VID29 Series Stepper Motor

DESCRIPTION

VID29-XX and VID29-XXP series is a precise stepping motor of patent design, with gear reduction ratio 180/1, mainly used in dashboard instrumentation or other digital indicator equipments, to transfer digital signals directly and accurately to analog display output.

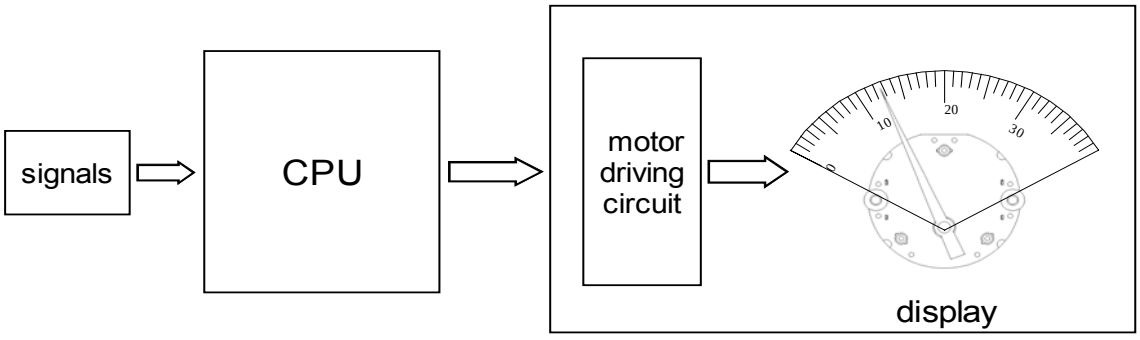
Driven by 2 sequent logic pulse signals in 5V-10V, the output shaft can reach stepping angle resolution 1/12°. The angular speed can reach more than 500Hz.

The new and modern design makes high efficiency, high position accuracy and extremely robust gear system. The special gear shape is helpful to decrease friction and noise. It chooses special material for each component to increase liability and safety for the motor.

FEATURES

- Wide working voltage: 5~10V.
- Low current consumption: less than20mA, 5V, 2X100mW.
- Wide working temperature: -40~105℃.
- Extremely robust construction: Φ30mm X 7.6mm.
- High μ-step resolution: 1/12°.
- Directly driven by a μ-controller.

