

## HWM...-600 series

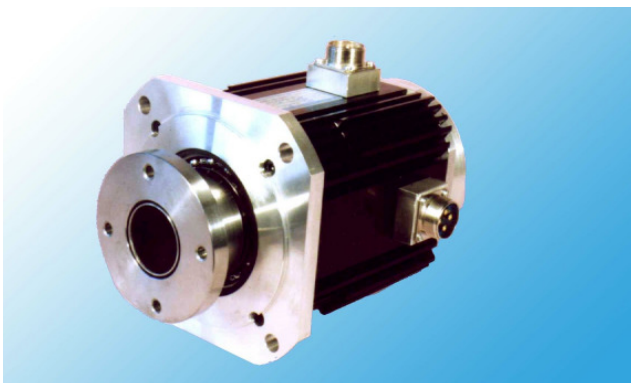
### Hollow shaft actuators

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 <sup>1)</sup>	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 <sup>2)</sup>	$M_N$	Nm	1	2	4	8	12	18
Nominal speed <sup>2)</sup>	$n_N$	rpm	3000	3000	3000	3000	3000	3000
Power output <sup>2)</sup>	$P_N$	W	310	630	1250	2500	3750	5600
Nominal frequency	$f_N$	Hz	200	200	200	200	200	200
Terminal voltage <sup>3) 4)</sup>	$U_N$	V	306	318	318	314	314	308
Nominal current <sup>2) 3)</sup>	$I_N$	A	1,2	1,9	3,6	6,7	9,2	13,4
<b>Motor Performances</b>								
Peak torque <sup>5)</sup>	$M_{max}$	Nm	6	12	24	48	60	90
Max. peak torque <sup>5)</sup>	$I_{max}$	A	7,2	11,4	21,6	40,5	46,0	66,0
Acceleration at peak torque	$a_{max}$	$10^3 \text{ rad/s}^2$	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	$n_{max}$	$\text{min}^{-1}$	5000	4500	4500	4000	4000	4000
Max. no load speed	$n_0$	$\text{min}^{-1}$	6000	5500	5000	5000	4500	4500
<b>Intrinsic Motor Constants</b>								
Torque constant <sup>3)</sup>	$k_T$	Nm/A	0,87	1,03	1,11	1,17	1,14	1,29
Back EMF constant <sup>3)</sup>	$k_E$	$\text{V}/10^3 \text{ min}^{-1}$	52,7	62,2	67,4	70,1	70,3	78,3
Terminal resistance <sup>4)</sup>	$R_A$	$\Omega$	33,2	9,8	4,0	1,8	1,3	0,7
Armature inductance <sup>4)</sup>	$L_A$	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)	$J$	$\text{kgcm}^2$	0,86	1,64	6,56	11,75	32,4	45,2
<b>Thermal Characteristics</b>								
Thermal Time constant <sup>6)</sup>	$T_{th}$	min	25	25	30	30	35	35
Thermal resistance <sup>6)</sup>	$R_{th}$	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
<b>Physical Data</b>								
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

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

<sup>2)</sup> 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.

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

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

<sup>6)</sup> Based upon mounted motors, derivation of dissipation heat through ambient.

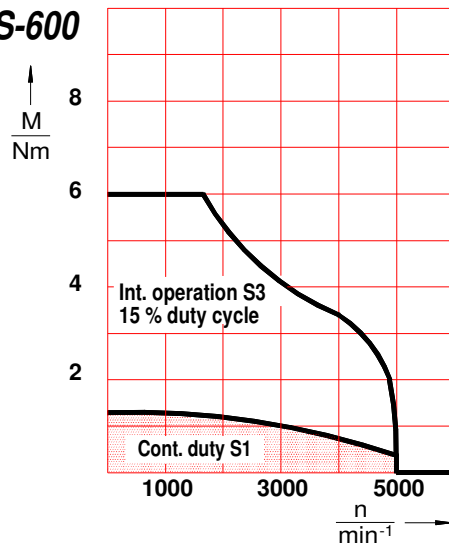
All specification subject to change without notice

