

**HEIDON**



# THREE-ONE MOTOR

General Catalogue

The consideration for our products is included in [Three-one] of [Three-one motor]



# 1 Safety

We believe that the unsafe products do not have a value as a product. Therefore, our company always spends a lot of money for the safety. The spark is prohibited in the laboratories used in special environment. There is a possibility that laboratory will catch fire due to the spark from motor. Three-one motor has brushless motor specially designed for agitator to avoid the sparks. Moreover, it is encapsulated type agitator with importance given to safety and external air is difficult to enter into it. Thermal protector is set into the motor to prevent combustion loss and current limiter circuit is set on electrical equipment part which prevents accidents due to overheat and over current without stopping agitator operation.

# 2 Satisfaction

Three-one motor not only rotates the agitator wing safely. It has hand start chuck which can be tightened with the hand even if no chuck handle. The idea of HEIDON of free joint, with which position of agitator can be changed freely, is incorporated. Agitator wings suitable to usage can be selected and the agitator suitable to the usage can be configured from accessory. Our company is promoting the further research on the efficiency of agitator and we also accept the queries related to agitation from customers.

# 3 Aftercare

We provide free of cost maintenance for breakdowns within the rules of our company and subsequent maintenance at actual cost. You can use our products safely forever.

スリーワンモータ

**THREE-ONE MOTOR** General Catalogue

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# The 12 Concepts of Three-One Motors

## 1. Drive Shaft

The drive shaft with gears conveys the rotation of the powerful brushless motor quietly and with reduced vibration to the agitator blades. The gear material quality, ratios, and fixing methods make best use of our company's experience and actual results. The quietness of our highly regarded Three-one Motors is due to the incorporation of these technologies. Because the drive shaft is hollow, the vertical position matching of the agitator blades can be easily carried out.

## 2. Brushless Motor

Brushless motors are utilized that do not create sparks. Inside the motors, there are no connecting parts such as brushes and commutators. The maintenance that was formerly required due to brush wear has become unnecessary. These powerful brushless motors have been developed specifically for use with Three-one Motors through long-period research for the demanding purpose of agitation.

## 3. Body

The body utilizes a lightweight and highly airtight aluminum die-cast structure. An O-ring is used in the main connection part, which has greatly increased the airtightness. The basic design which prioritizes ease of use has not changed since the first model was released in 1966. The narrow width enables use even on crowded laboratory benches.

## 4. Hand-tightening Chuck

It is possible to gently fix the agitation shaft without using a chuck handle. The use of the collet method realizes a high holding strength while limiting core vibration, and also supports forward/reverse operation. In addition, collet options for shafts with diameters of 2mm, 4mm and 6mm, and stainless steel drill chuck specification models are also available.

## 9. Safety Measures

These measures prioritize cost with regard to safety.

- 1. Safety Cover:** During agitation work, this prevents accidents such as the situation where operators' hair becomes caught in the agitator.
- 2. Current Control Circuit:** This controls the excess current to the motor as a result of overloading. It avoids stoppages caused by overloading by reducing the rotation speed to allow the agitating work to continue.
- 3. Thermal Protector:** This protects the motor internal parts from burnout accidents.

## 10. Noise Countermeasures

In laboratories where there are many instruments arranged together, the problem of noise must be given high priority. HEIDON agitators do not output noise that would adversely affect other instruments, and mis-operation will not easily occur even if the agitators receive noise emitted by other instruments. HEIDON gives great consideration to these problems that are not visible to the operator.

## 5. Free Joint

The agitator main unit head can be tilted through  $\pm 30^\circ$  from the vertical, and can be rotated through  $360^\circ$ . By loosening the fixing screw, the blades can easily be set to the agitating points. When using glass shafts and agitating seals, loosening the fixing screw will prevent unreasonable force from being exerted on the glass, which will improve safety. The idea for this free joint was inspired by the concertina-type shape of a traditional Japanese Odawara-style lantern.

## 6. LCD Panel

In addition to the previously incorporated rotation meter that allows setting of a minimum resolution of 1rpm, a torque indicator that allows understanding of the loading during agitation, an overload warning indicator which indicates overloading, and an indicator that is convenient during testing have been added as considerations to ensure the satisfaction of customers.

## 7. Forward/Reverse Switch

During agitation work, the rotating direction can be changed by pressing the switch. When using tilted-type blades, the shaft direction flow can be reversed by switch pressing, which will eliminate the donut-shaped unmixed area that is generated in medium and high viscosity agitation. Further, the reduction in agitating efficiency due to the circumferential flow generated during low-viscosity agitation can be eliminated by the turbulence caused by the switching. All instrument models incorporate auto forward/reverse rotation functions using a timer.

