HIWIN®

Motion Control & Systems

Rotary Tables

www.hiwin.de

Note:
The technical data in this catalog may
be changed without prior notice.

Motors, Drives & Accessories

Rotary Tables

Directly-driven rotary tables from HIWIN have a backlash-free and very rigid design, making them highly versatile. The compact design makes the tables easy to integrate and allows for a space-saving setup. Various diameters and heights simplify the process of selecting the right rotary table. On request, the rotary tables are also supplied as a complete system with drive.

Rotary Tables

Contents

Contents

1. Product overview

HIWIN rotary tables TMS

- Standard series
- Torques up to 450 Nm
- Integrated rotary encoder
- Outer diameter 110 – 300 mm
- With pneumatic clamping as an option

HIWIN rotary tables TMN

- Extremely flat design
- Torques up to 39.6 Nm
- Outer diameter 118 – 230 mm
- Integrated rotary encoder
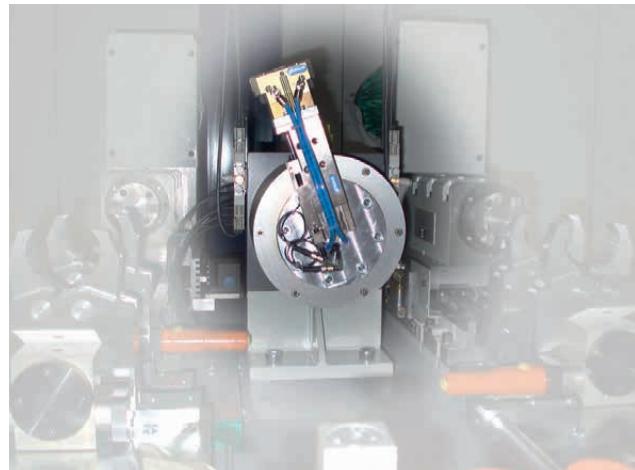
2. Sample applications

2.1 HIWIN rotary tables optimise transport processes

The specification

- Rapid positioning when transporting the work-pieces between the interlinked system parts on a vertical circular path = special requirements apply to acceleration and braking due to the short distances travelled
- Flexible solution, allowing changes or additions to be made during commissioning
- It should be possible for the system to be stopped in any position in order to inspect the parts

Our solution

- Swivel drive minimises the cycle times = saves time and money
- Centrifugal forces are reduced = transport components swiftly and gently to the next station with the gripper arm
- Precision bearing and optical positioning measurement system = maximum reproducibility
- Design with hollow shaft = pass cables or mechanisms through with ease
- Direct drive = no gearbox backlash or gearbox mechanisms prone to wear

2.2 HIWIN rotary table in glass plate handling

The specification

- Lay-up station in which the finished strings are drawn in with special vacuum suckers after welding. The strings are then swivelled and deposited either in string boxes or on glass plates
- The current method of holding the Z-axis for the cross bar above toothed belt and servo motor is to be replaced because it takes up too much room and is too heavy
- A high level of torque and a compact design are needed due to the long swivel arm and high inherent weight of the arm
- High speed is needed because of the short cycle times required

Our solution

- Rotary indexing table = high torque and compact design = high throughput, space and cost savings
- Design with hollow shaft = pneumatic hoses and cables can pass through
- Direct drive = no gearbox clearance or gearbox mechanisms prone to wear
- Adaptation to existing control

3. HIWIN rotary tables TMS

3.1 Characteristics of the TMS rotary tables

TMS rotary tables are directly driven rotary tables and do not therefore have a gearbox. The extremely rigid connection between the motor and load, coupled with a high-quality servo drive controller, ensures outstanding acceleration capabilities and movement with good uniformity. Due to the hollow shaft design, TMS rotary tables are especially well suited to automation tasks. Media, cable systems or mechanisms can pass through with ease.
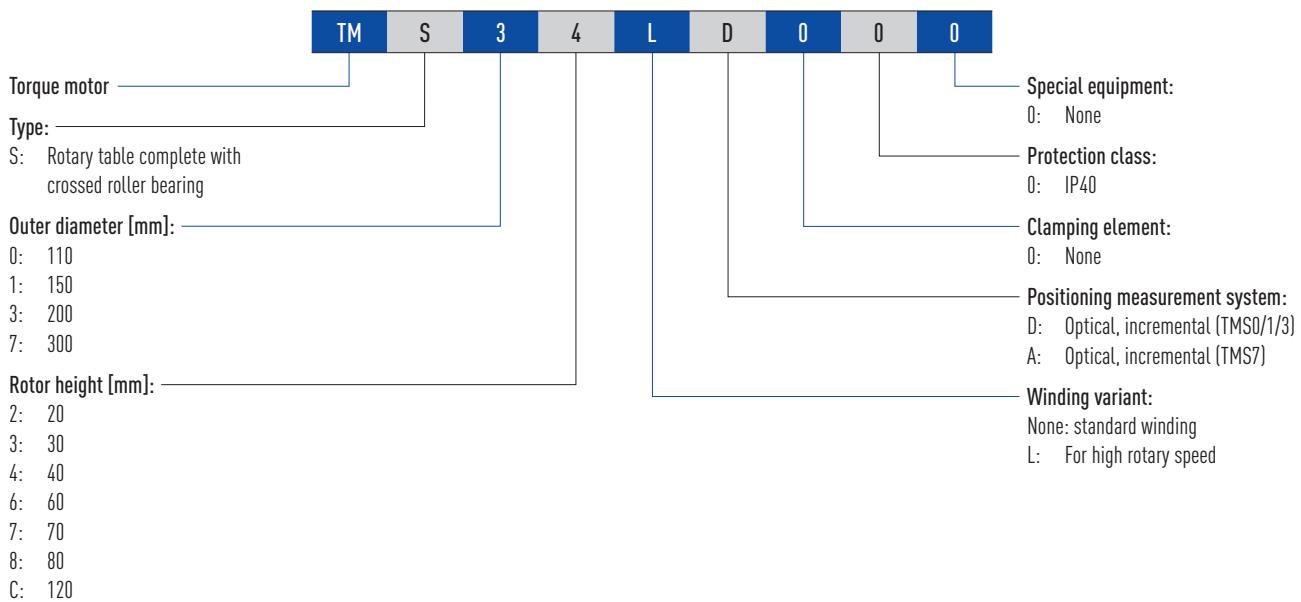
Key features:
- Backlash-free and extremely dynamic
- Brush-less and high-torque
- Integrated optical rotary encoder

Typical applications:
- Automation technology
- Pick-and-place machines

3.2 Order code for TMS rotary tables

TM	S	3	4	L	D	0	0	0

Torque motor

Type:
S: Rotary table complete with crossed roller bearing

Outer diameter [mm]:
- 0: 110
- 1: 150
- 3: 200
- 7: 300

Rotor height [mm]:
- 2: 20
- 3: 30
- 4: 40
- 6: 60
- 7: 70
- 8: 80
- C: 120

Winding variant:
None: standard winding
L: For high rotary speed

Positioning measurement system:
D: Optical, incremental (TMS0/1/3)
A: Optical, incremental (TMS7)

