ELIN Motoren
A Trasys Company

We Keep the World in Motion.

Power Plants
www.elinmotoren.at

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Which kind of power plants and applications are our motors used for?

ELIN Motoren offers drive solutions for selected applications in all forms of thermal power plants:

- Pumps
  - Boiler feed water pumps
  - Main cooling water pumps
  - Absorber pumps
  - Condensate pumps
  - Circulation pumps
  - District heating pumps
  - Misc. auxiliary pumps
  - …
- Mills
- Fans / Compressors
  - ID Fan
  - FD Fan
  - PA Fan
  - Oxi Compressor
  - Applications for CCS
  - …

Lignite Power Plant
Neurath (BoA 2&3), Germany

ID Fan Motor
Schwarze Pumpe Power Plant, Germany

Why have leading companies in the power plant business been using our products?

- 120 years market presence → decades of experience in the power plant market → visionary
- Selected motor partner in more than 40 % of European hard coal or lignite fired power plants
- VGB certified company
- Optimisation of drive concepts with planners, utilities, contractors and OEM

- Leading role in the implementation of „Transmission Code“ requirements / consequences into the motor design

How can we support you with planning, processing and life-cycle topics of your plant?

Customer specific engineering of the drive solution with regard to the process and the driven machine means:

- Process coordination and integration of the drive chain design in the planning stage
- Clarification of driven machine interfaces relevant for the motor
- Link between mechanical and electrical engineering, if necessary also on site - recognition and realisation of specification requirements for both areas
- Form of contract orientated on practical experience
- After planning stage relaxed project start for the customer - fast submission of project docs due to many references
- Low maintenance due to coordinated life-cycle management

- Commissioning
- Storage concept
- Revision
- Strategic spare parts

- High-powered, modern testing facility

Testing facility of ELIN Motoren

Which advantages are generated by our drive solution?

- Mechanically and electrically optimised according to the specification for highest availability and operational safety

- Starting current ratio
- minimal start-up current
- start-up against closed valve
- no breakdown during momentary voltage drops
- etc.

- Highest efficiencies

- Isolation system for demanding solutions up to 15 kV (Higher voltages on request)

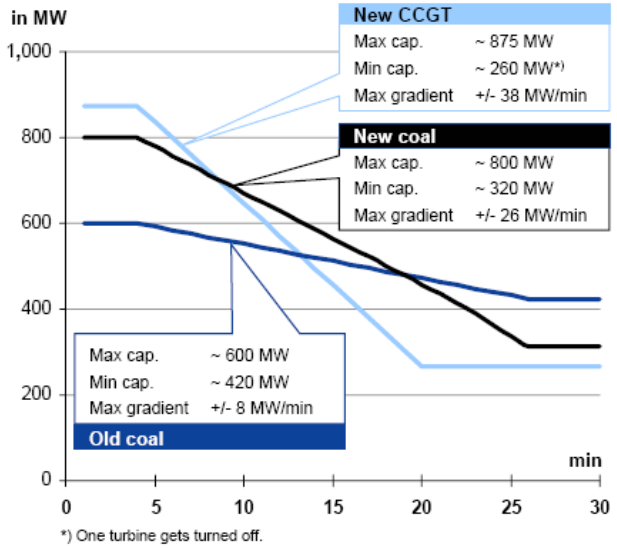
- Optimal drive chain integration due to minimal vibration emissions

- Western European quality product - developed, designed and manufactured in Austria

Why are utilities strongly considering variable-speed drive systems?

- Quick plant controllability and better block dynamic
- Controllability of coal fired power plants gets more important as they are not strictly used for base load anymore
- Optimal operating efficiency because the power plant can be adapted ideally to fuel mix and operating conditions
- Optimisation of efficiency and flexible block dynamic in CCPP

Comparison of ramp capacities (new CCGT unit and old coal unit)



Source: RWE Facts & Figures

Which advantages do variable-speed systems offer for the drive chain?

