LNC Milling series

Software Manual

2020/07 version：V01.00 (LN4408210139)

Enable intelligent machines

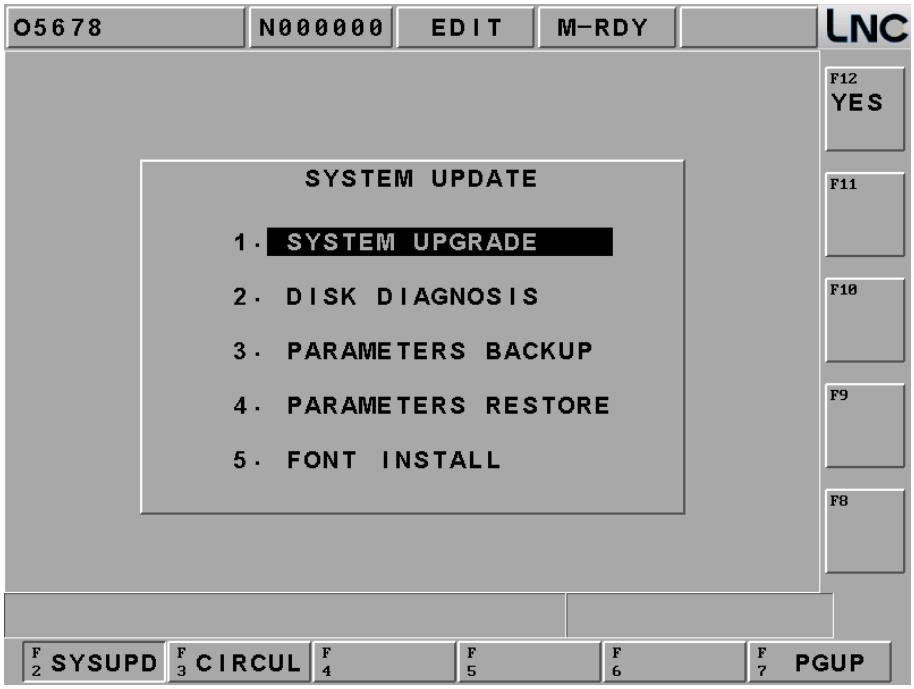
寶元數控股份有限公司
LNC Technology Co., Ltd.

Menu

1 System Update

1. Large-screen series **(LNC-615i, LNC-600, LNC-520, LNC-516i…)**

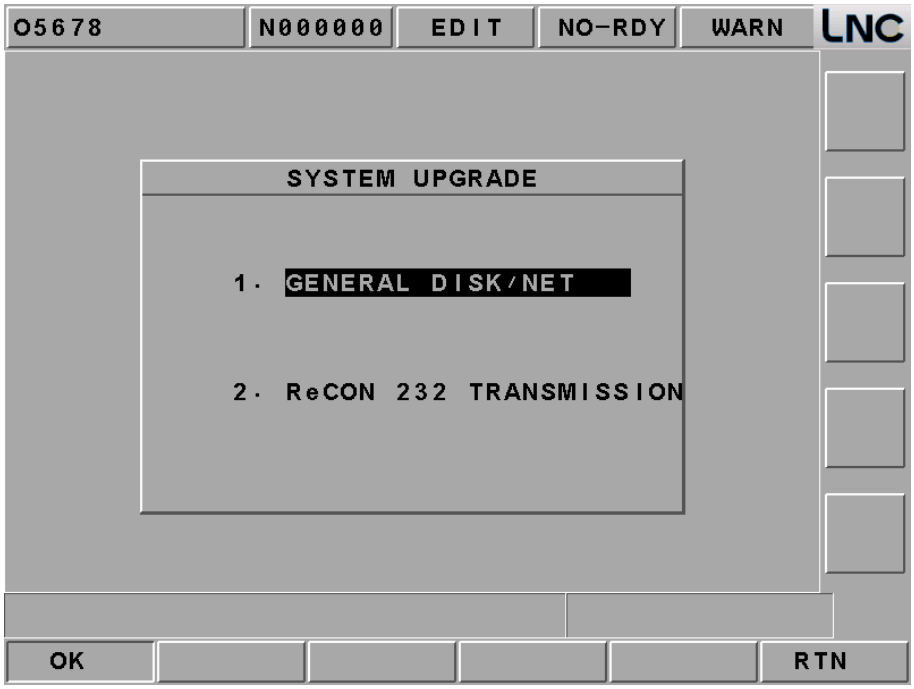
This function can only be executed under incomplete preparation, press EMG-STOP and press system update, below picture will be shown on the screen, users can choose each item to continue：



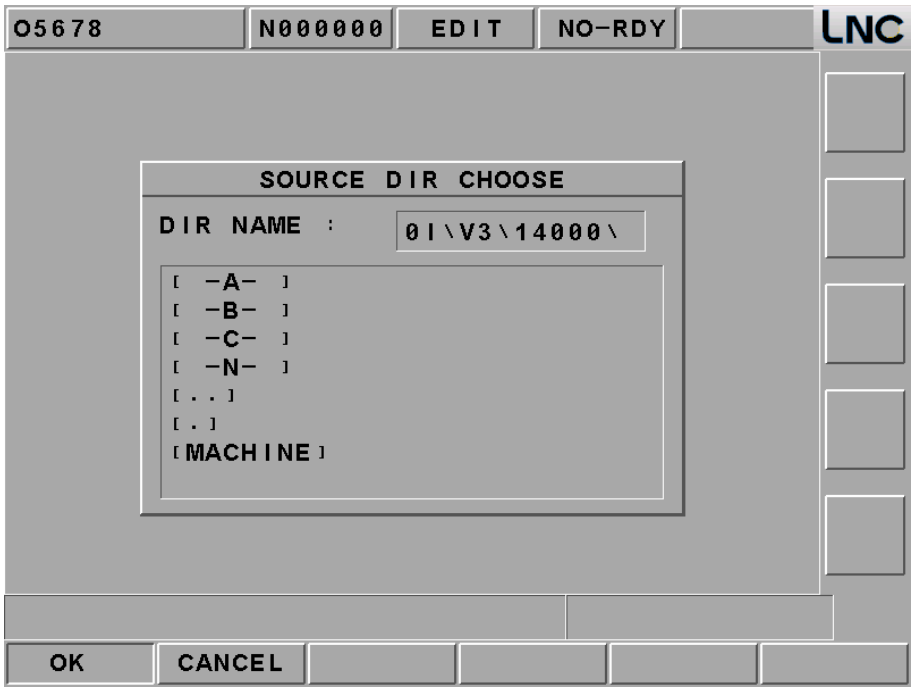
System Update Main Page

System update：

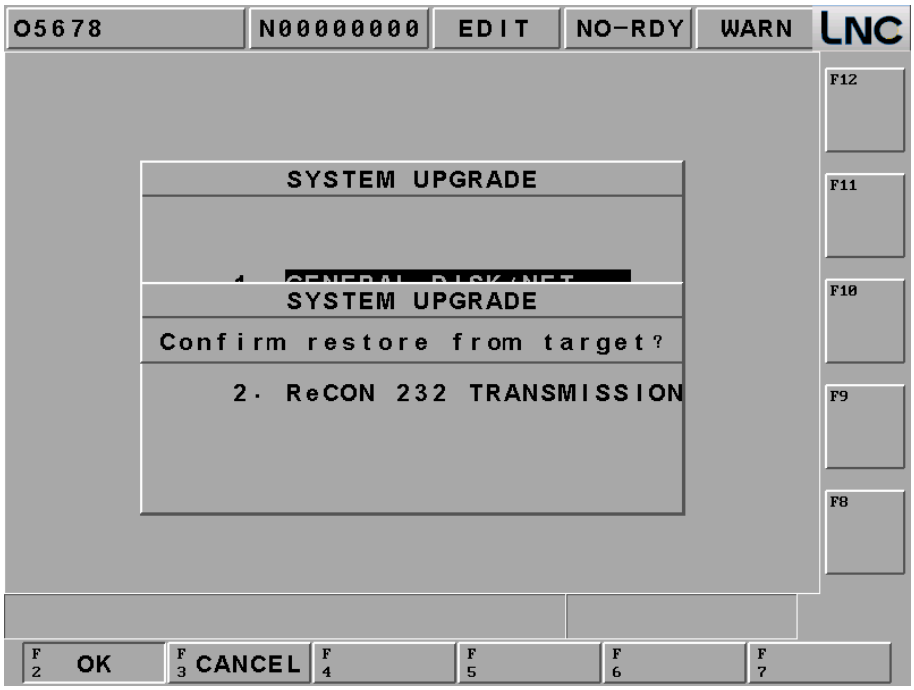
This function offers two ways for update: general disk/RS232 transmission. Please install LNC Technology Co., Ltd. latest version software if choosing this function. Pressing【**YES**】, the installation screen will occur. There is installation program instruction during installation so you only need to follow the instruction to upgrade the system.



At the system upgrade file，move cursor to the line and press【OK】



System will double confirm if you want to do upgrade, make sure if you really want to do upgrade and press【OK】



Then system will turn to DOS page as below to show current version and update version, press【Y】and system will process upgrade automatically.

```
=======================================
WELCOME TO INSTALL LNC-M600 SERIES
=======================================
Current Version:
   M600_VER_03.12.002

Installing Version:
   M600_VER_03.12.002

Are you sure to install?[Y,N]?
```

Please wait the upgrading process.

```
Installing...
Please wait,file preparing ...
```

System upgraded, press any key to restart.

```
Wonderful ! Fully install finish!!

Press any key to continue . . .
```

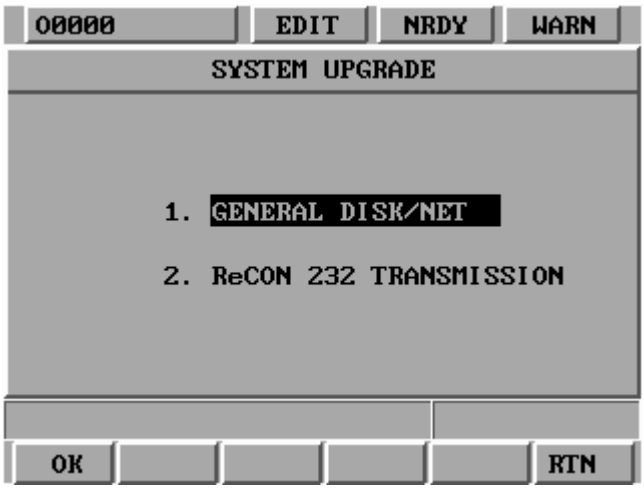
2. Small-screen Series (LNC-320i...)

This function can only be executed under incomplete preparation and EDIT mode, press EMG-STOP and press system update, below picture will be shown on the screen, users can choose each item to continue：

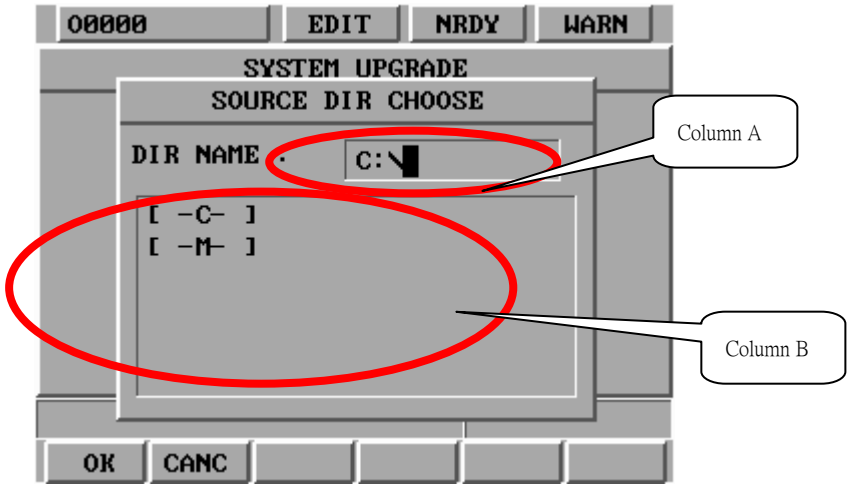
System Update Main Page

A. System update：

Press OK after Choosing SYSTEM UPDATE, there are 2 ways to update: general disk/RS232

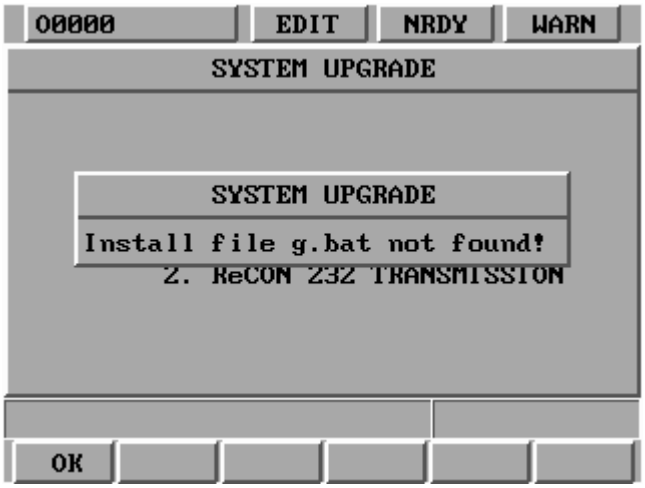


1. General disk/RS232
   a. After pressing confirm, system will pop up dialog box for users to choose update method. Please use up/down/left/right to move cursor to choose installation source, then press INPUT. It will show you the path at column A and all the folders under the path at column B.
   b. Move the cursor to column A after choosing the right path, please press OK



c. Press OK to confirm it again after choosing the right path.

d. It will show you the message if the path that you chose is wrong



e. It will leave the system and enter into installation screen if the path is correct.

System install instruction：

The welcome page shows the information of the current version in use (Current Version) and the version to be installed (Installing Version), please verify the version first, and then click “Y” to start the installation of this software. The following page will appear after the installation is completed, please press any key to reboot the system to validate the configuration and then enter LNC system.

```
=====================================
WELCOME TO INSTALL LNC-M300 SERIES
=====================================
Current Version:
   Not install

Installing Version:
   M300i_VER_03.00.013U1

Are you sure to install?[Y,N]?
```

2 PLC Maintenance -- C，S BITS & Register

2.1 C BIT Definition

Some models offer 4~6 axis function. Please ignore the parameter if your system doesn't show that.

C BIT PLC→CNC

BIT #	SYMBOL	DESCRIPTION	PAGE
C000	ST	CYCLE START	**18**
C001	SP	FEED HOLD	**18**
C002	-	-	
C003	PPROT	PROGRAM PROTECTION	**18**
C004	MANRET	MANUAL RETURN	**18**
C005	-	-	
C006	+X	SELECT AXIS & DIRECTION: ＋X	**18**
C007	-X	SELECT AXIS & DIRECTION: －X	**18**
C008	+Y	SELECT AXIS & DIRECTION: ＋Y	**18**
C009	-Y	SELECT AXIS & DIRECTION: －Y	**18**
C010	+Z	SELECT AXIS & DIRECTION: ＋Z	**18**
C011	-Z	SELECT AXIS & DIRECTION: －Z	**18**
C012	+4	+4 Axis Direction	**18**
C013	-4	-4 Axis Direction	**18**
C014	-	-	
C015	-	-	
C016	HX	SELECT MPG AXIS: X AXIS	**19**
C017	HY	SELECT MPG AXIS: Y AXIS	**19**
C018	HZ	SELECT MPG AXIS: Z AXIS	**19**
C019	H4	Handle 4th Axis	**19**
C020	MPGDRN	MPG DRY RUN	**19**
C021	SCNSAV	QUIT SCREENSAVER	**19**
C023	RT	RAPID TRAVEL	**19**
C024~C030	-	-	
C031	HOMEX	HOME DOG: X AXIS	**19**
C032	HOMEY	HOME DOG: Y AXIS	**19**
C033	HOMEZ	HOME DOG: Z AXIS	**19**
C034	HOME4	4th Axis Home DOG Signal	**19**
C035	-	-	
C036	ESP	EMERGENCY STOP	**19**
C037	ERS	EXTERNAL RESET	**19**
C038	FIN	M, S, T CODE FINISH	**20**
C039	-	-	
C040	SBK	SINGLE BLOCK	**20**
C041	BDT	OPTIONAL BLOCK SKIP	**20**
C042	DRN	DRY RUN	**20**
C043	MLK	MACHINE LOCK	**20**
C044	OPS	M01 OPTIONAL STOP	**20**
C045	ZNG	IGNORE SERVO AXIS: Z AXIS	**21**
C046	AFL	AUXILIARY FUNCTION LOCK	**21**
C047~C048	-	-	
C049	4NG	SERVO AXIS IGNORE SERVO AXIS: THE 4TH AXIS	**21**
C050	+LX	AXIS OVER TRAVEL: ＋X	**21**
C051	-LX	AXIS OVER TRAVEL: －X	**21**
C052	+LY	AXIS OVER TRAVEL: ＋Y	**21**
C053	-LY	AXIS OVER TRAVEL: －Y	**21**

BIT #	SYMBOL	DESCRIPTION	PAGE
C054	+LZ	AXIS OVER TRAVEL: ＋Z	**21**
C055	-LZ	AXIS OVER TRAVEL: －Z	**21**
C056	+L4	+4th Axis OT	**21**
C057	-L4	-4th Axis OT	**21**
C058	-	-	
C059	INTLKX	AXIS INTERLOCK: X AXIS	**22**
C060	INTLKY	AXIS INTERLOCK: Y AXIS	**22**
C061	INTLKZ	AXIS INTERLOCK: Z AXIS	**22**
C062	INTLK4	4th Axis Interlock	**22**
C063	-	-	
C064	WINRW	PLC WINDOW READ/WRITE	**22**
C065	WINREQ	PLC WINDOW COMMAND	**22**
C066	HIX	HANDLE INTERRUPT: X AXIS	**23**
C067	HIY	HANDLE INTERRUPT: Y AXIS	**23**
C068	HIZ	HANDLE INTERRUPT: Z AXIS	**23**
C069	HI4	4th Axis: Select Axis Direction Signal of Handle INT	**23**
C070~C71	-	Reserve	
C072	S1JOG	1st Spindle JOG	**23**
C073	S2JOG	2rd Spindle JOG	**23**
C074	S3JOG	3rd Spindle JOG	**23**
C075	SVAX	SERVO ALARM: X AXIS	**23**
C076	SVAY	SERVO ALARM: Y AXIS	**23**
C077	SVAZ	SERVO ALARM: Z AXIS	**23**
C078	SVA4	4th Axis Servo Alarm	**23**
C079		PLC open file	**23**
C080	S3CW	3rd Spindle CW	**24**
C081	S3CCW	3rd Spindle CCW	**24**
C082	S1CW	1st Spindle CW	**24**
C083	S1CCW	1st Spindle CCW	**24**
C084	-	-	
C085	ORT	Spindle Orientation	**24**
C086		SP command switch to PULSE command, complete.	**24**
C087	S2CW	2nd Spindle CW	**24**
C088	S2CCW	2nd Spindle CCW	**24**
C089	MRX	ENABLE MIRROR: X AXIS	**24**
C090	MRY	ENABLE MIRROR: Y AXIS	**24**
C091	MRZ	ENABLE MIRROR: Z AXIS	**24**
C092	MR4	4th Axis Servo Alarm	**24**
C093~C094		reserve	
C095~C096	-	-	
C097	S1GR1	1st Spindle Gear #1	**24**
C098	S1GR2	1st Spindle Gear #2	**24**
C099	S1GR3	1st Spindle Gear #3	**24**
C100	UI0	MACRO Variable $200	**25**
C101	UI1	MACRO Variable $201	**25**
C102	UI2	MACRO Variable $202	**25**
C103	UI3	MACRO Variable $203	**25**
C104	UI4	MACRO Variable $204	**25**
C105	UI5	MACRO Variable $205	**25**
C106	UI6	MACRO Variable $206	**25**
C107	UI7	MACRO Variable $207	**25**
C108	UI8	MACRO Variable $208	**25**
C109	UI9	MACRO Variable $209	**25**
C110	UI10	MACRO Variable $210	**25**
C111	UI11	MACRO Variable $211	**25**

BIT #	SYMBOL	DESCRIPTION	PAGE
C112	UI12	MACRO Variable $212	**25**
C113	UI13	MACRO Variable $213	**25**
C114	UI14	MACRO Variable $214	**25**
C115	UI15	MACRO Variable $215	**25**
C116	S2GR1	2nd Spindle Gear #1	**24**
C117	S2GR2	2nd Spindle Gear #2	**24**
C118	S2GR3	2nd Spindle Gear #3	**24**
C119	ZP2ZDC	MOTION PROHIBITION FOR AREA BELOW THE 2ND ZERO POINT OF Z AXIS	**25**
C120	PMCGO	COMMAND SIGNAL OF PMC AXIS	**25**
C121	S3GR1	3rd Spindle Gear #1	**24**
C122	S3GR2	3rd Spindle Gear #2	**24**
C123	S3GR3	3rd Spindle Gear #3	**24**
C124	RTFIN	Disable Signal in Rigid Tapping	**25**
C125	RTST	Enable Signal in Rigid Tapping	**25**
C126	SWEN	Enable Signal of Spindle Motor Rotates in Gear-Shifting Speed	**26**
C127	SWFIN	Spindle Gear-Shifting Complete Signal	**26**
C128~C129	-	-	
C130	DTX	X Axis Detach	**26**
C131	DTY	Y Axis Detach	**26**
C132	DTZ	Z Axis Detach	**26**
C133	DT4	4th Axis Detach	**26**
C134	PRTCLR	CLEAR PART COUNT NUMBER	**26**
C135		PLC axis RESET signal	**26**
C136~C137	-	-	
C138		Activate 1st software non-go zone	**26**
C139		Activate 1st software non-go zone	**26**
C140	2NDSLX	THE 2ND SOFT-LIMIT: ＋X	**26**
C141	2NDSLX	THE 2ND SOFT-LIMIT: －X	**26**
C142	2NDSLY	THE 2ND SOFT-LIMIT: ＋Y	**26**
C143	2NDSLY	THE 2ND SOFT-LIMIT: －Y	**2026**
C144	2NDSLZ	THE 2ND SOFT-LIMIT: ＋Z	**26**
C145	2NDSLZ	THE 2ND SOFT-LIMIT: －Z	**26**
C146	2NDSL4	2nd +4th Axis Software Limit Choice	**26**
C147	2NDSL4	2nd -4th Axis Software Limit Choice	**26**
C148~C171		reserve	
C172~C180		-	
C181		Servo axis hide: X	**27**
C182		Servo axis hide: Y	**27**
C183		Servo axis hide: Z	**27**
C184		Servo axis hide:4th	**27**
C185~C186		reserve	
C187		Servo synchronize control: X	**27**
C188		Servo synchronize control: Y	**27**
C189		Servo synchronize control: Z	**28**
C190		Servo synchronize control: 4th	**28**
C191~C192		reserve	
C193~200	-	-	
C201	AERSTX	Absolute encoder Reset Ready Signal: X Axis	**28**
C202	AERSTY	Absolute encoder Reset Ready Signal: Y Axis	**28**
C203	AERSTZ	Absolute encoder Reset Ready Signal: Z Axis	**28**
C204	AERST4	Absolute encoder Reset Ready Signal:4th Axis	**28**
C207	AERDYX	Absolute Encoder Data Ready Signal: X Axis	**28**
C208	AERDYY	Absolute Encoder Data Ready Signal: Y Axis	**28**
C209	AERDYZ	Absolute Encoder Data Ready Signal: Z Axis	**28**

BIT #	SYMBOL	DESCRIPTION	PAGE
C210	AERDY4	Absolute Encoder Data Ready Signal:4th Axis	**28**
C211~C212		reserve	
C213	AEB0X	Absolute Encoder Data Bit 0Transmitting Signal : X Axis	**28**
C214	AEB0Y	Absolute Encoder Data Bit 0Transmitting Signal : Y Axis	**28**
C215	AEB0Z	Absolute Encoder Data Bit 0Transmitting Signal : Z Axis	**28**
C216	AEB04	Absolute Encoder Data Bit 0Transmitting Signal : 4th Axis	**28**
C217~C218		reserve	
C219	AEB1X	Absolute Encoder Bit 1 Transmit: X Axis	**28**
C220	AEB1Y	Absolute Encoder Bit 1 Transmit: Y Axis	**28**
C221	AEB1Z	Absolute Encoder Bit 1 Transmit: Z Axis	**28**
C222	AEB14	Absolute Encoder Bit 1 Transmit: 4th Axis	**28**
C223~C224		reserve	
C225~C230	-	-	
C231		Encoder value clean: X	**28**
C232		Encoder value clean: Y	**28**
C233		Encoder value clean: Z	**28**
C234		Encoder value clean: 4th	**28**
C235~C236		reserve	
C237		Clear encoder value: 1st SP	**28**
C238		Clear encoder value: 2nd SP	**28**
C239		Clear encoder value: 3rd SP	**28**
C240		Non	
C241		PMC/INT switch：X (0:INT,1:PMC)	**29**
C242		PMC/INT switch：Y (0:INT,1:PMC)	**29**
C243		PMC/INT switch：Z (0:INT,1:PMC)	**29**
C244		PMC/INT switch：4th(0:INT,1:PMC)	**29**
C245~C246		Reserve	
C247		Servo axis name switch: X	**29**
C248		Servo axis name switch: Y	**29**
C249		Servo axis name switch: Z	**29**
C250		Servo axis name switch: 4^{th}	**29**
C251~C252		Reserve	
C253		Activate servo ABS coordinate update: X	**29**
C254		Activate servo ABS coordinate update: Y	**29**
C255		Activate servo ABS coordinate update: Z	**29**
C256		Activate servo ABS coordinate update: 4^{th}	**29**
C257~C258		Reserve	
C259		Activate servo ABS home update: X	**29**
C260		Activate servo ABS home update: Y	**29**
C261		Activate servo ABS home update: Z	**29**
C262		Activate servo ABS home update: 4^{th}	**29**
C263~C264		Reserve	
C265~C280		Non	**29**
C281		X M-II communication switch	
C282		Y M-II communication switch	**29**
C283		Z M-II communication switch	**29**
C284		4th M-II communication switch	**29**
C285~C286		Reserve	
C287		1st SP M-II communication switch	**29**
C288		2nd SP M-II communication switch	**29**
C289		3rd SP M-II communication switch	**29**
C290~C511		Non	

2.2 S Bits definition

S BIT CNC→PLC

BIT #	SYMBOL	DESCRIPTION	PAGE
S000	STL	CYCLE START	30
S001	SPL	FEED HOLD	30
S002	EDITL	MODE: EDIT	30
S003	MEML	MODE: MEM	30
S004	MDIL	MODE: MDI	30
S005	JOGL	MODE: JOG	**30**
S006	INCJOG	MODE: INC JOG	**30**
S007	MPGL	MODE: MPG	**30**
S008	HOMEL	MODE: HOME	**30**
S009	-	-	
S010	MREADY	MACHINE READY	**30**
S011	MDIPRS	MDI KEYS	**30**
S012		Manual Return status	
S013~S015	-	-	
S016	ZP1X	STATUS OF X AXIS AT THE 1ST ZERO POINT	**30**
S017	ZP1Y	STATUS OF Y AXIS AT THE 1ST ZERO POINT	**30**
S018	ZP1Z	STATUS OF Z AXIS AT THE 1ST ZERO POINT	**30**
S019	ZP14	4th 1st Axis Point Return End	**30**
S020	ZP2X	STATUS OF X AXIS AT THE 2ND ZERO POINT	**30**
S021	ZP2Y	STATUS OF Y AXIS AT THE 2ND ZERO POINT	**30**
S022	ZP2Z	STATUS OF Z AXIS AT THE 2ND ZERO POINT	**30**
S023	ZP24	4th 2nd Axis Point Return End	**30**
S024~S027		Reserve	
S028	WRN	SYSTEM ALARM	**31**
S029	MF	M CODE STROBE	**31**
S030	DEN	INTERPOLATION FINISH	**31**
S031	AL	SYSTEM ALARM	**31**
S032	RST	SYSTEM RESET	**31**
S033	NCRDY	SYSTEM READY	**31**
S034	-	-	
S035	X1000	STATUS OF MPG RATE: x1000	**31**
S036	X1	STATUS OF MPG RATE: x1	**31**
S037	X10	STATUS OF MPG RATE: x10	**31**
S038	X100	STATUS OF MPG RATE: x100	**31**
S039	PROGST	Program Restart	**31**
S040	SBKL	STATUS OF SINGLE BLOCK	**31**
S041	BDTL	STATUS OF OPTIONAL BLOCK SKIP	**32**
S042	DRNL	STATUS OF DRY RUN	**32**
S043	MLKL	STATUS OF MACHINE LOCK	**32**
S044	OPSL	STATUS OF OPTIONAL STOP	**32**
S045	RTL	STATUS OF RAPID TRAVERSE	**32**
S046	ZNGL	STATUS OF Z-AXIS NEGLECT	**32**
S047	AFLL	STATUS OF AUXILIARY FUNCTION LOCK	**32**
S048~S051	-	-	
S052	S2ZSA	2nd Spindle Zero Speed Arrival	**36**
S053	S2SA	2nd Spindle Speed Arrival	**36**
S054	S1STB	S CODE STROBE	**32**
S055	S2STB	2nd Spindle S Code	**32**
S056	S3STB	2nd Spindle S Code	**32**
S057	S3ZSA	3rd Spindle Zero Speed Arrival	**36**
S058	S3SA	3rd Spindle Speed Arrival	**36**
S059~S060	-	-	

BIT #	SYMBOL	DESCRIPTION	PAGE
S061	SK2	SOFT PANEL KEY: Z-AXIS NEGLECT	**33**
S062	SK3	SOFT KEY: MPG DRY RUN	**33**
S063	SK4	SOFT KEY: AUXILIARY FUNCTION LOCK OF M, S, T CODE	**33**
S064~S067	-	-	
S068	MPGDRN	MPG DRY RUN	**34**
S069	TSTB	T CODE STROBE	**34**
S070	-	-	
S071	SK6	SOFT KEY: MACHINE LOCK	**34**
S072	SK7	SOFT KEY: DRY RUN	**34**
S073	SK8	SOFT KEY: OPTIONAL BLOCK SKIP	**35**
S074	SK9	SOFT KEY: OPTIONAL STOP	**35**
S075~S078	-	-	
S079	PLCFN	PLC WINDOW COMPLETED	**35**
S080	M00	M00 STROBE	**35**
S081	M01	M01 STROBE	**35**
S082	M02	M02 STROBE	**35**
S083	M30	M30 STROBE	**35**
S084~S085	-	-	
S086	ORTFIN	FINISH SPINDLE ORIENTATION	**35**
S087	-	-	
S088	S1SA	THE 1ST SPINDLE REACHES ROTATION SPEED	**36**
S089~S090	-	-	
S091	G80	STATUS OF G080 IN CANNEL CYCLE	**36**
S092	S1ZSA	THE 1ST SPINDLE REACHES ZERO SPEED	**36**
S093	S1PLS	Spindle Command Format is Pulse signal	**36**
S094	GRCAR	Spindle Motor Speed when Gears are Switched	**36**
S095~S099	-	-	
S100	UO0	MACRO Variable $600	**36**
S101	UO1	MACRO Variable $601	**36**
S102	UO2	MACRO Variable $602	**36**
S103	UO3	MACRO Variable $603	**36**
S104	UO4	MACRO Variable $604	**36**
S105	UO5	MACRO Variable $605	**36**
S106	UO6	MACRO Variable $606	**36**
S109	UO9	MACRO Variable $609	**36**
S110	UO10	MACRO Variable $610	
S111	UO11	MACRO Variable $611	
S112	UO12	MACRO Variable $612	**36**
S113	UO13	MACRO Variable $613	**36**
S114	UO14	MACRO Variable $614	**36**
S115	UO15	MACRO Variable $615	**36**
S116~S119	-	-	
S120	PMCFIN	PMC AXIS	**37**
S121~S127	-	-	
S128	RTMODE	RIGID TAPPING	**37**
S129	-	-	
S130	MOVX	MOTION STATUS OF SERVO AXIS: X AXIS	**37**
S131	MOVY	MOTION STATUS OF SERVO AXIS: Y AXIS	**37**
S132	MOVZ	MOTION STATUS OF SERVO AXIS: Z AXIS	**37**
S133	MOV4	MOTION STATUS OF SERVO AXIS: THE 4TH AXIS	**37**
S134	WPARV	Max Working Piece Arrival	**37**
S135~S136		Reserve	
S137	-	-	
S138		Check mechanical coordinate if in 1st no-go zone(0:No,1:Yes)	**37**
S139		Check mechanical coordinate if in 2nd no-go zone(0:No,1:Yes)	**37**

BIT #	SYMBOL	DESCRIPTION	PAGE
S140	-	-	
S141		Fan 1 detection	**37**
S142		Fan 2 detection	**37**
S143~S149	-	-	
S150	SGRC1	Request Signal of Spindle Gear-Shifting: 1st Gear	**38**
S151	SGRC2	Request Signal of Spindle Gear-Shifting: 2nd Gear	**38**
S152	SGRC3	Request Signal of Spindle Gear-Shifting: 3rd Gear	**38**
S153	SGRC4	Request Signal of Spindle Gear-Shifting: 4th Gear	**38**
S154	MOVDX	MOTION DIRECTION OF SERVO AXIS: X AXIS	**38**
S155	MOVDX	MOTION DIRECTION OF SERVO AXIS: Y AXIS	**38**
S156	MOVDX	MOTION DIRECTION OF SERVO AXIS: Z AXIS	**38**
S157	MOVDX	MOTION DIRECTION OF SERVO AXIS: THE 4TH AXIS	**38**
S158~S159		reserve	**38-38**
S160		ENCODER wiring error: X	**38**
S161		ENCODER wiring error: Y	**38**
S162		ENCODER wiring error: Z	**38**
S163		ENCODER wiring error: 4th	**38**
S164~S165		Reserve	
S166~S169	-	-	
S170		Status of back to 3rd home: X	**38**
S171		Status of back to 3rd home: Y	**38**
S172		Status of back to 3rd home: Z	**38**
S173		Status of back to 3rd home:4th	**38**
S174~S175		Reserve	
S176		Status of back to 4th home: X	**38**
S177		Status of back to 4th home: Y	**38**
S178		Status of back to 3rd home: Z	**38**
S179		Status of back to 3rd home:4th	**38**
S180~S181		Reserve	
S182		Servo ABS home ready: X (0:not yet,1: Done)	**38**
S183		Servo ABS home ready: Y (0:not yet,1: Done)	**38**
S184		Servo ABS home ready: Z (0:not yet,1: Done)	**38**
S185		Servo ABS home ready: 4th (0:not yet,1: Done)	**39**
S186~S187		Reserve	
S188~S200	-	-	
S201	AETFX	Enter into Absolute Encoder Data Transmitting Mode: X Axis	**39**
S202	AETFY	Enter into Absolute Encoder Data Transmitting Mode: Y Axis	**39**
S203	AETFZ	Enter into Absolute Encoder Data Transmitting Mode: Z Axis	**39**
S204	AETF4	Enter into Absolute Encoder Data Transmitting Mode:4th Axis	**39**
S205~S206		Reserve	
S207	AETFRX	Absolute Encoder Data Transmitting: X Axis	**39**
S208	AETFRY	Absolute Encoder Data Transmitting: Y Axis	**39**
S209	AETFRZ	Absolute Encoder Data Transmitting: Z Axis	**39**
S210	AETFR4	Absolute Encoder Data Transmitting:4th Axis	**39**
S211~S212		Reserve	
S213	AERSTX	Absolute Encoder Reset: X Axis	**39**
S214	AERSTY	Absolute Encoder Reset:Y Axis	**39**
S215	AERSTZ	Absolute Encoder Reset:Z Axis	**39**
S216	AERST4	Absolute Encoder Reset:4th Axis	**39**
S217~S218		Reserve	
S219		Servo ABS coordinate update complete: X	**39**
S220		Servo ABS coordinate update complete: Y	**39**
S221		Servo ABS coordinate update complete: Z	**39**
S222		Servo ABS coordinate update complete: 4th	**39**
S223~S224		Reserve	

BIT #	SYMBOL	DESCRIPTION	PAGE
S225		Servo ABS home update complete: X	**39**
S226		Servo ABS home update complete: Y	**39**
S227		Servo ABS home update complete: Z	**39**
S228		Servo ABS home update complete: 4th	**39**
S229~S230		Reserve	
S231		Encoder value cleared: X	**39**
S232		Encoder value cleared: Y	**39**
S233		Encoder value cleared: Z	**39**
S234		Encoder value cleared: 4th	**39**
S235~S236		reserve	
S237		Encoder value cleared: 1st SP	**39**
S238		Encoder value cleared: 2nd SP	**39**
S239		Encoder value cleared: 3rd SP	**39**
S240		Servo following lag value over parameter 2 value alarm: X	**39**
S241		Servo following lag value over parameter 3 value alarm: Y	**39**
S242		Servo following lag value over parameter 4 value alarm: Z	**39**
S243		Servo following lag value over parameter 5 value alarm: 4th	**39**
S244~S245		Reserve	
S246		ERROR COUNTER over position alarm: X	**40**
S247		ERROR COUNTER over position alarm: Y	**40**
S248		ERROR COUNTER over position alarm: Z	**40**
S249		ERROR COUNTER over position alarm: 4th	**40**
S250~S251		reserve	
S252~S280		Non	
S281		X M-II servo activate status	**40**
S282		Y M-II servo activate status	**40**
S283		Z M-II servo activate status	**40**
S284		4th M-II servo activate status	**40**
S285~S286		reserve	
S287		1st SPM-II servo activate status	**40**
S288		2nd SPM-II servo activate status	**40**
S289		3rd SPM-II servo activate status	**40**
S290		Non	
S291		X M-II Servo drive power status	**40**
S292		Y M-II Servo drive power status	**40**
S293		Z M-II Servo drive power status	**40**
S294		4th M-II Servo drive power status	**40**
S295~S296		reserve	
S297		1st SP M-II Servo drive power status	**40**
S298		2nd SP M-II Servo drive power status	**4040**
S299		3rd SP M-II Servo drive power status	**40**
S300		Non	
S301		X M-II torque monitoring status	**40**
S302		Y M-II torque monitoring status	**40**
S303		Z M-II torque monitoring status	**40**
S304		4th M-II torque monitoring status	**40**
S305~S306		reserve	
S307		1st SPM-II torque monitoring status	**40**
S308		2nd SPM-II torque monitoring status	**40**
S309		3rd SPM-II torque monitoring status	**40**
S310~S511		Non	

2.3 Register definition

REGISTER

BIT #	SYMBOL	DESCRIPTION	PAGE
R001	M_CODE	M CODE	**41**
R002	S_CODE	S CODE	**41**
R003	T_CODE	T CODE	**41**
R004	SPAS	ACTUAL ROTATION SPEED OF THE SPINDLE	**41**
R005	S2_CODE	2nd spindle rotational speed command	**41**
R006	S2AS	2nd Spindle Actual Speed	**41**
R007	S3_CODE	3rd spindle rotational speed command	**41**
R008	S3AS	3rd Spindle Actual Speed	**41**
R009~R012	-	-	
R013	OPMDOE	MODE SELECTION 1：EDIT，2：MEM，3：MDI，4：JOG，5：INCJOG，6：MPG，7：HOME	**41**
R014	INCFED	MPG RATE 2: x10, 3: x100, OTHERS: x1 INCREMENTAL JOG OVERRIDE 2: x10, 3: x100, 4：x1000, OTHERS: x1	**42**
R015	SPDOV	ROTATION SPEED OVERRIDE OF THE SPINDLE 0 ~ 12 REPRESENT 0% ~ 120%, RESPECTIVELY; OTHERS: SET VALUE × 0.01	**42**
R016	FEEDOV	CUTTING OVERRIDE 0 ~ 20 REPRESENT 0% ~ 200%, RESPECTIVELY; OTHERS: SET VALUE × 0.001	**42**
R017	JOGOV	JOG OVERRIDE 0 ~ 20 REPRESENT 0% ~ 200%, RESPECTIVELY; OTHERS: SET VALUE × 0.001	**43**
R018	RTOV	RAPID TRAVERSE OVERRIDE 0, 1: F0, 2: 25%, 3: 50% ~ 4: 100%: OTHERS: SET VALUE × 0.001	**43**
R019	S2OV	2nd Spindle Rotating Mode Override 0 ~ 12 REPRESENT 0% ~ 120%, RESPECTIVELY; OTHERS: SET VALUE × 0.01	**42**
R020	S3OV	3rd Spindle Rotating Mode Override 0 ~ 12 REPRESENT 0% ~ 120%, RESPECTIVELY; OTHERS: SET VALUE × 0.01	**42**
R021	PMCF	OVERRIDE OF PMC AXIS, UNIT: mm/min.	**44**
R022	PMCC	PMC AXIS CONTROL	**44**
R023	-	-	
R024	PMCXMM	MOTION COMMAND OF PMC AXIS: X AXIS, mm part	**44**
R025	PMCXUM	MOTION COMMAND OF PMC AXIS: X AXIS, μm part	**44**
R026	PMCYMM	MOTION COMMAND OF PMC AXIS: Y AXIS, mm part	**44**
R027	PMCYUM	MOTION COMMAND OF PMC AXIS: Y AXIS, μm part	**44**
R028	PMCZMM	MOTION COMMAND OF PMC AXIS: Z AXIS, mm part	**44**
R029	PMCZUM	MOTION COMMAND OF PMC AXIS: Z AXIS, μm part	**44**
R030	PMC4MM	PMC Function of 4th-Axis Command Amount, Unit=mm	**44**
R031	PMC4UM	PMC Function of 4th-Axis Command Amount, Unit=μm	**44**
R032~R035		reserve	
R036		PMC axis rapid locating %（OVERRIDE）value 0、1：F0，2：25%，3：50%，4：100%，other: value * 0.01	**44**
R037		PMC axis cutting feed rate % (OVERRIDE) value 0 ~ 20 means 0% ~ 200%, others: value * 0.001	**44**
R038~R039	-	-	
R040	OPMES1	PLC ALARM	**45**
R041	OPMES2	PLC ALARM	**45**
R042	OPMES3	PLC ALARM	**45**
R043	OPMES4	PLC ALARM	

BIT #	SYMBOL	DESCRIPTION	PAGE
R044	OPMES5	PLC ALARM	**45**
R045	OPMES6	PLC ALARM	**45**
R046~R049	-	-	
R050		1st set analog voltage detection value	**45**
R051		2nd set analog voltage detection value	**45**
R052		3rd set analog voltage detection value	**45**
R053		4th set analog voltage detection value	**45**
R054		5th set analog voltage detection value	**45**
R055		6th set analog voltage detection value	**45**
R056		7th set analog voltage detection value	**45**
R057		8th set analog voltage detection value	**45**
R058		PLC Open file name	**45**
R059	-	-	
R060	PLCFN	PLC WINDOW FUNCTION	**45**
R061	PLCSF1	PLC WINDOW FUNCTION NO.1	**45**
R062	PLCSF2	PLC WINDOW FUNCTION NO.2	**45**
R063	PLCD1	PLC WINDOW READ/WRITE VALUE 1	**45**
R064	PLCD2	PLC WINDOW READ/WRITE VALUE 2	**45**
R065	PLCD3	PLC WINDOW READ/WRITE VALUE 3	**45**
R066	PLCD4	PLC WINDOW READ/WRITE VALUE 4	**45**
R067	PLCD5	PLC WINDOW READ/WRITE VALUE 5	**45**
R068	PLCD6	PLC WINDOW READ/WRITE VALUE 6	**46**
R069	PLCD7	PLC WINDOW READ/WRITE VALUE 7	**46**
R070	PLCD8	PLC WINDOW READ/WRITE VALUE 8	**46**
R071	PLCD9	PLC WINDOW READ/WRITE VALUE 9	**46**
R072	PLCD10	PLC WINDOW READ/WRITE VALUE 10	**46**
R073	PLCD11	PLC WINDOW READ/WRITE VALUE 11	**46**
R074	PLCD12	PLC WINDOW READ/WRITE VALUE 12	**46**
R075~R080		Non	
R081		MPG ratio select: Y 2：x10，3：x100, other values: x1 incremental jog value 2：x10，3：x100，4：x1000, other values: x1	**46**
R082		MPG ratio select: Z 2：x10，3：x100, other values: x1 incremental jog value 2：x10，3：x100，4：x1000, other values: x1	**46**
R083		MPG ratio select: 4th 2：x10，3：x100, other values: x1 incremental jog value 2：x10，3：x100，4：x1000, other values: x1	**46**
R084~R085		reserve	
R085~R089		Non	
R090		Each axis jog feedrate (OVERRIDE) value: X 0 ~ 20 means 0% ~ 200%, other values: * 0.001	**46**
R091		Each axis jog feedrate (OVERRIDE) value: Y 0 ~ 20 means 0% ~ 200%, other values: * 0.001	**46**
R092		Each axis jog feedrate (OVERRIDE) value: Z 0 ~ 20 means 0% ~ 200%, other values: * 0.001	**46**
R093		Each axis jog feedrate (OVERRIDE) value: 4^{th} 0 ~ 20 means 0% ~ 200%, other values: * 0.001	**46**
R094~R095		reserve	
R096~R100		Non	
R101		X M-II torque %	**47**
R102		Y M-II torque %	**47**
R103		Z M-II torque %	**47**
R104		4^{th} M-II torque %	**47**
R105~R106		reserve	
R107		1st SP M-II torque %	**47**
R108		2nd SP M-II torque %	**47**
R109		3rd SP M-II torque %	**47**

BIT #	SYMBOL	DESCRIPTION	PAGE
R110		PLC axis compensation X absolute (Pulse)	**47**
R111		PLC axis compensation Y absolute (Pulse)	**47**
R112		PLC axis compensation Z absolute (Pulse)	**47**
R113		PLC axis compensation 4th absolute (Pulse)	**47**
R114~R115		reserve	
R116~R239		Non	
R240~R255		$2000~$2015 value	**47-47**

2.4 C Bits Description

C Bit 000	Cycle Start

Description： Assumed the system is under MEM or MDI mode. When the signal changes from OFF to On, the system will be ready to be【Cycle Start】 condition. Meanwhile, the S BIT 000 signal will be set to ON in order to provide LADDER to enable work light ON function during machine running. On the other hand, assumed system is in【F-HOLD】 or 【B-STOP】 condition, the S BIT 000 will be set to OFF in order to provide LADDER to enable work light OFF function during machine stop. However, this signal will not be accepted by the system under the below three conditions:

a. System is not under MEM or MDI mode.
b. System is in 【NC NOT Ready】 or 【Cycle Start】 condition.
c. System alarm occurs.

C Bit 001	Feed Hold

Description： Assumed the system is in MEM or MDI mode and also in【NC Ready】 conditions. When this signal is ON, the system will be in 【F-HOLD】 condition. Meanwhile, the system will set S BIT 000 signal to OFF in order to provide LADDER to enable work light OFF function during machine running. And also, to set S BIT 001 signal to ON in order to provide LADDER to enable work light ON function during machine stop. But, please notice that this signal is disabled (ineffective) for PMC axis function under JOG or RAPID mode.

C Bit 003	Prog Protect

Description： When this signal is set to ON, part program editing is prohibited.

C Bit 004	Manual Return

Description： Assumed NC is under MEM or MDI mode. If switching to JOG or MPG mode during program executing and also manual moves the machine away from the original program interrupting position, user can have the following two selections to continue the unfinished command:

1. Manual Return: Moving the machine back to the original program interrupting position first and then to continue the unfinished commanding.
2. Continue the unfinished commanding from the current position. But, there will be an OFFSET amount of coordinate.

C Bit 006	+X Axis Direction
C Bit 007	-X Axis Direction
C Bit 008	+Y Axis Direction
C Bit 009	-Y Axis Direction
C Bit 010	+Z Axis Direction
C Bit 011	-Z Axis Direction
C Bit 012	+4 Axis Direction
C Bit 013	-4 Axis Direction

Description： These signals are selection commanding of system relative axis direction. There are three corresponding motions under each mode:

a. JOG Mode:
When axis direction signal is ON, the system will send out commanding signal to the designated axis direction in JOG speed until the signal is OFF.
b. RAPID Mode:

When axis direction signal is ON, the system will send out commanding signal to the designated axis direction in RAPID speed until the signal is OFF.

c. HOME:
When axis direction signal changes from OFF to ON, it starts moving back to HOME.

C Bit 016	**Handle X Axis**
C Bit 017	**Handle Y Axis**
C Bit 018	**Handle Z Axis**
C Bit 019	**Handle 4th Axis**

Description： These signals are used under MPG mode, which are to indicate the present select servo axis. For example, if C BIT 016 signal is ON, it indicates that the present MPG axis direction is X axis. So, turning the MPG rotary switch will moving the servo axis toward X axis.
HX：X Axis MPG Feed
HY：Y Axis MPG Feed
HZ：Z Axis MPG Feed
H4：4th Axis MPG Feed

C Bit 020	**MPG Dry Run**

Description： Assumed the NC is in MEM or MDI mode. When this signal is ON, MPG is as feedrate control. So, when operator uses MPG, the axis is moving in original feedrate, otherwise, stop.

C Bit 021	**Wake up the screen saver signal**

Description： The signal which is used by PLC to notify system stopping screen saver and recount start-time.

C Bit 023	**Rapid**

Description： Assumed NC is in JOG mode. If RT signal is ON, feedrate becomes rapidly speed, which is equal to RAPID mode. So, operator can apply the same principle in HOME mode.

C Bit 031	**X Axis Home DOG Signal**
C Bit 032	**Y Axis Home DOG Signal**
C Bit 033	**Z Axis Home DOG Signal**
C Bit 034	**4th Axis Home DOG Signal**

Description： To notify NC the present HOME DOG signal.
Remark: When Parameter # 0175 is 1 and when HOME DOG uses REMOTE key-in point, this signal is enabled.

C Bit 036	**Emergency Stop**

Description： When this signal is ON, the system is in RESET condition and all motions stop, which means the system condition, is NOT READY.

C Bit 037	**External Reset**

Description： System outer RESET signal which is the same function as pressing RESET bottom.

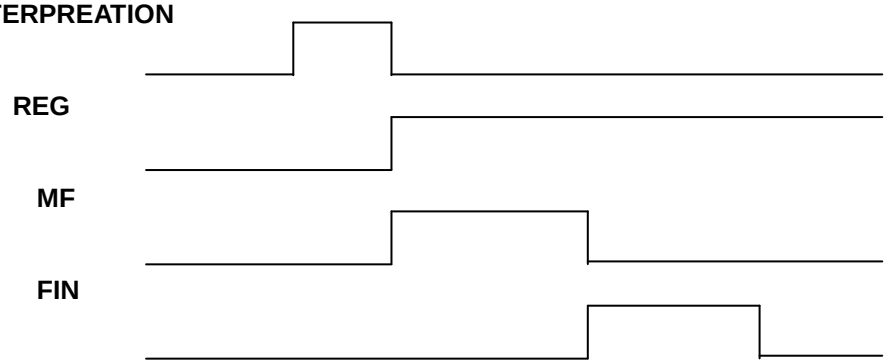
C Bit 038 **M, S, T Finish**

Description： Assumed NC is in the MEM or MDI mode. When the program executes M code interpretation, the content of M Code will be sent by REG 1. At the same time, it will send out M Code Read （MF）signal.

When LADDER finishes executing the related M Code and replies it back to M，S，T Finish （FIN）signal, the signal will inform the system that the executing of M code is completed.

Correct order is as following:

M CODE INTERPREATION



a. When executing M77, 77 will be entered into REG 1.
b. Assumed M Code and motion command are in the same BLOCK. If want M Code to execute its command after motion command is completed, then m code must coordinate with Distribution End（DEN）command under LADDER control.
c. M00, M01, M02, M30, M98, M99 has no such simultaneous motion.

C Bit 040 **Single Block**

Description： Assumed NC is in auto-executing condition of MEM mode. If this signal is ON, the system will stop after a BLOCK of program is finish executing. But, if STL signal in OFF and system condition is B_STOP, then NC will start executing the next BLOCK of program after Cycle Start (ST) signal is ON.

C Bit 041 **Optional Block Skip**

Description： Assumed NC is in auto-executing of MEM mode. If there is a such symbol, "／", in a program, any key-in after this symbol to EOB will be neglected.

C Bit 042 **Dry Run**

Description： Assumed NC is in MEM or MDI mode. If this signal is ON, program will be executed under the below feedrate：

G00：When RT is ON = RAPID feed.
When RT is OFF =JOG feed.
G01：JOG feed.

C Bit 043 **Machine Lock**

Description： Assumed NC is under manual and auto modes, all moving command will NOT send to position control servo system. But, software interpolation value is still executed which means that program coordinate will still be renewed.

C Bit 044 **Optional Stop**

Description： Assumed this signal is ON. If program executing reaches M01, system will be paused and STL signal is OFF. This implies that the system will continue executing programs after pressing Cycle Start (ST) bottom.

C Bit 045	Z Axis Cancel

Description： Assumed NC is in manual and auto modes. If this signal is ON, Z axis will be locked, which means that Z axis moving command will NOT be sent to loop control servo system. But, Z axis software interpolation value is still executing. So, program coordinate will be renewed.

C Bit 046	Auxiliary Function Lock

Description： Assumed this signal is ON. When M, S and T codes are executing, content code and reading signal are not sending out which means not to execute M, S and T simultaneously.

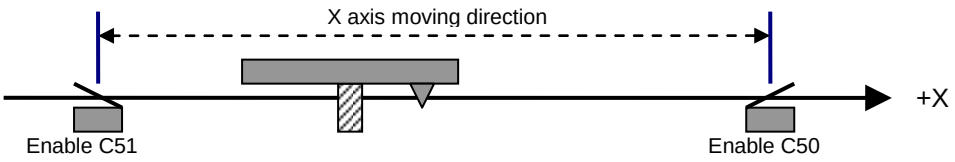
C Bit 049	4th Axis Neglect

Description： When this signal is ON, the corresponding axis commanding will NOT be executed.
For example: Enable 4th axis neglect which means when executing part program G01 X10 Z10 C10, C10 commanding will be neglected.

C Bit 050	+X Axis OT
C Bit 051	-X Axis OT
C Bit 052	+Y Axis OT
C Bit 053	-Y Axis OT
C Bit 054	+Z Axis OT
C Bit 055	-Z Axis OT
C Bit 056	+4th Axis OT
C Bit 057	-4th Axis OT

Description： Each axis sends out the machine hardware-traveling signal in order to inform the system to display it. These C Bits are PLC travel limit signals for each axis. When these C BIT signals are on, the system alarm will be enabled. So the servo axis can only move toward the opposite direction. The following list is the definition for each C BIT:

C BIT	Definition
50	X Axis +ive direction PLC Travel Limit
51	X Axis -ive direction PLC Travel Limit
52	Y Axis +ive direction PLC Travel Limit
53	Y Axis -ive direction PLC Travel Limit
54	Z Axis +ive direction PLC Travel Limit
55	Z Axis -ive direction PLC Travel Limit
56	4th Axis +ive direction PLC Travel Limit
57	4th Axis -ive direction PLC Travel Limit



The following list is the warning message of PLC travel limit:

WARNING ID	**Warning Message**

OP 6001	X AXIS OVER PLC TRAVEL LIMIT （+）
OP 6002	X AXIS OVER PLC TRAVEL LIMIT （-）
OP 6003	Y AXIS OVER PLC TRAVEL LIMIT （+）
OP 6004	Y AXIS OVER PLC TRAVEL LIMIT （-）
OP 6005	Z AXIS OVER PLC TRAVEL LIMIT （+）
OP 6006	Z AXIS OVER PLC TRAVEL LIMIT （-）
OP 6007	4TH AXIS OVER PLC TRAVEL LIMIT （+）
OP 6008	4TH AXIS OVER PLC TRAVEL LIMIT （-）

Warning/Alarm Cancel:

After the above system warning message is enabled, need to wait until the servo moves toward the opposite direction. And also, the corresponding C BIT changes from ON to OFF; the warning message will be removed automatically.

In JOG/RAPID or MPG mode, if the system warning message (OP 6001 ～ OP 6008) of PLC travel limit occurs, it is okay not to remove the warning message. Just moving directly to the reverse direction away from where the warning message occurs. After getting away from the software limitation range, the warning message will be removed.

Under mode of MEM, MDI or HOME, if the system warning message (OP 6001 ～ OP 6008) of PLC travel limit occurs, OP will send out the warning message. In this case, users must press “RESET” to reset the system.

ALARM ID	**Warning Message**
OP 1020	OVER PLC TRAVEL LIMIT

C Bit 059	**X Axis Interlock**
C Bit 060	**Y Axis Interlock**
C Bit 061	**Z Axis Interlock**
C Bit 062	**4th Axis Interlock**

Description： When the corresponding axis is ON, the axis will NOT move. But, the coordinate value will be renewed.

C Bit 064	**PLC Window Read/Write Signal**
C Bit 065	**PLC Commanding Signal**

Description： Please refer to 2.7 PLC Window structure for a detailed description.

C Bit 066	**X Axis: Select Axis Direction Signal of Handle INT**
C Bit 067	**Y Axis: Select Axis Direction Signal of Handle INT**
C Bit 068	**Z Axis: Select Axis Direction Signal of Handle INT**
C Bit 069	**4th Axis: Select Axis Direction Signal of Handle INT**

Description： Assumed NC is under MEM mode. User can use Manual Handle Interrupt function to increase/decrease tool shifting amount in order to modify path. However, before using this function, user must set Handle Interrupt axis selection signal and MPG ratio (R REGISTER 014). Then, user can use MPG to modify tool position. However, absolute coordinate will NOT be modified by Handle Interrupt; there will be an OFFSET amount of the initial program path and afterward tool path. This OFFSET amount will be cleared only by using manual reference point return.

C Bit 072	**1st SP JOG**
C Bit 073	**2nd SP JOG**
C Bit 074	**3rd SP JOG**

Description: When C bit ON, controller can release original SP RPM command, switch to the JOG speed which defined by parameter. SP will not control by Override during C bit ON, if C bit OFF, it comes to normal.

SP	Related parameter
1st SP	P 1121
2nd SP	P 1076
3rd SP	P 1077

C Bit 075	**X Axis Servo Alarm**
C Bit 076	**Y Axis Servo Alarm**
C Bit 077	**Z Axis Servo Alarm**
C Bit 078	**4th Axis Servo Alarm**

Description： This signal will notify system if motor driver of any axis has any extraordinary phenomenon.

C Bit 079	**PLC　Open file**

Description:
1. C079 = ON，Enter PLC　Open file。
2. activate cycle start C000(under MEM)，NC get file name from R058(formula: O+4 number from R058= Oxxxx)
3. If C079 OFF during process, it will not affect the file selection. It will directly go to NC ready.

C Bit 082	**1st Spindle CW**
C Bit 083	**1st Spindle CCW**
C Bit 087	**2ed Spindle CW**
C Bit 088	**2ed Spindle CCW**
C Bit 080	**3rd Spindle CW**
C Bit 081	**3rd Spindle CCW**

Description： When C bit of clockwise is ON, spindle rotates in clockwise direction.
When C bit of counter-clockwise is ON, spindle rotates in counter-clockwise direction.
If the above two are both OFF, spindle stops rotating.
Note 1: The above C bits are enabled in normal spindle speed control mode, which is spindle clockwise, counter-clockwise and stop.
Note 2: If the spindle CW and CCW are controlled by inventor's CW and CCW connection point control, the above signals will only notify NC that the current spindle is in CW or CCW condition.

C Bit 082	**1st SP CW signal**
C Bit 083	**1st SP CCW signal**
C Bit 087	**2nd SP CW signal**
C Bit 088	**2nd SP CCW signal**
C Bit 080	**3rd SP CW signal**
C Bit 081	**3rd SP CCW signal**

Description:
When CW C bit= ON, Drive the SP CW
When CCW C bit= ON, Drive the SP CCW
Both are OFF, And then SP stops.
Note1: These C bit only valid under standard speed control mode, e.g. CW, CCW, and stop.
Note2: If the SP CW/CCW controlled by inverter's terminal, and then these signal only use for informing NC controller the SP command status.

C Bit 085	**Spindle Orientation**

Description： This signal will be enabled when spindle orientation is decided by encoder and in JOG mode. Please notice that if Parameter # 0019, 1055, 1056 is not set for orientation position, spindle will be re-orientated again.

C Bit 086	**Spindle Command Type Changes to Pulse Type Under Spindle Orientation and Rigid Tapping Modes**

Description： Signal of Spindle is in orientation mode and also finishes orientating.

C Bit 089	**X Axis Mirror Image**
C Bit 090	**Y Axis Servo Alarm**
C Bit 091	**Z Axis Servo Alarm**
C Bit 092	**4th Axis Servo Alarm**

Description： When mirror image signal is ON under Auto mode, this axis will be in reverse moving direction.

C Bit 097	**1st Spindle Gear #1**
C Bit 098	**1st Spindle Gear #2**
C Bit 099	**1st Spindle Gear #3**
C Bit 116	**2nd Spindle Gear #1**
C Bit 117	**2nd Spindle Gear #2**
C Bit 118	**2nd Spindle Gear #3**
C Bit 121	**3rd Spindle Gear #1**
C Bit 122	**3rd Spindle Gear #2**
C Bit 123	**3rd Spindle Gear #3**

Description： Setting the gear ratio between spindle motor and spindle. Every spindle provides 4sets of parameter # of gear ratio. The system default is to use the 4th set of gear ratio. If user wants to modify other sets of gear ratio, user can select the suitable gear ratio from each spindle's corresponding gear ratio C bit.

Spindle	Gear	C bit	# of Motor Tooth	# of Spindle Tooth
1st Spindle	1	C97=ON	Parameter # 0049	Parameter # 0050
	2	C98=ON	Parameter # 0051	Parameter # 0052
	3	C99=ON	Parameter # 0178	Parameter # 0179
	4	C97,98,99=OFF	Parameter # 0181	Parameter # 0182
2nd Spindle	1	C116=ON	Parameter # 0664	Parameter # 0665
	2	C117=ON	Parameter # 0666	Parameter # 0667
	3	C118=ON	Parameter # 0668	Parameter # 0669
	4	C116,117,118=OFF	Parameter # 0670	Parameter # 0671
3rd Spindle	1	C121=ON	Parameter # 0672	Parameter # 0673
	2	C122=ON	Parameter # 0674	Parameter # 0675
	3	C123=ON	Parameter # 0676	Parameter # 0677
	4	C121,122,123=OFF	Parameter # 0678	Parameter # 0679

C Bit 100	**MACRO Variable $200**
C Bit 101	**MACRO Variable $201**
C Bit 102	**MACRO Variable $202**
C Bit 103	**MACRO Variable $203**
C Bit 104	**MACRO Variable $204**
C Bit 105	**MACRO Variable $205**
C Bit 106	**MACRO Variable $206**
C Bit 107	**MACRO Variable $207**
C Bit 108	**MACRO Variable $208**
C Bit 109	**MACRO Variable $209**
C Bit 110	**MACRO Variable $210**
C Bit 111	**MACRO Variable $211**
C Bit 112	**MACRO Variable $212**
C Bit 113	**MACRO Variable $213**
C Bit 114	**MACRO Variable $214**
C Bit 115	**MACRO Variable $215**

Description： These signals are the same as the MACRO system variables $120~$135. They provide input points of MACRO for LADDER. Example: If set UI0 to ON in LADDER, then $120 will be 1 in MACRO. These MACRO input point signals will provide order determination for MACRO.

C Bit 119	**ZP2Z Down Cancel**

Description： When this signal is ON, the local Z axis motion will be inhibited after the 2nd reference point. This signal is to protect tool exchanging and to prevent tool collusion after tool magazine moves toward left.

C Bit 120	**PMC Axis Go**

Description： Setting this signal to ON in order to enable PMC axis moving command under the condition of JOG mode and when all PMC axis moving data are ready.

C Bit 124	**Disable Signal in Rigid Tapping**

Description： Milling disables rigid tapping.

C Bit 125	**Enable Signal in Rigid Tapping**

Description： Rigid tapping (M29). When this signal is on, Z axis moving amount will follow the spindle encoder's pulse amount. So user must use M28 to delete the signal when rigid tapping is done in order to prevent any wrong motion from the system.

C Bit 126	Enable Signal of Spindle Motor Rotates in Gear-Shifting Speed

Description： Milling spindle changes rotational speed.

C Bit 127	Spindle Gear-Shifting Complete Signal

Description： Milling gear-shifting completed signal.

C Bit 130	Servo detach signal: X
C Bit 131	Servo detach signal : Y
C Bit 132	Servo detach signal : Z
C Bit 133	Servo detach signal : 4th

Description: If the signal =ON, it means this axis was detached. This controlled by M code to enable and disable, the M code customize by user.

C Bit 134	Clear Working Piece Number

Description： When NC reads M02, M30, the reading M code and parameter 89 are the same; NC will add the working piece by 1. If the working piece number is larger than or equal to that of the maximum working piece setting, NC will send out S134 to inform PLC to do the corresponding motion. When PLC sends out C 134, NC will clear the working piece number to zero.

C Bit 135	PLC axis RESET

Description: IF this signal =ON, press RESET, PLC axes will stop. If it is OFF, PLC axes will continue till program end when RESET pressed.

C Bit 138	Activate 1ST Software restricted area
C Bit 139	Activate 2ND Software restricted area

Description: Activate Software restricted area

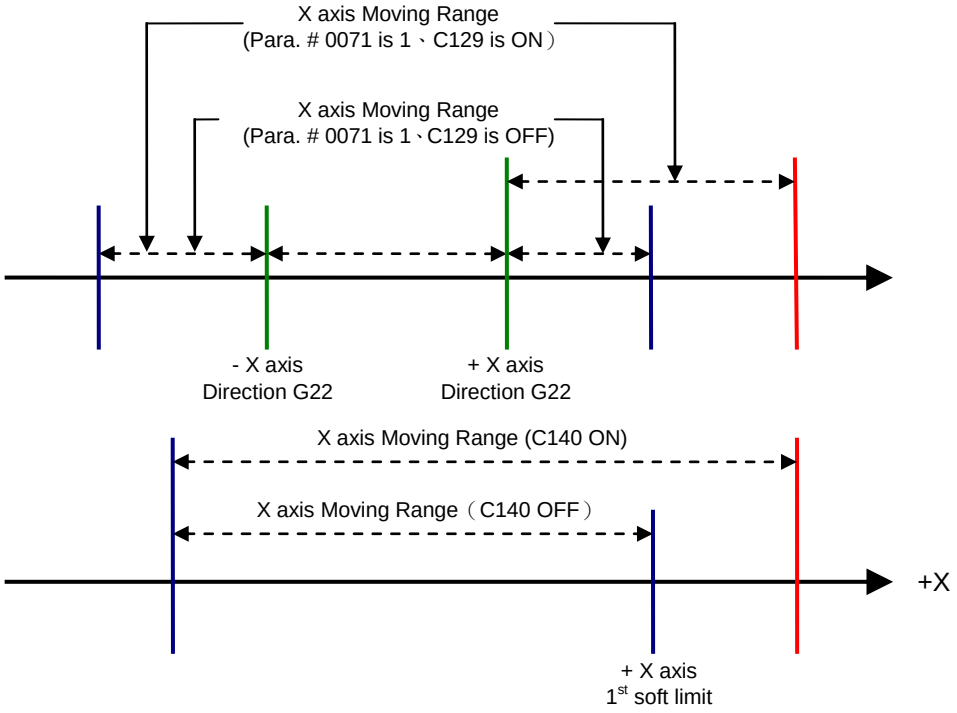
C Bit 140	2nd +X Axis Software Limit Choice
C Bit 141	2nd -X Axis Software Limit Choice
C Bit 142	2nd +Y Axis Software Limit Choice
C Bit 143	2nd -Y Axis Software Limit Choice
C Bit 144	2nd +Z Axis Software Limit Choice
C Bit 145	2nd -Y Axis Software Limit Choice
C Bit 146	2nd +4th Axis Software Limit Choice
C Bit 147	2nd -4th Axis Software Limit Choice

Description： 1st software limit: Using parameter 1006 ~ 1013 to set the limit. After executing zero return procedure, the parameter setting value will be enabled. The booting default value of +ive direction is 99999.999mm and the booting default value of –ive direction is -99999.999mm.

2nd software limit: Using parameter 1034 ~ 1041to set the limit. After executing zero return procedure, the parameter setting value will be enabled. The booting default value of +ive direction is 99999.999mm and the booting default value of –ive direction is -99999.999mm.

The corresponding C BIT of each axis can exchange any value between the 1st software limit and the 2nd software limit. This means that only one set/combination can be enabled at tone time within the limit of the 1st software limitation and the 2nd software limitation.

Software Limit	C BIT
X axis +ive direction software limit	C140： When OFF, use 1st software limit; When ON, using 2nd software limit.
X axis -ive direction software limit	C141： When OFF, use 1st software limit; When ON, using 2nd software limit.
Y axis +ive direction software limit	C142： When OFF, use 1st software limit; When ON, using 2nd software limit.
Y axis -ive direction software limit	C143：When OFF, use 1st software limit; When ON, using 2nd software limit.
Z axis +ive direction software limit	C144：When OFF, use 1st software limit; When ON, using 2nd software limit.
Z axis -ive direction software limit	C145：When OFF, use 1st software limit; When ON, using 2nd software limit.
4th axis +ive direction software limit	C146：When OFF, use 1st software limit; When ON, using 2nd software limit.
4th axis -ive direction software limit	C147：When OFF, use 1st software limit; When ON, using 2nd software limit.



G22 travel limit: Able to designated the embedded travel checking range. For Internal and external prohibit area, use parameter 0071 to set the prohibit area for both internal and external area. (0 means external prohibit area; 1 mean internal prohibit area).

C Bit 181	**Servo axes hide : X**
C Bit 182	**Servo axes hide : Y**
C Bit 183	**Servo axes hide : Z**
C Bit 184	**Servo axes hide : 4th**

Description: Hide the servo information from the user interface, but the axis still functional.

C Bit 187	**Servo axis synchronize activate : X**
C Bit 188	**Servo axis synchronize activate : Y**

C Bit 189	**Servo axis synchronize activate : Z**
C Bit 190	**Servo axis synchronize activate : 4th**

Description: When C Bit= ON, it means the related servo axis in synchronal mode. C bit =OFF, cancel synchronize.

C Bit 201	**Absolute encoder Reset Ready Signal: X Axis**
C Bit 202	**Absolute encoder Reset Ready Signal: Y Axis**
C Bit 203	**Absolute encoder Reset Ready Signal: Z Axis**
C Bit 204	**Absolute encoder Reset Ready Signal:4th Axis**

Description： When LADDER finishes absolute encoder zero return, this signal needs to be sent out to notify NC that.

C Bit 207	**Absolute Encoder Data Ready Signal: X Axis**
C Bit 208	**Absolute Encoder Data Ready Signal: Y Axis**
C Bit 209	**Absolute Encoder Data Ready Signal: Z Axis**
C Bit 210	**Absolute Encoder Data Ready Signal:4th Axis**

Description： LADDER will notify NC when driver enters into ABS transmitting mode and driver data are ready.

C Bit 213	**Absolute Encoder Data Bit 0Transmitting Signal : X Axis**
C Bit 214	**Absolute Encoder Data Bit 0Transmitting Signal : Y Axis**
C Bit 215	**Absolute Encoder Data Bit 0Transmitting Signal : Z Axis**
C Bit 216	**Absolute Encoder Data Bit 0Transmitting Signal : 4th Axis**

Description： Assumed absolute encoder data reading is sent by serial transmitting. Also, assumed 2 bits of Encoder will be transmitted every time. So, when this bit is ON, it indicates that the signal of transmitting 2 bits data from driver to NC is 1.

C Bit 219	**Absolute Encoder Bit 1 Transmit: X Axis**
C Bit 220	**Absolute Encoder Bit 1 Transmit: Y Axis**
C Bit 221	**Absolute Encoder Bit 1 Transmit: Z Axis**
C Bit 222	**Absolute Encoder Bit 1 Transmit: 4th Axis**

Description： Assumed absolute encoder data reading is sent by serial transmitting. Also, assumed 2 bits of Encoder will be transmitted every time. So, when this bit is ON, it indicates that the signal of transmitting 2 bits data from driver to NC is 1.

C Bit 231	**Clear encoder value: X**
C Bit 232	**Clear encoder value: Y**
C Bit 233	**Clear encoder value: Z**
C Bit 234	**Clear encoder value: 4th**
C Bit 237	**Clear encoder value: 1st SP**
C Bit 238	**Clear encoder value: 2nd SP**
C Bit 239	**Clear encoder value: 3rd SP**

Description: This C bit =ON= Clear related axis encoder value.

C Bit 241	**PMC/INT switch：X-axis (0:INT,1:PMC)**
C Bit 242	**PMC/INT switch：X-axis (0:INT,1:PMC)**
C Bit 243	**PMC/INT switch：X-axis (0:INT,1:PMC)**
C Bit 244	**PMC/INT switch：X-axis (0:INT,1:PMC)**

Description: 0：from NC，1：from PMC。

C Bit 247	**Servo axis name switch: X**
C Bit 248	**Servo axis name switch: Y**
C Bit 249	**Servo axis name switch: Z**
C Bit 250	**Servo axis name switch: 4th**

Description: This C Bit= ON, it means the related axis turns into command name switch. If C bit =OFF, no name switch.

C Bit 253	**Activate servo ABS coordinate update: X**
C Bit 254	**Activate servo ABS coordinate update: Y**
C Bit 255	**Activate servo ABS coordinate update: Z**
C Bit 256	**Activate servo ABS coordinate update: 4th**

Description: These C Bit= ON, it will update the ABS coordinate to machine coordinate.

C Bit 259	**Activate servo ABS home update: X**
C Bit 260	**Activate servo ABS home update: Y**
C Bit 261	**Activate servo ABS home update: Z**
C Bit 262	**Activate servo ABS home update: 4th**

Description: These C Bit=ON, it will set the current mechanical position to ABS home.

C Bit 281	**X M-II communication switch**
C Bit 282	**Y M-II communication switch**
C Bit 283	**Z M-II communication switch**
C Bit 284	**4th M-II communication switch**
C Bit 287	**1st SP M-II communication switch**
C Bit 288	**2nd SP M-II communication switch**
C Bit 289	**3rd SP M-II communication switch**

Description: When these C Bit=ON, it will activate the M-Ⅱ Servo ON. When OFF, it will be M-II servo OFF.

2.5 S Bits description

S Bit 000	Cycle Start Light

Description： When the system accepts to enable “CYCLE START” key and enters into automatic executing condition, this signal is ON, which means the system is in the “Cycle Start” condition. This signal is OFF when the automatic executing completed or the system is in “FEED HOLD” condition.

S Bit 001	Feed Hold Light

Description： When this signal is ON, it means the system is in “FEED HOLD” condition. So the system is in “Machine Stop” condition.

S Bit 002	Edit Mode Light
S Bit 003	MEM Mode Light
S Bit 004	MDI Mode Light
S Bit 005	JOG Mode Light
S Bit 006	INC JOG Mode Light
S Bit 007	MPG Mode Light
S Bit 008	Home Mode Light

Description： When these signals are ON, it means the system is in the relative operation mode condition.

S Bit 010	Preparation Completed

Description： When these signals are ON, the system is in “Preparation Complete” condition.

S Bit 011	MDI keyboard press signal

Description：
1. The signal will be sent from system when pressing the bottom on MDI.
2. The signal notifies PLC to turn on LCD power and recount time to turn off LCD power.

S Bit 012	Manual Return status signal

Description: When Manual Return enabled, C004=ON, this will be ON; When C004=OFF, this will be OFF.

S Bit 016	X 1st Axis Point Return End
S Bit 017	Y 1st Axis Point Return End
S Bit 018	Z 1st Axis Point Return End
S Bit 019	4th 1st Axis Point Return End

Description： When these signals are ON, it means the system relative axis completed the zero return procedure and stop at the zero point.

S Bit 020	X 2nd Axis Point Return End
S Bit 021	Y 2nd Axis Point Return End
S Bit 022	Z 2nd Axis Point Return End
S Bit 023	4th 2nd Axis Point Return End

Description： When these signals are ON, it means the system relative axis is completed the 2^{nd} (or the 3^{rd}, 4^{th}) reference return procedure and stop at the 2^{nd} (or 3^{rd}, 4^{th}) reference point.

S Bit 028	Warning

Description： When system warning occurs, this signal will notify PLC. After cause is eliminated, system warning is off automatically and this signal is OFF.

S Bit 029	M Code Read

Description： When executing to the M code, this signal is “ON” in order to provide LADDER to do M code executing until FIN signal replies back. Please refer to the description of M code end signal (C BIT 038).

S Bit 030	Distribution End Alarm

Description： In MEM or MDI mode, when the moving command interpolation is completed, this signal will be sent out. So when M code and the moving G code are on the same BLOCK, please use this signal to control and to execute M code after moving G code. If do not use this signal, M code will be executed simultaneously with G code interpolation.

S Bit 031	Alarm

Description： When the system alarm is on, this signal is ON.

S Bit 032	Reset

Description： When the system receives the RESET command, this signal is ON. Remain one time scanning time in order for LADDER to reset.

S Bit 033	NC Ready

Description： Assumed the controller’s power is on. After normally executing program, this signal will be ON.

S Bit 035	MPG x1000 Ratio Speeding
S Bit 036	MPG x1 Ratio Speeding
S Bit 037	MPG x10 Ratio Speeding
S Bit 038	MPG x100 Ratio Speeding

Description： These four signals are used to indicate the current using MPG ratio.

MPG Ratio	S035	S036	S037	S03
x1	0	1	0	0
x10	0	0	1	0
x100	0	0	0	1
x1000	1	0	0	0

S Bit 039	Program Restart

Description： When system enters the Program Restart process, the state signal of Program Restart will be enable (S39=ON), and will be disable when the system is completed or leave the operational status of Program Restart.

S Bit 040	Single Block

Description： Conditional signal that is relative to single block (SBK).

S Bit 041	Optional Block Skip

Description： Conditional signal that is relative to Optional Block Skip（BDT）.

S Bit 042	Dry Run

Description： Conditional signal that is relative to Dry Run (DRN).

S Bit 043	Machine Lock

Description： Conditional signal that is relative to Machine Lock（MLK）.

S Bit 044	Optional Stop

Description： Conditional signal that is relative to Optional Stop（OPS）.

S Bit 045	Rapid Traverse

Description： Conditional signal that is relative to Rapid Traverse（RT）.

S Bit 046	Z-Axis Neglect

Description： Conditional signal that is relative to Z Axis Cancel（ZNG）.

S Bit 047	Auxiliary Function Lock

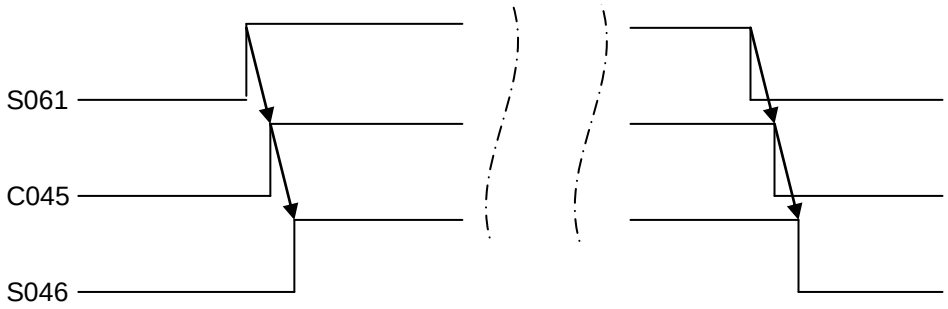
Description： Conditional signal that is relative to Auxiliary Function Lock（AFL）.

S Bit 054	S CODE STROBE
S Bit 055	2nd Spindle S Code
S Bit 056	2nd Spindle S Code

When NC executes some S code, S054 is ON to notify the ladder to process the S code until PLC responds with the signal FIN.

