

HIWIN®



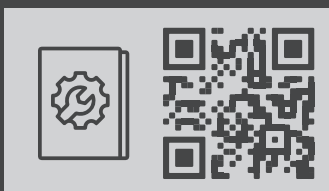
TORQUE MOTORS

TORQUE MOTORS

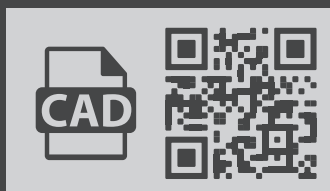
Alongside complete rotary tables, HIWIN also offers individual torque motor components for the customised design of directly driven rotary axes. The torque motor components each consist of a hollow shaft rotor and a stator with coils.

DOWNLOADS AND APPLICATIONS

Assembly instructions



CAD configurator



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Torque Motors

Product overview

1. Product overview



HIWIN torque motors DMR

Page 9

- Torques up to 450 Nm
- Typical field of application: automation technology



HIWIN torque motors TM-5

Page 18

- Torques up to 6,000 Nm
- Water cooling
- Typical field of application: machine tool



Options and accessories

Page 41

Torque Motors

General information

2. General information

2.1 Typical features of the torque motors

HIWIN torque motors are high-pole synchronous servomotors. Due to the high-pole structure, no downstream transmission is required for speed reduction and torque increase. HIWIN torque motors are typically used as direct drives in high-precision rotary and tilting axes.

The power transmission between the input and output sides is contactless. Mechanical components in the drivetrain, as they are present in classic engine/gearbox combinations, are not required.

The result is a wear- and maintenance-free drive with maximum efficiency. Due to the very rigid load coupling, HIWIN torque motors are predestined for highly dynamic applications with rapid load changes that push classic motor/gearbox combinations to their limits. In order to avoid introducing additional process heat, especially in the machine tool sector, the torque motors are equipped with cooling channels for liquid cooling.

- Wear-free and maintenance-free direct drive
- High constant torque independent of speed
- Highly dynamic and silent
- Play-free and highly precise
- Fast speed changes and maximum rigidity
- High efficiency
- Compact design with hollow shaft
- Made ready for liquid cooling



2.2 General structure of the torque motors

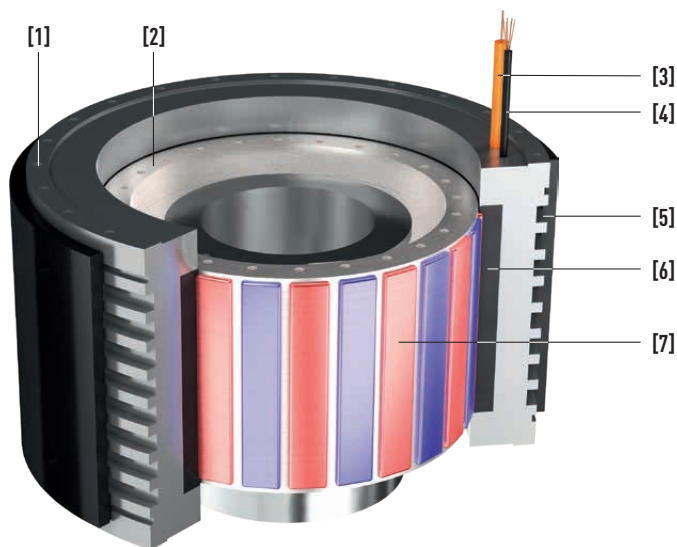


Table 2.1 Main components of the torque motors

Pos.	Component	Pos.	Component
1	Stator	5	Cooling channels for liquid cooling
2	Rotor with permanent magnets and hollow shaft	6	Winding package encapsulated in epoxy resin
3	Motor cable	7	Permanent magnets
4	Temperature sensor cable		

3. HIWIN torque motors DMR

3.1 Special characteristics of the torque motors DMR

DMR series torque motors are ready-to-install motor elements consisting of a stator and rotor, especially suitable for the field of automation technology. The rotor is designed as a ring element. Due to their high continuous and peak torques, they enable high accelerations and thus short cycle times.

Key features of the torque motors DMR:

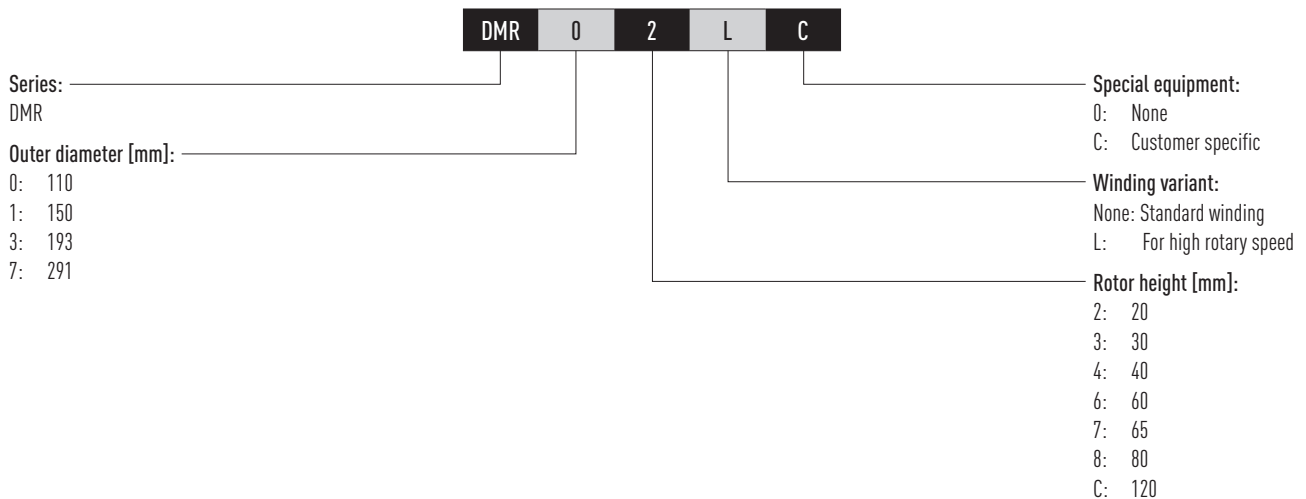
- Wear- and maintenance-free direct drive
- Play-free and highly precise
- UL-certified (DMR3, DMR7)

Typical fields of application for the torque motors DMR:

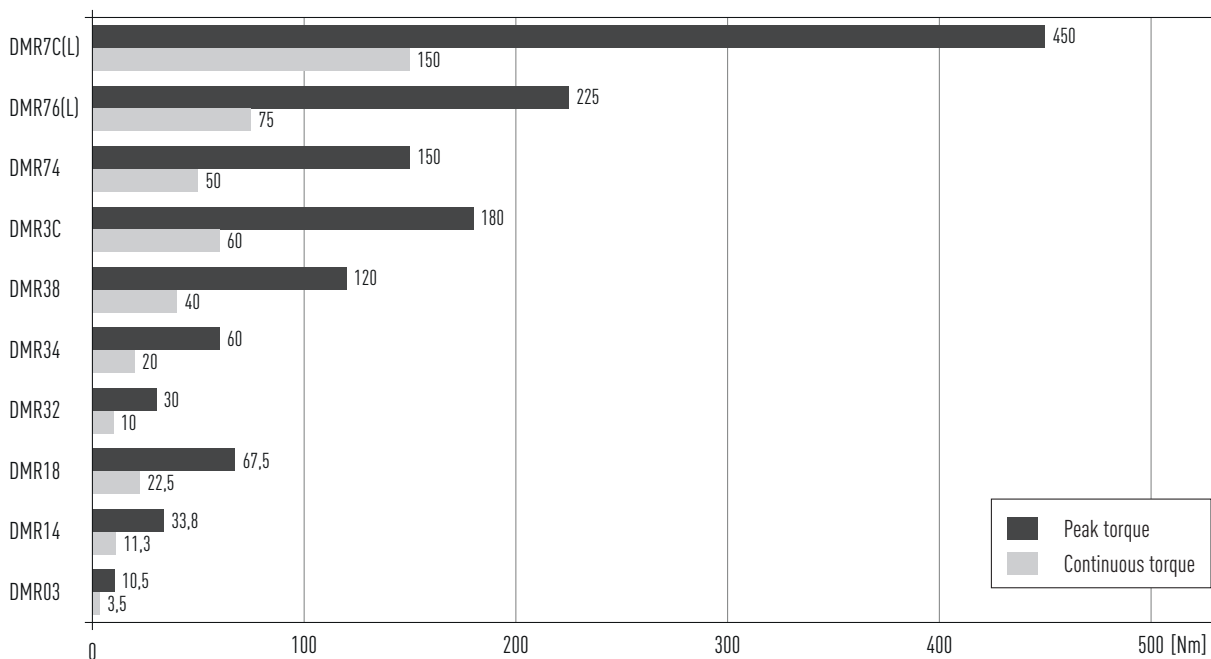
- Automation technology
- Rotary indexing tables



3.2 Order code for torque motors DMR



3.3 DMR torques



Torque Motors

HIWIN torque motors DMR

3.4 Torque motor DMR specifications

3.4.1 DMR0 specifications

Torque-speed curve (DC bus voltage: 600 VDC)

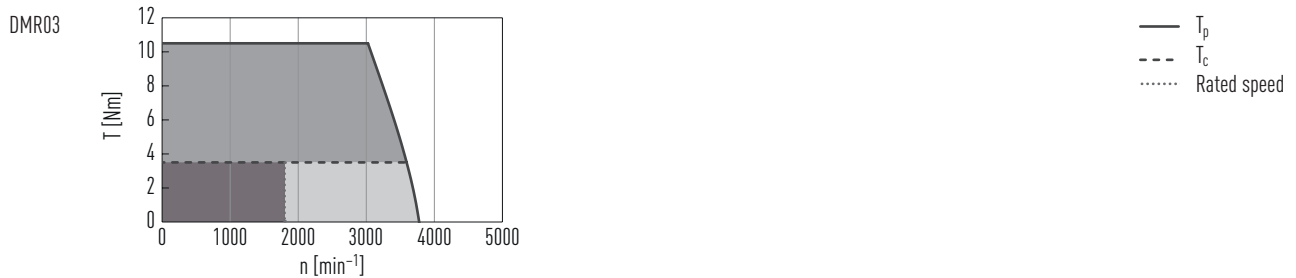


Table 3.1 Technical data for DMR0

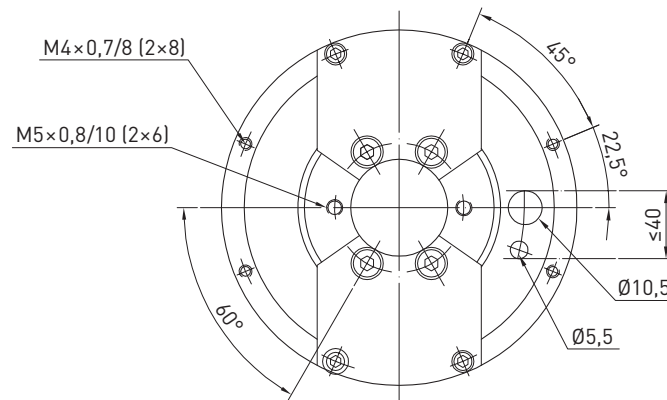
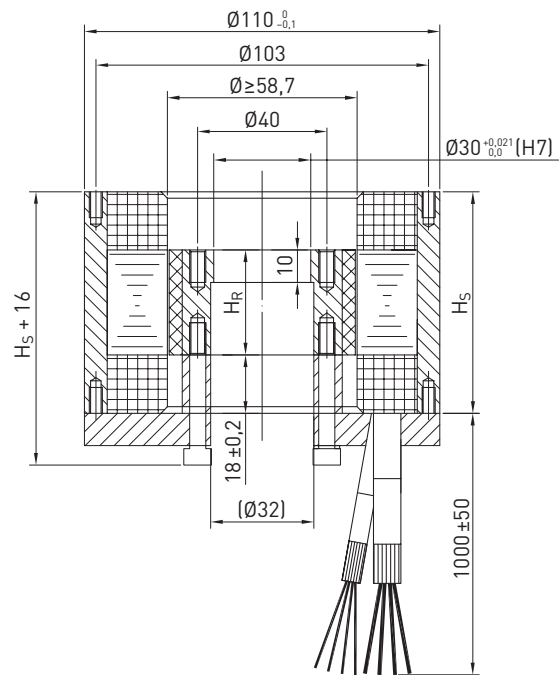
	Symbol	Unit	DMR03
Torques and electrical parameters			
Peak torque (for 1 sec.)	T_p	Nm	10.5
Continuous torque ¹⁾	T_c	Nm	3.5
Stall torque	T_s	Nm	2.5
Peak current (for 1 sec.)	I_p	A	6.8
Continuous current ¹⁾	I_c	A	2.3
Stall current	I_s	A	1.6
Resistance ²⁾	R_{25}	Ω	7.1
Inductance ²⁾	L_{25}	mH	15.2
Motor constant	K_m	Nm/ \sqrt{W}	0.5
Electrical time constant	K_e	ms	2.1
Torque constant	K_t	Nm/A	1.55
Back emf constant	K_u	V _{eff} /rad/s	0.82
Inertia of rotor	J	kgm ²	0.00018
Thermal resistance	R_{th}	°C/W	1.76
Thermal time constant	T_{th}	s	1,930
Max. DC bus voltage	U_{max}	VDC	600
Rated speed	n_N	min ⁻¹	1,800
Mechanical parameters			
Number of poles	2p		10
Thermal sensor			PTC SNM 120
Stator height	H_S	mm	68.5
Rotor height	H_R	mm	32.5
Mass of motor	M_m	kg	2.6

All the specifications in the table (except dimensions) are in $\pm 10\%$ of tolerance at 25 °C ambient temperature

¹⁾ Coil temperature: 120 °C

²⁾ Line to line

Dimensions DMRO



Torque Motors

HIWIN torque motors DMR

3.4.2 DMR1 specifications

Torque-speed curves (DC bus voltage: 600 VDC)

