Lexium BPH series servo motors

Motors Reference Guide

AMOMAN001U Edition 1.2001 (English, French, Italian, Germany, Spanish languages)

Merlin Gerin

Modicon

Square D

Telemecanique

Schneider Electric

GENERAL WARNINGS ON PRODUCT USE

All the international, state, regional and local standards must be complied with during the installation and during the use of this product.
Only properly qualified personnel having extensive knowledge in servomotor technology should install, commission and/or maintain the product.

These servomotors are suitable for operation at a temperature >100° C .
Safeguards must therefore be used to provide protection against accidental or direct contact with the motor housing .

The servomotors with keyed shaft must never be rotated under power unless connected to the mechanics of the machine.
The key could come out from the shaft and due to the centrifugal force could cause damage to personnel and machines.

The motors assembled vertically (with the upwards shaft) may be seriously damaged by liquids collected next to the shaft end output. Make therefore sure that there is no liquid deposit next to the motor shaft end .

The holding brake is not to be considered a safety device. In the case of a vertical axis, interpose safety interlock or additional safety brakes to stop the axis from falling. It could cause damage to personnel and machines.

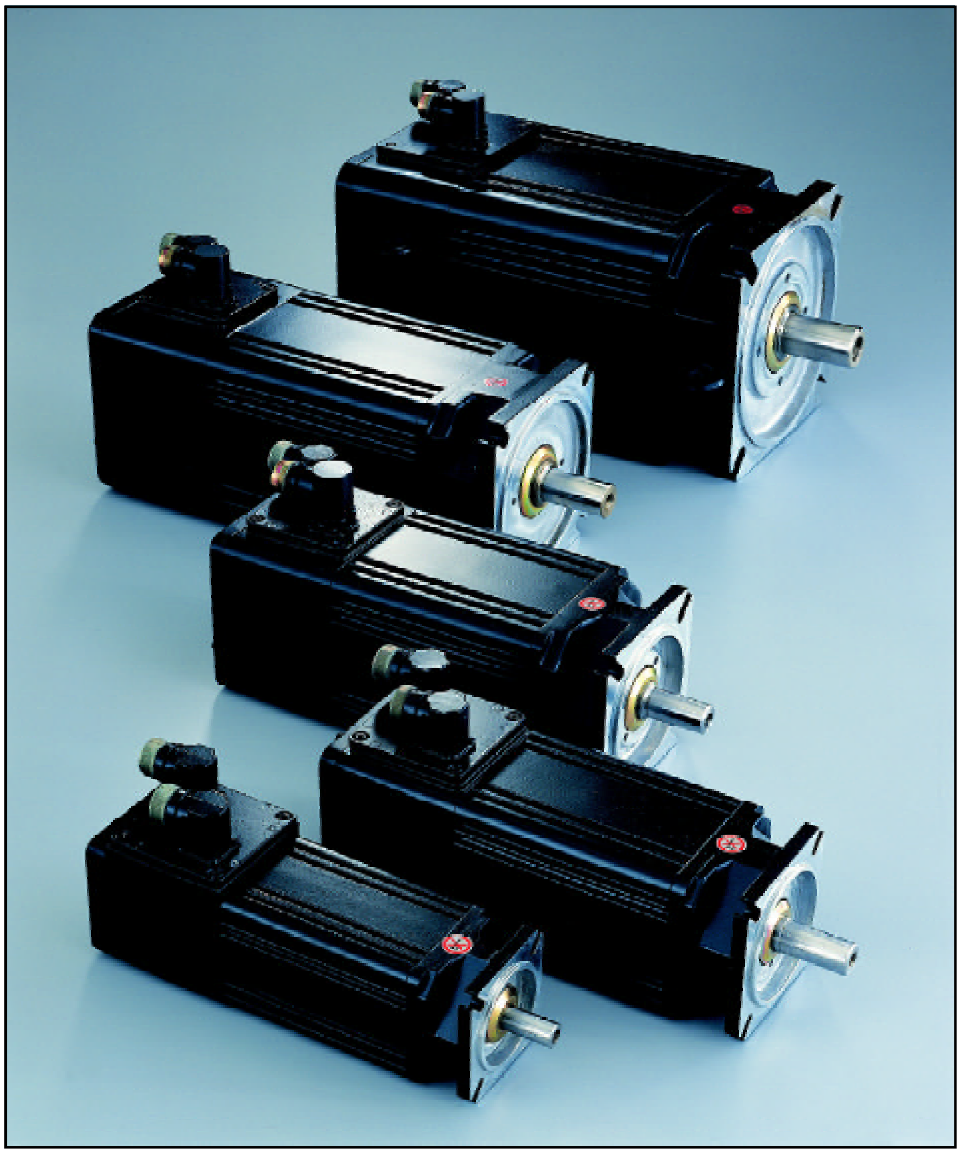
If a brake is provided on the motor, no axial loadings must be applied.
If it is supplied with reverse polarity, the brake stays locked on.
If the holding brake is not being used for a long time, the oxidation of its parts may lead to a braking torque reduction.

Use only original Schneider Electric cables. The original Schneider Electric cables have special characteristics (capacitance value...). Not to respect these characteristics can cause seriuos damage to servomotors.

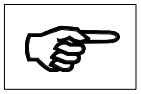
During the servomotor installation, always make sure that the connection cable used is the one established in the reference guide. The use of an incorrect cable leads to the violation of the international standards.

Always disable the system and disconnect the cables from the motor before carrying out the connector orientation (turnable each 90° by the customer).

Lexium BPH series servo motors



These servomotors are suitable for operation at a temperature >100° C .
Safeguards must therefore be used to provide protection against accidental or direct contact with the motor housing .



The products and equipment described in this document are subjected to both technical and operational improvements or modifications at any time .
Their description cannot therefore be considered contractually binding .

GENERAL INDEX

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GENERAL FEATURES

General features

- BPH brushless servo motors are synchronous motors and have permanent Samarium Cobalt magnets
- This means that they have a high power-to-weight ratio, low inertia, a large dynamic range of speeds and a compact size
- A high overtorque is possible with no risk of demagnetisation
- Their sinusoidal emf associated with performing control makes their rotation very smooth, even at very low speed
- Thermal protection is provided by a sensor and read by the Lexium Drive
- Power connections by connector (90° rotatable by the customer)
- Feedback connections by connector (90° rotatable by the customer).

Applications

- Robotics : for their low overall dimensions and low inertia
- Special and automatic machines .

CHARACTERISTICS

General characteristics

- General characteristics as per IEC 34.1
- Sm Co magnets on the rotor
- Torque range : 0.4 to 230 Nm
- Protection class : IP 65 as per IEC 529, IP67 optional (Excluded BPH055)
- Shaft end : IP65 protection as per IEC 529, IP67 optional (IP54 for BPH055 *)
- Power connector is rotatable by 90° increments for a full 360° of movement
- Feedback connector is rotatable by 90° increments for a full 360° of movement
- Optional holding brake (24 VDC)
- PTC temperature sensor enbedded in the motor winding. Fully thermally protected when used with properly wired Lexium series drives
- Winding insulation class : H (180°) as per VDE 0530 (class F for BPH055)
- Out-of-round, concentricity, perpendicularity between flange and shaft as per DIN 42955 R (class N for BPH055)
- Flange (drive end bell) as per IEC 72.2
- Shaft end and key as per IEC 72.1
- No mounting restrictions
  IMB5 - IMV1 - IMV3 as per DIN42950
- Balancing : class S as per ISO 2373
- Operating temperature range : from 0 to 40° C
- UL and cUL Recognized Component (Underwriters Laboratories Inc.)
  The BPH motors comply with the relevant American and Canadian standards (in this case UL1004 and CSA100). (Excluded BPH055)

* (IP64 by using seal code BMHQ101)

CHARACTERISTICS

General characteristics definitions

Characteristics	Unit	Description
Continuous rated stall torque	[Nm]	Maximum available stall torque considering the thermal limitation; the thermal limitation comply with the H class insulation system. This torque can be supplied without any limitation of time.
Continuous rated stall current	[Arms]	Equivalent rms phase current for producing the continuous rated stall torque.
Maximum current	[Arms]	Maximum rms phase current.
Maximum continuous power		Maximum available continuous power considering the thermal limitation; the thermal limitation comply with the H class insulation system. The maximum continuous power can be supplied without any limitation of time.
Current at the maximum continuous power	[Arms]	Rms phase current for producing the maximum continuous power
Speed at the maximum continuous power	[rpm]	Speed at which the maximum continuous power is obtained.
Maximum mechanical speed	[rpm]	Maximum speed considering mechanical limitations (bearings, centrifugal forces).
Torque constant at 25 °C	[Nm/Arms]	Ratio between the continuous rated stall torque and the continuous rated stall current. The ratio between torque and current is constant up to about twice the continuous rated stall torque; for higher torques the torque constant decreases (iron saturation effect).
Back EMF constant at 25 °C	[V s/rad]	Rms phase to phase voltage generated by the motor when rotating at 1 rad/s
Mechanical time constant	[ms]	$\frac{3}{2} \cdot R_W \cdot \frac{J_{Mot}}{K_T^2}$ Where: R_W = Winding resistance J_{Mot} = Rotor Inertia K_T = Torque constant
Electrical time constant	[ms]	Ratio between winding inductance and winding resistance
Thermal time constant	[min]	4-5 times the thermal time constant is needed for stabilizing the motor temperature (with the motor working in the same conditions for all the time).
Winding resistance at 25 °C (L-L)	[Ohm]	Phase to phase winding resistance
Winding inductance at 25 °C (L-L)	[mH]	Phase to phase winding inductance.

Tolerances of electromagnetic parameters for BPH motors

Tolerances of electromagnetic parameters for BPH motors		
Motors data	**Typical value**	**Maximum value**
Continuous stall torque	± 3.5 %	± 7.5 %
Torque constant	± 3.5 %	± 7.5 %
Back-e.m.f. force constant	± 3.5 %	± 7.5 %
Winding resistance	± 5 %	± 10 %
Winding Inductance	± 5 %	± 10 %
Motor moment of inertia	±3 %	± 10 %

CHARACTERISTICS

Pratical suggestion for choosing IP degree protection

MOTOR HOUSING DEGREE OF PROTECTION	
Environmental condition *	**Degree of protection**
Nebulization (atomization)	**IP65**
Spraying (not continuous)	
Dripping	**IP67**
Immersion for short time Continuous spraying	

SHAFT EXTENSION DEGREE OF PROTECTION	
Environmental condition *	**Degree of protection**
Nebulization (atomization)	**IP65** **Life : 20.000 hours also without lubrification**
Spraying (not continuous)	
Coupling with oil gear reducer	**IP67** **Life : 5.000 hours** **with lubrification**

* ***The environmental conditions are referred to water and non-corrosive cooling liquids (95% water, 5% oil).***

The above mentionated protection degrees are guaranteed only by using cables assembled Schneider Electric.

The motors assembled vertically (with the upwards shaft) may be seriously damaged by liquids collected next to the shaft end output. Make therefore sure that there is no liquid deposit next to the motor shaft end .

CHARACTERISTICS

Motor feedback

The standard motor is equipped with a 1 pole pair resolver .

It is available, as an option, a version with high resolution SinCos multiturn and singleturn encoder assuring the following functions :

- It gives the angular position of the rotor to allow static switching .
- It measures the rotor speed via the associated servo-drive .
  This information is used by the speed control .
- It supplies the information concerning the position, in absolute or incremental form, for the position adjustment.
  (See SinCos multiturn and singleturn high resolution encoder)
- The motor feedback connection is rotatable 90° for a full 360° range.

BPH055 motor is available with resolver only.

RESOLVER	**Technical characteristics**
Max. mechanical speed	8000 RPM
Excitation voltage	4,7Vrms
Excitation frequency	8kHz 0,1%
Excitation current	30mA (max)
Precision	< ±15 arcminutes
Number of poles	2
Transformation ratio	0.5
Operating temperature range	-55 ° / +155 °C

ENCODER	**Technical characteristics**	
	Encoder A	**Encoder B**
Max. mechanical speed	6000 RPM	
Precision	< ±40 arcseconds	
Operating temperature range	-40 ° / +125 °C	
Supply voltage	7V - 12V	
Resolution per revolution (with Lexium Drive)	20 BITS	
Revolutions	4096	-
Electrical interface	1Vpp Hiperface SinCos	

CHARACTERISTICS

Cables

The cable shown in the table below are available, in different sections and compositions, as an option for making power and signal connections.

The cables are available with feedback or power connector motor side or with connectors on both ends .

See paragraph on page 51, Accessories.

- The cables are multi-conductors for dynamic laying .
- The over-temperature protection for the motors is connected by the feedback cable .
- The brake connection is included in the motor power cable .

During the servomotor installation, always make sure that the connection cable used is the one established in the reference guide. The use of an incorrect cable, leads to the violation of the international standards.

General characteristics	Power	Transducer
Standard of utilization	UL and cUL Recognized - CE	
Working temperature	0 + 80°C	
External sheath / Colour	Polyurethane polyester PUR 11Y conforming with VDE / RAL 5010	
Insulation	Polyolefin, TPE-E for signals	
Mechanical data :	**Resistance to tensile strength :** Dynamic : 20N/mm^2 / Static : 50N/mm^2 **Chemical resistance :** VDE 0472 side 803B - UL1581 - VDE028 side10 **Acceleration (max) :** 4m/sec^2 **Bending radius (min) :** 12 times the external diameter of the cable in flex **Flexibility** : 10.000.000 of cycles in flex 12 times the external cable diameter with an acceleration of 4m/sec^2 at a speed of 120m/min	
Capacitance (Cond./Shield)	< 150pF/m	< 120pF/m
Shielding	Tin-plated copper sheath >85% coverage	
Working voltage	600V	300V
Max. utilization length	75m	

BPH055 power cable is not UL and cUL Recognized .
(See page 13 for the BPH055 power cable characteristics)

CHARACTERISTICS

BPH055 - Characteristics of shielded cables

General characteristics	Power
Standard of utilization	IEC332-1, CE
Working temperature	0 + 80°C
External sheath / Colour	Polyurethane / RAL 5010
Insulation	Polypropylene, polyester for brake
Mechanical data :	**Resistance to tensile strength :** Dynamic : 20N/mm² / Static : 50N/mm² **Chemical resistance :** VDE 0472 side B **Acceleration (max) :** 4m/sec² **Bending radius (min) :** 12 times the external diameter of the cable in flex **Flexibility** : 3.000.000 of cycles in flex 12 times the external cable diameter with an acceleration of 4m/sec² at a speed of 120m/min
Capacitance (Cond./Shield)	< 150pF/m
Shielding	Tin-plated copper sheath >85% coverage
Working voltage	450 / 750V
Max. utilization length	75m

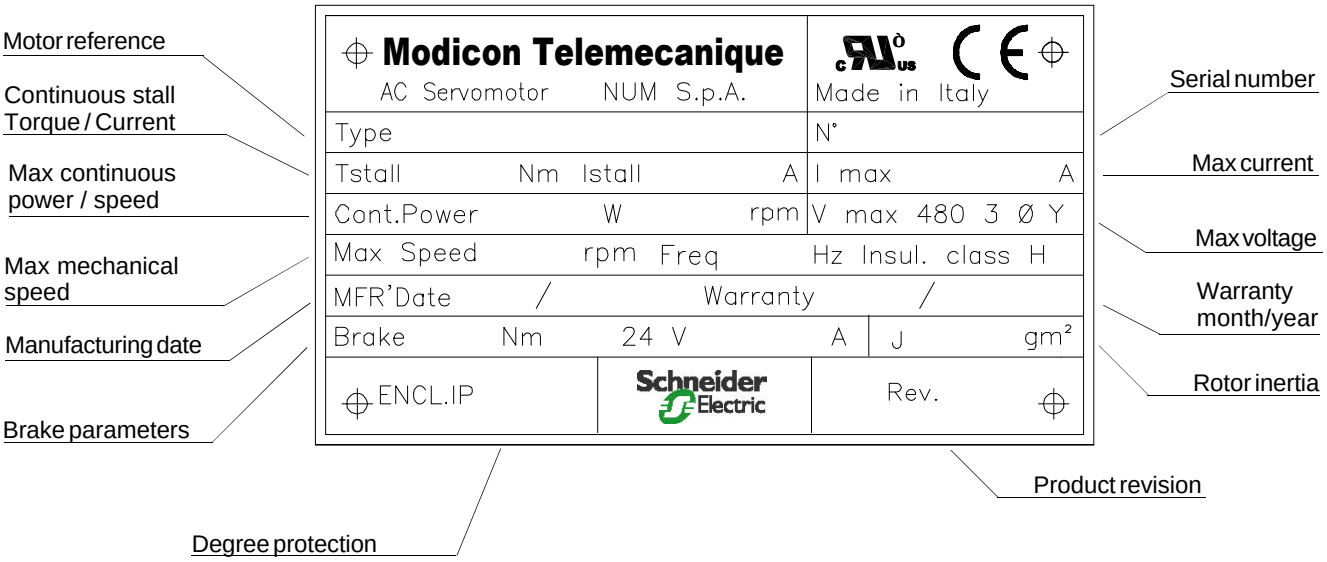
Detailed characteristics of shielded cables

Cable / motor characteristics	External diameter [mm]	Bending radius [mm]	Cable description
BPH0552S	11	132	(4 x 1,5mm² + (2 x 1mm²)) shielded **RPC305S**
BPH075 1N **BPH075 2N**	12.5	150	(4 x 1,5mm² + (2 x 1mm²)) shielded **AGOCAV004**
BPH095 2N **BPH095 3N**			
BPH115 2N **BPH115 3N**			
BPH142 2N **BPH142 3N**	15.5	186	(4 x 4mm² + (2 x 1mm²) shielded **AGOCAV005**
BPH190 2N **BPH190 3K** **BPH190 4N**			
BPH190 7K **BPH190 AK**	22.1	266	(4 x 10mm² + (2 x 1mm²) shielded **AGOCAV006**
Resolver	7.5	90	(4 x 2 x 0.25mm²) shielded **AGOCAV003**
Encoder A or B	9.4	112	(4 x 2 x 0.38mm² + 2 x 0.5mm²) shielded **AGOCAV002**

Use only original Schneider Electric cables. The original Schneider Electric cables have special characteristics (capacitance value...). Not to respect these characteristics can cause seriuos damage to servomotors.

