Digital Two-phase Motor Subdivision Driver SD-20504

Goods No.：001526 Low vibration, low noise, low energy consumption

Characteristics

- 32-digit DSP digital control mode
- Low vibration, low noise and low energy consumption
- Flexible subdivision, more stable operation
- Automatic phase memory at power-off
- Input signal optoelectronic isolation
- Space vector bipolar constant-current drive
- Maximum output current 4.0A/phase
- Providing energy-saving automatic half-current locking function
- 16 subdivision modes are available with the maximum mode being 25600 steps/rotation
- CE certified

Performance Index

Electrical performance (Ambient temperature Tj=25℃)

Power supply	24V~ 50VDC, capacity 0.2KVA
Output current	Peak value 4.0A/phase (Max) (the output current can be set by the panel dip switch)
Drive mode	Space vector bipolar constant-current drive
Excitation mode （steps/rotation）	200, 400, 800, 1000,1600, 2000, 3200, 4000, 5000, 6400, 8000, 10000, 12800, 20000, 25000, 25600
Insulation resistance	Under normal temperature and normal pressure, the insulation resistance is ＞100MΩ
Insulation strength	Under normal temperature and normal pressure, 1KV, 1Min

Service Environment and Parameters

Cooling mode		Natural convection (Installing the driver on the metal panel with good heat conduction will help heat emission)
Service environment	Area	Avoid as much as possible dust, oil spray and corrosive gases
	Temperature	-5℃~ +40℃
	Humidity	＜80%RH, with no condensation, no frost formation
	Vibration	5.9m/s^2 Max
Storage environment	Temperature	-40℃~ +55℃
	Humidity	＜93%RH, with no condensation, no frost formation
External dimensions		124×78×26mm
Weight		0.2Kg

Function and Use

◆ Obvious features

It adopts full-digital control mode which takes a 32-digital DSP as its kernel, its advanced space vector algorithm optimizes low-speed vibration and high-speed performance, and it is able to realize self-adaptive optimizing control of multiple motors; it is convenient for software upgrading and updating.

It adopts flexible subdivision algorithm, which ensures the motor can maintain the best operation performance no matter which subdivision motor is set by it; the algorithm also greatly improves the stability and noise in the low-subdivision range. Even if the user cannot select a higher subdivision value due to the limitation of the control system's output pulse frequency, he/she can obtain low-speed stability and high speed simultaneously, so as to reduce requirements of the control system, making it easier to reduce the overall cost of the system, improve system performance and realize the advantages of low vibration, low noise and low energy consumption.

SW5	SW6	SW7	Current
OFF	OFF	OFF	1.2A
ON	OFF	OFF	1.5A
OFF	ON	OFF	2.0A
ON	ON	OFF	2.4A
OFF	OFF	ON	2.8A
ON	OFF	ON	3.2A
OFF	ON	ON	3.6A
ON	ON	ON	4.0A

◆ Power-off memory function

0.1 second after the pulse input is stopped, the driver can automatically record the current motor position; when the power is on again, it will control the motor position as per its original position information, which avoids the motor shaft runout when the power is on again.

◆ Power supply

The switching power inside the driver ensures that it is adaptive to a wider scope of voltage, and the user can select between 24V~50VDC according to the situation. The capacity is determined by the matching motor and the current set. Generally, a higher rated power supply voltage is good for improving the motor's high-speed torque, but it will accelerate the driver's aging and raise its temperature. Pay attention to the polarity of power supply and never reverse the connection.

◆ Selection of output current

The driver adopts a bipolar constant-current mode with its maximum output current value being 4.0A/phase (peak value), and by using different combinations of the 5th, 6th, and 7th three-position switch

on the driver's side panel, it is convenient to select from 8 current values from 1.2A to 4.0A (Refer to Current Selection Table for details).

Note: User's change to the output current can be effective only after the driver's power is re-energized.

◆ Subdivision selection

The user can select from 16 subdivision modes by using the 1st, 2nd, 3rd and 4th dip switches on the drive's panel, which are identified by numbers of steps of the motor's each rotation. The user can choose the subdivision mode as required (Refer to the Subdivision Selection Table for the subdivision mode).

