SYNTEC TECHNOLOGY CO.,LTD.

# PLC Interface.

匯出日期：2021-08-03
修改日期：2021-07-29

# 1 CNC and PLC Interface

## 1.1 C Bit Interface (From PLC To CNC)

| No | Title | Description |
|---|---|---|
| C000 | Cycle Start | Under auto mode, when this bit ON CNC will start to execute the NC program. |
| C001 | Feed Hold | During machining, when this flag ON, CNC will pause the execution of the NC program. |
| C002 | | |
| C003 | | |
| C004 | | |
| C005 | | |
| C006® | X Axis JOG+ | Under JOG MODE, when this flag ON, machine will move in X+ direction. |
| C007® | X Axis JOG - | (As above) |
| C008® | Y Axis JOG + | (As above)R |
| C009® | Y Axis JOG - | (As above) |
| C010® | Z Axis JOG+ | (As above) |
| C011® | Z Axis JOG - | (As above) |
| C012® | C($6^{th}$) Axis JOG + | (As above) |

| No | Title | Description |
|---|---|---|
| C013® | C(6th) Axis JOG - | (As above) |
| C014 | | |
| C015 | M30 support program rewind | This Bit is valid only when Pr732 is set to 1. When this Bit is ON, main program does not execute Reset after M30 is executed. Instead, like M99 returns to the program initial position, then continues executing machining.<br>Notifications（While Pr732 set to 1）：<br>1. When M30 is executed, M code content description is updated in R1/R616/R620/R624.<br>a. If C15 ON and Pr3804 part count M code number is 30, only when M30 is executed, each path will update the M code content to 30 in R1/R616/R620/R624 respectively.<br>b. If C15 OFF, regardless of the Pr3804 part count M code number, when M30 is executed, each path will update the M code content to 30 in R1/R616/R620/R624 respectively.<br>2. Effective vision：10.116.54, 10.117.54 |
| C016 | X Axis MPG Selection | Select MPG to control X axis, when this FLAG is ON, controller will input as MPG and drive the X-axis to move relative displacement. |
| C017 | Y Axis MPG Selection | (As above) |
| C018 | Z Axis MPG Selection | (As above) |
| C019 | C(6th) Axis MPG Selection | (As above) |

| No | Title | Description |
|---|---|---|
| C020 | MPG Simulation | 1. In auto mode (Auto or MDI), when this Bit ON and cycle start, the machine axial moving speed determined by the MPG rotation speed and the current G01 override. The faster MPG is rotated, the faster the machine moves; when MPG stops, the machine also stopped. It is suitable for trial machining.<br>2. As mentioned above, "determined by current G01 override" means that even when the MPG is rotated under rapid traverse G00 block, and the rapid traverse feedrate (R18) is zero, machine will still move.<br>3. When using MPG simulation at G00 or G53 block, the maximum feedrate will be limited to the last G00 moving speed multiplied by 37.5% of the G01 override.<br>4. When using MPG simulation, the number of lines/single blocks to be reversed is limited. As for the number of lines/single blocks can be reversed, it depends on how the NC code is written. |
| C021 | Tool Withdraw | When this function is triggered, the system will automatically pause (Feedhold). After the machine stops, the tool will retract according to the tool retraction position set by G10.6 and feedrate override. |
| C022 | | |
| C023 | Rapid Traverse | Press this button under CON JOG mode, the machine movement speed changes from the JOG SPEED to RAPID SPEED(G00) , and enable the panel RAPID OVERRIDE. |
| C024 | | |
| C025 | Set X Axis Machine Position | To set the axial machine coordinates, the set value is determined by R38. |
| C026 | Set Y Axis Machine Position | (As above) |
| C027 | Set Z Axis Machine Position | (As above) |

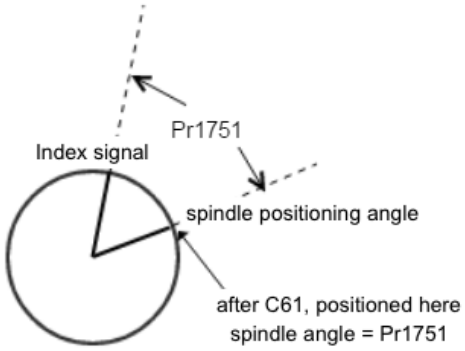
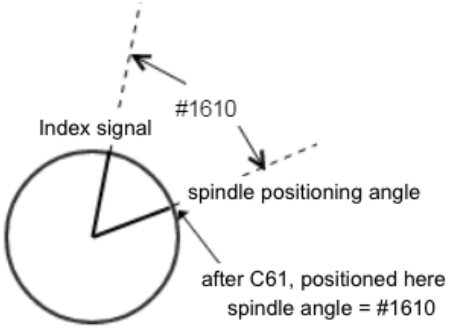
| No | Title | Description |
|---|---|---|
| C028 | Set C($6^{th}$) Axis Machine Position | (As above) |
| C029 | | |
| C030 | | |
| C031 | X Axis MANUAL CONTROL | The axial trips from control mode and enters feedback monitoring mode. At this moment, controller can no longer send commands to the axis. If the axis moves due to external force, the HMI displayed coordinates will also be updated.<br>Serial axis, if you need to SERVO_OFF certain axis, you can use this Cbit to SERVO OFF the serial axis.<br>Notification:<br>When the axis is switched back to the control mode from the feedback monitoring mode, if machine is still moving, will cause zero speed check fails (Pr901~), system will issue MOT-020/MOT-021 alarm, and at this moment axial needs to re-do homing. |
| C032 | Y Axis MANUAL CONTROL | (As above) |
| C033 | Z Axis MANUAL CONTROL | (As above) |
| C034 | C($6^{th}$) Axis MANUAL CONTROL | (As above) |

| No | Title | Description |
|---|---|---|
| C035 | Absolute Position Sync. | If any manual displacement (by Jog, MPG, PLC axis...) requires to be preserved during Feedhold state, upper edge trigger this C-BIT before the program started. In this case, the amount of displacement of all axis will be synchronized to MPG offset, the program coordinates will resume to state before feedhold. And once program starts, the machining path will always retain this amount of displacement.<br><br>Restrictions:<br>This function is invalid when BIT triggered during machining, tool retract function executing or O888801 executing.<br><br>Compatibility: Version 10.114.50G ~ 10.116.12 or later<br>Between Version 10.114.50G~10.116.12, when using upper edge triggers this BIT, the main system path will perform a coordinate synchronization. This BIT has no effect in earlier versions. |
| C036 | Emergency Stop | When the Emergency Stop button is pressed, LADDER should triggers this FLAG and CNC stops all the movement of the machine and enters NOT READY state. Until the E-stop button is released, this FLAG is disabled and CNC generate the REST command and return to the READY state. |
| C037 | External Reset | • Send the RESET command to the CNC from external device.<br>• In 10.118.40 and later version, when Pr741 is set to 1, the reset range is not including the axis group of independent operation. |
| C038 | M.S.T Finish | When LADEER executes M, S, T CODE, CNC will wait for this FLAG ON to start the execution of the next BLOCK. Therefore, after LADDER executed M, S, T CODE, this FLAG needs to be ON. |
| C039 | Part count M-code stop request | • When this BIT is ON, the part count M-code of the main program will be paused (B-STOP).<br>• If the part count M-code of the main program is M99, CNC will only be paused (M-99) when the M99 with the smallest path number is read.<br>• 10.118.29Z, 10.118.40F, 10.118.44 and later: The request is invalid in MDI mode.<br>Relative reference: Parameter3804, S35 |
| C040 | Single Block | When the machining program is executed under this FLAG ON, a block will be executed and then enter the single block stop. It is necessary to Cycle Start again before executing the next single block (Block).<br><br>(Please turn ON C40 before machining. If you turn ON C40 during machining, it may requires several blocks to decelerate to zero before block stop. If it is required to check the program during machining, it is recommended to stop with the MPG simulation C20 or M00. |
| C041 | Optional Skip | When the machining program is executed while this FLAG ON, if the jump character '/' is written in the program, the line will be skipped and the next block will be executed directly.<br><br>(This function cannot support partial syntax. When an unsupported syntax is encountered, a COM alarm will be issued.) |

| No | Title | Description |
|---|---|---|
| C042 | Dry Run | When this FLAG is ON, the execution of G CODE is performed at an dry run speed.<br>G01 dry run speed is up to 500% of the feedrate command in the program. The dry run speed is limited by Pr405 and Pr621~. Under this mode, G01 override is valid.<br>G00 dry run speed is 100% of the original G00 speed. |
| C043 | Machine Lock | When this FLAG is ON, and program is executed, the program will run but the machine will not move. It is usually used for program check.<br>Note: Version 10.114.45, 10.115.46B, 10.115.48 and after C43 function is cancelled.<br>This function enables (C43 ON) first, and sends a command to the axis, i.e. : G91G00X100., then axis does not move, and the remaining distance and program coordinates are displayed normally, but the machine coordinates are not changed. The system will synchronize the machine coordinates to the program coordinates until this function is turned off.<br>If the function is enabled (C43 ON) during axial movement, the axis will not move and the remaining distance and program coordinates will be displayed normally, but the machine coordinates will stop when the function is activated. The system will synchronize the machine coordinates to the program coordinates until this function is turned off. |
| C044 | Optional Stop | When this FLAG is ON and M01 is executed, controller will enter the FEEDHOLD state.<br>When this FLAG is OFF and M01 is executed, controller will ignore M01 and continue to execute the next BLOCK. |
| C045 | Z Axis Lock | When this FLAG is ON, and program is executed, the program will run but the machine will not move. It is usually used for program check.<br>This function enables (C45 ON) first, and sends a command to the Z axis, i.e. : G91G00Z100., then Z axis does not move, and the remaining distance and program coordinates are displayed normally, but the machine coordinates are not changed. The system will synchronize the machine coordinates to the program coordinates until this function is turned off.<br>If the function is enabled (C45 ON) during axial movement, the Z axis will not move and the remaining distance and program coordinates will be displayed normally, but the machine coordinates will stop when the function is activated. The system will synchronize the machine coordinates to the program coordinates until this function is turned off. |
| C046 | Axis Coupling Request | The first set of axis coupling state switches, when Pr3825 is set to non-mechanical coupling, the actual coupling state is determined by this bit.<br>When this FLAG is ON, the coupling axis enters the coupling state.<br>When this FLAG is OFF, the coupling state is disabled.<br>In the coupling state, when the master axis moves, the slave axis moves according to the set ratio. |

| No | Title | Description |
|---|---|---|
| C047 | Inhibit Persist State Flush | When this FLAG is ON, the system is prohibited from storing persistent data. However, the system will force to synchronize once this FLAG turns from OFF to ON. |
| C048 | Wait Function Skip Signal | All main system path skip the WAIT() command, and continues the look ahead in the following machining program. |
| C049 | Macro Interruption Request | Interrupt signal of interrupted subprogram function. When this C Bit On, the program that was originally executed stops immediately and calls the interrupt subprogram. |
| C050 | Over Travel X+ | The X-axis machine hardware limit, when this FLAG ON controller will automatically enter Feedhold state. Meanwhile, it will not accept the JOG command or MPG command in this direction, and can be retracted only in the opposite direction. |
| C051 | Over Travel X- | (As above) |
| C052 | Over Travel Y+ | (As above) |
| C053 | Over Travel Y- | (As above) |
| C054 | Over Travel Z+ | (As above) |
| C055 | Over Travel Z- | (As above) |
| C056 | Over Travel C(6th)+ | (As above) |

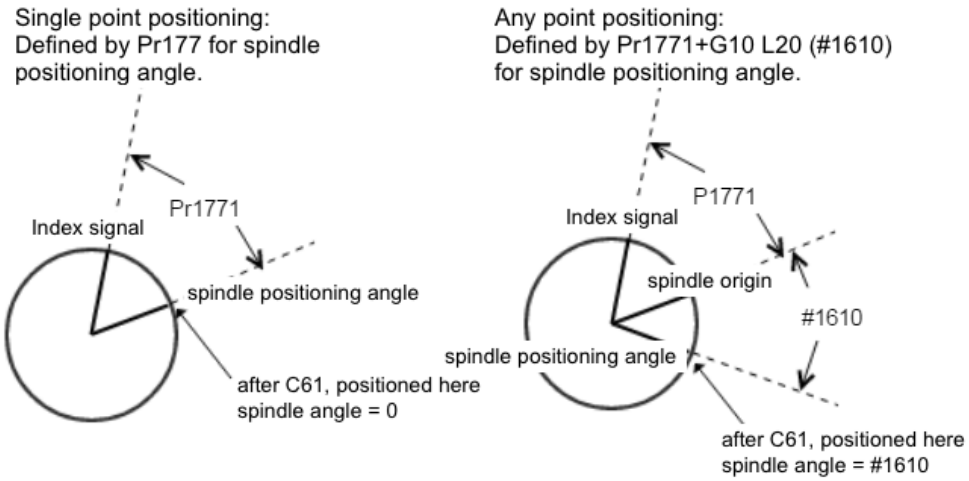
| No | Title | Description |
|---|---|---|
| C057 | Over Travel C(6th)- | (As above) |
| C058 | | |
| C059 | | |
| C060 | Spindle JOG Mode | When C60 ON, the spindle running speed will be forced to run at the spindle positioning drifting speed set by Pr1721. This function is usually used for milling machine spindle tool change, calibration or automatic lathe machine tending.<br>C60 only affects and designate the speed of the spindle, which does not activate the spindle rotation; therefore, it still needs to be used with C64. The spindle is originally under C64, and follow S code command; under C64+C60, follow the Pr1721 command. |

| No | Title | Description |
|---|---|---|
| C061 | Spindle Orientation Stop | When C61 is ON, the spindle positioning function is executed. This function must be equipped with position encoder on the spindle side or the gear ratio is 1:1. C61 can be disabled only when positioning completed; during positioning, press Reset (C37 ON) will not interrupt the positioning action.<br><br>General Spindle<br><br>1. Pr1741 sets the speed of spindle positioning. After the spindle reaches the positioning speed, it starts to detect the signal. Pr1751 sets the spindle positioning offset angle. This angle is the offset angle in respect to the index signal. After replacing the motor, encoder, or belt, this parameter must be re-calibrated; Pr1761 sets the spindle positioning time; S61 is the spindle positioning completion signal. When C61 is ON, the spindle will stop first and then start positioning from stationary.<br>2. Pr1771 is invalid after version 10.116.26A, 10.116.36I.<br>3. Spindle positioning angle description:<br><br>One point positioning:<br>Pr1751 defines spindle positioning angle<br>  <br><br>Any point positioning:<br>G10 L20 (#1610) defines spindle positioning angle<br>  <br><br><br>General Serial Spindle<br><br>1. Pr1791= 1~2, the positioning action is same as general spindle.<br>2. Pr1791= 3, the first positioning actin is same as general spindle. After the second time, the positioning can be reached within one revolution by using the acceleration of Pr1801 / Pr1831 / Pr1841. The positioning angle is Pr1751. Since the whole process is position control, the controller can directly position the spindle to the set value even if the spindle is running at high speed.<br>3. When the positioning is completed, S61 is ON, and the spindle angle is displayed as the setting of "Pr1751"<br>4. spindle positioning angle description: same as the general spindle<br>Syntec Serial Spindle<br><br>1. Use the built-in spindle quick positioning function in the driver.<br>2. The spindle positioning angle is determined by Pr1771.<br>3. Syntec M2 Pr1771 will be synchronized with the driver P6-20. The rules are as follows:<br>a. Power on, the P6-20 of the driver is synchronized to Pr1771~Pr1776 for the first time,<br>b. Afterwards, no matter modifying the controller parameters (Pr1771~Pr1776) or the driver parameters (P6-20), it will be synchronized in both sides. |

| No | Title | Description |
|---|---|---|

c. Syntec M3 has no P6-20 parameters, so there will be no such synchronous action.

4. Pr1751 is invalid and must be set to 0, otherwise system issue SPD-026 alarm.
5. After positioning is completed, the spindle angle is displayed as 0 degrees.
6. Spindle positioning angle description：




Any point high speed positioning function

1. **G10 L20 P0 R_** can be used to modify the positioning angle dynamically and display it synchronously at #1610.
2. **M19 C_** : The standard arbitrary point positioning function provided by the controller. It needs to register **M0019** as Macro to use. (ex. Pr3601 set as 19).
3. The actual specifications of M0019 are as follows：
   a. Read the C argument and set the spindle positioning angle through **G10 L20 P0 R#3**. (G10 L20 detailed usage please see the **development manual**)
   b. As above, if there is no C argument, the default angle is set by **Pr1751~Pr1756**, that is, in a. #3 will be replaced by **Pr1751~Pr1756**.
   c. After the positioning angle is determined, issue M19 to PLC for triggering C61 ON to perform positioning. (PLC needs to cooperate with C61 ON)
4. Support positioning when the spindle is rotating clockwise (counterclockwise), that is, directly position when C64 (C65) is ON.
5. The positioning speed and acceleration are controlled by the driver and are not affected by the controller parameter setting.
6. After positioning is executed, the positioning angle is restored to the angle set by the parameter.
7. For Syntec M2 spindle, the driver firmware must be updated to version 1.4.2 and above.

Operating restrictions

1. In the tapping mode, this C Bit is invalid.
2. Because the controller will synchronize the coordinates when C63 is switched, it is recommended to use this function in the case of C63 OFF. Otherwise, the error coordinate synchronization may cause, and the machining action is not as expected after the positioning is completed.

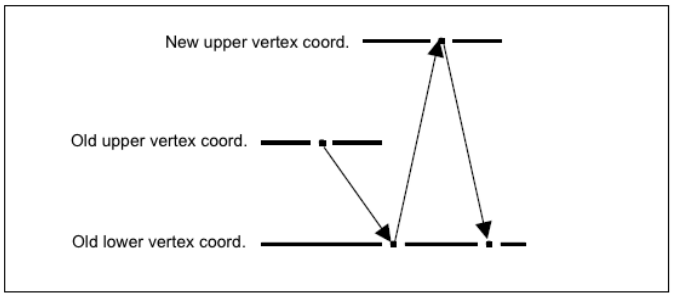
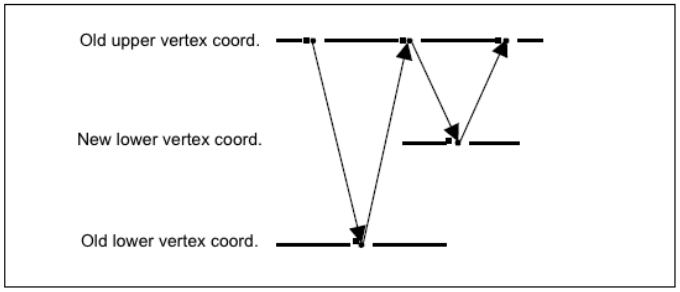
Version compatibility description

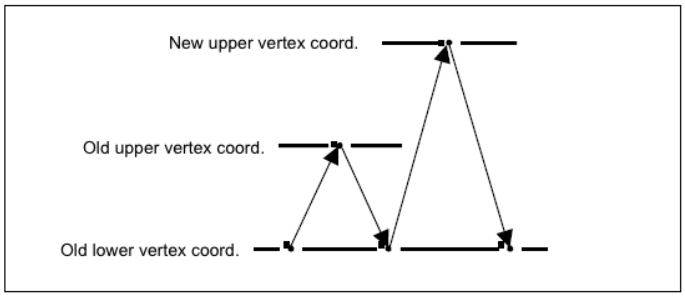
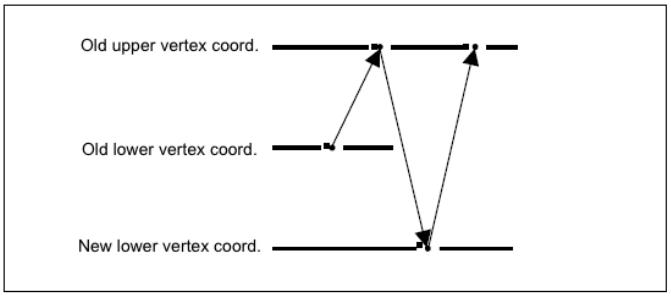
| No | Title | Description |
|---|---|---|
| | | 1. Refer to the page "Spindle Application - Spindle Positioning (C61)". |
| C062® | Skip Signal State | When C62 is ON, the measurement escape command G31 will be recording the current mechanical position and interrupt the G31 action, then jump directly to the next block to continue execution. If there are multiple G31 to be triggered in the program, it is recommended that C62 is upper triggered, preventing multiple G31 from being tripped within the same C62_ON. |
| C063 | Spindle OFF | For non-inverter spindle type (Pr1791~≠0, 5, 6, 7), this C BIT ON means that the spindle is switched to the position control mode. Now controller will perform mechanical coordinate synchronization (motor feedback synchronize back to the mechanical coordinate); but when C BIT is OFF, it means to switch back to the spindle speed control mode, and its clockwise and counterclockwise rotation control is determined by C64/C65.<br>Compatibility change:<br>1. Version 10.116 and before, when using M Code to switch the spindle C/S axis conversion, it is recommended that C38 in the PLC wait for S63 to ensure the correctness of the position control mode.<br>2. Version 9.x and before, the position control mode can be switched without using C63, but should follow the behavior of #1820 first turn on then turn off later to synchronize the coordinates, in order to ensure the correctness of the mechanical coordinates.<br>Operating restrictions:<br>In tapping mode, this C Bit is invalid. |
| C064 | Rotating the spindle clockwise | For non-inverter spindle type (Pr1791~≠0, 5, 7), this signal is the spindle clockwise rotation command.<br>In order to correctly use the spindle speed arrival check function Pr1991~, even if it is a variable frequency spindle, this C Bit must be triggered to notify the system spindle to enter the running state.<br>Operating restrictions:<br>In the tapping mode, this C Bit is invalid. |
| C065 | Rotating the spindle counter clockwise | For non-inverter spindle type (Pr1791~≠0, 5, 7), this signal is the spindle counterclockwise rotation command.<br>In order to correctly use the spindle speed arrival check function Pr1991~, even if it is a variable frequency spindle, this C Bit must be triggered to notify the system spindle to enter the running state.<br>Operating restrictions:<br>In the tapping mode, this C Bit is invalid. |

| No | Title | Description |
|---|---|---|
| C066® | X axis controlled by PLC | 1. When this signal is ON, the PLC axis movement is executed. The movement command of the NC program does consider the movement of the PLC axis, that is, the coordinate synchronization between the NC axis and the PLC axis, but the movement speed of the PLC axis at this time will not be added to display on HMI.<br>2. When this signal is OFF, the PLC axis movement is executed. The movement command of the NC program does not consider the movement of the PLC axis, but the movement speed of the PLC axis will be added to display on HMI.<br>3. Following item 2, since this signal is OFF, the axis is not declared as PLC control. Therefore, when mode switches, the specific axis' PLC movement will be interrupted.<br>4. When NC program and the PLC axis simultaneously command the same axis, the axial command will have an additive effect, user should pay extra attention on this.<br>5. This signal can only be used in position control mode. If the axis is spindle, you need to switch to position control mode to perform PLC axis. |
| C067® | Y axis controlled by PLC | (As above) |
| C068® | Z axis controlled by PLC | (As above) |
| C069® | C axis(6th) controlled by PLC | (As above) |
| C070 | | |
| C071 | Enable MPG No1 | Under non-MPG mode, this signal is enabled (ON), and the input of the No. 1 MPG is used as an axial position command to move the corresponding axis.<br>※ Under MPG mode, the default MPG channel is enabled, so this signal is disabled (OFF), and the MPG signal cannot be blocked as the axial position command input.<br>※The channel signal can be turned off by setting the parameter Pr2021 to 0. |
| C072 | Enable MPG No2 | (As above) |

| No | Title | Description |
|---|---|---|
| C073 | Enable MPG No3 | (As above) |
| C074 | | |
| C075 | | |
| C076 | | |
| C077 | | |
| C078 | | |
| C079 | X HOME DOG | When HOME DOG signal is read from IO board, this C BIT needs to be ON, so need to add this C BIT in LADDER. |
| C080 | Y HOME DOG | (As above) |
| C081 | Z HOME DOG | (As above) |
| C082 | C(6th) HOME DOG | (As above) |
| C083 | The third software stroke limit switch | The third software stroke limit switch. Off: protection disabled; On: protection enabled. Please refer to parameters 2441~2480 for further explanation. (Version 10.116.x and after it is renamed to the third software stroke limit) |

| No | Title | Description |
|---|---|---|
| C084 | Relieve the excessive amount of movement while power-off FLAG. | When the controller is powered off, and axial movement exceeds the setting range of Pr1021~1040 which R940 is triggered, this can be relieved by this C Bit. |
| C085 | | |
| C086 | CHPST | Enabled Chopping function, relative parameter：Pr3951~3956， safety cautions as below;<br>1. Valid version: 10.118.19(Include) and before.<br>2. Cannot be mixed with the first path G81.1.<br>3. When C86 Off → On, it means the Chopping function is enabled. Chopping axis image will move to the reference point first, and then move back and forth between up and down vertex.<br>4. When C86 On → Off, it means the Chopping function is , and the Chopping axis will move to the lower vertex first and then back to the R point.<br>5. If the emergency stop (C36) is pushed during the Chopping process, the Chopping axis will stop immediately.<br>6. If the controller is reset (C37) during Chopping, the Chopping axis will move back to the specified R point coordinates before stopping.<br>7. When the controller has an alarm, the Chopping axis will act according to the alarm urgency level:<br>a. The alarm that makes system enter Not Ready State (Servo Off), the Chopping axis will stop immediately.<br>b. The alarm that stop the system from machining cycle, the Chopping axis will move back to the specified R point coordinates before stopping.<br>c. The alarm does not stop the system from machining cycle, the Chopping axis will work normally.<br>8. Chopping cannot be used at the RTCP mode, otherwise COR-342 alarm is issued.<br>9. When Chopping is in progress, the Chopping axis can no longer input other movement commands, otherwise COR-339 alarm is issued.<br>a. Movement commands such as: G0, G1, G2/G3, G31, G53, and etc.<br>10. When Chopping is in process, the Chopping axis cannot change the coordinate data, otherwise COR-340 alarm is issued.<br>a. Coordinate data such as: G54 P1~G54 P100, G92/G92.1, G10 L2, G10 L1300, G68/G68.2/G68.3, #value(#1880~#1933, #20001~#20658), external coordinate offset, MPG offset.<br>11. When the Chopping axis is in the PLC axis execution state, or as spindle, or it has been specified by other path as the Chopping axis, COR-341 alarm will be issued.<br>12. Chopping axial does not support mirroring. |

