# NTN Micro Hydro Turbine

CAT.No.8409-III/E

# Looking to convert an irrigation channel water flow into energy?

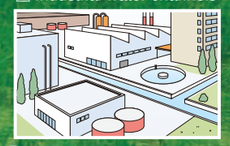

## High-efficiency power generation by simply placing over irrigation channels
## NTN Micro Hydro Turbine is an innovation in green energy

Comparing hydroelectric to solar light power generation, the NTN Micro Hydro Turbine has minimal output fluctuations during the day, evening and throughout the year. It also has a high energy conversion efficiency and is a reliable source of power. This unit is targeting the micro hydro turbine sector of hydroelectric power generation. Irrigation channels for agricultural and industrial purposes can now be used as a green energy resource, and the NTN Micro Hydro Turbine is an innovative power generator developed to convert this energy efficiently into usable power.

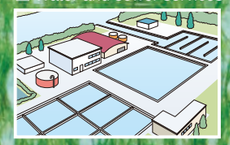
**Can be installed in:**

☐ Agricultural irrigation channels

☐ Industrial water channels



☐ Water and sewer services



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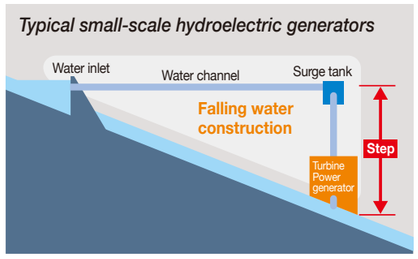
*The Micro Hydro Turbine can be easily set over irrigation channels*



## No falling water construction is required! Simply place over an irrigation channel

*Typical small-scale hydroelectric generators*





## Falling water needed for ordinary small-scale hydroelectric generators is not required, drastically reducing construction and installation costs.

Ordinary hydroelectric generators operate using the difference in water levels when dams are built across water channels, and extensive construction costs are required. NTN Micro Hydro Turbine requires no falling water and generates power by simply being placed over a water channel. Multiple units can also be installed in line or parallel to increase the amount of power generation.
Converting water in irrigation channels into energy – the NTN Micro Hydro Turbine is truly an innovation in green energy.

## Energy produced locally for local consumption.

There is a vast number of agricultural irrigation channels installed in regions all around the world. Small rivers and streams, water and sewer services, as well as industrial water channels, are also a vast source of potential energy. Installation of the NTN Micro Hydro Turbine in regions with such resources can form part of a community-based power generation system where local irrigation channels and streams can be used to generate power for local energy needs.
This can also limit the amount of energy loss normally incurred during power transmission over long distances from remotely located power stations. NTN Micro Hydro Turbine is a form of energy produced locally for local consumption. It can help stimulate industry and economy in the local community as a reliable source of energy.

### ☐ On-site power source for farms

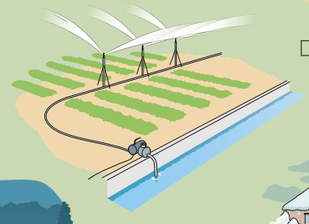
Ideal as a power source for pumps, electric fences, streetlights, greenhouses, snow-melting and other uses; it can also be used as an emergency power supply.

### ☐ Factory and office power source

Useful as a backup power supply for factories and offices.