Clamping element:
0: None

Protection class:
0: IP40

Special equipment:
0: None

3.3 Technical data for TMS

3.3.1 Technical data for TMS0

Torque-speed curves (DC bus voltage: 560 VDC)
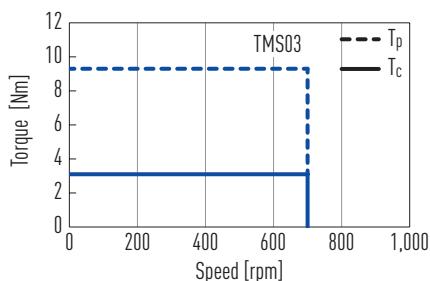
| Table 3.1 **Technical data for TMS0 HIWIN rotary tables**	Symbol	Unit	TMS03
Technical data of rotary table			
Peak torque (for 1 sec.)	T_p	Nm	9.3
Continuous torque	T_c	Nm	3.1
Stall torque	T_s	Nm	2.17
Inertia of rotating parts	J	kgm^2	0.003
Weight	M_m	kg	4
Max. axial load	F_a	N	3,700
Max. radial load	F_r	N	820
Max. moment of tilt	M_k	Nm	40
Nominal speed (at 400 VAC, 30 % duty cycle)	n	1/min	700
Position accuracy		arc sec	± 45/± 10 [2]
Repeatability		arc sec	± 3
Radial run-out		mm	0.03
Axial run-out		mm	0.03
Protection class			IP40
Technical data of motor			
Peak current (for 1 sec.)	I_p	A_{eff}	6.0
Continuous current	I_c	A_{eff}	2.0
Motor constant	K_m	Nm/√W	0.5
Resistance [1]	R_{25}	Ω	7.1
Inductance [1]	L	mH	15.2
Electrical time constant	T_e	ms	2.1
Torque constant	K_t	Nm/A_{eff}	1.55
Back emf constant	K_u	V_{eff}/(rad/s)	0.82
Number of poles	2p		10
Thermal resistance	R_{th}	°C/W	1.76
Thermal time constant	T_{th}	s	1,930
Thermal sensor			PTC SNM 100
Max. DC Bus		V	600
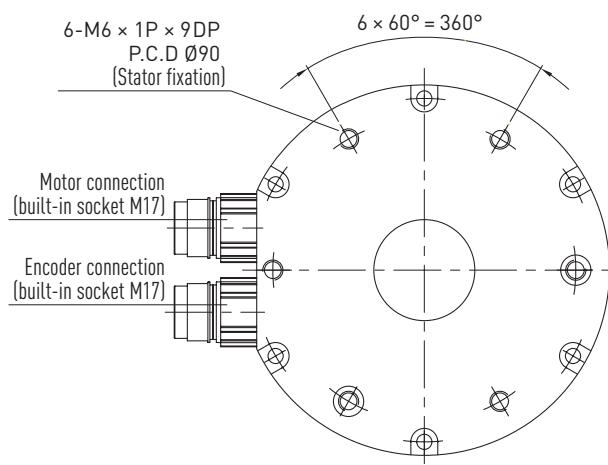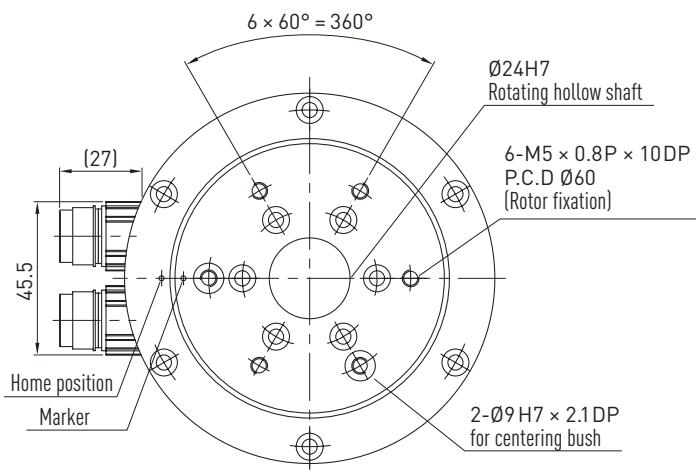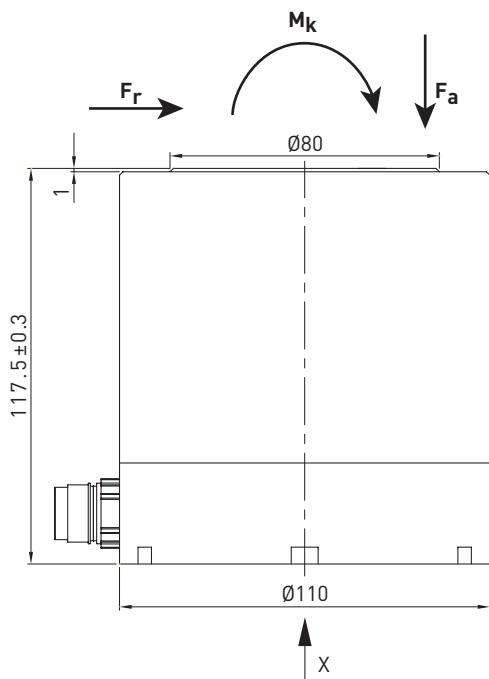
All the specifications in the table (except dimensions) are in ± 10 % of tolerance at 25 °C ambient temperature
[1] Line-to-line
[2] With error mapping

Encoder type D specifications (optical, incremental)
- 5,026 lines/cycle
- Index mark
- Signal output sin/cos 1 V_{PP}

Dimensions of the TMS0 HIWIN rotary table

(For values, see Table 3.1)

Ø80

M_k

F_r

F_a

117.5 ± 0.3

1

Ø110

X

6 × 60° = 360°

Ø24H7
Rotating hollow shaft

6-M5 × 0.8P × 10DP
P.C.D Ø60
(Rotor fixation)

(27)

45.5

Home position

Marker

2-Ø9H7 × 2.1DP
for centering bush

6-M6 × 1P × 9DP
P.C.D Ø90
(Stator fixation)

6 × 60° = 360°

Motor connection
(built-in socket M17)

Encoder connection
(built-in socket M17)

