Technical Data (Standard Types)
Edition 10/2003
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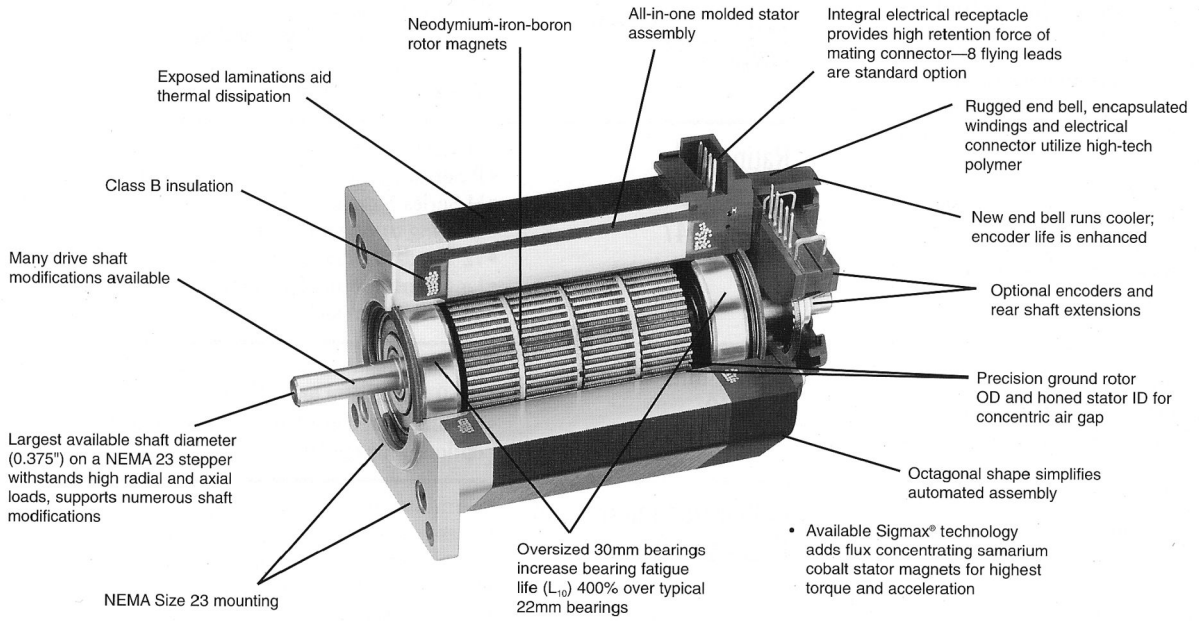
High Performance Stepper Motors
POWERMAX II®

- **2-phase hybrid stepper motor in size NEMA 23**
- **Full step angle 1,8°**
- **M series with Sigmax® stator technology for a maximum holding torque of up to 1,8 Nm**
- **P series with conventional stator design for holding torques of up to 1,4 Nm**
- **Fully encapsulated stator**
- **Oversized bearings withstand high radial and axial loads**
- **Exceptional thermal dissipation**
- **Highest dynamics at shortest positioning times**
- **Optional low inertia rotor**

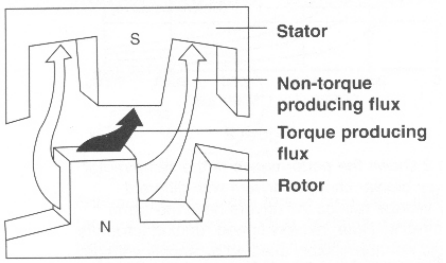
PACIFIC SCIENTIFIC

The motors in size NEMA 23 have an octagonal housing, which shows the structure of the stator lamination.
The rear end bell can be equipped with an 8-pole plug for motor connection. In standard version all motors have an 8-pole flying lead connection. The standard types are available in several lengths and have torques of up to 1,8 Nm.

POWERMAX II® Motor Design

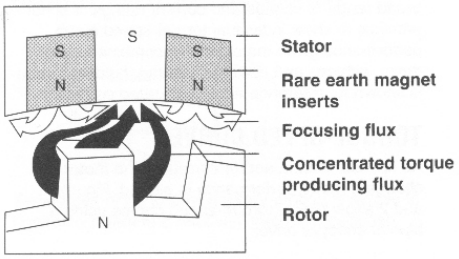


P Series Standard Hybrid Step Motor



Typical path of flux transfer in an energized conventional hybrid step motor. Some flux leakage occurs in normal operation.

M Series Sigmax® Hybrid Step Motor



Patented Sigmax® technology redirects magnetic flux t o inhibit leakage and optimize torque production.

