ŽOLLERN

Solid metals. Fine solutions.

Drive Technology

Synchronous motors

The ZOLLERN-Group
With first-class products and customized solutions in the sectors drive technology, investment casting, sand casting and forging as well as steel profiles we are one of the leading manufacturers – worldwide.

As one of the oldest family-run businesses in Germany we are proud to look back on an impressive 300-year history during which we have merged tradition with innovation. Our main focus is on excellent quality and service.

Welcome to the world of ZOLLERN, where experience and progress go hand in hand to offer our customers the best solutions and products for their requirements in various industrial sectors.

Contents Page

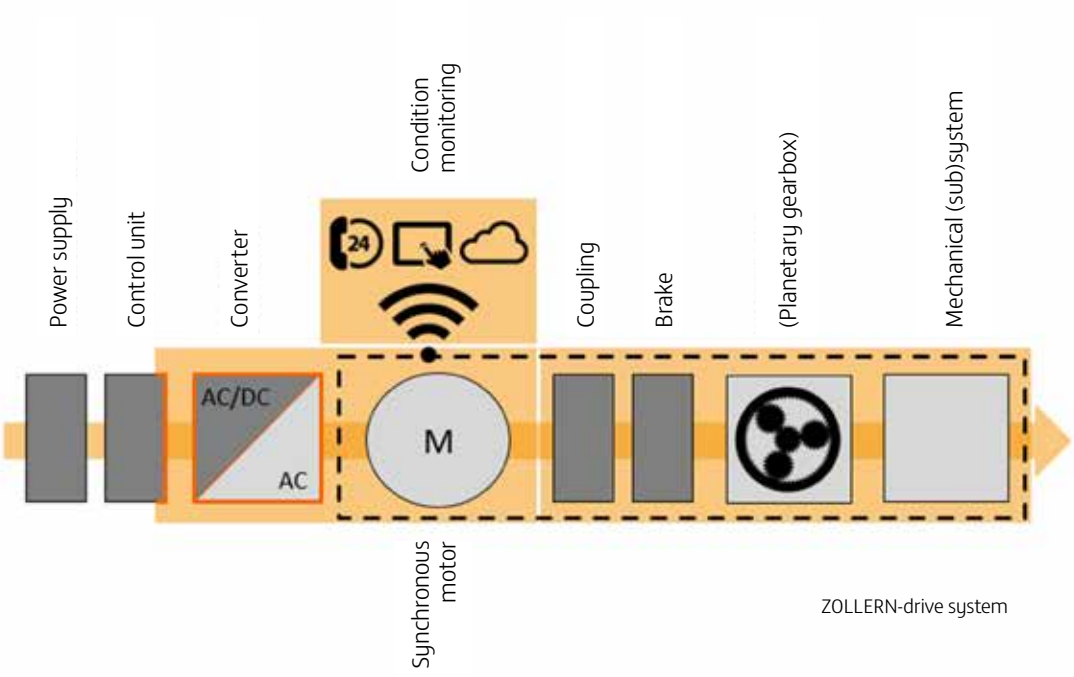
Powerful drives
for your application

Within the ZOLLERN-Group, drive technology has now developed into the largest business unit. Behind it are the product groups gear units and winches, automation, rotary table systems, hydrostatic bearing systems and direct drives. ZOLLERN-direct drives are permanently excited drive motors in synchronous or torque design. The torque motors were developed for high torques at comparatively low speeds.

Synchronous motors are used at high speeds. Project planning, electrical design, engineering, production and assembly as well as commissioning are all carried out in-house. This ensures an efficient and cost-optimised design, as well as high quality. Customer-specific wishes and requirements within the standard construction can be easily realised in this way.

ZOLLERN-direct drives impress with their high energy efficiency with high power density. Good control characteristics, optimum cooling and improved heat dissipation are the distinguishing features of the drives. ZOLLERN-direct drives are wear-free, backlash-free and low-maintenance. Large dimensions with diameters of up to 2,200 mm and maximum torques of 100,000 Nm are also possible.

As a manufacturer of gearboxes and synchronous motors, ZOLLERN combines the two components of the gearbox and motor to form a complete drive system. This is supplemented by a clutch, brake and frequency converter. The drive system can be monitored by the ZOLLERN-Drive Guard from anywhere in the world at any time or integrated into the customer's own monitoring systems.

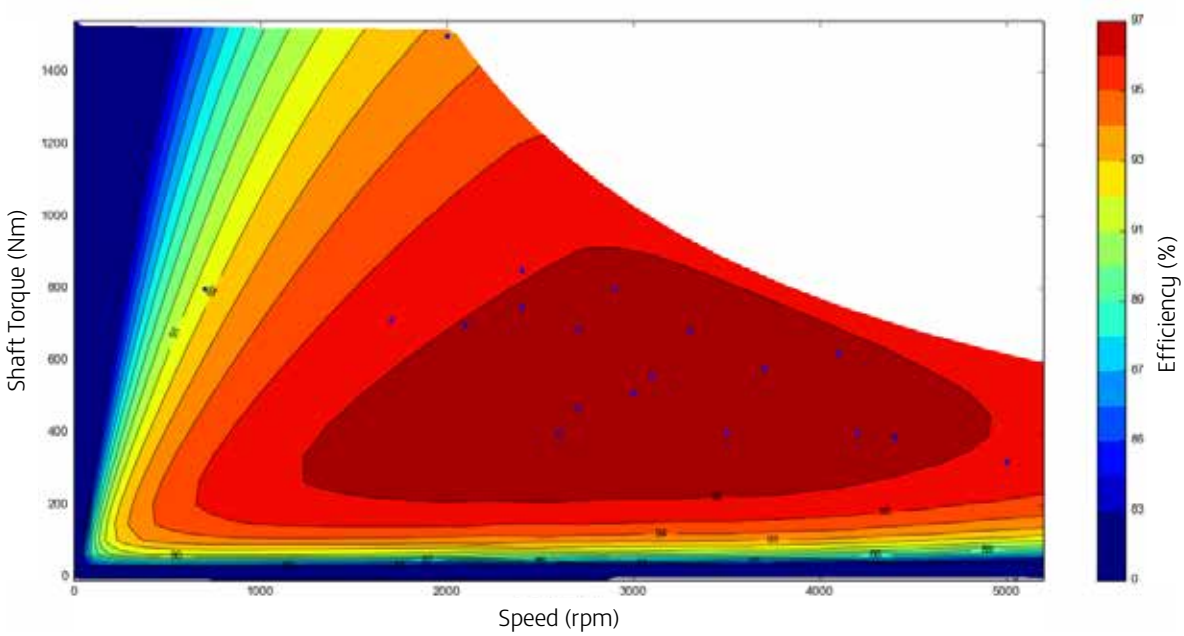


ZOLLERN-drive system

- Environmentally friendly electric motor technology
- High energy efficiency
- Minimum noise emissions

Features and advantages of the ZOLLERN-motor technology

- High efficiencies across the entire map
- Large spread between nominal speed and maximum speed
- Torque increase due to additional reluctance torque
- Robust and compact design
- Minimum shaft temperature
- Very good field weakenability
- High variability due to modular principle

