherwise it will cause spindle speed abnormal.
 - The EtherCAT DA spindle must be used with eTB3232 module.

1.115.4 Q&A

Q1: Difference between Pr1791=2 and Pr1791=4?

A1:

1. When Pr1791~ = 2, Pr381~ is valid. (invalid when Pr1791~ =4)
2. When Pr1791~ = 2 and not serial spindle, Pr1881~ is valid. (invalid when Pr1791~ =4)
3. When Pr1791~ = 2 and not serial spindle, max. speed of spindle is decided by the smaller value of Pr101~ (or Pr1671~) and Pr1801~, and it's decided by Pr1801~ directly when Pr1791~ =4.

1.115.5 Advanced Specification

	0	1	2	3	4	5	6	7
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Communication (Pr9)	Pulse/Voltage	<ul style="list-style-type: none"> • Pulse/Voltage • Syntec M2 • Syntec M3 • Yaskawa M2/M3 • EtherCAT 	<ul style="list-style-type: none"> • Pulse/Voltage • Syntec M2 • Syntec M3 	<ul style="list-style-type: none"> • Pulse/Voltage • Syntec M2 • Syntec M3 • Yaskawa M2/M3 • EtherCAT 	<ul style="list-style-type: none"> • Syntec M2 • Syntec M3 	Syntec M3	<ul style="list-style-type: none"> • Syntec M3 • Yaskawa M3 	<ul style="list-style-type: none"> • SRI • EtherCAT
Axis Occupied	X	O	O	O	O	X	X	X
Command (Pr381)	Voltage (0V~10V)	<ul style="list-style-type: none"> • Voltage (±10V) • Pulse • Serial Packet 	<ul style="list-style-type: none"> • Voltage (±10V) • Serial Packet 	<ul style="list-style-type: none"> • Pulse • Serial Packet 	Serial Packet	Voltage (0V~10V)	Serial Packet	Voltage (0V~10V)
Rotation (C64)	X	O	O	O	O	X	O	X
Rotation (I/O)	O	X	X	X	X	O	X	O
Orientation (C61)	X	O	O	O	O	X	X	X
Orientation (I/O)	O	X	X	X	X	O	X	O

C Axis Mode (C63)	X	O	O	O	O	X	X	X
Threading	O	O	O	O	O	X	O	X
Tapping	Inverter	<ul style="list-style-type: none"> • Synchronous (Serial) • Rapid (Serial/Optional) • Following (Non-Serial) 	<ul style="list-style-type: none"> • Synchronous (Serial) • Rapid (Serial/Optional) • Following (Non-Serial) 	<ul style="list-style-type: none"> • Synchronous • Rapid (Optional) 	<ul style="list-style-type: none"> • Synchronous • Rapid (Optional) 	X	X	X
Synchronization (G114.1)	X	X	O	O	O	X	X	X
Polygon Cutting (G51.2)	X	X	O	O	O	X	X	X
Super Imposition (G114.3) *To Synchronous Spindle	X	O	X	O	X	X	X	X

Load Rate (R5141)	X	O (Serial) X (Non-Serial)	O (Serial) X (Non-Serial)	O (Serial) X (Non-Serial)	O	X	O	X
Torque Limitation (R5171)	X	O (Serial) X (Non-Serial)	O (Serial) X (Non-Serial)	O (Serial) X (Non-Serial)	O	X	X	X
Note	Motion planned by inverter	Close loop velocity control when giving voltage command	Pr41~ of corresponding axis must be 0.		Same as Pr1791~ =2			

1.116 Pr1801~Pr1810 Spindle maximum speed.

No	Descriptions	Range	Unit	Default	Effective
1801~1810	Spindle maximum speed	[1~200000]	RPM	10000	Reset

- Set the spindle maximum speed.

1.117 Pr1811~Pr1820 Spindle encoder mount location

No	Descriptions	Range	Unit	Default	Default
1811~1820	Spindle encoder mount location	[0~1]	-	1	Press Reset

- This parameter determines the install position of the encoder to calculate the actual speed of the spindle.
0: Spindle side
1: Motor side
- Notice:
 - When the spindle motor type is non-inverter type (Pr179x≠0) and mounting position of the encoder is at spindle side, the spindle speed display on main screen is the actual feedback of encoder, not be affected by gear ratio.

- b. When using a servo spindle, if the corresponding axial sensor type Pr201~Pr220 is set to 'no feedback' and Pr1711~Pr1720 is set to 'spindle encoder exists', only 'Motor side' setting is supported for Pr1811~Pr1820.

1.118 Pr1821~Pr1830 Spindle servo differential gain

No	Descriptions	Range	Unit	Default	Effective
1821~1830	Spindle servo differential gain	[0~10000]	-	0	reset

- Set the spindle servo position differential gain, it's only useful for P mode servo spindle (Pr179~=1).

1.119 Pr1831~Pr1840 Spindle motor acceleration time.

No	Descriptions	Range	Unit	Default	Effective
1831~1840	Spindle motor acceleration time	[1~60000]	ms	2000	Reset

- This parameter is used to limit the maximum acceleration when the spindle is rotating. It is defined as follows:
 - Version 10.118.40A/10.118.41 and after:
 - When Pr1995 = 0, the spindle will be accelerated to the maximum speed (Pr1801~) within the acceleration time. The maximum acceleration is depended on the rated RPM(Pr1841~) and jerk(P1851~).
Notice: In the case of Pr1791 = 1 or 3, the spindle chatter is easily induced due to the heavy loading or the small power motor.
 - When Pr1995 = 1, the maximum acceleration is equal to $A_{max} = \frac{Pr1801\sim}{Pr1831\sim/1000}$.
 - Version 9.241.4 and before, and version between 9.241.22/10.104.31/10.111.35 and 10.118.40:
The spindle will be accelerated to the maximum speed (Pr1801~) within the acceleration time. The maximum acceleration is depended on the rated RPM(Pr1841~) and jerk(P1851~).
Notice: In the case of Pr1791 = 1 or 3, the spindle chatter is easily induced due to the heavy loading or the small power motor.
 - Version between 9.241.5~9.241.21 and version before 10.104.30/10.111.34

$$A_{max} = \frac{1000RPM}{Pr1831\sim/1000}$$
- In version 10.111.28 and before, this parameter can be set to -1, which means the spindle acceleration is decided by the G00 speed and acceleration time of the corresponding axis.

1.120 Pr1841~Pr1850 Spindle motor fundamental frequency speed.

No	Descriptions	Range	Unit	Default	Effective
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1841~1850	Spindle motor fundamental frequency speed	[0~18000]	RPM	0	Reset
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- Version 10.81 and after:
When the speed of motor reaches rated speed, motor status changes from constant torque to constant power.
If the speed command is over than the rated speed set by this parameter, controller will follow the function $P = T\omega = const$ to decrease the acceleration.
The original Y-Delta switch speed will become three times of the rated speed.
- Before 10.81:
The parameter defines the Y-Delta switch speed of the spindle.
If the speed is over than the value of the parameter, the corresponding register R602.x will be ON. These bits can be used in PLC for Y-Delta switch.
Bit 0: Reserved
Bit 1: Y-Delta status of 1st spindle, 0: Y; 1:Delta.
Bit 2: Y-Delta status of 2nd spindle, 0: Y; 1:Delta.
Bit 3: Y-Delta status of 3rd spindle, 0: Y; 1:Delta.
Bit 4: Y-Delta status of 4th spindle, 0: Y; 1:Delta.

1.121 Pr1851~Pr1860 Spindle acceleration accelerated to 1000RPM/s time

No	Descriptions	Range	Unit	Default	Effective
1851~1860	Spindle acceleration accelerated to 1000 RPM/s time	[1~60000]	ms	100	Reset

- Valid from version 9.241.5/10.68.
- This parameter defines the maximum Jerk when spindle rotates:

$$J_{max} = \frac{1000RPM/s}{Pr185X/1000} \left(\frac{deg}{sec^3} \right)$$

1.122 Pr1861~Pr1870 Spindle synchronize direction

No	Descriptions	Range	Unit	Default	Effective
1861~1870	Spindle synchronize direction	[0~1]		0	Press Reset

- The spindle rotation direction when spindle synchronization enabled. Default is 0.
0: CW - positive, CCW - negative;
1: CCW - negative, CW - positive.

1.123 Pr1871~Pr1880 *Spindle initial speed

No	Descriptions	Range	Unit	Default	Effective
1871~1880	*Spindle initial speed	[1~200000]	RPM	1000	Restart

- This parameter defines the initial spindle rotation speed after system start up and before RPM specified by S code.

1.124 Pr1881~Pr1890 Spindle speed control integral time (V type spindle)

No	Descriptions	Range	Unit	Default	Effective
1881~1890	Spindle speed control integral time (V type spindle)	[0~3000]	ms	0	Press Reset

- The parameter decides if the speed close loop control is enabled under V type spindle.
0: Disable. I.e. the controller does not adjust when tracking error appears.
1~3000: Enable speed close loop control.
- If the parameter is close to 1, the controller use less time send out command to correct the error, but it may cause motor to shake.
- When using serial spindle drive, controller does not control spindle speed with close loop (Pr188~ not effective). Valid from 10.116.16E.

1.125 Pr1891~Pr1900 Second Weak Flux Start Speed

No	Descriptions	Range	Unit	Default	Effective
1891~1900	Second Weak Flux Start Speed	[0~18000]	RPM	0	Press Reset

- When the speed of motor reaches second weak flux start speed, motor status changes from constant power to breakdown power.
If the speed command is over than the second weak flux start speed set by this parameter, controller will follow the function $T \propto \omega$ to decrease the acceleration.
- If the value of this parameter is lower than value of Pr1841~Pr1850, larger than the value of Pr1801~Pr1810 or equal to 0, controller would disable effect of decrease the acceleration.

1.126 Pr1901~Pr1960 Spindle 2nd~4th gear number at screw side and motor side

No	Descriptions	Range	Unit	Default	Default
1901~1920	Spindle 2nd gear number at screw side Spindle 2nd gear number at motor side	[1~99999999]	-	1	Press Reset
1921~1940	Spindle 3rd gear number at screw side Spindle 3rd gear number at motor side	[1~99999999]	-	1	Press Reset
1941~1960	Spindle 4th gear number at screw side Spindle 4th gear number at motor side	[1~99999999]	-	1	Press Reset

- Set the gear ratio between screw and motor of each spindle. The controller allows 4 sets of gear ratio settings, and the selection of gear ratio is done by PLC Registers.
- Spindle gear selection Register value:
 - 1: 1st gear;
 - 2: 2nd gear;
 - 3: 3rd gear;
 - 4: 4th gear;
 - 9: Neutral
 R024 is for 1st spindle gear selection; R782 is for 2nd spindle gear selection;
 R783 is for 3rd spindle gear selection; R784 is for 4th spindle gear selection;
 R785 is for 5th spindle gear selection; R786 is for 6th spindle gear selection;
 R787 is for 7th spindle gear selection; R788 is for 8th spindle gear selection.

1.127 Pr1961~Pr1965 The axis couple with spindle for tapping spindle

No	Descriptions	Range	Unit	Default	Effective
1961	The axis couple with 2 nd spindle for tapping	[0~16]	-	0	reset
1962	The axis couple with 3 rd spindle for tapping	[0~16]	-	0	reset

1963	The axis couple with 4 th spindle for tapping	[0~16]	-	0	reset
1964	The axis couple with 5 th spindle for tapping	[0~16]	-	0	reset
1965	The axis couple with 6 th spindle for tapping	[0~16]	-	0	reset

- When applying multi spindle for tapping, if these parameters are set correctly, user can check synchronous tapping error of each spindle through system data 368~373.
- For example, use the 1st and 2nd spindle for tapping, corresponding Z axis is the 3rd and 8th axis, so Pr1961=3 and Pr1962=8.
- Available version: 10.114.16~10.116.5

1.128 Pr1971~Pr1980 Spindle acceleration time when tapping

No	Descriptions	Range	Unit	Default	Effective
1971~1980	Spindle acceleration time when tapping	[0~60000]	ms	200	Press Reset

- This parameter is used to restrict the maximum spindle acceleration. If parameter set to 0, controller will use G01 acceleration of corresponding axis of spindle as the maximum spindle acceleration when tapping.
- The maximum spindle acceleration is defined as the time required for spindle to reach 1000 RPM:

$$A_{\max} = \frac{1000(\text{RPM})}{\text{Pr197X}(\text{msec})} = \frac{1000}{\text{Pr197X}/1000} (\text{RPM}/\text{sec})$$

- This parameter is for tapping only.
- Efficient version: 10.114.22 and after.

1.129 Pr1981~Pr1990 Spindle Acceleration Accelerated to 1000 RPM/s time when tapping

No	Descriptions	Range	Unit	Default	Effective
1981~1990	Spindle Acceleration Accelerated to 1000 RPM/sec time when tapping	[0~60000]	ms	100	Press Reset

- This parameter used to define the maximum spindle jerk. If parameter set to 0, controller will use G01 jerk of the corresponding axis of spindle as the maximum jerk when tapping.

- The definition of the maximum spindle jerk is the time required for spindle's acceleration to increase to 1000RPM/sec:

$$J_{\max} = \frac{1000(\text{RPM}/\text{sec})}{\text{Pr198X}(\text{msec})} = \frac{1000}{\text{Pr198X}/1000} (\text{RPM}/\text{sec}^2)$$

- This parameter is for tapping only.
- Valid version: 10.114.22 and later.

1.130 Pr1991 Check spindle speed arrival.

No	Descriptions	Range	Unit	Default	Effective
1991	Check spindle speed arrival (0: Disable; 1: Cutting; 2: Threading; 3: Cutting & Threading)	[0~3]	-	0	Reset

- This parameter is used to enable checking function for spindle speed arrival when cutting. If the effective spindle does not arrive the target speed, the system will remain "Running" state but pause the machining feed (axis may still move slightly), and then the machining will only continue after spindle speed check passed.
 - 0: Disable spindle speed arrival check for all cutting command.
 - 1: Enable spindle speed arrival check for cutting commands (G01/G02/G03).
 - 2: Enable spindle speed arrival check for threading commands.
 - 3: Enable spindle speed arrival check for cutting and threading commands.

Version	Compatibility
10.114.56A	<ul style="list-style-type: none"> • Support spindle speed arrival check function from 10.114.56A

SYNTEC

Version	Compatibility						
10.116.16U, 10.116.240, 10.116.33, 10.117.33	<ul style="list-style-type: none"> To use Pr1991 spindle speed arrival check function (including inverter spindle), the CW/CCW flags of the spindle (C64/C65, R583.x/R584.x) must be triggered to inform system the spindle enters running state. The spindle speed arrival check of inverter spindle is the same as servo spindle. When Pr1991≠0, the spindle speed arrival conditions are as followed: <table border="1" data-bbox="564 573 1423 1205"> <thead> <tr> <th data-bbox="564 573 884 719">Spindle CW/CCW Flags C64/C65, R583.x/R584.x</th> <th data-bbox="884 573 1423 719">Spindle Speed Arrival Condition</th> </tr> </thead> <tbody> <tr> <td data-bbox="564 719 884 1010">On</td> <td data-bbox="884 719 1423 1010"> Difference between feedback (Fbk) and command (Cmd) is less than the speed command Cmd multiplied by the spindle speed arrival check range (Pr1992 or Pr1993). i.e. $Fbk - Cmd < Cmd * (Pr1992 \text{ or } Pr1993) * 0.01$ </td> </tr> <tr> <td data-bbox="564 1010 884 1205">Off</td> <td data-bbox="884 1010 1423 1205"> The spindle feedback Fbk is less than 50 RPM. i.e. $Fbk < 50 \text{ (RPM)}$ </td> </tr> </tbody> </table> <p>Note: The CW/CCW flags Off is also checked to ensure spindle speed is low enough when spindle CW/CCW flags change from On to Off,</p> <ul style="list-style-type: none"> Add alarm SPD-23 spindle speed has not arrived. When the spindle speed arrival function is enabled, system will continuously check spindle speed within a certain period of time (The larger value of either 30 sec or 3 times of spindle acceleration time). Failing to reach the spindle speed will trigger alarm to guide the user to resolve the problem. 	Spindle CW/CCW Flags C64/C65, R583.x/R584.x	Spindle Speed Arrival Condition	On	Difference between feedback (Fbk) and command (Cmd) is less than the speed command Cmd multiplied by the spindle speed arrival check range (Pr1992 or Pr1993). i.e. $ Fbk - Cmd < Cmd * (Pr1992 \text{ or } Pr1993) * 0.01$	Off	The spindle feedback Fbk is less than 50 RPM. i.e. $Fbk < 50 \text{ (RPM)}$
Spindle CW/CCW Flags C64/C65, R583.x/R584.x	Spindle Speed Arrival Condition						
On	Difference between feedback (Fbk) and command (Cmd) is less than the speed command Cmd multiplied by the spindle speed arrival check range (Pr1992 or Pr1993). i.e. $ Fbk - Cmd < Cmd * (Pr1992 \text{ or } Pr1993) * 0.01$						
Off	The spindle feedback Fbk is less than 50 RPM. i.e. $Fbk < 50 \text{ (RPM)}$						

SYNTEC

Version	Compatibility						
10.116.16V, 10.116.24P, 10.116.34, 10.117.34	<ul style="list-style-type: none"> When the spindle has no encoder (Pr1711~ is set to 0), the spindle speed arrival conditions are as followed: <table border="1" data-bbox="564 443 1425 992"> <thead> <tr> <th data-bbox="564 443 903 524">Spindle Type</th> <th data-bbox="903 443 1425 524">Spindle Speed Arrival Condition</th> </tr> </thead> <tbody> <tr> <td data-bbox="564 524 903 768">Serial Servo Spindle</td> <td data-bbox="903 524 1425 768">Directly applies the spindle speed arrival info from the servo driver. (For serial drivers, the V_CMP bit in the serial packet contains the speed arrival info, and S59/S64 are synchronous with this bit)</td> </tr> <tr> <td data-bbox="564 768 903 992">Pulse Command Spindle Voltage Command Spindle</td> <td data-bbox="903 768 1425 992">It's regarded as the spindle speed arrival in the controller, so S59/S64 are On. To check the spindle speed arrival, a DO signal from the driver to TB-16IN could be used in PLC.</td> </tr> </tbody> </table> 	Spindle Type	Spindle Speed Arrival Condition	Serial Servo Spindle	Directly applies the spindle speed arrival info from the servo driver. (For serial drivers, the V_CMP bit in the serial packet contains the speed arrival info, and S59/S64 are synchronous with this bit)	Pulse Command Spindle Voltage Command Spindle	It's regarded as the spindle speed arrival in the controller, so S59/S64 are On. To check the spindle speed arrival, a DO signal from the driver to TB-16IN could be used in PLC.
Spindle Type	Spindle Speed Arrival Condition						
Serial Servo Spindle	Directly applies the spindle speed arrival info from the servo driver. (For serial drivers, the V_CMP bit in the serial packet contains the speed arrival info, and S59/S64 are synchronous with this bit)						
Pulse Command Spindle Voltage Command Spindle	It's regarded as the spindle speed arrival in the controller, so S59/S64 are On. To check the spindle speed arrival, a DO signal from the driver to TB-16IN could be used in PLC.						



SYNTEC

Version	Compatibility												
10.116.26B, 10.116.36L, 10.116.43, 10.117.43	<ul style="list-style-type: none"> When pulse spindle has no encoder installed (Pr1711~ is 0), the specification of spindle speed check is the same as previous version. When serial spindle has no encoder installed (Pr1711~ is 0), the spindle speed arrival check conditions are as followed: <table border="1"> <thead> <tr> <th>Serial Spindle Type</th> <th>Servo State</th> <th>Spindle Speed Arrival Condition</th> </tr> </thead> <tbody> <tr> <td>P position control (Pr1791~ is 1 or 3)</td> <td>Servo On</td> <td>Difference between speed specified by S code and speed command (Cmd) is less than the speed specified by S code multiplied by the spindle speed arrival check range (Pr1992 or Pr1993). i.e. $Cmd - S < S * (Pr1992 \text{ or } Pr1993) * 0.01$</td> </tr> <tr> <td>V velocity control (Pr1791~ is 2)</td> <td>Servo On</td> <td>Directly applies the spindle speed arrival info from the servo driver.</td> </tr> <tr> <td>Applicable to each spindle type (Pr1791~ ≠ 0, 5 or 6)</td> <td>Servo Off</td> <td>It's regarded as the spindle speed arrival in the controller, so S59/S64 are On.</td> </tr> </tbody> </table>	Serial Spindle Type	Servo State	Spindle Speed Arrival Condition	P position control (Pr1791~ is 1 or 3)	Servo On	Difference between speed specified by S code and speed command (Cmd) is less than the speed specified by S code multiplied by the spindle speed arrival check range (Pr1992 or Pr1993). i.e. $ Cmd - S < S * (Pr1992 \text{ or } Pr1993) * 0.01$	V velocity control (Pr1791~ is 2)	Servo On	Directly applies the spindle speed arrival info from the servo driver.	Applicable to each spindle type (Pr1791~ ≠ 0, 5 or 6)	Servo Off	It's regarded as the spindle speed arrival in the controller, so S59/S64 are On.
Serial Spindle Type	Servo State	Spindle Speed Arrival Condition											
P position control (Pr1791~ is 1 or 3)	Servo On	Difference between speed specified by S code and speed command (Cmd) is less than the speed specified by S code multiplied by the spindle speed arrival check range (Pr1992 or Pr1993). i.e. $ Cmd - S < S * (Pr1992 \text{ or } Pr1993) * 0.01$											
V velocity control (Pr1791~ is 2)	Servo On	Directly applies the spindle speed arrival info from the servo driver.											
Applicable to each spindle type (Pr1791~ ≠ 0, 5 or 6)	Servo Off	It's regarded as the spindle speed arrival in the controller, so S59/S64 are On.											

1.131 Pr1992 Spindle cutting speed arrival range.

No	Descriptions	Range	Unit	Default	Effective
1992	Spindle cutting speed arrival range	[1~100]	%	15	Reset

- This parameter is used to determine the check range of the effective spindle speed arrival under the general cutting command (G01/G02/G03).
- Example: Assume that Pr1992=15 (%) and the spindle speed command is 2000 RPM, when the actual speed falls between 1700 and 2300 RPM, it means that the spindle speed is arrived.
- The spindle speed arrival flags are as follows:
 - S64** On means 1st spindle speed arrival
 - R607.2** On means 2nd spindle speed arrival
 - R607.3** On means 3rd spindle speed arrival
 - ...and so on
 - R607.10** On means 10th spindle speed arrival

- Valid version: 10.114.39

1.132 Pr1993 Spindle threading speed arrival range.

No	Descriptions	Range	Unit	Default	Effective
1993	Spindle threading speed arrival range	[1~100]	%	15	Reset

- This parameter is used to determine the range of the effective spindle speed arrival under the threading command.
- Example: Assume that Pr1993=15 (%) and the spindle speed command is 2000 RPM, when the actual speed falls between 1700 and 2300 RPM, it means that the spindle speed is arrived.
- The spindle speed arrival flags are as follows:
 - S59** On means 1st spindle speed arrival
 - R607.12** On means 2nd spindle speed arrival
 - R607.13** On means 3rd spindle speed arrival
 - ...and so on
 - R607.20** On means 10th spindle speed arrival
- Valid version: 10.114.56A

1.133 Pr1994 *Spindle enable control parameters switch.

No	Descriptions	Range	Unit	Default	Effective
1994	*Spindle enable control parameters switch(0:Disable;1:Enable)	[0-1]	-	0	restart

- This parameter sets switch of driver control parameter set
 - 0 : Disable
 - 1 : Enable
- No. of driver control parameters for each set is described in the following form, if this function is enabled.
 - The default controller system mode is cutting mode, it will switch to the cutting mode and use the second control parameter set after others spindle application finished.
- The control parameter set will be the first group if this function is disabled.
- The drive is considered supported if it is a Syntec drive and M3 communication is in use.
 - Control parameters switch becomes effective only if both the controller and the drive support it. Setting Pr1994 to 1 with an unsupported drive will trigger the alarm SPD-042.
 - Both basic spindle and synchronous spindle will switch to the third control parameter set when two spindles are synchronizing.
- Valid for version 10.118.28T, 10.118.40, or later.

item	Spindle application	Control Parameters	Kp	Kv	Ti
1	Position control Mode(C63) Spindle Orientation Stop(C61) Tapping Mode(G63)	First group	Pn-102	Pn-100	Pn-101
2	Cutting Mode(C64)	Second group	Pn-106	Pn-104	Pn-105
3	Polygon Mode(G51.2) Spindle synchronization(G114.1)	Third group	Pn-12D	Pn-12B	Pn-12C

1.134 Pr1995 Spindle mode of acceleration calculation.

No	Descriptions	Range	Unit	Default	Effective
1995	Spindle mode of acceleration calculation(0:Acceleration time fixed;1:Max. acceleration fixed)	[0~1]	-	0	Reset

- To decide the calculation method of maximum acceleration.
 - Pr1995 = 0 means that the maximum acceleration is adjusted by system to make the spindle accelerated to the maximum speed(Pr1801~) within the acceleration time.
 - Pr1995 = 1 means that the maximum acceleration of spindle is restricted by the value of

$$A_{max} = \frac{Pr1801 \sim}{Pr1831 \sim / 1000} \cdot$$

1.135 Pr2001 MPG 4th scaling factor.

No	Descriptions	Range	Unit	Default	Effective
2001	MPG 4th scaling factor	[10~1000]	LIU	100	Press Reset

- Set the MPG unit of LIU per pulse when MPG scale selector knob turned to 4th position.
- The minimum input unit is LIU, which is affected by unit in metric or imperial.

1.136 Pr2002 MPG program simulation smoothing time

No	Descriptions	Range	Unit	Default	Effective
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2003	MPG program simulation smoothing time	[50~400]	ms	50	Press Reset
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- When the MPG rotation speed is uneven, setting this parameter can smooth the machining speed and reduce the machine vibration during MPG simulation.

- **Supported models**

models	versions	remark
SCARA、 DELTA、 ARTIC、 GANTRY	Starting from 10.118.28Y, 10.118.29Y, 10.118.40E, 10.118.43 and later versions	parameter range [50~400]
GlassGrind、 Lathe、 MILL、 WOOD、 Cutting、 Print	Starting from 10.118.60O, 10.118.66I, 10.118.70C, 10.118.73 and later versions	parameter range changed to [50 ~1000]

1.137 Pr2003 MPG program simulation handwheel No.

No	Descriptions	Range	Unit	Default	Effective
2003	MPG program simulation handwheel No.	[1~3]	-	1	Press Reset

- Select the handwheel (MPG) No. which controls the progress of MPG program simulation.

1.138 Pr2021~Pr2030 *Port number or register number for MPG

No	Descriptions	Range	Unit	Default	Effective
2021~2030	*Port number or register number for MPG	[0~65535]	-	0	Restart

- Set to 0 to indicate that the MPG is not enabled.
- If a physical MPG is used, the port number setting of the MPG interface on the controller hardware can be found in the table at the end.
- Please note that the Port number in the table below represents the **MPG port on the hardware**. For the usability of this port, please refer to [Pr9 *Servo board type](#) and [Pr13 *Number of servo card](#).
- For a physical MPG on the M3 expansion I/O card, if it is on 1st I/O station (Pr3261) then set to 5031; on 2nd station (Pr3262) then set to 5032, and so on.
 - Example: When Pr2021=5031 and Pr3261=1006, it means that the I/O card with the station number 1006 is set as the 1st I/O station, and its MPG is set as the 1st MPG.
 - Referring to the PLC Interface., the use of the physical MPG on the M3 expansion I/O card will occupy R5031~R5033; in version after 10.118.13, to release R5031~R5033, custom IO comparison table can be used ([Pr5 *I/O type](#)= 100) to modify the starting Register at I/O comparison screen..

- To use R Bit to simulate the MPG signal instead of physical MPG handwheel, set the value over 20 to specify corresponding Register.
 - Example: If Pr2021=300, then the value of R300 will be used by controller as the signal source of the first MPG.
 - Use the R value to simulate the handwheel signal, and the change amount shall not exceed 32767 each time (PLC scan).

1.138.1 CNC Products

Model	MPG	Model	MPG	Model	MPG	Model	MPG	Note
EZ3	5	3A	5	11A	5	30B	20	
EZ4	5	3B	5	11A-X	5	200A	20	
10A	5	3S	5	11B	9	200A-5	20	
10B	9	6A	5	11B-X	9	200A-X	20	
10C	5	6A-E	20	20A	20	200A-X5	20	
10D	9	6B	5	20A-R	20	200B	20	
10F	9	6B-E	20	20C	20	200B-5	20	
		6D	20	21A	20	200B-X	20	
		6D-E	20	21A-E	20	200B-X5	20	
		6D-H	20	21A-H	20	SUPER	1~16	Refer to Pr21~ Axis card port number
		7A	20	21A-X	20	SUPER-X	1~16	Refer to Pr21~ Axis card port number
				21B	20	SUPER-X5	1~16	Refer to Pr21~ Axis card port number
				21B-E	20	210A-E	20	
				21B-H	20	210A-E5	20	

Model	MPG	Model	MPG	Model	MPG	Model	MPG	Note
				21B-X	20	210A-H	20	
				22A	20	210A-H5	20	
				22B	20	210B-E	20	
						210B-E5	20	
						210B-H	20	
						210B-H5	20	
						220A	20	
						220A-5	20	
						220B	20	
						220B-5	20	
						610A-E5	20	
						610A-H5	20	

1.138.2 Automation Products

Model	MPG	Model	MPG
10B	20	80MI	20
10A	5	15C/15C-5/15E	20
8S	6	15B	20
8C/8C-5/8E	20	15A	5
8B	20	12B	20

Model	MPG	Model	MPG
8A	5	12A	5
7C	20	10C/10C-5/10E	20
Model	MPG	Note	
11R	9		
21R	20		
81R	20		
Model	MPG	Note	
FC-A	5	Corresponding to HHB Pin7~10	
FC-B	20	Corresponding to HHB Pin7~10	
FC-C	20		

1.138.3 New Products

Model	MPG	Note
60CA	5	Corresponding to HHB Pin7~10
60CB	20	
60WA	20	
60WB	20	
60DB	20	
60PA	20	
60PC	20	

60PE	20	
70CA	20	
70CB	20	
70CB-5	20	
71SA	20	
710SA	20	
720SA	20	
600WA	20	
610WA-H	20	
610WB-H	20	
6GA-E	20	
21GA-E	20	
72BA	20	
720BA	20	

1.139 Pr2024~Pr2027 *Continued I-Bit no. for MPG

No	Descriptions	Range	Unit	Default	Effective
2024~2027	*Continued I-Bit no. for MPG	[0~254]	-	0	Restart

- Set to 0 to indicate that the MPG is not enabled.
- Two consecutive I points are required as the source of the signal
 - When setting, specify Input with smaller number then system will automatically capture the next Input.
 - For example, Pr2024=5 indicates I005 and I006 are the signal sources of the 4th MPG.
 - The supported I-Bits for each model can be found in [Pr5 *I/O type](#).

- If the MPG parameters Pr2024~Pr2027 are not displayed on the parameter page, it means that this model does not support this function.
- This feature is not supported by all simulators.
- The following products support this feature:

Number of Supported MPGs	Mill	Lathe	eHMC	Robot	FC	CT	GG	WOOD	Print	Bending
4	6A 6B 11A 6D 21A	3A 3S 6A 6B 11A 21A 21B	8A 10A 12A 15A 8B 10B 12B 15B	81R-SCARA 81R-Delta 81R-Artic 81R-Gantry		6A 6B	6B		60B	
According to Pr9 setting: <ul style="list-style-type: none"> • M2: 4 • M3: 1 • EtherCAT: 1 • RTEX: 1 	6D-H 21A-H 210A-H 210A-H5 210B-H 210B-H5 610A-H5	6D-H 21A-H 21B-H 210B-H 210B-H5				70B 70B-5		610A-H 610B-H		



Number of Supported MPGs	Mill	Lathe	eHMC	Robot	FC	CT	GG	WOOD	Print	Bending
1	6A-E 6B-E 7A 21A-E 22A 210A-E 210A-E5 210B-E 210B-E5 220A 220A-5 220B 220B-5 610A-E5	6A-E 6D-E 7A 21A-E 21B-E 22A 22B 210B-E 210B-E5 220B	8C 8C-5 8E 10C 10C-5 10E 15C 15C-5 15E 80MI		A	60A	6A-E 21A-E	60-E	60A 60C 60E	7 2 A 7 2 0 A

1.140 Pr2031~Pr2040 MPG related axis ID

No	Descriptions	Range	Unit	Default	Effective
2031~2040	MPG related axis ID	[0~18]	-	0	Press Reset

- MPG related axis:
 0: Corresponding axis assigned by C16~C19
 1~18: Fix the MPG controlled axis as 1st to 18th axis, the relation is not affected by C16~C19 or C215~C228.

1.141 Pr2041~Pr2050 MPG resolution (Pulse/rev)

No	Descriptions	Range	Unit	Default	Effective
2041~2050	MPG resolution (Pulse/rev)	[100~2500000]	-	100	Press Reset

- This parameter setting defines MPG pulse resolution. For standard Syntec MPG, please use default value 100.

1.142 Pr2051~Pr2060 MPG scaling factor

No	Descriptions	Range	Unit	Default	Effective
2051~2060	MPG scaling factor	[1~4]	-	4	Press Reset

- Scaling factor of MPG pulse. Factor can be 1, 2, or 4.

1.143 Pr2061~Pr2080 MPG gear number at screw side, motor side

No	Descriptions	Range	Unit	Default	Effective
2061~2080	MPG gear number at screw side, motor side	[1~99999999]	-	1	Press Reset

- Set the gear ratio, enter the needed gear number at motor and screw side.

1.144 Pr2401~Pr2440 Axial position coordinate of stroke limit 1 (BLU)

No	Descriptions	Range	Unit	Default	Effective
2401~2440	Axial position coordinate of stroke limit 1 (BLU)	[-999999999 ~ 999999999]	BLU	-999999999 999999999	Press Reset

- When homing is finished after boot up, controller enables the stroke limit 1 automatically (1st software stroke limit).

1.145 Pr2441~Pr2480 Axial position coordinate of stroke limit 3 (BLU)

No	Descriptions	Range	Unit	Default	Effective
2441~2480	Axial position coordinate of stroke limit 3 (BLU)	[-999999999 ~ 999999999]	BLU	-999999999 999999999	Press Reset

- When homing is finished after boot up, C83 can enable the stroke limit 3 (3rd software stroke limit).
- After version 10.116, parameter name changed to "software stroke limit 3"; before 10.116, parameter name is "software stroke limit 2".

1.146 Pr2481 *Persistent of stroke limit 3

No	Descriptions	Range	Unit	Default	Default
2481	*Persistent of stroke limit 3 (0: No; 1: Reset; 2: Power Off)	[0~2]	-	0	Restart

- Software stroke limit 3 can be dynamically changed by #1941~#1976, which is different from other software stroke limits. Pr2481 is used to define its persistent type.

0: After boot up, system reads limit value from Pr2441~Pr2480 and assign to #1941~#1976. At this time, dynamically change #1941~#1976 is effective,; changing Pr2441~Pr2480 only updates parameters but will have no effect. Until Reset is pressed, system will read parameter again and update stroke limit. Registry Table will resume into unset condition after Reset.

1: After boot up, system reads limit value from Pr2441~Pr2480 and assign to #1941~#1976. At this time, dynamically change #1941~#1976 is effective,; changing Pr2441~Pr2480 only updates parameters but will have no effect. until next reboot, system will read parameter again and update stroke limit. Registry Table will resume into unset condition after Reboot.

2: After boot up, system reads limit value from Registry Table and assign to #1941~#1976. If Registry Table is unset, then read parameter from Pr2441~Pr2480 to assign to #1941~#1976 and Registry Table. From now on, dynamically change #1941~#1976 will be effective simultaneously and persistent. Changing Pr2441~Pr2480 only update parameter but is not effective.

- After version 10.116, parameter name changed to "software stroke limit 3"; before 10.116, parameter name is "software stroke limit 2".
- Always reboot after changing this parameter to avoid incorrect stroke limit value and cause problems.

1.147 Pr2482 Protect range of stroke limit 3

No	Descriptions	Range	Unit	Default	Effective
2482	Protect range of stroke limit 3	[1~2]	-	1	Press Reset

- When sets as 1, trigger alarm when axis position is beyond the limit range.
- When sets as 2, trigger alarm when axis position is within the limit range.
- Valid from version 10.116.

1.148 Pr2501~Pr2540 Axial position coordinate of stroke limit 2 (BLU)

No	Descriptions	Range	Unit	Default	Effective
2501~2540	Axial position coordinate of stroke limit 2 (BLU)	[-999999999 ~ 999999999]	BLU	0	Press Reset

- When homing is finished after boot up, G22/G23 can enable the stroke limit 2 (2nd software stroke limit).

- Valid from version 10.116.

1.149 Pr2542 Protect range of stroke limit 2

No	Descriptions	Range	Unit	Default	Effective
2542	Protect range of stroke limit 2	[1~2]	-	2	Press Reset

- When sets as 1, trigger alarm when axis position is beyond the limit range.
- When sets as 2, trigger alarm when axis position is within the limit range.
- Valid from version 10.116.

1.150 Pr2801~Pr2860 2nd~4th reference point

No	Descriptions	Range	Unit	Default	Effective
2801~2820	2nd reference point (machine coordinate)	[-999999999 ~ 999999999]	BLU	0	Press Reset
2821~2840	3rd reference point (machine coordinate)	[-999999999 ~ 999999999]	BLU	0	Press Reset
2841~2860	4th reference point (machine coordinate)	[-999999999 ~ 999999999]	BLU	0	Press Reset

1.151 Pr2901~Pr2902 *Servo station ID for master & slave axis of tension control couple axes

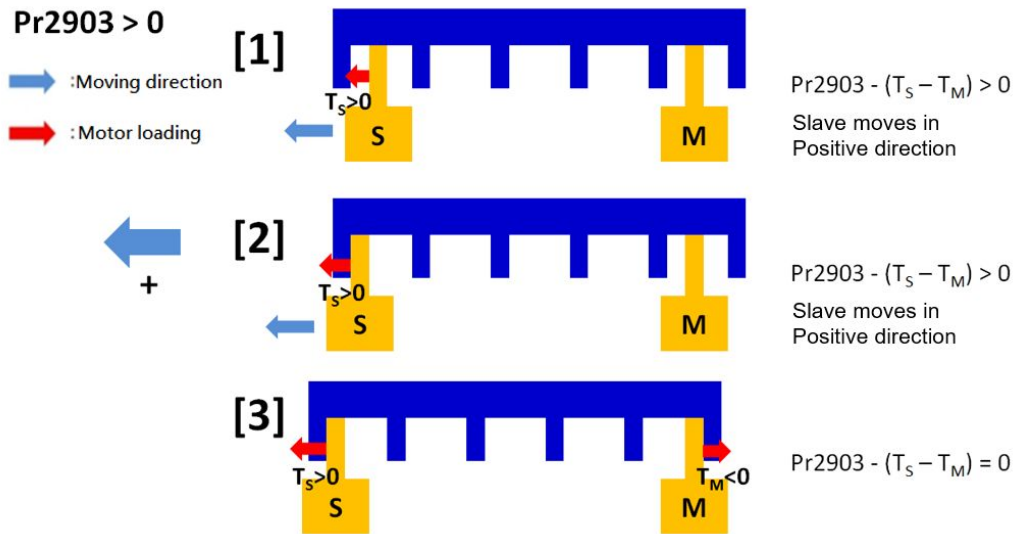
No	Descriptions	Range	Unit	Default	Effective
2901	*Servo station ID for master axis of tension control couple axes	[0~16010]	-	0	Reboot
2902	*Servo station ID for slave axis of tension control couple axes	[0~16010]	-	0	Reboot

- This parameter is used to set the master/slave axis port ID under tension controls axis coupling.
- It is recommended to set Pr2902 slave axis as a hidden axis (because the axes are synchronized, the coordinate of slave axis is not updating).

• Action Description

a. When Pr2903>0

- i. When master & slave axis has not reach to tension value set by Pr2903 and Pr2903 is positive, slave axis will move to positive first. Now slave axis torque $T_s > 0$.
- ii. Keep moving to positive. Slave axis touches the rack, and the rack creates a negative external torque to slave axis. To continue moving rack (bench) to positive, the positive torque will increase.
- iii. When rack (bench) touches master axis, it creates a positive external torque to master axis. To resist this positive external torque, the torque of master axis will increase negatively. Finally when $T_s - T_m$ equals to Pr2903, the tension control is completed.



b. When Pr2903 < 0

- i. When master & slave axis has not reach to tension value set by Pr2903 and Pr2903 is negative, slave axis will move to negative first. Now slave axis torque $T_s < 0$.
- ii. Keep moving to negative. Slave axis touches the rack, and the rack creates a positive external torque to slave axis. To continue moving rack (bench) to negative, the negative torque will increase.
- iii. When rack bumps into slave axis, it will give slave shaft a negative external torque. In order to fight with negative external torque, slave axis torque will positive slowly increase. Finally, $T_s - T_m$ will reaches to Pr2903 and finish tension control.
- iv. When rack (bench) touches master axis, it creates a negative external torque to master axis. To resist this negative external torque, the torque of master axis will increase positively.

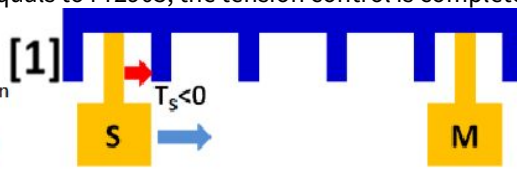
SYNTEC

Finally when $T_s - T_m$ equals to Pr2903, the tension control is completed.

Pr2903 < 0

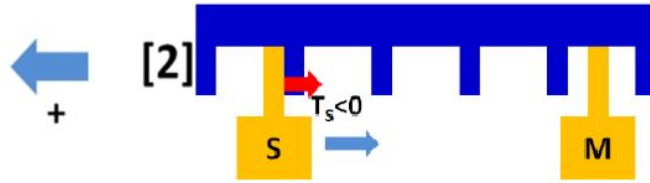
→ : Moving direction

→ : Motor loading



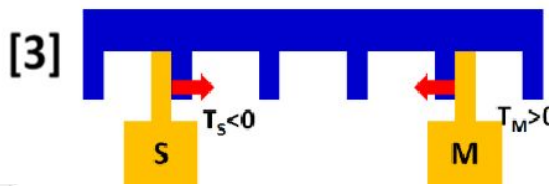
$$\text{Pr2903} - (T_s - T_m) > 0$$

Slave moves in negative direction



$$\text{Pr2903} - (T_s - T_m) > 0$$

Slave moves in negative direction



$$\text{Pr2903} - (T_s - T_m) = 0$$

- Note:
 - a. This function is only supported by serial bus servo axes.
 - b. If the relation between master & slave axes is opposite to the description above, and then tension control will become pressure control, and vice versa.
 - c. To avoid mechanical damage, please set Pr2903 and Pr2904 to a smaller value and test with a lower Feedrate. And adjust the parameter if needed afterward.
 - d. Please notices controller precision and drive electronic gear ratio setting are correct. (Recommended to set electronic ratio as 1:1. For newer drives with high resolution encoders i.e. Yaskawa Sigma 7, there is no need to use electronic gear ratio)
- Detailed operation can be found in Tension Control Function.

1.152 Pr2903 Target Tension Value of Tesion Control.

No	Descriptions	Range	Unit	Default	Effective
2903	Target Tension Value of Tesion Control	[-1000~1000]	Rated torque permille	0	Press Reset

- The parameter represents the target tension under tension control. When C137 is On, the slave axis will do position command compensation until $[\text{load of slave axis} - \text{load of master axis} = \text{Pr2903}]$.
- For example if Pr2903=100, when load of master axis is -2 (i.e. -2%), load of slave axis is 8 (i.e. 8%).
- The unit of this parameter is per mille (‰) of rated torque. Set this parameter to match motors with , therefore the structure undertakes same load level.
- If Pr2903 is positive value, the machine will extend to compensate backlash; on the contrary, machine will compress to compensate backlash.
- Detailed operation can be found in Tension Control Function.

1.153 Pr2904 Proportional Gain of Tension Control

No	Descriptions	Range	Unit	Default	Effective
2904	Proportional Gain of Tension Control	[0~1000]	0.01 RPM/ per mille of rated torque	0	Press Reset

- This parameter sets the compensation rate of slave axis when loads of master and slave axes are different.
- For example: Load of slave axis – load of master axis = 75 ‰ when Pr2903=100 and Pr2904=30, slave axis will have additional movement: $0.01 \times (100 - 75) \times 30 = 7.5$ RPM on top of its original command.
- Detailed operation can be found in Tension Control Function.

1.154 Pr2921~Pr2940 Axial quad-peak compensation method

No	Descriptions	Range	Unit	Default	Effective
2921~2940	Axial quad-peak compensation method	[-1~1]	-	0	Press Reset

- This parameter will decide which quad-peak compensation method the system will use:
 - 1:** Disable
 - 0:** Position quad-peak compensation: Use parameter values of Pr1361~, Pr1381~, Pr1441~, Pr1461~ to give additional position command when movement reverts.
 - 1:** Speed quad-peak compensation: Give additional speed command to when movement reverts. Can use quad-peak setting screen on controller to adjust.
 - 2:** Torque quad-peak compensation: Give additional torque command to when movement reverts. The controller will activate the torque quad-peak compensation of Syntec driver (Pn290).
- Parameter Changes:
 - Version 10.116.54D, 10.118.0B, 10.118.2 and after:
 - 1: Disable
 - 0: Speed quad-peak compensation: Give additional position command to when movement reverts. Can use quad-peak setting screen on controller to adjust.
 - 1: Torque quad-peak compensation: Give additional torque command to when movement reverts. This compensation is not adjustable by controller.
 - Version 10.116.54L, 10.118.0G, 10.118.7 and after, Pr2921~=0 description is corrected to 'speed quad-peak', and Pr2921~=1 compensation method is changed.
 - 1: Disable
 - 0: Position quad-peak compensation: Use parameter values of Pr1361~, Pr1381~, Pr1441~, Pr1461~ to give additional position command when movement reverts.
 - 1: Speed quad-peak compensation: Give additional speed command to when movement reverts. Can use quad-peak setting screen on controller to adjust.
 - Version 10.118.22A, 10.118.23 and after, Pr2921~ is correlated with the torque quad-peak compensation of Syntec driver (with serial parameter Pn290).
 - 1: Disable. Deactivate all the quad-peak compensation methods, including the one of Syntec driver (Pn290).
 - 0: Position quad-peak compensation: Use parameter values of Pr1361~, Pr1381~, Pr1441~, Pr1461~ to

give additional position command when movement reverts.

The controller will deactivate the torque quad-peak compensation of Syntec driver (Pn290).

1: Speed quad-peak compensation: Give additional speed command to when movement reverts. Can use quad-peak setting screen on controller to adjust.

The controller will deactivate the torque quad-peak compensation of Syntec driver (Pn290).

2: Torque quad-peak compensation: Give additional torque command to when movement reverts.

This compensation is not adjustable by controller.

The controller will activate the torque quad-peak compensation of Syntec driver (Pn290).

1.155 Pr3201 Machine Type

No	Descriptions	Range	Unit	Default	Effective
3201	*Machine type	[0~255]	-	0	Restart

- Set machine type of system axis group (path).
- If machine type is lathe, set Pr3201 according to lathe program style.
 - Pr3201 = 1, refer to lathe program C-type.
 - Pr3201 = 2, refer to lathe program A-type (Lathe Machine Program Manual (A Type)). MACRO subprograms can only use C-Type.
- After setting Pr3201 and reboot, the corresponding machine type-specific parameters can be found on user parameter page.
- This parameter description is the same for all machine types. (Different from CHT description)

Table of machine types:

Pr3201	Machine Type
0	General Milling Interface
1	General Lathe Interface, Type C program
2	General Lathe Interface, Type A program
3	General Lathe Interface, Type B program
10	Automation
11	EDM Electrical Discharge Machining
12	Spring Machine
101~255	Refer to Robot Types and Specification. ※Parameter description is "Robot Type" for Robot controllers

Parameter value range of corresponding machine types:

CPU	Lathe Type	Pr3201		
		Initial Value	Range	Default Machine Type
ARM	Mill(Non Super Series)	0	[0~0]	0: General Lathe Interface
	Mill(Super Series)	0	[0~20]	0: General Lathe Interface
	Cutting, Drill, FC, GlassGrind, Print, Scanning, WOOD	0	[0~0]	0: General Lathe Interface
	Lathe(Non Super Series)	1	[1~3]	1: Lathe Type C
	Lathe(Super Series)	1	[0~20]	1: Lathe Type C
	HC	10	[10~10]	10: Automation
	SCARA	101	[101~255]	101~255 Refer to Robot Type and Specification
	ARTIC	116	[101~255]	
	DELTA	121	[101~255]	
GANTRY	251	[101~255]		
x86	Mill	0	[0~20]	0: General Milling Machine Interface
	Lathe	1	[0~20]	1: Lathe Type C

1.156 Pr3202 I_O scan time

No	Descriptions	Range	Unit	Default	Effective
3202	• I/O scan time	[100~5000]	ms	3000	Restart

- This parameter sets the time interval of system kernel reading I/O Terminal Boards after boot up.
- Actual time interval is related to interpolation time (System Data 4), system will get the integral multiple of interpolation time which is closest to Pr3202 value.