X View

Rotary Tables

HIWIN rotary tables TMS

3.3.2 Technical data for TMS1

Torque-speed curves (DC bus voltage: 560 VDC)
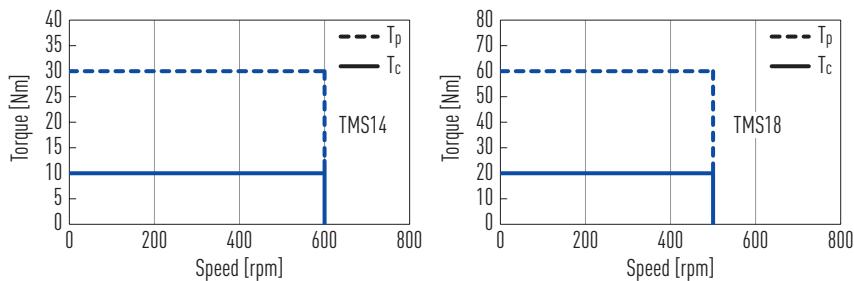
Table 3.2 **Technical data for TMS1 HIWIN rotary tables**				
	Symbol	Unit	TMS14	TMS18
Technical data of rotary table				
Peak torque (for 1 sec.)	T_p	Nm	30	60
Continuous torque	T_c	Nm	10	20
Stall torque	T_s	Nm	7	14
Inertia of rotating parts	J	kgm^2	0.0065	0.0075
Weight	M_m	kg	7	9.5
Max. axial load	F_a	N	3,700	
Max. radial load	F_r	N	1,700	
Max. moment of tilt	M_k	Nm	60	
Nominal speed (at 400 VAC, 30 % duty cycle)	n	1/min	600	500
Position accuracy		arc sec	± 45/± 10 [2]	
Repeatability		arc sec	± 3	
Radial run-out		mm	0.03	
Axial run-out		mm	0.03	
Height	H	mm	120	160
Protection class			IP40	
Technical data of motor				
Peak current (for 1 sec.)	I_p	A$_{eff}$	12	
Continuous current	I_c	A$_{eff}$	4	
Motor constant	K_m	Nm/√W	1.0	1.6
Resistance [1]	R_{25}	Ω	3.9	6.5
Inductance [1]	L	mH	14.0	26.0
Electrical time constant	T_e	ms	3.6	4.0
Torque constant	K_t	Nm/A$_{eff}$	2.50	5.00
Back emf constant	K_u	V$_{eff}$/(rad/s)	1.2	2.4
Number of poles	2p		22	
Thermal resistance	R_{th}	°C/W	0.80	0.48
Thermal time constant	T_{th}	s	2,290	2,520
Thermal sensor			PTC SNM 100	
Max. DC Bus		V	600	
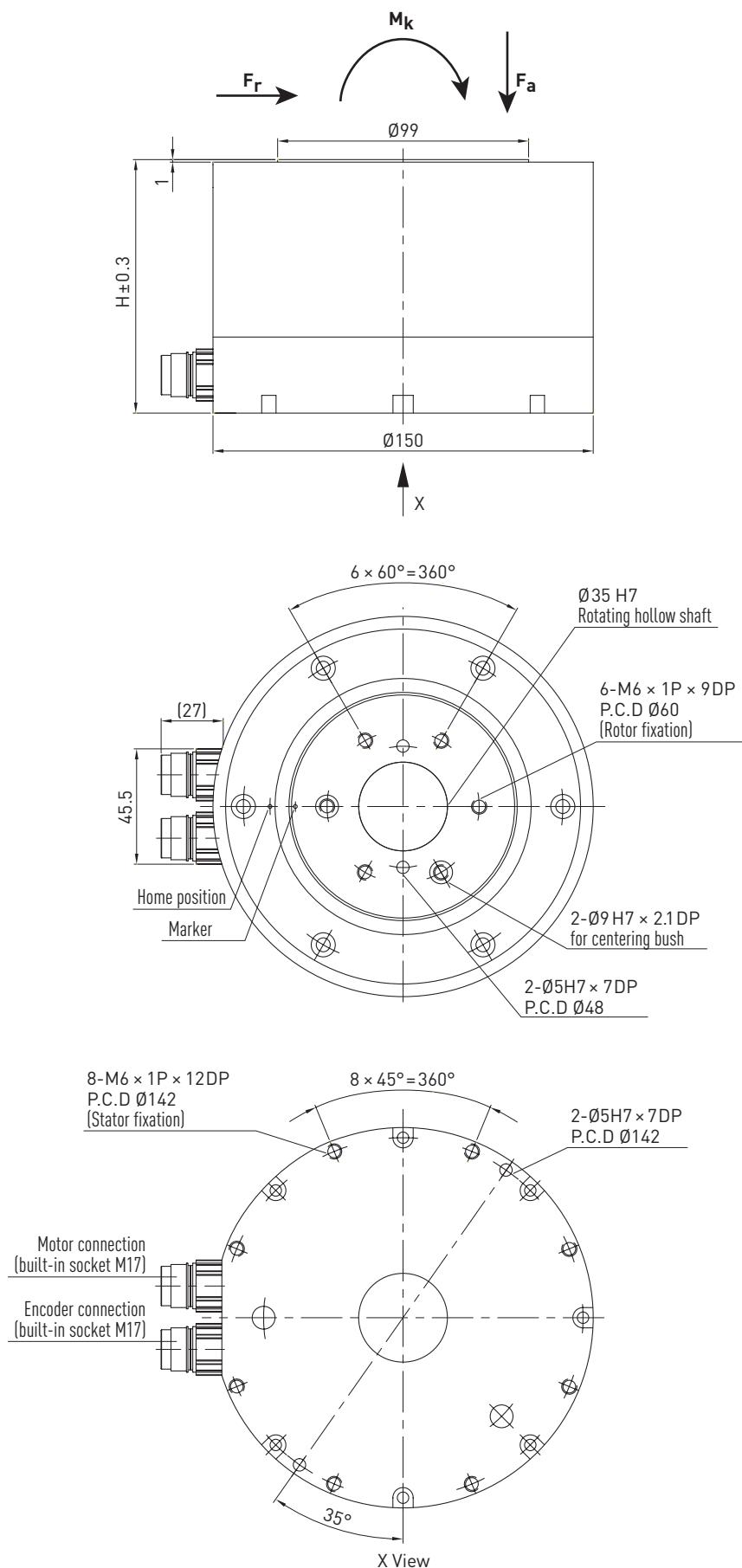
All the specifications in the table (except dimensions) are in ± 10 % of tolerance at 25 °C ambient temperature
[1] Line-to-line
[2] With error mapping

Encoder type D specifications (optical, incremental)

- 7,226 lines/cycle
- Index mark
- Signal output sin/cos 1 V$_{PP}$

Dimensions of the TMS1 HIWIN rotary table

(For values, see Table 3.2)

M_k

F_r F_a

Ø99

1

$H\pm0.3$

Ø150

X

6 × 60° = 360°

Ø35 H7
Rotating hollow shaft

6-M6 × 1P × 9 DP
P.C.D Ø60
(Rotor fixation)

(27)

45.5

Home position

Marker

2-Ø9 H7 × 2.1 DP
for centering bush

2-Ø5H7 × 7DP
P.C.D Ø48

8-M6 × 1P × 12DP
P.C.D Ø142
(Stator fixation)

8 × 45° = 360°

2-Ø5H7 × 7DP
P.C.D Ø142

Motor connection
(built-in socket M17)

Encoder connection
(built-in socket M17)

