DORNA

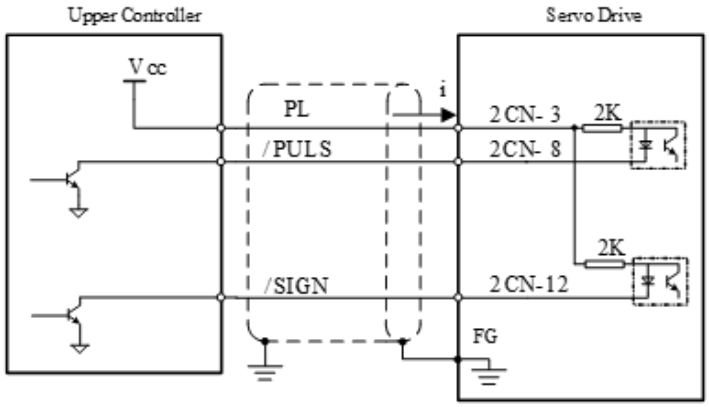
AC Servo Systems

EPS-B1 Series
User Manual Updates

Internal position, homing & RS485 communnication

Website: en.cn-dorna.com

Recommended wiring for 24VDC inputs (e.g. PLCs):



8.8 Internal Position

When **PA000.1=A**, servo drive is under internal position mode and can perform simple single-axis motion functions without upper controllers.

Up to 16 positions can be set. Each position can set its own distance, speed, acceleration/deceleration time, stop time etc. This internal position control mode also has homing function. Both speeds before and after contacting Zero signal can be set separately. (See PA771)

PA700: set internal position control switching modes

1) Use external I/O (PTRG) to choose INPOS0, INPOS1, INPOS2, INPOS3 by corresponding trigger signals. Triggers can be one trigger or any combinations of triggers.
2) Use external I/O (PTRG) to trigger cycle run. Cycle begins with PA700.2 and ends with PA700.3.
3) Internal timer trigger cycle run. Cycle begins with PA700.2 and ends with PA700.3.

■ Distance (PA701 to PA732)

Each distance is set by two parameters in pairs, for example, PA701 & PA702, PA703 & PA704 etc. Values in these paired parameters are hexadecimal, with symbols and combine to a 32-bit position data.

For example, PA702 is 0x 0007, PA701 is 0x A120, then position data is 0x0007A120, means 500000 pulses. For a 5000-line encoder, each turn creates 20,000 pulses. Thus the position data means 25 turns.

Notes:

1) Setting range is【0x0000, 0xFFFF】
2) Electric gear ratio (PA205/PA206) will have counter-effect on distance.

■ Speed (PA733 to PA748)

Electric gear ratio (PA205/PA206) will have counter-effect on speed.

■ Acceleration/deceleration time (PA749 to PA764)

■ Stop time at each position (PA765)

Only available when PA700.0＝2. (Internal timer trigger cycle run)

This means time between CMD_OK and next action.

8.8.1 Input signals

Type	Name	Pin	Setting	Definition
Input Signal	ZPS	To be assigned	ON=L electrical level	External Zero signal ON (valid)
			OFF=H electrical level	External Zero signal OFF (invalid)
	PZERO	To be assigned	ON=L electrical level	Internal position control stops (valid)
			OFF=H electrical level	Internal position control not stops (invalid)
	INPOS0	To be assigned	ON=L electrical level	INPOS0 signal valid
			OFF=H electrical level	INPOS0 signal invalid
	INPOS1	To be assigned	ON=L electrical level	INPOS1 signal valid
			OFF=H electrical level	INPOS1 signal invalid
	INPOS2	To be assigned	ON=L electrical level	INPOS2 signal valid
			OFF=H electrical level	INPOS2 signal invalid
	INPOS3	To be assigned	ON=L electrical level	INPOS3 signal valid
			OFF=H electrical level	INPOS3 signal invalid
	PTRG	To be assigned	OFF (H electrical level) to ON (L electrical level)	PTRG signal valid
	P-POS	To be assigned	ON=L electrical level	P-POS signal valid
			OFF=H electrical level	P-POS signal invalid
	N-POS	To be assigned	ON=L electrical level	N-POS signal valid
			OFF=H electrical level	N-POS signal invalid
	SHOME	To be assigned	OFF (H electrical level) to ON (L electrical level)	SHOME signal valid
Refer to 3.4.3 for assigning pins.				

■ Zero signal (ZPS)

Used for homing functions only.

■ Internal position control stops (PZERO)

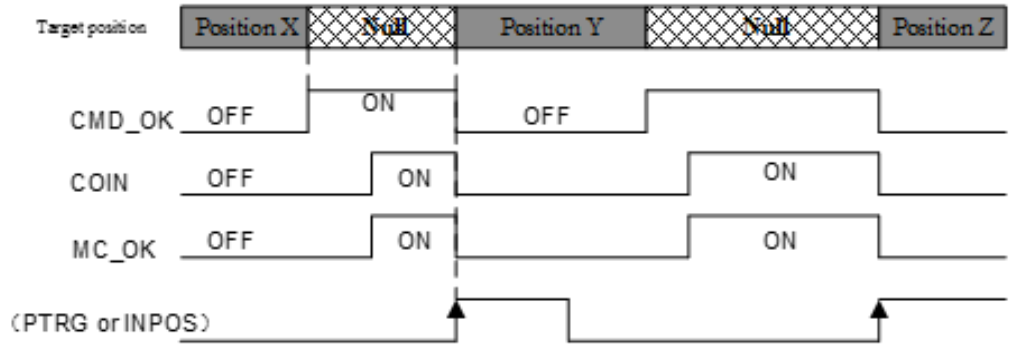
■ Internal position selection (INPOS0, INPOS1, INPOS2, INPOS3**)**

INPOS0, INPOS1, INPOS2, INPOS3 combines to achieve 16-position control

INPOS3	INPOS2	INPOS1	INPOS0	Position number
0 (invalid)	0 (invalid)	0 (invalid)	0 (invalid)	Position 0 (PA702&PA701)
0 (invalid)	0 (invalid)	0 (invalid)	1 (valid)	Position 1 (PA704&PA703)
0 (invalid)	0 (invalid)	1 (valid)	0 (invalid)	Position 2 (PA706&PA705)
0 (invalid)	0 (invalid)	1 (valid)	1 (valid)	Position 3 (PA708&PA707)

0 (valid)	1 (valid)	0 (invalid)	0 (invalid)	Position 4 (PA710&PA709)
0 (valid)	1 (valid)	0 (invalid)	1 (valid)	Position 5 (PA712&PA711)
0 (valid)	1 (valid)	1 (valid)	0 (invalid)	Position 6 (PA714&PA713)
0 (valid)	1 (valid)	1 (valid)	1 (valid)	Position 7 (PA716&PA715)
1 (valid)	0 (invalid)	0 (invalid)	0 (invalid)	Position 8 (PA718&PA717)
1 (valid)	0 (invalid)	0 (invalid)	1 (valid)	Position 9 (PA720&PA719)
1 (valid)	0 (invalid)	1 (valid)	0 (invalid)	Position 10 (PA722&PA721)
1 (valid)	0 (invalid)	1 (valid)	1 (valid)	Position 11 (PA724&PA723)
1 (valid)	1 (valid)	0 (invalid)	0 (invalid)	Position 12 (PA726&PA725)
1 (valid)	1 (valid)	0 (invalid)	1 (valid)	Position 13 (PA728&PA727)
1 (valid)	1 (valid)	1 (valid)	0 (invalid)	Position 14 (PA730&PA729)
1 (valid)	1 (valid)	1 (valid)	1 (valid)	Position 15 (PA732&PA731)

■ Trigger signal (PTRG)



■ Forward JOG under internal position mode (P-POS)

■ Reverse JOG under internal position mode (N-POS)

■ Homing activiation signal (SHOME)

8.8.2 Output Signals

Type	Name	Pin	Status	Definition
Output Signal	HOME	To be assigned	Active	Homing achieved
			Inactive	Homing not achieved
	CMD-OK	To be assigned	Active	Position command achieved
			Inactive	Position command not achieved
	MC-OK	To be assigned	Active	Positioning command executed
			Inactive	Positioning command not executed
All above output signals need to be assigned according to 3.4.3				
■Important: All above signals are only active under internal positioning mode.				

■ Homing (HOME)

◆When homing is achieved and positioning coordinate system is workable, this signal is ON.

◆At powered on, this signal is OFF.

◆When reaching next position, this signal is OFF.

◆When SHOME triggers homing command, this signal is OFF.