| No | Title | Description |
|---|---|---|
| C087 | CHLD | Chopping Feedhold function<br>Valid version: 10.118.19 (include) and before.<br>When C87 On → Off while in movement, the Chopping axis will stop and return to the R point; when C87 goes from Off → On, the Chopping axis action will activate again.<br>While feedhold, you may change the upper and lower vertex's coordinates. There can be different actions when you change in different timings. Below are four possible situations:<br>• When the upper vertex coordinates are modified, during the axial movement from the upper vertex to the lower vertex, the axis first moves to the lower vertex and then to the new upper vertex coordinates.<br>When the axis moves to the lower vertex coordinates, the servo lag compensation function will also be canceled at the same time. When the new upper vertex is reached, the compensation will be activated again.<br>  <br><br>• When the lower vertex coordinates are modified during the axial movement from the upper vertex to the lower vertex, the axis first moves to the upper vertex and then to the new lower vertex coordinates.<br>When the axis moves to the upper vertex coordinates, the servo lag compensation function will also be canceled at the same time. When the new lower vertex is reached, the compensation will be activated again.<br>  <br> |

| No | Title | Description |
|---|---|---|
| | | • When the upper vertex coordinates are modified during the axial movement from the lower vertex to the upper vertex, the axis moves to the upper vertex first, then to the lower vertex and the new upper vertex coordinates.<br>When the axis moves to the lower vertex coordinates, the servo lag compensation function will also be canceled at the same time. When the new upper vertex is reached, the compensation will be activated again.<br>  <br><br>• When the lower vertex coordinates are modified during the axial movement from the lower vertex to the upper vertex, the axis moves directly to the new lower vertex coordinates after moving to the upper vertex coordinates.<br>When the axis moves to the upper vertex coordinates, the servo lag compensation function will also be canceled at the same time. When the new lower vertex is reached, the compensation will be activated again.<br>  <br> |
| C088 | Disable Screen Saver | Disable the screen saver after screen saver is already activatd by on this bit. The recommended igniting time is 500ms at least.(Only available on CE system)<br>Valid version: 10.114.53, 10.115.55, 10.114.50C |
| C089 | Edit inhibition | Prohibit edit program mode (Including MDI edit) 0: Allow program editing 1: Prohibit program edition. |
| C090 | Program Edit Screen | Switch to program edit screen. |
| C091 | Graph Dialog Screen | Switch to graphical dialog screen. |

| No | Title | Description |
|---|---|---|
| C092 | Monitor Screen | Switch to program processing monitor screen. |
| C093 | Position Screen | Switch to Position Monitor screen |
| C094 | Tool Offset Screen | Switch to Tool Offset screen |
| C095 | | |
| C096 | File Management Screen | Switch to File Management screen |
| C097 | | |
| C098 | | |
| C099 | | |
| C100 | | |
| C101~C132 | Macro mapping variable | Mapping to the macro system variables (#6001~#6032) |
| C133 | Axis Exchange Request 1 | First path switch function<br>Enable axis exchange status of two axis assigned by Pr3721 & Pr3722. |
| C134 | Axis Exchange Request 2 | Second path switch function<br>Enable axis exchange of two axis assigned by Pr3726 & Pr3727. |

| No | Title | Description |
|---|---|---|
| C135 | Axis Exchange Request 3 | Third path switch function<br>Enable axis exchange of two axis assigned by Pr3731 & Pr3732. |
| C136 | Axis Exchange Request 4 | Fourth path switch function<br>Enable axis exchange of two axis assigned by Pr3736 & Pr3737. |
| C137 | Tension Control Switch | Two axis designated by Pr2901、Pr2902 will enter tension control state. |
| C138 | | |
| C139 | | |
| C140 | $4^{th}$ Axis OT + | The $4^{th}$ axis machine positive hardware limit, when this FLAG ON controller will automatically enters Feedhold state. Meanwhile, it will not accept the JOG command or MPG command in this direction, and can be retracted only in the opposite direction. |
| C141 | $4^{th}$ Axis OT - | (As above) |
| C142 | $5^{th}$ Axis OT + | (As above) |
| C143 | $5^{th}$ Axis OT - | (As above) |
| C144 | $7^{th}$ Axis OT + | (As above) |
| C145 | $7^{th}$ Axis OT - | (As above) |
| C146 | $8^{th}$ Axis OT + | (As above) |

| No | Title | Description |
|---|---|---|
| C147 | 8th Axis OT - | (As above) |
| C148 | 9th Axis OT + | (As above) |
| C149 | 9th Axis OT - | (As above) |
| C150 | 10th Axis OT + | (As above) |
| C151 | 10th Axis OT - | (As above) |
| C152 | 11th Axis OT + | (As above) |
| C153 | 11th Axis OT - | (As above) |
| C154 | 12th Axis OT + | (As above) |
| C155 | 12th Axis OT - | (As above) |
| C156 | 13th Axis OT + | (As above) |
| C157 | 13th Axis OT - | (As above) |
| C158 | 14th Axis OT + | (As above) |
| C159 | 14th Axis OT - | (As above) |

| No | Title | Description |
|---|---|---|
| C160 | 15th Axis OT + | (As above) |
| C161 | 15th Axis OT - | (As above) |
| C162 | 16th Axis OT + | (As above) |
| C163 | 16th Axis OT - | (As above) |
| C164 | 17th Axis OT + | (As above) |
| C165 | 17th Axis OT - | (As above) |
| C166 | 18th Axis OT + | (As above) |
| C167 | 18th Axis OT - | (As above) |
| C168 | | |
| C169 | | |
| C170® | 4th Axis JOG + | User JOG MODE, press the 4th Axis JOG+ button on the panel. When this FLAG is ON in the LADDER, controller will move along this direction. |
| C171® | 4th Axis JOG - | (As above) |
| C172® | 5th Axis JOG + | (As above) |

| No | Title | Description |
|---|---|---|
| C173® | 5th Axis JOG - | (As above) |
| C174® | 7th Axis JOG + | (As above) |
| C175® | 7th Axis JOG - | (As above) |
| C176® | 8th Axis JOG + | (As above) |
| C177® | 8th Axis JOG - | (As above) |
| C178® | 9th Axis JOG + | (As above) |
| C179® | $9^{th}$ JOG - | (As above) |
| C180® | $10^{th}$ Axis JOG + | (As above) |
| C181® | $10^{th}$ Axis JOG - | (As above) |
| C182® | $11^{th}$ Axis JOG + | (As above) |
| C183® | $11^{th}$ Axis JOG - | (As above) |
| C184® | $12^{th}$ Axis JOG + | (As above) |
| C185® | $12^{th}$ Axis JOG - | (As above) |

| No | Title | Description |
|---|---|---|
| C186® | 13th Axis JOG + | (As above) |
| C187® | 13th Axis JOG - | (As above) |
| C188® | 14th Axis JOG + | (As above) |
| C189® | 14th Axis JOG - | (As above) |
| C190® | 15th Axis JOG + | (As above) |
| C191® | 15th Axis JOG - | (As above) |
| C192® | 16th Axis JOG + | (As above) |
| C193® | 16th Axis JOG - | (As above) |
| C194 | 17th Axis JOG + | (As above) |
| C195 | 17th Axis JOG - | (As above) |
| C196 | 18th Axis JOG + | (As above) |
| C197 | 18th Axis JOG - | (As above) |

| No | Title | Description |
|---|---|---|
| C198 | | |
| C199 | | |
| C200 | 4th Axis Home Dog | When HOME DOG is read from IO board, LADDER needs to trigger this C BIT. |
| C201 | 5th Axis Home Dog | (As above) |
| C202 | 7th Axis Home Dog | (As above) |
| C203 | 8th Axis Home Dog | (As above) |
| C204 | 9th Axis Home Dog | (As above) |
| C205 | $10^{th}$ Axis Home Dog | (As above) |
| C206 | $11^{th}$ Axis Home Dog | (As above) |
| C207 | $12^{th}$ Axis Home Dog | (As above) |
| C208 | $13^{th}$ Axis Home Dog | (As above) |

| No | Title | Description |
|---|---|---|
| C209 | 14th Axis Home Dog | (As above) |
| C210 | 15th Axis Home Dog | (As above) |
| C211 | 16th Axis Home Dog | (As above) |
| C212 | 17th Axis Home Dog | (As above) |
| C213 | 18th Axis Home Dog | (As above) |
| C214 | | |
| C215 | 4th Axis MPG Selection | The 4th axis' axial MPG selection. When this FLAG is ON, controller will input pulse of the MPG and drive the 4th axis to move in relative displacement. |
| C216 | 5th Axis MPG Selection | (As above) |
| C217 | 7th Axis MPG Selection | (As above) |
| C218 | 8th Axis MPG Selection | (As above) |

| No | Title | Description |
|---|---|---|
| C219 | 9th Axis MPG Selection | (As above) |
| C220 | 10th Axis MPG Selection | (As above) |
| C221 | 11th Axis MPG Selection | (As above) |
| C222 | 12th Axis MPG Selection | (As above) |
| C223 | 13th Axis MPG Selection | (As above) |
| C224 | 14th Axis MPG Selection | (As above) |
| C225 | 15th Axis MPG Selection | (As above) |
| C226 | 16th Axis MPG Selection | (As above) |

| No | Title | Description |
|---|---|---|
| C227 | 17th Axis MPG Selection | (As above) |
| C228 | 18th Axis MPG Selection | (As above) |
| C229 | | |
| C230 | Set 4th Axis Machine Position | Set the axial machine coordinates, the content filled is determined by R38. |
| C231 | Set 5th Axis Machine Position | (As above) |
| C232 | Set 7th Axis Machine Position | (As above) |
| C233 | Set 8th Axis Machine Position | (As above) |
| C234 | Set 9th Axis Machine Position | (As above) |
| C235 | Set 10th Axis Machine Position | (As above) |

| No | Title | Description |
|---|---|---|
| C236 | Set 11th Axis Machine Position | (As above) |
| C237 | Set 12th Axis Machine Position | (As above) |
| C238 | Set 13th Axis Machine Position | (As above) |
| C239 | Set 14th Axis Machine Position | (As above) |
| C240 | Set 15th Axis Machine Position | (As above) |
| C241 | Set 16th Axis Machine Position | (As above) |
| C242 | Set 17th Axis Machine Position | (As above) |
| C243 | Set 18th Axis Machine Position | (As above) |
| C244 | | |

| No | Title | Description |
|---|---|---|
| C245 | 4th Axis MANUAL CONTROL | When axial trips from control mode, and enters the feedback monitoring mode. Now controller can no longer send commands to the axis. If the axis moves due to external force, the coordinates on MHI will also be updated.<br>Remark:<br>When the axis is switched back to the control mode from the feedback monitoring mode, if the machine is still moving, will cause zero speed check fails (Pr901~), the system will issue a MOT-020/MOT-021 alarm, and the axis needs to redo homing. |
| C246 | 5th Axis MANUAL CONTROL | (As above) |
| C247 | 7th Axis MANUAL CONTROL | (As above) |
| C248 | 8th Axis MANUAL CONTROL | (As above) |
| C249 | 9th Axis MANUAL CONTROL | (As above) |
| C250 | 10th Axis MANUAL CONTROL | (As above) |
| C251 | 11th Axis MANUAL CONTROL | (As above) |

| No | Title | Description |
|---|---|---|
| C252 | 12th Axis MANUAL CONTROL | (As above) |
| C253 | 13th Axis MANUAL CONTROL | (As above) |
| C254 | 14th Axis MANUAL CONTROL | (As above) |
| C255 | 15th Axis MANUAL CONTROL | (As above) |
| C256 | 16th Axis MANUAL CONTROL | (As above) |
| C257 | 17th Axis MANUAL CONTROL | (As above) |
| C258 | 18th Axis MANUAL CONTROL | (As above) |
| C259 | | |

| No | Title | Description |
|---|---|---|
| C260® | 4th axis controlled by PLC | 1. When this signal is ON, the PLC axis movement is executed. The movement command of the NC program does consider the movement of the PLC axis, that is, the coordinate synchronization between the NC axis and the PLC axis, but the movement speed of the PLC axis at this time will not be added to display on HMI.<br>2. When this signal is OFF, the PLC axis movement is executed. The movement command of the NC program does not consider the movement of the PLC axis, but the movement speed of the PLC axis will be added to display on HMI.<br>3. Following item 2, since this signal is OFF, the axis is not declared as PLC control. Therefore, when mode switches, the specific axis' PLC movement will be interrupted.<br>4. When NC program and the PLC axis simultaneously command the same axis, the axial command will have an additive effect, user should pay extra attention on this.<br>5. This signal can only be used in position control mode. If the axis is spindle, you need to switch to position control mode to perform PLC axis. |
| C261® | 5th axis controlled by PLC | (As above) |
| C262® | 7th axis controlled by PLC | (As above) |
| C263® | 8th axis controlled by PLC | (As above) |
| C264® | 9th axis controlled by PLC | (As above) |
| C265® | 10th axis controlled by PLC | (As above) |
| C266® | 11th axis controlled by PLC | (As above) |

| No | Title | Description |
|---|---|---|
| C267® | 12th axis controlled by PLC | (As above) |
| C268® | 13th axis controlled by PLC | (As above) |
| C269® | 14th axis controlled by PLC | (As above) |
| C270® | 15th axis controlled by PLC | (As above) |
| C271® | 16th axis controlled by PLC | (As above) |
| C272 | 17th axis controlled by PLC | (As above) |
| C273 | 18th axis controlled by PLC | (As above) |
| C274 | Enable MPG No4 | Under non-MPG mode, this signal is enabled (ON), and the input of the No. 4 MPG is used as an axial position command to move the corresponding axis.<br>※ Under MPG mode, the default MPG channel is enabled, so this signal is disabled (OFF), and the MPG signal cannot be blocked as the axial position command input.<br>※The channel signal can be turned off by setting the parameter Pr2024 to 0. |

| No | Title | Description |
|---|---|---|
| C275 | Enable MPG No5 | (As above) |
| C276 | Enable MPG No6 | (As above) |
| C277 | Enable MPG No7 | (As above) |
| C278 | | |
| C279 | | |
| C280 | | |
| C281 | | |
| C282 | | |
| C283 | | |
| C284 | | |
| C285 | | |
| C286 | | |
| C287 | | |
| C288 | | |
| C289 | | |
| C290 | | |
| C291 | | |

| No | Title | Description |
|---|---|---|
| C292 | | |
| C293 | | |
| C294 | | |
| C295 | | |
| C296 | | |
| C297 | | |
| C298 | | |
| C299 | | |
| C300 | Reload ECam | The Reload ECam insertion point is modified in the R value. (For electronic cam function) |
| C301 | Enable 1st ECam | Enable the first group of electronic cams. When this Bit ON, the first group of electronic cam will start executing, and the S Bit with same number will be ON; when this Bit is OFF, the ECam function will only be terminated until all curve paths are finished. |
| C302 | Enable 2nd ECam | (As above) |
| C303 | Enable 3rd ECam | (As above) |
| C304 | Enable 4th ECam | (As above) |
| C305 | Enable 5th ECam | (As above) |

| No | Title | Description |
|---|---|---|
| C306 | Enable 6th ECam | (As above) |
| C307 | Enable 7th ECam | (As above) |
| C308 | Enable 8th ECam | (As above) |
| C309 | | |
| C310 | | |
| C311 | | |
| C312 | | |
| C313 | | |
| C314 | | |
| C315 | | |
| C316 | | |
| C317 ~C319 | | |
| C320 ~C350 | For robot kernel | Robot kernel usage area (not customizable area) |
| C351 ~C400 | | |

| No | Title | Description |
|---|---|---|
| C401~C488 | Standard keyboard Scan Code | Mapping to the standard PC keyboard scan code 1~88 |
| C489 | OEM extended key | Application self-defined extension keys 89-111 are user defined by individual applications.<br><br>Mapping to PC keyboard ALT-1 |
| C490 | | Mapping to PC keyboard ALT-2 |
| C491 | | Mapping to PC keyboard ALT-3 |
| C492 | | Mapping to PC keyboard ALT-4 |
| C493 | | Mapping to PC keyboard ALT-5 |
| C494 | | Mapping to PC keyboard ALT-6 |
| C495 | | Mapping to PC keyboard ALT-7 |
| C496 | | Mapping to PC keyboard ALT-8 |
| C497 | | Mapping to PC keyboard ALT-9 |
| C498 | | Mapping to PC keyboard ALT-0 |
| C499 | | Mapping to PC keyboard ALT-B |
| C500 | | Mapping to PC keyboard ALT-V |
| C501 | | Mapping to PC keyboard ALT-E |
| C502 | | Mapping to PC keyboard ALT-F |
| C503 | | Mapping to PC keyboard ALT-I |

| No | Title | Description |
|---|---|---|
| C504 | | Mapping to PC keyboard ALT-J |
| C505 | | Mapping to PC keyboard ALT-K |
| C506 | | Mapping to PC keyboard ALT-L |
| C507 | | Mapping to PC keyboard ALT-W |
| C508 | | Mapping to PC keyboard ALT-N |
| C509 | | Mapping to PC keyboard ALT-S |
| C510 | | Mapping to PC keyboard ALT-T |
| C511 | | Mapping to PC keyboard ALT-U |

All the C bits will be read simultaneously and only the C bit with ® mark is processed at real time. Other signals will be send to the stack after being read, then run by sequence non-simultaneously.

## 1.2 S Bit Interface (From CNC To PLC)

| No | Title | Description |
|---|---|---|
| S000 | Cycle Start Light | During machining (BUSY status), this FLAG will be ON. |
| S001 | Feed Hold Light | Pause Machining (FEEDHOLD status), this FLAG will be ON. |
| S002 | Block stop | During single block stop (BLOCK STOP status), this FLAG will be ON. |
| S003 | Feedhold inhibit | When this FLAG is ON, it indicates that feedhold status is prohibited now. |
| S004 | Rigid Tapping | First spindle is on rigid tapping mode. |
| S005 | | |

| No | Title | Description |
|---|---|---|
| S006 | X Axis Busy | When this FLAG is ON, it indicates that the X-axis manual function (MPG/JOG/Homing/ PLC axis) is being executed, and the new manual command cannot be accepted. When this FLAG is OFF, the X-axis is in the Idle state and is allowed to accept new manual command. |
| S007 | Y Axis Busy | (As above) |
| S008 | Z Axis Busy | (As above) |
| S009 | C($6^{th}$) Axis Busy | (As above) |
| S010 | | |
| S011 | $2^{nd}$ of Multiple M code read | When Pr3810 (activating the same block M code simultaneous execution function) is set to 1, and the controller executes the second M code in the same block, this FLAG will be ON, and inform LADDER to execute M code, the content of M code is stored in R2051. After the controller issues this FLAG, it will wait until the C BIT FLAG ON of M code FIN, then starting to execute the next BLOCK. |
| S012 | $3^{rd}$ of Multiple M code read | (As above, and M mode content is stored in R2052) |
| S013 | $4^{th}$ of Multiple M code read | (As above, and M mode content is stored in R2053) |
| S014 | $5^{th}$ of Multiple M code read | (As above, and M mode content is stored in R2054) |
| S015 | | |
| S016 | X Axis Home OK | X Homing OK, X axis HOME process finished, and this FLAG will be ON. The software stroke limit protection will be activated after homing completed. Therefore, in the case that this S BIT FLAG is not ON, LADDER should write not allowed to cycle start and give homing not complete alarm. |

| No | Title | Description |
|---|---|---|
| S017 | Y Axis Home OK | (As above) |
| S018 | Z Axis Home OK | (As above) |
| S019 | C($6^{th}$) Axis Home OK | (As above) |
| S020 | | |
| S021 | During Tool Withdraw | After entering the tool retract function and leaving the original machining path, this FLAG will be ON; until the tool returned and repositioned to the original machining program path, and this FLAG will be OFF. |
| S022 | | |
| S023 | Servo Not Ready | • Description<br>  • When all the axes(except axes in spindle mode or watch mode) of CNC system are in servo-on state, this S bit will be off.<br>  • When NOT all the axes(except axes in spindle mode or watch mode) of CNC system are in servo-on state, this S bit will be on.<br>• Attention note<br>  • Valid version: 10.118.24A, 10.118.25A, 10.118.28N, 10.118.37 and later.<br>  • In 10.118.40 and later version, when Pr741 is set to 1, this status is not including the axis of axis group of independent operation. |
| S024 | | |
| S025 | | |
| S026 | | |
| S027 | | |
| S028 | | |
| S029 | M Code Read | When CNC executes M CODE, this FLAG will be ON, and tell LADDER to execute M CODE. The content of M CODE is saved in R1. After CNC issues this FLAG, it has to wait until M CODE FIN's C BIT FLAG ON, then executes the next BLOCK. |

| No | Title | Description |
|---|---|---|
| S030 | Distribution End | After MOTION G executed a BLOCK, it sends a DEN signal, usually used when G and M CODE have simultaneous action. |
| S031 | Alarm | • When an alarm appears in CNC or driver, and makes the system must stop or feedhold, and this flag will be ON.<br>• In 10.118.40 and later version, when Pr741 is set to 1, this flag is not including the axis group of independent operation has alarm.<br>Controller alarm:<br>CNC: COR alarm, MOT alarm, SPD alarm, OP alarm, COM alarm;<br>ROT: ROT alarm;<br>SPLC: SERIALPLCAXIS alarm;<br>SRI: SRI alarm;<br>Laser marking: LaserCtrl alarm. |
| S032 | Reset | 1. When press RESET on the panel, this FLAG will send a ONE SHOT signal.<br>2. When _Reset Action is triggered, this FLAG will send a ONE SHOT signal. |
| S033 | NC Ready | • After the boot is completed and the system is normal, NC READY FLAG will be ON.<br>• In 10.118.40 and later version, when Pr741 is set to 1, this status is nothing to do with the axis group of independent operation. |
| S034 | Require Part Count Reached | When the required workpieces number is reached, this S FLAG will be ON, and when Cycle Start or Reset, this FLAG will be OFF. |
| S035 | The Part Count M-code in Main Program | When main program reads a part count M code (default as M99), this FLAG sends out a ON/OFF one shot signal.<br>Relative information: Parameter3804, C39 |
| S036 | In Guidance Mode | When CNCis under Guidance Function mode, this BITwill be ON. |
| S037 | Loss data | When the user data (Registry.dat) is lost, this Bit will be ON. |
| S038 | MACRO WAIT | When system enters waiting mode (MACRO function WAIT() is read) |
| S039 | | |
| S040 | | |

| No | Title | Description |
|---|---|---|
| S041 | PLC Alarm | When the PLC has an alarm, this flag will be ON, and when the PLC alarm disappears, the flag will be OFF.<br>The first 16 bits (R4x.0~R4x.15) of R40~R49 are PLC alarm messages, and the PLC warning message after 16th bits will not trigger S41.<br>(The 0~15 bits of R40~R49 are PLC Alarms, and 16~31 bits of them are PLC Warnings.) |
| S042 | CNC Warning | • When the controller or driver has an warning, this flag will be ON, and when all Warnings disappear, the flag will be OFF.<br>• In 10.118.40 and later version, when Pr741 is set to 1, this flag is not including the axis group of independent operation has warning. |
| S043 | PLC Warning | When PLC has an alarm, this flag ON, and when all alarms disappear, the flag OFF. |
| S044 | | |
| S045 | | |
| S046 | | |
| S047 | | |
| S048 | | |
| S049 | | |
| S050 | | |
| S051 | | |
| S052 | | |
| S053 | B Code Read | This function is enabled by Pr3806.<br>When CNC executes to B CODE, this FLAG will be ON, and LADDER will be told to execute B CODE, the content of B CODE will be placed in R5. After the CNC sends this FLAG, it will wait until the B CODE FINISH (C38)'s C BIT FLAG ON, then start executing the next BLOCK.<br>Only the first MST channel supports thePLC B CODE execution (refer to Pr721~Pr730) |

| No | Title | Description |
|---|---|---|
| S054 | S Code Read | When CNC executes to S CODE, this FLAG will be ON, and LADDER will be told to execute S CODE, the content of S CODE will be placed in R2. After CNC issues this FLAG, it will wait until the S CODE FINISH (C38)'s C BIT FLAG ON, then start executing the next BLOCK. |
| S055 | | |
| S056 | | |
| S057 | | |
| S058 | | |