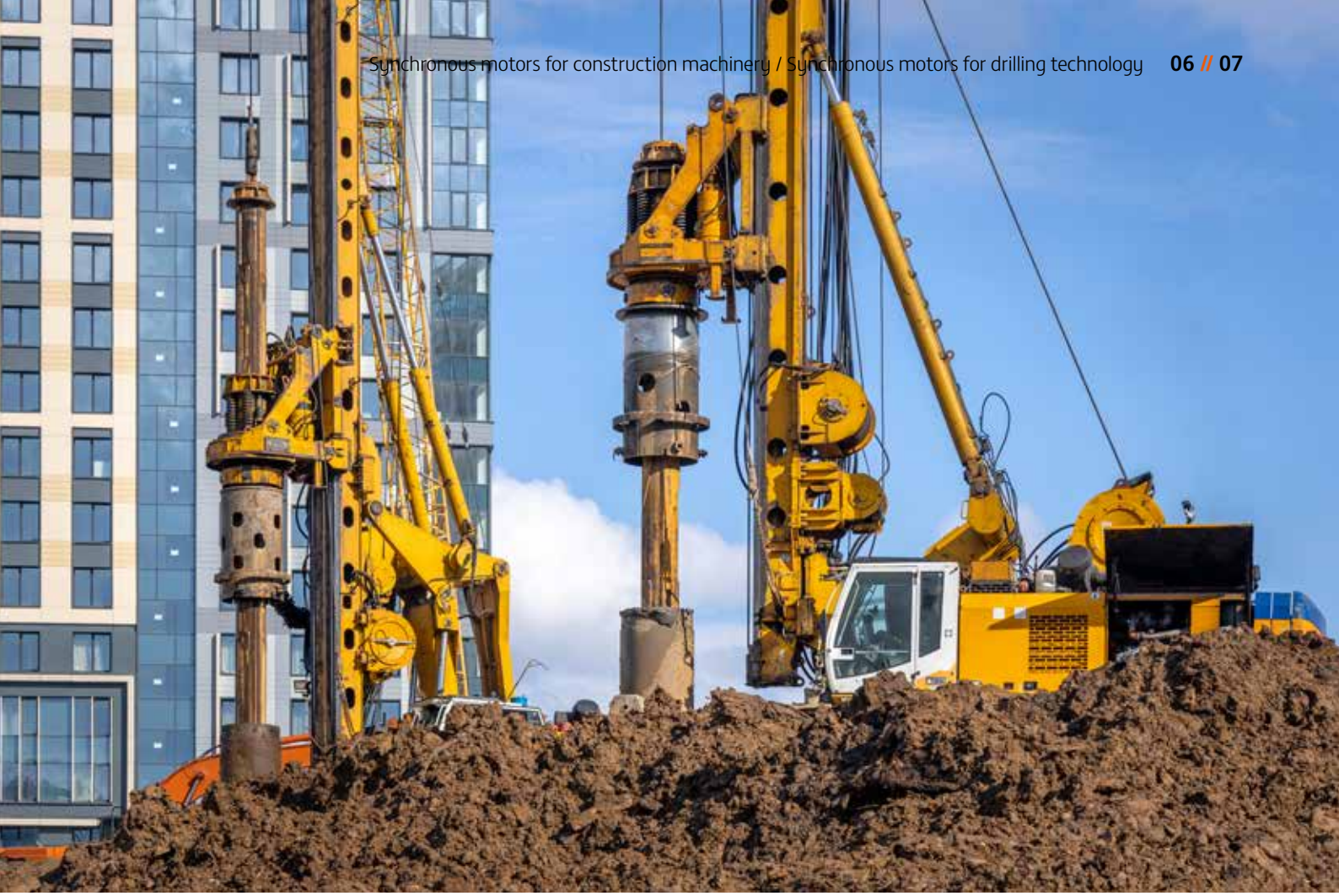


Synchronous motors for construction machinery

For use as

- Winch drive
- Drive of planetary gearboxes
- Drive of slewing gearboxes

Synchronous motor SMK 500-300
P = 260 kW
n = 1865 rpm



Synchronous motors for drilling technology

For use as

- Feed drive of drilling rigs
- Slush pump drive of drilling rigs
- Rotary drive of drilling rigs

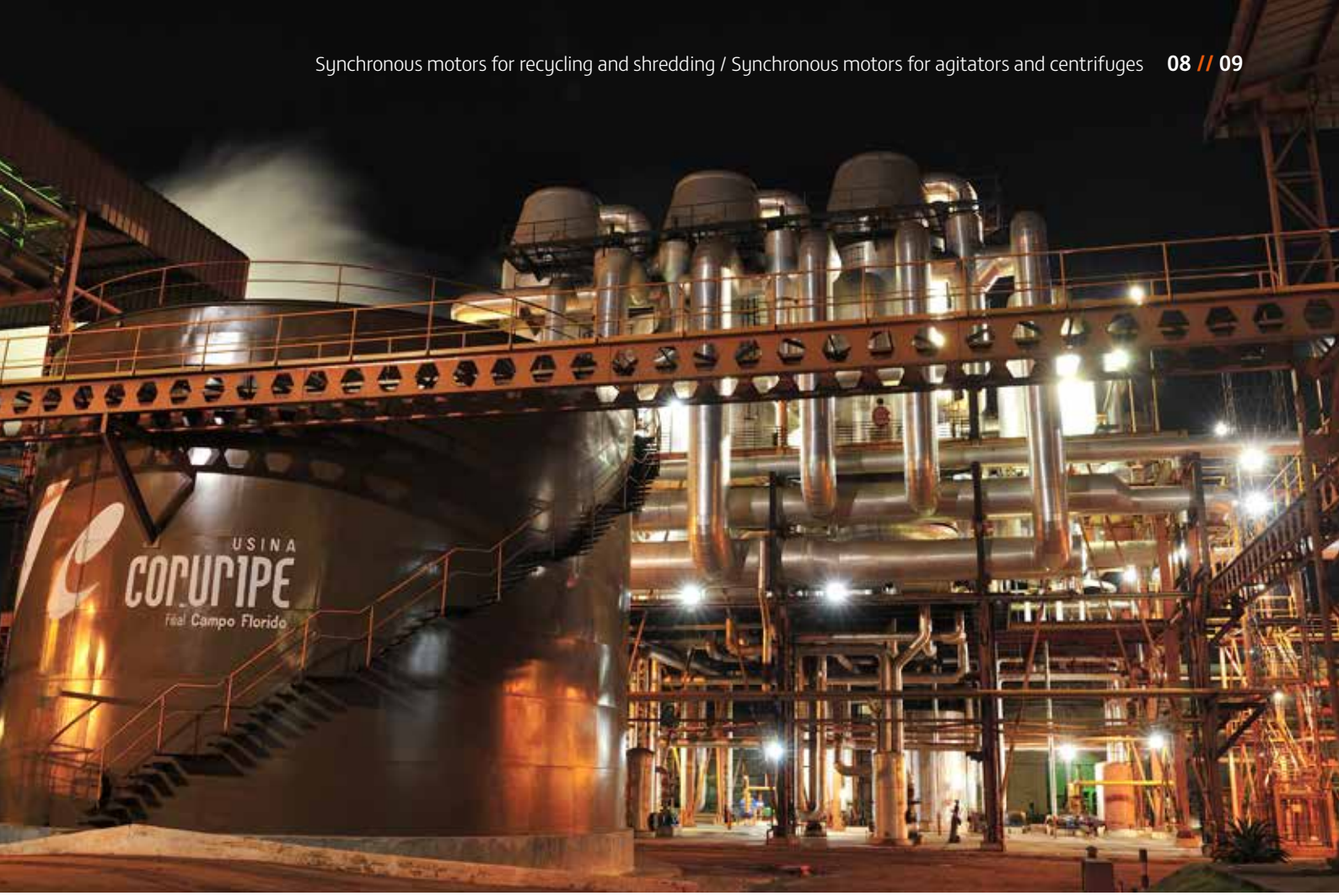
Synchronous motor SMK 300-400
P = 190 kW
n = 4600 rpm

Synchronous motors for recycling and shredding

For use as

- Drive of shredders
- Drive of cutting mills
- Drive of planetary gearboxes

Synchronous motor SMK 500-400
P = 360 kW
n = 1100 rpm



Synchronous motors for agitators and centrifuges

For use as

- Drive in agitators for sugar mills
- Drive of mixers and extruders
- Drive in centrifuges
- Drive in agitators in power engineering (biogas)

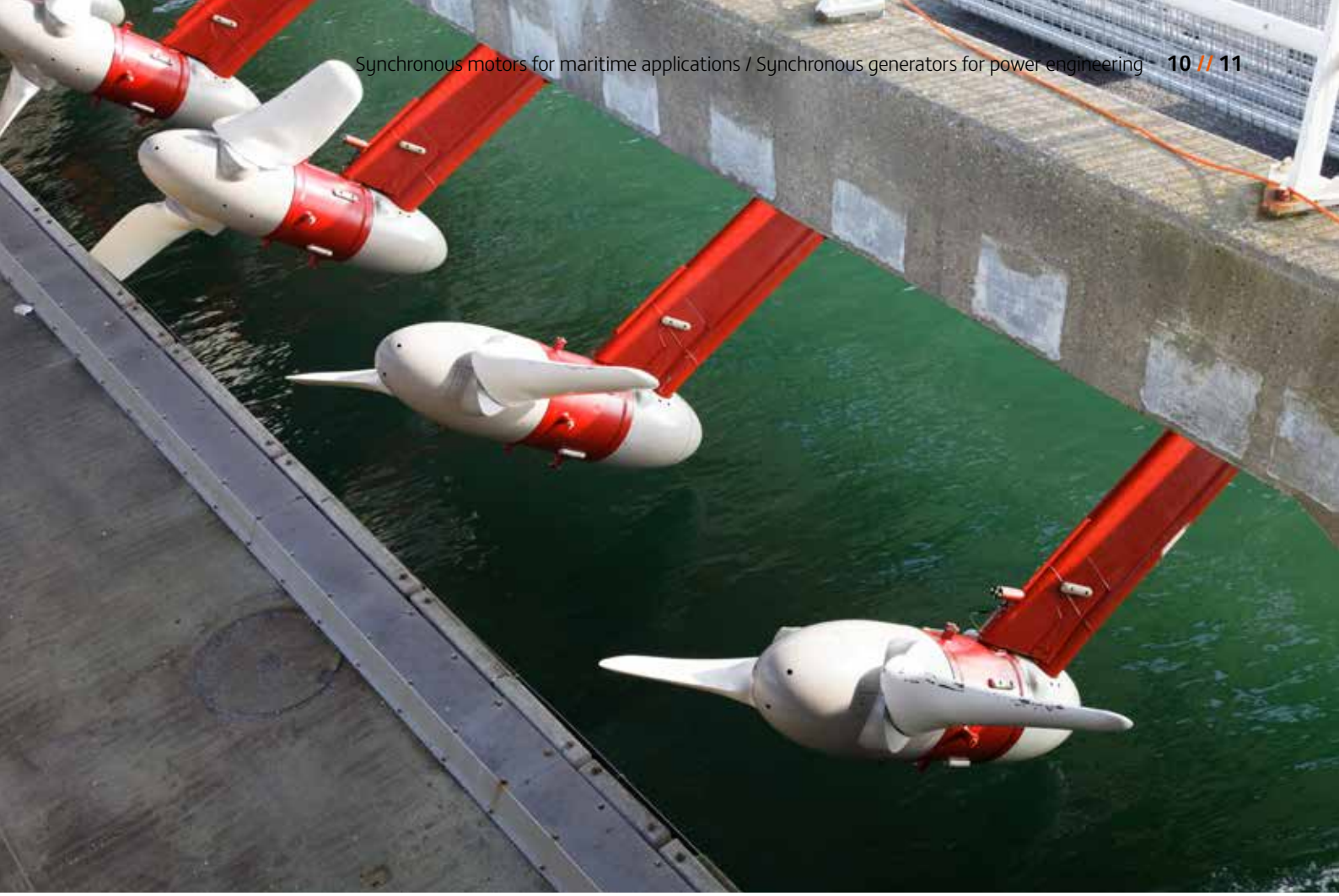
Synchronous motor SMK 1380-220
P = 115 kW
M = 22,000 Nm

