

VC512 Chase Shear Special Servo Function Manual

Directory

Chapter 1 All Parameters of Chase Shear Control Mode	1
Chapter 2 Chase shear control mode input function bits	8
Chapter 3 Chase shear control mode output function bits	10
Chapter 4 Fault Codes and Solutions	11
Chapter 5 Description of Chase Cut Function	11
5.1 Mechanical parameters	11
5.2 Cam engagement function	12
5.3 Interference filtering	13
5.4 Order function	13
5.5 immediate cut function	16
5.6 Change the position direction of the master and slave axis	16
5.7 Simulation function	17
5.8 Sync zone cut mode	17
5.9 Chase shear return mode	19
5.10 Origin return function	20
5.11 Cam disengagement function	21
5.12 Color scale related functions	22
5.13 Spindle position compensation method	23
5.14 Spindle phase shift function	25
5.15 Slave axis speed overlay function	25
5.16 Monitoring of important parameters	26
5.17 Hardware and software limit	27
5.18 The steps of using the function of clearing the feeding length of the current cycle	28
Chapter 6 Trial Operation of Cut Mode	29
6.1 Fixed length mode	29
6.1.1 wiring	29
6.1.2 Set the mechanical parameters	30
6.1.3 Setting the Chase Shear Control Parameters	31
6.1.4 Home zero return and limit	33
6.1.5 Cam engagement enable	34

6.1.6 Trial-run waveform analysis in fixed-length mode	34
6.2 trigger mode	35
6.2.1 wiring	35
6.2.2 Set the mechanical parameters	37
6.2.3 Setting the Chase Shear Control Parameters	37
6.2.4 Set the parameters related to the color scale	41
6.2.5 Origin return and limit	44
6.2.6 Enable the engage cam	44
6.2.7 Trigger mode test run waveform analysis	45
6.3 track mode	46
6.3.1 wiring	46
6.3.2 Set the mechanical parameters	47
6.3.3 Setting the Chase Shear Control Parameters	48
6.3.4 Set the parameters related to the color scale	50
6.3.5 Origin return and limit	53
6.3.6 Enable the engage cam	53
6.3.7 Trace mode test run waveform analysis	53
Chapter 7 Wiring	55
7.1 Main circuit wiring	55
7.2 Input and output lines	56
7.3 Position command pulse signal wiring	57
7.4 Communication wiring	60
7.5 Chase shear classic wiring diagram	62
Chapter 8 Modbus communication protocol	63
Chapter 9 Gain Adjustment	67
Chapter 10 Cutting Exception Handling	68
Version Update Record	69

Chapter 1 All Parameters of Chase Shear Control Mode

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P02.01	Servo drive control mode 0-position mode 1-speed mode 2-torque mode 7-dedicated mode	0-7	7	RW	Immediately
P15.01	Initial cut length 0-cut length 1-distance from color scale to origin	0-1	0	RW	Immediately
P15.02	Enable memory , the current cycle feed length 0-no memory; 1-memory	0-1	0	RW	Reset
P15.03	The source of the spindle position command 0-XY pulse input 1-second encoder input 2-INFn.171 (DI6) switching XY pulse input/second encoder input 3-simulation input 4-INFn.171 switch XY pulse input/simulation input 5-INFn.171 switch second encoder input/emulation input	0-5	0	RW	Reset
P15.04	Spindle speed median filter time constant, unit: ms	0-32	2	RW	Reset
P15.05	Spindle speed low-pass filter time constant, unit: ms	0-128	5	RW	Immediately
P15.06	Spindle circumference, unit: 0.01mm	0.01-21474836.47	500.00	RW	Immediately
P15.08	The number of pulses per week of the spindle, unit: clk	1-2147483647	10000	RW	Immediately
P15.10	The weekly lead of the slave axis, unit: 0.01mm	0.01-21474836.47	40.00	RW	Immediately
P15.12	The number of pulses per week for the slave axis, unit: clk	1-2147483647	10000	RW	Immediately
P15.14	Effective travel of the machine , unit: 0.01mm	0.01-21474836.47	5000.00	RW	Immediately

P15.16	Low-pass filter time for slave axis speed reference, unit: ms	1-128	1	RW	Immediately
P15.17	The acceleration and deceleration time of immediate cutting, units:ms	0-65535	50	RW	Immediately
P15.20	Order source selection 0-Do not switch, use order 1 1-DI Select order 2- Loop switching	0-2	0	RW	Immediately
P15.21	Servo status after order is completed 0-Clear all order times, and switch orders in a cycle 1-Slave axis stops at the origin position	0-1	0	RW	Immediately
P15.22	Cut length of order 1, unit: 0.01mm	0.01- 21474836.47	1000.00	RW	Immediately
P15.24	Cut times of order 1	0-65535	100	RW	Immediately
P15.25	Cut length of order 2, unit: 0.01mm	0.01- 21474836.47	1000.00	RW	Immediately
P15.27	Cut times of order 2	0-65535	100	RW	Immediately
P15.28	Cut length of order 3, unit: 0.01mm	0.01- 21474836.47	1000.00	RW	Immediately
P15.30	Cut times of order 3	0-65535	100	RW	Immediately
P15.31	Cut length of order 4, unit: 0.01mm	0.01- 21474836.47	1000.00	RW	Immediately
P15.33	Cut times of order 4	0-65535	100	RW	Immediately
P15.34	The order is close to the set threshold	0-65535	1	RW	Immediately
P15.35	Sampling length, unit: 0.01mm	0.01- 21474836.47	300.00	RW	Immediately
P15.37	Modify the cutting step length, unit: 0.01mm	0.00-655.35	5.00	RW	Immediately
P15.38	Saw blade width, unit: 0.01mm	0.00-655.35	0.00	RW	Immediately
P15.39	Electronic CAM function bit BIT0- changes the direction of XY pulse BIT1 changes the direction of the second encoder BIT2- changes the direction of movement from the axis	0-65535	0	RW	Reset
P15.40	Simulation selection 0-dynamic simulation, slave axis motion 1-static simulation, slave axis static	0-1	0	RW	Reset
P15.41	Simulation speed, unit: 0.1m/min	0.1-1000.0	60.0	RW	Immediately
P15.42	Simulation acceleration and deceleration time, unit: 0.1s P15.42 is the time for the slave axis to accelerate from zero speed to 1000.0m/min	0.0-100.0	6.0	RW	Immediately

P15.43	Meshing amount in synchronous zone , units: 0.01mm	0.01- 21474836.47	100.00	RW	Immediately
P15.45	Synchronization zone completion mode 0- shear time 1 - external DI 2- Actual stroke	0-2	1	RW	Immediately
P15.46	Cut time, unit: ms	0-65535	200	RW	Immediately
P15.47	Start time of synchronization signal, unit: ms	0-65535	20	RW	Immediately
P15.48	Sync signal end time, unit: ms	0-65535	0	RW	Immediately
P15.49	Sync length percentage, unit: 0.1%	0.0-100. 0	5.0	RW	Immediately
P15.50	Whether to enable stop waiting after the synchronization area is completed 0 - do not wait 1 - wait	0-1	0	RW	Immediately
P15.51	The deceleration front amount of the synchronization area, unit: 0.01mm	0.01- 21474836.47	100.00	RW	Immediately
P15.53	Deceleration waiting time, unit: ms	0-65535	100	RW	Immediately
P15.54	After the shear is complete, enable speed overlay 0-Disable 1-enable	0-1	0	RW	Immediately
P15.55	Cam synchronization area start position selection 0 - fixed 1 - dynamic	0-1	0	RW	Immediately
P15.56	Maximum speed return position selection 0-Fixed origin position 1-System dynamic calculation	0-1	0	RW	Immediately
P15.57	Enable the high speed return 0-Disable 1-enable	0-1	1	RW	Immediately
P15.58	High speed return speed source selection 0-from the spindle speed percentage 1-from the fixed value	0-1	1	RW	Immediately
P15.59	High-speed return to spindle speed percentage, unit: 0.1%	0.0-200.0	100.0	RW	Immediately
P15.60	High speed return speed of the fixed value, unit: rpm	0-10000	3000	RW	Immediately
P15.61	High-speed return acceleration and deceleration time, unit: ms	0-65535	500	RW	Immediately
P15.62	Return to the cut length of the last synchronization starting point , unit:	0.01- 21474836.47	1000.0	RW	Immediately

	0.01mm				
P15.64	Dynamic return position, minimum tangent length adjustment factor, units: 0.1%	50.0-150.0%	100.0	RW	Immediately
P15.65	Cam disengagement method 0-stop origin 1-stop immediately	0-1	1	RW	Immediately
P15.66	Cam disengagement speed, unit: rpm	0-10000	500	RW	Immediately
P15.67	Cam disengagement acceleration and deceleration time, unit: ms	0-65535	500	RW	Immediately
P15.69	The set value of the current order	0-65535	0	RO	-
P15.70	Accumulated value of the number of pulses for spindle feed, unit: clk	-2147483648- 2147483647	-	RO	-
P15.72	Total feed length, unit: 0.01mm	-21474836.48 - 21474836.47	-	RO	-
P15.74	Current cycle spindle position, unit: 0.01mm	-21474836.48 - 21474836.47	-	RO	-
P15.76	The target position of the slave axis in the current cycle, unit: 0.01mm	-21474836.48 - 21474836.47	-	RO	-
P15.78	Real-time error of slave axis, unit: 0.01mm	-21474836.48 - 21474836.47	-	RO	-
P03.17	Real-time error of slave axis pulse, unit: 0.0001 circle	-2147483648- 2147483647	-	RO	-
P15.80	Real-time speed of slave axis, unit: 0.1m/min	-3276.8-3276. 7	-	RO	-
P15.81	Real-time speed of slave axis, unit: 0.1m/min	-3276.8-3276. 7	-	RO	-
P15.82	Current cutting length set value, unit: 0.01mm	0- 21474836.47	-	RO	-
P15.84	Current actual detected shear length, unit: 0.01mm	-21474836.48 - 21474836.47	-	RW	Immediately
P15.86	Feed length of current cycle, unit: 0.01mm	-21474836.48 - 21474836.47	-	RO	-
P15.88	Minimum cutting length under current conditions, unit: 0.01mm	0- 21474836.47	-	RO	-
P15.91	Count value of order 1	0-65535	-	RO	-
P15.92	Count value of order 2	0-65535	-	RO	-
P15.93	Count value of order 3	0-65535	-	RO	-

P15.94	Count value of order 4	0-65535	-	RO	-
P15.95	Peak speed per revolution of the slave shaft, units: rpm	-32768-32767	-	RO	-
P15.96	Average torque per revolution of the slave shaft, units:0.1%	-3276.8-3276.7	-	RO	-
P15.97	Peak torque per revolution of the slave shaft, units:0.1%	-3276.8-3276.7	-	RO	-
P15.98	Color mark compensation length , units:0.1mm	-21474836.48 - 21474836.47	-	RO	-
P16.01	way to find the origin 0- The current position is the origin position 1- Automatically find the origin when meshing 2- Find the origin at the forward speed 3- Find the origin at the reverse speed;	0-3	3	RW	Immediately
P16.02	Find the origin velocity, unit: 0.1m/min	0.0-6553.5	5.0	RW	Immediately
P16.03	Acceleration and deceleration time for finding the origin, unit: 0.1s	0-65535	10.0	RW	Immediately
P16.04	The origin offset, unit: 0.01mm	-21474836.48 - 21474836.47	0.00	RW	Immediately
P16.06	Automatic origin confirmation	0-1	0	RW	Immediately
P16.07	Triggering times of the cut completion signal	0-65535	-	RO	-
P16.08	The cumulative total number of cuts	0-429496729 5	-	RO	-
P16.10	Software restricts location selection 0-software limit disabled 1-software limit output DO	0-1	0	RW	Immediately
P16.11	The value of the lower limit position of the software limit position, unit: mm	-32767-32767	-10	RW	Immediately
P16.12	The value of the upper limit position of the software limit position, unit: mm	-32767-32767	5000	RW	Immediately
P16.13	Hardware limit deceleration time, unit: ms	0-65535	50	RW	Immediately
P16.15	Cut mode 0-cut length mode 1-trigger mode 2-tracking mode	0-2	0	RW	Immediately
P16.18	Color mark left window, unit: 0.01mm	0.00- 21474836.47	100.00	RW	Immediately
P16.20	Color mark right window, unit: 0.01mm	0.00-	100.00	RW	Immediately

		21474836.47			
P16.22	The distance from the color mark to the tangent point, unit: 0.01mm	0.00- 21474836.47	200.00	RW	Immediately
P16.24	The adjustment amount from the color mark to the tangent point, unit: 0.01mm	-327.68-327.6 7	0.00	RW	Immediately
P16.25	The actual distance from the color mark to the tangent point, unit: 0.01mm	-21474836.48 - 21474836.47	-	RO	-
P16.27	Valid range of color mark spacing	0-100	20	RW	Immediately
P16.28	Detected color mark spacing, unit: 0.01mm	-21474836.48 - 21474836.47	-	RO	-
P16.30	Color mark width; unit: 0.01mm	0.00-327.67	0.0	RW	Immediately
P16.31	The color mark width error threshold, unit: 0.01mm	0.00-327.67	0.0	RW	Immediately
P16.32	The width of the detected color mark, unit: 0.01mm	-327.67-327.6 7	-	RO	-
P16.33	After every N color mark, the next color mark is the valid color mark	0-65535	0	RW	Immediately
P16.34	The number of color marks in the valid window, the overcut point is cleared	0-65535	0	RO	-
P16.35	The valid number of color mark	0-65535	-	RO	-
P16.36	Source of color mark compensation speed 0-spindle speed percentage 1-fixed compensation speed P16.40	0-1	0	RW	Immediately
P16.37	Compensation speed percentage, unit: % According to the position obtained by the spindle feed rate * P16.34, it is compensated to the spindle position.	0-200	20	RW	Immediately
P16.38	Compensate acceleration time; unit: 0.1s This time is the time for the compensation speed to accelerate from zero to 1000.0m/min	0-6553.5	10.0	RW	Immediately
P16.39	Compensate deceleration time; unit: 0.1s This time is the time for the compensation speed to decelerate from 1000.0m/min to zero	0-6553.5	10.0	RW	Immediately
P16.40	Compensate the maximum speed; unit: 0.1m/min	0-6553.5	20.0	RW	Immediately
P16.41	Compensate for the maximum displacement, unit: mm	0-65535	200	RW	Immediately
P16.42	Compensation position prohibited when the spindle speed is zero 0 - not forbidden	0-1	0	RW	Immediately

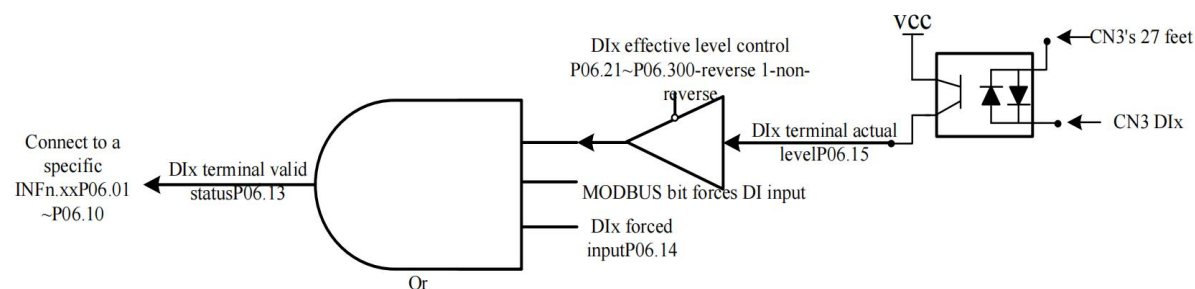
	1 - forbidden				
P16.44	Spindle phase shift step length , unit: 0.01mm	0-655.35	5.00	RW	Immediately
P16.45	Spindle phase shift speed, unit: 0.1m/min	0-6553.5	5.0	RW	Immediately
P16.46	Spindle phase shift acceleration and deceleration time, unit: 0.1s	0-6553.5	5.0	RW	Immediately
P16.47	Slave axis superposition position , unit: 0.01mm	0-655.35	5.00	RW	Immediately
P16.48	Jog speed of slave axis, unit: 0.1m/min	0-6553.5	10.0	RW	Immediately
P16.49	Slave axis jog acceleration and deceleration time, unit: 0.1s	0-6553.5	2.0	RW	Immediately
P16.50	Material missing protection options 0-no protection 1-Orders are not counted 2-Orders do not count and stop at the origin position	0-2	0	RW	Immediately
P16.51	Spindle reverse protection 0-no protection; 1-Reverse speed greater than P1652 failure 622 2- The reverse speed is greater than that of P1652 and the reverse position is greater than that of P1653	0-2	1	RW	Immediately
P16.52	Reverse speed, unit: 0.1m/min	0-6553.5	2	RW	Immediately
P16.53	Reverse position, unit: mm	0-65535	100	RW	Immediately
P16.54	Current cycle color scale clearing method 0-the start point of the synchronization area is cleared 1-the number of color marks is reached and cleared	0-1	0	RW	Immediately
P16.99	The firmware version number of the chase shear	-32.767-32.767	0	RO	-

Chapter 2 Chase shear control mode input function bits

There are 10 physical DIs in the servo, which are DI1~DI10. Each entity DI can be assigned an input function bit INFn.xx, and the configuration parameters are P06.01-P06.10. The effective level of each entity DI can be set separately, and the setting parameters are P06.21-P06.30. Each entity DI can be forced to input a certain level through P06.14, or a certain DI can be forced to input through the modbus bit.

