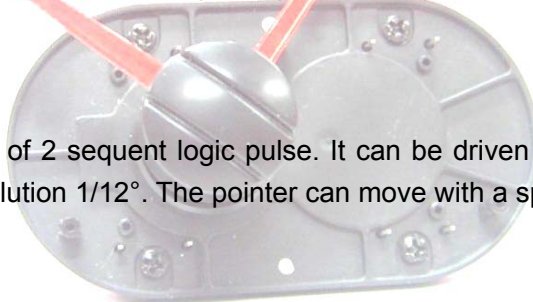


VID28 Series Stepper Motor

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.

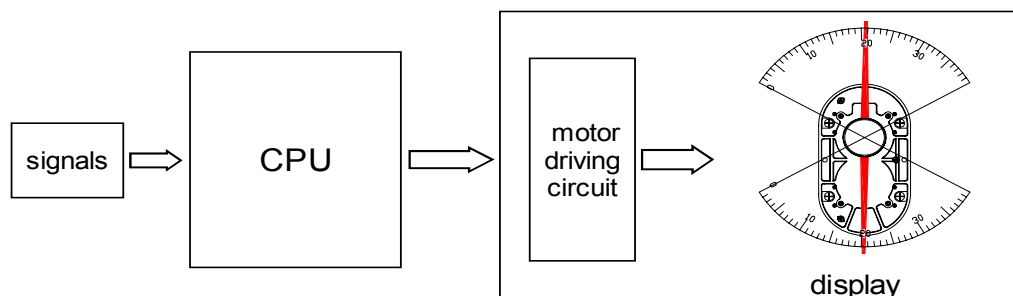
VID28-XX series

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 μ -step resolution: 1/12°.
- Wide working voltage: 3.5~10V.
- Wide working temperature: -40~105°C.
- Low current consumption: less than 20mA, 5V, 2X100mW.
- Extremely robust construction: 64mm×35mm×9.2mm.
- Liability and long life guaranteed.
- Directly driven by a μ -controller.

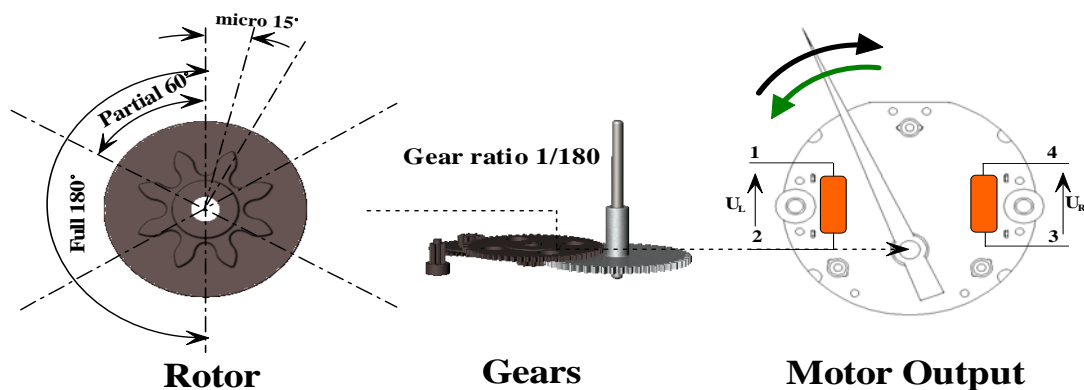
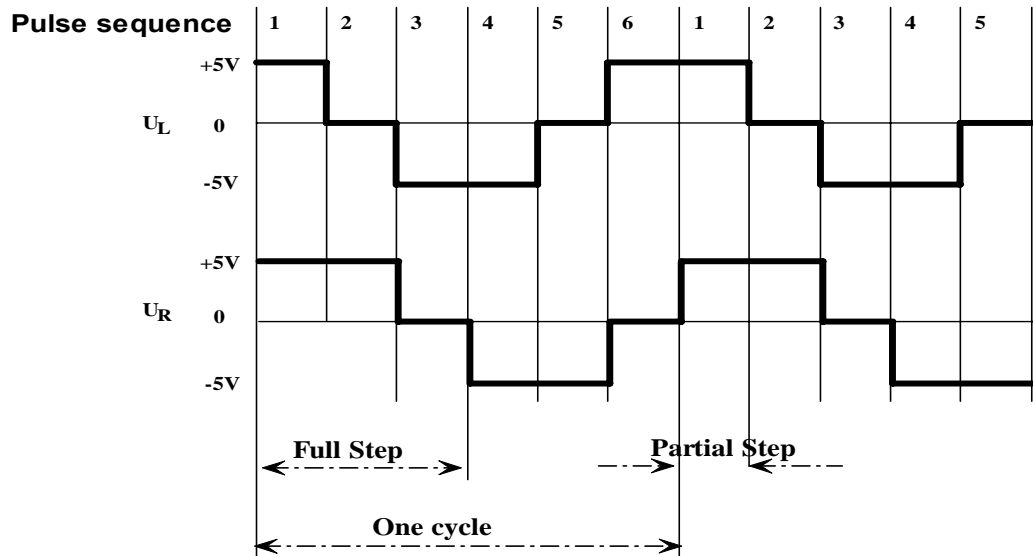
Typical application:



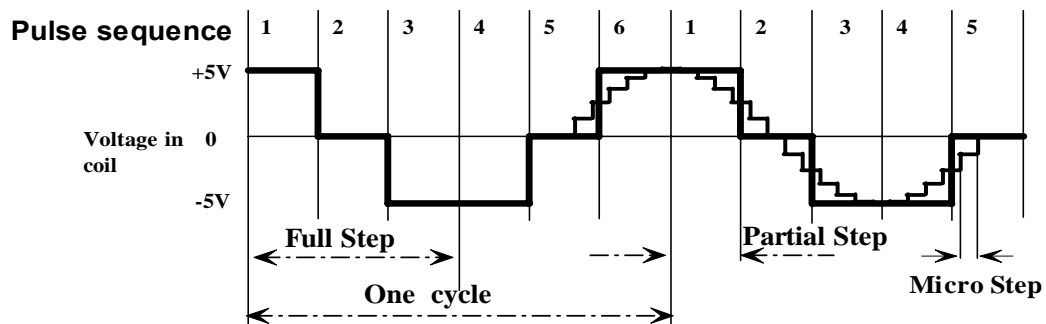
perfect combination of digital accuracy and analog facility

Step Definition and Rotor Movement

VID28-XX series is driven by dual signals of 2 sequent logic pulse signals and the outer shaft is Its work diagram is as following:



In order to make the motor run more stably 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 $1/12^\circ$ 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).....380°C

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}=25°C, 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	°C
Coil Resistance	R _b		260	280	300	Ω
Operating Current	I _m	f _a =200Hz			20	mA
Start-Stop Frequency	f _{ss}	J _L =0.2x10 ⁻⁶ kgm ²	125		125	Hz
Maximum Driving Frequency	f _{mm}	J _L =0.2x10 ⁻⁶ kgm ²	400		400	Hz
Mechanical Characteristics						
Dynamic Torque	M200 M400	f _a =200Hz f _a =400Hz		1.1 0.7		mNm mNm
Static Torque	M _s	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	1.2	Degree
Noise						
Noise Level	SPL	@100°/sec		34		dBA
		@200°/sec		41		
		@400°/sec		44		

Others

Angle of Rotation	Inner Shaft	@400°/sec	Motors with internal Stop			315	Degree
	Outer Shaft					280	Degree
Force allowed on the pointer shaft:							
Axial force (push)		Fa				60	N
Axial force (pull)		Fa				60	N
Perpendicular force		Fq				6	N
Imposed acceleration		α_p				1000	rad/s ²
Number of allowed pointer insertion						1	Times