<table>
<tr><th>No</th><th>Title</th><th>Description</th></tr>
<tr><td>S059</td><td>Spindle Threading Speed Arrival</td><td>Spindle Speed Arrival when Threading.
<table>
<tr><th>Spindle CW/CCW Signal (C64/ C65, R583.x/R584.x)</th><th>Spindle Speed Arrival Condition</th></tr>
<tr><td rowspan="2">On</td><td>The speed difference of spindle feedback Fbk and spindle command Cmd is less than the command speed Cmd multiplies a speed arrival check range percentage (Pr1992 or Pr1993).。</td></tr>
<tr><td>i.e. | Fdbk - Cmd | < Cmd * Pr1993 * 0.01</td></tr>
<tr><td rowspan="2">Off</td><td>Spindle feedback less than 50 RPM.</td></tr>
<tr><td>i.e. Fdbk < 50 (RPM)</td></tr>
</table>
When the spindle is not equipped with an encoder (Pr1711~ = 0), the spindle speed arrival determined with following conditions.
<table>
<tr><th>Spindle Type</th><th>Spindle Speed Arrival Condition</th></tr>
<tr><td>Serial Bus Spindle</td><td>Directly reflects the spindle speed arrival information provided by driver.<br>(In serial communication, it can be known from the V_CMP bit in the status of the driver packet, S59 reacts to this bit, and the PLC can be used.)</td></tr>
<tr><td>Pulse Train Spindle</td><td>Controller side considers spindle speed arrived S59 On. (CNC's S59 is always On)<br>If you want to check the spindle speed arrival, you can send an O bit to the TB16IN through the driver, PLC can get this information, and check the speed arrival in PLC.</td></tr>
</table></td></tr>
<tr><td>S060</td><td>1st Set Spindle Superimposition Finish</td><td>1st set spindle  superimposition completion signal.</td></tr>
<tr><td>S061</td><td>Spindle Orientation Stop Finish</td><td>Spindle positioning completion signal</td></tr>
</table>

| No | Title | Description |
|---|---|---|
| S062 | 1st Set Spindle Synchronization Finish | 1st set spindle speed/angle synchronization is completed. |
| S063 | Spindle axis mode | When this S BIT is ON, it indicates that the spindle is in the position control mode; when this S BIT is OFF, it indicates that the spindle is in the spindle speed control mode. |

<table>
<tr><th>No</th><th>Title</th><th>Description</th></tr>
<tr><td>S064</td><td>Spindle Cutting Speed Arrival</td><td>Spindle speed arrival signal while cutting.
<table>
<tr><th>Spindle CW/CCW Signal: C64/ C65, R583.x/R584.x</th><th>Spindle Speed Arrival Criteria</th></tr>
<tr><td rowspan="2">On</td><td>The speed difference of spindle feedback Fbk and spindle command Cmd is less than the command speed Cmd multiplies a speed arrival check range percentage (Pr1992 or Pr1993).。</td></tr>
<tr><td>i.e. | Fbk - Cmd | < Cmd * Pr1992 * 0.01</td></tr>
<tr><td rowspan="2">Off</td><td>Spindle speed feedback < 50RPM</td></tr>
<tr><td>i.e. Fbk < 50 (RPM)</td></tr>
</table>
When the spindle is not equipped with an encoder (Pr1711~ = 0), the spindle speed arrival determined with following conditions.
<table>
<tr><th>Spindle Type</th><th>Spindle Speed Arrival Criteria</th></tr>
<tr><td>Serial Bus Spindle</td><td>Directly reflects the spindle speed arrival information provided by driver.<br>(In serial communication, it can be known from the V_CMP bit in the status of the driver packet, S59 reacts to this bit, and the PLC can be used.)</td></tr>
<tr><td>Pulse Train Spindle</td><td>Controller side considers spindle speed arrived S64 On. (CNC's S64 is always On)<br>If you want to check the spindle speed arrival, you can send an O bit to the TB16IN through the driver, PLC can get this information, and check the speed arrival in PLC.</td></tr>
</table></td></tr>
<tr><td>S065</td><td></td><td></td></tr>
<tr><td>S066</td><td></td><td></td></tr>
<tr><td>S067</td><td></td><td></td></tr>
</table>

| No | Title | Description |
|---|---|---|
| S068 | | |
| S069 | T Code Read | When the controller executes to T CODE, this FLAG will be ON, and LADDER will be told to execute T CODE, the content of T CODE will be placed in R3. After the controller issues this FLAG, it will wait until the T CODE FIN's C BIT FLAG ON, then start executing the next BLOCK. |
| S070 | At start point | When this signal is ON, it indicates that the process is at the start of a program. After run into the program, S70 will OFF. And S70 will be ON after RESET(EX: M30). |
| S071 | At end point | When this signal is ON, it indicates that the process is at the end of a program. S71 will be OFF when program is running. Notice that S71 will stay ON, before the program is start again. S71 will be ON after RESET. |
| S072 | 2nd Set Spindle Synchronization Finish | 2nd set spindle speed/angle synchronization is completed. |
| S073 | 3rd Set Spindle Synchronization Finish | 3rd set spindle speed/angle synchronization is completed. |
| S074 | | |
| S075 | | |
| S076 | | |
| S077 | | |
| S078 | | |
| S079 | | |

| No | Title | Description |
|---|---|---|
| S080 | M00 Signal | M00 is read flag. This flag is automatically enabled after the M code is read until the system reset (Reset) or M Code Finish (C38 On).<br><br>Note:<br>1. Valid version: 10.114.56U, 10.116.0R, 10.116.10C, 10.116.13<br>2. Only support the first MST channel.<br>3. To ensure that the system properly enables this flag, it is recommended that in PLC applications the C38 is off until the kernel enables this flag. |
| S081 | M01 Signal | M01 is read flag. When the optional stop function (C44) is activated, this flag will be automatically enabled after the M code is read until the system reset (Reset) or M Code Finish (C38 On).<br><br>Note: Same as S080. |
| S082 | M02 Signal | M02 is read flag. this flag will be automatically enabled after the M code is read until the system reset (Reset) or M Code Finish (C38 On).<br><br>Note: Same as S080. |
| S083 | M30 Signal | M30 is read flag. this flag will be automatically enabled after the M code is read until the system reset (Reset) or M Code Finish (C38 On).<br><br>Note1: Same as S080.<br>Note2: If below conditions both fulfilled, M30 will enable the program return function (Valid version: 10.116.41, 10.117.41 and after). M30 will not be placed in R1 for LADDER to read, and S083 is not supported at this time.<br><br>1. Pr732 * Multi-program MST channel, set to 1<br>2. C015 ON |
| S084 | | |
| S085 | | |
| S086 | | |
| S087 | | |
| S088 | Screen Saver | Screen saver mode enabled. (Only in CE system) |
| S089 | | |
| S090 | | |

| No | Title | Description |
|---|---|---|
| S091 | | |
| S092 | | |
| S093 | | |
| S094 | | |
| S095 | | |
| S096 | | |
| S097 | Exe File CRC error | When this signal is ON, it indicates that system's specific file encounters CRC check error. This condition usually occurs. It may be that the system is infected with the virus and cannot be recovered. The relevant records will be stored in C:\CRC_Chk.log.<br>Compatibility change:<br>Valid version starts from 10.114.52. |
| S098 | OCAPI Server is Running | Whether OCAPIServer is activated. When OCAPIServer is activated, this Bit is set to True; and when OCAPIServer is deactivated, this Bit is set to False. |
| S099 | Dipole connection in use | Whether Dipole connection is in progress. When any remote program is connected to the kernel, this Bit is set to 1; and when no remote program is connected, this Bit is set to False. |
| S100 | DOS USB in use | on: DOS USB in use; off: DOS USB not in use. |
| S101~S132 | | Mapping macro system variable (#6001~#6032) |
| S133 | Axis Exchange Status 1 | First set of axis exchange successfully flag.<br>The axis exchange is completed inside the system, and this state changes. |
| S134 | Axis Exchange Status 2 | Second set of axis exchange successfully flag.<br>The axis exchange is completed inside the system, and this state changes. |

| No | Title | Description |
|---|---|---|
| S135 | Axis Exchange Status 3 | Third set of axis exchange successfully flag.<br>The axis exchange is completed inside the system, and this state changes. |
| S136 | Axis Exchange Status 4 | Fourth set of axis exchange successfully flag.<br>The axis exchange is completed inside the system, and this state changes. |
| S137 | | |
| S138 | | |
| S139 | | |
| S140 | $4^{th}$ Axis Home OK | 4th axis Homing OK, 4th axis axis HOME process finished, and this FLAG will be ON. The software stroke limit protection will be activated after homing completed. Therefore, in the case that this S BIT FLAG is not ON, LADDER should write not allowed to cycle start and give homing not complete alarm. |
| S141 | $5^{th}$ Axis Home OK | (As above) |
| S142 | $7^{th}$ Axis Home OK | (As above) |
| S143 | $8^{th}$ Axis Home OK | (As above) |
| S144 | $9^{th}$ Axis Home OK | (As above) |
| S145 | $10^{th}$ Axis Home OK | (As above) |
| S146 | $11^{th}$ Axis Home OK | (As above) |
| S147 | $12^{th}$ Axis Home OK | (As above) |

| No | Title | Description |
|---|---|---|
| S148 | 13th Axis Home OK | (As above) |
| S149 | 14th Axis Home OK | (As above) |
| S150 | 15th Axis Home OK | (As above) |
| S151 | 16th Axis Home OK | (As above) |
| S152 | 17th Axis Home OK | (As above) |
| S153 | 18th Axis Home OK | (As above) |
| S154 | | |
| S155 | 4th Axis Busy | When this FLAG is ON, it indicates that the fourth axis is being executed, and a new command cannot be accepted. When this FLAG is OFF, the fourth axis is in the Idle state, allowing new commands to be accepted. |
| S156 | 5th Axis Busy | (As above) |
| S157 | 7th Axis Busy | (As above) |
| S158 | 8th Axis Busy | (As above) |
| S159 | 9th Axis Busy | (As above) |
| S160 | 10th Axis Busy | (As above) |
| S161 | 11th Axis Busy | (As above) |

| No | Title | Description |
|---|---|---|
| S162 | 12th Axis Busy | (As above) |
| S163 | 13th Axis Busy | (As above) |
| S164 | 14th Axis Busy | (As above) |
| S165 | 15th Axis Busy | (As above) |
| S166 | 16th Axis Busy | (As above) |
| S167 | 17th Axis Busy | (As above) |
| S168 | 18th Axis Busy | (As above) |
| S169 | | |
| S170 | | |

<table>
<tr><th>No</th><th>Title</th><th>Description</th></tr>
<tr><td>S171~<br>S186</td><td>Servo Alarm State</td><td>
Alarm state for the port of motion card.<br><br>
Pulse Train Drives: This S bit will be activated when motion card does not receive alarm signal.<br>
Serial Bus Drives: This S bit will be activated when Servo Drive sens out a alarm signal.<br><br>
system reserved S171: Pulse Train Drive- Alarm state for the port 1; Serial Bus Drive- The station number 1 drive.<br>
S172: Pulse Train Drive- Alarm state for the port 2; Serial Bus Drive- The station number 2 drive.<br>
…<br>
S186: Pulse Train Drive- Alarm state for the port 16; Serial Bus Drive- The station number 16 drive.<br>
Note：<br>
This function does not support Servo6.<br><br>
Operation Restriction：<br>
1. The slot chassis type Servo6 axis card does not support this feature.<br>
2. This function is only supported by pulse train type and M2 type.<br>
3. Following from item 2, when using other communication types, please use S31 and S42.<br>
Pulse Train type：Indicates the signal status of the servo alarm contact<br><br>
This S-Bit only reflects the status of the servo alarm contact corresponding to the axis card port. When there is signal input, this S-Bit OFF; when there is no signal input, this S-Bit ON. According to the parameter "Pr10 servo alarm contact type", the system will trigger the corresponding axial "MOT-9 driver alarm" when this S-Bit ON/OFF is triggered.<br>
<table>
<tr><th>Servo Alarm Contact Type</th><th>Port Alarm Signal</th><th>S-17x</th><th>System Alarm</th></tr>
<tr><td rowspan="2">Pr10 = 0 ( A contact )</td><td>No</td><td>ON</td><td>No</td></tr>
<tr><td>Yes</td><td>OFF</td><td>MOT-9</td></tr>
<tr><td rowspan="2">Pr10 = 1 ( B contact )</td><td>No</td><td>ON</td><td>MOT-9</td></tr>
<tr><td>Yes</td><td>OFF</td><td>No</td></tr>
</table>
S171：Corresponding to the 1st axis card port.<br>
S172：Corresponding to the 2nd axis card port<br>
…<br>
S186：Corresponding to the 16th axis card port<br><br>
M2 Serial：Indicates the driver alarm state<br><br>
If an M2 serial driver is used, the corresponding S-bit On will occur when a driver alarm occurs.
</td></tr>
</table>

| No | Title | Description |
|---|---|---|
| | | S171：Corresponding to the driver station no. which is set to be 1.<br>S172：Corresponding to the driver station no. which is set to be 2.<br>…<br>S186：Corresponding to the driver station no. which is set to be 16.<br>i.e.：In the M2 serial environment, when the driver station number which set as 3 gives alarm, S173 will be On. |
| S190~S299 | | (System reserved area) |
| S300 | ECam Reload Status | Reload the ECam insertion point R value. When this Bit is On, it means that reload is completed and the electronic cam can be activated; when this Bit is Off, Reloading. |
| S301 | 1st ECam Busy | The first group of electronic cams is busy. When this Bit is On, it means that the first group of electronic cams are working; when this Bit Off, the cam relationship motion between the master and slave axis is canceled. |
| S302 | 2nd ECam Busy | (As above) When this Bit On is on, it indicates that the first group of electronic cams are in use; when this Bit is off, the master and slave axis are not working according to cam relationship. |
| S303 | 3rd ECam Busy | (As above) |
| S304 | 4th ECam Busy | (As above) |
| S305 | 5th ECam Busy | (As above) |
| S306 | 6th ECam Busy | (As above) |
| S307 | 7th ECam Busy | (As above) |
| S308 | 8th ECam Busy | (As above) |
| S309~S319 | | |

| No | Title | Description |
|---|---|---|
| S321~S250 | For robot kernel | Robot kernel usage area (non-product customization area). |
| S351~S400 | Keyboard Sbit | S Bit mapping to keyboard scan code, and now only S355~S374 are open. |
| S401~488 | Keyboard Scan Code | Mapping to the keyboard scan code 1~88. |
| ~S511 | Reserved for CNC | System reserved area. |

## 1.3 PC Keyboard C/S Mapping

### 1.3.1 Basic Key Area

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Esc 401 | F1 458 | F2 460 | F3 461 | F4 462 | F5 463 | F6 464 | F7 465 | F8 466 | F9 467 | F10 468 | F11 469 | F12 470 | | |
| ` 441 | 1 402 | 2 403 | 3 404 | 4 405 | 5 406 | 6 407 | 7 408 | 8 409 | 9 410 | 0 411 | - 412 | = 413 | \ 443 | Back 414 |
| Tab 415 | Q 416 | W 417 | E 418 | R 419 | T 420 | Y 421 | U 422 | I 423 | O 424 | P 425 | [ 426 | ] 427 | Enter 428 | |
| Caps 458 | A 430 | S 431 | D 432 | F 433 | G 434 | H 435 | J 436 | K 437 | L 438 | ; 439 | ‘ 440 | | | |
| Shift | Z 444 | X 445 | C 446 | V 447 | B 448 | N 449 | M 450 | , 451 | . 452 | / 453 | Shift 454 | | | |
| Ctrl 429 | | Alt 456 | | Space 457 | | | | | | | | Alt 456 | | Ctrl 429 |

### 1.3.2 Extension Key Area

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Print | Scroll<br>470 | Pause | | Num<br>469 | /<br>453 | *<br>455 | _<br>474 |
| Insert<br>482 | Home<br>471 | Up<br>473 | | 7 Home<br>471 | 8↑<br>472 | 9 Up<br>473 | +<br>478 |
| Delete<br>483 | End<br>479 | Down<br>481 | | 4 ←<br>475 | 5<br>476 | 6 →<br>477 | |
| | ↑<br>472 | | | 1 End<br>479 | 2↓<br>480 | 3 Down<br>481 | Enter<br>428 |
| ←<br>475 | ↓<br>480 | →<br>477 | | 0<br>482 | | . <br>483 | |

## 1.4 R Register Interface

### 1.4.1 Resources Distribution Table

| Number | Instructions | Reading/ Writing Regulations (HMI、PLC、MACRO) | Bit Storage | Permanent Preservation |
|---|---|---|---|---|
| R0~R39 | CNCSystem Interface | Defined according to the charts below | Yes | No |
| R40~R49 | PLC Alarm Message | | | |
| R50~R80 | User-defined | Read/Write | Yes | No |
| R81~R100 | Correspond to system parameters 3401~3420 | Read Only | Yes | Yes |
| R101~R102 | Tool Status (save in FRAM) | Read/Write | Yes | Yes |

| Number | Instructions | Reading/ Writing Regulations (HMI、PLC、MACRO) | Bit Storage | Permanent Preservation |
|---|---|---|---|---|
| R103~R192 | Correspond to milling machine tool data T1~T90 (saved in FRAM)<br>User-defined (non milling machine) | Read/Write | Yes | Yes |
| R193~R255 | User-defined (save in FRAM) | | | |
| R256~R511 | User-defined | | | No |
| R512~R639 | CNCSystem Interface | Defined according to the charts below | Yes | No |
| R640~R1023 | | | No | |
| R1000 | Part Count | Read/Write | No | Yes |
| R1002 | Required Part Count | Read/Write | | |
| R1004 | Total Part Count | Read/Write | | |
| R1005~R1007 | Controller ASCIICode | Read Only | | |
| R1009~R1019 | CNC system machining time/up time, please refer to the descriptions of each R value. | Read Only | | |
| R1024~R1032 | Milling Machine: Occupied by the milling machine auto middle function/auto tool presetting and measuring function.<br>Lathe: User-Defined | Read/Write | No | No |
| R1033~R2049 | User-defined | Read/Write | No | No |
| R2050~R2090 | Pr3810=0:User-defined | Read/Write | No | No |
| | Pr3810=1: Occupied by the concurrent multiple M codes executing function | | | |
| R2091~R2099 | User-defined | Read/Write | No | No |

| Number | Instructions | Reading/ Writing Regulations (HMI、PLC、MACRO) | Bit Storage | Permanent Preservation |
|---|---|---|---|---|
| R2100~R3100 | Pr3228=0: User-defined | Read/Write | No | No |
| | Pr3228=1: Occupied by the tool managing function | | | Yes |
| R3101~R4095 | User-defined | Read/Write | No | No |
| R4096~R5999 | CNC System Interface | Defined according to the charts below | No | No |
| R6000~R7999 | User-defined (save in FRAM) | Read/Write | No | Yes |
| R8000~R8500 | Correspond to system parameters 5001~5500 | Read Only | No | No |
| R8501~R8999 | CNC System Interface | Read Only | No | No |
| R9000~R9999 | Robot Kernel Operating Area (Not Customized Area) | Read/Write | No | No |
| R10000~R10999 | CNC system value adding applications memory area | Read/Write | No | Yes |
| R11000~R14999 | CNC System Interface | Read Only | No | No |
| R15000~R19909 | CNCsystem value adding applications non-memory area | Read/Write | No | No |
| R20000~R65535 | User-defined | Read/Write | No | No |

NOTE:

1. The permanent storage of R6000~R7999 is in Fram. If using PIO3, simulator, or controller using PIO5 and Pr5's setting is 9 (Virtual I/O Card), system will not be able to make permanent preservation.
2. DOS system only supports R0~R7999.
3. The part of this table about the macro program is only suitable for read and write R values using G10 L1000 P_ R_; if you use the @ method to read and write R values in the macro program, please refer to the Macro变数规格.

## 1.4.2 Interface Instructions

| No | Title & Range | Function Description | Read/ Write Principle |
|---|---|---|---|
| **R0** | Marking special edition<br>(ISSUE-ID + 2 version codes) | Records the special edition version of the controller installation package. | Read only |
| **R1** | M Code (00~99) | When the CNC executes M CODE, it stores the contents of the M CODE here for the LADDER to read. | Read only |
| **R2** | S Code (0000~9999) | When the CNC executes S CODE, it stores the contents of the S CODE here for the LADDER to read. | Read only |
| **R3** | T Code (0000~9999) | When the CNC executes T CODE, it stores the contents of the T CODE here for the LADDER to read. | Read only |
| **R4** | | Synthesis feedrate command value. Unit: LIU/min | |
| **R5** | B Code (0000~9999) | The function can be enabled by Pr 3806<br>When CNC executes B CODE, it stores the contents of the B CODE here for the LADDER to read.<br>Only the 1st MST channel supports the execution of B CODE on PLC. (Refer to Pr721~Pr730) | Read only |
| **R6~R12** | Reserved for CNC | System Reserved Area | |

| | | | |
|---|---|---|---|
| **R13®** | Mode Selection | Machining mode selection<br>1: Edit<br>2: Auto<br>3: MDI<br>4: JOG<br>5:INCJOG<br>6: MPG<br>7: HOME | Write only |
| **R14** | Increment Feed | Incremental JOG mode and MPG mode segments settings, this R value will not be affected by Pr3207.<br>INCJOG Mode:<br>1: x1 LIU<br>2: x10 LIU<br>3: x100 LIU<br>4: x1000 LIU<br><br>MPG Mode:<br>1: x1 LIU<br>2: x10 LIU<br>3: x100 LIU<br>4: The magnified rate is set in Pr2001<br>Note: Please refer to Pr17 for the definition of LIU. | Write only |
| **R15** | Spindle Override | Spindle segment setting (Maximum value is 200%)<br>1. If Pr3207=1, R15 is the percentage of spindle override, i.e. R15=5 means spindle override is 5%.<br>2. If Pr3207=2, override segment defined as below:<br>R15=1, spindle override is 50%<br>R15=2, spindle override is 60%<br>……<br>R15=8, spindle override is 120%<br>3. The actual spindle override is R15*R851~, which the unit of R851~ is defined as percentage, it does not affected by Pr3207~ | Write only |

| | | | |
|---|---|---|---|
| **R16** | Feedrate Override | G01,G02,G03 segment setup<br>1. If Pr3207=1, R16 is the percentage of spindle override, e.g. R16=5 means spindle override is 5%.<br>2. If Pr3207=2, R16 definition as below:<br>R16=1, spindle override is 10%<br>R16=2, spindle override is 20%<br>……<br>R16=20, spindle override is 200% | Write only |
| **R17** | JOG Override | JOG segment setup<br>1. If Pr3207=1, R17 is the percentage of jog override, e.g. R17=5 means spindle override is 5%.<br>2. If Pr3207=2, R17 definition as below:<br>R17=1, spindle override is 10%.<br>R17=2, spindle override is 20%,<br>……<br>R17=20, spindle override is 200%.<br>3. The lower limit of R17 is 0, JOG Override will be 0% if R17 is set to be a negative value; there is no upper limit for R17, but the speed of axis is limited by Pr461~ | Write only |
| **R18** | Rapid Traverse Override | G00 segment setup<br>1. If Pr3207=1, R18 is the percentage of spindle override, e.g. R18=1 means spindle override is 1%.<br>2. If Pr3207=2, R18 definition as below:<br>R18=1, spindle override is F0.<br>R18=2, spindle override is 25%.<br>R18=3, spindle override is 50%.<br>R18=4, spindle override is 100%. | Write only |
| **R19** | Chopping Feedrate Override | Chopping federate segments settings<br>1. If Pr3207=1, the feeding percentage equals to the content of R19. e.g. R19=5 means the feedrate override is 5%.<br>2. If Pr3207=2, the R19 definition as below:<br>R19=1 represents 10%<br>R19=2 represents 20%<br>……<br>R19=15 represents 150% | Write only |

| | | | |
|---|---|---|---|
| **R20** | Servo Axis Enabled | Servo Axis Enabled<br>Bit 0 reserved, not using.<br>Bit1 represents the 1st Axis (X) enabled.<br>Bit 2 represents the 2nd Axis (Y) enabled.<br>……<br>Bit18 represents the 18th Axis enabled. | Read only |

| | | | |
|---|---|---|---|
| **R21** | Active Session ID | Multi-Path CNC main system executing mode:<br>0: Execute the Multi-Path program or run the general non-Multi-Path program in the 1st path.<br>1: Only execute the $1 program or general non-Multi-Path program in the 1st path.<br>2: Only execute the $2 program or general non-Multi-Path program in the 2nd path.<br>3: Only execute the $3 program or general non-Multi-Path program in the 3rd path.<br>4: Only execute the $4 program or general non-Multi-Path program in the 4th path.<br><br>Function expansions from 10.116.34, 10.117.34.<br>If R21.11 is OFF, the specifications remain the same as above; if R21.11 is ON, change the specifications as below:<br>Bit 0, 12-31 reserved, not using<br>Bit 1: execute the $1 program or general non-Multi-Path program in the 1st path.<br>Bit 2: execute the $2 program in the 2nd path.<br>Bit 3: execute the $3 program in the 3rd path.<br>Bit 4: execute the $4 program in the 4th path.<br>Bit 5-10: not using, only reserved for the possibility of future expansion to 10 axis.<br>Bit 11: R21 definition switch.<br><br>R21 expansion function (R21.11 on) remarks;<br>• R21.1~R21.4 OFF: All the paths won't CycleStart when activated C0, suggest the developing personnel to provide proper protection for the action in PLC.<br>• Pr731=3 (The 1/2/3 path is the main system path), if R21.1, 2, R21.4are ON, only the 1st and 2nd paths CycleStart when activated C0.<br>• Switching R21 during machining/pause/block stop does not effect to the actual machining paths and HMI display, suggest the developing personnel to provide proper protection for the action in PLC. | Read only |

| | | | |
|---|---|---|---|
| **R22** | MPG:<br>1: x1<br>2: x10<br>3: x100<br>4: Base on Pr2001. | The 2nd MPG segment selection | Write only |
| **R23** | MPG:<br>1: x1<br>2: x10<br>3: x100<br>4: Base on Pr2001. | The 3rd MPG segment selection | Write only |
| **R24** | Spindle Gear Selection | Spindle gear shifting settings:<br><br>1 represents the 1st gear<br>2 represents the 2nd gear<br>3 represents the 3rd gear<br>9 represents the blank gear. | Write only |
| **R25** | Actual feedrate | | |
| **R26** | Program Coordinate X | X axis program coordinate position, the unit is the minimum input unit, LIU.<br>When control precision is micro meter, its value would be:<br>0.01 mm<br>0.01 deg,<br>0.0001 inch | Read only |
| **R27** | Program Coordinate Y | (As above) | Read only |
| **R28** | Program Coordinate Z | (As above) | Read only |
| **R29** | Program Coordinate C(6th) | (As above) | Read only |

