Operation Manual

Goodrive 35-07 inverter
Special for Tension Control

SHENZHEN INVT ELECTRIC CO., LTD.

Preface

Goodrive35-07 inverters special for tension control focus on the textile industry, printing and packaging industry, plastic machinery industry, paper industry, cable manufacturing industry. It has the function of tension control and coil diameter calculation and meets the requirements of medium and high-end winding applications.

In the algorithm, the tension control module is special for the tension control of wrapping up and off and the comprehensive solutions of the whole processing segments.

Use Goodrive35-07 tension control special inverter can not only replace torque motor, dc motor, such as tension controller and independently constitute a tension control system, and compared with traditional tension controller and frequency converter control scheme, the use of the frequency converter can make the system more concise, reduce cost, easy to maintain and gain more stable control effect.

Goodrive35-07 inverters special for tension control can replace the torque motor, DC motor, tension controller to build up the tension control system independently. And for the traditional control solution of tension controller and inverter solutions, this inverter can facilitate the whole system, reduce the cost and stabilize the control performance.

If the product is ultimately used for military affairs or manufacture of weapon, it will be listed on the export control formulated by ***Foreign Trade Law of the People's Republic of China***. Rigorous review and necessary export formalities are needed when exported.

Our company reserves the right to update the information of our products.

Contents

1 Product selection

1.1 Model description

GD35-07 – 5R5G – 4 – * *

① ② ③ ④

Product model and description

Key	No.	Instruction	Content
Abbreviation	①	Abbreviation	GD35-07: Special for tension control
Rated power	②	Power range +Load type	5R5:5.5kW G: Constant torque load
Voltage degree	③	Voltage degree	2:AC 3PH 220V(-15%)~240V(+10%) 4:AC 3PH 380V(-15%)~440V(+10%) 6:AC 3PH 520V(-15%)~690V(+10%)
Lot No.	④	Lot No.	C1: Support 24V incremental encoder; D1: support rotary transformer Pulse+direction pulse input reference (optional); H1: support 5V/12V incremental encoder, Pulse + direction pulse input reference

1.2 Selection table

Model	Output power (kW)	Input current (A)	Output current (A)	Carrier frequency (kHz)
Small power	1.5~2.2	Refer to GD300		
GD35-07-004G-4-XX	4	13.5	9.5	2~15(8)
GD35-07-5R5G-4-XX	5.5	19.5	14	2~15(8)
GD35-07-7R5G-4-XX	7.5	25	18.5	2~15(8)
GD35-07-011G-4-XX	11	32	25	2~15(8)
GD35-07-015G-4-XX	15	40	32	2~8(4)
Big power	18.5~75	Refer to GD300		

1.3 I/O PG card

EC-PG 3 01 - 24

① ② ③④ ⑤

No.	Instruction	Content
①	Product type	EC- Extension card
②	Card type	PG: P/G card
③	Technical version	Odds(1,3,5) are used to shown the technical version(the first generation, second generation and third generation) Note: 3 means special for GD3XX series products.
④	Code	03: PG port of UVW encoder
		04: PG port of rotary transformer (standard) + pulse direction reference (optional) 05: PG port of incremental encoder + pulse direction reference
⑤	Power supply	00:Null
		05:5V
		12:12-15V
		24:24V

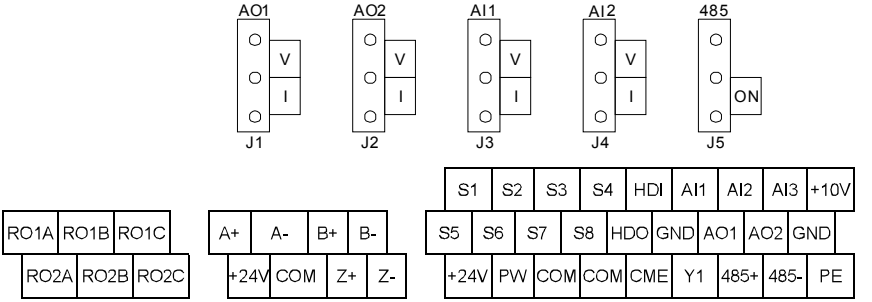
1.4 I/O PG selection table

Model	Instruction	Specification
EC-PG301-24	24V I/O incremental PG card	24V incremental ABZ encoder, support differential, OC and push-pull input, Max. 100kHz, standard for Goodrive35-07 series C1 inverters
EC-PG304-05	5V I/O resolver PG card	Rotary transformer encoder, Max. 500kHz, standard for Goodrive35-07 series D1 inverters
EC-PG304-00	I/O resolver PG card	Rotary transformer encoder, Max. 500kHz, support pulse reference, optional for Goodrive35-07 series D1 inverters
EC-PG305-12	5V/12V I/O multi-function incremental PG card	5V/12V incremental ABZ encoder, Max. 300kHz, standard for Goodrive35-07 series H1 inverters

1.5 I/O PG card and the wiring diagram

1.5.1 C1 terminal (EC-PG301-24) and the wiring diagram

1.5.1.1 Terminal arrangement

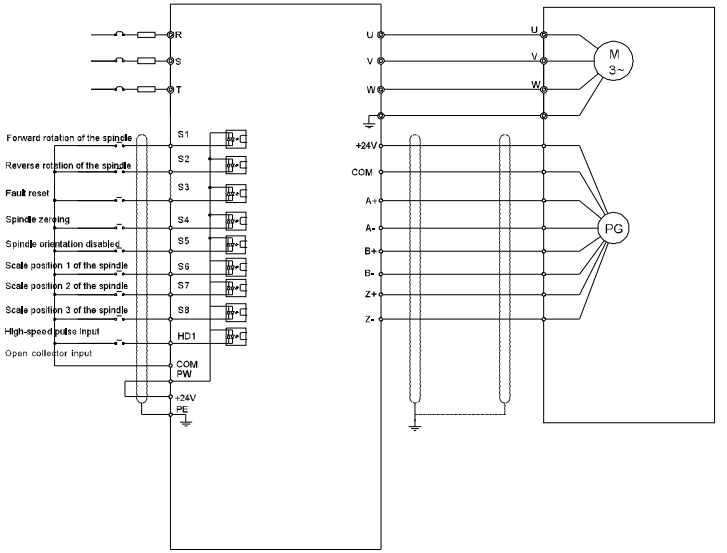


1.5.1.2 The terminal

Terminal	Instruction
+24V	Power supply, provide 24V, 200mA power supply
A+, A-, B+, B-, Z+, Z-	Signal input
COM1	Grounding terminal of the encoder

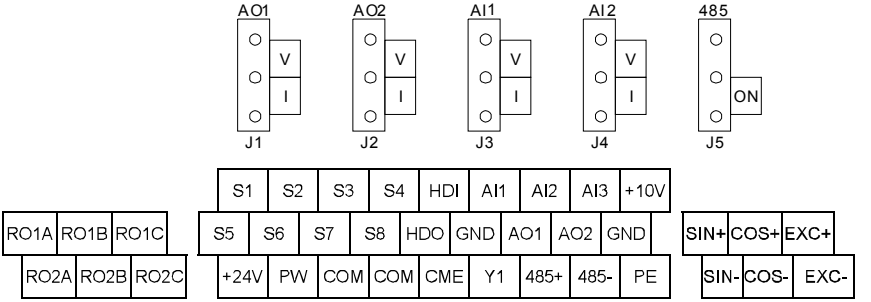
Note: refer to section 4.3.5 of the manual of GD300 for detailed information of AO1, AO2, AI1, AI2, 485 and other terminals.

1.5.1.3 The wiring diagram



1.5.2 D1 terminal (EC-PG304-05) and the wiring diagram

1.5.2.1 Terminal arrangement

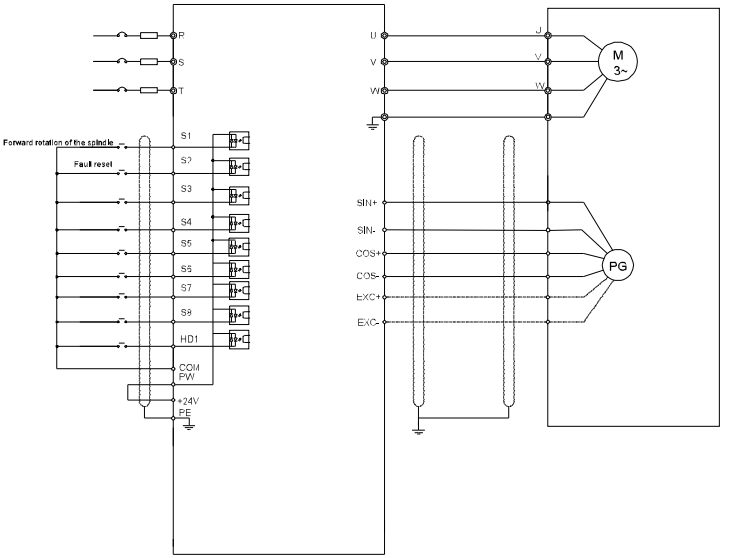


1.5.2.2 The terminal

Terminal	Instruction
EXC+, EXC-	Exciting signal
SIN+, SIN- , COS+ and COS-	Signal input

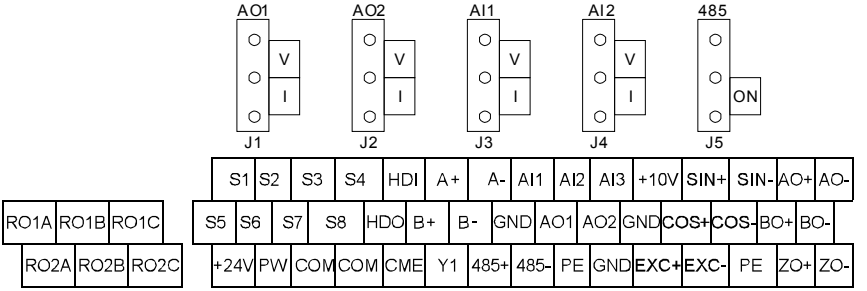
Note: refer to section 4.3.5 of the manual of GD300 for detailed information of AO1, AO2, AI1, AI2, 485 and other terminals.

1.5.2.3 The wiring diagram



1.5.3 D2 terminal (EC-PG304-00) and the wiring diagram

1.5.3.1 Terminal arrangement

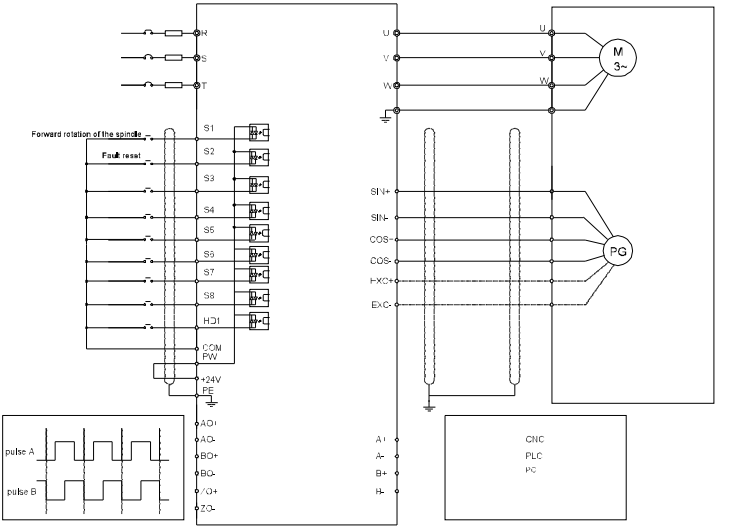


1.5.3.2 The terminal

Terminal	Instruction
EXC+, EXC-	Exciting signal
SIN+, SIN- , COS+ and COS-	Signal input
A+, A-, B+, B-	Pulse reference signal, default as 5V input and external limiting resistor is needed if the input is above 10V
AO+, AO-, BO+, BO-, ZO+ and ZO-	Encoder signal output, 5V differential signal and the ratio of frequency-division is 1:1

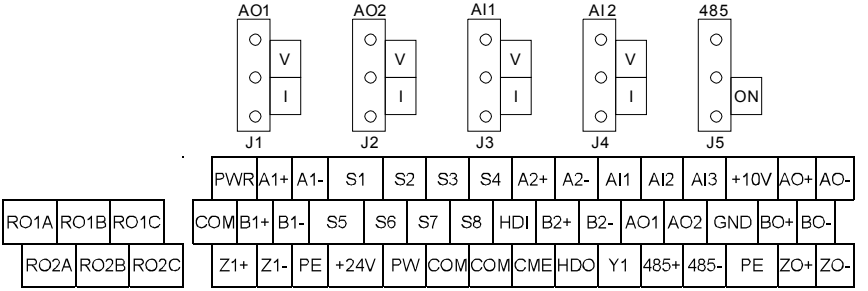
Note: refer to section 4.3.5 of the manual of GD300 for detailed information of AO1, AO2, AI1, AI2, 485 and other terminals.

1.5.3.3 The wiring diagram



1.5.4 H1 terminal (EC-PG305-12) and the wiring diagram

1.5.4.1 Terminal arrangement

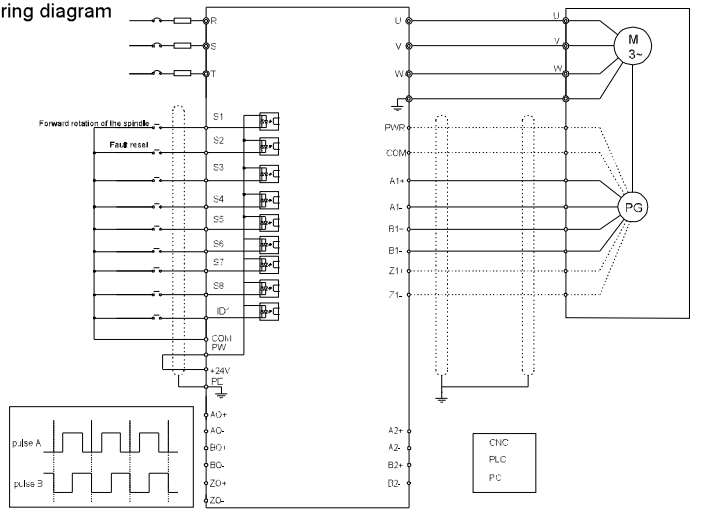


1.5.4.2 The terminal

Terminal	Instruction
PWR	Power supply, provide 5V/12V, 200mA power supply
A1+, A1-, B1+, B1-, Z1+, Z1-	Signal input
A2+, A2-, B2+, B2-,	Pulse reference signal, default as 5V input. External current-limiting resistor is needed when the input voltage is above 10V
AO+, AO-, BO+, BO-, ZO+ and ZO-	Encoder signal output, 5V differential signal and the ratio of frequency-division is 1:1
COM	Grounding terminal of the encoder

Note: refer to section 4.3.5 of the manual of GD300 for detailed information of AO1, AO2, AI1, AI2, 485 and other terminals.