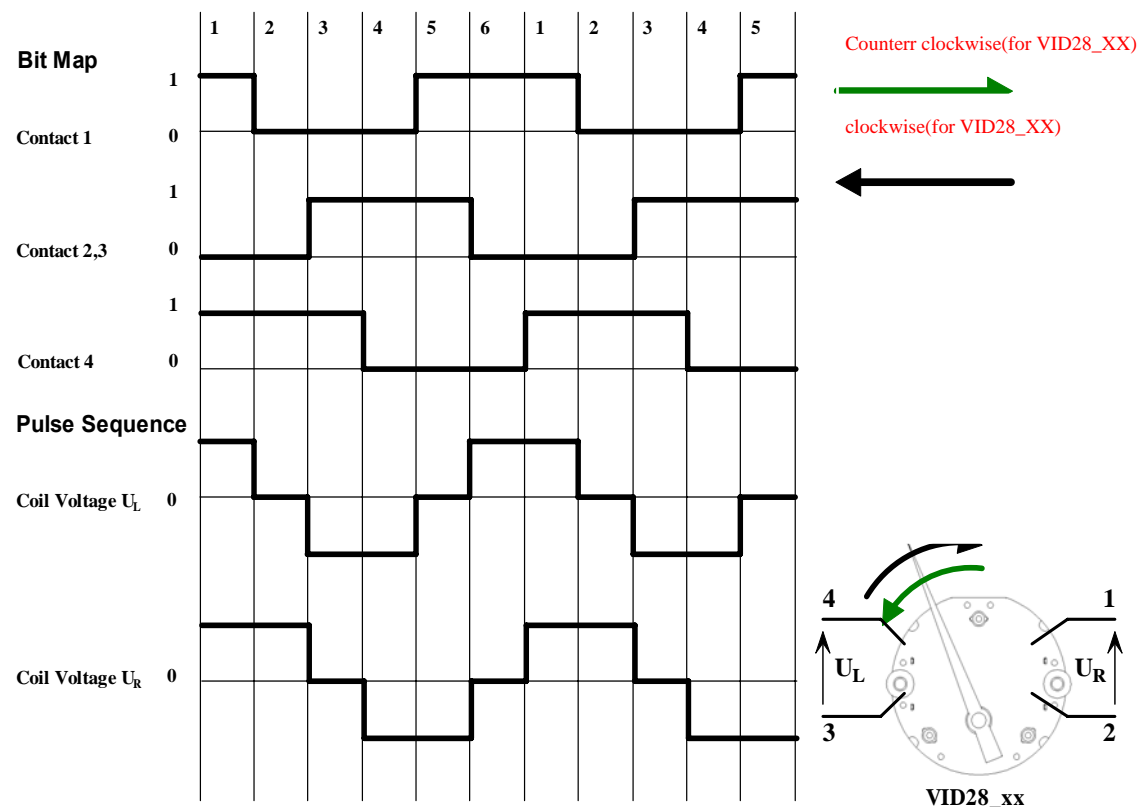
Note: f_a – full-step frequency J_L – Load inertia