Note: DI function configuration P06.01-P06.10 and modbus bit communication can only be selected from two.

The internal logic of DI is as shown in the figure below.



(Remarks: SW-DI: Pin 27 of CN3 is short-circuited with +24V for NPN mode; short-circuit with COM is for PNP mode.)

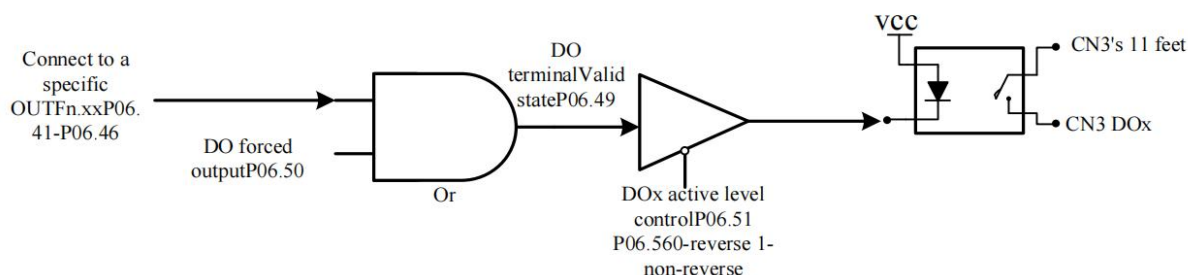
As can be seen from the above figure, to make the DIx terminal valid, you can modify the actual level of DIx, or set the MODBUS communication bit, or set the mandatory valid register P06.14. If input from an external terminal, a voltage difference of 24V needs to be input between the 27 pin of the servo CN3 terminal and the corresponding DIx pin.

Input Function No.	Parameter Description
INFn.01	Enable the servo
INFn.02	Reset the servo
INFn.43	Positive limit switch
INFn.44	Negative limit switch
INFn.171	Spindle position source switching, when it is valid, it comes from the second encoder, when it is invalid, it comes from XY pulse.
INFn.172	Cam engagement is enabled, valid when the valid level is high, engages when valid, disengages when invalid
INFn.173	Cam pause signal, valid when the valid level is high, when valid, the slave axis will stop at the waiting position, after the pause is released, the cam is re-engaged
INFn.174	The origin returns to zero, the rising edge is valid
INFn.175	Color mark signal input, valid on rising edge, fixed servo DI9

INFn.176	Origin signal input, valid for rising edge, fixed servo DI10
INFn.177	Color mark manual shielding input, valid when the valid level is high, color mark triggering is invalid when valid
INFn.178	Feeding detection signal, valid when the valid level is high
INFn.179	Immediately cut the signal, the rising edge is valid
INFn.180	Clear the current cycle color mark count
INFn.181	Clear the cut point count
INFn.182	The number of times of clearing P16.08, P15.91, P15.92, P15.93 and P15.94, valid when the valid level is high
INFn.183	Clear the color mark count P16.35, valid when the active level is high
INFn.184	The current order count is cleared, valid when the valid level is high
INFn.185	chasing shearing forward jog, valid when the valid level is high
INFn.186	chasing shearing reverse jog, valid when the valid level is high
INFn.187	Spindle forward jog phase shift
INFn.188	Spindle reverse jog phase shift
INFn.191	Order toggle switch 1, valid when the active level is high
INFn.192	Order toggle switch 2, valid when the active level is high
INFn.193	Positive phase shift of the spindle, trigger once, the spindle increases the displacement of P16.44, the rising edge is valid
INFn.194	Negative phase shift of the spindle, trigger once, the spindle reduces the displacement of P16.44, the rising edge is valid
INFn.195	Increase the cutting length of the current order, trigger once, the current order increases the length of P15.37, the rising edge is valid
INFn.196	Decrease the cutting length of the current order, trigger once, the current order will reduce the length of P15.37, the rising edge is valid
INFn.199	The origin is confirmed, and the rising edge is valid.
INFn.202	Cam emergency stop
INFn.203	Cut completion signal, the rising edge is valid.

Chapter 3 Chase shear control mode output function bits

The servo has 6 entity DOs, DO1~DO6 respectively. Each DO can be assigned an output function bit $OUTFn.xx$, and the configuration parameters are P06.41-P06.46. The effective level of each entity DO can be set individually, or a DO bit can be output through the forced register of P06.50. The effective level output of DO finally drives an optocoupler. Once the optocoupler is turned on, DOx outputs the voltage of pin 11 of CN3 port.



(Note: SW-DO: Pin 11 of CN3 is short-circuited with COM for NPN mode; short-circuited with +24V is for PNP mode.)

Output Function Number	Parameter Description
$OUTFn.09$	Fault output function
$OUTFn.40$	Engagement state output, output valid signal when engaged
$OUTFn.41$	The output is valid when the slave axis is in the synchronization area
$OUTFn.42$	When the order is close to the output, the actual number of cuts of the current order + the order close threshold P15.34 is greater than or equal to the set times of the current order cut, the output order close signal
$OUTFn.43$	Order completion output, when the actual number of cuts of the current order is greater than or equal to the set number of current order cuts, the order completion signal is output
$OUTFn.51$	The color mark triggers the valid interval output, and if the spindle position of the current cam cycle is in the color mark valid window, it outputs a high level.
$OUTFn.52$	The current set cutting length is too small to output, and the set cutting length is greater than the minimum cutting length that cannot be performed by the current system state.
$OUTFn.53$	Hardware limit output, output when encountering limit switch.
$OUTFn.54$	Software limit output, output when the current position of the saw table exceeds the software limit.
$OUTFn.55$	Output after the zero return is completed.

Chapter 4 Fault Codes and Solutions

fault code	Fault description	cause
Er.620	The origin has not been returned to zero	Before the cam is engaged, the origin has not been returned to zero
Er.621	Cam cycle error	Unreasonable setting of chase shear parameters, too fast feeding speed or too short cutting
Er.622	Cam reverse	The second encoder/XY pulse direction is the negative direction

Chapter 5 Description of Chase Cut Function

5.1 Mechanical parameters

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.03	The source of the spindle position command 0-XY pulse input 1-second encoder input 2-INFn.171 (DI6) switching XY pulse input/second encoder input 3-simulation input 4-INFn.171 switch XY pulse input/simulation input 5-INFn.171 switch second encoder input/emulation input	0-5	0	RW	Reset
P15.06	Spindle circumference, unit: 0.01mm	0.01- 21474836.47	500.00	RW	Immediately
P15.08	The number of pulses per week of the spindle, unit: clk	1- 2147483647	10000	RW	Immediately
P15.10	The weekly lead of the slave axis, unit: 0.01mm	0.01- 21474836.47	40.00	RW	Immediately
P15.12	The number of pulses per week for the slave axis, unit: clk	1- 2147483647	10000	RW	Immediately
P15.14	Effective travel of the machine, unit: 0.01mm	0.01- 21474836.47	5000.00	RW	Immediately

5.2 Cam engagement function

When the cam engagement enable signal INFn.172 is valid, the system will first engage according to the initial shear length P15.01.

Note: The cam engagement is valid only after the origin return is completed.

Re(initial) meshing cut length selection

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.01	Initial cut length 0-cut length 1-distance from color scale to origin	0-1	0	RW	Immediately

Parameter details:

- ◆ P15.01=0, Spindle cutting length, select the current order length for cutting.
- ◆ P15.01=1, When the color mark is effectively triggered, the system will cut according to the distance from the color mark to the origin P16.22 and the synchronous pre-position P15.43, and compensate the spindle position so that the cutter can cut to the color mark position.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.43	Meshing amount in synchronous zone , units: 0.01mm When engaged, after the master axis travels the distance of P15.43, the slave axis and the master axis have the same linear speed	0.01- 21474836.47	100.00	RW	Immediately
P16.22	The distance from the color mark to the tangent point, unit: 0.01mm	0.00- 21474836.47	200.00	RW	Immediately

The synchronization preamble P15.43 determines the position of the starting point of the synchronization area, and the corresponding machine position of the starting point of the synchronization area is $P15.43 * 8 / 15$.

Input Function No.	Parameter Description
INFn.172	Cam engagement is enabled, valid when the valid level is high, engages when valid, disengages when invalid

Output Function No.	Parameter Description
OUTFn.40	Engagement state output, output valid signal when engaged

5.3 Interference filtering

When the feeding speed fluctuates greatly, the speed of the chase shearing servo will fluctuate greatly. At this time, the speed needs to be filtered to make the spindle linear speed relatively smooth and reduce the fluctuation of the chase shearing servo speed. Especially when there are multiple axes in coordination, it should not be set too large.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.04	Spindle speed median filter time constant, unit: ms	0-32	2	RW	Reset
P15.05	Spindle speed low-pass filter time constant, unit: ms	0-128	5	RW	Immediately
P15.16	Low-pass filter time for slave axis speed reference, unit: ms	1-128	1	RW	Immediately

5.4 Order function

The order function can be used to customize different cutting material lengths, and can flexibly switch between different material lengths. Switching between orders can be reached with the DI selection or with the number of cuts. There is an order completion output, an order close to completion output signal, and the order number clearing function can repeat the current order.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.20	Order source selection 0-Do not switch, use order 1 1-DI Select order 2-Loop switching	0-2	0	RW	Immediately

Parameter details:

- ◆ P15.20=0, Don't switch the order length, just use the length of order 1.
- ◆ P15.20=1, Select the corresponding order through DI, the DI function number is INFn.191, INFn.192.

INFn.191	INFn.192	order selection
invalid	invalid	1
valid	invalid	2
invalid	valid	3
valid	valid	4

- ◆ P15.20=2, The order first works according to the cutting length of the first group of orders and the first group of cutting times. After the order is completed, it will automatically switch to the second group of orders, and cut in sequence. If the number of the next order is 0, then judge whether the next order is completed. When the fourth group is processed, the system will process according to the selection of P15.21.

After the order is completed and the processing method.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.21	Servo status after order is completed 0-Clear all order times, and switch orders in a cycle 1-Slave axis stops at the origin position	0-1	0	RW	Immediately

Note: P15.21 is only valid when P15.20=2.

- ◆ P15.21=0, After the order is completed, clear the actual cutting times P15.91, P15.92, P15.93, and P15.94 of all orders, and cyclically judge and select the order. If the set number of orders for all orders is 0, select order 1.
- ◆ P15.21=1, After the order is completed, the slave axis stops at the waiting position.

Order related parameters

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.22	Cut length of order 1, unit: 0.01mm	0.01-21474836.47	1000.00	RW	Immediately
P15.24	Cut times of order 1	0-65535	100	RW	Immediately
P15.25	Cut length of order 2, unit: 0.01mm	0.01-21474836.47	1000.00	RW	Immediately
P15.27	Cut times of order 2	0-65535	100	RW	Immediately
P15.28	Cut length of order 3, unit: 0.01mm	0.01-21474836.47	1000.00	RW	Immediately
P15.30	Cut times of order 3	0-65535	100	RW	Immediately
P15.31	Cut length of order 4, unit: 0.01mm	0.01-21474836.47	1000.00	RW	Immediately
P15.33	Cut times of order 4	0-65535	100	RW	Immediately

Cut length correction

The cutting length of the current order can be corrected according to DI, and the length of each correction is the step length P15.37 of the modification cutting length.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.37	Modify the cutting step length , unit: 0.01mm	0.00-655.35	5.00	RW	Immediately

Input Function No.	Parameter Description
INFn.195	Increase the cutting length of the current order, trigger once, the current order increases the length of P15.37, the rising edge is valid
INFn.196	Decrease the cutting length of the current order, trigger once, the current order will reduce the length of P15.37, the rising edge is valid

order is approaching

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.34	The order is close to the set threshold	0-65535	1	RW	Immediately

If the current cut length is order 1, when the count value of order 1 (P15.91) + the order close to the threshold (P15.34) \geq the number of cuts of order 1 (P15.24), the order is close to the output (OUTFn.42).

Order completed

When the actual number of cuts of the current order \geq the set times of the current order, the order completion signal is output.

Output Function No.	Parameter Description
OUTFn.42	When the order is close to the output, the actual number of cuts of the current order + the order close threshold P15.34 is greater than or equal to the set times of the current order cut, the output order close signal
OUTFn.43	Order completion output, when the actual number of cuts of the current order is greater than or equal to the set number of current order cuts, the order completion signal is output

If the current cut length is order 1, when the count value of order 1 P15.91 \geq order 1 cutting times P15.24, the order close to output OUTFn.43 is valid.

Order monitoring related parameters

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.82	Current cutting length set value , unit: 0.01mm	0-21474836.47	-	RO	-
P15.91	Count value of order 1	0-65535	-	RO	-
P15.92	Count value of order 2	0-65535	-	RO	-
P15.93	Count value of order 3	0-65535	-	RO	-
P15.94	Count value of order 4	0-65535	-	RO	-

5.5 immediate cut function

Immediate cutting function, used when cutting slug or cutting waste. The saw table stops at the origin position, and after triggering INFn.179, the system accelerates to the main axis speed according to the immediate cutting acceleration and deceleration time P15.17, and then enters the synchronization area, which is about to cut.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.17	The acceleration and deceleration time of immediate cutting, units:ms	0-65535	50	RW	Immediately

Input Function No.	Parameter Description
INFn.179	Immediately cut the signal, the rising edge is valid

5.6 Change the position direction of the master and slave axis

Parameter P15.39 can change the pulse direction of the master axis and the movement direction of the slave axis.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.39	Electronic CAM function bit BIT0- changes the direction of XY pulse BIT1 changes the direction of the second encoder BIT2- changes the direction of movement	0-65535	0	RW	Reset

from the axis				
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5.7 Simulation function

The simulation function is to virtualize a spindle speed P15.41 from the axis, output relevant data about the cam, and observe the curve through VECObserve, which is convenient for users to debug. There are two simulation modes: 0-Dynamic simulation, no need to input pulse from the master axis, after enabling the slave axis, the slave axis can realize the function of cam, and the slave axis moves; 1-Static simulation, no need to input pulse from the master axis, without enabling the slave axis Axis, the slave axis can output the data related to chase shear, but the slave axis is still. If simulation is required, P15.03 should be set to 3.

Related parameters

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.03	The source of the spindle position command 0-XY pulse input 1-second encoder input 2-INFn.171 (DI6) switching XY pulse input/second encoder input 3-simulation input 4-INFn.171 switch XY pulse input/simulation input 5-INFn.171 switch second encoder input/emulation input	0-5	0	RW	Reset
P15.40	Simulation selection 0-dynamic simulation, slave axis motion 1-static simulation, slave axis static	0-1	0	RW	Reset
P15.41	Simulation speed, unit: 0.1m/min	0.1-1000.0	60.0	RW	Immediately
P15.42	Simulation acceleration and deceleration time, unit: 0.1s P15.42 is the time for the slave axis to accelerate from zero speed to 1000.0m/min	0.0-100.0	6.0	RW	Immediately

5.8 Sync zone cut mode

In order to adapt to different materials and applications, the VC512 series chase shear driver provides 3 optional synchronous area shearing methods, one is according to the cutting time, when the time is up, it is considered that the cutting is

completed and the cutter returns; the other is through The external DI judges that an external sensor is encountered after cutting. This signal indicates that the material is cut and the tool returns. One is that according to the set length of the synchronization area, the cutting is considered complete after the synchronization area is completed, and then the tool returns.

