Spindle Servo Drive for VA-M Series Machine Tool

As a high-performance servo drive dedicated for spindle drive of machine tool, the spindle servo drive for VA-M series machine tool is researched, developed, and produced independently by Shenzhen V&T Technologies Co., Ltd. Since it is capable of implementing position, speed and torque control, satisfying spindle control requirements for various machine tools, it is the preferred drive product for various machine tool spindles.

Introduction to Products

VA-M series of servo drive for machine tool spindle feature fast acceleration and deceleration capacity, strong low frequency cutting force, leading-edge technologies such as vector control, torque control and servo drive in the world. It is capable of implementing high precision positioning in arbitrary angle, working with a number of major CNC systems, and being widely used in many machine tool plants such as Shenyang machine tool plant.

Product features

With high precision analog input, it is able to achieve zero servo, high precision arbitrary angle positioning (locating of cutter library), pulse control, rigid tapping, C-axis function, electronic gear, max pulse frequency 300kHz, and convenient wiring terminal. Moreover, it is able to work with a number of CNC systems.

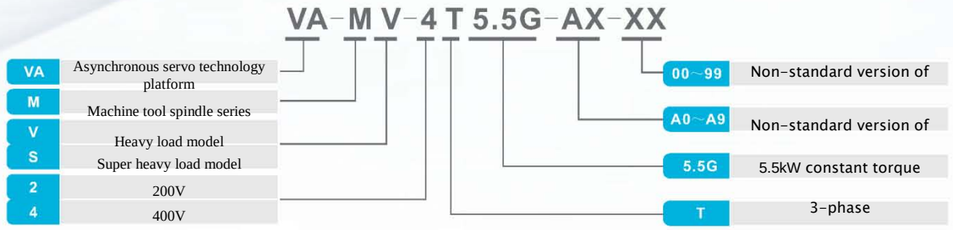
Application fields

It applies for the spindle drive motor of such CNC equipment as lathe, miller, machining center, borer and vertical lathe.

Adaptive motors

These include the AC servo spindle motor, variable frequency motor, and 3-phase asynchronous motor.

