1	0	Forced to low level	1	0	Forced to low level
1	1	Optional state	1	1	Optional state

Example: output port SigOut2 force output low level, other optional output port status, setting Pn082 parameter value is 8.

Number	Name	Value range	Default value	unit	apply
Pn083	Low pressure alarm detect amplitude	50~280	200	V	All

◢ When the bus voltage is less than the amplitude, the Pn078 decided whether to send out alarm.

Number	Name	Value range	Default value	unit	apply
Pn084	High pressure alarm detect amplitude	290~380V	365	V	All

◢ When the bus voltage is higher than the amplitude, immediately issued a warning, in order to protect the internal electronic components. Input power supply voltage should be within the specifications of the acceptable, if slightly on the high side, can be appropriately increase amplitude detection. If the input voltage power supply has been far beyond specification, shall not increase the parameter value, otherwise it will damage the driver, please conform to the specifications of the power supply.

Number	Name	Value range	Default value	unit	apply
Pn085▲	Motor pole logarithmic	1~100	4	对	All

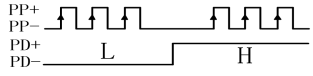
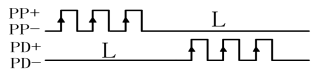
Number	Name	Value range	Default value	unit	apply
Pn086	Renewable circuit discharge cycle	0~2000	70	ms	All

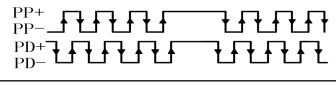
◢ When the servo motor running in generator mode, renewable electricity too much, must through the regeneration way discharge, otherwise the internal voltage is too high, damage to the drive. Set up, the longer the voltage release faster, but the greater the power needed for regenerative resistor, otherwise easy to burn regenerative resistor. See appendix E specific Settings.

4.3.2 Position control parameters

Number	Name	Value range	Default value	unit	apply
Pn096▲	The command pulse input mode	0-2	0		P
Pn097▲	Instruction selection logic pulse input direction	0-1	0		P

◢ Command pulse input mode in the following table:

Pn096		Forward command	reverse command
0	Pulse + direction		
1	Forward/reverse pulse		

2	The orthogonal pulse	

◢ Pn097 = 0: input command, the motor rotate counterclockwise (CCW)

Pn097 = 1: input command, motor rotate clockwise (included)

Number	Name	Value range	Default value	unit	apply
Pn098	Pulse electronics gear than the molecules of 1	1~32767	1		P
Pn099	Pulse electronics gear than the molecules of 2	1~32767	1		P
Pn100	Pulse electronics gear than the molecules of 3	1~32767	1		P
Pn101	Pulse electronics gear than the molecules of 4	1~32767	1		P
Pn102▲	Pulse electronics gear than the denominator	1~32767	1		P

◢ Electronic gear ratio must meet the following conditions, otherwise will not work:

Electronic gear or less than 1/127 of 127 or less

◢Electronic gear than the molecules of N by the input port of the SigIn GN1, GN2 decision. The denominator is fixed. Molecules to choose in the following table:

GN2	GN1	N Electronic gear than N
OFF	OFF	Molecular 1
OFF	ON	Molecular 2
ON	OFF	Molecular 3
ON	ON	Molecular 4

Number	Name	Value range	Default value	unit	apply
Pn103	Beyond the scope of setting position deviation	1~ 500	50	thousand pulse	P

◢ Deviation when the pulse counter pulse count more than the value set (i.e., the current position and target location are too large), drive out alarm signal.

Number	Name	Value range	Default value	unit	apply
Pn104	Complete range set position location	0~ 32767	10	pulse	P
Pn105	Positioning to complete set	0~ 32767	3	pulse	P

◢ While the rest of the deviation counter pulse Number is lower than the parameters setting, output port SigOut Preach signal is ON, or OFF.

Number	Name	Value range	Default value	unit	apply
Pn106	Position location close to the range of Settings	0~ 32767	300	pulse	P
Pn107	Position location close to the poor set back	0~ 32767	30	pulse	P

◢ While the rest of the deviation counter pulse Number is lower than the parameters setting, output port SigOut Pnear signal is ON, or OFF.

Number	Name	Value range	Default value	unit	apply
Pn108	Position deviation clear way	0-1	1		P

◢ Position control, can use SigIn Pclear function, clear position deviation value of the counter. Position deviation clearance in -

0: Pclear level ON period

1: Pclear rise along time (from OFF to ON)

Number	Name	Value range	Default value	unit	apply
Pn109◆	Position command deceleration mode	0-2	1		P

◢ 0： Do not use the filter

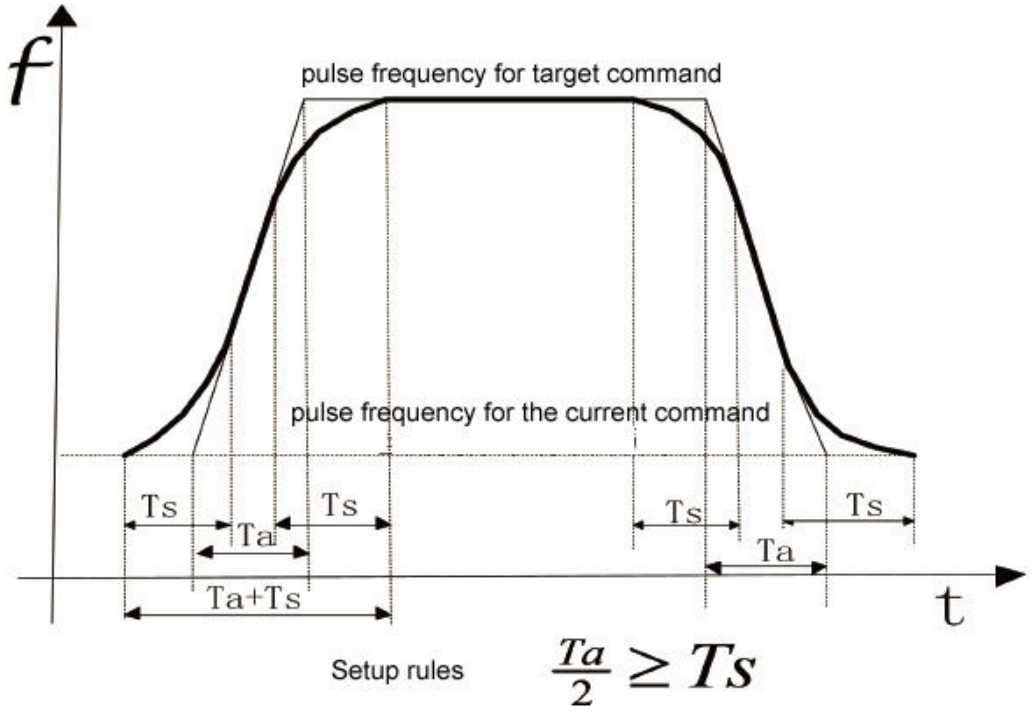
◢ 1： A smoothing filter

◢ 2： S-shaped filtering

Number	Name	Value range	Default value	unit	apply
Pn110◆	Position command s-shaped filtering time constant	5~1750	50	ms	P
Pn111◆	S-shaped filtering time constant Ta position instruction	5~1200	50	ms	P
Pn112◆	S-shaped filtering time constant Ts position instruction	5~550	20	ms	P

◢ Filter time constant is defined by the current location instructions frequency operation to the target frequency. Filtering, the longer the better position instruction frequency smoothness, but command the greater the response delay. In instruction pulse frequency step change, have the effect of smooth running motor. The filter has no effect on instruction pulse Number.

◢ Filtering time T = Ta + Ts. Ta: straight line part of the time, the smaller the Ta, the faster the deceleration. Ts: arc part time, Ts, the greater the speed is smooth, the smaller the impact.



Number	Name	Value range	Default value	unit	apply
Pn113▲	The position loop feedforward gain	0-100	0	%	P
Pn114▲	Position loop feedforward filter time constant	1-50	5	ms	P

◢ Position control, position feedforward directly on the speed instruction, can reduce the position tracking error, improve the response. If the feedforward gain is too big, can lead to speed overshoot. To smooth the feedforward commands.

Number	Name	Value range	Default value	unit	apply
Pn115	The position controller gain 1	5-2000	100	%	P
Pn116	The position controller gain 2	5-2000	100	%	P

◢ In mechanical systems do not produce under the premise of vibration or noise, increase the position loop gain value, to speed up the reaction rate, shorten the positioning time.

Number	Name	Value range	Default value	unit	apply
Pn117	Position command source selection	0~1	0		P

◢ 0： The external input pulse

◢ 1： Internal location instructions (see appendix G)

Number	Name	Value range	Default value	unit	apply
Pn118	Internal position instruction suspend mode selection	0~1	0		P

◢ 0：When pstop the trigger action, ptriger trigger again, according to the currently selected internal drive position command to run.

◢ 1：When pstop the trigger action, ptriger trigger again, drive to continue to complete the last remaining internal position command pulse Number.

Number	Name	Value range	Default value	unit	apply
Pn119	Internal position suspended deceleration time	0~10000	50		P

◢ Falling edge position in internal control, pstop, motor by the current running speed will slow down to zero, the deceleration time can be set by this parameter (only for internal position control).

Number	Name	Value range	Default value	unit	apply
Pn120	Internal position 0 high pulse Number set up	-9999~9999	0	ten thousand pulse	P
Pn121	Internal position 0 low pulse Number set up	-9999~9999	0	个	P
Pn122	Internal position 1 high pulse Number set up	-9999~9999	0	ten thousand pulse	P
Pn123	Internal position 0 low pulse Number set up	-9999~9999	0	个	P
Pn124	Internal position 2high pulse Number set up	-9999~9999	0	ten thousand pulse	P
Pn125	Internal position 2 low pulse Number set up	-9999~9999	0	个	P
Pn126	Internal position 3 high pulse Number set up	-9999~9999	0	ten thousand pulse	P
Pn127	Internal position 3 low pulse Number set up	-9999~9999	0	个	P

◢ Internal location instructions N (pulse) = internal position Number N pulse high value x 10000 + internal position instruction N pulse Number value low

◢ Pn120=12，Pn121=5000。Example: the encoder 2500 line, to go travel 12.5 turn, is set Pn120 = 12, Pn121 = 5000.

Number	Name	Value range	Default value	unit	apply
Pn128	Internal position command zero speed	0~3000	100	r/min	P
Pn129	Internal position command 1 speed	0~3000	100	r/min	
Pn130	Internal position command 2 speed	0~3000	100	r/min	P
Pn131	Internal position command 3 speed	0~3000	100	r/min	P

◢ When performing internal position instruction N, restrict the highest speed of motor can run.

Number	Name	Value range	Default value	unit	apply

Pn132	Torque/speed control switch to the position control	0~1	0		P

◢Control mode from the speed/torque mode conversion to position control (Pn002 = 3 or 4), to avoid severe mechanical shock, should be in low speed switching. The conditions of the switch can be set up:

Pn132=0：（zerospeed）

Pn132=1： Slow down to zero

Number	Name	Value range	Default value	unit	apply
Pn133	Torque/speed control switch to the position control of the deceleration time	5-10000	100	ms	P

◢Pn132 = 1, when cmode signals effectively, the order control mode by the torque/speed control switch to the position control, motor slow down to zero, then switch to the position control mode. Please refer to the appendix B for specific timing.

4.3.3 Speed control parameter

Number	Name	Value range	Default value	unit	apply
Pn146◆	Speed instruction deceleration mode	0~2	1		S

◢ Pn146=0: Do not use the speed instruction deceleration function

Pn146=1: Using the speed instruction S curve deceleration function

Pn146=2: Use linear deceleration function

◢ In speed control mode and the external position loop, this parameter must be set to 0.

Number	Name	Value range	Default value	unit	apply
Pn147◆	Speed instruction S curve and deceleration time constant Ts	5~ 1500	80	ms	S
Pn148◆	Speed instruction S curve acceleration time constant of Ta	5~ 10000	80	ms	S
Pn149◆	Speed instruction S curve deceleration time constant of Td	5~ 10000	80	ms	S

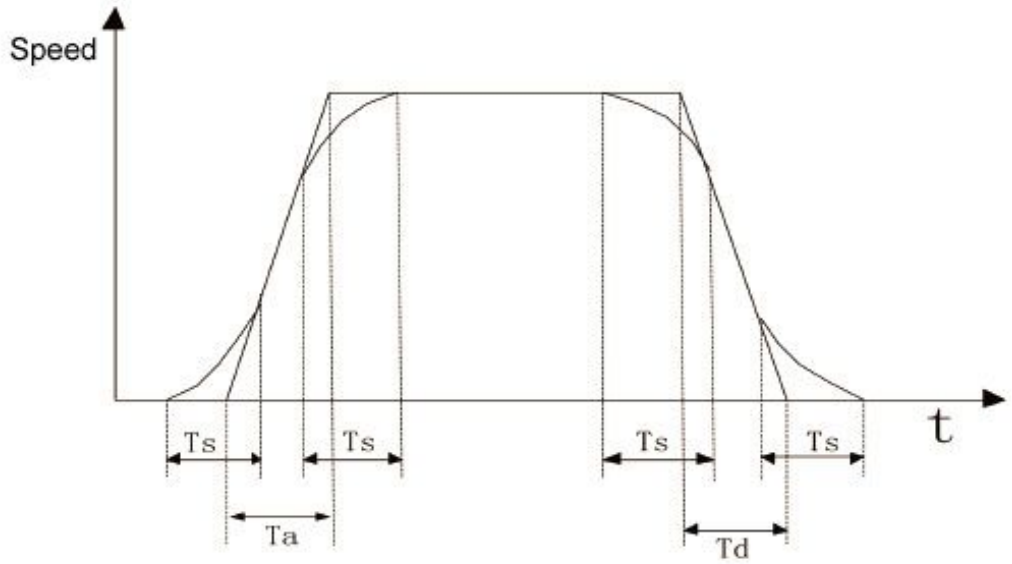
◢ In speed control mode, you can set the speed instruction, deceleration time, in order to smoothly to start and stop the servo motor.

