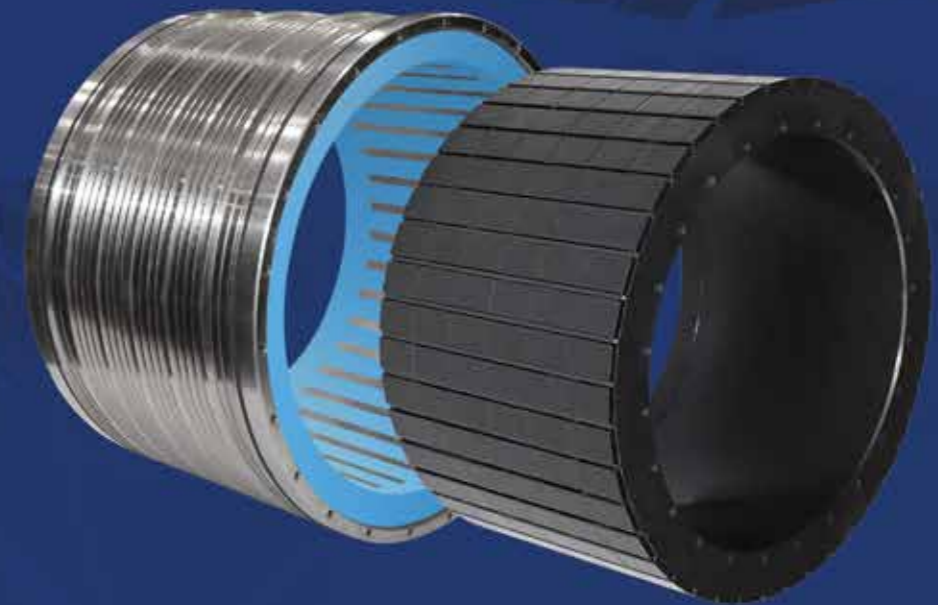


[www.phase.eu](http://www.phase.eu)

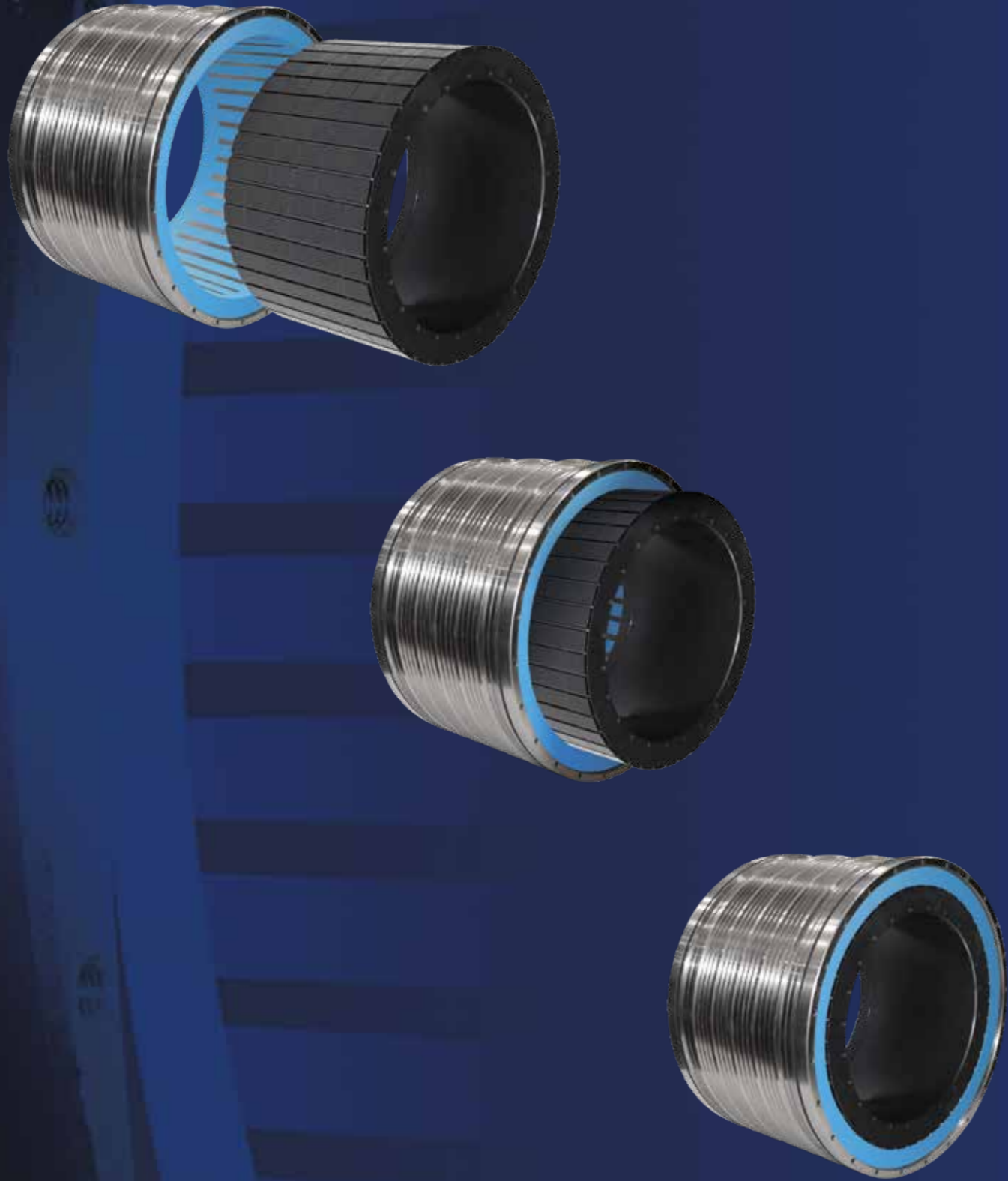
# TKH

SUPER HIGH TORQUE DENSITY, THIN RING TORQUE MOTOR SERIES



Phase Motion Control S.p.A.

Via Luigi Cibrario, 4 - 16154 Genova - Italy - Tel. +39 010 835161 - Fax +39 010 9998872 - P.IVA 03425740101



# TKH

## SUMMARY

- 04. COMPANY PROFILE
- 06. BACK TO ITALY
- 09. TKH GENERAL OVERVIEW
- 10. TKH CHARACTERISTICS
- 13. WHY TKH?
- 15. MOTOR SELECTION GUIDE
- 16. DETAIL SPECS
- 62. SERVICE & NETWORK



30%

*OF THE WORKFORCE IS DEDICATED TO R&D.  
PHASE OPERATES AND CONTINUOUSLY DEVELOPS ITS OWN  
TECHNOLOGIES AND INTERNATIONAL PATENTS IN THE GENOA HQ.  
INNOVATION AND R&D COEXIST WITH AUTOMATED  
PRODUCTION IN THE NEW GENOA BLUE GATE PLANT.*

## SW, FW, HW: ELECTRONIC AND ELECTROMECHANICAL COMPONENTS AND SOLUTIONS FOR CONTINUOUS PROGRESS IN MOTION CONTROL

### TKH – THIRD GENERATION DIRECT DRIVE TECHNOLOGY

Phase Motion Control first introduced **built-in Direct Drives** in co-engineered, customized applications back in **1992**. This progress, removing the flexure and nonlinearities (backlash and stick-slip) of all mechanical linkages, unleashed a **new level of performance** in terms of **accuracy, response speed** and **control bandwidth**. After 30 years of continuous innovation with DDs ranging from 30 mm to 18 m diameter, Phase is now introducing a **third generation frameless motor series** to push forward the limits of available performance again.

### Phase Motion Control is this:

1. The aim of the Company is to **expand scientific knowledge** and to progress **technology** through **invention, design and efficient production of innovative devices** in the field of **cybernetics, motion control and energy conversion**, in the belief that the advance of science is as much the **driving force of humanity** as it is the only means of offering **the best future for all living beings**.
1. The Company aims to make a profit, because **profit guarantees growth, independence and freedom of choice**, all factors which contribute towards the pursuit of its aims. Any profit which requires non ethical methods or which does not work towards the aims of the Company will not be pursued
2. As **innovation and discovery** are exclusive to **individual creativity**, the Company considers its human capital at all levels to be the key asset of the firm and places it at the center of its interests. Accordingly, the Company promotes and demands **behavior which is ethical, just and open**, both internally and in its external relationships, in the belief that this is the only principle capable of guaranteeing the growth of any social group in the long term.

## PHASE MOTION CONTROL S.P.A. THE EXPERTISE CENTRE IN POWER ELECTRONICS AND ENERGY CONTROL

Phase Motion Control operates according to the Integrated Management System (IMS) for Quality, Health, Safety, and the Environment, certified by **TÜV SÜD** in 2022, based on **ISO 9001:2015, ISO 45001:2018, and ISO 14001:2015**.

Continuous innovation is fed by an interdisciplinary and intercompany team, spanning magnetics, mechanics, power electronics, advance electrochemistry and material science, both internally and via co-engineering with Customers, suppliers and partners, to define the moving frontier of energy technology.



## BACK TO ITALY

THE TKH SERIES IS DESIGNED TO BE ENTIRELY MANUFACTURED IN ITALY WITH A MOSTLY LOCAL SUPPLY CHAIN AND INTERNAL PRODUCTION. THIS PROVIDES A SHORTER AND MORE RELIABLE SUPPLY CHAIN, INCREASED FLEXIBILITY AND FASTER RESPONSE TIMES.

THE HIGHLY MODULAR DESIGN IS OPTIMIZED TO GUARANTEE FASTER AVAILABILITY OF PARTS, REDUCING THE RISK OF STOCK SHORTAGES AND DOWNTIME.



High density, low radial width winding



Custom automatic winding equipment with on line testing



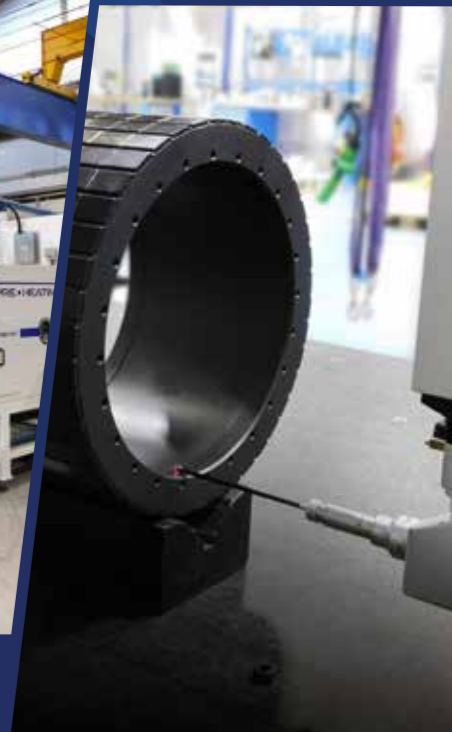
High speed machining



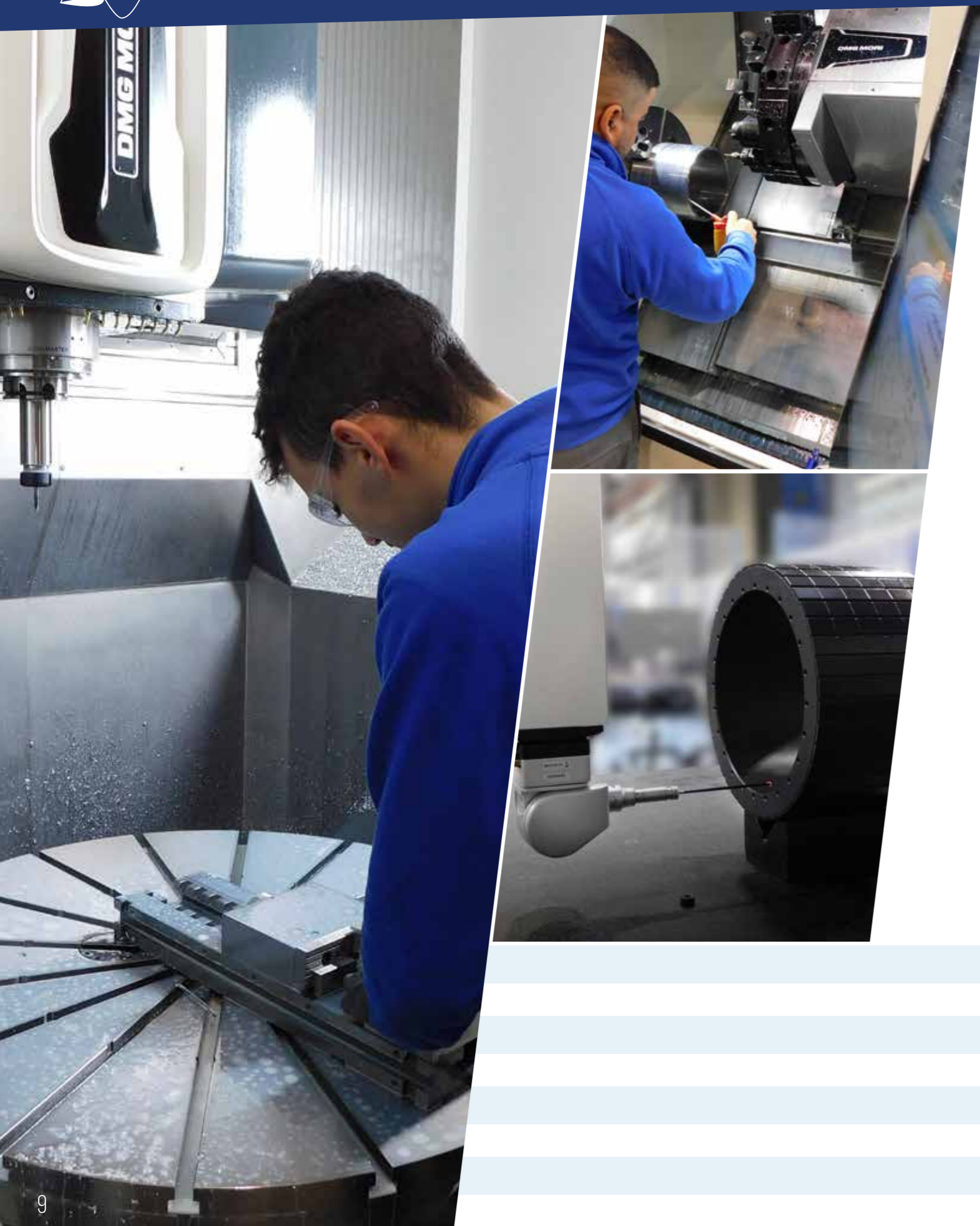
Rapid prototyping



Automated vacuum potting



NC testing and certification



## TKH HIGH TORQUE DENSITY THIN PROFILE FRAMELESS PM MOTORS

Designed to deliver exceptional performance in peak and continuous torque density, low to medium speed, with fast positioning ability. Equipped with cutting-edge technology such as an innovative electromagnetic circuit and magnet dovetail positive locking, the TKH series can handle even the most demanding applications requiring both low speed and fast transient positioning. The accurate magnetic circuit design and strict manufacturing tolerance design ensure low cogging ripple and smooth torque delivery.

## UNLOCK THE FULL POTENTIAL OF YOUR AUTOMATION AND MOTION CONTROL WITH THE TKH SERIES

## KEY PERFORMANCE AND RANGE

*11 DIFFERENT TKH SIZES, SPLIT INTO 100+ VARIANTS*

*ACTIVE STATOR LENGTH STACK UP TO 200 mm*

*EXTERNAL FRAME DIAMETER OPTIONS FROM 230 mm TO 1020 mm*

*INTERNAL ROTOR / SHAFT DIAMETER OPTIONS FROM 140 mm TO 860 mm*

*CONTINUOUS RATED TORQUE VALUES RANGING FROM 108 Nm TO 18700 Nm*

*PEAK TORQUE UP TO 30000 Nm*

*MAX SPEED UP TO 2300 rpm*

## TKH CHARACTERISTICS

Engineered to excel in demanding applications, the TKH “frameless” motors are designed to be built into the equipment they are intended to drive, and to ride on the bearings of the equipment. They feature a three-phase stator, vacuum encapsulated in epoxy, assembled into a steel frame which carries the male part of the cooling circuit and its seals, and rare earth magnets and steel rotor, with an overall IP 20 protection rating. Actual motor protection is realized by the application.

TKH motors are designed to provide the best mechanical characteristics, with the most efficient cooling and the smallest machine footprint. These are obtained with novel, optimized magnetic design, special high density winding and a new high thermal conductivity vacuum potting epoxy resin.

### STATOR CHARACTERISTICS

The TKH motors are the perfect choice for applications where compact size, high efficiency and absolute reliability are of the utmost importance. The TKH series boasts a new encapsulant (currently undergoing Class H development) with superior resistance to thermal cycling, exceptional thermal transfer and high peak temperature capability. This results in unparalleled thermal efficiency, making it an ideal choice for precision machines that are sensitive to thermal drift.

The TKH motors are engineered with a state-of-the-art winding concept, featuring surge-hardened Class H insulation, specifically designed for high  $\Delta V/\Delta t$  according to IEC 60034-18-42:2017 Class 3 (Severe) standards. This reinforced insulation allows operation with DC bus voltage up to 750 Vdc, making the TKH series the perfect solution for demanding servo drive applications.



The TKH series undergo rigorous testing to ensure the highest level of safety and performance, including a 4.5 kVdc phase-to-ground insulation voltage test for 60 seconds as well as 100% partial discharge testing.

TKH motors are equipped with a winding star point, which can be used for filtering purposes. The power leads are insulated with Radox 155, a material known for its exceptional mechanical and thermal resistance properties. This insulation ensures that the device operates reliably under a wide range of temperatures and conditions, making it a suitable option for various industrial and commercial applications. TKH motors are equipped with two PT 1000 and three PTC 155 sensor probes. The PTCs are placed on each phase and are used for protection, while the redundant PT 1000 sensors are intended for temperature monitoring and are double insulated to protect the drive circuitry.

### ROTOR CHARACTERISTICS

The permanent magnet rotors of the TKH series are isotropic, surface magnet type. Magnets are fastened mechanically on a magnetic circuit optimized to minimize cogging and ripple. This design provides for a very thin ring rotor. The coated FeNdB high temperature magnets ensure stability up to the max class temperature. The rotor to machine mechanical interface is realized out of machined C40 steel, uncoated and manufactured to Grade 8 tolerance, not balanced. **It is optimized for continuous peripheral speed of up to 10 m/sec.**

### COOLING FRAME

The stator frame carries the inner part of the cooling circuit. The special cooling circuit is designed for maximum heat exchange with minimal pressure drop and efficient, uniform temperature control of the stator. The cooling circuit is completed by inserting the stator, complete with the peripheral O-rings, in the cylindrical assembly cavity of the application. Cooling fluid can be either water-glycole with a ionic stabilizer, or oil, with some derating. Care must be taken to avoid galvanic corrosion in the cooling circuit. Refer to TK manual for specific guidelines. The motor is equipped with one or two O-rings on each side to seal the cooling circuit and an intermediate leakage collection ring to protect against damage in case of O-ring failure, ensuring reliable operation.

**For specialized applications**, oil cooling is also an option. While not as thermally efficient, oil cooling has good dielectric properties and provides added protection against leaks. When oil cooling is chosen, a 10% S1 torque derating is to be expected, as well as increased coolant flow and pressure drop compared to water/glycol systems. If oil cooling is required, a custom specification will be issued which will define performance derating and flow requirements.

Standard frames are machined out of C50 steel, normalized and phosphate conversion coating protected. This enhances corrosion resistance and improves performance while extending the service life of the system. Standard tolerance grade 8, higher accuracy can be supplied on demand.

All motors are equipped with 1 m power and sensor cables. This allows for easy integration and installation in various applications. Longer cables are discouraged as they increase the whole motor vulnerability.



*Assembly of the rotor into to stator is a critical process, due to intense magnetic forces and potential high voltage generation. This process needs special care and cannot be approached without specific preparation and tooling. Please refer to the user manual for detailed instructions and prescriptions.*





## WHY TKH?

The TKH design offers several advanced features which make them unique:

- > 20% TORQUE INCREASE OVER TK SERIES
- HIGHEST CONTINUOUS TORQUE DENSITY
- SUPER THIN RING DESIGN
- IMPROVED RESISTANCE TO THERMAL CYCLING WITH NEW CLASS H ENCAPSULANT
- UNMATCHED THERMAL EFFICIENCY FOR TEMPERATURE SENSITIVE, PRECISION MACHINES
- MAGNETIC DESIGN OPTIMIZED FOR LINEARITY IN OVERLOAD
- LOW COGGING AND RIPPLE TORQUE FOR SMOOTH OPERATION
- OPTIMIZED WATER COOLING CIRCUIT WITH CORROSION RESISTANT COATING
- HIGH DENSITY WINDING: LOWER LOSS, BETTER HEAT TRANSFER COMPARED TO CONVENTIONAL DESIGNS
- UL LISTING OPTION, AVAILABLE IN CLASS F
- SURGE HARDENED WINDING INSULATION FOR HIGH VOLTAGE OPERATION UP TO 750 VDC
- LIGHTWEIGHT AND SLIM DESIGN FOR EASY INTEGRATION
- FAST DELIVERY WITH MODULAR DESIGN
- MADE IN ITALY



## MOTOR SELECTION GUIDE

### CHOOSING THE RIGHT TKH MOTOR FOR YOUR APPLICATION

The TKH series of electric motors covers a wide range of diameters, which can in turn be realized with different stack lengths and windings. The large number of potential combinations can fit all specific needs. Special windings and stack lengths are available at the expense of a longer delivery. TKH motors are supplied as separate stator and rotor units, pre-assembled units with locking brackets are available on request.

## TKH CODING

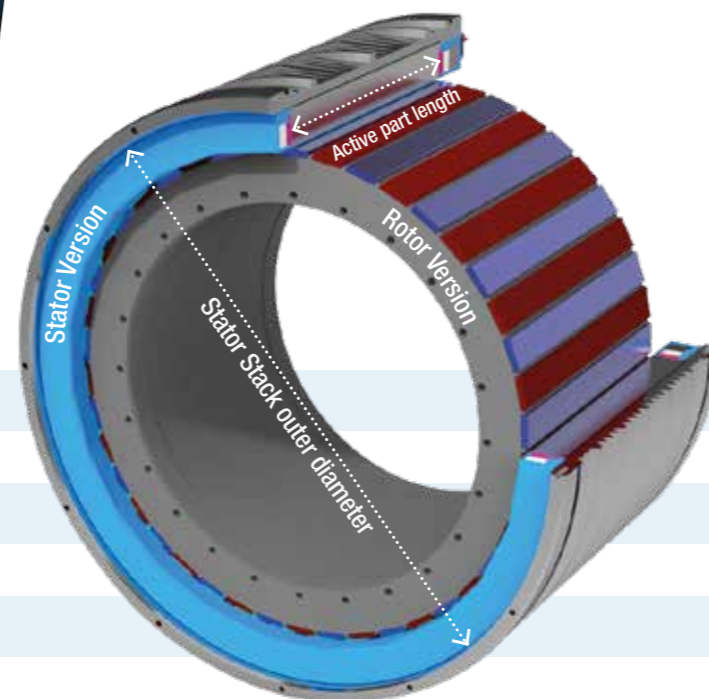
### GENERAL CODING SYSTEM FOR TKH MOTORS:

**TKH . XXX . YYY . ZZZ . KK**

**TKH**  
Motor Series

**Stator Stack outer diameter**  
as reported in the detailed  
mechanical drawings

**Motor version**  
First letter identifies the stator version  
Second letter identifies the rotor version  
Standard unit: AA



**Active part length**

**Approximate torque constant**  
Kt coding example as reported below:  
YYY.032 means 3,2 Nm/A  
YYY.32 means 32 Nm/A  
YYY.320 mean 320 Nm/A

*It is possible to order a single stator and rotor with a specific code,  
adding the following tag (ST/RT) to the main code:*

**TKHST.XXX.YYY.ZZZ.K**

**TKHRT.XXX.YYY.ZZZ. K**

It's important to ensure that the correct code is used in order to receive the correct motor specifications and configurations for your application.



# QUICK SELECTION GUIDE

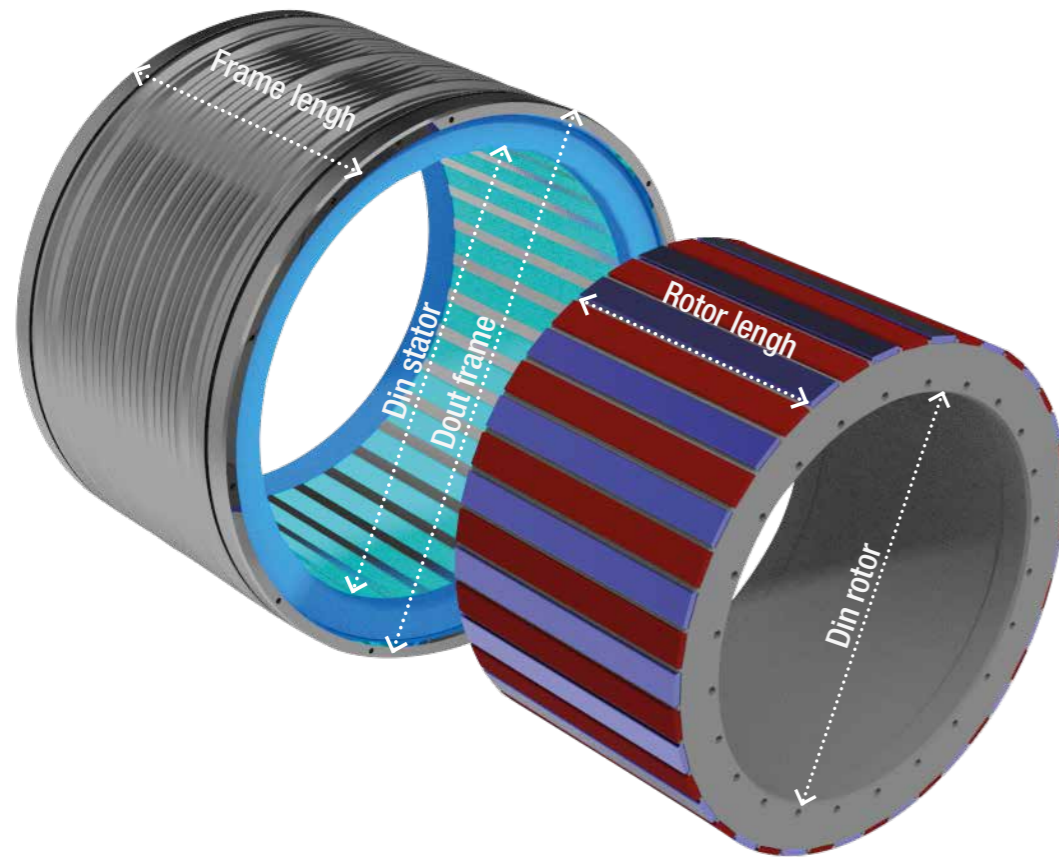
## AVAILABLE TORQUE AND DIAMETER RANGE

TKH motors offer a wide range of torque and diameter options to meet various application needs.

The available torque range and outside diameter options for TKH motors are:

- Outside diameters ranging from 230 to 1020 mm
- Different stack length modules in finite steps from 50 to 200 mm
- Winding configurations for different torque constant

Custom stack lengths and windings are available on demand.



Note: The data reported are the maximum values for each TKH typology. Please refer to the motor mechanical drawings for more details.