1.5.4.3 The wiring diagram

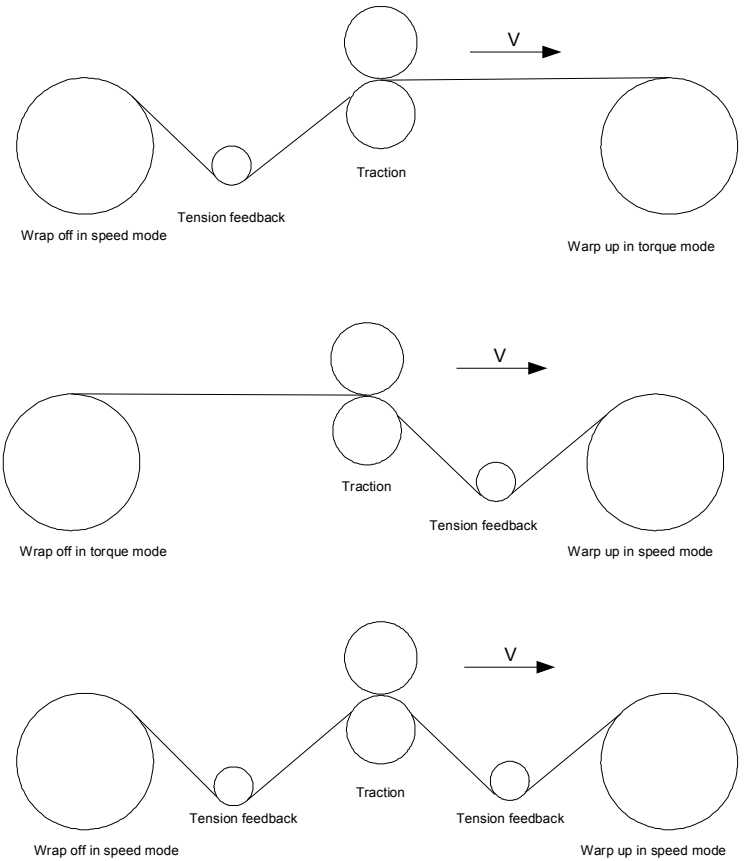


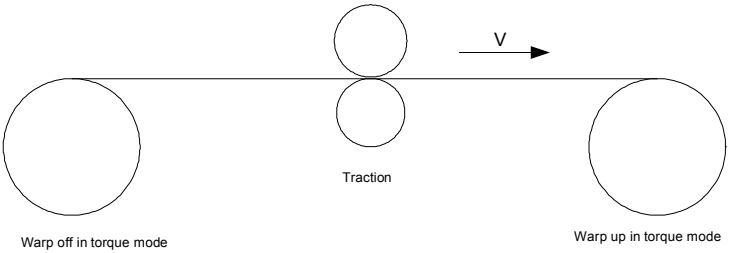
2 Tension control solutions

In many fields of industrial production, precise tension control is needed to maintain a constant output tension of the drive equipment, in order to improve the quality of the products. In the wrapping up and off of some industries such as paper processing, printing and dyeing, packing, wire and cable manufacturing, textile, fiber, optic cable, leather, metal foil material processing and so on, tension needs to keep constant.

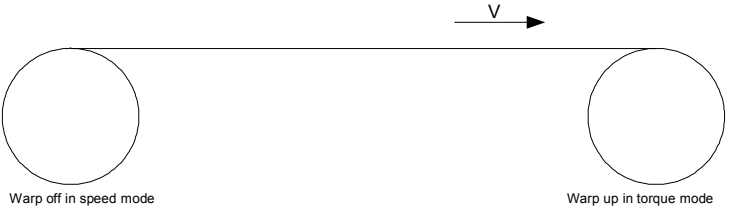
The inverter controls the tension through the output torque or speed of the motor. There are two kinds of control modes: tension speed control mode and the open loop tension torque control mode.

2.1 Sketch map of tension control





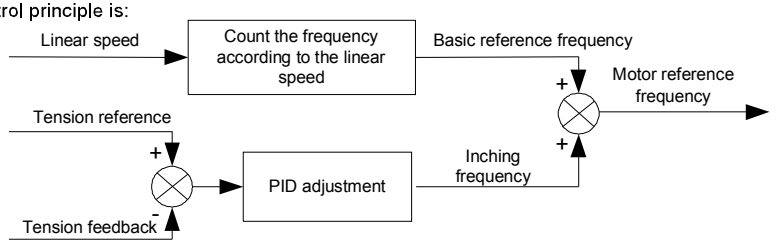
In some special situations, if the coil diameter can be counted through thickness, the following modes are available:



2.2 Speed control

The detection feedback signal is needed in the close loop adjustment. PID calculation is carried out according to the feedback signal for the motor speed adjustment, linear speed and stable tension control. If tension rod or floating roller is used for feedback, changing the setting value (PID reference) may change the actual tension, at the same time, changing the mechanical configuration such as tension rocker or floating roller weight can also change the tension.

The control principle is:



Relevant modes:

(1) Input module of linear speed: this part is important for the calculation of the basic setting frequency according to the linear speed and the calculation of coil diameter according to the linear speed.

(2) Calculation module of the real-time coil diameter: the calculation of coil diameter determines the control performance. The coil diameter can be calculated according to the output frequency of the inverter and the linear speed or be calculated through the thickness or sensor, of which, the linear speed is widely used for the calculation and if using this method, it is necessary to select whether enable the function of coil diameter limiting.

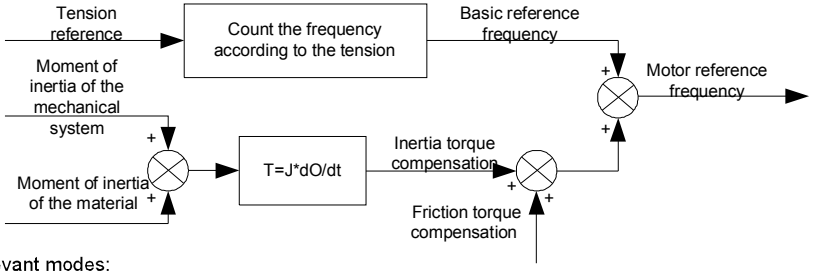
(3) PID adjustment module: mainly set in P09 group and there are other PID parameters in P26 group. The linear speed synchronization and stable tension can be kept through PID adjustment, but PID parameters can be adjusted according to the site commissioning. Parameters can be switched between two groups of PID parameters to PID improvement.

(4) Detection and processing module of materials loss. The function is valid when enabling the materials detection.

(5) Pre-drive: if the pre-drive function terminal is valid, when automatic volume-changing, after starting the inverter, the drum will run at the setting linear speed, if the terminal is invalid, the inverter will automatically switch to the corresponding control mode.

2.3 Open loop tension torque control

Open loop means no tension feedback signal; the mode controls the tension through the motor torque control directly. The rotation speed changes with the linear speed of the material automatically. The basic is: in frizzy control system, the relationship between the tension F of the roller with materials, current coil diameter D and output torque of the shaft is: T = F D / 2. If the output torque can be adjusted according to the variation of coil diameter, the tension can be controlled. In order to ensure the constant tension in the process of acceleration and deceleration, there is internal friction compensation module and inertia compensation module in the inverter to calculate the real time the moment of inertia, and compensate the torque according to the current speed rate of change. The torque control principle diagram is as follows:



Relevant modes:

(1) Linear speed input modes: Linear speed input modes: two functions, one is used to count the synchronous frequency in torque control system according to the linear speed; the other is used to count the coil diameter according to the linear speed.

(2) Tension setting modes: Set the tension with the control system, need to adjust according to the actual situation. After confirmation, the value remains the same, and for some need to improve the winding, tension taper function can be selected to raise the tension with the increasing coil diameter. ,

(3) Coil diameter real time calculation module: Coil diameter calculation directly determines the effect of the control. There are several kinds of coil diameter calculation methods. Linear speed, output frequency, thickness and sensor are available. The most convenient is to calculate through the thickness. And it is necessary to enable the coil diameter changing limit when using linear speed to calculate the coil diameter.

(4) Torque compensation module: include friction torque compensation and inertia torque compensation. Of which, the friction torque compensation is used to eliminate the impact of friction and tension, and it needs to be adjusted according to actual requirements; the inertia torque compensation includes the moment of inertia moment of mechanical systems and materials. In order to keep the tension stable in ACC/DEC, the compensation torque is required. But in some cases

which do not need tension control, disabling the inertia torque compensation can also meet the requirements.

(5) Detection and processing module of materials loss. The function is valid when enabling the materials detection.

(6) Pre-drive: if the pre-drive function terminal is valid, when automatic volume-changing, after starting the inverter, the drum will run at the setting linear speed, if the terminal is invalid, after an interval, the inverter will automatically switch to the corresponding control mode.

3 Function codes

The function parameters of each function group contain certain function codes applying 3-level menus. For the convenience of function codes setting, the function group number corresponds to the first level menu, the function code corresponds to the second level menu and the function code corresponds to the third level menu.

1. Below is the instruction of the function lists:

"Function code": codes of function parameter group and parameters;

"Name": full name of function parameters;

"Detailed illustration of parameters": Detailed illustration of the function parameters;

"Setting range": The setting range of the parameters;

"Default value": the original factory set value of the function parameter;

"Modify": the modifying character of function codes (the parameters can be modified or not and the modifying conditions), below is the instruction:

"○": means the set value of the parameter can be modified on stop and running state;

"◎": means the set value of the parameter can not be modified on the running state;

"●": means the value of the parameter is the real detection value which can not be modified.

3.1 Relevant function codes of Goodrive35-07 close loop vector

Function code	Name	Detailed	Setting range	Default	Modify
P00.00	Speed control mode	0: Vector control without PG 1(for AM，SM) 1: Vector control without PG 2(for AM) 2: SVPWM control 3: Close loop vector control Note: AM- asynchronous motor SM- synchronous motor	0~3	2	◎
P00.01	Run command channel	0: Keypad running command channel (LED off) 1: Terminal running command channel (LED flickering) 2: Communication running command channel (LED on)	0~2	0	○
P00.02	Communicati	Select the controlling	0~3	0	○

Function code	Name	Detailed	Setting range	Default	Modify
	on running commands	communication command channel of the inverter. 0:MODBUS communication channel 1: PROFIBUS\CANopen communication channel 2:Ethernet communication channel 3:Reserved Note: 1, 2 and 3 are extension functions which need corresponding extension cards.			
P00.03	Max. output frequency	P00.04~400.00Hz	P00.04~400.00	50.00Hz	◎
P00.04	Upper limit of the running frequency	P00.05~P00.03 (Max. output frequency)	P00.06~P00.03	50.00Hz	◎
P00.05	Lower limit of the running frequency	0.00Hz~P00.04(Upper limit of the running frequency)	0.00~P00.04	0.00Hz	◎
P00.11	ACC time 1	0.0~3600.0s	0.0~3600.0	Depend on model	○
P00.12	DEC time 1	0.0~3600.0s	0.0~3600.0	Depend on model	○
P01.25	DEC time of the E-stop	0.0~60.0s	0.0~60.0	2.0s	○
P00.13	Running direction	0: Runs at the default direction 1: Runs at the reverse direction 2: Forbid to run in reverse direction	0~2	0	○
P00.15	Motor autotuning	0: No operation 1: Rotating autotuning	0~3	0	◎

Function code	Name	Detailed	Setting range	Default	Modify
		2: Static autotuning (autotun at non-load and mutual inductance) 3: Static autotuning(not autotun at non-load and mutual inductance)			
P00.18	Function restore parameter	0:No operation 1:Restore the default value 2:Cancel the fault record	0~2	0	◎
P02.01	Rated power of asynchronous motor 1	0.1~3000.0kW	0.1~3000.0	Depend on model	◎
P02.02	Rated frequency of asynchronous motor 1	0.01Hz~P00.03(Max. frequency)	0.01~P00.03	50.00Hz	◎
P02.03	Rated speed of asynchronous motor 1	1~36000rpm	1~36000	Depend on model	◎
P02.04	Rated voltage of asynchronous motor 1	0~1200V	0~1200	Depend on model	◎
P02.05	Rated current of asynchronous motor 1	0.8~6000.0A	0.8~6000.0	Depend on model	◎
P02.06	Stator resistor of asynchronous motor 1	0.001~65.535Ω	0.001~65.535	Depend on model	○
P02.07	Rotor resistor of asynchronous	0.001~65.535Ω	0.001~65.535	Depend on model	○

Function code	Name	Detailed	Setting range	Default	Modify
	motor 1				
P02.08	Leakage inductance of asynchronous motor 1	0.1~6553.5mH	0.1~6553.5	Depend on model	○
P02.09	Mutual inductance of asynchronous motor 1	0.1~6553.5mH	0.1~6553.5	Depend on model	○
P02.10	Non-load current of asynchronous motor 1	0.1~6553.5A	0.1~6553.5	Depend on model	○
P02.15	Rated power of synchronous motor 1	0.1~3000.0kW	0.1~3000.0	Depend on model	◎
P02.16	Rated frequency of synchronous motor 1	0.01Hz~P00.03(Max. frequency)	0.01~P00.03	50.00Hz	◎
P02.17	Number of poles pairs for synchronous motor 1	1~100	1~100	2	◎
P02.18	Rated voltage of synchronous motor 1	0~1200V	0~1200	Depend on model	◎
P02.19	Rated current of synchronous motor 1	0.8~6000.0A	0.8~6000.0	Depend on model	◎
P03.11	Torque	0: Torque control is invalid	0~13	0	○

Function code	Name	Detailed	Setting range	Default	Modify
	setting	1:Keypad setting torque(P03.12) 2:Analog AI1 setting torque 3:Analog AI2 setting torque 4:Analog AI3 setting torque 5:Pulse frequency HDI setting torque 6:Multi-step torque setting 7:MODBUS communication setting torque 8:PROFIBUS\CANopen communication setting torque 9:Ethernet communication setting torque 10: AI1+AI2 11: AI1+AI3 12: AI2+AI3 13: Reserved			
P03.12	Keypad setting torque	-300.0%~300.0%(rated current of the motor)	-300.0~300.0	50.0%	○
P03.13	Torque reference filter time	0.000~10.000s	0.000~10.000s	0.100s	○
P03.14	Upper frequency of forward rotation in vector control	0:Keypad (P03.16) 1: AI1 2: AI2 3: AI3 4:Pulse frequency HDI setting upper-limit frequency 5:Multi-step setting upper-limit frequency 6:MODBUS communication setting upper-limit frequency 7:PROFIBUS/CANOPEN communication setting upper-limit frequency	0~9	0	○

Function code	Name	Detailed	Setting range	Default	Modify
		8:Ethernet communication setting upper-limit frequency 9: Reserved			
P03.15	Upper frequency of reverse rotation in vector control	0:Keypad (P03.17) 1: AI1 2: AI2 3: AI3 4:Pulse frequency HDI setting upper-limit frequency 5:Multi-step setting upper-limit frequency 6:MODBUS communication setting upper-limit frequency 7:PROFIBUS/CANOPEN communication setting upper-limit frequency 8:Ethernet communication setting upper-limit frequency 9: Reserved	0~9	0	○
P03.16	Keypad setting for upper frequency of forward rotation	0.00Hz~P00.03	0.00~P00.03	50.00 Hz	○
P03.17	Keypad setting for upper frequency of reverse rotation	0.00 Hz~P00.03	0.00~P00.03	50.00Hz	○
P03.18	Upper electromotion torque	0:Keypad setting upper-limit frequency(P03.20) 1: AI1	0~8	0	○

Function code	Name	Detailed	Setting range	Default	Modify
	source	2: AI2 3: AI3 4: HDI 5:MODBUS communication 6:PROFIBUS/CANOPEN communication 7:Ethernet communication 8: Reserved			
P03.19	Upper braking torque source	0:Keypad setting upper-limit frequency(P03.21) 1: AI1 2: AI2 3: AI3 4: HDI 5:MODBUS communication 6:PROFIBUS/CANOPEN communication 7:Ethernet communication 8: Reserved	0~8	0	○
P03.20	Keypad setting of electromotion torque	0.0~300.0%(motor rated current)	0.0~300.0	180.0%	○
P03.21	Keypad setting of braking torque	0.0~300.0%(motor rated current)	0.0~300.0	180.0%	○
P03.22	Weakening coefficient in the constant power range	0.01~2.00 (the bigger the value is, the smaller the pre-magnetic and bigger the exciting current)	0.01~2.00	1.00	○
P03.23	Weak point in the constant power range	10%~50%	10~50	10%	○