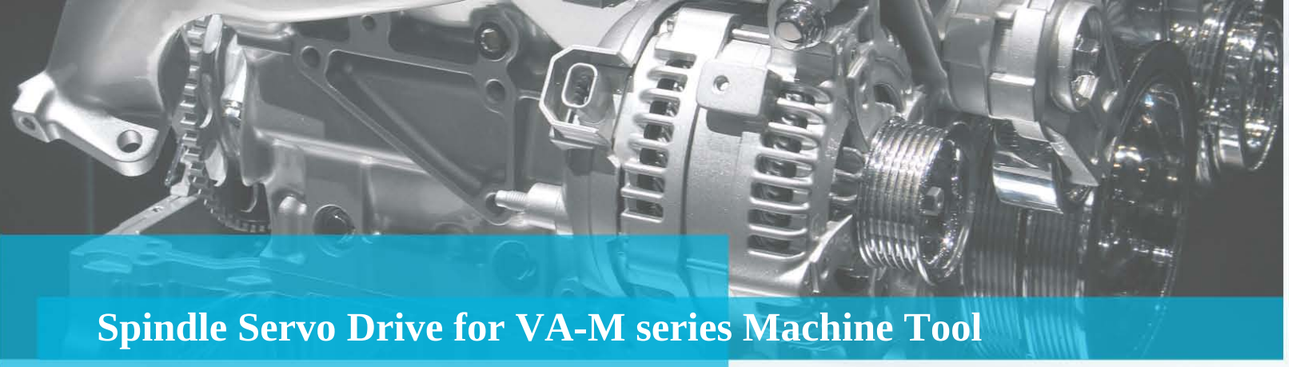
Description of Drive Models



Technical Specification and Performance Parameters

Power (kW)		2.2	3.7	5.5	7.5	11	15
Adapter power (kW)		2.2	3.7	5.5	7.5	11	15
Rated current (A)		5.5	9	13	17	24	30
Output	Overload capacity*	VA-MV: 150% 1 minute, 180% 10 seconds, 200% 0.5 seconds, interval of 10 minutes (inverse-time characteristic)					
	Max output voltage (V)	3-phase 380V/400/415/440V corresponding input voltage					
	Max output speed (RPM)	18000 rpm					
Input	Rated voltage/frequency	3-phase 380V/400/415/440V;50Hz/60Hz					
	Allowable voltage	323V-528V; Voltage unbalance: ≤3%; Allowable frequency fluctuation: ±5%					
Control characteristics	Control mode	Sine wave PWM control, full closed loop vector control					
	Range of speed regulation	1:5000					
	Accuracy of speed control	±0.02%					
	Accuracy of position control	±1Pulse					
	Resolution of frequency setting	Digital signal 0.01Hz; High precision analog signal: Bipolar, with max output frequency /16384					
	Acceleration	0.05-1000 Hz/s					
	Brake mode	Dynamic braking; Built-in brake unit					
I/O interface	Digital input	7-channel opto-isolator input; Input mode: PNP or NPN, optional					
	Digital output	2-channel opto-isolator open collector output; +24V 50mA					
	Analog input	3-channel: -10V~+10V					
	Analog output	3-channel, extensible					
	Relay output	1-channel: A set of normally open/closed contacts: AC250V/DC30V, 1A					
	Fault output relay	1-channel: A set of normally open/closed contacts; AC250V/DC30V, 1A					
	Input interface of encoder	One: Highest receiving frequency 300kHz;Linear drive mode; RS422 standard					
	Pulse input interface	One: Direction + pulse or orthogonal pulse					
	Output interface of encoder	One: Highest receiving frequency 300kHz;Linear drive mode; RS422 standard					
	Bus interface	RS232, CAN, Ethernet					
Spindle function	Speed control	Range: 0~18000 rpm; Direction of rotation: Forwarding and reversal; Speed command: Analog signal, pulse frequency, bus					
	Accuracy control	Precision ±1Pulse; Position adjustment: User parameter setting					
	Rigid tapping	Can be connected with various domestic and imported systems with tapping error of ±2%					
	Other functions	C-axis control, thread cutting, electronic gear, and fraising					
	Motor overload	Alarm when the output exceeds the overload threshold. It is set by parameter.					
	Abnormal output short to ground	Alarm when the output is short to the ground					
	Abnormal output with missing phase	Alarm when the output is missing phase					
Application environment	Operation place	No dust, corrosive or flammable gas					
	Temperature	Operate under the ratings between -10~+40°C, +40~+50°C. The rated current output decreases by 1% when the temperature increases by 1°C each time.					
	Humidity	5~95%. No condensation is allowed.					
	Vibration	3.5 m/s^2, 2~9 Hz; 10 m/s^2, 9~200 Hz; 15 m/s^2. 200~500 Hz					

*VA-MA: Overload capacity 200% 30S. MS refers to the super heavy load model.