Related parameters

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.45	Synchronization zone completion mode 0-shear time 1-external DI 2-Actual stroke	0-2	1	RW	Immediately
P15.46	Cut time, unit: ms	0-65535	200	RW	Immediately
P15.49	Sync length percentage, unit: 0.1%	0.0-100.0	5.0	RW	Immediately

Parameter Description:

- ◆ P15.45=0 , When the speed of the chase shearing drive reaches the synchronization area, and after running for the time of P15.46, it is considered that the cutting is completed.
- ◆ P15.45=1 , The speed of the chase shearing drive reaches the synchronization area, and the shearing is completed after receiving the externally given shearing completion signal INFn.203.
- ◆ P15.45=2 , When the speed of the chase shear drive reaches the synchronization area, and continues to walk the synchronization area length sync_L, it is considered that the cutting is completed.
sync_L=P15.14*P15.49。

Servo sync signal output. When the servo reaches the synchronization speed, after delaying the synchronization signal start time P15.47, the synchronization signal is output until the synchronization signal end time P15.48 is reached, and the synchronization signal output ends. After the cut is completed, regardless of whether the synchronization signal end time is completed, the synchronization signal output is ended.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.47	Start time of syn signal, unit: ms	0-65535	20	RW	Immediately
P15.48	end time of syn signal, unit: ms	0-65535	0	RW	Immediately

Waiting to return after cutting is complete.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.50	Whether to enable stop waiting after the	0-1	0	RW	Immediately

	synchronization area is completed 0 - do not wait 1 - wait				
P15.51	The deceleration front amount of the synchronization area, unit: 0.01mm	0.01-21474836.47	100.00	RW	Immediately
P15.53	Deceleration waiting time, unit: ms	0-65535	100	RW	Immediately

After the cutting is completed, according to the parameter P15.50, judge whether it needs to decelerate, wait for the time of P15.53 before returning. P15.50=0, return immediately after cutting is completed. P15.50=1, after the cutting is completed, after the spindle runs the distance of P15.51, the chase shear drive decelerates to zero, and then returns immediately after waiting for the time of P15.53.

5.9 Chase shear return mode

After the cutting is completed or the cutting is waiting for completion, the VC512 series chase shearing drive supports two return modes. The first is the quintic curve return. In this way, the curve planning is optimal and the mechanical impact is minimal, but there are uncertainties in the magnitude of the speed and acceleration. The second way, the quadratic curve returns, the highest speed can be set, the acceleration and deceleration time can also be set, and the relevant parameters can be set according to the driver and motor, so as to return to the optimal performance.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.43	Meshing amount in synchronous zone , units: 0.01mm	0.01-21474836.47	100.00	RW	Immediately
P15.57	Enable the high speed return 0-Disable 1-enable	0-1	1	RW	Immediately
P15.58	High speed return speed source selection 0-from the spindle speed percentage 1-from the fixed value	0-1	1	RW	Immediately
P15.59	High-speed return to spindle speed percentage, unit: 0.1%	0.0-200.0	100.0	RW	Immediately
P15.60	High speed return speed of the fixed value, unit: rpm	0-10000	3000	RW	Immediately
P15.61	High-speed return acceleration and deceleration time, unit: ms	0-65535	500	RW	Immediately
P15.62	Return to the cut length of the last synchronization starting point , unit:	0.01-21474836.47	1000.0	RW	Immediately

0.01mm				
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If P15.57=0, use quintic curve to return. P15.55=0, when returning, the starting position of the synchronization area is fixed, the specific position is P15.43*8/15; P15.55=1, when returning, the starting position of the synchronization area is dynamic. The position of is dynamically calculated by the system according to the value of P15.62.

If P15.57=1, use quartic curve to return. The return speed is determined by the high-speed return speed source P15.58, P15.58=0, return speed=spindle speed P15.80 * P15.59%; P15.58=1, return speed is P15.60. The return acceleration and deceleration time is determined by P15.61. The curve returns to the stop position, which is determined by P15.56. P15.56=0, each time it returns, it will stop the origin position; P15.56=1, the system will calculate dynamically according to the value of P15.62.

5.10 Origin return function

This function can be run only when the cam is disengaged, and there are four ways of origin confirmation.

P16.01=0, Trigger back to zero INFn.174, the current position is the origin position.

P16.01=1, After directly triggering and engaging INFn.172 cam enable, the system will automatically return to zero.

P16.01=2, Trigger the return to zero INFn.174, the system moves forward at the speed of P16.02. After encountering the origin switch, it stops at the origin, and the zero return is completed.

P16.01=3, Trigger the return to zero INFn.174, the system moves in the reverse direction at the speed of P16.02. After encountering the origin switch, it stops at the origin, and the zero return is completed.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P16.01	way to find the origin 0-The current position is the origin position 1-Automatically find the origin when meshing 2-Find the origin at the forward speed 3-Find the origin at the reverse speed;	0-3	3	RW	Immediately
P16.02	Find the origin velocity, unit: 0.1m/min	0.0-6553.5	5.0	RW	Immediately
P16.03	Acceleration and deceleration time for finding the origin, unit: 0.1s	0-65535	10.0	RW	Immediately
P16.04	The origin offset, unit: 0.01mm	-21474836.48	0.00	RW	Immediately

		- 21474836.47			
P16.48	Jog speed of slave axis, unit: 0.1m/min	0-6553.5	10.0	RW	Immediately
P16.49	Slave axis jog acceleration and deceleration time, unit: 0.1s	0-6553.5	2.0	RW	Immediately

Input Function No.	Parameter Description
INFn.43	Positive limit switch
INFn.44	Negative limit switch
INFn.174	The origin returns to zero, the rising edge is valid
INFn.176	Origin signal input, valid for rising edge, fixed servo DI10
INFn.186	chasing shearing reverse jog, valid when the valid level is high
INFn.187	Spindle forward jog phase shift
INFn.199	The origin is confirmed, and the rising edge is valid.

5.11 Cam disengagement function

When the cam enable INFn.172 is invalid, the system executes the cam disengagement function according to the cam disengagement mode P15.65.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.65	Cam disengagement method 0-stop origin 1-stop immediately	0-1	1	RW	Immediately
P15.66	Cam disengagement speed, unit: rpm	0-10000	500	RW	Immediately
P15.67	Cam disengagement acceleration and deceleration time, unit: ms	0-65535	500	RW	Immediately

Parameter details:

- ◆ P15.65=0, After INFn.172 is invalid, the cam stops at the origin position according to the cam disengagement speed P15.66 and the cam disengagement acceleration and deceleration time P15.67.
- ◆ P15.67=1, After INFn.172 is invalid, if the cam is not in the synchronization area, it will decelerate and stop immediately.

5.12 Color scale related functions

Note: The color mark signal input port is fixed on the servo DI9.

color mark width

When the color mark width P16.30 is zero, the color mark rising edge trigger is valid. When the color mark width P16.30 is not zero, the color mark falling edge trigger is valid, and the color mark width needs to meet the following conditions:

$$|P16.30-P16.32| \leq P16.31$$

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P16.30	Color mark width; unit: 0.01mm	0.00-327.67	0.0	RW	Immediately
P16.31	The color mark width error threshold , unit: 0.01mm	0.00-327.67	0.0	RW	Immediately
P16.32	The width of the detected color mark , unit: 0.01mm	-327.67-327.67	-	RO	-

Color mark tracking method selection

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P16.15	Cut mode 0-cut length mode 1-trigger mode 2-tracking mode	0-2	0	RW	Immediately

Parameter details:

- ◆ P16.15=0, Do not perform color mark tracking, go to normal cut-to-length mode.
- ◆ P16.15=1, Color mark trigger mode, window shielding method is invalid, DI shielding is valid; and this function can only be used when cutting long materials. When the first color mark is triggered, the system will adjust the position according to the distance from the color mark to the tangent point. Cut to the position of the color mark.
- ◆ P16.15=2, When using this mode, the spacing between the color patches should be uniform, and the color patch shielding method can be manual or automatic.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P16.22	The distance from the color mark to the tangent point, unit: 0.01mm	0.00-21474836.47	200.00	RW	Immediately
P16.24	The adjustment amount from the color mark to the tangent point, unit: 0.01mm	-327.68-327.67	0.00	RW	Immediately
P16.25	The actual distance from the color mark to the tangent point, unit: 0.01mm	-21474836.48-21474836.47	-	RO	-

Color mark count function

Within the valid window range, P16.34 is incremented by 1 once the color mark is triggered, and the overcut point is cleared to zero.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P16.35	The valid number of color mark	0-65535	-	RO	-

When INFn.183 is valid, clear P16.35 to zero.

Input Function No.	Parameter Description
INFn.175	Color mark signal input, valid on rising edge, fixed servo DI9
INFn.177	Color mark manual shielding input, valid when the valid level is high, color mark triggering is invalid when valid
INFn.183	Clear the color mark count P16.35, valid when the active level is high

5.13 Spindle position compensation method

Color mark tracking requires spindle position compensation, and there are two compensation methods to choose from.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P16.36	Source of color mark compensation speed 0-spindle speed percentage 1-fixed compensation speed P16.40	0-1	0	RW	Immediately

Parameter details:

- ◆ P16.36=0, Compensation speed = spindle speed * P16.37%; acceleration time P16.38, deceleration time P16.39, maximum compensation displacement

P16.41.

- ◆ P16.36=1, Compensation speed = P16.40; acceleration time P16.38, deceleration time P16.39, maximum compensation displacement P16.41.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P16.37	Compensation speed percentage, unit: % According to the position obtained by the spindle feed rate * P16.34, it is compensated to the spindle position.	0-200	20	RW	Immediately
P16.38	Compensate acceleration time; unit: 0.1s This time is the time for the compensation speed to accelerate from zero to 1000.0m/min	0-6553.5	10.0	RW	Immediately
P16.39	Compensate deceleration time; unit: 0.1s This time is the time for the compensation speed to decelerate from 1000.0m/min to zero	0-6553.5	10.0	RW	Immediately
P16.40	Compensate the maximum speed; unit: 0.1m/min	0-6553.5	20.0	RW	Immediately
P16.41	Compensate for the maximum displacement, unit: mm	0-65535	200	RW	Immediately

Whether to compensate the spindle position when the spindle speed is less than or equal to zero.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P16.42	Compensation position prohibited when the spindle speed is zero 0 - not forbidden 1 - forbidden	0-1	0	RW	Immediately

5.14 Spindle phase shift function

This function can move the spindle phase through DI. When DI is triggered, the spindle position will increase or decrease the length of P15.61. Sometimes it is impossible to confirm that the phase shift is required, and the position can be generated from a fixed phase shift speed by DI jogging and compensated to the spindle.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P16.44	Spindle phase shift step length , unit: 0.01mm	0-655.35	5.00	RW	Immediately
P16.45	Spindle phase shift speed , unit: 0.1m/min	0-6553.5	5.0	RW	Immediately
P16.46	Spindle phase shift acceleration and deceleration time, unit: 0.1s	0-6553.5	5.0	RW	Immediately

Input Function No.	Parameter Description
INFn.187	The positive jog of the spindle moves the phase, when DI is valid, the servo compensates to the spindle at the forward compensation speed of 16.45.
INFn.188	Spindle reverse jog phase shift, when DI is valid, the servo compensates to the spindle at the reverse compensation speed of 16.45.
INFn.193	Positive phase shift of the spindle, trigger once, the spindle increases the displacement of P16.44, the rising edge is valid
INFn.194	Negative phase shift of the spindle, trigger once, the spindle reduces the displacement of P16.44, the rising edge is valid

5.15 Slave axis speed overlay function

After the cutting is completed, in order to accelerate the saw table to separate from the material, the slave axis can superimpose a speed P16.48, run a short distance P16.47, and then return. This function is valid when P15.54=1

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.54	After the shear is complete , enable speed overlay	0-1	0	RW	Immediately

	0-Disable 1-enable				
P16.47	Slave axis superposition position, unit: 0.01mm	0-655.35	5.00	RW	Immediately
P16.48	Jog speed of slave axis , unit: 0.1m/min	0-6553.5	10.0	RW	Immediately
P16.49	Slave axis jog acceleration and deceleration time, unit: 0.1s	0-6553.5	2.0	RW	Immediately

5.16 Monitoring of important parameters

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.70	Accumulated value of the number of pulses for spindle feed, unit: clk	-2147483648- 2147483647	-	RO	-
P15.72	Total feed length, unit: 0.01mm	-21474836.48- 21474836.47	-	RO	-
P15.74	Current cycle spindle position , unit: 0.01mm	-21474836.48- 21474836.47	-	RO	-
P15.76	The target position of the slave axis in the current cycle, unit: 0.01mm	-21474836.48- 21474836.47	-	RO	-
P15.78	Real-time error of slave axis , unit: 0.01mm	-21474836.48- 21474836.47	-	RO	-
P03.17	Real-time error of slave axis pulse, unit: 0.0001 circle	-2147483648- 2147483647	-	RO	-
P15.80	Real-time speed of slave axis , unit: 0.1m/min	-3276.8-3276. 7	-	RO	-
P15.81	Real-time speed of slave axis , unit: 0.1m/min	-3276.8-3276. 7	-	RO	-
P15.82	Current cutting length set value, unit: 0.01mm	0- 21474836.47	-	RO	-
P15.88	Minimum cutting length under current conditions, unit: 0.01mm	0- 21474836.47	-	RO	-
P15.91	Count value of order 1	0-65535	-	RO	-
P15.92	Count value of order 2	0-65535	-	RO	-
P15.93	Count value of order 3	0-65535	-	RO	-
P15.94	Count value of order 4	0-65535	-	RO	-
P15.95	Peak speed per revolution of the slave shaft, units: rpm	-32768-32767	-	RO	-
P15.96	Average torque per revolution of the slave shaft, units:0.1%	-3276.8-3276. 7	-	RO	-

P15.97	Peak torque per revolution of the slave shaft, units:0.1%	-3276.8-3276.7	-	RO	-
P15.98	Color mark compensation length , units:0.1mm	-21474836.48-21474836.47	-	RO	-
P16.07	Triggering times of the cut completion signal	0-65535	-	RO	-
P16.08	The cumulative total number of cuts	0-4294967295	-	RO	-
P16.25	The actual distance from the color mark to the tangent point, unit: 0.01mm	-21474836.48-21474836.47	-	RO	-
P16.28	Detected color mark spacing , unit: 0.01mm	-21474836.48-21474836.47	-	RO	-
P16.32	The width of the detected color mark, unit: 0.01mm	-327.67-327.67	-	RO	-
P16.35	The valid number of color mark	0-65535	-	RO	-

5.17 Hardware and software limit

The software and hardware limit function avoids the overtravel of the saw table, so as to protect the equipment from damage. After the zero return is completed, the software limit is valid.

When P16.10=0, the software limit function is not used.

When P16.10=1, when the actual position of the chase shear servo is less than the software lower limit value P16.11 or greater than the software upper limit value P16.12, OUTFn.54 is output and the servo does not stop.

Hardware limit. When the forward limit switch is valid or the reverse limit switch is valid, the system immediately decelerates to zero according to P16.13, and outputs OUTFn.53 at the same time.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P16.10	Software restricts location selection 0-software limit disabled 1-software limit output DO	0-1	0	RW	Immediately
P16.11	The value of the lower limit position of the software limit position, unit: mm	-32767-32767	-10	RW	Immediately
P16.12	The value of the upper limit position of the software limit position, unit: mm	-32767-32767	5000	RW	Immediately
P16.13	Hardware limit deceleration time , unit: ms	0-65535	50	RW	Immediately

Input Function No.	Parameter Description
INFn.43	Positive limit switch
INFn.44	Negative limit switch

Output Function No.	Parameter Description
OUTFn.53	Hardware limit output, output when encountering limit switch.
OUTFn.54	Software limit output, output when the current position of the saw table exceeds the software limit.

5.18 The steps of using the function of clearing the feeding length of the current cycle

1.This function is best under the premise that the spindle is stopped, otherwise the spindle will continue to feed and then perform the following operations will lose part of the material.

2.In this step, two functions of cam enable and immediate cutting need to be configured and P16.01 (selection of origin search method) is set to 1 (automatic origin search during meshing). When the cam enable function is triggered, the slave axis will be in the meshing process Find the origin position, and then trigger the immediate cutting function to clear the feeding length of the current cycle.

3.Under the premise of not wasting material, the steps to initialize the parameter configuration of the chase cutting function are as follows

① P16.01=1 search origin mode, select 1-automatically search origin when meshing.

② Select a certain DI configuration of the sixth group of parameters as INFn.172 (cam enable).