| | | | |
|---|---|---|---|
| **R30** | IO Signal of 1st Driver Set | R30.1~R30.18 correspond to the 1st Axis~ 18th Axis driver IO signal.<br>Note 1: Supporting 10.116.20, 10.117.21 or above version, that is supporting the torque arrival signal.<br>Note 2: Torque arrival signal is only supported by;<br>1. YASKAWA M2/M3<br>2. SYNTEC M2/M3<br>3. EtherCAT, for brands and version info refer to EtherCAT Driver Application Manual<br>Note 3: To activate the function, set the driver parameters first to enable the torque limitation function and restart the driver.<br>Note 4:<br>R30 was preset to monitor the torque arrival signal, via Pr3266~Pr3267 Select the drive signal to be monitored (External 1 signal or Brake signal)<br>Pr3266 = 1, R30.1~R30.18 corresponds to the torque arrival signal of the 1st~16th axis, the Bit becomes 1 when the torque arrives the limit value.<br>Pr3266 = 2, R30.1~R30.18 corresponds to the EXT1 signal of the 1st~16th axis, the Bit becomes 1 when the driver receives the EXT1 input signal.<br>Pr3266 = 3, R30.1~R30.18 corresponds to the Brake signal of the 1st~16th axis, the Bit becomes 1 when the driver activates the brake.<br>**Supporting 10.116.36Y, 10.116.51, 10.117.51 and above version.**<br>Note 5: Only YASKAWA M2/M3 supports the External 1 signal and the Brake signal. | Read only |
| **R31** | Machine Coordinate X | X axis machine coordinate position, the unit is the minimum length input unit: LIU, same as the length unit of system parameters. | Read only |
| **R32** | Machine Coordinate Y | (As above) | Read only |
| **R33** | Machine Coordinate Z | (As above) | Read only |
| **R34** | Machine Coordinate C(6th) | (As above) | Read only |
| **R35** | Spindle Machine Position | Spindle machine position. Unit: 0.001 degree. | Read only |

| | | | |
|---|---|---|---|
| **R36** | 1st Spindle Speed | Current 1st spindle speed according to the feedback value or the command value if there is no encoder. If the 1st spindle is not activated, the value is fixed to 0 RPM. Unit: RPM. | Read only |
| **R37** | Movement direction relative to current working plane | Movement direction of tool relative to current working plan, unit is 0.001 degree. | Read only |
| **R38** | Argument one | Argument one, the meaning is defined by the C Bit function that uses this argument. | Write Only |
| **R39** | Relay 2 A/D value | Relay2 A/D converter value | Read only |
| **R40** | PLC Alarm Message #1 ~ #16<br>#251 ~ #266 | System default alarm area, corresponds to alarm number 1 to 16, please refer to the mechanical logic control alarm list for definitions.<br>Bit 0~15 #1 ~ #16 PLC Alarm Message, save to history.<br>Bit16~31 #251 ~ #266 PLC Waring Message, no save to history. | Write Only |
| **R41** | PLC Alarm Message #17 ~ #32<br>#267 ~ #282 | System default alarm area, corresponds to alarm number 17 to 32, please refer to the mechanical logic control alarm list for definitions.<br>Bit 0~15 #17 ~ #32 PLC Alarm Message, save to history.<br>Bit16~31 #267 ~ #282 PLC Warning Message, no save to history. | Write Only |
| **R42** | PLC Alarm Message #33 ~ #48<br>#283 ~ #298 | System default alarm area, corresponds to alarm number 33 to 48, please refer to the mechanical logic control alarm list for definitions.<br>Bit 0~15 #33~ #48 PLC Alarm Message, save to history.<br>Bit16~31 #283 ~ #298 PLC Warning Message, no save to history. | Write Only |
| **R43** | PLC Alarm Message #49 ~ #64<br>#299 ~ #314 | System default alarm area, corresponds to alarm number 49 to 64, please refer to the mechanical logic control alarm list for definitions.<br>Bit 0~15 #49 ~ #64 PLC Alarm Message, save to history.<br>Bit16~31 #299 ~ #314 PLC Warning Message, no save to history. | Write Only |

| | | | |
|---|---|---|---|
| **R44** | PLC Alarm Message #65 ~ #80<br>#315 ~ #330 | User define alarm message, corresponds to alarm number 65 to 80.<br>Bit 0~15 #65 ~ #80 PLC Alarm Message, save to history.<br>Bit16~31 #315 ~ #330. Depending on Pr3249, this area can be PLC Alarm Message or PLC Waring Message.<br>PLC Alarm Message will be saved to alarm history but PLC Warning Message will not be saved. | Write Only |
| **R45** | PLC Alarm Message #81 ~ #96<br>#331 ~ #346 | User define alarm message, corresponds to alarm number 81 to 96.<br>Bit 0~15 #81 ~ #96 PLC Alarm Message, save to history.<br>Bit16~31 #331 ~ #346. Depending on Pr3249, this area can be PLC Alarm Message or PLC Waring Message.<br>PLC Alarm Message will be saved to alarm history but PLC Warning Message will not be saved. | Write Only |
| **R46** | PLC Alarm Message #97 ~ #112<br>#347 ~ #362 | User define alarm message, corresponds to alarm number 97 to 112.<br>Bit 0~15 #97 ~ #112 PLC Alarm Message, save to history.<br>Bit16~31 #347 ~ #362. Depending on Pr3249, this area can be PLC Alarm Message or PLC Waring Message.<br>PLC Alarm Message will be saved to alarm history but PLC Warning Message will not be saved. | Write Only |
| **R47** | PLC Alarm Message #113 ~ #128<br>#363 ~ #378 | User define alarm message, corresponds to alarm number 113 to 128.<br>Bit 0~15 #113 ~ #128 PLC Alarm Message, save to history.<br>Bit16~31 #363 ~ #378. Depending on Pr3249, this area can be PLC Alarm Message or PLC Waring Message.<br>PLC Alarm Message will be saved to alarm history but PLC Warning Message will not be saved. | Write Only |
| **R48** | PLC Alarm Message #129 ~ #144<br>#379 ~ #394 | User define alarm message, corresponds to alarm number 129 to 144.<br>Bit 0~15 #129 ~ #144 PLC Alarm Message, save to history.<br>Bit16~31 #379 ~ #394. Depending on Pr3249, this area can be PLC Alarm Message or PLC Waring Message.<br>PLC Alarm Message will be saved to alarm history but PLC Warning Message will not be saved. | Write Only |

| | | | |
|---|---|---|---|
| **R49** | PLC Alarm Message #145 ~ #160<br>#395 ~ #410 | User define alarm message, corresponds to alarm number 145 to 160.<br>Bit 0~15 #145 ~ #160 PLC Alarm Message, save to history.<br>Bit16~31 #395 ~ #410. Depending on Pr3249, this area can be PLC Alarm Message or PLC Waring Message.<br>PLC Alarm Message will be saved to alarm history but PLC Warning Message will not be saved. | Write Only |
| **R50~R80** | User define | User-defined | Read/ Write |
| **R81~R100** | MLC System Parameter | Apply MLC system parameter No.3401~No3420 to build a LADDER which is adaptable to various machines, such as tool changing and etc. | Read Only |
| **R101** | Tool Magazine Position | Tool Magazine position status | Read/ Write |
| **R102** | Current Spindle Tool Number | Current Spindle Tool Number<br>Used in the HMI display of T code in single program system (Pr731=1); please refer to R525 for multi-program system. | Read/ Write |
| **R103~R192** | Mill Tool Data | Correspond to milling machine tool data T1~T90 (saved in FRAM)<br>User-defined (non milling machine) | Read/ Write |
| **R193~R255** | User define | User-define (saved in FRAM) | Read/ Write |
| **R256~R511** | User define | User-define | Read/ Write |
| **R512** | Net Ready | Net PLC Function, when the corresponding bit is ON, means the station in network is READY. All the shared data are the latest.<br>Bit 0: Reserved.<br>Bit 1: Station 1 ready<br>Bit 2: Station 2 ready<br>.....<br>Please check Pr3236~Pr3238 for Net PLC setups. | Read Only |

| | | | |
|---|---|---|---|
| **R513** | Net Timeout | Net PLC Function.<br>The network should have been timeout when the corresponding Bit shows ON. It's an exception if just started up the system, but if not receiving any updates of the station within 100ms after the connection, then it'll be a timeout. The information update frequency is decided by the PLC scanning time.<br>Bit 0: Reserved.<br>Bit 1: Station 1 timeout.<br>Bit 2: Station 2 timeout.<br>.... | Read Only |
| **R514** | Pending alarm module ID | Pending alarm module ID of current PLC display.<br>Updates the pending alarm module information to PLC every 3 seconds by HMI.<br>For alarm module ID, please refer to Alarm Class Table.<br>For alarm information about serial servo drives, please also refer to to S171~186. | |
| **R515** | Pending alarm ID | Pending alarm ID of current PLC display.<br>Updates the pending alarm information to PLC every 3 seconds by HMI. | |
| **R516** | Pending alarm Axis ID | Pending alarm Axis ID of current PLC display.<br>Updates the pending alarm information to PLC every 3 seconds by HMI. | |
| **R517** | Pending alarm Spindle ID | Pending alarm Spindle ID of current PLC display.<br>Updates the pending alarm information to PLC every 3 seconds by HMI. | |
| **R518** | Manual Coordinate (5 Axis RTCP) | Define the coordinate system referring to when giving manual commands (MPG、JOG、INCJOG)<br>0: Machine Coordinate<br>1: Program Coordinate (G92 Coordinate)<br>2: Tool Coordinate (Only effective in five-axis machine.) | |
| **R519** | Manual RTCP | Manual RTCP<br>Set R519 to 1 and execute G43.4 to enable RTCP. | |

**R520~ R529** — First Axis Group Control Registers

The R value in this area is the control interface of the first axis group, which can be used to give commands to the first axis group and monitor the status of the first axis group.

Definition and description of each R value

| | Definition | Description | Notifications |
|---|---|---|---|
| **R520** | Command Register | • The user can order the axis group through this R value.<br>• The R value is a bit value, each bit represents different axis group commands. See the table below for details. | • If the multi-axis group independent function is not enabled (ie Pr732 is not 2), the main system axis group can only be controlled through the interface of the first axis group (ie R520~R529), and the control interfaces of the other main system axis groups will be invalid. |
| **R521** | State Register | • The user can monitor the status of the axis group through this R value.<br>• The R value is a bit value, each bit represents different axis group commands. See the table below for details. | - |

| | | | | | |
|---|---|---|---|---|---|
| | | **R522** | Program No. | • Used to specify the file name of the processing program.<br>For example: R522 = ABCD, it means that the processing program with the file name "OABCD" is assigned to the first axis group.<br>• Valid value range: [0~999,999] | • When this axis group is the main system axis group:<br>  • If R522 is non-zero, the file name is determined by R522. Triggering R520.0 will execute the processing program specified by R522.<br>  • If R522 is zero, the file name will be selected by the man-machine, and triggering R520.0 will be equivalent to triggering C0.<br>  • The program specified by R522 allows the use of $1, $2, which is a multi-axis group program.<br>• When the axis group is a non-main system axis group: | |

| | | | |
|---|---|---|---|
| | | | • If R522 is non-zero, triggering R520.0 will execute the processing program specified by R522.<br>• If R522 is zero and R520.0 is triggered, the axis group will not have any action. |
| **R523** | Feedrate Override | • It is used to control the G01/G02/G03 feed percentage of the axis group.<br>• Valid value range: [-200~200] | • If the multi-axis group independent function is not enabled (that is, Pr732 is not 2), the R523 interface of the main system axis group will be invalid, but will be controlled by R16. |
| **R524** | Rapid Travel Override | • G00 feed percentage used to control the axis group.<br>• Valid value range: [-100~100] | • If the multi-axis group independent function is not enabled (that is, Pr732 is not 2), the R524 interface of the main system axis group will be invalid, but will be controlled by R18. |

| | | | |
|---|---|---|---|
| **R525** | Target Tool Number. | • For multi-program system (Pr731≠1), display the T code of the first main system axis group on the man-machine screen; for single program system, please refer to R102. | - |
| **R526** | Remaining block distance | Display the remaining distance of the running block of the axis group, read only and always greater than zero, the unit is BLU. | - |
| **R527** | CNC Mode | The switching interface of processing mode is the same as R13. | • The interface of the first axis group (ie R527) is actually invalid, and only the interface of the second to fourth axis group (ie R537, R547, R557) is valid. |
| **R528** | (Reserved) | - | - |
| **R529** | (Reserved) | - | - |

Command Register Guideline (the bit out of below description No. is reserved):

| No. | Command | Description | Attention note |
|---|---|---|---|
| R520.0 | Cycle Start | The axis group execute specified program. | Please refer to the program numbers above for the designation of executing program. |
| R520.1 | Feedhold | Feedhold the axis group movement. | |
| R520.2 | Reset/ Abort | • Pr741 is 0<br>  • Only reset the internal status of axis group.<br>• Pr741 is 1<br>  • if it is the axis group of independent operation, then reset for axis and spindle under axis group, and clear alarm.<br>  • Otherwise, only reset the internal status of axis group. | • Please refer to Pr741 *The rule of non-primary axis group for setting of axis group of independent operation.<br>• Pr741 can be set to 1, only if the system is 10.118.40 and later version. |

| No. | Command | Description | Attention note |
|---|---|---|---|
| R520.3 | MPG Simulation | | |
| R520.4 | Block Optional Skip | | Block optional skip is not compatible with all G code format, a COM alarm will appear when the unsupported format detected. |
| R520.5 | Emergency Stop | • Pr741 is 0<br>  • Not support.<br>• Pr741 is 1<br>  • The bit is supported only for axis group of independent operation. | • Please refer to Pr741 *The rule of non-primary axis group for setting of axis group of independent operation.<br>• Pr741 can be set to 1, only if the system is 10.118.40 and later version. |

| No. | Command | Description | Attention note |
|---|---|---|---|
| | | • When C36 is on, the axis group state will be not ready. And when C36 is off, the axis group use this bit to further select ready/ not ready state. | |
| R520.6 | M30 Support Program Rewind | Turning this bit to ON, when the machining program is executed to M30, it will not be reset, but it will return to the starting position of the program like M99 and re-execute the machining. | • The interface of the first axis group (ie R520.6) is actually invalid, and only the interface of the second to fourth axis group (ie R530.6, R540.6, R550.6) is valid. |

| No. | Command | Description | Attention note |
| --- | --- | --- | --- |
| R520.7 | Single Block Pause | Turning this bit to ON, the axis group will enter the single-block pause state every time a block is executed when the machining program is executed. Start machining again (Cycle Start), the axis group will execute the next block. | • This bit is only valid when Pr732 is set to 2.<br>• The interface of the first axis group (ie R520.7) is actually invalid, and only the interface of the second to fourth axis group (ie R530.7, R540.7, R550.7) is valid.<br>• This bit only supports the main system axis group.<br>• Please switch this bit to ON before processing. If the switch is performed during processing, it may execute several more blocks to enter the single block pause. If the user needs to check the processing program during processing, it is recommended to use the handwheel to simulate R5X0.3 or M00 pause. |

| No. | Command | Description | Attention note |
| --- | --- | --- | --- |
| R520.8 | Optional Stop | • Turn this bit to ON, and when the machining program is executed to M01, the axis group will enter the pause state.<br>• Turn this bit to OFF, and when the processing program is executed to M01, M01 will be ignored and continue to execute on the next block. | • This bit is only valid when Pr732 is set to 2.<br>• The interface of the first axis group (ie R520.8) is actually invalid, and only the interface of the second to fourth axis group (ie R530.8, R540.8, R550.8) is valid.<br>• This bit only supports the main system axis group. |
| R520.11 ~R520.19 | Block Optional Skip #, '/#' | • R520.11 Block Optional Skip 1, '/1'<br>• R520.12 Block Optional Skip 2, '/2'<br>• R520.13 Block Optional Skip 3, '/3'<br>• R520.14 Block Optional Skip 4, '/4'<br>• R520.15 Block Optional Skip 5, '/5'<br>• R520.16 Block Optional Skip 6, '/6'<br>• R520.17 Block Optional Skip 7, '/7'<br>• R520.18 Block Optional Skip 8, '/8'<br>• R520.19 Block Optional Skip 9, '/9' | • Only support 10.114.20 and later version.<br>• Block optional skip is not compatible with all G code format, a COM alarm will appear when the unsupported format detected. |

State Registers guideline (the bit out of below description No. is reserved):

| No. | State | Description | Attention note |
|---|---|---|---|
| R521.0 | Busy | When the system is busy, this bit will be on. | |
| R521.1 | Feedhold | When the system is feedhold, this bit will be on. | |
| R521.2 | Work | When a system is busy( S0, R521.0 on ) , feedhold( S1, R521.1 on ) or block stop( S2 on ), this bit will be on. | |
| R521.3 | NC Ready | • Pr741 is 0<br>  • When there are "C36 on" or "system in alarm", this bit will be off.<br>  • When there are "C36 off" and "system no alarm", this bit will be represented for the all axis under axis group whether are all servo on. | • Only support 10.118.40 and later version.<br>• Please refer to Pr741 *The rule of non-primary axis group for setting of axis group of independent operation.<br>• Pr741 can be set to 1, only if the system is 10.118.40 and later version. |

| No. | State | Description | Attention note |
| --- | --- | --- | --- |
| | | • Pr741 is 1<br>• Only for axis group of independent operation to extend rule, and others axis group remain original rule the same as Pr741 is set to 0.<br>• When there are "C36on", "Independent axis grou | |

| No. | State | Description | Attention note |
| --- | --- | --- | --- |
| | | pinalarm" or "R520.5on", thisbitwillbeoff.<br>• Whenthereare"C36off","Independe | |

| No. | State | Description | Attention note |
| --- | --- | --- | --- |
| | | nt axis group no alarm" and "R520.5 off", this bit will be represented for the all axis und | |

| No. | State | Description | Attention note |
| --- | --- | --- | --- |
| | | er axis group whether are all servo on. | |
| R521.4 | Servo Not Ready | It represents that whether there is any servo not ready under the axis group. | Only support 10.118.40 and later version. |
| R521.5 | System Alarm | • ON indicates that there exist(s) alarm(s) in the axis group.<br>• OFF indicates that there is NO alarm in the axis group.<br>• This bit is only supported for main axis groups and independent subordinate axis groups. | • Only support 10.118.40 and later version.<br>• Please refer to Pr741 *The rule of non-primary axis group and Pr732 *MST channel rules of multi-programs for setting of axis group of independent operation. |

| No. | State | Description | Attention note |
| --- | --- | --- | --- |
| | | • If Pr732 is not set to 2, this bit is supported only in the first axis group for the entire main axis groups. | • Pr741 can be set to 1, only if the system is 10.118.40 and later version. |
| R521.6 | System Warning | • ON indicates that there exist(s) warning(s) in the axis group.<br>• OFF indicates that there is NO warning in the axis group.<br>• This bit is only supported for main axis groups and independent subordinate axis groups.<br>• If Pr732 is not set to 2, this bit is supported only in the first axis group for the entire main axis groups. | |
| R521.7 | Block stop | During single block stop( BLOCK STOP status ), this bit will be on. | • Only support 10.118.29W, 10.118.40C, 10.118.42 and later version. |
| R521.8 | The number of required workpieces arrives | • When this bit is ON, it indicates that the number of required workpieces of the axis group has reached. | • This bit is only valid when Pr732 is set to 2.<br>• This bit only supports the main system axis group. |

| No. | State | Description | Attention note |
|---|---|---|---|
| | | • When Cycle Start or Reset is triggered, this bit will be turned OFF. | |

| | | |
|---|---|---|
| **R530~ R539** | Second Axis Group Control Registers | The R value in this area is the control interface of the second axis group, which can be used to command and monitor the status of the second axis group.<br>The definition of each R value is the same as R520~R529, and will not be listed one by one. Please refer to the description of R520~R529 for details.<br><br>Note: When the axis group independent function is not enabled (Pr732 is not 2) and the second axis group is the main system axis group, the second axis group will be controlled by the main system axis group uniformly, and the control interface in this area will be invalid.<br>The effectiveness of the control interface is as follows: |

| | **2nd Axis Group Belongs to Main Axis Groups** | **2nd Axis Group Belongs to Secondary Axis Groups** |
|---|---|---|
| **Pr732 ≠2** | Ineffective (Unified control by the main system axis group) | Effective |
| **Pr732 =2** | Effective | Effective |

<table>
<tr>
<td>R540~<br>R549</td>
<td>Third Axis Group Control Registers</td>
<td>The R value in this area is the control interface of the third axis group, which can be used to command and monitor the status of the third axis group.<br>The definition of each R value is the same as R520~R529, and will not be listed one by one. Please refer to the description of R520~R529 for details.<br><br>Note: When the axis group independent function is not enabled (Pr732 is not 2) and the third axis group is the main system axis group, the third axis group will be controlled by the main system axis group uniformly, and the control interface in this area will be invalid.<br>The effectiveness of the control interface is as follows:
<table>
<tr><th></th><th>3rd Axis Group Belongs to Main Axis Groups</th><th>3rd Axis Group Belongs to Secondary Axis Groups</th></tr>
<tr><td>Pr732 ≠2</td><td>Ineffective (Unified control by the main system axis group)</td><td>Effective</td></tr>
<tr><td>Pr732 =2</td><td>Effective</td><td>Effective</td></tr>
</table>
</td>
<td></td>
</tr>
<tr>
<td>R550~<br>R559</td>
<td>Fourth Axis Group Control Registers</td>
<td>The R value in this area is the control interface of the fourth axis group, which can be used to command and monitor the status of the fourth axis group.<br>The definition of each R value is the same as R520~R529, and will not be listed one by one. Please refer to the description of R520~R529 for details.<br><br>Note: When the axis group independent function is not enabled (Pr732 is not 2) and the fourth axis group is the main system axis group, the fourth axis group will be controlled by the main system axis group uniformly, and the control interface in this area will be invalid.<br>The effectiveness of the control interface is as follows:
<table>
<tr><th></th><th>4th Axis Group Belongs to Main Axis Groups</th><th>4th Axis Group Belongs to Secondary Axis Groups</th></tr>
<tr><td>Pr732 ≠2</td><td>Ineffective (Unified control by the main system axis group)</td><td>Effective</td></tr>
<tr><td>Pr732 =2</td><td>Effective</td><td>Effective</td></tr>
</table>
</td>
<td></td>
</tr>
</table>

| | | | |
|---|---|---|---|
| **R560~ R564** | Reserved for CNC | Reserved for 1st Axis Group | |
| **R565~R569** | Machining Info of 2nd Axis Group | R565：Part Count<br>R566：Required Part Count<br>R567：Total Part Count<br>R568：Cycle Time<br>R569：Accumulated Machining Time | R/W |
| **R570~R574** | Machining Info of 3rd Axis Group | R570：Part Count<br>R571：Required Part Count<br>R572：Total Part Count<br>R573：Cycle Time<br>R574：Accumulated Machining Time | R/W |
| **R575~R579** | Machining Info of 4th Axis Group | R575：Part Count<br>R576：Required Part Count<br>R577：Total Part Count<br>R578：Cycle Time<br>R579：Accumulated Machining Time | R/W |
| **R580** | Spindle PLC Control Mode | Spindle PLC Control Mode<br>Under this mode, the spindle command will be controlled by PLC and decided by R941~R950 (Correspond to the $1^{st}$~$10^{th}$spindle).<br>It represents the PLC control mode when the corresponding Bit is 1; general CNC control mode when the corresponding Bit is 0.<br>Bit 0, 11-31 → Reserved<br>Bit 1 → 1st spindle controlled by PLC<br>Bit 2 → 2nd spindle controlled by PLC<br>....<br>Bit 10 → 10th spindle controlled by PLC | |

| | | | |
|---|---|---|---|
| **R581** | Spindle OFF | Spindle Mode Command<br>The corresponding Bit (R581.x) only works when the parameter 179x sets up the spindle motor type to servo motor.<br>When the corresponding bit is 1, the logic axis switches to position orientation control mode;<br>when the corresponding bit is 0, the logic axis switches back to spindle control mode, the clockwise/counterclockwise rotation control is defined by R583/R584.<br><br>Bit 0, 1, 11-31 → Reserved<br>Bit 2 → 2nd spindle mode command.<br>Bit 3 → 3rd spindle mode command.<br>...<br>Bit 10 → 10th spindle mode command.<br>Note:<br>- 1st spindle mode command is controlled by C63.<br>- When using M code to operate the Spindle CS axis exchange, the action is directly done by the kernel (not with C38). | Write Only |
| **R582** | Spindle axis mode | Spindle current axis mode<br>When the corresponding bit is 1, the spindle is under position orientation control mode;<br>when the corresponding bit is 0, the spindle is under spindle speed control mode.<br>Bit 0, 11-31 → Reserved<br>Bit 1 → 1st spindle axis control mode<br>Bit 2 → 2nd spindle axis control mode<br>...<br>Bit 10 → 10th spindle axis control mode | Read Only |
| **R583** | Rotating the spindle clockwise | Spindle clockwise rotation<br>Bit 0, 1, 11-31 → Reserved<br>Bit 2 → 2nd spindle clockwise rotation.<br>Bit 3 → 3rd spindle clockwise rotation.<br>...<br>Bit 10 → 10th spindle clockwise rotation.<br>Note:<br>1. 1st spindle clockwise rotation is controlled by C64.<br>2. To use the spindle rotating speed arrival check function correctly (parameter 1991~), it is necessary to activate the R bit to switch the system spindle into operating mode even it is a VFD spindle. | Write Only |

