

HWM...-600 series

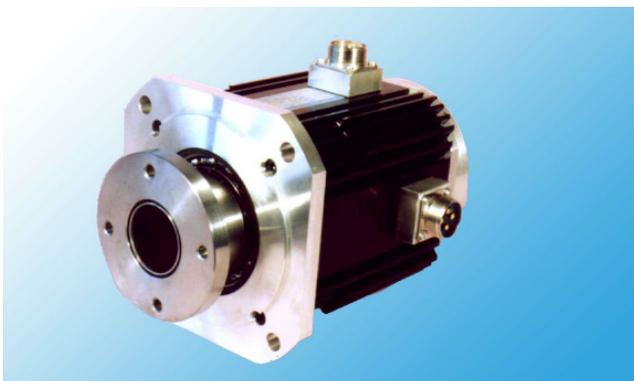
Hollow shaft actuators

The hollow shaft actuators **HWM...-600** are a special variation of the approved Printed Motors SynchroDyn – actuators. In principle, these motors correspond to 3-phase synchronous motors with a 8-pole permanent magnet rotor.

The use of rare earth magnets with a high energy product and a special guidance of the magnetic flux through the superficial parts of the rotor, the inside can be designed as a hollow shaft with a huge drilling.

Characteristics

- High power density by short and compact axial length
- Throughout hollow shaft with inside diameter up to 80 mm
- With permanent magnet rotor, brushless, sinusoidal commutated
- Zero cogging, even at an extremely low speed
- low inertia, small electrical and mechanical time constants
- Short start up- and stopping times
- High overload operating mode
- With integrated resolver or hall sensors
- Nominal speed 3000 to 5000 rpm
- Deliverable with hollow shaft gearboxes up to 400 Nm



Like a conventional AC motor, the stator coil is supplied with sinusoidal, three-phase AC-current. At PWM control of the circulation frequently and the terminal voltage, the speed of the SynchroDyn servo motor can smoothly operate between zero speed and max. no-load speed, in addition high rated and maximum torques are available over the whole speed range.

The rotor position is seized by a brushless resolver. Through its sine und cosine-signals, the current angle of the rotor and the rotation speed are reported to the servo-amplifier, so no additional position sensor is needed. The hollow shaft resolver is integrated in the rear side of the servo motor.

Standard Version

IP 54 (IEC 34-5) protection; shaft run out tolerance class N; vibration class R (ISO 2373 insulation class F (IEC 34-7); PTC temperature sensor, shielded ball bearings with life-long lubrication, separate connectors for the motor and resolver, mating plugs included.

Options

Reduced vibration severity, restricted run-out-tolerance, higher protection, special flange or shaft, gear on A-side.

Characteristics

Rated values ¹⁾	Symbol	Unit	HWM 10 S-600	HWM 10 L-600	HWM 13 S-600	HWM 13 L-600	HWM 16 S-600	HWM 16 L-600
Nominal torque ²⁾	M_N	Nm	1	2	4	8	12	18
Nominal speed ²⁾	n_N	rpm	3000	3000	3000	3000	3000	3000
Power output ²⁾	P_N	W	310	630	1250	2500	3750	5600
Nominal frequency	f_N	Hz	200	200	200	200	200	200
Terminal voltage ^{3) 4)}	U_N	V	306	318	318	314	314	308
Nominal current ^{2) 3)}	I_N	A	1,2	1,9	3,6	6,7	9,2	13,4
Motor Performances								
Peak torque ⁵⁾	M_{max}	Nm	6	12	24	48	60	90
Max. peak torque ⁵⁾	I_{max}	A	7,2	11,4	21,6	40,5	46,0	66,0
Acceleration at peak torque	a_{max}	10^3 rad/s^2	65	73	36	40	18	20
Stall torque	M_0	Nm	1,3	2,5	5,0	10,0	15,0	20,5
Current at stall torque	I_0	A	1,6	2,4	4,5	8,4	11,4	14,7
Max. load speed	n_{max}	min^{-1}	5000	4500	4500	4000	4000	4000
Max. no load speed	n_0	min^{-1}	6000	5500	5000	5000	4500	4500
Intrinsic Motor Constants								
Torque constant ³⁾	k_T	Nm/A	0,87	1,03	1,11	1,17	1,14	1,29
Back EMF constant ³⁾	k_E	$\text{V}/10^3 \text{ min}^{-1}$	52,7	62,2	67,4	70,1	70,3	78,3
Terminal resistance ⁴⁾	R_A	Ω	33,2	9,8	4,0	1,8	1,3	0,7
Armature inductance ⁴⁾	L_A	mH	30	24	18	14	7,4	5,2
Mechanical time constant	T_m	ms	5,1	2,9	3,2	2,2	3,3	2,8
Electrical time constant	T_e	ms	0,9	1,5	2,6	5,5	5,7	7,4
Inertia (rotor)	J	kgcm^2	0,86	1,64	6,56	11,75	32,4	45,2
Thermal Characteristics								
Thermal Time constant ⁶⁾	T_{th}	min	25	25	30	30	35	35
Thermal resistance ⁶⁾	R_{th}	K/W	0,55	0,5	0,33	0,33	0,24	0,24
Temperature coeff. of back EMF	c_{th}	%/K	-0,04	-0,04	-0,04	-0,04	-0,04	-0,04
Max. cont. winding temperature	$t_{wi \max}$	$^{\circ}\text{C}$	155	155	155	155	155	155
Physical Data								
Number of magnet poles	$2p$	pcs	8	8	8	8	8	8
Radial shaft load	F_R	N	400	400	500	500	600	600
Axial shaft load	F_A	N	200	200	250	250	400	400
Weight	m	kg	2,8	3,6	7,1	10,1	13,6	17,3

