Hydro-eKIDS™

MICRO HYDRO POWER GENERATING EQUIPMENT

TOSHIBA

TOSHIBA ENGINEERING

In general, specifications of hydroelectric power system vary depending upon the installation location. The hydro turbine and generator employed therein are custom manufactured in accordance with site conditions.

However, this approach, especially for small scale hydro turbines and generators, is inefficient, requiring a high construction cost which is not economically viable.

In order to improve the economic viability, we have developed a new concept to improve the manufacturing and construction efficiency of hydro turbine and generator sets for small scale hydroelectric power generation, through a mass production approach.

We present a new product, Hydro-eKIDS™, for Low Head and Small Scale Hydroelectric Power Plants.

What is the Hydro-eKIDS TM ?

Wide Output Range of 5 to 200 kW
with three standard Propeller Turbines and effective head between 2 and 15 m.

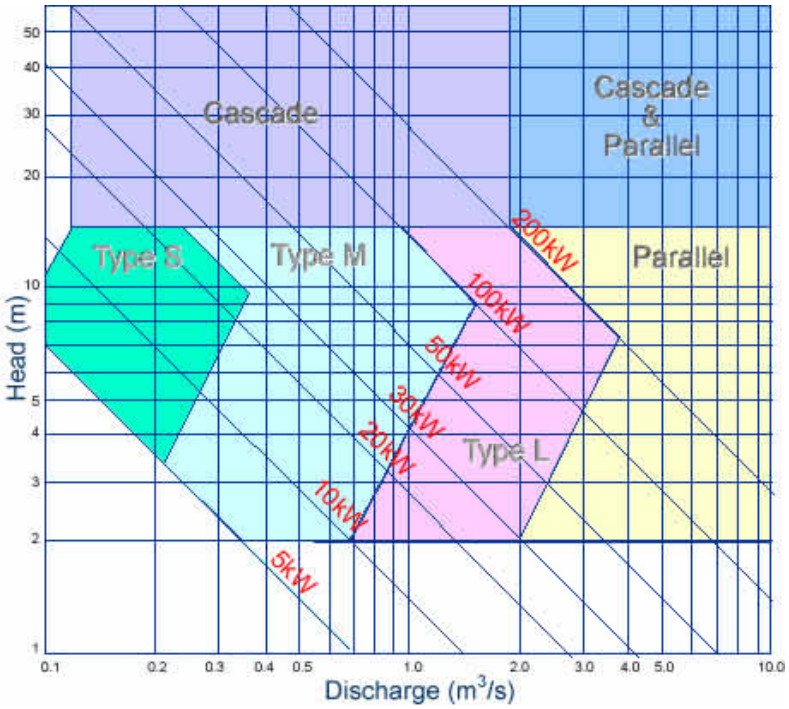
Flexible Application for Various Types of Sites
with parallel arrangement for larger discharge and a cascade arrangement for higher effective head.

Small and Compact Package
to facilitate transportation and handling.

Reduced Construction Cost
achieved by adopting a straight pipe-in shape for turbine water passage, which simplifies construction work.

Reduced Concrete Volume for Foundation
achieved by mounting the generator on the turbine structure.

WIDE RANGE OF APPLICABLE SITE CONDITION



Hydro-eKDIS™ as three types of standard unit so as to conform to the various types of the site condition.

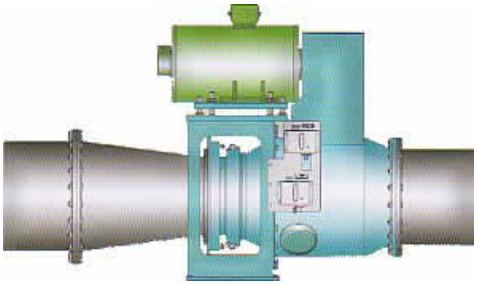
Each unit has three types of runner to suit to the various water flow.

Hydro-eKIDS™ is shipped adjusting angles of runner vane and guide vane to conform to the site condition exactly.

Runner vane angle also can be adjusted after installation to detach the runner. When the discharge fluctuates in rainy season or dry season, Hydro-eKIDS™ can operate under the best condition adjusting the runner vane angle.