◆When homing is achieved again, this signal is ON.

◆Through inputting SZERO (stop command), homing can be stopped, this signal is OFF.

■Position command achieved (CMD-OK)

◆When enter internal position control mode, this signal is ON.

◆When position command is being processed, this signal is OFF.

◆When position command is achieved, this signal is ON.

◆This signal only means command is achieved, not the actual motor positioning.

■ Positioning command executed (MC-OK)

This signal means position command execution achieved. When both CMD-OK and COIN are on, this signal is ON, otherwise OFF.

8.8.3 Relevant Parameter Settings

Parameter		Meaning
PA000	h.□□A□	Internal position control (junction instruction)
	h.□□B□	Internal position control (junction instruction) ←→Position control (pulse instruction)

PA701	**Internal Position 0 low-place**			
	Setting Scope	Unit	Factory Setting	Effective time
	0x0000～0xFFFF	pulse	0x4E20	immediate
PA702	**Internal Position 0 high-place**			
	Setting Scope	Unit	Factory Setting	Effective time
	0x0000～0xFFFF	pulse	0x0000	immediate
～～				
PA731	**Internal Position 15 low-place**			
	Setting Scope	Unit	Factory Setting	Effective time
	0x0000～0xFFFF	pulse	0x7100	immediate
PA732	**Internal Position 15 high-place**			
	Setting Scope	Unit	Factory Setting	Effective time
	0x0000～0xFFFF	pulse	0x0002	immediate
PA733	**Internal position speed 0**			
	Setting Scope	Unit	Factory Setting	Effective time
	0～5000	rpm	100	immediate
～～				
PA748	**Internal position speed 15**			
	Setting Scope	Unit	Factory Setting	Effective time
	0～5000	rpm	700	immediate
PA749	**Internal position 0 acceleration/deceleration time**			
	Setting Scope	Unit	Factory Setting	Effective time
	0～500	mms	0	immediate

	～～			
PA764	**Internal position 15 acceleration/deceleration time**			
	Setting Scope	Unit	Factory Setting	Effective time
	0～500	mms	0	immediate
PA765	**Internal position stop time**			
	Setting Scope	Unit	Factory Setting	Effective time
	0~65535	mms	100	immediate

■Important

When PA733~PA748 settings exceed highest speed of the servo motor, actual value is still restricted as servo motor's highest speed.

8.9 Homing function

Normally there should be a zero switch on working tables and is used to determine Zero positions for point-to-point controls. Homing is needed when power-on or after each processing for next movement. In internal position control mode, upper controller gives Homing-Startup (SHOME) signals and the servo driver executes homing functions automatically. Homing modes, homing speeds and deviations can all be set through PA771, PA775, PA776, PA777, and PA778.

■Homing Modes selection

Parameter		**Meaning**
PA771	d.□□□0	CCW homing
	d.□□□1	CW homing
	d.□□0□	Once contact with homing switch, move backwards and look for Z Pulse
	d.□□1□	Once contact with homing switch, not move backwards, and look for Z Pulse
	d.□□2□	Once contact with homing switch, move backwards and use departure point as zero point.
	d.□□3□	Once contact with homing switch, not move backwards, and use departure point as zero point.
	d.□0□□	Homing achieved, not clear all data
	d.□1□□	Homing achieved, clear all position data
	d.0□□□	Use external zero position signal (ZPS)
	d.1□□□	reserved

■Relevant parameters

PA771	**Homing Modes selection**			
	Setting Scope	Unit	Factory Setting	Effective time
	0x0000～0x1131	——	0000	immediate
PA775	**Homing speed 1 (speed before contacting Zero position)**			

	Setting Scope	Unit	Factory Setting	Effective time
	0～3000	rpm	1000	immediate
PA776	**Homing speed 2 (speed before contacting Zero position)**			
	Setting Scope	Unit	Factory Setting	Effective time
	0～500	rpm	30	immediate
PA777	**Zero position deviation low 16 place**			
	Setting Scope	Unit	Factory Setting	Effective time
	0x0000～0x1000	pulse	0	immediate
PA778	**Zero position deviation high 16 place**			
	Setting Scope	Unit	Factory Setting	Effective time
	0x0000～0xFFFF	pulse	0	immediate

■Important

1, When PA775, PA776 settings exceed highest speed of the servo motor, actual value is still restricted as servo motor's highest speed.

2, Zero position deviation directions are determined by homing directions.

Zero position deviation ＝ (Zero position deviation high 16 place <<16) & Zero position deviation low 16 place.

3, Homing functions are suitable for Internal position control (junction instruction) and Position control (pulse instruction).

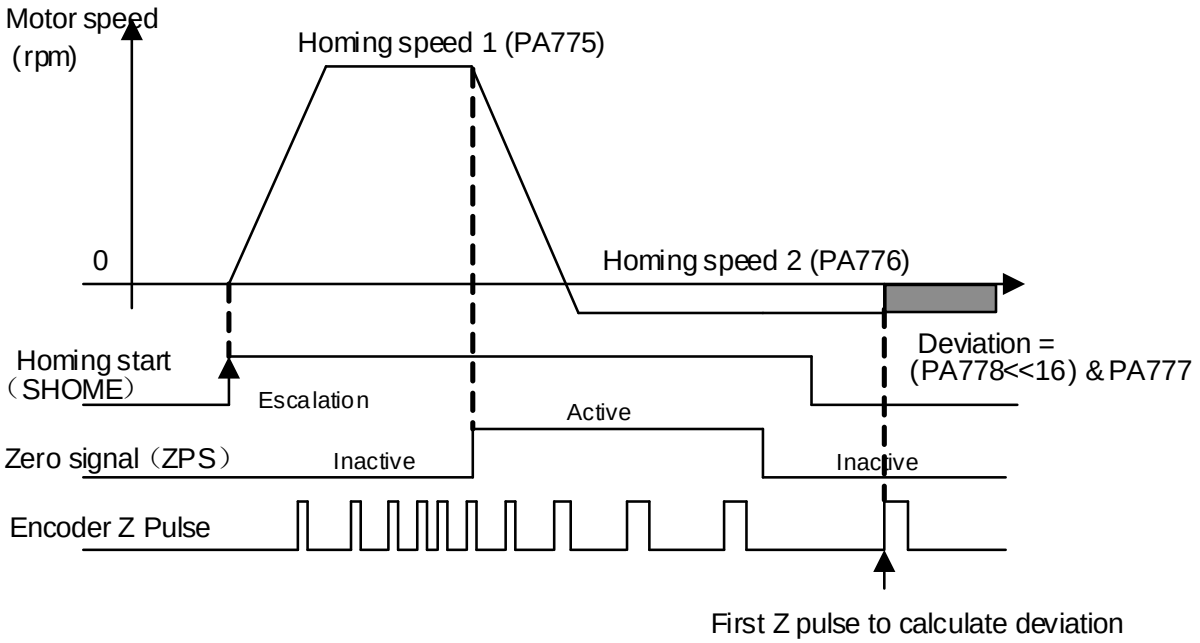
4, During homing, servo driver does not receive pulse commands.

■Description of the homing process

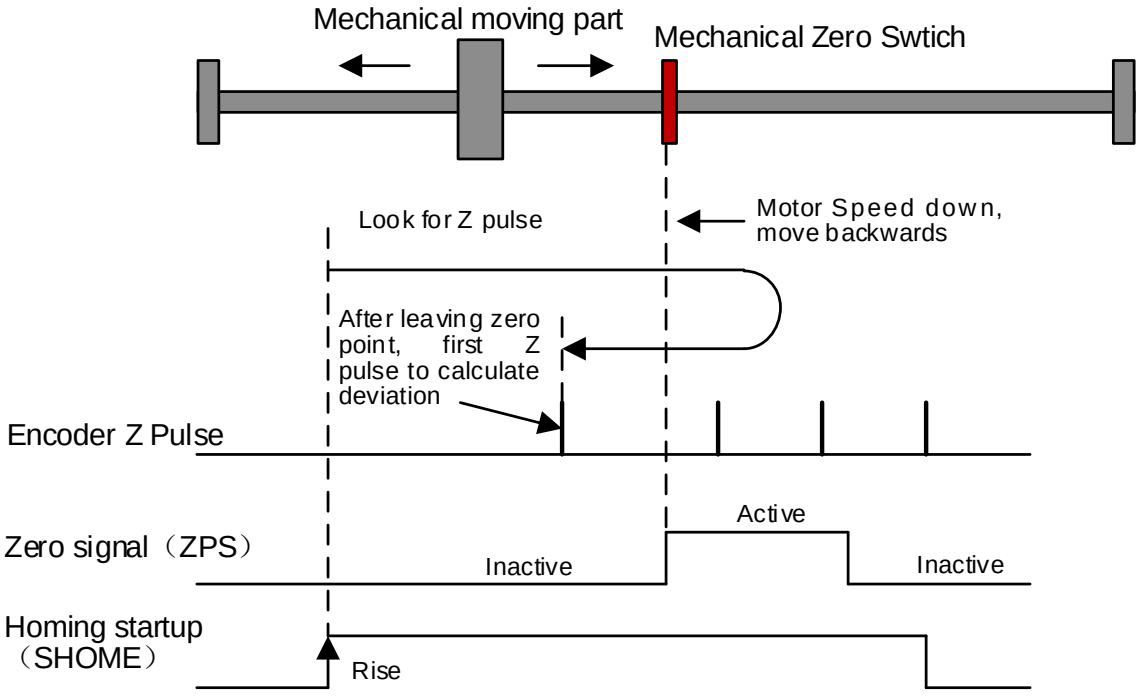
In internal position control mode:

- When SHOME is detected, motor runs at direction set by PA771.0 and speed set by PA772.
- When zero position signal ZPS (reference point) is detected active, motor runs at speed set by PA775 after finding Z pulse according to PA771.1 settings.
- When ZPS is inactive, also after detected Z pulse, motor runs at speed set by PA776 and starts counting zero position deviation pulse numbers.
- Motor stops and outputs HOME signal.
- Normally set PA775 at high speed and PA776 at low speed. Note that if PA776 is set too high, homing accuracy will be affected.

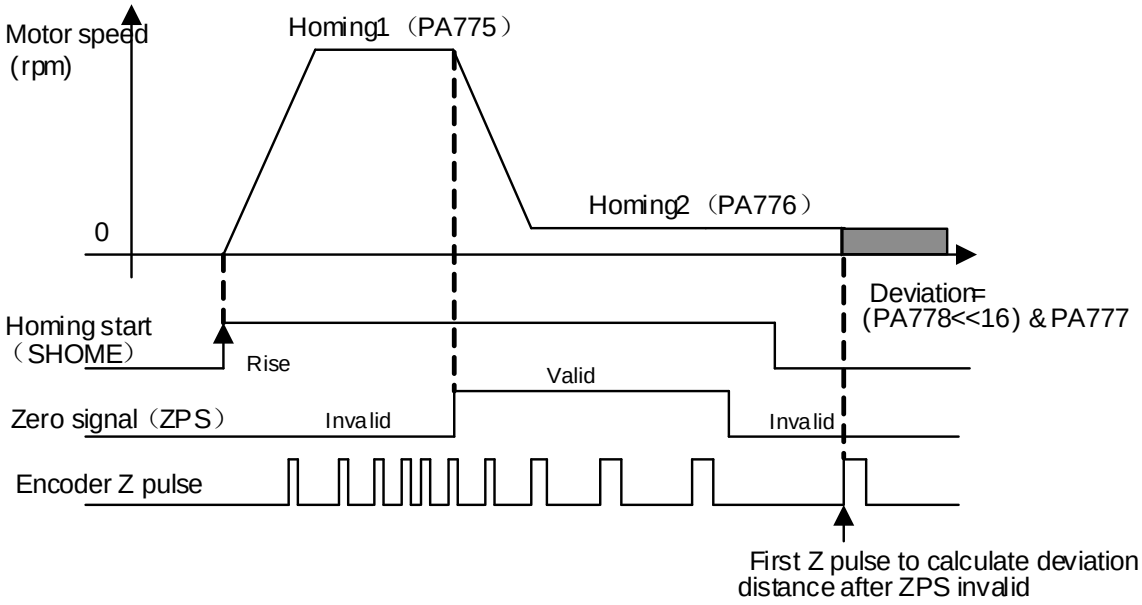
1) PA771.1=0, after contacting with ZPS, time sequences of motor looking for Z pulse:



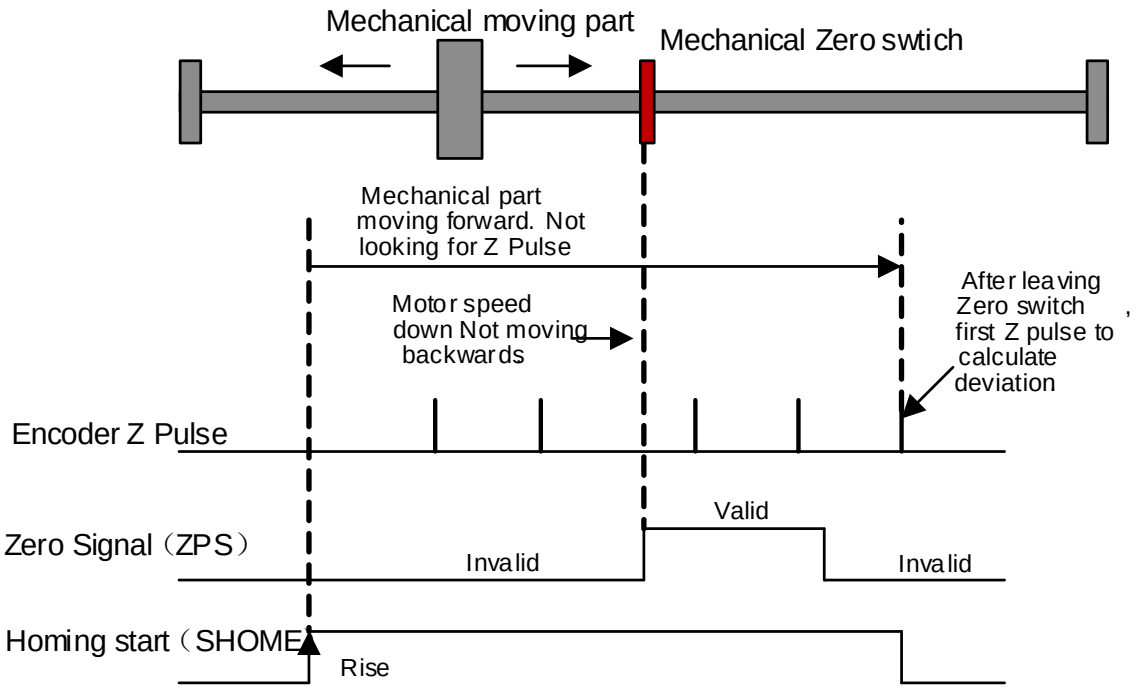
Relevant positions are shown below:



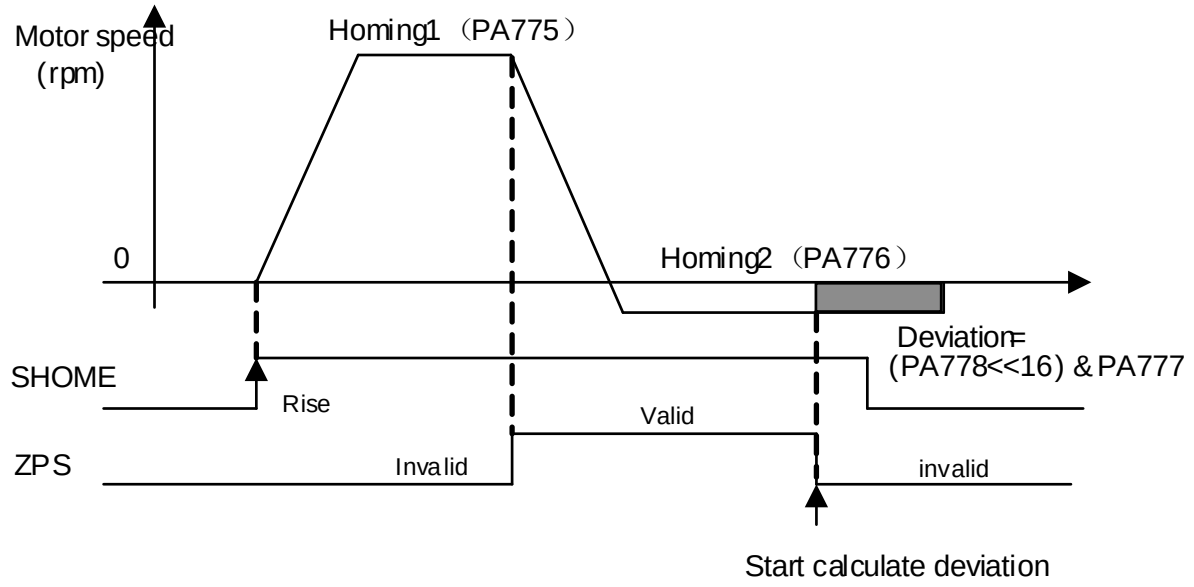
2) PA771.1=1, after contacting with ZPS, time sequences of motor not return and looking for Z pulse:



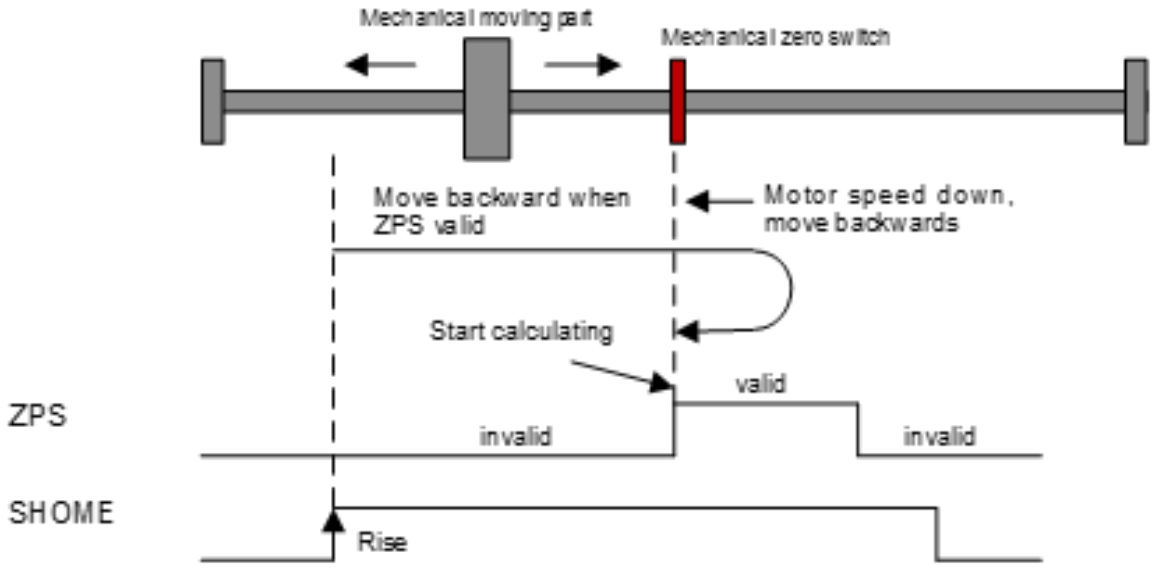
Relevant positions are shown below: s



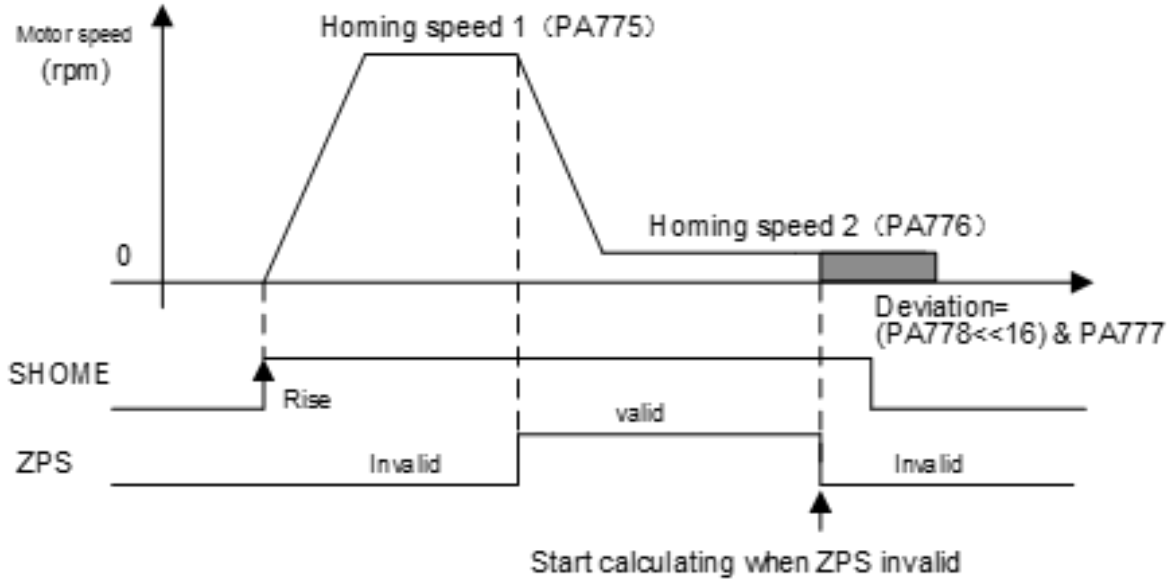
3) PA771.1=2, Once contact with homing switch, move backwards and use departure point as zero point (not look for Z Pulse) :



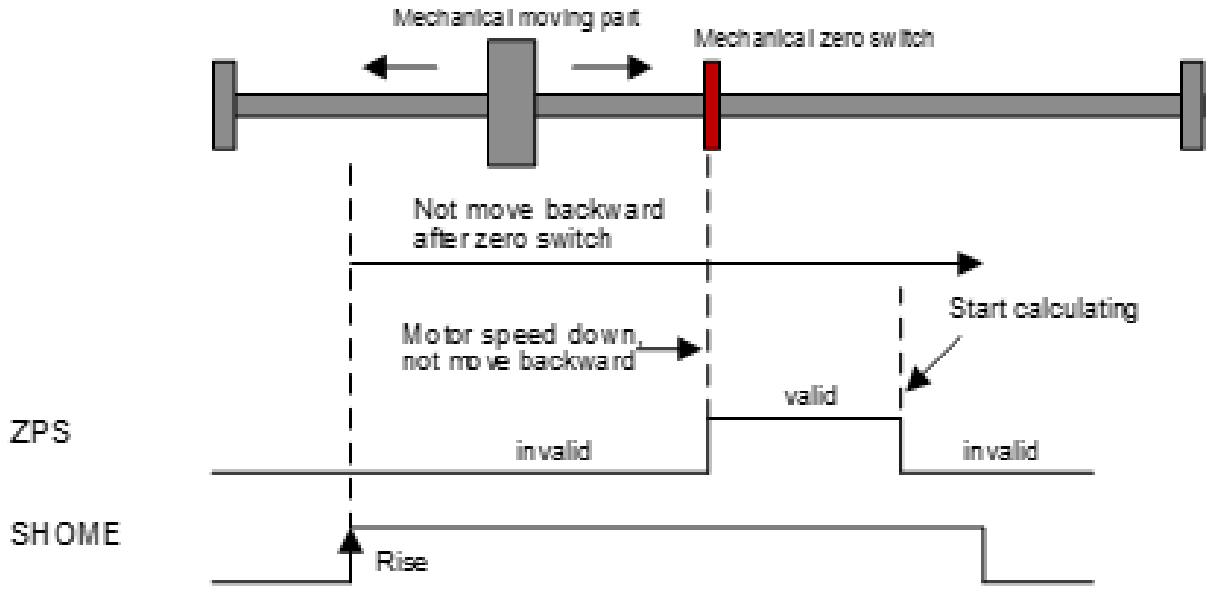
Relevant positions are shown below:



4) PA771.1=3, once contact with homing switch, not move backwards and use departure point as zero point (not look for Z Pulse)



Relevant positions are shown below:



Communication

10.1 Communication terminals

Please refer to chapter 3.3 for CN1 connections.

10.1.1 Communication connections

1) If upper controller only connects to one servo drive, connect RJ45(1) to upper controller and RJ45 (2) to a 120Ω resistor.
2) If upper controller connects to multiple servo drives, connect RJ45(1) of first servo drive to upper controller and RJ45(2) of first servo drive to RJ45(1) of second servo drive. Connect all servo drives in this way and connect RJ45 (2) of last servo drive to a 120Ω resistor.

10.2 Communication parameters

Please refer to PA015 and PA016 of the user manual.

10.3 Communication protocols

When using RS-485 for serial communications, each servo drive must set its own axis number (PA015). There are two MODBUS modes: ASCII (American Standard Code for information interchange) or RTU (Remote Terminal Unit).

10.3.1 Encoding definition

- **ASCII mode:**
  Every 8-bits date consists of two ASCII bytes.

