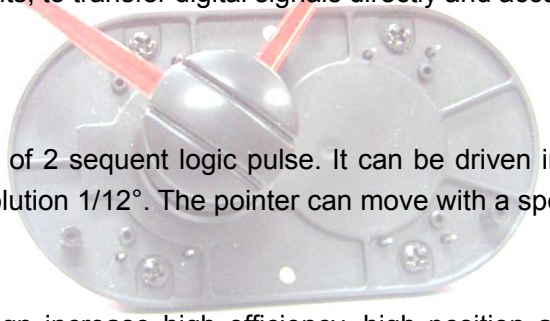
VID28 Series Stepper Motor

Description

VID28-XX series

Is a precise stepping motor of patent design, with a reduction ratio of 1/180. It's an innovation products based on our company product VID29-xx,and it can drive two point independently,this motor could help dashboard designer save space in dial surface design and benefit for new concept design. It's mainly used in dashboard instrumentation or other digital indicator equipments, to transfer digital signals directly and accurately to analog display output.



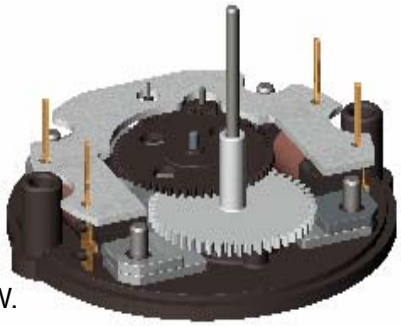
VID28-XX series

Is driven by dual signals of 2 sequent logic pulse. It can be driven in 3.5V ~ 10V providing shaft stepping angle resolution 1/12°. The pointer can move with a speed more than 500Hz.

VID28-XX series

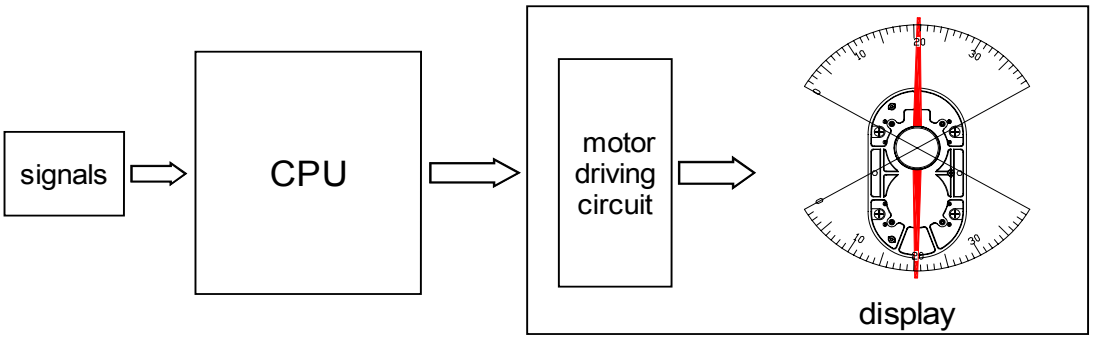
A new and modern design increase high efficiency, high position accuracy and extremely robust gear system. The special gear shape is helpful to decrease friction and noise. It chooses appropriate material for each component to increase durability and safety of the motor. All these futures enhance VID motor's stability and long life time.

The main features are:



- High speed rotation: 500Hz.
- High μ-step resolution: 1/12°.
- Wide working voltage: 3.5~10V.
- Wide working temperature: -40~105℃.
- Low current consumption: less than20mA, 5V, 2X100mW.
- Extremely robust construction: 64mm×35mm×9.2mm.
- Long lifetime: in 200Hz, constant working up to 5000Hrs.
- Directly driven by a μ-controller.

