



*Specialist for Pumping Technology*



**PUMPS FOR  
POWER GENERATION**

# Advanced pumping technology that moves our world

There is no doubt that power is a key driver of human progress. As global economies continue to expand, the demand for electrical energy is forecast to grow. Energy production is a challenging and competitive industry where process efficiency, emissions control and safety requirements are key factors.

With a long story of innovation in pumping technology and services, Ruhrpumpen has been providing reliable, efficient pumping equipment suitable for different power generation technologies, such as:

- Conventional steam
- Nuclear
- Combined cycle
- Concentrated solar power
- Biomass
- Geothermal

## A pumping solution for every application

Our experience supplying reliable pumps and systems for power plants includes critical services such as:

- Boiler feed water
- Water injection
- Condensate extraction
- Heat transfer fluid
- Circulating water
- Chemical treatment
- Closed cooling and service water
- Auxiliary services
- Molten salt
- Fire protection



## Commitment to quality

Our innovative solutions go beyond simple compliance with regulations and standards, reducing risks and improving performance. Ruhrpumpen uses state of the art manufacturing technology to ensure our products meet the highest standards for quality and reliability.

**Ruhrpumpen pump systems and units are certified by SAI Global and ANAB EN ISO.**



## Ruhrpumpen is your single source supplier

- Original Equipment
- Spare parts
- Installation and startup support
- Repair and maintenance
- Engineering, training and consulting
- Reverse engineering

## Benefits of our pumps:

- Proven reliability
- High efficiency designs ensure lowest operating cost
- Robust design allows for long system life with minimal maintenance
- Optimized total cost of ownership

## Efficient, flexible and environmentally friendly pumping solutions for the power generation market

Supported by our global team of experienced industry professionals, we offer a wide range of pump systems that are especially designed for use in fossil-fuel and renewable power generation plants.

### Fossil-fuel power plants

Driven by the need to reduce greenhouse gas emissions, fossil fuel energy producers are striving to improve processes and plant efficiency.

Each Fossil-Fuel Power Plant is a complex, custom-designed system where coal, natural gas or oil are burnt to produce electricity. The combustion of these fossil fuels generates heat energy which is converted through a steam turbine into mechanical energy that later powers an electric generator.

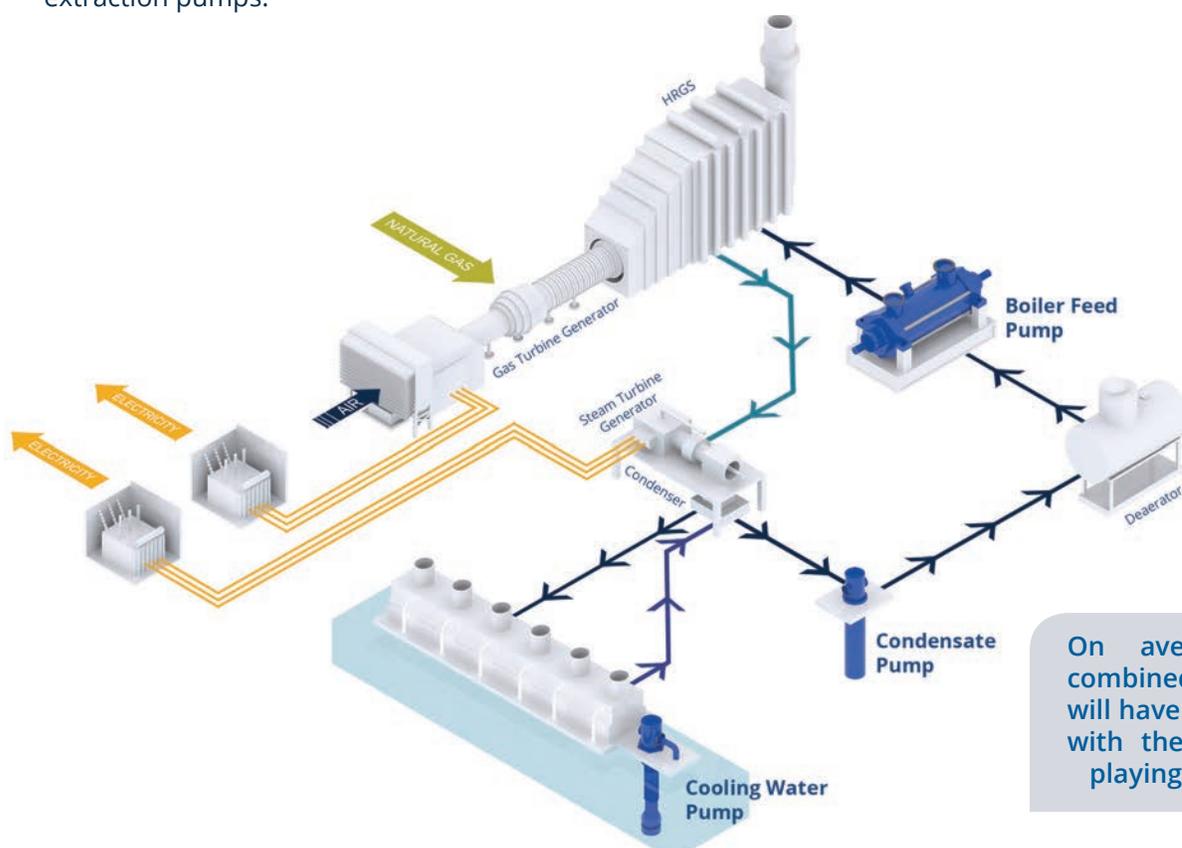
Designed for continuous or cycling operation, these power stations demand reliable and highly efficient pumps for condensate extraction, cooling water and boiler feed water and booster services.