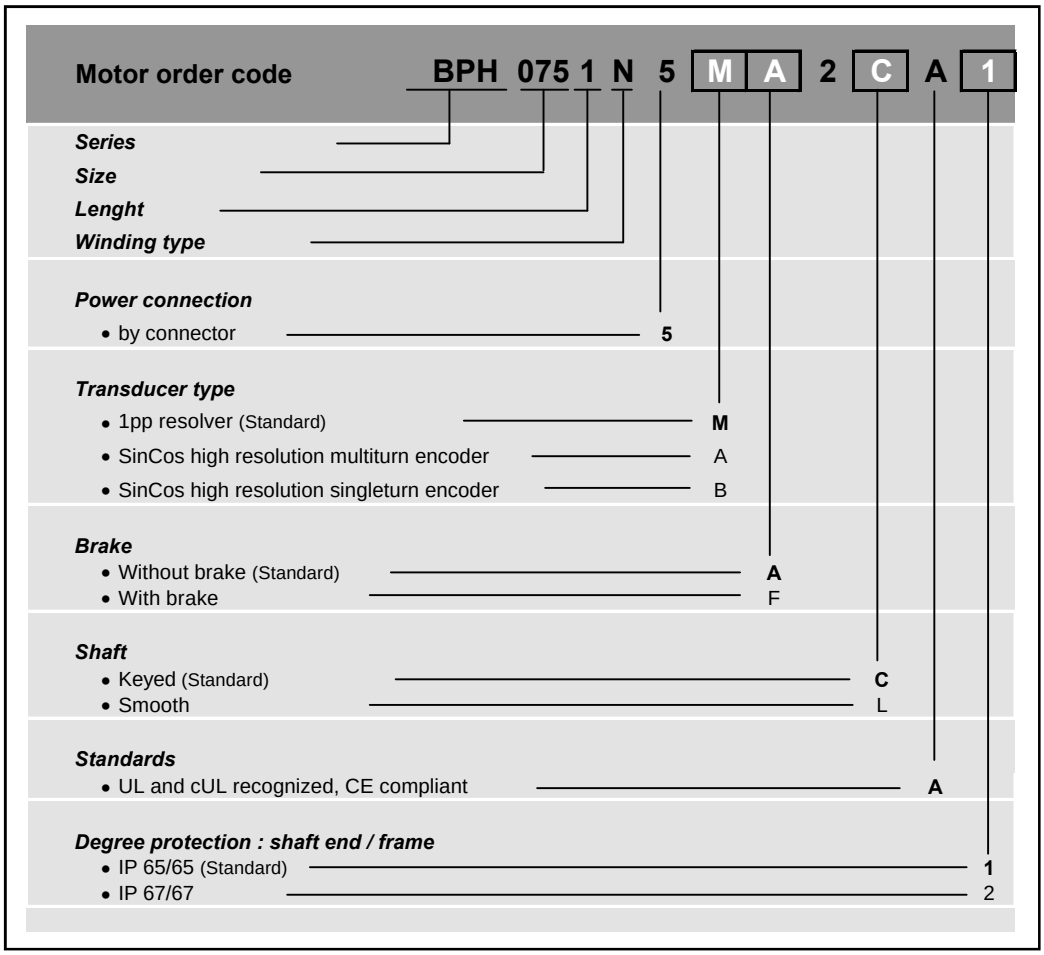
CHARACTERISTICS

Motor identification example

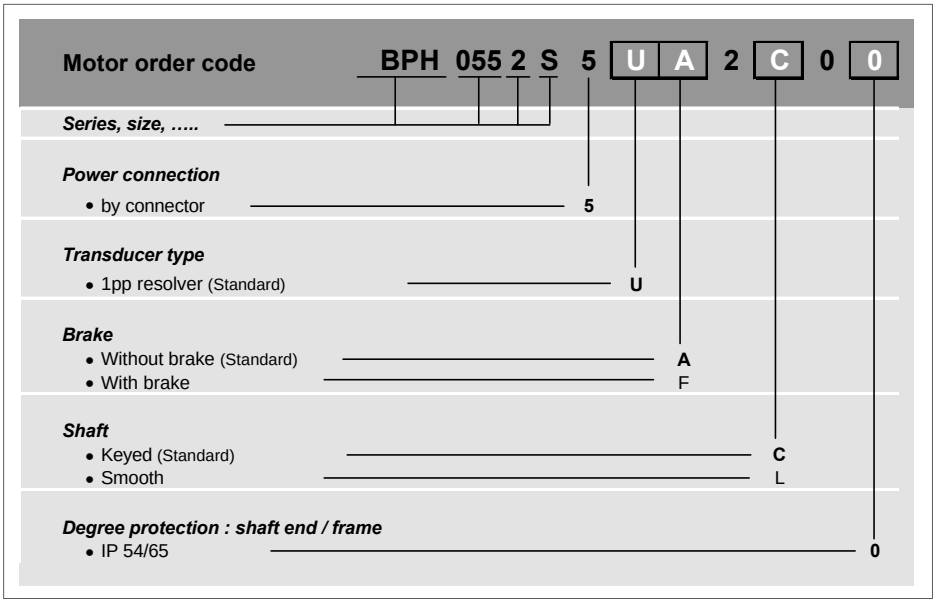


CHARACTERISTICS

Motor ordering code



BPH055 motor order code



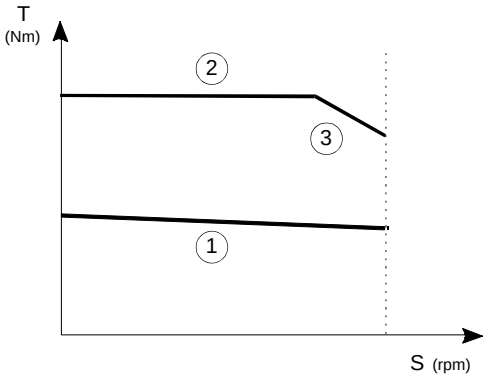
CHARACTERISTICS

Motor / Servo-Drive associations

Lexium drive MHD •				1004N	1008N	1017N	1028N	1056N	1112N	1198N
Permanent rms current				1,5 A	3 A	6 A	10 A	20 A	40 A	70 A
Lexium BPH axis motors type	**Stall torque [Nm]**	**Max torque [Nm]**	**Max mechan. speed [rpm]**							
BPH 0552S	0,4	1.1	8000	■						
BPH 0751 N	0,9	1,7	6000	■						
	1.3	3.4	6000		■					
BPH 0752 N	1.3	2.5	6000	■						
	2.3	4.8	6000		■					
BPH 0952 N	3.7	7.2	6000		■					
	4.3	13.4	6000			■				
BPH 0953 N	6	13.4	6000			■				
	6	20.3	6000				■			
BPH 1152 N	7.4	13.6	6000			■				
	7.4	19.3	6000				■			
BPH 1153 N	6.8	13.5	6000			■				
	10.5	19.4	6000				■			
BPH 1422 N	11.4	18	4000				■			
	12	30	4000					■		
BPH 1423 N	14.5	24.2	4000				■			
	17	42	4000					■		
BPH 1902 N	25	37.5	4000					■		
BPH 1903 K	36	57	4000					■		
BPH 1904 K	44	76.2	4000					■		
BPH 1907 K	75	157	4000						■	
BPH 190A K	90	163	4000						■	
	100	230	4000							■

CHARACTERISTICS

Torque and speed characteristics diagram

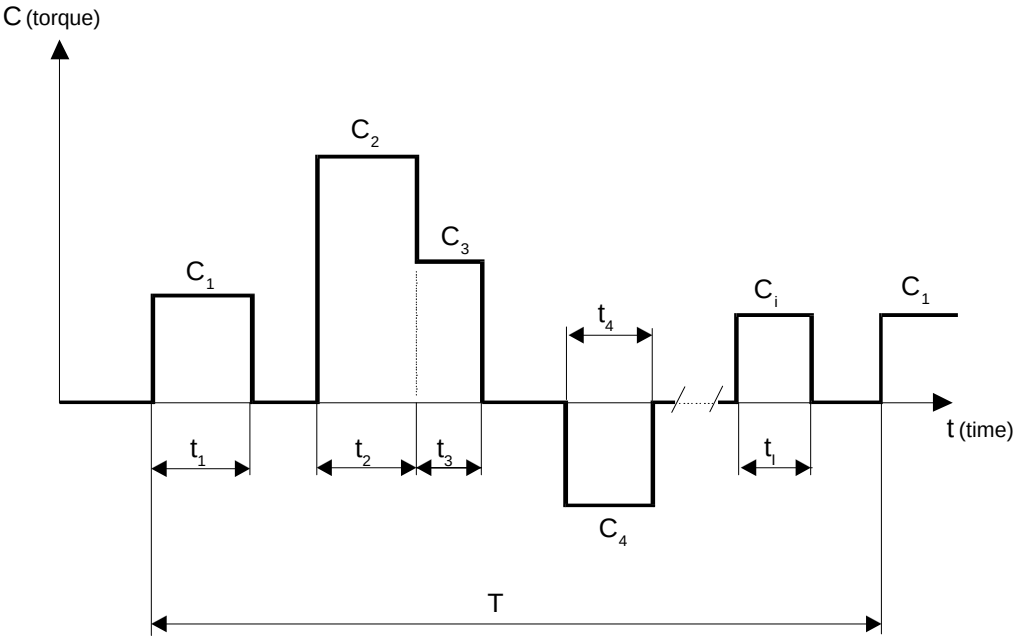


3 Limitation due to the voltage.

2 Maximum torque characteristics .
(it depends on the motor / drive association)

1 Continuous torque characteristics .
Ambient operating temperature 40°C.

General thermical sizing



By viewing the cycle in the drawing, the thermal torque value C_{EQ} requested to the motor will be :

$$C_{EQ} = \sqrt{\frac{C_1^2 \cdot t_1 + C_2^2 \cdot t_2 + C_3^2 \cdot t_3 + C_4^2 \cdot t_4 + ... + C_i^2 \cdot t_i}{T}}$$

Where:

T = Total cycle time
C_i = Torque value (Nm)
t_i = Time (Seconds)

DETAILED MOTOR CHARACTERISTICS

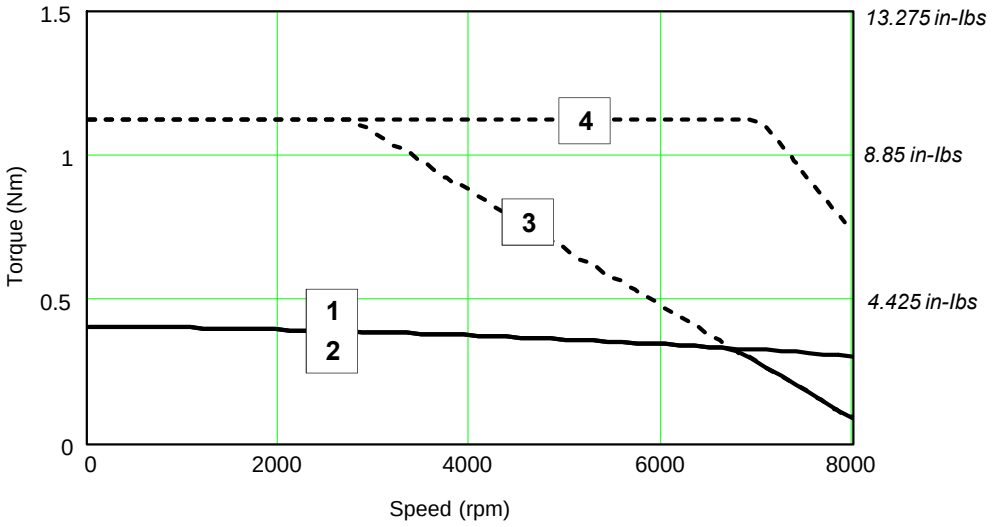
BPH055 - Technical characteristics

TECHNICAL DESCRIPTION	UNIT	BPH0552S
Continuous rated stall torque	[Nm]	0.4
Continuous rated stall current	[Arms]	1.07
Maximum current	[Arms]	4.28
Maximum continuous power	[W]	251
Current at maximum continuous power	[Arms]	0.8
Speed at maximum continuous power	[rpm]	8000
Maximum mechanical speed	[rpm]	8000
Rotor inertia without brake	[gm^2]	0.024
Rotor inertia with brake	[gm^2]	0.025
Torque constant at 25°C	[Nm/Arms]	0.374
BEMF constant at 25°C	[V s/rad]	0.216
Mechanical time constant	[ms]	4.9
Electrical time constant	[ms]	0.9
Thermal time constant	[min]	20
Stator resistance (L-L) 25°C	[Ohm]	19
Stator inductance (L-L) 25°C	[mH]	17
Number of poles		4
Static friction	[Nm]	0.02
Motor weight without brake	[kg]	1.4
Motor weight with brake (optional)	[kg]	1.65
Brake torque	[Nm]	1
Brake voltage	[Vdc]	24 Vdc ±10%
Brake current	[Adc]	0.33
Brake release time (on application of power)	[ms]	25
Brake locking time (on removal of power)	[ms]	20

DETAILED MOTOR CHARACTERISTICS

BPH0552S - Speed / Torque curves

BPH0552S with Lexium MHD•1004N00



LEGEND

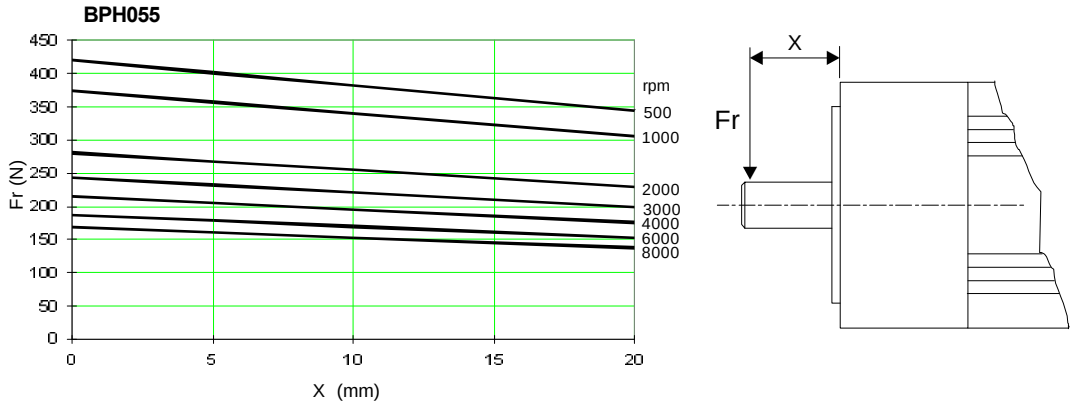
1	= Continuous torque at 230V (singlephase)	**3**	= Max torque at 230V (singlephase)
2	= Continuous torque at 230V (threephases)	**4**	= Max torque at 230V (threephases)

DETAILED MOTOR CHARACTERISTICS

BPH055 - Radial and axial load

The curves below show the permissible radial load versus the operating speed and dimensions X for a bearing life of 20,000 hours .

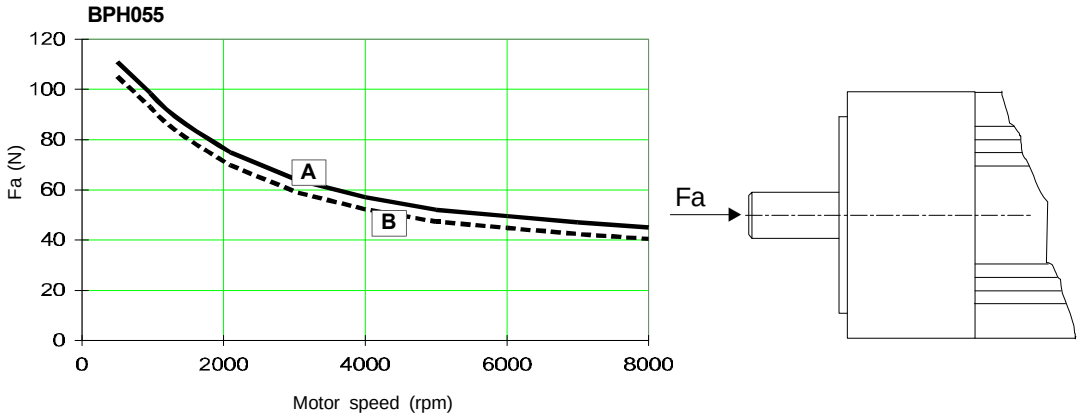
Fr : load applied to the shaft



The curves below show the permissible axial load versus the operating speed for a bearing life of 20,000 hours .