Typical application:



perfect combination of digital accuracy and analog facility

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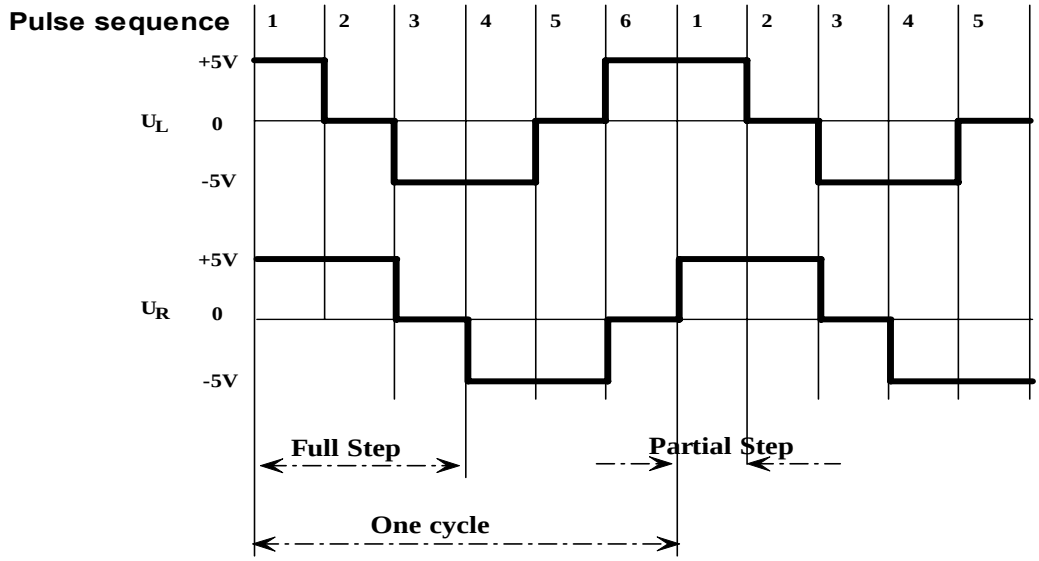
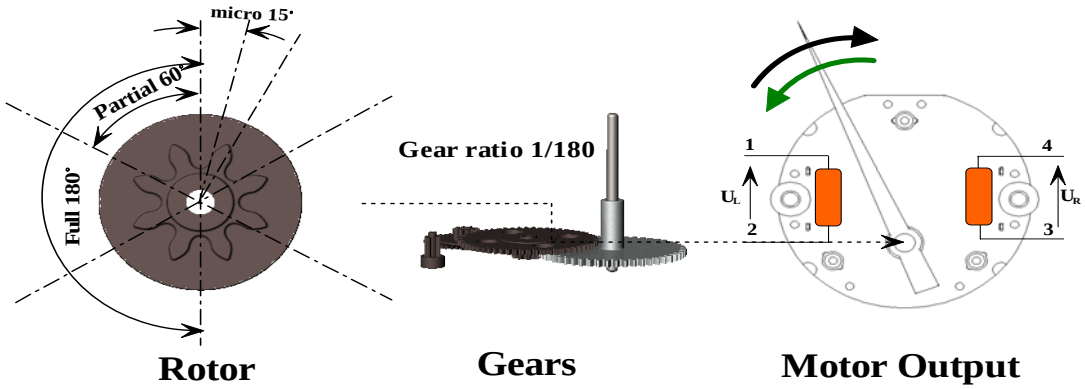
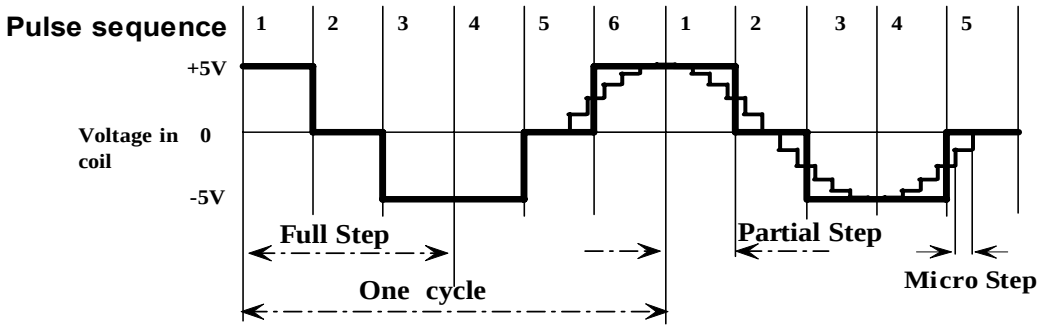
Step Definition and Rotor Movement

VID28-×× series is driven by dual signals of 2 sequent logic pulse singnals and its inner shaft has 4 gears its outer shaft has 5 gears idesign to construct high efficiency, and the outer shaft is Its work diagram is as following:





In order to make the motor run more stablely and reduce its 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.