### SUMMARY OF AVAILABLE SIZES

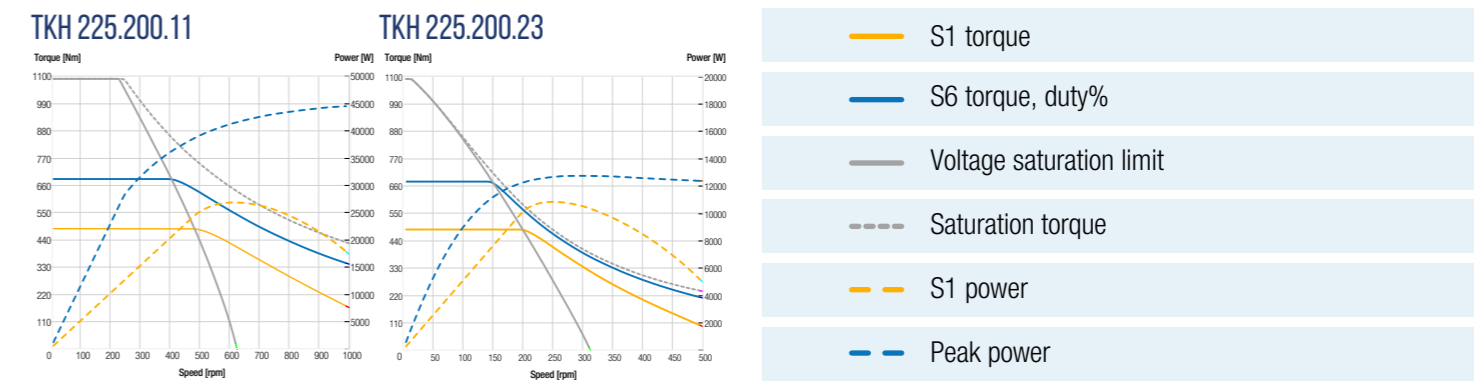
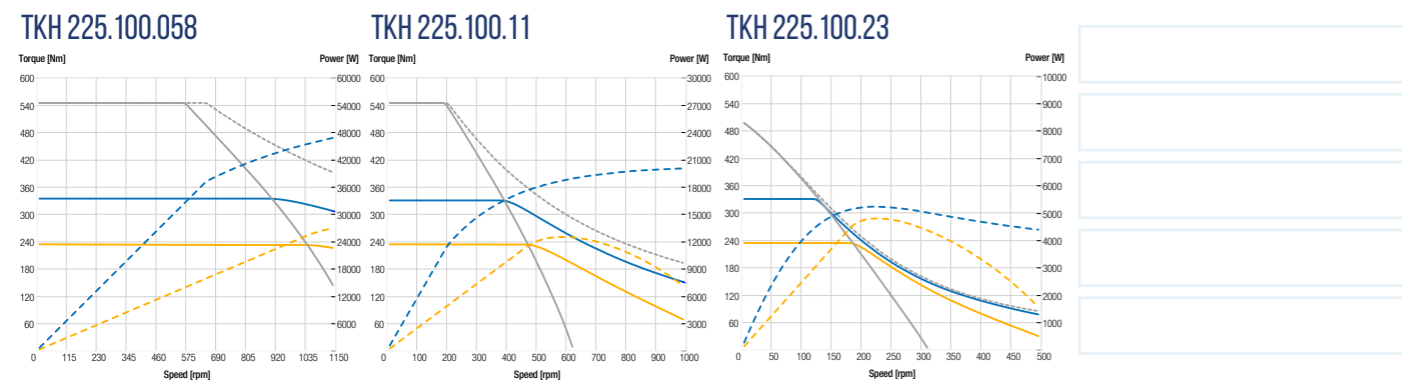
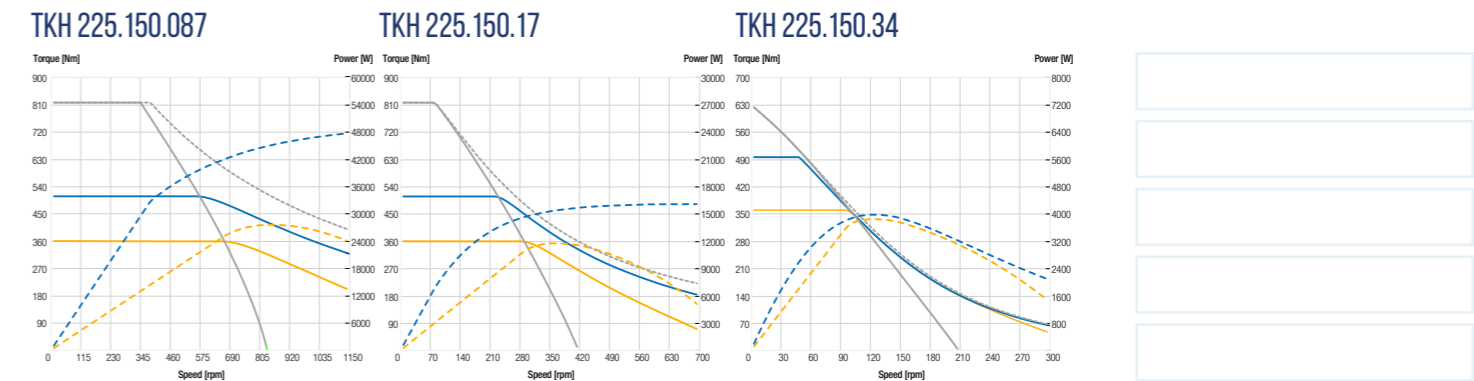
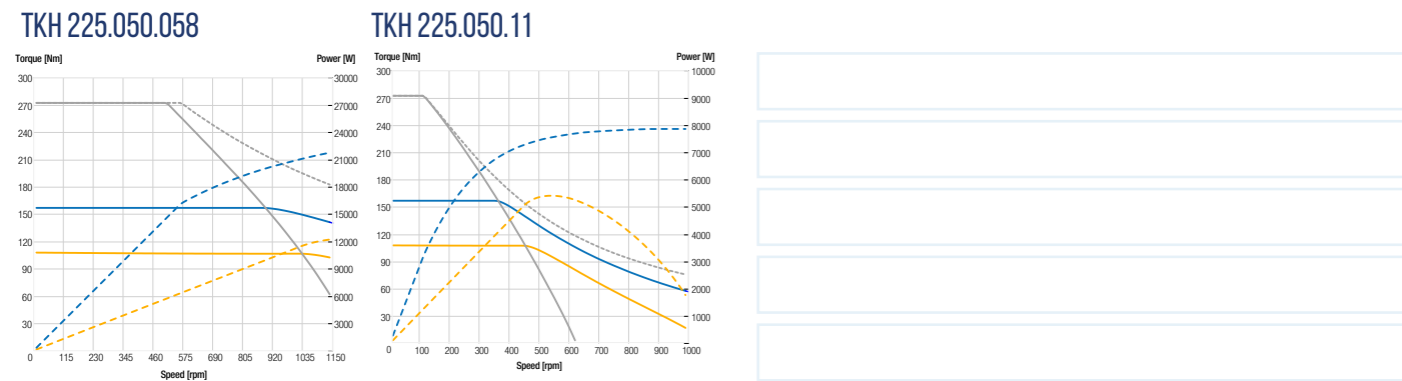
TKH MOTOR CODE		MECH DIMENSIONS					MAIN PERFORMANCES								
TKH code	Stack	Dout frame [mm]	Din stator [mm]	Din rotor [mm]	Frame length [mm]	Rotor length [mm]	Continuous Torque min - max [Nm]		Peak Torque min - max [Nm]		Knee Speed min - max [rpm]		Max Continuous Speed min - max [rpm]		Max Transient Speed min - max [rpm]
TKH 225	50	230	170	140	90	51	102	105	255	255	445	1015	1000	1150	2300
	100	230	170	140	140	101	230	230	480	520	180	1010	500	1150	2300
	150	230	170	140	190	151	360	360	600	785	95	650	300	1150	2300
	200	230	170	140	240	201	485	485	1050	1050	195	470	500	1000	2300
TKH 295	50	310	255	220	91	51	230	230	550	570	174	680	450	770	1540
	100	310	255	220	141	101	505	510	800	1150	60	680	220	770	1540
	150	310	255	220	191	151	790	790	1650	1700	100	405	330	770	1540
TKH 365	50	385	304	260	94	51	420	460	825	850	105	1100	650	650	1280
	100	385	304	260	144	101	1000	1000	1650	1700	40	510	430	650	1280
	150	385	304	260	194	151	1570	1570	2550	2550	60	330	650	650	1280
	200	385	304	260	244	201	2150	2150	3400	3400	40	235	600	650	1280
TKH 445	50	475	380	335	94	51	700	700	1250	1250	60	860	400	500	1000
	100	475	380	335	144	101	1550	1550	2550	2550	60	405	500	500	1000
	150	475	380	335	194	151	2400	2500	3850	3850	35	260	460	500	1000
TKH 525	50	555	456	410	101	51	950	1000	1840	1890	40	740	270	420	840
	100	555	456	410	151	101	2250	2300	3790	3800	40	330	420	420	840
	150	555	456	410	201	151	3453	3550	5650	5710	20	215	300	420	840
	200	555	456	410	251	201	4800	4800	7620	7620	25	155	420	420	840
TKH 595	50	630	532	485	101	51	1250	1360	2450	2450	70	630	360	360	720
	100	630	532	485	151	101	2950	3000	5000	5000	25	290	300	360	720
	150	630	532	485	201	151	4680	4700	7500	7600	85	185	360	360	720
TKH 675	50	710	608	560	103	51	1770	1800	3250	3300	50	263	320	320	640
	100	710	608	560	153	101	3800	4000	6600	6650	50	250	320	320	640
	150	710	608	560	203	151	6300	6300	9900	9900	30	160	320	320	640
TKH 745	50	790	684	635	105	51	2150	2200	4100	4100	40	235	250	300	570
	100	790	684	635	155	101	4800	4950	8350	8400	25	225	300	300	570
	150	790	684	635	205	151	7600	7600	12500	12600	40	145	300	300	570
TKH 825	50	865	760	710	105	51	2700	2750	5000	5000	30	210	250	250	500
	100	865	760	710	155	101	6100	6200	10000	10000	30	200	250	250	500
	150	865	760	710	205	151	9500	9500	15500	15500	25	130	250	250	500
	200	865	760	710	255	201	12900	12900	20500	20500	40	95	250	250	500
TKH 895	50	940	836	785	105	51	3050	3350	6000	6000	25	400	160	230	460
	100	940	836	785	155	101	7360	7400	12500	12650	85	185	230	230	460
	150	940	836	785	205	151	11500	11500	19000	19000	55	120	230	230	460
TKH 975	50	1020	912	860	105	51	3900	4000	7450	7450	35	175	210	210	420
	100	1020	912	860	155	101	8800	9000	15000	15000	20	170	210	210	420
	150	1020	912	860	205	151	13800	13800	22500	22500	20	105	210	210	420
	200	1020	912	860	255	201	18700	18700	30000	30000	20	80	210	210	420

TKH 225		050-058	050-11	100-058	100-11	100-23	150-087	150-17	150-34	200-11	200-23
Rated Torque	① Nm	102	105	230	230	230	360	360	360	485	485
Knee Speed	② rpm	1015	445	1010	460	180	650	280	95	470	195
Rated Current	① A	19	9,7	42	21	10,5	44	22	11	45	22
Torque Constant	Nm/A	5,8	11,6	5,8	11,6	23,2	8,7	17,4	34,9	11,6	23,2
Rated Power	① ② kW	11	5	24	11	4	24,5	10,5	3,5	24	10
Peak Torque	Nm	255	255	520	520	480	785	785	600	1050	1050
Peak Current	A	65	31,6	129	64	27,8	130	65	21	130	65
S6 Torque (duty 40%, 60s cycle)	① Nm	157	157	334	330	330	508	508	496	685	677
Rated Torque at 0 rpm	① Nm	78	78	170	170	170	260	260	260	350	350
Maximum Continuous Speed	③ rpm	1150	1000	1150	1000	500	1150	700	300	1000	500
Maximum Transient Speed	rpm	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300
Motor Constant	Nm/√W	3,32	3,32	5,45	5,45	5,45	7,11	7,11	7,11	8,5	8,5
Number of Poles	-	28	28	28	28	28	28	28	28	28	28
Back EMF Constant at 20°C	V*s	3,35	6,7	3,35	6,7	13,4	5,03	10,06	20,13	6,7	13,42
Thermal Time Constant	s	165,4	165,4	139,3	138,8	138,5	130,3	130	130	125,8	125,6
Minimum Coolant Flow (Δt 10°C)	l/min	2,4	2,8	5,1	4,9	4,7	6,9	6,7	6,6	8,6	8,4
Rotor Inertia	kg*m <sup>2</sup>	0,012	0,012	0,021	0,021	0,021	0,030	0,030	0,030	0,040	0,040
Rotor Mass	kg	3	3	5,9	5,9	6	8,8	8,8	9	11,6	11,6
Stator Mass	kg	13,1	13,1	20,1	20,1	20	26,9	26,9	27	33,8	33,8
Motor Loss	④ kW	1,69	1,68	2,98	2,98	2,98	4,17	4,17	4,17	5,3	5,3

**TEST CONDITIONS**

- ① Coolant inlet temperature 20 °C
- ② 600 V DC\_Bus
- ③ For higher speed application contact our technical team
- ④ At Rated Power

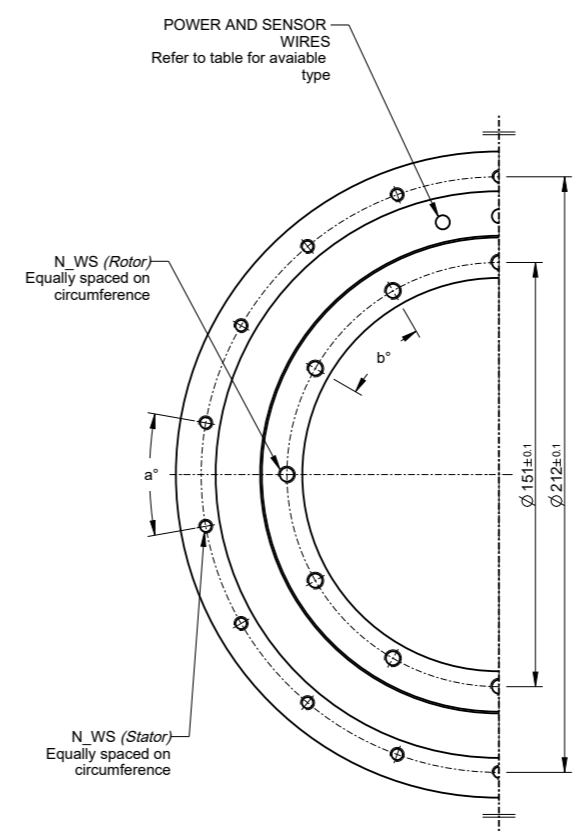
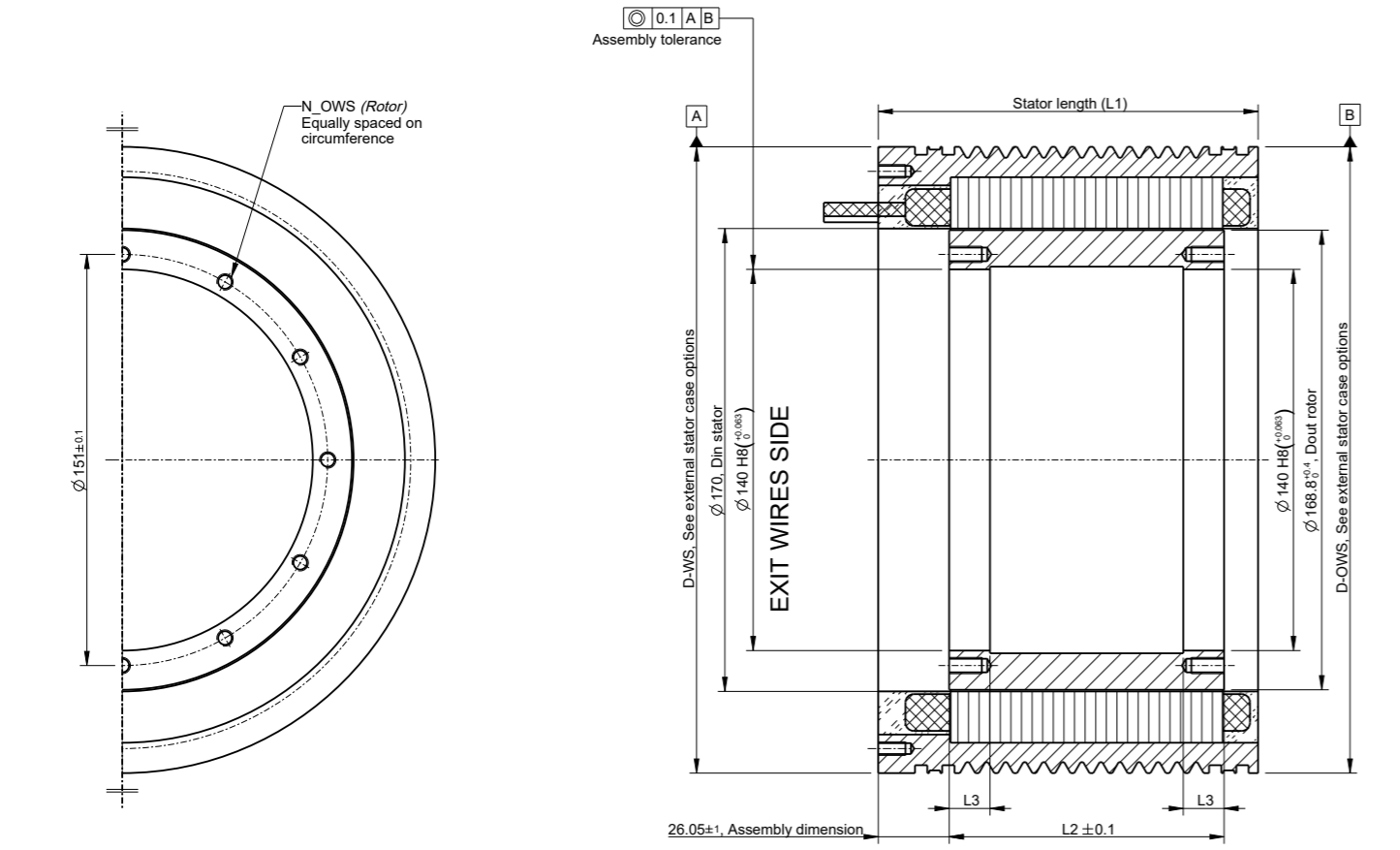
**TORQUE SPEED DIAGRAMS**



- S1 torque
- S6 torque, duty%
- Voltage saturation limit
- Saturation torque
- S1 power
- Peak power

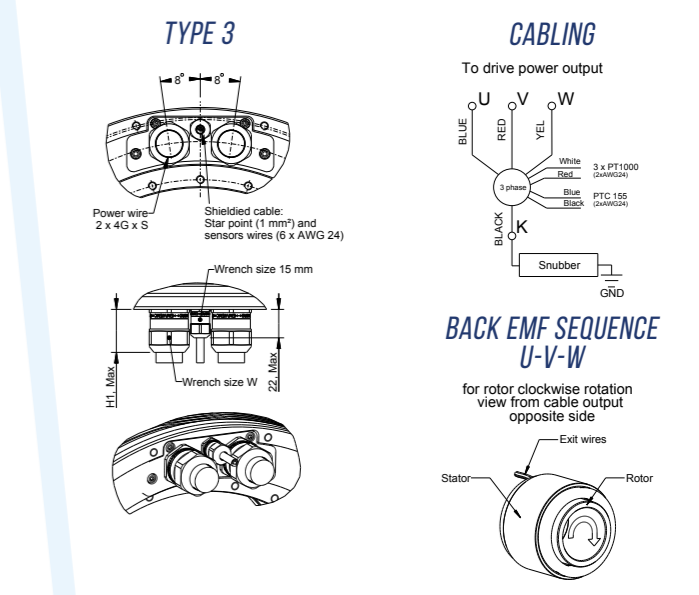
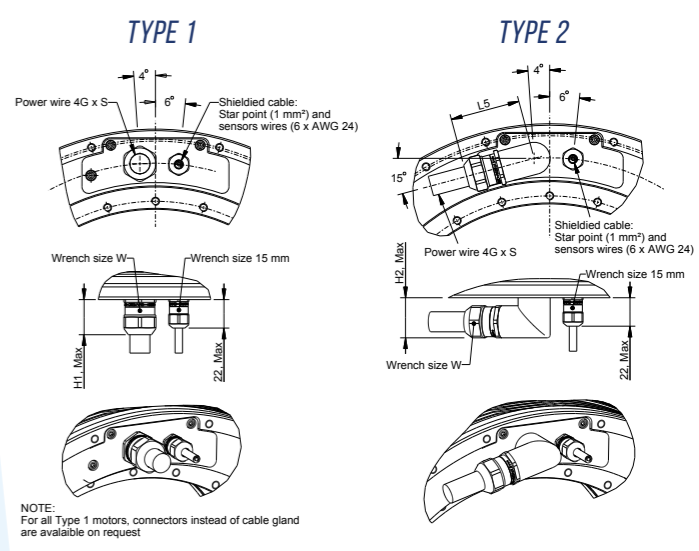
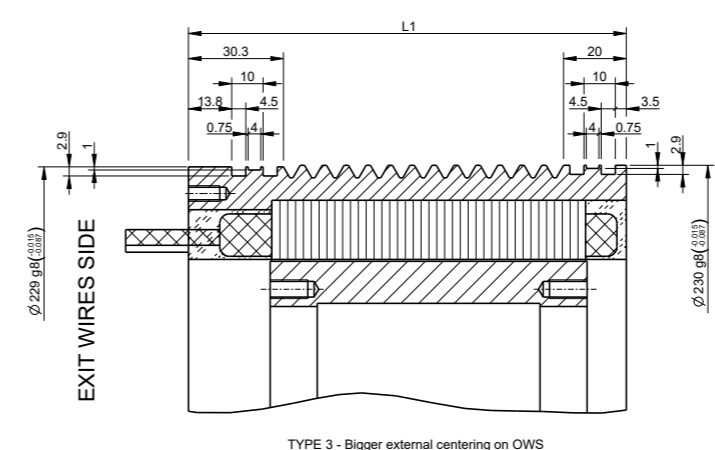
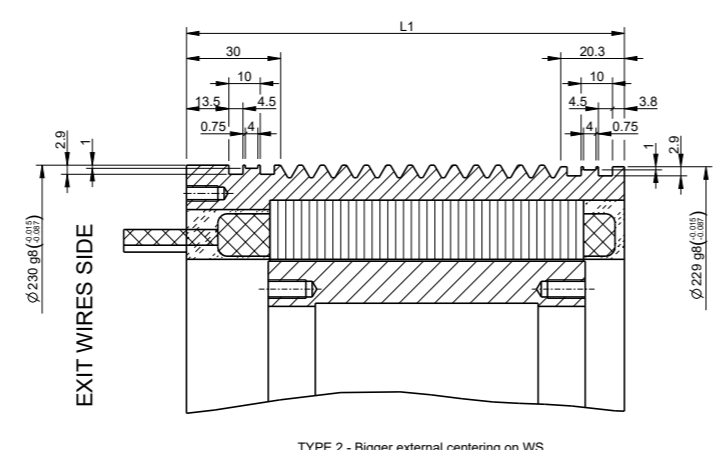
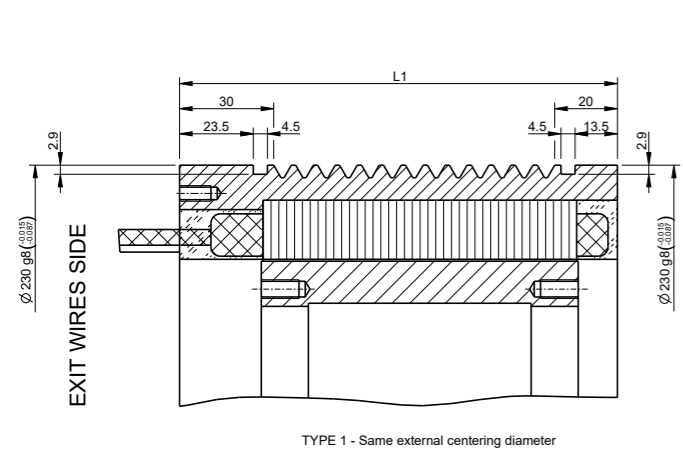
We offer the flexibility to customize mechanical interfaces to suit your individual application needs, ensuring a seamless plug-and-play experience.

**TECHNICAL DRAWING TKH 225**



Rotor size TKHRT	Rotor fixing holes			Rotor dimensions	
	N_WS (min class)	N_OWS (min class)	$b^\circ$ (angular pitch)	L2 (Rotor length)	L3 (Centering length)
TKHRT 225 50	12 x M5 (8.8)	12 x M5 (8.8)	30°	51	10
TKHRT 225 100	12 x M6 (8.8)	12 x M6 (8.8)	30°	101	15
TKHRT 225 150	18 x M6 (8.8)	18 x M6 (8.8)	20°	151	15
TKHRT 225 200	24 x M6 (8.8)	24 x M6 (8.8)	15°	201	20

Stator size TKHST	Stator fixing holes			Stator Length L1
	N°_WS (min class)	N°_OWS (min class)	$a^\circ$ (angular pitch)	
TKHST 225 50	12 x M4 (8.8)	-	30°	90
TKHST 225 100	18 x M4 (8.8)	-	20°	140
TKHST 225 150	18 x M5 (8.8)	-	20°	190
TKHST 225 200	24 x M5 (8.8)	-	15°	240



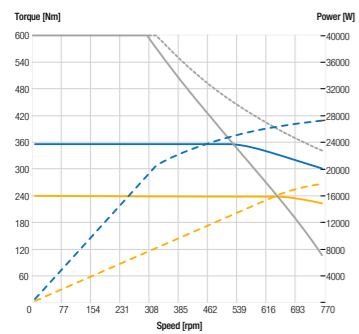
TKH 295		050-088	050-13	050-26	100-088	100-17	100-26	100-52	150-13	150-26	150-39	200-17	200-35	200-52
Rated Torque	① Nm	230	230	230	505	510	510	510	790	790	790	1060	1060	1060
Knee Speed	② rpm	680	427	174	680	310	186	60	405	178	100	315	130	70
Rated Current	① A	28	19	9	62	31	20	10	64	32	21	65	32	22
Torque Constant	Nm/A	8,8	13,2	26,4	8,8	17,6	26,4	58,2	13,2	26,4	39,6	17,6	35,2	52,8
Rated Power	①② kW	16	10	4	36	17	10	3	33,5	15	8	35	14	8
Peak Torque	Nm	565	570	550	1150	1150	1150	800	1700	1700	1650	2300	2300	1900
Peak Current	A	89	60	28	180	90	60	18	174	87	55	178	90	44
S6 Torque (duty 40%, 60s cycle)	① Nm	355	355	355	760	748	748	748	1140	1140	1140	1545	1545	1545
Rated Torque at 0 rpm	① Nm	174	174	174	378	378	378	378	582	582	582	784	784	784
Maximum Continuous Speed	③ rpm	770	770	450	770	770	500	220	770	550	330	770	380	240
Maximum Transient Speed	rpm	1540	1540	1540	1540	1540	1540	1540	1540	1540	1540	1540	1540	1540
Motor Constant	Nm/√W	6,19	6,19	6,19	10,2	10,2	10,2	10,2	13,3	13,3	13,3	15,9	15,9	15,9
Number of Poles	-	42	42	42	42	42	42	42	42	42	42	42	42	42
Back EMF Constant at 20°C	V*s	5,1	7,6	15,3	5,1	10,2	15,3	30,5	7,6	15,3	22,9	10,2	20,3	30,5
Thermal Time Constant	s	170,2	169,7	169	143,4	142,8	142,6	142,2	134,1	133,7	133,5	129,4	129,4	129
Minimum Coolant Flow (Δt 10°C)	l/min	4,2	4	3,8	7,1	6,9	6,8	6,7	9,8	9,6	9,5	12,4	12,2	12,1
Rotor Inertia	kg*m <sup>2</sup>	0,037	0,037	0,037	0,066	0,066	0,066	0,066	0,095	0,095	0,095	0,123	0,123	0,123
Rotor Mass	kg	6,1	6,1	6,1	9,3	9,3	9,3	9	17,9	17,9	17,9	23,8	23,8	23,8
Stator Mass	kg	16,8	16,8	16,8	25,8	25,8	25,8	26	34,6	34,6	34,6	43,5	43,5	43,5
Motor Loss	④ kW	2,4	2,4	2,4	4,3	4,3	4,3	4,3	6	6	6	7,6	7,6	7,6

**TEST CONDITIONS**

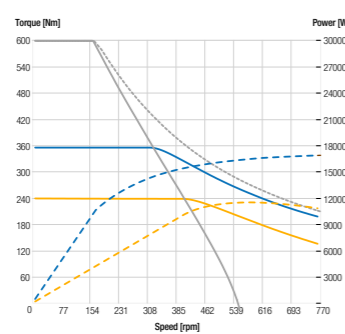
- ① Coolant inlet temperature 20 °C
- ② 600 V DC\_Bus
- ③ For higher speed application contact our technical team
- ④ At Rated Power

**TORQUE SPEED DIAGRAM**

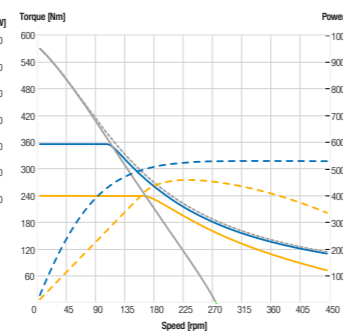
TKH 295.050.088



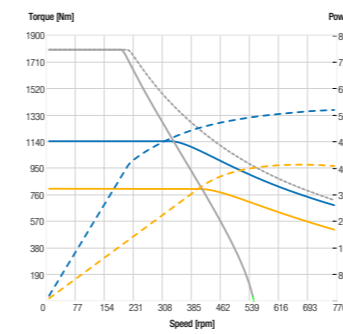
TKH 295.050.13



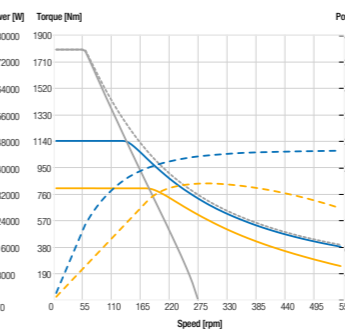
TKH 295.050.26



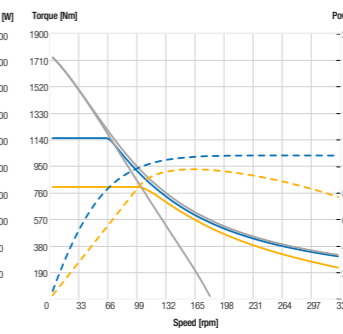
TKH 295.150.13



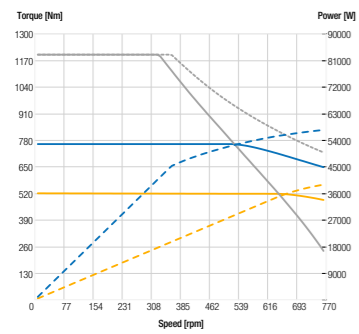
TKH 295.150.26



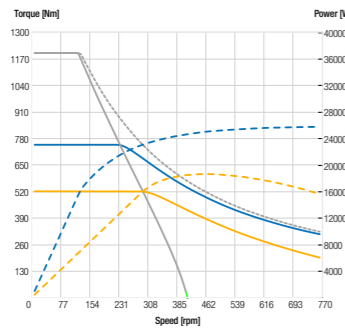
TKH 295.150.39



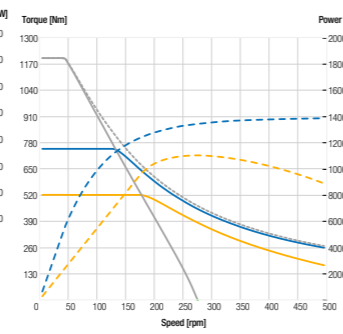
TKH 295.100.088



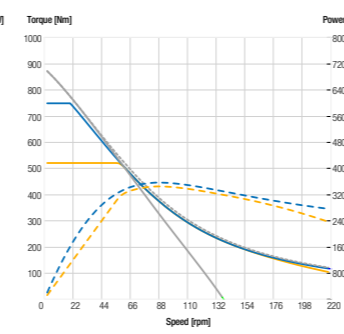
TKH 295.100.17



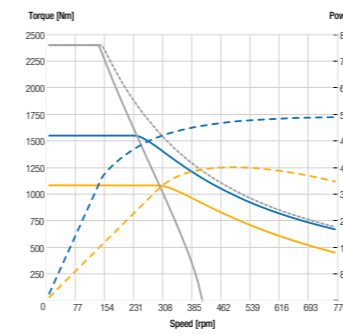
TKH 295.100.26



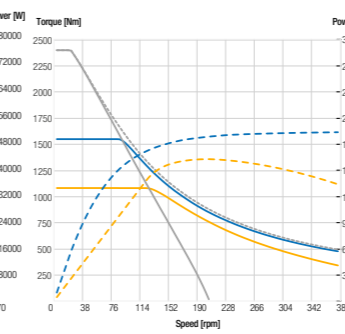
TKH 295.100.52



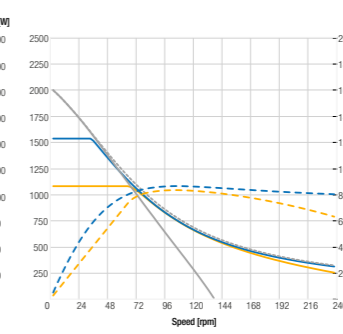
TKH 295.200.17



TKH 295.200.35



TKH 295.200.52



- S1 torque
- S6 torque, duty%
- Voltage saturation limit
- - - Saturation torque
- - - S1 power
- - - Peak power

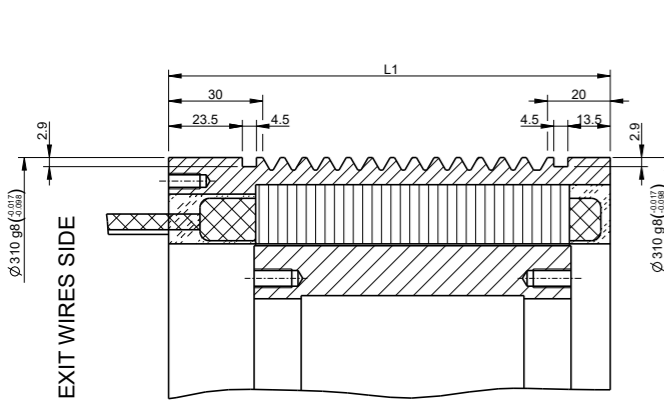
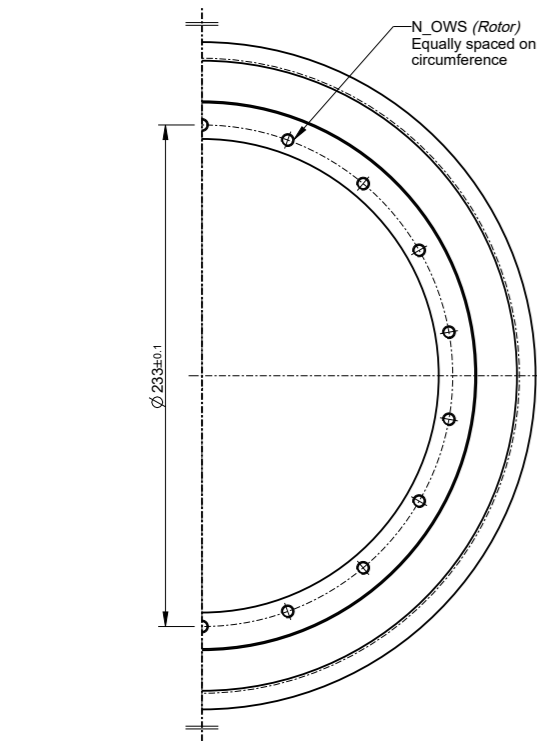
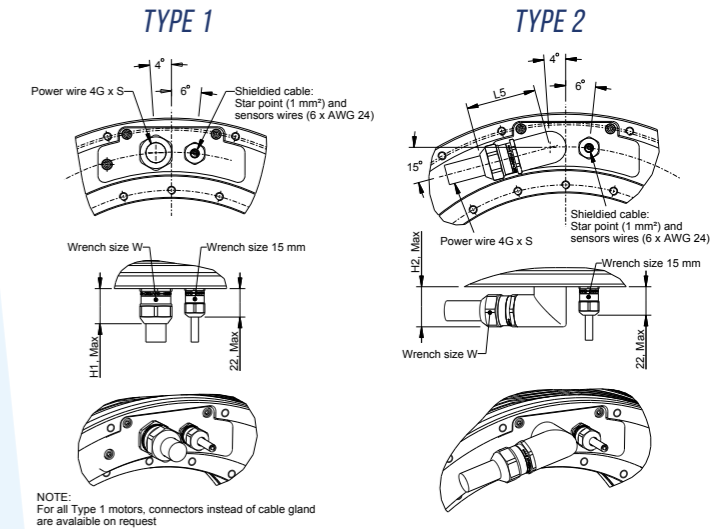
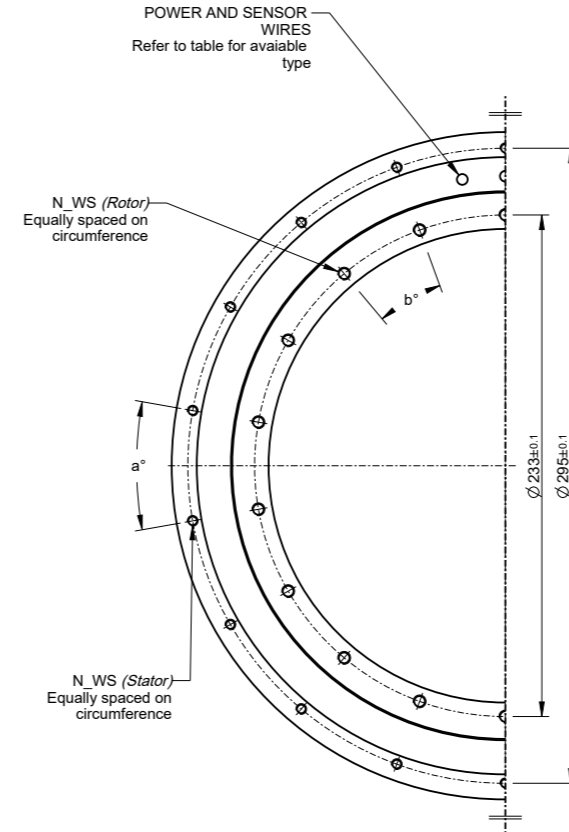
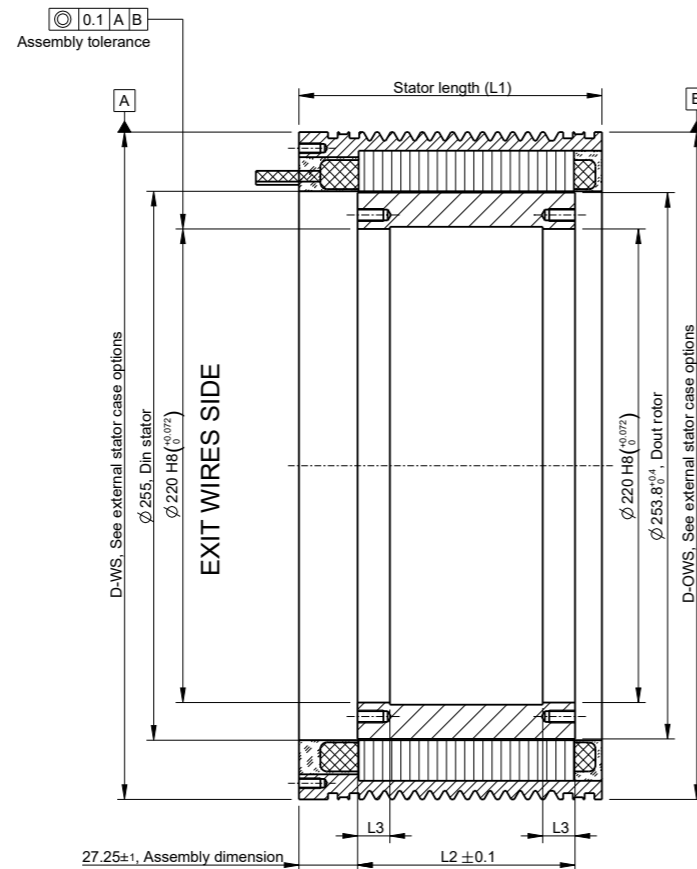
We offer the flexibility to customize mechanical interfaces to suit your individual application needs, ensuring a seamless plug-and-play experience.