◢ Ta: acceleration time: from 0 r/min to rated speed. For example, servo motor rated speed 3000 r/min, if the setting time is 3 s, accelerate from 0 r/min to 1000 r/min for 1 s.

Td: Deceleration time: by the rated speed reduced to 0 r/min

Ts: Arc part time

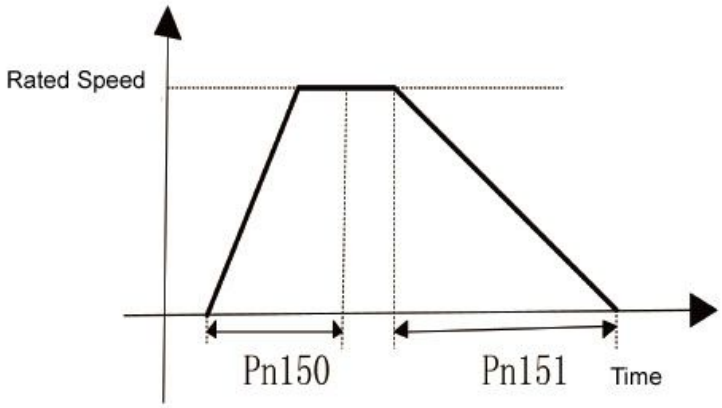
E-Mail:Sales@cncservocontrol.comHuanfeng Industrial zone Baoan avenue Baoan district, Shenzhen Guangdong, China



Setup rules : $\frac{Ta}{2} \geq Ts, \frac{Td}{2} \geq Ts$

Number	Name	Value range	the Default value	unit	apply
Pn150◆	Linear acceleration time constant	5~30000	80	ms	S
Pn151◆	Linear deceleration time constant	5~30000	80	ms	S

◢ Accelerating time constant is defined as the speed instruction from zero to rated speed.



Number	Name	Value range	Default value	unit	apply
Pn152▲	Speed detection filter time constant	1~380	10	0.1ms	All

◢ The smooth the speed of the parameter value, the greater the detected, but lead to the slower speed response. Too easy to cause the oscillation, too small may lead to noise.

Number	Name	Value range	Default value	unit	apply
Pn153	The speed regulator proportional gain 1	5~ 2000	100	%	All
Pn154	Speed regulator integral time constant of 1	5~ 2000	100	%	All
Pn155	The speed regulator proportional gain 2	5~ 2000	100	%	All
Pn156	Speed regulator integral time constant 2	5~ 2000	100	%	All

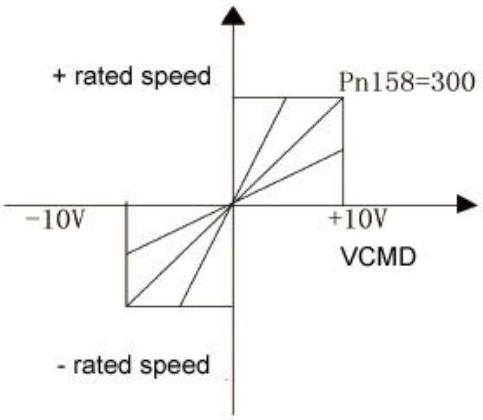
- Speed loop controller gain directly determine the response of the speed control loop bandwidth, the mechanical system without vibration or noise, increase the speed loop gain value, accelerated the response.
- Integral time constant is used to adjust the steady-state error compensation rate, decrease the parameter values, reduce the speed control error, increase rigidity. Is too small easy to cause vibration and noise.

Number	Name	Value range	Default value	unit	apply
Pn157▲	Simulation speed instruction smoothing filtering time	1~500	1	0.1ms	S

- The set value, the greater the input analog response speed is slow, is beneficial to reduce the high frequency noise, setting is smaller, the faster response speed, but will get big interference noise.

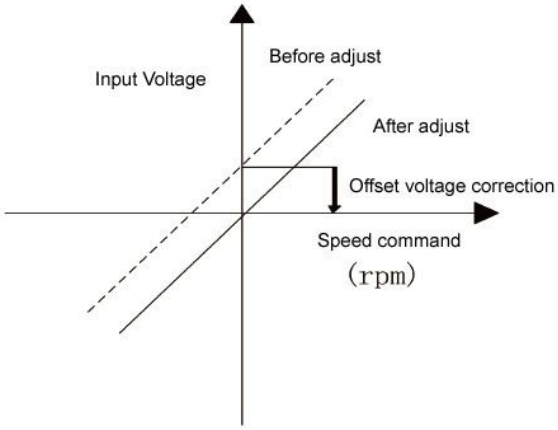
Number	Name	Value range	Default value	unit	apply
Pn158	The directive gain simulation speed	1~1500	300	r/min/V	S

- Analog speed reference input and the ratio between the actual speed motor. The range of input voltage - 10 ~ 10 v. Formula: speed = * Pn158 input voltage. For example: when the input voltage of 10 v, if set to 300, the corresponding rate of 10 * 300 = 3000 r/min.



Number	Name	Value range	Default value	unit	apply
Pn159	Simulation speed instruction offset adjustment	-5000~5000	mv		S

- May occur in the analog input offset phenomenon, can through this parameter.



- Automatic offset adjusting, perform Fn008 operations.
- Manually adjust the migration steps are as follows:

1： The external zero potential access to the analog input port

2： This parameter is zero, the monitor dn17 shows the value of the model.

3： If observed values are not zero, negative observation value to the input parameters, can be realized to adjust (note that the voltage unit conversion relationship).

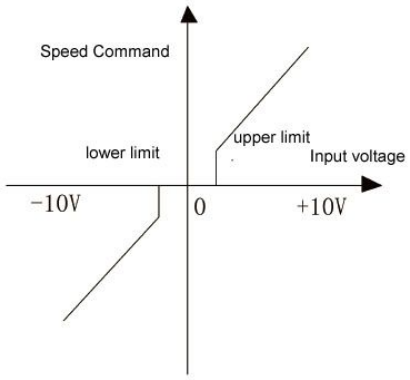
Example: dn17 = 1.12 V, Pn159 input - 1120 mv.

Number	Name	Value range	Default value	unit	apply
Pn160	Simulation speed instruction direction	0-1	0		S

- 0：Positive voltage forward (CCW), negative voltage inversion (the cw)
- 1：Positive voltage forward (CCW), negative voltage inversion (the cw)

Number	Name	Value range	Default value	unit	apply
Pn161	Simulation speed instruction to enforce zero range	0~1000	0	10mv	S
Pn162	Simulation speed instruction to enforce zero range	-1000~0	0	10mv	S

- Input speed instruction lies between floor and ceiling, forced to 0 V input instructions.



- When the input voltage is after adjusting for PN159 offset of the input voltage.
- Through the upper and lower set, can make the input instructions into a single polarity, double polarity. Example: the upper limit of 0, lower limit for - 1000, the equivalent input command range of 0 ~ 10 v, for normal polarity speed commands.

Number	Name	Value range	Default value	unit	apply
Pn163	Zero speed clamp lock mode	0-1		0	S

- 0： Lock, the clamping position loop control is the mode, involved in internal ring loop control, gain by Pn167 Settings.
- 1： Locked, clamping way is speed loop control, speed instruction forced to 0, location may change due to external force.

Number	Name	Value range	Default value	unit	apply
Pn164	Zero speed clamp is triggered	0~1		0	S

- 0： SigIn port ZeroLocK to ON
- 1： Triggered when the speed instruction below Pn165 parameters

Number	Name	Value range	Default value	unit	apply
Pn165	The clamp level zero speed	0~200	6	r/min	S

- When Pn164 is set to 1, and the speed instruction below this parameter value, the lock on the motor shaft. Example: this parameter is set to 10 r/min, if the analog speed instruction - 10 r/min ~ 10 r/min, within the scope of the deceleration clamp, in order to prevent the analog speed instruction near the zero drift, lead to the motor shaft instability.

Number	Name	Value range	Default value	unit	apply
Pn166	Zero speed clamp deceleration time	5~10000	50	ms	S

- When zero speed clamp when triggered, immediately according to deceleration time to slow down to zero, and then to lock.

Number	Name	Value range	Default value	unit	apply
Pn167	Internal position controller gain	5~2000	100	%	All

Number	Name	Value range	Default value	unit	apply
Pn168	Speed reference source	0~1	0		S

- In speed control mode, the optional speed reference source:

Pn168=0： External simulation speed instruction within + 2 ~ 8

Pn168=1： 1 ~8 Speed within 1 ~ 8

Number	Name	Value range	Default value	unit	apply
Pn169	Internal speed reference 1	-5000-5000	0	R/min	S
Pn170	Internal speed reference 2	-5000-5000	0	R/min	S
Pn171	Internal speed reference 3	-5000-5000	0	R/min	S
Pn172	Internal speed reference 4	-5000-5000	0	R/min	S
Pn173	Internal speed reference 5	-5000-5000	0	R/min	S
Pn174	Internal speed reference 6	-5000-5000	0	R/min	S
Pn175	Internal speed reference 7	-5000-5000	0	R/min	S

Pn176	Internal speed reference 8	-5000-5000	0	R/min	S

◢ When a drive control mode in speed control mode, the speed reference source by the input port of the SigIn SP1, SP2, SP3 decision:

SP3	SP2	SP1	Speed instruction
0	0	0	Internal speed 1 / external analog instruction (decided by Pn168)
0	0	1	Internal speed 2
0	1	0	Internal speed 3
0	1	1	Internal speed 4
1	0	0	Internal speed 5
1	0	1	Internal speed 6
1	1	0	Internal speed 7
1	1	1	Internal speed 8

Note 1:0 is OFF, 1 is ON.

Note 2: if the SigIn port is not specified SP3, SP2, SP1 function, is OFF by default

Number	Name	Value range	the Default value	unit	apply
Pn177	JOG speed	0~5000	200	r/min	S
Pn178◆	JOG speed up the time	5~ 10000	100	ms	S
Pn179◆	JOG Deceleration time	5~ 10000	100	ms	S

◢ When commissioning at, can set the speed of the motor running and the deceleration time

4.3.4 Torque control parameters

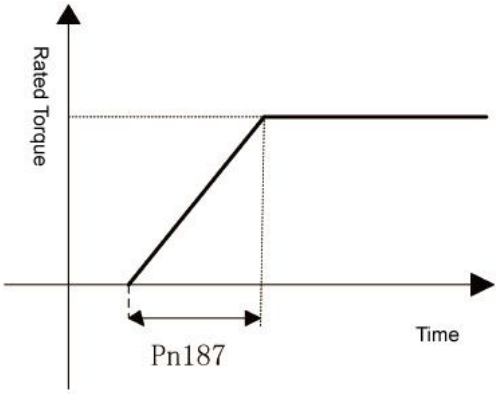
Number	Name	Value range	Default value	unit	apply
Pn186	Torque command deceleration mode	0~1	0		T

◢ 0: Do not use the deceleration torque instruction

◢ 1： Using linear deceleration torque instruction

Number	Name	Value range	Default value	unit	apply
Pn187▲	Linear deceleration time constant torque instruction	1~30000	1	ms	T

◢ Time constant is defined as a torque command from zero has soared to the rated torque.

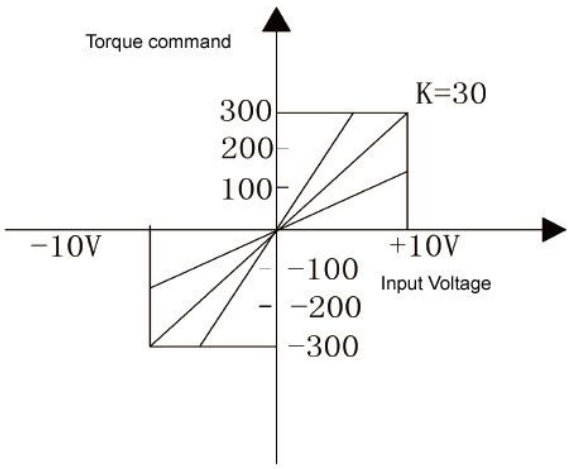


Number	Name	Value range	Default value	unit	apply
Pn188▲	Analog torque instruction smooth filtering time	1~500	1	0.1ms	T

◢ The set value, the greater the input analog response speed is slow, is helpful to reduce the high frequency noise; Setup is smaller, the faster the speed of response, but will get big interference noise.

Number	Name	Value range	Default value	unit	apply
Pn189	Analog gain torque instruction	1-300	30	%/V	T

◢ Analog torque command input and the ratio between the actual output torque. The range of input voltage - 10 ~ 10 v. The default input voltage of 10 v, motor at 3 times the rated torque, Namely = KX = 30 x, Y K = 30.



Number	Name	Value range	Default value	unit	apply
Pn190	Analog torque instruction offset djustment	-1500~1500	0	mv	T

◢ Adjust the way reference "simulation speed deviation adjustment directive"

Number	Name	Value range	Default value	unit	apply
Pn191	Simulation of torque command direction	0-1	0		T

- 0： Positive voltage forward (CCW), negative voltage inversion (the cw)
- 1： Turn negative voltage is (CCW), positive voltage inversion (the cw)

Number	Name	Value range	Default value	unit	apply
Pn192	Q shaft torque regulator proportional gain is 1	5~ 2000	100	%	All
Pn193	Q shaft torque regulator integral time constant of 1	5~ 2000	100	%	All
Pn194	Q shaft torque regulator proportional gain is 12	5~ 2000	100	%	All
Pn195	Q shaft torque regulator integral time constant of 2	5~ 2000	100	%	All

- Increase the proportional gain, can make the Q axis current response speed.
- Reduce the integral time constant, can reduce the Q axis current control error

Number	Name	Value range	Default value	unit	apply
Pn196	Torque Q axis filter time constant of 1	1-500	1	0.1ms	All
Pn197	Torque Q axis filter time constant of 2	1~500	1	0.1ms	All

- Inhibits mechanical vibration, the larger the set values, the better the results, will cause slow response and may cause oscillation; Set the value is smaller, the faster the response, but the mechanical conditions.