Fa: shaft load

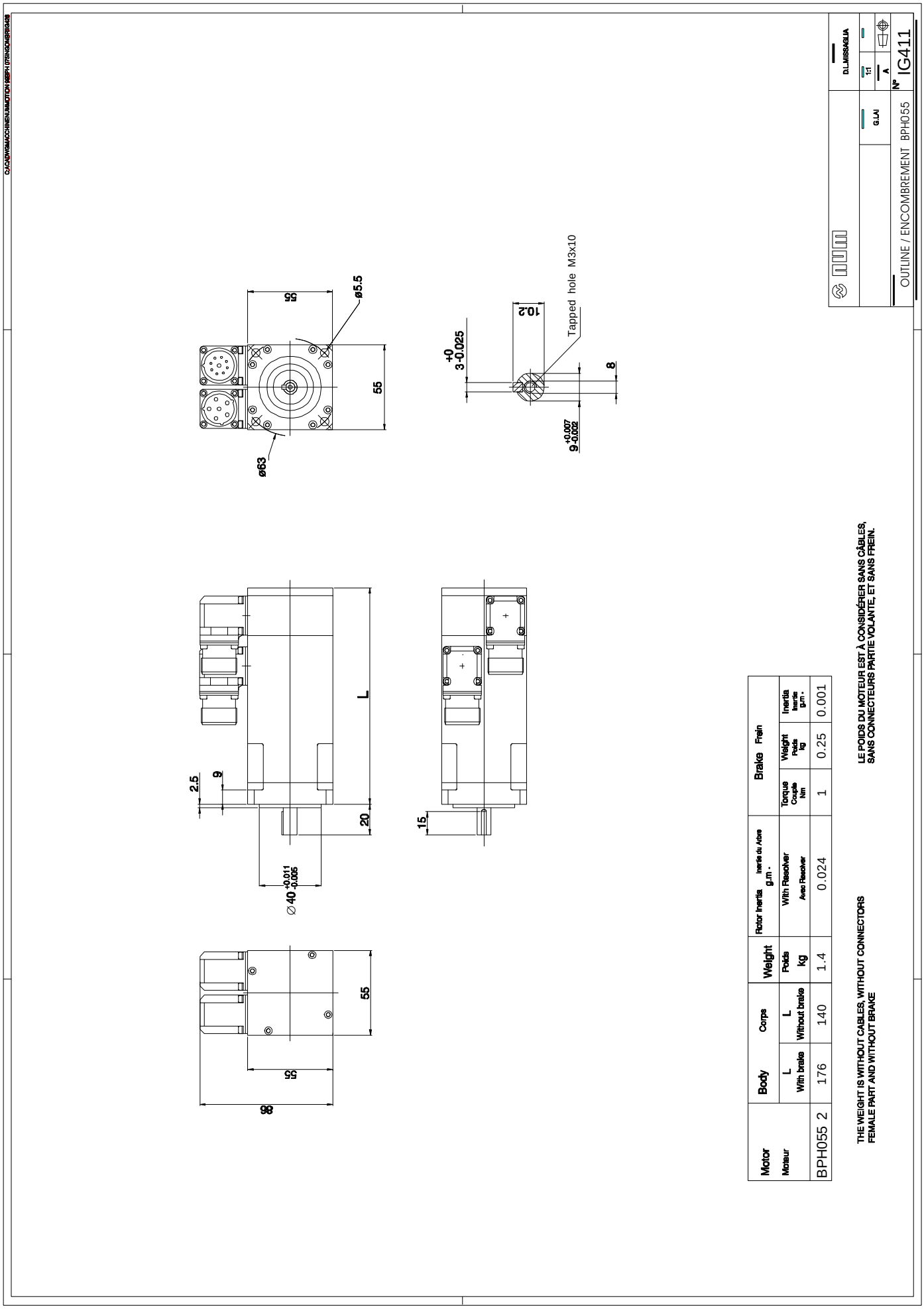
Useful axial load :
- Determine the authorized load from the curve .



LEGEND

A = Load with horizontal motor mounting

B = Load with vertical motor mounting



Motor Moteur	Body Corps L With brake	Body Corps L Without brake	Weight Poids kg	Rotor Inertia Inertie du Rotor g.m² With Resolver Avec Resolver	Brake Frein Torque Couple Nm	Brake Frein Weight Poids kg	Brake Frein Inertia Inertie g.m²
BPH055 2	176	140	1.4	0.024	1	0.25	0.001

THE WEIGHT IS WITHOUT CABLES, WITHOUT CONNECTORS
FEMALE PART AND WITHOUT BRAKE

LE POIDS DU MOTEUR EST À CONSIDÉRER SANS CÂBLES,
SANS CONNECTEURS PARTIE VOLANTE, ET SANS FREIN.

DETAILED MOTOR CHARACTERISTICS

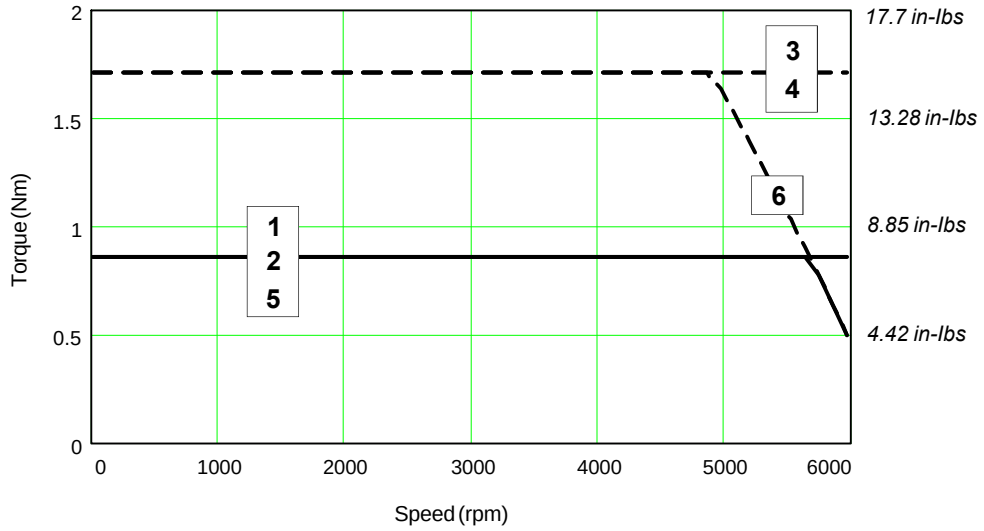
BPH075 - Technical characteristics

TECHNICAL DESCRIPTION	UNIT	BPH0751N	BPH0752N
Continuous rated stall torque	[Nm]	1.3	2.3
Continuous rated stall current	[Arms]	2.2	2.7
Maximum current	[Arms]	8.8	10.8
Maximum continuous power	[W]	542	794
Current at maximum continuous power	[Arms]	1.58	1.85
Speed at maximum continuous power	[rpm]	5640	4870
Maximum mechanical speed	[rpm]	6000	
Rotor inertia without brake	[gm^2]	0.08	0.12
Rotor inertia with brake	[gm^2]	0.12	0.16
Torque constant at 25°C	[Nm/Arm-s]	0.58	0.84
BEMF constant at 25°C	[V s/rad]	0.33	0.48
Mechanical time constant	[ms]	4.6	2.3
Electrical time constant	[ms]	1.7	2.3
Thermal time constant	[min]	20	23
Stator resistance (L-L) 25°C	[Ohm]	11.7	8.9
Stator inductance (L-L) 25°C	[mH]	19.5	20.3
Number of poles		6	
Static friction	[Nm]	< 0.11	< 0.14
Motor weight without brake	[kg]	3.5	4.3
Motor weight with brake (optional)	[kg]	3.85	4.65
Brake torque	[Nm]	2.5	
Brake voltage	[Vdc]	24 Vdc +5%, -10%	
Brake current	[Adc]	0.5	
Brake release time (on application of power)	[ms]	7	
Brake locking time (on removal of power)	[ms]	5	

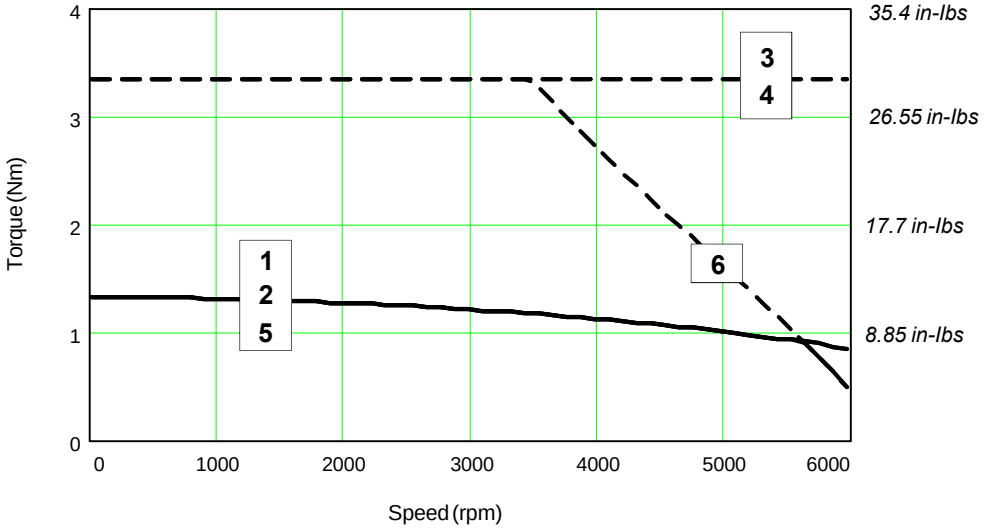
DETAILED MOTOR CHARACTERISTICS

BPH0751N - Speed / Torque curves

BPH0751N with Lexium MHD•1004 N00



BPH0751N with Lexium MHD•1008 N00



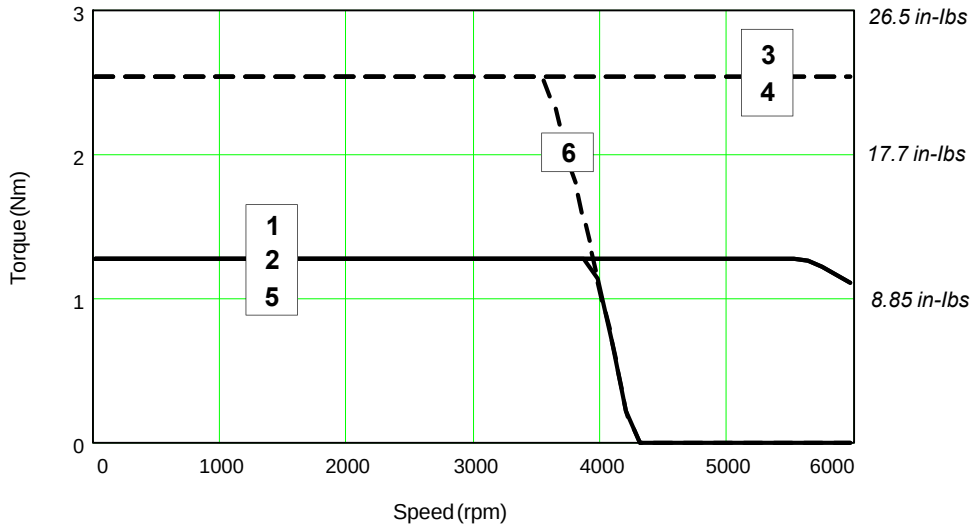
LEGEND

1	= Continuous torque at 400V (threephases)	**4**	= Max torque at 480V (threephases)
2	= Continuous torque at 480V (threephases)	**5**	= Continuous torque at 230V (threephases)
3	= Max torque at 400V (threephases)	**6**	= Max torque at 230V (threephases)

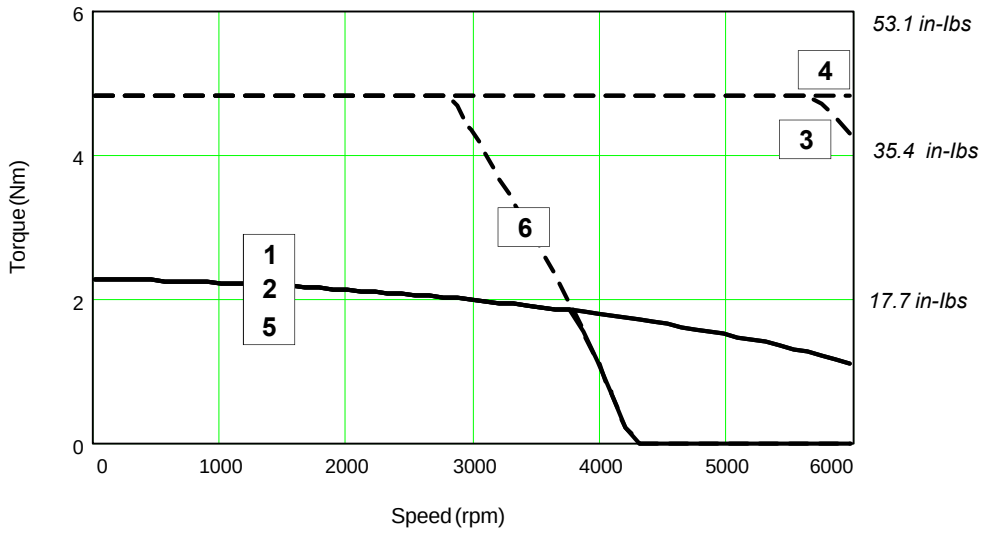
DETAILED MOTOR CHARACTERISTICS

BPH0752N - Speed / Torque curves

BPH0752N with Lexium MHD•1004 N00



BPH0752N with Lexium MHD•1008 N00



LEGEND

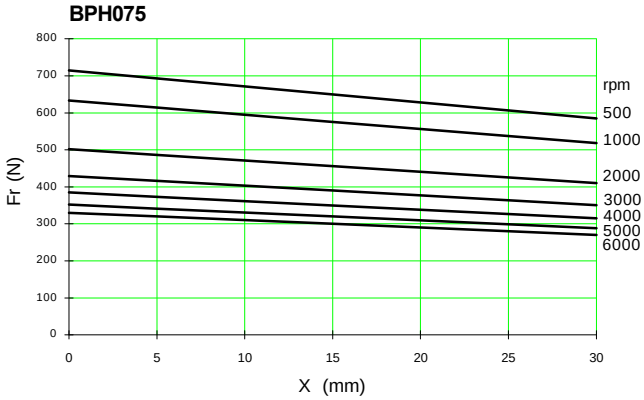
1	= Continuous torque at 400V (threephases)	**4**	= Max torque at 480V (threephases)
2	= Continuous torque at 480V (threephases)	**5**	= Continuous torque at 230V (threephases)
3	= Max torque at 400V (threephases)	**6**	= Max torque at 230V (threephases)

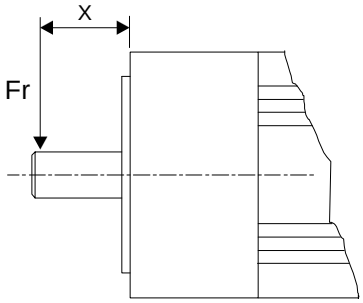
DETAILED MOTOR CHARACTERISTICS

BPH075 - Radial and axial load

The curves below show the permissible radial load versus the operating speed and dimensions X for a bearing life of 20,000 hours .

Fr : load applied to the shaft

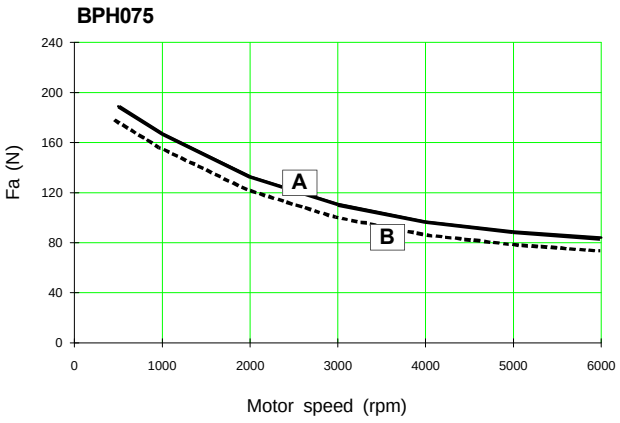


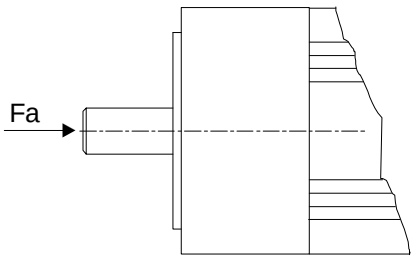


The curves below show the permissible axial load versus the operating speed for a bearing life of 20,000 hours .

Fa: shaft load

Useful axial load :
- Determine the authorized load from the curve .