③ To configure the immediate cutting function, select a certain DI of the sixth group of parameters to configure as INFn.179 (immediate cutting signal input), P15.17 (immediate cutting acceleration and deceleration time).

④ First enable the servo, then trigger the cam enable, the slave axis will search for the origin during the meshing process, and finally trigger the immediate cutting function. At this time, the system will accelerate to the main axis line speed according to the P15.17 immediate cutting acceleration and deceleration time. When the spindle speed is 0, the current cycle feed length of P15.86 will be cleared. If the spindle speed is not 0, the system will immediately accelerate to the spindle line speed according to the acceleration and deceleration time of P15.17, and cut, and the system will cut part of the material head (waste).

Chapter 6 Trial Operation of Cut Mode

Briefly explain how to use the three modes of chase cutting.

6.1 Fixed length mode

Note: The following parameters are for reference only, please set them according to the actual mechanical parameters.

6.1.1 wiring

Select the wiring method through the source of the spindle position command. The second encoder input is selected as an example below

① P03.78 of the spindle servo is set to 0 - output the pulse of the motor encoder.

② P03.78 of the slave axis servo is set to 2-no output, and it is used as input.

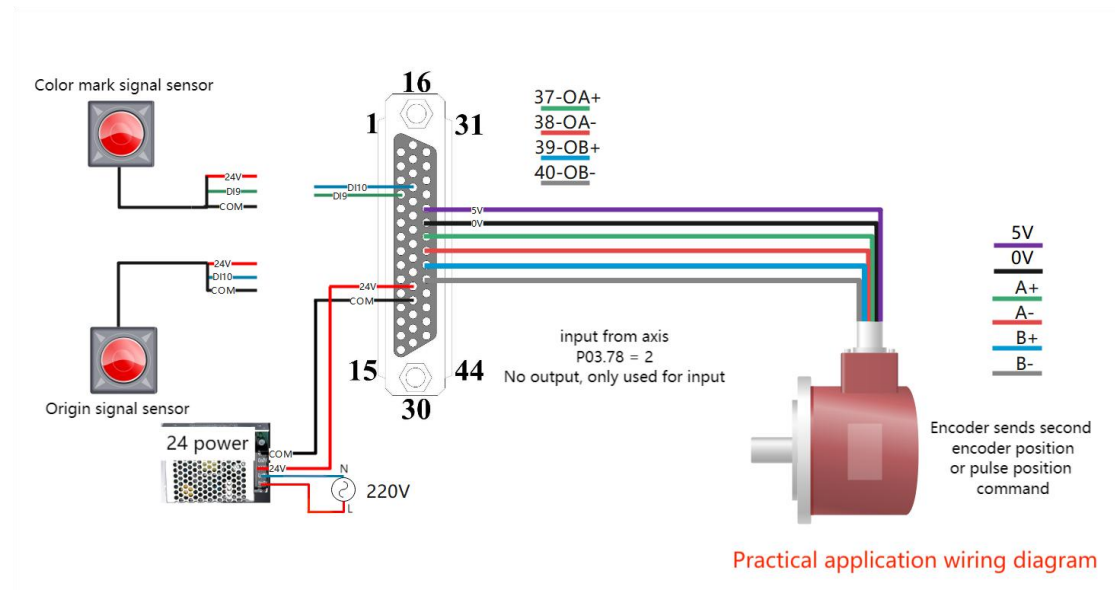
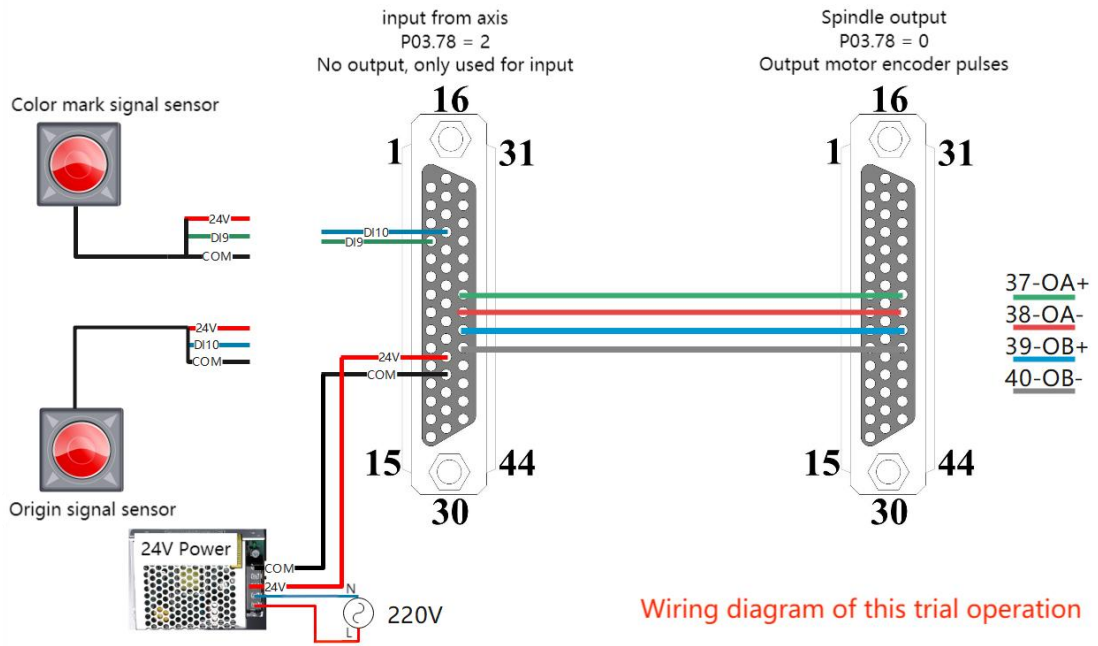
③ P02.01= 7 special control mode of slave axis servo.

④ And connect the 37~40 pins (AO+, AO-, BO+, BO-) of the CN3 signal input and output end of the slave axis, and the 37~40 pins (AO+, AO-, BO+, BO-) of the CN3 signal input and output end of the spindle. One-to-one correspondence.

⑤ P06.09 = 175, configure DI9 as 175-color mark signal input, and the input bit of this function is fixed at DI9. (Use fixed-length mode, the color code signal is invalid)

⑥ P06.10 =176, configure DI10 as 176-origin signal input, the input bit of this function is fixed at DI10.

⑦ After configuring DI9 and DI10, you need to connect the color mark signal and cut point signal sensor to DI9 and DI10.



6.1.2 Set the mechanical parameters

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.03	The source of the spindle position command 0-XY pulse input 1-second encoder input 2-InFun.171 (DI6) switching XY pulse input/second encoder input	0-5	0	RW	Reset

	3-simulation input 4-INTn.171 switch XY pulse input/simulation input 5-INTn.171 switch second encoder input/emulation input				
P15.06	Spindle circumference, unit: 0.01mm	0.01- 21474836.47	500.00	RW	Immediately
P15.08	The number of pulses per week of the spindle, unit: clk	1- 21474836.47	10000	RW	Immediately
P15.10	The weekly lead of the slave axis , unit: 0.01mm	0.01- 21474836.47	40.00	RW	Immediately
P15.12	The number of pulses per week for the slave axis, unit: clk	1- 21474836.47	10000	RW	Immediately
P15.14	Effective travel of the machine, unit: 0.01mm	0.01- 21474836.47	5000.00	RW	Immediately

Set P15.03 according to the source of the spindle position. If P15.03=0, the spindle position comes from the XY pulse, you need to set the command pulse form of P03.02. If P15.03=1, the spindle position comes from the second encoder input, you need to set Servo pulse output source selection P03.78=2.

P15.03 = 1, The spindle position command comes from the second encoder input

P15.06 = 170, The perimeter of the spindle, unit: 0.01mm.

P15.08 = 10000, The number of pulses per week of the spindle, unit: clk.

P15.10 = 120, The lead of the slave axis per week, unit: 0.01mm.

P15.12 = 10000, The number of pulses per week of the slave axis, unit: clk.

6.1.3 Setting the Chase Shear Control Parameters

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.01	Initial cut length 0-cut length 1-distance from color scale to origin	0-1	0	RW	Immediately
P15.43	Meshing amount in synchronous zone, units: 0.01mm When engaged, after the master axis travels the distance of P15.43, the slave axis and the master axis have the same linear speed	0.01- 21474836.47	100.00	RW	Immediately
P16.15	Cut mode 0-cut length mode 1-trigger mode	0-2	0	RW	Immediately

2-tracking mode

Set the initial shear length P15.01=0, and the shear length is used as the initial shear length.

P15.01 = 0, the initial shear length is 0 - shear length.

P15.43 = 60, synchronous lead amount, unit: 0.01mm, when engaged, after the master axis travels the distance of P15.43, the speed of the slave axis and the master axis is the same as the linear speed. The smaller the value, the greater the acceleration. This parameter determines the position of the starting point of the synchronization area. The calculation formula of the corresponding machine position of the starting point of the synchronization area is:

The position of the starting point of the sync area corresponds to the position of the machine

$$= P15.43(\text{Sync Prefix}) \times \frac{8}{15}$$

P16.15 = 0, Cut mode.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.22	Cut length of order 1, unit: 0.01mm	0.01-21474836.47	1000.00	RW	Immediately
P15.24	Cut times of order 1	0-65535	100	RW	Immediately

P15.22 = 1000, Cut length of order 1, unit: 0.01mm.

P15.24 = 100, Number of cuts for order 1.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.39	Electronic CAM function bit BIT0- changes the direction of XY pulse BIT1- changes the direction of the second encoder BIT2- changes the direction of movement from the axis	0-65535	0	RW	Reset

P15.39 = 2, electronic cam function bit, change the direction of the second encoder (the cumulative value of the number of pulses fed by the spindle P15.70 is cumulative in the positive direction)

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
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P15.45	Synchronization zone completion mode 0 -shear time 1 - external DI 2 - Actual stroke	0-2	1	RW	Immediately
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Set the synchronization area completion mode according to the user's needs, which generally depends on the external cutting completion signal, P15.45=1.

P15.45 = 0, select 0-cut time for synchronization area completion mode. (The actual application generally chooses 1-external DI, and externally outputs a high-level signal to complete the cut to the DI configured as INFn.203 cut complete)

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.57	Enable the high speed return 0-Disable 1-enable	0-1	1	RW	Immediately
P15.58	High speed return speed source selection 0-from the spindle speed percentage 1-from the fixed value	0-1	1	RW	Immediately
P15.59	High-speed return to spindle speed percentage, unit: 0.1%	0.0-200.0	100.0	RW	Immediately
P15.60	High speed return speed of the fixed value, unit: rpm	0-10000	3000	RW	Immediately
P15.61	High-speed return acceleration and deceleration time, unit: ms	0-65535	500	RW	Immediately

Set P15.57=1 to enable high-speed return. Set P15.56=0, the position returned each time is the origin position. Set P15.58=0, the return speed comes from the spindle speed. Set the acceleration and deceleration time of P15.61 high-speed return.

P15.57 = 1, High speed return enable.

P15.58 = 1, High Speed Return Speed Source 1 - Derived from a fixed value.

P15.60 = 200, High speed return speed fixed value, unit: rpm. (Each return is the origin position)

Unit conversion formula:

$$\text{speed (m/min)} = \text{Set the speed (rpm/min)} \times \text{Circumference of the slave shaft (m/rpm)}$$

6.1.4 Home zero return and limit

When the chase shear drive is just powered on, it needs to perform the zero return function. After the zero return is completed, the cam can be engaged. For the

specific operation of origin return, please refer to "5.10 Origin Return Function".

Set the software and hardware limits according to the system needs, please refer to 5.17 for details.

6.1.5 Cam engagement enable

Note: The cam engagement enable is valid only after the origin return is completed.

Input Function No.	Parameter Description
INFn.172	Cam engagement is enabled, valid when the valid level is high, engages when valid, disengages when invalid
INFn.174	The origin returns to zero, the rising edge is valid

P06.03 = 172, DI3 is configured as 172-cam enable.

P06.04 = 174, DI4 is configured as 174 - return to zero input bit.

Output Function No.	Parameter Description
OUTFn.40	Engagement state output, output valid signal when engaged

6.1.6 Trial-run waveform analysis in fixed-length mode

After the chase shear drive is powered on, the system needs to be reset to zero before engaging the cam, otherwise the servo will report Er.620.

Enable the spindle running speed mode or jog FN001, and trigger INFn.174 to make the slave axis search for the origin. After the origin search is completed, the slave axis stops at the waiting position angle P15.17, and triggers INFn.172 to enable the cam. At this time, you can pass VECObserve The oscilloscope page of the software observes the waveform.



① The current cycle feed length, P15.22 order 1 cut length is set to 1000.0mm, but the upper position of the waveform is 1032mm, because the waveform is the first meshing, and the Sync prepended value size is 60mm. According to the formula, the position of the synchronization area can be obtained. The actual position of the corresponding machine is 32mm, so the current cycle feeding length is 1032mm.

② P15.57 = 1, enabling high-speed return, so after cutting is completed, the slave axis will be returned to the origin position.

③ P15.58 = 1, the high-speed return speed is derived from a fixed value, while P15.60 = 200rpm, according to the calculation formula, the high-speed return speed can be calculated as 24m/min.

6.2 trigger mode

Note: The following parameters are for reference only, please set them according to the actual mechanical parameters.

6.2.1 wiring

Select the wiring method through the source of the spindle position command. The following selects the second encoder input as an example to illustrate

① P03.78 of the spindle servo is set to 0 - output the pulse of the motor encoder.

② P03.78 of the slave axis servo is set to 2 - no output, used as input.

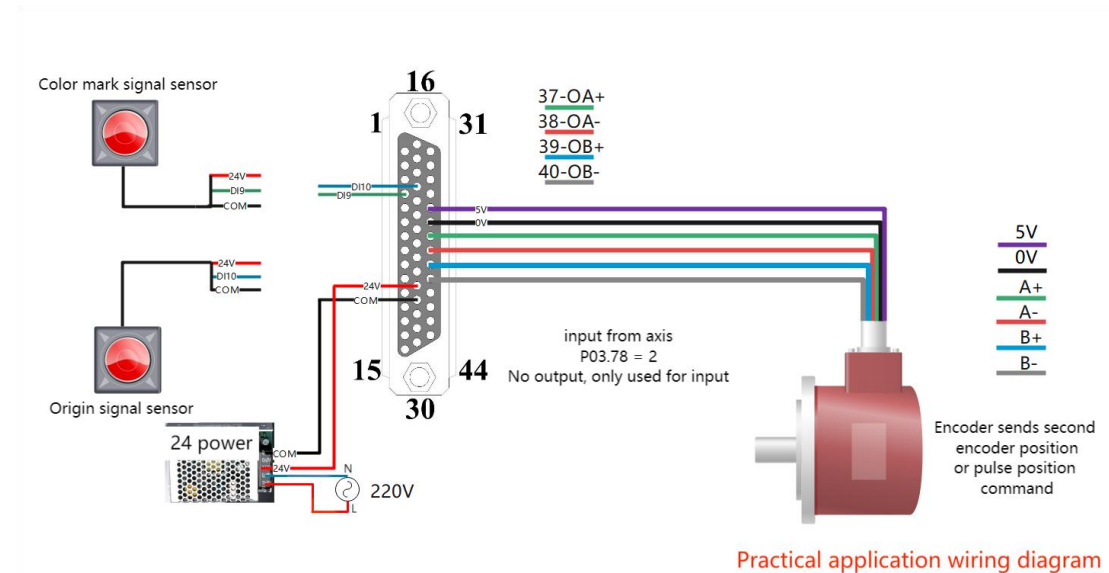
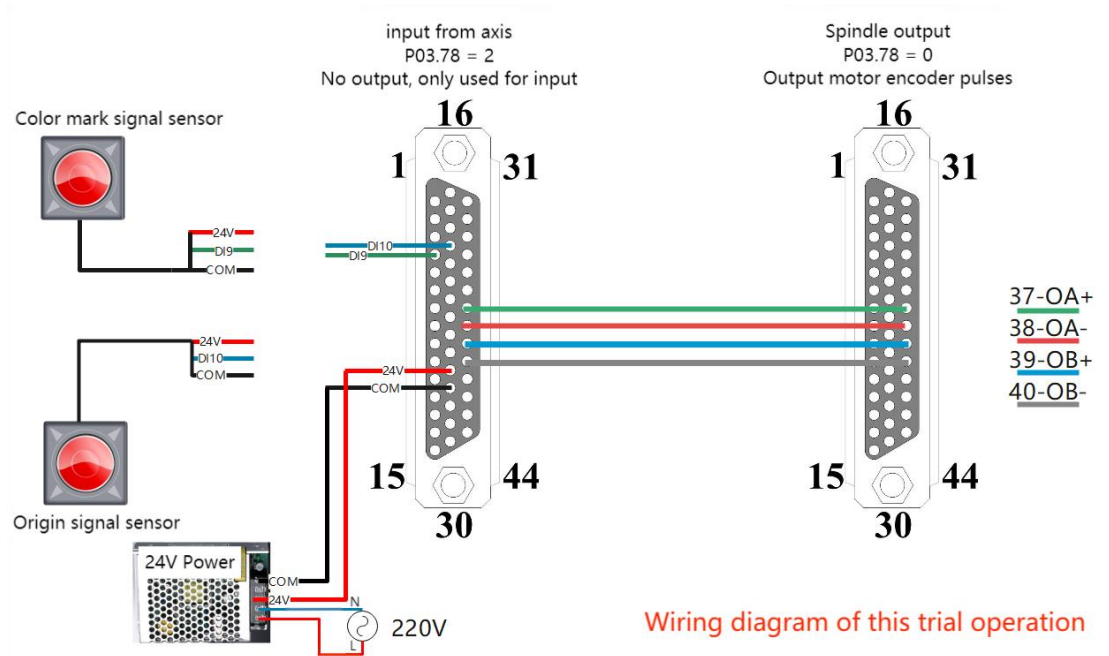
③ P02.01 = 7 special control mode of slave axis servo.

