



SYNTEC
TECHNOLOGY CO.,LTD.

System Data of Controller.

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[0000]: Human-machine interface (HMI) module execution times

[Definition]

When human-machine module is executed once, add 1 to System Data 0000.

[Description]

1. Check whether human-machine interface module is executing. If this value is not adding, it means HMI module stops abnormally.
2. The faster variable 0000 is adding, the more times HMI module is executed. It also means human-machine responds faster.

[0001]: Times of motion interpolation

[Definition]

When hardware interrupt signal (ISR) is triggered, add 1 to System Data 0001.

[Description]

1. If communication module functions correctly, variable 0001 will be adding normally. If it is not adding, there are some problems with hardware or communication module and alarm OP-001[Invalid axis board setting, IO will not work] will appear.
2. The adding speed means times of execution of motion interpolation module in a unit time period, it is related to Pr3203.

[0002]: PLC scan times

[Definition]

Each time when Normal PLC in ladder is completely scanned, add 1 to System Data 0002 will be added 1

[Description]

1. The adding speed means the times of scanning PLC ladder in a unit time period, it is related to Pr3204.
2. Actual value of Pr3204 is related to Motion Interpolation Time (System Data 0004), system picks the closest integer multiple of System Data 0004 to parameter value. I.e., Pr3204 is 10000 and System Data 0004 is 3000, the closest integer multiple is 9000 therefore the actual PLC scan time is 9000 (0.001ms).

[0003]: I/O scan times

[Definition]

Each time controller reads and writes all IO, add 1 to System Data 0003.

[Description]

1. The adding speed means the times that controller reads and writes all IOs, it is related to Pr3202.
2. Actual value of Pr3202 is related to Motion Interpolation Time (System Data 0004), system picks the closest integer multiple of System Data 0004 to parameter value. I.e., Pr3202 is 5000 and System Data 0004 is 3000, the closest integer multiple is 6000 therefore the actual I/O scan time is 6000 (0.001ms).
3. If the adding speed is slower than PLC Scan Times, the parameter settings are inappropriate.
4. The System Data does not include Control Panel scan time.

[0004]: Motion interpolation time

[Definition]

The time interval between two hardware interrupt (ISR) is triggered, unit: μsec .

[Description]

1. For SUPER Controller, this System Data is approximately $\text{Pr3203}/1000*983$; for 10 and EZ Series controller, it is $\text{Pr3203}/1000*819$; other series of controllers equal to Pr3203.
2. If the System Data 0005 is different from above value, please refer to Parameter Manual to check if Pr11 is set correctly.

[0005]: PLC scanning time

[Definition]

Scanning time interval of PLC, unit: μsec

[Description]

1. For SUPER Controller, this System Data is approximately Pr3204/1000*983; for 10 and EZ Series controller, it is Pr3204/1000*819; other series of controllers equal to Pr3204.
2. If the System Data 0005 is different from above value, please refer to Parameter Manual to check if Pr11 is set correctly.

[0006]: SRAM writing times

[Definition] CF card writing times

[Description]

1. CF card has an endurance of about 1 million reading and writing cycles. When System Data 0006 is close to one million, it is suggested to replace a new CF card to prevent bootup failure.
2. Reference System Data 020, 021, and 022.

[0007]: Free system memory

[Definition]

Free memory of Kernel, Unit: Byte

[Description]

1. System Data 0007 too low can causes system unstable or crash. If it is lower than 1M(1000000) or 100K(100000), alarm OP-007 [Low memory, memory space is less than 1M] or Op-008 [Fatal low memory, memory space is less than 100K] will be triggered.

[0008~0011]: X/Y/Z/C axis following error

[Definition]

Error between position command and position feedback of each axis

Calculation: [X/Y/Z/C axis following error- System Data 008~011] = [X/Y/Z/C axis absolute position command- System Data 040~043] - [X/Y/Z/C axis absolute position feedback- System Data 024~027], Unit: BLU

[Description]

1. This variable is the real time following error used to check motion lag of each axis.
2. For static axis, this error is called static error and should be very close to zero. If it is greater than Pr561~, alarm MOT-008 [Loss Pulse] will appear.
3. For dynamic axis, this error is called dynamic error and should be smaller than [Maximum allowed following error - System Data 016~019]. If not, alarm MOT-019 [following error exceed] or even MOT-023 [Fatal following error exceed] will appear.
4. When moving in constant speed, System Data [0008~0011] and [reasonable following error- System Data 032~035] should be very close. If not, please check if drive position loop gain and controller Pr181~ are the same; and drive's feed forward command or filter function are not disabled. Connection problem may be also a reason.

[0012]: Spindle DA value

[Definition]

Spindle DA value sent by axis card. Unit: mV

[Description]

Theoretical value = (spindle speed command/Pr1671)*1000. Generally used to inspect voltage output under inverter spindle type (Pr1791=0, 5, 6, 7) or non-inverter spindle type (Pr1791=1~4) with voltage control mode (Pr386=1~).

[0013]: Max interpolation error of Z axis following spindle when tapping (linear direction)**[Definition]**

During tapping, maximum error of Z axis following spindle, Unit: BLU

[Description]

1. During tapping, smaller the maximum value of [System Data 0014 Interpolation error of Z axis following spindle], the better it is. It means tapping has higher precision.
2. For multiple axis group or multi-spindle systems, the displayed value is decided by R21 and R791~R794. For example:
When R21= 0 or 1, displays tapping information of main spindle of Axis Group 1;
When R21= 2, displays tapping information of main spindle of Axis Group 2;
When R21= 3, displays tapping information of main spindle of Axis Group 3;
When R21= 4, displays tapping information of main spindle of Axis Group 4;
3. Multiple axis group or multi-spindle systems display is valid from ver. 10.116.6A.

[0014]: Interpolation error of Z axis following spindle when tapping (linear direction)**[Definition]**

During tapping, the dynamic error of Z axis following spindle, Unit: BLU

[Description]

1. During tapping, the dynamic error of Z axis following spindle
2. For multiple axis group or multi-spindle systems, refer to System Data 0013 Max interpolation error of Z axis following spindle when tapping (linear direction)

[0015]: Interpolation error of Z axis following spindle when tapping (rotation direction)**[Definition]**

During tapping, the dynamic error of Z axis following spindle, Unit: IU (degree)

[Description]

1. During tapping, the dynamic error of Z axis following spindle
2. For multiple axis group or multi-spindle systems, refer to System Data 0013 Max interpolation error of Z axis following spindle when tapping (linear direction)

[0016~0019]: X/Y/Z/C maximum allowed following error**[Definition]**

The allowed maximum value of following error when axis moving

[Description]

1. Theoretical value = Max (Pr461~, Pr821~)/Pr181~/60*1000.
2. If [Following error System Data 008~010] exceeds this value, alarm MOT-019 [following error exceed] will appear.
3. If [Following error system Data 008~010] exceeds twice of this value, alarm MOT-023 [Fatal following error exceed] will appear.

[0020]: Consecutive failure times of writing registry file

[Definition]

After booting, the consecutive failure times of writing registry file (registry.dat).

[Description]

If System Data 0020 exceeds 100, alarm OP-026 [Machine data file fault error, re-calibrate before machining and do scan disk] will appear.

[0021]: Failure times of writing registry file

[Definition]

After booting, the failure times of writing registry file (registry.dat).

[Description]

If System Data 0021 exceeds 100, alarm OP-025 [Machine data file write fail many times, re-calibrate before machining] will appear.

[0022]: Allowed times of writing permanent data

[Definition]

Currently allowed writing times of CF card

[Description]

1. After booting, the default value is 100. Each time that registry file (registry.dat) is written, System Data 0022 will be subtracted 1. When this variable is equal to 0, no more write is allowed to avoid CF card being written too frequently.
2. This variable adds 1 every 30 seconds until reaches 1000. The normal range is between 100 to 1000, the higher the better. It is abnormal if the value is close or equal to 0, please check the memory or this System Data changes too frequently.

[0023]: Percentage of actual time motion interpolation

[Definition]

Percentage of theoretical and actual motion interpolation time

[Description]

Normally this variable is around 99~101. When abnormal value appears, please check whether Pr9 Servo board type and Pr11 Servo board clock source are set correctly.

[0024~0027]: X/Y/Z/C axis absolute position feedback

[Definition]

Position feedback of axial motor, Unit: BLU

[Description]

1. $[X/Y/Z/C \text{ axis following error System Data } 008\sim011] = [X/Y/Z/C \text{ absolute position command System Data } 040\sim043] - [X/Y/Z/C \text{ absolute position feedback System Data } 024\sim027]$
2. The value will be set to zero after finishing the first home search for non-absolute encoder.

[0028]: Spindle angle (related to index signal)

[Definition]

Spindle motor compares the index signal of position feedback, Unit: BLU

[Description]

1. This variable is used to compare spindle with index signal (Index, Z-phase or C-phase) of position feedback to confirm whether position of spindle is correct

2. Transmission mechanism (V-belt) can have slipping and cause error, installing encoder on spindle side (Pr1811=0) will be more reliable.
3. This variable becomes effective after the controller received the spindle's index signal. If you find this variable implausible (this usually happens when you reboot the controller without rebooting the drive), rotate the spindle until the controller receives the index signal.
4. A common example of this variable giving implausible values is that a Syntec Spindle executes the Spindle Orientation Stop function right after the controller is rebooted. Make sure that the index signal is received first.

[0029~0031]: The 1st / 2nd / 3rd MPG absolute position counter

[Definition] Pulse accumulated value of MPG (after multiplied by 4)

[Description]

This variable can be used to check whether input signal pulse of MPG is normal. If this value is abnormal after one turn, please check setting of Pr2021~, Pr2041~and Pr2051 or wiring of MPG (loose connector, MPG power, A+, A-, B+, B- signal...)

[0032~0035]: X/Y/Z/C reasonable following error

[Definition]

Theoretical position following error of each axis.

Calculation: Speed command (mm/min,deg/min)/60/Pr181~, Unit: BLU

[Description]

This System Data displays theoretical following error of each axis, should be close to [Axis following error- System Data 008~011]. If not, please check whether drive position loop gain and setting parameter Pr181~ are the same, driver feedforward or command filter function are not closed. Abnormal wire connections may cause inconsistency.

[0036~0037]: Reserved

[Definition] Reserved

[Description] Reserved

[0038]: System temperature (°C)

[Definition] display the current temperature inside controller

[Description]

1. The temperature is better to be close to room temperature. Keep it lower than 50°C.
2. Supports only x86 series controller.

[0039]: CPU temperature (°C)

[Definition] display the actual temperature of CPU

[Description]

1. The temperature is better to be close to room temperature. Keep it lower than 75°C.
2. If it exceeds 80°C for more than 6 minutes, controller will send alarm MLC-57 [CPU temp too high, exceed 80 °C].
3. Under normal condition, this variable cannot exceed [ID-038 System temperature] over 30 °C. If it exceeds system temperature over 30°C, please check controller cooling fan functionality or CPU heat sink.
4. Supports only x86, i.MX6 series controller.

[0040~0043]: X/Y/Z/C axis absolute position command

[Definition]

When controller sends command to each axis card, cumulative command of each corresponding axis. Unit: BLU

[Description]

1. [X/Y/Z/C axis following error System Data 008~011] = [X/Y/Z/C absolute position command System Data 040~043] - [X/Y/Z/C absolute position feedback System Data 024~027]
2. This variable is the position command being sent out from the controller, it may not equal to [X/Y/Z/C axis machine coordinate System Data 072~075] because it includes mechanical compensations (backlash, pitch, temperature, quad-peak).
3. This variable will be set to zero after finishing the first home search for non-absolute encoder.

[0044]: Spindle speed command

[Definition] Effective spindle speed command, Unit: BLU

[Description]

Check the effective spindle speed command

[0045]: Angular error of spindle synchronization

[Definition] The dynamic angular error between two synchronized spindles in a dual-spindle Lathe.

[Definition]

1. Dynamic angular error between two synchronized spindles, smaller value means better synchronization.
2. When the value fails to converge, check if both spindles has same position loop gain. If gains are the same, it could be the dynamic characteristics of two spindles do not match. Please increase acceleration time or redo servo tuning of both spindles.

[0046]: Maximum angular error of spindle synchronization

[Definition] The maximum angular error between two synchronized spindles in a dual-spindle Lathe.

[Definition]

1. Maximum angular error between two synchronized spindles, smaller value means better synchronization.
2. When sync is disabled, the value will remain until next sync enabled.
3. Refer to System Data 045 for other description.

[0047]: Reserved

[Definition] Reserved

[Description] Reserved

[0048~0051]: X/Y/Z/C Axis position index counter

[Definition]

When index signal of each axis is generated, hardware will record the current number of pulse (latch).

[Description]

1. Theoretically, the value change increment in the same direction must equal to Pr61~ * Pr81. If not, it means cables have loss pulse, please check the feedback signal (A+,A-,B+,B-,C+,C-) to confirm it is loose cable or noise interference.
2. This variable will be set to zero after finishing the first home search for non-absolute encoder.

[0052]: Spindle position index counter

[Definition]

When index signal of spindle is generated, hardware will record the current number of pulse (latch).

[Description]

1. Theoretically, the value change increment in the same direction must equal to Pr1651~ * Pr1661. If not, it means cables have lost pulse, please check the feedback signal (A+,A-,B+,B-,C+,C-) to confirm it is loose cable or noise interference.
2. This variable will be set zero after finishing spindle positioning (C61).

[0053]: Serial communication initialize failure code

[Definition] M2/M3 serial communication initialize failure code

[Description]

1. Valid version 10.118.12
2. When M2/M3 connection encounters serial communication initialize failure (OP-53), the corresponding error code will be displayed in decimal.

[0054]: Times of interpolation timeout

[Definition]

After axis card is interrupted, Kernel will check buffer command on axis card to know whether buffer command has been fetched. If not, it means computation time of the last motion interpolation exceeds [Motion interpolation time System Data 04] and System Data 54 will add 1.

[Description]

It is abnormal if the value does not equal to 0, please try to adjust slightly Pr3203 to see whether it is improved. If not, CPU or axis card could be damaged.

[0055]: Times of incomplete move command

[Definition] Check if unsend command exists after interpolation finishes for one block. If it exists, System Data 55 add 1 and this tapping cycle failed.

[Description]

Only applicable on Lathe command G33, G21, G21.2, G78.
Valid version: 10.116.30, 10.116.240, 10.116.16U and newer.

[0056~0059]: X/Y/Z/C axis offset limit

[Definition]

1. Pr201~ =0: During home search of each axis, the motor rotation revolution from home switch signal disappears to encoder index signal appears. Unit: %. If value is 500, it means motor rotates 5 revs.
2. Pr201~ =1: During home search of each axis, the distance from home switch signal disappears to optical scale (linear encoder) index signal appears relative to 1 mm (Pr17=2). Unit: %. If value is 500, it means axis moves 5 mm.

[Description]

If Pr201~ = 0, suggested range of value is 20%~80%. If it is not in that range, enable home grid function (Pr941~=1).

[0060~0063]: Reserved

[Definition] reserved

[Description] reserved

[0064~0067]: X/Y/Z/C axis following error of feedforward compensation

[Definition]

The effective following error value of each axis after the speed feedforward compensation is enabled.

[Description]

1. To enable feedforward compensation, one method is to set feedforward of each axis (Pr581~), the other method is to enable feedforward of all axes at once (Pr3808>0).
2. Excess value of feedforward setting can cause vibration or over-cut.
3. System Data 0064 can be compared with System Data 0008 and 0032, it is easier to tell the difference under constant speed.
4. If feedforward is disabled, System Data 0064 should be very close to System Data 0008 & 0032; yet it is calculated with feedback so they may not be equal.
5. If feedforward is enabled, System Data 0064 should be much smaller than System Data 0008 & 0032. The effect of feedforward can be observed this way.
6. If feedforward is enabled but not under Auto Mode, the compensation has no effect thus System Data 0064 is very close to System Data 0008 & 0032.

[0068]: Failure times of axis card synchronization

[Definition]

After axis card is interrupted, Kernel will check buffer command on axis card to know whether buffer command has been fetched. If not, it means the hardware executing DDA interpolation cycle and hardware interrupting cycle are non-synchronized, and System Data 0068 add 1.

[Description]

It is abnormal if the value does not equal to 0, please check whether interrupt setting of axis card is correct. If setting is correct, axis card could be damaged.

[0069]: Abnormal times of encoder value / Times of serial communication failure of all axes

[Definition]

1. Pulse Controller: Controller will read all axial position feedback pulse at each interpolation cycle. If the difference between current and previous value is over 10000, controller will diagnose it as abnormal feedback, and System Data 0069 will add 1.
2. Serial Controller: Controller will handshake with each axis drive at each interpolation cycle. If any handshake fails, System Data 0070 will add 1.

[Description]

1. For pulse controller, non-zero System Data 0069 is abnormal. Please check whether interrupt setting of axis card is correct. If setting is correct, axis card could be damaged.
2. For serial controller, non-zero System Data 0069 is abnormal. Please check the controller-drive connection, station setting in controller (Pr21~), and machine grounding.

[0070]: Abnormal value of encoder / Times of serial communication failure of a single axis

[Definition]

1. Pulse Controller: When [Abnormal times of absolute recorder System Data 069] is added 1, abnormal value of position feedback pulse will be recorded in System Data 0070.
2. Serial Controller: The failure times of the last axis that has serial communication failure will be recorded in System Data 0070.

[Description]

Refer to description of System Data 0069.

[0071]: Abnormal encoder axis / Serial communication failure station number

[Definition]

1. Pulse Controller: When [Abnormal times of absolute recorder - System Data 0069] is added 1, axis number that has abnormal encoder value will be recorded in this system Data. Range 1~16.
2. Serial Controller: When [Times of serial communication failure of a single axis - System Data 0070] is added 1, the station number that failure occurs will be recorded in this System Data. Range 1~16.

[Description]

Refer to description of System Data 0069.

[0072~0075]: X/Y/Z/C axis machine coordinate

[Definition] Display the machine coordinates of each axis, Unit: BLU

[Description]

1. Use to check the correctness of machine's position.
2. This variable will be set to zero after finishing the first home search for non-absolute encoder.

[0076]: CNC2 firmware version

[Definition] firmware version of chip on the axis card

[Description]

1. If necessary, check firmware version of motion chip on axis card to troubleshoot.
2. Thousands of digits are used to determine the FPGA family, 0 is Spartan-6, and 1 is Artix-7.

[0077]: CE- Free hardware memory

[Definition] Actual free hardware memory, Unit: Byte

[Description]

Too low of the value could causes system unstable or crash, when free hardware memory is less than 1M (1000000) or 100K (100000) alarm OP-007 [Low memory, memory space is less than 1M] or OP-008 [Fatal low memory, memory space is less than 100K] will appear

[0078]: CE- HMI free memory / DOS- PLC version

[Definition]

- 1.CE6.0: The free memory of human-machine interface module, Unit: Byte
- 2.DOS: Display PLC R1019

[Description]

If necessary, please confirm the PLC version to classify issue

[0079]: Software version

[Definition] Software version of controller

[Description]

If necessary, please confirm the controller software version to classify issue

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| | | | | | | | | | |
|----|---|-----|---|-----|--|-----|---|-----|---|
| 80 | X axis double loop position error | 96 | X axis absolute position feedback | 112 | X axis second absolute position feedback | 128 | X axis machine coordinate | 144 | X axis second feedback position index counter |
| 81 | Y axis double loop position error | 97 | Y axis absolute position feedback | 113 | Y axis second absolute position feedback | 129 | Y axis machine coordinate | 145 | Y axis second feedback position index counter |
| 82 | Z axis double loop position error | 98 | Z axis absolute position feedback | 114 | Z axis second absolute position feedback | 130 | Z axis machine coordinate | 146 | Z axis second feedback position index counter |
| 83 | 4 th axis double loop position error | 99 | 4 th axis absolute position feedback | 115 | 4 th axis second absolute position feedback | 131 | 4 th axis machine coordinate | 147 | 4 th axis second feedback position index counter |
| 84 | 5 th axis double loop position error | 100 | 5 th axis absolute position feedback | 116 | 5 th axis second absolute position feedback | 132 | 5 th axis machine coordinate | 148 | 5 th axis second feedback position index counter |
| 85 | 6 th axis double loop position error | 101 | 6 th axis absolute position feedback | 117 | 6 th axis second absolute position feedback | 133 | 6 th axis machine coordinate | 149 | 6 th axis second feedback position index counter |
| 86 | 7 th axis double loop position error | 102 | 7 th axis absolute position feedback | 118 | 7 th axis second absolute position feedback | 134 | 7 th axis machine coordinate | 150 | 7 th axis second feedback position index counter |
| 87 | 8 th axis double loop position error | 103 | 8 th axis absolute position feedback | 119 | 8 th axis second absolute position feedback | 135 | 8 th axis machine coordinate | 151 | 8 th axis second feedback position index counter |

| | | | | | | | | | |
|----|--|-----|--|-----|---|-----|--|-----|--|
| 88 | 9 th axis double loop position error | 104 | 9 th axis absolute position feedback | 120 | 9 th axis second absolute position feedback | 136 | 9 th axis machine coordinate | 152 | 9 th axis second feedback position index counter |
| 89 | 10 th axis double loop position error | 105 | 10 th axis absolute position feedback | 121 | 10 th axis second absolute position feedback | 137 | 10 th axis machine coordinate | 153 | 10 th axis second feedback position index counter |
| 90 | 11 th axis double loop position error | 106 | 11 th axis absolute position feedback | 122 | 11 th axis second absolute position feedback | 138 | 11 th axis machine coordinate | 154 | 11 th axis second feedback position index counter |
| 91 | 12 th axis double loop position error | 107 | 12 th axis absolute position feedback | 123 | 12 th axis second absolute position feedback | 139 | 12 th axis machine coordinate | 155 | 12 th axis second feedback position index counter |
| 92 | 13 th axis double loop position error | 108 | 13 th axis absolute position feedback | 124 | 13 th axis second absolute position feedback | 140 | 13 th axis machine coordinate | 156 | 13 th axis second feedback position index counter |
| 93 | 14 th axis double loop position error | 109 | 14 th axis absolute position feedback | 125 | 14 th axis second absolute position feedback | 141 | 14 th axis machine coordinate | 157 | 14 th axis second feedback position index counter |
| 94 | 15 th axis double loop position error | 110 | 15 th axis absolute position feedback | 126 | 15 th axis second absolute position feedback | 142 | 15 th axis machine coordinate | 158 | 15 th axis second feedback position index counter |

| | | | | | | | | | |
|--------|--|---------|---|---------|---|---------|--|---------|--|
| 9 5 | 16 th axis double loop position error | 11 1 | 16 th axis absolute position feedback | 12 7 | 16 th axis second absolute position feedback | 14 3 | 16 th axis machine coordinate | 15 9 | 16 th axis second feedback position index counter |
|--------|--|---------|---|---------|---|---------|--|---------|--|

[0080~0095] : 1st ~ 16th axis double loop position error

[Definition] : Difference value between feedback of motor encoder & optical scale encoder. Calculated as: "Double loop Position Error - System Data 080~095" = "Absolute position feedback - System Data 096~111" - "Second absolute position feedback - System Data 112~127". Unit: BLU.

[Description] :

1. The value reflects the mechanical error (backlash or slip) between motor and linear encoder to mismatch.
2. When the axis is static, the error is called static error. If it is greater than Pr1421~, alarm MOT-31 "Excess static double loop position error" will appear.
3. When axis is in motion, the error is called dynamic error. If it is greater than Pr3817, alarm MOT-24 "Severe double loop position error" will appear.
4. If this data increases abnormally with machine movement before home search, please check linear encoder resolution, or check its signal order (A+, A-, B+, B-).

[0096~0111] : 1st ~ 16th axis absolute position feedback

[Definition] : Axis motors position feedback, unit: BLU

[Description] :

1. The value will be set to zero after finishing the first home search for non-absolute encoder.

[0112~0127] : 1st ~ 16th axis second absolute position feedback

[Definition] : Linear scales or second encoders on spindle position feedback, unit: BLU

[Description] :

1. The value will be set to zero after finishing the first home search for non-absolute encoder.

[0128~0143] : 1st ~ 16th axis machine coordinate

[Definition] : Machine coordinate display of each axis, unit: BLU

[Description] :

1. Use to check the correctness of machine's position.
2. This variable will be set to zero after finishing the first home search for non-absolute encoder.

[0144~0159] : 1st ~ 16th axis second feedback position index counter

[Definition] :

When index signal of second feedback of each axis is generated, hardware will latch the current number of pulse.

[Description] :

1. Theoretically, the value change increment in the same direction must equal to Pr261~ * Pr301. If not, it means cables have loss pulse, please check the feedback signal (A+,A-,B+,B-,C+,C-) to confirm it is loose cable or noise interference.
2. This variable will be set to zero after finishing the first home search for non-absolute encoder.