Synchronous motors for maritime applications

For use as

- Winch drive
- Ship propulsion

Synchronous motor SMK 720-300
P = 480 kW
n = 800 rpm



Synchronous generators for power engineering

For use as

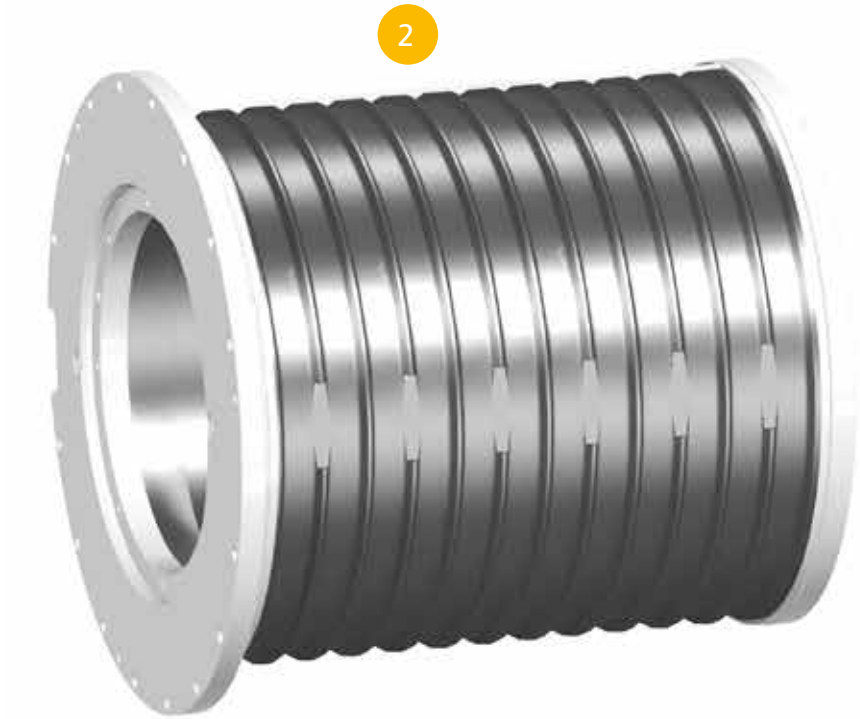
- Generator of tidal works
- Generator of wave power plants
- Generator of wind and hydropower plants

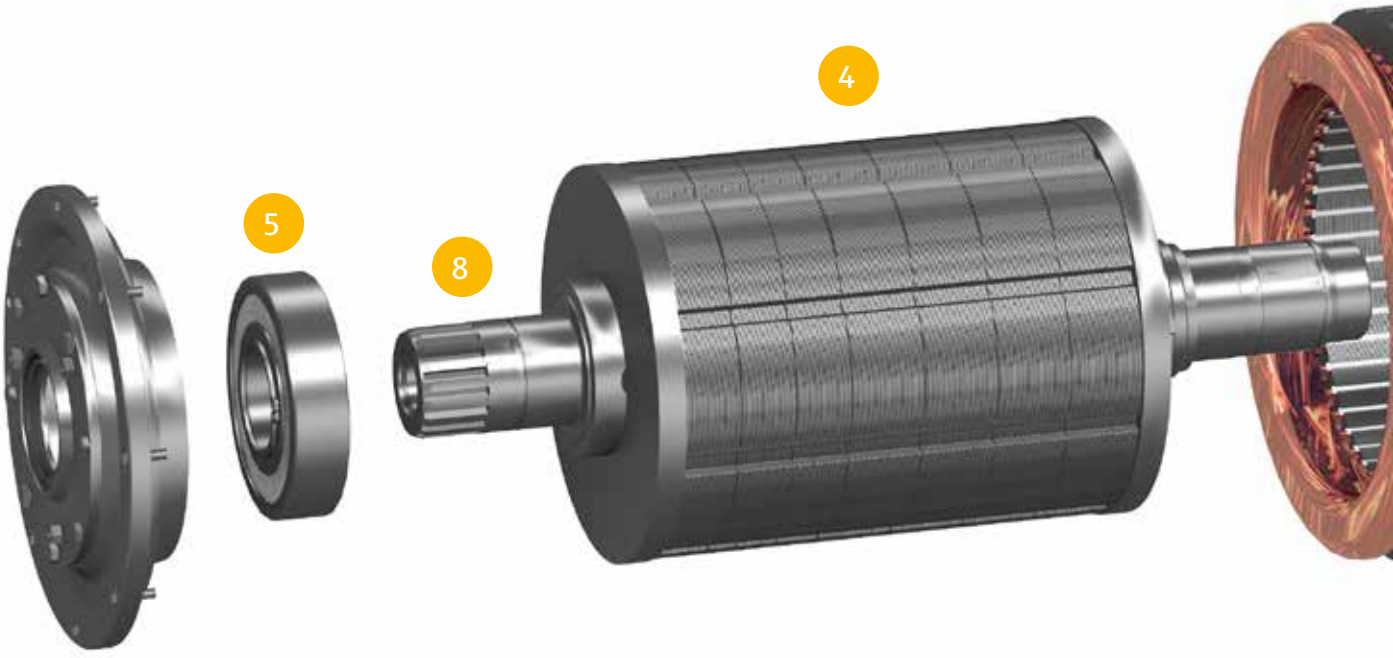
Synchronous generator SMK 500-200
P = 230 kW
n = 1450 rpm

