

# ZOLLERN

Solid metals. Fine solutions.

Drive Technology  
Synchronous  
motors



#### **The ZOLLERN Group**

ZOLLERN is one of the pioneers in the metal industry. At several locations in Europe, North America and Asia, 2,000 employees develop, produce and service a wide range of high-quality metal products. ZOLLERN supplies sophisticated solutions for a wide range of applications with its business areas of drive technology, investment casting, sand casting and forging as well as steel profiles.

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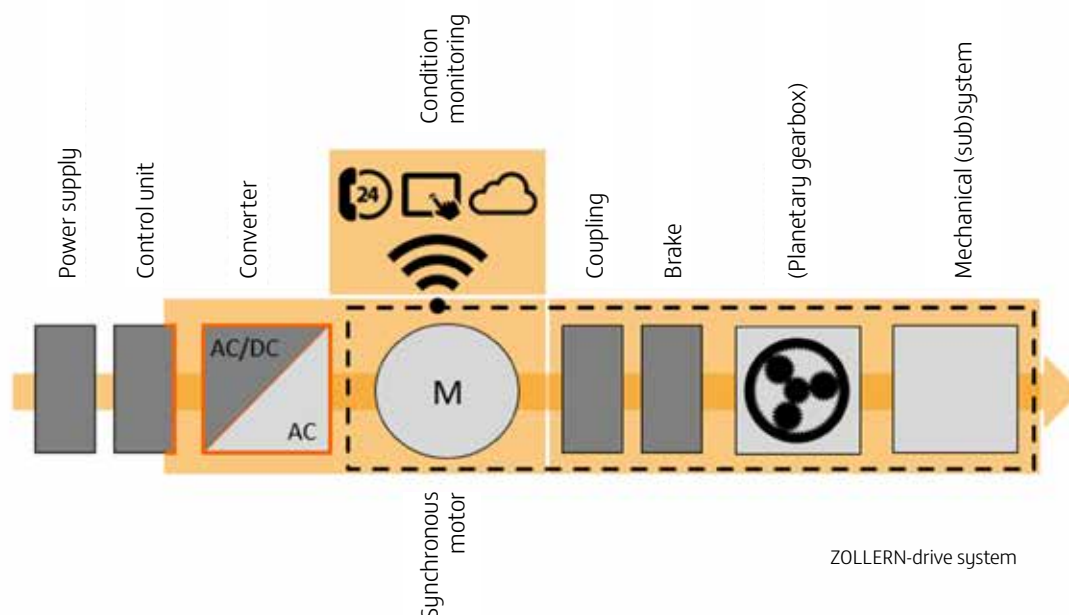
# Powerful drives for your application

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.



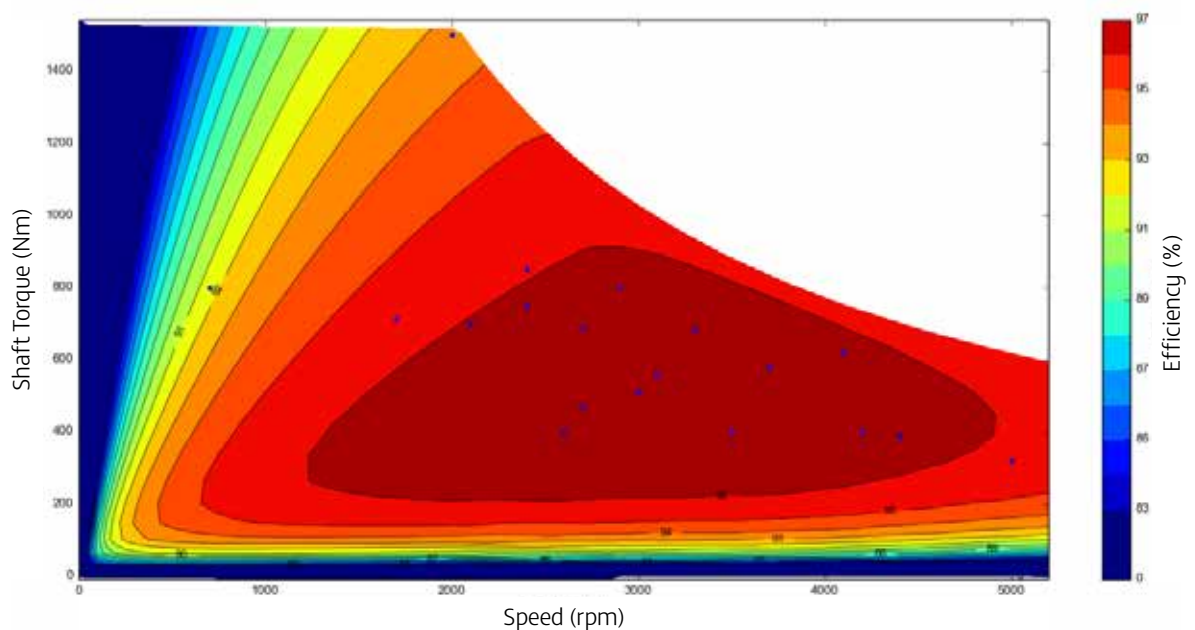


- 
- » • Environmentally friendly electric motor technology
  - High energy efficiency
  - Minimum noise emissions «