- Example: Pr3202 is 5000 and System Data 4 is 3000, so the ratio is 1.67. The integral multiple closest to Pr3202 is 2, therefore actual I/O scan time interval is 6000 (unit 0.001ms).
- This parameter is not related to reading time interval of operation panel I/O.

1.157 Pr3203 Interpolation time interval

No	Descriptions	Range	Unit	Default	Effective
3203	*Interpolation time interval	[500~200000]	ms	2000	Restart

- This parameter sets the time interval between each motion command is sent out after system boots up. But the actual time interval is related to hardware interruption (ISR).
 - SUPER controller: Around Pr3203/1000*983,
 - 10 series & EZ series controller: Around Pr3203/1000*819.
 - Other controllers are the same as Pr3203, or directly use System Data 4 as reference.
- For dual-core controllers, minimum setting is 2000 (2ms);
If the value is <2000, controller will take 2000 as interpolation time for communication, and trigger Hint OP-83 "Interpolation time must ≥ 2ms".
- Max Number of M2 Supported Axis and Interpolation Time.
(Including general CNC axes + serial PLC axes + ROT axes)

Pr3203	Axis number
1000	8
2000~4000	16

Restriction: With M2 drives, Pr3203 must be integer multiple of 500. For example:1000, 1500, 2000, ..., and up to 4000 maximum.

- Max Number of M3 Supported Axis and Interpolation Time.
(Including general CNC axes + serial PLC axes + ROT axes + M3-IO + ATC axes + serial NC axes)

Pr3203	Axis number
1000	8
2000	16
3000	24
4000	48

Restriction: With M3 drives, Pr3203 must be integer multiple of 500. For example:1000, 1500, 2000, ..., and up to 4000 maximum.

- Max Number of RTEX Supported Axis and Interpolation Time.
(General CNC axis)

Pr3203	Axis number
1000	8
2000	16

Restriction: With RTEX drives, Pr3203 can only set as 1000 or 2000.

- Max Number of EtherCAT Supported Axis and Interpolation Time.
 - version 10.118.28I, 10.118.33 and below: Suggested max number of axis: 9.
 - version 10.118.28J, 10.118.34 and above:
(General CNC axis)

Hardware	3203	Axis number	Note
I.MX6 Dual Core	2000	16	Supported max number of axis: 16.
I.MX6 Single Core	2000	16	Suggested max number of axis: 16, according to controller performance(BPT, Man Machine Interface...).
AM3354 Single Core	2000	8	Suggested max number of axis: 8, according to controller performance(BPT, Man Machine Interface...).
	3000~4000	16	Suggested max number of axis: 16, according to controller performance(BPT, Man Machine Interface...).

- The setting range of Pr3203 for each servo drive brand:

Pr3203	Delta	Panasonic	Mitsubishi	Servotronic
1000	O	O	O	O
2000	O	O	O	O
3000	O	X	X	O
4000	O	O	O*	O

* Supported Driver Version: 2.03.01 and above.

1.158 Pr3204 PLC scan time

No	Descriptions	Range	Unit	Default	Effective
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3204	*PLC scan time	[500~ 200000]	0.001ms	10000	Restart
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- This parameter sets the time interval between each PLC scanning.
- Actual time interval is related to interpolation time (System Data 4), system will get the integral multiple of interpolation time which is closest to Pr3204 value.
 - Example: Pr3204 is 10000 and System Data 4 is 3000, so the ratio is 3.33. The integral multiple closest to Pr3204 is 3, therefore actual I/O scan time interval is 9000 (unit 0.001ms).

1.159 Pr3205 *Function key type

No	Descriptions	Range	Unit	Default	Effective
3205	*Function key type	[0~2]	-	0	Restart

- Syntec controllers have three types of function keys configurations under their LED monitor: 5 keys, 8 keys, and 10 keys. This parameter sets the display modes of the software function keys at the bottom of the screen.
 - 0: 5 keys
 - 1: 8 keys
 - 2: 10 keys (Note: Currently only for 22 and 220 series)
- At the version 10.116.54E, 10.118.0C, 10.118.3 and later, the following machin type and model is limited to certain keys, so the parameter can't be changed and is also not shown.
 - Limited to 5 keys
 - Lathe: 6D-H, 7A
 - Mill: 6D, 6D-H, 7A
 - Limited to 8 keys
 - Lathe: 11A, 11A-X, 11B, 11B-X, 220B, 22A, 22B
 - Mill: 11A, 11A-X, 11B, 11B-X, 200A-X, 200A-X5, 200B-X, 200B-X5, 220A, 220A-5, 220B, 220B-5, 22A
 - eHMC: 80MI
 - Cutting: 70A
 - Print: 60B, 60C

1.160 Pr3207 C/S interface version number

No	Descriptions	Range	Unit	Default	Effective
3207	*C/S interface version number	[1~2]	-	2	Restart

- This parameter sets the override register value type:
 - 1: Override value is in percentage, range:-200% ~ +200 % (Industry Machine);
 - 2: Override value in levels, range: 1~20 (Lathe and Mill).
- This parameter setting affects multiple override including:
 - Spindle Override: R15
 - Feedrate Override: R16, R533, R543, R553
 - JOG Override: R17
 - Rapid Traverse (G00) Override: R18, R534, R544, R554

1.161 Pr3209 Language.

No	Descriptions	Range	Unit	Default	Effective
3209	*Language	[0~233]	-	1	Immediately

- This parameter is used to set the displayed language on machine interface.
- DOS System supports following languages:

Number	Language	String file	Note
0	English	cncloc.str	
1	Traditional Chinese	cncloc.str	
2	Local language	cncloc.str	Support English character only
3	Simplified Chinese	none	Translated from Traditional Chinese

- WinCE System Default Languages:

Number	Language	Code	Note
0	Default Language	COM	Default language is English
1	Traditional Chinese	CHT	
119	Simplified Chinese	CHS	
176	Korean	KOR	from 10.118.26 Note: <ul style="list-style-type: none"> • Korean font is built-in from BSP 9.21 for i.MX6 • Font file has to be installed for AM335x
194	Turkish	TRK	

- Compatibility
 - Version 10.116.24 and later:
 - Support dynamic language switching function, no need to reboot after parameter change.
 - When switching language at the first time, it is normal to have lag for 1~2 seconds.
- To create customized languages in WinCE System:

- a. Contact technical support to receive language string installation pack.
- b. Change font setting in MMIconfig.
- c. Customize the corresponding String file according to following table of language code
- d. Sets Pr3209 according to the following table of language code

Number	Language	Region	Code	Note
0	Directory for country-independent resources	Local	COM/ Common	Default in English
1	Chinese Traditional	Taiwan	CHT	
100	Arabic	Saudi Arabia	ARA	
101	Arabic	Iraq	ARI	
102	Arabic	Egypt	ARE	
103	Arabic	Libya	ARL	
104	Arabic	Algeria	ARG	
105	Arabic	Morocco	ARM	
106	Arabic	Tunisia	ART	
107	Arabic	Oman	ARO	
108	Arabic	Yemen	ARY	
109	Arabic	Syria	ARS	
110	Arabic	Jordan	ARJ	
111	Arabic	Lebanon	ARB	
112	Arabic	Kuwait	ARK	
113	Arabic	U.A.E.	ARU	
114	Arabic	Bahrain	ARH	

Number	Language	Region	Code	Note
115	Arabic	Qatar	ARQ	
116	Bulgarian	Bulgaria	BGR	
117	Catalan	Spain	CAT	
118	Chinese Traditional	Taiwan	CHT	
119	Chinese Simplified	PRC	CHS	
120	Chinese	Hong Kong SAR	ZHH	
121	Chinese	Singapore	ZHI	
122	Chinese	Macau SAR	ZHM	
123	Czech	Czech Republic	CSY	
124	Danish	Denmark	DAN	
125	German	Germany	GER	
126	German	Switzerland	DES	
127	German	Austria	DEA	
128	German	Luxembourg	DEL	
129	German	Liechtenstein	DEC	
130	Greek	Greece	ELL	
131	English	United States	USA	
132	English	United Kingdom	ENG	
133	English	Australia	ENA	

Number	Language	Region	Code	Note
134	English	Canada	ENC	
135	English	New Zealand	ENZ	
136	English	Ireland	ENI	
137	English	South Africa	ENS	
138	English	Jamaica	ENJ	
139	English	Caribbean	ENB	
140	English	Belize	ENL	
141	English	Trinidad	ENT	
141	English	Zimbabwe	ENW	
142	English	Philippines	ENP	
143	Spanish	Spain	ESP	
144	Spanish	Mexico	ESM	
145	Spanish	Spain	ESN	
146	Spanish	Guatemala	ESG	
147	Spanish	Costa Rica	ESC	
148	Spanish	Panama	ESA	
149	Spanish	Dominican Republic	ESD	
150	Spanish	Venezuela	ESV	
151	Spanish	Colombia	ESO	

Number	Language	Region	Code	Note
152	Spanish	Peru	ESR	
153	Spanish	Argentina	ESS	
154	Spanish	Ecuador	ESF	
155	Spanish	Chile	ESL	
156	Spanish	Uruguay	ESY	
157	Spanish	Paraguay	ESZ	
158	Spanish	Bolivia	ESB	
159	Spanish	El Salvador	ESE	
160	Spanish	Honduras	ESH	
161	Spanish	Nicaragua	ESI	
162	Spanish	Puerto Rico	ESU	
163	French	Finland	FIN	
164	French	France	FRA	
165	French	Belgium	FRB	
166	French	Canada	FRC	
167	French	Switzerland	FRS	
168	French	Luxembourg	FRL	
169	French	Monaco	FRM	
170	Hebrew	Israel	HEB	

Number	Language	Region	Code	Note
171	Hungarian	Hungary	HUN	
172	Icelandic	Iceland	ISL	
173	Italian	Italy	ITA	
174	Italian	Switzerland	ITS	
175	Japanese	Japan	JPN	
176	Korean (Extended Wansung)	Korea	KOR	
177	Dutch	Netherlands	NLD	
178	Dutch	Belgium	NLB	
179	Norwegian (Bokmål)	Norway	NOR	
180	Norwegian (Nynorsk)	Norway	NON	
181	Polish	Poland	PLK	
182	Portuguese	Brazil	PTB	
183	Portuguese	Portugal	PTG	
184	Romanian	Romania	ROM	
185	Russian	Russia	RUS	
186	Croatian	Croatia	HRV	
187	Serbian (Latin)	Serbia	SRL	
188	Serbian (Cyrillic)	Serbia	SRB	
189	Slovak	Slovakia	SKY	

Number	Language	Region	Code	Note
190	Albanian	Albania	SQI	
191	Swedish	Sweden	SVE	
192	Swedish	Finland	SVF	
193	Thai	Thailand	THA	
194	Turkish	Turkey	TRK	
195	Urdu	Pakistan	URP	
196	Indonesian	Indonesia	IND	
197	Ukrainian	Ukraine	UKR	
198	Belarusian	Belarus	BEL	
199	Slovene	Slovenia	SLV	
200	Estonian	Estonia	ETI	
201	Latvian	Latvia	LVI	
202	Lithuanian	Lithuania	LTH	
203	Classic Lithuanian	Lithuania	LTC	
204	Farsi	Iran	FAR	
205	Vietnamese	Vietnam	VIT	
206	Armenian	Armenia	HYE	
207	Azeri (Latin)	Azerbaijan	AZE	
208	Azeri (Cyrillic)	Azerbaijan	AZE	

Number	Language	Region	Code	Note
209	Basque	Spain	EUQ	
210	FYRO	Macedonian	MKI	
211	Afrikaans	South Africa	AFK	
212	Georgian	Georgia	KAT	
213	Faeroese	Faeroe Islands	FOS	
214	Hindi	India	HIN	
215	Malay	Malaysia	MSL	
216	Malay	Brunei Darussalam	MSB	
217	Kazak	Kazakhstan	KAZ	
218	Swahili	Kenya	SWK	
219	Uzbek (Latin)	Uzbekistan	UZB	
220	Uzbek (Cyrillic)	Uzbekistan	UZB	
221	Tatar:	Tatarstan	TAT	
222	Bengali	India	BEN	
223	Punjabi	India	PAN	
224	Gujarati	India	GUJ	
225	Oriya	India	ORI	
226	Tamil	India	TAM	
227	Telugu	India	TEL	

Number	Language	Region	Code	Note
228	Kannada	India	KAN	
229	Malayalam	India	MAL	
230	Assamese	India	ASM	
231	Marathi	India	MAR	
232	Sanskrit	India	SAN	
233	Konkani	India	KOK	

1.162 Pr3211 *Display type

No	Descriptions	Range	Unit	Default	Effective
3211	*Display type	[0~1]	-	0	Restart

- Set display type:
0: Color display;
1: Mono-color display (only Syntec 9" CRT monitor is mono-color)

1.163 Pr3213 Floppy Name

No	Descriptions	Range	Unit	Initial	occasion
3213	Floppy Name	[0~7]	-	1	Restart

- This parameter is to decide the initial(default) position of external accessible storage disk.
- In CE system, the initial external disk driver code is as following:
1: USB1 port;
2: DiskA;
3: Network folder;
4: USB2 port;

- In DOS system, the initial external disk driver code is as following:
0: 1.44MB Floppy;
1: 1.44MB Floppy;
2: Second CF card;
3: Network folder;

- 4: Front plug CF card (Embedded controllers);
- 5: Front plug USB1 port (Embedded controllers);
- 6: Back plug USB2 port (Embedded controllers);
- 7: Back plug USB3 port (Embedded controllers);

1.164 Pr3215 *Enable T code call mode.

No	Descriptions	Range	Unit	Default	Effective
3215	*Enable T code call mode	[0~2]	-	0	Restart

- This parameter is used to set the call mode when executing T code.

Value	Mode
0	<ul style="list-style-type: none"> • Execute in PLC • Will not call T0000
1	<ul style="list-style-type: none"> • Call T0000 as sub-program • Will not occupy argument
2	<ul style="list-style-type: none"> • Call T0000 as MACRO • Read & occupy arguments

- In Lathe systems, if Pr3215 is set to zero, system will automatically switch to Pr3215=1 mode because lathe uses T code MACRO by default.
- For both MACRO and Sub-program, no more M code MACRO can be called in T0000. Instead, PLC devices will be triggered directly.



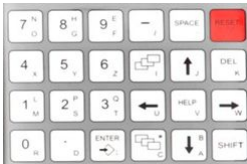


Example:




Pr3215	Program	Effect
1	T01 M03 S1000	Machine will change tool first, and then begin spindle rotation CW.
2	T01 M03 S1000	If #13 and #19 are used in T0000, then the M code and S code will have no effect. Therefore the machine will change tool only.

1.165 Pr3217 *Control panel type



No	Descriptions	Range	Unit	Initial	occasion
3217	*Control panel type	[0~200]	-	0	Restart

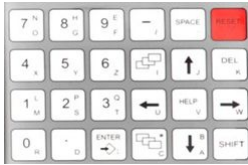





This parameter is used to set the control panel keyboard type, please refer to the table below.

Setup	Hardware Type	Hardware Picture	Remarks
1	8.4" TFT900 monitor SK series EZ series		Each text key has two definitions.
2	10.4" TFT900 monitor VK-900 keyboard HK-900 keyboard 15" operation panel		Each text key has one definition.
4	10.4" TFT940 monitor 8.4" TFT940 monitor		Each text key has three definitions.
13	VK8-900 keyboard 10" VK split type keyboard 6/21/ 22/ 210/ 220 series		Each text key has two definitions. [
14	11A-940 (same as 960)		Each text key has three definitions.

15	VK15 keyboard 15" monitor of 22/220 series		<ol style="list-style-type: none"> The right column keys (G1~G8) will work when Pr3217=15. When Pr3217=15 with PC keyboard: <ol style="list-style-type: none"> Number pad arrow keys can be used to move cursor. The "←, ↑, →, ↓, Pg Up, Pg Dn, Home, and End" keys on PC keyboard correspond to the right column keys (G1~G8) respectively. Unable to trigger S-bits on PC keyboard. 		
9	PC keyboard		Cannot trigger S Bits.		
0	PC keyboard		Cannot use special symbols, ex: ~!@#\$ etc...		
No	Descriptions	Range	Unit	Initial	occasion
3217	*Control panel type	[0~200]	-	0	Restart

This parameter is used to set the control panel keyboard type, please refer to the table below.

Setup	Hardware Type	Hardware Picture	Remarks
1	8.4" TFT900 monitor SK series EZ series		Each text key has two definitions.
2	10.4" TFT900 monitor VK-900 keyboard HK-900 keyboard 15" operation panel		Each text key has one definition.

4	10.4" TFT940 monitor 8.4" TFT940 monitor		Each text key has three definitions.
13	VK8-900 keyboard 10" VK split type keyboard 6/21/ 22/ 210/ 220 series		Each text key has two definitions.[
14	960 keyboard 6C series		Each text key has three definitions.
15	VK15 keyboard 15" monitor of 22/220 series		<ol style="list-style-type: none"> 1. The right column keys (G1~G8) will work when Pr3217=15. 2. When Pr3217=15 with PC keyboard: <ol style="list-style-type: none"> a. Number pad arrow keys can be used to move cursor. b. The "←, ↑, →, ↓, Pg Up, Pg Dn, Home, and End" keys on PC keyboard correspond to the right column keys (G1~G8) respectively. c. Unable to trigger S-bits on PC keyboard.
9	PC keyboard		Cannot trigger S Bits.
0	PC keyboard		Cannot use special symbols, ex: ~!@#\$ etc...

1.166 Pr3219 *System configuration

No	Descriptions	Range	Unit	Default	Effective
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3219	*System configuration	[0~4]	-	0	Restart
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- This parameter defines the different location to store GNcFile/NcFile and Registry in different systems; but MACRO is not affected by this parameter. The path of DOS system is C:\CNC\EXE; the path of CE system is DiskC:\\OpenCnc\\MACRO
- NcFile(GNcFile) and Registry storage location will be changed by the setting of this parameter.

P r 3 2 1 9	DOS	WinCE
0	NcFile(GNcFile) → C: \CNC\NcFile(GNcFile) Registry → C: \CNC\USER	NcFile(GNcFile) → DiskC2: \OpenCnc\NcFile(GNcFile) Registry → DiskC2: \OpenCnc\USER
1	NcFile(GNcFile) → A: \CNC\NcFile(GNcFile) Registry → A: \CNC\USER	NcFile(GNcFile) → DiskC2: \OpenCnc\NcFile(GNcFile) Registry → DiskC2: \OpenCnc\USER
2	NcFile(GNcFile) → D: \CNC\NcFile(GNcFile) Registry → A: \CNC\USER	NcFile(GNcFile) → DiskC: \OpenCnc\NcFile(GNcFile) Registry → DiskC: \OpenCnc\USER
3	NcFile(GNcFile) → D: \CNC\NcFile(GNcFile) Registry → D: \CNC\USER	NcFile(GNcFile) → DiskA: \OpenCnc\NcFile(GNcFile) Registry → DiskA: \OpenCnc\USER
4	Unavailable	NcFile(GNcFile) → N: \\CNC\\NcFiles(GNcFile) Registry → DiskA: \\OpenCnc\\USER

SYNTEC

N o t e	<p>a. C: is the first CF card (system card); D: is the second CF card (file card); A is SRAM (early hardware type, no longer used.)</p> <p>b. When parameter is 3 but no file card presents, files will be saved to the 2nd partition of system card automatically.</p>	<p>a. DiskC is the first CF card (system card); DiskA is the second CF card (file card). DiskC2 is the inaccessible 2nd partition of system card; N is the Network folder.</p> <p>b. Pr3219 = 4, the path of the NC file is a network folder.</p> <p>i. Tool length and home position, are still stored in DiskA.</p> <p>ii. Steps(10.118.28G, 10.118.32 and earlier):</p> <ol style="list-style-type: none"> 1. PC: Create a network sharing folder and name CNC. 2. Controller: Set up the network sharing folder, and the connection between PC and controller. <p>iii. Steps(10.118.28H, 10.118.33 and later):</p> <ol style="list-style-type: none"> 1. PC: Use SyntecFS to create a network sharing folder and name CNC. 2. Controller: Set up the network sharing folder, and the connection between PC and controller. 3. Note1: Please refer SyntecFS Server Manual. to use SyntecFS. 4. Note2: Dual core system must use SyntecFS to create connection, signal core system can use old method, but it is recommended to use SyntecFS in new version. 5. Note3: Dual core system validation version:
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		<p>a. Range 1: 10.118.28H, 10.118.33 ~ 10.118.28W, 10.118.29W, 10.118.40C, with image version 9.22 and later.</p> <p>b. Range 2: 10.118.40K, 10.118.41K ~ 10.118.44D, with image version 9.22 and later.</p> <p>6. Pr3219 = 4, if the network connection is not successful, CNC cannot do the following actions:</p> <p>a. Program editing, file management.</p> <p>b. MDI editing</p>
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1.167 Pr3220 Folder Path Limitation

No	Descriptions	Range	Unit	Default	Effective
3220	Folder Path Limitation	[0~1]	-	0	Press Reset

- This parameter is used to set whether "non-main system, PLC axis, auxiliary program before and after processing" can only find files from the Macro folder.
0: Disable;
1: Enable; "non-main system, PLC axis, auxiliary program before and after processing" can only find files from the Macro folder.
※When Pr3220 = 1, the file name opened in "non-main system, PLC axis, auxiliary program before and after processing", NcFiles folder is not allowed to have the same file name.
- When Pr3221 = 1 or 2 (Pr3221 is enabled), this parameter is invalid (equivalent to Pr3220 = 0).
- Mill, Lathe, Spring do not support this parameter.

1.168 Pr3221 Debug level

No	Descriptions	Range	Unit	Default	Effective
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3221	Debug level	[0~2]	-	0	Press Reset
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- The debug level is the function for checking the MACRO syntax. When the single block flag(C40) is ON and this function is disabled, if there is a block using the MACRO syntax command in the program, it will not enter the single block stop;
When the single block flag(C40) is ON and this function is enabled, if there is a block using the MACRO syntax command in the subroutine or macro, it will also enter the single block stop.
0: Disable the debug function;
1: Enable the debug function in the subroutine (Oxxxx);
2: Enable the debug function in the macro (Gxxxx).
- When the debug level is set, the single block flag(C40) needs to be triggered ON before the program is started. It will have no effect if the single block flag is triggered during the program execution.
- The debugging Macro or sub-program should be stored in Ncfiles folder so the program cursor and simulation can be correctly displayed in Monitor screen.
- It is suggested to disable this function after debugging finishes, otherwise it can cause the cursor in Monitor screen is not synchronous with program execution.
- Pr3215 decides if T code is processed as a Sub-program or Macro.
- MACRO variable #1502 is valid only when Pr3221 is set to 0. Under the other setting values of Pr3221, in order to debug the MACRO syntax, even if the bit 0 of #1502 is set to 1, it will still enter the single block stop.

1.169 Pr3223 *Enable System Manager

No	Descriptions	Range	Unit	Default	Effective
3223	*Enable System Manager	[0~1]	-	1	Restart

- This parameter defines if "System Admin" is displayed or not.
0: Disable this Function Key;
1: Enable this Function Key.
- Valid from version 10.116.36E, 10.116.39 and after.

1.170 Pr3224 Spindle Position Display

No	Descriptions	Range	Unit	Default	Effective
3224	Spindle Position Display	[0~1]	-	0	Press Reset

- Set to display spindle angle or not:
0: Not display spindle angle (Default);
1: Display spindle angle.
- Spindle mode, i.e. C63 is Off (Type0~3):
Pr3224=0, not display spindle angle
Pr3224=1, display spindle angle

No matter what Pr3224 is, main screen displays spindle in rotation speed RPM.
Spindle rotation will not be included in Feedrate calculation.

- C axis mode, also means when C63 is on (Type1~3):
Main screen will display C axis angle
Spindle rotation will show 0 RPM
C axis rotation speed will be included in Feedrate calculation.

1.171 Pr3225 Screen Saver Time Latency.

No	Descriptions	Range	Unit	Default	Effective
3225	Screen saver time latency	[1~99]	min	5	Reset

- This parameter is used to activate the screen saver function to extend the life of the monitor.
1~99: The value sets how long the monitor will turn off after user stops operating.
- After 10.114.53, 10.115.55, 10.114.50C, C088 is provided for the monitor to leave the screen saver mode. (Not disable the screen saver function)
 - only in CE system

1.172 Pr3227 *Screen resolution

No	Descriptions	Range	Unit	initial	occasion
3227	*Screen resolution	[0~2]	-	0	Restart

- Set the screen resolution of controller monitor:
 - DOS:
 - 0: 640X480 pixel;
 - 1: 800X600 pixel.
 - WinCE
 - 0: Full Screen;
 - 1: 800X600 pixel;
 - 2: 1024X768 pixel.
 - PC CE Simulator
 - 0: Full screen;
 - 1: 800X600 pixel;
 - 2: 1024X768 pixel.
- For ARM controllers, e.g. 6/11/21/FC series, please set same value to the LCD resolution under SA to have the resolution correct.
 - After 10.118.11, SA doesn't support "Change LCD Resolution" function.
- X86 controllers do not support changing screen resolution by this parameter.

1.173 Pr3228 *Enable tool manager

No	Descriptions	Range	Unit	Default	Effective
3228	*Enable tool manager	[0~1]	-	0	Restart

- 0: Disable "Tool Life Management" in "Offset/Setting"
- 1: Enable "Tool Life Management"
- Valid from version 10.116.36E, 10.116.39 and later.

1.174 Pr3229 *Disable workpiece coordinate

No	Descriptions	Range	Unit	Default	Effective
3229	*Disable workpiece coordinate	[0~1]	-	0	Restart

- Set workpiece coordinate setting screen displayed or not.
0: Enable;
1: Disable
- Valid from version 10.116.36E, 10.116.39 and after.

1.175 Pr3230 *Disable lathe tool length setting screen

No	Descriptions	Range	Unit	Default	Effective
3230	*Disable lathe tool length setting screen	[0~1]	-	0	Restart

- Set disable lathe tool length setting screen display:
0: Enable function keys;
1: Disable function keys.

Note :

- In version after 10.116.36E, 10.116.39, when disabling lathe tool length setting screen, function key of tool length is not displayed.
- In version after 10.116.38F, 10.116.54D, 10.118.0B, 10.118.2, when disabling lathe tool length setting screen, lathe shortcut key "Offset/Setting" does not jump to tool length setting screen.

1.176 Pr3231 *COM1 Remote Device

No	Descriptions	Range	Unit	Default	Effective
3231	*COM1 Remote Device	[0~9]	-	0	Restart

- This parameter sets COM1 remote device type:
0: Disable;
1: FX2 HMI;
3: FX2-V2 HMI. This setup allows 4056 Registers.
- When Pr3231=1, FX2 HMI D0~D511 corresponds to controller R0~R255.
- When Pr3231=3, the corresponding controller registers of FX2 HMI D0~D511 are in the table below. Relation between R0~R3999 and FX2 HMI D0~D399 can be switched by controller's R4055 (FX2's D510); on the other hand, the correspondence between controller R4000~R4055 and FX2 HMI D400~D511 is fixed.

R4055 Setting	FX2 D Register	CNC R Register
R4055(D510)=0	D000~D399	R0000~R0199
R4055(D510)=1	D000~D399	R0200~R0399
...
R4055(D510)=19	D000~D399	R3800~R3999
X	D400, D401	R4000
	D402, D403	R4001

	D510, D511	R4055
Note	Controller Registers are 32bit FX2 D Registers are 16bit	

1.177 Pr3232 *COM2 Remote Device

No	Descriptions	Range	Unit	Default	Effective
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3232	*COM2 Remote Device	[0~9]	-	0	Restart
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- This parameter sets COM1 remote device type:
0: Disable;
1: FX2 HMI;
3: FX2-V2 HMI. This setup allows 4056 Registers.
- Refer to [Pr3231 *COM1 Remote Device](#) for detail

1.178 Pr3234 *Open Modbus Slave

No	Descriptions	Range	Unit	Default	Effective
3234	*Open Modbus Slave	[0~3]	-	0	Restart

- This parameter defines Modbus Slave function is enabled on which port number.
0: Disable
1: COM1
2: COM2(For Arm series controllers exclude 81R series)
3: COM3(For SUPER/10/20/200)
9: LAN (LAN1), valid from version: 10.116.54F, 10.118.0D, 10.118.4

Note:

- Setting Description:
 - Use COM1~3 through Modbus RS485.
 - Use LAN(LAN1) through Modbus TCP.
- When using Modbus TCP Server(Slave):
 - Server (Slave) and Client (Master) must be in the same domain.
 - Once connected, if master is PC or other non-controller devices, and no command (packet) is sent from Client (Master) over 10 second, Server will terminate the connection with Client. (Remark 1)
- ARM 81R series controllers do not support this function

Remark 1: If master is controller, it will stay connected with slave.

1.179 Pr3235 *Modbus Slave Station ID

No	Descriptions	Range	Unit	Default	Effective
3235	*Modbus Slave Station ID	[0~255]	-	0	Restart

- Set the Station ID of Modbus Slave:
0~255: Modbus Slave Station ID

1.180 Pr3236 *Network Station ID

No	Descriptions	Range	Unit	Default	Effective
3236	*Network Station ID	[0~31]	-	0	Restart

- Set network station number:
0: Disable;
1~31: Network CNC number.

- This parameter defines NetPLC network station number:

Number	Function
0 or any unlisted value	Close
1~31, 101~131, 201~231... .. 9801~9831, 9901~9931	<p>NetPLC network station number. Number of centesimal (≥ 100) digit is Group ID, only stations under same Group can connect with each other. Currently support 100 Groups.</p> <p>1~31 → Group 0</p> <ul style="list-style-type: none"> Group 0 Server network station number: 1 Group 0 Client network station number: 2~31 <p>101~131 → Group 1</p> <ul style="list-style-type: none"> Group 1 Server network station number: 101 Group 1 Client network station number: 102~131 <p>201~231 → Group 2</p> <ul style="list-style-type: none"> Group 2 Server network station number: 201 Group 2 Client network station number: 202~231 <p>..... and so on</p> <p>9901~9931 → Group 99</p> <ul style="list-style-type: none"> Group 99 Server network station number: 9901 Group 99 Client network station number: 9902~9931

- Effective version of Network Station ID

Version	Parameter Range
10.116.52, 10.117.52 & Before	Only support one NetPLC Group network station number, parameter range is [0~31].

Version	Parameter Range
10.116.53, 10.117.53 & After	Support multi-group NetPLC network station number, parameter range is [0~9931]

1.181 Pr3237 *Network whiteboard R register start number

No	Descriptions	Range	Unit	Default	Effective
3237	*Network whiteboard Register start number	[1024~4096]	-	1024	Restart

1.182 Pr3238 *Network whiteboard R register length

No	Descriptions	Range	Unit	Default	Effective
3238	*Network whiteboard R register length	[0~3072]	-	0	Restart

1.183 Pr3241 *Decimal point type

No	Descriptions	Range	Unit	Default	Effective
3241	*Decimal point type	[0~1]	-	0	Restart

- This parameter defines the decimal point type of position and time input in NC files.
- The value is 0 by default:

Unit	Pr17	Inout unit when no decimal point entered
mm	1	0.01
deg	2	0.001
sec		
	3	0.0001
inch	1	0.001

	2	0.0001
	3	0.00001

- Parameter is 1:
Irrelevant to Pr17 Control precision, when no decimal point entered, 1 unit means 1 mm, 1 deg, 1 inch, or 1 sec.
- Changing this parameter may reduce or increase the command by 100 times. Please make sure the NC program unit is correct.
Example in Metric:

Pr3241	Pr17	Movement Command	Actual Distance
0	1	G00 X100	1(mm)
0	2	G00 X100	0.1(mm)
1	-	G00 X100	100(mm)
-	-	G00 X100. (with decimal point)	100(mm)

*Note: In the table, "-" means it is irrelevant to that parameter. All values are valid.

1.184 Pr3243 *Keyboard reset process by PLC

No	Descriptions	Range	Unit	Default	Effective
3243	*Keyboard reset process by PLC	[0~1]	-	0	Restart

- This parameter decides how reset signal is processed when Reset button on panel is pressed (S32 ON).
0: MMI processes S32 and directly inform kernel.
1: S32 read by PLC, and ladder logic triggers C37 to inform kernel.

1.185 Pr3245 Max increment value of input for tool wear compensation(BLU)

No	Descriptions	Range	Unit	initial	occasion
3245	Max increment value of input for tool wear compensation (BLU)	[1~200000]	BLU	1000	Press Reset

- This parameter limits the maximum increment of adjusting tool wear by operator to avoid excess input and cause mechanical interference.

1.186 Pr3247 Feedrate display method

No	Descriptions	Range	Unit	Default	Effective
3247	Feedrate display method	[0~1]	-	0	Reset

- Set the unit of feedrate display:
0: mm/min;
1: m/min.
- Only valid for DOS systems, CE systems do not have this parameter.

1.187 Pr3249 *MLC Alarm ID Expansion

i 中文版本Chinese version: Pr3249 *MLC警報數量擴增

No	Descriptions	Range	Unit	initial	occasion
3249	*MLC Alarm ID Expansion	[0~63]	-	0	Restart

- Basic Information:

This parameter can let controller treats bit 16~31 of R44~R49 as PLC Alarms in order to satisfy the demand on the number of custom alarms.

- Parameter explanation:

This parameter can let controller treats bit 16~31 of R44~R49 as PLC Alarms and will be stored in alarm history. Be treated as a PLC Alarm, the Alarm ID will not be changed.

Setting the Pr3249 is just like setting binary bits. Means setting the specific R bits, the corresponding Alarm ID will be treated as PLC Alarm.

Although the setting of Pr3249 is like setting binary bits, the actual setting value will be the corresponding decimal value of the binary value.

The details about setting Pr3249 will be shown in the following table.

bit	Schematic diagram	Setting value of Pr3249	Setting Results	Annotations
bit 0	0000 000 1	+1	Bit 16~31 of R44 are treated as PLC alarms.	Bit 0~15 of R44 are corresponding to MLC 65~80; Bit 16~31 of R44 are corresponding to MLC 315~330.
bit 1	0000 00 10	+2	Bit 16~31 of R45 are treated as PLC alarms.	Bit 0~15 of R45 are corresponding to MLC 81~96; Bit 16~31 of R45 are corresponding to MLC 331~346.
bit 2	0000 0 100	+4	Bit 16~31 of R46 are treated as PLC alarms.	Bit 0~15 of R46 are corresponding to MLC 97~112; Bit 16~31 of R46 are corresponding to MLC 347~362.
bit 3	0000 1000	+8	Bit 16~31 of R47 are treated as PLC alarms.	Bit 0~15 of R47 are corresponding to MLC 113~128; Bit 16~31 of R47 are corresponding to MLC 363~378.
bit 4	000 1 0000	+16	Bit 16~31 of R48 are treated as PLC alarms.	Bit 0~15 of R48 are corresponding to MLC 129~144; Bit 16~31 of R48 are corresponding to MLC 379~394.
bit 5	00 10 0000	+32	Bit 16~31 of R49 are treated as PLC alarms.	Bit 0~15 of R49 are corresponding to MLC 145~160; Bit 16~31 of R49 are corresponding to MLC 395~410.

The actual setting value is a combination of above settings. For example, to treat bit 16~31 of R45 and R47 as PLC Alarms. The schematic diagram will be 0000 **1010**.

The setting value will be the decimal value of 0000 1010. It will be 10.

- Version information : This parameter is only supported at version 10.118.40E, 10.118.43 and later versions.

1.188 Pr3251 *Touch (screen)

No	Descriptions	Range	Unit	Default	Effective
3251	*Touch	[0~9]	-	0	Restart

This parameter sets the touch screen type, or decide whether the cursor is displayed or not:

x86 controllers include: Super, 10F, 30 and, 200 series. The definitions of the parameter are:

Value	Brand/Model	Port (Controller/Screen)	Note
0	No	-	-
1	PenMount 9000 Resistive/ Capacitive	COM4/RS232	Default hardware from Syntec
2	Elo TouchKit Resistive/ Capacitive	COM1/RS232	-
3	PenMount 9000 Resistive/ Capacitive	COM1/RS232	-
4	PenMount 6000 Resistive/ Capacitive	COM1/RS232	-
9	-	USB or PS2	Cursor displayed

ARM-Based controllers include: 6, 11, 21, 22, 60, 70, 80, 220, eHMC, FC, and -X series. The definitions of the parameter are:

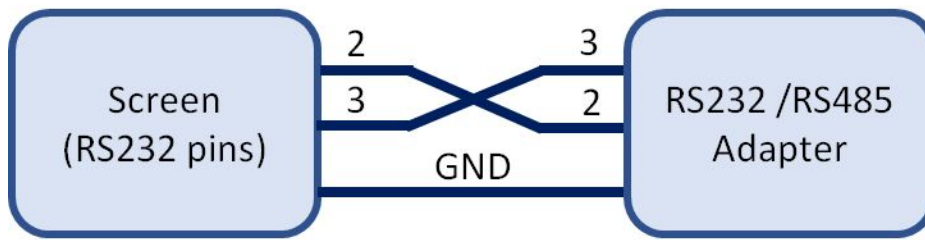
Value	Brand/Model	Port (Controller/Screen)	Note
0	No	-	-
1	PenMount 6000 Resistive/ Capacitive	USB	<ul style="list-style-type: none"> • Default hardware from Syntec • Software versions after 10.118.66L, 10.118.70F, 10.118.75 <ul style="list-style-type: none"> • I.MX6 motherboard is supported after image versions 10.1

Value	Brand/Model	Port (Controller/Screen)	Note
2	EETI Resistive/ Capacitive	USB	<ul style="list-style-type: none"> • Default hardware from Syntec • Software versions after 10.118.66L, 10.118.70F, 10.118.75 <ul style="list-style-type: none"> • I.MX6 motherboard is supported after image versions 10.1
3	PenMount 9000 Resistive/ Capacitive	COM1/ RS232	<ul style="list-style-type: none"> • For -X series controllers with COM1(RS232) port., controllers with COM1(RS232) port. • Software versions after 10.116.26H, 10.116.36V, 10.116.50, 10.117.37 (Note 1、 2) <ul style="list-style-type: none"> • I.MX6 motherboard is supported after image versions 9.7 • AM3354 motherboard is supported after image versions 7.50 • AM3517 motherboard is not supported • Software versions after 10.118.66L, 10.118.70F, 10.118.75 <ul style="list-style-type: none"> • I.MX6 motherboard is supported after image versions 10.1 • Supporting 800*480 touch screen
4	PenMount 9000 Resistive/ Capacitive	COM2/ RS232	<ul style="list-style-type: none"> • For controllers other than the -X series, only with COM2(Option IO or SRI, with RS485 or SRI+RS485 pins), so an RS232/RS485 adapter is required, please refer to Note 7. • Software versions after 10.116.26H, 10.116.36V, 10.116.50, 10.117.37 (Note 1、 2) <ul style="list-style-type: none"> • I.MX6 motherboard is supported after image versions 9.7 • AM3354 motherboard is supported after image versions 7.50 • AM3517 motherboard is not supported • Supporting 800*480 touch screen
5	Elo TouchKit Resistive/ Capacitive	COM1/ RS232	For -X series controllers with COM1(RS232) port.
6	EETI PCAP Projected Capacitive	USB	<ul style="list-style-type: none"> • Default hardware from Syntec (22、 220 series controller with 15-inch touch screen), and doesn't need adjustment. • Software versions after 10.118.12I, 10.118.17 (Note 4) <ul style="list-style-type: none"> • I.MX6 motherboard is supported after image versions 9.13 • AM335x motherboard is supported after image versions 7.71

Value	Brand/Model	Port (Controller/Screen)	Note
7	PenMount 6000 Resistive/ Capacitive	COM1/ RS232	For -X series controllers with COM1(RS232) port.
9	Mouse	USB or PS2	<ul style="list-style-type: none"> Cursor displayed For I.MX6 motherboard (image version after 10.1), software does not yet support displaying the cursor.

Notes for ARM Controller Settings:

1. When the parameter is 3 or 4: PenMount 9000 RS232 touch driver, it's supported after software version 10.116.24V, 10.116.36B, 10.116.37, 10.117.37.
 - a. AM335x motherboard (image file version after 7.45)
 - b. i.MX6 motherboard (image file version after 9.7)
 - c. AM3517 is not supported.
2. Image version after 7.49A must be used with software version 10.116.26H, 10.116.36V, 10.116.50 or later, otherwise touch screen function is invalid.
3. Software version 10.116.54W, 10.118.12E, 10.118.15 and later supports parameter setting 5: Elo TouchKit touch screen. The compatible motherboard and image file version are as followed:
 - a. AM335x motherboard (image file version after 7.45)
 - b. i.MX6 motherboard (image file version after 9.6)
 - c. AM3517 is not supported.
4. Software version 10.118.12I, 10.118.17 and later supports parameter setting 6: EETI PCAP touch screen, and must use with image file after version i.MX6_9.13, AM335x_7.71.0.
5. Software version 10.116.56M, 10.118.12U, 10.118.22C, 10.118.24 and later supports parameter setting 7: PM6000 COM1 touch screen, and must use with image file after version 9.13.
6. When the parameter setting is 9, the display format of screen keyboard:
 - a. Version 10.114.56N, 10.116.0J, 10.116.6C, 10.116.8, 10.117.8 and later: screen keyboard always displayed.
 - b. Version 10.118.12R, 10.118.22 and later: screen keyboard no longer displayed.
7. RS232/RS485 adapter wiring, reference: Connect FC controller and touch screen display(CHT)
 - a. Common adapters are 9 pins (DB9) and 25 pins (DB25). The most common is the three-wire connection, which is respectively ground, data receiving and data sending.
 - b. The second and third pins of RS232 port on the adapter should be connected to the third and second pins of RS232 port on the screen. So, the correct connection is 2 to 3, 3 to 2, 5 to 5(GND).

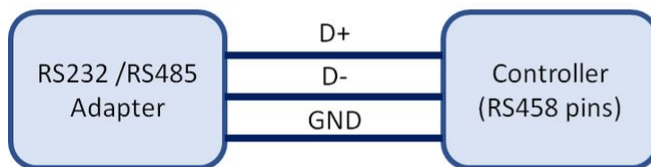


9 pin-9 pin		25 pin-25 pin		9 pin-25 pin	
2	3	2	3	2	3
3	2	3	2	3	2
5	5	7	7	5	7

- c. The D+ and D-pins of RS485 port on the adaptor are connected to the RS485_D+ and RS485_D- pins of the SRI port or OptionIO port of the controller, and then GND is connected to GND.

● Option IO

Option I/O	PIN	SIGNAL	PIN	SIGNAL
	1	--	6	RS485_D-
	2	--	7	RS485_D+
	3	--	8	--
	4	--	9	5V
	5	GND	10	--



● SRI

SRI	PIN	SIGNAL	PIN	SIGNAL
	1	SRI5_D+	6	RS485_D-
	2	SRI5_D-	7	RS485_D+
	3	--	8	--
	4	--	9	5V
	5	GND	10	--

- Touch screen calibration (Screen Adjust) is available only when parameter is 1~4 for x86 or 1,2,3,4,5,7 for ARM. Make sure the touch screen is connected correctly. Calibration function key path is followed:
 - CNC(Mill or Lathe): F5 Maintain → F5 System Setting → F1 Screen Adjust
 - Automation: F1 Electronic Module → F1 → Maintain → F10 Next → F3 Screen Adjust
- With touch screen provided by FIEFDOM after 2020/9/1, controller with motherboard 3354 or I.MX6 is able to communicate with EETI(Pr3251=2) and EETI PCAP(Pr3251=6).
 - With software versions after 10.116.24P, 10.116.34, 10.117.34, and image versions after 9.13, controller supports EETI(Pr3251=2).
 - If motherboard is I.MX6, with software versions after 10.118.12I, 10.118.17, and image versions after 9.13, controller supports EETI PCAP(Pr3251=6).
- I.MX6 motherboards (image version 10.1 and later) only support parameter values 1, 2, and 4, and do not support parameter values 3, 5, 6, and 7.

1.189 Pr3252~Pr3255 *Touch Screen side

No	Descriptions	Range	Unit	Default	Effective
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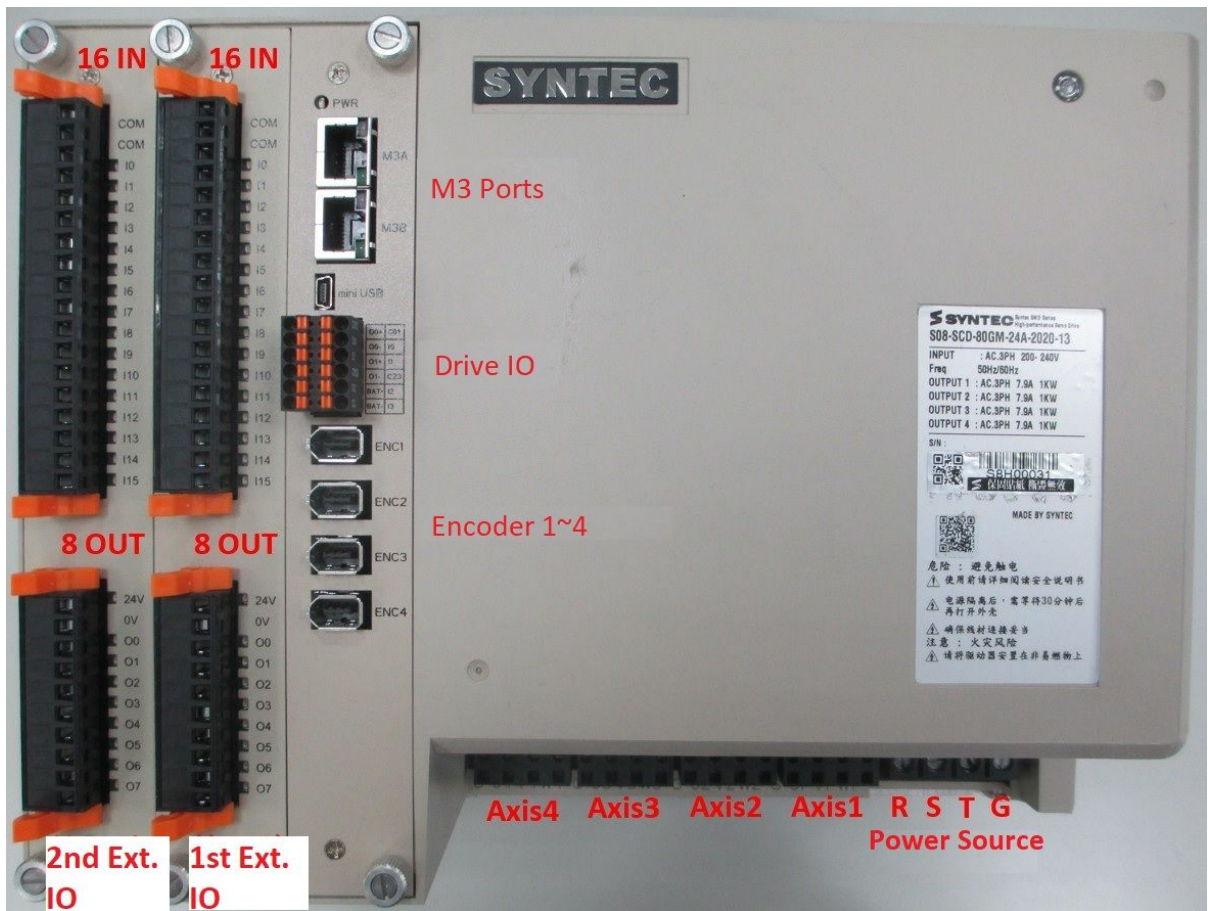
3252~3255	*Touch Screen side	[1~9999]	-	25	Restart
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- Set touch screen border range Xmin, Xmax, Ymin, Ymax when calibrating.
- At version 10.116.38B, 10.116.54, 10.118.0及 and above, this parameter is no longer supported.

1.190 Pr3261~Pr3263 *M3-IO Station No

No.	Description	Range	Unit	Default	Effective
3261	*M3-IO 1st Station No	[0~16010]	-	0	Restart
3262	*M3-IO 2nd Station No	[0~16010]	-	0	Restart
3263	*M3-IO 3rd Station No	[0~16010]	-	0	Restart

- To use this function, make sure that the [Pr5 *I/O type](#) is not set to 9 (virtual IO).
- The station number set by Pr3261~3226 must be ordered from small to large. (consider compatibility for automatic detection in the future)
- The controller must support M3 serial communication (refer to [Pr9 *Servo board type](#)) for this function. (Example: Pr9 of 21-H controller should be 103)
- The M3 IO station number must be unique. (Example: Pr3261=Pr3262=1005 is not allowed)
- If the M3 IO station number $\neq 0$, it means enabling the Digit IO communication function (10.116.24K, 10.116.30, 10.117.30)
 - a. The I-bits of the Nth station are $320+(N-1)*64 \sim 320+N*64-1$; the corresponding O-bits are $320+(N-1)*64 \sim 320+N*64-1$.
 - i. 1st station: I320~I383, O320~383
 - ii. 2nd station: I384~I447, O384~447
 - iii. 3rd station: I448~I511, O448~511
 - b. If the I/O station provides the serial MPG function, the I-bit of the MPG will correspond to I56~I62 on this station. For example, if 1st IO station provides MPG function, MPG I-bits are I376~I382. This design is identical to 21A controller so that the I/O of the MPG use the next 8 Inputs.
- This parameter is set to MMnnn when using **Multi-axis drive**, which means as follows:
MM: Primary station number (1~16), the setting can refer to [Pr21~Pr40 * Axis corresponding axis card port number](#).
nnn: Secondary Station number (000~010), the setting depends on the Secondary Station number specification of the drive.
- **For 380V Multi-axis drive:**
 - **1000, 1001, 1002 correspond to 1~3 axis of a multi-axis drive.**
 - **1003 corresponds to the spindle drive only. The three-axes drive has only two feed axes and should be set to 1000, 1001, and 1003.**
 - **1004 corresponds to the add-on card only. This parameter is preserved when no add-on card is installed, therefore M3 IO board cannot be set to 1004.**
 - **1005, 1006 correspond to the first and second M3 IO boards**
- Example:
The setting for a **M3** four-axes drive is:



1st extension IO: Secondary station number is 5 (n005)

2nd extension IO: Secondary station number is 6 (n006)

If the drive DIP switch sets the Primary station number 1, the controller parameters can be set as follows

Parameter	Value
Pr3261	1005
Pr3262	1006

Here it means the first station of M3 IO corresponds to 1st Ext. IO, and 2nd station of M3 IO corresponds to 2nd Ext. IO.

1.191 Pr3266~Pr3267 Select the drive signal to be monitored

No	Descriptions	Range Select	Unit	Default	Effective
3266	Select the first set of drive signal to be monitored	[1~5]	-	1	Press Reset

3267	Select the second set of drive signal to be monitored	[1~5]	-	2	Press Reset
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Parameter value definition

- 1: Drive torque limit reached signal.
- 2: Drive external latch input 1.
- 3: Drive brake signal.
- 4: Drive positive software stroke limit (P-SOT)。
- 5: Drive negative software stroke limit (N-SOT)。

R30 displays the first set of signal; R5291 displays the second set of signal. Register explanation reference: PLC Interface.#RRegisterInterface。

Supported versions:

Drive	Yaskawa M2/M3	Syntech M2	Syntech M3	Panasonic RTEX	EtherCAT
1: T_LIM	10.116.36 Y, 10.116.51, 10.118.0 and later	10.116.36 Y, 10.116.51, 10.118.0 and later	10.116.36Y, 10.116.51, 10.118.0 and later	-	EtherCAT Driver Application Manual (ENG)
2: EXT1		-		10.116.36Y, 10.116.51, 10.118.0 and later	-
3: BRK		-	-	-	-
4: P-SOT	-	-	10.118.27 and later;	-	-
5: N-SOT	-	-	Drive version: 2.14.0 and later	-	-

1.192 Pr3270 *Tolerated time when Wireless portable box disconnects

No	Descriptions	Range	Unit	Default	Effective
3270	*Tolerated time when wireless portable box	[0~3000]	ms	3000	Restart

- If wireless portable box disconnects over setting time, then alarm "OP-67 Wireless portable box status abnormal" will be triggered.

1.193 Pr3271 *Enables SRI in IO mapping table

No	Descriptions	Range	Unit	Default	Effective
3271	*Enables SRI in IO mapping table	[0~1]	-	0	Restart

- The parameter is only valid when [Pr5 *I/O type](#) is set to 100.
- If this parameter is 0, it means SRI is disabled when using customized IO table; if parameter is 1, it means SRI is enabled.
- To start SRI in customized IO table, then IO mapping table content will change according to SRI parameter (Refer to SRI Parameter Setting). If SRI device has changed, **"automatic synchronize and parameter save" must be executed in SRI parameter screen.**

1.194 Pr3281~Pr3288 *EtherCAT-IO Station No

No.	Description	Range	Unit	Default	Effective
3281	*EtherCAT IO 1st Station No	[0~16]	-	0	Restart
3282	*EtherCAT IO 2nd Station No	[0~16]	-	0	Restart
3283	*EtherCAT IO 3rd Station No	[0~16]	-	0	Restart
3284	*EtherCAT IO 4th Station No	[0~16]	-	0	Restart
3285	*EtherCAT IO 5th Station No	[0~16]	-	0	Restart
3286	*EtherCAT IO 6th Station No	[0~16]	-	0	Restart
3287	*EtherCAT IO 7th Station No	[0~16]	-	0	Restart
3288	*EtherCAT IO 8th Station No	[0~16]	-	0	Restart

1. The parameter setting value is the station number of the IO device.
 - 0: Does not correspond to IO device.
 - 1~16: Corresponding IO device station number.
2. To use this function, make sure that the [Pr5 *I/O type](#) is set to 100 (Customized I/O Chart Manual).
3. The controller must support EtherCAT serial communication (refer to [Pr9 *Servo board type](#)) for this function. (Example: Pr9 of 21MA-H controller should be 110)
4. The EtherCAT IO station number must be unique.
5. The EtherCAT IO station number cannot conflict with the axial port number ([Pr21~Pr40 * Axis corresponding axis card port number](#), [Pr1621~Pr1630 Axis ID or Port Number for Spindle](#)).

Note: When the station number is set repeatedly or conflicts with the axial port (points 4, 5 above), an OP-018 Port configuration error alarm will be generated.

1.195 Pr3401~Pr3460 MLC Register parameter

No	Descriptions	Range	Unit	Default	Effective
3401~3460	MLC Register parameter	[0~32767]	-	0	Press Reset

1.196 Pr3581~Pr3588 Pre/Post-program of the independent mode group

No	Descriptions	Range	Unit	Default	Effective
3581~3587	Pre-program of the independent mode group	[1~999999]	-	0	Press reset
3582~3588	Post-program of the independent mode group	[1~999999]	-	0	Press reset

- Pr3581~Pr3587 (**Odd**), represent the pre-program of the first independent mode group to the forth one.
- Pr3582~Pr3588 (**Even**), represent the post-program of the first independent mode group to the forth one.
- The parameter will be effective after triggering **the reset for the whole system : C36** (Reset, after emergency stop) / **C37** (Reset for the whole system)
- The parameter will be effective after setting Pr732 by 2.
- If Pr value equal to 0, then the pre/post-program won't be execute.
- If Pr value is above 0, then it will represent the number of the pre/post-program.
- If Pr value are set successfully, the pre-program will be executed before the main program, and the post-program will be executed after the main program.
- The first word of the pre/post-program should be named by O.
- If the name of the pre/post-program is less than 4 numbers, it will set to 4 numbers automatically.
If the name of the pre/post-program is less than 6 numbers and more than 4 numbers, it will set to 6 numbers automatically.
eg.
 - Pr3585 = 123, represent the **pre-program** of the **third** independent mode group is O0123
 - Pr3588 = 12345, represent the **post-program** of the **forth** independent mode group is O012345
- For 81RG model, it will restrict Pr3581 to 211 and restrcit Pr3582 to 221.

1.197 Pr3599 *Register M code for Advanced Look-Ahead mode

No	Descriptions	Range	Unit	Default	Effective
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3599	*Register M code for Advanced Look-Ahead mode	[0 ~9999]	-	0	Restart
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- When this parameter is 0, the advanced look-ahead mode is disabled.
- The following M codes are already used by system and cannot be used for advanced look-ahead mode. M0, M1, M2, M30, M98, M99, M198
- M codes used for other functions cannot be used again for advanced look-ahead mode. For example: Pr3600 (Interrupted M code), Pr3601~3610 (M code macro).
- Effective version: 10.116.36K, 10.116.43, 10.117.43 and later.

1.198 Pr3600 *Register custom Macro interrupt M code

No	Descriptions	Range	Unit	Default	Effective
3600	*Register custom Macro interrupt M code	[0 ~9998]	-	0	Restart

- When parameter is 0, the interrupt Macro function is disabled.
- When parameter value is n(n≠0), M(n): enable interrupt Macro call function; M(n+1): disable interrupt Macro call function
- Effective version: 10.116.24Y, 10.116.36E, 10.116.39, 10.117.39 and later.

1.199 Pr3601~Pr3610 *M code Macro call registry

No	Descriptions	Range	Unit	Default	Effective
3601~3610	*M code Macro call registry	[0~ 999999999]	-	0	Restart

- This parameter sets the M code calling rule:
0: Not calling marco Mxxxx and trigger PLC flags directly.
1: Call Mxxxx first, then depend on the Macro contact to use PLC or not. xxxx is the value of Pr3601~Pr3610.
- Default system M code can not be used: M00, M01, M02, M30, M96, M97, M98, M99.
- Note that inside the M code Macros defined by Pr3601~, no other M or T code Macros can be called but directly trigger PLC flags.

1.200 Pr3701~Pr3710 *G code Macro call registry

No	Descriptions	Range	Unit	Default	Effective
3701~3710	*G code Macro call registry	[-1~11]	-	0	Restart

- Syntec controller allows customized MACRO to replace standard G codes G00/G01/G02/G03/G53/G40/G41/G42/G43/G44/G49/G04.

Value	G Code
0	N/A
-1	G00
1	G01
2	G02
3	G03
4	G53
5	G40
6	G41
7	G42
8	G43
9	G44
10	G49
11	G04

- We call these customizable G codes as registered G codes.

- **G00/G01/G02/G03**
 - File name specification

G Code	Register G code MACRO File Name
N/A	N/A
G00	G0000
G01	G0001

G02	G0002
G03	G0003

- Call standard G code specification
 - To use standard G code within G code Macro, e.g. use standard G01 inside G0001 Macro, the specification below must be followed.
 - Using G900001 is still allowed after v10.114.49, but using G01 is suggested as a more intuitive spec.

Version 10.114.49	Command in the registered G code Macro	
Standard G code to use	Before	After
G00	G900000	G00
G01	G900001	G01
G02	G900002	G02
G03	G900003	G03

- **G53**
 - Support registered G53 from 10.116.16A, 10.116.17.
 - File name specification

G Code	Register G code MACRO File Name
G53	G0053

- Call standard G code specification

Version 10.116.16A/10.116.17	Command in the registered G code Macro	
Standard G code to use	Before	After
G53	Not supported	G53

- **G40/G41/G42**
 - Support registered G40, G41, G42 from 10.118.22F, 10.118.26.
 - To use customized G code, standard G code must be enabled (Some of the models need option to enable standard G code)
 - File name specification

G code	Register G code MACRO File Name
G40	G0040

G code	Register G code MACRO File Name
G41	G0041
G42	G0042

- Call standard G code specification

Version 10.118.22F 10.118.26	Command in the registered G code Macro	
Standard G code to use	Before	After
G40	Not supported	G40
G41	Not supported	G41
G42	Not supported	G42

- **G43/G44/G49**

- Support registered G43, G44, G49 from 10.118.42S, 10.118.45
- To use customized G code, standard G code must be enabled (Some of the models need option to enable standard G code)
- File name specification

G code	Register G code MACRO File Name
G43	G0043
G44	G0044
G49	G0049

- Call standard G code specification

Version 10.118.42S, 10.118.45	Command in the registered G code Macro	
Standard G code to use	Before	After
G43	Not supported	G43
G44	Not supported	G44
G49	Not supported	G49

- **G04**

- Support registered G04 from 10.118.52D, 10.118.54

- File name specification

G code	Register G code MACRO File Name
G04	G0004

- Call standard G code specification

Version 10.118.52D, 10.118.54	Command in the registered G code Macro	
Standard G code to use	Before	After
G04	Not supported	G04

1.201 Pr3721~Pr3722 *Axis of 1st axis exchange

No	Descriptions	Range	Unit	Default	Effective
3721	*Axis 1 of 1 st axis exchange	[0,20]	-	0	Restart
3722	*Axis 2 of 1 st axis exchange	[0,20]	-	0	Restart

- Define the axes [Pr21~Pr35] to be exchanged. The function is enabled when C133 ON.

Limit:

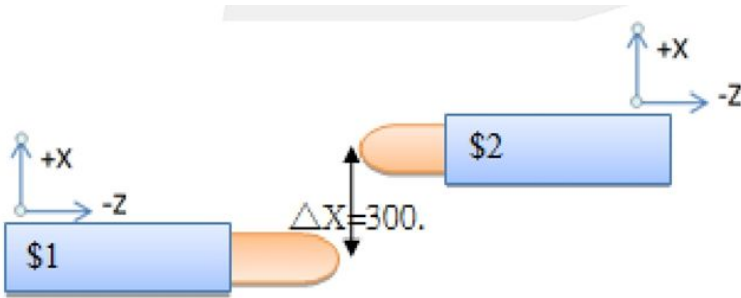
- [Pr21~35] The axis must be enabled.

1.202 Pr3723~Pr3724 Offset of 1st axis exchange

No	Descriptions	Range	Unit	Default	Effective
3723	Offset 1 of 1 st axis exchange	[0~999999999]	BLU	0	Press Reset
3724	Offset 2 of 1 st axis exchange	[0~999999999]	BLU	0	Press Reset

- Pr3723: offset from second axis program origin point to first axis program origin point
- Pr3724: offset from first axis program origin point to second axis program origin point

Parameter calculation example:



Pr3723=-300:

The offset from second axis program origin point to first axis program origin point. Because \$2 needs to move to -X direction to reach \$1 program origin point.

Pr3724=300:

The moving distance from first axis program origin point to second axis program origin point. Because \$1 needs to move to +X direction to reach \$2 program origin point.

1.203 Pr3725 Mirror of 1st axis exchange

No	Descriptions	Range	Unit	Default	Effective
3725	*Mirror of 1 st axis exchange	[0,1]	-	0	Press Reset

- Enable this function if the exchanging and exchanged axis moves in opposite direction.

1.204 Pr3726~3740 *2nd~4th axis exchange parameters

No	Descriptions	Range	Unit	Default	Effective
3726~3740	*2 nd ~4 th axis exchange		-	0	Refer to 1st axis exchange parameters

- Define 2nd to 4th group coupling related parameter. Parameter specs are the same as 1st exchange.
 - Pr3721~3725: 1st axis exchange
 - Pr3726~3730: 2nd axis exchange
 - Pr3731~3735: 3rd axis exchange
 - Pr3736~3740: 4th axis exchange
- Each group exchanges switches and corresponding condition flags are:

	Axis exchanges switch	Axis exchanges flag
1st group of axis exchange	C133	S133
2nd group of axis exchange	C134	S134

3rd group of axis exchange	C135	S135
4th group of axis exchange	C136	S136

1.205 Pr3741 Axis ID of 1st rotary axis auxiliary brake

i 中文版本Chinese version: Pr3741 第一組旋轉軸輔助煞車軸號

No	Descriptions	Range	Unit	Default	Effective
3741	*Axis ID of 1st rotary axis auxiliary brake	[0,20]	-	0	Restart

- Set axis ID of 1st rotary axis auxiliary brake.
- The specified axis type should be rotary.
- Enable the rotary axis auxiliary brake by G10 L1500 command. For more details: G10L1500 Rotary Axis Auxiliary Brake.

1.206 Pr3742 M code of 1st rotary axis auxiliary brake

i 中文版本Chinese version: Pr3742 第一組旋轉軸輔助煞車M碼

No	Descriptions	Range	Unit	Default	Effective
3741	*M code of 1st rotary axis auxiliary brake	[0,99999999]	-	0	Restart

- When the parameter is 0, the rotary axis auxiliary brake function is disabled.
- When parameter value is n(n≠0), M(n): 1st clamped M code; M(n+1): 1st unclamped M code.
- The following M codes are already used by the system, including M00, M01, M02, M30, M98, M99, and M198. M(n) and M(n+1) should not use them, or OP-020 【 NC file name is different with backup name, re-calibrate before machining】 will be triggered.
- The M code can not conflict with Pr3599 *Register M code for Advanced Look-Ahead mode, Pr3600 *Register custom Macro interrupt M code and Pr3804 Part count M code.
- Enable the rotary axis auxiliary brake by G10 L1500 command. For more details: G10L1500 Rotary Axis Auxiliary Brake.

1.207 Pr3743~Pr3744 Parameters of 2nd rotary axis auxiliary brake

i 中文版本Chinese version: Pr3743~Pr3744 第二組旋轉軸輔助煞車參數

No	Descriptions	Range	Unit	Default	Effective
3743~3744	*Parameters of 2nd rotary axis auxiliary brake	-	-	0	Restart

- Please refer to Pr3741~Pr3742 Parameters of the 1st rotary axis auxiliary brake.

1.208 Pr3751 *Orthogonal axis ID of inclined Axes control

No	Descriptions	Range	Unit	Default	Effective
3751	*Orthogonal axis ID of inclined Axes control	[0~20]	-	0	Restart

- Set the orthogonal axis ID of inclined Axes control.
- The inclined Axes control function must be enabled through Option54.
- Parameter setting restrictions:
 - Pr3751 and Pr3752 are both set to 0, indicating that the inclined axes control is not enabled.
 - Pr3751 and Pr3752 cannot have the same value, otherwise the inclined axes control will not be enabled.
 - One of Pr3751 and Pr3752 must not specify an invalid axis ID, otherwise the inclined axes control will not be enabled.
- There are the following restrictions on the configuration of the orthogonal and tilt axes. If they do not meet the requirements, operation alarm OP-104 will be triggered :
 - linear axes must be used for axis types.
 - they cannot be set as the spindle.
 - Only a single coordinate is allowed to use inclined axes control.
 - PLC axis control, axis exchange, roaming axis, and axis coupling are prohibited.

1.209 Pr3752 *Incline axis ID of inclined Axes control

No	Descriptions	Range	Unit	Default	Effective
3752	*Incline axis ID of inclined Axes control	[0~20]	-	0	Restart

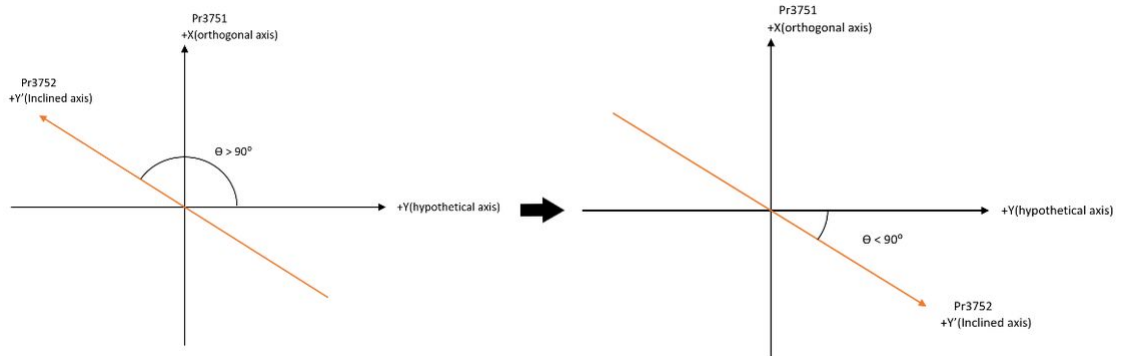
- Set Incline axis ID of inclined Axes control.
- The inclined Axes control function must be enabled through Option54.
- Parameter setting restrictions:
 - Pr3751 and Pr3752 are both set to 0, indicating that the inclined axes control is not enabled.
 - Pr3751 and Pr3752 cannot have the same value, otherwise the inclined axes control will not be enabled.
 - One of Pr3751 and Pr3752 must not specify an invalid axis ID, otherwise the inclined axes control will not be enabled.
- There are the following restrictions on the configuration of the orthogonal and tilt axes. If they do not meet the requirements, operation alarm OP-104 will be triggered :
 - linear axes must be used for axis types.
 - they cannot be set as the spindle.
 - Only a single coordinate is allowed to use inclined axes control.
 - PLC axis control, axis exchange, roaming axis, and axis coupling are prohibited.

1.210 Pr3753 *Inclined angle of inclined Axes control

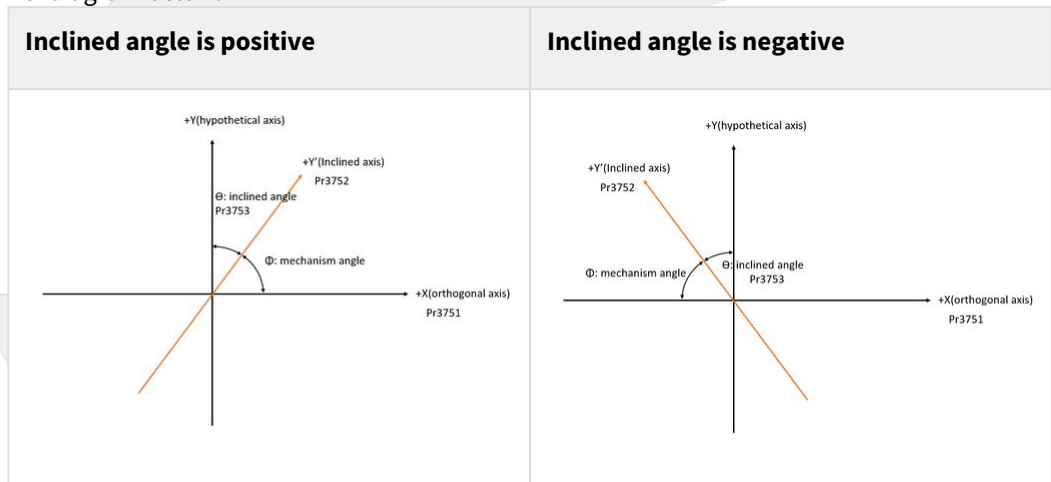
No	Descriptions	Range	Unit	Default	Effective
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3753	*Inclined angle of inclined Axes control	[-85000~85000]	-	0	Restart
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- Set inclined angle of inclined axes control.
- The inclined axes control function must be enabled through Option54.
- Angle setting steps:
 - When the angle between the positive direction of the physical inclined axis and the positive direction of the hypothetical axis is obtuse, please reverse the motion direction of the physical inclined axis to make the angle between it and the hypothetical axis acute.



- Calculate the inclined angle through the mechanism angle conversion, and determine the positive or negative value based on the angle between the physical inclined axis and the orthogonal axis.
 - If the angle between the physical inclined axis and the orthogonal axis is less than 90 degrees, the inclined angle equals 90 degrees minus the mechanism angle.
 - If the angle between the physical inclined axis and the orthogonal axis is greater than 90 degrees, the inclined angle equals $-(90 \text{ degrees minus the mechanism angle})$.
- Ref diagram below:



1.211 Pr3761 *Indexing Axis ID

No	Descriptions	Range	Unit	Default	Effective
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3761	*Indexing axis ID	[0~18]	-	0	Restart
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- After Setting the axis number of the indexing axis, the control must be restarted to enable the indexing table function.
- When the indexing axis ID is zero, then the indexing table function is disabled.
- During the controller startup, the following condition would be examined for activating indexing table function. The alarm **OP-105 Indexing Axis configure failed** raises if examination doesn't pass.
 - a. Corresponding Pr221~ Axis Type of Indexing axis must be rotary axis type A or type B.
 - b. Corresponding Pr701~ axis group of Indexing axis must be first group.
 - c. Pr1621~Axis ID for Spindle assigns non indexing axis.
 - d. Pr3721~Axis ID of Axis Exchange assigns non indexing axis.
 - e. Pr3821~Coupling Axis assigns non indexing axis.
- Don't use PLC Run or Move to operate indexing aixe, otherwise the alarm **MOT-089 Not allow the PLC axis controls the indexing axis** would raise.
- Don't use G52.1/G52.2 to to remove or borrow any indexing axis, otherwise the alarm **COR-363 Invalid axis removal/axis borrowing function** would raise.
- Don't use G10L901 modify any indexing axis as coupling axis, otherwise the alarm **COR-105 Indexing Axis configure failed** would raise.

1.212 Pr3762 Function of Indexing Axis

No	Descriptions	Range	Unit	initial	occasion
3762	function of indexing axis	[0~1]	-	0	reset

- Setting:
 - 1: Program correction(automatically自動取最近的整數度數).
 - 2: Program examination(檢差加工程序, 分度軸的移動量不是最小定位角度的整數倍會跳警報).

1.213 Pr3763 Minimum Precision Angle of Indexing Axis

No	Descriptions	Range	Unit	initial	occasion
3763	Minimun precision angle of indexing axis	[1~99999999]	-	1	Reset

- Set minimum precision angle of indexing axis.

1.214 Pr3764 Braking M code of Indexing Axis

No	Descriptions	Range	Unit	initial	occasion
3763	Braking M code of indexing aixe	[1~99999999]	-	1	Reset

- Set braking M code of indexing axis.

- When the parameter is 0, the brake of indexing axis function is disabled but position indexing function is still activated.
- When parameter value is $n(n \neq 0)$, M(n): 1st clamped M code; M(n+1): 1st unclamped M code.
- The following M codes are already used by the system, including M00, M01, M02, M30, M98, M99, and M198. M(n) and M(n+1) should not use them, or OP-020 【 NC file name is different with backup name, re-calibrate before machining】 will be triggered.
- The M code can not conflict with [Pr3599 *Register M code for Advanced Look-Ahead mode](#), [Pr3600 *Register custom Macro interrupt M code](#) and [Pr3804 Part count M code](#). Otherwise, OP-020 【 NC file name is different with backup name, re-calibrate before machining】 will be triggered.

1.215 Pr3801 Feed tight couple with spindle position under G95

No	Descriptions	Range	Unit	Default	Effective
3801	Feed tight couple with spindle position under G95	[0~1]	-	0	Press Reset

- When set this parameter as 1, feedrate of servo axis under G95 mode will use tight coupling method, which means servo axis feed will follow the spindle position. This method is limited to encoder installed spindle.
- When set this parameter as 0, feedrate of servo axis under G95 mode will use loose coupling method, which means servo axis feed will follow spindle speed command or feedback depends on the spindle has encoder or not. If Pr1711 is 0, servo axis follows spindle command value; if Pr1711 is 1, servo axis follows the speed feedback of spindle encoder.
- Under G95 mode, this parameter effects G04 definition:

0: Dwell unit is second.

1: Dwell unit is spindle revolutions.

1.216 Pr3802 Default feedrate control mode

No	Descriptions	Range	Unit	Default	Effective
3802	Default feedrate control mode	[0~3]	-	0	Reset

- This parameter define default high-precision control mode. With Option 11 (High-precision contour control, HPCC) disabled, parameter definitions are as followed:
 - 0: G64;
 - 1: G62;
- When Option 11 (HPCC) enabled, parameter definition are as followed:
 - 0: G64;
 - 1: G62;
 - 2: HPCC;
- In version 10.114.26E, 10.114.33G, 10.114.38M, 10.114.50B, 10.114.52 and later, this parameter is no longer supported. G64 is the default high precision control mode.
- In version 10.116.x and later, this parameter is supported again.
- Not all machine types support G64, contact machine maker for detail.

1.217 Pr3804 Part count M code

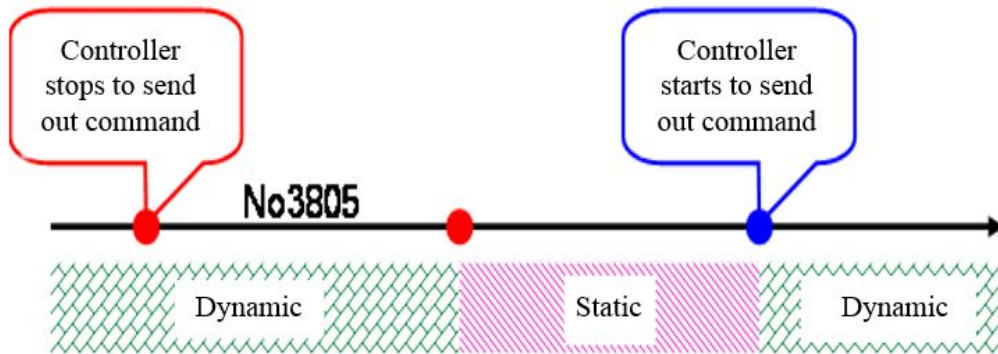
No	Descriptions	Range	Unit	Default	Effective
3804	Part count M code	[1~999999]	-	99	Press Reset

- The part count M code. When this M code is executed, part counter will plus one and single part machining time reset to 0. Machine will pause when target part count is reached.
- Default value is 99, i.e. when execute to M99, part counter will plus one and machining time reset to 0.
- If part count by M30, machine will not stay pause due to program will be reset by M30.
- If part count by M30, the single part machining time will reset to 0 after cycle start.
- If part count by M99, then part count plus 1 will be triggered by the M99 of the smallest axis group number in CNC main system.
- While the axis group independent function is not enabled:
 - Only the 1st MST channel has timing and part counting function.
That means, only those axis groups who correspond to 1st MST channel will activate the part counting process mentioned above when they receive this part count M code. (Related Parameters: [Pr721~Pr730 Axis group MST channel No.](#))
- While the axis group independent function is enabled(Pr732 is set to 2):
 - Every MST channel has timing and part counting function.
That means, those axis groups who correspond to each MST channel will activate the part counting process mentioned above when they receive this part count M code. (Related Parameters: [Pr732 *MST channel rules of multi-programs](#))
- Notice:
 - a. Special function M codes cannot be defined for part count: M00, M01, M98, M198. Part count is invalid when these M codes are used as part count M code.
 - b. M96/97 can be defined as Pr3804 part count M codes, but then M96/97 can no longer enable interrupt sub-program.
 - c. When part count M-code stop be request(C39 ON) or require part count reached(S34 ON) causes feed hold, the single part machining time will reset to 0 after cycle start.
 - d. Part count and C39 is invalid When the part count M code is executed in MDI mode. (Supported version: 10.118.29Z, 10.118.40F, 10.118.44 and later)
- Related Data: C39, S34, S35.

1.218 Pr3805 Static dual feedback error timeout

No.	Description	Range	Unit	Default	Effective
3805	Static dual feedback error timeout	[2~60000]	ms	1000	Press Reset

- This parameter defines the waiting time before the controller switches to static state when it stops sending command.



- When this parameter is 0, it means disabling dual-feedback error check function.

1.219 Pr3806 Second auxiliary code

No	Descriptions	Range	Unit	Default	Effective
3806	Second auxiliary code	[0~1]	-	0	Press Reset

- Second auxiliary B code switch:
 - 0: Disable;
 - 1: Enable, all B codes are regarded as PLC process code instead of axial commands. Only the first MST channel supports to execute B code on PLC (refer to Pr721~730).
- PLC interface:
 - S53: B Code strobe;
 - R5: B Code Value.

1.220 Pr3807 Destination not on arc check window

No	Descriptions	Range	Unit	Default	Effective
3807	Destination not on arc check window	[0~10000]	BLU	5	Press Reset

- This parameter defines the allowed error of radius from start-point to end-point. If the error exceeds the parameter, an alarm will be triggered.

1.221 Pr3808 High Precision Smoothness(SPA)

No	Descriptions	Range	Unit	Default	Effective
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3808	Smooth Precision Advanced	[0~5]	-	0	Reset
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- The Smooth Precision Advance (SPA) function is to compensate for the machining contour error caused by servo delay of motor drives.
 - 0: Disable
 - 1~5: Enabled with different compensation levels.
 - 6~9: Special application used for extreme high-speed machining (usually for linear motor), not suggested for general ball screw axes.
- Please refer to the feed forward compensation application document for detailed features and activation restrictions of each version of SPA (SPA 1.0/SPA 2.0/SPA 3.0).

1.222 Pr3809 *Are UVW incremental command of XYZ axes

No	Descriptions	Range	Unit	Default	Effective
3809	*Are UVW inc. command of XYZ axes	[0~1]	-	0	Restart

- This parameter defines the logic of UVW commands in NC program:
 - 0: UVW is UVW axis command;
 - 1: UVW is XYZ axis inc. command.
 - In lathe system, UVWH are incremental commands of XYZC axes
 - In Mill systems, UVW are incremental commands of XYZ axes. H commands are used for tool length correction, cannot be a incremental command.
- The parameter for Lathe system is always 1 in system.
- The correspondence between actual and program axis name, please refer to [Pr321~Pr340 Axis name](#).

1.223 Pr3810 *Paralleled executing multiple M code in one block.

No	Descriptions	Range	Unit	Default	Effective
3810	*Paralleled executing multiple M code in one block	[0~1]	-	0	Restart

- When multiple M codes exist within one block, this parameter defines if these M codes are executed in parallel.
 - 0: NO. Send one M code to PLC each time. Not until C38 is ON, the next M code is then executed.
 - 1: Yes. Simultaneously send five M codes in the block to PLC.
- When sets this parameter as 1, different S Bits and Registers are used according to M code order, please refers to the table below.
 - Any "user defined registers" will be taken by system, be aware of this.

1st	M Code Read	S29、S11、S12、S13、S14
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	M Code(00~99)	R2050(R1)、R2051、R2052、R2053、R2054
	M Code Finish	C38
2nd	M Code Read	R615.24(R615.2)、R615.25、R615.26、R615.27、R615.28
	M Code(00~99)	R2060(R616)、R2061、R2062、R2063、R2064
	M Code Finish	R615.0
3rd	M Code Read	R619.24(R619.2)、R619.25、R619.26、R619.27、R619.28
	M Code(00~99)	R2070(R620)、R2071、R2072、R2073、R2074
	M Code Finish	R619.0
4th	M Code Read	R623.24(R623.2)、R623.25、R623.26、R623.27、R623.28
	M Code(00~99)	R2080(R624)、R2081、R2082、R2083、R2084
	M Code Finish	R623.0

1.224 Pr3811 *Start address of persist working global variable

No	Descriptions	Range	Unit	Default	Effective
3811	*Start address of persist working global variable	[0~400]	-	0	Restart

- This parameter decides Global Variable @1~@400 is preserved or not after shut off.
 0: Not reserved;
 1~400: Start address of persist working global variable.
 E.g. Parameter is 100, then @100~@400 data will preserve after power off.

1.225 Pr3812 Optional skip mode selection

No	Descriptions	Range	Unit	Default	Effective
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3812	Optional skip mode selection	[0~1]	-	0	Press Reset
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- 0: C41 signal is effective immediately, but will decelerate to zero if a"/" is executed.
- 1: Look-ahead will not decelerate, but C41 is not effective immediately.
- Note:
 - No deceleration look-ahead function is valid from: 10.116.24N, 10.116.33, 10.117.33 (Only Lathe & Mill)
 - When parameter sets as 0, if tool radius compensation(G41/G42) is enabled, C41 will not be effective immediately after triggered.
C41 need to be triggered at least 8 blocks before to be effective, depending on program look-ahead.

1.226 Pr3813 Number of extended global variables

No	Descriptions	Range	Unit	Default	Effective
3813	*Number of extended global variables	[0~20000]	-	0	Restart

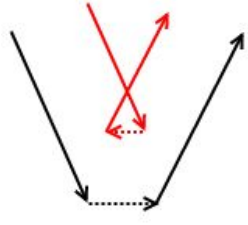
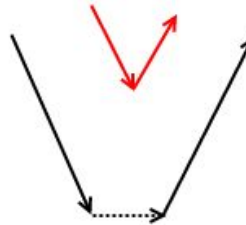

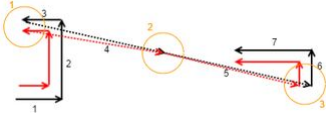
- This parameter defines the number of extended global variable.
- Range: @60000 ~ @79999
- Set to 0 means all global variables in this section are not enabled.
- Set to 1000 means @60000 ~ @60999 are enabled.

1.227 Pr3814 Rapid traverse compensation mode.

No	Descriptions	Range	Unit	Default	Effective
3814	Rapid traverse compensation mode	[0~2]	-	0	Press Reset

- Valid from 10.116.26C, 10.116.36M and later version.
- This parameter is used to set tool compensation under rapid traverse command
Pr3814 = 0: G00 block does not check overcut, and use the same tool radius compensation method as G01.
Pr3814 = 1: G00 block does check overcut, and use the same tool radius compensation method as G01.
Pr3814 = 2: G00 block does check overcut, and **adjusts** G00 tool radius compensation method.
- When Pr3814 = 2, the **adjustment** of G00 tool radius compensation method are as followed:
 - In the position where G01/G02/G03 followed by G00, this joint position will move to compensation end point of the previous block (G01/G02/G03).
 - In the position where G00 followed by G01/G02/G03, this joint position will move to compensation start point of the next block (G01/G02/G03).
 - In the position where G00 followed by G00, the joint position will cancel tool radius compensation and move to the original path ending point of G00 block.
- Specification Diagram:

Black: Original path	Red: Compensation Path
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Solid Line: G01		Dotted Line: G00	
Movement Specification	Pr3814 = 0	Pr3814 = 1	Pr3814 = 2
Undercutting Check	 <p>G00 does no undercutting check.</p>	 <p>Pr3819 = 1: Trigger alarm</p> <p>Pr3819 = 2: Fix path is as figure above.</p>	<p>The same overcut check specification as Pr3814 = 1.</p>
Compensation Path	 <p>G00's tool compensation path is the same as G01.</p>	<p>The same tool compensation path as as Pr3814 = 0.</p>	 <ol style="list-style-type: none"> G01(G02/G03) followed by G00, will move to the end point of tool compensation of previous block. (Not reference G00) G00 followed by G00, will cancel tool compensation G00 followed by G01(G02/G03), will move to start point of tool compensation of the next block. (Not reference G00)

1.228 Pr3815 Tool radius compensation mode

No	Descriptions	Range	Unit	Default	Effective
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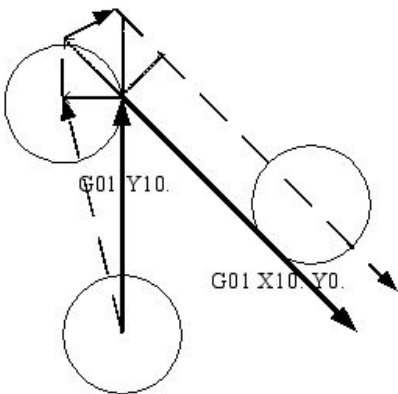
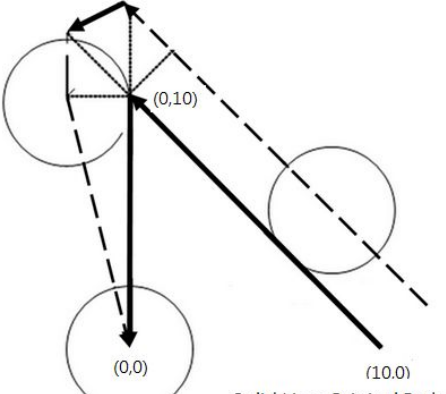
3815	Tool radius compensation mode	[0~2]	-	0	Press Reset
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- This parameter defines the starting and the ending block of tool radius compensation:
 - 0: Type B (normal mode), tool radius compensation starts at G41/G42 motion block or the next motion block, then ends at G40 motion block or the next motion block.
 - 1: Type A (preview mode), tool radius compensation starts at the closest G00 or G01 block before G41/G42, then ends at G40 motion block or the next motion block.
 - 2: Type A (normal mode), tool radius compensation starts at G41/G42 motion block or the next motion block, then ends at G40 motion block or the next motion block.

- 2: Type A (normal mode)

Compensation Start	Compensation End
G00 X0. Y0. Z0. G41 D1 // D = 2.5mm G01 Y10. // Startup block. G01 X10. Y0. // Compensation start at the beginning of this block.	G00 X10. Y0. Z0. G40 G01 X0 Y10. // Compensation end at the ending of this block. G01 X0. Y0. // Cancellation block.
Compensation start: The beginning of the second block The first block moves to the compensation start point of the second block.	Compensation stops: The end of the second to last block Tool compensation enabled until the end of the second to last block , then cancel compensation and move to the end of last block.
<p>Solid Line: original path Dotted Line: tool compensation path</p>	<p>Solid Line: Original Path Dotted Line: Tool Compensation Path</p>

- 0: Type B (normal mode)

Compensation Start	Compensation End
<p>G00 X0. Y0. Z0. G41 D1 // D = 2.5mm G01 Y10. // Startup block. Compensation start at the end of this block. G01 X10. Y0.</p>	<p>G00 X10. Y0. Z0. G40 G01 X0 Y10. G01 X0. Y0. // Cancellation block. Compensation end at the beginning of this block.</p>
<p>Compensation start: The end of the first block Directly move to the end point of the first block, then tool compensation is enabled afterward.</p>	<p>Compensation stop: The beginning of the last block Tool compensation enabled until the beginning of the last block, then cancel compensation and move to the end of last block.</p>
 <p>Solid Line: original path Dotted Line: tool compensation path</p>	 <p>Solid Line: Original Path Dotted Line: Tool Compensation Path</p>

1.229 Pr3816 *Tool length compensation mode

No	Descriptions	Range	Unit	Default	Effective
3816	*Tool length compensation mode	[0~2]	-	0	Restart

- This parameter sets tool length compensation mode:
 0: Only Z-Axis;
 1: Single axis compensation, perpendicular to work plane;
 2: Multi-axis compensation, perpendicular to work plane.
 3: H code is multi-axis tool length offset. Supported version: 10.118.11 and later.
- Compensation Mode:

Pr3816	0	1	2	3
H_	Z axis	Axis perpendicular to work plane	Axis perpendicular to work plane	1st to 12th linear axis and belong to axis group of the tool
G10 L1050 X_ Y_ Z_	Not support	Not support	1st to 6th linear axis and belong to axis group of the tool	1st to 6th linear axis and belong to axis group of the tool
G10 L1051 P_	Not support	Not support	1st to 12th linear axis and belong to axis group of the tool	1st to 12th linear axis and belong to axis group of the tool

- Software version 10.116.33, 10.117.33 and before only support compensation function from 1st to 6th linear axial tool compensation.
- Software version 10.116.34, 10.117.34 and later support compensation function from 1st to 12th linear axial tool compensation.
- Instruction of G10 L1050/L1051 : Industry Machine Application Manual
- Reference of tool compensation variable: Macro Variable
- This parameter is invalid for Lathe system, Lathe system is always 2 (axis perpendicular to work plane).
- Compensation reset rule: Change compensation mode and system will automatically reset compensation value.
 - When parameter is changed, a warning [Pr3816 is changed. Tool compensations will be cleared after reboot.] will be triggered.
 - Restart system after changing Pr3816, system will reset compensation value to zero and trigger OP-74 [Tool Compensations are cleared. Please reset compensation values.]

1.230 Pr3817 Fatal dual feedback error

No.	Description	Range	Unit	Default	Effective
3817	Fatal dual feedback error	[0~ 100000]	BLU	10000	Press Reset

- This parameter is used to define the maximum allowed dual feedback error between motor encoder and optical scale signal **in dynamic state**
- If setting value is 0, this dual feedback error check function is disabled.

1.231 Pr3818 Dual feedback self-detect error (pulse)

No.	Description	Range	Unit	Default	Effective
3818	Dual feedback self-detect error	[0~ 50]	Pulse	0	Press Reset

- After activating dual feedback, the A/B pulse number between two indexes are recorded and checked for each index on optical scale. If the difference exceeds the value set by this parameter, controller shall trigger MOT-40 "Dual feedback self-detect error exceed"
- If the setting value is 0, the self-checking function is disabled
- Applicable to general equal-distance optical scale and distance code optical scale.
- Restrictions:
 - a. This function is only enabled after the axis completes Homing.
 - b. When a problem occurs, the system will not trigger alarm until the 5th index is received. I.e. if the movement range is within 4 indexes, this check function is ineffective
 - c. Default index's width is 5 Pulses.

1.232 Pr3819 Overcut check mode

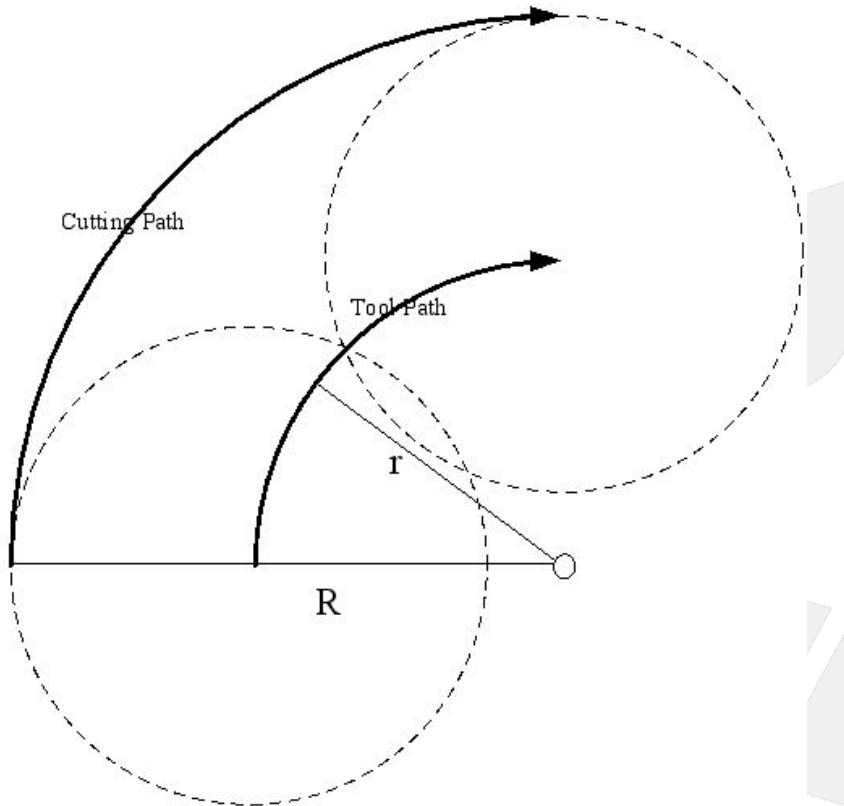
No	Descriptions	Range	Unit	Default	Effective
3819	Overcut check mode	[0~2]	-	0	Press Reset

- This parameter sets overcut check logic after tool radius compensation is enabled:
 - 0: Not to check the path;
 - 1: Check the path after the tool radius compensation. System trigger alarm if overcut detected.
 - 2: Check the path after the tool radius compensation. System corrects tool path when overcut detected and no alarm is triggered.

1.233 Pr3820 Minimal deceleration ratio for inner circular cutting

No	Descriptions	Range	Unit	Default	Effective
3820	Minimal deceleration ratio for inner circular cutting	[1~100]	%	2	Press Reset

SYNTEC



- To maintain constant surface speed control, after tool radius compensation, system re-calculate tool

feedrate base on the ratio of cutting path radius R to tool path radius r:

$$F_{actual} = \frac{r}{R} \times F$$

- This parameter (Pr3820) restricts the minimum percentage of $\frac{r}{R}$.

1.234 Pr3821~Pr3822 *1st coupling master/slave axis number

No	Descriptions	Range	Unit	initial	occasion
3821	*1st coupling master axis number	[0~20]	-	0	Restart
3822	*1st coupling slave axis number	[0~20]	-	0	Restart

- Pr3821 and Pr3822 define the coupling axis number of master and slave axis.
E.g. When Pr3821 = 1 (means X axis) and Pr3822 = 2 (means Y axis), then Y axis will follow the movement of X

axis, and the movement ratio changes based on Pr3823 and Pr3824.

- Notice:
Dynamic setting of the coupling axis is supported G10 L901 P_ Q_ I_ R_ J_ K_, please refer to G10 Programmable Data Input.

1.235 Pr3823~Pr3824 *1st coupling master/slave axis ratio factor

No	Descriptions	Range	Unit	Default	Effective
3823	*1st coupling master axis ratio factor	[1~999999]		0	Restart
3824	*1st coupling slave axis ratio factor	[-999999999~999999999]		0	Restart

- Pr3823 and Pr3824 set the movement ratio for the synchronous movement of coupling axes.
E.g.: When Pr3823 = 1 and Pr3824 = 2, if master axis moves 1 mm, then slave axis moves 2 mm.
- Notice:
Dynamic setting of the coupling axis is supported G10 L901 P_ Q_ I_ R_ J_ K_, please refer to G10 Programmable Data Input.

1.236 Pr3825 *1st coupling type

No	Descriptions	Range	Unit	Default	Effective
3825	*1st coupling type	[0~6]		0	Restart

Pr3825 set the enable timing of the two coupled axes.

0: Cancel coupling

1: Machine coupling

- Coupling is enabled when controller is "Ready", cannot be disabled
- The coupling time parameter is invalid, and each axis moves based on coupling ratio.
- System Data of Slave axis is not displayed

2: Peer synchronous coupling

- Coupling is enabled when controller is "Ready" and C46 is ON. When C46 is OFF, coupling is disabled.
- Both slave and master axes under synchronous coupling can be given position command, but alternating commands is not allowed. The movement command for another axis is calculated from coupling ratio.
- The pitch compensation of slave and master axes are independent.

3: Superimposition coupling

- Coupling is enabled when controller is "Ready" and C46 is ON. When C46 is OFF, coupling is disabled.

- Superimposition coupling means slave axis superimposes on the master axis. Under this mode, when command for master axis is executed, both of the axes will move.
- When command for slave axis is executed, the slave axis will move **relative to the position of the master axis**.

4: Master-slave synchronous coupling

- Coupling is enabled when controller is "Ready" and C46 is ON. When C46 is OFF, coupling is disabled.
- Master-slave synchronous coupling means the controller only processes command for master axis, then execute on both axes.
- Movement command for only slave axis is invalid. Both axes will not move.
- The pitch compensation of slave and master axes are independent.

5: One-to-many coupling

- Coupling is enabled when controller is "Ready" and C46 is ON. When C46 is OFF, coupling is disabled.
- Similar to peer synchronous coupling, master axis and slave axes under one-to-many coupling can be given position command but alternating commands is not allowed. The movement commands for other axes are calculated from coupling ratio.
- The selection of Slave axes is decided by Register bits, an axis is coupled when the corresponding bit is ON:
Bit 1: X axis, equal to 2 in decimal
Bit 2: Y axis, equal to 4 in decimal
Bit 3: Z axis, equal to 8 in decimal
Bit 4 : 4th axis, equal to 16 in decimal... and so on.

When Pr3822 is 28 (28=4+8+16), the coupled slave axes are Y axis, Z axis and 4th axis.

Note: When using one-to-many coupling, gear-ratio between master and slave axes is always 1: 1. Pr3823 & Pr3824 have no effect under this mode.

6: Feedback coupling

- Coupling is enabled when controller is "Ready" and C46 is ON. When C46 is OFF, coupling is disabled.
- Feedback coupling means the controller use the feedback of master axis and parameters of master & slave ratio to calculate slave axis movement.
- Movement command for slave axis is invalid.
- Note:
 - a. Controller has 2 ticks of axis card delay, and servo system has delay too. Therefore it is normal for slave axis to fall behind master axis under this coupling mode.
 - b. Coupling function needs to assign master/slave axes (Pr3821/Pr3822); if inverter spindle is used as master axis of feedback coupling, PLC ladder must be modified to trigger spindle monitoring mode to use this function.
- The pitch compensation of slave and master axes are independent.

Note:

1. If the Gantry Tuning Couple Switch has not be set yet, the coupling state is determined by C046, R614.
2. When the Gantry Tuning Couple Switch setting is turned on, the coupling function is turned on, the coupling state can be determined by C046, R614.
3. When the Gantry Tuning Couple Switch setting is turned off, the coupling function is turned off. At this time, the coupling cannot be turned on by C046, R614.
4. Reset restore the coupling state which is determined by C046.

1.237 Pr3826~Pr3827 1st coupling couple/decouple time

No	Descriptions	Range	Unit	Default	Effective
3826	1st coupling couple time (ms)	[0~60000]	ms		Press Reset
3827	1st coupling decouple time (ms)	[0~60000]	ms		Press Reset

- Pr3826: 1st coupling couple time
- Pr3827: 1st coupling decouple time
- Notice:
Dynamic setting of the coupling axis is supported G10 L901 P_ Q_ I_ R_ J_ K_, please refer to G10 Programmable Data Input in the application document.

1.238 Pr3829 *Support multi-axis group tool length compensation

No	Descriptions	Range	Unit	Default	Effective
3829	*Support multi-axis group tool length compensation	[0~1]	-	0	Restart

- When parameter value is 0, the multi-axis group independent tool length compensation function is disabled.
- When parameter value is 1, the multi-axis group independent tool length compensation function is enabled.
 - The number of open axis groups determines the number of tools that can be used. Take 96 tools as an example:
 - Open 2 axis groups: 48 tools per axis group.
 - Open 3 axis groups: 32 tools per axis group.
 - Open 4 axis groups: 24 tools per axis group.
- Controller must provide "tool compensation function" to use this function.
- Precautions:
 - The affected functions include G43(G44) H_, G10 L10~L15, G10 L1050, G10 L1051, #10000~#15999, #30000~#39999. After opening the multi-axis group tool table, the above functions will correspond to each axis group.
 - Supported models include Mill, Lathe, WOOD, Drill, Cutting, GlassGrind.

1.239 Pr3831 *Discharge resolution

No	Descriptions	Range	Unit	Default	Effective
3831	*Discharge resolution	[1~ 999999999]	ns	1000	Restart

1.240 Pr3832 *Discharge ignition delay

No	Descriptions	Range	Unit	Default	Effective
3832	*Discharge ignition delay	[0~ 999999999]	ns	0	Restart

1.241 Pr3835 Initial Machining Condition

參數編號	說明	範圍	單位	初始值	修改後何時有效
3835	Initial Machining Condition	[0 ~ 9]	-	0	Press Reset

- User can still use G120.1 to change the current machining condition, and press reset will return the current machining condition to the initial machining condition.
- Reference to the new version of multi-machining condition
 10+8 Key : G4(Monitor) → Next → F7(Machining Condition)
 8 Key : F4(Monitor) → Next → F7(Machining Condition)
 5 Key : F4(Monitor) → Next → Next → F4(Machining Condition)

1.242 Pr3836 *Initial Feed Mode

No	Descriptions	Range	Unit	Default	Effective
3836	*Initial Feed Mode (0:default;1: per min; 2: per rev)	[0~2]	-	0	Restart

- Default value: Lathe is 2 (G95, mm per rev); Mill is 1 (G94, mm per min).

1.243 Pr3837 *Initial Command Mode

No	Descriptions	Range	Unit	Default	Effective
3837	*Initial Command Mode (0:default; 1: G90; 2: G91)	[0~2]	-	0	Restart

- Default is G90.

1.244 Pr3838 *Initial Mode of 2nd Stroke limit

No	Descriptions	Range	Unit	Default	Effective
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3837	*Initial Mode of 2nd Stroke limit (1:G22, 2: G23)	[1~2]	-	1	Restart
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- When value is 1, 2nd software stroke limit is enabled after Homing finished.
- When value is 2, stroke limit can only be enabled when G22 is executed in program.
- Effective version starts from 10.116.

1.245 Pr3841~Pr3844 Contact surface position of tool probe

No	Descriptions	Range	Unit	Default	Effective
3841	Z+ contact surface position	[-999999999~999999999]	BLU	0	Press Reset
3842	Z- contact surface position	[-999999999~999999999]	BLU	0	Press Reset
3843	X+ contact surface position	[-999999999~999999999]	BLU	0	Press Reset
3844	X- contact surface position	[-999999999~999999999]	BLU	0	Press Reset

1.246 Pr3850 *Feedforward compensation selection (0: SPA2.0, 1: SPA3.0)

No	Descriptions	Range	Unit	Default	Effective
3850	*Feedforward compensation selection (0: SPA2.0, 1: SPA3.0)	[0~1]	-	0	Restart

- 0: SPA2.0(ZPEC), 1: SPA3.0(Syntec Advanced Feedforward Compensation), using SPA2.0 as default.
- SPA3.0, is generally called "Syntec Advanced Feedforward Compensation", it achieves high precision smoothness by combining Syntec controller and Syntec driver, and provides high performance at corner and curver.
- **Requests:**
 - It connects at least one Syntec driver which software version is 4.4.0, 5.2.2 or higher. Otherwise, warning of operation OP-103 Drivers connected don't support SPA3.0 would be raised to remind the user to disable Pr3850.
 - Suggesting enabling driver parameter **【Pn-833】** Host pos cmd interpo mode, otherwise driver torque feedforward control would not be activated but only velocity feedforward control.
- **Description of spec:**
 - Smoothness can be specified by Pr3808 in both SPA2.0 and SPA3.0. When Pr3850 = 0, refer to the spec of [Pr3808 High Precision Smoothness\(SPA\)](#); When Pr3850 = 1, the value definition of Pr3808 would be redefined as following table.

- While larger value is chosen, the machining will have better precision but worse smoothness, i.e. machine may fluctuate more.

Pr3808\Pr3850	0: SPA2.0(ZPEC)	1: SPA3.0		
0	No compensation enabled			
1	The specification of SPA2.0 is same with decription of Pr3808 High Precision Smoothness(SPA)		Axis which supports Syntec Advanced Feedforward compensation	Axis which not supports Syntec Advanced Feedforward compensation
		Precision	Good	Average
		Smoothness	Good	Good
9			Axis which supports Syntec Advanced Feedforward compensation	Axis which not supports Syntec Advanced Feedforward compensation
		Precision	Excellent	Average
		Smoothness	Average	Average

- Whatever value of Pr3808 is setted, it would ignore limit of [Pr3972 Enable driver delay compensation](#) and force to enable driver delay compensation after SPA3.0 is activated:
 - The synchrony of driver's movement would decrease after activating compensation except following driver.
 - Yaskawa serial bus: M2, M3 Sigma5, Sigma7, and SigmaM series
 - Syntec serial bus: All M2, M3 drive series
 - Axis device state variable - J204 could check type of feedforward compensation which is woking currently, refer to HMI Variable.
- Supported version:
 - SPA3.0 is provided in version 10.118.60P, 10.118.66J, 10.118.70D, 10.118.73 or above.

1.247 Pr3851 Tool break handle program No.

No	Descriptions	Range	Unit	Default	Effective
3851	Tool break handle program No.	[0~999999]	-	0	Press Reset

1.247.1 Timing of use

1. Tool break during machining and user needs to change the tool. (at this moment, usually need to reset the machine)
2. The machine needs to reboot caused by abnormal power failure.
3. Without Reset machine, user wants to inspect work-piece or make offset under feedhold state, can use Pr3852 halted point return function.

1.247.2 Description

1. This parameter defines the tool break handle program No.:
 - a. 0: System directly jump to assigned line number, no tool break program executed;
 - b. 1~999999:
 - i. System executes tool break handle program first, then executes the assigned line.
 - ii. When Pr3851=888800/999900/999901, system executes the built-in O888800/O999900/O999901 tool break program;
 - iii. when Pr3851≠888800/999900/999901, i.e. 12345, then user must define a customized tool break program O012345.
2. When Pr3851= 0,
 - a. The program section before assigned line will not be executed. User must make sure [MSTG codes are in correct status for this block](#). MDI can be used to reset the initial mode.
 - b. When jump to (tool break) block starts, system will execute the assigned block with G90G01F1000 directly. [This mode is the quickest](#).
3. When "Pr3851=888800" and "machine type is Mill, WOOD or GlassGrind"
 - a. The system will [scan NC program from line 1](#), so all MSTG codes will be fully recorded in O888800. But only absolute mode (G90) is supported, incremental (G91) is not supported. Moreover, do not support axis names with numbers, such as X1, C2, etc.
 - i. tool number/auxiliary function/spindle RPM(MST),
 - ii. tool length (G43/G44/G49),
 - iii. tool radius (G40/G41/G42),
 - iv. interpolation mode (G00/01/02/03/33/34),
 - v. workpiece coordinate (G54...),
 - vi. mirror command (G51.1/G50.1),
 - vii. feed mode (G94/G95), feedrate,
 - viii. work plane (G17/G18/G19)
 - ix. units (G70/G71).
 - b. Before O888800 scans to the assigned tool break line, if the program is in incremental mode(G91), MAR-453 "In tool break handler program O888800, G91 incremental mode is not supported " will be triggered and pause O888800.

- c. After starting tool break point, system will execute O888800 first. Machine moves XY to position before assigned line with G00, then move Z axis to position before assigned line with G01F1000. Finally, system executes the assigned program line.
 - d. This mode only use MMI module to scan program, and kernel does not process program value. So it is slower than Pr3851=0 but faster than Pr3851=999900. Notice that: (1) M code restoration only supports M3/M4/M5. And even if no M code is found before tool break line, system will still execute M3; (2) If no interpolation G code is found before tool break line (G00/01/02/03/33/34), then returning position is not updated and use the last tool break point starting position.
4. When "Pr3851=999900" or "Pr3851=888800 or 999901 and machine type is not Mill, WOOD or GlassGrind"
- a. Kernel scan the program from line 1 with mute mode, so tool number/auxiliary function/spindle RPM (MST), absolute/incremental, tool length, interpolation mode (G00/01/02/03), workpiece coordinates (G54...), feed type, feedrate, work plane(G17/G18/G19), units (G70/G71)...etc, all MSTG code will be updated.
 - b. After starting tool break point, system will execute O999900. First disable mute mode, and then move XY axis to position before assigned line with G00, then move Z axis to position before assigned line with G01F1000. Finally, system executes the assigned program line.
 - c. This mode use Kernel to fully scan the program and process its value, but no command is sent before assigned program line, therefore it is the slowest.
 - d. When using ATC, and with multiple tool change command in one machining file. If user use tool break return, in spec of O999900 kernel enters Mute Mode and scan the machining program from start and restore the last status before the line number called, when T code is read in mute mode, system executes T0000. Actual tool number on spindle is not change, however, if T0000 MACRO includeds @502:=#1036 to update spindle tool number, when T0000 executed spindle tool number will be re-write to the last tool before the called line and wrong tool will happened. To avoid wrong tool number, user should add the mute mode checking in the beginning of the T0000.

Example for T0000 With and Without Mute Mode



SYNTEC

T0000	O999900 action
<p>Without checking Mute Mode</p> <pre> %@MACRO WAIT(); IF (@502 = #1036 OR 0 = #1036 OR @489 < #1036) THEN M99; END_IF; @460:=1; M05; @104:=#1036; //store NC file T_code target tool number. @103:=#1004; WAIT(); T@502; G90 G53 Z#26023; M19; M52; M50; WAIT(); G04X0.5; G90 G53 Z0; WAIT(); T@104; WAIT(); G90 G53 Z#26023; M51; G04X0.5; @502:=@104; //modify the spindle tool number to current number. M53; M05; WAIT(); G@103; @460:=0; M99; </pre>	<p>IF on Spindle tool number is T3, enter N2 in tool break return input box, execute tool break return, turret rotate to T1 spindle want to return T3 to T1 pocket, wrong tool no.</p> <pre> T1 N1 G0X-20.Z-10 T2 N2 G0Y15. T3 N3 G0Y10. Z20. M30 </pre>

SYNTEC

T0000	O999900 action
<p>With checking Mute Mode. Add checking if it is Mute Mode in the beginning of T0000:</p> <pre> % @MACRO WAIT(); IF #1820=1 THEN // If Mute Mode is encountered then exit T0000 M99; END_IF; % @MACRO WAIT(); IF (@502 = #1036 OR 0 = #1036 OR @489 < #1036) THEN M99; END_IF; @460:=1; M05; @104:=#1036; //store NC file T_code target tool number. @103:=#1004; WAIT(); T@502; G90 G53 Z#26023; M19; M52; M50; WAIT(); G04X0.5; G90 G53 Z0; WAIT(); T@104; WAIT(); G90 G53 Z#26023; M51; G04X0.5; @502:=@104; //modify the spindle tool number to current number. M53; M05; WAIT(); G@103; @460:=0; M99; </pre>	<p>IF on Spindle tool number is T3, enter N2 in tool break return input box, execute tool break return, turret rotate to T3 spindle return T3 to T3 pocket, turret rotate to T2 spindle take T2 from pocket, continue execute N2 program.</p> <pre> T1 N1 G0X-20.Z-10 T2 N2 G0Y15. T3 N3 G0Y10. Z20. M30 </pre>

5. When "Pr3851=999901 and machine type is Mill, WOOD or GlassGrind" (Version after 10.118.39)

- a. Intelligent mid-program return line number chosen mode is enabled.
- b. The system scans the program from line 1 in mute mode. If the previous line before initial assigned line number is an unbelievable block, program position in previous line cannot be referenced by tool break handler program. In this condition, system will continue in mute mode and search for a believable positioning block to replace the initial assigned one automatically.
- c. If the previous line before the initial assigned line number is a believable block, machine motion will remain the same as Pr3851=999900.
- d. There are some commands that will make program position unbelievable, for example
 - i. mechanism compensation related commands: G43 H_, G43.4, G49,....
 - ii. coordinate system related commands: G54, G68.2,....
- e. Rule of searching believable positioning command
 - i. Check if two conditions listed below are both satisfied. if not, the system will keep scanning and checking lines below until conditions are met.
 1. Program position of previous line is believable
 2. Previous line is mid-program return acceptable moving command (it can only be G00, G01, G02, G03, G02.4, G03.4, G33, G34)
- f. When conditions are met, system will execute O999901.
 - i. Two system variables are provided:
 1. #1111: Initial assigned mid-program return line number in Intelligent mid-program return line number mode.
 2. #1112: Positioning command line number in Intelligent mid-program return line number mode.
 - ii. If line number has changed, standard O999901 will let system enter into block stop status and notify user that line number has changed. After checking changed line number, user can press cycle start to continue return program. (MPG simulation is recommended)
 1. **example for O999901**

O999901

```

1  %@MACRO
2  // backup modal status: command feedrate, G94/G95,
   G90/G91, G00/G01/G02/G03...
3  ...
4
5  // disable mute mode
6  G10 L1100 P1820 R0;
7
8  // mid-program return line number was delayed to
   latter block
9  IF #1111 <> #1112 THEN
10 // open macro, depending on the language setting, to
    create message
11 #51 := PARAM(3209);
12   CASE #51 OF
13     0:
14       M198 P"MSG999901_common";
15     1:
16       M198 P"MSG999901_cht";
17     119:
18       M198 P"MSG999901_chs";
19   ELSE

```

```

20         M198 P"MSG999901_common";
21     END_CASE;
22     M00;
23     WAIT();
24 END_IF;
25
26 // restore: tool length compensation, Spindle MS
27 // command
28 ..
29 // restore: M code by M code group table
30 ...
31
32 // move to break point
33 ...
34 G90 G00 X#11 Y#12 C#16; // rapid move to (x,y,c)
35 G94 G01 Z#13 F1000.; // cutting move to (z)
36
37 // restore modal mode
38 ...
39 M99;

```

p.s. hint of line number can be omitted to simplify return program.

no line number hint example

```

1 // mid-program return line number was delayed to
2 // latter block
3 IF #1111 <> #1112 THEN
4     MSG("Break point was delayed to latter line.");
5
6     M00;
7     WAIT();
8 END_IF;

```

iii. After the return program finished, the system executes the newly chosen program line number.

6. When "Pr3851>0 but ≠ 888800/999900"

- Same as Pr3851=999900, kernel will use mute mode to [scan NC program from line 1](#). All MSTG codes will be updated, and [execution speed is also the same](#).
- After starting tool break point, system will execute the customized tool break point program first and then execute the assigned program line.
- Notice that customized tool break point program needs to include G10 L1100 P1820 R0 command to stop mute mode customized tool break point program needs to [include G10 L1100 P1820 R0 command](#) to stop mute mode and return to normal mode. Otherwise, the system will stay in mute mode which only solves program but does not send commands.

1.247.3 Notice

- O888800 cannot be customized. When the tool break handle is used. HMI will automatically update O888800 after scanning.

- Standard O999900 can be found in software installation package or simulator. It is inside the zip file sysmacro.res at the directory of OpenCNC/Res. Unzip the *.res file and get O999900.
- Standard O999900 only handles actions of three axes of XYZ. If more axes are needed, please customize O999900 according to machine structure. Customized O999900 should be stored in Macro folder.
- If multiple tool is corresponding to multiple N block, then write Tool number (Tn) in one block before block number (Nn), when block Nn is called, Tn will be restored.

For example, current spindle tool number is T3, user want to call T2 and execute N2.

Nn Tn writing style	Expected tool break return action
N1 T1 G0X-20.Z-10 N2 T2 G0Y15. N3 T3 G0Y10. Z20. M30	<p>If enter N2 in tool break return input box, kernel restore to status before N2, change tool to T1, complete break-point return, and cycle start.</p> <p>Once cycle start, system will change T1 to T2, if target tool number is T2 then it need to change one more tool.</p>
T1 N1 G0X-20.Z-10 T2 N2 G0Y15. T3 N3 G0Y10. Z20. M30	<p>If enter N2 in tool break return input box, kernel restore to status before N2, change tool to T2, complete break-point return, and cycle start.</p>

1.247.4 Additional Features

- Version after [10.116.24T/10.116.36](#), [tool break point function supports M code group record function](#). Details is followed:
 - Provide 10x M code group setting, each group can record up to 5 M codes. They [will be recorded in #1101~#1110 base on their order in program when scanning](#). Default is disabled, the function is only enabled when group is set.
 - #1101~#1110 records with order, and the M codes within same group will only be recorded once. For example:
 - 3 groups are set as: 1-"M3/M4/M5", 2-"M7/M8", 3-"M9/M10". The order in group setting does not effect the scan result.
 - Assume the M codes scanned in program are: M3 → M7 → M9 → M4 → M8 → M10 → M7 → M5.
 - Final record value will be : #1101 = 10, #1102 = 7, #1103 = 5.

- c. Following is the added content in tool break point program O999900 for M code group function. During tool break handle, system will perform recorded M codes in #1101~#1110 by the machining order.

```
// restore M code by M code group table
FOR #31 := 1 TO 10 BY 1 DO
#32 := #[1100+#31];
IF #32 <> #0 THEN
M#32;
END_IF;
END_FOR;
```
- d. If O999900 is not used, user is allowed to use #1101~#1110 to customize the program.
- e. If a Macro M code is scanned, only Macro M code will be recorded. Any M codes inside the Macro is not recorded.
- f. As mentioned above, if T code is set as Macro, M codes inside T0000 Macro will not be recorded either.

1.248 Pr3852 *Enable halted point return

No	Descriptions	Range	Unit	Default	Effective
3852	*Enable halted point return	[0~1]	-	0	Restart

- This parameter is used to enable halted point return.
 - 1: Enable halted point return. When the system is under Feedhold/B-stop state and cycle start again, it will execute halted point return Macro(O888801) to move machine back to halted point position and then continue executing remaining NC program;
 - 0: Disable halted point return.
- Example:

N1 and N2 are two moving block in program, path is A through B to C:
 Under Auto/MDI mode, press feedhold at any point D while moving from A to B. Then switch to MPG/JOG mode to move to E. Now switch back to Auto/MDI mode and press cycle start:

 - If Pr3852=0
Version 10.114.x: System directly executes remainder NC program until tool reaches F (or a few blocks more base on real application), then insert a moving block to compensate the movement by MPG/JOG;
 - **Version 10.116.x: System inserts a moving block to compensate the movement by MPG/JOG** until tool reaches D, and then continue the remainder NC program. Thus the final position of N1 must be point B.
 - If Pr3852=1, system executes built-in Macro (O888801) **to move XY to halted point (D program XY position) with F1000, then move Z to halted point (D program Z position)**; and then continue the remainder NC program. Thus the final position of N1 must be point B.
 Customized halted point return Macro O888801 can be used to add special return movement.
- Restrictions
 - Customized halted point return Macro does not support most of commands, it only supports:
 - 1.Axis movement G Code: G00, G01.
 - 2.M code with 1st MST channel. (**Note: If Pr732 enables multi-MST channel, M code is invalid here.**)

- 3.#1461~#1476, compensate distance for halted point return.
- When multi-axis group function is enabled
 - 1.When customized halted point return function is enabled, each axis group needs to pause before triggering Cycle Start to execute halted point return function.
 - 2.When executing halted point return, the custom halted point return action will be executed first, and then the standard halted point return action will be executed.
- Extract partial of system built-in MACRO(O888801) for Mills only:

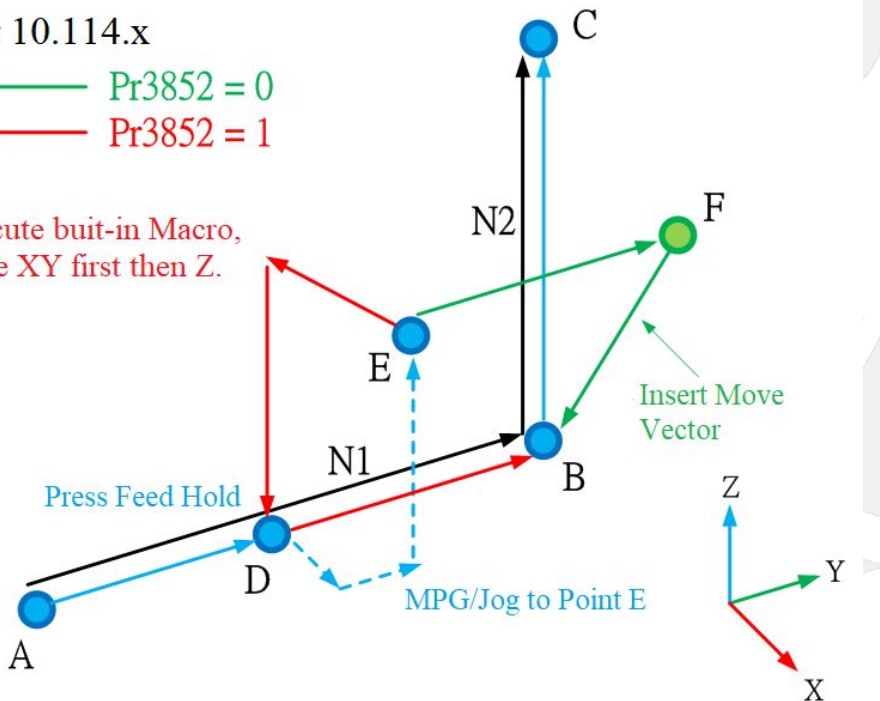

```

            %@MACRO
            // O888801HALTED POINT RETURN FUNCTION
            G91 G01 X#1461 Y#1462 F1000;
            Z#1463;
            
```

Ver 10.114.x

— Pr3852 = 0
 — Pr3852 = 1

Execute buit-in Macro,
 move XY first then Z.



SYNTEC

Ver 10.116.x

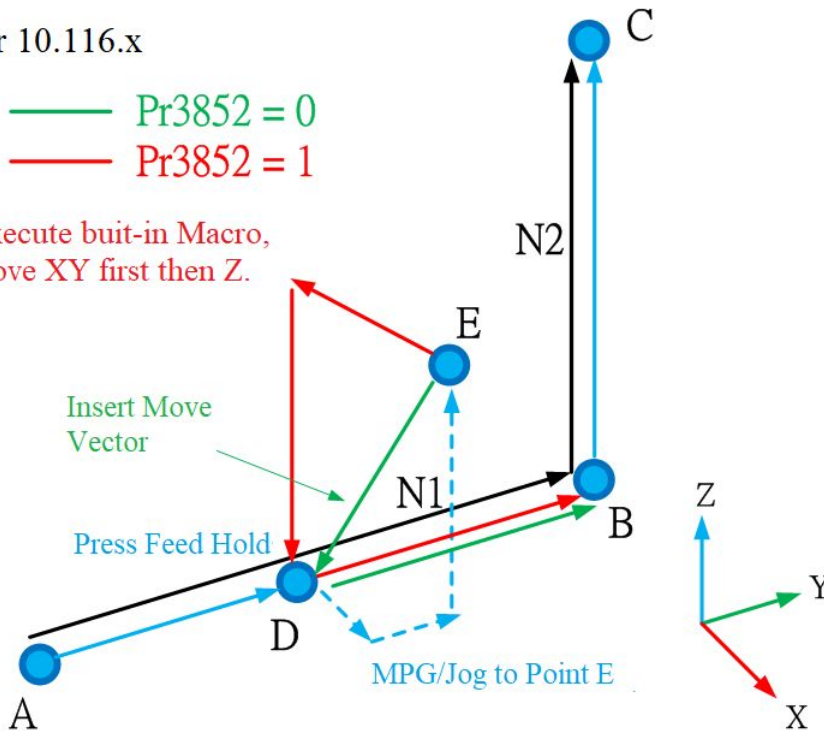
— Pr3852 = 0
 — Pr3852 = 1

Execute built-in Macro,
 move XY first then Z.

Insert Move
 Vector

Press Feed Hold

MPG/Jog to Point E



1.249 Pr3853 Enable NC program error examination (0:No;1:Yes)

No	Descriptions	Range	Unit	Default	Effective
3853	Enable NC program error examination (0:No;1:Yes)	[0~1]	-	0	Press Reset

• After enabling NC program error examination function, controller will add following checks when interpreting NC program:

1. Main program ending M code check:

When controller finish NC program interpretation, if main program has no ending M code (M02/M30/M99) then it determines the program is incomplete. To prevent unexpected action, alarm "COR-343 Main Program Exit without Finishing M Code" will be triggered.

Note: This function only checks ending of main program (default: disabled), sub-program ending check is always enabled.

2. Program invalid section check:

When controller is interpreting NC program, if an invalid section is found (no info after interpretation, could be garbled/blank/annotation), then it determines the file may be damaged. To prevent unexpected action, alarm "COR-344 There is meaningless paragraph in program."

Note: This function is effective in both main program and sub-program.

• This exam function supports following interpreting cases:

- Process path interpretation

Description: After parameter enabled exam function, the function is only effective under Auto mode. Once an alarm triggered, controller will switch to Feedhold and pause machining.

Effective Version: 10.116.56J, 10.118.12R, 10.118.22.

- Graphic simulation
Description: After parameter enabled exam function, the function is effective immediately and trigger alarms when error is found.
Effective Version: 10.118.12R, 10.118.22.
- Note:
 - a. Not support "Background element" error check.

1.250 Pr3854 G10.6 Tool Retract speed

No	Descriptions	Range	Unit	Default	Effective
3854	G10.6 Tool Retract speed	[1 ~999999999]	mm/min	1000	Press Reset

- This parameter is used to define G10.6 Tool Retract speed
- When G10.6 has a Feedrate argument, tool retracts, returns, and re-positions with the specified feedrate; if feedrate is not specified, use Pr3854 for Tool Retract speed.
- 10.118.27 and later version provides this parameter to define G10.6 Tool Retract speed

1.251 Pr3855 G10.6 Tool Retraction and repositioning speed

No	Descriptions	Range	Unit	Default	Default
3855	G10.6 Tool Retraction and repositioning speed	[1 ~999999999]	mm/min	1000	Press Reset

- This parameter defines G10.6 Tool Retraction and re-positioning speed.
- When G10.6 has a Feedrate argument, tool retracts, returns, and re-positions with the specified feedrate; if feedrate is not specified, use Pr3855 for tool retract and re-positioning speed.
- 10.118.27 and later version provides this parameter to define G10.6 Tool Retraction and re-positioning speed.

1.252 Pr3858 *Motion setting of Master-Slave mode

No	Descriptions	Range	Unit	Default	Effective
3858	*Motion setting of Master-Slave mode	[0~1]	-	0	restart

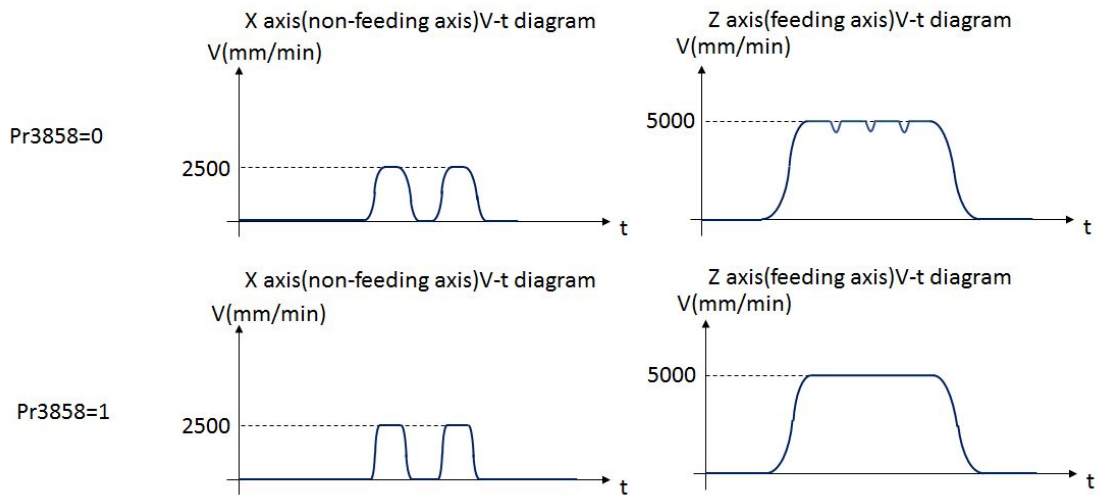
- This parameter decides motion planning of Master-Slave mode(G10 L1100 P1002):
 - 0: Plan motion in direction of all axes with smoothed velocity curve.

1: Plan motion in direction of the feeding axes specified by command G10 L1100 P1002 R_ with smoothed velocity curve. More detail please refer to G10L1100-Real-time Attributes Setting.

- Only effective in axis group of CNC main system. Not supported in axis group of non-CNC main system, loader axis group, woodworking labeling axis group.
- Difference of planning velocity between these setting(for example):
 - G10 L1100 P1002 R4 is used to specify the third axis(Z, Pr323=300) as the feeding axis.

NC File

```
G10 L1100 P1002 R4; // Set Z as feeding axis
G91;
G01 Z80.F5000;
G01 X40.Z80.; // non-feeding axis : feeding axis = 1:2
G01 Z80.;
G01 X40.Z80.;
```



- Supported models

valid versions	models
10.118.28F, 10.118.32 and later	HC series(including 80GM)、FC series、71SA、70SB、70CA、70CB、70CB-5
10.118.60J,10.118.66D, 10.118.68 and later	210A-E5、210B-E5、210A-H5、210B-H5、220A-5、220B-5、610A-E5、610A-H5

- Note:

- Corner velocity will decrease if Axial maximum corner reference feedrate Pr601~ is too low.
- Feeding axes velocity profile will be clamped if Axial maximum cutting feedrate of non-feeding axis is too low.

1.253 Pr3859 *High Precision Pitch Error Compensation

No	Descriptions	Range	Unit	Default	Effective
3859	*High Precision Pitch Error Compensation	[0~1]	-	0	restart

- 0 : Disable high precision pitch error compensation
 - 1~10 axis : the maximum compensated number is 100
 - 11~18 axis : No compensation
- 1 : Enable high precision pitch error compensation
 - 1~18 axis : the maximum compensated number is 2000
- The relation between Pr1301~Pr1320 and Pr3859 as follow :

Axis ID	Pr1301~Pr1320	Pr3859 = 0	Pr3859 = 1
1-10 axis	0	No compensation	No compensation
	1	Uni-directional compensation	High Precision Uni-directional compensation
	2	Bi-directional compensation	High Precision Bi-directional compensation
11~18 axis	0	No compensation	No compensation
	1	No compensation	High Precision Uni-directional compensation
	2	No compensation	High Precision Bi-directional compensation

- Effective version: 10.118.52G, 10.118.56A, 10.118.57 or abover.

1.254 Pr3861~Pr3890 *2nd~4th axis coupling setting parameter

No	Descriptions	Range	Unit	Default	Effective
3861~3890	*2 nd ~4 th axis coupling setting parameter				Restart

- Pr3861~Pr3890 are 2nd~4th axis coupling setting parameter, the definition are same as 1st coupling.
- Couple and decouple switch and flag:

	Couple switch	Couple state flag
1 st coupling	C46	R609.1
2 nd coupling	R614.2	R609.2
3 rd coupling	R614.3	R609.3
4 th coupling	R614.4	R609.4

1.255 Pr3901 DC protocol role

No	Descriptions	Range	Unit	Default	Effective
3901	DC protocol role	[0~1]	-	0	Press Reset

- This parameter defines the role in flow control mode. So this parameter is only effective when Pr3927 = 2. Please set 0 in the controller end (CNC), and set 1 in the PC end (Device or PC).
0: CNC;
1: Device or PC.

1.256 Pr3903 File transfer port number

No	Descriptions	Range	Unit	Default	Effective
3903	File transfer port number	[1~2]	-	1	Press Reset

- Defines the port number for file transfer, incorrect setting will cause file transfer failure. Another reason for file transfer failure could be cable connection problem. Default setting is 1 (COM1).
1: COM1;
2: COM2.

1.257 Pr3905 Macro program port number

No	Descriptions	Range	Unit	Default	Effective
3905	Macro program port number (1: COM1; 2: COM2)	[1~2]	-	1	Press Reset

- Defines the RS232/RS485 port number of PRINT command in Macro program. Incorrect setting will cause file transfer failure. Another reason for file transfer failure could be cable connection problem. Default setting is 2 (COM2).
1: COM1;
2: COM2.

1.258 Pr3921 COM1 baud

No	Descriptions	Range	Unit	Default	Effective
3921	COM1 baud	[0~6]	bit/s	3	Press Reset

- The speed of file transfer (Baud Rated). The parameter affects both file sending and receiving, and must match the setting on the other end. Mismatch Baud Rate can cause garbled data. Default setting is 2 (9600).
- Only special controllers support Baud rate over 230400.
0: 2400;
1: 4800;
2: 9600;
3: 19200;
4: 38400;
5: 57600;
6: 115200;
7: 230400;
8: 460800;
9: 921600.

1.259 Pr3922 COM1 data bit number

No	Descriptions	Range	Unit	Default	Effective
3922	COM1 data bit number	[7~8]	bit	7	Press Reset

- The length of transfer data. The parameter affects both data sending and receiving, and must match the setting on the other end. Mismatch bit number can cause garbled data. Default setting is 8 (8 bits).
7: 7 bits;
8: 8 bits.

1.260 Pr3923 COM1 exchange code type

No	Descriptions	Range	Unit	initial	occasion
3923	COM1 exchange code type	[0~2]	-	0	Press Reset

- COM1 data exchange encoding types. The parameter affects both data sending and receiving, and must match the setting on the other end. Mismatch encoding type can cause garbled data. Default setting is 0 (ASCII).
0: ASCII;
1: EIA;
2: ISO.

1.261 Pr3924 COM1 control code

No	Descriptions	Range	Unit	Default	Effective
3924	COM1 control code	[0~3]	-	0	Press Reset

- The parameter sets RS232 device control, it affects the RS232 data transfer, and should be setup based on data requirement of external device. Wrong parameter setting can cause external device turns ON/OFF abnormally. Default setting is 0 (no RS232 device).
0: No;
1: DC2 at data head;
2: DC4 at data end;
3: DC2 at data head +DC4 at data end.

1.262 Pr3925 COM1 end-of-block output code

No	Descriptions	Range	Unit	Default	Effective
3925	COM1 end-of-block output code	[0~1]	-	0	Press Reset

- Defines COM1 end-of-block output code format to add <Return> at the end of each block sign (EOB). This parameter only affects data output, it depends on the receiving requirement on the other end. Wrong setting can cause the transferred blocks in wrong order. Default setting is 0.
0: EOB;
1: Add CR before EOB.

1.263 Pr3926 COM1 DC3 control code parity

No	Descriptions	Range	Unit	Default	Effective
3926	COM1 DC3 control code parity	[0~1]	-	0	Press Reset

- Set DC3 flow control code format. DC3 is used to control software flow and only effective when Pr3927 software flow control method set as 2: software flow control. When Pr3926 is 0, DC3 code corresponds to

ASCII code is 13H; when Pr3926 is 1, DC3 code corresponds to ASCII code 93H . This parameter affects both data output and input, it must match the transmitting software on the other end. Wrong setting can cause missing text. Default setting is 0 (use ASCII 13H as DC3 control code).

0: Off;

1: On.

1.264 Pr3927 COM1 flow control

No	Descriptions	Range	Unit	Default	Effective
3927	COM1 flow control	[0~3]	-	1	Press Reset

- Setup COM1 flow control handshake format. Pr3927=1: CTS/RTS protocol is fastest but need CTS/RTS cable; Pr3927=2: Xon/Xoff use DC1/DC3 bits as flow control, which is slower but need only 3 wires (GND/REC/TRA); Pr3927=0: is for external HMI applications because their protocol has built in flow control.

This parameter affects both data input and output, and must match the transmitting software on the other end. Wrong setting can cause missing text. Default setting is 2 (Xon/Xoff software handshake).

0: No;

1: CTS/RTS software protocol;

2: Xon/Xoff software protocol;

3: RS485.

1.265 Pr3928 COM1 parity check

No	Descriptions	Range	Unit	Default	Effective
3928	COM1 parity check	[0~2]	-	0	Press Reset

- Defines COM1 parity check method. This parameter affects both data input and output, and must match the transmitting software on the other end. Wrong setting can cause garbed text. Default setting is 0 (Odd).

0: No;

1: Odd corresponding;

2: Even corresponding.

1.266 Pr3929 COM1 stop bit number

No	Descriptions	Range	Unit	Default	Effective
3929	COM1 stop bit number	[1~2]	bit	1	Press Reset

- Set the COM1 stop bit number. This parameter affects both data input and output, and must match the transmitting software on the other end. Wrong setting can cause garbed text. Default setting is 1 (1 bit).

1: 1 Bit;
2: 2 Bits.

1.267 Pr3930 COM1 communicate error timeout(ms)

No	Descriptions	Range	Unit	Default	Effective
3930	COM1 communicate error timeout(ms)	[10~1000]	ms	10	Press Reset

When executing MODR, MODW, MODRS commands, if no respond data is received within the time defined by this parameter under receive mode, system will retry to send command again. If there is still no respond data after 10 retries, system will assign R5039=250 to show TimeOut, and trigger R608.31 as an error flag.

1.268 Pr3941~Pr3949 COM2 communication

No	Descriptions	Range	Unit	Default	Effective
3941~3949	COM2 communication	-	-	-	Press Reset

- Please refer to Pr3921~Pr3930 COM1 communication.

1.269 Pr3951 Axis no. for chopping axis

No	Descriptions	Range	Unit	Default	Effective
3951	Axis no. for chopping axis	[0~18]	-	0	Press Reset

Valid version for mill machine: 10.118.19 and before.

Valid version for non-mill machine: 10.116.56E, 10.118.12M, 10.118.19 and before.

1.270 Pr3952 Chopping reference machine position

No	Descriptions	Range	Unit	Default	Effective
3952	Chopping reference machine position (BLU)	[-999999999~ 999999999]	BLU	0	Press Reset

Valid version for mill machine: 10.118.19 and before.

Valid version for non-mill machine: 10.116.56E, 10.118.12M, 10.118.19 and before.

1.271 Pr3953 Chopping upper dead machine position

No	Descriptions	Range	Unit	Default	Effective
3953	Chopping upper dead machine position	[-999999999~999999999]	BLU	0	Press Reset

Valid version for mill machine: 10.118.19 and before.

Valid version for non-mill machine: 10.116.56E, 10.118.12M, 10.118.19 and before.

1.272 Pr3954 Chopping lower dead machine position

No	Descriptions	Range	Unit	Default	Effective
3954	Chopping lower dead machine position	[-999999999~999999999]	BLU	0	Press Reset

Valid version for mill machine: 10.118.19 and before.

Valid version for non-mill machine: 10.116.56E, 10.118.12M, 10.118.19 and before.

1.273 Pr3955 Chopping feedrate

No	Descriptions	Range	Unit	Default	Effective
3955	Chopping feedrate	[1~320000]	mm/min	0	Press Reset

Valid version for mill machine: 10.118.19 and before.

Valid version for non-mill machine: 10.116.56E, 10.118.12M, 10.118.19 and before.

1.274 Pr3956 Chopping compensation factor

No	Descriptions	Range	Unit	Default	Effective
3956	Chopping compensation factor	[0~200]	%	100	Press Reset

- The controller will use parameter value to adjust speed command to improve motor's tracking of command, then to reduce the servo error. The larger the set value, the smaller the error is; but notice it may cause the machine to resonate.
- Valid version for mill machine: 10.118.19 and before.
Valid version for non-mill machine: 10.116.56E, 10.118.12M, 10.118.19 and before.

1.275 Pr3957 *High precision advanced chopping stopping position

No	Descriptions	Range	Unit	Default	Effective
3957	*High precision advanced chopping stopping position	[0~1]	-	0	restart

- The controller will use parameter value to decide the G81.2's chopping stop position after reset(On C1), feedhold(On C37), close chopping, alarm.(excluding the alarms which will make the system turn into Servo Off state.)
 - 0 : Stop at R point
 - 1 : Stop immediately

1.276 Pr3961~Pr3970 COM3 communication

No	Descriptions	Range	Unit	Default	Effective
3961~3970	COM3 communication	-	-	-	Press Reset

- Please refer to Pr3921~Pr3930 COM1 communication.

1.277 Pr3971 Modbus TCP Communication Error Timeout

No	Description	Range	Unit	Default	Effective
3971	Modbus TCP Communication Error Timeout	[10~1000]	ms	100	Press Reset

- This parameter is effective when R5040 is 9: Modbus TCP function.
- When executing MODR, MODW, MODRS commands, if no respond data is received within the time defined by this parameter under receive mode, system will retry to send command again. If there is still no respond data after 10 retries, system will assign R5039=250 to show TimeOut, and trigger R608.31 as an error flag.

1.278 Pr3972 Enable driver delay compensation.

No	Descriptions	Range	Unit	Default	Effective
3972	Enable driver delay compensation	[-1~0]	--	0	Restart

- This function is used to solve two problems when using different servo drives:
 - Asynchronous command due to different communication delay time.
 - Incorrect feedback compensation due to different feedback timing.

- ~10.118.40F, 10.118.43

0: Disable, 1: Enable

10.118.40G, 10.118.44~	-1: Disable, 0: Enable
------------------------	------------------------

- The supported servo drive types:
 - Yaskawa serial bus: M2, M3 Sigma5, Sigma7, and SigmaM series
 - Syntec serial bus: All M2, M3 drive series
- Supported version:

Servo Drive	Controller Version
Yaskawa M2, M3 Sigma5, Sigma7, Sigma M	10.118.13, 10.118.12B, 10.116.26M and later
Syntec M3 drives	10.118.12Z, 10.118.22K, 10.118.28 and later
Syntec M2 drives	10.118.12Z and later

- The command delay time of motors are different when Pn-833 setting of driver in each axis are various. It leads to low synchronization. Activate this function can compensate this problem.
- If any of the synchronous movement axes uses a delay model that controller does not support, driver delay compensation will not be enabled.
- After driver compensation being enabled, Syntec driver is supported to use the cubic spline delay model.

1.279 Pr3980 *Simulation feedback order setting

No	Descriptions	Range	Unit	Default	Effective
3980	*Simulation feedback order setting (0: 1 st order; 1: high order)	[0~1]	--	1	Restart

- 0: Use 1st order motor to calculate simulation feedback
 - 1: Use high order motor to calculate simulation feedback
- Note: Because simulation feedback will be used by mechanical compensation, if this parameter is changed, 1st order and high order simulation at the high frequency section. Therefore mechanical compensation quantity will have small difference.

1.280 Pr3981 Smooth level of post-accelerated filter of the cutting command

i 中文版本Chinese version: Pr3981 切削後加減速濾波器平滑等級

No	Descriptions	Range	Unit	Default	Effective
3981	Smooth level of post-accelerated filter	[0~1]	-	0	Press Reset

1.280.1 Descriptions for the value of the parameter

- 0: the single moving average filter
- 1: the multiple moving average filter

1.280.2 Operating Descriptions

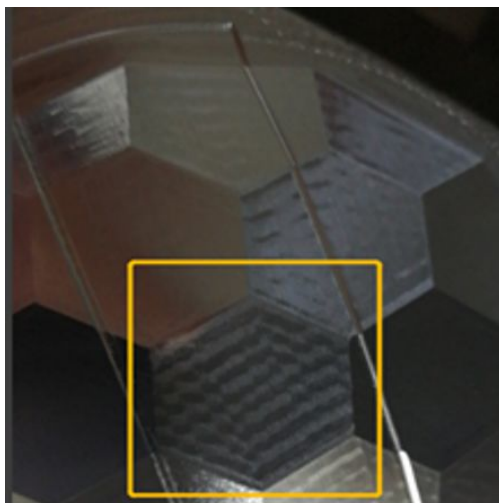
- This parameter setting only affects the post acceleration filter of the cutting command(the post acceleration time is the setting value of Pr404).
- When this parameter is set to 0, and the single moving average filter is applied.
- When this parameter is set to 1, and the multiple moving average filter is applied.
 - The multiple moving average filter is appropriate for solving the machining problems, such as the ripple at corner, the vibration texture, etc., and the case which requires smoothness more than precision at the corners.

ripple at corner



Vibration Texture

Vibration Texture



- Compared to the single moving average filter with the same Pr404, the multiple moving average filter provides the smoother command, which is more efficient for vibration suppression. However, it will reduce the precision at the corner more severely.
- When Pr404 is too small, the multiple moving average filter may be ineffective. For more details, refer to the following conversion table between time constant and bandwidth.

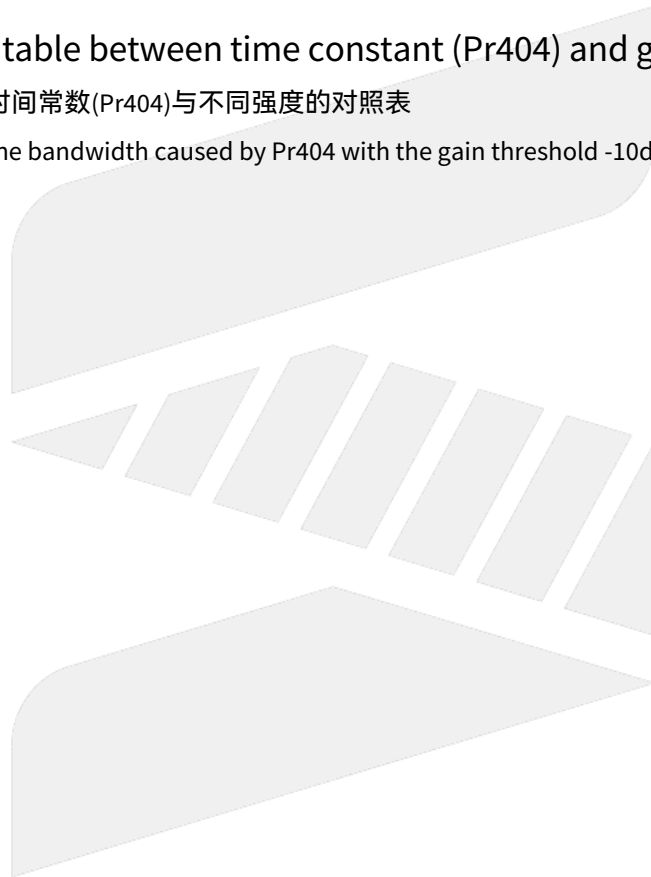
Supported Controller Software Version: 10.118.28E, 10.118.32, and above

References: [Conversion table between time constant \(Pr404\) and gain](#)

1.280.3 Conversion table between time constant (Pr404) and gain

中文版本Chinese version: [时间常数\(Pr404\)与不同强度的对照表](#)

The following table shows the bandwidth caused by Pr404 with the gain threshold -10dB, -20dB, -30dB.



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gain	Pr3981 = 0					Pr3981 = 1				
-10dB (suppress vibration to 32%)	Pr404 vs. Pr3203	0.5ms	1ms	2ms	3ms	Pr404 vs. Pr3203	0.5ms	1ms	2ms	3ms
	1	795.2	Inf	Inf	Inf	1	Inf	Inf	Inf	Inf
	2	375.8	397.6	Inf	Inf	2	460.3	Inf	Inf	Inf
	3	248	254.1	Inf	Inf	3	285.2	Inf	Inf	Inf
	4	185.4	187.9	198.8	Inf	4	209	230.2	Inf	Inf
	5	148.1	149.4	198.8	Inf	5	165.5	230.2	Inf	Inf
	6	123.3	124	127.1	132.6	6	137.1	142.6	Inf	Inf
	7	105.6	106.1	127.1	132.6	7	117.2	142.6	Inf	Inf
	8	92.4	92.7	94	132.6	8	102.3	104.5	115.1	Inf
	9	82.1	82.3	94	84.7	9	90.8	104.5	115.1	Inf
	10	73.9	74.1	74.7	84.7					

gain	Pr3981 = 0					Pr3981 = 1				
	11	67 .2	67 .3	74 .7	84 .7	10	81 .6	82 .8	11 5. 1	ln f
	12	61 .6	61 .7	62	62 .7	11	74 .2	82 .8	11 5. 1	ln f
	13	56 .8	56 .9	62	62 .7	12	68	68 .6	71 .3	7 6. 8
	14	52 .8	52 .8	53 .1	62 .7	13	62 .7	68 .6	71 .3	7 6. 8
	15	49 .3	49 .3	53 .1	49 .8	14	58 .2	58 .6	71 .3	7 6. 8
	16	46 .2	46 .2	46 .4	49 .8	15	54 .3	58 .6	71 .3	7 6. 8
	17	43 .5	43 .5	46 .4	49 .8	16	50 .9	51 .2	52 .3	7 6. 8
	18	41 .1	41 .1	41 .2	41 .4	17	47 .9	51 .2	52 .3	7 6. 8
	19	38 .9	38 .9	41 .2	41 .4	18	45 .2	45 .4	52 .3	4 7. 6
	20	37	37	37 .1	41 .4	19	42 .9	45 .4	52 .3	4 7. 6
	21	35 .2	35 .2	37 .1	35 .4					
	22	33 .6	33 .6	33 .7	35 .4					
	23	32 .1	32 .2	33 .7	35 .4					
	24	30 .8	30 .8	30 .9	30 .9					

gain	Pr3981 = 0					Pr3981 = 1				
	25	29 .6	29 .6	30 .9	30 .9	20	40 .7	40 .8	41 .4	4 7. 6
	26	28 .4	28 .4	28 .5	30 .9	21	38 .8	40 .8	41 .4	4 7. 6
	27	27 .4	27 .4	28 .5	27 .5	22	37	37 .1	41 .4	4 7. 6
	28	26 .4	26 .4	26 .4	27 .5	23	35 .4	37 .1	41 .4	4 7. 6
	29	25 .5	25 .5	26 .4	27 .5	24	33 .9	34	34 .3	3 4. 9
	30	24 .7	24 .7	24 .7	24 .7	25	32 .6	34	34 .3	3 4. 9
	31	23 .9	23 .9	24 .7	24 .7	26	31 .3	31 .4	34 .3	3 4. 9
	32	23 .1	23 .1	23 .1	24 .7	27	30 .2	31 .4	34 .3	3 4. 9
	33	22 .4	22 .4	23 .1	22 .5	28	29 .1	29 .1	29 .3	3 4. 9
	34	21 .8	21 .8	21 .8	22 .5	29	28 .1	29 .1	29 .3	3 4. 9
	35	21 .1	21 .1	21 .8	22 .5					
	36	20 .6	20 .6	20 .6	20 .6					
	37	20	20	20 .6	20 .6					
	38	19 .5	19 .5	19 .5	20 .6					

gain	Pr3981 = 0				Pr3981 = 1				
39	19	19	19	19	30	27	27	29	2
			.5	19		.1	.2	.3	7.
									6
40	18	18	18	19	31	26	27	29	2
	.5	.5	.5			.3	.2	.3	7.
									6
41	18	18	18	19	32	25	25	25	2
	.1	.1	.5			.4	.5	.6	7.
									6
42	17	17	17	17	33	24	25	25	2
	.6	.6	.6	.6		.7	.5	.6	7.
									6
43	17	17	17	17	34	24	24	25	2
	.2	.2	.6	.6				.6	7.
									6
44	16	16	16	17	35	23	24	25	2
	.8	.8	.8	.6		.3		.6	7.
									6
45	16	16	16	16	36	22	22	22	2
	.5	.5	.8	.5		.6	.6	.7	2.
									9
46	16	16	16	16	37	22	22	22	2
	.1	.1	.1	.5			.6	.7	2.
									9
47	15	15	16	16	38	21	21	22	2
	.8	.8	.1	.5		.4	.5	.7	2.
									9
48	15	15	15	15	39	20	21	22	2
	.4	.4	.4	.4		.9	.5	.7	2.
									9
49	15	15	15	15					
	.1	.1	.4	.4					
50	14	14	14	15					
	.8	.8	.8	.4					
51	14	14	14	14					
	.5	.5	.8	.5					
52	14	14	14	14					
	.2	.2	.2	.5					

gain	Pr3981 = 0				Pr3981 = 1					
	53	14	14	14 .2	14 .5	40	20 .4	20 .4	20 .4	2 2. 9
	54	13 .7	13 .7	13 .7	13 .7	41	19 .9	20 .4	20 .4	2 2. 9
	55	13 .5	13 .5	13 .7	13 .7	42	19 .4	19 .4	20 .4	1 9. 6
	56	13 .2	13 .2	13 .2	13 .7	43	18 .9	19 .4	20 .4	1 9. 6
	57	13	13	13 .2	13	44	18 .5	18 .5	18 .6	1 9. 6
	58	12 .8	12 .8	12 .8	13	45	18 .1	18 .5	18 .6	1 9. 6
	59	12 .6	12 .6	12 .8	13	46	17 .7	17 .7	18 .6	1 9. 6
	60	12 .4	12 .4	12 .4	12 .4	47	17 .3	17 .7	18 .6	1 9. 6
	61	12 .1	12 .1	12 .4	12 .4	48	17	17	17	1 7. 1
	62	12	12	12	12 .4	49	16 .6	17	17	1 7. 1
	63	11 .8	11 .8	12	11 .8					
	64	11 .6	11 .6	11 .6	11 .8					
	65	11 .4	11 .4	11 .6	11 .8					
	66	11 .2	11 .2	11 .2	11 .2					

gain	Pr3981 = 0					Pr3981 = 1				
	67	11 .1	11 .1	11 .2	11 .2	50	16 .3	16 .3	17	1 7. 1
	68	10 .9	10 .9	10 .9	11 .2	51	16	16 .3	17	1 7. 1
	69	10 .7	10 .7	10 .9	10 .8	52	15 .7	15 .7	15 .7	1 7. 1
	70	10 .6	10 .6	10 .6	10 .8	53	15 .4	15 .7	15 .7	1 7. 1
	71	10 .4	10 .4	10 .6	10 .8	54	15 .1	15 .1	15 .7	1 5. 2
	72	10 .3	10 .3	10 .3	10 .3	55	14 .8	15 .1	15 .7	1 5. 2
	73	10 .2	10 .2	10 .3	10 .3	56	14 .6	14 .6	14 .6	1 5. 2
	74	10	10	10	10 .3	57	14 .3	14 .6	14 .6	1 5. 2
	75	9. 9	9. 9	10	9. 9	58	14 .1	14 .1	14 .6	1 5. 2
	76	9. 8	9. 8	9. 8	9. 9	59	13 .8	14 .1	14 .6	1 5. 2
	77	9. 6	9. 6	9. 8	9. 9					
	78	9. 5	9. 5	9. 5	9. 5					
	79	9. 4	9. 4	9. 5	9. 5					
	80	9. 3	9. 3	9. 3	9. 5					

gain	Pr3981 = 0					Pr3981 = 1				
	81	9. 2	9. 2	9. 3	9. 2	60	13 .6	13 .6	13 .6	1 3. 6
	82	9. 1	9. 1	9. 1	9. 2	61	13 .4	13 .6	13 .6	1 3. 6
	83	8. 9	8. 9	9. 1	9. 2	62	13 .2	13 .2	13 .6	1 3. 6
	84	8. 8	8. 8	8. 8	8. 8	63	12 .9	13 .2	13 .6	1 3. 6
	85	8. 7	8. 7	8. 8	8. 8	64	12 .7	12 .7	12 .8	1 3. 6
	86	8. 6	8. 6	8. 6	8. 8	65	12 .5	12 .7	12 .8	1 3. 6
	87	8. 5	8. 5	8. 6	8. 5	66	12 .4	12 .4	12 .8	1 2. 4
	88	8. 4	8. 4	8. 4	8. 5	67	12 .2	12 .4	12 .8	1 2. 4
	89	8. 3	8. 3	8. 4	8. 5	68	12	12	12	1 2. 4
	90	8. 3	8. 3	8. 3	8. 3	69	11 .8	12	12	1 2. 4
	91	8. 2	8. 2	8. 3	8. 3					
	92	8. 1	8. 1	8. 1	8. 3					
	93	8	8	8. 1	8					
	94	7. 9	7. 9	7. 9	8					

gain	Pr3981 = 0					Pr3981 = 1				
	95	7. 8	7. 8	7. 9	8	70	11 .7	11 .7	12	1 2. 4
	96	7. 7	7. 7	7. 7	7. 7	71	11 .5	11 .7	12	1 2. 4
	97	7. 7	7. 7	7. 7	7. 7	72	11 .3	11 .3	11 .3	1 1. 4
	98	7. 6	7. 6	7. 6	7. 7	73	11 .2	11 .3	11 .3	1 1. 4
	99	7. 5	7. 5	7. 6	7. 5	74	11	11	11 .3	1 1. 4
	100	7. 4	7. 4	7. 4	7. 5	75	10 .9	11	11 .3	1 1. 4
						76	10 .7	10 .7	10 .8	1 1. 4
						77	10 .6	10 .7	10 .8	1 1. 4
						78	10 .5	10 .5	10 .8	1 0. 5
						79	10 .3	10 .5	10 .8	1 0. 5

gain	Pr3981 = 0	Pr3981 = 1				
		80	10 .2	10 .2	10 .2	1 0. 5
		81	10 .1	10 .2	10 .2	1 0. 5
		82	10	10	10 .2	1 0. 5
		83	9. 8	10	10 .2	1 0. 5
		84	9. 7	9. 7	9. 7	9. 7
		85	9. 6	9. 7	9. 7	9. 7
		86	9. 5	9. 5	9. 7	9. 7
		87	9. 4	9. 5	9. 7	9. 7
		88	9. 3	9. 3	9. 3	9. 7
		89	9. 2	9. 3	9. 3	9. 7
		90	9. 1	9. 1	9. 3	9. 1
		91	9	9. 1	9. 3	9. 1

gain	Pr3981 = 0	Pr3981 = 1				
		92	8. 9	8. 9	8. 9	9. 1
		93	8. 8	8. 9	8. 9	9. 1
		94	8. 7	8. 7	8. 9	9. 1
		95	8. 6	8. 7	8. 9	9. 1
		96	8. 5	8. 5	8. 5	8. 5
		97	8. 4	8. 5	8. 5	8. 5
		98	8. 3	8. 3	8. 5	8. 5
		99	8. 3	8. 3	8. 5	8. 5
		100	8. 2	8. 2	8. 2	8. 5

SYNTEC

gain	Pr3981 = 0					Pr3981 = 1				
-20dB (suppress vibration to 10%)	Pr404 vs. Pr3203	0.5ms	1ms	2ms	3ms	Pr404 vs. Pr3203	0.5ms	1ms	2ms	3ms
	1	936.3	Inf	Inf	Inf	1	Inf	Inf	Inf	Inf
	2	457.6	468.2	Inf	Inf	2	619.9	Inf	Inf	Inf
	3	303.8	307	Inf	Inf	3	388.5	Inf	Inf	Inf
	4	227.5	228.8	234.1	Inf	4	285.6	310	Inf	Inf
	5	181.9	182.6	234.1	Inf	5	226.4	310	Inf	Inf
	6	151.5	151.9	153.5	156.1	6	187.8	194.2	Inf	Inf
	7	129.8	130.1	153.5	156.1	7	160.5	194.2	Inf	Inf
	8	113.6	113.8	114.4	156.1	8	140.2	142.8	155	Inf
	9	101	101.1	114.4	104	9	124.5	142.8	155	Inf

gain	Pr3981 = 0					Pr3981 = 1				
	10	90 .9	91	91 .3	10 2. 4	10	11 1. 9	11 3. 2	1 5 5	Inf
	11	82 .6	82 .7	91 .3	10 2. 4	11	10 1. 7	11 3. 2	1 5 5	Inf
	12	75 .7	75 .8	76	76 .3	12	93 .2	93 .9	9 7. 1	10 3. 4
	13	69 .9	69 .9	76	76 .3	13	86	93 .9	9 7. 1	10 3. 4
	14	64 .9	64 .9	65 .1	76 .3	14	79 .8	80 .3	9 7. 1	10 3. 4
	15	60 .6	60 .6	65 .1	60 .9	15	74 .5	80 .3	9 7. 1	10 3. 4
	16	56 .8	56 .8	56 .9	60 .9	16	69 .8	70 .1	7 1. 4	10 3. 4
	17	53 .5	53 .5	56 .9	60 .9	17	65 .7	70 .1	7 1. 4	10 3. 4
	18	50 .5	50 .5	50 .6	50 .7	18	62 .1	62 .2	7 1. 4	64 .8
	19	47 .8	47 .9	50 .6	50 .7	19	58 .8	62 .2	7 1. 4	64 .8
	20	45 .5	45 .5	45 .5	50 .7					
	21	43 .3	43 .3	45 .5	43 .4					
	22	41 .3	41 .3	41 .4	43 .4					

gain	Pr3981 = 0					Pr3981 = 1				
	23	39 .5	39 .5	41 .4	43 .4	20	55 .9	56	5 6. 6	64 .8
	24	37 .9	37 .9	37 .9	38	21	53 .2	56	5 6. 6	64 .8
	25	36 .4	36 .4	37 .9	38	22	50 .8	50 .8	5 6. 6	64 .8
	26	35	35	35	38	23	48 .6	50 .8	5 6. 6	64 .8
	27	33 .7	33 .7	35	33 .7	24	46 .5	46 .6	4 7	47 .6
	28	32 .5	32 .5	32 .5	33 .7	25	44 .7	46 .6	4 7	47 .6
	29	31 .4	31 .4	32 .5	33 .7	26	43	43	4 7	47 .6
	30	30 .3	30 .3	30 .3	30 .4	27	41 .4	43	4 7	47 .6
	31	29 .3	29 .3	30 .3	30 .4	28	39 .9	39 .9	4 0. 2	47 .6
	32	28 .4	28 .4	28 .4	30 .4	29	38 .5	39 .9	4 0. 2	47 .6
	33	27 .6	27 .6	28 .4	27 .6	30	37 .2	37 .2	4 0. 2	37 .8
	34	26 .8	26 .8	26 .8	27 .6					
	35	26	26	26 .8	27 .6					
	36	25 .3	25 .3	25 .3	25 .3					

gain	Pr3981 = 0					Pr3981 = 1				
	37	24 .6	24 .6	25 .3	25 .3	31	36	37 .2	4 0. 2	37 .8
	38	23 .9	23 .9	24	25 .3	32	34 .9	34 .9	3 5. 1	37 .8
	39	23 .3	23 .3	24	23 .3	33	33 .9	34 .9	3 5. 1	37 .8
	40	22 .7	22 .8	22 .8	23 .3	34	32 .9	32 .9	3 5. 1	37 .8
	41	22 .2	22 .2	22 .8	23 .3	35	31 .9	32 .9	3 5. 1	37 .8
	42	21 .7	21 .7	21 .7	21 .7	36	31 .1	31	3 1. 1	31 .3
	43	21 .2	21 .2	21 .7	21 .7	37	30 .2	31	3 1. 1	31 .3
	44	20 .7	20 .7	20 .7	21 .7	38	29 .4	29 .4	3 1. 1	31 .3
	45	20 .2	20 .2	20 .7	20 .2	39	28 .7	29 .4	3 1. 1	31 .3
	46	19 .8	19 .8	19 .8	20 .2	40	28	27 .9	2 8	31 .3
	47	19 .4	19 .4	19 .8	20 .2	41	27 .3	27 .9	2 8	31 .3
	48	19	19	19	19					
	49	18 .6	18 .6	19	19					
	50	18 .2	18 .2	18 .2	19					

gain	Pr3981 = 0				Pr3981 = 1					
	51	17 .9	17 .9	18 .2	17 .9	42	26 .6	26 .6	2 8	26 .8
	52	17 .5	17 .5	17 .5	17 .9	43	26	26 .6	2 8	26 .8
	53	17 .2	17 .2	17 .5	17 .9	44	25 .4	25 .4	2 5. 4	26 .8
	54	16 .9	16 .9	16 .9	16 .9	45	24 .9	25 .4	2 5. 4	26 .8
	55	16 .6	16 .6	16 .9	16 .9	46	24 .3	24 .3	2 5. 4	26 .8
	56	16 .3	16 .3	16 .3	16 .9	47	23 .8	24 .3	2 5. 4	26 .8
	57	16	16	16 .3	16	48	23 .3	23 .3	2 3. 3	23 .4
	58	15 .7	15 .7	15 .7	16	49	22 .8	23 .3	2 3. 3	23 .4
	59	15 .4	15 .4	15 .7	16	50	22 .4	22 .3	2 3. 3	23 .4
	60	15 .2	15 .2	15 .2	15 .2	51	21 .9	22 .3	2 3. 3	23 .4
	61	14 .9	14 .9	15 .2	15 .2	52	21 .5	21 .5	2 1. 5	23 .4
	62	14 .7	14 .7	14 .7	15 .2					
	63	14 .5	14 .5	14 .7	14 .5					
	64	14 .2	14 .2	14 .2	14 .5					

gain	Pr3981 = 0				Pr3981 = 1					
	65	14	14	14 .2	14 .5	53	21 .1	21 .5	2 1. 5	23 .4
	66	13 .8	13 .8	13 .8	13 .8	54	20 .7	20 .7	2 1. 5	20 .8
	67	13 .6	13 .6	13 .8	13 .8	55	20 .4	20 .7	2 1. 5	20 .8
	68	13 .4	13 .4	13 .4	13 .8	56	20	20	2 0	20 .8
	69	13 .2	13 .2	13 .4	13 .2	57	19 .6	20	2 0	20 .8
	70	13	13	13	13 .2	58	19 .3	19 .3	2 0	20 .8
	71	12 .8	12 .8	13	13 .2	59	19	19 .3	2 0	20 .8
	72	12 .7	12 .7	12 .7	12 .7	60	18 .7	18 .6	1 8. 6	18 .7
	73	12 .5	12 .5	12 .7	12 .7	61	18 .4	18 .6	1 8. 6	18 .7
	74	12 .3	12 .3	12 .3	12 .7	62	18 .1	18	1 8. 6	18 .7
	75	12 .2	12 .2	12 .3	12 .2	63	17 .8	18	1 8. 6	18 .7
	76	12	12	12	12 .2					
	77	11 .8	11 .8	12	12 .2					
	78	11 .7	11 .7	11 .7	11 .7					

gain	Pr3981 = 0				Pr3981 = 1					
	79	11 .5	11 .5	11 .7	11 .7	64	17 .5	17 .5	1 7. 5	18 .7
	80	11 .4	11 .4	11 .4	11 .7	65	17 .2	17 .5	1 7. 5	18 .7
	81	11 .3	11 .3	11 .4	11 .3	66	17	16 .9	1 7. 5	17
	82	11 .1	11 .1	11 .1	11 .3	67	16 .7	16 .9	1 7. 5	17
	83	11	11	11 .1	11 .3	68	16 .5	16 .4	1 6. 5	17
	84	10 .9	10 .9	10 .9	10 .9	69	16 .2	16 .4	1 6. 5	17
	85	10 .7	10 .7	10 .9	10 .9	70	16	16	1 6. 5	17
	86	10 .6	10 .6	10 .6	10 .9	71	15 .8	16	1 6. 5	17
	87	10 .5	10 .5	10 .6	10 .5	72	15 .6	15 .5	1 5. 5	15 .6
	88	10 .4	10 .4	10 .4	10 .5	73	15 .4	15 .5	1 5. 5	15 .6
	89	10 .3	10 .3	10 .4	10 .5					
	90	10 .1	10 .1	10 .1	10 .1					
	91	10	10	10 .1	10 .1					
	92	9. 9	9. 9	9. 9	10 .1					

gain	Pr3981 = 0					Pr3981 = 1				
	93	9. 8	9. 8	9. 9	9. 8	74	15 .2	15 .1	1 5. 5	15 .6
	94	9. 7	9. 7	9. 7	9. 8	75	15	15 .1	1 5. 5	15 .6
	95	9. 6	9. 6	9. 7	9. 8	76	14 .8	14 .7	1 4. 7	15 .6
	96	9. 5	9. 5	9. 5	9. 5	77	14 .6	14 .7	1 4. 7	15 .6
	97	9. 4	9. 4	9. 5	9. 5	78	14 .4	14 .3	1 4. 7	14 .4
	98	9. 3	9. 3	9. 3	9. 5	79	14 .2	14 .3	1 4. 7	14 .4
	99	9. 2	9. 2	9. 3	9. 2	80	14	14	1 4	14 .4
	100	9. 1	9. 1	9. 1	9. 2	81	13 .9	14	1 4	14 .4
						82	13 .7	13 .6	1 4	14 .4
						83	13 .5	13 .6	1 4	14 .4
						84	13 .4	13 .3	1 3. 3	13 .3

gain	Pr3981 = 0	Pr3981 = 1				
		85	13 .2	13 .3	1 3. 3	13 .3
		86	13 .1	13	1 3. 3	13 .3
		87	12 .9	13	1 3. 3	13 .3
		88	12 .8	12 .7	1 2. 7	13 .3
		89	12 .6	12 .7	1 2. 7	13 .3
		90	12 .5	12 .4	1 2. 7	12 .4
		91	12 .3	12 .4	1 2. 7	12 .4
		92	12 .2	12 .2	1 2. 2	12 .4
		93	12 .1	12 .2	1 2. 2	12 .4
		94	12	11 .9	1 2. 2	12 .4

gain	Pr3981 = 0		Pr3981 = 1			
		95	11 .8	11 .9	1 2. 2	12 .4
		96	11 .7	11 .7	1 1. 7	11 .7
		97	11 .6	11 .7	1 1. 7	11 .7
		98	11 .5	11 .4	1 1. 7	11 .7
		99	11 .4	11 .4	1 1. 7	11 .7
		100	11 .2	11 .2	1 1. 2	11 .7



SYNTEC

gain	Pr3981 = 0					Pr3981 = 1				
-30dB (suppress vibration to 3%)	Pr40 4 vs. Pr32 03	0. 5 m s	1 m s	2 m s	3 m s	Pr40 4 vs. Pr32 03	0. 5 m s	1 m s	2 m s	3 m s
	1	97 9. 9	Inf	Inf	Inf	1	Inf	Inf	Inf	Inf
	2	48 6. 1	49 0	Inf	Inf	2	72 2. 9	Inf	Inf	Inf
	3	32 3. 6	32 4. 8	Inf	Inf	3	45 7. 7	Inf	Inf	Inf
	4	24 2. 6	24 3. 1	24 5	Inf	4	33 7. 5	36 1. 5	Inf	Inf
	5	19 4	19 4. 3	24 5	Inf	5	26 7. 9	36 1. 5	Inf	Inf
	6	16 1. 7	16 1. 8	16 2. 4	16 3. 4	6	22 2. 3	22 8. 9	Inf	Inf
	7	13 8. 6	13 8. 7	16 2. 4	16 3. 4	7	19 0. 1	22 8. 9	Inf	Inf
	8	12 1. 2	12 1. 3	12 1. 6	16 3. 4	8	16 6. 1	16 8. 8	18 0. 8	Inf
	9	10 7. 8	10 7. 8	12 1. 6	10 8. 3	9	14 7. 5	16 8. 8	18 0. 8	Inf
10					10	13 2. 6	13 4	18 0. 8	Inf	

gain	Pr3981 = 0					Pr3981 = 1				
	10	97	97	97 .2	10 8. 3	11	12 0. 5	13 4	18 0. 8	Inf
	11	88 .2	88 .2	97 .2	10 8. 3	12	11 0. 4	11 1. 2	11 4. 5	12 0. 5
	12	80 .8	80 .9	80 .9	81 .1	13	10 1. 9	11 1. 2	11 4. 5	12 0. 5
	13	74 .6	74 .6	80 .9	81 .1	14	94 .6	95 .1	11 4. 5	12 0. 5
	14	69 .3	69 .3	69 .4	81 .1	15	88 .3	95 .1	11 4. 5	12 0. 5
	15	64 .7	64 .7	69 .4	64 .8	16	82 .7	83 .1	84 .4	12 0. 5
	16	60 .6	60 .6	60 .7	64 .8	17	77 .9	83 .1	84 .4	12 0. 5
	17	57 .1	57 .1	60 .7	64 .8	18	73 .5	73 .8	84 .4	76 .3
	18	53 .9	53 .9	53 .9	54	19	69 .7	73 .8	84 .4	76 .3
	19	51 .1	51 .1	53 .9	54	20	66 .2	66 .3	67	76 .3
	20	48 .5	48 .5	48 .5	54	21	63	66 .3	67	76 .3
	21	46 .2	46 .2	48 .5	46 .3	22	60 .2	60 .3	67	76 .3
	22	44 .1	44 .1	44 .1	46 .3					

gain	Pr3981 = 0					Pr3981 = 1				
	23	42 .2	42 .2	44 .1	46 .3	23	57 .5	60 .3	67	76 .3
	24	40 .4	40 .4	40 .5	40 .5	24	55 .1	55 .2	55 .6	56 .3
	25	38 .8	38 .8	40 .5	40 .5	25	52 .9	55 .2	55 .6	56 .3
	26	37 .3	37 .3	37 .3	40 .5	26	50 .9	51	55 .6	56 .3
	27	36	36	37 .3	36	27	49	51	55 .6	56 .3
	28	34 .7	34 .7	34 .7	36	28	47 .3	47 .3	47 .6	56 .3
	29	33 .5	33 .5	34 .7	36	29	45 .6	47 .3	47 .6	56 .3
	30	32 .4	32 .4	32 .4	32 .4	30	44 .1	44 .2	47 .6	44 .7
	31	31 .3	31 .3	32 .4	32 .4	31	42 .7	44 .2	47 .6	44 .7
	32	30 .3	30 .3	30 .3	32 .4	32	41 .4	41 .4	41 .6	44 .7
	33	29 .4	29 .4	30 .3	29 .4	33	40 .1	41 .4	41 .6	44 .7
	34	28 .6	28 .6	28 .6	29 .4	34	38 .9	39	41 .6	44 .7
	35	27 .7	27 .7	28 .6	29 .4	35	37 .8	39	41 .6	44 .7
	36	27	27	27	27	36	36 .8	36 .8	36 .9	37 .1

gain	Pr3981 = 0					Pr3981 = 1				
	37	26 .2	26 .2	27	27	37	35 .8	36 .8	36 .9	37 .1
	38	25 .6	25 .6	25 .6	27	38	34 .8	34 .9	36 .9	37 .1
	39	24 .9	24 .9	25 .6	24 .9	39	33 .9	34 .9	36 .9	37 .1
	40	24 .3	24 .3	24 .3	24 .9	40	33 .1	33 .1	33 .2	37 .1
	41	23 .7	23 .7	24 .3	24 .9	41	32 .3	33 .1	33 .2	37 .1
	42	23 .1	23 .1	23 .1	23 .1	42	31 .5	31 .5	33 .2	31 .7
	43	22 .6	22 .6	23 .1	23 .1	43	30 .8	31 .5	33 .2	31 .7
	44	22 .1	22 .1	22 .1	23 .1	44	30 .1	30 .1	30 .2	31 .7
	45	21 .6	21 .6	22 .1	21 .6	45	29 .4	30 .1	30 .2	31 .7
	46	21 .1	21 .1	21 .1	21 .6	46	28 .8	28 .8	30 .2	31 .7
	47	20 .7	20 .7	21 .1	21 .6	47	28 .2	28 .8	30 .2	31 .7
	48	20 .2	20 .2	20 .2	20 .2	48	27 .6	27 .6	27 .6	27 .7
	49	19 .8	19 .8	20 .2	20 .2	49	27	27 .6	27 .6	27 .7
	50	19 .4	19 .4	19 .4	20 .2	50	26 .5	26 .5	27 .6	27 .7

gain	Pr3981 = 0					Pr3981 = 1				
	51	19 .1	19 .1	19 .4	19 .1	51	26 .5	26 .5	27 .6	27 .7
	52	18 .7	18 .7	18 .7	19 .1	52	25 .5	25 .5	25 .5	27 .7
	53	18 .3	18 .3	18 .7	19 .1	53	25 .5	25 .5	25 .5	27 .7
	54	18	18	18	18	54	24 .5	24 .5	25 .5	24 .6
	55	17 .7	17 .7	18	18	55	24 .1	24 .5	25 .5	24 .6
	56	17 .4	17 .4	17 .4	18	56	23 .6	23 .7	23 .7	24 .6
	57	17 .1	17 .1	17 .4	17 .1	57	23 .2	23 .7	23 .7	24 .6
	58	16 .8	16 .8	16 .8	17 .1	58	22 .8	22 .8	23 .7	24 .6
	59	16 .5	16 .5	16 .8	17 .1	59	22 .4	22 .8	23 .7	24 .6
	60	16 .2	16 .2	16 .2	16 .2	60	22 .1	22 .1	22 .1	22 .1
	61	15 .9	15 .9	16 .2	16 .2	61	21 .7	22 .1	22 .1	22 .1
	62	15 .7	15 .7	15 .7	16 .2	62	21 .4	21 .4	22 .1	22 .1
	63	15 .4	15 .4	15 .7	15 .4	63	21 .4	21 .4	22 .1	22 .1
	64	15 .2	15 .2	15 .2	15 .4	64	20 .7	20 .7	20 .7	22 .1

gain	Pr3981 = 0					Pr3981 = 1				
	65	15	15	15 .2	15 .4	65	20 .4	20 .7	20 .7	22 .1
	66	14 .7	14 .7	14 .7	14 .7	66	20 .1	20 .1	20 .7	20 .1
	67	14 .5	14 .5	14 .7	14 .7	67	19 .8	20 .1	20 .7	20 .1
	68	14 .3	14 .3	14 .3	14 .7	68	19 .5	19 .5	19 .5	20 .1
	69	14 .1	14 .1	14 .3	14 .1	69	19 .2	19 .5	19 .5	20 .1
	70	13 .9	13 .9	13 .9	14 .1	70	18 .9	18 .9	19 .5	20 .1
	71	13 .7	13 .7	13 .9	14 .1	71	18 .7	18 .9	19 .5	20 .1
	72	13 .5	13 .5	13 .5	13 .5	72	18 .4	18 .4	18 .4	18 .4
	73	13 .3	13 .3	13 .5	13 .5	73	18 .2	18 .4	18 .4	18 .4
	74	13 .1	13 .1	13 .1	13 .5	74	17 .9	17 .9	18 .4	18 .4
	75	13	13	13 .1	13	75	17 .7	17 .9	18 .4	18 .4
	76	12 .8	12 .8	12 .8	13	76	17 .4	17 .4	17 .5	18 .4
	77	12 .6	12 .6	12 .8	13	77	17 .2	17 .4	17 .5	18 .4
	78	12 .5	12 .5	12 .5	12 .5	78	17	17	17 .5	17

gain	Pr3981 = 0					Pr3981 = 1				
	79	12 .3	12 .3	12 .5	12 .5	79	16 .8	17	17 .5	17
	80	12 .2	12 .2	12 .2	12 .5	80	16 .6	16 .6	16 .6	17
	81	12	12	12 .2	12	81	16 .4	16 .6	16 .6	17
	82	11 .9	11 .9	11 .9	12	82	16 .2	16 .2	16 .6	17
	83	11 .7	11 .7	11 .9	12	83	16	16 .2	16 .6	17
	84	11 .6	11 .6	11 .6	11 .6	84	15 .8	15 .8	15 .8	15 .8
	85	11 .5	11 .5	11 .6	11 .6	85	15 .6	15 .8	15 .8	15 .8
	86	11 .3	11 .3	11 .3	11 .6	86	15 .4	15 .4	15 .8	15 .8
	87	11 .2	11 .2	11 .3	11 .2	87	15 .2	15 .4	15 .8	15 .8
	88	11 .1	11 .1	11 .1	11 .2	88	15 .1	15 .1	15 .1	15 .8
	89	10 .9	10 .9	11 .1	11 .2	89	14 .9	15 .1	15 .1	15 .8
	90	10 .8	10 .8	10 .8	10 .8	90	14 .7	14 .7	15 .1	14 .8
	91	10 .7	10 .7	10 .8	10 .8	91	14 .6	14 .7	15 .1	14 .8
	92	10 .6	10 .6	10 .6	10 .8	92	14 .4	14 .4	14 .4	14 .8

gain	Pr3981 = 0				Pr3981 = 1					
	93	10 .5	10 .5	10 .6	10 .5	93	14 .3	14 .4	14 .4	14 .8
	94	10 .4	10 .4	10 .4	10 .5	94	14 .1	14 .1	14 .4	14 .8
	95	10 .3	10 .3	10 .4	10 .5	95	14	14 .1	14 .4	14 .8
	96	10 .1	10 .1	10 .1	10 .1	96	13 .8	13 .8	13 .8	13 .8
	97	10	10	10 .1	10 .1	97	13 .7	13 .8	13 .8	13 .8
	98	9. 9	9. 9	9. 9	10 .1	98	13 .5	13 .5	13 .8	13 .8
	99	9. 8	9. 8	9. 9	9. 8	99	13 .4	13 .5	13 .8	13 .8
	100	9. 7	9. 7	9. 7	9. 8	100	13 .3	13 .3	13 .3	13 .8

Take Pr3203 = 3000 as an example,

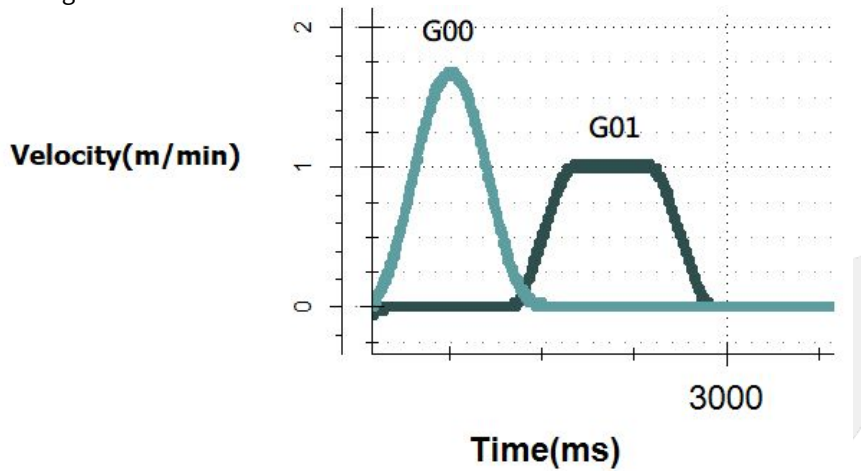
1. To suppress the resonance at 25Hz to -20dB (10%) with the single moving average filter (Pr3981 = 0), Pr404 should be set to 36 depended on the look-up table.
2. To suppress the resonance at 17Hz to -30dB (3%) with the multiple moving average filter (Pr3981 = 1), Pr404 should be set to 78 depended on the look-up table.

1.281 Pr3983 Common to rapid traverse (G00) and cutting commands post acceleration time(ms)

No	Descriptions	Range	Unit	Default	Effective
3983	Common to rapid traverse (G00) and cutting commands post acceleration time(ms)	[0~100]	ms	0	Press Reset

- Setting this parameter can smooth the rapid traverse and cutting commands speed profile planned by acceleration and deceleration, so as to reduce the fluctuation of speed command as well as machine

shaking.



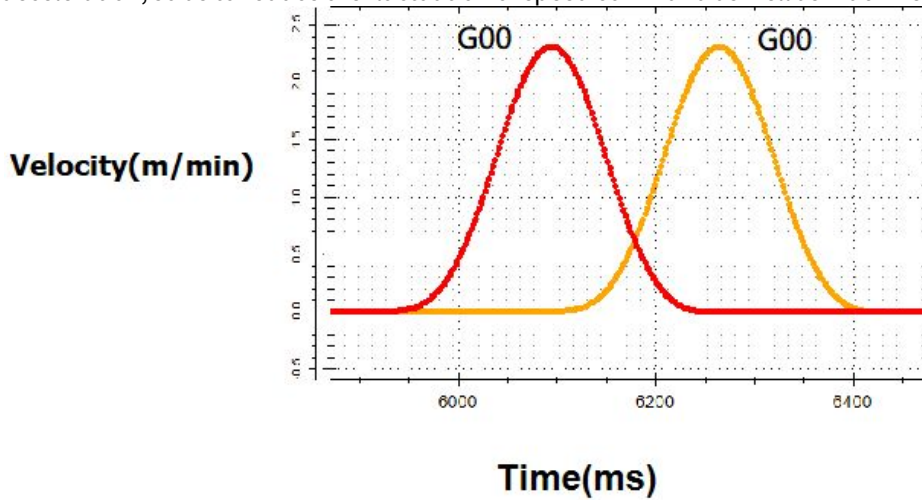
- If the post-acceleration/deceleration time is set to zero, it means that this function is not activated. If the set value is greater than zero, it means that the command curve is smoothed according to the specified time. For example: If Pr3983 is set to 5ms, that means the command adds 5ms forward, then averages.
- If the [Pr404 Post acceleration bell-shaped time](#) or [Pr3983 Common to rapid traverse \(G00\) and cutting commands post acceleration time\(ms\)](#) is set at the same time, the servo output command will be smoother.
- In automatic mode, only G00, G01, G02, G03, G02.4, G03.4, G06.2 commands refer to this parameter.
- Movement in manual mode (such as continuous jog, incremental jog, home) does not affected by this parameter.
- Software versions 10.118.60.x, 10.118.66.x, 10.118.70.x, 10.118.x (included)and later versions, modifying this parameter will also modify Pn-131, and if Pr3983 is set to less than 8ms, Pn-131 will be set to 8ms.

1.282 Pr3984 Rapid traverse (G00) commands post acceleration time(ms)

No	Descriptions	Range	Unit	Default	Effective
3984	Rapid traverse (G00) commands post acceleration time(ms)	[0~100]	ms	0	Press Reset



- Setting this parameter can smooth the rapid traverse commands speed profile planned by acceleration and deceleration, so as to reduce the fluctuation of speed command as well as machine shaking.



- If the post-acceleration/deceleration time is set to zero, it means that this function is not activated. If the set value is greater than zero, it means that the command curve is smoothed according to the specified time. For example: If Pr3984 is set to 5ms, that means the command adds 5ms forward, then averages.
- If the [Pr3983 Common to rapid traverse \(G00\) and cutting commands post acceleration time\(ms\)](#) is set at the same time, the servo output command will be smoother.
- In automatic mode, only G00 commands refer to this parameter.
- Movement in manual mode (such as continuous jog, incremental jog, home) does not affected by this parameter.

1.283 Pr3985 *Axis enable control parameters switch

No	Descriptions	Range	Unit	Default	Effective
3985	*Axis enable control parameters switch (0:Disable;1:Enable)	[0~1]	-	0	restart

- This parameter sets switch of driver control parameter set according to axial motion.
 - 0: Disable
 - 1: Enable
- According to the parameter, **all axes** switch their own driver control parameter set by scenario shown in the figure below.
- The drive is considered supported if it is a Syntec drive and M3 communication is in use.
- It is recommended to turn on **Syntec Advanced Feedforward Compensation** (Pr3850 = 1) with this parameter turning on for better machine performance.
- Spindle in C-Axis application is **NOT** affected by this parameter, so driver control parameter set will not been switched when a C-Axis Spindle executing G00 instructions.
- In manual mode, switch control parameter to **2nd set** when R13 = 4, 5, 6 and 7.
- Software version available: 10.118.60P, 10.118.66J, 10.118.70D and later versions.
- Driver version available: 4.4 and later versions.

Usage of Driver Control Parameter Set in Axis		
Pr3985 = 0	Pr3985 = 1	
All Scenarios	execute instructions except G00 and G53	execute G00 and G53 instructions
1st parameter set (Pn-100, Pn-101, Pn-102)	1st parameter set (Pn-100, Pn-101, Pn-102)	2nd parameter set (Pn-104, Pn-105, Pn-106)

1.284 Pr3986 Switch of the intelligent contour error control

No	Descriptions	Range	Unit	Default	Effective
3986	Switch of the intelligent contour error control	[0~1]	-	0	Press Reset

- This parameter determines whether to user intelligent contour error control or not. Definition of parameter value are described as below:
0: turn off the intelligent contour error control.
1: turn on the intelligent contour error control.
- User can put G10 L1350 P_ command to overwrite Pr3986 setting.
- For more detailed description of the intelligent contour error control function, please refer to [Pr3987 Tolerance of intelligent contour error control\(um\)](#), G10L1350-Intelligent Contour Error Control.
- Switch of the intelligent contour error control is provided in version 10.118.66L, 10.118.70F, 10.118.75 and above.

1.285 Pr3987 Tolerance of intelligent contour error control(um)

No	Descriptions	Range	Unit	Default	Effective
3987	Tolerance of intelligent contour error control(um)	[0~1000]	um	0	Press Reset

- This parameter determine the default tolerance of intelligent contour error control after Pr404 (Post acceleration bell-shaped time) turned on.
- Intelligent contour error control function only take effects on G01/G02/G03/G02.4/G03.4 blocks. For more information about the function, please refer to G10L1350-Intelligent Contour Error Control .
- User may put G10L1350 E_ command in NC to specify tolerance of intelligent contour error control, this will overwrite the tolerance set by Pr3987(, which is shown as the following example.)
NC:
//Pr3986=1, Pr3987=100, set tolerance to 100 um by parameter
N001 G90 G71 G01 X10. F5000. ;
N002 Y10. ;

N003 G10 L1350 E0.01;// Control contour error at about 0.01mm

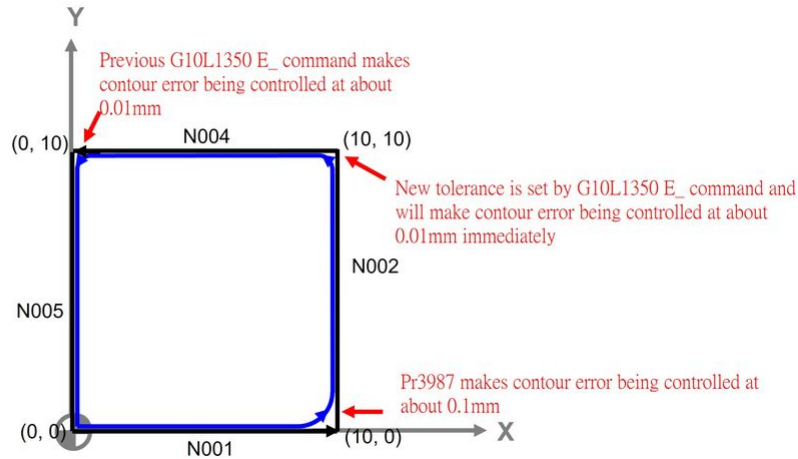
N004 X0.;

N005 Y0.;

N006 M30;

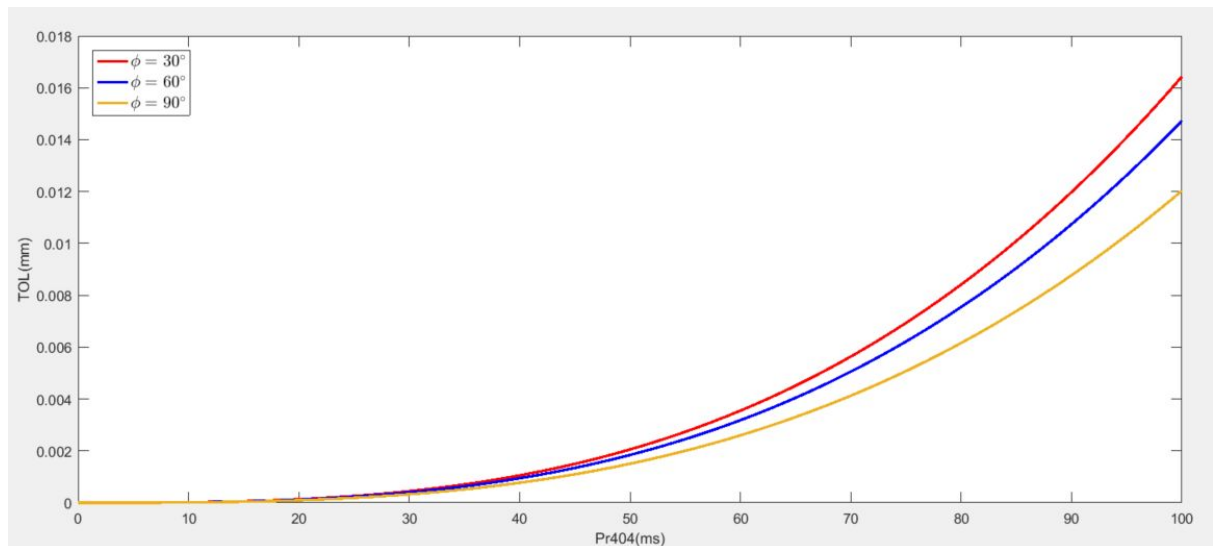
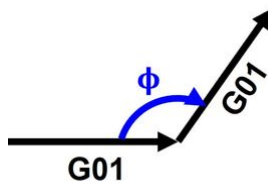
- NC Contour

- Machining Contour



- Cancel intelligent contour error control by setting Pr3986 = 0.
- If tolerance is set by G10 L1350 E_ command, after Reset or M30, tolerance will be reset to the value of Pr3987, and whether to use intelligent contour error control or not depends on value of Pr3986.
- Tolerance is suggested to be set according to tolerance of CAM. If lower machining time is concerned, user can adjust tolerance to a larger value; if higher precision is concerned, user can adjust tolerance to a smaller value.
- There is a limit in tolerance approaching. As angle between 2 blocks decreases or Pr404 increases, the minimum reachable contour error will increase accordingly. The following figure shows the trend of the minimum reachable contour error under certain motion parameters setting. This trend will be more moderate as jerk set smaller(i.e. Pr402, Pr641~ set larger).

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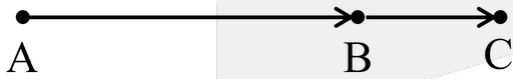


- As mentioned above, if smaller contour error, which can be even closed to 0, is required, one can use G09 motion to achieve such requirement.
- If there is a defect in NC, intelligent contour error control will make the machining result similar to the original defect based on the specified tolerance. If users want to get rid of the machining defect, smoothing function such as G05, G05.1 can be used to solve the problem, afterwards, intelligent contour error control function will approach the smoothed contour.
- Contour error caused by other post acceleration function such as Pr3981, Pr3983 are not taken into consideration in intelligent contour error control. Hence, contour error may increase while Pr3981 \neq 0 or Pr3983 \neq 0.
- As mentioned above, this function cannot deal with contour error caused by servo lag as well. To deal with contour error caused by servo lag, one can turn on servo feedforward control, for more details, please refer to Pr3808.
- Precision of the contour error control:
 - Pr3987 = 0 or G10 L1350 E0.0 refers to not using intelligent contour error control function.
 - While using Pr3987 to set tolerance, minimum of the tolerance for contour error control can be 1 μ m.
 - While using G10 L1350 E_ command to set tolerance, minimum of the tolerance for contour error control can be 0.1 μ m. Meanwhile, different control effect only happens when input of E_ is with at least 0.1 μ m difference compares to the last input.
- Intelligent contour error control function is provided in version 10.118.66L, 10.118.70F, 10.118.75 and above.
- For version: 10.118.66M, 10.118.70I, 10.118.78 and the above, user can turn of the intelligent contour error control function by setting Pr3986 into 0 without modifying Pr3987.

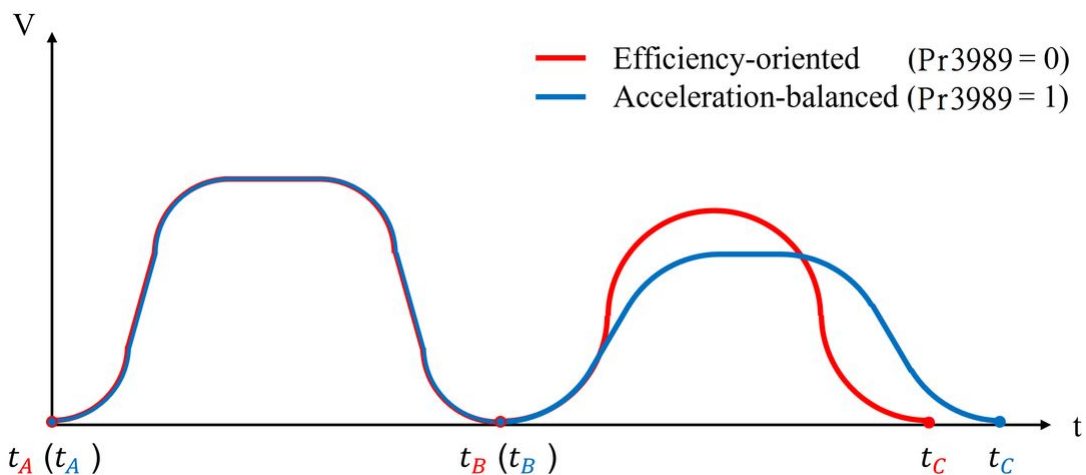
1.286 Pr3989 Axial rapid travel trajectory planning strategy

No	Descriptions	Range	Unit	Default	Effective
3989	Axial rapid travel trajectory planning strategy	[0~1]	-	0	Reset

- This parameter sets a switch for different trajectory planning strategies.
 - 0: efficiency-oriented
 - 1: acceleration-balanced
- Efficiency-oriented strategy finishes blocks in shortest time.
- When using acceleration-balanced strategy, the execution time of each block will be longer, in order to suppress unnecessary vibration.
- Pr1521~Pr1540 are not supported when using acceleration-balanced strategy. In other words, when Pr3989 is equal to 1, the acceleration time must equal to the deceleration time. Pr1521~Pr1540 is disabled.
- Below illustrates the difference under different strategies.



Rapid travel from A through B to C.



If necessary, acceleration-balanced strategy will clamp the maximum feedrate automatically when the acceleration and deceleration switch frequently, and hence the execution time will be longer.

Supported Controller Software Version: 10.118.70I, 10.118.78, and above

1.287 Pr5001~Pr5500 User parameter.

No	Descriptions	Range	Unit	Default	Effective
5001~5500	User parameter	[-99999999~99999999]	-	0	Press Reset

- Allow user to change specific Local Variable #5001~#5500 value through Pr5001~Pr5500 when controller is on.
Values of #5001~#5500 are for customized Macro.
- Corresponding to R8001~R8500, supporting version: 10.118.24B, 10.118.25B, 10.118.28O, 10.118.38 and above.
- Usage description refer to Extension Parameter Application Manual

1.288 Pr6001~Pr6640 Extended software stroke limit parameter (1 ~ 64 group)

One group of software stroke limit includes night parameters. Take first group as an example:

No	Descriptions	Range	Unit	Default	Effective
6001	1st axis ID of 1st ext. stroke limit	[0~18]	----	0	Press Reset
6002	1st axis pos. coordinate of 1st ext. stroke limit	[-999,999,999 ~ 999,999,999]	BLU	0	Press Reset
6003	1st axis neg. coordinate of 1st ext. stroke limit	[-999,999,999 ~ 999,999,999]	BLU	0	Press Reset
6004	2nd axis ID of 1st ext. stroke limit	[0~18]	----	0	Press Reset
6005	2nd axis pos. coordinate of 1st ext. stroke limit	[-999,999,999 ~ 999,999,999]	BLU	0	Press Reset
6006	2nd axis neg. coordinate of 1st ext. stroke limit	[-999,999,999 ~ 999,999,999]	BLU	0	Press Reset
6007	3rd axis ID of 1st ext. stroke limit	[0~18]	----	0	Press Reset
6008	3rd axis pos. coordinate of 1st ext. stroke limit	[-999,999,999 ~ 999,999,999]	BLU	0	Press Reset
6009	3rd axis neg. coordinate of 1st ext. stroke limit	[-999,999,999 ~ 999,999,999]	BLU	0	Press Reset

- Second group is Pr6011~6019, and so on ... until Pr6631~6639. A total of 64 groups of extended software stroke limit.
- Can independently enable/disable each group of stroke protection through Register:
R956.0~R956.31 can enable 01~32 group protection.
R958.0~R958.31 can enable 33~64 group protection.
- Following setup is regarded wrong setting or disable axial stroke protection, stroke protection will be disabled:

- a. Positive limit is smaller than negative limit. (Followed by parameter error hint EXTSTROKELIMIT-002)
- b. Positive limit equals to negative limit.
- c. Set axial number as 0.

- Version Information:

Since 10.118.12J, 10.118.18 and later version, the "Extended software stroke limit" function. is supported.

1. Parameter setting specification:

- a. 118.12J version: Axial number setting only supports 1~18, not support value 0.
- b. 118.12K, 10.118.18 or newer version: Axial number setting supports 0~18. 0 means disable protection of specified axis.
- c. 10.118.22D, 10.118.25 or newer version: Extended software stroke limit is effective after pressing Reset.
- d. Before Versions 10.118.24S, 10.118.30H, 10.118.32H, 10.118.40L, 10.118.41L, 10.118.47, the function only support 81RG series.
- e. Versions 10.118.24S, 10.118.30H, 10.118.32H, 10.118.40L, 10.118.41L, 10.118.47 and later, the supported models are listed below.

Machine	Model
GANTRY	81RG
HC	HC-8A / HC-10A / HC-7C / HC-8C / HC-10C / HC-15C / HC-8E / HC-10E / HC-15E / HC-8S
FC	FC-A / FC-B / FC-C

2. "Parameter error hint EXTSTROKELIMIT-002":

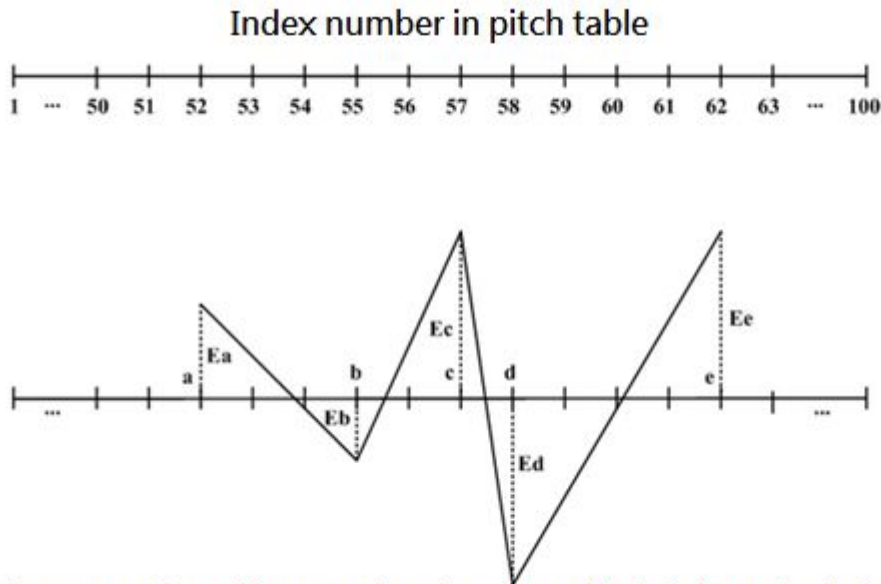
- New hint added from 10.118.12S, 10.118.22A, 10.118.23 or newer version.
- In 10.118.22D, 10.118.25 or newer version, hint has no effect when specified axial number is 0.
- For detail description, refer to Software Stroke Limitation Application Manual.

1.289 Pr7001~Pr7025 Straightness offset moving axis position

No	Descriptions	Range	Unit	Default	Effective
7001~7025	Straightness offset moving axis position	[0~100]	-	0	Restart

- Pr7001~Pr7025 determine straightness compensation position by defining reference points in moving axis's pitch table, 5 compensation positions can be set for each moving axis.
- The index number in pitch table which represents axis home position can be determined by Pr1341~Pr1360 Axis pitch table index for reference.
- The distance between each pitch compensation point can be determined by Pr1321~Pr1326 Axis pitch error comp. interval(BLU).
- The straightness compensation amount at each reference point can be setup by Pr7026~Pr7050 Straightness offset moving axis position compensation amount.

- Please enter five non-decreasing compensation positions in order from point a~e.
- Incorrect straightness compensation setting will trigger OP-16 "Straightness offset parameter setting error" and straightness compensation is not effective.
As shown in below, a,b,c,d,e was set to 52, 55, 57, 58 and 62 respectively, the area affected by straightness compensation will be from the corresponding position of point 52 to that of point 62 in moving axis pitch table.
- 10.118.52G, 10.118.56A, 10.118.57 or above version, expanded to 2000 in high precision pitch error mode.



a,b,c,d,e: Compensation position on moving axis (represented by the index number in pitch table)
Ea,Eb,Ec,Ed,Ee: Compensation amount on compensation axis for each compensation position on moving axis

1.290 Pr7026~Pr7050 Straightness offset moving axis position compensation amount

No	Descriptions	Range	Unit	Default	Effective
7026~7050	Straightness offset moving axis position compensation amount	[-999999~999999]	BLU	0	Press Reset

1.291 Pr7051~Pr7125 Straightness offset moving axis position

No	Descriptions	Range	Unit	Default	Effective
7051~7125	Straightness offset moving axis position	[0, 100]		0	Restart

Expansion of two-dimensional linear (straightness) compensation function:

※Only version after 118.12.E, 118.15 and after supports the expanded two-dimensional linear (straightness) compensation function (total 20 points).

- Provide 5 groups of two-dimensional linear compensation parameter setting, each group of moving axis has a total of 20 points of compensation position:
 - In straightness compensation function ,Pr7001~Pr7025 defines each group of compensation point positions (a~e) in pitch compensation table of the axis;
 - In straightness compensation function, Pr7051~Pr7125 defines each group of compensation point positions (f~t) in pitch compensation table of the axis. Total is 20 points (a~t).
- Provide more flexible compensation position setting, please incrementally enter points from a~t. Number of points: min 2 points, max 20 points, and cannot in decreasing order.
- Incorrect straightness compensation setting will trigger OP-16 "Straightness offset parameter setting error" and straightness compensation is not disabled.
- 10.118.52G, 10.118.56A, 10.118.57 or above version, expanded to 2000 in high precision pitch error mode.

1.292 Pr7126~Pr7200 Straightness offset moving axis position compensation amount

No	Descriptions	Range	Unit	Default	Effective
7126~7200	Straightness offset moving axis position compensation amount	[-999999~999999]	BLU	0	Press Reset

1.293 Pr8001~Pr10000 Axis pos./neg. abs. comp. pitch err. table

No	Descriptions	Range	Unit	Default	Effective
8001~10000	Axis positive/negative absolute compensation pitch error table	[-999999~999999]	BLU	0	Press Reset

- The param set for the compensation of the pitch error in **Absolute** value, the points are independent with each other. Compensation Value = Position Command - Actual Position

Example:

Command value is 20000um and actual position is 20002 um, then the compensation value is -2.

Command value is 40000um and machine value is 39999 um, then the compensation value is 1.

Command value is -20000um and machine value is -20002 um, then the compensation value is 2.

Command value is -40000um and machine value is -39999 um, then the compensation value is -1.

- In version 10.114.15 and before, only support 6 axes; in 10.114.16 and after, support up to 10 axes.

2 Lathe Only.

- Pr4001 Drilling mode
- Pr4002 Retraction distance of drilling
- Pr4003 Dwell time at point R level
- Pr4004 Peck tapping mode
- Pr4005 Retraction distance of tapping
- Pr4006 Tapping cycle retrace speed (%)
- Pr4007 Spindle orientation stop before tapping for serial spindle
- Pr4008 High speed drilling/tapping mode
- Pr4011 System return amount of G76/G77
- Pr4012 Escaping amount of G73/G74
- Pr4013 Depth of Cut for G73/G74
- Pr4014 Mode of Cut for G73/G74
- Pr4015 X axis relife amount of G75
- Pr4016 Z axis relife amount of G75
- Pr4017 The number of division of G75
- Pr4018 Chamfer angle of thread cutting G21
- Pr4019 Y axis is positioning instruction for Drilling/Tapping/Boring
- Pr4020 Type of X axis under G12.1
- Pr4021 *Spindle synchronization, 1st basic spindle number
- Pr4022 *Spindle synchronization, 1st synchronous spindle number
- Pr4023 *Spindle synchronization, 2nd basic spindle number
- Pr4024 *Spindle synchronization, 2nd synchronous spindle number
- Pr4025 *Spindle synchronization, 3rd basic spindle number
- Pr4026 *Spindle synchronization, 3rd synchronous spindle number
- Pr4040 Threading mode
- Pr4041 Finishing allowance of threading
- Pr4042 Tip angle for threading
- Pr4043 Chamfer amount for threading
- Pr4044 Repetitive count in finishing for threading
- Pr4045 Min. cutting depth for threading
- Pr4046 Enter amount for threading
- Pr4047 Enter height for threading
- Pr4051 In multiple repetitive cycle, error allowance for monotone properties
- Pr4052 Infeed Method Of Multiple / Complex Mid-Section Thread Cutting Cycle
- Pr4053 Chip Cutting Mode
- Pr4080 *Enable/Disable position coordinate of stroke limit detection during file interpretation
- Pr4601 *Enable New Tool Life Management(0:Original 1:New) (Lathe)
- Pr4602 *Enable Working List(0:Disable 1:Enable) (Lathe)

2.1 Pr4001 Drilling mode

No	Descriptions	Range	Unit	Default	Effective
4001	Drilling mode	[0~2]	-	0	Press Reset

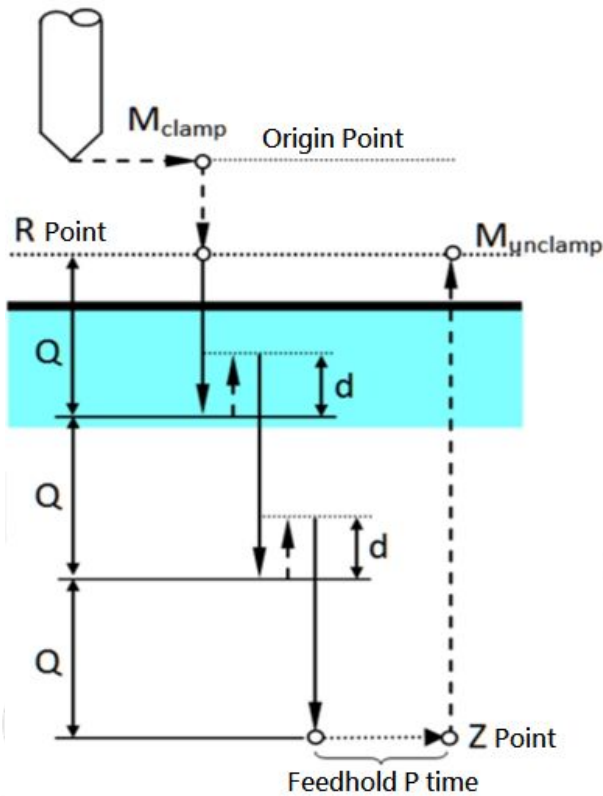
- 0: General peck drilling. When executing the cycle, tool must return to point R and drill again; equivalent to G83.3/G87.3.

- 1: High speed peck drilling. When executing the cycle, tool only need to retract a distance d (Pr4002) then drill again; equivalent to G83.1/G87.1.
 - 2: Deep hole peck drilling. When executing the cycle, tool must return to the initial point and drill again; equivalent to G83.2/G87.2.
- For G83/G87, please refer to G83/G87- Front/Side Drilling Cycle in Lathe Program Manual.

2.2 Pr4002 Retraction distance of drilling

No	Descriptions	Range	Unit	Default	Effective
4002	Retraction distance of drilling	[0~ 999999999]	LIU	5000	Press Reset

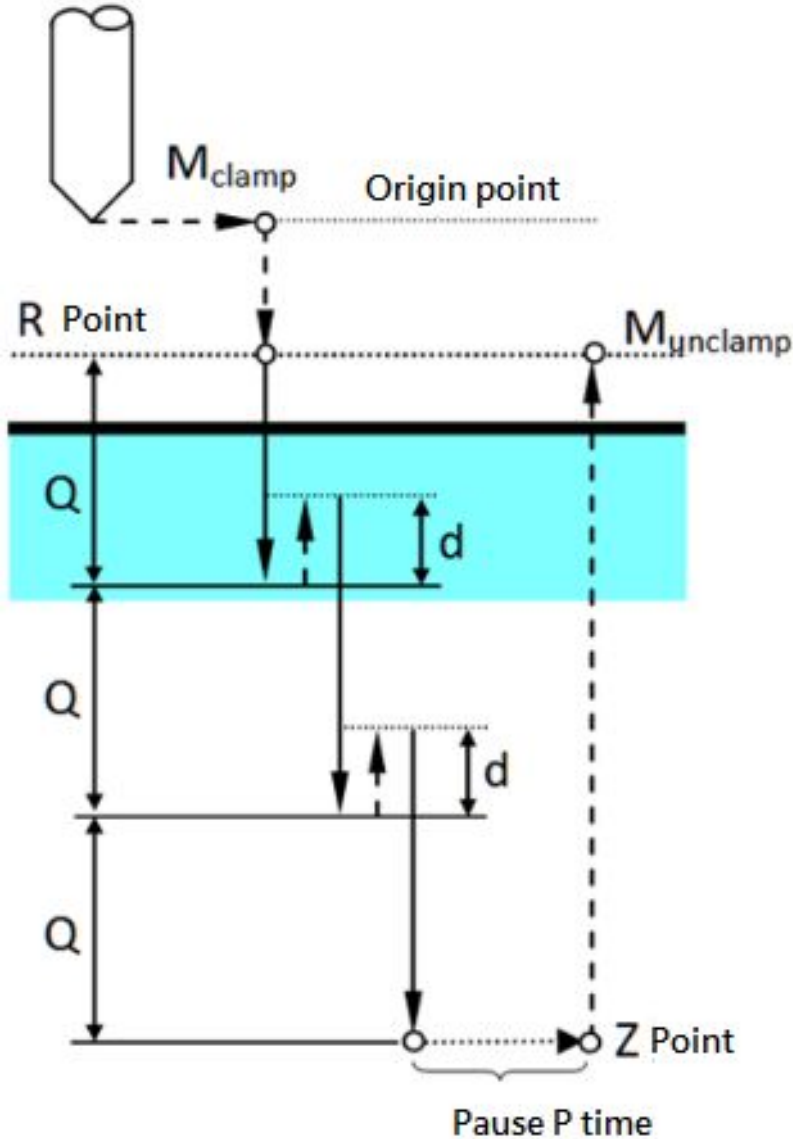
- The amount of retraction when drilling, as shown as increment d in the drawing below.
- For detailed descriptions of G83、G83.1~G83.3、G87、G87.1~G87.3, please refer to the G83、G83.1~G83.3、G87、G87.1~G87.3 graphic description in the lathe program manual.



2.3 Pr4003 Dwell time at point R level

No	Descriptions	Range	Unit	Default	Effective
4003	Dwell time at point R level	[0~ 999999999]	ms	0	Press Reset

- During tapping, the tool reverse and retract to point R and wait, This parameter defines the wait time at point R, as shown in the diagram below.
- For G83/G84/G85/G87/G88/G89, please refer to the graphic explanation of G83/G84/G85/G87/G88/G89 in the lathe program manual



2.4 Pr4004 Peck tapping mode

No	Descriptions	Range	Unit	Default	Effective
4004	Peck tapping mode	[0~1]	-	0	Press Reset

- 0: General peck tapping. When executing the cycle, tool must retract to point R to tap again.
- 1: High-speed tapping. When executing the cycle, tool only retracts the amount of retraction d (Pr4005).
- For G84/G88, refer to TYPE II and TYPE III of G84/G88 in the lathe program manual.

2.5 Pr4005 Retraction distance of tapping

No	Descriptions	Range	Unit	Default	Effective
4005	Retraction distance of tapping	[0~ 999999999]	LIU	5000	Press Reset

- The amount of retraction when performing peck tapping, as shown in the following figure increment d.
- For G84、G84.1、G88、G88.1 detailed explanation, please refer to G84、G84.1、G88、G88.1 in the lathe program manual.



2.6 Pr4006 Tapping cycle retrace speed (%)

No	Descriptions	Range	Unit	Default	Effective
4006	Tapping cycle retrace speed (%)	[100~300]	%	100	Press Reset

When the tool retracts during tapping, since it is not cutting and only need to maintain the shape of thread, the retract speed can be faster than the infeed cutting speed. The retraction speed is determined as a percentage of the infeed cutting speed.

- Retraction speed = Infeed speed * Pr4006.
- The current internal retracting speed limited by Pr405, when the calculated retraction speed exceeds Pr405, system limits it to Pr405.
- The retraction speed will be limited by the specified axial speed, user must confirm the retraction speed does not exceed the axial speed limit according to work planes. (The G17 plane is limited by the Z-axis speed, the G18 plane is limited by the Y-axis speed, and the G19 plane is limited by the X-axis speed)

2.7 Pr4007 Spindle orientation stop before tapping for serial spindle

No	Descriptions	Range	Unit	Default	Effective
4007	Spindle orientation stop before tapping for serial spindle (0: disabled; 1: enabled)	[0~1]	-	0	Pres Reset

- 0: Turn off the orientation stop before spindle tapping function.
- 1: Turn on the orientation stop before spindle tapping function. System will first position base on spindle origin offset (Pr1771~Pr1780), and then perform tapping after orientation stop finished.
- Valid from version 10.116.16, but invalid for pulse-train spindles.

2.8 Pr4008 High speed drilling/tapping mode

No	Descriptions	Range	Unit	Default	Effective
4008	High speed drilling/tapping mode	[0~1]	-	0	Press Reset

- 0: Turn off the high speed tapping/drilling function.
- 1: Turn on the high-speed tapping/drilling function, system triggers the Overlapping action base on I and J arguments.
- For details, please refer to the G83/G84/G87/G88 diagram description in the lathe program manual.
- Valid version: 10.116.53 and later.

2.9 Pr4011 System return amount of G76/G77

No	Descriptions	Range	Unit	Default	Effective
4011	System return amount of G76/G77	[0~ 999999999]	LIU	2000	Press Reset

- Defines the retraction distance when performing end face (G76/G76.1) or lateral (G77/G77.1) peck cutting cycles such as increment e (radius positioning value) in the diagram below. Please refer to G76/G76.1 or G77/G77.1 in the lathe program manual for description.



2.10 Pr4012 Escaping amount of G73/G74

No	Descriptions	Range	Unit	Default	Effective
4012	Escaping amount of G73/G74	[0~ 999999999]	LIU	1000	Press Reset

- The retraction amount in the lateral (G73/G73.1) or radial (G74/G74.1) roughing cycle, represented in radius positioning. Such as the increment e in the following diagram. For details, please refer to G73/G73.1 or G74/G74.1 in the lathe program manual.



2.11 Pr4013 Depth of Cut for G73/G74

No	Descriptions	Range	Unit	Default	Effective
4013	Depth of Cut for G73/G74	[0~ 999999999]	LIU	3000	Press Reset

- The amount of infeed during the lateral (G73/G73.1) or radial (G74/G74.1) rough cycle, represented in radius positioning, such as increment d in the following diagram. For details, please refer to G73/G73.1 or G74/

G74.1 in the lathe program manual



2.12 Pr4014 Mode of Cut for G73/G74

No	Descriptions	Range	Unit	Default	Effective
4014	Mode of Cut for G73/G74	[0~1]	-	0	Press Reset

2.12.1 Parameter Description

1. The lathe rough turning cycle function provides Pr4014 for the user to select the cutting mode.
2. The cutting mode is selected to determine three specifications: path check, turning start point, and retract path.
3. The parameters affect the rough cycle G code path specification, including A-Type G71/G72, C-Type G73/G74

2.12.2 Background Info

1. Please read the following G codes for their command format, path order.... and detail will not be covered in this page.
 - a. G71- Lateral (Outer-Surface) Rough Turning Cycle (A-Type)
 - b. G72- Radial (End-Face) Rough Facing Cycle (A-Type)
2. Nomenclatures are listed in the table below:

#	Noun	Symbol	Description
1	Initial point	A	<ol style="list-style-type: none"> a. The position of previous block before rough turning cycle G code. b. The rough turning cycle G code includes A-Type G71/G72 and C-Type G73/G74.
2	Reserved point	C	<ol style="list-style-type: none"> a. To preserve turning allowance, there is an offset ($\Delta w, \Delta u/2$) from the initial point (A). b. If no reserved amount ($\Delta w, \Delta u/2$) is specified, the reserved point (C) is equivalent to the initial point (A).
3	Turning start point	D	<ol style="list-style-type: none"> a. Starting position of the rough turning cycle.
4	Fine turning path	A' → B	<ol style="list-style-type: none"> a. The fine turning path formed by the blocks between the start number (ns) and the end number (nf).

#	Noun	Symbol	Description
5	Fine turning path start point	A'	a. Position of start sequence number (ns) block.
6	Fine turning path end point	B	a. Position of end sequence number (ns) block .
7	Turning end point	E	a. The end point of the rough turning contour which is the end position of roughing cycle. b. If no reserved amount ($\Delta w, \Delta u/2$) specified, the turning end point (E) is equivalent to the fine turning contour path end point (B).
8	Retract path	E → C	a. The path from the turning end point (E) to the reserved point (C).

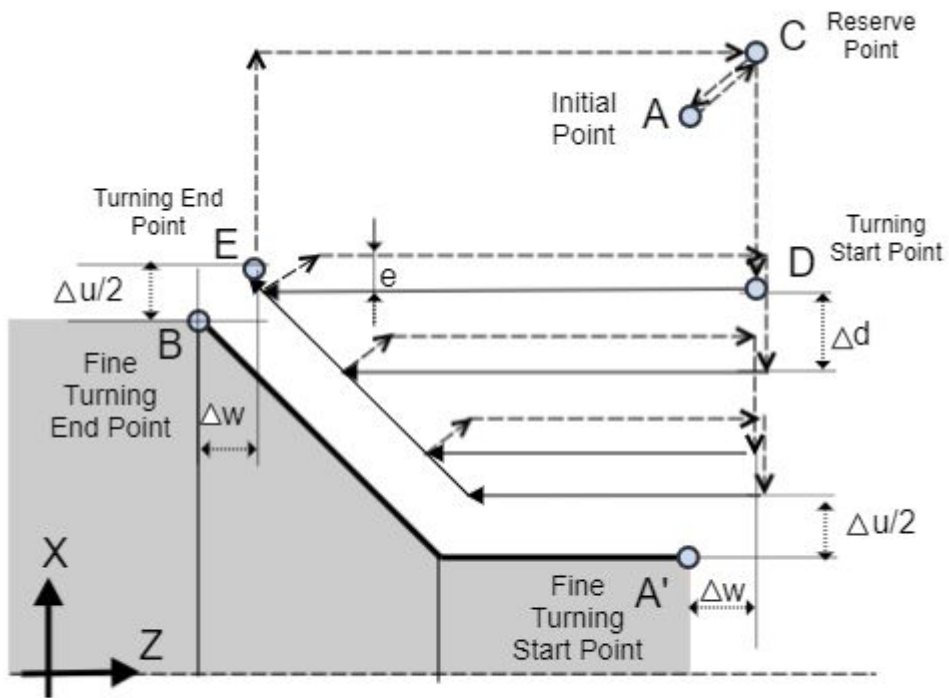
2.12.3 Lateral Rough Turning G71(A-Type)/G73(C-Type)

Pr4014 = 0

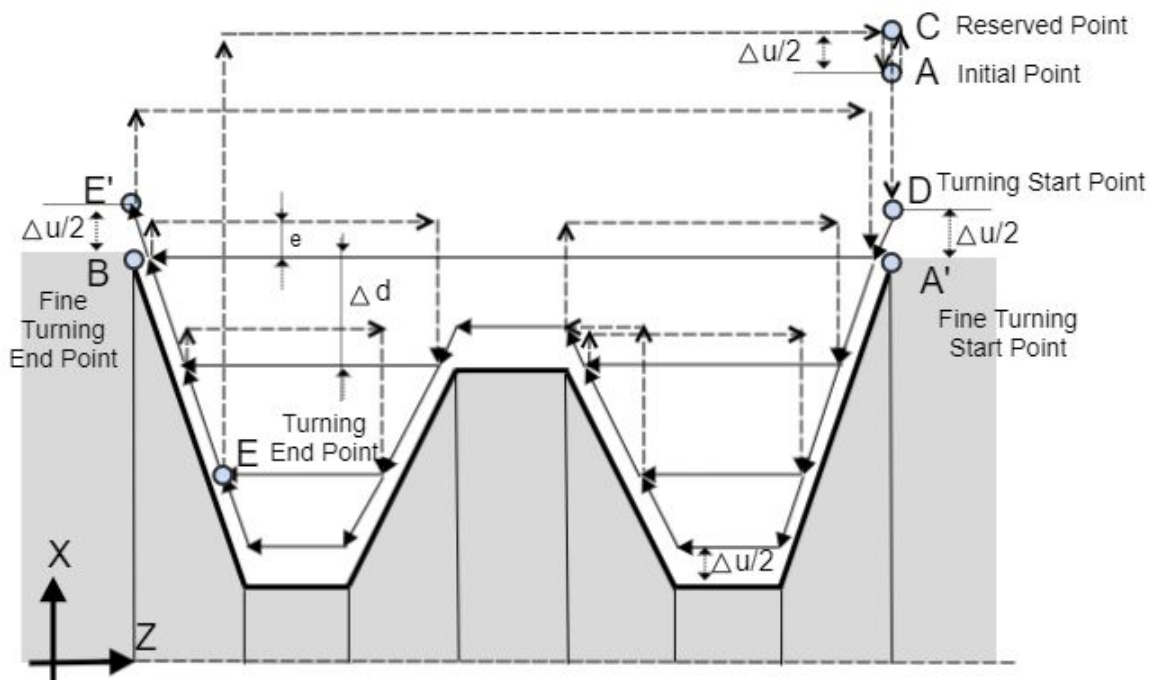
1. Path check: If the position of the initial point (A) in the X direction is between the fine turning path (A' → B), the alarm [MAR-005 the position higher than the cycle start point] will be triggered.
2. Turning start (D): Refer to the position of the fine turning end point (B) to find the starting point for turning (D):
3. Retract path (E → C): Move the X axis first and then the Z axis.
4. Illustration:

Type 1

SYNTEC



Type 2



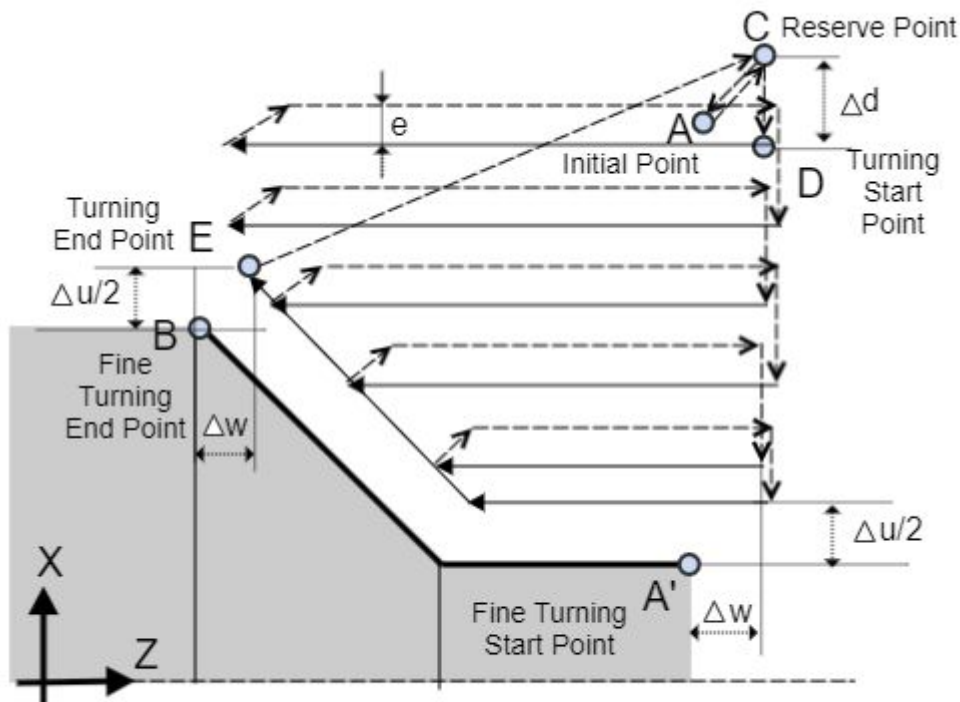
Pr4014 = 1

There are two path specifications for Type 1 or 2.

For definitions of Type 1 and 2, see: G71- Lateral (Outer-Surface) Rough Turning Cycle (A-Type)

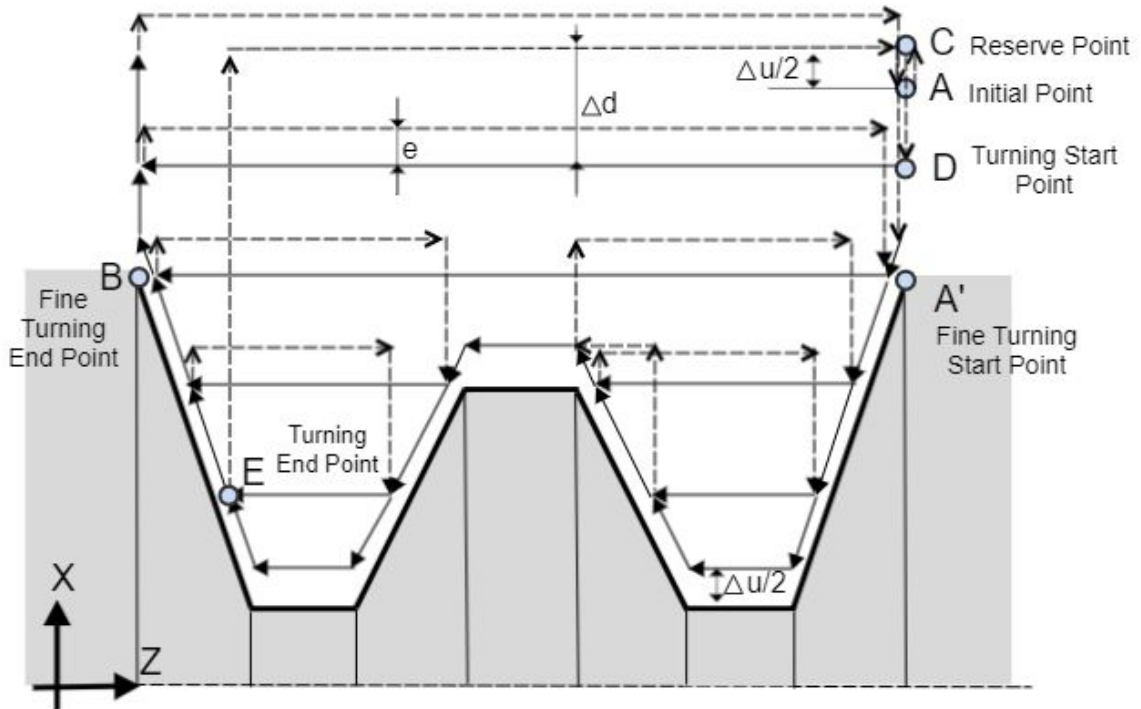
Type 1:

1. Path check: Path check will not be performed.
2. Turning start point (D): Refer to position of reserved point (C) as the start point for turning.
3. Retract path (E → C): G0 XZ axes moves together
4. Illustration

Type 1**Type 2:**

1. Path check: If the position of the initial point (A) Z direction is within the fine turning path (A' → B), the alarm [MAR-005 the position higher than the cycle start point] will be triggered.
2. Turning start point (D): Refer to the position of the reserve point (C) to find the starting point for turning.
3. Retract path (E → C): First move X axis and then move Z axis.
4. Illustration

Type 2



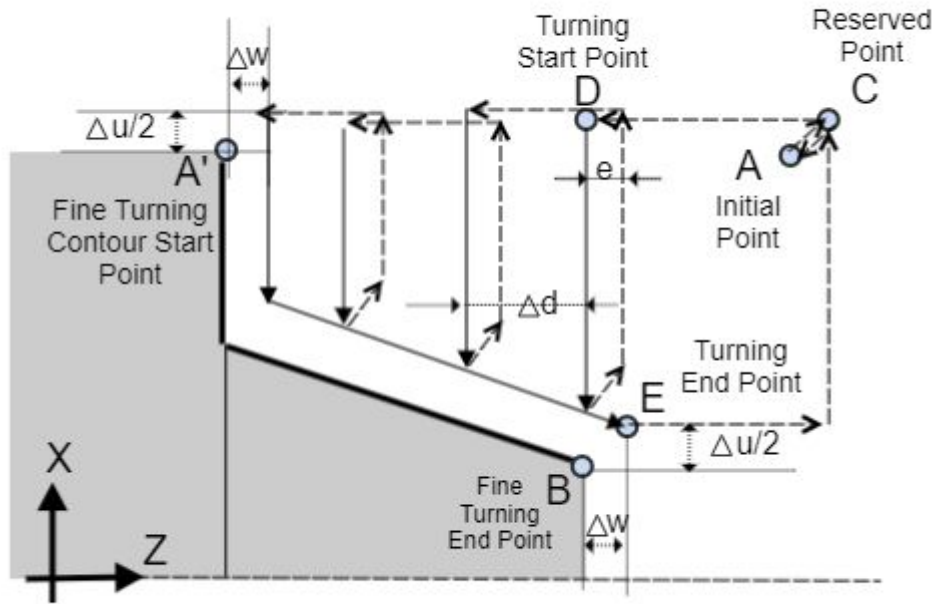
2.12.4 Radial Rough Turning G72(A-Type)/G74(C-Type)

Pr4014 = 0

1. Path check: If the position of the initial point (A) in the Z direction is between the fine turning path (A' → B), the alarm [MAR-005 the position higher than the cycle start point] will be triggered.
2. Turning start (D): Refer to the position of the fine turning end point (B) to find the turning start point (D).
3. Retract path (E → C): Move the Z axis first and then the X axis.
4. Illustration:

Type 1

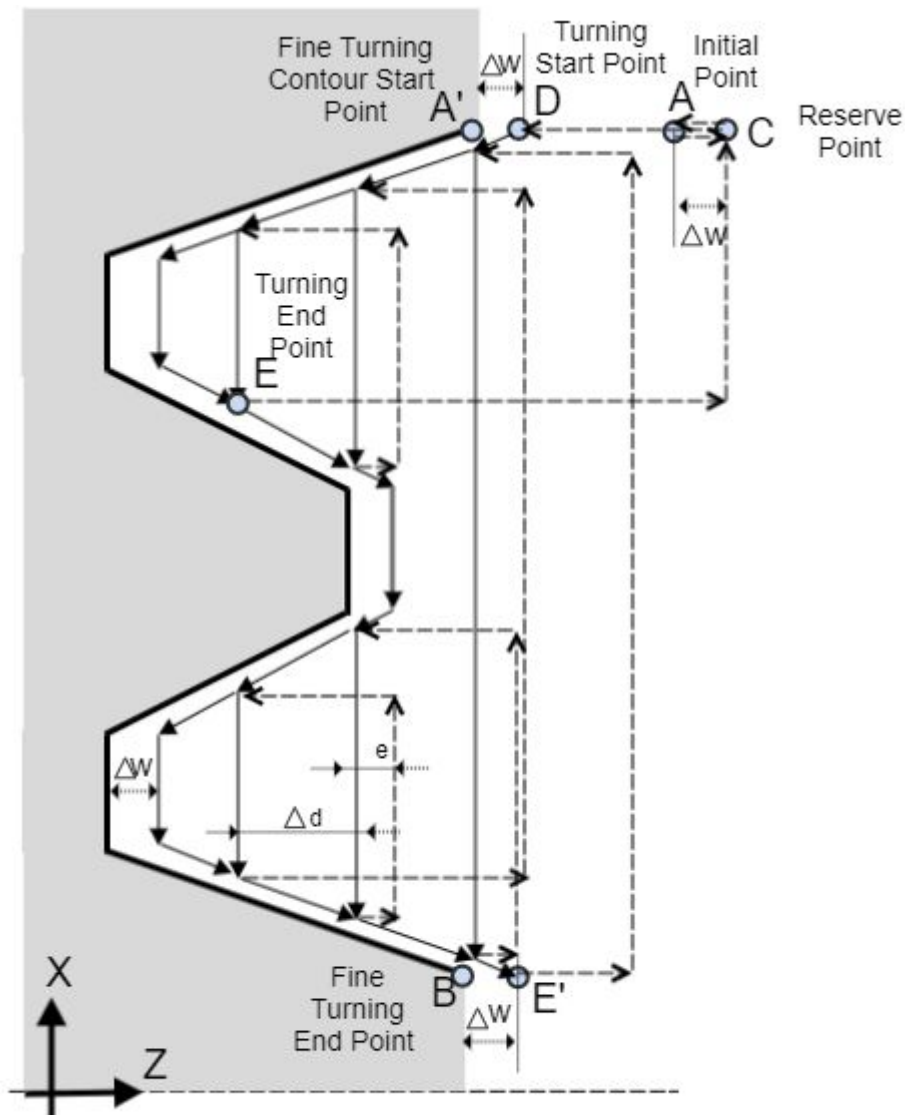
SYNTEC



Type 2



SYNTEC



Pr4014 = 1

There are two path specifications for Type 1 or 2.

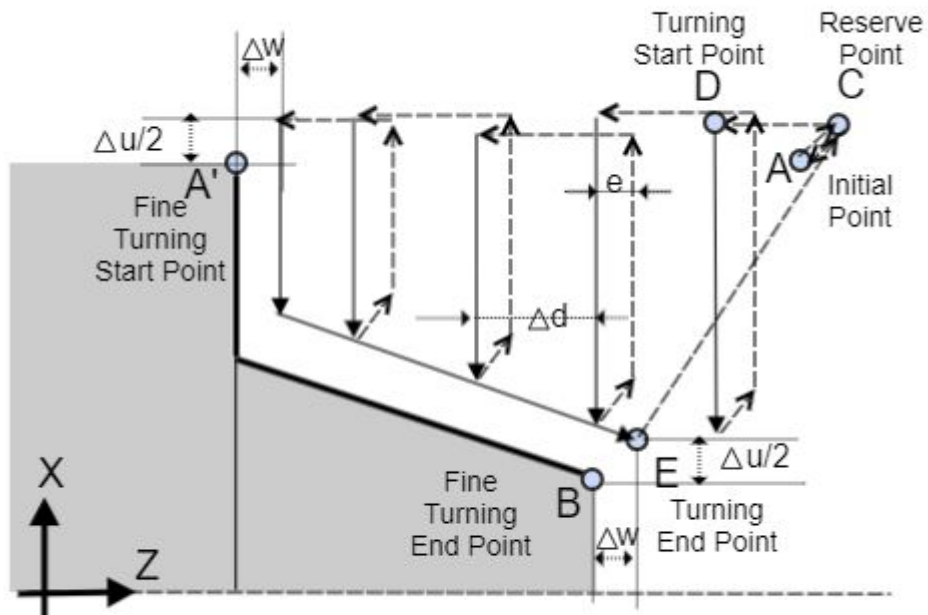
For definitions of Type 1 and 2, see: G72- Radial (End-Face) Rough Facing Cycle (A-Type)

Type 1:

1. Path check: Path check will not be performed.
2. Turning start point (D): Refer to position of reserve point (C) to find the start point for turning (D).
3. Retract path (E → C): G0 XZ axes moves together

4. Illustration

Type 1

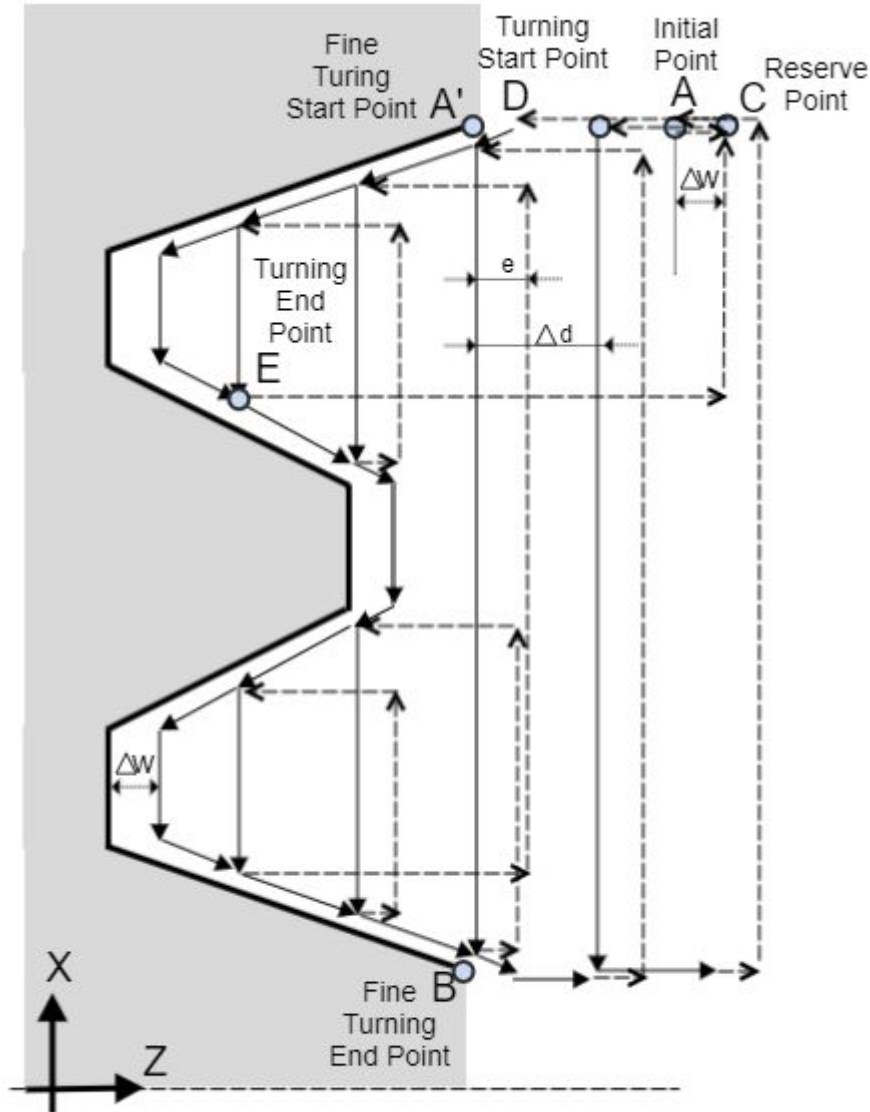


Type 2:

1. Path check: If the position of the initial point (A) Z direction is within the fine turning path ($A' \rightarrow B$), the alarm [MAR-005 the position higher than the cycle start point] will be triggered.
2. Turning start point (D): Refer to the position of the reserve point (C) to find the starting point for turning.
3. Retract path ($E \rightarrow C$): First move Z axis and then move X axis.
4. Illustration:

Type 2

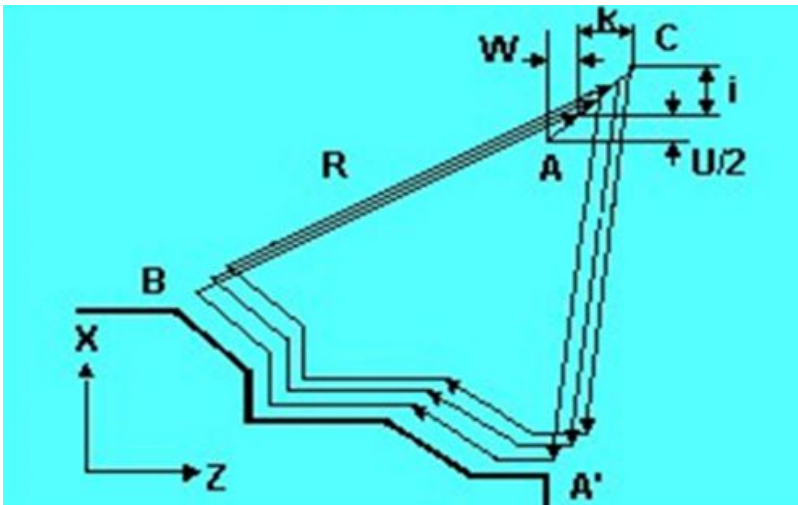
SYNTEC



2.13 Pr4015 X axis relife amount of G75

No	Descriptions	Range	Unit	Default	Effective
4015	X axis relife (infeed) amount of G75	[0~99999999]	LIU	5000	Press Reset

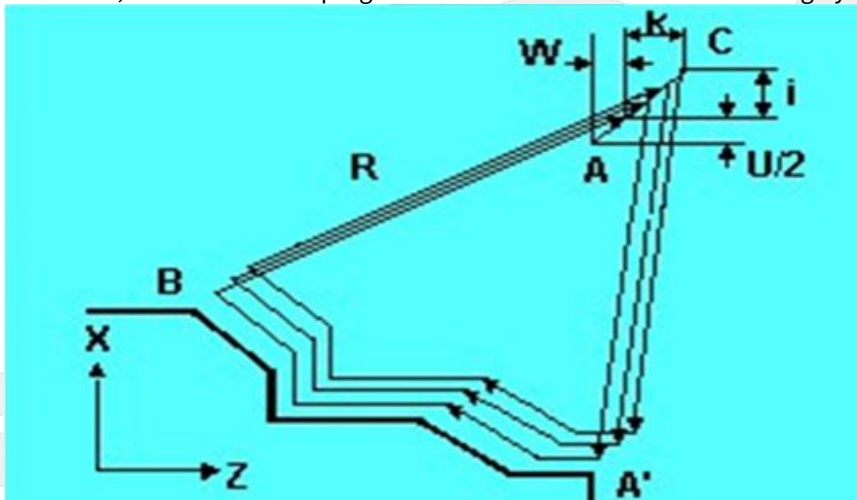
- The X infeed amount when the grooving cycle (G75/G75.1) such as the i increment in the following diagram. For details, refer to the lathe program manual G75- Lateral Peck Grooving Cycle



2.14 Pr4016 Z axis relife amount of G75

No	Descriptions	Range	Unit	Default	Effective
4016	Z axis relife (infeed) amount of G75	[0~999999999]	LIU	5000	Press Reset

- The Z infeed amount when the grooving cycle (G75/G75.1) such as the K increment in the following diagram. For details, refer to the lathe program manual G75- Lateral Peck Grooving Cycle



2.15 Pr4017 The number of division of G75

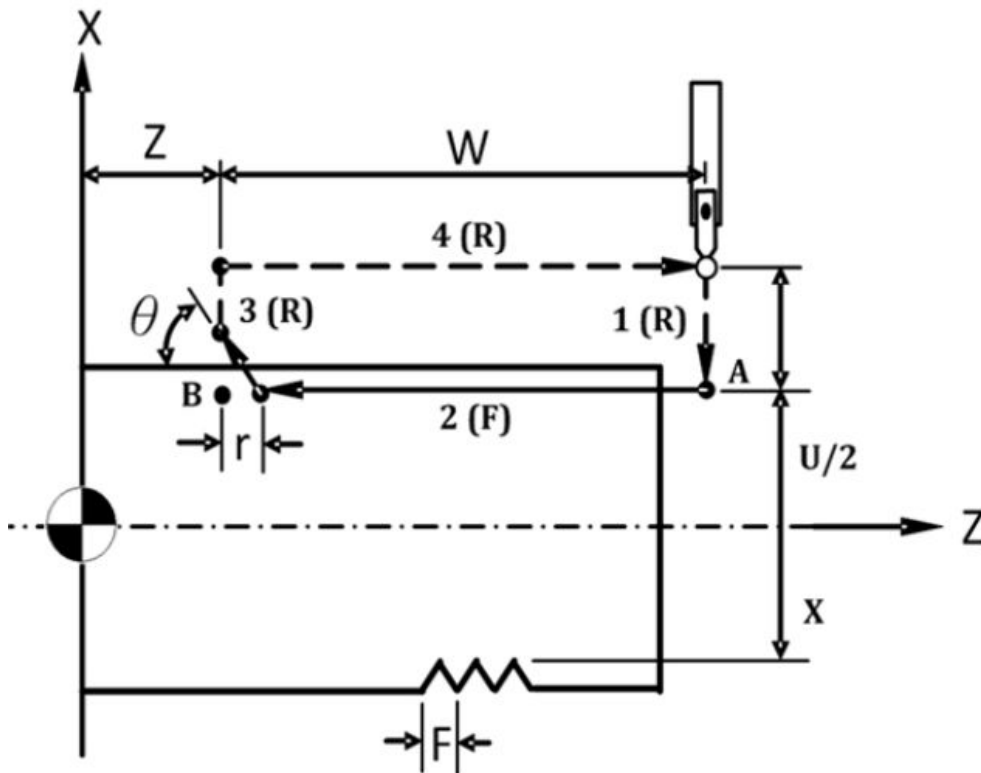
No	Descriptions	Range	Unit	Default	Effective
4017	The number of division of G75	[1~999]	-	1	Press Reset

- Defines the number of repeating cuts in rough turning cycle (G75/G75.1).

2.16 Pr4018 Chamfer angle of thread cutting G21

No	Descriptions	Range	Unit	Default	Effective
4018	Chamfer angle of thread cutting G21	[0~89]	deg	45	Press Reset

The parameter defines the retraction angle when performing the thread cutting cycle (G21/G21.2) of lathe, see the diagram below. Refer to the illustration of G21 in the lathe program manual. Generally the retraction angle setting (Pr4018) should be greater than $(90 - 0.5 * (\text{tool angle}))$. For example, if the tool tip angle is 60 degrees, the retraction angle (Pr4018) is 60 degrees or more.



- When Pr4040 is 2 High-speed threading, the retraction angle of the Complex threading cycle (G78/G78.2) is the same as above.
When the setting angle is less than $(\text{thread height} / \text{chamfer retraction length})$, the tool will retreat to the workpiece surface to avoid damage.

2.17 Pr4019 Y axis is positioning instruction for Drilling/Tapping/Boring

No	Descriptions	Range	Unit	Default	Effective
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4019	Y axis is positioning instruction for Drilling/Tapping/Boring (0:No; 1:Yes)	[0~1]	-	0	Press Reset
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- 0: When executing G83~G89 cycle command, the Y axis position control is not enabled.
- 1: When executing G83~G89 cycle command, the Y axis position control is enabled.

2.18 Pr4020 Type of X axis under G12.1

No	Descriptions	Range	Unit	Default	Effective
4020	Type of X axis under G12.1(0: radius 1: diameter)	[0~1]	-	0	Press Reset

For 10.114.51 and before, G12.1 command for Lathe only support radius positioning. However, from 10.114.51 and later, selection of radius and diameter positioning is decided by using Pr4020.

- 0: Radius positioning
- 1: Diameter positioning

2.19 Pr4021 *Spindle synchronization, 1st basic spindle number

No	Descriptions	Range	Unit	Default	Effective
4021	*Spindle synchronization, 1st basic spindle number	[0~6]	-	0	Restart

- Defines the basic spindle number when two spindles are synchronizing. For detail of spindle synchronization function, please refer to G51.2/G114.1 in lathe program manual.

2.20 Pr4022 *Spindle synchronization, 1st synchronous spindle number

No	Descriptions	Range	Unit	Default	Effective
4022	*Spindle synchronization, 1st synchronous spindle number	[0~6]	-	0	Restart

- Defines the synchronous spindle number when two spindles are synchronizing. For detail of spindle synchronization function, please refer to G51.2/G114.1 in lathe program manual.

2.21 Pr4023 *Spindle synchronization, 2nd basic spindle number

No	Descriptions	Range	Unit	Default	Effective
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4023	*Spindle synchronization, 2nd basic spindle number	[0~6]	-	0	Restart
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- Defines the basic spindle number when two spindles are synchronizing. For detail of spindle synchronization function, please refer to G51.2/G114.1 in lathe program manual.
- This parameter is valid only in version 10.116.24M, 10.116.32 and later.

2.22 Pr4024 *Spindle synchronization, 2nd synchronous spindle number

No	Descriptions	Range	Unit	Default	Effective
4024	*Spindle synchronization, 2nd synchronous spindle number	[0~6]	-	0	Restart

- Defines the synchronous spindle number when two spindles are synchronizing. For detail of spindle synchronization function, please refer to G51.2/G114.1 in lathe program manual.
- This parameter is valid only in version 10.116.24M, 10.116.32 and later.

2.23 Pr4025 *Spindle synchronization, 3rd basic spindle number

No	Descriptions	Range	Unit	Default	Effective
4025	*Spindle synchronization, 3rd basic spindle number	[0~6]	-	0	Restart

- Defines the basic spindle number when two spindles are synchronizing. For detail of spindle synchronization function, please refer to G51.2/G114.1 in lathe program manual.
- This parameter is valid only in version 10.116.24M, 10.116.32 and later.

2.24 Pr4026 *Spindle synchronization, 3rd synchronous spindle number

No	Descriptions	Range	Unit	Default	Effective
4026	*Spindle synchronization, 3rd synchronous spindle number	[0~6]	-	0	Restart

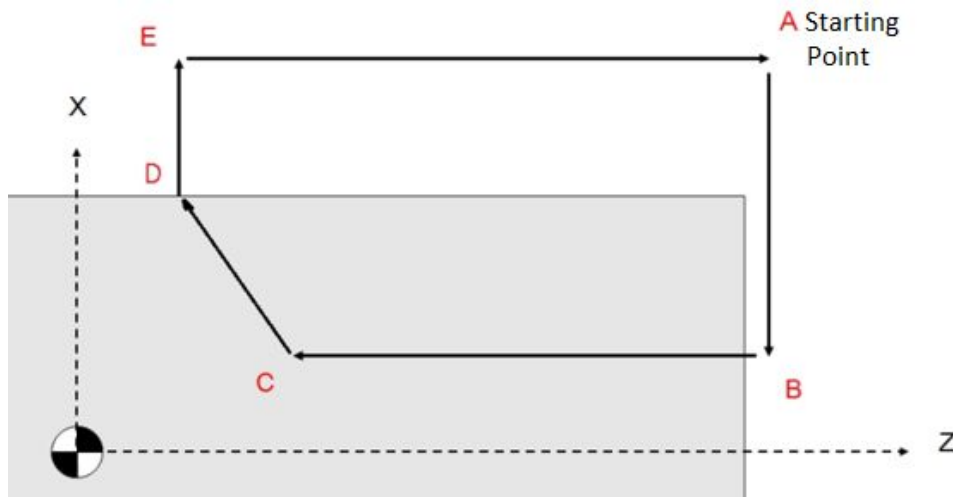
- Defines the synchronous spindle number when two spindles are synchronizing. For detail of spindle synchronization function, please refer to G51.2/G114.1 in lathe program manual.
- This parameter is valid only in version 10.116.24M, 10.116.32 and later.

2.25 Pr4040 Threading mode

No	Descriptions	Range	Unit	Default	Effective
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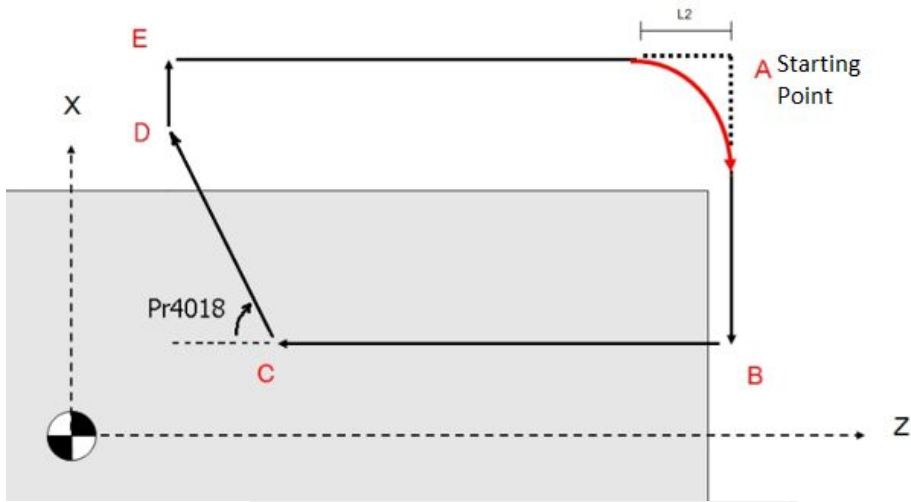
4040	Threading mode (0: Normal; 1: High Speed; 2: Extreme Speed)	[0~2]	-	1	Press Reset
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- 0: Normal threading
1: High speed threading
2: Extreme speed threading
- Processing time: Normal threading > High speed threading > Extreme speed threading
Retract quality: Normal threading < High speed threading \cong Extreme speed threading
- 1: High-speed threading, used when the spindle speed exceeds 1000 rpm;
0: Normal threading, used when the spindle speed is 300~800 rpm;
High-speed threading has the same path as general threading, and the difference is the speed profile at chamfer retraction.
Compared with the normal threading, high-speed threading has higher retraction speed to reduce the time for the tool to leave the workpiece surface and reduces the chance of bad chamfer thread (overlap thread); therefore it has faster processing speed and a better chamfer quality.



Path diagram of Normal Threading & High-speed Threading

- 2: Extremely speed threading, used when the spindle speed exceeds 1000 rpm;
Base on high-speed threading, extremely speed threading adds an overlapping function when tool retract and enter another cut cycle, as shown in the red curve below.
It can reduce the time of G21 or G78 to retract and re-enter the next thread; when the AB segment and the DE segment are larger, extreme speed threading can have more obvious effect to reduce process time.
Also consider Pr4018 chamfer angle to plan chamfer profile to retract to surface of the workpiece, so the path is slightly different from other threading mode. Extreme speed threading has a faster processing time and has better quality than high-speed threading.
- Notice:
 1. In version 10.116.16N, 10.116.24G and later, the extreme speed threading is changed to only the in-feed section to have the overlapping function to reduce machine vibration. The processing time increased but still faster than high-speed threading.
 2. In version 10.118.12D and later, G78 under the extreme speed threading is changed to use Pr4018 to calculate chamfer planning, the thread quality is better than high-speed threading and normal threading.



Path diagram of Extreme Speed Threading

- If the machine vibration is too large, try to adjust the following parameters:
 - a. Lower the retract angle (Pr4018)
 - b. Increase the acceleration and deceleration time while cutting (Pr409)
 - c. Increase chamfer amount for threading (Pr4043)

2.26 Pr4041 Finishing allowance of threading

No	Descriptions	Range	Unit	Default	Effective
4041	Finishing allowance of threading	[0~ 999999999]	LIU	1000	Press Reset

- When performing compound thread cutting (G78/G78.2), the allowance amount for fine turning as shown in the following diagram d; for complete operation, refer to G78- Multiple Thread Cutting Cycle (C-Type).



2.27 Pr4042 Tip angle for threading

No	Descriptions	Range	Unit	Default	Effective
4042	Tip angle for threading	[0~80]	deg	0	Press Reset

- When performing compound thread cutting (G78/G78.2), this parameter is used to determine the angle of tool tip, as shown in the following figure a; for complete operation, please refer to G78- Multiple Thread Cutting Cycle (C-Type).



2.28 Pr4043 Chamfer amount for threading

No	Descriptions	Range	Unit	Default	Effective
4043	Chamfer amount for threading	[0~99]	0.1 lead	10	Press Reset

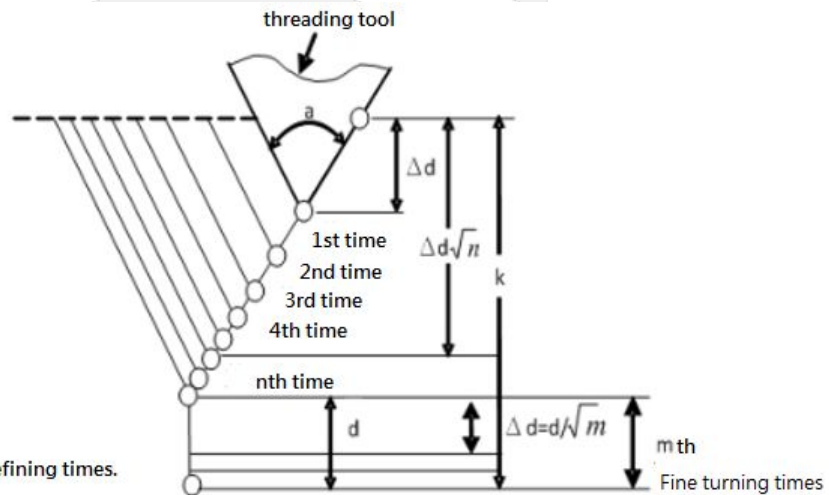
- The amount of retraction when executing threading cycles (G21/G21.2) and the compound thread cutting fixed cycles (G78/G78.2) is the length of the invalid thread; taking G21 as an example, it is the r value in the diagram below. For details, please refer to the G21/G21.2/G78/G78.2 in the lathe program manual.



2.29 Pr4044 Repetitive count in finishing for threading

No	Descriptions	Range	Unit	Default	Effective
4044	Repetitive count in finishing for threading	[0~99]	-	1	Press Reset

- When performing compound thread cutting (C-Type G78/G78.2), it is used to determine the number of times of fine turning (finishing). For complete operation, please refer to G70~G76-Complex Canned Cycle (A-Type).

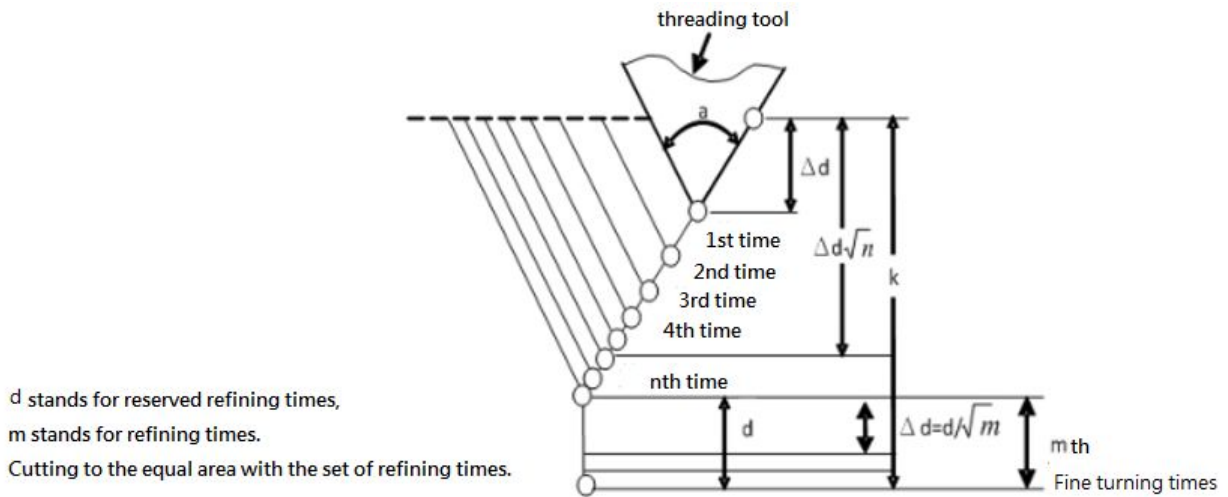


2.30 Pr4045 Min. cutting depth for threading

No	Descriptions	Range	Unit	Default	Effective
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4045	Minimum cutting depth for threading	[0~999999999]	LIU	1000	Press Reset
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When performing complex threading cycles (C-Type G78/G78.2; A-Type G76/G76.2), the parameter determines the minimum cutting depth in X direction. As shown in the diagram below, if the difference between n depth ($\Delta d\sqrt{n}$) and the n-1 depth is less than parameter value, the nth cutting depth will use this value. For complete operation, please refer to the lathe program manual G70~G76-Complex Canned Cycle (A-Type).

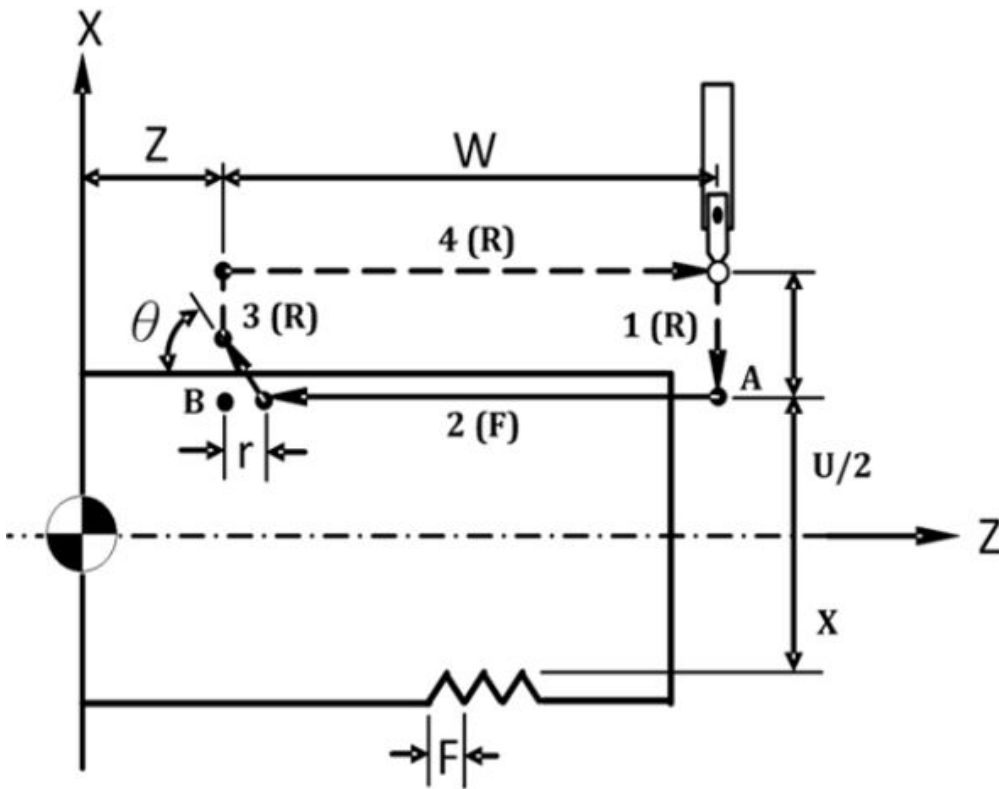


2.31 Pr4046 Enter amount for threading

No	Descriptions	Range	Unit	Default	Effective
4046	Enter amount for threading	[0~999999999]	LIU	0	Press Reset

- The amount of feed in the mid-section threading cycle (Type-C: G21.2/G78.2), such as distance K in the diagram below. For details, please refer to the G21.2/G78.2 command format and illustration in the lathe program manual. (G92.2- Mid-Section Threading Cycle (A-Type)/G76.2- Complex Mid-Section Threading Cycle(A-Type))

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2.32 Pr4047 Enter height for threading

No	Descriptions	Range	Unit	Default	Effective
4047	Enter height for threading	[0~999999999]	LIU	0	Press Reset

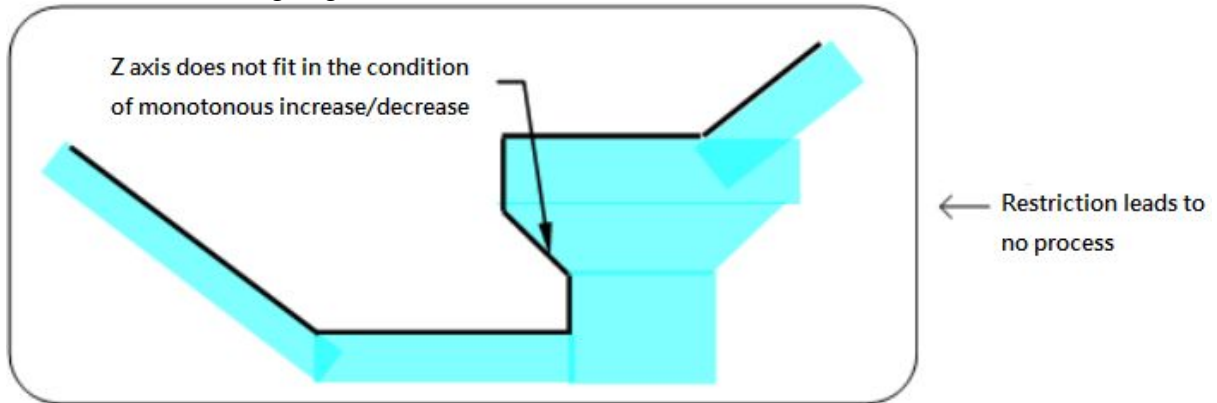
- When performing the vertical amount of the mid-section threading cycle (Type-C: G21.2/G78.2), such as distance l in the following diagram. For details, please refer to the G21.2/G78.2 command format and illustration in the lathe program manual. (G92.2- Mid-Section Threading Cycle (A-Type)/G76.2- Complex Mid-Section Threading Cycle(A-Type))



2.33 Pr4051 In multiple repetitive cycle, error allowance for monotone properties

No	Descriptions	Range	Unit	Default	Effective
4051	In multiple repetitive cycle, error allowance for monotone properties	[0~999999999]	LIU	0	Press Reset

- In Lathe rough turning cycles(C-Type G73/G73.1/G74/G74.1), contour must be single-directional increase/decrease as the following diagram:

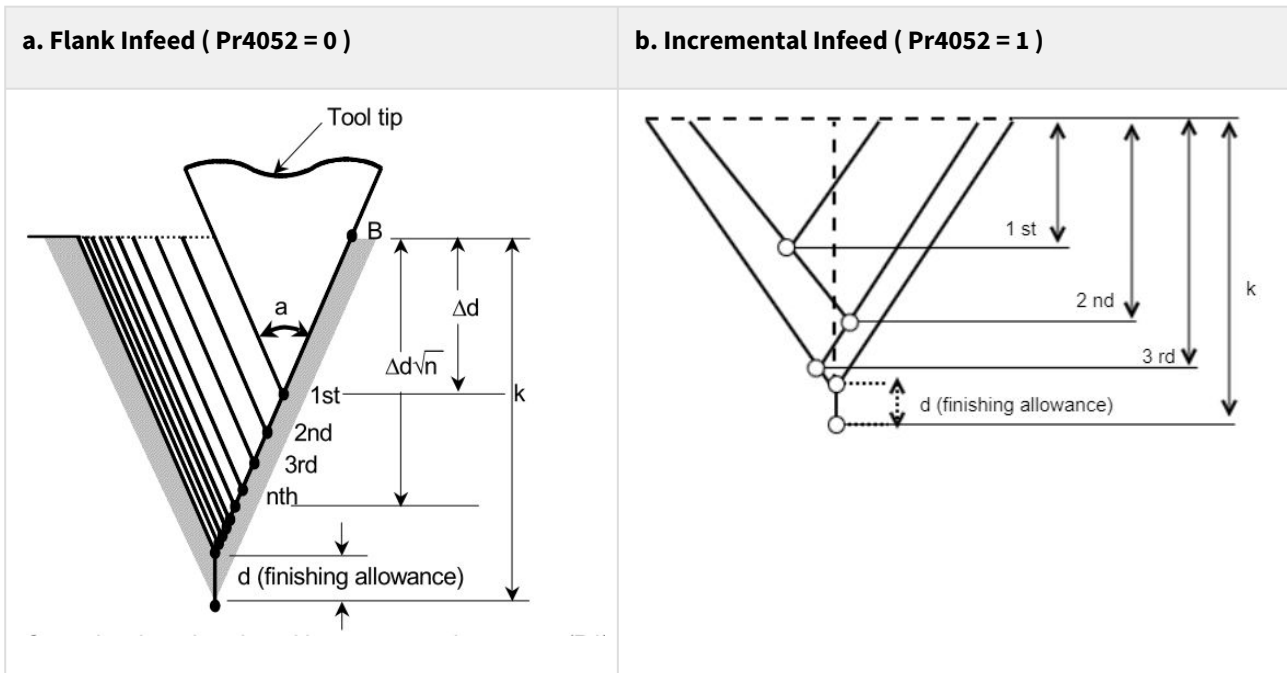


- Pr4051 setting increases the tolerance value of increase/decrease (when contour does not fully comply the monotonous increase/decrease rule)
- In lateral (horizontal) rough turning cycle, if the monotonous error in X direction is within the range of Pr4051, the system will not change to Type II. (from 10.116.54Z, 10.118.12H, 10.118.14 and later)
- In radial (vertical) rough turning cycle, if the monotonous error in Z direction is within the range of Pr4051, the system will not change to Type II. (from 10.116.54Z, 10.118.12H, 10.118.14 and later)

2.34 Pr4052 Infeed Method Of Multiple / Complex Mid-Section Thread Cutting Cycle

No	Descriptions	Range	Unit	Default	Effective
4052	Infeed Method Of Multiple / Complex Mid-Section Thread Cutting Cycle	[0~1]	-	0	Press Reset

- 0: Flank Infeed
- 1: Incremental Infeed
- Applicable to Multiple / Complex Mid-Section Thread Cutting Cycle (G78/G78.2)
- Flank Infeed (Figure a) is a traditional feed method; however, due to pure single-side cutting, the tool wears quickly and the tool life is short.
- Through the setting of parameter 4052, the infeed method can be changed to Incremental Infeed ((Figure b), which is characterized by the following items
 - Gives even insert wear and the longest tool life.
 - Good chip discharge control.
 - For detailed description, please refer to the description and illustration of G78 / G78.2 in the Lathe Machine Program Manual (C Type)
- Incremental infeed method (using parameter 4052) supports current and after Controller version : 10.118.28E



2.35 Pr4053 Chip Cutting Mode

No	Descriptions	Range	Unit	Default	Effective
4053	Chip Cutting Mode(0:Surface roughness priority; 1:Chip removal priority)	[0~1]	-	0	Press Reset

- 0: Surface roughness priority, which means the frequency is larger than "chip removal priority" and amplitude is smaller than "chip removal priority".
- 1: Chip removal priority, which means the frequency is smaller than "surface roughness priority" and amplitude is larger than "surface roughness priority".
- Please contact the original company for the usage of chip removal function.
- Switch the cutting mode by setting parameter 4053. If the weaving level of machine system is too severe, please set the Pr4053 to 1(Chip removal priority).
- This function supports the version of 10.118.28F and after it.

2.36 Pr4080 *Enable/Disable position coordinate of stroke limit detection during file interpretation

No	Descriptions	Range	Unit	Default	Effective
4080	*Enable/Disable position coordinate of stroke limit detection during file interpretation	[0~1]	-	0	restart

- This parameter enables/disables position coordinate of stroke limit detection during file interpretation.

0: Enable

1: Disable

- It is applicable to position coordinate of stroke limit 1, 2 and 3.
- It is applicable to all axis groups.
- If disabled, detection of stroke limit **only disabled during file interpretation**. It is still effective in stroke limit detection and protection.
- If disabled, when reaching stroke limit while tooling, **the corresponding axis deceleration and stop timing will be later** than it is enabled. In other words, the distance between axial stop position and stroke limit position is shorter.
p.s. If enabled, the system can detect stroke limit during file interpretation so the axis can be decelerated and stopped earlier. On the other hand, if disabled, the system can only detect stroke limit while sending commands and it causes later deceleration and stop.

2.37 Pr4601 *Enable New Tool Life Management(0:Original 1:New) (Lathe)

No	Descriptions	Range	Unit	Default	Effective
4601	*Enable New Tool Life Management(0:Original 1:New)	[0~1]	-	0	Restart

- 0: Original tool life management.
- 1: New tool life management.
- Valid version: 10.118.28Q, 10.118.39 and later.

2.38 Pr4602 *Enable Working List(0:Disable 1:Enable) (Lathe)

No	Descriptions	Range	Unit	Default	Effective
4602	*Enable Working List(0:Disable 1:Enable)	[0~1]	-	0	Restart

- 0: Disable.
- 1: Enable.
- Valid version: 10.118.28Q, 10.118.39 to 10.118.29Y, 10.118.40E, 10.118.43.

3 Mill Only.

- Pr4001 Tapping mode
- Pr4002 Drilling cycle retrace amount
- Pr4004 Tapping cycle retrace amount
- Pr4006 Tapping cycle retrace speed(%)
- Pr4007 Spindle orientation stop before tapping for serial spindle (Mill)
- Pr4008 setting for drilling/tapping mode
- Pr4010 Facing cycle X/Y plane milling stepover percent
- Pr4020 OSS direction of boring cycle
- Pr4055 G code tool measurement distance R
- Pr4056 G code tool measurement allowed distance D
- Pr4057 G code tool measurement feedrate F
- Pr4058 G code tool measurement reference point P
- Pr4059 G code measuring position in mechanical coordinate Z
- Pr4060 Servo compensation type
- Pr4070 Default cutting feedrate
- Pr4601 *Enable New Tool Life Management(0:Original 1:New)
- Pr4602 *Enable Working List(0:Disable 1:Enable)

3.1 Pr4001 Tapping mode

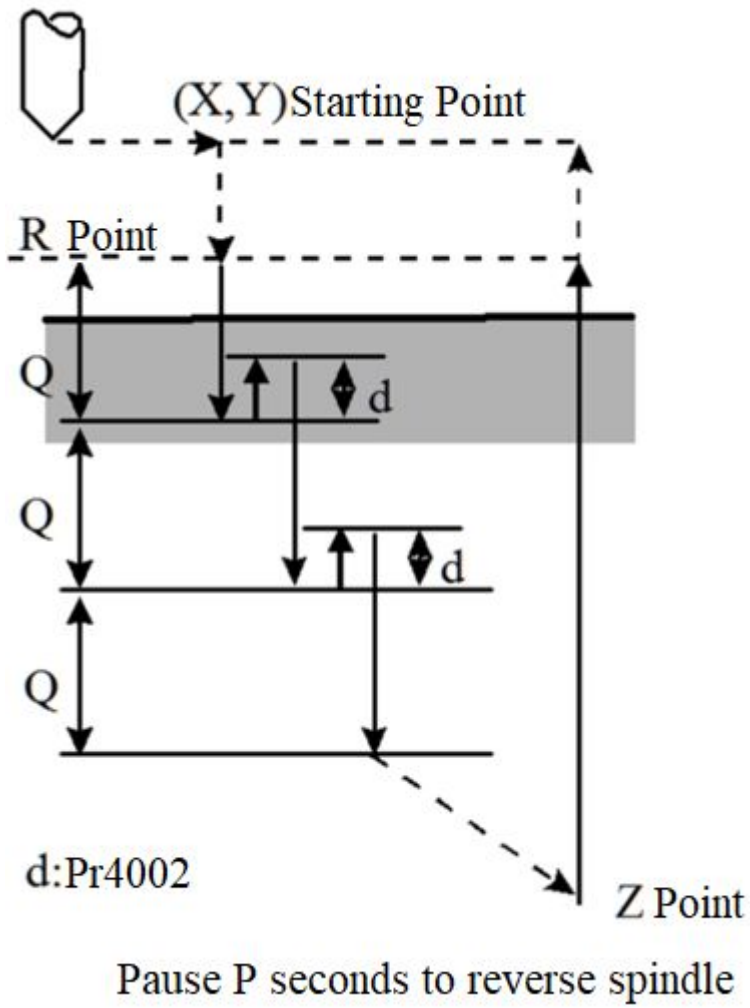
No	Descriptions	Range	Unit	Default	Effective
4001	Tapping mode	[0~1]		0	Press Reset

- 0: Peck tapping; when running the cycle, the tool must return to the R point and tap again.
- 1: High-speed. when running the cycle, the tool only need to return the retract amount d (Pr4004);
- For G84/G74, the detailed action can be seen in the G84/G74 section of Mill program manual.

3.2 Pr4002 Drilling cycle retrace amount

No	Descriptions	Range	Unit	Default	Effective
4002	Drilling cycle retrace amount	[0~999999999]	LIU	5000	Press Reset

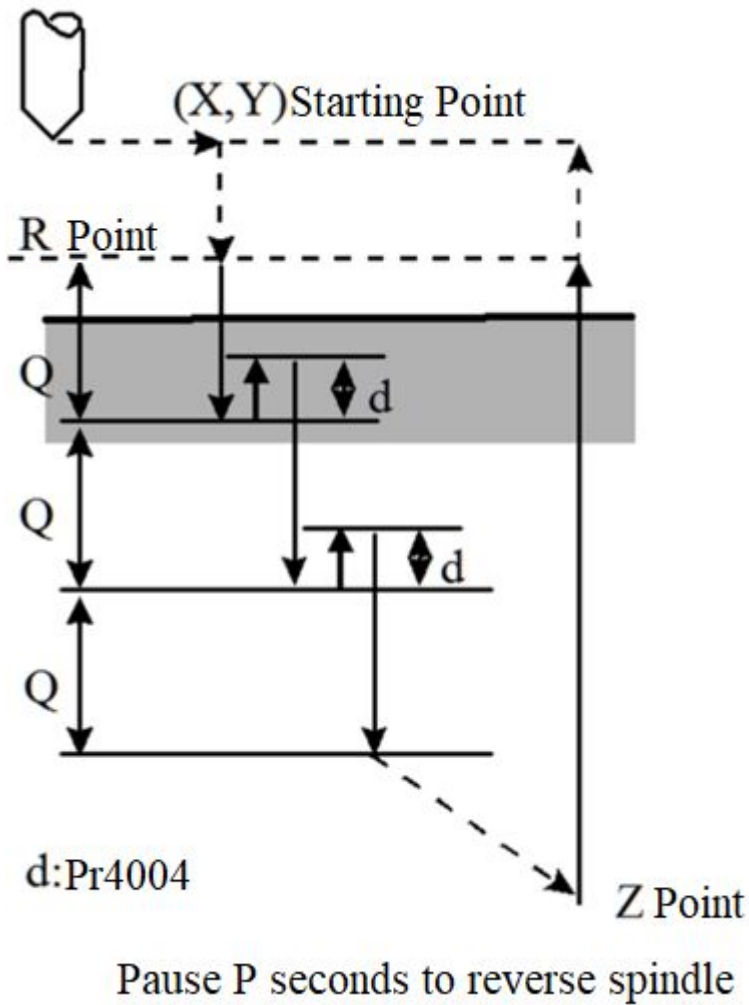
- The amount of retraction when drilling, such as increment d in the following diagram.
- For the G73/G83, the detailed action can be seen in the G73/G83 section of Mill program manual.



3.3 Pr4004 Tapping cycle retrace amount

No	Descriptions	Range	Unit	Default	Effective
4004	Tapping cycle retrace amount	[0~99999999]	LIU	5000	Press Reset

- The amount of retraction when tapping, such as increment d in the following diagram.
- For the G74/G84, the detailed action can be seen in the G74/G84 section of Mill program manual.



3.4 Pr4006 Tapping cycle retrace speed(%)

No	Descriptions	Range	Unit	Default	Effective
4006	Tapping cycle retrace speed	[100~300]	-	100	Press Reset

When the tool retracts during tapping, since it is not cutting and only need to maintain the shape of thread, the retract speed can be faster than the infeed cutting speed. The retraction speed is determined as a percentage of the infeed cutting speed.

- Retraction speed = Infeed speed * Pr4006.
- The current internal retracting speed limited by Pr405, when the calculated retraction speed exceeds Pr405, system limits it to Pr405.
- The retraction speed will be limited by the specified axial speed, user must confirm the retraction speed does not exceed the axial speed limit according to work planes. (The G17 plane is limited by the Z-axis speed, the G18 plane is limited by the Y-axis speed, and the G19 plane is limited by the X-axis speed)

3.5 Pr4007 Spindle orientation stop before tapping for serial spindle (Mill)

No	Descriptions	Range	Unit	Default	Effective
4007	Serial spindle tapping positioning function	[0~1]	-	0	Press Reset

- 0: Turn off the orientation stop before spindle tapping function.
- 1: Turn on the orientation stop before spindle tapping function. System will first position base on spindle origin offset (Pr1771~Pr1780), and then perform tapping after orientation stop finished.
- Valid from version 10.116.16, but invalid for pulse-train spindles.

3.6 Pr4008 setting for drilling/tapping mode

No	Descriptions	Range	Unit	Default	Effective
4008	setting for drilling/tapping mode	[0~1]	-	0	Press Reset

- G81 drilling
 - 0: General drilling
 - i. Actions of Feedhold, Reset, MPG simulation, change G01 override are allowed while drilling.
 - 1: Fast-drilling;
 - i. Actions of Feedhold, Reset, MPG simulation, change G01 override are NOT allowed while drilling.
 - ii. Only Emergency Stop can interrupt the drilling cycle.
 - iii. G01 Override must be fixed at 100% before drilling start to enter the fast-drilling mode.
 - iv. Compare with general drilling, it has better hole bottom precision.
 - v. When the overlapping function is enabled, the overlapping distance Q, D are considered in this function.
 - vi. For details, please refer to the G81 schema description in the Mill program manual
- If Pr4008 is 1, it may still be switched back to general mode while drilling multiple holes. Please note that the G01 override must be fixed until drilling ends.
- For a detailed description of the G81, refer to the Mill program manual.
- G84/G74 tapping
 - 0: Enable the overlapping function.
 - 1: Disable the overlapping function.
 - i. overlapping will be excuted considering the value of overlapping distance I、 J
 - ii. For details, please refer to the G84/G74 schema description in the Mill program manual

3.7 Pr4010 Facing cycle X/Y plane milling stepover percent

No	Descriptions	Range	Unit	Default	Effective
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4010	Facing cycle X/Y plane milling stepover percent	[1~100]	-	50	Press Reset
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- The feedrate percentage of performing canned cycles such as G161~G164 and G173~G178.

3.8 Pr4020 OSS direction of boring cycle

No	Descriptions	Range	Unit	Default	Effective
4020	OSS direction of boring cycle	[0~5]	-	0	Press Reset

Used for G76/G87, defining angle of orientation stop of spindle (OSS).

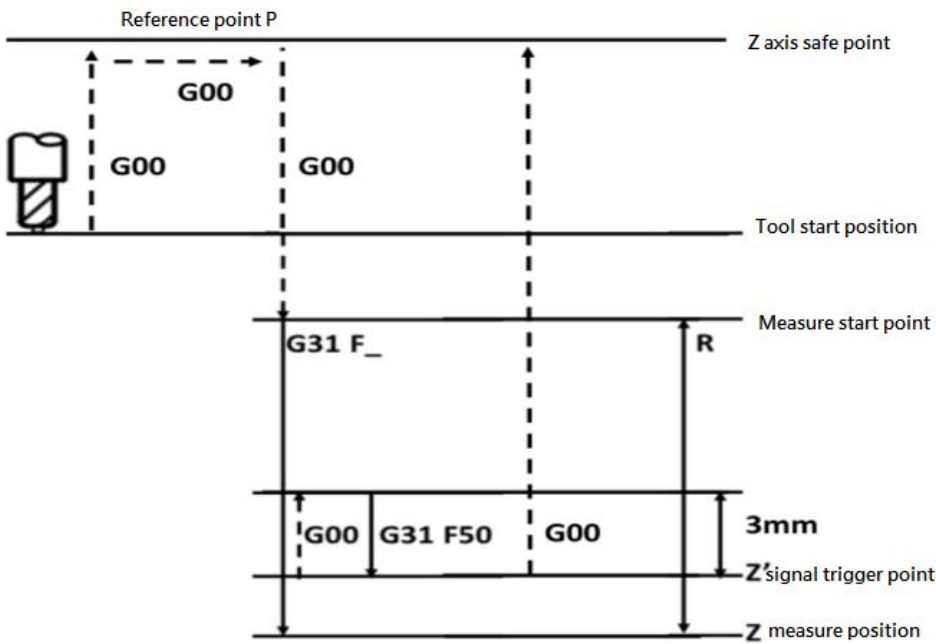
- 0: X+;
- 1: X-;
- 2: Y+;
- 3: Y-;
- 4: Z+;
- 5: Z-.

3.9 Pr4055 G code tool measurement distance R

No	Descriptions	Range	Unit	initial	occasion
4055	G code tool measurement distance R	[0~99999999]	LIU	100000	Press Reset

- The probing distance when performing automatic tool setting (G37/G37.2/G37.3), is shown as R in the diagram below.
- Valid from 10.116.16P, 10.116.24J. For detailed specifications, please refer to "Milling Machine Programming Manual (G37/G37.2 /G37.3)"

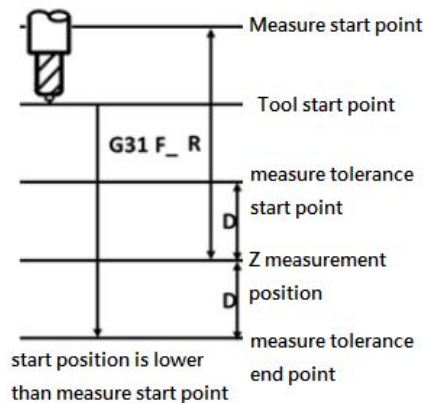
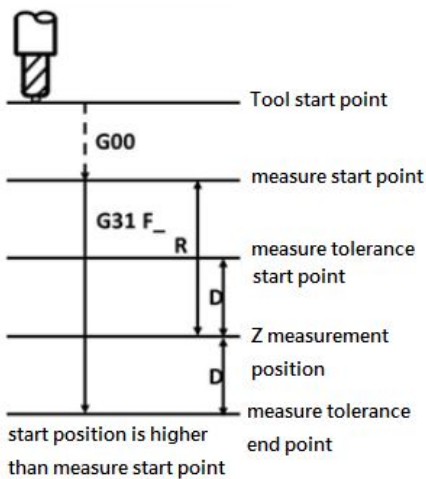
SYNTEC



3.10 Pr4056 G code tool measurement allowed distance D

No	Descriptions	Range	Unit	Default	Effective
4056	G code tool measurement allowed distance D	[0~1000]	LIU	20	Press Reset

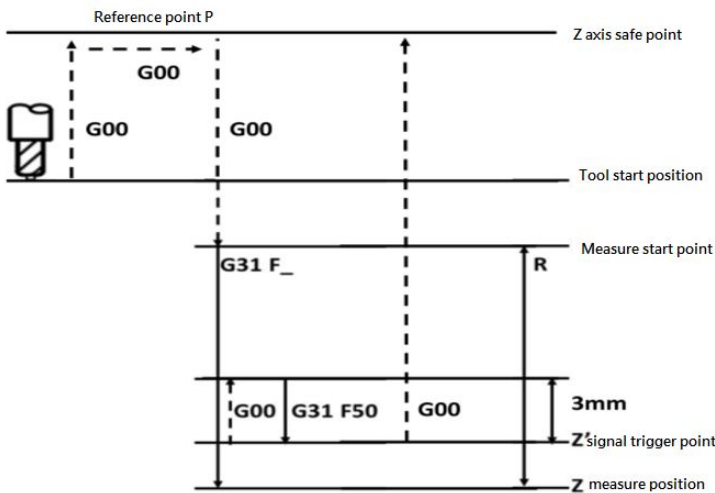
- The allowed signal triggering distance when performing automatic tool setting (G37), is shown as D in the diagram below.
- For detailed specifications, please refer to "Milling Machine Programming Manual (G37)"



3.11 Pr4057 G code tool measurement feedrate F

No	Descriptions	Range	Unit	Default	Effective
4057	G code tool measurement feedrate F	[0~ 999999999]	mm/min	100	Press Reset

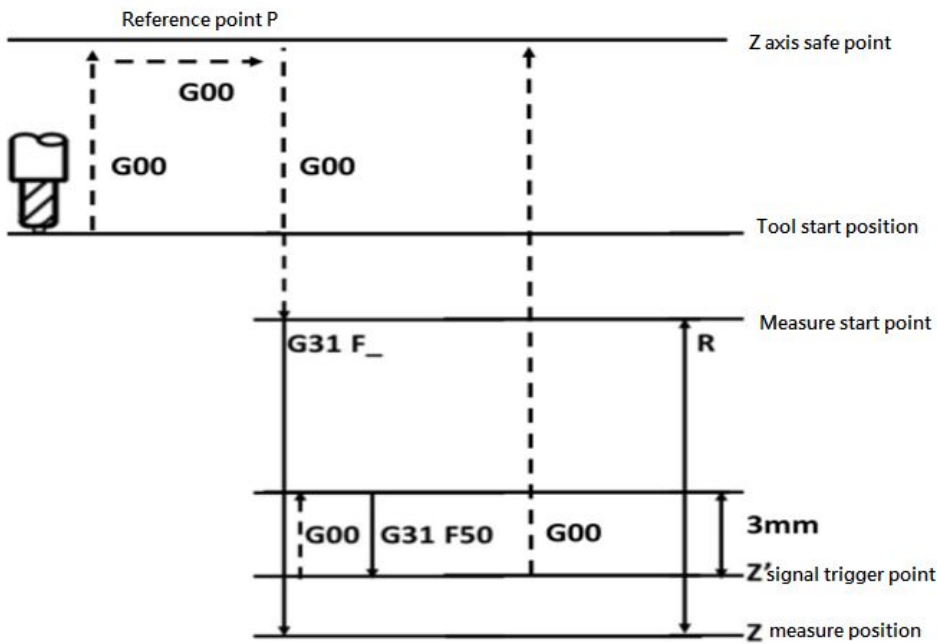
- Determine the measurement speed when performing automatic tool setting (G37/G37.2/G37.3), is shown as F in the diagram below.
- Valid from 10.116.16P, 10.116.24J. For detailed specifications, please refer to "Milling Machine Programming Manual (G37/G37.2 /G37.3)"



3.12 Pr4058 G code tool measurement reference point P

No	Descriptions	Range	Unit	Default	Effective
4058	G code tool measurement reference point P	[0~4]		0	Press Reset

- The reference point in XY axis direction when performing automatic tool setting (G37/G37.2/G37.3). 0 means reference point not specified, and 1~4 refer to 1st to 4th reference points in the parameter (Pr2801~Pr2860).)
- Valid from 10.116.16P, 10.116.24J. For detailed specifications, please refer to "Milling Machine Programming Manual (G37/G37.2 /G37.3)"

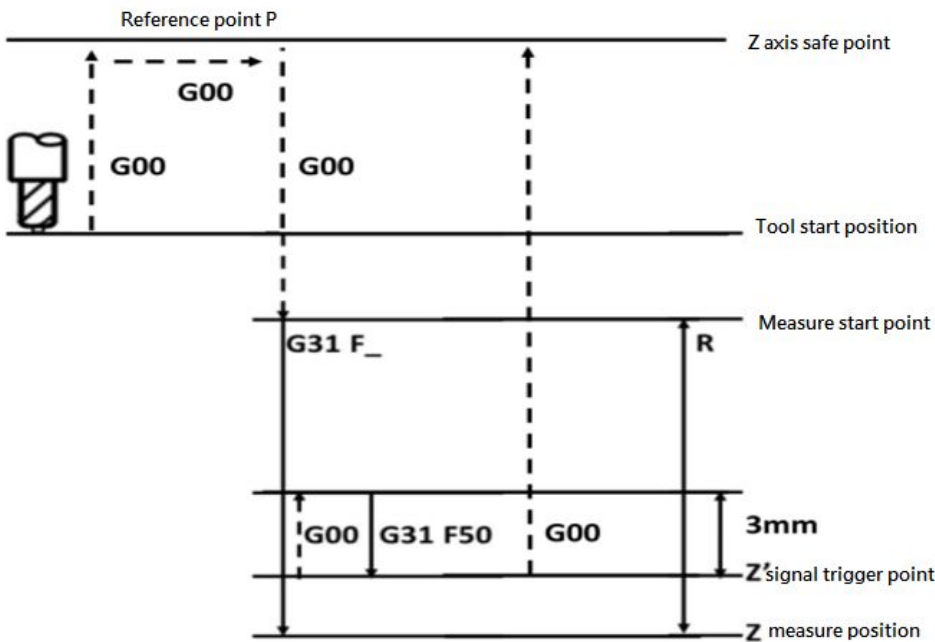


3.13 Pr4059 G code measuring position in mechanical coordinate Z

No	Descriptions	Range	Unit	Default	Effective
4059	G code measuring position in mechanical coordinate Z	[-999999999~999999999]	LIU	0	Press Reset

- The position of the measurement when performing automatic tool setting (G37.2/G37.3), is shown as position Z in diagram below.
- Valid from 10.116.16P, 10.116.24J. For detailed specifications, please refer to "Milling Machine Programming Manual (G37.2/G37.3)"

SYNTEC



3.14 Pr4060 Servo compensation type

No	Descriptions	Range	Unit	Default	Effective
4060	Servo backward compensation function (0: ZPEC; 1: SPA)	[0~1]	-	0	Press Reset

- This parameter is available after version 10.116.36.
- Recommended default value: 0 (ZPEC).
- This parameter is used to determine the type of controller's servo delay compensation function.
- When Pr4060 = 0, the function used is ZPEC zero phase error compensation (default).
- When Pr4060 = 1, the function used is SPA (Smooth Precision Advanced) high-precision smoothing function.
- The level of compensation is determined by Pr3808. If Pr3808 = 0, no compensation for servo delay is made regardless of the setting of Pr4060. For the compensation effect of different levels, and the comparison of SPA and ZPEC effects, please refer to the description of Pr3808.
- After the 10.116.36 version, when Pr3808 > 0 and the user under the G05 P10000 with a non-zero E argument or smoothing level, the parameter optimization function will only be activated if Pr4060 = 1.

3.15 Pr4070 Default cutting feedrate

No	Descriptions	Range	Unit	Default	Effective
4070	Default cutting feedrate	[6~3600000]	-	1000	Press Reset

- The feedrate setting after system bootup according to Pr3836 are:
 Default G94: Default feedrate is Pr4070, Unit: mm/min (inch/min)
 Default G95: Default feedrate is Pr4070/1000, Unit: mm/rev (inch/rev)
- After reset, feedrate return to this default value.

- Default cutting feedrate is limited by [Pr405 Maximum cutting feedrate] and [Pr621~Pr640 Maximum axial cutting feedrate]. Default feedrate equals to the maximum cutting feedrate if exceeding it.
- Valid edition started from 10.116.24.

3.16 Pr4601 *Enable New Tool Life Management(0:Original 1:New)

No	Descriptions	Range	Unit	Default	Effective
4601	*Enable New Tool Life Management(0:Original 1:New)	[0~1]	-	0	Restart

- 0: Original tool life management.
1: New tool life management.
- The following products support this feature:

Mill	Lathe	Glass	CT	WOOD
6A-E 6B-E 21A-E 22A 210A-E 210A-E5 210B-E 210B-E5 220A 220A-5 220B 220B-5	6A-E 21A-E 21B-E 22A 22B 210B-E 210B-E5 220B 220B-5	6A-E 21A-E	60A 60B	60A 600A 610A-H 610B-H 60E

※ Note:

- Mill, Lath, Glass supported version: 10.118.28Q, 10.118.39 and later versions.
- CT, WOOD supported version: 10.118.28T, 10.118.40 and later versions.

3.17 Pr4602 *Enable Working List(0:Disable 1:Enable)

No	Descriptions	Range	Unit	Default	Effective
4602	*Enable Working List(0:Disable 1:Enable)	[0~1]	-	0	Restart

- 0: Disable.
1: Enable.
- Valid version: 10.118.28Q, 10.118.39 to 10.118.29Y, 10.118.40E, 10.118.43.
- Not support for Wood, Print and Cutting model.

4 Wood Only.

4.1 Pr4501 The compensation value for over-cutting and undercut.

No	Descriptions	Range	Unit	Default	Effective
4501	The compensation value for over-cutting and undercut	[-50~50]	--	0	Press Reset

- This is the feature of the wood-machining to deal with the problem of over-cutting or undercut at the specific corners.
 - Over-cutting: let the value of this parameter smaller.
 - Undercut: let the value of this parameter larger.

4.2 Pr4502 Corner smoothing(0:disable;1:enable)

No	Descriptions	Range	Unit	Default	Effective
4502	Corner smoothing(0:disable;1:enable)	[0~1]	--	0	Press Reset

- Enable/ disable the feature of the corner smoothing for wood-machining.

4.3 Pr4503 Level of corner smoothing.

No	Descriptions	Range	Unit	Default	Effective
4503	Level of corner smoothing	[25~100]	--	50	Press Reset

- The value represents the corner-smoothing level for wood-machining.
- The larger the value is set, the smoother the tool move around the corner. However, the precision around the corner will be compromised.

4.4 Pr4504 Corner moulding tool angle

No	Descriptions	Range	Unit	Default	Effective
4504	Corner moulding tool angle	[10000~170000]	mdeg	120000	Press Reset

- This is a parameter of corner moulding tool angle for the wood-machining.

5 5-Axis Only.

5.1 Pr3001 - *1st Organization for five axis machine.

No	Descriptions	Range	Unit	Default	Effective
3001	*1st Organization for five axis machine	[0,5]	-	0	Restart

This parameter defines the mechanism arrangement of the 5-axis machine.

Definitions:

- 0: not 5-axis machine
- 1: Spindle Type
- 2: Table Type
- 3: Mix Type
- 4: Single Spindle Type
- 5: Single Table Type

5.2 Pr3002 - 1st Direction of Tool.

No	Descriptions	Range	Unit	Default	Effective
3002	1st Direction of Tool	[0,3]	-	0	Reset

This parameter defines the direction of tool (from tool tip to tool holder) when the angle of rotary axis is 0.

- 0: Undefine
- 1: Positive X-Axis
- 2: Positive Y-Axis
- 3: Positive Z-Axis

5.3 Pr3003 - 1st Incline Angle of Direction of Tool(RA)

No	Descriptions	Range	Unit	Default	Effective
3003	1st Incline Angle of Direction of Tool(RA)	[0,360000]	BLU	0	Reset

Definitions:

- Tool vector: The vector from tool tip to tool holder.
- Rotation direction: The angle for this parameter is decided by right-hand rule along the axis.
- Order of RA & RB : Tool vector can be any vector in space, and this vector can be obtained by RA first then RB from default direction of tool.

Description:

This parameter is used to correct the angle error from installation of the spindle or tool.

- When Pr3002 is 1
Pr3003 represents the positive angle between tool direction projection on XY plane and positive X axis.
- When Pr3002 is 2
Pr3003 represents the positive angle between tool direction projection on YZ plane and positive Y axis.
- When Pr3002 is 3
Pr3003 represents the positive angle between tool direction projection on ZX plane and positive Z axis.

Take Pr3002 = 3 as an example.

The definition of Pr3003 (RA) is shown as the figure 9.

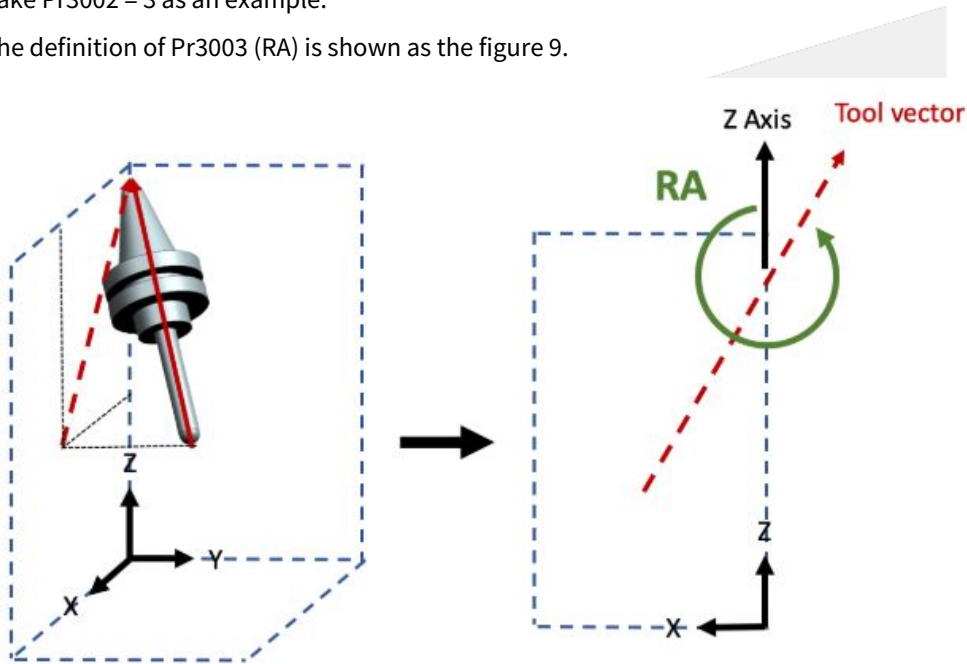


Figure 9

5.4 Pr3004 - 1st Incline Angle of Direction of Tool(RB)

No	Descriptions	Range	Unit	Default	Effective
3004	1st Incline Angle of Direction of Tool(RB)	[0,360000]	BLU	0	Reset

Definitions:

- Tool vector: The vector from tool tip to tool holder.
- Rotation direction: The angle for this parameter is decided by right-hand rule along the axis.
- Order of RA & RB : Tool vector can be any vector in space, and this vector can be obtained by RA first then RB from default direction of tool.

Description:

After RA is defined, the result could be used to get RB and finally align to the actual tool vector.

- When Pr3002 is 1:
Pr3004 represents the positive angle between the tool vector of RA and the tool direction projection on YZ plane.

- When Pr3002 is 2:
Pr3004 represents the positive angle between the tool vector of RA and the tool direction projection on ZX plane.
- When Pr3002 is 3:
Pr3004 represents the positive angle between the tool vector of RA and the tool direction projection on XY plane.

Take Pr3002 = 3 as an example.

The definition of Pr3004 (RB) is shown as the figure 10.

The vector rotated by RA is now projected onto XY plane, then the vector rotates an RB angle along positive Z direction to align with the projection of tool vector on XY plane.



Figure 10

5.5 Pr3005~Pr3006 - 1st First & Second Rotation Axis.

No	Descriptions	Range	Unit	Default	Effective
----	--------------	-------	------	---------	-----------

3005	1st first rotation axis	[0,3]	-	0	Reset
3006	1st second rotation axis	[0,3]	-	0	Reset

This parameter defines which coordinate axis the rotary axis is rotating around (figure 11).

Description:

- 0: Undefine
- 1: Rotate around X-Axis
- 2: Rotate around Y-Axis
- 3: Rotate around Z-Axis



Figure 11

5.6 Pr3007~Pr3008 - 1st Rotation Direction of First & Second Rotation Axis.

No	Descriptions	Range	Unit	Default	Effective
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3007	1st rotation direction of first rotation axis	[0,2]	-	0	Reset
3008	1st rotation direction of second rotation axis	[0,2]	-	0	Reset

Description:

- 0: Undefine
- 1: Right-hand rule
- 2: Left-hand rule

How to determine:

- Point your thumb to positive axis direction and the other 4 fingers point out the positive rotation direction.
- Check if the rotation direction of the rotary axis matches to right-hand rule or left-hand rule.

According to ISO-230 standard, both rotary axis of spindle type must follow right-hand rule, and those of table type must follow left-hand rule (as shown in figure 12).

However, it is more accurate to make the judgement at the scene.



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Figure

12

5.7 Pr3009~Pr3012 - 1st Starting/Terminal Point of Rotation Angle of Rotation Axis

No	Descriptions	Range	Unit	Default	Effective
3009	1st starting point of rotation angle of first rotation axis	[0,360000]	BLU	0	Reset

3010	1st terminal point of rotation angle of first rotation axis	[0,360000]	BLU	0	Reset
3011	1st starting point of rotation angle of second rotation axis	[0,360000]	BLU	0	Reset
3012	1st terminal point of rotation angle of second rotation axis	[0,360000]	BLU	0	Reset

Description:

The direction of this parameter is determined by Pr3007 & Pr3008.

If there is an alarm related to angle range, please check if the direction judgement is correct.

Assume that right-hand rule is used and take A axis as an example.

First, point your right thumb to positive X axis direction, and then look from positive X to negative X, as shown in figure 13;

The other 4 fingers point out the positive rotation direction.

According to the positive direction and the actual operation angle of the rotary axis, the parameters could be defined, as shown in figure 14.

If Area 1 is the operation range of the rotary axis, starting point is 290 degree then Pr3011=290000; terminal point is 70 degree then Pr3012=70000.

If Area 2 is the operation range of the rotary axis, starting point is 70 degree then Pr3011=70000; terminal point is 290 degree then Pr3012=290000.

Please notice that when left-hand rule is used, the positive direction will reverse.

For example, 90 degree under right-hand rule becomes 270 degree under left-hand rule; 270 degree under right-hand rule becomes 90 degree under left-hand rule.

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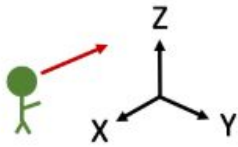


figure 13

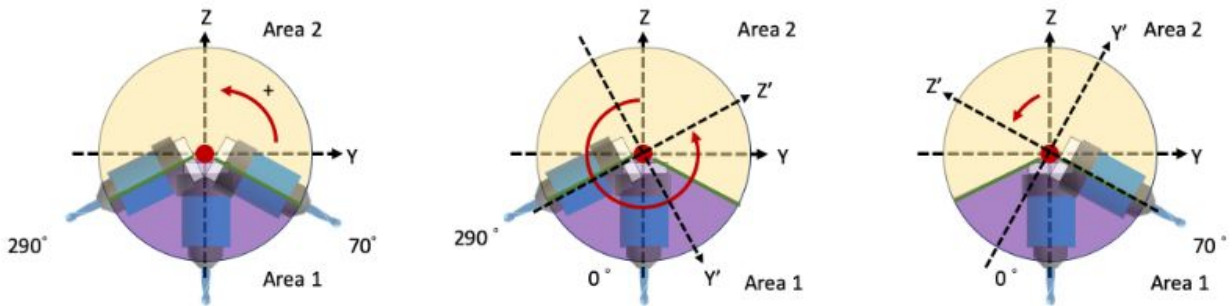


figure 14

5.8 Pr3013 - 1st Tool Holder Offset.

No	Descriptions	Range	Unit	Default	Effective
3013	1st Tool Holder Offset	[0,999999999]	BLU	0	Reset

Description:

This parameter is valid only when there is rotary axis on spindle side.

Tool holder offset means the distance from control point (center of rotary axis) to spindle tip (tool is not included).

It can be measured by simple process, the specific definition of tool holder offset and tool length can refer to figure 15.

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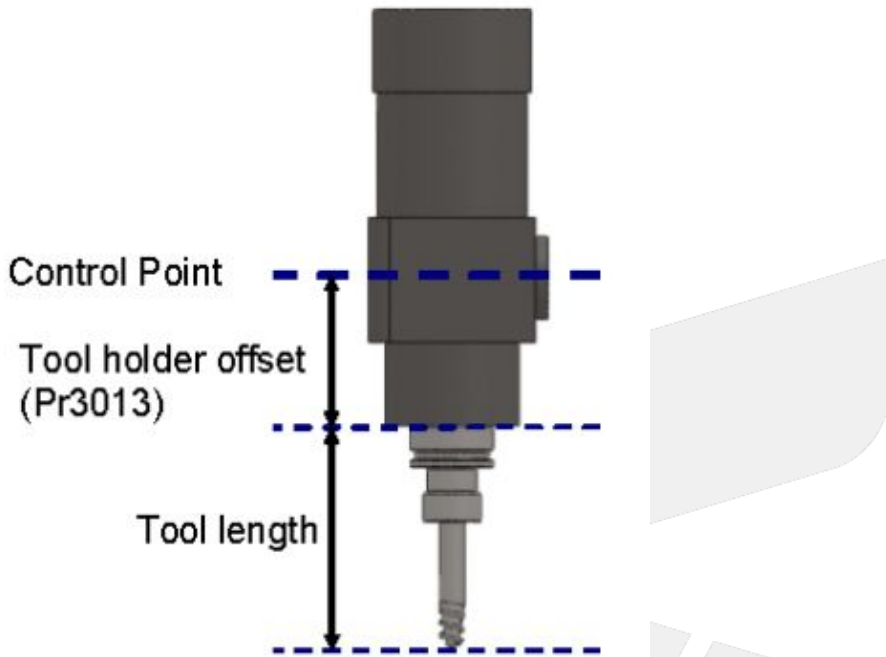


Figure 15

5.9 Pr3014 - Feature Coordinate Persist Mode.

No	Descriptions	Range	Unit	Details	Effective
3014	Feature coordinate persist mode	[0, 2]	-	0: Do NOT preserve feature coordinate status defined by G68.2/G68.3 after reset & reboot. 1: Preserve feature coordinate status defined by G68.2/G68.3 after reset only. 2: Preserve feature coordinate status defined by G68.2/G68.3 after reset and reboot.	Reset

5.10 Pr3015~Pr3020 - 1st A/B/C Component of Offset for Rotation Axis.

No	Descriptions	Range	Unit	Default	Effective
3015	1st A-component of offset for first rotation axis	[-360000,360000]	BLU	0	Reset
3016	1st B-component of offset for first rotation axis	[-360000,360000]	BLU	0	Reset

3017	1st C-component of offset for first rotation axis	[-360000,360000]	BLU	0	Reset
3018	1st A-component of offset for second rotation axis	[-360000,360000]	BLU	0	Reset
3019	1st B-component of offset for second rotation axis	[-360000,360000]	BLU	0	Reset
3020	1st C-component of offset for second rotation axis	[-360000,360000]	BLU	0	Reset

Description:

Pr3015~Pr3020 are used to compensate the error when the rotary axis are not orthogonal to XYZ axis.

According to Pr3005 & Pr3006, each component of offset should be measured and entered in Pr3015~Pr3020.

For example:

If first rotary axis is C axis (Pr3005=3), then AOC, BOC, COC in figure 16 are corresponding to Pr3015~Pr3017.

Take C axis as example to explain how to define the sign of the offset.

The offset, AOC, is the angle between the projection vector of C axis on YZ plane and positive Z axis.

The sign of AOC is decided by right-hand rule along A axis, so the sign of AOC in figure 16 is negative.

The offset, BOC, is the angle between the projection vector of C axis on XZ plane and positive Z axis.

The sign of BOC is decided by right-hand rule along B axis, so the sign of BOC in figure 16 is positive.

The offset, COC, is the offset of the origin point, and the sign of COC is also decided by right-hand rule.

If this offset exists, it's recommended to reset the origin point of the rotary axis, as shown in figure 17.

Example of parameter setting

First rotary axis is C and second rotary axis is B (Pr3005=3, Pr3006=2), $\angle \text{COC}=50$ degree, $\angle \text{BOB}=30$ degree.

C component of first rotary axis is Pr3017 = 50000 (BLU)

B component of second rotary axis is Pr3019 = 30000 (BLU)



Figure 16

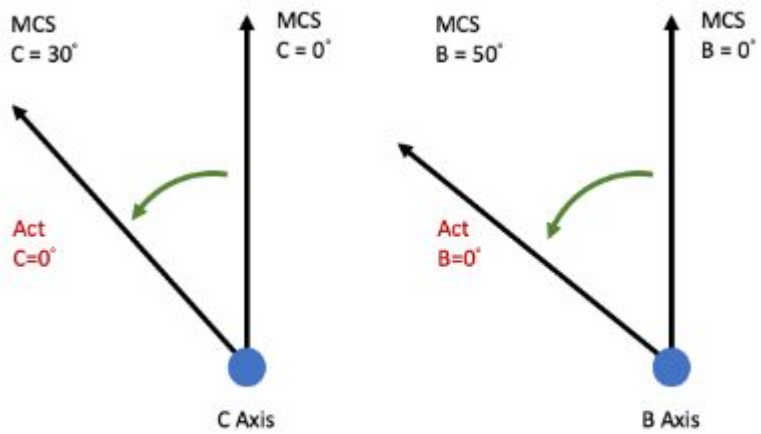


Figure 17.

EC

i *Details of AOC, BOC and COC mentioned above, please refers to chapter 5.

5.11 Pr3021~Pr3023 - 1st Offset from Tool Holder to Second Rotation Axis.

No	Descriptions	Range	Unit	Default	Effective
3021	1st X-component of offset from tool holder to second rotation axis	[-999999999,999999999]	BLU	0	Reset
3022	1st Y-component of offset from tool holder to second rotation axis	[-999999999,999999999]	BLU	0	Reset
3023	1st Z-component of offset from tool holder to second rotation axis	[-999999999,999999999]	BLU	0	Reset

Description:

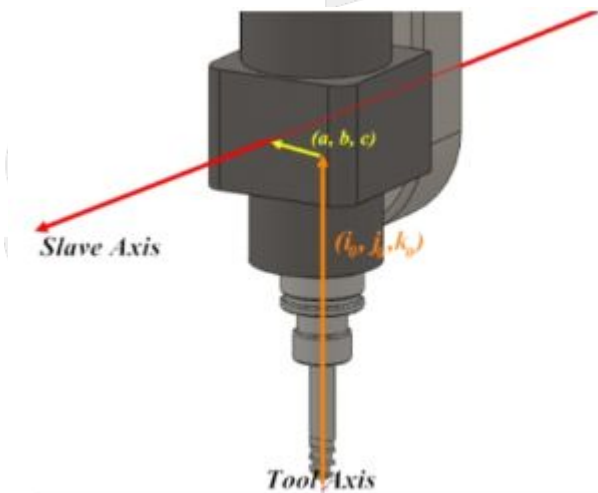
Pr3021~Pr3023 are used to set up the mechanism chain of the 5-axis machine for spindle type (see figure 19).

If the offset vector from tool axis to second rotary axis is (a,b,c), then a is Pr3021, b is Pr3022, c is Pr3023.

Recommend Setting

If second rotary axis is

1. A axis, then (a,b,c) = (0, Y component from tool holder to A axis, Z component from tool holder to A axis)
2. B axis, then (a,b,c) = (X component from tool holder to B axis, 0, Z component from tool holder to B axis)



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Figure 19

5.12 Pr3024~Pr3026 - 1st Offset from Second Rotation Axis to First Rotation Axis.

No	Descriptions	Range	Unit	Default	Effective
3024	1st X-component of offset from second rotation axis to first rotation axis	[-999999999,999999999]	BLU	0	Reset
3025	1st Y-component of offset from second rotation axis to first rotation axis	[-999999999,999999999]	BLU	0	Reset
3026	1st Z-component of offset from second rotation axis to first rotation axis	[-999999999,999999999]	BLU	0	Reset

Description:

Pr3024 ~ 3026 are used to set up the mechanism chain of the 5-axis machine for spindle type (see figure 20).

If the offset vector from second rotation axis to first rotation axis is (d, e, f), then d is Pr3024, e is Pr3025, f is Pr3026.

Recommend Setting

Following the conditions of Pr3021~Pr3023, the offset vector from second rotary axis to first rotary axis is

(1) C axis + (2) A axis: (d,e,f) = (X component from A axis to C axis, Y component from A axis to C axis, 0)

(1) C axis + (2) B axis: (d,e,f) = (X component from B axis to C axis, Y component from B axis to C axis, 0)

(1) B axis + (2) A axis: (d,e,f) = (X component from A axis to B axis, 0, Z component from A axis to B axis)

(1) A axis + (2) B axis: (d,e,f) = (0, Y component from B axis to A axis, Z component from B axis to A axis)

Figure 20

5.13 Pr3031~Pr3033 - 1st Offset from First Rotation Axis to Second Rotation Axis.

No	Descriptions	Range	Unit	Default	Effective
3031	1st X-component of offset from first rotation axis to second rotation axis	[-999999999,999999999]	BLU	0	Reset

3032	1st Y-component of offset from first rotation axis to second rotation axis	[-999999999,999999999]	BL U	0	Reset
3033	1st Z-component of offset from first rotation axis to second rotation axis	[-999999999,999999999]	BL U	0	Reset

Description:

Pr3031~3033 are used to set up the mechanism chain of the 5-axis machine for table type (see figure 21).

If the offset vector from first rotary axis to second rotary axis is (a, b, c), then a is Pr3031, b is Pr3032, c is Pr3033.

Recommend Setting

Following the conditions of Pr3034~Pr3036, the offset vector from first rotary axis to second rotary axis is

- (1) A axis + (2) C axis: set (a,b,c) = (X component from A axis to C axis, Y component from A axis to C axis, 0)
- (1) B axis + (2) C axis: set (a,b,c) = (X component from B axis to C axis, Y component from B axis to C axis, 0)
- (1) A axis + (2) B axis: set (a,b,c) = (X component from A axis to B axis, 0, Z component from A axis to B axis)
- (1) B axis + (2) A axis: set (a,b,c) = (0, Y component from B axis to A axis, Z component from B axis to A axis)

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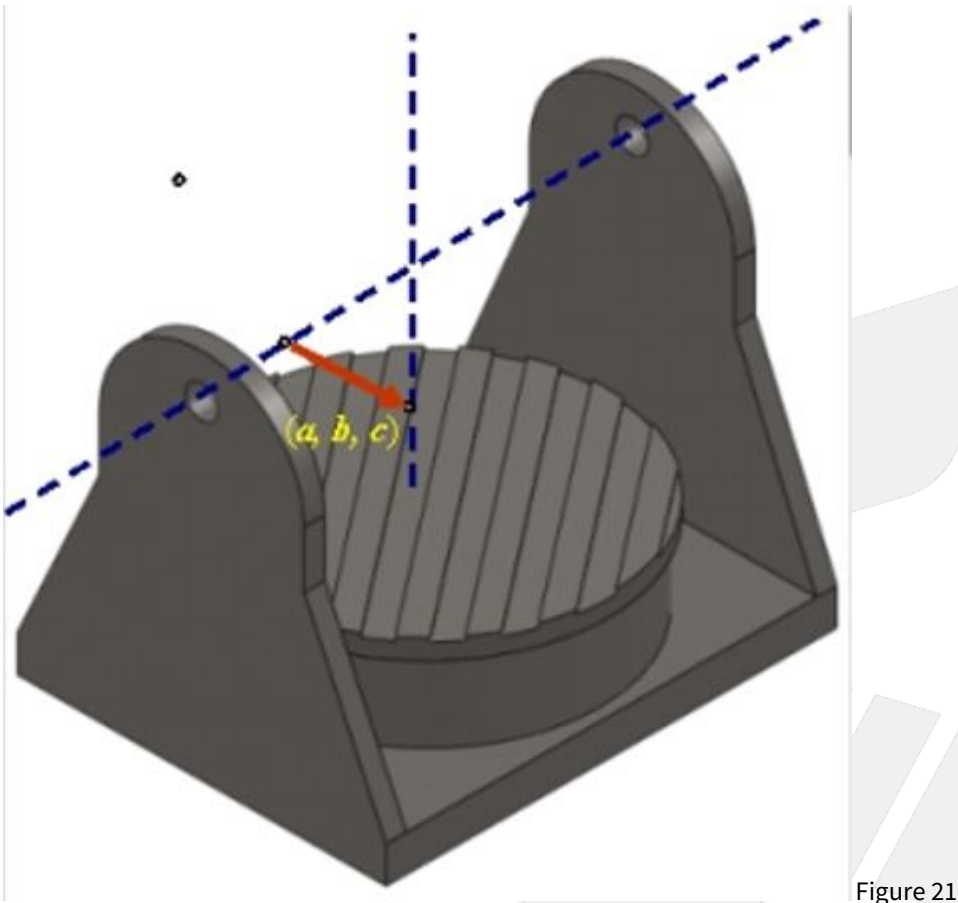


Figure 21

5.14 Pr3034~Pr3036 - 1st Offset from Machine to First Rotation Axis.

No	Descriptions	Range	Unit	Default	Effective
3034	1st X-component of offset from machine to first rotation axis	[-999999999,99999999]	BLU	0	Reset
3035	1st Y-component of offset from machine to first rotation axis	[-999999999,99999999]	BLU	0	Reset
3036	1st Z-component of offset from machine to first rotation axis	[-999999999,99999999]	BLU	0	Reset

Description:

Pr3034~3036 are used to set up the mechanism chain of the 5-axis machine for table type (see figure 22)

If the offset vector from arbitrary position on the machine to first rotary axis is (d, e, f), then d is Pr3034, e is Pr3035, f is Pr3036.

Machine origin is usually chosen as the reference point, so d, e, f are the machine coordinate of the rotary axis.

Recommend Setting

If first rotary axis is

1. A axis, then (d,e,f) = (0, Y component of the machine coordinate, Z component of the machine coordinate)
2. B axis, then (d,e,f) = (X component of the machine coordinate, 0, Z component of the machine coordinate)

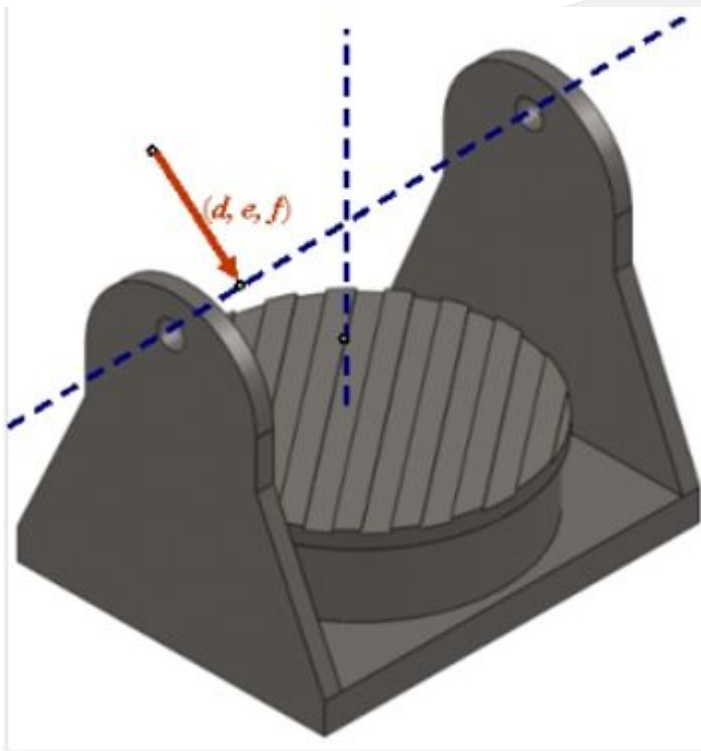


Figure 22

5.15 Pr3041~Pr3043 - 1st Offset from Tool Holder to First Rotation Axis.

No	Descriptions	Range	Unit	Default	Effective
3041	1st X-component of offset from tool holder to first rotation axis	[-999999999,999999999]	BLU	0	Reset
3042	1st Y-component of offset from tool holder to first rotation axis	[-999999999,999999999]	BLU	0	Reset

3043	1st Z-component of offset from tool holder to first rotation axis	[-999999999,999999999]	BLU	0	Reset
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Description:

Pr3041~3043 are used to set up the mechanism chain of the 5-axis machine for mix type (see figure 23)

If the offset vector from tool holder to first rotary axis is (a, b, c), then a is Pr3041, b is Pr3042, c is Pr3043.

Recommend Setting

If first rotary axis is

1. A axis, then (a,b,c) = (0, Y component from tool holder to A axis, Z component from tool holder to A axis)
2. B axis, then (a,b,c) = (X component from tool holder to B axis, 0, Z component from tool holder to B axis)

Figure 23

5.16 Pr3044~Pr3046 - 1st Offset from Machine to Second Rotation Axis.

No	Descriptions	Range	Unit	Default	Effective
3044	1st X-component of offset from machine to second rotation axis	[-999999999,999999999]	BLU	0	Reset
3045	1st Y-component of offset from machine to second rotation axis	[-999999999,999999999]	BLU	0	Reset
3046	1st Z-component of offset from machine to second rotation axis	[-999999999,999999999]	BLU	0	Reset

Description:

Pr3034 ~ Pr3036 are used to set up the mechanism chain of the 5-axis machine for mix type (see figure 24)

If the offset vector from machine origin to second rotary axis is (d, e, f), then d is Pr3034, e is Pr3035, f is Pr3036.

Recommend Setting

If second rotary axis is

1. A axis, then (d,e,f) = (0, Y component of the machine coordinate, Z component of the machine coordinate)
2. B axis, then (d,e,f) = (X component of the machine coordinate, 0, Z component of the machine coordinate)
3. C axis, then (d,e,f) = (X component of the machine coordinate, Y component of the machine coordinate, 0)

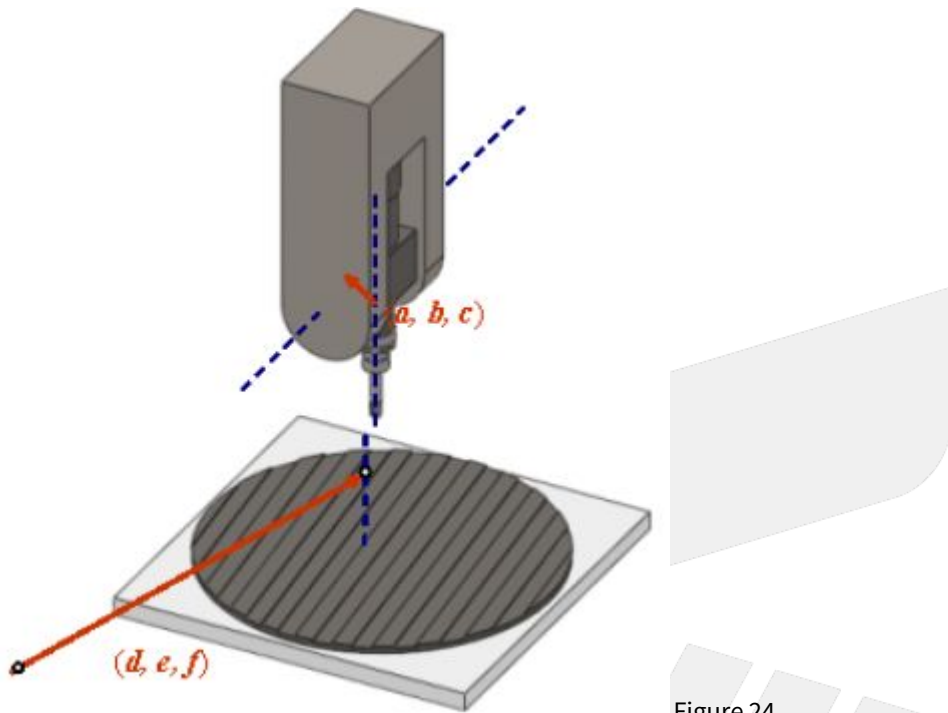


Figure 24

5.17 Pr3051 - Enable Smooth RTCP Function.

No	Descriptions	Range	Unit	Default	Effective
3051	Enable smooth RTCP function (0:No;1:Yes)	[0,1]	-	0	Reset

Description:

0: Disable STCP (Smooth RTCP) Function

1: Enable STCP (Smooth RTCP) Function

When this parameter is set as 1, user can neglect L argument in NC program and STCP function will be enabled automatically.

5.18 Pr3052~Pr3053 - Rotation Axis Smoothness Tolerance.

No	Descriptions	Range	Unit	Default	Effective
3052	First rotation axis smoothness tolerance (0.001deg)	[1, 179999]	0.001 deg	500	Reset
3053	Second rotation axis smoothness tolerance (0.001deg)	[1, 179999]	0.001 deg	500	Reset

5.19 Pr3054 -1st RTCP Interpolation Mode.

No	Descriptions	Range	Unit	Default	Effective
3054	1st RTCP interpolation mode (0: Five axis simultaneously; 1: Tool vector)	[0,1]	-	0	Reset

Description:

0: Five Axis Simultaneous

1: Tool Vector

Five Axes Simultaneous:

If the tool moves from vector V_1 to vector V_2 , the tool direction and posture will not be considered, all axis will move simultaneously with the normal interpolation mode.

Tool Vector:

If the tool moves from vector V_1 to vector V_2 , considering the tool posture during movement, the tool vector must stay on the plane composed of V_1 and V_2 .

Note

1. Tool vector interpolation mode is only valid for cutting G codes, such as G01, G02, G03, G02.4, G03.4. Axial movement generated from other G codes, such as G00, will not be affected by this parameter.
2. Under Pr3054 = 1, NC blocks will be interpreted as tool vectors. Therefore, the axes might not arrive the designated positions after executing a block, and their behavior might not follow the rules defined by axial types(Pr221~) as well.
ex. After executing the NC block: " A10. C0. ", the axes might stop at " A-10. C180. " since these two sets of rotary position represent the same tool vector.



Example 1

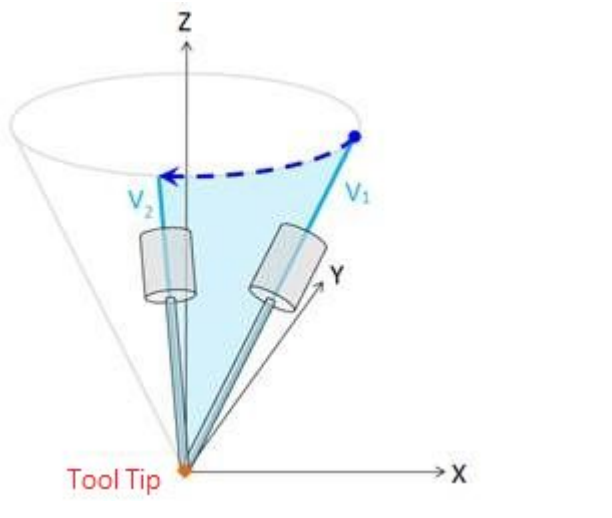
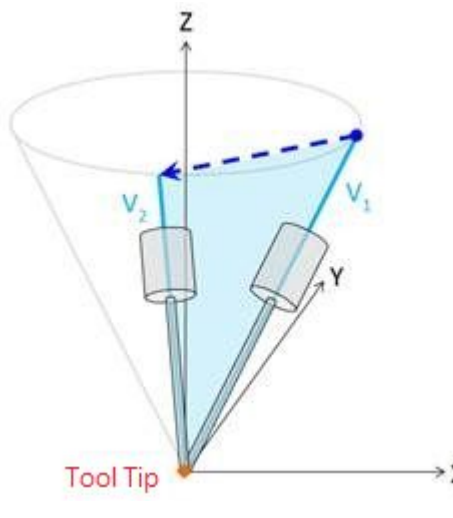
```
G43.4 H1           [Enable RTCP]
G90 G01 X0. Y0. Z0. B30. C0.  [Initial tool posture]
G01 C-90. F1000      [Execute motion command]
```

Five Axis Simultaneous

Tool posture changes during movement

Tool Vector

Tool posture stays on the same plane

	
<p>Because there is no command for B axis, so B axis stays still; the tool posture is slightly off from the plane composed of V_1 and V_2.</p>	<p>To stay on the plane composed of V_1 and V_2 during movement, B axis rotates without command and eventually returns to its original angle.</p>

i Example 2
 G90 G00 B30. C45. [Initial tool posture]
 G43.4 H1 [Enable RTCP]
 X0. Y0. Z0. [Positioning]
 G01 Y100. B60. C135. F1000 [Execute motion command]

Five Axis Simultaneous

Tool posture changes during movement

Tool Vector

Tool posture stays on the same plane

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<p>Because tool posture is not considered, B and C axis will rotate simultaneously. Therefore tool posture deflects.</p>	<p>Tool posture stays on the plane composed of V_1 and V_2 during movement. B and C axis will reach target coordinate at the same time even they don't rotate simultaneously.</p>

5.20 Pr3055 - 1st Basic Position of Table Coordinate System.

No	Descriptions	Range	Unit	Default	Effective
3055	Basic position of table coordinate system	[0,1]	-	0	Reset

Value

0: RTCP start position

1: zero position of workpiece coordinate

Description

- Table coordinate system:
Table coordinate system is a workpiece coordinate system exclusive to RTCP and only exist during RTCP is enabled.
When RTCP is enabled, table coordinate will be established on the table.
During RTCP is enabled, the commands in NC program will be interpreted as the commands of table coordinate.
- Rotation of the table coordinate system:
When RTCP is enabled, zero position of rotary axis in table coordinate will be fixed according to Pr3055.

Pr3055 = 0 :

Zero position of rotary axis in table coordinate will be fixed on "current machine coordinate of rotary axis".

Pr3055 = 1 :

Zero position of rotary axis in table coordinate will be fixed on "zero position of rotary axis in workpiece coordinate", regardless of current angle of rotary axis.

During RTCP is enabled, the table coordinate will rotate along with the table.

- Difference in application:

If Pr3055 is 0, user should locate rotary axis to the specific angle before enabling RTCP.

If Pr3055 is 1, user should fill the specific angle into G54 offset before enabling RTCP.

Examples are made to explain the specification in detail.

Notice

- If the parameter is modified when RTCP is enabled, it will take effect when RTCP being enabled next time.
- This parameter is only valid for the rotary axes on the table side.

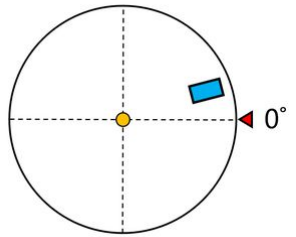
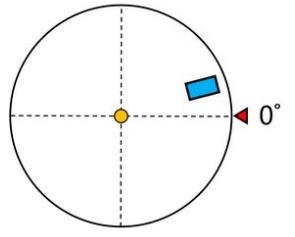
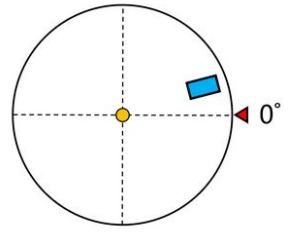
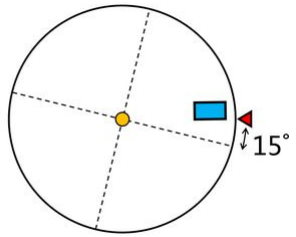
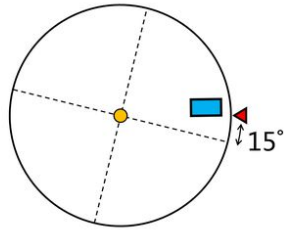
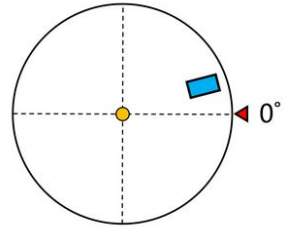
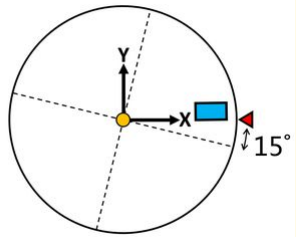
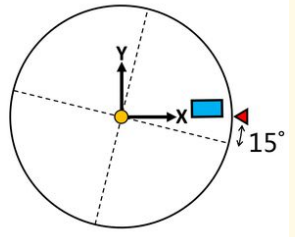
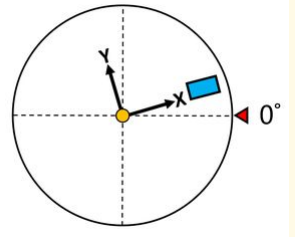
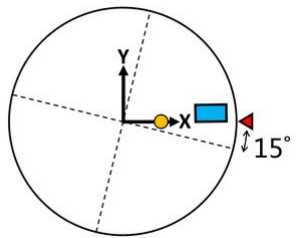
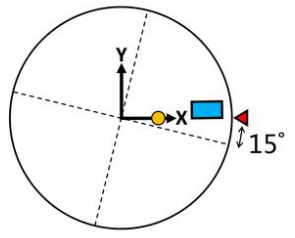
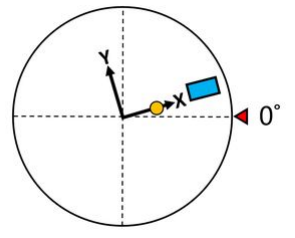
Example

- The purpose of following examples is making the table coordinate to align to the angle of the workpiece (that is C15. in machine coordinate).
- If Pr3055 is 0, like example A, user should locate C axis to C15. in advance before enabling RTCP.
- If Pr3055 is 1, like example B and C, user only need to fill C15. in G54 offset.

Legend

- The table rotation should follow left-hand rule.
- Yellow circle: position of tool tip
- Triangle: zero position of C axis in machine coordinate
- Square: Workpiece

Example	A	B	C
Pr3055	0	1	1
G54 Offset	无	C+15.	C+15.
NC Command	(locate C axis, then enable RTCP) G90 G49 G54 N1 C15. // C positioning N2 G43.4 H1 Z0. // RTCP ON N3 X10. Y0. Z0. // tool tip moves	(locate C axis, then enable RTCP) G90 G49 G54 N1 C0. // C positioning N2 G43.4 H1 Z0. // RTCP ON N3 X10. Y0. Z0. // tool tip moves	(directly enable RTCP) G90 G49 G54 N1 // do nothing N2 G43.4 H1 Z0. // RTCP ON N3 X10. Y0. Z0. // tool tip moves

<p>Initial position</p>			
<p>N1</p>	<p>C15. // C positioning</p> 	<p>C0. // C positioning</p> 	<p>// do nothing</p> 
<p>N2</p>	<p>G43.4 H1 Z0. // RTCP ON</p> 	<p>G43.4 H1 Z0. // RTCP ON</p> 	<p>G43.4 H1 Z0. // RTCP ON</p> 
<p>N3</p>	<p>X10. Y0. Z0. // tool tip moves</p> 	<p>X10. Y0. Z0. // tool tip moves</p> 	<p>X10. Y0. Z0. // tool tip moves</p> 

Note	<p>The machine coordinate of C axis is 15. when RTCP is enabled.</p> <p>Therefore, the zero position of C axis in table coordinate is at C15. in machine coordinate.</p>	<p>Regardless of the angle of C axis when RTCP is enabled, the zero position of C axis in table coordinate is the same as zero position of C axis in workpiece coordinate.</p>
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