



*Specialist for Pumping Technology*

INNOVATION  
EFFICIENCY  
QUALITY



**VTG**

Vertical Turbine Generator



### For more than 60 years the name Ruhrpumpen™ has been synonymous worldwide with innovation and reliability for pumping technology

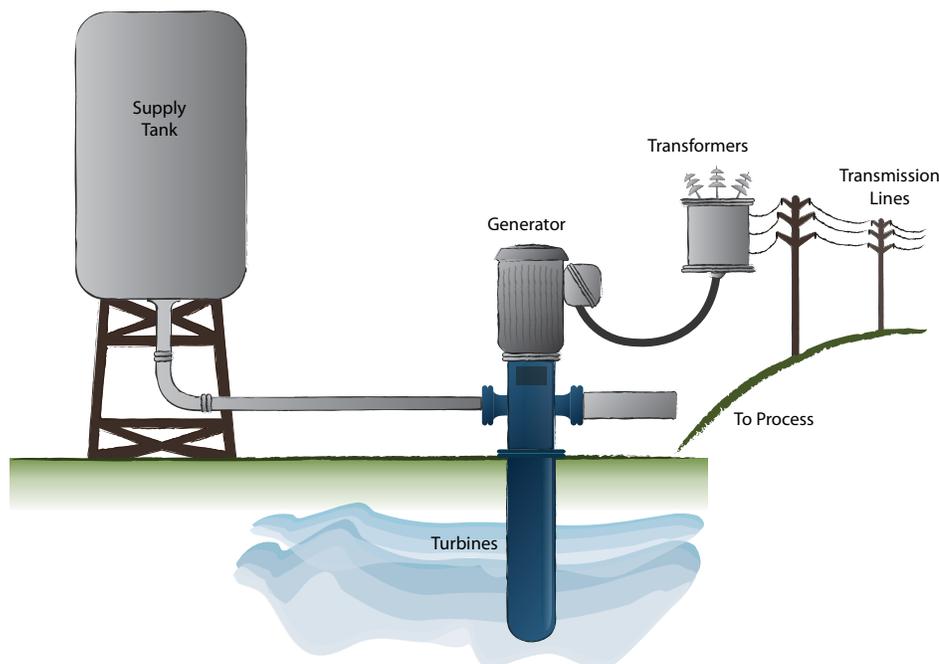
Ruhrpumpen is an innovative and efficient centrifugal pump company that offers operators of Pump systems a wide range of quality products. Ruhrpumpen is committed to worldwide excellence, with a complete range of pumps to support core markets which includes: Municipal Water Distribution, Wastewater, Petrochemical, Power, Heavy Industry Applications and Chemical. Our broad product line complies with the most demanding quality standards and industry specifications such as: API, ANSI and Hydraulic Institute Standards.

### Using pumps as turbines

With more than 60 years of experience and pumps installed in more than 90 countries, Ruhrpumpen has the experience you can count on.

Worried about the actual world environment and economical issues, such as global warming and increase of the demand and cost of energy, Ruhrpumpen developed the VTG pump, which is a vertical reverse running pump.

The principal characteristic of a reverse running pump is that when the flow that runs through the pump is reversed, the impeller starts turning in the other direction and the pump operates as a turbine. The motor that drives the pump can work also as a generator; when it's working as a turbine, it collects the mechanical energy and transforms it into electricity.



## The VTG Turbine Pump

The Ruhrpumpen vertical pump line covers a very broad range of standardized sizes. Components of these pumps can be utilized to manufacture VTG turbines for small hydroelectric sites. An extensive test program has produced the data needed to publish a complete set of performance curves for use in the application of the VTG turbines. Each VTG type has been thoroughly tested for kW output, efficiency, NPSH, runaway speed and runaway flow (also known as choke-flow).

Because the VTG turbines have a fixed geometry, and operating speeds are limited by available generator speeds and gear ratios, each turbine has an operating range which is relatively narrow. Multiple units are usually required to absorb large flow variations. Our VTG line has a broad coverage by virtue of so many different available types and sizes. This is even more significant when it is understood that impellers may not be cut for turbine applications.

## Application

The VTG is particularly suited to where the head and flow are consistent. All fixed geometry turbines have a relatively narrow operating flow range. Multiple units are usually required to absorb large flow variations. Our VTG line has broad coverage by virtue of so many different types and sizes.

The main purpose of the VTG is to fill small hydroelectric needs, but they can also be used in industrial systems, for Water Transportation Systems, Dams, Reverse Osmosis, Oil Supply Systems, in Chemical & Petrochemical Processes, and in Cryogenic Closed System applications.