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| | | | | | | | | | |
|-----|--------------------------------------|-----|---|-----|--|-----|---|-----|--|
| 160 | X axis following error | 176 | X axis absolute position feedback | 192 | X axis absolute position command | 208 | X axis reasonable following error | 224 | X axis maximum allowed following error |
| 161 | Y axis following error | 177 | Y axis absolute position feedback | 193 | Y axis absolute position command | 209 | Y axis reasonable following error | 225 | Y axis maximum allowed following error |
| 162 | Z axis following error | 178 | Z axis absolute position feedback | 194 | Z axis absolute position command | 210 | Z axis reasonable following error | 226 | Z axis maximum allowed following error |
| 163 | 4 th axis following error | 179 | 4 th axis absolute position feedback | 195 | 4 th axis absolute position command | 211 | 4 th axis reasonable following error | 227 | 4 th axis maximum allowed following error |
| 164 | 5 th axis following error | 180 | 5 th axis absolute position feedback | 196 | 5 th axis absolute position command | 212 | 5 th axis reasonable following error | 228 | 5 th axis maximum allowed following error |
| 165 | 6 th axis following error | 181 | 6 th axis absolute position feedback | 197 | 6 th axis absolute position command | 213 | 6 th axis reasonable following error | 229 | 6 th axis maximum allowed following error |
| 166 | 7 th axis following error | 182 | 7 th axis absolute position feedback | 198 | 7 th axis absolute position command | 214 | 7 th axis reasonable following error | 230 | 7 th axis maximum allowed following error |
| 167 | 8 th axis following error | 183 | 8 th axis absolute position feedback | 199 | 8 th axis absolute position command | 215 | 8 th axis reasonable following error | 231 | 8 th axis maximum allowed following error |

| | | | | | | | | | |
|-----|---------------------------------------|-----|--|-----|---|-----|--|-----|---|
| 168 | 9 th axis following error | 184 | 9 th axis absolute position feedback | 200 | 9 th axis absolute position command | 216 | 9 th axis reasonable following error | 232 | 9 th axis maximum allowed following error |
| 169 | 10 th axis following error | 185 | 10 th axis absolute position feedback | 201 | 10 th axis absolute position command | 217 | 10 th axis reasonable following error | 233 | 10 th axis maximum allowed following error |
| 170 | 11 th axis following error | 186 | 11 th axis absolute position feedback | 202 | 11 th axis absolute position command | 218 | 11 th axis reasonable following error | 234 | 11 th axis maximum allowed following error |
| 171 | 12 th axis following error | 187 | 12 th axis absolute position feedback | 203 | 12 th axis absolute position command | 219 | 12 th axis reasonable following error | 235 | 12 th axis maximum allowed following error |
| 172 | 13 th axis following error | 188 | 13 th axis absolute position feedback | 204 | 13 th axis absolute position command | 220 | 13 th axis reasonable following error | 236 | 13 th axis maximum allowed following error |
| 173 | 14 th axis following error | 189 | 14 th axis absolute position feedback | 205 | 14 th axis absolute position command | 221 | 14 th axis reasonable following error | 237 | 14 th axis maximum allowed following error |
| 174 | 15 th axis following error | 190 | 15 th axis absolute position feedback | 206 | 15 th axis absolute position command | 222 | 15 th axis reasonable following error | 238 | 15 th axis maximum allowed following error |
| 175 | 16 th axis following error | 191 | 16 th axis absolute position feedback | 207 | 16 th axis absolute position command | 223 | 16 th axis reasonable following error | 239 | 16 th axis maximum allowed following error |

[0160~0175] : 1st ~ 16th axis following error

[Definition] : Axis position command and position feedback error value, calculation:

[Following error- System Data 160~175] = [Absolute position command - System Data 192~207] - [Absolute position feedback- System Data 176~191], unit: BLU

[Description] :

- 1.The value is the real time following error used to check motion lag of each axis.
- 2.For static axis, this error is called static error and should be very close to zero. If it is greater than Pr561~, alarm MOT-008 [Loss Pulse] will appear.
- 3.For dynamic axis, this error is called dynamic error and should be smaller than [Maximum allowed following error Value- System Data 016~019]. If not, alarm MOT-019 [following error exceed] or even MOT-023 [Fatal following error exceed] will appear.
- 4.When moving in constant speed, the variable should be close to [Reasonable following error Value- System Data 032~035], if not, please check if drive position loop gain and controller Pr181~ are the same; and drive's feed forward command or filter function are not disabled. Connection problem may be also a reason.

[0176~0191] : 1st ~ 16th axis absolute position feedback

[Definition] : Position feedback of axial motor, Unit: BLU

[Description] :

- 1.The value will be set to zero after finishing the first home search for non-absolute encoder.

[0192~0207] : 1st ~ 16th axis absolute position command

[Definition] : Controller sends the accumulated command value of each axis to axis board, unit: BLU

[Description] :

- 1.This variable is the position command being sent out from the controller, it may not equal to [X/Y/Z/C axis machine coordinate- System Data 072~075] because it includes mechanical compensations (backlash, pitch, temperature, quad-peak).
- 2.The value will be set to zero after finishing the first home search for non-absolute encoder.

[0208~0223] : 1st ~ 16th axis reasonable following error

[Definition] : Theoretical position following error value of each axis, calculation: speed command (mm/min, deg/min)/60/Pr181~, unit: BLU

[Description] :

- 1.The variable shows the theoretical following error value of each axis, it should be close to "Axis following error Value- System Data 160~175", if not, please make sure the driver position loop gain is the same as Pr181~ settings, driver feedforward or command filter function are not closed. Abnormal cable connection may also cause inconsistency.

[0224~0239] : 1st ~ 16th axis maximum allowed following error value

[Definition] : The maximum allowed following error value during the axis is moving.

[Description] :

1. Theoretical value = Max (Pr461~, Pr821~)/Pr181~/60*1000.
2. If [Following error System Data 0224~0239] exceeds this value, alarm MOT-019 [following error exceed] will appear.
3. If [Following error system Data 0224~0239] exceeds twice of this value, alarm MOT-023 [Fatal following error exceed] will appear.
4. The first four of these values are same as System Data 008~010.

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|-----|---------------------------------------|-----|--|-----|---|-----|------------------------------------|-----|--|
| 240 | 1 st axis following error | 256 | 1 st axis following error of feedforward | 272 | 1 st axis servo loop DA value | 288 | X axis offset limit | 304 | X axis position index counter |
| 241 | 2 nd axis following error | 257 | 2 nd axis following error of feedforward | 273 | 2 nd axis servo loop DA value | 289 | Y axis offset limit | 305 | Y axis position index counter |
| 242 | 3 rd axis following error | 258 | 3 rd axis following error of feedforward | 274 | 3 rd axis servo loop DA value | 290 | Z axis offset limit | 306 | Z axis position index counter |
| 243 | 4 th axis following error | 259 | 4 th axis following error of feedforward | 275 | 4 th axis servo loop DA value | 291 | 4 th axis offset limit | 307 | 4 th axis position index counter |
| 244 | 5 th axis following error | 260 | 5 th axis following error of feedforward | 276 | 5 th axis servo loop DA value | 292 | 5 th axis offset limit | 308 | 5 th axis position index counter |
| 245 | 6 th axis following error | 261 | 6 th axis following error of feedforward | 277 | 6 th axis servo loop DA value | 293 | 6 th axis offset limit | 309 | 6 th axis position index counter |
| 246 | 7 th axis following error | 262 | 7 th axis following error of feedforward | 278 | 7 th axis servo loop DA value | 294 | 7 th axis offset limit | 310 | 7 th axis position index counter |
| 247 | 8 th axis following error | 263 | 8 th axis following error of feedforward | 279 | 8 th axis servo loop DA value | 295 | 8 th axis offset limit | 311 | 8 th axis position index counter |
| 248 | 9 th axis following error | 264 | 9 th axis following error of feedforward | 280 | 9 th axis servo loop DA value | 296 | 9 th axis offset limit | 312 | 9 th axis position index counter |
| 249 | 10 th axis following error | 265 | 10 th axis following error of feedforward | 281 | 10 th axis servo loop DA value | 297 | 10 th axis offset limit | 313 | 10 th axis position index counter |

| | | | | | | | | | |
|-----|---------------------------------------|-----|--|-----|---|-----|------------------------------------|-----|--|
| 250 | 11 th axis following error | 266 | 11 th axis following error of feedforward | 282 | 11 th axis servo loop DA value | 298 | 11 th axis offset limit | 314 | 11 th axis position index counter |
| 251 | 12 th axis following error | 267 | 12 th axis following error of feedforward | 283 | 12 th axis servo loop DA value | 299 | 12 th axis offset limit | 315 | 12 th axis position index counter |
| 252 | 13 th axis following error | 268 | 13 th axis following error of feedforward | 284 | 13 th axis servo loop DA value | 300 | 13 th axis offset limit | 316 | 13 th axis position index counter |
| 253 | 14 th axis following error | 269 | 14 th axis following error of feedforward | 285 | 14 th axis servo loop DA value | 301 | 14 th axis offset limit | 317 | 14 th axis position index counter |
| 254 | 15 th axis following error | 270 | 15 th axis following error of feedforward | 286 | 15 th axis servo loop DA value | 302 | 15 th axis offset limit | 318 | 15 th axis position index counter |
| 255 | 16 th axis following error | 271 | 16 th axis following error of feedforward | 287 | 16 th axis servo loop DA value | 303 | 16 th axis offset limit | 319 | 16 th axis position index counter |

[0240~0255] : 1st ~ 16th axis following error

[Definition] : Refer to System Data 0160~0175: 1st ~ 16th axis following error

[Description] : Refer to System Data 0160~0175: 1st ~ 16th axis following error

[0256~0271] : 1st ~ 16th axis following error of feedforward

[Definition] : The effective following error value of each axis after the speed feedforward compensation is enabled.

[Description] :

1. Refer to [System Data 0064~0067]: X/Y/Z/C axis following error of feedforward compensation.

[0272~0287] : 1st ~ 16th axis servo loop DA value

[Definition] : The voltage command sent of each axis board's DAC chips , unit: mV

[Description] :

1. Check if the voltage (speed) command is correct when Pr381~=1 (Voltage Command).

[0288~0303] : 1st ~ 16th axis offset limit

[Definition] :

1. Pr201~=0: During home search of each axis, the motor rotation revolution from home switch signal disappears to encoder index signal appears. Unit: %. If value is 500, it means motor rotates 5 revs.
2. Pr201~=1: During home search of each axis, the distance from home switch signal disappears to optical scale (linear encoder) index signal appears relative to 1 mm (Pr17=2). Unit: %. If value is 500, it means axis moves 5 mm.

[Description] :

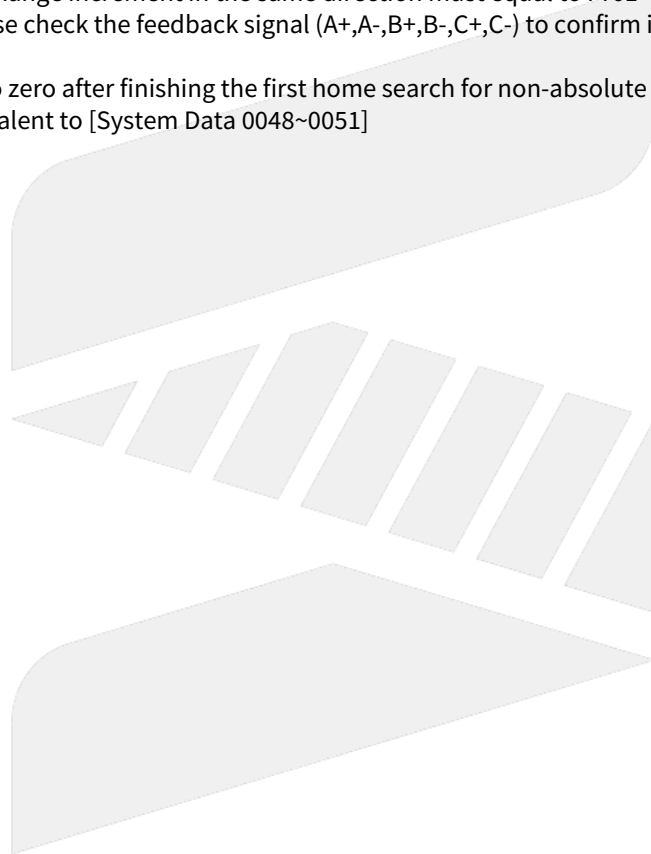
1. If Pr201~= 0, suggested range of value is 20%~80%. If it is not in that range, enable home grid function (Pr941~=1).
2. This System Data is equivalent to [System Data 0056~0059]

[0304~0319] : 1st ~ 16th axis position index counter

[Definition] : The number of (latch) pulses recorded by the hardware when the axis feedback index signal of each axis was generated.

[Description] :

1. Theoretically, the value change increment in the same direction must equal to Pr61~ * Pr81. If not, it means cables have lost pulse, please check the feedback signal (A+,A-,B+,B-,C+,C-) to confirm it is loose cable or noise interference.
2. This variable will be set to zero after finishing the first home search for non-absolute encoder.
3. This System Data is equivalent to [System Data 0048~0051]



SYNTEC

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|-----|--|-----|--|-----|---|-----|---|-----|------------------------------|
| 320 | Number of previewed serial blocks | 336 | Axis board data exchange time | 352 | 1 st axis estimated actual axis servo loop gain (Kp) | 368 | Maximum feeding axis tracking 1st spindle error when tapping (linear direction) | 384 | 4th MPG Position Counter |
| 321 | Judge if polynomial module find no root under alarms | 337 | Axis board data exchange time (MAX) | 353 | 2 nd axis estimated actual axis servo loop gain (Kp) | 369 | Maximum feeding axis tracking 2nd spindle error when tapping (linear direction) | 385 | 5th MPG Position Counter |
| 322 | Threading index checking error | 338 | Fine interpolation calculation time | 354 | 3 rd axis estimated actual axis servo loop gain (Kp) | 370 | Maximum feeding axis tracking 3rd spindle error when tapping (linear direction) | 386 | 6th MPG Position Counter |
| 323 | Max Z axis tracking spindle error when threading | 339 | Fine interpolation calculation time(MAX) | 355 | 4 th axis estimated actual axis servo loop gain (Kp) | 371 | Maximum feeding axis tracking 4th spindle error when tapping (linear direction) | 387 | 7th MPG Position Counter |
| 324 | Number of interpolating serial blocks | 340 | MatrixIO scanning time | 356 | 5 th axis estimated actual axis servo loop gain (Kp) | 372 | Maximum feeding axis tracking 5th spindle error when tapping (linear direction) | 388 | Script executor execute time |

| | | | | | | | | | |
|-----|---|-----|--|-----|--|-----|---|-----|---|
| 325 | Time of previewed serial interpolation, unit μ s. | 341 | MatrixIO scanning time (MAX) | 357 | 6 th axis estimated actual axis servo loop gain (Kp) | 373 | Maximum feeding axis tracking 6th spindle error when tapping (linear direction) | 389 | Script executor execute time (MAX) |
| 326 | Time of completed serial interpolation, unit μ s | 342 | Interpolation calculation time | 358 | 7 th axis estimated actual axis servo loop gain (Kp) | 374 | Axis board data exchange interpolation timeout times | 390 | Number of times that motion planning block exceeded capacity limitation |
| 327 | Interpolation command remaining time, unit ms | 343 | Interpolation calculation time(MAX) | 359 | 8 th axis estimated actual axis servo loop gain (Kp) | 375 | BPT function block number limit | 391 | Internal process execution times |
| 328 | Synthesis speed | 344 | Trajectory Plan calculation time | 360 | 9 th axis estimated actual axis servo loop gain (Kp) | 376 | Motion planning low performance times | 392 | System interpolation data accessible space insufficient times |
| 329 | Cycle time (time-minute-second) | 345 | Trajectory Plan calculation time (MAX) | 361 | 10 th axis estimated actual axis servo loop gain (Kp) | 377 | Playing mode command error times | 393 | Wireless handheld pendant Key Lost times |
| 330 | Interpolation command interrupted times | 346 | IO scanning time | 362 | 11 th axis estimated actual axis servo loop gain (Kp) | 378 | Substitute interpolation execution times | 394 | Wireless handheld pendant CRC packet error times |

| | | | | | | | | | |
|-----|---|-----|-----------------------------------|-----|--|-----|-----------------------------------|-----|---|
| 331 | Acquired program memory area number | 347 | IO scanning time (MAX) | 363 | 12 th axis estimated actual axis servo loop gain (Kp) | 379 | Substitute interpolation status | 395 | Customized PLC scanning time |
| 332 | Idle program memory area number | | PLC scanning time | 364 | 13 th axis estimated actual axis servo loop gain (Kp) | 380 | Times of axis board data exchange | 396 | Customized PLC scanning time (MAX) |
| 333 | Ratio of coarse/fine interpolation (Removed after 10.116.10A) | 349 | PLC scanning time (MAX) | 365 | 14 th axis estimated actual axis servo loop gain (Kp) | 381 | Hardware interrupt status | 397 | Customized PLC fast scanning time |
| 334 | Motion planning command error times (Internal Test) | 350 | MotionPlan calculation time | 366 | 15 th axis estimated actual axis servo loop gain (Kp) | 382 | System interrupt status | 398 | Customized PLC fast scanning time (MAX) |
| 335 | FRAM error counter (Removed after 10.114.38C, 10.115.43C) | 351 | MotionPlan calculation time (MAX) | 367 | 16 th axis estimated actual axis servo loop gain (Kp) | 383 | Software interrupt status | 399 | Customized PLC version number |

[0320] : Number of previewed serial blocks

[Definition] : The number of blocks in NC program which are previewed for generating velocity profile while system is machining.

[Description] :

1. When controller has enough performance, the value will stay constant.
2. The value may drop to 0 when machining start, machining ending or having low-performance.
3. System Data 320 only accumulates after data 324 reaches its max value.

[0321] : Judge if polynomial module find no root under alarms

[Definition] : Used to explain the possible reason of system sending COR-139 polynomial solution root error.

[Description] :

When system sending "COR-139 Polynomial Solution Root Error", please send the system data variable feedback message to the controller OEM.

1. If the data variable is 0 represents "Didn't enter the polynomial module/Polynomial module solution correct"
2. If the data variable is 1 represents "Polynomial solution root correct but not the one user requests".
3. If the data variable is 2 represents "Polynomial module solution failed, numerical method failed".
4. If the data variable is 3 represents "The highest power of the polynomial is not 1~4".

[0322] : Threading index checking error

[Definition] : The threading begins after receiving the spindle index signal, if found the signal unreasonable then the system data will +1, ends the threading starting action and access a new index signal. Not influencing the threading quality.

[Descriptions] :

1. If found the signal unreasonable then the system data will +1, ends the threading starting action and awaits for the next index signal.
2. The threading action won't start if the system data +1, the action only starts after the next correct index signal comes in, so it won't affect the threading quality

[0323] : Maximum Z axis tracking spindle error when threading

[Definition] : Use the spindle and Z axis feedback to calculate the tracking error when Z axis is in constant speed during the threading, unit: BLU

[Descriptions] :

1. Calculation: Z to Spindle tracking error = (Spindle feedback error) * (Spindle rotation to Z axis movement ratio) - (Z axis feedback error).
2. Only works for G33/G21/G78 blocks; the value only updates when Z axis in constant speed section.
3. The smaller the value is, the better the Z axis to spindle tracking and the threading quality.
4. When consecutive G21 blocks are executed, the value will be set 0 at first G21 block; will be set 0 when G87 block executed, but will keep updating maximum error value when G33 executed.
5. Available version starts from 10.116.16U, 10.116.24O.

[0324] : Number of interpolating serial blocks

[Definition] :

[Descriptions] :

1. When controller has enough performance, the value will stay constant.
2. The value may drop to 0 when machining start, machining ending or having low-performance.
3. When performance lowers, System Data 320 will first decrease down to 0 then System Data 324, and System Data 376 will +1.

[0325] : Time of previewed serial interpolation, unit μ s

[Definition] : The total time of all previewed blocks which have preliminary acceleration/deceleration profiling while system machining.

[Descriptions] :

1. The value increases when the machining start, and then decrease after acceleration/deceleration profiling finishes while System Data 326 value increases.
2. When performance lowers or the previewed blocks are about to finish, System Data 327 will first decrease to 0, then System Data 326, and finally System Data 325.

[0326] : Time of completed serial interpolation, unit μ s

[Definition] : The total time of all blocks which finished the acceleration/deceleration profiling while system machining

[Descriptions] :

1. System Data 325 increases first when the machining starts, then System Data 326 increases.
2. The value decreases after the acceleration/deceleration profiles were transformed into interpolation commands.
3. When performance lowers or the previewed blocks are about to finish, System Data 327 will first decrease to 0, then System Data 326, and finally System Data 325.

[0327] : Interpolation command remaining time, unit ms

[Definition] : The total time of the pending interpolation commands in system machining.

[Descriptions] :

1. System Data 325 increases first when the machining starts, then System Data 327 increases.
2. System Data 326 usually decreases when System Data 327 increases.
3. When performance lowers or the previewed blocks are about to finish, System Data 327 will first decrease to 0, then System Data 326, and finally System Data 325.

[0328] : Combined speed

[Definition] : The actual combined feedrate command value, unit LIU/min

[Descriptions] :

1. The PLC axis is excluded from combined feedrate calculation.
2. The value is the same as R700.

[0329] : Cycle time

[Definition] : Shows the current machining time

[Descriptions] :

1. Displaying format : hour-minute (the 3rd & 4th digit from last) - second (the last 2 digits).
2. Example : When value is 12345, it means the machining time has been : 1 hour-23 minutes-45 seconds

[0330] : Interpolation command interrupted times

[Definition] : If the command was interrupted during interpolation, the accumulation count of all paths +1.

[Descriptions] :

1. The CNC and PLC axis groups (paths) will vibrate with the machine if this happens.

[0331] : Acquired program memory area number

[Definition] : The number of acquired memory area when system executes the machining.

[Descriptions] :

1. Records the current machining status, being cleared after reset.

[0332] : Idle program memory area number

[Definition] : The number of idle memory area when system executes the machining.

[Descriptions] :

1. Records the current machining status, being cleared after reset.

[0333] : Ratio of coarse/fine interpolation

[Descriptions] :

1. Removed after version 10.116.10A.

[0334] : Motion planning command error times (Internal Test)

[Definition] : The number of times that motion planning command error occurred when system is machining.

[Descriptions] :

1. The value should be 0 normally.
2. Motion planning command error check only activated while running certain scripts of Auto-Test. If there is an error occurred, add one to the value.

[0335] : FRAM error counter

[Descriptions] :

1. Removed after version 10.114.38C, 10.115.43C.

[0336] : Axis board data exchange time

[Definition] : The average data exchange time between the controller and its slave device, unit: us.

[Descriptions] :

1. The value shouldn't be higher than Pr3203 * interpolation time, or it can cause command error. Please refer to controller parameter Pr3203 for further descriptions.
2. If the abnormal axis board data exchange time is within 5000 (5 ms), the system will activates the substitute interpolation as a compensation, or it can cause severe command error.
3. For further descriptions of substitute interpolation, please refer to System Data 0378 Substitute interpolation execution times
4. For further descriptions of interpolation time, please refer to controller parameter Pr3203 and System Data 4 Motion interpolation time.

[0337] : Axis board data exchange time (MAX)

[Definition] : The longest axis board data exchange time the system has ever recorded, unit: us.

[Descriptions] :

1. If the value is higher than controller parameter Pr3203 * interpolation time, it means the command error happened.
2. For further descriptions of interpolation time, please refer to controller parameter Pr3203 and System Data 4 Motion interpolation time.

[0338] : Fine interpolation calculation time

[Descriptions] :

1. Removed after version 10.116.10A.

[0339] : Fine interpolation calculation time (MAX)

[Descriptions] :

1. Removed after version 10.116.10A.

[0340] : MatrixIO scanning time

[Definition] : The average MatrixIO scanning time, unit: us.

[0341] : MatrixIO scanning time (MAX)

[Definition] : The longest MatrixIO scanning time the system has ever recorded, unit: us.

[0342] : Interpolation calculation time

[Definition] : The average time system used to calculate the interpolation commands, unit: us.

[Descriptions] :

1. The variable shouldn't be higher than controller parameter Pr3203 * interpolation time, or it can cause interpolation timeout and lead to command error.
2. For further descriptions of interpolation time, please refer to controller parameter Pr3203 and System Data 4 Motion interpolation time.

[0343] : Interpolation calculation time (MAX)

[Definition] : The longest interpolation calculation time the system has ever recorded, unit: us.

[Descriptions] :

1. If the variable is higher than controller parameter Pr3203 * interpolation time, it means the interpolation timeout had happened and can lead to command error.
2. For further descriptions of interpolation time, please refer to controller parameter Pr3203 and System Data 4 Motion interpolation time.

[0344] : Trajectory Plan calculation time

[Definition] : The average time system used calculate the Trajectory Plan, unit: us.

[0345] : Trajectory Plan calculation time(MAX)

[Definition] : The longest Trajectory Plan calculating time the system has ever recorded, unit: us.

[0346] : IO scanning time

[Definition] : The average time kernel used to read the I/O changes on the I/O board, unit: us.

[Descriptions] :

1. The variable shouldn't be higher than controller parameter Pr3202 *I/O scanning time, or it can cause IO update lag. Please refer to controller parameter Pr3202 for further descriptions.

[0347] : IO scanning time (MAX)

[Definition] : The longest IO scanning time the system has ever recorded, unit: us.

[Descriptions] :

1. If the variable is higher than controller parameter Pr3202 *I/O scanning time, it means the IO update lag had happened.

[0348] : PLC scanning time

[Definition] : The average PLC scanning time, unit: us.

[Descriptions] :

1. The value shouldn't exceed parameter Pr3204 PLC scanning time, or it might cause PLC update lag.
2. For further descriptions of interpolation time, please refer to controller parameter Pr3204 and System Data 5 PLC scanning time.

[0349] : PLC scanning time (MAX)

[Definition] : The longest PLC scanning time the system has ever recorded, unit: us.

[Descriptions] :

1. If the value is higher than controller parameter Pr3204 *PLC scanning time, it means the PLC update lag had happened.
2. For further descriptions of interpolation time, please refer to controller parameter Pr3204 and System Data 5 PLC scanning time.

[0350] : Motion Plan calculation time

[Definition] : The average time system used to calculate the Motion Plan (velocity profile), unit: us.

[0351] : Motion Plan calculation time (MAX)

[Definition] : The longest Motion Plan calculation time the system has ever recorded, unit: us.

[0352~0367] : 1st ~16th axis estimated actual axis servo loop gain (Kp)

[Definition] : The Kp value estimated by following error and the current speed.

[Descriptions] :

1. The estimated Kp value = Speed feedback / following error (1/sec)
2. Pr181~196 is the actual Kp setting value, and System Data 352~367 here are the estimated Kp value.
3. The estimated Kp value is 0 when the following error is 0.

[0368~0373] : Maximum feeding axis tracking spindle error when tapping (linear direction)

[Definition] : The maximum error when the feeding axis tracking spindle in the tapping process, unit: BLU

[Descriptions] :

1. The deviation between maximum and minimum feeding axis spindle following error (straight direction) in the tapping process should be smaller, the smaller the deviation is, the better the synchronous tapping precision is.
2. Available version: 10.114.16~10.116.5

[0374] : Times of axis board data exchange timeout (exceeds 2x interpolation)

[Definition] : The variable will +1 if the axis board exchange time is accidentally too long and exceeds twice the interpolation time while running the system, but not definitely affects the machining effects.

[Descriptions] :

1. Axis board data exchange timeout, it might make the YASKAWA/SYNTEC serial drivers send AE50 alarm.
2. Not definitely affects the machining surface effects, the variable is used to support AE50 alarm diagnose.