# 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





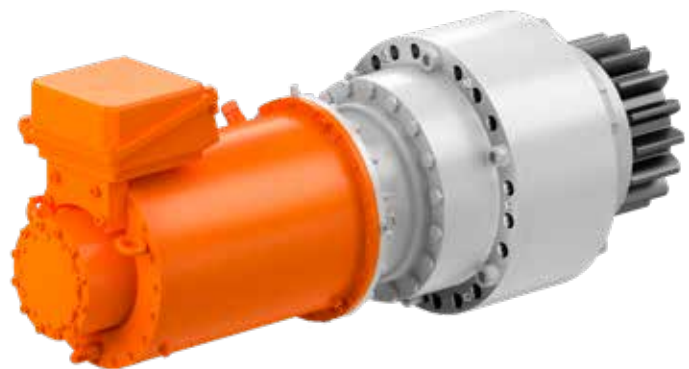


# Synchronous motors for construction machinery



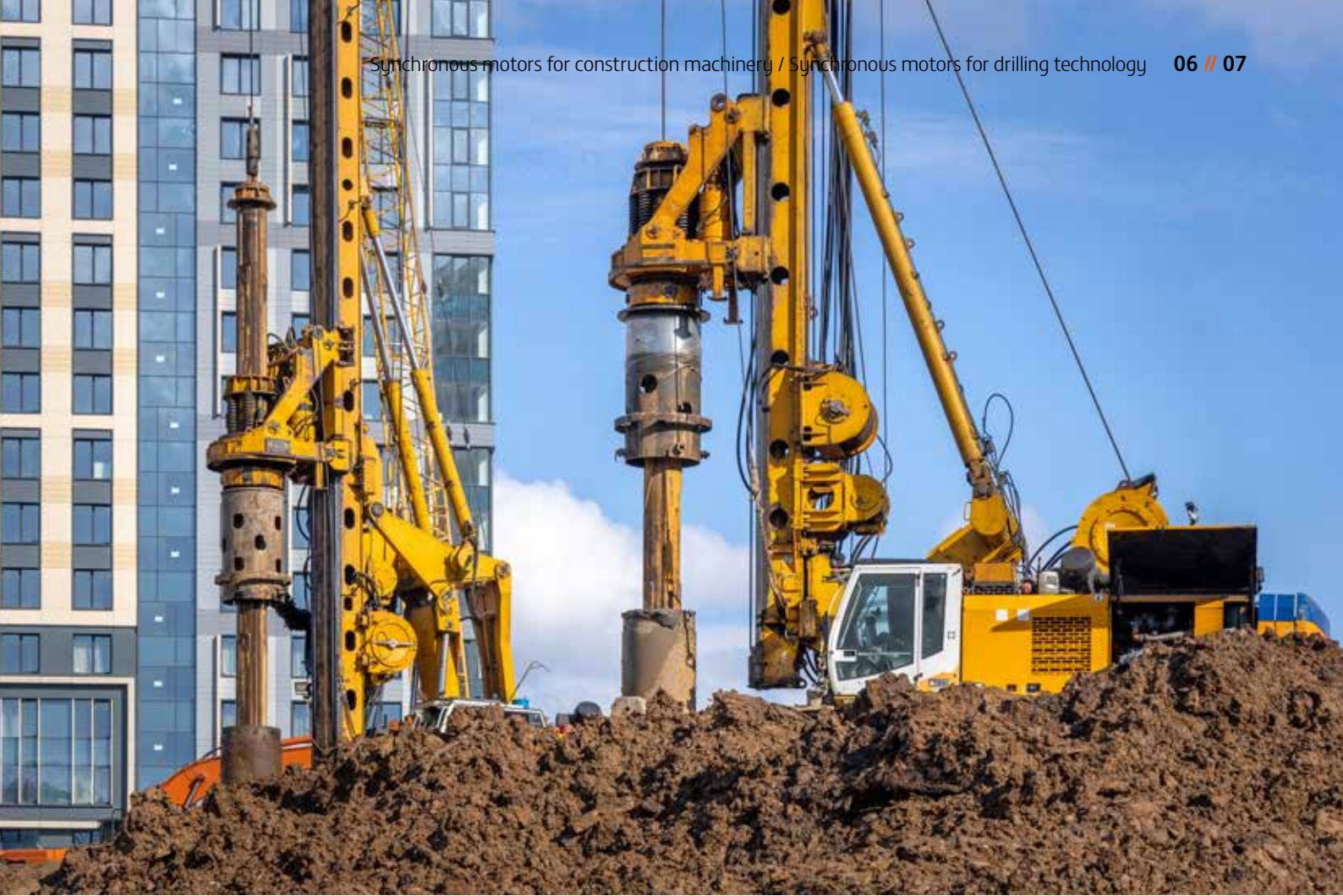
For use as

- 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  
 $P = 115 \text{ kW}$   
 $M = 22,000 \text{ Nm}$