Function code	Name	Detailed	Setting range	Default	Modify
P03.24	Max. voltage limit	0.0~120.0%	0.0~120.0	100.0%	○
P03.25	Pre-excitation time	0.000~10.000s	0.000~10.000s	0.0s	○
P03.26	Weak proportional gain	0~8000	0~8000	1200	○
P03.27	Integral gain of the weak magnetic	0~8000	0~8000	1200	○
P03.28	Control mode of the weak magnetic	0~2	0~2	0	○
P03.29	Torque control mode	Ones: Torque command 0: Torque reference 1: Torque current reference Tens: Reserved	0~0x1	0x01	○
P05.32	Lower limit of AI1	0.00V~P05.34	0.00~P05.34	0.00V	○
P05.37	Lower limit of AI2	0.00V~P05.39	0.00V~P05.30	0.00V	○
P05.50	Lower limit frequency of HDI	0.00 kHz ~ P05.52	0.00~ P05.52	0.00kHz	○
P07.05	Parameters state 1	0x0000~0xFFFF BIT0: running linear speed BIT1:setting linear speed BIT2:current coil diameter BIT3: running frequency (Hz on) BIT4: set frequency(Hz flickering) BIT5: bus voltage (Hz on) BIT6: output voltage(V on) BIT7: output current(A on)	0~0xFFFF	0x0FFF	○

Function code	Name	Detailed	Setting range	Default	Modify
		Others are the samer as Goodrive300.			
P07.07	Parameters for stopping state	0x0000~0xFFFF BIT0: setting linear speed (linear speed flicking) BIT1: current coil diameter BIT2: running frequency (Hz on, frequency flicking) BIT3: bus voltage (Hz on) BIT4: input terminals state BIT5: output terminals state BIT6: PID reference (% flickering) BIT7: PID feedback value(% on) Others are the same as Goodrive300.	0000~0xFFFF	0x00FF	○
P07.27	Current fault type	37: ENC1O 38: ENC1D 39: ENC1Z 43: OT	0~43	0	●
P07.28	Previous fault type		0~43	0	●
P07.29	Previous 2 fault type		0~43	0	●
P07.30	Previous 3 fault type		0~43	0	●
P07.31	Previous 4 fault type		0~43	0	●
P07.32	Previous 5 fault type		0~43	0	●
P08.15	Bus voltage modulator gain	0.0~1000.0	0.0~1000.0	12.0	○
P08.16	Speed loop differential gain	0.00~10.00s	0.00~10.00	0.00s	○

Function code	Name	Detailed	Setting range	Default	Modify
P08.19	Scale coefficient of high frequency current loop(SM)	0~20000	0~20000	1000	○
P08.20	Integral coefficient of high frequency current loop(SM)	0~20000	0~20000	1000	○
P08.21	High-frequency switching point of the current loop(SM)	0.0~100.0% (relative to the Max. frequency)	0~100.0%	100.0%	○
P08.40	PWM selection	LED ones: PWM mode selection 0: PWM mode 1, three-phase modulation and two-modulation 1: PWM mode 2, three-phase modulation LED tens: low-speed carrier frequency limit mode 0: low-speed with carrier frequency decreasing 1: low-speed without carrier frequency decreasing	0x00~0x11	0x01	◎
P08.41	Overmodulation	Ones: Overmodulation selection 0: Invalid 1: Valid Tens:Heavy overcommission 0~9	0x00~0x91	0x01	○
P08.42	Keypad data	LED ones:frequency enable	0x0000~0x1223	0x1103	○

Function code	Name	Detailed	Setting range	Default	Modify
	control	selection 0:Both ∧/∨ keys and digital potentiometer adjustments are valid 1:Only ∧/∨ keys adjustment is valid 2:Only digital potentiometer adjustments is valid 3:Neither ∧/∨ keys nor digital potentiometer adjustments are valid LED tens: frequency control selection 0:Only valid when P00.06=0 or P00.07=0 1:Valid for all frequency setting manner 2:Invalid for multi-step speed when multi-step speed has the priority LED hundreds: action selection during stopping 0:Setting is valid 1:Valid during running, cleared after stopping 2:Valid during running, cleared after receiving the stop command LED thousands: ∧/∨ keys and digital potentiometer integral function 0:The integral function is valid 1:The integral function is invalid			
P11.03	Overvoltage	0:Disable	0~1	0	○

Function code	Name	Detailed	Setting range	Default	Modify
	stall protection	1:Enable			
P11.04	Voltage protection of overvoltage stall	120~150% (standard bus voltage) (380V)	120~150%	140%	○
		120~150% (standard bus voltage) (220V)	120~150%	120%	
P11.14	Detection value of speed deviation	0.0~50.0%	0.0~50.0	10.0%	○
P11.15	Detection time of Speed deviation	0.0~10.0s (No protection at 0.0s)	0.0~10.0	0.5s	○
P11.16	Automatic frequency-decreasing at voltage drop	0:Invalid 1:Valid; ensure rated output torque when voltage drop	0~1	0	○
P09 group PID control					
P09.00	PID reference source	0:Keypad (P09.01) 1: AI1 2: AI2 3: AI3 4: HDI 5:Multi-step speed set 6:MODBUS communication set 7:PROFIBUS/CANopen communication set 8:Ethernet communication set 9:Reserved	0~9	0	○
P09.01	Keypad PID preset	-100.0%~100.0%	-100.0~100.0	0.0%	○

Function code	Name	Detailed	Setting range	Default	Modify
P09.02	PID feedback source	0: AI1 1: AI2 2: AI3 3: HDI 4:MODBUS communication feedback 5:PROFIBUS/CANopen communication feedback 6:Ethernet communication feedback 7:Reserved	0~7	0	○
P09.03	PID output feature	0: PID output is positive : PID output is negative	0~1	0	○
P09.04	Proportional gain (Kp)	0.000~30.000	0.000~30.000	0.300	○
P09.05	Integral time(Ti)	0.000~30.000s	0.000~30.000	5.000s	○
P09.06	Differential time(Td)	0.000~10.000s	0.000~10.000	0.000s	○
P09.07	Sampling cycle(T)	0.001~30.000s	0.001~30.000	0.010s	○
P09.08	PID control deviation limit	0.0~100.0%	0.0~100.0	0.0%	○
P09.09	Output upper limit of PID	P09.10~100.0% (Max. frequency or voltage)	P09.10~100.0	100.0%	○
P09.10	Output lower limit of PID	-100.0%~P09.09 (Max. frequency or voltage)	-100.0~P09.09	-50.0%	○
P09.11	Detection value of feedback offline	0.0~100.0%	0.0~100.0%	0.0%	○
P09.12	Detection time of feedback	0.0~3600.0s	0.0~3600.0	1.0s	○

Function code	Name	Detailed	Setting range	Default	Modify
	offline				
P09.13	PID adjustment	0x00~0x11 LED ones: 0: Keep on integral adjustment when the frequency achieves the upper and low limit 1: Stop integral adjustment when the frequency achieves the upper and low limit LED hundreds: 0:The same as the setting direction 1:Reverse with the setting direction	0x00~0x11	0x01	○
P09.14	Deviation limit of PID input	0.0~200.0%	0.0~200.0%	200.0%	○
P09.15	ACC/DEC time of PID command	0.0~1000.0s	0.0~1000.0s	0.0s	○
P09.16	Filter time of PID output	0.000~10.000s	0.000~10.000s	0.000s	○
P18 group Control state of the close loop					
P18.00	Actual frequency detected by the encoder	-999.9~999.9	-999.9~999.9	0.0Hz	●
P18.01	Position counting of the encoder	0~65535	0~65535	0	●
P18.02	Z pulse counting of the encoder	0~65535	0~65535	0	●
P18.11	Reverse of Z pulse	0:Forward 1:Reverse	0~1	0	●

Function code	Name	Detailed	Setting range	Default	Modify
P18.12	Angle Z pulse	0~359.99	0~359.99	0	●
P18.13	Fault times of Z pulse	0~65535	0~65535	0	●
P18.14	High bit of Pg1 counting	0~65535	0~65535	0	●
P18.15	Low bit of Pg1 counting	0~65535	0~65535	0	●
P18.20	Rotary counting	0~65535	0~65535	0	●
P18.21	Rotary angle	0~359.99	0~359.99	0	●
P18.22	Pole angle	0~359.99	0~359.99	0	●
P20 group Encoder					
P20.00	Encoder type	0: Incremental encoder 1: (Reserved) 2: Resolver encoder 3: Reserved	0~3	0	◎
P20.01	Pulse number	0~60000	0~60000	1024	◎
P20.02	Encoder direction	Ones: AB direction 0: Forward 1: Reverse Tens:Z pulse direction 0: Non-reverse 1: Reverse	0x00~0x11	0x00	◎
P20.03	Offline detection time	0.0~10.0s	0.1~100.0	0.5s	○
P20.04	Encoder reverse fault detection time	0.0~100.0s	0.1~100.0	0.8s	○
P20.05	Filter times	Ones: Low speed Tens: High speed	0x00~0x99	0x33	○
P20.06	Speed ratio of motor and encoder	0~65.535	0~65.535	1.000	○
P20.07	Control parameters of	Bit0: =0: z pulse correction =1: no z pulse correction	0x0000~0xFFFF	0x0003	○

Function code	Name	Detailed	Setting range	Default	Modify
	the SM	Bit1: Position signal correction Bit2: SVC speed detection enable Bit4: Z pulse capture options Bit12: Z pulse arrival signal clearance after stop			
P20.08	Offline detection enabling of Z pulse	0: Invalid 1: Enabling detection	0~1	0	○
P20.09	Initial angle of Z pulse	0~359.99	0~359.99	0	○
P20.10	Pole initial angle	0~359.99	0~359.99	0	○
P20.11	Autotuning of pole initial angle	0:No operation 1:Rotating autotuning 2:Autotuning with load (may rotate)	0~2	0	◎

3.2 Function codes of tension control

Function code	Name	Detailed	Setting range	Default	Modify
P26 group Tension control 1					
P26.00	Tension control mode	0:Invalid 1:Speed control 2:Torque control	0~2	0	◎
P26.01	Wrap up and wrap off	0: Wrap up 1: Wrap off	0~1	0	○
P26.02	Linear speed input	0: Keypad 1: AI1 2: AI2 3: AI3 4: HDI 5:MODBUS	0~6	0	◎

Function code	Name	Detailed	Setting range	Default	Modify
		communication (0.0~100.0%)			
P26.03	Linear speed input reference	0.0~100.0%(Max. linear speed)	0.0~100.0	20.0%	○
P26.04	Max. linear speed	0.0~6000.0 m/min	0.0~6000.0	1000.0 m/min	○
P26.05	Mini linear speed counted by the coil diameter	0.0~100.0%(Max. linear speed)	0.0~100.0	10.0 %	○
P26.06	Material frapping	0x00~0x11 Ones: torque control 0: Material frapping when starting 1: No material frapping when starting Tens: warp off 0:Reverse frapping when starting 1: No reverse frapping when starting	0x00~0x11	0x00	○
P26.07	Gear ratio	0.01~300.00	0.01~300.00	1.00	○
P26.08	The initial coil diameter 1	0.0~5000.0 mm	0.0~5000.0	100.1 mm	○
P26.09	The initial coil diameter 2	0.0~5000.0 mm	0.0~5000.0	100.2 mm	○
P26.10	The initial coil diameter 3	0.0~5000.0 mm	0.0~5000.0	100.3 mm	○
P26.11	Mini diameter of blank coil	0.0~5000.0 mm	0.0~5000.0	50.0 mm	○
P26.12	Max. coil diameter	0.0~5000.0 mm	0.0~5000.0	1000.0 mm	○
P26.13	Counting of coil diameter	0:No counting 1:Calculation method of linear speed 2:AI1 measurement	0~9	0	◎

Function code	Name	Detailed	Setting range	Default	Modify
		3:AI2 measurement 4:AI3 measurement 5:Thickness calculation with materials 6: Materials thickness calculation 7: Thickness calculation with materials 2 8: Materials thickness calculation 2 9:Actual measurement			
P26.14	Current coil diameter	0.0~5000.0 mm	0.0~5000.0	0.0 mm	◎
P26.15	Filter time	0.000~60.000s	0.000~60.000	1.000s	○
P26.16	Coil diameter setting arrived	0.0~100.0% (Max. coil diameter)	0.0~100.0	80.0%	○
P26.17	Relative settings	0x00~0x11 Ones: stopping 0:keep current coil diameter 1:restore to the initial coil diameter Tens: power loss during running 0: keep current coil diameter 1: restore to the initial coil diameter	0x00~0x11	0x00	○
P26.18	Material thickness	0.001~65.535 mm	0.001~65.535	0.010 mm	○
P26.19	Coil number of each layer	1~10000	1~10000	1	◎
P26.20	Pulses number of each circle	1~60	1~60	1	◎
P26.21	Circle record	0:ON/OFF terminal input 1:PG card input	0~1	0	◎
P26.22	Proportional gain 2	0.000~30.000	0.000~30.000	0.500	○

Function code	Name	Detailed	Setting range	Default	Modify
P26.23	Integral time 2	0.000~30.000s	0.000~30.000	8.000s	○
P26.24	Differential time 2	0.000~10.000s	0.000~10.000	0.000s	○
P26.25	Integral separation thresholds	0.0~200.0%	0.0~200.0	200.0%	○
P26.26	Differential filter times	0~65535	0~65535	0	○
P26.27	Differential effect limiting value	0.0~100.0%	0.0~100.0	0.0%	○
P26.28	PID parameters adjusting basis	0:Only select the first group 1:Adjust to the coil diameter 2: Adjust to the running frequency 3: Adjust to the linear speed	0~3	0	○
P26.29	Relative reference of PID adjusting frequency	0:Relative to the maximum output frequency 1: Relative to the current running frequency	0~1	0	○
P26.30	Input source of measured linear speed	0:No input 1: AI1 2: AI2 3: AI3 4: HDI 5:MODBUS communication (0x2011) 6:PROFIBUS/CANopen communication (0.0~100.0%)	0~6	0	○
P26.31	Counting delay time of coil diameter	0.0~100.0s	0.0~100.0	5.0s	○
P26.32	Minimum frequency of coil diameter counting	0.00~50.00Hz	0.00~50.00	5.00Hz	○

Function code	Name	Detailed	Setting range	Default	Modify
P26.33	Reverser tighten of torque control	0:Enable 1:Disabled	0~1	0	○
P26.34	Stopping mode at zero speed	0:Coast to stop 1:Decelerate to stop	0~1	0	○
P26.35	Reserved	0~65535	0~65535	0	○
P26.36	Reserved	0~65535	0~65535	0	○
P26.37	Coil diameter reset	0x00~0x11 Ones: for all calculation 0:Only for coil diameter of stopping reset 1:For coil diameter reset in running Tens:For calculation of thickness 0:Reset when not arrive P26.16 1: Reset after arrive P26.16	0x00~0x11	0x00	○
P26.38	Reverse limit of Coil diameter counting	0: No limit 1: Limit the reverse direction changing	0~1	0	○
P26.39	Changing limit of coil diameter	0:No limit 1:Limit according to the operation frequency	0~1	0	○
P26.40	Max. material thickness	0.01~100.00 mm	0.01~100.00	0.10 mm	○
P26.41	ACC time of linear speed	0.00~600.00s	0.00~600.00	0.00s	○
P26.42	DEC time of linear speed	0.00~600.00s	0.00~600.00	0.00s	○
P27 group Tension control 2					
P27.00	Tension setting	0:Keypad 1: AI1 2: AI2 3: AI3	0~6	0	◎

Function code	Name	Detailed	Setting range	Default	Modify
		4: HDI 5:MODBUS communication (0x2010) 6:PROFIBUS/CANopen communication (0.0~100.0%)			
P27.01	Keypad setting	0.0~100.0% (Max. tension)	0.0~100.0	10.0%	○
P27.02	Max. tension	0~30000N	0~30000	3000N	○
P27.03	Upper frequency of vector control	0: P03.14 and P03.15 1:Linear speed setting the forward range 2: Linear speed setting the reverse range 3: Linear speed setting the forward/ reverse range	0~3	0	○
P27.04	Deviation value of upper operation frequency in tension control	0.0~100.0% (Max. frequency)	0.0~100.0	5.0%	○
P27.05	Zero-speed tension deviation	0.0~200.0% (Max. tension)	0.0~200.0	0.0%	○
P27.06	Lower speed after zero-speed deviation	0.0~100.0% (Max. frequency)	0.0~100.0	3.0%	○
P27.07	Compensation correction of tension conicity	0.0~5000.0 mm	0.0~5000.0	0.0mm	○
P27.08	Tension conicity coefficient source	0:P27.09 1: AI1 2: AI2 3: AI3	0~4	0	◎