## 8. Switch Volume Dial

The ON/OFF switch and rotation speed setting dial are unified. This way of thinking regarding safety has been adopted in all Three-one Motors since the first model was created in 1966, realizing an unnoticed ease of use during everyday work. Because the instrument starts at a slow speed when it is switched on, accidents resulting from sudden agitation will be prevented. The speed should then be gradually increased to the setting speed. The digital display also has a good response speed, which enables setting to be readily carried out.

## 11. Feedback

Agitation is an extremely demanding operation for motors due to the constant changes in loading that are received. Our powerful brushless motors that were developed specifically for Three-one Motors deliver nearly perfect feedback even for loading that is changing from moment to moment. The set rotation speed will be maintained within the rated range even when there are changes in the viscosity.

## 12. For Optimum Agitation

We are continuing to carry out research and development so that all customers can realize the objectives of their agitation work safely and with high efficiency. Please feel free to contact us regarding the agitation efficiency and equipment selection.

### Vertical Motion Rotating Agitator Z+ Series / Agitators with Torque Converters Te Series

BL300Z<sup>+</sup>, 600Z<sup>+</sup> / BL300Te, 600Te, 1200Te ..... P 8

### Can be used in any atmosphere / Circulating Stirrers

EP 700, 1800 / Stirrer 100 ..... P 9

### Accessories

Torque-meter Unit / Vacuum Stirrer / Drill Chucks / Air Purge / Safety Cover / Clamp Holder  
/ Collet / Assistant Pulley / Collapsible Stand ..... P10

### Agitator Blades and Agitator Shafts for Three-One Motor Agitators

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## BL Series

The series utilizes a maintenance-free brushless motor that was developed to handle demanding agitation situations.

The forward/reverse rotation function allows changing of the rotation direction to completely eliminate the ring-shaped unmixed area that is generated with one-directional agitation. When using tilted-type blades (square cross, propeller, etc.), the axis direction flow will also be reversed, enabling an even better effect to be achieved.

## BLh Series

The series utilizes a high output 70W brushless motor that was developed to handle demanding agitation situations.

These strong laboratory agitators generate twice as much torque as the BL series.

The automatic forward/reverse rotation function with timer allows changing of the rotation direction to eliminate the ring-shaped unmixed area that is generated with one-directional agitation.

## BLW Series

A 120W motor is utilized in the BLW Series with the purpose of agitating high viscosity liquids, and the torque has been further increased in this Three-One Motor.

Capable of supporting high viscosity levels that are not possible with the BL (35W) Series and BLh (70W) Series, this greatly increases the breadth of laboratory work that can be carried out. To also support experiments and production that were previously carried out, the rotation control (forward/reverse rotation switching, forward/reverse rotation timer) and ease of use are inherited from the Three-One Motor.

- The exceptional quietness will not interfere with the laboratory environment.
- During the agitation, even if there are changes in viscosity the set rotation speed will be maintained.
- Utilizes a powerful brushless motor that does not generate sparks.
- During agitating work, one-switch operation changes the rotation direction.
- Does not output noise that would adversely affect other equipment, and incorporates measures to prevent mis-operation even when affected by noise.
- Provided with protection equipment such as a current restricting circuit and thermal protector to protect against agitator motor overloading.
- Realizes twice as much torque from approximately the same size as the previous BL Series instruments, allowing high viscosity agitation and the use of large sized blades. (BLh Series)
- Utilizes a specially developed high-performance 120W brushless motor. agitation. The high rotation speed BL3000 has been added to the BLW Series to seek even higher viscosity (BLW Series)





## General Purpose Agitator

## BL Series

### BL300

High viscosity

Rotation Speed / 5 - 300rpm  
Rated To Torque / 0.9N/m (9.0Kgf/cm)

### BL600

Medium to high

Rotation Speed / 10 - 600rpm  
Rated To Torque / 0.5N/m (5.0Kgf/cm)

### BL1200

Medium to low

Rotation Speed / 10 - 1200rpm  
Rated To Torque / 0.3N/m (3.0Kgf/cm)

### BL3000

Low viscosity

Rotation Speed / 30 - 3000rpm  
Rated To Torque / 0.1N/m (1.0Kgf/cm)

Motor / DC Brushless Motor B Type Insulation 35W

Chuck / dia.8mm Collet-type Hand-tightening chuck

Safety Equipment / Current Restricting Circuit, Thermal Protector: Motor Coil Temperature 90deg C, Safety Cover