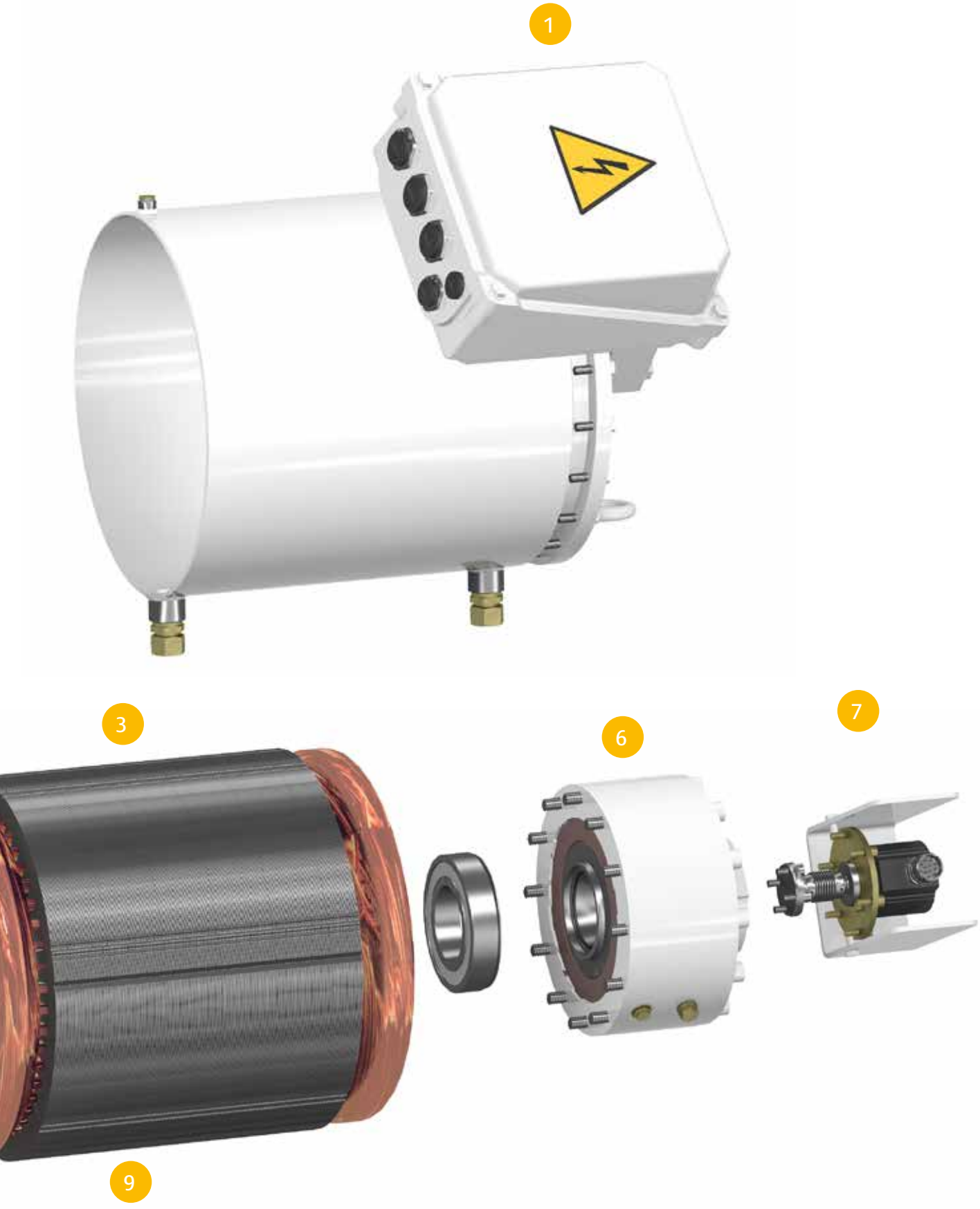
Structure of ZOLLERN-synchronous motor

Options and advanced equipment

1. Electrical interface
2. Cooling
3. Individual winding design
4. Rotor in torque or speed version
5. Insulated bearings
6. Brake
7. Rotary encoder
8. Mechanical interface
9. Standstill heating



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Overview of technical data
Synchronous motor SMK

Synchronous motor **SMK-300**

// Values for continuous mode (S1)					
Size	nominal Torque	nominal Power	nominal Speed	max. speed	nom. Current*
	(Nm)	(kW)	(rpm)	(rpm)	(Aeff)
-200	350	110	3000	5200	170
-250	450	140	2970	5200	206
-300	550	170	2950	5200	252
-350	650	200	2940	5200	285
-400	750	230	2930	5200	325

Higher speeds and torques, as well as other lengths on request.

Synchronous motor **SMK-500**

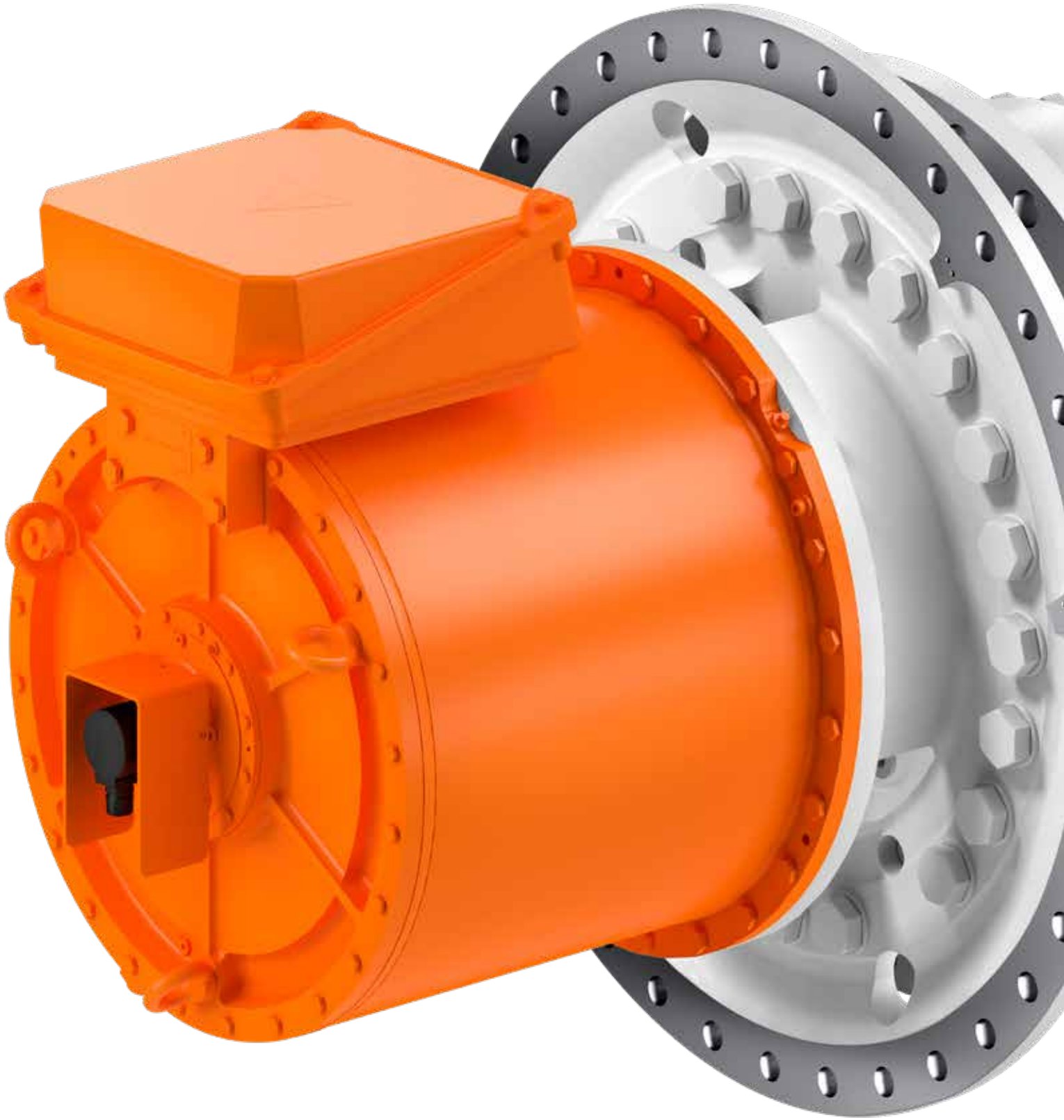
// Values for continous Mode (S1)					
Size	nominal Torque	nominal Power	nominal Speed	max. speed	nom. Current*
	(Nm)	(kW)	(rpm)	(rpm)	(Aeff)
-200	1700	250	1400	3000	370
	1500	230	1460	4600	370
-300	2800	320	1090	3000	485
	2400	290	1150	4600	485
-400	3750	400	1020	3000	600
	3200	360	1080	4600	600

Higher speeds and torques, as well as other lengths on request.

Synchronous motor **SMK-720**

// Values for continous Mode (S1)					
Size	nominal Torque	nominal Power	nominal Speed	max. speed	nom. Current*
	(Nm)	(kW)	(rpm)	(rpm)	(Aeff)
-200	4000	410	980	1200	530
-300	6500	510	750	1200	665
-400	8800	600	650	1200	800

Higher speeds and torques, as well as other lengths on request.



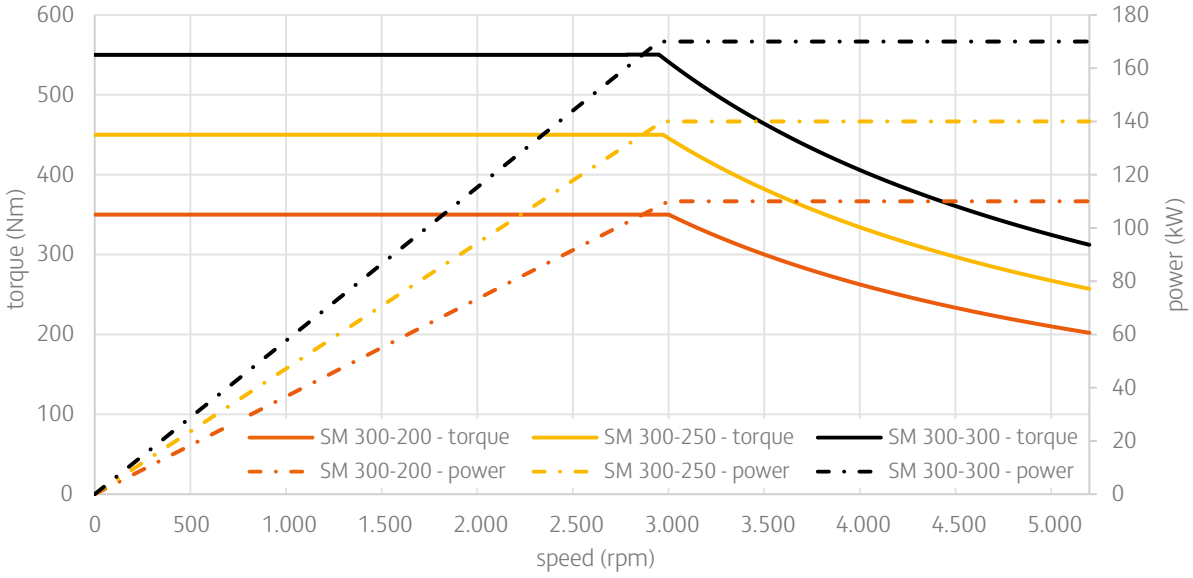
Synchronous motor SMK-300

// Values for continous Mode (S1)