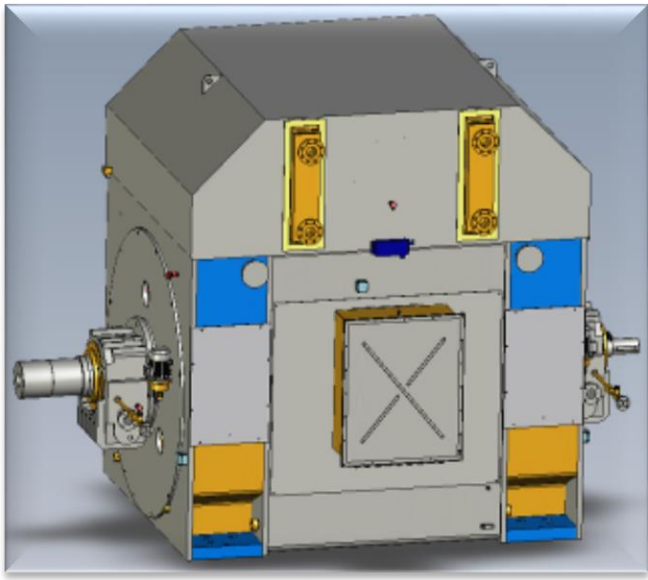
- Shock-free mechanical start-up of the drive chain
- Lower load of the station supply due to start-up with nominal current (Under considerations of transmission code requirements!)
- Savings through indirect returns (lower load in the station supply network, station supply transformer, …)
- Quick amortisation of motors with quadratic resisting moment
- High system efficiencies in all control ranges
- Availability requirements according to specification as variable-drive systems are used in power plants for years in stable operation

Main cooling water pump motor with tilting device

Variable-speed regulated boiler feed water pump motor / Termoli power plant, Italy

Which philosophy do we apply when handling variable-speed projects?

- Leading the way and focusing on power plant motors / Quickly recognising and adapting markets trends
- Coordination with the customer if electrical or mechanical speed regulation is preferred
- Fans and pumps with hydraulic adjustable blades or impeller blades are subject to special physical conditions



Variable-speed regulated asynch. motor / 22 MW, 1800 min^{-1} / boiler feed water pump motor for 900 MW hard coal block

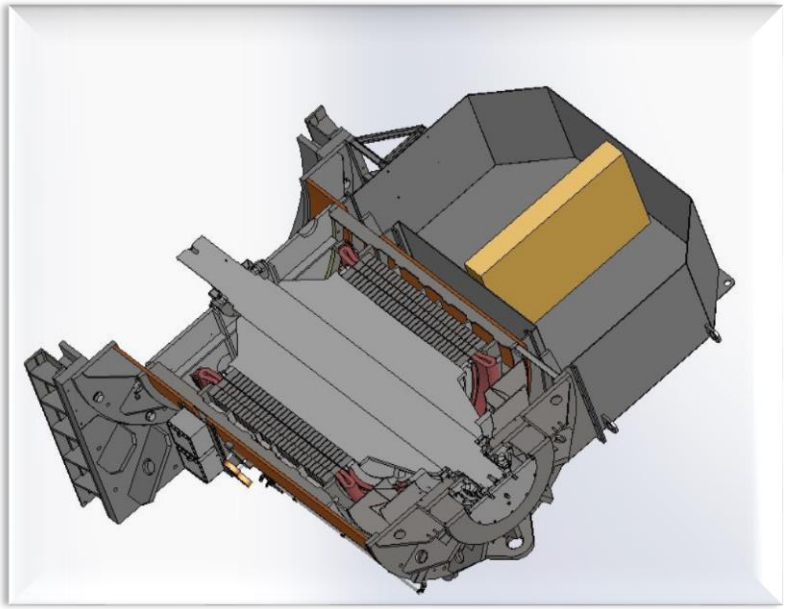
Which philosophy do we apply when handling variable-speed projects?