### Combined cycle power plant

Also known as gas turbine, it is one of the most popular power generation technologies. Turbines are fueled either with natural gas, syngas or fuel oil.

Ruhrpumpen has a full range of pumps to meet all the stringent requirements of a high efficiency Combined Cycle Power Plant, from ring-section boiler feed pumps to large diameter vertical circulating water pumps and condensate extraction pumps.



On average, a 300 MW combined cycle power plant will have more than 40 pumps, with the BFP, CEP and CWP playing the most vital roles.

# PUMPS FOR POWER GENERATION

## Concentrated solar power plants

One of the fastest growing energy markets in the world, as the Sun is the cleanest, most abundant renewable energy source available.

Concentrated Solar Power Plants (CSP) combine three major systems to produce electricity by collecting and concentrating sunlight with mirrors and lenses in a Heat Transfer Fluid (HTF, e.g. synthetic oil, or molten salt). Through a heat exchanger system, pumps move the HTF and heat water to generate steam. The power block then produces electricity using a steam turbine and a generator.

Concentrated solar power plants are subject to highly variable operation with daily stopping and starting, large temperature differentials and corrosive environments. This requires heavy-duty pumps that can manage temperatures as high as 1100 °F (600 °C). With special materials and design considerations, our HVN and J Line pumps are the perfect choice when handling HTF; while our VLT model can pump molten salt in heat transfer and thermal storage systems.