35°

X View

3.3.3 Technical data for TMS3

Torque-speed curves (DC bus voltage: 560 VDC)
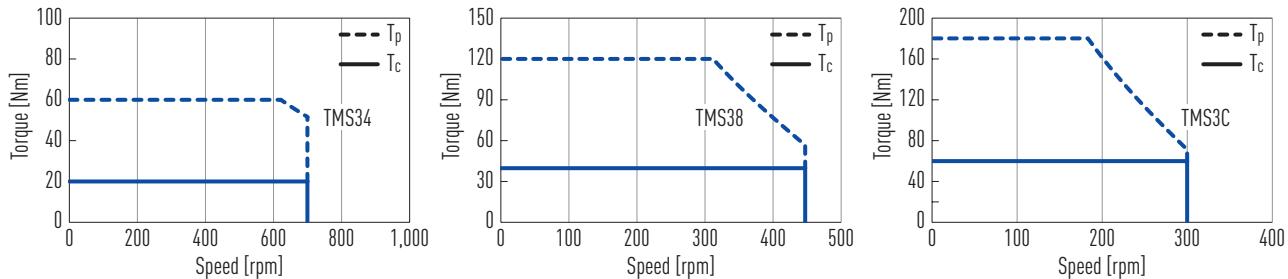
Table 3.3 **Technical data for HIWIN rotary tables TMS3**					
	Symbol	Unit	TMS34	TMS38	TMS3C
Technical data of rotary table					
Peak torque (for 1 sec.)	T_p	Nm	60	120	180
Continuous torque	T_c	Nm	20	40	60
Stall torque	T_s	Nm	14	28	42
Inertia of rotating parts	J	kgm^2	0.020	0.026	0.035
Weight	M_m	kg	21	26	32
Max. axial load	F_a	N	8,000		
Max. radial load	F_r	N	6,500		
Max. moment of tilt	M_k	Nm	240		
Nominal speed (at 400 VAC, 30 % duty cycle)	n	1/min	700	450	300
Position accuracy		arc sec	± 25/± 10 [2]		
Repeatability		arc sec	± 2.5		
Radial run-out		mm	0.05		
Axial run-out		mm	0.05		
Height	H	mm	150	190	230
Protection class			IP40		
Technical data of motor					
Peak current (for 1 sec.)	I_p	A$_{eff}$	10.2		
Continuous current	I_c	A$_{eff}$	3.4		
Motor constant	K_m	Nm/√W	1.8	2.8	3.6
Resistance [1]	R_{25}	Ω	7.5	12	17.1
Inductance [1]	L	mH	34.60	53.6	84.4
Electrical time constant	T_e	ms	4.6	4.5	4.9
Torque constant	K_t	Nm/A$_{eff}$	6	12	18
Back emf constant	K_u	V$_{eff}$/(rad/s)	3	6	9
Number of poles	2p		22		
Thermal resistance	R_{th}	°C/W	0.73	0.46	0.32
Thermal time constant	T_{th}	s	2,020	2,130	2,170
Thermal sensor			PTC SNM 120		
Max. DC Bus		V	600		

All the specifications in the table (except dimensions) are in ± 10 % of tolerance at 25 °C ambient temperature
[1] Line-to-line   [2] With error mapping
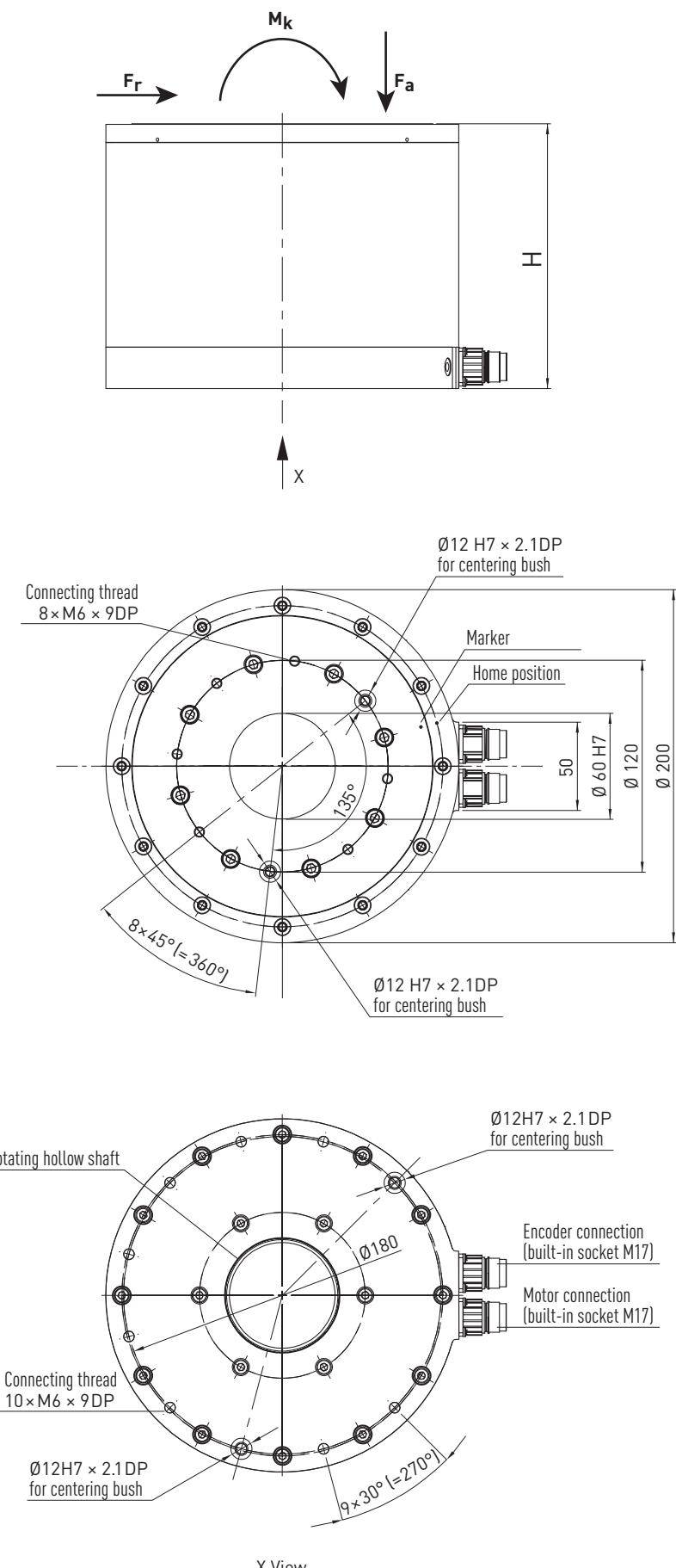
Encoder specifications
Type D: optical, incremental
- 7,226 lines/cycle
- Index mark
- Signal output sin/cos 1 V$_{PP}$

Dimensions of the TMS3 HIWIN rotary table

(For values, see Table 3.3)