TYPICAL APPLICATION



perfect combination of digital accuracy and analog facility

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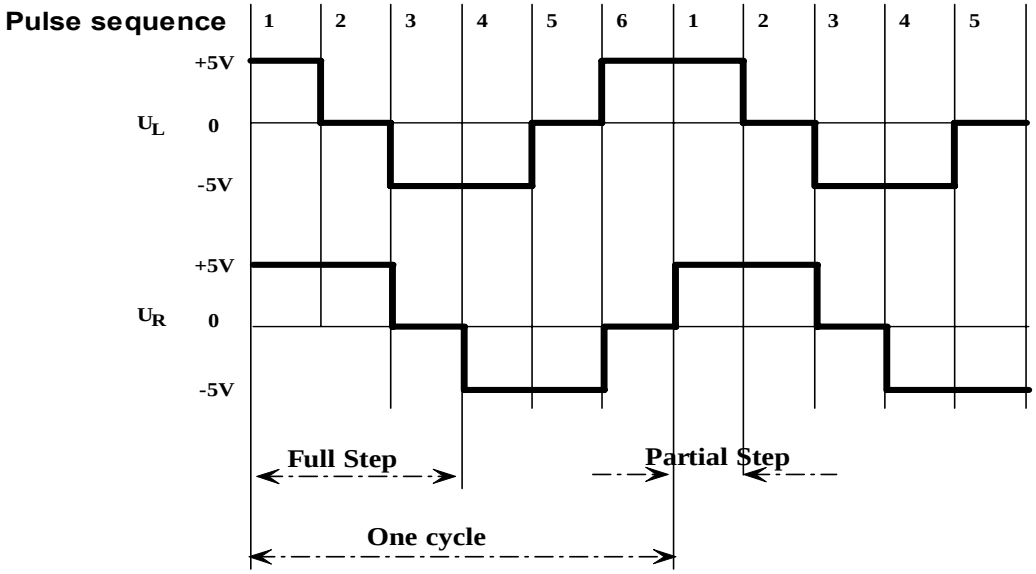
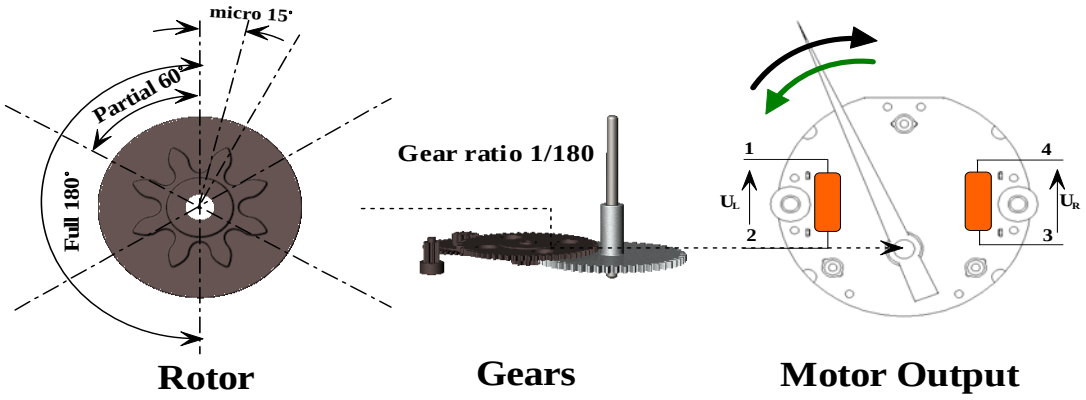
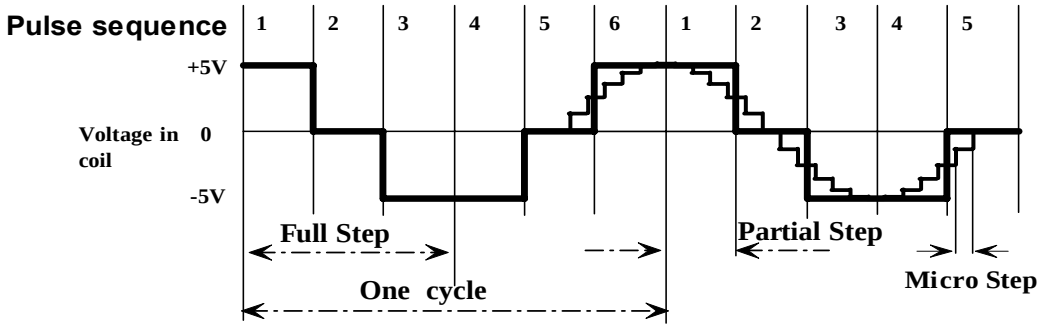
STEP DEFINITION AND ROTOR MOVEMENT

VID29-**XX** and VID29-**XX**P series motor are driven by 2 sequent logic pulse singnals. Its work diagram is as following:





In order to make motor run more stable and decrease the noise, micro stepping technology is recommended. The micro pulse sequence which is more precise and near to sine wave, which could drive motor with 1/12° micro step of the pointer. The diagram is as following:



For more details about the micro stepping driving signals, please see specified files.

ABSOLUTE MAXIMUM RATINGS

Driving voltage (Ub).....10V
EMI tolerance (1 kHz;AM 80%; 100 kHz - 2 GHz) .....80 V/m
Solder temperature (10 sec)..... ....260ºC

ELECTRICAL AND MECHANICAL CHARACTERISTICS

T_{amb}=25ºC, In micro step mode @ Max. voltage 4.2V, unless other specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max	Units
Electrical Characteristics						
Operating Temperature	T_a		-40		105	ºC
Coil Resistance	R_b		260	280	300	Ω
Operating Current	I_m	f_a=200Hz		15	20	mA
Start-Stop Frequency	f_{ss}	$J_L=0.2x10^{-6}kgm^2$	125			Hz
Maximum Driving Frequency	f_{mm}	$J_L=0.2x10^{-6}kgm^2$	600			Hz
Mechanical Characteristics						
Dynamic Torque	M200 M400	f_a=200Hz f_a=400Hz	1.0 0.7	1.2 0.85	1.4 1.0	MNm mNm
Static Torque	Ms	U_b=5V	3.5	4.0		mNm
Equivalent Motor Inertia @ Output	Jm			4.225 E-7		Kgm^2
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				0.5	1.0	Degree
Noise						
Noise Level	SPL	@ 100 °/sec @ 200 °/sec @ 400 °/sec		34 41 44		dBA dBA dBA
Others						
Angle of Rotation	f_l	Motors with internal			315	Degree