[0375] : BPT block number limit

[Definition] : If executing massive high speed short blocks while executing, system will automatically arrange blocks to protect system stability. The value shows the limit block number.

[Descriptions] :

1. If the machining program is too strict, the controller will plan and send a more steady feedrate if it is impossible to plan according to the input feedrate.
2. The increase of the system data does not affect the machining rate if it is impossible to plan according to the input feedrate.
2. The increase of the system data does not affect the machining performance .

[0376] : Motion planning low performance times

[Definition] : When the controller is in motion planning, if deceleration happened due to low-performance, the system data will +1.

[Descriptions] :

1. The variable increases because of severe low-performance of the system, please check if there is any high load customization or plug-ins.
2. When low performance happened, the machining decelerates because of the system self-protection. Can be avoided by reducing the command feedrate.
3. The value is normal to increase when the Cycle Start just begins. If it increases during the machining then it means the lack of performance.
4. If there is no fluctuation in the machining time, then no need to refer to this System Data.

[0377] : Playing mode command error times

[Definition] : If the controller can't access the correct playing command in the playing process, the system data will +1.

[Descriptions] :

1. The variable only works under the playing mode.

[0378] : Substitute interpolation execution times

[Definition] : If the axis board data exchange time is too long, the system will activates the substitute interpolation to avoid the M2/M3/EtherCAT serial drivers sending synchronization error alarms, and the System Data will +1.

[Descriptions] :

1. The system data should be 0 under normal conditions, non-zero means the substitute interpolation had happened.
2. Substitute interpolation might be caused by low-performance, long machining time or system timeout when using dipole.
3. The substitute interpolation is a predicted contour, it might slightly affects the machining quality.
4. To avoid mechanical conflict, the substitute interpolation can only be executed for 10 millisecond, the driver will still send the alarm if exceeded.

[0379] : Substitute interpolation status

[Definition] : To determine if the controller is activating the substitute interpolation function.

[Descriptions] :

1. -1 : Not supporting, 0 : Not activated, 1 : Activated

[0380] : Times of axis board data exchange

[Definition] : The variable +1 every time the communication module executes.

[Descriptions] :

1. If hardware interrupt and the address of the axis board are both correct, the System Data will add up normally; if not adding up normally, then it means there may be hardware problems or the interrupt and axis board address are incorrect. System will send the OP-001 "axis board setup error" alarm.
2. The adding up speed equals to the execution times of the communication module in a unit time, it's related to Pr3203 setups.
3. The actual value of Pr3203 is related to hardware interrupt clock rate, the actual value of SUPER controller is about $Pr3203/1000*983$; 10 series and EZ series controllers are about $Pr3203/1000*819$; other series controllers are the same as Pr3203.

[0381] : Hardware interrupt status

[Definition] : Reads the output logic level of external hardware interrupt.

[Descriptions] :

1. -1 : Not support reading, 0 : Logic 0, 1 : Logic 1
2. Because the interrupt changing frequency is far higher than the HMI update frequency, the system data shows 0 in steady state if supports reading.

[0382] : System interrupt status

[Definition] : Reads the received logic level of CPU interrupt.

[Descriptions] :

1. -1 : Not support reading, 0 : Logic 0, 1 : Logic 1
2. Because the interrupt changing frequency is far higher than the HMI update frequency, the system data shows 0 in steady state if supports reading.

[0383] : Software interrupt status

[Definition] : Records the current logic level of software interrupt.

[Descriptions] :

1. -1 : Not support reading, 0 : Logic 0, 1 : Logic 1
2. Because the interrupt changing frequency is far higher than the HMI update frequency, the system data shows 0 in steady state if supports recording.

[0384~0387] : The 4th/5th/6th/7th MPG absolute position counter

[Definition] : The current pulse accumulation value (after frequency quadrupling) input of each MPG.

[Descriptions] :

This variable can be used to check whether input signal pulse of MPG is normal. If this value is abnormal after one turn, please check setting of Pr2024~, Pr2044~and Pr2054~ or wiring of MPG (loose connector, MPG power, A+, A-, B+, B- signal...)

[0388] : Script executor execute time

[Definition] : The average time of script executor execute all script, unit: us.

[Descriptions] :

1. If the value increase continually, please check the script of routine script has not infinity loop.
2. Support version: 10.118.32E, 10.118.40I, 10.118.41I, 10.118.45 and after.

[0389] : Script executor execute time (MAX)

[Definition] : The longest script executor execute time the system has ever recorded, unit: us.

[Descriptions] :

1. If the value increase continually, please check the script of routine script has not infinity loop.
2. Support version: 10.118.32E, 10.118.40I, 10.118.41I, 10.118.45 and after.

[0390] : Number of times that motion planning block exceeded capacity limitation

[Definition] : When blocks that controller have interpreted are out of capacity, the debug value will add one.

[Description] :

1. There are limits for blocks interpreted by the controller. When too many blocks for the controller to process, it might be out of capacity.
2. There is a protection by software to avoid circumstance that the controller is unable to interpret any blocks. The system will stop interpretation if capacity is full, so that exceeding capacity limitation should never happen.
3. The value should be zero normally. If not, system alarm OP-001 or system crash may occur.

[0391] : Internal process execution times

[Definition] : The controller software background execution times, the data +1 after every execution.

[Descriptions] :

1. The process that no need to be executed immediately will be executed in the controller software background.
2. The internal process execution times will be lower when the system is busier.

[0392] : System interpolation data accessible space insufficient times

[Definition] : If there are excessive function data being sent out during interpolation and exceeds the accessible space, the system will ignore the exceeded function data and system data +1.

[Descriptions] :

1. The system data should be 0 under normal situation, if it's not 0 means the insufficient of system accessible space during interpolation.
2. The space insufficient may be caused by the excessive function data being sent out during interpolation.
3. The situation might lead to the incorrect execution of axis function, ex: Backlash changing error.

[0393] : Wireless handheld pendant Key Lost times

[Definition] : Wireless handheld pendant Key Lost times

[Descriptions] :

1. The wireless receiver doesn't receive the correct handheld pendant key packet.

[0394] : Wireless handheld pendant CRC packet error times

[Definition] : The wireless handheld pendant CRC packet error times.

[Descriptions] :

1. The wireless receiver being interfered by noise and lead to CRC packet error.

[0395] : Customized PLC scanning time

[Definition] : The average spent time of customized PLC scanning, unit: us.

[Descriptions] :

1. The data only works when using customized PLC functions.

[0396] : Customized PLC scanning time (MAX)

[Definition] : The maximum spent time of customized PLC scanning, unit: us.

[Descriptions] :

1. The data only works when using customized PLC functions.

[0397] : Customized PLC fast scanning time

[Definition] : The average spent time of customized PLC fast scanning, unit: us.

[Descriptions] :

1. The data only works when using customized PLC functions.

[0398] : Customized PLC fast scanning time (MAX)

[Definition] : The maximum spent time of customized PLC fast scanning, unit: us.

[Descriptions] :

1. The data only works when using customized PLC functions.

[0399] : Customized PLC version number

[Definition] : Customized PLC version number.

[Descriptions] :

1. The data only works when using customized PLC functions.

6 Debug Page 6

| | | | | | | | | | |
|-------------|---|-------------|---|-------------|---|-------------|---|-------------|---|
| 4 0 0 | 1 st spindle machine angle | 4 1 6 | 2 nd spindle ma chine angle | 4 3 2 | 3 rd spindle mac hine angle | 4 4 8 | 4 th spindle mac hine angle | 4 6 4 | 5 th spindle mac hine angle |
| 4 0 1 | 1 st spindle IGBT temperature | 4 1 7 | 2 nd spindle IGBT temperature | 4 3 3 | 3 rd spindle IGBT temperature | 4 4 9 | 4 th spindle IGBT temperature | 4 6 5 | 5 th spindle IGBT temperature |
| 4 0 2 | 1 st spindle DC bus voltage | 4 1 8 | 2 nd spindle DC bus voltage | 4 3 4 | 3 rd spindle DC bus voltage | 4 5 0 | 4 th spindle DC bus voltage | 4 6 6 | 5 th spindle DC bus voltage |
| 4 0 3 | 1 st spindle serial encoder CRC error times (hardware) | 4 1 9 | 2 nd spindle serial encoder CRC error times (hardware) | 4 3 5 | 3 rd spindle serial encoder CRC error times (hardware) | 4 5 1 | 4 th spindle serial encoder CRC error times (hardware) | 4 6 7 | 5 th spindle serial encoder CRC error times (hardware) |
| 4 0 4 | 1 st spindle drive KTY84 temperature | 4 2 0 | 2 nd spindle drive KTY84 temperature | 4 3 6 | 3 rd spindle drive KTY84 temperature | 4 5 2 | 4 th spindle drive KTY84 temperature | 4 6 8 | 5 th spindle drive KTY84 temperature |
| 4 0 5 | 1 st spindle second serial encoder CRC error times (hardware) | 4 2 1 | 2 nd spindle second serial encoder CRC error times (hardware) | 4 3 7 | 3 rd spindle second serial encoder CRC error times (hardware) | 4 5 3 | 4 th spindle second serial encoder CRC error times (hardware) | 4 6 9 | 5 th spindle second serial encoder CRC error times (hardware) |
| 4 0 6 | 1 st spindle first feedback SYNTEC encoder internal KTY84 temperature | 4 2 2 | 2 nd spindle first feedback SYNTEC encoder internal KTY84 temperature | 4 3 8 | 3 rd spindle first feedback SYNTEC encoder internal KTY84 temperature | 4 5 4 | 4 th spindle first feedback SYNTEC encoder internal KTY84 temperature | 4 7 0 | 5 th spindle first feedback SYNTEC encoder internal KTY84 temperature |
| 4 0 7 | 1 st spindle first feedback SYNTEC encoder external KTY84 temperature | 4 2 3 | 2 nd spindle first feedback SYNTEC encoder external KTY84 temperature | 4 3 9 | 3 rd spindle first feedback SYNTEC encoder external KTY84 temperature | 4 5 5 | 4 th spindle first feedback SYNTEC encoder external KTY84 temperature | 4 7 1 | 5 th spindle first feedback SYNTEC encoder external KTY84 temperature |

| | | | | | | | | | |
|-------------|---|-------------|---|-------------|---|-------------|---|-------------|---|
| 4 0 8 | 1 st spindle encoder command error times | 4 2 4 | 2 nd spindle encoder command error times | 4 4 0 | 3 rd spindle encoder command error times | 4 5 6 | 4 th spindle encoder command error times | 4 7 2 | 5 th spindle encoder command error times |
| 4 0 9 | 1 st spindle serial encoder timeout error times | 4 2 5 | 2 nd spindle serial encoder timeout error times | 4 4 1 | 3 rd spindle serial encoder timeout error times | 4 5 7 | 4 th spindle serial encoder timeout error times | 4 7 3 | 5 th spindle serial encoder timeout error times |
| 4 1 0 | (Reserved) | 4 2 6 | (Reserved) | 4 4 2 | (Reserved) | 4 5 8 | (Reserved) | 4 7 4 | (Reserved) |
| 4 1 1 | (Reserved) | 4 2 7 | (Reserved) | 4 4 3 | (Reserved) | 4 5 9 | (Reserved) | 4 7 5 | (Reserved) |
| 4 1 2 | (Reserved) | 4 2 8 | (Reserved) | 4 4 4 | (Reserved) | 4 6 0 | (Reserved) | 4 7 6 | (Reserved) |
| 4 1 3 | (Reserved) | 4 2 9 | (Reserved) | 4 4 5 | (Reserved) | 4 6 1 | (Reserved) | 4 7 7 | (Reserved) |
| 4 1 4 | (Reserved) | 4 3 0 | (Reserved) | 4 4 6 | (Reserved) | 4 6 2 | (Reserved) | 4 7 8 | (Reserved) |
| 4 1 5 | (Reserved) | 4 3 1 | (Reserved) | 4 4 7 | (Reserved) | 4 6 3 | (Reserved) | 4 7 9 | (Reserved) |

[Debug Page 6] : System Data on this page only apply to SYNTEC serial spindle, and drive firmware version must be 1.2.28 or newer, and the controller version must be newer than 10.116.10H or 116.16.

[400~] : Machine angle

[Unit] : 0.0001 Rev

[Descriptions] : Corresponds to drive status variable D1-04

1. The absolute position relates to the Z index of encoder. The position of the Z index is 0 and divides 1 rev into 10000 increments. The System Data resets 0 from 9999 after 1 revolution and counts continuously. For example: If the machine angle value is 4791 means 0.4791 rev, and it equals to $360 \text{ deg} \times 0.4791 \text{ rev} = 172.476 \text{ degree}$.
2. To troubleshoot encoder feedback problems, rotate the motor manually and check if the machine angle changes following the motor rotation.
3. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[401~] : IGBT temperature

[Unit] : 0.1 °C

[Descriptions] : Corresponds to drive status variable D1-23

1. Shows the current IGBT temperature, check if the driver is overheated. Alarm AL-10 will be triggered the value exceeds 90°C, please troubleshoot according to the manual instructions.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[402~] : DC bus voltage

[Unit] : 0.1 V_{rms}

[Descriptions] : Corresponds to driver status variable D1-24

1. Checks the driver input voltage. When the driver is connected to a 220V, 3-phase power supply, the data value should be around 2200. Alarm AL-13 will be triggered if the voltage is lower than 70% of the rated value, please check the power supply.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[403~] : Serial encoder CRC error times (hardware)

[Unit] : Count

[Descriptions] : Corresponds to driver status variable D1-28.

1. Checks if there are CRC errors in the serial packets returned to drive from the first encoder, if there is an error then +1. Alarm AL-48 will be triggered if there are 3 error packets in a row, please check the groundings of the machine, drive, and encoder.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[404~] : Driver KTY84 sensor temperature

[Unit] : 0.1°C

[Descriptions] : Corresponds to driver status variable D1-41.

1. The data value is the KTY84 sensor temperature, can use drive parameter P1-31 to decide the threshold of alarm AL-11. Please check P1-31 or troubleshoot according to the manual instructions when AL-11 is triggered.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[405~] : Second serial encoder CRC error times (hardware)

[Unit] : Count

[Descriptions] : Corresponds to driver status variable D1-42.

1. Checks if there are CRC errors in the serial packets returned to drive from the second encoder, if there is an error then +1. Alarm AL-49 will be triggered if there are 3 error packets in a row, please check the groundings of the machine, drive, and encoder.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[406~] : First feedback SYNTEC encoder internal KTY84 sensor temperature

[Unit] : 0.1°C

[Descriptions] : Corresponds to driver status variable D1-50.

1. It's the internal KTY84 sensor temperature of the first feedback SYNTEC encoder, can use drive parameter P1-32 to decide the threshold of alarm AL-40. Please check P1-32 or troubleshoot according to the manual instructions when AL-40 is triggered.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[407~] : First feedback SYNTEC encoder external KTY84 sensor temperature

[Unit] : 0.1°C

[Descriptions] : Corresponds to driver status variable D1-51.

1. It's the external KTY84 sensor temperature of the first feedback SYNTEC encoder, can use drive parameter P1-33 to decide the threshold of alarm AL-41. Please check P1-33 or troubleshoot according to the manual instructions when AL-41 is triggered.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[408~] : Serial encoder command error times

[Unit] : Count

[Descriptions] : Corresponds to drive status variable D1-46.

1. Checks the correctness of the packet from drive sent to the encoder, the data value +1 if incorrect. Please check the groundings of the machine, drive, and encoder when this case happens.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[409~] : Serial encoder timeout error times

[Unit] : Count

[Descriptions] : Corresponds to driver status variable D1-47.

1. Determine encoder functionality by checking if the encoder responds in time after a command sent, the data value +1 if the driver and encoder disconnect. Alarm AL-48 will be triggered if disconnection happens 3 times in a row, please check the groundings of the machine, drive, and encoder.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

A large, light gray watermark of the SYNTEC logo is centered on the page. The logo consists of the word "SYNTEC" in a bold, sans-serif font. The letters are slightly spaced out and have a subtle shadow effect, making them stand out against the white background.

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| | | | | | | | | | |
|-----|--|-----|--|-----|--|-----|--|-----|---|
| 480 | 6 th spindle machine angle | 496 | 7 th spindle machine angle | 512 | 8 th spindle machine angle | 528 | 6 th spindle machine angle | 544 | 10 th spindle machine angle |
| 481 | 6 th spindle IGBT temperature | 497 | 7 th spindle IGBT temperature | 513 | 8 th spindle IGBT temperature | 529 | 6 th spindle IGBT temperature | 545 | 10 th spindle IGBT temperature |
| 482 | 6 th spindle DC bus voltage | 498 | 7 th spindle DC bus voltage | 514 | 8 th spindle DC bus voltage | 530 | 9 th spindle DC bus voltage | 546 | 10 th spindle DC bus voltage |
| 483 | 6 th spindle serial encoder CRC error times (hardware) | 499 | 7 th spindle serial encoder CRC error times (hardware) | 515 | 8 th spindle serial encoder CRC error times (hardware) | 531 | 9 th spindle serial encoder CRC error times (hardware) | 547 | 10 th spindle serial encoder CRC error times (hardware) |
| 484 | 6 th spindle driver KTY84 temperature | 500 | 7 th spindle driver KTY84 temperature | 516 | 8 th spindle driver KTY84 temperature | 532 | 9 th spindle driver KTY84 temperature | 548 | 10 th spindle driver KTY84 temperature |
| 485 | 6 th spindle second serial encoder CRC error times (hardware) | 501 | 7 th spindle second serial encoder CRC error times (hardware) | 517 | 8 th spindle second serial encoder CRC error times (hardware) | 533 | 9 th spindle second serial encoder CRC error times (hardware) | 549 | 10 th spindle second serial encoder CRC error times (hardware) |
| 486 | 6 th spindle first feedback SYNTEC encoder internal KTY84 temperature | 502 | 7 th spindle first feedback SYNTEC encoder internal KTY84 temperature | 518 | 8 th spindle first feedback SYNTEC encoder internal KTY84 temperature | 534 | 9 th spindle first feedback SYNTEC encoder internal KTY84 temperature | 550 | 10 th spindle first feedback SYNTEC encoder internal KTY84 temperature |

| | | | | | | | | | |
|-----|--|-----|--|-----|--|-----|--|-----|---|
| 487 | 6 th spindle first feedback SYNTEC encoder external KTY84 temperature | 503 | 7 th spindle first feedback SYNTEC encoder external KTY84 temperature | 519 | 8 th spindle first feedback SYNTEC encoder external KTY84 temperature | 535 | 9 th spindle first feedback SYNTEC encoder external KTY84 temperature | 551 | 10 th spindle first feedback SYNTEC encoder external KTY84 temperature |
| 488 | 6 th spindle encoder command error times | 504 | 7 th spindle encoder command error times | 520 | 8 th spindle encoder command error times | 536 | 9 th spindle encoder command error times | 552 | 10 th spindle encoder command error times |
| 489 | 6 th spindle encoder timeout error times | 505 | 7 th spindle encoder timeout error times | 521 | 8 th spindle encoder timeout error times | 537 | 9 th spindle encoder timeout error times | 553 | 10 th spindle encoder timeout error times |
| 490 | (Reserved) | 506 | (Reserved) | 522 | (Reserved) | 538 | (Reserved) | 554 | (Reserved) |
| 491 | (Reserved) | 507 | (Reserved) | 523 | (Reserved) | 539 | (Reserved) | 555 | (Reserved) |
| 492 | (Reserved) | 508 | (Reserved) | 524 | (Reserved) | 540 | (Reserved) | 556 | (Reserved) |
| 493 | (Reserved) | 509 | (Reserved) | 525 | (Reserved) | 541 | (Reserved) | 557 | (Reserved) |
| 494 | (Reserved) | 510 | (Reserved) | 526 | (Reserved) | 542 | (Reserved) | 558 | (Reserved) |
| 495 | (Reserved) | 511 | (Reserved) | 527 | (Reserved) | 543 | (Reserved) | 559 | (Reserved) |

[Debug Page 7] : System Data on this page only apply to SYNTEC serial spindle, and drive firmware version must be 1.2.28 or newer, and the controller version must be newer than 10.116.10H or 116.16.

[480~] : Machine angle

[Unit] : 0.0001Rev

[Descriptions] : Corresponds to driver status variable D1-04.

1. The absolute position relates to the Z index of encoder. The position of the Z index is 0 and divides 1 rev into 10000 increments. The System Data resets 0 from 9999 after 1 revolution and counts continuously. For example: If the machine angle value is 4791 means 0.4791 rev, and it equals to $360 \text{ deg} \times 0.4791 \text{ rev} = 172.476 \text{ degree}$.
2. To troubleshoot encoder feedback problems, rotate the motor manually and check if the machine angle changes following the motor rotation.
3. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[481~] : IGBT temperature

[Unit] : 0.1 °C

[Descriptions] : Corresponds to driver status variable D1-23.

1. Shows the current IGBT temperature, check if the driver is overheated. Alarm AL-10 will be triggered the value exceeds 90°C, please troubleshoot according to the manual instructions.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[482~] : DC bus voltage

[Unit] : 0.1 V_{rms}

[Descriptions] : Corresponds to driver status variable D1-24.

1. Checks the driver input voltage. When the driver is connected to a 220V, 3-phase power supply, the data value should be around 2200. Alarm AL-13 will be triggered if the voltage is lower than 70% of the rated value, please check the power supply.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[483~] : Serial encoder CRC error times (hardware)

[Unit] : Count

[Descriptions] : Corresponds to driver status variable D1-28.

1. Checks if there are CRC errors in the serial packets returned to drive from the first encoder, if there is an error then +1. Alarm AL-48 will be triggered if there are 3 error packets in a row, please check the groundings of the machine, drive, and encoder.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[484~] : Driver KTY84 sensor temperature

[Unit] : 0.1°C

[Descriptions] : Corresponds to driver status variable D1-41.

1. The data value is the KTY84 sensor temperature, can use drive parameter P1-31 to decide the threshold of alarm AL-11. Please check P1-31 or troubleshoot according to the manual instructions when AL-11 is triggered.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[485~] : Second serial encoder CRC error times (hardware)

[Unit] : Count

[Descriptions] : Corresponds to driver status variable D1-42.

1. Checks if there are CRC errors in the serial packets returned to drive from the second encoder, if there is an error then +1. Alarm AL-49 will be triggered if there are 3 error packets in a row, please check the groundings of the machine, drive, and encoder.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[486~] : First feedback SYNTEC encoder internal KTY84 sensor temperature

[Unit] : 0.1°C

[Descriptions] : Corresponds to driver status variable D1-50.

1. It's the internal KTY84 sensor temperature of the first feedback SYNTEC encoder, can use drive parameter P1-32 to decide the threshold of alarm AL-40. Please check P1-32 or troubleshoot according to the manual instructions when AL-40 is triggered.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[487~] : First feedback SYNTEC encoder external KTY84 sensor temperature

[Unit] : 0.1°C

[Descriptions] : Corresponds to driver status variable D1-51.

1. It's the external KTY84 sensor temperature of the first feedback SYNTEC encoder, can use drive parameter P1-33 to decide the threshold of alarm AL-41. Please check P1-33 or troubleshoot according to the manual instructions when AL-41 is triggered.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[488~] : Serial encoder command error times

[Unit] : Count

[Descriptions] : Corresponds to driver status variable D1-46.

1. Checks the correctness of the packet from drive sent to the encoder, the data value +1 if incorrect. Please check the groundings of the machine, drive, and encoder when this case happens.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[489~] : Serial encoder timeout error times

[Unit] : Count

[Descriptions] : Corresponds to driver status variable D1-47.

1. Determine encoder functionality by checking if the encoder responds in time after a command sent, the data value +1 if the driver and encoder disconnect. Alarm AL-48 will be triggered if disconnection happens 3 times in a row, please check the groundings of the machine, drive, and encoder.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.



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| | | | | | | | | | |
|-----|--|-----|--|-----|---|-----|--|-----|--|
| 560 | 17 th axis double loop position error | 576 | 17 th axis absolute position feedback | 592 | 17 th axis second absolute position feedback | 608 | 17 th axis machine coordinate | 624 | 17 th axis second feedback position index counter |
| 561 | 18 th axis double loop position error | 577 | 18 th axis absolute position feedback | 593 | 18 th axis second absolute position feedback | 609 | 18 th axis machine coordinate | 625 | 18 th axis second feedback position index counter |
| 562 | (Reserved) | 578 | (Reserved) | 594 | (Reserved) | 610 | (Reserved) | 626 | (Reserved) |
| 563 | (Reserved) | 579 | (Reserved) | 595 | (Reserved) | 611 | (Reserved) | 627 | (Reserved) |
| 564 | (Reserved) | 580 | (Reserved) | 596 | (Reserved) | 612 | (Reserved) | 628 | (Reserved) |
| 565 | (Reserved) | 581 | (Reserved) | 597 | (Reserved) | 613 | (Reserved) | 629 | (Reserved) |
| 566 | (Reserved) | 582 | (Reserved) | 598 | (Reserved) | 614 | (Reserved) | 630 | (Reserved) |
| 567 | (Reserved) | 583 | (Reserved) | 599 | (Reserved) | 615 | (Reserved) | 631 | (Reserved) |
| 568 | (Reserved) | 584 | (Reserved) | 600 | (Reserved) | 616 | (Reserved) | 632 | (Reserved) |
| 569 | (Reserved) | 585 | (Reserved) | 601 | (Reserved) | 617 | (Reserved) | 633 | (Reserved) |
| 570 | (Reserved) | 586 | (Reserved) | 602 | (Reserved) | 618 | (Reserved) | 634 | (Reserved) |
| 571 | (Reserved) | 587 | (Reserved) | 603 | (Reserved) | 619 | (Reserved) | 635 | (Reserved) |
| 572 | (Reserved) | 588 | (Reserved) | 604 | (Reserved) | 620 | (Reserved) | 636 | (Reserved) |

| | | | | | | | | | |
|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|
| 57 3 | (Reserved) | 58 9 | (Reserved) | 60 5 | (Reserved) | 62 1 | (Reserved) | 63 7 | (Reserved) |
| 57 4 | (Reserved) | 59 0 | (Reserved) | 60 6 | (Reserved) | 62 2 | (Reserved) | 63 8 | (Reserved) |
| 57 5 | (Reserved) | 59 1 | (Reserved) | 60 7 | (Reserved) | 62 3 | (Reserved) | 63 9 | (Reserved) |

[Debug Page 8] : For the system data on this page, the controller version must be 10.118.3 or newer.

