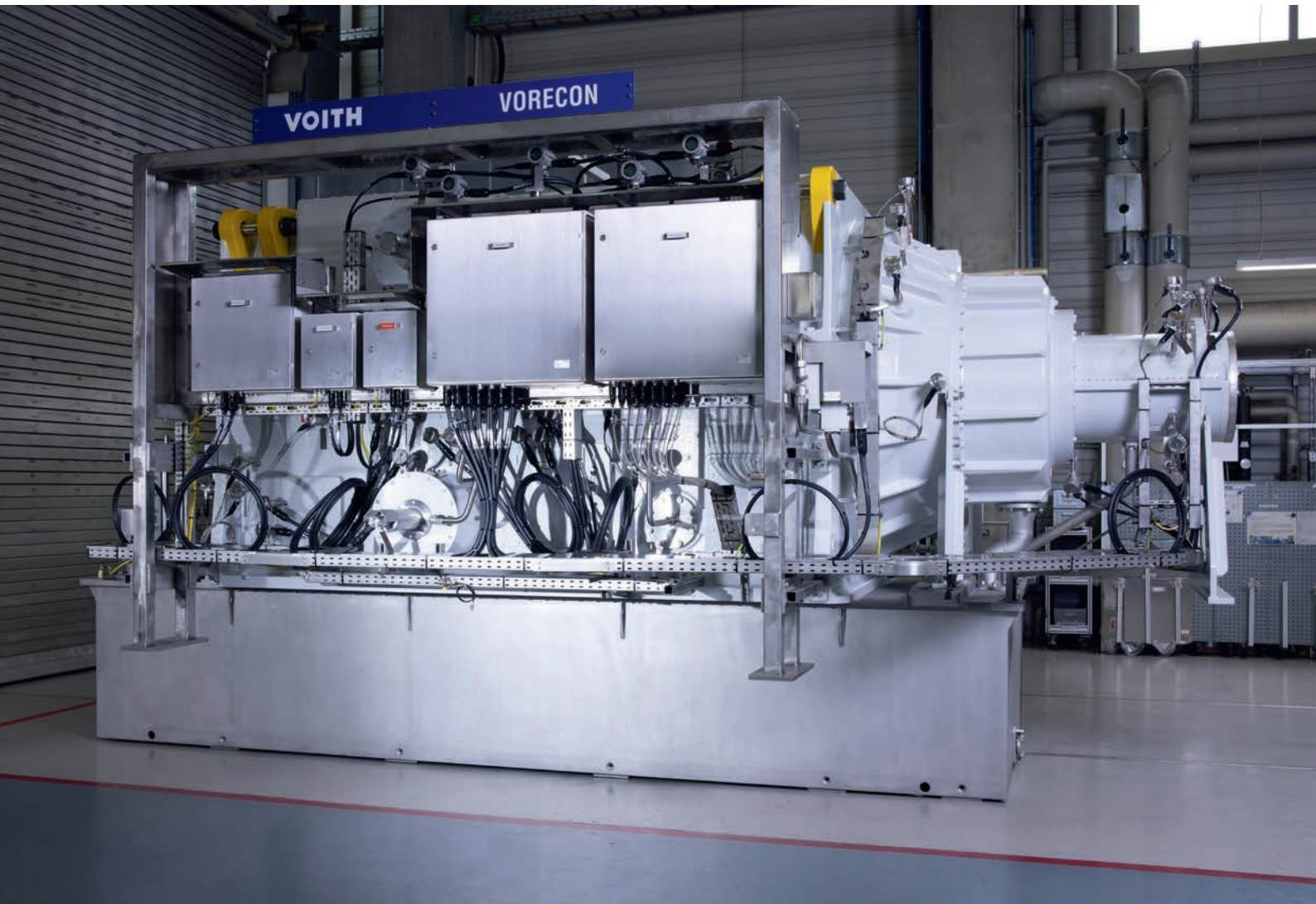
voith.com

VOITH

Efficient control of pumps and compressors

Vorecon variable speed planetary gear



Reliable speed control

The Vorecon

Using the Vorecon allows you to control the speed of your driven machine. Your process is carried out at exactly the speed required. As a result, the process runs with optimal efficiency saving you costly energy. But that is not all it does.

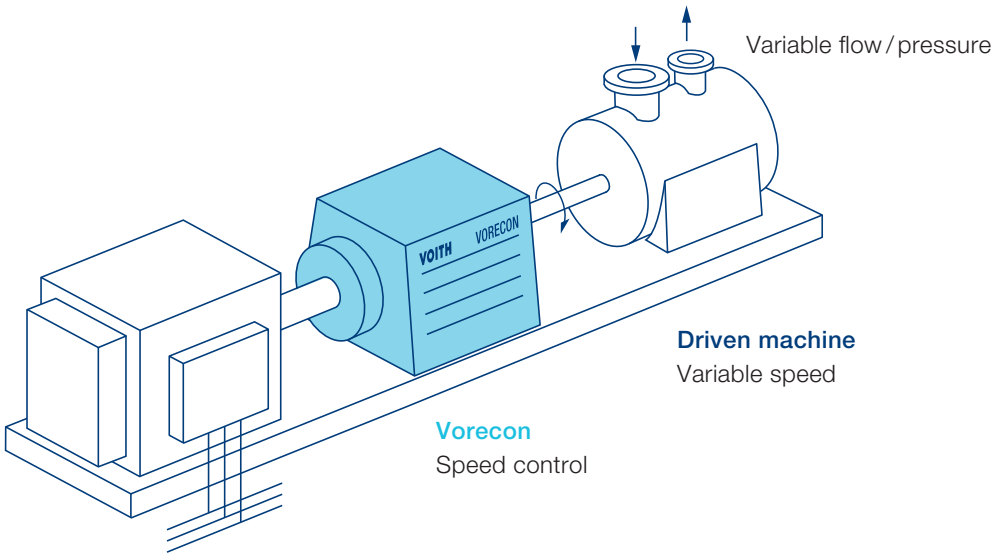
The principle

- The Vorecon is a hydrodynamic variable speed planetary gear for transmission of up to 50 MW and output speed up to 20 000 rpm.
- It combines reliable mechanical design with hydrodynamic power transmission.

Unique characteristics

- Hydrodynamic power transmission is wear-free.
- The service life of the Vorecon spans many decades and is, in general terms, more than 3 times longer than that of variable frequency drives (VFD).
- The mean time between failures (MTBF) is 48 years.
- The overall efficiency of a drive system equipped with Vorecon is up to 2 % better than that of an electric variable speed drive.
- A single aggregate for handling speed control, speed increase and oil supply.

Driveline with Vorecon, power transmission 1 – 50 MW




Consider both
the visible
and the hidden
costs

Reduce costs by using the Vorecon Total Cost of Ownership (TCO)

No matter whether you build, operate, design or modernize your drive systems, there are always two common goals: high equipment availability and reduced overall operating costs. Vorecon helps you to achieve this very effectively.

Drive solutions

Are you planning a project with variable speed drive? Please contact us and we can look for the best solution together. Jointly, we can consider all of the costs incurred over the planned system service life. Rather than telling you how to arrange the calculation, we prefer to work through it with you as a team.

TCO in the iceberg model

	Cost factors	Drive system fitted with Vorecon
Visible costs	CAPEX	Cost efficient
	Commissioning	Low costs – short time
Hidden costs	Infrastructure	Low costs
	Energy	Typical low costs – high efficiency
	Space	Low costs
	Maintenance and repair	Significant low costs – high reliability
	Standstill	Significant low costs – high availability
	End-of-life	Low costs – almost 100 % recycable

Even very unfavorable external influences such as heat, cold, moisture or offshore conditions hold up our products reliably – and for a very long time.

Intelligent drive control

Applications

The Vorecon is ideal for variable speed drive applications in power ranges from 1 to over 50 MW in the oil and gas industry, as well as in thermal power plants.

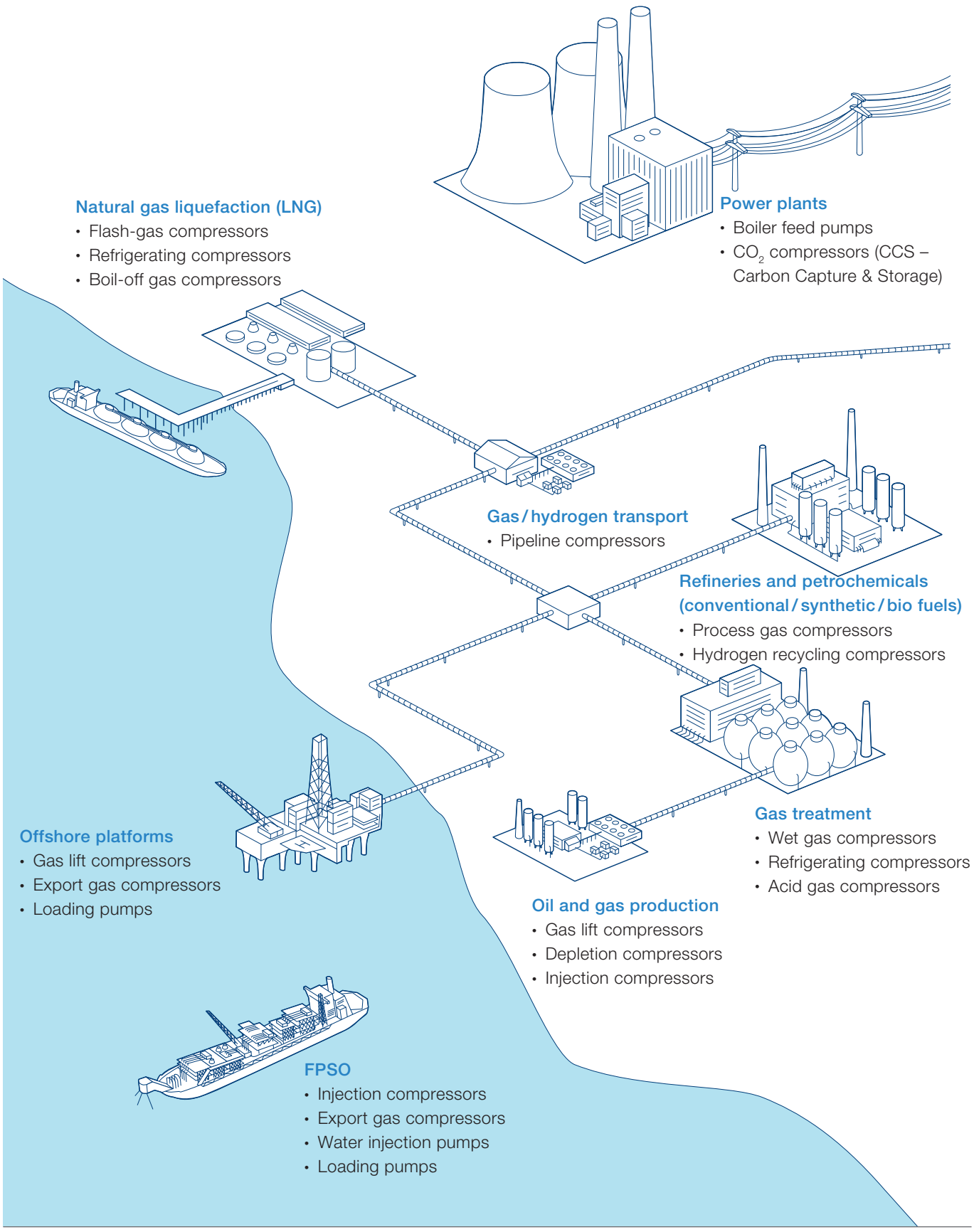
Energy efficiency

Speed control of pumps, compressors or blowers result in significant energy savings compared to flow control methods with fix constant speed. Replacing a constant speed drive system with a variable speed Vorecon system can pay for itself in a few years of operation. Replacement of gas or steam turbines with a Vorecon system will pay for itself in less than a year.

Productivity

The robust Vorecon, with its characteristic reliability, provides the basis for your system to achieve high productivity. And this applies anywhere in the world – even under extreme environmental conditions.