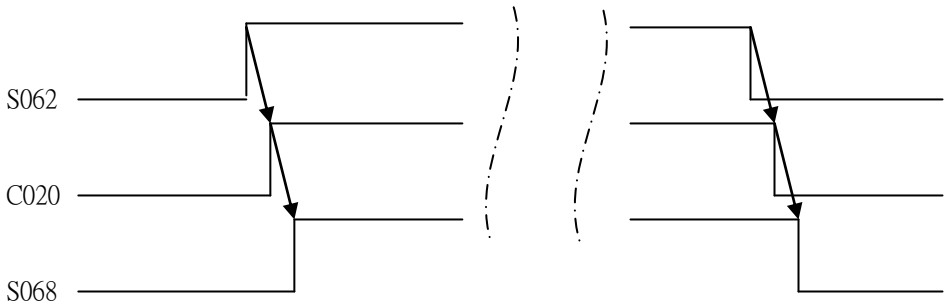
S Bit 061 **Z-Axis Neglect**

Description： ON/OFF control on the communication style software Panel will communicate with LADDER through this signal. For Z-AXIS NEGLECT key on the software Panel, ON/OFF control will communicate with LADDER through this signal. The timing procedure is as following:



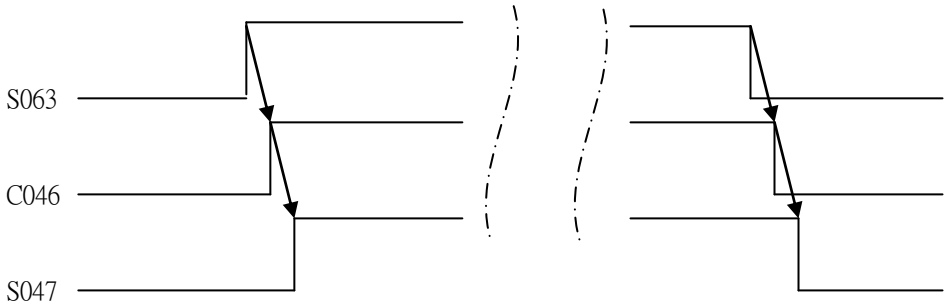
S Bit 062 **MPG Dry Run**

Description： ON/OFF control on the communication style software Panel will communicate with LADDER through this signal. For MPG Dry Run key on the software Panel, ON/OFF control will communicate with LADDER through this signal. The timing procedure is as following:



S Bit 063 **Auxiliary Function Lock**

Description： ON/OFF control on the communication style software Panel will communicate with LADDER through this signal. For AUXILIARY FUNCTION LOCK key on the software Panel, ON/OFF control will communicate with LADDER through this signal. The timing procedure is as following:



S Bit 068	MPG Dry Run

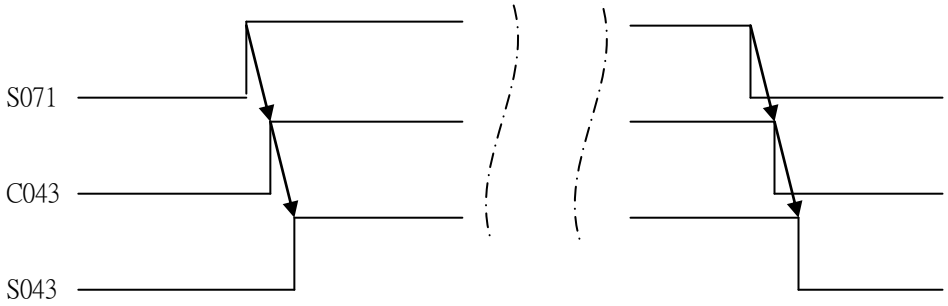
Description： Conditional signal that is relative to MPG Dry Run（MPGDRN）.

S Bit 069	T Code Read

Description： When executing to T code, this signal is ON in order to provide LADDTER to do T code executing until FIN signal is sending back.

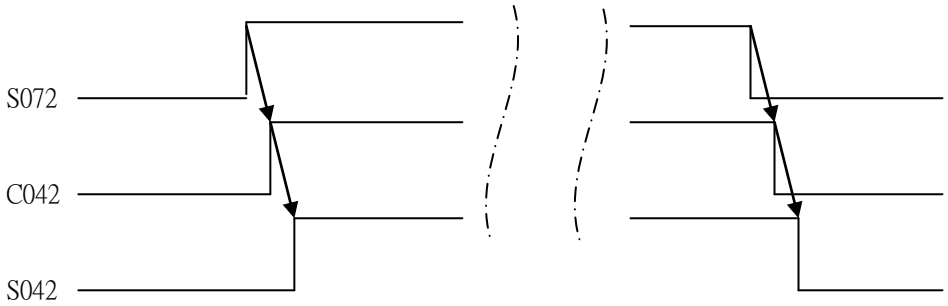
S Bit 071	Machine Lock

Description： ON/OFF control on the communication style software Panel will communicate with LADDER through this signal. For Machine Lock key on the software Panel, ON/OFF control will communicate with LADDER through this signal. The timing procedure is as following:



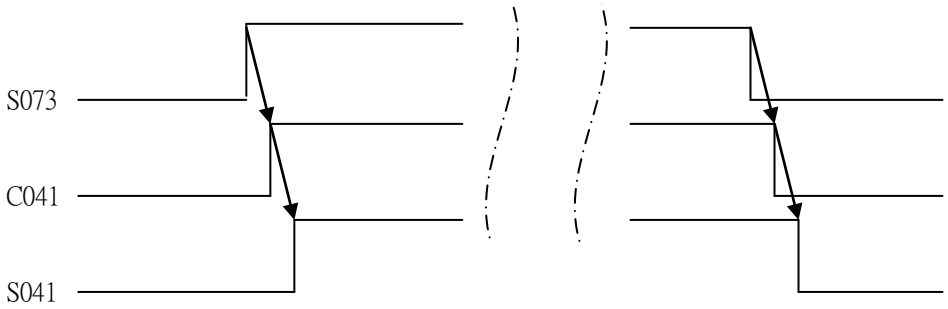
S Bit 072	Dry Run

Description： ON/OFF control on the communication style software Panel will communicate with LADDER through this signal. For Dry Run key on the software Panel, ON/OFF control will communicate with LADDER through this signal. The timing procedure is as following:



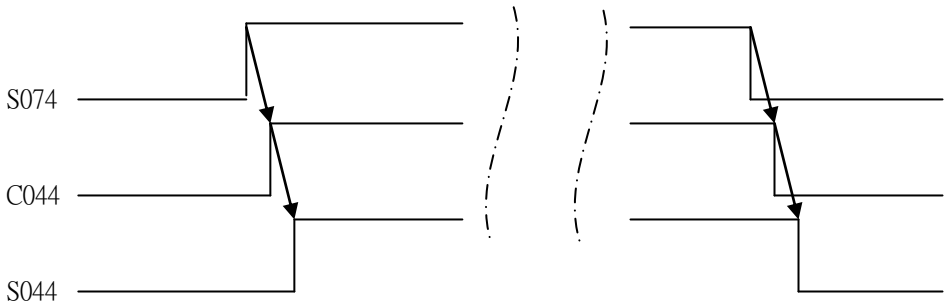
S Bit 073	Optional Block Skip

Description： ON/OFF control on the communication style software Panel will communicate with LADDER through this signal. For Optional Block Skip key on the software Panel, ON/OFF control will communicate with LADDER through this signal. The timing procedure is as following:



S Bit 074	Optional Stop

Description： ON/OFF control on the communication style software Panel will communicate with LADDER through this signal. For Optional Stop key on the software Panel, ON/OFF control will communicate with LADDER through this signal. The timing procedure is as following:



S Bit 079	PLC WINDOW COMPLETED

Please refer to 2.7 PLC Window structure for a detailed description.

S Bit 080	M00 Read
S Bit 081	M01 Read
S Bit 082	M02 Read
S Bit 083	M30 Read

Description： M00：after interpreting as M00, this signal is ON（remain one time scanning time）
M01：after interpreting as M01, this signal is ON（remain one time scanning time）
M02：after interpreting as M02, this signal is ON（remain one time scanning time）
M30：after interpreting as M03, this signal is ON（remain one time scanning time）

S Bit 086	Orientation Finish

Description： When spindle orientation is completed, this signal is ON. When PLC cancels the spindle orientation command (C85), this signal will become OFF.

S Bit 053	**2nd Spindle Speed Arrival**
S Bit 058	**3rd Spindle Speed Arrival**
S Bit 088	**THE 1ST SPINDLE REACHES ROTATION SPEED**

When the spindle speed reaches the expected speed, these will ON.
Following parameter can set the tolerance rage

SP	Parameter
1ST SP	1054
2ND SP	0298
3RD SP	0881

S Bit 091	**Not in Canned Cycle Mode**

Description： Assumed the system is in Canned Cycle mode. If this signal is OFF, effective G code of Group G09 is not 80. On the other hand, if the system is not under Canned Cycle mode and this signal is ON, then the effective G code of Group G09 is 80.

S Bit 052	**2nd Spindle Zero Speed Arrival**
S Bit 057	**3rd Spindle Zero Speed Arrival**
S Bit 092	**THE 1ST SPINDLE REACHES ZERO SPEED**

When the rotation speed of each spindle is lower than the value set by the parameters below, the system will send this signal to notify PLC.
The 1st spindle: Pr. 1063.
The 2nd spindle: Pr. 0299.
The 3rd spindle: Pr. 0882.

S Bit 093	**Spindle Command Type Changes to Pulse Command in Spindle and Rigid Tapping Mode**

Description： NC notifies PLC spindle to get ready to switch to the position control mode. Meanwhile, driver does the corresponding switch.

S Bit 094	**Spindle Motor Speed when Gears are Switched**

Description： This signal will be sent out when spindle reaches gear-shifting speed.

S Bit 100	**MACRO Variable $600**
S Bit 101	**MACRO Variable $601**
S Bit 102	**MACRO Variable $602**
S Bit 103	**MACRO Variable $603**
S Bit 104	**MACRO Variable $604**
S Bit 105	**MACRO Variable $605**
S Bit 106	**MACRO Variable $606**
S Bit 109	**MACRO Variable $609**
S Bit 112	**MACRO Variable $612**
S Bit 113	**MACRO Variable $613**
S Bit 114	**MACRO Variable $614**
S Bit 115	**MACRO Variable $615**

Description： These signals are the MACRO system variables $600~$615, which are MACRO outputs to LADDER point. Example: set $600 as 1 in MACRO, then UO0 will be ON in LADDER, which means that MACRO output signals will be used as external control for LADDER.

S Bit 120	PMC Axis Finish

Description： This signal is ON when PMC axis moving is completed.

S Bit 128	Riding Tapping Mode

Description： NC notifies PLC that whether or not NC is in rigid tapping mode.

S Bit 130	X Axis Moving
S Bit 131	Y Axis Moving
S Bit 132	Z Axis Moving
S Bit 133	4th Axis Moving

Description： Moving condition of each axis：
ON：Moving；
OFF：Stop.

S Bit 134	Max Working Piece Arrival

Description： When the number of working piece is greater than or equal to that of the maximum setting-working piece, S134 will be sent out to inform PLC. If setting the maximum working piece to zero, then this signal will not be sent out. PLC will use C134 to inform NC to clear working piece.

Application Description:

Enter into user parameter to do function select and set parameter No. 12 as 1. When the working piece number reaches the setting working piece number, it will enter into the Feed Hole condition and send out warning message (Wrokpiece is full).

At this time, user can do any needed motion. If there is no need to do any other motion, please press “Cycle Start” key directly. Then the working piece number will be cleared to zero automatically. Furthermore, it will start working automatically and counting working piece number from zero. If no need this function at all, and then set parameter No.12 as 0. Circulating work of working piece will not be affected.

01	Program Editing	0	11	Power Off Delay Time	5
02	Home Point Search Priority	1	12	Work Piece Alarm	1
03	Return Home Axis Priority	1	13		
04	Rapidly Moving 50%	0	14		
05	Total Number of Turret	0	15		
06	Safety Door	0	16		
07	Enforce Track Lubrication	0	17		
08	Lubricate ON Time	5	18		
09	Lubricate OFF Time	30	19		
10	Auto Power Off Function	1	20		

S Bit 138	Machine coordinate at 1ST Software restricted area (0:No,1:Yes)
S Bit 139	Machine coordinate at 2ND Software restricted area (0:No,1:Yes)

Description: Indicator for the Software restricted area:
ON：IN Software restricted area
OFF：NOT IN Software restricted area

S Bit 141	Fan 1 detection
S Bit 142	Fan 2 detection

Description: ON: fan failed
OFF: fan normal.

S Bit 150	**Request Signal of Spindle Gear-Shifting: 1st Gear**
S Bit 151	**Request Signal of Spindle Gear-Shifting: 2nd Gear**
S Bit 152	**Request Signal of Spindle Gear-Shifting: 3rd Gear**
S Bit 153	**Request Signal of Spindle Gear-Shifting: 4th Gear**

Description： When S code is not below into the current gear range, System will use S Bit to notify PLC to execute gear shifting:
S Bit 150：1st spindle gear shifting signal；
S Bit 151：2nd spindle gear shifting signal；
S Bit 152：3rd spindle gear shifting signal；
S Bit 153：4th spindle gear shifting signal；
At this time, spindle output voltage remains the same.

S Bit 154	**X Axis Moving Direction**
S Bit 155	**Y Axis Moving Direction**
S Bit 156	**Z Axis Moving Direction**
S Bit 157	**4th Axis Moving Direction**
S Bit 158	**5th Axis Moving Direction**
S Bit 159	**6th Axis Moving Direction**

Description： These S BITs express the moving direction of each axis, when axis is at moving state.
ON：positive direction
OFF：negative direction

S Bit 160	**ENCODER wiring error: X**
S Bit 161	**ENCODER wiring error: Y**
S Bit 162	**ENCODER wiring error: Z**
S Bit 163	**ENCODER wiring error: 4th**

Description: When ENCODER send alarm, this will ON。

Servo	Alarm
X	MOT4026
Y	MOT4087
Z	MOT4096
4th	MOT4097

S Bit 170	**Status of back to 3rd home :X**
S Bit 171	**Status of back to 3rd home :Y**
S Bit 172	**Status of back to 3rd home :Z**
S Bit 173	**Status of back to 3rd home :4th**

Description: When these signal ON, it means the axes had zero to the 3rd home and on 3rd home.

S Bit 176	**Status of back to 4th home :X**
S Bit 177	**Status of back to 4th home :Y**
S Bit 178	**Status of back to 4th home :Z**
S Bit 179	**Status of back to 4th home :4th**

Description: When these signal ON, it means the axes had zero to the 4th home and on 4th home.

S Bit 182	**Servo ABS home ready X(0:not yet,1: Done)**
S Bit 183	**Servo ABS home ready Y(0:not yet,1: Done)**
S Bit 184	**Servo ABS home ready Z(0:not yet,1: Done)**

S Bit 185	Servo ABS home ready 4th(0:not yet,1: Done)

Description: When these=ON, means servo went ABS home.

S Bit 201	Enter into Absolute Encoder Data Transmitting Mode: X Axis
S Bit 202	Enter into Absolute Encoder Data Transmitting Mode: Y Axis
S Bit 203	Enter into Absolute Encoder Data Transmitting Mode: Z Axis
S Bit 204	Enter into Absolute Encoder Data Transmitting Mode:4th Axis

Description： To use this signal to notify servo driver to enter into ABS transmitting mode.

S Bit 207	Absolute Encoder Data Transmitting: X Axis
S Bit 208	Absolute Encoder Data Transmitting: Y Axis
S Bit 209	Absolute Encoder Data Transmitting: Z Axis
S Bit 210	Absolute Encoder Data Transmitting:4th Axis

Description： To use this signal to request ABS transmitting from servo driver.

S Bit 213	Absolute Encoder Reset: X Axis
S Bit 214	Absolute Encoder Reset: Y Axis
S Bit 215	Absolute Encoder Reset:Z Axis
S Bit 216	Absolute Encoder Reset:4th Axis

Description： To use this signal to notify servo driver to eliminate absolute Encoder zero return motion.

S Bit 219	Servo ABS coordinate update complete: X
S Bit 220	Servo ABS coordinate update complete: Y
S Bit 221	Servo ABS coordinate update complete: Z
S Bit 222	Servo ABS coordinate update complete: 4th

Description: ON: Servo ABS coordinate updated
OFF: Servo ABS coordinates not update yet.

S Bit 225	Servo ABS home update complete: X
S Bit 226	Servo ABS home update complete: Y
S Bit 227	Servo ABS home update complete: Z
S Bit 228	Servo ABS home update complete: 4th

Description: ON: Servo ABS home updated
OFF: Servo ABS home not update yet.

S Bit 231	Encoder value cleared: X
S Bit 232	Encoder value cleared: Y
S Bit 233	Encoder value cleared: Z
S Bit 234	Encoder value cleared: 4th
S Bit 237	Encoder value cleared: 1st SP
S Bit 238	Encoder value cleared: 2nd SP
S Bit 239	Encoder value cleared: 3rd SP

Description: These signal=ON, it means these encoder value cleared.

S Bit 240	Servo following lag value over parameter 2 value alarm: X
S Bit 241	Servo following lag value over parameter 3 value alarm: Y
S Bit 242	Servo following lag value over parameter 4 value alarm: Z
S Bit 243	Servo following lag value over parameter 5 value alarm: 4th

Description: When Servo following lag value over these parameter value, this signal will ON.

Servo	Alarm
X	MOT4006

Y	MOT4007
Z	MOT4008
4th	MOT4009

S Bit 246	**HAS ERROR COUNTER over position alarm: X**
S Bit 247	**HAS ERROR COUNTER over position alarm: Y**
S Bit 248	**HAS ERROR COUNTER over position alarm: Z**
S Bit 249	**HAS ERROR COUNTER over position alarm: 4th**

Description:

When it has ERROR COUNTER alarm, this will ON。

Servo	Alarm
X	MOT4006
Y	MOT400
Z	MOT4008
4th	MOT4009

S Bit 281	**X M-II servo activate status**
S Bit 282	**Y M-II servo activate status**
S Bit 283	**Z M-II servo activate status**
S Bit 284	**4th M-II servo activate status**
S Bit 287	**1st SPM-II servo activate status**
S Bit 288	**2nd SPM-II servo activate status**
S Bit 289	**3rd SPM-II servo activate status**

Description:

Means M-Ⅱ servo ON/OFF status.
ON：SERVO ON；
OFF：SERVO OFF。

S Bit 291	**X M-II Servo drive power status**
S Bit 292	**Y M-II Servo drive power status**
S Bit 293	**Z M-II Servo drive power status**
S Bit 294	**4th M-II Servo drive power status**
S Bit 297	**1st SPM-II Servo drive power status**
S Bit 298	**2nd SPM-II Servo drive power status**
S Bit 299	**3rd SPM-II Servo drive power status**

Description:

Means M-Ⅱ Servo drive power status：
ON：Powered；
OFF：No power

S Bit 301	**X M-II torque monitoring status**
S Bit 302	**Y M-II torque monitoring status**
S Bit 303	**Z M-II torque monitoring status**
S Bit 304	**4th M-II torque monitoring status**
S Bit 307	**1st SPM-II torque monitoring status**
S Bit 308	**2nd SPM-II torque monitoring status**
S Bit 309	**3rd SPM-II torque monitoring status**

Description:

Means M-Ⅱ torque monitoring status：
ON: Monitoring;
OFF: No monitoring

2.6 Register description

R Bit 001	M CODE

R001 sends out M code value when M code is being executed.
Range: 00 ~ 99.

R Bit 002	S CODE

R002 sends out S code value when S code is being executed.
Range: 0000 ~ 9999.

R Bit 003	T CODE

R001 sends out T code value when T code is being executed.
Range: 0000 ~ 9999.

R Bit 004	ACTUAL ROTATION SPEED OF THE SPINDLE
R Bit 006	2nd Spindle Actual Speed
R Bit 008	3rd Spindle Actual Speed

The actual rotation speed of the spindle.

R Bit 005	2nd spindle rotational speed command
R Bit 007	3rd spindle rotational speed command

The command of the spindle's rotational speed.

R Bit 013	MODE SELECTION 1：EDIT，2：MEM，3：MDI，4：JOG，5：INCJOG，6：MPG，7：HOME

The register value of each operation module is listed as the chart below:

Operation Mode	REG 013
EDIT	1
MEM	2
MDI	
JOG	4 （C23=OFF）
RAPID	4 （C23=ON ）
NCJOG	5
MPG	6
HOME	7

R Bit 014	**MPG RATE 2: x10, 3: x100, OTHERS: x1** **INCREMENTAL JOG OVERRIDE 2: x10, 3: x100, 4：x1000, OTHERS: x1**

The register value of each MPG rate is listed as the chart below:

MPG Ratio	REG 014
X1	1 (Or Others)
x10	2
x 00	3

R Bit 015	**ROTATION SPEED OVERRIDE OF THE SPINDLE** **0 ~ 12 REPRESENT 0% ~ 120%, RESPECTIVELY; OTHERS: SET VALUE × 0.01**
R Bit 019	**2nd Spindle Rotating Mode Override**
R Bit 020	**3rd Spindle Rotating Mode Override**

The register value of each spindle rotation speed's override is listed as the chart below:

%	REG 015
0%	0
10%	1
20%	2
30%	3
40%	4
50%	5
60%	6
70%	7
80%	8
90%	9
100%	10
110%	11
120%	12
1%	Others

R Bit 016	**CUTTING OVERRIDE** **0 ~ 20 REPRESENT 0% ~ 200%, RESPECTIVELY; OTHERS: SET VALUE × 0.001**

The register value of each cutting override is listed as the chart below:

%	REG 016
0%	0
10%	1
20%	2
30%	3
40%	4
50%	5
60%	6
70%	7
80%	8
90%	9
100%	10
110%	11
120%	12
130%	13

140%	14
150%	15
160%	16
170%	17
180%	18
190%	19
200%	20
‰ (Thousandth)	Others

R Bit 017

JOG OVERRIDE
0 ~ 20 REPRESENT 0% ~ 200%, RESPECTIVELY; OTHERS: SET VALUE × 0.001

The register value of each manual override is listed as the chart below:

%	REG 017
0%	0
10%	1
20%	2
30%	3
40%	4
50%	5
60%	6
70%	7
80%	8
90%	9
100%	10
110%	11
120%	12
130%	13
140%	14
150%	15
160%	16
170%	17
180%	18
190%	19
200%	20
‰ (Thousandth)	Others

R Bit 018

RAPID TRAVERSE OVERRIDE
0, 1: F0, 2: 25%, 3: 50% ~ 4: 100%: OTHERS: SET VALUE × 0.001

The register value of each rapid feed override is listed as the chart below:

%	REG 18
F0%	0
F0%	1
25%	2
50%	3
100%	4
1%	Others

NOTE: The actual rapid override of F0% is set by Pr. 0040.

R Bit 021	OVERRIDE OF PMC AXIS, UNIT: mm/min.

R021 sets the override of PMC axis.

R Bit 022	PMC AXIS CONTROL

R022 sets the axis to be controlled by PMC.
Bit 1, Bit 0：00 for G00; 01 for G01; 10 for G53
Bit 2：1 spindle.
Bit 3：Reserved.
Bit 4：1 X axis
Bit 5：1 Y axis
Bit 6：1 Z axis
Bit 7：1 The 4th axis

R Bit 024	MOTION COMMAND OF PMC AXIS: X AXIS, mm part
R Bit 025	MOTION COMMAND OF PMC AXIS: X AXIS, μm part
R Bit 026	MOTION COMMAND OF PMC AXIS: Y AXIS, mm part
R Bit 027	MOTION COMMAND OF PMC AXIS: Y AXIS, μm part
R Bit 028	MOTION COMMAND OF PMC AXIS: Z AXIS, mm part
R Bit 029	MOTION COMMAND OF PMC AXIS: Z AXIS, μm part
R Bit 030	PMC Function of 4th-Axis Command Amount, Unit=mm
R Bit 031	PMC Function of 4th-Axis Command Amount, Unit=μm

R024 ~ R029 set the assigned motion distance for each PMC axis when executing a motion command. Motion distances must be set by entering two parts, mm & um, respectively into each register.

R Bit 036	PMC axes fast locate feed rate (OVERRIDE) value 0、1：F0，2：25%，3：50%，4：100%, other values: value * 0.01

Feed rate % definition as following:：

Description:

%	REG 36
F0%	0
F0%	1
25%	2
50%	3
100%	4
1%	other

R Bit 037	PMC axis cutting feed rate(OVERRIDE) value 0 ~ 20 means 0% ~ 200%, other values: value * 0.001

Cutting feed rate definition as following chart:

Description:

%	REG 037
0	0
10%	1
20%	2
30%	3
40%	4
50%	5
60%	6
70%	7

80%	8
90%	9
100%	10
110%	11
20%	12
130%	13
140%	14
150%	15
160%	16
170%	17
80%	18
190%	19
200%	20
‰（千分之一）	others

R Bit 040	**PLC ALARM**
R Bit 041	**PLC ALARM**
R Bit 042	**PLC ALARM**
R Bit 043	**PLC ALARM**
R Bit 044	**PLC ALARM**
R Bit 045	**PLC ALARM**

R040 ~ R045 enables alarms. There are 6 registers (word), and 96 messages in total for definition and actuation. For example, if the alarms #1 & #3 are to be enabled, LADDER must enter R40 into constant 5 (bit 1 & bit 3) with a MOV command. At the same time, messages must be pre-defined in the corresponding position in ENG_ PLC.ERR. To clear the PLC alarm, simply set R40 to 0.

R Bit 050	**1ST set analog voltage detection value**
R Bit 051	**2ND set analog voltage detection value**
R Bit 052	**3RD set analog voltage detection value**
R Bit 053	**4TH set analog voltage detection value**
R Bit 054	**5TH set analog voltage detection value**
R Bit 055	**6TH set analog voltage detection value**
R Bit 056	**7TH set analog voltage detection value**
R Bit 057	**8TH set analog voltage detection value**

Description: Use DAQ3718 analog voltage detect card, NC controller can detect external analog voltage signal and save in R register.

R Bit 058	**PLC Open file Name**

Description:
Use the 4 digit number as file name, if it is negative then define as no action.
E.g.:
R058 = 123，then Open O123
R058 = 12345，then Open O2345
R058 = -678，then Open file failed, use the original file which selected in UI.

R Bit 060	**PLC WINDOW FUNCTION**
R Bit 061	**PLC WINDOW FUNCTION NO.1**
R Bit 062	**PLC WINDOW FUNCTION NO.2**
R Bit 063	**PLC WINDOW READ/WRITE VALUE 1**
R Bit 064	**PLC WINDOW READ/WRITE VALUE 2**
R Bit 065	**PLC WINDOW READ/WRITE VALUE 3**
R Bit 066	**PLC WINDOW READ/WRITE VALUE 4**
R Bit 067	**PLC WINDOW READ/WRITE VALUE 5**

R Bit 068	**PLC WINDOW READ/WRITE VALUE 6**
R Bit 069	**PLC WINDOW READ/WRITE VALUE 7**
R Bit 070	**PLC WINDOW READ/WRITE VALUE 8**
R Bit 071	**PLC WINDOW READ/WRITE VALUE 9**
R Bit 072	**PLC WINDOW READ/WRITE VALUE 10**
R Bit 073	**PLC WINDOW READ/WRITE VALUE 11**
R Bit 074	**PLC WINDOW READ/WRITE VALUE 12**

Please refer to the description of 4.7 PLC Window mechanisms.

R Bit 081	**MPG ratio select: Y 2：x10，3：x100, other values: x1** **incremental jog value 2：x10，3：x100，4：x1000, other values: x1**
R Bit 082	**MPG ratio select: Z 2：x10，3：x100, other values: x1** **incremental jog value 2：x10，3：x100，4：x1000, other values: x1**
R Bit 083	**MPG ratio select: 4TH 2：x10，3：x100, other values: x1** **incremental jog value 2：x10，3：x100，4：x1000, other values: x1**

When P0014 MPG ratio setup=1, MPG ratio definition as following chart.

Description:

MPG ratio	REG
x1	1（or others）
x10	2
x100	3

R Bit 090	**Each axis jog feedrate (OVERRIDE) value: X** **0 ~ 20 means 0% ~ 200%, other values: Value * 0.001**
R Bit 091	**Each axis jog feedrate (OVERRIDE) value: Y** **0 ~ 20 means 0% ~ 200%, other values: Value * 0.001**
R Bit 092	**Each axis jog feedrate (OVERRIDE) value: Z** **0 ~ 20 means 0% ~ 200%, other values: Value * 0.001**
R Bit 093	**Each axis jog feedrate (OVERRIDE) value: 4th** **0 ~ 20 means 0% ~ 200%, other values: Value * 0.001**

Description: When P0023(each feed rate0)R17 1)R90-R95 =1, manual feed rate register define as following:

%	REG
%	0
10%	1
20%	2
30%	3
40%	4
50%	5
60%	6
70%	7
80%	8
90%	9
100%	10
110%	11
120%	12
130%	13
140%	14
150%	15

160%	16
170%	17
180%	18
190%	19
200%	20
（1/1000）	others

R Bit 101	**X M-II torque %**
R Bit 102	**Y M-II torque %**
R Bit 103	**Z M-II torque %**
R Bit 104	**4th M-II torque %**
R Bit 107	**1st SPM-II torque %**
R Bit 108	**2nd SPM-II torque %**
R Bit 109	**3rd SPM-II torque %**

Description: Monitoring M-Ⅱ torque value which saved in R register

R Bit 110	**PLC axis compensation X absolute (Pulse)**
R Bit 111	**PLC axis compensation Y absolute (Pulse)**
R Bit 112	**PLC axis compensation Z absolute (Pulse)**
R Bit 113	**PLC axis compensation 4th absolute (Pulse)**

Description: Use PLC to set R value for control each axis comprehension

R Bit 240~255	**$2000~$2015 value**

Description: Use R to read $2000~$2015

2.7 PLC Window

After Ladder key-in the desired item codes in R60 ～ R62, setting C640 (0: Read, 1 writes). When completed, using C65 to inform NC. NC will enter the desired item into the corresponding R register (C64 is 0) according to the setting of R60 ～ R62 and C64. Or read the setting value (C64 is 1) from the corresponding R register. When completed the task, using S79 to inform Ladder. This function is enabled (raising edge trigger) when C65 becomes 1 from 0; S79 will become OFF after C65 has become OFF.

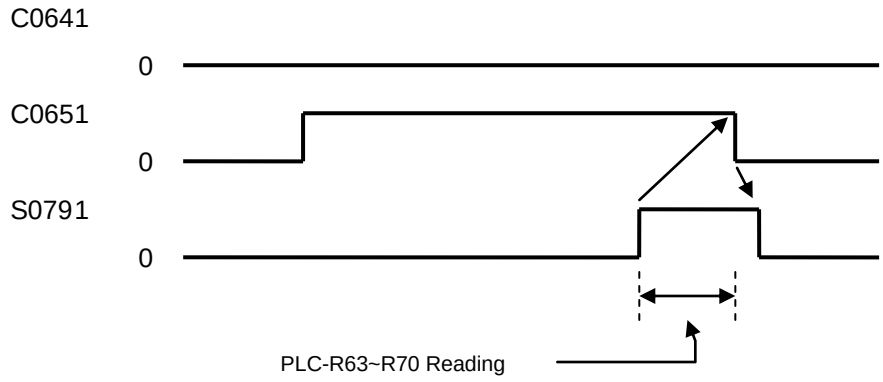
R Register Definition：

R Register	Definition	Remarks
60	Item Code 1：read absolute coordinate value； 2：read machine coordinate value； 3：read & write macro global variables； 4：read parameter value；	1：read only； 2：read only； 3：read & write。 4：read only；
61	Sub-Item Code 1 (different depends on R60) R60：3, means the starting numbers of macro global variables(1 ~ 500) that are read and wrote R60：4, the starting parameter #s that are read	
62	Sub-Item Code 2 (different depends on R60 and R61) R60：3，means the desired read/write macro global variables numbers (starting from the number that is designated by R61)，maximum 8. R60：4，means the desired read/write parameter variables numbers(starting from the number that is designated by R61) ，maximum 8.	Use R61 and R62 to order read and write multiple macro global variables continuously (max 8 variables),or the designated parameter continuously
63	Read/Write Value (different depends on R60~R62) R60：1，means X axis absolute coordinate mm part； R60：2，means X axis machine coordinate mm part； R60：3，means the present value of the1st macro global variable that is designated by R61 and R62. R60：4，means the value of 1st parameter that is designated by R61 and R62.	Please refer to Attention.
64	Read/Write Value (different depends on R60~R62) R60：1，means X axis absolute coordinate um part； R60：2，means X axis machine coordinate um part； R60：3，means the present value of the1st macro global variable that is designated by R61 and R62. R60：4，means the value of 1st parameter that is designated by R61 and R62.	Please refer to Attention.
65	Read/Write Value (different depends on R60~R62) R60：1，means Y axis absolute coordinate mm part； R60：2，means Y axis machine coordinate mm part； R60：3，means the present value of the1st macro global variable that is designated by R61 and R62. R60：4，means the value of 1st parameter that is designated by R61 and R62.	Please refer to Attention.

R Register	Definition	Remarks
66	Read/Write Value (different depends on R60~R62) R60：1，means Y axis absolute coordinate um part； R60：2，means Y axis machine coordinate um part； R60:3,means the present value of the1st macro global variable that is designated by R61 and R62. R60：4，means the value of 1st parameter that is designated by R61 and R62.	Please refer to Attention.
67	Read/Write Value (different depends on R60~R62) R60：1，means Z axis absolute coordinate mm part； R60：2，means Z axis machine coordinate mm part； R60:3,means the present value of the1st macro global variable that is designated by R61 and R62. R60：4，means the value of 1st parameter that is designated by R61 and R62.	Please refer to Attention.
68	Read/Write Value (different depends on R60~R62) R60：1，means Z axis absolute coordinate um part； R60：2，means Z axis machine coordinate um part； R60:3,means the present value of the1st macro global variable that is designated by R61 and R62. R60：4，means the value of 1st parameter that is designated by R61 and R62.	Please refer to Attention.
69	Read/Write Value (different depends on R60~R62) R60：1，means 4th axis absolute coordinate mm part； R60：2，means 4th axis machine coordinate mm part； R60:3,means the present value of the1st macro global variable that is designated by R61 and R62. R60：4，means the value of 1st parameter that is designated by R61 and R62.	Please refer to Attention.
70	Read/Write Value (different depends on R60~R62) R60：1，means 4th axis absolute coordinate um part； R60：2，means 4th axis machine coordinate um part； R60:3,means the present value of the1st macro global variable that is designated by R61 and R62. R60：4，means the value of 1st parameter that is designated by R61 and R62.	Please refer to Attention.
71	Read/Write Value (different depends on R60~R62) R60：3，means the present value of the 9th macro global variable that is designated by R61 and R62. R60：4，means the value of 9th parameter that is designated by R61 and R62.	Please refer to Attention.
72	Read/Write Value (different depends on R60~R62) R60:3,means the present value of the 10th macro global variable that is designated by R61 and R62. R60：4，means the value of 10th parameter that is designated by R61 and R62.	Please refer to Attention.
73	Read/Write Value (different depends on R60~R62) R60:3,means the present value of the 11th macro global variable that is designated by R61 and R62. R60：4，means the value of 11th parameter that is designated by R61 and R62.	Please refer to Attention.

R Register	Definition	Remarks
74	Read/Write Value (different depends on R60~R62) R60：3，means the present value of the 12th macro global variable that is designated by R61 and R62. R60：4，means the value of 12th parameter that is designated by R61 and R62.	Please refer to Attention.

Timing Procedure Diagram：



Attention：

1. For read only items, if Ladder sets C64 to 1, NC will ignore it. Using the same principle for the writing items, if Ladder sets C64 to 0, NC will ignore it.
2. Macro variables belong to DOUBLE type. But the present Ladder can only take care of the value in INT type. So if Ladder reads macro global variables via MLC Window, NC will check whether or not the macro global variable value is between -32768 ~ 32767. If yes, the macro global variables will change to INT type and then enter into the corresponding R register. If no, then the alarm【OP 1019 DESIRED MACRO VARIABLES OVER RANGE】will occur.
3. Using R61 and R62, Ladder can read/write multiple macro global variables (maximum 8 variables) continuously. Example: set R60 to 3, R61 to 200 and R62 to 5. When C64 is OFF, it means the total current value of the designated reading/writing @200 ~ @204, total 5 macro global variables. But, if (R61 + R62 – 1) > 500, then alarm message【OP 1018 DESIRED MACRO GLOBAL VARIABLES NOT EXISTED】will occur.
4. Macro local variables not able to execute read and write via MLC Window.
5. The reading parameter value must be an integrate number (INT) or long integrate number (LONG). But the present Ladder can only take care of the values in INT type. So if Ladder reads parameter value via MLC Window, NC will check whether or not that parameter value is between -32768 ~ 32767. If yes, the parameter will change to INT type, and then enter into the corresponding R register. If not, the alarm message 【OP 1022 DESIRED PARAMETER VARIABLES OVER RANGE】 will occur.

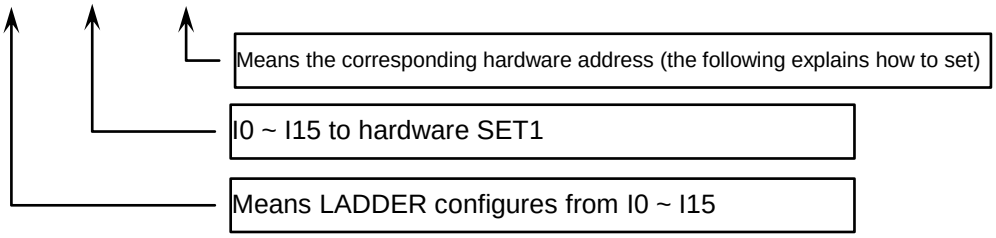
6. Using R61 and R62, Ladder can read/write multiple parameter variables (maximum 8 variables) continuously. Example: set R60 to 3, R61 to 200 and R62 to 5. When C64 is OFF, it means the total value of the reading parameter variables 0200 ~ 0204, total 5 parameter variables. If it is over the valid parameter range, the alarm message【OP 1023 DESIRED PARAMETER VARIABLES NOT EXISTED】will occur.
   Valid parameter variable range： 0 ~ 220，300 ~ 899，1000 ~ 1200。
7. Parameter is not able to execute setting via PLC Window.

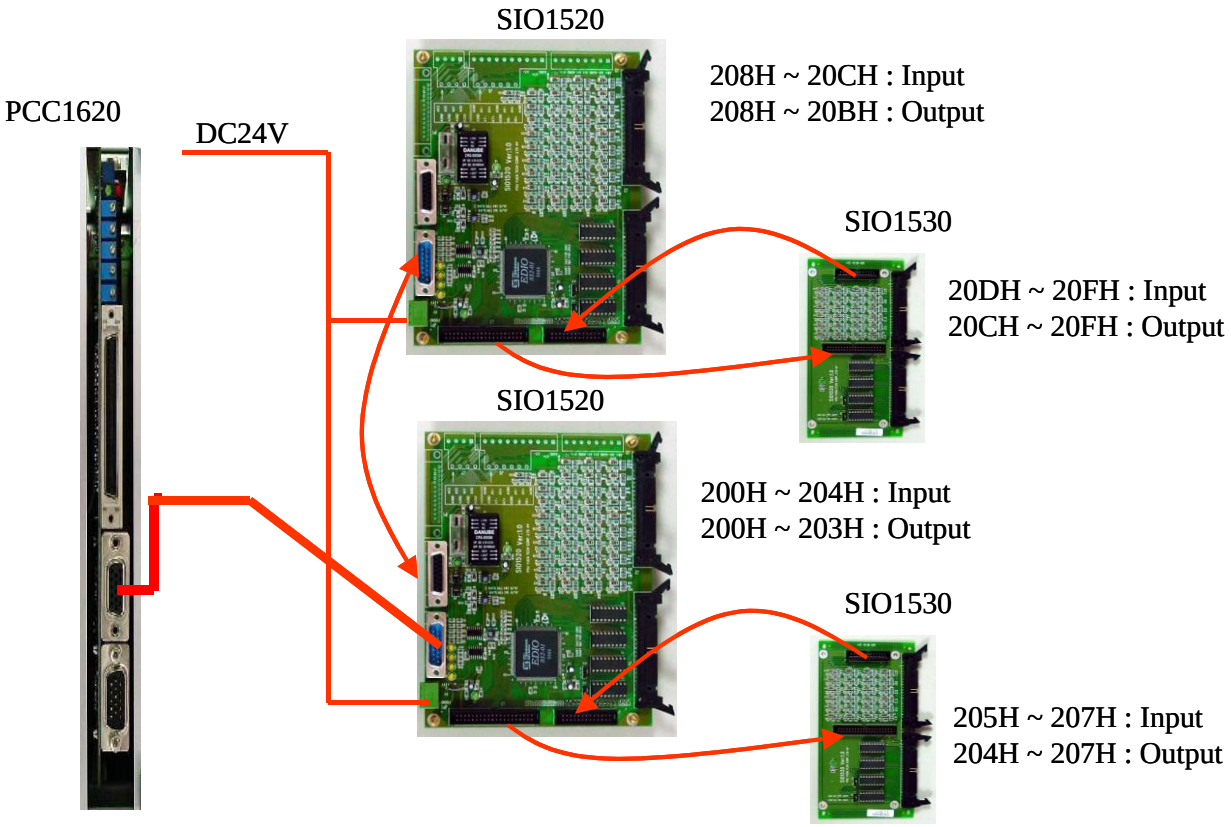
2.8 PLC initialize sets (PLCIO.CFG)

In LNCMILL\MACHINE, file name is PLCIO.CFG, this file is to set PLC I/O configuration and definition, file content is as following：

```
InputSignalInverse=0        // I point is reverse turning, 0=No , 1=Yes
OutputSignalInverse=0       // O point is reverse turning, 0=No , 1=Yes
BaseAddress=0x200           // pcc1620 base address
Set1Slave1=1                    // whether to use Set1's Slave1, 0=No, 1=Yes
Set1Slave2=0                    // whether to use Set1's Slave2, 0=No, 1=Yes
Set2Slave1=1                    // whether to use Set2's Slave1, 0=No, 1=Yes
Set2Slave2=0                    // whether to use Set2's Slave2, 0=No, 1=Yes
I     0     1     0x200             // column [I or O][NUMBER][SET][ADDRESS][able to add footnote]
I     8     1     0x201             // no blank space in between
I     16    1     0x202             // I or i is okay
I     24    1     0x203             // O or o is okay
I     32    1     0x204             // SET=1means SET1, SET=2 means SET2
I     40    2     0x200             // must starts from I0
O     0     1     0x200             // O point must be set as even number.
O     16    1     0x202
O     32    2     0x200
O     48    2     0x202
```

（Note）I 0 1 0x200





Due to user option I/O board and different connection methods, need to define on different I/O address. For the above diagram, due to connect to RIO1, the I/O address must be defined to SET 1.

3 Parameters

Parameters separated into 7 types: servo parameter, machine parameter, spindle parameter, MPG parameter, compensation parameter, original parameter, and operation parameter.

Note:

1. Four effective times due to different parameter setting values.
   a：Effective immediately
   b：Effective after RESET（R）
   c：Effective after rebooting（⊙）
   d：Effective after re-power on（ㄣ）
2. Two types of authorization status according to each parameter's functions. However, under 【End-User】status, some parameter will NOT occur：
   a：End-user
   b：Machine maker
3. Some parameters use Bit method to set whether or not to enable a certain function. Usually, Bit0 corresponds X axis, Bit1 corresponds Y axis, Bit2 corresponds Z axis. The setting method is as below:
   Bit0：1 means 1 in 1, 2, 4, 8, 16, 32 and so on
   Bit1：1 means 2 in 1, 2, 4, 8, 16, 32 and so on；
   Bit2：1 means 4 in 1, 2, 4, 8, 16, 32 and so on；
   Bit3：1 means 8 in 1, 2, 4, 8, 16, 32 and so on；
   Bit4：1 means 12 in 1, 2, 4, 8, 16, 32 and so on；
   So, if want to set a certain Bit to 1, only need to adding up the corresponding value into the parameter. For example, if want to set both Bit1 and Bit3 to 1, the setting value of this parameter is 10（2 + 8）.

3.1 Parameters

No	Group	Description	Effective	Level	Page
1	Servo	SYSTEM LOOP GAINS FOR V CMD	⊙	Machine Maker	**78**
2	Servo	MAX. SERVO LAG OF X AXIS, μm	R	Machine Maker	**78**
3	Servo	MAX. SERVO LAG OF Y AXIS, μm	R	Machine Maker	**78**
4	Servo	MAX. SERVO LAG OF Z AXIS, μm	R	Machine Maker	**78**
5	Servo	MAX. SERVO LAG OF THE 4TH AXIS, μm	R	Machine Maker	**78**
6	Servo	IN-POSITION CHECK WINDOW OF X AXIS, μm	R	Machine Maker	**78**
7	Servo	IN-POSITION CHECK WINDOW OF Y AXIS, μm	R	Machine Maker	**78**
8	Servo	IN-POSITION CHECK WINDOW OF Z AXIS, μm	R	Machine Maker	**78**
9	Servo	IN-POSITION CHECK WINDOW OF THE 4TH AXIS, μm	R	Machine Maker	**78**
10	Servo	G00'S ACCEL. /DECEL. TIME OF X AXIS, ms	⊙	Machine Maker	**79**
11	Servo	G00'S ACCEL. /DECEL. TIME OF Y AXIS, ms	⊙	Machine Maker	**79**
12	Servo	G00'S ACCEL. /DECEL. TIME OF Z AXIS, ms	⊙	Machine Maker	79
13	Servo	G00'S ACCEL. /DECEL. TIME OF THE 4TH AXIS, ms	⊙	Machine Maker	**79**
14	Servo	G01 ACCEL. /DECEL. TIME	⊙	Machine Maker	79
15	MPG	CORRESPONDING MECHANICAL AXIS OF MPG SIMULATED AXIS	⊙	Machine Maker	118
16	Spindle	ACC/DEC TIME OF 1ST SPINDLE	⊙	Machine Maker	98
17		reserve			
18	Servo	THREAD CUTTING ACC/DEC TIME	⊙	Machine Maker	**118**
19	Zero Point	SOLUTIONS WHEN HOME IS ON DOG	R	Machine Maker	**127**
20	Zero Point	DEFAULT SETTING OF HOME RETURN BIT	⊙	Machine Maker	**127**
21	Spindle	RPM OF THE 1ST SPINDLE'S ORIENTATION	R	Machine Maker	**98**
22		reserve			
23	Operation	Each axis JOG feed rate 0)R17 1)R90-R95	⊙	Machine Maker	**143**
24	Servo	CORRESPONDING SERVO AXIS NUMBER OF X AXIS	⊙	Machine Maker	**79**
25	Servo	CHANNEL NO FOR Y AXIS	⊙	Machine Maker	**79**
26	Servo	CORRESPONDING SERVO AXIS NUMBER OF Z AXIS	⊙	Machine Maker	**79**
27	Servo	CORRESPONDING SERVO AXIS NUMBER OF THE 4TH AXIS	⊙	Machine Maker	**79**

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28	MPG	MPG CONNECTION PORT OF X AXIS	⊙	Machine Maker	**119**
29	Spindle	THE CORRESPONDING SERVO AXIS NUMBER OF THE 1ST SPINDLE	⊙	Machine Maker	**98**
30	Zero Point	OFFSET AMOUNT OF HOME RETURN: X AXIS μm	R	Machine Maker	**127**
31	Zero Point	OFFSET AMOUNT OF HOME RETURN: Y AXIS μm	R	Machine Maker	**127**
32	Zero Point	OFFSET AMOUNT OF HOME RETURN: Z AXIS μm	R	Machine Maker	**127**
33	Zero Point	OFFSET AMOUNT OF HOME RETURN: THE 4TH AXIS μm	R	Machine Maker	**127**
34	Zero Point	IDLE DURATION FOR X AXIS TO SEARCH FOR ZERO POINT 10ms	R	Machine Maker	**128**
35	Zero Point	IDLE DURATION FOR Y AXIS TO SEARCH FOR ZERO POINT 10ms	R	Machine Maker	**128**
36	Zero Point	IDLE DURATION FOR Z AXIS TO SEARCH FOR ZERO POINT 10ms	R	Machine Maker	**128**
37	Zero Point	IDLE DURATION FOR THE 4TH AXIS TO SEARCH FOR ZERO POINT 10ms	R	Machine Maker	**128**
38	Compensation	BACKLASH COMPENSATION UNIT 0)PULSE 16)μm	⊙	Machine Maker	**120**
39	Operation	G92 IS CANCELLED AT G54~G59	R	User	**143**
40	Servo	G00'S LOWEST OVERRIDE AT F0	R	User	**79**
41	Operation	SYNCHRONIC MOTION OF G00 COMMAND 0)NO 1)YES	R	User	**143**
42	Operation	COMMENT TYPE 0:/*...*/ 1 :(...)	R	User	**144**
43	Operation	FLAG OF EXACT CHECK	R	User	**144**
44	Compensation	BACKLASH COMPENSATION AMOUNT OF X AXIS μm	R	Machine Maker	**120**
45	Compensation	BACKLASH COMPENSATION AMOUNT OF Y AXIS μm	R	Machine Maker	**120**
46	Compensation	BACKLASH COMPENSATION AMOUNT OF Z AXIS μm	R	Machine Maker	**120**
47	Compensation	BACKLASH COMPENSATION AMOUNT OF THE 4TH AXIS μm	R	Machine Maker	**120**
48	Zero Point	HOME SEARCH METHOD BIT	⊙	Machine Maker	**128**
49	Spindle	MOTOR'S TOOTH NUMBER OF THE 1ST SPINDLE IN 1ST GEAR	⊙	Machine Maker	**99**
50	Spindle	THE 1ST SPINDLE'S TEETH NUMBER IN 1ST GEAR	⊙	Machine Maker	**99**
51	Spindle	TOOTH NUMBER OF THE 1ST SPINDLE'S MOTOR IN 2ND GEAR	⊙	Machine Maker	**100**
52	Spindle	TOOTH NUMBER OF THE 1ST SPINDLE IN 2ND GEAR	⊙	Machine Maker	**100**
53	Servo	ENCODER FEEDBACK MULTIPLIER OF THE 4TH AXIS 1/2/4	⊙	Machine Maker	**80**
54	Servo	ENCODER FEEDBACK MULTIPLIER OF X AXIS 1/2/4	⊙	Machine Maker	**80**
55	Servo	ENCODER FEEDBACK MULTIPLIER OF Y AXIS 1/2/4	⊙	Machine Maker	**80**
56	Servo	ENCODER FEEDBACK MULTIPLIER OF Z AXIS 1/2/4	⊙	Machine Maker	**80**
57	Spindle	FEEDBACK RATE OF THE 1ST SPINDLE	⊙	Machine Maker	**101**

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58~61		Non			
62	Machine	UNIT OF Pr.0104 ~ Pr.0107 0) METRIC 1) IMPERIAL	⊙	Machine Maker	**96**
63	Operation	SET RELATIVE COORDINATES ACCORDING TO ABSOLUTE COORIDNATES 0)NO 1)YES	R	User	**145**
64	Zero Point	HOME DOG SENSOR IS 0)NC 1)NO	⊙	Machine Maker	**128**
65	Servo	ABSOLUTE ENCODER BIT 0-3	⊙	Machine Maker	**80**
66	Servo	SET THE 4TH AXIS AS A 0)RATORY 1)LINEAR AXIS	⊙	Machine Maker	**81**
67		Non			
68	Machine	TOOTH NUMBER OF X AXIS MOTOR (DENOMINATOR IN GEAR RATIO)	⊙	Machine Maker	**96**
69	Machine	TOOTH NUMBER OF Y AXIS'S MOTOR (DENOMINATOR IN GEAR RATIO)	⊙	Machine Maker	**96**
70	Machine	TOOTH NUMBER OF Z AXIS'S MOTOR (DENOMINATOR IN GEAR RATIO)	⊙	Machine Maker	**96**
71	Operation	PATH CHECK G22 ADOPTS 0)OUTSIDE 1)INSIDE	R	User	**145**
72	Machine	TOOTH NUMBER OF THE 4TH AXIS'S MOTOR (DENOMINATOR IN GEAR RATIO)	⊙	Machine Maker	**96**
73	Operation	ACCELERATION/DECELERATION OF G31 0)NO 1)YES	⊙	Machine Maker	**145**
74	Operation	EXECUTE SINGLE BLOCK OF MACRO	R	User	**146**
75	MPG	MPG CONNECTION PORT OF THE 4TH AXIS	⊙	Machine Maker	**119**
76	Zero Point	SET ABSOLUTE COORD. AFTER HOME RETURN 0)NO 1)YES	R	Machine Maker	**129**
77	Zero Point	G00 1)DISABLED 0) 1)EFFECTIVE	R	User	**129**
78	Operation	ENABLE C AXIS TANGENT FOLLOW	⊙	User	
79	Zero Point	X AXIS'S ZERO POINT IS 0)AFTER 1)BEFORE DOG	R	Machine Maker	**130**
80	Zero Point	Y AXIS'S ZERO POINT IS 0)AFTER 1)BEFORE DOG	R	Machine Maker	**130**
81	Zero Point	Z AXIS'S ZERO POINT IS 0)AFTER 1)BEFORE DOG	R	Machine Maker	**130**
82	Zero Point	THE 4TH AXIS'S ZERO POINT IS 0)AFTER 1)BEFORE DOG	R	Machine Maker	**130**
83	Operation	G00 IS 0)DISABLED 1)EFFECTIVE IN DRY RUN	R	User	**146**
84	Spindle	THE 1ST SPINDLE ORIENTATION 0)SENSOR 1)ENCODER	R	Machine Maker	**101**
85~86		Non			
87	MPG	MPG CONNECTION PORT OF Y AXIS	⊙	Machine Maker	**119**
88	MPG	MPG CONNECTION PORT OF Z AXIS	⊙	Machine Maker	**119**
89	Operation	SET M CODE COMMAND OF PART COUNT BY USER	R	User	**147**
90	Spindle	THE 1ST SPINDLE DISPLAYS 0)COMMAND 1) SENSOR		Machine Maker	**102**
91~92		Non			
93		reserve			
94	Operation	EDIBILITY OF 09XXX 0)NO 1)YES		Machine Maker	**147**

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95	Spindle	MIN. SPEED OF THE 1ST SPINDLE	R	Machine Maker	**102**
96~97		Non			
98	Spindle	VOLTAGE COMMAND'S OFFSET VALUE OF THE 1ST SPINDLE'S RPM	R	Machine Maker	**103**
99		Non			
100	Machine	BALL SCREW'S TOOTH NUMBER OF X AXIS (NUMERATOR IN GEAR RATIO)	⊙	Machine Maker	**96**
101	Machine	BALL SCREW'S TOOTH NUMBER OF Y AXIS (NUMERATOR IN GEAR RATIO)	⊙	Machine Maker	**96**
102	Machine	BALL SCREW'S TOOTH NUMBER OF Z AXIS (NUMERATOR IN GEAR RATIO)	⊙	Machine Maker	**96**
103	Machine	BALL SCREW'S TOOTH NUMBER OF THE 4TH AXIS (NUMERATOR IN GEAR RATIO)	⊙	Machine Maker	**96**
104	Machine	BALL SCREW PITCH. OF X AXIS	⊙	Machine Maker	**97**
105	Machine	BALL SCREW PITCH. OF Y AXIS	⊙	Machine Maker	**97**
106	Machine	BALL SCREW PITCH. OF Z AXIS	⊙	Machine Maker	**97**
107	Machine	BALL SCREW PITCH. OF THE 4TH AXIS	⊙	Machine Maker	**97**
108	Servo	RPM TO VOLTAGE RATIO FOR X AXIS RPM/1V	⊙	Machine Maker	**81**
109	Servo	RPM TO VOLTAGE RATIO FOR Y AXIS RPM/1V	⊙	Machine Maker	**81**
110	Servo	RPM TO VOLTAGE RATIO FOR Z AXIS RPM/1V	⊙	Machine Maker	**81**
111	Servo	RPM TO VOLTAGE RATIO FOR THE 4TH AXIS RPM/1V	⊙	Machine Maker	**81**
112	Compensation	TOTAL SESSION NUMBER OF PITCH ERROR COMPENSATION OF X AXIS	⊙	Machine Maker	**120**
113	Compensation	TOTAL SESSION NUMBER OF PITCH ERROR COMPENSATION OF Y AXIS	⊙	Machine Maker	**120**
114	Compensation	TOTAL SESSION NUMBER OF PITCH ERROR COMPENSATION OF Z AXIS	⊙	Machine Maker	**120**
115	Compensation	TOTAL SESSION NUMBER OF PITCH ERROR COMPENSATION OF THE 4TH AXIS	⊙	Machine Maker	**120**
116	Servo	MOVING DIR OF EACH AXIS	⊙	Machine Maker	**81**
117	Compensation	BACKLASH COMPENSATION FUNCTION BIT	R	Machine Maker	**121**
118	Compensation	DIRECTION OF PITCH ERROR COMPENSATION BIT	⊙	Machine Maker	**121**
119	Compensation	PITCH ERROR COMPENSATION FUNCTION BIT	⊙	Machine Maker	**121**
120	Zero Point	DIRECTION OF HOME RETURN FOR EACH AXIS BIT	⊙	Machine Maker	**130**
121	Operation	Tool fleeing direction when G76/G87 Cycle process	R	User	**147**
122	Operation	NAME THE 4TH AXIS (ABCUVW)	⊙	Machine Maker	**148**
123	Operation	UNIT SYSTEM 0)G21 METRIC 1)G20 IMPERIAL	⊙	User	**148**
124	Operation	INITIAL MOTION COMMAND 0)G00 1)G01	⊙	User	**148**
125~128		Non			

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129	Operation	G02 G03 Curve tolerance range	R	User	**148**
130	Operation	UNIT OF INPUT VALUE	R	User	**149**
131	Operation	CUTTER COMPENSATION TYPE 0)A 1)B	R	Machine Maker	**149**
132~133		Non			
134	Operation	G83/G87 EXTRACT 0)ESCAPE 1)R	R	User	**149**
135	Operation	DEFAULT COORDINATES 0)ABSOLUTE G90 1)INCREMENTAL G91	⊙	User	**149**
136	Operation	X SCALING IS EFFECTIVE OR NOT	R	User	**150**
137	Operation	Y SCALING IS EFFECTIVE OR NOT	R	User	**150**
138	Operation	Z SCALING IS EFFECTIVE OR NOT	R	User	**150**
139	Operation	RADIUS COMP SYMBOL SET	R	User	**150**
140	Operation	GLOBAL VARIABLES AFTER RESET 0)DELETED 1)PRESERVED	R	User	**150**
141	Operation	LOCAL VARIABLES AFTER RESET 0)DELETED 1)PRESERVED	R	User	**150**
142	Operation	ABS/RLT ROTATION COMMAND	R	User	**151**
143	Operation	CODE FOR SCALING	R	User	**151**
144		Non			
145	Operation	DEFAULT PLANE 0)XY 1)ZX 2)YZ	⊙	Machine Maker	**151**
146	Operation	M CODE FOR MACRO O9001	R	Machine Maker	**151**
147	Operation	M CODE FOR MACRO O9002	R	Machine Maker	**151**
148	Operation	M CODE FOR MACRO O9003	R	Machine Maker	**151**
149	Operation	DEFAULT FEED RATE	⊙	User	**152**
150	Operation	TOOL ESCAPE AMOUNT IN DRILLING CYCLE	R	User	**152**
151		Non	R		
152	Operation	ROTARY PATH OF THE 4TH AXIS	R	User	**153**
153~154		Non	⊙		
155	Operation	UNIT OF INITIAL FEED RATE 0)MM/REV 1)MM/MIN	⊙	User	**153**
156	Servo	COMMAND TYPE OF X AXIS 0)AB 1)CW 2)PD 3)V	⊙	Machine Maker	**81**
157	Servo	COMMAND TYPE OF Y AXIS 0)AB 1)CW 2)PD 3)V	⊙	Machine Maker	**81**
158	Servo	COMMAND TYPE OF Z AXIS 0)AB 1)CW 2)PD 3)V	⊙	Machine Maker	**81**
159	Servo	COMMAND TYPE OF THE 4TH AXIS 0)AB 1)CW 2)PD 3)V	⊙	Machine Maker	**82**
160		Non			
161	Operation	M CODE FOR MACRO O9004	R	Machine Maker	**153**
162	Operation	M CODE FOR MACRO O9005	R	Machine Maker	**153**
163	Operation	M CODE FOR MACRO O9006	R	Machine Maker	**153**
164	Operation	M CODE FOR MACRO O9007	R	Machine Maker	**153**
165	Operation	M CODE FOR MACRO O9008	R	Machine Maker	**153**

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166	Operation	G CODE FOR MACRO O9010	R	Machine Maker	**153**
167	Operation	G CODE FOR MACRO O9011	R	Machine Maker	**153**
168	Operation	G CODE FOR MACRO O9012	R	Machine Maker	**153**
169	Operation	T CODE CALLS O9020	R	Machine Maker	**153**
170	Operation	MODAL UPDATE AFTER MDI TO MEM	R	User	**154**
171	Spindle	FEEDBACK DIR. OF SPINDLES(BIT)	⊙	Machine Maker	**103**
172~174		Non	⊙		
175	Zero Point	HOME DOG I POINT 0)LOCAL 1)REMOTE	⊙	Machine Maker	**131**
176	Operation	LOCAL PORT NO FOR G31 P1	R	Machine Maker	**154**
177	Operation	G31 SIGNAL SOURCE TYPE 0)NC 1)NO	R	Machine Maker	**154**
178	Spindle	TOOTH NUMBER OF THE 1ST SPINDLE'S MOTOR IN 3RD GEAR	⊙	Machine Maker	**104**
179	Spindle	TOOTH NUMBER OF THE 1ST SPINDLE IN 3RD GEAR	⊙	Machine Maker	**104**
180	Operation	MANUAL RETURN	R	User	**155**
181	Spindle	TOOTH NUMBER OF THE 1ST SPINDLE'S MOTOR IN 4TH GEAR	⊙	Machine Maker	**104**
182	Spindle	TOOTH NUMBER OF THE 1ST SPINDLE IN 4TH GEAR	⊙	Machine Maker	**105**
183	Spindle	COMMAND TYPE OF THE 1ST SPINDLE'S SPEED	⊙	Machine Maker	**105**
184	Spindle	LOCAL INPUT OF THE 1ST SPINDLE'S ORIENTATION	R	Machine Maker	**107**
185	Servo	INV POS FEEDBACK OF EACH AXIS	⊙	Machine Maker	**82**
186	Servo	Enable or not, pulse rise automatically adjust		Machine Maker	**83**
187	Operation	AUTO ARC FEED RATE CLAMP 0)NO 1)YES	R	User	**156**
188	Servo	POSITION LOOP GAIN OF SERVO AXIS IN PULSE COMMAND 1/sec.	R	Machine Maker	**83**
189	Spindle	DEFAULT INITIAL SPEED OF THE 1ST SPINDLE	⊙	User	**107**
190	Spindle	POSITION COMMAND TYPE	⊙	Machine Maker	**107**
191	Servo	ENCORDER SIGNAL TYPE OF X AXIS	⊙	Machine Maker	**83**
192	Servo	ENCORDER SIGNAL TYPE OF Y AXIS	⊙	Machine Maker	**83**
193	Servo	ENCORDER SIGNAL TYPE OF Z AXIS	⊙	Machine Maker	**83**
194	Servo	ENCORDER SIGNAL TYPE OF THE 4TH AXIS	⊙	Machine Maker	**83**
195	Spindle	SIGNAL TYPE OF THE 1ST SPINDLE'S ENCODER	⊙	Machine Maker	**108**
196~199		Non			
200	Operation	FEEDRATE DISPLAY 0)COMMAND 1)ACTUAL FEEDBACK	R	User	**157**
201		Non			

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202	Operation	OPERATION LANGUAGE 0)ENGLISH 1)TRADITIONAL CHINESE 2)SIMPLIFIED CHINESE	⊙	User	**157**
203		Non			
204	Zero Point	ZERO POINT RECORDED BY NC BIT	R	Machine Maker	**132**
205	Operation	TOOL COMPENSATION 0)ABSOLUTE 1) RELATIVE INPUT	R	User	**157**
206~207		Non			
208	Zero Return	REFERENCE MARKS OF LINEAR SCALE	⊙	Machine Maker	**28**
209	Zero Return	HOME RETURN FOR LINEAR SCALE	R	Machine Maker	**28**
210	Zero Return	HOME POINT FOR LINEAR SCALE	R	Machine Maker	**28**
211	Operation	STOP PRE-INTERPRETATION OF M CODE	R	User	**157**
212	Operation	STOP PRE-INTERPRETATION OF M CODE	R	User	**157**
213	Operation	STOP PRE-INTERPRETATION OF M CODE	R	User	**157**
214	Operation	STOP PRE-INTERPRETATION OF M CODE	R	User	**157**
215	Operation	STOP PRE-INTERPRETATION OF M CODE	R	User	**157**
216	Operation	STOP PRE-INTERPRETATION OF M CODE	R	User	**157**
217	Operation	STOP PRE-INTERPRETATION OF M CODE	R	User	**157**
218	Operation	STOP PRE-INTERPRETATION OF M CODE	R	User	**157**
219	Operation	STOP PRE-INTERPRETATION OF M CODE	R	User	**157**
220	Operation	STOP PRE-INTERPRETATION OF M CODE	R	User	**157**
221	Operation	DIGITAL FILTER FREQUENCY (KHZ)	⊙	Machine Maker	**158**
222		Non			
223	Operation	AXES MANUAL RETURN(BIT)	R	Machine Maker	**158**
224	Spindle	2ND SPD SPEED CHK 0)ACT 1)CMD	R	Machine Maker	**110**
225	Spindle	3RD SPD SPEED CHK 0)ACT 1)CMD	R	Machine Maker	**110**
226	Spindle	MOVING DIR. OF SPINDLES(BIT)	⊙	Machine Maker	**108**
227~230		Non			
231	Operation	HIDE INFORMATION OF X AXIS		Machine Maker	**159**
232	Operation	HIDE INFORMATION OF Y AXIS		Machine Maker	**159**
233	Operation	HIDE INFORMATION OF Z AXIS		Machine Maker	**159**
234	Operation	HIDE INFORMATION OF THE 4TH AXIS		Machine Maker	**159**
235~236		reserve			
237		Non			
238	Operation	Coordinate detection page(0:ON 1:OFF)	R	User	**83**
239		Non		User	
240	Spindle	CLOSE LOOP GAIN OF THE 1ST SPINDLE'S ORIENTATION	R	Machine Maker	**109**
241	Spindle	1ST SPD POS GAIN AT RIGID TAP	R	Machine Maker	**109**
242~247		Non			

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248	Spindle	1ST SPD ORIENT OFFSET UNIT	R	Machine Maker	**109**
249	Operation	DISPLAY ABNORMALITY OF RAMDISK 0)OFF 1)ON	⊙	Machine Maker	**159**
250~251		reserve			
252~253		Non			
254~291		reserve			
292	Operation	ENABLE C AXIS PATH FOLLOWING	⊙	User	**146**
293	Zero Point	REFERENCE OF SERVO AXIS'S ZERO POINT	⊙	Machine Maker	**133**
294	Spindle	CORRESPONDING TO 2ND SPINDLE	⊙	Machine Maker	**98**
295	Spindle	CORRESPONDING TO 3RD SPINDLE	⊙	Machine Maker	**98**
296	Spindle	COMMAND TYPE OF THE 2ND SPINDLE'S SPEED	⊙	Machine Maker	**105**
297	Spindle	COMMAND TYPE OF THE 3RD SPINDLE'S SPEED	⊙	Machine Maker	**105**
298	Spindle	RPM REACHES SET RANGE OF THE 2ND SPINDLE	R	Machine Maker	**110**
299	Spindle	THE 2ND SPINDLE REACHES ZERO SPEED RPM	R	Machine Maker	**112**
300~349	Compensation	PITCH ERROR COMPENSATION OF 001~050 SESSION OF X AXIS μm	R	Machine Maker	**122**
351	Operation	UNIT OF CUTTING OVERRIDE FEED RATE	⊙	Machine Maker	**160**
352	Operation	UNIT OF JOG OVERRIDE	⊙	Machine Maker	**160**
353	Operation	UNIT OF RAPID TRAVERSDE OVERRIDE	⊙	Machine Maker	**160**
354	Spindle	OVERRIDE UNIT OF THE 1ST SPINDLE'S RPM	⊙	Machine Maker	**109**
355	Spindle	OVERRIDE UNIT OF THE 2ND SPINDLE'S RPM	⊙	Machine Maker	**109**
356	Spindle	OVERRIDE UNIT OF THE 3RD SPINDLE'S RPM	⊙	Machine Maker	**109**
357		reserve			
358	Compensation	ENABLE THERMO DEFORMED CMP	⊙	Machine Maker	**122**
359	Compensation	ALLOWANCE OF THERMO CMP INPUT		Machine Maker	**122**
360	Operation	SET OPERATION SCREEN COLOR (0~3)	⊙	User	**160**
361	Operation	SET THE NUMBER FOR BLACK (0~16)	⊙	User	**161**
362	Operation	SET THE NUMBER FOR BLUE (0~16)	⊙	User	**161**
363	Operation	SET THE NUMBER FOR GREEN (0~16)	⊙	User	**161**
364	Operation	SET THE NUMBER FOR CYAN (0~16)	⊙	User	**161**
365	Operation	SET THE NUMBER FOR RED (0~16)	⊙	User	**161**
366	Operation	SET THE NUMBER FOR PURPLE (0~16)	⊙	User	**161**
367	Operation	SET THE NUMBER FOR BROWN (0~16)	⊙	User	**161**
368	Operation	SET THE NUMBER FOR WHITE (0~16)	⊙	User	**161**
369	Operation	SET THE NUMBER FOR GRAY (0~16)	⊙	User	**161**
370	Operation	SET THE NUMBER FOR LIGHT BLUE (0~16)	⊙	User	**161**
371	Operation	SET THE NUMBER FOR LIGHT GREEN (0~16)	⊙	User	**161**

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372	Operation	SET THE NUMBER FOR LIGHT CYAN (0~16)	⊙	User	**161**
373	Operation	SET THE NUMBER FOR LIGHT RED (0~16)	⊙	User	**161**
374	Operation	SET THE NUMBER FOR LIGHT PURPLE (0~16)	⊙	User	**161**
375	Operation	SET THE NUMBER FOR YELLOW COLOR (0~16)	⊙	User	**161**
376	Operation	SET THE NUMBER FOR BRIGHT WHITE COLOR (0~16)	⊙	User	**161**
377	Operation	SET THE NUMBER FOR CURSOR (0~16)	⊙	User	**161**
378	Operation	SET THE NUMBER FOR HIGHLIGHT (0~16)	⊙	User	**161**
379	Operation	SET THE NUMBER FOR UPPER FRAME (0~16)	⊙	User	**161**
380	Operation	SET THE NUMBER FOR LOWER FRAME (0~16)	⊙	User	**161**
381	Operation	Cutting speed lock on curve surface	R	User	**161**
382~392		Non			
393	Spindle	1st SP gear change 0)Auto 1)Manual	⊙	Machine Maker	**109**
394	Operation	SCREENSAVER WAIT TIME	⊙	User	**161**
395	Operation	Operation record ON 1)Y 0)N	⊙	Machine Maker	**162**
396	Operation	Set the work path using method.	⊙	Machine Maker	**162**
397	Operation	M98 calling file name format: (0)4 digit (1)7 digit	R	User	**162**
398	Servo	Set the PMC axis G00 acceleration time /ms	⊙	Machine Maker	**84**
399	Servo	Set the PMC axis G01 acceleration time /ms	⊙	Machine Maker	**84**
400	Servo	[R1]Cutting Linear acceleration time /ms	R	Machine Maker	**84**
401	Servo	[R1]Cutting bell shape acceleration time /ms	R	Machine Maker	**84**
402	Servo	[R1]Cutting smooth acceleration time /ms	R	Machine Maker	**85**
403	Servo	[R1]After cutting acceleration time /ms	R	Machine Maker	**85**
404	Servo	[R1]Round speed lock um/min	R	Machine Maker	**85**
405	Servo	[R1]Round minim speed lock um/min	R	Machine Maker	**85**
406	Servo	SHINING MODE	R	Machine Maker	**85**
407	Servo	Activate feed forward	R	Machine Maker	**85**
408	Servo	G05R_default value	R	User	**85**
409	Servo	Curve fitting tolerance (um)	R	Machine Maker	**86**
410	Servo	[R1]X Corner speed difference um/min	R	Machine Maker	**86**
411	Servo	[R1]Y Corner speed difference um/min	R	Machine Maker	**86**
412	Servo	[R1]Z Corner speed difference um/min	R	Machine Maker	**86**

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413	Servo	[R1]4th Corner speed difference um/min	R	Machine Maker	**86**
414~415		reserve			
416	Servo	X stops Servo lag check um	R	Machine Maker	**86**
417	Servo	Y stops Servo lag check um	R	Machine Maker	**86**
418	Servo	Z stops Servo lag check um	R	Machine Maker	**86**
419	Servo	4th stops Servo lag check um	R	Machine Maker	**86**
420~421		reserve			
422	Servo	X position loop gain 1/s	R	Machine Maker	**87**
423	Servo	Y position loop gain 1/s	R	Machine Maker	**87**
424	Servo	Z position loop gain 1/s	R	Machine Maker	**87**
425	Servo	4th position loop gain 1/s	R	Machine Maker	**87**
426~427		reserve			
428		Non			
429	Servo	Corner method 0) Normal 1)Speed difference 2) referenced	R	Machine Maker	**87**
430	Servo	[R1] Corner reference speed um/min	R	Machine Maker	**87**
431	Servo	[R1]X speed feed forward (%%)	R	Machine Maker	**87**
432	Servo	[R1]Y speed feed forward (%%)	R	Machine Maker	**87**
433	Servo	[R1]Z speed feed forward (%%)	R	Machine Maker	**87**
434	Servo	[R1]4th speed feed forward (%%)	R	Machine Maker	**87**
435~436		reserve			
437	Servo	X feed forward acceleration time (ms)	R	Machine Maker	**88**
438	Servo	Y feed forward acceleration time (ms)	R	Machine Maker	**88**
439	Servo	Z feed forward acceleration time (ms)	R	Machine Maker	**88**
440	Servo	4th feed forward acceleration time (ms)	R	Machine Maker	**88**
441~442		reserve			
443~449		Non			
450~499	Compensation	PITCH ERROR COMPENSATION OF 001 ~050 SESSION OF Y AXIS μm	R	Machine Maker	**122**
500	Servo	In synchronization X follow target axis Name	⊙	Machine Maker	**88**
501	Servo	In synchronization Y follow target axis Name	⊙	Machine Maker	**88**
502	Servo	In synchronization Z follow target axis Name	⊙	Machine Maker	**88**
503	Servo	In synchronization 4^{th} follow target axis Name	⊙	Machine Maker	**88**
504~505		reserve			

No	Group	Description	Effective	Level	Page
506	Servo	In synchronization X direction setup as a follower.	⊙	Machine Maker	**88**
507	Servo	In synchronization Y direction setup as a follower.	⊙	Machine Maker	**88**
508	Servo	In synchronization Z direction setup as a follower.	⊙	Machine Maker	**88**
509	Servo	In synchronization 4th direction setup as a follower.	⊙	Machine Maker	**88**
510~511		Reserve			
512	Servo	Analog voltage detect card address	⊙	Machine Maker	**162**
513	Servo	Analog voltage detect	⊙	Machine Maker	**162**
514	Operation	1ST Analog voltage detect range	⊙	Machine Maker	**162**
515	Operation	2ND Analog voltage detect range	⊙	Machine Maker	**162**
516	Operation	3RD Analog voltage detect range	⊙	Machine Maker	**162**
517	Operation	4TH Analog voltage detect range	⊙	Machine Maker	**162**
518	Operation	5TH Analog voltage detect range	⊙	Machine Maker	**162**
519	Operation	6TH Analog voltage detect range	⊙	Machine Maker	**163**
520	Operation	7TH Analog voltage detect range	⊙	Machine Maker	**163**
521	Operation	8TH Analog voltage detect range	⊙	Machine Maker	**163**
522	Operation	1ST Analog voltage detects minim value.	⊙	Machine Maker	**163**
523	Operation	1ST Analog voltage detects max value.	⊙	Machine Maker	**163**
524	Operation	2ND Analog voltage detects minim value.	⊙	Machine Maker	**163**
525	Operation	2ND Analog voltage detects max value.	⊙	Machine Maker	**163**
526	Operation	3RD Analog voltage detects minim value.	⊙	Machine Maker	**163**
527	Operation	3RD Analog voltage detects max value.	⊙	Machine Maker	**163**
528	Operation	4TH Analog voltage detects minim value.	⊙	Machine Maker	**163**
529	Operation	4TH Analog voltage detects max value.	⊙	Machine Maker	**163**
530	Operation	5TH Analog voltage detects minim value.	⊙	Machine Maker	**163**
531	Operation	5TH Analog voltage detects max value.	⊙	Machine Maker	**163**
532	Operation	6TH Analog voltage detects minim value.	⊙	Machine Maker	**163**
533	Operation	6TH Analog voltage detects max value.	⊙	Machine Maker	**163**
534	Operation	7TH Analog voltage detects minim value.	⊙	Machine Maker	**163**

No	Group	Description	Effective	Level	Page
535	Operation	7TH Analog voltage detects max value.	⊙	Machine Maker	**163**
536	Operation	8TH Analog voltage detects minim value.	⊙	Machine Maker	**163**
537	Operation	8TH Analog voltage detects max value.	⊙	Machine Maker	**163**
538	Servo	Axis name which switch with X	⊙	Machine Maker	**89**
539	Servo	Axis name which switch with Y	⊙	Machine Maker	**89**
540	Servo	Axis name which switch with Z	⊙	Machine Maker	**89**
541	Servo	Axis name which switch with 4th	⊙	Machine Maker	**89**
542~543		reserve			
544	MPG	MPG X acceleration time (ms)	⊙	Machine Maker	**119**
545	MPG	MPG Y acceleration time (ms)	⊙	Machine Maker	**119**
546	MPG	MPG Z acceleration time (ms)	⊙	Machine Maker	**119**
547	MPG	MPG 4th acceleration time (ms)	⊙	Machine Maker	**119**
548~549		Reserve			
550	MPG	MPG X max speed (um/min)	R	Machine Maker	**119**
551	MPG	MPG Y max speed (um/min)	R	Machine Maker	**119**
552	MPG	MPG Z max speed (um/min)	R	Machine Maker	**119**
553	MPG	MPG 4th max speed (um/min)	R	Machine Maker	**119**
554~555		reserve			
556	Operation	LCD type (0~2)	⊙	Machine Maker	**163**
557		Non			
558	Operation	Process line No. record Time interval		Machine Maker	**163**
559		Non			
560	Operation	Floppy settings	⊙	Machine Maker	**164**
561	Operation	User interface group switch	⊙	Machine Maker	**164**
562	compensation	PLC axis compensation bit 0)OFF 1)ON	⊙	Machine Maker	**123**
563	compensation	PLC axis compensation X acceleration time ms	R	Machine Maker	**123**
564	compensation	PLC axis compensation Y acceleration time ms	R	Machine Maker	**123**
565	compensation	PLC axis compensation Z acceleration time ms	R	Machine Maker	**123**
566	compensation	PLC axis compensation 4^{th} acceleration time ms	R	Machine Maker	**123**
567~568		reserve			
569	compensation	X backlash compensation acceleration time ms	R	Machine Maker	**123**