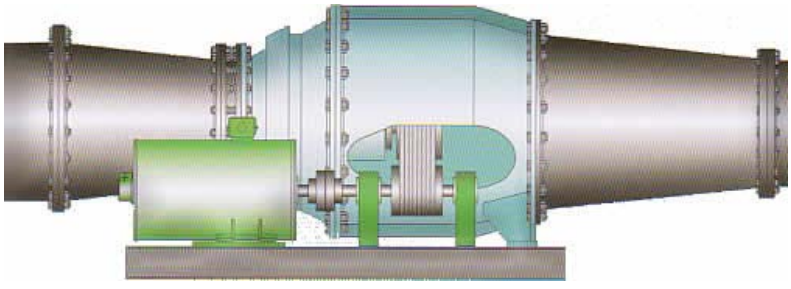
Hydro-eKIDS Type S

Discharge 0.1 ~ 0.3 m^3/s
Head 2 ~ 15 m
Power 5 ~ 25 kW
Dimension 1260L x 600D x 1000H



Hydro-eKIDS Type M

Discharge 0.1 ~ 1.4 m^3/s
Head 2 ~ 15 m
Power 5 ~ 100 kW
Dimension 2050L x 111 OD x 1700H



Hydro-eKIDS Type L

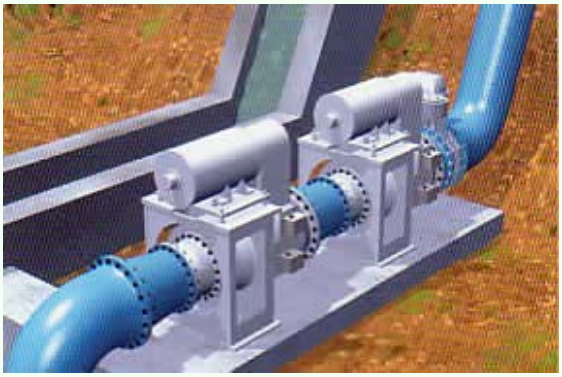
Discharge 1.0 ~ 3.5 m^3/s
Head 2 ~ 15 m
Power 10 ~ 200 kW
Dimension 4600L x 1600D x 2500H

ARRANGEMENT VARIATIONS

PARALLEL ARRANGEMENT

Parallel arrangement adopts plural units in parallel connection when water discharge volume exceeds the unit capacity. And either unit can stop the operation when the water volume diminishes occasionally.

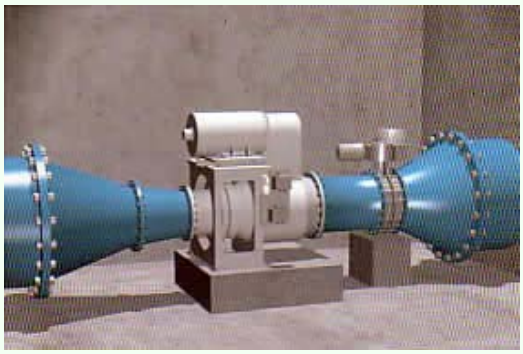
CASCADE ARRANGEMENT



Cascade arrangement adopts plural units in series connection when head exceeds the unit capacity of 15 meters. And each unit can shares water head equally.

INSTALLATION VARIATIONS

Siphon intake system has advantages to reduce initial civil construction cost.



Hydro-eKIDS can install city water intake pipe for primary treatment.

Hydro-eKIDS can install on platform of regulation dam gates.

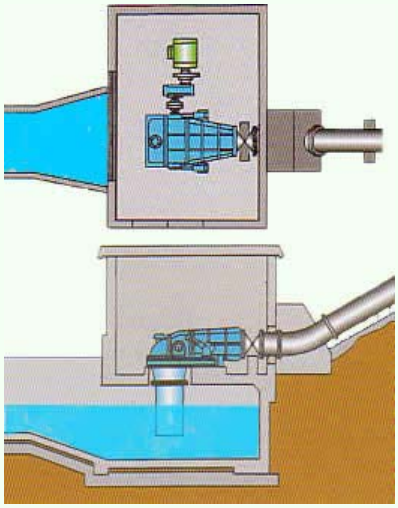
Typical layout of Hydro-eKIDS in water passage.