Function code	Name	Detailed	Setting range	Default	Modify
		4: HDI			
P27.09	Keypad setting of tension conicity	0.0~100.0%	0.0~100.0	0.0%	○
P27.10	Reserved	0~65535	0~65535	0	○
P27.11	Reserved	0~65535	0~65535	0	○
P27.12	Inertia compensation enabling	0: Disabled 1: Enabled	0~1	0	○
P27.13	Mechanical inertia identification enabling	0: Disabled 1: Enabled	0~1	0	◎
P27.14	Keyboard setting of identification torque	-50.0%~50.0% (Relative to rated torque motor)	-50.0~50.0	20.0%	◎
P27.15	Mechanical inertia of identification system	0.000~30.000kg.m^2	0.000~30.000	0.000 kg.m^2	○
P27.16	Material density	0~30000kg/m^3	0~30000	0 kg/m^3	○
P27.17	Reel width	0.000~60.000m	0.000~60.000	0.000m	○
P27.18	Compensation coefficient of rotating inertia	0.0~100.0%	0.0~100.0	50.0%	○
P27.19	Upper compensation inertia of rotating inertia	0.0~50.0%	0.0~50.0	5.0%	○
P27.20	Compensation coefficient	0.0~100.0% (Relative to rated torque motor)	0.0~100.0	0.0%	○

Function code	Name	Detailed	Setting range	Default	Modify
	of static friction torque				
P27.21	Compensation coefficient of sliding friction torque	0.0~100.0% (Relative to rated torque motor)	0.0~100.0	0.0%	○
P27.22	High-speed torque compensation	0:No compensation 1:Frequency 2:Linear speed	0~2	0	○
P27.23	Corresponding upper torque of high-speed torque compensation	0.0~100.0% P27.22=1, relative to Max. output frequency; P27.22=2，relative to Max. linear speed	0.0~100.0	100.0%	○
P27.24	High-speed torque compensation coefficient	0.0~50.0% (Relative to rated torque motor)	0.0~50.0	0.0%	○
P27.25	Speed gain of pre-drive	0.0~200.0%	0.0~200.0	100.0%	○
P27.26	Torque limit of pre-drive	0:P03.20 1:Limit according to P27.27	0~1	0	◎
P27.27	Torque limit of pre-drive	0.0~200.0%	0.0~200.0	100.0%	○
P27.28	Coil diameter counting delay after pre-drive	0.0~100.0s	0.0~100.0	5.0s	○
P27.29	Material-lack detection mode	0:No detection 1:Detect to the digital 2: Coil diameter counting 3: Position feedback deviation	0~1	0	◎
P27.30	Starting delay of material-lack	0.00~200.00s	0.00~200.00	10.00s	○

Function code	Name	Detailed	Setting range	Default	Modify
	detection				
P27.31	Lower frequency of material-lack detection	0.00~300.00Hz	0.00~300.00	10.00Hz	○
P27.32	Deviation range of material-lack detection	0.1~50.0% (Max. coil diameter)	0.1~50.0	10.0%	○
P27.33	Delay time of material-lack detection	0.1~60.0s	0.1~60.0	1.0s	○
P27.34	Material lack processing	0x00~0x12 Ones: stopping mode 0: Decelerate to stop 1: Coast to stop 2:E-stop Tens: alarm mode 0:No alarm, stop at the mode designated 1:Alarm and coast to stop	0x00~0x12	0x00	○
P27.35	Stopping braking frequency	0.00~300.00Hz	0.00~300.00	1.50Hz	○
P27.36	Stopping braking time	0.0~600.0s	0.0~600.0	0.0s	○
P27.37	Material circles on the coil	-100~32767 (0x1b25)	-100~32767	0	◎
P27.38	Material length on the coil	0~65535m (0x1b26)	0~65535	0m	◎
P27.39	Upper limit of ACC tension	0.0~100.0% (Max. tension)	0.0~100.0	10.0%	○
P27.40	Upper limit of	0.0~100.0%	0.0~100.0	10.0%	○

Function code	Name	Detailed	Setting range	Default	Modify
	DEC tension	(Max. tension)			
P27.41	Chang ratio of ACC/DEC tension	0.0~100.0%/s (Max. tension)	0.0~100.0	0.0%/s	○
P27.42	Reserved	0~65535	0~65535	0	○
P05 Input terminals					
P05.01	S1 terminal function	32:Length reset 56:E-stop 57:Coil diameter reset 58:Wrap up/off switching 59:Initial coil diameter 1 60:Initial coil diameter 2 61:Pre-drive 62:Coil diameter counting stop 63:Signal of material-lack clear 64:Manual-braking trigging 65:Material-lack trigging 66: Circle-report input 67: Control mode switching 68:Motor overtemperature fault input 69:Counting reset 70~79:Reserved	0~79	1	◎
P05.02	S2 terminal function		0~79	4	◎
P05.03	S3 terminal function		0~79	7	◎
P05.04	S4 terminal function		0~79	0	◎
P05.05	S5 terminal function		0~79	0	◎
P05.06	S6 terminal function		0~79	0	◎
P05.07	S7 terminal function		0~79	0	◎
P05.08	S8 terminal function		0~79	0	◎
P05.09	HDI terminal function		0~79	0	◎
P06 Output terminals					
P06.01	Y output	34: Setting coil diameter arrived 35: Max. coil diameter arrived 36: Blank coil diameter arrived 37: Alarm of material-lack output 38: Braking output 39~40: Reserved	0~40	0	○
P06.02	HDO output		0~40	0	○
P06.03	RO1 output		0~40	1	○
P06.04	RO2 output		0~40	5	○
P06.14	AO1 output	27: Current tension 28: Current linear speed 29: Current coil diameter 30: Wrap up/off	0~32	0	○
P06.15	AO2 output		0~32	0	○
P06.16	HDO output		0~32	0	○

Function code	Name	Detailed	Setting range	Default	Modify
		length(0.0~100.0% of the setting length reserved) 31~32: Reserved			
P19 State view					
P19.00	Actual wrap up/off mode	0: Wrap up 1: Wrap off	0~1	0	●
P19.01	Initial coil diameter	0.0~5000.0 mm Wrap up: the initial coil diameter is the diameter of blank coil; Wrap off: the initial coil diameter is the diameter of full coil	0.0~5000.0	0.0 mm	●
P19.02	Actual diameter of blank coil	0.0~5000.0 mm	0.0~5000.0	0.0 mm	●
P19.03	Reserved	0.0~5000.0 mm	0.0~5000.0	0.0 mm	●
P19.04	Actual control mode	0:Tension control invalid 1:Close-loop speed control 2:Open-loop tension and torque control	0~2	0	●
P19.05	Main reference frequency	0.00~600.00Hz	0.00~600.00	0.00Hz	●
P19.06	PID output frequency	-99.99~99.99Hz	-99.99~99.99	0.00Hz	●
P19.07	Material circles on the coil	-100~32767	-100~32767	0	●
P19.08	Material length on the coil	0~65535m	0~65535	0m	●
P19.09	Current linear speed	0.0~6000.0m/min	0.0~6000.0	0.0 m/min	●
P19.10	Current coil diameter	0.0~5000.0 mm	0.0~5000.0	0.0 mm	●
P19.11	Actual	0.000~30.000	0.000~30.000	0.000	●

Function code	Name	Detailed	Setting range	Default	Modify
	propositional gain				
P19.12	Actual integral time	0.000~30.000s	0.000~30.000	0.000s	●
P19.13	Setting linear speed	0.0~6000.0m/min	0.0~6000.0	0.0 m/min	●
P19.14	Setting tension	0~30000N	0~30000	0N	●
P19.15	Tension conicity coefficient	0.0~100.0%	0.0~100.0	0.0%	●
P19.16	Actual tension	0~30000N	0~30000	0N	●
P19.17	System rotating inertia	0~655.35 $kg.m^2$	0~655.35	0.00 $kg.m^2$	●
P19.18	Frequency changing in inertia compensation interval	-99.99~327.67Hz	-99.99~327.67	0.00Hz	●
P19.19	Basic torque reference	-300.0~300.0% (Relative to rated torque motor)	-300.0~300.0	0.0%	●
P19.20	Friction compensation torque	-300.0~300.0% (Relative to rated torque motor)	-300.0~300.0	0.0%	●
P19.21	Torque compensation of system rotating inertia	-300.0~300.0% (Relative to rated torque motor)	-300.0~300.0	0.0%	●
P19.22	Torque compensation during ACC/DEC	-300.0~300.0% (Relative to rated torque motor)	-300.0~300.0	0.0%	●
P19.23	Reference value after torque	-300.0~300.0% (Relative to rated torque motor)	-300.0~300.0	0.0%	●

Function code	Name	Detailed	Setting range	Default	Modify
	compensation				
P19.24	Max. linear speed setting	0.0~6000.0m/min	0.0~6000.0	0.0m/min	●
P19.25	Length increasing	0.0~6553.5m	0~6553.5	0.0m	●
P19.26	Change ratio of coil diameter	0.0~655.35mm/s	0~655.35	0.00mm/s	●
P19.27	ACC/DEC mark	0~2 0:Constant speed; 1: DEC; 2:ACC	0~2	0	●

4 Detailed description

4.1 Description of relevant function codes

Function code	Name	Detailed	Default	Modify
P01.25	DEC time of the E-stop	0.0~60.0s	2.0s	○

DEC time during E-stop (the terminal is set to 56).

Function code	Name	Detailed	Default	Modify
P03.22	Weakening coefficient in the constant power range	0.01~2.00 (the bigger the value is, the smaller the pre-magnetic and bigger the exciting current)	1.00	○
P03.23	Weak point in the constant power range	10%~50%	10%	○
P03.24	Max. voltage limit	0.0~120.0%	100.0%	○
P03.26	Weak proportional gain	0~8000	1200	○
P03.27	Integral gain of the weak magnetic	0~8000	1200	○
P03.28	Control mode of the weak magnetic	0~2	0	○
P03.29	Torque control mode	Ones: Torque command 0: Torque reference 1: Torque current reference Tens: Reserved	0~0x01	○

P03.22 is the weakening coefficient, the bigger the parameter is, and the more obvious the effect is. The parameter is valid when P03.26 is 0.

P03.24 can not exceed the maximum output voltage of the inverter; it is the percentage of the rated

voltage of the motor.

P03.28 is the control mode of the weak magnetic, valid when P03.26 is not 0 and generally no need to modify.

P03.29 is torque control mode, can be adjusted according to actual working.

Relative to P03.26 and P03.27.

Function code	Name	Detailed	Default	Modify
P08.15	Bus voltage modulator gain	0.0~1000.0	12.0	○

The modulator gain when overvoltage stall is only valid in vector control mode. Increasing the value may speed up the adjustment response to avoid overvoltage fault.

Function code	Name	Detailed	Default	Modify
P08.16	Speed loop differential gain	0.00~10.00s	0.00s	○

Speed loop differential gain can raise the damp of speed regulator. No need to set.

Function code	Name	Detailed	Default	Modify
P08.19	Scale coefficient of high frequency current loop(SM)	0~20000	1000	○
P08.20	Integral coefficient of high frequency current loop(SM)	0~20000	1000	○
P08.21	High-frequency switching point of the current loop(SM)	0.0~100.0%(relative to the Max. frequency)	100.0%	○

When P0.00=3, if the value is less than P08.21, the parameter of current loop PI is P03.09 and P03.10, if the value is more than P08.21, the parameter of current loop PI is P08.19 and P08.20.

Function code	Name	Detailed	Default	Modify
P11.14	Detection value of speed deviation	0.0~50.0%	10.0%	○
P11.15	Detection time of Speed deviation	0.0~10.0s (No speed deviation protection when P11.15 is set to 0.0)	0.5s	○

No speed deviation protection when P11.15 is set to 0.0.

Function code	Name	Detailed	Default	Modify
P18.00	Actual frequency detected by the encoder	-999.9~999.9	0.0Hz	●
P18.01	Position counting of the encoder	0~65535	0	●
P18.02	Z pulse counting of the encoder	0~65535	0	●

P18.00 is the actual frequency detected. The value is positive if the motor rotates forward, and the value will be negative if the motor rotates reverse.

P18.01 is the counting value of the encoder, 4 times of the frequency.

P18.02 is the corresponding counting value of Z pulse.

Function code	Name	Detailed	Default	Modify
P18.14	High bit of Pg1 counting	0~65535	0	0
P18.15	Low bit of Pg1 counting	0~65535	0	0

Encoder pulse counting and the value will be recorded continuously if the power is on.

Function code	Name	Detailed	Default	Modify
P18.20	Rotary counting	0~65535	0.00	●
P18.21	Rotary angle	0~359.99	0.00	●

P18.20, rotary counting, 0~1024.

P18.21 is used to read the pole angle according to the encoder.

Function code	Name	Detailed	Default	Modify
P18.22	Pole angle	0~359.99	0.00	●

Current pole position.

Function code	Name	Detailed	Default	Modify
P20.01	Pulse number	0~60000	1024	◎

The pulse number when the encoder rotates a circle.

Function code	Name	Detailed	Default	Modify
P20.02	Encoder direction	Ones: AB direction 0: Forward 1: Reverse Tens:Z pulse direction 0: Non-reverse 1: Reverse	0x00	◎

Ones: encoder AB direction. When it reports ENC1O or ENC1D, adjust the function code to change the direction of AB pulse. There is no need to adjust AB pulse wiring of the encoder.

Tens: direction of the Z pulse, when using the spindle stopping function, if the direction of forward and reverse stopping need to be the same, it is necessary to adjust the function code to ensure the counting value of P18.02 is the same in the forward and reverse rotation. There is no need to modify the parameter in other modes.

Function code	Name	Detailed	Default	Modify
P20.03	Offline detection time	0.1~100.0s	0.5s	○

Detection time of the encoder offline.

Function code	Name	Detailed	Default	Modify
P20.04	Encoder reverse fault detection time	0.1~100.0s	0.8s	○

Detection time of the encoder reverse fault.

Function code	Name	Detailed	Default	Modify
P20.05	Filter times	Ones: Low speed Tens: High speed	0x33	○

Ones: filter times at low speed; corresponds to $2^{(0\sim9)}$*125us.

Tens: filter times at high speed; corresponds to $2^{(0\sim9)}$*125us.

Function code	Name	Detailed	Default	Modify
P20.06	Speed ratio of motor and encoder	0~65.535	1.000	○

It is necessary to set the parameter when the encoder is not installed on the motor shaft and the speed ratio is not 1.

Function code	Name	Detailed	Default	Modify
P20.07	Control parameters of the SM	Bit0: =0: z pulse correction =1: no z pulse correction Bit1: Position signal correction Bit2: SVC speed detection enable Bit4: Z pulse capture options Bit12: Z pulse arrival signal clearance after stop	0003	○

Generally no need to adjust.

Function code	Name	Detailed	Default	Modify
P20.08	Offline detection enabling of Z pulse	0: Invalid 1: Enabling detection	0	○

The fault is ENC1Z. When the synchronous motor applies incremental encoder, it is necessary to enable Z pulse detection to avoid control loss caused by Z pulse.

Function code	Name	Detailed	Default	Modify
P20.09	Initial angle of Z pulse	0~359.99	0.00	○

It is the relative electrical angle of encoder Z pulse to the motor pole position.

Function code	Name	Detailed	Default	Modify
P20.10	Pole initial angle	0~359.99	0.00	○

Encoder position and relative electrical angle of encoder position to motor pole position.

Function code	Name	Detailed	Default	Modify
P20.11	Autotuning of pole initial angle	0:No operation 1:Rotating autotuning 2:Autotuning with load (may rotate)	0	◎

After setting it as 1 or 2, the keypad will display " - run - ", and then press " - run - " button to begin the autotuning of poles initial angle until the keyboard display " -End -". The identified the pole initial angle is stored in P20.09 and P20.10.