④ And connect the 37~40 pins (AO+, AO-, BO+, BO-) of the CN3 signal input and output end of the slave axis, and the 37~40 pins (AO+, AO-, BO+, BO-) of the CN3 signal input and output end of the spindle. One-to-one correspondence.

⑤ P06.09 =175, configure DI9 as 175-color code signal input, the input bit of this function is fixed at DI9.

⑥ P06.10 =176, configure DI10 as 176-origin signal input, the input bit of this function is fixed at DI10.

⑦ After configuring DI9 and DI10, you need to connect the color mark signal and cut point signal sensor to DI9 and DI10.



6.2.2 Set the mechanical parameters

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.03	The source of the spindle position command 0-XY pulse input 1-second encoder input 2-INFn.171 (DI6) switching XY pulse input/second encoder input 3-simulation input 4-INFn.171 switch XY pulse input/simulation input 5-INFn.171 switch second encoder input/emulation input	0-5	0	RW	Reset
P15.06	Spindle circumference, unit: 0.01mm	0.01-21474836.47	500.00	RW	Immediately
P15.08	The number of pulses per week of the spindle, unit: clk	1-2147483647	10000	RW	Immediately
P15.10	The weekly lead of the slave axis, unit: 0.01mm	0.01-21474836.47	40.00	RW	Immediately
P15.12	The number of pulses per week for the slave axis, unit: clk	1-2147483647	10000	RW	Immediately
P15.14	Effective travel of the machine, unit: 0.01mm	0.01-21474836.47	5000.00	RW	Immediately

Set P15.03 according to the source of the spindle position. If P15.03=0, the spindle position comes from the XY pulse, and you need to set the command pulse shape of P03.02. If P15.03=1, the spindle position comes from the second encoder input, you need to set Servo pulse output source selection P03.78=2.

P15.03 = 1, The spindle position command source selection 1-second encoder input.

P15.06 = 170, The perimeter of the spindle, unit: 0.01mm.

P15.08 = 10000, The number of pulses per week of the spindle, unit: clk.

P15.10 = 120, The lead of the slave axis per week, unit: 0.01mm.

P15.12 = 10000, The number of pulses per week of the slave axis, unit: clk.

6.2.3 Setting the Chase Shear Control Parameters

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.01	Initial cut length	0-1	0	RW	Immediately

	0-cut length 1-distance from color scale to origin				
P15.43	The size of the synchronization pre-value, unit: 0.01mm When engaged, after the master axis travels the distance of P15.43, the slave axis and the master axis have the same linear speed	0.01- 21474836.47	100.00	RW	Immediately
P16.15	Cut mode 0-cut length mode 1-trigger mode 2-tracking mode	0-2	0	RW	Immediately

Set the initial cutting length P15.01=1, and cut according to the distance P16.22 from the color mark to the origin.

Set the synchronization prep value P15.43, the smaller the value, the greater the acceleration.

P15.01 = 1, The initial shear length is 1 - the distance of the color stop from the origin.

P15.43 = 60, Synchronization front amount, unit: 0.01mm, when engaged, after the master axis runs the distance of P15.43, the speed of the slave axis and the master axis is the same linear speed. The smaller the value, the greater the acceleration. This parameter determines the position of the starting point of the synchronization area. The calculation formula of the corresponding machine position of the starting point of the synchronization area is:

The position of the starting point of the sync area corresponds to the position of the machine =

$$P15.43(\text{sync prefix}) \times \frac{8}{15}$$

P16.15 = 1, the flying shear mode is 1-trigger mode. Trigger mode color code window shielding method is invalid, DI shielding is valid, and it can only be used when cutting long materials. When the first color code is valid, the system will adjust the position according to the distance from the color code to the tangent point, to cutter the color marked position.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.22	Cut length of order 1, unit: 0.01mm	0.01- 21474836.47	1000.00	RW	Immediately
P15.24	Cut times of order 1	0-65535	100	RW	Immediately

Set order cut length P15.22 and order quantity P15.24. The cutting length should be set according to the color mark spacing. For example: the color mark

spacing is 1m, then P15.22=1000.00mm.

P15.22 = 1000, Cut length of order 1, unit: 0.01mm.

P15.24 = 100, Number of cuts for order 1.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.39	Electronic CAM function bit BIT0- changes the direction of XY pulse BIT1 changes the direction of the second encoder BIT2- changes the direction of movement from the axis	0-65535	0	RW	Reset

According to the rotation of the spindle, observe the accumulated value of the number of pulses fed by the spindle P15.70. If P15.70 is accumulated in the positive direction, the spindle position direction is correct; if P15.70 is accumulated in the negative direction, and the spindle position direction needs to be changed, the parameter P15.39 needs to be modified. If you want to modify the movement direction of the saw table, you can also modify the value of P15.39 BIT3.

P15.39 = 2, electronic cam function bit, set to 2 to change the direction of the second encoder. (The accumulated value of the number of pulses fed by the spindle P15.70 is accumulated in the positive direction)

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.45	Synchronization zone completion mode 0 - shear time 1 - external DI 2- Actual stroke	0-2	1	RW	Immediately
P15.46	Cut time, unit: ms	0-65535	200	RW	Immediately

Set the synchronization area completion mode according to the user's needs, which generally depends on the external cutting completion signal, P15.45=1.

P15.45 = 0, select 0-cut time for synchronization area completion mode. (The actual application generally chooses 1-external DI, and externally outputs a high-level signal to complete the cut to the DI configured as INFn.203 cut complete)

P15.46 = 300, cut time, unit: ms.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.57	Enable the high speed return 0-Disable 1-enable	0-1	1	RW	Immediately
P15.58	High speed return speed source selection 0-from the spindle speed percentage 1-from the fixed value	0-1	1	RW	Immediately
P15.59	High-speed return to spindle speed percentage, unit: 0.1%	0.0-200.0	100.0	RW	Immediately
P15.60	High speed return speed of the fixed value, unit: rpm	0-10000	3000	RW	Immediately
P15.61	High-speed return acceleration and deceleration time, unit: ms	0-65535	500	RW	Immediately

Set P15.57=1 to enable high-speed return. Set P15.58=0, the position returned each time is the origin position. Set P15.59=0, the return speed comes from the spindle speed. Set the acceleration and deceleration time of P15.61 high-speed return.

P15.57 = 1, Enable the high speed return.

P15.58 = 1, High Speed Return Speed Source 1 - Derived from a fixed value.

P15.60 = 200, High speed return speed fixed value, unit: rpm. (Each return is the origin position)

The unit conversion formula:

$$\text{speed (m/min)} = \text{Set the speed (rpm/min)} \times \text{perimeter of slave axis (m/rpm)}$$

P15.61 = 500, Acceleration and deceleration time for high-speed return, unit: ms.

Set the hardware and software limits according to the system requirements. For details, please refer to 5.18.

6.2.4 Set the parameters related to the color scale

Note: The color mark signal input port is fixed on the servo DI9.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P16.30	Color mark width; unit: 0.01mm	0.00-327.67	0.0	RW	Immediately
P16.31	The color mark width error threshold, unit: 0.01mm	0.00-327.67	0.0	RW	Immediately
P16.32	The width of the detected color mark, unit: 0.01mm	-327.67-327.67	-	RO	-

P16.30= 0, the color mark width is zero, the color mark rising edge trigger is valid, when the color mark width P16.30≠0, the color mark falling edge trigger is valid, and the color mark width needs to meet the following conditions:

$$|P16.30 - P16.320| \leq P16.31$$

Selection of color mark tracking method

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P16.15	Cut mode 0-cut length mode 1-trigger mode 2-tracking mode	0-2	0	RW	Immediately

P16.15=1, color mark trigger mode, window shielding method is invalid, DI shielding is valid; and this function can only be used when cutting long material, when the first color mark is triggered, The system will be based on the distance from the color stop to the tangent point, adjust the position, and cut to the position of the color mark.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P16.22	The distance from the color mark to the tangent point, unit: 0.01mm	0.00-21474836.47	200.00	RW	Immediately
P16.24	The adjustment amount from the color mark to the tangent point, unit: 0.01mm	-327.68-327.67	0.00	RW	Immediately

P16.25	The actual distance from the color mark to the tangent point , unit: 0.01mm	-21474836.48- 21474836.47	-	RO	-
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P16.22 = 223 , The distance from the color mark to the tangent point, unit: 0.01mm.

P16.24 = 2 , The adjustment amount of the distance from the color mark to the tangent point, unit: 0.01mm.

Color mark counting function

Within the valid window range, P16.34 is incremented by 1 when the color mark is triggered once, and the overcut point is cleared.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P16.35	The valid number of color mark	0-65535	-	RO	-

When INFn.183 is valid, P16.35 is cleared.

Input Function No.	Parameter Description
INFn.175	Color mark signal input, valid on rising edge, fixed servo DI9
INFn.177	Color mark manual shielding input, valid when the valid level is high, color mark triggering is invalid when valid
INFn.180	Clear the current cycle color mark count
INFn.183	Clear the color mark count P16.35, valid when the active level is high

P06.05 = 177, DI5 is configured as 177 - the input bit of the manual mask color scale.

P06.06 = 180, DI6 is configured as 180-clear current color mark period count.

P06.07 = 183, DI7 is configured to 183-color mark count clear.

P06.09 = 175, DI9 is configured as a 175-color code signal input.

Color mark tracking requires spindle position compensation, and there are two compensation methods to choose from.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P16.36	Source of color mark compensation speed 1-spindle speed percentage	0-1	0	RW	Immediately

	1-fixed compensation speed P16.40				
P16.37	Compensation speed percentage, unit: % According to the position obtained by the spindle feed rate * P16.34, it is compensated to the spindle position.	0-200	20	RW	Immediately
P16.38	Compensate acceleration time; unit: 0.1s This time is the time for the compensation speed to accelerate from zero to 1000.0m/min	0-6553.5	10.0	RW	Immediately
P16.39	Compensate deceleration time; unit: 0.1s This time is the time for the compensation speed to decelerate from 1000.0m/min to zero	0-6553.5	10.0	RW	Immediately
P16.40	Compensate the maximum speed; unit: 0.1m/min	0-6553.5	20.0	RW	Immediately
P16.41	Compensate for the maximum displacement, unit: mm	0-65535	200	RW	Immediately
P16.42	Compensation position prohibited when the spindle speed is zero 0 - not forbidden 1 - forbidden	0-1	0	RW	Immediately

Parameter details:

- ◆ P16.36=0, compensation speed = spindle speed * P16.37%; acceleration time P16.38, deceleration time P16.39, maximum compensation displacement P16.41.
- ◆ P16.36=1, compensation speed = P16.40; acceleration time P16.38, deceleration time P16.39, maximum compensation displacement P16.41.

P16.36 = 0, the color mark compensation speed comes from 0 - the percentage of spindle speed.

P16.37= 30, the percentage of compensation speed, unit: %, which is compensated to the spindle position according to the position obtained by the spindle feed speed*P16.34.

P16.38 = 2, compensation acceleration time, unit: 0.1s, this time is the time when the compensation speed accelerates from 0m/min to 1000.0m/min.

P16.39 = 2, compensation deceleration time, unit: 0.1s, this time is the time for decelerating from 1000.0m/min to 0m/min at compensation speed.

6.2.5 Origin return and limit

When the chase shear drive is just powered on, it needs to perform the zero return function. After the zero return is completed, the cam can be engaged. For the specific operation of origin return, please refer to "5.10 Origin Return Function".

Set the software and hardware limits according to the system needs, please refer to 5.17 for details.

6.2.6 Enable the engage cam

Input Function No.	Parameter Description
INFn.172	Cam engagement is enabled, valid when the valid level is high, engages when valid, disengages when invalid
INFn.174	The origin returns to zero, the rising edge is valid

P06.03 = 172, DI3 is configured as INFn.172 cam engagement enable.

P06.04 = 174, DI4 is configured as INFn.174 origin return to zero signal bit.

(Notice:)

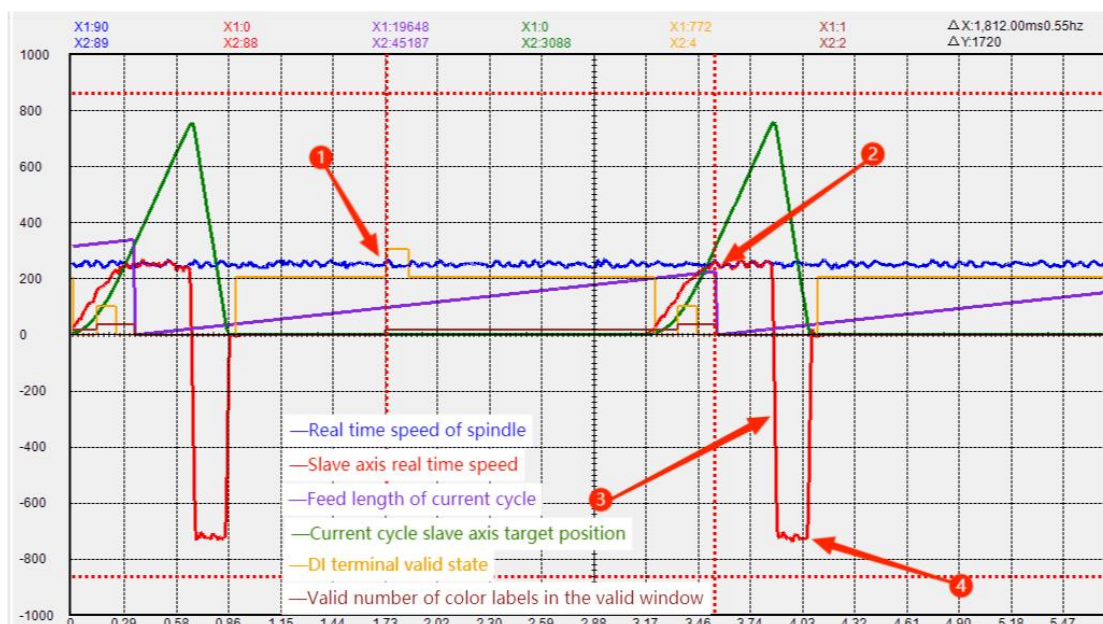
1. If the number of color marks in the effective window of P16.34 and the number of clear overcut points are 0, you can directly run the following operations:

2. If the number of color marks in the valid window of P16.34 and the number of clearing over-cut points are not 0, you need to configure INFn.180 to clear the color mark count of the current cycle and clear P16.34.

After the chase shear drive is powered on, the system needs to be reset to zero before engaging the cam, otherwise the servo will report Er.620.

Enable the spindle running speed mode or jog FN001, and trigger INFn.174 to make the slave axis search for the origin. After the origin search is completed, the slave axis stops at the waiting position angle P15.17, and triggers INFn.172 to enable the cam. At this time, you can pass VEObserve The oscilloscope page of the software observes the waveform.

6.2.7 Trigger mode test run waveform analysis



① When the valid color mark is triggered, the system starts to run the cam curve.