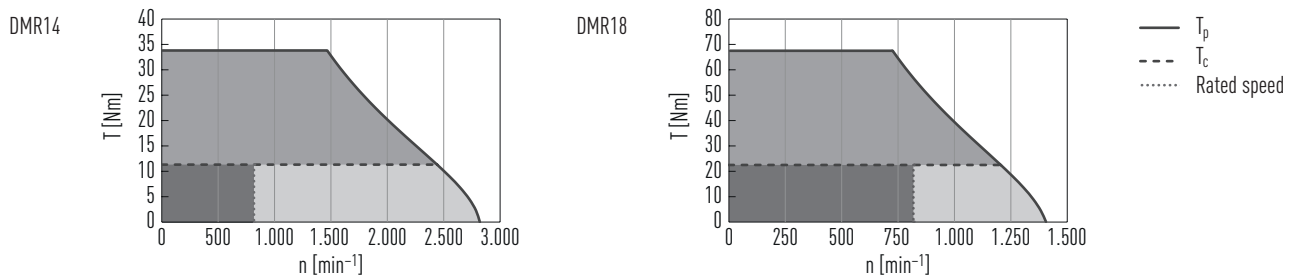


Table 3.2 Technical data for DMR1

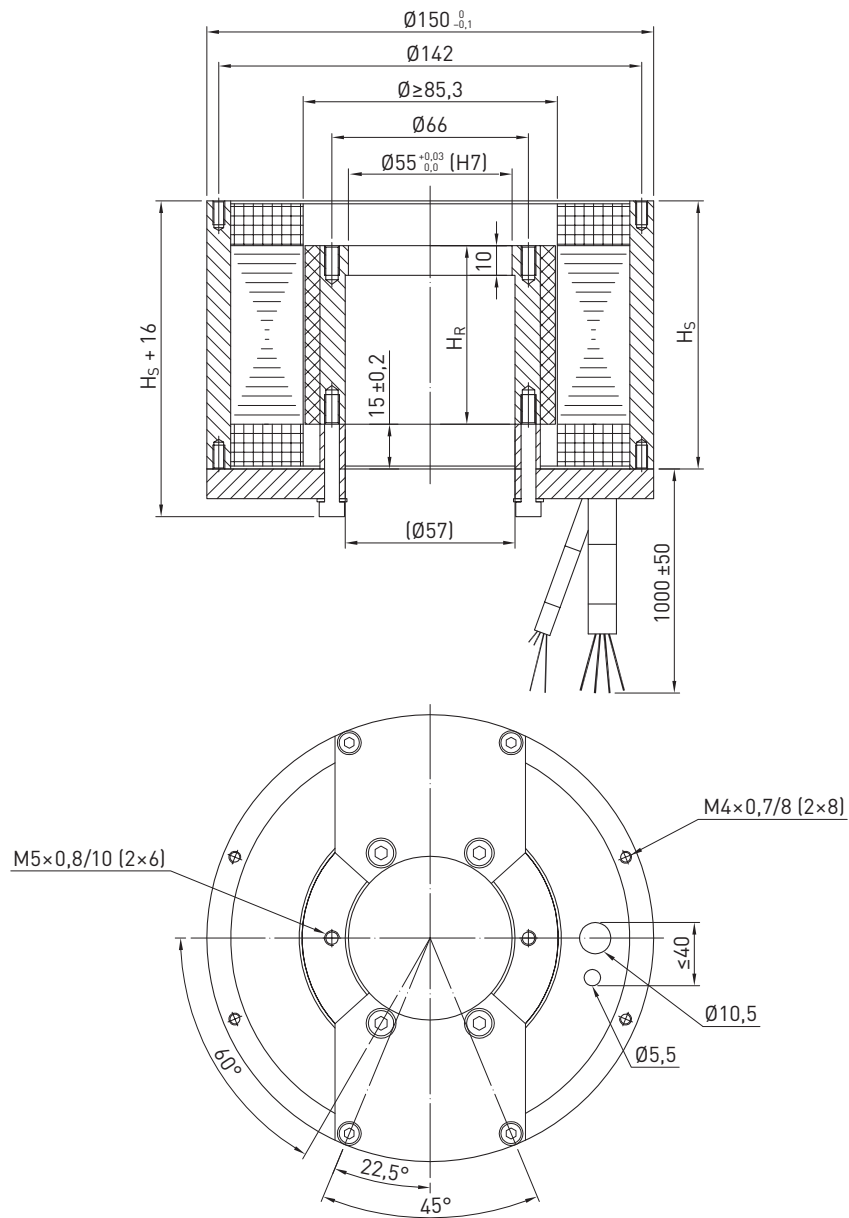
	Symbol	Unit	DMR14	DMR18
Torques and electrical parameters				
Peak torque (for 1 sec.)	T_p	Nm	33.8	67.5
Continuous torque ¹⁾	T_c	Nm	11.3	22.5
Stall torque	T_s	Nm	7.9	15.8
Peak current (for 1 sec.)	I_p	A	13.5	13.5
Continuous current ¹⁾	I_c	A	4.5	4.5
Stall current	I_s	A	3.2	3.2
Resistance ²⁾	R_{25}	Ω	3.9	6.5
Inductance ²⁾	L_{25}	mH	14	26
Motor constant	K_m	Nm/ \sqrt{W}	1.0	1.6
Electrical time constant	K_e	ms	3.6	4.0
Torque constant	K_t	Nm/A	2.50	5.0
Back emf constant	K_u	$V_{eff}/(\text{rad/s})$	1.2	2.4
Inertia of rotor	J	kgm ²	0.00088	0.00175
Thermal resistance	R_{th}	°C/W	0.80	0.48
Thermal time constant	T_{th}	s	2,290	2,520
Max. DC bus voltage	U_{max}	VDC	600	
Rated speed	n_N	min ⁻¹	818	818
Mechanical parameters				
Number of poles	$2p$		22	
Thermal sensor			PTC SNM 120	
Stator height	H_S	mm	70	110
Rotor height	H_R	mm	40	80
Mass of motor	M_m	kg	4.8	8.3

All the specifications in the table (except dimensions) are in $\pm 10\%$ of tolerance at 25 °C ambient temperature

¹⁾ Coil temperature: 120 °C

²⁾ Line to line

Dimensions DMR1



Torque Motors

HIWIN torque motors DMR

3.4.3 DMR3 specifications

Torque-speed curves (DC bus voltage: 600 VDC)

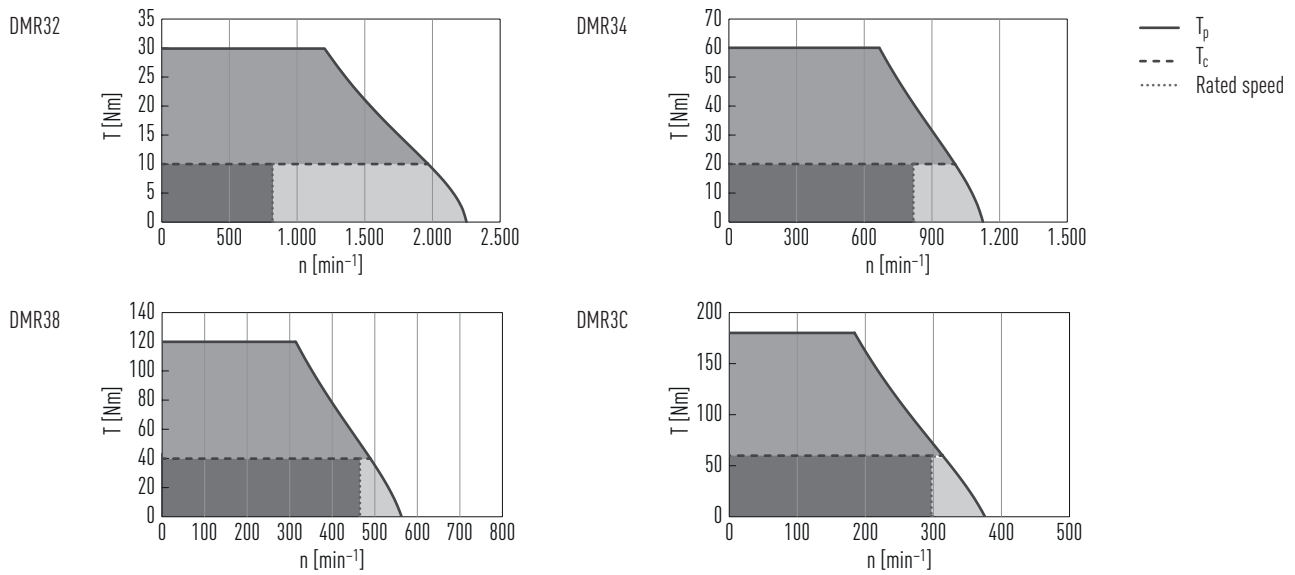


Table 3.3 Technical data for DMR3

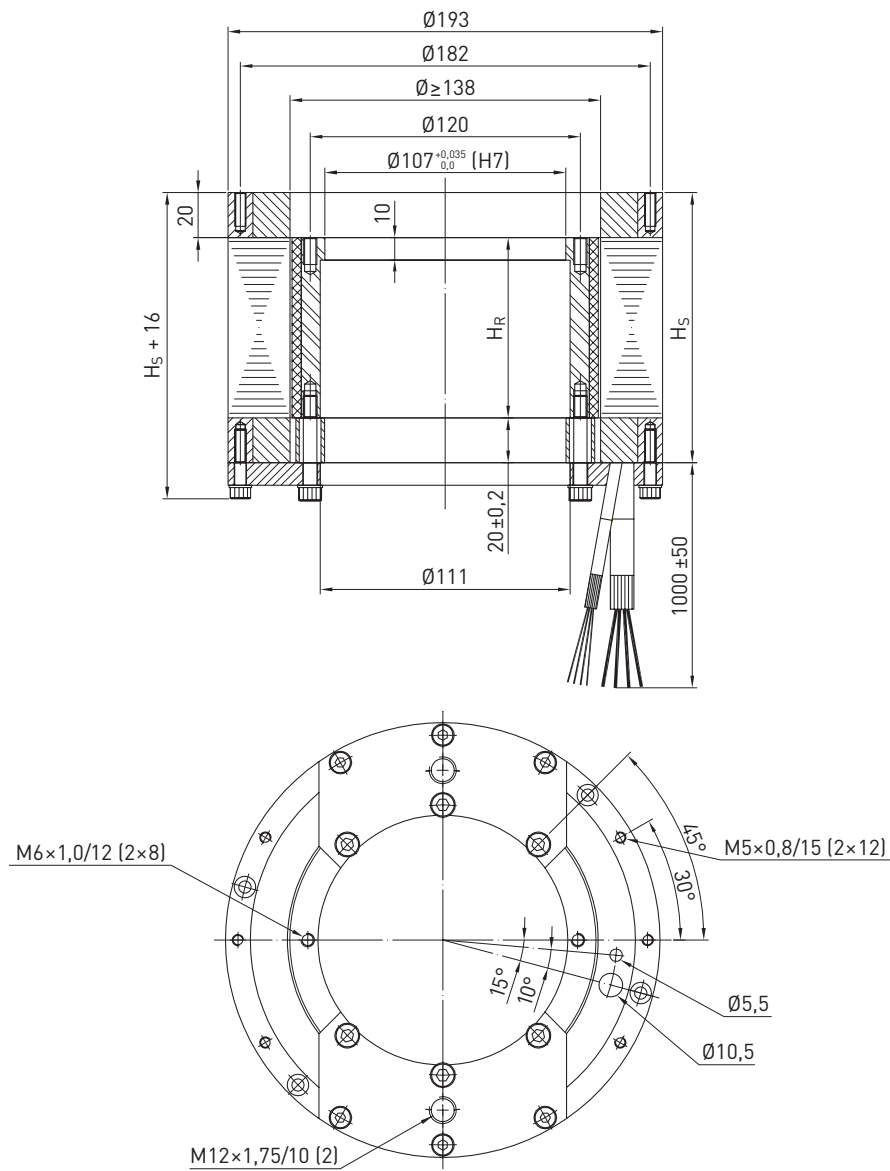
	Symbol	Unit	DMR32	DMR34	DMR38	DMR3C
Torques and electrical parameters						
Peak torque (for 1 sec.)	T _p	Nm	30	60	120	180
Continuous torque ¹⁾	T _c	Nm	10	20	40	60
Stall torque	T _s	Nm	7	14	28	42
Peak current (for 1 sec.)	I _p	A	10.2	10.2	10.2	10.2
Continuous current ¹⁾	I _c	A	3.4	3.4	3.4	3.4
Stall current	I _s	A	2.4	2.4	2.4	2.4
Resistance ²⁾	R ₂₅	Ω	5.0	7.5	12.0	17.1
Inductance ²⁾	L ₂₅	mH	20.6	34.6	53.6	84.4
Motor constant	K _m	Nm/√W	1.1	1.8	2.8	3.6
Electrical time constant	K _e	ms	4.1	4.6	4.5	4.9
Torque constant	K _t	Nm/A	3	6	12	18
Back emf constant	K _u	V _{eff} /rad/s	1.5	3.0	6.0	9.0
Inertia of rotor	J	kgm ²	0.002	0.005	0.009	0.014
Thermal resistance	R _{th}	°C/W	1.1	0.73	0.46	0.32
Thermal time constant	T _{th}	s	1,980	2,020	2,130	2,170
Max. DC bus voltage	U _{max}	VDC	600			
Rated speed	n _N	min ⁻¹	818	818	465	297
Mechanical parameters						
Number of poles	2p		22			
Thermal sensor			PTC SNM 120			
Stator height	H _S	mm	60	80	120	160
Rotor height	H _R	mm	20	40	80	120
Mass of motor	M _m	kg	5.7	8.2	13.2	18.1

All the specifications in the table (except dimensions) are in ± 10 % of tolerance at 25 °C ambient temperature

¹⁾ Coil temperature: 120 °C

²⁾ Line to line

Dimensions DMR3



Torque Motors

HIWIN torque motors DMR

3.4.4 DMR7 specifications

Torque-speed curves (DC bus voltage: 600 VDC)

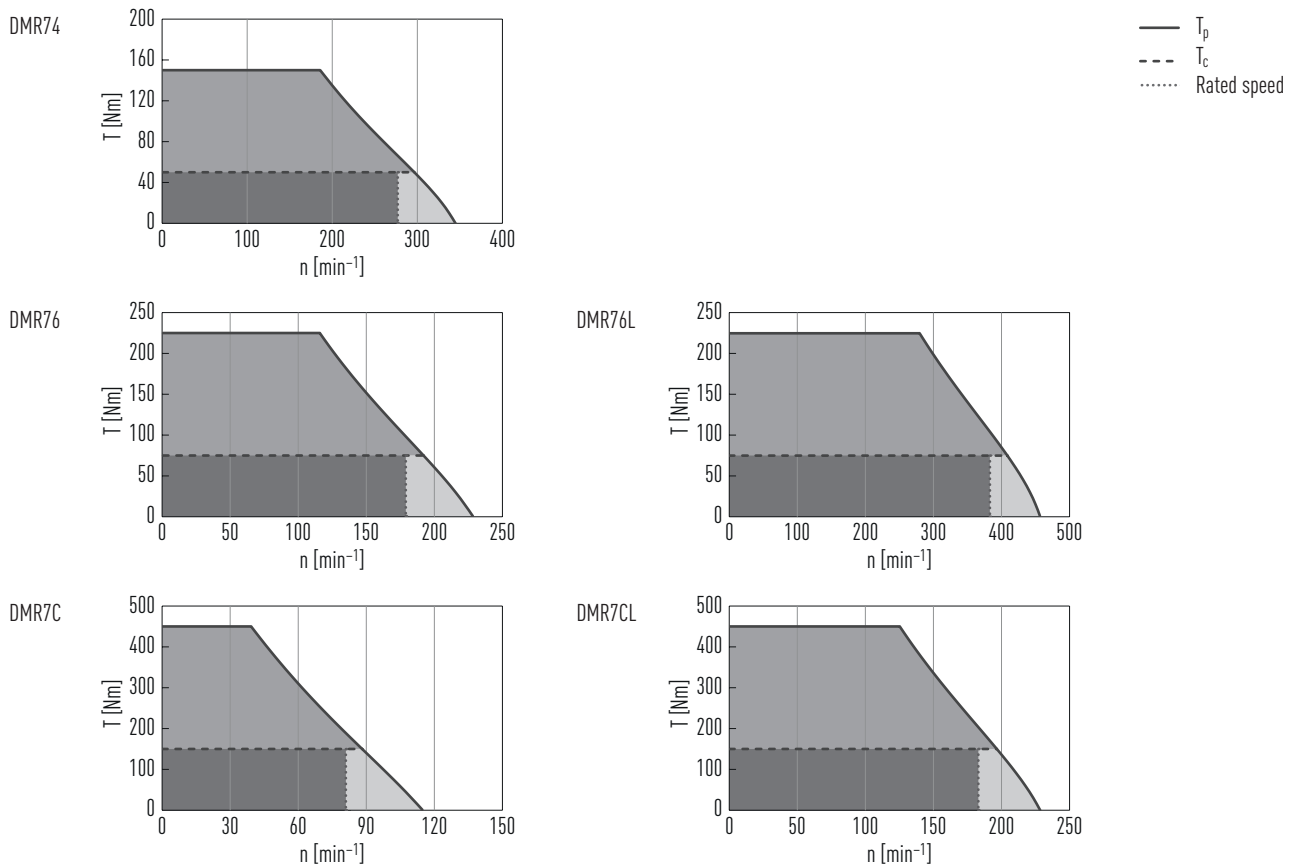


Table 3.4 Technical data for DMR7

	Symbol	Unit	DMR74	DMR76	DMR76L	DMR7C	DMR7CL
Torques and electrical parameters							
Peak torque (for 1 sec.)	T_p	Nm	150	225		450	
Continuous torque ¹⁾	T_c	Nm	50	75		150	
Stall torque	T_s	Nm	35.0	52.5		105.0	
Peak current (for 1 sec.)	I_p	A	10.2	10.2	20.4	10.2	20.4
Continuous current ¹⁾	I_c	A	3.4	3.4	6.8	3.4	6.8
Stall current	I_s	A	2.4	2.4	4.8	2.4	4.8
Resistance ²⁾	R_{25}	Ω	12.9	17.0	4.3	29.0	7.3
Inductance ²⁾	L_{25}	mH	55.0	76.0	19.0	145.0	36.3
Motor constant	K_m	Nm/ \sqrt{W}	3.9	5.1	5.0	7.7	7.7
Electrical time constant	K_e	ms	4.3	4.5	4.4	5.0	5.0
Torque constant	K_t	Nm/A	17.0	25.6	12.8	51.1	25.5
Back emf constant	K_u	$V_{eff}/(rad/s)$	9.8	14.8	7.4	29.5	14.8
Inertia of rotor	J	kgm ²	0.044	0.061		0.11	
Thermal resistance	R_{th}	$^{\circ}C/W$	0.42	0.32		0.19	
Thermal time constant	T_{th}	s	2,230	2,330		2,350	
Max. DC bus voltage	U_{max}	VDC	600				
Rated speed	n_N	min ⁻¹	277	179	383	81	183