## Environment

Generating electricity from a natural resource helps the environment because no fossil fuels are used to create this power, and no greenhouse gases are produced.

Our VTG pumps are able to generate electricity when they are used as turbines. The world has a huge potential in using reverse running pumps in different processes and it is our commitment to do our part in helping the environment.



### BENEFITS

- The fact that the pump and the electric generator are the same product, reduces costs and the system can be paid in a short period of time.
- Requires only 30 to 40 percent of the floor space needed with horizontal turbine designs.
- Designed to maximize standardization and avoid complex controls.
- Reduced maintenance, site preparation and installation costs.
- Prompt delivery.
- Lowest total capital investment per kilowatt output.
- Flexible payment options.
- Complete water-to-wire machinery packages.
- Environmental friendly alternative.

### STANDARD MATERIALS OF CONSTRUCTION

- Cast iron, bronze fitted for 18-inch diameter and smaller; 20-inch and larger often utilize either Ni-Aluminum Bronze #958 for impeller and liner, or 304 stainless steel.
- Stainless steel shaft.
- Self-lube, oil lube, grease lube, or clean water injection to bearings can be specified to meet site conditions and prolong bearing life.
- Designed for maximum energy recovery of velocity head, the fabricated steel draft tube is flanged for connection to the runner casing.
- Special ductile materials (depending on the fluid) are used for the cryogenic applications to insure they are compatible with the cryogenic fluids.
- Other materials available upon request.

### PERFORMANCE DATA

Capacity	29,174 GPM	(6,626 m <sup>3</sup> /h)
Head	3,500 feet	(1067 m)
Temperature	-300 to 250 °F	(-185 to 121 °C)
Pressure	up to 1,523 psi	(105 bar)

The performance is not limited. For pump operation outside this range, please contact us for more information. Other materials can be used in order to accomplish your necessities.

### CHARACTERISTICS

- The Vertical Turbine Generator (VTG) not only operates efficiently, but also has good choke flow characteristics. When added to its axially adjustable semi-enclosed runner design it provides many excellent user benefits.
- Semi-open runners which are axially adjustable from the operating floor level.
- Discharge may be open into a sump, or into a barrel in a closed system.

### PRODUCT DESCRIPTION

- Multi-stage vertical centrifugal pump, which can also be used as a turbine generator.
- Enclosed and open impeller available.
- Bearings are product lubricated.
- Different types of turbine for different operating conditions.
- Available for sump or closed system applications.