Number	Name	Value range	Default value	unit	apply
Pn198	Torque control speed limit	0~4500	2500	r/min	T

- When the torque control, motor speed limit in this parameter range. There was a phenomenon of speeding can prevent the light load. Speeding, speed control to reduce the actual torque intervention, but the actual speed will be slightly error.

Number	Name	Value range	Default value	unit	apply
Pn199	Source of limited torque control speed choice	0~2	0		T

- Pn199=0： Restricted by Pn198 parameters

  Pn199=1： Restricted by internal speed instruction 1 ~ 8

  Pn199=2: If Pn204 = 1, i.e., all instructions from the internal torque, torque, speed can be restricted by analog voltage speed command
- All the above speed limit both positive and negative, multiple speed limit, restricted to the minimum speed.
- If this parameter is set to 1, restricted by internal speed instruction, by sp1, sp2, sp3 limited decision speed value:

SP3	SP2	SP1	Speed instruction
0	0	0	Internal speed 1

0	0	1	Internal speed 2
0	1	0	Internal speed 3
0	1	1	Internal speed 4
1	0	0	Internal speed 5
1	0	1	Internal speed 6
1	1	0	Internal speed 7
1	1	1	Internal speed 8

0 means OFF, 1 is ON.

◢ Even if the setting values than the system allows the highest speed, the actual speed can limit under the highest speed.

Number	Name	Value range	Default value	unit	apply
Pn200	The internal torque 1	-300~300	0	%	T
Pn201	The internal torque 2	-300~300	0	%	T
Pn202	The internal torque 3	-300~300	0	%	T
Pn203	The internal torque 4	-300~300	0	%	T

◢ Select the internal torque control mode, use input port of the SigIn TR1 TR2 can choose 4 kinds of torque command:

TR2	TR1	Torque command
0	0	The external torque 1 or internal analog torque instruction (decided by Pn204)
0	1	The external torque 2
1	0	The external torque 3
1	1	The external torque 4

NOTE: 0 means OFF, 1 is ON.

Note 2: if the SigIn port doesn't specify TR2, TR1 functions, is OFF by default.

Number	Name	Value range	Default value	unit	apply
Pn204	Torque command source	0~1	0		T

0: external analog torque command

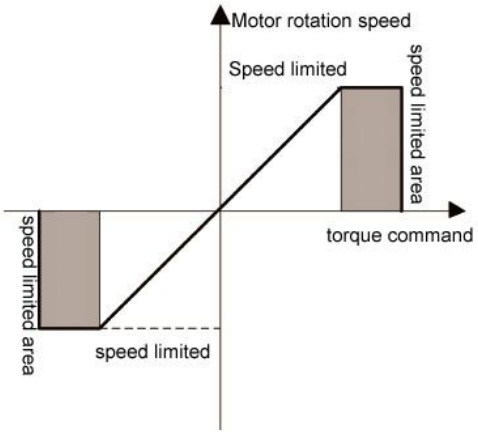
1:1internal torque1

Number	Name	Value range	Default value	unit	apply
Pn205	D shaft torque regulator proportional gain	5~2000	100	%	All
Pn206	D shaft torque regulator integral time constant	5~2000	100	%	All

◢ Space vector modulation, D shaft torque regulator proportional gain and integral time constant.

Number	Name	Value range	Default value	unit	apply
Pn207	Speed feedback adjustment coefficient	1~3000	100		T

◢ When the torque control, the motor speed in a limited speed range, interventional speed feedback, to reduce the actual torque, so that the speed to limit within the scope of regression. Parameter Settings is smaller, the greater the amount of feedback, the faster the adjustment, the smaller amount of speeding, but is too small will fuel motor shaking; Parameter is set too large, adjust the slower, may have been speed, less than the speed limit. Actual speed will be slightly higher than the limit speed value.



Number	Name	Value range	Default value	unit	apply
Pn208	track torque instruction judgment error range1	0~300	5	%	T
Pn209	track torque instruction judgment error range2	0~300	2	%	T

◢ To make SigOut effective TCMDreach signal output port, must meet the following conditions:

Condition 1: PC set torque instruction must be within the error range of 1. Example: input torque command 80%, Pn208 set to 5%, internal drive of input torque instruction in deceleration operation, when calculating the output torque of the instructions within the scope of 75% ~ 85%, condition 1 is satisfied.

Condition 2: detect the actual motor torque and the difference between the input torque of the instructions in the judgment error range within 2.

4.3.5 Extension control parameters

4.4 Port functions,

4.4.1 SigIn port function explanation

<table>
<tr><td>Number</td><td>symbol</td><td>function</td><td>Functional specifications</td></tr>
<tr><td>0</td><td>NULL</td><td>No function specified</td><td>Drive the input status does not produce any action.</td></tr>
<tr><td>1</td><td>Son</td><td>servo enable</td><td>OFF： The driver is not enabled, the motor without power
ON： Drive enabled, the motor power
Note: Pn003 parameters or Son state decision.</td></tr>
<tr><td>2</td><td>AlarmRst</td><td>The alarm reset</td><td>Alarm, and when the alarm can be clear, the input signal (OFF to ON), the delay to clear the alarm.</td></tr>
<tr><td>3</td><td>CCWL</td><td>Forward driving ban</td><td>OFF: Motor forward is prohibited
ON： Allow the motor forward
Note 1: if you want to use forward driving ban, first set Pn006 parameters, enabled, and designated to a specific to the input port. By default, do not use this feature.
Note 2: the normal operation of the motor, CCWL must in a normally closed contact state (ON)
Note 3: the origin, this function is invalid.</td></tr>
<tr><td>4</td><td>CWL</td><td>Reverse driving ban</td><td>OFF: Prohibit motor reversal
ON： Allow the motor reversal</td></tr>
<tr><td>5</td><td>TCCW</td><td>External forward torque limit</td><td>OFF: CCW direction /torque without limited Pn010 parameters
ON: CCW direction/torque limited by Pn010 parameters
Note: whether TCCW efficient or effective, CCW direction torque is also restricted by Pn008 parameters.</td></tr>
<tr><td>6</td><td>TCW</td><td>Around outside the torque limit</td><td>OFF: The CW direction torque Pn011 parameters without limit
ON: The CW direction torque Pn011 parameter restrictions
Note: whether TCW efficient or effective, the CW direction torque is also restricted by Pn009 parameters.</td></tr>
<tr><td>7</td><td>EMG</td><td>Emergency stop</td><td>OFF: Ban drive motor drive, to cut off the motor current
ON: Allow normal drive motor drive</td></tr>
<tr><td>8</td><td>Zero Lock</td><td>Zero speed clamp</td><td>Speed control:
OFF: Don't lock the motor shaft
ON : Lock the motor shaft</td></tr>
<tr><td>9</td><td>SP1</td><td>Internal speed command option 1</td><td rowspan="2">When a drive control mode in speed control mode, the speed reference source by SigIn SP1, SP2, SP3 decision:
<table><tr><td>SP3</td><td>SP2</td><td>SP1</td><td>Speed instruction</td></tr></table></td></tr>
<tr><td>10</td><td>SP2</td><td>Internal speed</td></tr>
</table>

<table>
<tr><td></td><td></td><td>command option 2</td><td rowspan="3"><table>
<tr><td>0</td><td>0</td><td>0</td><td>Internal speed 1/
External analog
External analog</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>internal speed 2</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>internal speed 3</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>internal speed 4</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>internal speed 5</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>internal speed 6</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>internal speed 7</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>internal speed 8</td></tr>
</table>
Note:0 means OFF,1means ON.
Note 2: if the SigIn port is not specified SP3, SP2, SP1 function, is OFF by default.</td></tr>
<tr><td>11</td><td>SP3</td><td>3nternal speed command option 1</td></tr>
<tr><td>12</td><td>TR1</td><td>1The internal torque command option 1</td></tr>
<tr><td>13</td><td>TR2</td><td>The internal torque command</td><td><table>
<tr><td>TR2</td><td>TR1</td><td>Torque command</td></tr>
<tr><td>0</td><td>0</td><td>The external torque 1 / internal analog torque command</td></tr>
<tr><td>0</td><td>1</td><td>The internal torque 2</td></tr>
<tr><td>1</td><td>0</td><td>The internal torque 3</td></tr>
<tr><td>1</td><td>1</td><td>The internal torque 4</td></tr>
</table>
Note:0 means OFF,1means ON.
Note 2: if the SigIn port doesn't specify TR2, TR1 functions, is OFF by default.</td></tr>
<tr><td>14</td><td>Cmode</td><td>Control mode switch</td><td>Parameter Pn002 for 3, 4, 5, control mode can be switched.</td></tr>
<tr><td>15</td><td>Cgain</td><td>Gain switch</td><td>When the parameter Pn045 is 2, through Cgain switch gain combination:
OFF：The first gain
ON： The second gain</td></tr>
<tr><td>16</td><td>Gn1</td><td>Electronic gear molecular option 1</td><td rowspan="2">By Gn1, Gn2 combination, electronic gear molecules 1 ~ 4<table>
<tr><td>Gn2</td><td>Gn1</td><td>Electronic gear ratio than N</td></tr>
<tr><td>OFF</td><td>OFF</td><td>the 1 molecular</td></tr>
<tr><td>OFF</td><td>ON</td><td>the 2 molecular</td></tr>
<tr><td>ON</td><td>OFF</td><td>the 3 molecular</td></tr>
<tr><td>ON</td><td>ON</td><td>the 4 molecular</td></tr>
</table></td></tr>
<tr><td>17</td><td>Gn2</td><td>Electronic gear molecular option 2</td></tr>
<tr><td>18</td><td>CINV</td><td>Instructions in reverse</td><td>The speed or torque control mode, take the speed or torque of the instruction.</td></tr>
</table>

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<table>
<tr><td></td><td></td><td></td><td>OFF: The normal order
ON: Instructions in reverse</td></tr>
<tr><td>19</td><td>Pclear</td><td>Position deviation to clear</td><td>Clear position deviation value of the counter, clear way by Pn108 parameters:<table><tr><td>Pn108</td><td>way</td></tr><tr><td>0</td><td>During the Pclear level ON</td></tr><tr><td>1</td><td>Pclear rise along time (from OFF to ON)</td></tr></table></td></tr>
<tr><td>20</td><td>INH</td><td>Pulse input is prohibited</td><td>OFF: Pulse allows input instructions
ON : Input instruction pulse have been banned, ignored</td></tr>
<tr><td>21</td><td>PC</td><td>Proportional control</td><td>OFF: Speed loop PI control
ON :Speed loop P control</td></tr>
<tr><td>22</td><td>GOH</td><td>The origin return to trigger</td><td rowspan="2">See the appendix F</td></tr>
<tr><td>23</td><td>REF</td><td>The origin return reference point</td></tr>
<tr><td>24</td><td>Pos1</td><td>pos1Pos1 internal location choice</td><td rowspan="4">See the appendix G</td></tr>
<tr><td>25</td><td>Pos2</td><td>pos2Pos2 internal location choice</td></tr>
<tr><td>26</td><td>ptriger</td><td>Trigger internal position command</td></tr>
<tr><td>27</td><td>pstop</td><td>Suspend internal position command</td></tr>
</table>

4.4.2 SigOut port function explanation

Number	symbol	function	Functional specifications
0	null	No function specified	
1	Alarm	Alarm detection	OFF: alarm ON: no alarm
2	Ready	servo is ready	OFF: There are alarm or malfunction ON: No alarm and fault
3	Emg	Emergency stop checked out	OFF：Not in a state of emergency stop ON : In a state of emergency stop
4	Preach	Positioning to complete	Position control mode OFF: Pn104 position deviation is greater than the parameter set value ON: The value of position deviation less than or

			equal to Pn104 parameters setting
5	Sreach	Speed to reach	OFF: Speed is less than Pn021 set value ON： Speed is greater than or equal to Pn021 set value
6	Treach	reach the predetermined torque	OFF： Torque is less than Pn024 set value ON： The value of torque is greater than or equal to Pn024 set
7	Zero Speed	zero speed	OFF: Faster than Pn027 set value ON： Speed is less than or equal to Pn027 set value
8	Run	Servo motor current	OFF: The motor has no electricity ON: motor current
9	BRK	Electromagnetic brake	OFF: Electromagnetic brake ON : 电磁制动器释放 Electromagnetic brake release
10	HOME	The origin return to complete	See the appendix F
11	Pnear	Located close to	in a position control OFF: Pn106 position deviation is greater than the parameter set value ON: The value of position deviation less than or equal to Pn106 parameters setting
12	TRQL	The torque limit	OFF: The motor torque is not limited ON: The motor torque is limited When the torque command reaches Pn008 Pn009, Pn010, the parameter value, the smallest Pn011 TRQL to ON.
13	SPL	The speed limit	When the torque control OFF: Motor speed wasn't up to the limiting value ON: Motor speed has reached the limit Look Pn198 Pn199 instructions
14	TCMDreach	Look Pn198 Pn199 instructions	In torque control: OFF： Motor torque did not reach the upper machine set torque instruction value ON： The setting of motor torque reaches the upper machine set torque instruction value See Pn208, Pn209 instructions.