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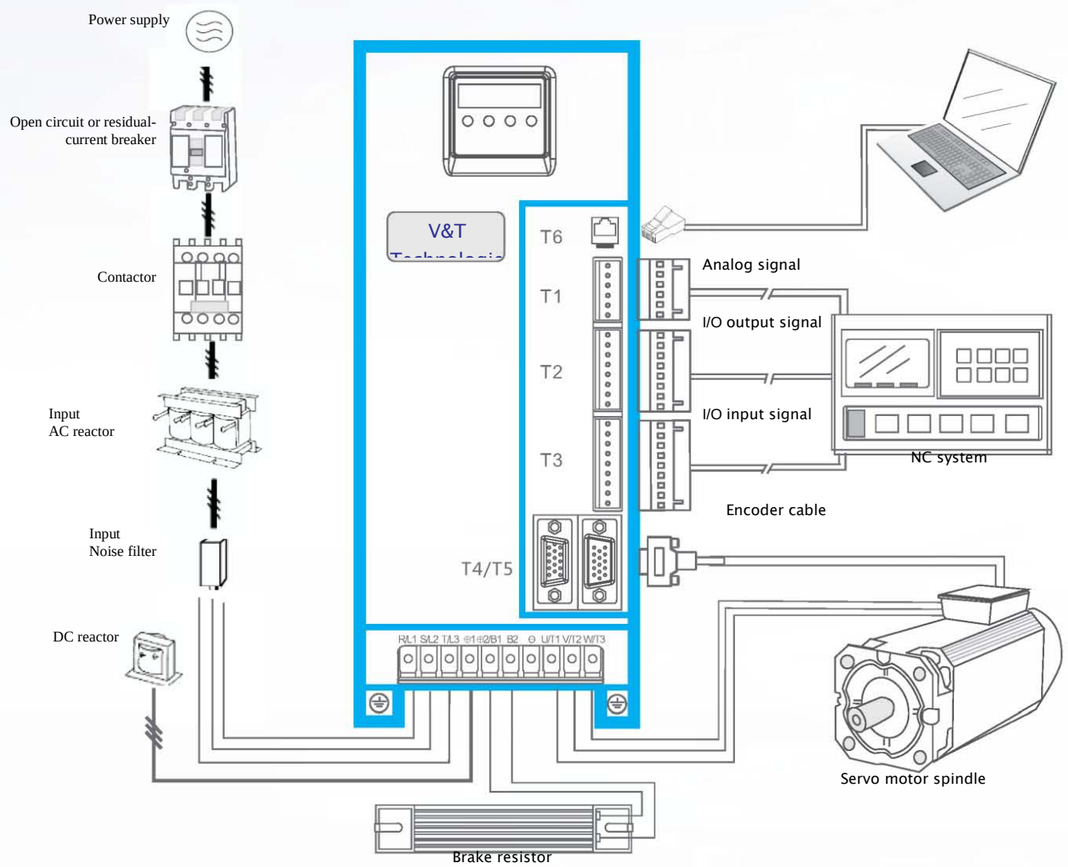
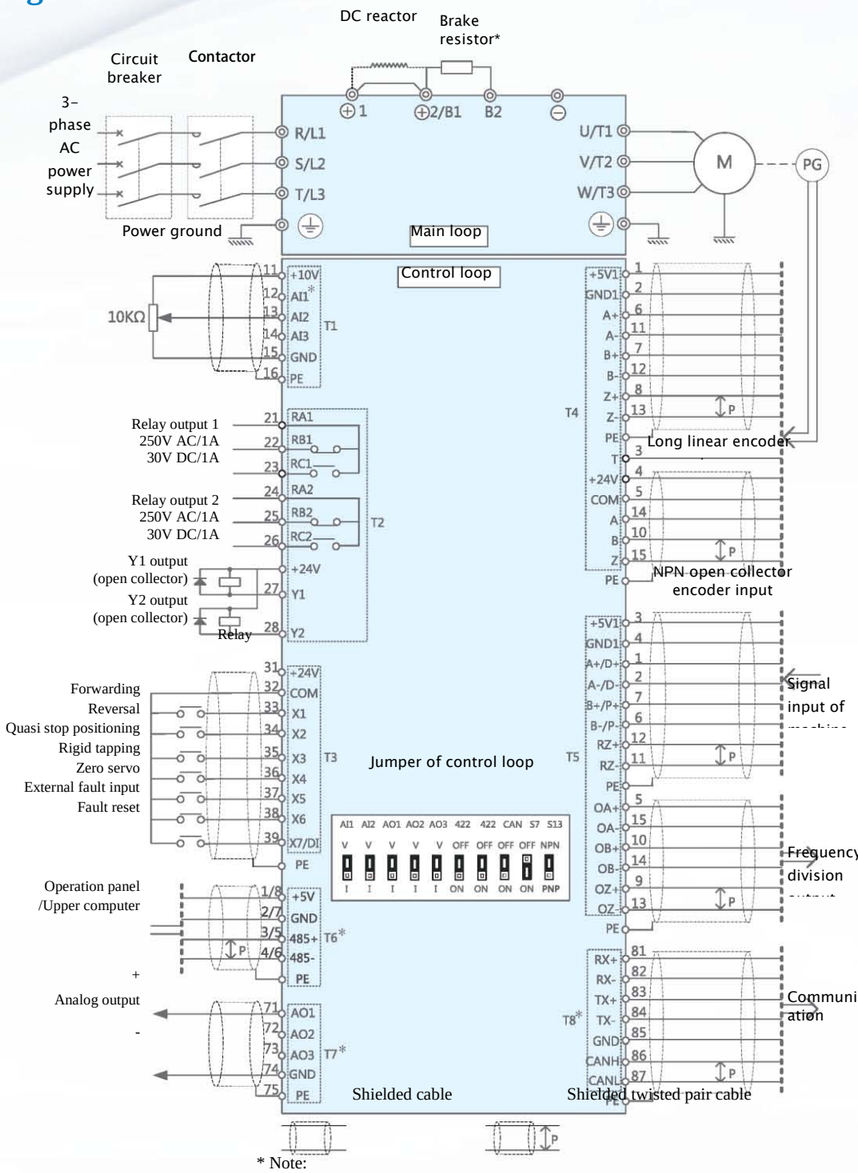
System Wiring Diagram



Wiring Diagram

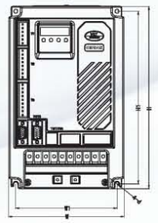


* Note:
1. For the selection of brake resistors, see the User Manual.
2. Shielded twisted pair cable should be used for the signal line of T4 encoder, and shielded cable should be used for the analog input signal.
3. The terminals AI1, T7, and T8 are optional.
4. The external operation panel T6 is optional.