All the specifications in the table (except dimensions) are in $\pm 10\%$ of tolerance at 25 $^{\circ}C$ ambient temperature

¹⁾ Coil temperature: 120 $^{\circ}C$

²⁾ Line to line

Table 3.4 **Technical data for DMR7**

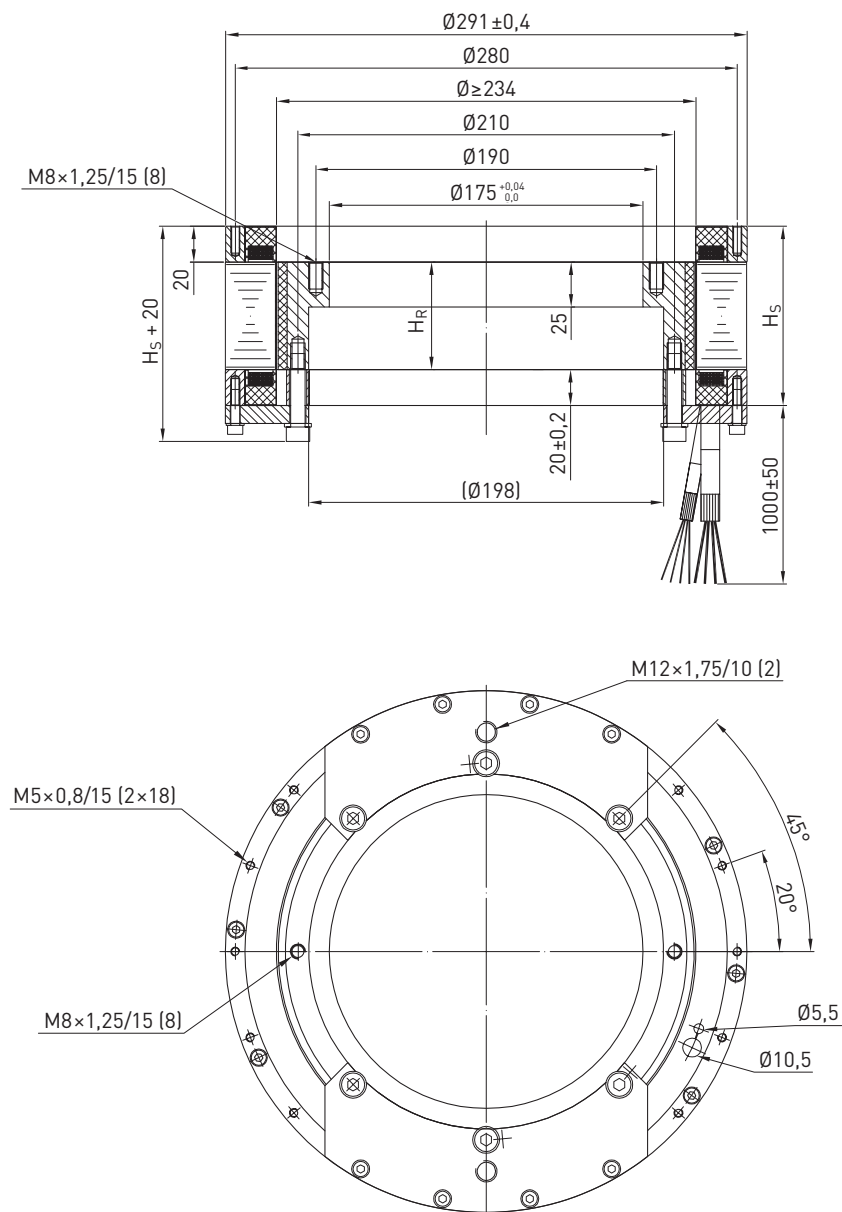
	Symbol	Unit	DMR74	DMR76	DMR76L	DMR7C	DMR7CL
Mechanical parameters							
Number of poles	2p		44				
Thermal sensor			PTC SNM 120				
Stator height	H _S	mm	80	100		160	
Rotor height	H _R	mm	40	60		120	
Mass of motor	M _m	kg	15.9	20.4		33.7	

All the specifications in the table (except dimensions) are in $\pm 10\%$ of tolerance at 25 °C ambient temperature

¹⁾ Coil temperature: 120 °C

2) Line to line

Dimensions DMR7



HIWIN torque motors TM-5

4.1 Special characteristics of the torque motors TM-5

- Optimised for highest torques
- Wear- and maintenance-free direct drive
- Play-free and highly precise
- Prepared for liquid cooling
- UL-certified

- Machine tools
- Servo presses
- Laser processing

Series: TM-5

Outer diameter [mm]:

- 1: 160
- 2: 198
- 4: 230
- 7: 310
- A: 385
- D: 485
- G: 565

Rotor height [mm]:

- 3: 30
- 5: 50
- 7: 70
- A: 100
- F: 150

Winding variant

Special equipment:

- 00: Rotor and stator separately (standard)
- 03: Rotor and stator mounted with installation clamp

Cable outlet orientation:

- S: Straight, potted in the stator
- V: Straight, with strain relief plate
- A: Straight, with PG screw connections
- H: 90° motor cable outlet with strain relief plate

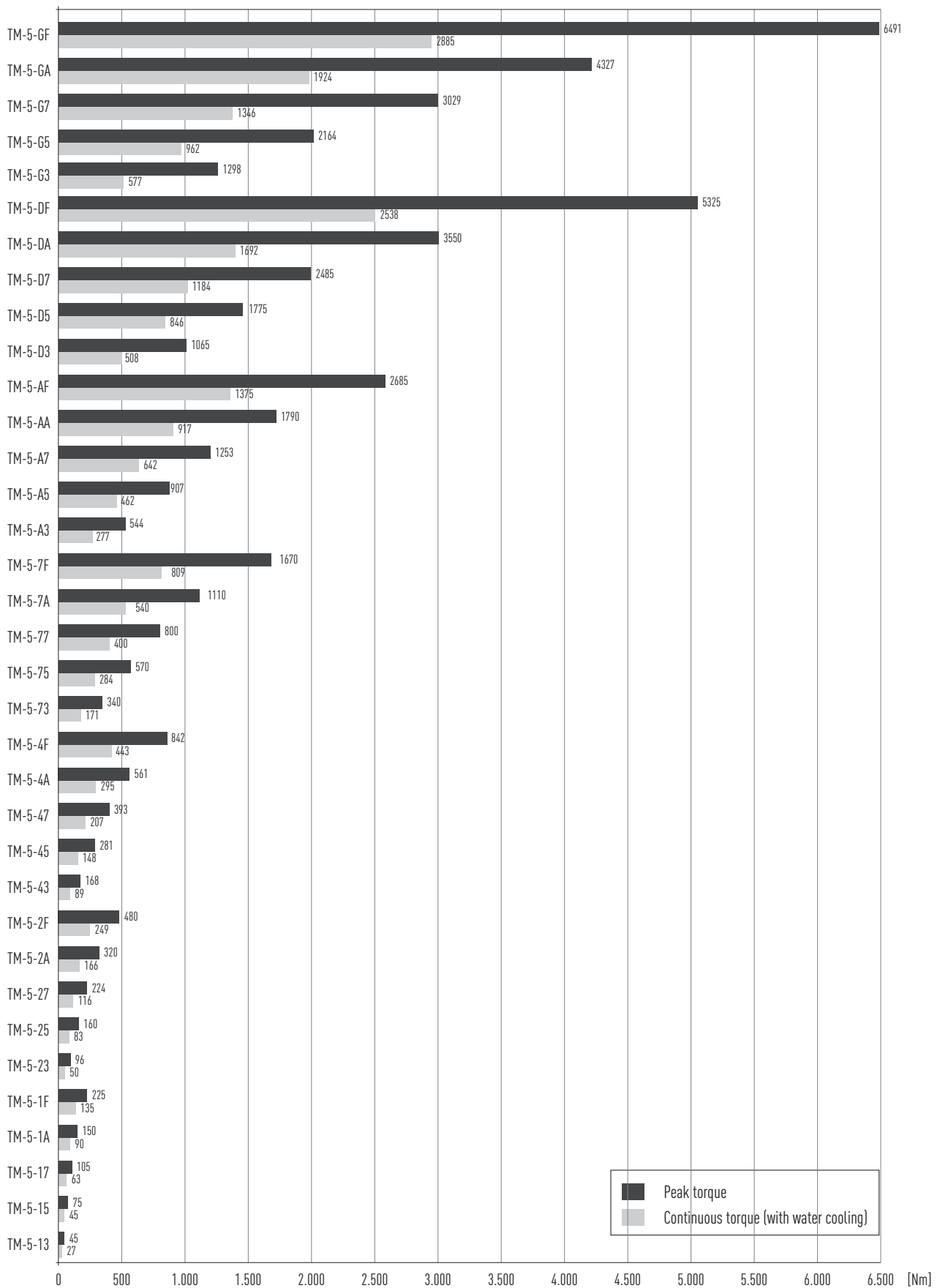
Cable length:

- 05: 500
- 10: 1,000
- 20: 2,000 (standard)

Thermal sensors:

- 0: 3 × PTC100, 3 × PTC130, 1 × PT1000 (standard)
- 1: 3 × PTC100, 3 × PTC130, 3 × PT1000

4.3 TM-5 torques



Torque Motors

HIWIN torque motors TM-5

4.4 Torque motor TM-5 specifications

4.4.1 TM-5-1 specifications

Torque-speed curves (DC bus voltage: 600 VDC)

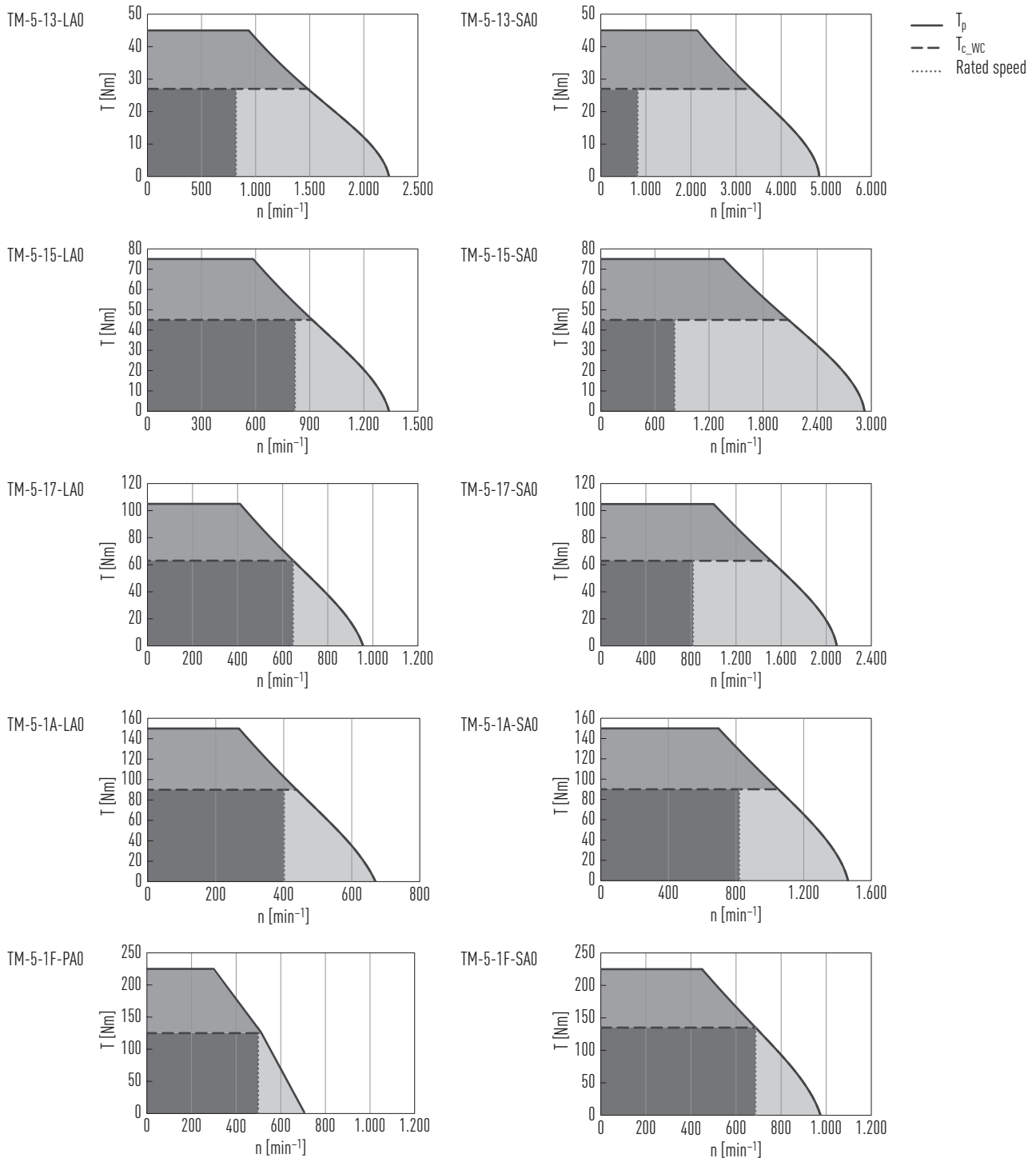


Table 4.1 Technical data for TM-5-1

	Symbol	Unit	TM-5-13-LA0	TM-5-13-SA0	TM-5-15-LA0	TM-5-15-SA0	TM-5-17-LA0	TM-5-17-SA0	TM-5-1A-LA0	TM-5-1A-SA0	TM-5-1F-PA0	TM-5-1F-SA0
Torques and electrical parameters												
Peak torque (for 1 sec.)	T_p	Nm	45		75		105		150		202	225
Continuous torque (WC)	T_{c_WC}	Nm	27		45		63		90		121	135
Stall torque (WC)	T_{s_WC}	Nm	22		37		52		74		100	111
Peak current (for 1 sec.)	I_p	A	20	43.4	20	43.4	20	43.4	20	43.4	32.1	43.4
Continuous current (WC)	I_{c_WC}	A	10.3	22.3	10.3	22.3	10.3	22.3	10.3	22.3	16.5	22.3
Stall current (WC)	I_{s_WC}	A	8.2	17.8	8.2	17.8	8.2	17.8	8.2	17.8	13.2	17.8
Resistance ¹⁾	R_{25}	Ω	3.5	0.7	5.3	1.1	6.8	1.4	9.2	2	5.2	2.8
Inductance ¹⁾	L_{25}	mH	18.1	3.8	24.6	5.7	35.3	7.5	48.2	10.3	25.6	14.8
Motor constant	K_m	Nm/ \sqrt{W}	1.25	1.26	1.69	1.68	2.09	2.09	2.57	2.49	2.86	3.16
Electrical time constant	K_e	ms	4.9	5.1	4.4	4.9	4.9	5.1	4.9	4.9	4.9	5
Torque constant	K_t	Nm/A	2.86	1.32	4.76	2.18	6.67	3.05	9.53	4.36	7.97	6.55
Back emf constant	K_u	$V_{eff}/(rad/s)$	1.65	0.76	2.75	1.26	3.85	1.76	5.5	2.52	4.6	3.78
Inertia of rotor	J	kgm ²	0.001		0.0016		0.0023		0.0033		0.0049	
Thermal resistance (WC)	R_{th_WC}	°C/W	0.189	0.201	0.124	0.128	0.097	0.101	0.072	0.07	0.049	0.05
Max. DC bus voltage	U_{max}	VDC	750									
Max. speed at T_{c_WC}	n	min ⁻¹	1,482	3,338	940	2,080	646	1,510	437	1,049	519	686
Max. speed at T_p	n	min ⁻¹	935	2,138	614	1,362	410	1,001	268	695	317	448
Rated speed	n_N	min ⁻¹	818	818	818	818	646	818	437	818	519	686
Mechanical parameters												
Number of poles	2p		22									
Thermal sensors			PTC SNM 100; PTC SNM 130; PT1000									
Stator height	H_S	mm	70		90		110		140		190	
Rotor height	H_R	mm	31		51		71		101		151	
Length of rotor centring fit	H	mm	10		15		15		15		15	
Rotor mass	M_r	kg	0.7		1.2		1.6		2.3		3.5	
Stator mass	M_s	kg	5.6		7.2		9		11.3		15.8	