# Synchronous motors for maritime applications



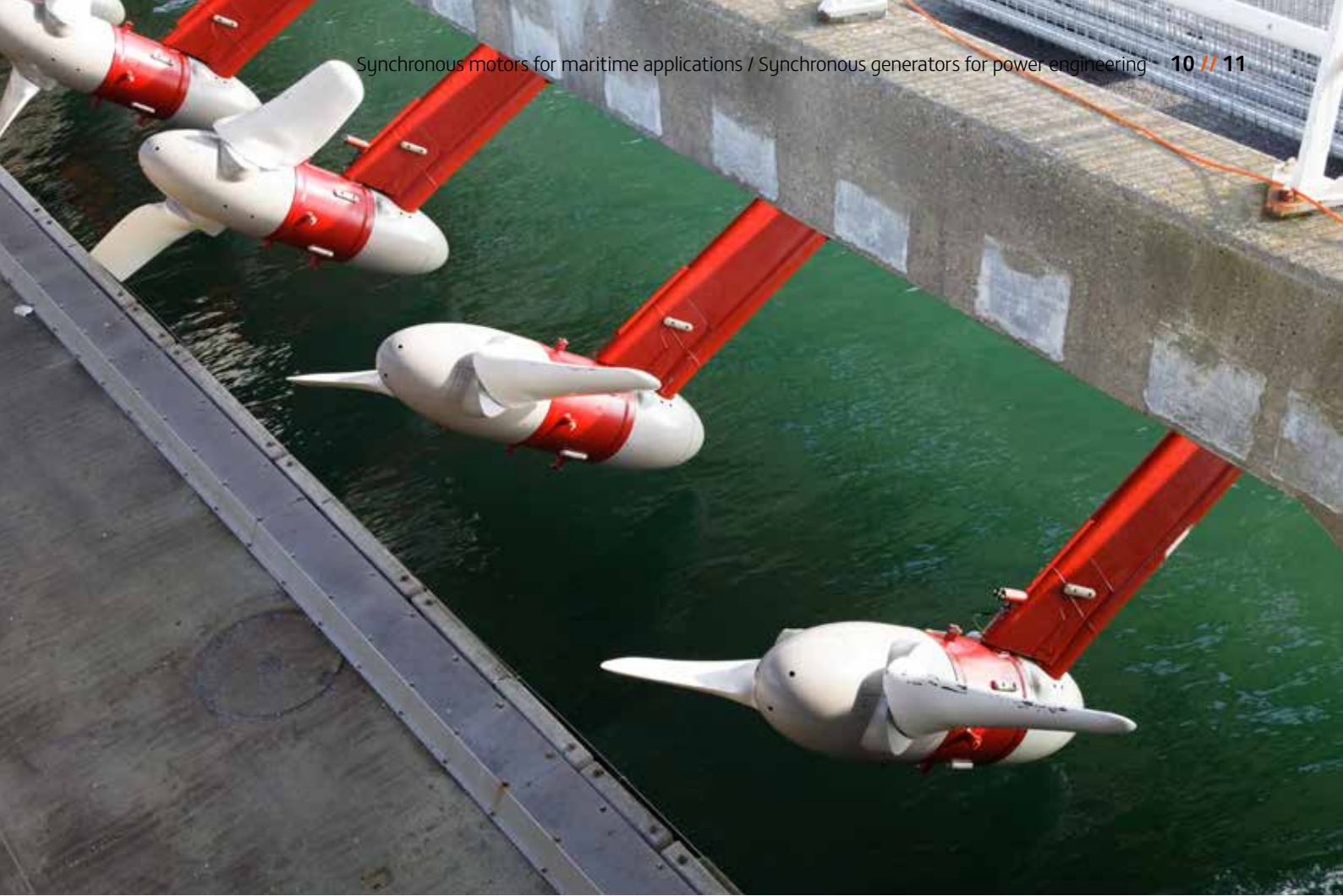
For use as

- Winch drive
- Ship propulsion «



Synchronous motor SMK 720-300  
 $P = 480 \text{ kW}$   
 $n = 800 \text{ rpm}$





# Synchronous generators for power engineering



For use as

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

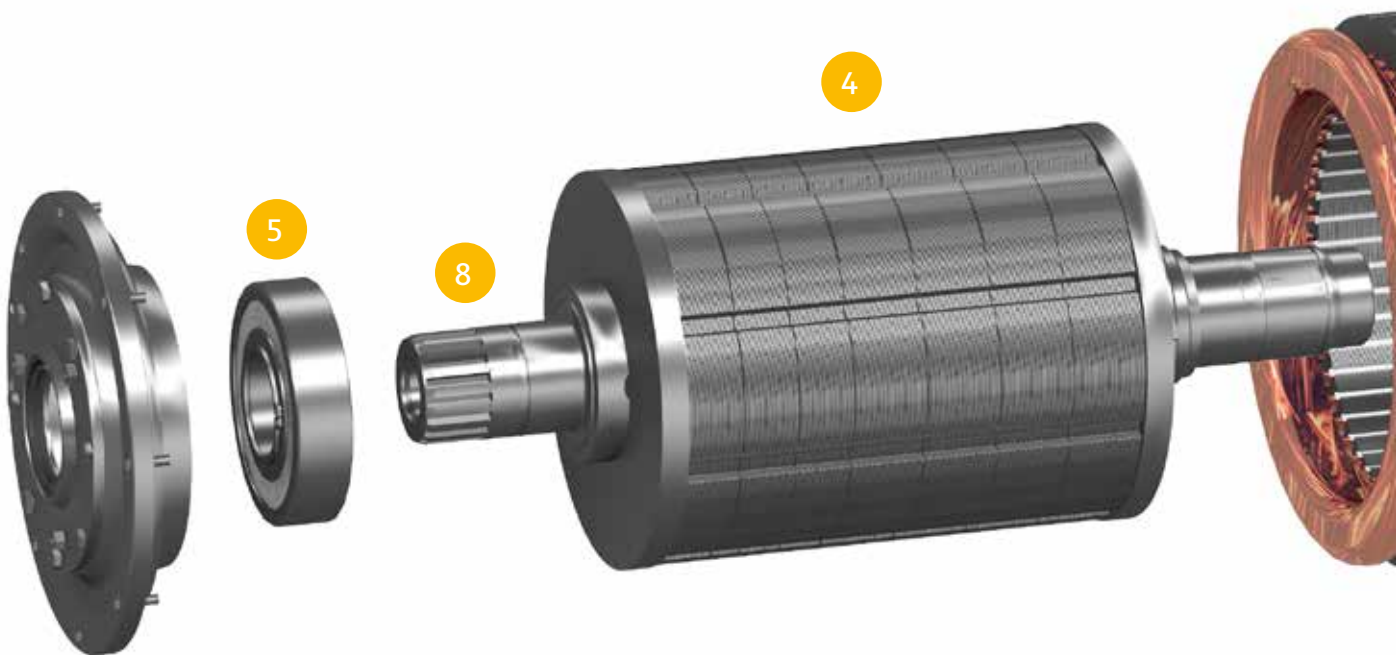
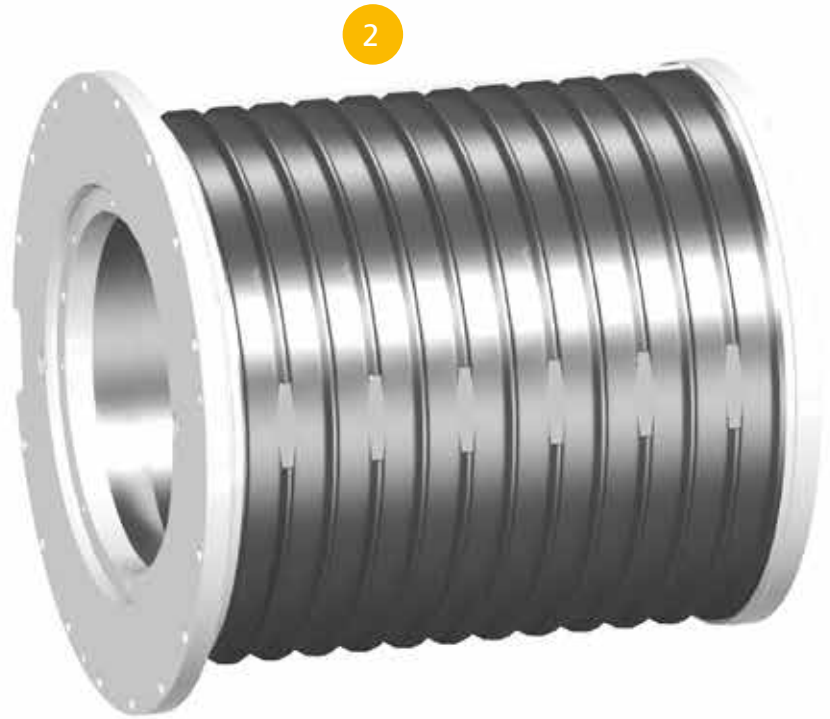


Synchronous generator SMK 500-200  
 $P = 230 \text{ kW}$   
 $n = 1450 \text{ rpm}$

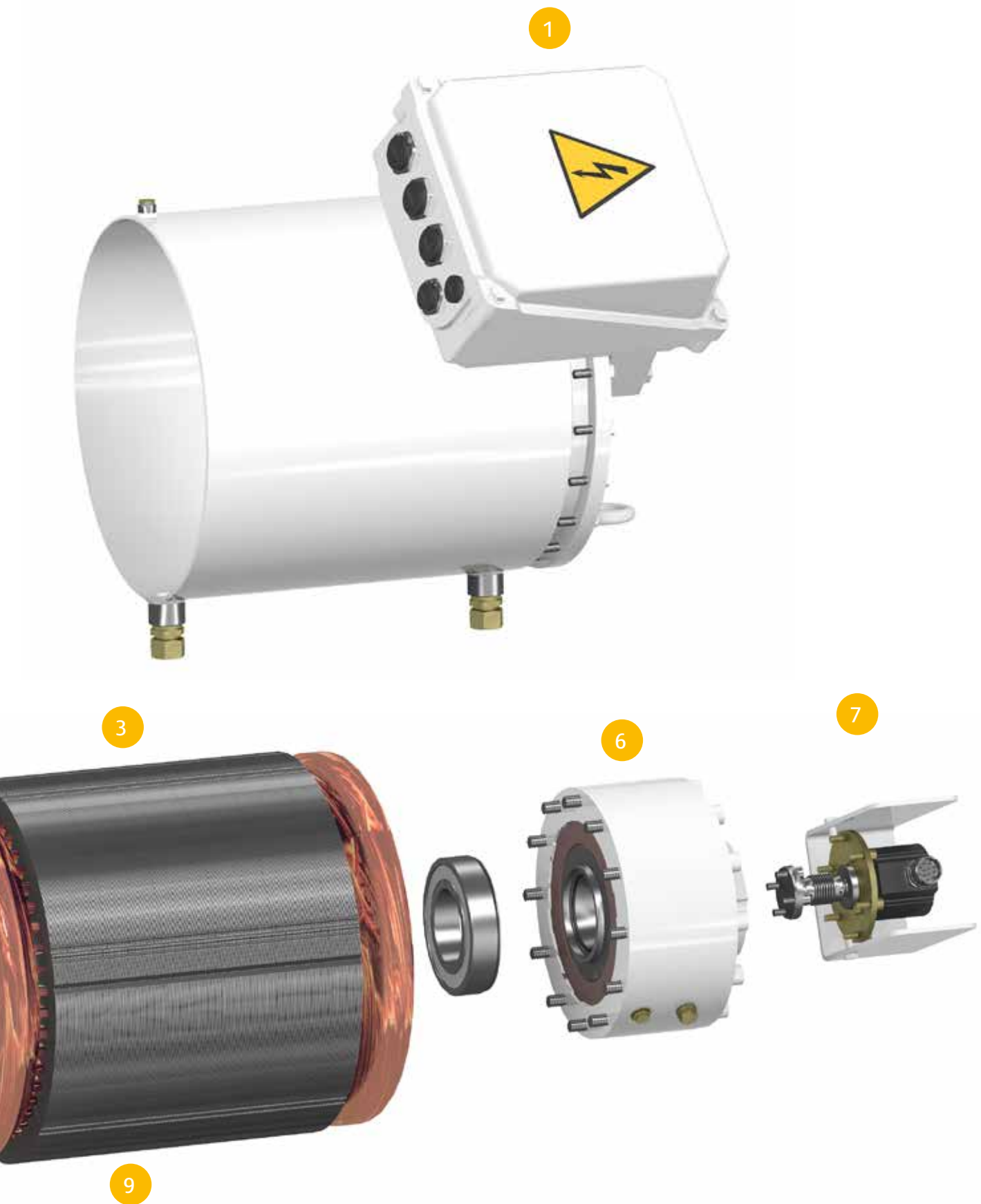
# Structure of ZOLLERN-synchronous motor