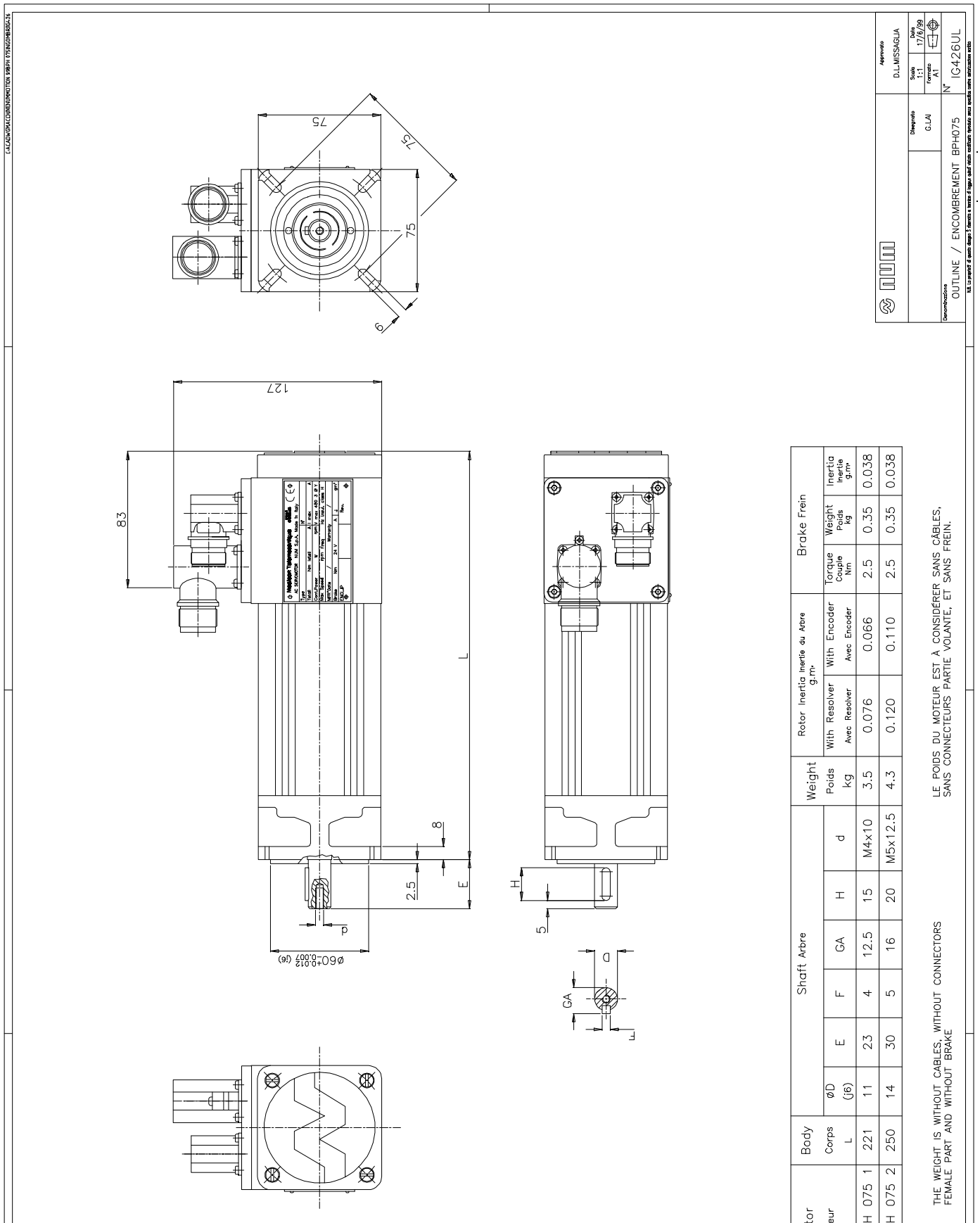




LEGEND

A = Load with horizontal motor mounting

B = Load with vertical motor mounting



Motor Moteur	Body Corps	Shaft Arbre						Weight Poids	Rotor Inertia Inertie du Arbre g.m².		Brake Frein		
	L	øD (j6)	E	F	GA	H	d	kg	With Resolver Avec Resolver	With Encoder Avec Encoder	Torque Couple Nm	Weight Poids kg	Inertia Inertie g.m²
BPH 075 1	221	11	23	4	12.5	15	M4x10	3.5	0.076	0.066	2.5	0.35	0.038
BPH 075 2	250	14	30	5	16	20	M5x12.5	4.3	0.120	0.110	2.5	0.35	0.038

THE WEIGHT IS WITHOUT CABLES, WITHOUT CONNECTORS
FEMALE PART AND WITHOUT BRAKE

LE POIDS DU MOTEUR EST À CONSIDÉRER SANS CÂBLES,
SANS CONNECTEURS PARTIE VOLANTE, ET SANS FREIN.

DETAILED MOTOR CHARACTERISTICS

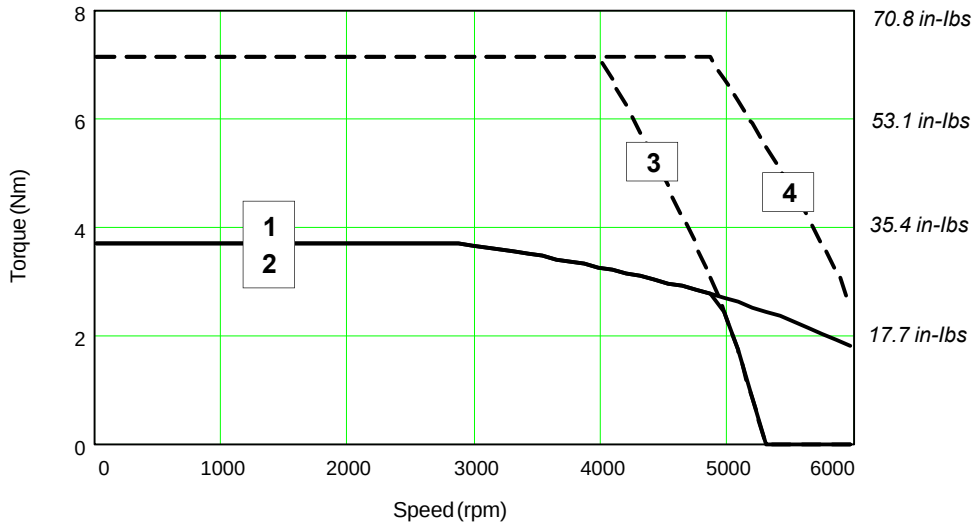
BPH095 - Technical characteristics

TECHNICAL DESCRIPTION	UNIT	BPH0952N	BPH09532N
Continuous rated stall torque	[Nm]	4.3	6
Continuous rated stall current	[Arms]	3.5	5.2
Maximum current	[Arms]	14	20.8
Maximum continuous power	[W]	1420	1940
Current at maximum continuous power	[Arms]	2.35	3.64
Speed at maximum continuous power	[RPM]	4760	4540
Maximum mechanical speed	[RPM]	6000	
Rotor inertia without brake	[gm^2]	0.3	0.41
Rotor inertia with brake	[gm^2]	0.41	0.52
Torque constant at 25°C	[Nm/Arms]	1.21	1.12
BEMF constant at 25°C	[V s/rad]	0.7	0.65
Mechanical time constant	[ms]	2.2	1.5
Electrical time constant	[ms]	4.4	5.6
Thermal time constant	[min]	26	29
Stator resistance (L-L) 25°C	[Ohm]	7	3.1
Stator inductance (L-L) 25°C	[mH]	31	17.6
Number of poles		6	
Static friction	[Nm]	< 0.19	< 0.24
Motor weight without brake	[kg]	6.7	8
Motor weight with brake (optional)	[kg]	7.5	8.8
Brake torque	[Nm]	5	
Brake voltage	[Vdc]	24 Vdc +5%, -10%	
Brake current	[Adc]	0.7	
Brake release time (on application of power)	[ms]	15	
Brake locking time (on removal of power)	[ms]	7	

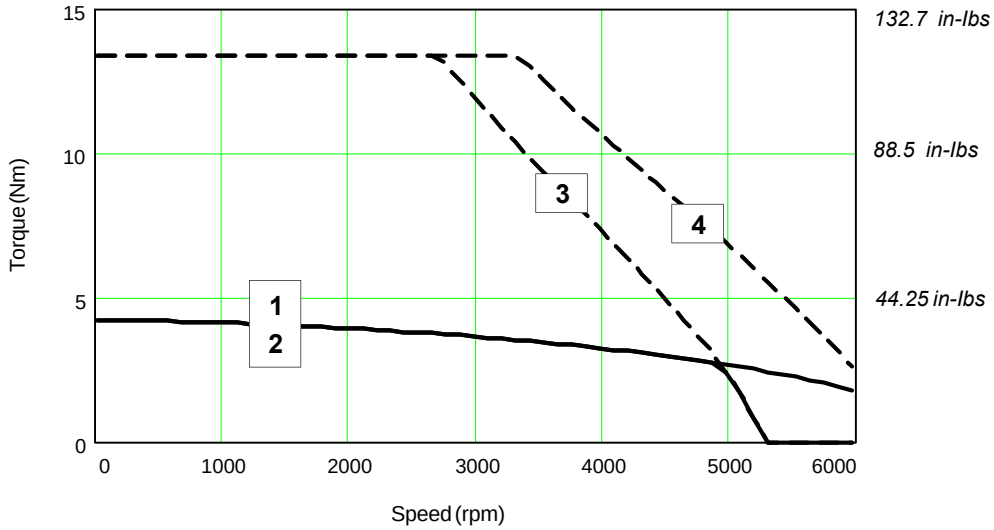
DETAILED MOTOR CHARACTERISTICS

BPH0952N - Speed / Torque curves

BPH0952N with Lexium MHD•1008 N00



BPH0952N with Lexium MHD•1017 N00



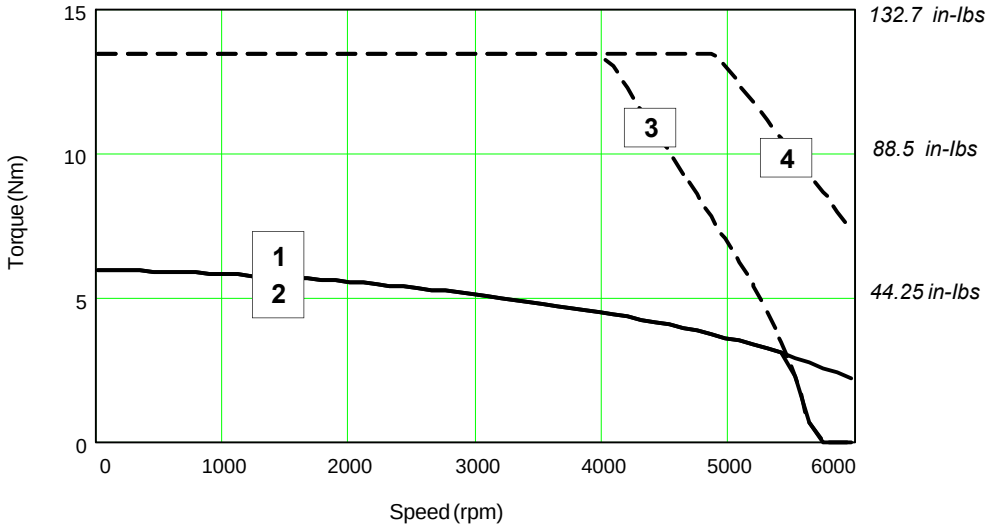
LEGEND

1	= Continuous torque at 400V (threephases)	**3**	= Max torque at 400V (threephases)
2	= Continuous torque at 480V (threephases)	**4**	= Max torque at 480V (threephases)

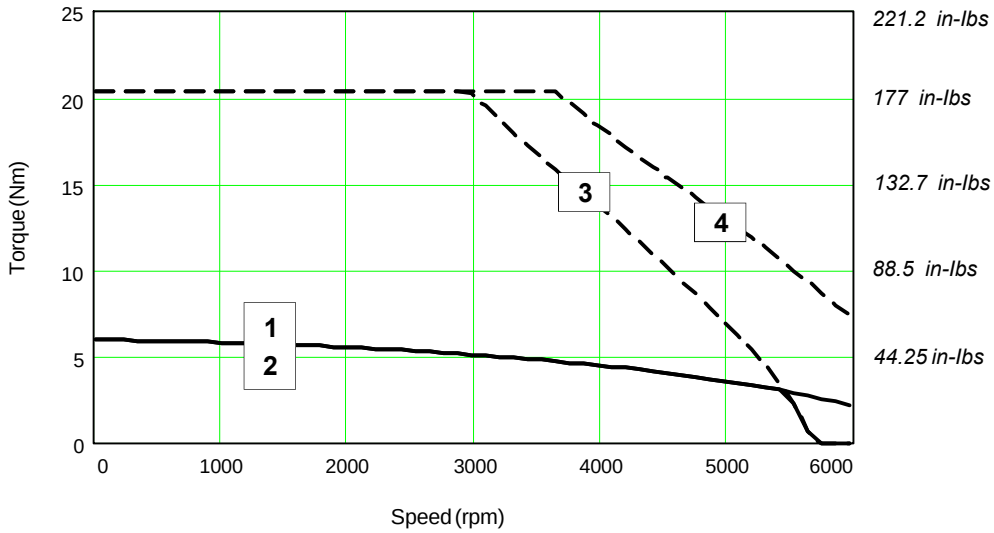
DETAILED MOTOR CHARACTERISTICS

BPH0953N - Speed / Torque curves

BPH0953N with Lexium MHD•1017 N00



BPH0953N with Lexium MHD•1028 N00



LEGEND

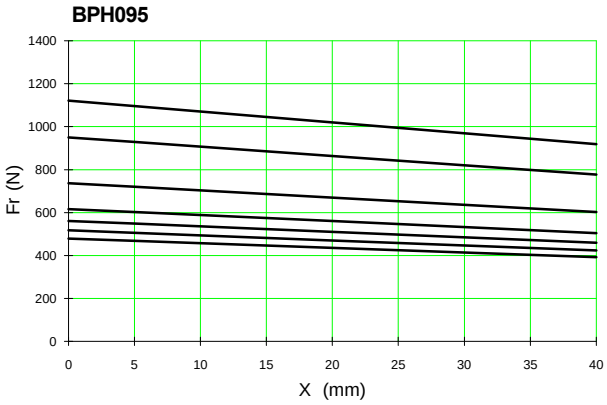
1	= Continuous torque at 400V (threephases)	**3**	= Max torque at 400V (threephases)
2	= Continuous torque at 480V (threephases)	**4**	= Max torque at 480V (threephases)

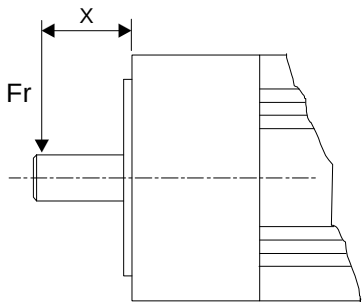
DETAILED MOTOR CHARACTERISTICS

BPH095 - Radial and axial load

The curves below show the permissible radial load versus the operating speed and dimensions X for a bearing life of 20,000 hours .

Fr : load applied to the shaft

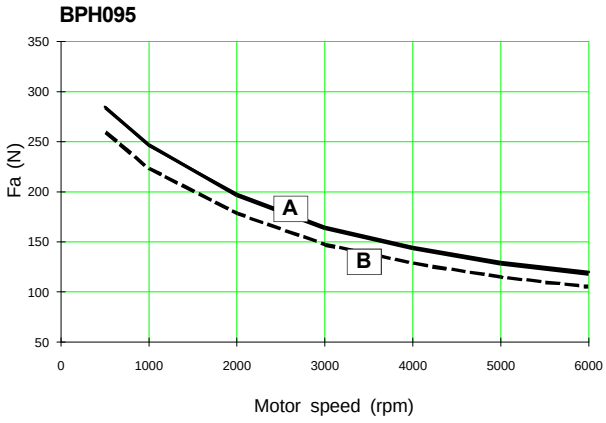


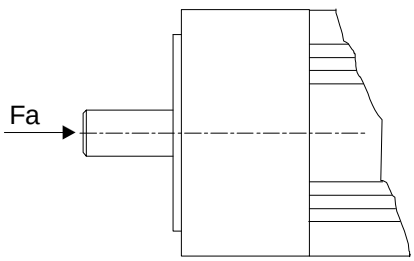


The curves below show the permissible axial load versus the operating speed for a bearing life of 20.000 hours .

Fa: shaft load

Useful axial load :
- Determine the authorized load from the curve .