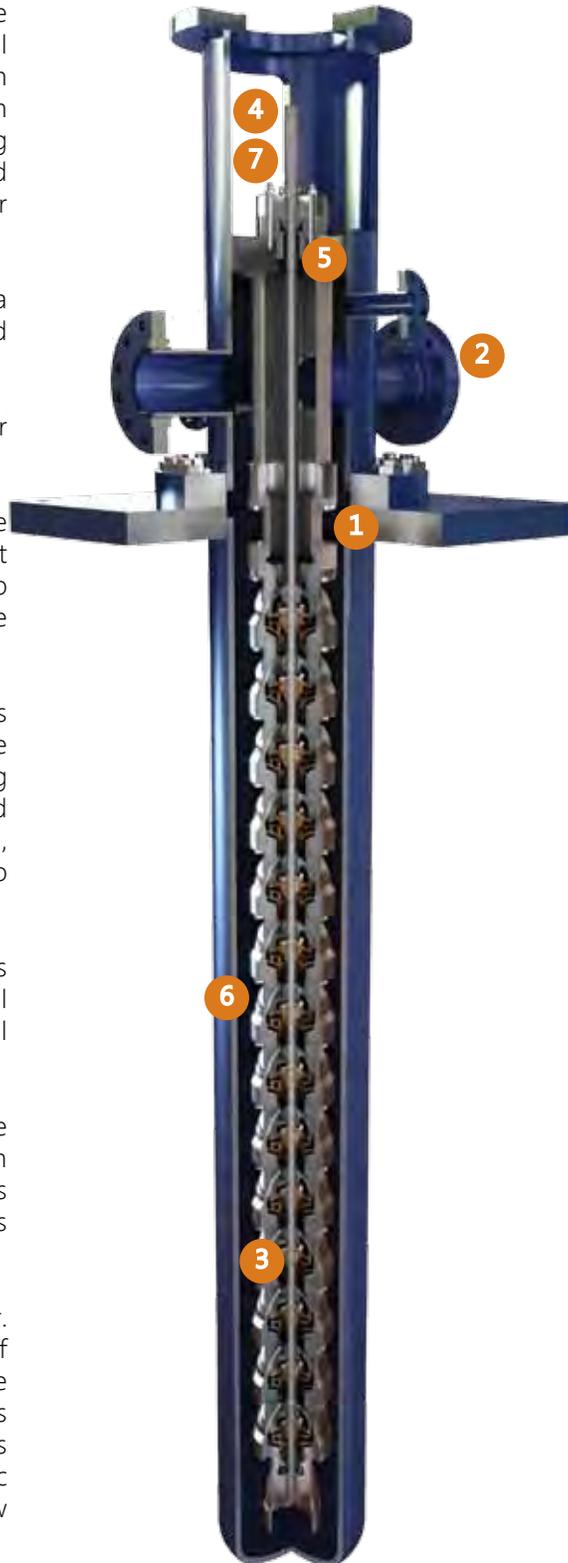


With the draft tube design Ruhrpumpen offers maximum energy recovery of velocity head in a open pit discharge design.

**Draft tube design available**

### VTG Standard

- 1** Less downtime. Column piece are designed so that Shaft critical speeds (Bearing Spans) are within API 610 latest edition requirements. All bearing retainers are integrally fabricated into the column sections for alignment and concentricity.
  - 2** Discharge may be open into a sump, or into a barrel in a closed system.
  - 3** Enclosed and open impeller available.
  - 4** Coupling. All metal, four piece adjustable coupling for solid shaft drivers. Spacer in coupling also serves to facilitate seal cartridge removal for servicing.
  - 5** Longer seal life. Mechanical seal is located in full flow of inlet pressure for positive lubrication-cooling and is inherently self-venting and self-cleaning. Water jacketed, bleed-off stuffing boxes are also available.
  - 6** No leaking. O-Ring gaskets throughout allow metal-to-metal rabbeted fits between all components.
  - 7** Semi-open runners available which are axially adjustable from the operating floor level restores efficiency and always maintains optimum output.
- Prevent Water Hammer. When turbine encounters loss of grid and run-away flow (choke flow) the reduction in flowrate is minimized to eliminate the effects of Water Hammer. Our specific speeds greatly reduce choke-flow at run-away speeds.



- Lower overall cost. The fact that the pump and the electric generator are the same product, reduces costs. Also the VTG results in lower connected horsepower, while floor space is a minimum.
- Reduced maintenance, site preparation and installation costs. It is easy to install.
- API-610 latest edition construction available.
- Environmentally friendly alternative.
- Column bearing construction can be self-lube (open-shaft) or oil-lube (enclosed shaft).
- Complete water-to-wire machinery packages.