| | | | |
|---|---|---|---|
| **R584** | Rotating the spindle counterclockwise | Spindle counterclockwise rotation<br><br>Bit0,1, 11-31 → Reserved<br>Bit 2 → 2nd spindle counterclockwise rotation.<br>Bit 3 → 3rd spindle counterclockwise rotation.<br>...<br>Bit 10 → 10th spindle counterclockwise rotation.<br><br>Note:<br><br>1. 1st spindle counterclockwise is controlled by C65.<br>2. To check spindle speed arrival, this bit must be triggered even if it is a inverter spindle.<br>3. To use the spindle rotating speed arrival check function correctly (parameter 1991~), it is necessary to activate the R bit to switch the system spindle into operating mode even it is a VFD spindle. | Write Only |
| **R585** | Spindle JOG Mode | Spindle JOG Mode Command<br><br>When the corresponding bit is 1, it forces the spindle to rotate with the spindle JOG speed set by parameter 172x.<br><br>The function is usually used on spindle tool change and modeling of Milling machine or auto feed of Lathe.<br><br>Bit 0, 1, 11-31 → Reserved<br>Bit 2 → 2nd spindle JOG mode<br>Bit 3 → 3rd spindle JOG mode<br>...<br>Bit 10 → 10th spindle JOG mode.<br><br>Note: 1st spindle JOG mode is controlled by C60. | Write Only |

| | | | |
|---|---|---|---|
| **R586** | Spindle Orientation Stop | Spindle Orientation Mode Command<br>When the corresponding bit is 1, it runs the spindle orientation function.<br>The function only works with an encoder installed on the spindle and the corresponding bit remains ON.<br>Parameter 174x: Modify the spindle orientation speed.<br>Parameter 175x: Modify the spindle orientation angle, the angle is the synchronization signal position relative to the encoder. Therefore, the parameter must be readjusted every time after changing a motor, encoder or belt.<br>Parameter 176x: Modify the spindle orientation time.<br>R587: Show the complete signal of the spindle orientation function.<br>Bit 0, 1, 11-31 → Reserved<br>Bit 2 → 2nd spindle orientation mode.<br>Bit 3 → 3rd spindle orientation mode.<br>...<br>Bit 10 → 10th spindle orientation mode.<br>Note: 1st spindle Orientation is controlled by C61 | Write Only |
| **R587** | Spindle Orientation Stop Finish | Spindle Orientation finish flag<br>Bit 0, 1, 11-31 → Reserved<br>Bit 1 → 1st spindle orientation finish<br>Bit 2 → 2nd spindle orientation finish<br>Bit 3 → 3rd spindle orientation finish<br>...<br>Bit 10 → 10th spindle orientation finish<br>Note: S61 & R587.1 both are flags of 1st spindle. | Read Only |
| **R588** | Rigid Tapping Mode | Spindle rigid tapping mode<br>Bit 1 → 1st spindle is in rigid tapping mode<br>Bit 2 → 2nd spindle is in rigid tapping mode<br>Bit 3 → 3rd spindle is in rigid tapping mode<br>...<br>Bit 10 → 10th spindle is in rigid tapping mode | |

| | | | |
|---|---|---|---|
| **R589** | Multiple Axis Group MST associated information | This Registry stores M/S/T information triggered by S29/S54/S69, and the information will be contained until next M/S/T command is read.<br>[ Bit 1 ~ 4, M/S/T Command Path Information ]<br>R589.1 The current M/S/T is being sent by $1 (1st path).<br>R589.2 The current M/S/T is being sent by $2 (2nd path).<br>...<br>[Bit 11 ~ 20 Spindle Information]<br>R589.11, The current M/S/T is being sent by $x, its main spindle is the first spindle.<br>R589.12, The current M/S/T is being sent by $x, its main spindle is the second spindle.<br>...<br>R589.20, The current M/S/T is being sent by $x, its main spindle is the tenth spindle. | |
| **R590~ R599** | PLC warning message | PLC Hint(Warning) Message Area, each bit triggers one hint. There are 32 bits in one register, and a total 320 messages can be used.<br>R590.0 Reserved<br>R590.1 for 1st hint message<br>R590.2 for 2nd hint message<br>..<br>R590.31 for 31st hint message<br>R591.0 for 32nd hint message<br>..<br>R592.0 for 64th hint message<br>..<br>R593.0 for 96th hint message<br>..<br>Hint message is defined from string list 23001. That is, 23001 is the content of 1st hint, 23002 is the content of 2nd hint, so on and so forth. | |

| | | | |
|---|---|---|---|
| **R600** | Machine Lock | Machine Lock<br>Bit 0 Reserved<br>Bit 1 for 1st axis (X) lock<br>Bit 2 for 2nd axis (Y) lock<br>...<br>Bit 18 for 18th axis lock<br>…<br>• The axis won't be moving if the command (e.g. G91G00X100) is sent under this function being activated (R600.X ON), both the remaining distance and the program coordinate will show normally, but the machine coordinate will be fixed till the function being turned off, then the system will synchronize the machine coordinate with the program coordinate.<br>• If this function being activated (R600.X.ON) during axial movements, the axis won't be moving and both the remaining distance and the program coordinate will show normally, but the machine coordinate will be fixed right after the function being activated till the function being turned off, then the system will synchronize the machine coordinate with the program coordinate. | Write Only |
| **R601** | Axis MPG simulation | Under the PLC Axis program, if the corresponding flag bit is 1, the feedrate speed of the PLC axis is decided by the rotating speed of MPG. The machine moves faster when the MPG rotates faster; the machine moves backwards when the MPG is rotating reversely; the machine stops when the MPG stops. It is suitable for trial machining.<br>Bit 0 Reserved.<br>Bit 1 for 1st axis (X) MPG simulation<br>Bit 2 for 2nd axis (Y) MPG simulation<br>...<br>Bit 18 for 18th axis MPG simulation | |
| **R602** | Spindle Y-Delta Request Mode | Spindle Y-Delta request mode, the switching speed is set by parameter 1841~1850.<br>If the corresponding bit is 0 means Y connect; 1 means Delta connect.<br>Bit 0 Reserved.<br>Bit 1 is 1st axis Y-Delta connect Mode.<br>Bit 2 is 2nd axis Y-Delta connect Mode.<br>…<br>Bit 10 is 10th axis Y-Delta connect Mode. | |

| | | | |
|---|---|---|---|
| **R603** | Inhibit Axis Command | Inhibit specific axis moving command.<br>When the Inhibit Axis command is ON, the running program turns into **Feedhold** state. R841~R844 will show the feedhlold reason.<br>(Versions after 10.116.38B, 10.116.52E, 10.116.54, 10.117.54 turn into Feedhold state, previous versions turn into Block Stop state)<br>Bit 0: Reserved.<br>Bit 1: Inhibit 1st Axis Motion Command.<br>Bit 2: Inhibit 2nd Axis Motion Command.<br>…<br>Bit 18: Inhibit 18th Axis Motion Command. | |
| **R604** | Teach In command | Teach In Command Area<br>Bit 0 Rapid orientation endpoint teaching<br>Bit 1 Straight cutting endpoint teaching<br>Bit 2 Arc cutting teaching. Frist trigger is the arc middle point input, second trigger is the arc endpoint input.<br>Bit 3 Point coordinate teaching.<br>Bit 7 Designate the arc teaching plane to be G17, and add G17 in front of G codes when generating.<br>Bit 8 Designate the arc teaching plane to be G18, and add G18 in front of G codes when generating.<br>Bit 9 Designate the arc teaching plane to be G19 and add G19 in front of G codes when generating.<br>Bit 15 Edit Overwrite Mode. On: Overwrite the line where cursor at; Off: insert line.<br><Note> R604.x Teach In Command is only allowed to be used in F2 Program Edit -> F6 Teaching Page | |
| **R605** | Tool Offset Write | Tool Length Measurement Write In Command<br>Bit 0 Tool Length Measuring Function activated.<br>Bit 1: Z+ contacting surface write in request.<br>Bit 2: Z- contacting surface write in request.<br>Bit 3: X+ contacting surface write in request.<br>Bit 4: X- contacting surface write in request.<br>… | |

| | | | |
|---|---|---|---|
| **R606** | MPG Shift | MPG Shift Enable Commad<br>1. R606=0 Disable MPG Shift<br>R606=1 Enable MPG Shift<br>2. Caution: When MPPG shift enabled, with C16~ to assign MPG axis, the axis can be moved by MPG under any circumstances. Please be extra careful! | Write Only |
| **R607** | Spindle Speed Arrival | Spindle Speed Arrival Signal, identical to S64/S59.<br>Bits 0, 1, 11, 21-31 Reserved.<br>1. Under cutting G01/G02/G03<br>R607.2 means 2nd Spinde speed arrival<br>R607.3 means 3rd Spinde speed arrival<br>...<br>R607.10 means 10th Spinde speed arrival<br>2. Under threading<br>R607.12 means 2nd Spinde speed arrival<br>R607.13 means 3rd Spinde speed arrival<br>...<br>R607.20 means 10th Spinde speed arrival | Read Only |
| **R608** | Modbus PLC Communication | R608.0 Trigger this Bit to show that the master is ready for Modbus communication. ( R608.10, R608.31, and error code R5039 will be cleared when the PLC Modbus component is triggered . )<br>R608.1 (Read Only) Transmitting Status.<br>R608.2 (Read Only) Waiting to Receive.<br>R608.3 (Read Only) Receiving.<br>R608.10 (Read Only) Reception finished correctly.<br>R608.31 (Read Only) Error Flag . ON indicates that error(s) occurred and the error code will be displayed at R5039. | |
| **R609** | Axis Coupling Status | Axis Coupling Status<br>When coupling type (Pr3825/Pr3865/Pr3875/Pr3885) ≠1 (non-mechanical coupling type), the Register displays coupling status. If the coupling status is changed by C46 or R614, this Register will update after system finishes mode switch.<br>Bit 1: 1st set of axis is coupling.<br>Bit 2: 2nd set of axis is coupling.<br>Bit 3: 3rd set of axis is coupling.<br>Bit 4: 4th set of axis is coupling.<br>Note: Please refer to C46/R614 Axis Coupling Switch for axis coupling control. | |

| | | | |
|---|---|---|---|
| **R610** | Skip Position Latched | G31 or G28.1 skip command touch the skip signal and record the position.<br>Bit 0: Reserved<br>Bit 1: 1st axis (X) skip occur<br>Bit 2: 2nd axis (Y) skip occur<br>...<br>Bit 18: 18th axis skip occur | Read Only |
| **R611** | Axis Movement Flag | Display each axis movement status, according to the feedback value, failing the Zero Speed Check means the axis is moving. Zero Speed Check parameters are Pr901-920.<br>Bit 0 Reserved<br>Bit 1 : 1st axis (X) is moving<br>Bit 2 : 2nd axis (Y) is moving<br>...<br>Bit 18 : 18th axis is moving | |
| **R612** | Machine Positive Direction Lock | Machine Positive Direction Lock.<br>Bit 0 Reserved<br>Bit 1 : 1st axis (X) positive direction lock.<br>Bit 2 : 2nd axis (Y) positive direction lock.<br>...<br>Bit 18 : 18th axis positive direction lock.<br>• The axis won't be moving if the command (e.g. G91G00X100) is sent under the function being activated (R612.xx ON), and both the program and the machine coordinate will be fixed.<br>• If the function being activated (R612.x ON) during axial movements, the axis will stop moving immediately, and both the program and the machine coordinate will be fixed right after the function being activated. | |
| **R613** | Machine Negiaive Direction Lock | Machine Negative Direction Lock.<br>Bit 0 Reserved<br>Bit 1 : 1st axis (X) negative direction lock.<br>Bit 2 : 2nd axis (Y) negative direction lock.<br>...<br>Bit 18 : 18th axis negative direction lock.<br>• The axis won't be moving if the command (e.g. G91G00X100) is sent under the function being activated (R612.xx ON), and both the program and the machine coordinate will be fixed.<br>• If the function being activated (R612.x ON) during axial movements, the axis will stop moving immediately, and both the program and the machine coordinate will be fixed right after the function being activated. | |

| | | | |
|---|---|---|---|
| **R614** | Axis Coupling Request | Axis coupling status switch.<br>If Coupling Type (Pr3865/Pr3875/Pr3885) ≠1 (non-mechanical coupling), the actual coupling mode is decided by this Register. When FLAG ON, the coupling axis direction turns into coupling status; when FLAG OFF, the coupling axis direction leaves coupling status. Under coupling status, the slave axis moves with the set ratio when the spindle moves.<br>Bit 0, 1 Reserved<br>Bit 2 → 2nd set of axis coupling command<br>Bit 3 → 3rd set of axis coupling command<br>Bit 4 → 4th set of axis coupling command<br>Note:<br>• The 1st set of axis coupling command is activated by C46.<br>• Please refer to R609 Axis Coupling Status for axis coupling status. | |

| | | | |
|---|---|---|---|
| **R615~ R618** | Second M/S/T Execution Channel | Second M/S/T Execution Channel<br><br>R615 command and status<br>R616 M code<br>R617 S code<br>R618 T code<br><br>R615.0 MST code finish (PLC → CNC)<br>R615.1 DEN moving command finish (CNC → PLC)<br>R615.2 M code read (CNC → PLC)<br>R615.3 S code read (CNC → PLC)<br>R615.4 T code read (CNC → PLC)<br>…<br>R615.8 M/S/T code is executed by 1st path ($1)<br>R615.9 M/S/T code is executed by 2nd path ($2)<br>R615.10 M/S/T code is executed by 3rd path ($3)<br>R615.11 M/S/T code is executed by 4th path ($4)<br><br>R615.12 M00 Read Flag<br>R615.13 M01 Read Flag; need to activate the optional stop function (C44).<br>R615.14 M02 Read Flag<br>R615.15 M30 Read Flag<br><br>Note:<br><br>1. Valid version: 116.41, 10.117.41<br>2. The flag only works when the parameter of “Pr732 * multi-program MST channel rules” is set to 1.<br>3. The flag will activate automatically after reading the M code till system reset (Reset) or M Code Finish (R615.0 On).<br>4. To ensure the system activates the flag correctly, R615.0 should be OFF before the flag being activated by the kernel in PLC applications.<br>R615.16 The current M/S/T is being sent by $x, its main spindle is the 1st spindle.<br><br>R615.17 The current M/S/T is being sent by $x, its main spindle is the 2nd spindle.<br><br>…<br><br>R615.23 The current M/S/T is being sent by $x, its main spindle is the 8th spindle.<br><br>R615.29…The current M/S/T is being sent by $x, its main spindle is the 9th spindle.<br><br>R615.30…The current M/S/T is being sent by $x, its main spindle is the 10th spindle.<br><br>(When parameter 3810 activates the Single Block multi-M code execution function)<br><br>R615.24 1st M code execution request<br><br>R615.25 2nd M code execution request | |

| | | | |
|---|---|---|---|
| | | R615.26 3rd M code execution request<br>R615.27 4th M code execution request<br>R615.28 5th M code execution request | |
| **R619~ R622** | Third M/S/T Execution Channel | Third M/S/T Execution Channel<br>R619 Control and Status Register<br>R620 M Code<br>R621 S Code<br>R622 T Code<br>For related functions, please refer to the description of R615~R618. | |
| **R623~ R626** | Fourth M/S/T Execution Channel | Fourth M/S/T Execution Channel<br>R623 Control and Status Register<br>R624 M Code<br>R625 S Code<br>R626 T Code<br>For related functions, please refer to the description of R615~R618. | |
| **R627** | Axis Torque Mode | The axis switch to torque control under the mode, the corresponding commands are R880~R895.<br>When the corresponding bit is 1 means the axis is switched to torque control mode; when the corresponding bit is 0 means the axis is position control mode.<br>R627.0 Reserved, not using.<br>R627.1 represents the $1^{st}$axis torque control mode<br>R627.2 represents the $2^{nd}$axis torque control mode<br>...<br>R627.18 represents the $18^{th}$axis torque control mode<br>**Note 1:** The interface only works for serial bus communication.<br>**Note 2:** The control interface only supports version 10.118.10 and below. | Write Only |

| | | | |
|---|---|---|---|
| **R628** | Spindle CSS Mode | Display the current spindle cutting speed mode.<br>When the corresponding Bit is ON, the spindle is in the constant surface cutting speed control mode (G96); when the corresponding Bit is OFF, the spindle is in the rotating speed control mode (G97).<br>Bit 0, 5-31 Reserved<br>Bit 1 → machining spindle of the 1st path<br>Bit 2 → machining spindle of the 2nd path<br>Bit 3 → machining spindle of the 3rd path<br>Bit 4 → machining spindle of the 4th path | Read Only |
| **R629** | Axis M code | The register provides the PLC axis M code request signal. When axis executes to M codes, the corresponding Bit ON and request new M code from PLC program, M code contents are stored in the R618~R696. After the controller send the request, only until M code completion signal (R630) On, then next block start executing.<br>Bit 0 Reserved<br>Bit 1 → 1st axis (X) M code request<br>Bit 2 → 2nd axis (Y) M code request<br>...<br>Bit 18 → 18th axis M code request | Read Only |
| **R630** | | M Code Completion Signal (Please refer to R629)<br>Bit 0 Reserved, not using<br>Bit 1 represents the 1st axis (X) M code completion.<br>Bit 2 represents the 2nd axis (Y) M code completion.<br>...<br>Bit 18 represents the 18th axis M codes completion. | Write Only |
| **R631** | The target winding of Y-Delta of each spindle. | Each spindle Y-Delta target state<br>When the corresponding bit is 0, the spindle is Y connection; 1 means Delta connection.<br>Bit 0 reserved<br>Bit 1: 1st spindle Y-Delta target state.<br>Bit 2: 2nd spindle Y-Delta target state.<br>...<br>Bit 10: 10th spindle Y-Delta target state. | |

| | | | |
|---|---|---|---|
| **R632** | The adopted winring of Y-Delta of each spindle. | Each spindle Y-Delta adopted winring<br>When the corresponding bit is 0, the spindle is Y connection; 1 means Delta connection.<br>Bit 0 reserved<br>Bit 1: 1st spindle Y-Delta target state.<br>Bit 2: 2nd spindle Y-Delta target state.<br>...<br>Bit 10: 10th spindle Y-Delta target state. | |
| **R633~R636** | 1st~4th reference point (machine coordinate) arrival flag | The arrival flag for 1st~4th reference point (machine coordinate), will be updated at each PLC scan time.<br>• R633: Represent arrival status of each axis for 1st reference point (machine origin).<br>• R634: Represent arrival status of each axis for 2nd reference point (corresponding to Pr2801~).<br>• R635: Represent arrival status of each axis for 3rd reference point (corresponding to Pr2821~).<br>• R636: Represent arrival status of each axis for 4th reference point (corresponding to Pr2841~).<br>Bit 0 reserved, not used.<br>Bit 1 represents reference point arrival flag for 1st axis (X). If the axis has arrived then flag is 1 (On), otherwise 0 (Off).<br>Bit 2 represents reference point arrival flag for 2nd axis (Y). If the axis has arrived then flag is 1 (On), otherwise 0 (Off).<br>...<br>Bit 18 represents reference point arrival flag for 18th axis. If the axis has arrived then flag is 1 (On), otherwise 0 (Off).<br>• To determine whether the arrival flag is on or not, the following conditions must be confirmed **simultaneously**.<br>a. The homing process has finished (S Bit of Axis Home OK should be on) and the axis is not used as spindle.<br>b. The axis has arrived at target machine position.<br>c. The position error between servo command and motor feedback should be less or equals to Pr481~Pr500 Axial rapid travel in-position window. | Read Only |
| **R637~R639** | Reserved for CNC | System Reserved Area | |

| | | | |
|---|---|---|---|
| **R641~ R658** | Axis MPG command multiplier ratio | Set the manual ratio of each axis; set the manual multiplier ratio of the MPG JOG axis.<br>R641: multiplier ratio of the 1st axis.<br>R642: multiplier ratio of the 2nd axis.<br>so on and so forth...<br>The actual affective ratio is equal to the MPG segment (defined by R14, R22, R23) multiplied the multiplier ratio of the register.<br>Register=1000 means the ratio is 1.0<br>Register=1 means the ratio is 0.001, but when Register=0 ratio is default as 1.0.<br>Note: The R value only valid when the MPG corresponding coordinate is set up to be controlled by MLC (Ref. Parameter 2031~2040). | Write Only |
| **R661~ R678** | PLC axis program G00/ G01 feedrate override | Set the feedrate range of each axis PLC program -200~200, Default value 100.<br>R661 → feedrate range of the 1st axis PLC program<br>R662 → feedrate range of the 2nd axis PLC program<br>so on and so forth... | Write Only |
| **R681~ R698** | PLC axis M code value | (please refer to R629) | Read Only |
| **R700** | Actual compound feedrate | Actual compound feedrate command, unit: LIU/min (PLC axis doesn't count in compound feedrate calculation)<br>Always regarded as linear axis, for the rotary axis is in Imperial units, the value should be magnified 10 times.<br>i.e. Pr17=2, under Imperial units, the 3rd axis is rotary axis feedrate F100.<br>R700 = 100 (IU/min) * (10000 LIU/IU)<br>LIU: 0.0001 inch, IU = inch<br>R703 = 100 (IU/min) * (1000 BLU/IU)<br>BLU: 0.001 deg, IU = deg<br>Thus, R700 is 10 times to R703. | |

| | | | |
|---|---|---|---|
| **R701~ R718** | Axis Velocity | Velocity of each axis, Servo On mode: according to command value; Servo Off mode: according to feedback value, unit : BLU/min.<br>R701 → single axis speed of the 1st axis<br>R702 → single axis speed of the 2nd axis<br>so on and so forth... | Read Only |
| **R721~ R738** | Program Coordinate | Axis program coordinate position, unit: minimum input unit (LIU).<br>R721 → 1st axis program coordinate position<br>R722 → 2nd axis program coordinate position<br>so on and so forth...<br><br>When control precision is micro meter and the value:<br>0.01 mm<br>0.01 deg,<br>0.0001 inch | Read Only |
| **R741~ R758** | Machine Coordinate | Axis machine coordinate position, unit: minimum input unit (LIU).<br>R741 → 1st axis machine coordinate position<br>R742 → 2nd axis machine coordinate position<br>so on and so forth... | Read Only |
| **R761~ R770** | Spindle Machine Position | Display the machine position of the corresponding spindle, unit: 0.001 deg.<br>R761 → 1st spindle machine position<br>R762 → 2nd spindle machine position<br>so on and so forth... | Read Only |
| **R771~ R780** | Spindle Speed | Current Spindle Speed according to the feedback value, if there's no encoder then refer to the command value. If the spindle is not activated, the value should be fixed to 0. Unit: RPM.<br>R771 → 1st spindle speed.<br>R772 → 2nd spindle speed.<br>so on and so forth... | Read Only |

| | | | |
|---|---|---|---|
| **R781** | Axis group switching interface of HMI | This register is used to determine which axis group information will be processed by the HMI.<br>R781=1: The HMI will display the processing information of the 1st axis group, and the settings made by the HMI will be set to the 1st axis group.<br>R781=2: The HMI will display the processing information of the 2nd axis group, and the settings made by the HMI will be set to the 2nd axis group.<br>R781=3: The HMI will display the processing information of the 3rd axis group, and the settings made by the HMI will be set to the 3rd axis group.<br>R781=4: The HMI will display the processing information of the 4th axis group, and the settings made by the HMI will be set to the 4th axis group.<br>If R781 is set to other values, the HMI will always process the processing information of the 1st axis group.<br>Example: R781 is set to 2. then:<br>1. The HMI will display the information of the 2nd axis group.<br>2. Set the number of workpieces to be processed through the HMI, and it will be set to the 2nd axis group. | R/W |
| **R782~R790** | Spindle Gear Selection | Spindle Gear setting ：<br>1 → 1st Gear<br>2 → 2nd Gear<br>3 → 3rd Gear<br>9 → Neutral<br>R782 → 2nd spindle gear position<br>R783 → 3rd spindle gear position<br>so on and so forth...<br>Note: 1st spindle gear position is controlled by R24 setting. | Write Only |

| | | | |
|---|---|---|---|
| **R791~R794** | Effective Spindle Selection | The machining spindle under multi-axis applications is selected by the content of the register, value definition:<br>1. the 1st spindle is the machining spindle<br>2. the 2nd spindle is the machining spindle<br>3. the 3rd spindle is the machining spindle<br>4. the 4th spindle is the machining spindle<br>so on and so forth...<br>R791 → machining spindle of 1st path<br>R792 → machining spindle of 2nd path<br>R793 → machining spindle of 3rd path<br>R794 → machining spindle of 4th path<br>When the spindle of the path is selected, the S command given to the path ($1, $2) will be directly send to the corresponding affective spindle. e.g. R791 = 1, R792 = 2,<br>$1 S1000 → 1000 RPM is assigned to 1st spindle<br>$2 S1500 → 1500 RPM is assigned to 2nd spindle<br>Note: Before switching the machining spindle (R791~), if the current spindle is in the tapping state, must first cancel with G80 to avoid unexpected subsequent machining actions. | Write Only |
| **R801~R830** | MLC System Parameter | System parameter No.3421 ~ No.3450 of MLC parameter (Extension Parameter), for which one LADDER can be applicable to various machines, i.e. tool change… | Read Only |
| **R831~R840** | MLC System Parameter | System parameter No.3451 ~ No.3460 of MLC parameter (Extension Parameter), for which one LADDER can be applicable to various machines, i.e. tool change…<br>** These parameters don't need to Login and can be edit by user. | |
| **R841~R844** | Cause of Block Stop | Cause of block stop.<br>0: Normal. Stop by M00/M01 or Feedhold by user.<br>1: axis motion prohibited command, system automatically enter **Feedhold** status.<br>R841 Cause of 1st path block stop.<br>R842 Cause of 2nd path block stop.<br>R843 Cause of 3rd path block stop.<br>R844 Cause of 4th path block stop. | |
| **~R850** | Reserved for CNC | System reserved area | |

| | | | |
|---|---|---|---|
| **R851~ R860** | Spindle Override | Override % of an individual spindle. R15 is the common override of all spindles, the actual override is R15*R851~. The unit of R851~ is %, and does not affected by Pr3207 setting.<br>R851 1st Spindle override<br>R852 2nd Spindle override<br>....<br>R856 10th Spindle override | |
| **R861~ R870** | Break point machine position | Machine coordinate position where machining stops. Unit is BLU, and the Registries support up to 10 axes.<br>Machining Break Point Machine Position, unit: minimum length unit (BLU), same as the length parameter of system parameters. Registries support up to 10 axis. | |
| **R871~ R879** | Spindle Effective Speed Command | Spindle effective speed command, unit: RPM.<br>Effective RPM means the actual speed command after calculation with spindle override or constant surface speed.<br>The Effective Command is the final effective speed command value calculated after the spindle override command, constant surface speed cutting (G96/G97) and all other related factors.<br>R871 1st Spindle Effective Speed Command<br>R871 2nd Spindle Effective Speed Command<br>...<br>R879 9th Spindle Effective Speed Command<br>Note: Please refer to R930 for the 10thspindle. | Read Only |