X View

Rotary Tables

HIWIN rotary tables TMS

3.3.4 Technical data for TMS7

**Torque-speed curves (DC bus voltage: 560 VDC)**
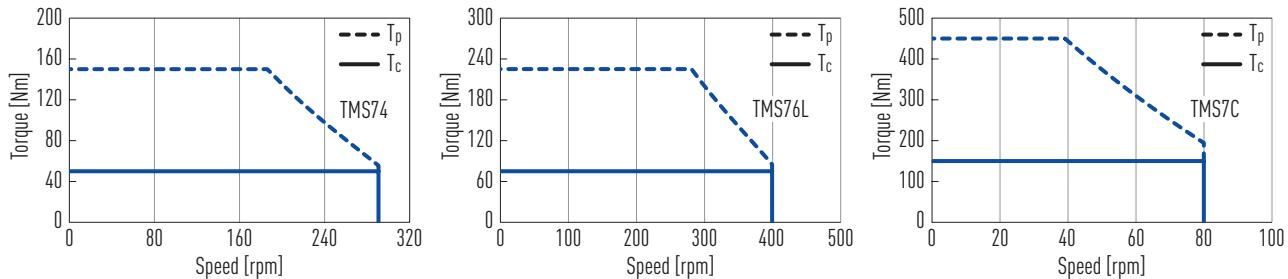
Table 3.4 **Technical data for TMS7 HIWIN rotary tables**					
	Symbol	**Unit**	**TMS74**	**TMS76L**	**TMS7C**
Technical data of rotary table					
Peak torque (for 1 sec.)	T_p	Nm	150	225	450
Continuous torque	T_c	Nm	50	75	150
Stall torque	T_s	Nm	35	52.5	105
Inertia of rotating parts	J	kgm^2	0.152	0.174	0.241
Weight	M_m	kg	39	44.5	61.5
Max. axial load	F_a	N	8,000		
Max. radial load	F_r	N	6,500		
Max. moment of tilt	M_k	Nm	360		
Nominal speed (at 400 VAC, 30 % duty cycle)	n	1/min	290	400	80
Position accuracy		arc sec	± 25/± 10 [2]		
Repeatability		arc sec	± 2.5		
Radial run-out		mm	0.05		
Axial run-out		mm	0.05		
Height	H	mm	160	180	240
Protection class			IP40		
Technical data of motor					
Peak current (for 1 sec.)	I_p	A$_{eff}$	10.2	20.4	10.2
Continuous current	I_c	A$_{eff}$	3.4	6.8	3.4
Motor constant	K_m	Nm/√W	3.9	5.0	7.7
Resistance [1]	R_{25}	Ω	12.9	4.3	29
Inductance [1]	L	mH	55	19	145
Electrical time constant	T_e	ms	4.3	4.4	5.0
Torque constant	K_t	Nm/A$_{eff}$	17	12.8	51.1
Back emf constant	K_u	V$_{eff}$/(rad/s)	9.8	7.4	29.5
Number of poles	2p		44		
Thermal resistance	R_{th}	°C/W	0.42	0.32	0.19
Thermal time constant	T_{th}	s	2,230	2,330	2,350
Thermal sensor			PTC SNM 120		
Max. DC Bus		V	600		

All the specifications in the table (except dimensions) are in ± 10 % of tolerance at 25 °C ambient temperature
[1] Line-to-line   [2] With error mapping
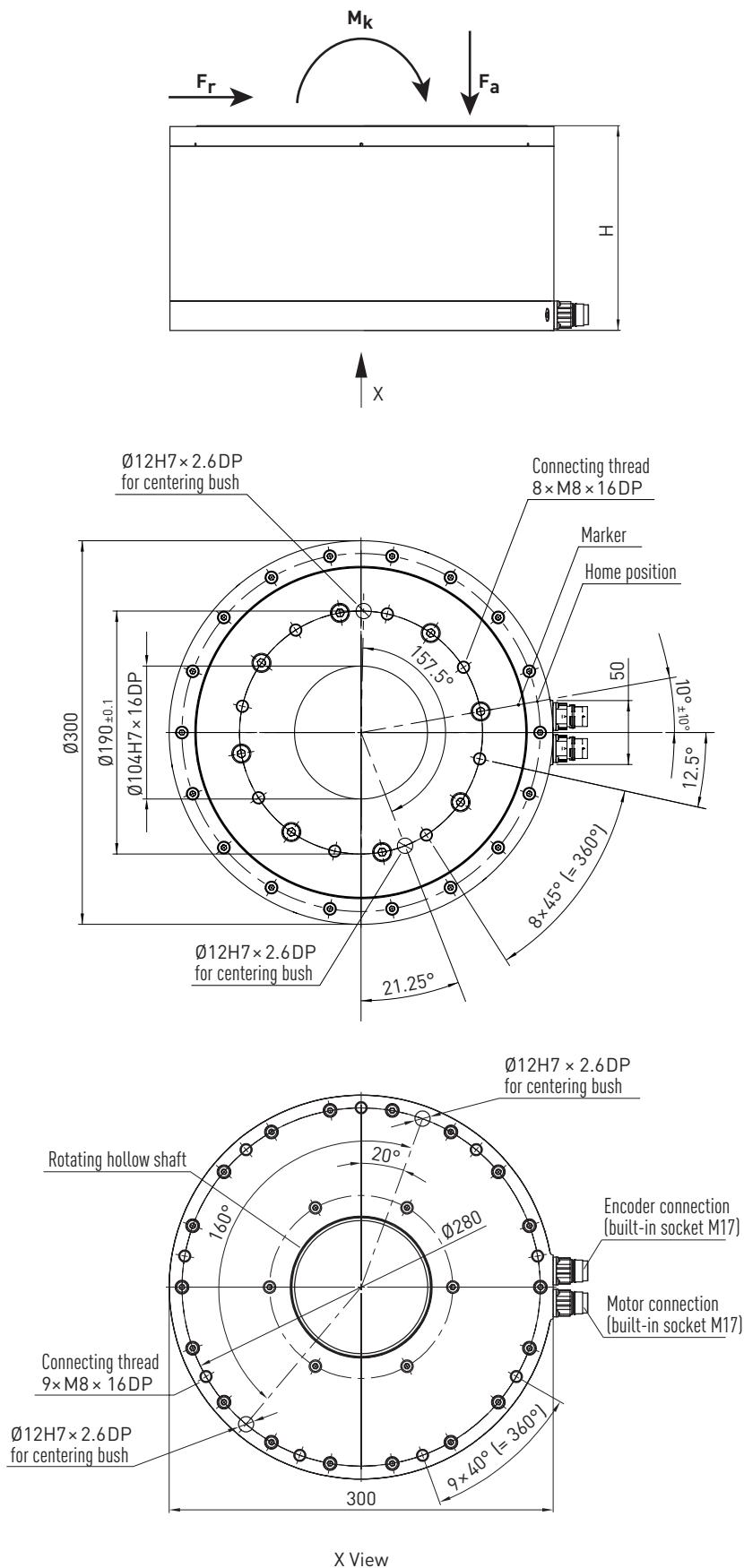
Encoder specifications
Type A: optical, incremental
- 5,400 lines/cycle
- Index mark
- Signal output sin/cos 1 V$_{PP}$

Dimensions of the TMS7 HIWIN rotary table
(For values, see Table 3.4)

Ø12H7 × 2.6 DP for centering bush

Connecting thread 8 × M8 × 16 DP

Marker

Home position

157.5°

50

10° ± 0.1°

12.5°

Ø300

Ø190 ±0.1

Ø104H7 × 16 DP

8 × 45° (= 360°)

Ø12H7 × 2.6 DP for centering bush

21.25°

Ø12H7 × 2.6 DP for centering bush

Rotating hollow shaft

20°

160°

Ø280

Encoder connection (built-in socket M17)

Motor connection (built-in socket M17)

Connecting thread 9 × M8 × 16 DP

Ø12H7 × 2.6 DP for centering bush

300

9 × 40° (= 360°)