Chapter 5 monitoring parameters and operation

5.1 Monitor panel operation

As shown in the third chapter "monitoring mode operation"

5.2 Monitor the parameter list

Number	instruction
dn-00	Monitor display options (the default for motor speed), and by setting the Pn079 parameter, make the dn - 00 show different monitoring status.
dn-01	(r/min) Speed instruction (r/min)
dn-02	The average torque (%)
dn-03	Position deviation value (9999 ~ 9999) (unit: a)
dn-04	The ac power voltage (V)
dn-05	The maximum instantaneous torque (%)
dn-06	Input pulse frequency (in KHZ)
dn-07	Heat sink temperature (℃)
dn-08	The current motor speed (r/min)
dn-09	Effective input command pulse accumulative total value low (9999 ~ 9999) (unit: a)
dn-10	Effective input command pulse accumulative total value high (5000 ~ 5000) (unit: m) (pulse accumulative total value high more than + 5000, the high position 0, low today, to count)
dn-11	Effective feedback position control, the encoder pulse accumulative total value is low (9999 ~ 9999) (unit: a)
dn-12	Effective feedback position control, the encoder pulse accumulative total value high (5000 ~ 5000) (unit: m) (feedback pulse accumulative total value more than + 5000 high, high position 0, low today, to count)
dn-13	Regenerative braking load factor
dn-14	Signal input port state, from left to right in turn is SigIn1 ~ SigIn4 (1: high level; 0: low level)
dn-15	Output port status signal, from left to right in turn is SigOut1 ~ SigOut4 (1: high level; 0: low level)
dn-16	Analog torque command voltage (V)
dn-17	Simulation speed reference voltage (V)
dn-18	Output function status register
dn-19	After power on the servo, motor feedback pulse accumulative total value low (9999 ~ 9999) (unit: a)
dn-20	Electric servo, motor feedback pulse accumulative total value high (5000 ~ 5000) (unit: m) (feedback pulse accumulative total value more than + 5000 high, high position 0, low today, to count)

dn-21	The drive software version
dn-22	Encoder UVW signals from left to right in order for the sale of state level (1: high level; 0: low level)
dn-23	Rotor absolute position

Note: Dn - 18 output function status register SigOut port state of logic, Namely each Bit position shown in the table below:

Bit	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
function	Run	Zero Speed	Treach	Sreach	Preach	Emg	Ready	Alarm
Bit	Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
function	-	-	-	SPL	TRQL	Pnear	HOME	BRK

Function for Bit is 0, said ON state, 1 is the OFF state.

Chapter 6 alarm and processing

6.1 Alarm clearance operations

As shown in the third chapter of the auxiliary model operation "police clearance operation"

6.2 Alarm content and countermeasure

Alarm display	Clear way	Abnormal alarm instructions	Elimination method
AL-01	power on	The memory chip memory contents are destroyed or damaged	1: To initialize the parameters, and observation. 2：Internal chip is damaged, replace the servo amplifier.

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AL-02	reset	In the case of lack of low-pressure warning, dc bus voltage below Pn083 alarm (200 v).	1：The external power supply voltage is measured with a voltmeter is in accordance with the specifications. If conform to the specifications, can use Fn009 auxiliary mode, busbar voltage correction. 2：Through the display panel, into monitor mode, observations show that whether the voltage is consistent with an external voltage, if the difference is too big, the internal components damaged, replace the servo amplifier. 3：Motor start too fast, large load, which leads to the internal bus voltage is lower. If it is single phase power supply access, please use three-phase power supply connection.
AL-03	power on	Internal dc bus voltage is higher than Pn084 (365 v).	1： The external power supply voltage is measured with a voltmeter is in accordance with the specifications. If conform to the specifications, can use Fn009 auxiliary mode, busbar voltage correction. 2： Through the display panel, into monitor mode, observations show that whether the voltage is consistent with an external voltage, if the difference is too big, the internal components damaged, replace the servo amplifier. 3： In a reasonable range, appropriate reduction small load inertia or prolonged deceleration, or need additional braking resistor.

AL-04	power on	Intelligent power module directly produce the report to the alarm	1： Check the motor line U, V, W and encoder line is normal. 2： Turn the power off half an hour, electricity again, if the alarm is still there, may be internal power module is damaged, please replace the servo amplifier. 3: Speed loop and current loop pid parameter Settings.
AL-05	reset	overload 1	Pn014 parameters set period of time for greater than Pn012 overload capacity parameters or Pn013 set by multiples of the current. 1： Check the motor line U, V, W and encoder line is normal. 2: Motor high frequency, acceleration and deceleration delay when the director of the deceleration time, reduce the load inertia, or in more powerful capacity of servo motor.
AL-06	power on	overload 2	Pn015 parameter set period of time, 3 times greater than the rated load. Eliminate overload method reference 1. 注：有些电机只能承受额定负载的 2.5 或 2 倍 ，则不按 3 倍作为计算。Note: some motor can only bear the 2.5 or 2 times of the rated load, are not as calculated as 3 times.
AL-07	reset	Motor speed is too high	1： Check the motor line U, V, W and encoder line is normal. 2： Reduce the pulse frequency of input instructions, or adjust the electronic gear ratio. 3： Improper speed loop pid parameter adjustment, readjust.
AL-08	reset	70℃Servo amplifier heat sink overheating, actual temperature has more than 70 ℃	1： Repeat overload will cause the drive overheating, please change the motor operation mode. For prolonging the life of the server, and should be used under the environment temperature of 55 ℃, the recommended temperature does not exceed

			40 ℃. 2： Brake average power overload.
AL-09	power	The encoder abnormal	1： Check whether the motor encoder wiring is connected to the drive. 2： Check whether the motor encoder interface virtual welding, short circuit, or fall off, the encoder the power cord is normal connection. 3: Check the encoder voltage (5 v + / - 5%). (encoder line is long, need to pay special attention to)
AL-10	reset	600kppsActually receives the pulse frequency is too high, more than 600 KPPS	1： Electronic gear ratio (A/B) Settings. To adjust the ratio of A/B. 2: Reduce the pulse frequency of the input command
AL-11	reset	Postion Pulse deviation value over the default	1： Check the motor line U, V, W and encoder line is normal. 2: Position command smoothing time constant set is too large. 3: Increase the position loop gain, to speed up the response speed of the machine. 4： Using the monitor model, check to see if the motor output torque limits.
AL-12	reset	Current sampling circuit may be damaged	1： The instantaneous electric current too big, is beyond the range of detection. 2: Check the motor line (U, V, W) whether loose fall off. 3: Sampling circuit is damaged, replace the servo amplifier.
AL-13	power on	The CPU internal fault	1: The external interference is too large, reduce the interference. 2： The CPU chip is damaged, replace the servo amplifier.
AL-14	Emergency stop	Emergency stop signal is effective	See if port, setting of emergency stop function, signal contact is in a normally closed state (ON)
AL-15	Abnormal driving ban	Ccwl or.cwl to OFF state	1: Check CCWL,.cwl wiring, the signal contact is in a normally closed state (ON).

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			2：If do not use the driving ban function, can set pn006 parameters, to block it.
AL-16	Brake average power overload	The input voltage is too high or braking load rate above 85%	1： Using the monitoring mode to see if the input voltage is beyond the normal range 2： Reduce the start-stop frequency 3： External more powerful regenerative braking resistor (remove internal brake resistance, not parallel) 4： Increase the deceleration time 5： Renewable power resistance value and the resistance value is set correctly 6：Change a more powerful motor and drive
AL-17	Abnormal encoder signal frequency output Settings	Set the encoder output of frequency division than not.	Resetting Pn016, Pn017 parameter values, must satisfy the DA/DB > = 1.
AL-18	Improper motor code sets	The current drive model does not support setting of motor model	Reference drive and motor type adapter table, resetting Pn001.

Chapter 7 Modbus communication function

7.1 Modbus communication profile

This drive is RS - 232 and RS - 485 communication interface, the user can choose a kind of communication interface and the driver. Communication method adopts the Modbus transfer agreement, can use the following two communication modes: ASCII (American Standard Code for information interchange) mode and the RTU (Remote Terminal Unit) model. Before communication, you must first set up good communication related parameters (Pn064 ~ Pn071).

7.1.2 Coding meaning

ASCII mode:

Each 8-bit data consists of two ASCII characters. For example, a 78 - byte data 1 h (hexadecimal notation), expressed in ASCII, contains the '7' ASCII (37 h) and "8" ASCII (38 h).

The Numbers 0 to 9 and letters A through F ASCII, the following table:

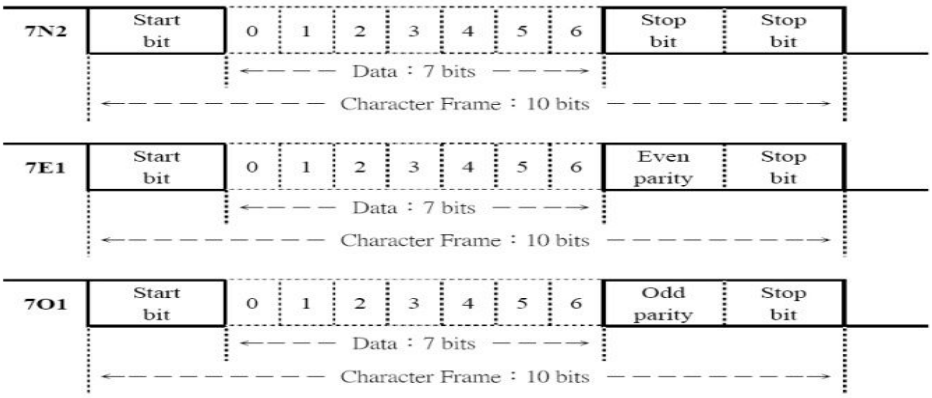
Character symbols	'0'	'1'	'2'	'3'	'4'	'5'	'6'	'7'
Corresponding to the ASCII	30H	31H	32H	33H	34H	35H	36H	37H
Character symbols	'8'	'9'	'A'	'B'	'C'	'D'	'E'	'F'
Corresponding to the ASCII	38H	39H	41H	42H	43H	44H	45H	46H

RTU mode:

Each 4 - bit 8-bit data by two hexadecimal data, Namely the general Number of hexadecimal. For example, decimal in 1 120 - byte RTU data representation for 78 H.

7.1.3 The data structure

10 bit character mode (for 7 bit data)



11 bit character mode (for 8 bit data)

7.2 Communication protocol structure

ASCII mode

Name	meaning	instruction
Start	Communication began	The starting character ':' (ASCII: 3 ah)
Address	The communication address	'0'=30H Address, that is, drive site Number. For example: a drive site # 32, hexadecimal for 20 h, Address = '2', '0' or '2' = 32 h, '0' = 30 h
CMD	order	1 byte contains two ASCII. Commonly used commands: 3 h (read registers), 6 h ((reading a single register), 8 h (diagnostic function), 10 h (write multiple register)
DATA(n-1)	The data content	N = 2 N word bytes = 4 N ASCII (N < = 8)
.....		
DATA(0)		
LRC	Check code	1 byte contains two ASCII

End 1	The end of the code 1	CR0 dh, i.e., CR
End 0	The end of the code 0	LF0 ah, that is, LF

RTU mode

Name	meaning	instruction
Start	Communication began	The rest time to at least 3.5 bytes transmission time
Address	The communication address	Address =20H Address, that is, drive site Number. For example: a drive site # 32, hexadecimal for 20 h, Address = 20 h
CMD	command	1 byte. Commonly used commands: 3 h (read registers), 6 h ((reading a single register), 8 h (diagnostic function), 10 h (write multiple register)
DATA(n-1)	data content	Word N = 2 N bytes (N < = 9)
.....		
DATA(0)		
CRC	Check code	1 byte
End 1	The end	The rest time to at least 3.5 bytes transmission time

7.3 Commonly used command code

7.3.1 Reading a multiple register

03H： Reading a multiple register

Instructions: read the N word, N values for 1 ~ 8 scope

Example: from the site of 01 h drive read starting address 0013 h 2 words.

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1. ASCII mode

PC - > drive

start		':'
Address		'0'
		'1'
cmd		'0'
		'3'
Data source address	high bit	' 0 '
		' 0'
	low bit	'1'
		' 3 '
Read the register Number		' 0 '
		' 0 '
		' 0 '
		' 2'
LRC		'E'
		'7'
END1(CR)		0DH
END0(LF)		0AH

Response - > PC (OK)

start		':'
Address		'0'
		'1'
cmd		'0'
		'3'
Data bytes		'0'
		'4'
Address 0013 h content	high bit	' 0 '
		' 0 '
	low bit	' 3 '
		'2'
Address 0014 h content	high bit	'0 '
		'0'
	low bit	'0'
		' A '
LRC		'B'
		'C'
END1(CR)		0DH
END0(LF)		0AH

Response - > PC (Error)

start	':'
Address	'0'
	'1'
cmd	'8'
	'3'
Abnormal code	'0'
	'2'
LRC	'7'
	'A'
END1(CR)	0DH
END0(LF)	0AH

2. RTU mode

PC - > drive

Address		01H
CMD		03H
Data source address	high bit	00H
	low bit	13H
Read the register Number		00H
		02H

Response - > PC (OK)

Address		01H
CMD		03H
Data bytes		04H
The content of the 0013 h address	high bit	00H
	low bit	32H
The	high	00H

Response - > PC (Error)

Address	01H
CMD	83H
Abnormal code	02H
CRC low bit	C0H
high bit	F1H

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CRC low bit	35H
CRC high bit	CEH

content of the 0014 h address	bit	
	low bit	0AH
CRC low bit		DBH
CRC high bit		FBH

7.3.2 Write a single register

06H： Write a single register

Description: write a word to the register.

For example: drive station Number of 01, write data initial address is 0013 h, write data, 100 (64 h).