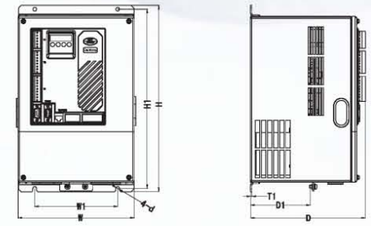
Function of Control Circuit Terminal

Port	Type	Pin	Name	Description for terminal function	Technical specification
T1	Analog input	1	+10V	Reference voltage of analog input	10±3%, isolated from COM inside, max current 10mA, short circuit and overload protection
		2	AI1	Analog input channel 1	-10~10V: Input impedance 14kΩ Max input voltage ±15V Resolution: 16 digits (0.0016%)
		3	AI2	Analog input channel 2	0~20mA: Input impedance 500Ω; Max current 30mA -10~10V: Input impedance 20kΩ; Max input voltage 15V Resolution: 13 digits (0.013%) Select analog inputs 0~20 mA or 0~10V by jumper
		4	AI3	Analog input channel 3	0~20mA: Input impedance 500Ω; Max current 30mA -10~10V: Input impedance 20kΩ; Max input voltage ±15V Resolution: 12 digits (0.025%) Select analog inputs 0~20 mA or 0~10V by jumper
		5	GND	Simulated ground	Isolated from GND1 and COM inside
		6	PE	Ground	
T2	Relay input	1/2/3	RA1/RB1/RC1	Relay output 1	RA1-RB1: Normally closed RA1-RC1: Normally open Contact capacity: 250VAC/1A, 30VDC/1A
		4/5/6	RA2/RB2/RC1	Relay output 2	RA2-RB2: Normally closed RA2-RC2: Normally open Contact capacity: 250VAC/1A, 30VDC/1A
	Programmable open collector output	7 8	Y1 YI	Open collector output 1 Open collector output 2	Voltage range: 24V±20%, max input current 50mA
T3	Control power supply	1	+24V	+24V	24V±1%, isolated from GND inside max load 200mA, overload and short circuit protection
		2	COM	+24V GND	Isolated from GND and GND1 inside
	Control signal input	3	X1	Forwarding (FWD)	Input parameter: 24VDC, 5Ma Frequency range: 0~200 Hz Voltage range: 24V±20%
		4	X2	Reversal (REV)	
		5	X3	Quasi stop positioning	
		6	X4	Rigid tapping	
		7	X5	Zero servo	
		8	X6	External fault input	
		9	X7/DI	Fault reset	Multi-function input: Same as X1~X6; Pulse input: 0.1Hz~50kHz; Voltage range: 24V±20%
T4	Encoder input	1/2	+5V1/GND1	+5V1/GND1	Isolated from +5V/GND and +24V/COM inside
		6/11	A+/A-	Encoder A-phase input	Long linear encoder input
		7/12	B+/B-	Encoder B-phase input	
		8/13	Z+/Z-	Encoder Z-phase input	
		3	T	Thermal protection input	Input parameter: 5VDC, 5mA Frequency range: 0~200 Hz Voltage range: 5V±2% Active for high level, reference ground:GND1
		4/5	+24V/COM	+24V/COM	Isolated from +5/GND and +5V1/GND1 inside
		14	A	Encoder A-phase input	NPN open collector encoder input
		10	B	Encoder B-phase input	
		15	Z	Encoder Z-phase input	
T5	Input	3	+5V1	+5V1	Isolated from +5V and +24V inside
		4	GND1	+5V1 GND	Isolated from GND and COM inside
		1 2	A+/D+ A-/D-	Encoder A-phase/Machine tool controlled orthogonal pulse A-phase input/single pulse direction input D	Input end for pulse given
		7 6	B+/P+ B-/B-	Encoder B-phase/Machine tool controlled orthogonal pulse B-phase input/Single pulse series input P	
		12 11	RZ+ RZ-	Encoder Z-phase	
	Frequency division output	5/15	OA+/OA-	Encoder A-phase output	Frequency division output end
		10/14	OB+/OB-	Encoder B-phase output	
		9/13	OZ+/OZ-	Encoder Z-phase output	
T6	Net port 485	1/8	+5V	+5V	Isolated from +5V1 and +24V inside
		2/7	GND	+5V GND	Isolated from GND1 and COM inside
		3/5	485+	Positive terminal of differential signal 485	The same as terminal 485 when the upper computer is connected for communication
		4/6	485-	Negative terminal of differential signal 485	The longest distance is 15m when the operation panel is connected for communication