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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

1.The electrical and mechanical characteristics of inner shaft refer to VID29 spec.
2.The following list is only for out shaft
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			280		Ω
Operating Current	I_m	f_a=200Hz			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	400			Hz
Mechanical Characteristics						
Dynamic Torque	M200 M400	f_a=200Hz f_a=400Hz		1.1 0.7		mNm mNm
Static Torque	Ms	U_b=5V	3.5	4.0		mNm
Equivalent Motor Inertia @ Output	J_m			5.064 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				0.7		Degree
Noise						
Noise Level	SPL	@200°/sec		46		dBA
Others						
Angle of	Inner Shaft	f_l	Motors with		315	Degree

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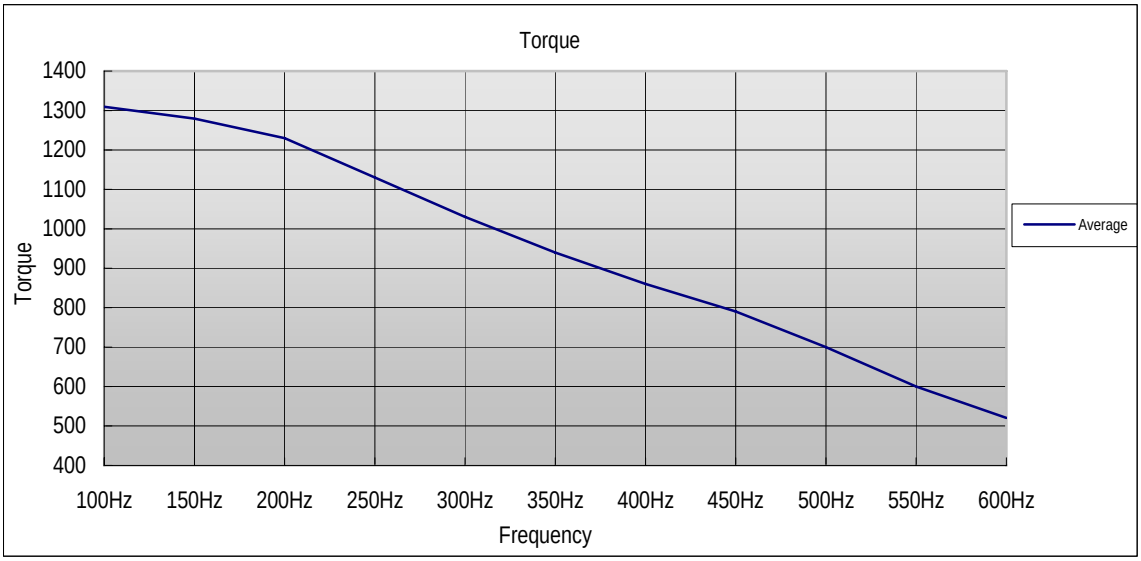
Rotation	OuterShaft		internal Stop			280	Degree
Force allowed on the pointer shaft: Axial force (push) Axial force (pull) Perpendicular force Imposed acceleration		Fa Fa Fq α_p				60 60 6 1000	N N N rad/s^2
Number of allowed pointer insertion						1	Times

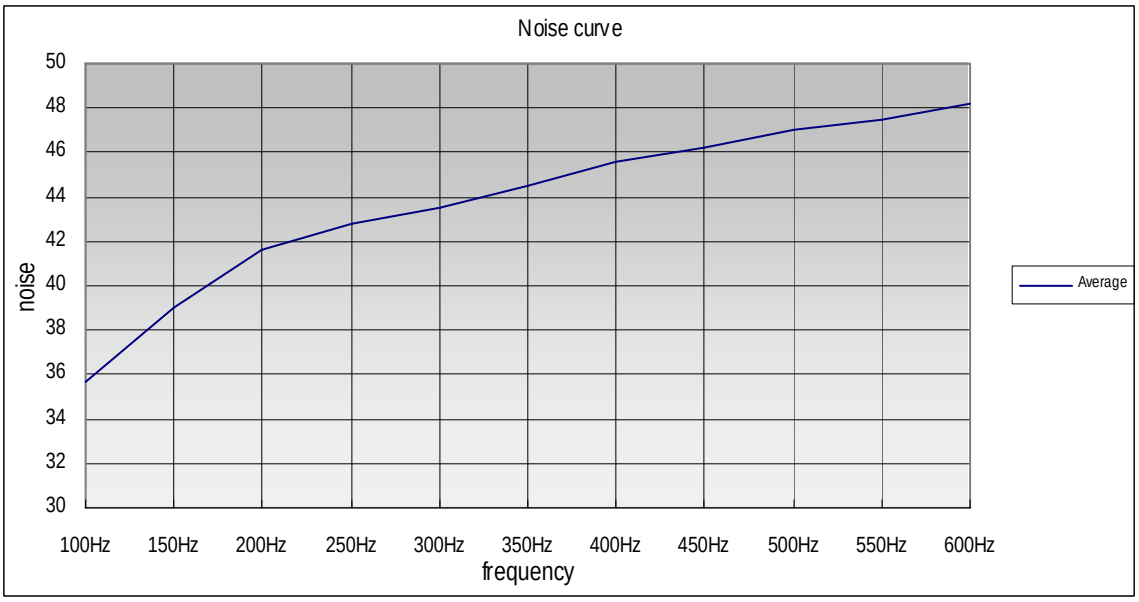
Note: f_a – full-step frequency J_L – Load inertia