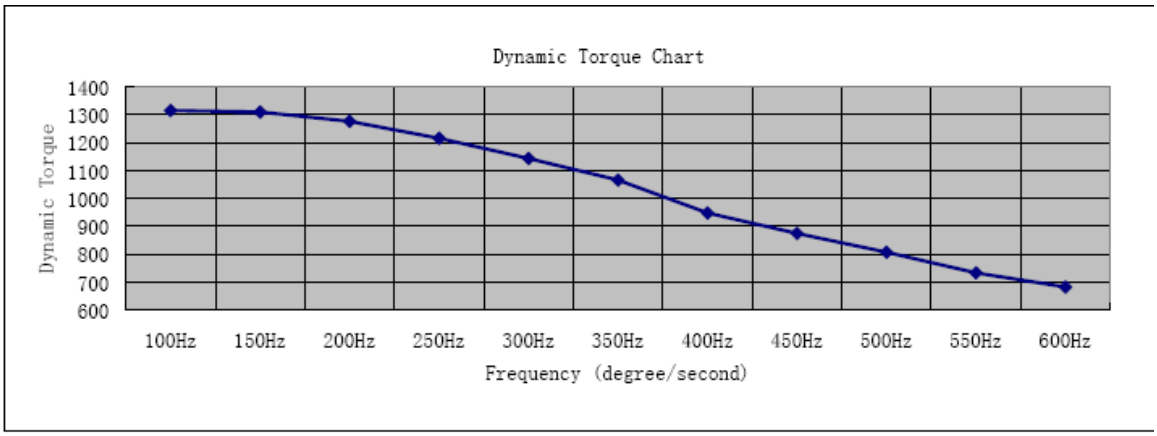
		Stop				
Force allowed on the pointer shaft:						
Axial force (push)	Fa				150	N
Axial force (pull)	Fa				70	N
Perpendicular force	Fq				12	N
Imposed acceleration	α_p				1000	Rad/s2

Note: f_a – full-step frequency J_L – Load inertia

TYPICAL TORQUE AND NOISE

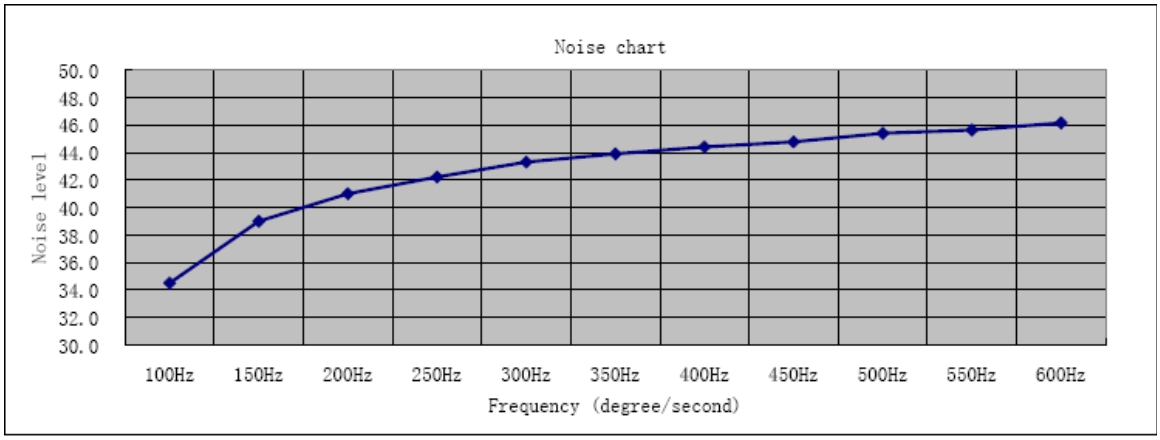
Torque in micro step driving mode, @ Max voltage U_b= 4.2V

Unit: Unm.