## 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







# 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           |

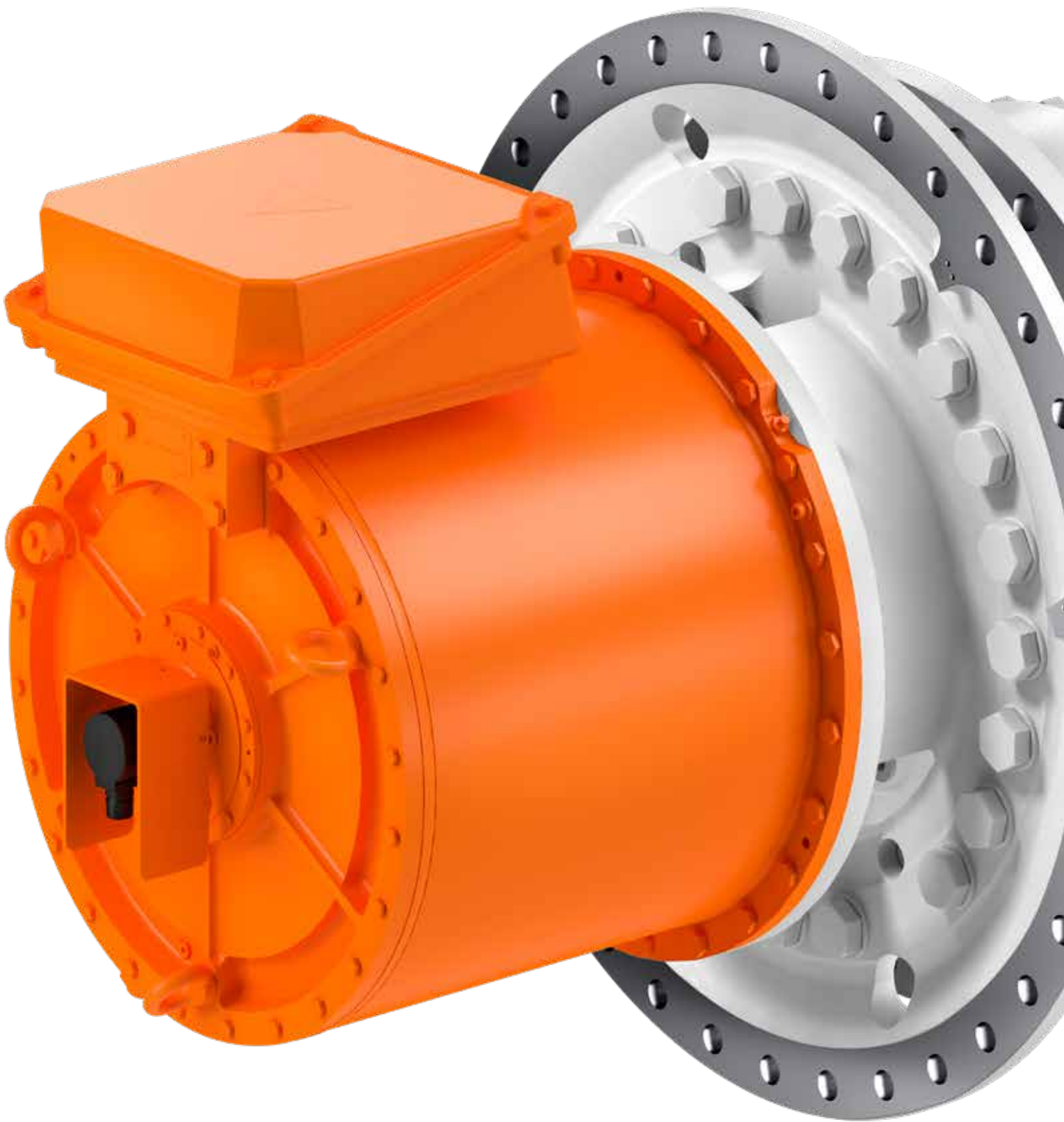
Higher speeds and torques, as well as other lengths on request.

