

Integrated Micro Hydro turbines



Shanghai Witmake Industry Co., Ltd.

Introduction

Running water has power. A micro hydro turbine can turn a stream's potential energy into electricity, satisfying people's need for power in remote area. If you can find a stream/river with some water head and cubic water fluid nearby, you can benefit from it.



Integrated Micro Hydro Turbine

Micro hydro power is generally identified as system which power is under 100kw. Micro hydro could supply power solutions for the remote mountain residents/national park/rural village/school/military camp/outdoor camp/etc which possess micro hydro resources. 0.1kw power could satisfy lighting,TV,charge and other basic needs; higher power could make the house or village uses different electrical household appliances, meanwhile it could supply power for small plant for manufacture use.



Sample

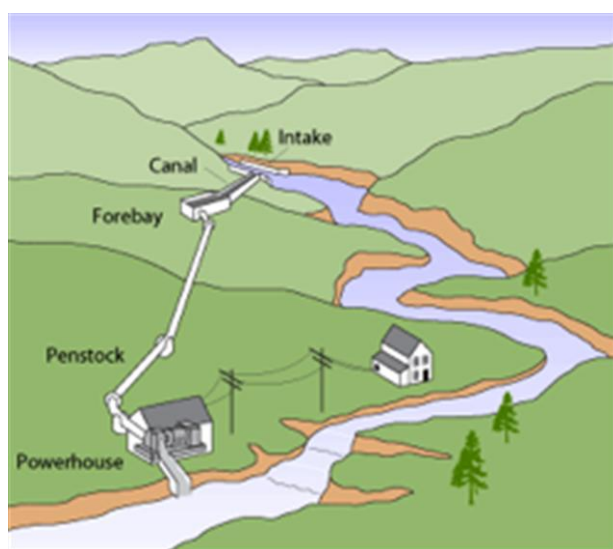
Clean, renewable and sustainable, micro hydro turbine can make you benefit from the power of the nature.

The lack of energy supplies in rural areas is a chronic problem. In many developing countries less than 10% of the rural population has access to electricity. Rural electrification through conventional means such as grid connection or diesel generators is very costly. Fortunately, abundant water resources for energy production are available in some poor countries.

Micro hydro is perhaps the most mature of the modern small-scale decentralised energy supply technologies used in developing countries. There are thought to be tens of thousands of plant in the “micro” range operating successfully in China, and significant numbers are operated in wide ranging countries such as Nepal, Sri Lanka, Pakistan, Vietnam and Peru. This experience shows that in certain circumstances micro hydro can be profitable in financial terms, while at others, even unprofitable plant can exhibit such strong positive impacts on the lives of poor people.

The advantage of using micro hydro turbine power systems:

1. Stable costs: Comparing with gas or oil power generation, the running cost is nearly free and stable. You can consider the fluctuant prices of oil and gas. Even the electricity price charged by the power company is arising all the time.
2. Short transmission lines. The micro hydro power system do not need long lines cause its users are nearby. Generally 800m is long enough.
3. Long running life. Generally a micro hydro system could run for over 20 years, longer than other power generation systems. In some places, using micro hydro power can also get public finance encourage policy support.



Schematic plan



A inclined micro hydro turbine installed in the rural district.



In the picture there is a XJ14-0.2DCT4-Z inclined micro hydro turbine. By installing this turbine, we solved the problem of lacking electricity for the resident.

Water head : 12 m
Flow rate: 0.003m³/s
Output: 200w

Brief View

Although we can sort micro hydro turbines by its type, we think it is better to sort them by usage. We sort them into 3 kinds: home use, village use and factory use. Special turbines could be tailored by sending us the parameters of the local stream.

Home use

This category covers turbines under 800w, single-phase.

Water head: 4-18m

Flow rate: 0.003-0.05m³/s



XJ Series
Inclined micro hydro turbine
Single nozzle



GD Series
Tubular type micro hydro turbine



New type
Tube type micro hydro turbine



ZD Series
Kaplan type micro hydro turbine

Village use

This category covers turbines over 800w, single-phase.