[0560~0561] : 17th ~ 18th axis double loop position feedback error

[Definition] : Difference value between feedback of motor encoder & optical scale encoder. Calculated as: "Double loop Position Error - System Data 080~095" = "Absolute position feedback - System Data 096~111" - "Second absolute position feedback - System Data 112~127". Unit: BLU.

[Descriptions] :

1. The value reflects the mechanical error (backlash or slip) between motor and linear encoder to mismatch.
2. When the axis is static, the error is called static error. If it is greater than Pr1421~, alarm MOT-31 "Excess static double loop position error" will appear.
3. When axis is in motion, the error is called dynamic error. If it is greater than Pr3817, alarm MOT-24 "Severe double loop position error" will appear.
4. If this data increases abnormally with machine movement before home search, please check linear encoder resolution, or check its signal order (A+, A-, B+, B-).

[0576~0577] : 17th ~ 18th axis absolute position feedback

[Definition] : Axis motors position feedback, unit: BLU

[Descriptions] :

1. The value will be set to zero after finishing the first home search for non-absolute encoder.

[0592~0593] : 17th ~ 18th axis second absolute position feedback

[Definition] : The position feedback of axis linear scales, unit: BLU

[Descriptions] :

1. The value will be set to zero after finishing the first home search for non-absolute encoder.

[0608~0609] : 17th ~ 18th axis machine coordinate

[Definition] : Display of each axis machine coordinate, unit: BLU

[Descriptions] :

1. Use to check the correctness of machine's position.
2. The value will be set to zero after finishing the first home search for non-absolute encoder.

[0624~0625] : 17th ~ 18th axis second feedback position index counter

[Definition] : When index signal of second feedback of each axis is generated, hardware will latch the current number of pulse.

[Descriptions] :

1. Theoretically, the value change increment in the same direction must equal to Pr261~ * Pr301. If not, it means cables have loss pulse, please check the feedback signal (A+,A-,B+,B-,C+,C-) to confirm it is loose cable or

noise interference.

2. This variable will be set to zero after finishing the first home search for non-absolute encoder.



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| | | | | | | | | | |
|-------------|---|-------------|---|-------------|--|-------------|--|-------------|--|
| 6 4 0 | 17 th axis following error | 6 5 6 | 17 th axis absolute position feedback | 6 7 2 | 17 th axis absolute position command | 6 8 8 | 17 th axis reasonable following error | 7 0 4 | 17 th axis maximum allowed following error |
| 6 4 1 | 18 th axis following error | 6 5 7 | 18 th axis absolute position feedback | 6 7 3 | 18 th axis absolute position command | 6 8 9 | 18 th axis legitimate following error | 7 0 5 | 18 th axis maximum allowed following error |
| 6 4 2 | (Reserved) | 6 5 8 | (Reserved) | 6 7 4 | (Reserved) | 6 9 0 | (Reserved) | 7 0 6 | (Reserved) |
| 6 4 3 | (Reserved) | 6 5 9 | (Reserved) | 6 7 5 | (Reserved) | 6 9 1 | (Reserved) | 7 0 7 | (Reserved) |
| 6 4 4 | (Reserved) | 6 6 0 | (Reserved) | 6 7 6 | (Reserved) | 6 9 2 | (Reserved) | 7 0 8 | (Reserved) |
| 6 4 5 | (Reserved) | 6 6 1 | (Reserved) | 6 7 7 | (Reserved) | 6 9 3 | (Reserved) | 7 0 9 | (Reserved) |
| 6 4 6 | (Reserved) | 6 6 2 | (Reserved) | 6 7 8 | (Reserved) | 6 9 4 | (Reserved) | 7 1 0 | (Reserved) |
| 6 4 7 | (Reserved) | 6 6 3 | (Reserved) | 6 7 9 | (Reserved) | 6 9 5 | (Reserved) | 7 1 1 | (Reserved) |
| 6 4 8 | (Reserved) | 6 6 4 | (Reserved) | 6 8 0 | (Reserved) | 6 9 6 | (Reserved) | 7 1 2 | (Reserved) |
| 6 4 9 | (Reserved) | 6 6 5 | (Reserved) | 6 8 1 | (Reserved) | 6 9 7 | (Reserved) | 7 1 3 | (Reserved) |

| | | | | | | | | | |
|-------------|------------|-------------|------------|-------------|------------|-------------|------------|-------------|------------|
| 6 5 0 | (Reserved) | 6 6 6 | (Reserved) | 6 8 2 | (Reserved) | 6 9 8 | (Reserved) | 7 1 4 | (Reserved) |
| 6 5 1 | (Reserved) | 6 6 7 | (Reserved) | 6 8 3 | (Reserved) | 6 9 9 | (Reserved) | 7 1 5 | (Reserved) |
| 6 5 2 | (Reserved) | 6 6 8 | (Reserved) | 6 8 4 | (Reserved) | 7 0 0 | (Reserved) | 7 1 6 | (Reserved) |
| 6 5 3 | (Reserved) | 6 6 9 | (Reserved) | 6 8 5 | (Reserved) | 7 0 1 | (Reserved) | 7 1 7 | (Reserved) |
| 6 5 4 | (Reserved) | 6 7 0 | (Reserved) | 6 8 6 | (Reserved) | 7 0 2 | (Reserved) | 7 1 8 | (Reserved) |
| 6 5 5 | (Reserved) | 6 7 1 | (Reserved) | 6 8 7 | (Reserved) | 7 0 3 | (Reserved) | 7 1 9 | (Reserved) |

[Debug Page 9] : For the system data on this page, the controller version must be 10.118.3 or newer.

[0640~0641] : 17th ~ 18th axis following error

[Definition] : Axis position command and position feedback error value, calculation:

[Following error- System Data 160~175] = [Absolute position command - System Data 192~207] - [Absolute position feedback- System Data 176~191] , unit: BLU

[Descriptions] :

- 1.The value is the real time following error used to check motion lag of each axis.
- 2.For static axis, this error is called static error and should be very close to zero. If it is greater than Pr561~, alarm MOT-008 [Loss Pulse] will appear.
- 3.For dynamic axis, this error is called dynamic error and should be smaller than [Maximum allowed following error Value- System Data 016~019]. If not, alarm MOT-019 [following error exceed] or even MOT-023 [Fatal following error exceed] will appear.
- 4.When moving in constant speed, the variable should be close to [Reasonable following error Value- System Data 032~035], if not, please check if drive position loop gain and controller Pr181~ are the same; and drive's feed forward command or filter function are not disabled. Connection problem may be also a reason.

[0656~0657] : 17th ~ 18th axis absolute position feedback

[Definition] : Position feedback of axial motor, Unit: BLU

[Descriptions] :

- 1.The value will be set to zero after finishing the first home search for non-absolute encoder.

[0672~0673] : 17th ~ 18th axis absolute position command

[Definition] : The accumulated number of commands corresponds to each axis when the controller sends command to the axis board, unit: BLU

[Descriptions] :

- 1."X/Y/Z/C Axis following error- System Data 008~011" = "X/Y/Z/C Absolute Position Command- System Data 040~043" - "X/Y/Z/C Absolute Position Feedback- System Data 024~027".
- 2.This variable is the position command being sent out from the controller, it may not equal to [X/Y/Z/C axis machine coordinate- System Data 072~075] because it includes mechanical compensations (backlash, pitch, temperature, quad-peak).
- 3.The value will be set to zero after finishing the first home search for non-absolute encoder.

[0688~0689] : 17th ~ 18th axis reasonable following error

[Definition] : The reasonable position following error of each axis, calculation: Speed command(mm/min, deg/min)/60/Pr181~, unit: BLU.

[Descriptions] :

- 1.The variable shows the reasonable following error of each axis, it should be close to "Axis following error- System Data 640~641", if not, please make sure the driver position loop gain is the same as Pr181~ settings, driver feedforward or command filter function are not closed. Abnormal cable connection may also cause inconsistency.

[0704~0705] : 17th ~ 18th axis maximum allowed following error

[Definition] : The maximum allowed following error when the axis is moving.

[Descriptions] :

- 1.The theorem value is $\text{Max}(\text{Pr461}\sim, \text{Pr821}\sim)/\text{Pr181}\sim/60*1000$.
- 2.If "Following error- System Data 640~641" exceeds this data value, alarm MOT-019 "Excess following error" will appear.
- 3.If "following error- System Data 640~641" exceeds twice the data value, alarm MOT-023 "Severe Excess following error" will appear.

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| | | | | | | | | | |
|-------------|---------------------------------------|-------------|--|-------------|---|-------------|------------------------------------|-------------|--|
| 7 2 0 | 17 th axis following error | 7 3 6 | 17 th axis following error after feedforward compensation | 7 5 2 | 17 th axis servo loop DA value | 7 6 8 | 17 th axis offset limit | 7 8 4 | 17 th axis position index counter |
| 7 2 1 | 18 th axis following error | 7 3 7 | 18 th axis following error after feedforward compensation | 7 5 3 | 18 th axis servo loop DA value | 7 6 9 | 18 th axis offset limit | 7 8 5 | 18 th axis position index counter |
| 7 2 2 | (Reserved) | 7 3 8 | (Reserved) | 7 5 4 | (Reserved) | 7 7 0 | (Reserved) | 7 8 6 | (Reserved) |
| 7 2 3 | (Reserved) | 7 3 9 | (Reserved) | 7 5 5 | (Reserved) | 7 7 1 | (Reserved) | 7 8 7 | (Reserved) |
| 7 2 4 | (Reserved) | 7 4 0 | (Reserved) | 7 5 6 | (Reserved) | 7 7 2 | (Reserved) | 7 8 8 | (Reserved) |
| 7 2 5 | (Reserved) | 7 4 1 | (Reserved) | 7 5 7 | (Reserved) | 7 7 3 | (Reserved) | 7 8 9 | (Reserved) |
| 7 2 6 | (Reserved) | 7 4 2 | (Reserved) | 7 5 8 | (Reserved) | 7 7 4 | (Reserved) | 7 9 0 | (Reserved) |
| 7 2 7 | (Reserved) | 7 4 3 | (Reserved) | 7 5 9 | (Reserved) | 7 7 5 | (Reserved) | 7 9 1 | (Reserved) |
| 7 2 8 | (Reserved) | 7 4 4 | (Reserved) | 7 6 0 | (Reserved) | 7 7 6 | (Reserved) | 7 9 2 | (Reserved) |
| 7 2 9 | (Reserved) | 7 4 5 | (Reserved) | 7 6 1 | (Reserved) | 7 7 7 | (Reserved) | 7 9 3 | (Reserved) |

| | | | | | | | | | |
|-----|-------------|-----|------------|-----|------------|-----|------------|-----|------------|
| 730 | (Reserve d) | 746 | (Reserved) | 762 | (Reserved) | 778 | (Reserved) | 794 | (Reserved) |
| 731 | (Reserve d) | 747 | (Reserved) | 763 | (Reserved) | 779 | (Reserved) | 795 | (Reserved) |
| 732 | (Reserve d) | 748 | (Reserved) | 764 | (Reserved) | 780 | (Reserved) | 796 | (Reserved) |
| 733 | (Reserve d) | 749 | (Reserved) | 765 | (Reserved) | 781 | (Reserved) | 797 | (Reserved) |
| 734 | (Reserve d) | 750 | (Reserved) | 766 | (Reserved) | 782 | (Reserved) | 798 | (Reserved) |
| 735 | (Reserve d) | 751 | (Reserved) | 767 | (Reserved) | 783 | (Reserved) | 799 | (Reserved) |

[Debug Page 10] : For the system data on this page, the controller version must be 10.118.3 or newer.

[0720~0721] : 17th ~ 18th axis following error

[Definition] : Axis position command and position feedback error value, calculation:

[Following error- System Data 160~175] = [Absolute position command - System Data 192~207] - [Absolute position feedback- System Data 176~191] , unit: BLU

[Descriptions] :

- 1.The value is the real time following error used to check motion lag of each axis.
- 2.For static axis, this error is called static error and should be very close to zero. If it is greater than Pr561~, alarm MOT-008 [Loss Pulse] will appear.
- 3.For dynamic axis, this error is called dynamic error and should be smaller than [Maximum allowed following error Value- System Data 016~019]. If not, alarm MOT-019 [following error exceed] or even MOT-023 [Fatal following error exceed] will appear.
- 4.When moving in constant speed, the variable should be close to [Reasonable following error Value- System Data 032~035], if not, please check if drive position loop gain and controller Pr181~ are the same; and drive's feed forward command or filter function are not disabled. Connection problem may be also a reason.

[0736~0737] : 17th ~ 18th axis following error after feedforward compensation

[Definition] : The effective following error value of each axis after the speed feedforward compensation is enabled.

[Descriptions] :

1. To enable feedforward compensation is to set Pr581>0, theoretical value = X axis speed command/((Pr181/(1-Pr581/100)). When position Kp (Pr181) is fixed, the larger the feedforward value (Pr581), the smaller following error displayed by the System Data is.

2. Feedforward is suitable to compensate the following error of subtle target speed change. Excessive feedforward may lead to vibration or contour overcut.

[0752~0753] : 17th ~ 18th axis servo loop DA value

[Definition] : The voltage value of each axis DAC chips which was sent to the axis board, unit: mV

[Descriptions] :

1. Checks if the voltage (speed) command is correct when Pr381=1 (Voltage Command).

[0768~0769] : 17th ~ 18th axis offset limit

[Definition] :

1. Pr201~ =0: During home search of each axis, the motor rotation revolution from home switch signal disappears to encoder index signal appears. Unit: %. If value is 500, it means motor rotates 5 revs.
2. Pr201~ =1: During home search of each axis, the distance from home switch signal disappears to optical scale (linear encoder) index signal appears relative to 1 mm (Pr17=2). Unit: %. If value is 500, it means axis moves 5 mm.

[Descriptions] :

1. If Pr201~ = 0, suggested range of value is 20%~80%. If it is not in that range, enable home grid function (Pr941~=1).

[0784~0785] : 17th ~ 18th axis position index counter

[Definition] : When index signal of each axis is generated, hardware will latch the current number of pulse.

[Descriptions] :

1. Theoretically, the value change increment in the same direction must equal to Pr61~ * Pr81. If not, it means cables have lost pulse, please check the feedback signal (A+,A-,B+,B-,C+,C-) to confirm it is loose cable or noise interference.
2. This variable will be set to zero after finishing the first home search for non-absolute encoder.

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| | | | | | | | | | |
|-----|---|-----|--|-----|---------------------------------|-----|------------|-----|------------|
| 800 | 1 st axis abnormal communication times | 816 | 17 th axis abnormal communication times | 832 | Average IST Latency | 848 | (Occupied) | 864 | (Occupied) |
| 801 | 2 nd axis abnormal communication times | 817 | 18 th axis abnormal communication times | 833 | Maximum IST Latency | 849 | (Occupied) | 865 | (Occupied) |
| 802 | 3 rd axis abnormal communication times | 818 | (Reserved) | 834 | (Reserved) | 850 | (Occupied) | 866 | (Occupied) |
| 803 | 4 th axis abnormal communication times | 819 | (Reserved) | 835 | IST Latency Severe Error Counts | 851 | (Occupied) | 867 | (Occupied) |
| 804 | 5 th axis abnormal communication times | 820 | (Reserved) | 836 | (Reserved) | 852 | (Occupied) | 868 | (Occupied) |
| 805 | 6 th axis abnormal communication times | 821 | (Reserved) | 837 | (Reserved) | 853 | (Occupied) | 869 | (Occupied) |
| 806 | 7 th axis abnormal communication times | 822 | (Reserved) | 838 | (Reserved) | 854 | (Occupied) | 870 | (Occupied) |
| 807 | 8 th axis abnormal communication times | 823 | (Reserved) | 839 | (Reserved) | 855 | (Occupied) | 871 | (Occupied) |

| | | | | | | | | | |
|-----|--|-----|------------|-----|--------------------------------------|-----|------------|-----|------------|
| 808 | 9 th axis abnormal communication times | 824 | (Reserved) | 840 | (Reserved) | 856 | (Occupied) | 872 | (Occupied) |
| 809 | 10 th axis abnormal communication times | 825 | (Reserved) | 841 | (Reserved) | 857 | (Occupied) | 873 | (Occupied) |
| 810 | 11 th axis abnormal communication times | 826 | (Reserved) | 842 | (Reserved) | 858 | (Occupied) | 874 | (Occupied) |
| 811 | 12 th axis abnormal communication times | 827 | (Reserved) | 843 | Max run time of serious error thread | 859 | (Occupied) | 875 | (Occupied) |
| 812 | 13 th axis abnormal communication times | 828 | (Reserved) | 844 | The thread which has serious error | 860 | (Occupied) | 876 | (Occupied) |
| 813 | 14 th axis abnormal communication times | 829 | (Reserved) | 845 | The thread which has serious error | 861 | (Occupied) | 877 | (Occupied) |
| 814 | 15 th axis abnormal communication times | 830 | (Reserved) | 846 | RIO Transmission Error Counts | 862 | (Occupied) | 878 | (Occupied) |
| 815 | 16 th axis abnormal communication times | 831 | (Reserved) | 847 | RIO Overload Error Counts | 863 | (Occupied) | 879 | (Occupied) |

[Debug Page 11] : For the system data on this page, the controller version must be 10.118.3 or newer.

[0800~0817] : 1st ~ 18th axis abnormal communication times

[Definition] : Abnormal axis communication times.

[Descriptions] : The counter increases by one every time when the serial communication axis occurs an abnormal communication.

[0832] : Average IST Latency

[Definition] : The average time span from the end of the ISR to the start of the IST. (Unit: μ s)

[Descriptions]

1. This variable is considered unacceptable if it is larger than the interpolation time interval. An unacceptable average IST latency leads to command error(s).
2. For more information about the interpolation time interval, please refer to the controller parameter Pr3203 and the system data 0004.

[0833] : Maximum IST Latency

[Definition] : The maximum IST Latency observed by the software. (Unit: μ s)

[Descriptions]

1. A maximum IST latency longer than the interpolation time interval, which is considered unacceptable, indicates that command error(s) occurred.
2. For more information about the interpolation time interval, please refer to the controller parameter Pr3203 and the system data 0004.
3. A possible cause of an unacceptable maximum IST latency is a large axis board data exchange time. Check the controller parameter Pr3203, system data 0336, and system data 0337.

[0835] : IST Latency Severe Error Counts

[Definition] : Times that the IST Latency was observed longer than the interpolation time interval.

[Descriptions] : An IST Latency longer than the interpolation time interval leads to communication issue(s) and hence this variable can be used in the analysis of the cause of communication issue(s).

[0843] : Max run time of serious error thread

[Definition] : Max run time of the thread has serious error

[Descriptions] :

1. If thread has serious error, show max run time of thread. The unit is second.
2. Because there are no only one thread, so the value just show the highest priority thread's max run time.

[0844~0845] : The thread which has serious error

[Definition] : Show which kernel thread has serious error now

[Descriptions] :

1. The number will show the kernel thread which has serious error, the value should be 0 at normal.
2. The value corresponds to the record value of the System crash event of the datalog, and the record size is 2 LONG.

[0846] : RIO Transmission Error Counts

[Definition] : Times that an RIO communication error in FPGA was detected by the controller software.

[Descriptions] : The RIO communication status of the FPGA is checked during each IO scanning, and this counter will increase by one if an error is detected.

[0847] : RIO Overload Error Counts

[Definition] : Times that an RIO overload error in FPGA was detected by the controller software.

[Descriptions] : The RIO overload status of the FPGA is checked during each IO scanning, and this counter will increase by one if an error is detected.

◆ Ver 10.118.6 content not translated yet, incomplete CHT version.



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| | | | | | | | | | |
|---|--|--------|--|--------|-----------------------------------|--------|--------------------------------------|--------|---|
| 0 | Human-machine module (HMI) execution times | 1 6 | Max. X axis allowed following error | 3 2 | X axis reasonable following error | 4 8 | X axis position index counter | 6 4 | X axis following error of feedforward |
| 1 | Times of motion interpolation | 1 7 | Max. Y axis allowed following error | 3 3 | Y axis reasonable following error | 4 9 | Y axis position index counter | 6 5 | Y axis following error of feedforward |
| 2 | PLC scan times | 1 8 | Max. Z axis allowed following error | 3 4 | Z axis reasonable following error | 5 0 | Z axis position index counter | 6 6 | Z axis following error of feedforward |
| 3 | I/O scan times | 1 9 | Max. C axis allowed following error | 3 5 | C axis reasonable following error | 5 1 | C axis position index counter | 6 7 | C axis following error of feedforward |
| 4 | Motion interpolation time | 2 0 | Consecutive failure times of writing registry file | 3 6 | | 5 2 | Spindle position index counter | 6 8 | Failure times of axis card synchronization |
| 5 | PLC scanning time | 2 1 | Failure times of writing registry file | 3 7 | | 5 3 | Serial comm. initialize failure code | 6 9 | Times of abnormal encoder value / Times of serial comm. failure of all axes |
| 6 | SRAM writing times | 2 2 | Allowed times of writing permanent data | 3 8 | System temperature (Celsius) | 5 4 | Times of interpolation timeout | 7 0 | Abnormal value of encoder / Times of a single serial axis comm. failure |
| 7 | Free system memory | 2 3 | Percentage actual time motion interpolation | 3 9 | CPU temperature (Celsius) | 5 5 | Times of incomplete move command | 7 1 | Port number of abnormal encoder / Station number of serial axis comm. failure |

| | | | | | | | | | |
|--------|--|--------|---|--------|---|--------|---------------------|--------|---|
| 8 | X axis following error | 2 4 | X axis absolute position feedback | 4 0 | X axis absolute position command | 5 6 | X axis offset limit | 7 2 | X axis machine coordinate |
| 9 | Y axis following error | 2 5 | Y axis absolute position feedback | 4 1 | Y axis absolute position command | 5 7 | Y axis offset limit | 7 3 | Y axis machine coordinate |
| 1 0 | Z axis following error | 2 6 | Z axis absolute position feedback | 4 2 | Z axis absolute position command | 5 8 | Z axis offset limit | 7 4 | Z axis machine coordinate |
| 1 1 | C axis following error | 2 7 | C axis absolute position feedback | 4 3 | C axis absolute position command | 5 9 | C axis offset limit | 7 5 | C axis machine coordinate |
| 1 2 | Spindle DA value | 2 8 | Spindle angle (relative to index signal) | 4 4 | Spindle speed command | 6 0 | | 7 6 | CNC2 firmware version |
| 1 3 | Max. interpolation error of Z axis following spindle when tapping (linear direction) | 2 9 | 1 st MPG absolute position counter | 4 5 | Angular error of spindle sync. Unit: 0.001deg | 6 1 | | 7 7 | CE: Free hardware memory |
| 1 4 | Interpolation error of Z axis following spindle when tapping (linear direction) | 3 0 | 2 nd MPG absolute position counter | 4 6 | Maximum Angular error of spindle sync. Unit: 0.001deg | 6 2 | | 7 8 | CE: HMI free memory DOS: PLC version |
| 1 5 | Interpolation error of Z axis following spindle when tapping (rotational direction) | 3 1 | 3 rd MPG absolute position counter | 4 7 | | 6 3 | | 7 9 | Software version |

[0000]: Human-machine interface (HMI) module execution times

[Definition]

When human-machine module is executed once, add 1 to System Data 0000.

[Description]

1. Check whether human-machine interface module is executing. If this value is not adding, it means HMI module stops abnormally.
2. The faster variable 0000 is adding, the more times HMI module is executed. It also means human-machine responds faster.

[0001]: Times of motion interpolation

[Definition]

When hardware interrupt signal (ISR) is triggered, add 1 to System Data 0001.

[Description]

1. If communication module functions correctly, variable 0001 will be adding normally. If it is not adding, there are some problems with hardware or communication module and alarm OP-001[Invalid axis board setting, IO will not work] will appear.
2. The adding speed means times of execution of motion interpolation module in a unit time period, it is related to Pr3203.

[0002]: PLC scan times

[Definition]

Each time when Normal PLC in ladder is completely scanned, add 1 to System Data 0002 will be added 1

[Description]

1. The adding speed means the times of scanning PLC ladder in a unit time period, it is related to Pr3204.
2. Actual value of Pr3204 is related to Motion Interpolation Time (System Data 0004), system picks the closest integer multiple of System Data 0004 to parameter value. I.e., Pr3204 is 10000 and System Data 0004 is 3000, the closest integer multiple is 9000 therefore the actual PLC scan time is 9000 (0.001ms).

[0003]: I/O scan times

[Definition]

Each time controller reads and writes all IO, add 1 to System Data 0003.

[Description]

1. The adding speed means the times that controller reads and writes all IOs, it is related to Pr3202.
2. Actual value of Pr3202 is related to Motion Interpolation Time (System Data 0004), system picks the closest integer multiple of System Data 0004 to parameter value. I.e., Pr3202 is 5000 and System Data 0004 is 3000, the closest integer multiple is 6000 therefore the actual I/O scan time is 6000 (0.001ms).
3. If the adding speed is slower than PLC Scan Times, the parameter settings are inappropriate.
4. The System Data does not include Control Panel scan time.

[0004]: Motion interpolation time

[Definition]

The time interval between two hardware interrupt (ISR) is triggered, unit: μ sec.

[Description]

1. For SUPER Controller, this System Data is approximately $Pr3203/1000*983$; for 10 and EZ Series controller, it is $Pr3203/1000*819$; other series of controllers equal to Pr3203.
2. If the System Data 0005 is different from above value, please refer to Parameter Manual to check if Pr11 is set correctly.

[0005]: PLC scanning time

[Definition]

Scanning time interval of PLC, unit: μsec

[Description]

1. For SUPER Controller, this System Data is approximately Pr3204/1000*983; for 10 and EZ Series controller, it is Pr3204/1000*819; other series of controllers equal to Pr3204.
2. If the System Data 0005 is different from above value, please refer to Parameter Manual to check if Pr11 is set correctly.

[0006]: SRAM writing times

[Definition] CF card writing times

[Description]

1. CF card has an endurance of about 1 million reading and writing cycles. When System Data 0006 is close to one million, it is suggested to replace a new CF card to prevent bootup failure.
2. Reference System Data 020, 021, and 022.

[0007]: Free system memory

[Definition]

Free memory of Kernel, Unit: Byte

[Description]

1. System Data 0007 too low can causes system unstable or crash. If it is lower than 1M(1000000) or 100K(100000), alarm OP-007 [Low memory, memory space is less than 1M] or Op-008 [Fatal low memory, memory space is less than 100K] will be triggered.