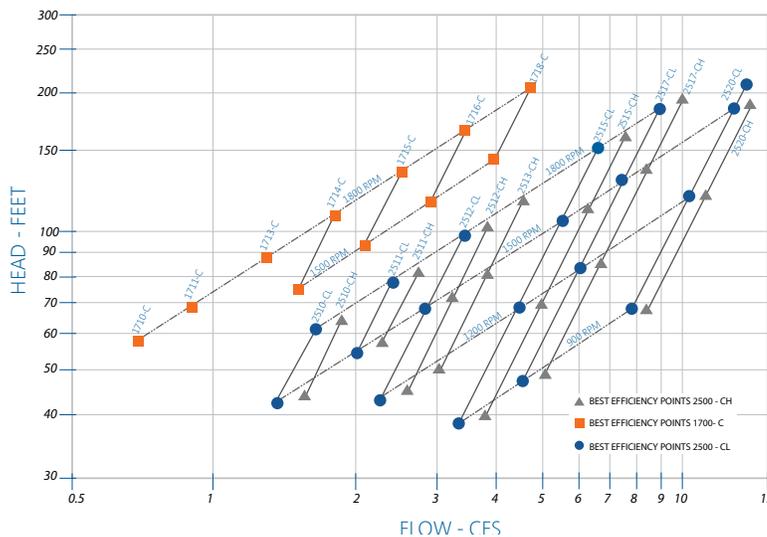
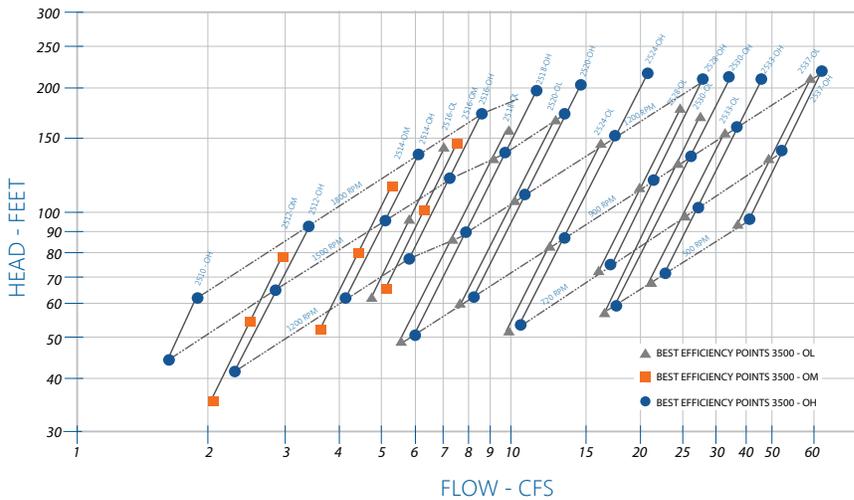
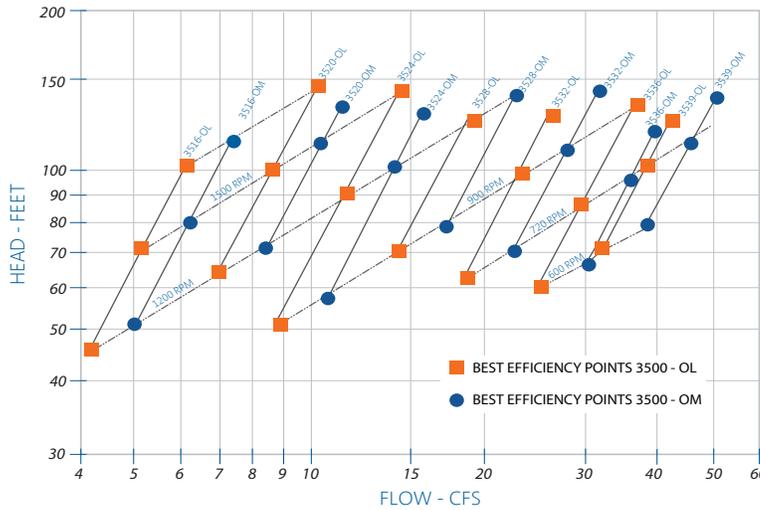
### VTG Cryogenic



Ruhrpumpen also has a cryogenic version available for cryogenic applications.

### Range Charts

The following range charts are for one stage. Additional stages will break down the head the times of stages, and the pressure will also increase. Please contact Ruhrpumpen for more information.



### Other Ruhrpumpen Products



#### Multi-Stage, Axially Split Casing Pump

Axially split, horizontal multi-stage, centrifugal pump, near-centerline mounted, single suction, radial, closed impeller. Design according to API 610 latest edition (BB3).  
**Oil Field and Terminals, Water Pipelines, Fluid Injection, High Pressure Services.**



#### Vertical Barrel Pump

Low NPSH "Shockless Entry" first stage impeller (single or double suction), Single or multi-stage. Heavy duty process design according to API 610 latest edition (VS6).  
**Condensate, Power plants, Municipal, Hydrocarbons, Pipeline, Refineries.**



#### Single-Stage Horizontal Process Pump

Radially split, horizontal single-stage centrifugal pump, centerline mounted. Single suction, radial, closed impeller. Design according to API 610 latest edition (OH2).  
**Petroleum Refining & Distribution, Power Generation, Petrochemical/ Chemical and Gas Industry.**



#### Cryogenic Pumps

Vertical pump with a special sealing system. Low temperature design. Construction materials for Cryogenic applications. Single or multi-stage.  
**Liquid Nitrogen, Liquid Oxygen, Hydrocarbons, Cryogenics.**



**With every project you can count on QUALITY, SERVICE, EXPERTISE, INNOVATION and COMPETITIVENESS. Because we have a commitment to each customer, the community, and the world. We are Ruhrpumpen, the specialist for pumping technology!**



## RUHRPUMPEN PLANTS

-  GERMANY, Witten
-  USA, Tulsa & Orland
-  MEXICO, Monterrey
-  EGYPT, Cairo
-  INDIA, Chennai
-  BRAZIL, Rio de Janeiro
-  ARGENTINA, Buenos Aires

More Information:

