Flat Belt Drive System: Hyper Flat Drive System

Eco Drive System with Top Energy-Saving Level!

The HFD (Hyper Flat Drive) is a high-efficiency power transmission system that meets the needs of the entire Earth environment, such as energy-saving and reduced CO_2 emissions.

Product Concept

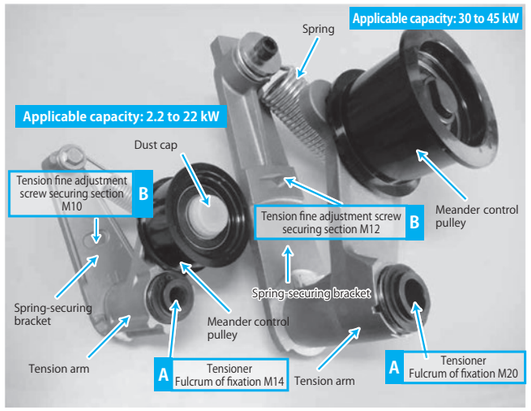
We have developed a high-efficiency belt power transmission system (HFD) using an anti-meander device and a newly designed flat belt that aim at energy-saving and reduced CO_2 emissions and that were developed as items that can smoothly transmit power with a flat belt at high efficiency.

Product Features

- Transmission efficiency improvement and operation at an optimum tension allow you to expect a significant energy-saving effect and reduced CO_2 emissions.
- The longer service life and tensioning by the tensioner eliminate the need for maintenance.
- The thin belt and the resulting lower effect of distortion due to bending enable smaller pulleys and miniaturization.

Principles and structure of flat belt drive system (HFD)

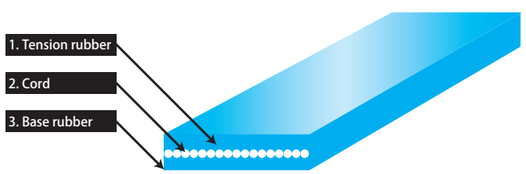
Device Structure



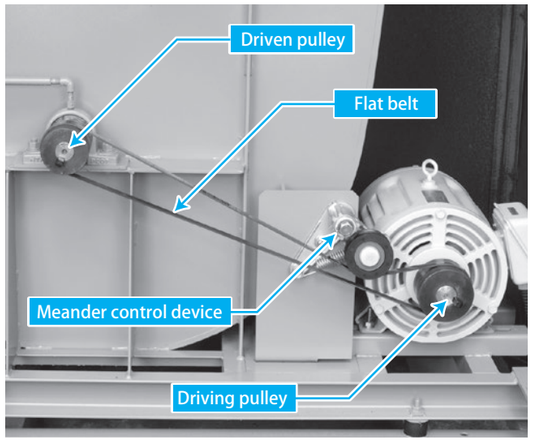
*The applicable capacities are guidelines.
*When you consider the use outside the range of the applicable capacity, please consult us.

This is a high-power-transmission and high-efficiency flat belt specification using the rubber and cord design techniques that were accumulated over many years in the automobile field.
By installing a pulley that controls the meander of the flat belt, the belt and the pulleys can autonomously control themselves, and by stably maintaining tensioning using the spring, a long service life and the elimination of the need for maintenance have become possible. The system can be easily installed by securing the sections A and B on the bracket as designed. By so doing, the system is designed to provide an appropriate tension.

Flat belt Structure



Mounting Example



Adoption Track Record

Air-conditioning machines, blowers, compressors, robotics field, etc.

Range of Manufacturable Sizes

■ Flat belt

● List of belt standard lengths (Unit: mm)

1000	1060	1120	1180	1250	1320
1400	1500	1600	1700	1800	1900
2000	2120	2240	2360	2500	2650
2800	3000	4000	4250	4400	4500
4750	5000	5200			

● The standard belt widths are 10 mm, 15 mm, 20 mm, 25 mm, 30 mm, 35 mm, 40 mm, and 45 mm, totaling eight types.
● The standard belt thickness is 2.6 mm (belt standard lengths: 1000 to 3000 mm) and 3.0 mm (belt standard lengths: 4000 to 5200 mm), totaling two types.