Technical Data P Series

P2HNRXx-LNN-NS-00*			**F**	**C**	**H**
Motor Data					
Holding torque (bipolar/parallel 2 phases on)	**M_H**	**Nm**	**0,42**	**0,43**	**0,42**
Rated current per winding (bipolar/parallel)	**I**	**A**	**1,6**	**2,5**	**5,2**
Technical Data					
Full step			200 per revolution		
Step angle		°	1,8	1,8	1,8
Angular accuracy		%	3	3	3
Phases			2	2	2
Winding resistance	R_{ph}	Ω	3,8	1,68	0,44
Winding inductivity	L_{ph}	mH	5,1	2,3	0,5
Detent torque	M_P	Nm	0,018	0,018	0,018
Insulation class			B	B	B
Insulation inductance			100MΩ @ $500V_{DC}$		
Dielectricity test			$500V_{DC}$ 1min		
Mechanical Data					
Rotor inertia	J	Kgm^2*10^{-3}	0,007	0,007	0,007
Mass	m	kg	0,45	0,45	0,45
Length	L_{max}	mm	40,7	40,7	40,7
Ambient temperature		°C	-20 up to +40		
Max. surface temperature		°C	95		
Protection class			IP 23		

* Please replace the x in the item number by the letter of the requested winding.

P21NRXx-LNN-NS-00*			**D**	**C**	**B**	**A**
Motor Data						
Holding torque (bipolar/parallel 2 phases on)	**M_H**	**Nm**	**0,77**	**0,82**	**0,79**	**0,81**
Rated current per winding (bipolar/parallel)	**I**	**A**	**1,5**	**3,5**	**4,6**	**5,6**
Technical Data						
Full step			200 per resolution			
Step angle		°	1,8	1,8	1,8	1,8
Angular accuracy		%	3	3	3	3
Phases			2	2	2	2
Winding resistance	R_{ph}	Ω	5,22	1,06	0,64	0,46
Winding inductivity	L_{ph}	mH	10,3	2,3	1,1	0,8
Detent torque	M_P	Nm	0,03	0,03	0,03	0,03
Insulation class			B	B	B	B
Insulation inductance			100MΩ @ $500V_{DC}$			
Dielectricity test			$500V_{DC}$ 1min			
Mechanical Data						
Rotor inertia	J	Kgm^2*10^{-3}	0,012	0,012	0,012	0,012
Mass	m	kg	0,68	0,68	0,68	0,68
Length	L_{max}	mm	52,4	52,4	52,4	52,4
Ambient temperature		°C	-20 up to +40			
Max. surface temperature		°C	95			
Protection class			IP 23			

* Please replace the x in the item number by the letter of the requested winding.

P22NRXx-LNN-NS-00*			**D**	**C**	**B**	**A**
Motor Data						
Holding torque (bipolar/parallel 2 phases on)	**M_H**	**Nm**	**1,43**	**1,43**	**1,51**	**1,39**
Rated current per winding (bipolar/parallel)	**I**	**A**	**2,5**	**3,1**	**4,6**	**6,5**
Technical Data						
Full step				200 per resolution		
Step angle		°	1,8	1,8	1,8	1,8
Angular accuracy		%	3	3	3	3
Phases			2	2	2	2
Winding resistance	R_{ph}	Ω	2,44	1,56	0,76	0,42
Winding inductivity	L_{ph}	mH	6,2	3,9	2,1	0,8
Detent torque	M_P	Nm	0,05	0,05	0,05	0,05
Insulation class			B	B	B	B
Insulation inductance				100MΩ @ $500V_{DC}$		
Dielectricity test				$500V_{DC}$ 1min		
Mechanical Data						
Rotor inertia	J	Kgm^2*10^{-3}	0,025	0,025	0,025	0,025
Mass	m	kg	1,13	1,13	1,13	1,13
Length	L_{max}	mm	78,8	78,8	78,8	78,8
Ambient temperature		°C		-20 up to +40		
Max. surface temperature		°C		95		
Protection class				IP 23		

* Please replace the x in the item number by the letter of the requested winding.