¹⁾ TENV motor, IP 54 or IP 65 protection, ambient temperature +40 °C, installation height < 1000 m NN.

²⁾ Continuous operation S1 (IEC 34-7), housing temperature + 65 °C
Motor can operate at all points of the torque-speed curve up to max. load speed.

³⁾ RMS values, for sinusoidal current/voltage peak factor $\sqrt{2}$

⁵⁾ Intermittent operation S3 (VDE 0530), IEC 34.7, 15% duty cycle, one time 10 s.

⁶⁾ Based upon mounted motors, derivation of dissipation heat through ambient.

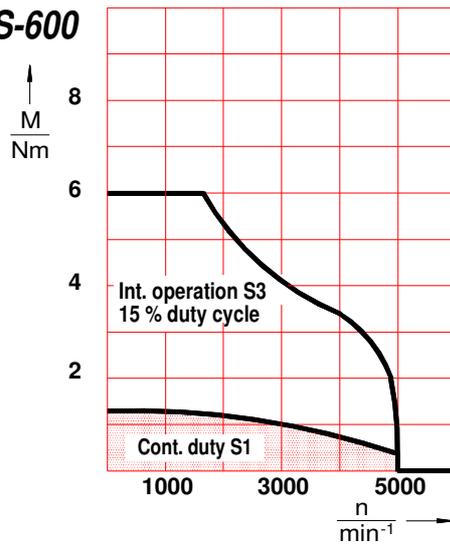
All specification subject to change without notice