■ Meander control pulley

The standard pulley widths are 30 mm, 40 mm, and 75 mm, totaling three types.

■ Flat pulley

Driving and driven pulleys for the HFD system require flat pulleys.

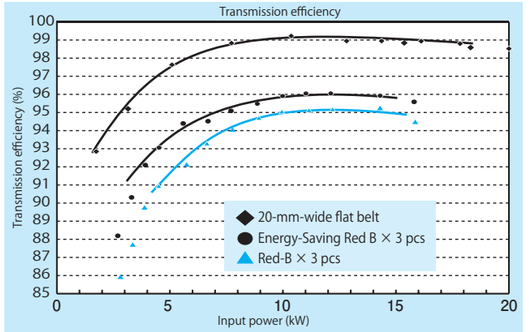
*Flat pulleys are available from us; please consult us.

■ Flat belt system design

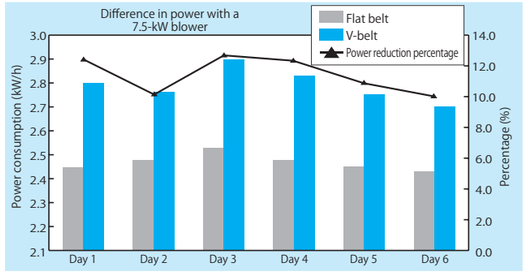
The current setting range is aimed at 2.2 to 45 kW (75 kW). For a capacity of 45 kW or more or outside the range of the applicable capacity, please consult us.
We will consult with you on energy-saving, pulley miniaturization, and size reduction in accordance with the operating conditions and layout drawings.

Verification Result for Flat Belt Drive System

■ Power transmission efficiency verification result



■ Power consumption verification result

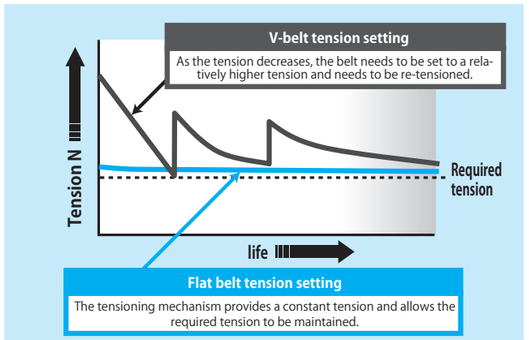


■ Energy-saving and CO_2 emissions reduction effects

The Type-A three V-belts Red of the 7.5-kW blower were replaced with a single 10-mm flat belt!
(Calculated with an operating rate of 10 hr/day and 300 days of operation annually)
<**Energy-saving effect**> With approx. 0.3 kW/h and an electricity cost of 12 yen/kWh, the effect in value = 12 yen × 0.3 kW/h × 10 h/day × 300 days/year ≈ 10,800-yen/year reduction in cost.
<**Amount of CO_2 emissions reduced**> CO_2 conversion factor = 0.378 kg CO_2/kWh
Amount reduced: 0.378 × 0.3 kW/h × 10 h/day × 300 days/year ≈ 340-kg/year reduction in CO_2 emissions
Note: The CO_2 conversion factor used the average value for general electric utilities by the "Calculation method of greenhouse gas emissions from utilities (draft proposal)" by the Global Environmental Bureau of the Ministry of Environment in July 2003.

■ Elimination of the need for maintenance

(Compared to V-belts: about 2.5-fold service life)
The longer service life and tensioning by the tensioner have eliminated the need for maintenance.



As the flat belt is thin, it is less affected by bending distortion when it is wrapped around a pulley. Therefore, even if it is affected by reverse bend, its service life is as long as approximately 2.5 times that of V-belts. The tensioning mechanism eliminates the reduction in tension that used to occur with V-belts and allows a tension close to the required tension to be maintained at all times; making the belt maintenance-free and achieving a longer service life.

■ Compact design possible

(Compared to V-belts: about 40% reduction)
The thinness and the little effect of distortion by bend eliminate the effect on durability even when reverse bend is applied, allowing compact designs.