[0008~0011]: X/Y/Z/C axis following error

[Definition]

Error between position command and position feedback of each axis

Calculation: [X/Y/Z/C axis following error- System Data 008~011] = [X/Y/Z/C axis absolute position command- System Data 040~043] - [X/Y/Z/C axis absolute position feedback- System Data 024~027], Unit: BLU

[Description]

1. This variable is the real time following error used to check motion lag of each axis.
2. For static axis, this error is called static error and should be very close to zero. If it is greater than Pr561~, alarm MOT-008 [Loss Pulse] will appear.
3. For dynamic axis, this error is called dynamic error and should be smaller than [Maximum allowed following error - System Data 016~019]. If not, alarm MOT-019 [following error exceed] or even MOT-023 [Fatal following error exceed] will appear.
4. When moving in constant speed, System Data [0008~0011] and [reasonable following error- System Data 032~035] should be very close. If not, please check if drive position loop gain and controller Pr181~ are the same; and drive's feed forward command or filter function are not disabled. Connection problem may be also a reason.

[0012]: Spindle DA value

[Definition]

Spindle DA value sent by axis card. Unit: mV

[Description]

Theoretical value = (spindle speed command/Pr1671)*1000. Generally used to inspect voltage output under inverter spindle type (Pr1791=0, 5, 6, 7) or non-inverter spindle type (Pr1791=1~4) with voltage control mode (Pr386=1~).

[0013]: Max interpolation error of Z axis following spindle when tapping (linear direction)**[Definition]**

During tapping, maximum error of Z axis following spindle, Unit: BLU

[Description]

1. During tapping, smaller the maximum value of [System Data 0014 Interpolation error of Z axis following spindle], the better it is. It means tapping has higher precision.
2. For multiple axis group or multi-spindle systems, the displayed value is decided by R21 and R791~R794. For example:
When R21= 0 or 1, displays tapping information of main spindle of Axis Group 1;
When R21= 2, displays tapping information of main spindle of Axis Group 2;
When R21= 3, displays tapping information of main spindle of Axis Group 3;
When R21= 4, displays tapping information of main spindle of Axis Group 4;
3. Multiple axis group or multi-spindle systems display is valid from ver. 10.116.6A.

[0014]: Interpolation error of Z axis following spindle when tapping (linear direction)**[Definition]**

During tapping, the dynamic error of Z axis following spindle, Unit: BLU

[Description]

1. During tapping, the dynamic error of Z axis following spindle
2. For multiple axis group or multi-spindle systems, refer to System Data 0013 Max interpolation error of Z axis following spindle when tapping (linear direction)

[0015]: Interpolation error of Z axis following spindle when tapping (rotation direction)**[Definition]**

During tapping, the dynamic error of Z axis following spindle, Unit: IU (degree)

[Description]

1. During tapping, the dynamic error of Z axis following spindle
2. For multiple axis group or multi-spindle systems, refer to System Data 0013 Max interpolation error of Z axis following spindle when tapping (linear direction)

[0016~0019]: X/Y/Z/C maximum allowed following error**[Definition]**

The allowed maximum value of following error when axis moving

[Description]

1. Theoretical value = Max (Pr461~, Pr821~)/Pr181~/60*1000.
2. If [Following error System Data 008~010] exceeds this value, alarm MOT-019 [following error exceed] will appear.
3. If [Following error system Data 008~010] exceeds twice of this value, alarm MOT-023 [Fatal following error exceed] will appear.

[0020]: Consecutive failure times of writing registry file

[Definition]

After booting, the consecutive failure times of writing registry file (registry.dat).

[Description]

If System Data 0020 exceeds 100, alarm OP-026 [Machine data file fault error, re-calibrate before machining and do scan disk] will appear.

[0021]: Failure times of writing registry file

[Definition]

After booting, the failure times of writing registry file (registry.dat).

[Description]

If System Data 0021 exceeds 100, alarm OP-025 [Machine data file write fail many times, re-calibrate before machining] will appear.

[0022]: Allowed times of writing permanent data

[Definition]

Currently allowed writing times of CF card

[Description]

1. After booting, the default value is 100. Each time that registry file (registry.dat) is written, System Data 0022 will be subtracted 1. When this variable is equal to 0, no more write is allowed to avoid CF card being written too frequently.
2. This variable adds 1 every 30 seconds until reaches 1000. The normal range is between 100 to 1000, the higher the better. It is abnormal if the value is close or equal to 0, please check the memory or this System Data changes too frequently.

[0023]: Percentage of actual time motion interpolation

[Definition]

Percentage of theoretical and actual motion interpolation time

[Description]

Normally this variable is around 99~101. When abnormal value appears, please check whether Pr9 Servo board type and Pr11 Servo board clock source are set correctly.

[0024~0027]: X/Y/Z/C axis absolute position feedback

[Definition]

Position feedback of axial motor, Unit: BLU

[Description]

1. $[X/Y/Z/C \text{ axis following error System Data } 008\sim011] = [X/Y/Z/C \text{ absolute position command System Data } 040\sim043] - [X/Y/Z/C \text{ absolute position feedback System Data } 024\sim027]$
2. The value will be set to zero after finishing the first home search for non-absolute encoder.

[0028]: Spindle angle (related to index signal)

[Definition]

Spindle motor compares the index signal of position feedback, Unit: BLU

[Description]

1. This variable is used to compare spindle with index signal (Index, Z-phase or C-phase) of position feedback to confirm whether position of spindle is correct

2. Transmission mechanism (V-belt) can have slipping and cause error, installing encoder on spindle side (Pr1811=0) will be more reliable.
3. This variable becomes effective after the controller received the spindle's index signal. If you find this variable implausible (this usually happens when you reboot the controller without rebooting the drive), rotate the spindle until the controller receives the index signal.
4. A common example of this variable giving implausible values is that a Syntec Spindle executes the Spindle Orientation Stop function right after the controller is rebooted. Make sure that the index signal is received first.

[0029~0031]: The 1st / 2nd / 3rd MPG absolute position counter

[Definition] Pulse accumulated value of MPG (after multiplied by 4)

[Description]

This variable can be used to check whether input signal pulse of MPG is normal. If this value is abnormal after one turn, please check setting of Pr2021~, Pr2041~and Pr2051 or wiring of MPG (loose connector, MPG power, A+, A-, B+, B- signal...)

[0032~0035]: X/Y/Z/C reasonable following error

[Definition]

Theoretical position following error of each axis.

Calculation: Speed command (mm/min,deg/min)/60/Pr181~, Unit: BLU

[Description]

This System Data displays theoretical following error of each axis, should be close to [Axis following error- System Data 008~011]. If not, please check whether drive position loop gain and setting parameter Pr181~ are the same, driver feedforward or command filter function are not closed. Abnormal wire connections may cause inconsistency.

[0036~0037]: Reserved

[Definition] Reserved

[Description] Reserved

[0038]: System temperature (oc)

[Definition] display the current temperature inside controller

[Description]

The temperature is better to be close to room temperature. Keep it lower than 50oc.

[0039]: CPU temperature (oc)

[Definition] display the actual temperature of CPU

[Description]

1. The temperature is better to be close to room temperature. Keep it lower than 75 oc.
2. If it exceeds 80 °C for more than 6 minutes, controller will send alarm MLC-57 [CPU temp too high, exceed 80 °C].
3. Under normal condition, this variable cannot exceed [ID-038 System temperature] over 30 °C. If it exceeds system temperature over 30°C, please check controller cooling fan functionality or CPU heat sink.

[0040~0043]: X/Y/Z/C axis absolute position command

[Definition]

When controller sends command to each axis card, cumulative command of each corresponding axis. Unit: BLU

[Description]

1. [X/Y/Z/C axis following error System Data 008~011] = [X/Y/Z/C absolute position command System Data 040~043] - [X/Y/Z/C absolute position feedback System Data 024~027]
2. This variable is the position command being sent out from the controller, it may not equal to [X/Y/Z/C axis machine coordinate System Data 072~075] because it includes mechanical compensations (backlash, pitch, temperature, quad-peak).
3. This variable will be set to zero after finishing the first home search for non-absolute encoder.

[0044]: Spindle speed command

[Definition] Effective spindle speed command, Unit: BLU

[Description]

Check the effective spindle speed command

[0045]: Angular error of spindle synchronization

[Definition] The dynamic angular error between two synchronized spindles in a dual-spindle Lathe.

[Definition]

1. Dynamic angular error between two synchronized spindles, smaller value means better synchronization.
2. When the value fails to converge, check if both spindles has same position loop gain. If gains are the same, it could be the dynamic characteristics of two spindles do not match. Please increase acceleration time or redo servo tuning of both spindles.

[0046]: Maximum angular error of spindle synchronization

[Definition] The maximum angular error between two synchronized spindles in a dual-spindle Lathe.

[Definition]

1. Maximum angular error between two synchronized spindles, smaller value means better synchronization.
2. When sync is disabled, the value will remain until next sync enabled.
3. Refer to System Data 045 for other description.

[0047]: Reserved

[Definition] Reserved

[Description] Reserved

[0048~0051]: X/Y/Z/C Axis position index counter

[Definition]

When index signal of each axis is generated, hardware will record the current number of pulse (latch).

[Description]

1. Theoretically, the value change increment in the same direction must equal to Pr61~ * Pr81. If not, it means cables have loss pulse, please check the feedback signal (A+,A-,B+,B-,C+,C-) to confirm it is loose cable or noise interference.
2. This variable will be set to zero after finishing the first home search for non-absolute encoder.

[0052]: Spindle position index counter

[Definition]

When index signal of spindle is generated, hardware will record the current number of pulse (latch).

[Description]

1. Theoretically, the value change increment in the same direction must equal to $Pr1651 \sim * Pr1661$. If not, it means cables have lost pulse, please check the feedback signal (A+,A-,B+,B-,C+,C-) to confirm it is loose cable or noise interference.
2. This variable will be set zero after finishing spindle positioning (C61).

[0053]: Serial communication initialize failure code

[Definition] M2/M3 serial communication initialize failure code

[Description]

1. Valid version 10.118.12
2. When M2/M3 connection encounters serial communication initialize failure (OP-53), the corresponding error code will be displayed in decimal.

[0054]: Times of interpolation timeout

[Definition]

After axis card is interrupted, Kernel will check buffer command on axis card to know whether buffer command has been fetched. If not, it means computation time of the last motion interpolation exceeds [Motion interpolation time System Data 04] and System Data 54 will add 1.

[Description]

It is abnormal if the value does not equal to 0, please try to adjust slightly Pr3203 to see whether it is improved. If not, CPU or axis card could be damaged.

[0055]: Times of incomplete move command

[Definition] Check if unsend command exists after interpolation finishes for one block. If it exists, System Data 55 add 1 and this tapping cycle failed.

[Description]

Only applicable on Lathe command G33, G21, G21.2, G78.
Valid version: 10.116.30, 10.116.240, 10.116.16U and newer.

[0056~0059]: X/Y/Z/C axis offset limit

[Definition]

1. Pr201~ =0: During home search of each axis, the motor rotation revolution from home switch signal disappears to encoder index signal appears. Unit: %. If value is 500, it means motor rotates 5 revs.
2. Pr201~ =1: During home search of each axis, the distance from home switch signal disappears to optical scale (linear encoder) index signal appears relative to 1 mm (Pr17=2). Unit: %. If value is 500, it means axis moves 5 mm.

[Description]

If Pr201~ = 0, suggested range of value is 20%~80%. If it is not in that range, enable home grid function (Pr941~ =1).

[0060~0063]: Reserved

[Definition] reserved

[Description] reserved

[0064~0067]: X/Y/Z/C axis following error of feedforward compensation

[Definition]

The effective following error value of each axis after the speed feedforward compensation is enabled.

[Description]

1. To enable feedforward compensation, one method is to set feedforward of each axis (Pr581~), the other method is to enable feedforward of all axes at once (Pr3808>0).
2. Excess value of feedforward setting can cause vibration or over-cut.
3. System Data 0064 can be compared with System Data 0008 and 0032, it is easier to tell the difference under constant speed.
4. If feedforward is disabled, System Data 0064 should be very close to System Data 0008 & 0032; yet it is calculated with feedback so they may not be equal.
5. If feedforward is enabled, System Data 0064 should be much smaller than System Data 0008 & 0032. The effect of feedforward can be observed this way.
6. If feedforward is enabled but not under Auto Mode, the compensation has no effect thus System Data 0064 is very close to System Data 0008 & 0032.

[0068]: Failure times of axis card synchronization

[Definition]

After axis card is interrupted, Kernel will check buffer command on axis card to know whether buffer command has been fetched. If not, it means the hardware executing DDA interpolation cycle and hardware interrupting cycle are non-synchronized, and System Data 0068 add 1.

[Description]

It is abnormal if the value does not equal to 0, please check whether interrupt setting of axis card is correct. If setting is correct, axis card could be damaged.

[0069]: Abnormal times of encoder value / Times of serial communication failure of all axes

[Definition]

1. Pulse Controller: Controller will read all axial position feedback pulse at each interpolation cycle. If the difference between current and previous value is over 10000, controller will diagnose it as abnormal feedback, and System Data 0069 will add 1.
2. Serial Controller: Controller will handshake with each axis drive at each interpolation cycle. If any handshake fails, System Data 0070 will add 1.

[Description]

1. For pulse controller, non-zero System Data 0069 is abnormal. Please check whether interrupt setting of axis card is correct. If setting is correct, axis card could be damaged.
2. For serial controller, non-zero System Data 0069 is abnormal. Please check the controller-drive connection, station setting in controller (Pr21~), and machine grounding.

[0070]: Abnormal value of encoder / Times of serial communication failure of a single axis

[Definition]

1. Pulse Controller: When [Abnormal times of absolute recorder System Data 069] is added 1, abnormal value of position feedback pulse will be recorded in System Data 0070.
2. Serial Controller: The failure times of the last axis that has serial communication failure will be recorded in System Data 0070.

[Description]

Refer to description of System Data 0069.

[0071]: Abnormal encoder axis / Serial communication failure station number

[Definition]

1. Pulse Controller: When [Abnormal times of absolute recorder - System Data 0069] is added 1, axis number that has abnormal encoder value will be recorded in this system Data. Range 1~16.
2. Serial Controller: When [Times of serial communication failure of a single axis - System Data 0070] is added 1, the station number that failure occurs will be recorded in this System Data. Range 1~16.

[Description]

Refer to description of System Data 0069.

[0072~0075]: X/Y/Z/C axis machine coordinate

[Definition] Display the machine coordinates of each axis, Unit: BLU

[Description]

1. Use to check the correctness of machine's position.
2. This variable will be set to zero after finishing the first home search for non-absolute encoder.

[0076]: CNC2 firmware version

[Definition] firmware version of chip on the axis card

[Description]

If necessary, check firmware version of motion chip on axis card to troubleshoot.

[0077]: CE- Free hardware memory

[Definition] Actual free hardware memory, Unit: Byte

[Description]

Too low of the value could causes system unstable or crash, when free hardware memory is less than 1M (1000000) or 100K (100000) alarm OP-007 [Low memory, memory space is less than 1M] or OP-008 [Fatal low memory, memory space is less than 100K] will appear

[0078]: CE- HMI free memory / DOS- PLC version

[Definition]

- 1.CE6.0: The free memory of human-machine interface module, Unit: Byte
- 2.DOS: Display PLC R1019

[Description]

If necessary, please confirm the PLC version to classify issue

[0079]: Software version

[Definition] Software version of controller

[Description]

If necessary, please confirm the controller software version to classify issue

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| | | | | | | | | | |
|----|---|-----|---|-----|--|-----|---|-----|---|
| 80 | X axis double loop position error | 96 | X axis absolute position feedback | 112 | X axis second absolute position feedback | 128 | X axis machine coordinate | 144 | X axis second feedback position index counter |
| 81 | Y axis double loop position error | 97 | Y axis absolute position feedback | 113 | Y axis second absolute position feedback | 129 | Y axis machine coordinate | 145 | Y axis second feedback position index counter |
| 82 | Z axis double loop position error | 98 | Z axis absolute position feedback | 114 | Z axis second absolute position feedback | 130 | Z axis machine coordinate | 146 | Z axis second feedback position index counter |
| 83 | 4 th axis double loop position error | 99 | 4 th axis absolute position feedback | 115 | 4 th axis second absolute position feedback | 131 | 4 th axis machine coordinate | 147 | 4 th axis second feedback position index counter |
| 84 | 5 th axis double loop position error | 100 | 5 th axis absolute position feedback | 116 | 5 th axis second absolute position feedback | 132 | 5 th axis machine coordinate | 148 | 5 th axis second feedback position index counter |
| 85 | 6 th axis double loop position error | 101 | 6 th axis absolute position feedback | 117 | 6 th axis second absolute position feedback | 133 | 6 th axis machine coordinate | 149 | 6 th axis second feedback position index counter |
| 86 | 7 th axis double loop position error | 102 | 7 th axis absolute position feedback | 118 | 7 th axis second absolute position feedback | 134 | 7 th axis machine coordinate | 150 | 7 th axis second feedback position index counter |
| 87 | 8 th axis double loop position error | 103 | 8 th axis absolute position feedback | 119 | 8 th axis second absolute position feedback | 135 | 8 th axis machine coordinate | 151 | 8 th axis second feedback position index counter |

| | | | | | | | | | |
|----|--|-----|--|-----|---|-----|--|-----|--|
| 88 | 9 th axis double loop position error | 104 | 9 th axis absolute position feedback | 120 | 9 th axis second absolute position feedback | 136 | 9 th axis machine coordinate | 152 | 9 th axis second feedback position index counter |
| 89 | 10 th axis double loop position error | 105 | 10 th axis absolute position feedback | 121 | 10 th axis second absolute position feedback | 137 | 10 th axis machine coordinate | 153 | 10 th axis second feedback position index counter |
| 90 | 11 th axis double loop position error | 106 | 11 th axis absolute position feedback | 122 | 11 th axis second absolute position feedback | 138 | 11 th axis machine coordinate | 154 | 11 th axis second feedback position index counter |
| 91 | 12 th axis double loop position error | 107 | 12 th axis absolute position feedback | 123 | 12 th axis second absolute position feedback | 139 | 12 th axis machine coordinate | 155 | 12 th axis second feedback position index counter |
| 92 | 13 th axis double loop position error | 108 | 13 th axis absolute position feedback | 124 | 13 th axis second absolute position feedback | 140 | 13 th axis machine coordinate | 156 | 13 th axis second feedback position index counter |
| 93 | 14 th axis double loop position error | 109 | 14 th axis absolute position feedback | 125 | 14 th axis second absolute position feedback | 141 | 14 th axis machine coordinate | 157 | 14 th axis second feedback position index counter |
| 94 | 15 th axis double loop position error | 110 | 15 th axis absolute position feedback | 126 | 15 th axis second absolute position feedback | 142 | 15 th axis machine coordinate | 158 | 15 th axis second feedback position index counter |

| | | | | | | | | | |
|--------|--|---------|---|---------|---|---------|--|---------|--|
| 9 5 | 16 th axis double loop position error | 11 1 | 16 th axis absolute position feedback | 12 7 | 16 th axis second absolute position feedback | 14 3 | 16 th axis machine coordinate | 15 9 | 16 th axis second feedback position index counter |
|--------|--|---------|---|---------|---|---------|--|---------|--|

[0080~0095] : 1st ~ 16th axis double loop position error

[Definition] : Difference value between feedback of motor encoder & optical scale encoder. Calculated as: "Double loop Position Error - System Data 080~095" = "Absolute position feedback - System Data 096~111" - "Second absolute position feedback - System Data 112~127". Unit: BLU.

[Description] :

1. The value reflects the mechanical error (backlash or slip) between motor and linear encoder to mismatch.
2. When the axis is static, the error is called static error. If it is greater than Pr1421~, alarm MOT-31 "Excess static double loop position error" will appear.
3. When axis is in motion, the error is called dynamic error. If it is greater than Pr3817, alarm MOT-24 "Severe double loop position error" will appear.
4. If this data increases abnormally with machine movement before home search, please check linear encoder resolution, or check its signal order (A+, A-, B+, B-).

[0096~0111] : 1st ~ 16th axis absolute position feedback

[Definition] : Axis motors position feedback, unit: BLU

[Description] :

1. The value will be set to zero after finishing the first home search for non-absolute encoder.

[0112~0127] : 1st ~ 16th axis second absolute position feedback

[Definition] : Linear scales or second encoders on spindle position feedback, unit: BLU

[Description] :

1. The value will be set to zero after finishing the first home search for non-absolute encoder.

[0128~0143] : 1st ~ 16th axis machine coordinate

[Definition] : Machine coordinate display of each axis, unit: BLU

[Description] :

1. Use to check the correctness of machine's position.
2. This variable will be set to zero after finishing the first home search for non-absolute encoder.

[0144~0159] : 1st ~ 16th axis second feedback position index counter

[Definition] :

When index signal of second feedback of each axis is generated, hardware will latch the current number of pulse.

[Description] :

1. Theoretically, the value change increment in the same direction must equal to Pr261~ * Pr301. If not, it means cables have loss pulse, please check the feedback signal (A+,A-,B+,B-,C+,C-) to confirm it is loose cable or noise interference.
2. This variable will be set to zero after finishing the first home search for non-absolute encoder.

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| | | | | | | | | | |
|-----|--------------------------------------|-----|---|-----|--|-----|---|-----|--|
| 160 | X axis following error | 176 | X axis absolute position feedback | 192 | X axis absolute position command | 208 | X axis reasonable following error | 224 | X axis maximum allowed following error |
| 161 | Y axis following error | 177 | Y axis absolute position feedback | 193 | Y axis absolute position command | 209 | Y axis reasonable following error | 225 | Y axis maximum allowed following error |
| 162 | Z axis following error | 178 | Z axis absolute position feedback | 194 | Z axis absolute position command | 210 | Z axis reasonable following error | 226 | Z axis maximum allowed following error |
| 163 | 4 th axis following error | 179 | 4 th axis absolute position feedback | 195 | 4 th axis absolute position command | 211 | 4 th axis reasonable following error | 227 | 4 th axis maximum allowed following error |
| 164 | 5 th axis following error | 180 | 5 th axis absolute position feedback | 196 | 5 th axis absolute position command | 212 | 5 th axis reasonable following error | 228 | 5 th axis maximum allowed following error |
| 165 | 6 th axis following error | 181 | 6 th axis absolute position feedback | 197 | 6 th axis absolute position command | 213 | 6 th axis reasonable following error | 229 | 6 th axis maximum allowed following error |
| 166 | 7 th axis following error | 182 | 7 th axis absolute position feedback | 198 | 7 th axis absolute position command | 214 | 7 th axis reasonable following error | 230 | 7 th axis maximum allowed following error |
| 167 | 8 th axis following error | 183 | 8 th axis absolute position feedback | 199 | 8 th axis absolute position command | 215 | 8 th axis reasonable following error | 231 | 8 th axis maximum allowed following error |

| | | | | | | | | | |
|-----|---------------------------------------|-----|--|-----|---|-----|--|-----|---|
| 168 | 9 th axis following error | 184 | 9 th axis absolute position feedback | 200 | 9 th axis absolute position command | 216 | 9 th axis reasonable following error | 232 | 9 th axis maximum allowed following error |
| 169 | 10 th axis following error | 185 | 10 th axis absolute position feedback | 201 | 10 th axis absolute position command | 217 | 10 th axis reasonable following error | 233 | 10 th axis maximum allowed following error |
| 170 | 11 th axis following error | 186 | 11 th axis absolute position feedback | 202 | 11 th axis absolute position command | 218 | 11 th axis reasonable following error | 234 | 11 th axis maximum allowed following error |
| 171 | 12 th axis following error | 187 | 12 th axis absolute position feedback | 203 | 12 th axis absolute position command | 219 | 12 th axis reasonable following error | 235 | 12 th axis maximum allowed following error |
| 172 | 13 th axis following error | 188 | 13 th axis absolute position feedback | 204 | 13 th axis absolute position command | 220 | 13 th axis reasonable following error | 236 | 13 th axis maximum allowed following error |
| 173 | 14 th axis following error | 189 | 14 th axis absolute position feedback | 205 | 14 th axis absolute position command | 221 | 14 th axis reasonable following error | 237 | 14 th axis maximum allowed following error |
| 174 | 15 th axis following error | 190 | 15 th axis absolute position feedback | 206 | 15 th axis absolute position command | 222 | 15 th axis reasonable following error | 238 | 15 th axis maximum allowed following error |
| 175 | 16 th axis following error | 191 | 16 th axis absolute position feedback | 207 | 16 th axis absolute position command | 223 | 16 th axis reasonable following error | 239 | 16 th axis maximum allowed following error |

[0160~0175] : 1st ~ 16th axis following error

[Definition] : Axis position command and position feedback error value, calculation:

[Following error- System Data 160~175] = [Absolute position command - System Data 192~207] - [Absolute position feedback- System Data 176~191], unit: BLU

[Description] :

- 1.The value is the real time following error used to check motion lag of each axis.
- 2.For static axis, this error is called static error and should be very close to zero. If it is greater than Pr561~, alarm MOT-008 [Loss Pulse] will appear.
- 3.For dynamic axis, this error is called dynamic error and should be smaller than [Maximum allowed following error Value- System Data 016~019]. If not, alarm MOT-019 [following error exceed] or even MOT-023 [Fatal following error exceed] will appear.
- 4.When moving in constant speed, the variable should be close to [Reasonable following error Value- System Data 032~035], if not, please check if drive position loop gain and controller Pr181~ are the same; and drive's feed forward command or filter function are not disabled. Connection problem may be also a reason.

[0176~0191] : 1st ~ 16th axis absolute position feedback

[Definition] : Position feedback of axial motor, Unit: BLU

[Description] :

- 1.The value will be set to zero after finishing the first home search for non-absolute encoder.

[0192~0207] : 1st ~ 16th axis absolute position command

[Definition] : Controller sends the accumulated command value of each axis to axis board, unit: BLU

[Description] :

- 1.This variable is the position command being sent out from the controller, it may not equal to [X/Y/Z/C axis machine coordinate- System Data 072~075] because it includes mechanical compensations (backlash, pitch, temperature, quad-peak).
- 2.The value will be set to zero after finishing the first home search for non-absolute encoder.