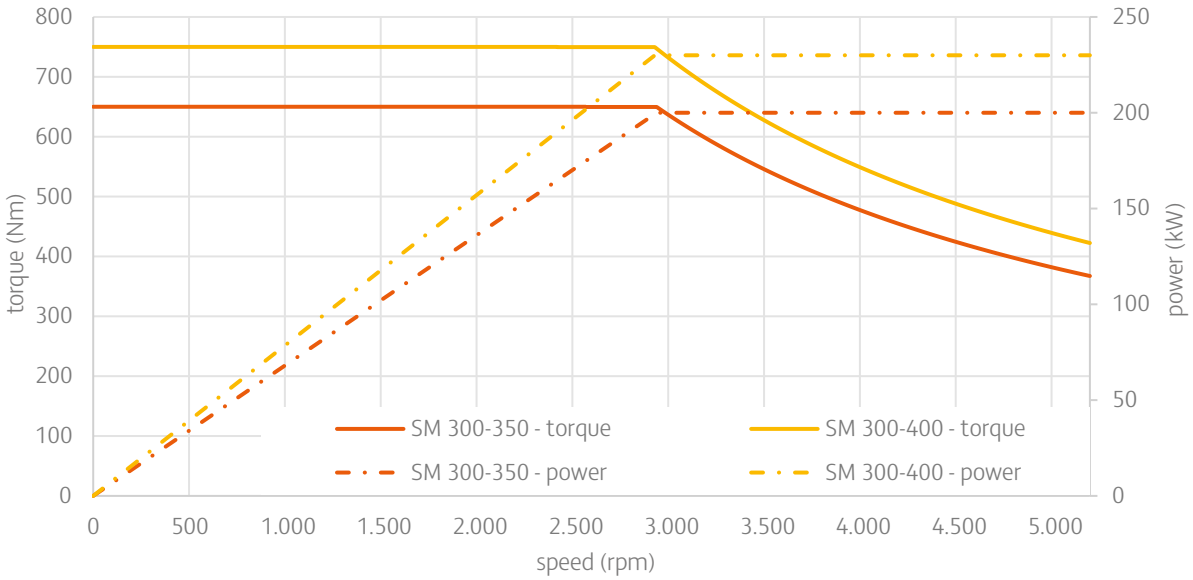
Size	nominal Torque	nominal Power	nominal Speed	max. speed	nom. Current*
	(Nm)	(kW)	(rpm)	(rpm)	(Aeff)
-200	350	110	3000	5200	170
-250	450	140	2970	5200	206
-300	550	170	2950	5200	252
-350	650	200	2940	5200	285
-400	750	230	2930	5200	325

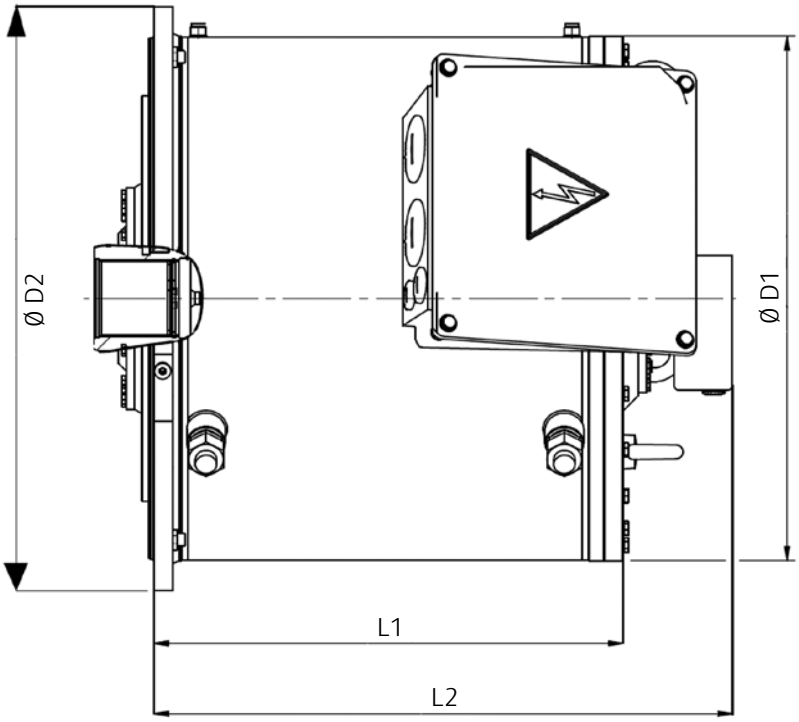
*@500Vrms

// SMK 300 - 200, 250, 300



// SMK 300 - 350, 400





Motor diameter D1	338 mm
Flange diameter D2	380 mm
Motor length L1	- size + 150 mm
Motor length L2	- size + 252 mm
Active-Length	- size
Stator lamination Ø	300 mm
EN material no	EN standard, none

Technical data

- synchronous reluctance assisted permanent magnet motor
- designed for inverter operation
- ambient temperatures -20 °C - +50 °C
- vibration quantity: A
- shock < 15 g, vibration < 5 g
- IP65
- insulation class F* 175 °C
- water cooled
- short time torque up to 200 % of nominal torque
- customized winding design for optimized power/torque performance

Optional equipment

- feedback system: Encoder or resolver
- Holding brake
- hollow shaft
- shaft grounding
- insulated bearings
- Standstill heating
- cutomized mechanical and electrical interface

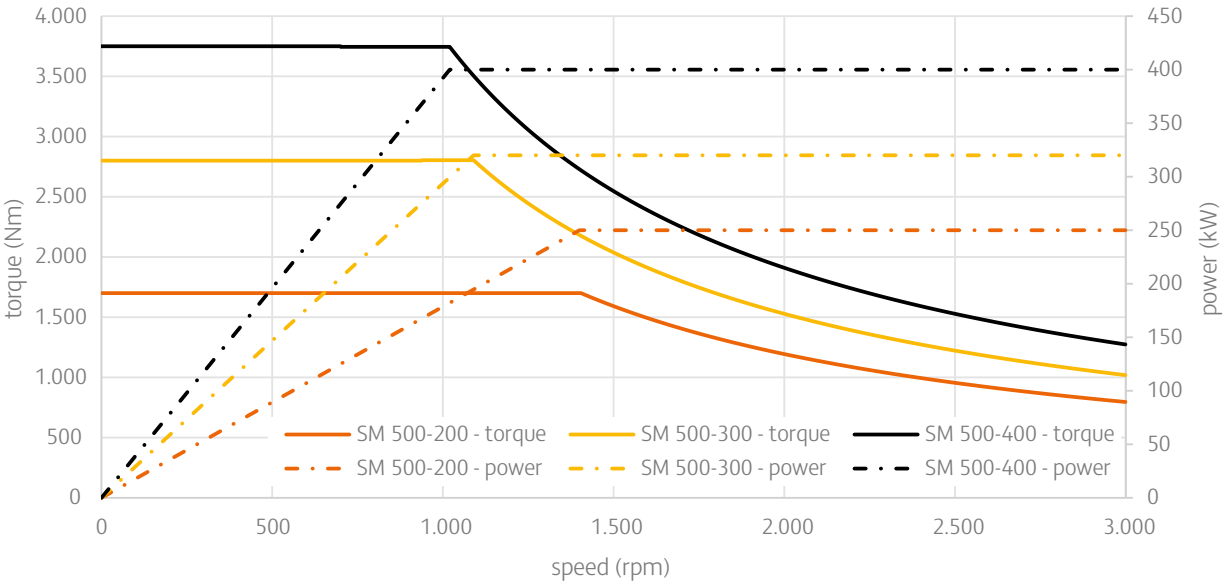
Synchronous motor SMK-500

// Values for continous Mode (S1)