 All the specifications in the table (except dimensions) are in $\pm 10\%$ of tolerance at 25 °C ambient temperature

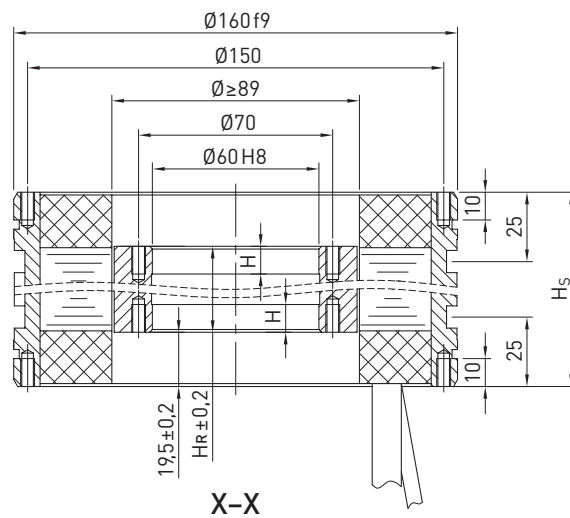
WC: with water cooling

¹⁾ Line to line

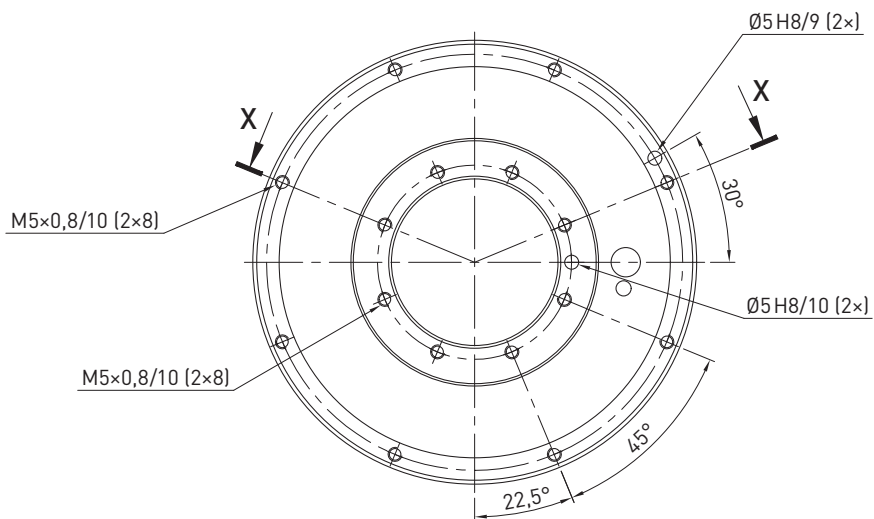
Torque Motors

HIWIN torque motors TM-5

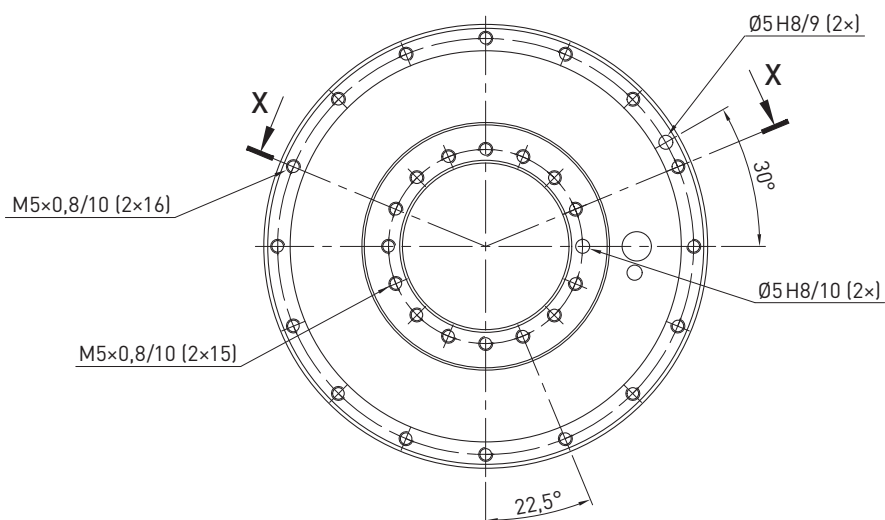
Dimensions TM-5-1



TM-5-13, TM-5-15, TM-5-17

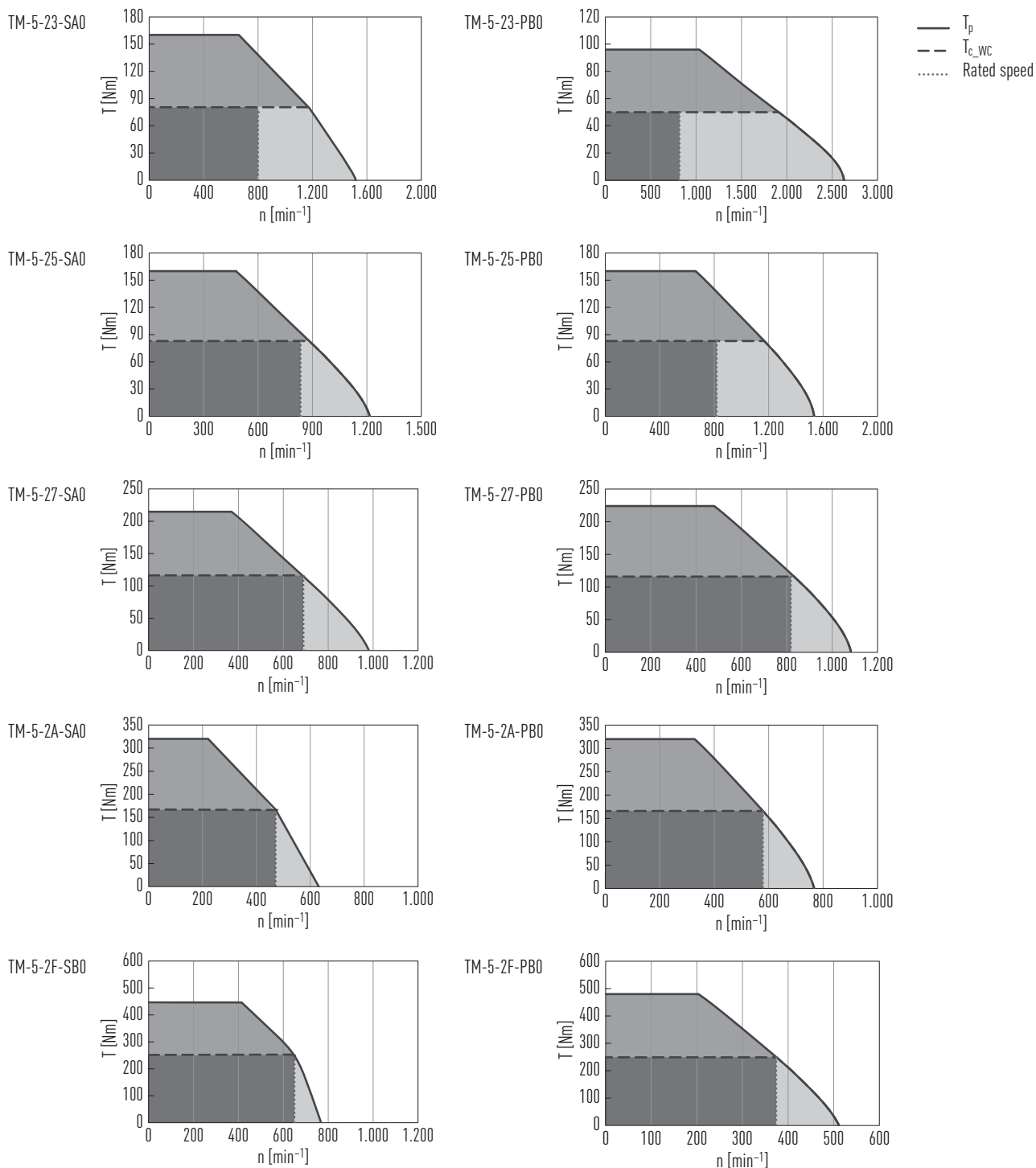


TM-5-1A, TM-5-1F



4.4.2 TM-5-2 specifications

Torque-speed curves (DC bus voltage: 600 VDC)



Torque Motors

HIWIN torque motors TM-5

Table 4.2 Technical data for TM-5-2

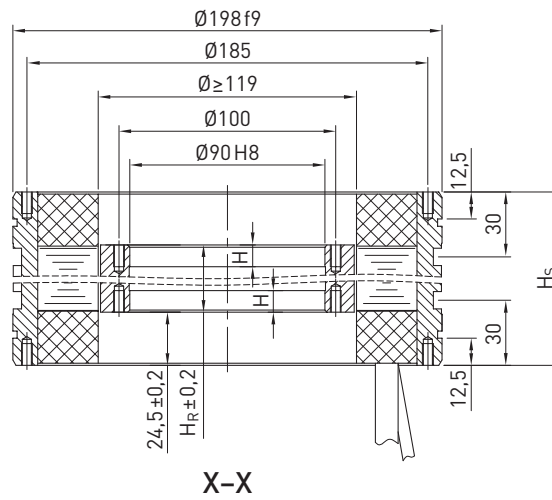
	Symbol	Unit	TM-5-23-SA0	TM-5-23-PB0	TM-5-25-SA0	TM-5-25-PB0	TM-5-27-SA0	TM-5-27-PB0	TM-5-2A-SA0	TM-5-2A-PB0	TM-5-2F-PB0	TM-5-2F-SB0
Torques and electrical parameters												
Peak torque (for 1 sec.)	T_p	Nm	91	96	152	160	213	224	304	320	480	455
Continuous torque (WC)	T_{c_WC}	Nm	47	50	79	83	110	116	157	166	249	236
Stall torque (WC)	T_{s_WC}	Nm	38	41	64	68	90	95	128	135	203	193
Peak current (for 1 sec.)	I_p	A	40.2	51	40.2	51	40.2	51	40.2	51	51	80.4
Continuous current (WC)	I_{c_WC}	A	16.1	20.4	16.1	20.4	16.1	20.4	16.1	20.4	20.4	32.2
Stall current (WC)	I_{s_WC}	A	12.9	16.3	12.9	16.3	12.9	16.3	12.9	16.3	16.3	25.8
Resistance ¹⁾	R_{25}	Ω	1.5	0.9	2.2	1.3	2.8	1.7	3.8	2.4	3.4	1.4
Inductance ¹⁾	L_{25}	mH	10.3	6.1	15.2	8.9	20	11.8	27.4	16.2	23.4	9.9
Motor constant	K_m	Nm/ \sqrt{W}	1.97	2.14	2.71	2.98	3.44	3.65	4.19	4.38	5.52	5.15
Electrical time constant	K_e	ms	6.9	7.1	6.9	7.2	7.1	7.3	7.2	7.1	7.2	7.1
Torque constant	K_t	Nm/A	2.94	2.42	4.85	4.16	6.93	5.89	10.05	8.31	12.47	7.62
Back emf constant	K_u	$V_{eff}/(rad/s)$	1.7	1.4	2.8	2.4	4	3.4	5.8	4.8	7.2	4.4
Inertia of rotor	J	kgm ²	0.0028		0.0047		0.0065		0.0092		0.0139	
Thermal resistance (WC)	R_{th_WC}	°C/W	0.18	0.187	0.123	0.129	0.096	0.099	0.071	0.07	0.049	0.048
Max. DC bus voltage	U_{max}	VDC	750									
Max. speed at T_{c_WC}	n	min ⁻¹	1,528	1,911	953	1,167	676	832	460	579	374	635
Max. speed at T_p	n	min ⁻¹	810	1,034	517	663	371	479	249	328	203	363
Rated speed	n_N	min ⁻¹	818	818	818	818	676	818	460	579	374	635
Mechanical parameters												
Number of poles	2p		22									
Thermal sensors			PTC SNM 100; PTC SNM 130; PT1000									
Stator height	H_S	mm	80		100		120		150		200	
Rotor height	H_R	mm	31		51		71		101		151	
Length of rotor centring fit	H	mm	10		15		15		15		15	
Rotor mass	M_r	kg	1		1.7		2.3		3.3		5	
Stator mass	M_s	kg	8.6		10.9		13.4		16.7		23.2	

All the specifications in the table (except dimensions) are in $\pm 10\%$ of tolerance at 25 °C ambient temperature

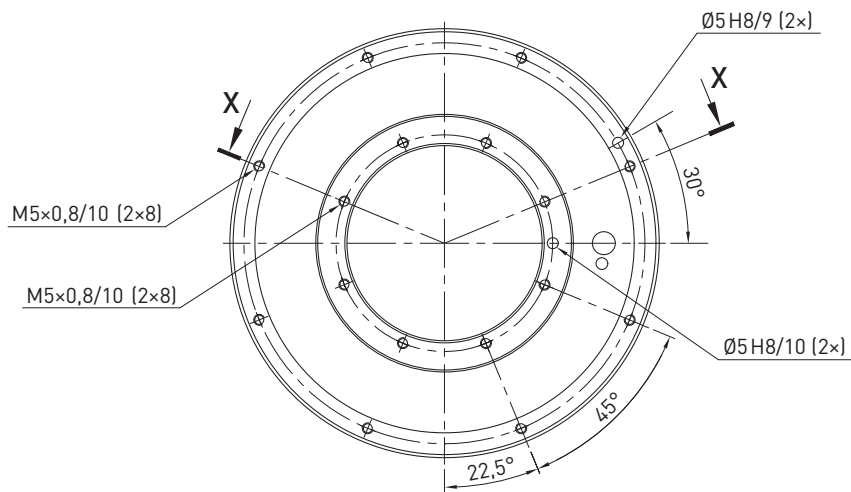
WC: with water cooling

¹⁾ Line to line

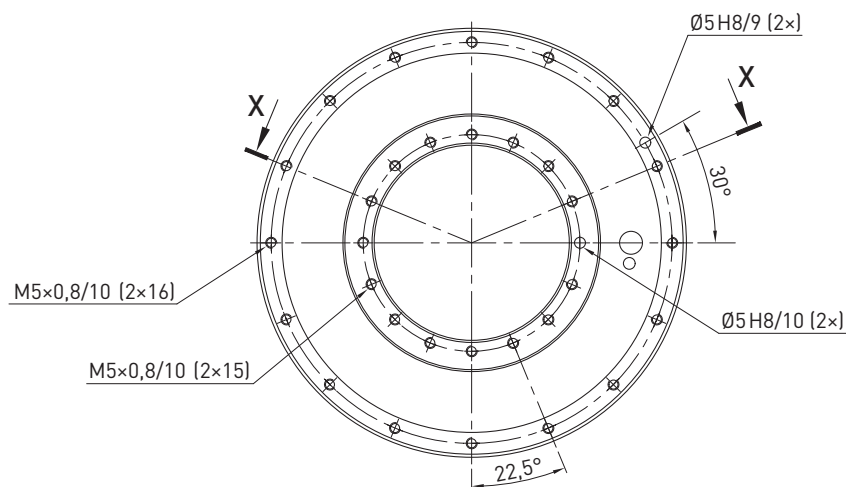
Dimensions TM-5-2



TM-5-23, TM-5-25, TM-5-27



TM-5-2A, TM-5-2F



Torque Motors

HIWIN torque motors TM-5

4.4.3 TM-5-4 specifications

Torque-speed curves (DC bus voltage: 600 VDC)