Printed Motors

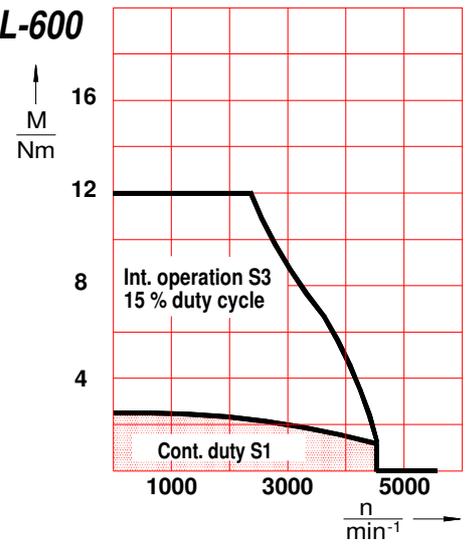


Speed-torque characteristics

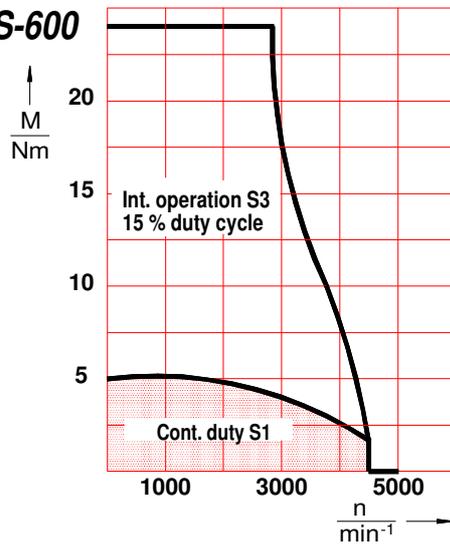
HWM 10 S-600



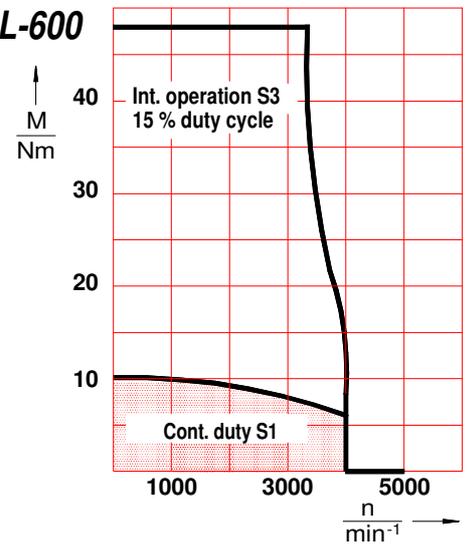
HWM 10 L-600



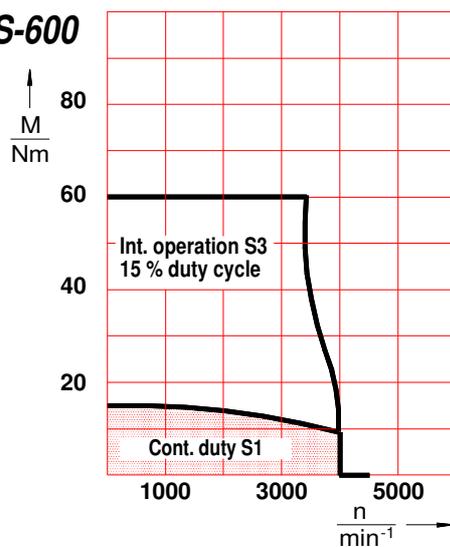
HWM 13 S-600



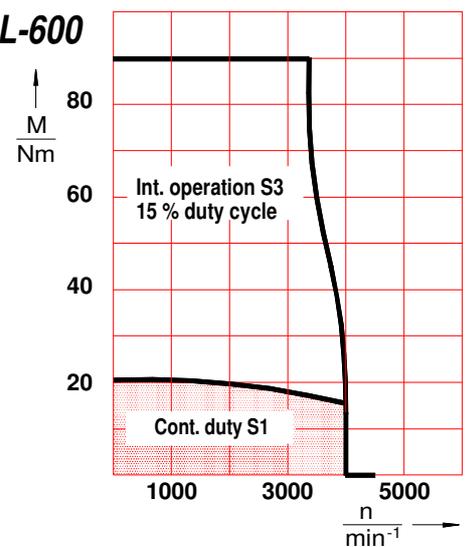
HWM 13 L-600



HWM 16 S-600

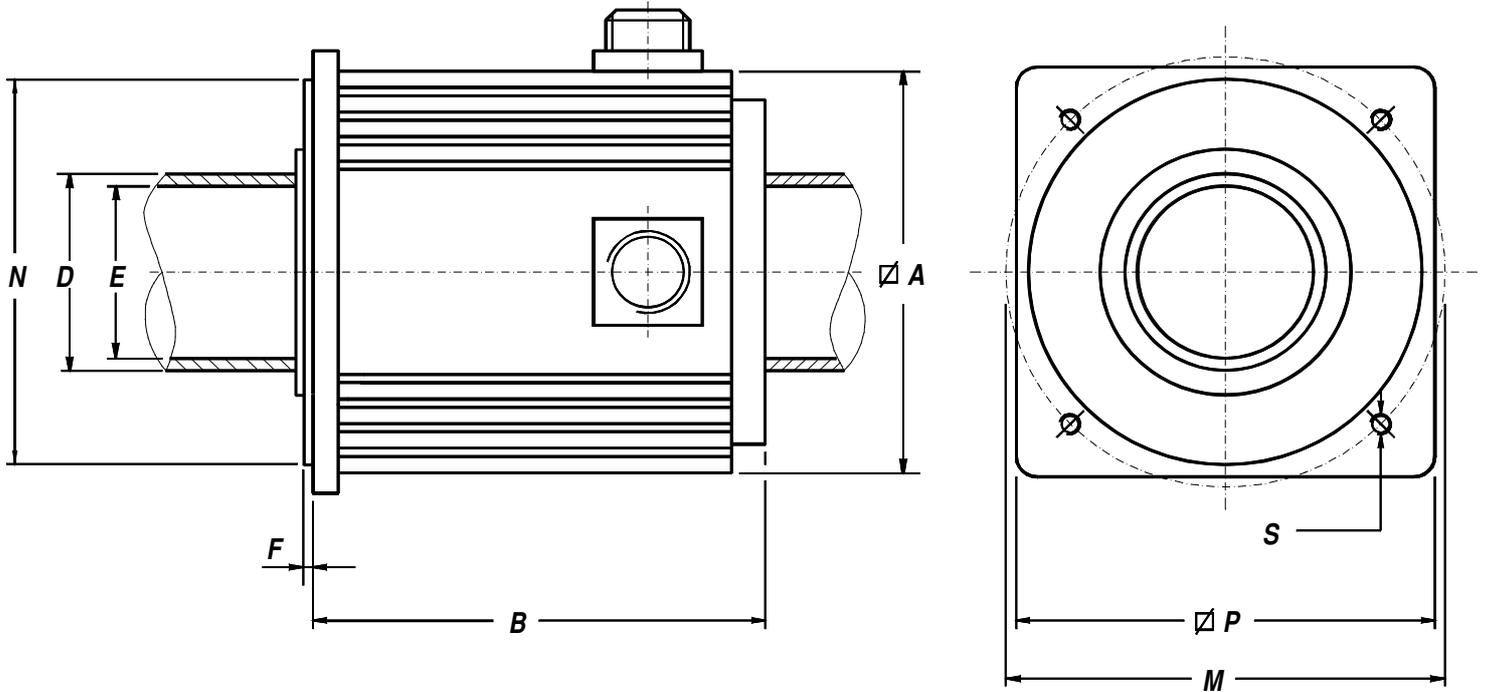


HWM 16 L-600



Outline Drawings

HWM... 600 series



Motor	A	B	D	E	F	M	N	P	S
HWM 10 S-600	98	118	22	18	2,5	130	110 ^{j6}	115	M6x8
HWM 10 L-600	98	138	22	18	2,5	130	110 ^{j6}	115	M6x8
HWM 13 S-600	128	172	55	48	2,5	165	130 ^{j6}	155	M10x12
HWM 13 L-600	128	208	55	48	2,5	165	130 ^{j6}	155	M10x12
HWM 16 S-600	158	208	80	64	2,5	215	180 ^{j6}	200	M12x12
HWM 16 L-600	158	287	80	64	2,5	215	180 ^{j6}	200	M12x12

Outline dimensions in mm, shaftend and mounting flange according to IEC 72

Other options (B5) on request

Order Code Key

H x - W xx xx - M 0 x

Mounting, protection

O = B14 (IEC 34 T7) IP 54, standard outline
 N = B5 (IEC 34 T7), IP 54, standard outline
 I = motor with gearhead, on request
 K = customer specifications

Size (dimension P in cm)

10 = HWM 10 ...
 13 = HWM 13 ...
 16 = HWM 16 ...

Electrical options

5 = standard nominal value (600-V)

Feedback

1 = without feedback system
 2 = resolver

Stack options

1 = length: "short"
 2 = length: "long"

How to order:

Hollow shaft servo motor
 HWM 13 L-600, B 14
 flange, IP 54 protection,
 standard characteristics
 and standard rated
 values, 2-pole resolver:

HO-W1351-M02

All specifications subject to change without notice

Accessories

	Article-No.		Article-No.
Mating plug motor, 4 pin HWM 10 S to HWM 13 S HWM 13 L to HWM 16 L	HO-44308-500 HO-53076-300	mating plug resolver/temperature sensor, 8 pin (suitable for all motors) with MIL-plug on request	HO-44295-500

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