Driving Pulse and Control Circuit

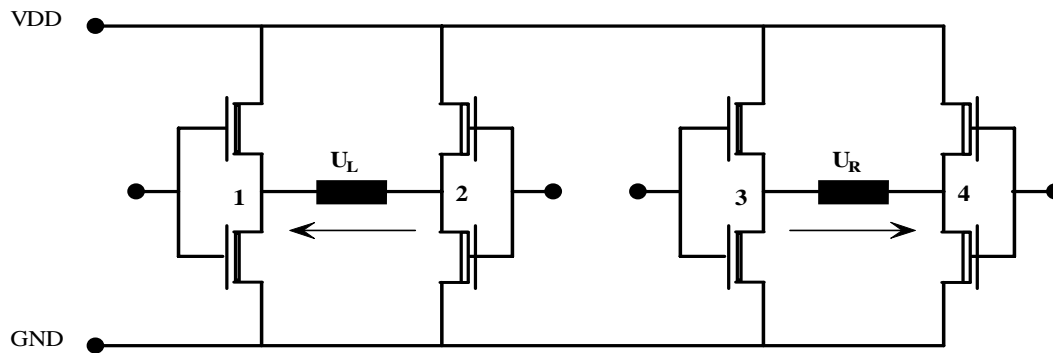
Partial-Step Driving Mode

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



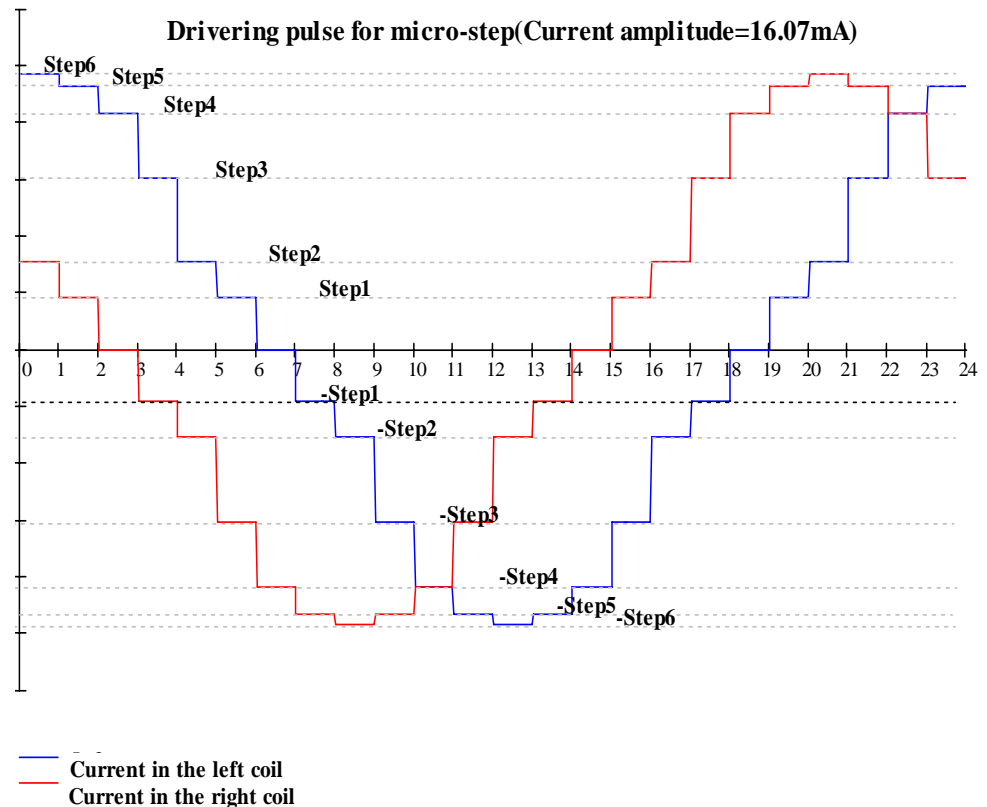
Driving Diagram in Partial Mode



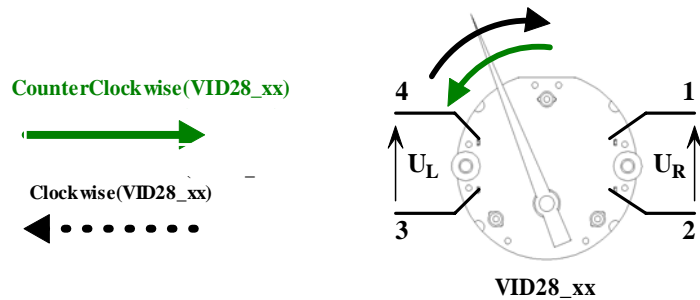
μ-Step Driving Mode

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



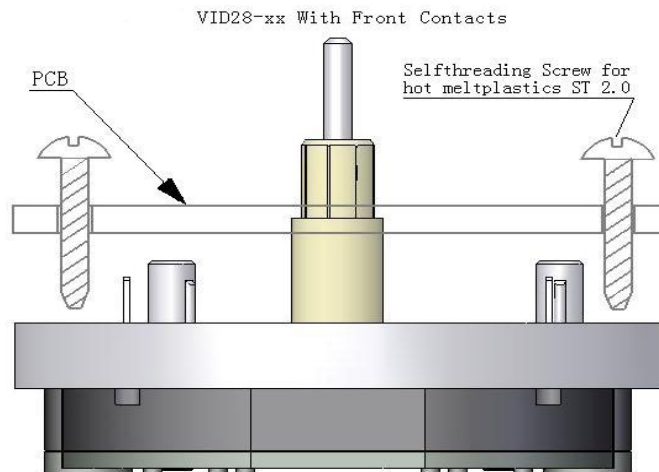
In general the peak amplitude should be between 12.9mA and 16.07mA.



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.