Water head: 4-35m

Flow rate: 0.08-0.165m³/s



XJ Series
Inclined micro hydro turbine
Single nozzle



GD Series
Tubular type micro hydro
turbine



XJ Series
Inclined micro hydro turbine
Double nozzles



ZD Series
Kaplan type micro hydro
turbine



HL Series
Francis type Micro hydro
turbine

Industry use



XJ Series
Inclined micro hydro turbine
Double nozzles



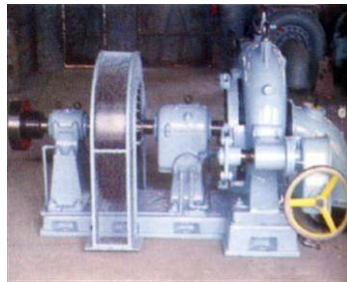
SJ Series
Double Impulse type micro
hydro turbine



SL Series
Double wheel pelton type
micro hydro turbine



HL Series
Francis micro hydro turbine



HL Series
Francis micro hydro turbine
horizontal

Specifications

Below table shows parameters of some of our products. 220V or 400V ,50HZ
More turbines will be customized base on order.

Item No.	Model	Water head (m)	Flow (M ³ /s)	Generator (W)	Phase	Speed (r/min)	Inlet DN (mm)
Home use							
1	XJ14-0.2DCT4-Z	10-14	0.003-0.004	200	Single Phase	1500	50
2	XJ14-0.3DCT4-Z	12-14	0.003-0.005	300	Single Phase	1500	50
3	XJ18-0.5DCT4-Z	12-18	0.005-0.007	500	Single Phase	1500	50-75
4	XJ18-0.75DCT4-Z	14-18	0.005-0.008	750	Single Phase	1500	75
5	QS-LZ-12-0.55KW	2-5	0.020-0.050	550	Single Phase	1500	150-250
Village use							
6	XJ22-1.1DCT4-Z	16-22	0.008-0.010	1100	Single Phase	1500	100
7	XJ22-1.1DCTH4-Z	15	0.010-0.015	1100	Single Phase	1500	125-150
8	XJ25-1.5DCT4-Z	18-25	0.008-0.011	1500	Single Phase	1500	125
9	XJ25-1.5DCTH4-Z	15	0.012-0.018	1500	Single Phase	1500	125-150
10	XJ25-3.0DCT4-Z	25-35	0.015-0.019	3000	Single Phase	1500	125-150
11	XJ25-3.0DCTF4-Z	18-20	0.018-0.030	3000	Single Phase	1500	150
12	XJ28-6.0DCT4/6-Z	28-35	0.030-0.038	6000	Single Phase	1500	150-200
13	XJ28-6.0DCTF4/6-Z	18-20	0.038-0.050	6000	Single Phase	1000	200
14	XJ30-10DCT4-Z	30-38	0.040-0.050	10000	Single Phase	1500	200-250
15	XJ30-10DCTF4/6-Z	25-30	0.050-0.060	10000	Single Phase	1000	200-250

Integrated Micro Hydro Turbine

16	DG11-3.0DC T 4-Z	11	0.045	3000	Single Phase	1500	150
17	GD-WZ-20-3KW	4	0.136	3000	Single Phase	1000	250
19	GD-WZ-20-5KW	6	0.151	5000	Single Phase	1500	300
20	GD-WZ-20-6KW	7	0.156	6000	Single Phase	1500	300
21	GD-WZ-20-8KW	9	0.161	8000	Single Phase	1500	300
22	GD-WZ-20-10KW	11	0.165	10000	Single Phase	1500	300
Industry use							
23	XJ30-12SCTF4-Z	28-35	0.050-0.060	12000	Three Phase	1500	200-250
24	XJ30-15SCTF4/6-Z	30-40	0.060-0.070	15000	Three Phase	1500/1000	200
25	XJ30-20SCTF4/6-Z	30-45	0.060-0.100	20000	Three Phase	1500/1000	250-300
26	XJ38-30SCTF4/6-Z	38-45	0.090-0.120	30000	Three Phase	1500/1000	250-300

Notice:

We customize micro hydro turbine systems based on customer's local situations(water head and flow rate), and can adjust the product's voltage and frequency as well.

Applications

Household electronic



Lighting



Refrigerator



TV



Washing machine

With micro hydro, you can generate power for household use, such as light, washer, TV, refrigerator, etc.