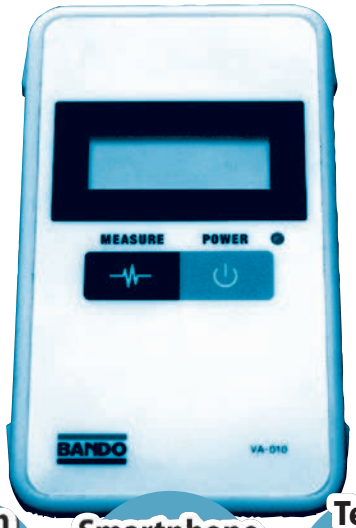
		Previous system	Flat belt drive system
Belt specification		V-belt Red	Flat belt
(Example of an experiment at 11 kW)		Type B × 3 pcs (50.1 mm)	20 mm-wide
Pulley dia.	Pulley dia. on driving motor side	ϕ133 mm/1750 rpm	ϕ115 mm/1750 rpm
	Pulley dia. on fan side	ϕ710 mm	ϕ612 mm
Center distance		1220 mm	500 mm
Pitch length		3810 mm (150 inches)	2542 mm

Precautions for Use

- Applicable model: For driving blowers and compressors (For applications, please consult us.)
- Applicable capacity: 2.2 to 45 kW (75 kW) (For outside this range, please consult us.)
- Operating temperature range: -10°C to 60°C
- For HFD installation layout, we will provide a recommend design based on design layout drawings and operating conditions.
- Other environmental conditions that should be avoided
  ① Operation in a condensing condition
  ② Use in a dusty environment
  ③ Use with 6P motors other than inverters
  ④ Use with insufficient frame strength
  ⑤ Use in an environment that may be directly exposed to rainwater
  *In particular, never let rainwater or the like into the sliding section of the fulcrum of the tensioner.
  ⑥ For use in an environment in which water or oil may adhere and in environments described in ② and ⑤, provide protection by covers or the like.
  ⑦ For HFD installation, we will provide guidance separately, including settings such as misalignment.

Next-Generation Tension Gauge [Natural Vibration Measuring Instrument]

TENSION MASTER



Tension Master (Natural vibration measuring instrument) Capable of measuring natural vibration

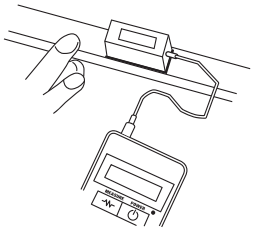
Smartphone Download the dedicated app

Tension gauge Capable of measurement on the highest level in the industry

Features

① As vibrations can be measured directly with the acceleration sensor, measurement can be performed even under a noisy environment.
(A sonic-type tension gauge senses noise simultaneously with the microphone, making it likely to result in a measurement error.)
② Accurate measurement is possible even with a layout or belt type that emits low-frequency sound, which is difficult to measure with the sonic type.
③ Measurement accuracy on the highest level in the industry.
④ The calculation function software can be used with a smartphone (tablets can also be used).
⑤ It can also be used as a measuring instrument for natural frequency of equipment, machinery, or buildings.

How to Measure Frequency



Flip with a finger etc. to vibrate it.

Measurement accuracy

- Measurement range of natural frequency: 10 to 1000 Hz
- Measurement accuracy of natural frequency: ±1%
- Sampling frequency: 3.2 kHz
- Operating ambient temperature: -10°C to 60°C

How to Use

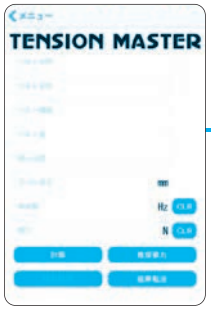
Download the app into your smartphone.

*The app is available on Google Play and App Store. Calculation on the website is also possible.

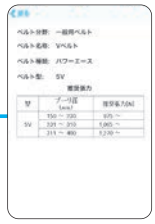
Pattern 1 Tension calculation by selecting a belt

① Input operating conditions.

② Measure the frequency with the Tension Master.→ Input the frequency and calculate the tension.



③ Input a target tension (recommended tension) and calculate the target frequency.



Pattern 2 Tension calculation from the unit weight

① Input a unit weight and span length of the belt.

② Measure the frequency with the Tension Master.→ Input the frequency and calculate the tension.

③ Input a target tension (recommended tension / design calculation) and calculate the target frequency.