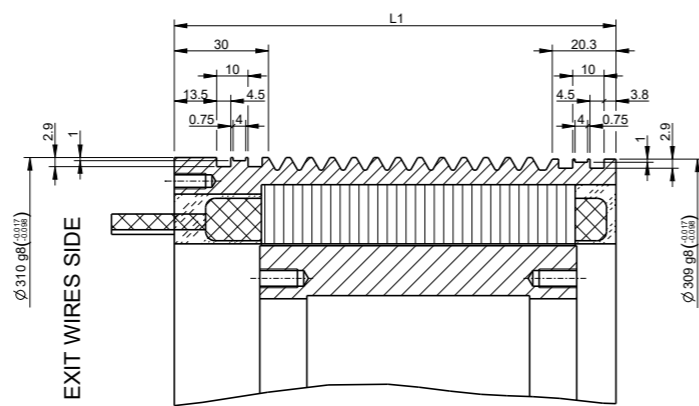
**TECHNICAL DRAWING TKH 295**

Rotor size TKHRT	Rotor fixing holes			Rotor dimensions	
	N <sub>WS</sub> (min class)	N <sub>OWS</sub> (min class)	b° (angular pitch)	L <sub>2</sub> (Rotor length)	L <sub>3</sub> (Centering length)
TKHRT 295 50	12 x M6 (8.8)	12 x M6 (8.8)	30°	51	10
TKHRT 295 100	18 x M6 (8.8)	18 x M6 (8.8)	20°	101	15
TKHRT 295 150	24 x M6 (8.8)	24 x M6 (8.8)	15°	151	15
TKHRT 295 200	18 x M8 (8.8)	18 x M8 (8.8)	20°	201	20

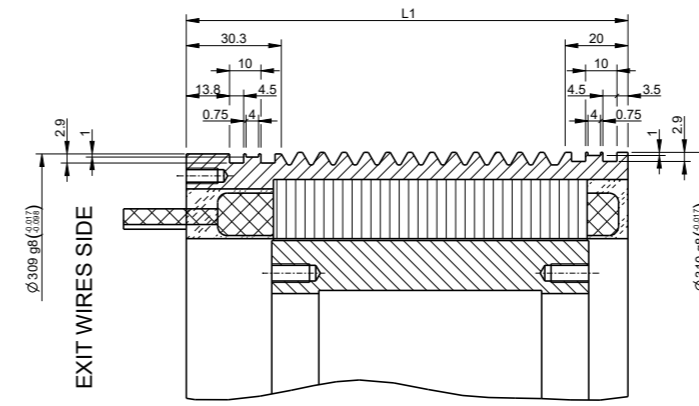
Stator size TKHST	Stator fixing holes			Stator Length L <sub>1</sub>
	N° <sub>WS</sub> (min class)	N° <sub>OWS</sub> (min class)	a° (angular pitch)	
TKHST 295 50	12 x M5 (8.8)	-	30°	91
TKHST 295 100	18 x M5 (8.8)	-	20°	141
TKHST 295 150	36 x M5 (8.8)	-	10°	191
TKHST 295 200	36 x M5 (8.8)	-	10°	241



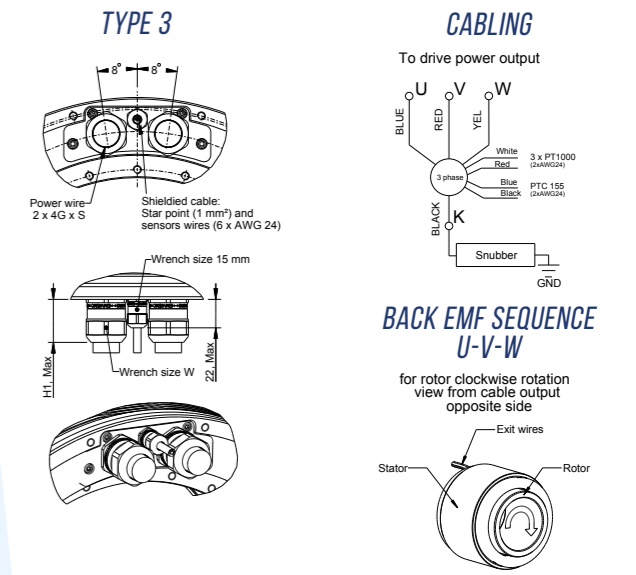
TYPE 1 - Same external centering diameter



TYPE 2 - Bigger external centering on WS



TYPE 3 - Bigger external centering on OWS



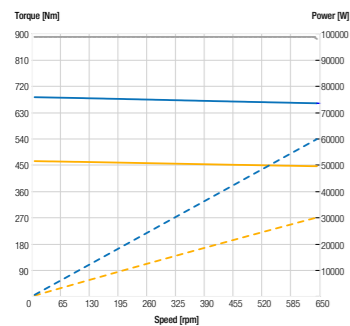
**TEST CONDITIONS**

TKH 365		050-050	050-10	050-20	050-40	100-10	100-20	100-40	100-80	150-15	150-30	150-60	200-20	200-40	200-80
Rated Torque	① Nm	420	450	450	460	1000	1000	1000	1000	1570	1570	1570	2150	2150	2150
Knee Speed	② rpm	1100	530	245	105	510	240	105	40	330	150	60	235	105	40
Rated Current	① A	92	48	24	12	108	54	27	14	113	56	28	116	58	29
Torque Constant	Nm/A	5,02	10,05	20,1	40,2	10,05	20,1	40,2	80,4	15,1	30,2	60,3	20,1	40,2	80,4
Rated Power	① ② kW	48	25	12	5	53	25	11	4	54	25	10	53	24	9
Peak Torque	Nm	825	840	850	850	1700	1700	1700	1650	2550	2550	2550	3400	3400	3400
Peak Current	A	218	109	55	27	218	109	54	26	217	108	54	217	108	54
S6 Torque (duty 40%, 60s cycle)	① Nm	683	679	673	673	1459	1470	1470	1447	2275	2275	2275	3055	3033	3033
Rated Torque at 0 rpm	① Nm	335	335	335	335	742	742	742	742	1153	1153	1153	1563	1563	1563
Maximum Continuous Speed	③ rpm	650	650	650	650	650	650	650	430	650	650	650	650	650	600
Maximum Transient Speed	rpm	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280
Motor Constant	Nm/√W	11,2	11,2	11,2	11,2	18,32	18,32	18,32	18,32	23,8	23,8	23,8	28,4	28,4	28,4
Number of Poles	-	56	56	56	56	56	56	56	56	56	56	56	56	56	56
Back EMF Constant at 20°C	V*s	2,9	5,8	11,6	23,2	5,8	11,6	23,2	46,4	8,7	17,4	34,8	11,6	23,2	46,4
Thermal Time Constant	s	308,8	305,8	303,6	302,1	260,3	258,8	257,7	256,9	244,2	243,2	242,4	236,2	235,4	234,8
Minimum Coolant Flow (Δt 10°C)	l/min	6,5	5,1	4,7	4,6	8,8	8,6	8,6	8,4	12,4	12,4	12,3	16,1	16	15,8
Rotor Inertia	kg*m <sup>2</sup>	0,103	0,103	0,103	0,103	0,184	0,184	0,184	0,184	0,265	0,265	0,265	0,346	0,346	0,346
Rotor Mass	kg	5,2	5,2	5,2	5,2	11,8	11,8	11,8	11,8	18,7	18,7	18,7	20,4	20,4	20,4
Stator Mass	kg	29,8	29,8	29,8	29,8	46,3	46,3	46,3	46,3	62,6	62,6	62,6	78,4	78,4	78,4
Motor Loss	④ kW	2,8	2,8	2,8	2,8	5,18	5,17	5,17	5,17	7,45	7,45	7,45	9,66	9,66	9,66

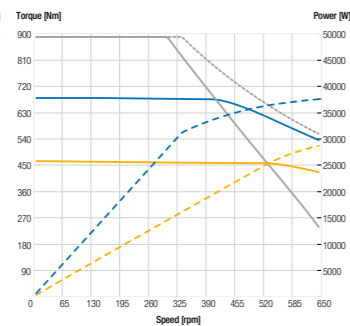
- ① Coolant inlet temperature 20 °C
- ② 600 V DC\_Bus
- ③ For higher speed application contact our technical team
- ④ At Rated Power

**TORQUE SPEED DIAGRAM**

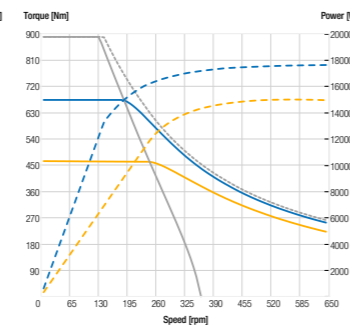
TKH 365.050.050



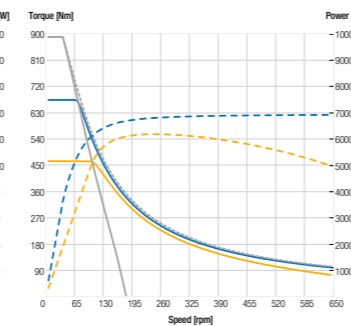
TKH 365.050.10



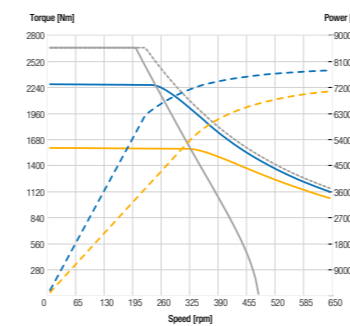
TKH 365.050.20



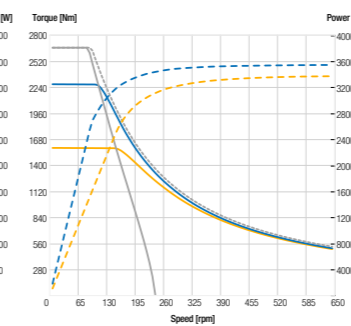
TKH 365.050.40



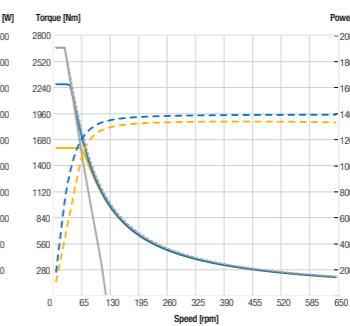
TKH 365.150.15



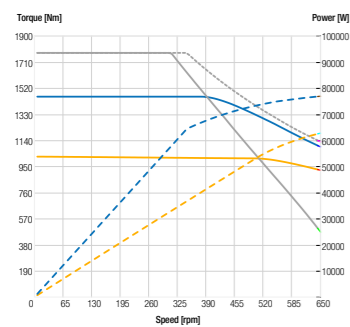
TKH 365.150.30



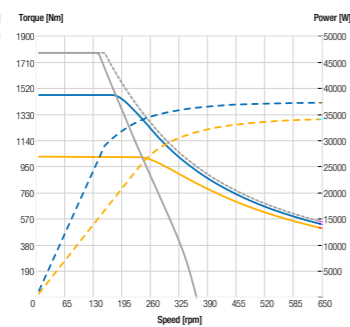
TKH 365.150.60



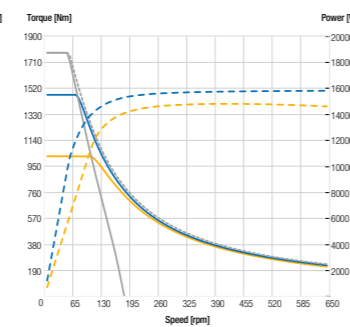
TKH 365.100.10



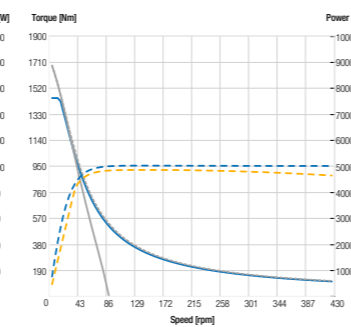
TKH 365.100.20



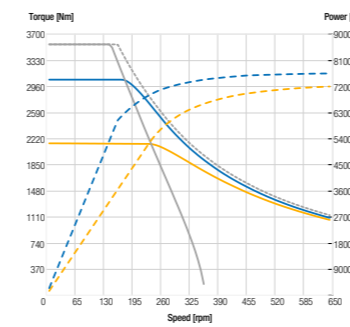
TKH 365.100.40



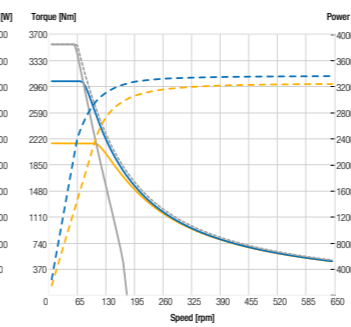
TKH 365.100.80



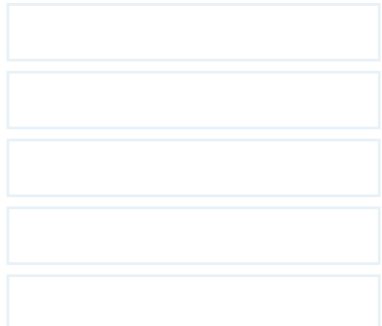
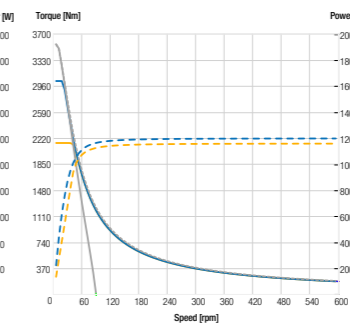
TKH 365.200.20



TKH 365.200.40



TKH 365.200.80



- S1 torque
- S6 torque, duty%
- Voltage saturation limit
- - - Saturation torque
- - - S1 power
- - - Peak power

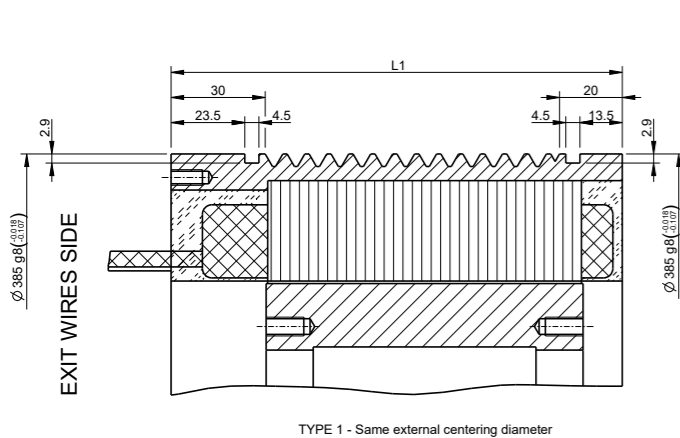
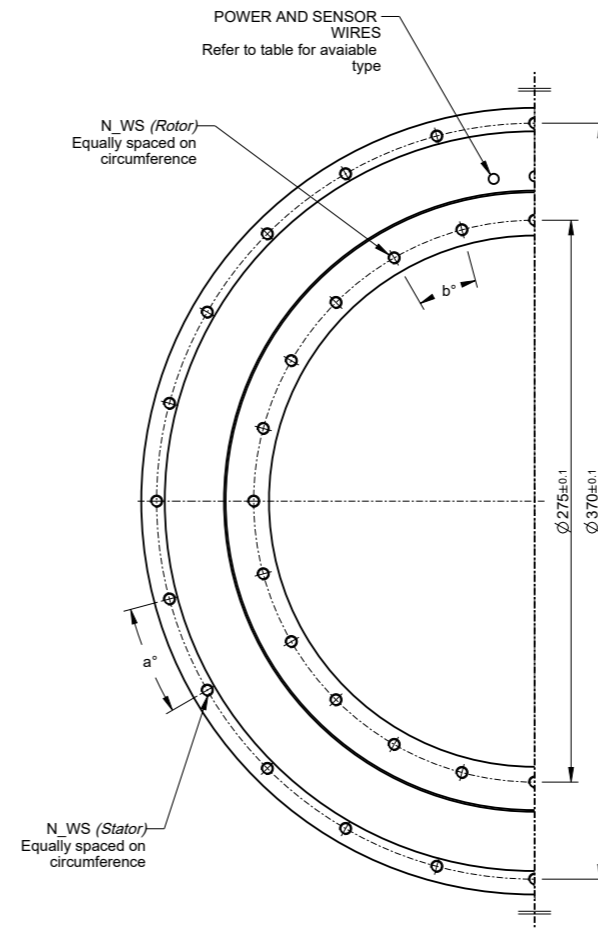
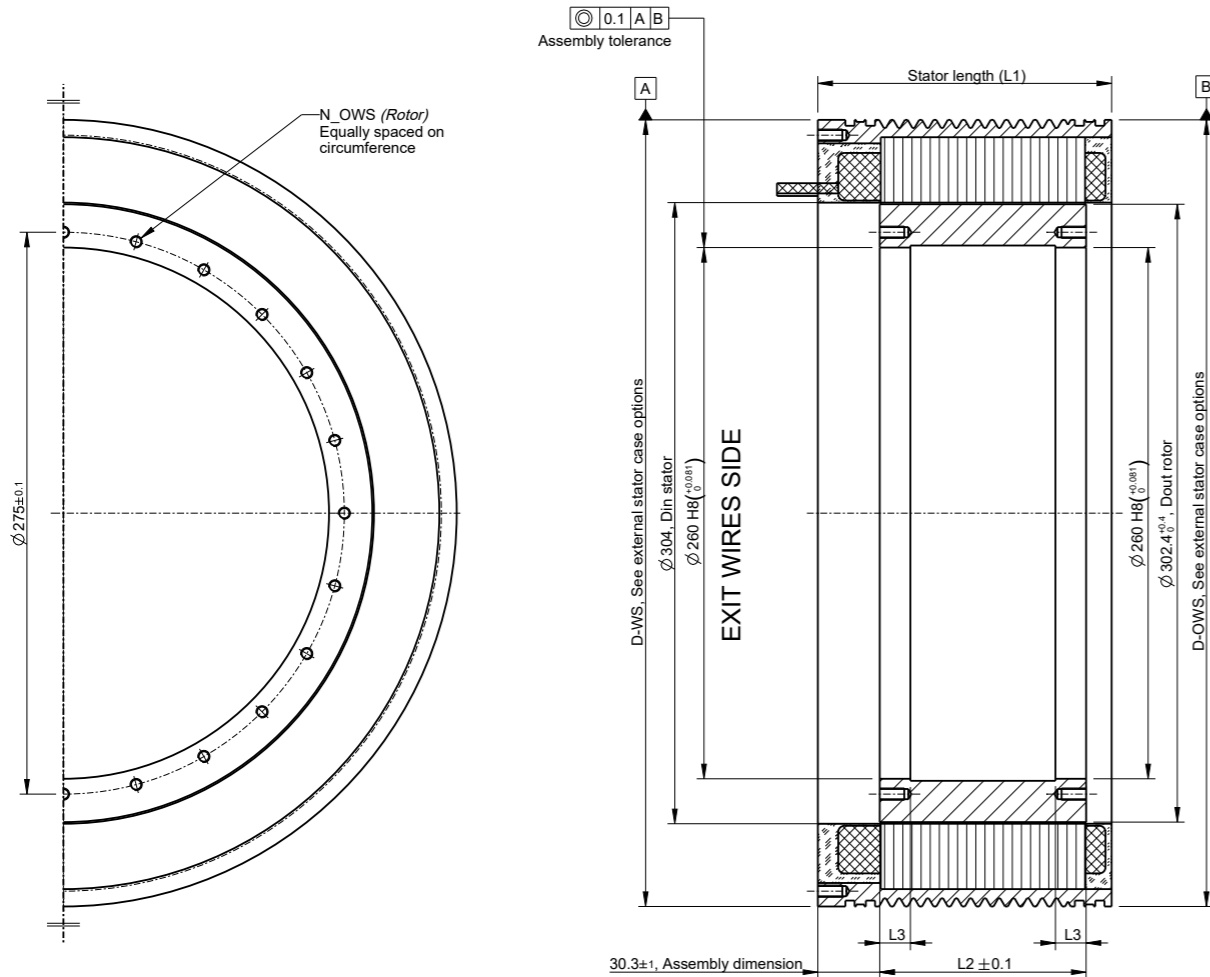
We offer the flexibility to customize mechanical interfaces to suit your individual application needs, ensuring a seamless plug-and-play experience.



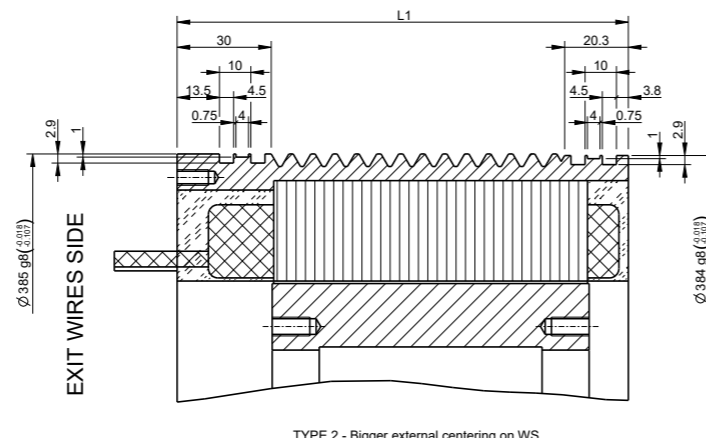
**TECHNICAL DRAWING TKH 365**

Rotor size TKHRT	Rotor fixing holes			Rotor dimensions	
	N_WS (min class)	N_OWS (min class)	b° (angular pitch)	L2 (Rotor length)	L3 (Centering length)
TKHRT 365 50	12 x M6 (8.8)	12 x M6 (8.8)	30°	51	10
TKHRT 365 100	24 x M6 (8.8)	24 x M6 (8.8)	15°	101	15
TKHRT 365 150	18 x M8 (8.8)	18 x M8 (8.8)	20°	151	15
TKHRT 365 200	24 x M8 (8.8)	24 x M8 (8.8)	15°	201	20

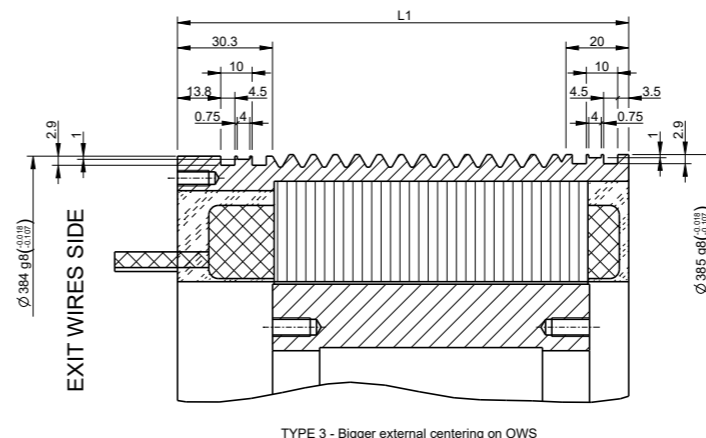
Stator size TKHST	Stator fixing holes			Stator Length L1
	N°_WS (min class)	N°_OWS (min class)	a° (angular pitch)	
TKHST 365 50	12 x M5 (8.8)	-	30°	94
TKHST 365 100	24 x M5 (8.8)	-	15°	144
TKHST 365 150	36 x M5 (8.8)	-	10°	194
TKHST 365 200	36 x M6 (8.8)	-	10°	244



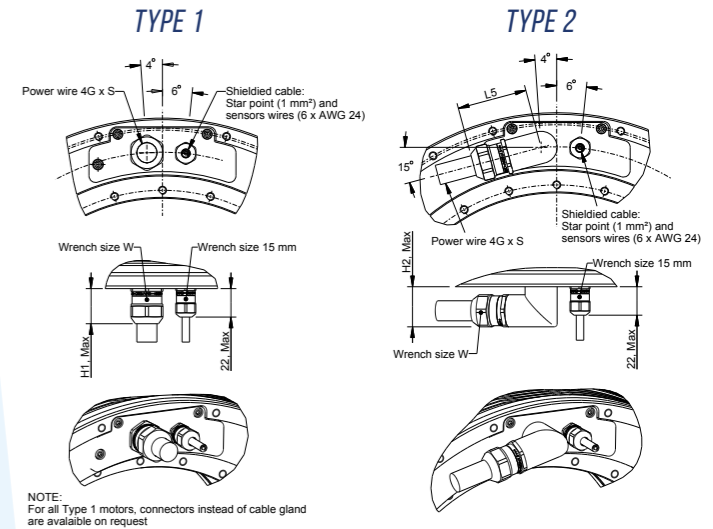
TYPE 1 - Same external centering diameter



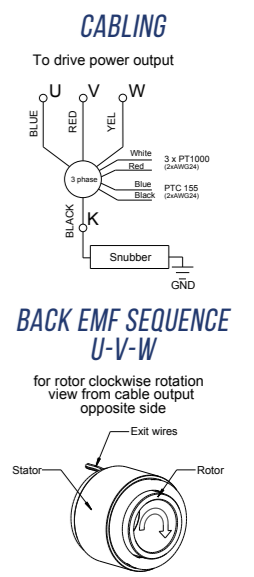
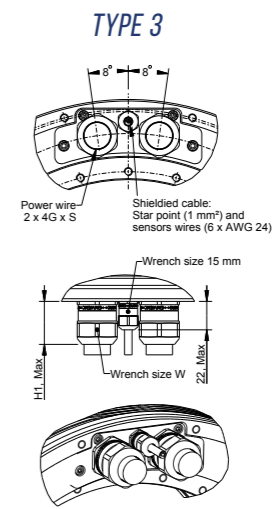
TYPE 2 - Bigger external centering on WS



TYPE 3 - Bigger external centering on OWS



NOTE: For all Type 1 motors, connectors instead of cable gland are available on request



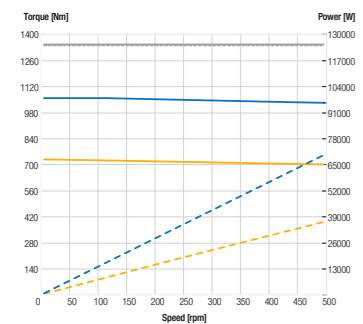
TKH 445		050-064	050-12	050-32	050-64	100-12	100-25	100-64	150-19	150-38	150-96	200-25	200-51	200-128	
Rated Torque	①	Nm	700	700	700	1550	1550	1550	2400	2500	2450	3350	3350	3350	
Knee Speed	②	rpm	860	422	150	60	405	190	60	260	120	35	190	85	20
Rated Current	①	A	120	60	24	12	132	66	26	136	71	28	143	72	29
Torque Constant		Nm/A	6,4	12,8	32,1	64,1	12,8	25,7	64,1	19,2	38,5	96,2	25,7	51,3	128,3
Rated Power	① ②	kW	63	31	11	4,5	66	31	10	65	32	9	66,7	30	7
Peak Torque		Nm	1250	1250	1250	1250	2550	2550	2550	3850	3850	3850	5150	5150	5050
Peak Current		A	260	126	50	25	254	127	51	256	128	51	257	128	50
S6 Torque (duty 40%, 60s cycle)	①	Nm	1057	1057	1057	1057	2270	2270	2307	3516	3516	3516	4772	4772	4758
Rated Torque at 0 rpm	①	Nm	527	527	527	527	1164	1164	1164	1808	1808	1808	2450	2450	2450
Maximum Continuous Speed	③	rpm	500	500	500	400	500	500	500	500	460	500	500	260	
Maximum Transient Speed		rpm	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	
Motor Constant		Nm/√W	16	16	16	16	26,2	26,2	26,2	34	34	34	40,6	40,6	40,6
Number of Poles		-	70	70	70	70	70	70	70	70	70	70	70	70	70
Back EMF Constant at 20°C		V*s	3,7	7,4	18,5	37	7,4	14,8	37	11,1	22,2	55,5	14,8	29,6	74,1
Thermal Time Constant		s	311,6	308,2	305,1	303,6	262,4	260,7	259,1	246,1	244,9	243,9	237,9	237	236,3
Minimum Coolant Flow (Δt 10°C)		l/min	7,9	6,2	5,7	5,6	10,8	10,6	10,5	15,3	15,2	15,1	19,8	19,7	19,4
Rotor Inertia		kg*m²	0,218	0,218	0,218	0,218	0,388	0,388	0,388	0,558	0,558	0,558	0,728	0,728	0,728
Rotor Mass		kg	7,2	7,2	7,2	7,2	14	14	14	20,9	20,9	20,9	27,6	27,6	27,6
Stator Mass		kg	52,3	52,3	52,3	52,3	79,2	79,2	79,2	105,9	105,9	105,9	132,8	132,8	132,8
Motor Loss	④	kW	3,42	3,41	3,41	3,41	6,35	6,35	6,35	9,14	9,14	9,14	11,85	11,85	11,85