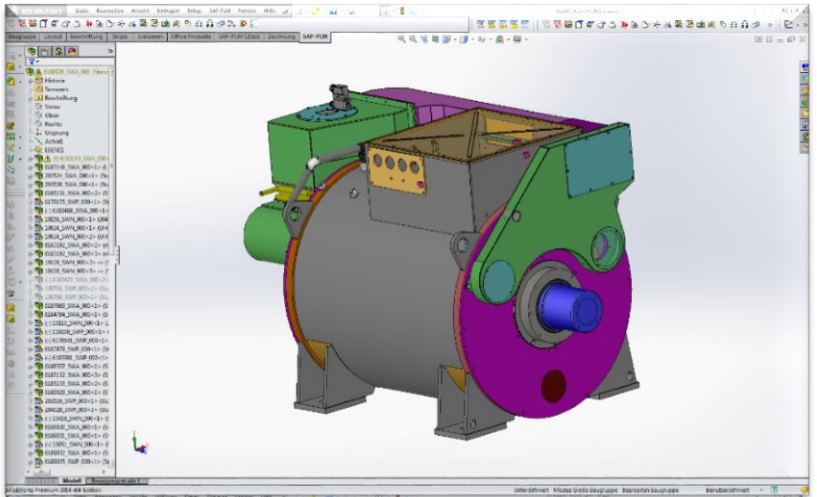
- Cooperation with all leading manufacturers of frequency inverters - ELIN Motoren integrates your preferred equipment into the drive system
- Determination of operating-efficiency together with the customer
- Flexible and quick customer support during the project planning
- Solution of mechanical and electrical topics in one hand - providing a „carefree“ package for the customer

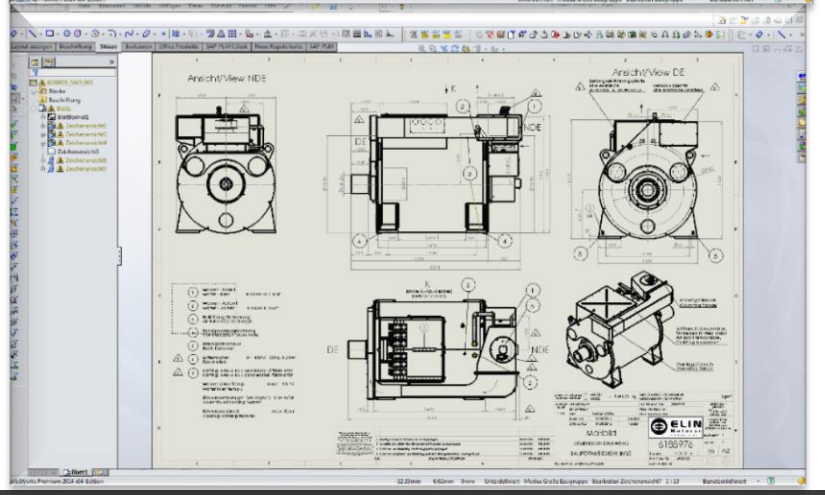
Mechanically controlled ELIN motor

State-of-the-Art Design Tools

Our Designers are experienced specialists in usage of state-of-the-art design tools such as SOLID WORKS, which is used for 3D modelling and visualization of all designed parts.