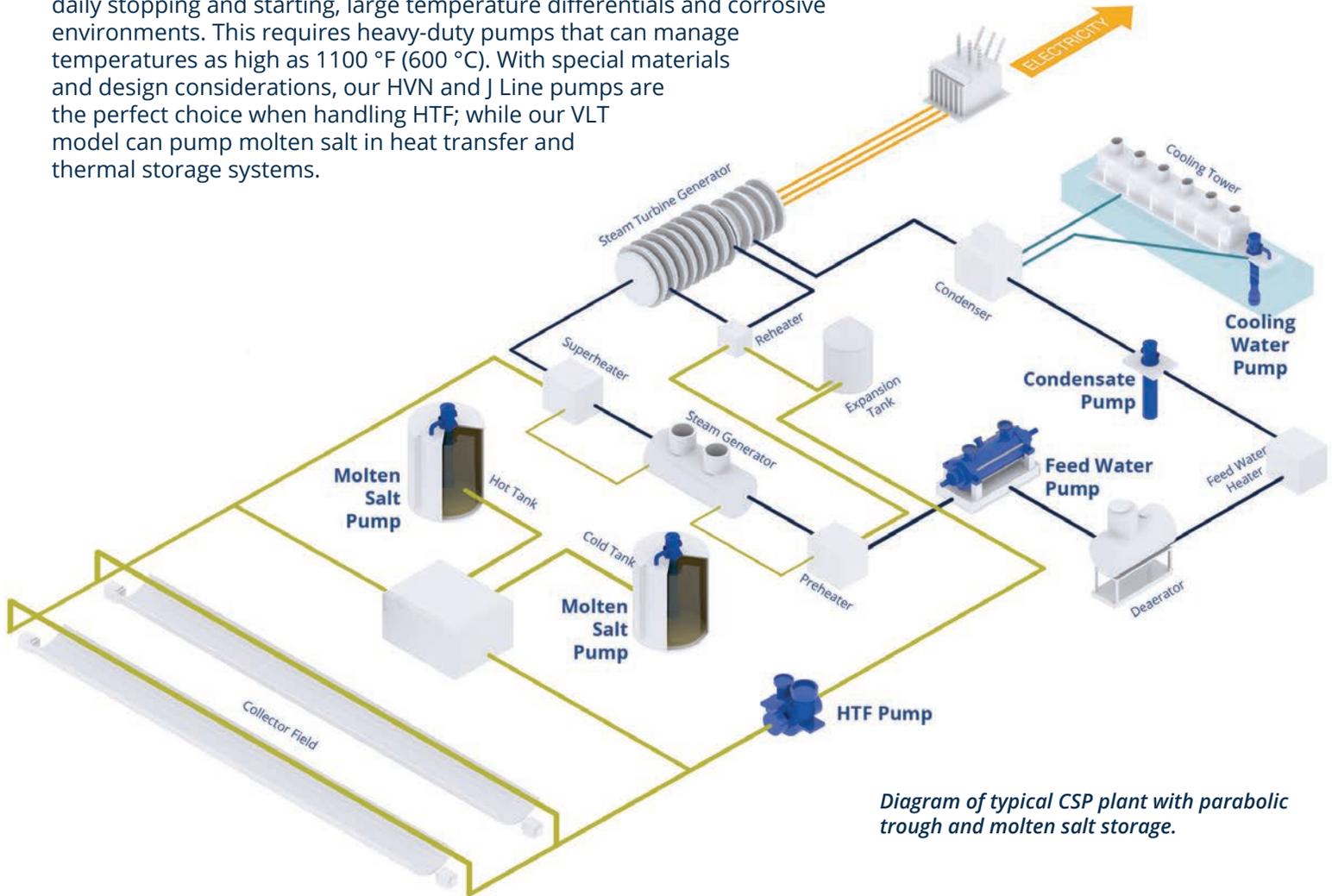


Diagram of typical CSP plant with parabolic trough and molten salt storage.

## Geothermal power plants

One of the most promising renewable energy sources of the future. Geothermal Power Plants harness the hydrothermal resources found underneath the Earth's surface.

High-temperature dry steam or hot water, ranging from 300 °F (149 °C) to 700 °F (371 °C), are extracted from deep wells and pumped to power a turbine that generates electricity. There are four types of geothermal power plants: dry steam plants, flash steam plants, binary cycle power plants and combined flash and binary.

Ruhrpumpen has a full range of pumps to meet the needs of geothermal power plants with our range of vertical pumps in API 610 and non-API configurations and vast material selections, heavy-duty horizontal between bearing pumps for water services and utility pumps for auxiliary services.

Our pumps offer high efficiencies, superior quality and high reliability resulting in lower maintenance costs and emissions to the atmosphere.

## Boiler Feed Water Pumps

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At the heart of the power generation process, the Boiler Feed Water Pump (BFP) plays an essential role feeding high pressure and high temperature water to a steam generator.

Without water to the boiler, there is no steam and no power can be produced. Ruhrpumpen's robust Boiler Feed Pumps have been specially designed to bring optimum performance in the harshest operating conditions.

- **GP:** radially split, multi-stage, single case, ring-section type process pump.
- **SM and JTN:** axially split, multi-stage process pumps in both diffuser and volute casings.
- **A LINE:** radially split, multi-stage, double case, barrel type process pump.

## Circulating Water Pumps

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An integral part of process operations, Circulating Water Pumps (CWP) move large volumes of water from cooling towers or other sources, such as a lake or river, to the condenser. Typically require high flows, but low head.

- Our **VCT** vertical circulating pump has been designed specifically for water services with industry-leading high efficiencies and is suitable for high flows with diameters up to 108" (2,800 mm).
- Our **ZW** and **HSC** horizontal pumps (BB1 type) offer high efficiencies and a wide range of hydraulics ideal for horizontal cooling water services.

## Condensate Extraction Pumps

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Condensate Extraction Pumps (CEP) are required to handle low pressure water leaving the condenser, hence this service often requires a vertical canned pump suitable for use on low or zero NPSH applications.