Typical torque and noise

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



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



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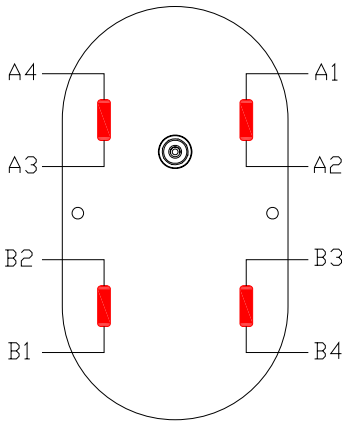
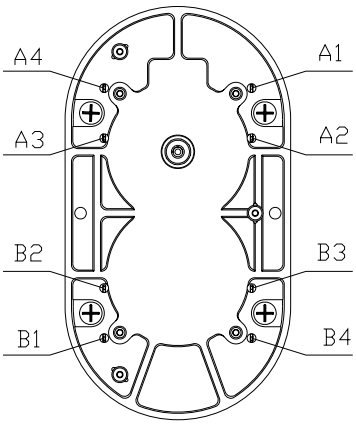
Pin Connection

VID28-XX Pin Connection

Schematic



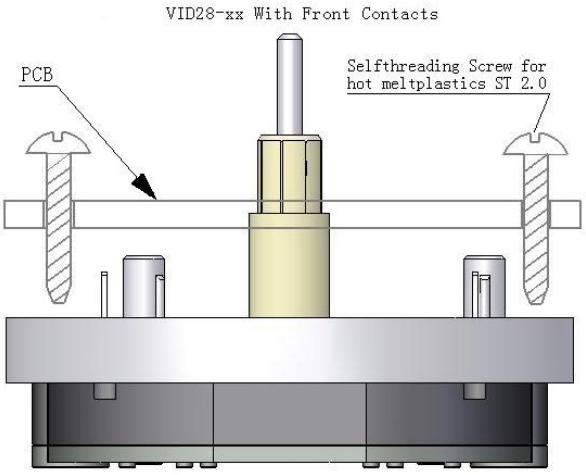
Front Mount



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



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

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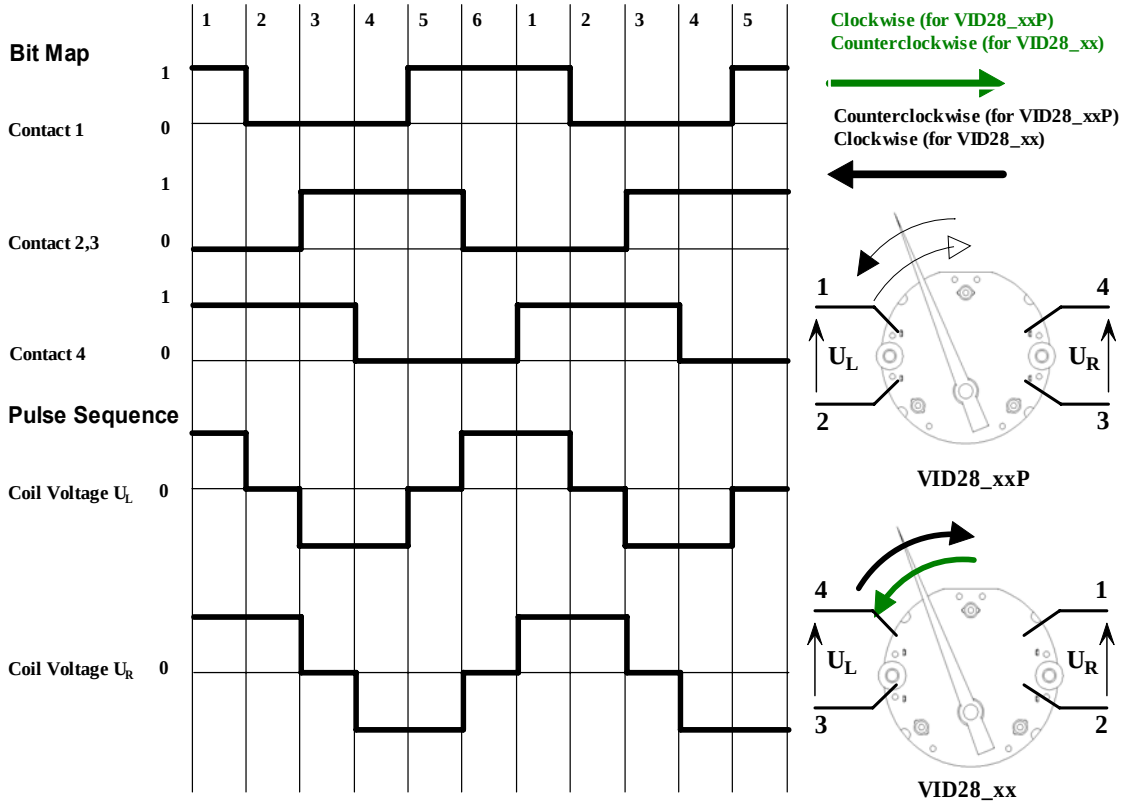
Driving Pulse and Control Circuit

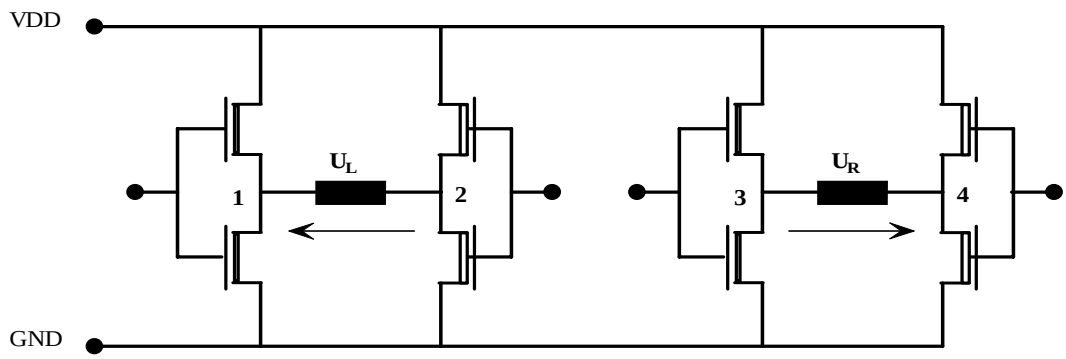
Partial-Step Driving Mode

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



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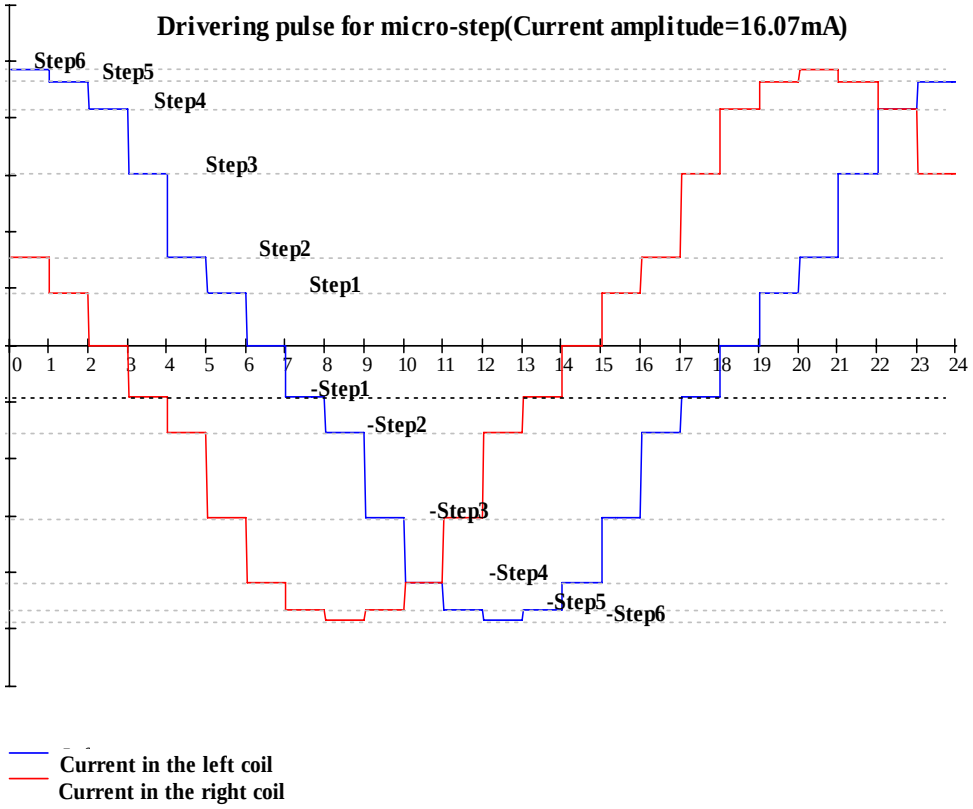
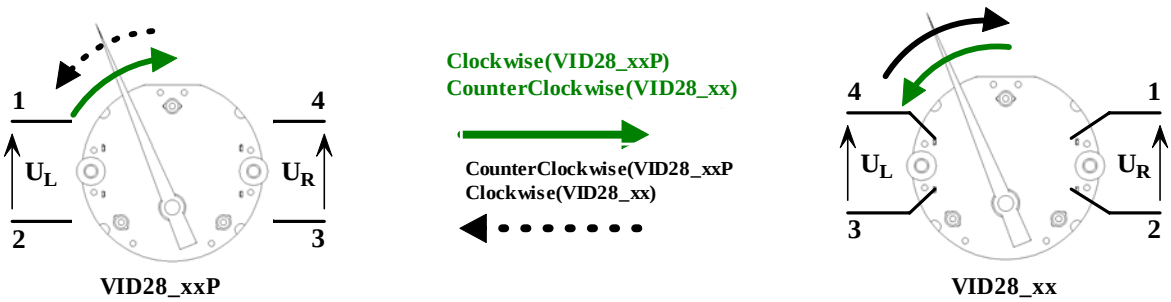
μ-Step Driving Mode