Seismic- and Strength Calculations

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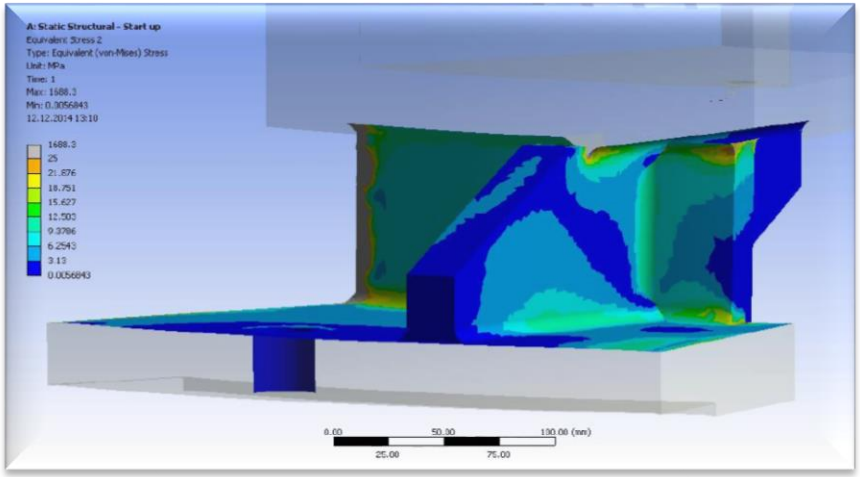
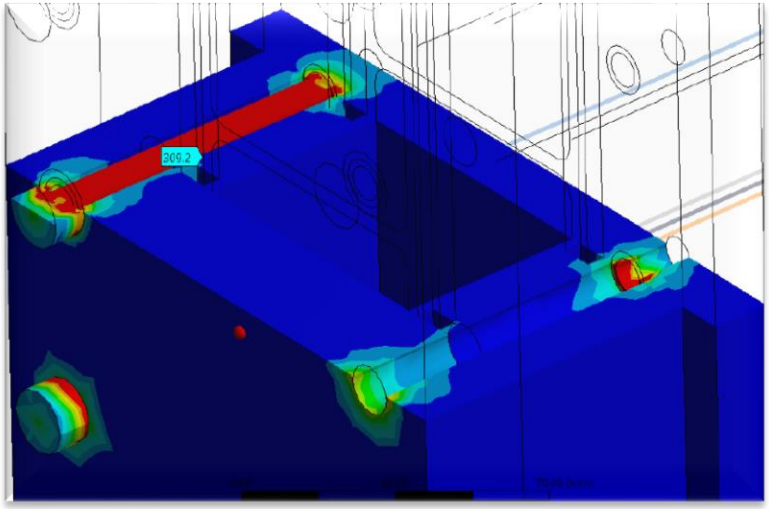
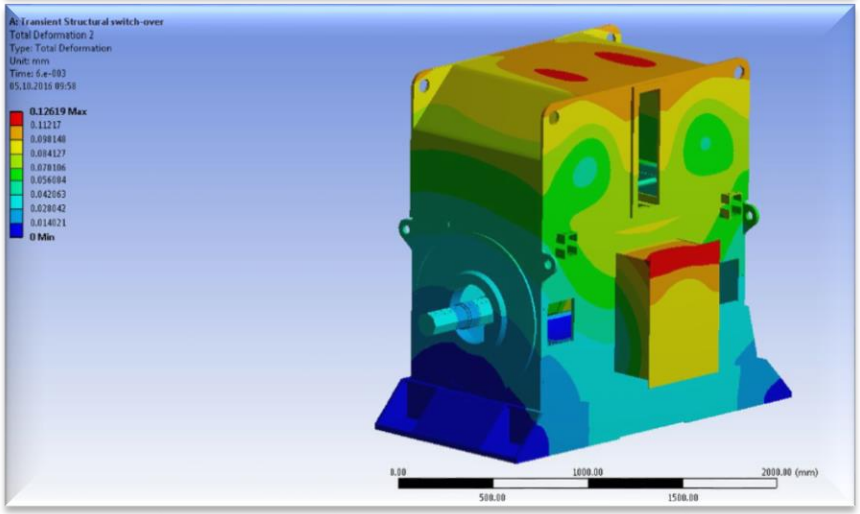
To benefit our customers, we are able to perform all necessary seismic- and strength calculations of HV- and LV-Motors needed for the nuclear sector in-house.

Either with state-of-the-art commercial tools, such as ANSYS and KISSsoft, or internally developed calculation programs, the whole range of critical parts calculation can be covered by our company.