**TEST CONDITIONS**

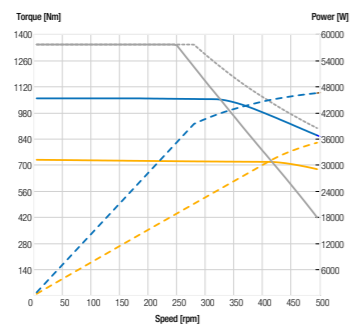
- ① Coolant inlet temperature 20 °C
- ② 600 V DC\_Bus
- ③ For higher speed application contact our technical team
- ④ At Rated Power

**TORQUE SPEED DIAGRAM**

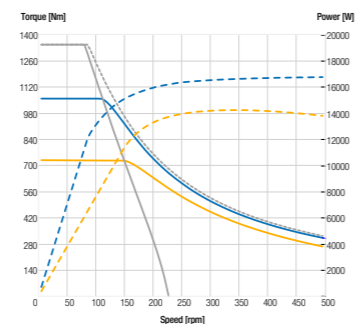
TKH 445.050.064



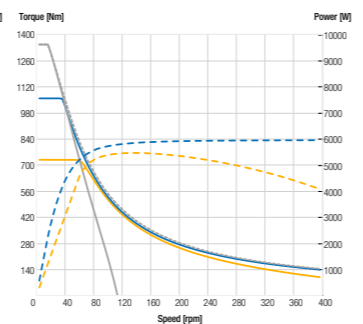
TKH 445.050.12



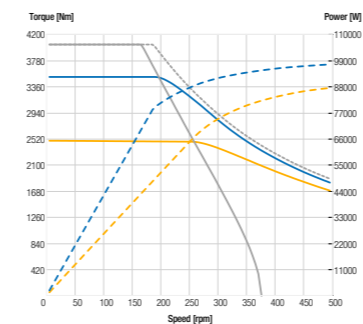
TKH 445.050.32



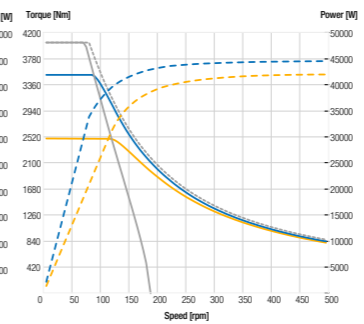
TKH 445.050.64



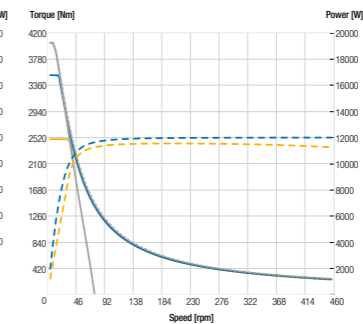
TKH 445.150.19



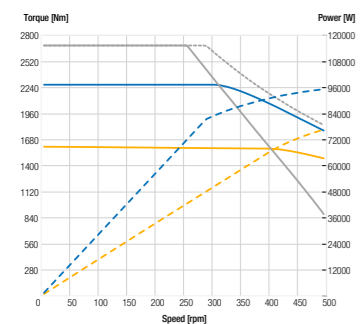
TKH 445.150.38



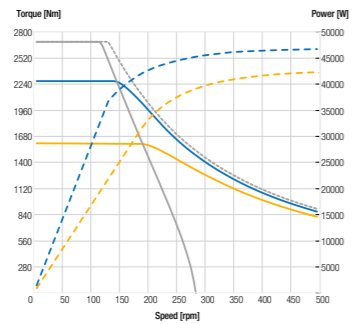
TKH 445.150.96



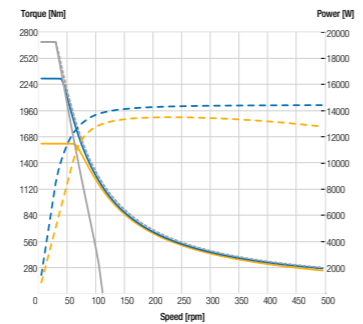
TKH 445.100.12



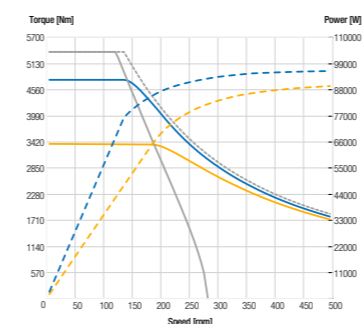
TKH 445.100.25



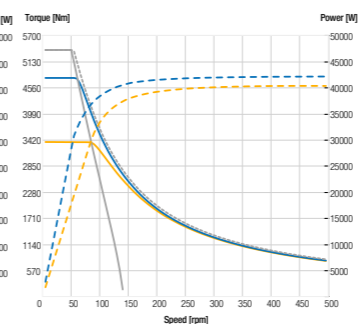
TKH 445.100.64



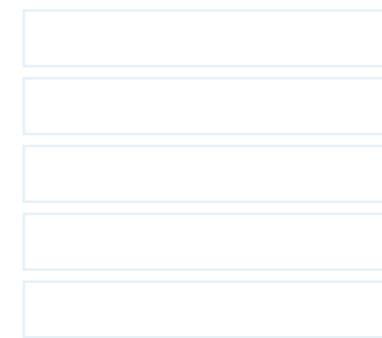
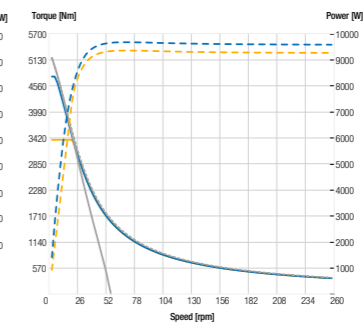
TKH 445.200.25



TKH 445.200.51



TKH 445.200.128



- S1 torque
- S6 torque, duty%
- Voltage saturation limit
- - - Saturation torque
- - - S1 power
- - - Peak power



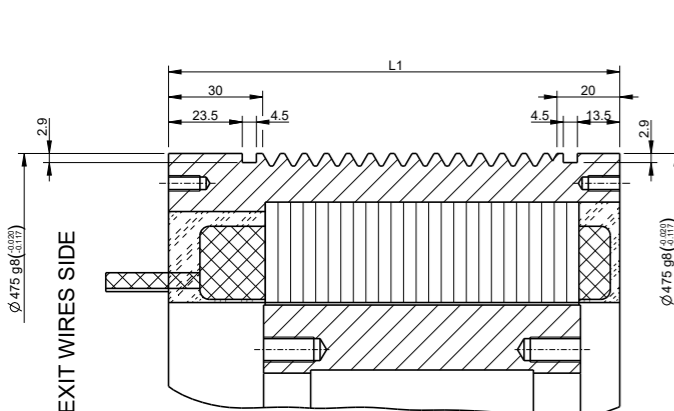
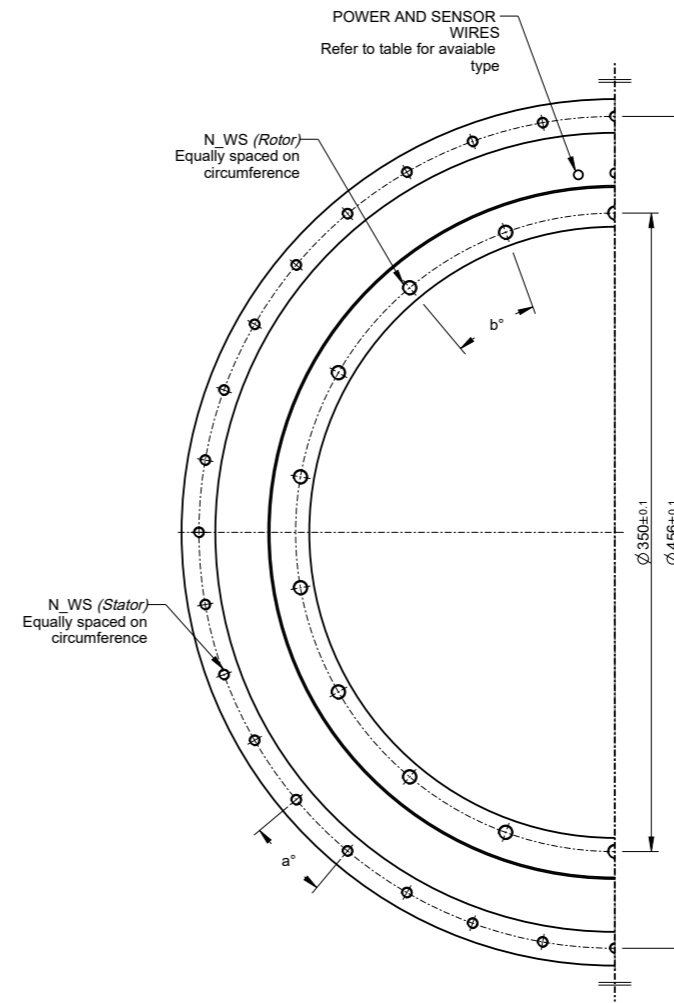
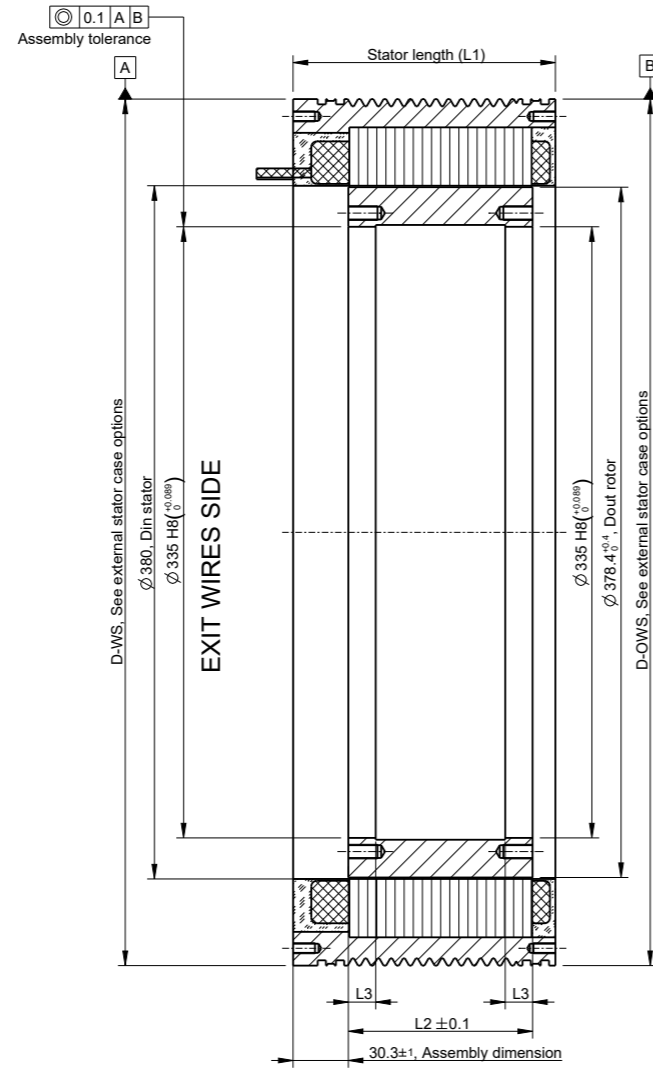
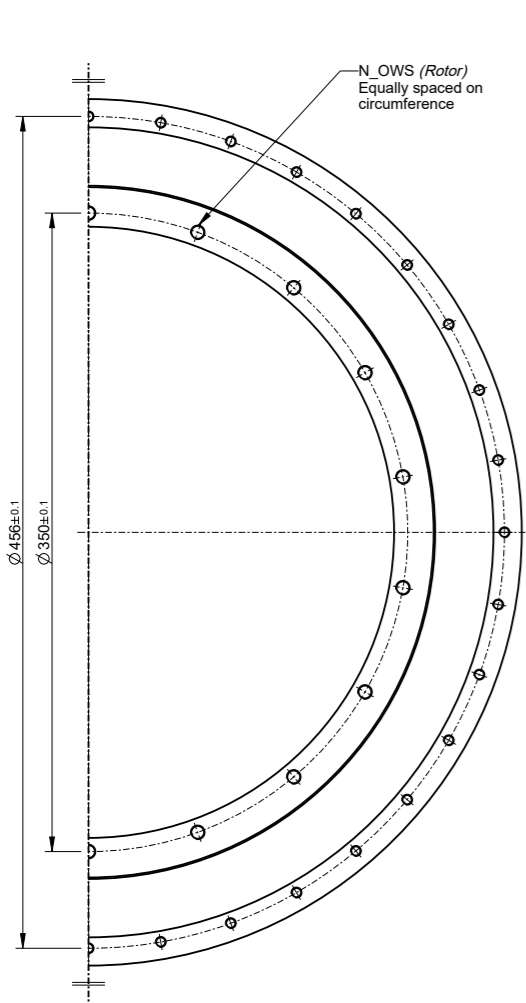
We offer the flexibility to customize mechanical interfaces to suit your individual application needs, ensuring a seamless plug-and-play experience.



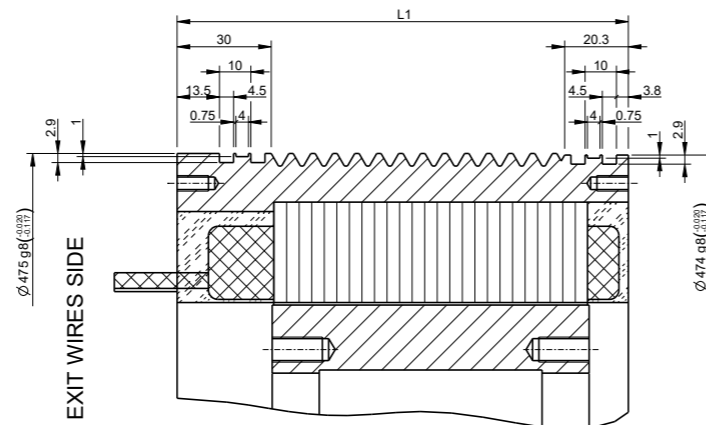
## TECHNICAL DRAWING TKH 445

Rotor size TKHRT	ROTOR FIXING HOLES			Rotor dimensions	
	N° WS (min class)	N° OWS (min class)	b° (angular pitch)	L2 (Rotor length)	L3 (Centering length)
TKHRT 445 50	12 x M6 (8.8)	12 x M6 (8.8)	30°	51	10
TKHRT 445 100	18 x M8 (8.8)	18 x M8 (8.8)	20°	101	15
TKHRT 445 150	24 x M8 (8.8)	24 x M8 (8.8)	15°	151	15
TKHRT 445 200	36 x M8 (8.8)	36 x M8 (8.8)	10°	201	20

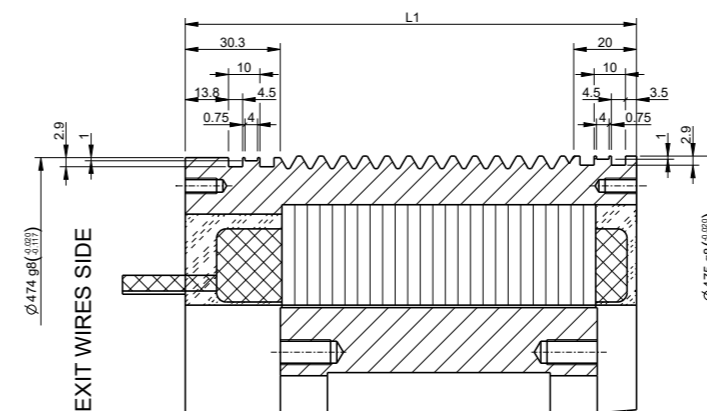
Stator size TKHST	Stator fixing holes			Stator Length
	N° WS (min class)	N° OWS (min class)	a° (angular pitch)	L1
TKHST 445 50	18 x M5 (8.8)	18 x M5 (8.8)	20°	94
TKHST 445 100	36 x M5 (8.8)	36 x M5 (8.8)	10°	144
TKHST 445 150	36 x M6 (8.8)	36 x M6 (8.8)	10°	194
TKHST 445 200	36 x M6 (8.8)	36 x M6 (8.8)	10°	244



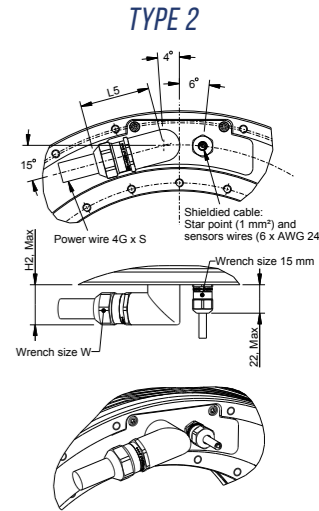
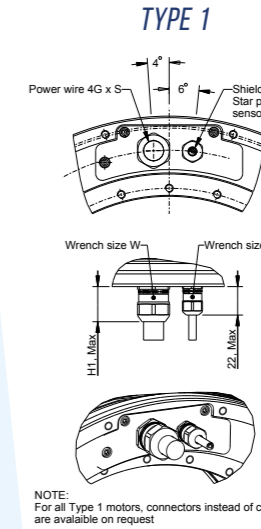
TYPE 1 - Same external centering diameter



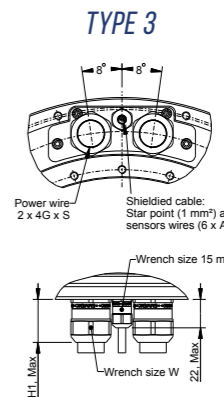
TYPE 2 - Bigger external centering on WS



TYPE 3 - Bigger external centering on OWS

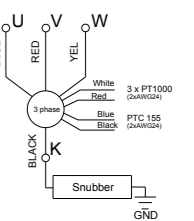


NOTE:  
For all Type 1 motors, connectors instead of cable gland are available on request



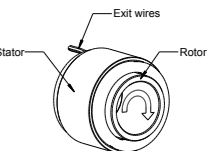
### CABLING

To drive power output



### BACK EMF SEQUENCE U-V-W

for rotor clockwise rotation view from cable output opposite side

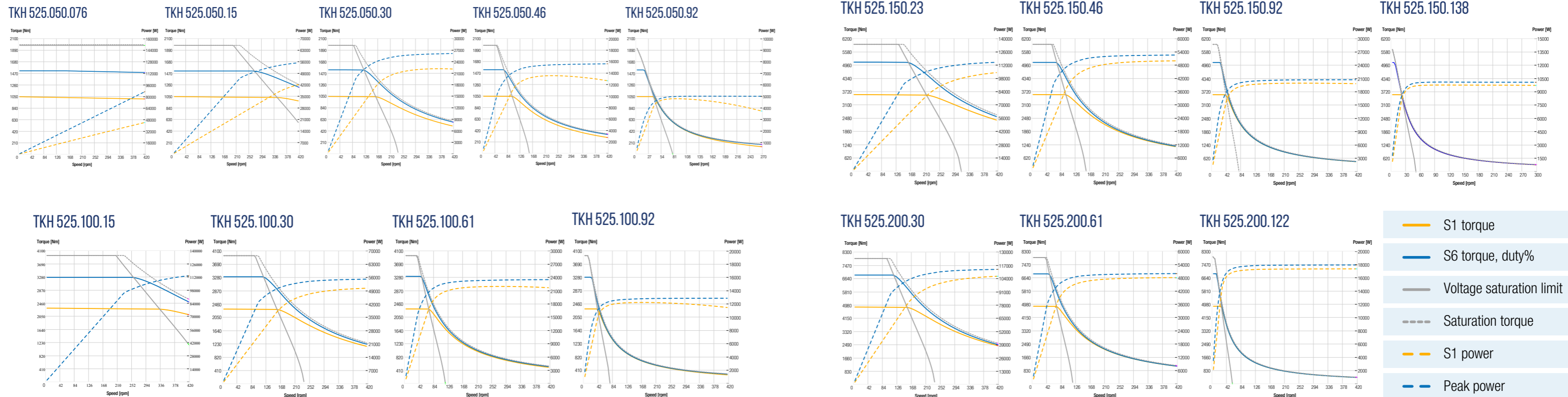


## TEST CONDITIONS

TKH 525		050-076	050-15	050-30	050-46	050-92	100-15	100-30	100-61	100-92	150-23	150-46	150-92	150-138	200-30	200-61	200-122
Rated Torque	①	Nm	950	1000	1000	1000	2250	2300	2300	2300	3550	3453	3550	3550	4800	4800	4800
Knee Speed	②	rpm	740	350	160	100	40	330	155	70	40	215	100	40	20	155	70
Rated Current	①	A	136	70	35	23	12	159	81	41	27	168	81	42	28	171	85
Torque Constant		Nm/A	7,7	15,4	30,7	46,1	92,2	15,4	30,7	61,5	92,2	23,1	46,1	92,2	138,3	30,7	61,5
Rated Power	① ②	kW	74	37	17	10	4,2	77,8	37	17	10	80	36	15	7	78	35
Peak Torque		Nm	1840	1870	1880	1890	1870	3790	3800	3800	3800	5710	5710	5710	5650	7620	7620
Peak Current		A	319	160	80	53	26	319	160	80	53	320	160	80	52	320	160
S6 Torque (duty 40%, 60s cycle)	①	Nm	1514	1509	1529	1529	1529	3264	3300	3319	3283	5094	5082	5082	6858	6875	6907
Rated Torque at 0 rpm	①	Nm	756	756	756	756	756	1672	1672	1672	1672	2600	2600	2600	3525	3525	3525
Maximum Continuous Speed	③	rpm	420	420	420	420	270	420	420	420	420	420	420	300	420	420	420
Maximum Transient Speed		rpm	840	840	840	840	840	840	840	840	840	840	840	840	840	840	840
Motor Constant		Nm/√W	21	21	21	21	21	34,33	34,33	34,33	34,33	44,65	44,65	44,65	44,65	53,28	53,28
Number of Poles		-	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Back EMF Constant at 20°C		V*s	4,4	8,9	17,8	26,6	53,3	8,9	17,8	35,5	53,3	13,3	26,6	53,3	79,9	17,8	35,5
Thermal Time Constant		s	313,7	310	307,4	306,2	304,7	264	262,1	260,7	260,1	247,4	246,2	245,3	244,9	239,2	238,2
Minimum Coolant Flow (Δt 10°C)		l/min	9,3	7,3	6,8	6,7	6,5	12,8	12,5	12,4	12,4	18,1	18	18	17,6	23,4	23,3
Rotor Inertia		kg*m <sup>2</sup>	0,367	0,367	0,367	0,367	0,367	0,653	0,653	0,653	0,653	0,939	0,939	0,939	1,226	1,226	1,226
Rotor Mass		kg	8,9	8,9	8,9	8,9	8,9	17,7	17,7	17,7	17,7	25,9	25,9	25,9	34,6	34,6	34,6
Stator Mass		kg	64	64	64	64	64	97,1	97,1	97,1	97,1	130,1	130,1	130,1	163,1	163,1	163,1
Motor Loss	④	kW	4,04	4,04	4,04	4,04	4,04	7,52	7,52	7,52	7,52	10,84	10,84	10,84	14,1	14,1	14,1

- ① Coolant inlet temperature 20 °C
- ② 600 V DC\_Bus
- ③ For higher speed application contact our technical team
- ④ At Rated Power

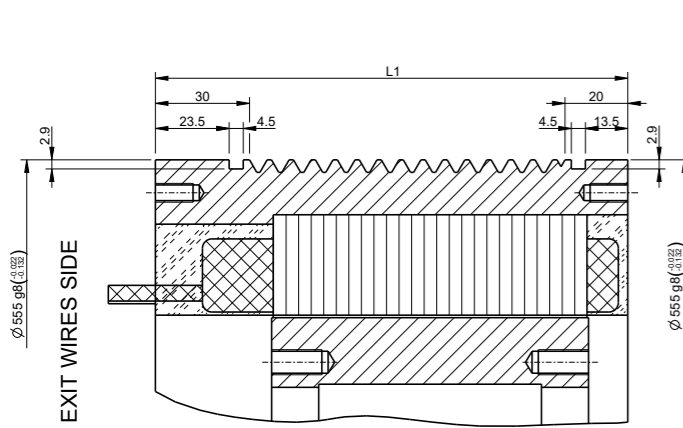
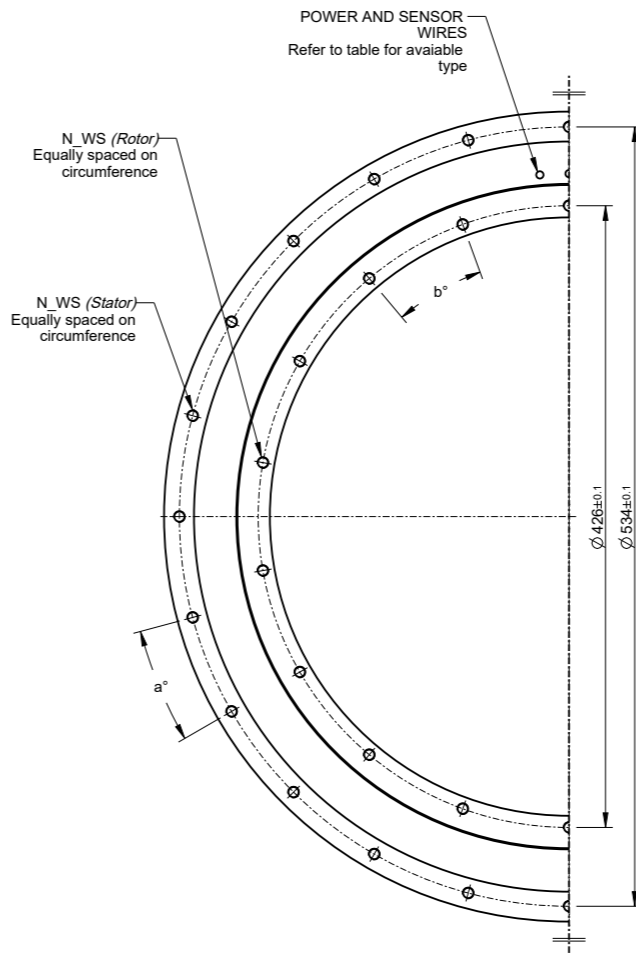
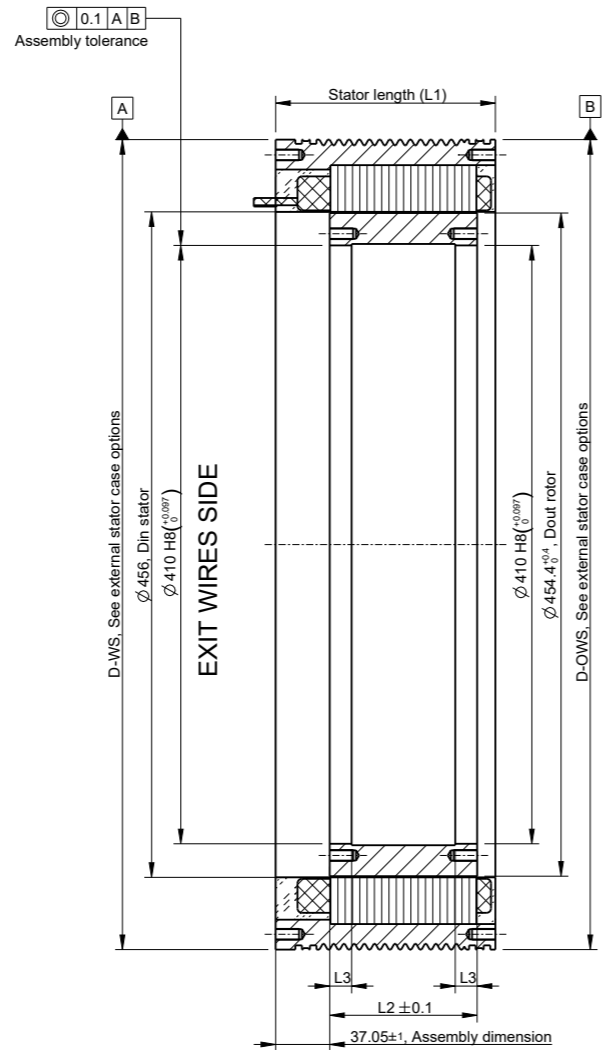
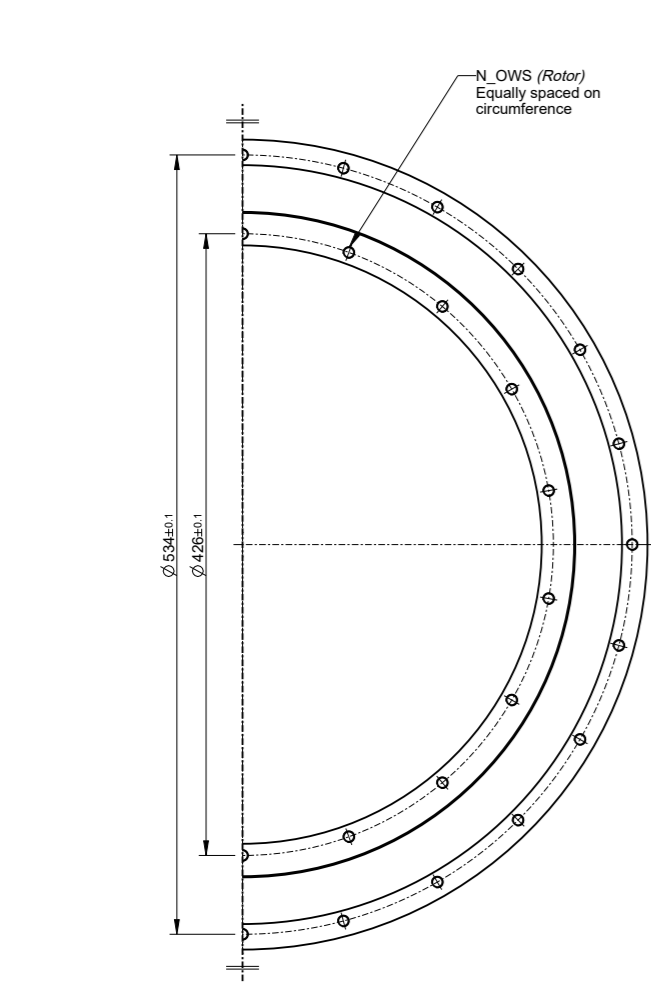
## TORQUE SPEED DIAGRAM



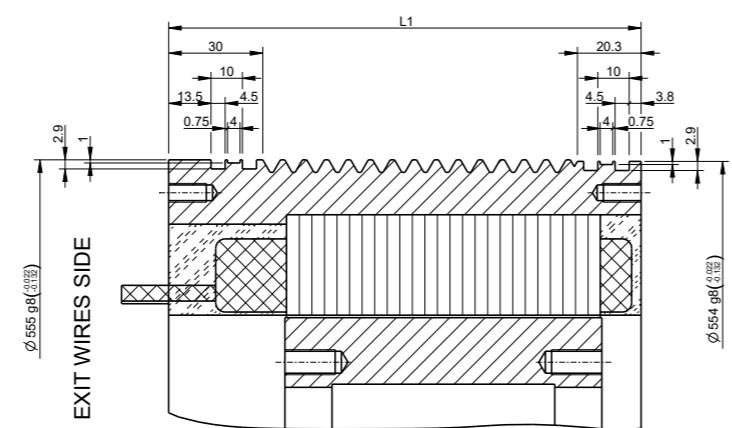
We offer the flexibility to customize mechanical interfaces to suit your individual application needs, ensuring a seamless plug-and-play experience.



