

Wenling Yuhai Electromechanical Co.,Ltd

YH3822 Operating Manual



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Among the application of 86mm、110mm、130mm hybrid stepper motor(Main request point is positioning control of within 900rpm,high torque,fast response,high cost-effective or frequency conversation speed governing control), the three-phase hybrid stepper motor apply for wide range.

YH3822 set the customer demand of high voltage three phase stepper motor driver as goal,use industrial application basis,in order to offer customer high cost-effective、high stable product.The control project base on the advanced technology over the world.It strongly concerns the strong and weak electric isolation、input signal compatibility、key raw material brand、mature component on designing the hardware; The software adopts improved vector control technology and fast algorithm,have the function of self testing running、single and double pulse mode setting、multiple protection etc.

Feature

- Single power input,voltage range:AC110-240V;
- Driver current can be tuned by 16 grade from available value 1.2A/phase to 8.5A/phase;
- 16 grade subdivision setting,the highest resolution ration 60000 step/rev; Subdivision configuration adopts micro subdivision control mode when less than or equal to 2000 step/rev;
- The highest response frequency can be 200KHz;
- Phase memory function: automatic memory motor rotor position when power off;
- Protection function: over-heat /over current protection、phase short circuit protection、over-voltage protection;
- Automatic semi-flow: when input pulse stops for more than 100ms,the current reduce half automatic,reduce the motor heat;
- Fully isolation: signal input output isolation; strong and weak electric isolation(pwm control signal and current sampling isolation);
- 5V/24V signal input compatibility design;
- Control mode choice: pulse/direction mode; or double pulse input mode;
- Self test function: driver motor at 30 rev/min speed without outer pulse signal;
- Size 83x202x147(mm³), Suggested installation space at least100x230x200(mm³); Net weight: 1.5kg(with package 1.7kg); Color: White;
- Adopt industrial chip design, running surrounding temperature: $-25^{\circ} \sim +60^{\circ}$ (below 0° without frost);
- Adopt vector control and micro subdivision control technology, compare to original driver,it does much better on running stability、noisy、vibration、heat;

Application

Potting machine、Engraving machine、Laser cutting machine、CNC lathe machine、Packing machine、Drilling machine、Pipe-bending machine、Zipper teeth cutting machine、embroidery machine、Sewing machine、Coiling machine

Current Setting

Driver working current IM(Abbreviation IM) set by D1-D4 dial-up switch(note: working current is the available value when regularly running,embrace axis current is 50% of corresponding working current,calls automatic semi-flow.The driver runs internal automatic semi-flow when pulse input stops for more than 100ms and MF release signal invalid),Totally 16 grade,Details check following form.

Note:RMS/A on driver shell stands for current valid value,Peak/A stands for peak current setting.Working current support online setting when power on.

IM/A	1.2	1.5	2.0	2.3	2.5	3.0	3.2	3.6	4.0	4.5	5.0	5.3	5.8	6.5	7.5	8.5
D1	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
D2	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
D3	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
D4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON

Subdivision Setting

Driver subdivision DIV(Abbreviation DIV) set by D5-D8 dial-up switch,totally 16 grade,details check following form.Three phase driver subdivision setting define by how many pulse need when stepper motor rotor one revolution,Pulse/rev on driver shell stands for this.

DIV	400	500	600	800	1000	1200	2000	3000	4000	5000	6000	10000	12000	20000	30000	60000
D5	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF
D6	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF
D7	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF
D8	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

Note: Subdivision setting modification will be valid after power-off and re-start.

Single/Double Pulse Working Mode Select Setting

Single/double pulse working mode selection set by D9 dial-up switch.

Appears double working mode when D9 turns ON(CW needs CW pulse input by PU+/- single opening,CCW needs CCW pulse input by DR+/DR- opening);

Appears pulse+direction working mode when D9 turns OFF(Pulse signal input by PU+/PU- signal opening,direction signal input by DR+/DR- opening);

Note: Single/Double working mode modification will be valid after power-off and re-start

Smooth type driver only have pulse+direction mode;Standard type driver is tracing type,like pulse stops,motor stops;There is a lag on control of smooth type,the pulse stops for 8ms,then the motor r stops.

