VID Company Limited

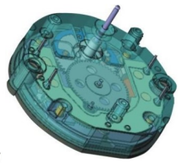
VID29 Series Stepper Motor

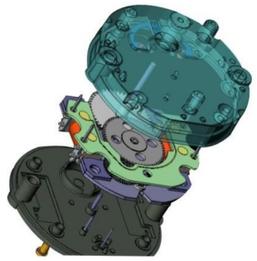
Description

The VID29 series stepper motor is a patented stepper motor design. The product is mainly used in instrumentation and panel digital indicator equipments to transfer a digital signal into an accurate analog display. VID29 series has a 4-gear design in order to guarantee high efficiency, high position accuracy and a robust gear system. The unique gear shape design reduces friction and noise. The special material used for each component is to increase the reliability & safety.

Main Features

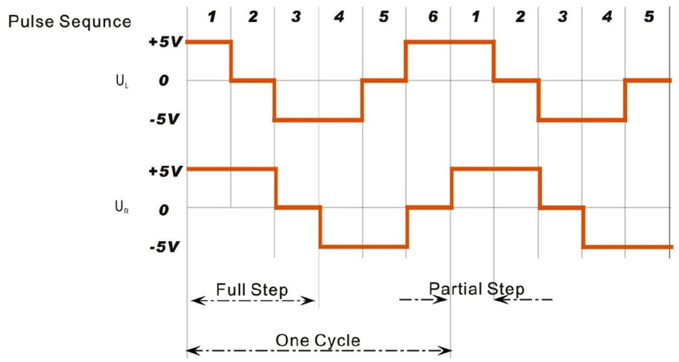
★High speed rotation: 600°/sec
★High μ-step resolution: 1/12°
★Wide working voltage: 3.5V-10V
★Wide working temperature: -40℃~105℃
★Low current consumption : 20mA, 5V, 2X100mW

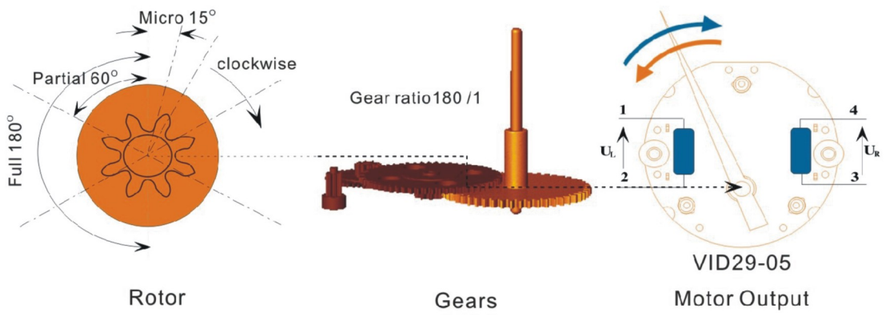




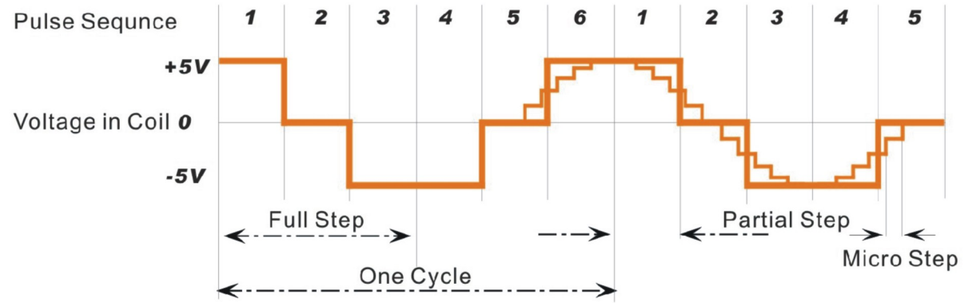
Step Definition and Rotor Movement

VID29 series is a 4-gear design stepper motor, it can be driven by 2 groups of sequent logic pulse signals,including full step mode and partial step mode. The driving diagram can be refered as following:



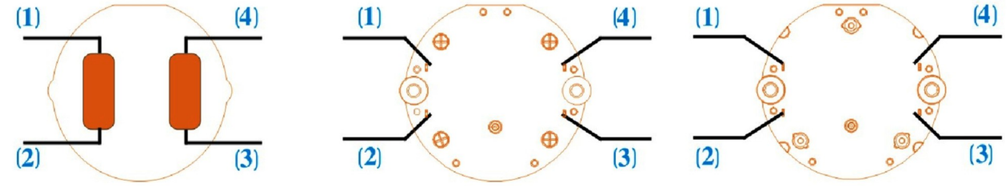


In order to let the motor run stably and reduce the noise, Micro step driving technology is recommended. The micro pulse sequence is much more precise and close to a sine wave, which could drive motor with 1/12° micro step of the pointer. Below is a reference driving diagram.



To have more details or the micro step driving signals, please refer to VID29 product specification .

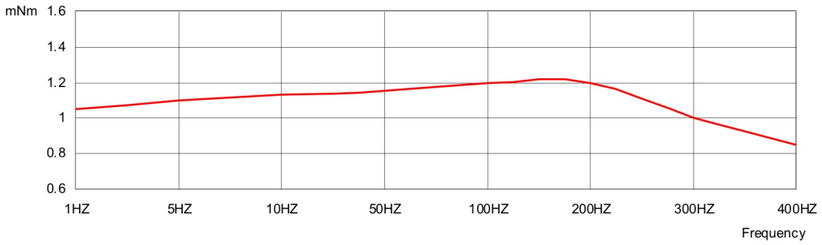
Pin connection



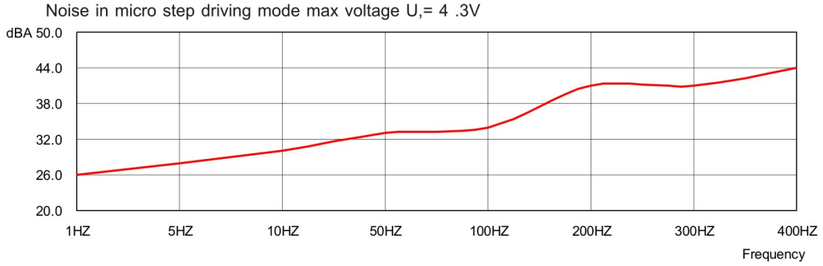
Schematic | Front Mount -VID29-02 | Rear Mount -VID29-05

Typical Torque And Noise

Torque in micro step driving mode, max voltage U,= 4.3V



Noise in micro step driving mode max voltage U,= 4 .3V



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Absolute Maximum Ratings

Parameter	Symbol	Max
Drving Voltage	U_b	10V
ESD Tolerance	U_{ESD}	10'000V
EMI Tolerance(1kHz; AM 80%; 100kHz-2GHz)	E	80V/M
Storage Temperature	T_{stg}	95℃
Solder Temperature(<3s)	T_S	290℃

Warning:

The parameter over max will bring permanent damage to VID29 stepper motor. And the parameter exceeded the arranged parameter will effect the reliability of the stepper motor.

Electrical and Mechanical Characteristics

Symbol Definition F_a-testing frequency,J_L-testing pointer inertia , U_b-Driving Voltage.

Testing Conditions Tamb=25℃,fIn micro step mode@Max. voltage 4.3V,unless other specified.