*Any building is required for protection and installation of panel.

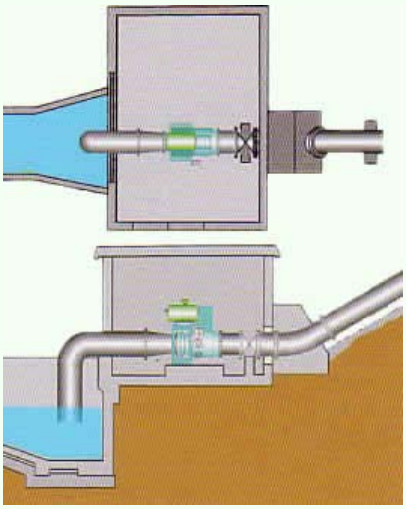
EASY TO HANDLE

Hydro-eKIDS mounts a generator on a turbine and forms compact body for easy handlings. No heavy duty vehicle needs to transport (for type S and M), lift nor set Hydro-KIDS for installation.

SIMPLE ARRARGEMENT



CROSS FLOW TURBINE



Hydro-eKIDS^{TM}

SIMPLE POWERHOUSE DESIGN

Conventional mini hydro equipment such as CROSS-FLOW type requires the tailrace under the powerhouse so as to divert flow downward which costs civil construction. Hydro-eKIDSTm designs straight water flow so as to locate the tailrace out of the powerhouse as far as civil design requires.

SIMPLE INSTALLATION

Conventional mini hydro equipment requires wide space each for a turbine and a generator, and precise alignment work at installation. Hydro-eKIDSTm has unit body to minimize the installation area as much as the turbine requires. And also no alignment work between a turbine and a generator (for type S and M) requires because of its constructional features.

IN CASE OF THE REHABILITATION PROJECT

Existed S-Type Tubular Turbine | Remove the Existed Turbine | Foundation | Connect to the Existing Pipe Line | Finish