Note: User's change to the subdivision mode can be effective only after the driver is re-energized.

SW1	SW2	SW3	SW4	Steps per rotation	SW1	SW2	SW3	SW4	Steps per rotation
ON	ON	ON	ON	25000	OFF	OFF	ON	OFF	25600
OFF	ON	ON	ON	20000	ON	ON	OFF	OFF	12800
ON	ON	ON	OFF	10000	OFF	ON	OFF	OFF	6400
ON	OFF	ON	ON	8000	OFF	ON	OFF	ON	3200
OFF	ON	ON	OFF	5000	ON	OFF	OFF	OFF	1600
OFF	OFF	ON	ON	4000	ON	OFF	OFF	ON	800
ON	ON	OFF	ON	2000	OFF	OFF	OFF	ON	400
ON	OFF	ON	OFF	1000	OFF	OFF	OFF	OFF	200

◆ Self-measurement mode switch

The user can choose to enable or disable the self-measurement mode by using the 8th dip switch on the driver panel. When the self-measurement mode is enabled, the driver will measure the motor parameters immediately after the power is on, and will automatically seek the optimized control parameters. When the self-measurement mode is disabled, the driver will work by using the motor parameters that were measured last time. Therefore, when the user uses the driver and the motor for the first time, the user shall adopt self-measurement mode to enable self-adaptive matching of the motor parameters, and then the switch can be set in "OFF" position to lock the current parameters. When the working status is changed, self-measurement optimizing can be re-enabled. Self-measurement setting can only be done when the drive power is on each time, so any change to the 8th dip switch's status can only be effective after the driver is re-energized.

◆ Single-pulse mode

The driver supports standard single-pulse mode, under which the step pulse is connected from the pulse port, and the power level on the direction port determines the motor's rotation direction.

Note: it takes 5 seconds for the driver to be energized and reset, and only then the driver can normally respond to the command signals.

◆ Automatic half current

If the driver receives no new pulse for a continuous 0.1 second during work, it will automatically enter into half current status, the phase current will be reduced to 50% of the standard value to reduce the energy consumption. When the driver receives a new pulse, it will automatically exit from half-current status.

Offline function

When inputting offline signals, the driver will cut off the winding current of the motor's each phase to enable the motor shaft to stay in a free state, and then the stepping impulse will not be responded to. This state will effectively reduce energy consumption, temperature rise and aging of the driver and motor. After the offline control signal is withdrawn, the driver will automatically be restored to the phase sequence before offline status and restore the motor current. When this function is not used, the offline port can be left unconnected.

Over-voltage protection

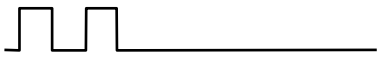
In case of power voltage fluctuation or motor braking which causes the direct-current bus voltage to exceed 60VDC, the driver over-voltage protection circuit actuates, the driver alarm light (red) flashes, the driver will temporarily stop driving the motor, and the alarm can only be removed by manual power-off and then power-on operation. In case of such fault, the user needs to check the power supply voltage, and appropriately reduce the input power voltage.

Undervoltage protection

When the driver detects an input direct-current bus voltage lower than 20VDC, the undervoltage protection circuit of the driver actuates, the drive alarm light (red) flashes, and the motor winding output is cut off and operation is stopped; the alarm can only be removed by manual power-off and then power-on operation. In case of such fault, the user needs to check the power supply voltage and capacity, and appropriately increase the input power voltage.