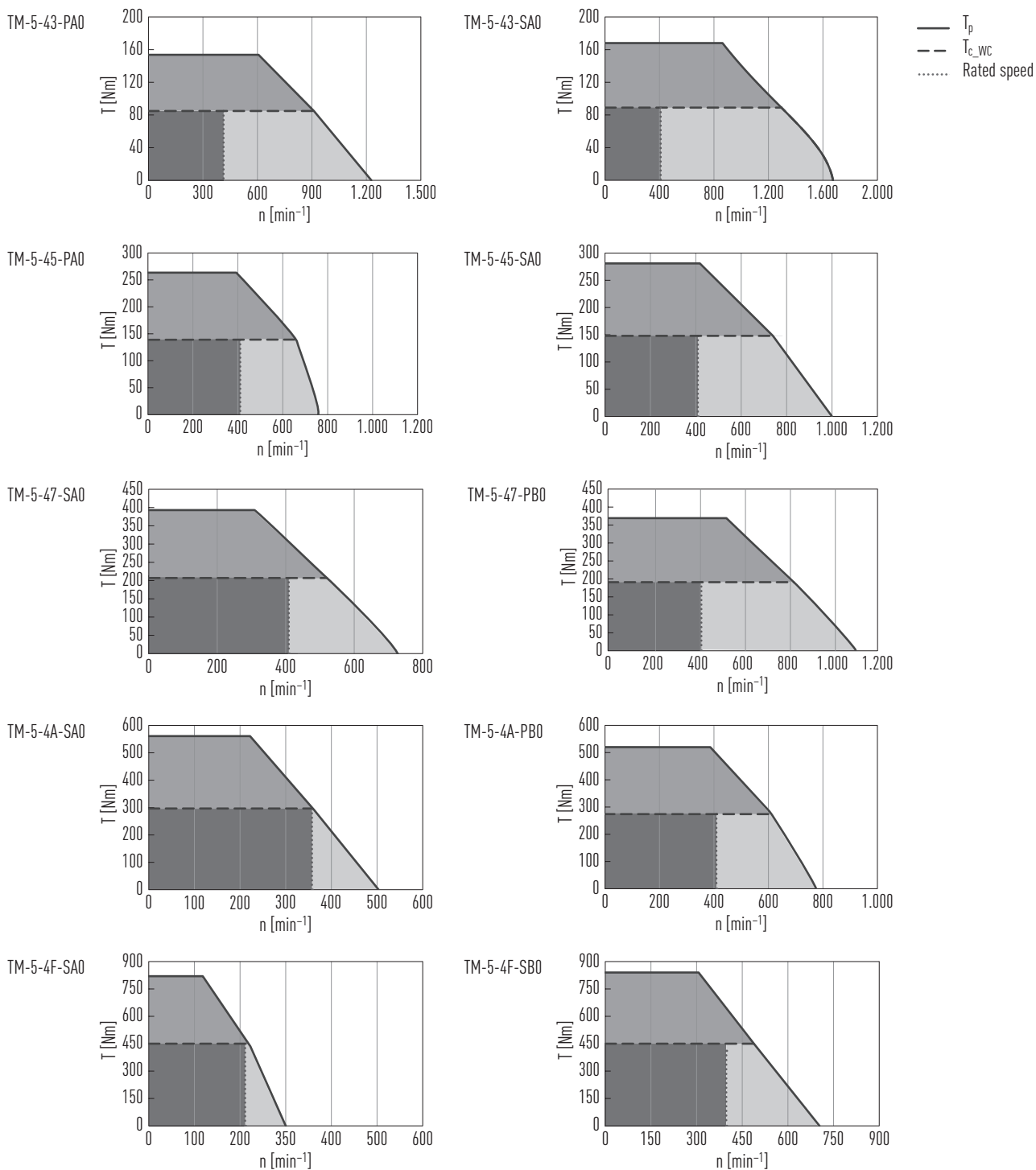


Table 4.3 Technical data for TM-5-4

	Symbol	Unit	TM-5-43-PA0	TM-5-43-SA0	TM-5-45-PA0	TM-5-45-SA0	TM-5-47-SA0	TM-5-47-PB0	TM-5-4A-SA0	TM-5-4A-PB0	TM-5-4F-SA0	TM-5-4F-SB0
Torques and electrical parameters												
Peak torque (for 1 sec.)	T_p	Nm	156	168	260	281	393	364	561	520	842	842
Continuous torque (WC)	T_{c_WC}	Nm	82	89	137	148	207	192	295	274	443	443
Stall torque (WC)	T_{s_WC}	Nm	67	72	111	120	168	156	239	222	360	360
Peak current (for 1 sec.)	I_p	A	37.5	52	37.5	52	52	75	52	75	52	104
Continuous current (WC)	I_{c_WC}	A	18	24.9	18	24.9	24.9	36	24.9	36	24.9	49.8
Stall current (WC)	I_{s_WC}	A	14.4	19.9	14.4	19.9	19.9	28.8	19.9	28.8	19.9	39.8
Resistance ¹⁾	R_{25}	Ω	2.2	1.2	3.3	1.72	2.3	1.1	3.1	1.5	4.5	1.13
Inductance ¹⁾	L_{25}	mH	7.03	4.44	10.42	6.55	8.65	3.45	11.8	4.72	17.05	4.26
Motor constant	K_m	Nm/ \sqrt{W}	2.6	2.84	3.51	3.93	4.6	4.32	5.74	5.27	7.14	7.13
Electrical time constant	K_e	ms	3.2	3.7	3.2	3.8	3.8	3.1	3.8	3.1	3.8	3.8
Torque constant	K_t	Nm/A	4.85	3.81	7.97	6.41	8.66	5.58	12.47	7.97	18.71	9.35
Back emf constant	K_u	$V_{eff}/(rad/s)$	2.8	2.2	4.6	3.7	5	3.22	7.2	4.6	10.8	5.4
Inertia of rotor	J	kgm ²	0.0085		0.014		0.022		0.029		0.045	
Thermal resistance (WC)	R_{th_WC}	°C/W	0.098	0.094	0.065	0.066	0.049	0.049	0.036	0.036	0.025	0.025
Max. DC bus voltage	U_{max}	VDC	750									
Max. speed at T_{c_WC}	n	min ⁻¹	934	1,154	570	710	516	860	351	594	220	494
Max. speed at T_p	n	min ⁻¹	581	701	355	442	317	561	211	384	120	312
Rated speed	n_N	min ⁻¹	409	409	409	409	409	409	351	409	220	409
Mechanical parameters												
Number of poles	2p		44									
Thermal sensors			PTC SNM 100; PTC SNM 130; PT1000									
Stator height	H_S	mm	70		90		110		140		190	
Rotor height	H_R	mm	31		51		71		101		151	
Length of rotor centring fit	H	mm	10		15		15		15		15	
Rotor mass	M_r	kg	1.5		2.6		3.5		5.0		7.6	
Stator mass	M_s	kg	6.5		9.0		11.2		15.0		22.2	

 All the specifications in the table (except dimensions) are in $\pm 10\%$ of tolerance at 25 °C ambient temperature

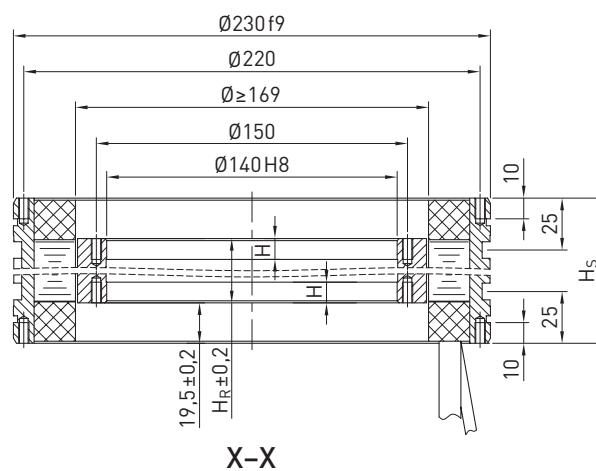
WC: with water cooling

¹⁾ Line to line

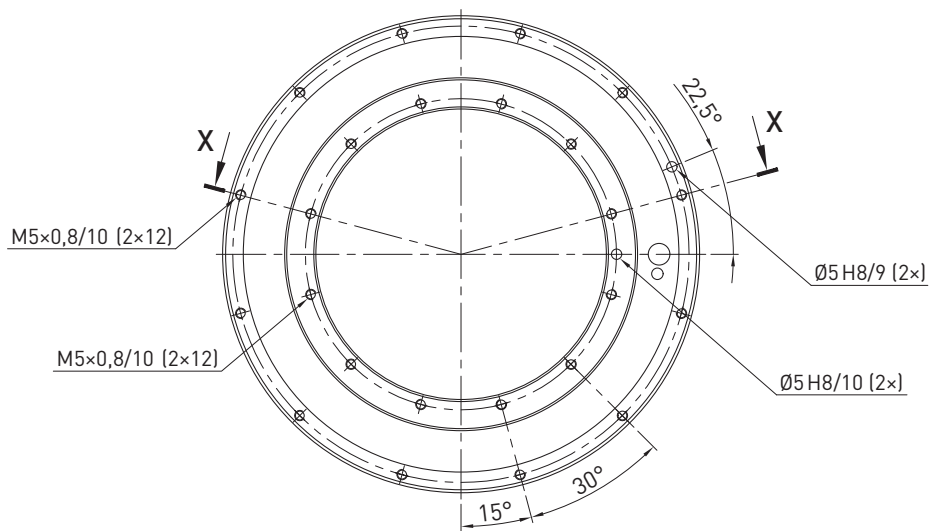
Torque Motors

HIWIN torque motors TM-5

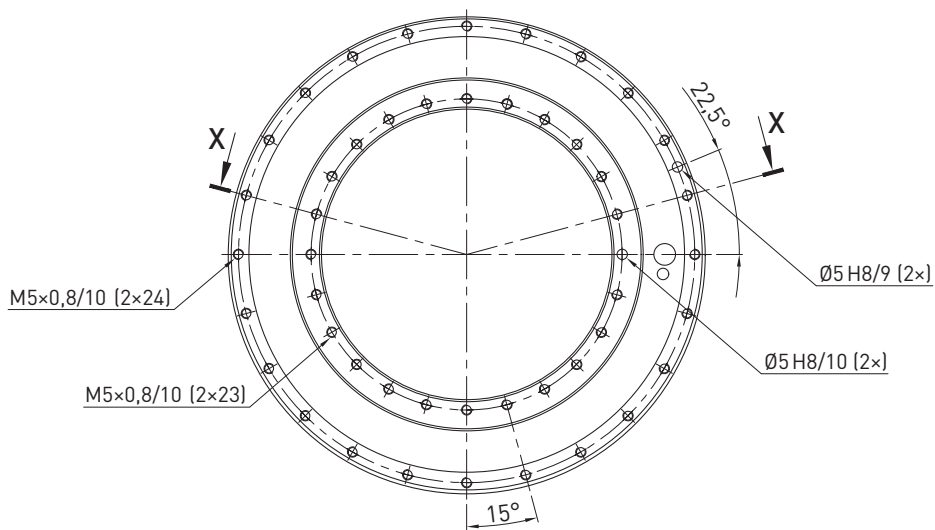
Dimensions TM-5-4



TM-5-43, TM-5-45, TM-5-47

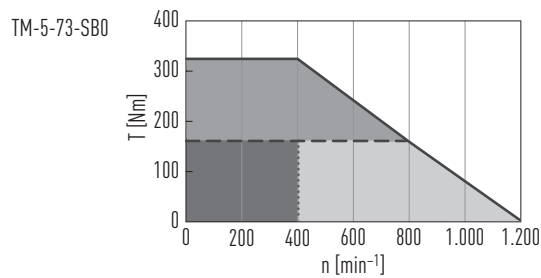
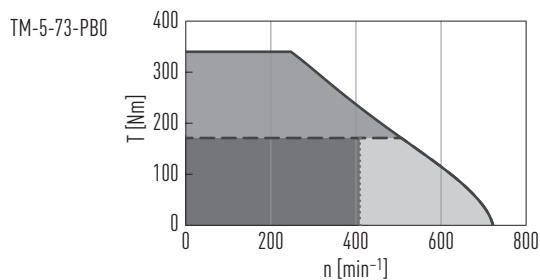


TM-5-4A, TM-5-4F

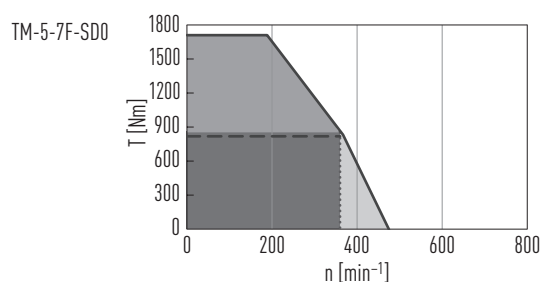
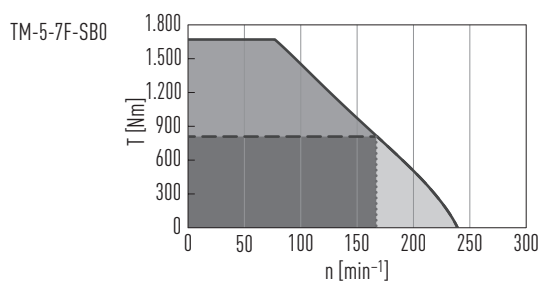
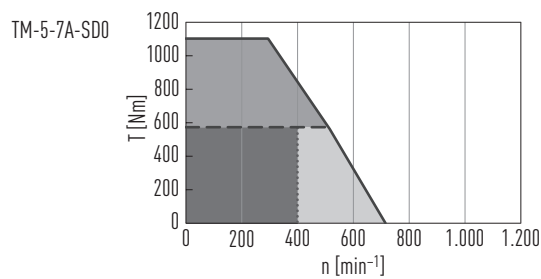
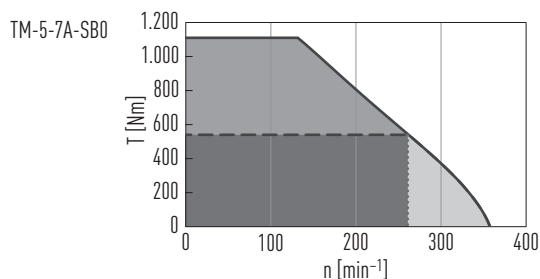
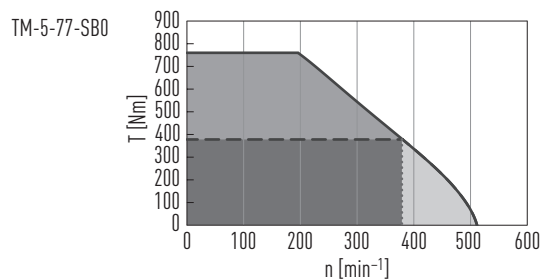
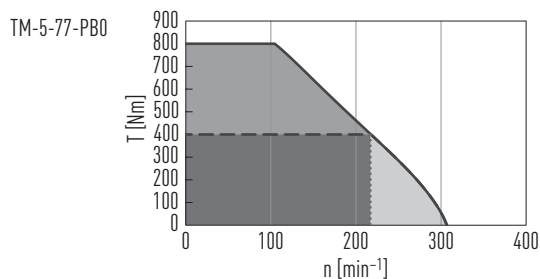
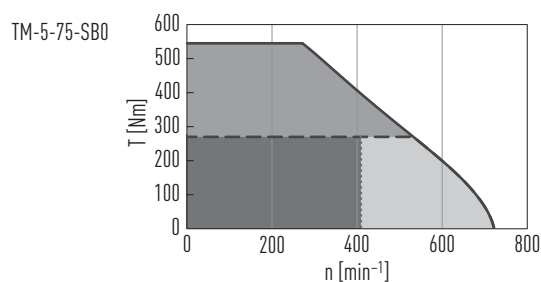
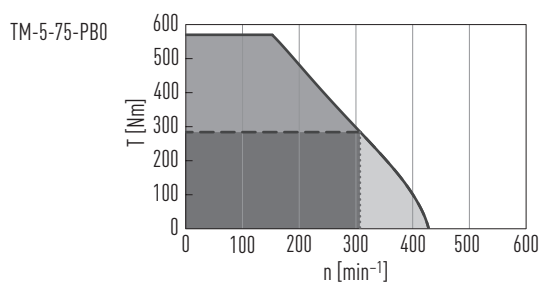