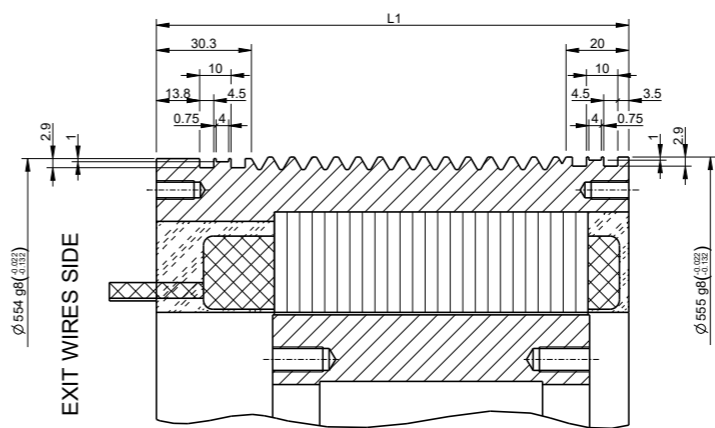
**TECHNICAL DRAWING TKH 525**



TYPE 1 - Same external centering diameter



TYPE 2 - Bigger external centering on WS

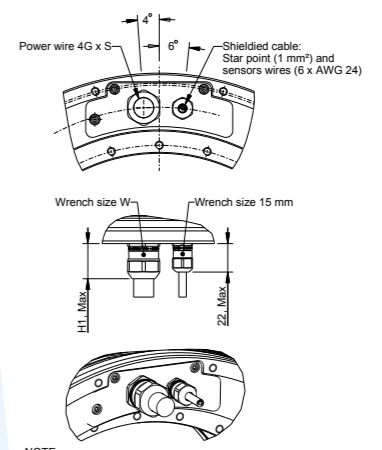


TYPE 3 - Bigger external centering on OWS

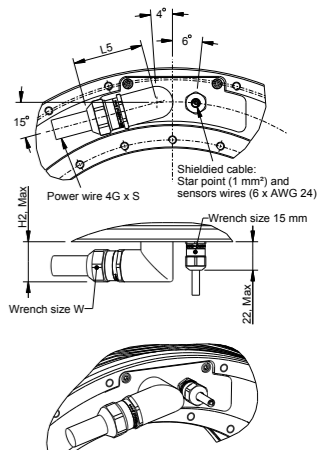
Rotor size TKHRT	Rotor fixing holes			Rotor dimensions	
	N <sup>o</sup> WS (min class)	N <sup>o</sup> OWS (min class)	b <sup>o</sup> (angular pitch)	L2 (Rotor length)	L3 (Centering length)
TKHRT 525 50	18 x M6 (8.8)	18 x M6 (8.8)	20°	51	10
TKHRT 525 100	18 x M8 (8.8)	18 x M8 (8.8)	20°	101	15
TKHRT 525 150	24 x M8 (8.8)	24 x M8 (8.8)	15°	151	15
TKHRT 525 200	24 x M10 (8.8)	24 x M10 (8.8)	15°	201	20

Stator size TKHST	Stator fixing holes			Stator Length L1
	N <sup>o</sup> WS (min class)	N <sup>o</sup> OWS (min class)	a <sup>o</sup> (angular pitch)	
TKHST 525 50	18 x M5 (8.8)	18 x M5 (8.8)	20°	101
TKHST 525 100	24 x M6 (8.8)	24 x M6 (8.8)	15°	151
TKHST 525 150	36 x M6 (8.8)	36 x M6 (8.8)	10°	201
TKHST 525 200	24 x M8 (8.8)	24 x M8 (8.8)	15°	251

**TYPE 1**

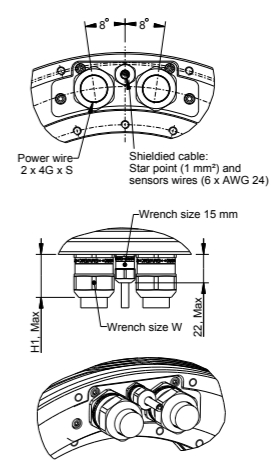


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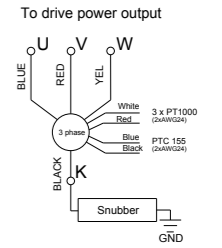


NOTE:  
For all Type 1 motors, connectors instead of cable gland are available on request

**TYPE 3**

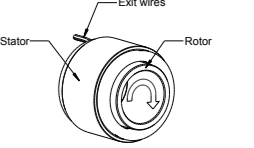


**CABLING**



**BACK EMF SEQUENCE U-V-W**

for rotor clockwise rotation view from cable output opposite side



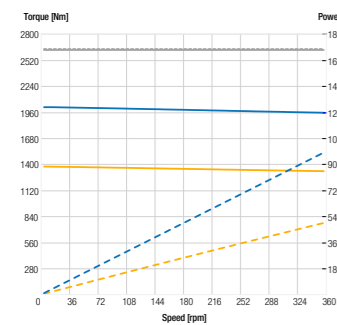
TKH 595		050-087	050-17	050-61	100-17	100-35	100-122	150-26	150-52	200-35	200-70	
Rated Torque	①	Nm	1250	1360	1360	2950	3000	3000	4680	4700	6300	6300
Knee Speed	②	rpm	630	300	70	290	135	25	185	85	135	60
Rated Current	①	A	157	85	24	183	93	27	194	98	196	98
Torque Constant		Nm/A	8,8	17,6	61,5	17,6	35,1	122,9	26,4	52,7	35,1	70,3
Rated Power	① ②	kW	83	43	10	90	42	8	91	42	90	40
Peak Torque		Nm	2450	2450	2450	5000	5000	5000	7600	7500	10100	10100
Peak Current		A	379	184	52	373	186	53	380	185	377	188
S6 Torque (duty 40%, 60s cycle)	①	Nm	2015	1988	2021	4313	4334	4334	6662	6734	9035	8980
Rated Torque at 0 rpm	①	Nm	998	998	998	2206	2206	2206	3430	3430	4653	4653
Maximum Continuous Speed	③	rpm	360	360	360	360	360	300	360	360	360	360
Maximum Transient Speed		rpm	720	720	720	720	720	720	720	720	720	720
Motor Constant		Nm/√W	25,9	25,9	25,9	42,39	42,39	42,39	55,12	55,12	65,78	65,78
Number of Poles		-	98	98	98	98	98	98	98	98	98	98
Back EMF Constant at 20°C		V*s	5,07	10,14	35,5	10,1	20,3	71	15,2	30,4	20,3	40,6
Thermal Time Constant		s	315,5	311,5	307	265,2	263,2	260,9	248,5	247,1	240,2	239,1
Minimum Coolant Flow (Δt 10°C)		l/min	10,8	8,4	7,7	14,7	14,3	14,1	20,7	20,6	26,8	26,7
Rotor Inertia		kg*m <sup>2</sup>	0,561	0,561	0,561	1,000	1,000	1,000	1,439	1,439	1,877	1,877
Rotor Mass		kg	10,9	10,9	10,9	27,5	27,5	27,5	32,2	32,2	42,9	42,9
Stator Mass		kg	53,8	53,8	53,8	81,9	81,9	81,9	109,8	109,8	137,7	137,7
Motor Loss	④	kW	4,7	4,7	4,7	8,7	8,7	8,7	12,5	12,5	16,3	16,3

**TEST CONDITIONS**

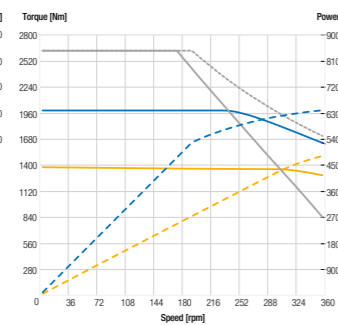
- ① Coolant inlet temperature 20 °C
- ② 600 V DC\_Bus
- ③ For higher speed application contact our technical team
- ④ At Rated Power

**TORQUE SPEED DIAGRAM**

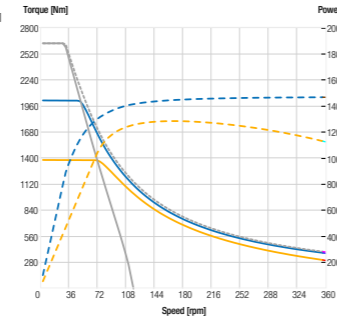
TKH 595.050.087



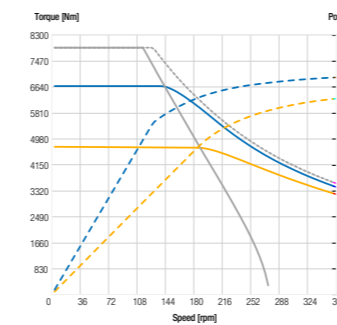
TKH 595.050.17



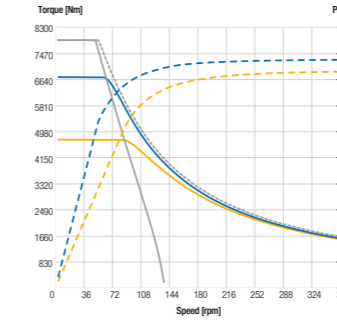
TKH 595.050.61



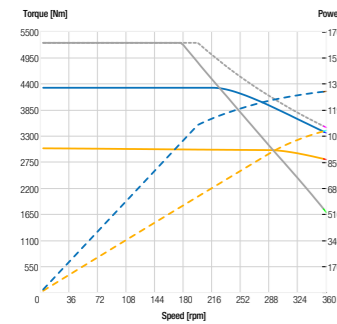
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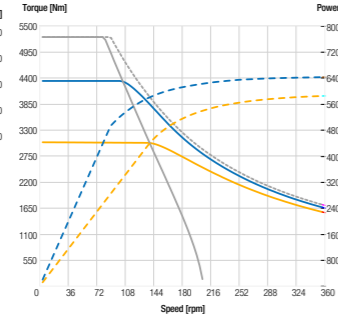
TKH 595.150.52



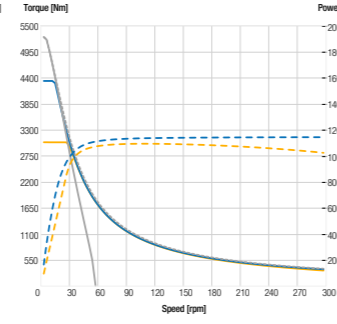
TKH 595.100.17



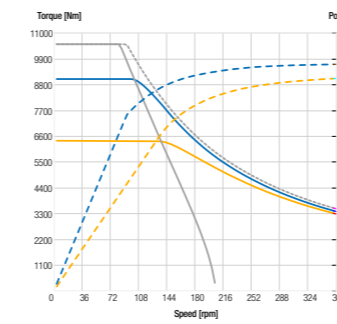
TKH 595.100.35



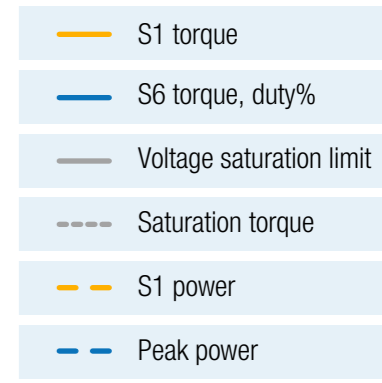
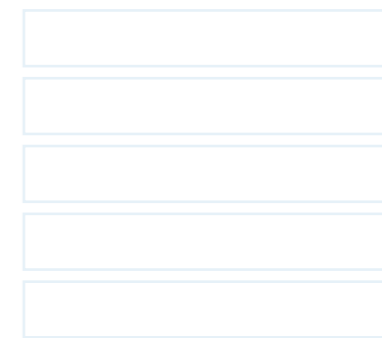
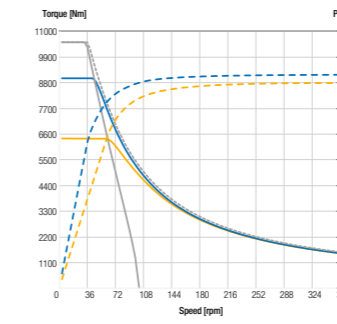
TKH 595.100.122



TKH 595.200.35

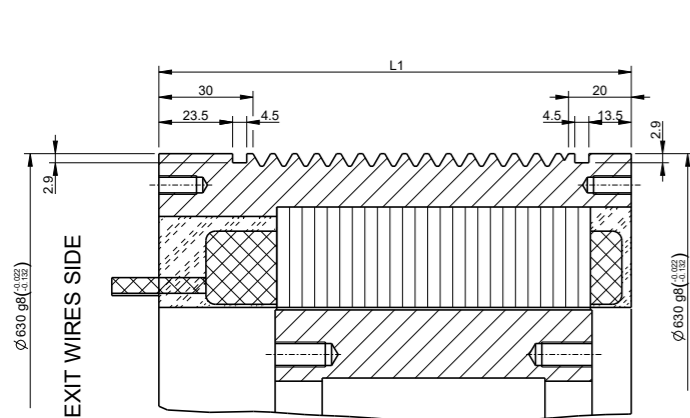
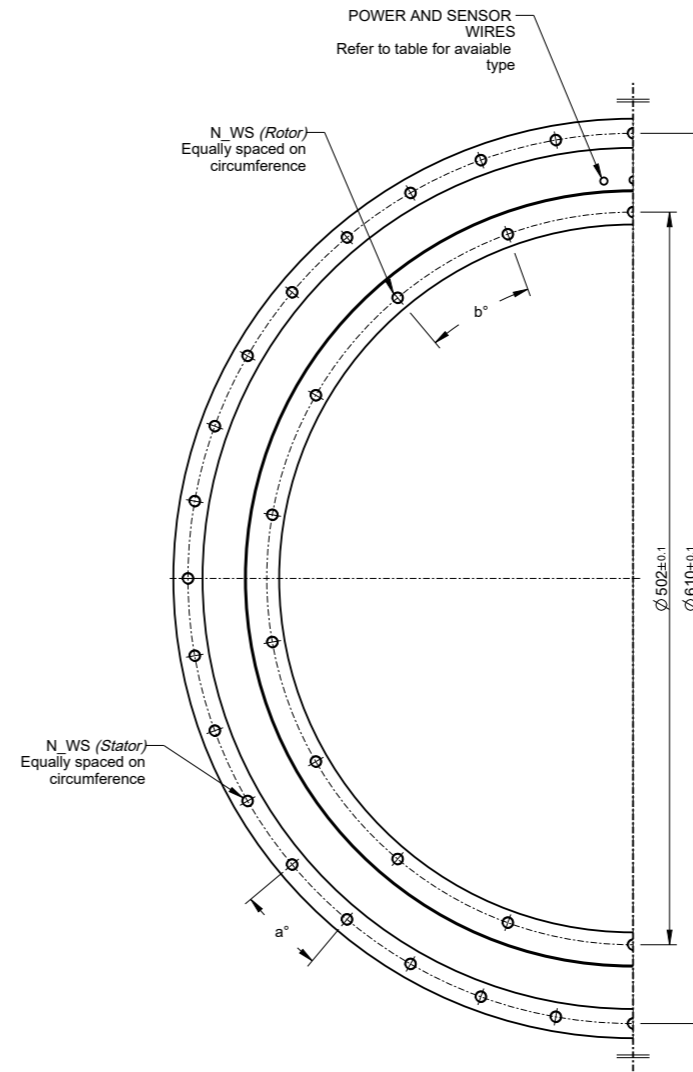
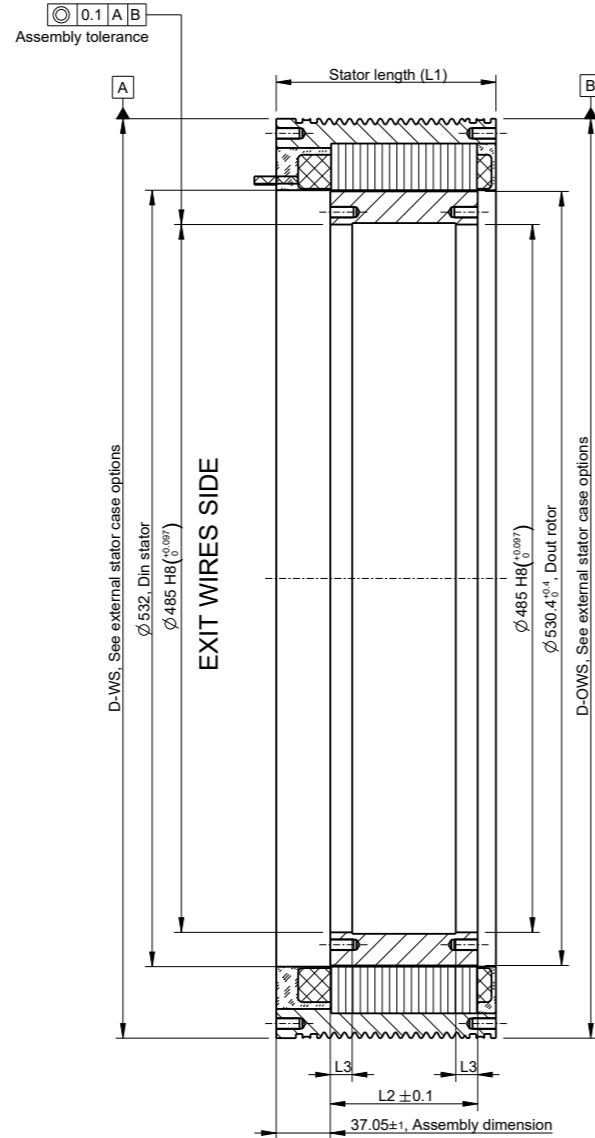
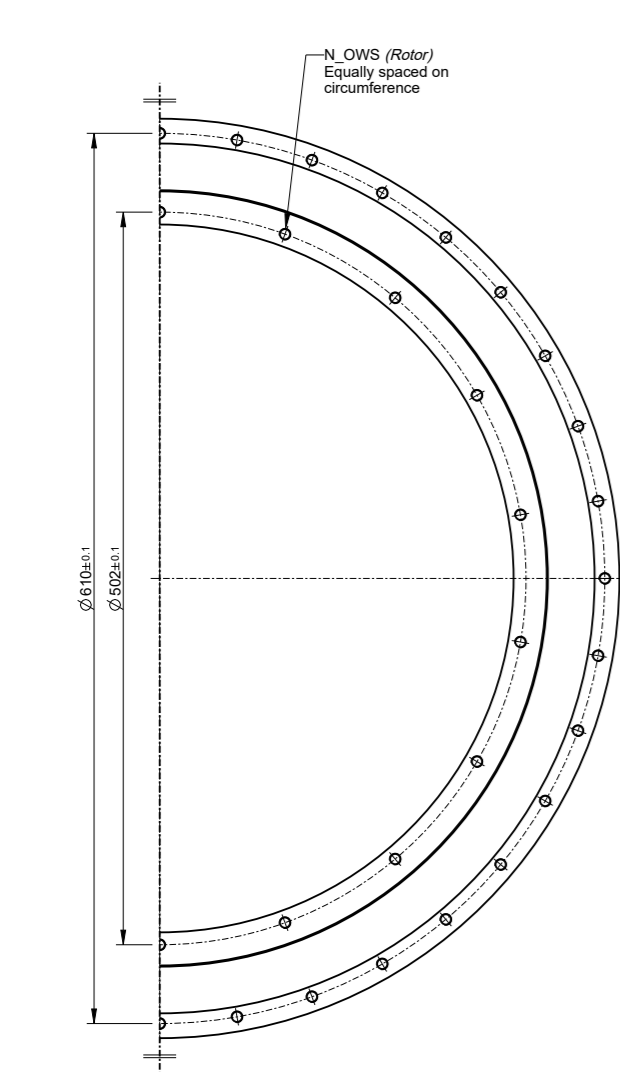


TKH 595.200.70

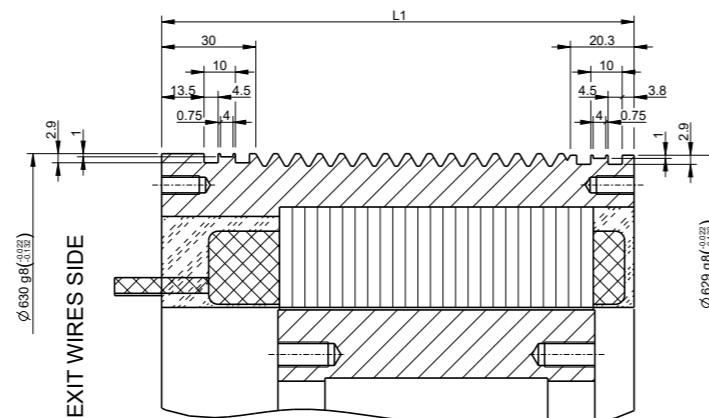


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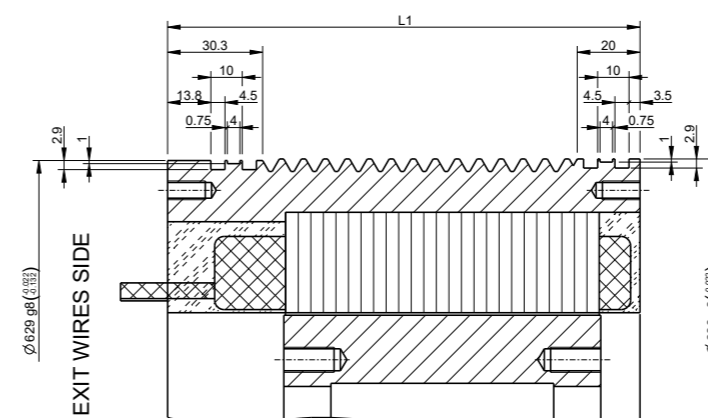
**TECHNICAL DRAWING TKH 595**



TYPE 1 - Same external centering diameter



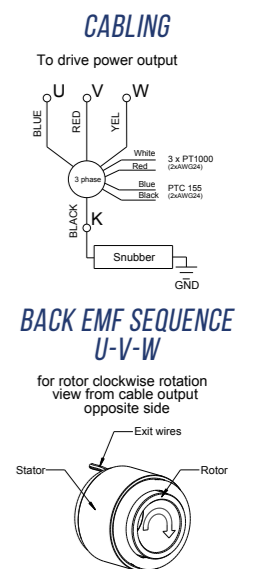
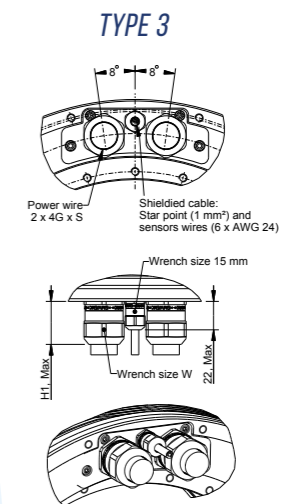
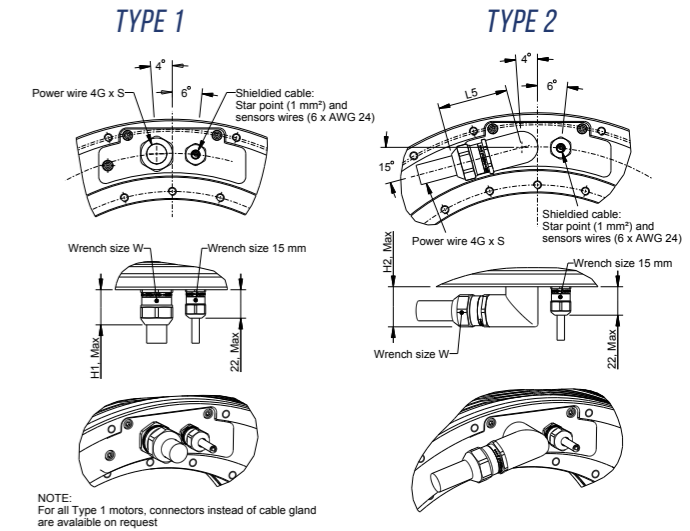
TYPE 2 - Bigger external centering on WS



TYPE 3 - Bigger external centering on OWS

Rotor size TKHRT	Rotor fixing holes			Rotor dimensions	
	N_WS (min class)	N_OWS (min class)	b° (angular pitch)	L2 (Rotor length)	L3 (Centering length)
TKHRT 595 50	12 x M8 (8.8)	12 x M8 (8.8)	30°	51	10
TKHRT 595 100	18 x M8 (8.8)	18 x M8 (8.8)	20°	101	15
TKHRT 595 150	18 x M10 (8.8)	18 x M10 (8.8)	20°	151	15
TKHRT 595 200	24 x M10 (8.8)	24 x M10 (8.8)	15°	201	20

Stator size TKHST	Stator fixing holes			Stator Length L1
	N° WS (min class)	N° OWS (min class)	a° (angular pitch)	
TKHST 595 50	24 x M5 (8.8)	24 x M5 (8.8)	15°	101
TKHST 595 100	36 x M6 (8.8)	36 x M6 (8.8)	10°	151
TKHST 595 150	24 x M8 (8.8)	24 x M8 (8.8)	15°	201
TKHST 595 200	36 x M8 (8.8)	36 x M8 (8.8)	10°	251



TKH 675		050-20	050-41	050-82	100-20	100-41	100-82	150-30	150-61	150-123	200-41	200-82	200-164
Rated Torque	① Nm	1770	1800	1800	3800	4000	4000	6300	6300	6300	8500	8500	8500
Knee Speed	② rpm	263	120	50	250	120	50	160	75	30	120	50	20
Rated Current	① A	94	47	24	200	106	52	223,4	112	56	227	113	57
Torque Constant	Nm/A	20,5	41,1	82,1	20,5	41,1	82,1	30,8	61,6	123,2	41,1	82,1	164,2
Rated Power	① ② kW	49	23	9	100	50	21	106	50	20	107	45	18
Peak Torque	Nm	3250	3300	3300	6600	6650	6650	9900	9900	9900	13000	13000	13000
Peak Current	A	207	105	52	416	210	105	414	207	103	403	202	101
S6 Torque (duty 40%, 60s cycle)	① Nm	2680	2680	2706	5793	5805	5805	8948	8948	8980	12040	12150	12150
Rated Torque at 0 rpm	① Nm	1332	1332	1332	2950	2950	2950	4587	4587	4587	6218	6218	6218
Maximum Continuous Speed	③ rpm	320	320	320	320	320	320	320	320	320	320	320	210
Maximum Transient Speed	rpm	640	640	640	640	640	640	640	640	640	640	640	640
Motor Constant	Nm/√W	32,36	32,36	32,36	52,96	52,96	52,96	68,87	68,87	68,87	82,19	82,19	82,19
Number of Poles	-	112	112	112	112	112	112	112	112	112	112	112	112
Back EMF Constant at 20°C	V*s	11,9	23,7	47,4	11,85	23,7	47,4	17,8	35,6	71,1	23,7	47,4	94,8
Thermal Time Constant	s	312,7	309,7	307,5	266,3	264,1	262,5	249,4	247,9	246,9	241	239,9	239,1
Minimum Coolant Flow (Δt 10°C)	l/min	9,6	9	8,8	16,9	16,5	16,4	23,9	23,8	23,7	30,9	30,9	30,1
Rotor Inertia	kg*m <sup>2</sup>	0,956	0,956	0,956	1,702	1,702	1,702	2,449	2,449	2,449	3,195	3,195	3,195
Rotor Mass	kg	12,6	12,6	12,6	32,3	32,3	32,3	37	37	37	49,3	49,3	49,3
Stator Mass	kg	60,1	60,1	60,1	91,5	91,5	91,5	122,7	122,7	122,7	153,9	153,9	153,9
Motor Loss	④ kW	5,3	5,3	5,3	9,9	9,9	9,9	14,2	14,2	14,2	18,5	18,5	18,5

**TEST CONDITIONS**

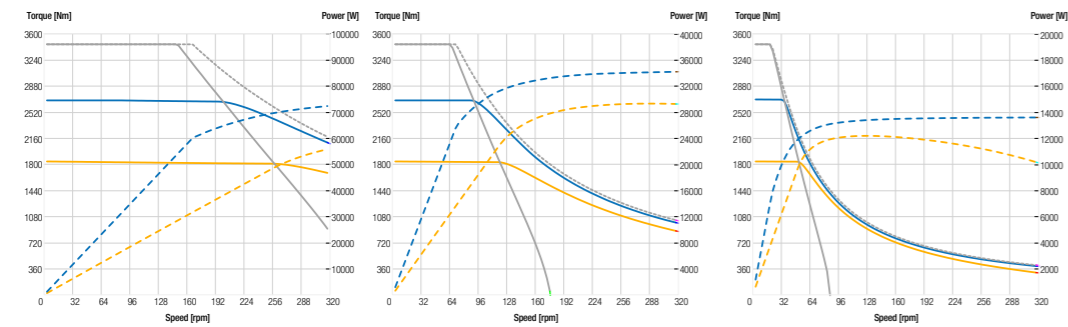
- ① Coolant inlet temperature 20 °C
- ② 600 V DC\_Bus
- ③ For higher speed application contact our technical team
- ④ At Rated Power