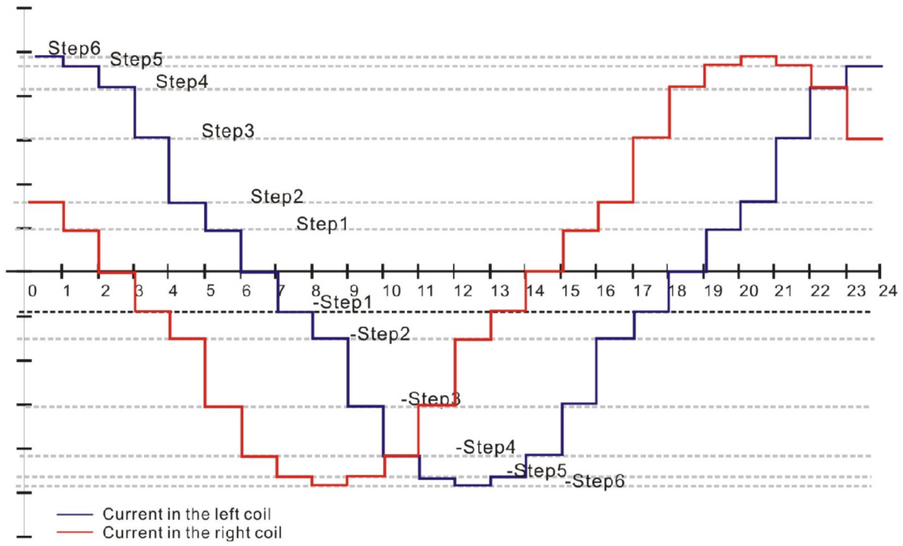
Parameter		Symbol	Test Conditions	Min.	Typ.	Max.	Units
Electrical Characteristics							
Operating Temperature		T_a		-40		105	℃
Coil Resistance		R_b		260	280	300	Ω
Operating Current		I_m	f_a=200Hz		15.4	30	mA
Start-Stop Frequency		f_{ss}	J_L=0.2x10^{-6}Kgm²	125			Hz
Maximum Driving Frequency		f_{mm}	J_L=0.2x10^{-6}Kgm²			400	Hz
Mechanical Characteristics							
Dynamic Torque		M200 M400	fa=200Hz fa=400Hz	1.0 0.7	1.2 0.85		mNm
Holding Torque		M_S	U_b=5V	3.5	4.0		mNm
Equivalent Motor Inertia @ Output		J_m			4.225 E-7		Kgm²
Gear ratio					180:1		
Step size in full step mode					1		Degree
Step size in partial step mode					1/3		Degree
Step size in micro step mode					1/12		Degree
Backlash					0.8	1.2	Degree
Noise							
Noise Level		SPL	@ 100 °/sec @ 200 °/sec @ 400 °/sec		34 41 44		dBA
Others							
Angle of Ratation	outer shaft	f_l	Motors with internal Stop			315	Degree
	inner shaft	f_l	Motors with internal Stop			360	Degree
Force allowed on the pointer shaft: Axial force (push) Axial force (pull) Perpendicular force Imposed acceleration		 Fa Fa Fq α_p				 150 70 12 1000	 N N N Rad/s²

Driving Pulse And control Circuit

Micro-Step Driving Mode

In micro-step driving mode, the motor can be driven by a current-level sequence. A-micro step is a 1/12°angular rotation of the pointer. The driving pulses consist of many different current level pulse sequences.The micro-step pulses provides the pointer with shaft continuous and smooth movement.

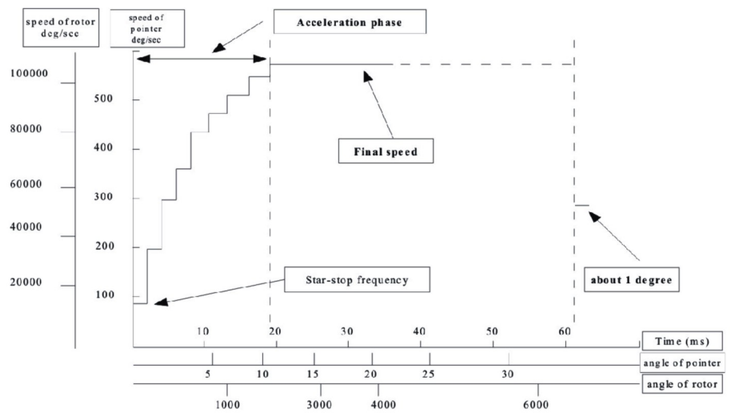
Driving Pulses in Micro-step



In general the peak amplitude should be between 12.9mA and 16.07mA.