The Vorecon as variable speed drive in the oil and gas industry, as well as in thermal power plants



Setting the highest standards
The benefits of the Vorecon

Power from

1–50 MW

2%

Higher overall efficiency than that of electric variable speed drive systems.

More than

700

drives worldwide.

Controlling speeds up to and exceeding

20 000 rpm

Unbeatable reliability of

99.98 %

48 years

mean time between failures (MTBF).

3x

longer service life than a variable frequency drive (VFD).

Reduction of consumption and CO_2 emissions by

50 %

by replacement of steam / gas turbines with electrical drivers.

Our Vorecon – your advantage

With the Vorecon, you avoid costly downtime so overall your system is more productive. At the same time, you use less energy and installation space while enjoying both low investment and maintenance costs.

Productivity

+ Your system can run uninterrupted by unscheduled outages and downtime; your overall process productivity is increased.

Why? We combine hydrodynamic power transmission with mechanical parts designed for a long life. The mean time between failures (MTBF) of all Vorecons in operation is 48 years.

Reliability, MTBF

Machines considered	201
Operating hours	8 065 000 hours
Reliability	**99.98 %**
MTBF	**≈ 48 years**

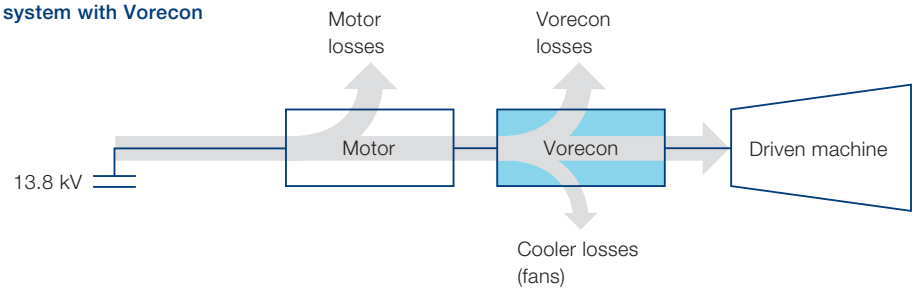
Energy

+ Speed control saves energy. You reduce your operating costs and lower CO2 emissions.

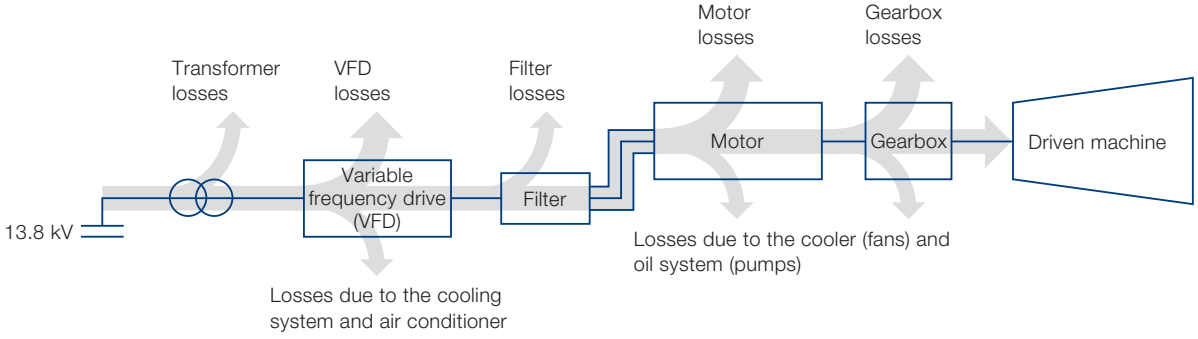
Why? The Vorecon operates based on the principle of power splitting. This permits the Vorecon to achieve an efficiency of more than 95 %. Drive systems featuring the Vorecon have fewer added accessories requiring energy. The result: overall efficiency is up to 2 % greater than that of electric variable speed drive systems.

Comparison of overall efficiency

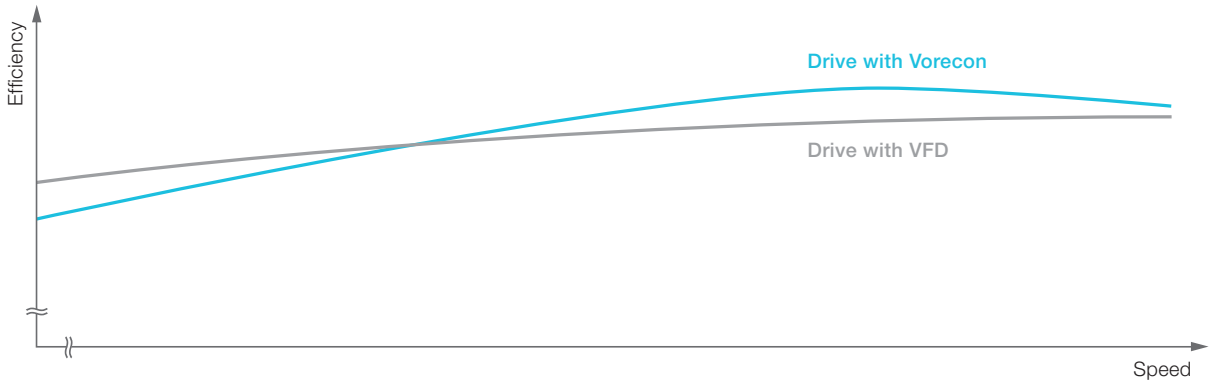
Drive system with Vorecon



Electric variable speed drive system



Look at the overall efficiency of the system



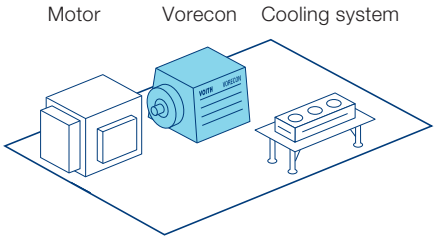
Installation space

+ The Vorecon saves on installation space and reduces the overall system weight. This saves on overall construction costs – quite significantly in the case of space-critical offshore platforms and FPSO vessels.

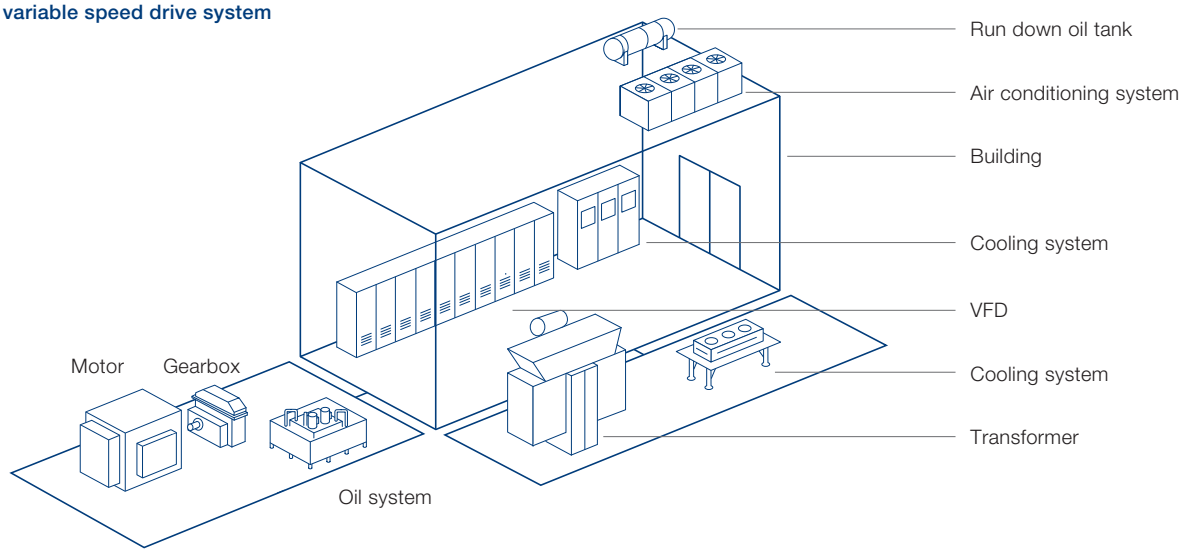
Why? The Vorecon is an aggregated system comprising a speed control system, gearbox and oil supply. Thus, the Voith drive system needs up to 68 % less installation space than comparative electronically speed controlled drive systems. The reduced space required for installation means much lower infrastructure costs, particularly in offshore applications.

Comparison of required installation space

Drive system with Vorecon



Electric variable speed drive system

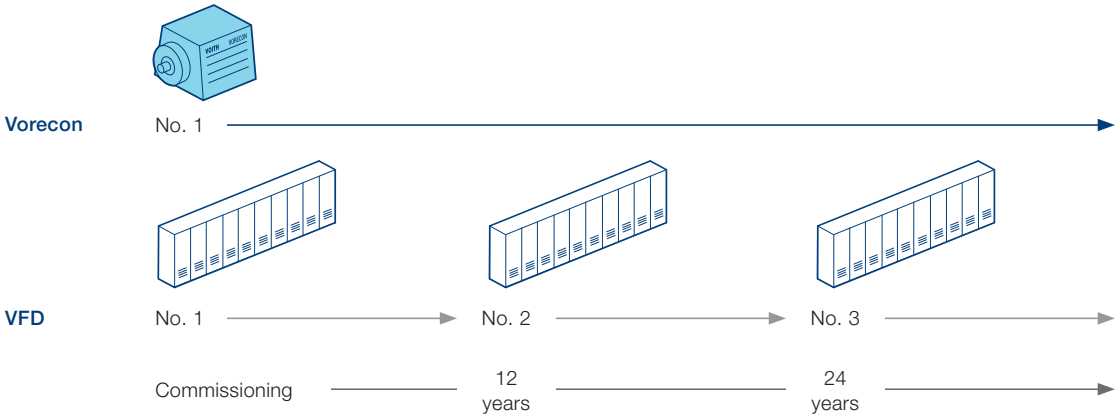


Service life

+ The Vorecon is a product built for the long term. It gives you long-term planning security – over many decades.

Why? Hydrodynamic power transmission is wear-free. The mechanical power transmitting components are robust and designed for a long service life. Compared with a variable frequency drive (VFD), the service life of the Vorecon is more than three times as long.

Comparison of service life

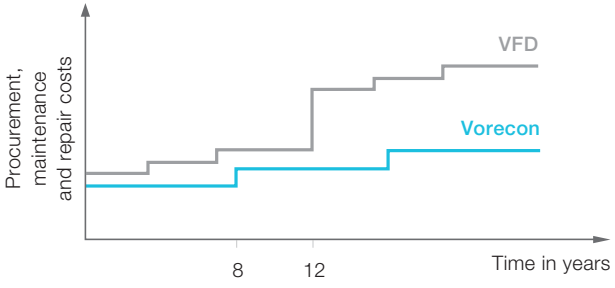


Maintenance and repair

+ Maintenance costs are low and service outages can be planned and scheduled in advance. You reduce both the downtime and operating costs of your equipment.

Why? Our system components don‘t just have a long service life. We also manufacture our systems to be low-maintenance. This, combined with overhaul intervals of 8 years, ensures both low operating costs and high availability.

Comparison of maintenance and repair costs

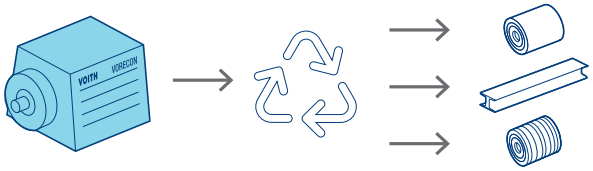


End-of-Life

+ Sustainability matters – more than ever before.

Why? Besides its high efficiency a Vorecon comes with a long lasting construction. This saves resources and at the end of a long operation time it can be recycled by almost 100 %. The units comprise primarily of metal.