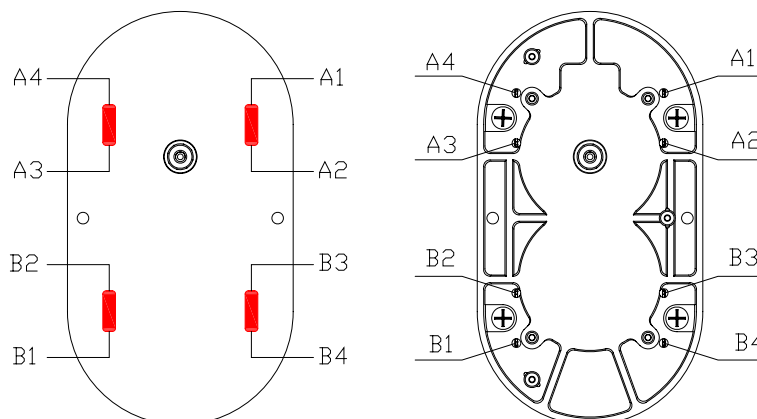
Installation Diagram



Pin Connection

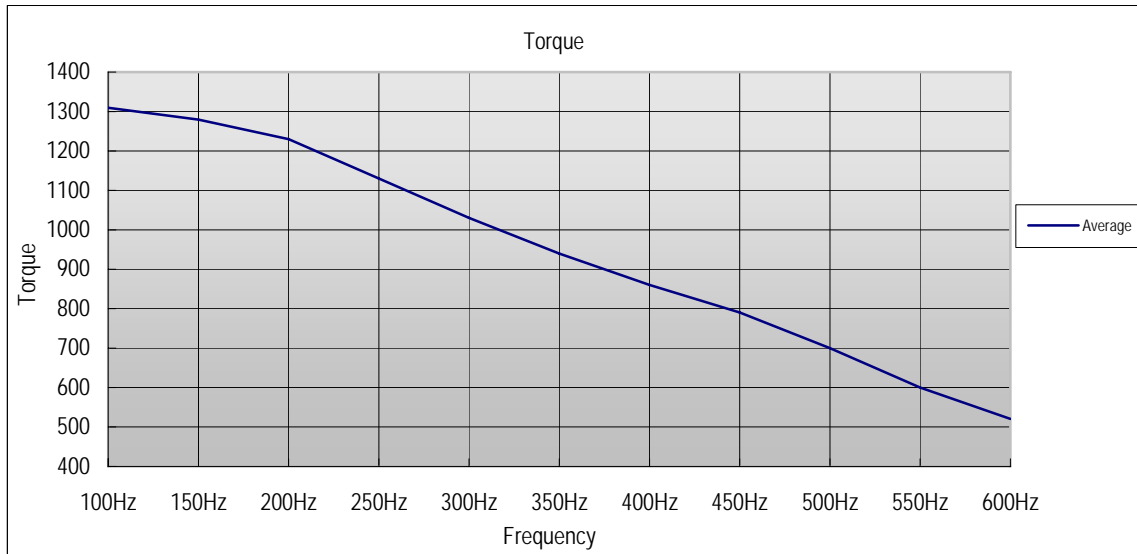
VID28-XX Pin Connection

Schematic

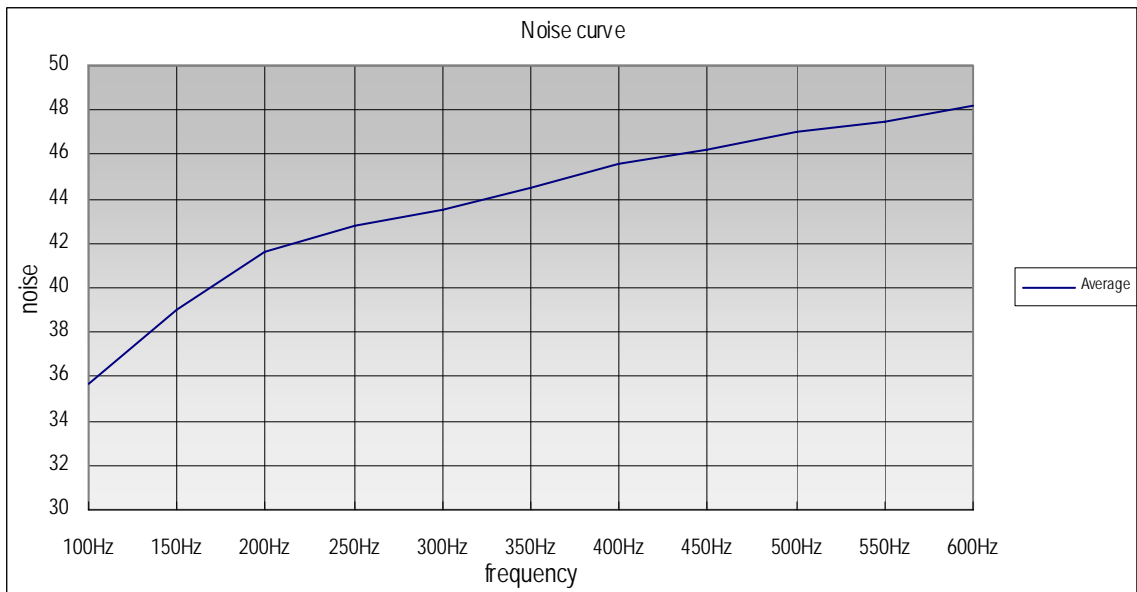


Typical torque and noise

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



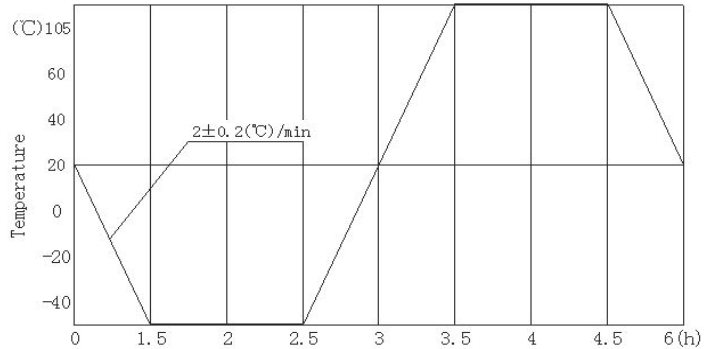
Noise in micro step driving mode, @ Max voltage $U_b = 4.2V$



Reliability Test (stepper motor)

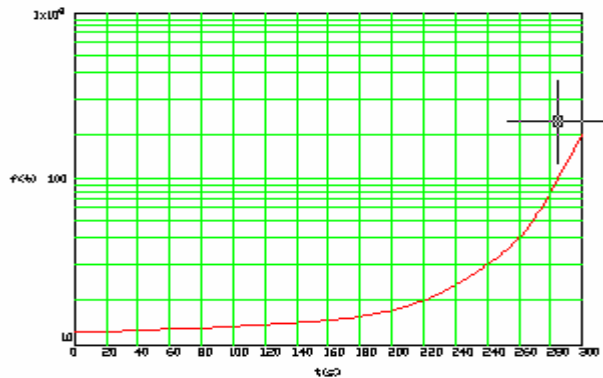
Temperature Cycle Test