X View

4. HIWIN rotary tables TMN

4.1 Characteristics of the TMN rotary tables

The particularly flat and light precision rotary tables of the TMN series are suited to all applications in which high rigidity and accuracy are needed along with the smallest dimensions possible. Typical areas of use include the manufacture of LEDs, solar cells and semiconductors. The zero-maintenance TMN rotary tables use precision bearings and optical encoders to achieve very high positioning and repeat accuracy.
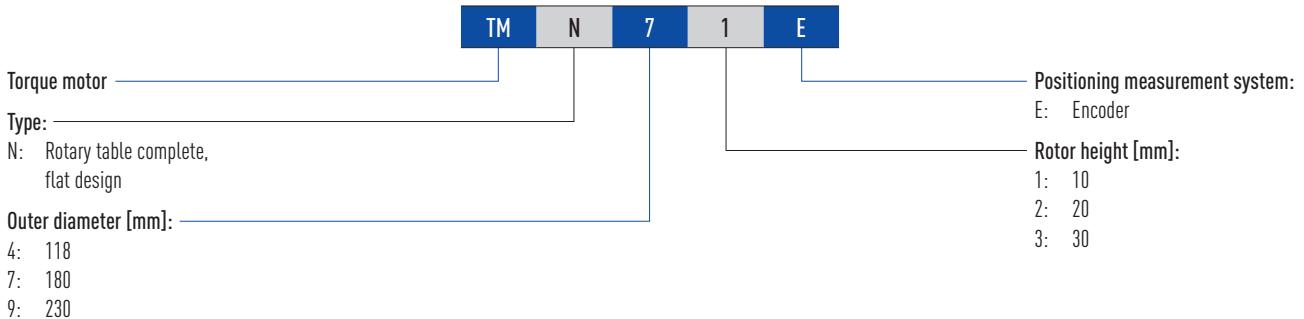
Key features:
o   Backlash-free and extremely dynamic
o   Extremely flat design
o   Integrated rotary encoder

Typical applications:
o   LED manufacture and testing
o   Production of solar cells
o   Manufacture of semiconductor components

4.2 Order code for TMN rotary tables

TM	N	7	1	E

Torque motor

Type:
N: Rotary table complete,
      flat design

Outer diameter [mm]:
4:   118
7:   180
9:   230

Positioning measurement system:
E: Encoder

Rotor height [mm]:
1:   10
2:   20
3:   30

4.3 Technical data for TMN

4.3.1 Technical data for TMN42

Torque-speed curves (DC bus voltage: 320/560 VDC)
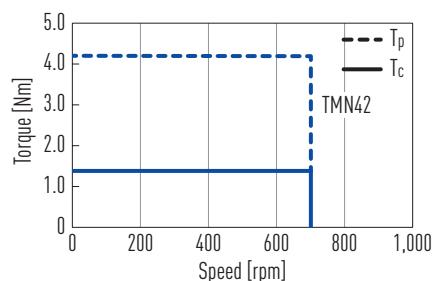


Table 4.1 **Technical data for TMN42 HIWIN rotary tables**			
	Symbol	**Unit**	**TMN42**
Technical data of rotary table			
Peak torque (for 1 sec.)	T_p	Nm	4.2
Continuous torque	T_c	Nm	1.4
Stall torque	T_s	Nm	0.98
Inertia of rotating parts	J	kgm^2	0.003
Weight	M_m	kg	2
Max. axial load	F_a	N	600
Max. radial load	F_r	N	600
Max. moment of tilt	M_k	Nm	30
Nominal speed (at 400 VAC)	n	1/min	700
Position accuracy		arc sec	± 45
Repeatability		arc sec	± 2.5
Radial run-out		mm	0.03
Axial run-out		mm	0.03
Height	H	mm	45
Protection class			IP40
Technical data of motor			
Peak current (for 1 sec.)	I_p	A_{eff}	4.5
Continuous current	I_c	A_{eff}	1.5
Motor constant	K_m	Nm/√W	0.4
Resistance [1]	R_{25}	Ω	4.59
Inductance [1]	L	mH	8.18
Electrical time constant	T_e	ms	1.78
Torque constant	K_t	Nm/A_{eff}	0.97
Back emf constant	K_u	V_{eff}/(rad/s)	0.56
Number of poles	2p		16
Thermal resistance	R_{th}	°C/W	4.84
Thermal time constant	T_{th}	s	1,170
Thermal sensor			PTC SNM 100
Max. DC Bus		V	600

All the specifications in the table (except dimensions) are in ± 10 % of tolerance at 25 °C ambient temperature
[1] Line-to-line

Encoder specifications (optical, incremental)
- 2,048 lines/cycle
- Index mark
- Signal output sin/cos 1 V_{PP}
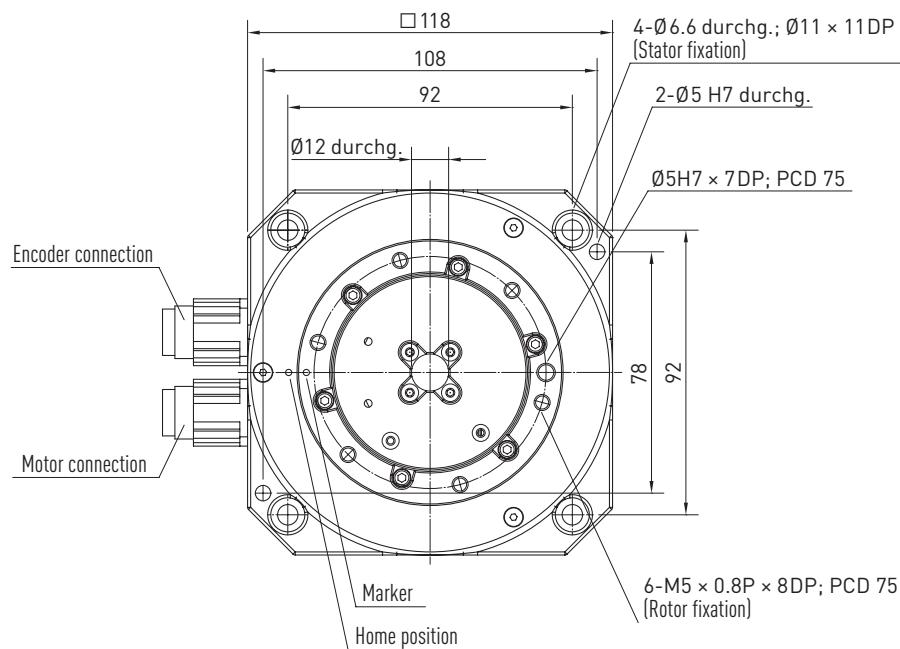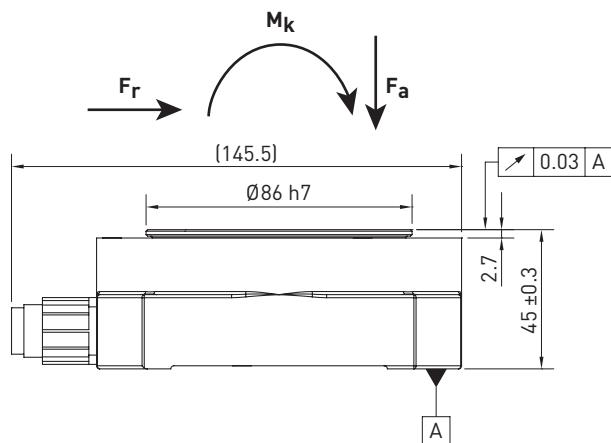
Rotary Tables

HIWIN rotary tables TMN

Dimensions of the TMN42 HIWIN rotary table
(For values, see Table 4.1)

