

VOITH SIEMENS

HYDRO POWER GENERATION



Employing well over a century of expertise, Voith Siemens Hydro Power Generation supplies the optimum hydraulic turbines, auxiliary equipment and installation services to meet your needs.

Voith Siemens Hydro Power Generation has engineered high-flow, low-head micro turbines. These high-performance hydraulic turbines provide the same high quality and reliable operation of larger turbines. Their serial arrangement allows for the units to be applied at sites with the head higher than that of the units' actual application range. The units may also be applied at sites with a variable flow rate due to adjustable runner blades.

Variable speed hydraulic turbines for variable flow operation

Examples of application



To open channels
- Irrigation canal
- River



To sustainable discharge
- Dam
- Weir

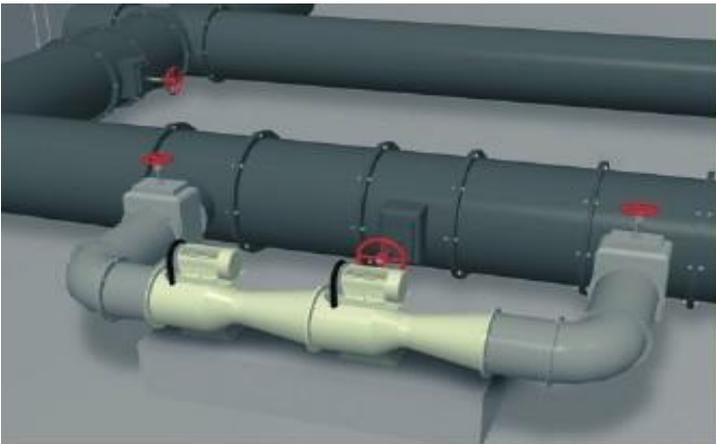
Hydro power resources can be harnessed from more than natural bodies of water and developed reservoirs: factories, waterworks, sewage treatment plants and irrigation canals also hold an enormous potential. Non-utilized head as a byproduct of line operation can be employed very effectively for on-site power generation.

Research and Development

The reliability and performance of our micro tubular turbines have been carefully developed and tested at our world-class hydraulic laboratory.



Example of serial arrangement with two units.



*To mid-point of piping
- Waterworks
- Industrial water*

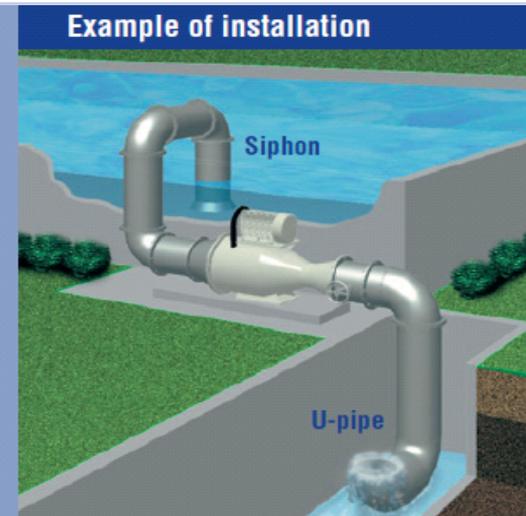
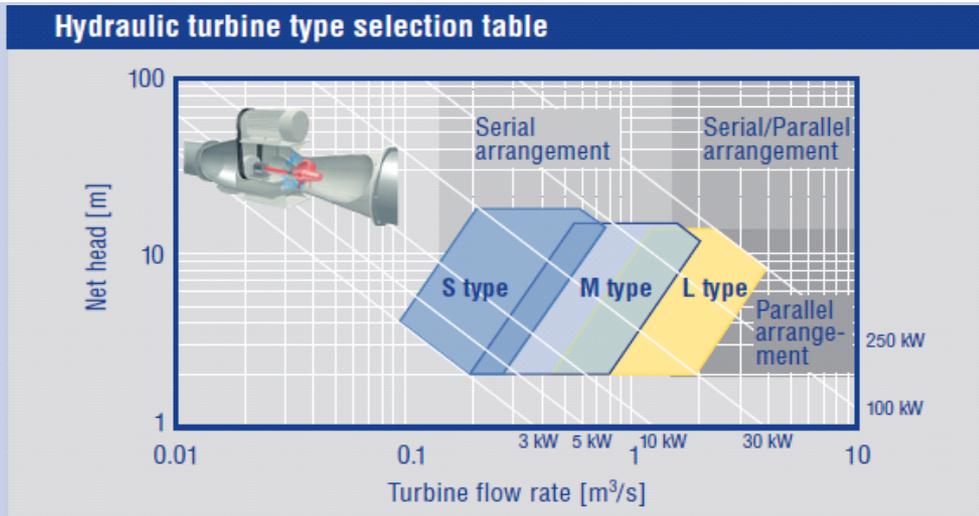