### 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.





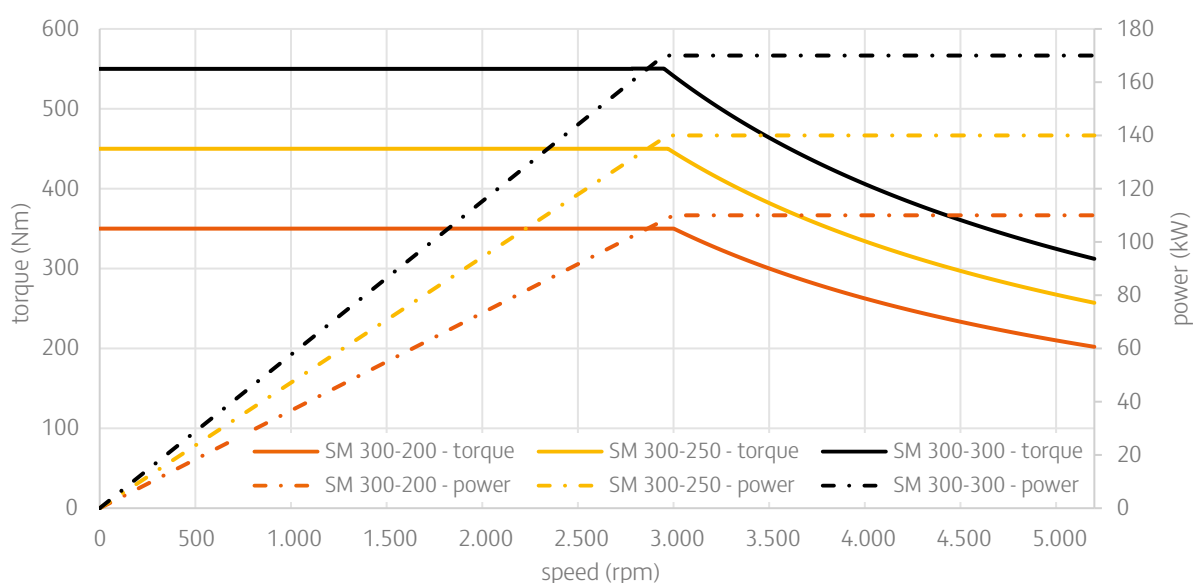
# Synchronous motor SMK-300

## // Values for continous Mode (S1)

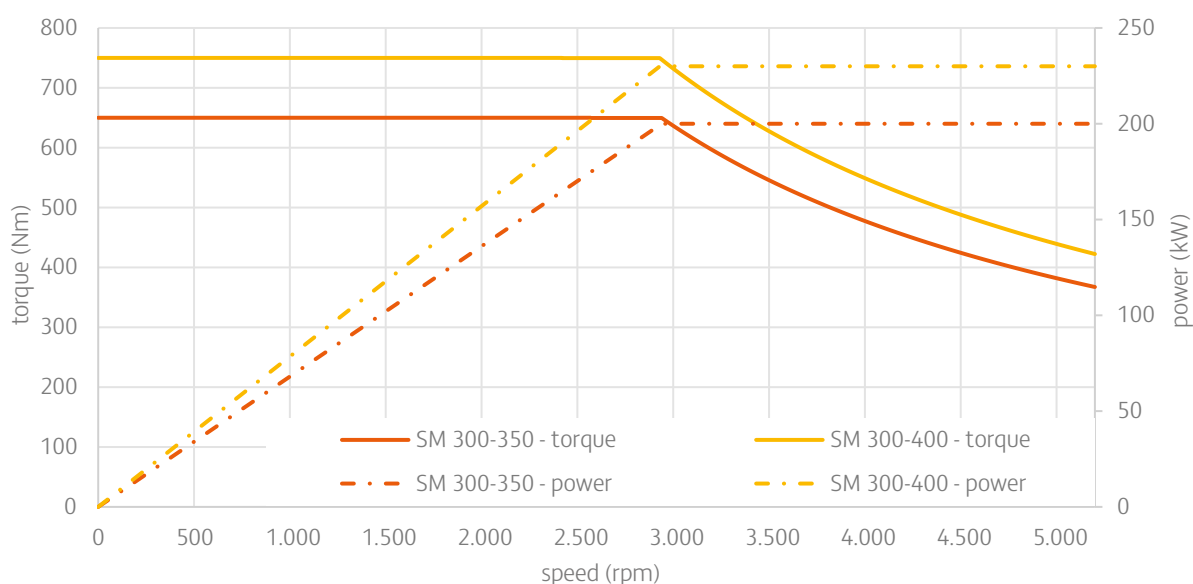
| Size | nominal Torque<br>(Nm) | nominal Power<br>(kW) | nominal Speed<br>(rpm) | max. speed<br>(rpm) | nom. Current*<br>(Aeff) |
|------|------------------------|-----------------------|------------------------|---------------------|-------------------------|
| -200 | 350                    | 110                   | 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