4.4.4 TM-5-7 specifications

Torque-speed curves (DC bus voltage: 600 VDC)



— T_p
 --- T_{c_wc}
 Rated speed



Torque Motors

HIWIN torque motors TM-5

Table 4.4 Technical data for TM-5-7

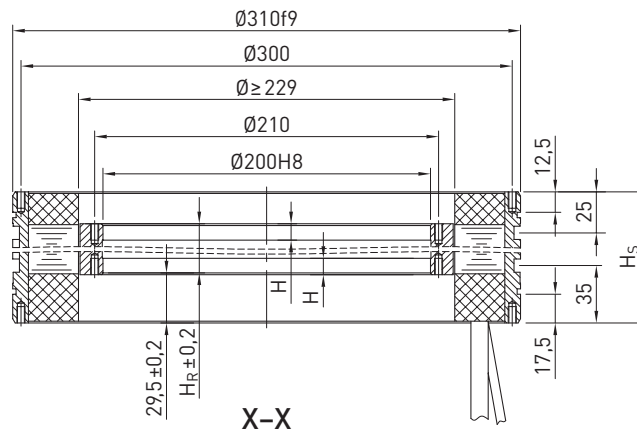
	Symbol	Unit	TM-5-73-PB0	TM-5-73-SB0	TM-5-75-PB0	TM-5-75-SB0	TM-5-77-PB0	TM-5-77-SB0	TM-5-7A-SB0	TM-5-7A-SD0	TM-5-7F-SB0	TM-5-7F-SD0
Torques and electrical parameters												
Peak torque (for 1 sec.)	T_p	Nm	340	325	570	545	800	760	1110	1110	1670	1670
Continuous torque (WC)	T_{c_WC}	Nm	171	162	284	270	400	378	540	540	809	809
Stall torque (WC)	T_{s_WC}	Nm	141	133	233	222	329	310	442	443	663	664
Peak current (for 1 sec.)	I_p	A	56	88.3	56	88.3	56	88.3	88.3	176.6	88.3	176.6
Continuous current (WC)	I_{c_WC}	A	20.5	32.3	20.5	32.3	20.5	32.3	32.3	64.6	32.3	64.6
Stall current (WC)	I_{s_WC}	A	16.4	25.8	16.4	25.8	16.4	25.8	25.8	51.7	25.8	51.7
Resistance ¹⁾	R_{25}	Ω	1.7	0.7	2.5	1	3.3	1.3	1.8	0.45	2.6	0.7
Inductance ¹⁾	L_{25}	mH	11.8	4.5	17.4	6.7	23	8.8	12	3	17.4	4.4
Motor constant	K_m	Nm/ \sqrt{W}	5.58	5.18	7.63	7.26	9.33	8.89	10.79	10.79	13.48	12.99
Electrical time constant	K_e	ms	6.9	6.4	7	6.7	7	6.8	6.7	6.7	6.7	6.3
Torque constant	K_t	Nm/A	8.83	5.37	14.9	8.83	20.78	12.47	17.84	8.92	26.67	13.34
Back emf constant	K_u	$V_{eff}/(rad/s)$	5.1	3.1	8.6	5.1	12	7.2	10.3	5.15	15.4	7.7
Inertia of rotor	J	kgm ²	0.025		0.041		0.057		0.081		0.121	
Thermal resistance (WC)	R_{th_WC}	°C/W	0.089	0.087	0.06	0.061	0.046	0.047	0.034	0.034	0.023	0.022
Max. DC bus voltage	U_{max}	VDC	750									
Max. speed at T_{c_WC}	n	min ⁻¹	506	855	307	532	217	380	261	552	167	361
Max. speed at T_p	n	min ⁻¹	246	425	152	271	104	195	131	297	77	189
Rated speed	n_N	min ⁻¹	409	409	307	409	217	380	261	409	167	361
Mechanical parameters												
Number of poles	2p		44									
Thermal sensors			PTC SNM 100; PTC SNM 130; PT1000									
Stator height	H_S	mm	80		100		120		150		200	
Rotor height	H_R	mm	31		51		71		101		151	
Length of rotor centring fit	H	mm	10		15		15		15		15	
Rotor mass	M_r	kg	2.2		3.6		5.0		7.1		11.6	
Stator mass	M_s	kg	13.6		17.9		22.3		28.9		40.6	

All the specifications in the table (except dimensions) are in $\pm 10\%$ of tolerance at 25 °C ambient temperature

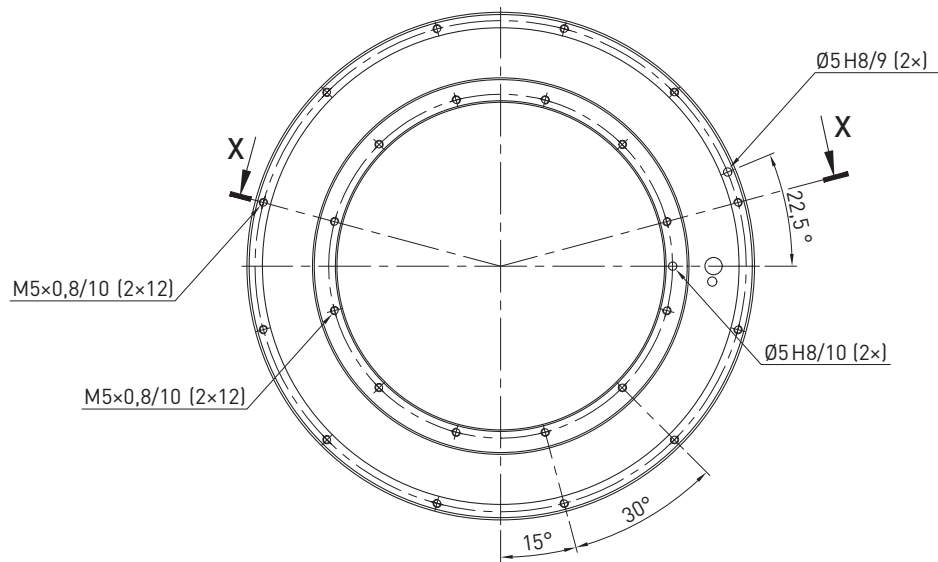
WC: with water cooling

¹⁾ Line to line

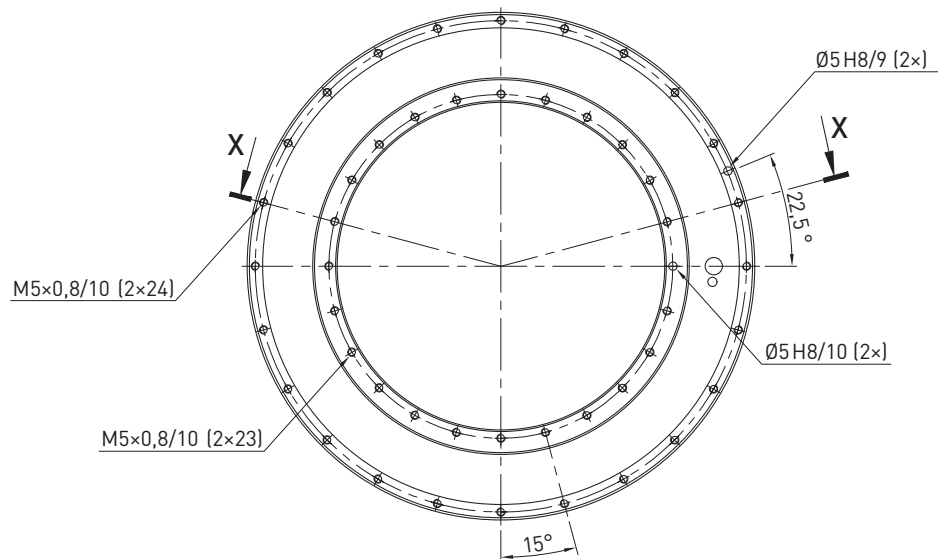
Dimensions TM-5-7



TM-5-73, TM-5-75, TM-5-77



TM-5-7A, TM-5-7F



Torque Motors

HIWIN torque motors TM-5

4.4.5 TM-5-A specifications

Torque-speed curves (DC bus voltage: 600 VDC)

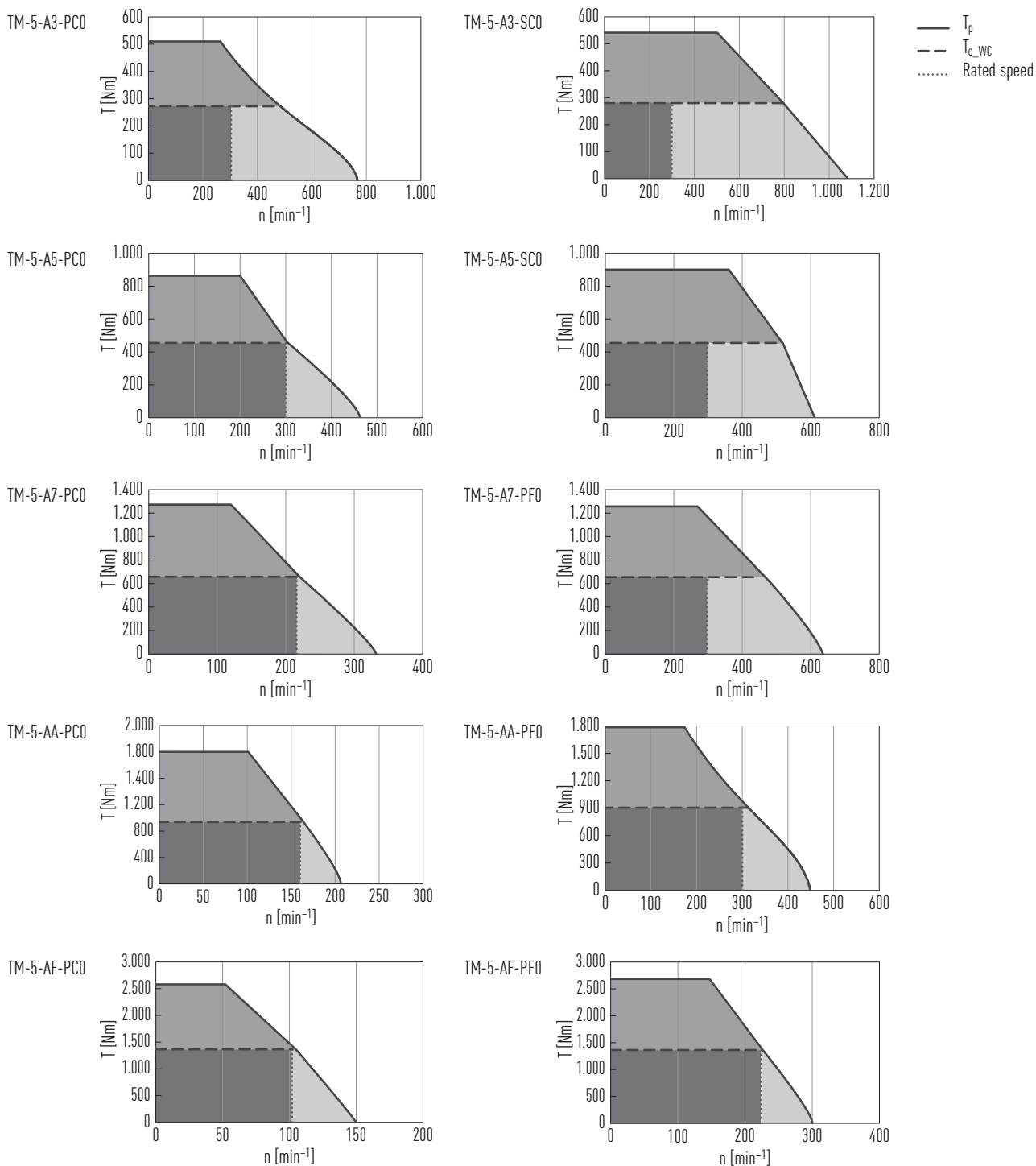


Table 4.5 Technical data for TM-5-A

	Symbol	Unit	TM-5-A3-PC0	TM-5-A3-SC0	TM-5-A5-PC0	TM-5-A5-SC0	TM-5-A7-PC0	TM-5-A7-PF0	TM-5-AA-PC0	TM-5-AA-PF0	TM-5-AF-PC0	TM-5-AF-PF0
Torques and electrical parameters												
Peak torque (for 1 sec.)	T_p	Nm	537	544	895	907	1,253	1,253	1,790	1,790	2,685	2,685
Continuous torque (WC)	T_{c_WC}	Nm	275	277	458	462	642	642	917	917	1,375	1,375
Stall torque (WC)	T_{s_WC}	Nm	221	221	367	370	514	514	734	734	1,099	1,099
Peak current (for 1 sec.)	I_p	A	75	114	75	114	75	150	75	150	75	150
Continuous current (WC)	I_{c_WC}	A	33	49.5	33	49.5	33	66	33	66	33	66
Stall current (WC)	I_{s_WC}	A	26.4	39.6	26.4	39.6	26.4	52.8	26.4	52.8	26.4	52.8
Resistance ¹⁾	R_{25}	Ω	0.88	0.36	1.18	0.49	1.48	0.37	1.92	0.48	2.68	0.67
Inductance ¹⁾	L_{25}	mH	6.17	2.18	8.28	2.94	10.4	2.6	13.56	3.39	18.86	4.71
Motor constant	K_m	Nm/ \sqrt{W}	7.28	7.59	10.45	10.89	13.06	13.06	16.39	16.39	20.77	20.77
Electrical time constant	K_e	ms	7	6.1	7	6	7	7	7.1	7.1	7	7
Torque constant	K_t	Nm/A	8.52	5.73	14.2	9.56	19.88	9.94	28.41	14.2	42.61	21.3
Back emf constant	K_u	$V_{eff}/(rad/s)$	4.92	3.31	8.2	5.52	11.48	5.74	16.4	8.2	24.6	12.3
Inertia of rotor	J	kgm ²	0.066		0.11		0.154		0.22		0.33	
Thermal resistance (WC)	R_{th_WC}	$^{\circ}C/W$	0.073	0.079	0.054	0.058	0.043	0.043	0.033	0.033	0.024	0.024
Max. DC bus voltage	U_{max}	VDC	750									
Max. speed at T_{c_WC}	n	min ⁻¹	488	825	318	527	232	486	163	346	105	231
Max. speed at T_p	n	min ⁻¹	266	486	184	333	137	297	96	216	59	145
Rated speed	n_N	min ⁻¹	300	300	300	300	232	300	163	300	105	231
Mechanical parameters												
Number of poles	2p		60									
Thermal sensors			PTC 100; PTC 130; Pt1000									
Stator height	H_S	mm	90		110		130		160		210	
Rotor height	H_R	mm	31		51		71		101		151	
Length of rotor centring fit	H	mm	10		15		15		15		15	
Rotor mass	M_r	kg	3,3		5,5		7,6		10,9		16,4	
Stator mass	M_s	kg	11,61		19,35		27,09		38,7		58,05	