- **VLT, VTP and VCT:** vertical multi-stage canned pumps suited for condensates with a low NPSH3 first stage impeller designed to match series stage flow rates.

## Closed Cooling and Service Water Pumps

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Our horizontal split case pumps can handle services such as: condensate booster, service water, cooling water booster, raw water supply and makeup water, among others.

Additionally, our vertical pumps, with single and double suction, can operate as: auxiliary to the circulating water pump, screen wash, water treatment and raw water makeup services.

## Pumps for Auxiliary Services

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Ruhrpumpen's wide range of vertical and horizontal pumps, including HI, ANSI, ISO and API designs, can handle primary applications such as fuel oil handling and auxiliary systems like lubrication and cooling.

## Fire Protection Pumps and Systems

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We are a world leading specialist in the design and manufacture of UL Listed and FM Approved fire protection pump systems with NFPA full compliance.

## GP

### Radially split, multi-stage, single case, ring-section type process pump



#### CHARACTERISTICS AND DESIGN FEATURES

- Non-API and API 610 latest edition (BB4) constructions available
- Modular design for various number of stages
- Available with balance drum or balance disk
- Low NPSH first stage design is available
- Single or double mechanical seals

#### OPERATING LIMITS

Capacity	up to 4,000 gpm up to 900 m <sup>3</sup> /hr
Head	up to 13,120 ft up to 4,000 m
Pressure	up to 6,000 psi up to 416 bar
Temperature	up to 400 °F up to 205 °C

#### APPLICATIONS

High-pressure and high-temperature applications across industries:

- Boiler feed water
- Refining
- Hydraulic decoking
- Membrane feed pump in reverse osmosis

## A Line [AB]

### Radially split, multi-stage, double case, barrel type process pumps



#### CHARACTERISTICS AND DESIGN FEATURES

- Heavy-duty process design according to API 610 latest edition (BB5)
- In-line or back-to-back impeller arrangements
- "Blind" stages for future upgrades available
- Ring oil lubrication, other methods available
- Standard or cartridge full-pull-out designs available
- Materials of construction per API 610 (other materials on request)

#### OPERATING LIMITS

Capacity	up to 6,160 gpm up to 1,400 m <sup>3</sup> /h
Head	up to 13,776 ft up to 4,200 m
Pressure	up to 7,830 psi up to 450 bar
Temperature	up to 840 °F up to 450 °C

#### APPLICATIONS

High-pressure applications:

- Boiler feed water
- Amine / ethylene feed
- Hydrocarbon charge
- Pipeline
- Decoking jet service (ADC)
- Cogeneration
- Descaling

## SM / SM-I

### Axially split, multi-stage, double volute casing process pump



#### CHARACTERISTICS AND DESIGN FEATURES

- Heavy-duty process design according to API 610 latest edition (BB3)
- Designed for a minimum service life of 20 years
- Axially split design allows direct access to the rotor providing ease of inspection and maintenance
- Double row bolting for upper and lower part of high pressure design (SM)
- Materials of construction per API 610 (other materials on request)

#### OPERATING LIMITS

Capacity	up to 8,806 gpm up to 2,000 m <sup>3</sup> /h
Head	up to 5,249 ft up to 1,600 m
Pressure	up to 4,000 psi up to 276 bar
Temperature	up to 392 °F up to 200 °C

#### APPLICATIONS

- Boiler feed water
- Descaling
- Pipelines
- Membrane feed pumps in reverse osmosis
- Mine dewatering

## JTN

### Axially split, multi-stage, diffuser casing process pump



#### CHARACTERISTICS AND DESIGN FEATURES

- Heavy-duty process design according to API 610 latest edition (BB3)
- Axially split design enables easy access to pump internals for removal and maintenance
- Anti-friction bearings as standard (other bearing designs are available)
- Materials of construction per API 610 (other materials on request)

#### OPERATING LIMITS

Capacity	up to 1,321 gpm up to 300 m <sup>3</sup> /h
Head	up to 2,625 ft up to 800 m
Pressure	up to 1,880 psi up to 130 bar
Temperature	up to 92 °F up to 200 °C