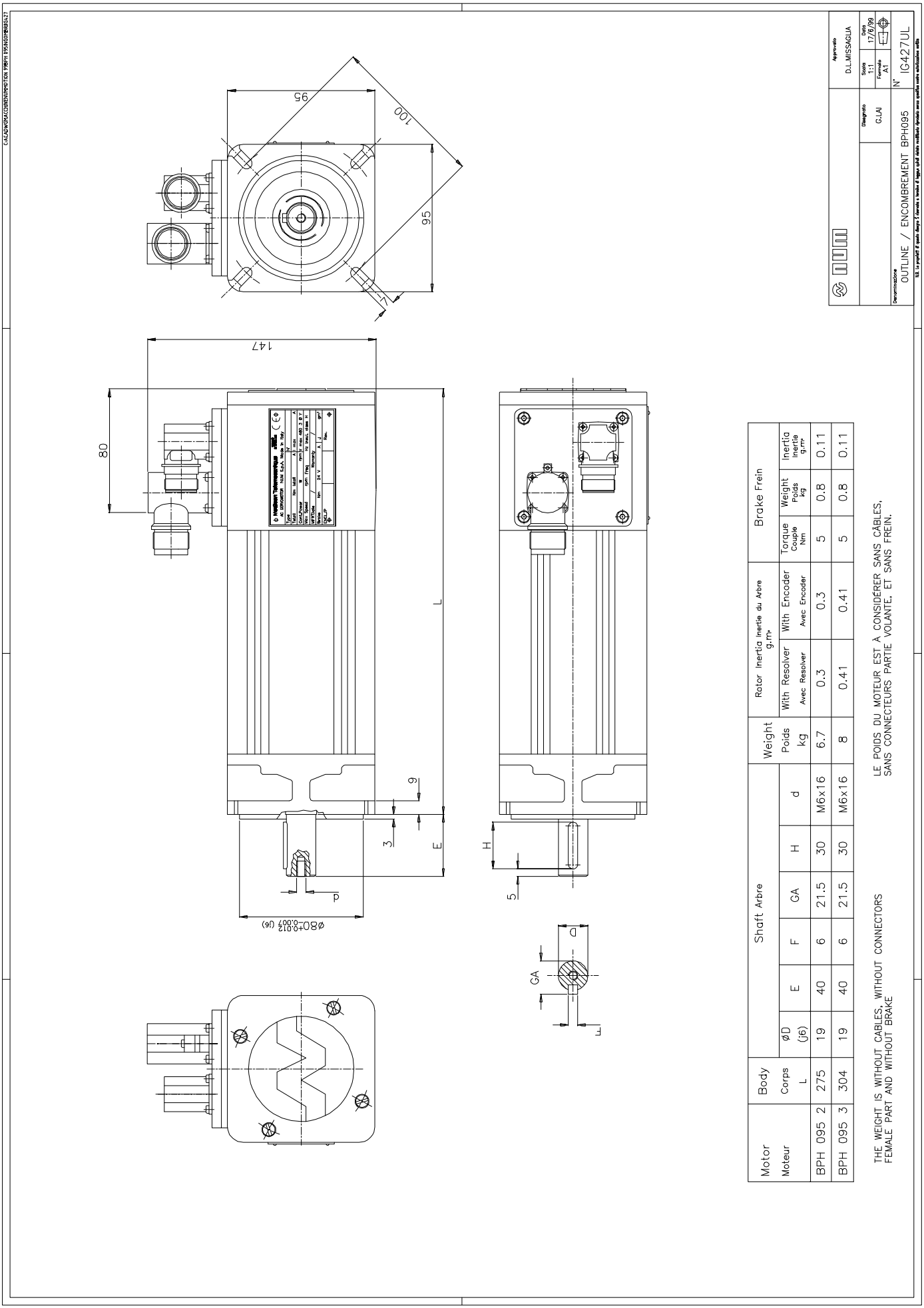




LEGEND

A = Load with horizontal motor mounting

B = Load with vertical motor mounting



Motor Moteur	Body Corps L	Shaft Arbre ØD (j6)	E	F	GA	H	d	Weight Poids kg	Rotor Inertia Inertie du Arbre g.m² With Resolver Avec Resolver	With Encoder Avec Encoder	Brake Frein Torque Couple Nm	Weight Poids kg	Inertia Inertie g.m²
BPH 095 2	275	19	40	6	21.5	30	M6x16	6.7	0.3	0.3	5	0.8	0.11
BPH 095 3	304	19	40	6	21.5	30	M6x16	8	0.41	0.41	5	0.8	0.11

THE WEIGHT IS WITHOUT CABLES, WITHOUT CONNECTORS
FEMALE PART AND WITHOUT BRAKE

LE POIDS DU MOTEUR EST À CONSIDÉRER SANS CÂBLES,
SANS CONNECTEURS PARTIE VOLANTE, ET SANS FREIN.

DETAILED MOTOR CHARACTERISTICS

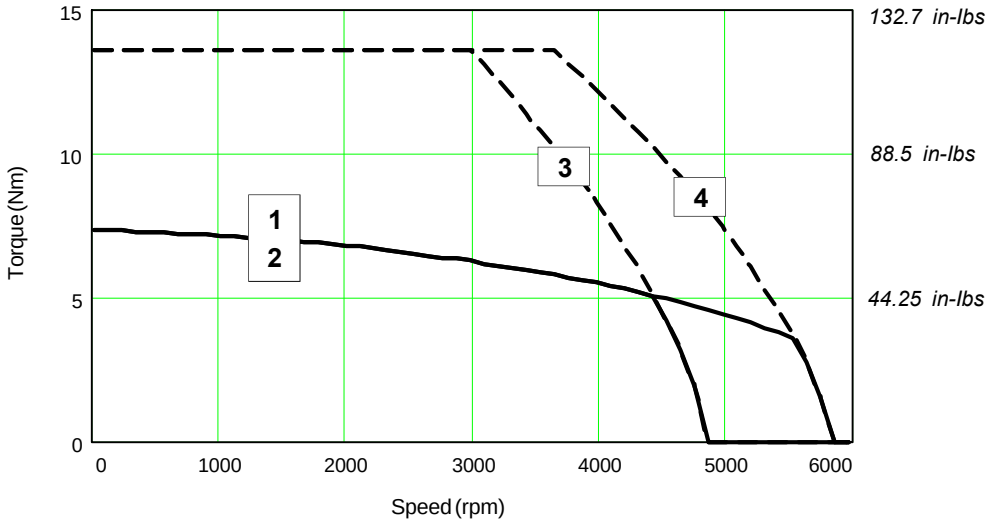
BPH115 - Technical characteristics

TECHNICAL DESCRIPTION	UNIT	BPH1152N	BPH1153N
Continuous rated stall torque	[Nm]	7.4	10.5
Continuous rated stall current	[Arms]	5.5	9.2
Maximum current	[Arms]	22	36.8
Maximum continuous power	[W]	2360	3140
Current at maximum continuous power	[Arms]	3.7	6.3
Speed at maximum continuous power	[RPM]	4540	4320
Maximum mechanical speed	[RPM]	6000	
Rotor inertia without brake	[gm^2]	0.7	0.97
Rotor inertia with brake	[gm^2]	1.07	1.34
Torque constant at 25°C	[Nm/Arm-s]	1.32	1.1
BEMF constant at 25°C	[V s/rad]	0.76	0.64
Mechanical time constant	[ms]	2.25	1.6
Electrical time constant	[ms]	7.4	9.3
Thermal time constant	[min]	29	33
Stator resistance (L-L) 25°C	[Ohm]	3.75	1.37
Stator inductance (L-L) 25°C	[mH]	27.7	12.8
Number of poles		6	
Static friction	[Nm]	< 0.27	< 0.33
Motor weight without brake	[kg]	9.6	11.7
Motor weight with brake (optional)	[kg]	10.9	13
Brake torque	[Nm]	12	
Brake voltage	[Vdc]	24 Vdc +5%, -10%	
Brake current	[Adc]	0.8	
Brake release time (on application of power)	[ms]	30	
Brake locking time (on removal of power)	[ms]	13	

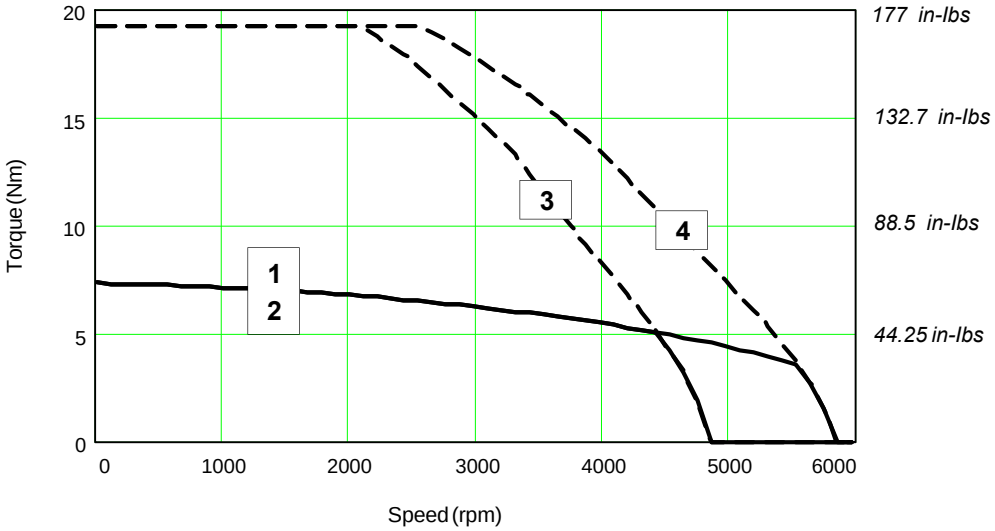
DETAILED MOTOR CHARACTERISTICS

BPH1152N - Speed / Torque curves

BPH1152N with Lexium MHD•1017 N00



BPH1152N with Lexium MHD•1028 N00



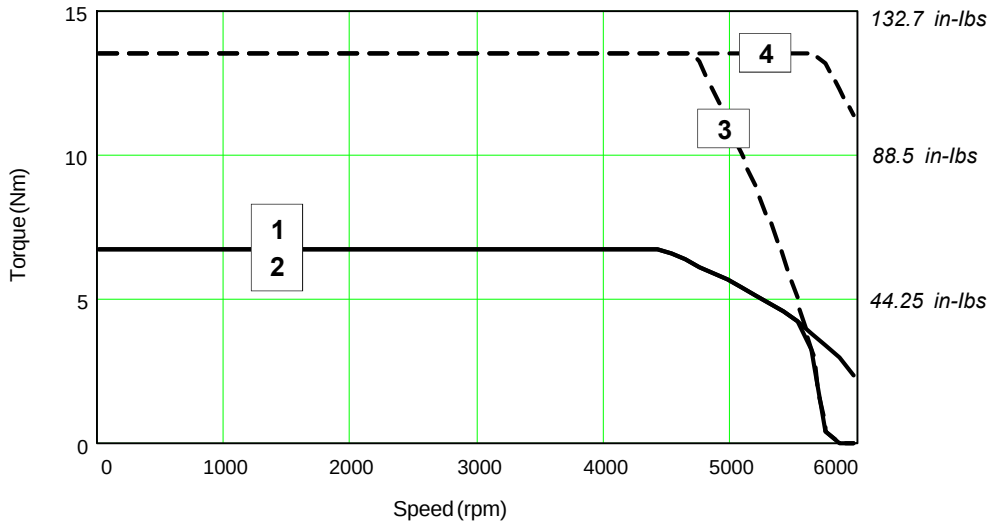
LEGEND

1	= Continuous torque at 400V (threephases)	**3**	= Max torque at 400V (threephases)
2	= Continuous torque at 480V (threephases)	**4**	= Max torque at 480V (threephases)

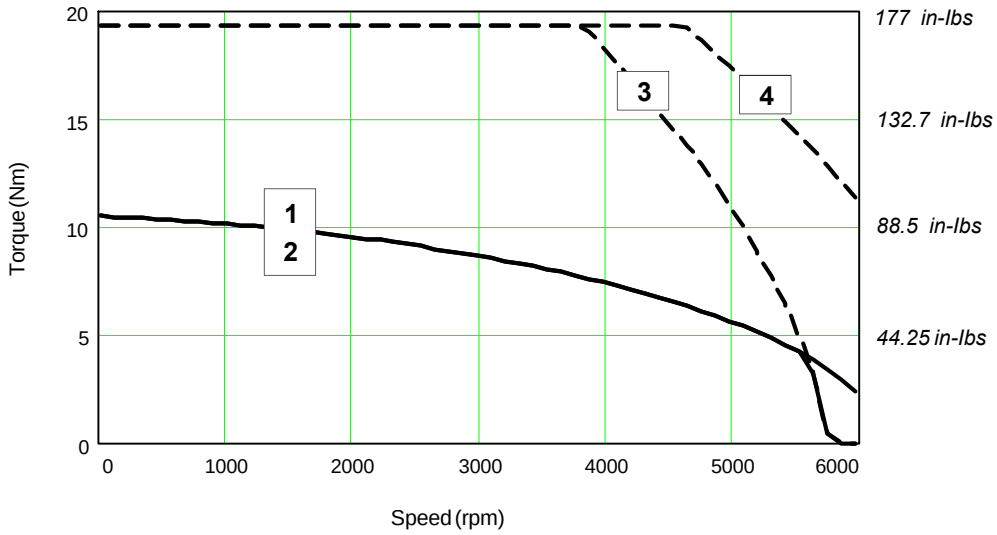
DETAILED MOTOR CHARACTERISTICS

BPH1153N - Speed / Torque curves

BPH1153N with Lexium MHD•1017 N00



BPH1153N with Lexium MHD•1028 N00



LEGEND

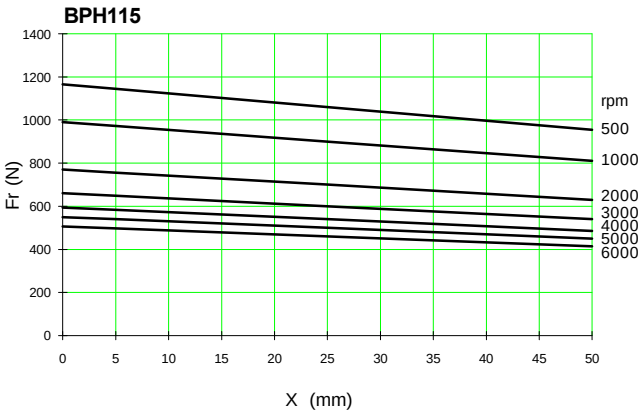
1	= Continuous torque at 400V (threephases)	**3**	= Max torque at 400V (threephases)
2	= Continuous torque at 480V (threephases)	**4**	= Max torque at 480V (threephases)

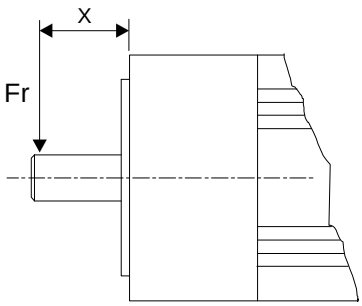
DETAILED MOTOR CHARACTERISTICS

BPH115 - Radial and axial load

The curves below show the permissible radial load versus the operating speed and dimensions X for a bearing life of 20,000 hours .

Fr : load applied to the shaft

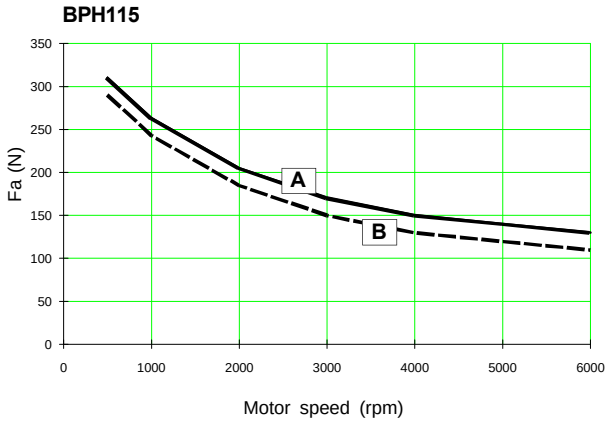


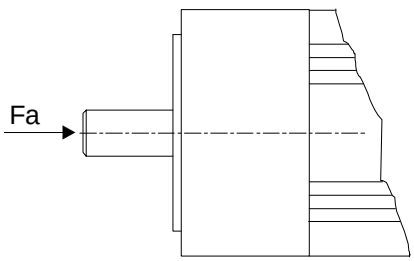


The curves below show the permissible axial load versus the operating speed for a bearing life of 20,000 hours .

Fa: shaft load

Useful axial load :
- Determine the authorized load from the curve .