<table>
<tr>
<td>R880~R895</td>
<td>Reference Value for D/A of Servo Card or Torque Command</td>
<td>
<table>
<tr><th>Control Mode</th><th>Machine Model</th><th>Descriptions</th></tr>
<tr><td rowspan="4">Servo card D/A command (range: ± 10000mV), effective version: 10.116.5</td><td>EZ, 10A</td><td>R881 is active as D/A command only if all the axis and spindle have not been defined as voltage control mode (i.e., Pr381~ ≠ 1, Pr1791~ ≠ 0/2).</td></tr>
<tr><td>10B/11B</td><td>R881 is active as D/A command only if all the axis and spindle which are linked to P5~P8 have not been defined as voltage control mode (i.e., Pr381~ ≠ 1, Pr1791~ ≠ 0/2)</td></tr>
<tr><td>Super-servo4</td><td>R880~R883 are active as servo card D/A command only if all the axis and spindle of the servo card have not been defined as voltage control mode (i.e., Pr381~ ≠ 1, Pr1791~ ≠ 0/2)<br>R880 → 1st servo card D/A command.<br>R881 → 2nd servo card D/A command.<br>R882 → 3rd servo card D/A command<br>R883 → 4th servo card D/A command</td></tr>
<tr><td>Super-servo6</td><td>R880 → 1st servo card D/A command<br>R881 → 2nd servo card D/A command<br>R882 → 3rd servo card D/A command<br>R883 → 4th servo card D/A command</td></tr>
</table>
</td>
<td>Write/ Read</td>
</tr>
</table>

| Control Mode | Machine Model | Descriptions |
|---|---|---|
| | 60A | Pre-defined zone for DAC value, reserve 16 channels.<br>ps: Except Servo-6/60A, all other models needs to activate at least 1 axis to use this function. |
| Servo Card 1st D/A & 2nd D/A command (Range ± 10000mV), | 3, 6, 11, 21, eHMC series<br>(effective version: 10.114.56R, 10.116.0O, 10.116.6G, 10.116.10A) | Have 2 sets of DA (DA1 & DA2).<br>1. When DA is not occupied by any spindle or axis, Registries can control DA voltage.<br>2. Under condition 1, it's able to control DA1 output with R880; DA2 output with R884. |
| | FC-B, FC-60WA, FC-60CB and 60DB<br>(Valid version: 10.118.12R,<br>10.118.22) | |
| | 71SA<br>(Valid version: 10.118.12R,<br>10.118.22) | Have 2 sets of D/A (DA1 & DA2)<br>1. When the DA is not occupied by any spindle or axis, Registries can control DA voltage.<br>2. Under condition 1, it's able to control DA1 output with R880; DA2 output with R884.<br>3. The DA output of FC-LSMK laser source is controlled by R881. |
| | 70SB<br>(Valid version: 10.118.12R,<br>10.118.22) | The DA output of the laser source is controlled by R881. |

| Control Mode | Machine Model | Descriptions |
|---|---|---|
| Expansion D/A Card on Multi-Axis Servo Drive Embedded Controller<br>(Range:±10000, unit: mV) | Multi-Axis Servo Drive Embedded Controller<br>(Valid version: 10.116.36I, 10.116.41, 10.117.41) | When Pr3261~Pr3263 =n004 (n: card station number), R880/R884/ R888/R892 represents the 1st~4th DA port on expansion card. |
| Rated Torque Reference Command (Unit: Rated torque/ 1000) | 6MD, 20, 21, 200 series<br>(Valid version: 10. 114.56, 10.116.0) | Serial controllers support torque control. Use R627 to enable/ disable torque control mode. When axis under R627 torque control mode, these registers are torque reference command, with positive value means positive output, negative value means negative output.<br>R880 → 1st axis torque command.<br>R881 → 2nd axis torque command.<br>...<br>R895 → 16th axis torque command<br>Note1: Not Support the 17th & 18thaxis.<br>Note2: The control interface only supports version 10.118.10 and below. |

| | | | |
|---|---|---|---|
| **R896~R899** | A/D value | (1) A/D converter value, 2 channel per servo 6 board.<br>(2 ) Pre-defined zone for ADC value, reserve 4 channels. | Read Only |

| | | | |
|---|---|---|---|
| **R900** | Data Acquisition Trigger (On DOS System)<br>Ballbar Adjust Trigger (On WinCE) | A/D converter value, 2 channel per servo 6 board (DOS only)<br>DOS system:<br>When this R value is On, the oscilloscope will activate the capture function.<br>WinCE system:<br>When this R value is On, start executing ballbar tuning.<br>When this R value is Off, stop executing ballbar tuning. | Write Only |
| **R901~R918** | Axis temperature compensation amount | Temperature Compensation Amount, unit: BLU<br>R901 1st axis temperature compensation amount<br>R902 2nd axis temperature compensation amount<br>…<br>R918 18th axis temperature compensation amount | Write Only |
| **R920** | EDM discharge enable. | EDM discharge enabled. (0: Disable, 1: Enable) | Write Only |
| **R921** | EDM control mode | EDM discharge control mode.<br>0: Fixed Frequency. suitable for laser machine.<br>1: Fixed Energy. suitable for EDM. | Write Only |
| **R922** | EDM normal ON time | EDM normal ON time level, unit: Discharge resolution set by Pr3831.<br>(When PR3261~Pr3263= n004, this parameter means the setting for PWM on Expandable Card of Servo Drive Embedded Controller. Valid version 10.116.36I, 10.116.41, 10.117.41) | Write Only |
| **R923** | EDM normal OFF time | EDM normal OFF time level, unit: Discharge resolution set by Pr3831.<br>(When PR3261~Pr3263= n004, this parameter means the setting for PWM on Expandable Card of Servo Drive Embedded Controller. Valid version 10.116.36I, 10.116.41, 10.117.41) | Write Only |
| **R924** | EDM arc ON time | EDM arc ON time level, unit: Discharge resolution set by Pr3831. | Write Only |
| **R925** | EDM arc OFF time | EDM arc OFF time level, unit: Discharge resolution set by Pr3831. | Write Only |
| **R926** | Reserved | Reserved for system. | |

| | | | |
|---|---|---|---|
| **R927** | Total Discharge Count | Constant energy machining, total discharge count. | Read Only |
| **R928** | Normal Discharge Count | Constant energy machining, total normal discharge count. | Read Only |
| **R929** | Abnormal Discharge Count | Constant energy machining, total abnormal discharge count. | Read Only |
| **R930** | Spindle Effective Speed Command | The effective speed command of the $10^{th}$spindle, unit: RPM.<br>The Effective Command is the final effective speed command value of spindle commend calculation result from percentage, constant linear velocity control on surface (G96/G97), and all related factors. | |
| **R934** | MPG:<br>1: x1<br>2: x10<br>3: x100<br>4: x magnified based on Pr2001 setting. | 4th MPG override selection. | Write only |
| **R935** | MPG:<br>1: x1<br>2: x10<br>3: x100<br>4: x magnified based on Pr2001 setting. | 5th MPG override selection. | Write only |
| **R936** | MPG:<br>1: x1<br>2: x10<br>3: x100<br>4: x magnified based on Pr2001 setting. | 6th MPG override selection. | Write only |

| | | | |
|---|---|---|---|
| **R937** | MPG:<br>1: x1<br>2: x10<br>3: x100<br>4: x magnified based on Pr2001 setting. | 7th MPG override selection. | Write only |
| **R938** | Start program No. of "auxiliary program function before and after machining" | Start program No. of "auxiliary program function before and after machining"<br>1. When value = or <0, auxiliary program will not be executed.<br>2. Auxiliary program needs to start with letter "O". (O####)<br>3. If value is less than 4 digit, system recognizes it as a 4 digit program No.; if less than 6 digit, system recognizes a 6 digits. Example:<br>• R938 = 12 → Program No. O0012<br>• R938 = 1234 → Program No. O1234<br>• R938 = 12345 → Program No. O012345<br>• R938 = 123456 → Program No. O123456 | Read/ Write |
| **R939** | End program No. of "auxiliary program function before and after machining" | End program No. of "auxiliary program function before and after machining"<br>1. When value = or <0, auxiliary program will not be executed.<br>2. Auxiliary program needs to start with letter "O". (O####)<br>3. If value is less than 4 digit, system recognizes it as a 4 digit program No.; if less than 6 digit, system recognizes a 6 digits. i.e.:<br>• R939 = 12 → Program No. O0012<br>• R939 = 1234 → Program No. O1234<br>• R939 = 12345 → Program No. O012345<br>• R939 = 123456 → Program No. O123456 | Read/ Write |

| | | | |
|---|---|---|---|
| **R940** | Excessive Displacement During Power Off | In absolute system, when CNC axis position displacement exceeds the range set in Pr1021~1040 during power off, the Bit of corresponding R value will be On. When C84 ON this R value is cleared to 0.<br>If needs the Bit value to send MLC alarms of corresponding axis, it can be processed by filling the value into R44~R49.<br>Bit 0: 1st axis excess displacement during power off<br>Bit 1: 2nd axis excess displacement during power off<br>...<br>Bit 18: 18th axis excess displacement during power off<br>Note:<br>Due to the limitation of ladder file format, the R value that can be accessed on the ladder edit is only till R639. Therefore, when using this R value, better choose a user-defined section and an accessible R value then write the ladder as the example shows below (take R50 for example).<br>  | Read Only |
| **R941~ R950** | PLC Spindle Command | PLC Spindle Command, unit: RPM. This function enabled by R580.<br>R941 → 1st spindle<br>R942 → 2nd spindle<br>...<br>R950 → 10th spindle | Read/ Write |
| **R951~R954** | Current interpolation mode | Current interpolation mode, possible value: 1/2/3/4/33/34/35<br>R951 current interpolation mode of 1st path.<br>R952 current interpolation mode of 2nd path.<br>R953 current interpolation mode of 3rd path.<br>R954 current interpolation mode of 4th path. | Read Only |

| | | | |
|---|---|---|---|
| **R956~R959** | Extended Stroke Limit | Switch & Operation Status of extended stroke limit<br>The extended limit switch is defined by the Bit value, Bit =1 means activated; =0 means de-activated.<br><br>R956 .0~.31 : 01~32 set of extended stroke limit switch.<br>R957 .0~.31 : 01~32 set of extended stroke limit operation status.<br>R958 .0~.31: 33~64 set of extended stroke limit switch.<br>R959 .0~.31: 33~64 set of extended stroke limit operation status.<br>Notification:<br>1. Due to the limitation of ladder file format, the R value that can be accessed on the ladder edit is only till R639. Therefore, when using this R value, better choose a user-defined section and an accessible R value then write the ladder as the example shows below (take R50 for example).<br>  <br>2. The supported models are listed below.<br>81RG / HC-8A / HC-10A/ HC-7C / HC-8C / HC-10C / HC-15C / HC-8E / HC-10E / HC-15E / HC-8S / FC-A / FC-B / FC-C | Read/ Write |
| **R961~R978** | Home Dog Shift | The shift (offset) from Home Dog signal to motor index. Unit for rotary encoder: 0.01 rev; for linear encoder: 0.01 mm. (Equivalent to System Data 56~59)<br>R961 is the home dog shift limit of the 1st axis<br>R962 is the home dog shift limit of 2nd axis<br>so on and so forth…… | |
| **R981~R998** | Axis Absolute Counter | The absolute position feedback of each axis, which is the axial motor encoder feedback. For axis with dual feedback control, the Registry displays feedback from 2nd (external) encoder. Unit: BLU.<br>R981, the position sensor value of the 1st axis<br>R982, the position sensor value of the 2nd axis<br>so on and so forth…… | Read Only |
| **R1000** | Part count | Part count | Read/ Write |
| **R1002** | Required part count | Required part count | Read/ Write |
| **R1004** | Total part count | Total part count | Read/ Write |

<table>
<tr>
<td>R1005~R1007</td>
<td>Controller S/N ASCII Code</td>
<td>4 bytes as one set, uses “little endian” display method; below is an example with M9A0001:
<table>
<tr><th>Number</th><th>Hexadecimal</th><th>Decimal (Controller Display)</th></tr>
<tr><td>R1005</td><td>0x30 0x41 0x39 0x4D<br>0 A 9 M</td><td>809580877</td></tr>
<tr><td>R1006</td><td>0x31 0x30 0x30<br>1 0 0</td><td>3223600</td></tr>
<tr><td>R1007</td><td>0</td><td>0</td></tr>
</table>
R1007 is reserved for “controller serial number” expansion.<br>
Situation Applied:<br>
If customers have encryption demands for “machine MACRO”, usually check the controller serial numbers with CHKSN ("Serial Number") inside the MACRO. But if customer wants to protect the serial number again with the encryption logic designed by themselves, then will decrypt inside the MACRO to compare the controller serial "number", and R1005~R1007 can provide customers to perform this checkup.<br>
Note: For “little endian” method, the least significant bit is in front of the most significant bit.</td>
<td>Read only</td>
</tr>
<tr>
<td>R1009</td>
<td>Motion interpolation times after power-on</td>
<td>Motion interpolation times after power-on, refer to System Data No. 4, multiply the 2 factors can get the run time after power-on.<br><br>i.e. R1009=1000, and System Data No. 4=3000, means that the controller has been powered-on for 3 seconds.</td>
<td>Read only</td>
</tr>
<tr>
<td>R1010</td>
<td>Cutting time per cycle</td>
<td>Machining time per cycle, unit: second. Not retained after power-off.</td>
<td>Read only</td>
</tr>
<tr>
<td>R1011</td>
<td>Accumulate cutting time</td>
<td>Accumulating machining time, unit: second. Value reserved when power off, value can be reset to 0 by user on HMI manually.</td>
<td>Read only</td>
</tr>
<tr>
<td>R1012</td>
<td>Power-on time_1</td>
<td>Power-on time, unit: second. Value not-reserved after power off.</td>
<td>Read only</td>
</tr>
<tr>
<td>R1013</td>
<td>Accumulate power-on time</td>
<td>Accumulated power-on time, unit: second. Value reserved after power-off.</td>
<td>Read only</td>
</tr>
</table>

| | | | |
|---|---|---|---|
| **R1014** | Installation cutting time | Installation cutting time for total, unit: hour. Value reserved after power-off, can only be cleared at the 1st installation. | Read only |
| **R1015** | Power-on time_2 | Power-on time, unit: hour. Value not-reserved after power-off. | Read only |
| **R1016** | System date | YYYYMMDD<br>YYYY: Year; MM: Month; DD: Day | Read only |
| **R1017** | System time | HHMMSS<br>HH: Hour; MM: Minute; SS: Second | Read only |
| **R1018** | Cutting time per cycle | Cutting time of last machining part, update after a part (program) is finished, unit: ms. value not-reserved after power-off. | Read only |
| **R1019** | PLC Version | PLC Version, format is ##,##.<br>R1019=101 means V1,01<br>R1019=1020 means V10.20. | Read/ Write |
| **R1020~1023** | PLC File System | R1020 allowed file number of PLC file system.<br>R1021 set store data width, unit is number of register.<br>R1022 set store data height, unit row number.<br>R1023 set the starting address of file system.<br>Control format as follow: | Write only |
| **R1024~R1032** | User define/ System use | Mill: Used for auto tool center & tool height measure function;<br>X Axis: R1024~R1026<br>Y Axis: R1027~R1029<br>Z Axis: R1030~R1032<br>Lathe: User-Defined Registers | Read/ Write |
| **R2050~R2090** | User define/ System use | When Pr3810 is set to 0, these registers are user defined; when Pr3810 is set to 1, these registers are used by system.<br>For details, please refer to Pr3810 *Paralleled executing multiple M code in one block. | Read only |
| **R2091~R2099** | User define | User defined | Read/ Write |

| | | | |
|---|---|---|---|
| **R2100~R 3100** | User define/ System use | When Pr3228 'Enable tool manager' =0, these registers are user-defined;<br>when Pr3228=1, registers are used by HMI, and HMI system will auto load or save to Registry Table 2100~3100. | Read/ Write |
| **R3101~R 4095** | User define | User defined | Read/ Write |
| **R4096~R 4099** | Accumulate look-ahead length | G01, G02, G03 look-ahead accumulated length ( unit : mm ) (Effective version: 10.118.12 and above )<br>R4096 : 1st path accumulated length<br>R4097 : 2nd path accumulated length<br>R4098 : 3rd path accumulated length<br>R4099 : 4th path accumulated length<br><br>**Note 1 :** Maximum Accumulated length is 2147483647 (unit: mm)<br>**Note 2 :** Stop to accumulate length under Feedhold and Emergency stop.<br>**Note 3 :** After reset and Emergency stop, clear the accumulator.<br>**Note 4 :** M30 will clear the accumulator<br>**Note 5 :** When executing the M Code of Workpiece Counter( Pr3804 ), clear clear the accumulator of all paths.<br>**Note 6 :** Using M99 to repeat cycleing, the accumulated length will not be clear. Unless Pr3804 is 99 ( Note 5 ).<br>**Note 7 :** Special Situation ( Insert Program、 Tool break retract、 Feedhold Point Retract 、 Tool Retraction )<br>1. Insert Program : Continue to accumulate when executing sub-program.<br>2. Tool break retract : Accumulator only starts on the middle of the program, user can use #1048, #1052 to evaluate remain time.<br>3. Feedhold Point Retract : Stop to accumulate under Feedhold. Restart to accumulate after cycling start. The length of tool back will not accumulate.<br>4. Tool Retraction : Tool Retraction ( that is, the moment between Tool retract and recover ) will not accumulate length. | |
| **R4100~R 5000** | Reserved for CNC | System reserved area | |

| | | | |
|---|---|---|---|
| **R5001~R5018** | Axis Following Error | R5001: 1st axis following error.<br>R5002: 2nd axis following error.<br>so on and so forth.. | Read only |
| **R5021~R5024** | Spindle Max Cutting Speed | Spindle maximum cutting speed<br>R5021 is the spindle of 1st path.<br>R5022 is the spindle of 2nd path.<br>R5023 is the spindle of 3rd path.<br>R5024 is the spindle of 4th path. | Read only |
| **R5025~R5028** | Reserved for CNC | System reserved area | |
| **R5029** | Modbus Slave Error Code | Modbus Slave Error Code. When the slave is controller, this error code can be used for troubleshooting.<br>0：Slave (Server) activate success<br>1：Slave (Server) activate failure<br>2：Invalid Port<br>3：Invalid Station ID<br>4：Incorrect packet length<br>5：Incorrect packet content<br>6：Data confirmation error (CRC error)<br>7：Machining file upload abort command not received<br>8：Machining file read error<br>9：Response return failure | Read only |

<table>
<tr>
<td>R5030</td>
<td>Modbus Protocol Setup</td>
<td>When R5030.0 is set to disabled, PLC Modbus component communication use the set value of Pr39xx (COM2: Pr3941~Pr3950, COM3: Pr3961~ Pr3970)
<table>
<tr><td>$b_0$</td><td>Enable Modbus protocol setting</td><td>Disable: 0<br>Enabled: 1</td></tr>
<tr><td>$b_1$</td><td>Data length</td><td>7 bit: 0<br>8 bit: 1</td></tr>
<tr><td>$b_3b_2$</td><td>Polarity Bit</td><td>No: 00<br>Odd Corresponding: 01<br>Even Corresponding: 11</td></tr>
<tr><td>$b_4$</td><td>Stop Bit</td><td>1 bit: 0<br>2 bit: 1</td></tr>
<tr><td>$b_8b_7b_6b_5$</td><td>Baud Rate</td><td>2400 bps：0000<br>4800 bps：0001<br>9600 bps：0010<br>19200 bps：0011<br>38400 bps：0100<br>57600 bps：0101<br>115200 bps：0110<br>230400 bps：0111<br>460800 bps：1000<br>912600 bps：1001</td></tr>
<tr><td>$b_9$~$b_{31}$</td><td colspan="2">System reserved area (do not use)</td></tr>
</table>
Communication Format R5030 setting example:<br>
Baud Rate "9600"/Stop bit "1"/Polarity Bit "None"/Data length "8"/ Enable "1"<br>
$b_8b_7b_6b_5$=0010 / $b_4$ =0 / $b_3b_2$ =00 / $b_1$ =1 / $b_0$ =1<br>
R5030=001000011$_{(2)}$ → Binary format should be converted to decimal format, R5030=67$_{(10)}$</td>
<td>Write/ Read</td>
</tr>
</table>

| | | | |
|---|---|---|---|
| **R5031** | 1st Serial MPG Pulse Count | Absolute value of Serial MPG Pulse Count, corresponds to M3 IO 1st station MPG pulse feedback signal.<br>After software version 10.118.13, when activating the customized IO chart (Pr5 *I_O board type=100), it's able to modify the corresponding initial point R at the I/O chart page and not using R5031~R5033. | Read Only |
| **R5032** | 2nd Serial MPG Pulse Count | As above, corresponds to MPG pulse feedback signal of M3 IO 2nd station. | Read Only |
| **R5033** | 3rd Serial MPG Pulse Count | As above, corresponds to MPG pulse feedback signal of M3 IO 3rd station. | Read Only |
| **R5034~R5038** | Reserved for Serial MPG | Serial MPG Function Reserved Area | |

**R5039** Modbus Error Code

When the master is controller, this error code can be used for troubleshooting.