*To water tank
- Sewage
- Factory utility*

Features

- Use of tubular hydraulic turbine designed for high flows.
- Broad applicability including water supply, sewage systems, irrigation canals and rivers.
- Three standard sizes.
- High heads can be handled through a serial arrangement.
- High efficiency is ensured over a wide operation range.
- Easy maintenance due to simplified structure.

Application range

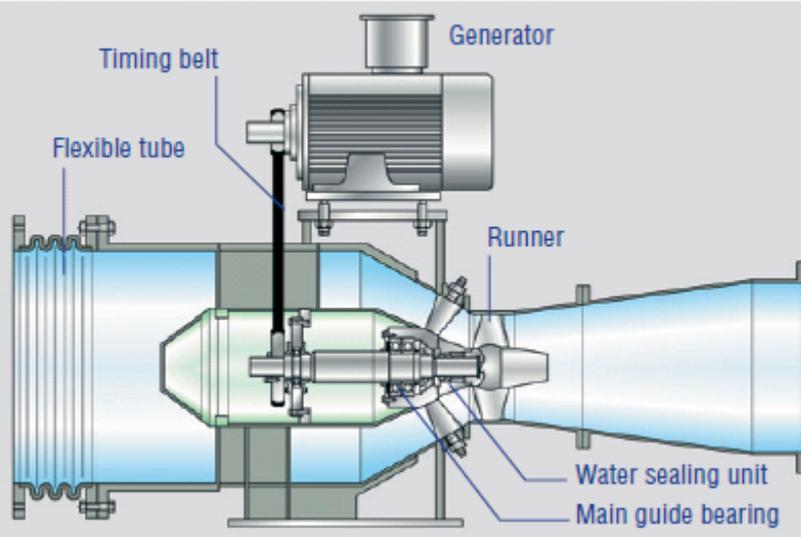


Water intake through siphon

With this installation method, the water intake can be simplified and gates are eliminated. U-pipe connection to discharge channel pipe. This connection does not require a tailrace (patent pending).

Application range			
	Runner diameter	Applicable head	Applicable output (generator capacity)
S type	290 mm	2 to 20 m	90 kW max.
M type	500 mm	2 to 16.5 m	200 kW max.
L type	760 mm	2 to 15 m	250 kW max.