  For example:

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

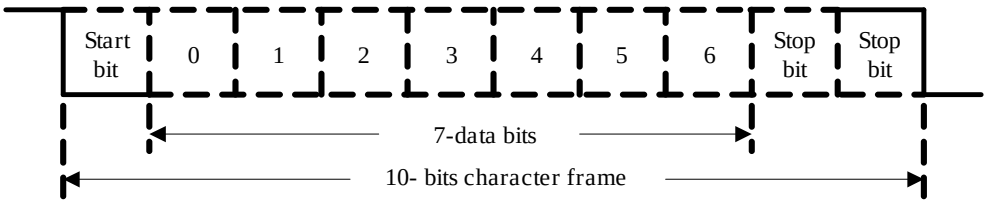
- **RTU mode:**
  Every 8-bits data consists of two 4-bits hexadecimal bytes.

10.3.2 Byte structure

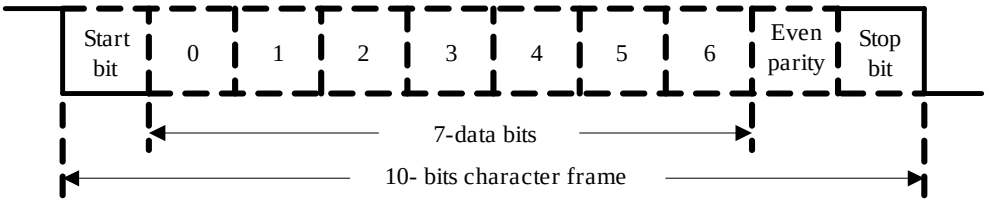
◆ 10bits byte box

Used for **7-bits** bytes

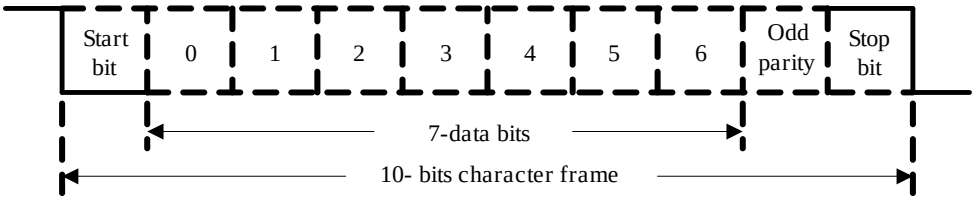
7，N，2（Modbus，ASCII）



7，E，1（Modbus，ASCII）



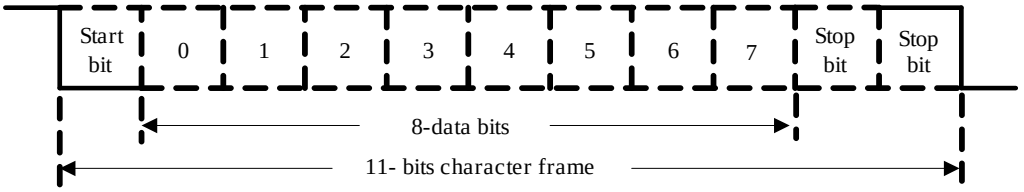
7，O，1（Modbus，ASCII）



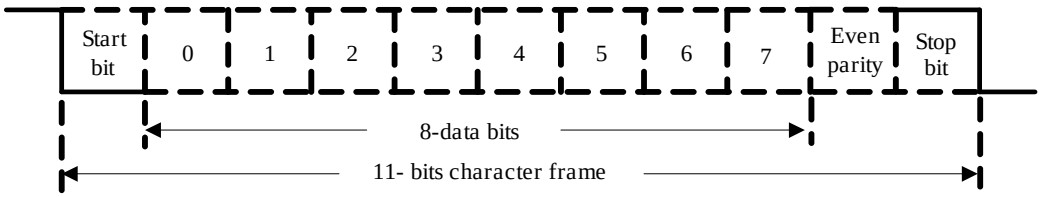
◆ Byte box

Used for 8-bits bytes

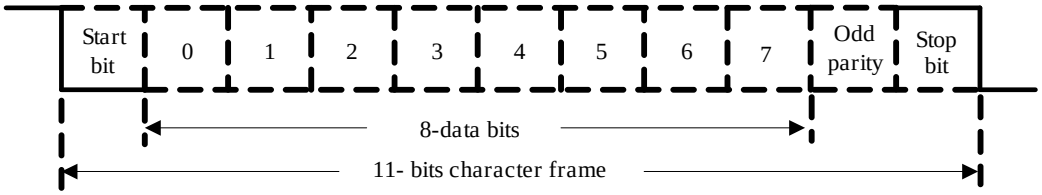
8，N，2（Modbus，ASCII / RTU）



8，E，1（Modbus，ASCII / RTU）



8，O，1（Modbus，ASCII / RTU）



10.3.3 Communication data structure

Data format definitions are as below:

◆ **ASCII mode**

STX	Beginning byte: (3AH)
ADR	Communication address: 1-byte contains 2 ASCII codes
CMD	Command code: 1-byte contains 2 ASCII codes
DATA (n-1)	Data content: n-word =2n-byte includes 4n ASCII codes, n<=12
…….	
DATA (0)	
LRC	Command code: 1-byte contains 2 ASCII codes
End 1	End code 1: (0DH) (CR)
End 0	End code 0: (0AH) (LF)

◆ **RTU mode**

STX	Exceeds static time of 3.5 bytes
ADR	communication address: 1-byte
CMD	Command code: 1-byte
DATA (n-1)	Data content: n-word =2n-byte, n<=12
…….	
DATA (0)	
CRC	Command code: 1-byte
End 1	Exceeds static time of 3.5 bytes

Communication data formats:

➢ **STX (communication start)**

ASCII mode: ': ' byte (3AH) .

RTU mode: Exceeds static time of 3.5 bytes under current ommunication speed.

➢ **ADR (communication address)**

Legal communication address is between 1 and 127. For example: To communicate with Axis 16 servo drive (hexadecimal: 10H):

ASCII mode: ADR='1', '0' => '1'=31H, '0'=30H

RTU mode: ADR = 10H

➢ **CMD & DATA (data byte)**

Data byte format is determined by Command code. Common command codes are as below.

Communication command

command	Command content	Explanation
03H	Read N words, N<=29	Standard 03 command
06H	Write 1 word	Standard 06 command
10H	Write N words, N<=29	Standard 10 command

1) Command code: 03H, read N words , N≤29

For example, from starting address of Servo drive 01H: 0200H, to read two bytes continuously.

ASCII mode:

Command

STX	**': '**
ADR	**'0'**
	'1'
CMD	**'0'**
	'3'
Starting data position (High to low)	**'0'**
	'2'
	'0'
	'0'
Data number (WORD)	**'0'**
	'0'
	'0'
	'2'
LRC Check (High to low)	**'F'**
	'8'
End 1	**(0DH) (CR)**
End 0	**(0AH) (LF)**

Feedback

STX	**':'**
ADR	**'0'**
	'1'
CMD	**'0'**
	'3'
Data quantity (byte）	**'0'**
	'4'
Starting data address 0200H content (high to low)	**'0'**
	'0'
	'B'
	'1'
2nd data address 0201H content (high to low)	**'1'**
	'F'
	'4'
	'0'
LRC Check (high to low)	**'E'**
	'8'
End 1	**(0DH)(CR)**
End 0	**(0AH)(LF)**

RTU mode:

Command:

ADR	**01H**
CMD	**03H**
Starting data position (High to low)	**02H**
	00H
Data number (high to low)	**00H**
	02H
CRC Check Low	**C5H (low place byte)**
CRC Check High	**B3H (high place byte)**

Feedback:

ADR	**01H**
CMD	**03H**
Data number（bytes）	**04H**
Starting data address 0200H content	**00H（high place byte）**
	B1H（low place byte）
2nd data address 0200H content	**1FH（high place byte）**
	40H（low place byte）
CRC Check Low	**A3H（low place byte）**
CRC Check High	**D4H（high place byte）**

2) Command code: 06H, write 1 word

For example: write 100 (0064H) to 01H Servo drive 01H's starting address 0200H.