In μ-step driving mode, the motor can be driven by a current-level sequence. A μ-step is a 0.083° 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.



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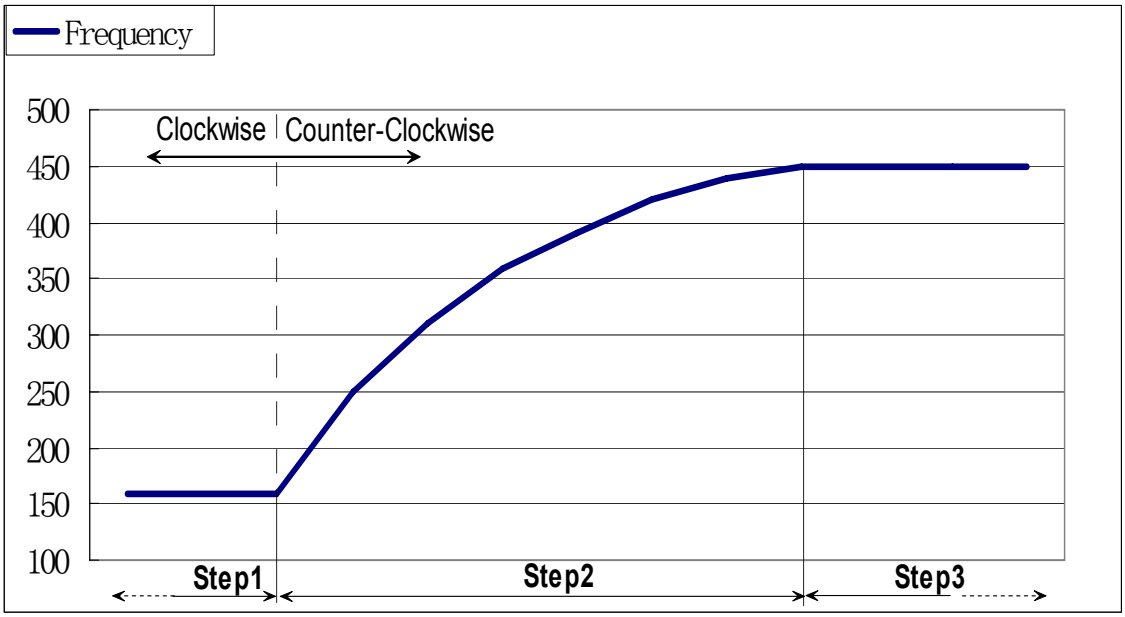
Suggested Reseting Process