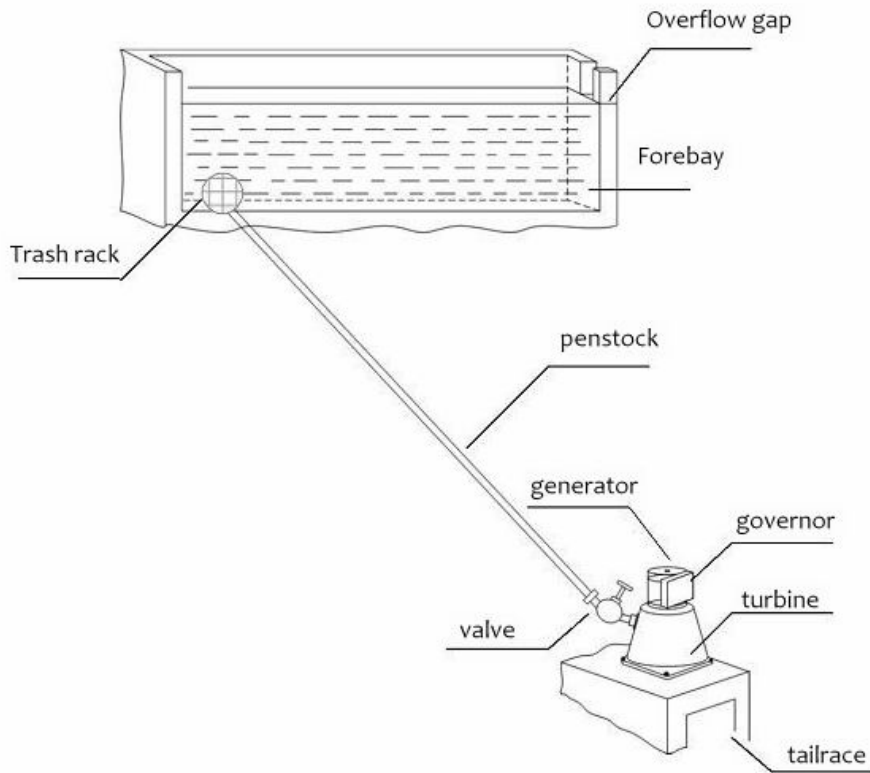
Some of the African buyers buy micro turbine to refrigerate the beer. In their words, they "can bear no light, but they could not bear having no cold beer".

Small mill production

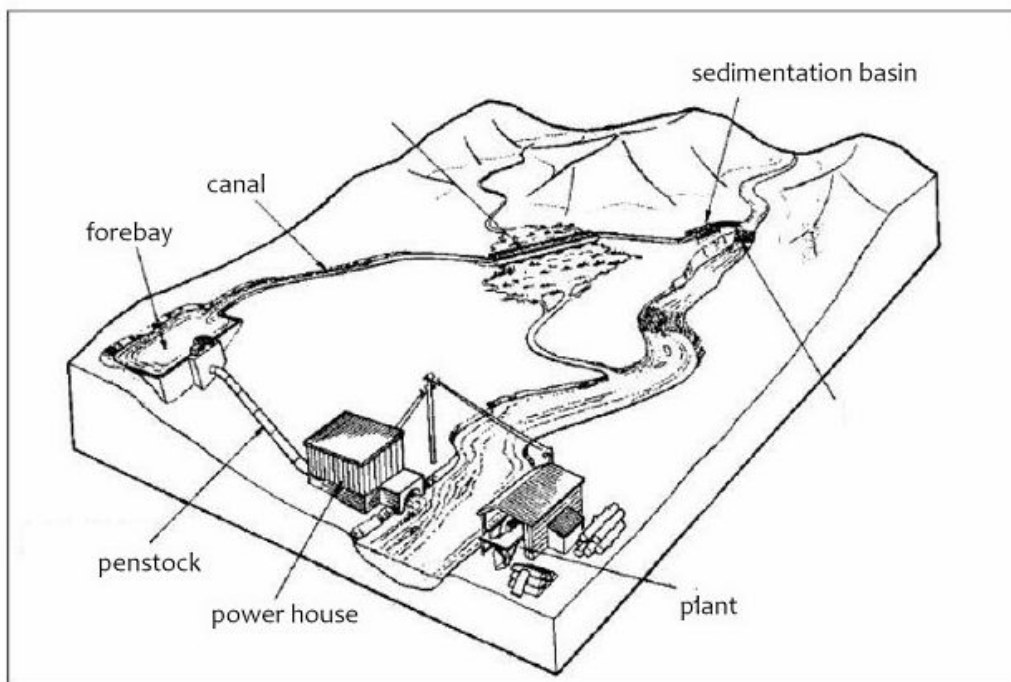


By using electricity generated by micro hydro turbine set, the local people can develop local industry which could not be done before due to out of the grid.