Very high recycling ratio



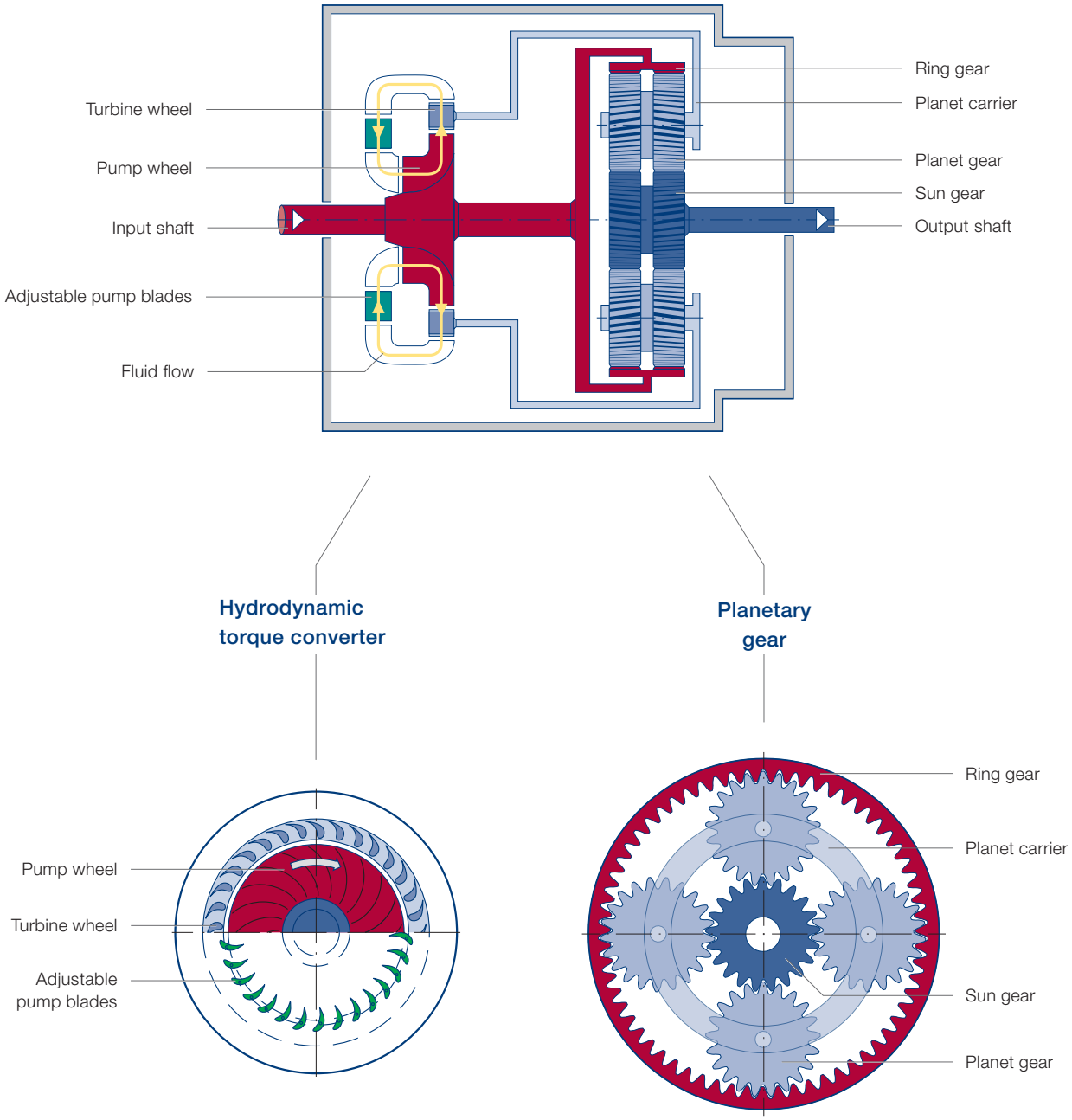
Clever combination of hydrodynamics and mechanics
Function

The basic components of the Vorecon are a hydrodynamic torque converter coupled with a planetary gear. The planetary gear is designed as a superimposing gear. The torque converter acts as the control unit.

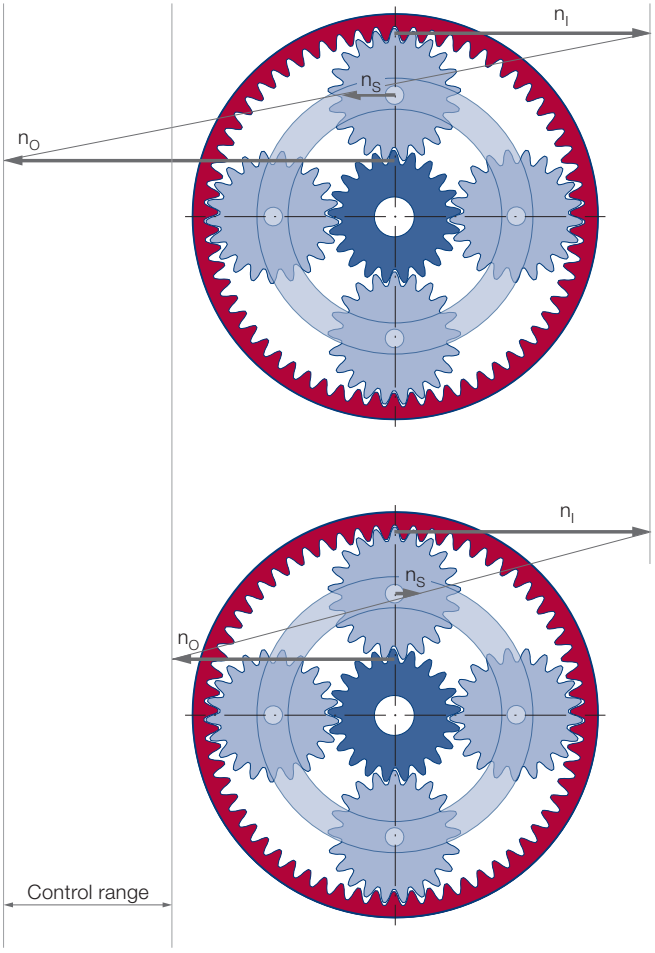
Design and function

- In the driveline, the Vorecon is located between the drive motor and the driven machine.
- The input shaft is connected to the planetary gear and the torque converter.
- A large proportion of the input power is thus transmitted to the planetary gear directly, mechanically and almost loss-free.
- The pump wheel of the torque converter is linked to the input shaft and branches off just a small proportion of the input power.
- An oil flow transmits this power from the pump wheel to the turbine wheel of the torque converter (hydrodynamic power transmission).
- The power branched off is transmitted to the super-imposing planetary gear via the turbine wheel.
- The direct transmitted power and the power from the torque converter are added together in the planetary gear.
- The planet gears transmit the accumulated power to the sun gear, the output shaft and, finally, to the driven machine.
- Adjustable pump blades control the flow of fluid in the torque converter and determine the speed of the turbine wheel. This allows the speed of the driven machine to be infinitely adjusted.

Basic design of the Vorecon



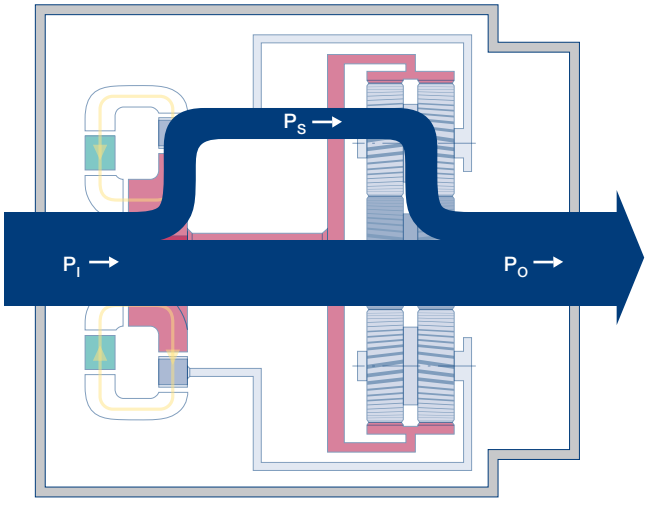
The superimposition principle



- The input speed corresponds with the motor speed and is constant.
- The continuously adjustable pump blades in the hydrodynamic torque converter determine the variable superimposition speed.
- The output speed results from the vectorial addition of the input and superimposition speed.

n_I: Input speed
n_S: Superimposition speed
n_O: Output speed

The principle of power splitting in the Vorecon



- In the Vorecon, the largest proportion of the input power flows directly from the input shaft to the output shaft.
- The hydrodynamic torque converter branches off a small proportion of the input power.
- The power being branched off is then reapplied to the output shaft through the superimposing gear.
- The Vorecon achieves high efficiency thanks to the principle of power splitting.

P_I: Input power
P_S: Superimposition power
P_O: Output power

Finding the best solution
Vorecon product range

The Vorecon product range comprises various types and configurations, enabling us to respond to your requirements. Together, we choose the Vorecon that best matches your drive and system.

Vorecon types

Type	What it offers	Application Compressors	Application Pumps
RWE-NX	Best Total Cost of Ownership, upgradable basic gear	✔	
RWC-NX	Modular and no-load starting	✔	
RWE	Economical and compact	✔	✔
RWC	For starting up the motor load-free	✔	✔
RW	For a wide control range		✔
RWE-M	Economical and modular	✔	✔
RWC-M	The economically-priced modular version for starting up the motor load-free	✔	✔

Lowest Total Cost of Ownership, upgradeable basic gear
Type RWE-NX

Function

- During the starting sequence the torque converter is filled in the beginning and then branches off a minor portion of the input power.
- The power branched off is superimposed in the revolving gear.
- The driven machine is accellerated to minimum speed.
- The speed control is applied using the adjustable pump blades in the torque converter.

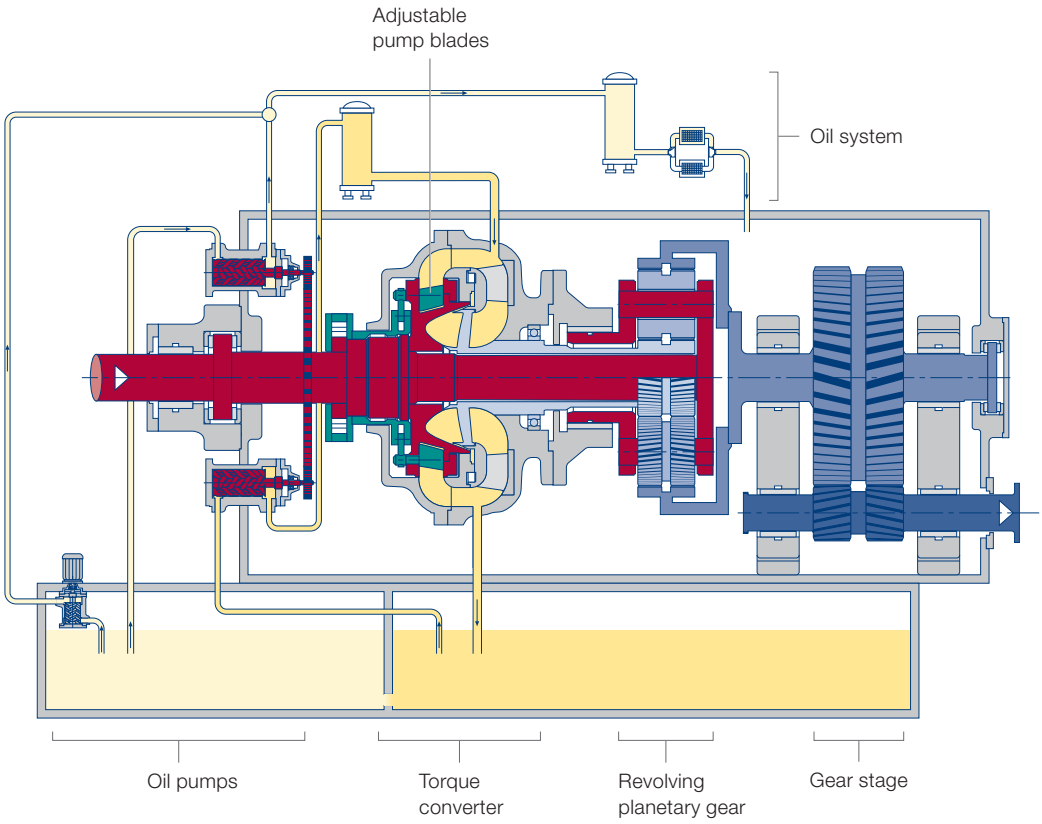
Special benefits

+ The Vorecon RWE-NX is a cost effective and simple solution for high speed turbo compressors.
+ The horizontal split housing allows service to be carried out quickly and effectively, which is an important aspect for offshore systems.
+ The consequently modular design allows interchangeability among different units.