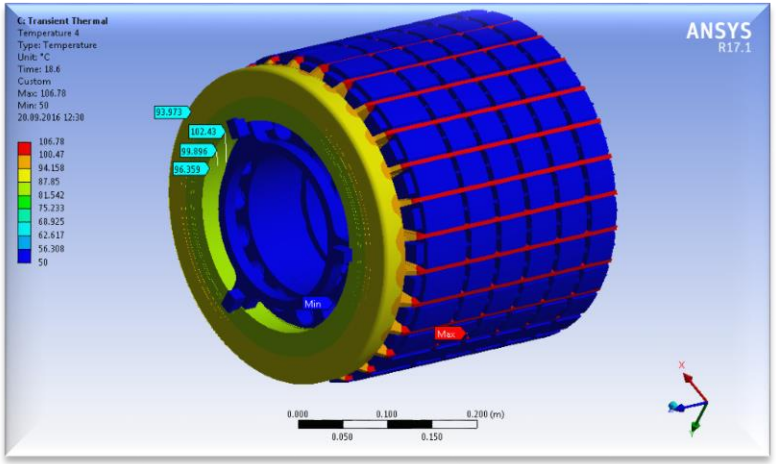


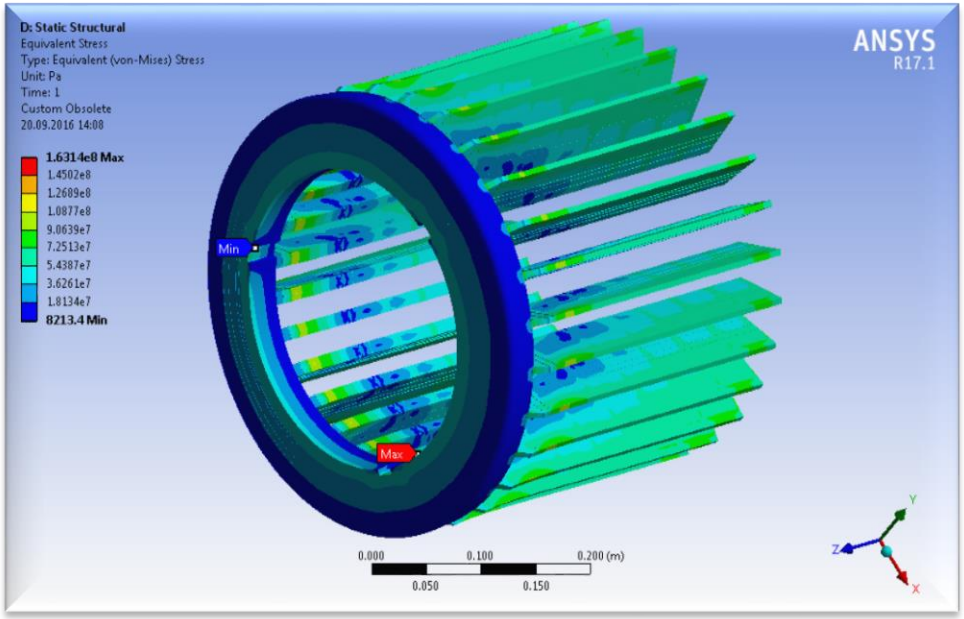


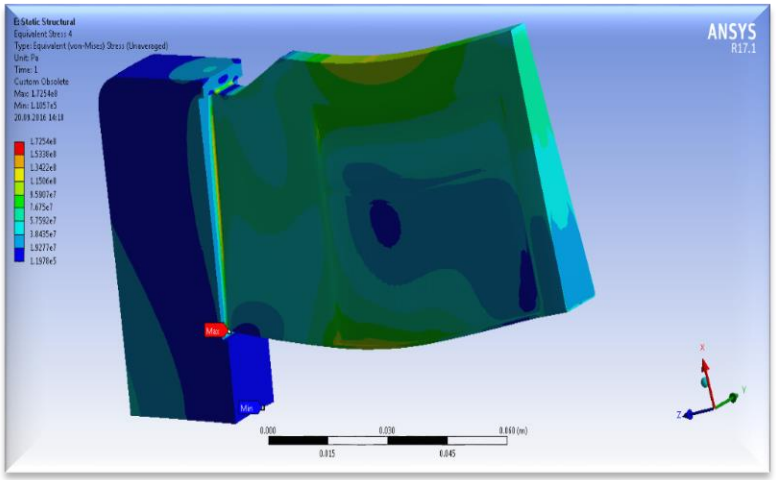


Rotor Cage Calculations

State-of-the-art commercial tools, such as ANSYS, as well as internal calculation programs enable us to perform a wide range of calculations and thus project the behaviour of our machines during their life cycle as well as potential technical irregularities well in advance.







Impulse Voltage Test for the HV Insulation System

An impulse voltage test for HV insulation systems can be performed at one of the reliable partner companies of ELIN.

A proven insulation technology ensures a high level of safety margin to the specified standard values.

Example values for 4 kV system (single conductor insulation):

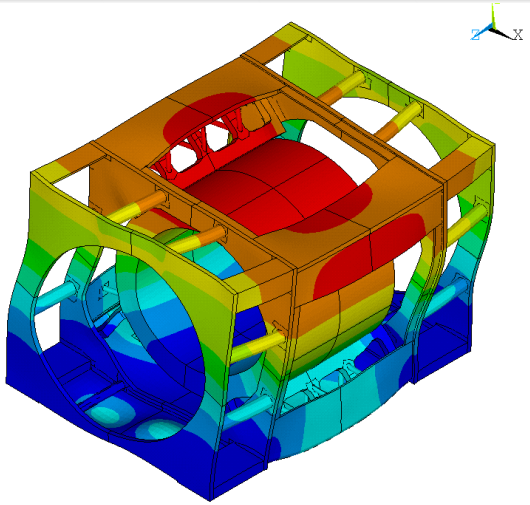
- 14 kV necessary acc. to EN-60034-15
- Insulation breakdown at 112 kV