☐ Streetlights

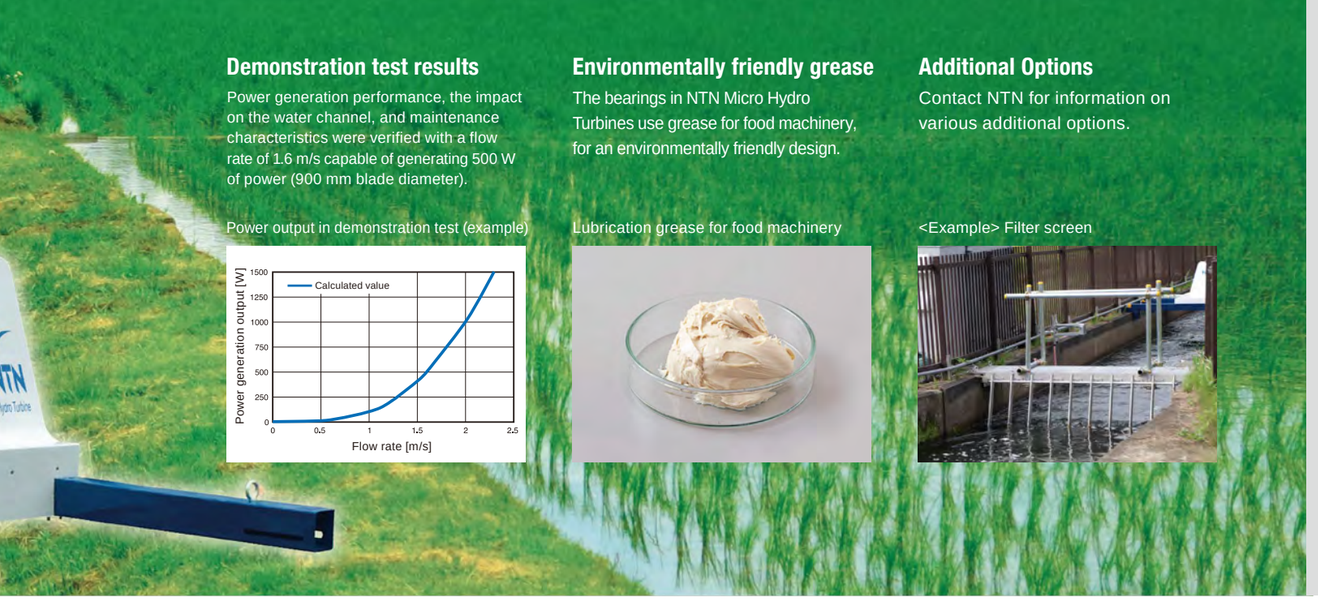
☐ Pump operation



☐ Electric fences to avoid wild animals

☐ Power supply for greenhouse lighting

☐ Power supply for snow-melting facilities



### Demonstration test results

Power generation performance, the impact on the water channel, and maintenance characteristics were verified with a flow rate of 1.6 m/s capable of generating 500 W of power (900 mm blade diameter).

Power output in demonstration test (example)




### Environmentally friendly grease

The bearings in NTN Micro Hydro Turbines use grease for food machinery, for an environmentally friendly design.

Lubrication grease for food machinery



### Additional Options

Contact NTN for information on various additional options.

<Example> Filter screen



## ☐ Green Energy Products of NTN

NTN, celebrating its 100th anniversary in 2018, is developing business in the green energy field by combining technology and know-how we have developed over the years. Products under development include the NTN Vertical Axis Wind Turbine, NTN Hybrid Street Light and NTN Micro Hydro Turbine that utilize highly efficient blade technology to optimize power generation. NTN is helping to resolve the world's environmental issues and energy problems by supplying clean energy efficiently and without emitting greenhouse gases.

Product Variations of Green Energy Products

**NTN Hybrid Street Light**
Available since July 2016

**NTN Micro Hydro Turbine**
Available since July 2017

**NTN Vertical Axis Wind Turbine**

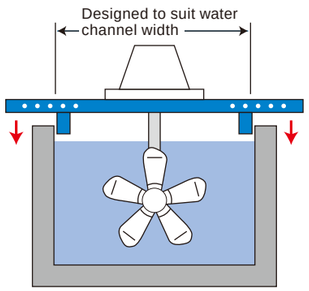
## 01 Easy installation to minimize cost and time

### Drastically reduce installation costs

Installation of ordinary small-scale hydroelectric generators requires the building of a dam to store the energy of upstream water. This increases overall installation cost. NTN Micro Hydro Turbines do not require major construction work and can drastically reduce installation costs.

### Install almost anywhere

NTN Micro Hydro Turbines are designed with beam lengths to suit the width of the water channel and they can be installed almost anywhere. Simply place the turbine on the walls of any channel with enough depth and flow for power generation.