The obtained initial angle in rotating autotunging is more correct and then it is necessary to de-couple it from the motor.

4.2 Tension control functions 1

Function code	Name	Detailed	Default	Modify
P26.00	Tension control mode	0:Invalid 1:Speed control 2:Torque control	0	◎

0: Invalid, general Goodrive35 functions is available.

1: Speed control

If tension test feedback signal (such as tension sensor or swinging rod) is available, the inverter will control the output frequency through PID tension closed-loop regulation to set the tension and keep the linear speed stable. Its control mode is SVPWM, the speed sensorless vector control or closed-loop vector control, for precise control tension, it is suggested to operate in closed loop vector control mode.

If tension test feedback signal is not available, but in the winding control mode, if stable linear speed is required, following ways are available:

(1) Under the condition of motor with encoder, select the closed-loop vector control mode, combined with the thickness of the material (P26.18), and set P26.21 = 1, P26.13 = 5 or 6 to calculate the coil diameter, control the motor output frequency under different diameters, and keep linear speed constant.

(2) Under the condition of motor without encoder, combined with the thickness of the material (P26.18), and set P26.13 = 7 or 8 to calculate the coil diameter, control the motor output frequency under different diameters, and keep linear speed constant.

(3) If the linear speed sensor is installed outside, through the choice of thickness calculation function

of coil diameter (P26.13 = 9), to calculate the coil diameter, then control the operation frequency through the setting linear speed and current coil diameter and keep linear speed constant.

2: Torque control

Without tension testing feedback signal, the inverter can control the tension on materials through the output torque. It is recommended to use in close loop vector control mode.

Function code	Name	Detailed	Default	Modify
P26.01	Wrap up and wrap off	0: Wrap up 1: Wrap off	0	○

Set the winding mode, it can be used with switch terminals.

Set the motor forward as the direction of winding up, in the tension control mode, firstly confirm the motor rotation is correct and then modify P26.01 to be 1 or switch terminal to change the mode.

Function code	Name	Detailed	Default	Modify
P26.02	Linear speed input	0: Keypad 1: AI1 2: AI2 3: AI3 4: HDI 5:MODBUS communication(0x200F) 6:PROFIBUS/CANopen communication (0.0~100.0%)	0	◎

This function code is used to select the input mode and channel of linear speed, 100% corresponds to the maximum speed.

0: set by P26.03;

1, 2, and 3: is determined by the analog input voltage or current, 10V or 20mA corresponds to 100%;

4: is determined by external input pulse frequency, P05.52 corresponds to 100%;

5: given by the upper communication, the communication address is 0 x200f;

6: need the communication expansion card, given by the upper PC.

Function code	Name	Detailed	Default	Modify
P26.03	Linear speed input reference	0.0~100.0%	20.0%	○

When P26.02 is 0, set the linear speed by the function code.

Function code	Name	Detailed	Default	Modify
P26.04	Max. linear speed	0.0~6000.0m/min	1000.0 m/min	○

Its value should be run with the actual linear speed of the largest output frequency for the traction hosts.

Function code	Name	Detailed	Default	Modify
P26.05	Mini linear speed counted by the coil diameter	0.0~100.0%(Max. linear speed)	20.0 %	○

There are two requirements for calculation: 1: the current linear speed is greater than P26.05; 2: the start time is greater than the P26.31; 3: the current operating frequency is greater than P26.32.

When the detected current linear speed is less than the value, the inverter will stop counting. Setting the correct value can effectively prevent large deviation at low speed. In general, this value is set to more than 10% of the maximum speed.

Function code	Name	Detailed	Default	Modify
P26.06	Material frapping	0x00~0x11 Ones: torque control 0: Material frapping when starting 1: No material frapping when starting Tens: warp off 0:Reverse frapping when starting 1: No reverse frapping when starting	0x00	○

When the inverter starts as a slave and the host input linear speed is 0:

(1) In wrapping up, it is suitable for open loop tension torque control occasions, if P26.06 bits is 0, the materials will be tightened by the slave, the speed is limited by P27.04; if the bit is 1, there is no wrapping up and the speed is 0.

(2) In wrapping off, it is suitable for the tension feedback signal of speed control mode, if P26.06 bits are 0, the materials will be tightened by the wrapping off inverter, the speed is limited by P27.04; if the bit is 1, after the inverter starting, and the speed is 0.

Function code	Name	Detailed	Default	Modify
P26.07	Gear ratio	0.01~300.00	1.00	○

Mechanical gear ratio = motor speed/scroll speed, it is necessary to properly set mechanical gear ratio.

Function code	Name	Detailed	Default	Modify
P26.08	The initial coil diameter 1	0.0~5000.0 mm	100.1 mm	○
P26.09	The initial coil diameter 2	0.0~5000.0 mm	100. 2mm	○
P26.10	The initial coil diameter 3	0.0~5000.0 mm	100.3 mm	○
P26.11	Mini diameter of blank coil	0.0~5000.0 mm	100.0 mm	○
P26.12	Max. coil diameter	0.0~5000.0 mm	1000.0 mm	○

This parameter is used to set the coil diameter at full coil and blank coil. In wrapping up mode, initial coil diameter 1, 2, 3 are the blank coil diameter and in wrapping off mode, initial coil diameter 1, 2, 3 are the full coil diameter. Select the specifications of the scroll of empty volume through the terminals and P26.12 is the minimum coil diameter. If S1 and S2 terminal can be used to select the initial coil diameter, the configuration of S1 and S2 are as follows:

S1	S2	Initial coil diameter (wrapping up)	Initial coil diameter (wrapping off)
OFF	OFF	P26.11	P26.12
ON	OFF	P26.08	P26.08
OFF	ON	P26.09	P26.19
ON	ON	P26.10	P26.10

Select wrapping up mode in first power on. And the current coil diameter is the minimum blank diameter. If select wrapping off mode, it is necessary to reset the coil diameter and the current is equal to the largest coil diameter.

If the terminal is valid, the current initial diameter is the coil diameter; if it is invalid, the current coil diameter stays the same.

Function code	Name	Detailed	Default	Modify
P26.13	Counting of coil diameter	0:No counting 1:Calculation method of linear speed 2:AI1 measurement 3:AI2 measurement 4:AI3 measurement 5:Thickness calculation with materials 6: Materials thickness calculation 7: Thickness calculation with materials 2 8: Materials thickness calculation 2 9:Actual measurement	0	◎

0: No counting, suitable for control occasions without winding.

1: Count the coil diameter through the linear speed and output frequency.

2, 3, and 4: suitable for coil diameter detected by sensor detection, at the same time, set maximum P26.13 of coil diameter properly.

5, 6: the thickness calculation of coil diameter, the coil diameter can be counted through the sensors and the PG card. It is necessary to get the value of P26.18.

7, 8: count the coil diameter through the linear speed and the drum circumference; it needs to be used with P26.18 and P26.19.

9: suitable for installation of cable speed sensor, count the coil diameter through the actual speed and the current running frequency.

Function code	Name	Detailed	Default	Modify
P26.14	Current coil diameter	0.0~5000.0 mm	0.0 mm	○

Modify the value manually in stopping.

Function code	Name	Detailed	Default	Modify
P26.15	Filter time	0.000~60.000s	1.000s	○

Increasing the filtering time can prevent the calculation value change rapidly.

Function code	Name	Detailed	Default	Modify
P26.16	Coil diameter setting arrived	0.0~100.0% (Max. coil diameter)	80.0%	○

When the coil diameter arrives P26.16, output signal by selecting the relay; its function can be set with P26.37, to choose whether the reset is valid or not when the coil diameter is P26.16.

Function code	Name	Detailed	Default	Modify
P26.17	Relative settings	0x00~0x11 Ones: stopping 0:keep current coil diameter 1:restore to the initial coil diameter Tens: power loss during running 0: keep current coil diameter 1: restore to the initial coil diameter	0x00	○

This parameter is used to keep the coil diameter when stopping and power off.

0 x00: keep the current calculation values of coil diameter;

0 x01: if power off in the operation, keep the current coil diameter, if no power off in the operation, restore to the initial diameter in normal stopping;

0 x10: if power off in the operation, restore to the initial diameter, if no power off in the operation, and keep the current coil diameter in normal stopping;

0 x11: if power off in the operation, restore to the initial diameter, if no power off in the operation, restore to the initial diameter in normal stopping;

Function code	Name	Detailed	Default	Modify
P26.18	Material thickness	0.001~65.535 mm	0.010mm	○
P26.19	Coil number of each layer	1~10000	1	◎
P26.20	Pulses number of each circle	1~60	1	◎
P26.21	Circle record	0:ON/OFF terminal input 1:PG card input	0	◎

Used for the thickness calculation method of coil diameter, P26.19 is the number of turns on each layer when winding;

P26.21 is 0; count the coil diameter according to the switch approach to the external. This method is suitable for lower pulse frequency, at the same time, pay attention to reduce the input filter time of P5 terminal;

P26.21 is 1; count the coil diameter according to the PG card. This method is suitable for the motor with encoder.

Function code	Name	Detailed	Default	Modify
P26.22	Proportional gain 2	0.000~30.000	0.500	○
P26.23	Integral time 2	0.000~30.000s	8.000s	○
P26.24	Differential time 2	0.000~10.000s	0.000s	○
P26.25	Integral separation thresholds	0.0~200.0%	200.0%	○
P26.26	Differential filter times	0~65535	0	○
P26.27	Differential effect limiting value	0.0~100.0%	0.0%	○
P26.28	PID parameters adjusting basis	0:Only select the first group 1:Adjust to the coil diameter 2: Adjust to the running frequency 3: Adjust to the linear speed	0	○
P26.29	Relative reference of PID adjusting frequency	0:Relative to the maximum output frequency 1: Relative to the current running frequency	0	○

P26.22 P26.23, P26.24 are the second group of PID parameters and P09.04, P09.05, P09.06 are the second group of PID parameters, the second adjustment of P, I and D is better than the first group, P26.25 is used to select the PID parameters based on, in order to optimize the PID effect.

0: Only use the first group of parameters;

1: Use the first group of parameters when blank coil, and use the first group of parameters when full coil, PID parameters may get linear change when arriving the middle value of coil diameter;

2: Use the second group of parameters when lower limit of the frequency, and use the first group of parameters when upper limit of the frequency, PID parameters may get linear change when arriving the middle value of the frequency;

3: when the linear speed is 0, use the first group of parameters, when maximum speed, use the second group of parameters. P26.26 is used to process the PID value, 0: based on the maximum output frequency; 1: based on the current running frequency.

Function code	Name	Detailed	Default	Modify
P26.30	Input source of measured linear speed	0:No input 1: AI1 2: AI2 3: AI3 4: HDI 5:MODBUS communication (0x2011) 6:PROFIBUS/CANopen communication (0.0~100.0%)	0	○

For the reference mode of actual linear speed, the value is relative to the maximum linear speed of P26.04.

Function code	Name	Detailed	Default	Modify
P26.33	Reverser tighten of torque control	0:Enable 1:Disabled	0	○
P26.34	Stopping mode at zero speed	0:Coast to stop 1:Decelerate to stop	0	○

P26.33 is suitable in the torque control mode; 0, in wrapping off mode, the motor can rotates in the wrapping up direction; 1, in wrapping off mode, the motor can not rotates in the wrapping up direction.

P26.34 is suitable in the torque control mode; after stopping mode, it is the stopping mode of the inverter when the setting linear speed is 0.

P26.34 is 0, it coasts to stop, if it is 1, it decelerates to stop.

Function code	Name	Detailed	Default	Modify
P26.37	Coil diameter reset	0x00~0x11 Ones: for all calculation 0:Only for coil diameter of stopping reset 1:For coil diameter reset in running Tens:For calculation of thickness 0:Reset when not arrive P26.16 1: Reset after arrive P26.16	0x00	○

When the diameter reset terminal is valid:

Ones 0: in the stopping state, reset the current coil diameter to the initial value; 1, it can be reset under the running state, and when the terminal is valid, the current coil diameter has no change.

Tens 0: as long as meet the conditions of bits, coil diameter reset is available; 1: the coil diameter can be reset if the coil diameter is P26.16.

Function code	Name	Detailed	Default	Modify
P26.38	Reverse limit of Coil diameter counting	0: No limit 1: Limit the reverse direction changing	0	○

Apply to the coil diameter counting of linear speed calculation.

0: when it is warping up or off, the calculated value is not limited.

1: when it is warping up, the value of coil diameter cannot be reduced, and when it is warping off, the value of coil diameter cannot be increased.

Function code	Name	Detailed	Default	Modify
P26.39	Changing limit of coil diameter	0:No limit 1:Limit according to the operation frequency	0	○
P26.40	Max. material thickness	0.01~100.00 mm	0.10 mm	○

Apply to the coil diameter counting of linear speed calculation.

P26.39 is 0: the calculated coil diameter is limited by P26.38; is 1: it is necessary to count withP26.40 for the change rate of coil diameter, and limit the change ratio of coil diameter, at the same time, the result is limited by P26.38.

Function code	Name	Detailed	Default	Modify
P26.41	ACC time of linear speed	0.00~600.00	0.00s	○
P26.42	DEC time of linear speed	0.00~600.00	0.00s	○

If the inverter is the master, set P26.41, P26.42 to control the ACC/DEC time of linear speed; if it is the slave, set P26.41 and P26.42 to 0.

4.3 Tension control functions 2

Function code	Name	Detailed	Default	Modify
P27.00	Tension setting	0:Keypad 1: AI1 2: AI2 3: AI3 4: HDI 5:MODBUS communication (0x2010) 6:PROFIBUS/CANopen communication (0.0~100.0%)	0	◎

This parameter is used to select the input mode of the tension, 100% corresponds to the maximum tension.

0: Set by P27.01;

1, 2, and 3: is determined by the analog input voltage or current, 10V or 20mA corresponds to 100%;

4: is determined by external pulse input pulse frequency, P05.52 corresponds to 100%;

5: given by the upper communication, the communication address 0 x2010;

6: need to configure the communication expansion card, given by the upper PC.

Function code	Name	Detailed	Default	Modify
P27.01	Keypad setting	0.0~100.0% (Max. tension)	10.0%	○

When P27.00 is 0, the tension is determined by the function code.

Function code	Name	Detailed	Default	Modify
P27.02	Max. tension	0~30000N	3000N	○

Used to determine the maximum tension on the materials.

Function code	Name	Detailed	Default	Modify
P27.03	Upper frequency of vector control	0: P03.14 and P03.15 1:Linear speed setting the forward range 2: Linear speed setting the reverse range 3: Linear speed setting the forward/ reverse range	0	○

0: The upper frequency is determined by P03.14 and P03.15;

1, 2, and 3: the frequency counted by the linear speed is the upper frequency.

Function code	Name	Detailed	Default	Modify
P27.04	Deviation value of upper operation frequency in tension control	0.0~100.0% (Max. frequency)	5.0%	○

In the tension control mode, when the linear speed is0, after setting P26.06 = 0 x00, the inverter can operate at the deviation frequency to tighten the materials.

In the open loop tension torque control mode, this parameter can be used to set the deviation value of the upper frequency, which means the total value of basic upper frequency and deviation value is the upper frequency, but the final result is limited by the maximum output frequency P00.03.

Function code	Name	Detailed	Default	Modify
P27.05	Zero-speed tension deviation	0.0~200.0% (Max. tension)	0.0%	○
P27.06	Lower speed after zero-speed deviation	0.0~100.0% (Max. frequency)	3.0%	○

P27.05 sets the tension in additional boost at zero speed. When the tension is small, it is necessary to set the value to boost ACC.

P27.06 sets the zero speed threshold, when the operation frequency is less than P27.06, P27.20 and P27.05 are valid; when it is bigger than P27.06, sliding friction compensation coefficient and high speed torque compensation are valid.