② The current cycle feeding length (the position of the spindle when the system is cutting), the cutting length is 451mm, the current cycle feeding length when the color mark is triggered is 196mm, the distance from the P16.22 color mark to the origin is 223mm, and the P15.43 synchronization front amount It is 60mm, and it can be calculated that the corresponding length of the synchronous front is 32mm. Therefore, when cutting in the synchronous area, the feeding length of the current cycle is equal to the position when the effective color mark is triggered plus the distance from the color mark to the origin plus The position corresponding to the pre-synchronization amount.

③ P15.57 = 1, high-speed return is enabled, so after the cutting is completed, the slave axis will be returned to the origin position.

④ P15.58 = 1, the high-speed return speed is derived from a fixed value, while P15.60 = 200rpm, according to the calculation formula, the high-speed return speed can be calculated as 24m/min.

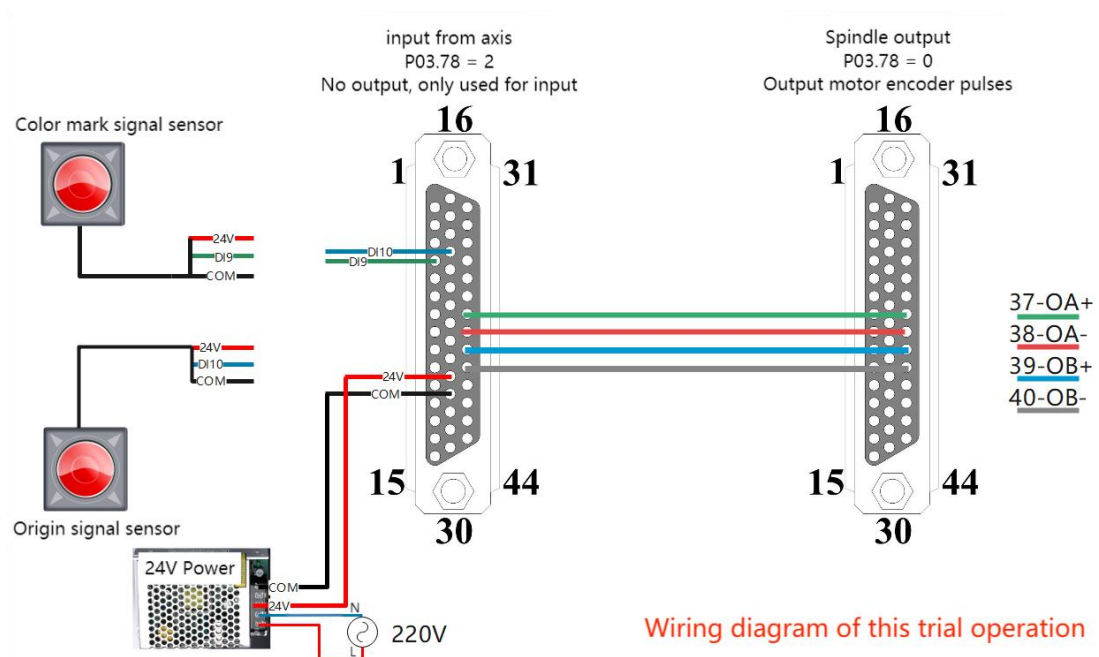
6.3 track mode

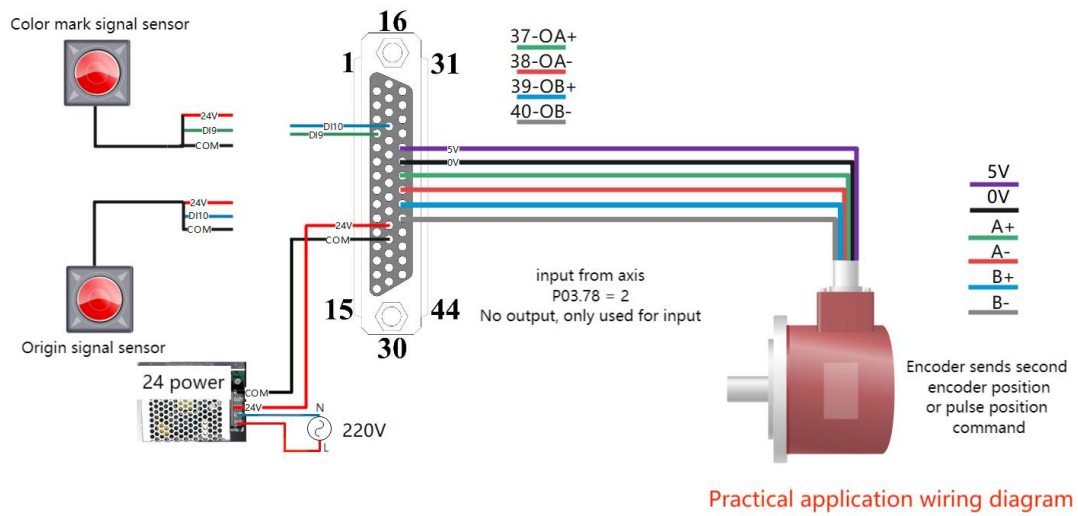
Note: The following parameters are for reference only, please set them according to the actual mechanical parameters.

6.3.1 wiring

Select the wiring method through the source of the spindle position command. The following selects the second encoder input as an example to illustrate

- ① P03.78 of the spindle servo is set to 0 - output the pulse of the motor encoder.
- ② P03.78 of the slave axis servo is set to 2 - no output, used as input.
- ③ P02.01 = 7 special control mode of slave axis servo.
- ④ And connect the 37~40 pins (AO+, AO-, BO+, BO-) of the CN3 signal input and output end of the slave axis, and the 37~40 pins (AO+, AO-, BO+, BO-) of the CN3 signal input and output end of the spindle. One-to-one correspondence.
- ⑤ P06.09 =175, configure DI9 as 175-color code signal input, the input bit of this function is fixed at DI9.
- ⑥ P06.10 =176, configure DI10 as 176-origin signal input, the input bit of this function is fixed at DI10.
- ⑦ After configuring DI9 and DI10, you need to connect the color mark signal and cut point signal sensor to DI9 and DI10.





6.3.2 Set the mechanical parameters

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.03	The source of the spindle position command 0-XY pulse input 1-second encoder input 2-InFun.171 (DI6) switching XY pulse input/second encoder input 3-simulation input 4-INFn.171 switch XY pulse input/simulation input 5-INFn.171 switch second encoder input/emulation input	0-5	0	RW	Reset
P15.06	Spindle circumference, unit: 0.01mm	0.01-21474836.47	500.00	RW	Immediately
P15.08	The number of pulses per week of the spindle, unit: clk	1-2147483647	10000	RW	Immediately
P15.10	The weekly lead of the slave axis, unit: 0.01mm	0.01-21474836.47	40.00	RW	Immediately
P15.12	The number of pulses per week for the slave axis, unit: clk	1-2147483647	10000	RW	Immediately
P15.14	Effective travel of the machine, unit: 0.01mm	0.01-21474836.47	5000.00	RW	Immediately

Set P15.03 according to the source of the spindle position. If P15.03=0, the spindle

position comes from the XY pulse, and you need to set the command pulse shape of P03.02. If P15.03=1, the spindle position comes from the second encoder input, you need to set Servo pulse output source selection P03.78=2.

P15.03 = 1, The spindle position command source selection 1-second encoder input.

P15.06 = 170, The perimeter of the spindle, unit: 0.01mm.

P15.08 = 10000, The number of pulses per week of the spindle, unit: clk.

P15.10 = 120, The weekly lead of the slave axis, unit: 0.01mm.

P15.12 = 10000, The number of pulses per week of the slave axis, unit: clk.

6.3.3 Setting the Chase Shear Control Parameters

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.01	Initial cut length 0-cut length 1-distance from color scale to origin	0-1	0	RW	Immediately
P15.43	The size of the synchronization pre-value, unit: 0.01mm When engaged, after the master axis travels the distance of P15.43, the slave axis and the master axis have the same linear speed	0.01-21474836.47	100.00	RW	Immediately

Set the initial cutting length P15.01=1, and cut according to the distance P16.22 from the color mark to the origin.

Set the synchronization prep value P15.43, the smaller the value, the greater the acceleration.

P15.01 = 1, The initial shear length is 1 - the distance of the color stop from the origin.

P15.43 = 60, Synchronization front amount, unit: 0.01mm, when engaged, after the master axis travels the distance of P15.43, the speed of the slave axis and the master axis is the same as the linear speed. The smaller the value, the greater the acceleration. This parameter determines the position of the starting point of the synchronization area. The calculation formula of the corresponding machine position of the starting point of the synchronization area is:

The position of the starting point of the sync area corresponds to the position of the machine =

$$P15.43(\text{sync prefix}) \times \frac{8}{15}$$

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.22	Cut length of order 1, unit: 0.01mm	0.01-21474836.47	1000.00	RW	Immediately
P15.24	Cut times of order 1	0-65535	100	RW	Immediately

Set order cut length P15.22 and order quantity P15.24. The cutting length should be set according to the color mark spacing. For example: the color mark spacing is 1m, then P15.22=1000.00mm.

P15.22 = 1000, Cut length of order 1, unit: 0.01mm.

P15.24 = 100, Number of cuts for order 1.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.39	Electronic CAM function bit BIT0- changes the direction of XY pulse BIT1 changes the direction of the second encoder BIT2- changes the direction of movement from the axis	0-65535	0	RW	Reset

According to the rotation of the spindle, observe the accumulated value of the number of pulses fed by the spindle P15.70. If P15.70 is accumulated in the positive direction, the spindle position direction is correct; if P15.70 is accumulated in the negative direction, and the spindle position direction needs to be changed, the parameter P15.39 needs to be modified. If you want to modify the movement direction of the saw table, you can also modify the value of P15.39BIT3.

P15.39 = 2, electronic cam function bit, set to 2 to change the direction of the second encoder. (The accumulated value of the number of pulses fed by the spindle P15.70 is accumulated in the positive direction)

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P15.45	Synchronization zone completion mode 0 - shear time 1 - external DI 2- Actual stroke	0-2	1	RW	Immediately
P15.46	Cut time, unit: ms	0-65535	200	RW	Immediately

Set the synchronization area completion mode according to the user's needs, generally relying on the external cut completion signal,

P15.45 = 0, select 0-cut time for synchronization area completion mode. (The actual application generally chooses 1-external DI, and externally outputs a

high-level signal to complete the cut to the DI configured as INFn.203 cut complete)

P15.46 = 300, shearing time, unit: ms.

Set the hardware and software limits according to the system requirements. For details, please refer to 5.18.

6.3.4 Set the parameters related to the color scale

Note: The color mark signal input port is fixed on servo DI9.

color mark width

When the color mark width P16.30 is zero, the color mark rising edge trigger is valid. When the color mark width P16.30 is not zero, the color mark falling edge trigger is valid, and the color mark width needs to meet the following conditions:

$$|P16.30 - P16.32| \leq P16.31$$

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P16.30	Color mark width; unit: 0.01mm	0.00-327.67	0.0	RW	Immediately
P16.31	The color mark width error threshold, unit: 0.01mm	0.00-327.67	0.0	RW	Immediately
P16.32	The width of the detected color mark, unit: 0.01mm	-327.67-327.67	-	RO	-

P16.30 = 0, Color mark width, unit: 0.01mm.

P16.31 = 0, Color mark width error threshold, unit: 0.01mm.

Color mark tracking method selection

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P16.15	Cut mode 0-cut length mode 1-trigger mode 2-tracking mode	0-2	0	RW	Immediately

P16.15=2, in this mode, the spacing of color marks should be uniform, and the color mark shielding method can be manual or automatic.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P16.22	The distance from the color mark to the tangent point, unit: 0.01mm	0.00-21474836.47	200.00	RW	Immediately
P16.24	The adjustment amount from the color	-327.68-327.67	0.00	RW	Immediately

	mark to the tangent point , unit: 0.01mm				
P16.25	The actual distance from the color mark to the tangent point , unit: 0.01mm	-21474836.48- 21474836.47	-	RO	-

P16.22 = 223 , The distance from the color mark to the tangent point, unit: 0.01mm.

P16.24 = 2, The adjustment amount of the distance from the color mark to the tangent point, unit: 0.01mm.

Color mark counting function

Within the valid window range, P16.34 is incremented by 1 when the color mark is triggered once, and the overcut point is cleared.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P16.35	The valid number of color mark	0-65535	-	RO	-

When INFn.183 is valid, P16.35 is cleared.

Input Function No.	Parameter Description
INFn.175	Color mark signal input, valid on rising edge, fixed servo DI9
INFn.177	Color mark manual shielding input, valid when the valid level is high, color mark triggering is invalid when valid
INFn.180	Clear the current cycle color mark count
INFn.183	Clear the color mark count P16.35, valid when the active level is high

P06.09 = 175, DI9 is configured as a 175-color mark signal input.

P06.05 = 177, DI5 is configured as 177-manual mask color code input bit.

P06.06 = 180, DI6 is configured as 180-clear current color mark period count.

P06.07 = 183, DI7 is configured for 183-color mark count clearing.

Color mark tracking requires spindle position compensation, and there are two compensation methods to choose from.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P16.36	Source of color mark compensation speed 0-spindle speed percentage 1-fixed compensation speed P16.40	0-1	0	RW	Immediately

Parameter details:

- ◆ P16.36=0, compensation speed = spindle speed * P16.37%; acceleration time P16.38, deceleration time P16.39, maximum compensation displacement P16.41.
- ◆ P16.36=1, compensation speed = P16.40; acceleration time P16.38, deceleration time P16.39, maximum compensation displacement P16.41.

parameter no.	Parameter Description	set range	Defaults	Type of read and write	Effective way
P16.37	Compensation speed percentage, unit: % According to the position obtained by the spindle feed rate * P16.34, it is compensated to the spindle position.	0-200	20	RW	Immediately
P16.38	Compensate acceleration time; unit: 0.1s This time is the time for the compensation speed to accelerate from zero to 1000.0m/min	0-6553.5	10.0	RW	Immediately
P16.39	Compensate deceleration time; unit: 0.1s This time is the time for the compensation speed to decelerate from 1000.0m/min to zero	0-6553.5	10.0	RW	Immediately
P16.40	Compensate the maximum speed; unit: 0.1m/min	0-6553.5	20.0	RW	Immediately
P16.41	Compensate for the maximum displacement, unit: mm	0-65535	200	RW	Immediately
P16.42	Compensation position prohibited when the spindle speed is zero 0 - not forbidden 1 - forbidden	0-1	0	RW	Immediately

P16.36 = 0 , The color mark compensation speed is derived from 0 - the percentage of the spindle speed.

P16.37= 30, Compensation speed percentage, unit: %, which is compensated to the spindle position according to the position obtained by the spindle feed speed*P16.34.

P16.38 = 2, Compensation acceleration time, unit: 0.1s, this time is the time for the compensation speed to accelerate from 0m/min to 1000.0m/min.

P16.39 = 2, Compensation deceleration time, unit: 0.1s, this time is the time for decelerating from 1000.0m/min to 0m/min from compensation speed.

6.3.5 Origin return and limit

When the chase shear drive is just powered on, it needs to perform the zero return function. After the zero return is completed, the cam can be engaged. For the specific operation of origin return, please refer to "5.10 Origin Return Function".

Set the hardware and software limits according to the system needs. For details, please refer to 5.17.

6.3.6 Enable the engage cam

Input Function No.	Parameter Description
INFn.172	Cam engagement is enabled, valid when the valid level is high, engages when valid, disengages when invalid
INFn.174	The origin returns to zero, the rising edge is valid

P06.03 = 172, DI3 is configured as INFn.172 cam engagement enable.

P06.04 = 174, DI4 is configured as INFn.174 origin return to zero signal bit.