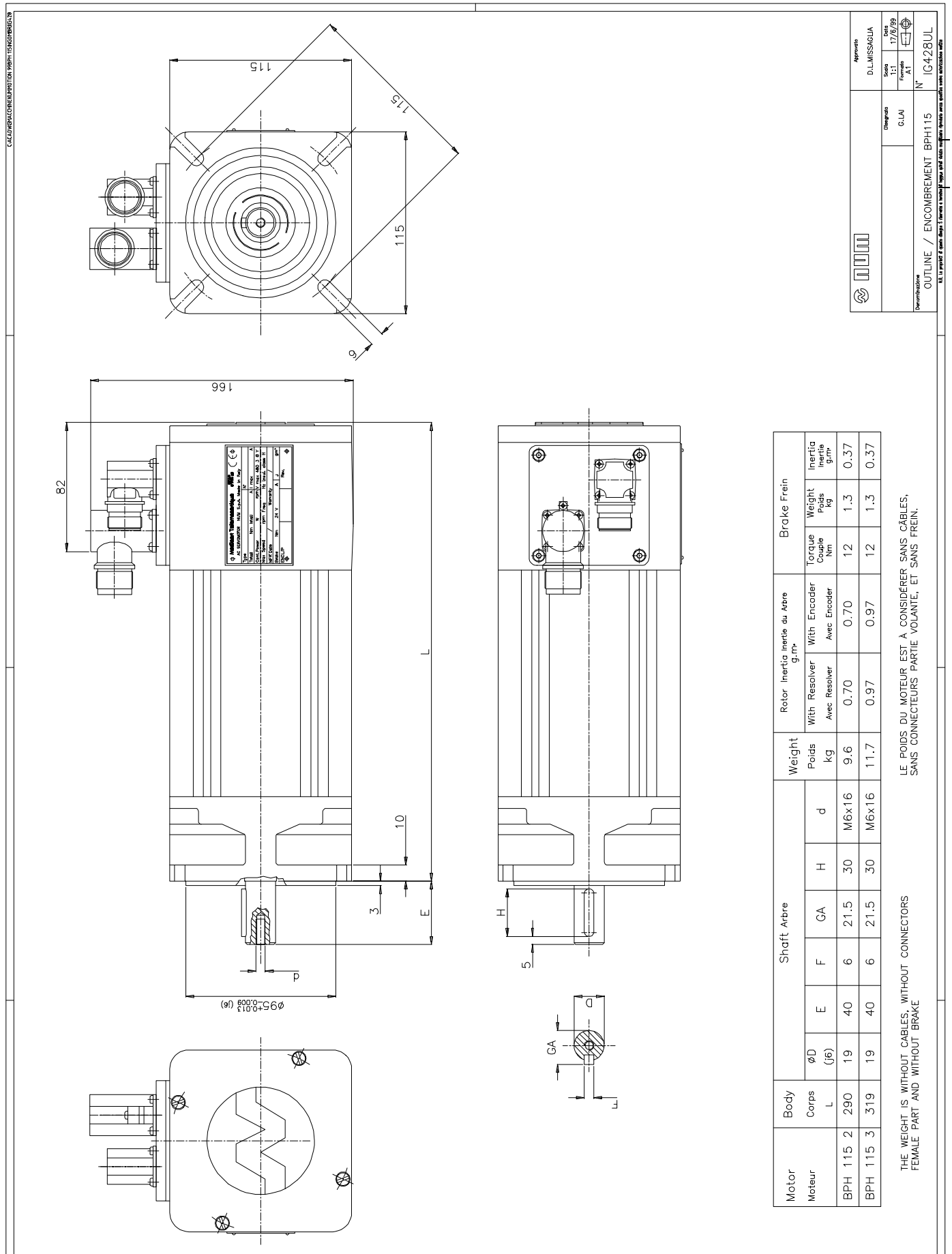




LEGEND

A = Load with horizontal motor mounting

B = Load with vertical motor mounting



Motor Moteur	Body Corps L	Shaft Arbre ØD (j6)	E	F	GA	H	d	Weight Poids kg	Rotor Inertia Inertie du Arbre g.m² With Resolver Avec Resolver	With Encoder Avec Encoder	Brake Frein Torque Couple Nm	Weight Poids kg	Inertia Inertie g.m²
BPH 115 2	290	19	40	6	21.5	30	M6x16	9.6	0.70	0.70	12	1.3	0.37
BPH 115 3	319	19	40	6	21.5	30	M6x16	11.7	0.97	0.97	12	1.3	0.37

THE WEIGHT IS WITHOUT CABLES, WITHOUT CONNECTORS
FEMALE PART AND WITHOUT BRAKE

LE POIDS DU MOTEUR EST À CONSIDÉRER SANS CÂBLES,
SANS CONNECTEURS PARTIE VOLANTE, ET SANS FREIN.

DETAILED MOTOR CHARACTERISTICS

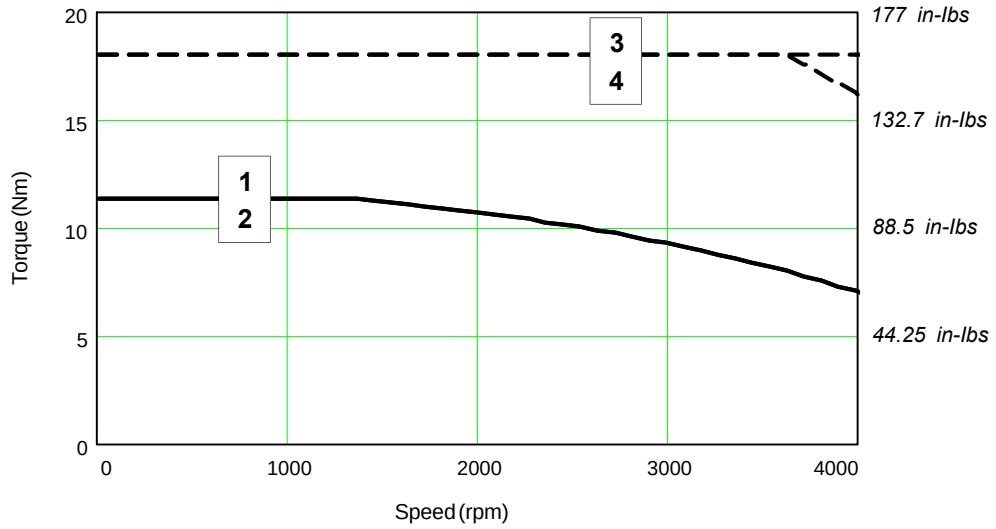
BPH142 - Technical characteristics

TECHNICAL DESCRIPTION	UNIT	BPH1422N	BPH1423N
Continuous rated stall torque	[Nm]	12	17
Continuous rated stall current	[Arms]	10.4	11.7
Maximum current	[Arms]	41.6	46.8
Maximum continuous power	[W]	3050	4050
Current at maximum continuous power	[Arms]	6.9	7.7
Speed at maximum continuous power	[RPM]	3630	3460
Maximum mechanical speed	[RPM]	4000	
Rotor inertia without brake	[gm^2]	1.59	2.19
Rotor inertia with brake	[gm^2]	2.54	3.14
Torque constant at 25°C	[Nm/Arms]	1.15	1.45
BEMF constant at 25°C	[V s/rad]	0.66	0.84
Mechanical time constant	[ms]	2.2	1.7
Electrical time constant	[ms]	11.4	13.6
Thermal time constant	[min]	30	34
Stator resistance (L-L) 25°C	[Ohm]	1.25	1.1
Stator inductance (L-L) 25°C	[mH]	14.3	15
Number of poles		6	
Static friction	[Nm]	< 0.41	< 0.51
Motor weight without brake	[kg]	17.2	20.1
Motor weight with brake (optional)	[kg]	19.4	22.3
Brake torque	[Nm]	20	
Brake voltage	[Vdc]	24 Vdc +5%, -10%	
Brake current	[Adc]	1	
Brake release time (on application of power)	[ms]	55	
Brake locking time (on removal of power)	[ms]	18	

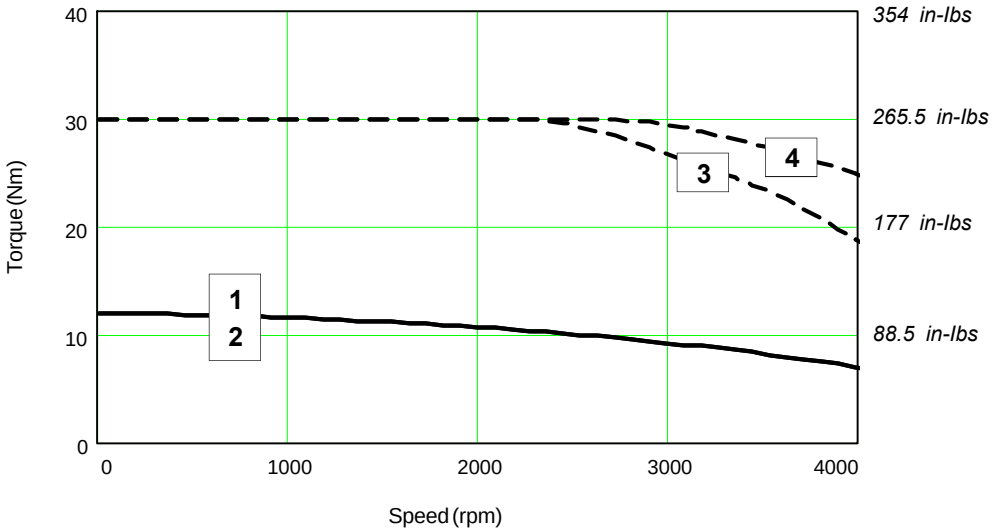
DETAILED MOTOR CHARACTERISTICS

BPH1422N - Speed / Torque curves

BPH1422N with Lexium MHD•1028 N00



BPH1422N with Lexium MHD•1056 N00



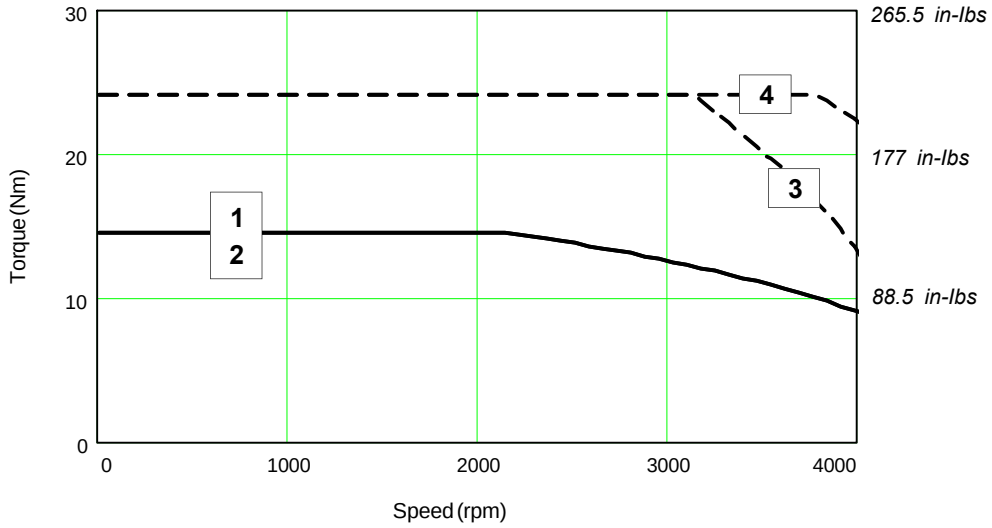
LEGEND

1	= Continuous torque at 400V (threephases)	**3**	= Max torque at 400V (threephases)
2	= Continuous torque at 480V (threephases)	**4**	= Max torque at 480V (threephases)

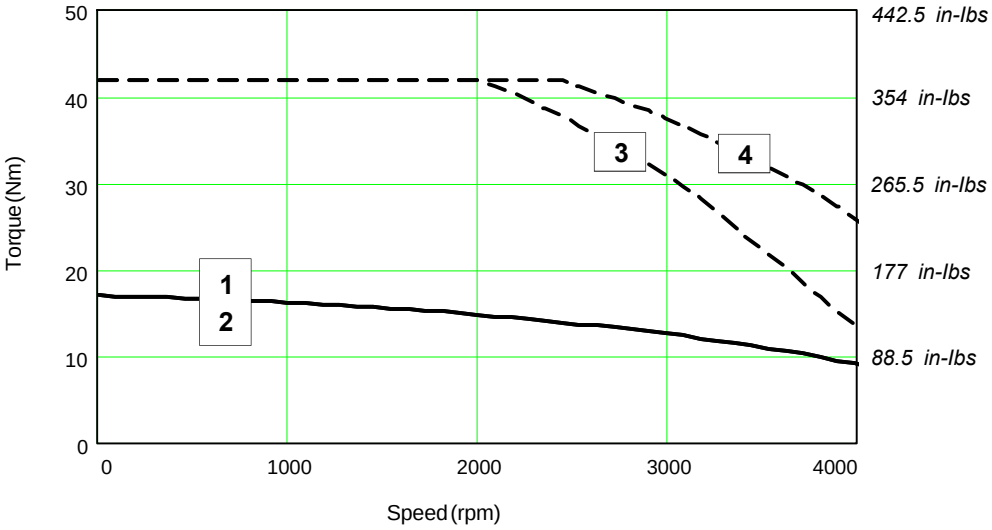
DETAILED MOTOR CHARACTERISTICS

BPH1423N - Speed / Torque curves

BPH1423N with Lexium MHD•1028 N00



BPH1423N with Lexium MHD•1056 N00



LEGEND

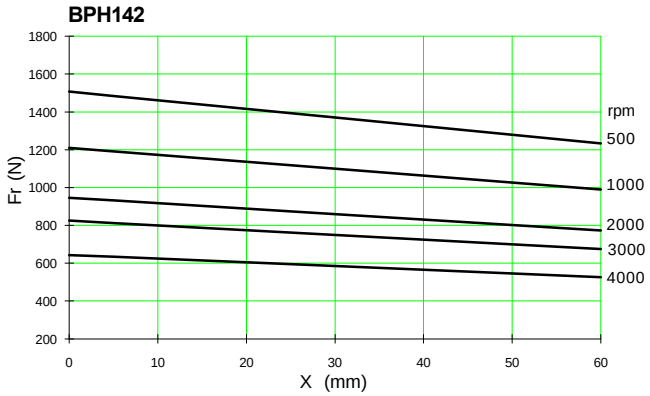
1	= Continuous torque at 400V (threephases)	**3**	= Max torque at 400V (threephases)
2	= Continuous torque at 480V (threephases)	**4**	= Max torque at 480V (threephases)

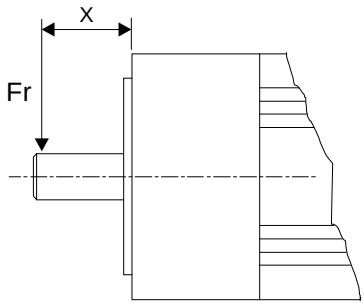
DETAILED MOTOR CHARACTERISTICS

BPH142 - Radial and axial load

The curves below show the permissible radial load versus the operating speed and dimensions X for a bearing life of 20,000 hours .

Fr : load applied to the shaft

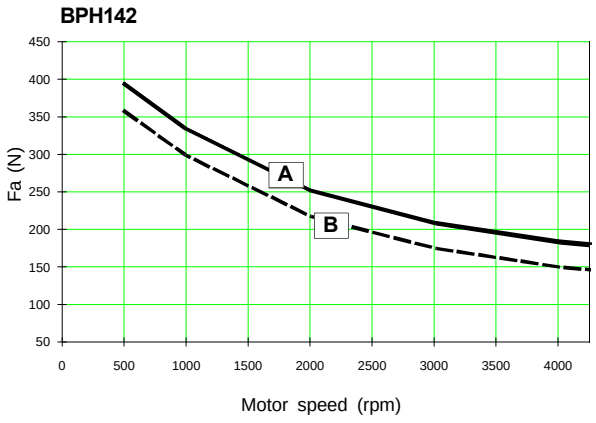


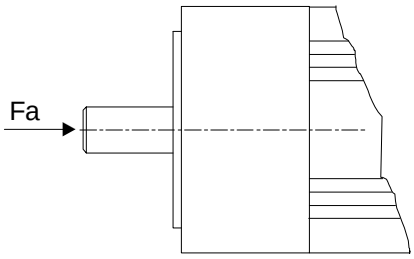


The curves below show the permissible axial load versus the operating speed for a bearing life of 20,000 hours .

Fa: shaft load

Useful axial load :
- Determine the authorized load from the curve .