[0208~0223] : 1st ~ 16th axis reasonable following error

[Definition] : Theoretical position following error value of each axis, calculation: speed command (mm/min, deg/min)/60/Pr181~, unit: BLU

[Description] :

- 1.The variable shows the theoretical following error value of each axis, it should be close to "Axis following error Value- System Data 160~175", if not, please make sure the driver position loop gain is the same as Pr181~ settings, driver feedforward or command filter function are not closed. Abnormal cable connection may also cause inconsistency.

[0224~0239] : 1st ~ 16th axis maximum allowed following error value

[Definition] : The maximum allowed following error value during the axis is moving.

[Description] :

1. Theoretical value = Max (Pr461~, Pr821~)/Pr181~/60*1000.
2. If [Following error System Data 0224~0239] exceeds this value, alarm MOT-019 [following error exceed] will appear.
3. If [Following error system Data 0224~0239] exceeds twice of this value, alarm MOT-023 [Fatal following error exceed] will appear.
4. The first four of these values are same as System Data 008~010.

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|-----|---------------------------------------|-----|--|-----|---|-----|------------------------------------|-----|--|
| 240 | 1 st axis following error | 256 | 1 st axis following error of feedforward | 272 | 1 st axis servo loop DA value | 288 | X axis offset limit | 304 | X axis position index counter |
| 241 | 2 nd axis following error | 257 | 2 nd axis following error of feedforward | 273 | 2 nd axis servo loop DA value | 289 | Y axis offset limit | 305 | Y axis position index counter |
| 242 | 3 rd axis following error | 258 | 3 rd axis following error of feedforward | 274 | 3 rd axis servo loop DA value | 290 | Z axis offset limit | 306 | Z axis position index counter |
| 243 | 4 th axis following error | 259 | 4 th axis following error of feedforward | 275 | 4 th axis servo loop DA value | 291 | 4 th axis offset limit | 307 | 4 th axis position index counter |
| 244 | 5 th axis following error | 260 | 5 th axis following error of feedforward | 276 | 5 th axis servo loop DA value | 292 | 5 th axis offset limit | 308 | 5 th axis position index counter |
| 245 | 6 th axis following error | 261 | 6 th axis following error of feedforward | 277 | 6 th axis servo loop DA value | 293 | 6 th axis offset limit | 309 | 6 th axis position index counter |
| 246 | 7 th axis following error | 262 | 7 th axis following error of feedforward | 278 | 7 th axis servo loop DA value | 294 | 7 th axis offset limit | 310 | 7 th axis position index counter |
| 247 | 8 th axis following error | 263 | 8 th axis following error of feedforward | 279 | 8 th axis servo loop DA value | 295 | 8 th axis offset limit | 311 | 8 th axis position index counter |
| 248 | 9 th axis following error | 264 | 9 th axis following error of feedforward | 280 | 9 th axis servo loop DA value | 296 | 9 th axis offset limit | 312 | 9 th axis position index counter |
| 249 | 10 th axis following error | 265 | 10 th axis following error of feedforward | 281 | 10 th axis servo loop DA value | 297 | 10 th axis offset limit | 313 | 10 th axis position index counter |

| | | | | | | | | | |
|-----|---------------------------------------|-----|--|-----|---|-----|------------------------------------|-----|--|
| 250 | 11 th axis following error | 266 | 11 th axis following error of feedforward | 282 | 11 th axis servo loop DA value | 298 | 11 th axis offset limit | 314 | 11 th axis position index counter |
| 251 | 12 th axis following error | 267 | 12 th axis following error of feedforward | 283 | 12 th axis servo loop DA value | 299 | 12 th axis offset limit | 315 | 12 th axis position index counter |
| 252 | 13 th axis following error | 268 | 13 th axis following error of feedforward | 284 | 13 th axis servo loop DA value | 300 | 13 th axis offset limit | 316 | 13 th axis position index counter |
| 253 | 14 th axis following error | 269 | 14 th axis following error of feedforward | 285 | 14 th axis servo loop DA value | 301 | 14 th axis offset limit | 317 | 14 th axis position index counter |
| 254 | 15 th axis following error | 270 | 15 th axis following error of feedforward | 286 | 15 th axis servo loop DA value | 302 | 15 th axis offset limit | 318 | 15 th axis position index counter |
| 255 | 16 th axis following error | 271 | 16 th axis following error of feedforward | 287 | 16 th axis servo loop DA value | 303 | 16 th axis offset limit | 319 | 16 th axis position index counter |

[0240~0255] : 1st ~ 16th axis following error

[Definition] : Refer to System Data 0160~0175: 1st ~ 16th axis following error

[Description] : Refer to System Data 0160~0175: 1st ~ 16th axis following error

[0256~0271] : 1st ~ 16th axis following error of feedforward

[Definition] : The effective following error value of each axis after the speed feedforward compensation is enabled.

[Description] :

1. Refer to [System Data 0064~0067]: X/Y/Z/C axis following error of feedforward compensation.

[0272~0287] : 1st ~ 16th axis servo loop DA value

[Definition] : The voltage command sent of each axis board's DAC chips , unit: mV

[Description] :

1. Check if the voltage (speed) command is correct when Pr381~=1 (Voltage Command).

[0288~0303] : 1st ~ 16th axis offset limit

[Definition] :

1. Pr201~=0: During home search of each axis, the motor rotation revolution from home switch signal disappears to encoder index signal appears. Unit: %. If value is 500, it means motor rotates 5 revs.
2. Pr201~=1: During home search of each axis, the distance from home switch signal disappears to optical scale (linear encoder) index signal appears relative to 1 mm (Pr17=2). Unit: %. If value is 500, it means axis moves 5 mm.

[Description] :

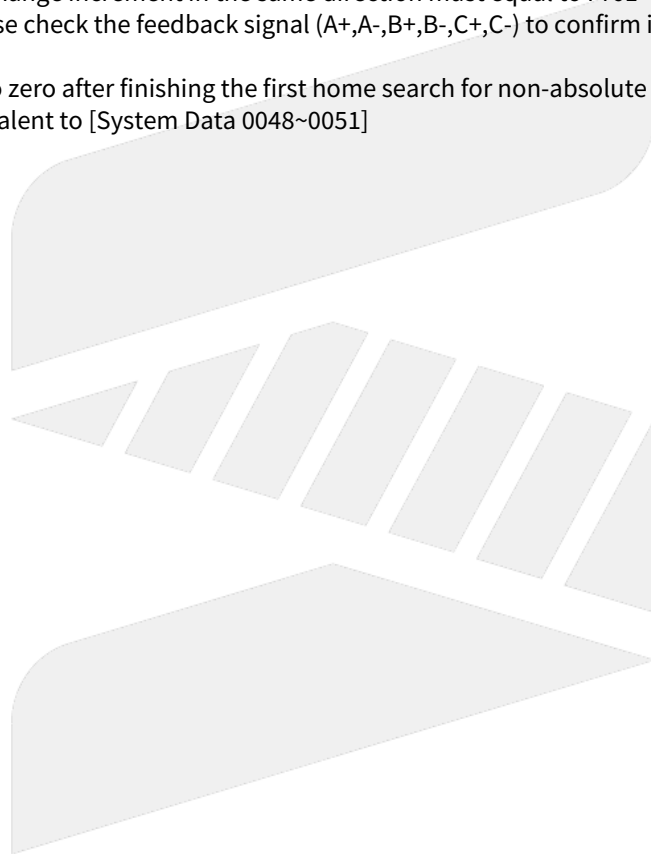
1. If Pr201~= 0, suggested range of value is 20%~80%. If it is not in that range, enable home grid function (Pr941~=1).
2. This System Data is equivalent to [System Data 0056~0059]

[0304~0319] : 1st ~ 16th axis position index counter

[Definition] : The number of (latch) pulses recorded by the hardware when the axis feedback index signal of each axis was generated.

[Description] :

1. Theoretically, the value change increment in the same direction must equal to Pr61~ * Pr81. If not, it means cables have lost pulse, please check the feedback signal (A+,A-,B+,B-,C+,C-) to confirm it is loose cable or noise interference.
2. This variable will be set to zero after finishing the first home search for non-absolute encoder.
3. This System Data is equivalent to [System Data 0048~0051]



SYNTEC

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| | | | | | | | | | |
|-----|--|-----|--|-----|---|-----|---|-----|--------------------------|
| 320 | Number of previewed serial blocks | 336 | Axis board data exchange time | 352 | 1 st axis estimated actual axis servo loop gain (Kp) | 368 | Maximum feeding axis tracking 1st spindle error when tapping (linear direction) | 384 | 4th MPG Position Counter |
| 321 | Judge if polynomial module find no root under alarms | 337 | Axis board data exchange time (MAX) | 353 | 2 nd axis estimated actual axis servo loop gain (Kp) | 369 | Maximum feeding axis tracking 2nd spindle error when tapping (linear direction) | 385 | 5th MPG Position Counter |
| 322 | Threading index checking error | 338 | Fine interpolation calculation time | 354 | 3 rd axis estimated actual axis servo loop gain (Kp) | 370 | Maximum feeding axis tracking 3rd spindle error when tapping (linear direction) | 386 | 6th MPG Position Counter |
| 323 | Max Z axis tracking spindle error when threading | 339 | Fine interpolation calculation time(MAX) | 355 | 4 th axis estimated actual axis servo loop gain (Kp) | 371 | Maximum feeding axis tracking 4th spindle error when tapping (linear direction) | 387 | 7th MPG Position Counter |
| 324 | Number of interpolating serial blocks | 340 | MatrixIO scanning time | 356 | 5 th axis estimated actual axis servo loop gain (Kp) | 372 | Maximum feeding axis tracking 5th spindle error when tapping (linear direction) | 388 | (Reserved) |

| | | | | | | | | | |
|-----|---|-----|--|-----|--|-----|---|-----|---|
| 325 | Time of previewed serial interpolation, unit μ s. | 341 | MatrixIO scanning time (MAX) | 357 | 6 th axis estimated actual axis servo loop gain (Kp) | 373 | Maximum feeding axis tracking 6th spindle error when tapping (linear direction) | 389 | (Reserved) |
| 326 | Time of completed serial interpolation, unit μ s | 342 | Interpolation calculation time | 358 | 7 th axis estimated actual axis servo loop gain (Kp) | 374 | Axis board data exchange interpolation timeout times | 390 | Number of times that motion planning block exceeded capacity limitation |
| 327 | Interpolation command remaining time, unit ms | 343 | Interpolation calculation time(MAX) | 359 | 8 th axis estimated actual axis servo loop gain (Kp) | 375 | BPT function block number limit | 391 | Internal process execution times |
| 328 | Synthesis speed | 344 | Trajectory Plan calculation time | 360 | 9 th axis estimated actual axis servo loop gain (Kp) | 376 | Motion planning low performance times | 392 | System interpolation data accessible space insufficient times |
| 329 | Cycle time (time-minute-second) | 345 | Trajectory Plan calculation time (MAX) | 361 | 10 th axis estimated actual axis servo loop gain (Kp) | 377 | Playing mode command error times | 393 | Wireless handheld pendant Key Lost times |
| 330 | Interpolation command interrupted times | 346 | IO scanning time | 362 | 11 th axis estimated actual axis servo loop gain (Kp) | 378 | Substitute interpolation execution times | 394 | Wireless handheld pendant CRC packet error times |

| | | | | | | | | | |
|-----|---|-----|-----------------------------------|-----|--|-----|-----------------------------------|-----|---|
| 331 | Acquired program memory area number | 347 | IO scanning time (MAX) | 363 | 12 th axis estimated actual axis servo loop gain (Kp) | 379 | Substitute interpolation status | 395 | Customized PLC scanning time |
| 332 | Idle program memory area number | | PLC scanning time | 364 | 13 th axis estimated actual axis servo loop gain (Kp) | 380 | Times of axis board data exchange | 396 | Customized PLC scanning time (MAX) |
| 333 | Ratio of coarse/fine interpolation (Removed after 10.116.10A) | 349 | PLC scanning time (MAX) | 365 | 14 th axis estimated actual axis servo loop gain (Kp) | 381 | Hardware interrupt status | 397 | Customized PLC fast scanning time |
| 334 | Motion planning command error times (Internal Test) | 350 | MotionPlan calculation time | 366 | 15 th axis estimated actual axis servo loop gain (Kp) | 382 | System interrupt status | 398 | Customized PLC fast scanning time (MAX) |
| 335 | FRAM error counter (Removed after 10.114.38C, 10.115.43C) | 351 | MotionPlan calculation time (MAX) | 367 | 16 th axis estimated actual axis servo loop gain (Kp) | 383 | Software interrupt status | 399 | Customized PLC version number |

[0320] : Number of previewed serial blocks

[Definition] : The number of blocks in NC program which are previewed for generating velocity profile while system is machining.

[Description] :

1. When controller has enough performance, the value will stay constant.
2. The value may drop to 0 when machining start, machining ending or having low-performance.
3. System Data 320 only accumulates after data 324 reaches its max value.

[0321] : Judge if polynomial module find no root under alarms

[Definition] : Used to explain the possible reason of system sending COR-139 polynomial solution root error.

[Description] :

When system sending "COR-139 Polynomial Solution Root Error", please send the system data variable feedback message to the controller OEM.

1. If the data variable is 0 represents "Didn't enter the polynomial module/Polynomial module solution correct"
2. If the data variable is 1 represents "Polynomial solution root correct but not the one user requests".
3. If the data variable is 2 represents "Polynomial module solution failed, numerical method failed".
4. If the data variable is 3 represents "The highest power of the polynomial is not 1~4".

[0322] : Threading index checking error

[Definition] : The threading begins after receiving the spindle index signal, if found the signal unreasonable then the system data will +1, ends the threading starting action and access a new index signal. Not influencing the threading quality.

[Descriptions] :

1. If found the signal unreasonable then the system data will +1, ends the threading starting action and awaits for the next index signal.
2. The threading action won't start if the system data +1, the action only starts after the next correct index signal comes in, so it won't affect the threading quality

[0323] : Maximum Z axis tracking spindle error when threading

[Definition] : Use the spindle and Z axis feedback to calculate the tracking error when Z axis is in constant speed during the threading, unit: BLU

[Descriptions] :

1. Calculation: Z to Spindle tracking error = (Spindle feedback error) * (Spindle rotation to Z axis movement ratio) - (Z axis feedback error).
2. Only works for G33/G21/G78 blocks; the value only updates when Z axis in constant speed section.
3. The smaller the value is, the better the Z axis to spindle tracking and the threading quality.
4. When consecutive G21 blocks are executed, the value will be set 0 at first G21 block; will be set 0 when G87 block executed, but will keep updating maximum error value when G33 executed.
5. Available version starts from 10.116.16U, 10.116.24O.

[0324] : Number of interpolating serial blocks

[Definition] :

[Descriptions] :

1. When controller has enough performance, the value will stay constant.
2. The value may drop to 0 when machining start, machining ending or having low-performance.
3. When performance lowers, System Data 320 will first decrease down to 0 then System Data 324, and System Data 376 will +1.

[0325] : Time of previewed serial interpolation, unit μ s

[Definition] : The total time of all previewed blocks which have preliminary acceleration/deceleration profiling while system machining.

[Descriptions] :

1. The value increases when the machining start, and then decrease after acceleration/deceleration profiling finishes while System Data 326 value increases.
2. When performance lowers or the previewed blocks are about to finish, System Data 327 will first decrease to 0, then System Data 326, and finally System Data 325.

[0326] : Time of completed serial interpolation, unit μ s

[Definition] : The total time of all blocks which finished the acceleration/deceleration profiling while system machining

[Descriptions] :

1. System Data 325 increases first when the machining starts, then System Data 326 increases.
2. The value decreases after the acceleration/deceleration profiles were transformed into interpolation commands.
3. When performance lowers or the previewed blocks are about to finish, System Data 327 will first decrease to 0, then System Data 326, and finally System Data 325.

[0327] : Interpolation command remaining time, unit ms

[Definition] : The total time of the pending interpolation commands in system machining.

[Descriptions] :

1. System Data 325 increases first when the machining starts, then System Data 327 increases.
2. System Data 326 usually decreases when System Data 327 increases.
3. When performance lowers or the previewed blocks are about to finish, System Data 327 will first decrease to 0, then System Data 326, and finally System Data 325.

[0328] : Combined speed

[Definition] : The actual combined feedrate command value, unit LIU/min

[Descriptions] :

1. The PLC axis is excluded from combined feedrate calculation.
2. The value is the same as R700.

[0329] : Cycle time

[Definition] : Shows the current machining time

[Descriptions] :

1. Displaying format : hour-minute (the 3rd & 4th digit from last) - second (the last 2 digits).
2. Example : When value is 12345, it means the machining time has been : 1 hour-23 minutes-45 seconds

[0330] : Interpolation command interrupted times

[Definition] : If the command was interrupted during interpolation, the accumulation count of all paths +1.

[Descriptions] :

1. The CNC and PLC axis groups (paths) will vibrate with the machine if this happens.

[0331] : Acquired program memory area number

[Definition] : The number of acquired memory area when system executes the machining.

[Descriptions] :

1. Records the current machining status, being cleared after reset.

[0332] : Idle program memory area number

[Definition] : The number of idle memory area when system executes the machining.

[Descriptions] :

1. Records the current machining status, being cleared after reset.

[0333] : Ratio of coarse/fine interpolation

[Descriptions] :

1. Removed after version 10.116.10A.

[0334] : Motion planning command error times (Internal Test)

[Definition] : The number of times that motion planning command error occurred when system is machining.

[Descriptions] :

1. The value should be 0 normally.
2. Motion planning command error check only activated while running certain scripts of Auto-Test. If there is an error occurred, add one to the value.

[0335] : FRAM error counter

[Descriptions] :

1. Removed after version 10.114.38C, 10.115.43C.

[0336] : Axis board data exchange time

[Definition] : The average data exchange time between the controller and its slave device, unit: us.

[Descriptions] :

1. The value shouldn't be higher than Pr3203 * interpolation time, or it can cause command error. Please refer to controller parameter Pr3203 for further descriptions.
2. If the abnormal axis board data exchange time is within 5000 (5 ms), the system will activates the substitute interpolation as a compensation, or it can cause severe command error.
3. For further descriptions of substitute interpolation, please refer to System Data 0378 Substitute interpolation execution times
4. For further descriptions of interpolation time, please refer to controller parameter Pr3203 and System Data 4 Motion interpolation time.

[0337] : Axis board data exchange time (MAX)

[Definition] : The longest axis board data exchange time the system has ever recorded, unit: us.

[Descriptions] :

1. If the value is higher than controller parameter Pr3203 * interpolation time, it means the command error happened.
2. For further descriptions of interpolation time, please refer to controller parameter Pr3203 and System Data 4 Motion interpolation time.

[0338] : Fine interpolation calculation time

[Descriptions] :

1. Removed after version 10.116.10A.

[0339] : Fine interpolation calculation time (MAX)

[Descriptions] :

1. Removed after version 10.116.10A.

[0340] : MatrixIO scanning time

[Definition] : The average MatrixIO scanning time, unit: us.

[0341] : MatrixIO scanning time (MAX)

[Definition] : The longest MatrixIO scanning time the system has ever recorded, unit: us.

[0342] : Interpolation calculation time

[Definition] : The average time system used to calculate the interpolation commands, unit: us.

[Descriptions] :

1. The variable shouldn't be higher than controller parameter Pr3203 * interpolation time, or it can cause interpolation timeout and lead to command error.
2. For further descriptions of interpolation time, please refer to controller parameter Pr3203 and System Data 4 Motion interpolation time.

[0343] : Interpolation calculation time (MAX)

[Definition] : The longest interpolation calculation time the system has ever recorded, unit: us.

[Descriptions] :

1. If the variable is higher than controller parameter Pr3203 * interpolation time, it means the interpolation timeout had happened and can lead to command error.
2. For further descriptions of interpolation time, please refer to controller parameter Pr3203 and System Data 4 Motion interpolation time.

[0344] : Trajectory Plan calculation time

[Definition] : The average time system used calculate the Trajectory Plan, unit: us.

[0345] : Trajectory Plan calculation time(MAX)

[Definition] : The longest Trajectory Plan calculating time the system has ever recorded, unit: us.

[0346] : IO scanning time

[Definition] : The average time kernel used to read the I/O changes on the I/O board, unit: us.

[Descriptions] :

1. The variable shouldn't be higher than controller parameter Pr3202 *I/O scanning time, or it can cause IO update lag. Please refer to controller parameter Pr3202 for further descriptions.

[0347] : IO scanning time (MAX)

[Definition] : The longest IO scanning time the system has ever recorded, unit: us.

[Descriptions] :

1. If the variable is higher than controller parameter Pr3202 *I/O scanning time, it means the IO update lag had happened.

[0348] : PLC scanning time

[Definition] : The average PLC scanning time, unit: us.

[Descriptions] :

1. The value shouldn't exceed parameter Pr3204 PLC scanning time, or it might cause PLC update lag.
2. For further descriptions of interpolation time, please refer to controller parameter Pr3204 and System Data 5 PLC scanning time.

[0349] : PLC scanning time (MAX)

[Definition] : The longest PLC scanning time the system has ever recorded, unit: us.

[Descriptions] :

1. If the value is higher than controller parameter Pr3204 *PLC scanning time, it means the PLC update lag had happened.
2. For further descriptions of interpolation time, please refer to controller parameter Pr3204 and System Data 5 PLC scanning time.

[0350] : Motion Plan calculation time

[Definition] : The average time system used to calculate the Motion Plan (velocity profile), unit: us.

[0351] : Motion Plan calculation time (MAX)

[Definition] : The longest Motion Plan calculation time the system has ever recorded, unit: us.

[0352~0367] : 1st ~16th axis estimated actual axis servo loop gain (Kp)

[Definition] : The Kp value estimated by following error and the current speed.

[Descriptions] :

1. The estimated Kp value = Speed feedback / following error (1/sec)
2. Pr181~196 is the actual Kp setting value, and System Data 352~367 here are the estimated Kp value.
3. The estimated Kp value is 0 when the following error is 0.

[0368~0373] : Maximum feeding axis tracking spindle error when tapping (linear direction)

[Definition] : The maximum error when the feeding axis tracking spindle in the tapping process, unit: BLU

[Descriptions] :

1. The deviation between maximum and minimum feeding axis spindle following error (straight direction) in the tapping process should be smaller, the smaller the deviation is, the better the synchronous tapping precision is.
2. Available version: 10.114.16~10.116.5

[0374] : Times of axis board data exchange timeout (exceeds 2x interpolation)

[Definition] : The variable will +1 if the axis board exchange time is accidentally too long and exceeds twice the interpolation time while running the system, but not definitely affects the machining effects.

[Descriptions] :

1. Axis board data exchange timeout, it might make the YASKAWA/SYNTEC serial drivers send AE50 alarm.
2. Not definitely affects the machining surface effects, the variable is used to support AE50 alarm diagnose.

[0375] : BPT block number limit

[Definition] : If executing massive high speed short blocks while executing, system will automatically arrange blocks to protect system stability. The value shows the limit block number.

[Descriptions] :

1. If the machining program is too strict, the controller will plan and send a more steady feedrate if it is impossible to plan according to the input feedrate.
2. The increase of the system data does not affect the machining rate if it is impossible to plan according to the input feedrate.
2. The increase of the system data does not affect the machining performance .

[0376] : Motion planning low performance times

[Definition] : When the controller is in motion planning, if deceleration happened due to low-performance, the system data will +1.

[Descriptions] :

1. The variable increases because of severe low-performance of the system, please check if there is any high load customization or plug-ins.
2. When low performance happened, the machining decelerates because of the system self-protection. Can be avoided by reducing the command feedrate.
3. The value is normal to increase when the Cycle Start just begins. If it increases during the machining then it means the lack of performance.
4. If there is no fluctuation in the machining time, then no need to refer to this System Data.

[0377] : Playing mode command error times

[Definition] : If the controller can't access the correct playing command in the playing process, the system data will +1.

[Descriptions] :

1. The variable only works under the playing mode.

[0378] : Substitute interpolation execution times

[Definition] : If the axis board data exchange time is too long, the system will activates the substitute interpolation to avoid the M2/M3/EtherCAT serial drivers sending synchronization error alarms, and the System Data will +1.

[Descriptions] :

1. The system data should be 0 under normal conditions, non-zero means the substitute interpolation had happened.
2. Substitute interpolation might be caused by low-performance, long machining time or system timeout when using dipole.
3. The substitute interpolation is a predicted contour, it might slightly affects the machining quality.
4. To avoid mechanical conflict, the substitute interpolation can only be executed for 10 millisecond, the driver will still send the alarm if exceeded.

[0379] : Substitute interpolation status

[Definition] : To determine if the controller is activating the substitute interpolation function.

[Descriptions] :

1. -1 : Not supporting, 0 : Not activated, 1 : Activated

[0380] : Times of axis board data exchange

[Definition] : The variable +1 every time the communication module executes.

[Descriptions] :

1. If hardware interrupt and the address of the axis board are both correct, the System Data will add up normally; if not adding up normally, then it means there may be hardware problems or the interrupt and axis board address are incorrect. System will send the OP-001 "axis board setup error" alarm.
2. The adding up speed equals to the execution times of the communication module in a unit time, it's related to Pr3203 setups.
3. The actual value of Pr3203 is related to hardware interrupt clock rate, the actual value of SUPER controller is about $Pr3203/1000*983$; 10 series and EZ series controllers are about $Pr3203/1000*819$; other series controllers are the same as Pr3203.

[0381] : Hardware interrupt status

[Definition] : Reads the output logic level of external hardware interrupt.

[Descriptions] :

1. -1 : Not support reading, 0 : Logic 0, 1 : Logic 1
2. Because the interrupt changing frequency is far higher than the HMI update frequency, the system data shows 0 in steady state if supports reading.

[0382] : System interrupt status

[Definition] : Reads the received logic level of CPU interrupt.

[Descriptions] :

1. -1 : Not support reading, 0 : Logic 0, 1 : Logic 1
2. Because the interrupt changing frequency is far higher than the HMI update frequency, the system data shows 0 in steady state if supports reading.

[0383] : Software interrupt status

[Definition] : Records the current logic level of software interrupt.

[Descriptions] :

1. -1 : Not support reading, 0 : Logic 0, 1 : Logic 1
2. Because the interrupt changing frequency is far higher than the HMI update frequency, the system data shows 0 in steady state if supports recording.