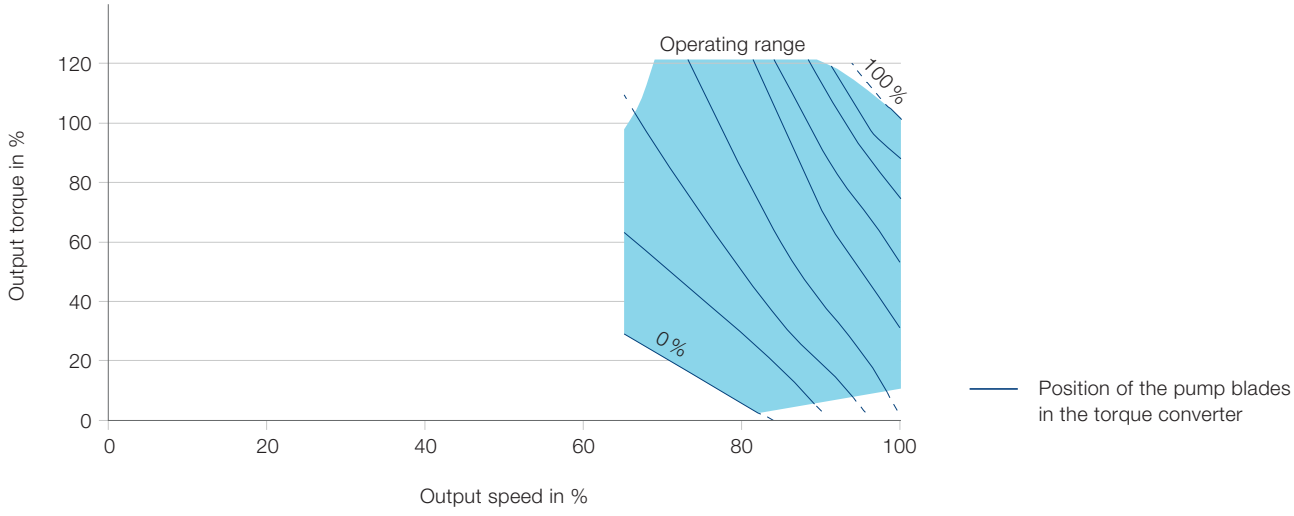
Technical data

Rated power	2 – 10 MW
Input speed	1 500 or 1 800 rpm
Rated output speed	3 600 – 16 000 rpm
Speed range	67 % – 105 %
Installation	Ex & Non-ex

RWE-NX sectional diagram



RWE-NX characteristic curves



Modular and no-load starting
Type RWC-NX

Function

- During the starting sequence the filling of the torque converter is delayed by means of a filling valve. The main motor gets to full speed with lowest load torque.
- At rated speed of the main motor the torque converter is filled. The torque converter branches off the required power for accelleration of the driven machine.
- The power branched off is superimposed in the revolving gear.
- After reaching minimum speed the speed control is applied using the adjustable pump blades in the torque converter.

Special benefits

+ The drive motor starts unloaded. Therefore the driven machine can be started at weak grid conditions even if high inertia and high suction pressure are existent.

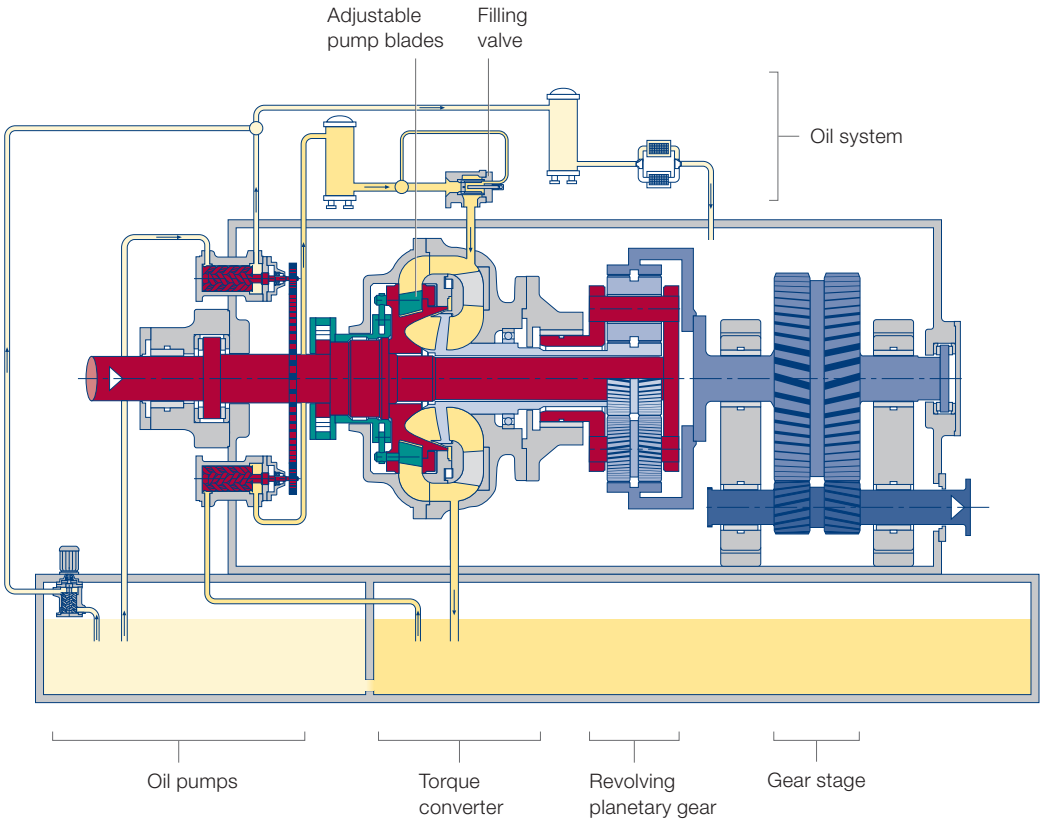
+ The horizontal split housing allows service to be carried out quickly and effectively, which is an important aspect for offshore systems.

+ The consequently modular design allows interchangeability among different units.

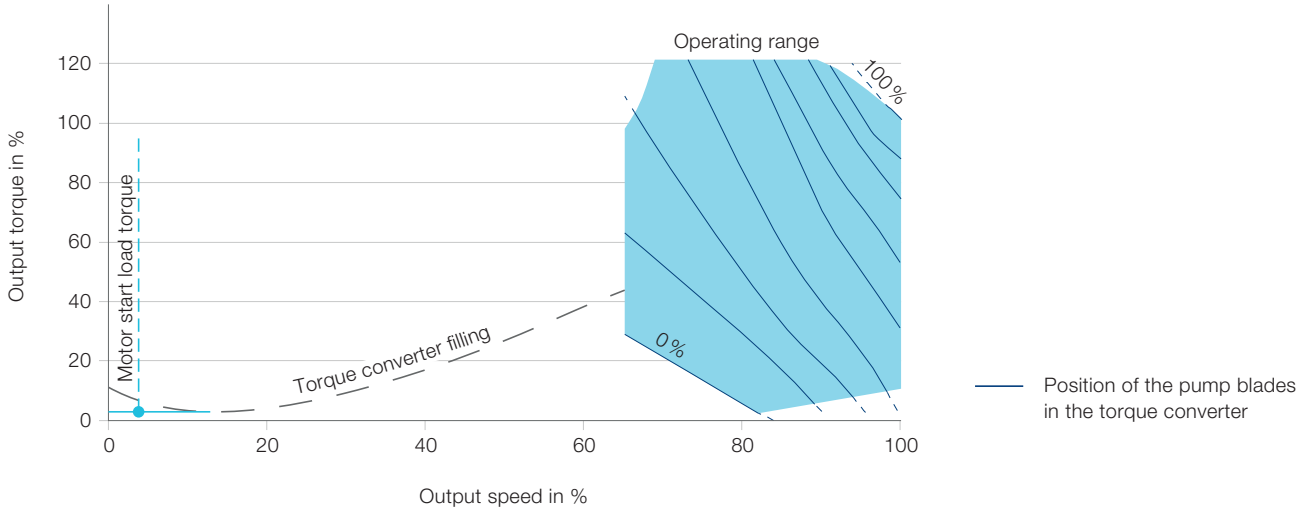
Technical data

Rated power	2 – 10 MW
Input speed	1 500 or 1 800 rpm
Rated output speed	3 600 – 16 000 rpm
Speed range	67 % – 105 %
Installation	Ex & Non-ex

RWC-NX sectional diagram



RWC-NX characteristic curves



Economical and compact
Type RWE

Function

- The torque converter fills immediately after starting the motor and branches off a small proportion of the input power.
- The driven machine is accelerated to minimum speed.
- A fixed planetary gear transmits the power branched-off to the revolving planetary gear (superimposing gear).
- The revolving planetary gear adds up the power again.
- Speed control is applied using the adjustable pump blades in the torque converter.
- The integrated oil system fills the torque converter with operating oil. At the same time, the Vorecon supplies the drive motor and the driven machine with lubricating oil.

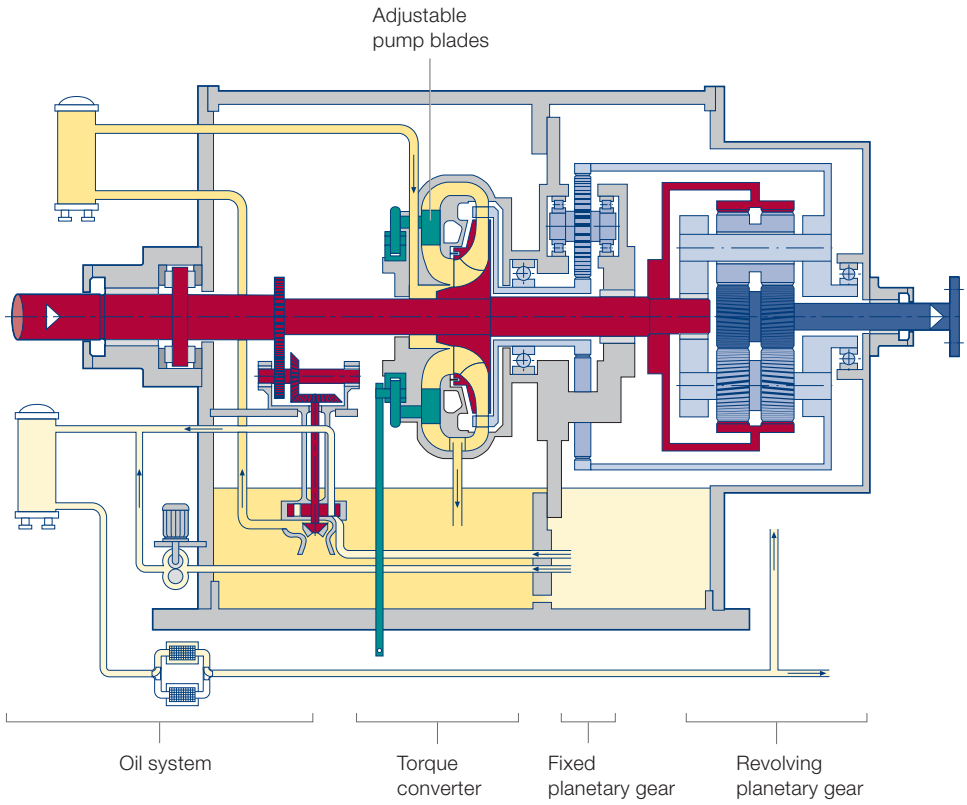
Special benefits

+ The Vorecon RWE is a cost-effective and simple solution for high-speed turbo compressors and boiler feed pumps with reduced control range.