Hydraulic turbine and generator



Standard specifications of generator

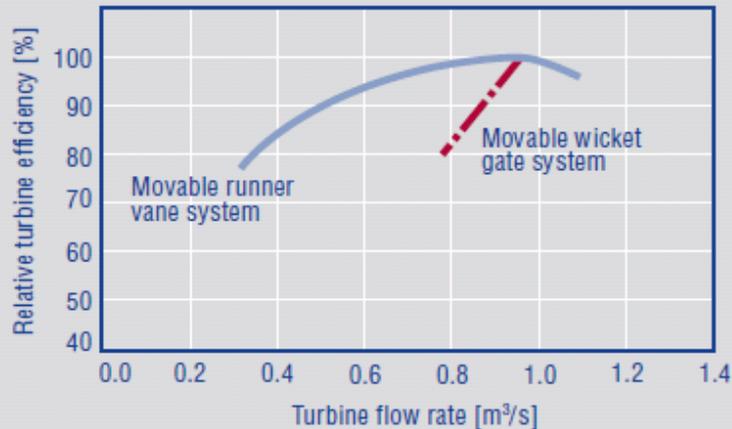
	Induction motor	Synchronous motor
Protection type	Totally-enclosed fan cooled type or drip-proof type	Drip-proof type (Option)
Rotor type	Squirrel-cage type	Revolving field type
Rotational speed	Selection of optimum synchronous rotational speed for each point	
Rating type	Continuous	
Rated voltage	200 V, 400 V	
No. of phases	3-phase	
Frequency	50 Hz or 60 Hz	
Excitation method	-	Brushless

Structural outline

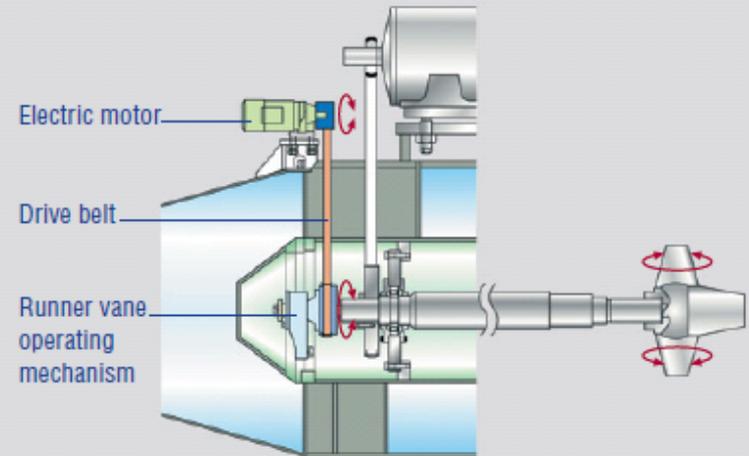
- With variable flows, a motor-driven adjustable-runner vane adjusts the blade angle to maximize energy production.
- The centerline of the hydraulic turbine can be set higher than the discharge, thus reducing civil costs.
- Torque is transmitted to the generator with a highly efficient timing belt.
- The flexible tube makes installation easy.

Movable design of runner vane

Comparison of efficiency between different movable systems



Features of movable runner vane systems



Adjustable runner blades

Variable flow is easily accommodated with the adjustable runner. Micro tubular turbines use an adjustable runner blade system to regulate flow, whereas conventional small-capacity hydraulic turbines use adjustable wicket gates. However, the latter causes various problems such as limited flow regulation, a sudden fall in hydraulic turbine efficiency and vibration.

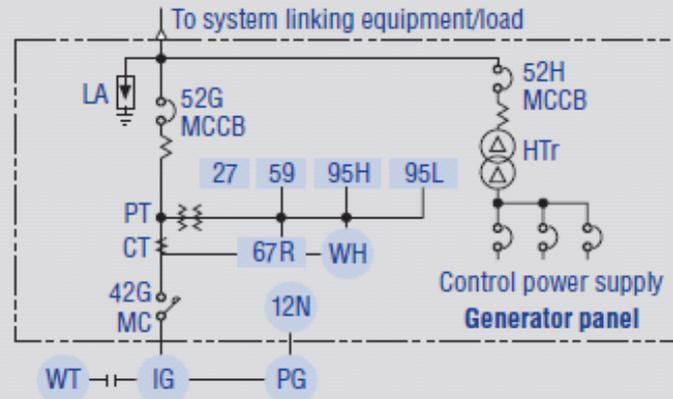
Adjustable runner system

- The unit automatically adjusts to operate at optimum efficiency.
- Oil leakage is eliminated because an electric motor drives the runner blade mechanism.
- The runner blade mechanism is contained inside the runner hub, requiring no extra space.