No	Group	Description	Effective	Level	Page
570	compensation	Y backlash compensation acceleration time ms	R	Machine Maker	**123**
571	compensation	Z backlash compensation acceleration time ms	R	Machine Maker	**123**
572	compensation	4th backlash compensation acceleration time ms	R	Machine Maker	**123**
573~574		reserve			
575~599		Non			
600~649	Compensation	PITCH ERROR COMPENSATION OF 001~050 SESSION OF Z AXIS μm	R	Machine Maker	**123**
650	Operation	SET THE METHOD OF PROGRAM RESTART		User	**164**
651	Operation	Internet method 0)Net disk 1)ReCON	⊙	Machine Maker	**164**
652	Operation	Net monitor time out (sec)		Machine Maker	**164**
653	Operation	Activate Data Recorder	⊙	Machine Maker	**164**
654~662		Non			
663	Spindle	1ST SPD ORIENT ACC/DEC TIME	⊙	Machine Maker	**110**
664	Spindle	MOTOR'S TOOTH NUMBER OF THE 2ND SPINDLE IN 1ST GEAR	⊙	Machine Maker	**99**
665	Spindle	THE 2ND SPINDLE'S TEETH NUMBER IN 1ST GEAR	⊙	Machine Maker	**99**
666	Spindle	TOOTH NUMBER OF THE 2ND SPINDLE'S MOTOR IN 2ND GEAR	⊙	Machine Maker	**100**
667	Spindle	TOOTH NUMBER OF THE 2ND SPINDLE IN 2ND GEAR	⊙	Machine Maker	**100**
668	Spindle	TOOTH NUMBER OF THE 2ND SPINDLE'S MOTOR IN 3RD GEAR	⊙	Machine Maker	**104**
669	Spindle	TOOTH NUMBER OF THE 2ND SPINDLE IN 3RD GEAR	⊙	Machine Maker	**104**
670	Spindle	TOOTH NUMBER OF THE 2ND SPINDLE'S MOTOR IN 4TH GEAR	⊙	Machine Maker	**104**
671	Spindle	TOOTH NUMBER OF THE 2ND SPINDLE IN 4TH GEAR	⊙	Machine Maker	**105**
672	Spindle	MOTOR'S TOOTH NUMBER OF THE 3RD SPINDLE IN 1ST GEAR	⊙	Machine Maker	**99**
673	Spindle	THE 3RD SPINDLE'S TEETH NUMBER IN 1ST GEAR	⊙	Machine Maker	**99**
674	Spindle	TOOTH NUMBER OF THE 3RD SPINDLE'S MOTOR IN 2ND GEAR	⊙	Machine Maker	**100**
675	Spindle	TOOTH NUMBER OF THE 3RD SPINDLE IN 2ND GEAR	⊙	Machine Maker	**100**
676	Spindle	TOOTH NUMBER OF THE 3RD SPINDLE'S MOTOR IN 3RD GEAR	⊙	Machine Maker	**104**
677	Spindle	TOOTH NUMBER OF THE 3RD SPINDLE IN 3RD GEAR	⊙	Machine Maker	**104**
678	Spindle	TOOTH NUMBER OF THE 3RD SPINDLE'S MOTOR IN 4TH GEAR	⊙	Machine Maker	**104**
679	Spindle	TOOTH NUMBER OF THE 3RD SPINDLE IN 4TH GEAR	⊙	Machine Maker	**105**
680~699		Non			
700	Servo	[R10]Cutting Linear acceleration time ms	R	Machine Maker	**89**

No	Group	Description	Effective	Level	Page
701	Servo	[R10]Cutting bell shape acceleration time ms	R	Machine Maker	**89**
702	Servo	[R10]Smooth Cutting acceleration time ms	R	Machine Maker	**89**
703	Servo	[R10]After Cutting acceleration time ms	R	Machine Maker	**89**
704	Servo	[R10] round speed lock um/min	R	Machine Maker	**90**
705	Servo	[R10] round speed lock minimum/min	R	Machine Maker	**90**
706~709		Non			
710	Servo	[R10]X Corner speed difference um/min	R	Machine Maker	**90**
711	Servo	[R10]Y Corner speed difference um/min	R	Machine Maker	**90**
712	Servo	[R10]Z Corner speed difference um/min	R	Machine Maker	**90**
713	Servo	[R10]4TH Corner speed difference um/min	R	Machine Maker	**90**
714~715		Reserve			
716~729		Non			
730	Servo	[R10]Corner reference speed um/min	R	Machine Maker	**90**
731	Servo	[R10]X speed front feedback (%%)	R	Machine Maker	**90**
732	Servo	[R10]Y speed front feedback (%%)	R	Machine Maker	**90**
733	Servo	[R10]Z speed front feedback (%%)	R	Machine Maker	**90**
734	Servo	[R10]4th speed front feedback (%%)	R	Machine Maker	**90**
735~736		reserve			
737~749		Non			
750~799	Compensation	PITCH ERROR COMPENSATION OF 001 ~050SESSION OF THE 4TH AXIS μm	R	Machine Maker	**123**
800	Servo	G00'S IN-POSITION CHECK WINDOW OF X AXIS, μm	R	Machine Maker	**91**
801	Servo	G00'S IN-POSITION CHECK WINDOW OF Y AXIS, μm	R	Machine Maker	**91**
802	Servo	G00'S IN-POSITION CHECK WINDOW OF Z AXIS, μm	R	Machine Maker	**91**
803	Servo	G00'S IN-POSITION CHECK WINDOW OF THE 4TH AXIS, μm	R	Machine Maker	**91**
804	Operation	Screen saver		User	**165**
805~809		Non	R	User	
810	Operation	G101~G105 Rigid tapping setup	R	User	**165**
811	Compensation	BALL BAR COMPENSATION G CODE 0)G2 G3 1) ALL	R	Machine Maker	**124**
812	Compensation	REVERSAL SPIKE COMPENSATION: ＋X	R	Machine Maker	**124**
813	Compensation	DURATION OF REVERSAL SPIKE COMPENSATION: ＋X	R	Machine Maker	**124**
814	Compensation	REVERSAL SPIKE LAG COMPENSATION: ＋X	R	Machine Maker	**125**

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815	Compensation	REVERSAL SPIKE COMPENSATION: －X	R	Machine Maker	**125**
816	Compensation	DURATION OF REVERSAL SPIKE COMPENSATION: －X	R	Machine Maker	**126**
817	Compensation	REVERSAL SPIKE LAG COMPENSATION: －X	R	Machine Maker	**126**
818	Compensation	REVERSAL SPIKE COMPENSATION: ＋Y	R	Machine Maker	**124**
819	Compensation	DURATION OF REVERSAL SPIKE COMPENSATION: ＋Y	R	Machine Maker	**124**
820	Compensation	REVERSAL SPIKE LAG COMPENSATION: ＋Y	R	Machine Maker	**125**
821~824		Non			
825	Compensation	REVERSAL SPIKE COMPENSATION: －Y	R	Machine Maker	**125**
826	Compensation	DURATION OF REVERSAL SPIKE COMPENSATION: －Y	R	Machine Maker	**126**
827	Compensation	REVERSAL SPIKE LAG COMPENSATION: －Y	R	Machine Maker	**126**
828	Compensation	REVERSAL SPIKE COMPENSATION: ＋Z	R	Machine Maker	**124**
829	Compensation	DURATION OF REVERSAL SPIKE COMPENSATION: ＋Z	R	Machine Maker	**124**
830	Compensation	REVERSAL SPIKE LAG COMPENSATION: ＋Z	R	Machine Maker	**125**
831	Compensation	REVERSAL SPIKE COMPENSATION: －Z	R	Machine Maker	**125**
832	Compensation	DURATION OF REVERSAL SPIKE COMPENSATION: －Z	R	Machine Maker	**126**
833	Compensation	REVERSAL SPIKE LAG COMPENSATION: －Z	R	Machine Maker	**126**
834	Zero Point	READING DURATION OF ABSOLUTE ENCODER	R	Machine Maker	**134**
835~838		Non	⊙		
839	Spindle	TOLERANCE OF THE 1ST SPINDLE DURING ORIENTATION	R	Machine Maker	**110**
840~844		Non			
845	Servo	X AXIS LINEAR/ROTARY TYPE	⊙	Machine Maker	**91**
846	Servo	Y AXIS LINEAR/ROTARY TYPE	⊙	Machine Maker	**91**
847	Servo	Z AXIS LINEAR/ROTARY TYPE	⊙	Machine Maker	**91**
848	Operation	X AXIS OPTIMAL	R	User	**165**
849	Operation	Y AXIS OPTIMAL	R	User	**165**
850	Operation	Z AXIS OPTIMAL	R	User	**165**
851~873		Non			
874	Spindle	1ST SPD SPEED CHK 0)ACT 1)CMD	R	Machine Maker	**110**
875	Spindle	DEFAULT INITIAL SPEED OF THE 2ND SPINDLE	⊙	User	**107**
876	Spindle	MAX SPEED OF 2ND SPINDLE	R	Machine Maker	**102**

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877	Spindle	MIN. RPM OF THE 2nd SPINDLE	R	Machine Maker	**102**
878	Spindle	INITIAL RPM OF THE 3RD SPINDLE	⊙	User	**102**
879	Spindle	MAX. RPM OF THE 3RD SPINDLE	R	Machine Maker	**102**
880	Spindle	MIN. RPM OF THE 3RD SPINDLE	R	Machine Maker	**102**
881	Spindle	RPM REACHES SET RANGE OF THE 3RD SPINDLE	R	Machine Maker	**110**
882	Spindle	THE 3RD SPINDLE REACHES ZERO SPEED RPM	R	Machine Maker	**112**
883	Spindle	CORRESPONDING RPM OF THE 2ND SPINDLE MOTOR'S INPUT VOLTAGE 10V	R	Machine Maker	**102**
884	Spindle	VOLTAGE COMMAND'S OFFSET VALUE OF THE 2ND SPINDLE'S RPM	R	Machine Maker	**103**
885	Spindle	ACC/DEC TIME OF 2ND SPINDLE	⊙	Machine Maker	**98**
886	Spindle	CORRESPONDING RPM OF THE 3rd SPINDLE MOTOR'S INPUT VOLTAGE 10V	R	Machine Maker	**102**
887	Spindle	VOLTAGE COMMAND'S OFFSET VALUE OF THE 3RD SPINDLE'S RPM	R	Machine Maker	**103**
888	Spindle	ACCEL. /DECEL. TIME PER KILO-REV.OF THE 3RD SPINDLE	⊙	Machine Maker	**98**
889	Spindle	PPR OF THE 2ND SPINDLE'S ENCODER	⊙	Machine Maker	**101**
890	Spindle	FEEDBACK RATE OF THE 2ND SPINDLE	⊙	Machine Maker	**101**
891	Spindle	SIGNAL TYPE OF THE 2ND SPINDLE'S ENCODER	⊙	Machine Maker	**108**
892	Spindle	INSTALL THE 2ND SPINDLE'S ENCODER ONTO THE 0)SPINDLE 1)MOTOR	R	Machine Maker	**103**
893	Spindle	PPR OF THE 3RD SPINDLE'S ENCODER	⊙	Machine Maker	**101**
894	Spindle	FEEDBACK RATE OF THE 3RD SPINDLE	⊙	Machine Maker	**101**
895	Spindle	SIGNAL TYPE OF THE 3RD SPINDLE'S ENCODER	⊙	Machine Maker	**108**
896	Spindle	INSTALL THE 3RD SPINDLE'S ENCODER ONTO THE 0)SPINDLE 1)MOTOR	R	Machine Maker	**103**
897	Spindle	THE 2ND SPINDLE DISPLAYS 0)COMMAND 1) SENSOR	R	Machine Maker	**102**
898	Spindle	THE 3RD SPINDLE DISPLAYS 0)COMMAND 1) SENSOR	R	Machine Maker	**102**
899	Operation	APPLY CE REGULATIONS 0)NO 1)YES	R	Machine Maker	**166**
900~999		reserve			
1000	Servo	G00 MAX. SPEED OF X AXIS IN RAPID TRAVERSE, μm/min	R	Machine Maker	**91**
1001	Servo	G00 MAX. SPEED OF Y AXIS IN RAPID TRAVERSE, μm/min	R	Machine Maker	**91**
1002	Servo	G00 MAX. SPEED OF Z AXIS IN RAPID TRAVERSE, μm/min	R	Machine Maker	**91**
1003	Servo	G00 MAX. SPEED OF THE 4TH AXIS IN RAPID TRAVERSE, μm/min	R	Machine Maker	**91**
1004	Servo	G01 MAX. SPEED OF LINEAR CUTTING, μm/min	R	Machine Maker	**91**

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1005		Non			
1006	Operation	SOFT PROTECTION OF THE 1ST TRAVEL LIMIT: +X μm	R	Machine Maker	**166**
1007	Operation	SOFT PROTECTION OF THE 1ST TRAVEL LIMIT: - X μm	R	Machine Maker	**166**
1008	Operation	SOFT PROTECTION OF THE 1ST TRAVEL LIMIT: +Y μm	R	Machine Maker	**166**
1009	Operation	SOFT PROTECTION OF THE 1ST TRAVEL LIMIT: - Y μm	R	Machine Maker	**166**
1010	Operation	SOFT PROTECTION OF THE 1ST TRAVEL LIMIT: +Z μm	R	Machine Maker	**166**
1011	Operation	SOFT PROTECTION OF THE 1ST TRAVEL LIMIT: - Z μm	R	Machine Maker	**166**
1012	Operation	SOFT PROTECTION OF THE 1ST TRAVEL LIMIT: +THE 4TH μm	R	Machine Maker	**166**
1013	Operation	SOFT PROTECTION OF THE 1ST TRAVEL LIMIT: - THE 4TH AXIS μm	R	Machine Maker	**166**
1014	Zero Point	ABSOLUTE COORDINATES OF X AXIS AFTER RETURNING TO HOME POINT μm	R	Machine Maker	**134**
1015	Zero Point	ABSOLUTE COORDINATES OF Y AXIS AFTER RETURNING TO HOME POINT μm	R	Machine Maker	**134**
1016	Zero Point	ABSOLUTE COORDINATES OF Z AXIS AFTER RETURNING TO HOME POINT μm	R	Machine Maker	**134**
1017	Zero Point	ABSOLUTE COORDINATES OF THE 4TH AXIS AFTER RETURNING TO HOME POINT μm	R	Machine Maker	**134**
1018	Compensation	SESSION INTERVAL OF PITCH ERROR COMPENSATION: X AXIS μm	⊙	Machine Maker	**126**
1019	Compensation	SESSION INTERVAL OF PITCH ERROR COMPENSATION: Y AXIS μm	⊙	Machine Maker	**126**
1020	Compensation	SESSION INTERVAL OF PITCH ERROR COMPENSATION: Z AXIS μm	⊙	Machine Maker	**126**
1021	Compensation	SESSION INTERVAL OF PITCH ERROR COMPENSATION: THE 4TH AXIS μm	⊙	Machine Maker	**126**
1022	Zero Point	THE CORRESPONDING OFFSET AMOUNT OF X AXIS'S 2ND ZERO POINT TO THE 1ST ZERO POINT μm	R	Machine Maker	**134**
1023	Zero Point	THE CORRESPONDING OFFSET AMOUNT OF Y AXIS'S 2ND ZERO POINT TO THE 1ST ZERO POINT μm	R	Machine Maker	**134**
1024	Zero Point	THE CORRESPONDING OFFSET AMOUNT OF Z AXIS'S 2ND ZERO POINT TO THE 1ST ZERO POINT μm	R	Machine Maker	**134**
1025	Zero Point	THE CORRESPONDING OFFSET AMOUNT OF THE 4TH AXIS'S 2ND ZERO POINT TO THE 1ST ZERO POINT μm	R	Machine Maker	**134**
1026	Zero Point	THE CORRESPONDING OFFSET AMOUNT OF X AXIS'S 3RD ZERO POINT TO THE 1ST ZERO POINT μm	R	Machine Maker	**135**
1027	Zero Point	THE CORRESPONDING OFFSET AMOUNT OF Y AXIS'S 3RD ZERO POINT TO THE 1ST ZERO POINT μm	R	Machine Maker	**135**
1028	Zero Point	THE CORRESPONDING OFFSET AMOUNT OF Z AXIS'S 3RD ZERO POINT TO THE 1ST ZERO POINT μm	R	Machine Maker	**135**

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1029	Zero Point	THE CORRESPONDING OFFSET AMOUNT OF THE 4TH AXIS'S 3RD ZERO POINT TO THE 1ST ZERO POINT μm	R	Machine Maker	**135**
1030	Zero Point	THE CORRESPONDING OFFSET AMOUNT OF X AXIS'S 4TH ZERO POINT TO THE 1ST ZERO POINT μm	R	Machine Maker	**135**
1031	Zero Point	THE CORRESPONDING OFFSET AMOUNT OF Y AXIS'S 4TH ZERO POINT TO THE 1ST ZERO POINT μm	R	Machine Maker	**135**
1032	Zero Point	THE CORRESPONDING OFFSET AMOUNT OF Z AXIS'S 4TH ZERO POINT TO THE 1ST ZERO POINT μm	R	Machine Maker	**135**
1033	Zero Point	THE CORRESPONDING OFFSET AMOUNT OF THE 4TH AXIS'S 4TH ZERO POINT TO THE 1ST ZERO POINT μm	R	Machine Maker	**135**
1034	Operation	SOFT PROTECTION OF THE 2ND TRAVEL LIMIT: +X μm	R	Machine Maker	**167**
1035	Operation	SOFT PROTECTION OF THE 2ND TRAVEL LIMIT: -X μm	R	Machine Maker	**167**
1036	Operation	SOFT PROTECTION OF THE 2ND TRAVEL LIMIT: +Y μm	R	Machine Maker	**167**
1037	Operation	SOFT PROTECTION OF THE 2ND TRAVEL LIMIT: -Y μm	R	Machine Maker	**167**
1038	Operation	SOFT PROTECTION OF THE 2ND TRAVEL LIMIT: +Z μm	R	Machine Maker	**167**
1039	Operation	SOFT PROTECTION OF THE 2ND TRAVEL LIMIT: -Z μm	R	Machine Maker	**167**
1040	Operation	SOFT PROTECTION OF THE 2ND TRAVEL LIMIT: +4TH AXIS μm	R	Machine Maker	**167**
1041	Operation	SOFT PROTECTION OF THE 2ND TRAVEL LIMIT: -4TH AXIS μm	R	Machine Maker	**167**
1042	Servo	G31 PRESET FEED RATE	R	Machine Maker	**92**
1043~1045		Non		User	
1046	Compensation	START POSITION OF PITCH ERROR: X AXIS μm	⊙	Machine Maker	**126**
1047	Compensation	START POSITION OF PITCH ERROR: Y AXIS μm	⊙	Machine Maker	**126**
1048	Compensation	START POSITION OF PITCH ERROR: Z AXIS μm	⊙	Machine Maker	**126**
1049	Compensation	START POSITION OF PITCH ERROR: THE 4TH AXIS μm	⊙	Machine Maker	**126**
1050~1053		Non			
1054	Spindle	RPM REACHES SET RANGE OF THE 1ST SPINDLE	R	Machine Maker	**110**
1055		Non			
1056	Spindle	SPD ORIENTATION OFFSET ANGLE	R	Machine Maker	**111**
1057		Non			
1058	Spindle	1st SP Rigid tapping following max lag value μm	R	Machine Maker	
1059	Spindle	ACCEL. /DECEL. TIME PER KILO-REV. OF THE 1ST SPINDLE DURING RIGID TAPPING	R	Machine Maker	**111**
1060	Spindle	1ST SPD RIGTAP EXTRACTION RATE			
1061	Servo	MAX. SPEED OF LATHE TAPPING	R	Machine Maker	**92**

No	Group	Description	Effective	Level	Page
1062		Non	R	Machine Maker	
1063	Spindle	THE 1ST SPINDLE REACHES ZERO SPEED RPM	R	Machine Maker	**112**
1064	Spindle	COMMAND COMPENSATION AMOUNT OF THE 1ST SPINDLE'S RPM DURING RIGID TAPPING	R	Machine Maker	**112**
1065	Spindle	COMMAND COMPENSATION AMOUNT OF THE 1ST SPINDLE'S ACCELERATION DURING RIGID TAPPING	R	Machine Maker	**112**
1066	Spindle	COMPENSATIVE FILTER INTENSITY OF THE 1ST SPINDLE'S RPM DURING RIGID TAPPING	R	Machine Maker	**113**
1067~1069		Non			
1070	Spindle	COMPENSATIVE FILTER INTENSITY OF THE 1ST SPINDLE'S ACCELERATION SPEED DURING RIGID TAPPING	R	Machine Maker	**113**
1071	Spindle	1st SP revers rigid tap output 0)NO 1)YES	R	Machine Maker	**113**
1072	Servo	PULSE WIDTH μs	⊙	Machine Maker	**92**
1073~1074		Non			
1075	Spindle	TOLERANCE OF THE 1ST SPINDLE IN CONTROL MODE	R	Machine Maker	**113**
1076	Spindle	SPD1 RIGTAP DEC TIME/1000 RPM	R	Machine Maker	**114**
1077	Spindle	JOG SPEED OF 3RD SPINDLE	R	Machine Maker	**114**
1078~1090		Non			
1091	Operation	Default turning angle for coordinate system	R	User	**167**
1092	Operation	Ratio for X coordinate zoom	R	User	**168**
1093	Operation	Ratio for Y coordinate zoom	R	User	**168**
1094	Operation	Ratio for Z coordinate zoom	R	User	**168**
1095		Non			
1096	Spindle	MAX SPEED OF 1ST SPINDLE	R	Machine Maker	**114**
1097	Spindle	1ST SPINDLE D/A SCALE RPM/10V	R	Machine Maker	**114**
1098	Zero Return	ABS. ENCODER CHECK RANGE	R	Machine Maker	**135**
1099		Non			
1100	Servo	JOG SPEED FOR X AXIS μm/min	R	Machine Maker	**93**
1101	Servo	JOG SPEED FOR Y AXIS μm/min	R	Machine Maker	**93**
1102	Servo	JOG SPEED FOR Z AXIS μm/min	R	Machine Maker	**93**
1103	Servo	JOG SPEED FOR THE 4TH AXIS μm/min	R	Machine Maker	**93**
1104	Zero Point	HOME RETURN AT THE 1ST SPEED: X AXIS μm/min	R	Machine Maker	**136**
1105	Zero Point	HOME RETURN AT THE 1ST SPEED: Y AXIS μm/min	R	Machine Maker	**136**
1106	Zero Point	HOME RETURN AT THE 1ST SPEED: Z AXIS μm/min	R	Machine Maker	**136**

No	Group	Description	Effective	Level	Page
1107	Zero Point	HOME RETURN AT THE 1ST SPEED: THE 4TH AXIS μm/min	R	Machine Maker	**136**
1108	Zero Point	HOME RETURN AT THE 2ND SPEED: X AXIS μm/min	R	Machine Maker	**136**
1109	Zero Point	HOME RETURN AT THE 2ND SPEED: Y AXIS μm/min	R	Machine Maker	**136**
1110	Zero Point	HOME RETURN AT THE 2ND SPEED: Z AXIS μm/min	R	Machine Maker	**136**
1111	Zero Point	HOME RETURN AT THE 2ND SPEED: THE 4TH AXIS μm/min	R	Machine Maker	**136**
1112	Servo	ENCODER.X PULSES/ROTATION	⊙	Machine Maker	**80**
1113	Servo	ENCODER.Y PULSES/ROTATION	⊙	Machine Maker	**80**
1114	Servo	ENCODER.Z PULSES/ROTATION	⊙	Machine Maker	**80**
1115	Servo	ENCODER.4TH PULSES/ROTATION	⊙	Machine Maker	**80**
1116	Spindle	1ST SPINDLE ENCODER PPR	⊙	Machine Maker	**114**
1117		Non			
1118	Zero Point	INDEX PROTECTION	R	User	**136**
1119~1120		reserve			
1121	Spindle	JOG RPM OF THE 1ST SPINDLE	R	Machine Maker	**114**
1122~1149		reserve			
1150	Spindle	1st SP 1ST Gear switch RPM	R	Machine Maker	**114**
1151	Spindle	1st SP 2ND Gear switch RPM	R	Machine Maker	**115**
1152	Spindle	1st SP 3RD Gear switch RPM	R	Machine Maker	**115**
1153	Spindle	1st SP Motor gear change RPM	R	Machine Maker	**116**
1154	Spindle	1st SP Motor gear change RPM check range	R	Machine Maker	**116**
1155	Spindle	1st SP Max RPM at 1ST gear	R	Machine Maker	**116**
1156	Spindle	1st SP Max RPM at 2ND gear	R	Machine Maker	**116**
1157	Spindle	1st SP Max RPM at 3RD gear	R	Machine Maker	**117**
1158	Operation	SHOW F2~F12 FOR FUN. KEY	⊙	User	**168**
1159	Operation	PROGRAM READING OVERTIME		User	**168**
1160~1170		Non			
1171	Home	X multiple Home Linear encoder Home space 1 /μm	⊙	Machine Maker	**137**
1172	Home	X multiple Home Linear encoder Home space 2/μm	⊙	Machine Maker	**137**
1173	Home	Y multiple Home Linear encoder Home space 1/μm	⊙	Machine Maker	**137**
1174	Home	Y multiple Home Linear encoder Home space 2/μm	⊙	Machine Maker	**137**
1175	Home	Z multiple Home Linear encoder Home space 1/μm	⊙	Machine Maker	**137**

No	Group	Description	Effective	Level	Page
1176	Home	Z multiple Home Linear encoder Home space 2/μm	⊙	Machine Maker	**137**
1177	Home	4th multiple Home Linear encoder Home space 1/μm	⊙	Machine Maker	**137**
1178	Home	4th multiple Home Linear encoder Home space 2/μm	⊙	Machine Maker	**137**
1179~1182		reserve			
1183	Home	X home OFFSET relative to Linear encoder.	R	Machine Maker	**137**
1184	Home	Y home OFFSET relative to Linear encoder.	R	Machine Maker	**137**
1185	Home	Z home OFFSET relative to Linear encoder.	R	Machine Maker	**137**
1186	Home	4th home OFFSET relative to Linear encoder.	R	Machine Maker	**137**
1187~1188		Reserve			
1189~1199		Non			
1200~1299	compensation	X the 051~150 section gear error compensation / μm	R	Machine Maker	**122**
1300~1399	compensation	Y the 051~150 section gear error compensation /μm	R	Machine Maker	**122**
1400~1499	compensation	Z the 051 section gear error compensation /μm	R	Machine Maker	**123**
1500~1599	compensation	4^{th} the 051 section gear error compensation / μm	R	Machine Maker	**123**
1600~1799		Reserve			
1800~1805		Non			
1806	Operation	COM1 address (0:Disable 744~1016)	⊙	Machine Maker	**169**
1807	Operation	COM2 address (0:Disable 744~1016)	⊙	Machine Maker	**169**
1809	Operation	COM1 Interrupt number (3~7)	⊙	Machine Maker	**169**
1810	Operation	COM2 Interrupt number (3~7)	⊙	Machine Maker	**169**
1811	Operation	COM1 (0:Non 1:File 2:ABS 3:Spindle)	⊙	Machine Maker	**169**
1812	Operation	COM2 (0Non 1:file 2:ABS 3:Spindle)	⊙	Machine Maker	**170**
1813	Operation	File transfer Speed (bps)(0~4)		User	**170**
1814	Operation	File transfer Data Bit(0:7 1:8 bit)		User	**170**
1815	Operation	File transfer stop bit(0:1 1:2)		User	**170**
1816	Operation	File transfer odd, even check (0: N 1: E 2: O)		User	**170**
1817	Operation	File transfer mode (0:terminal 1:Host)		User	**170**
1818~1823		Non			
1824	Servo	Servo communication type(0:NO 1:M)	⊙	Machine Maker	**93**
1825	Servo	X Servo communication station number(0:Not use 1~15)	⊙	Machine Maker	**93**
1826	Servo	Y Servo communication station number(0:Not use 1~15)	⊙	Machine Maker	**93**
1827	Servo	Z Servo communication station number(0:Not use 1~15)	⊙	Machine Maker	**93**
1828	Servo	4^{th} Servo communication station number(0:Not use 1~15)	⊙	Machine Maker	**93**
1829~1830		Reserve			

No	Group	Description	Effective	Level	Page
1831		X-PMC G01 position check window range um	R	Machine Maker	**94**
1832		Y-PMC G01 position check window range um	R	Machine Maker	**94**
1833		Z-PMC G01 position check window range um	R	Machine Maker	**94**
1834		4TH-PMC G01 position check window range um	R	Machine Maker	**94**
1835~1836		Reserve			
1837		X-PMC G00 position check window range um	R	Machine Maker	**94**
1838		Y-PMC G00 position check window range um	R	Machine Maker	**94**
1839		Z-PMC G00 position check window range um	R	Machine Maker	**94**
1840		4TH-PMC G00 position check window range um	R	Machine Maker	**94**
1841~1842		Reserve			
1843~1882	Operation	User parameter 2, R value column 1~40		Machine Maker	**171**
1883	Servo	PMC Linear Cutting G01 的 max speed um/min	R	Machine Maker	**94**
1884	Servo	X-PMC G00 max speed um/min	R	Machine Maker	**94**
1885	Servo	Y-PMC G00 max speed um/min	R	Machine Maker	**94**
1886	Servo	Z-PMC G00 max speed um/min	R	Machine Maker	**94**
1887	Servo	4TH-PMC G00 max speed um/min	R	Machine Maker	**94**
1888~1889		Reserve			
1900	Operation	1ST Software restricted area X positive axis travel value(um)	R	Machine Maker	**171**
1901	Operation	1ST Software restricted area X negative axis travel value(um)	R	Machine Maker	**171**
1902	Operation	1ST Software restricted area Y positive axis travel value(um)	R	Machine Maker	**171**
1903	Operation	1ST Software restricted area Y negative axis travel value(um)	R	Machine Maker	**171**
1904	Operation	1ST Software restricted area Z positive axis travel value(um)	R	Machine Maker	**171**
1905	Operation	1ST Software restricted area Z negative axis travel value(um)	R	Machine Maker	**171**
1906	Operation	1ST Software restricted area 4th positive axis travel value(um)	R	Machine Maker	**171**
1907	Operation	1ST Software restricted area 4th negative axis travel value(um)	R	Machine Maker	**171**
1908~1911		reserve			
1912	Operation	2ND Software restricted area X positive axis travel value(um)	R	Machine Maker	**171**
1913	Operation	2ND Software restricted area X negative axis travel value(um)	R	Machine Maker	**171**
1914	Operation	2ND Software restricted area Y positive axis travel value(um)	R	Machine Maker	**171**
1915	Operation	2ND Software restricted area Y negative axis travel value(um)	R	Machine Maker	**171**

No	Group	Description	Effective	Level	Page
1916	Operation	2ND Software restricted area Z positive axis travel value(um)	R	Machine Maker	**171**
1917	Operation	2ND Software restricted area Z negative axis travel value(um)	R	Machine Maker	**171**
1918	Operation	2ND Software restricted area 4TH positive axis travel value(um)	R	Machine Maker	**171**
1919	Operation	2ND Software restricted area 4TH negative axis travel value(um)	R	Machine Maker	**171**
1920~1923		reserve			
1924~1928		Non			
1929	Servo	M-II 0)OFF 1)ON	⊙	Machine Maker	**94**
1930	Servo	M-II communicate time (us)	⊙	Machine Maker	**94**
1931	Servo	M-II use ABS encoder(Bit)	⊙	Machine Maker	**95**
1932	Servo	Artificial Intelligent Cutting Type (0:AIC 1:AIC-II)	R	Machine Maker	**95**
1933	Servo	M-II G31 signal source axis name(Bit)	R	Machine Maker	**95**
1934~1939		Non			
1940~1947		reserve			
1948~2999		reserve			
3000~3131		reserve			
3132~3799		Non			
3800~3810		reserve			

3.2 Servo Parameter

1	**SYSTEM LOOP GAINS FOR V CMD**

Range： 1 ~ 20000
Effective： Effective After Reboot
Access level： Machine Maker
Default： 30
Unit： 1/sec
This used with V command position loop gain.

2	**MAX. SERVO LAG OF X AXIS, μm**
3	**MAX. SERVO LAG OF Y AXIS, μm**
4	**MAX. SERVO LAG OF Z AXIS, μm**
5	**MAX. SERVO LAG OF THE 4TH AXIS, μm**

Range： 1 ~ 30000
Effective： Effective After RESET
Access level： Machine Maker
Default： 30000
Unit： μm
This parameter is to set maximum following error amount of X axis (SERVO LAG). When the following error amount of X axis is over this parameter setting value, System Alarm [MOT The Axis Servo LAG Over Para. Setting Value] will occur.
lag = F/Kp
F is the feedrate; Kp is the position Loop incremental value.
From the above formula, the bigger the feedrate, the bigger the following error amount. So, user only needs to key-in maximum speed into the above formula to get the maximum following error amount of the axis.
Example:
gain is $100(\frac{1}{s})$, the speed of G00 is 20000mm/min, and the servo lag would be:

$$lag = \frac{20000000(\mu m)}{60(s) \times 100(\frac{1}{s})} = 3333.3\mu m$$

When the machine functions normally, the servo lag amount of X axis should not exceed 3334μm at any time. Hence, the recommendation is to multiply this value by a safe coefficient (about 1.1) and enter the product into Pr. 0002.

6	**IN-POSITION CHECK WINDOW OF X AXIS, μm**
7	**IN-POSITION CHECK WINDOW OF Y AXIS, μm**
8	**IN-POSITION CHECK WINDOW OF Z AXIS, μm**
9	**IN-POSITION CHECK WINDOW OF THE 4TH AXIS, μm**

Range： 1 ~ 20000
Effective： Effective After RESET
Access level： Machine Maker
Default： 50
Unit： μm
This parameter sets the in-position check window of each axis in the Exact Stop mode. When some axis's
| command position – actual position | $\leqq$ this parameter's set value,
This means that this axis has completed cutting feed and stopped. Please also refer to the setting description of Pr. 0043.

10	**G00'S ACCEL. /DECEL. TIME OF X AXIS, ms**
11	**G00'S ACCEL. /DECEL. TIME OF Y AXIS, ms**
12	**G00'S ACCEL. /DECEL. TIME OF Z AXIS, ms**
13	**G00'S ACCEL. /DECEL. TIME OF THE 4TH AXIS, ms**

Range： 3 ~ 1500
Effective： Effective After Reboot
Access level： Machine Maker
Default： 230
Unit： ms

This parameter sets each axis's acceleration & deceleration time of rapid traverse. The smaller the parameter is, the faster each axis reaches the designated motion speed. However, this might also cause vibration of each axis.
For 486IPC version (IPO is 5ms), the maximum value of this parameter is 2000.
For 586IPC version (IPO is 3ms), the maximum value of this parameter is 1500.
If the set value is smaller than IPO cycle or exceeds the tolerance of the above values, the alarm "MOT4031 ~ 4034 SET PAR ERROR" will be triggered.

14	**G01 ACCEL. /DECEL. TIME**

Range： 3 ~ 1500
Effective： Effective After Reboot
Access level： Machine Maker
Default： 100
Unit： ms

This parameter is to set the acceleration/deceleration time of G00 of all servo axes. The smaller this parameter is, the faster the servo axis reaches the specified speed; vibration, however, would be more indispensable. For 486IPC version (the IPO is 10ms), the max. Value is 2000; for 586IPC version (the IPO is 3ms), the max. Value is 1500.
If the set value exceeds the above limit, the alarm "MOT 4030 SET PAR 14 ERROR" will be triggered.

24	**CORRESPONDING SERVO AXIS NUMBER OF X AXIS**
25	**CHANNEL NO FOR Y AXIS**
26	**CORRESPONDING SERVO AXIS NUMBER OF Z AXIS**
27	**CORRESPONDING SERVO AXIS NUMBER OF THE 4TH AXIS**

Range： 0 ~ 6
Effective： Effective After Reboot
Access level： Machine Maker
Default： 0
Unit： Null

If the lead of X (Y, Z, the 4th) axis is connected to the Nth axis of the transit card, then set this parameter to N; if not connected to a motor, set to 0.

40	**G00'S LOWEST OVERRIDE AT F0**

Range： 0 ~ 25
Effective： Effective After RESET
Access level： User
Default： 10
Unit： %

This parameter sets the actual override value in percentage when the override rotary switch of rapid traverse is turned to 0%. For example, if this parameter is set to 10, and the rotary switch of rapid traverse is turned to 0%, then the actual corresponding value is 10%.

53	**ENCODER FEEDBACK MULTIPLIER OF THE 4TH AXIS 1/2/4**
54	**ENCODER FEEDBACK MULTIPLIER OF X AXIS 1/2/4**
55	**ENCODER FEEDBACK MULTIPLIER OF Y AXIS 1/2/4**
56	**ENCODER FEEDBACK MULTIPLIER OF Z AXIS 1/2/4**

Range： 1 ~ 4
Effective： Effective After Reboot
Access level： Machine Maker
Default： 4
Unit： Nul

This parameter sets the encoder feedback multiplier of each axis. This parameter is valid only when the types of encoder feedback signals are A/B PHASE. If each axis's encoder feedback signals are the CW/CCW or PULSE/DIRECTION type (the set value is 1 or 2, respectively), then the encoder feedback multiplier would always be 1.
In Pulse Command mode, the product of this parameter multiplying the output pulse number for each motor encoder to make one revolution is equal to the pulse command amount that NC demands to enable each axial motor to make one revolution.

1112	**ENCODER.X PULSES/ROTATION**
1113	**ENCODER.Y PULSES/ROTATION**
1114	**ENCODER.Z PULSES/ROTATION**
1115	**ENCODER.4TH PULSES/ROTATION**

Range： 1 ~ 99999999
Effective： Effective After Reboot
Access level： Machine Maker
Default： 2500
Unit： pulse

If the motor ENCODER 1 turn = 2500 PULSE, then this set to be 2500. Please refer to the ratio factor of each axis of feedback setup instructions.

65	**Absolute encoder BIT**

Range: 0 ~ 63
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: BIT 0：Set 0=X use Incremental encoder, set1= X use ABS encoder.
BIT 1：Set 0=Y use Incremental encoder, set1= Y use ABS encoder.
BIT 2：Set 0=Z use Incremental encoder, set1= Z use ABS encoder.
BIT 3：Set 0=4TH use Incremental encoder, set1= 4TH use ABS encoder.

66	SET THE 4TH AXIS AS A 0)RATORY 1)LINEAR AXIS

Range： 0 ~ 1
Effective： Effective After Reboot
Access level： Machine Maker
Default： 0
Unit： Nul

0: Rotary axis;
1: Linear axis.
If the axes are linear axes, the ball screw's pitch should be set according to its actual value; if the axes are rotary axes, the ball screw's pitch should be set to 360 (which indicate 360∘).

108	RPM TO VOLTAGE RATIO FOR X AXIS RPM/1V
109	RPM TO VOLTAGE RATIO FOR Y AXIS RPM/1V
110	RPM TO VOLTAGE RATIO FOR Z AXIS RPM/1V
111	RPM TO VOLTAGE RATIO FOR THE 4TH AXIS RPM/1V

Range： 1 ~ 20000
Effective： Effective After Reboot
Access level： Machine Maker
Default： 200
Unit： RPM/1V

This parameter sets the RPM that corresponds to 1V of input voltage for each axis motor. For example, if the input voltage is 10V, and the rotation speed of each axis motor is 2000RPM, then this parameter's set value would be 200. This parameter is only effective when the control mode of each axis is V Command.

116	MOVING DIR OF EACH AXIS

Range： 0 ~ 63
Effective： Effective After Reboot
Access level： Machine Maker
Default： 0
Unit： Nul

BIT0：When set as 1, the X-axis should move in reverse direction against previous movement. When set as 0, there is no reverse movement.
BIT1：When set as 1, the Y-axis should move in reverse direction against previous movement. When set as 0, there is no reverse movement.
BIT2：When set as 1, the Z-axis should move in reverse direction against previous movement. When set as 0, there is no reverse movement.
BIT3：When set as 1, the 4^{TH}-axis should move in reverse direction against previous movement. When set as 0, there is no reverse movement.
BIT4：When set as 1, the spindle-axis should rotate in reverse direction against previous. When set as 0, there is no reverse rotation. This only effects only when the spindle is under PULSE COMMAND, such as spindle orientation and rigid tapping.

Description: Take the X-axis for example, under JOG mode, if you pressed the +x button on the OP panel, the machine X-axis moves in negative direction, it means motor's positive rotation is in reverse to +X axis direction. Please set BIT0 as 1. If you pressed the +x button on the OP panel, the machine X-axis moves in positive direction as well, please set BIT0 as 0. Such is the same with the entire rest axis.

156	COMMAND TYPE OF X AXIS 0)AB 1)CW 2)PD 3)V
157	COMMAND TYPE OF Y AXIS 0)AB 1)CW 2)PD 3)V
158	COMMAND TYPE OF Z AXIS 0)AB 1)CW 2)PD 3)V

159 **COMMAND TYPE OF THE 4TH AXIS 0)AB 1)CW 2)PD 3)V**

Range： 0 ~ 3
Effective： Effective After Reboot
Access level： Machine Maker
Default： 0
Unit： Nul

0：A/B PHASE；
1：CW/CCW；
2：PULSE/DIRECTION。
3：Voltage

When some pulse command type is set at NC side, the same pulse command type must be also set for the motor driver. If the set value is 1 or 2, users must either set the rising width of output pulse (Pr. 1072) or enable Pr. 0186 so the rising width of output pulse will be adjusted to 50% automatically. For A/B PHASE, NC axis card adjusts itself to 50% duration automatically and does not require additional settings.

185 **INV POS FEEDBACK OF EACH AXIS**

Range： 0 ~ 63
Effective： Effective After Reboot
Access level： Machine Maker
Default： 0
Unit： Nul

BIT0：when set as 1, means negative X-axis ENCODER feedback signal
BIT1：when set as 1, means negative Y-axis ENCODER feedback signal
BIT2：when set as 1, means negative Z-axis ENCODER feedback signal
BIT3：when set as 1, means negative 4^{TH}-axis ENCODER feedback signal
BIT4：when set as 1, means negative spindle ENCODER feedback signal
【Setting timing】
Take X-axis for example, if X-axis is set as PULSE TYPE, when you press the +X button of OP panel, the machine X-axis moves in positive direction, but the value of system data #000(X-axis following error) continuously increases, and this value doesn't decrease down to the range of ±1, it means that you have to reverse the X-axis ENCODER signal.
(Usually this is caused when the BIT0 of parameter # 0116 is set as 1.) In this case, please set the BIT0 of parameter # 0116 as 1. If the above didn't occur, please set the BIT0 of parameter # 0116 as 0. If X-axis is under V COMMAND mode, when you press the +X button of OP panel, the machine X-axis rushes, it means that you have to reverse the X-axis ENCODER signal. In this case, please set the BIT0 of this parameter as1.
So is the same with the other entire axis.

186 **Enable the pulse rise wide auto adjustment**

Range: 0 ~ 1
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: Set to 1, command type=Pulse Dir. or CW/CCW, output pulse wide will auto adjust to 50%/50%. Need certain hardware to support this function.

188 **POSITION LOOP GAIN OF SERVO AXIS IN PULSE COMMAND 1/sec.**

Range： 1 ~ 32767
Effective： Effective After RESET
Access level： Machine Maker
Default： 30
Unit： 1/sec

This parameter is to calculate the actual contour of ARCH error set by ARCH FEEDRATE AUTO CLAMP function (please refer to Pr. 0187 for further details of this function). In PULSE TYPE, because position control loop is processed by servo driver, NC is unable to obtain the set value of this parameter. In order to allow NC to obtain the set value of this parameter when ARCH FEEDRATE AUTO CLAMP function is enabled, a position loop gain must be set manually in advance. Please note that the position loop gain of each axis must be the same, otherwise the actual contour of ARCH command will become an ellipse.
Please also refer to the descriptions of related parameters: Pr.0187 & Pr.0809.

191 **ENCORDER SIGNAL TYPE OF X AXIS**
192 **ENCORDER SIGNAL TYPE OF Y AXIS**
193 **ENCORDER SIGNAL TYPE OF Z AXIS**
194 **ENCORDER SIGNAL TYPE OF THE 4TH AXIS**

Range： 0 ~ 3
Effective： Effective After Reboot
Access level： Machine Maker
Default： 0
Unit： Nul

0：A/B PHASE
1：CW/CCW
2：PULSE/DIRECTION
3：n/A

This parameter sets the output signal type of X axis's motor encoder
. Please refer to the setting of motor driver. If X axis does not have an encoder (ex. a stepping motor), please set this parameter to 3.

238 **Enable the pulse rise wide auto adjustment**

Range: 0 ~ 1
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: Set to 1, command type=Pulse Dir. or CW/CCW, output pulse wide will auto adjust to 50%/50%. Need certain hardware to support this function.

298 **Set PMC axis G00 acceleration time ms**

Range: 3 ~ 1500
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 230
Unit: ms
Description: Set PMC axis G00 acceleration time。

299 **Set PMC axis G01 acceleration time ms**

Range: 3 ~ 1500
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 100
Unit: Ms
Description: Set PMC axis G01 acceleration time。

398 **Set PMC axis G00 的 acceleration time ms**

Range: 3 ~ 1500
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 230
Unit: Ms
Description: Set PMC axis G00 acceleration time。

399 **Set PMC axis G01 acceleration time ms**

Range: 3 ~ 1500
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 100
Unit: Ms
Description: Set PMC axis G01 acceleration time。

400 **[R1]Cutting Linear acceleration time ms**

Range: 0 ~ 1000
Effective time: Effective After RESET
Access level: Machine Maker
Default: 60
Unit: Ms
Description: Set HSP[R1]Cutting Linear acceleration time。

401 **[R1]Cutting Bell shape acceleration time ms**

Range: 0 ~ 1000
Effective time: Effective After RESET
Access level: Machine Maker
Default: 20
Unit: ms
Description: Set HSP[R1]Cutting Bell shape acceleration time。

402 **[R1]Smooth Cutting acceleration time ms**

Range: 0 ~ 1000
Effective time: Effective After RESET
Access level: Machine Maker
Default: 0
Unit: ms
Description: Set HSP[R1]Cutting Smooth acceleration time 。

403 **[R1]After Cutting acceleration time ms**

Range: 0 ~ 1000
Effective time: Effective After RESET
Access level: Machine Maker
Default: 60
Unit: ms
Description: Set HSP[R1] After Cutting acceleration time 。

404 **[R1] round speed lock um/min**

Range: 100 ~ 200000000
Effective time: Effective After RESET
Access level: Machine Maker
Default: 2000000
Unit: Um/min
Description: Set HSP[R1] round speed lock 。

405 **[R1] round speed lock minimum/min**

Range: 100 ~ 200000000
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 500000
Unit: Um/min
Description: Set HSP[R1] round speed lock minim。

406 **SHINING MODE**

Range: 0 ~ 1
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 0
Unit: Non
Description: 0：OFF SHINING MODE
1：ON SHINING MODE

407 **Feed forward**

Range: 0 ~ 1
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 0
Unit: Non
Description: 0：OFF feed forward
1：ON feed forward

408 **G05R_Default level**

Range: 0 ~ 10
Effective time: EFFECTIVE AFTER RESET
Access level: User
Default: 1
Unit: Non
Description: G05 HSP default level set up

409	**Curve fitting tolerance (um)**

Range: -1 ~ 10
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: -1
Unit: um
Description: -1：OFF。

410	**[R1]X Corner speed difference um/min**
411	**[R1]Y Corner speed difference um/min**
412	**[R1]Z Corner speed difference um/min**
413	**[R1]4TH Corner speed difference um/min**

Range: 0 ~ 200000000
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 8000000
Unit: Um/min
Description: Set HSP[R1]各 Corner speed difference 。

416	**X stops Servo lag check um**
417	**Y stops Servo lag check um**
418	**Z stops Servo lag check um**
419	**4TH stops Servo lag check um**

Range: 0 ~ 50000
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 50
Unit: um
Description: This parameter use for set Servo stop lag checking range, When the axis servo lag over this value, it will send alarm[MOT Servo lag over range, check servo wiring or parameter]

422	**X position loop gain 1/s**
423	**Y position loop gain 1/s**
424	**Z position loop gain 1/s**
425	**4TH position loop gain 1/s**

Range: 0 ~ 1000
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 60
Unit: 1/s
Description: Use this parameter to set position loop gain value

429	**Corner method 0)Normal 1)Speed deference 2)reference**

Range: 0 ~ 3
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 2
Unit: Non
Description: Set Corner method ◦

430	**[R1] Corner reference speed um/min**

Range: 0 ~ 200000000
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 800000
Unit: Um/min
Description: Set HSP[R1] Corner reference speed◦

431	**[R1]X speed feed forward (%)**
432	**[R1]Y speed feed forward (%)**
433	**[R1]Z speed feed forward (%)**
434	**[R1]4TH speed feed forward (%)**

Range: 0 ~ 200
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 0
Unit: %
Description: Set HSP[R1] each axis speed feed forward◦

437	**X feed forward acceleration time (ms)**
438	**Y feed forward acceleration time (ms)**
439	**Z feed forward acceleration time (ms)**
440	**4TH feed forward acceleration time (ms)**

Range: 0 ~ 100
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 10
Unit: ms
Description: Use this to set feed forward acceleration time 。

500	**In synchronization X follow target axis Name**
501	**In synchronization Y follow target axis Name**
502	**In synchronization Z follow target axis Name**
503	**In synchronization 4TH follow target axis Name**

Range: 0 ~ 6
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: 0：Not use (default)
1：System X
2：System Y
3：System Z
4：System 4TH
5：System 5TH
6：System 6TH

506	**In synchronization X direction setup as a follower.**
507	**In synchronization Y direction setup as a follower.**
508	**In synchronization Z direction setup as a follower.**
509	**In synchronization 4TH direction setup as a follower.**

Range: 0 ~ 1
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: 0：Forward
1：Reverse

538	**Axis name which switch with X**
539	**Axis name which switch with Y**
540	**Axis name which switch with Z**
541	**Axis name which switch with 4TH**

Range: 0 ~ 6
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: 0：Not use (default)
1：System X
2：System Y
3：System Z
4：System 4TH
5：System 5TH
6：System 6TH

700	**[R10]Cutting Linear acceleration time ms**

Range: 0 ~ 1000
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 100
Unit: ms
Description: Set HSP[R10]Cutting Linear acceleration time 。

701	**[R10]Cutting bell shape acceleration time ms**

Range: 0 ~ 1000
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 20
Unit: ms
Description: Set HSP[R10]Cutting Bell shape acceleration time 。

702	**[R10]Smooth Cutting acceleration time ms**

Range: 0 ~ 1000
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 0
Unit: ms
Description: Set HSP[R10]Smooth Cutting acceleration time 。

703	**[R10] After Cutting acceleration time ms**

Range: 0 ~ 1000
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 25
Unit: ms
Description: Set HSP[R10]after Cutting acceleration time 。

704	**[R10] round speed lock um/min**

Range: 100 ~ 200000000
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 1200000
Unit: Um/min
Description: Set HSP[R10] round speed lock 。

705	**[R10] round speed lock minimum/min**

Range: 100 ~ 200000000
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 200000
Unit: Um/min
Description: Set HSP[R10] round speed lock minim。

710	**[R10]X Corner speed difference um/min**
711	**[R10]Y Corner speed difference um/min**
712	**[R10]Z Corner speed difference um/min**
713	**[R10]4TH Corner speed difference um/min**

Range: 0 ~ 200000000
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 300000
Unit: Um/min
Description: Set HSP[R10]各 Corner speed difference 。

730	**[R10]Corner reference speed um/min**

Range: 0 ~ 200000000
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 400000
Unit: Um/min
Description: Set HSP[R10]Corner reference speed。

731	**[R10]X speed feed forward (%)**
732	**[R10]Y speed feed forward (%)**
733	**[R10]Z speed feed forward (%)**
734	**[R10]4TH speed feed forward (%)**

Range: 0 ~ 200
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 95
Unit: %
Description: Set HSP[R10]each axis speed feed forward。

800	**G00'S IN-POSITION CHECK WINDOW OF X AXIS, μm**
801	**G00'S IN-POSITION CHECK WINDOW OF Y AXIS, μm**
802	**G00'S IN-POSITION CHECK WINDOW OF Z AXIS, μm**
803	**G00'S IN-POSITION CHECK WINDOW OF THE 4TH AXIS, μm**

Range： 1 ~ 20000
Effective： Effective After RESET
Access level： Machine Maker
Default： 500
Unit： μm

This parameter sets the in-position check window of each axis when the exact stop function of rapid positioning is enabled. When some axis's
| command position – actual position | ≦ this parameter's set value,
This means that this axis has already completed rapid positioning and stopped.

845	**Set X as 0)Linear 1)Rotate**
846	**Set Y as 0)Linear 1)Rotate**
847	**Set Z as 0)Linear 1)Rotate**

Range: 0 ~ 1
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: 0：Set as linear axis, screw section please set as your machine type.
1：Set as Rotate axis, screw section please set as 360(means 360 degree)

1000	**G00 MAX. SPEED OF X AXIS IN RAPID TRAVERSE, μm/min**
1001	**G00 MAX. SPEED OF Y AXIS IN RAPID TRAVERSE, μm/min**
1002	**G00 MAX. SPEED OF Z AXIS IN RAPID TRAVERSE, μm/min**
1003	**G00 MAX. SPEED OF THE 4TH AXIS IN RAPID TRAVERSE, μm/min**

Range： 1 ~ 99999999
Effective： Effective After RESET
Access level： Machine Maker
Default： 5000000
Unit： μm/min

This parameter sets the max. Motion speed of each axis during rapid traverse.

1004	**G01 MAX. SPEED OF LINEAR CUTTING, μm/min**

Range： 1 ~ 99999999
Effective： Effective After RESET
Access level： Machine Maker
Default： 2000000
Unit： μm/min

This parameter sets the following values:
1. The max. feed rate of the linear cutting command G01;
2. The max. feed rate of the curve cutting command G02/03;
3. The feed rate of the cutting commands G01/02/03 in DRY RUN mode.

This parameter's set value is taken by NC as the maximum allowed feedrate even when the actual feedrate set on the operation panel might exceed this parameter's set value.

1042 **G31 PRESET FEED RATE**

Range： 1 ~ 99999999
Effective： Effective After RESET
Access level： Machine Maker
Default： 2000
Unit： μm/min

If assigning a feed rate in the block of G31 command, the block would take the command value as its feed rate; if there is no feed rate assigned in the block of G31 command, the feed rate is set by this parameter.

1061 **MAX. SPEED OF LATHE TAPPING**

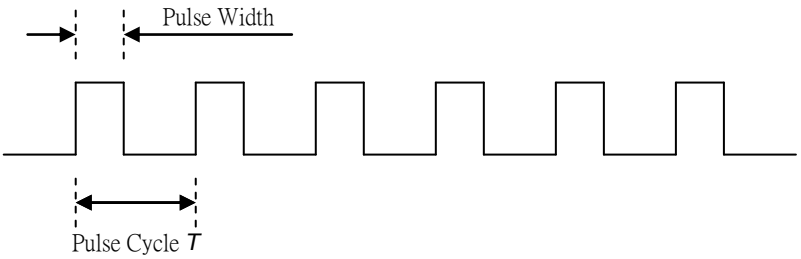
Range： 1 ~ 99999999
Effective： Effective After RESET
Access level： Machine Maker
Default： 10000000
Unit： μm

The cutting feed rate is decided by the spindle's rotation speed and thread pitch during lathe tapping. If the feed rate produced by these two elements exceeds the set value of this parameter, the alarm "MOT 4061: LATHE TAPPING SPEED OVER SETTING VALUE" will be triggered to prevent any danger that might be caused by false programming.

1072 **PULSE WIDTH μs**

Range： 1 ~ 50
Effective： Effective After Reboot
Access level： Machine Maker
Default： 20
Unit： μs

When the pulse command type is CW/CCW or PULSE/DIRECTON, this parameter sets the pulse width as shown in the figure below.



Below is the formula for pulse cycle (ex. a linear axis)：

$$1/T = \frac{feedrate}{pitch} \times GR \times Pulse/rev \times \frac{1}{60000}$$, unit：ms

Example：
In this example, the thread pitch of X axis is 10mm, the gear ratio is 2 (Deceleration ratio: When the motor makes 2 rev., the ball screw makes 1 rev.), the pulse/rev. is 10000, and the feed rate is 2000mm/min., and the required output pulse/1ms would be:

$$Pulses = \frac{2000}{10} \times 2 \times 10000 \times \frac{1}{60000} \approx 67\ pulses/ms$$

And the pulse cycle would be：

$$T = \frac{1000}{67} \approx 15\mu s$$

Under this condition, the pulse width should be set as 7us to keep the pulse command as 50% of DURATION. If the set value of this parameter is too large, the pulse width might exceed the pulse cycle during high-speed motion, and the motor driver could not read the overlapping pulse command lines to actuate the motor's rotation normally.
However, if the set value is too small, the motor driver might also be unable to identify the pulse command lines. Therefore, the max value of this parameter should be set according to the max width within which tolerance that pulse command lines do not overlap each other. And the min. value should be set according to the min. width within which tolerance the motor can identify pulse command lines.

1100	**JOG SPEED FOR X AXIS μm/min**
1101	**JOG SPEED FOR Y AXIS μm/min**
1102	**JOG SPEED FOR Z AXIS μm/min**
1103	**JOG SPEED FOR THE 4TH AXIS μm/min**

Range： 1 ~ 99999999
Effective： Effective After RESET
Access level： Machine Maker
Default： 2000000
Unit： μm/min
This parameter sets the moving speed of each axis in JOG mode.

1824	**Servo Communication type(0:Not use 1:M)**

Range: 0 ~ 1
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: Set Servo communication Servo motor brand
0:Not use
1:M

1825	**X Servo communication station number(0:Not use 1~15)**
1826	**Y Servo communication station number(0:Not use 1~15)**
1827	**Z Servo communication station number(0:Not use 1~15)**
1828	**4TH Servo communication station number(0:Not use 1~15)**

Range: 0 ~ 15
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: Set Servo drive and motor's station number. This parameter must be same with servo motor station. If set to 0 = not use servo communication.

1831	**X-PMC G01 position check window range um**
1832	**Y-PMC G01 position check window range um**
1833	**Z-PMC G01 position check window range um**
1834	**4TH-PMC G01 position check window range um**

Range: 1 ~ 20000
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 50
Unit: Non
Description: Set PMC axis G01 position check range.

1837	**X-PMC G00 position check range um**
1838	**Y-PMC G00 position check range um**
1839	**Z-PMC G00 position check range um**
1840	**4TH-PMC G00 position check range um**

Range: 1 ~ 20000
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 500
Unit: Non
Description: Set PMC axis G00 position check range.

1883	**PMC linear Cutting G01 max speed um/min**

Range: 1 ~ 99999999
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 2000000
Unit: um/min
Description: Set PMC axis G01 max speed。

1884	**X-PMC G00 max speed um/min**
1885	**Y-PMC G00 max speed um/min**
1886	**Z-PMC G00 max speed um/min**
1887	**4TH –PMC G00 max speed um/min**

Range: 1 ~ 20000
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 5000000
Unit: um/min
Description: Set PMC axis G00 max speed。

1929	**M-II ON/OFF 0)OFF 1)ON**

Range: 0 ~ 1
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: Enable M-II

1930	**M-II communication time(us)**

Range: 1500 ~ 4000
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0

Unit: Non
Description: Set M-II communication time, please use default 2500us.

1931 M-II use Absolute encoder(Bit)

Range: 0 ~ 63
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: Set M-II axis use ABS encoder or not: +1：X use，+2：Y use，+4：Z use，+8：4^{TH} use。

1932 Artificial intelligent cutting type: (0:AIC 1:AIC-II)

Range: 0 ~ 1
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 0
Unit: Non
Description: Set AIC type, AIC: G05 R1~R10. AIC-II: customize AIC parameter.

1933 M-II G31 signal source axis name(Bit)

Range: 0 ~ 64
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 4
Unit: Non
Description: +1：X，+2：Y，+4：Z，+8：4TH

3.3 Mechanical parameter

62	UNIT OF Pr.0104 ~ Pr.0107 0) METRIC 1) IMPERIAL

Range： 0 ~ 1
Effective： Effective After Reboot
Access level： Machine Maker
Default： 0
Unit： Nul

This parameters sets the unit system of Pr.0104 ~ Pr.0107 to be metric or imperial.

68	TOOTH NUMBER OF X AXIS MOTOR (DENOMINATOR IN GEAR RATIO)
69	TOOTH NUMBER OF Y AXIS'S MOTOR (DENOMINATOR IN GEAR RATIO)
70	TOOTH NUMBER OF Z AXIS'S MOTOR (DENOMINATOR IN GEAR RATIO)
72	TOOTH NUMBER OF THE 4TH AXIS'S MOTOR (DENOMINATOR IN GEAR RATIO)

Range： 1 ~ 32767
Effective： Effective After Reboot
Access level： Machine Maker
Default： 1
Unit： Nul

This parameter sets the tooth number of each axis motor, which equals to setting an axis's denominator in gear ratio.

$$\text{Gear ratio of some axis} = \frac{\text{Ball screw's tooth number}}{\text{Motor's tooth number (this parameter)}}$$

If the gear ratio of some axis is larger than 1, motor speed is decelerated by ball screw; if smaller than 1, motor speed is accelerated by ball screw. Please refer to the following formula for the setting method:

$$\text{Motor's tooth number} \times \text{Motor's rotation speed} = \text{Ball screw's tooth number} \times \text{Ball screw's rotation speed}$$

100	BALL SCREW'S TOOTH NUMBER OF X AXIS (NUMERATOR IN GEAR RATIO)
101	BALL SCREW'S TOOTH NUMBER OF Y AXIS (NUMERATOR IN GEAR RATIO)
102	BALL SCREW'S TOOTH NUMBER OF Z AXIS (NUMERATOR IN GEAR RATIO)
103	BALL SCREW'S TOOTH NUMBER OF THE 4TH AXIS (NUMERATOR IN GEAR RATIO)

Range： 1 ~ 32767
Effective： Effective After Reboot
Access level： Machine Maker
Default： 1
Unit： Nul

This parameter sets the ball screw's tooth number of each axis, which equals to setting the numerator in gear ratio of each axis.

$$\text{Gear ratio of some axis} = \frac{\text{Ball screw's tooth number (this parameter)}}{\text{Motor's tooth number}}$$

If the gear ratio of some axis is larger than 1, motor speed is decelerated by ball screw; if smaller than 1, motor speed is accelerated by ball screw. Please refer to the following formula for the setting method:

$$\text{Motor's tooth number} \times \text{motor's rotation speed} = \text{Ball screw's tooth number} \times \text{ball screw's rotation speed}$$

104	**BALL SCREW PITCH. OF X AXIS**
105	**BALL SCREW PITCH. OF Y AXIS**
106	**BALL SCREW PITCH. OF Z AXIS**
107	**BALL SCREW PITCH. OF THE 4TH AXIS**

Range： 1 ~ 32767
Effective： Effective After Reboot
Access level： Machine Maker
Default： 360
Unit： μm
This parameter sets the ball screw pitch of each axis.

3.4 Spindle Parameter

16	**1st SP every 1000RPM acceleration time**
885	**2nd SP every 1000RPM acceleration time**
888	**3rd SP every 1000RPM acceleration time**

Range: 0 ~ 32767
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 1000
Unit: MS/KRPM
Description: This parameter can set Spindle RPM corresponding voltage, Pulse command acceleration speed.
When Spindle RPM use voltage control, it must set the offset and 10V corresponds to RPM.

21	**RPM OF THE 1ST SPINDLE'S ORIENTATION**

Range： 1 ~ 20000
Effective： Effective After RESET
Access level： Machine Maker
Default： 100
Unit： RPM
This parameter sets the spindle's rotation speed during orientation. This parameter also decides the spindle's rotation speed when the spindle is being oriented. To prevent deviation caused by different rotation speeds, please do not change the set value of this parameter after finishing the orientation adjustment of the spindle.

29	**THE CORRESPONDING SERVO AXIS NUMBER OF THE 1ST SPINDLE**
294	**CORRESPONDING TO 2ND SPINDLE**
295	**CORRESPONDING TO 3RD SPINDLE**

Range： 0 ~ 16
Effective： Effective After Reboot
Access level： Machine Maker
Default： 0
Unit： Nul
If the spindle's wiring is connected to the N^{th} axis of the transit card, set this parameter to N; if there is no spindle, set to 0.

49	**MOTOR'S TOOTH NUMBER OF THE 1ST SPINDLE IN 1ST GEAR**
664	**MOTOR'S TOOTH NUMBER OF THE 2ND SPINDLE IN 1ST GEAR**
672	**MOTOR'S TOOTH NUMBER OF THE 3RD SPINDLE IN 1ST GEAR**

Range： 1 ~ 32767
Effective： Effective After Reboot
Access level： Machine Maker
Default： 1
Unit： Nul

This parameter sets the motor's tooth number of some spindle in 1st gear, which equals to setting the denominator in gear ratio of some spindle in 1st gear. When some spindle is in 1st gear (C097 is ON)：

$$\text{Gear ratio of the spindle} = \frac{\text{Tooth number of spindle (Pr.0050)}}{\text{Tooth number of motor (this parameter)}}$$

If the spindle's gear ratio is larger than 1, there is a deceleration relationship between motor and spindle; if the ratio is smaller than 1, there is an acceleration relationship between motor and spindle. Please refer to the following formula for the setting method：

$$\text{Motor's tooth number} \times \text{Motor's rotation speed} = \text{Spindle's tooth number} \times \text{Spindle's rotation speed}$$

50	**THE 1ST SPINDLE'S TEETH NUMBER IN 1ST GEAR**
665	**THE 2ND SPINDLE'S TEETH NUMBER IN 1ST GEAR**
673	**THE 3RD SPINDLE'S TEETH NUMBER IN 1ST GEAR**

Range： 1 ~ 32767
Effective： Effective After Reboot
Access level： Machine Maker
Default： 1
Unit： Nul

This parameter sets the motor's tooth number of some spindle in 1st gear, which equals to setting the numerator in gear ratio of some spindle in 1st gear. When some spindle is in 1st gear (C097 is ON)：

$$\text{Gear ratio of the spindle} = \frac{\text{Tooth number of spindle (this parameter)}}{\text{Tooth number of motor (Pr.0049)}}$$

If the spindle's gear ratio is larger than 1, there is a deceleration relationship between motor and spindle; if the ratio is smaller than 1, there is an acceleration relationship between motor and spindle. Please refer to the following formula for the setting method：

$$\text{Motor's tooth number} \times \text{Motor's rotation speed} = \text{Spindle's tooth number} \times \text{Spindle's rotation speed}$$

51	**TOOTH NUMBER OF THE 1ST SPINDLE'S MOTOR IN 2ND GEAR**
666	**TOOTH NUMBER OF THE 2ND SPINDLE'S MOTOR IN 2ND GEAR**
674	**TOOTH NUMBER OF THE 3RD SPINDLE'S MOTOR IN 2ND GEAR**

Range： 1 ~ 32767
Effective： Effective After Reboot
Access level： Machine Maker
Default： 1
Unit： Nul

This parameter sets the tooth number of some spindle's motor in 2nd gear, which equals to setting the denominator in gear ratio of some spindle in 2nd gear. When some spindle is in 2nd gear (C098 is ON)：

$$\text{Gear ratio of the spindle} = \frac{\text{Tooth number of spindle (Pr.0052)}}{\text{Tooth number of motor (this parameter)}}$$

If the spindle's gear ratio is larger than 1, there is a deceleration relationship between motor and spindle; if the ratio is smaller than 1, there is an acceleration relationship between motor and spindle. Please refer to the following formula for the setting method：

$$\text{Motor's tooth number} \times \text{Motor's rotation speed} = \text{Spindle's tooth number} \times \text{Spindle's rotation speed}$$

52	**TOOTH NUMBER OF THE 1ST SPINDLE IN 2ND GEAR**
667	**TOOTH NUMBER OF THE 2ND SPINDLE IN 2ND GEAR**
675	**TOOTH NUMBER OF THE 3RD SPINDLE IN 2ND GEAR**

Range： 1 ~ 32767
Effective： Effective After Reboot
Access level： Machine Maker
Default： 1
Unit： Nul

This parameter sets the tooth number of some spindle in 2nd gear, which equals to setting the numerator in gear ratio of some spindle in 2nd gear. When some spindle is in 2nd gear (C098 is ON)：

$$\text{Gear ratio of the spindle} = \frac{\text{Tooth number of spindle (this parameter)}}{\text{Tooth number of motor (Pr.0051)}}$$

If the spindle's gear ratio is larger than 1, there is a deceleration relationship between motor and spindle; if the ratio is smaller than 1, there is an acceleration relationship between motor and spindle. Please refer to the following formula for the setting method：

$$\text{Motor's tooth number} \times \text{Motor's rotation speed} = \text{Spindle's tooth number} \times \text{Spindle's rotation speed}$$

57	**FEEDBACK RATE OF THE 1ST SPINDLE**
890	**FEEDBACK RATE OF THE 2ND SPINDLE**
894	**FEEDBACK RATE OF THE 3RD SPINDLE**

Range： 1 ~ 4
Effective： Effective After Reboot
Access level： Machine Maker
Default： 1
Unit： Nul

This parameter sets the feedback rate multiplier of some spindle's encoder and is only effective when the feedback signal type is AB PHASE (Pr.0195 is set to 0). If the feedback signal type of the spindle's encoder is CW/CCW or PULSE/DIRECTION (Pr.0195 is 1 or 2, respectively), the feedback rate multiplier would always be 1.
When the spindle's control mode is PULSE COMMAND (in SPINDLE ORIENTATION or RIGID TAPPING modes), the product of this parameter's set value and Pr.1116's set value (pulse/rev of the spindle motor's encoder) is the pulse command amount of NC to make one revolution of the spindle motor. If the spindle's control mode is V Command, the product of this parameter's set value and Pr.1116's set value is used to calculate the spindle's actual rotation speed only.

889	**PPR OF THE 2ND SPINDLE'S ENCODER**
893	**PPR OF THE 3RD SPINDLE'S ENCODER**

Range： 1 ~ 32767
Effective： Effective After Reboot
Access level： Machine Maker
Default： 1024
Unit： pulse

Assuming pulse/rev. of some motor encoder is 2500 then set this parameter to 2500.

84	**THE 1ST SPINDLE ORIENTATION 0)SENSOR 1)ENCODER**

Range： 0 ~ 1
Effective： Effective After RESET
Access level： Machine Maker
Default： 0
Unit： Nul

0：Use a positioning sensor as the reference for spindle orientation.
1：Use an encoder index as the reference for spindle orientation.

90	**THE 1ST SPINDLE DISPLAYS 0)COMMAND 1) SENSOR**
897	**THE 2ND SPINDLE DISPLAYS 0)COMMAND 1) SENSOR**
898	**THE 3RD SPINDLE DISPLAYS 0)COMMAND 1) SENSOR**

Range： 0 ~ 1
Effective： Effective After RESET
Access level： Machine Maker
Default： 1
Unit： Nul

0：Display the command value

1：Display the actual value, meanwhile NC calculates the actual rotation speed according to the feedback signal of the spindle's motor ENCODER and displays the product on HMI

If some spindle motor does not have an encoder, please set this parameter to 0 in case RPM check cannot reach the assigned speed.

92	**SPINDLE D/A SCALE RPM/10V**
883	**CORRESPONDING RPM OF THE 2ND SPINDLE MOTOR'S INPUT VOLTAGE 10V**
886	**CORRESPONDING RPM OF THE 3rd SPINDLE MOTOR'S INPUT VOLTAGE 10V**

Range： 1 ~ 32767
Effective： Effective After RESET
Access level： Machine Maker
Default： 6000
Unit： RPM

Assume 10V of the spindle is corresponding to 3000RPM, and then set this parameter to 3000. This parameter is effective only when the spindle's driver in Velocity Command mode.

95	**MIN. SPEED OF THE 1ST SPINDLE**
96	**MAX SPEED OF 1ST SPINDLE**
876	**MAX SPEED OF 2ND SPINDLE**
877	**MIN. RPM OF THE 2nd SPINDLE**
878	**INITIAL RPM OF THE 3RD SPINDLE**
879	**MAX. RPM OF THE 3RD SPINDLE**
880	**MIN. RPM OF THE 3RD SPINDLE**

Range： 0 ~ 20000
Effective： Effective After RESET
Access level： Machine Maker
Default： 0
Unit： RPM

This parameter sets the RPM range to prevent any part's damage of the machine caused by executing a command at a RPM that exceeds the acceptable range.

98	**VOLTAGE COMMAND'S OFFSET VALUE OF THE 1ST SPINDLE'S RPM**
884	**VOLTAGE COMMAND'S OFFSET VALUE OF THE 2ND SPINDLE'S RPM**
887	**VOLTAGE COMMAND'S OFFSET VALUE OF THE 3RD SPINDLE'S RPM**

Range： -5000 ~ 5000
Effective： Effective After RESET
Access level： Machine Maker
Default： 0
Unit： 0.3mV

This parameter sets the offset value of the spindle's voltage command. After the required voltage command is deduced based on the spindle command RPM, minus this parameter's set value from the voltage command, then the user can obtain the actual voltage command that needs to be sent to the spindle's A/C. The present DAC of the system's motion card is 16 bits, which corresponds to ±10V, so the dpi is 10/32768 = 0.3mV, which is the unit of this parameter.

892	**INSTALL THE 2ND SPINDLE'S ENCODER ONTO THE 0)SPINDLE 1)MOTOR**
896	**INSTALL THE 3RD SPINDLE'S ENCODER ONTO THE 0)SPINDLE 1)MOTOR**

Range： 0 ~ 1
Effective： Effective After RESET
Access level： Machine Maker
Default： 0
Unit： Nul

This parameter sets the installation position of the spindle's encoder.
0: Onto the spindle.
1. Onto the motor.

171	**Spindle feedback reverse BIT**

Range: 0 ~ 7
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: Set Spindle feedback reverse bit
BIT 0 (+1)：1st SP
BIT 1 (+2)：2nd SP
BIT 2 (+4)：3rd SP

178	**TOOTH NUMBER OF THE 1ST SPINDLE'S MOTOR IN 3RD GEAR**
668	**TOOTH NUMBER OF THE 2ND SPINDLE'S MOTOR IN 3RD GEAR**
676	**TOOTH NUMBER OF THE 3RD SPINDLE'S MOTOR IN 3RD GEAR**

Range： 1 ~ 32767
Effective： Effective After Reboot
Access level： Machine Maker
Default： 1
Unit： Nul

This parameter sets the tooth number of some spindle's motor in 3rd gear, which equals to setting the denominator in gear ratio of some spindle in 3rd gear. When some spindle is in 3rd gear (C099 is ON)：

$$\text{Gear ratio of the spindle} = \frac{\text{Tooth number of spindle (Pr.0179)}}{\text{Tooth number of motor (this parameter)}}$$

If the spindle's gear ratio is larger than 1, there is a deceleration relationship between spindle and motor; if the ratio is smaller than 1, there is an acceleration relationship between spindle and motor. Please refer to the following formula for the setting method：

$$\text{Motor's tooth number} \times \text{Motor's rotation speed} = \text{Spindle's tooth number} \times \text{Spindle's rotation speed}$$

179	**TOOTH NUMBER OF THE 1ST SPINDLE IN 3RD GEAR**
669	**TOOTH NUMBER OF THE 2ND SPINDLE IN 3RD GEAR**
677	**TOOTH NUMBER OF THE 3RD SPINDLE IN 3RD GEAR**

Range： 1 ~ 32767
Effective： Effective After Reboot
Access level： Machine Maker
Default： 1
Unit： Nul

This parameter sets the tooth number of some spindle in 3rd gear, which equals to setting the numerator in gear ratio of some spindle in 3rd gear. When some spindle is in 3rd gear (C099 is OFF)：

$$\text{Gear ratio of the spindle} = \frac{\text{Tooth number of spindle (this parameter)}}{\text{Tooth number of motor (Pr.0178)}}$$

If the spindle's gear ratio is larger than 1, there is a deceleration relationship between spindle and motor; if the ratio is smaller than 1, there is an acceleration relationship between spindle and motor. Please refer to the following formula for the setting method：

$$\text{Motor's tooth number} \times \text{Motor's rotation speed} = \text{Spindle's tooth number} \times \text{Spindle's rotation speed}$$

181	**TOOTH NUMBER OF THE 1ST SPINDLE'S MOTOR IN 4TH GEAR**
670	**TOOTH NUMBER OF THE 2ND SPINDLE'S MOTOR IN 4TH GEAR**
678	**TOOTH NUMBER OF THE 3RD SPINDLE'S MOTOR IN 4TH GEAR**

Range： 1 ~ 32767
Effective： Effective After Reboot
Access level： Machine Maker
Default： 1
Unit： Nul

This parameter sets the tooth number of some spindle's motor in 4TH gear,

which equals to setting the denominator in gear ratio of some spindle in 4^{TH} gear. When some spindle is in 4^{TH} gear (C097 ~ C099 are all OFF)：

$$\text{Gear ratio of the spindle} = \frac{\text{Tooth number of spindle (Pr.0182)}}{\text{Tooth number of motor (this parameter)}}$$

If the spindle's gear ratio is larger than 1, there is a deceleration relationship between spindle and motor; if the ratio is smaller than 1, there is an acceleration relationship between spindle and motor. Please refer to the following formula for the setting method:

$$\text{Motor's tooth number} \times \text{Motor's rotation speed} = \text{Spindle's tooth number} \times \text{Spindle's rotation speed}$$

182	**TOOTH NUMBER OF THE 1ST SPINDLE IN 4TH GEAR**
671	**TOOTH NUMBER OF THE 2ND SPINDLE IN 4TH GEAR**
679	**TOOTH NUMBER OF THE 3RD SPINDLE IN 4TH GEAR**

Range： 1 ~ 32767
Effective： Effective After Reboot
Access level： Machine Maker
Default： 1
Unit： Nul

This parameter sets the tooth number of some spindle in 4^{th} gear, which equals to setting the numerator in gear ratio of some spindle in 4^{th} gear. When some spindle is in 4^{th} gear (C097 ~ C099 are all OFF)：

$$\text{Gear ratio of the spindle} = \frac{\text{Tooth number of spindle (this parameter)}}{\text{Tooth number of motor (Pr.0181)}}$$

If the spindle's gear ratio is larger than 1, there is a deceleration relationship between spindle and motor; if the ratio is smaller than 1, there is an acceleration relationship between spindle and motor. Please refer to the following formula for the setting method：

$$\text{Motor's tooth number} \times \text{Motor's rotation speed} = \text{Spindle's tooth number} \times \text{Spindle's rotation speed}$$

183	**COMMAND TYPE OF THE 1ST SPINDLE'S SPEED**
296	**COMMAND TYPE OF THE 2ND SPINDLE'S SPEED**
297	**COMMAND TYPE OF THE 3RD SPINDLE'S SPEED**

Range： 0 ~ 4
Effective： Effective After Reboot
Access level： Machine Maker
Default： 0
Unit： Nul

This parameter sets the command type of some spindle's rotation speed. The system's preset command type is voltage output. If the motor driver of the spindle has a PG card or the spindle motor is a servo motor, the output command type of the spindle can be set in the pulse type that the motor driver accepts.

Value	Type	axis	Description
0	Voltage command (0~10V)	**Defined by P.29**	(1) Spindle CW/CCW switch by ladder switch inverter terminal. (2) P16=0, accelerate controlled by inverter. If P16 has any value, the acceleration control by controller.
1	Pulse Output (A/B Phase)	4	(1) Spindle direction define by C82，C83 (2) Accelerate control by P16 (3) Output axis not effect by P29 (Spindle's servo no.) It fixed to 4TH, used for TRF1720 P5 (SPD AXIS) sends pulse. (4) Under speed control, NC won't check Servo lag.
2	Pulse Output (CW/CCW)	4	
3	Pulse Output (Pulse/Dir.)	4	
	V-command (-10V~10V)	**Defined by P.29**	(1) Spindle direction define by C82，C83 (2) Accelerate control by P16
5	Pulse Output A/B Phase	**Defined by P.29**	(1) Spindle direction define by C82，C83 (2) Accelerate control by P16 (3) Output axis not effect by P29 (Spindle's servo no.) (4) Under speed control, NC won't check Servo lag.
6	Pulse Output CW/CCW	**Defined by P.29**	
7	Pulse Output Pulse/Dir.	**Defined by P.29**	
8	M-II	**Defined by P.29**	

Note:
C82,C83 control method
C82 = ON ,C83=OFF => Spindle CW
C82 = OFF ,C83=ON => Spindle CCW
Others => Spindle Stop

184 **LOCAL INPUT OF THE 1ST SPINDLE'S ORIENTATION**

Range： 1 ~ 10
Effective： Effective After RESET
Access level： Machine Maker
Default： 9
Unit： Nul

Bit 2	Bit 1	Bit 0	Description
0	0	1	Connected to Local input 1 (HS1 on the transit card) (Default)
0	1	0	Connected to Local input 2 (HS2 on he transit card)

Bit 3	Description
0	Normally close
1	Normally open. (Default)

Bit 0 ~ Bit 2：Set the input number of the spindle's orientation sensor signal. Set to 1, the local input is connected to HS1 on the transit card; set to 2, the local input is connected to HS2 on the transit card.
Bit 3：Set the signal type of the spindle's orientation sensor. Set to 0: Normally Close (NC); set to 1: Normally Open. (NO).
Set to 1：The local input port of spindle positioning sensor signal is HS1, the signal type is Normally Close (NC);
Set to 9：The local input port of spindle positioning sensor signal is HS1, the signal type is Normally Open (NO);
Set to 2：The local input port of spindle positioning sensor signal is HS2, the signal type is Normally Close (NC);
Set to 10：The local input port of spindle positioning sensor signal is HS2, signal type is Normally Open (NO).

189 **DEFAULT INITIAL SPEED OF THE 1ST SPINDLE**
875 **DEFAULT INITIAL SPEED OF THE 2ND SPINDLE**

Range： 0 ~ 99999
Effective： Effective After Reboot
Access level： User
Default： 0
Unit： RPM
When the system is started, this parameter is the preset initial rotation speed of the spindle.

190 **1st SP Position command type**

Range: 0 ~ 6
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 0
Unit: Non
Description:

value	Signal type	axis	description

0	Pulse Output (A/B Phase)	4	● Usually Spindle drive have position card(PG card) ※ **Use pulse form TRF1720 P5**
1	Pulse Output (CW/CCW)	4	
2	Pulse Output，(Pulse /Dir.)	4	
3	V command (-10V~10V) Controller inner hardware do the close loop control	**Defined by P.29**	● Use with Spindle drive have close loop vector control, and accept ±10V control(+ for CW, - for CCW) ● Spindle output V-cmd by TRF1720 P5(SPD AXIS) , and read SP encoder through SPD ENC.
4	Pulse Output (A/B Phase)	**Defined by P.29**	● Use with Spindle and position card(PG card)
5	Pulse Output (CW/ CW)	**Defined by P.29**	
6	Pulse Output (Pulse/Dir.)	**Defined by P.29**	
7	M-II		

195	**ENCODER TYPE OF 1ST SPINDLE**
891	**ENCODER TYPE OF 2ND SPINDLE**
895	**ENCODER TYPE OF 3RD SPINDLE**

Range： 0 ~ 3
Active： Active After Reboot
Level： Machinery Builder
Default value：0
Unit： Nul
Description： This parameter is to set the spindle Encoder's output signal type.
0：A/B PHASE
1：CW/CCW
2：PULSE/DIRECTION
3：none

226	**MOVING DIR. OF SPINDLES(BIT)**

Range： 0 ~ 7
Active： Active After Reboot
Level： Machinery Builder
Default value： 0
Unit： Nul
Description： **BIT 0**： When set to 1, motion direction of the 1st spindle must be reversed;
BIT 1： When set to 1, motion direction of the 2nd spindle must be reversed;
BIT 2： When set to 1, motion direction of the 3rd spindle must be reversed;
Only valid when output command format of the spindle is in pulse format.

240 **1ST SPD POS GAIN AT ORIENTATION**

Range： 0 ~ 20000
Active： Active After RESET
Level： Machinery Builder
Default value：30
Unit： 1/S
Description： When the spindle's command format in control mode is V command (parameter No. 0190 = 3), this parameter sets the spindle's proportional gain during positioning.

241 **1ST SPD POS GAIN AT RIGID TAP**

Range： 0 ~ 20000
Active： Active After RESET
Level： Machinery Builder
Default value： 30
Unit： 1/S
Description： When the spindle's command format in control mode is V command (parameter No. 0190 = 3), this parameter sets the spindle's proportional gain during rigid tapping.

248 **1ST SPD ORIENT OFFSET UNIT**

Range： 0 ~ 1
Active： Active After Reboot
Level： Machinery Builder
Default value： 0
Unit： NUL
Description： 0: Unit of OFFSET amount between Spindle Orientation point and center point (Parameter #1056 and System Data #10) is pulse.
1: Unit of OFFSET amount between Spindle Orientation point and center point (Parameter #1056 and System Data #10) is 0.001 degree.

354 **1ST SPD OVERRIDE UNIT**
355 **2ND SPD OVERRIDE UNIT**
356 **3RD SPD OVERRIDE UNIT**

Range： 0 ~ 1
Active： Active After Reboot
Level： Machinery Builder
Default value： 0
Unit： Nul
Description： 0：The 1st (2nd & 3rd) spindle's rotation override speed = R015 (R019、R020) register value * 10%；
1：The 1st (2nd & 3rd) spindle's rotation override speed = R015 (R019、R020) register value* 1%。

393 **1ST SPINDEL GEARING METHOD**

Range： 0 ~ 1
Active： Active After Reboot
Level： Machinery Builder
Default value： 0

Unit： Nul
Description： Choose either “automatic” or “manual” gear change method to be the spindle’s gear change method
0：Automatic gear change
1：Manual gear change

663	1ST SPD ORIENT ACC/DEC TIME

Range： 0 ~ 1500
Active： Active After Reboot
Level： Machinery Builder
Default value：100
Unit： ms
Description： This parameter is to set the acceleration and deceleration time of Spindle orientation (including Spindle Adjustment).

839	1ST SPD ORIENT CHECK TOLERANCE

Range： 0 ~ 32767
Active： Active After RESET
Level： Machinery Builder
Default value：1000
Unit： 0.001 degree
Description： This parameter is to see the allowable error amount of Spindle Orientation. If the difference between Spindle stopping position and the actual orientation position is smaller than this parameter setting value, Spindle orientation task can be meant as accomplish. However, if the difference amount is larger than this parameter setting value, System Alarm 【MOT 4049 Spindle Orientation Exceed Allowable Error】 will occur.

224	2ND SPD SPEED CHK 0)ACT 1)CMD
225	3RD SPD SPEED CHK 0)ACT 1)CMD
874	1ST SPD SPEED CHK 0)ACT 1)CMD

Range： 0 ~ 1
Active： Active After RESET
Level： Machinery Builder
Default value： 0
Unit： Nul
Description： 0：Spindle rotational speed checking signal source is Spindle Loop Encoder.
1：Spindle rotational speed checking signal source is Spindle rotational command.

298	2ND SPD.SPEED ARRIVAL RANGE
881	3RD SPD.SPEED ARRIVAL RANGE
1054	1ST SPD.SPEED ARRIVAL RANGE

Range： 1 ~ 20000
Active： Active After RESET
Level： Machinery Builder
Default value： 50
Unit： RPM
Description： Under the condition that parameter 0090 is 1 (Spindle rotational speed is the actually speed), the system will calculate the actual rotational speed according to the spindle ENCODER feedback signal.
When | Spindle actual rotational speed – spindle command rotational speed | is

less than or equal to this parameter setting value, the system will set S BIT 088 to ON. Also, it will inform PL that the spindle actual rotational speed to is arrived to the commanding value. If this parameter setting value is too small, it is possible to cause the system's checking spindle actual rotational speed not able to arrive within the error range, which will not set S BIT 088 to ON. This further causes S code or M3, and M4 commands not able to end.

1056 **1ST SPD ORIENT OFFSET VALUE**

Range： -99999999 ~ 99999999
Active： Active After RESET
Level： Machinery Builder
Default value： 0
Unit： pulse
Description： During Spindle orientation, this parameter sets the OFFSET amount of positioning final point and basic point. Parameter # 0248 can assign pulse or 0.001 degree as OFFSET amount unit.

1058 **1ST SPD RIGTAP MAX FOLLOW ERROR**

Range： 1 ~ 32767
Active： Active After RESET
Level： Machinery Builder
Default value： 3000
Unit： um
Description： During rigid tapping, if the following error limit of Z-axis is larger than this setting value, the system will stop rigid tapping. Also, the system warning message (MOT 0052 error in rigid tapping is over limit) will occur. After machine adjustment, please set this parameter to a smaller value in order to prevent wrong motion that may cause damage of machines. After the rigid tapping machine adjustment is completed, please set the value that is 5 ～10 times larger than the display value from system data #021 on DGNOS page.

1059 **1ST SPD RIGTAP ACC/DEC TIME**

Range： 1 ~ 32767
Active： Active After RESET
Level： Machinery Builder
Default value： 500
Unit： ms
Description： Setting under the rigid tapping mode, spindle's acc/deceleration time. Since under the rigid tapping mode, the movement amount of Z-axis is calculated by the spindle movement so this parameter also set the acc/deceleration time for Z-axis.

1060 **1ST SPD RIGTAP EXTRACTION RATE**

Range： 1 ~ 400
Active： Active After RESET
Level： Machinery Builder
Default value：100
Unit： %
Description： During rigid tapping returning, the needed cutting power is small, so can use this parameter to set the increasing return speed.
Example, if setting value is 200, this means during returning procedure, the spindle turns by two times of the original commanding rotational speed, Z-axis moves by two times of the original commanding the feedrate. But, the faster the rotational speed, the larger the following error of Z-axis. So must be careful in order to prevent crash situation. Also, must be careful of the limitation of the highest turning speed of the spindle and the highest cutting speed of the Z-axis.

299 **2RD SPINDLE ZERO SPEED RANGE**
882 **3RD SPINDLE ZERO SPEED RANGE**
1063 **1RD SPINDLE ZERO SPEED RANGE**

Range： 1 ~ 20000
Active： Active After RESET
Level： Machinery Builder
Default value：10
Unit： RPM
Description： Under the condition that parameter 0090 is 1 (actual value of spindle rotational speed), the system ENCODER feedback signal will calculate the actual rotational speed. When the spindle actual rotational speed is less than or equal to this parameter setting value, the system will set S BIT 092 to ON and also inform the PLC that the spindle actual rotational speed has reached zero speed already.

1064 **1ST SPD RIGTAP VELOCITY COMP.**

Range： 0 ~ 100000
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： Nul
Description： when the rigid tapping machine adjustment is completed,
Please set the commanding compensation value as the display value from data system #023 at (Diagnostic) DGNOS page.

1065 **1ST SPD RIGTAP ACCELERATED COMP**

Range： 0 ~ 100000
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： Nul
Description： after rigid tapping is completed, please set the commanding compensation value as the display value of data system #022 at (Diagnostic) DGNOS page.

1066 **1ST SPD RIGTAP VELOCITY FILTER**

Range： 0 ~ 20
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： Nul
Description： The bigger the value, the less vibration will occur. , but the bigger the rigid tapping following error will be. When enter 0, this means there is no filtering effect. When enter the maximum value (i.e., 20), this means there is a completely filtering effect, which means the signal is filtered completely. Please adjust this parameter setting value during the rigid tapping machine adjustment.

1070 **1ST SPD RIGTAP ACC. FILTER**

Range： 0 ~ 20
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： Nul
Description： The bigger the value, the less vibration will occur and the smaller of the following error. But, it is NOT absolute, which means there is an optimal value under certain filter intensity. When enter 0, it means there is no filtering effect. When enter the maximum value (i.e., 20), it means there is a completely filtering effect, which means the signal is filtered completely. Please adjust this parameter setting value during the rigid tapping machine adjustment.

1071 **1ST SPD RIGTAP OUTPUT INVERSE**

Range： 0 ~ 1
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： Nul
Description： When the spindle +ive rotating direction under rigid tapping is not the same as that under not rigid tapping mode, please set this parameter to 1. Please adjust this parameter setting value during rigid tapping machine adjustment.

1075 **1ST SPD SERVOLAG LIMIT**

Range： 0 ~ 100000
Active： Active After RESET
Level： Machinery Builder
Default value：4096
Unit： Pulse
Description： When rigid tapping machine adjustment is complete, please set the value or the allowable following error that is 5-10 times larger of the display value from data system #26 at DGNOS page. If this setting value is too small, it is possible to cause the system alarm (MOT 055 rigid tapping spindle servo error is over the allowable limit) to occur during rigid tapping.

1096 **MAX SPEED OF 1ST SPINDLE**

Range： 0 ~ 99999
Active： Active After RESET
Level： Machinery Builder
Default value：6000
Unit： RPM
Description： This parameter is used to set the max rotational speed of spindle. When spindle command rotational speed, which is set by user, is larger than this Parameter setting value, the system will restrict the spindle rotational speed according to this parameter setting value.

1097 **1ST SPINDLE D/A SCALE RPM/10V**

Range： 1 ~ 99999
Active： Active After RESET
Level： Machinery Builder
Default value：6000
Unit： RPM
Description： this parameter is to set the corresponding spindle rotational Speed when the spindle motor input voltage is 10V.

1116 **1ST SPINDLE ENCODER PPR**

Range： 1 ~ 32767
Active： Active After Reboot
Level： Machinery Builder
Default value：1024
Unit： pulse
Description： Assumed total pulse per rotation of spindle motor ENCODER is 2500, this means this parameter is set to 2500. Please refer to parameter # 0057 for setting description.

1076 **JOG SPEED OF 2ND SPINDLE**
1077 **JOG SPEED OF 3RD SPINDLE**
1121 **JOG SPEED OF 1ST SPINDLE**

Range： 0 ~ 99999
Active： Active After RESET
Level： Machinery Builder
Default value：200
Unit： RPM
Description： When C BIT 072 is ON, spindle will rotate in this parameter’s setting rotational speed.

1150 **SPEED OF 1ST SPINDLE GEAR**

Range： 0 ~ 99999
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： RPM
Description： This parameter is to determine whether or not to do gear shifting motion according to the spindle S code command.
1. when the spindle is at 1st gear and assuming that the user command of the

spindle S code command is larger than (not including equal to) this parameter setting value, the system will inform PLC to do the gear shifting motion (shifting to which gear depends on the spindle commanding rotational speed);

2. when the spindle is NOT at 1st gear and assuming that the user command of the spindle S code command is smaller than (including equal to) this parameter setting value, the system will inform PLC to shift the spindle to the 1st gear;
3. If no spindle gear shifting need, recommend to use the 4th gear (C BIT 097 – 099 are OFF) and set this parameter to 0.

Need to pay attention to the following: NC only follow S code command from the user command of to determine the desired gear and then to inform PCL to execute gear shifting motion. If due to the spindle rotational speed OVERRIDE, which causes the actual rotational speed, is over that gear range, then NC will NOT execute the above motion.

1151 SPEED OF 2ND SPINDLE GEAR

Range： 0 ~ 99999
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： RPM
Description： This parameter is to determine whether or not to execute the gear shifting motion according to the spindle S code command.

1. when the spindle is at 2nd gear and assuming that the spindle S code command from the user commanding of is larger than (not including equal to) this parameter setting value, or smaller than (including equal to) the setting value of parameter 1150 (gear shifting rotational speed of 1st spindle gear), the system will inform PLC to execute the gear shifting motion (shifting to which gear is determined by the spindle commanding rotational speed);
2. the spindle is NOT at 2nd gear and assuming that the spindle S code command from the user command of is smaller than (including equal to) this parameter setting value and larger than (not including equal to) the setting value of parameter 1150 (gear shifting rotational speed of 1st spindle gear), the system will inform PLC to shift the spindle to the 2nd gear;
3. If no spindle gear shifting need, recommend to use the 4th gear (C BIT 097 – 099 are OFF) and set this parameter to 0.

Need to pay attention to the following: NC only follows the S code command from user command to determine the gear and then to inform PCL to execute gear shifting motion. If due to the spindle rotational speed OVERRIDE, the actual rotational speed is over that gear range, and then NC will NOT execute the above motion.

1152 SPEED OF 3RD SPINDLE GEAR

Range： 0 ~ 99999
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： RPM
Description： this parameter is to determine whether or not to execute gear shifting motion according to spindle S code command:

1. when spindle is at 3rd gear and assuming that the spindle S code command from user command of is larger than (not including equal to) this parameter setting value, or smaller than (including equal to) the setting value of parameter 1151 (gear shifting rotational speed of the 2nd spindle

gear), the system will inform PLC to execute gear shifting motion (shifting to which gear is determined by the spindle commanding rotational speed);
2. when spindle is NOT at 3rd gear and assuming the spindle S code command from user command is smaller than (including equal to) this parameter setting value and larger than (not including equal to) the setting value of parameter 1151 (gear shifting rotational speed of the 2nd spindle gear). System will inform PLC to shift spindle to the 3rd gear.
3. If no spindle gear shifting need, recommend to use the 4th gear (C BIT 097 – 099 are OFF) and set this parameter to 0.

Need to pay attention to the following: NC only follows the S code command from user command to determine the gear and then to inform PCL to execute gear shifting motion. If due to the spindle rotational speed OVERRIDE, the actual rotational speed is over that gear range, then NC will NOT execute the above motion.

1153 1ST SPD MOTOR RPM OF GEARING

Range： 0 ~ 99999
Active： Active After RESET
Level： Machinery Builder
Default value：100
Unit： RPM
Description： During spindle is shifting gears, when C BIT 126 is ON, the system will use this parameter to set the rotating speed to driver spindle motor. At this time, spindle rotational speed OVERRIDE does not work.

1154 1ST SPD MOTOR RPM RANGE OF GEAR

Range： 0 ~ 99999
Active： Active After RESET
Level： Machinery Builder
Default value：50
Unit： RPM
Description： Assumed during spindle gear shifting procedure. Assumed C BIT 126 is ON, if the spindle motor actual rotational speed - parameter 1113 setting value is less than and equal to this parameter setting value, the system will set S BIT 094 to ON.

1155 MAX SPEED OF 1ST SPINDLE GEAR

Range： 0 ~ 99999
Active： Active After RESET
Level： Machinery Builder
Default value：1000
Unit： RPM
Description： Assumed the spindle is at the 1st gear, when the spindle rotational speed (spindle S Code command * rotational speed OVERRIDE) is over this parameter setting value, the system will be restricted this parameter setting value.

1156 MAX SPEED OF 1ND SPINDLE GEAR

Range： 0 ~ 99999
Active： Active After RESET
Level： Machinery Builder
Default value：2000
Unit： RPM
Description： Assumed the spindle is at the 2nd gear, when the spindle rotational speed (spindle S Code command * rotational speed OVERRIDE) is over this parameter setting value, the system will be restricted this parameter setting

value.

1157	MAX SPEED OF 1RD SPINDLE GEAR

Range： 0 ~ 99999
Active： Active After RESET
Level： Machinery Builder
Default value：3000
Unit： RPM
Description： Assumed the spindle is at the 3rd gear, when the spindle rotational speed (spindle S Code command * rotational speed OVERRIDE) is over this parameter setting value, the system will be restricted this parameter setting value.

3.5 MPG Parameter

15 **AXIS.HANDLE FOR MPG DRY RUN**

Range： 1 ~ 19
Active： Active After Reboot
Level： Machinery Builder
Default value：6
Unit： Nul
Description： This is used to set connection port number of the hand wheel under MPG dry fun mode (works only in MEM or MDI modes).

18 **MPG MULTIPLIER MODE**

Range： 0 ~ 1
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： Nul
Description： When P18=0, all Servo MPG ration are defined by register 14, ratio value defined as following chart.

Servo	register	value	MPG ratio
X Y Z 4th	14	1	X1
		2	X10
		3	X100
		other	X1

When 18=1, different Servo MPG ratio defined by different register, please refer to following chart.

Servo	register	value	MPG ration
X	14	1	X1
		2	X10
		3	X100
		other	X1
Y	81	1	X1
		2	X10
		3	X100
		other	X1
Z	82	1	X1
		2	X10
		3	X100
		other	X1
4th	83	1	X1
		2	X10
		3	X100
		other	X1

28	**MPG X PORT**
75	**MPG 4TH PORT**
87	**MPG Y PORT**
88	**MPG Z PORT**

Range： 1 ~ 19
Active： Active After Reboot
Level： Machinery Builder
Default value：6
Unit： Nul
Description： Under MPG mode, connection port number of X-axis MPG.

544	**MPGX acceleration time (ms)**
545	**MPGY acceleration time (ms)**
546	**MPGZ acceleration time (ms)**
547	**MPG4TH acceleration time (ms)**

Range: 0 ~ 300
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: ms
Description: Under MPG mode, each axis MPG acceleration time 。

550	**MPGX max speed (um/min)**
551	**MPGY max speed (um/min)**
552	**MPGZ max speed (um/min)**
553	**MPG4TH max speed (um/min)**

Range: 1 ~ 99999999
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 2000000
Unit: Um/min
Description: Under MPG mode, each axis MPG max speed 。

3.6 Compensation Parameter

Compensation can setup about backlash, gear tolerance and ball bar. Also can refer to 5.2 Laser Compensation Procedure 5.3 5.3 Double Ball Bar Measure – Backlash or Circular Spike Backlash

38	**BACKLASH/PITCH COMP UNITS**

Range： 0 ~ 16
Active： Active After Reboot
Level： Machinery Builder
Default value：16
Unit： Nul
Description： to set units for backlash compensation parameters (parameters 0044~ 0047) and pitch compensation parameters (parameters 0300 ~ 0349、0450 ~0499、0600 ~ 0649、0750 ~ 0799).

44	**X BACKLASH**
45	**Y BACKLASH**
46	**Z BACKLASH**
47	**4TH BACKLASH**

Range： 0 ~ 32767
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： um
Description： To set backlash compensation of X-axis.

112	**NUM.SECS OF X.PICTH COMP**
113	**NUM.SECS OF Y.PICTH COMP**
114	**NUM.SECS OF Z.PICTH COMP**
115	**NUM.SECS OF 4TH.PICTH COMP**

Range： 1 ~ 150
Active： Active After Reboot
Level： Machinery Builder
Default value：20
Unit： Nul
Description： To set total section of X-axis pitch error compensation. The multiple product of this parameter setting value and parameter 1018(1019, 1020, 1021) setting value should be the total length of X-axis ball screw pitch error compensation. Now the max compensation section is 50 sections for each axis.

117 **ENABLE OF BACKLASH COMP(BIT)**

Range： 0 ~ 63
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： Nul
Description： BIT0: for X axis, 1 means to enable X-axis backlash compensation function; 0 means not to enable.
BIT1：For Y axis, 1 means to enable Y axis backlash compensation function; 0 means not to enable.
BIT2：For Z axis, 1 means to enable Z axis backlash compensation function; 0 means not to enable.
BIT3：For 4th axis, 1 means to enable 4th axis backlash compensation function; 0 means not to enable.

118 **FLAG OF BACKLASH DIRECTION**

Range： 0 ~ 63
Active： Active After Reboot
Level： Machinery Builder
Default value：0
Unit： Nul
Description： BIT0：for setting X axis, 1 means pitch error compensation starts from –ive direction X axis returns to the reference point; 0 means pitch error compensation starts toward +ive direction.
BIT1：for setting Y axis, 1 means pitch error compensation starts from –ive direction Y axis returns to the reference point; 0 means pitch error compensation starts toward +ive direction.
BIT2：for setting Z axis, 1 means pitch error compensation starts from –ive direction Z axis returns to the reference point; 0 means pitch error compensation starts toward +ive direction.
BIT3：for setting 4th axis, 1 means pitch error compensation starts from –ive direction 4th axis returns to the reference point; 0 means pitch error compensation starts toward +ive direction.

119 **ENABLE FLAG OF PITCH COMP**

Range： 0 ~ 63
Active： Active After Reboot
Level： Machinery Builder
Default value：0
Unit： Nul
Description： BIT0：For X axis, 1 means to enable X axis pitch error compensation function; 0 means not to enable.
BIT1：For Y axis, 1 means to enable Y axis pitch error compensation function; 0 means not to enable.
BIT2：For Z axis, 1 means to enable Z-axis pitch error compensation function; 0 means not to enable.
BIT3：For 4th axis, 1 means to enable 4th axis pitch error compensation function; 0 means not to enable.

300	**PITCH X COMP.001**
349	**PITCH X COMP.050**
1200	**PITCH X COMP.051**
1299	**PITCH X COMP.150**

Range： -20000 ~ 20000
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： um
Description： Assumed pitch error on the nth section of X axis is M (um), the parameter # (300+N – 1) is set as M, and parameter 0038 is set as 16.

358	**ENABLE THERMO DEFORMED CMP**

Range： 0 ~ 1
Active： Active After Reboot
Level： Machinery Builder
Default value：0
Unit： Nul
Description： 0：Turn off the thermal compensation function
1：Turn on the thermal compensation function

359	**ALLOWANCE OF THERMO CMP INPUT**

Range： 1 ~ 1000
Active： Instant Activity
Level： Machinery Builder
Default value：1000
Unit： um
Description： The maximum thermal compensation input amount allowed.

450	**PITCH Y COMP.001**
499	**PITCH Y COMP.050**
1300	**PITCH Y COMP.051**
1399	**PITCH Y COMP.150**

Range： -20000 ~ 20000
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： um
Description： Assumed pitch error on the nth section of Y axis is M (um), the Parameter # (450+N – 1) is set as M, and parameter 0038 is set as 16.

600	**PITCH Z COMP.001**
649	**PITCH Z COMP.050**
1400	**PITCH Z COMP.051**
1499	**PITCH Z COMP.150**

Range： -20000 ~ 20000
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： um
Description： Assumed pitch error on the nth section of Z axis is M (um), the Parameter # (600+N – 1) is set as M, and parameter 0038 is set as 16.

750	**PITCH A COMP.001**
799	**PITCH A COMP.050**
1500	**PITCH A COMP.051**
1599	**PITCH A COMP.150**

Range： -20000 ~ 20000
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： um
Description： Assumed pitch error on the nth section of Z axis is M (um), the parameter # (750+N – 1) is set as M, and parameter 0038 is set as 16.

562	**PLC axis compensation bit 0)OFF 1)ON**

Range: 0 ~ 1
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: 0:OFF,1:ON

563	**PLC axis compensation X acceleration time ms**
564	**PLC axis compensation Y acceleration time ms**
565	**PLC axis compensation Z acceleration time ms**
566	**PLC axis compensation 4TH acceleration time ms**

Range: 100 ~ 1000
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 1000
Unit: ms
Description: Set PLC axis compensation acceleration time

569	**X backlash compensation acceleration time ms**
570	**Y backlash compensation acceleration time ms**
571	**Z backlash compensation acceleration time ms**
572	**4TH backlash compensation acceleration time ms**

Range: 0 ~ 1000
Effective time: EFFECTIVE AFTER RESET

Access level: Machine Maker
Default: 0
Unit: ms
Description: Set each axis backlash compensation acceleration time

811	SPIKE CMP G CODE 0)G2 G3 1)ALL

Range： 0 ~ 1
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： um
Description： When parameter setting is 0, this means the spike compensation value, set by using circular testing, can only be applied on G02/03 arch interpolation command. When it is 1, the spike compensation value can be applied on all moving G codes, which means as long as servo axis is doing reverse direction motion; the setting spike compensation value will be added.

812	SPIKE +X CMP VALUE
818	SPIKE +Y CMP VALUE
828	SPIKE +Z CMP VALUE

Range： 0 ~ 200
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： um
Description： Assumed doing the circular testing. When the spike value of +ive X axis direction is 0, this means NOT to enable the spike compensation function of +ive X-axis direction.

813	SPIKE +X CMP TIME
819	SPIKE +Y CMP TIME
829	SPIKE +Z CMP TIME

Range： 0 ~ 200
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： um
Description： Please check the controller’s actual disconnecting time interval first and then set the desired value. Assumed doing circular testing. When set the spike time interval to 0, it means NOT to enable the spike compensation function of +ive X-axis direction.

814	**SPIKE +X CMP DELAY**
820	**SPIKE +Y CMP DELAY**
830	**SPIKE +Z CMP DELAY**

Range： 0 ~ 200
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： um
Description： Please check the controller's actual disconnecting time interval first and then set the value. Assumed doing circular testing. Delay time interval between the spike point of +ive X-axis direction and the direction changing point.

815	**SPIKE -X CMP VALUE**
825	**SPIKE -Y CMP VALUE**
831	**SPIKE -Z CMP VALUE**

Range： 0 ~ 200
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： um
Description： Assumed doing the circular testing. When the spike value of -ive X axis direction is 0, this means NOT to enable the spike compensation function of -ive X-axis direction.

816	**SPIKE -X CMP TIME**
826	**SPIKE -Y CMP TIME**
832	**SPIKE -Z CMP TIME**

Range： 0 ~ 200
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： um
Description： Please check the controller's actual disconnecting time interval first and then set the value. Assumed doing canned cycle testing. When set the spike time interval to 0, it means NOT to enable the spike compensation function of -ive X-axis direction.

817	**SPIKE -X CMP DELAY**
827	**SPIKE -Y CMP DELAY**
833	**SPIKE -Z CMP DELAY**

Range： 0 ~ 200
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： um
Description： Please check the controller's actual disconnecting time interval first and then set the value. Assumed doing canned cycle testing. Delay time interval between the spike point of X axis -ive direction and the direction changing point.

1018	**COMP DIST OF EACH SECTION.X**
1019	**COMP DIST OF EACH SECTION.Y**
1020	**COMP DIST OF EACH SECTION.Z**
1021	**COMP DIST OF EACH SECTION.A**

Range： 0 ~ 99999999
Active： Active After Reboot
Level： Machinery Builder
Default value：30000
Unit： um
Description： Assumed pitch error compensation interval is 10000μm of every X axis section, so please set this parameter to 1000.

1046	**START.X COMP POS**
1047	**START.Y COMP POS**
1048	**START.Z COMP POS**
1049	**START.4 COMP POS**

Range： -99999999 ~ 99999999
Active： Active After Reboot
Level： Machinery Builder
Default value：0
Unit： um
Description： When the starting position of X axis pitch error compensation is 0μm（machine coordinate）, please set this parameter to 0.

3.7 Home Parameter

19	WAY TO DEAL HOMING ON DOG

Range： 0 ~ 1
Active： Active After RESET
Level： Machinery Builder
Default value： 0
Unit： Nul
Description： 0：Warning from the system in order to inform user to move away the servo axis. Then the system will execute the zero return procedure. Each axis warning message is as following:
X Axis：【MOT 0014 X axis is on HOME DOG】
Y Axis：【MOT 0015 Y axis is on HOME DOG】
Z Axis：【MOT 0016 Z axis is on HOME DOG】
4^{th} Axis：【MOT 0017 4^{th} axis is on HOME DOG】
1：NC moves away the servo axis automatically (moves toward the reverse direction from the reference point). After getting away from DOG, it will execute home/zero return procedure.

20	DEFAULT OF RETURN HOME FN.(BIT)

Range： 0 ~ 63
Active： Active After Reboot
Level： Machinery Builder
Default value： 0
Unit： Nul
Description： After turning on the machine, check if each axis is preset to having returned to reference point.
Bit 0：X axis
Bit 1：Y axis
Bit 2：Z axis
Bit 3：The 4^{th} axis

30	OFFSET LENGTH OF X.ORG
31	OFFSET LENGTH OF Y.ORG
32	OFFSET LENGTH OF Z.ORG
33	OFFSET LENGTH OF 4.ORG

Range： -99999999 ~ 99999999
Active： Active After RESET
Level： Machinery Builder
Default value： 0
Unit： um
Description： Assumed each axis moves N distance toward machine reference point. Setting this parameter to N if want to get the offset amount of N distance (um). Different setting value will change the reference point due to different offset amount. But, this setting value will NOT change the display coordinate after returning home.
When the setting value is positive, it makes the machine home point of this axis moves away from DOG direction.
When the setting value is positive, it makes the machine home point of this axis moves close to DOG direction.

34	**PAUSE TIME.X HOME SERACHING**
35	**PAUSE TIME.Y HOME SERACHING**
36	**PAUSE TIME.Z HOME SERACHING**
37	**PAUSE TIME.4 HOME SERACHING**

Range： 100 ~ 2000
Active： Active After RESET
Level： Machinery Builder
Default value： 100
Unit： 10 ms
Description： the required dwell time that is set by this parameter can be used in the following three places:

a. Dwell time of decelerating stop when X axis moves toward the reference point in 1st speed and reaches DOG.
b. dwell time of decelerating stop when X axis gets away from DOG in 2nd speed and finds motor INDEX.
c. Dwell time of decelerating stop when X axis returns back the desired motor INDEX position.

48	**DIRECT SET HOME POSITION**

Range： 0 ~ 63
Active： Active After Reboot
Level： Machinery Builder
Default value： 0
Unit： Nul
Description： BIT 0：Setting 0 to indicate X axis re-searching HOME point method is re-searching DOG+ Index. 1 to indicate X axis re-searching HOME point method is force setting.
BIT 1：Setting 0 to indicate Y axis re-searching HOME point method is re-searching DOG+ Index. 1 to indicate Y axis re-searching HOME point method is force setting.
BIT 2：Setting 0 to indicate Z axis re-searching HOME point method is re-searching DOG+ Index. 1 to indicate Z axis re-searching HOME point method is force setting.
BIT 3：Setting 0 to indicate the 4th axis re-searching HOME point method is re-searching DOG+ Index. 1 to indicate the 4th axis re-searching HOME point method is force setting.

64	**HOME DOG 0)NC 1)NO**

Range： 0 ~ 1
Active： Active After Reboot
Level： Machinery Builder
Default value： 0
Unit： Nul
Description： this parameter works only when the home DOG sensor signal is connected to LOCAL INPUTS (Transit Board HS1 ～ HS4 connect points). (Parameter 0175 setting value is 0). If the home dog sensor signal is connected REMOTE INPUTS, then PLC ladder diagram program needs to change each axis home DOG signal state to C BIT 0031 ～ 0035 in order to inform NC.

76 **ENABLE ABS SET AFTER HOMING**

Range： 0 ~ 1
Active： Active After RESET
Level： Machinery Builder
Default value： 1
Unit： Nul
Description： please refer to 1014 ~ 1017 for absolute coordinate setting Value. After each servo axis returns home, display value of absolute coordinate is determined by following three points:

a. setting value of parameters 1014 ~ 1017;
b. 00 coordinated system, setting value of G54 ~ G59 coordinate system；
c. Setting value in G52 area coordinate system.

$$Para\#1014 \sim 1017\ value - \begin{pmatrix} 00\ coordinate\ value \\ +G54 \sim G59\ coordinate\ value \\ +G52\ regional\ coordinate\ value \end{pmatrix}$$

In addition,

a. setting value of parameters 1014 ~ 1017: use this parameter to decide whether or not they are effective；
b. 00 coordinate system, G54 ~ G59 coordinate system setting values: effective permanently；
c. Setting value in G52 area coordinate system: use parameter 0133 to decide whether or not it is effective.

77 **ENABLE NONE HOMING G00 OPR**

Range： 0 ~ 1
Active： Active After RESET
Level： User
Default value： 1
Unit： Nul
Description：

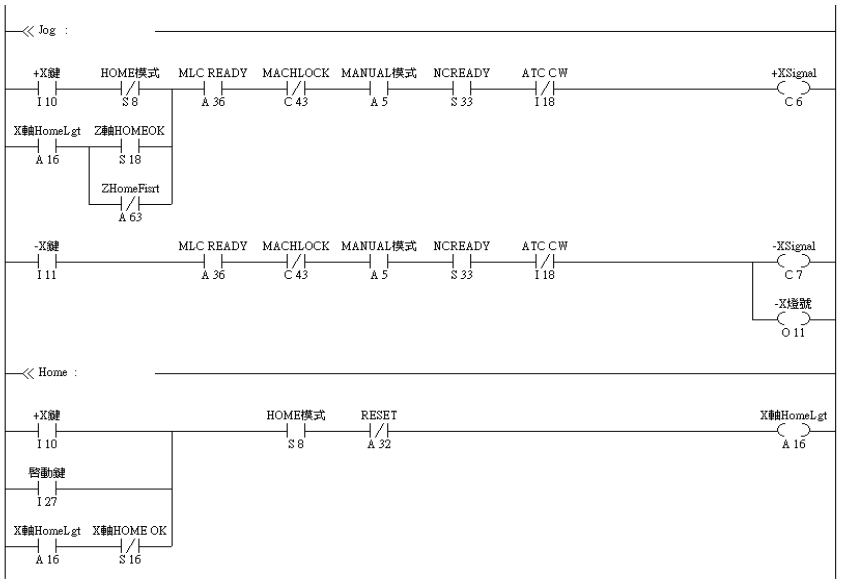
	Parameter 77setting value is 1, G00 is effective before zero return	**Parameter 77 setting value is 0,G00 is NOT effective before Return Home**
MEM, MDI Automatic mode	G00 motion normally, each axis feedrate is decided by the setting value of parameters 1000 ~ 1003.	Automatically change G00 motion to G01 motion, feedrate is the present F code designated value (use parameter 149 to set the default value).
JOG, RAPID Manual mode	Under JOG, each axis feedrate is decided by the Setting value of parameter 1100 ~ 1103; under RAPID, each axis feedrate is decided by the setting value of parameters 1000 ~ 1003.	Motion of RAPID and motion of JOG, each axis feedrate is decided by the setting value of parameter1100 ~ 1103.

79	**ORG.X AHEAD/BEHIND OF DOG**
80	**ORG.Y AHEAD/BEHIND OF DOG**
81	**ORG.Z AHEAD/BEHIND OF DOG**
82	**ORG.4 AHEAD/BEHIND OF DOG**

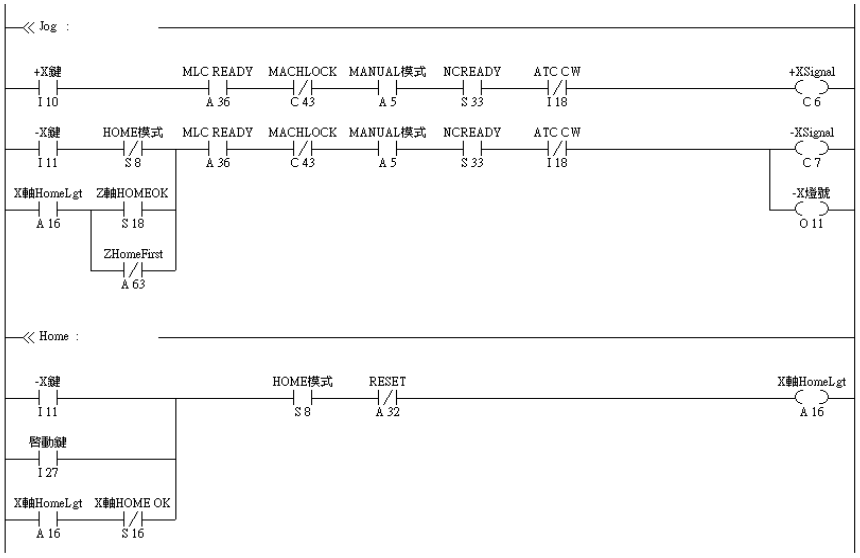
Range： 0 ~ 1
Active： Active After RESET
Level： Machinery Builder
Default value： 1
Unit： Nul
Description： 0：when reference point is behind DOG, after each axis reaches DOG, each axis will continue moving toward the same direction and look for the reference point；
1：Home position is ahead of DOG, after each axis reaches DOG; each axis will continue moving toward the reverse direction and look for the reference point.

120	**HOME DIRECTION OF AXIS**

Range： 0 ~ 63
Active： Active After Reboot
Level： Machinery Builder
Default value： 0
Unit： Nul
Description： About home return direction, other than this parameter setting, PLC also needs to do the corresponding modification according to this setting. Home return procedure that is written by PLC of the controller machine version uses the home point is at +ive direction as the standard.
Also, in the safety concern to prevent mistakenly touching, the <+> direction signal will be sent out (using X axis as an example, which is C6) no matter which servo axis key (<+> <->) that the user presses. So, under the condition that the home point is at the –ive servo axis direction, not only needs to set the corresponding BIT of this parameter to 1 but also needs to modify the corresponding returning home program in PLC.
Use X axis as an example, the diagram of PLC return home procedure from +ive direction is as following:



If X axis returns home at the –ive direction, other than setting this parameter BIT0 to 1, PLC modification is as following:



175	**HOME DOG FROM 0)LOCAL 1)REMOTE**

Range： 0 ~ 1
Active： Active After Reboot
Level： Machinery Builder
Default value： 0
Unit： Nul
Description： 0：means the HOME DOG signal is connected LOCAL INPUTS （transit board HS1 ~ HS4）, must setting the type of DOG signal to（parameter 0064）;
1：means the HOME DOG signal is connected REMOTE INPUTS, PLC must change each axis reference point DOG signal to the corresponding C BIT 0031 ~ 0034（please refer to C BIT 0031 ~ 0034 for description）.

204 **HOME POSITION RECORD BIT**

Range： 0 ~ 63
Active： Active After RESET
Level： Machinery Builder
Default value： 0
Unit： Nul
Description： BIT 0：0 means when X axis is in Home point mode, the system must research Home point when executing return Home process.
1 means when X axis is in Home point mode, the system uses NC record's Home point when executing return Home process.
BIT 1：0 means when Y axis is in Home point mode, the system must research Home point when executing return Home process.
1 means when Y axis is in Home point mode, the system uses NC record's Home point when executing return Home process.
BIT 2：0 means when Y axis is in Home point mode, the system must research Home point when executing return Home process.
1 means when Y axis is in Home point mode, the system uses NC record's Home point when executing return Home process.
BIT 3：0 means when 4th axis is in Home point mode, the system must research Home point when executing return Home process.
1 means when 4th axis is in Home point mode, the system uses NC record's Home point when executing return Home process.

208 **REFERENCE MARKS OF LINEAR SCALE**

Range： 0 ~ 63
Active： Active After Reboot
Level： Machinery Builder
Default value： 0
Unit： Nul
Description： For a servo axis that uses a linear scale with multiple reference marks, zero point return can be done manually by measuring the signal intervals between any 2 or 3 reference positions. (Please use parameter No. 0209 & 0210 to set other relevant actions).
BIT0：1 Heidenhain's linear scale with multiple reference marks is used for position feedback of X axis; 0 means not used.
BIT1：1 Heidenhain's linear scale with multiple reference marks is used for position feedback of Y axis; 0 means not used.
BIT2：1 Heidenhain's linear scale with multiple reference marks is used for position feedback of Z axis; 0 means not used.
BIT3：1 Heidenhain's linear scale with multiple reference marks is used for position feedback of the 4th axis; 0 means not used.
(Below is for 6-axis version)
BIT4：1 Heidenhain's linear scale with multiple reference marks is used for position feedback of the 5th axis; 0 means not used.
BIT5：1 Heidenhain's linear scale with multiple reference marks is used for position feedback of the 6^{th} axis; **0** means not used.

209 **HOME RETURN FOR LINEAR SCALE**

Range： 0 ~ 63
Active： Active After RESET
Level： Machinery Builder
Default value： 0
Unit： Nul
Description： This parameter is only applicable to Heidenhain's linear scale with multiple reference marks. When executing zero return manually, please use BIT defined as follows to set the numbers of reference mark signals that need to be checked for each axis.

0：In manual mode, 3 reference marks must be checked to complete the zero return.

1：In manual mode, only 2 reference marks have to be checked to complete the zero return. If this option is adopted, parameter No. 0210 must be set additionally.

210 **HOME POINT FOR LINEAR SCALE**

Range： 0 ~ 63
Active： Active After RESET
Level： Machinery Builder
Default value： 0
Unit： Nul
Description： This parameter is only applicable to Heidenhain's linear scale with multiple reference marks. Please use BIT to set the relative position of each axis's machine zero point and the linear scale's zero point (Only valid when the relevant BIT value to parameter No. 0209 is set to 1).
0：Machine zero point is at the *positive* side of the linear scale's reference mark；
1：Machine zero point is at the *negative* side of the linear scale's reference mark.

293 **ZRN BY DOG OR INDEX**

Range： 0 ~ 63
Active： Active After Reboot
Level： Machinery Builder
Default value： 0
Unit： Nul
Description： BIT0：0 means X axis uses DOG for machine reference point reference and 1 means X uses motor INDEX signal for reference.
BIT1：0 means Y axis uses DOG for machine reference point reference and 1 means Y uses motor INDEX signal for reference.
BIT2：0 means Z axis uses DOG for machine reference point reference and 1 means Z uses motor INDEX signal for reference.

834	ABS. ENCODER READ TIME

Range： 0 ~ 10
Active： Active After RESET
Level： Machinery Builder
Default value： 5
Unit： s
Description： To set time restriction of NC executes Encoder reading movement.

1014	ABS COORD.X AFTER HOMING
1015	ABS COORD.Y AFTER HOMING
1016	ABS COORD.Z AFTER HOMING
1017	ABS COORD.4 AFTER HOMING

Range： -99999999 ~ 99999999
Active： Active After RESET
Level： Machinery Builder
Default value： 0
Unit： um
Description： Assumed the desired X axis absolute coordinate is 300 um after home return, so the setting value must be 300. This parameter setting value only changes the coordinate display value after X-axis returns home.
This will NOT change the actual machine position when X-axis returns home.
So must set the parameter 0076 setting value to 1 for this setting to be effective.

1022	X.OFF FOR ORG.2 REF TO ORG.1
1023	Y.OFF FOR ORG.2 REF TO ORG.1
1024	Z.OFF FOR ORG.2 REF TO ORG.1
1025	4.OFF FOR ORG.2 REF TO ORG.1

Range： -99999999 ~ 99999999
Active： Active After RESET
Level： Machinery Builder
Default value： 0
Unit： um
Description： This parameter is to set the offset amount of the 1st reference point corresponding to the 2nd reference point of X axis. Assumed the desired corresponding offset amount of the 1st reference point is 2000 um, so set the offset amount to 2000.

1026	**X.OFF FOR ORG.3 REF TO ORG.1**
1027	**Y.OFF FOR ORG.3 REF TO ORG.1**
1028	**Z.OFF FOR ORG.3 REF TO ORG.1**
1029	**4.OFF FOR ORG.3 REF TO ORG.1**

Range： -99999999 ~ 99999999
Active： Active After RESET
Level： Machinery Builder
Default value： 0
Unit： um
Description： This parameter is to set the offset amount of the 1st reference point corresponding to the 3rd reference point of X axis. Assumed the desired corresponding offset amount of the 1st reference point is 2000um, so set the offset amount to 2000.

1030	**X.OFF FOR ORG.4 REF TO ORG.1**
1031	**Y.OFF FOR ORG.4 REF TO ORG.1**
1032	**Z.OFF FOR ORG.4 REF TO ORG.1**
1033	**4.OFF FOR ORG.4 REF TO ORG.1**

Range： -99999999 ~ 99999999
Active： Active After RESET
Level： Machinery Builder
Default value： 0
Unit： um
Description： This parameter is to set the offset amount of the 1st reference point corresponding to the 4th reference point of X axis. Assumed the desired corresponding offset amount of the 1st reference point is 2000um, so set the offset amount to 2000.

1098	**ABS. ENCODER CHECK RANGE**

Range： 0 ~ 1000
Active： Active After RESET
Level： Machinery Builder
Default value： 30
Unit： pulse
Description： To set the max difference value that is between NC internal Encoder value and Driver Absolute Encoder value. Difference value that is between setting value of X axis Absolute Encoder (System Data #41) and NC internal value (System Data #32). Difference value that is between setting value of Y axis Absolute Encoder (System Data #42) and NC internal value (System Data #33). Difference value that is between setting value of Z axis Absolute Encoder (System Data #43) and NC internal value (System Data #34). Difference value that is between setting value of the 4th axis Absolute Encoder (System Data #44) and NC internal value (System Data #35).

1104	**1ST SPEED OF X HOMING**
1105	**1ST SPEED OF Y HOMING**
1106	**1ST SPEED OF Z HOMING**
1107	**1ST SPEED OF C HOMING**

Range： 1 ~ 99999999
Active： Active After RESET
Level： Machinery Builder
Default value： 2000000
Unit： um/min
Description： during each axis zero return procedure, moves toward this axis Reference point in this parameter setting speed (set by parameter 0120). After reaching the home DOG, please use the 2nd gear speed, which is set By parameter 1108 ~ 1111, to move and to search for motor reference point.

1108	**2ST SPEED OF X HOMING**
1109	**2ST SPEED OF Y HOMING**
1110	**2ST SPEED OF Z HOMING**
1111	**2ST SPEED OF C HOMING**

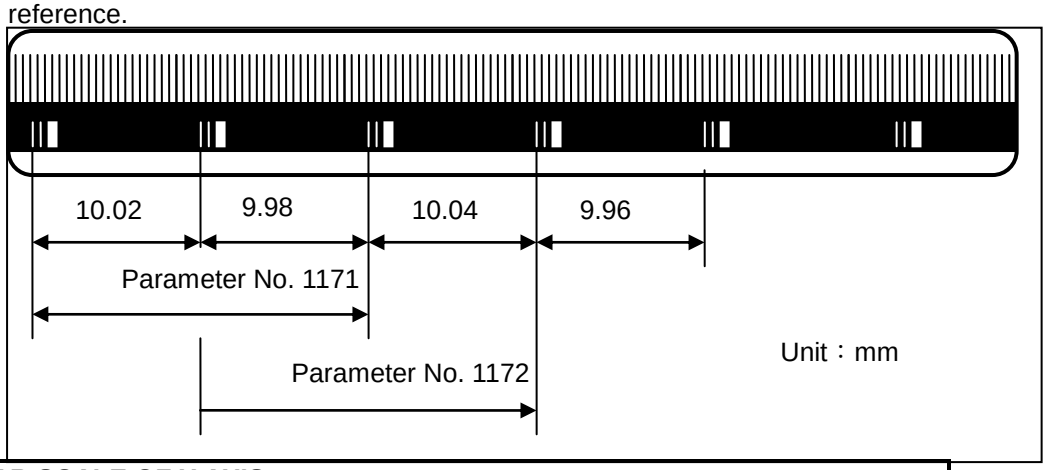
Range： 1 ~ 99999999
Active： Active After RESET
Level： Machinery Builder
Default value： 200000
Unit： um/min
Description： during each axis zero return procedure, moves toward this axis Reference point in Parameter #1104 ~ #1107's setting speed. (Set by parameter 0120). After touching the home DOG, please use the 2nd gear speed, which is set by this parameter, to move and to search for motor reference point.

1118	**ENABLE INDEX PROTECTED FUNCTION**

Range： 0 ~ 1
Active： Active After RESET
Level： User
Default value： 0
Unit： Nul
Description： When the distance between the 1st index and limit switch is less than 1/5 or more than 4/5 revolution of the encoder, grid protection function will activate so the next index mark will be used to make the distance between the 1st index and limit switch over 1/2 revolution of the encoder if the distance in-between is less than 1/2 revolution. This function ensures that the zero point is always the original one.

1171	**SPACE1 LINEAR SCALE OF X AXIS**
1172	**SPACE2 LINEAR SCALE OF X AXIS**
1173	**SPACE1 LINEAR SCALE OF Y AXIS**
1174	**SPACE2 LINEAR SCALE OF Y AXIS**
1175	**SPACE1 LINEAR SCALE OF Z AXIS**
1176	**SPACE2 LINEAR SCALE OF Z AXIS**
1177	**SPACE1 LINEAR SCALE OF 4TH AXIS**
1178	**SPACE2 LINEAR SCALE OF 4TH AXIS**

Range： 0 ~ 99999999
Active： Active After Reboot
Level： Machinery Builder
Default value： 20020
Unit： um
Description： This parameter is only applicable to Heidenhain's linear scale with multiple reference marks. For the setting method, please go to the figure below for reference.

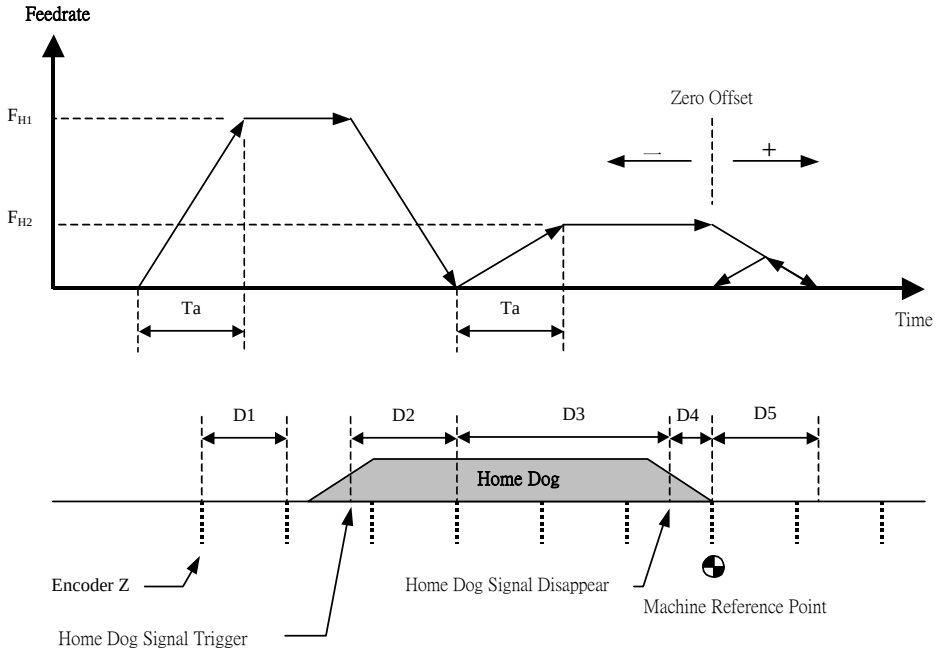


1183	**OFFSET LINEAR SCALE OF X AXIS**
1184	**OFFSET LINEAR SCALE OF Y AXIS**
1185	**OFFSET LINEAR SCALE OF Z AXIS**
1186	**OFFSET LINEAR SCALE OF 4TH AXIS**

Range： 0 ~ 99999999
Active： Active After RESET
Level： Machinery Builder
Default value： 0
Unit： um
Description： This parameter is only applicable to Heidenhain's linear scale with multiple reference marks. To change the set value of this parameter, please press RESET first and executes zero return manually again. By measuring 2 or 3 signal intervals of the linear scale, NC can detect instantly the relative position between each axis's current position and the linear scale's zero point. If the two positions do not match each other, the shift between them must be defined by setting this parameter.

Zero Return Procedure Description

■ **When Reference Point is Behind DOG**



D1is the distance between two Z phase signals that are close together of servo motor ECNODER.

D2 is the distance between the HOME DOG input points to the servo axis by using the 1st gear speed decelerating stop. The calculating formula is as following:

D2 ≒ servo lag + deceleration distance ≒ $\frac{F_{H1}}{K_p}+\frac{F_{H1}\cdot T_a}{2}$

K_p is the servo position loop gain （sec^{-1}），, T_a is the servo axis G00 acc/decelerating time.

If the length between the Home DOG input point and the disappear point is smaller than D2, then warning message (MOT 0027 Home DOG length is too short) will occur.

D3 is the traveling distance at the time when servo motor starts from complete stop and accelerates to 2nd gear speed to when Home DOG signal disappears. In order to catch the Z phase signal under the condition of the same speed, the distance of D3 must be long enough in order for the servo motor to be able to reach the 2nd gear speed. Calculating formula is as following:

D3 ≧ $\frac{F_{H2}\cdot T_a}{2}$, T_a is servo axis G00 acc/deceleration time.

So, the length of the Home DOG must be at least (D2 + D3) long.

D4 is the time interval from the disappear point of Home DOG to the next Z phase signal of servo motor ECNODER. In order to prevent any confusion that is caused by the electric and the machine delay, D4 must be approximately one-half of D1, which means the disappear point of Home DOG must be approximately at the mid-point of the two Z phase signals that are close to the servo motor. If the motor rotates one time but not able to find the Z phase signal after the Home Dog signal is disappear, then the alarm message (MOT0045 not able to find the Zl light of motor) will occur. Please check whether there is motor connection error.

D5 is the traveling distance from the 1st Z phase signal of servo motor ENCODER after getting away DOG to servo axis in 2nd gear decelerating stop. The calculating formula is as following:

D5 ≒ servo lag + deceleration distance ≒ $\frac{F_{H2}}{K_p} + \frac{F_{H2} \cdot T_a}{2}$

K_p is the servo position loop gain （sec^{-1}），, T_a is the servo axis G00 acc/decelerating time.

The distance between the machine reference point of servo axis and the traveling limit must be at least greater than D5. Or it will mistakenly cause travel limitation during zero return.

Recommanding to set the offset amount of the servo axis reference point (parameters 0030 ~ 0033) greater than D5 in order to prevent any reverse direciton moving of servo axis.

【Example】Assumed a servo axis home return in 1st gear speed is 10m/min, the 2nd gear speed is 200mm/min, G00 acc/decelerating time is 150ms, position loop gain is 100sec^{-1}. Under the condition that the reference point is behind DOG, the calculating formula of the shortest needed length of DOG is as following:

$$D2 \fallingdotseq \frac{10000/60}{100} + \frac{10000/60 \cdot 0.15}{2} \fallingdotseq 14.17mm$$

$$D3 \fallingdotseq \frac{200/60 \cdot 0.15}{2} \fallingdotseq 0.25mm$$

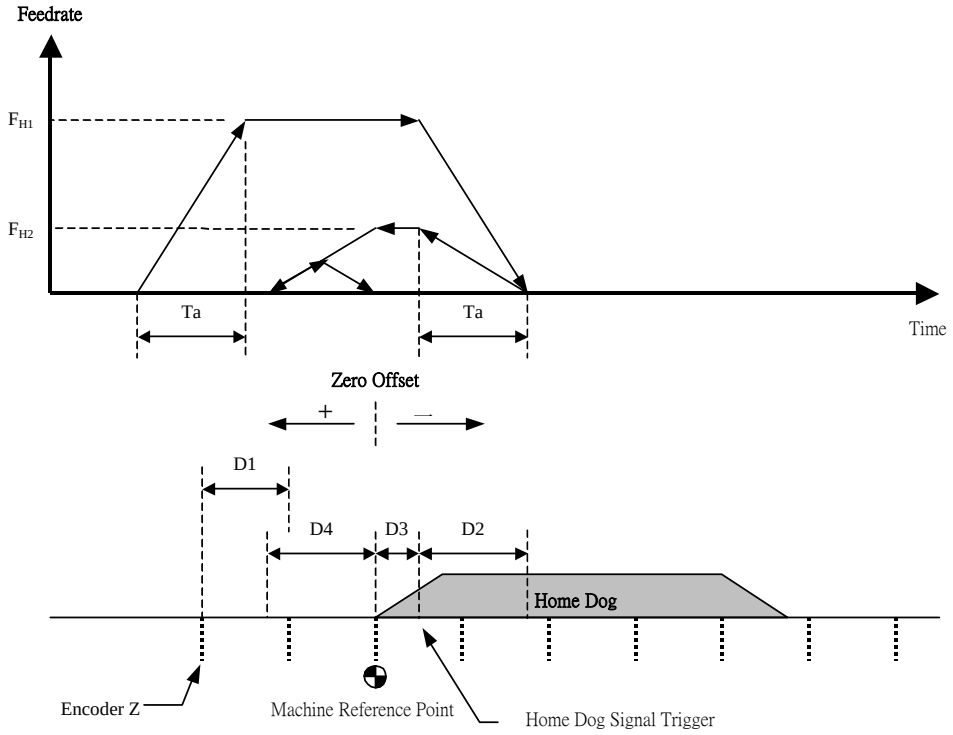
So, the shortest needed length of DOG is（D2 + D3） $\fallingdotseq$ 14.42mm

Also,

$$D5 \fallingdotseq \frac{200/60}{100} + \frac{200/60 \cdot 0.15}{2} \fallingdotseq 0.28mm$$

If the setting vaule for the offset amount of this axis reference point is larger than 0.28mm, it will be able to prevent this axis to do the reverse direction moving at the last step of the home return procedure.

■ **When Reference Point is Ahead DOG**



D1is the distance between two Z phase signals that are close together of servo motor ECNODER.

D2 is the distance between the HOME DOG input points to the servo axis by using the 1st gear speed decelerating stop. The calculating formula is as following:

D2 ≒ servo lag + deceleration distance ≒ $\frac{F_{H1}}{K_p} + \frac{F_{H1} \cdot T_a}{2}$

K_p is the servo position loop gain （sec^{-1}），, T_a is the servo axis G00 acc/decelerating time.

If the length between the Home DOG input point and the disappear point is smaller than D2, then warning message (MOT 0027 Home DOG length is too short) will occur.

D2 is the traveling distance at the time when servo motor starts from complete stop and accelerates to 2nd gear speed to when Home DOG signal disappears General speaking, the 2nd gear speed is smaller than the 1st gear speed, so the length of D2 must be long enough for the servo motor to accelerate to the 2nd gear speed, which means catching the servo motor Z phase signals in the same speed.

D3 is the time interval from the disappear point of Home DOG to the next Z phase signal of servo motor ECNODER. In order to prevent any confusion that is caused by the electric and the machine delay, D4 must be approximately one-half of D1, which means the disappear point of Home DOG must be approximately at the mid-point of the two Z phase signals that are close to the servo motor. If the motor rotates one time but not able to find the Z phase signal after the Home Dog signal is disappear, then the alarm message (MOT0045 not able to find the Zl light of motor) will occur. Please check whether there is motor connection error.

D4 is the traveling distance from the 1st Z phase signal of servo motor ENCODER after getting away DOG to servo axis in 2nd gear decelerating stop. The calculating formula is as following:

D5 ≒ servo lag + deceleration distance ≒ $\frac{F_{H2}}{K_p} + \frac{F_{H2} \cdot T_a}{2}$

K_p is the servo position loop gain （sec^{-1}），, T_a is the servo axis G00 acc/decelerating time. Recommanding to set the setting value for the offset amount of the servo axis reference point that is greater than D4 in order to prevent the servo axis to do the reverse direction moving.

3.8 Operation Parameter

23 **Each axis JOG feed rate 0)R17 1)R90-R95**

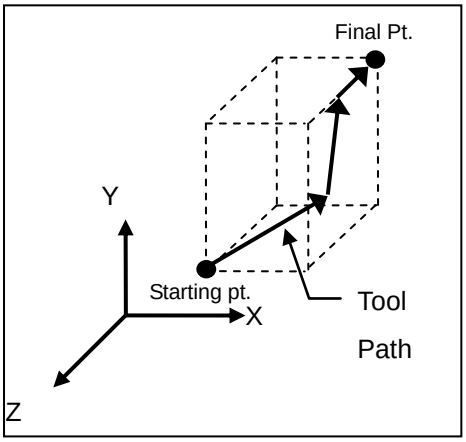
Range: 0 ~ 1
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: Set to be 0, each axis feed rate will refer to R17, If set to be 1, each axis will refer to related R value for feed rate.

39 **G92 IS CANCELLED AT G54~G59**

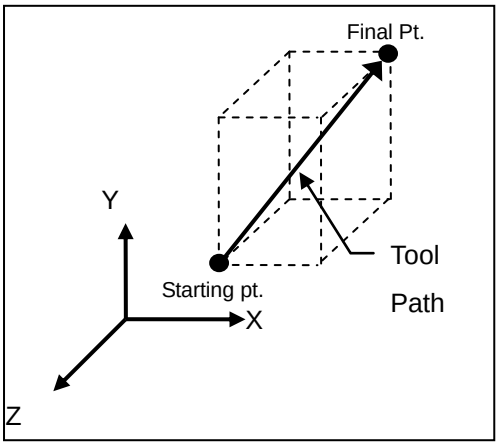
Range： 0 ~ 1
Active： Active After RESET
Level： User
Default value：0
Unit： Nul
Description： 0：When program executes G54 ~ G59 coordinate selecting command, not to cancel previous coordinate OFFSET amount which is caused by G92 command. Not to cancel neither the designated command of absolute command (G90) nor OFFSET amount G54 ~ G59.
1：When program executes G54 ~ G59 coordinates selecting command, cancel previous coordinate OFFSET amount which is caused by G92 command and also designated coordinate of absolute command (G90), which is for G54 ~ G59 coordinates ONLY.

41 **G00 LINEAR INTERPOLATION**

Range： 0 ~ 1
Active： Active After RESET
Level： User
Default value：1
Unit： Nul
Description： 0：For G00 command, each servo axis will move by its setting G00 speed, NOT to do compensation motion simultaneously.
1：for G00 command, each servo does compensation motion simultaneously, the valid range is as following:
a. G00 commands in MEM and/or MDI modes
b. Same G00 motion commands under MEM and/or MDI modes, such as G27 ~ G30、G53;
c. G00 and G53 commands of PMC axis function



Parameter 0041 setting value is 0



Parameter 0041setting value is 1

42 **COMMENT TYPE 0:/*...*/ 1 :(...)**

Range： 0 ~ 1
Active： Active After RESET
Level： User
Default value：0
Unit： Nul
Description： Parameter No. 42 sets the annotation format for part programs. When parameter No. 42 is set to 0, the annotation format is /*……*/, and the functional format can either be (…) or […]. When parameter No. 42 is set to 1, the annotation format can be either /*……*/ or (…….), but the functional format must be […].

43 **FLAG OF EXACT CHECK**

Range： 0 ~ 127
Active： Active After RESET
Level： User
Default value：16
Unit： Nul
Description： Bit0：1 means X axis straight-line cutting (G01) of exact stop checking function is canceled.
Bit1：1 means Y axis straight-line cutting (G01) of exact stop checking function is canceled.
Bit2：1 means Z axis straight-line cutting (G01) of exact stop checking function is canceled.
Bit3：1 means 4th axis straight-line cutting (G01) of exact stop checking function is canceled.
Bit4：1 means starting rapid traverse (G00) of exact stop checking function is canceled.
For straight-line cutting command (G01), if want to enable the exact stop checking function, not only needs to set this parameter corresponding bit but also needs to order G09 command (exact stop command, works for a single block), or G61 command (exact stop mode, permanently effective, so must use G64 command to cancel.)
Once activating the exact stop checking function of G01 command, NC system will wait until each enabled servo axis enters into the checking windows range

(parameters 0006 ~ 0009) after completed interpolation of any one of G01 command, then it will execute the next single block.
For the RAPID TRAVERSE command, G00, only need to set BIT 4 of this parameter to 1 in order to active the exact stop checking function. Under the condition that the exact stop function can be enable, NC system will wait until the actual position of each servo axis already enters into the checking windows range (parameters 0800 ~ 0803) after the interpolation is completed, then it will execute the next signal block. But if the former single block and the latter single block of a certain rapidly orientation command are both rapid traverse commands, then this rapid traverse command will NOT execute the exact stop checking.

63 COORD.RLT SET WITH COORD.ABS

Range： 0 ~ 1
Active： Active After RESET
Level： User
Default value：1
Unit： Nul
Description： the valid range of this parameter setting value is as following:
1. Reboot coordinate display value；
2. After zero return procedure is completed, coordinate display value；
3. G54 ~ G59 commands（work coordinate system selection）;
4. G92 command（coordinate value setting）.

71 INNER/OUTTER CHECK OF G22

Range： 0 ~ 1
Active： Active After RESET
Level： User
Default value：0
Unit： Nul
Description： 0：The embedded travel checking function that is set by G22 is the external prohibit area. When there is command that will move the tool to outside of the setting range, the system alarm will be enabled.
1：The embedded travel checking function that is set by G22 is the external prohibit area. When there is command that will move the tool to outside of the setting range, the system alarm will be enabled.
About system alarm, please refer to the description of MOT 4058、9009 ~ 9014.

73 ENABLE G31 ACCELERATION

Range： 0 ~ 1
Active： Active After Reboot
Level： Machinery Builder
Default value：1
Unit： Nul
Description： 0：after G31 SKIP SIGNAL enters, immediately stop without decelerating;
1：After G31 SKIP SIGNAL enters, use parameter 0041 to set the acc/decelerating time in order to precede stop in decelerating speed.

74 **ENABLE MACRO TRACE UNDER SBK**

Range： 0 ~ 1
Active： Active After RESET
Level： User
Default value：0
Unit： Nul
Description： 0：Macro command (not NC command) Not execute single block;
1：Macro command (not NC command) execute single block.

78 **ENABLE C AXIS TANGENT FOLLOW**
292 **ENABLE C AXIS PATH FOLLOWING**

Range： 0 ~ 1
Active： Active After Reboot
Level： User
Default value：0
Unit： Nul
Description： When this function is enabled, C axis moving angle will move by following XY cutting line direction.

83 **ENABLE G00 UNDER DRY RUN**

Range： 0 ~ 1
Active： Active After RESET
Level： User
Default value：1
Unit： Nul
Description：

Under Dry Run, Motion of RAPID TRAVERSE Command

	Para #0083			
	0		1	
	Para #0041		Para #0041	
	0	1	0	1
RAPID mode	（1）			
In MEM and MDI modes, G00 command and/or motion with G00 command	（2）	（3）	（1）	（4）
G00 and G53 commands of PMC axis function	C23 OFF：（1）	C23 OFF：（3）	（1）	（4）
	C23 ON：（1）	C23 ON：（4）		

Each axis moves according to its G00 speed.
Each axis moves according to its JOG speed
Each axis moving speed will NOT excess its setting JOG speed.
Each axis moving speed will NOT excess its setting G00 speed.

89 **M CODE ID OF PART COUNTER**

Range： 1 ~ 99
Active： Active After RESET
Level： User
Default value：99
Unit： Nul
Description： Other than M02 and M03, users can use this parameter to set another working piece counter control of M code command. But, must avoid using normal M code commands, such as M00 (program stop), M01 (optional stop), M3 (Spindle Positive Rotating) and est. Please refer to the program manual for a full detailed description of M code commands. When the program executes this M code, working piece will be added up at the POS page. At the same time, machine working time will return to zero automatically. If the adding-up sum of working piece is larger than the max sum of working piece which is set by users, the system will send out S BIT 134 signal to inform PLC.

94 **EDIT FILE O9XXX 0)N 1)Y**

Range： 0 ~ 1
Active： Instant Activity
Level： Machinery Builder
Default value：0
Unit： Nul
Description： Set the edibility of files No. O9000~O9999, etc.

121 **ESCAPE DIRECTION OF G76/G87**

Range： 0 ~ 3
Active： Active After RESET
Level： User
Default value：0
Unit： Nul
Description：

Tool Escape Direction of Canned Cycle Commands (G76/G87)

	G17	G18	G19
0	+X	+Z	+Y
1	-X	-Z	-Y
2	+Y	+X	+Z
3	-Y	-X	-Z

122 **NAME OF AXIX.4**

Range： 0 ~ 5
Active： Active After Reboot
Level： Machinery Builder
Default value：2
Unit： Nul
Description： Setting Value is 0, name of the 4th Axis is A;
Setting Value is 1, name of the 4th Axis is B;
Setting Value is 2, name of the 4th Axis is C;
Setting Value is 3, name of the 4th Axis is U;
Setting Value is 4, name of the 4th Axis is V;
Setting Value is 5; name of the 4th Axis is W.

123 **POWER ON METRIC/INCH SYSTEM**

Range： 0 ~ 1
Active： Active After Reboot
Level： User
Default value：0
Unit： Nul
Description： This parameter is to set the system starting unit after rebooting the system. Please use G20 (inch command)/G21 (metric command) to exchange the system starting unit.

124 **POWER ON G00/G01 DEFAULT**

Range： 0 ~ 1
Active： Active After Reboot
Level： User
Default value：1
Unit： Nul
Description： This parameter is used to set the moving command after NC starts. After entering into NC system, user needs to execute the following command under MEM or MDI mode:
G91 X100. Y100. Z100.
When parameter setting value is 0, the above command equals to:
G91 G00 X100. Y100. Z100.
When parameter setting value is 1, the above command equals to:
G91 G01 X100. Y100. Z100.

129 **G02 G03 ARC ERROR RANGE**

Range： 0 ~ 32767
Active： Active After RESET
Level： User
Default value：5
Unit： um
Description： When part programs execute G02 or G03, the system will check if the terminal position of an arc is on the circle described by starting point coordinates and center point coordinates. If the deviation between the arc's terminal position and the circle exceeds the range set by parameter No. 129, the system will send a warning signal as [Illegal Radius].
When parameter is set to 0, the range to be checked is preset as 5um.

130 **AUTO CONTROL OF NUM PRECISION**

Range： 0 ~ 1
Active： Active After RESET
Level： User
Default value：1
Unit： Nul
Description： 【Example】Under the metric unit system, if set this parameter to 0, user will order the following commands in MDI mode：
G90G00X100F1000
X axis moves 0.1mm position in 1mm/min speed
G90G00X100.F1000.
X axis moves to 100mm position in 1000mm/min speed
If set this parameter to 1：
G90G00X100F1000
X axis moves to 100mm position in 1000mm/min speed
G90G00X100.F1000.
X axis moves to 100mm position in 1000mm/min speed

131 **COMPENSATION STARTING TYPE**

Range： 0 ~ 1
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： Nul
Description： 0：path compensation by using Type A；
1：Path compensation by using Type B.
Please refer to program manual for the full detailed description of path compensation type.

134 **G83/G87 EXTRACT 0)ESCAPE 1)R**

Range： 0 ~ 1
Active： Active After RESET
Level： User
Default value：1
Unit： Nul
Description： 0：Start point
1：R point

135 **DEFAULTS OF G90/G91**

Range： 0 ~ 1
Active： Active After Reboot
Level： User
Default value：0
Unit： Nul
Description： 0：setting absolute coordinate（G90）as the coordinate type when starting system
1：setting incremental coordinate（G91）as the coordinate type when starting system.

136	X SCALING IS EFFECTIVE OR NOT
137	Y SCALING IS EFFECTIVE OR NOT
138	Z SCALING IS EFFECTIVE OR NOT

Range： 0 ~ 1
Active： Active After RESET
Level： User
Default value：0
Unit： Nul
Description： 0：invalid
1：valid

139	RADIUS COMP SYMBOL SET

Range： 0 ~ 1
Active： Active After RESET
Level： User
Default value：1
Unit： Nul
Description： 0：H code
1：D code
This parameter is to set the path compensation code is either H code or D code.
0 means the path compensation command is G41H1
1 means the path compensation command is G41D1

140	DISABLE RESET COMMON VAR CLR

Range： 0 ~ 1
Active： Active After RESET
Level： User
Default value：1
Unit： Nul
Description： There are 500 command variables and all level programs share these common variables. The default value is VACANT for common variables @1 ~ @400 when rebooting. But, whether or not clear means VACANT is decided by this parameter when press RESET. For common
variables @401 ~ @500, remaining as the original value after pressing RESET key and also remaining power-discontinue memory. @0 means VACANT permanently.

141	DISABLE RESET GLOBAL VAR CLR

Range： 0 ~ 1
Active： Active After RESET
Level： User
Default value：0
Unit： Nul
Description： There are 33 local variables and program in each level program has its own 33 local variables. Only need to end that level program to clear local variables of that level. Since pressing RESET key will return back to the main program level, the content of local variables in the main program level will use this parameter to set whether or not to clear when pressing RESET. If rebooting, local variables will be cleared no matter in which local level. #0 means VANCANT permanently.

142	ABS/RLT ROTATION COMMAND

Range： 0 ~ 1
Active： Active After RESET
Level： User
Default value：0
Unit： Nul
Description： 0：absolute value
1：incremental value
Please refer to program manual for a full detailed description.

143	CODE FOR SCALING

Range： 0 ~ 1
Active： Active After RESET
Level： User
Default value：0
Unit： Nul
Description： 0：X, Y, and Z axis zoom in/out scale is set by P code command
1：I, J, K code will set X, Y, and Z axis zoom in/out scale. In this case, each axis zoom in/out scale is set by parameters 1092 ~ 1094.
Please refer to program manual for a full detailed description.

145	DEFALTS OF PLANE XY/ZX/YZ

Range： 0 ~ 2
Active： Active After Reboot
Level： Machinery Builder
Default value：0
Unit： Nul
Description： 0：after entering into the system, default setting is XY panel（G17）
1：after entering into the system, default setting is ZX panel（G18）
2：after entering into the system, default setting is YZ panel（G19）

146	M CODE CALLING MACRO O9001
147	M CODE CALLING MACRO O9002
148	M CODE CALLING MACRO O9003

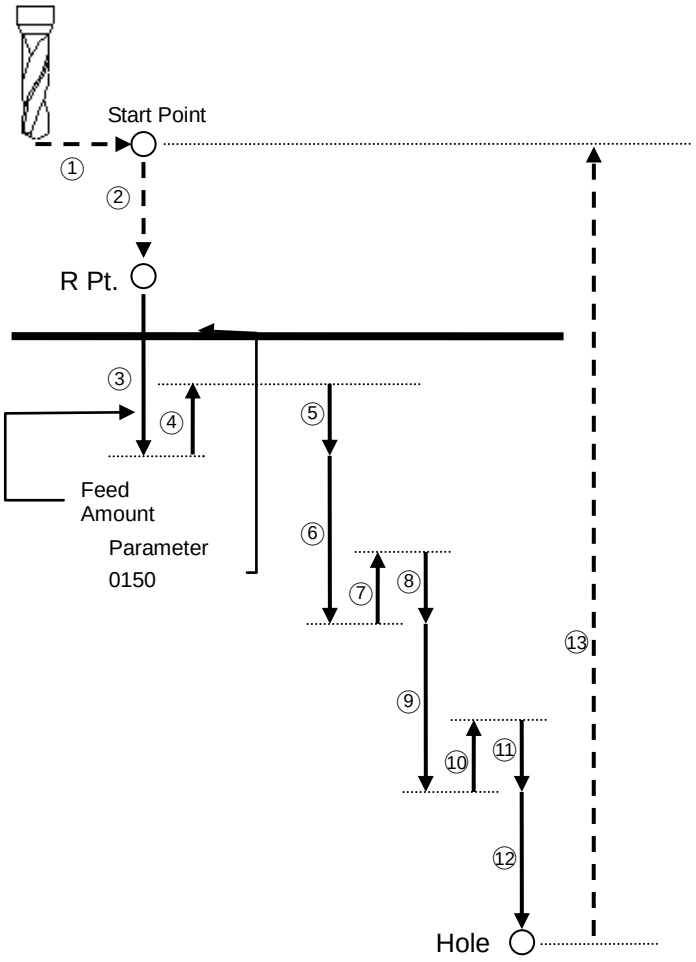
Range： 0 ~ 99
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： Nul
Description： O9001 is the automatic tool changing of MACRO program of the system. When the system executes to this parameter’s setting M code, it will call and execute MACRO program O9001, which is to change tool automatically. The setting value of this parameter must avoid all normal M code commands. Please refer to program manual for a full detailed M code command list.

149 **DEFAULTS VAL OF FEEDRATE**

Range： 0 ~ 32767
Active： Active After Reboot
Level： User
Default value：1000
Unit： mm/min
Description： This parameter is to set the default feedrate of the system under MEM or MDI mode.

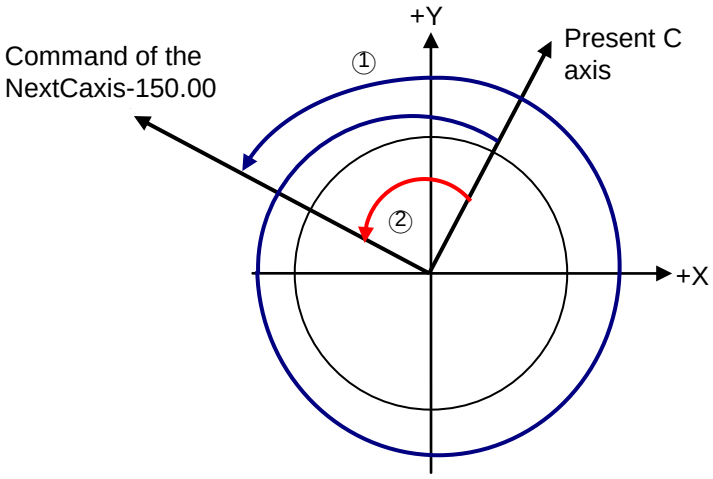
150 **CLEANCE VALUE OF DEEP DRILLING**

Range： 0 ~ 32767
Active： Active After RESET
Level： User
Default value：200
Unit： um
Description： This parameter is to set the shrinking amount that every time X-axis feed into a constant value in G73 peak drilling command. The following shows the separate motion of a peak drilling command. Please refer to program manual for a full detailed description.



152	4TH AXIS OPTIMAL

Range： 0 ~ 3
Active： Active After RESET
Level： User
Default value：0
Unit： Nul
Description： The following diagram shows when C axis moves from 300.000◦position to -150.000◦position, whether or not C axis takes into account the difference if take the shortest path: the path in ① means using the linear-type axis method of the rotatory axis. After completed, C axis coordinate display value is –150.000. The path in ② means to take the shortest path. When completed, C axis coordinate display value is 210.0000.