In most of the VID28-XX applications, the angular range of the instrument dial is less than 260°. This allows use of a mechanical stop to define the zero position. Generally the pointer will be reset to the zero position at each power-up of the instrument.

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



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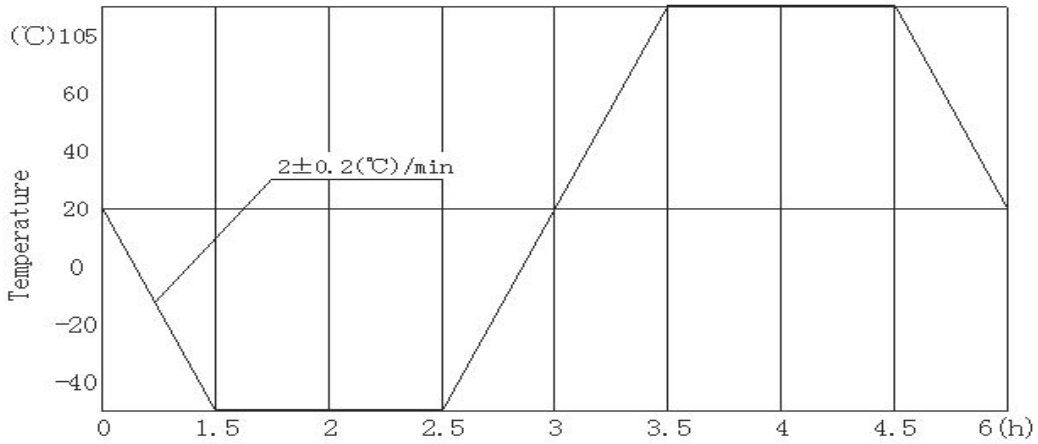
Reliability Test (stepper motor)

Temperature Cycle Test

- Low Temperature:-40°C±2°C
- High Temperature:+105°C±2°C
- Dwell time:1 Hrs/each
- Transfer Time:1.5 hrs
- Cycle:50 Cycles
- Motor Status : running
- The test was carried out according to IEC68-2-14 and PF-9688(DaimlerChrysler)

Temperature change like the following curve



Thermal Shock Test

- Low Temperature:-40°C±2°C
- High Temperature:+85°C±2°C
- Dwell time:30 Minutes/each
- Transfer Time:within 30 seconds
- Cycle:100 Cycles
- Motor Status: non-running
- The test was carried out according to IEC68-2-14 and PF-9688(DaimlerChrysler)

Humidity Test

- Temperature:+50°C±2°C
- Humidity:94±2％RH
- Duration:144 Hrs
- Motor Status: non-running
- The test was carried out according to IEC68-2-3 and PF-9688(DaimlerChrysler)

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High Temperature Test

- Temperature:+105°C±2°C
- Duration:168 Hrs
- Motor Status : running
- The test was carried out according to IEC68-2-2 and PF-9688(DaimlerChrysler)