Function state indication

The yellow LED is power indicator light and it is normally on when the driver is powered; when the driver power is cut off, this LED turns off. Red LED is fault indicator light, and it is on or off in different ways when a fault occurs. The different on-and-off ways of the red LED light represent different fault information, which is shown as follows:

The way the red light flashes	Red light flashing waveform	Fault description
Normally on		Overcurrent alarm
Flashing twice every other second		AD sampling middle point is incorrect
Flashing 3 times every other second		The motor wire is not connected or the motor wire connection is not firm; or there is short-circuiting of the winding
Flashing 4 times every other second		Under-voltage fault (voltage＜20V)
Flashing 5 times every other second		Over-voltage fault (voltage＞60V)

Control signal

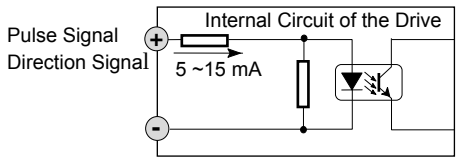
Pulse signal input An optocoupler is built in the driver port, and every on-operation of the optocoupler is interpreted by the driver as an effective pulse. For the common-anode mode, the low level is effective, and the driver will drive the motor to rotate one step as per the corresponding time sequence. To ensure reliable response of the pulse signal, the effective conduction of the optocoupler shall not last less than 2μs. The signal response frequency of the driver is 200KHz, and over-high input frequency or non-standard pulse width might not get the correct response.

Direction signal input This signal is taken as the rotation direction control signal. The on and off operations of the optocoupler built in the port is interpreted as two directions of the motor rotation. When controlling the motor rotation, it shall be ensured that the direction signal is established at least 2μs before the pulse signal, so as to avoid wrong response of the driver to the pulse.

Offline signal input When built-in optocoupler is conducted, the phase current of the motor will be cut off and the rotor is in a free state (offline state). When the optocoupler is cut off, the motor current will restore to the original value and direction before offline state. When this function is not needed, the offline signal port can be left unconnected.

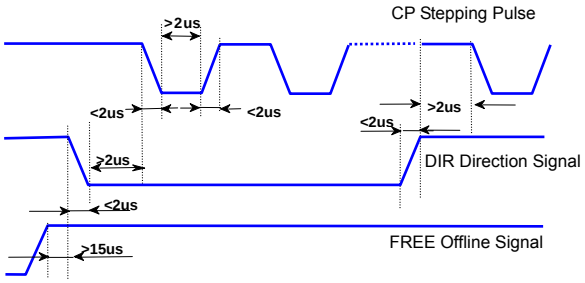
Wiring terminals of the driver are pluggable, enabling them to be pulled out first, and plugged in back when the wiring is done.

Circuit of Input Port

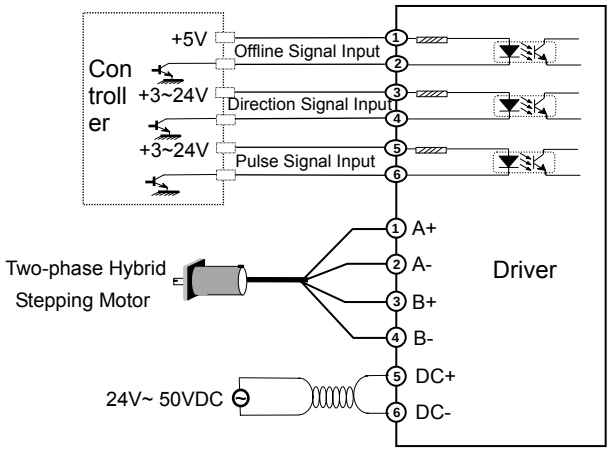


Note:
Input control signal is transferred through a double-end port; various connection styles can be used depending on the need, such as common-anode and differential connection. The port is compatible with TTL, OC and differential signal modes. Pulse and direction signal port can bear a voltage of +3~24V. With a resistor of 330Ω connected in series with it, the offline signal port is compatible with TTL signals. If any higher signal voltage is applied, a resistor of a suitable resistance value shall be connected in series for reducing the current; for example, 1KΩ shall be connected for 12V and 2KΩ for 24V.