155	FEEDRATE IS MM/REV OR MM/MIN

Range： 0 ~ 1
Active： Active After Reboot
Level： User
Default value：1
Unit： Nul
Description： This parameter is to set the default unit of the cutting federate under MEM or MDI mode, but this is not valid for the rapid traverse command (G00).
0：Using G95, under metric: unit is mm/rev; under inch: unit is inch/rev. In this situation, must match with the spindle rotating for the cutting command (G01/G02/G03) to be effective;
1：using G94，under metric: Unit is mm/min; under inch: unit is inch/min.

161	M CODE CALLING MACRO O9004
162	M CODE CALLING MACRO O9005
163	M CODE CALLING MACRO O9006
164	M CODE CALLING MACRO O9007
165	M CODE CALLING MACRO O9008
166	G CODE CALLING MACRO O9010
167	G CODE CALLING MACRO O9011
168	G CODE CALLING MACRO O9012
169	MACRO O9020 CALLED BY T CODES

Range： 0 ~ 1
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： Nul
Description： when NC executes this parameter's setting M code, it will call and execute MACRO program O9004(O9005 ~ O9008、O9010 ~ O9012、O9020). Users can write the content of this MACRO themselves and then copy this file to the desired MACRO program menu (default: C:\[system path]\MACRO) in the system. The setting value of this parameter must avoid all normal M code commands. Please see program manual for the full detailed M code commands.

170 MODAL UPDATE AFTER MDI TO MEM

Range： 0 ~ 1
Active： Active After RESET
Level： User
Default value：0
Unit： Nul
Description： 0：Yes, the changing modal of MDI mode does NOT work, all modals return back to the default condition
1：NO, the changing modal of MDI mode will continue to MEM mode.

【Example】Assumed the setting value of parameter 0135 is 0 (the default system coordinate modal is G90 modal). After entering and executing the G91 command under the MDI mode, MDI mode will change to MEM mode. If the parameter setting value of this parameter is 0:
Executing
G01X100.F1000.
Will move X axis to 100mm position in 1000mm/mm speed.
If the parameter setting value is 1:
Executing
G01X100.F1000.
Will move X axis direct to 100mm position in 1000mm/mm speed.

176 LOCAL PORT NO FOR G31

Range： 1 ~ 2
Active： Active After RESET
Level： Machinery Builder
Default value：1
Unit： Nul
Description： 1：G31 SKIP signal to 1st LOCAL INPUT point（HS1 on Transit Board）
2：G31 SKIP signal to 2nd LOCAL INPUT point（HS2 on Transit Board）
G31 SKIP signal must be connected to LOCAL INPUT on Transit board. This parameter is to set connector point number. Since G31 signal must use LOCAL INPUT to latch absolute position record value of each axis, must use the 1st and the 2nd point of LOCAL INPUT.

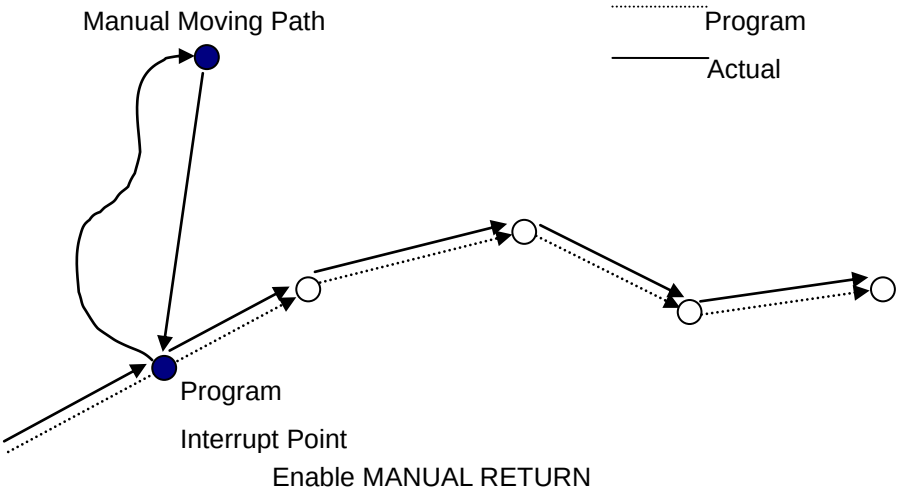
177 CONTACT TYPE OF G31

Range： 0 ~ 1
Active： Active After RESET
Level： Machinery Builder

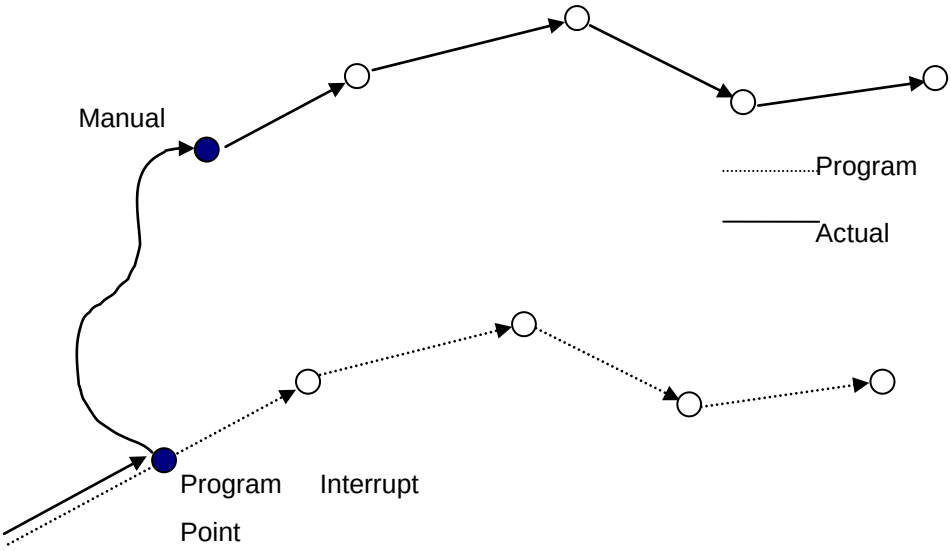
Default value：1
Unit： Nul
Description： 0：G31 SKIP signal is NC. When SKIP signal changes from 1 to 0, this G31 signal blocks stops immediately and executes the next signal block.
1：G31 SKIP signal is NO. When SKIP signal changes from 0 to 1, this G31 signal block stops immediately and executes the next signal block.

180 ENABLE MANUAL RETURN

Range： 0 ~ 1
Active： Active After RESET
Level： User
Default value：0
Unit： Nul
Description： 0：No
1：Yes
Assumed the system is in MEM or MDI mode. If switching to JOG, MPG and/or RAPID modes during program executing, system will enter into 【Free Hold】. If user uses this manual function to move the machine from the initial program interrupting position and then continue executing the unfinished command in MEM or MDI mode, user has two choices. One is to move the machine back to the initial program interrupting position and continue the unfinished commanding, which is called MANUAL RETURN. The other one is to continue the unfinished commanding from the present position. But, there will be an OFFFET amount between the program path and afterward working path. Please refer the below diagrams for the difference between the above two methods.



Enable MANUAL RETURN

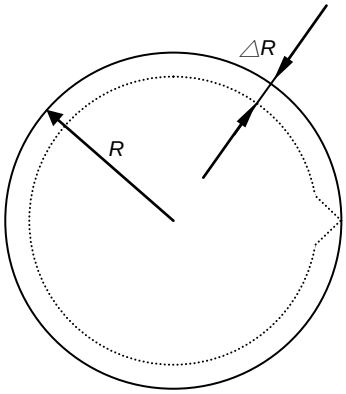


Disable MANUAL RETURN

Other than using this parameter to set MANUAL RETURN function, C BIT 0004 can also be used:
If C BIT 004 is ON, it means enable MANUAL RETURN function.
If C BIT 004 is OFF, it means disable MANUAL RETURN function.
Moreover, if the Parameter #0180 is 1, MANUAL RETURN function will be enabled no matter C BIT 004 is enable or not. On the other hand, if Parameter #0180 is 0, C BIT 004 does matter whether or not to enable this function.

187	**FEED RATE CLAMPING**
Range：	0 ~ 1
Active：	Active After RESET
Level：	User
Default value：	0
Unit：	Nul
Description：	0：No 1：Yes

There will be an error amount ΔR between arch commanding and actual path.



Calculating formula is ： $\Delta R = (\frac{1}{2K_p^2 R} + \frac{T^2}{24R})V^2$. K_p Is position loop incremental? T is acceleration and deceleration time integer number. R is arch

radius and V is the assigned feedrate. This formula is used only when the corresponding speed of speed loop is 3 ~ 10 times faster than position loop. Please also refer to description of Parameter 0188 and 0809 for detailed description.

200	FEEDRAT SHOW 0)CMD 1)ACTUAL

Range： 0 ~ 1
Active： Active After RESET
Level： User
Default value：0
Unit： Nul
Description： 0：HMI panel displays feedrate commanding value
1：System will calculate the actual feedrate according to each axis motor ENCODER (or linear scale) and then will display it on HMI panel.

202	ENG/CHI/SIM LANG SETTING

Range： 0 ~ 2
Active： Active After Reboot
Level： User
Default value：1
Unit： Nul
Description： 0：English
1：Traditional Chinese
2：Simplify Chinese

205	REL/ABS COMP VALUE

Range： 0 ~ 1
Active： Active After RESET
Level： User
Default value：0
Unit： Nul
Description： Using this parameter to set the entering tool compensation value at OFFSET page, either absolute value or relative value.

211	M CODE TO STOP INTERPRETER
212	M CODE TO STOP INTERPRETER
213	M CODE TO STOP INTERPRETER
214	M CODE TO STOP INTERPRETER
215	M CODE TO STOP INTERPRETER
216	M CODE TO STOP INTERPRETER
217	M CODE TO STOP INTERPRETER
218	M CODE TO STOP INTERPRETER
219	M CODE TO STOP INTERPRETER
220	M CODE TO STOP INTERPRETER

Range： 0 ~ 299
Active： Active After RESET
Level： User
Default value：209

Unit： Nul
Description： If some M code must wait for outside signals, it must be registered here to prevent any false action caused by pre-interpretation of part programs.

221 DIGITAL FILITER FREQUECNY

Range： 0 ~ 6666
Active： Active After Reboot
Level： Machinery Builder
Default value：0
Unit： Nul
Description： Please go to the reference chart below for the valid ranges of digital filter frequency. If the frequency is set between two ranges, NC will use the closest value as the filter frequency. For example, parameter No. 221 is set as 250 KHz while the actual filter frequency is 256 KHz.

Filter Freq. (KHz)	Filter Freq. (KHz)	Filter Freq. (KHz)	Filter Freq. (KHz)	Filter Freq. (KHz)	Filter Freq. (KHz)
6667	256	131	81	53	28
3333	247	128	80	52	27
2222	238	126	79	51	26
1667	230	123	78	50	
1333	222	121	77	49	
1111	215	119	76	48	
952	208	117	75	47	
833	202	115	74	46	
741	196	113	73	45	
667	190	111	72	44	
606	185	109	71	43	
556	180	108	67	42	
513	175	106	66	41	
476	171	104	63	40	
444	167	101	65	39	
417	163	100	64	38	
392	159	98	63	37	
370	155	95	62	36	
351	152	94	61	35	
333	148	93	60	34	
317	145	90	59	33	
303	142	88	58	32	
290	139	85	57	31	
278	136	83	56	30	
267	133	82	54	29	

223 AXES MANUAL RETURN(BIT)

Range： 0 ~ 63
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： Nul
Description： Bit 0: Enable manual return function of X axis.
Bit 1: Enable manual return function of Y axis.
Bit 2: Enable manual return function of Z axis.
Bit 3: Enable manual return function of the 4th axis.

Bit 4: Enable manual return function of the 5th axis.
Bit 5: Enable manual return function of the 6th axis.
Preset as 0: Enable manual return function of all axes.

231	**AXIS X INFORMATION HIDE**
232	**AXIS Y INFORMATION HIDE**
233	**AXIS Z INFORMATION HIDE**
234	**AXIS 4TH INFORMATION HIDE**

Range： 0 ~ 3
Active： Instant Activity
Level： Machinery Builder
Default value：0
Unit： Nul
Description： 0：Show relative HMI information of X (Y, Z, the 4th, the 5th, the 6th) axis.
1：Hide relative HMI information of X (Y, Z, the 4th, the 5th, the 6th) axis.
2：Set by C Bit 0181(0182、0183、0184、0185、0186). OFF: Show；ON: Hide.

238	**Coordinate measuring page (0:ON 1:OFF)**

Range: 0 ~ 1
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: 0: Display coordinate measuring page
1: Hide coordinate measuring page

249	**RAMDISK ERR MSG 0)OFF 1)ON**

Range： 0 ~ 1
Active： Active After Reboot
Level： Machinery Builder
Default value：0
Unit： Nul
Description： 0：When RAMDISK error, did not show alarm message.
1：When RAMDISK error, show alarm message.

350	**JOG FRATE REF TO MDI F COMMAND**

Range： 0 ~ 1
Active： Active After RESET
Level： User
Default value：0
Unit： Nul
Description： 0：In JOG mode, the speed of each axis is *always* defined by parameters.
1：In JOG mode, the speed of each axis is *preset* by parameters. If executing F code in MDI mode, F code replaces JOG speed to set the speed of each axis until RESET is pressed. However, in JOG mode, the highest speed of each axis is still set by parameters.

351 **FEEDRATE OVERRIDE UNIT**

Range： 0 ~ 1
Active： Active After Reboot
Level： Machinery Builder
Default value：0
Unit： Nul
Description： 0：Cutting override feed rate = R016 register value* 10%；
1：Cutting override feed rate = R016 register value* 1%。

352 **JOG OVERRIDE UNIT**

Range： 0 ~ 1
Active： Active After Reboot
Level： Machinery Builder
Default value：0
Unit： Nul
Description： 0：Jog override unit feed rate = R017 register value* 10%；
1：Jog override unit feed rate = R017 register value* 1%。

353 **RAPID TRAVERSE OVERRIDE UNIT**

Range： 0 ~ 1
Active： Active After Reboot
Level： Machinery Builder
Default value：0
Unit： Nul
Description： 0：Rapid traverse override are F0, 25%, 50%, & 100%, respectively；
1：Rapid traverse override = R018 register value* 1%。

360 **OPTION COLOR SET(0~3)**

Range： 0 ~ 3
Active： Active After Reboot
Level： User
Default value：0
Unit： Nul
Description： 0：Screen color setting is not applied.
1：Screen color setting is white words over a black background
2：Screen color setting is black words over a white background
3：Screen color setting is customized by users.

361	**BLACK COLOR SET(0~16)**
362	**BLUE COLOR SET(0~16)**
363	**GREEN COLOR SET(0~16)**
364	**CYAN COLOR SET(0~16)**
365	**RED COLOR SET(0~16)**
366	**MAGENTA COLOR SET(0~16)**
367	**BROWN COLOR SET(0~16)**
368	**WHITE COLOR SET(0~16)**
369	**GRAY COLOR SET(0~16)**
370	**LIGHTBLUE COLOR SET(0~16)**
371	**LIGHTGREEN COLOR SET(0~16)**
372	**LIGHTCYAN COLOR SET(0~16)**
373	**LIGHTRED COLOR SET(0~16)**
374	**LIGHTMAGENTA COLOR SET(0~16)**
375	**YELLOW COLOR SET(0~16)**
376	**LIGHTWHITE COLOR SET(0~16)**
377	**CURSOR COLOR SET(0~16)**
378	**MARK COLOR SET(0~16)**
379	**UP EDGE COLOR SET(0~16)**
380	**DOWN EDGE COLOR SET(0~16)**

Range： 0 ~ 16
Active： Active After Reboot
Level： User
Default value：0
Unit： Nul
Description： Only valid when parameter No. 0360 is set to 3.
0：Not applied.
1~16：Applied and change to the selected color.

381 **Curve surface Cutting feedrate speed fix**

Range: 0 ~ 1
Effective time: EFFECTIVE AFTER RESET
Access level: User
Default: 0
Unit: Non
Description: 0: Disable the speed fix function,
1: Enable the curve surface speed fix.

394 **SCREENSAVER WAIT TIME**

Range： 0 ~ 9999
Effective： Effective After Reboot
Access level： User
Default： 0
Unit： Nul

1. When this parameter is set to 0, the screensaver is not applied.
2. When this parameter is not 0, the screensaver activates automatically after the system is not operated for a specified amount of time (time length set by the parameter). If screensaver has not activated and some key is pressed, wait time will be counted from the last keystroke. If screensaver already activates, pressing any key will immediately terminate it, and wait time will be counted from zero.

395 **Operation history record 1)ON 0)OFF**

Range: 0 ~ 1
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: 0：OFF Operation history record
1：ON Operation history record

396 **Set the work path using method**

Range: 0 ~ 2
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description:

397 **M98 Calling file type (0)4digit (1)7 digit**

Range: 0 ~ 1
Effective time: EFFECTIVE AFTER RESET
Access level: User
Default: 0
Unit: Non
Description:

512 **Analog voltage detect card address**

Range: 0 ~ 992
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: Set the analog voltage detect card base address

513 **Analog voltage detect**

Range: 0 ~ 8
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: 0：Not use
1：active 1ST Analog voltage detect
2：active 1~2ND Analog voltage detect
3：active 1~3RD Analog voltage detect
4：active 1~4TH Analog voltage detect
5：active 1~5TH Analog voltage detect
6：active 1~6TH Analog voltage detect
7：active 1~7TH Analog voltage detect
8：active 1~8TH Analog voltage detect

514	**1ST Analog voltage detect range**
515	**2ND Analog voltage detect range**
516	**2RD Analog voltage detect range**
517	**4TH Analog voltage detect range**
518	**5TH Analog voltage detect range**

519	**6TH Analog voltage detect range**
520	**7TH Analog voltage detect range**
521	**8TH Analog voltage detect range**

Range: 0 ~ 8
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: 0：-5V ~ +5V
1：-2.5V ~ +2.5V
2：-1.25V ~ +1.25V
3：-0.625V ~ +0.625V
4：0V ~ +10V
5：0V ~ +5V
6：0V ~ +2.5V
7：0V ~ +1.25V
8：-10V ~ +10V

522	**1ST Analog voltage detects minim value.**
523	**1ST Analog voltage detects max value.**
524	**2ND Analog voltage detects minim value.**
525	**2ND Analog voltage detects max value.**
526	**2RD Analog voltage detects minim value.**
527	**2RD Analog voltage detects max value.**
528	**4TH Analog voltage detects minim value.**
529	**4TH Analog voltage detects max value.**
530	**5TH Analog voltage detects minim value.**
531	**5TH Analog voltage detects max value.**
532	**6TH Analog voltage detects minim value.**
533	**6TH Analog voltage detects max value.**
534	**7TH Analog voltage detects minim value.**
535	**7TH Analog voltage detects max value.**
536	**8TH Analog voltage detects minim value.**
537	**8TH Analog voltage detects max value.**

Range: -4096 ~ 4096
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: The max and min value after analog voltage measurement.

556	**LCD type(0~2)**

Range: 0 ~ 2
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: 0:Auto set 320x234 or 320x240 frame mode.
1:Set to 320x234 frame mode.
2:Set to 320x240 frame mode.

558	**Process line number record time interval**

Range: 0 ~ 3600

Effective time: Effective right away
Access level: Machine Maker
Default: 0
Unit: Sec
Description:

560 **Floppy setting**

Range: 0 ~ 1
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: 0：Not use ，1：Use

561 **UI group key switch**

Range: 0 ~ 2
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: Suitable to M60
To be 0= Num0~Num7 use for switch UI groups
To be 1= SHIFT+F1~F8 use for switch UI groups.
To be 2= CTRL+F1~F8 use for switch UI groups

650 **SET THE METHOD OF PROGRAM RESTART**

Range： 0 ~ 1
Active： Instant Activity
Level： User
Default value：0
Unit： Nul
Description： 0：Program restart definition 1st .
1：Program restarts definition 2nd. (Call O9888)

651 **Internet connection method 0)Net share 1)Recon**

Range: 0 ~ 1
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: 0：Netshare
1：ReCON

652 **Net monitoring overtime (sec)**

Range: 0 ~ 32767
Effective time: Active right away.
Access level: Machine Maker
Default: 0
Unit: Sec
Description:

653 **Active Data Recorder**

Range: 0 ~ 3

Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description:

804	Screen saver

Range: 0 ~ 2
Effective time: right away
Access level: User
Default: 0
Unit: Non
Description:

810	SET RIGID TAP IN G101~G105

Range： 0 ~ 1
Active： Active After RESET
Level： User
Default value：0
Unit： Nul
Description： When applying multi-hole drilling compound G code (G101 ~105), use this parameter to set the tapping function. Set to 1: rigid tapping is activated; set to 0, tapping is activated. The preset mode is tapping.

848	X AXIS OPTIMAL
849	Y AXIS OPTIMAL
850	Z AXIS OPTIMAL

Range： 0 ~ 3
Active： Active After RESET
Level： User
Default value：0
Unit： Nul
Description： This parameter is effective only for rotary axis.

bit 0: Coordinate display method selection
0: Display as Linear method.
1: Display as one rotates 0.000~360.000 cycle method.

bit 1: Coordinate display method is 0~360 cycle（bit 0 setting is 1）, user is able to select whether or not the absolute command is handled as the shortest path.
0: Calculate the shortest moving distance.
1: Move according to commanding value.

（Note）Incremental commanding is NOT handled as the shortest path at all.

899	USE CE RULE 0)NO 1)YES

Range： 0 ~ 1
Active： Active After RESET
Level： Machinery Builder
Default value：0
Unit： Nul
Description： 0：CE regulations are not applied.
1：CE regulations are applied.

1006	1ST X+ SOFT LIMIT
1008	1ST Y+ SOFT LIMIT
1010	1ST Z+ SOFT LIMIT
1012	1ST 4+ SOFT LIMIT

Range： -99999999 ~ 99999999
Active： Active After RESET
Level： Machinery Builder
Default value：99999999
Unit： um
Description： This parameter is to set the limitation value of the +ive X-axis software travel limit. It works only after X axis is completed zero return procedure, or using the rebooting default value 99999.999 um. If this parameter setting value is smaller than parameter # 1007 (-ive X-axis software travel limit), it will enable the alarm system (MOT 4005, 1st software traveling limit setting error). The +ive X axis 1st and 2nd software
Traveling limit is able to execute exchanging through C BIT 140. Please refer to the description of C BIT. Under the condition that the +ive X axis 1st software traveling limit is enabled, when X-axis will excess the restricted range, it will enable the alarm system (MOT 9001 X-axis over the +ive software travel limit) or (MOT 4058 over the software travel limit). Please refer to the description of this warning message.

1007	1ST X- SOFT LIMIT
1009	1ST Y- SOFT LIMIT
1011	1ST Z- SOFT LIMIT
1013	1ST 4- SOFT LIMIT

Range： -99999999 ~ 99999999
Active： Active After RESET
Level： Machinery Builder
Default value：-99999999
Unit： um
Description： This parameter is to set the limitation value of the -ive X axis software travel limit. It works only after X axis is completed zero return procedure, or using the rebooting default value 99999.999 um. If this parameter setting value is larger than parameter # 1006 (+ive X-axis
Software travel limit), it will enable the alarm system (MOT 4005, 1st software traveling limit setting error). The -ive X axis 1st and 2nd software traveling limit is able to execute exchanging through C BIT 141. Please refer to the description of C BIT. Under the condition that the -ive X axis 1st software traveling limit is enabled, when X axis will excess the restricted range, it will enable the alarm system (MOT 9002 X axis over the –ive software travel limit) or (MOT 4058 over the software travel limit). Please refer to the description of this warning message.

1034	**2ND X+ SOFT LIMIT**
1036	**2ND Y+ SOFT LIMIT**
1038	**2ND Z+ SOFT LIMIT**
1040	**2ND 4+ SOFT LIMIT**

Range： -99999999 ~ 99999999
Active： Active After RESET
Level： Machinery Builder
Default value：99999999
Unit： um
Description： This parameter is to set the limitation value of the +ive X axis software travel limit. It works only after X axis is completed zero return procedure, or using the rebooting default value 99999.999 um. If this parameter setting value is smaller than parameter # 1035 (-ive X axis
Software travel limit), it will enable the alarm system (MOT 4023, 2nd software traveling limit setting error). The +ive X axis 1st and 2nd software traveling limit is able to execute exchanging through C BIT 140. Please refer to the description of C BIT. Under the condition that the +ive X axis 2nd software traveling limit is enabled, when X axis will excess the restricted range, it will enable the alarm system (MOT 9001 X axis over the +ive software travel limit) or (MOT 4058 over the software travel limit). Please refer to the description of this warning message.

1035	**2ND X- SOFT LIMIT**
1037	**2ND Y- SOFT LIMIT**
1039	**2ND Z- SOFT LIMIT**
1041	**2ND 4- SOFT LIMIT**

Range： -99999999 ~ 99999999
Active： Active After RESET
Level： Machinery Builder
Default value：-99999999
Unit： um
Description： This parameter is to set the limitation value of the -ive X axis software travel limit. It works only after X axis is completed zero return procedure, or using the rebooting default value 99999.999 um. If this parameter setting value is larger than parameter # 1034 (+ive X axis software travel limit), it will enable the alarm system (MOT 4023, 2nd software traveling limit setting error). The -ive X axis 1st and 2nd software traveling limit is able to execute exchanging through C BIT 141. Please refer to the description of C BIT. Under the condition that the -ive X axis 1st software traveling limit is enabled, when X axis will excess the restricted range, it will enable the alarm system (MOT 9002 X axis over the –ive software travel limit) or (MOT 4058 over the software travel limit). Please refer to the description of this warning message.

1091	**PROTAG**

Range： -360000 ~ 360000
Active： Active After RESET
Level： User
Default value：0
Unit： um
Description： This parameter is to set the default angle for G68 coordinate rotating command.

1092 **PSCRT**

Range： 1 ~ 99999999
Active： Active After RESET
Level： User
Default value：1
Unit： Nul
Description： When the setting value of parameter# 0143 is 1 (X, Y and Z axes zoom in/out scale is determined by I, J and K of G51 zoom in/out scale command), this parameter is to set the default zoom in/out scale of X-axis.

1093 **PSCRT2**

Range： 1 ~ 99999999
Active： Active After RESET
Level： User
Default value：1
Unit： Nul
Description： When the setting value of parameter# 0143 is 1 (X, Y and Z axes zoom in/out scale is determined by I, J and K of G51 zoom in/out scale command), this parameter is to set the default zoom in/out scale of Y-axis.

1094 **PSCRT3**

Range： 1 ~ 99999999
Active： Active After RESET
Level： User
Default value：1
Unit： Nul
Description： When the setting value of parameter# 0143 is 1 (X, Y and Z axes zoom in/out scale is determined by I, J and K of G51 zoom in/out scale command), this parameter is to set the default zoom in/out scale of Z axis.

1158 **SHOW F2~F12 FOR FUN. KEY**

Range： 0 ~ 1
Active： Active After Reboot
Level： User
Default value：0
Unit： Nul
Description： Because inconvenience could occur when operators use commercial PC keyboard to operate controller, F2~F12 characters are shown on the function keys on the screen for users' convenience during operation.

1159 **SET READ TIMEOUT TIMES**

Range： 0 ~ 30000
Active： Instant Activity
Level： User
Default value：30
Unit： sec
Description： If the time is too long when abnormal file reading of the controller happens during machining, a new dialog box with warning messages will appear to notify users about the abnormal situation and also remind users to reset the system to ensure efficiency of the controller and the machine.

1806 **COM1 address (0:Disable 744~1016)**

Range: 744 ~ 1016
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 1016
Unit: Non
Description: COM1 address 。

1807 **COM2 address (0:Disable 744~1016)**

Range: 744 ~ 1016
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 760
Unit: Non
Description: COM2 address 。

1808 **COM1 base address (0:Disable 744~1016)**

Range: 0 ~ 1016
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 1016
Unit: Non
Description: Set COM1 base address
0：Not use 。

1809 **COM2 address (0:Disable 744~1016)**

Range: 0 ~ 1016
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 760
Unit: Non
Description: 設定 COM2 的基底 address 。
0：Not use 。

1810 **COM1 function (0Non 1:file 2:ABS 3:Spindle)**

Range: 0 ~ 3
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: Set COM1 IRQ Number

1811 **COM2 function (0Non 1:file 2:ABS 3Spindle)**

Range: 0 ~ 3
Effective time: Effective After Reboot
Access level: Machine Maker
Default: 0
Unit: Non
Description: Set COM2 IRQ number.

1812 **File transfer speed (bps)(0~4)**

Range: 0 ~ 4
Effective time: Right away
Access level: User
Default: 0
Unit: bps
Description:

1813 **File transfer 資料位元(0:7 1:8 bit)**

Range: 0 ~ 1
Effective time: Right away
Access level: User
Default: 0
Unit: Bit
Description:

1814 **File transfer Stop bit(0:1 1:2)**

Range: 0 ~ 1
Effective time: Right away
Access level: User
Default: 0
Unit: Non
Description:

1815 **File transfer Odd even check (0: N 1: E 2: O)**

Range: 0 ~ 2
Effective time: Right away
Access level: User
Default: 0
Unit: Non
Description:

1816 **File transfer mode (0:terminal 1:Host)**

Range: 0 ~ 1
Effective time: Right away
Access level: User
Default: 0
Unit: Non
Description:

1817 **File transfer Coding type (0ASCII 1EIA 2ISO)**

Range: 0 ~ 2
Effective time: Right away
Access level: User
Default: 0
Unit: Non
Description:

1843~1842	**User parameter 2: 1~40 column R value**

Range: 0 ~ 1023
Effective time: Right away
Access level: User
Default: 0
Unit: Non
Description:

1890	**1ST Software restricted area X positive axis travel value(um)**
1891	**1ST Software restricted area X negative axis travel value(um)**
1892	**1ST Software restricted area Y positive axis travel value(um)**
1893	**1ST Software restricted area Y negative axis travel value(um)**
1894	**1ST Software restricted area Z positive axis travel value(um)**
1895	**1ST Software restricted area Z negative axis travel value(um)**
1896	**1ST Software restricted area 4TH positive axis travel value(um)**
1897	**1ST Software restricted area 4TH negative axis travel value(um)**

Range: -99999999 ~ 99999999
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 0
Unit: Um
Description: Set each axis, 1ST Software restricted area value

1900	**1ST Software restricted area X positive axis travel value(um)**
1901	**1ST Software restricted area X negative axis travel value(um)**
1902	**1ST Software restricted area Y positive axis travel value(um)**
1903	**1ST Software restricted area Y negative axis travel value(um)**
1904	**1ST Software restricted area Z positive axis travel value(um)**
1905	**1ST Software restricted area Z negative axis travel value(um)**
1906	**1ST Software restricted area 4TH positive axis travel value(um)**
1907	**1ST Software restricted area 4TH negative axis travel value(um)**

Range: -99999999 ~ 99999999
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 0
Unit: Um
Description: Set each axis, 1ST Software restricted area value。

1912	**2ND Software restricted area X positive axis travel value(um)**
1913	**2ND Software restricted area X negative axis travel value(um)**
1914	**2ND Software restricted area Y positive axis travel value(um)**
1915	**2ND Software restricted area Y negative axis travel value(um)**
1916	**2ND Software restricted area Z positive axis travel value(um)**
1917	**2ND Software restricted area Z negative axis travel value(um)**
1918	**2ND Software restricted area 4TH positive axis travel value(um)**
1919	**2ND Software restricted area 4TH negative axis travel value(um)**

Range: -99999999 ~ 99999999
Effective time: EFFECTIVE AFTER RESET
Access level: Machine Maker
Default: 0
Unit: Um
Description: Set each axis, 2ND Software restricted area value。

4 SYSTEM ALARM （Alarm）and WARNING（Warning）

When the system alarm message (ALARM) occurs, operation will stop. User must check the whole machine according to the alarm message. If able to solve problems, then only need to click RESET again to clear the condition. (However, if need to change parameter, then must exit the system software and then re-enter for the system to work.)

Three types of alarm message which are MOT (MOTION) ALARM, OP (OPERATION) ALARM or INT (INTERPREATATION) ALARM. Definitions of the above alarm message are as following：

4.1 OP OPERATION ALARM

OP 1001：X SERVO ALARM

OP 1002：Y SERVO ALARM

OP 1003：Z SERVO ALARM

OP 1004：4TH SERVO ALARM

(1) Alarm message from SERVO driver.

(2) Please check ERROR message from the SERVO driver to know the cause.

(3) Please re-booting.

OP 1013: SWITCH TO CONTROL/MONITOR WHILE X MOVING

Trigger C bit 130 while X moving.

Press RESET to clear move command and C 130

OP 1014: SWITCH TO CONTROL/MONITOR WHILE Y MOVING

Trigger C bit 131 while Y moving.

Press RESET to clear move command and C 131

OP 1015: SWITCH TO CONTROL/MONITOR WHILE Z MOVING

Trigger C bit 132 while Z moving

Press RESET to clear move command and C 132

OP 1016: SWITCH TO CONTROL/MONITOR WHILE 4 MOVING

Trigger C bit 133 while 4 moving

Press RESET to clear move command and C 133

OP 1017：LNC SYSTEM EXPIRED

(1) Please contact with distributor or machine makers.

OP 1018：DESIRED MACRO VARIABLES NOT EXIST.

(1) Check Macro variables.

OP 1019：DESIRED MACRO VARIABLES OVER RANGE

(1) Check Macro variable value.

OP 1020：OVER MLC TRAVEL LIMIT

(1) Check each axis hardware travel limit.

OP 1021：GEAR SIGNAL ERROR

(1) Check if gear is correct.

OP 1024: SWITCH TO CONTROL/MONITOR WHILE 5 MOVING

(1) Trigger C bit 168 while 5 moving

(2) Press RESET to clear move command and C 168

OP 1025: SWITCH TO CONTROL/MONITOR WHILE 6 MOVING

(1) Trigger C bit 169 while 6 moving

(2) Press RESET to clear move command and C 169

OP 1027：HSP LONG, NEED TO CONTACT WITH SYSTEM PROVIDER.

Please contact with distributor or machine makers

OP 1029：X AXIS OVER MLC TRAVEL LIMIT （+）

OP 1030：X AXIS OVER MLC TRAVEL LIMIT （-）

OP 1031：Y AXIS OVER MLC TRAVEL LIMIT （+）

OP 1032：Y AXIS OVER MLC TRAVEL LIMIT （-）

OP 1033：Z AXIS OVER MLC TRAVEL LIMIT （+）

OP 1034：Z AXIS OVER MLC TRAVEL LIMIT （-）

OP 1035：4TH AXIS OVER MLC TRAVEL LIMIT （+）

OP 1036：4TH AXIS OVER MLC TRAVEL LIMIT （-）

OP 1037：5TH AXIS OVER MLC TRAVEL LIMIT （+）

OP 1038：5TH AXIS OVER MLC TRAVEL LIMIT （-）

OP 1039：6TH AXIS OVER MLC TRAVEL LIMIT （+）

OP 1040：6TH AXIS OVER MLC TRAVEL LIMIT （-）

OP1029~OP1040:

(1) Press rest to reboot system

(2) Move to the opposite side out of limit manually

OP 1100: 5TH axis Servo drive error

(1) 5TH axis Servo drive send ALARM

(2) Please check Servo drive ERROR log to know the reason
(3) Restart

OP 1101: 6TH axis Servo drive error
(1) 6TH axis Servo drive send ALARM
(2) Please check Servo drive ERROR log to know the reason
(3) Restart

4.2 OP Operation related alarm

OP 6001：X AXIS OVER MLC TRAVEL LIMIT （+）

OP 6002：X AXIS OVER MLC TRAVEL LIMIT （-）
OP 6003：Y AXIS OVER MLC TRAVEL LIMIT （+）
OP 6004：Y AXIS OVER MLC TRAVEL LIMIT （-）
OP 6005：Z AXIS OVER MLC TRAVEL LIMIT （+）
OP 6006：Z AXIS OVER MLC TRAVEL LIMIT （-）
OP 6007：4TH AXIS OVER MLC TRAVEL LIMIT （+）
OP 6008：4TH AXIS OVER MLC TRAVEL LIMIT （-）
OP 6009：5TH AXIS OVER MLC TRAVEL LIMIT （+）
OP 6010：5TH AXIS OVER MLC TRAVEL LIMIT （-）
OP 6011：6TH AXIS OVER MLC TRAVEL LIMIT （+）
OP 6012：6TH AXIS OVER MLC TRAVEL LIMIT （-）
OP6001~OP6012: Check each axis hardware travel limit.

4.3 INT interpreter alarm

INT 3001：NO SUCH TOKEN

(1) Part program enter data has invalid symbols or characters.
(2) Modify program error.
(3) Press RESET to clear the wrong warning message.

INT 3002：GRAMMAR ERROR

(1) Part program enter data has invalid symbols or characters.
(2) Modify program error.
(3) Press RESET to clear the wrong warning message.

INT 3003：OUT OF NODE MEMORY

(1) MACRO grammar has too complicate showing program such as too many brackets.
(2) Simplify complexity degree or make it to be 2 blocks.
(3) Press RESET to clear the wrong warning message.

INT 3004：EXECUTE NODE ERROR

(1) System executes mathematics calculation that is not allow to execute
(2) Press RESET to clear the wrong warning message.

INT 3005：FUNCTION ERROR

(1) System executes invalid function that is not allow to execute.（Won't happen under normal system condition.）
(2) System error, please contact the supplier.

INT 3006：DIVIDED BY 0

(1) MACRO is divided by 0.
(2) Modify numerator of the division. Must NOT be 0.
(3) Press RESET to clear the wrong warning message.

INT 3007：VARIABLE OVER RANGE

(1) One/some of local variables, common variables and global variables are out of range.
(2) Modify variable numbers that are out of their number range.
(3) Press RESET to clear the wrong warning message.

INT 3008：MACRO DOMAIN ERROR

(1) MACRO function domain error. If square (SQRT) argument is negative or ATAN arguments are two zeros.

(2) Modify domain.

(3) Press RESET to clear the wrong warning message.

INT 3010：NOT ALLOWABLE DECIMAL POINT

(1) NC address has not allowable decimal point.

(2) Modify decimal point in NC address.

INT 3011：WORD DATA OVER RANGE

(1) NC address word data is out of range.

(2) Modify word data in NC address.

(3) Press RESET to clear wrong warning message.

INT 3012：MACRO ILLEGAL MACRO PARAMATER INPUT（G、L、N、O、P）

(1) Illegal arguments（G，L，N，O，P）in MACRO program.

(2) Correcting these illegal arguments.

(3) Press RESET to clear wrong warning message.

INT 3013：PART PROGRAM HAS GRAMMER ERROR.

(1) Input data has grammar error.

(2) Part program error.

(3) Press RESET to clear wrong warning message.

INT 3050：TOOL DIAMETER IS 0

(1) Modify tool diameter setting.

INT 3051：ILLEGAL RPM GIVEN

(1) Part program command has rotation speed command over maximum setting.

(2) Modify error in part program.

INT 3052：ILLEGAL FEEDRATE GIVEN

(1) Part program command has feed rate command over maximum setting.

(2) Modify error in part program.

INT 3053：（D）EACH CUT DOWN DEPTH IS 0

(1) When using G101~G133, check if setting cutting depth, if setting is equal to 0 or smaller than 0, Alarm.
(2) Check program, if has this situation.
(3) Revise program to prevent cutting depth is equal to 0 or smaller than 0.

INT 3054：（H）TOTAL DEPTH IS 0

(1) When using G101~G133, check if setting total cutting depth, if setting is equal to 0 or smaller than 0, Alarm
(2) Check program, if has this situation。
(3) Revise program to prevent total cutting depth is equal to 0 or smaller than 0.

INT 3055：ESCAPE LOWER START POINT.Z

(1) G100 can set up return amount, when using G101~G133, check if the setting of cycle return R point is higher than setting, Alarm.
(2) Check program, if has this situation.
(3) Revise program to make cycle return R lower than return amount.

INT 3056：（W）EACH CUT WIDTH IS 0

(1) When using G101~G133, check if setting cutting width, if setting is equal to 0 or smaller than 0, Alarm
(2) Check program, if has this situation.
(3) Revise program to prevent cutting width is equal to 0 or smaller than 0.

INT 3060：HOLES TOO DENSITY

(1) When using G101~G133, check if hole distance too small, Alarm.
(2) Check program, if has this situation.
(3) Revise program to prevent too small hole.

INT 3061：HOLES COUNT MUST>=2

(1) When using G101~G133, check if hole numbers are small or equal to 1, Alarm.
(2) Check program, if has this situation.
(3) Revise program to prevent hole numbers are small or equal to 1.

INT 3062：R MUST > Z

(1) When using G101~G133, check if this Z axis hold bottom coordinate setting is higher than cycle return R point, Alarm.
(2) Check program, if has this situation.
(3) Revise program, make this Z axis hold bottom coordinate lower then cycle return R.

INT 3070：WRONG DATA：R=0

(1) When using G101~G133, the R radius value=0, Alarm.
(2) Check program, if has this situation.
(3) Revise program, make R radius is not 0.

INT 3071：WRONG DATA：2R<=PHI

(1) When using G101~G133, check if 2 times of R radius is smaller than tool diameter, Alarm.
(2) Check program, if has this situation.
(3) Revise program, make R radius to be reasonable value.

INT 3072：WRONG DATA：V>PHI

(1) When using G101~G133, check if finish amount is over tool diameter, Alarm.
(2) Check program, if has this situation.
(3) Revise program, make finish amount to be reasonable value.

INT 3073：WRONG DATA：Q=0

(1) When using G101~G133, check if setting total move value, and setting=0, Alarm.
(2) Check program, if has this situation.
(3) Revise program to prevent total setting= 0.

INT 3074：WRONG DATA：V>=Q

(1) When using G101~G133, check if finish amount is over total cutting alarm, Alarm.
(2) Check program, if has this situation.
(3) Revise program, make finish amount to be reasonable value.

INT 3075：WRONG DATA：（PHI+2Q）>=2R

(1) When using G101~G133, check if setting diameter+2 time' total cutting amount is over 2 times' R radius, Alarm.
(2) Check program, if has this situation.
(3) Revise program, make above setting to be reasonable value.

INT 3076：WRONG DATA：I（J）=0

(1) When using G101~G133, check if complete work size I or J=0, Alarm.
(2) Check program, if has this situation.
(3) Revise program, make above setting to be reasonable value.

INT 3077：WRONG DATA：I（J）-2R<=0

(1) When using G101~G133, check if complete work sizes I or J is smaller than 2 times' R radius, Alarm.
(2) Check program, if has this situation.
(3) Revise program, make above setting to be reasonable value.

INT 3078：WRONG DATA：2Q+PHI>=I（J）

(1) When using G101~G133, check if setting diameter+2 times' total cutting amount is over complete work piece I or J, Alarm.
(2) Check program, if has this situation.
(3) Revise program, make above setting to be reasonable value.

INT 3079：WRONG DATA：2V+PHI>I（J）

(1) When using G101~G133, check if setting diameter+2 times' finish amount is over complete work piece I or J, Alarm.
(2) Check program, if has this situation.
(3) Revise program, make above setting to be reasonable value.

INT 3080：DISTANCE OF TWO CENTER IS 0

(1) When using G123~G133, check the runway-shaped command's center distance is less than or equal to 0, Alarm.
(2) Check program, if has this situation.
(3) Revise program, make above setting to be reasonable value.

INT 3081：WRONG DATA：2（R-V）<PHI

(1) When using G123~G133, check the runway-shaped command's R radius and finish amount difference is smaller than tool radius, Alarm.
(2) Check program, if has this situation.
(3) Revise program, make above setting to be reasonable value.

INT 3082：WRONG DATA：2（R-V）<=PHI

(1) When using G131~G133, check the runway-shaped command's R radius and finish amount difference is smaller than tool radius, Alarm.
(2) Check program, if has this situation.
(3) Revise program, make above setting to be reasonable value.

INT 3083：WRONG DATA：2V+PHI>=I（J）

(1) When using G132, check this command's tool radius +2 times finish amount are over complete work piece I or J, Alarm.
(2) Check program, if has this situation.
(3) Revise program, make above setting to be reasonable value.

INT 3090：T COMMAND ERROR

(1) Check if T code has errors.
(2) Check program, if has this situation.
(3) Revise program, make change tool command tool number correct.

INT 3100：ILLEGAL G CODE

(1) Illegal G code in part program.

(2) Delete illegal G code.
(3) Press RESET to clear wrong warning message.

INT 3101：PFM INITIAL ERROR

INT 3102：TRANS INITIAL ERROR

INT 3103：TABLE INITIAL ERROR

INT 3104：POST INITIAL ERROR

INT 3105：PFM ERROR

INT 3106：NC Program Block Interpretation Fail

INT3101~INT3106

(1) System normal will not happen
(2) System error contact supplier

INT 3110：FETCH ERROR

(1) System normal will not happen
(2) System error contact supplier

INT 3111：LACK OF FILENAME（P address is not entered）

（1） Lock of filenames in part program. (P address is not entered.）
（2） Increase number of filenames.
（3） Press RESET to clear wrong warning message.

INT 3112：ILLEGAL FILENAME

（1） Illegal filename in part program.
（2） Modify filename.
（3） Press RESET to clear wrong warning message.

INT 3113：FILE NOT FOUND

（1） File not found in the system.
（2） Making/modifying the executing file.
（3） Press RESET to clear wrong warning message.

INT 3114：END OF FILE

INT 3120：POST ERROR

INT 3121：LACK OF SUB RETURN（M99）

(1) No returning to the part program command in the sub-program.
(2) Add returning back to the part program command in the sub-program.
(3) Press RESET to clear wrong warning message.

INT 3122：PROGRAM OVERFLOW（8）

(1) Total numbers of calling Sub-program or MACRO is over the total level limit.（i.e., 8）
(2) Decrease numbers of calling program level.
(3) Press RESET to clear the wrong warning message.

INT 3123：MACRO OVERFLOW（4）

(1) Total numbers of calling MACRO is over the total level limit. (i.e., 4).
(2) Decrease numbers of calling program level.
(3) Press RESET to clear the wrong warning message.

INT 3124：MACRO UNDERFLOW（G67）

(1) Under G67, but give G67 command again.
(2) Delete G67.
(3) Press RESET to clear warning.

INT 3125：WITHOUT LABEL

(1) NO such LABEL .
(2) Please check LABEL name.
(3) Press RESET to clear wrong message error.

INT 3126：BLOCK NOT FOUND

(1) The designated BLOCK is not found.
(2) Check whether or not the designated BLOCK is exist in part program.
(3) Press RESET to clear wrong message error.

INT 3127：ILLEGAL LABEL

INT 3128：FEEDRATE OUT OF RANGE， Check G94/G95

(1) Check G94 and G95 are used correctly.
(2) Check whether or not the FEEDRAT F value is too big.
(3) Press RESET to clear the error and adjust G94, G95 and F value.

INT 3130：COORDINATE ERROR

INT 3131：UNKNOWN PLANE

INT 3132：ILLEGAL RADIUS

(1) Using G02, G03 arch cutting command, the final coordinate is NOT on the arch
(2) Check the position of center point, direction and final point’s coordinate value
(3) Press RESET to clear error.

INT 3135：Tool Number Assigned Over Range

(1) T code range is 0~99.

(2) Modify T code.

INT 3136：Tool Length Comp Number Assigned Over Range

(1) Tool length compensation number or tool diameter compensation number over range.

(2) Tool length or tool diameter range is 0~99.

INT 3137：System Program Overflow

(1) System sub-program +system MACRO are over call layer.

(2) Decrease calling layers.

INT 3138：System Macro Overflow

(1) Call layer of system MACRO over limit（8）

(2) Decrease calling layers.

INT 3139：Does Not Permit Set Model Macro Call

(1) This is in the model MACRO call, cannot be call again.

(2) Check model MACRO call,

INT 3140：SEND TABLE ERROR

(1) System is not normal right now.

(2) System error, contact LNC.

INT 3141：NO FREE VARIABLES

(1) System is not normal right now.

(2) System error, contact LNC.

INT 3142：Address Duplication Error

(1) There is duplication in program single block, EX：G01 X10 Y20 X30。

(2) Modify program.

INT 3150：INSUFFICIENT DATA

(1) Not enough executing G code data.（Lack of G10's P，R，Z）

(2) Supply the needed data.

(3) Press RESET to clear wrong warning message.

INT 3152：CC R RETURN

(1) Executing G27，G28，G29，G30 in the CANNED CYCLE.

(2) Cancel the above G codes in CANNED CYCLE before executing.

(3) Press RESET to clear wrong warning message.

INT 3153：NO SUCH R POINT

(1) Wrong reference point number in G30.

(2) Modify the entered reference point number.

(3) Press RESET to clear wrong warning message.

INT 3156：ILLEGAL G31 IN COMPENSATION

(1) G31 Skip signal stop SBK cannot be used under G41/G42, adjust program to prevent G31 in G41/G42.

INT 3157：G10 P CODE OUT OF RANGE

(1) P argument is over command legal usage range.
(2) Modify P argument

INT 3158：G10 L/E CODE OUT OF RANGE

(1) L argument is over command legal usage range or E argument is over command legal usage range.
(2) Modify P argument or E argument.◦

INT 3160：DNC：INCORRECT READ SEQUENCE

(1) Check whether or not there is incorrect sub-program or jump sequence from the part program.
(2) Press RESET to clear wrong warning message, and modify part program.

INT 3161：DNC：LOSS DATA PACKET

(1) DNC RS232 info lost when transmission.
(2) Transmission cable loose or brake.
(3) Lower Transmission speed parameter
(4) Press RESET to clear warning or reboot.

INT 3162：DNC：PROGRAM BUFFER OVERFLOW

(1) Program buffer overflow while DNC RS232 is transmitting program.
(2) Check whether or not the connecting line is disconnect or fall.
(3) Press RESET to clear wrong warning message or reboot.

INT 3163： G05 R CODE RANGE BETWEEN 1 TO 10

(1) G05 R argument range 1-10.
(2) Revise program to make G05 R argument in legal range.
(3) Press RESET to clear warning or reboot.

INT 3165： Illegal data in G54 P address

(1) G05 extension coodinates P argument range 1-300
(2) Revise program to make G05 extension coodinates P argument in legal range.
(3) Press RESET to clear warning or reboot.

INT 3166： Illegal data in G10

(1) G10 gives L argument, L20 must set up extension coordinate.
(2) Use G10 to set up extension coordinate, P range=1-300
(3) Revise program to make G10 at reasonable range.
(4) Press RESET to clear warning or reboot.

INT 3167： G05 P/L CODE MUST APPEAR SIMULTANEOUSLY

(1) G05, if set up for individual items, P and L must show together.
(2) Revise program to make G05 at reasonable range.
(3) Press RESET to clear warning or reboot.

INT 3168： NO RETURN HOME

(1) Before run HOME, make sure if return home manually.

INT 3169： RETURN HOME FAILURE

(1) Current position is not at home.

(2) Check prorgam.

INT 3177： Address Q Not Found

(1) G73/G83 did not give cutting feedrate argument, check program to make Q has value, and cannot be 0.

INT 3200： THE SEQUENCE NO OF GOTO COMMAND ERROR

(1) Skip line number is at the current line number, infinitive loop.

(2) Modify skip serial.

INT 3201：COMP UNIT VECTOR 0

(1) Compensation unit vector is 0.

(2) System error, please contact supplier.

(3) Press RESET to clear wrong warning message

INT 3202

Mill V3: Comp Operation Does Not Permit Change Plane

(1) Under G41/G42, cannot change surface.

(2) Revise program and cancel G17/G18/G19.

Mill V6: COMP START UP ARC

（1）Compensating start-up is arch.

（2）Please start compensating according to G00/G01.

（3）Press RESET to clear wrong warning message.

INT 3203

Mill V3: Arc Line Not Found INTersect At Comp Start Up Arc

(1) Compensation starting is arc.

(2) Use linear as compensation starting.

(3) Press RESET to clear warning.

Mill V6: COMP CANCEL ARC

(1) Compensating cancel is arch.

(2) Please cancel compensation according to G00/G01.

(3) Press RESET to clear wrong warning message.

INT 3204： Arc Line Not Found INTersect At Comp Cancel Arc

(1) Compensation cancel is arc.

(2) Use linear to cancel compensation.

(3) Press RESET to clear warning.

INT 3205：COMP VECTOR LENGTH 0

(1) When compensation calculating, there is no moving SBK.

(2) Check program.

INT 3206： Arc Line INTersect Vector Over Comp Range

(1) Not able to find the intersect points while calculating compensation value.

(2) Decrease compensation radius or modify part program pathway.

(3) Press RESET to clear wrong warning message.

INT 3207： Arc Line INTersect Vector Length Over Arc Move Vector

(1) Not able to find the intersect points while calculating compensation value.

(2) Decrease compensation radius or modify part program pathway.

(3) Press RESET to clear wrong warning message.

INT 3223： COMP OPERATION DOES NOT PERMIT CHANGE TOOL RADIUS OFFSET NO.

(1) Under G41/G42, cannot change tool diameter compensation number at arc command SBK.

(2) Revise program to cancel tool diameter compensation number at radius compensation mode.

INT 3301： THIS AXIS IS SLAVE AXIS IN SYNCHRONOUS CONTROL

(1) You cannot give command to slave axis, because the control is from master axis.

(2) Revise program to delete salve axis program command.

(3) Press RESET to clear warning.

INT 3303：THIS REPLACED AXIS MOVE REPEAT IN AXIS NAME CHANGE MODE

(1) You cannot give command to replace axis, because the control is from this SBK axis.

(2) Revise program to cancel this SBK.

(3) Press RESET to clear warning.

4.4 MOT MOTION RELATED ALARM

MOT 4001：X-AXIS ERROR COUNTER OVERFLOW

(1) Motion board X- Axis ERROR COUNTER overflow（16-BIT）.
(2) Check or not the commanding speed is too fast.
(3) Check whether or not servo motor is working normally.
(4) Check whether or not the machine is running normally.
(5) Check whether or not the board is normal.

MOT 4002：Y-AXIS ERROR COUNTER OVERFLOW

(1) Motion board Y-AXIS ERROR COUNTER overflow（16-BIT）
(2) Check or not the commanding speed is too fast.
(3) Check whether or not servo motor is working normally.
(4) Check whether or not the machine is running normally.
(5) Check whether or not the board is normal.

MOT 4003：Z-AXIS ERROR COUNTER OVERFLOW

(1) Motion board Z-AXIS ERROR COUNTER overflow（16-BIT）
(2) Check or not the commanding speed is too fast.
(3) Check whether or not servo motor is working normally.
(4) Check whether or not the machine is running normally.
(5) Check whether or not the board is normal.

MOT 4004：4TH-AXIS ERROR COUNTER OVERFLOW

(1) Motion board 4th-AXIS ERROR COUNTER overflow（16-BIT）
(2) Check or not the commanding speed is too fast.
(3) Check whether or not servo motor is working normally.
(4) Check whether or not the machine is running normally.
(5) Check whether or not the board is normal.

MOT 4005：SET FIRST SOFT LIMIT ERROR

(1) Error setting of 1st soft limit parameter (i.e., +ive soft limit is smaller than –ive soft limit) Please check parameter numbers 1006~1013.
(2) Clicking RESET to set new parameter.
(3) After changing the parameter, please reboot.

MOT 4006：X AXIS SERVO LAG OVERFLOW

(1) X Axis servo lag over parameter 0002 setting value.
(2) Check whether the setting speed is too fast or the parameter 0002 setting value is too small.
(3) Clicking RESET to continue operating.
(4) If reset parameter, must reboot.

MOT 4007：Y AXIS SERVO LAG OVERFLOW

(1) Y Axis servo lag over parameter 0003 setting value.
(2) Check whether the setting speed is too fast or the parameter 0003 setting value is too small.
(3) Clicking RESET to continue operating.
(4) If reset parameter, must reboot.

MOT 4008：Z AXIS SERVO LAG OVERFLOW

(1) Z Axis servo lag over parameter 0004 setting value.
(2) Check whether the setting speed is too fast or the parameter 0004 setting value is too small.
(3) Clicking RESET to continue operating.
(4) If reset parameter, must reboot.

MOT 4009：4TH AXIS SERVO LAG OVERFLOW

(1) 4th Axis servo lag over parameter 0005 setting value.
(2) Check whether the setting speed is too fast or the parameter 0005 setting value is too small.
(3) Clicking RESET to continue operating.
(4) If reset parameter, must reboot.

MOT 4012: SBK COMMAND ERROR

(1) Check program.

MOT 4014：X AXIS ON HOME DOG

(1) X Axis on HOME DOG.
(2) Clicking RESET, use JOG to take the machine away from HOME DOG then will be able to return to the reference point.

MOT 4015：Y AXIS ON HOME DOG

(1) Y Axis on HOME DOG.
(2) Clicking RESET, use JOG to take the machine away from HOME DOG then will be able to return to the reference point.

MOT 4016：Z AXIS ON HOME DOG

(1) Z Axis on HOME DOG.

(2) Clicking RESET, use JOG to take the machine away from HOME DOG then will be able to return to the reference point.

MOT 4017：4TH AXIS ON HOME DOG

(1) 4th Axis on HOME DOG.

(2) Clicking RESET, use JOG to take the machine away from HOME DOG then will be able to return to the reference point.

MOT 4018：NO RETURN HOME

(1) Not return to the reference point after rebooting.

(2) Clicking RESET and return to the reference point first.

MOT 4023：SET SECOND SOFT LIMIT ERROR

(1) Maximum parameter value of the 2nd soft limit is smaller than the smallest value.

(2) Checking parameters 1034~1041.

(3) Reset parameter and then reboot.

MOT 4025：G10 P RANGE ERROR

(1) P value is over range.

(2) Please checking the part program.

MOT 4026：ENCODER A，B PHASE ERROR

(1) ENCODER disconnect or 5V power problem

(2) Checking whether or not the ENCODER or power port is connected.

MOT 4027：HOME DOG TOO SHORT

(1) Check whether or not HOME DOG is too short or the speed is too fast.

(2) Extend DOG or slow down the zero return speed.

MOT 4035：SET CMR ERROR

(1) Setting CMR error

(2) Checking Para. # 0053 ~ 0056，0067 ~ 0070，0072，0100 ~ 0107，1112 ~ 1115.

(3) Re-setting parameter and re-booting.

MOT 4037：SET DMR ERROR

(1) DMR setting error.

(2) Checking whether or not the setting value is over setting parameter 53~57 range.

(3) Re-setting parameter and re-booting.

MOT 4039：HOME LOW SPEED ERROR

(1) 2nd home speed setting error.

(2) Checking whether or not the setting value is over setting parameter 1108-1111 range.

(3) Re-setting parameter and re-booting.

MOT 4040：X CMP NO. ERROR

(1) Pitch compensation section setting error.

(2) Checking Parameter # 0112 range.

(3) Re-setting parameter and re-booting.

MOT 4041：Y CMP NO. ERROR

(1) Pitch compensation section setting error.

(2) Checking Parameter # 0113 range.

(3) Re-setting parameter and re-booting.

MOT 4042：Z CMP NO. ERROR

(1) Pitch compensation section setting error.

(2) Checking Parameter # 0114 range.

(3) Re-set parameter and re-boot.

MOT 4043：4TH CMP NO. ERROR

(1) Pitch compensation section setting error.

(2) Checking Parameter # 0115 range.

(3) Re-setting parameter and re-booting.

MOT 4044：CMP INTERVAL ERROR

(1) Pitch compensation section setting error.

(2) Checking Parameter # 0114 range.

(3) Re-setting parameter and re-booting.

MOT 4045：NO INDEX INTERRUPT

(1) Reference point index disconnect signal error or HOME DOG too short.

(2) Checking connection for motor to servo.

MOT 4046：RETURN HOME FAILURE

(1) Checking whether nor not machine lock or other machine problems.

(2) Press RESET to clear the condition.

MOT 4047：I/O COMMUNICATION ERROR

(1) Checking I/O board.

(2) Checking all connectors on I/O board.

MOT 4048：SPINDLE ORITENTATION SIGNAL NOT RELEASE

Assumed executing machine adjustment and orientation. If initially, the spindle is positioned on the sensor, the spindle will move away automatically. After the orientation signal is off, user will be able to execute machine adjustment or orientation. However, if the spindle already rotates one cycle but the orientation signal has not been released, then this alarm message will occur.

(1) Checking whether or not there is connection problem on the spindle orientation sensor.

(2) Checking whether or not the spindle orientation sensor signal and type setting is correct (Parameter # 184).

(3) Checking whether or not the spindle orientation sensor is broken.

MOT 4049：SPINDLE ORITENTATION FLAUT

When executing spindle orientation, the spindle is NOT able to reach the correct orientation point.

(1) Please go to DGNOS page. If the data system NO. 10 are changing, but the spindle is not rotating. Then, it means the spindle motor ENCDER signal has external distribution that makes the system misunderstood.

(2) Please check whether or not the setting orientation rate is too high by parameter NO. 21 that make spindle motor have missing step in the Pulse Mode.

MOT 4050：SPINDLE ORITENTATION SIGNAL NOT FOUND

Assumed the spindle has rotated one time already but it hasn't found the orientation position sensor while executing machine adjustment or while orientation program is running. The following alarm messages will occur.

(1) Checking whether or not there is connection problem on the spindle orientation sensor

(2) Checking whether or not the spindle orientation sensor signal and type setting is correct (Parameter # 184).

(3) Checking whether or not the spindle orientation sensor is broken.

MOT 4051：NO SPINDLE SPEED DEFINE

No spindle speed definition. So please define rotary command in rigid tapping. Please key-in rotational speed command S before tapping command.

MOT 4052：MOVE ERR OVER LIMIT IN RIGTAP

(1) Please check whether or not the procedure of rigid machine adjustment is completed.

(2) Please check whether not the setting value of Parameter 1058 is too small.

MOT 4053：SPD SPEED WILL OVER LIMIT

(1) Please check whether or not the setting spindle rotational speed is over the maximum speed that this gear spindle can handle.

(2) Please check whether or not the setting of Parameter NO. 1060 for the spindle return accelerating speed is too big under rigid tapping. Unless necessary, recommend setting to 100.

MOT 4054：Z AXIS FEEDRATE WILL OVER LIMIT

Z axis cutting feedrate speed of rigid tapping is larger than the maximum cutting speed that is set by Parameter 1004.

(1) Checking whether or not Parameter NO. 1060 has set the spindle returning accelerating speed too large under rigid tapping. If speed starts to accelerate while returning (i.e., P1060 > 1000), then speed of cutting spindle will accelerate too. Unless necessary, recommend to set 100.

MOT 4055：SPD SERROLAG OVER LIMIT IN RT

(1) Please check whether or not ladder has error.

(2) Please check whether or to the spindle is rotating in rigid tapping procedure. If not, please check （3） whether or not there is problem for the spindle driver setting.

(3) Please check whether or not the spindle Encoder line is discount or fall.

(4) Please check whether or not the setting of Parameter 1075 is too small.

MOT 4057: Z TRAVEL IS OVER 2 HOME LIMIT

When Z is at second home, stop move down.

MOT 4058：OVER SOFTLIMIT

(1) RESET system.

(2) Move axis out of limit manually.

MOT 4059 : Spindle ERROR COUNTER

(1) SP ERROR COUNTER overflow.

(2) Check if command speed too big.

(3) Check if driver is ok.

(4) Check if machine is ok.

(5) Check if board is ok.

MOT 4062：X-AXIS ABSOLUTE ENCODER VALUE OUT OF TOLERANCE

After X axis re-finds home, NC will ask 4th absolute encoder to do returning zero. After complete, NC re-read encoder data to make sure it has return zero. But if the data is over the Pr.1098 setting, Alarm. (MITSUBISHI servo motor-when you want to re-read absolute encoder, you need to servo off, wait around 20ms and servo on, during the time, NC will follow 4th encoder to update coordinate. Later's comparison also use update coordinate.)

(1) Check if Pr.1098 is correct or not.

(2) Check if X axis absolute encoder completes the action of returning zero.

MOT 4063：X AXIS ABSOLUTE ENCODER TRANSMISSION OVER TIME

When NC is doing X axis absolute encoder reading, if it didn't finish the reading action under Pr. 0834 setting time, Alarm

(1) Check if servo drives set to be absolute encoder.

(2) Check hardware cable connections.

(3) Check if X axis Ladder correct (MITSUBISHI servo motor-when you want to re-read absolute encoder, you need to servo off, wait around 20ms and servo on. Check if CS bit is correct.)

(4) Check if Pr.0834 setting time is enough to complete absolute encoder reading action.

MOT 4064：X AXIS ABSOLUTE ENCODER CHECK SMM ERROR

X axis reading-absolute encoder has CHECK SMM error.

Check hardware cable connections.

Please check whether or not X Axis ladder has error

MOT 4065：Y-AXIS ABSOLUTE ENCODER VALUE OUT OF TOLERANCE

After Y axis re-finds home, NC will ask 4th absolute encoder to do returning zero. After complete, NC re-read encoder data to make sure it has return zero. But if the data is over the Pr.1098 setting, Alarm. (MITSUBISHI servo motor-when you want to re-read absolute encoder, you need to servo off, wait around 20ms and servo on, during the time, NC will follow 4th encoder to update coordinate. Later's comparison also use update coordinate.)

(1) Check if Pr.1098 is correct or not.

(2) Check if Y axis absolute encoder completes the action of returning zero.

MOT 4066：Y AXIS ABSOLUTE ENCODER TRANSMISSION OVER TIME

When NC is doing Y axis absolute encoder reading, if it didn't finish the reading action under Pr. 0834 setting time, Alarm.

(1) Check if servo drives set to be absolute encoder.

(2) Check hardware cable connections.

(3) Check if Y axis Ladder correct (MITSUBISHI servo motor-when you want to re-read absolute encoder, you need to servo off, wait around 20ms and servo on. Check if CS bit is correct.)

(4) Check if Pr.0834 setting time is enough to complete absolute encoder reading action.

MOT 4067：Y AXIS ABSOLUTE ENCODER CHECK SMM ERROR

Y axis reading-absolute encoder has CHECK SMM error.

(1) Check hardware cable connections.

(2) Please check whether or not Y Axis ladder has error

MOT 4068：Z-AXIS ABSOLUTE ENCODER VALUE OUT OF TOLERANCE

After Z axis re-finds home, NC will ask 4th absolute encoder to do returning zero. After complete, NC re-read encoder data to make sure it has return zero. But if the data is over the Pr.1098 setting, Alarm. (MITSUBISHI servo motor-when you want to re-read absolute encoder, you need to servo off, wait around 20ms and servo on, during the time, NC will follow 4th encoder to update coordinate. Later's comparison also use update coordinate.)

(1) Check if Pr.1098 is correct or not.

(2) Check if Z axis absolute encoder completes the action of returning zero.

MOT 4069：Z AXIS ABSOLUTE ENCODER TRANSMISSION OVER TIME

When NC is doing Z axis absolute encoder reading, if it didn't finish the reading action under Pr. 0834 setting time, Alarm.

(1) Check if servo drives set to be absolute encoder.

(2) Check hardware cable connections.

(3) Check if Z axis Ladder correct (MITSUBISHI servo motor-when you want to re-read absolute encoder, you need to servo off, wait around 20ms and servo on. Check if CS bit is correct.)

(4) Check if Pr.0834 setting time is enough to complete absolute encoder reading action.

MOT 4070：Z AXIS ABSOLUTE ENCODER CHECK SMM ERROR

Z axis reading-absolute encoder has CHECK SMM error.

(1) Check hardware cable connections.

(2) Please check whether or not Z Axis ladder has error

MOT 4071：4TH-AXIS ABSOLUTE ENCODER VALUE OUT OF TOLERANCE

After 4th axis re-finds home, NC will ask 4th absolute encoder to do returning zero. After complete, NC re-read encoder data to make sure it has return zero. But if the data is over the Pr.1098 setting, Alarm. (MITSUBISHI servo motor-when you want to re-read absolute encoder, you need to servo off, wait around 20ms and servo on, during the time, NC will follow 4th encoder to update coordinate. Later's comparison also use update coordinate.)

(1) Check if Pr.1098 is correct or not.

(2) Check if 4th axis absolute encoder completes the action of returning zero.

MOT 4072：4TH AXIS ABSOLUTE ENCODER TRANSMISSION OVER TIME

When NC is doing 4th axis absolute encoder reading, if it didn't finish the reading action under Pr. 0834 setting time, Alarm

(1) Check if servo drives set to be absolute encoder.
(2) Check hardware cable connections.
(3) Check if 4th axis Ladder correct (MITSUBISHI servo motor-when you want to re-read absolute encoder, you need to servo off, wait around 20ms and servo on. Check if CS bit is correct.)
(4) Check if Pr.0834 setting time is enough to complete absolute encoder reading action.

MOT 4073：4TH AXIS ABSOLUTE ENCODER CHECK SMM ERROR

4th axis reading-absolute encoder has CHECK SMM error.

(1) Check hardware cable connection.

(2) Please check whether or not 4th Axis ladder has error.

MOT 4079：5TH AXIS ABSOLUTE ENCODER TRANSMISSION OVER TIME

(1) When NC reads 5 axes ABS encoder, if not finish at P.0834 setting time, Alarm.
(2) Check servo drive is ABS setting.
(3) Check hardware wiring see if there is any problem.
(4) Check 4 axis Ladder(If you want to read MITSUBISHI ABS encoder, you will need to make servo motor servo off, wait 20ms and above time and servo on, check if corresponding CS bit is correct.)
(5) Check if P.0834 setting too fast.

MOT 4080：5th AXIS ABSOLUTE ENCODER CHECK SMM ERROR

(1) 5 read ABS encoder has CHECK SUM error.
(2) Check hardware wiring see if there is any problem.
(3) Check if 5 Ladder is correct.

MOT 4081: 6TH Absolute encoder big difference error

(1) When 6 axis research home, NC will ask 6 axis ABS encoder to do zero；After completing, NC will read again ABS encoder to make sure this value is zero. If reading value and NC inner value is over P.1098 setting, Alarm. (If you want to read MITSUBISHI ABS encoder, you will need to make servo motor servo off, wait 20ms and above time and servo on. During this time, NC will update coordinate by 6 axis encoder, later will use new coordinate.)
(2) Check P.1098 setting.
(3) Check 6 axis ABS encoder if complete zero.

MOT 4082：6TH AXIS ABSOLUTE ENCODER TRANSMISSION OVER TIME

When NC is doing servo axis absolute encoder reading, if it didn't finish the reading action under Pr. 0834 setting time, Alarm.

(1) Check if servo drives set to be absolute encoder.
(2) Check hardware cable connections.
(3) Check if servo axis Ladder correct (MITSUBISHI servo motor-when you want to re-read absolute encoder, you need to servo off, wait around 20ms and servo on. Check if CS bit is correct.)
(4) Check if Pr.0834 setting time is enough to complete absolute encoder reading action.

MOT 4083：6th AXIS ABSOLUTE ENCODER CHECK SMM ERROR

Servo axis reading-absolute encoder has CHECK SMM error.

(1) Check hardware cable connections.
(2) Please check whether or not servo axis ladder has error.

MOT 4084: 5TH ABSOLUTE ENCODER BIG DIFFERENCE ERROR

(1) When 5 axis research home, NC will ask 6 axis ABS encoder to do zero；after completing, NC will read again ABS encoder to make sure this value is zero. If reading value and NC inner value is over P.1098 setting, Alarm. (If you want to read MITSUBISHI ABS encoder, you will need to make servo motor servo off, wait 20ms and above time and servo on. During this time, NC will update coordinate by 6 axis encoder, later will use new coordinate.)
(2) Check P.1098 setting.
(3) Check 5 axis ABS encoder if complete zero.

MOT 4087: Y motor ENCODER wiring error

(1) ENCODER break or 5V power error
(2) Stop machine and check wiring and connector.

MOT 4090：X AXIS SERVO LAG TOO BIG, CHECK WIRING OR PR. 416
X Servo lag over range when stop, please check wire or P416 set too small.

MOT 4091：Y AXIS SERVO LAG TOO BIG, CHECK WIRING OR PR. 417

Y Servo lag over range when stop, please check wire or P417 set too small.

MOT 4092：Z AXIS SERVO LAG TOO BIG, CHECK WIRING OR PR. 418

Z Servo lag over range when stop, please check wire or P418 set too small.

MOT 4093：4TH AXIS SERVO LAG TOO BIG, CHECK WIRING OR PR. 419

4^{TH} Servo lag over range when stop, please check wire or P419 set too small.

MOT 4094：5TH AXIS SERVO LAG TOO BIG, CHECK WIRING OR PR. 420

5TH Servo lag over range when stop, please check wire or P420 set too small.

MOT 4095：6TH AXIS SERVO LAG TOO BIG, CHECK WIRING OR PR. 421

6TH Servo lag over range when stop, please check wire or P421 set too small.

MOT 4096: Z motor ENCODER wiring error

(1) ENCODER BRAKE OR 5V POWER ERROR.
(2) Stop machine and check wiring or connector.

MOT 4097: 4THmotor ENCODER wiring error

(1) ENCODER BRAKE OR 5V POWER ERROR.
(2) Stop machine and check wiring or connector.

MOT 4098: 5TH motor ENCODER wiring error

(1) ENCODER BRAKE OR 5V POWER ERROR.
(2) Stop machine and check wiring or connector.

MOT 4099: 6TH motor ENCODER wiring error

(1) ENCODER BRAKE OR 5V POWER ERROR.
(2) Stop machine and check wiring or connector.

MOT 4100：COM REPEAT CHECK PR.1810 AND 1811

(1) Check if P.1810 & 1811 is the same.
(2) Press RESET to clear alarm.

MOT 4104: X PMC/INT output error
MOT 4105: Y PMC/INT output error
MOT 4106: Z PMC/INT output error
MOT 4107: 4TH PMC/INT output error
MOT 4108: 5TH PMC/INT output error
MOT 4109: 6TH PMC/INT output error

MOT4104~MOT4109: modify command to make it ok for PMC axis.

MOT 4121：X AXIS COMMANDED UNDER DETACHED

(1) RESET system to clear alarm
(2) Check if PLC sends C bit 130 and clear it.

MOT 4122：Y AXIS COMMANDED UNDER DETACHED

(1) Check if PLC sends C bit 131 and clear it.

MOT 4123：Z AXIS COMMANDED UNDER DETACHED

(1) RESET system to clear alarm
(2) Check if PLC sends C bit 132 and clear it.

MOT 4124：4th AXIS COMMANDED UNDER DETACHED

(1) RESET system to clear alarm
(2) Check if PLC sends C bit 133 and clear it.

MOT 4126: MOVE COMMAND NOT RESTART

Under MDI, you can not give move command at program restart.

MOT 4127：5th AXIS COMMANDED UNDER DETACHED

(1) RESET SYSTEM TO CLEAR ALARM.
(2) Check if PLC gives axis C bit 168 and release.

MOT 4128：6th AXIS COMMANDED UNDER DETACHED

(1) RESET SYSTEM TO CLEAR ALARM.
(2) Check if PLC gives axis C bit 169 and release.

MOT 4129：LIMIT AND INDEX HAS CERTAIN SAFE DISTANCE, USE GRID TO PROTECT

(1) This distance from index to limit sensor is smaller than encoder 1/5 or bigger than 4/5 revolution, then open grid protection function, if no, and then close grid protection function.
(2) If confirming that the distance is smaller than 1/5 or bigger than 4/5 revolution, but this alarm still exist, check if home limit sensor position error.

MOT 4130：X AXIS MULTI-HOME LINEAR SCALE HOME PITCH ERROR

(1) X multi-home linear scale home interval setting error. (P.1171、1172 small or equal to 0.
(2) Refer to linear scale manual and system P.1171、1172, reset.

MOT 4131：Y AXIS MULTI-HOME LINEAR SCALE HOME PITCH ERROR

(1) Y multi-home linear scale home interval setting error. (P.1173、1174 small or equal to 0).
(2) Refer to linear scale manual and system P.1173、1174, reset.

MOT 4132：Z AXIS MULTI-HOME LINEAR SCALE HOME PITCH ERROR

(1) Z multi-home linear scale home interval setting error. (P.1175、1176 small or equal to 0).
(2) Refer to linear scale manual and system P.1175、1176, reset.

MOT 4133：4TH AXIS MULTI-HOME LINEAR SCALE HOME PITCH ERROR

(1) 4TH multi-home linear scale home interval setting error. (P.1177、1178 small or equal to 0)。
(2) Refer to linear scale manual and system P.1177、1178, reset.

MOT 4134：5TH AXIS MULTI-HOME LINEAR SCALE HOME PITCH ERROR

(1) 5TH multi-home linear scale home interval setting error. (P.1179、1180 small or equal to 0)。
(2) Refer to linear scale manual and system P.1179、1180, reset.

MOT 4135：6TH AXIS MULTI-HOME LINEAR SCALE HOME PITCH ERROR

(1) 6TH multi-home linear scale home interval setting error. (P.1181、1182 small or equal to 0)。
(2) Refer to linear scale manual and system P.1181、1182, reset.

MOT 4136: 5TH PITCH COMPENSATION SEGMENT ERROR

(1) Pitch compensation segment errors.
(2) Check P.0280
(3) Reset parameter and reboot.

MOT 4137: 6TH PITCH COMPENSATION SEGMENT ERROR

(1) Pitch compensation segment errors.
(2) Check P.0281
(3) Reset parameter and reboot.

MOT 4138：FOLLOW SP NAME ERROR

Fallow master axis number setting error, check if P. 500~505 setting error.

MOT 4139：ANALOG VOLTAGE CHECKING CARD DO NOT EXIST

This controller did not have DAQ3718 analog voltage check card, make this to be 0, no use.

MOT 4140：ANALOG VOLTAGE CHECKING MAX AND MIN SETTING ERROR

Maximum setting cannot smaller than minimum setting.

MOT 4141：EXECUTE RETURN HOME WHEN AT PREPARE COMPLETE

Under NC-ready can return home.

MOT 4142：STOP INT M CODE, M CODE REPEAT, CHECK PR.211~220

Check P.211~220 if using system M code (EX: M0, M1, M2, M30, M98, M99)

MOT 4143：X AXIS ABS ENCODER COMMUNICATION ERROR

MOT 4144：Y AXIS ABS ENCODER COMMUNICATION ERROR

MOT 4145：Z AXIS ABS ENCODER COMMUNICATION ERROR

MOT 4146：4TH AXIS ABS ENCODER COMMUNICATION ERROR

MOT 4147：5TH AXIS ABS ENCODER COMMUNICATION ERROR

MOT 4148：6TH AXIS ABS ENCODER COMMUNICATION ERROR

MOT4143~MOT4148:

(1) Read this axis ABS encoder fail.
(2) Check serial communication wiring.
(3) Check if servo motor serial communication setting correct.
(4) If PLC editing correct.
(5) Press RESET to clear alarm.

MOT 4149：X AXIS ABS ENCODER CAN NOT USE ROTATION AXIS, CHECK PR.845

RS-422ABS encoder cannot use at rotating axis, check P.845 if set up X to be rotating axis.

MOT 4150：Y AXIS ABS ENCODER CAN NOT USE ROTATION AXIS, CHECK PR.846

RS-422ABS encoder cannot use at rotating axis, check P.846 if set up Y to be rotating axis.

MOT 4151：Z AXIS ABS ENCODER CAN NOT USE ROTATION AXIS, CHECK PR.847

RS-422ABS encoder cannot use at rotating axis, check P.847 if set up Z to be rotating axis.

MOT 4152：4TH AXIS ABS ENCODER CAN NOT USE ROTATION AXIS, CHECK PR.66

RS-422ABS encoder cannot use at rotating axis, check P.66 if set up 4 axis to be rotating axis.

MOT 4153：5TH AXIS ABS ENCODER CAN NOT USE ROTATION AXIS, CHECK PR.260

RS-422ABS encoder cannot use at rotating axis, check P.260 if set up 5 axis to be rotating axis.

MOT 4154：6TH AXIS ABS ENCODER CAN NOT USE ROTATION AXIS, CHECK PR.261

RS-422ABS encoder cannot use at rotating axis, check P.261 if set up 6 axis to be rotating axis.

MOT 4155：PMC G00 ACC/DEC (PR.398) ERROR

Check P.398 setting error.

MOT 4156：PMC G01 ACC/DEC (PR.399) ERROR

Check P.399 setting error.

MOT 4157：PMC G00 POSITION CHECK RANGE (PR.1831~1836) ERROR

Check P.1831~1836 setting error.

MOT 4158：PMC G01 POSITION CHECK RANGE (PR.1837~1842) ERROR

Check P.1837~1842 setting error.