Technical Data P Series (Sigmax®)

Motor Data			**D**	**C**	**B**	**A**
Holding torque (bipolar/parallel 2 phases on)						
Rated current per winding (bipolar/parallel)	**M_H**	**Nm**	**0,95**	**1,02**	**0,97**	**1,00**
Technical Data	**I**	**A**	**1,5**	**3,5**	**4,6**	**5,6**
Full step						
Step angle				200 per resolution		
Angular accuracy		°	1,8	1,8	1,8	1,8
Phases		%	1,5	1,5	1,5	1,5
Winding resistance			2	2	2	2
Winding inductivity	R_{ph}	Ω	5,22	1,06	0,64	0,46
Detent torque	L_{ph}	mH	8,7	2,0	1,0	0,7
Insulation class	M_P	Nm	0,066	0,066	0,066	0,066
Insulation inductance			B	B	B	B
Dielectricity test				100MΩ @ $500V_{DC}$		
Mechanical Data				$500V_{DC}$ 1min		
Rotor inertia						
Mass	J	Kgm^2*10^{-3}	0,012	0,012	0,012	0,012
Length	m	kg	0,68	0,68	0,68	0,68
Ambient temperature	L_{max}	mm	52,4	52,4	52,4	52,4
Max. surface temperature		°C		-20 up to +40		
Protection class		°C		95		
Motor Data				IP 23		

* Please replace the x in the item number by the letter of the requested winding.

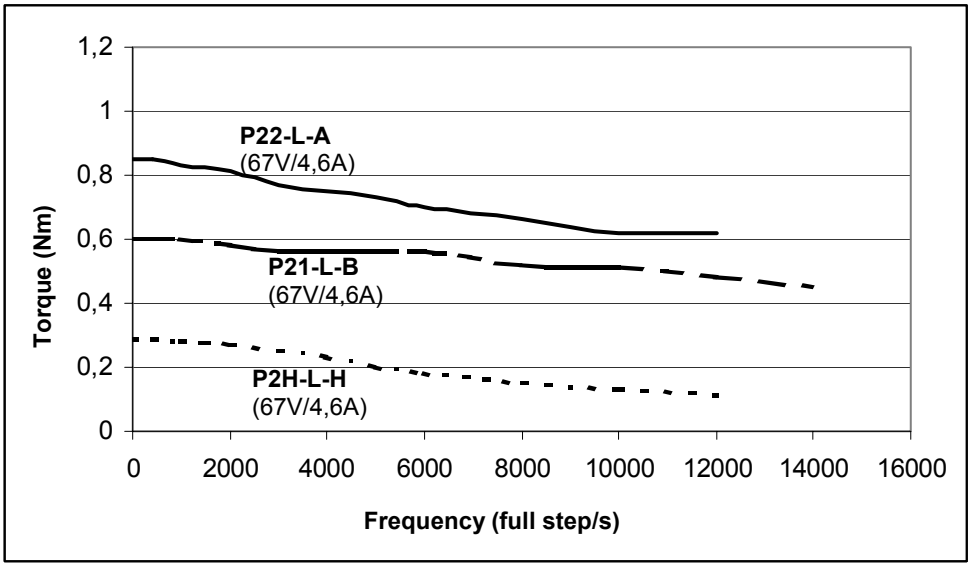
M22NRXx-LNN-NS-00*			**D**	**C**	**B**	**A**
Motor Data						
Holding torque (bipolar/parallel 2 phases on)	**M_H**	**Nm**	**1,68**	**1,68**	**1,79**	**1,62**
Rated current per winding (bipolar/parallel)	**I**	**A**	**2,5**	**3,1**	**4,6**	**6,5**
Technical Data						
Full step				200 per resolution		
Step angle		°	1,8	1,8	1,8	1,8
Angular accuracy		%	1,5	1,5	1,5	1,5
Phases			2	2	2	2
Winding resistance	R_{ph}	Ω	2,44	1,56	0,76	0,42
Winding inductivity	L_{ph}	mH	5,0	3,1	1,7	0,7
Detent torque	M_P	Nm	0,12	0,12	0,12	0,12
Insulation class			B	B	B	B
Insulation inductance				100MΩ @ $500V_{DC}$		
Dielectricity test				$500V_{DC}$ 1min		
Mechanical Data						
Rotor inertia	J	Kgm^2*10^{-3}	0,025	0,025	0,025	0,025
Mass	m	kg	1,13	1,13	1,13	1,13
Length	L_{max}	mm	78,8	78,8	78,8	78,8
Ambient temperature		°C		-20 up to +40		
Max. surface temperature		°C		95		
Protection class				IP 23		

* Please replace the x in the item number by the letter of the requested winding.