ASCII mode:

Command:

STX	**': '**
ADR	**'0'**
	'1'
CMD	**'0'**
	'6'
	'0'
	'2'

Feedback:

STX	**':'**
ADR	**'0'**
	'1'
CMD	**'0'**
	'6'
Starting data address (high to low)	**'0'**
	'2'
	'0'
	'0'
Data content	**'0'**
	'0'
	'6'

Starting data address (high to low)	**‘0’**
	‘0’
data content (high to low)	**‘0’**
	‘0’
	‘6’
	‘4’
LRC Check	**‘9’**
	‘3’
End 1	**(0DH)**
End 0	**(0AH)**

RTU mode:

Command:

ADR	**01H**
CMD	**06H**
startingdata address (high to low)	**02H**
	00H
data content (high to low)	**00H**
	64H
CRC Check Low	**89H**
CRC Check High	**99H**

Feedback:

ADR	**01H**
CMD	**06H**
Starting data address (high to low)	**02H**
	00H
Data content (high to low)	**00H**
	64H
CRC Check Low	**89H**
CRC Check High	**99H**

3) Command code: 10H, write N words, N≤29

For example: write 100 (0064H) , 102 (0066H) to servo drive Axis number 01H, starting address is 0200H.

ASCII mode:

Command:

STX	**‘: ’**
ADR	**‘0’**
	‘1’
CMD	**‘1’**
	‘0’
Starting data address (high to low)	**‘0’**
	‘2’
	‘0’
	‘0’
Data number (high place)	**‘0’**
	‘0’
Data number (low place)	**‘0’**
	‘2’
data byte number	**‘0’**
	‘4’
data1 content (high to low)	**‘0’**
	‘0’
	‘6’
	‘4’
data2 content (high to low)	**‘0’**
	‘0’
	‘6’
	‘6’
LRC Check	**‘1’**
	‘D’
End 1	**(0DH)**
End 0	**(0AH)**

Feedback:

STX	**‘:’**
ADR	**‘0’**
	‘1’
CMD	**‘1’**
	‘0’
Starting data address (high to low)	**‘0’**
	‘2'
	‘0’
	‘0’
Data number (high to low)	**‘0’**
	‘0’
	‘0’
	‘2’
LRC Check	**‘9’**
	‘3’
End 1	**(0DH)(CR)**
End 0	**(0AH)(LF)**

RTU mode:

Command:

ADR	**01H**
CMD	**10H**
startingdata address (high to low)	**02H**
	00H
Data number (high to low)	**00**
	02
data byte number	**04**
data1 content	**00H**
	64H
data2 content	**00H**
	66H
CRC Check Low	**50H**
CRC Check High	**11H**

Feedback:

ADR	**01H**
CMD	**10H**
Starting data address (high to low)	**02H**
	00H
Data number (high to low)	**00H**
	02H
CRC Check Low	**40H**
CRC Check High	**70H**

- **LRC (ASCII mode) & CRC (RTU mode) detected error value calculation**

ASCII mode:

ASCII mode uses LRC (Longitudinal Redundancy Check) to detect error value. LRC detected error value is the sum from ADR to last data content and divided by 256, take the balance. (For example: sum is 128H, then only use 28H), and then calculate compliment number of 2.

RTU mode:

RTU mode uses CRC (Cyclical Redundancy Check) detected error value.
Step 1: CRC register is a 16-bits register whose content is FFFFH;
Step 2: Exclusive OR compute first byte of command & low place byte of 16-bits CRC register and store the result back to CRC register.
Step 3: Check lowest place (LSB) of CRC register. If this place is 0, then move to the right by 1 place; If this place is 1, then CRC register value move to the right by 1 place and Exclusive OR compute with A001H.
Step 4: Go back to Step 3 until Step 3 has been excuted 8 times; then to Step 5.
Step 5: Repeat Step 2 to Step 4 for next byte of the Command until all bytes have been processed.
At this point, CRC register content is CRC detected error value.

Notes: After calculated CRC detected error value, in command, shall first fill in CRC low place, then CRC high place.

4) End1, End0 (communication end)

ASCII mode:

Use (0DH) i.e. byte as '\r' (carriage return) & (0AH) i.e. byte 为'\n' (new line) , means communication end.

RTU mode:

When under current communication speed exceeds static time of 3.5 bytes.

10.3.4 Communication troubleshooting

Common error causes are:

- When reading-writing parameters, data address is wrong;
- When writing parameters, data exceeds upper/lower limit of this parameter;
- Communication is interfered, data transmission error or verification error.

When above communication error occurs, the servo drive will continue running, meanwhile will send back an error frame.

Error frame format:

Upper controller data frame:

start	slave address	command	data address, information, etc	Verify

Error frame:

start	slave address	Response code	Error code	Verify

Error frame response code= command+80H;

Error code=00H: communication normal;

=01H: servo drive cannot recognize the requrest;

=02H: Given data address of the requrest does not exist in the servo drive;

=03H: Given data of the request is not allowed (exceeds upper/lower limit) ;

＝04H:　servo drive starts to execute the request but failed；

For example:　servo drive Axis number is 03H, for parameter PA004writedata06H. As both upper/lower limit of PA004 is 0, writedata cannot be used, servo drive will send back an error frame, error code is 03 (exceeds upper/lower limit). Structure is as below:

Upper controller data frame:

start	**slave address**	**command**	**data address, information etc.**	**verify**
	03H	06H	0004H　0006H	

Servo drive feedback error frame:

start	**slave address**	**Response code**	**Error code**	**verify**
	03H	86H	03H	

If data frame of slave address is 00H from upper controller, frame data is broadcasting data, servo drive will send no feedback frame.

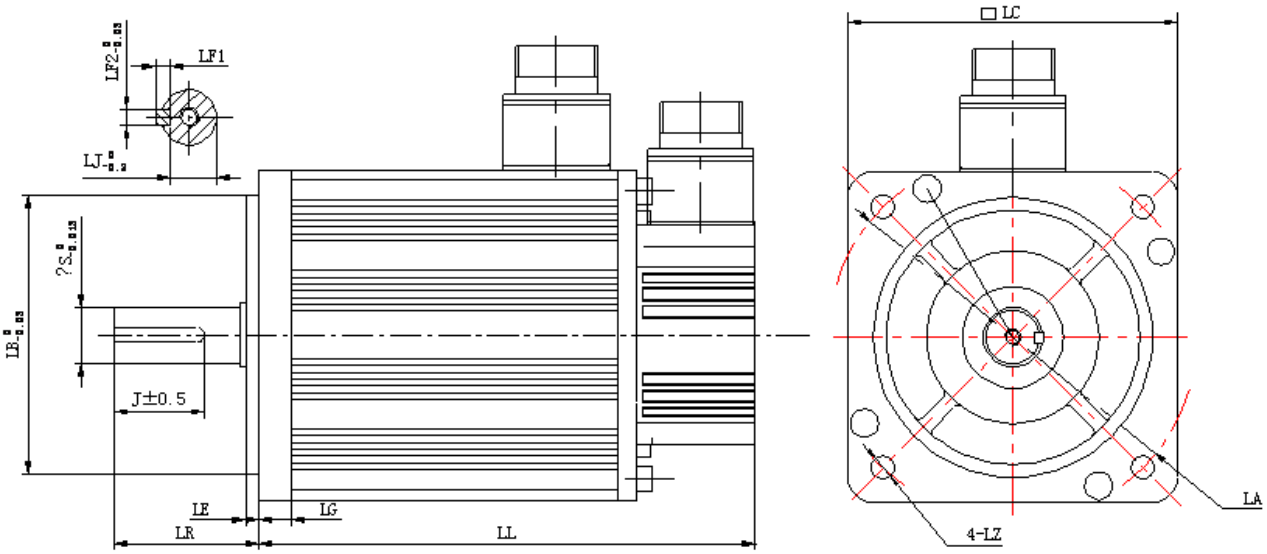
10.4 Communication address

communication address hexadecimal	**content**	**notes**	**Read/write**
0000~03E7H	Parameter area	Corresponding parameter in parameter list e.g. PA005 address is 0005H； PA101 address is 0065H； PA530 address is 0212H；	Readable/writable
0600~0628H	Monitoring data (same as panel display)	Data is not real-time updated, Some data is average value for monitoring purpose only.	read-only
0600H	Motor speed	rpm	read-only
0601H	Motor feedback　pulse quantity low place	pulse	read-only

0602H	Motor feedback pulse quantity	pulse	read-only
0603H	pulse command input pulse quantity low place	pulse	read-only
0604H	pulse command input pulse quantity high place	pulse	read-only
0605H	error pulse quantity low place	pulse	read-only
0606H	error pulse quantity high place	pulse	read-only
0607H	Speed command	0.01V	read-only
0608H	speed input	RPM	read-only
0609H	Torque command	0.01V	read-only
060AH	torque input	%	read-only
060BH	Internal torque feedback	%	read-only
060CH	input signal monitor		read-only
060DH	output signal monitor		read-only
060EH	command pulse frequency	0.1Khz	read-only
060FH	Main circuit voltage	V	read-only
0610H	Total running time	H	read-only
0611H	Rotation angle		read-only
0612H	Encoder absolute position (only valid for absolute encoders)	2pulse	read-only
0613H	Encoder circle quantity (only valid for absolute encoders)	circle	read-only
0614H	Cumulative load factor	%	read-only
0617H	Ratio of inertias of load	%	read-only
0618H	Effective gain monitoring		read-only
0630H	Current alarm		read-only
0631H	Current warning		read-only
0780H	**Absolute encoder multiple-circle information**	**Unit: 1 circle**	**read-only**