### Quick and easy installation

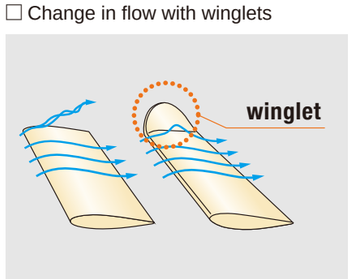
Installation can be completed in less than an hour with one mobile crane and three workers (including crane operator).

## 02 High-efficiency power generation to harness the energy of water

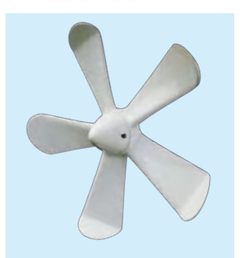
### Reduce energy loss

The proprietary fan-like blades harness the energy in water further away from the shaft center. The resultant torque turning the rotating shaft is increased and energy captured from the moving water is maximized. Blade tips use a proprietary shape called winglets that curve inward at a fixed ratio that limit energy loss caused by vortices at the tips and result in large amounts of energy generation.

☐ Change in flow with winglets




☐ Turbine blades

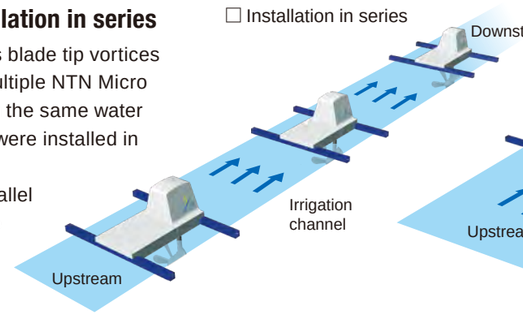


## 03 Installation can be arranged in series and in parallel for optimum power generation

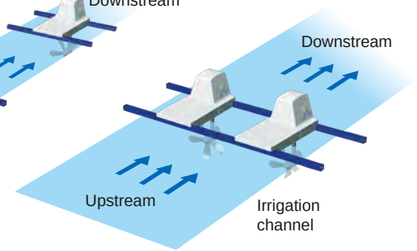
### Power generation with installation in series

The proprietary blade shape limits blade tip vortices and interruptions of water flow. Multiple NTN Micro Hydro Turbines can be installed in the same water channel. Up to 10 units in series were installed in demonstration tests.
To increase the power output, parallel arrangement can be also possible to the channel width.

☐ Installation in series




☐ Installation in parallel



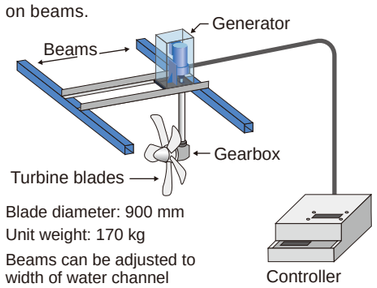

## ☐ Specifications

| Blade Diameter | Power Output | Flow Rate | Recommended Water Channel |
|---|---|---|---|
| 600mm | 0.4kW | 2m/s | Width: 700 mm or more<br>Water depth: 700 mm or more |
| 900mm | 1.0kW | 2m/s | Width: 1000 mm or more<br>Water depth: 1000 mm or more |
| 1300mm | 2.0kW | 2m/s | Width: 1400 mm or more<br>Water depth: 1400 mm or more |

*Unit specifications are subject to change without notice.

## ☐ Turbine structure

The unit consists of a power generator, gearbox and turbine blades supported on beams.




Blade diameter: 900 mm
Unit weight: 170 kg
Beams can be adjusted to width of water channel

## ☐ Installation conditions

Beam length will be designed to suit the water channel width after checking the site.

## ☐ Maintenance and manufacturer warranty

The unit will be repaired free of charge in accordance with the warranty agreement during the warranty period (1 year).

☐ Inquiry

NTN corporation
Green Energy Products Division

Business Development Department
5-105 Hidamarinooka, Kuwana-shi, Mie 511-0867
Phone: +81- 594-33-1256
E-mail: green_energy@osa.ntn.co.jp

www.ntnglobal.com/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