

# **Operation Instruction**

**Ball Bearing Motorized Spindle (DC-40V3)**

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# Product Brief Instruction

1. This spindle is motor-spindle 2 in 1. The motor is built in the spindle. It is three - phase AC asynchronous induction motor and its speed is controlled by a frequency inverter with stepless speed change. The whole unit is well compacted with the characteristics of low vibration and noise, high speed and accuracy as well as stably running.
2. It is lubricated with grease and need no further lubrication in whole life.
3. The motor is cooled compulsorily with air. Cooling air takes the heat away through hole channels well assigned in the motor and keep the motor temperature in a stable and reasonable value.
4. For more detailed information of the spindle, refer to the instruction or call the service phone number of 020-29032485.

# Technical Data Sheet

No.	Data \ Type	DC-40V3
01	Speed (rpm)	10000~60000
02	Max current (A)	2.5
03	Frequency (Hz)	167~1000
04	Voltage (V)	0~100
05	Power (KW)	0.35 (max)
06	Shaft-end static runout (um)	2.0 (max)
07	Shaft-end dynamic runout (um)	5.0 (at 12mm out)
08	Vibration (mm/s)	≤0.8
09	Mounting diameter (mm)	Φ40-6h
10	Cooling air flow volume (L/min)	≥40
11	Cooling air pressure (kg f/cm <sup>2</sup> )	2.5~3.0
12	Motor winding insulation resistance (MΩ)	≥500 (H级)
13	Motor winding withstand voltage test (V/M)	1500V/1 minute
14	Noise (dBA)	≤72
15	Tooling releasing pressure (kg f/cm <sup>2</sup> )	5.0~6.0
16	Tooling exchange way	ATC
17	Collet torsion force (N·cm)	≥165(Φ4 tool)

## Wire Connection Instruction

### 1. Power cable

The motor is 3 phases and 3 lines. To adjust the any two phase to find the right turn direction.

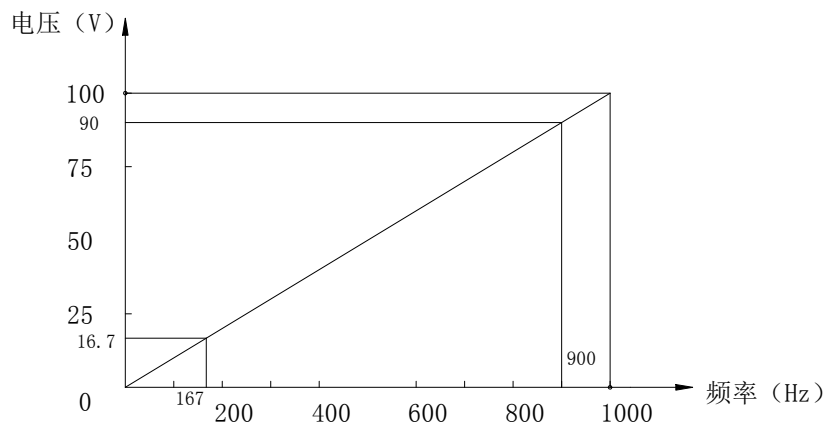
	Color	Phase	Number
Motor stator wires	Red	U	1
	Black	V	1
	Green	W	1
	Yellow-green	Earthing	

### 2. Sensor signal wire

	Color	Function	Number
Temperature sensor wires	Yellow	0V or 5V	Optional
	Blue	5V or 0V	Optional

# Frequency-Voltage Adjustment Curve

## F/V曲线(仅供参考)



Frequency inverter setting: ENTER for Confirm, PRGM for Back, << for location move