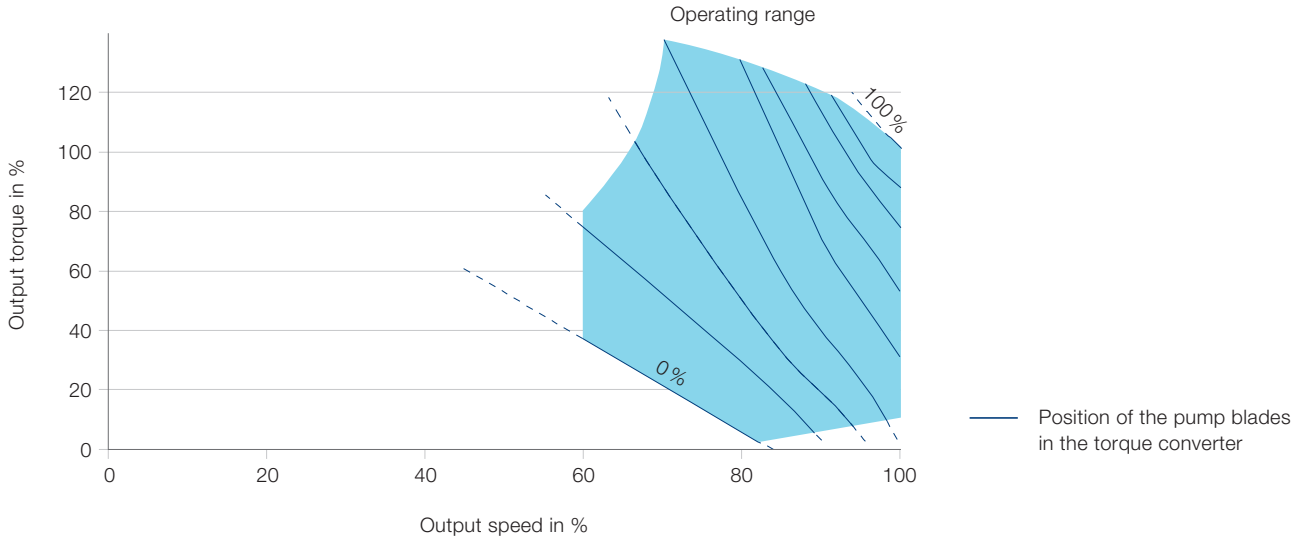
Technical data

Rated power	5 – 18 MW
Input speed	1 500 or 1 800 rpm
Rated output speed	5 000 – 20 000 rpm
Speed range	60 % – 105 %
Installation	Ex & Non-ex

RWE sectional diagram



RWE characteristic curves



For starting up the motor load-free
Type RWC

Function

- When starting the drive motor, the hydrodynamic coupling is drained and the clutch is open. Therefore, the drive motor and the driven machine are decoupled, with the motor started up essentially load-free.
- The hydrodynamic coupling is filled after the drive motor is running, and begins to transmit power. The driven machine is then gently accelerated to minimum speed.
- The clutch closes and locks up the hydrodynamic coupling.
- From then on, the Vorecon RWC operates in the same way as the Vorecon RWE. The speed control of the driven machine is applied using the adjustable pump blades in the torque converter.

Special benefits

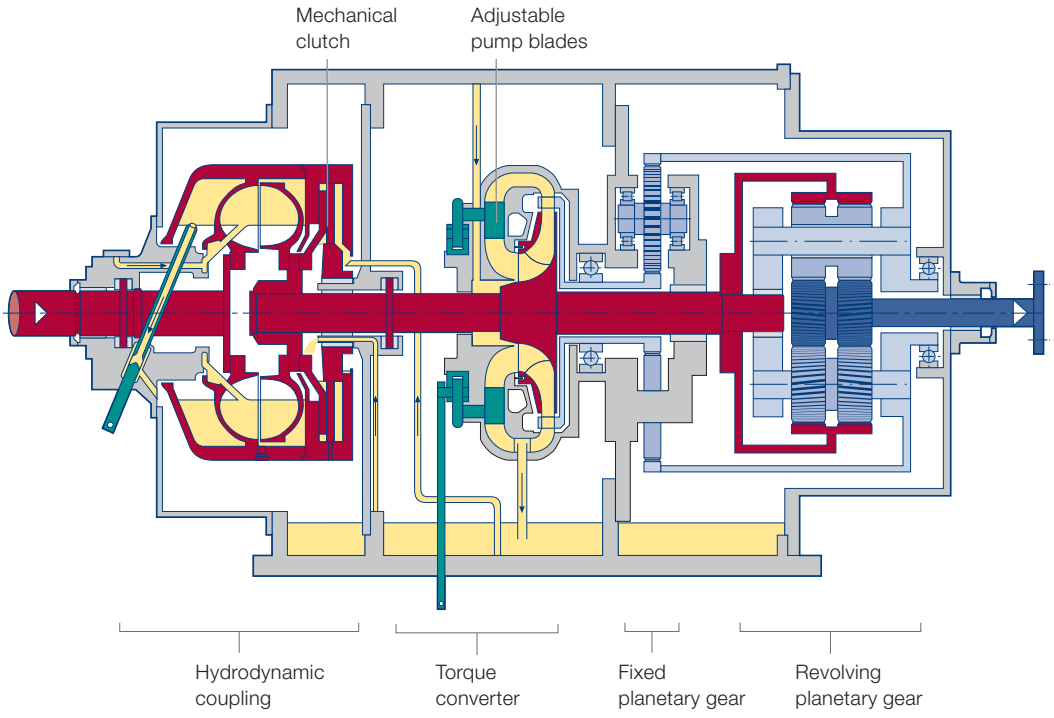
+ The drive motor starts unloaded. The driven machine can also be started under weak power grid conditions.

+ Driven machines with a high mass moment of inertia are easier to start-up.

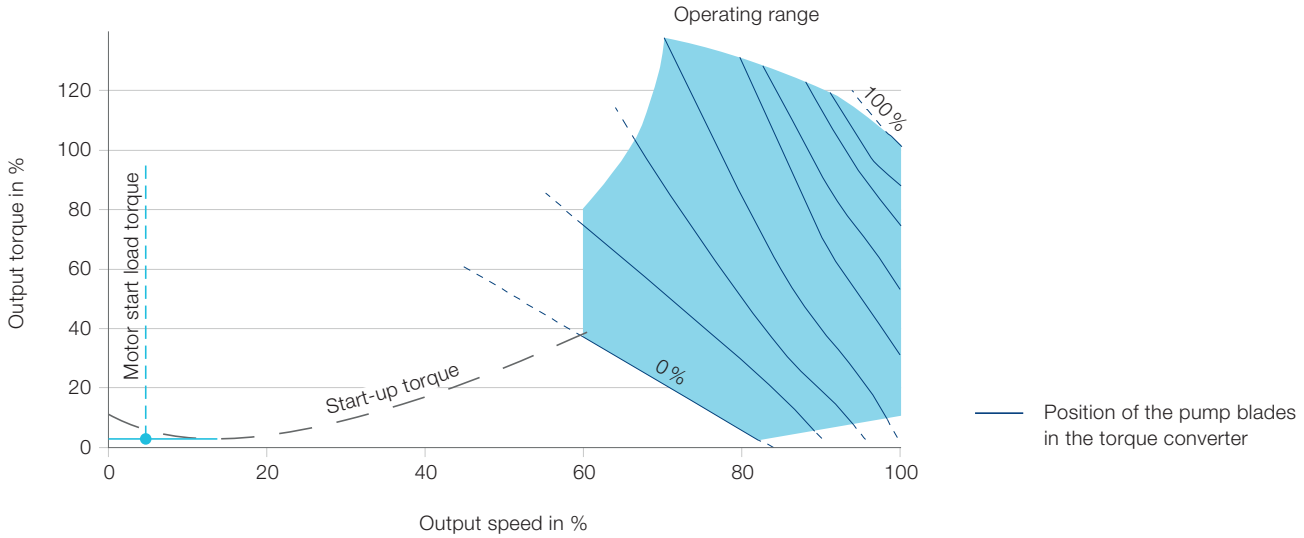
Technical data

Rated power	5 – 50 MW
Input speed	1 500 or 1 800 rpm
Rated output speed	5 000 – 20 000 rpm
Speed range	60 % – 105 %
Installation	Ex & Non-ex

RWC sectional diagram



RWC characteristic curves



For a wide control range
Type RW

Function

- The hydrodynamic variable speed coupling is drained and the clutch is open. Therefore, the drive motor and the driven machine are decoupled, with the motor started up essentially load-free.
- In the lower control range, the hydrodynamic variable speed coupling is filled and transmits the power. The torque converter is disengaged and thus is non-operational in this control range. The speed control of the driven machine is achieved via the adjustable scoop tube which determines the filling level of the operating oil in the coupling and therefore, the power transmitted.
- The retarder (hydrodynamic brake) is filled with oil and keeps the fixed planetary gear at a low speed.
- To achieve the upper speed range, the clutch closes and locks up the variable speed coupling.
- The retarder is drained and the torque converter is filled.
- From then on, the Vorecon RW operates in the same way as the Vorecon RWE. The speed control of the driven machine is applied using the adjustable pump blades in the torque converter.

Special benefits

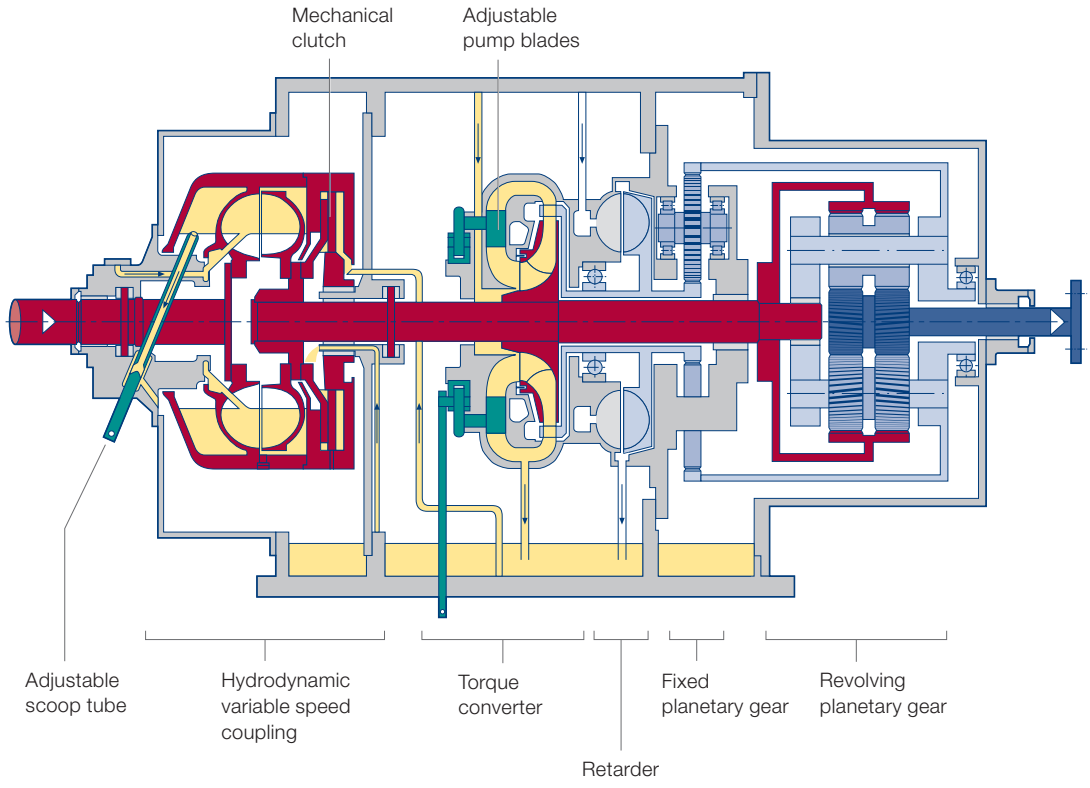
+ The Vorecon RW is the ideal control combination for driven machines with a wide control range – mainly pumps and blowers.