MOT 4159：1 SOFTWARE PROHIBIT ERROR

(1) P.1900~1911 1ST Software restricted area (-) value Do not large then (+) value.
(2) Modify this parameter, press RESET.

MOT 4160：2 SOFTWARE PROHIBIT ERROR

(1) P.1912~1923 1ST Software restricted area (-) value Do not large then (+) value.
(2) Modify this parameter, press RESET.

MOT 4161：I/OCARD COMMUNICATION ERROR (RIO2)

(1) Check I/O board.
(2) Check I/O all wiring.
(3) Check PLCIO.CFG setting error.

MOT 4162

Mill V3: OUT OF X AXIS HOME DOG, CHECK PR.1890 OR DOG SIGNAL

Check P. 1890, see if it set too small or Check X Home dog see if it failed

Mill V6: Communication IO lost

RS232 communicate lost, please Check wiring and reboot.

MOT 4163

Mill V3: OUT OF Y AXIS HOME DOG, CHECK PR.1891 OR DOG SIGNAL
Check P. 1891, see if it set too small or Check Y Home dog see if it failed

Mill V6: OUT OF X AXIS HOME DOG, CHECK PR.1890 OR DOG SIGNAL
Check P. 1890, see if it set too small or Check X Home dog see if it failed

MOT 4164

Mill V3: OUT OF Z AXIS HOME DOG, CHECK PR.1892 OR DOG SIGNAL
Check P. 1892, see if it set too small or Check Z Home dog see if it failed

Mill V6: OUT OF Y AXIS HOME DOG, CHECK PR.1891 OR DOG SIGNAL
Check P. 1891, see if it set too small or Check Y Home dog see if it failed

MOT 4165

Mill V3: OUT OF C AXIS HOME DOG, CHECK PR.1893 OR DOG SIGNAL
Check P. 1893, see if it set too small or Check 4TH Home dog see if it failed

Mill V6: OUT OF Z AXIS HOME DOG, CHECK PR.1892 OR DOG SIGNAL
Check P. 1892, see if it set too small or Check Z Home dog see if it failed

MOT 4166

Mill V3: OUT OF 5TH AXIS HOME DOG, CHECK PR.1894 OR DOG SIGNAL
Check P. 1894, see if it set too small or Check 5TH Home dog see if it failed

Mill V6: OUT OF C AXIS HOME DOG, CHECK PR.1893 OR DOG SIGNAL
Check P. 1893, see if it set too small or Check 4TH Home dog see if it failed

MOT 4167

Mill V3: OUT OF 6TH AXIS HOME DOG, CHECK PR.1895 OR DOG SIGNAL
Check P. 1895, see if it set too small or Check 6TH Home dog see if it failed

Mill V6: OUT OF 5TH AXIS HOME DOG, CHECK PR.1894 OR DOG SIGNAL
Check P. 1894, see if it set too small or Check 5TH Home dog see if it failed

MOT 4168

Mill V3: TWO SETS OF INNER M CODER CAN NOT EXIT TOGETHER
Check there are 2 or more CNC inner M code in program, include：M00、M01、M02、M30、M98、M99.

Mill V6: OUT OF 6TH AXIS HOME DOG, CHECK PR.1895 OR DOG SIGNAL

Check P. 1895, see if it set too small or Check 6TH Home dog see if it failed

MOT 4169: X AXIS 2ND FEEDBACK EXAM WRONG, CHECK IF MACHINE INTERFERENCE OR PR. **1980** TOO SMALL

MOT 4170: Y AXIS 2ND FEEDBACK EXAM WRONG, CHECK IF MACHINE INTERFERENCE OR PR.1981 TOO SMALL

MOT 4171: Z AXIS 2ND FEEDBACK EXAM WRONG, CHECK IF MACHINE INTERFERENCE OR PR. **1982** TOO SMALL

MOT 4172: 4TH AXIS 2ND FEEDBACK EXAM WRONG, CHECK IF MACHINE INTERFERENCE OR PR.1983 TOO SMALL

MOT 4173: 5TH AXIS 2ND FEEDBACK EXAM WRONG, CHECK IF MACHINE INTERFERENCE OR PR.1984 TOO SMALL

MOT 4174: 6TH AXIS 2ND FEEDBACK EXAM WRONG, CHECK IF MACHINE INTERFERENCE OR PR.1985 TOO SMALL

MOT 4169~MOT4174

(1) Check if feedback signal was interfered.

(2) Check if have machine interference

(3) Reset corresponding 2nd encoder feedback exam tolerance Pr.1980~1985 value, and press reset to continue.

(4) Enlarge Pr. .1980~1985, press reset, clear alarm, press ZRN to make value to be 0.

(5) Press reboots to make value to be 0.

MOT 4175: X AXIS AND MAIN AXIS LAG, CHECK IF MACHINE INTERFERENCE OR PR.1986 TOO SMALL

MOT 4176: Y AXIS AND MAIN AXIS LAG, CHECK IF MACHINE INTERFERENCE OR PR.1987 TOO SMALL

MOT 4177: Z AXIS AND MAIN AXIS LAG, CHECK IF MACHINE INTERFERENCE OR PR.1988 TOO SMALL

MOT 4178: 4TH AXIS AND MAIN AXIS LAG, CHECK IF MACHINE INTERFERENCE OR PR.1989 TOO SMALL

MOT 4179: 5TH AXIS AND MAIN AXIS LAG, CHECK IF MACHINE INTERFERENCE OR PR.1990 TOO SMALL

MOT 4180: 6TH AXIS AND MAIN AXIS LAG, CHECK IF MACHINE INTERFERENCE OR PR.1991 TOO SMALL

MOT 4175~MOT 4180

(1) Reboot system.

(2) Make Pr.1960~1965 bigger, press reset

(3) Check if have machine interference.

MOT 4181: IO COMMUNICATION BRAKE

RS232 communication brake, check wiring and reboot.

MOT 4182: SP POSITIONING ERROR, CHECK P.184 OR WIRING

(1) Check P.184 setting.

(2) Check SP positioning signal wiring.

MOT 4190: Program restart but end by meets M02.M30/M99

Program restart, but there is M02/M30, check if confirming lines too much.

MOT 4191: DO NOT SUPPORT RIGID TAPPING

Mill V6 did not support rigid tapping, check if there is M29.

MOT 4202: 5TH ERROR COUNTER OVERFLOW

(1) 5 axis ERROR COUNTER overflow（16-BIT）

(2) Check if command speed is too big.

(3) Check if servo driver is ok.

(4) Check if machine is moving ok.

(5) Check if board is ok.

MOT 4203: 6TH ERROR COUNTER OVERFLOW

(1) 6 axis ERROR COUNTER overflow（16-BIT）

(2) Check if command speed is too big.

(3) Check if servo driver is ok.

(4) Check if machine is moving ok.

(5) Check if board is ok.

MOT 4204: 5TH SERVO LAG OVER P.250

(1) 5 axis servo lag is over P.0250.

(2) Check if speed too big or P.0250 too small.

(3) Press RESET to continue operation.

(4) If reset parameter, need to reboot.

MOT 4205: 6TH SERVO LAG OVER P.251

(1) 5 axis servo lag is over P.0251.

(2) Check if speed too big or P.0251 too small.

(3) Press RESET to continue operation.

(4) If reset parameter, need to reboot.

MOT 4206: 5TH AXIS IS ON HOME DOG

(1) 5 axis is on HOME DOG.

(2) Press RESET and use JOG to move axis out of HOME DOG.

MOT 4207: 6TH AXIS IS ON HOME DOG

(1) 6 axis is on HOME DOG.

(2) Press RESET and use JOG to move axis out of HOME DOG.

MOT 4208：SERVO AXIS NO. REPEAT

Check P.24~27, 256~257 is double setting, revise and reboot to clear alarm. If only using reset to clear this alarm, then input port is invalid.

MOT 4209：2ND FEEDBACK EXAM IMPUT PORT REPEAT, CHECK PR.1950~1955

(1) Check if Pr.1950~1955 setting repeats. If so, modify and reboot to clear alarm. If only using reset to clear this alarm, this input port will be invalid.

MOT 4210: M-II INITIAL FAIL

Check MII axis setting or controller MII hardware error.

MOT 4211: M-II INTERRUPT FAIL

Check MII axis setting or controller MII hardware error.

MOT 4212: M-II X Servo On/Off COMMAND & STATUS NOT THE SAME.

(1) Re-ON C281 OFF to trigger X motor.

(2) Press RESET to clear alarm

MOT 4213: M-II Y Servo On/Off COMMAND & STATUS NOT THE SAME

(1) Re-ON C282 OFF to trigger Y motor.

(2) Press RESET to clear alarm.

MOT 4214: M-II Z Servo On/Off COMMAND & STATUS NOT THE SAME

(1) Re-ON C283 OFF to trigger Z motor.

(2) Press RESET to clear alarm.

MOT 4215: M-II C Servo On/Off COMMAND & STATUS NOT THE SAME

(1) Re-ON C284 OFF to trigger C motor.

(2) Press RESET to clear alarm.

MOT 4216: M-II 5TH Servo On/Off COMMAND & STATUS NOT THE SAME

(1) Re-ON C285 OFF to trigger 5^{th} motor.

(2) Press RESET to clear alarm.

MOT 4217: M-II 6TH Servo On/Off COMMAND & STATUS NOT THE SAME

(1) Re-ON C283 OFF to trigger 6^{th} motor.

(2) Press RESET to clear alarm.

MOT 4218: M-II 1st SP Servo On/Off COMMAND & STATUS NOT THE SAME.

(1) Re-ON C287 OFF to trigger 1 SP.

(2) Press RESET to clear alarm.

MOT 4219: M-II 2nd SP Servo On/Off COMMAND & STATUS NOT THE SAME.

(1) Re-ON C288 OFF to trigger 2 SP.

(2) Press RESET to clear alarm.

MOT 4220: M-II 3rd SP Servo On/Off COMMAND & STATUS NOT THE SAME.

(1) Re-ON C289 OFF to trigger 3 SP.

(2) Press RESET to clear alarm

MOT 4221: M-II COMMUNICATION READ INFO FAIL

(1) M-II communication cable brake or disturbed, Re-ON communication cable.

(2) Press RESET to clear alarm.

MOT 4222: M-II COMMUNICATION WRITE INFO FAIL

(1) M-II communication cable brake or disturbed, Re-ON communication cable.

(2) Press RESET to clear alarm.

MOT 4300: 1st SP COMMUNICATION ERROR

Check hardware wiring, BIOS parameter, and controller and inverter parameter, press RESET to make it reconnect and clear alarm.

MOT 4301 ~ MOT 4340: ALARM

(1) This is inverter alarm, refer to inverter manual.

(2) Press RESET to clear.

MOT 4341: 1st SP POLES SETTING CONFLICT, CHECK SYSTEM P.681& INVERTER P.4-04

(1) Check controller P.681 & inverter P.4-04, check if both setting are the same.

(2) After setting, press RESET to make parameter valid and clear alarm.

MOT 4342: 1st SP FREQUENCY GAIN SETTING CONFLICT, CHECK SYSTEM P.685& INVERTER P.0-23

(1) Check controller P.685 & inverter P.0-23, check if both setting are reasonable.

(2) After setting, press RESET to make parameter valid and clear alarm.

MOT 4343: 1st SP MAX. FREQUENCY SETTING CONFLICT, CHECK SYSTEM P.682& INVERTER P.1-00

(1) Check controller P.682 & inverter P.1-00, check if both setting are reasonable.

(2) After setting, press RESET to make parameter valid and clear alarm.

MOT 4344: 1st SP UP LIMIT OUTPUT FREQUENCY SETTING CONFLICT, CHECK SYSTEM P.683& INVERTER P.1-21

(1) Check controller P.683 & inverter P.1-21, check if both setting are reasonable.

(2) After setting, press RESET to make parameter valid and clear alarm.

MOT 4345: 1st SP DOWN LIMIT OUTPUT FREQUENCY SETTING CONFLICT, CHECK SYSTEM P.684& INVERTER P.1-22

(3) Check controller P.684 & inverter P.1-22, check if both setting are reasonable.

(4) After setting, press RESET to make parameter valid and clear alarm.

MOT 4950：SYSTEM ALARM

Contact system maker, LNC.

MOT 4999: Spindle POSITION DIFFERENCE ANGLE OVER SETTING

(1) Make P.1999 bigger.
(2) Reboot system.
(3) Contact LNC

4.5 MOT Alarms

MOT 9001：X AXIS OVER SOFTLIMIT（+）

MOT 9002：X AXIS OVER SOFTLIMIT（-）

MOT 9003：Y AXIS OVER SOFTLIMIT（+）

MOT 9004：Y AXIS OVER SOFTLIMIT（-）

MOT 9005：Z AXIS OVER SOFTLIMIT（+）

MOT 9006：Z AXIS OVER SOFTLIMIT（-）

MOT 9007：4TH AXIS OVER SOFTLIMIT（+）

MOT 9008：4TH AXIS OVER SOFTLIMIT（-）

MOT9001~MOT9008: Move this warning servo axis back to safe area, it can clear warning.

MOT 9009：X AXIS OVER G22 SOFTLIMIT （+）

MOT 9010：X AXIS OVER G22 SOFTLIMIT （-）

MOT 9011：Y AXIS OVER G22 SOFTLIMIT （+）

MOT 9012：Y AXIS OVER G22 SOFTLIMIT （-）

MOT 9013：Z AXIS OVER G22 SOFTLIMIT （+）

MOT 9014：Z AXIS OVER G22 SOFTLIMIT （-）

MOT9009~MOT9014: Move this warning servo axis back to safe area as G22 has set up, it can clear warning.
Check G22 each axis travel limit and see if need to be adjusted, or modify program command location.

MOT 9016: 5TH OVER (-) SOFTWARE LIMIT
MOT 9017: 6TH OVER (+) SOFTWARE LIMIT
MOT 9018: 6TH OVER (-) SOFTWARE LIMIT
MOT 9019: 5TH OVER (+) SOFTWARE LIMIT
MOT9016~MOT9019: Move this warning servo axis back to safe area, it can clear warning

MOT 4801~MOT 4876: AS ALARM SHOW
MOT 9033~MOT 9051: AS ALARM SHOW

(1) This is M-II drive alarm and warning
(2) Refer to M-II drive manual to clear this alarm/warning.
(3) Reboot.

5 Machine Adjustment

5.1 Milling Rigid Tapping Commanding

Description：

G94（G95）

Mode	Thread Pitch Calculation	F_ Unit
G94	F_ / S_	mm/min
G95	F_	mm/rev

G98、G99

G98 ： Returning back to the initial height.

G99 ： Returning back to R point

G84（G74）X_Y_Z_R_P_F_K_：

G84：Right helical.

G74：Left helical.

X_Y_：Tapping position.

Z_：Tapping’s lowest point (hole bottom).

R_：Tapping’s starting point.

P_：Tapping’s stop time.

F_：Tapping’s Z axis feed speed（G94）or pitch（G95）.

K_：Repeating tapping numbers.

Example：

G94（G95）; // To set Feedrate unit.

M29 S_; // To enable rigid tapping mode and to command spindle to the desired rotational speed.

G98（G99）G84（G74）X_Y_Z_R_P_F_K_;

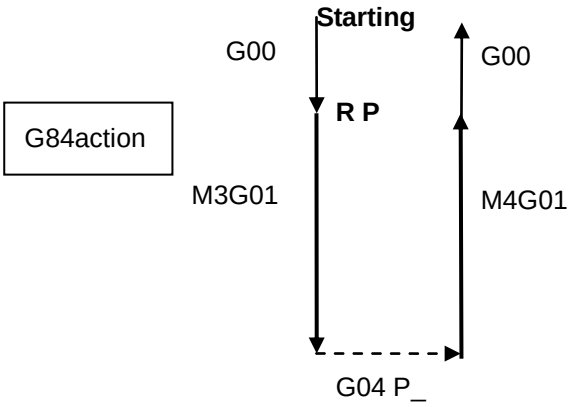
G80; // or Group 0 commands（G00、G01、G02、G03）, disable rigid mode.

Returning acceleration function

Setting parameter 1060, which will be able to accelerate the Z axis returning speed under rigid tapping and to decrease working time。

Override

Under rigid tapping, Feed Override and Spindle Speed Override will be disabled



PLC Rigid Tapping C BIT

C BIT	SYMBOL	Description
C125	**RT START**	When C125 is ON, it will inform NC to start rigid tapping mode. PLC needs to wait until NC S128 = ON and then to disable C125.
C124	**RT STOP**	Disable rigid tapping mode. Under normal situation, rigid tapping mode will be disabled automatically after reading G80 or Group 1's G code. If there is special need, please set bit to ON and then rigid tapping will be disabled automatically.
S128	**RT STATE**	Rigid Tapping Mode Status When NC enters into the rigid tapping mode, S128 remains ON until it exits rigid tapping mode. If user press RESET under rigid tapping, NC will set S128 OFF.

Notice：When user press RESET, please disable rigid tapping mode in order to prevent any unpredicted situation.

Rigid Tapping System Information

Rigid Tapping System Information #	Description
#21	Max error in rigid tapping travel
#22	Estimate value of rigid tapping 1st speed compensation value
#23	Estimate value of rigid tapping 1st acceleration speed compensation value
#24	Estimate value of rigid tapping 2nd speed compensation value
#25	Estimate value of rigid tapping 2nd acceleration compensation value
#26	Rigid tapping spindle following error

Rigid Tapping Machine Adjustment Procedure

(1). Please increase the maximum allowable following error of Z axis direction (Para. # 1058 is approximately set to 3000). Also increase the maximum servo error of the spindle (Para. # 1075 is approximately set to encoder size per rotation of the spindle*10) in order to prevent warning when doing machine adjustment.

(2). Confirm Spindle Rotational Direction（Para. # 1071）

Executing the following program：

M29S500

G91G84R-10Z-50F500

M28

M30

Check whether or not the spindle rotational direction is the same direction as M3 direction under non-rigid tapping mode. If not the same, please set Para. # 1071 to 1.

(3). Acc/Deceleration Time Adjustment

To adjust acc/deceleration time (parameter 1059) and execute the following program:

M29S2500; rotational speed setting is the maximum rigid tapping speed.

G91G84R-10Z-50F2500

M28

M30

during executing must make the spindle drive devices current lower than the saturation value, and make the spindle to turn smoothly.

Please pay attention to whether or not the needed maximum rotational speed can be reached at

the upper enter frequency limit of the spindle. Using Toshiba as an example, adjust Para. # 373, 425, 426, 427, and 428.

If the spindle rotational speed is not smooth in high rotational speed, please refer to Para. # 371.

(4). Speed Compensation

a.Please set parameters 1064、1065、1073、1074 to zero and reboot the system after modifying.

b.Executing the following program in dry run one time (no need to put on any material)

M29S2500

G91G84R-10Z-50 F2500 P1000

M28

M30

To observe system data #22, and to enter this value into speed compensation parameter 1064. This value should be between 100~8000. After entering system data #24 into parameter 1073 （S22 → P1064，S24→P1073）, reboot the system.

c.Executing the above part program again. If there is any shaking, please adding parameter 1066 from 0 to 20 in order to decrease shaking. This value shouldn't be as too big as possible, or the following error will increase. Recommending value is between 3~5.

(5). Acceleration Speed Compensation

a.Executing Step 4 program one more time, enter system data # 23 and #25 separately into acceleration speed compensation parameter 1065 and 1074 and then reboot the system. This value should be between 100~8000.

b.If shaking occurs, please adding parameter 1070 from 0 to 20 in order to decrease shaking. Recommending value is 10~15.

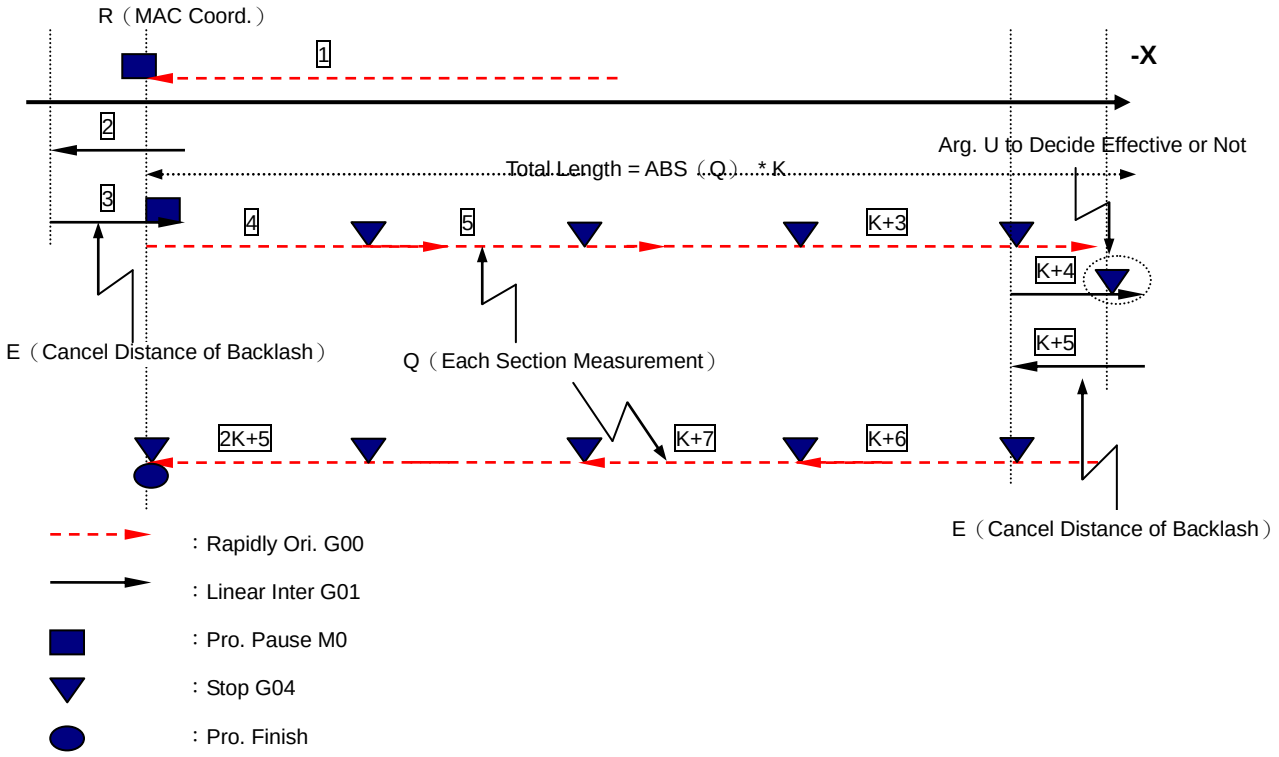
c.After completed, please observe system data #21. This is the biggest error of Z axis direction during tapping.

(6). Servo Error Amount Checking

a.Reset Para. # 1058 as the allowable error amount and it must be larger than system data #21. Recommend setting this value as 5 – 10 times larger than system parameter 21. During rigid tapping, when the error is over this setting value, tapping will stop.

b.Using the same principle to set Para. # 1075 as the allowable error amount for the spindle servo. Recommend to set this value as 5-10 times larger than the system parameter #26. During rigid tapping, when the error is over this setting value, tapping will stop.

5.2 Laser Compensation Procedure



Program Argument Description

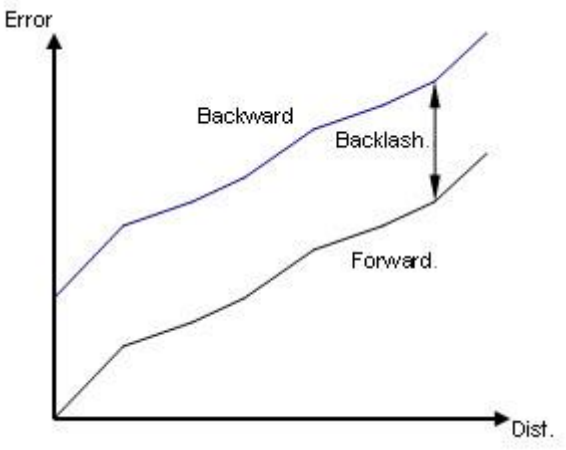
1. A：Axis direction, 1 means X axis, 2 means Y axis and 3 means Z axis.
2. E：Delete backlash moving distance. If it is a positive value, at beginning of measuring, the program should move ABS（E）distance toward this axis positive direction. Then moving ABS（E）distance toward negative direction (Step 2 and Step 3 from the above Diagram). After measuring forward direction, first moving ABS（E）distance toward negative direction and then moving ABS（E）distance toward positive direction (Steps K+4 and K+5 from the above diagram). If it is a negative value, then using the opposite method. So, if this axis pitch error compensation direction is positive, then this argument must be set as negative value. If it is a negative direction compensation, then this argument must be set as positive.

   To delete backlash motion is to execute G01 and the feedrate is constant to 800mm/min. In order to catch the first point of Backward direction (which equals to the last point of the Forward direction, final point of Step K+3 or the starting point of Step K+6), so the setting value of this argument should be bigger than the setting value of Laser measuring software (such as RENISHAW, HP and etc.). If not, Step K+4 and Step K+5 should stop for a while.
3. K：Measure section, this argument value must be the same as the total section setting value of the pitch error compensation (Parameters 0112 – 0115) for the corresponding axis direction in NC system.

4. Q：Each section’s measuring length. If it is positive direction compensation, please set setting value as positive value. If it is negative direction, please set setting value as negative value. This argument value must be the same as each pitch error compensation distance’s setting value for the corresponding axis in NC system. (Parameters 1018 – 1021, NC system parameter values are positive permanently. Parameter 0118 will set the compensation direction.)
5. R：Measure starting coordinate (machine coordinate), this argument value must be the same as the starting position’s setting value of pitch error compensation (Parameters 1046 – 1049) for the corresponding axis direction in NC system.
6. T：For each section’s pause time, unit is sec.
7. U：When the setting is 1, after executing K+4 Step, pause argument T will continue moving toward the reverse direction at the desired time. When the setting is 0, pause argument T will continue moving toward the reverse direction immediately after executing K+4 Step. Please refer to Argument E for a description.

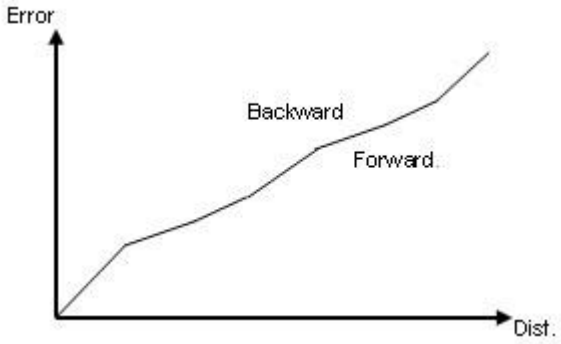
Executing Steps

1. Check NC parameter 0038 (Backlash and pitch error compensation unit) setting value is correct or not.
2. Correct O0000 content and modify each argument’s (E, K, Q, R) corresponding NC parameter setting value.
3. Disable backlash or pitch error compensation function (Parameters 0117 and 0119); reboot system.
4. Executing reference point procedure.
5. After resetting laser measure software (such as RENISHAW、HP and est.), executing O0000 program and measuring the error amount of each section’s compensation length. The measure result is as below:



Putting the measured backlash（From the upper diagram, the vertical difference between two lines）into NC parameter（Parameters 0044 ~ 0047）, and enable the backlash function（Parameter 0117）; reboot the system.

After looking for the reference point, re-executing Step 5 and the measure result should be as following：



Setting pitch error compensation values（NC Parameters 0300 ~ 0349、0450 ~ 0499、0600 ~ 0649 and 0750 ~ 0799）. Assumed the LNC system pitch error compensation value uses the relative value setting. If the laser measure software (such as RENISHAW, HP, and est.) able to execute exchanging, there will be no problem. But, if can only use the absolute value to indicate, the exchanging method is as following:：

The N^{th} section relative error = the N^{th} section absolute error – the $(N-1)^{th}$ section absolute error；The N^{th} section compensation setting value = -ive N^{th} section relative error.

Ideal Time Interval, ex:

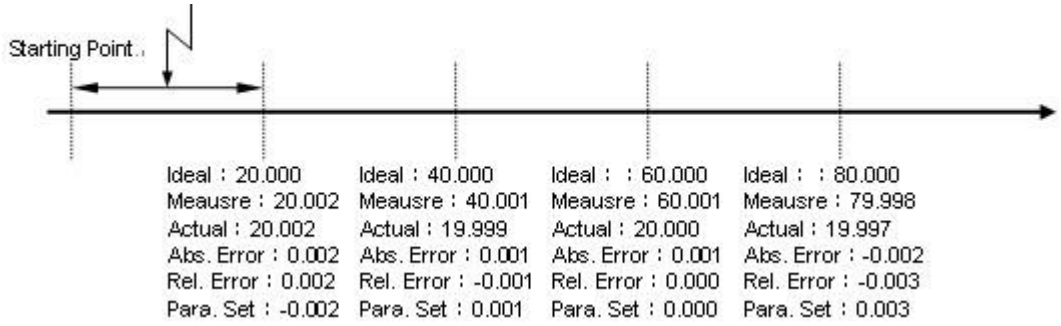
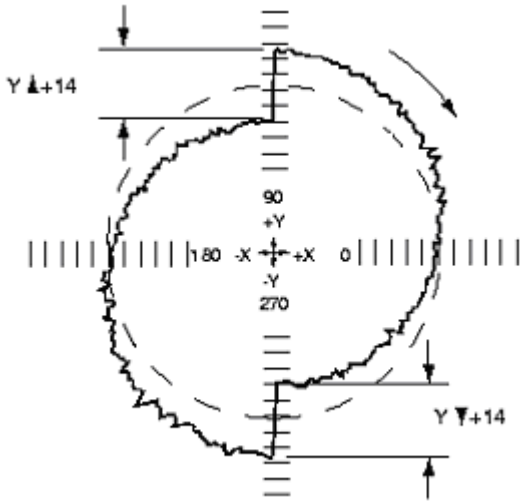


table range.

5.3 Double Ball Bar Measure – Backlash or Circular Spike

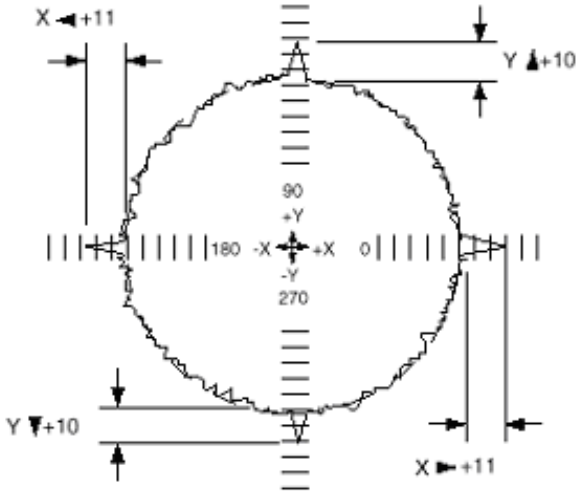
Backlash

Using DOUBLE BALL BAR to measure backlash, the result analyzing diagram is as following (only the Y axis part, which is called Positive Backlash). Able to see the Y axis backlash is 14um from the diagram. So please set this value (i.e., 14um) into Para. # 0045 and set BIT1 of Para. # 0117 to 1 in order to enable Y axis backlash compensation functions.



Reversal Spikes

Using DOUBLE BALL BAR to executing canned cycle testing, the result analyzing diagram is as below. In the diagram, the sticking out path in the direction changing area of each axis is called the circular spikes phenomenon.



Using +ive X axis direction as an example, each related parameter setting for circular spikes compensation value is as following：

Parameter 0812：+ X Axis Direction of Reversal Spikes Value

Unit：um

Description: This parameter is to set the circular compensation value of +ive X axis direction. Using the above diagram as an example. The +ive X axis direction circular spike is 11. So based on the principle, the parameter setting value is 11. However, since the present LNC series controller is using PULSE COMMAND control mode (spike compensation is added to CURRENT LOOP value), there will be some delay between the actual corresponding of servo motor and the commanding value. Based on past experience, the circular compensation value should be set as 8-9 times of the actual value. So according to the result from the above diagram, the recommend setting value for this parameter is 90. If this parameter setting value is 0, it means not to enable the + X axis spike compensation function.

(7). Parameter 0813: Reversal Spikes Time Interval of +ive X Axis Direction

Unit: disconnecting time interval

486IPC is 10.6ms

586IPC is 3.6ms

Description: To use this parameter to set the maintaining time of +ive X axis direction spike compensation. The corresponding +ive X axis spike maintaining time (spindle width) is displayed on the result analyzing diagram. The measure software will provide each measured Sampling Rate. Using RENISHAW as an example,【Sample: 7.81 per sec information will be displayed on the left side of analysis diagram. This means the time interval for two closing points is $\frac{1}{7.81} = 128ms$. Need at least 3 points (during time $2 \times 128 = 256ms$) if want the analysis diagram to display multiple-angle sharp. Under this requirement, the parameter setting value is $\frac{256}{3.6} = 71$（586IPC）. If this parameter setting value is zero, this means not to enable the +ive X axis spike compensation function.

(8). Parameter 0814: Reversal Spikes Delay Time of +ive X axis

Unit: discounting time interval

486IPC is 10.6ms

586IPC is 3.6ms

Description: Assumed the circular spike occurring point of +ive X axis is not in the direction changing center (on the X axis), but it occurs after direction changing. Then, need to set this parameter. Please refer to the description of parameter 0813 for the calculating method of this setting value

5.4 Spindle Positioning Tuning

Design Purpose

This tuning is the preparation for M19 spindle positioning preparation. Its purpose is finding the correct position for spindle positioning. After setting, NC will adjust to this new setting position automatically.

Tuning Steps

After booting, make sure the system is in preparation complete mode.

(1). Confirm relating parameters are all correct.

Pr.0021：Spindle positioning speed(rpm)

We recommend that at first spindle positioning tuning, you can slow down speed to about 100 ~ 200rpm. When the movement turns to be normal, you can enlarge the parameter and re-do tuning again. In order to avoid the difference caused by different speed, please do not change this parameter setting after tuning.

Pr. 0663：Spindle positioning acc/dec time(ms)

Pr. 0084：Spindle tuning benchmark

0：Spindle tuning benchmark use external positioning sensor, this sensor signal should connect to transit board's HS1 or HS2. Usually, between spindle and motor side will have gear ratio design.

1：Spindle tuning benchmark use motor encoder Z phase signal, no need to do external connection. Usually, between spindle and motor side will be 1:1 transmission design.

Pr. 0184：Pr. 0184：Spindle external positioning sensor connects and type. This parameter will be only effective when Pr.0084 is 0.

Pr. 0190：Spindle position control command format.

If you use KEB, Delta inverter with position card (or so called PG card), the command format is AB phase, if use TOSHIBA inverter with positioning card, command format is CW/CCW, others, please define as its exact situation.

Pr. 0057：Spindle encoder feedback magnification factor.

Pr. 0195：Spindle encoder feedback signal format.

This two parameters can be judged by executing M3S1000. If use TOSHIBA inverter, usually set Pr.0057 to be 1, Pr.0195 to be 1024.

Pr. 0049 ~ 0052、0178 ~ 0179、0181 ~ 0182：Spindle 1-4 gear ratio, confirm using section (C097 ~ C099) and corresponding gear ratio is correct.

Pr. 0248：Offset unit of spindle positioning point and benchmark.0 means the offset unit is pulse, 0 means the offset unit is 0.001 degree.

(2). Please make Pr.1056 to be 0(Offset of spindle points and benchmark), Pr.0839 to be 2000. (Spindle positioning allowable difference) press RESET to make the change to be valid.

(3). Confirm spindle encoder feedback signal's CW/CCW, use manual mode to turn spindle to be CW rotation (the same with M3 direction). Monitor if the system info 10's change to be incremental, if for decreasing, please set Pr.0185's BIT4 to be 1 or change the spindle encoder a (feedback to NC) with signal cable.

(4). Switch to MDI mode, execute M19 and monitor if spindle rotation direction is the same with M3. If it's different, please set Pr.0116 BIT4 to be 1, or change inverter's command signal cable A with signal cable.

(5). Spindle rotation stops after 2 laps, system situation from【cycle start】to be【preparation complete】At this time, spindle is still on lock situation, cannot be turned by hand.

(6). Press RESET to clear spindle lock, use hand to turn spindle to positioning point along with CW direction.

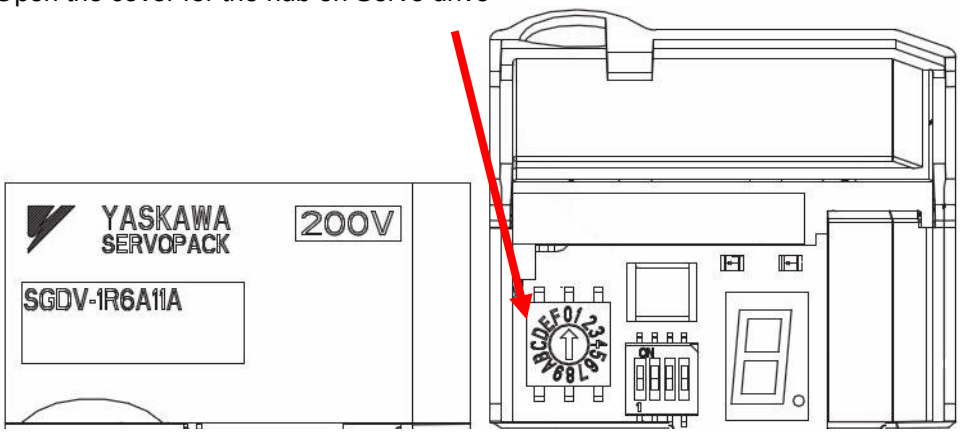
(7). After confirmation of positioning point, set system info 10 value into Pr.1056, press RESET to make it valid.

(8). Re-do M19 and confirm action complete, spindle position will be the same to setting position.

(9). Confirm spindle positioning action is correct, to speed up p ositioning rotation speed(recommendation value is 300) and minimum allowable difference (recommendation value is 1000)

5.5 Digital communication adjust instruction

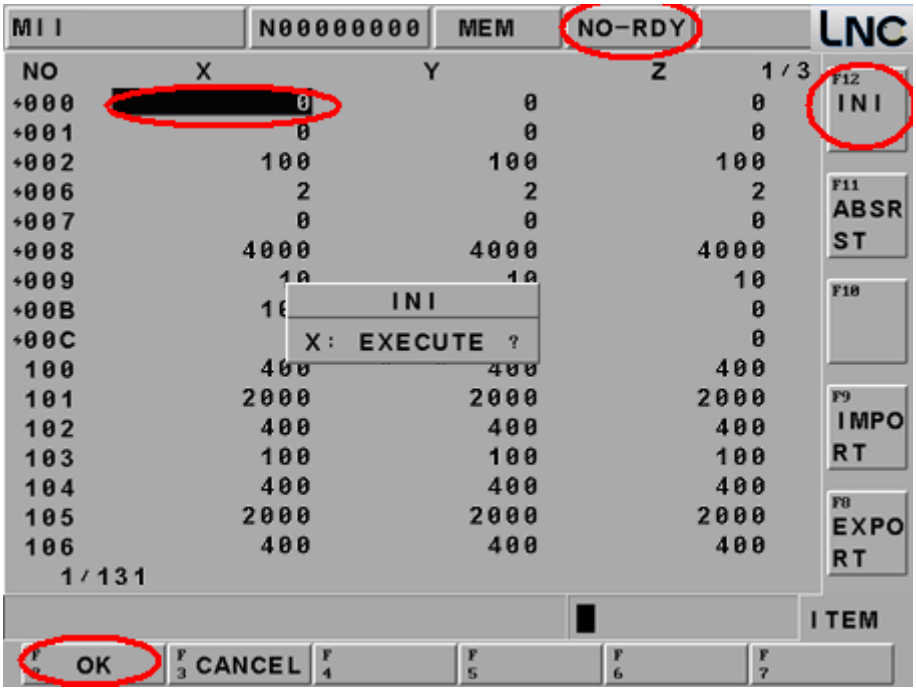
1. Set the machine parameter and servo drive parameter as your machine combination, check following chart as reference.

Controller parameter Hardware: 3 axis engraving machine. XYZ, with M-II Servo. 1st SP DA control. Switch to controller PARAMETER page and enter machine maker permission. Then set as following sample. **Remind: reboot controller after set the parameter.**	
1	P1929：M-II ON/OFF
2500	P1930：M-II communication time（ us）
101	P24：X corresponds Servo name（Set X M-II servo drive nub to 1）
102	P25：Y corresponds Servo name（Set Y M-II servo drive nub to 2）
103	P26：Z corresponds Servo name（Set Z M-II servo drive nub to 3）
	Open the cover for the nub on Servo drive 
1	P29：1st SP corresponds Servo name must be 1
As re	P104：Set X screw pitch (screw 5mm= 5000)
Based on actual	P105：Set Y screw pitch (screw 5mm= 5000)
Based on actual	P106：Set Z screw pitch (screw 5mm= 5000)
0	P156：X command type 0)AB 1)CW 2)PD 3)V (must set to 0)
0	P157：Y command type 0)AB 1)CW 2)PD 3)V （must set to 0）
0	P158：Z command type 0)AB 1)CW 2)PD 3)V （must set to 0）
0	P191：X ENCODER signal type（must set to 0）
0	P192：Y ENCODER signal type（must set to 0）
0	P193：Z ENCODER signal type（must set to 0）
1	P54：Set X Feedback rate factor 1/2/4（must set to 1）
1	P55：Set Y Feedback rate factor 1/2/4（must set to 1）

1	P56：Set Z Feedback rate factor 1/2/4（must set to 1）
0	P185：Servo feedback reverse BIT(Must set to 0）
Based on actual	P1112：X Pulse count for Encoder one turn(Please set same value with X Servo drive Pn.210）
Based on actual	P1113：Y Pulse count for Encoder one turn Please set same value with Y Servo Pn.210）
Based on actual	P1114：Z Pulse count for Encoder one turn (Please set same value with X Servo drive Pn.210.)
2	P116：Servo output reserve BIT (Please set as axis moving direction.)
0	P195：1st SP encoder signal type(Must be 0)
1	P57：1st SP feedback ratio (Must be 1 ）
0	P171：Spindle feedback reverse BIT(must be 0)
Based on actual	P1116：1st SP Pulse count for Encoder one turn, set as encoder spec.
0	P226：Spindle output reverse BIT(must be 0)
0	P183：1st SP speed command type(must be 0)
0	P190：1st SP position command type(must be 0)
2	P15：Set MPG stimulates mechanical axis name(Must be 2)
2	P28：Set X MPG connecting axis(Must be 2)
2	P87：Set Y MPG connecting axis(Must be 2)
2	P88：Set Z MPG connecting axis(Must be 2)

X、Y、Z Servo parameter list

When set M-II Servo and M-II Spindle number, reboot the controller. Switch to machine maker, in the parameter page. It will have Servo parameter. Press EMG, under NOT RDY. Move the cursor to X parameter, press initial parameter then confirm the pop up window. The initialize complete.



Follow the steps to initial the M-II servo drives, and then restart the controller.

Remind: must Servo must reboot after parameter setup.

1400H	Pn170：Tuning-less Switch(cancel Tuning-less gain adjust will affect)
1048576	Pn20E：electric gear ratio (Numerators) (20Bit: 1048576)
5000	Pn210：electric gear ratio (denominators)　(screw 5mm=5000)
8881H	Pn50A：Input signal select 1[cancel (+) over travel signal (P-OT)].
8888H	Pn50B：Input signal select 2 [cancel (-) over travel signal (N-OT)]
211H	Pn50E：Output signal select 1[set when it has brake, as the pin define]
300H	Pn50F：Output signal select 2[set when it has brake, as the pin define]
65D3H	Pn511：Input signal select 5 (use when it has measurement, as the pin define)
100H	Pn140：mode Tracing switch(must be 100H)
10H	Pn160：Vibration prevent switch(must be 10H)

2. Enter controller, move X, Y, Z to check if it can move correctly. If there has odd sounds and vibration, please check the machine mechanism. Due to the servo setting is soft enough, if the machine still has vibration issue, please check motor, flange and coupling.

Remind: Must adjust them properly, or it may unable to process next steps.

3. Use USB adjusts wire with SigmaWin+ to get each axis inertia ratio Pn103. Next use the heavy loads axis to do the Auto tuning, record the Pn100 value then initial the Servo parameter. Next, **Reset the power** then initialize the X, Y, Z as the instruction above, then **reset power** again.

4. Use the record Pn100 value, e.g. 1320. Please use Pn100:1300 level [Safety first] or [locating first] to

pick Pn101, Pn102, Pm 401 value. After each axis servo setup, move JOG check if there has odd sounds. If not, it can process the cutting test. If any servo has resonance tones, use the Servo parameter Pn408 and Pn409 to set resonance filter. If still have resonance tones, try to look up from mechanism.

Machine rigidity		**Safety first (Engraving, machine center)**				**Locating ability**		
Pn100_Kv [Hz]		**Pn101_Ti** [*0.01ms]	**Pn102_Kp** [1/s]	**Pn401_Tf** [*0.01ms]		**Pn101_Ti** [*0.01ms]	**Pn102_Kp** [1/s]	**Pn401_Tf** [*0.01ms]
500		1592	523	80		1273	785	80
550		1447	576	72		1157	863	72
600		1326	628	66		1061	942	66
650		1224	680	61		979	102	61
700		1137	733	57		909	109	57
750		1061	785	53		849	1178	53
800		995	837	50		796	1256	50
850		936	890	47		749	1335	47
900		884	942	44		707	1413	44
950		838	994	42		670	1492	42
1000		796	1047	40		637	1570	40
1050		758	1099	38		606	1649	38
1100		723	1151	36		579	1727	36
1150		692	1204	35		554	1806	35
1200		663	1256	33		531	1885	33
1250		637	1309	32		509	1963	32
1300		612	1361	31		490	2042	31
1350		589	1413	29		472	2120	29
1400		568	1466	28		455	2199	28
1450		549	1518	27		439	2277	27
1500		531	1570	27		424	2356	27
1550		513	1623	26		411	2434	26
1600		497	1675	25		398	2513	25
1650		482	1727	24		386	2591	24
1700		468	1780	23		374	2670	23
1750		455	1832	23		364	2748	23
1800		442	1885	22		354	2827	22

5. Use SigmaWin+ monitor the wave, check the final wave is normal or not. Adjust till normal.

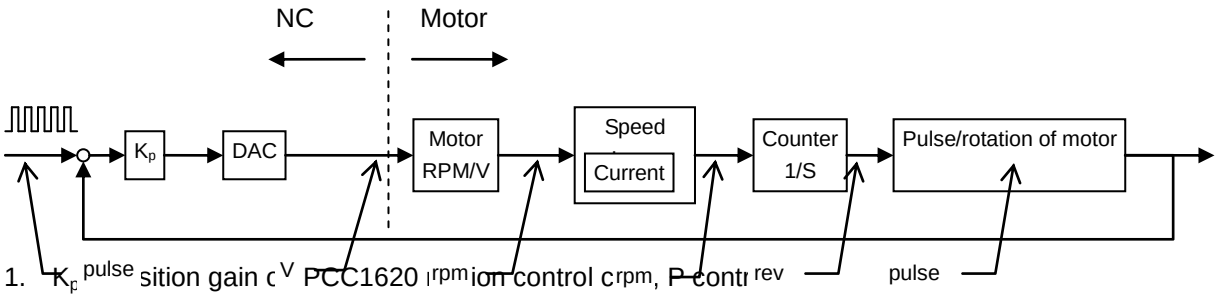
6. If no problem, enter system then use JOG to check if there have odd sounds. If it is finem use cutting test to adjust.

7. Please combine with LNC digital controller tuning SOP to check if the operation goes correct.

APPENDIX A PARAMETER ADJUSTMENT EXAMPLE

A1 Parameter Adjustment of V Command Control Method

Using X axis as an example, the following is the diagram of CONTROL BLOCK DIAGRAM when motor ENCODER has the position feedback signal



1. K_p pulse sition gain c V PCC1620 rpm ion control c rpm, P contr rev
2. PCC1620 motion control board DAC specification：

16-bit，output ±10V → DAC analogy degree = $\frac{10}{2^{16-1}-1}=\frac{10}{32767}$

3. Motor incremental gain = 1V, the corresponding motor rotational speed rpm, is decided by motor specification（motor driver also needs to be set）.
4. The speed of motor driver and the responding speed of the current feedback are much faster than the speed of position feedback, so it is able to set it as 1.
5. Total pulse per rotation of Motor = total Encoder output pulse per rotation of motor * multiple feedback factor.

Example：X axis selects motor 2000rpm/10V, the total encoder output pulse per rotation of motor is 2500; for machine structure, gear ratio is 4; pitch is 10mm. Under V command control method, if users hope the system feedback loop gain is 30 for this axis, then how to set the related parameters?

Answer: Parameter #0001：30（system feedback loop gain）.

Parameter # 0054：4（X axis multiple feedback factor）.

Parameter #1112：2500（total encoder output pulse per rotation of X axis motor）.

Parameter # 0108：200（X axis motor loop gain）.

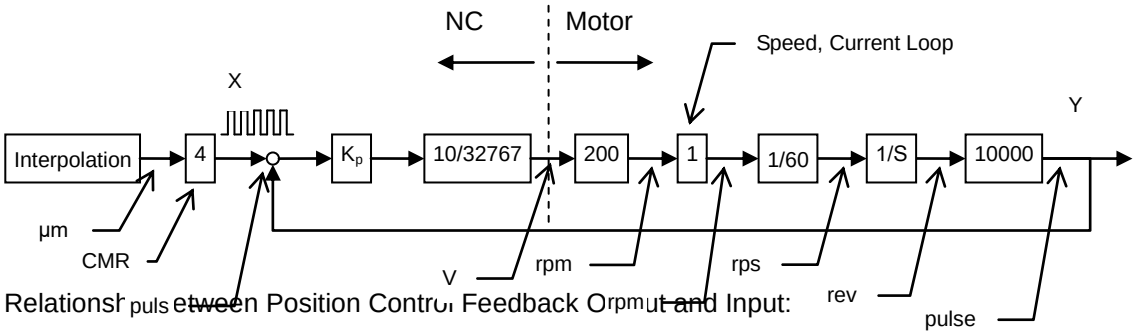
Parameter #0156：3（X axis control commanding mode）.

Parameter #0068：1（denominator of X axis motor）.

Parameter #0100：4（numerator of X axis ball screw）.

Parameter #0104：10000（pitch of X axis ball screw）.

So the control loop at this time is as below:



Relationship between Position Control Feedback Output and Input:

$$Y = \frac{K_p \cdot {}^{10}\!/_{32767} \cdot 200 \cdot {}^{1}\!/_{60} \cdot \frac{1}{S} \cdot 10000}{1 + K_p \cdot {}^{10}\!/_{32767} \cdot 200 \cdot {}^{1}\!/_{60} \cdot \frac{1}{S} \cdot 10000} X = \frac{10.17284\,K_p}{S + 10.17284\,K_p} X \quad ,$$

At this time, the position feedback loop gain is $10.17284K_p$. Since the user requires the desired position loop gain is 30, so the K_p value needs to be set as $\frac{30}{10.17284} = 2.949^{i}$ on motion control board.

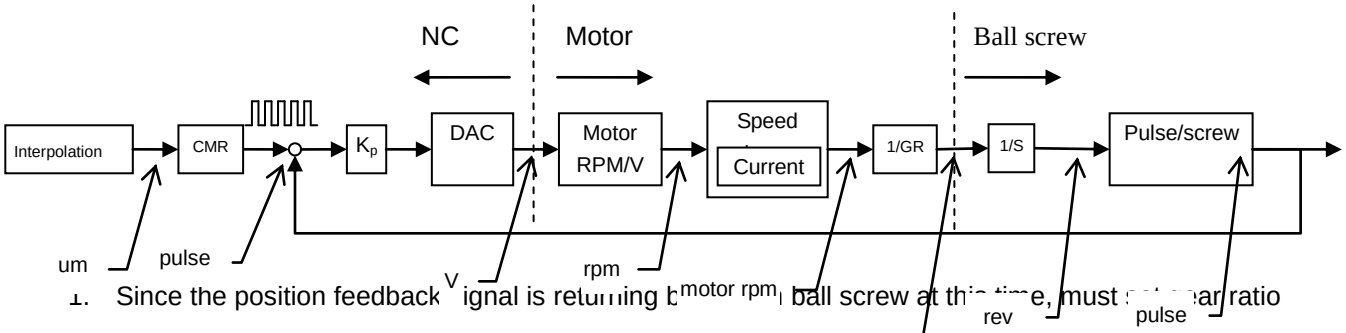
Testing Method：

$e = \frac{F}{K}$ ，e is the following error under stable condition（X axis reaches equal speed），please check system data # 000, unit is the smallest unit of the system; F is the feedrate; K is the position feedback loop gain. In this example, when K is 30 and under the condition that feedrate is 2000mm/min, following error should be

$e = \frac{{}^{2000000}\!/_{60}}{30} = 1111$ when X axis is in equal speed. When X axis is already in equal speed and the value of system data #000 is 1111 (or close to this number, sometimes there will be some difference due to moving forward one space), it means the parameter setting is correct.

A2 Parameter Adjustment when Encoder is installed besides Ball Screw

1. Connecting ball screw encoder feedback signal to NC, using it as position control.
2. Connecting motor encoder feedback signal to motor driver, using it as speed (velocity) and voltage control.



1. Since the position feedback signal is returning by ball screw at this time, must set gear ratio to 1 even there is gear ratio is between motor and ball screw, changing the gear ratio factor into the position control feedback.
2. Assumed the initial parameter # 1112 is to set the encoder total output pulse value per rotation of motor. At this time, changing it to as the encoder total output pulse value per rotation of ball screw.

Example：X axis selects 2000rpm/10V motor，encoder total output pulse value per rotation of motor is 2500; For machine structure, gear ratio is 4; pitch is 10mm, Please to install an additional 3000pulses/rev encoder on the ball screw side and also to connect the feedback signal to NC for position control. Under the condition that V command control method and the system loop gain is 30, how to set the related parameters?

Answer：Parameter #0001：30（system feedback loop gain）.

Parameter #0054：4（X axis multiple feedback factor）.

Parameter #1112：3000（encoder total output pulse value per rotation of X axis ball screw）.

Parameter #0108：????（X axis motor loop gain）→explain later.

Parameter #0156：3（X axis control commanding mode）.

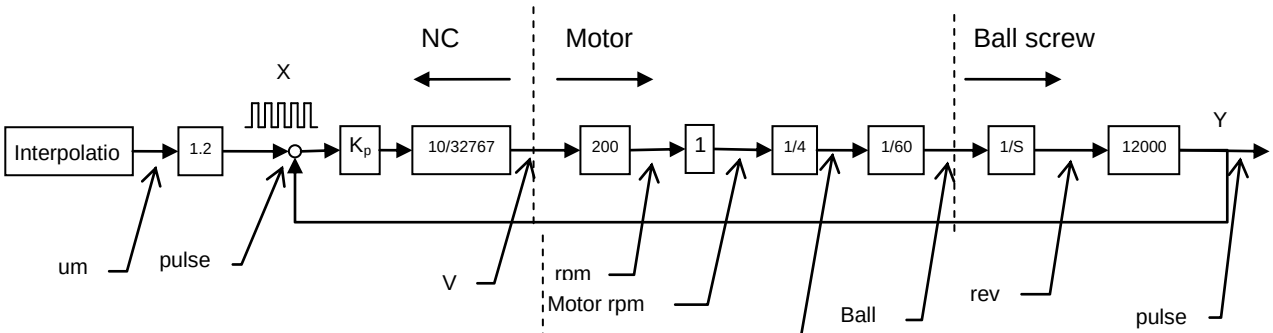
Parameter #0068：1（denominator of X axis motor）.

Parameter #0100：1（numerator of X axis ball screw）.

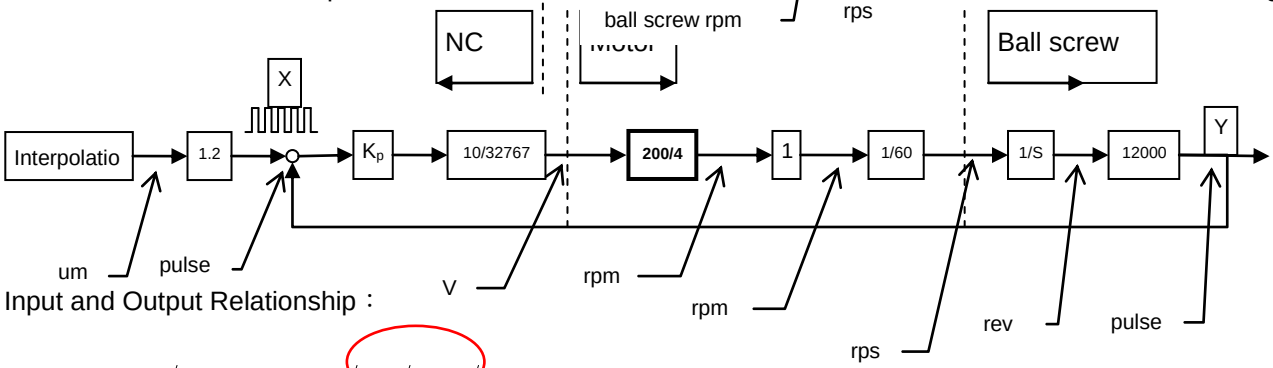
Parameter #0104：10000（Pitch of X axis ball screw）.

$CMR = \frac{3000 * 4}{10000} = 1.2\, pulses/um$，which means 1um on X axis is correspond to 1.2 pulses that is the encoder total output signal of ball screw.

Control Loop is as below：



But, since there is no extra parameters for GR factor setting in position back, modification is as following:



Input and Output Relationship：

$$Y = \frac{K_p \cdot 10/32767 \cdot 200 \cdot 1/4 \cdot 1/60 \cdot 1/S \cdot 12000}{1 + K_p \cdot 10/32767 \cdot 200 \cdot 1/4 \cdot 1/60 \cdot 1/S \cdot 12000} X$$

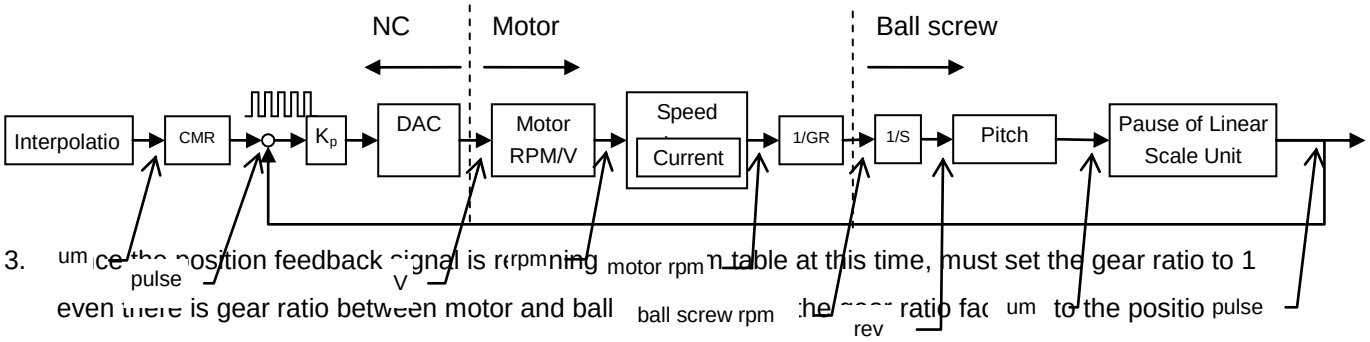
$$= \frac{K_p \cdot 10/32767 \cdot 200/4 \cdot 1/60 \cdot 1/S \cdot 12000}{1 + K_p \cdot 10/32767 \cdot 200/4 \cdot 1/60 \cdot 1/S \cdot 12000} X = \frac{3.05185 K_p}{S + 3.05185 K_p} X$$

So, in this application example, parameter #0108 setting value is 200/4=50 and the K_p setting value is $\frac{30}{3.05185} = 9.83$ on PCC1620 motion control board.

Weakness: under the present structure, when the motor actual loop gain cannot be completely divided by gear wheel ratio, please enter the closest integrate value. Also, there is a little bit difference between the whole position loop gain values and Parameter #0001 value. But, the position control has no problem at all. Strength: able to clear backlash error.

A3 Parameter Adjustment when using Linear Scale Control Method

1. Connecting linear scale feedback signal to NC, using it as position control.
2. Connecting motor encoder feedback signal to motor driver, using it as velocity (speed) and voltage control.



3. um ce the position feedback signal is rpm ning n table at this time, must set the gear ratio to 1 even there is gear ratio between motor and ball he gear ratio fac um to the positio pulse control loop.

   Example：X axis selects 2000rpm/10V motor, the total
   Encoder output pulse value per rotation of motor is 2500; for the
   machine structure, gear ratio is 4, pitch is 10mm. Also, please install an addition linear scale: every 20um will output one A/B pulse set; every 50mm will output one Z phase pulse and also sending the feedback signal to NC. Under the condition of V command control method and the system loop gain value is 30, how to set the related parameters?

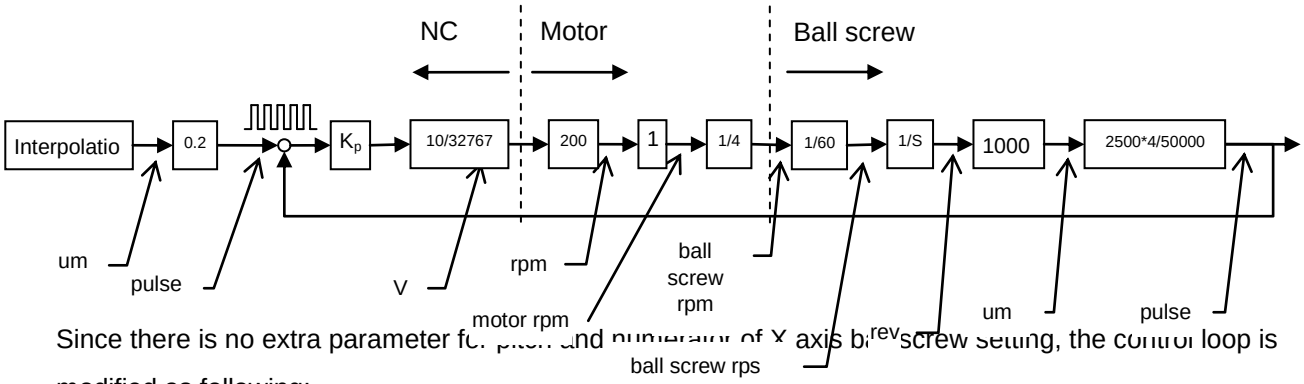
   Answer：Parameter #0001：30（system loop gain）.
   Parameter #0054：4（X axis multiple feedback factor）.
   Parameter #1112：????（total encoder output pulse value per rotation of X axis motor）.→Explain later.
   Parameter #0108：????（X axis motor loop gain）.→Explain later.
   Parameter #0156：3（X axis control commanding mode）.
   Parameter #0068：1（denominator of X axis motor）.
   Parameter #0100：1（numerator of X axis ball screw）.
   Parameter #0104：????（X axis pitch）.→Explain later.
   （Parameter #1112 * Parameter #0054）the initial definition is the total encoder output pulse value per rotation of X axis motor. This value is used as the distance between each index in zero return procedure. So after changing to linear scale, Parameter #1112 also needs to change to the pulse value that is sent out by linear scale. In this example, every 50 mm linear scale will produce one Z phase pulse, every 20 um will produce one A/B pulse set, so the pulse value that is produced by linear scale between each index is 50 * 1000 / 20 = 2500 → the setting value of Parameter #1112 is 2500. For linear scale, every 20 um will produce one A/B pulse set. This means every 5um will produce one pulse after 4 ratio so the CMR = 1 / 5 = 0.2. But for NC,

$$CMR = \frac{P0058 \times P0054}{P0104} \times \frac{P100}{P68}$$

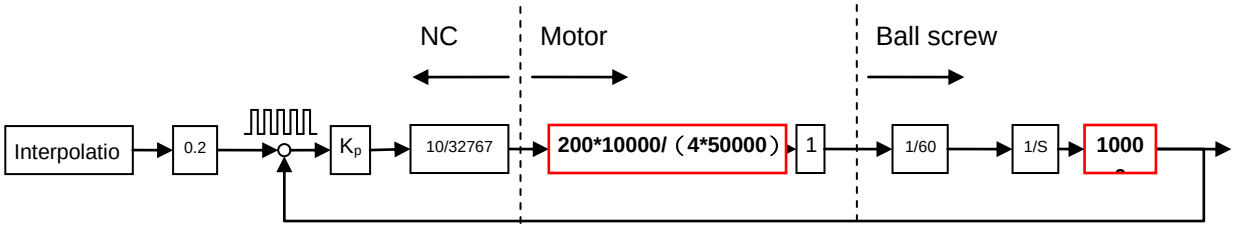
   Since Parameter #1112 is to set the pulse value, which is produced by linear scale, between each index,

Parameter #0104 must set the distance between each linear scale index in order to make the CMR in NC the same as that in linear scale. In this example, Parameter #0104 must be set as 50000.

Control loop is as below：



Since there is no extra parameter for pitch and number of X axis ball screw setting, the control loop is modified as following:



Output and Input Relationship:

$$Y = \frac{K_p \cdot 10/32767 \cdot 200 \cdot 1/4 \cdot 1/60 \cdot 1/S \cdot 10000 \cdot 10000/50000}{1 + K_p \cdot 10/32767 \cdot 200 \cdot 1/4 \cdot 1/60 \cdot 1/S \cdot 10000 \cdot 10000/50000} X$$

$$= \frac{K_p \cdot 10/32767 \cdot (200 \cdot 10000)/(4 \cdot 50000) \cdot 1/60 \cdot 1/S \cdot 10000}{1 + K_p \cdot 10/32767 \cdot (200 \cdot 10000)/(4 \cdot 500000) \cdot 1/60 \cdot 1/S \cdot 10000} X = \frac{0.50864}{S + 0.50864 K_p} X$$

So, in this application case, the setting value of Parameter 0108 is 200*10000/（4*50000）=10. The K_p setting value is

$\frac{30}{0.50864} = 58.9808$ On PCC1620 Motion Control Board.

Weakness: Under current structure, when Parameter 0108 cannot be an integrate number, please enter the closest integrate number. At this time, there will be some difference between the whole position loop gain and parameter 0001, but the position control will not have any problem. Strength: able to clear backlash error and pitch error.

Appendix E Internet Setting Description

Network Connection Settings for the Controller

This controller can obtain the resource of a remote disk in Microsoft Network by “Internet Connection Sharing.” Below are the steps to be made at the controller side & PC side, respectively, to install and to make relative settings to enable network connection sharing function.

At the controller side:

Install network software at the controller side. To install, boot the system with an OS floppy disk and select the installation option 3 “INSTALL NETWORK UTILITIES.” (This step can be skipped if there is already a NET directory in the path of “C:\NET.”)

Modify network configuration of the controller. There are two ways to make the modifications: **Method 1：By DOS or by the operating interface of LNC software.**

Modify the file “C：\config.sys” of the controller

Modify

REM device=C：\NET\ifshlp.sys

Into

device=C：\NET\ifshlp.sys

Edit “C:\Net\2net.bat.” Modify this line according to your needs:

C：\NET\net△use△N：△\\PCNET\share△12345△YES

Below are the definitions for each field in the line.

△represents a blank character.

PCNET” is the computer name in the Network, and “share” is the folder name shared by the computer.

”N” is the (virtual) disk of N: which is mapping to the sharing resource “\\PCNET\ share “in the network. (Please do not use “D:” which is used for different purposes; using “D:” will cause errors.)

“12345” indicates the password to log on PC. Passwords may or may not be required for different operating systems.

Window98：For this system, instead of adding a new account, users can connect some network disk by sharing a folder with each other. Therefore, users must log on with the same password as set by PC for “folder-sharing” function.

Window2000 and WindowXP：The two systems have higher security levels for access permissions, so users of different identifications are required to enter different passwords as set by PC. If no password is set at PC side, network connection would fail unless PC permission is open for guest access (the setup of guest access is described in the later chapter).

For OS versions Ver.2.5 or versions earlier than Ver.2.5, some disk codes that are no longer applicable can still be shown. If this occurs when the controller is on-line, add the line C:\NET\net stop /yes before the line C:\NET\ net initialize.

Verify if the settings are correct for the controller's file C：\NET\SYSTEM.INI and also for other relative settings in Network Neighborhood. Some programs might need to be modified as below (Please DO NOT change the settings that are not mentioned here)：

[network]

：

computername=LNCDOS

：

username=LNCDOS

：

workgroup=WORKGROUP

：

logondomain=WORKGROUP

：

a. ”computername=” is the controller name in the Network. Each controller should have its own unique name that is different from other disks in the Network. The default computer name is LNCDOS. Therefore, if there is more than one controller in a domain, this default name must be modified.

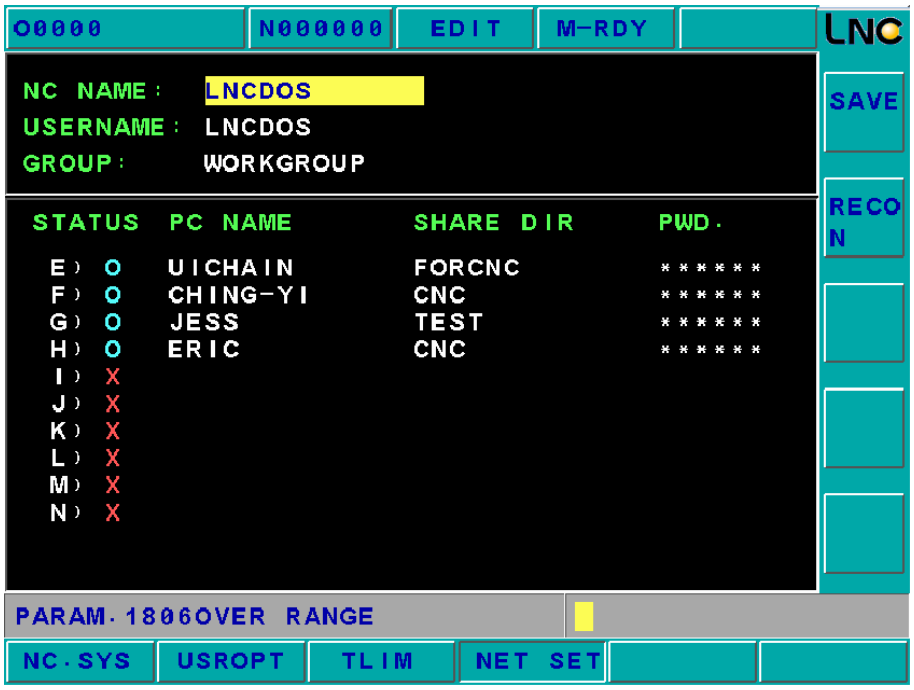
b. ”username=” is the controller name to log on PC. Except for Window98, all other operating systems require PC side to add a new user with the same name at the same time unless access permission is open to guests. The default user name is LNCDOS. Since a user can use the same name to log on repeatedly, there is no need to modify this name even if there is more than one controller in a domain.

”workgroup=” is the work group name of the controller when logging on the internet. Please set this value according to the Network which the controller belongs to. By default, it is set as “WORKGROUP.”

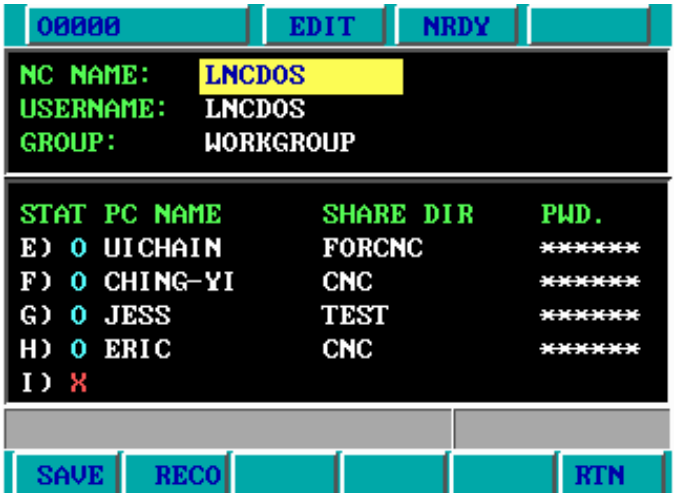
”logondomain=” is the domain name of the controller when logging on the internet. Please set this value according to the domain that the controller belongs to. The setting method is basically the same as that of “WORKGROUP.”

Method 2. By the operating interface of LNC software

I. For 600 & 520 Series, the path to go to the configuration interface is <PARAM> NET SET; for 500i/510i & 300i/310i Series, it is < PARAM > NET, as shown in the figures below



Networking configuration screen for 600 & 520 Series



Networking configuration screen for 500 & 300 Series

II. FIELD DEFINITIONS：

A. LNCDOS◦NC NAME: “computername” in the C:\Net\system.ini file. One name should not be used twice in the same domain. The default name is LNCDOS.

USERNAME: “username” in the C:\Net\system.ini file. This is the user to log on PC. The default name is LNCDOS

GROUP: “workgroup” in the C:\Net\system.ini file. This is the work group name of the controller when logging on the internet. The default name is WORKGROUP.

STATUS (for 600 & 520 Series) or STAT (for 500i & 300 Series):

Disk codes are used in C:\Net\2net.bat when logging on the internet.

Disk codes start from “E” to “N.” There are 10 codes in total.

The drive codes are assigned by the system; users are not allowed to set the codes by themselves.

○ & X after drive codes indicate the network status of the drive. X means off-line; ○ means on-line.

Disk codes other than E ~ N existing before network setting is configured will be deleted after networking configuration is finished.

PC NAME: Enter the full computer name for the controller to get connected with PC. The maximum length allowed is 12 characters.

SHARE DIR: Enter the share folder name for the controller to get connected with PC. The maximum length allowed is 12 characters.

PWD. Set the password to get connected with PC. The content of the password is visible when being entered, but it will be converted into “******” as soon as “Enter” key is pressed. The maximum length allowed is 12 characters.

DEFINITIONS OF FUNCTION KEYS：

B. Press the keys UP, DOWN, LEFT, & RIGHT to move cursor to the desired field.

Enter the information in the input text box, then press INPUT to upload the information to the field assigned by cursor.

Pressing INPUT without any information in the input text box will delete the original information in the field

Press PageUp & PageDown to switch between pages.

CANCEL：Leave this network setting and do not save changes.

ESC：The same to CANCEL button.

SAVE: Press SAVE to save changes, the network setting need to re-boot and make the setting valid.

Due to connectivity issues, sometimes the controller fails to log on the network. If this happens when the above functions are in use, the controller will try to connect to the same disk for 3 times before connecting to the next disk. After all connections are tried, the controller will then enter the system

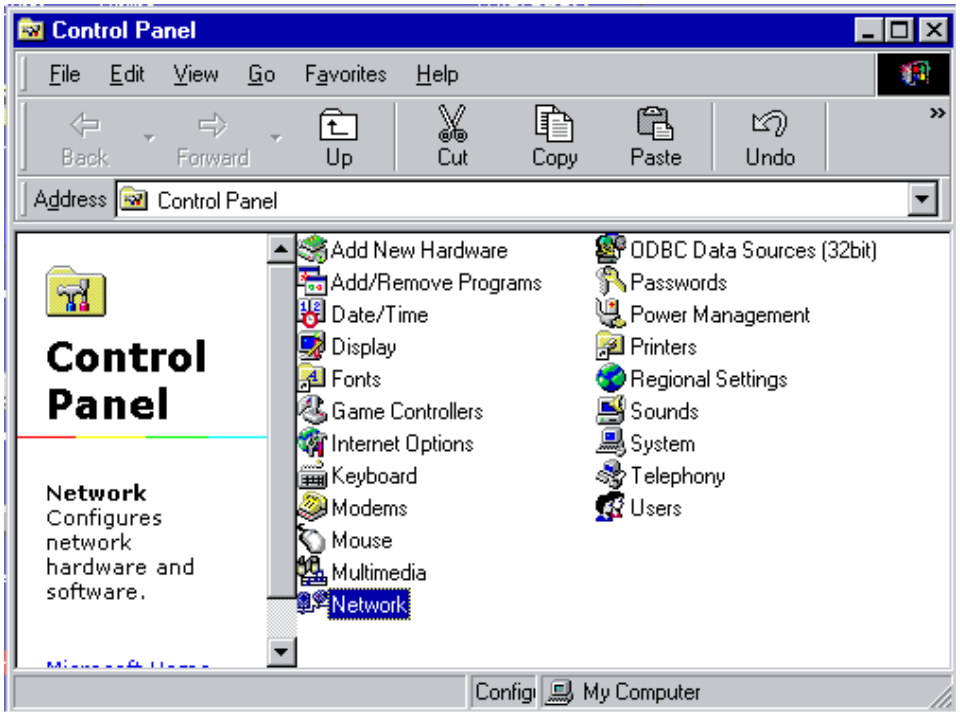
NETWORK SETTINGS AT PC SIDE

Network Settings for Windows 98

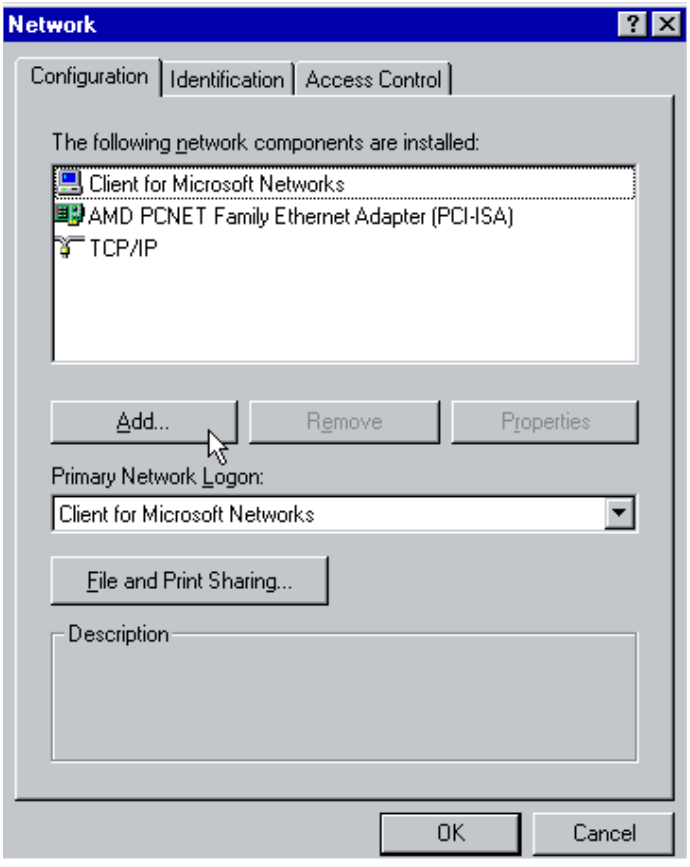
Verify if the network card, internet cables, and relative protocols have been installed properly. Verify if the “NetBEUI” protocol & the “File and printer sharing for Microsoft Networks” service have been installed. (Caution: DO NOT activate the network protocol “NWlink NetBIOS” which would cause network connection to fail.)