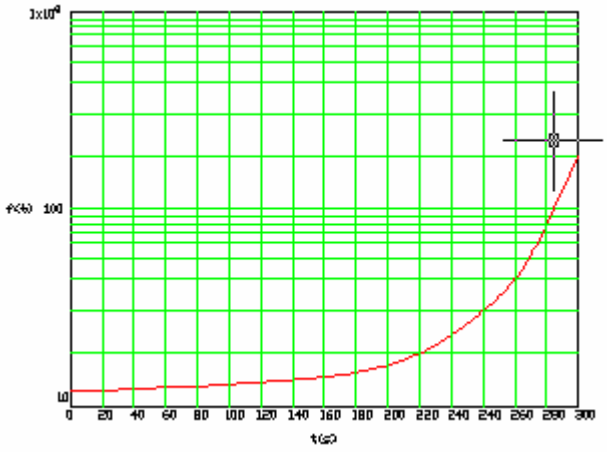
Low Temperature Test

- Temperature:-40°C±2°C
- Duration:48 Hrs
- Motor Status : running
- The test was carried out according to IEC68-2-1 and PF-9688(DaimlerChrysler)

Mechanical Vibration Test

- Pulse shape:sine pulse form
- Range of frequency:5Hz～200Hz(logarithm sweep)
- Sweep cycle: 315 sec.
- Direction:X,Y axis
- Duration:8 hrs /each Direction
- Acceleration : 6 g
- Motor Status : running
- The test was carried out according to IEC68-2-6

  Frequency change with time :



Mechanical Shock Test

- Height: 1 m
- Direction:X/Y/Z
- Motor Status : non-running
- The test was carried out according to IEC68-2-62 and ISO 1413

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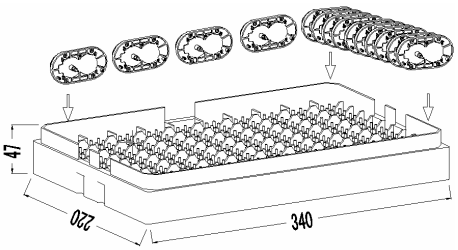
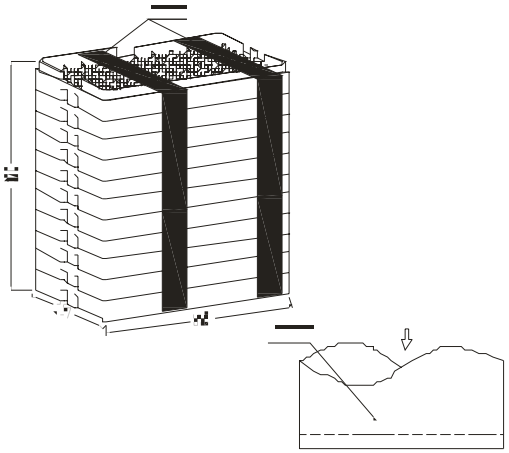
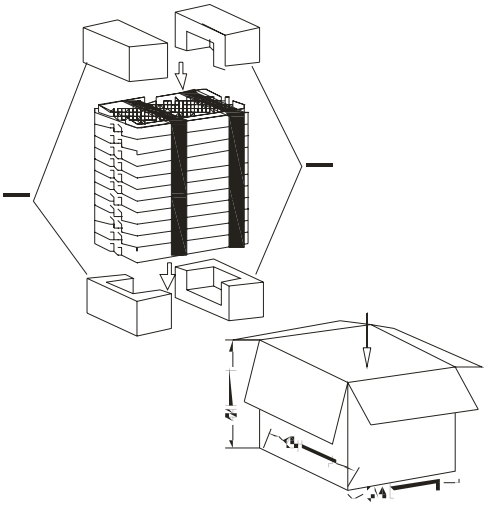
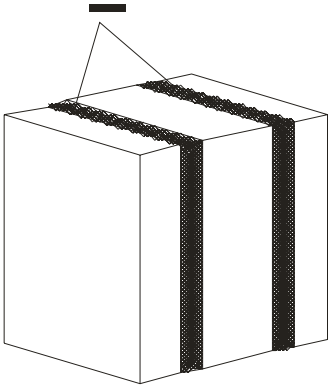
Packing Sketch Map

Tray for 50 stepper motors VID28 Material : PP Weight : Tray 1x210g=210g Motors 100x9g=900g Total 1110g	
Stack for 500 motors VID28: Material : 11Trays (including Cover) strappedtogether with plastic band Weight : Trays 10x1110g=11100g Cover tray 1x210g=210g Plastic strap 2x15g=30g Total 11340g	
Master-carton for 500 motors VID28: Material : cardboard 710g/m Weight : Master-carton 1x900g=900g PE bag 2x50g=100g Production 1x11340g=11340g PE 4x60g=240g Total 12580g	
A cardboard of motors 12580g Plastic strap 2x15g=30g Total 12610g	

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