+ In addition, the Vorecon RW offers the same advantages as the Vorecon RWC: no-load motor start-up and easy start-up of driven machines with a high mass moment of inertia.

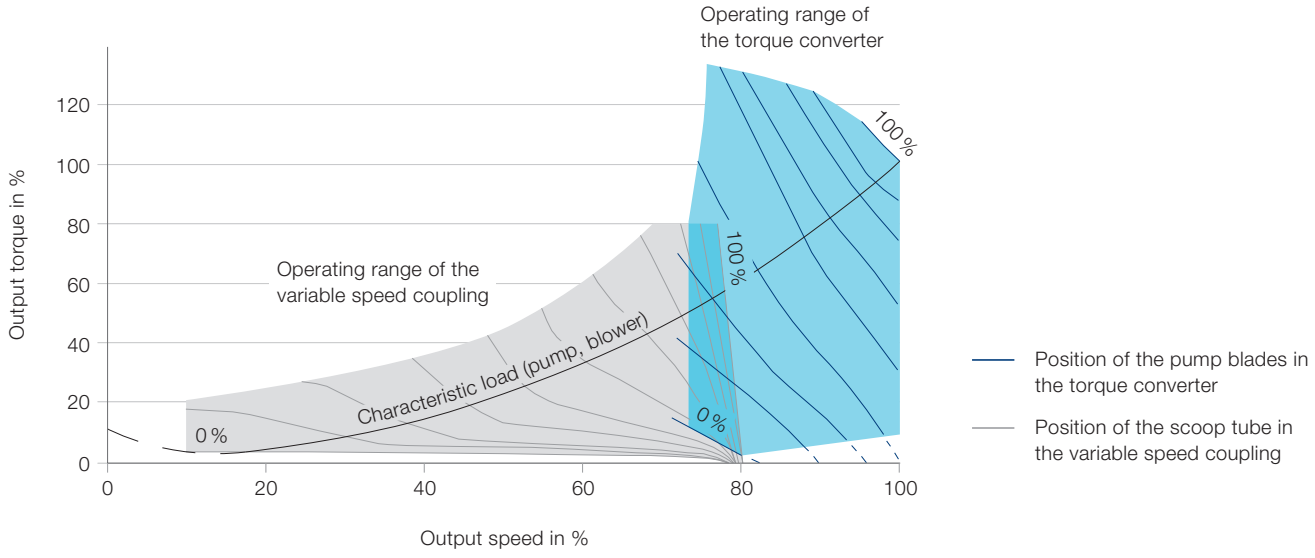
Technical data

Rated power	10 – 45 MW
Input speed	1 500 or 1 800 rpm
Rated output speed	5 000 – 20 000 rpm
Speed range	20 % – 105 %
Installation	Ex & Non-ex

RW sectional diagram



RW characteristic curves



Economical and modular
Type RWE-M

Function

- The torque converter fills immediately after starting the motor and branches off a small proportion of the input power.
- The driven machine is accelerated to minimum speed.
- A stationary gear transmits the power branched-off to the revolving planetary gear.
- The revolving planetary gear adds up the power again.
- The speed control is applied using the adjustable pump blades in the torque converter.

Special benefits

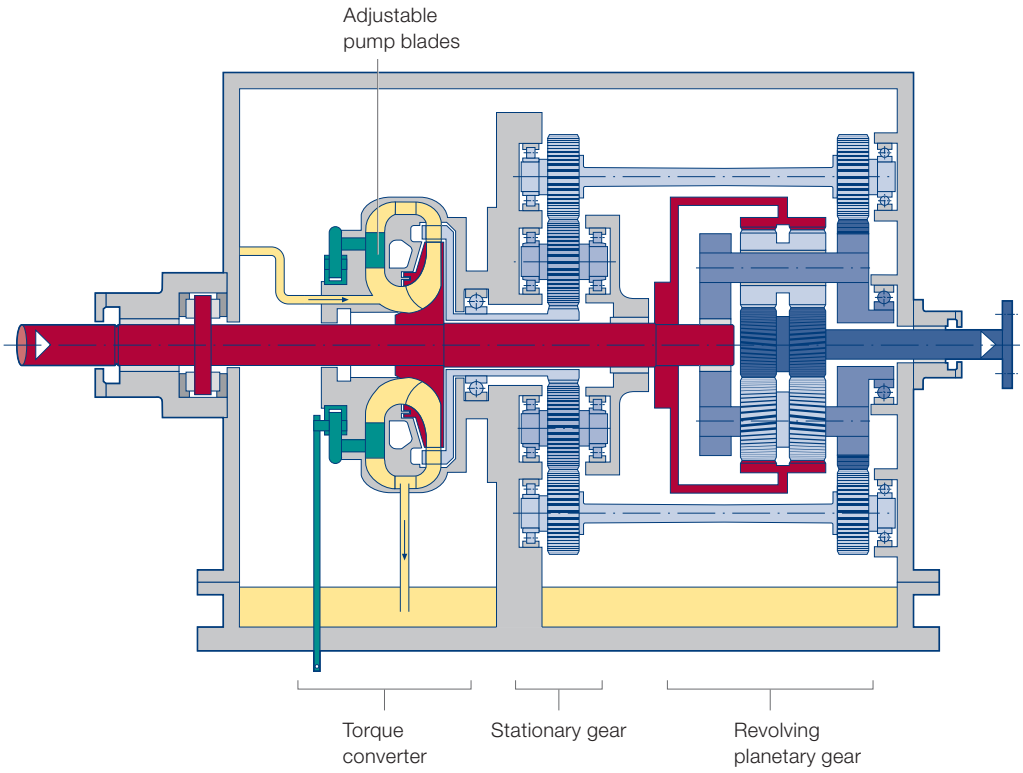
+ The Vorecon RWE-M is a cost-effective and simple solution for high-speed turbo compressors and boiler feed pumps with reduced control range.

+ The modular design with horizontally split housing allows service work to be carried out quickly and effectively, which is an important aspect for offshore systems.

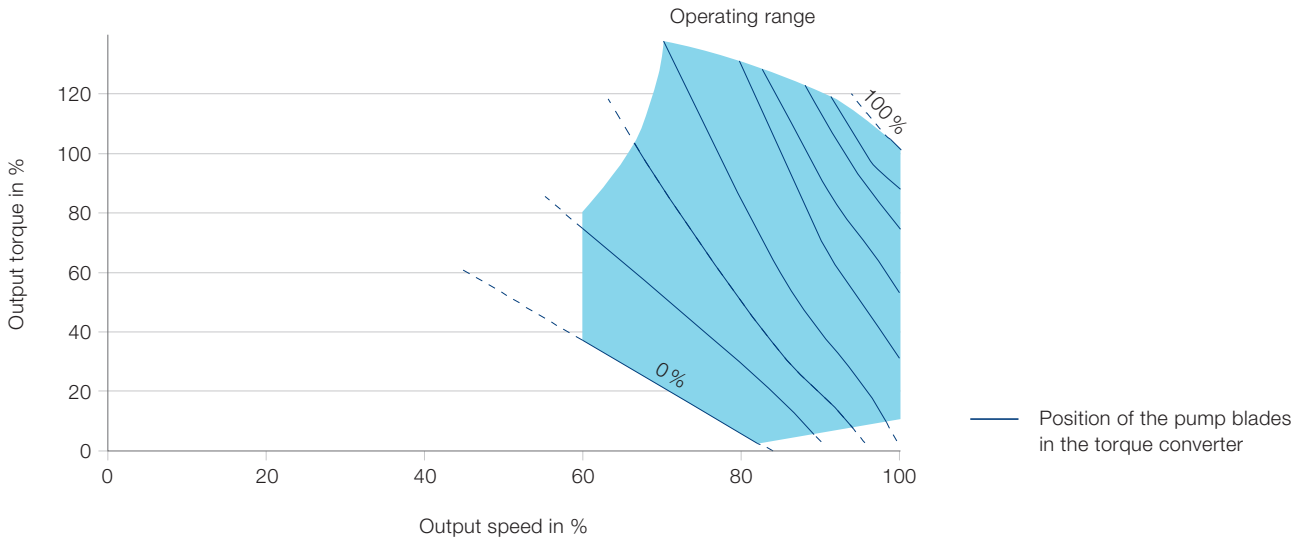
Technical data

Rated power	5 – 22 MW
Input speed	1 500 or 1 800 rpm
Rated output speed	5 000 – 20 000 rpm
Speed range	60 % – 105 %
Installation	Ex & Non-ex

RWE-M sectional diagram



RWE-M characteristic curves



The economically-priced modular version for starting up the motor load-relieved
Type RWC-M

Function

- When starting the motor, the hydrodynamic couplings are filled and the torque converter is drained. The hydrodynamic couplings thus connect the stationary gear with the input shaft. This results in a very low speed on the output shaft and the driven machine takes on only little power. This relieves the motor when starting up.
- After starting up the motor, the hydrodynamic couplings are emptied and the torque converter is filled. The driven machine is accelerated to minimum speed.
- From then on, the Vorecon RWC-M operates in the same way as the Vorecon RWE-M. The speed control of the driven machine is applied using the adjustable pump blades in the torque converter.

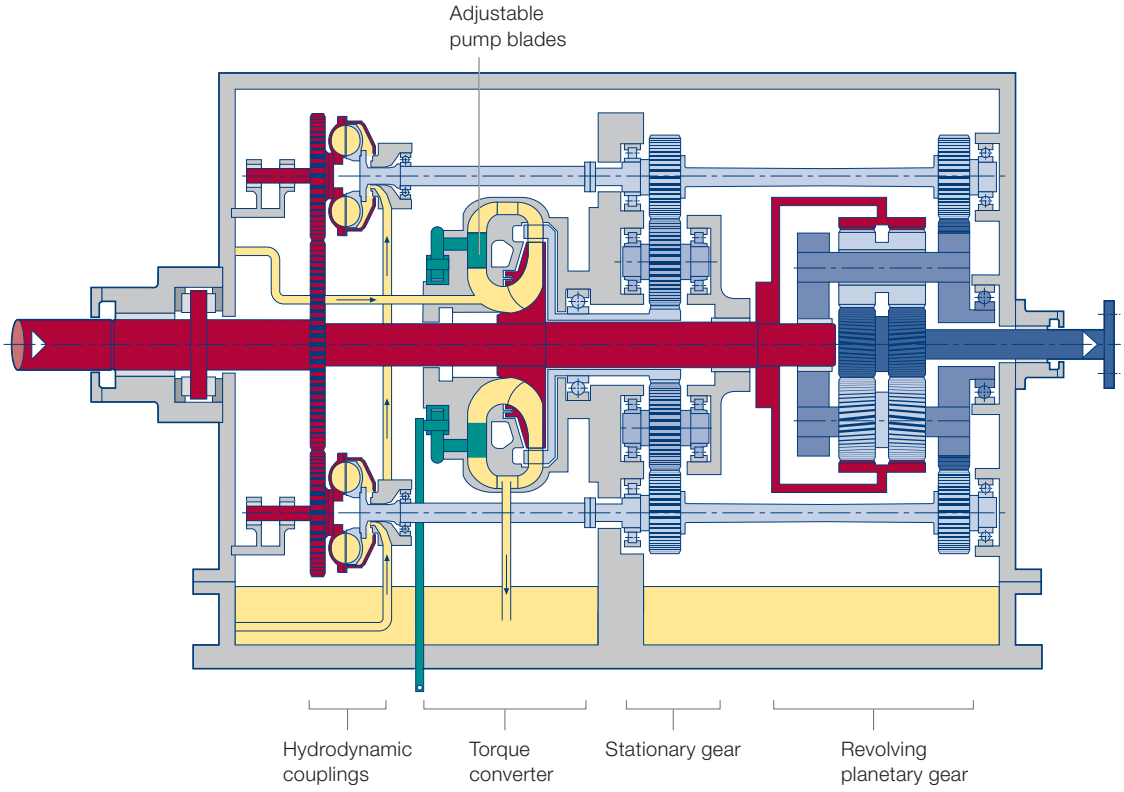
Special benefits

+ The drive motor starts unloaded. The driven machine can also be started under weak power grid conditions.
+ Driven machines with a high mass moment of inertia are easier to start-up.
+ The modular design with horizontally split housing allows service work to be carried out quickly and effectively, which is an important aspect for offshore systems.

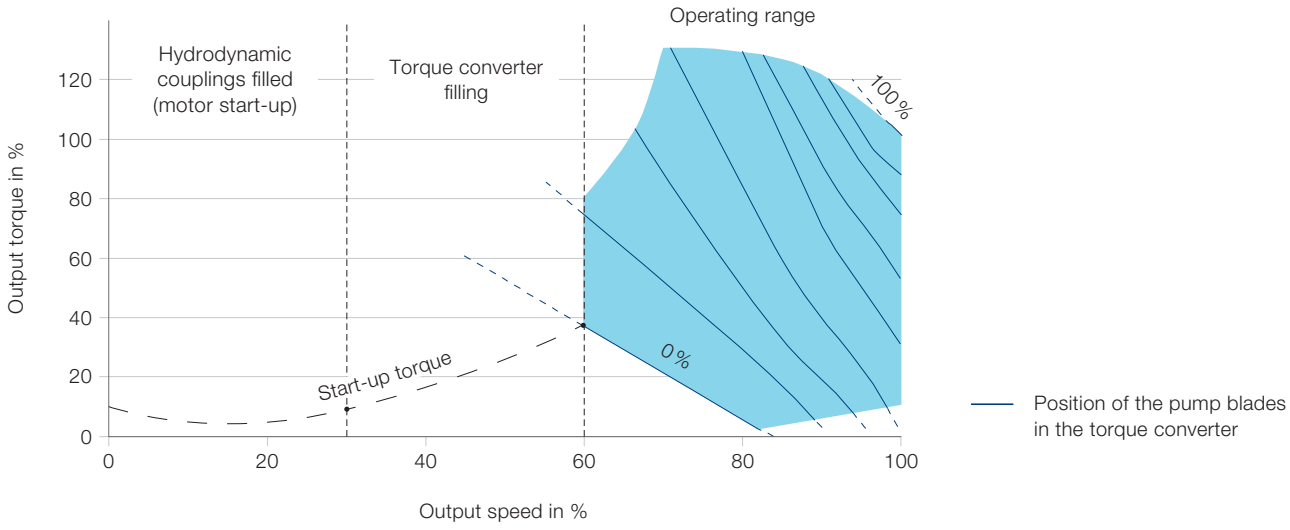
Technical data

Rated power	10 – 22 MW
Input speed	1 500 or 1 800 rpm
Rated output speed	5 000 – 20 000 rpm
Speed range	60 % – 105 %
Installation	Ex & Non-ex

RWC-M sectional diagram

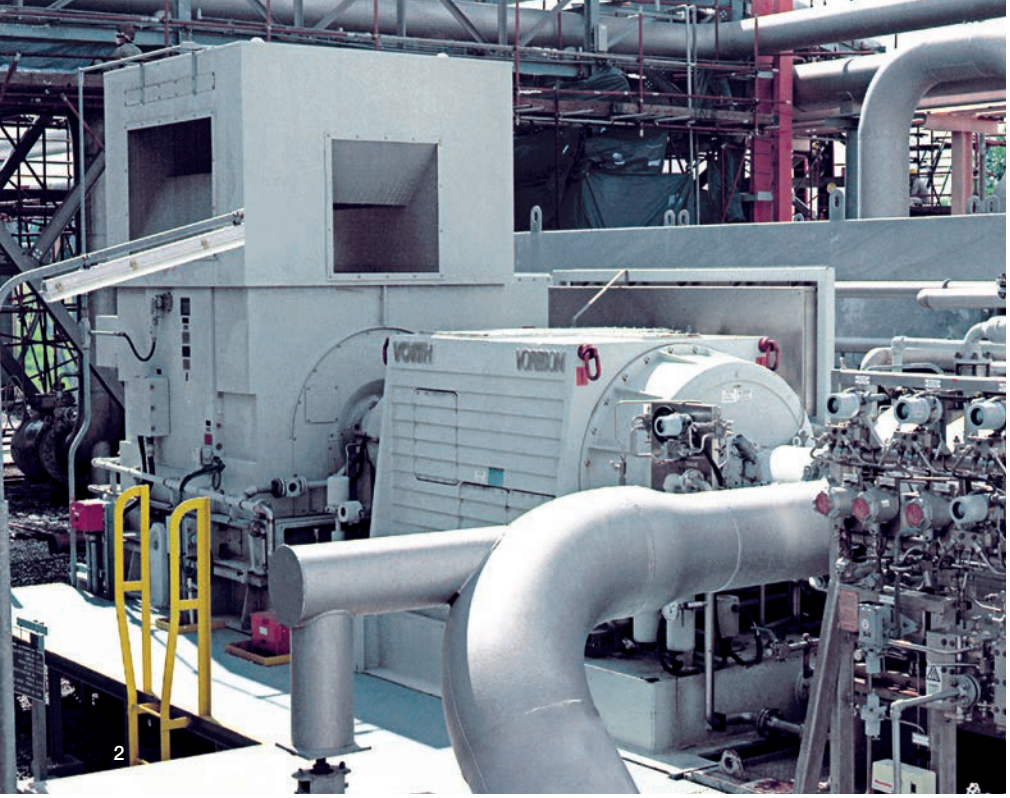


RWC-M characteristic curves



1

Drive solutions that inspire References



2

1 **Type: RWC 15-14.5 F 9**
Driven machine: depletion compressor
Country: Oman

2 **Type: RWE 12 F 7**
Driven machine: pipeline compressor
Country: Thailand

1 Defying the desert conditions

Searing daytime heat with temperatures exceeding 50 °C, sandstorms, no enclosed building, and as if that weren‘t enough, potentially explosive environment. None of these are a special challenge for the Vorecon. What other drive system could make such a claim?

Our customer uses this Vorecon to control a turbo compressor in their gas production facility. They have been trusting Voith drive solutions for decades with more than 30 hydrodynamic variable speed drives are in use in oil and gas production throughout Oman.

2 Withstanding tropical environments

High temperatures combined with high humidity are typical of tropical climates. In electronic devices, this leads to a significantly increased failure rate and to reduced service life. Consequently, electronic variable speed drives using VFD require an enclosed building with expensive air conditioning that results in high energy costs.

The operator of this natural gas processing plant put their faith in the Vorecon. They rely on the benefits of the hydrodynamic power transmission: long-lasting, robust and, on top of that, low investment and operating costs. They were particularly impressed with the possibility to simply install the Vorecons outdoors in a harsh and potentially explosive environment.

3

3 Type: RWE
Driven machine: turbo compressor
Country: Brazil

4 Type: RWC 12-12 F 8
Driven machine: pipeline compressor
Country: USA

5 Type: RWC 16-15 F 11
Driven machine: pipeline compressor
Country: USA

3 Exploiting offshore treasure

FSO, FPSO, FLNG, FSRU – These abbreviations stand for vessels that store, process and transship crude oil or natural gas on-location during offshore exploitation. On these vessels, the requirements of machines and systems are particularly demanding. The environment is potentially explosive and corrosive. Roll&pitch movements have to be considered. The installation space on vessels is extremely valuable and the weight of the system must be kept as low as possible. Downtimes during production are highly expensive which is why only machines are used that have a much higher verified availability. Controlling offshore pumps and compressors – the Vorecon is just right for the job.

For developing offshore fields Petrobras decided to use the Vorecons on several FSPOs for CO_2 injection, main and export compressor trains for natural gas. Since ten years the machines are operating to the customer's complete satisfaction. In total more than one hundred units are in operation at a power range of 8 MW and more.

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4 Playing a part in a success story

Natural gas is the cleanest fossil fuel. This source of energy is sufficiently available in North America. In the USA, an extensive pipeline system transports the gas from the production areas to the large consumption regions. The safe transport of the gases and reliable consumer supply is the main focus of the pipeline company.

The operators of the gas pipelines frequently choose the Vorecon as the drive solution in the pipeline compressor stations. Vorecon isn‘t just present in new stations. When retrofitting gas turbines and electronic variable speed drives, the Vorecon fares well with its significantly higher availability and low life-cycle costs.

5 47 000 horses strutting out

Power is what they need here! This pipeline compressor station pumps gas through one of the largest pipelines in North America: 16 900 km long and with capacity of almost 100 billion cubic meters per year. This amount of gas would be enough to meet the needs of 20 million households.

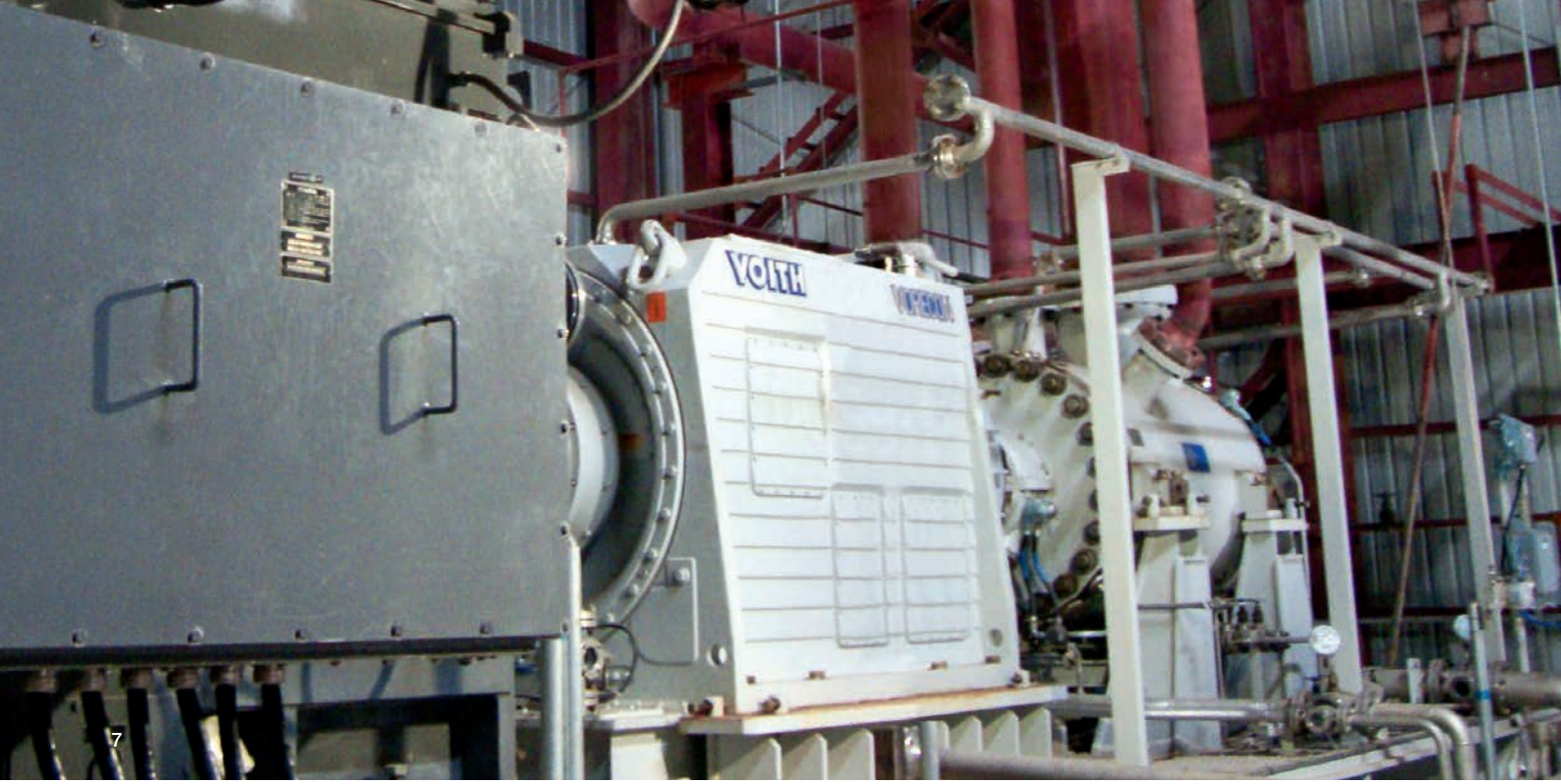
As the capacity of the pipeline was about to be expanded over the next few years, this compressor station needed to be modernized and upgraded. Up until then, four reciprocating compressors and a turbo compressor had been operated in the station. A high-speed electric motor with magnetic bearings had driven the turbo compressor and a VFD had controlled the speed. Now everything is a lot simpler and more reliable: an electric motor, a Vorecon and a compressor do the whole job.