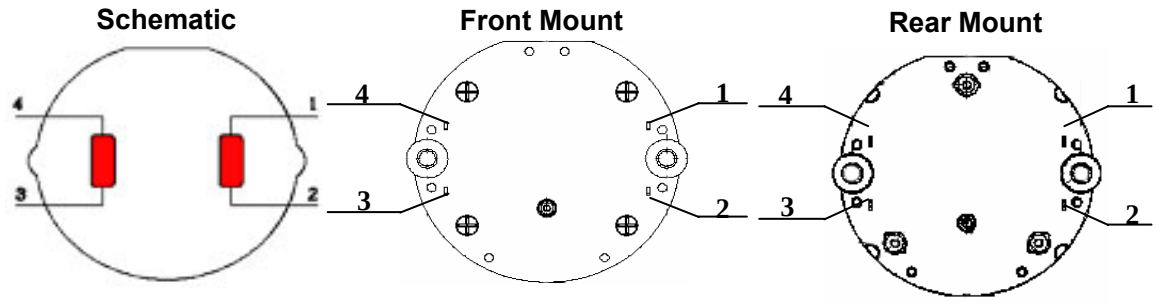
Noise in micro step driving mode, @ Max voltage U_b= 4.2V

Unit: dB.

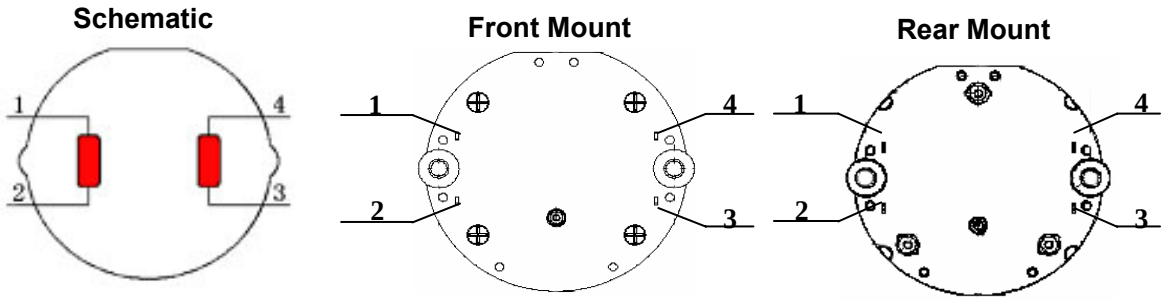


PIN CONNECTION

VID29-XX Pin Connection



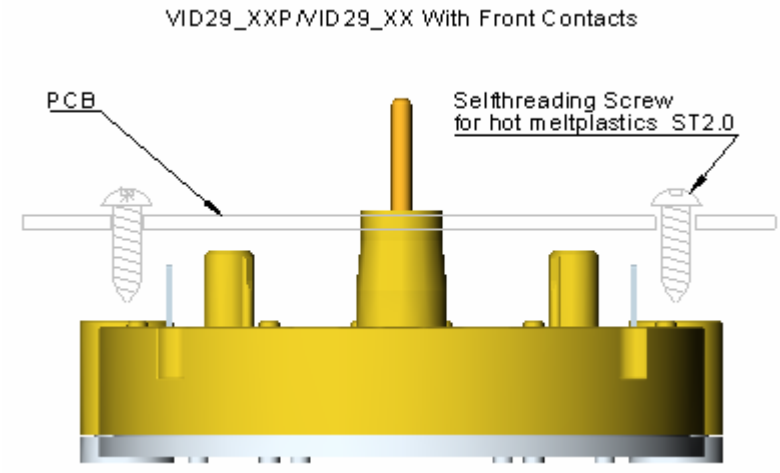
VID29-XXP Pin Connection



SUGGESTED INSTALLATION

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

Installation Diagram



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APPLICATION HINT

The parameter of the pointer:

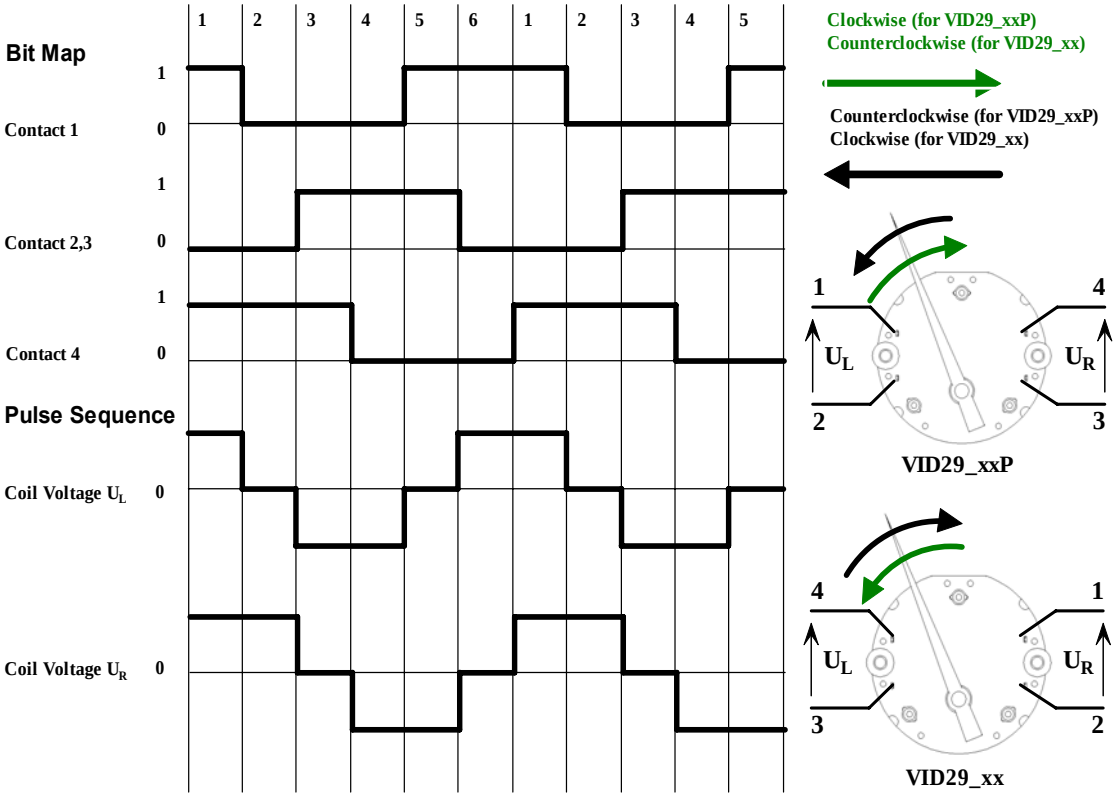
	Min	Typical	Suggested MaxValue(*)
Size:		50mm	80mm
Weight:		2.5g	10g
Inertia moment:		$2\times10^{-7}kgm^2$	$20\times10^{-7}kgm^2$
Unbalance:		0.01mNm	0.025mNm

DRIVING PULSE AND CONTROL CIRCUIT

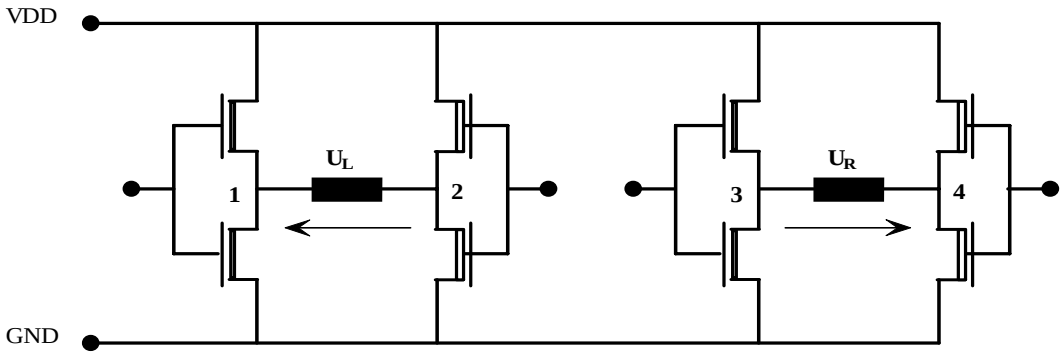
Partial-Step Driving Mode

In partial-step driving mode, the motor can be directly driven by a standard logic voltage level with less than 20mA current consumption. The bit-time sequence determines the turning direction of the motor. The time sequence diagram is as following:

Driving Pulse in Partial Mode



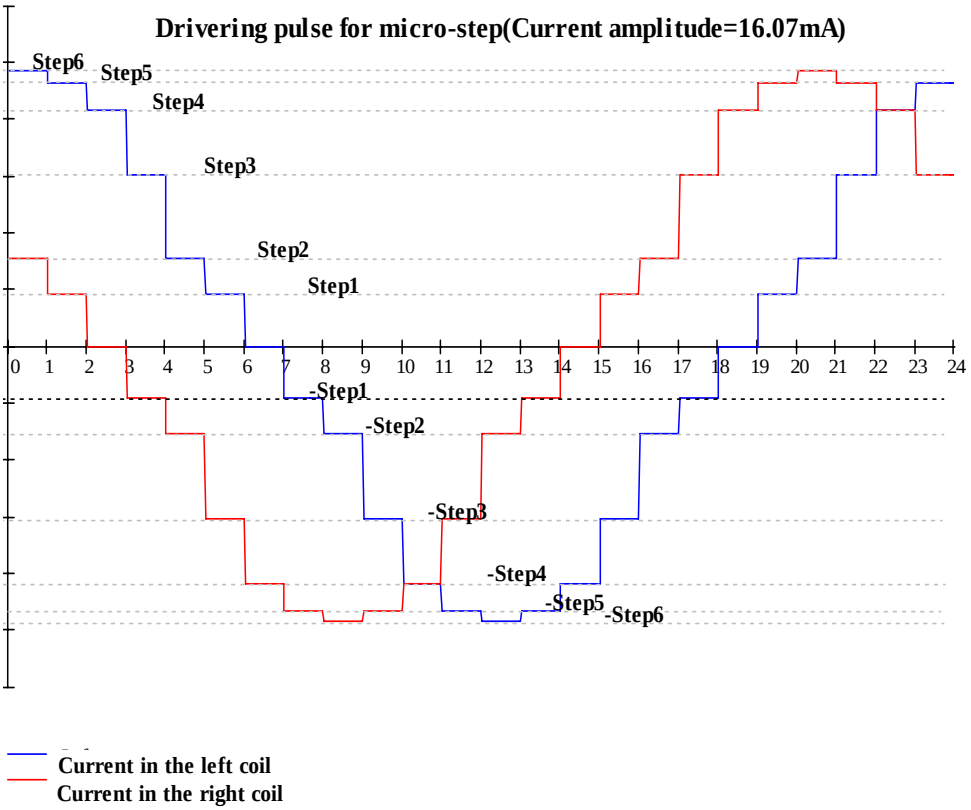
Driving Diagram in Partial Mode



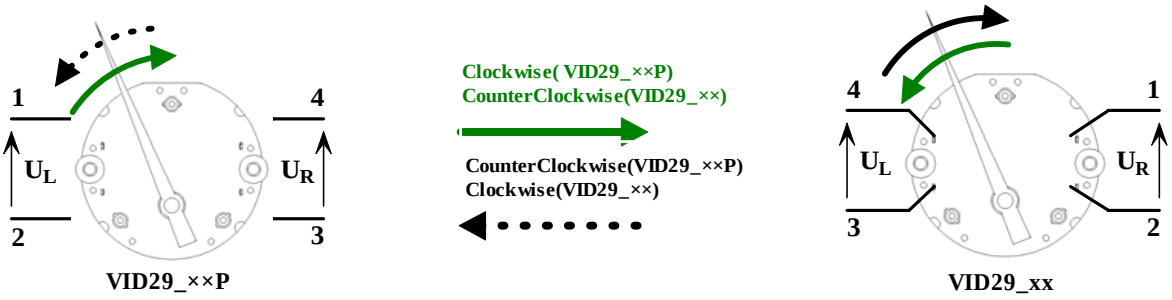
μ-Step Driving Mode

In μ-step driving mode, the motor can be driven by a current-level sequence. A μ-step is a 0.083º of pointer. The driving pulses consist of many different current level pulse sequences. The μ-step provides the pointer shaft continuous, smooth movement.