**TORQUE SPEED DIAGRAM**

TKH 675.050.20

TKH 675.050.41

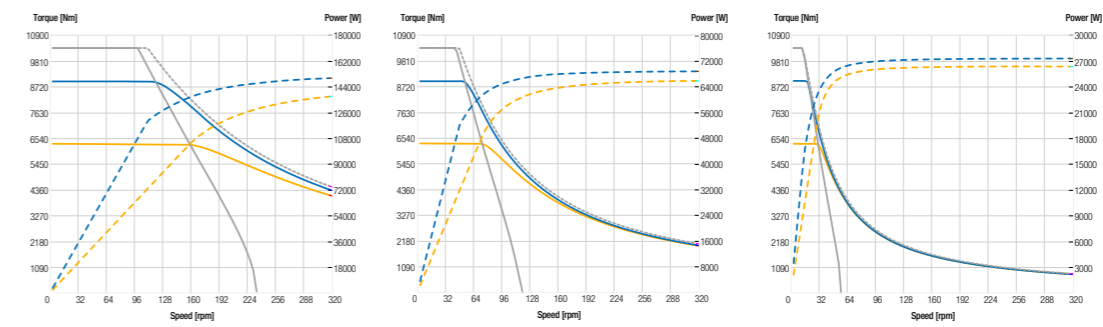
TKH 675.050.82



TKH 675.150.30

TKH 675.150.61

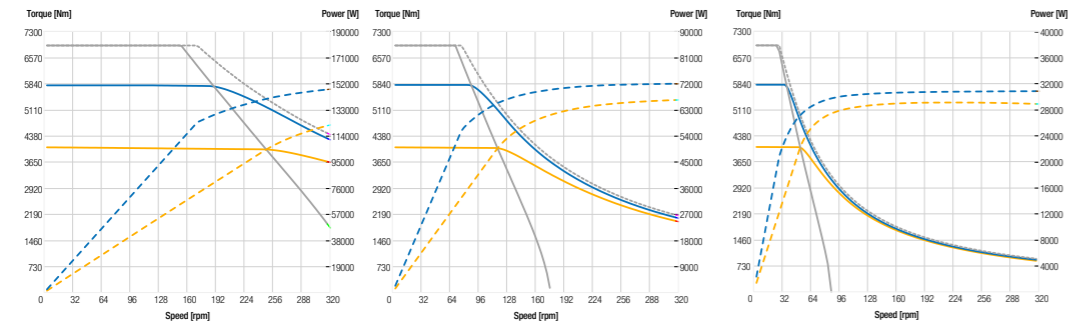
TKH 675.150.123



TKH 675.100.20

TKH 675.100.41

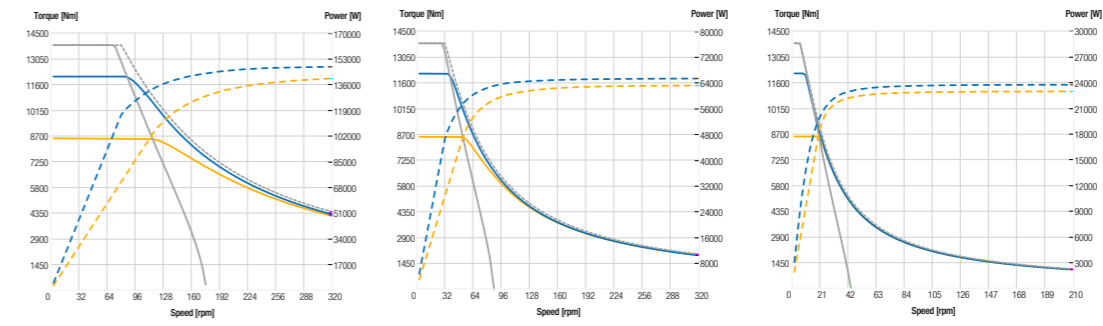
TKH 675.100.82



TKH 675.200.41

TKH 675.200.82

TKH 675.200.164

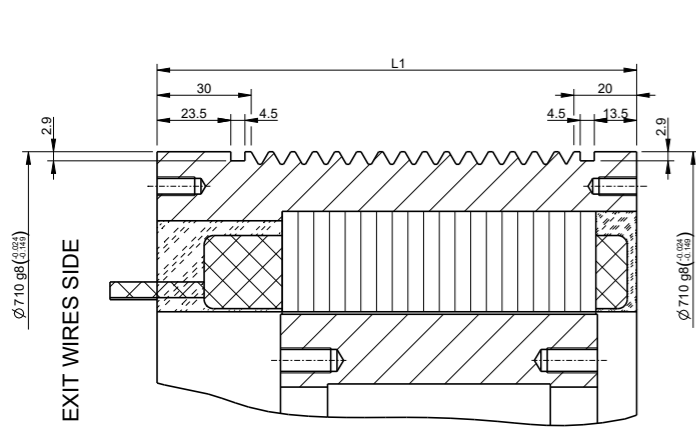
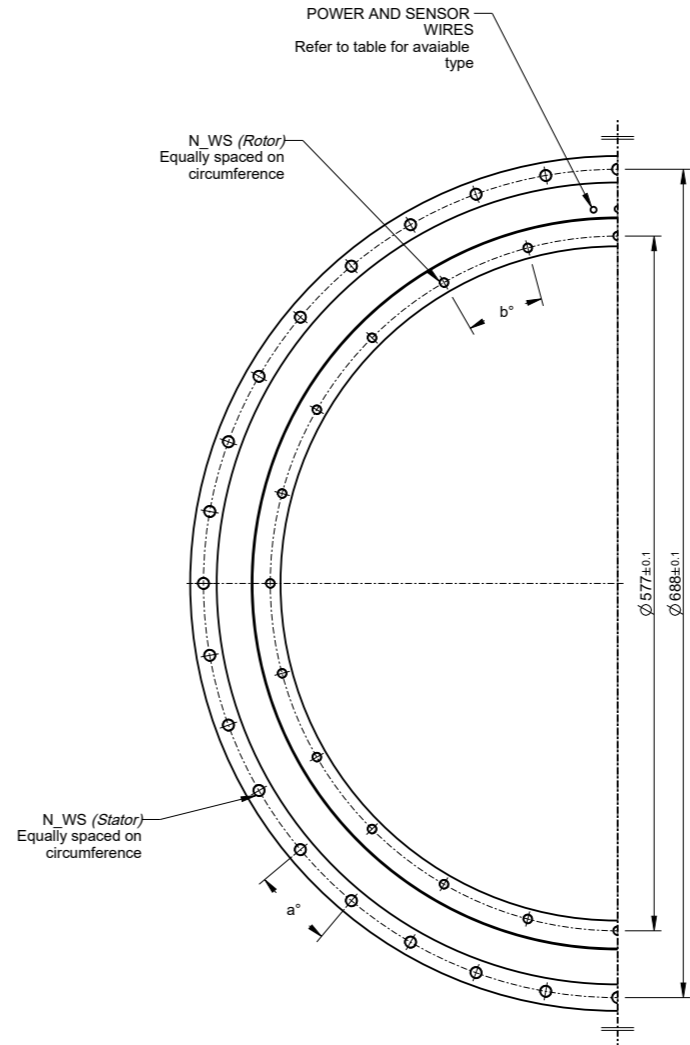
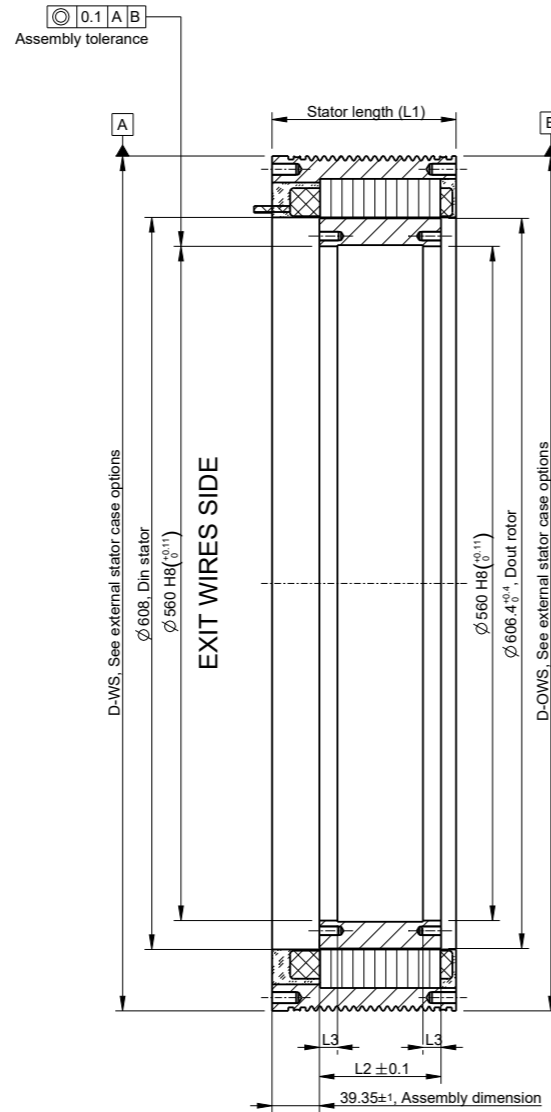
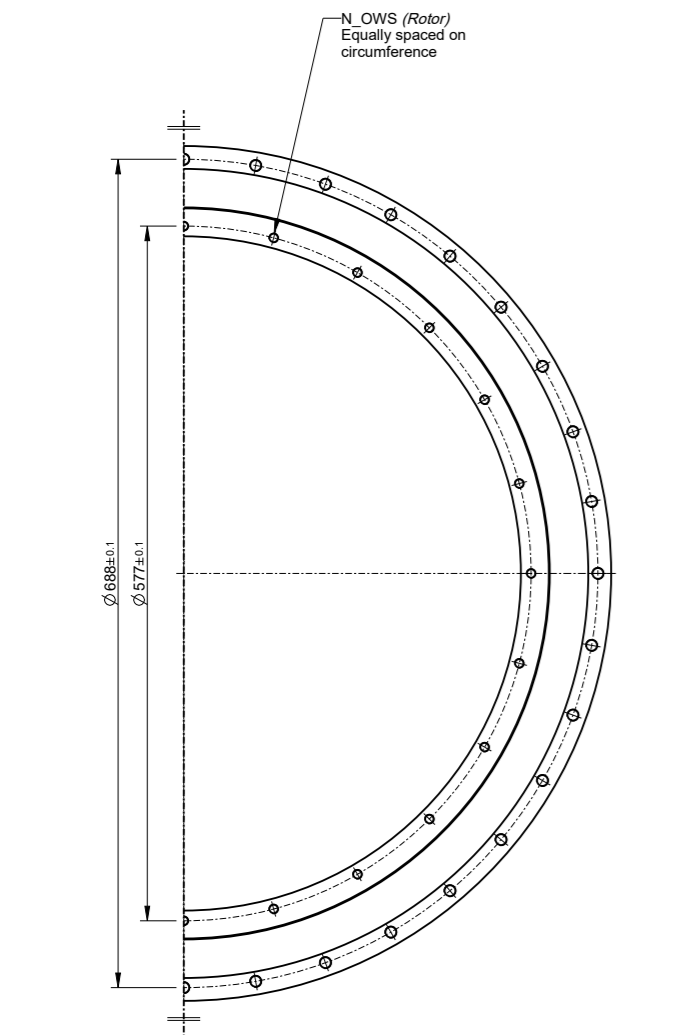


- S1 torque
- S6 torque, duty%
- Voltage saturation limit
- - - Saturation torque
- - - S1 power
- - - Peak power

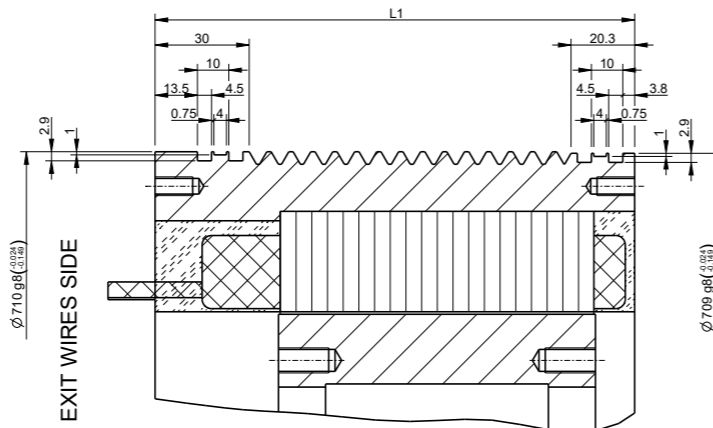
We offer the flexibility to customize mechanical interfaces to suit your individual application needs, ensuring a seamless plug-and-play experience.



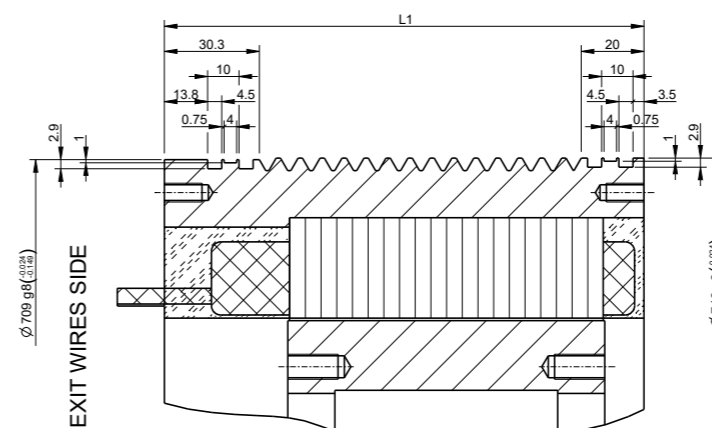
**TECHNICAL DRAWING TKH 675**



TYPE 1 - Same external centering diameter



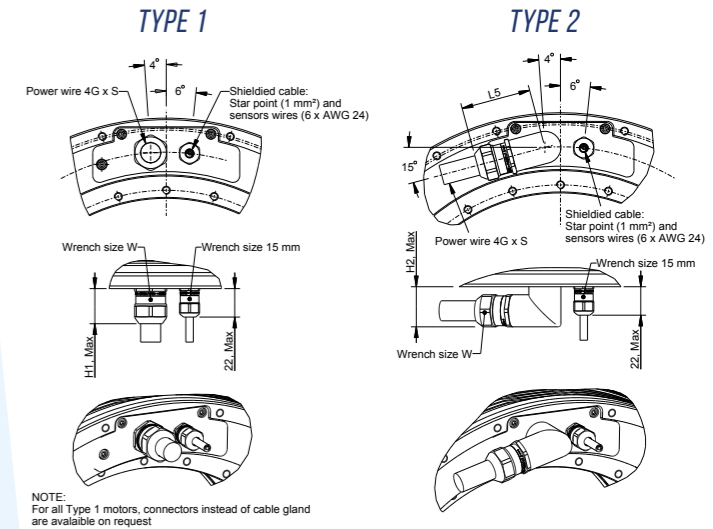
TYPE 2 - Bigger external centering on WS



TYPE 3 - Bigger external centering on OWS

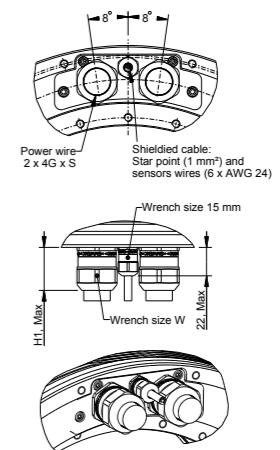
Rotor size TKHRT	Rotor fixing holes			Rotor dimensions	
	N_WS (min class)	N_OWS (min class)	b° (angular pitch)	L2 (Rotor length)	L3 (Centering length)
TKHRT 675 50	12 x M8 (8.8)	12 x M8 (8.8)	30°	51	10
TKHRT 675 100	24 x M8 (8.8)	24 x M8 (8.8)	15°	101	15
TKHRT 675 150	24 x M10 (8.8)	24 x M10 (8.8)	15°	151	15
TKHRT 675 200	24 x M10 (8.8)	24 x M10 (8.8)	15°	201	20

Stator size TKHST	Stator fixing holes			Stator Length
	N°_WS (min class)	N°_OWS (min class)	a° (angular pitch)	L1
TKHST 675 50	18 x M6 (8.8)	18 x M6 (8.8)	20°	103
TKHST 675 100	36 x M6 (8.8)	36 x M6 (8.8)	10°	153
TKHST 675 150	24 x M8 (8.8)	24 x M8 (8.8)	15°	203
TKHST 675 200	24 x M10 (8.8)	24 x M10 (8.8)	15°	253

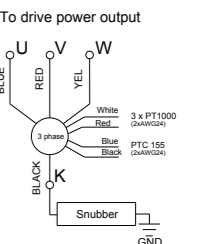


NOTE:  
For all Type 1 motors, connectors instead of cable gland are available on request

**TYPE 3**

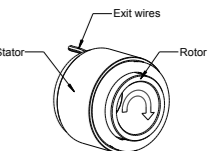


**CABLING**



**BACK EMF SEQUENCE U-V-W**

for rotor clockwise rotation view from cable output opposite side



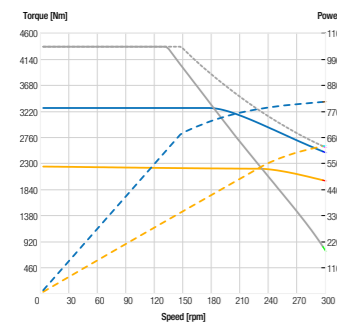
## TEST CONDITIONS

TKH 745		050-22	050-34	050-68	050-102	100-22	100-45	100-68	100-136	150-34	150-68	150-102	200-45	200-91	200-136
Rated Torque	① Nm	2150	2200	2200	2200	4800	4950	4950	4950	7600	7600	7600	10400	10400	10400
Knee Speed	② rpm	235	150	65	40	225	105	65	25	145	67	40	105	45	25
Rated Current	① A	104	71	35	23	232	120	80	40	245	122	82	252	126	84
Torque Constant	Nm/A	22,8	34,2	68,5	102,7	22,8	45,6	68,5	136,9	34,2	68,5	102,7	45,6	91,3	136,9
Rated Power	① ② kW	53	35	15	9	113	54	34	13	115	53	32	114	49	27
Peak Torque	Nm	4100	4100	4100	4100	8350	8400	8400	8400	12500	12600	12500	16500	16500	16500
Peak Current	A	236	156	77	51	477	240	160	80	472	240	157	464	232	155
S6 Torque (duty 40%, 60s cycle)	① Nm	3278	3300	3324	3300	7205	7218	7205	7245	11104	11104	11104	15062	15062	14806
Rated Torque at 0 rpm	① Nm	1630	1630	1630	1630	3618	3618	3618	3618	5630	5630	5630	7636	7636	7636
Maximum Continuous Speed	③ rpm	300	300	300	250	300	300	300	300	300	300	300	300	300	300
Maximum Transient Speed	rpm	570	570	570	570	570	570	570	570	570	570	570	570	570	570
Motor Constant	Nm/√W	38,16	38,16	38,16	38,16	62,45	62,45	62,45	62,45	81,21	81,21	81,21	96,92	96,92	96,92
Number of Poles	-	126	126	126	126	126	126	126	126	126	126	126	126	126	126
Back EMF Constant at 20°C	V*s	13,2	19,8	39,5	59,3	13,2	26,4	39,5	79,1	19,8	39,5	59,3	26,4	52,7	79,1
Thermal Time Constant	s	316,7	314,7	312	310,9	269,6	267,3	266,2	264,9	252,4	250,8	250,1	243,8	242,6	242,1
Minimum Coolant Flow (Δt 10°C)	l/min	10,6	10,1	9,8	9,6	18,6	18,2	18,2	18,1	26,4	26,2	26,2	34,2	34,1	34,1
Rotor Inertia	kg*m <sup>2</sup>	1,278	1,278	1,278	1,278	2,277	2,277	2,277	2,277	3,275	3,275	3,275	4,274	4,274	4,274
Rotor Mass	kg	14,1	14,1	14,1	14,1	37	37	37	37	41,1	41,1	41,1	54,9	54,9	54,9
Stator Mass	kg	94,8	94,8	94,8	94,8	143,5	143,5	143,5	143,5	192,1	192,1	192,1	240,5	240,5	240,5
Motor Loss	④ kW	5,9	5,9	5,9	5,9	10,9	10,9	10,9	10,9	15,8	15,8	15,8	20,5	20,5	20,5

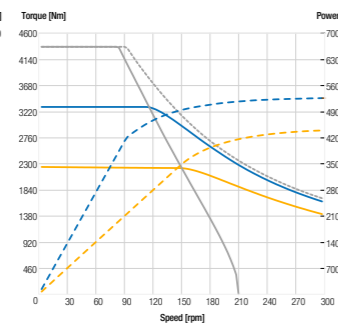
- ① Coolant inlet temperature 20 °C
- ② 600 V DC\_Bus
- ③ For higher speed application contact our technical team
- ④ At Rated Power

## TORQUE SPEED DIAGRAM

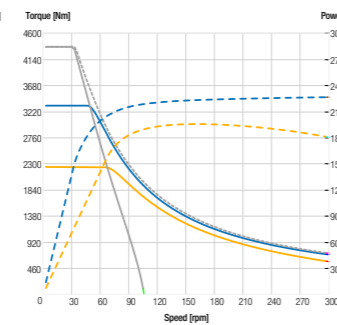
TKH 745.050.22



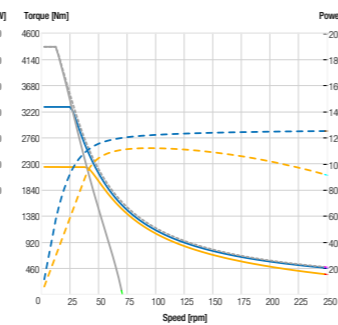
TKH 745.050.34



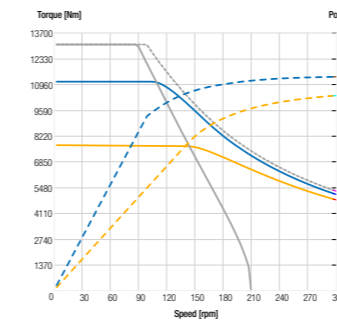
TKH 745.050.68



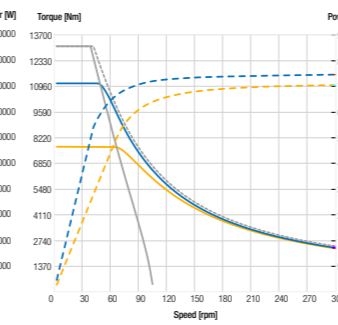
TKH 745.050.102



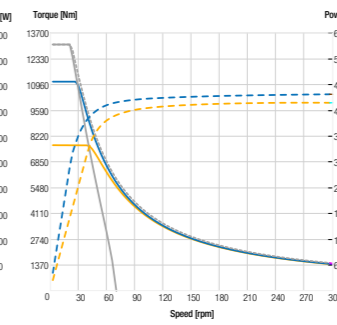
TKH 745.150.34



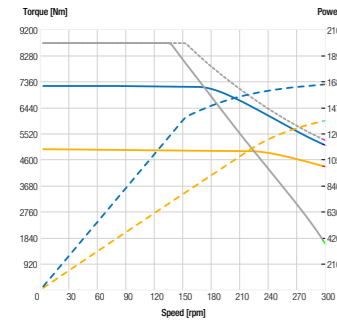
TKH 745.150.68



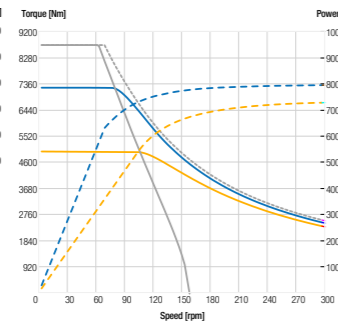
TKH 745.150.102



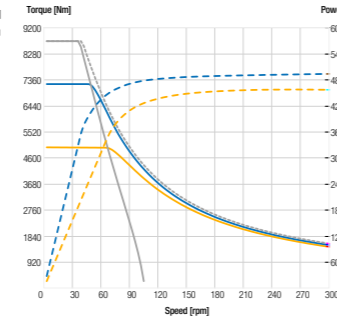
TKH 745.100.22



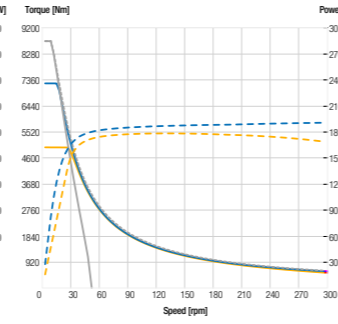
TKH 745.100.45



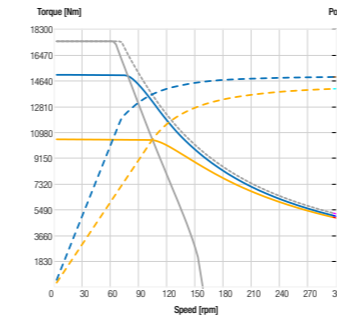
TKH 745.100.68



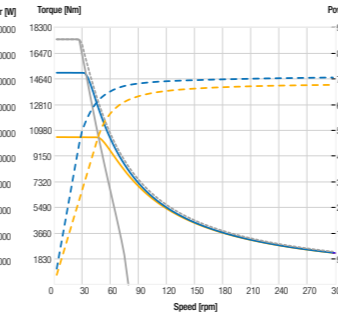
TKH 745.100.136



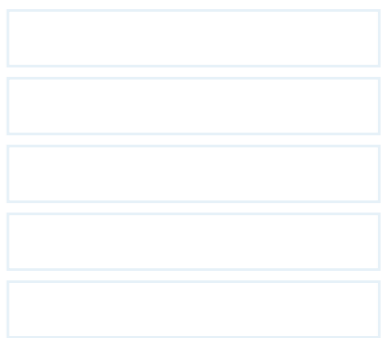
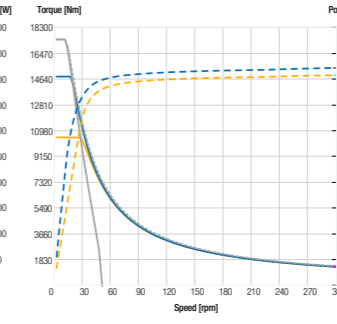
TKH 745.200.45



TKH 745.200.91



TKH 745.200.136



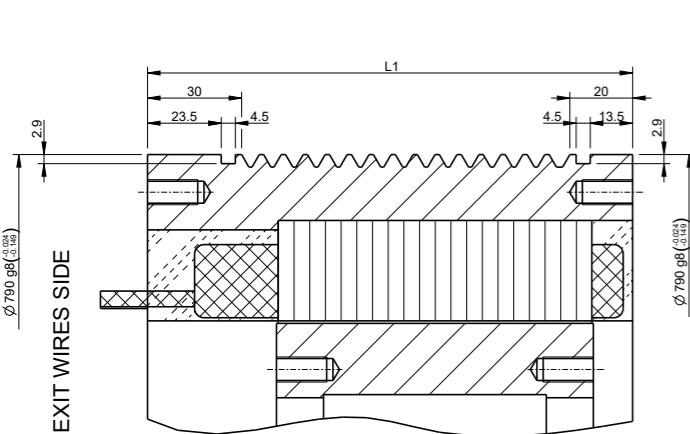
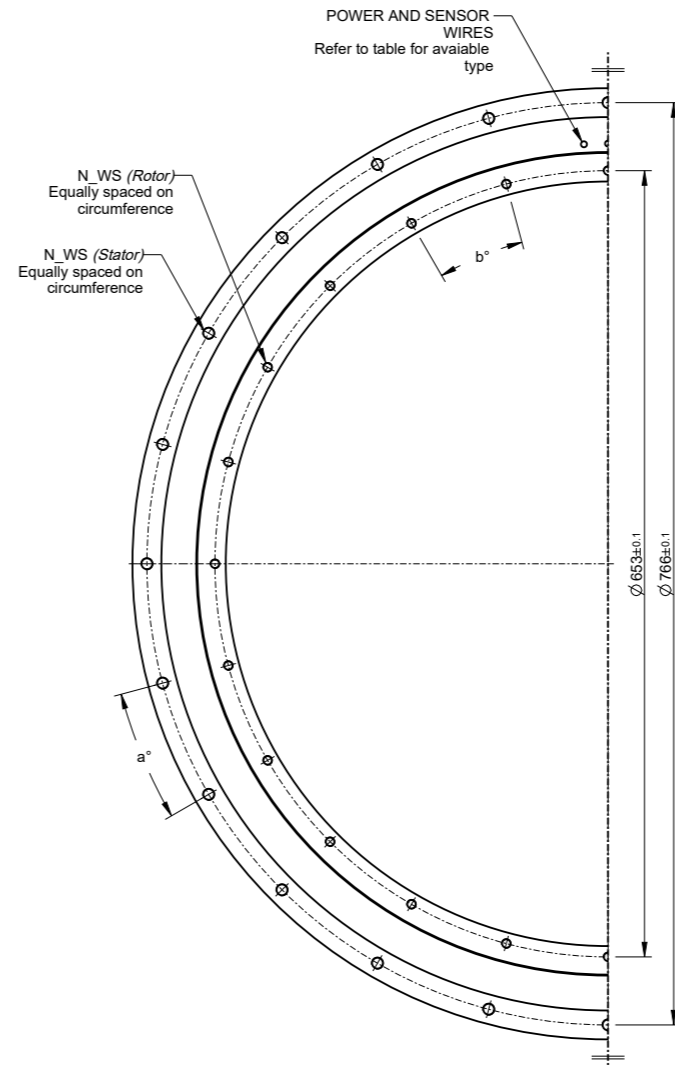
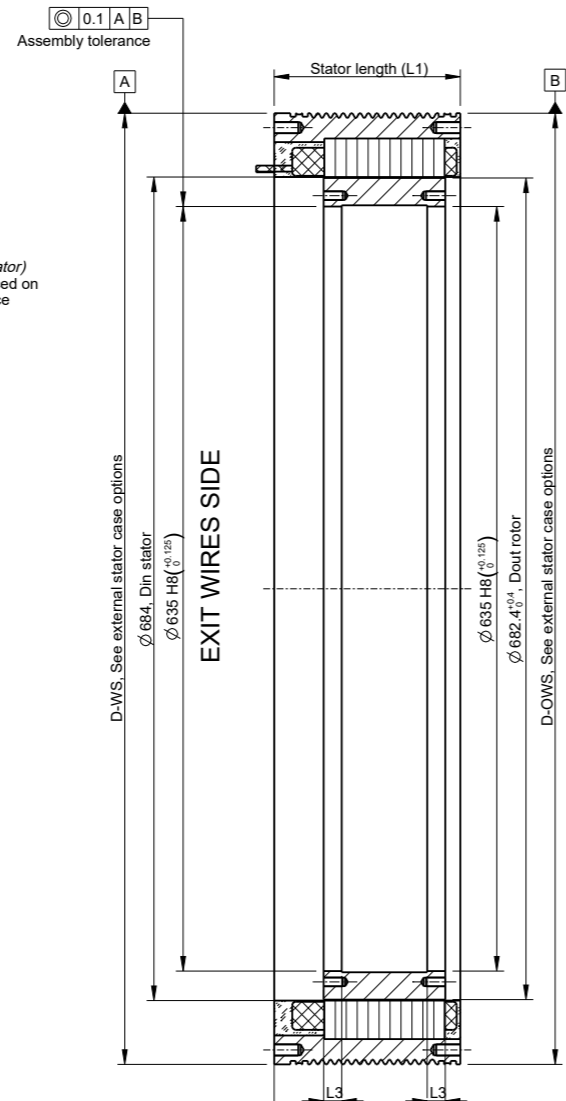
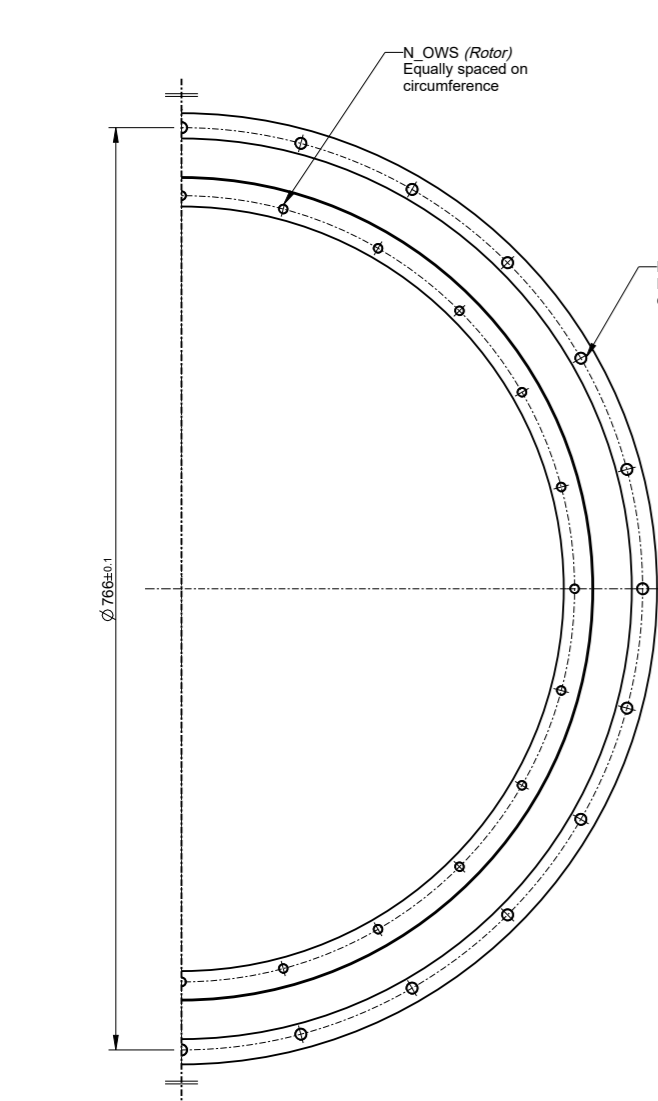
- S1 torque
- S6 torque, duty%
- Voltage saturation limit
- - - Saturation torque
- - - S1 power
- - - Peak power



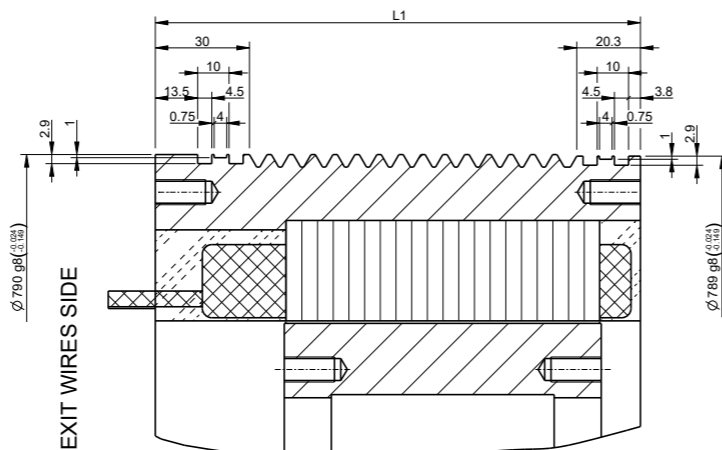
We offer the flexibility to customize mechanical interfaces to suit your individual application needs, ensuring a seamless plug-and-play experience.