6

6 Delivering natural gas to the “Sunshine State”

Bright sunshine and fantastic beaches – this is how we all imagine Florida to be. Natural gas is the primary source of energy for this wonderful state. A large pipeline system brings the gas to Florida from the production areas in Texas, Louisiana, Mississippi and Alabama.

The Vorecon is also now installed here and was delivered as a package: motor and Vorecon mounted together on a base frame with integrated oil supply system. Our customer originally intended to use VFDs but at the last moment, discovered the Vorecon. The customers initial thought was that the Vorecon would be too expensive and maintenance-intensive. We were delighted to disprove that thought and now have another satisfied Vorecon customer!



7

6 Type: RWC 710 M 9
Driven machine: pipeline compressor
Country: USA

7 Type: RWE 12 F 6
Driven machine: refrigerating compressor
Country: China

7 Safe liquefaction of natural gas

Global demand for liquefied natural gas (LNG) has grown rapidly in recent years – and the trend is expected to continue in the coming years. A critical success factor here is that the plants operate reliably and cost-efficiently.

That is why our customer Hanas relies on Voith solutions in its natural gas liquefaction plant in Yinchuan, China. Since April 2012, a Vorecon RWC has been running here – already the second Vorecon responsible for liquefying natural gas in the drive train of the main refrigeration compressor. But what were the reasons for Hanas to rely on Voith technology once again? For one thing, the extraordinary reliability that ensures that the plant always runs smoothly. On the other hand, the Vorecon RWC scores with low operating and maintenance costs and, due to the settle-out pressure applied, has very good starting behavior at high initial loads.

8

8 Putting a package together

Our customer is an energy company involved in the entire value-added chain of the oil industry. The company operates a number of refineries in Spain with a processing capacity of more than a half a million barrels of oil a day. Since the 1980s, hydrodynamic variable speed drives from Voith have been used at the refineries.

As a recycle gas compressor was being upgraded for a number of years, we received an inquiry concerning the drive system. Our customer placed great value on the fact that the entire drive was supplied by a single source. They wanted a „Plug & Play“ solution and that is exactly what we were able to offer them; Vorecon plus an electric motor mounted on a base frame. Our customer has not regretted their decision to opt for the Vorecon at any time since. This is due in large part to the fact that everything ran smoothly from the start.

8 **Type: RWE 12 F 6**
Driven machine: recycle gas compressor
Country: Spain

9 **Type: RWC 12 NX 60**
Driven machine: refrigeration gas compressor
Country: USA

9 Refrigeration compressor drive for Louisiana refinery

In a refinery near New Orleans, our customer has equipped a refrigeration gas compressor with a VoreconNX. This decision was the kick-off for a series of installations. The VoreconNX used for speed control and mitigating the high start-up load of the heavy compressor was delivered in 2019.

The decision in favor of the VoreconNX was mainly made due to the high reliability of the Vorecon and the modular design of the VoreconNX series, that simplifies maintenance work considerably and makes cost reduction possible when pooling spare parts for the entire fleet of the VoreconNX.

10

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10 Keeping up with time

This driveline with Vorecon is a retrofit solution. A simple and robust drive was needed to replace an outdated steam turbine drive. The customer considered both an electronic variable speed drive with variable frequency drive (VFD) and a solution with variable speed planetary gear from Voith. Voith soon proved to be the solution of choice. The exceptional high availability and minimum installation space turned out to be the decisive criteria.

Our customer operates refineries that are among the most modern and environmentally-friendly worldwide. The environmental compatibility of the products being manufactured are also exemplary. For example, the refineries were the first in the world to produce unleaded petrol. In doing so, the Vorecon has been found to be highly available and efficient when in operation.

11 Almost forgotten already

These Vorecons are running in one of the largest and most modern coal-fired power plants in Germany. All this without drawing any attention to them doing so, for more than 20 years, simply operating according to plan. The Vorecons control the speed of the boiler feed pumps.

The Vorecon had convinced our customer right from the very beginning. In those days, a comparative study with variable frequency drives had already shown that when considering the overall life-cycle costs, the variable speed planetary gear scored considerably better.

10 **Type: RWE 7 F 5**
Driven machine: process gas compressor
Country: Sweden

11 **Type: RW 14-12 F 7**
Driven machine: boiler feed pump
Country: Germany

Data diagnostic system
OnCare.Health Vorecon 2.0

Are you interested in minimizing maintenance costs and increasing the availability of your critical drivetrain? The answer: OnCare.Health Vorecon 2.0

OnCare.Health Vorecon 2.0 is a self-learning data diagnostic that provides machine and operation-specific key performance indicators. It analyzes the machine's condition continuously and predicts future behavior using intelligent algorithms and artificial intelligence.

Benefits

+ Improved machine condition insights with health indicator
+ Energy saving by monitoring the machine's efficiency
+ Quick root cause analysis with remote access
+ Minimizing unplanned downtime risk
+ Time and cost savings ensured with predictive maintenance planning

OnCare.Health Vorecon 2.0

The system learns, monitors, and diagnoses in real-time.

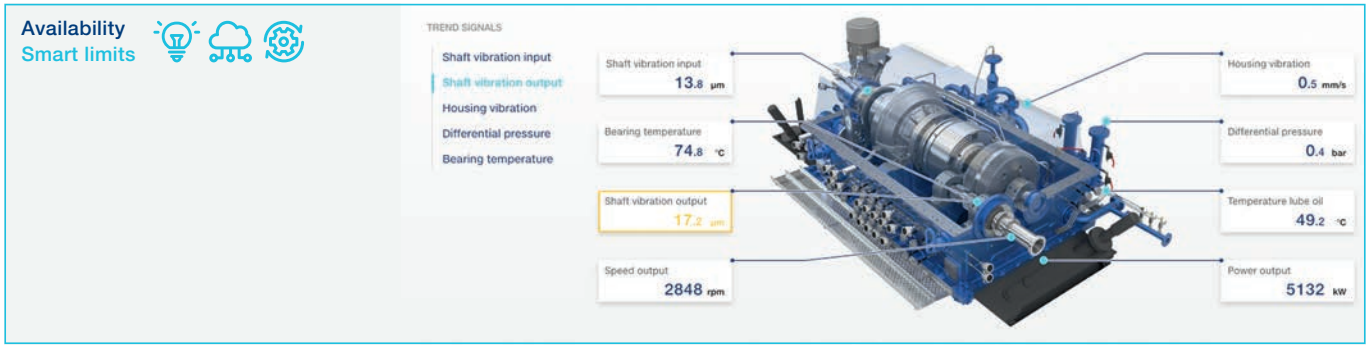
Installation and data acquisition

This data diagnostic system is installed onsite and can be connected via fieldbus to existing IT infrastructure. All communication channels comply with the highest security standards, and an internet or cloud connection is not required. Data results are accessible remotely and are displayed on a graphical user interface.

Data processing and new features

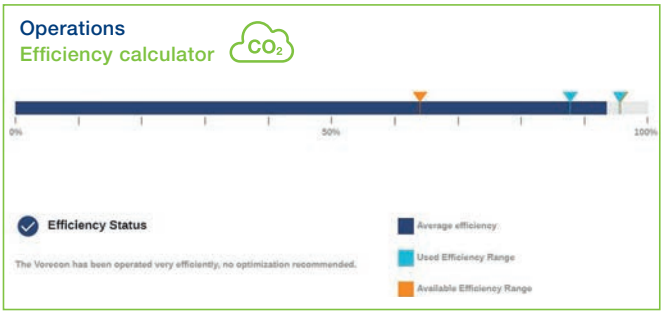
An easily accessible interface displays Vorecon operating data, hours, and modes. After installing the system, the machine's reference condition is evaluated, and a signal fingerprint is learned automatically. After that, during operation, typical signals are continuously monitored, recorded, analyzed, and rated. With release 2.0, three key performance indicators are shown:

Vorecon signal monitoring



Vorecon maintenance condition

Vorecon operating efficiency



Smart limits

Significant changes in the machine's behavior are detected quickly before any alarm or trip occurs.

Health indicator

Based on actual load cycles, the remaining bearing lifetime is calculated. With the signal fingerprint, the health status of the machine is evaluated, and recommendations for service actions are provided.

Efficiency calculator

The current and historic machine efficiency is shown, with the potential for operational or gear optimization suggested.

Service package

A regular service report is offered, including detailed signal analysis, machine performance diagnosis, condition-based maintenance, and service recommendations. In the event of technical issues, remote data access and quick root cause analysis are possible.

Benefits

The new key performance indicators help operators minimize unplanned downtime risk while service can be planned timeously and effectively, reducing maintenance costs. Furthermore, energy-saving potential is identified, enabling operating cost reduction and lower CO_2 emissions.

Complementary products
Main drive motors from ELIN

A drive solution includes the motor. ELIN, as part of the Voith Turbo Group, manufactures electric motors up to 35 MW, which fit perfectly as a drive to the Vorecon.

Construction types
- Induction and synchronous machines
- Cooling as air/air, air/water, surface or water jacket design
- 50 Hz and 60 Hz
- All medium voltage levels
- Certificates according to IEC, IECEX, ATEX, UL, etc.

Package solution
- 4-pole motors for the Vorecon
- Matching torque characteristic
- Oil circulation lubrication, supply by Vorecon
- Single lift skid
- String torsional analysis

Drive solution

Achieving common goals
Engineering

We don‘t just supply products, we also provide ideas. Voith products have been controlling the speed in drive systems for more than 60 years now. The benefit from this experience can be applied in planning, use and cost-optimized operation and maintenance.

System competence

The Vorecon can be found in more than 500 drives in the oil and gas industry, as well as in the chemical industry and thermal power plants.

Make the right decision to invest using our knowledge of systems and the applications in which they are employed. In this way, you can both increase your plant availability and lower your operating costs.

Partnership

Do you have questions concerning the equipment that is driving your rotating machines? Please consider turning to Voith and we would be happy to discuss your concerns together.

Our competences

- Consultation in the planning of drive systems
- Torsional vibration calculation and analysis
- Strength calculations using FEM
- Run-up calculations
- Calculation of speed step responses
- Retrofitting of electric variable speed drives and turbine drives

Benefit from the manufacturer‘s knowledge
Service

Service by the manufacturer increases the efficiency, safety and availability of your system. The engineers and technicians of Voith’s worldwide service network are there to assist you. We maintain sales and service facilities in all regions of the world.

Our services
- Installation, commissioning
- Training
- Maintenance and repair
- Original spare parts
- Service contracts

The benefits for your system
- Improved operational reliability
- Increased service life
- Assured productivity
- Optimized maintenance costs
- Plannable life-cycle costs

Modernization & Retrofit
- Energy efficiency assessment (OPEX and CO_2 reduction)
- Retrofit engineering and conversion works
- Upgrades and modernization
- Conversion of fix speed to variable speed drives
- Feasibility studies and consultancy
- Replacement of steam and gas turbines with electrical drives

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