- 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



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 :



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)

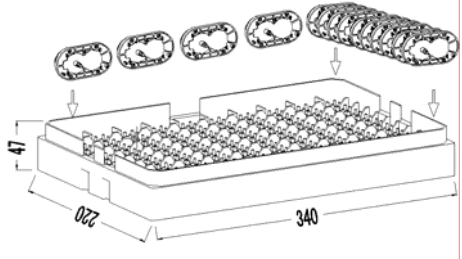
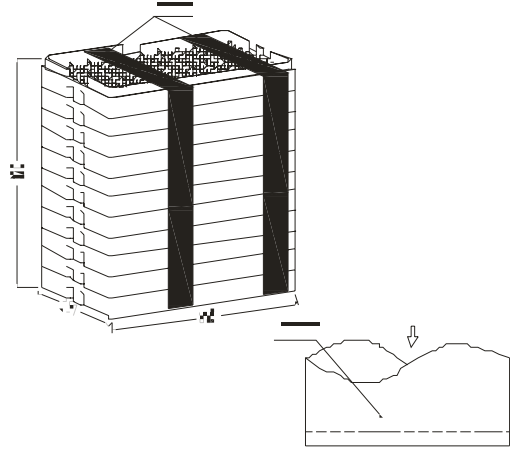
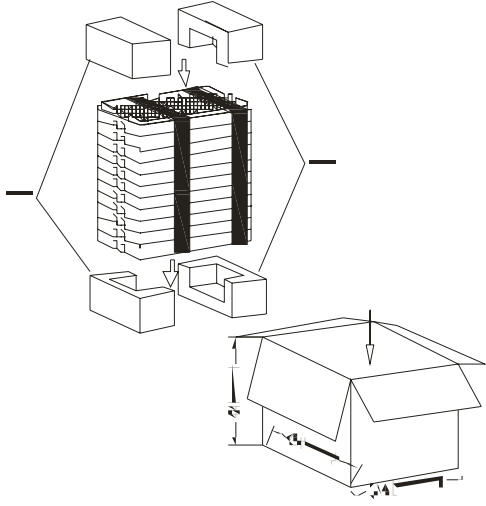
High Temperature Test

- 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)

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 1

Packing Sketch Map

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