SYMPLE AND COMPACT DESIGN

GENERATOR

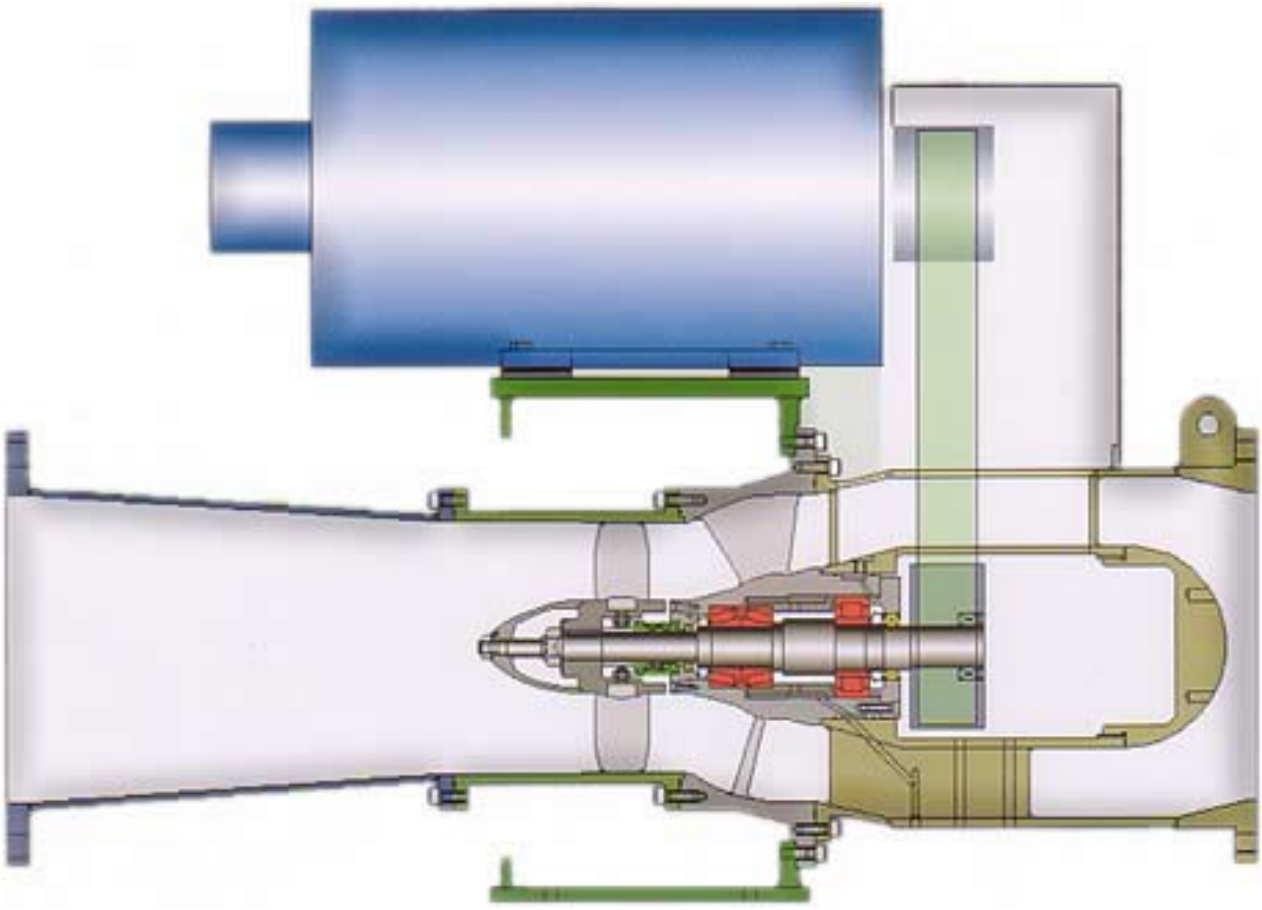
Optimum selections is made among induction or synchronous generators depending on the grid or independent from the grid.

Bearings are of standard ball-type and lubricated with grease.

RUNNER

Optimum selection is made among three types of runners depending on site condition such as head and cavitations.

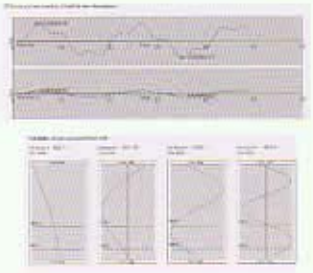
Runner blades and runner hub are of stainless steel castings.

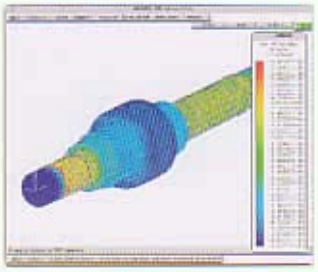


TURBINE SHAFT

Turbine shaft is of stainless steel.

Turbine shaft is designed with vibration analysis by FEM and also static strength analysis so as to withstand runaway speed in a same method as large capacity turbines.





TURBINE BEARING

Bearings combine with tapered roller type which withstands thrust and radial load, and cylindrical roller type which withstands radial load independently.

Bearings are lubricated with oil of VG-46 or equivalent.

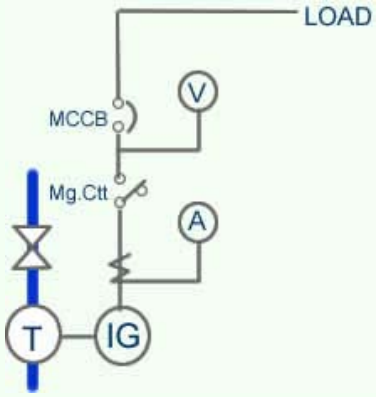
SHAFT SEAL

Shaft seal is mechanical type of self lubricating with liquid paraffin.