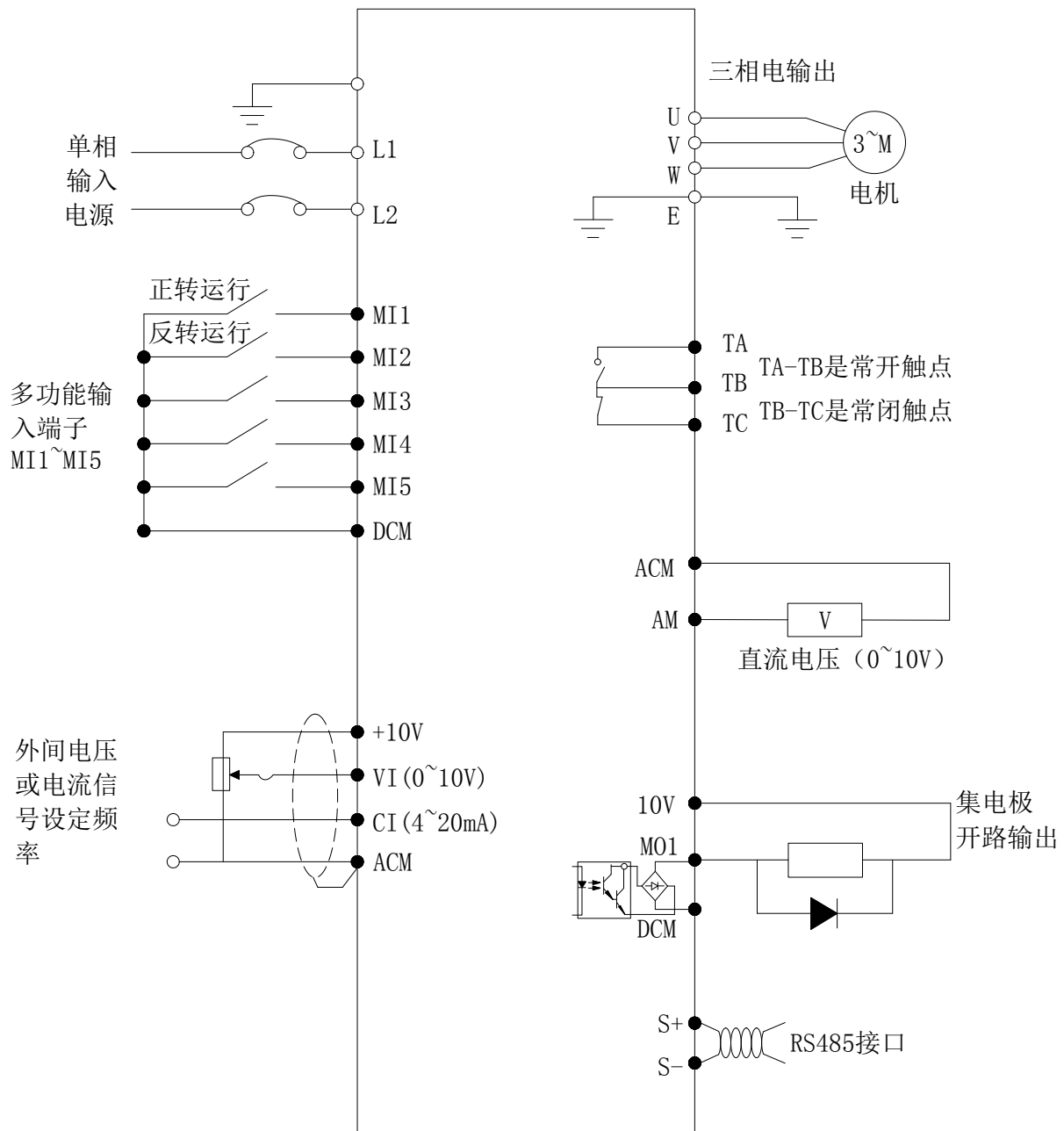
Data Number	Name	Description	Value
F0-01	Motor control way	0: Vector control without speed sensor SVC 1: Maintain 2: V/F	2
F0-02	Instruction origin selection	Terminal instruction route	1
F0-03	Frequency instruction selection	Analog quantity VI setting	2
F0-10	Max output frequency	10.0~1000.0Hz	1000
F0-12	Upper limit of running frequency	P0.05~0.04Hz	500
F0-14	Lower limit of running frequency	0.00Hz~P0.06	166.6
F0-17	Speedup time	0.1~3600.0s	5.0
F0-18	Speedcut time	0.1~3600.0s	5.0
F0-15	Carrier frequency setting	0.5~15.0kHz	6.0~8.0
F2-04	Motor rated frequency	0.01Hz~P0.04	1000
F2-05	Motor rated speed	0~36000rpm	60000
F2-02	Motor rated voltage	0~460V	100
F2-03	Motor rated currency	0.1~2000.0A	3.8
F4-01	Torque boost	0.1‰~30.0‰	10
F5-15	VI upper limit	F5-13~100V	↑ ↓
F5-13	VI lower limit	0.0V~P5-15	↑ ↓
10000rpm	Corresponding 166.6	30000	Against 500
F6-02	Relay ABC selection	Break-down output	2 ( Change to 4 for test )
F0-27	Parameter initialization	Restore basic parameter	01