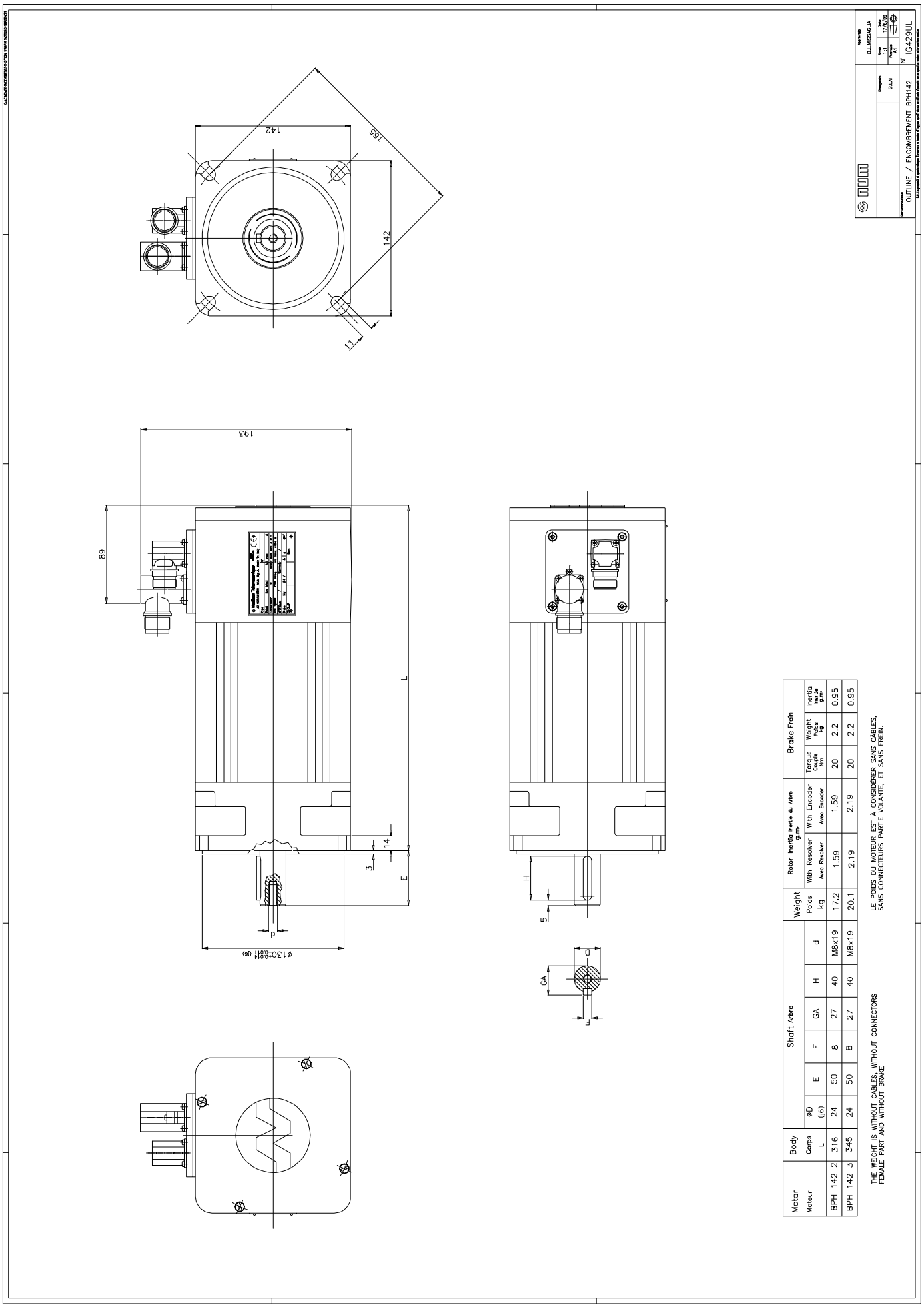




LEGEND

A = Load with horizontal motor mounting

B = Load with vertical motor mounting



Motor Moteur	Body Corps L	Shaft Arbre ØD (j6)	E	F	GA	H	d	Weight Poids kg	Rotor Inertia Inertie du Rotor g.m² With Resolver Avec Resolver	With Encoder Avec Encoder	Brake Frein Torque Couple Nm	Weight Poids kg	Inertia Inertie g.m²
BPH 142 2	316	24	50	8	27	40	M8x19	17.2	1.59	1.59	20	2.2	0.95
BPH 142 3	345	24	50	8	27	40	M8x19	20.1	2.19	2.19	20	2.2	0.95

THE WEIGHT IS WITHOUT CABLES, WITHOUT CONNECTORS FEMALE PART AND WITHOUT BRAKE

LE POIDS DU MOTEUR EST À CONSIDÉRER SANS CÂBLES, SANS CONNECTEURS PARTIE VOLANTE, ET SANS FREIN.

DETAILED MOTOR CHARACTERISTICS

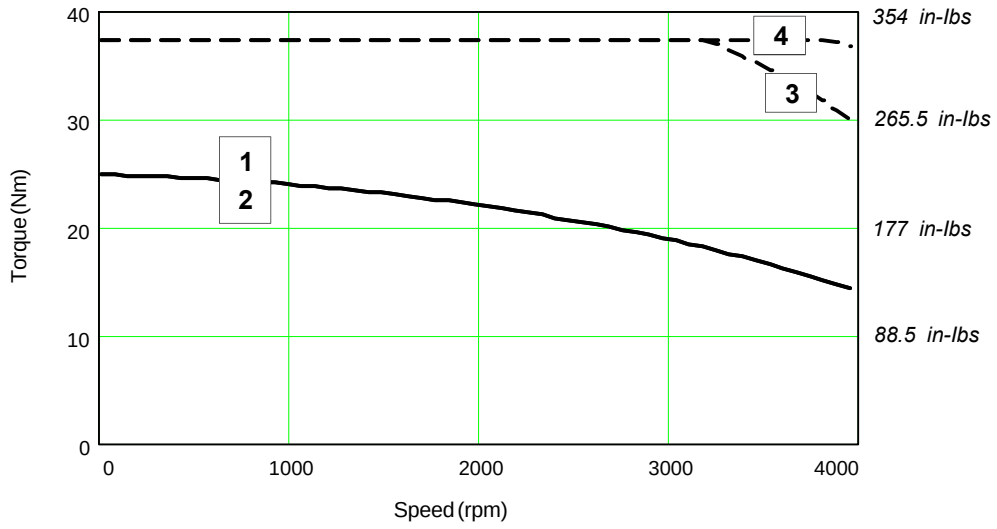
BPH190 - Technical characteristics

TECHNICAL DESCRIPTION	UNIT	BPH1902N	BPH1903K	BPH1904K	BPH1907K	BPH190AK
Continuous rated stall torque	[Nm]	25	36	46	75	100
Continuous rated stall current	[Arms]	19.9	19.7	20.6	27.9	44
Maximum current	[Arms]	79.6	78.8	82.4	111.6	176
Maximum continuous power	[W]	6150	7400	9100	11200	13800
Current at maximum continuous power	[Arms]	13.4	13.6	14.7	19.2	29.4
Speed at maximum continuous power	[RPM]	3530	2900	2700	2130	2000
Maximum mechanical speed	[RPM]	4000				
Rotor inertia without brake	[gm^2]	5.14	7.1	9.04	14.9	20.75
Rotor inertia with brake	[gm^2]	8.25	10.2	12.1	18	23.8
Torque constant at 25°C	[Nm/Arms]	1.24	1.79	2.18	2.61	2.24
BEMF constant at 25°C	[V s/rad]	0.72	1.03	1.26	1.51	1.3
Mechanical time constant	[ms]	2.6	1.9	1.7	1.2	1.05
Electrical time constant	[ms]	16	19.6	19.6	25.9	31.7
Thermal time constant	[min]	38	43	48	61	65
Stator resistance (L-L) 25°C	[Ohm]	0.53	0.58	0.59	0.37	0.17
Stator inductance (L-L) 25°C	[mH]	8.5	11.4	11.6	9.6	5.4
Number of poles		6				
Static friction	[Nm]	< 0.72	< 0.94	< 1.18	< 1.7	< 2.2
Motor weight without brake	[kg]	32.1	37.3	42.4	58	73.9
Motor weight with brake (optional)	[kg]	36.2	41.4	46.5	62.1	78
Brake torque	[Nm]	40			80	
Brake voltage	[Vdc]	24 Vdc +5%, -10%				
Brake current	[Adc]	1.5				
Brake release time (on application of power)	[ms]	100			97	
Brake locking time (on removal of power)	[ms]	30			53	

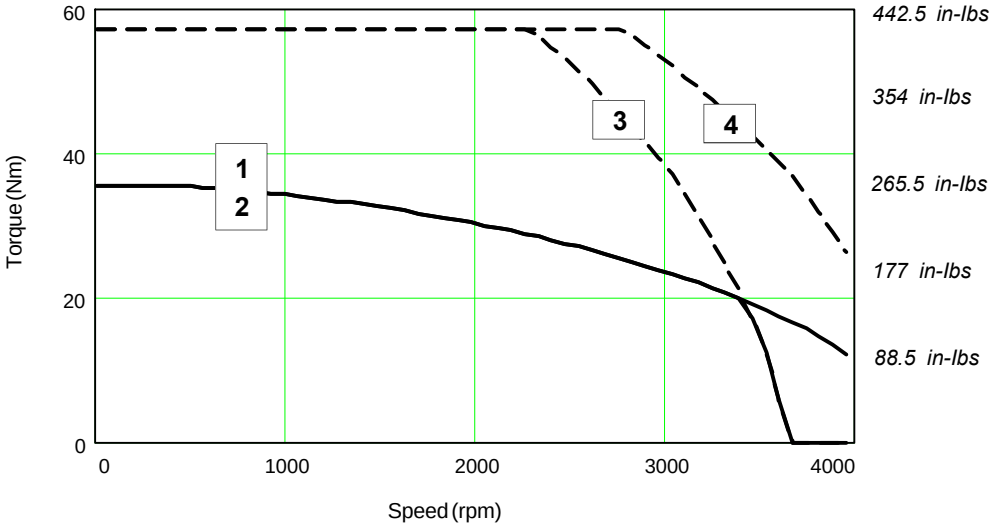
DETAILED MOTOR CHARACTERISTICS

BPH1902N / **BPH1903K -** Speed / Torque curves

BPH1902N with Lexium MHD•1056 N00



BPH1903K with Lexium MHD•1056 N00



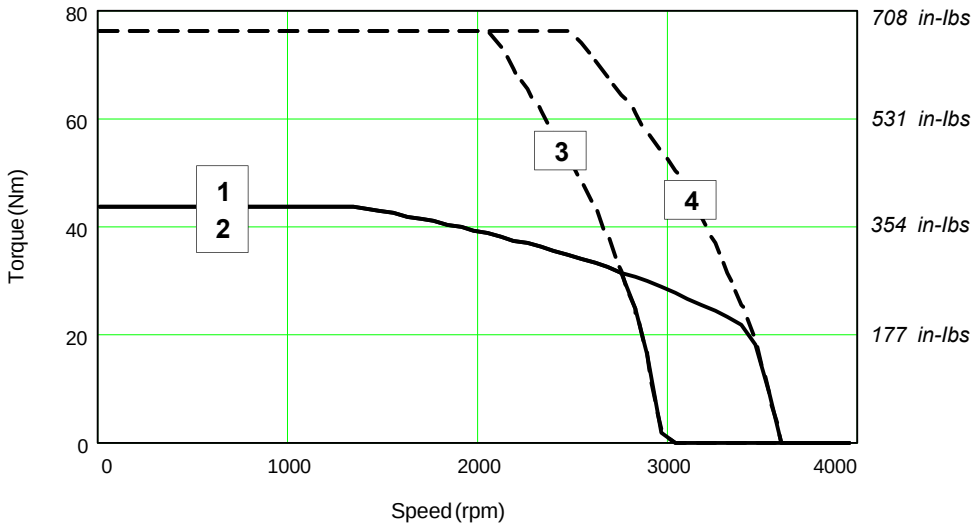
LEGEND

1	= Continuous torque at 400V (threephases)	**3**	= Max torque at 400V (threephases)
2	= Continuous torque at 480V (threephases)	**4**	= Max torque at 480V (threephases)

DETAILED MOTOR CHARACTERISTICS

BPH1904K - Speed / Torque curves

BPH1904K with Lexium MHD•1056 N00



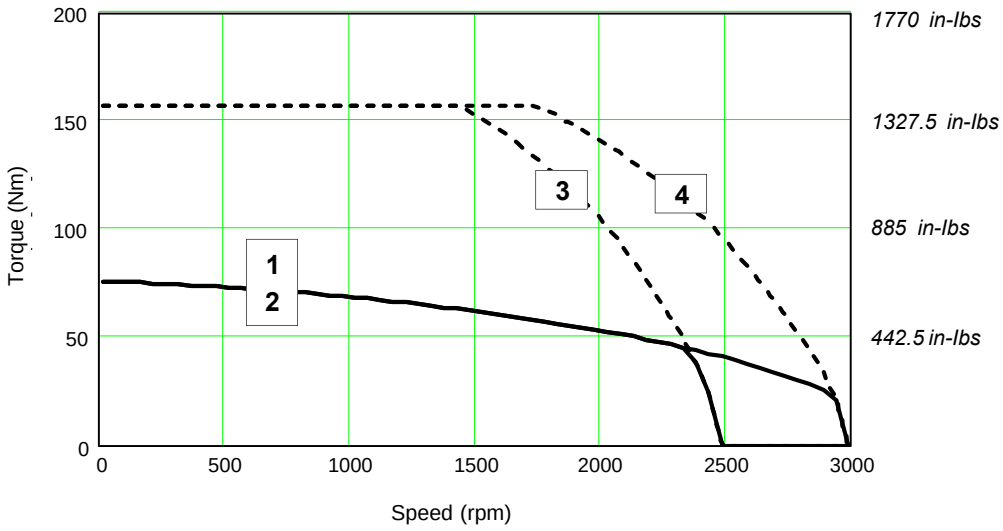
LEGEND

1	= Continuous torque at 400V (threephases)	**3**	= Max torque at 400V (threephases)
2	= Continuous torque at 480V (threephases)	**4**	= Max torque at 480V (threephases)

DETAILED MOTOR CHARACTERISTICS

BPH1907K - Speed / Torque curves

BPH1907K with Lexium MHD•1112N00



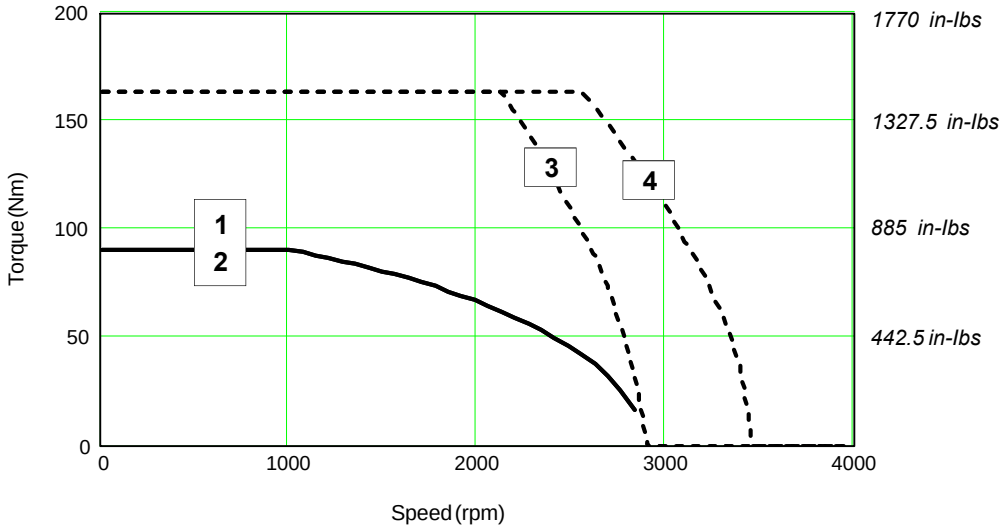
LEGEND

1	= Continuous torque at 400V (threephases)	**3**	= Max torque at 400V (threephases)
2	= Continuous torque at 480V (threephases)	**4**	= Max torque at 480V (threephases)

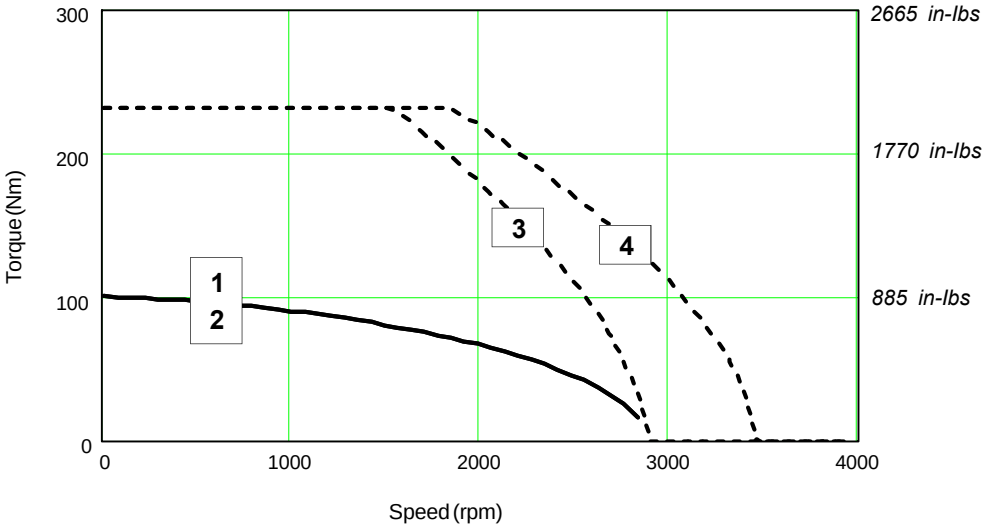
DETAILED MOTOR CHARACTERISTICS

BPH190AK - Speed / Torque curves

BPH190AK with Lexium MHD•1112N00



BPH190AK with Lexium MHD•1198N00



LEGEND

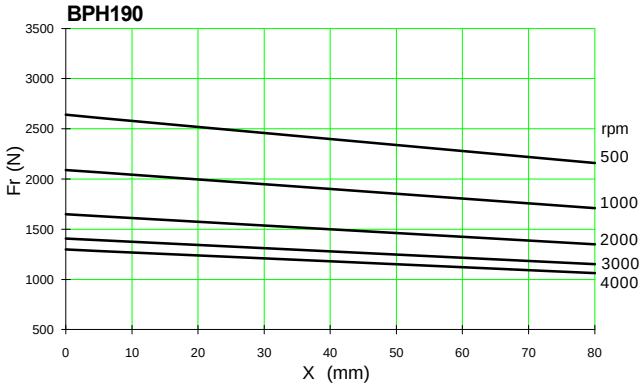
1	= Continuous torque at 400V (threephases)	**3**	= Max torque at 400V (threephases)
2	= Continuous torque at 480V (threephases)	**4**	= Max torque at 480V (threephases)

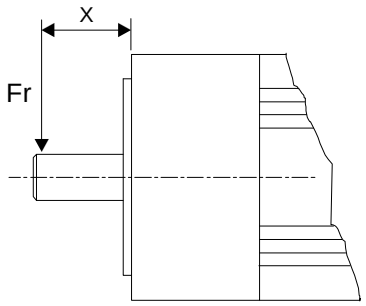
DETAILED MOTOR CHARACTERISTICS

BPH190 - Radial and axial load

The curves below show the permissible radial load versus the operating speed and dimensions X for a bearing life of 20,000 hours .