Click Start → Settings → Control Panel

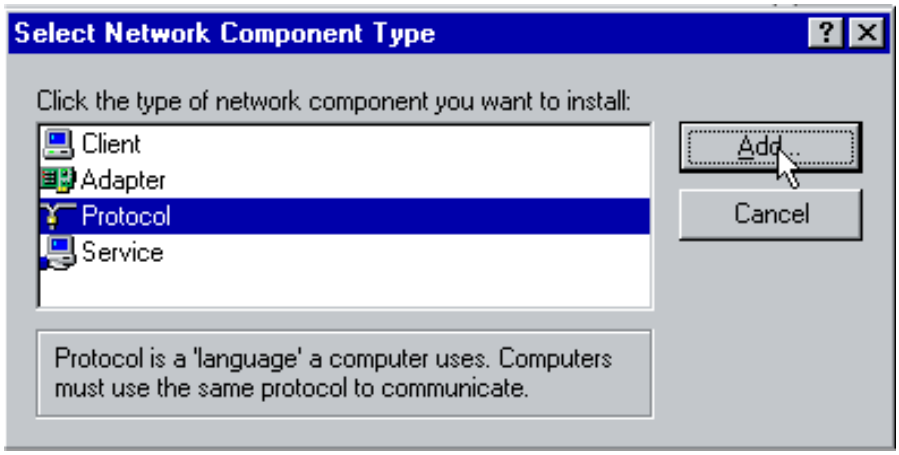
Double-click on the Network icon to configure network settings



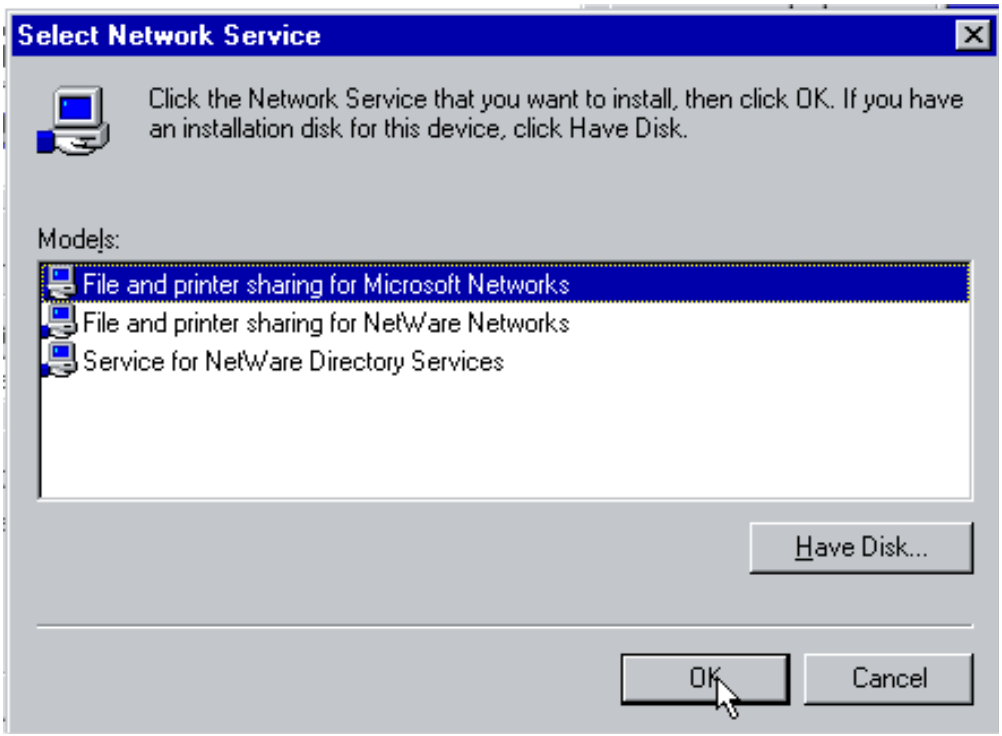
If the two network protocols “File and Printer Sharing for Microsoft Networks” & “NetBEUI” are not installed, please press Add.



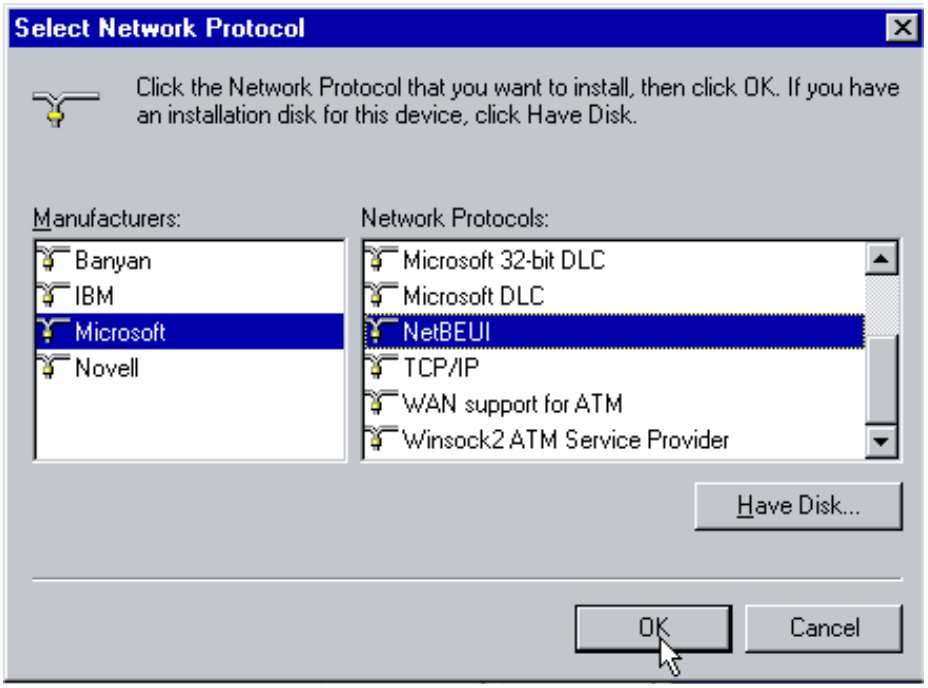
If “File and Printer Sharing for Microsoft Networks” is not installed, please select Service; if “NetBEUI” protocol is not installed, please select Protocol. Then click Add.



If “File and Printer Sharing for Microsoft Networks” is not installed, highlight it on the service menu then click OK to complete installation.



If the network protocol “NetBEUI” is not installed, please highlight it on the menu as shown in the diagram below then click OK to complete installation.



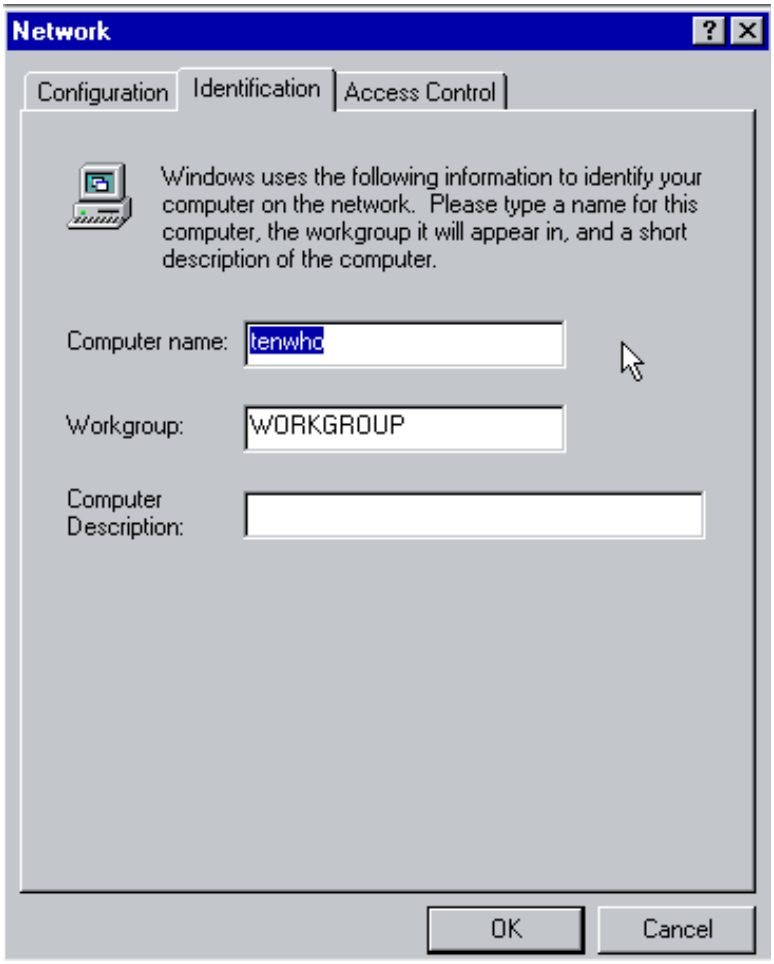
Verify if Computer Name & Workgroup are set correctly.

（The setting of workgroup and logondomain in C：\net\system.ini must be the same as those at PC side. The computername in C:\net\2net.bat must be the same as PC’s computer name.）

A. Select Start→Settings→Control Panel.

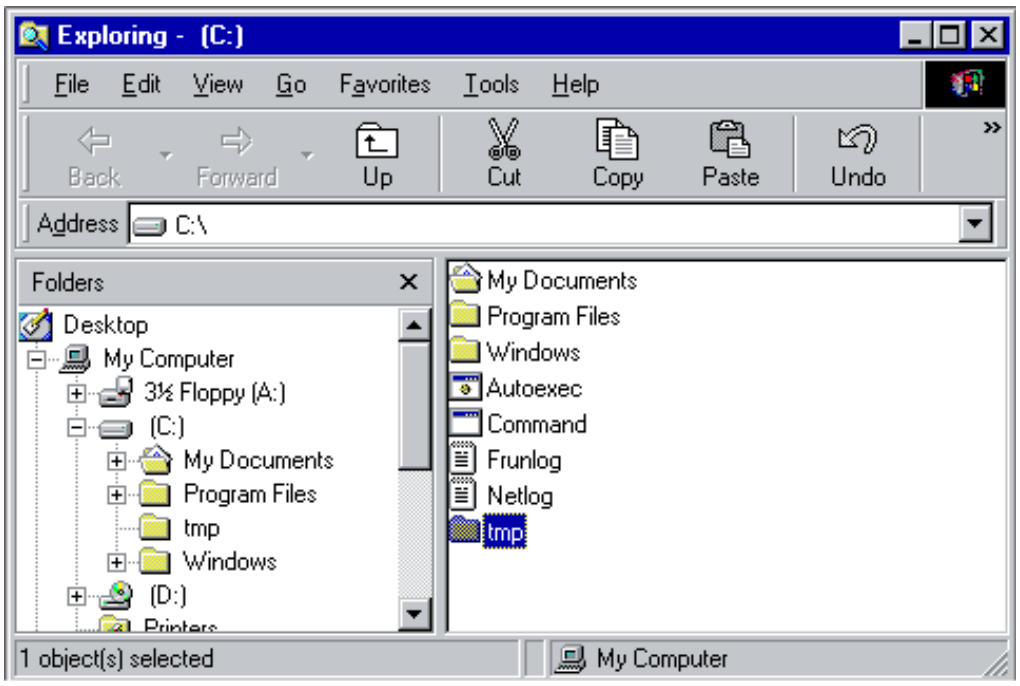
B. Double-click on the Network icon.

Verify if the settings of Computer Name & Workgroup are the same as those in C:\NET\2net.bat & C:\NET\system.ini. (Take the diagram below as an example, computername of 2net.bat should be set to “tenwho”；workgroup of system.ini should be set to “Workgroup”).

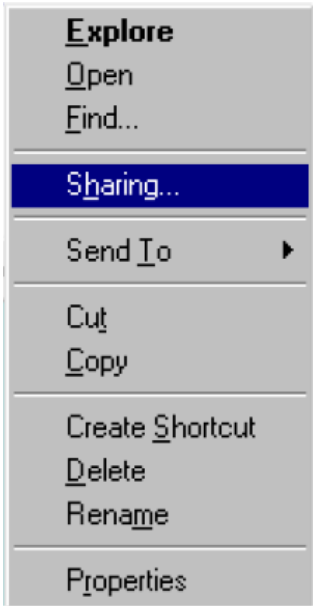


Share a directory at PC side

C. Go to Windows Explorer and create a new folder with the name “tmp” (The folder can be named differently by users).



D. Left-click to select the “tmp” folder, then right-click and choose Sharing.



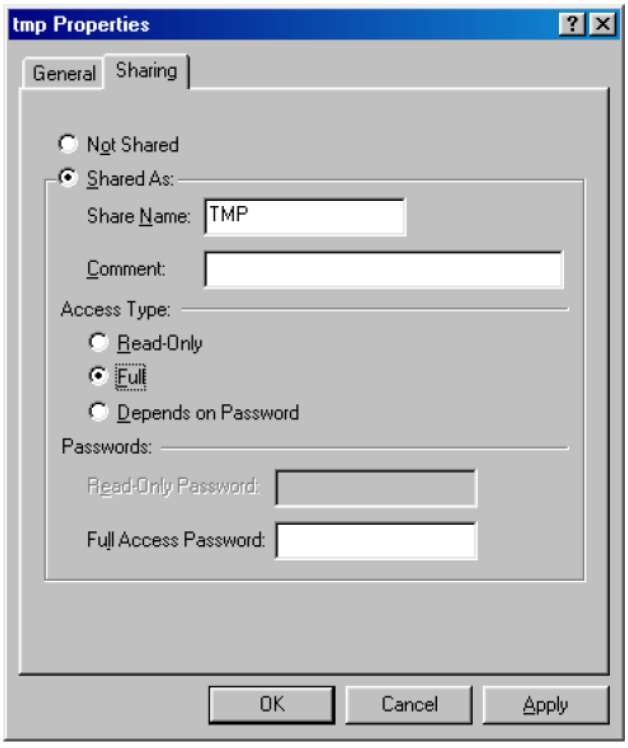
Please follow the steps below for configuration:

Click the Sharing tab.

By default, the Share Name and the newly-created folder are the same. Users can change name of the new folder, but it must be the same as the folder name in 2net.bat.

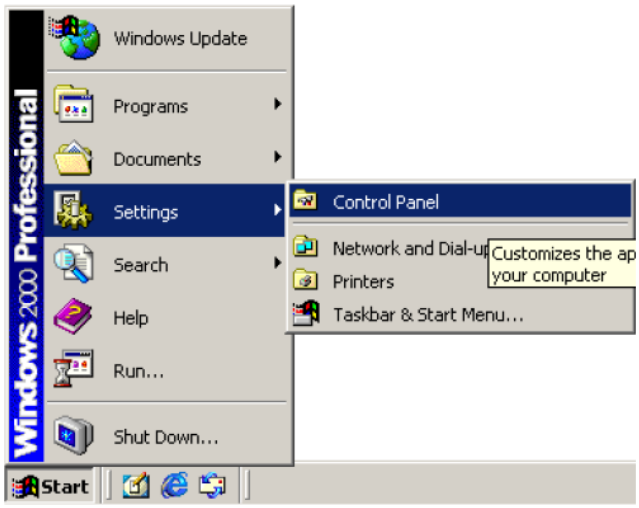
Verify the box of Full for Access Type.

You can choose either to set a password or not. If set, the password must be the same as that in 2net.bat.

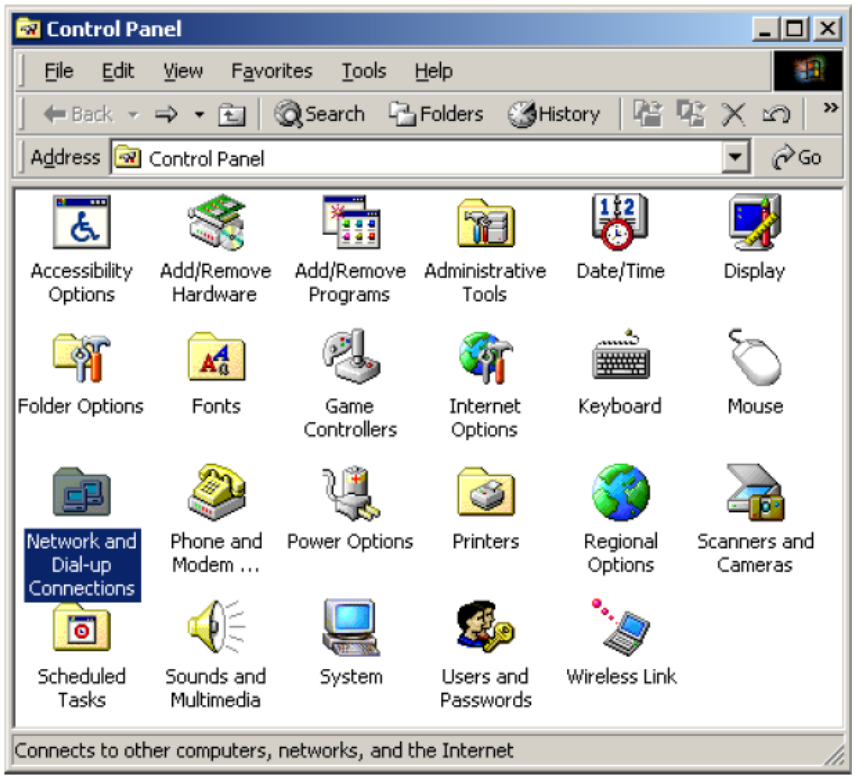


NETWORK SETTING FOR WINDOWS 2000

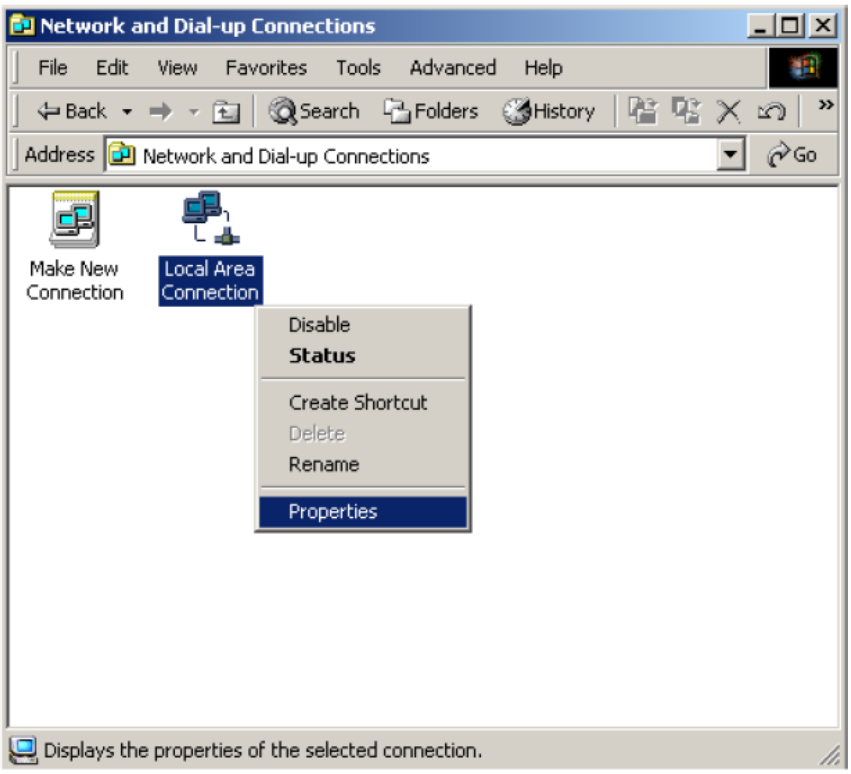
1. Verify if a network card, internet cables, and the relative protocols have been installed properly.
   Verify if the “NetBEUI” protocol & the “File and printer sharing for Microsoft Networks” service have been installed. (Caution: DO NOT activate the network protocol “Nwlink NetBIOS” which would cause network connection to fail.)
   Select Start→Settings→Control Panel.



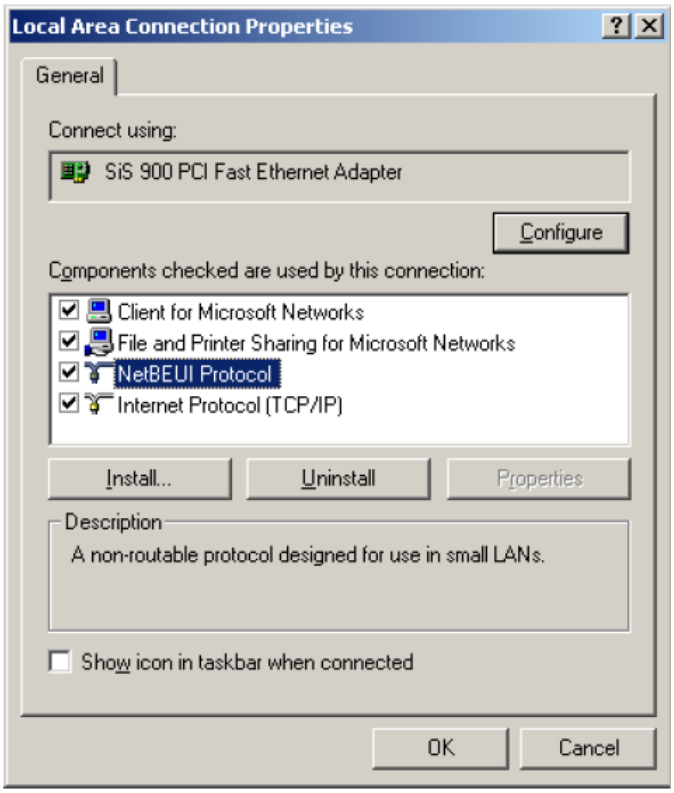
   Double-click on the Network and Dial-up Connections icon.



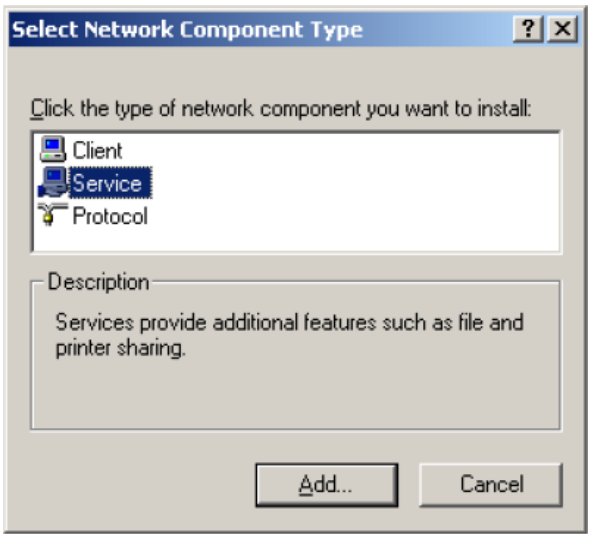
Right-click on the Local Area Connection icon and left-click properties.



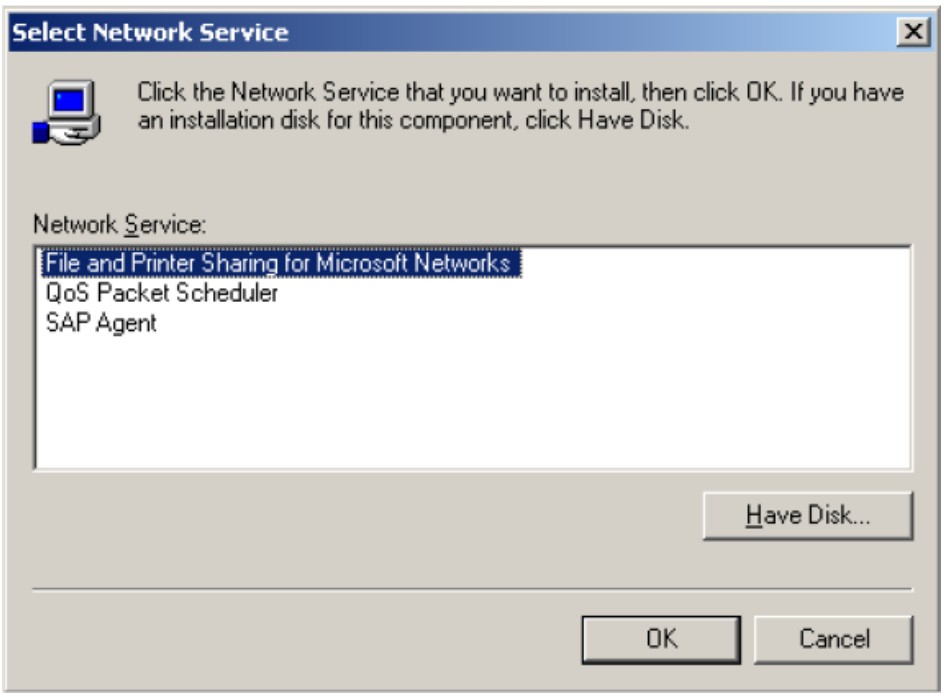
If the two network protocols “File and Printer Sharing for Microsoft Networks” & “NetBEUI Protocol” are not installed, verify the boxes and press Install to install them.



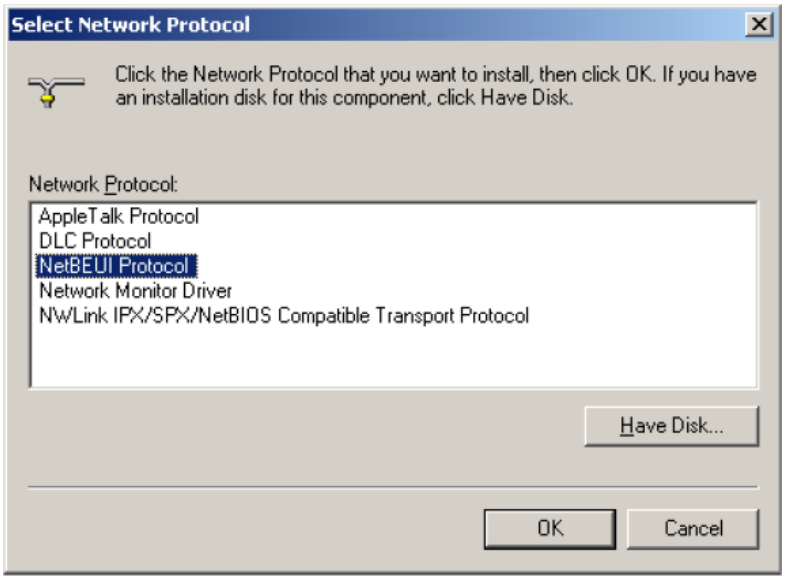
If “File and Printer Sharing for Microsoft NetWorks” is not installed, please select Service; if “NetBEUI Protocol” is not installed, please select Protocol. Then click Add.



If “File and Printer Sharing for Microsoft Networks” is not installed, highlight it on the menu then click OK to complete the installation.



If “NetBEUI Protocol” is not installed, highlight it on the menu then click OK to complete the installation.

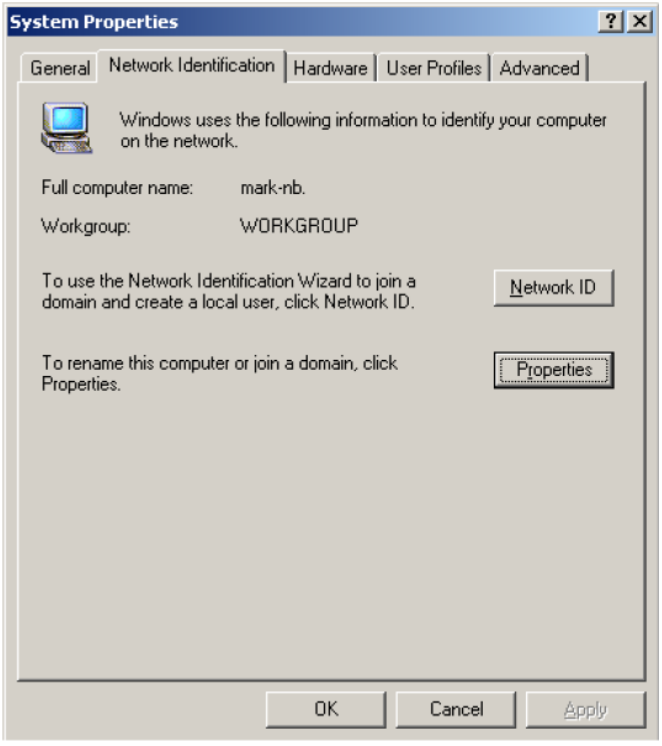


Verify if “computername” & “workgroup” are set correctly.

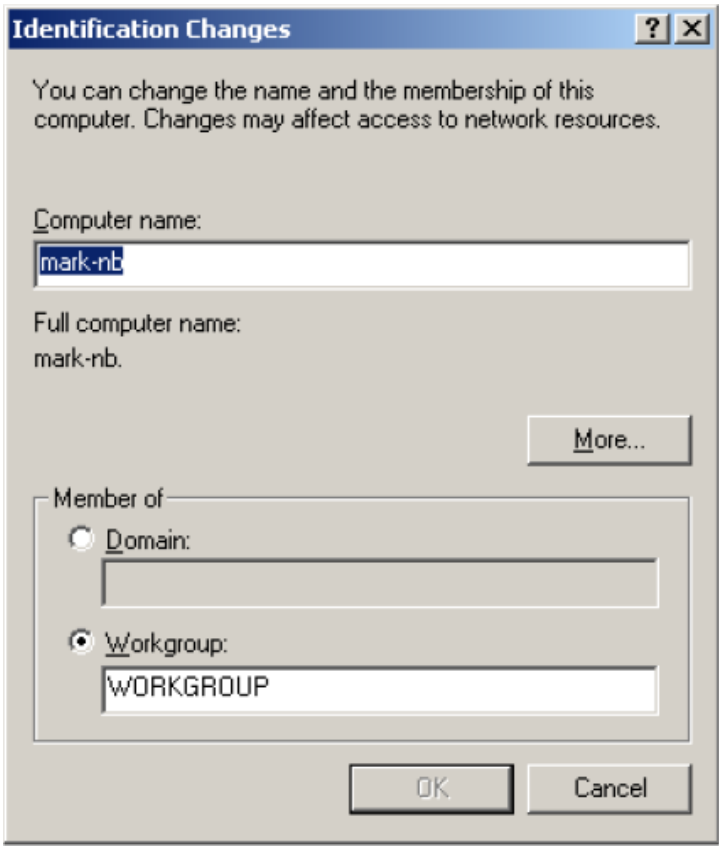
（The setting of workgroup and logondomain in C：\net\system.ini must be the same as those at PC side. The computername in C:\net\2net.bat must be the same as PC’s computer name.）

A. Right-click on “My Computer” icon on the desktop then left-click properties.

B. Select the Network Identification tab. Verify if the settings of Full computer name & Workgroup are the same as those in C:\NET\2net.bat & C:\NET\system.ini. (Take the diagram below as an example, computername of 2net.bat should be set to “mark-nb”；workgroup of system.ini should be set to “WORKGROUP”). Press Properties to change Full computer name & Workgroup.

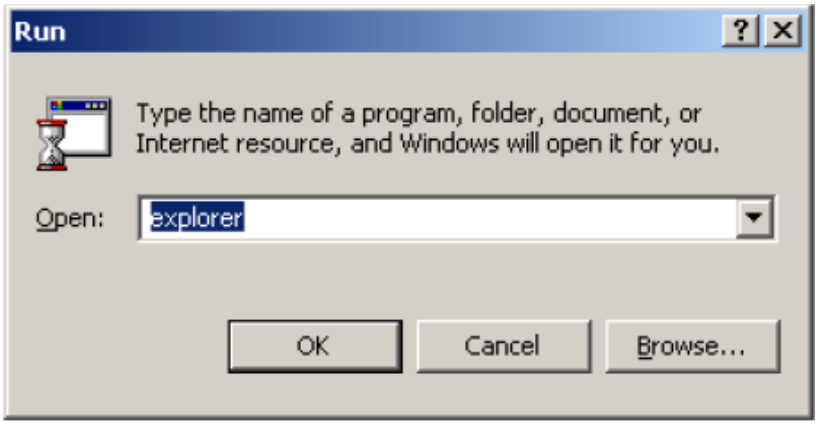


To change a computer or workgroup name, modify it directly in the corresponding text box.

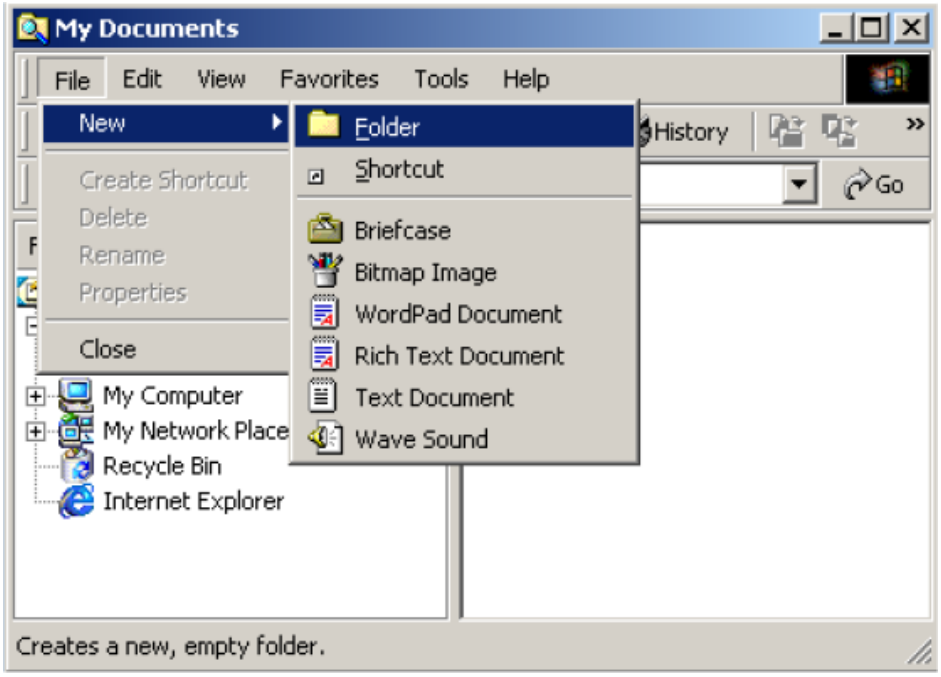


Share a directory at PC side

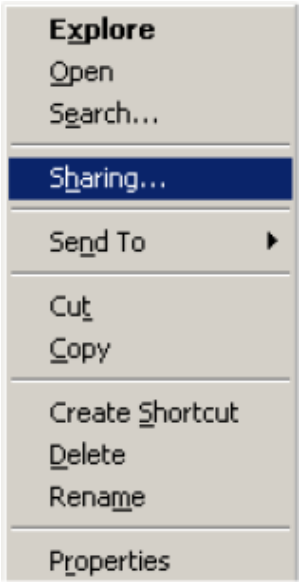
C. Press Start → Run, enter “explorer,” and press OK to open explorer.



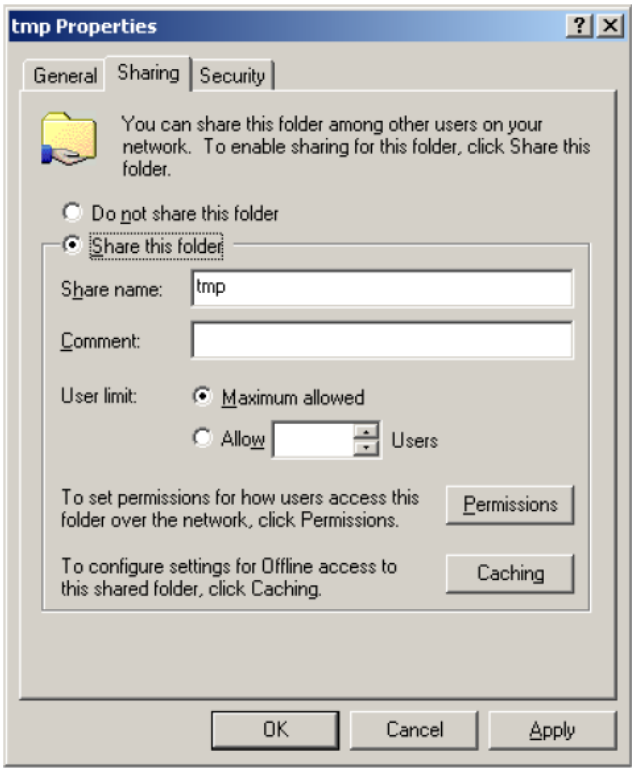
Create a new folder for sharing.



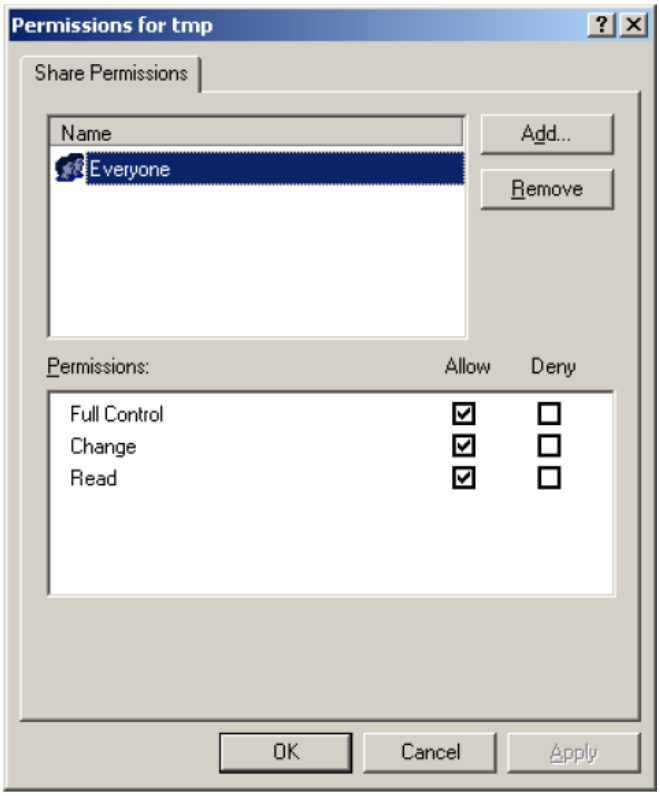
Left-click the new folder, and then right-click Sharing.



Click the Sharing tab, click to select Share this folder, and verify if the name in the Share name text box is the same as that in the 2net.bat file. Then click Permissions.



Select “Everyone” in the Share Permissions section, and check all the Allow boxes in the Permissions section. Then press OK.



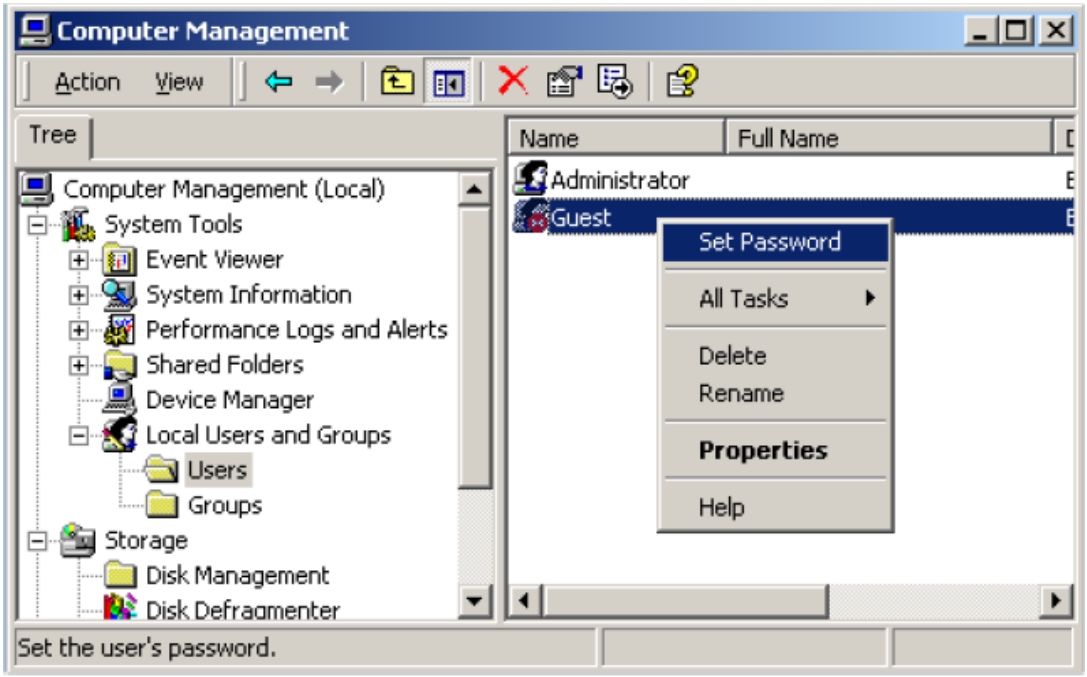
ENABLE USER ACCESS：

There are two ways to enable user access. Please choose either one according to your need. The advantage of method 1 (recommended) is its convenience for installation, and there is no need to add a new user if each controller has its own username; however, the disadvantage is that its security level is low. On the contrary, the second method has a higher security level. But if there are different user names for different controllers, users are required to add a new user each time. Depending on the types of operating systems, there are different steps for setup as listed below：

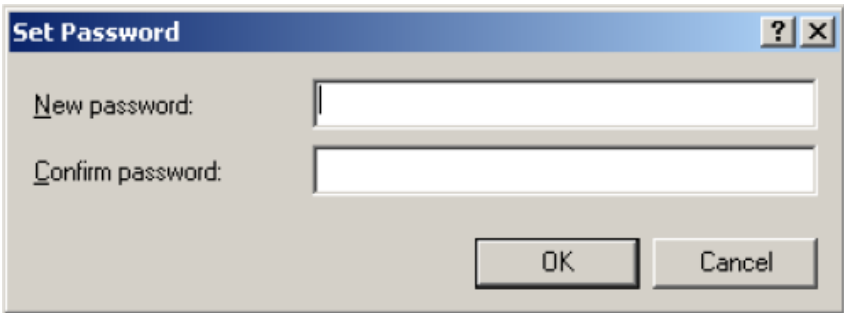
Method 1：

D. Right -click the My Computer icon on the desktop and Left-click Manage.

E. In the Manage pop-up menu, in the Users folder, left-click Guest, right-click, and then left -click “Set Password.”

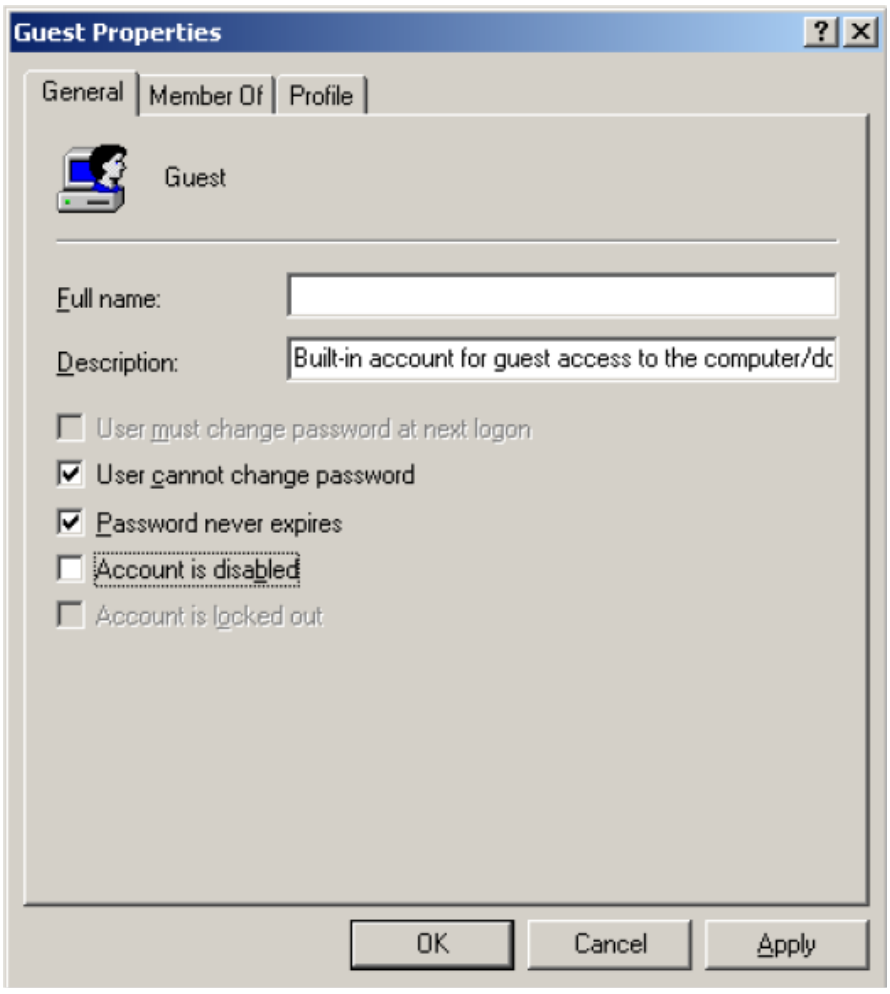


Leave the password boxes blank, and press OK.

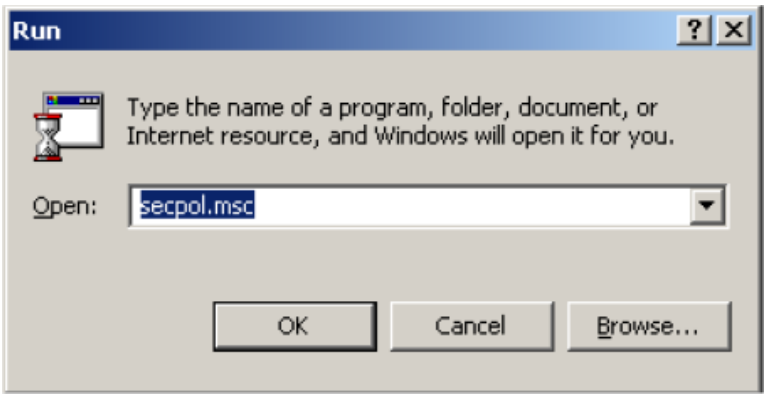


Press OK again, and finish the procedure of password modification.

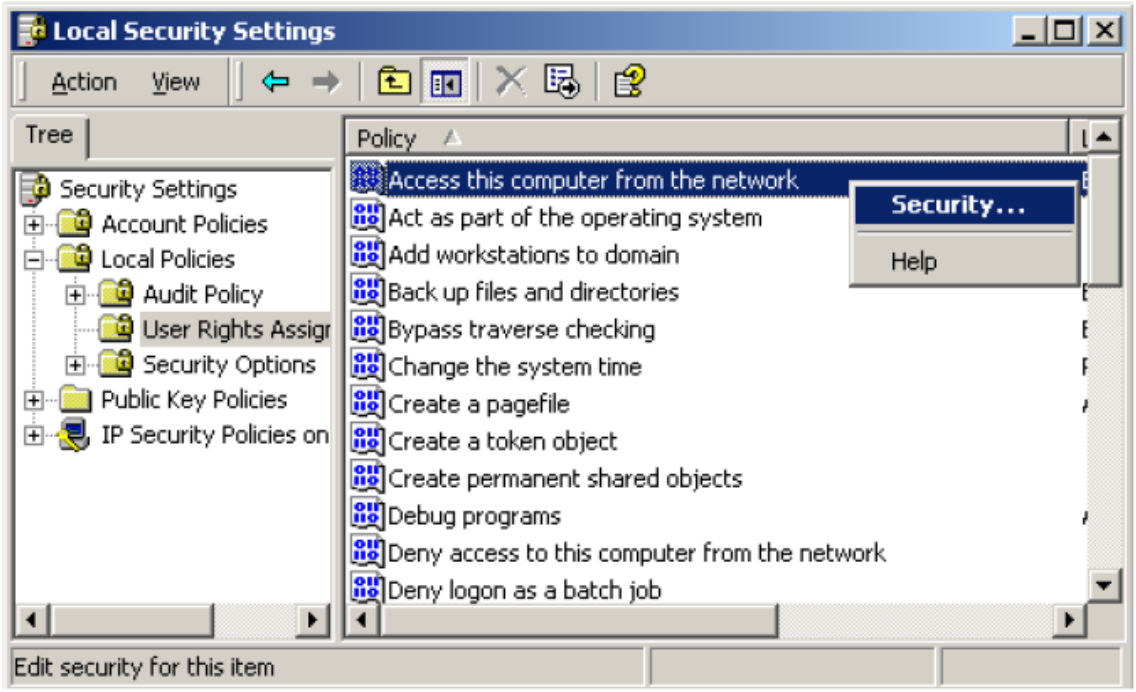
If there is a red cross over the Guest icon in the Users folder, right-click on Guest and select Properties. A dialogue box will appear as the figure below, check the boxes of “User cannot change password” & “Password never expires” and uncheck the box of “Account is disabled.”



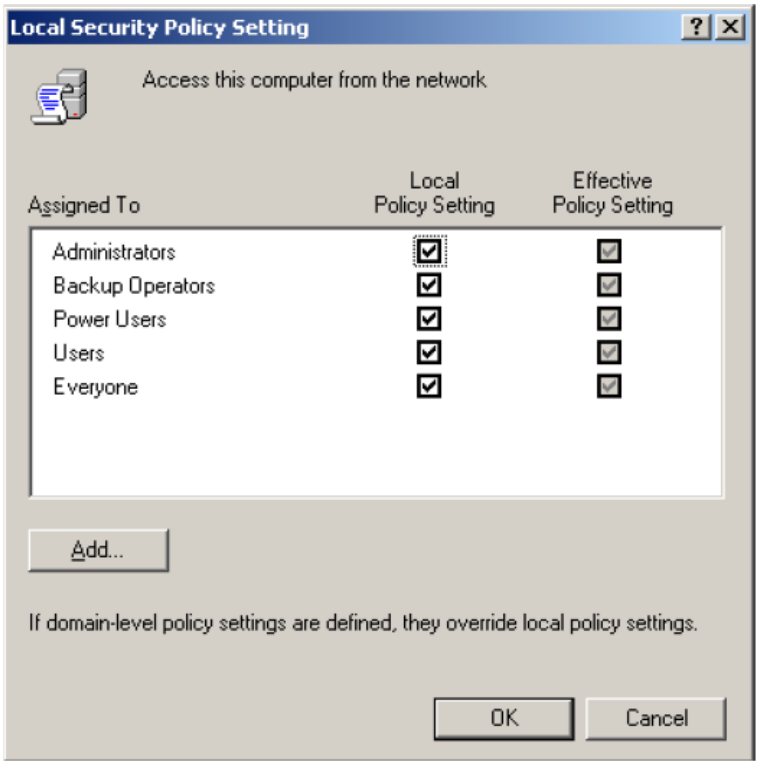
Next, set a higher access level for Guest. To do so, click Start>Run, and enter secpol.msc in the text box. Then press OK.



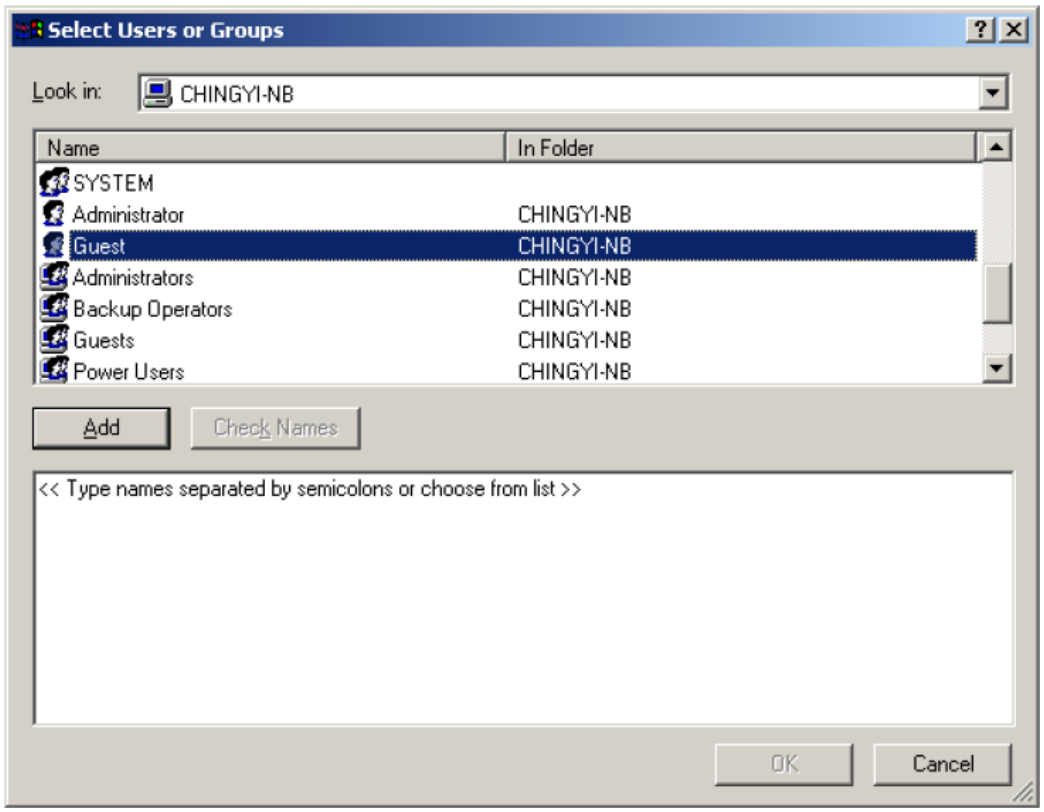
Click Local Policies → User Rights Assignment. Right-click the Access this computer from the network method, and then left-click Security



Click the Add button



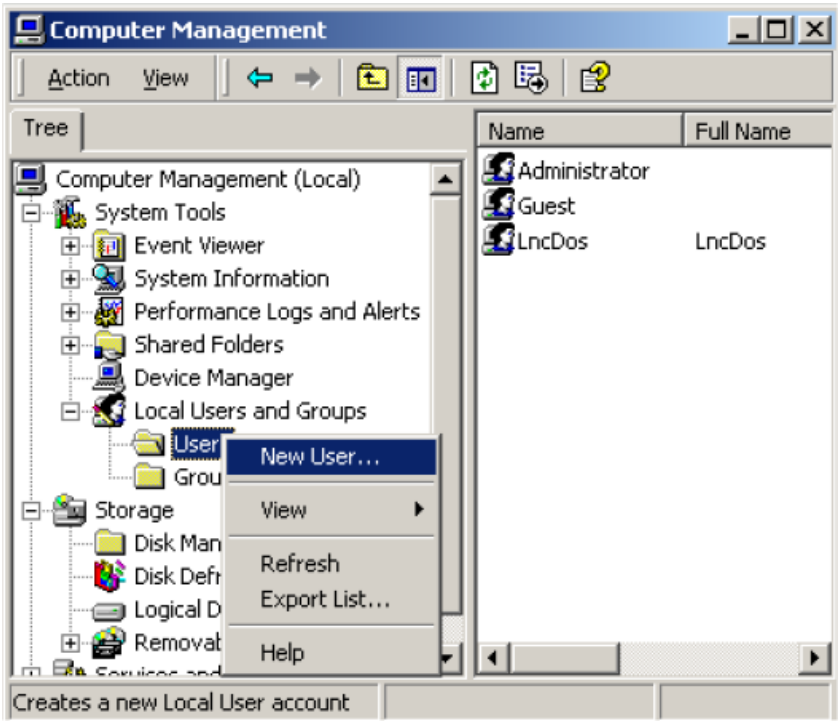
After Add is clicked, a new dialog box will appear as the figure below. Click Guests, click Add, and press OK. Then the procedure to enable guest access is finished.



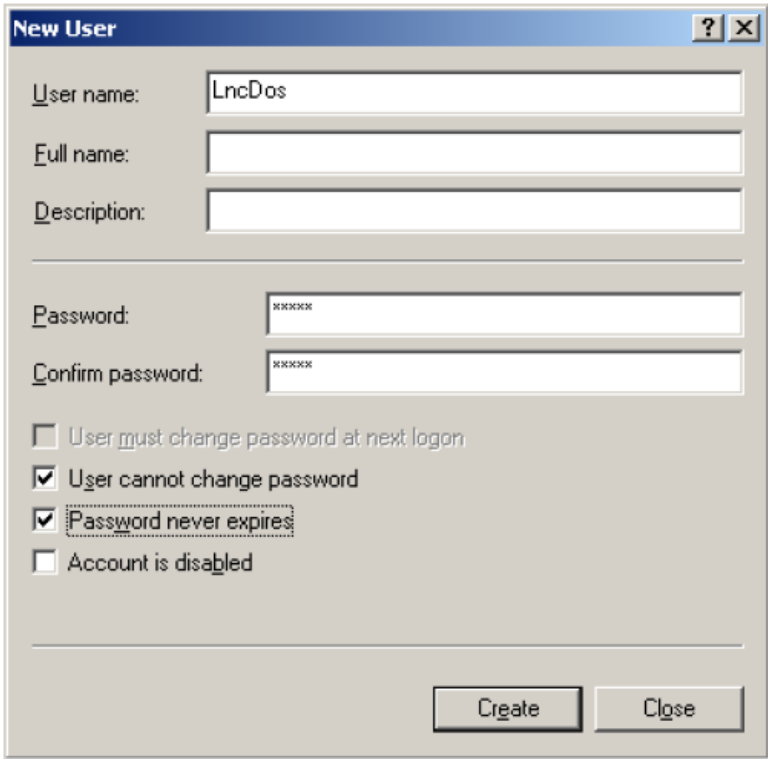
Method 2：

F. Right-click the My Computer icon on the desktop and Left-click Manage.

G. Right-click the User folder and left-click New User.



A dialog box will appear as the figure below. Please enter the username same as that in the system.ini file, and enter the password same as that in the 2net.bat file. Check the boxes as the figure shown below, and then press Create to finish the procedure of enabling user access.



Network Settings for Windows XP Professional

2. Verify if a network card, internet cables, and the relative protocols have been installed properly. Verify if the “NetBEUI Protocol” & the “File and printer sharing for Microsoft Networks” service have been installed. (Caution: DO NOT activate the network protocol “NWlink NetBIOS” which would cause network connection to fail.)

   H. Because Microsoft does not support the network protocol “NetBIOS” (NetBEUI) in Windows XP, users must install the network protocol NetBEUI additionally from the Windows XP CD. Please follow the steps below for installation：

   Insert the Windows XP CD-ROM into the CD-ROM drive.

   Browse the Valueadd\MSFT\Net\NetBEUI folder.

   Copy Nbf.sys to the directory %SYSTEMROOT%\System32\Drivers.

   Copy Netnbf.inf to the hidden directory %SYSTEMROOT%\Inf.

Note: To make the hidden directory visible, execute the following steps:：

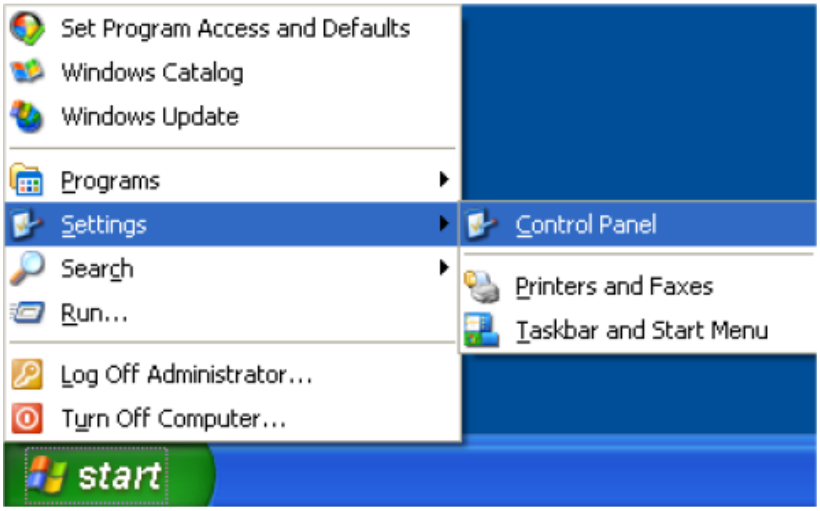
Click Start, click Run, enter “explorer” in the text box, and then press ENTER.

Click Tools, click Folder Options, and then click the View tab.

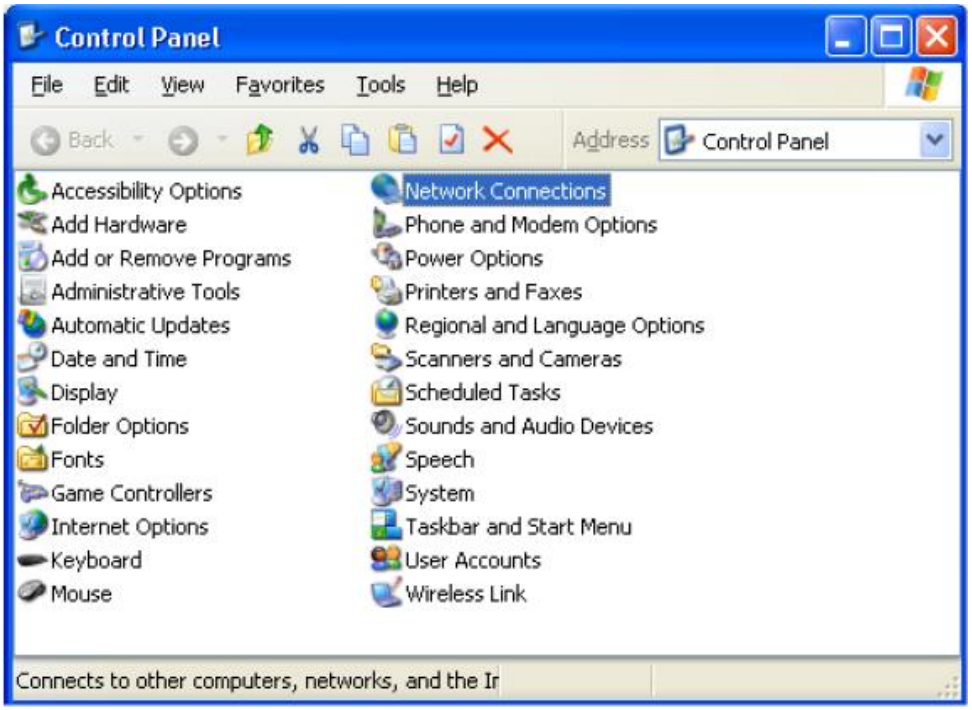
Under Advanced Settings, and under Hidden files and folders, click Show hidden files and folders.

Note: %SYSTEMROOT% is a Windows environment variable for discerning the directory installed in Windows XP (Ex. C:\Windows). If users want to view the relative values of %SYSTEMROOT% or other environment variables, please enter “set” in the Command Prompt window, then press “ENTER.”

Click Start → Control Panel.

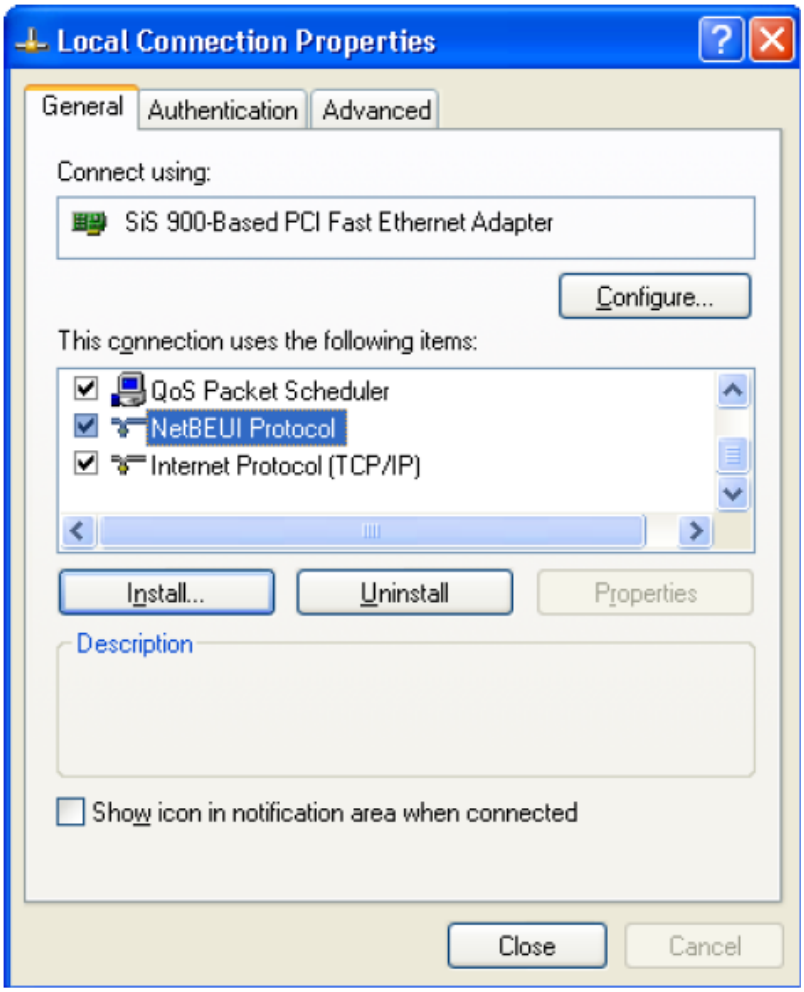


Double-click Network Connections.

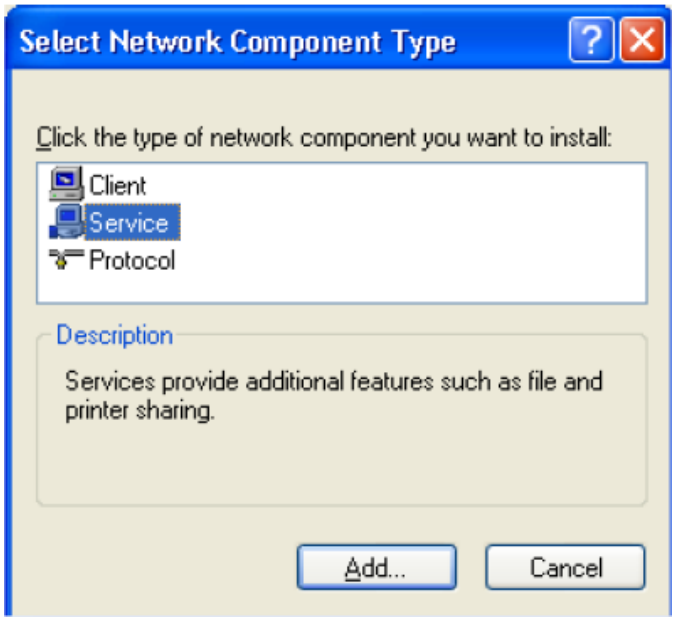


Right -click the Local Connection icon, then left-click properties.

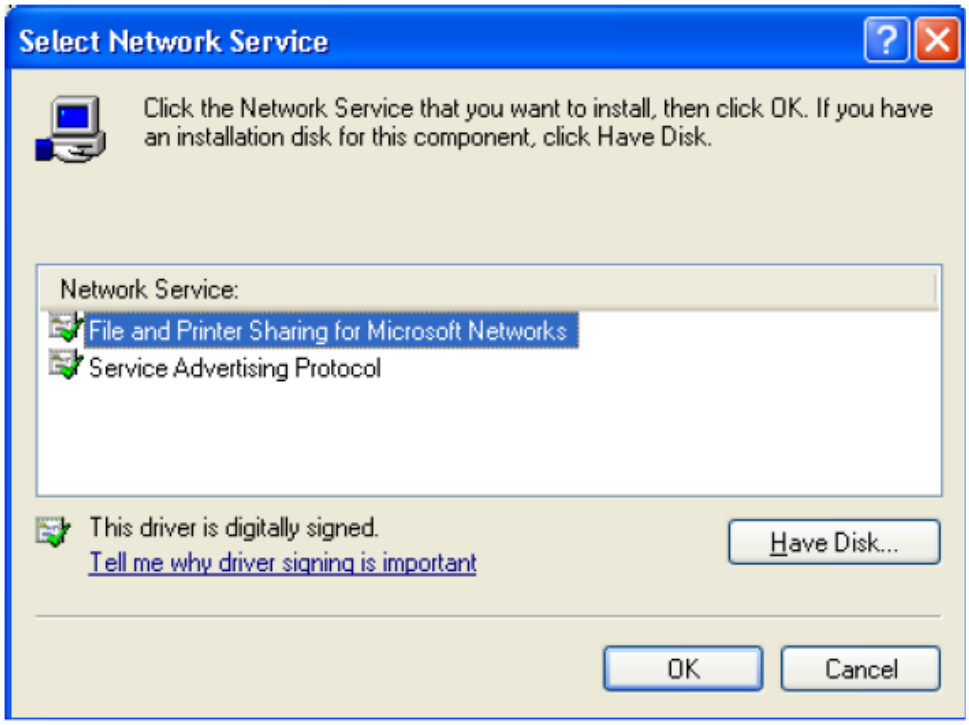
If the two network protocols “File and Printer Sharing for Microsoft Networks” & “NetBEUI Protocol” are not installed, please press Install for installation.



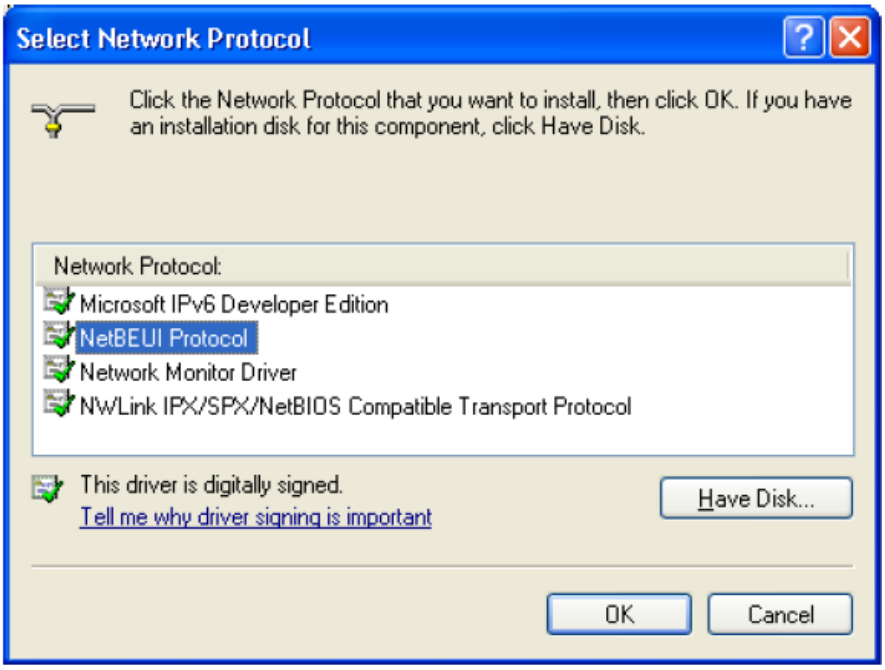
If “File and Printer Sharing for Microsoft Networks” is not installed, please select Service; if “NetBEUI Protocol” is not installed, please select Protocol. Then click Add.



If “File and Printer Sharing for Microsoft Networks” is not installed, highlight it on the service menu then click OK to complete installation.



If the “NetBEUI Protocol” is not installed, please highlight it on the menu as shown in the diagram below then click OK to complete the installation. To validate the configuration, please reboot the system.

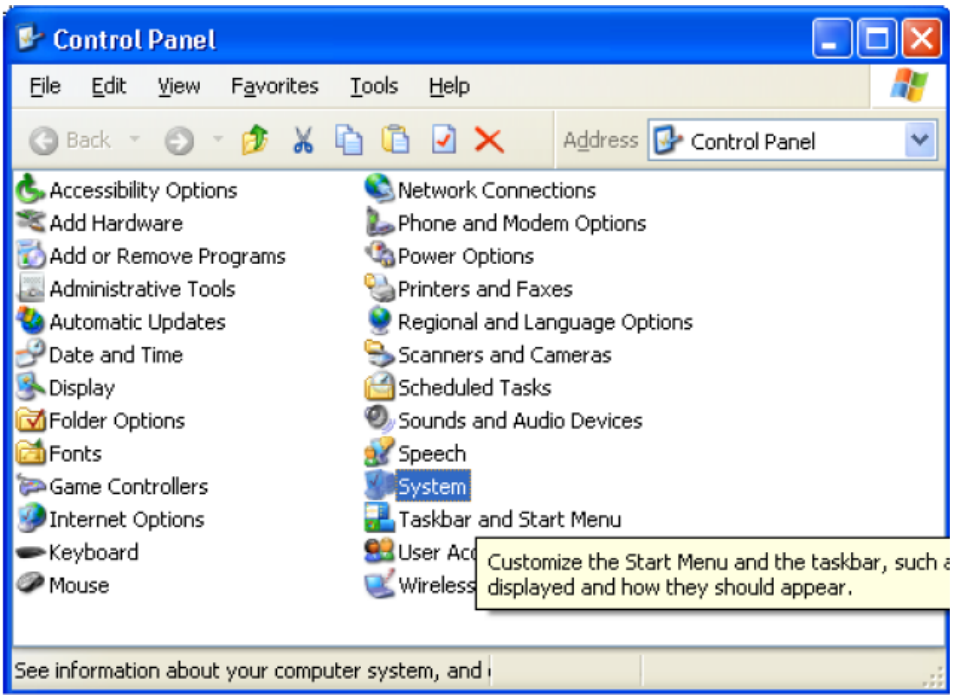


Verify if Computer name & Workgroup are set correctly.

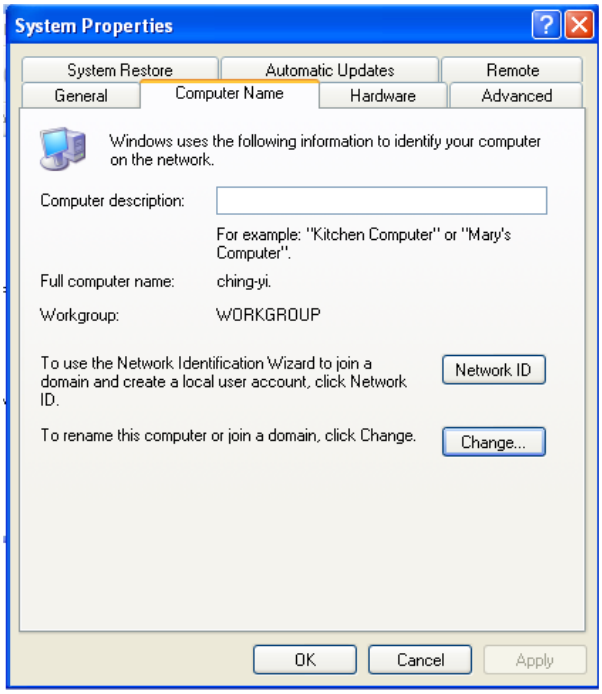
（The settings of workgroup & logondomain in C：\net\system.ini must be the same as those at PC side. The computername in C:\net\2net.bat must be the same as PC’s computer name.）

I. Click Start → Control Panel

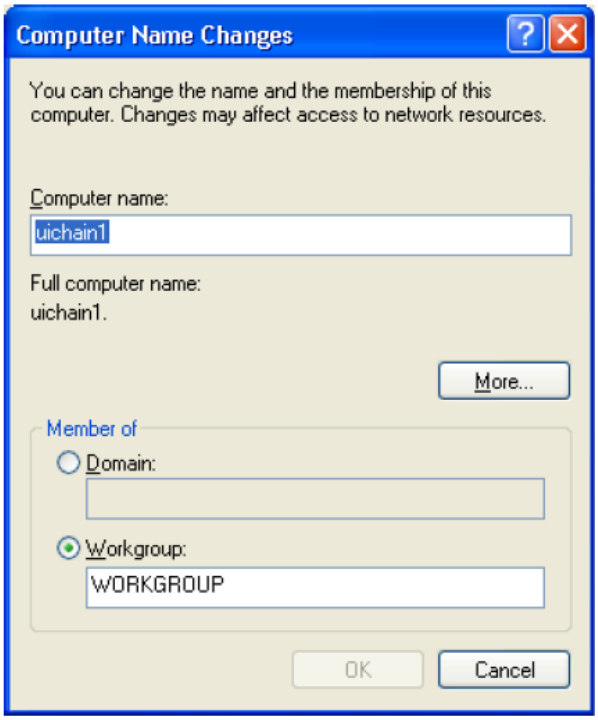
J. Double-click System



Select the Computer Name tab, and verify if the settings of Full computer name & Workgroup are the same as those in C:\NET\2net.bat & C:\NET\system.ini at the controller side. (Take the figure below for example, computername of 2net.bat must be set to “uichain1,” and workgroup of system.ini must be set to “WORKGROUP.” If you need to change the computer name or workgroup name, click Change to modify it.

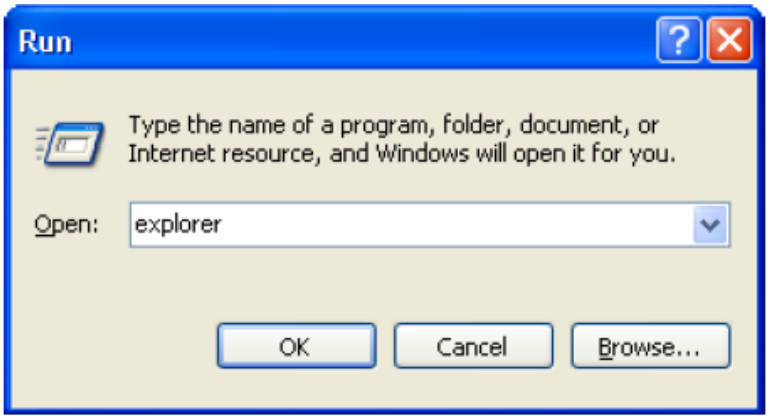


To modify the computer name or workgroup name, make the revision directly in the corresponding text box.

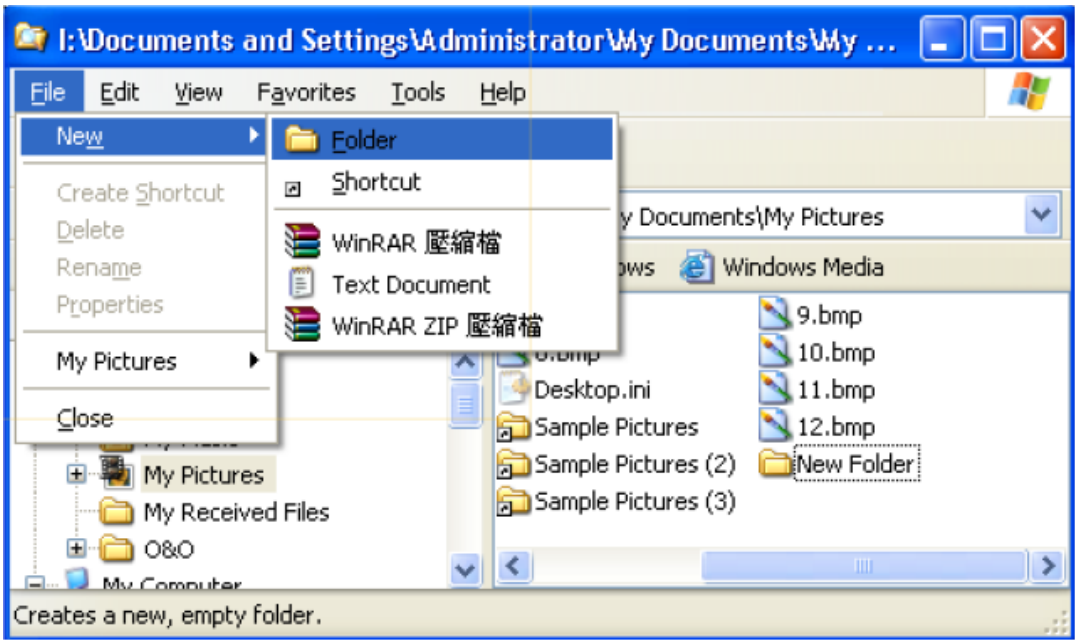


Share a directory at PC side

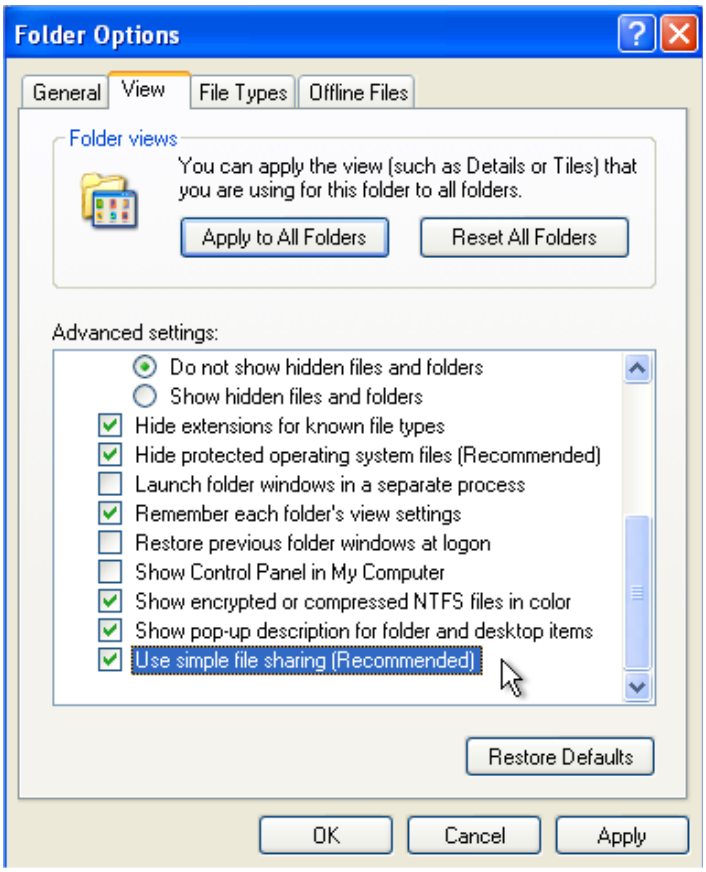
K. Click Start→Run, enter “explorer” in the text box, and then press OK.