Modbus Error Code Instruction

| R5039 | Detail |
|---|---|
| 0 | Success |
| 1 | Function Code error |
| 2 | Address error |
| 3 | Data Value error - Data value is defined invalid by Slave |
| 4 | Slave Device error |
| 5 | Confirm Acknowledge (ACK), when Slave defined longer process time is needed, then return ACK to prevent timeout. |
| 6 | Slave Device Busy |
| 8 | Memory Parity error |
| 10 | Gateway Path Unavailable |
| 11 | Gateway target Device failed to Respond |
| 245 | Non-supported Function Code |
| 246 | Modbus Packet format error |
| 247 | The COM Port assigned by R5040 is incorrect. |
| 248 | Server busy, halt communication command. |
| 249 | Data confirmation error (CRC error) |
| 250 | TimeOut error |

| | | | |
|---|---|---|---|
| | | <table><tr><th>R5039</th><th>Detail</th></tr><tr><td>251</td><td>Read COM Port error</td></tr><tr><td>252</td><td>Write COM Port error</td></tr><tr><td>253</td><td>Open COM Port error</td></tr><tr><td>254</td><td>Unknown error</td></tr></table> | |
| **R5040** | Modbus COM Port | Modbus COM Port is used to set up the actual wirings. If the hardware is SUPER/10/20/200, the COM Port is 3 (R5040=3); if it's eHMC/ 3/6/11/21, the COM Port is 2 (R5040=2).<br>COM Port is Modbus TCP when set to 9, it would be able to transmit data through the Internet (LAN), the specifications are the same as Modbus RS485, and differences are:<br>1. Controller client (Master) and the connecting device server (Slave) should be under the same domain.<br>2. The station ID of the connecting device server (Slave) should set to be the same as the 4$^{th}$digit of IP.<br>i.e. If the IP is 192.168.1.5, the station ID should set to be 5.<br>3. Can connect at most 2 server (Slave) devices.<br>4. The communication error timeout can be set in Pr 3971. | |
| **R5041~R 5060** | Reserved for CNC | Syntec Reserved Area | |
| **R5061~R 5080** | A/D value | When Pr3261~Pr3263 =n004 (n: card station number), R5061~R5066 mapping to 1$^{st}$~6$^{th}$ DA port on expansion card of Syntec Servo Drive Embedded Controller.<br>(Effective version: 10.116.36I, 10.116.41, 10.117.41) | Read only |
| **R5081~R 5100** | Thermal value | Pre-defined zone for Thermal value, reserve 20 channels | Read only |
| **R5101~R 5118** | Axis Index Counter | R5101: 1$^{st}$ axis index counter<br>R5102: 2$^{nd}$ axis index counter<br>so on and so forth... | Read only |

| | | | |
|---|---|---|---|
| **R5121~R5138** | Accumulated Total Index Signal Counts | Axis corresponding register value +1 whenever an index signal is read.<br>R5121: 1st axis total index counts<br>R5122: 2nd axis total index counts<br>so on and so forth... | Read only |
| **R5139~R5140** | Reserved for CNC | Reserved for system | |
| **R5141~R5150** | Spindle Torque Load | Spindle Torque Load: actual torque output of motor, unit % of rated torque.<br>R5141: 1st spindle torque load<br>R5142: 2nd spindle torque load<br>...<br>R5150: 10th spindle torque load<br>**Note 1:** The function only works for serial bus communication.<br>**Note 2:** Supporting Version 10.116.9 and above.<br>**Note 3:** For the supporting versions and brands of EtherCAT serial, Refer to EtherCAT驱动器应用手册#主轴与轴向负载率.<br>**Note 4:** For Panasonic RTEX (A6N) set driver parameter Pr7.34=18, supporting versions refer to RTEX驱动器应用手册.<br>**Note 5:** When spindle type is inverter spindle (Pr1791~ = 0, 5), this value will be 0. | Read only |
| **R5151~R5168** | Axial Torque Load | Axial Torque Load: actual torque output of motor, unit % of rated torque.<br>R5151: 1st axis (X) torque load<br>R5152: 2nd axis (Y) torque load<br>so on and so forth...<br>**Note 1:** The function only works for serial bus communication.<br>**Note 2:** Supporting Version 10.116.15 and above.<br>**Note 3:** Please refer to EtherCat driver application manual for the supporting versions and brands of EtherCat serial PLC.<br>**Note 4:** For Panasonic RTEX (A6N) set driver parameter Pr7.34=18, supporting versions refer to RTEX驱动器应用手册 | Read |

| | | | |
|---|---|---|---|
| **R5171~R5188** | Axial Rated Torque Limit Permille | Torque limit ratio, unit thousands (1/1000) of rated torque. The Registers =0 means the axis is under maximum torque for position control.<br><br>R5171: 1st axis (X) torque limit ratio<br>R5172: 2nd axis (Y) torque limit ratio<br>so on and so forth..<br><br>Note 1: The function only supports<br>1. YASKAWAM2/M3<br>2. SYNTECM3<br>3. EtherCAT serial supporting versions and brand, ref. EtherCAT驱动器应用手册<br>Note 2:To activate the function, enable the torque limitation function by setting driver parameters and restart the driver.<br><br>Note 3: If R5171~5188 are not 0, both Pulse and Serial System do not protect the loss pulse and tracking error.<br><br>Note4: Supporting version: 10.116.20, 10.117.21 and above<br><br>Note5: Current supporting modes are NC Axis Position Mode, Spindle Orientation Mode (C61), Spindle Speed Mode (C64), Spindle C Axis Mode (C63) | Write/ Read |
| **R5189~R5190** | Reserved for CNC | Reserved for system | |
| **R5191~R5208** | Velocity FeedForward under Axis Position Mode | Velocity FeedForward under Axis Position Mode, unit: um/sec.<br><br>R5191 is the 1st axis Velocity FeedForward under Axis Position Mode.<br><br>R5192 is the 2nd axis Velocity FeedForward under Axis Position Mode.<br><br>so on and so forth…...<br><br>Note1: The function only supports YASKAWA M3 and Panasonic RTEX.<br><br>Note2: Loss pulse and tracking error won't be protected when using this function.<br><br>Note3: YASKAWA M3 supporting version should be 10.116.51, 10.117.51 and above.<br><br>Note4: Panasonic RTEX supporting version should be 10.118.12I, 10.118.17 and above, please refer to RTEX Driver Application Manual(CHT) for related parameters settings of RTEX velocity feedforward. | Read/ Write |

| | | | |
|---|---|---|---|
| **R5291** | 2nd Driver IO Signal, default as external latch signal (External latch 1 input) | It's able to monitor other driver signals (Torque Limit or Brake signal) by Pr3266~Pr3267 Select the first set of driver signal to be monitored.<br>Pr3267 = 1, R5291.1~R5291.18 corresponds to the torque arrival signal of the 1st ~18th axis, the Bit becomes 1 when the torque arrives the limit value.<br>Pr3267 = 2, R5291.1~R5291.18 corresponds to the EXT1 signal of the 1st ~18th axis, the Bit becomes 1 when the driver receives the EXT1 input signal.。<br>Pr3267 = 3, R5291.1~R5291.18corresponds to the Brake signal of the 1st~18th axis, the Bit becomes 1 when the driver activates the brake..<br>When applying high speed function G31, it would be able to monitor the signal with R value and adjust it more easily if the signal resource of G31 is set up to come from driver EXT1.<br>Note1: Supporting Version 10.116.36Y, 10.116.51, 10.117.51 and above<br>Note2: Please refer to R30 for the signal state supported by drivers from each brand. | Read Only |
| **R5292~R5879** | Reserved for CNC | System Reserved Area | |
| **R5880** | Cruise Control Switch | Axis Switch between Positioning Control Mode and Gap Control Mode<br>0: Switch back to Positioning Control Mode<br>1: Switch the 1st axis to Gap Control Mode<br>2: Switch the 2nd axis to Gap Control Mode<br>...<br>so on and so forth. | |
| **R5881** | Target Capacitance | Cruise Control Mode Target Capacitance (count: 0~500,000) | |
| **R5882** | Tracing Slope | Cruise Control Mode Tracing Slope (pulse/count: -500,000~500,000) | |
| **R5883** | Check Window / Max Capacitance | ~10.118.28M, 10.118.36: Cruise Control Mode Position Check Window (BLU: 0~10,000)<br>10.118.28N, 10.118.37 and above: Max Capacitance(count: -32,768~32,767), 1 Unit equals 1000 Units of R5881; Drive version must be 2.15.0, 2.14.105, 3.0.0 and above. | |

| | | | |
|---|---|---|---|
| **R5884** | Capacitance Threshold / Min Capacitance | ~10.118.28M, 10.118.36:Capacitance Threshold Value (count: 0~500,000)<br>10.118.28N, 10.118.37 and above: Min Capacitance(count: -32,768~32,767), 1 Unit equals 1000 Units of R5881; Drive version must be 2.15.0, 2.14.105, 3.0.0 and above. | |
| **R5885** | Cruise Control Status | Cruise Control Axial Status<br>0: Not In Cruise Control Mode<br>1: In Cruise Control Mode | |
| **R5886** | Cruise in Position | Cruise Control Status<br>0: Cruise control unfinished/not support<br>1: Cruise control finished | |
| **R5887** | Increment Position Limit | Increment Position Limit (BLU: -999,999~999,999) | |
| **R5888~R5890** | Reserved for CNC | System Reserved Area | |
| **R5891~R5894** | Coordinate Feedrate Feedback | Combined feedrate FEEDBACK of axis group, unit LIU/min.<br>R5891: Combined feedrate of the 1st path<br>R5892: Combined feedrate of the 2nd path<br>R5893: Combined feedrate of the 3rd path<br>R5894: Combined feedrate of the 4th path | Read |
| **R5895~R5900** | Reserved for CNC | Reserved for system | |
| **R5901~R5904** | Coordinate Feedrate Command | Combined feedrate COMMAND of axis group, unit: LIU/min.<br>R5901: Combined feedrate of the 1st path<br>R5902: Combined feedrate of the 2nd path<br>R5903: Combined feedrate of the 3rd path<br>R5904: Combined feedrate of the 4th path | Read |
| **R5905~R5910** | Reserved for CNC | System Reserved Area | |

| | | | |
|---|---|---|---|
| **R5911~R5930** | Robot Coordinate Feedrate Command | Robot Path Actual Speed Command Value, unit: LIU/s<br>R5911: Shows the maximum single axis speed percentage the internal axis of the 1st path can reach (unit: 0.001%)<br>R5912: Shows the linear direction feeding speed of the 1st path end point.<br>R5913: Shows the rotary direction feeding speed of the 1st path end point.<br>R5914: Shows the maximum single axis speed percentage the external axis of the 1st path can reach (unit: 0.001%).<br>R5915: Reserved.<br>Each path provides 5 R values, and so on to R5930. | Read |
| **R5931~5996** | Reserved for CNC | System Reserved Area | |
| **R5997** | Preview Manager Classfication | 9: Syntec customer service staff<br>99: Machine Manufacturer<br>100: End-User Manager<br>101: End-User Operator<br>999: Not Logged In<br>Effective version 10.116.10 and above | Read |
| **R5998** | Background Action | Register for PLC customized Image ACTION | Read/ Write |
| **R5999** | Tapping Maximum Tracking Error | Max. Z axis to spindle following error under rigid/rapid tapping | Read |
| **R6000~R7999** | F-RAM memory for user define | F-RAM memory for user self defined | Read/ Write |
| **R8000~R8500** | MLC System Parameter | R8001~R8500 correspond to System parameter No.5001 ~ No.5500. | Read |
| **R8500~R8999** | Reserved for CNC | Reserved for system | |

| | | | |
|---|---|---|---|
| **R9000~R9999** | For robot kernel | Robot Kernel Operating Area (Not Customized Area) | Read / Write |
| **R10000~R10499** | Reserved for Vision Memory | Reserved for Vision system, ref. 3.7 system variables (R/L) instructions | Read |
| **R10500~R14999** | Reserved for CNC | Reserved for system | |
| **R15000~R15199** | Reserved for Vision Processing | Reserved for Vision system, ref. 3.7 system variables (R/L) instructions | |
| **R15200~R15499** | Reserved for Robot HMI | Reserved for Robot HMI | |
| **R15500~R15999** | Reserved for Vision | Reserved for Vision system, ref. 3.7 system variables (R/L) instructions | |
| **R16000** | Trigger Software Panel **_CycleStart** Action | The register represents **_CycleStart** action on software panel.<br>When user triggers **_CycleStart** on software panel, this register = 1. | Read |
| **R16001** | Disable Direct **Cycle Start** by Software Panel | If this **Register = 0**, triggering **_CycleStart** on software panel will **start running program**;<br>if this **Register≠ 0**, system will **not start** when triggering **_CycleStart**. | Write/ Read |
| **R16002** | Trigger Software Panel<br>**_FeedHold** Action | The register represents **_FeedHold** action on software panel.<br>When user triggers **_FeedHold** on software panel, this register = 1. | Read |
| **R16003** | Disable Direct **Feed Hold** by Software Panel | If this **Register = 0**, triggering **_FeedHold** on software panel will **pause running program**;<br>if this **Register≠ 0**, system will **not pause** when triggering **_FeedHold**. | Write/ Read |

| | | | |
|---|---|---|---|
| **R16004** | Trigger Software Panel<br>**_Jog+Axis_1, _StopJog+Axis_1** Action | The register represents **_Jog+Axis_1, _StopJog+Axis_1** action on software panel.<br>When user triggers **_Jog+Axis_1** on software panel, this register = 1.<br>When user triggers **_StopJog+Axis_1** on software panel, this register = 0. | Read |
| **R16005** | Disable Direct **X Axis JOG +** by Software Panel | If this **Register = 0**, triggering **_Jog+Axis_1** on software panel, **system will do X Axis JOG +** ;<br>if this **Register≠ 0**, system will **not do X Axis JOG +** when triggering **_Jog+Axis_1.** | Write/ Read |
| **R16006** | Trigger Software Panel<br>**_Jog-Axis_1, _StopJog-Axis_1** Action | The register represents **_Jog-Axis_1, _StopJog-Axis_1** action on software panel.<br>When user triggers **_Jog-Axis_1** on software panel, this register = 1.<br>When user triggers **_StopJog-Axis_1** on software panel, this register = 0. | Read |
| **R16007** | Disable Direct **X Axis JOG -** by Software Panel | If this **Register = 0**, triggering **_Jog-Axis_1** on software panel, **system will do X Axis JOG -** ;<br>if this **Register≠ 0**, system will **not do X Axis JOG -** when triggering **_Jog-Axis_1.** | Write/ Read |
| **R16008** | Trigger Software Panel<br>**_Jog+Axis_2 , _StopJog+Axis_2** Action | The register represents **_Jog+Axis_2, _StopJog+Axis_2** action on software panel.<br>When user triggers **_Jog+Axis_2** on software panel, this register = 1.<br>When user triggers **_StopJog+Axis_2** on software panel, this register = 0. | Read |
| **R16009** | Disable Direct **Y Axis JOG +** by Software Panel | If this **Register = 0**, triggering **_Jog+Axis_2** on software panel, **system will do Y Axis JOG +** ;<br>if this **Register≠ 0**, system will **not do Y Axis JOG +** when triggering **_Jog+Axis_2.** | Write/ Read |

| | | | |
|---|---|---|---|
| **R16010** | Trigger Software Panel **_Jog-Axis_2 , _StopJog-Axis_2** Action | The register represents **_Jog-Axis_2, _StopJog-Axis_2** action on software panel.<br>When user triggers **_Jog-Axis_2** on software panel, this register = 1.<br>When user triggers **_StopJog-Axis_2** on software panel, this register = 0. | Read |
| **R16011** | Disable Direct **Y Axis JOG -** by Software Panel | If this **Register = 0**, triggering **_Jog-Axis_2** on software panel, **system will do Y Axis JOG -** ;<br>if this **Register≠ 0**, system will **not do Y Axis JOG -** when triggering **_Jog-Axis_2.** | Write/ Read |
| **R16012** | Trigger Software Panel **_Jog+Axis_3 , _StopJog+Axis_3** Action | The register represents **_Jog+Axis_3, _StopJog+Axis_3** action on software panel.<br>When user triggers **_Jog+Axis_3** on software panel, this register = 1.<br>When user triggers **_StopJog+Axis_3** on software panel, this register = 0. | Read |
| **R16013** | Disable Direct **Z Axis JOG +** by Software Panel | If this **Register = 0**, triggering **_Jog+Axis_3** on software panel, **system will do Z Axis JOG +** ;<br>if this **Register≠ 0**, system will **not do Z Axis JOG +** when triggering **_Jog+Axis_3.** | Write/ Read |
| **R16014** | Trigger Software Panel **_Jog-Axis_3 , _StopJog-Axis_3** Action | The register represents **_Jog-Axis_3, _StopJog-Axis_3** action on software panel.<br>When user triggers **_Jog-Axis_3** on software panel, this register = 1.<br>When user triggers **_StopJog-Axis_3** on software panel, this register = 0. | Read |
| **R16015** | Disable Direct **Z Axis JOG -** by Software Panel | If this **Register = 0**, triggering **_Jog-Axis_3** on software panel, **system will do Z Axis JOG -** ;<br>if this **Register≠ 0**, system will **not do Z Axis JOG -** when triggering **_Jog-Axis_3.** | Write/ Read |

| | | | |
|---|---|---|---|
| **R16016~ R16067** | Trigger Software Panel<br>**_Jog+/- Axis_4~16 ,**<br>**_StopJog+/- Axis_4~16**<br>Action | Same as above | Read |
| | Disable Direct **4th~16th Axis JOG + / -** by Software Panel | | Write/ Read |
| **R16068** | Trigger Software Panel<br>**_MPGSimuOn , _MPGSimuOff** Action | The register represents **_MPGSimuOn, _MPGSimuOff** action on software panel.<br>When user triggers **_MPGSimuOn** on software panel, this register = 1.<br>When user triggers **_MPGSimuOff** on software panel, this register = 0. | Read |
| **R16069** | Disable Direct **MPG Simulation** by Software Panel | If this **Register = 0**, triggering **_MPGSimuOn** on software panel, **system will enable MPG Simulation** ;<br>if this **Register≠ 0**, system will **not enable MPG Simulation** when triggering **_MPGSimuOn.** | Write/ Read |
| **R16070** | Trigger Software Panel<br>**_SetMachinePosAxis_1** Action | The register represents **_SetMachinePosAxis_1** action on software panel.<br>When user triggers **_SetMachinePosAxis_1** on software panel, this register = 1. | Read |
| **R16071** | Disable Direct **Set X Axis Machine Position** by Software Panel | If this **Register = 0**, triggering **_SetMachinePosAxis_1** on software panel, **system will Set X Axis Machine Position** ;<br>if this **Register≠ 0**, system will **not Set X Axis Machine Position** when triggering **_SetMachinePosAxis_1.** | Write/ Read |

| | | | |
|---|---|---|---|
| **R16072** | Trigger Software Panel **_SetMachinePosAxis_2** Action | The register represents **_SetMachinePosAxis_2** action on software panel.<br>When user triggers **_SetMachinePosAxis_2** on software panel, this register = 1. | Read |
| **R16073** | Disable Direct **Set Y Axis Machine Position** by Software Panel | If this **Register = 0**, triggering **_SetMachinePosAxis_2** on software panel, **system will Set Y Axis Machine Position** ;<br>if this **Register≠ 0**, system will **not Set Y Axis Machine Position** when triggering **_SetMachinePosAxis_2.** | Write/ Read |
| **R16074** | Trigger Software Panel **_SetMachinePosAxis_3** Action | The register represents **_SetMachinePosAxis_3** action on software panel.<br>When user triggers **_SetMachinePosAxis_3** on software panel, this register = 1. | Read |
| **R16075** | Disable Direct **Set Z Axis Machine Position** by Software Panel | If this **Register = 0**, triggering **_SetMachinePosAxis_3** on software panel, **system will Set Z Axis Machine Position** ;<br>if this **Register≠ 0**, system will **not Set Z Axis Machine Position** when triggering **_SetMachinePosAxis_3.** | Write/ Read |
| **R16076~ R16101** | Trigger Software Panel **_SetMachinePosAxis_4 ~16th** Action | Same as above | Read |
| | Disable Direct **Set 4th~16th Axis Machine Position** by Software Panel | | Write/ Read |

| | | | |
|---|---|---|---|
| **R16102** | Trigger Software Panel<br>**_ManualControlOnAxis_1 ,**<br>**_ManualControlOffAxis_1**<br>Action | The register represents **_ManualControlOnAxis_1 , _ManualControlOffAxis_1** action on software panel.<br>When user triggers **_ManualControlOnAxis_1** on software panel, this register = 1.<br>When user triggers **_ManualControlOffAxis_1** on software panel, this register = 0. | Read |
| **R16103** | Disable Direct **X Axis MANUAL CONTROL** by Software Panel | If this **Register = 0**, triggering **_ManualControlOnAxis_1** on software panel, **system will enable X Axis MANUAL CONTROL** ;<br>if this **Register≠ 0**, system will **not enable X Axis MANUAL CONTROL** when triggering **_ManualControlOnAxis_1.** | Write/ Read |
| **R16104** | Trigger Software Panel<br>**_ManualControlOnAxis_2 ,**<br>**_ManualControlOffAxis_2**<br>Action | The register represents **_ManualControlOnAxis_2 , _ManualControlOffAxis_2** action on software panel.<br>When user triggers **_ManualControlOnAxis_2** on software panel, this register = 1.<br>When user triggers **_ManualControlOffAxis_2** on software panel, this register = 0. | Read |
| **R16105** | Disable Direct **Y Axis MANUAL CONTROL** by Software Panel | If this **Register = 0**, triggering **_ManualControlOnAxis_2** on software panel, **system will enable Y Axis MANUAL CONTROL** ;<br>if this **Register≠ 0**, system will **not enable Y Axis MANUAL CONTROL** when triggering **_ManualControlOnAxis_2.** | Write/ Read |

| | | | |
|---|---|---|---|
| **R16106** | Trigger Software Panel<br>**_ManualControlOnAxis_3 ,**<br>**_ ManualControlOffAxis_3**<br>Action | The register represents **_ManualControlOnAxis_3 , _ManualControlOffAxis_3** action on software panel.<br>When user triggers **_ManualControlOnAxis_3** on software panel, this register = 1.<br>When user triggers **_ManualControlOffAxis_3** on software panel, this register = 0. | Read |
| **R16107** | Disable Direct **Z Axis MANUAL CONTROL** by Software Panel | If this **Register = 0**, triggering **_ManualControlOnAxis_3** on software panel, **system will enable Z Axis MANUAL CONTROL** ;<br>if this **Register≠ 0**, system will **not enable Z Axis MANUAL CONTROL** when triggering **_ManualControlOnAxis_3.** | Write/ Read |
| **R16108~ R16133** | Trigger Software Panel<br>**_ManualControlOnAxis_4~16 ,**<br>**_ManualControlOffAxis_4~16**<br>Action | Same as above | Read |
| | Disable Direct **4th~16th Axis MANUAL CONTROL** by Software Panel | | Write/ Read |
| **R16134** | Trigger Software Panel<br>**_Reset**<br>Action | The register represents **_Reset** action on software panel.<br>When user triggers **_Reset** on software panel, this register = 1. | Read |

| | | | |
|---|---|---|---|
| **R16135** | Disable Direct **Reset** by Software Panel | If this **Register = 0**, triggering **_Reset** on software panel, **system will RESET;**<br>if this **Register≠ 0**, system will **not RESET** when triggering **_Reset.** | Write/ Read |
| **R16136** | Trigger Software Panel **_SingleBlockOn, _SingleBlockOff** Action | The register represents **_SingleBlockOn, _SingleBlockOff** action on software panel.<br>When user triggers **_SingleBlockOn** on software panel, this register = 1.<br>When user triggers **_SingleBlockOff** on software panel, this register = 0. | Read |
| **R16137** | Disable Direct **Single Block** by Software Panel | If this **Register = 0**, triggering **_SingleBlockOn** on software panel, **system will enable Single Block Stop;**<br>if this **Register≠ 0**, system will **not enable Single Block Stop** when triggering **_SingleBlockOn.** | Write/ Read |
| **R16138** | Software Panel **Mode Selection** | The register represents the argument N of **_Mode_N** action on software panel, and the action **switch modes** base on value of N:<br>1: Edit<br>2: Auto<br>3: MDI<br>4: Jog<br>5: InJog<br>6: MPG<br>7: Home<br>I.e.: Triggering **_Mode_2** will **set the register =2**, and switch to **Auto Mode.** | Read |
| **R16139** | Disable Direct Change **Mode Selection** by Software Panel | If this **Register = 0**, triggering **_Mode_N** on software panel, **system will switch Modes;**<br>if this **Register≠ 0**, system will **not switch Modes** when triggering **_Mode_N.** | Write/ Read |

| | | | |
|---|---|---|---|
| **R16140** | Software Panel **Increment Feed** | The register represents the argument N of **_IncrementFeed_N** action on software panel, which decides the **magnify ratio of 1st MPG & InJog**<br>Example: Triggering **_IncrementFeed_10**, this register =10 and the magnify ratio become **x10**. The single movement of InJog increased from 0.001 to 0.10. | Read |
| **R16141** | Disable Direct Change **Increment Feed** by Software Panel | If this **Register = 0**, triggering **_IncrementFeed_N** on software panel, **system will adjust Magnify Ratio of 1st MPG & InJog;**<br>if this **Register≠ 0**, system will **not adjust Magnify Ratio of 1st MPG & Injog** when triggering **_IncrementFeed_N.** | Write/ Read |
| **R16142** | Software Panel **Spindle Override** | The register represents the argument N of **_SpindleOverride_N** action on software panel, which decides the **Override of Spindle.**<br>Example: Triggering **_SpindleOverride_10, this register = 50** and the **Spindle Override** become **50%**. | Read |
| **R16143** | Disable Direct Change **Spindle Override** by Software Panel | If this **Register = 0**, triggering **_SpindleOverride_N** on software panel, **system will adjust spindle override;**<br>if this **Register≠ 0**, system will **not adjust spindle override** when triggering **_SpindleOverride_N.** | Write/ Read |
| **R16144** | Software Panel **Feedrate Override** | The register represents the argument N of **_FeedrateOverride_N** action on software panel, which decides the **Override of G01.**<br>Example: Triggering **_FeedrateOverride_50, this register = 50** and the **G01 Override** become **50%**. | Read |
| **R16145** | Disable Direct Change **Feedrate Override** by Software Panel | If this **Register = 0**, triggering **_FeedrateOverride_N** on software panel, **system will adjust G01 override;**<br>if this **Register≠ 0**, system will **not adjust G01 override** when triggering **_FeedrateOverride_N.** | W/R |
| **R16146** | Software Panel **JOG Override** | The register represents the argument N of **_JOGOverride_N** action on software panel, which decides the **Override of Jog.**<br>Example: Triggering **_JOGOverride_50, this register = 50** and the override become **50%**. | Read |

| | | | |
|---|---|---|---|
| **R16147** | Disable Direct Change **JOG Override** by Software Panel | If this **Register = 0**, triggering **_JOGOverride_N** on software panel, **system will adjust Jog override;**<br>if this **Register≠ 0**, system will **not adjust Jog override** when triggering **_JOGOverride_N.** | Read / Write |
| **R16148** | Software Panel **Rapid Traverse Override** | The register represents the argument N of **_RapidTravelOverride_N** action on software panel, which decides the **Override of G00.**<br>Example: Triggering **_RapidTravelOverride_50, this register = 50** and the **G00 Override** become **50%**. | Read |
| **R16149** | Disable Direct Change **Rapid Traverse Override** by Software Panel | If this **Register = 0**, triggering **_RapidTravelOverride_N** on software panel, **system will adjust G00 override;**<br>if this **Register≠ 0**, system will **NOT adjust G00 override** when triggering **_RapidTravelOverride_N.** | Read / Write |
| **R16150~ R16999** | Reserved for Software Panel | Reserved for Software Panel Function | |
| **R17000** | Reserved for Laser Marking | Reserved for Laser Marking Function | |
| **R17001** | SCANNER_OFFSET **XOffset** | X Offset of laser marking galvanometer module, unit : μm. | Read / Write |
| **R17002** | SCANNER_OFFSET **Y Offset** | Y Offset of laser marking galvanometer module, unit : μm. | Read / Write |
| **R17003** | Reserved for Laser Marking | Reserved for expansion of Z offset. | |
| **R17004** | SCANNER_ANGLE **Angle** | Galvonometer module scanner mirror rotation angle, unit: 10^-6 deg.<br>angle > 0 rotate counter-clockwise.<br>angle < 0 rotate clockwise. | Read / Write |