1. ASCII MODE

PC - > drive

start		':'
Address		'0'
		'1'
cmd		'0'
		'6'
Data source address	high bit	' 0 '
		' 0'
	low bit	' 1 '
		' 3 '
The data content (word format)		' 0 '
		' 0 '
		' 6'
		' 4'
LRC		'8'
		'2'
END1(CR)		0DH
END0(LF)		0AH

Response - > PC (OK)

start		':'
Address		'0'
		'1'
cmd		'0'
		'6'
Data source address	high bit	' 0 '
		' 0'
	low bit	' 1 '
		' 3'
The data content (word format)		' 0 '
		'0'
		' 6 '
		' 4 '
LRC		'8'
		'2'
END1(CR)		0DH
END0(LF)		0AH

Response - > PC (Error)

start	':'
Address	'0'
	'1'
cmd	'8'
	'6'
Abnormal code	'0'
	'3'
LRC	'7'
	'6'
END1(CR)	0DH
END0(LF)	0AH

2. RTU MODE

PC - > drive

ddress		01H
CMD		06H
Data source address	high bit	00H
	low bit	13H
The data content (word format)		00H
		64H
CRC low bit		79H
CRC high bit		E4H

Response - > PC (OK)

Address		01H
CMD		06H
Data source address	high bit	00H
	low bit	13H
The data content (word format)	F4H	00H
	48H	64H
CRC low bit		79H
CRC high bit		E4H

Response - > PC (Error)

Address	01H
CMD	86H
Abnormal code	03H
CRC low bit	02H
CRC high bit	61H

7.3.3 diagnosis

08H: Diagnostic function

Note: use 0000 h subfunction code, check the signal transmission between the Master and Slaver. The data content can be any Number.

For example: the site of 01 h drive using diagnostic function

1. ASCII Mode

PC - > drive

start		':'
Address		'0'
		'1'
cmd		'0'
		'8'
Subroutine code	high bit	' 0 '
		' 0'

Response - > PC (OK)

start		':'
Address		'0'
		'1'
cmd		'0'
		'8'
Subroutine code	high bit	' 0 '
		' 0 '

Response - > PC (Error)

start	':'
Address	'0'
	'1'
cmd	'8'
	'8'
Abnormal code	'0'
	'3'

	low bit	‘ 0 ’
		‘ 0 ’
The data content (word format)		‘ 8 ’
		‘ 6 ’
		‘3’
		‘ 1’
LRC		‘4’
		‘0’
END1(CR)		0DH
END0(LF)		0AH

	low bit	‘ 0 ’
		‘ 0 ’
The data content (word format)	high bit	‘ 8 ’
		‘ 6 ’
	low bit	‘3’
		‘ 1’
LRC		‘4’
		‘0’
END1(CR)		0DH
END0(LF)		0AH

LRC	‘7’
	‘4’
END1(CR)	0DH
END0(LF)	0AH

2. RTU mode

PC - > drive

Address		01H
CMD		08H
Subroutine code	high bit	00H
	low bit	00H
The data content (word format)	high bit	86H
	low bit	31H
CRC low bit		43H
CRC high bit		BFH

Response - > PC (OK)

Address		01H
CMD		08H
Subroutine code	high bit	00H
	low bit	00H
The data content (word format)	high bit	86H
	low bit	31H
CRC low bit		43H
CRC high bit		BFH

Response - > PC (Error)

Address	01H
CMD	88H
Abnormal code	03H
CRC low bit	06H
CRC high bit	01H

7.3.4 Write multiple register

10H: Write multiple register

Note: write the N word to register in a row, the N maximum 8 h (08).

For example: 100 (0064 h), 300 (012 ch) writes JuHao for 01 servo drives the starting address of 0013 h two consecutive registers.

1. ASCII MODE

PC - > drive

start		':'
Address		'0'
		'1'
cmd		'1'
		'0'
Data source address	high bit	' 0 '
		' 0'
	low bit	' 1 '
		' 3 '
Write the register Number		' 0 '
		' 0 '
		' 0 '
		' 2 '
Data bytes		' 0 '
		' 4'
Write data to the 0013 h	high bit	' 0 '
		' 0 '
	low	' 6'

Response - > PC (OK)

start		':'
Address		'0'
		'1'
cmd		'1'
		'0'
Data source address	high bit	' 0 '
		' 0 '
	low bit	' 1 '
		' 3 '
Write the register Number	high bit	' 0 '
		'0'
	low bit	'0'
		' 2 '
LRC		'4'
		'1'
END1(CR)		0DH
END0(LF)		0AH

Response - > PC (Error)

start	':'
Address	'0'
	'1'
cmd	'9'
	'0'
Abnormal code	'0'
	'3'
LRC	'6'
	'C'
END1(CR)	0DH
END0(LF)	0AH

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	bit	‘ 4 ’
Write data to the 0014 h	high bit	‘ 0 ’
		‘ 1 ’
	low bit	‘ 2’
		‘ C’
LRC		‘4’
		‘5’
END1(CR)		0DH
END0(LF)		0AH

2. RTU Mode

PC - > drive

Address		01H
CMD		10H
Data source address	high bit	00H
	low bit	13H
Write the register Number	high bit	00H
	低位 low bit	02H
Data bytes		04H
Write data to the 0013 h	high bit	00H
	low bit	64H
Write data to	high bit	01H

Response - > PC (OK)

Address		01H
CMD		10H
Data source address	high bit	00H
	low bit	13H
Write the register Number	high bit	00H
	low bit	02H
CRC low bit		B0H
CRC high bit		0DH

Response - > PC (Error)

Address	01H
CMD	90H
Abnormal code	03H
CRC low bit	0CH
CRC high bit	01H

the 0014 h	low bit	2CH
CRC low bit		F3H

A signed integer.

Note 2: write a single register, PC must be about 5.5 ms, waiting for the driver to complete the internal data storage of burning; By the same token, the register write N (N < = 8), the upper machine needs 5.5 ms * N waiting time, to send the write command.

Note 3: read the Dn - 13 parameters, the actual voltage value = value read / 100.

7.3.5 Check code to calculate

1. LRC England check

ASCII mode using LRC England (Longitudinal Redundancy Check) Check code. LRC England calibration is to calculate the Address, CMD, initial data Address and the sum total of the data content will be combined results in 256, modulo (if the sum of the results for 150 h, then only take 50 h), to calculate its complement, the final results for LRC England check code.

Example: 01 H servo drive from site 0013 address read 2 word (word)

start		':'
Address		'0'
		'1'
cmd		'0'
		'3'
Data source address	high bit	' 0 '
		' 0'
	low bit	'1'
		' 3 '
Read the register Number		' 0 '
		' 0 '
		' 0 '
		' 2'
LRC		'E'
		'7'
END1(CR)		0DH
END0(LF)		0AH

From the Address data add to the last data:

01 H + 3 H + 00 00 H + 13 H + H + 02 H = 19 H, for 19 H complement E7H, so LRC England as the 'E', '7'

2. CRC check

RTU mode adopts CRC (Cyclical Redundancy Check) Check code. Cyclic redundancy check (CRC) domain into two bytes, containing a binary 16-bit value. Attached to the message behind the CRC value calculated by the transmitting device. When receiving device on the receiving message to recalculate the CRC value, and the calculated results compared to actually receives the CRC value. If the two values are not equal, is wrong.

CRC calculation, to a 16-bit registers with full 1. Then put the message in the continuous section 8 of the seats on the subsequent calculations. Only the characters of the eight data bits participate in the operation of generating CRC, start bit, stop bits and parity bit CRC calculation will not be involved.

To generate CRC process as follows:

1. The a 16-bit registers into hexadecimal FFFF. (1) all will be referred to as the CRC register.
2. The first 8 bytes of a message with a 16-bit CRC register low byte exclusive or, result in CRC register.
3. The CRC register moves to the right one to the LSB (direction), the MSB filling zero. Extraction and detection of LSB.
4. (if the LSB of 0) : repeat step 3 (another shift).
   (if the LSB to 1) : the CRC register exclusive or polynomial value 0 xa001 (1010, 0000, 0000, 0001).
5. Repeat steps 3 and 4 until complete displacement of 8 times. As after this action, will complete the full operation of eight bytes.
6. For the next byte of message repeat steps 2 to 5, this operation until all message being processed.
7. CRC register the final content for CRC value.
8. When the CRC value is placed on a message, high and low byte must exchange. Byte is sent first, and then the high byte

For example: from the site of 01 H drive reads two words (word), reading the starting address of 0200 H address. The last of the data from the Address to calculate the CRC register at the end of the content is 0704 H, is the instruction format as shown below, note that the front of the 04 H in H.

Address		01H
CMD		03H
Data source address	high bit	02H
	low high	00H
Data length (in terms of word)		00H
		02H
CRC low bit		04H
CRC high bit		07H

CRC generation paradigm:

he following CRC value by C language. This function requires two parameters:

Unsigned char * data; / / data source address, used to calculate the CRC value

Unsigned char length; / / data length

This function returns the unsigned integer type of CRC value.

```
unsigned int crc_chk(unsigned char * data,unsigned char length)
{
```

```
  int i,j;
  unsigned int crc_reg=oxFFFF;
   While(length- -)
   {
    Crc_ reg ^=*data++;
    for(j=0;j<8;j++)
    {
        If(crc_reg & 0x01)
        {
           crc_reg=( crc_reg >>1)^0xA001;
        }else
        {
         crc_reg＝crc_reg >>1;
        }
    }
  }
  return crc_reg;
}
```

7.3.6 Abnormal code

In the process of communication, may create a communication error, common error event in the following table:

Communication error event	Servo driver approach
Read/write parameters, data address is not correct;	The request for processing, and abnormal return an error code
Write parameters, data Number more than the maximum or not within the scope of this parameter;	The request for processing, and abnormal return an error code
Data transmission errors or check code (LRC England, CRC, parity check) error	Data is discarded, not returns the response, PC should be request as state handling overtime

Drive send error exception code, will command function code plus 80 h after send the ModBus master station system together. Abnormal code in the following table:

01 H	The function of the servo driver does not recognize the request code
02 H	Data address illegal request
03 H	Request the data given in the servo driver does not allow (read and write data Number more than drive to allow maximum or write data value is beyond the scope of parameter values)
04 H	Servo drives are beginning to execute the request, but can't complete the request.

7.4 The servo parameters, the state information communication address

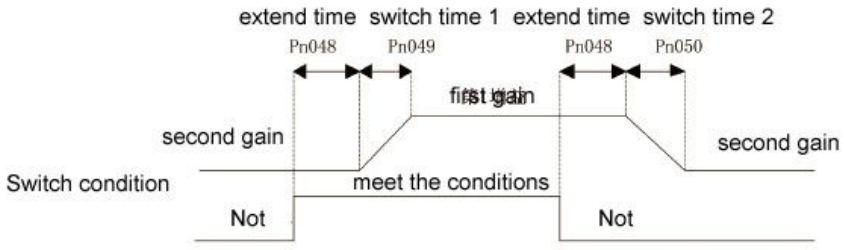
Data address		meaning	instructions	operation
hexadecimal	The decimal system			
0000H~00EFH	0 ~ 239	Parameter setting area	Corresponding Pn000 ~ Pn239	Can read but write
0164H~016DH	356 ~ 365	Alarm recording area	In Fn000 can view, corresponding Sn - 0 to Sn - 9	read-only
0170H~0185H	368 ~ 389	Data monitoring area	Corresponding Dn000~Dn021	read-only

The appendix

Appendix A gain switch

The first gain		The second gain	
parameter	Name	parameter	Name
Pn153	The speed regulator proportional gain 1	Pn155	The speed regulator proportional gain 2
Pn154	Speed regulator integral time constant of 1	Pn156	Speed regulator integral time constant of 2
Pn192	Q shaft torque regulator proportional gain is 1	Pn194	Q shaft torque regulator proportional gain is 2
Pn193	Q shaft torque regulator integral time constant of 1	Pn195	Q shaft torque regulator integral time constant of 2
Pn196	Torque Q axis filter time constant of 1	Pn197	Torque Q axis filter time constant of 2
Pn115	The position controller gain 1	Pn116	The position controller gain 2

Note: gain switch, must be in the right control mode, the setting parameters Pn046 conditions are right, to meet gain switching conditions, to switch.



Gain switching sequence diagram

Appendix B control mode switch

Position/speed control mode switch

Using the control switch (cmode), can be controlled by input port SigIn contact for position control and speed control mode switch.

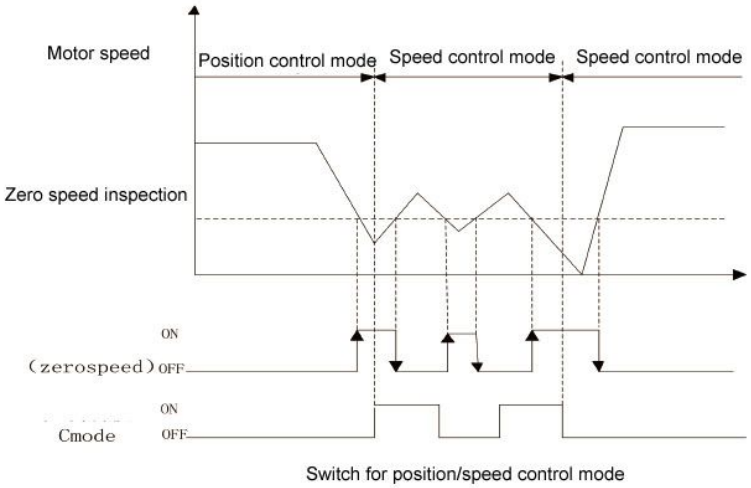
Cmode relationship with control mode is shown below.