Improved Motor Resetting Program

In most of the VID29 series applications, the angular range of the instrument dial is less than 300°. This needs a mechanical stop to define the pointer´s zero position. Generally the pointer will be reset to zero position at each power-up process. During the power-up of instrument, to bring the pointer at this initial stop position without creating any visible and audible jitter of the pointer, we suggest frequency accelerate process to speed up VID29 stepping motor at a high speed. Right is an example:



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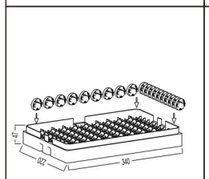
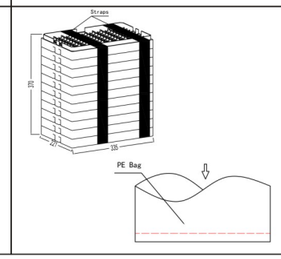
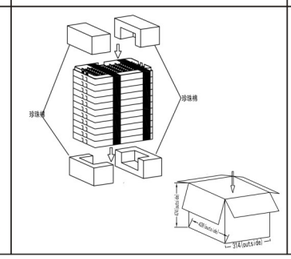
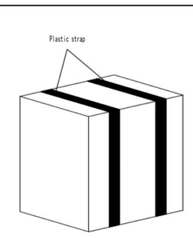
VID29 Package

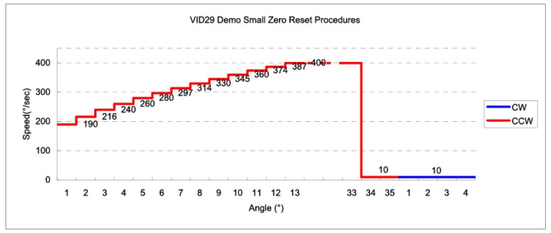
Tray for 10×10=100 Stepper motor VID29 Material: PP Weight: Tray 1×210g=210g Motor 100×7g=700g Total =910g	Stack for 100×10=1000 VID29 motor Material: 11 Trays(including cover) strapped together with plastic band Weight: Trays 10×910g=9100g Cover Tray 1×210g=210g Plastic strap 2×15g=30g Total =9340g	Master-carton for 100×10=1000 VID29 motor Material: cardboard 710g/m2 Weight: Production 1×8818g=8818g PE bag 2×50g=100g PE 4×60g=240g Master-Carton 1×900g=900g Tatol =10580g	Weight: A cardboard of motors 1×10580g=9599g Plastic strap 2×15g=30g Tatol =10610g
			

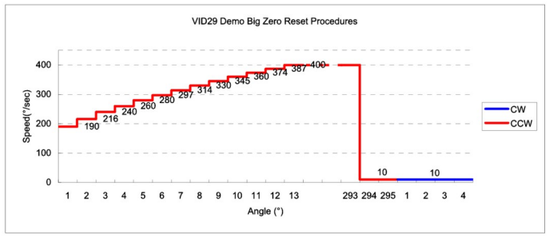
VID29 Stepper Motor Reset

Most of the dashboard producers use the internal mechanical stop of stepper motor as its zero position, and use the full scale reset as the pointer calibration. To achieve a stable, smooth reset, and avoid the extreme vibration and shock on the mechanical stop of stepper motor, it should be using a high speed (approximate 500°/s) for this reset process basing on a proper acceleration , the following is an accelerating process example for reference:

Motor Resetting Program

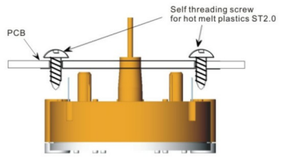
During the reset process, some clients let stepper motors move back to zero position under a high speed, this may not let the pointer return to the zero position but have a gap with 0.8 degree approximately. This kind of phenomena generate due to the motor backlash and the deviation between Rotor magnet and Stator Magnetic field.Solution: After high speed return to Zero position, continued to give motor the pulse which can let the motor move a head 1 degree with a low speed.





Suggested Installation

The VID29 can be easily installed. The four contact pins can be soldered on PCB circuits. If the application is subject to very strong vibrations, screws might be necessary.



VID29-XX with front contacts