4.3.2 Technical data for TMN71

Torque-speed curves (DC bus voltage: 320/560 VDC)
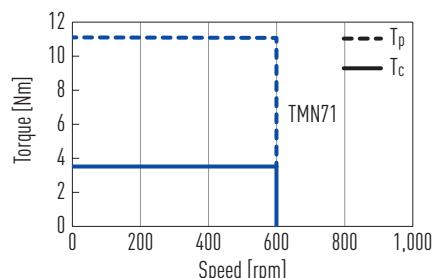
Table 4.2 **Technical data for TMN71 HIWIN rotary tables**			
	Symbol	**Unit**	**TMN71**
Technical data of rotary table			
Peak torque (for 1 sec.)	T_p	Nm	11.1
Continuous torque	T_c	Nm	3.7
Stall torque	T_s	Nm	2.59
Inertia of rotating parts	J	kgm^2	0.008
Weight	M_m	kg	3.5
Max. axial load	F_a	N	1,000
Max. radial load	F_r	N	1,000
Max. moment of tilt	M_k	Nm	50
Nominal speed (at 400 VAC)	n	1/min	600
Position accuracy		arc sec	± 45
Repeatability		arc sec	± 2.5
Radial run-out		mm	0.03
Axial run-out		mm	0.03
Height	H	mm	50
Protection class			IP40
Technical data of motor			
Peak current (for 1 sec.)	I_p	A_{eff}	10.2
Continuous current	I_c	A_{eff}	3.4
Motor constant	K_m	Nm/√W	0.6
Resistance [1]	R_{25}	Ω	2.22
Inductance [1]	L	mH	9.02
Electrical time constant	T_e	ms	4.1
Torque constant	K_t	Nm/A_{eff}	1.09
Back emf constant	K_u	V_{eff}/(rad/s)	0.63
Number of poles	2p		16
Thermal resistance	R_{th}	°C/W	1.95
Thermal time constant	T_{th}	s	1,420
Thermal sensor			PTC SNM 100
Max. DC Bus		V	600

All the specifications in the table (except dimensions) are in ± 10 % of tolerance at 25 °C ambient temperature
[1] Line-to-line

Encoder specifications (optical, incremental)
- 2,048 lines/cycle
- Index mark
- Signal output sin/cos 1 V_{PP}
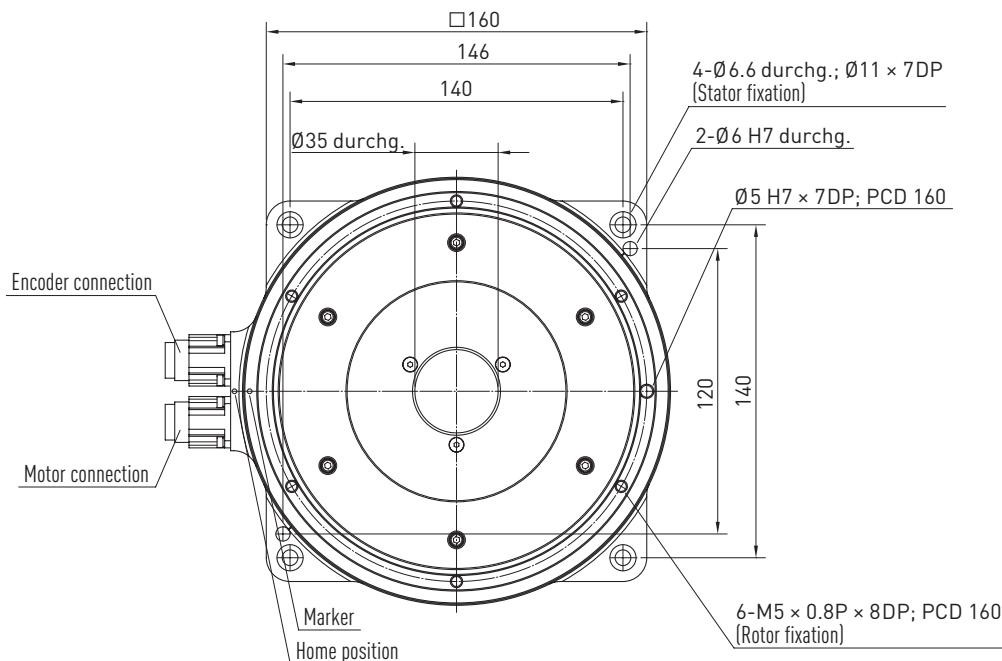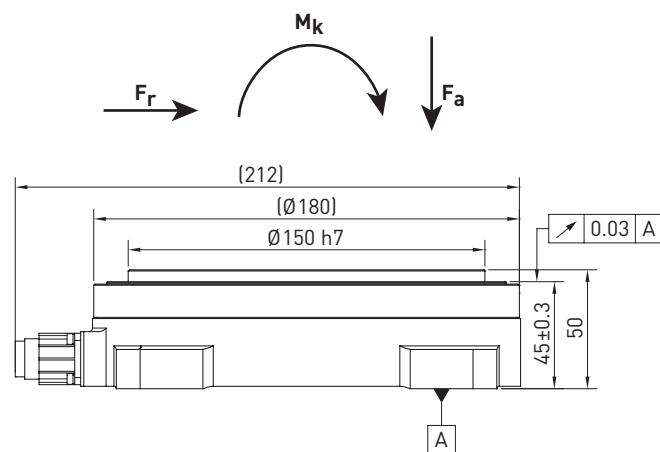
Rotary Tables

HIWIN rotary tables TMN

Dimensions of the TMN71 HIWIN rotary table
(For values, see Table 4.2)

4.3.3 Technical data for TMN93

Torque-speed curves (DC bus voltage: 320/560 VDC)
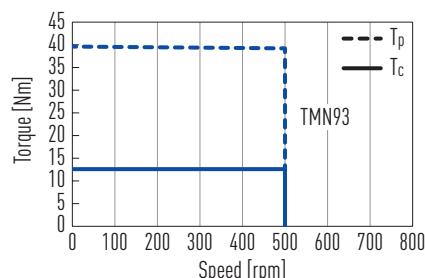
Table 4.3 **Technical data for TMN93 HIWIN rotary tables**	Symbol	Unit	TMN93
Technical data of rotary table			
Peak torque (for 1 sec.)	T_p	Nm	39.6
Continuous torque	T_c	Nm	13.2
Stall torque	T_s	Nm	9.24
Inertia of rotating parts	J	kgm^2	0.012
Weight	M_m	kg	7.5
Max. axial load	F_a	N	1,000
Max. radial load	F_r	N	1,000
Max. moment of tilt	M_k	Nm	50
Nominal speed (at 400 VAC)	n	1/min	500
Position accuracy		arc sec	± 45
Repeatability		arc sec	± 2.5
Radial run-out		mm	0.03
Axial run-out		mm	0.03
Height	H	mm	55
Protection class			IP40
Technical data of motor			
Peak current (for 1 sec.)	I_p	A$_{eff}$	10.2
Continuous current	I_c	A$_{eff}$	3.4
Motor constant	K_m	Nm/√W	1.5
Resistance[1]	R_{25}	Ω	4.3
Inductance[1]	L	mH	23.2
Electrical time constant	T_e	ms	5.4
Torque constant	K_t	Nm/A$_{eff}$	3.9
Back emf constant	K_u	V$_{eff}$/(rad/s)	2.25
Number of poles	2p		22
Thermal resistance	R_{th}	°C/W	1.01
Thermal time constant	T_{th}	s	1,780
Thermal sensor			PTC SNM 100
Max. DC Bus		V	600