Cmode	Control mode
OFF	Position control mode
ON	Speed control mode

Can be in the state of zero speed control mode switch. But to be on the safe side, please switch with the servo motor stopped. From the position control mode switch to the speed control mode, the trapped pulse will be cleared. Before the machine can make, please make sure to enter the control mode (state) of cmode pin. Motor can make, there are two main ways to switch, sequence diagram as shown below:

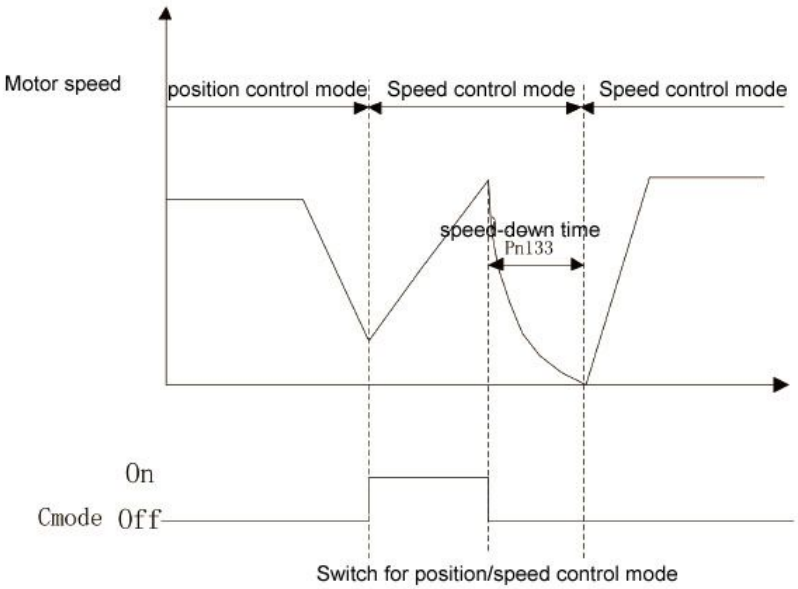
◢Pn132=0:

Only the zero speed condition, switching signal changes, the mode switch is valid; If not zero speed state, the switching signal is changed, then enter into the state of zero speed signal, the mode switch does not occur.



Switch for position/speed control mode

◢Pn132=1:



B.2 Position/torque control mode switch

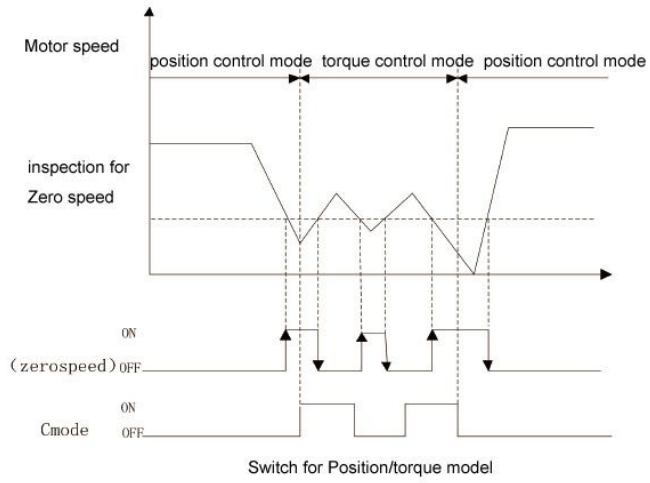
Using the control switch (cmode), can be controlled by input port SigIn contact position control mode and the torque control mode switching. Cmode relationship with control mode is shown below.

Cmode	Control mode
OFF	Position control mode
ON	Torque control mode

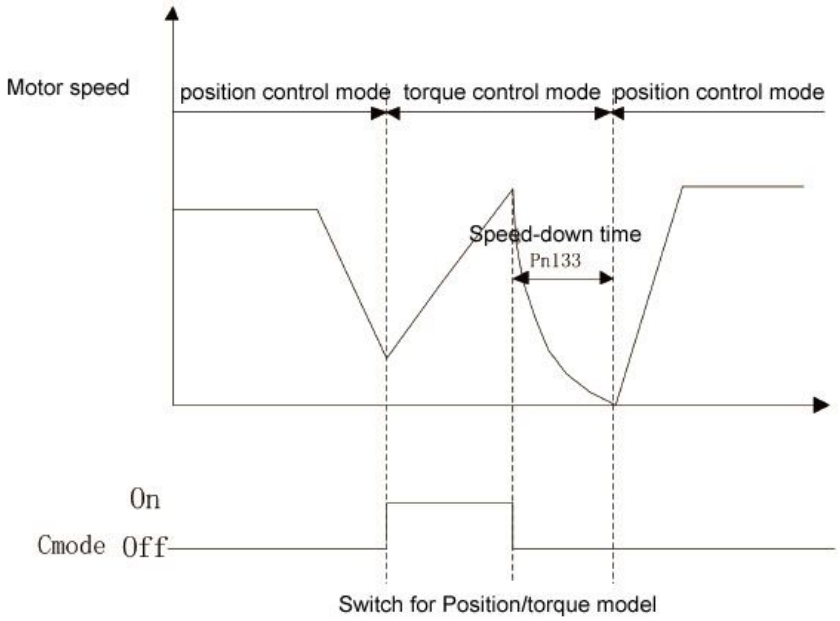
Can be in the state of zero speed control mode switch. But to be on the safe side, please switch with the servo motor stopped. From the position control mode switch to the torque control mode, the trapped pulse will be cleared. Motor can make, there are two main ways to switch, sequence diagram as shown below:

◢Pn132=0:

Only the zero speed condition, switching signal changes, the mode switch is valid; If not zero speed state, the switching signal is changed, then enter into the state of zero speed signal, the mode switch does not occur.



◢Pn132=1:



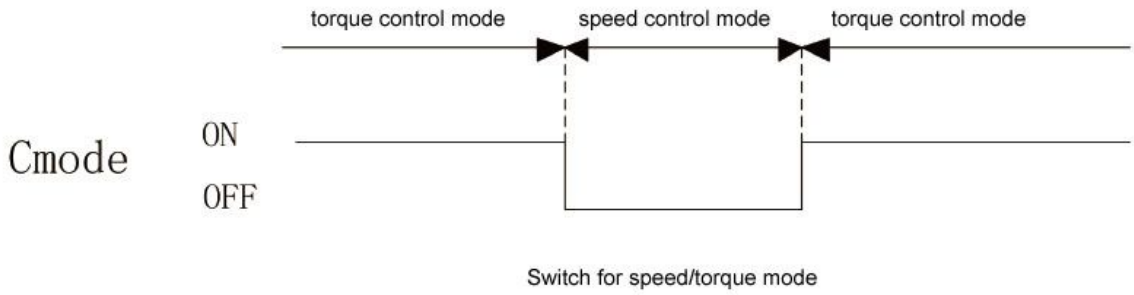
B.3 Speed/torque control mode switch

Using the control switch (cmode), can be controlled by input port SigIn contact for speed control mode and the torque control mode switching.

Cmode relationship with control mode is shown below.

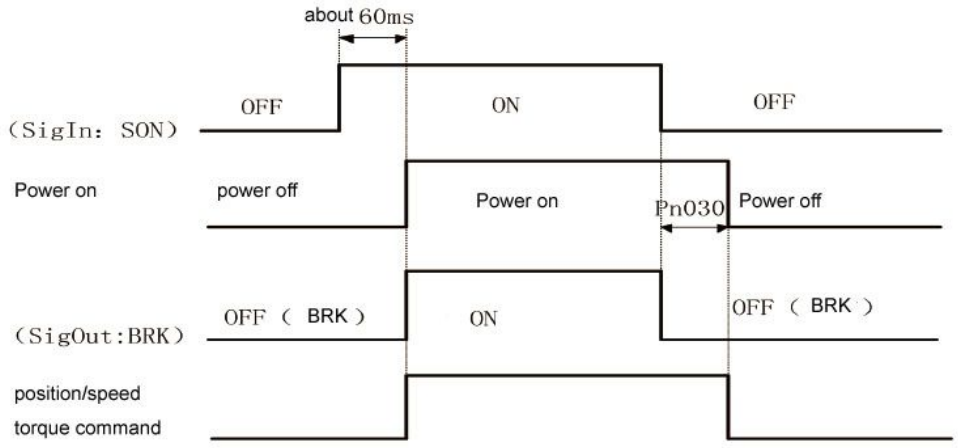
Cmode	Control mode
OFF	Position control mode
ON	Torque control mode

Whenever can control mode switch, switching sequence diagram as shown below:



Appendix C servo driver work sequence

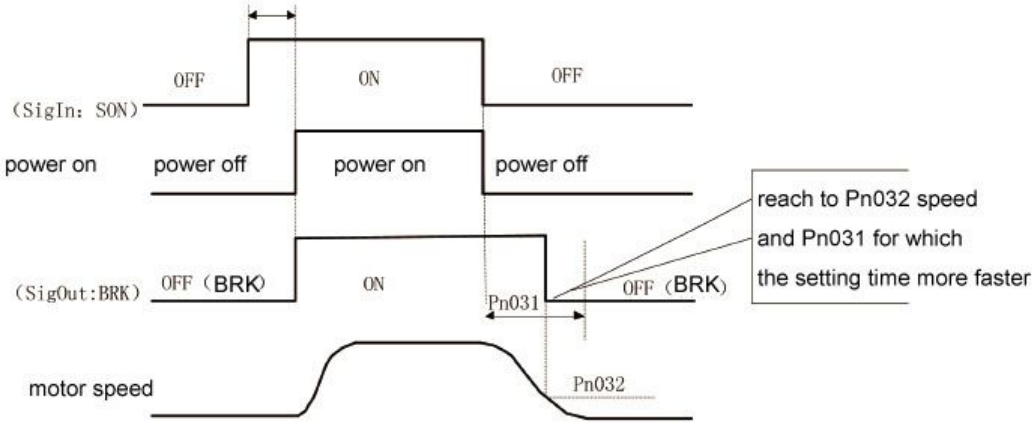
Motor resting ON/OFF action sequence



Note 1: when using electromagnetic brake function, servo broken way can make Pn004 must be set to 2.

Note 2: when Pn029 motor speed is lower than the argument, the electromagnetic brake action sequence.

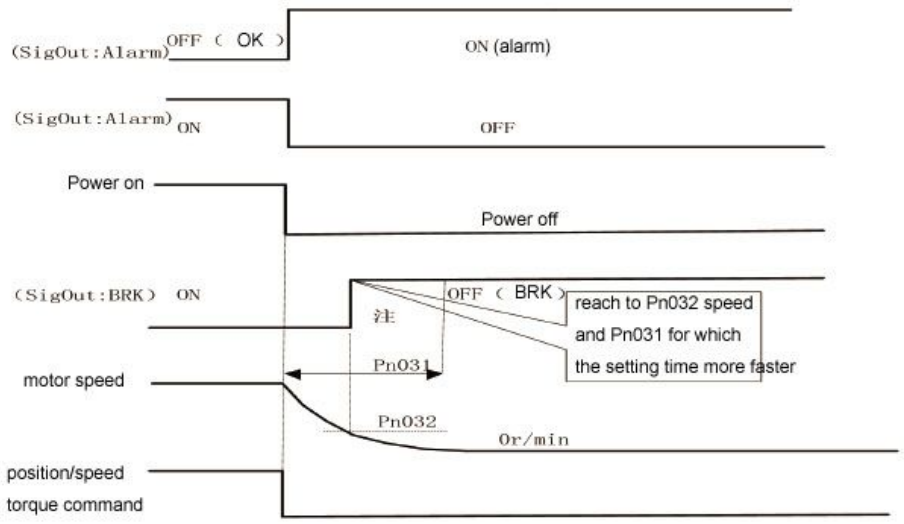
C.2 In the operation of the motor ON/OFF action sequence



Note 1: when using electromagnetic brake function, servo broken way can make Pn004 must be set to 2

Note 2: when the motor speed is not lower than Pn029 setting parameters, the electromagnetic brake action sequence.

C.3 When the servo ON alarm sequence



Note 1: when using electromagnetic brake function, servo broken way can make Pn005 must be set to 2

Appendix D electromagnetic brake

Electromagnetic brake (to keep the brakes, brake losing electricity, are connected to the motor is used to lock the vertical or inclined workbench, prevent the servo power after losing the workbench. Implement this function, you must choose and buy motor with brake. The brake can be used to keep the workbench, must not be used to slow down and stop the machine movement.

n004 parameter must be set using the electromagnetic brake, to 2, and specify the SigOut port function. Pn029 drive according to the speed of the motor running, according to the parameters setting, choose corresponding braking time sequence, perform the function of electromagnetic brake. Please refer to the appendix C for specific timing.

Appendix E regenerative braking resistor

When servo motor running in generator mode, electricity will flow by motor drives, called renewable electricity. The following usage, can make the servo motor running in generator (renewable) mode:

(1) Servo motor, the deceleration is running by slowing down to stop.

(2) When applied to the vertical load.

(3) Driven by load operation of the servo motor.

The renewable electricity will be absorbed by the drive of the primary loop filter capacitor, but too much renewable electricity, filter capacitance cannot afford, regenerative resistor must be used to burn off excess renewable electricity. When there is a renewable energy is too large, the internal brake resistance cannot be fully absorbed, resulting in AL - 03 (overvoltage), AL - 08 (temperature) or AL - 16 (such as brake average power overload) call the police. According to the practical application, increase deceleration time, if still alarm, requires external braking resistance, enhance the braking effect. External braking resistance tolerance range of 40 ~ 200 ohms, 1000-50 w, the smaller the value, the braking current, the greater the power, the greater the braking resistance is required for braking energy is larger, but the value is too small may cause damage to the drive, resistance test method is from big to small, until the alarm is no longer present drives, running at the same time, the brake resistance temperature is not too high. When external braking resistor, down the internal regenerative

braking resistor. Because regenerative resistor in the consumption of renewable power, can produce high temperature above 100 ° C, please be careful, the connection of regenerative resistor wire please use of heat-resistant non-flammable cables, and confirm the regenerative resistor without touching anything.

Note: if the alarm when using regenerative resistor, please cut off power supply, cooling and a half hours. Due to the regenerative transistor failure, abnormal regeneration resistance heating, may cause a fire. Please be sure to choose according to applications, matching the braking resistor.

Appendix F origin point

F. 1 origin point operation steps

Looking for a reference point

After start origin regression function, looking for reference point at the origin and return to the first rate, can use SigIn input terminals REF, CCWL or.cwl as a reference point, can also be Z pulse as a reference point, can choose forward or reverse direction finding.

2：Find the origin

When find reference point, and then to find the origin at the second speed, can choose continue to forward or backward turn-back find Z pulse, may also directly to the reference point for the origin.

Origin point execution process, to avoid rapid changes of mechanical impact speed, can be set parameters for deceleration Pn040, Pn041. Find the origin and offset pulse as actual origin, the offset is: Pn036*10000+Pn037。
The origin return reference point mode (Pn034) and the origin (Pn035) has the following combination:

Pn034 / Pn035	0	1	2	3	4	5
0	✓(A)	✓(B)	✓(A)	✓(B)	X	X
1	✓(C)	✓(D)	X	X	X	X
2	✓(E)	✓(F)	X	X	✓(G)	✓(H)

✓ mean will work in correct for this combine　　X mean will not work for this combine

F.2 The origin return to trigger sequence

Pn033	The origin is triggered	0: Close the origin regression function 1： Triggered by the GOH SigIn input level 2： GOH edge triggered by SigIn input 3： Electricity automatically perform again

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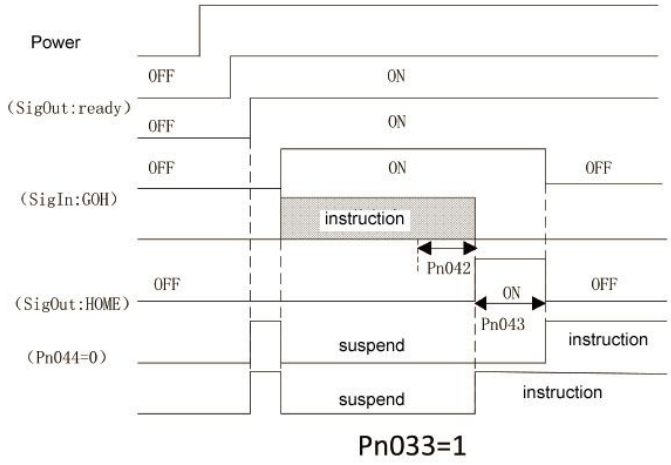
Level trigger (Pn033 = 1)

Servo enabled, the input terminals GOH triggered the origin return to execute, GOH edge began to return to operation, the suspension of normal instruction execution, the end of the edge back to operation. GOH has kept ON, after the return to perform, position deviation reset (position control), the output terminal HOME ON. Until GOH is OFF, is HOME to OFF.

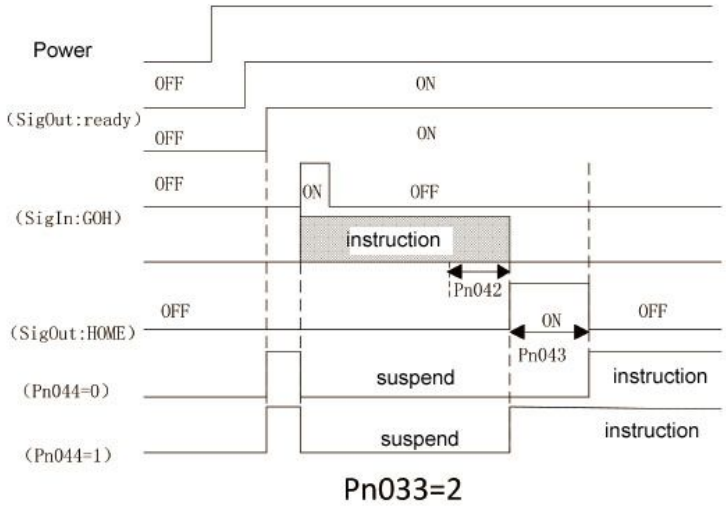
When Pn044 = 0, origin wait for after the completion of the HOME after the signal into a OFF again executes instructions, waiting for the motor during stay at the origin, not accept instructions; When Pn044 = 1, the origin return immediately after the completion of the instructions.

At the origin in the execution of regression, if cancel the servo can make SON, produce any alarm, GOH into OFF ahead of schedule, the origin of regression function suspension and output terminals HOME not action. In addition, if effective, no alarm, can make the son return in execution and there is no complete, even if the edge triggered (Pn033 = 2) repeat signals effectively, the drive will be completed the current return after operation, to detect edge trigger signal.



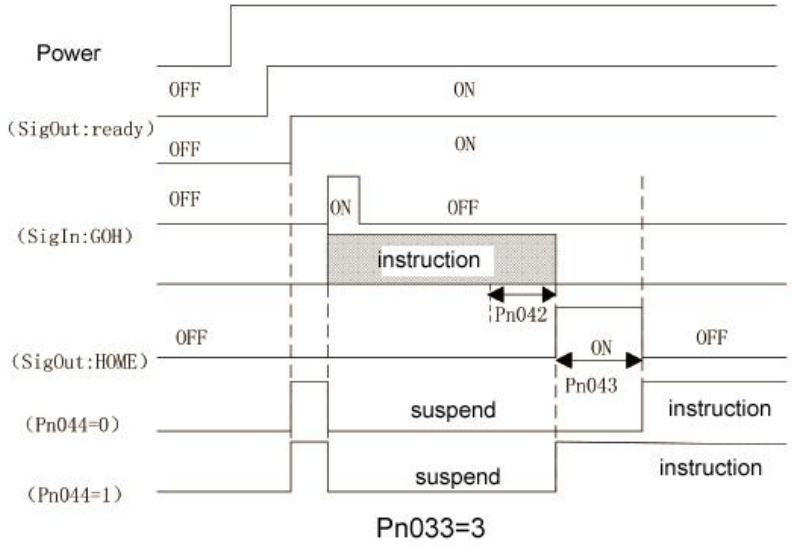
Edge triggered (Pn033 = 2)

Servo enabled, the input terminals GOH rise triggered the origin return to perform, and suspension of normal instruction execution



Electricity automatically perform (Pn033 = 3)

This function only in electric servo make effective for the first time after the execution time, later don't need to repeat the origin regression. Every time it with electricity, drive automatically perform an origin point operations. Use this feature can save one input terminal GOH.



Pn033=3

F.3 The origin model time-series regression combination

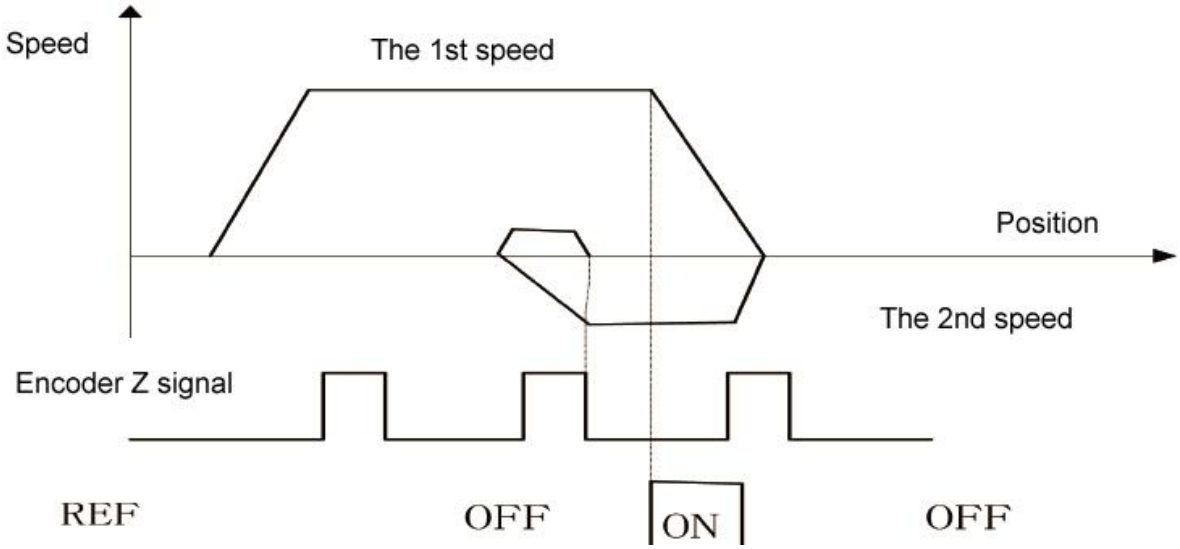
Pn034	The origin return reference point model	0: Forward looking for REF (rising along the trigger) as a reference point 1: Inversion for REF (rising along the trigger) as a reference point 2: Forward looking for CCWL falling edge (trigger) as a reference point 3: Inversion to find.cwl falling edge (trigger) for reference 4: Forward looking for Z pulse as a reference point 5: Pulse inversion for Z as a reference point	0~5	0
Pn035	The origin back to the origin model	0： Backward looking for Z pulse as the origin 1： Forward looking for Z pulse as the origin 2： Directly with reference point rise along the origin	0~2	0

Note 1: by combining Pn034 and Pn035 parameters, there are eight kinds of available ways of origin.

Note 2: when operating at the origin regression will close/reverse driving ban function, until the exit to return to operation.

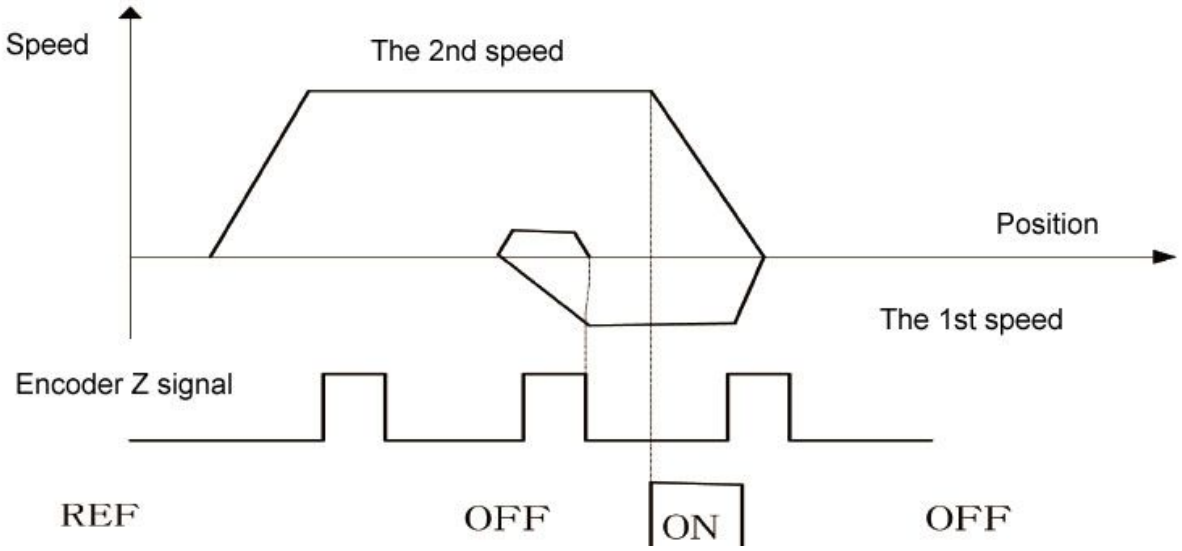
(A)Pn034=0 or 2,Pn035=0

parameter	set	instruction
Pn034	0 or 2	Origin starts, to return to the first speed forward looking for REF (rising along the trigger) or CCWL falling edge (trigger) as a reference point
Pn035	0	Arriving at reference points, the backward looking for Z pulse to return to the second speed as the origin



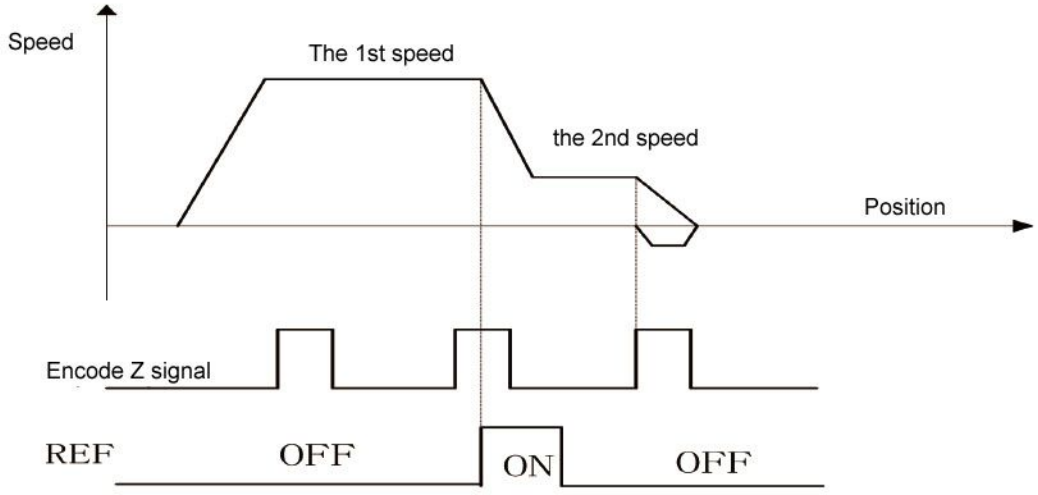
(B)Pn034=1or 3,Pn035=0

parameter	set	instruction
Pn034	1or 3	Origin starts, to return to the first speed inversion for REF (rising along the trigger) or.cwl falling edge (trigger) as a reference point
Pn035	0	Arriving at reference points, the backward looking for Z pulse to return to the second speed as the origin