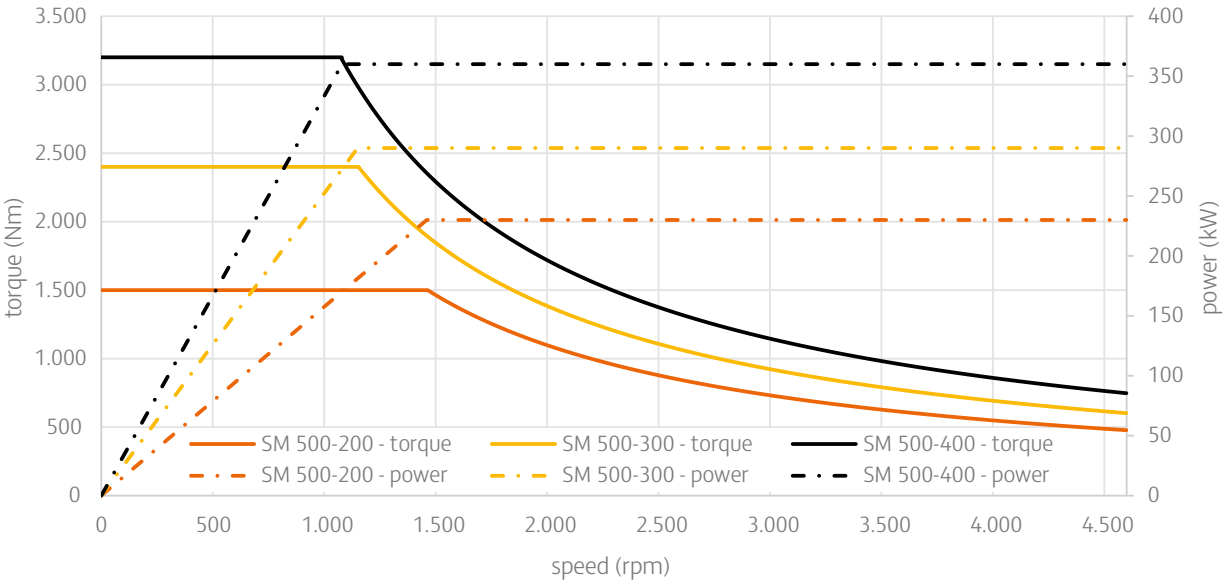
Size	nominal Torque	nominal Power	nominal Speed	max. speed	nom. Current*
	(Nm)	(kW)	(rpm)	(rpm)	(Aeff)
-200	1700	250	1400	3000	370
	1500	230	1460	4600	370
-300	2800	320	1090	3000	485
	2400	290	1150	4600	485
-400	3750	400	1020	3000	600
	3200	360	1080	4600	600

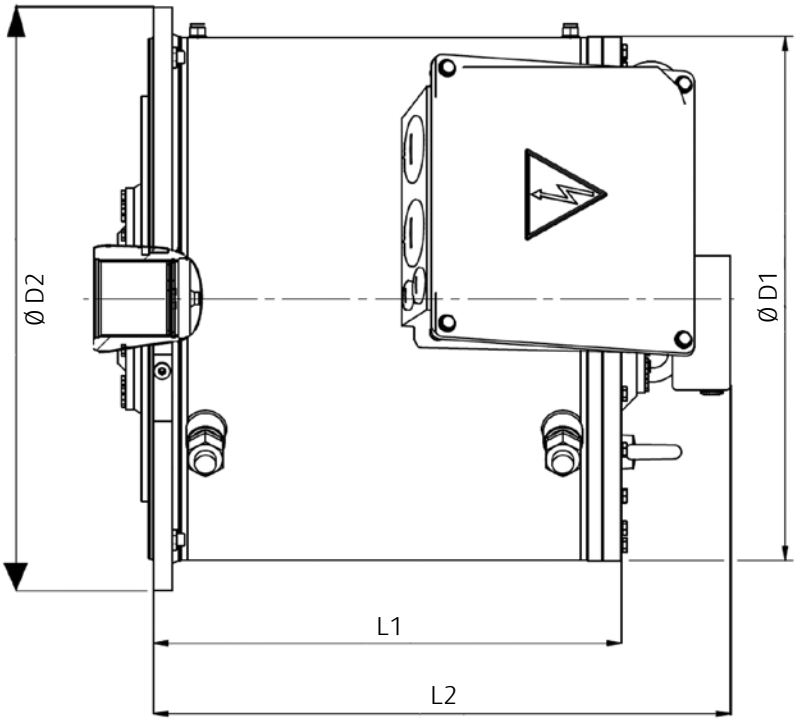
*@500Vrms

// SMK 500 - torque line



// SMK 500 - 200, 300, 400





Motor diameter D1	544 mm
Flange diameter D2	605 mm
Motor length L1	-size + 186 mm
Motor length L2	-size + 299 mm
Active-Length	-size mm
Stator lamination Ø	500 mm

Technical data

- synchronous reluctance assisted permanent magnet motor
- designed for inverter operation
- ambient temperatures -20 °C - +50 °C
- vibration quantity: A
- shock < 5 g, vibration < 1 g
- IP65
- insulation class F* 175 °C
- water cooled
- short time torque up to 200 % of nominal torque
- customized winding design for optimized power/torque performance

Optional equipment

- feedback system: Encoder or resolver
- Holding brake
- hollow shaft
- shaft grounding
- insulated bearings
- Standstill heating
- cutomized mechanical and electrical interface

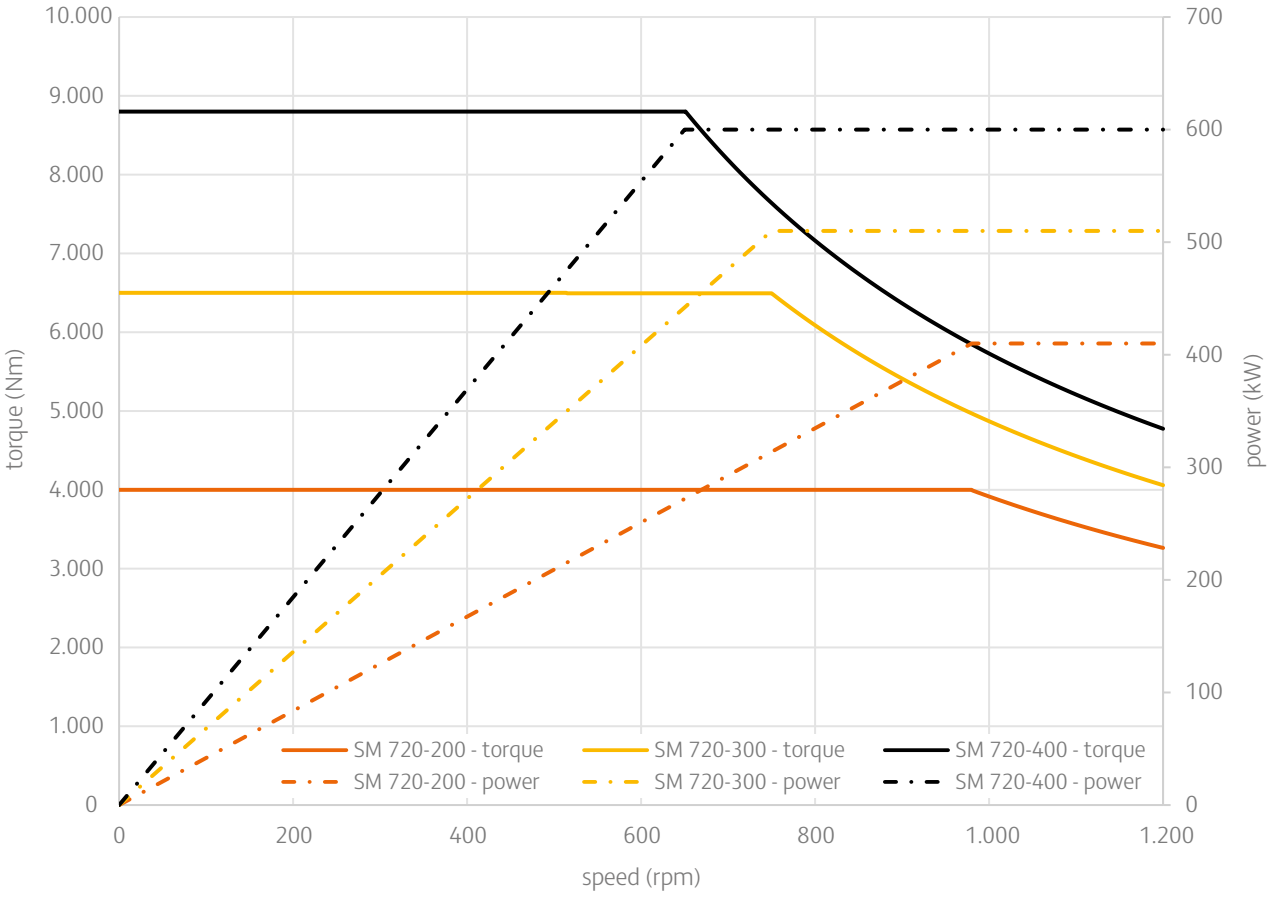
Synchronous motor SMK-720

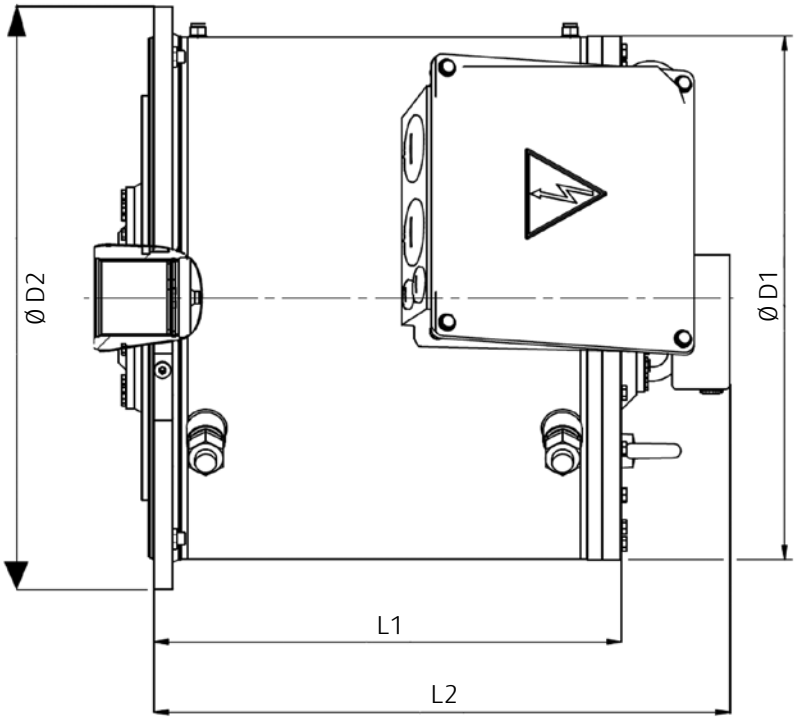
// Values for continous Mode (S1)