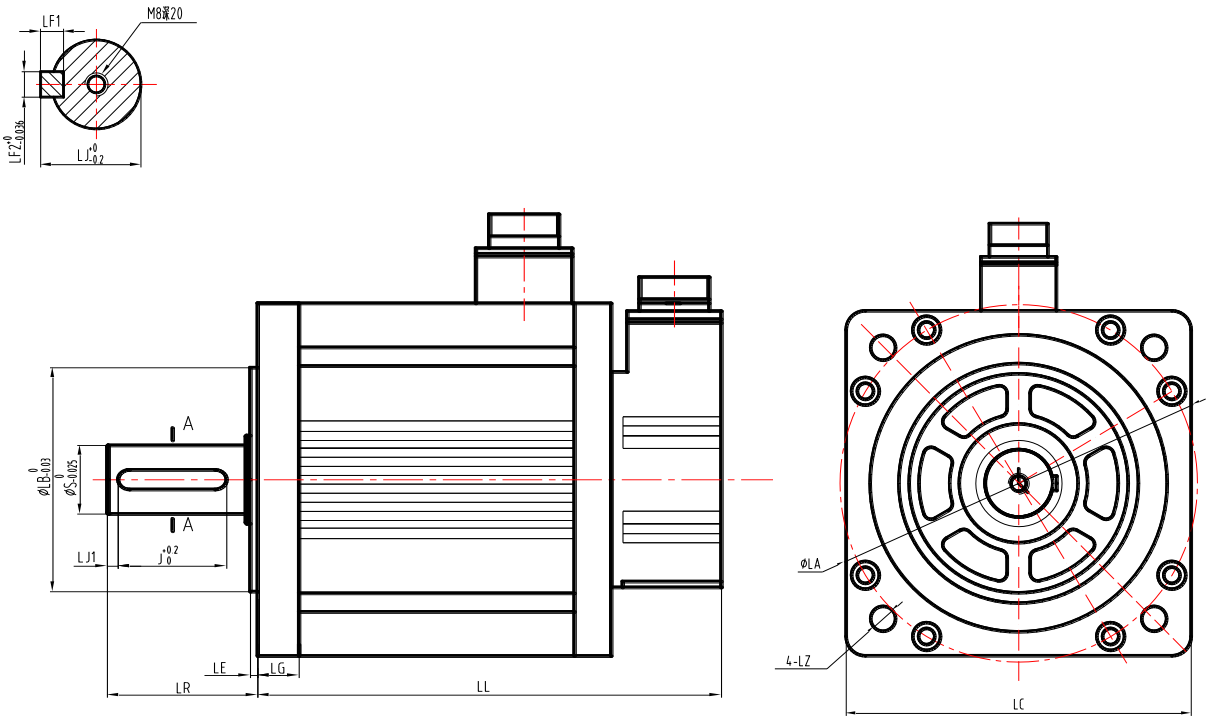
0781H	**Absolute encoder single-circle information high place**	**Unit: 1pulse**	**read-only**
0782H	**Absolute encoder single-circle information high place**	**Unit: 1pulse**	**read-only**
0783H	Motor feedback position low 16 place	Unit: 1pulse	read-only
0784H	Motor feedback position high 16 place	Unit: 1pulse	read-only
0785H	Motor given position low 16 place	Unit: 1pulse	read-only
0786H	Motor given position high 16 place	Unit: 1pulse	read-only

11.4.2 130 Motor dimensions: Unit (mm)



Model	Flange face				Shaft end					LL (w/brake)	LR	LE	LG
	LC	LA	LB	LZ	S	LJ	J	LF1	LLF2				
130DNMA1-0D85C	130	145	110	9	22	18.5	36	6	6	161 (220)	57	5	13
130DNMA1-0001C	130	145	110	9	22	18.5	36	6	6	172 (231)	57	5	13
130DNMA1-01D2C	130	145	110	9	22	18.5	36	6	6	181 (240)	57	5	13
130DNMA1-01D5C	130	145	110	9	22	18.5	36	6	6	197 (256)	57	5	13
130DNMA1-02D2C	130	145	110	9	22	18.5	36	6	6	219 (278)	57	5	13
130DNMA1-0003C	130	145	110	9	22	18.5	36	6	6	267 (326)	57	5	13

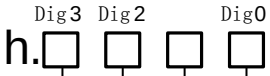
11.4.3 180 Motor dimensions: Unit (mm)



Model	Flange face				Shaft end					LL (w/brake)	LR	LE	LG
	LC	LA	LB	LZ	S	LJ	J	LF1	LF2				
180DNA-30B	180	200	114.3	13	35	30	51	8	10	212 (287)	65	3.2	18
180DNA-40B	180	200	114.3	13	35	30	51	8	10	232 (307)	65	3.2	18
180DNA-45B	180	200	114.3	13	35	30	51	8	10	252 (327)	65	3.2	18
180DNA-55B	180	200	114.3	13	35	30	51	8	10	272 (347)	65	3.2	18

PA500	**Port DI1 input signal selection** 【0】Servo-on (S-ON) 【1】Control mode switch (C-MODE) 【2】Positive driving prohibited (POT) 【3】Negative driving prohibited (NOT) 【4】Deviation counter clearance (CLR) 【5】Alarm reset (A-RST) 【6】Pulse input inhibition (INHIBIT) 【7】Zero-speed restoration (ZEROSPD) 【8】Positive torque limitation (PCL) 【9】Negative torque limitation (NCL) 【10】Gain switch (GAIN) 【11】Zero signal (ZPS) 【12】Signal negation under internal position & speed control mode (CMDINV) 【13】Instruction frequency division/multiplication switch 0 (DIV0) 【14】Instruction frequency division/multiplication switch 1 (DIV1) 【15】Internal instruction speed selection 0 (INSPD0) 【16】Internal instruction speed selection 1 (INSPD1) 【17】Internal instruction speed selection 2 (INSPD2) 【18】Internal position selection 0 (INPOS0) 【19】Internal position selection 1 (INPOS1) 【20】Internal position selection 2 (INPOS2) 【21】Internal position selection 3 (INPOS3) 【22】Internal position trigger (PTRG) 【23】Internal position control positive JOG (P-POS) 【24】Internal position control negative JOG (N-POS) 【25】Internal position control homing startup (SHOME) 【26】Internal position control stop signal (PZERO) 【Other】Special function and usage	0～28		0	immediate	

PA510	Output signal form selection	h.0000~FFF0		d.3210	immediate	



DO 1 Output signal	
0	Alarm Signal Output （ALM）

DO 2 Output signal selection	
0	Alarm Signal Output （ALM）
1	Positioning completed（COIN）
2	ZPulse collector signal （CZ）
3	External brake null signal （BK）
4	Servo ready（S-RDY）
5	Speed compatibility （VCMP）
6	Motor rotation detection （TGON）
7	Torque Limited（TLC）
8	Zero-speed detection （ZSP）
9	Warning （WARN）
A	Internal position control mode: homing achieved （HOME）
B	Internal position control mode: position command achieved（CMD-OK）
C	Internal position control mode: position achieved （MC-OK）

DO 3 Output signal selection	
0～C	Same as DO2

DO 4 Output signal selection	
0～C	Same as DO2

PA700	Internal position mode switch 1	h.0000～FF02		h.1002	immediate	

Position change over mode	
0	External IO signal（POS） selects position and external IO signal（trigger） triggers action
1	External IO signal（trigger） triggers action and position operates in a cycle
2	Timed internal operation in a circle