All the specifications in the table (except dimensions) are in $\pm 10\%$ of tolerance at 25 $^{\circ}C$ ambient temperature

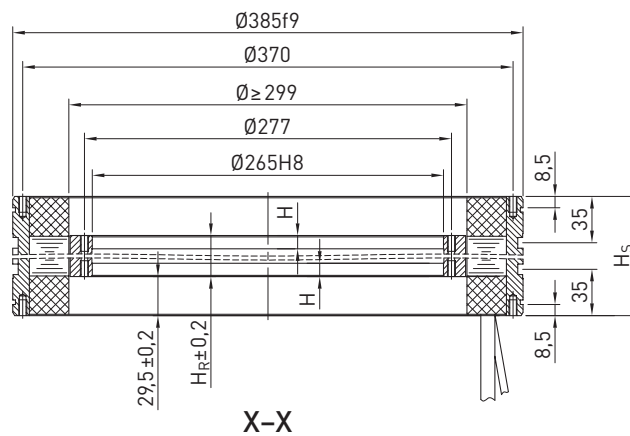
WC: with water cooling

¹⁾ Line to line

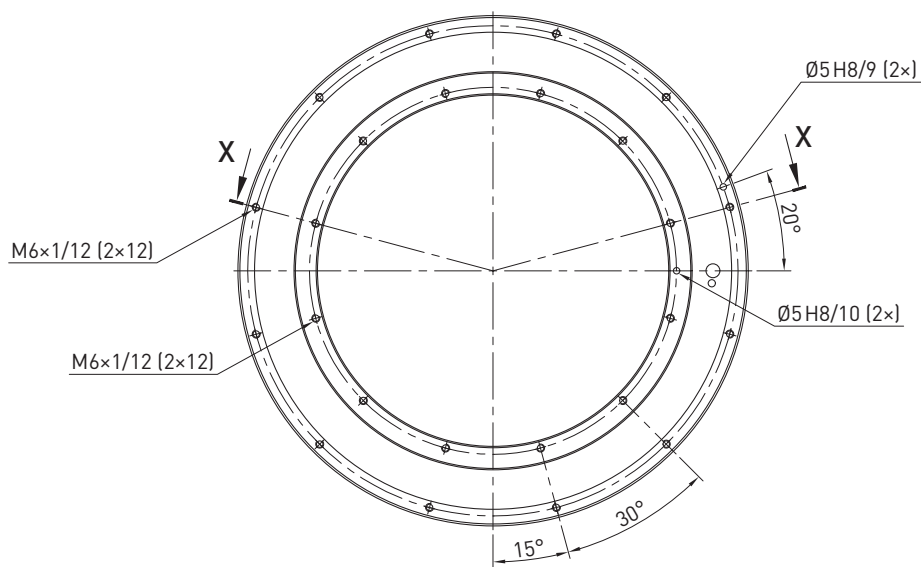
Torque Motors

HIWIN torque motors TM-5

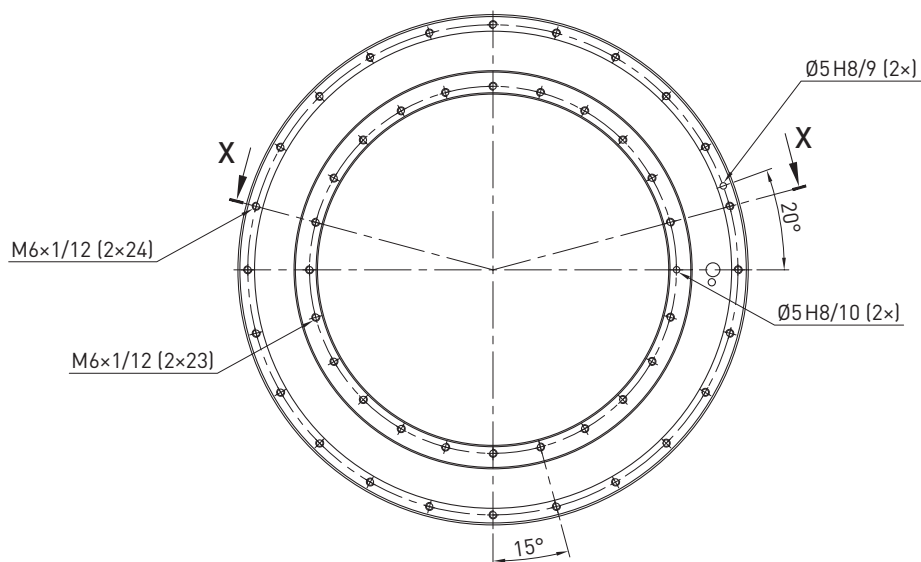
Dimensions TM-5-A



TM-5-A3, TM-5-A5, TM-5-A7

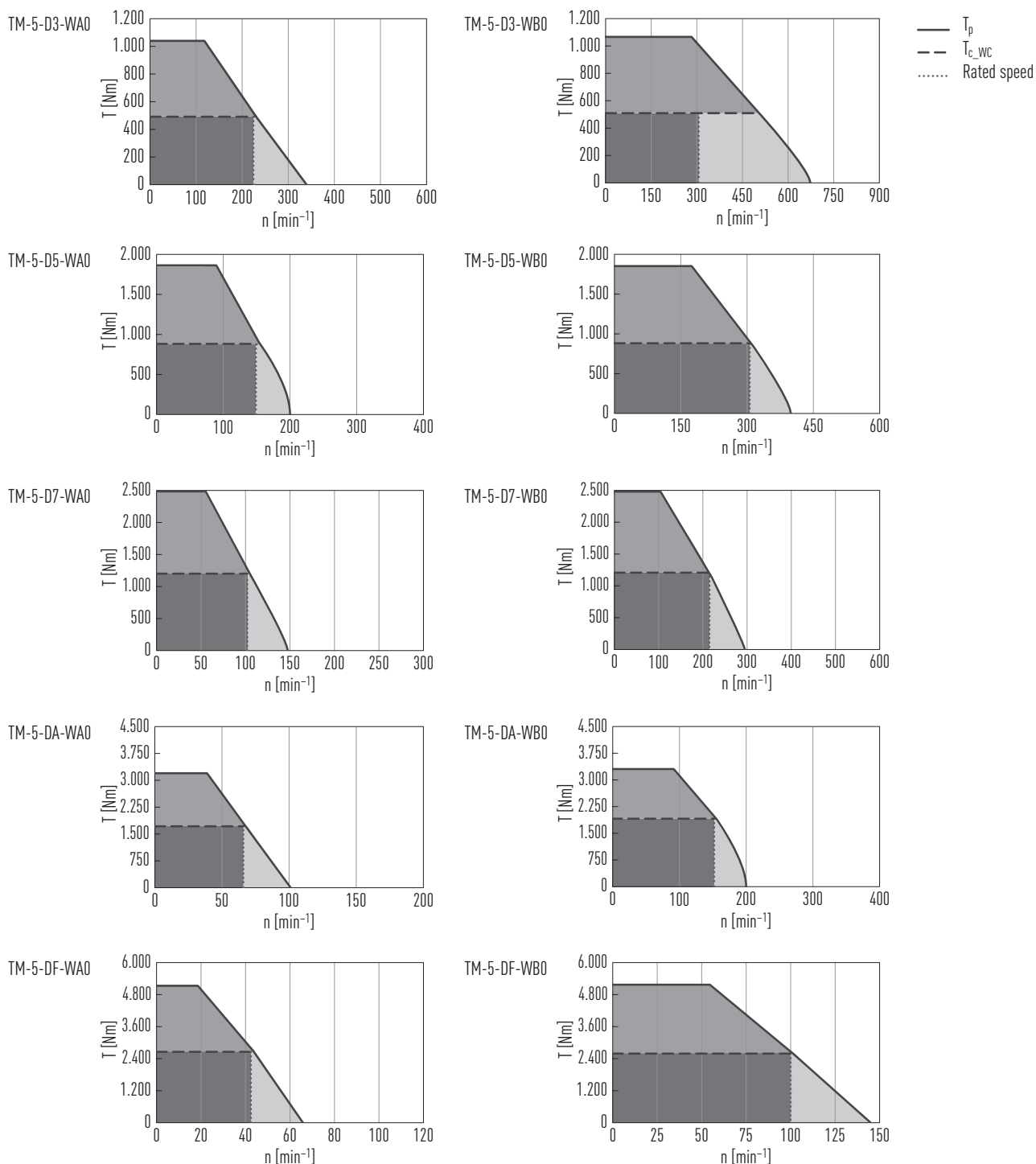


TM-5-AA, TM-5-AF



4.4.6 TM-5-D specifications

Torque-speed curves (DC bus voltage: 600 VDC)



Torque Motors

HIWIN torque motors TM-5

Table 4.6 Technical data for TM-5-D

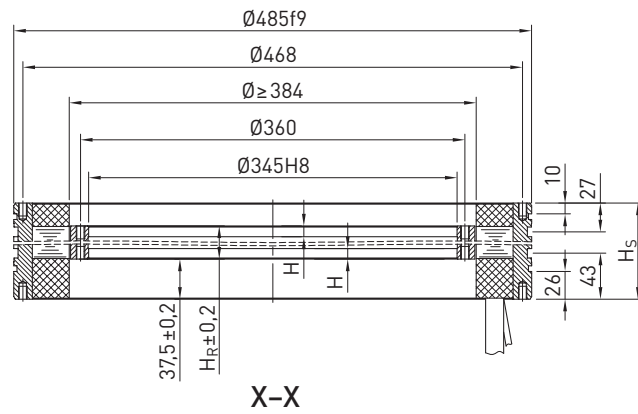
	Symbol	Unit	TM-5-D3-WA0	TM-5-D3-WB0	TM-5-D5-WA0	TM-5-D5-WB0	TM-5-D7-WA0	TM-5-D7-WB0	TM-5-DA-WA0	TM-5-DA-WB0	TM-5-DF-WA0	TM-5-DF-WB0
Torques and electrical parameters												
Peak torque (for 1 sec.)	T_p	Nm	1,065		1,775		2,485		3,550		5,325	
Continuous torque (WC)	T_{c_WC}	Nm	508		846		1,184		1,692		2,538	
Stall torque (WC)	T_{s_WC}	Nm	412		686		960		1,372		2,058	
Peak current (for 1 sec.)	I_p	A	68	136	68	136	68	136	68	136	68	136
Continuous current (WC)	I_{c_WC}	A	27.6	55.2	27.6	55.2	27.6	55.2	27.6	55.2	27.6	55.2
Stall current (WC)	I_{s_WC}	A	22.1	44.2	22.1	44.2	22.1	44.2	22.1	44.2	22.1	44.2
Resistance ¹⁾	R_{25}	Ω	1.72	0.43	2.26	0.57	2.8	0.7	3.61	0.9	4.97	1.24
Inductance ¹⁾	L_{25}	mH	13.5	3.4	19.3	4.8	25.1	6.3	33.7	8.4	48.2	12
Motor constant	K_m	Nm/ \sqrt{W}	11.64	11.64	16.88	16.81	21.25	21.25	26.72	26.76	34.18	34.22
Electrical time constant	K_e	ms	7.8	7.9	8.5	8.4	9	9	9.3	9.3	9.7	9.7
Torque constant	K_t	Nm/A	18.88	9.35	31.35	15.59	43.82	22	62.7	31.35	94.05	46.94
Back emf constant	K_u	$V_{eff}/(rad/s)$	10.9	5.4	18.1	9	25.3	12.7	36.2	18.1	54.3	27.1
Inertia of rotor	J	kgm ²	0.188		0.313		0.439		0.627		0.94	
Thermal resistance (WC)	R_{th_WC}	$^{\circ}C/W$	0.053	0.053	0.041	0.04	0.033	0.033	0.025	0.026	0.018	0.019
Max. DC bus voltage	U_{max}	VDC	750									
Max. speed at T_{c_WC}	n	min ⁻¹	233	487	144	308	102	220	69	154	43	100
Max. speed at T_p	n	min ⁻¹	123	264	77	175	54	127	34	89	16	56
Rated speed	n_N	min ⁻¹	233	300	144	300	102	220	69	154	43	100
Mechanical parameters												
Number of poles	2p		60									
Thermal sensors			PTC 100; PTC 130; Pt1000									
Stator height	H_S	mm	90		110		130		160		210	
Rotor height	H_R	mm	31		51		71		101		151	
Length of rotor centring fit	H	mm	10		15		15		15		15	
Rotor mass	M_r	kg	5.6		9.3		13.1		18.7		28	
Stator mass	M_s	kg	34.2		44.2		55.1		69.7		95.7	

All the specifications in the table (except dimensions) are in $\pm 10\%$ of tolerance at 25 $^{\circ}C$ ambient temperature

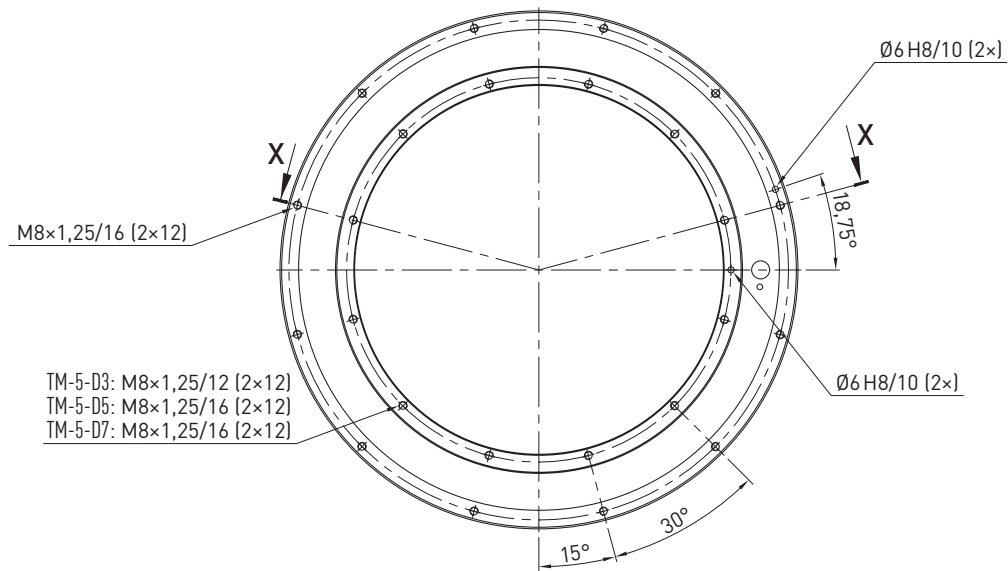
WC: with water cooling

¹⁾ Line to line

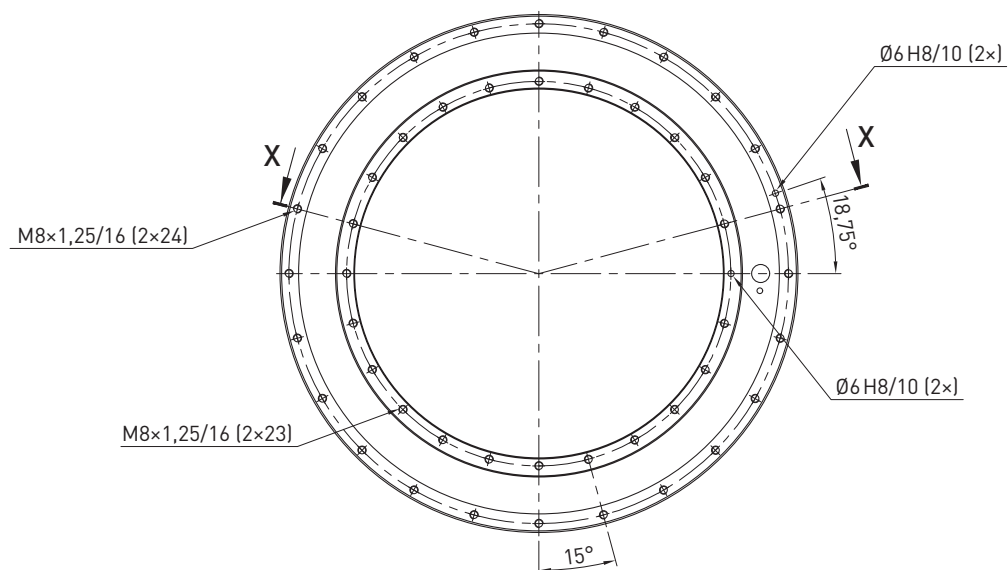
Dimensions TM-5-D



TM-5-D3, TM-5-D5, TM-5-D7



TM-5-DA, TM-5-DF



Torque Motors

HIWIN torque motors TM-5

4.4.7 TM-5-G specifications

Torque-speed curves (DC bus voltage: 600 VDC)