## Customer Guide:

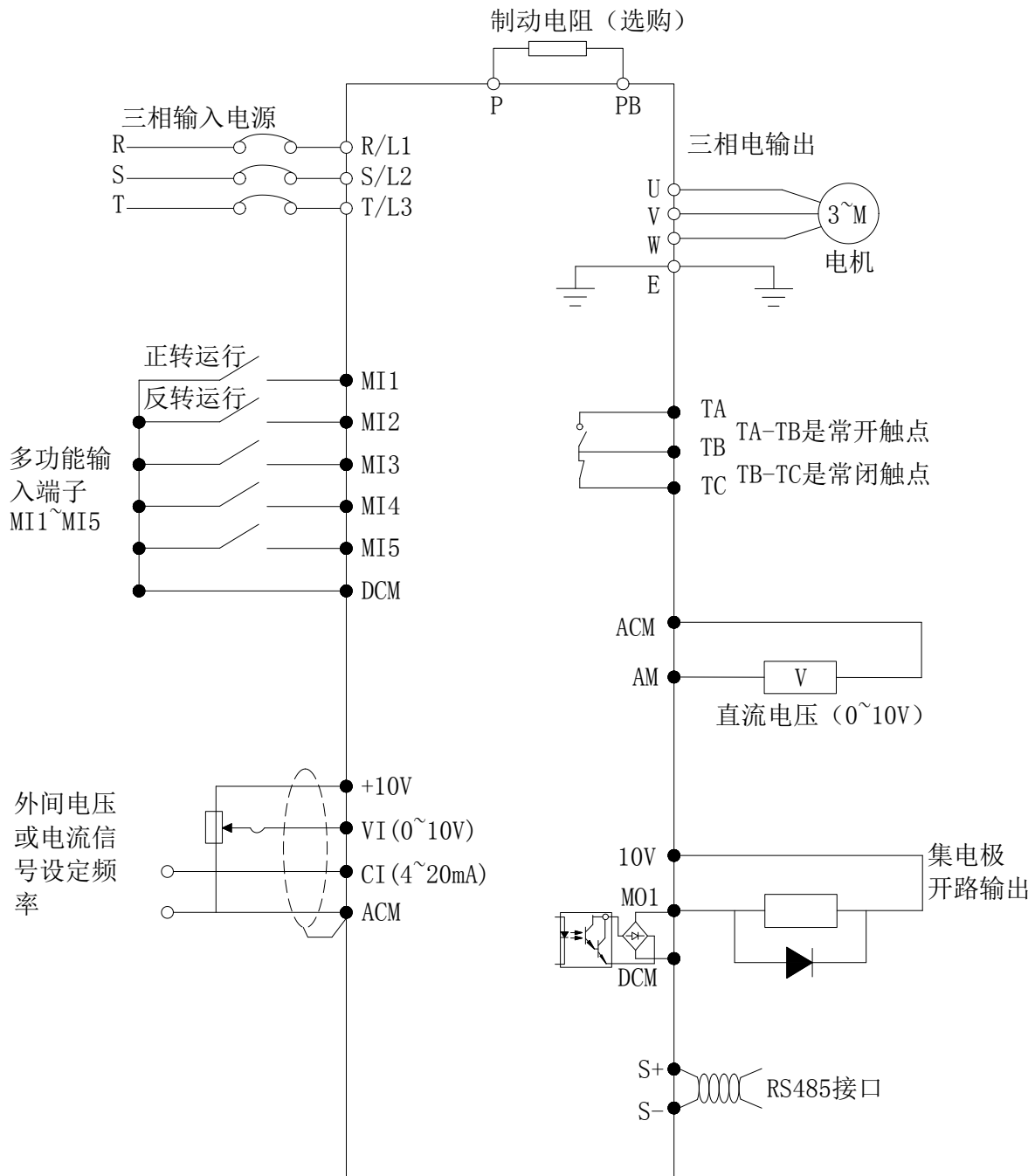
When a customer uses F/V control way to drive the spindle, he should take the actual F/V curve set by the serviceman as the running curve which can meet all running condition in the customer's factory. The curve in the instruction is only for reference.