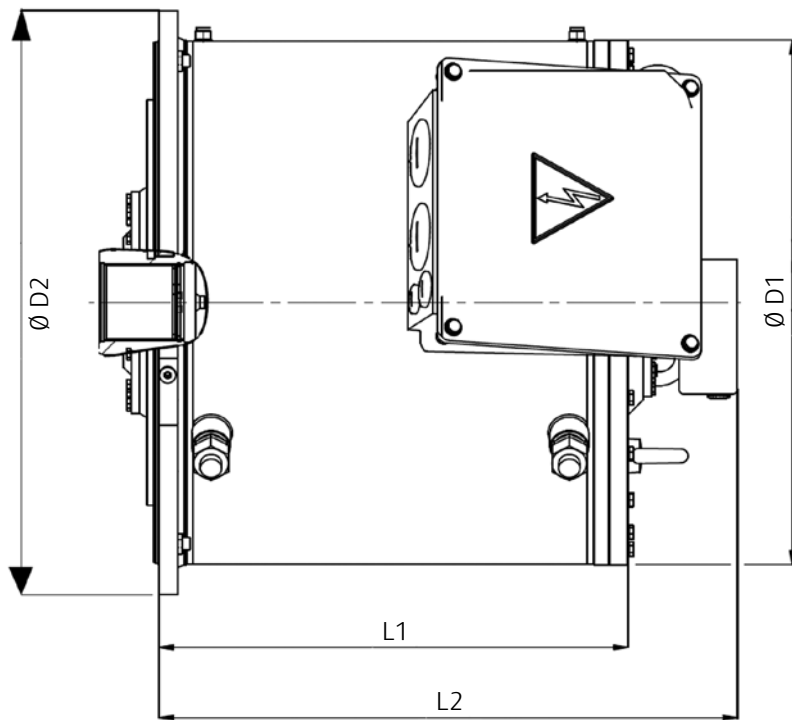
## // SMK 300 - 200, 250, 300



## // 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
- customized mechanical and electrical interface

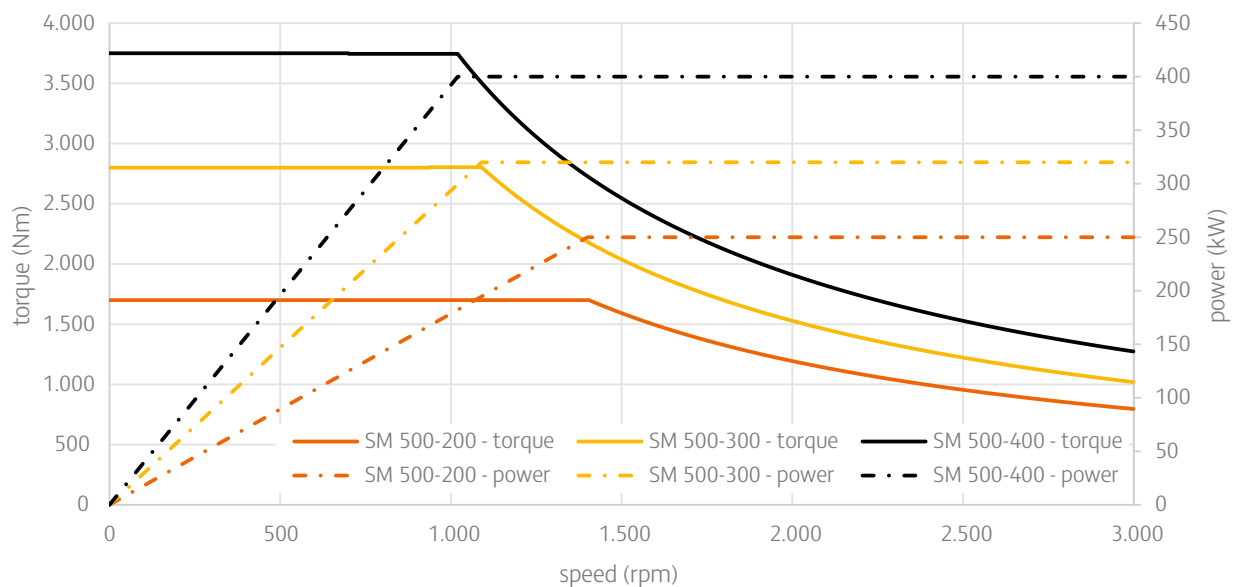
# Synchronous motor SMK-500

## // Values for continous Mode (S1)

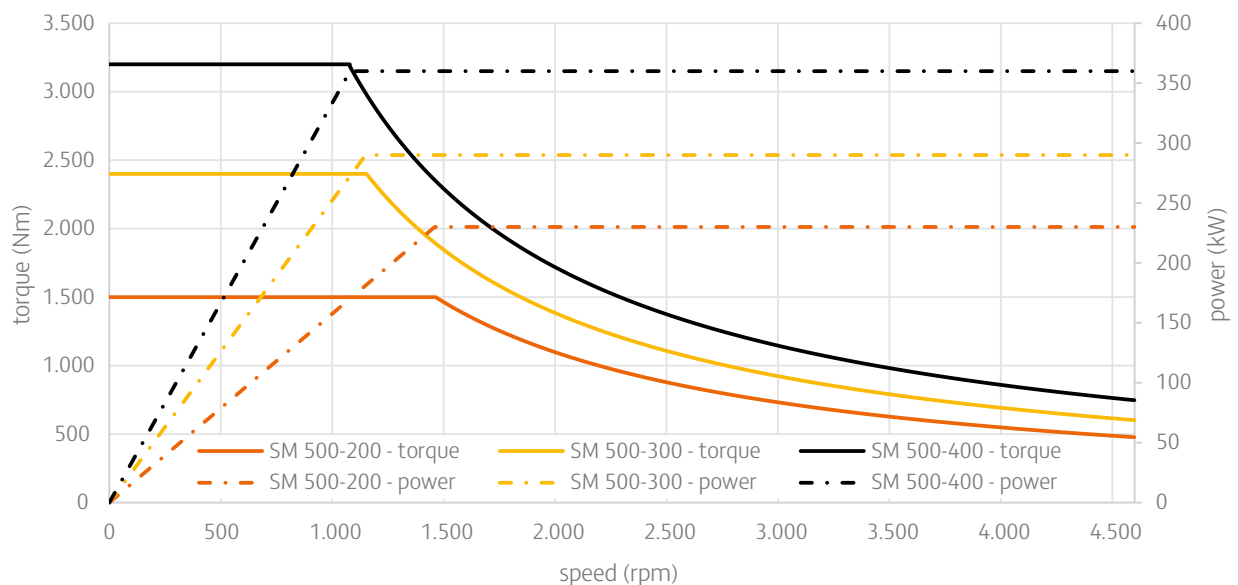
| Size | nominal Torque | nominal Power | nominal Speed | max. speed | nom. Current* |
|------|----------------|---------------|---------------|------------|---------------|
|      | (Nm)           | (kW)          | (rpm)         | (rpm)      | (Aeff)        |
| -200 | 1700           | 250           | 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