Example of driving Pulses in μ-step Mode



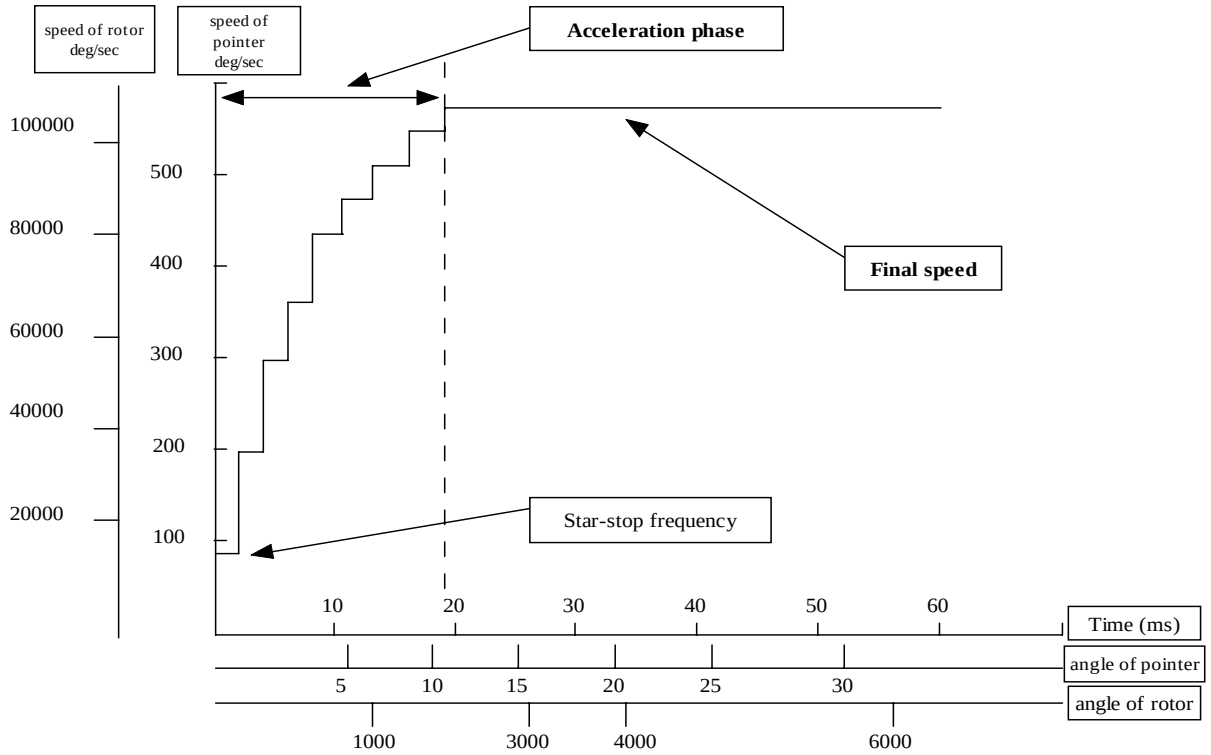
In general the peak amplitude should be between 12.9mA and 16.07mA.



ACCELERATION PROCESS

In most of the VID29-XX applications, the angular range of the instrument dial is less than 300°. This allows to using mechanical stop to define the zero position. Generally the pointer will be reset to the zero position at each time power-up process.

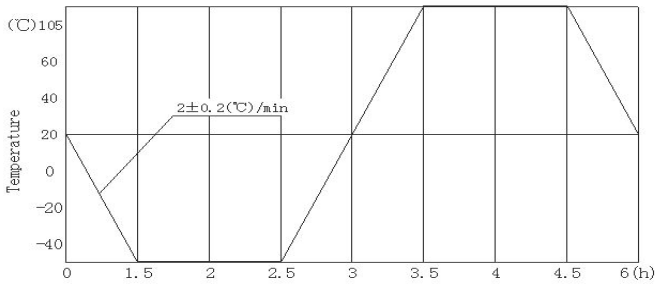
In power-up process, to quickly drive the pointer onto his initial stop position without creating visible and audible jitter of the pointer, we suggest a frequency acceleration process to speed up VID29 step motor till a high speed. Below is an example:



RELIABILITY TEST

Temperature Cycle Test

- Low Temperature: -40°C±2°C
- High Temperature: +105°C±2°C
- Dwell time: each for 1 Hrs
- Transfer Time: 1.5 hrs
- Cycle times: 50 cycles total 300hrs
- Cycle mode: see right graph..
- Motor Status: running
- Reference standard: IEC60068-2-1



Thermal Shock Test

- Low Temperature: -40°C±2°C
- High Temperature: +105°C±2°C
- Dwell time: each for 0.5hrs
- Transfer Time: within 30s
- Cycle:100 Cycles total 100hrs
- Motor Status: non-running
- Reference standard: IEC60068-2-14.