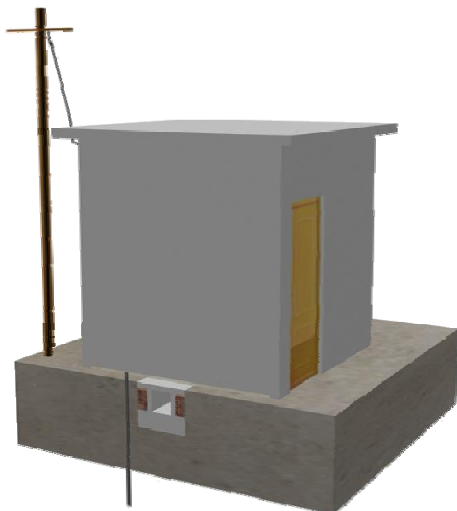
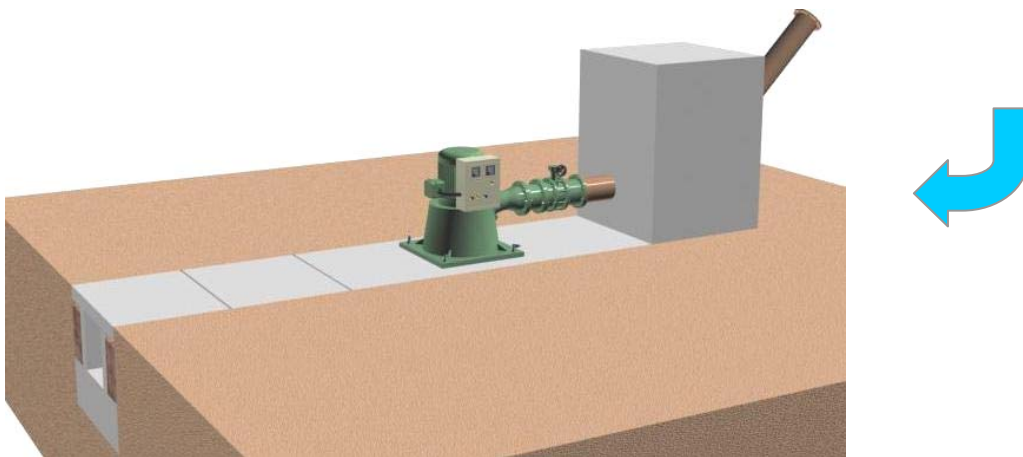
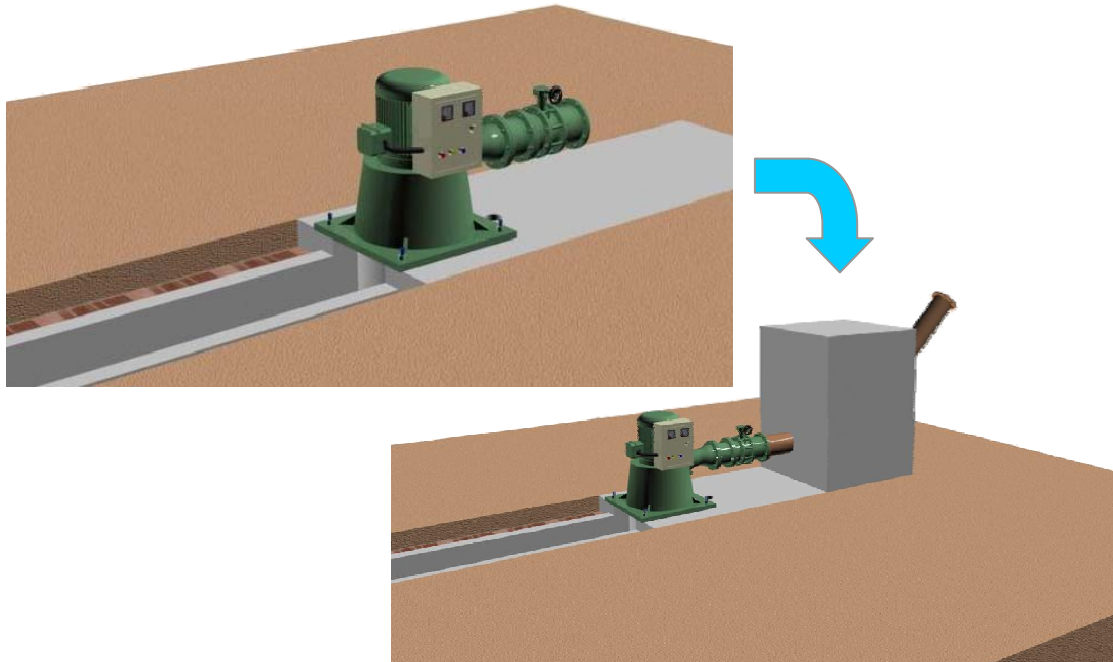
Install