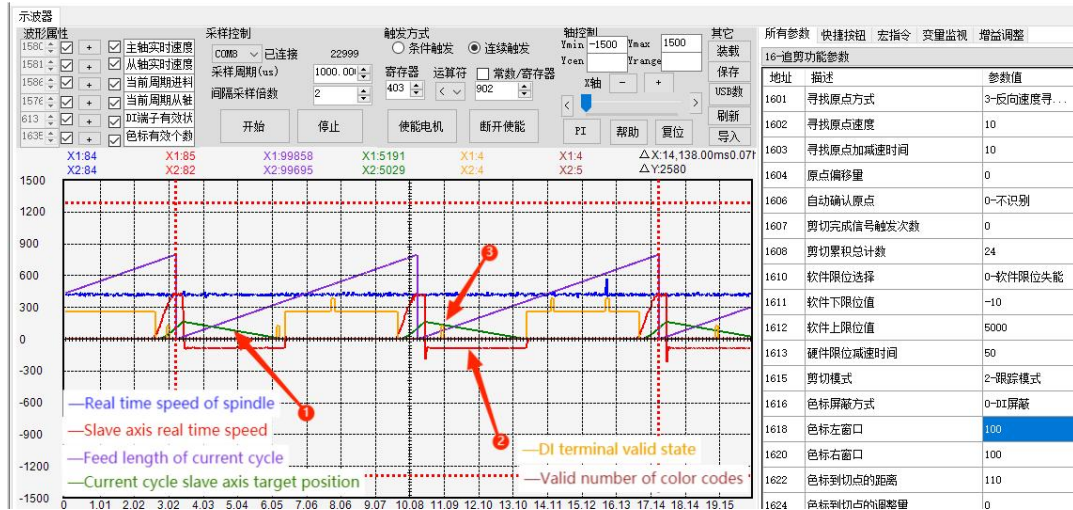
(Notice:)

1. If the number of color marks in the valid window of P16.34 and the number of clear overcut points are 0, the following operations can be performed directly.
2. If the number of color marks in the valid window of P16.34 and the number of clearing over-cut points are not 0, you need to configure INFn.180 to clear the color mark count of the current cycle and clear P16.34.

After the chase shear drive is powered on, the system needs to be reset to zero before engaging the cam, otherwise the servo will report Er.620.

Enable the spindle running speed mode or jog FN001, and trigger INFn.174 to make the slave axis search for the origin. After the origin search is completed, the slave axis stops at the waiting position angle P15.17, and triggers INFn.172 to enable the cam. At this time, you can pass VEObserve The oscilloscope page of the software observes the waveform.

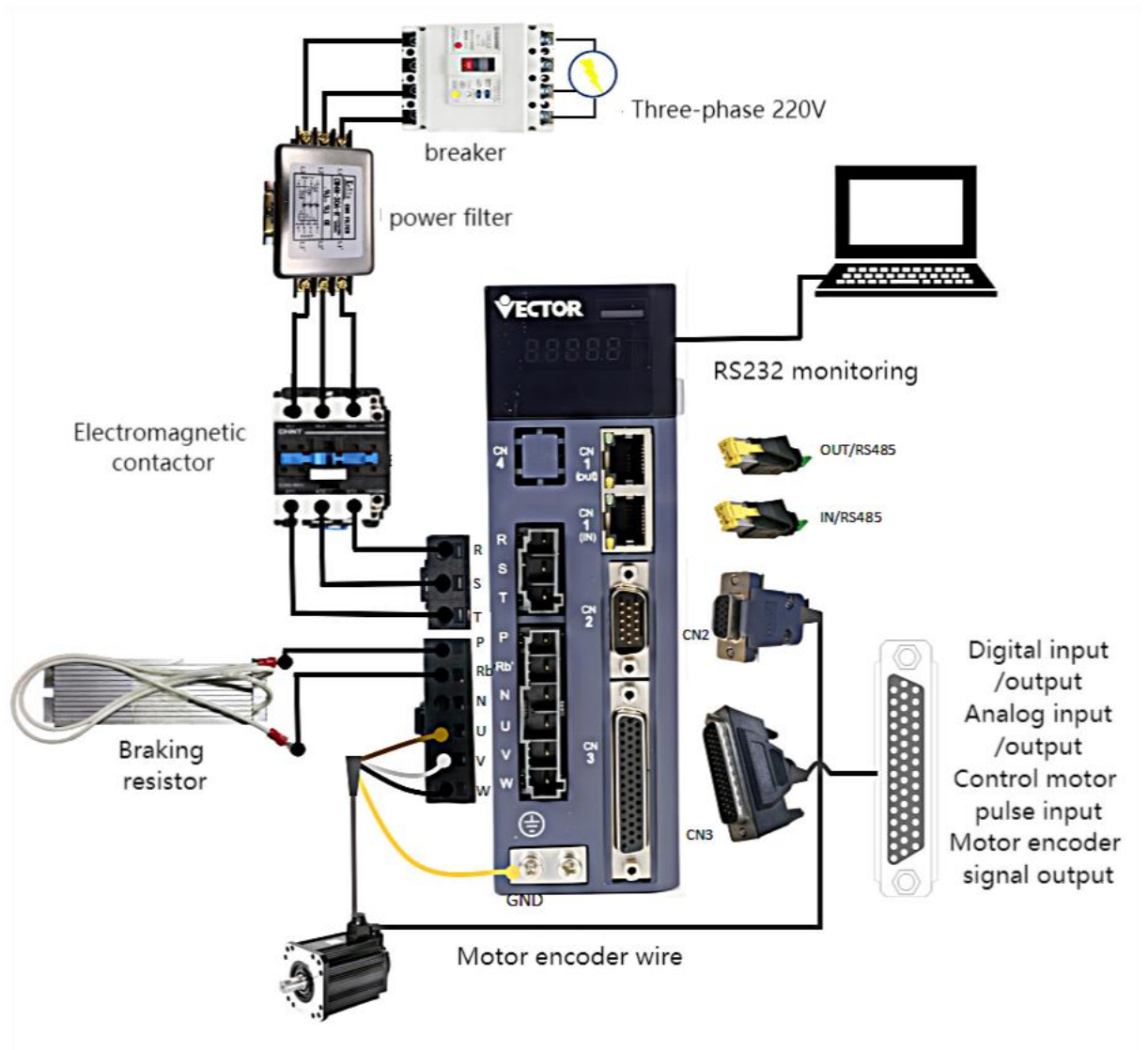
6.3.7 Trace mode test run waveform analysis



- ① P15.98 Compensation length of color mark, unit: 0.01mm.
- ② Color mark compensation speed.
- ③ Trigger a valid color scale.

Chapter 7 Wiring

7.1 Main circuit wiring



7.2 Input and output lines

In order to facilitate communication with the upper controller, the VECServo drive provides 10 groups of digital input terminals and 6 groups of digital output terminals that can be arbitrarily configured. In addition, it also provides XY pulse input and encoder differential output signals OA+, OA-, OB+, OB- and analog input and output signals that can be arbitrarily divided.

Depending on the type of the host controller, the DI and DO signals of the VECServo drive are designed to be selected by jumpers.

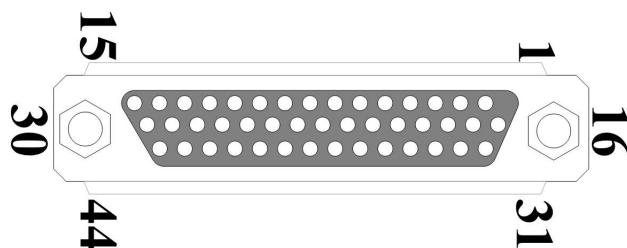
1) DIx jumper selection

SW-DI (pin 27 of CN3) and +24V (pin 26) are short-circuited as NPN, and SW-DI (pin 27 of CN3) and COM (pin 25) are short-circuited as PNP;

2) DOx jumper selection

SW-DO (pin 11 of CN3) and COM (pin 25) are short-circuited as NPN, and SW-DO (pin 11 of CN3) and +24V (pin 26) are short-circuited as PNP;

Remarks: Connect external DC24V power supply to pin 9 (COM) and pin 10 (+24V).



44PIN pin definition					
Pin No.	Define	Functional Description	Pin No.	Define	Functional Description
10、26	+24V	External DC24V power supply, for DI, DO work	21	RST	Reset
9、25	COM		12	AGND	Built-in Analog Ground
3	DO1	Programmable Digital Output	14	AI1	Analog input
18	DO2		15	AI2	
2	DO3		44	AO1	Programmable Analog Output
17	DO4		28	Y2+	High-speed pulse position command input
			29	Y2-	
1	DO5		13	X2+ (SIG+)	(Default high-speed pulse position command input (can be customized as Tension sensor signal input, the tension sensor can be powered through pins 35 and 36 (only for rewinding and unwinding)) Two functions can be selected)
16	DO6	30	X2- (SIG-)		
24	DI1	Programmable digital	37	OA+	Select the encoder signal frequency division output or the second encoder input through parameter
8	DI2		38	OA-	
23	DI3		39	OB+	

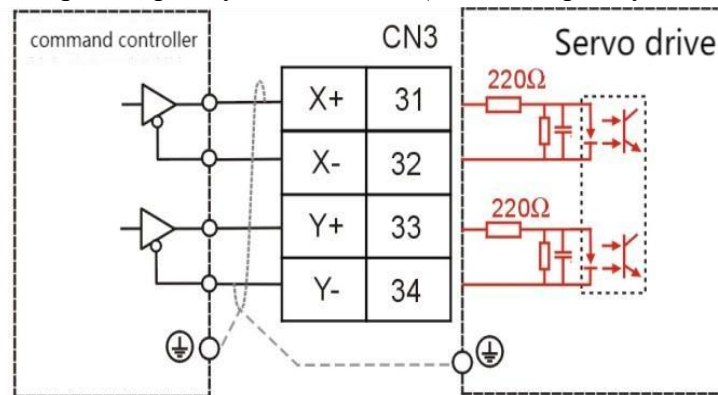
7	DI4	input	40	OB-	P03.78	
22	DI5		41	OZ+	Encoder Z point signal output	
6	DI6		42	OZ-		
5	DI7		35	+5V		Built-in +5V power
20	DI8		36	0V		
4	DI9		11	SW-DO	DO's NPN/PNP jumper	
19	DI10		27	SW-DI	DI's NPN/PNP jumper	
31	X+		Position command input, input signal type can choose differential signal or open collector	43	XYPH	XY input pull-up resistor
32	X-			Case	Shielded network layer	Connect to the ground wire of the driver
33	Y+					
34	Y-					

7.3 Position command pulse signal wiring

The following describes the wiring method of the position command input in the CN3 port in detail. There are two options for the input signal type, namely differential signal input and open collector input. Details are as follows:

(1) When differential signal input

Maximum input frequency \cong 500KHz (before frequency multiplication)



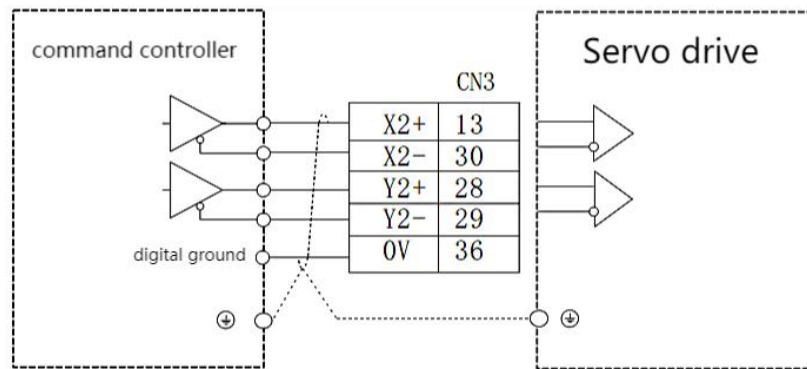
When working, please ensure that:

● $3.2V \leq [(high\ level) - (low\ level)] \leq 5.1V$

If the above formula cannot be satisfied, the input pulse of the servo drive will be unstable, and the phenomenon of pulse loss or command inversion may occur.

(2) High-speed pulse position command input (differential signal input)

Maximum input frequency \cong 4MHz (before frequency multiplication)



When working, please ensure that:

- $3.2V \leq [(high\ level) - (low\ level)] \leq 5.1V$

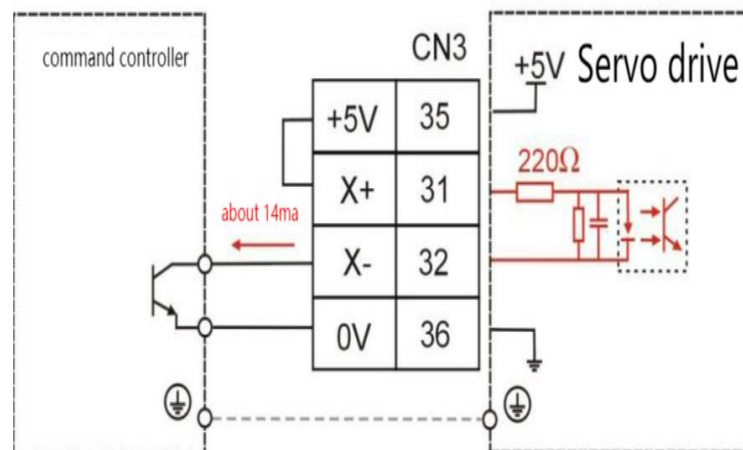
If the above formula cannot be satisfied, the input pulse of the servo drive will be unstable, and the phenomenon of pulse loss or command inversion may occur.

(3) Open collector input

Maximum input frequency \cong 300KHz (before frequency multiplication)

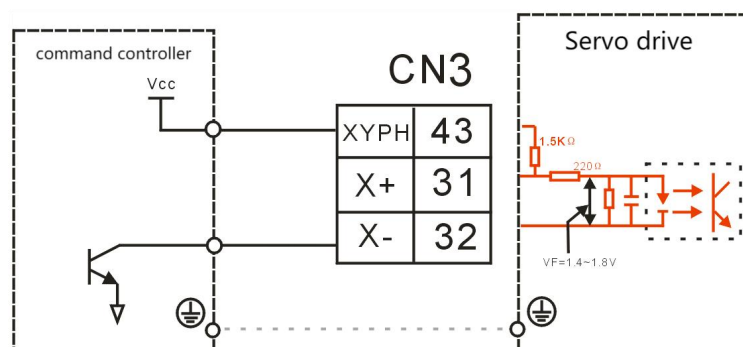
① The upper controller is NPN type (Japanese PLC such as Mitsubishi, Panasonic, Omron, etc.)

a. When using the drive's internal 5V power supply:



- The wiring of Y+ (33 feet) and Y- (34 feet) is the same as that of X+ and X-.

b. When using an external power supply prepared by the user:

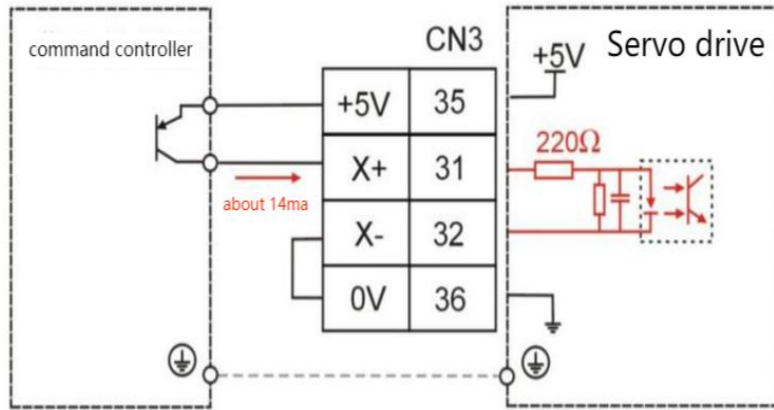


- The wiring of Y+ (33 feet) and Y- (34 feet) is the same as that of X+ and X-.

- VCC=24V。

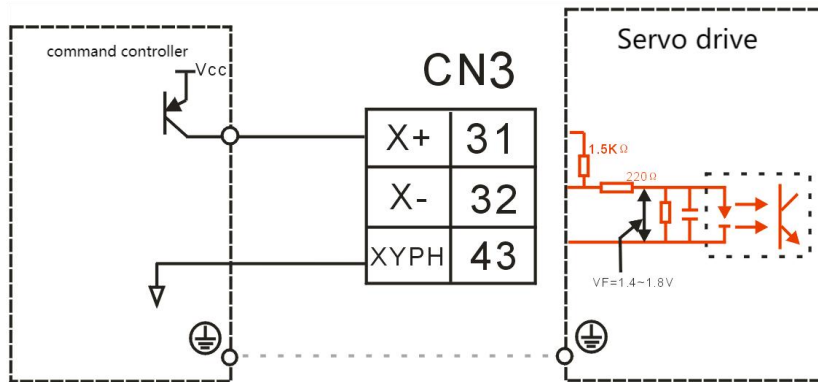
②The upper controller is PNP type (European PLC such as Siemens)

a. When using the drive's internal 5V power supply:



- The wiring of Y+ (33 feet) and Y- (34 feet) is the same as that of X+ and X-.