[0384~0387] : The 4th/5th/6th/7th MPG absolute position counter

[Definition] : The current pulse accumulation value (after frequency quadrupling) input of each MPG.

[Descriptions] :

This variable can be used to check whether input signal pulse of MPG is normal. If this value is abnormal after one turn, please check setting of Pr2024~, Pr2044~and Pr2054~ or wiring of MPG (loose connector, MPG power, A+, A-, B+, B- signal...)

[0388~0389]: Reserved

[Definition] reserved

[Description] reserved

[0390] : Number of times that motion planning block exceeded capacity limitation

[Definition] : When blocks that controller have interpreted are out of capacity, the debug value will add one.

[Description] :

1. There are limits for blocks interpreted by the controller. When too many blocks for the controller to process, it might be out of capacity.
2. There is a protection by software to avoid circumstance that the controller is unable to interpret any blocks. The system will stop interpretation if capacity is full, so that exceeding capacity limitation should never happen.
3. The value should be zero normally. If not, system alarm OP-001 or system crash may occur.

[0391] : Internal process execution times

[Definition] : The controller software background execution times, the data +1 after every execution.

[Descriptions] :

1. The process that no need to be executed immediately will be executed in the controller software background.
2. The internal process execution times will be lower when the system is busier.

[0392] : System interpolation data accessible space insufficient times

[Definition] : If there are excessive function data being sent out during interpolation and exceeds the accessible space, the system will ignore the exceeded function data and system data +1.

[Descriptions] :

1. The system data should be 0 under normal situation, if it's not 0 means the insufficient of system accessible space during interpolation.
2. The space insufficient may be caused by the excessive function data being sent out during interpolation.
3. The situation might lead to the incorrect execution of axis function, ex: Backlash changing error.

[0393] : Wireless handheld pendant Key Lost times

[Definition] : Wireless handheld pendant Key Lost times

[Descriptions] :

1. The wireless receiver doesn't receive the correct handheld pendant key packet.

[0394] : Wireless handheld pendant CRC packet error times

[Definition] : The wireless handheld pendant CRC packet error times.

[Descriptions] :

1. The wireless receiver being interfered by noise and lead to CRC packet error.

[0395] : Customized PLC scanning time

[Definition] : The average spent time of customized PLC scanning, unit: us.

[Descriptions] :

1. The data only works when using customized PLC functions.

[0396] : Customized PLC scanning time (MAX)

[Definition] : The maximum spent time of customized PLC scanning, unit: us.

[Descriptions] :

1. The data only works when using customized PLC functions.

[0397] : Customized PLC fast scanning time

[Definition] : The average spent time of customized PLC fast scanning, unit: us.

[Descriptions] :

1. The data only works when using customized PLC functions.

[0398] : Customized PLC fast scanning time (MAX)

[Definition] : The maximum spent time of customized PLC fast scanning, unit: us.

[Descriptions] :

1. The data only works when using customized PLC functions.

[0399] : Customized PLC version number

[Definition] : Customized PLC version number.

[Descriptions] :

1. The data only works when using customized PLC functions.

SYNTEC

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| | | | | | | | | | |
|-----|--|-----|--|-----|--|-----|--|-----|--|
| 400 | 1 st spindle machine angle | 416 | 2 nd spindle machine angle | 432 | 3 rd spindle machine angle | 448 | 4 th spindle machine angle | 464 | 5 th spindle machine angle |
| 401 | 1 st spindle IGBT temperature | 417 | 2 nd spindle IGBT temperature | 433 | 3 rd spindle IGBT temperature | 449 | 4 th spindle IGBT temperature | 465 | 5 th spindle IGBT temperature |
| 402 | 1 st spindle DC bus voltage | 418 | 2 nd spindle DC bus voltage | 434 | 3 rd spindle DC bus voltage | 450 | 4 th spindle DC bus voltage | 466 | 5 th spindle DC bus voltage |
| 403 | 1 st spindle serial encoder CRC error times (hardware) | 419 | 2 nd spindle serial encoder CRC error times (hardware) | 435 | 3 rd spindle serial encoder CRC error times (hardware) | 451 | 4 th spindle serial encoder CRC error times (hardware) | 467 | 5 th spindle serial encoder CRC error times (hardware) |
| 404 | 1 st spindle drive KTY84 temperature | 420 | 2 nd spindle drive KTY84 temperature | 436 | 3 rd spindle drive KTY84 temperature | 452 | 4 th spindle drive KTY84 temperature | 468 | 5 th spindle drive KTY84 temperature |
| 405 | 1 st spindle second serial encoder CRC error times (hardware) | 421 | 2 nd spindle second serial encoder CRC error times (hardware) | 437 | 3 rd spindle second serial encoder CRC error times (hardware) | 453 | 4 th spindle second serial encoder CRC error times (hardware) | 469 | 5 th spindle second serial encoder CRC error times (hardware) |
| 406 | 1 st spindle first feedback SYNTEC encoder internal KTY84 temperature | 422 | 2 nd spindle first feedback SYNTEC encoder internal KTY84 temperature | 438 | 3 rd spindle first feedback SYNTEC encoder internal KTY84 temperature | 454 | 4 th spindle first feedback SYNTEC encoder internal KTY84 temperature | 470 | 5 th spindle first feedback SYNTEC encoder internal KTY84 temperature |
| 407 | 1 st spindle first feedback SYNTEC encoder external KTY84 temperature | 423 | 2 nd spindle first feedback SYNTEC encoder external KTY84 temperature | 439 | 3 rd spindle first feedback SYNTEC encoder external KTY84 temperature | 455 | 4 th spindle first feedback SYNTEC encoder external KTY84 temperature | 471 | 5 th spindle first feedback SYNTEC encoder external KTY84 temperature |

| | | | | | | | | | |
|-------------|---|-------------|---|-------------|---|-------------|---|-------------|---|
| 4 0 8 | 1 st spindle encoder command error times | 4 2 4 | 2 nd spindle encoder command error times | 4 4 0 | 3 rd spindle encoder command error times | 4 5 6 | 4 th spindle encoder command error times | 4 7 2 | 5 th spindle encoder command error times |
| 4 0 9 | 1 st spindle serial encoder timeout error times | 4 2 5 | 2 nd spindle serial encoder timeout error times | 4 4 1 | 3 rd spindle serial encoder timeout error times | 4 5 7 | 4 th spindle serial encoder timeout error times | 4 7 3 | 5 th spindle serial encoder timeout error times |
| 4 1 0 | (Reserved) | 4 2 6 | (Reserved) | 4 4 2 | (Reserved) | 4 5 8 | (Reserved) | 4 7 4 | (Reserved) |
| 4 1 1 | (Reserved) | 4 2 7 | (Reserved) | 4 4 3 | (Reserved) | 4 5 9 | (Reserved) | 4 7 5 | (Reserved) |
| 4 1 2 | (Reserved) | 4 2 8 | (Reserved) | 4 4 4 | (Reserved) | 4 6 0 | (Reserved) | 4 7 6 | (Reserved) |
| 4 1 3 | (Reserved) | 4 2 9 | (Reserved) | 4 4 5 | (Reserved) | 4 6 1 | (Reserved) | 4 7 7 | (Reserved) |
| 4 1 4 | (Reserved) | 4 3 0 | (Reserved) | 4 4 6 | (Reserved) | 4 6 2 | (Reserved) | 4 7 8 | (Reserved) |
| 4 1 5 | (Reserved) | 4 3 1 | (Reserved) | 4 4 7 | (Reserved) | 4 6 3 | (Reserved) | 4 7 9 | (Reserved) |

[Debug Page 6] : System Data on this page only apply to SYNTEC serial spindle, and drive firmware version must be 1.2.28 or newer, and the controller version must be newer than 10.116.10H or 116.16.

[400~] : Machine angle

[Unit] : 0.0001 Rev

[Descriptions] : Corresponds to drive status variable D1-04

1. The absolute position relates to the Z index of encoder. The position of the Z index is 0 and divides 1 rev into 10000 increments. The System Data resets 0 from 9999 after 1 revolution and counts continuously. For example: If the machine angle value is 4791 means 0.4791 rev, and it equals to $360 \text{ deg} \times 0.4791 \text{ rev} = 172.476 \text{ degree}$.
2. To troubleshoot encoder feedback problems, rotate the motor manually and check if the machine angle changes following the motor rotation.
3. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[401~] : IGBT temperature

[Unit] : 0.1 °C

[Descriptions] : Corresponds to drive status variable D1-23

1. Shows the current IGBT temperature, check if the driver is overheated. Alarm AL-10 will be triggered the value exceeds 90°C, please troubleshoot according to the manual instructions.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[402~] : DC bus voltage

[Unit] : 0.1 V_{rms}

[Descriptions] : Corresponds to driver status variable D1-24

1. Checks the driver input voltage. When the driver is connected to a 220V, 3-phase power supply, the data value should be around 2200. Alarm AL-13 will be triggered if the voltage is lower than 70% of the rated value, please check the power supply.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[403~] : Serial encoder CRC error times (hardware)

[Unit] : Count

[Descriptions] : Corresponds to driver status variable D1-28.

1. Checks if there are CRC errors in the serial packets returned to drive from the first encoder, if there is an error then +1. Alarm AL-48 will be triggered if there are 3 error packets in a row, please check the groundings of the machine, drive, and encoder.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[404~] : Driver KTY84 sensor temperature

[Unit] : 0.1°C

[Descriptions] : Corresponds to driver status variable D1-41.

1. The data value is the KTY84 sensor temperature, can use drive parameter P1-31 to decide the threshold of alarm AL-11. Please check P1-31 or troubleshoot according to the manual instructions when AL-11 is triggered.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[405~] : Second serial encoder CRC error times (hardware)

[Unit] : Count

[Descriptions] : Corresponds to driver status variable D1-42.

1. Checks if there are CRC errors in the serial packets returned to drive from the second encoder, if there is an error then +1. Alarm AL-49 will be triggered if there are 3 error packets in a row, please check the groundings of the machine, drive, and encoder.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[406~] : First feedback SYNTEC encoder internal KTY84 sensor temperature

[Unit] : 0.1°C

[Descriptions] : Corresponds to driver status variable D1-50.

1. It's the internal KTY84 sensor temperature of the first feedback SYNTEC encoder, can use drive parameter P1-32 to decide the threshold of alarm AL-40. Please check P1-32 or troubleshoot according to the manual instructions when AL-40 is triggered.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[407~] : First feedback SYNTEC encoder external KTY84 sensor temperature

[Unit] : 0.1°C

[Descriptions] : Corresponds to driver status variable D1-51.

1. It's the external KTY84 sensor temperature of the first feedback SYNTEC encoder, can use drive parameter P1-33 to decide the threshold of alarm AL-41. Please check P1-33 or troubleshoot according to the manual instructions when AL-41 is triggered.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[408~] : Serial encoder command error times

[Unit] : Count

[Descriptions] : Corresponds to drive status variable D1-46.

1. Checks the correctness of the packet from drive sent to the encoder, the data value +1 if incorrect. Please check the groundings of the machine, drive, and encoder when this case happens.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[409~] : Serial encoder timeout error times

[Unit] : Count

[Descriptions] : Corresponds to driver status variable D1-47.

1. Determine encoder functionality by checking if the encoder responds in time after a command sent, the data value +1 if the driver and encoder disconnect. Alarm AL-48 will be triggered if disconnection happens 3 times in a row, please check the groundings of the machine, drive, and encoder.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

A large, light gray watermark of the SYNTEC logo is centered on the page. The logo consists of the word "SYNTEC" in a bold, sans-serif font. The letters are slightly spaced out and have a subtle gradient, making them appear as a background watermark.

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| | | | | | | | | | |
|-----|--|-----|--|-----|--|-----|--|-----|---|
| 480 | 6 th spindle machine angle | 496 | 7 th spindle machine angle | 512 | 8 th spindle machine angle | 528 | 6 th spindle machine angle | 544 | 10 th spindle machine angle |
| 481 | 6 th spindle IGBT temperature | 497 | 7 th spindle IGBT temperature | 513 | 8 th spindle IGBT temperature | 529 | 6 th spindle IGBT temperature | 545 | 10 th spindle IGBT temperature |
| 482 | 6 th spindle DC bus voltage | 498 | 7 th spindle DC bus voltage | 514 | 8 th spindle DC bus voltage | 530 | 9 th spindle DC bus voltage | 546 | 10 th spindle DC bus voltage |
| 483 | 6 th spindle serial encoder CRC error times (hardware) | 499 | 7 th spindle serial encoder CRC error times (hardware) | 515 | 8 th spindle serial encoder CRC error times (hardware) | 531 | 9 th spindle serial encoder CRC error times (hardware) | 547 | 10 th spindle serial encoder CRC error times (hardware) |
| 484 | 6 th spindle driver KTY84 temperature | 500 | 7 th spindle driver KTY84 temperature | 516 | 8 th spindle driver KTY84 temperature | 532 | 9 th spindle driver KTY84 temperature | 548 | 10 th spindle driver KTY84 temperature |
| 485 | 6 th spindle second serial encoder CRC error times (hardware) | 501 | 7 th spindle second serial encoder CRC error times (hardware) | 517 | 8 th spindle second serial encoder CRC error times (hardware) | 533 | 9 th spindle second serial encoder CRC error times (hardware) | 549 | 10 th spindle second serial encoder CRC error times (hardware) |
| 486 | 6 th spindle first feedback SYNTEC encoder internal KTY84 temperature | 502 | 7 th spindle first feedback SYNTEC encoder internal KTY84 temperature | 518 | 8 th spindle first feedback SYNTEC encoder internal KTY84 temperature | 534 | 9 th spindle first feedback SYNTEC encoder internal KTY84 temperature | 550 | 10 th spindle first feedback SYNTEC encoder internal KTY84 temperature |

| | | | | | | | | | |
|-----|--|-----|--|-----|--|-----|--|-----|---|
| 487 | 6 th spindle first feedback SYNTEC encoder external KTY84 temperature | 503 | 7 th spindle first feedback SYNTEC encoder external KTY84 temperature | 519 | 8 th spindle first feedback SYNTEC encoder external KTY84 temperature | 535 | 9 th spindle first feedback SYNTEC encoder external KTY84 temperature | 551 | 10 th spindle first feedback SYNTEC encoder external KTY84 temperature |
| 488 | 6 th spindle encoder command error times | 504 | 7 th spindle encoder command error times | 520 | 8 th spindle encoder command error times | 536 | 9 th spindle encoder command error times | 552 | 10 th spindle encoder command error times |
| 489 | 6 th spindle encoder timeout error times | 505 | 7 th spindle encoder timeout error times | 521 | 8 th spindle encoder timeout error times | 537 | 9 th spindle encoder timeout error times | 553 | 10 th spindle encoder timeout error times |
| 490 | (Reserved) | 506 | (Reserved) | 522 | (Reserved) | 538 | (Reserved) | 554 | (Reserved) |
| 491 | (Reserved) | 507 | (Reserved) | 523 | (Reserved) | 539 | (Reserved) | 555 | (Reserved) |
| 492 | (Reserved) | 508 | (Reserved) | 524 | (Reserved) | 540 | (Reserved) | 556 | (Reserved) |
| 493 | (Reserved) | 509 | (Reserved) | 525 | (Reserved) | 541 | (Reserved) | 557 | (Reserved) |
| 494 | (Reserved) | 510 | (Reserved) | 526 | (Reserved) | 542 | (Reserved) | 558 | (Reserved) |
| 495 | (Reserved) | 511 | (Reserved) | 527 | (Reserved) | 543 | (Reserved) | 559 | (Reserved) |

[Debug Page 7] : System Data on this page only apply to SYNTEC serial spindle, and drive firmware version must be 1.2.28 or newer, and the controller version must be newer than 10.116.10H or 116.16.

[480~] : Machine angle

[Unit] : 0.0001Rev

[Descriptions] : Corresponds to driver status variable D1-04.

1. The absolute position relates to the Z index of encoder. The position of the Z index is 0 and divides 1 rev into 10000 increments. The System Data resets 0 from 9999 after 1 revolution and counts continuously. For example: If the machine angle value is 4791 means 0.4791 rev, and it equals to $360 \text{ deg} \times 0.4791 \text{ rev} = 172.476 \text{ degree}$.
2. To troubleshoot encoder feedback problems, rotate the motor manually and check if the machine angle changes following the motor rotation.
3. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[481~] : IGBT temperature

[Unit] : 0.1 °C

[Descriptions] : Corresponds to driver status variable D1-23.

1. Shows the current IGBT temperature, check if the driver is overheated. Alarm AL-10 will be triggered the value exceeds 90°C, please troubleshoot according to the manual instructions.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[482~] : DC bus voltage

[Unit] : 0.1 V_{rms}

[Descriptions] : Corresponds to driver status variable D1-24.

1. Checks the driver input voltage. When the driver is connected to a 220V, 3-phase power supply, the data value should be around 2200. Alarm AL-13 will be triggered if the voltage is lower than 70% of the rated value, please check the power supply.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[483~] : Serial encoder CRC error times (hardware)

[Unit] : Count

[Descriptions] : Corresponds to driver status variable D1-28.

1. Checks if there are CRC errors in the serial packets returned to drive from the first encoder, if there is an error then +1. Alarm AL-48 will be triggered if there are 3 error packets in a row, please check the groundings of the machine, drive, and encoder.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[484~] : Driver KTY84 sensor temperature

[Unit] : 0.1°C

[Descriptions] : Corresponds to driver status variable D1-41.

1. The data value is the KTY84 sensor temperature, can use drive parameter P1-31 to decide the threshold of alarm AL-11. Please check P1-31 or troubleshoot according to the manual instructions when AL-11 is triggered.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[485~] : Second serial encoder CRC error times (hardware)

[Unit] : Count

[Descriptions] : Corresponds to driver status variable D1-42.

1. Checks if there are CRC errors in the serial packets returned to drive from the second encoder, if there is an error then +1. Alarm AL-49 will be triggered if there are 3 error packets in a row, please check the groundings of the machine, drive, and encoder.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[486~] : First feedback SYNTEC encoder internal KTY84 sensor temperature

[Unit] : 0.1°C

[Descriptions] : Corresponds to driver status variable D1-50.

1. It's the internal KTY84 sensor temperature of the first feedback SYNTEC encoder, can use drive parameter P1-32 to decide the threshold of alarm AL-40. Please check P1-32 or troubleshoot according to the manual instructions when AL-40 is triggered.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[487~] : First feedback SYNTEC encoder external KTY84 sensor temperature

[Unit] : 0.1°C

[Descriptions] : Corresponds to driver status variable D1-51.

1. It's the external KTY84 sensor temperature of the first feedback SYNTEC encoder, can use drive parameter P1-33 to decide the threshold of alarm AL-41. Please check P1-33 or troubleshoot according to the manual instructions when AL-41 is triggered.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[488~] : Serial encoder command error times

[Unit] : Count

[Descriptions] : Corresponds to driver status variable D1-46.

1. Checks the correctness of the packet from drive sent to the encoder, the data value +1 if incorrect. Please check the groundings of the machine, drive, and encoder when this case happens.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.

[489~] : Serial encoder timeout error times

[Unit] : Count

[Descriptions] : Corresponds to driver status variable D1-47.

1. Determine encoder functionality by checking if the encoder responds in time after a command sent, the data value +1 if the driver and encoder disconnect. Alarm AL-48 will be triggered if disconnection happens 3 times in a row, please check the groundings of the machine, drive, and encoder.
2. Supports only SYNTEC M2 Spindle and SYNTEC M2 II Spindle.



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| | | | | | | | | | |
|-----|--|-----|--|-----|---|-----|--|-----|--|
| 560 | 17 th axis double loop position error | 576 | 17 th axis absolute position feedback | 592 | 17 th axis second absolute position feedback | 608 | 17 th axis machine coordinate | 624 | 17 th axis second feedback position index counter |
| 561 | 18 th axis double loop position error | 577 | 18 th axis absolute position feedback | 593 | 18 th axis second absolute position feedback | 609 | 18 th axis machine coordinate | 625 | 18 th axis second feedback position index counter |
| 562 | (Reserved) | 578 | (Reserved) | 594 | (Reserved) | 610 | (Reserved) | 626 | (Reserved) |
| 563 | (Reserved) | 579 | (Reserved) | 595 | (Reserved) | 611 | (Reserved) | 627 | (Reserved) |
| 564 | (Reserved) | 580 | (Reserved) | 596 | (Reserved) | 612 | (Reserved) | 628 | (Reserved) |
| 565 | (Reserved) | 581 | (Reserved) | 597 | (Reserved) | 613 | (Reserved) | 629 | (Reserved) |
| 566 | (Reserved) | 582 | (Reserved) | 598 | (Reserved) | 614 | (Reserved) | 630 | (Reserved) |
| 567 | (Reserved) | 583 | (Reserved) | 599 | (Reserved) | 615 | (Reserved) | 631 | (Reserved) |
| 568 | (Reserved) | 584 | (Reserved) | 600 | (Reserved) | 616 | (Reserved) | 632 | (Reserved) |
| 569 | (Reserved) | 585 | (Reserved) | 601 | (Reserved) | 617 | (Reserved) | 633 | (Reserved) |
| 570 | (Reserved) | 586 | (Reserved) | 602 | (Reserved) | 618 | (Reserved) | 634 | (Reserved) |
| 571 | (Reserved) | 587 | (Reserved) | 603 | (Reserved) | 619 | (Reserved) | 635 | (Reserved) |
| 572 | (Reserved) | 588 | (Reserved) | 604 | (Reserved) | 620 | (Reserved) | 636 | (Reserved) |

| | | | | | | | | | |
|---------|------------|---------|------------|---------|------------|---------|------------|---------|------------|
| 57 3 | (Reserved) | 58 9 | (Reserved) | 60 5 | (Reserved) | 62 1 | (Reserved) | 63 7 | (Reserved) |
| 57 4 | (Reserved) | 59 0 | (Reserved) | 60 6 | (Reserved) | 62 2 | (Reserved) | 63 8 | (Reserved) |
| 57 5 | (Reserved) | 59 1 | (Reserved) | 60 7 | (Reserved) | 62 3 | (Reserved) | 63 9 | (Reserved) |

[Debug Page 8] : For the system data on this page, the controller version must be 10.118.3 or newer.

[0560~0561] : 17th ~ 18th axis double loop position feedback error

[Definition] : Difference value between feedback of motor encoder & optical scale encoder. Calculated as: "Double loop Position Error - System Data 080~095" = "Absolute position feedback - System Data 096~111" - "Second absolute position feedback - System Data 112~127". Unit: BLU.

[Descriptions] :

1. The value reflects the mechanical error (backlash or slip) between motor and linear encoder to mismatch.
2. When the axis is static, the error is called static error. If it is greater than Pr1421~, alarm MOT-31 "Excess static double loop position error" will appear.
3. When axis is in motion, the error is called dynamic error. If it is greater than Pr3817, alarm MOT-24 "Severe double loop position error" will appear.
4. If this data increases abnormally with machine movement before home search, please check linear encoder resolution, or check its signal order (A+, A-, B+, B-).

[0576~0577] : 17th ~ 18th axis absolute position feedback

[Definition] : Axis motors position feedback, unit: BLU

[Descriptions] :

1. The value will be set to zero after finishing the first home search for non-absolute encoder.

[0592~0593] : 17th ~ 18th axis second absolute position feedback

[Definition] : The position feedback of axis linear scales, unit: BLU

[Descriptions] :

1. The value will be set to zero after finishing the first home search for non-absolute encoder.

[0608~0609] : 17th ~ 18th axis machine coordinate

[Definition] : Display of each axis machine coordinate, unit: BLU

[Descriptions] :

1. Use to check the correctness of machine's position.
2. The value will be set to zero after finishing the first home search for non-absolute encoder.

[0624~0625] : 17th ~ 18th axis second feedback position index counter

[Definition] : When index signal of second feedback of each axis is generated, hardware will latch the current number of pulse.

[Descriptions] :

1. Theoretically, the value change increment in the same direction must equal to Pr261~ * Pr301. If not, it means cables have loss pulse, please check the feedback signal (A+,A-,B+,B-,C+,C-) to confirm it is loose cable or

noise interference.

2. This variable will be set to zero after finishing the first home search for non-absolute encoder.



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| | | | | | | | | | |
|-------------|---|-------------|---|-------------|--|-------------|--|-------------|--|
| 6 4 0 | 17 th axis following error | 6 5 6 | 17 th axis absolute position feedback | 6 7 2 | 17 th axis absolute position command | 6 8 8 | 17 th axis reasonable following error | 7 0 4 | 17 th axis maximum allowed following error |
| 6 4 1 | 18 th axis following error | 6 5 7 | 18 th axis absolute position feedback | 6 7 3 | 18 th axis absolute position command | 6 8 9 | 18 th axis legitimate following error | 7 0 5 | 18 th axis maximum allowed following error |
| 6 4 2 | (Reserved) | 6 5 8 | (Reserved) | 6 7 4 | (Reserved) | 6 9 0 | (Reserved) | 7 0 6 | (Reserved) |
| 6 4 3 | (Reserved) | 6 5 9 | (Reserved) | 6 7 5 | (Reserved) | 6 9 1 | (Reserved) | 7 0 7 | (Reserved) |
| 6 4 4 | (Reserved) | 6 6 0 | (Reserved) | 6 7 6 | (Reserved) | 6 9 2 | (Reserved) | 7 0 8 | (Reserved) |
| 6 4 5 | (Reserved) | 6 6 1 | (Reserved) | 6 7 7 | (Reserved) | 6 9 3 | (Reserved) | 7 0 9 | (Reserved) |
| 6 4 6 | (Reserved) | 6 6 2 | (Reserved) | 6 7 8 | (Reserved) | 6 9 4 | (Reserved) | 7 1 0 | (Reserved) |
| 6 4 7 | (Reserved) | 6 6 3 | (Reserved) | 6 7 9 | (Reserved) | 6 9 5 | (Reserved) | 7 1 1 | (Reserved) |
| 6 4 8 | (Reserved) | 6 6 4 | (Reserved) | 6 8 0 | (Reserved) | 6 9 6 | (Reserved) | 7 1 2 | (Reserved) |
| 6 4 9 | (Reserved) | 6 6 5 | (Reserved) | 6 8 1 | (Reserved) | 6 9 7 | (Reserved) | 7 1 3 | (Reserved) |

| | | | | | | | | | |
|-------------|------------|-------------|------------|-------------|------------|-------------|------------|-------------|------------|
| 6 5 0 | (Reserved) | 6 6 6 | (Reserved) | 6 8 2 | (Reserved) | 6 9 8 | (Reserved) | 7 1 4 | (Reserved) |
| 6 5 1 | (Reserved) | 6 6 7 | (Reserved) | 6 8 3 | (Reserved) | 6 9 9 | (Reserved) | 7 1 5 | (Reserved) |
| 6 5 2 | (Reserved) | 6 6 8 | (Reserved) | 6 8 4 | (Reserved) | 7 0 0 | (Reserved) | 7 1 6 | (Reserved) |
| 6 5 3 | (Reserved) | 6 6 9 | (Reserved) | 6 8 5 | (Reserved) | 7 0 1 | (Reserved) | 7 1 7 | (Reserved) |
| 6 5 4 | (Reserved) | 6 7 0 | (Reserved) | 6 8 6 | (Reserved) | 7 0 2 | (Reserved) | 7 1 8 | (Reserved) |
| 6 5 5 | (Reserved) | 6 7 1 | (Reserved) | 6 8 7 | (Reserved) | 7 0 3 | (Reserved) | 7 1 9 | (Reserved) |

[Debug Page 9] : For the system data on this page, the controller version must be 10.118.3 or newer.