Typical installation of a inclined micro hydro turbine



Micro hydro power house sketch





Sample: 10kw inclined hydro power station

This power station utilize the irrigation drain water by installing a XJ30-10DCT4-Z hydro turbine set. Its power is used for the nearby families. This type turbine has two nozzle. By cut off one nozzle, the power turns to a half, and water consumption turns to a half, too.

Parameters: Water head: 40 M

Flow rate: 0.04cubic meters per second.

Output :10kw

Volume of forebay: 200 cubic meters.

Penstock:DN 200, cement pipe.

Q&A

How does it work?

Water from the river is channelled through a settling basin, which helps to remove sediment that could harm the turbine. The water then flows into the Forebay Tank where it is directed downhill through a pipe called a penstock. When the water reaches the bottom, it drives a specially designed turbine to produce the electricity.

What does it cost?

Costs vary depending upon the particular project, but as a rough guide, these projects cost just over \$1200 per kilowatt of power generated. So a system with a capacity of six kilowatts - enough to drive a mill and provide electric light to a community of 20 families - would cost about \$8000 (The cost depends on local area economy).

Once the system is in operation, local people pay a small charge to use the electricity. This covers maintenance and the eventual cost of replacement.

Why is it needed?

Of course, every community's particular needs are different. But in general, access to energy is a vital stage in the development of remote villages like these.

It can lead to swift and significant improvements in education, sanitation, healthcare and the overall standard of living. These benefits are achieved both directly - as in the provision of light - and indirectly - as the time and money that people save is redirected into other projects.

How long will it last?

Micro-hydro systems like these are designed to operate for a minimum of twenty years if they are properly looked after. And by making a small charge for use, communities can accumulate enough money to pay for the replacement of the unit at the end of its useful life.

Once schemes are set up, they should continue to function indefinitely without any more external funding.

What's the environmental impact?

Unlike traditional power stations that use fossil fuels, micro-hydro generators have practically no effect on the environment. And because they don't depend on dams to store and direct water, they're also better for the environment than large-scale hydro-electric stations.

In fact, by reducing the need to cut down trees for firewood and increasing farming efficiency, micro-hydro has a positive effect on the local environment.

What can we do if we don't have enough flow?

You can build a reservoir to store the water and generate power when needed.

For example, there is a micro water source near the resident. During the dry season it only have a $0.0006 \text{ m}^3/\text{s}$ flow, and the water head is 14 meter. How to design a micro hydro system to solve the lighting problem?

Calculation as below:

Each day we can storage water: $0.6 \times 3600 \times 24 = 51840 \text{ kg} = 52$ cubic meters.

1. Choose 300w type micro hydro turbine set. It consume 3 kg waters per second
2. Water consumption in a hour: $3 \times 3600 = 10.8$ cubic meters.
3. Power period= $52/10.8 = 4.8$ hours.
4. Generator output= $14 \times 3 \times 5 = 210 \text{ w}$

Thus we can satisfy the basic lighting needs for a family.

According the above calculation, we need to build a 30CMS pond($52 - 5 \times 0.6 \times 3600$).

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