Note: In same running condition, different frequency inverters, using the similar F/V curve, will have different drive output.

Frequency wire connection is divided into main circuit and control circuit. When the cover of a inverter is opened, the main circuit terminals and control circuit terminals can be seen. The terminal wiring must be connected as the below chart.



M系列0.4-1.5Kw标准配线图



0.75-7.5Kw标准配线图

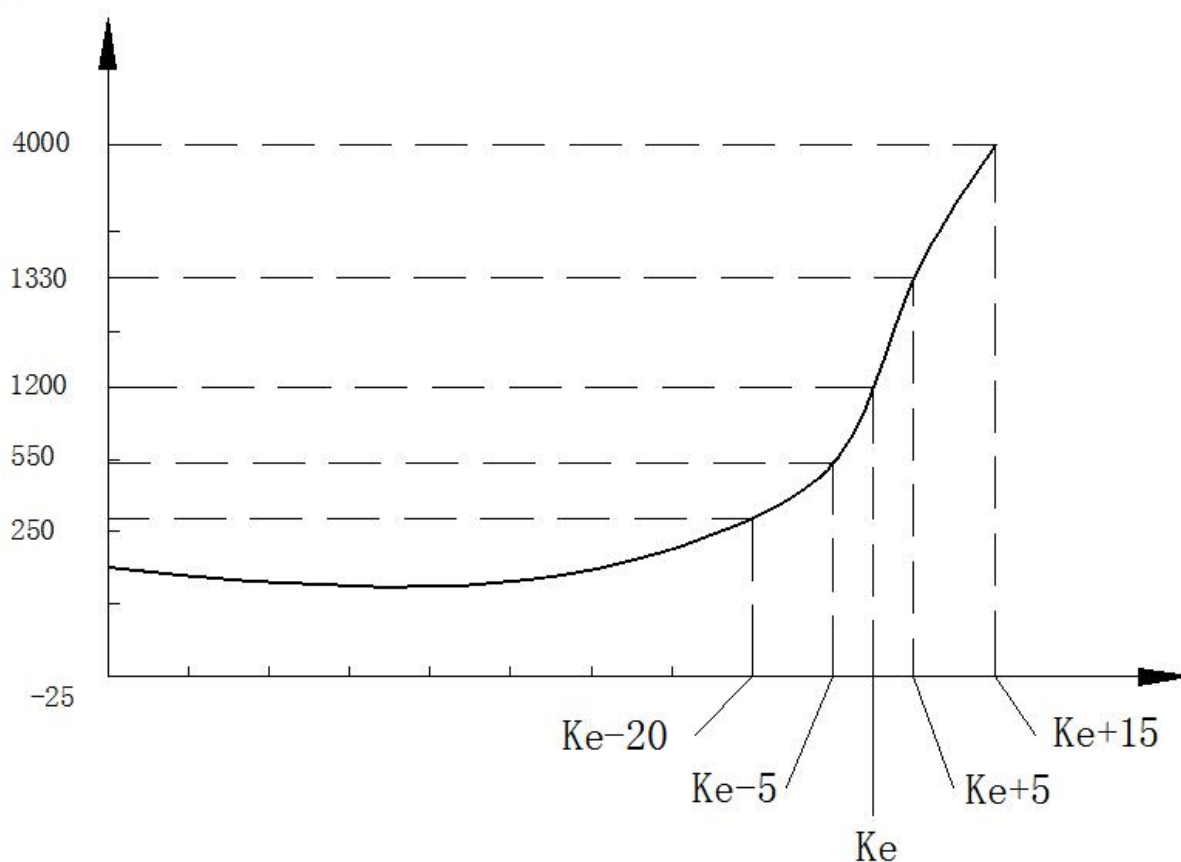


# Temperature Sensor

## Technical data

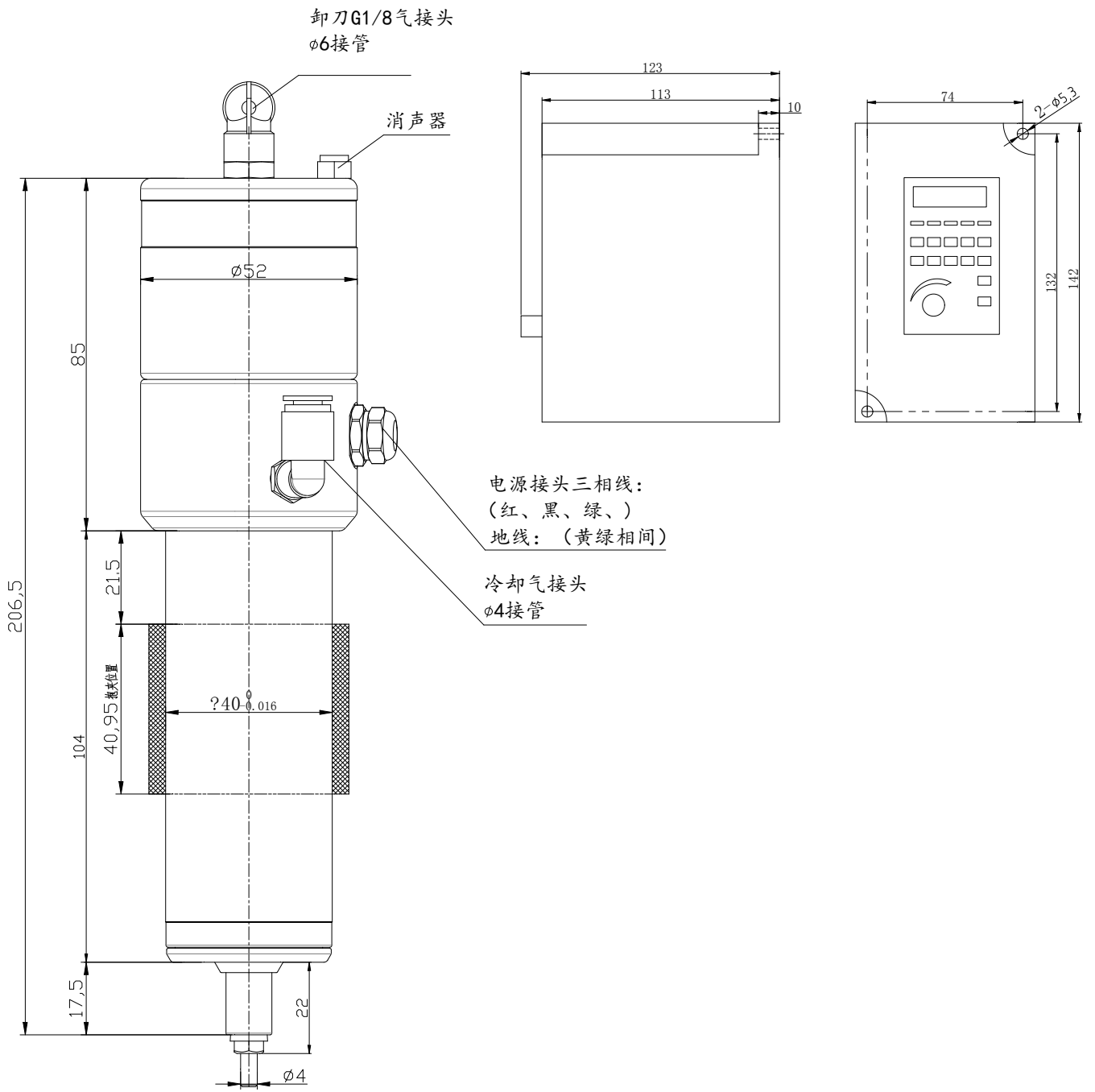
- 1、Sensor kind: PTC (Positive temperature coefficient), normal temperature resistance  $R_{25} \leq 85 \Omega$ 。
- 2、Switching characteristics: Temperature control point  $K_e = 130^\circ\text{C}$ ,  $K_{e-5} \leq 550 \Omega$ ,  $K_{e+5} \geq 1400 \Omega$ 。
- 3、 $K_e$  deviation  $\Delta K = \pm 5^\circ\text{C}$ ,  $K_e$  repeating  $\Delta K = \pm 0.5^\circ\text{C}$ 。
- 4、Heat reaction time:  $\leq 2\text{s}$ 。
- 5、Max voltage 30V (DC), insulation strength 2.5KV。