Function code	Name	Detailed	Default	Modify
P27.07	Compensation correction of tension conicity	0.0~5000.0 mm	0.0mm	○
P27.08	Tension conicity coefficient source	0:P27.09 1: AI1 2: AI2 3: AI3 4: HDI	0	◎
P27.09	Keypad setting of tension conicity	0.0~100.0%	0.0%	○

It is suitable for warping up mode, the control tension can be reduced with the increasing coil diameter to prevent damage to scroll and improve product curling effect. The taper tension formula is:

$$F = F_0 \times [1 - k(1 - \frac{D_0 + D_1}{D + D_1})]$$

Among them, F_0 is the setting tension, k is the taper tension coefficient, D_0 is the blank coil diameter, D is the current coil diameter, , D_1 is the taper tension compensation correction for the difference between the calculated coil diameter and the actual coil diameter.

Function code	Name	Detailed	Default	Modify
P27.12	Inertia compensation enabling	0: Disabled 1: Enabled	0	○

0: Disabled, can be combined with P27.39, P27.40, P27.41 to carry out linear torque compensation during the deceleration phase.

1: Enabled, can be combined with P27.15, P27.16, P27.17, P27.18, P27.19, according to calculated inertia and frequency variation to compensate automatically.

Function code	Name	Detailed	Default	Modify

Function code	Name	Detailed	Default	Modify
P27.13	Mechanical inertia identification enabling	0: Disabled 1: Enabled	0	◎
P27.14	Keyboard setting of identification torque	-50.0%~50.0% (Relative to rated torque motor)	20.0%	◎
P27.15	Mechanical inertia of identification system	0.000~30.000kg.m^2	0.000 kg.m^2	○

P27.15 is the fixed value, including the motor, drive system, air shaft and so on, such as inertia, has nothing to do with the coil diameter.

In the torque control mode, when P27.13 is 1, the system mechanical inertia is available. After pressing the RUN key, the motor will rotate and the keypad will display "-tUn-", please pay attention to the safety and after the keypad display "-End-", the identification is finished and the identified inertia is saved in P27.15.

After the identification, P27.13 is changed into 0, if the P27.13 is 1, there is no inertia identification, and it is necessary to set P27.13 to 0 manually.

Function code	Name	Detailed	Default	Modify
P27.16	Material density	0~30000kg/m^3	0 kg/m^3	○
P27.17	Reel width	0.000~60.000 m	0.000m	○

P27.16 and P27.17 are used to calculate the material inertia.

Function code	Name	Detailed	Default	Modify
P27.18	Compensation coefficient of rotating inertia	0.0~100.0%	50.0%	○
P27.19	Upper compensation inertia of rotating inertia	0.0~50.0%	5.0%	○

On the host linear velocity, deceleration time is short, P27.18 can be set up, on the other hand, is set,

should be adjusted according to the actual control effect, when loose volume phenomenon appeared in the process of accelerating, increasing P27.18.

If the ACC/DEC time of the master is too short, P27.18 can be set to a large value, otherwise, it is necessary to adjust according to the reality. If coil loose occur during the ACC, it is necessary to increase the value of P27.18.

P27.19 is used to limit the upper limit of the compensation torque.

Function code	Name	Detailed	Default	Modify
P27.20	Compensation coefficient of static friction torque	0.0~100.0% (Relative to rated torque motor)	0.0%	○
P27.21	Compensation coefficient of sliding friction torque	0.0~100.0% (Relative to rated torque motor)	0.0%	○

There is friction during the wrapping up and off. The friction may reduce the material tension, so it is necessary to set the friction compensation value to partly overcome frictional resistance and improve the effect of tension control. P27.20 is used to compensate the friction when then running frequency is less than 0 and P27.21 is used to compensate the friction when the speed is above 0.

Function code	Name	Detailed	Default	Modify
P27.22	High-speed torque compensation	0:No compensation 1:Frequency 2:Linear speed	0	○
P27.23	Corresponding upper torque of high-speed torque compensation	0.0~100.0% P27.22=1, relative to Max. output frequency; P27.22=2，relative to Max. linear speed	100.0%	○
P27.24	High-speed torque compensation coefficient	0.0~50.0% (Relative to rated torque motor)	0.0%	○

High-speed torque compensation function is suitable for low-speed torque control system. It is

necessary to set the parameter to compensate the system impact. When P27.22 is 1, compensate according to the frequency; if it is 2, compensate according to the linear speed, P27.24 is the torque value when the linear speed and frequency is more than P27.23.

Function code	Name	Detailed	Default	Modify
P27.25	Speed gain of pre-drive	0.0~200.0%	100.0%	○

When P27.25 is used for automatic change of volume, it can adjust the matching relation between linear speeds, 100.0% means the drive linear speed and wrapping linear speed is synchronous. Adjusting the parameters can make its linear speed is greater than or less than the linear speed of operation of the material.

Function code	Name	Detailed	Default	Modify
P27.26	Torque limit of pre-drive	0:P03.20 1:Limit according to P27.27	0	◎
P27.27	Torque limit of pre-drive	0.0~200.0%	100.0%	○

If the pre-drive is enabled, it is used to limit the output torque; P27.26 is 0, the output torque is limited by P03.20; if it is 1, it is restricted by P27.27 alone.

Function code	Name	Detailed	Default	Modify
P27.28	Coil diameter counting delay after pre-drive	0.0~100.0s	5.0s	○

After enabling the pre-drive, when canceling the driving terminal, the coil diameter will be calculated after the delay time.

Function code	Name	Detailed	Default	Modify
P27.29	Material-lack detection mode	0:No detection 1:Detect to the digital 2: Coil diameter counting 3: Position feedback deviation	0	◎
P27.30	Starting delay of material-lack detection	0.00~200.00s	10.00s	○

Function code	Name	Detailed	Default	Modify
P27.31	Lower frequency of material-lack detection	0.00~300.00Hz	10.00Hz	○
P27.32	Deviation range of material-lack detection	0.1~50.0% (Max. coil diameter)	10.0%	○
P27.33	Delay time of material-lack detection	0.1~60.0s	1.0s	○

P27.29 is 0: no detection

The following two conditions needs to be met if P27.29 is not 0:

(1) The starting running time is greater than the P27.30

(2) The inverter frequency is greater than P27.31

P27.29 is 1: meet the above two conditions, judge when receiving the pulse signal.

P27.29 is 2: judge with P27.32 and P27.33, valid when used the linear speed to count the coil diameter;

P27.29 is 3: judge with P09.11 and P09.12, only applies when the position feedback signal is available.

When detecting breaking, the keyboard will show "br-ERR", and the inverter acts according to P27.34 at the same time.

When P27.29 is 2, another two conditions need to be met:

Condition 1: the coil diameter is more than P27.32

Condition 2: the changing time of coil diameter is P27.33

Function code	Name	Detailed	Default	Modify
P27.34	Material lack processing	0x00~0x12 Ones: stopping mode 0: Decelerate to stop 1: Coast to stop 2:E-stop Tens: alarm mode 0:No alarm, stop at the mode designated 1:Alarm and coast to stop	0x00	○

After reporting breaking, the keyboard will display "brERR". The function code decided inverter action. After downtime, pressing the reset button, can cancel the record.

Function code	Name	Detailed	Default	Modify
P27.35	Stopping braking frequency	0.00~300.00Hz	1.50Hz	○
P27.36	Stopping braking time	0.0~600.0s	0.0s	○

During coasting to stop, if the operation frequency is less than P27.35, the inverter output brake signal, and after the duration time of P27.36, the brake signal is invalid. During brake signal output, the starting command is invalid.

Function code	Name	Detailed	Default	Modify
P27.37	Material circles on the coil	-100~32767	0	◎

There are two method of circle recording:

Method 1: select the switch circle recording through P26.21, and this is suitable for the material shaft end equipped with proximity switch, it can receive lower recognition pulse frequency and reduce the input filter time of P5 terminal;

Method 2: suitable for motor with encoder, record the circle through PG card, and this can increase or decrease automatically.

Function code	Name	Detailed	Default	Modify
P27.38	Material length on the coil	0~65535m	0m	◎

The length can be recorded in the following two cases; the correction is determined by the current coil diameter, if the coil diameter does not change, the length can be recorded correctly:

Case 1: select the switch circle recording through P26.21, and this is suitable for the material shaft end equipped with proximity switch, it can receive lower recognition pulse frequency and reduce the input filter time of P5 terminal;

Situation 2: suitable for motor with encoder, record the circle through PG card, and the length can be recorded automatically.

Function code	Name	Detailed	Default	Modify
P27.39	Upper limit of ACC tension	0.0~100.0% (Max. tension)	10.0%	○
P27.40	Upper limit of DEC tension	0.0~100.0% (Max. tension)	10.0%	○
P27.41	Chang ratio of ACC/DEC tension	0.0~100.0%/s (Max. tension)	0.0%/s	○

In open loop tension torque control, if the moment of inertia compensation is banned, the tension control can be improved during ACC and DEC. If the linear speed is stable, the compensation torque is 0, P27.39 is the upper limit for additional increasing tension, if the increased tension is larger than P27.39, maintain the value; Similarly, P27.40 is the upper limit for additional decreasing tension, if the increased tension is larger than P27.40, maintain the value. During the deceleration, it is necessary to increase the compensation value on the basis of setting tension when wrapping up and it is necessary to decrease the compensation value on the basis of setting tension when wrapping off.

4.4 Input and output terminals

Function code	Name	Detailed	Default	Modify
P05 Input terminals				
P05.01	S1 terminal function	32:Length reset 56:E-stop 57:Coil diameter reset 58:Wrap up/off switching 59:Initial coil diameter 1 60:Initial coil diameter 2 61:Pre-drive 62:Coil diameter counting stop 63:Signal of material-lack clear 67:Tension control mode switching 68:Motor overtemperature fault input 69:Circling reset 70~79:Reserved	1	◎
P05.02	S2 terminal function		4	◎
P05.03	S3 terminal function		7	◎
P05.04	S4 terminal function		0	◎
P05.05	S5 terminal function		0	◎
P05.06	S6 terminal function		0	◎

Function code	Name	Detailed	Default	Modify
P05.07	S7 terminal function		0	◎
P05.08	S8 terminal function		0	◎
P05.09	HDI terminal function		0	◎

32: Length reset

If the reset is valid, P27.42 is cleared.

56: E-stop

If the terminal is valid, the inverter stops according to P01.25.

57: Coil diameter reset

Reset the coil diameter when changing new coil and P27.37 and P27.42 are cleared.

58: Wrap up/off switching

Switch the mode, if it is invalid, the mode is determined by P26.01.

59: Initial coil diameter 1

60: Initial coil diameter 2

Wrapping up mode, different coil diameter can be selected through 59 and 60 and the blank coil diameter is P26.12; it is necessary to press fixed button to get the initial coil diameter, after loosing the button, the initial coil diameter can be got.

61:Pre-drive

When automatic coil changing, it is necessary to use the pre-drive function to make the blank coil runs at the corresponding linear speed. It is independent from the starting command, after receiving the command, press the pre-drive terminal to begin pre-drive. If canceling the pre-drive, the corresponding mode is tension control mode.

62: Coil diameter counting stop

Press the terminal to stop the function.

63: Signal of material-lack clear

Enable the function and the keypad report the fault. The material lack can be cleared through the terminal or the keyboard, otherwise, it can't run.

67: Tension control mode switching

It is used to switch the open loop tension mode and the close loop speed mode (no tension feedback signal, and use the thickness to calculate the coil diameter), if it is invalid, the control mode is decided by P26.00.

69: Circling reset

If the reset is valid, P27.37 is cleared.

70~79: Reserved

Function code	Name	Detailed	Default	Modify
P06 Output terminals				
P06.01	Y output	34: Setting coil diameter arrived 35: Max. coil diameter arrived 36: Blank coil diameter arrived 37: Alarm of material-lack output 38: Braking output 39~40: Reserved	0	○
P06.02	HDO output		0	○
P06.03	RO1 output		1	○
P06.04	RO2 output		5	○

34: Setting coil diameter arrived

If the current coil diameter reaches P26.16, output digital signals, if it is less than the value, the signal is automatically cancelled.

35: Max. Coil diameter arrived

If the current coil diameter reaches P26.13 in wrapping up, output digital signals, if it is less than the value, the signal is automatically cancelled.

36: Blank coil diameter arrived

If the current coil diameter reaches blank coil diameter in wrapping off, output digital signals, if it is less than the value, the signal is automatically cancelled.

37: Alarm of material-lack output

When material lack, select P27.34 = 0 x1x to output alarm signals. When the material lack signal is cleared, the signal is clear automatically.

38: Braking output

When parking, if the running frequency is less than P27.35, output brake signal, and brake signal duration time is P27.36.

39~40: Reserved

Function code	Name	Detailed	Default	Modify
P06 Output terminals				
P06.14	AO1 output	27: Current tension 28: Current linear speed	0	○
P06.15	AO2 output		0	○

P06.16	HDO output		0	○

27: Current tension; 28: Current linear speed; 29: Current coil diameter; 31~32: Reserved

4.5 Communication setting special for tension control

(1)MODBUS communication protocol

Based on Goodrive300, there are another 3 kinds of function parameters of MODBUS for Goodrive35-07. Refer to communication protocol of Goodrive300 for related debugging and the new functions are as below:

Function	Address definition	Data meaning	R/W
Communications address	200FH	Setting linear speed reference(0~1000，1000 corresponds to 100.0%)	W
	2010H	Tension reference (0~1000，1000 corresponds to 100.0%)	W
	2011H	Actual linear speed reference (0~1000，1000 corresponds to 100.0%)	W

(2)PROFIBUS/CANopen communication protocol

Goodrive35-07 based on Goodrive300 added three through PROFIBUS/CANopen communication protocol set the size of a function parameter, select the communications protocol given parameters, the expansion card need to configure the communication, specific operation please refer to part Goodrive300 communication protocol related and debugging, the new function of the specific meaning of see the table below:

Based on Goodrive300, there are another 3 kinds of function parameters of PROFIBUS/CANopen for Goodrive35-07. Refer to communication protocol of Goodrive300 for related debugging and the new functions are as below:

Function code	Name	Detailed	Default	Modify
P15 group Profibus function				
P15.02	PZD2 receiving	14: Setting linear speed reference (0~1000, 1000 corresponds to 100.0%) 15: Tension reference (0~1000, 1000 corresponds to 100.0%) 16: Actual linear speed reference (0~1000, 1000 corresponds to 100.0%)	0	○
P15.03	PZD3 receiving		0	○
P15.04	PZD4 receiving		0	○
P15.05	PZD5 receiving		0	○
P15.06	PZD6 receiving		0	○
P15.07	PZD7 receiving		0	○

Function code	Name	Detailed	Default	Modify
P15.08	PZD8 receiving	17~20:Reserved	0	○
P15.09	PZD9 receiving		0	○
P15.10	PZD10 receiving		0	○
P15.11	PZD11 receiving		0	○
P15.12	PZD12 receiving		0	○

4.6 Function view group

Function code	Name	Detailed	Default	Modify
P19.00	Actual wrap up/off mode	0: Wrap up 1: Wrap off	0	●
P19.01	Initial coil diameter	0.0~5000.0 mm Wrap up: the initial coil diameter is the diameter of blank coil; Wrap off: the initial coil diameter is the diameter of full coil	0.0 mm	●
P19.02	Actual diameter of blank coil	0.0~5000.0 mm	0.0 mm	●
P19.03	Reserved	0.0~5000.0 mm	0.0 mm	●
P19.04	Actual control mode	0:Tension control invalid 1:Close-loop speed control 2:Open-loop tension and torque control	0	●
P19.05	Main reference frequency	0.00~600.00Hz	0.00Hz	●
P19.06	PID output frequency	-99.99~99.99Hz	0.00Hz	●
P19.07	Material circles on the coil	-100~32767	0	●
P19.08	Material length on the coil	0~65535m	0m	●
P19.09	Current linear speed	0.0~6000.0m/min	0.0m/min	●
P19.10	Current coil	0.0~5000.0 mm	0.0 mm	●

Function code	Name	Detailed	Default	Modify
	diameter			
P19.11	Actual propositional gain	0.000~30.000	0.000	●
P19.12	Actual integral time	0.000~30.000s	0.000s	●
P19.13	Setting linear speed	0.0~6000.0m/min	0.0m/min	●
P19.14	Setting tension	0~30000N	0N	●
P19.15	Tension conicity coefficient	0.0~100.0%	0.0%	●
P19.16	Actual tension	0~30000N	0N	●
P19.17	System rotating inertia	0~655.35 $kg.m^2$	0.00 $kg.m^2$	●
P19.18	Frequency changing in inertia compensation interval	-99.99~327.67Hz	0.00Hz	●
P19.19	Basic torque reference	-300.0~300.0% (Relative to rated motor torque)	0.0%	●
P19.20	Friction compensation torque	-300.0~300.0% (Relative to rated motor torque)	0.0%	●
P19.21	Torque compensation of system rotating inertia	-300.0~300.0% (Relative to rated motor torque)	0.0%	●
P19.22	Torque compensation during ACC/DEC	-300.0~300.0% (Relative to rated torque motor)	0.0%	●
P19.23	Reference value	-300.0~300.0%(Relative to rated motor	0.0%	●

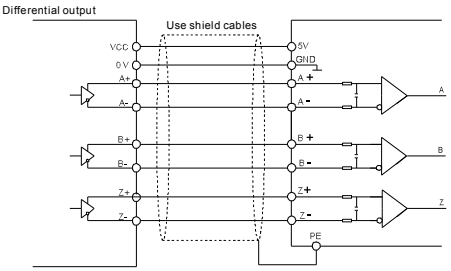
Function code	Name	Detailed	Default	Modify
	after torque compensation	torque)		
P19.24	Max. linear speed setting	0.0~6000.0m/min	0.0m/min	●
P19.25	Length increasing	0.0~6553.5m	0.0m	●
P19.26	Change ratio of coil diameter	0.0~655.35mm/s	0.00mm/s	●
P19.27	ACC/DEC mark	0~2 0:Constant speed; 1: DEC; 2:ACC	0	●

View the related parameters through P19 group.