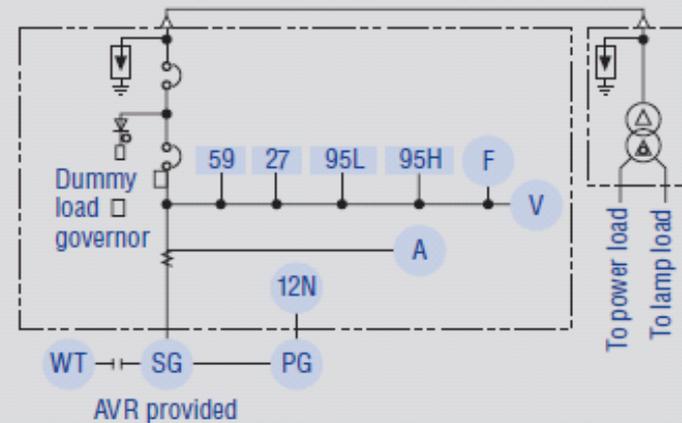
Control unit

Standard circuit composition

For power supply to house load equipment



For power supply by independent operation



Space-saving control equipment

Equipment is compact with a single panel. The micro tubular turbine/generator control and protection equipment is designed to save space.

Connectivity to the power grid

Addition of optional functions enable connection to the power grid

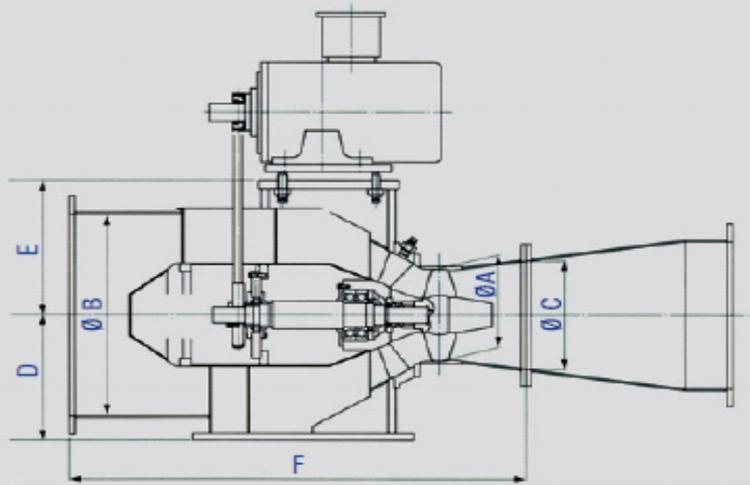
Optional equipment for site specific applications

- Provision for outdoor installations: When installing the power generation equipment outdoors, the control equipment can select the outdoor specification.
- Remote operations: The status of the power generation equipment can be remotely monitored.

Voith Siemens Hydro
 Power Generation GmbH & Co. KG
 Alexanderstrasse 11
 89522 Heidenheim, Germany
 Tel. +49 7321 37-6848
 Fax +49 7321 37-7828
 hydrocontact@vs-hydro.com
 www.voithsiemens.com

Voith Fuji Hydro K.K.
 1-1, Tanabeshinden, Kawasaki-ku
 210-9530 Kawasaki, Japan
 Tel. +81 44 329 2061
 Fax +81 44 329 2036

A Voith and Siemens Company



Dimensions (unit mm)

	A	B	C	D	E	F
S type	290	600	310	425	425	1175
M type	500	900	529	630	630	1760
L type	760	1350	802	875	875	2480

Maintenance/replacement parts

Name

Timing belt
 Timing belt
 Pulley
 Bearing
 Water sealing unit

Replacement interval

Every six month*
 Every five years
 Every five years
 Every five years

* The replacement interval of Timing belt depends mainly on the operating condition of the unit.

Engineered reliability.