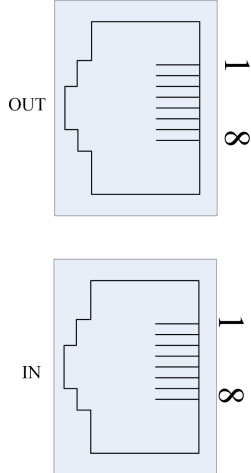
b. Use a user-prepared external power supply



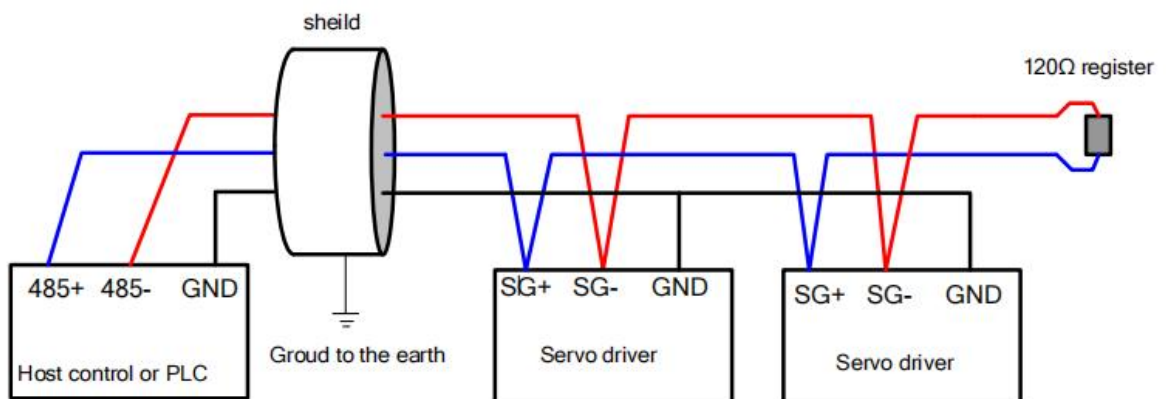
- The wiring of Y+ (33 feet) and Y- (34 feet) is the same as that of X+ and X-.
- VCC=24V。

7.4 Communication wiring

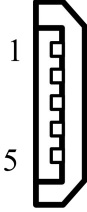
Pin assignment and definition of the E-structure communication port (CN1)

Location and function	Terminal shape	Description																											
CN1		Both interfaces are defined the same.																											
		<table border="1"> <thead> <tr> <th>Pin.No</th> <th>Position</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>NC</td> <td>dangling</td> </tr> <tr> <td>2</td> <td>NC</td> <td>dangling</td> </tr> <tr> <td>3</td> <td>GND</td> <td>power ground</td> </tr> <tr> <td>4</td> <td>SG+</td> <td>The signal of RS485 is positive</td> </tr> <tr> <td>5</td> <td>SG-</td> <td>The signal of RS485 is negative</td> </tr> <tr> <td>6</td> <td>NC</td> <td>dangling</td> </tr> <tr> <td>7</td> <td>NC</td> <td>dangling</td> </tr> <tr> <td>8</td> <td>GND</td> <td>power ground</td> </tr> </tbody> </table>	Pin.No	Position	Description	1	NC	dangling	2	NC	dangling	3	GND	power ground	4	SG+	The signal of RS485 is positive	5	SG-	The signal of RS485 is negative	6	NC	dangling	7	NC	dangling	8	GND	power ground
		Pin.No	Position	Description																									
		1	NC	dangling																									
		2	NC	dangling																									
		3	GND	power ground																									
		4	SG+	The signal of RS485 is positive																									
		5	SG-	The signal of RS485 is negative																									
		6	NC	dangling																									
7	NC	dangling																											
8	GND	power ground																											
<p><u>(1)It is necessary to connect the power ground of the controller (PLC) with the power ground of the servo drive</u></p>																													
<p><u>(2)When multiple drives use the RS485 bus in parallel, please add a 120 Ω terminal resistor between the SG+ and SG- terminals of the most remote drive</u></p>																													

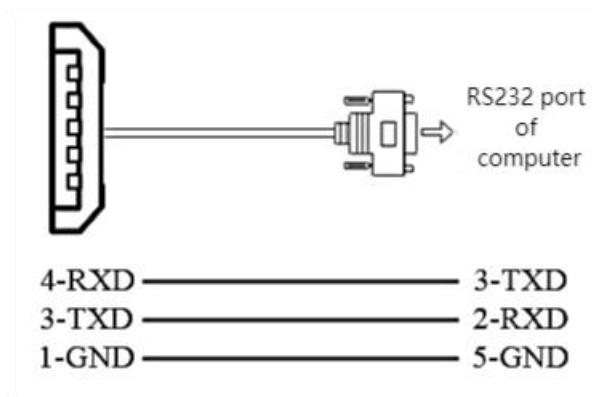
Note: When wiring, please connect the GND terminal of the host device and the GND terminal of the servo drive together.



E structure monitoring port pin assignment and definition

Location and function	Terminal shape	Description		
CN5		Pin No.	Define	Description
		1	GND	power ground
		2	NC	dangling
		3	TXD	RS232 send
		4	RXD	RS232 receive
		5	NC	dangling

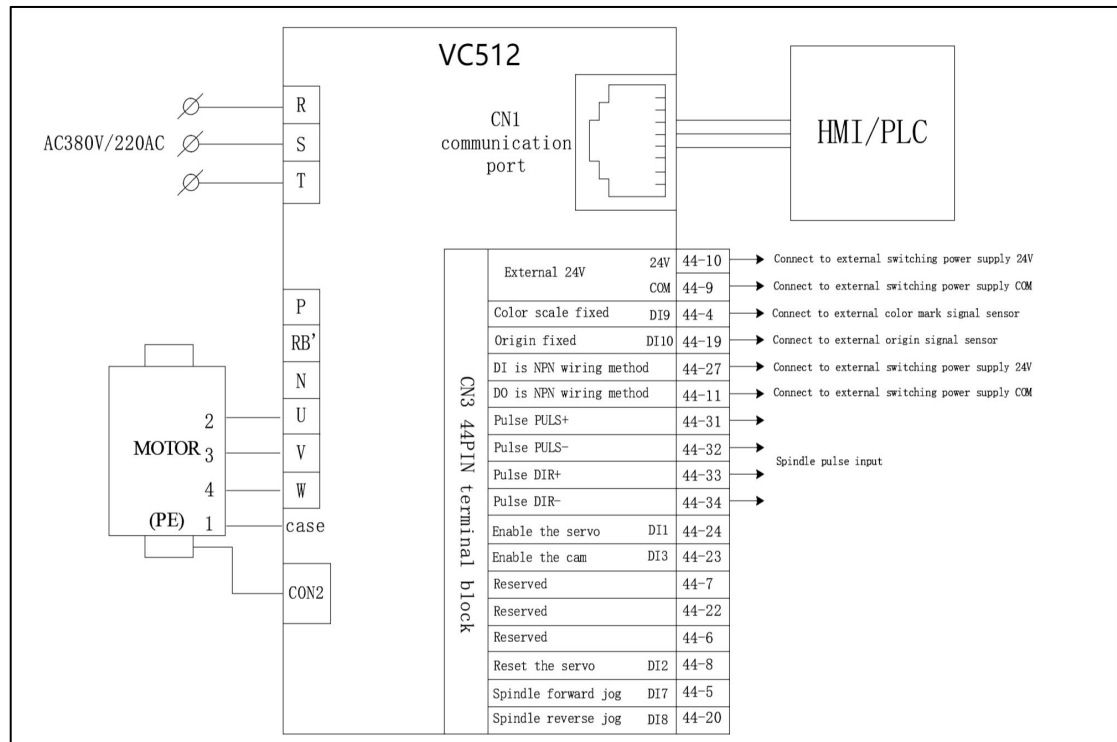
The connection to the computer is as shown below:



RS232 baud rate selection parameters are as follows:

parameter no.	Parameter Description	Setting range	Units	Function	Setting method	Effective way	Defaults	read and write method
P08.26	RS232 监视口波特率 0- 9600 1- 38400 2- 115200	0~2	bps	设置 RS232 监视口的波特率。	运行设置	立即生效	2	RW

7.5 Chase shear classic wiring diagram



Notice:

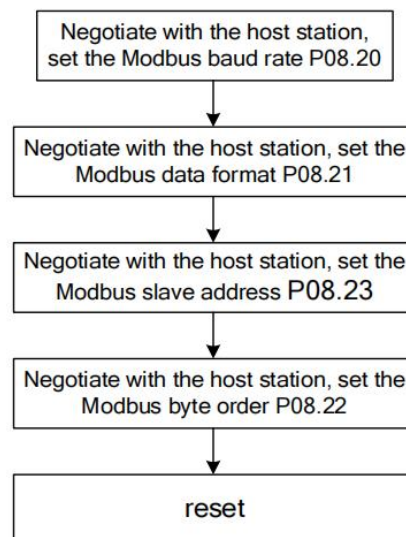
- 1、 The GND of the motor cable must be connected to the ground.
- 2、 The shielded wire of CN3 should be connected to the shell.
- 3、 The momdbus communication line should be connected to pin 3 GND.
- 4、 Do not run strong wires and weak wires in the same trunking.

Chapter 8 Modbus communication protocol

The relevant parameters are as follows.

parameter no.	Parameter Description	Setting range	Units	Function	Setting method	Effective way	Defaults	read and write method
P08.20	Modbus Baud Rate Register 0- 4800 1- 9600 2- 19200 3- 38400 4- 57600 5- 115200	0~5	bps	Set the communication rate between the driver and the host computer. The communication rate of the servo drive must be consistent with the communication rate of the host computer, otherwise the communication cannot be performed.	anytime	Immediately	1	RW
P08.21	Modbus data format registers 0-No parity, 2 stop bits 1-No parity, 1 stop bit 2-Even parity, 1 stop bit 3-Odd parity, 1 stop bit	0~3	-	Set the data verification method when the drive communicates with the upper computer.	anytime	Immediately	1	RW
P08.22	32-bit address access high and low byte order 0-When accessing a	0~1	-	Sets the transmission format for	anytime	Immediately	1	RW

	32-bit address, the high-order 16 bits are first 1-When accessing a 32-bit address, the lower 16 bits are in front			32-bit data when using MODBUS communication.				
P08.23	Modbus Slave Address	1~255	-	Set Modbus slave address.	anytime	Immediately	1	RW
P08.24	Modbus fault register	-	-	An error code is displayed when a communication failure occurs.	-	-	-	RO



Function codes supported by Modbus

The servo drive only supports communication in Modbus RTU format. The function codes of the internally implemented Modbus protocol stack are shown in the table below.

Function code (decimal)	Function Description
1	Read bits
2	Read bits
3	Read registers
4	Read registers
5	Write Bit
6	Write 16-bit registers
16	write 32-bit registers

Servo DI bit address = function number + 40.

MODBUS Bit Addresses	Function	Valid rules
41	INFn.01	Enable the driver
42	INFn.02	Reset the drive
83	INFn.43	Positive limit switch
84	INFn.44	Reverse limit switch
211	INFn.171	Spindle position source switching, when it is valid, it comes from the second encoder, when it is invalid, it comes from XY pulse.
212	INFn.172	Cam engagement is enabled, valid when the valid level is high, engages when valid, disengages when invalid
213	INFn.173	Cam pause signal, valid when the valid level is high, when valid, the slave axis will stop at the waiting position, after the pause is released, the cam is re-engaged
214	INFn.174	The origin returns to zero, the rising edge is valid
215	INFn.175	Color mark signal input, valid on rising edge, fixed servo DI9
216	INFn.176	Origin signal input, valid for rising edge, fixed servo DI10
217	INFn.177	Color mark manual shielding input, valid when the valid level is high, color mark triggering is invalid when valid
218	INFn.178	Feeding detection signal, valid when the valid level is high
219	INFn.179	Immediately cut the signal, the rising edge is valid
222	INFn.182	The number of times of clearing P16.08, P15.91, P15.92, P15.93 and P15.94, valid when the valid level is high
223	INFn.183	Clear the color mark count P16.35, valid when the active level is high
224	INFn.184	The current order count is cleared, valid when the valid level is high
225	INFn.185	chasing shearing forward jog, valid when the valid level is high
226	INFn.186	chasing shearing reverse jog, valid when the valid level is high
227	INFn.187	Spindle forward jog phase shift
228	INFn.188	Spindle reverse jog phase shift
231	INFn.191	Order toggle switch 1, valid when the active level is high
232	INFn.192	Order toggle switch 2, valid when the active level is high
233	INFn.193	Positive phase shift of the spindle, trigger once, the spindle increases the displacement of P16.44, the rising edge is valid
234	INFn.194	Negative phase shift of the spindle, trigger once, the spindle reduces the displacement of P16.44, the rising edge is valid
235	INFn.195	Increase the cutting length of the current order, trigger once, the current order increases the length of P15.37, the rising edge is valid
236	INFn.196	Decrease the cutting length of the current order, trigger once, the current order will reduce the length of P15.37, the rising edge is valid

239	INFn.199	The origin is confirmed, and the rising edge is valid.
242	INFn.202	Cam emergency stop
243	INFn.203	Cut completion signal, the rising edge is valid.

Servo DO bit address = function number + 140.

MODBUS Bit Addresses	Function	Valid rules
149	OUTFn.09	Fault output function
180	OUTFn.40	Engagement state output, output valid signal when engaged
181	OUTFn.41	The output is valid when the slave axis is in the synchronization area
182	OUTFn.42	When the order is close to the output, the actual number of cuts of the current order + the order close threshold P15.34 is greater than or equal to the set times of the current order cut, the output order close signal
183	OUTFn.43	Order completion output, when the actual number of cuts of the current order is greater than or equal to the set number of current order cuts, the order completion signal is output
191	OUTFn.51	The color mark triggers the valid interval output, and if the spindle position of the current cam cycle is in the color mark valid window, it outputs a high level.
192	OUTFn.52	The current set cutting length is too small to output, and the set cutting length is greater than the minimum cutting length that cannot be performed by the current system state.
193	OUTFn.53	Hardware limit output, output when encountering limit switch.
194	OUTFn.54	Software limit output, output when the current position of the saw table exceeds the software limit.
195	OUTFn.55	Output after the zero return is completed.

All Pxx.yy parameters of the servo drive can be read, and the corresponding parameter register address is $xx*100+yy$. The parameter address of most host computers should be set to "parameter register address + 1". Such as servo parameter P15.01, the parameter address is $1501=15*100+01$.

Chapter 9 Gain Adjustment

parameter no.	Parameter Description	General adjustment range	Recommended value
P07.01	Current loop P gain Reduce this value when the motor whistle, The speed following difference will increase this value	60-150	100
P07.02	Current loop I gain If the motor whistle, reduce this value. The speed following difference will increase this value	10-50	20
P07.03	Speed loop P gain speed jitter, decrease this value The speed following is poor, the position error is large, and the inertia is large, increase this value	1000-3000	2000
P07.04	Speed loop I gain Speed jitter, large inertia, reduce this value If the position error is large and the rigidity is strong, increase this value	10-100	20
P07.05	Position loop P gain speed jitter, decrease this value If the position error is large, then increase this value	50-100	100
P07.10	Torque feedforward Jitter at low speed, reduce this value If the speed following is poor and the inertia is large, increase this value	0-150	50
P07.20	Gain adjustment mode Please set it to 0	0	0

Chapter 10 Cutting Exception Handling

No.	Problem Description	Possible causes and their solutions	
		possible reason	Solution
1	Low cutting repetition accuracy	1、 Spindle slip	Increase the friction between the spindle and the material
		2、 Spindle speed is not stable	The feeding power is unstable, the spindle is not standard round, or the spindle pulse is disturbed
		3、 Saw table loose	Secure the saw table
		4、 The material is not on the same level as the die mouth of the saw table	Adjust the saw table or material position
		5、 Servo position loop error is large	When the torque is sufficient, adjust the gain.
2	Blocking material when cutting	possible reason	Solution
		1 、 The mechanical parameters are inaccurate (the circumference of the master axis, the number of pulses per week of the slave axis, etc.)	Re-measure mechanical parameters
		2、 Spindle slip	Increase the friction between the spindle and the material
3	Cut length suddenly becomes longer or shorter	possible reason	Solution
		1、 Spindle slip	Increase the friction between the spindle and the material
		2 、 The spindle pulse is disturbed	Observe whether the wiring is reasonable, whether the shielded wire is grounded, whether it is subject to strong electrical interference, etc.

Version Update Record

version	change date	Change the content
1.01	2022-3-4	The function bits of INFn.xx are changed, AI3 and AO2 are canceled on the hardware, and the description of AI3 and AO2 is deleted in the manual.
1.02	2022-3-12	Improve the test run steps