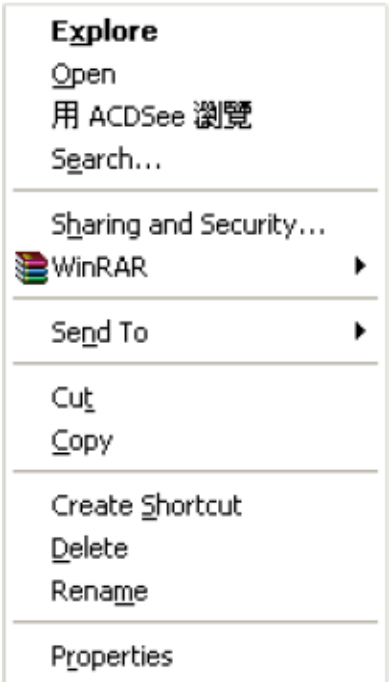
L. In Windows Explorer, select File → New → Folder. Name the new folder after the corresponding folder at the controller side such as share, pcscan, and so on



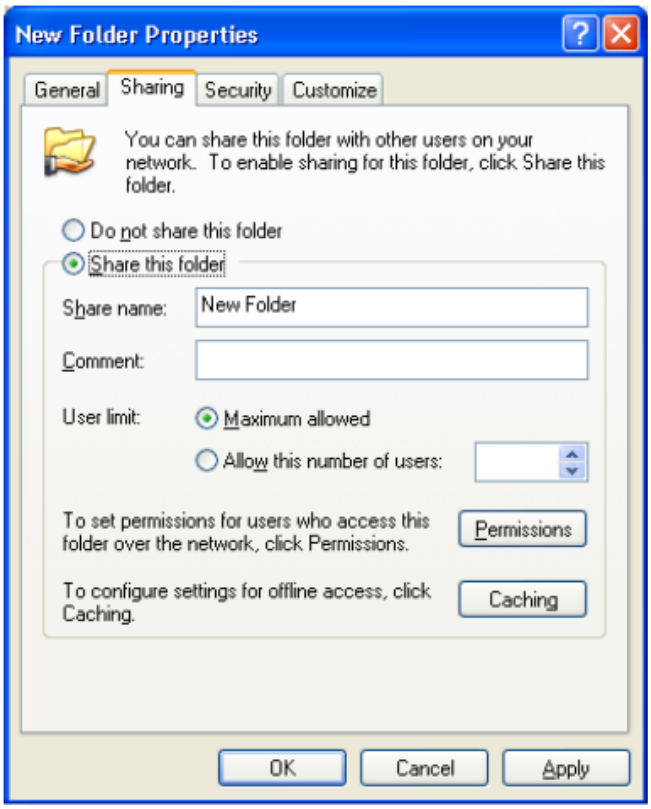
Uncheck Use simple file sharing mode. In Windows Explorer, select Tools→Folder Options, click the View tab, and uncheck the box of Use simple file sharing.



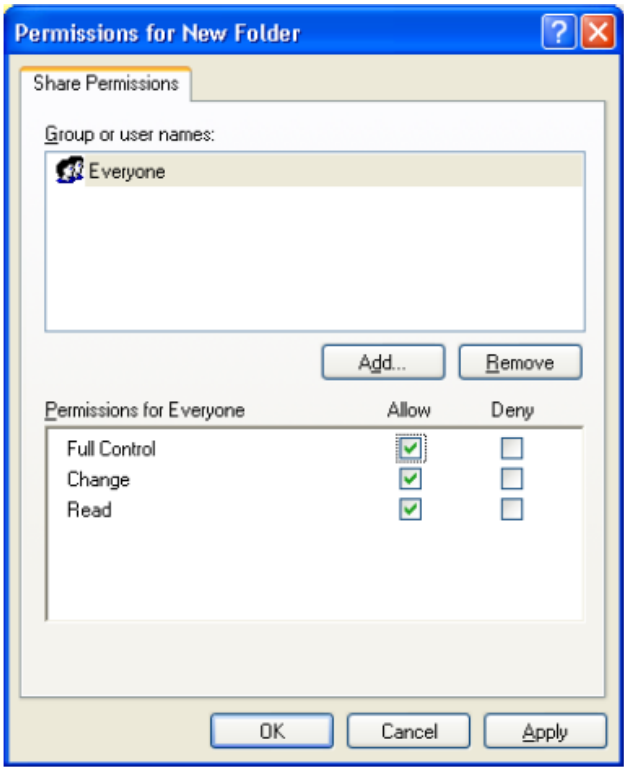
Right-click the new folder and left-click Sharing and Security.



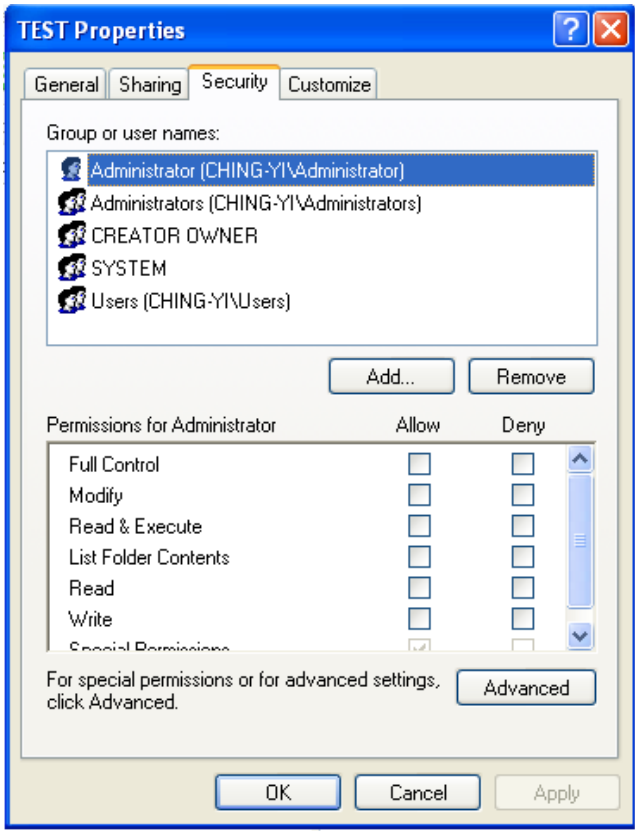
Click the Sharing tab, check the box of Share this folder, and verify if the name in the Share name text box is the same as that in the 2net.bat file. Then click [Permissions].



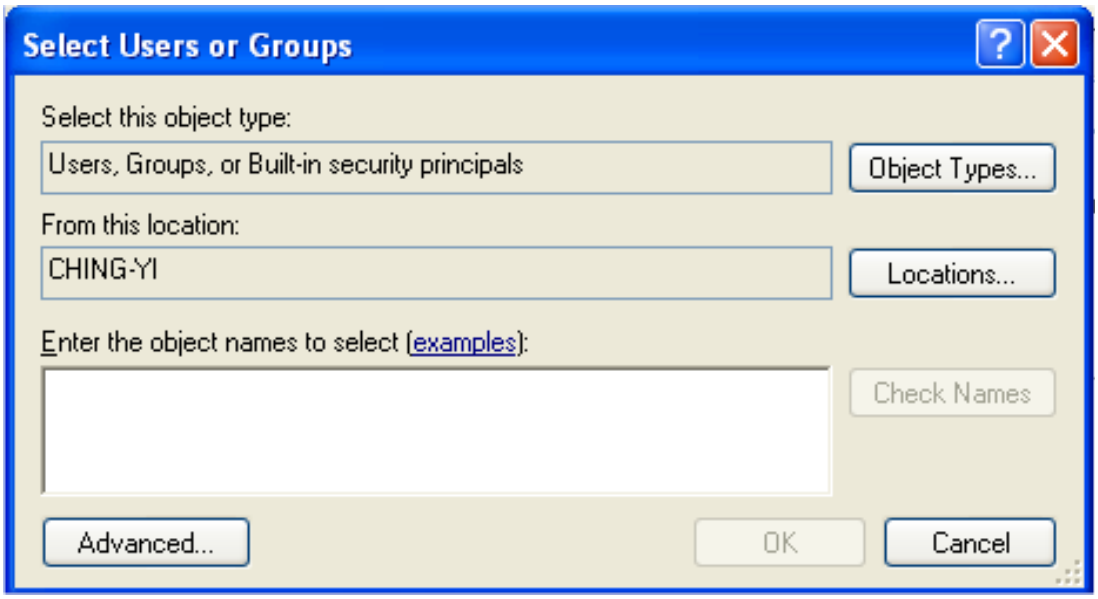
Select “Everyone” as Group or user names, and checks all the Allow boxes in the Permissions for Everyone section.



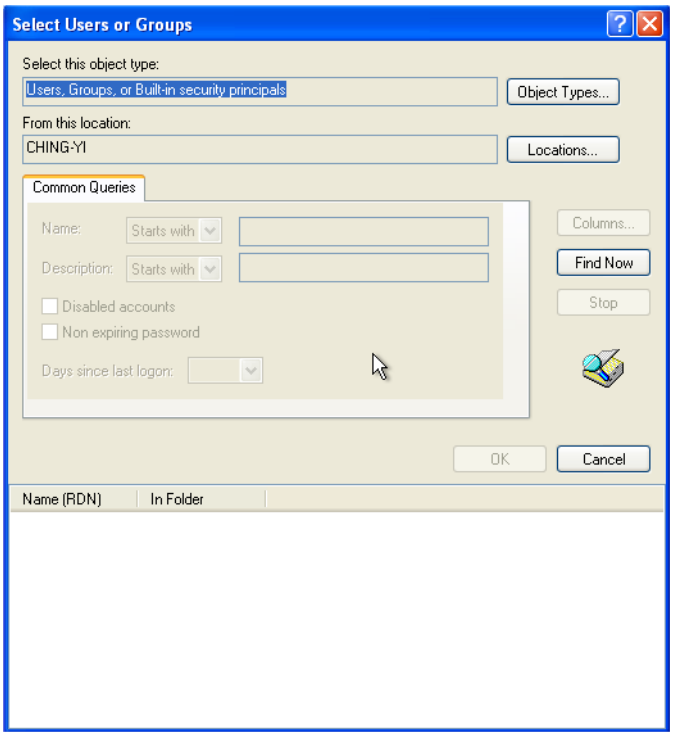
If there is no Security tab in the dialog box, the steps for folder sharing is then finished. If there is, please click the Security tab, and the following figure is shown.



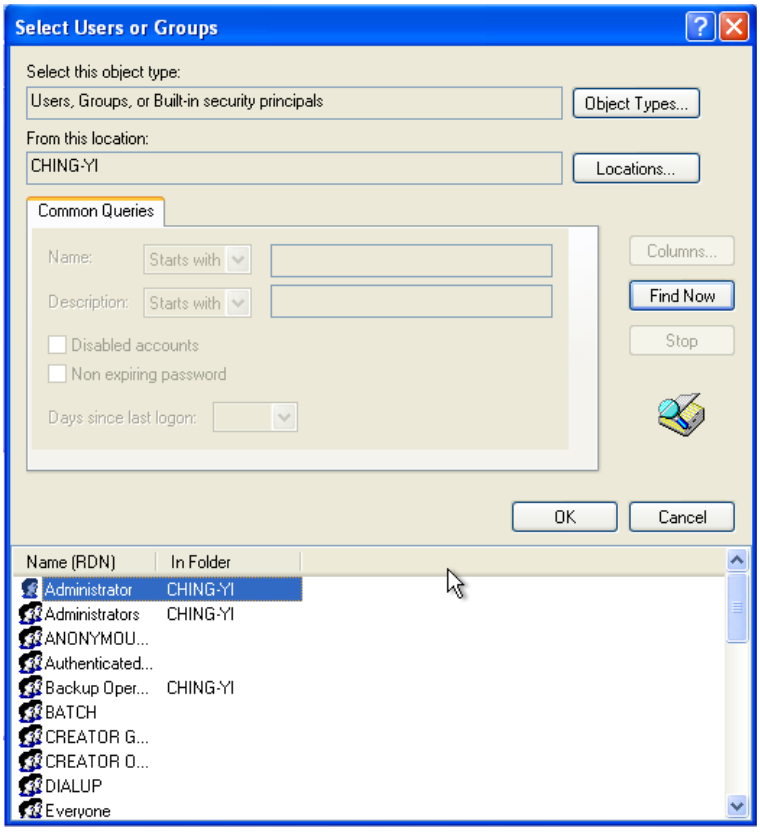
Click the Add button, and the Select users or Groups dialog box will appear as the figure below.



Click the Advanced button, and the following dialog box will be shown.



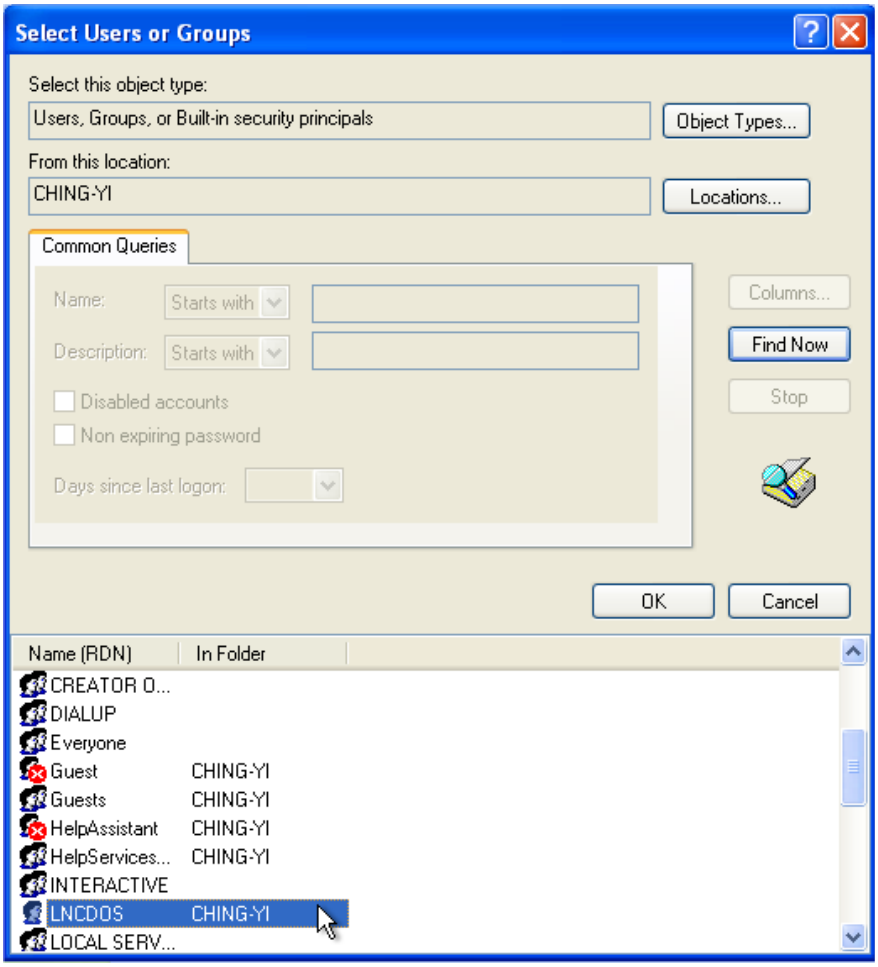
Press the Find Now button, and a list of users will appear in the bottom section of the dialog as shown below.



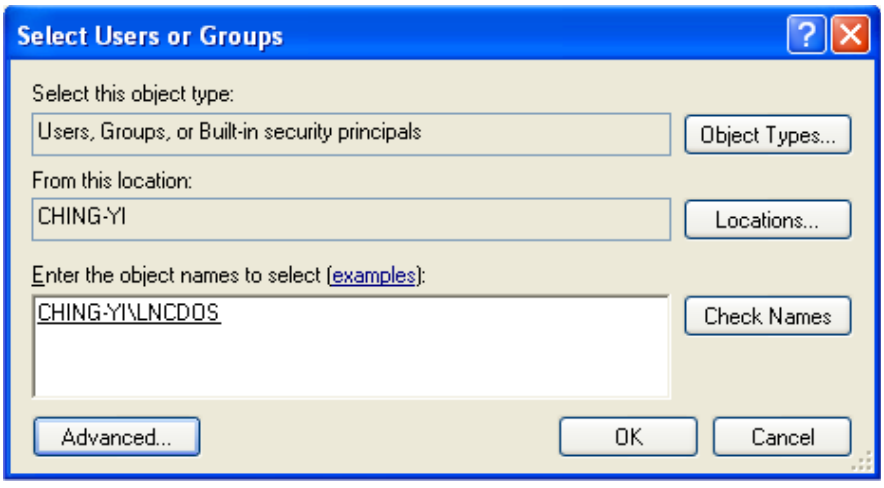
Click to select in the list the user that needs to be added. There are two ways to do this：

Method 1：Open permissions to everyone by selecting everyone in the menu.

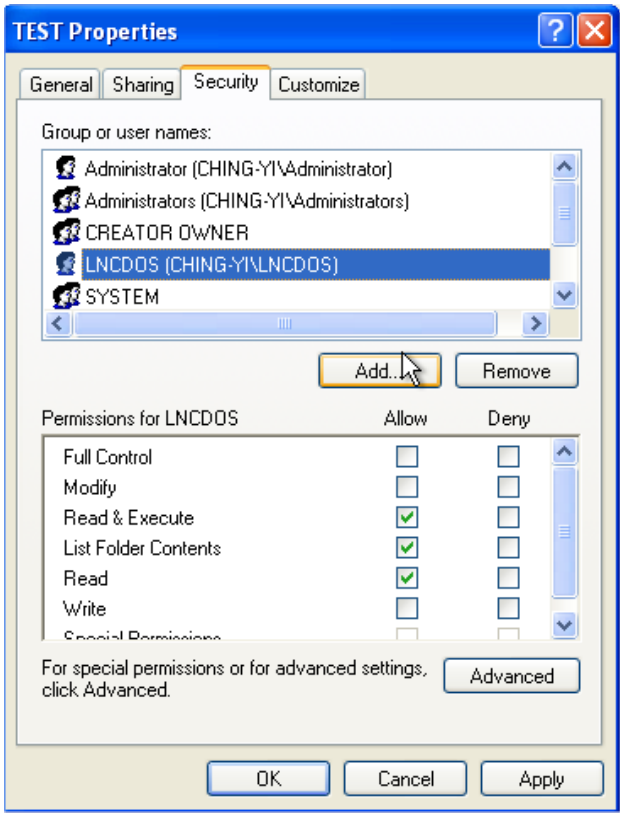
Method 2：Add the user “lncdos” as assigned by〝username=lncdos〞in the c:\net\system.ini file. The username may not be “lncdos;” for its setting, please refer to the setting in system.ini.



Take the example of adding the new user “lncdos,” after clicking to select the new user in the list, press OK, and the following figure will be shown.



Press OK again, and the following dialog box will appear. Please check the box of Full Control, and then press OK to complete the procedure of adding a new folder.



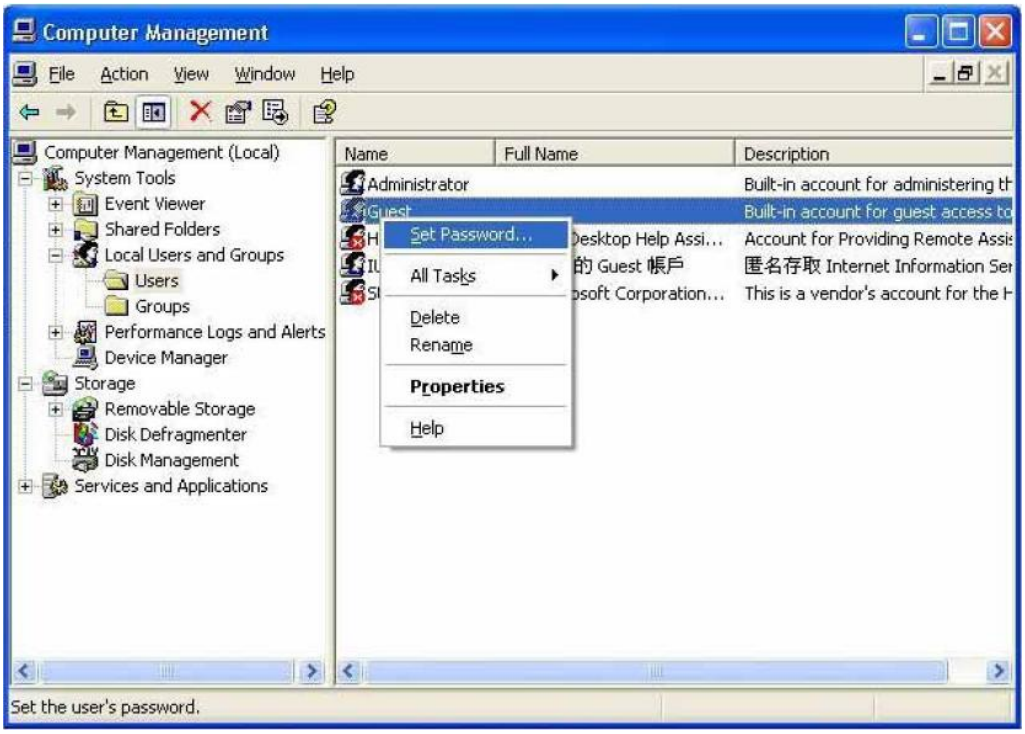
ENABLE USER ACCESS：

There are two ways to enable user access. Please choose either one according to your need. The advantage of method 1 (recommended) is its convenience for configuration, and there is no need to add a new user for controllers with different usernames; however, it has the disadvantage of a low security level. On the contrary, the second method has a higher security level. But if there are multiple controllers with different names, users are required to add a new user for each controller separately. Depending on the types of operating systems, there are different steps for setup as listed below：

Method 1：

M. Press Start → My Computer → Manage.

Click to select the folder Local Users and Group → Users, Right-click Guest, and then left-click Set Password**.**

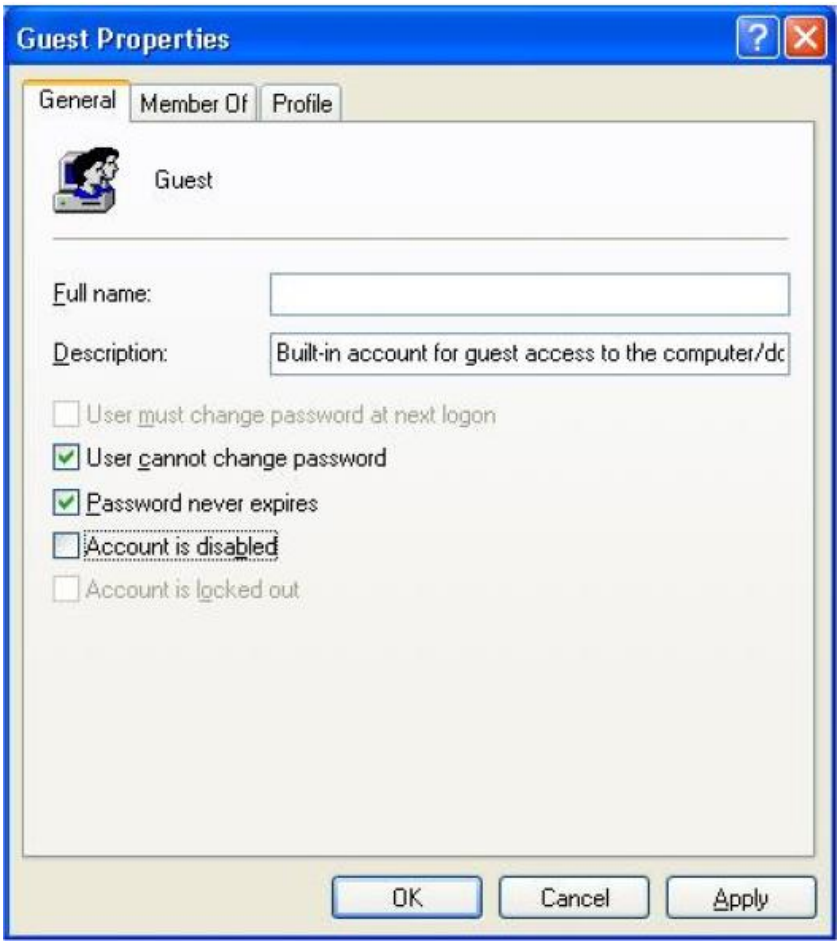


The following dialog box will appear, press the Proceed button to close the dialog box.

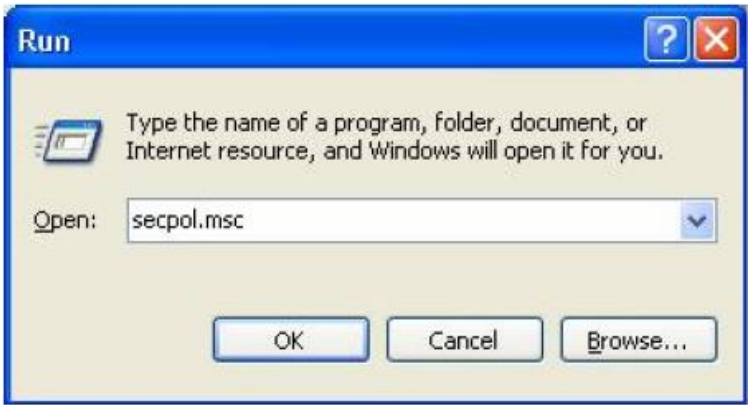
Leave the password boxes blank, and press OK.

Press OK again to finish password modification.

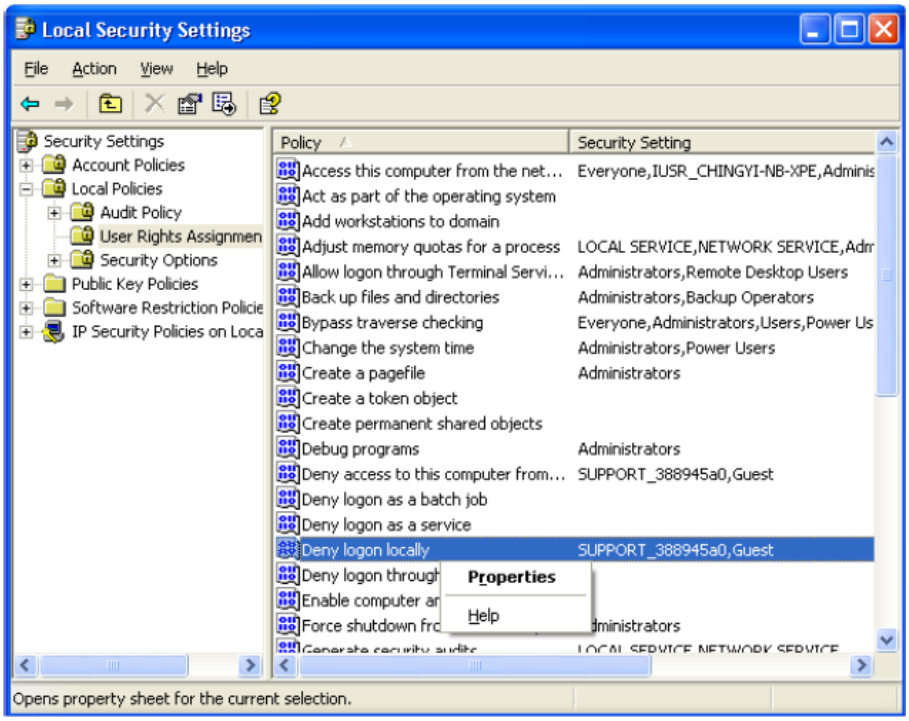
If there is a red cross over the Guest icon in the Users folder, right-click on Guest and select Properties. A dialogue box will appear as the figure below, check the boxes of User cannot change password & Password never expires and uncheck the box Account is disabled：



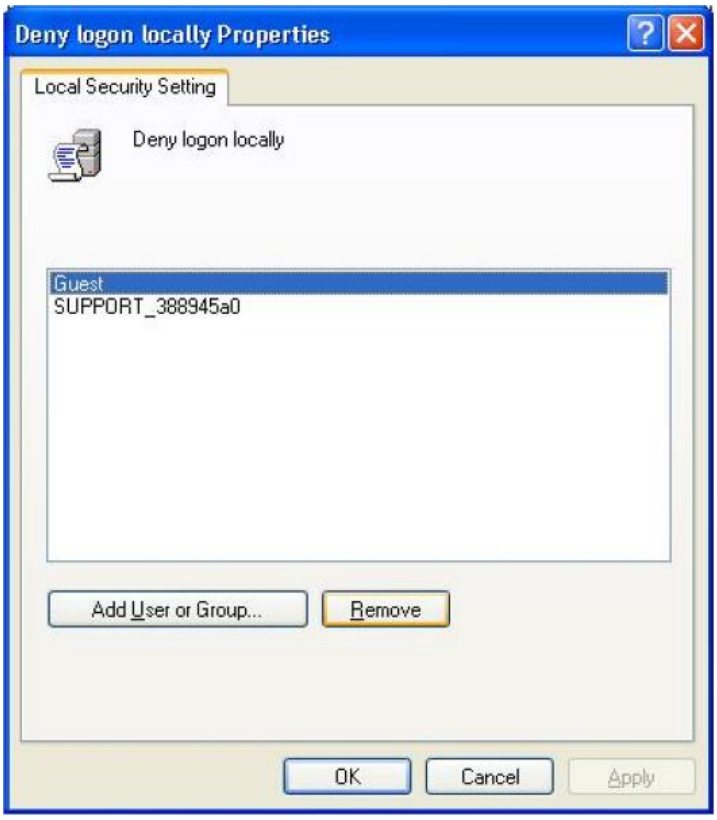
Next, set a higher access level for Guest. To do so, click Start→Run, and enter secpol.msc in the text box. Then press OK.



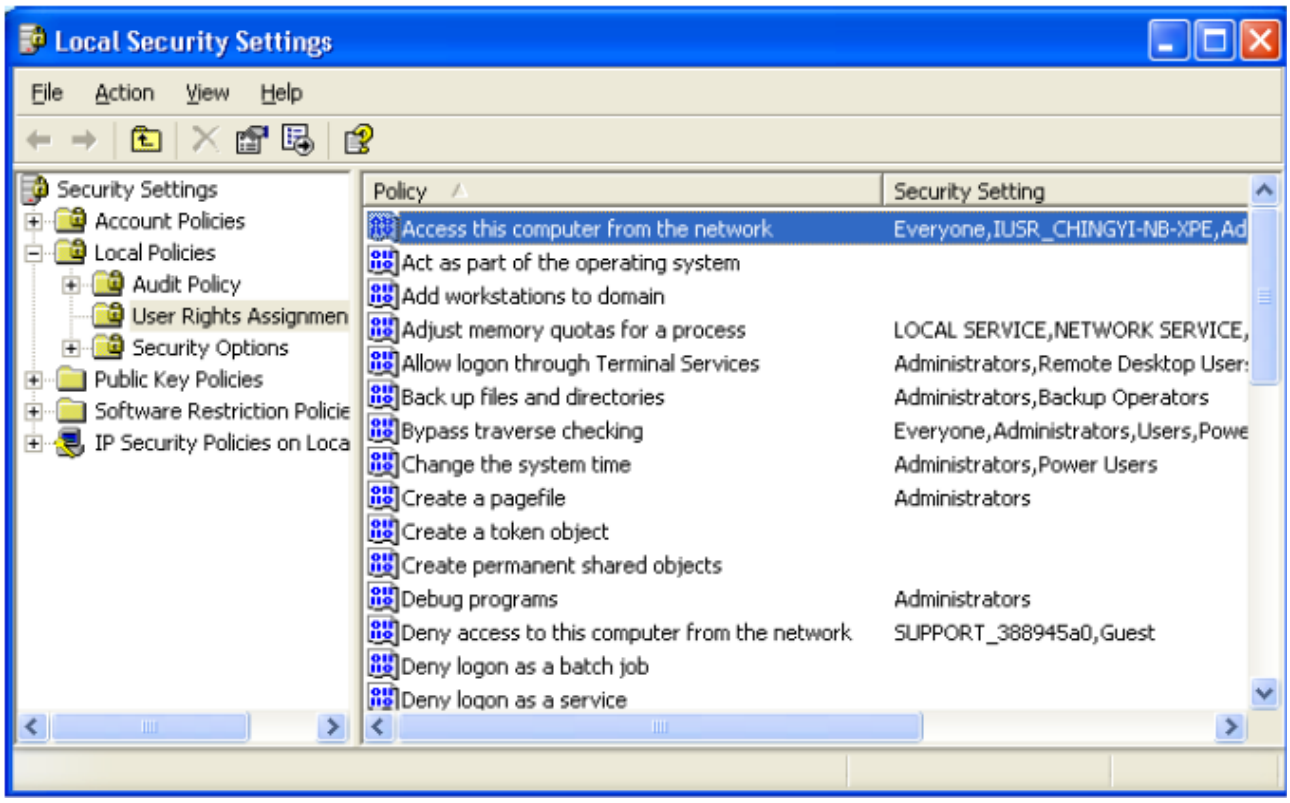
Click Local Policies → User Rights Assignment, right-click the Deny logon locally policy, and then left-click properties.



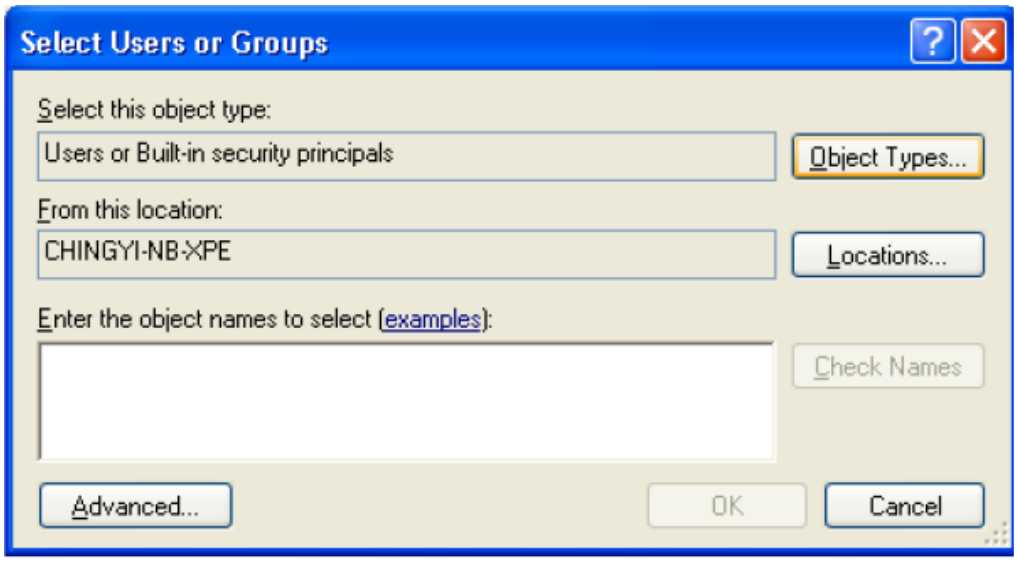
Left-click Guest, and press the Remove button. After the access permission for Guest is open, press OK to close the dialog box.



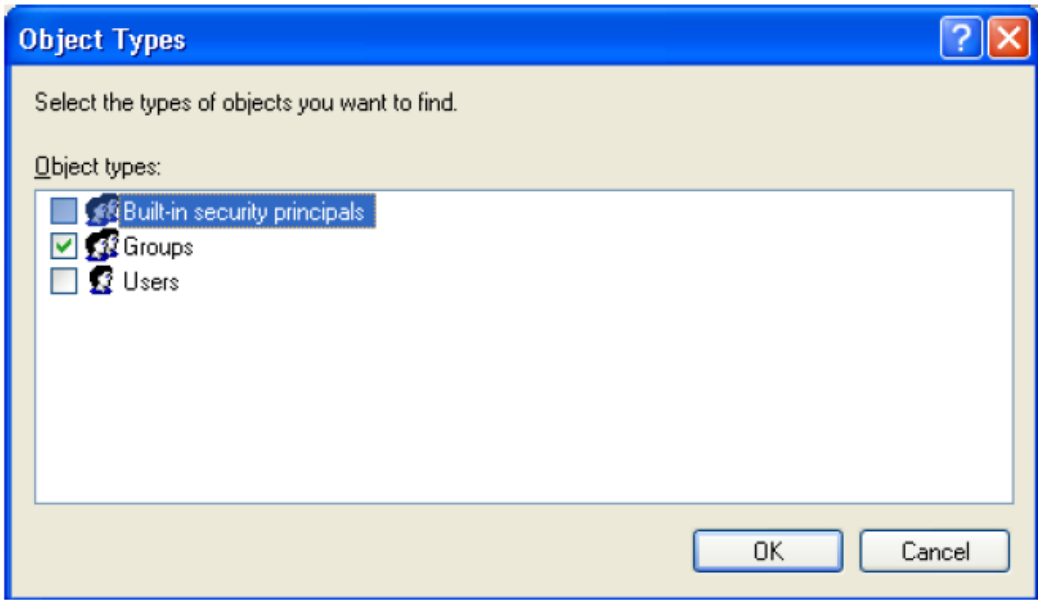
Right -click the Access this computer from the network policy, left-click properties.



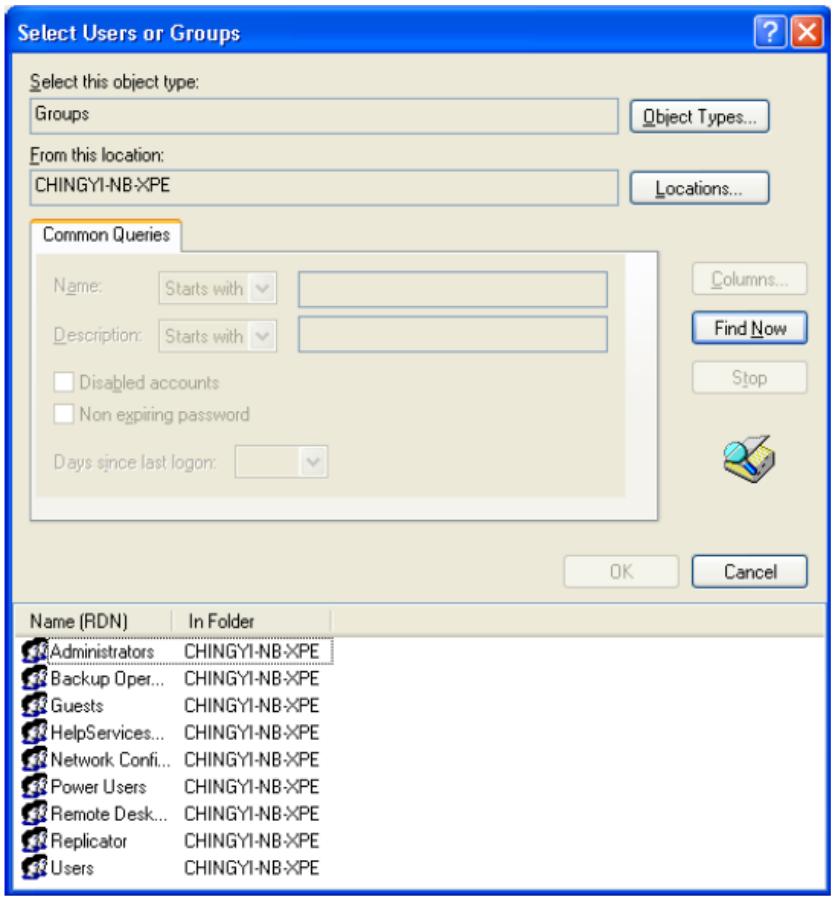
Click the Object Types button.



Check the box of Groups, and then press OK.



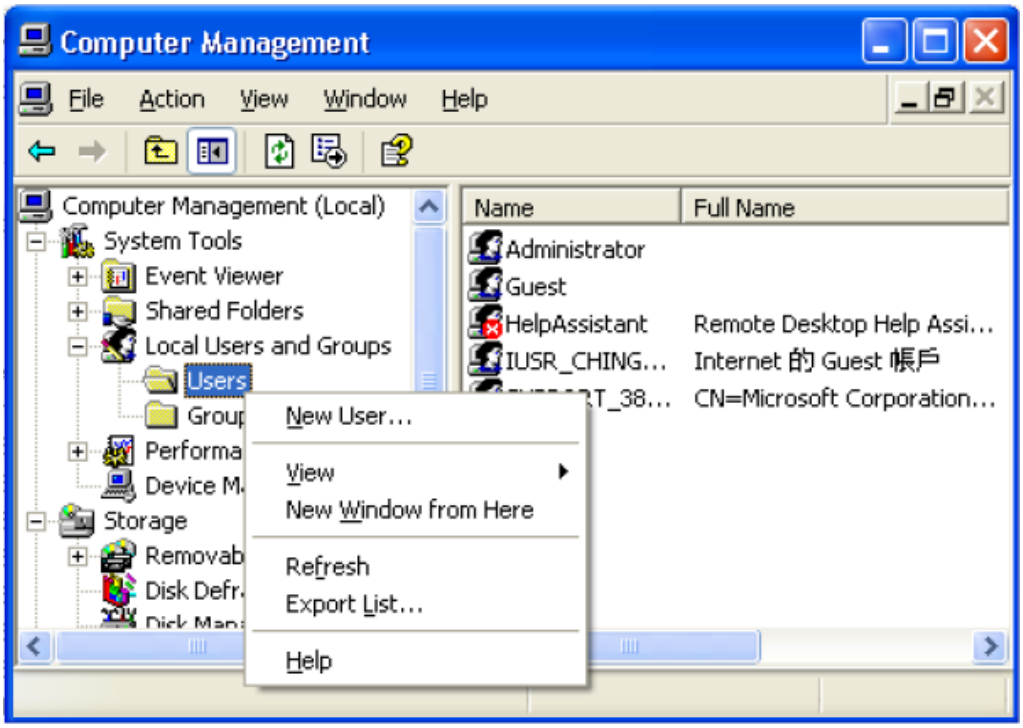
Press the Advanced button, press the Find Now button, and a list of users will be shown in the bottom section of the dialog box. Select Guests in the list, and press OK to complete the procedure of enabling guest access.



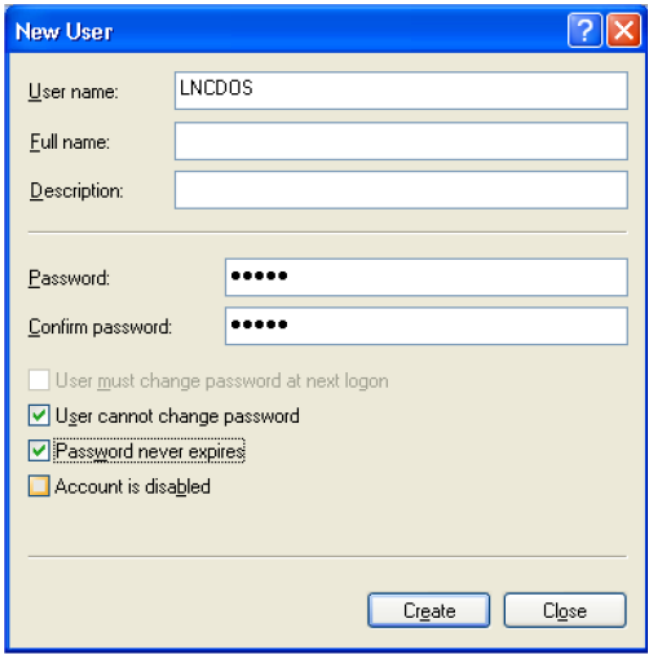
Method 2：

N. Click Start → My Computer → Manage

O. Right-click the Users folder and left-click New User.



A dialog box will appear as the figure below. Please enter the username same as that in the system.ini file, and enter the password same as that in the 2net.bat file. Verify the boxes as the figure shown below, and then press **Create** to finish the procedure of enabling guess access.



Network Settings for Windows XP HOME Edition

3. Verify if the network card, internet cables, and relative protocols have been installed properly.

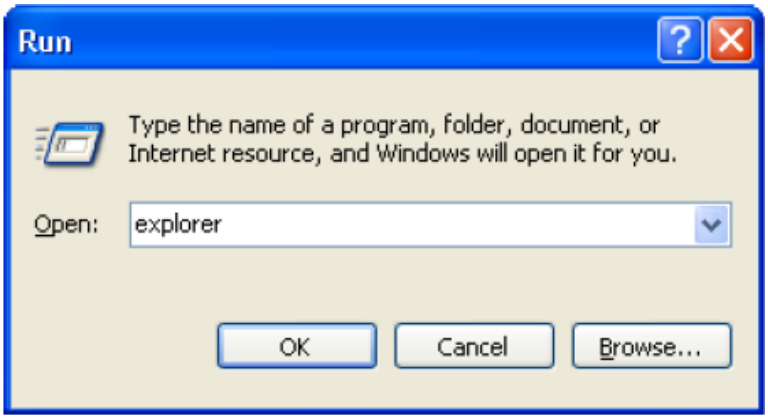
For this section, please refer to the above setting procedure of Windows XP Professional.

Verify if Computer name and Workgroup have been set correctly.

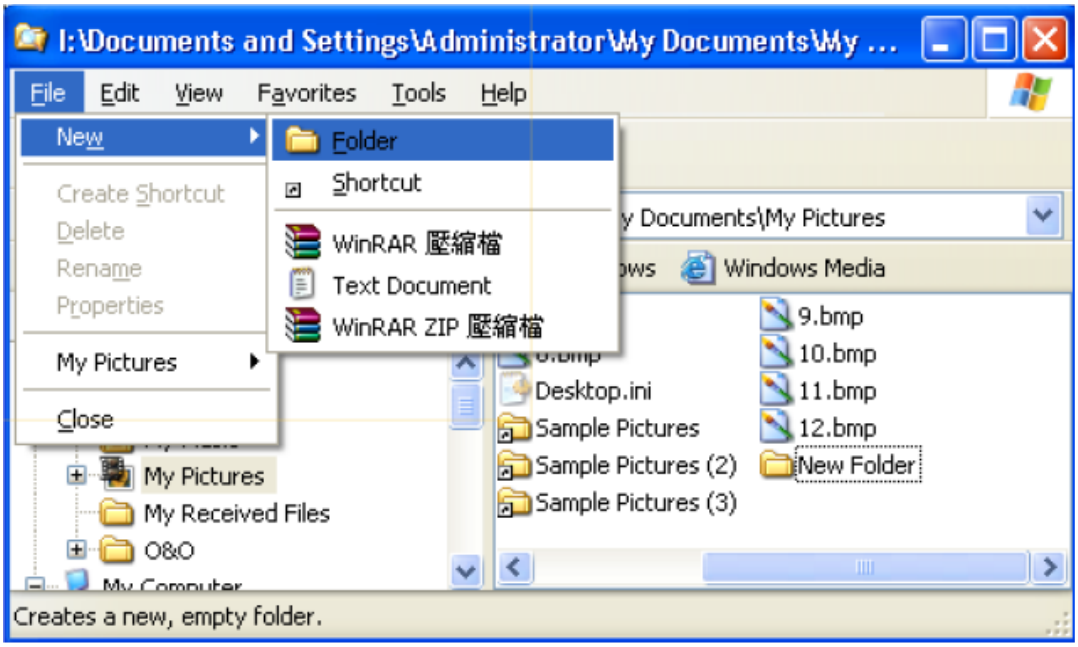
For this section, please refer to the above setting procedure of Windows XP Professional.

Share a directory at PC side

P. Click Start → Run, enter “explorer” in the text box, and then press OK.

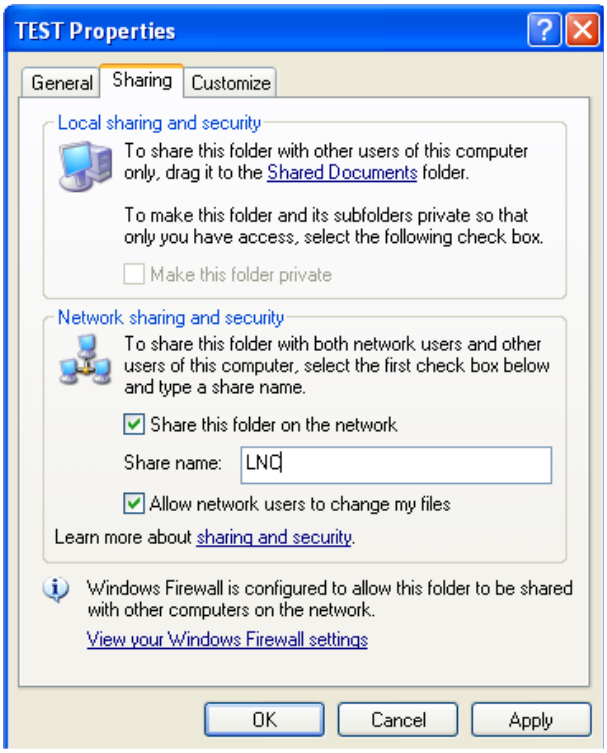


In Windows Explorer, select File → New → Folder. Name the new folder after the corresponding folder at the controller side such as share, pcscan, and so on.



Right-click the new folder and left-click Sharing and Security.

Click the Sharing tab, and verify the boxes of Share this folder on the network & Allow network users to change my files. Check that the name in the Share name text box is the same as that in the 2net.bat file, and then press OK to complete the procedure of file-sharing.



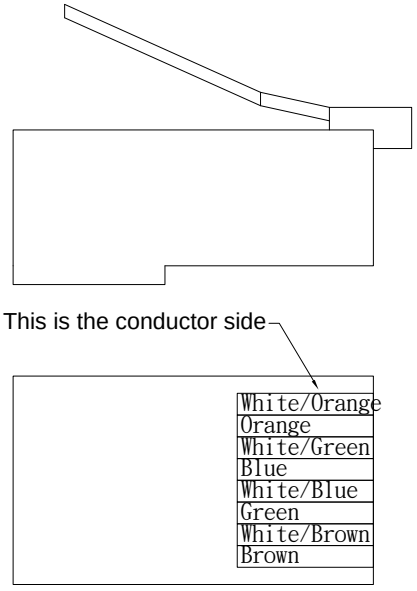
NETWORK WIRING

STEPS TO WIRE A CONNECTOR WITH CABLE

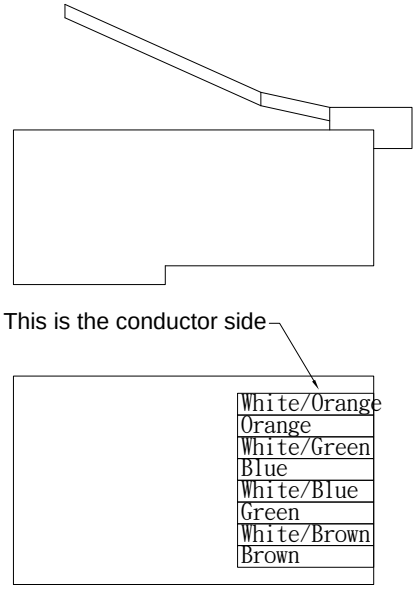
Network cable from controller to HUB：

Internal network wiring

PC side



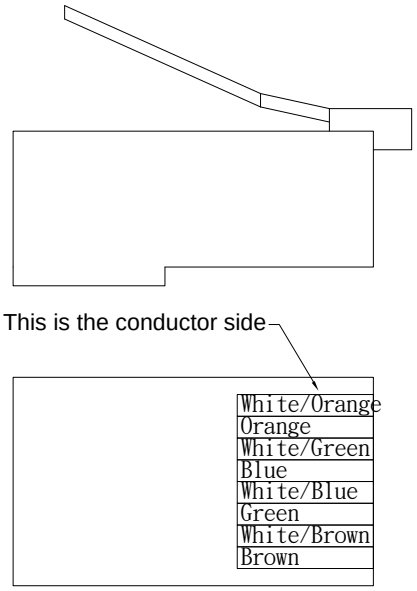
Controller side



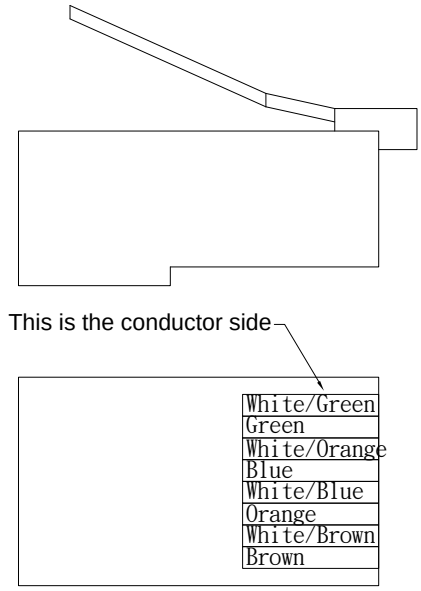
Network cable from the controller to PC：

One to one network wiring

PC side



Controller side



DISCONNECTION & IDLE TIME-OUT SETTINGS

There are two possible causes for users to experience a disconnection problem for “over idle time-out limit” when sharing a folder with network disks on-line：

Operating system: For the operating system at PC side that is Windows 2000 or Windows XP, by default, the idle time-out limit is set to 15 minutes.

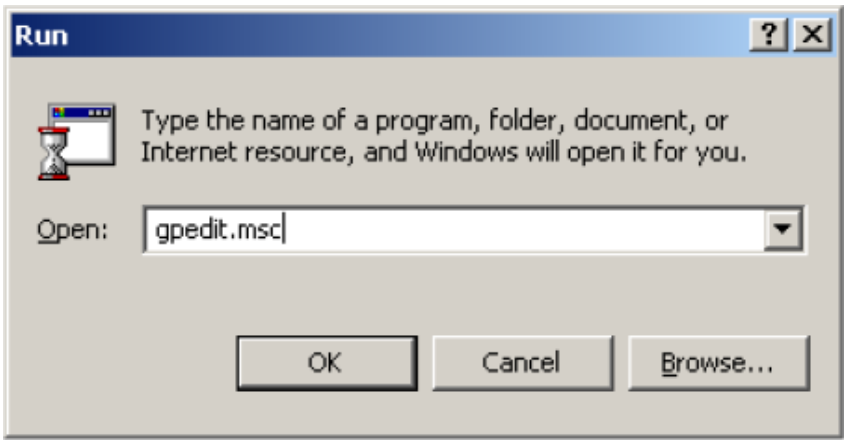
Network card: PC side automatically shuts down the power of network cards. This usually happens for laptop users.

Below are the procedures to disable idle time-out limit。

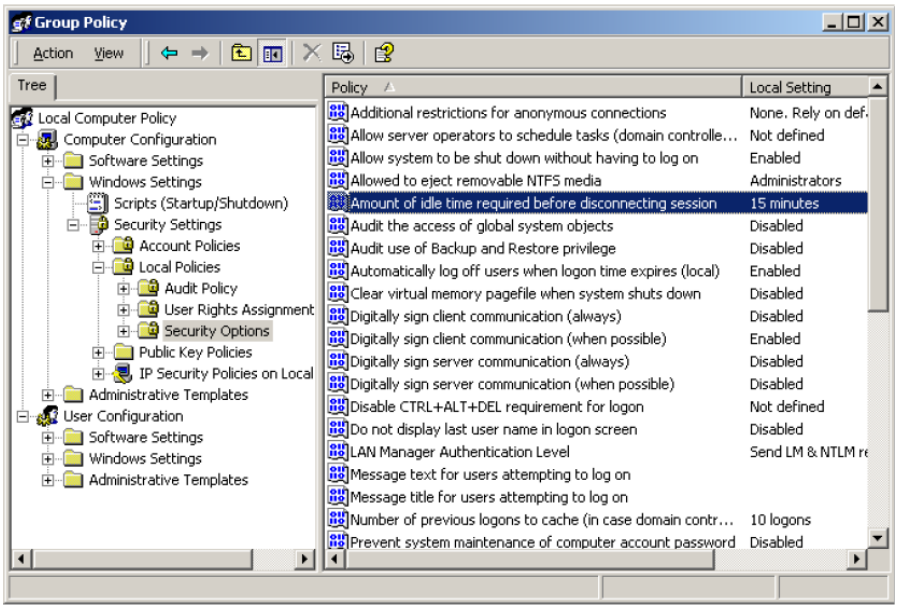
OPERATING SYSTEMS：

For Windows 2000：

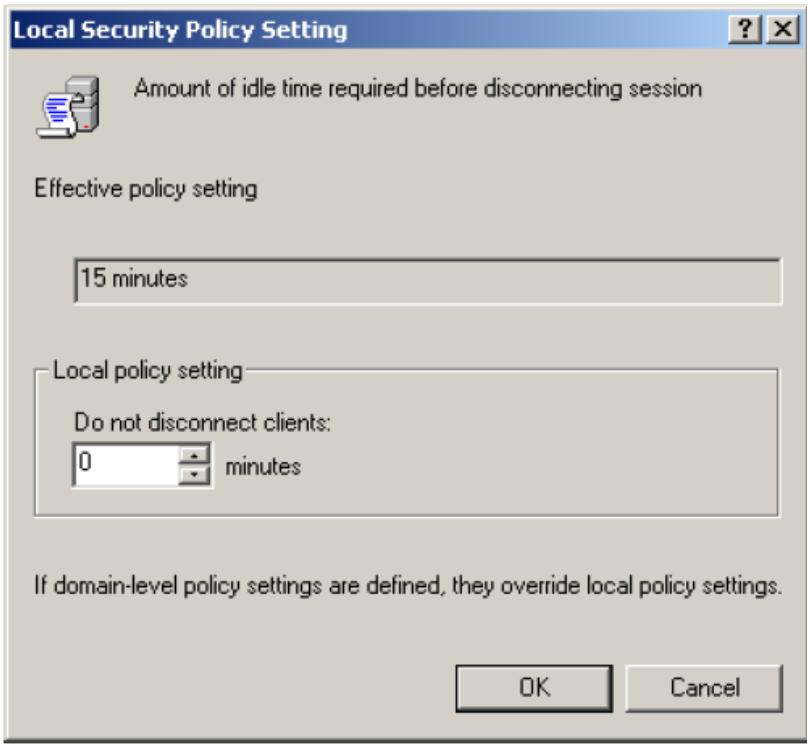
1. Click **Start** → **Run**, enter “gpedit.msc” in the text box, and press **OK** to open the **Group Policy** configuration dialog box：



2. Set the policy Amount of idle time required before disconnecting session in Computer Configuration\ Windows Settings\ Security Settings\ Local Policies\ Security Options.



3. Double-click on the principle, and a dialog box will appear as the figure below. Enter “0” in the text box, which means no disconnection at all time. To validate the configuration, please reboot the system.

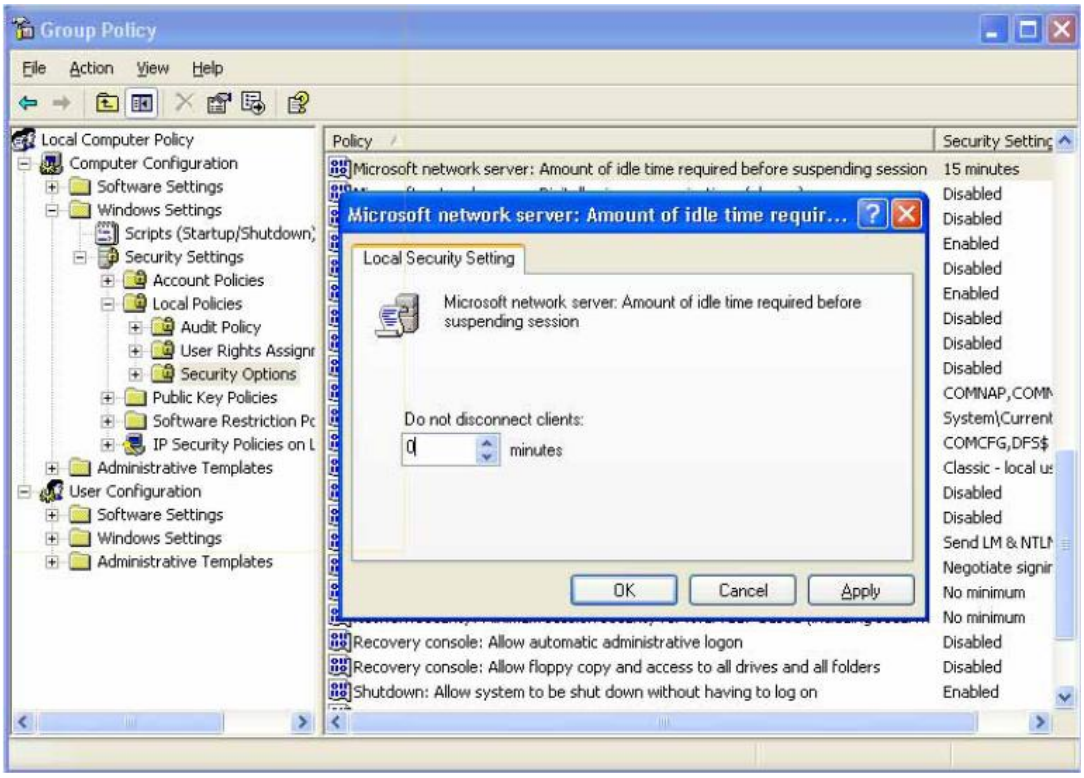


For Windows XP：

Click Start → Run, enter “gpedit.msc” in the text box, and press OK to open the Group Policy configuration dialog box.

Set the policy Microsoft network server: Amount of idle time required before suspending session in Computer Configuration\ Windows Settings\ Security Settings\ Local Policies\ Security Options.

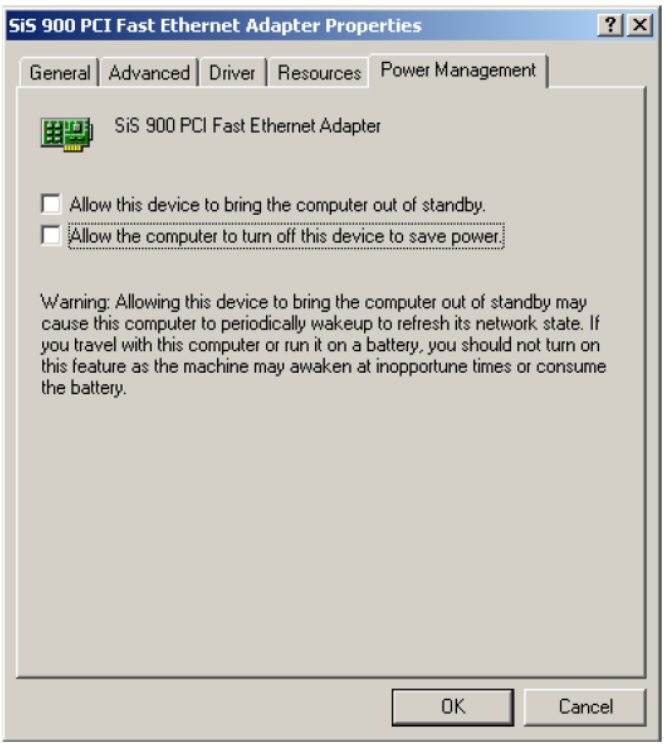
Double-click on the principle, and a dialog box will appear as the figure below. Enter “0” in the text box, which means no disconnection at all time. To validate the configuration, please reboot the system.



NETWORK CARD：

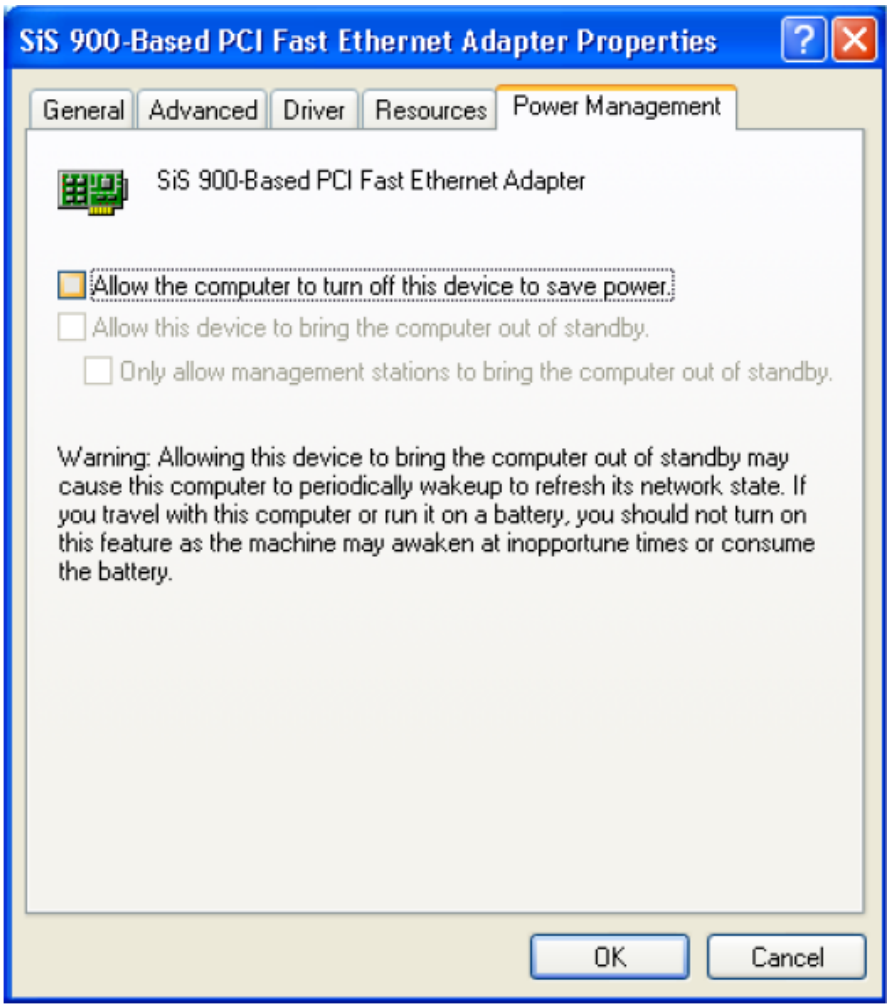
For Windows 2000：

Click **My Network Places** → Right-click properties → **Local Area Connection** → Right-click properties → Click the **Configure** button of **General** tab → Click the **Power Management** tab, and uncheck the box of **Allow the computer to turn off this device to save power** as the figure below：



For Windows XP：

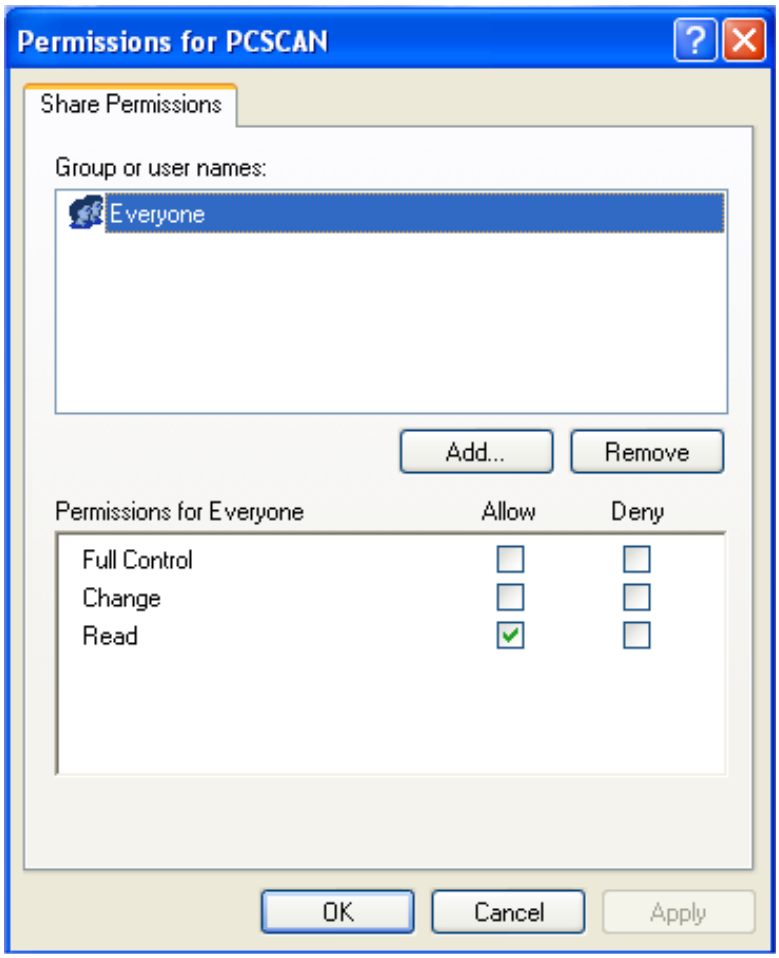
Click My Network Places → Right-click properties → Local Area Connection → Right-click properties → Click the Configure button of General tab → Click the Power Management tab, and uncheck the box of Allow the computer to turn off this device to save power as the figure below：



VIRUS SCAN BY A NETWORK DRIVE：

If the controller is infected with a virus, enter the system and scan for virus. If the virus cannot be removed, you can try to scan the virus by a network drive. The setting procedure is as below.

1. Follow the installation method of the virus scan program to install the program in the C:\PCSCAN directory at PC side. Or, double-click the PCSCAN.EXE file in the directory of network settings to decompress and move the files automatically to the C:\PCSCAN directory.
2. Please set access permission of the **PCSCAN** file to “read-only”.



3. Make an emergency boot disk：
   a. Insert a disk into the PC drive.
   b. Double-click the program NRC1.0.exe.
   c. “1.0” of NRC1.0.exe indicates the version of the program.
4. Modify the following contents in the boot disk：
   a. A:\NET\SYSTEM.INI
   b. The shared file PCSCAN in A:\NET\2NET.BAT
   For example A:\net\net use u: \\uichain1\pcscan /yes
   For further details, please refer to Appendix D “Networking Settings.”
5. After the boot disk has been reconfigured and set to “read-only,” insert the disk into the controller drive

and reboot the system. Please change the system configuration to boot off by a disk; in so doing, the controller will connect to network disks at the same time as entering the system.

6. During initial connection, because the disk is set to “read-only” and the network drive cannot write to the disk, the message “Write protect error writing drive A, Abort, Retry, Fail?” will appear. When this occurs, please press “f” to discharge the message and continue to connect to the network.
7. When the connection is successful, switch manually to the pcscan directory. For the above example, switch to U disk (U:\\pcscan).
8. Execute pcscan.exe

COMMON PROBLEMS OF NETWORK DISKS：

Common network errors at the controller side：

Error 5: Access has been denied

Definition: Access has been denied.

Troubleshooting:

Verify if there is any new username in the system.ini file at PC side; and also verify if guest access of the file is enabled.

Verify if the file names at PC side and in the 2net.bat file are the same.

Error 52: duplicate workgroup or computer name exists on the network.

Definition: Duplicate workgroup or computer name exists on the network.

Troubleshooting: Change the computer name of the controller; meaning, change “computername” in the system.ini file.

Error 53: The computer name specified in the network path cannot be located.

Definition: The specified computer name does not exist or is not open for access.

Troubleshooting:

a. Verify if the network connection light of network cable has turn on.

Verify if the NetBEUI Protocol has been installed.

Verify if the contents of computername and workgroup are the same as those in 2net.bat & system.ini at the controller side.

Reboot the system with the emergency boot disk to connect to a network disk and scan the system by using the connected disk.

Error 55: This resource does not exist on the network.

Definition: The share file does not exist, or the share file at the controller side does not have authority to access.

Troubleshooting:

b. Verify if the file names at PC side and in the 2net.bat file at the controller side are the same.

Verify if the file at PC side is open for access, and the access method is set to full control.

Verify if the user password at PC side has expired. To verify, reset the user password and check the box of Password never expires. Then reconnect to see if the connection works.

Error 58: The network has responded incorrectly.

Definition: Incorrect response of the network.

Troubleshooting:

c. Verify if the user password at PC side has expired.

Verify if the user password at PC side is the same as that in the 2net.bat file at the controller side.

Error 67: The specified shared directory cannot be found.

Definition: The specified share directory cannot be found.

Troubleshooting:

d. Verify if the file of PC side has the permission for file sharing.

Verify if the file names at PC side and in the 2net.bat file are the same.

Error 85: The local device name is already in use.

Definition: The local device name is already in use.

Troubleshooting: Verify if there is any duplicate disk code in the 2net.bat file at the controller side.

Error 2184: The service has not been started.

This error message can be ignored.

Error 3658: The IFSHLP.SYS driver is not installed.

Definition: The IFSHLP.SYS driver is not installed.

Troubleshooting: Verify if “rem” of rem device=C:\NET\ifshlp.sys in the C:\config.sys file has been deleted.

Appendix C Key Code switch

1 Summary

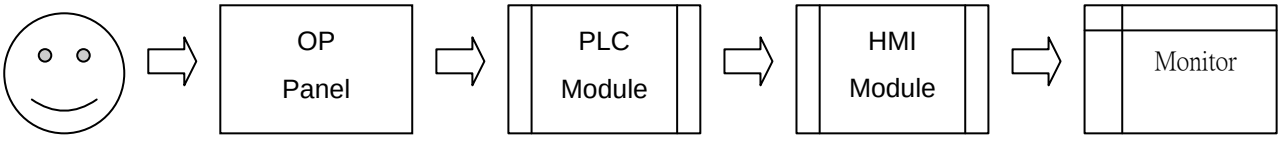
This controller offers the standard keyboard and the transformation between C bit and S bit codes, this can increase the convenience of CNC controller operates and controls.

2 Applicable edition

Milling machine V3, V6 and lathe V3 are applicable.

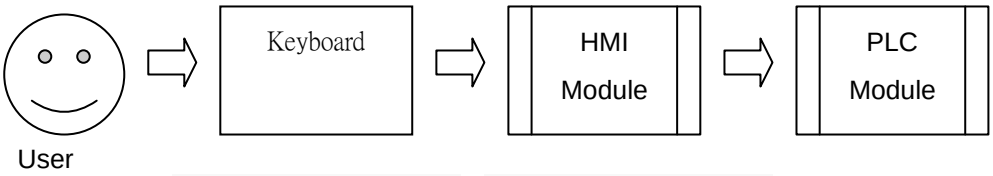
3 Instruction

How C bit transfer to the ASCII Code



User operate the OP panel to launch the I bit	PLC module follows the I bit to launch the C	HMI module follows the C bit to send ASCII	Display ASCII letters

How ASCII transfer to the S bit



User use the Keyboard to activate the ASCII Code.	HMI module follows the ASCII Code to launch S bit	PLC module launches processes by S bit

HMI operating instruction

- From ASCII Code to S bit is a real-time output. .When the related key activates, the S bit and HMI will response the input method.
- C bit to ASCII Code is for stimulation the standard keyboard by C bit. While the settled C bit been activating, HMI will output to the remaining key, also activate the code relay to the key.
- Except the Shift key function, the C bit and ASCII Code only activate single C bit.

C/S bit range

- C bit to ASCII range located at C401~ C488

- ASCII to S bit range located at S401~ S488

Standard PC keyboard corresponds to S bit

Keyboard button	S bit	Keyboard button	S bit	Keyboard button	S bit	Keyboard button	S bit
ESC	401	[	426	,	451	Num5	476
1	402	]	427	.	452	Num6	477
2	403	Enter	428	/	453	+	478
3	404	Left Ctrl	429	Right Shift	454	Num1	479
4	405	A	430	*	455	Num2	480
5	406	S	431	Left Alt	456	Num3	481
6	407	D	432	Space	457	Num0	482
7	408	F	433	Caps Lock	458	.	483
8	409	G	434	F1	459	F11	487
9	410	H	435	F2	460	F12	488
0	411	J	436	F3	461		
-	412	K	437	F4	462		
=	413	L	438	F5	463		
BackSpace	414	;	439	F6	464		
Tab	415	'	440	F7	465		
Q	416	`	441	F8	466		
W	417	Left Shift	442	F9	467		
E	418	\	443	F10	468		
R	419	Z	444	Num Lock	469		
T	420	X	445	Scroll Lock	470		
Y	421	C	446	Num7	471		
U	422	V	447	Num8	472		
I	423	B	448	Num9	473		
O	424	N	449	-	474		
P	425	M	450	Num4	475		

C bit corresponds to standard PC keyboard, table 1

C bit	Shift key status		C bit	Shift key status	
	OFF	ON		OFF	ON
401	Esc	Esc	426	[	{
402	1	!	427	]	}
403	2	@	428	Enter	Enter
404	3	#	430	A	A
405	4	$	431	S	S
406	5	%	432	D	D
407	6	^	433	F	F
408	7	&	434	G	G
409	8	*	435	H	H
410	9	(	436	J	J
411	0	)	437	K	K
412	-	_	438	L	L
413	=	+	439	;	:
414	BackSpace	BackSpace	440	'	"
415	Tab	Tab	441	`	~
416	Q	Q	442	Left Shift	Left Shift
417	W	W	443	\	|
418	E	E	444	Z	Z
419	R	R	445	X	X
420	T	T	446	C	C
421	Y	Y	447	V	V
422	U	U	448	B	B
423	I	I	449	N	N
424	O	O	450	M	M
425	P	P	451	,	<

C bit corresponds to standard PC keyboard, table 2

C bit	Shift key status		C bit	Shift key status	
	OFF	ON		OFF	ON
452	.	>	481	Num3	PgDn
453	/	?	482	Num0	Ins
454	Right Shift	Right Shift	483	.	Del
455	*	*	487	F11	F11
457	Space	Space	488	F12	F12
459	F1	F1			
460	F2	F2			
461	F3	F3			
462	F4	F4			
463	F5	F5			
464	F6	F6			
465	F7	F7			
466	F8	F8			
467	F9	F9			
468	F10	F10			
471	Num7	Home			
472	Num8	UP			
473	Num9	PgUp			
474	-	-			
475	Num4	Left			
476	Num5				
477	Num6	Right			
478	+	+			
479	Num1	End			
480	Num2	Down			

Notes

- Due to HMI used some of the keyboard for controlling the interface, users should be careful on C bit to ASCII transferring.
- Because of ASCII to S bit is real-time output, the application of the activated S bit will decide by Ladder.

HMI keyboard table

Keyboard button	C/S bit	HMI Operate instruction
`	441	CNC Reset
F2	460	Main Menu 01
F3	461	Main Menu 02
F4	462	Main Menu 03
F5	463	Main Menu 04
F6	464	Main Menu 05
F7	465	Main Menu 06
F8	466	Sub Menu 01
F9	467	Sub Menu 02
F10	468	Sub Menu 03
F11	487	Sub Menu 04
F12	488	Sub Menu 05
Num0	482	<POS> Group
Num1	479	<PROG> Group
Num2	480	<OFFSET> Group
Num3	481	<CAM> Group
Num4	475	<GRAPH> Group
Num5	476	<DGNOS> Group
Num6	477	<SOFTPL> Group
Num7	471	<PARAM> Group

4 Add and edit the parameter

4.1 Parameter 0658

Add and Modify	Modification
Chinese Display	Parameter 0658 Keyboard trasfrmation 0)Disable 1)Enable
English Display	Pr0658 KEY CODE 0)DISABLE 1)ENABLE
Classification	Operation
Enable time	Restart
Permissions	Manufacturers
Setting range	0~1
Dufalt Value	0
Unit	Non
Applicable model	Milling machine V3, milling machine V6 and V3 series system of lathe
Note	0：Disable. 1：Enable.

5 Add and Edit MLC Signal

5.1 S401~488

Chinese Display	S401~488 Key code:
English Display	S401~488 Key code:
Applicable model	Milling machine V3, milling machine V6 and V3 series system of lathe
Note	Please follow the instruction

5.2 C401~488

Chinese display	C401~488 Key code:
English display	C401~488 Key code:
Applicable model	Milling machine V3, milling machine V6 and V3 series system of lathe
Note	Please follow the instruction