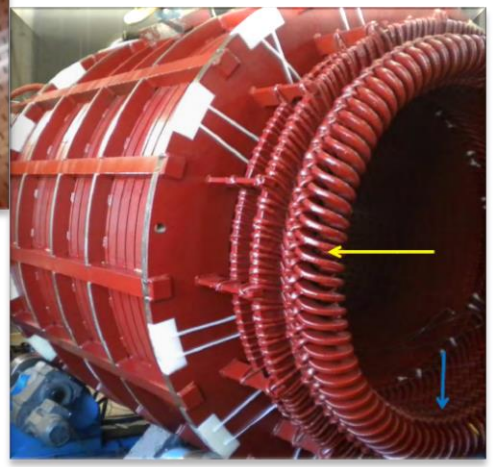
Reinforced Stator Design

The reinforced stator design of ELIN products enables DOL quickstarts and offers protection against electrical accidents during switch overs with residual voltage.

Winding overhang supports and stator-housing connections are designed to guarantee best-possible avoidance of excitement frequencies, which could cause potential harm.
In addition, bump tests can be performed on request.

The specific know-how leadership of ELIN concerning this topic results from vast experience and countless references for machines being operated in state-of-the-art thermal power plants and under today's grid-conditions, which are heavily affected by being fed with on-and-off energy from renewable sources.





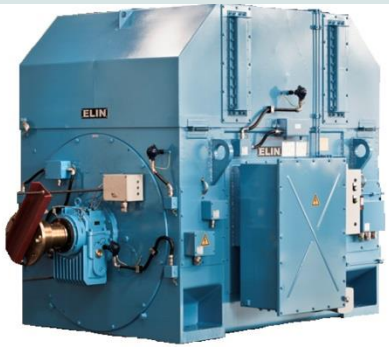
Motor types & cooling methods – air cooled

	IC411	IC511	IC611	IC01 (IP23)	moreover *
					e.g. Forced cooling & channel connection for air inlet and air outlet
Motor Type					
Squirrel cage	HKG	HKR/	HKL/	HKJ/	HK_/
Slip ring		HRR	HRL	HRJ	HR_
Power (based on 4-pole)					
Squirrel cage	2.2 MW	8.0 MW	18.0 MW	30.0 MW	30.0 MW
Slip ring		6.0 MW	12.0 MW	15.0 MW	15.0 MW
Voltage					
Squirrel cage **Slip ring**	0.4 – 11.0 kV	0.4 - 15 kV	0.4 - 15 kV	0.4 - 15 kV	0.4 - 15 kV

* The mentioned examples are a general overview about our products. We certainly will offer customer specific applications and requirements.

Motor types & cooling methods - water cooled

IC81W
(ICW37A81)



Motor Type

Squirrel cage	HKM/
Slip ring	HRM

Power (based on 4-pole)

Squirrel cage	35.0 MW
Slip ring	20.0 MW

Voltage

Squirrel cage	0.4 -15 kV
Slip ring	

Water jacket cooled
(IC3A0W7)

Motor Type

Low Voltage	MKH/
High Voltage	HCZ

Power (based on 4-pole)

Squirrel cage	2.5 MW
Slip ring	1.5 MW

Voltage

Squirrel cage	0.4 -11.0 kV
Slip ring	

Selected Projects

BoA 2&3, Neurath

Boxberg, Block R

Westfalen

Moorburg

Großkraftwerk Mannheim

Eemshaven

Wilhelmshaven

Walsum, Block 10

Countless other projects can be found in our motor reference list

Project: Kozienice Power Plant – CWP

Location: Kozienice, Poland

Year: 2014

- Type: HKM111R18
- Power: 5000 kW
- Voltage: 10 kV
- Frequency: 50 Hz
- Speed: 330 rpm
- Cooling: Air/water cooled
- Quantity: 2 pieces

- Application: Pump

- Highlight: IM3011 with flange adapter (mass~8000 kg)