阻值 ( $\Omega$ )



# DC-38A mounting Instruction

# Frequency Inverter Assembly



## Requirement for tooling installation and holding:

A screw is used to tighten the tooling. The tightening torque is 2.5 to 3.5. In tooling tightening, a torque spanner should be used. For the 1<sup>st</sup> step the torsion force limit should be set to 2 Nm. After having tightened the tooling to the force and for the 2<sup>nd</sup> step, set the limit to 2.5 to 3.5 and tighten the tooling again. At least two time tightening is necessary so that the tightening is step by step and the force is even. If the tightening is over, the shaft might be deformed and accuracy is decreased.

## Notes for operation

1. Motor spindles are electrical and mechanical combined unit with high speed and precise components. For your correct and safe operation of the spindles, please read the instruction and these notes.
2. A spindle should be stocked in the environmental temperature of  $20^{\circ}\text{C} \pm 10^{\circ}\text{C}$ , humidity  $\leq 85\%$  with less than 3 month shelf life.
3. The best running environmental temperature is  $20 \pm 2^{\circ}\text{C}$  under which the bearing can run for the longest life. It is agreed that the environmental temperature is  $20^{\circ}\text{C} \pm 10^{\circ}\text{C}$  but it should be made sure that the coolant temperature is set same as the surrounding environmental one.
4. No spindle can be started without collet installation.
5. Before starting a spindle, the sealing air should be checked if it is blown out from the shaft end or not. If yes, the spindle can be started or the sealing system should be checked further.
6. Make the spindle turn in correct direction (same as the arrow shows).
7. Before a machine with the spindle is started, the compressed air filtering bottles should be checked and it should function well with water drainage. Or it should not be started. Before the spindle two oil/water filter bottle should be installed and they can drain water automatically with the filtering grade of 5um and the bottle volume 60CC over.
8. A tooling releasing can only be conducted after the spindle has been stopped completely for over 10 seconds. The releasing button can be pressed down.
9. Before replacing tooling, the shaft must be stopped completely and the collet is open.

10. After a spindle stops, the cooling air should not be switched off until it is well cooled.
11. The specific tool should be used to take off the tooling.
12. When mounting a spindle, it is not allowed that the spindle is over clamped around it or the body will be deformed and internal components would be damaged.
13. A spindle can't run at over speed and can only run at the speed range shown in the data sheet.
14. There must be a tooling when the collet is tightened.
15. A spindle newly mounted or that doesn't run for long time, it should not run at the highest speed until it runs at lower speed (recommend at 50% of the max limit) for around 5 to 10 minutes.
16. An untrained operator can't mount and take off a spindle and operate it.

## Maintenance precautions

1. Before a production shift starts, check the cooling system for normal function and parameter setting correctly.
2. Before running, check all running parameters for correctly setting.
3. Clean the internal hole and tapering of a collet every day and make sure no dirt and contamination inside. And according to the data in the data sheet, check the collet torsion force and static/dynamic runout.
4. Timely check the cooling system for any possible failure according to the equipment supplier instruction.
5. Every year take off the spindle and clean it. Make sure no dirt and contamination inside as well as the ball bearing in good status.
6. If a spindle breaks down or technical service support is necessary, call our service phone 020-29032485.

## Collet maintenance instruction

1. This serious spindles are assigned with the collet made by ourself:  $\Phi 4\text{mm}$  and its installation way is fixedly positioned. The maintenance schedule is one time every 100 running hours. The processes are: stop the spindle. Turn off the cooling, take away the tooling and collet, clean the taper with no dust tissue, put the collet back onto its original position, tighten the collet with torsion spanner with torsion for less than 3Nm and turn back the spanner for half circle (180 degree) after having tightened the collet. Every collet must be installed back to its spindle that it was taken away from and can not be mixed up. If a collet is broken, the new one must be from the original spindle manufacturer or the machining accuracy can not be guaranteed.
2. In normal running, the compressed air for the automatic tooling releasing mechanism must be 5.6–6.0kgf/c. Because the air pressure has the relationship with the tightening force of the collet clamping force, it is required same in setting the spindle and running the machine. Or the clamping force of the tooling might be in trouble.

End