#### APPLICATIONS

- Boiler feed water
- Pipelines

## VCT

Single or multi-stage, mixed and radial flow circulating pumps



### CHARACTERISTICS AND DESIGN FEATURES

- HI design and API 610 latest edition (VS1) constructions available
- Open, semi-open and enclosed impellers available according to pump model
- Packing as standard, mechanical seal is available
- Above or below ground discharge
- Optional pull-out design for ease of maintenance (for some large models)
- Cast iron as standard material (other materials on request)

### OPERATING LIMITS

Capacity	up to 300,000 gpm up to 68,137 m <sup>3</sup> /h
Head	up to 330 ft up to 100 m
Pressure	up to 285 psi up to 20 bar
Temperature	-20 °F to 275 °F -30 °C to 135 °C

### APPLICATIONS

- Condensate extraction service
- Cooling water service
- Offshore facilities
- Pipelines
- Storm and flood water disposal
- Water transportation, distribution and treatment

## VLT

Single or multi-stage, vertical canned pumps



### CHARACTERISTICS AND DESIGN FEATURES

- HI design, cryogenic and API 610 latest edition (VS6) constructions available
- Low NPSH "shockless entry" first stage impeller
- Integral fabricated column support bearings
- One-piece shaft construction for shaft lengths up to 6 m (20 ft)
- Materials of construction per API 610 (other materials on request)

### OPERATING LIMITS

Capacity	up to 45,000 gpm up to 9,500 m <sup>3</sup> /h
Head	up to 4,900 ft up to 1,494 m
Pressure	up to 2,020 psi up to 140 bar
Temperature	up to 1,500 °F up to 815 °C

### APPLICATIONS

- Condensate extraction service
- Molten salt application for Concentrated Solar Power
- Hydrocarbon processing
- Pipelines
- Municipal water systems

## HSC / HSD / HSR / ZW

\*See ZM line for API build

Horizontal, single stage, split case pumps



### CHARACTERISTICS AND DESIGN FEATURES

- HI design (BB1)
- High efficiency, foot mounted design
- Double suction, dynamically balanced enclosed impeller
- Mechanical or packing seal
- All HS/ZW pumps can be mounted vertically or horizontally
- Cast iron as standard material (other materials on request)

### OPERATING LIMITS

Capacity	up to 140,000 gpm up to 31,800 m <sup>3</sup> /h
Head	up to 2,210 ft up to 480 m
Pressure	up to 298 psi up to 20 bar
Temperature	50 °F to 300 °F 10 °C to 150 °C

### APPLICATIONS

- Circulating water service
- Cooling towers
- Pipelines
- HVAC
- Dewatering
- Municipal water systems
- Fire protection

## HSM

Horizontal, 2 or 4 stage, split case pumps for high pressure applications



### CHARACTERISTICS AND DESIGN FEATURES

- HI design (BB3)
- Two or four stage pump with double volute casing and side-side nozzle arrangement
- Double suction, dynamically balanced enclosed impeller
- Cast iron as standard material (other materials on request)

### OPERATING LIMITS

Capacity	up to 2,000 gpm up to 454 m <sup>3</sup> /h
Head	up to 2,200 ft up to 670 m
Pressure	up to 740 psi up to 51 bar
Temperature	up to 250 °F up to 121 °C

### APPLICATIONS

- Circulating water service
- Cooling towers
- Pipelines
- HVAC
- Dewatering
- Municipal water systems
- Fire protection

## HVN / J / JS / JD

Radially split, single stage process pumps



### CHARACTERISTICS AND DESIGN FEATURES

- Heavy-duty process design according to API 610 latest edition (BB2)
- Single stage, centerline mounted
- Double volute, centerline mounted casing
- Top-top nozzle arrangement, other arrangements on request
- Double suction, dynamically balanced enclosed impeller
- Materials of construction per API 610 (other materials on request)

### OPERATING LIMITS

Capacity	up to 30,000 gpm up to 6,814 m <sup>3</sup> /h
Head	up to 2,000 ft up to 610 m
Pressure	up to 1,813 psi up to 125 bar
Temperature	up to 850 °F up to 450 °C

### APPLICATIONS

- Heavy-duty, high-temperature processes: charge, transfer, injection and utility booster
- HTF pump for synthetic oils

## SCE

Horizontal, centerline mounted, single stage process pump



### CHARACTERISTICS AND DESIGN FEATURES

- Heavy-duty process design according to API 610 latest edition (OH2)
- Single or double volute depending on size
- Single suction, enclosed impeller
- Designed for continuous duty and over 130 hydraulic combinations available
- Back pull-out design for ease of maintenance
- SCE-L for low flow applications available
- Materials of construction per API 610 (other materials on request)