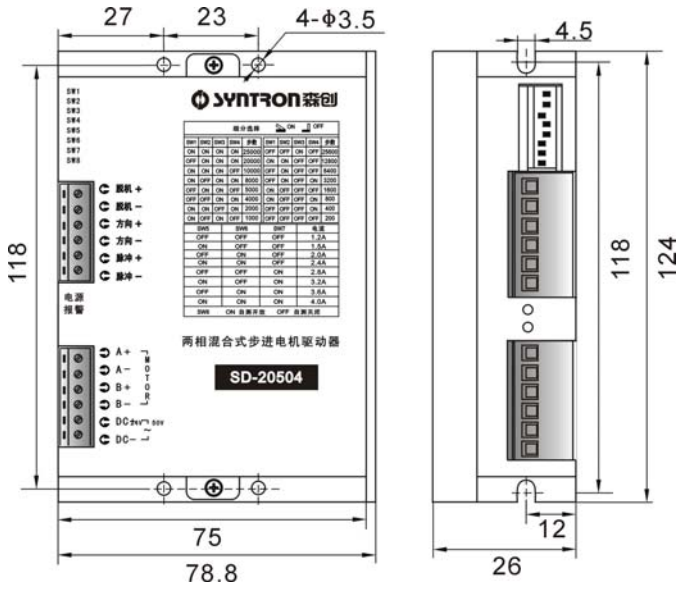
Waveform and time sequence of input signal



Typical Wiring Diagram



External Dimensions [Unit: mm]



Operating Precautions

- Drastic change to storage and transportation environment temperature might generate condensation or frost easily. In this case the driver shall be laid aside for over 12 hours and shall not be operated with power unless the driver temperature is identical to ambient temperature. If the driver is stored in an inappropriate environment for a long time, the product quality shall be inspected before the driver is operated.
- In order to use the driver properly, users shall separate power cables (phase lines and power lines of the motor) from weak-current signal lines in the wiring process so as to prevent control signal interference. If it's not feasible or any strong interference source (frequency converters and solenoid valves) exists, it's recommended to use shielded cables to transmit control signals. Applying control high-level signals also makes certain sense in preventing interference.
- Power supply quality has direct influence on the driver's performance and power consumption: power supply's ripple waves influence subdivision accuracy, and power supply's ability to inhibit common-mode interference affects the system's anti-interference performance. As a result, for the applications with high performance requirements, users must take care to improve power supply quality.
- The driver's output current means the peak output current of the driver's each phase; the ampere meter connected in series with it can't give the correct reading.
- Ensure good ventilation of the equipment when the driver is installed and regularly inspect if the heat dissipation fan is working properly. If several drivers are configured in parallel in a cabinet, keep at least 5cm between them.
- If users have customized requirements on the power supply voltage, current, subdivision and signal ports, please contact the manufacturer. Customized products are available to meet customer needs. The product is customized if the end of its model code has Ver*.*, in which *.* refers to the customized version number. This manual is only for standard products and does not cover customers' requirements regarding customized products.

Product and Service

Motion Control Motor and Drive

- Stepping motor system

Two-phase/three-phase/five-phase series
Motor outer diameter range: 28mm-130mm
Motor torque range: 0.06Nm-45Nm
Working voltage range of the driver:
24VDC-70VDC 100VAC-220VAC
Output current range of the driver: 0.9A-15A
Exciting mode of the driver:
full step-128 sub-steps
Digital drive control mode
Close-loop stepping motor drive control mode

- AC servo system

Motor outer diameter range: 40mm-180mm
Power range: 100W-9000W
Rotation speed range: 1000rpm-3000rpm
Torque range: 0.32Nm-71.6Nm
Voltage range: 18-80VDC, 220VAC, 380VAC

- Brushless DC motor system

Motor outer diameter range: 57mm-92mm
Power rage: 70W-600W
Rotation speed range: 1000rpm-8000rpm
Torque range: 0.095Nm-1.9Nm
Working voltage range of the driver:
48VDC, 220VAC
High-speed brushless DC motor system
Power range: 200W-1000W
Rotation speed range: 10000rpm-20000rpm
Torque range: 0.13Nm-1Nm

Industrial dedicated control system

Dedicated control system for digital transverse coiling

Multi-degree-of-freedom networked motion control system

SC-GSJ01 controller for threading machine

ATTpw advanced coiling control system for elasticizer

Control system for single-servo/three-servo pillow-type packing machine

Control system for double-fly-fork winding machine

Mechanical drive unit

- Planetary gear reducer

Motion control system

- PLC, motion control card, SC series controller, TRIO motion controller

System integration and service

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