Size	nominal Torque	nominal Power	nominal Speed	max. speed	nom. Current*
	(Nm)	(kW)	(rpm)	(rpm)	(Aeff)
-200	4000	410	980	1200	530
-300	6500	510	750	1200	665
-400	8800	600	650	1200	800

*@500Vrms

// SMK 720 - torque line





Motor diameter D1	775 mm
Flange diameter D2	835 mm
Motor length L1	-size + 200 mm
Motor length L2	-size + 310 mm
Active-Length	-size mm
Stator lamination Ø	720 mm

Technical data

- synchronous reluctance assisted permanent magnet motor
- designed for inverter operation
- ambient temperatures -20 °C - +50 °C
- vibration quantity: A
- shock < 5 g, vibration < 1 g
- IP65
- insulation class F* 175 °C
- water cooled
- short time torque up to 200 % of nominal torque
- customized winding design for optimized power/torque performance

Optional equipment

- feedback system: Encoder or resolver
- Holding brake
- hollow shaft
- shaft grounding
- insulated bearings
- Standstill heating
- cutomized mechanical and electrical interface

ZOLLERN-synchronous motors
are wear- and and backlash-free and low maintenance

In order to be able to provide our customers with an optimum product and guarantee quality standards at the highest level, ZOLLERN has an extensive and future-oriented testing environment.

Service and Condition Monitoring

Customer Service

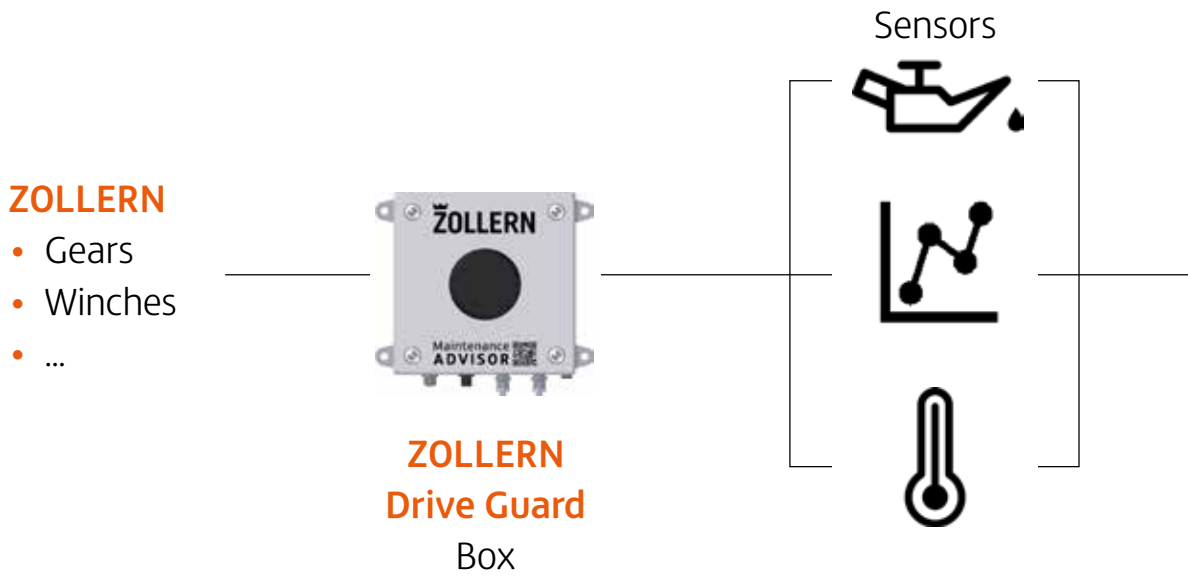
ZOLLERN offers comprehensive service from the first product idea to the after sales service.

- Development partnership
- Technical and application-specific consultation
- Individual order processing, including scheduling agreements
- Comprehensive test run and test equipment (including load test)
- Intensive cooperation with classification societies

After Sales Service

Maintenance and repairs are performed in the ZOLLERN-Service Centre. The global service deployments and spare parts deliveries are coordinated from here.

- Commissioning on site
- Quick spare parts deliveries with original spare parts
- Technical findings with repair report
- Error analyses, repairs and assembly work worldwide
- Retrofitting, revision and repair
- Maintenance service
- ZOLLERN-training centre
- Diagnostics and condition monitoring
- Service Hotline



Condition Monitoring
ZOLLERN-Drive Guard

The ZOLLERN-Drive Guard offers the possibility of monitoring the condition and running performance of entire systems as well as individual components from any location around the world by continuously recording specific operating data.

Minimising downtimes, optimally utilising wear components and a predictive planning of maintenance intervals make it possible to achieve a more efficient use of new and existing systems.
The ZOLLERN-Drive Guard can be used for new and existing systems.

- Condition monitoring
- Service interval planning - Predictive Maintenance
- Gearbox diagnostics, motor diagnostics
- Calculation of remaining service life

ZOLLERN
Drive Guard
online portal

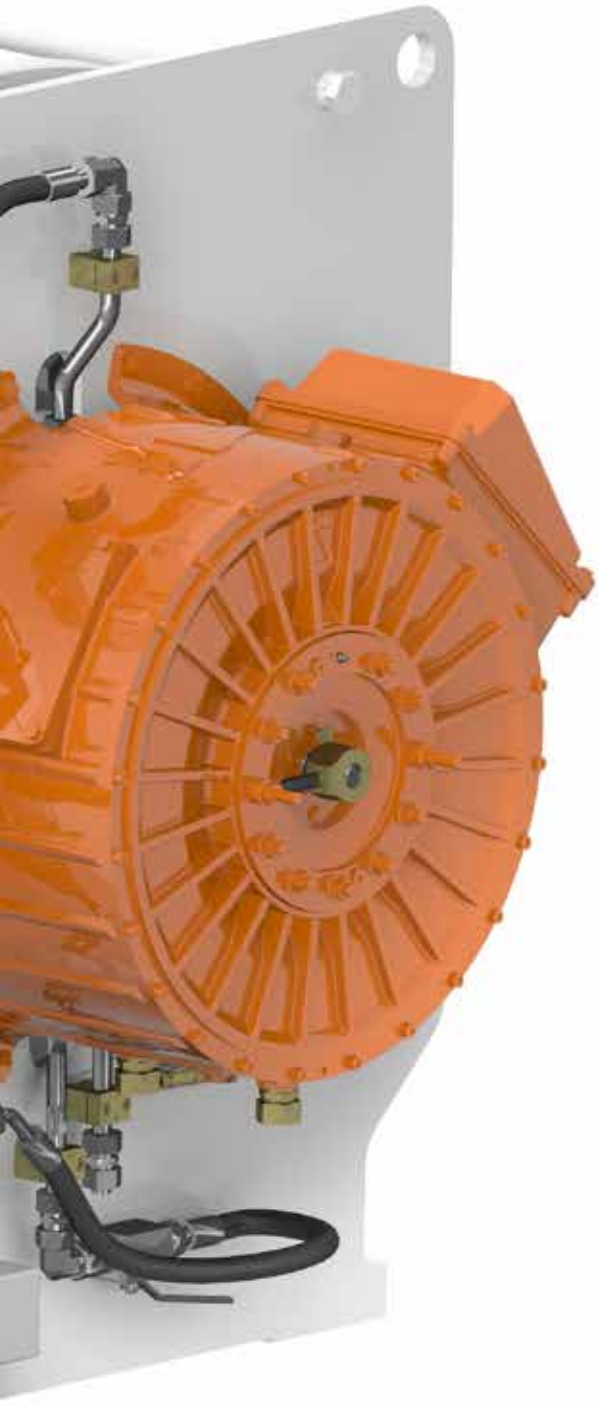
ZOLLERN Drive Guard
online portal

Device analyses
and reporting

Automated service
recommendation

Inspection
and Service

Hardware
of the ZOLLERN-Drive Guard



Through the customised and product-specific configuration of various sensors, device and status data can be generated and monitored as required. The computing unit developed by ZOLLERN offers a variety of interfaces for connecting different sensors and systems. The pre-processing of the information takes place within this computing unit. The data is then transmitted to the ZOLLERN-Drive Guard online portal. The machine and condition data can be retrieved and evaluated here.