Self test running mode setting

Self test running mode selection set by D10 dial-up switch.

Appears self test running mode when D10 turns ON,Only connect to power and motor cable before self test,without outer pulse control signal(This time need to pull up the pulse input signal terminal or confirm on pulse signal input),right now subdivided dial-up invalid,current dial-up selection valid,motor runs at 0.5r/s(30RPM).This function use to check the inner function of driver normally or not.

Appears to normal working mode when D10 turns OFF,now need to connect with out pulse control signal to make the motor running.

Note: Must confirm no pulse signal input to driver when D10 turns ON;Must not turn D10 to ON if there is pulse sent to make driver normally work,or easily to cause over current alarm.

Control signal interface and major loop wiring statement

All input signal use photoelectric coupler to isolate the input output signal.To ensure built-in high speed optocoupler breakover reliably,needs the current of input control signal at least 10mA.Driver already has current-limiting resistor,when the voltage of input signal is 5V,directly connected to 5PU+/PU-, 5DR+/DR-, 5MF+/MF-.When input signal is 24V,control signal directly connect to 24PU+/PU-, 24DR+/DR-, 24MF+/MF-.If the voltage of input signal is 12V,tell us before ordering,we can make revised inside of driver,or you can use 510Ω current-limiting resistor to 5PU+/5DR+/5MF+terminal.

Input signal connection normally has following ways,details check following form.Following is input output signal pin function statement.

Terminal	Identification symbol			Function	Statement
DB15 Signal interface terminal	Input signal	13 pin	24PU +	Pulse input(5V/24V selection); double pulse is CW signal	Details check signal/double working mode selection setting and input signal wiring statement form,please note timing sequence must meet parameter of “input signal timing sequence” on appendix
		1 pin	5PU+		
		2 pin	PU-		
		14 pin	24DR +	Direction input(5V/24V selection),double pulse is CCW signal	
		3	5DR+		

		pin			
		4	DR-		
		pin			
		15	24MF	Motor releases the signal (5V/24V selection);Motor will be in free state when released signal valid,motor will be in journal sticking or running state when invalid	Details check the graphical statement of input signal timing sequence appendix
		pin	+		
		7	5MF+		
	Outp ut signal	pin	8	MF-	
		pin			
		11	RDY+	Driver signal ready,correspond to C、E terminal of optocoupler	Details check appendix of the output signal wiring,when driver power on,self test program will make optocoupler breakover for around 0.5s,at this time,the ALM light will be flashing one time,means ALM light is normal,give a state command to upper computer,state self test normal.
		pin	12	RDY-	
Fence type wiring terminal CON6	Moto r cable	1、 2、 3 pin	U、V、 W	Connect to U、V、W of three-phase hybrid stepper motor	Usually 86mm motor only have U/V/W wire,110mm and 130mm motor will have one more extra grounding wire,this wire should be connected to M4 screw of bottom case,PE->guiding position on side of driver shell is shell ground.Make the distance between motor cable and driver short(Normally no longer than 3m).
	Powe r input	5、 6 pin	~AC 、 ~ AC	AC input,AC:110-220V	The highest voltage do not over 250V,please install a isolated transformer if voltage too high or in the area that power supply not stable ,the ratio around 220:180,power around 0.5-1.5KW(depends on current).Normally cnc lathe machine install with a isolated transformer to make running much more stable.

Note:1.the 4 pin N of fence type wiring terminal CON6 is empty terminal,do not wire; N of DB15 terminal is empty terminal as well;

2.The signal input wire should use shield wire to ensure ground connection reliably,power cable(motor cable and power cable)also need shielding wire to ensure ground connection reliably(Specially for the system of multiple stepper driver or multiply stepper driver and