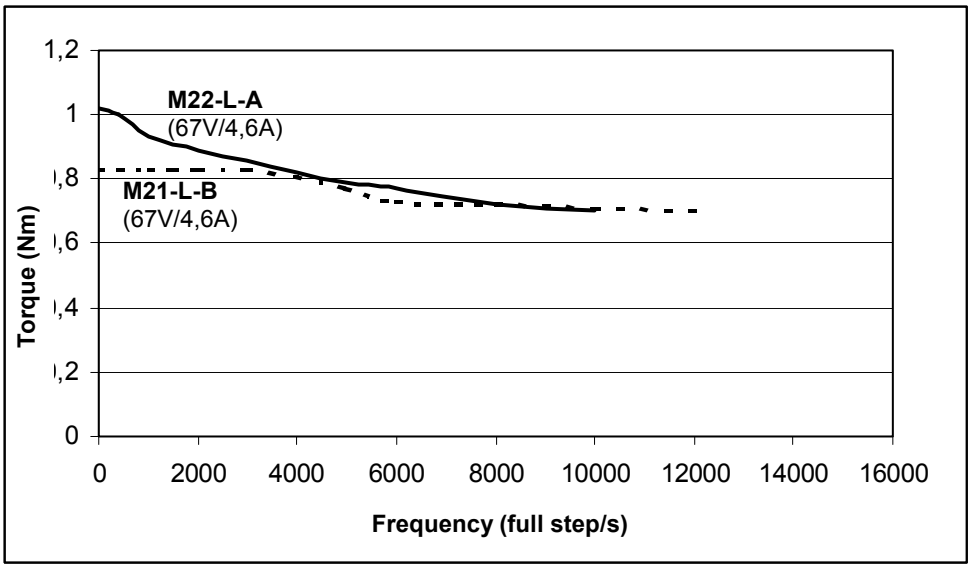
Torque Characteristics

(connection bipolar, parallel, with drive DSM5-70)

P Series (selected windings)

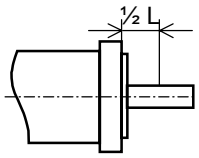


M Series (selected windings)



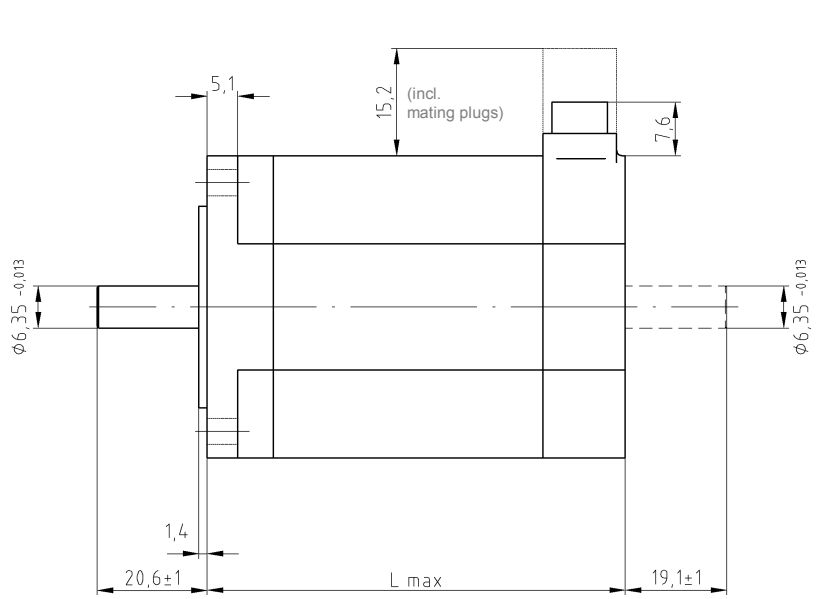
Radial and Axial Shaft Loading

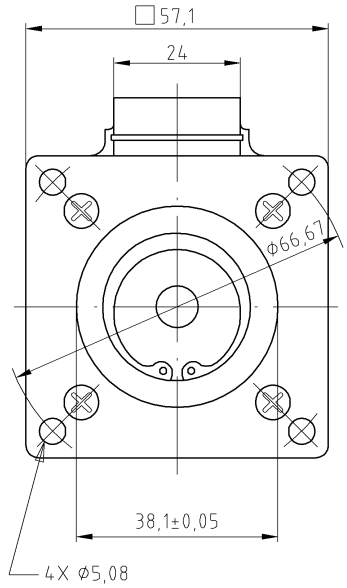
F_{radial} = 90 N
F_{axial} = 60 N



regarding to half the shaft length distance to the bearing

Dimensions





all dimensions in mm

Motor type	P2H	P21/M21	P22/M22
Length	40,7	52,4	78,8

Standard Version

- NEMA 23
- smooth shaft Ø 6,35 mm
- 8 flying leads for serial or parallel connection
- single shaft (version ...-L**N**N-...)
- alternative with double shaft (version ...-L**D**N-...)
- **connecting cable KAB.300 has to be ordered separately**

Further types and options for this series as well as stepper drives and other accessories are available upon request.

Sales and Service

We are committed to quality customer service. In order to serve you in the most effective way please contact your local sales representative for assistance.
If you do not know the local sales representative please contact our customer support.

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