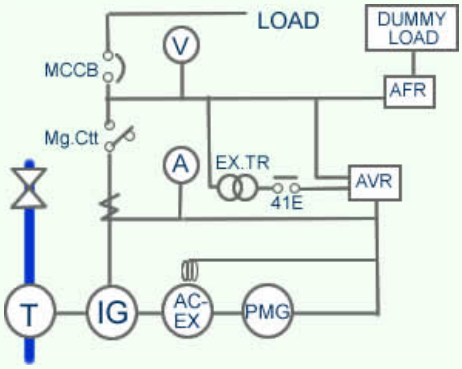
Materials are of ceramic or carbon.

TYPICAL SINGLE LINE DIAGRAM

CONNECTING TO THE GRID



INDEPENDENT FROM THE GRID



T=Turbine IG=Induction Generator SG=Synchronous Generator AC.Ex=AC Exciter
PMG=Permanent Magnetic Generator Mg.Ctt=Magnetic Contactor
MCCB=Molded Circuit Breaker AVR=Automatic Voltage Regulator
AFR=Automatic Frequency Regulator EX.TR=Exciter Transformer

STANDARD SPECIFICATION OF THE GENERATOR

INDUCTION GENERATOR

Frame Type	: Drip Proof
Rotor Type	: Squirrel Cage Type
Number of Pole	: 4 or 6 Poles
Synchronous Speed	: 1000 or 1500 min^{-1} (50 Hz)
	: 1200 or 1800 min^{-1} (60 Hz)
Type of Rating	: Continuous
Rated Voltage	:200 V (75 kW or below)
	:400 V (90 kW or above)
Number of Phases	:Three Phases
Frequency	: 50 Hz or 60 Hz

SYNCRONOUS GENERATOR

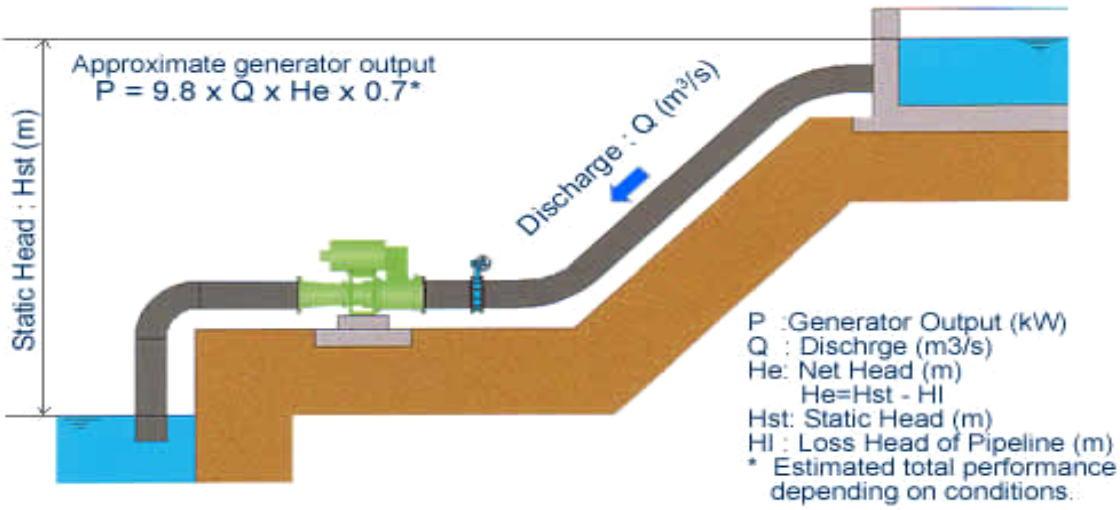
Frame Type	: Drip Proof
Rotor Type	: Revolving Field Type
Number of Pole	: 6 Poles
Synchronous Speed	: 1000 min^{-1} (50 Hz)
	: 1200 min^{-1} (60 Hz)
Type of Rating	: Continuous
Rated Voltage	: 200 V
Number of Phases	: Three Phases
Frequency	: 50 Hz or 60 Hz
Excitation System	: Brush-less Type