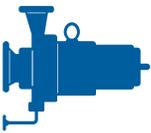
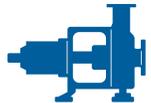
### OPERATING LIMITS

Capacity	up to 14,000 gpm up to 3,200 m <sup>3</sup> /h
Head	up to 1,575 ft up to 480 m
Pressure	up to 1,300 psi up to 90 bar
Temperature	-110 °F to 850 °F -80 °C to 450 °C

### APPLICATIONS

- HTF auxiliary pump for synthetic oils
- Petroleum refining, production and distribution
- Hydrocarbon processing
- Heavy-duty chemical
- Industrial wastes

# Additional Ruhrpumpen pumps for power generation services

	RP MODEL	DESCRIPTION	SERVICE	OPERATING LIMITS
	<b>CRP-M</b>	Sealless process pump with magnetic drive acc. to DIN EN ISO 2858 & 15783	Heating and cooling circuits Thermal oils	Capacity up to 9,690 gpm (2,200 m <sup>3</sup> /h) Head up to 1,080 ft (330 m)
	<b>SCE-M</b>	Heavy-duty process pump with magnetic drive acc. to API 685	Heating and cooling circuits Thermal oils	Capacity up to 2,200 gpm (500 m <sup>3</sup> /h) Head up to 705 ft (215 m)
	<b>CPP / CPO CRP</b>	Single stage, end suction ANSI & ISO process pumps sign (OH1)	Auxiliary services Fire protection	Capacity up to 12,340 gpm (2,800 m <sup>3</sup> /h) Head up to 770 ft (235 m)
	<b>GSD</b>	Single stage, end suction general service pump (OH0)	Auxiliary services	Capacity up to 4,500 gpm (1,022 m <sup>3</sup> /h) Head up to 400 ft (122 m)
	<b>SD / SDV</b>	Single stage, end suction pump in horizontal and vertical installations (OH3A)	Water auxiliary services	Capacity up to 61,700 gpm (14,000 m <sup>3</sup> /h) Head up to 147 ft (45 m)
	<b>DSV</b>	Heavy-duty, double suction, single or multi-stage, vertical centrifugal pump (VS2)	Cooling water	Capacity up to 80,000 gpm (18,170 m <sup>3</sup> /h) Head up to 800 ft (244 m)
	<b>VSP</b>	Single casing, vertical sump pumps for wet pit applications (VS4)	Cooling water Utility pump	Capacity up to 8,500 gpm (1,931 m <sup>3</sup> /h) Head up to 425 ft (130 m)
	<b>COMBITUBE</b>	Single stage, pitot tube pump for low flow, high head applications (HI design)	Boiler feed Reactor feed	Capacity up to 352 gpm (80 m <sup>3</sup> /h) Head up to 4,856 ft (1,480 m)
	<b>RDP</b>	Reciprocating plunger pumps in triplex and quintuplex formats acc. to API 674 & ISO 13710	Dosing pump Auxiliary services	Capacity up to 1,611 gpm (366.5 m <sup>3</sup> /h) Discharge pressure up to 14,500 psi (1,000 bar)
	<b>VTG</b>	Multi-stage, vertical turbine generators (reverse running pumps) (VS6)	Small hydroelectric needs Water distribution	Capacity up to 29,174 gpm (6,626 m <sup>3</sup> /h) Head up to 3,500 ft (1,067 m)
<b>Pre-Packaged Fire Pump Systems</b>		Fire systems incorporate pumps, drivers, control systems and pipework in a single container. They can be skid mounted, with or without enclosure and supplied with electric motor or diesel engine. NFPA 20-850 with UL and FM approved components.	Fire protection	Capacity up to 5,500 gpm (1,250 m <sup>3</sup> /h) Head up to 670 ft (204 m) Pressure up to 355 psi (24 bar)

## +65 years creating the pumping technology that moves our world

Ruhrpumpen is an innovative and efficient pump technology company that offers highly-engineered and standard pumping solutions for the oil & gas, power generation, industrial, water and chemical markets. We offer a broad range of centrifugal and reciprocating pumps that meet and exceed the requirements of the most demanding quality specifications and industry standards such as API, ANSI, UL, FM, ISO and Hydraulic Institute.