Common Problem and Handling Method

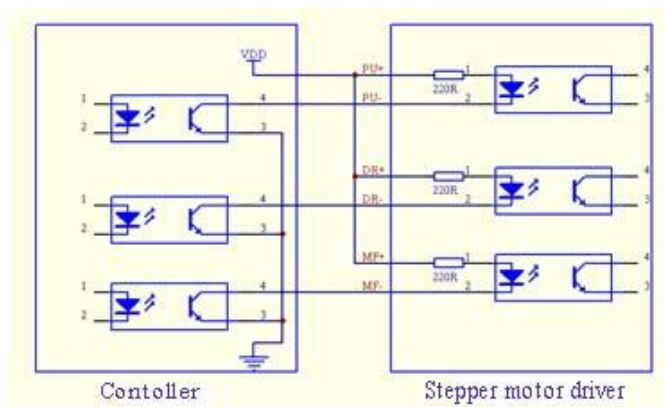
Problem	Reason	Handling method
Motor can not rotate	Power indicator light(green) do not light	Check power supply normal or not,if normal,means abnormity caused in inner circuit(maybe fuse burned or other reason)
	Fault indicator light lighten	Check motor wiring short circuit or not(Or motor fault)), current setting correct or not; if correct,means driver inner circuit abnormal
	Inner circuit of driver abnormal;control signal of DB15 terminal input abnormally	1.Turn the self test dial-up switch to ON,set current as rated current,check motor can rotate or not,if rotate,means most of driver is normal,may be abnormity exist in driver signal connect circuit or external input signal abnormal; if not rotate,means motor or driver abnormal; 2.Under self test rotate condition,check DB15 signal input loop wiring correct or not,single/double pulse mode setting correct or not etc; 3.If self test normal,DB15 signal loop normal,use another driver or motor to do cross-test,available to find out the reason for abnormal.
Motor scream	Driver working current is not match with motor rated current	Set driver working current as rated current(Usually too low current will make motor scream).
	Time for accelerating too short	Extend the time for accelerating
	Subdivided configuration mistake	Set the subdivided configuration to correct value(usually too low will make motor locked-rotor and scream)

	Overstep of input pulse too big	<p>1.Accelerating and decelerating curve configuration fault,or the acceleration and deceleration in accelerating and decelerating curve too big,or large burr exist in pulse delivery and pulse drop;</p> <p>2.Disturb too large,multiple stepper driver or converter and servo driver use together but without reliable shielding ground connection,when this condition occurs,the motor will slightly wriggle when motor journal sticking;</p>
Position incorrect	Subdivided number incorrect	Select correct subdivided number
	Motor load too big	Change motor or increase driver working currently properly
	Running speed too high	Reduce the motor running speed properly,to check still cause position incorrect problem or not.The motor load capacity decline at high speed,so will cause lose step.
	Current setting too large	Running current too large will cause motor heat seriously,easy to cause lose step.Should set current to rated current or smaller(test after motor heat reduce),the check cause lose step or not.
	Motor fault	Change another motor to test
	Slight lose step(specially for go circular arc interpolation in cnc system)	<p>1.Timing sequence of pulse and direction may not meet demand,detail check appendix of input signal timing sequence chart,noted at least 2.5us timing sequence interval(or larger).</p> <p>2.Signal cable and strong electric cable(motor cable and</p>

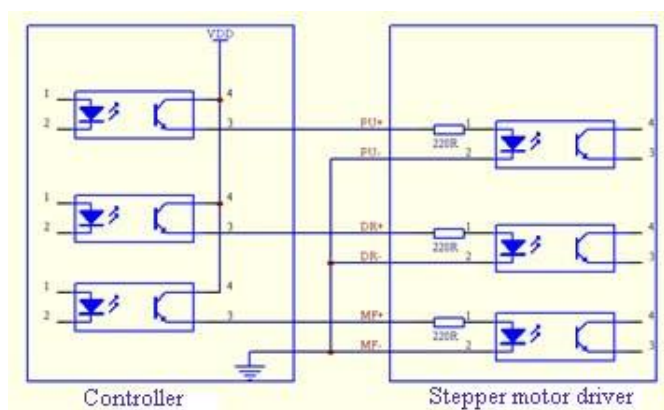
		<p>power cable)donot use shielding cable to connect ground so cause the input pulse disturbed.</p> <p>3.Motor cable too long,usually,the cable between driver and stepper motor is not longer than 3m,use better quality cable;</p>
“electric leakage”problem	Driver and motor without reliable ground connection	<p>1.Connect driver and motor to the ground reliable,instead of only connect motor ground wire to the driver shell;</p> <p>2.In the occasion without ground wire,use insulated rubber mat or other method to isolate the place that can easily touch motor 、 driver and bedplate by hand,set warning sign</p> <p>3.In the occasion using multiple driver,can negotiate with power supply department about the grounding wire problem,or find professional company to customize underpinning.</p>
Driver 、 motor too hot	Driver running current too big、 motor abnormal or outer heat dissipation condition bad	<p>1.Reduce the driver running current properly</p> <p>2.Change motor</p> <p>3.Increase driver and motor ventilation and heat dissipation</p>