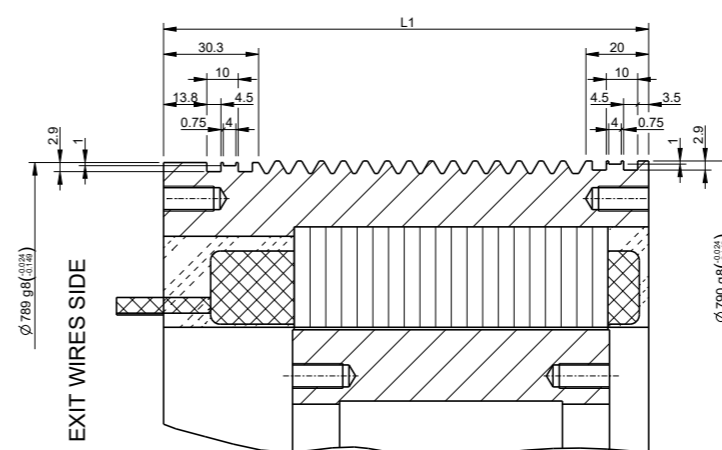
**TECHNICAL DRAWING TKH 745**



TYPE 1 - Same external centering diameter



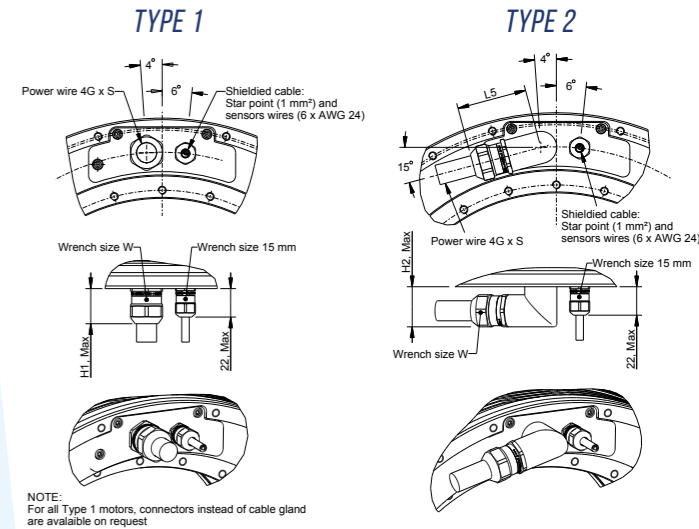
TYPE 2 - Bigger external centering on WS



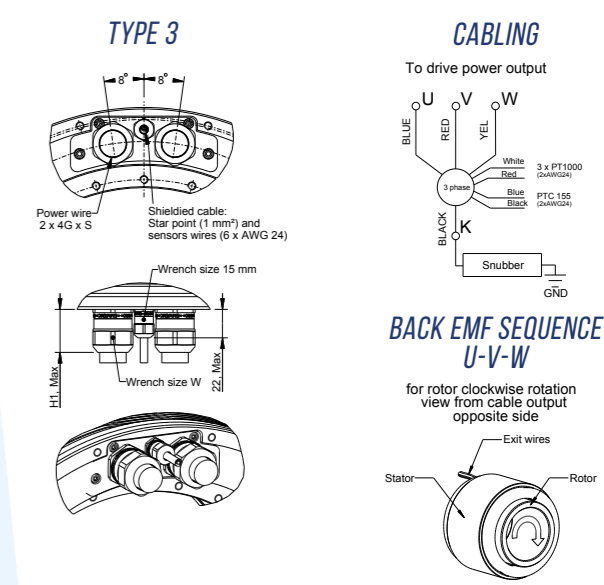
TYPE 3 - Bigger external centering on OWS

Rotor size TKHRT	Rotor fixing holes			Rotor dimensions	
	N_WS (min class)	N_OWS (min class)	b° (angular pitch)	L2 (Rotor length)	L3 (Centering length)
TKHRT 745 50	12 x M8 (8.8)	12 x M8 (8.8)	30°	51	10
TKHRT 745 100	24 x M8 (8.8)	24 x M8 (8.8)	15°	101	15
TKHRT 745 150	24 x M10 (8.8)	24 x M10 (8.8)	15°	151	15
TKHRT 745 200	36 x M10 (8.8)	36 x M10 (8.8)	10°	201	20

Stator size TKHST	Stator fixing holes			Stator Length
	N° WS (min class)	N° OWS (min class)	a° (angular pitch)	L1
TKHST 745 50	18 x M6 (8.8)	18 x M6 (8.8)	20°	105
TKHST 745 100	24 x M8 (8.8)	24 x M8 (8.8)	15°	155
TKHST 745 150	36 x M8 (8.8)	36 x M8 (8.8)	10°	205
TKHST 745 200	24 x M10 (8.8)	24 x M10 (8.8)	15°	255



NOTE: For all Type 1 motors, connectors instead of cable gland are available on request



**BACK EMF SEQUENCE U-V-W**  
for rotor clockwise rotation view from cable output opposite side

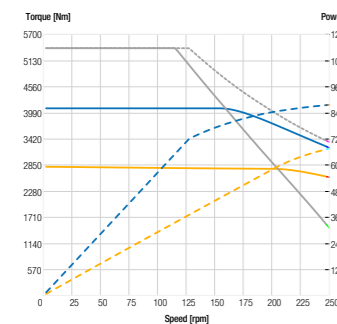
TKH 825		050-25	050-51	050-64	050-128	100-25	100-51	100-102	100-128	150-38	150-77	150-154	200-51	200-102
Rated Torque	① Nm	2700	2750	2750	2750	6100	6100	6200	6200	9500	9500	9500	12900	12900
Knee Speed	② rpm	210	100	75	30	200	95	40	30	130	60	25	95	40
Rated Current	① A	116	59	47	24	263	131	67	53	274	137	68	279	140
Torque Constant	Nm/A	25,7	51,5	64,3	128,7	25,7	51,5	102,9	128,7	38,6	77,2	154,4	51,5	102,9
Rated Power	① ② kW	59	29	22	9	128	61	26	20	130	60	25	128	54
Peak Torque	Nm	5000	5000	5000	5000	10000	10000	10000	10000	15500	15500	15500	20500	20500
Peak Current	A	259	127	102	51	506	252	125	100	533	266	133	525	262
S6 Torque (duty 40%, 60s cycle)	① Nm	4086	4102	4126	4166	8864	8937	8937	9009	13725	13746	13830	18522	18550
Rated Torque at 0 rpm	① Nm	2037	2037	2037	2037	4510	4510	4510	4510	7017	7017	7017	9518	9518
Maximum Continuous Speed	③ rpm	250	250	250	250	250	250	250	250	250	250	250	250	250
Maximum Transient Speed	rpm	500	500	500	500	500	500	500	500	500	500	500	500	500
Motor Constant	Nm/√W	45,36	45,36	45,36	45,36	74,23	74,23	74,23	74,23	96,53	96,53	96,53	115,19	115,19
Number of Poles	-	140	140	140	140	140	140	140	140	140	140	140	140	140
Back EMF Constant at 20°C	V*s	14,86	29,7	37,2	74,3	14,9	29,7	59,4	74,3	22,3	44,6	89,2	29,7	59,4
Thermal Time Constant	s	314,8	311,4	310,5	308,4	267,9	265,5	263,8	263,3	250,8	249,1	248	242,2	240,9
Minimum Coolant Flow (Δt 10°C)	l/min	11,8	11	11	10,8	20,8	20,3	20,2	20,2	29,4	29,3	29,2	38,1	37,9
Rotor Inertia	kg*m <sup>2</sup>	1,852	1,852	1,852	1,852	3,299	3,299	3,299	3,299	4,746	4,746	4,746	6,193	6,193
Rotor Mass	kg	15,8	15,8	15,8	15,8	42,5	42,5	42,5	42,5	46,6	46,6	46,6	62	62
Stator Mass	kg	82,5	82,5	82,5	82,5	125,4	125,4	125,4	125,4	168,1	168,1	168,1	210,7	210,7
Motor Loss	④ kW	6,6	6,6	6,6	6,5	12,2	12,2	12,2	12,2	17,6	17,6	17,6	22,9	22,9

**TEST CONDITIONS**

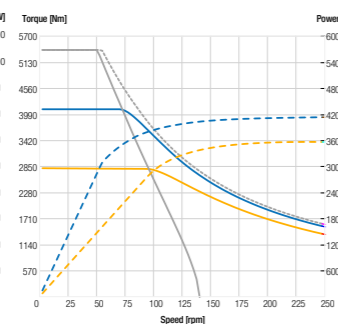
- ① Coolant inlet temperature 20 °C
- ② 600 V DC\_Bus
- ③ For higher speed application contact our technical team
- ④ At Rated Power

**TORQUE SPEED DIAGRAM**

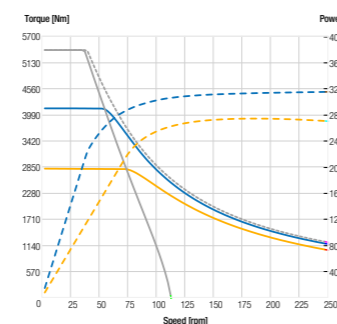
TKH 825.050.25



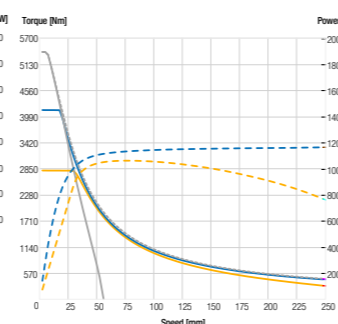
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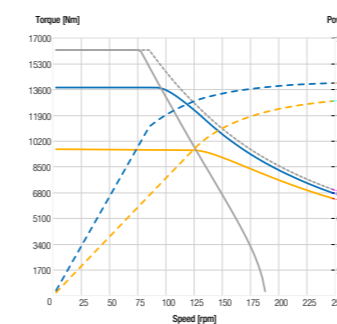
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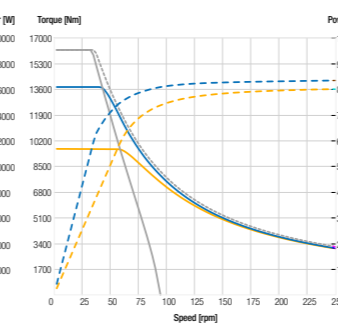
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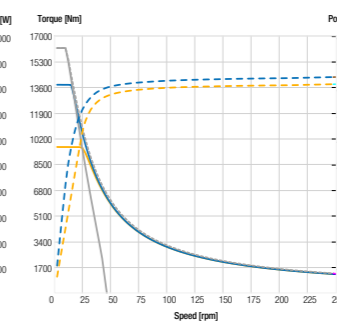
TKH 825.150.38



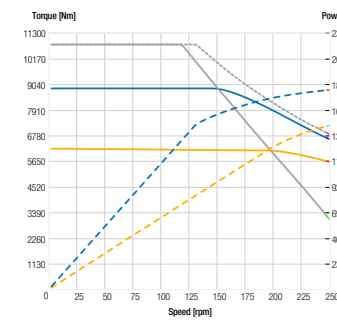
TKH 825.150.77



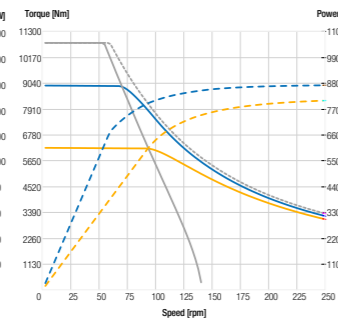
TKH 825.150.154



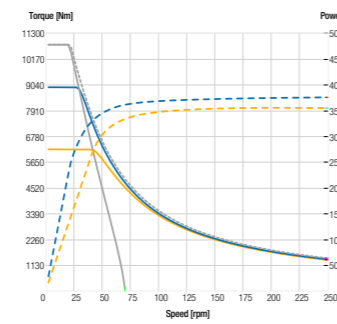
TKH 825.100.25



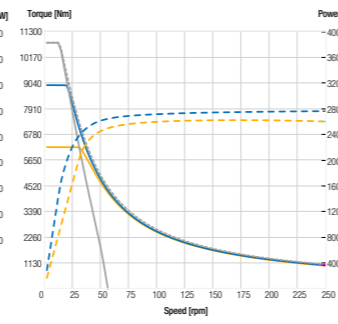
TKH 825.100.51



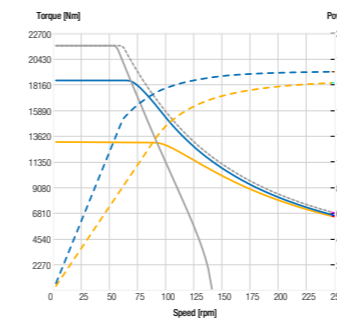
TKH 825.100.102



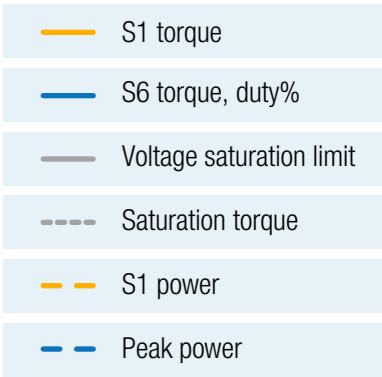
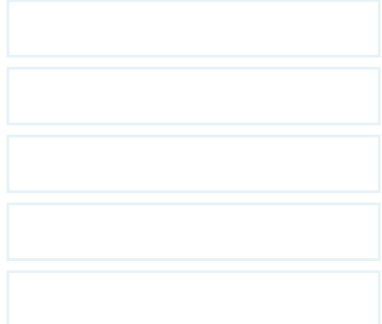
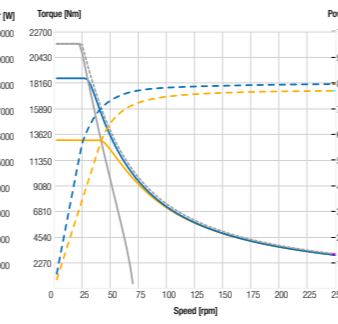
TKH 825.100.128



TKH 825.200.51



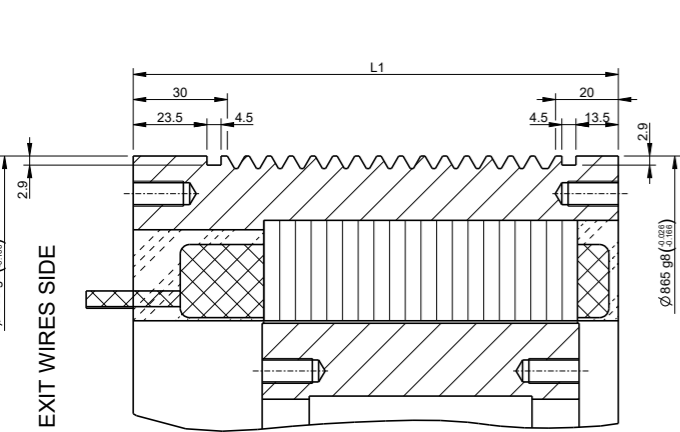
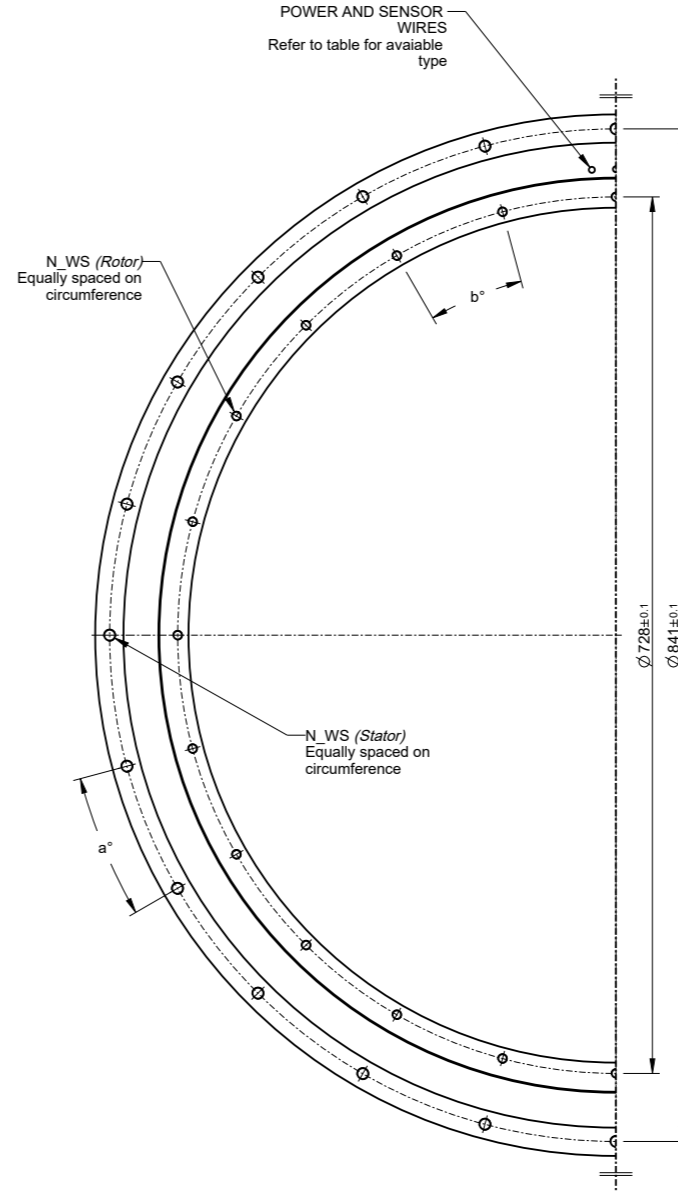
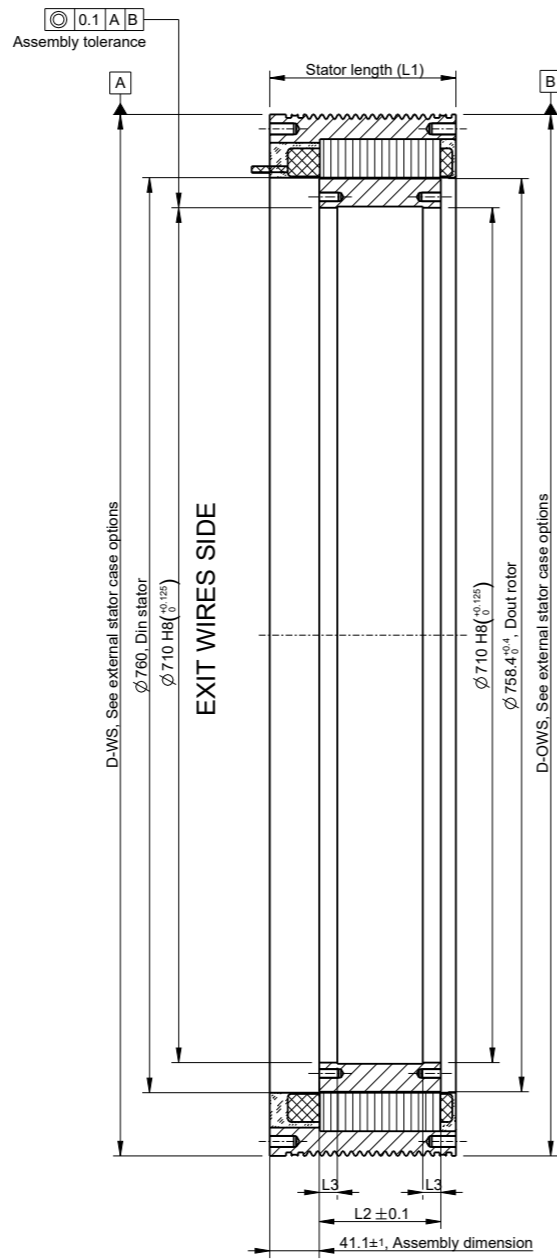
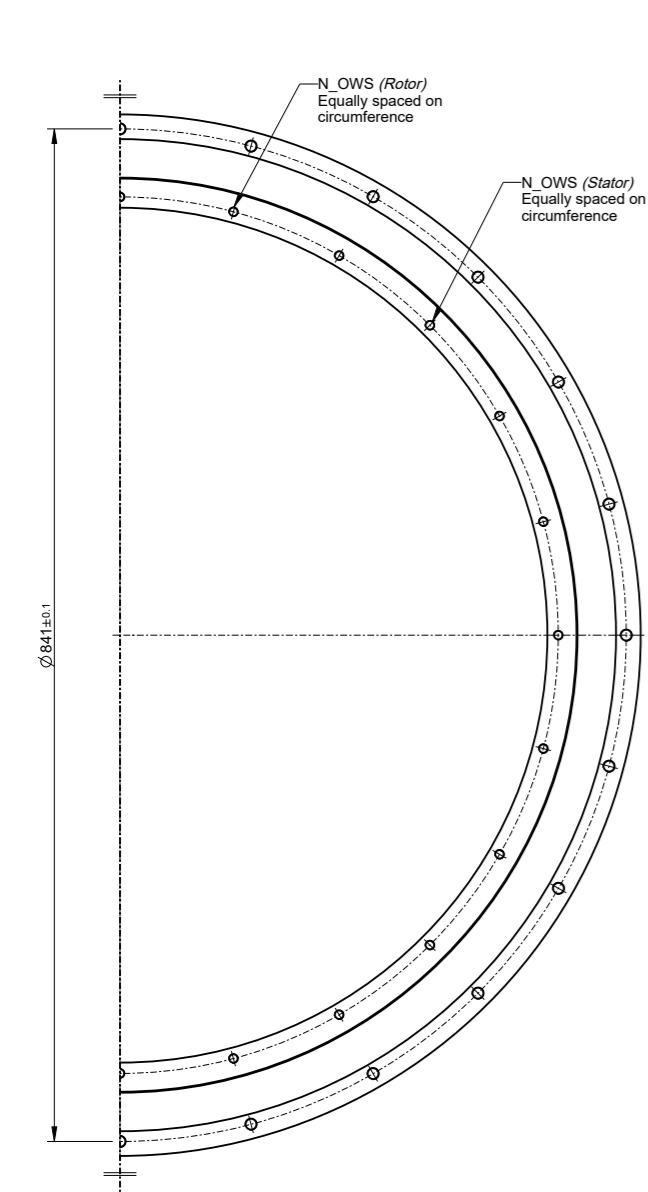
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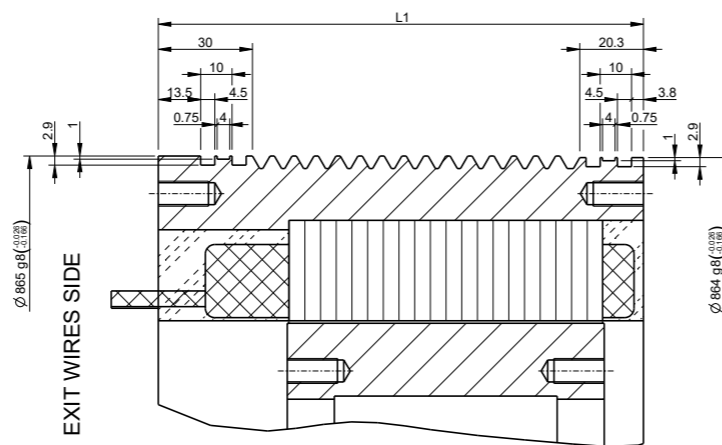
We offer the flexibility to customize mechanical interfaces to suit your individual application needs, ensuring a seamless plug-and-play experience.



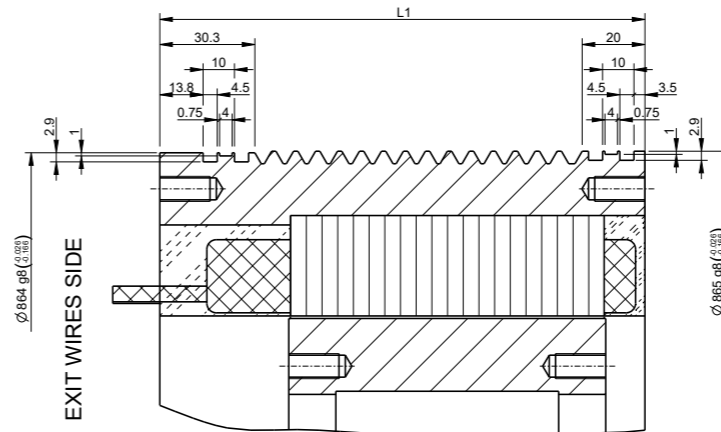
**TECHNICAL DRAWING TKH 825**



TYPE 1 - Same external centering diameter



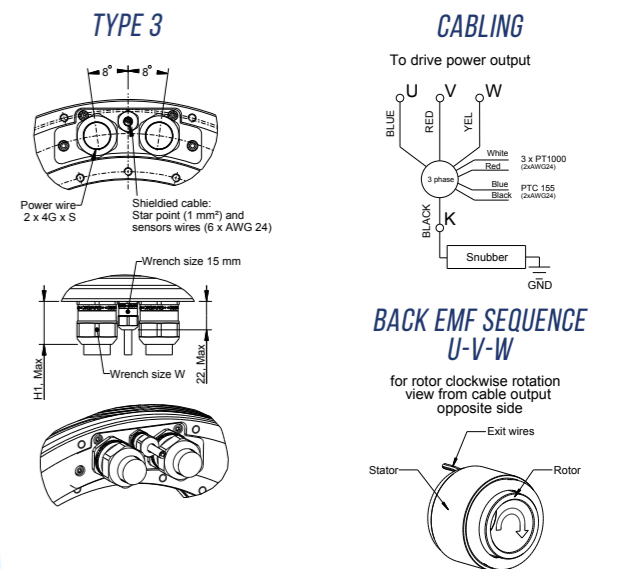
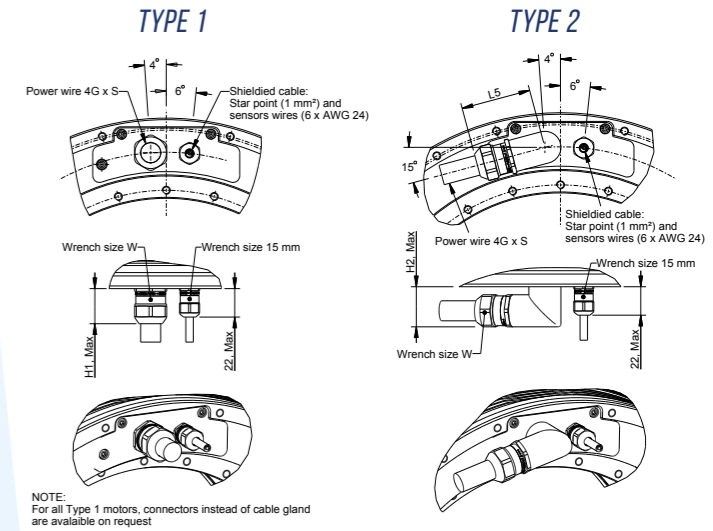
TYPE 2 - Bigger external centering on WS



TYPE 3 - Bigger external centering on OWS

Rotor size TKHRT	Rotor fixing holes		$b^\circ$ (angular pitch)	Rotor dimensions	
	$N_{WS}$ (min class)	$N_{OWS}$ (min class)		L2 (Rotor length)	L3 (Centering length)
TKHRT 825 50	12 x M8 (8.8)	12 x M8 (8.8)	30°	51	10
TKHRT 825 100	24 x M8 (8.8)	24 x M8 (8.8)	15°	101	15
TKHRT 825 150	24 x M10 (8.8)	24 x M10 (8.8)	15°	151	15
TKHRT 825 200	24 x M12 (8.8)	24 x M12 (8.8)	15°	201	20

Stator size TKHST	Stator fixing holes			Stator Length L1
	$N_{WS}$ (min class)	$N_{OWS}$ (min class)	$a^\circ$ (angular pitch)	
TKHST 825 50	24 x M6 (8.8)	24 x M6 (8.8)	15°	105
TKHST 825 100	24 x M8 (8.8)	24 x M8 (8.8)	15°	155
TKHST 825 150	36 x M8 (8.8)	36 x M8 (8.8)	10°	205
TKHST 825 200	36 x M10 (8.8)	36 x M10 (8.8)	10°	255



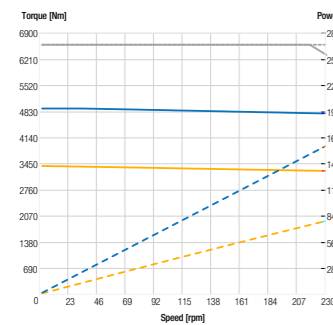
TKH 895		050-14	050-28	050-155	100-28	100-56	150-42	150-84	200-56	200-113
Rated Torque	① Nm	3050	3300	3350	7360	7400	11500	11500	15500	15500
Knee Speed	② rpm	400	190	25	185	85	120	55	85	40
Rated Current	① A	241	129	24	289	145	302	150	305	153
Torque Constant	Nm/A	14,1	28,3	155,4	28,3	56,5	42,4	84,7	56,5	113
Rated Power	① ② kW	128	66	9	143	66	145	66	138	65
Peak Torque	Nm	6000	6000	6000	12650	12500	19000	19000	25000	25000
Peak Current	A	592	288	51	617	300	616	308	600	300
S6 Torque (duty 40%, 60s cycle)	① Nm	4909	4909	4884	10554	10632	16406	16406	22110	22110
Rated Torque at 0 rpm	① Nm	2457	2457	2457	5435	5435	8451	8451	11458	11458
Maximum Continuous Speed	③ rpm	230	230	160	230	230	230	230	230	230
Maximum Transient Speed	rpm	460	460	460	460	460	460	460	460	460
Motor Constant	Nm/√W	52,24	52,24	52,24	85,48	85,48	111,15	111,15	132,64	132,64
Number of Poles	-	154	154	154	154	154	154	154	154	154
Back EMF Constant at 20°C	V*s	8,2	16,3	89,7	16,3	32,6	24,5	48,9	32,6	65,3
Thermal Time Constant	s	320,7	315,7	308,7	268,7	266,1	251,4	249,6	242,7	241,4
Minimum Coolant Flow (Δt 10°C)	l/min	16,4	12,9	11,6	22,8	22,1	32	31,8	41,4	41,4
Rotor Inertia	kg*m <sup>2</sup>	2,242	2,242	2,242	3,994	3,994	5,746	5,746	7,498	7,498
Rotor Mass	kg	17,5	17,5	17,5	47,9	47,9	51,4	51,4	68,4	68,4
Stator Mass	kg	83,5	83,5	83,5	127	127	170,4	170,4	213,7	213,7
Motor Loss	④ kW	7,2	7,2	7,2	13,4	13,4	19,3	19,3	25,1	25,1

**TEST CONDITIONS**

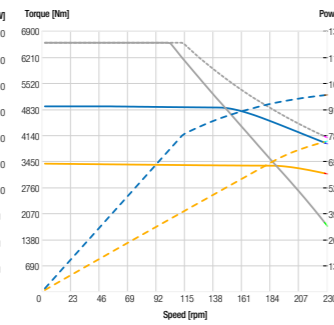
- ① Coolant inlet temperature 20 °C
- ② 600 V DC\_Bus
- ③ For higher speed application contact our technical team
- ④ At Rated Power