[0640~0641] : 17th ~ 18th axis following error

[Definition] : Axis position command and position feedback error value, calculation:

[Following error- System Data 160~175] = [Absolute position command - System Data 192~207] - [Absolute position feedback- System Data 176~191] , unit: BLU

[Descriptions] :

- 1.The value is the real time following error used to check motion lag of each axis.
- 2.For static axis, this error is called static error and should be very close to zero. If it is greater than Pr561~, alarm MOT-008 [Loss Pulse] will appear.
- 3.For dynamic axis, this error is called dynamic error and should be smaller than [Maximum allowed following error Value- System Data 016~019]. If not, alarm MOT-019 [following error exceed] or even MOT-023 [Fatal following error exceed] will appear.
- 4.When moving in constant speed, the variable should be close to [Reasonable following error Value- System Data 032~035], if not, please check if drive position loop gain and controller Pr181~ are the same; and drive's feed forward command or filter function are not disabled. Connection problem may be also a reason.

[0656~0657] : 17th ~ 18th axis absolute position feedback

[Definition] : Position feedback of axial motor, Unit: BLU

[Descriptions] :

- 1.The value will be set to zero after finishing the first home search for non-absolute encoder.

[0672~0673] : 17th ~ 18th axis absolute position command

[Definition] : The accumulated number of commands corresponds to each axis when the controller sends command to the axis board, unit: BLU

[Descriptions] :

- 1."X/Y/Z/C Axis following error- System Data 008~011" = "X/Y/Z/C Absolute Position Command- System Data 040~043" - "X/Y/Z/C Absolute Position Feedback- System Data 024~027".
- 2.This variable is the position command being sent out from the controller, it may not equal to [X/Y/Z/C axis machine coordinate- System Data 072~075] because it includes mechanical compensations (backlash, pitch, temperature, quad-peak).
- 3.The value will be set to zero after finishing the first home search for non-absolute encoder.

[0688~0689] : 17th ~ 18th axis reasonable following error

[Definition] : The reasonable position following error of each axis, calculation: Speed command(mm/min, deg/min)/60/Pr181~, unit: BLU.

[Descriptions] :

- 1.The variable shows the reasonable following error of each axis, it should be close to "Axis following error- System Data 640~641", if not, please make sure the driver position loop gain is the same as Pr181~ settings, driver feedforward or command filter function are not closed. Abnormal cable connection may also cause inconsistency.

[0704~0705] : 17th ~ 18th axis maximum allowed following error

[Definition] : The maximum allowed following error when the axis is moving.

[Descriptions] :

- 1.The theorem value is $\text{Max}(\text{Pr461}\sim, \text{Pr821}\sim)/\text{Pr181}\sim/60*1000$.
- 2.If "Following error- System Data 640~641" exceeds this data value, alarm MOT-019 "Excess following error" will appear.
- 3.If "following error- System Data 640~641" exceeds twice the data value, alarm MOT-023 "Severe Excess following error" will appear.

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| | | | | | | | | | |
|-------------|---------------------------------------|-------------|--|-------------|---|-------------|------------------------------------|-------------|--|
| 7 2 0 | 17 th axis following error | 7 3 6 | 17 th axis following error after feedforward compensation | 7 5 2 | 17 th axis servo loop DA value | 7 6 8 | 17 th axis offset limit | 7 8 4 | 17 th axis position index counter |
| 7 2 1 | 18 th axis following error | 7 3 7 | 18 th axis following error after feedforward compensation | 7 5 3 | 18 th axis servo loop DA value | 7 6 9 | 18 th axis offset limit | 7 8 5 | 18 th axis position index counter |
| 7 2 2 | (Reserved) | 7 3 8 | (Reserved) | 7 5 4 | (Reserved) | 7 7 0 | (Reserved) | 7 8 6 | (Reserved) |
| 7 2 3 | (Reserved) | 7 3 9 | (Reserved) | 7 5 5 | (Reserved) | 7 7 1 | (Reserved) | 7 8 7 | (Reserved) |
| 7 2 4 | (Reserved) | 7 4 0 | (Reserved) | 7 5 6 | (Reserved) | 7 7 2 | (Reserved) | 7 8 8 | (Reserved) |
| 7 2 5 | (Reserved) | 7 4 1 | (Reserved) | 7 5 7 | (Reserved) | 7 7 3 | (Reserved) | 7 8 9 | (Reserved) |
| 7 2 6 | (Reserved) | 7 4 2 | (Reserved) | 7 5 8 | (Reserved) | 7 7 4 | (Reserved) | 7 9 0 | (Reserved) |
| 7 2 7 | (Reserved) | 7 4 3 | (Reserved) | 7 5 9 | (Reserved) | 7 7 5 | (Reserved) | 7 9 1 | (Reserved) |
| 7 2 8 | (Reserved) | 7 4 4 | (Reserved) | 7 6 0 | (Reserved) | 7 7 6 | (Reserved) | 7 9 2 | (Reserved) |
| 7 2 9 | (Reserved) | 7 4 5 | (Reserved) | 7 6 1 | (Reserved) | 7 7 7 | (Reserved) | 7 9 3 | (Reserved) |

| | | | | | | | | | |
|-------------|----------------|-------------|------------|-------------|------------|-------------|------------|-------------|------------|
| 7 3 0 | (Reserve d) | 7 4 6 | (Reserved) | 7 6 2 | (Reserved) | 7 7 8 | (Reserved) | 7 9 4 | (Reserved) |
| 7 3 1 | (Reserve d) | 7 4 7 | (Reserved) | 7 6 3 | (Reserved) | 7 7 9 | (Reserved) | 7 9 5 | (Reserved) |
| 7 3 2 | (Reserve d) | 7 4 8 | (Reserved) | 7 6 4 | (Reserved) | 7 8 0 | (Reserved) | 7 9 6 | (Reserved) |
| 7 3 3 | (Reserve d) | 7 4 9 | (Reserved) | 7 6 5 | (Reserved) | 7 8 1 | (Reserved) | 7 9 7 | (Reserved) |
| 7 3 4 | (Reserve d) | 7 5 0 | (Reserved) | 7 6 6 | (Reserved) | 7 8 2 | (Reserved) | 7 9 8 | (Reserved) |
| 7 3 5 | (Reserve d) | 7 5 1 | (Reserved) | 7 6 7 | (Reserved) | 7 8 3 | (Reserved) | 7 9 9 | (Reserved) |

[Debug Page 10] : For the system data on this page, the controller version must be 10.118.3 or newer.

[0720~0721] : 17th ~ 18th axis following error

[Definition] : Axis position command and position feedback error value, calculation:

[Following error- System Data 160~175] = [Absolute position command - System Data 192~207] - [Absolute position feedback- System Data 176~191] , unit: BLU

[Descriptions] :

- 1.The value is the real time following error used to check motion lag of each axis.
- 2.For static axis, this error is called static error and should be very close to zero. If it is greater than Pr561~, alarm MOT-008 [Loss Pulse] will appear.
- 3.For dynamic axis, this error is called dynamic error and should be smaller than [Maximum allowed following error Value- System Data 016~019]. If not, alarm MOT-019 [following error exceed] or even MOT-023 [Fatal following error exceed] will appear.
- 4.When moving in constant speed, the variable should be close to [Reasonable following error Value- System Data 032~035], if not, please check if drive position loop gain and controller Pr181~ are the same; and drive's feed forward command or filter function are not disabled. Connection problem may be also a reason.

[0736~0737] : 17th ~ 18th axis following error after feedforward compensation

[Definition] : The effective following error value of each axis after the speed feedforward compensation is enabled.

[Descriptions] :

1. To enable feedforward compensation is to set Pr581>0, theoretical value = X axis speed command/((Pr181/(1-Pr581/100)). When position Kp (Pr181) is fixed, the larger the feedforward value (Pr581), the smaller following error displayed by the System Data is.

2. Feedforward is suitable to compensate the following error of subtle target speed change. Excessive feedforward may lead to vibration or contour overcut.

[0752~0753] : 17th ~ 18th axis servo loop DA value

[Definition] : The voltage value of each axis DAC chips which was sent to the axis board, unit: mV

[Descriptions] :

1. Checks if the voltage (speed) command is correct when Pr381=1 (Voltage Command).

[0768~0769] : 17th ~ 18th axis offset limit

[Definition] :

1. Pr201~ =0: During home search of each axis, the motor rotation revolution from home switch signal disappears to encoder index signal appears. Unit: %. If value is 500, it means motor rotates 5 revs.
2. Pr201~ =1: During home search of each axis, the distance from home switch signal disappears to optical scale (linear encoder) index signal appears relative to 1 mm (Pr17=2). Unit: %. If value is 500, it means axis moves 5 mm.

[Descriptions] :

1. If Pr201~ = 0, suggested range of value is 20%~80%. If it is not in that range, enable home grid function (Pr941~ =1).

[0784~0785] : 17th ~ 18th axis position index counter

[Definition] : When index signal of each axis is generated, hardware will latch the current number of pulse.

[Descriptions] :

1. Theoretically, the value change increment in the same direction must equal to Pr61~ * Pr81. If not, it means cables have lost pulse, please check the feedback signal (A+,A-,B+,B-,C+,C-) to confirm it is loose cable or noise interference.
2. This variable will be set to zero after finishing the first home search for non-absolute encoder.

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| | | | | | | | | | |
|-----|---|-----|--|-----|---------------------------------|-----|---------------------------|-----|------------|
| 800 | 1 st axis abnormal communication times | 816 | 17 th axis abnormal communication times | 832 | Average IST Latency | 848 | FineDDA run count | 864 | (Occupied) |
| 801 | 2 nd axis abnormal communication times | 817 | 18 th axis abnormal communication times | 833 | Maximum IST Latency | 849 | Matrix I/O scan run count | 865 | (Occupied) |
| 802 | 3 rd axis abnormal communication times | 818 | (Reserved) | 834 | (Reserved) | 850 | Trajectory plan run count | 866 | (Occupied) |
| 803 | 4 th axis abnormal communication times | 819 | (Reserved) | 835 | IST Latency Severe Error Counts | 851 | Motion plan run count | 867 | (Occupied) |
| 804 | 5 th axis abnormal communication times | 820 | (Reserved) | 836 | (Reserved) | 852 | Sub interpolation count | 868 | (Occupied) |
| 805 | 6 th axis abnormal communication times | 821 | (Reserved) | 837 | (Reserved) | 853 | Macro executor run count | 869 | (Occupied) |
| 806 | 7 th axis abnormal communication times | 822 | (Reserved) | 838 | (Reserved) | 854 | Operation scan run count | 870 | (Occupied) |
| 807 | 8 th axis abnormal communication times | 823 | (Reserved) | 839 | (Reserved) | 855 | Foreground run count | 871 | (Occupied) |

| | | | | | | | | | |
|-----|--|-----|------------|-----|--------------------------------------|-----|-----------------------------------|-----|------------|
| 808 | 9 th axis abnormal communication times | 824 | (Reserved) | 840 | (Reserved) | 856 | HMI watch dog run count | 872 | (Occupied) |
| 809 | 10 th axis abnormal communication times | 825 | (Reserved) | 841 | (Reserved) | 857 | Sri communication run count | 873 | (Occupied) |
| 810 | 11 th axis abnormal communication times | 826 | (Reserved) | 842 | (Reserved) | 858 | DiskA space limit check run count | 874 | (Occupied) |
| 811 | 12 th axis abnormal communication times | 827 | (Reserved) | 843 | Max run time of serious error thread | 859 | Slow trajectory plan run count | 875 | (Occupied) |
| 812 | 13 th axis abnormal communication times | 828 | (Reserved) | 844 | The thread which has serious error 1 | 860 | Slow motion plan run count | 876 | (Occupied) |
| 813 | 14 th axis abnormal communication times | 829 | (Reserved) | 845 | The thread which has serious error 2 | 861 | Sub macro executor run count | 877 | (Occupied) |
| 814 | 15 th axis abnormal communication times | 830 | (Reserved) | 846 | RIO Transmission Error Counts | 862 | Sub house keeping run count | 878 | (Occupied) |
| 815 | 16 th axis abnormal communication times | 831 | (Reserved) | 847 | RIO Overload Error Counts | 863 | Script executor run count | 879 | (Occupied) |

[Debug Page 11] : For the system data on this page, the controller version must be 10.118.3 or newer.

[0800~0817] : 1st ~ 18th axis abnormal communication times

[Definition] : Abnormal axis communication times.

[Descriptions] : The counter increases by one every time when the serial communication axis occurs an abnormal communication.

[0832] : Average IST Latency

[Definition] : The average time span from the end of the ISR to the start of the IST. (Unit: μ s)

[Descriptions]

1. This variable is considered unacceptable if it is larger than the interpolation time interval. An unacceptable average IST latency leads to command error(s).
2. For more information about the interpolation time interval, please refer to the controller parameter Pr3203 and the system data 0004.

[0833] : Maximum IST Latency

[Definition] : The maximum IST Latency observed by the software. (Unit: μ s)

[Descriptions]

1. A maximum IST latency longer than the interpolation time interval, which is considered unacceptable, indicates that command error(s) occurred.
2. For more information about the interpolation time interval, please refer to the controller parameter Pr3203 and the system data 0004.
3. A possible cause of an unacceptable maximum IST latency is a large axis board data exchange time. Check the controller parameter Pr3203, system data 0336, and system data 0337.

[0835] : IST Latency Severe Error Counts

[Definition] : Times that the IST Latency was observed longer than the interpolation time interval.

[Descriptions] : An IST Latency longer than the interpolation time interval leads to communication issue(s) and hence this variable can be used in the analysis of the cause of communication issue(s).

[0843] : Max run time of serious error thread

[Definition] : Max run time of the thread has serious error

[Descriptions] :

1. If thread has serious error, show max run time of thread. The unit is second.
2. Because there are no only one thread, so the value just show the highest priority thread's max run time.

[0848~0863] : Software thread run count

[Definition] : record current thread run count

[Descriptions] : when thread run once, the count will add one.

[0844~0845] : The thread which has serious error 1~2

[Definition] : Show which kernel thread has serious error now

[Descriptions] :

1. The number will show the kernel thread which has serious error, the value should be 0 at normal.
2. The value corresponds to the record value of the System crash event of the datalog, and the record size is 2 LONG.

[0846] : RIO Transmission Error Counts

[Definition] : Times that an RIO communication error in FPGA was detected by the controller software.

[Descriptions] : The RIO communication status of the FPGA is checked during each IO scanning, and this counter will increase by one if an error is detected.

[0847] : RIO Overload Error Counts

[Definition] : Times that an RIO overload error in FPGA was detected by the controller software.

[Descriptions] : The RIO overload status of the FPGA is checked during each IO scanning, and this counter will increase by one if an error is detected.



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| | | | | | | | | | |
|-----|--|-----|---|-----|---|-----|-------------------------|-----|------------|
| 880 | Axis board data exchange time | 896 | SubMacroExecuter execute time | 912 | Housekeeping execute time | 928 | Profile read time | 944 | (Reserved) |
| 881 | Axis board data exchange time (MAX) | 897 | SubMacroExecuter execute time(MAX) | 913 | Housekeeping execute time(MAX) | 929 | Profile read time(MAX) | 945 | (Reserved) |
| 882 | MatrixIO scanning time | 898 | MacroExecuter execute time | 914 | Script executor execute time | 930 | Profile parse time | 946 | (Reserved) |
| 883 | MatrixIO scanning time (MAX) | 899 | MacroExecuter execute time(MAX) | 915 | Script executor execute time (MAX) | 931 | Profile parse time(MAX) | 947 | (Reserved) |
| 884 | Interpolation calculation time | 900 | (reserved, real time thread execute time) | 916 | (reserved, non-real time thread execute time) | 932 | (Reserved) | 948 | (Reserved) |
| 885 | Interpolation calculation time(MAX) | 901 | (reserved, real time thread execute time) | 917 | (reserved, non-real time thread execute time) | 933 | (Reserved) | 949 | (Reserved) |
| 886 | Trajectory Plan calculation time | 902 | (reserved, real time thread execute time) | 918 | (reserved, non-real time thread execute time) | 934 | (Reserved) | 950 | (Reserved) |
| 887 | Trajectory Plan calculation time (MAX) | 903 | (reserved, real time thread execute time) | 919 | (reserved, non-real time thread execute time) | 935 | (Reserved) | 951 | (Reserved) |
| 888 | IO scanning time | 904 | (reserved, real time thread execute time) | 920 | (reserved, non-real time thread execute time) | 936 | (Reserved) | 952 | (Reserved) |
| 889 | IO scanning time (MAX) | 905 | (reserved, real time thread execute time) | 921 | (reserved, non-real time thread execute time) | 937 | (Reserved) | 953 | (Reserved) |
| 890 | PLC scanning time | 906 | (reserved, real time thread execute time) | 922 | (reserved, non-real time thread execute time) | 938 | (Reserved) | 954 | (Reserved) |

| | | | | | | | | | |
|-----|-------------------------------------|-----|---|-----|---|-----|------------|-----|------------|
| 891 | PLC scanning time (MAX) | 907 | (reserved, real time thread execute time) | 923 | (reserved, non-real time thread execute time) | 939 | (Reserved) | 955 | (Reserved) |
| 892 | MotionPlan calculation time | 908 | (reserved, real time thread execute time) | 924 | (reserved, non-real time thread execute time) | 940 | (Reserved) | 956 | (Reserved) |
| 893 | MotionPlan calculation time (MAX) | 909 | (reserved, real time thread execute time) | 925 | (reserved, non-real time thread execute time) | 941 | (Reserved) | 957 | (Reserved) |
| 894 | SubInterpolation execute time | 910 | (reserved, real time thread execute time) | 926 | (reserved, non-real time thread execute time) | 942 | (Reserved) | 958 | (Reserved) |
| 895 | SubInterpolation execute time (MAX) | 911 | (reserved, real time thread execute time) | 927 | (reserved, non-real time thread execute time) | 943 | (Reserved) | 959 | (Reserved) |

[Debug Page 12] : For the system data on this page, the controller version must be 10.118.410, 10.118.48 or newer.

[0880] : Axis board data exchange time

[Definition] : The average data exchange time between the controller and its slave device, unit: us.

[Descriptions] :

1. The value shouldn't be higher than Pr3203 * interpolation time, or it can cause command error. Please refer to controller parameter Pr3203 for further descriptions.
2. If the abnormal axis board data exchange time is within 5000 (5 ms), the system will activate the substitute interpolation as a compensation, or it can cause severe command error.
3. For further descriptions of substitute interpolation, please refer to System Data 0378 Substitute interpolation execution times
4. For further descriptions of interpolation time, please refer to controller parameter Pr3203 and System Data 4 Motion interpolation time.

[0881] : Axis board data exchange time (MAX)

[Definition] : The longest axis board data exchange time the system has ever recorded, unit: us.

[Descriptions] :

1. If the value is higher than controller parameter Pr3203 * interpolation time, it means the command error happened.
2. For further descriptions of interpolation time, please refer to controller parameter Pr3203 and System Data 4 Motion interpolation time.

[0882] : MatrixIO scanning time

[Definition] : The average MatrixIO scanning time, unit: us.

[0883] : MatrixIO scanning time (MAX)

[Definition] : The longest MatrixIO scanning time the system has ever recorded, unit: us.

[0884] : Interpolation calculation time

[Definition] : The average time system used to calculate the interpolation commands, unit: us.

[Descriptions] :

1. The variable shouldn't be higher than controller parameter Pr3203 * interpolation time, or it can cause interpolation timeout and lead to command error.
2. For further descriptions of interpolation time, please refer to controller parameter Pr3203 and System Data 4 Motion interpolation time.

[0885] : Interpolation calculation time (MAX)

[Definition] : The longest interpolation calculation time the system has ever recorded, unit: us.

[Descriptions] :

1. If the variable is higher than controller parameter Pr3203 * interpolation time, it means the interpolation timeout had happened and can lead to command error.
2. For further descriptions of interpolation time, please refer to controller parameter Pr3203 and System Data 4 Motion interpolation time.

[0886] : Trajectory Plan calculation time

[Definition] : The average time system used calculate the Trajectory Plan, unit: us.

[0887] : Trajectory Plan calculation time(MAX)

[Definition] : The longest Trajectory Plan calculating time the system has ever recorded, unit: us.

[0888] : IO scanning time

[Definition] : The average time kernel used to read the I/O changes on the I/O board, unit: us.

[Descriptions] :

1. The variable shouldn't be higher than controller parameter Pr3202 *I/O scanning time, or it can cause IO update lag. Please refer to controller parameter Pr3202 fro further descriptions.

[0889] : IO scanning time (MAX)

[Definition] : The longest IO scanning time the system has ever recorded, unit: us.

[Descriptions] :

1. If the variable is higher than controller parameter Pr3202 *I/O scanning time, it means the IO update lag had happened.

[0890] : PLC scanning time

[Definition] : The average PLC scanning time, unit: us.

[Descriptions] :

1. The value shouldn't exceed parameter Pr3204 PLC scanning time, or it might cause PLC update lag.
2. For further descriptions of interpolation time, please refer to controller parameter Pr3204 and System Data 5 PLC scanning time.

[0981] : PLC scanning time (MAX)

[Definition] : The longest PLC scanning time the system has ever recorded, unit: us.

[Descriptions] :

1. If the value is higher than controller parameter Pr3204 *PLC scanning time, it means the PLC update lag had happened.

2. For further descriptions of interpolation time, please refer to controller parameter Pr3204 and System Data 5 PLC scanning time.

[0892] : Motion Plan calculation time

[Definition] : The average time system used to calculate the Motion Plan (velocity profile), unit: us.

[0351] : Motion Plan calculation time (MAX)

[Definition] : The longest Motion Plan calculation time the system has ever recorded, unit: us.

[0894] : SubInterpolation execute time

[Definition] : The average SubInterpolation execute time, unit: us.

[Descriptions] : If system is in an abnormal condition or in a state of insufficient performance, the value will larger than Pr3203 *interpolation time.

[0895] : SubInterpolation execute time(MAX)

[Definition] : The longest SubInterpolation execute time the system has ever recorded, unit: us.

[Descriptions] : If system is in an abnormal condition or in a state of insufficient performance, the value will larger than Pr3203 *interpolation time.

[0896] : SubMacroExecuter execute time

[Definition] : The average SubMacroExecuter execute time, unit: us.

[Descriptions] : If system is in an abnormal condition or in a state of insufficient performance, the value will larger than 4 times of PLC scan time.

[0897] : SubMacroExecuter execute time(MAX)

[Definition] : The longest SubMacroExecuter execute time the system has ever recorded, unit: us.

[Descriptions] : If system is in an abnormal condition or in a state of insufficient performance, the value will larger than 4 times of PLC scan time.

[0898] : MacroExecuter execute time

[Definition] : The average MacroExecuter execute time, unit: us.

[Descriptions] : If system is in an abnormal condition or in a state of insufficient performance, the value will larger than 4 times of PLC scan time.

[0899] : MacroExecuter execute time(MAX)

[Definition] : The longest MacroExecuter execute time the system has ever recorded, unit: us.

[Descriptions] : If system is in an abnormal condition or in a state of insufficient performance, the value will larger than 4 times of PLC scan time.

[0900~0911] : Reserved

[Definition] : Reserved.

[Descriptions] : Reserved for real time thread execute time.

[0912] : Housekeeping execute time

[Definition] : The average Housekeeping thread execute time, unit: us.

[Descriptions] : This variable is used to evaluate the busyness of the system.

[0913] : Housekeeping execute time(MAX)

[Definition] : The longest Housekeeping thread execute time the system has ever recorded, unit: us.

[Descriptions] : This variable is used to evaluate the busyness of the system.

[0914] : Script executor execute time

[Definition] : The average time of script executor execute all script, unit: us.

[Descriptions] : If the value increase continually, please check the script of routine script has not infinity loop.

[0915] : Script executor execute time (MAX)

[Definition] : The longest script executor execute time the system has ever recorded, unit: us.

[Descriptions] : If the value increase continually, please check the script of routine script has not infinity loop.

[0916~0927] : Reserved

[Definition] : Reserved.

[Descriptions] : Reserved for non-real time thread execute time.

[0928] : Profile read time

[Definition] : The average time of reading profile unit: us.

[Descriptions] :

1. This variable is used to evaluate the the performance of reading profile
2. If Pr732 = 2, each coordinate will load profile independently, the value will be sum of reading time of all coordinate.
3. If Pr732 ≠ 2, or only have 1 coordinate, profile will load once, the value will be the reading time of profile.

[0929] : Profile read time(MAX)

[Definition] : The average read profile time, unit: us.

[Descriptions] : This variable is used to evaluate the busyness of the system.

[0930] : Profile parse time

[Definition] : The average time of parsing profile unit: us.

[Descriptions] :

1. This variable is used to evaluate the the performance of parsing profile
2. If Pr732 = 2, each coordinate will load profile independently, the value will be sum of reading time of all coordinate.
3. If Pr732 ≠ 2, or only have 1 coordinate, profile will load once, the value will be the reading time of profile.

[0931] : Profile parse time(MAX)

[Definition] : The average read profile time, unit: us.

[Descriptions] : This variable is used to evaluate the busyness of the system.

[0932~0959] : Reserved
[Definition] : Reserved.
[Descriptions] : Reserved.



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