PROTECTION

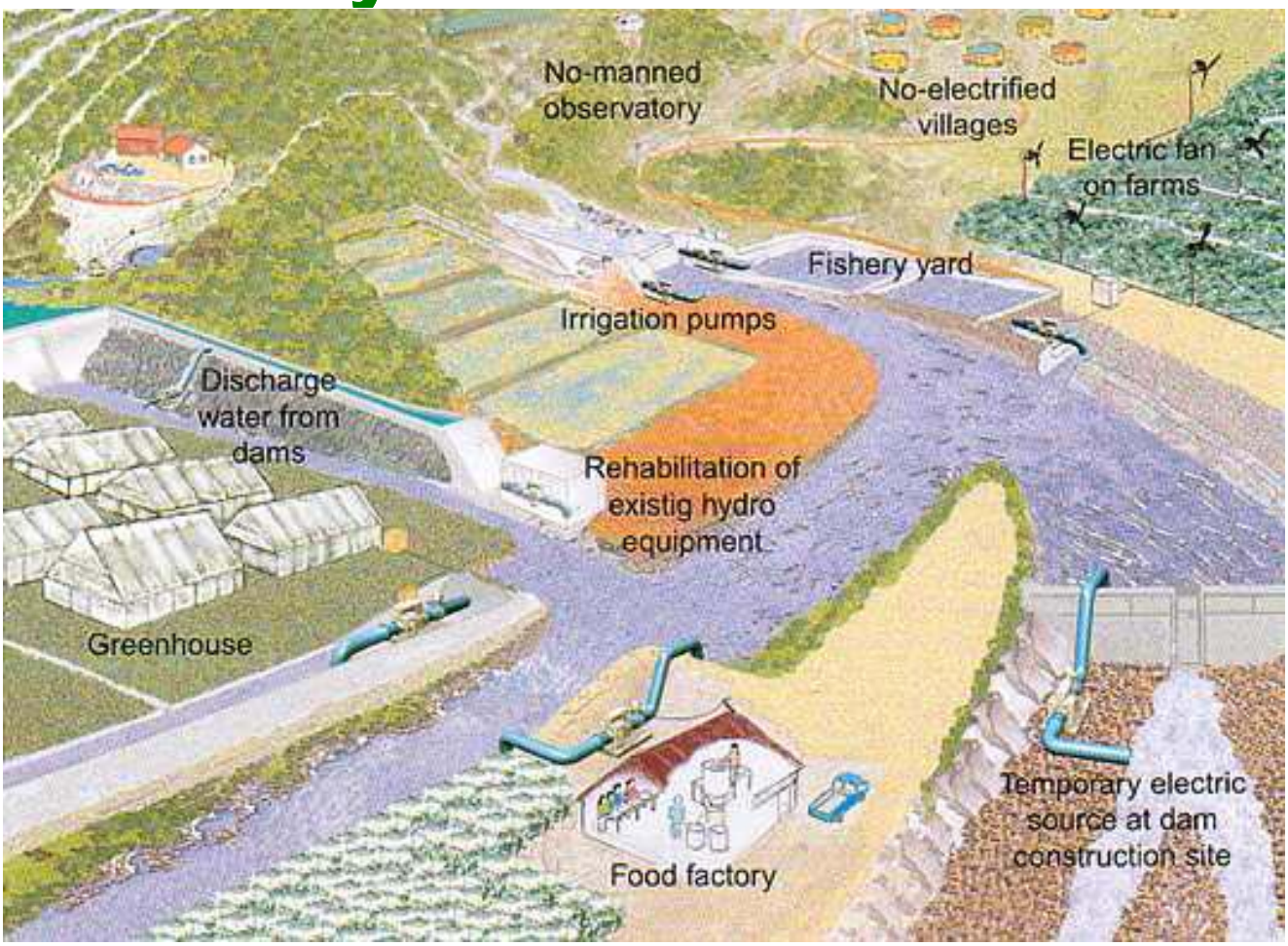
Short Circuit
Over Current
Grounding
Over Speed
Power Transmission Fault

MAINTENANCE

Turbine	Bearings	Every 5 years
	Mechanical Seal	Every 5 years
	Belt for Power Transmission	Every year
	Lubrication Oil	Every year
Generator	Bearings	Every 3 years



Hydro-eKIDS' World



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