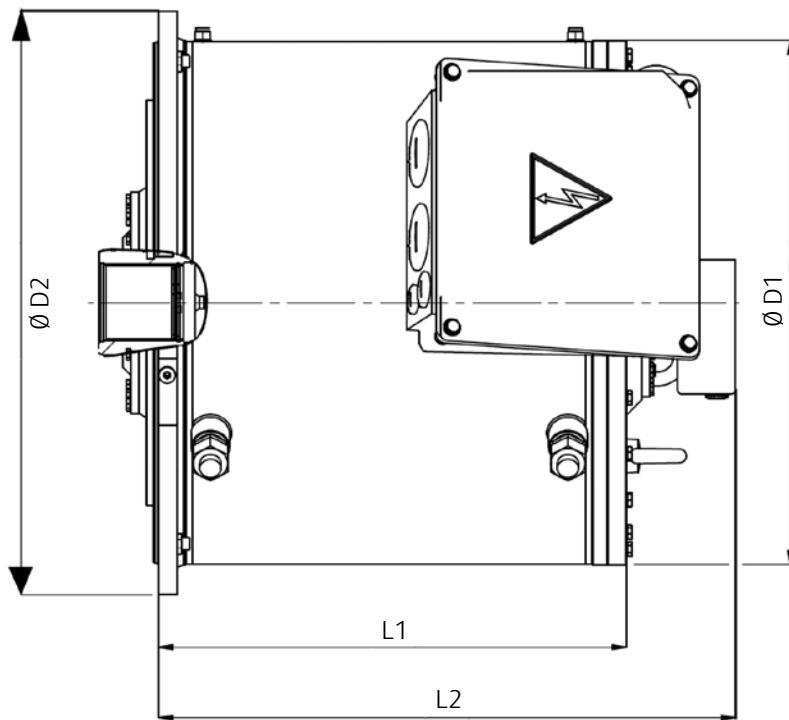
## // SMK 500 - torque line



## // 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
- customized mechanical and electrical interface

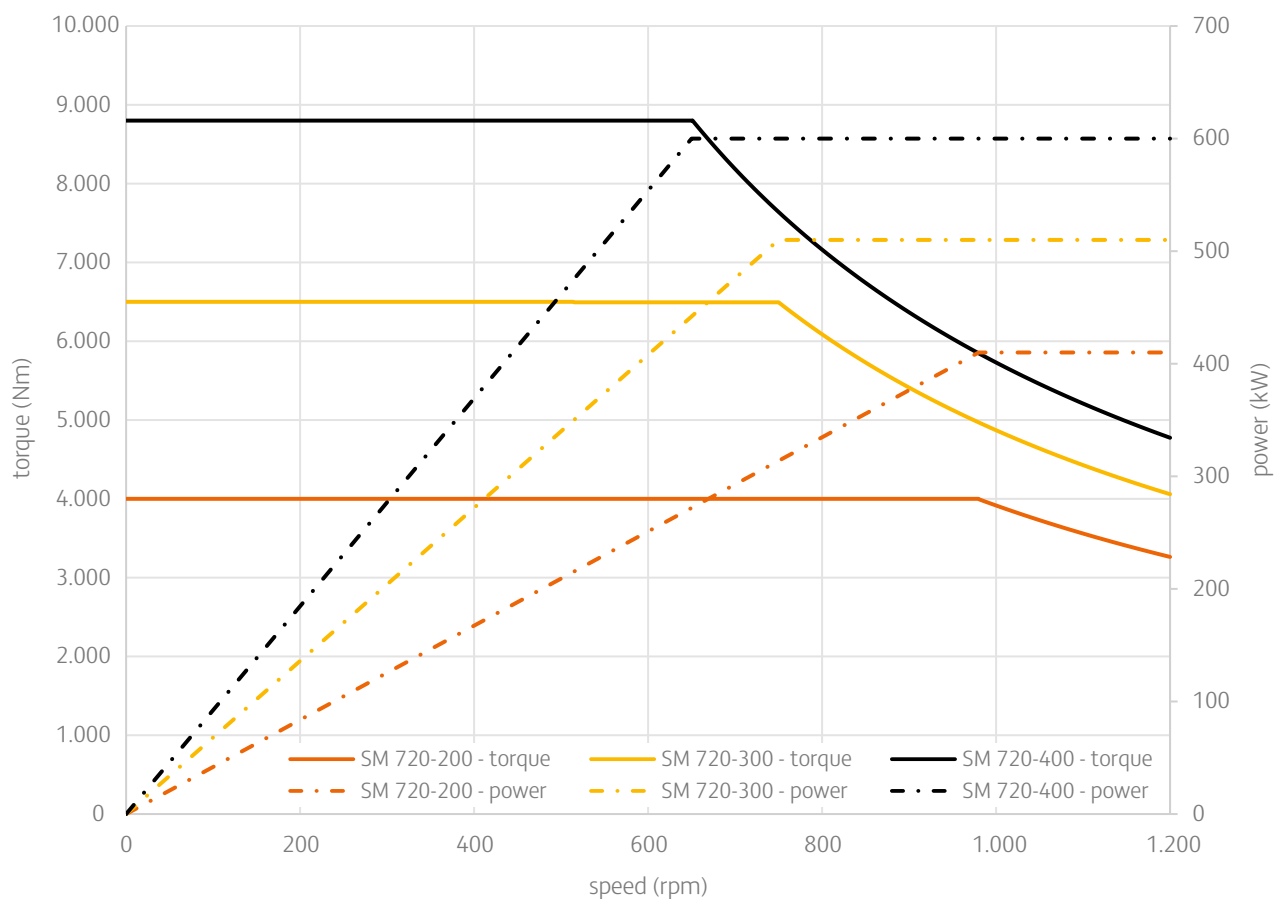
# Synchronous motor SMK-720

## // Values for continous Mode (S1)

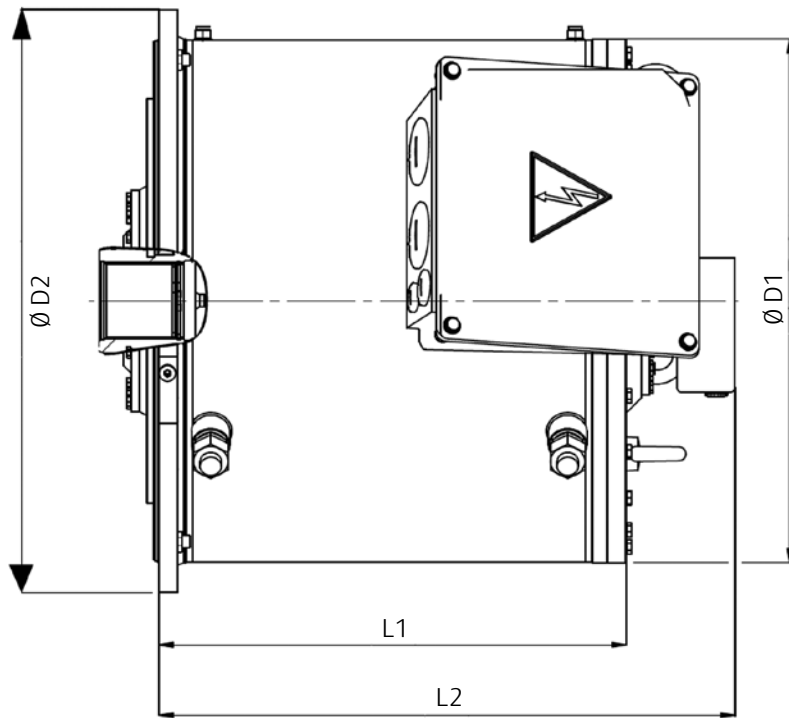
| Size | nominal Torque<br>(Nm) | nominal Power<br>(kW) | nominal Speed<br>(rpm) | max. speed<br>(rpm) | nom. Current*<br>(Aeff) |
|------|------------------------|-----------------------|------------------------|---------------------|-------------------------|
| -200 | 4000                   | 410                   | 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
- customized 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

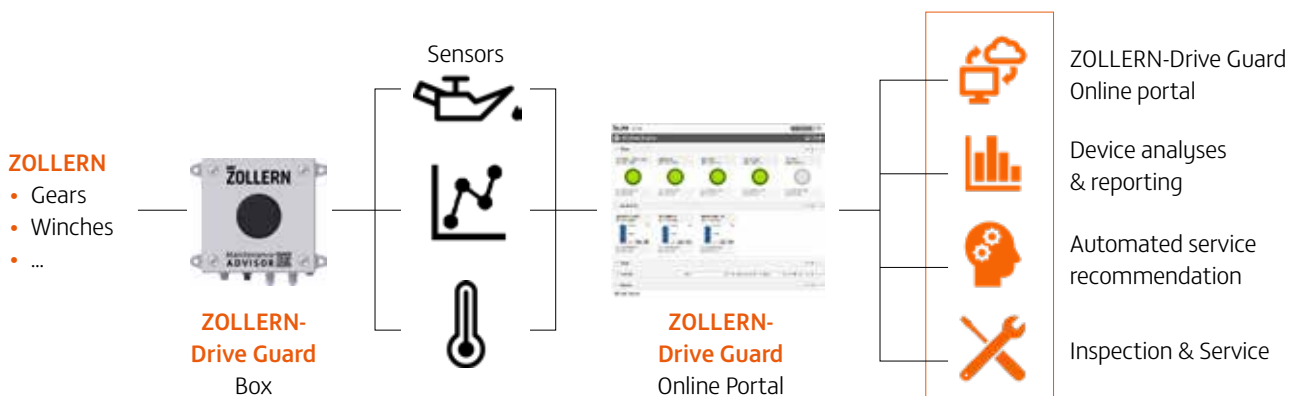
## Condition Monitoring ZOLLERN-Drive Guard