Position operating mode	
0	Gain position
1	Absolute position

Circular operating position start point	
0～F	Select start point of position

Circular operating position end point	
0～F	Select End point of position

PA701	Internal position 0 low 16 place	h.0000～FFFF	pulse	h.4E20	immediate	
PA702	Internal position 0 high 16 place	h.0000～FFFF		h.0000	immediate	
PA703	Internal position 0 low 16 place	h.0000～FFFF	pulse	h.9C40	immediate	
PA704	Internal position 1 high 16 place	h.0000～FFFF		h.0000	immediate	
PA705	Internal position 2 low 16 place	h.0000～FFFF	pulse	h.EA60	immediate	
PA706	Internal position 2 high 16 place	h.0000～FFFF		h.0000	immediate	
PA707	Internal position 3 low 16 place	h.0000～FFFF	pulse	h.3880	immediate	
PA708	Internal position 3 high 16 place	h.0000～FFFF		h.0001	immediate	
PA709	Internal position 4 low 16 place	h.0000～FFFF	pulse	h.86A0	immediate	
PA710	Internal position 4 high 16 place	h.0000～FFFF		h.0001	immediate	
PA711	Internal position 5 low 16 place	h.0000～FFFF	pulse	h.D4C0	immediate	
PA712	Internal position 5 high 16 place	h.0000～FFFF		h.0001	immediate	
PA713	Internal position 6 low 16 place	h.0000～FFFF	pulse	h.22E0	immediate	
PA714	Internal position 6 high 16 place	h.0000～FFFF		h.0002	immediate	
PA715	Internal position 7 low 16 place	h.0000～FFFF	pulse	h.7100	immediate	
PA716	Internal position 7 high 16 place	h.0000～FFFF		h.0002	immediate	
PA717	Internal position 8 low 16 place	h.0000～FFFF	pulse	h.BF20	immediate	
PA718	Internal position 8 high 16 place	h.0000～FFFF		h.0002	immediate	
PA719	Internal position 9 low 16 place	h.0000～FFFF	pulse	h.0D40	immediate	
PA720	Internal position 9 high 16 place	h.0000～FFFF		h.0003	immediate	
PA721	Internal position 10 low 16 place	h.0000～FFFF	pulse	h.5B60	immediate	
PA722	Internal position 10 high 16 place	h.0000～FFFF		h.0003	immediate	
PA723	Internal position 11 low 16 place	h.0000～FFFF	pulse	h.A980	immediate	
PA724	Internal position 11 high 16 place	h.0000～FFFF		h.0003	immediate	
PA725	Internal position 12 low 16 place	h.0000～FFFF	pulse	h.F7A0	immediate	
PA726	Internal position 12 high 16 place	h.0000～FFFF		h.0003	immediate	
PA727	Internal position 13 low 16 place	h.0000～FFFF	pulse	h.45C0	immediate	
PA728	Internal position 13 high 16 place	h.0000～FFFF		h.0004	immediate	
PA729	Internal position 14 low 16 place	h.0000～FFFF	pulse	h.93E0	immediate	
PA730	Internal position 14 high 16 place	h.0000～FFFF		h.0004	immediate	
PA731	Internal position 15 low 16 place	h.0000～FFFF	pulse	h.E200	immediate	
PA732	Internal position 15 high 16 place	h.0000～FFFF		h.0004	immediate	
PA733	Internal position 0 speed	0~5000	1 min-1	100	immediate	
PA734	Internal position 1 speed	0~5000	1 min-1	100	immediate	
PA735	Internal position 2 speed	0~5000	1 min-1	100	immediate	
PA736	Internal position 3 speed	0~5000	1 min-1	100	immediate	
PA737	Internal position 4 speed	0~5000	1 min-1	100	immediate	
PA738	Internal position 5 speed	0~5000	1 min-1	100	immediate	
PA739	Internal position 6 speed	0~5000	1 min-1	100	immediate	
PA740	Internal position 7 speed	0~5000	1 min-1	100	immediate	

PA741	Internal position 8 speed	0~5000	1 min-1	100	immediate	
PA742	Internal position 9 speed	0~5000	1 min-1	100	immediate	
PA743	Internal position 10 speed	0~5000	1 min-1	100	immediate	
PA744	Internal position 11 speed	0~5000	1 min-1	100	immediate	
PA745	Internal position 12 speed	0~5000	1 min-1	100	immediate	
PA746	Internal position 13 speed	0~5000	1 min-1	100	immediate	
PA747	Internal position 14 speed	0~5000	1 min-1	100	immediate	
PA748	Internal position 15 speed	0~5000	1 min-1	100	immediate	
PA749	Internal position 0 acceleration/deceleration time parameter	0~500	ms	0	immediate	
PA750	Internal position 1 acceleration/deceleration time parameter	0~500	ms	0	immediate	
PA751	Internal position 2 acceleration/deceleration time parameter	0~500	ms	0	immediate	
PA752	Internal position 3 acceleration/deceleration time parameter	0~500	ms	0	immediate	
PA753	Internal position 4 acceleration/deceleration time parameter	0~500	ms	0	immediate	
PA754	Internal position 5 acceleration/deceleration time parameter	0~500	ms	0	immediate	
PA755	Internal position 6 acceleration/deceleration time parameter	0~500	ms	0	immediate	
PA756	Internal position 7 acceleration/deceleration time parameter	0~500	ms	0	immediate	
PA757	Internal position 8 acceleration/deceleration time parameter	0~500	ms	0	immediate	
PA758	Internal position 9 acceleration/deceleration time parameter	0~500	ms	0	immediate	
PA759	Internal position 10 acceleration/deceleration time parameter	0~500	ms	0	immediate	
PA760	Internal position 11 acceleration/deceleration time parameter	0~500	ms	0	immediate	
PA761	Internal position 12 acceleration/deceleration time parameter	0~500	ms	0	immediate	
PA762	Internal position 13 acceleration/deceleration time parameter	0~500	ms	0	immediate	
PA763	Internal position 14 acceleration/deceleration time parameter	0~500	ms	0	immediate	
PA764	Internal position 15 acceleration/deceleration time parameter	0~500	ms	0	immediate	
PA765	Internal position stop time	0~65535	ms	100	immediate	
PA766	Position display low 16 place	h.0000～FFFF	pulse	0	immediate	
PA767	Position display high 16 place	h.0000～FFFF		0	immediate	
PA768	Position control JOG speed	0~5000	rpm	100	immediate	
PA769	reserved					

PA770	**Internal position mode switch 2**	b.0000～1111		b.0000	immediate	

b. □ □ □ □

Trigger selection	
0	Use external signal PTRG to trigger
1	User position selection signal（INPOS0、INPOS1、INPOS2）

Trigger time sequence	
0	Only receive new signal when current position finishes. (CMD-OK valid)
1	Even current position not finishes, can still receive new signal

PZERO function	
0	Stop
1	Pause

Software limit enable	
0	Software limit can not enable
1	Software limit can enable. PA756、PA757 are positive limit; PA758、PA759 are negative limit.

PA771	**Internal position mode switch 3**	b.0000～1131		b.0000	immediate	

d. □ □ □ □

Homing direction	
0	Positive direction
1	Negative direction

Homing mode selection	
0	Move backward. Look for Z pulse
1	Not move backward. Look for Z pulse
2	Move backward. Not look for Z pulse
3	Not move backward. Not look for Z pulse

Homing completion operation	
0	Home completes, do not clear all position data.
1	Home completes, clear all position data.

Homing signal selection	
0	User external ZPS signal as homing signal.
1	Use external torque control signal (PA404、PA405) as homing signal.

	Internal position mode switch 4	b.0000～1111		b.0000	immediate	
PA772	b. □ □ □ □ **Calculation method under absolute position control mode** 0 Use actual feedback position to calculate 1 Use given position to calculate **reserved** **Electronic gear ratio for communication position feedback** 0 communication position feedback (0x0783，0x0784) data as data after using electronic gear ratio 1 communication position feedback(0x0783，0x0784) as motor feedback data, same as dP001\dP002 **High/low place switching** 0 Not switch 1 Negate					
PA773	**Internal position mode switch 5**	b.0000～1111		b.0000	immediate	
	b. □ □ □ □ **CLR signal** 0 CLR only clears position deviation data 1 CLR clear all position data in all modes **reserved** **reserved** **reserved**					
PA774	reserved					
PA775	Homing speed 1 (before contacting homing switch)	0～3000	Rpm	3000	immediate	
PA776	Homing speed 2 (after contacting homing switch)	0～500	Rpm	30	immediate	
PA777	Homing deviation low 16 place	h.0000～FFFF	Pulse	0	immediate	
PA778	Homing deviation high 16 place	h.0000～1000		0	immediate	
PA779	Positive soft limit place low 16 place data	h.0000～FFFF	Pulse	h.0000	immediate	
PA780	Positive soft limit place high 16 place data	h.0000～FFFF		h.1000	immediate	
PA781	Negative soft limit place low 16 place data	h.0000～FFFF	Pulse	h.0000	immediate	
PA782	Negative soft limit place high 16 place data	h.0000～FFFF		h.E000	immediate	