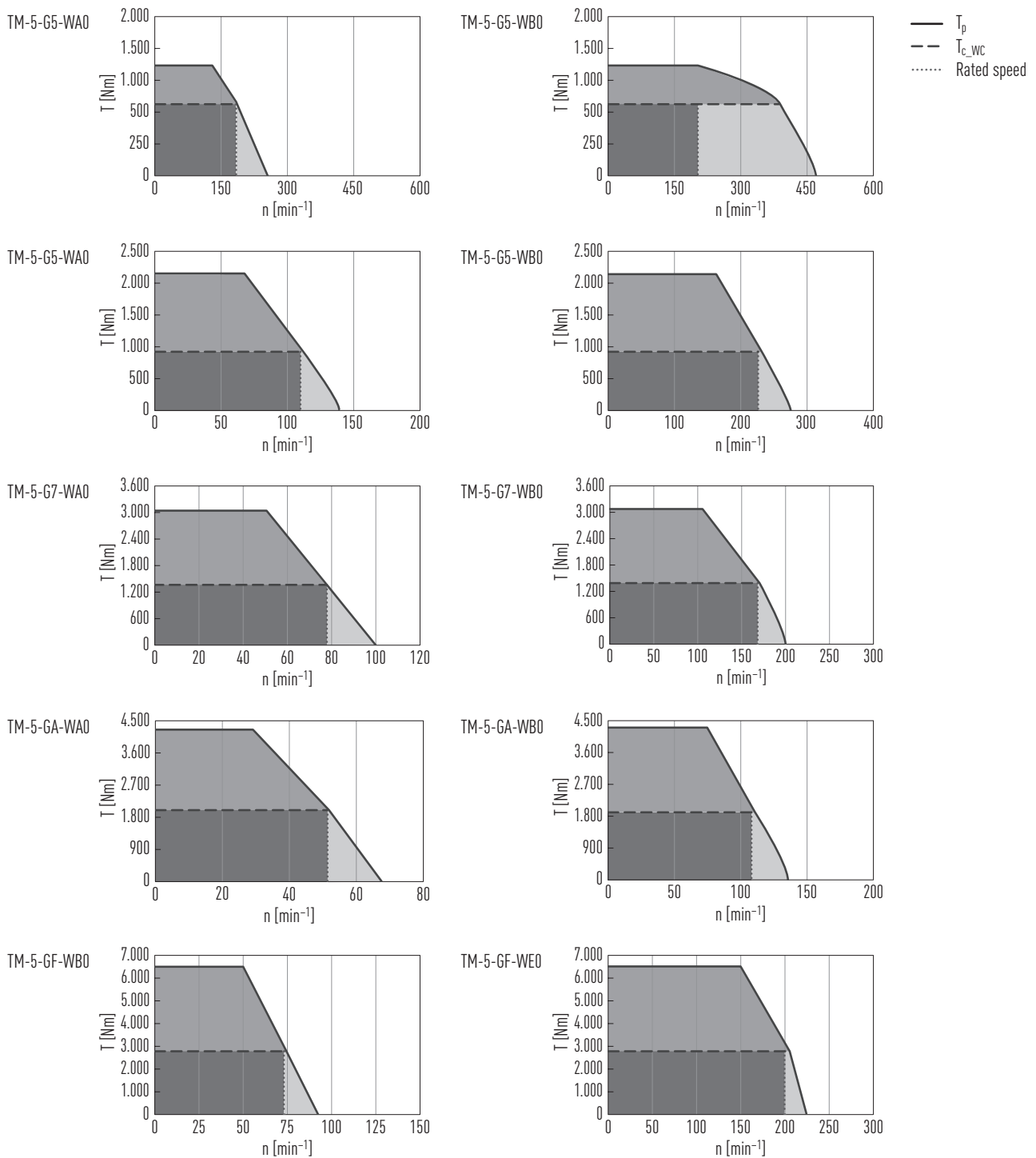


Table 4.7 Technical data for TM-5-G

	Symbol	Unit	TM-5-G3-WA0	TM-5-G3-WB0	TM-5-G5-WA0	TM-5-G5-WB0	TM-5-G7-WA0	TM-5-G7-WB0	TM-5-GA-WA0	TM-5-GA-WB0	TM-5-GF-WB0	TM-5-GF-WE0
Torques and electrical parameters												
Peak torque (for 1 sec.)	T_p	Nm	1,298	1,298	2,164	2,164	3,029	3,029	4,327	4,327	6,491	6,491
Continuous torque (WC)	T_{c_WC}	Nm	577	577	962	962	1,346	1,346	1,924	1,924	2,885	2,885
Stall torque (WC)	T_{s_WC}	Nm	459	463	764	770	1,070	1,077	1,529	1,540	2,310	2,298
Peak current (for 1 sec.)	I_p	A	56	112	56	112	56	112	56	112	112	280
Continuous current (WC)	I_{c_WC}	A	22.3	44.6	22.3	44.6	22.3	44.6	22.3	44.6	44.6	111.5
Stall current (WC)	I_{s_WC}	A	17.8	35.7	17.8	35.7	17.8	35.7	17.8	35.7	35.7	89.2
Resistance ¹⁾	R_{25}	Ω	1.99	0.5	2.62	0.66	3.26	0.81	4.21	1.05	1.45	0.232
Inductance ¹⁾	L_{25}	mH	13.2	3.3	18.9	4.7	24.5	6.1	33	8.2	11.8	1.888
Motor constant	K_m	Nm/ \sqrt{W}	14.94	14.96	21.66	21.68	27.17	27.38	34.18	34.37	43.88	43.68
Electrical time constant	K_e	ms	6.6	6.6	7.2	7.1	7.5	7.5	7.8	7.8	8.1	8.1
Torque constant	K_t	Nm/A	27.89	13.86	46.42	23.21	65.13	32.56	92.84	46.42	69.63	27.85
Back emf constant	K_u	$V_{eff}/(rad/s)$	16.1	8	26.8	13.4	37.6	18.8	53.6	26.8	40.2	16.08
Inertia of rotor	J	kgm ²	0.282		0.47		0.658		0.94		1.41	
Thermal resistance (WC)	R_{th_WC}	$^{\circ}C/W$	0.071	0.07	0.054	0.053	0.043	0.043	0.033	0.034	0.024	0.024
Max. DC bus voltage	U_{max}	VDC	750									
Max. speed at T_{c_WC}	n	min ⁻¹	184	386	110	234	77	167	52	115	74	202
Max. speed at T_p	n	min ⁻¹	113	248	68	158	46	114	28	78	47	146
Rated speed	n_N	min ⁻¹	184	257	110	234	77	167	52	115	74	202
Mechanical parameters												
Number of poles	2p		70									
Thermal sensors			PTC 100; PTC 130; Pt1000									
Stator height	H_S	mm	90		110		130		160		210	
Rotor height	H_R	mm	31		51		71		101		151	
Length of rotor centring fit	H	mm	10		15		15		15		15	
Rotor mass	M_r	kg	5.9		9.8		13.7		19.5		29.3	
Stator mass	M_s	kg	39.9		51.4		63.3		79.3		108.7	

All the specifications in the table (except dimensions) are in $\pm 10\%$ of tolerance at 25 $^{\circ}C$ ambient temperature

WC: with water cooling

¹⁾ Line to line

HIWIN torque motors TM-5

Technical drawing of a shaft assembly in cross-section X-X. The shaft has a total length of 565 f9 and a diameter of Ø548. It features a central section with a diameter of Ø420 H8 and a length of 459. The shaft is supported by bearings with a width of 35. The drawing includes various dimension lines and tolerances, such as 29,5 ± 0,2, $H_R \pm 0,2$, and ≤ 9 . The section line X-X is indicated at the bottom.

Technical drawing of a circular flange with the following dimensions and labels:

- Outer diameter: $\geq 230,5$
- Inner diameter: ≤ 51
- Flange thickness: ≤ 65
- Angle between centerlines: $18,75^\circ$
- Angle between centerlines: 30°
- Angle between centerlines: 15°
- Labels: $M8 \times 1,25/16 [2 \times 12]$, $\emptyset 6 H8/10 [2 \times]$
- Section line: X-X

[illegible]

5. Options and accessories

5.1 Closed cooling jacket

For easy integration of our water-cooled torque motors, we also supply them in a closed version. The connection to the cooling unit is realised via 2 G $\frac{1}{8}$ threads in the stainless steel jacket. As in the version without a closed cooling jacket, the alignment of the motor is realised easily via the fit of the stator. Available for the series TMRW, TM-5 and IM-2G.

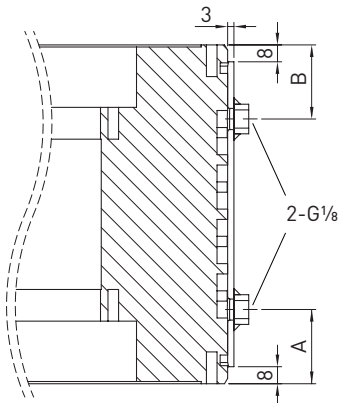


Table 5.1 Dimensions of steel cooling jacket





Torque motor ¹⁾	Dimension A [mm]	Dimension B [mm]
TMRW7, TM-5-7, IM-2-7	35	25
TMRWA, TM-5-A, IM-2-A	35	35
TMRWG, TM-5-G, IM-2-G	35	35
TMRWD, TM-5-D	27	43

¹⁾ All other sizes upon request

Torque Motors

Options and accessories

5.2 Cable outlet orientations of the torque motors

 A 3D perspective view of a torque motor stator with a single orange cable outlet pointing straight out from the center of the motor's face.	Type S <ul style="list-style-type: none">– Straight cable outlet– Cables potted in the stator
 A 3D perspective view of a torque motor stator with a single orange cable outlet pointing straight out from the center. A thin, light-colored plate is visible behind the cable base.	Type V <ul style="list-style-type: none">– Straight cable outlet– With strain relief plate
 A 3D perspective view of a torque motor stator with two cable outlets (one orange, one grey) pointing straight out from the center. A light-colored plate is visible behind the outlets.	Type A <ul style="list-style-type: none">– Straight cable outlet– With strain relief plate– With PG screw connections
 A 3D perspective view of a torque motor stator with two cable outlets (one orange, one grey). The orange outlet is angled at 90 degrees, while the grey outlet points straight out. A light-colored plate is visible behind the outlets.	Type H <ul style="list-style-type: none">– 90° cable outlet of the motor cable– Straight cable outlet of the temperature cable– With strain relief plate

6. Glossary

Continuous current I_c / I_{c_wc} (A)

The continuous current or rated current I_c , or I_{c_wc} in the case of water cooling, is the current which in continuous operation heats the motor to the permissible motor temperature T_{max} at an ambient temperature of 25 °C.

Continuous torque T_c / T_{c_wc} (Nm)

The motor generates the continuous torque or rated torque in continuous operation (duty cycle = 100 %).

Stall current I_s / I_{s_wc} (A)

The stall current is the current that generates the maximum stall torque T_s or T_{s_wc} at a motor temperature of 25 °C.

Stall torque T_s / T_{s_wc} (Nm)

If the motor is operated with a frequency of 0 – 1 Hz, the motor torque must be reduced to the maximum stall torque T_s or T_{s_wc} in continuous operation.

Peak current I_p (A)

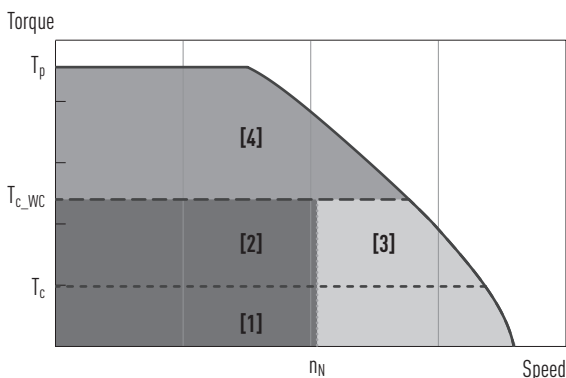
The peak current is applied briefly to generate the peak torque. The maximum permissible duration of the peak current is one second. The motor must then cool down to the nominal temperature before the peak current can be applied again.

Peak torque T_p (Nm)

The peak torque is the maximum torque that the motor can generate for about one second. For HIWIN products, it is at the end of the linear modulation range at the peak current I_p and is particularly important during acceleration and braking.

Torque-speed curve

The torque-speed curve describes the available torque T as a function of the speed n and the input voltage UDC.



- Range [1]
Continuous operation without water cooling: When operating without water cooling, the motor can be operated continuously up to the maximum motor torque T_c and the maximum speed n_N .
- Ranges [1] + [2]
Continuous operation with water cooling: When operating with water cooling, the motor can be operated in continuous operation up to the maximum motor torque T_{c_wc} and the maximum speed n_N .
- Range [3]
Intermittent operation: When operating at a speed greater than n_N , the load cycle must be reduced to avoid thermal overload of the motor.
- Range [4]
Intermittent operation: When operating with a torque greater than T_c (without water cooling) or T_{c_wc} (with water cooling), the load cycle must be reduced to avoid thermal overload of the motor.

Back emf constant K_u ($V_{eff}/(rad/s)$)

The back EMF constant K_u is the ratio of the back EMF voltage (V_{eff}) to the motor speed (rad/s). The back EMF is an electromagnetic force generated by the movement of the coils in the magnetic field of the permanent magnets and acts contrary to the motor force.

Winding temperature T_{max} (°C)

Permissible winding temperature. The actual motor temperature depends on the installation conditions, the cooling conditions and the operating conditions and can therefore only be determined in the specific case and only inadequately calculated.

Winding resistance R_{25} (Ω)

Winding-specific parameter that specifies the winding resistance line to line at 25 °C winding temperature.

Winding inductance L_{25} (mH)

Winding-specific parameter indicating the inductance line to line at 25 °C winding temperature.

Motor constant K_m (Nm/VW)

Ratio of generated power to power loss, i. e. a measure of the efficiency of a motor.

Number of poles $2p$

The number of poles $2p$ indicates the number of single poles of the motor, P the number of pole pairs.

Thermal resistance R_{th} (°C/W)

Thermal resistance is defined as the resistance below which the motor winding dissipates heat to the environment. Considered is the natural convection at an ambient temperature of 25 °C, and for the water-cooled versions at a water temperature of 25 °C.

Torque constant K_t (Nm/A)

Winding-specific parameter from which the resulting torque at 25 °C motor temperature is calculated by multiplication with the input current.

$$T = I \times K_t$$

Maximum speed n_{max} (min^{-1})

The maximum speed is defined as the speed at which a specific torque is still achieved. 3 maximum speeds are specified, n_{max} at T_c , n_{max} at T_{c_wc} and n_{max} at T_p .

Rated speed n_N (min^{-1})

The rated speed is defined as the speed at which the rotor does not heat up above 80 °C in continuous operation. At higher speeds, either the duty cycle must be reduced or suitable measures must be taken for rotor cooling.

Maximum input voltage U_{max} (VDC)

Maximum DC bus voltage of the drive amplifier, or the resulting maximum input voltage at the motor.

WE LIVE NOTION

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