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

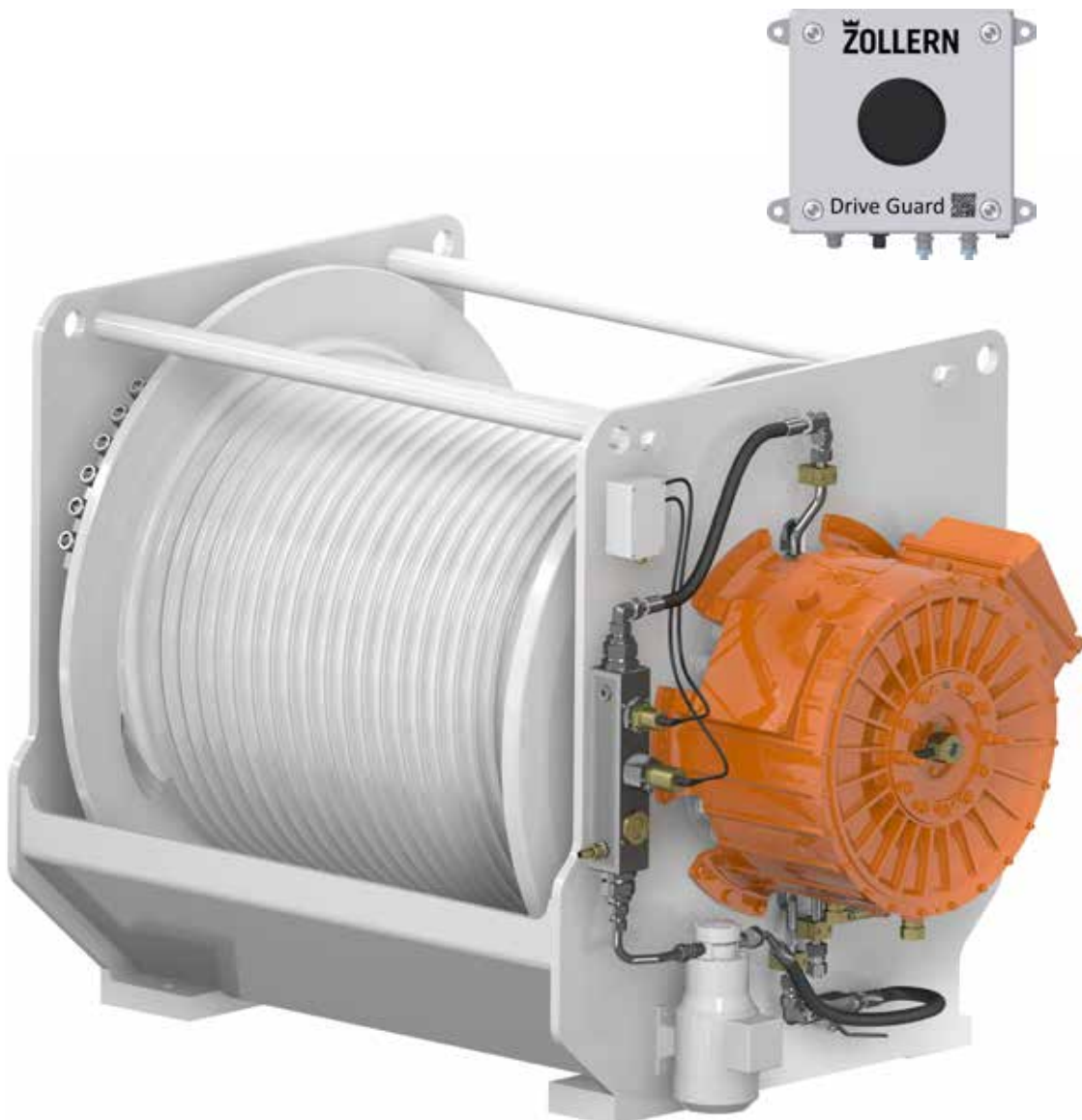


# Hardware of the ZOLLERN-Drive Guard

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

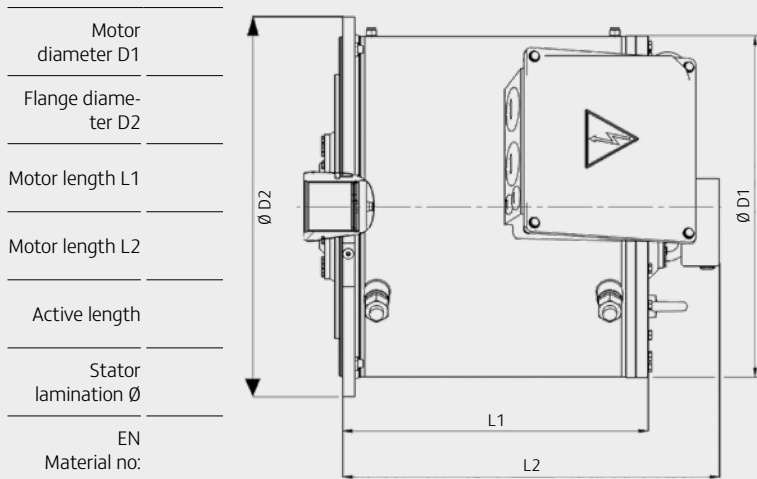
# Enquiry synchronous motor

|                     |                |
|---------------------|----------------|
| Customer            | Item no.       |
| Project/Application | Drawing no.    |
| Clerk               | Enquiry number |
| Telephone           | Email          |
| Fax                 | Date           |

Reply to enquiry by no later than:

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

|                      |                          |
|----------------------|--------------------------|
| Offer                | <input type="checkbox"/> |
| Draft                | <input type="checkbox"/> |
| Feasibility analysis | <input type="checkbox"/> |
| <b>Motor</b>         |                          |
| Synchronous          | <input type="checkbox"/> |



## 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 | _____ |

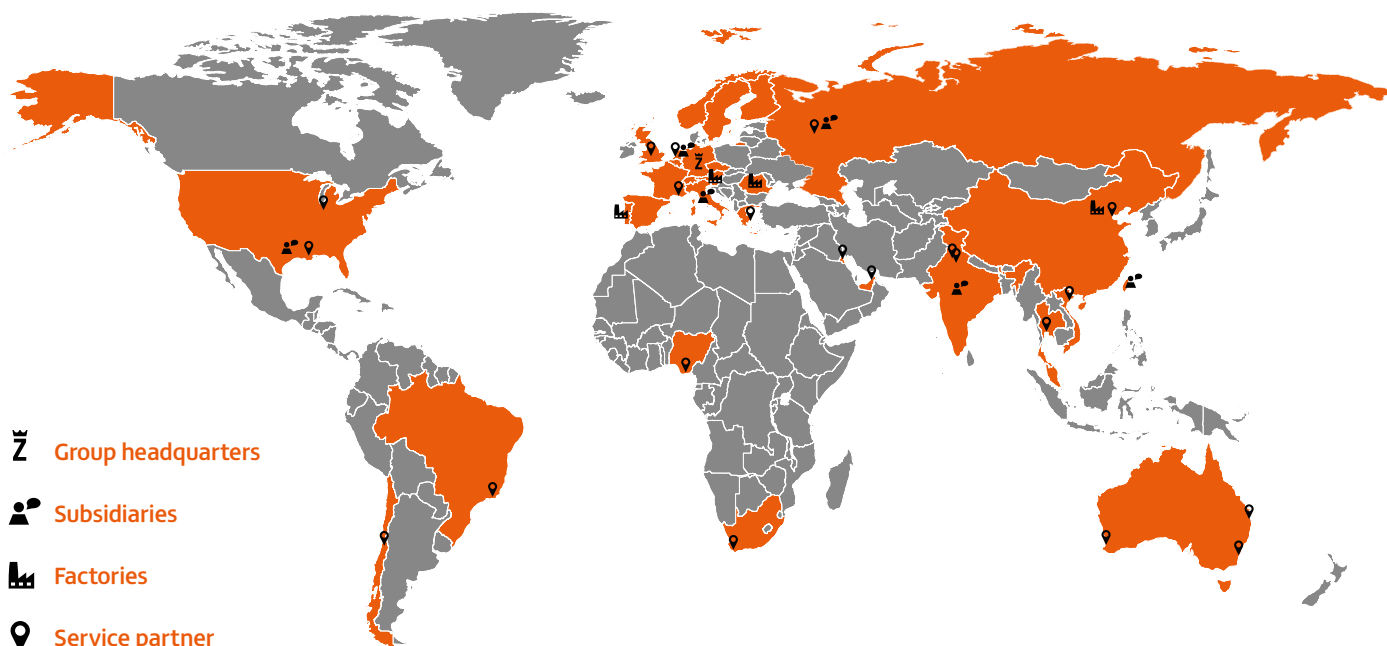
## Engines in competition

|      |       |
|------|-------|
| Make | _____ |
| Type | _____ |

## Cooling type

|       |                          |       |
|-------|--------------------------|-------|
| Water | <input type="checkbox"/> | _____ |
| Air   | <input type="checkbox"/> | _____ |
| Oil   | <input type="checkbox"/> | _____ |

## Additional remarks/information



# ZOLLERN

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