Mechanical Vibration Test

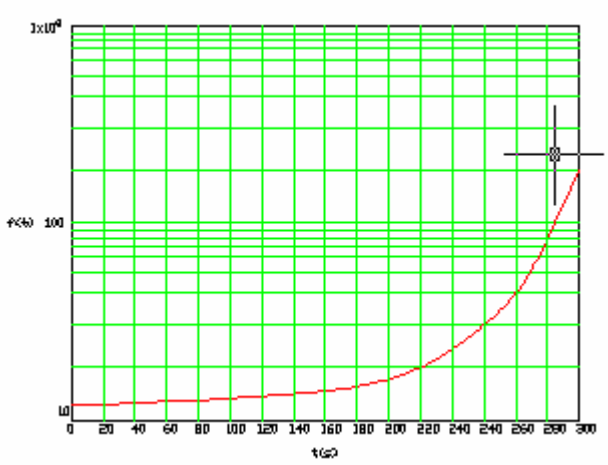
- Pulse shape: sine pulse form
- Range of frequency: 10Hz～200Hz(logarithm sweep)
- Sweep cycle: 300 sec.
- Direction: X,Y axis
- Duration:8 hrs /each Direction
- Acceleration: 6 g
- Motor Status: running
- Reference standard: IEC60068-2-6

Humidity Test

- Temperature:+65°C±2°C
- Humidity:95±2％RH
- Duration:144 Hrs
- Motor Status: non-running
- Reference standard: IEC68-2-3.

High Temperature Test

- Temperature: +105°C±2°C
- Duration:168 Hrs
- Motor Status: running
- Reference standard: IEC60068-2-2.



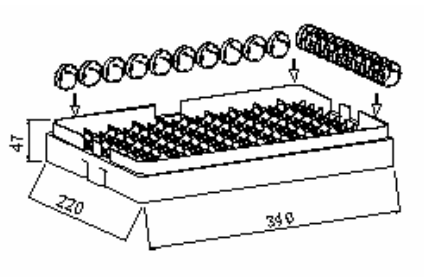
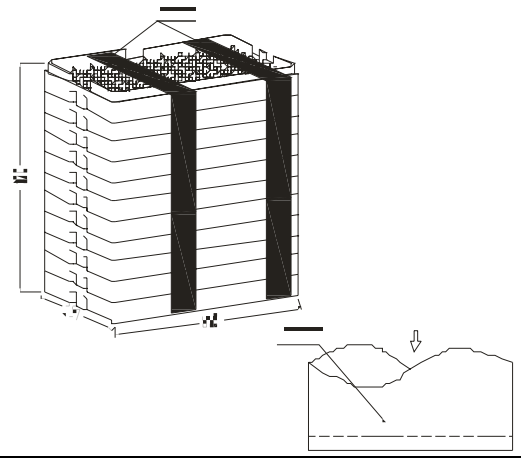
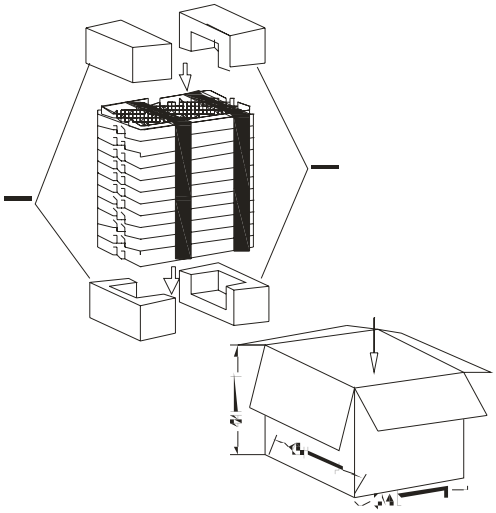
Low Temperature Test

- Temperature: -40°C±2°C
- Duration: 48 Hrs
- Motor Status: running
- Reference standard: IEC68-2-1.

Mechanical Shocking Test

- Height: 1.2 m
- Direction: X/Y
- Motor Status: non-running
- Reference standard: IEC68-2-62

PACKING SKETCH MAP

Tray for 100 stepper motors VID29 Material : PP Weight : Tray 1x210g=210g Motors 100x7g=700g Total = 910g	
Stack for 1000 motors VID29: Material : 11Trays (including Cover) strappedtogether with plastic band Weight : Trays 10x910g=9100g Cover tray 1x210g=210g Plastic strap 2x15g=30g Total = 9340g	
Master-carton for 1000 motors VID29: Material : cardboard 710g/m Weight : Master-carton 1x900g=900g PE bag 2x50g=100g Production 1x9340g=9340g PE 4x60g=240g Total 10580g	
A cardboard of motors 10580g Plastic strap 2x15g=30g Total 10620g