Appendix:input output signal wiring and control timing sequence statement

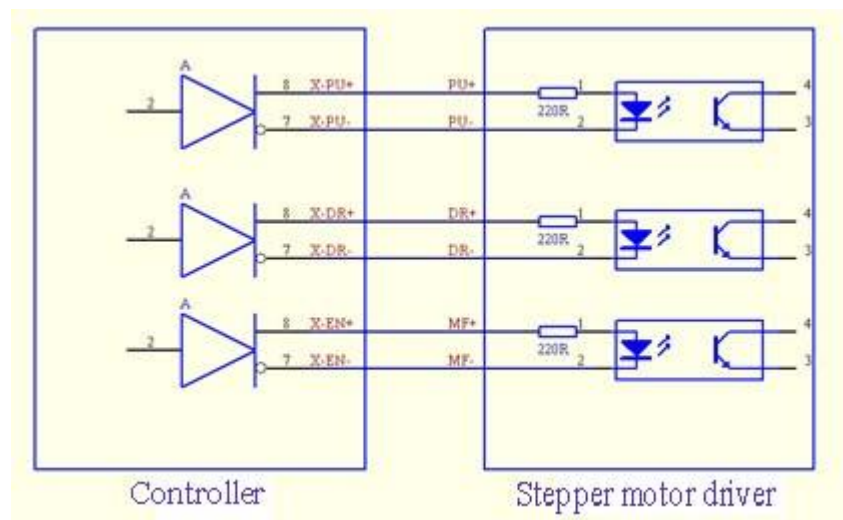
➤ Input signal common anode connection



➤ Input signal common cathode connection



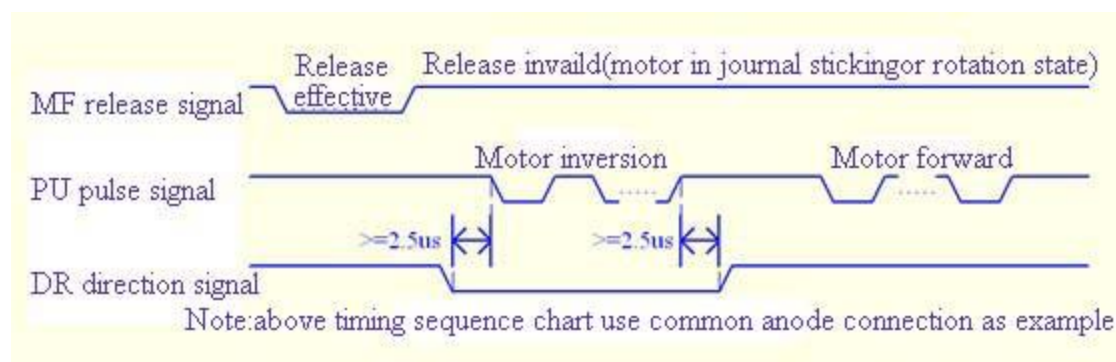
➤ Input signal differential connection



Note: Differential connection must connect to controller or the differential output opening of running control card, can not use anode or cathode of differential signal as control signal of common anode connection to connect (This connection will easy cause control position incorrect or lose step).

➤ Input signal timing sequence chart

Following is the timing sequence of MF-, PU-, DR- under common anode connection (low effective).



➤ Output signal connection

Output signal isolated output by optocoupler, usually as driver working state indicate (The indication that driver cause fault or not) Connector signal offer to controller or upper computer. This connection is similar to the above-mentioned common anode connection or cathode connection of input signal. Following is one of therein connection.