(C)Pn034=0,Pn035=1

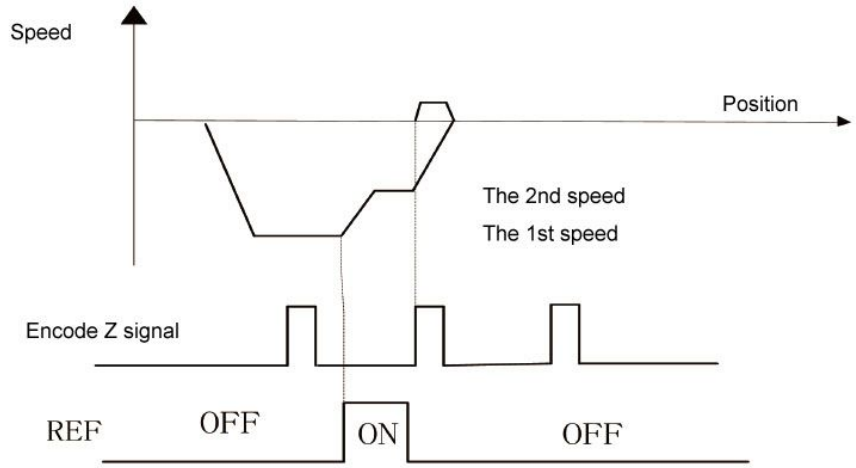
parameter	set	instruction
Pn034	0	Origin starts, to return to the first speed forward looking for REF (rising along the trigger) as a reference point
Pn035	1	Arrived at the reference point, to return to the second speed forward looking for Z pulse as the origin



(D)Pn034=1,Pn035=1

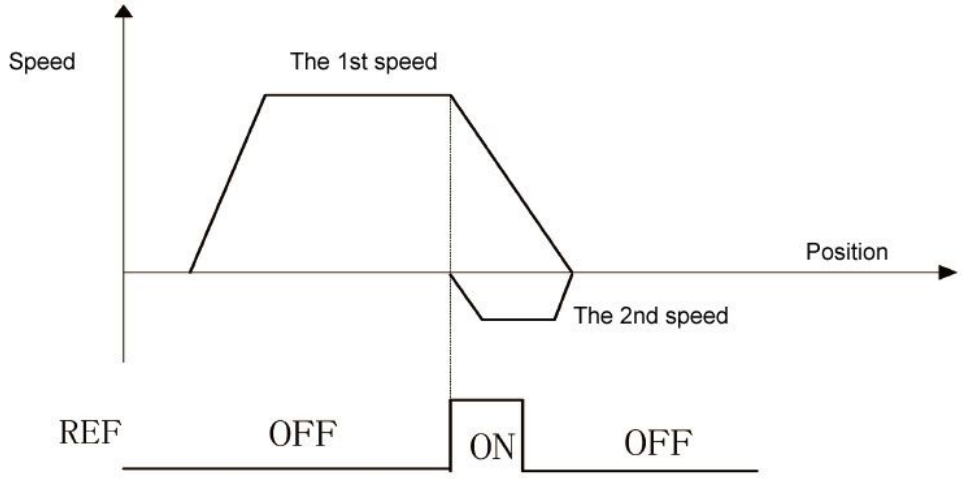
parameter	set	instruction
Pn034	1	Origin starts, to return to the first speed inversion to find the REF (rising along the trigger) as a reference point

Pn035	1	Arrived at the reference point, to return to the second speed forward looking for Z pulse as the origin



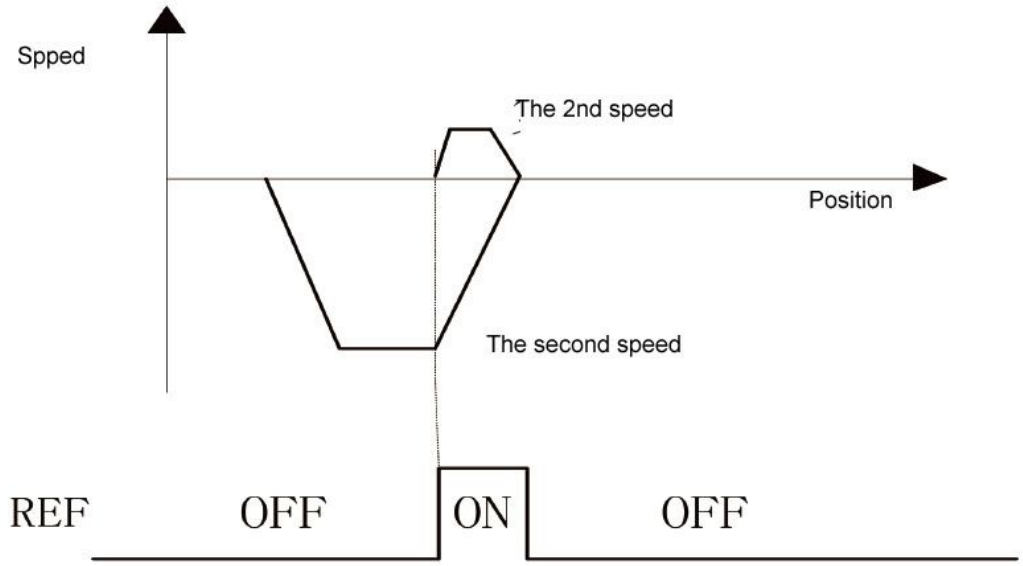
(E)Pn034=0,Pn035=2

parameter	set	instruction
Pn034	0	Origin starts, to return to the first speed forward looking for REF (rising along the trigger) as a reference point
Pn035	2	Arriving at reference points, the direct reference point as the origin



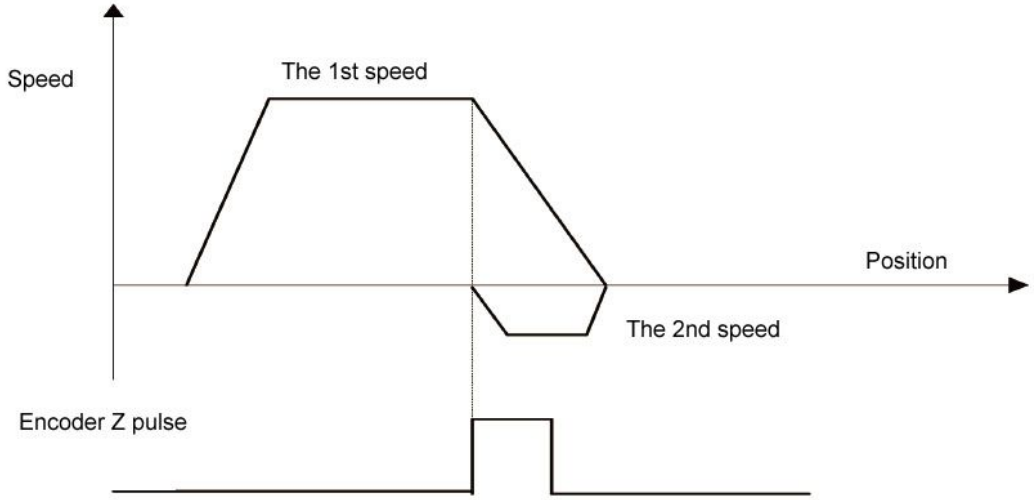
(F)Pn034=1,Pn035=2

parameter	set	instruction
Pn034	1	Origin starts, to return to the first speed inversion for REF (rising along the trigger) as a reference point
Pn035	2	Arriving at reference points, the direct reference point as the origin



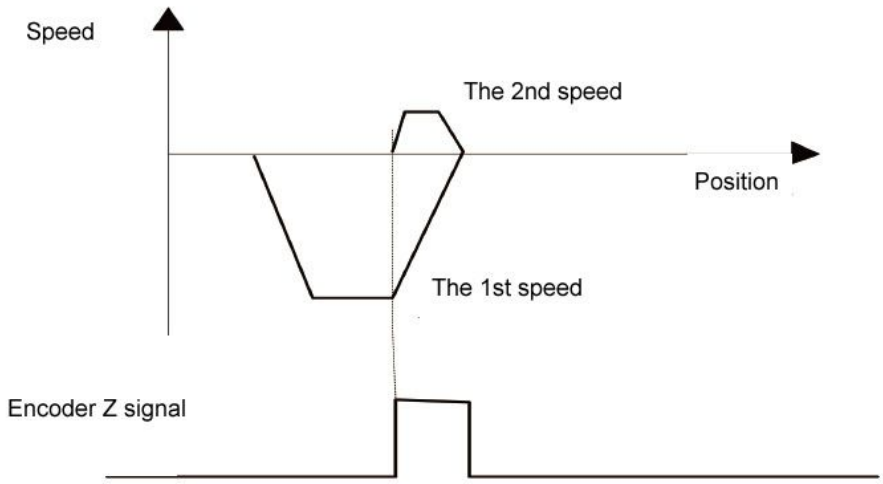
(G)Pn034=4,Pn035=2

parameter	set	instruction
Pn034	4	Origin starts, to return to the first speed forward looking for Z pulse as a reference point
Pn035	2	Arriving at reference points, the direct reference point as the origin



(H)Pn034=5,Pn035=2

parameter	set	instruction
Pn034	5	Origin starts, to return to the first speed pulse inversion for Z as a reference point
Pn035	2	Arriving at reference points, the direct reference point as the origin



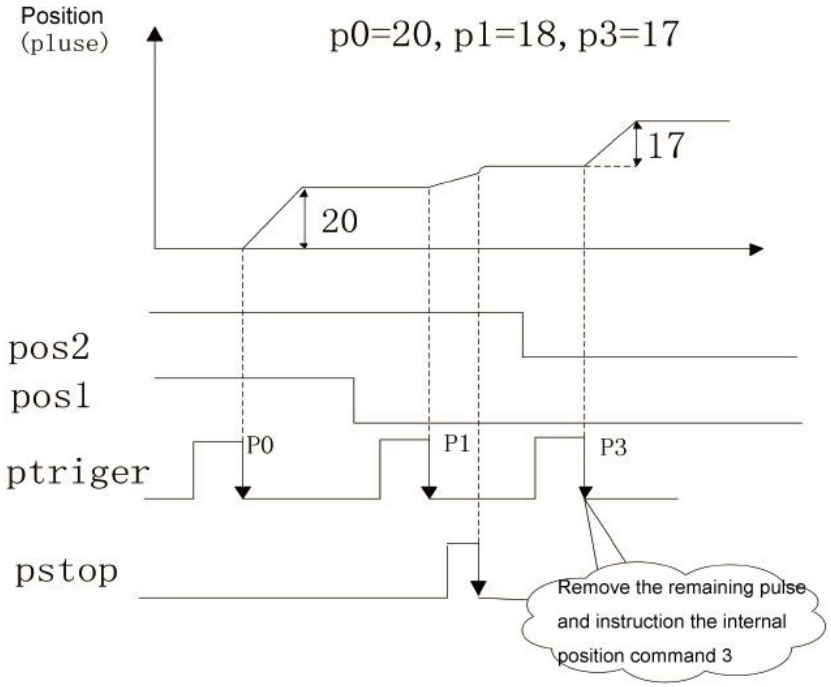
The appendix G internal position control

Internal position control, need to set Pn002 = 2, Pn117 = 1, and in Pn118 ~ Pn131 set up corresponding operation parameters. SigIn port pos1, pos2 choose internal position command N:

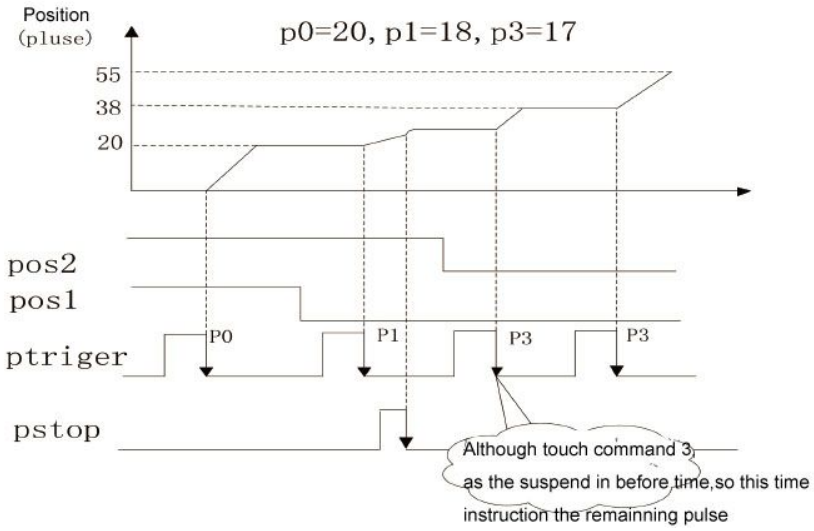
Pos2	Pos1	internal location instructions N
1	1	internal location instructions 0
1	0	internal location instructions 1
0	1	internal location instructions 2
0	0	internal location instructions 3

When using internal position control, make sure the input port pos1, pos2 state, Namely choose corresponding internal position command, and then trigger ptriger input signal, each ptriger (OFF - > ON) falling edge, the driver will read instruction N internal position, accumulate to the rest of the order the Number of pulses, continue to perform the corresponding operation.

If set Pn118 = 0, want to suspend the motor running, in the process of position when the trigger input port pstop signal, motor speed to stop, and then drive automatically remove residual position instruction, when the input port ptriger fire again, the drive will be based on the current pos1, pos2 state, execute the position of the corresponding instructions, please refer to the following sequence diagram:



If set Pn118 = 1, want to pause in the process of the position the motor running, when the trigger input port pstop signal, motor speed to stop, when the input port ptriger fire again, the location of the electricity opportunities continue to walk the remaining instructions, the input port pstop trigger issued before the target location, please refer to the following sequence diagram:



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