| | | | |
|---|---|---|---|
| **R17005** | MAX laser frequency( unit: kHz ) | Maximum laser frequency (unit: kHz) | Read/ Write |
| **R17006** | MIN laser frequency( unit: kHz ) | Minimum laser frequency (unit: kHz) | Read/ Write |
| **R17007** | Laser delay time ( unit: 0.1 ms ) | Laser delay time ( unit: 0.1 ms) | Read/ Write |
| **R17008** | Laser mode selection | Laser mode selection<br>0: Not selected<br>1: Auto Mode<br>2: Marking while data transmitting | Read/ Write |
| **R17009** | Laser Marking Control Interface | Laser program start running when the Register=1, and the Register is cleared to 0 when program starts.<br>When the corresponding Bit ON, the corresponding function is triggered, and R17009 is automatically cleared to 0. (Do not trigger multiple functions at once)<br>Bit 0: Trigger laser marking machining.<br>Bit 1: Trigger the laser marking reset. (C37 can also trigger a reset) | Read / Write |
| **R17010** | Laser end programming request | When the R value is 1, end the machining process of marking-while-data-transmitting, except under synchronous marking mode.<br>After activated, system clear R-value with 0 automatically. | Read / Write |
| **R17011** | Enable manual function for galvo meter | Enable manual control of galvo motor<br>R17011= 0: Disabled<br>R17011= 1: Enabled | Read / Write |
| **R17012** | Enable manual laser energy | Enable manual laser emitting<br>R17012 = 0: Enabled<br>R17012 = 1: Disabled | Read / Write |
| **R17013** | Set manual laser frequency( unit: kHz ) | Set manual laser frequency (unit: kHz) | Read / Write |

| | | | |
|---|---|---|---|
| **R17014~ R17016** | Set manual jog for galvo motor | Setup the manual jog for galvanometer scanner<br>R17014: Axis ID (1:X, 2: Y, 3: Z)<br>R17015: Magnify Ratio<br>0: 0.1x<br>1: 1x<br>2: 10x<br>3: 100x<br>R17016: Basic Movement, unit: mdeg. Take the deviation value as the current movement. | Read / Write |
| **R17018** | Machining cycle mode | 0: Single interpretation of the machining file.<br>1: Repeat the interpretation of the machining file a limited number of times.<br>2: Repeat the interpretation of the machining file indefinitely until the reset signal (Reset) is triggered.<br>3: Record mode for the small files (unsupported with 70SB)<br>4: Play mode for the small files (unsupported with 70SB) | Read / Write |
| **R17019** | Machining paths interp retation repeat count | If R17018 is set to 1, the value specified by this R value is used as the counts of repeated interpretations of the processing file.<br>If R17018 is set to 1, and R17019 is set to a non-positive integer, cycle start will trigger the alarm LASERCTRL-006. | Read / Write |
| **R17020** | Laser marking override | Setup laser marking feedrate override, override must be > 0 and ≤ 200%。<br>R17020 = 100 means feedrate is100%;<br>R17020 = 150 means feedrate is 150%. | Read / Write |
| **R17021** | Part detecting trigger signal | Only applied in conveyer marking mode, an I Bit is used to detect whether the parts on the conveyer passed by, and the I Bit informs the kernel there are parts passing by with R17021.<br>When R17021 turns to 1 from 0 means there are parts being detected. The laser kernel will set R17021 back to 0 automatically after receiving the signal. | Read / Write |
| **R17022** | Part detecting trigger signal - macro | Only applied in conveyer marking mode, an I Bit is used to detect whether the parts on the conveyer passed by, and the I Bit informs macro there are parts passing by with R17022.<br>When R17022 turns to 1 from 0 means there are parts being detected. Macro will send the marking data to kernel and set R17022 back to 0 automatically after receiving the signal. | Read / Write |

| | | | |
|---|---|---|---|
| **R17023~ R17024** | Laser Marking Function Reserved Area | Reserved for Laser Marking Functions | Read / Write |
| **R17025** | Laser Marking Synchronous Mode/ Tracking Mode Setup | Laser Marking Synchronous Mode/Tracking Mode Setup<br>0: Disabled<br>1: Tracking Mode (Product Line) | Read / Write |
| **R17026** | Laser Marking Synchronous Mode Setup | Laser Marking Synchronous Mode Setup<br>0: Disp-Base<br>1: Time-Base | Read / Write |
| **R17027~ R17030** | Laser Marking Function Reserved Area | Reserved for Laser Marking Functions | Read / Write |
| **R17031~ R17040** | Assign laser file name | Assign Laser File Name, 10 R values reserved, maximum 39 bytes (Plus 1 ending character)<br>Example:<br>Macro :<br>@117031:= "Laser_Main"<br>Registers:<br>R17031'e''s''a''L'<br>R17032 'a''M''_''r'<br>R17033 '\0''n''i' | Read/ Write |
| **R17041~ R17042** | Laser Source Pulse Width Modulation | R17041: Set to 1, laser source switched to data transmission mode; set to be 0, laser source data transmission mode off.<br>R17042: Pulse width (unit: ns). Range limitation: 0~65535<br>The 71SA needs to use with the FC-LSMPW to connect to the first piece of the first station. | Read / Write |
| **R17043~ R17045** | Reserved for Laser source pulse width setting | Reserved for Laser source pulse width setting | |

| | | | |
|---|---|---|---|
| **R17046~ R17099** | Reserved for Laser Marking | Reserved for Laser Marking | |
| **R17100** | Laser status | Laser status<br>0：Not Ready<br>1：Ready<br>2：Processing<br>3：Manual | Read |
| **R17101** | Laser mode | Laser mode<br>0: Not selected<br>1: Auto Mode<br>2: Marking while data transmitting | Read |
| **R17103~ R17109** | Reserved for Laser Marking Function | Reserved for Laser Marking Function | |
| **R17110** | Laser energy command | Laser energy command (0~255) | Read |
| **R17111~ R17113** | Laser galvo axis command( unit: mdeg ) | Laser galvanometer scanner axis command (unit: mdeg) | Read |
| **R17114~ R17116** | Laser galvo axis feedback( unit: mdeg ) | Laser galvanometer scanner axis feedback command (unit: mdeg) These Registers display command value if no feedback. | Read |
| **R17117~ R17119** | Reserved for Laser Marking | Reserved for Laser Marking | Read |
| **R17120** | Conveyor Current Speed | Conveyor Current Speed<br>When the conveyor sensor being set as a normal encoder, it shows the actual feedback; when being set as the virtual speed, it shows the virtual conveyor speed. | Read |
| **R17121~ R17124** | Laser Marking Function Reserved Area | Laser Marking Function Reserved Area | Read |

| | | | |
|---|---|---|---|
| **R17125** | Laser Marking Synchronous Mode/ Tracking Mode Setup | Laser Marking Synchronous Mode/Tracking Mode Setup<br>0: Disabled<br>1: Tracking Mode (Product Line) | Read |
| **R17126** | Laser Marking Synchronous Mode Status | Current Laser Marking Synchronous Mode Status<br>0: Disp-Base<br>1: Time-Base | Read |
| **R17127~ R17150** | Laser Marking Function Reserved Area | Laser Marking Function Reserved Area | Read |
| **R17151** | Laser Energy Display | Decide the laser source type according to parameter 3402 and display the laser energy of each laser source type corresponding R value, unit: %.<br>The corresponding R value of SPI is R880<br>The corresponding R value of IPG is R53 | Read |
| **R17152** | Manual Laser On Time Input | The R value is related to the manual laser time of the controller, the laser turns on when the R value is not 0, unit: second. | Read / Write |
| **R17153** | Remaining Manual Laser On Time | The R value is related to the remaining manual laser time, the laser turns off when the R value is 0, unit: second. | Read |
| **R17154** | Laser Energy Setup | Decide the laser source type according to parameter 3402 and fill the energy into corresponding R values.<br>The corresponding R value of SPI is R880<br>The corresponding R value of IPG is R53 | Read / Write |
| **R17155** | Part Rotary Angle Setup | Set the rotary amount of laser marking, the original unit: 10^-6 deg, change the rotary amount unit to deg.<br>angle > 0 means rotating counterclockwise<br>angle < 0 means rotating clockwise | Read / Write |

| | | | |
|---|---|---|---|
| **R17156** | Set the grid point number on single side of Grid Distortion Correction Marking (NxN) | The grid point number on single side when calling G533 for Grid Distortion Correction Marking.<br>i.e. When the value is 5, it means to mark a 5x5 grid points.<br>Since the kernel of the Grid Distortion Correction only accepts 3x3, 5x5, 9x9. 17x17, 33x33, total 5 correction options, the value should better set to be 3,5,6,17,33. | Read / Write |
| **R17157** | Grid Distortion Correction Marking Range Setup (mm) | The unilateral length (mm) when calling G533 for Grid Calibration Marking. | Read / Write |
| **R17158** | Maximum Distortion Amount | The maximum distortion amount of all grid points when doing vision distortion measurements (um). | Read / Write |
| **R17159** | Host stopped slave device machining mechanism | When R17159=1, it triggered C37 and run the sub-program O1111. The content of O1111 is controller send HMI_Reset action. | Read / Write |
| **R17160** | Set manual laser pulse width (unit: ns) | Manual Laser Pulse Width Setup (Unit: ns) | Read / Write |
| **R17161~ R17200** | Laser Marking HMI System Reserved Area | Laser Marking HMI System Reserved Area | |
| **R17201~ R17210** | Woodworking Drilling Machine Occupied R value<br>G54~G57 station cycle start | 0: Empty, not processing, or being overwrite to 0 by PLC after reset.<br>1: The station is ready for machining. | Read / Write |

| | | | |
|---|---|---|---|
| **R17211** | Woodworking Station Alarm | When system couldn't find the R1720x file, unable to assign, the R value changes to x ( x= 1~4 ). | Read |
| **R17212~ R17300** | Woodworking Function Reserved Area | Woodworking Function Reserved Area | |
| **R17301~ R17350** | Five-Axis Function Reserved Area | Five-Axis Function Reserved Area | |
| **R17351~ R17400** | Laser Cutting Process Parameters | Laser Cutting Process Parameters, CYC File. | Read / Write |
| **R17401~ R17440** | Laser Cutting Servo Correction – Height Voltage Parameters | Laser Cutting Servo Correction – Height Voltage Parameters, CYC File. | Read / Write |
| **R17441~ R17461** | Laser Cutting Speed Power Chart | Laser Cutting Speed Power Chart, CYC File. | Read / Write |
| **R17462~ R17500** | Laser Cutting Software Panel Parameters (Software Panel) | Laser Cutting Software Panel Parameters (Software Panel) | Read / Write |
| **R17501~ R17548** | Laser Cutting Power, Frequency, Servo PLC Calculating Area. | Laser Cutting Power, Frequency, Servo PLC Calculating Area. | Read / Write |

| | | | |
|---|---|---|---|
| **R17549~ R17556** | Laser Cutting Customized Functions (Tube exchange, Process repeat, Coordinate transformation) | Laser Cutting Customized Functions (Tube exchange, Process repeat, Coordinate transformation) | Read / Write |
| **R17557~ R17600** | Laser Cutting Function Reserved Area | Laser Cutting Function Reserved Area | Read / Write |
| **R17601~ R17699** | High-Speed Spindle Glass Milling Machine Reserved Area | High-Speed Spindle Glass Milling Machine Reserved Area | |
| **R17700~ R17999** | Reserved for CNC | System Reserved Area | |
| **R18000~ R18999** | Vision Function Reserved Area | Vision Reserved Area - ref 3.7 System Parameter(R/L) Instructions | |
| **R19000~ R19199** | Robot Process Package Reserved Area | Robot Process Package Reserved Area | |
| **R19000~ R19199** | Robot Process Package Reserved Area | Robot Process Package Reserved Area | |
| **R19200~ R19999** | Reserved for CNC | Reserved for system (Consider the robot data coherence when using) | |

| | | | |
|---|---|---|---|
| **R20159~ R65535** | User define | User-defined | |

® marked components mean the signal or Register will be processed instantly.

# 2 PLC Interface Integration-Axis & Spindle

- This page integrates PLC interface of axis and spindle related functions, so that the developers can improve the search speed.
- For the detail of each component, please refers to PLC Interface.

Axis Spindle others

## 2.1 Command

| | Function\Axis ID | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Axis Jog (+) | C6 | C8 | C10 | C1770 | C1772 | C12 | C1774 | C1776 | C1778 | C1880 | C1882 | C1884 | C1886 | C1888 | C1990 | C1992 | C1994 | C1996 |
| 2 | Axis Jog (-) | C7 | C9 | C11 | C1771 | C1773 | C13 | C1775 | C1777 | C1779 | C1881 | C1883 | C1885 | C1887 | C1889 | C1991 | C1993 | C1995 | C1997 |
| 3 | Axis MPG Selection | C16 | C17 | C18 | C2155 | C2156 | C19 | C2157 | C2158 | C2159 | C2200 | C2201 | C2202 | C2203 | C2204 | C2205 | C2206 | C2207 | C2228 |
| 4 | Set Machine Position | C25 | C26 | C27 | C2330 | C2331 | C28 | C2332 | C2333 | C2334 | C2335 | C2336 | C2337 | C2338 | C2339 | C2340 | C2341 | C2342 | C2343 |
| 5 | Axis Manual Control ( Monitor Mode) | C31 | C32 | C33 | C2445 | C2446 | C34 | C2447 | C2448 | C2449 | C2550 | C2551 | C2552 | C2553 | C2554 | C2555 | C2556 | C2557 | C2558 |
| 6 | Over Travel (+) | C50 | C52 | C54 | C1440 | C1442 | C56 | C1444 | C1446 | C1448 | C1550 | C1552 | C1554 | C1556 | C1558 | C1660 | C1662 | C1664 | C1666 |

| | Function\Axis ID | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | Over Travel (-) | C51 | C53 | C55 | C1441 | C1443 | C57 | C1445 | C1447 | C1449 | C1551 | C1553 | C1555 | C1557 | C1559 | C1661 | C1663 | C1665 | C167 |
| 8 | Axis Controlled by PLC | C66 | C67 | C68 | C2600 | C2601 | C69 | C2602 | C2603 | C2604 | C2605 | C2606 | C2607 | C2608 | C2609 | C2710 | C2711 | C2712 | C273 |
| 9 | Home Dog Signal | C79 | C80 | C81 | C2000 | C2001 | C82 | C2002 | C2003 | C2004 | C2005 | C2006 | C2007 | C2008 | C2009 | C2110 | C2111 | C2112 | C213 |
| 10 | Machine Lock | R600.01 | R600.02 | R600.03 | R600.04 | R600.05 | R600.06 | R600.07 | R600.08 | R600.09 | R600.10 | R600.11 | R600.12 | R600.13 | R600.14 | R600.15 | R600.16 | R600.17 | R600.18 |
| 11 | Axis MPG Simulation （PLC Axis) | R601.01 | R601.02 | R601.03 | R601.04 | R601.05 | R601.06 | R601.07 | R601.08 | R601.09 | R601.10 | R601.11 | R601.12 | R601.13 | R601.14 | R601.15 | R601.16 | R601.17 | R601.18 |
| 12 | Prohibit Axis Command | R603.01 | R603.02 | R603.03 | R603.04 | R603.05 | R603.06 | R603.07 | R603.08 | R603.09 | R603.10 | R603.11 | R603.12 | R603.13 | R603.14 | R603.15 | R603.16 | R603.17 | R603.18 |
| 13 | Machine Lock for Positive Direction | R612.01 | R612.02 | R612.03 | R612.04 | R612.05 | R612.06 | R612.07 | R612.08 | R612.09 | R612.10 | R612.11 | R612.12 | R612.13 | R612.14 | R612.15 | R612.16 | R612.17 | R612.18 |

| | Function\Axis ID | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | Machine Lock for Negative Direction | R613.01 | R613.02 | R613.03 | R613.04 | R613.05 | R613.06 | R613.07 | R613.08 | R613.09 | R613.10 | R613.11 | R613.12 | R613.13 | R613.14 | R613.15 | R613.16 | R613.17 | R613.18 |

## 2.2 Status

| | Function\Axis ID | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Axis Busy | S6 | S7 | S8 | S155 | S156 | S9 | S157 | S158 | S159 | S160 | S161 | S162 | S163 | S164 | S165 | S166 | S167 | S168 |
| 2 | Axis Homing OK | S16 | S17 | S18 | S140 | S141 | S19 | S142 | S143 | S144 | S145 | S146 | S147 | S148 | S149 | S150 | S151 | S152 | S153 |
| 3 | Servo Axis Alarm | S171 | S172 | S173 | S174 | S175 | S176 | S177 | S178 | S179 | S180 | S181 | S182 | S183 | S184 | S185 | S186 | （only support 16 axes） | |
| 4 | Axis Enabled | R20.01 | R20.02 | R20.03 | R20.04 | R20.05 | R20.06 | R20.07 | R20.08 | R20.09 | R20.10 | R20.11 | R20.12 | R20.13 | R20.14 | R20.15 | R20.16 | R20.17 | R20.18 |
| 5 | Axis Movement Flag | R611.01 | R611.02 | R611.03 | R611.04 | R611.05 | R611.06 | R611.07 | R611.08 | R611.09 | R611.10 | R611.11 | R611.12 | R611.13 | R611.14 | R611.15 | R611.16 | R611.17 | R611.18 |

| | Function\ Axis ID | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | M Code Read for PLC Axis | R6299.01 | R6299.02 | R6299.03 | R6299.04 | R6299.05 | R6299.06 | R6299.07 | R6299.08 | R6299.09 | R6299.10 | R6299.11 | R6299.12 | R6299.13 | R6299.14 | R6299.15 | R6299.16 | R6299.17 | R6299.18 |
| 7 | M Code Finish for PLC Axis | R6300.01 | R6300.02 | R6300.03 | R6300.04 | R6300.05 | R6300.06 | R6300.07 | R6300.08 | R6300.09 | R6300.10 | R6300.11 | R6300.12 | R6300.13 | R6300.14 | R6300.15 | R6300.16 | R6300.17 | R6300.18 |

## 2.3 Value

| | Function\ Axis ID | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Program Coordinate | R721/R26 | R722/R27 | R723/R28 | R724 | R725 | R726/R29 | R727 | R728 | R729 | R730 | R731 | R732 | R733 | R734 | R735 | R736 | R737 | R738 |
| 2 | Machine Coordinate | R741/R31 | R742/R32 | R743/R33 | R744 | R745 | R746/R34 | R747 | R748 | R749 | R750 | R751 | R752 | R753 | R754 | R755 | R756 | R757 | R758 |
| 3 | MPG Command Ratio | R641 | R642 | R643 | R644 | R645 | R646 | R647 | R648 | R649 | R650 | R651 | R652 | R653 | R654 | R655 | R656 | R657 | R658 |

| | Function\ Axis ID | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | G00/ G01 Feedrate Override for PLC Axis | R661 | R662 | R663 | R664 | R665 | R666 | R667 | R668 | R669 | R670 | R671 | R672 | R673 | R674 | R675 | R676 | R677 | R678 |
| 5 | M Code Content for PLC Axis | R681 | R682 | R683 | R684 | R685 | R686 | R687 | R688 | R689 | R690 | R691 | R692 | R693 | R694 | R695 | R696 | R697 | R698 |
| 6 | Axis Velocity | R701 | R702 | R703 | R704 | R705 | R706 | R707 | R708 | R709 | R710 | R711 | R712 | R713 | R714 | R715 | R716 | R717 | R718 |
| 7 | Axis Temperature Compensation Value | R901 | R902 | R903 | R904 | R905 | R906 | R907 | R908 | R909 | R910 | R911 | R912 | R913 | R914 | R915 | R916 | R917 | R918 |
| 8 | Home Dog Signal Offset | R961 | R962 | R963 | R964 | R965 | R966 | R967 | R968 | R969 | R970 | R971 | R972 | R973 | R974 | R975 | R976 | R977 | R978 |
| 9 | Position Feedback Counter | R981 | R982 | R983 | R984 | R985 | R986 | R987 | R988 | R989 | R990 | R991 | R992 | R993 | R994 | R995 | R996 | R997 | R998 |

| | Function\Axis ID | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | Following Error | R5001 | R5002 | R5003 | R50004 | R50005 | R5006 | R50007 | R50008 | R50009 | R50010 | R50011 | R50012 | R50013 | R50014 | R50015 | R50016 | R50017 | R50018 |
| 11 | Index Signal Counter | R5121 | R5122 | R5123 | R51124 | R51125 | R5126 | R51127 | R51128 | R51129 | R51130 | R51131 | R51132 | R51133 | R51134 | R51135 | R51136 | R51137 | R51138 |
| 12 | Torque Load | R5151 | R5152 | R5153 | R51154 | R51155 | R5156 | R51157 | R51158 | R51159 | R51160 | R51161 | R51162 | R51163 | R51164 | R51165 | R51166 | R51167 | R51168 |
| 13 | Torque Limit Value | R5171 | R5172 | R5173 | R51174 | R51175 | R5176 | R51177 | R51178 | R51179 | R51180 | R51181 | R51182 | R51183 | R51184 | R51185 | R51186 | R51187 | R51188 |

Axis Spindle others

## 2.4 Command

| | Function\Spindle ID | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Spindle PLC Control Mode | R580.01 | R580.02 | R580.03 | R580.04 | R580.05 | R580.06 | R580.07 | R580.08 | R580.09 | R580.10 |
| 2 | Switch to C Axis Control Mode | C63 | R581.02 | R581.03 | R581.04 | R581.05 | R581.06 | R581.07 | R581.08 | R581.09 | R581.10 |
| 3 | Spindle Rotating CW | C64 | R583.02 | R583.03 | R583.04 | R583.05 | R583.06 | R583.07 | R583.08 | R583.09 | R583.10 |
| 4 | Spindle Rotating CCW | C65 | R584.02 | R584.03 | R584.04 | R584.05 | R584.06 | R584.07 | R584.08 | R584.09 | R584.10 |

| | Function\Spindle ID | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | Spindle JOG Mode | C60 | R585.02 | R585.03 | R585.04 | R585.05 | R585.06 | R585.07 | R585.08 | R585.09 | R585.10 |
| 6 | Spindle Orientation | C61 | R586.02 | R586.03 | R586.04 | R586.05 | R586.06 | R586.07 | R586.08 | R586.09 | R586.10 |
| 7 | Target State of Y-D Winding | R631.01 | R631.02 | R631.03 | R631.04 | R631.05 | R631.06 | R631.07 | R631.08 | R631.09 | R631.10 |

## 2.5 Status

| | Function\Spindle ID | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Switched to C Axis Control Mode | R582.01 / S63 | R582.02 | R582.03 | R582.04 | R582.05 | R582.06 | R582.07 | R582.08 | R582.09 | R582.10 |
| 2 | Spindle Orientation Completed | R587.01 / S61 | R587.02 | R587.03 | R587.04 | R587.05 | R587.06 | R587.07 | R587.08 | R587.09 | R587.10 |
| 3 | Rigid Tapping Mode | R588.01 / S04 | R588.02 | R588.03 | R588.04 | R588.05 | R588.06 | R588.07 | R588.08 | R588.09 | R588.10 |
| 4 | Spindle Request Mode of Y-D Winding | R602.01 | R602.02 | R602.03 | R602.04 | R602.05 | R602.06 | R602.07 | R602.08 | R602.09 | R602.10 |
| 5 | Spindle Speed Arrival for Cutting | S64 | R607.02 | R607.03 | R607.04 | R607.05 | R607.06 | R607.07 | R607.08 | R607.09 | R607.10 |
| 6 | Spindle Speed Arrival for Threading | S59 | R607.12 | R607.13 | R607.14 | R607.15 | R607.16 | R607.17 | R607.18 | R607.19 | R607.20 |
| 7 | Status of Y-D Winding | R632.01 | R632.02 | R632.03 | R632.04 | R632.05 | R632.06 | R632.07 | R632.08 | R632.09 | R632.10 |

## 2.6 Value

| | Function\Spindle ID | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Spindle Machine Position | R761（R35） | R762 | R763 | R764 | R765 | R766 | R767 | R768 | R769 | R770 |
| 2 | Spindle Speed Feedback | R771（R36） | R772 | R773 | R774 | R775 | R776 | R777 | R778 | R779 | R780 |
| 3 | Spindle Gear Selection | R24 | R782 | R783 | R784 | R785 | R786 | R787 | R788 | R789 | R790 |
| 4 | Spindle Speed Override | R851 | R852 | R853 | R854 | R855 | R856 | R857 | R858 | R859 | R860 |
| 5 | Spindle Effective Speed Command | R871 | R872 | R873 | R874 | R875 | R876 | R877 | R878 | R879 | R930 |
| 6 | Spindle Speed Command for PLC Control Mode | R941 | R942 | R943 | R944 | R945 | R946 | R947 | R948 | R949 | R950 |
| 7 | Spindle Torque Load | R5141 | R5142 | R5143 | R5144 | R5145 | R5146 | R5147 | R5148 | R5149 | R5150 |

Axis Spindle others

## 2.7 Command

| | Function\Group | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 1 | Axis Coupling Request | C46 | R614.02 | R614.03 | R614.04 |
| 2 | Axis Exchange Request | C133 | C134 | C135 | C136 |

## 2.8 Status

| | Function\Group | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 1 | Spindle Synchronization Finish | S62 | S72 | S73 | NA |
| 2 | Axis Exchange Status | S133 | S134 | S135 | S136 |
| 3 | Axis Coupling Status | R609.01 | R609.02 | R609.03 | R609.04 |
| 4 | Spindle CSS Mode | R628.01 | R628.02 | R628.03 | R628.04 |

## 2.9 Value

| | Function\Group | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 1 | Effective Spindle Selection | R791 | R792 | R793 | R794 |
| 2 | Spindle Max. Cutting Speed | R5021 | R5022 | R5023 | R5024 |