**Printed Motors**

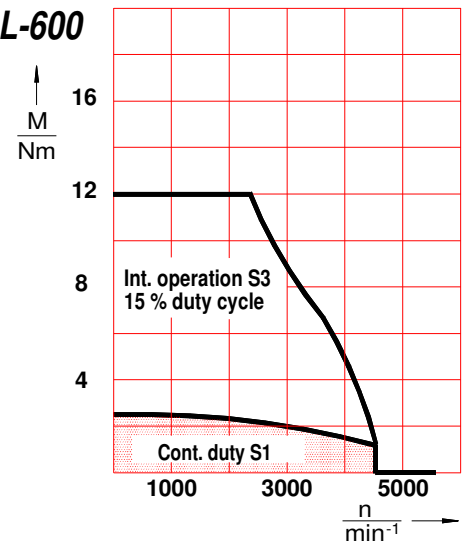


# Speed-torque characteristics

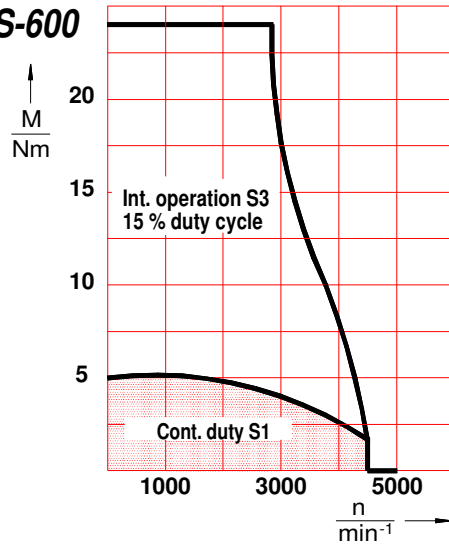
**HWM 10 S-600**



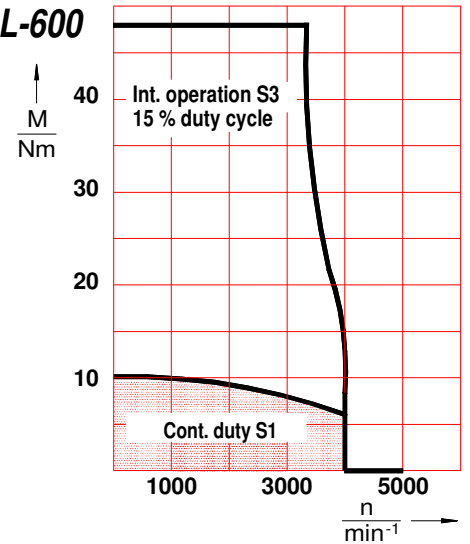
**HWM 10 L-600**



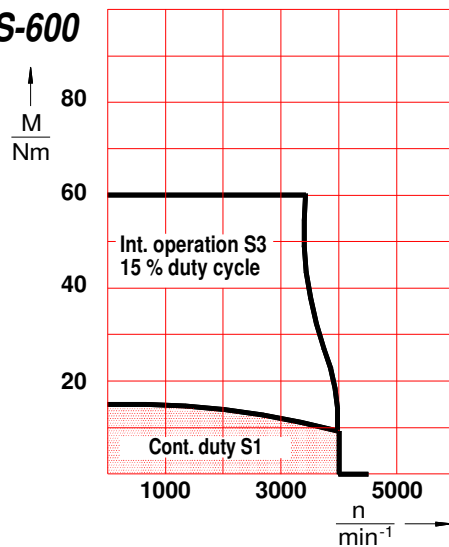
**HWM 13 S-600**



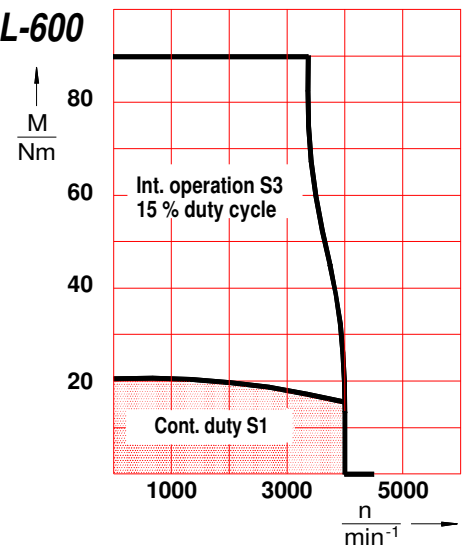
**HWM 13 L-600**



**HWM 16 S-600**

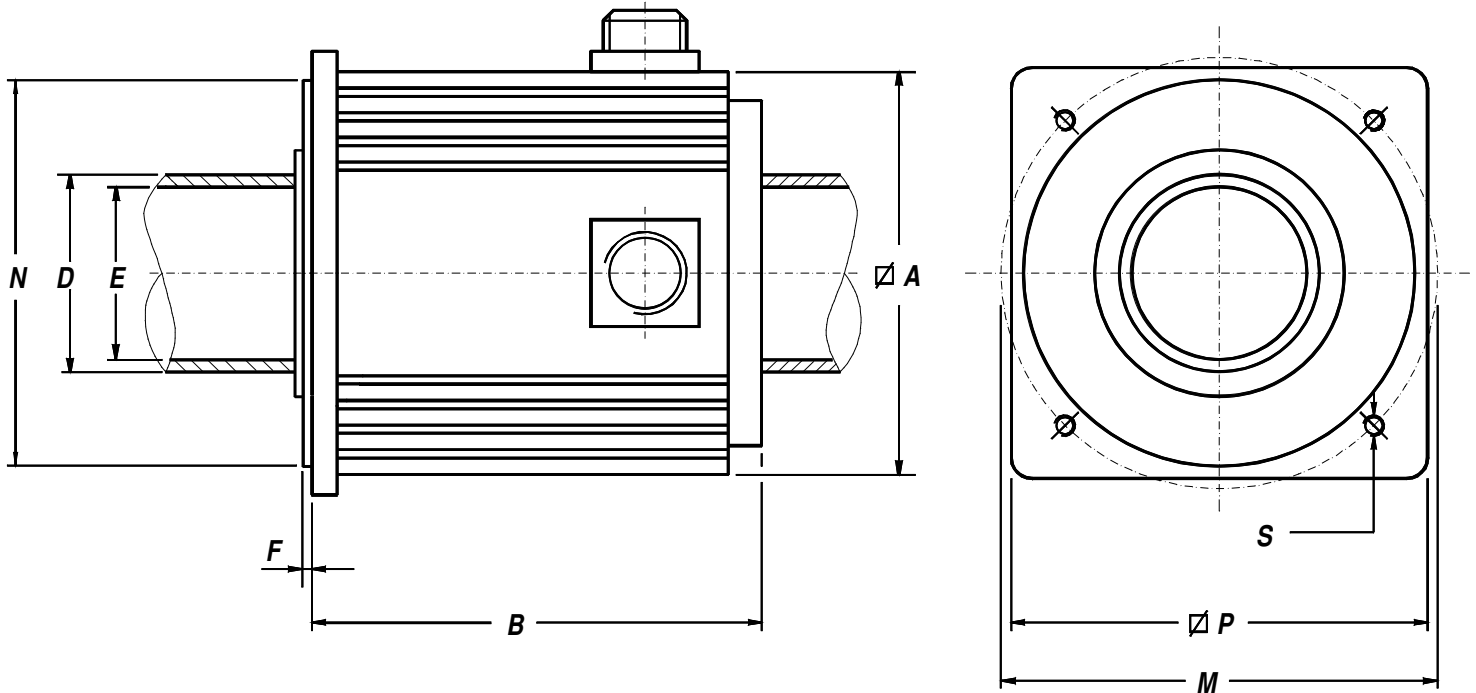


**HWM 16 L-600**



## 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 <sup>j6</sup>	115	M6x8
HWM 10 L-600	98	138	22	18	2,5	130	110 <sup>j6</sup>	115	M6x8
HWM 13 S-600	128	172	55	48	2,5	165	130 <sup>j6</sup>	155	M10x12
HWM 13 L-600	128	208	55	48	2,5	165	130 <sup>j6</sup>	155	M10x12
HWM 16 S-600	158	208	80	64	2,5	215	180 <sup>j6</sup>	200	M12x12
HWM 16 L-600	158	287	80	64	2,5	215	180 <sup>j6</sup>	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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