All the specifications in the table (except dimensions) are in ± 10 % of tolerance at 25 °C ambient temperature
[1] Line-to-line
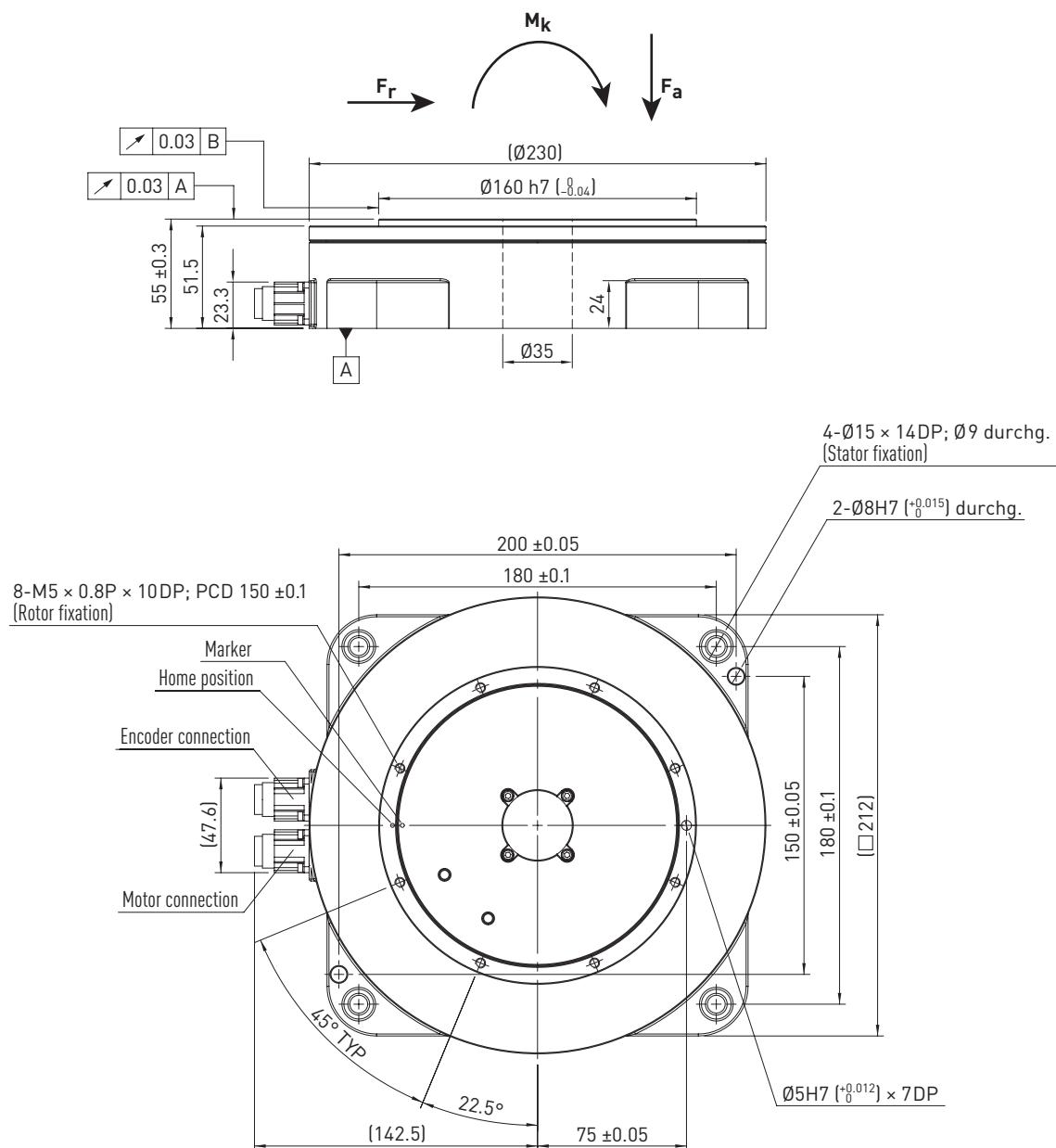
Encoder specifications (optical, incremental)
- 3,600 lines/cycle
- Index mark
- Signal output sin/cos 1 V$_{PP}$

Rotary Tables

HIWIN rotary tables TMN

Dimensions of the TMN93 HIWIN rotary table
(For values, see Table 4.3)

Rotary Tables

Notes
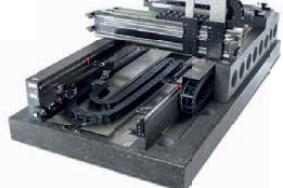
Linear Guideways

Ballscrews

Linear Motor Systems

Linear Axes

Linear Actuators

Robots

Linear Motor Components

Rotary Tables

Drives & Servo Motors

Germany
HIWIN GmbH
Brücklesbünd 2
D-77654 Offenburg
Phone   +49 (0) 7 81 9 32 78 - 0
Fax   +49 (0) 7 81 9 32 78 - 90
info@hiwin.de
www.hiwin.de

Taiwan
Headquarters
HIWIN Technologies Corp.
No. 7, Jingke Road
Taichung Precision Machinery Park
Taichung 40852, Taiwan
Phone +886-4-2359-4510
Fax   +886-4-2359-4420
business@hiwin.tw
www.hiwin.tw

Taiwan
Headquarters
HIWIN Mikrosystem Corp.
No. 6, Jingke Central Road
Taichung Precision Machinery Park
Taichung 40852, Taiwan
Phone +886-4-2355-0110
Fax   +886-4-2355-0123
business@hiwinmikro.tw
www.hiwinmikro.tw

France
HIWIN France s.a.r.l.
20 Rue du Vieux Bourg
F-61370 Echauffour
Phone   +33 (2) 33 34 11 15
Fax   +33 (2) 33 34 73 79
info@hiwin.fr
www.hiwin.fr

Italy
HIWIN Srl
Via Pitagora 4
I-20861 Brugherio (MB)
Phone   +39 039 287 61 68
Fax   +39 039 287 43 73
info@hiwin.it
www.hiwin.it

Poland
HIWIN GmbH
ul. Puławska 405a
PL-02-801 Warszawa
Phone +48 22 544 07 07
Fax   +48 22 544 07 08
info@hiwin.pl
www.hiwin.pl

Switzerland
HIWIN Schweiz GmbH
Eichwiesstrasse 20
CH-8645 Jona
Phone   +41 (0) 55 225 00 25
Fax   +41 (0) 55 225 00 20
info@hiwin.ch
www.hiwin.ch

Slovakia
HIWIN s.r.o., o.z.z.o.
Mládežnicka 2101
SK-01701 Považská Bystrica
Phone +421 424 43 47 77
Fax   +421 424 26 23 06
info@hiwin.sk
www.hiwin.sk

Czech Republic
HIWIN s.r.o.
Medkova 888/11
CZ-62700 BRNO
Phone +42 05 48 528 238
Fax   +42 05 48 220 223
info@hiwin.cz
www.hiwin.cz

Netherlands
HIWIN GmbH
info@hiwin.nl
www.hiwin.nl

Austria
HIWIN GmbH
info@hiwin.at
www.hiwin.at

Slovenia
HIWIN GmbH
info@hiwin.si
www.hiwin.si

Hungary
HIWIN GmbH
info@hiwin.hu
www.hiwin.hu

China
HIWIN Corp.
www.hiwin.cn

Japan
HIWIN Corp.
mail@hiwin.co.jp
www.hiwin.co.jp

USA
HIWIN Corp.
info@hiwin.com
www.hiwin.com

Korea
HIWIN Corp.
www.hiwin.kr

Singapore
HIWIN Corp.
www.hiwin.sg