Sensor configuration

- Operating hours counter (digital sensor)
- Oil temperature sensor
- Oil analysis sensor
- Ferromagnetic foreign particle counter
- Load data recording
- Displacement sensors (brake wear measurement)
- Vibration sensors
- More

Torque motors
Product range / motor types

In addition to its synchronous motor portfolio, ZOLLERN also offers torque motors with high torques. With dimensions of up to 3,000 mm in diameter and maximum torques of up to 100,000 Nm, ZOLLERN covers a wide performance spectrum here.

Torque motors type TM / TMS / TMSHT / TMNC
High torques / speeds

* For dimensions, see separate brochure

Features

- Internal rotor
- External cooling jacket open / closed
- Surface magnets
- Bracing on rotor
- Orthocyclic wound coils
- Standard and special sizes
- Customised versions possible
- No cogging torque

Enquiry synchronous motor

Customer

Item no.

Project/Application

Drawing no..

Clerk

Enquiry number

Telephone

Email

Fax

Date

Reply to enquiry by no later than:

Offer ❑

Draft ❑

Feasibility analysis ❑

Motor

Synchronous ❑

Speed	Power S1	Torque S1	Holding torque	Max. torque	Current S1	Max. current
(rpm)	(kW)	(Nm)	(Nm)	(Nm)	(A)	(A)

Motor diameter D1

Flange diameter D2

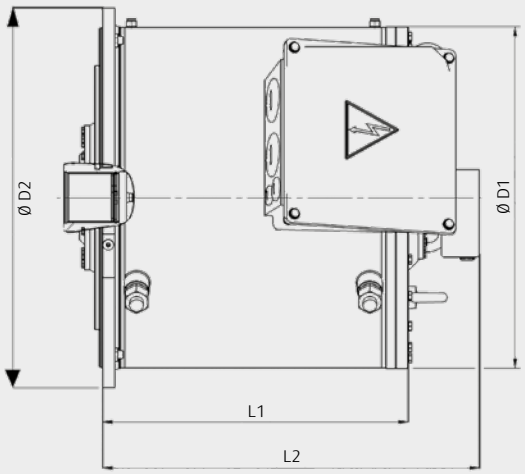
Motor length L1

Motor length L2

Active length

Stator lamination Ø

EN Material no:



Optional equipment/information:

Brake ❑ Insulated bearings ❑

Rotary encoder

mechanical interface

Vibration

Shock

Approvals

Details of the frequency inverter

Rated current

Max. current

Type

DC link voltage

Engines in competition

Make

Type

Cooling type

Water ❑

Air ❑

Oil ❑

Additional remarks/information

ZOLLERN Group
Product areas

Metals and shaping

// Investment casting parts

- Turbine components
  - Vanes / Blades/ Shrouds / Heat Shields
- Structural Castings
  - Gas Turbines / Aero / Engines Defense / Medical / Industrial Components
- Automotive
  - Turbine Wheels / Waste gates / Vanes / Pins / Planet carriers
- Implants
  - Knees (Femur, Tibia) / Hipps
- Alloys
  - Super alloys / Cobalt Chrome alloys

// Sand casting parts

- Sand casting
- Croningguss / Maskenguss
- Ceramic casting
- Continuous casting
- Centrifugal casting

// Forgings

- Forgings made of pure copper and copper alloys
- Semi-finished products, open die forged, flat bars, round bar
- Drop forged parts
- Rings, seamlessly rolled
- Bushings, seamlessly forged
- Individual pieces, small series, large series

// Special profiles and finished parts

- Special profiles, coils, bars
- Customer-specific finished parts
- Profile types hot-rolled, cold-rolled, cold-drawn, induction-hardened

Drive technology and automation

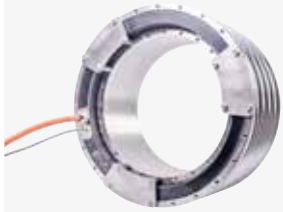
// Gearboxes

- Travel drives
- Slewing gearboxes
- Winch gearboxes
- Industrial gear units
- Gearboxes for tunnel boring machines
- Sugar mill gearboxes
- Electric drive systems
- Condition Monitoring and Predictive Maintenance

// Winches

- Hoisting winches
- Free fall winches
- Pull winches
- Rescue boat winches
- Winch systems
- Winch gearboxes

// Electric motors



- Torque motors kits
- Synchronous motor kits
- Synchronous motor modules

// Automation, special systems

- Linear units, linear modules, gantry axes, portal units
- Telescoping axes
- Rotary modules, rotary tables
- Line gantries, area gantries
- Robot traverse axes, jig axes
- Storey lifter and lifting columns
- Fast conveyor
- Framing tenter handling / overhead systems
- Storage systems
- Complete systems with steel construction and control
- Special solutions
- Gripper

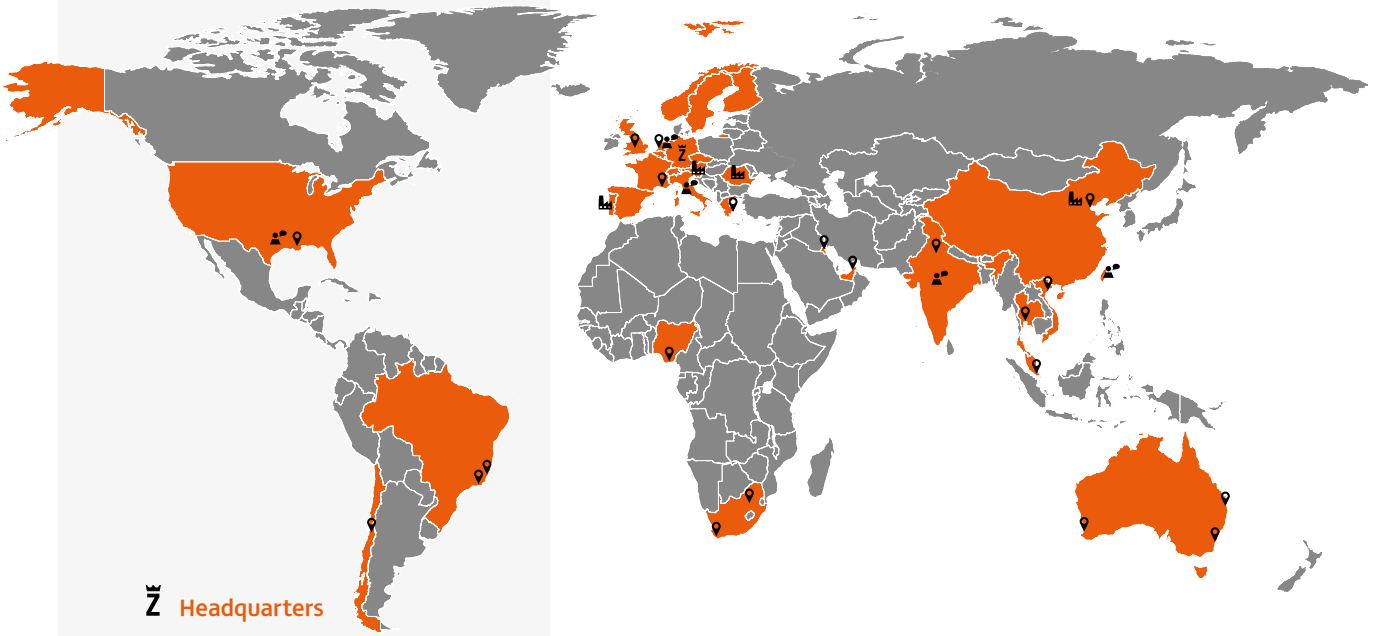
// Hydrostatic systems

- Hydrostatic spindle units
- Hydrostatic rotary tables
- Aerostatic rotary tables
- Hydrostatic linear guides
- Hydrostatic center drive spindles
- Hydrostatic bearing components
- Hydrostatic special applications and test benches

// Rotary tables systems

- Roller bearing rotary tables
- Hydrostatic rotary tables
- Automatic pallet changing systems and linear axes
- Swiveling tables
- After sales service for products of ZOLLERN, Rückle and Eimeldingen

ZOLLERN



Headquarters

Subsidiaries

Italy and southern Europe
Netherlands and Northern Europe
USA
India and Southeast Asia
Taiwan, China

Factories

Germany
Portugal
Romania
Slovenia
China

Service partner

Australia
Brazil
Chile
Greece
Great Britain
Kuwait
Singapore
South Africa
Thailand
Dubai
USA
Vietnam

ZOLLERN-worldwide

ZOLLERN-Products

QUALITY SYSTEM CERTIFICATION DNV·GL ISO 9001

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