  Motor mass: 52 tons

  Start against open discharge valve of the pump

  Start up voltage 75 % Un

  Starting current max. 5.9 x FLC

Project: Kozienice Power Plant – BFP

Location: Kozienice, Poland

Year: 2014

- Type: HKM111Z04
- Power: 21700 kW
- Voltage: 10 kV
- Frequency: 60.5 Hz
- Speed: 1807 rpm
- Cooling: Air/water cooled
- Quantity: 3 pieces

- Application: Pump

- Highlight: Mass of motor 44 tons

  Designed for start and operation on frequency inverter Speed range 1015 – 1807 rpm

  Efficiency 4/4: 98%, 3/4: 98 %

  Power factor: 4/4: 0.91, 3/4: 0.905

Project: Boxberg Power Plant Block R - BFP

Location: Germany

Year: 2009

Copyright: Vattenfall Europe

- Type: HKM110D04
- Power: 13500 kW
- Voltage: 10 kV
- Frequency: 50 Hz
- Speed: 1478 rpm
- Cooling: Air / water cooled
- Quantity: 1 piece

- Application: Pump

- Highlight: Start-up at 75 % of the nominal voltage against full resisting moment of the pump.

  Best efficiency (>97 %) at 75 % of the nominal power (usual operation point of this application)

Project: Kozienice Power Plant – CMP

Location: Kozienice, Poland

Year: 2014

- Type: HKR180B04
- Power: 1835 kW
- Voltage: 3.3 kV
- Frequency: 52.25 Hz
- Speed: 1558 rpm
- Cooling: Tube cooled
- Quantity: 2 pieces

- Application: Pump

- Highlight: Start and operation on medium voltage frequency converter

  Speed range 944 – 1558 rpm

Project: Turow Power Plant – CEP

Location: Poland

Year: 2016

- Type: HKG545F04
- Power: 560 kW
- Voltage: 10 kV
- Frequency: 50 Hz
- Speed: 1493 rpm
- Cooling: Rib cooled
- Quantity: 2 piece

- Application: Condensate Extraction Pump

Project: Gebze Adapazari Power Plant – Replica Motor

Location: Turkey

Year: 2016

- Type: HKL171D14
- Power: 1600 kW
- Voltage: 6 kV
- Frequency: 50 Hz
- Speed: 423 rpm
- Cooling: Air-air cooled
- Quantity: 1 piece

- Application: Pump

Project: Sostanj Block 6 - BFP

Location: Sostanj, Slovenia

Year: 2012

- Type: HKM110D04
- Power: 15500 kW
- Voltage: 10.5 kV
- Frequency: 50 Hz
- Speed: 1490 rpm
- Cooling: Air / water cooled
- Quantity: 1 piece

- Application: Pump

- Highlight: Efficienecy at 75 % load = 97.93 %

  Sound pressure level at no-load = 77.9 dB(A)

  Drive chain length = almost 18 m

  Run-out after voltage drop against open valve is possible

Project: WaiGaoQiao Power Plant – ID-Fan

Location: Shanghai, China

Year: 2012

- Type: HKM190D08
- Power: 7600 kW
- Voltage: 10 kV
- Frequency: 50 Hz
- Speed: 745 rpm
- Cooling: Air/water cooled
- Quantity: 5 pieces

- Application: Fan

- Highlight: Efficiency:
  4/4: 97.3 %
  3/4: 97.55 %
  2/4: 97.4 %
  (Customer requirement: Best efficiency at 3/4 load)

  Starting current 5.5x FLC without positive tolerance

  Fan load moment of inertia = 7824 kgm2

Project: Altbach Power Plant – FD-Fan

Location: Altbach-Deizisau, Germany

Year: 2012

- Type: HKM180Z99
- Power: 3100 / 3800 kW
- Voltage: 10.5 / 2.5 kV
- Frequency: 50 / 60 Hz
- Speed: 993 / 1191 rpm
- Cooling: Air/water cooled
- Quantity: 1 piece

- Application: Fan

- Highlight: Design with 2 separated windings

  Winding 1: Operation on 10.5 kV mains, 50 Hz, start DOL

  Winding 2: Start and operation on IGBT inverter with 2.5 kV, 60 Hz

Selected Contacts

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