Fr : load applied to the shaft

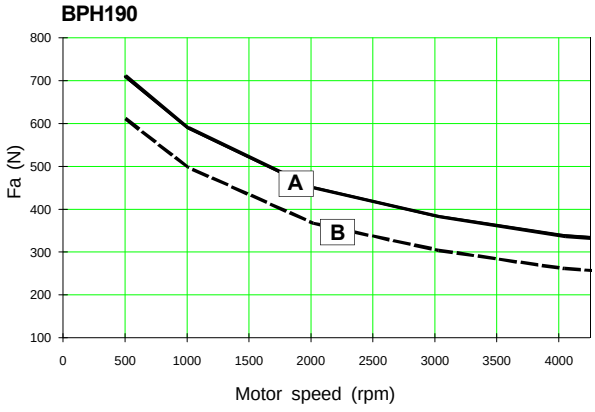


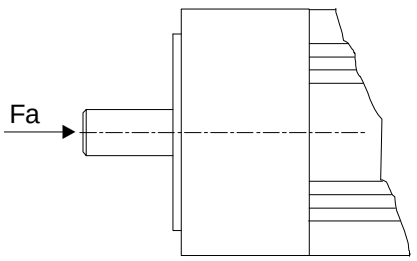


The curves below show the permissible axial load versus the operating speed for a bearing life of 20,000 hours .

Fa: shaft load

Useful axial load :
- Determine the authorized load from the curve .

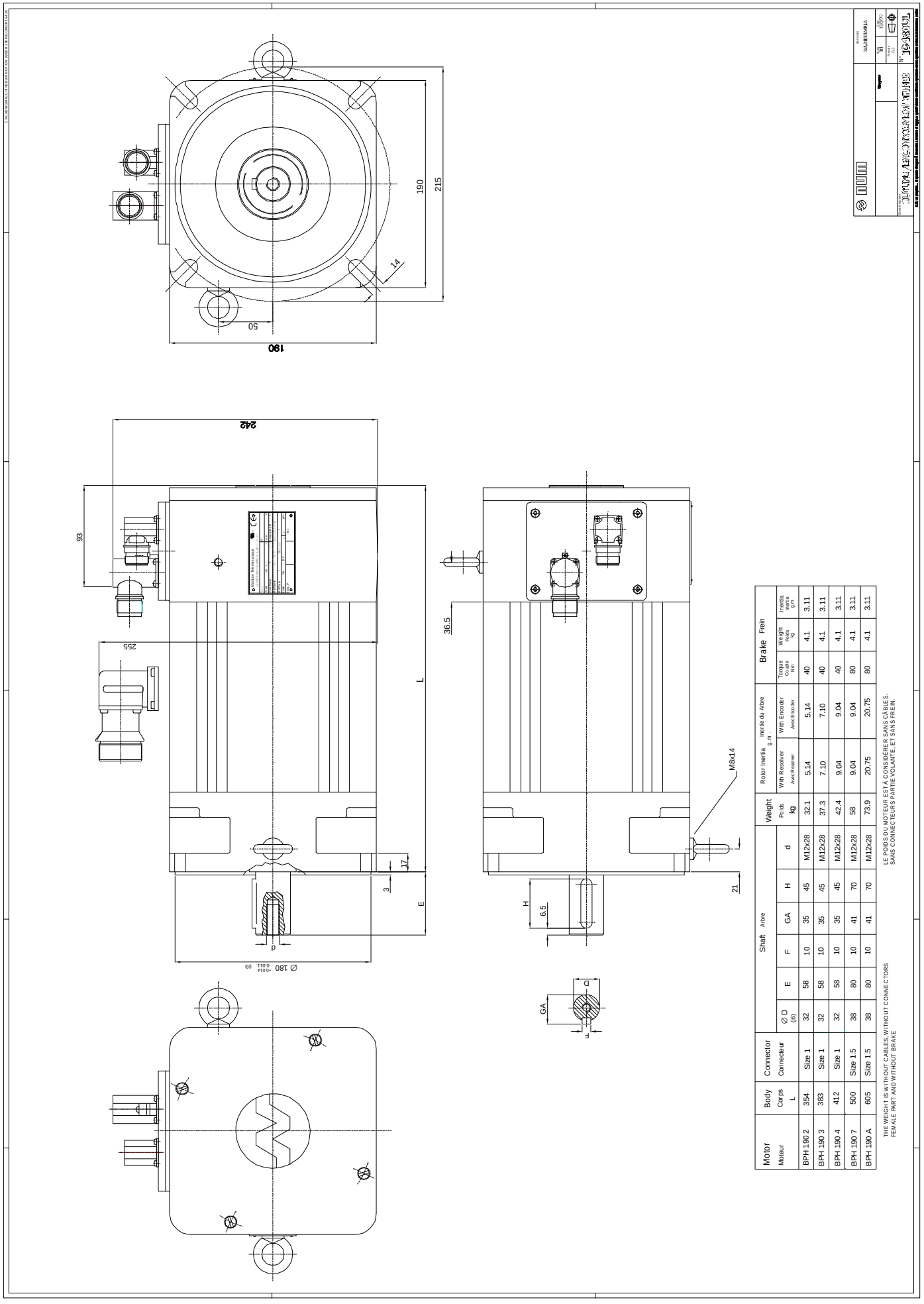




LEGEND

A = Load with horizontal motor mounting

B = Load with vertical motor mounting



Motor / Moteur	Body / Corps L	Connector / Connecteur	Shaft / Arbre Ø D (j6)	E	F	GA	H	d	Weight / Poids kg	Rotor Inertia / Inertie du Rotor g.m² With Resolver / Avec Resolver	With Encoder / Avec Encoder	Brake / Frein Torque / Couple Nm	Weight / Poids kg	Inertia / Inertie g.m²
BPH 190 2	354	Size 1	32	58	10	35	45	M12x28	32.1	5.14	5.14	40	4.1	3.11
BPH 190 3	383	Size 1	32	58	10	35	45	M12x28	37.3	7.10	7.10	40	4.1	3.11
BPH 190 4	412	Size 1	32	58	10	35	45	M12x28	42.4	9.04	9.04	40	4.1	3.11
BPH 190 7	500	Size 1.5	38	80	10	41	70	M12x28	58	9.04	9.04	80	4.1	3.11
BPH 190 A	605	Size 1.5	38	80	10	41	70	M12x28	73.9	20.75	20.75	80	4.1	3.11

THE WEIGHT IS WITHOUT CABLES, WITHOUT CONNECTORS
FEMALE PART AND WITHOUT BRAKE

LE POIDS DU MOTEUR EST A CONSIDERER SANS CABLES,
SANS CONNECTEURS PARTIE VOLANTE ET SANS FREIN.

OPTION

Motor holding brake

The permanent magnet holding brake included in the motor is applied by a current failure.

The brake is only intended for use as a holding static brake and not as a dynamic brake. About 1800-2000 braking operations can be performed in case of emergency or power failure with a total inertia equal to two times the rotor inertia.

For ordering, see page 15.

The holding brake is not to be considered a safety device. In the case of a vertical axis, interpose safety interlock or additional safety brakes to stop the axis from falling. It could cause damage to personnel and machines.

If a brake is provided on the motor, no axial loadings must be applied.
If it is supplied with reverse polarity, the brake stays locked on.
f the holding brake is not being used for a long time, the oxidation of its parts may lead to a braking torque reduction.

Smooth shaft end (without key)

The motor shaft can be ordered without a key .

For ordering, see page 15.

Encoder feedback SinCos multiturn type A

For technical characteristics, see page 11.

For ordering, see page 15.

Encoder feedback SinCos singleturn type B

For technical characteristics see page 11.

For ordering, see page 15.

Available accessories

BPH MOTORS ACCESSORIES : MOTOR CABLE WITH CONNECTORS (from BPH055 to BPH115)					
ACCESSORIES		**BPH0552S**	**BPH0751N BPH0752N**	**BPH0952N BPH0953N**	**BPH1152N BPH1153N**
Complete cable with motor side and drive side connector (1)	**• Power**	Not available	AGOFRU015M010		
	• Resolver • Encoder		AGOFRU014M010 AGOFRU013M010		
Cable with motor side connector (2)	**• Potenza**	AGOKIT001M0xx	AGOKIT018M0xx		
	• Resolver	AGOKIT025M0xx	AGOKIT024M0xx		
	• Encoder	Not available	AGOKIT023M0xx		

BPH MOTORS ACCESSORIES : MOTOR CABLE WITH CONNECTORS (from BPH115 to BPH190)				
ACCESSORIES		**BPH1422N BPH1423N**	**BPH1902N BPH1903K BPH1904K**	**BPH1907K BPH190AK**
Complete cable with motor side and drive side connector (1)	**• Power**	AGOFRU016M010		AGOFRU020M0xx **(3)**
	• Resolver • Encoder	AGOFRU014M010 AGOFRU013M010		
Cable with motor side connector (2)	**• Potenza**	AGOKIT019M0xx		AGOFRU020M0xx **(3)**
	• Resolver • Encoder	AGOKIT024M0xx AGOKIT023M0xx		

NOTES.

(1) Complete cable = Cable with motor side connector + drive side both end assembled.
The complete cable is available only by 10 meters length.

(2) Cable with motor side moving connector assembled.
The last three figures of the code show the length of cables in meters
In the code it is included the drive side connector not assembled.
The available lengths are AGOKIT018M .. **005, 015, 025, 050, 075 meters.**
BPH055 available lengths are AGOKIT001M0 .. and AGOKIT025M0.. **005, 015, 025, meters.**

(3) The drive side connector is not foreseen for BPH1907K, AK motors.
(the cable is directly connected to the drive power terminal board)

Use only original Schneider Electric cables. The original Schneider Electric cables have special characteristics (capacitance value...). Not to respect these characteristics can cause seriuos damage to servomotors.

During the servomotor installation, always make sure that the connection cable used is the one established in the reference guide. The use of an incorrect cable leads to the violation of the international standards.

Available accessories

ACCESSORIES : CABLES, CONNECTORS, CRIMPING TOOL (from BPH055 to BPH115)					
ACCESSORIES		**BPH0552S**	**BPH0751N BPH0752N**	**BPH0952N BPH0953N**	**BPH1152N BPH1153N**
Cable (1)	• **Power**	RPC305S	AGOCAV004		
	• **Resolver** • **Encoder**	AGOCAV003 Not available	AGOCAV003 AGOCAV002		
Motor side connector (2)	• **Power**	CONN117D00	AMOCON004D		
	• **Resolver** • **Encoder**	CONN116D00 Not available	AMOCON003D AMOCON002D		
Crimping tool (3)	• **Power** • **Resolver** • **Encoder**	Not available (the contacts have to be soldered)	AMOKIT001CRP		
Drive side connector	• **Power**	AEOCON009			
	• **Resolver** • **Encoder**	AEOCON011 AEOCON010			

ACCESSORIES : CABLES, CONNECTORS, CRIMPING TOOL (from BPH142 to BPH190)				
ACCESSORIES		**BPH1422N BPH1423N**	**BPH1902N BPH1903K BPH1904K**	**BPH1907K BPH190AK**
Cable (1)	• **Power**	AGOCAV005		AGOCAV006
	• **Resolver** • **Encoder**	AGOCAV003 AGOCAV002		
Motor side connector (2)	• **Power**	AMOCON004D		AMOCON005D
	• **Resolver** • **Encoder**	AMOCON003D AMOCON002D		
Crimping tool (3)	• **Power**	AMOKIT002CRP		
	• **Resolver** • **Encoder**	AMOKIT001CRP		
Drive side connector	• **Power**	AEOCON009		Not available The cable is directly connected to the drive.
	• **Resolver** • **Encoder**	AEOCON011 AEOCON010		

NOTES.

(1) **The cable is available** in multiples of meters. (i.e **AGOCAV003 unit 10** = 10 meters of resolver cable)

(2) The motor side connector have crimping contacts (see crimping tool for contacts fixing) .The BPH055 contacts have to be soldered.

(3) **Crimping tool code AGOKIT001CRP consists of:**
- Crimping tool for power and brake cables (BPH from 075 to115), for resolver/encoder and thermal prove cables (for BPH from 075 to190).
- Contacts positioner for power and brake cables (BPH from 075 to190/4) - Contacts positioner for resolver/encoder and thermal probe cables (BPH from 075 to190).

Crimping tool code AGOKIT002CRP consists of:
- Crimping tool for power and brake cables (BPH from 142 to 190) - Contacts positioner for brake cables BPH190/7/A
- Contacts positioner for power cables BPH190/7/A.

Accessories

Available accessories

BMHQ101 seal (IP64 seal for BPH055 motors)

BPH055 motors	IP64 SEAL
	BMHQ101

Multilanguages motors reference guide

BPH motors	MULTILANGUAGES MOTORS REFERENCE GUIDE
	AMOMAN001U

SPARE PARTS

Available spare parts

BPH MOTORS SPARES PARTS (from BPH055 to BPH115)					
SPARES PARTS		**BPH0552S**	**BPH0751N* BPH0752N****	**BPH0952N BPH0953N**	**BPH1152N BPH1153N**
Internal crimping contact	**• Power • Brake • Resolver • Encoder**	Not used **(1)**	AMOCTC002F AMOCTC002F AMOCTC001F AMOCTC001F		
Shaft end key		AMOCHI00615X3	AMOCHI0014x4* AMOCHI0025x5**	AMOCHI0036x6	
Eyebolt		Not used			

NOTE.
(1) The BPH055 motor side connectors contacts have to be soldered.

BPH MOTORS SPARES PARTS (from BPH142 to BPH190)				
SPARES PARTS		**BPH1422N BPH1423N**	**BPH1902N BPH1903K BPH1904K**	**BPH1907K BPH190AK**
Internal crimping contact	**• Power • Brake • Resolver • Encoder**	AMOCTC002F AMOCTC002F AMOCTC001F AMOCTC001F		AMOCTC004F AMOCTC003F AMOCTC001F AMOCTC001F
Shaft end key		AMOCHI0048X7	AMOCHI0050X8	AMOCHI00770X10
Eyebolt			AMOGOL001M8	

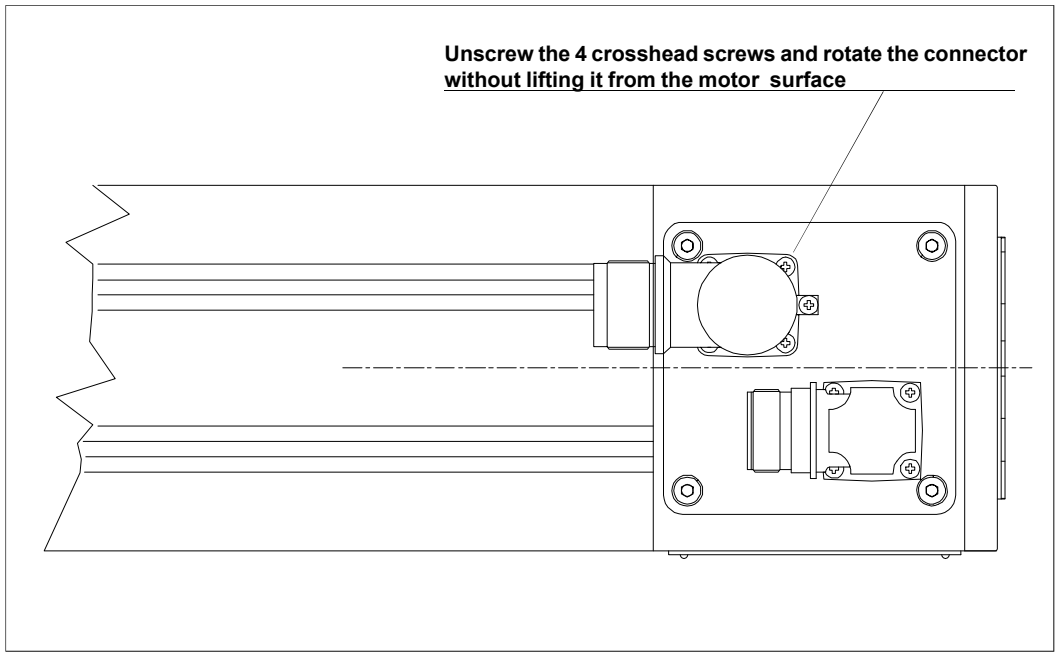
CONNECTIONS

Connector orientation (turnable by the customer).

CONNECTORS CAN BE ROTATED 90^{O} FOR A 360^{O} RANGE OF ORIENTATION . (See below drawing)

Always disable the system and disconnect the cables from the motor before changing the connector orientation.

BPH - Connectors



CONNECTIONS

Power and signal connections of the motor

The power and signal connections to the motor are reported in the manuals Lexium Series Drives User Guides 890USE1200X and 890USE1210X .