**TORQUE SPEED DIAGRAM**

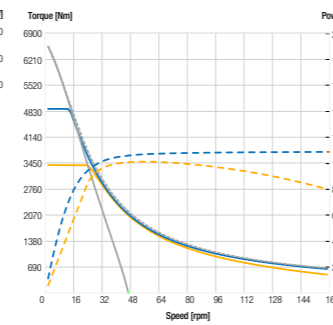
TKH 895.050.14



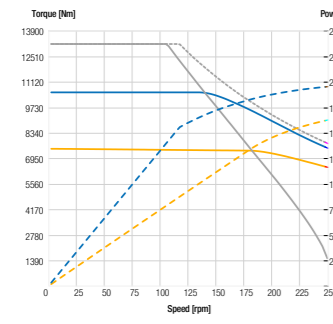
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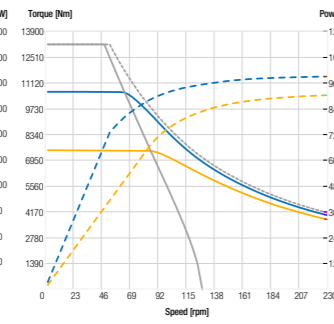
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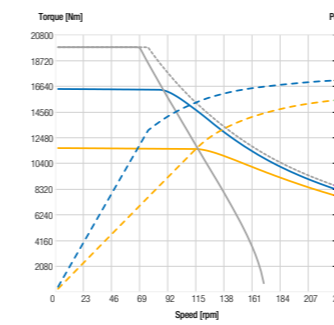
TKH 895.100.28



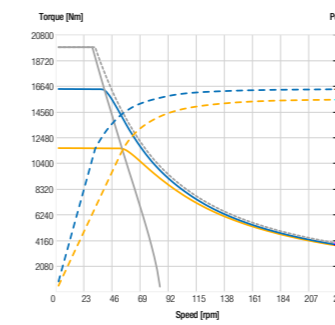
TKH 895.100.56



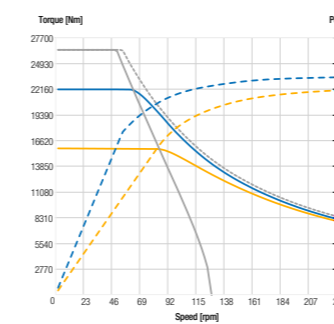
TKH 895.150.42



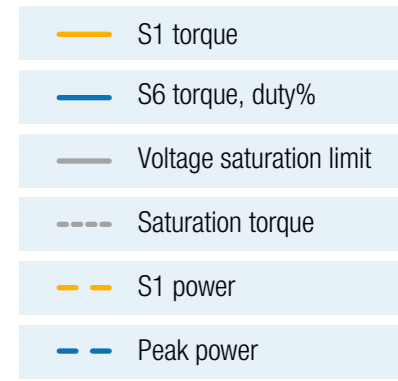
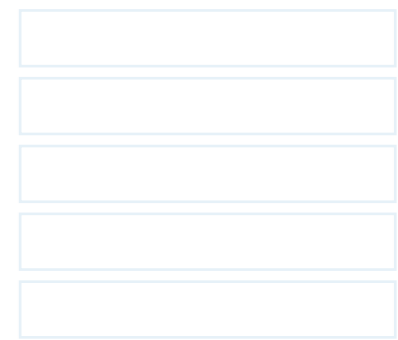
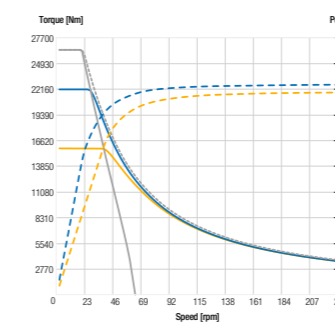
TKH 895.150.84



TKH 895.200.56



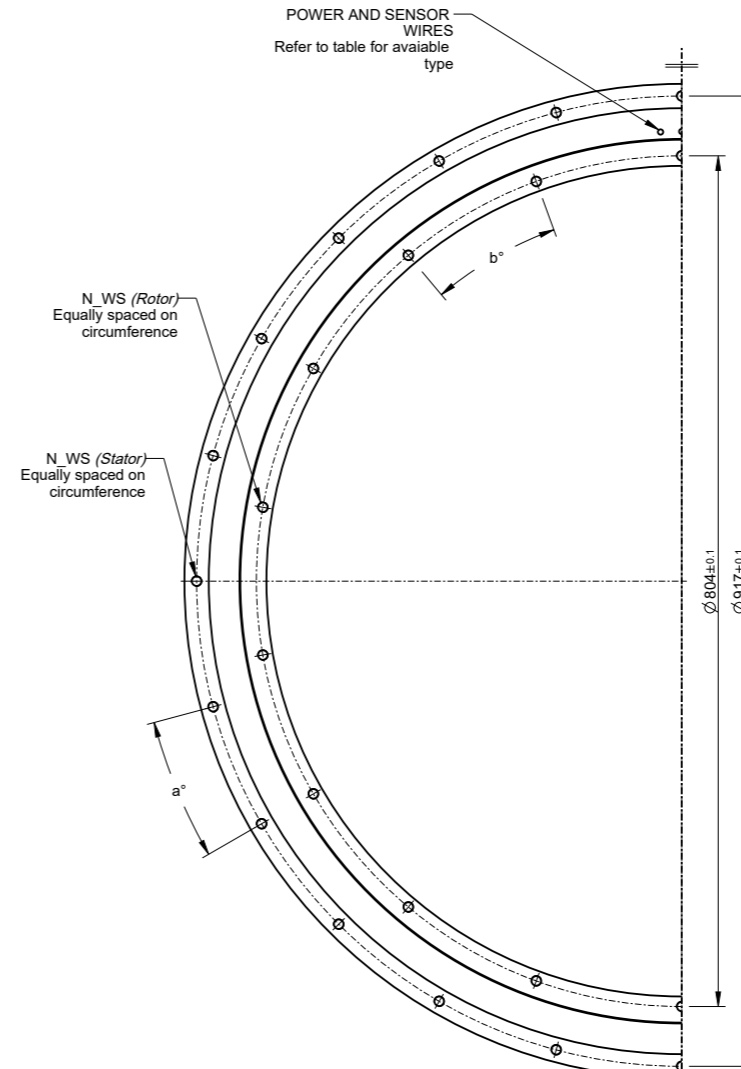
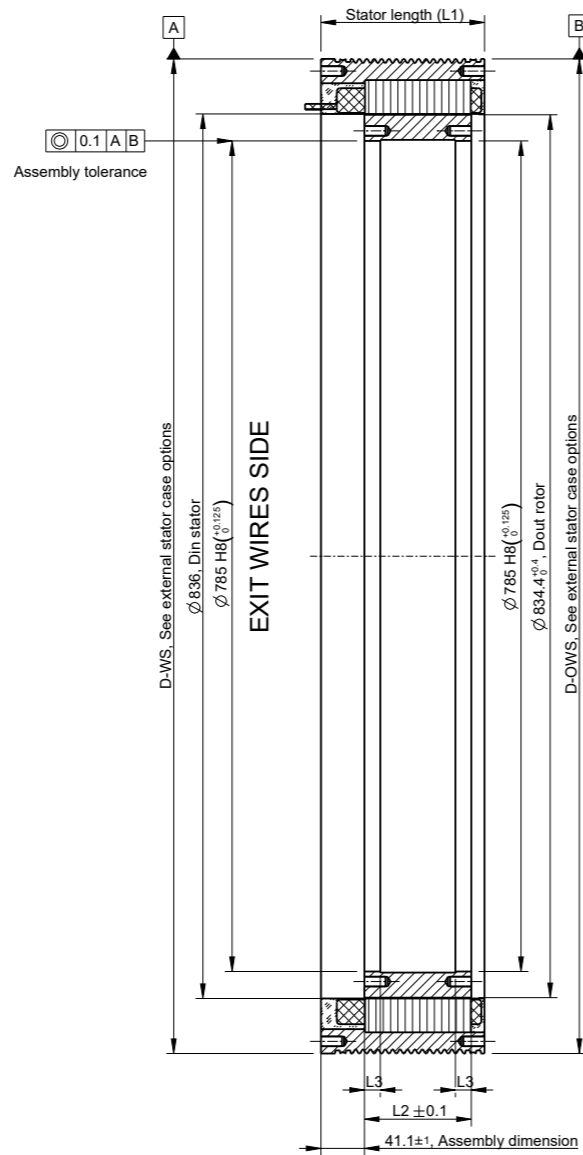
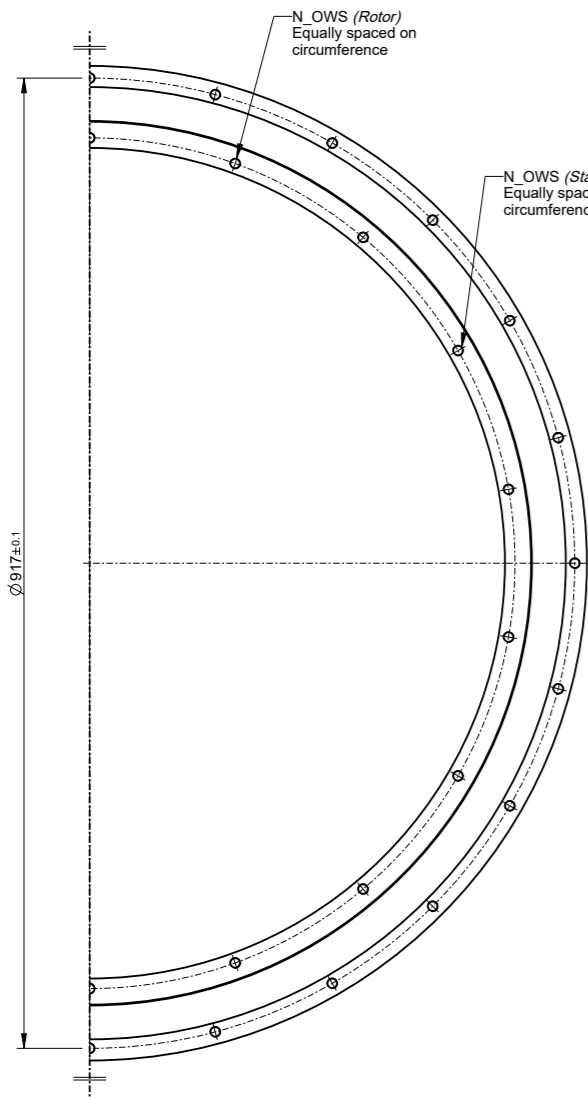
TKH 895.200.113



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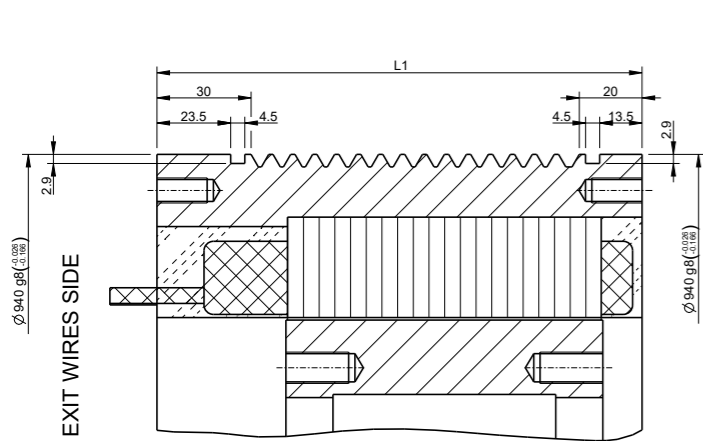


**TECHNICAL DRAWING TKH 895**

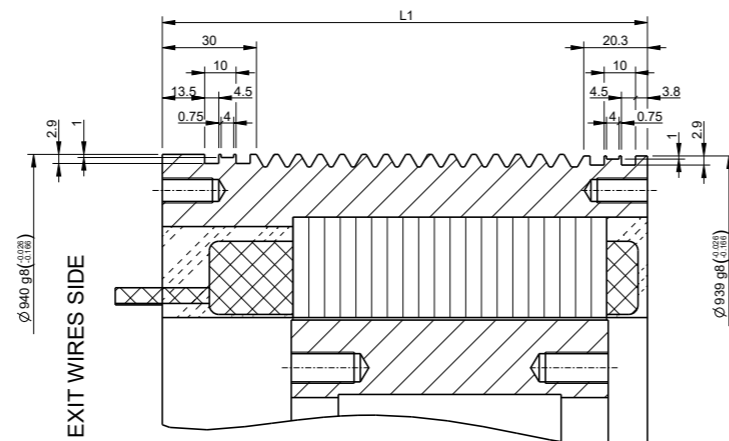


Rotor size	Rotor fixing holes		Rotor dimensions		
TKHRT	N_WS (min class)	N_OWS (min class)	b° (angular pitch)	L2 (Rotor length)	L3 (Centering length)
TKHRT 895 50	18 x M8 (8.8)	18 x M8 (8.8)	20°	51	10
TKHRT 895 100	18 x M10 (8.8)	18 x M10 (8.8)	20°	101	15
TKHRT 895 150	18 x M12 (8.8)	18 x M12 (8.8)	20°	151	15
TKHRT 895 200	24 x M12 (8.8)	24 x M12 (8.8)	15°	201	20

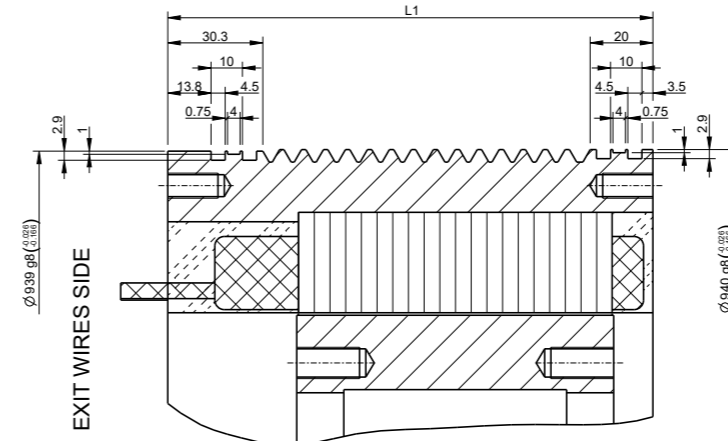
Stator size	Stator fixing holes		Stator Length	
TKHST	N°_WS (min class)	N°_OWS (min class)	a° (angular pitch)	L1
TKHST 895 50	24 x M6 (8.8)	24 x M6 (8.8)	15°	105
TKHST 895 100	24 x M8 (8.8)	24 x M8 (8.8)	15°	155
TKHST 895 150	24 x M10 (8.8)	24 x M10 (8.8)	15°	205
TKHST 895 200	36 x M10 (8.8)	36 x M10 (8.8)	10°	255



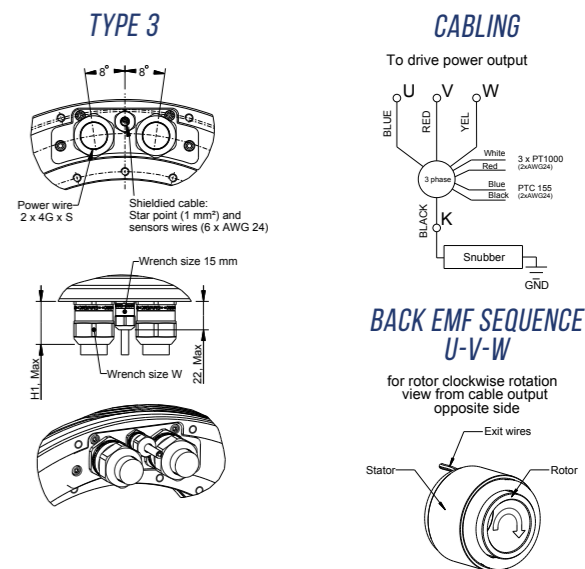
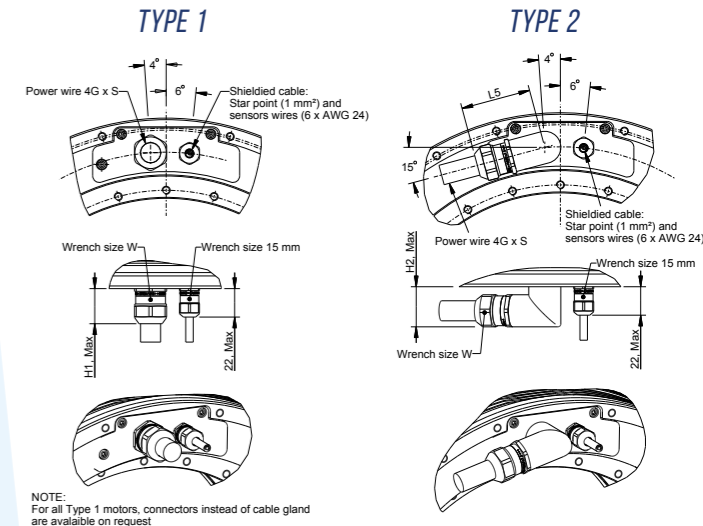
TYPE 1 - Same external centering diameter



TYPE 2 - Bigger external centering on WS



TYPE 3 - Bigger external centering on OWS



**TEST CONDITIONS**

TKH 975		050-30	050-46	050-61	050-92	050-123	100-30	100-61	100-92	100-123	100-185	150-46	150-92	150-139	150-185	200-61	200-123	200-185
Rated Torque	① Nm	3900	4000	4000	4000	4000	8800	9000	9000	9000	9000	13800	13800	13800	13800	18700	18700	18700
Knee Speed	② rpm	175	110	80	50	35	170	80	50	35	20	105	50	30	20	80	35	20
Rated Current	① A	138	94	70	47	35	312	160	106	80	53	327	163	109	82	333	166	111
Torque Constant	Nm/A	30,9	46,3	61,8	92,7	123,6	30,9	61,8	92,7	123,6	185,4	46,3	92,7	139	185,4	61,8	123,6	185,4
Rated Power	①② kW	72	46	34	21	15	157	75	47	33	19	152	72	43	29	157	69	39
Peak Torque	Nm	7450	7450	7450	7450	7450	15000	15000	15000	15000	15000	22500	22500	22500	22500	30000	30000	30000
Peak Current	A	330	218	162	108	81	653	325	217	162	108	650	325	216	162	649	324	216
S6 Torque (duty 40%, 60s cycle)	① Nm	5950	5950	5930	5950	5930	12710	12797	12814	12797	12966	19700	19700	19820	19700	26590	26655	26720
Rated Torque at 0 rpm	① Nm	2960	2960	2960	2960	2960	6550	6550	6550	6550	6550	10190	10190	10190	10190	13813	13813	13813
Maximum Continuous Speed	③ rpm	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210
Maximum Transient Speed	rpm	420	420	420	420	420	420	420	420	420	420	420	420	420	420	420	420	420
Motor Constant	Nm/√W	59,66	59,66	59,66	59,66	59,66	97,63	97,63	97,63	97,63	97,63	126,95	126,95	126,95	126,95	151,49	151,49	151,49
Number of Poles	-	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168
Back EMF Constant at 20°C	V*s	17,8	26,8	35,7	53,5	71,4	17,8	35,7	53,5	71,4	107	26,76	53,5	80,3	107	35,7	71,4	107
Thermal Time Constant	s	316,5	314,2	312,8	311,1	310,1	269,3	266,6	265,4	264,7	263,9	251,9	250,1	249,3	248,8	243,2	241,8	241,2
Minimum Coolant Flow (Δt 10°C)	l/min	14,1	13,4	13,2	13	12,9	24,8	24,3	24,2	24,1	24,1	35,1	34,9	34,9	34,9	45,5	45,4	45,4
Rotor Inertia	kg*m²	3,233	3,233	3,233	3,233	3,233	5,758	5,758	5,758	5,758	5,758	8,283	8,283	8,283	8,283	10,809	10,809	10,809
Rotor Mass	kg	18,9	18,9	18,9	18,9	18,9	42,3	42,3	42,3	42,3	42,3	55,1	55,1	55,1	55,1	73,7	73,7	73,7
Stator Mass	kg	132,7	132,7	132,7	132,7	132,7	200,8	200,8	200,8	200,8	200,8	268,6	268,6	268,6	268,6	336,4	336,4	336,4
Motor Loss	④ kW	7,8	7,8	7,8	7,8	7,8	14,6	14,6	14,5	14,6	14,5	21	21	21	21	27,3	27,2	27,2

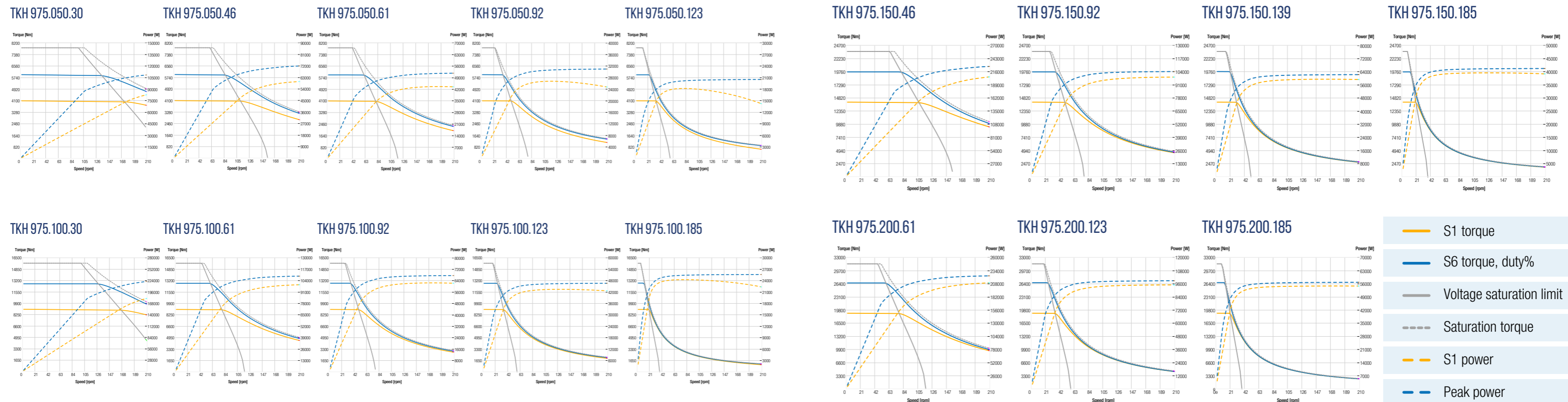
① Coolant inlet temperature 20 °C

② 600 V DC\_Bus

③ For higher speed application contact our technical team

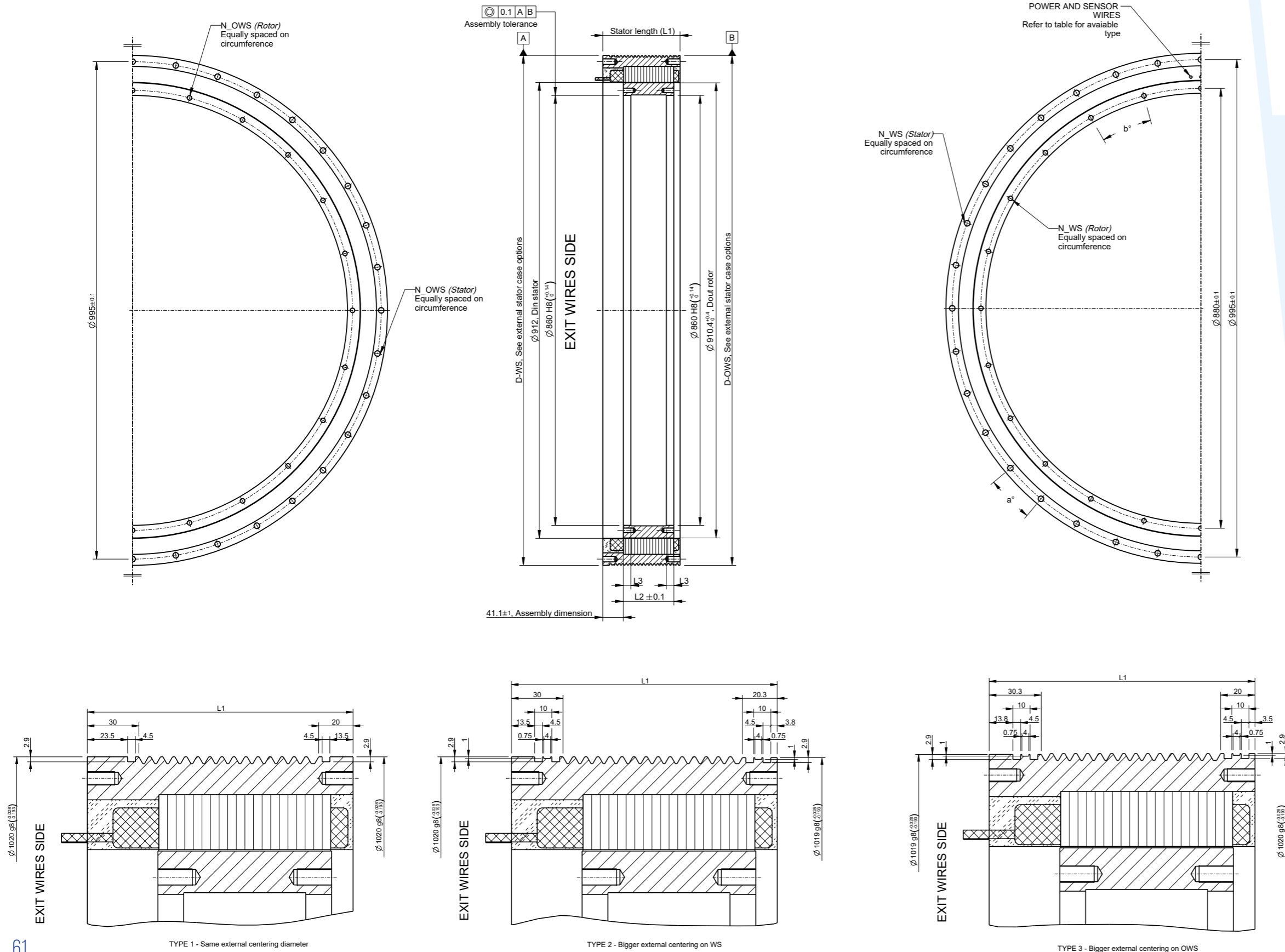
④ At Rated Power

**TORQUE SPEED DIAGRAM**



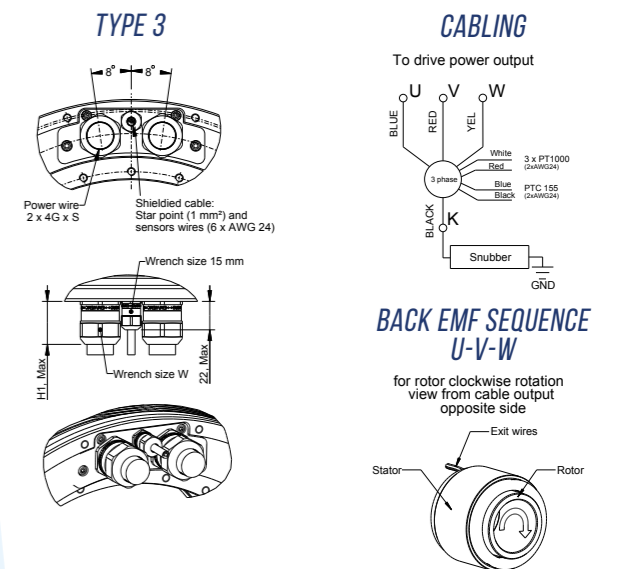
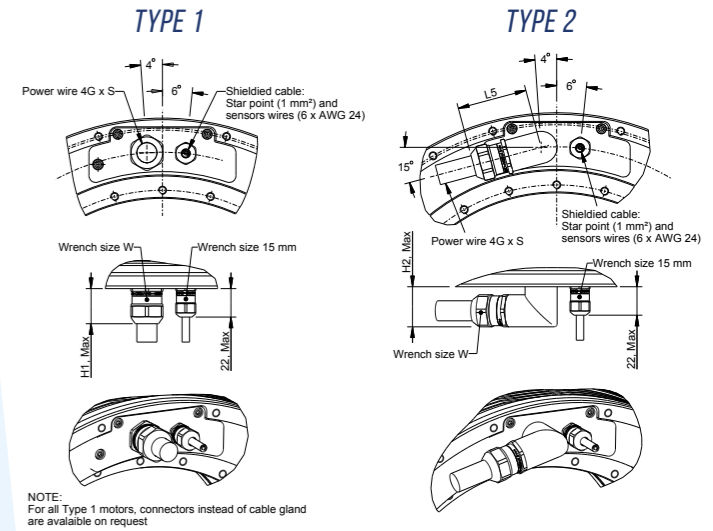
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**TECHNICAL DRAWING TKH 975**



Rotor size TKHRT	Rotor fixing holes			Rotor dimensions	
	N <sub>WS</sub> (min class)	N <sub>OWS</sub> (min class)	b° (angular pitch)	L2 (Rotor length)	L3 (Centering length)
TKHRT 975 50	18 x M8 (8.8)	18 x M8 (8.8)	20°	51	10
TKHRT 975 100	24 x M10 (8.8)	24 x M10 (8.8)	15°	101	15
TKHRT 975 150	24 x M12 (8.8)	24 x M12 (8.8)	15°	151	15
TKHRT 975 200	36 x M12 (8.8)	36 x M12 (8.8)	12°	201	20

Stator size TKHST	Stator fixing holes			Stator Length L1
	N° <sub>WS</sub> (min class)	N° <sub>OWS</sub> (min class)	a° (angular pitch)	
TKHST 975 50	24 x M6 (8.8)	24 x M6 (8.8)	15°	105
TKHST 975 100	36 x M8 (8.8)	36 x M8 (8.8)	10°	155
TKHST 975 150	24 x M10 (8.8)	24 x M10 (8.8)	15°	205
TKHST 975 200	24 x M12 (8.8)	24 x M12 (8.8)	15°	255



# OUR WORLDWIDE EXPERTS' NETWORK AT YOUR SERVICE

Phase Motion Control engineering team cooperates with customers around the globe to solve technological challenges. To respond to diverse needs across motion control solutions, Phase Motion Control offers a wide range of expertise with a team of interdisciplinary electric, mechanical, servo and power conversion experts available worldwide.

## Phase USA Inc.

In the heart of U.S.A. (Chicago) to provide support and solutions in the United States.  
[sales@phaseusa.us](mailto:sales@phaseusa.us)

## Phase Automation GmbH

The technical and commercial support in German-speaking countries.  
[office@phase-automation.at](mailto:office@phase-automation.at)

## Phase Automation Sarl

Technical and commercial support in French-speaking countries.  
[contact@phase-automation.com](mailto:contact@phase-automation.com)

## PHASE ITALY HQ. Genoa

- The Italian Factory is the Main Manufacturing and R&D Plant.
  - Ongoing equipment upgrade
  - New CNC manufacturing area, high density winding, vacuum potting facility, high accuracy balancing, multiple NC measuring. (160 Employees)

## IN LINE WITH OUR STRATEGY OF CO-ENGINEERING ADVANCED SOLUTIONS, WE PROVIDE:

- Expertise and experience in many application fields, from automation and robotics, to NC machine tools and servo press, all the way to lifting, HVAC, flight simulation and motion systems;
- Electric mobility technology: from battery to drive to motors, for undersea, oversea, land and air propulsion;
- High power density, low mass advanced drives and actuators for avionics;
- Electrical and mechanical failure analysis, remedial actions;

In Phase Motion Control, expertise is dedicated to providing comprehensive mechanical and electrical support. With over 100,000 torque motor units in operation worldwide, since 1994, we strive to always be at the forefront of innovation and shape the future together. For any support need, to reach out to us at the following contacts:

- [support@phase.eu](mailto:support@phase.eu) for technical support
- [repair@phase.eu](mailto:repair@phase.eu) for failure analysis and repair activities
- [customercare@phase.eu](mailto:customercare@phase.eu) for any enquiry and customer assistance

We are committed to helping our customers achieve their goals and overcome their technological challenges with our comprehensive range of motion control solutions. Let us help you reach your objectives.