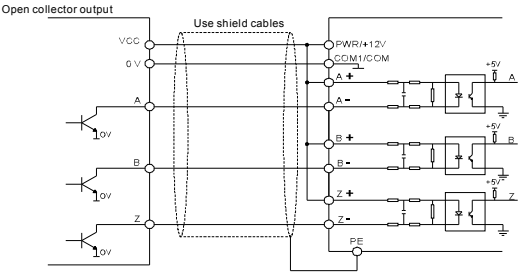
5 Commissioning instruction

5.1 Connection mode of encoder ports

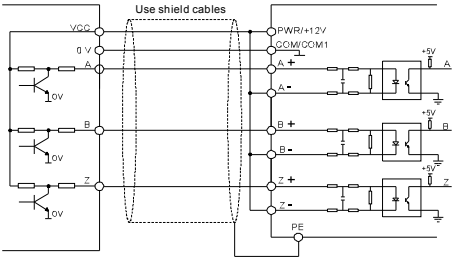
1. Differential output (for C1 and H1)



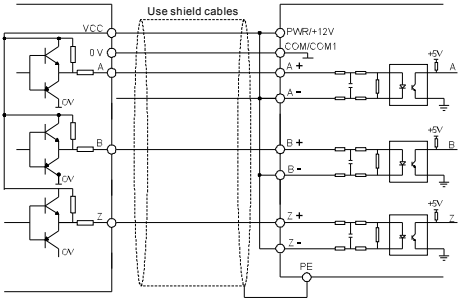
2. Open collector output (for C1 and H1)



3. Voltage output (for C1 and H1)



4. Complementary output (for C1 and H1)



Note:

① The above diagram is the example given according to the common encoder interface connection. The signal and connection mode also apply to H1 interface.

② Difference output schematic takes C1 interface as an example, C1 and H1 interface apply the optical coupling isolation and the external connection is the same.

③ If external current limiting, C1 and H1 model can be applied to the encoder pulse signal or reference input signal with higher voltage grades.

5.2 Instructions of commissioning steps

Step 1: Motor autotuning, it is better to carry out rotating autotuning for parameters identification;

(1) Set P00.18=1, restore to the factory setting

(2) Set P00.03 and P00.04 and P02 group

(3) Motor autotuning

a) Set P00.15=1, begin rotating autotuning

b) Set P00.15=2, begin static autotuning

If the motor can be de-coupled from the load, it is necessary to begin rotating autotuning; otherwise, begin static autotuning and the parameters after autotuning are saved in P02.

Step 2: if the encoder is installed at the motor side, close loop vector control is available;

1. Commissioning steps of AM

(1) Check the installation and parameters setting of the encoder

Set P20.01, P00.00=2, P00.10=20Hz and start the inverter. The frequency is 20Hz and observe the tested value of P18.00, if the value is negative, the direction of the encoder is reversed and set P20.02=1. If the tested value is large, the setting of P20.01 is wrong. Observe P18.02 is fluctuated or not (counting value of Z pulse). If it fluctuates, there is interface to the encoder and the setting of P20.01 is wrong, please check the wiring and shield layer.

(2) Close loop vector operation

Set P00.00=3 and begin close loop vector control, adjust P00.10, P03 group and PI parameters to stabilize the operation.

(3) Weakening control

Set P03.26=0~2000 and observe the control performance. P03.22~P03.24 can be adjusted according to the needs.

2. Commissioning steps of SM

If the motor is SM, after the parameters identification, it is necessary to begin autotuning for the initial pole position in close loop vector control.

(1) Set P00.00=3, P20.00 and P20.01

If resolver encoder is selected, please set the pulse pair of the encoder (the number of pole pair*1024), if the pole pair is 4, please set P20.01=4096.

(2) Check the encoder is installed and correctly set

Observe the value of P18.21 after motor stopping to ensure the value has no fluctuations or small fluctuations. But check the wiring and grounding if the fluctuation is huge. Rotate the motor slowly and the value of P18.21 may change slowly, too. If the value of P18.02 does not change and not equal to 0 after several cycles, then the signal of encoder Z is correct.

(3) Autotuning of the pole initial angle

Set P20.11=1 or 2 (1 is the rotating autotuning and 2 is the autotuning when the load is not de-coupled) and press " RUN ".

a) Rotating autotuning (P20.11=1)

Detect the pole position in the beginning, and then accelerate to 10Hz to autotune the pole position of Z pulse, after that decelerate to stop.

If ENC1O or ENC1D occurs during the operation, please set P20.02=1 and then reautotune. If ENC1Z occurs, check the connection of Z pulse.

The result will be saved in P20.09 and P20.10 after autotuning.

b) Autotuning when the load is not de-coupled

It is recommended to apply rotating autotuning P20.11=1 to get higher autotuning precision if the load can be de-coupled. The other autotuning mode is also available if the load can not de-couple. Encoders except rotary transformer encoders may rotate during rotating. The pole position after autotuning is saved in P20.09 and P20.10.

(4) Trial running of the close loop vector

Adjust P0.10 and the speed loop and current loop PI parameters in P3 group. If fluctuation occurs, reduce the value of P03.00 and P03.03 and P03.09 and P03.10. If the current fluctuates at low speed, adjust P20.05.

Note: reset P20.02 after change the motor or encoder wiring and reautotune the angle of Z pulse.

3 Commissioning steps of special inverters :(it is necessary to set P26 and P27)

When it is used as the master, it is necessary to set P26.41 and P26.42; when used as the slave, it is necessary to set P26.41 and P26.42 as 0.

(1) Speed mode

1. Set basic parameters of production control such as the linear speed, gear ratio, diameter of blank coil and cancel out the zero voltage through setting the lower limit of analog input in P05 group;

2. Set Max. output frequency and the upper limit of the frequency

Set P26,.02=0 and P26.03=100.0%, observe the displayed frequency of P19.05 and make the value as the value of P00.03 and P00.04, and then set P00.11 and P00.12 as 0.2s, after that, modify P26.02.

3. Select the counting mode of coil diameter

If P26.13=1, the function of coil diameter changing limit can be enabled by setting P26.38, P26.39 and P26.40; if the encoder is installed, the coil diameter can be counted by thickness mode 5 and 6(if no encoders but the Max. linear speed and gear ratio is attained clearly, the coil diameter can be counted by thickness mode 7 and 8). Set the parameters of P26.18, P26.19, P26.20 and P26.21.

If the coil diameter is counted through the thickness and there is no tension feedback signal, the speed mode can control the constant speed. It is necessary to set P09.09 and P09.10 as 0, forbidden PID adjustment and calculate the motor frequency through linear speed setting and current coil diameter to keep the linear speed constant. If there is tension feedback signal, PID adjustment and thickness can be used to count the coil diameter.

If the speed sensor is installed, set P26.13=9 and P26.30 and then the coil diameter will be counted according to the actual linear speed and current running frequency. If no tension feedback signal, the constant speed can be controlled in the speed mode.

4. Adjust P and I

Select the changing source through P26.25. And then choose P26 (with better adjusting effect) or P09 to adjust PI according to the site working. Below is the adjusting description:

When blank coil, select P26 group; when full coil, select P09 group;

When Mini frequency, select P09 group; when Max. frequency, select P26 group;

When Mini linear speed, select P09 group; when Max. linear speed, select P26 group;

If only one group of PID can be selected, then select P09 group.

Please refer to P09 group and GD300 for PID adjustment.

5. Enable the function of material-lack detection or pre-alarm according to the site working

(2) Open-loop tension torque control mode

1. Set basic parameters of production control such as the linear speed, tension reference, gear

ratio and diameter of blank coil and cancel out the zero voltage through setting the lower limit of analog input in P05 group;

2. Set the upper frequency of torque control and Max. output frequency

Set 100% of Max. linear speed and the diameter of blank coil by keypad observe the displayed frequency of P19.05 and make the value as the value of P00.03, P03.16 and P03.17, after that, modifies P26.02.

3. Select the counting mode of coil diameter

If P26.13=1, the function of coil diameter changing limit can be enabled by setting P26.38, P26.39 and P26.40; if the encoder is installed, the coil diameter can be counted by thickness mode 5 and 6(if no encoders but the Max. linear speed and gear ratio is attained clearly, the coil diameter can be counted by thickness mode 7 and 8). Set the parameters of P26.18, P26.19, P26.20 and P26.21.

If the speed sensor is installed, set P26.13=9 and P26.30, and then the inverter will count the coil diameter according to the linear speed and current running frequency.

4. Check the tension and the compensation torque

Step 1: Set P26.00 to 0 when there is no materials on the coil, and then enable P03.11 as 01 to select close-loop vector torque control mode. Set a larger torque through the keypad, and observe whether the value reaches to the upper limit frequency of torque control. If: the torque is set to about 2.0%, the blank coil can not rotate; set to 2.5%, the blank can rotate, then set P27.20 to 2.5% and increase P27.21 by 1.0%; set to 7.5%, the blank can raise to the upper limit frequency of torque control in some time, after stopping, 7.5% minus sliding friction 3.5% to get 4.0%, and then set P27.24 to 4.0% and enable the function of high speed torque compensation and set P27.22 to 1.

Step 2: Set P27.13 = 1, after operation, the keypad will display "tuR" and the motor will rotate. Please pay attention to the physical health. When the keypad displays"-End-", the inertia identification is ended and P27.1 will turn to 0 automatically. The program will save the identified value to P27.15 automatically for the preparation of subsequent inertia compensation.

Step 3: Set P26.00=2 when there are materials on the coil, set and select the torque control mode of open loop. On the basis of friction compensation coefficient, adjust the detailed compensation parameters, such as static friction compensation coefficient, sliding friction compensation coefficient and high speed torque compensation coefficient and so on.

Ensure following parameters when blank coil:

(1) Ensure the tension reference after stopping when the linear speed is zero. If the required tension is smaller, then increasing P27.05 which is only valid below P27.06, if it is bigger than P27.06, then it will become to 0 gradually;

(2) adjust the static friction compensation coefficient at some frequency which is below the threshold;

(3) Accelerate gradually, make the running frequency is between the threshold value and 1/4 of the upper limit and then adjust the sliding friction compensation coefficient;

(4) Adjust the high speed torque compensation coefficient at some frequency which is between 1/4 of the upper limit and the upper limit. After that, the parameter adjusting is finished and then decelerates. Observe the materials, and reduce the sliding friction compensation coefficient and high speed torque compensation coefficient;

Generally the compensation coefficient is less than or equal to the basic torque which is set through the tension value (observe through P19.19);

Set the linear speed to close to the Max. value, start the machine directly and observe whether there are materials loose during ACC and materials pressing during DEC. If yes, add the rotating inertia compensation, and if not, the parameters setting are finished.

Step 4: Inertia compensation commissioning

Inertia compensation function is only needed if setting torque is very small when blank coil. If the setting torque is big enough, there is no need to se the inertia compensation.

There are two modes of inertia compensation, only one is selected at a time:

Mode 1:P27.12 = 1

The materials during ACC/DEC can be adjusted through automatic inertia compensation calculation; detailed commissioning steps are as following:

(1) Ensure the Identification of mechanical system inertia is identified and saved into P27.15 when blank coil;

(2) Set P27.17, P27.16 and P27.18, of which P27.17 and P27.16 can be set to an estimated value;

(3) Set P27.38.

Mode 2:P27.12 = 0

Increasing or reducing the torque manually during ACC/DEC to eliminate the impact of materials. Detailed commissioning steps are as following:

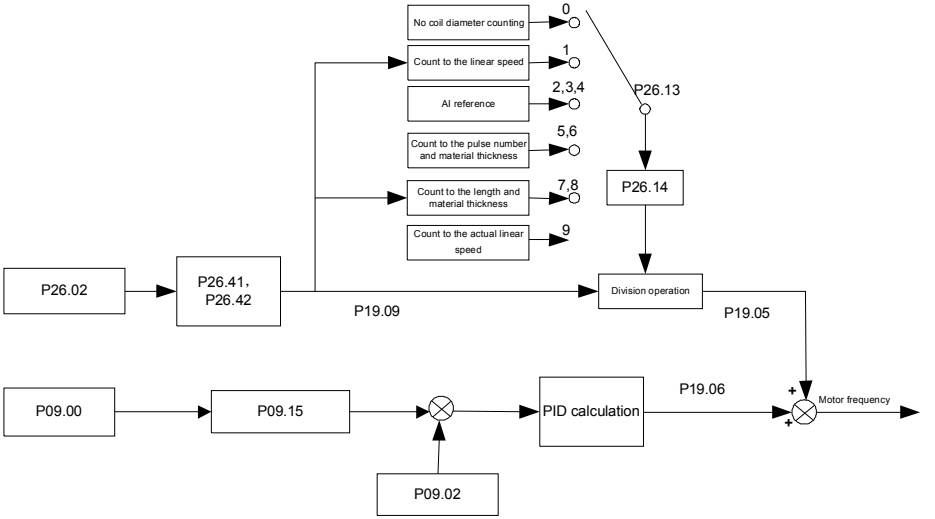
(1) Set P27.39 and P27.40 according to P27.01 and P19.19, generally it will be less than P27.01;

(2) Set P27.41 according to the ACC/DEC time of master linear speed (before ACC/DEC the changed tension may will reach to the upper tension set by P27.39 and P27.40).