Appearance, Installation Dimension and Weight



VA-MV-4T7.5G and the power level lower than it, VA-MS-4T5.5G and the power level lower than it

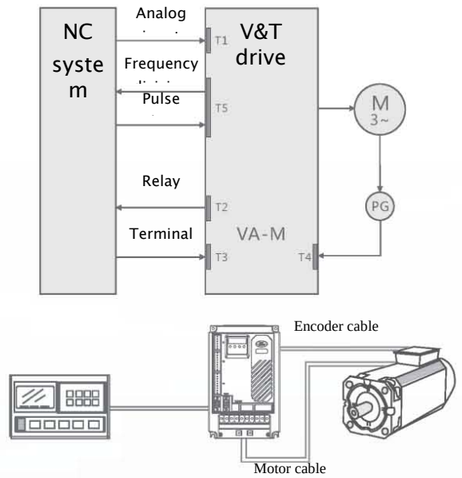


VA-MV-4T11G and the power level higher than it, VA-MS-4T7.5G and the power level higher than it

Voltage level	Drive type	Dimension (mm)								Rough weight (kg)
		W	H	D	W1	H1	D1	T1	Mounting hole d	
400V	VA-MV-4T2.2G VA-MV-4T3.7G VA-MV-4T5.5G VA-MV-4T7.5G	155	249	187.7	136	232	69	8	5.5	3.3
	VA-MV-4T11G VA-MV-4T15G	210	337	220	150	324	107.5	2.5	7	8.5
400V	VA-MS-4T2.2G VA-MS-4T3.7G VA-MS-4T5.5G	155	249	187.7	136	232	69	8	5.5	3.3
	VA-MS-4T7.5G VA-MS-4T11G	210	337	220	150	324	107.5	2.5	7	8.5

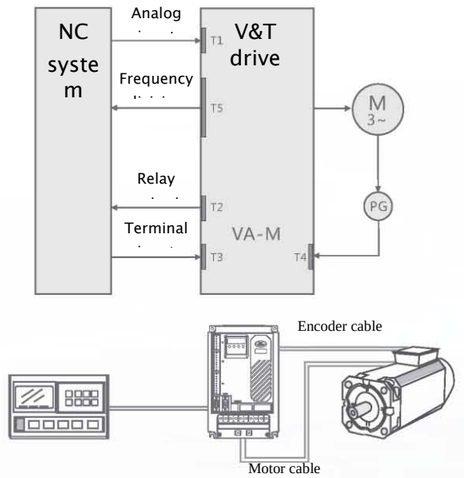
Introduction to Typical Application

1. Analog and pulse control



Function features: Spindle speed/position control, pulse speed/position control, full pulse control, arbitrary angle positioning (locating of tool magazine), indexing function, C-axis function, and rigid tapping

2. Analog control



Function features: Spindle speed/position control, arbitrary angle positioning, and rigid tapping

V&T Technologies

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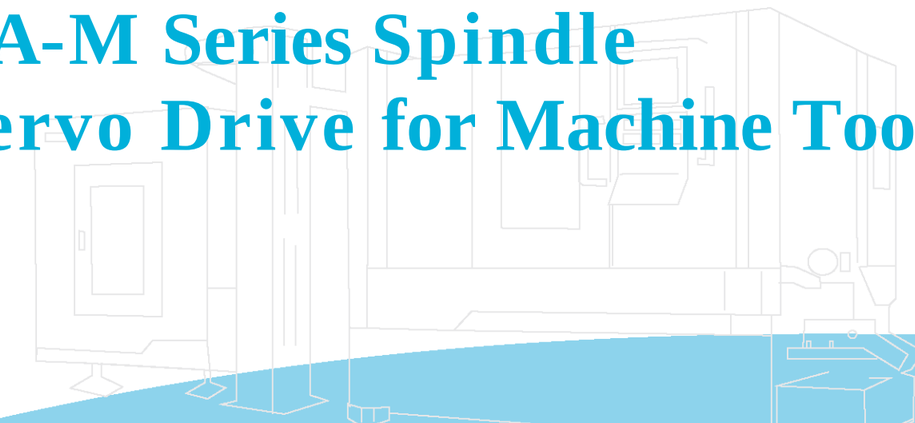
VA-M Series Spindle Servo Drive for Machine Tool



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