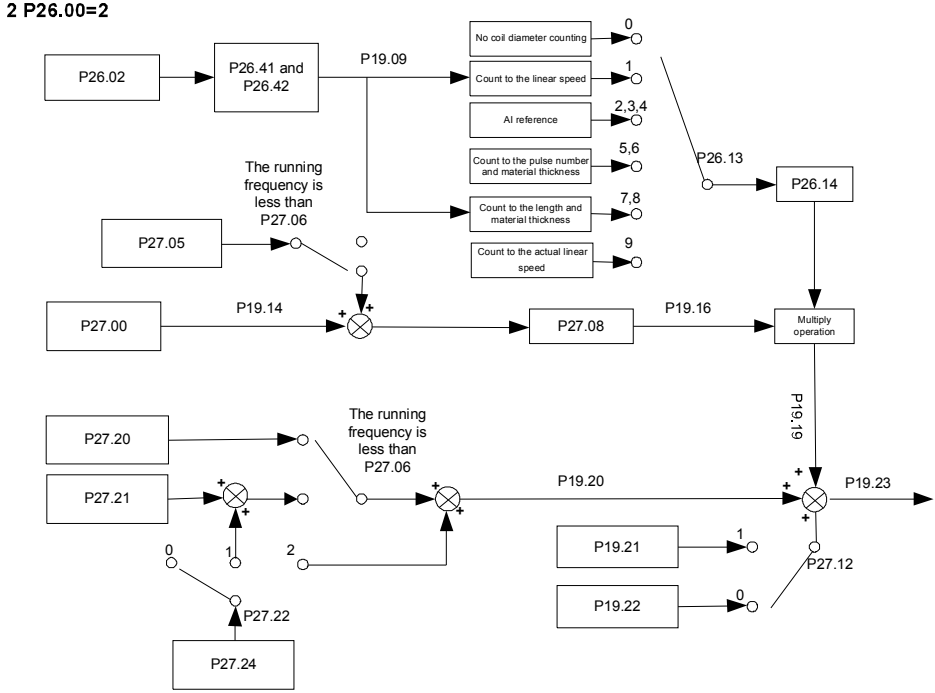
5. It is necessary to enable the functions of material-lack detection and pre-drive according to the site working

5.3 Tension control flow chart

1 P26.00=1



2 P26.00=2

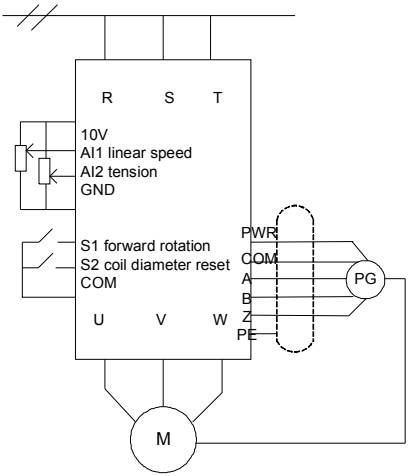


5.4 Goodrive35-07 applications

Application 1: Winding control system of coating machine production

The production line of coating machine is made up of multiple traction and winding, and more than one inverter can synchronize the linear speed through the synchronous controller. The traction device is mainly for the processing of cloth. After processing, the cloth is winded up on the shaft and controlled by the tension. Winding device is composed of two winding parts for the paper and cloth. Every moment, there are two sets of winding inverter in the work for the paper and cloth winding. The final product is cloth and paper which can be recycled is laid on the bottom. Two inverters control two winding motors for non-stopping operation. Another two inverters for winding are also applied. So there are four inverters to control for Goodrive35-07 applications.

Wiring diagram of one of the inverters:



Traction and winding part of the inverter are controlled by the same linear speed signal given by potentiometer analog. Two inverters can use the same control cabinet through AI1 and AI2. The inverter applies terminal control mode. When it is used to wind up the cloth, the coil diameter will become larger. After the full coil, remove the cloth and reset the coil diameter.

Parameters table:

Function codes	Setting values	Remark
Basic parameters		
P00.00	3	Close loop vector control
P00.01	1	Terminal running command

Function codes	Setting values	Remark
P00.03	200.00Hz	Max. output frequency
P03.14	1	AI1 setting
P03.15	1	AI1 setting
P03.16	200.00Hz	Keypad setting for upper frequency of forward rotation
P03.17	200.00Hz	Keypad setting for upper frequency of reverse rotation
P05.01	01	Running forward
P05.02	57	Coil diameter reset
P05.32	0.04v	AI1 lower limit voltage
P05.34	6.00v	AI1 upper limit voltage
P05.37	0.03v	AI2 lower limit voltage
Special parameters		
P26.00	2	Open loop tension torque control
P26.01	0	Wrap up
P26.02	1	AI1 reference linear speed
P26.04	26.0m/Min	Max. linear speed
P26.05	15.0%	Mini linear speed counted by the coil diameter
P26.07	66.00	Gear ratio
P26.11	90.0mm	Mini diameter of blank coil
P26.12	1200.0mm	Max. coil diameter
P26.13	1	Counting of coil diameter by linear speed
P26.39	1	Limit automatically according to the running frequency
P26.40	1.00mm	Max. material thickness (material thickness 0.40mm)
P27.00	2	AI2 reference linear speed
P27.02	6000N	Max. tension
P27.03	0	Determined by P03
P27.04	13.0%	Upper limit offset
P27.09	10.0%	Set by the keyboard

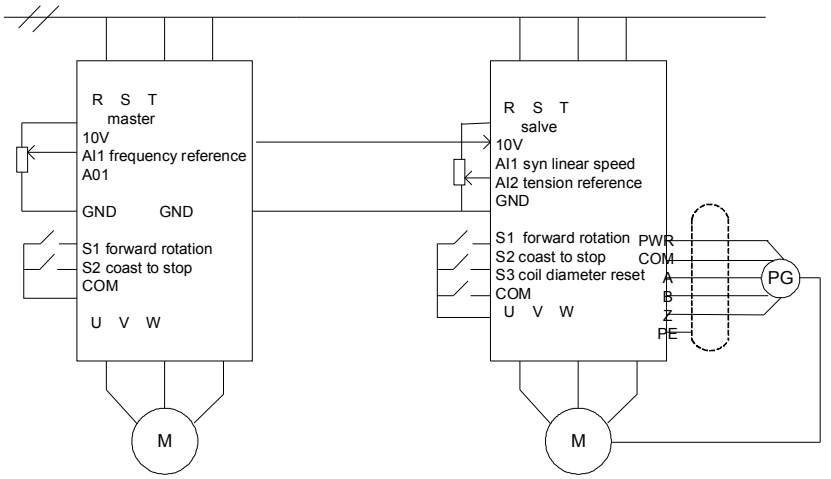
Function codes	Setting values	Remark
Parameters of torque compensation		
P27.06	2.0%	Lower speed limit
P27.12	0	Disabled
P27.20	2.0%	The compensation coefficient of static friction
P27.21	2.5%	The compensation coefficient of sliding friction
P27.22	1	Compensate to the frequency
P27.24	6.0%	High speed torque compensation coefficient

Application 2: Winding control system of slasher production

The main process of slasher is to size the yarn. After boiling the sizing materials, when the temperature reached the value, transfer the slurry to the slurry tank, the winding part will begin to wind up if the slurry is dried through the traction of the motor. The tension needs to be stable for next operation.

There are following applications of Goodrive35-07.

Wiring diagram:



In the diagram, the linear speed is control by the current running frequency. Synchronous linear speed of the slave is output through the master AO and input through the AI1; the tension value is input through AI2 and can be adjusted according to the actual operation. The tension reference includes winding tension and setting tension. When the linear speed is more than 10.0m/Min, the

tension reference can be switched to the setting tension.

Parameters table:

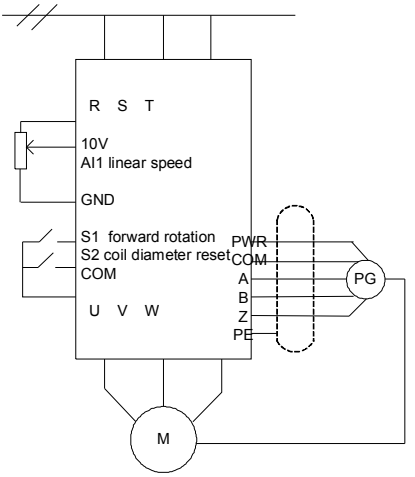
Function codes	Setting values	Remark
Basic parameters		
P00.00	3	Close loop vector control
P00.01	1	Terminal running command
P00.03	100.00Hz	Max. output frequency
P03.14	1	AI1 setting
P03.15	1	AI1 setting
P03.16	100.00Hz	Keypad setting for upper frequency of forward rotation
P03.17	100.00Hz	Keypad setting for upper frequency of reverse rotation
P05.01	01	Running forward
P05.02	06	Coast to stop
P05.03	57	Coil diameter reset
P05.32	0.06v	AI1 lower limit voltage
P05.37	0.11v	AI2 lower limit voltage
Special parameters		
P26.00	2	Open loop tension torque control
P26.01	0	Wrap up
P26.02	1	AI1 reference linear speed
P26.04	70.0m/Min	Max. linear speed
P26.05	8.0%	Mini linear speed counted by the coil diameter
P26.07	14.57	Gear ratio
P26.11	110.0mm	Mini diameter of blank coil
P26.12	800.0mm	Max. coil diameter
P26.13	1	Counting of coil diameter by linear speed
P27.00	2	AI2 reference linear speed
P27.02	6000N	Max. tension
P27.03	0	Determined by P03
P27.04	5.0%	Upper limit offset

Function codes	Setting values	Remark
P27.09	5.0%	Set by the keyboard
Parameters of torque compensation		
P27.05	4.0%	Zero speed tension boost
P27.06	6.0%	Lower speed limit
P27.12	1	Enabled
P27.15	0.397	Identified mechanical system inertia
P27.16	1500kg/m^3	Material density of
P27.17	1.600m	Shaft width
P27.18	5.0%	Inertia compensation coefficient
P27.20	4.0%	The compensation coefficient of static friction
P27.21	5.0%	The compensation coefficient of sliding friction
P27.22	1	Compensate to the frequency
P27.24	8.0%	High speed torque compensation coefficient

Application 3: Winding control system of aluminum polishing equipments

The running aluminum plate needs to be polished and the linear speed and tension is required to be constant for better polishing effect. Generally, the unprocessed aluminum plate is controlled by the magnetic powder controller and the inverter. If there is no tension feedback signal at the winding side, after calculating the coil diameter through the thickness, the motor frequency can be adjusted to keep the linear speed stable. If the thickness calculation precision of coil diameter is 0.1 mm, coil diameter is increasing by 0.1mm in each layer without winding, and the coil diameter is not 2 times of the thickness of the aluminum plate suddenly, the linear speed is more stable.

Wiring diagram:



The applications need to keep the linear speed constant and the tension is controlled by the magnetic powder controller. So canceling PID adjustment and the set the upper and lower limit as 0. If the coil diameter is counted through thickness, once the coil diameter is reset, the value will not be counted correctly. The resetting function is reset after it reaches a fixed value. If the encoder can not be installed at the motor side, set P26.13 to be 7 for a constant tension control.

Parameters table:

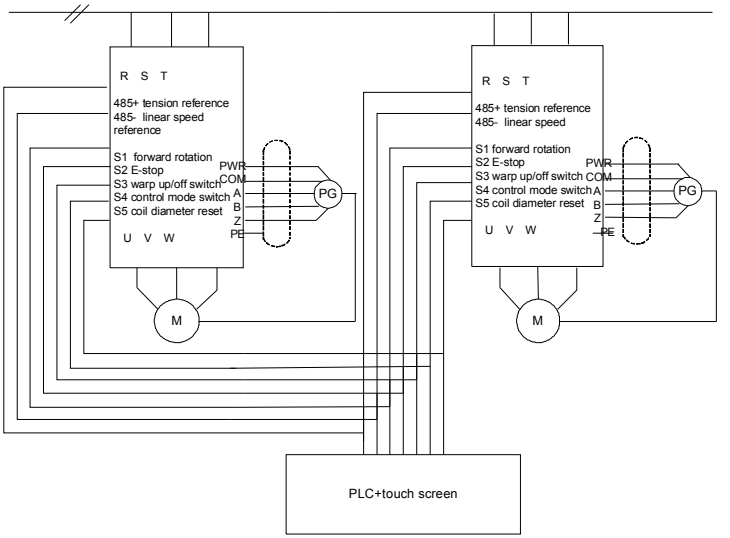
Function codes	Setting values	Remark
Basic parameters		
P00.00	3	Close loop vector control
P00.01	1	Terminal running command
P00.03	26.00Hz	Max. output frequency
P00.04	26.00Hz	Upper limit frequency

Function codes	Setting values	Remark
P00.11	0.1s	ACC time of frequency
P00.12	0.1s	DEC time of frequency
P05.01	01	Running forward
P05.02	57	Coil diameter reset
P05.32	0.03v	AI1 lower limit voltage
P09.09	0.0%	Upper limit of PID output
P09.10	0.0%	Lower limit of PID output
Special parameters		
P26.00	1	Open loop tension torque control
P26.01	0	Wrap up
P26.02	1	AI1 reference linear speed
P26.04	10.0m/Min	Max. linear speed
P26.07	129.54	Gear ratio
P26.11	530.0mm	Mini diameter of blank coil
P26.12	1300.0mm	Max. coil diameter
P26.13	5	Thickness calculation with materials
P26.16	80.0%	Coil diameter arrived value
P26.18	0.40mm	Material thickness
P26.21	1	PG card input
P26.37	0x10	Coil diameter reset selection
P26.41	20.00s	ACC time of linear speed
P26.42	5.00s	DEC time of linear speed

Application 4: Winding control system of jig dyeing machine with constant linear speed and tension

The process of jig dyeing machine is to dye the cloth. The control process is: first, put the cloth on one of the roller, there is a counting switch on the drive shaft to count the circle. If the PG card is installed, the cloth thickness can be counted by the cloth diameter and the circles. If the cloth thickness is got, after winding, the operator can roll the cloth to another roller and the two rollers run at the same direction. If the dyeing is finished, it is necessary to switch the motor and the cloth will run at the reverse direction to be defied again. The repeated dyeing requires tension and speed control keep constant.

Wiring diagram:



The control needs reference linear speed according to different cloth. In zero speed operation, the reference tension can be adjusted according to the winding tension. Pay attention to reset the coil diameter after repeated dyeing. If the control is complicate, it is necessary to begin sequence and terminal control through PLC.

The parameters of two inverters are the same except for the motor autotuning. The parameters of one inverter are as below:

Function codes	Setting values	Remark
Basic parameters		
P00.00	3	Close loop vector control

Function codes	Setting values	Remark
P00.01	1	Terminal running command
P00.03	64.00Hz	Max. output frequency
P00.04	64.00Hz	Upper limit frequency
P00.11	0.2s	ACC time of frequency
P00.12	0.2s	DEC time of frequency
P01.25	2.0s	E-stopping time
P03.16	64.00Hz	Keypad setting for upper frequency of forward rotation
P03.17	64.00Hz	Keypad setting for upper frequency of reverse rotation
P05.01	01	Forward running
P05.02	58	Wrapping up/off switch
P05.03	67	Control mode switch
P05.04	57	Coil diameter reset
P05.05	07	Fault reset
P05.06	56	E-stop
P06.03	05	Inverter fault
P09.09	0.0%	Upper limit of PID output frequency
P09.10	0.0%	Lower limit of PID output frequency
Special parameters		
P26.00	1	Tension speed control
P26.01	0	Wrap up
P26.02	5	Linear speed determined by MODBUS
P26.04	120.0m/Min	Max. linear speed
P26.07	17.87	Gear ratio
P26.11	360.0mm	Mini diameter of blank coil
P26.12	1000.0mm	Max. coil diameter
P26.13	5	Counting of coil diameter by thickness
P26.18	0.700mm	Material thickness
P26.21	1	PG card input
P26.41	20.00	ACC time of linear speed
P26.42	5.00	DEC time of linear speed

Function codes	Setting values	Remark
P27.00	5	Tension is determined by MODBUS
P27.02	1000N	Max. tension
P27.03	3	Determined by linear speed
P27.04	12.0%	Upper limit offset
Parameters of torque compensation		
P27.06	5.0%	Lower speed limit
P27.12	0	Disabled
P27.20	2.0%	The compensation coefficient of static friction
P27.21	2.5%	The compensation coefficient of sliding friction
P27.22	1	Compensate to the frequency
P27.24	10.0%	High speed torque compensation coefficient

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