Power Supply and Consumption / Single Phase 100V±10% Joint Use 50/60Hz 88VA

Dimensions / Main Unit: W125mm x D172mm x H196mm

Weight / 2.2Kg



## High Power General Purpose Agitator

## BLh Series

### BLh300

High viscosity

Rotation Speed / 5 - 300rpm  
Rated To Torque / 1.8N/m (18.0Kgf/cm)

### BLh600

Medium to high

Rotation Speed / 10 - 600rpm  
Rated To Torque / 1.0N/m (10.0Kgf/cm)

### BLh1200

Medium to low

Rotation Speed / 10 - 1200rpm  
Rated To Torque / 0.6N/m (6.0Kgf/cm)

### BLh3000

Low viscosity

Rotation Speed / 30 - 3000rpm  
Rated To Torque / 0.2N/m (2.0Kgf/cm)

Motor / DC Brushless Motor B Type Insulation (130deg C) 70W

Chuck / dia.8mm Collet-type Hand-tightening Chuck

Safety Equipment / Current Restricting Circuit, Thermal Protector: Motor Coil Temperature 90deg C, Safety Cover

Power Supply and Consumption / Single Phase 100V±10% Joint Use 50/60Hz 90VA

Dimensions / Main Unit: W125mm x D190.5mm x H209mm

Weight / 2.8Kg



## Mini-Plant-Class Agitators

## BLW Series

### BLW300

High viscosity

Rotation Speed / 5 - 300rpm  
Rated To Torque / 4.5N/m (45.0Kgf/cm)

### BLW600

Medium to high

Rotation Speed / 10 - 600rpm  
Rated To Torque / 2.2N/m (22.5Kgf/cm)

### BLW1200

Medium to low

Rotation Speed / 10 - 1200rpm  
Rated To Torque / 1.2N/m (12.5Kgf/cm)

### BLW3000

Low viscosity

Rotation Speed / 30 - 3000rpm  
Rated To Torque / 0.4N/m (4.1Kgf/cm)

Motor / DC Brushless Motor B Type Insulation (130deg C) 120W

Chuck / dia.13mm Drill Chuck \*Up to 12mm shafts accepted, BLW3000 not accepted.

Safety Equipment / Current Restricting Circuit, Motor Axis Restricting Protection Circuit, Thermal Protector: Motor Coil Temperature 90deg C, Fuse (4A)

Power Supply and Consumption / Single Phase 100V±10%, Joint Use 50/60Hz, 400VA

Dimensions / W160mm x D259mm x H244mm BLW3000:W160mm x D233mm x H262mm

Weight / 5.8Kg BLW3000:5.5Kg

photo:BLW600

### BL / BLh / BLW Series Common Specifications

Rotation Control	Feedback Control and Forward/Reverse Rotation Switching (Timer mode, manual)
Rotation Timer	5, 10, 20, 30, 45, and 60 sec Setting Switching Possible
Panel Display	Rotation Speed Digital 4 Digits and Overload Display
	Torque Indicator (1 graduation 20%)
Power Cable	2m Power cable with 2-pole Grounded Plug
Standard Accessories	Clamp Holder (Type: 21 x 16) 1 piece

Remote-controlled Agitators with External Input/Output

## BL-R Series

The R Series instruments are remote control operation models that are convenient for using inside fume hoods. Using the external output of the rotation speed and converted torque, the agitating situation can be understood. Then depending on the agitating condition it is possible to control the rotation speed and switch the rotation direction through inputting from an external source, allowing the instrument to be used as part of an agitation system.

## BLh-R Series

The BLh-R Series is a remote-controlled type agitator that allows control from an external source. The series utilizes a high output 70W brushless motor that was developed to handle demanding agitation situations. These strong laboratory agitators generate twice the torque of the BL-R series. Using the external output of the rotation speed and converted torque, the agitating situation can be understood. Then depending on the agitating condition it is possible to control the rotation speed and switch the rotation direction through inputting from an external source, allowing the instrument to be used as part of an agitation system.

- Because the rotation speed and conversion torque values are output as analog voltages, it will be possible to identify changes in viscosity.
- The rotation speed setting and rotation direction switching can be operated through inputting from an external source.
- During the agitating operation, one-switch operation allows the rotation direction to be changed, and the timer allows automatic forward/reverse rotation agitating to be carried out.
- During the agitating operation, even if there is a change in the viscosity, the set rotation speed will be maintained.
- A strong brushless motor is used that does not generate sparks, and the motor part is maintenance-free.
- A collet-type hand-tightening chuck is utilized, and noise countermeasures are implemented to prevent mistaken operation of the instrument or other equipment.
- For the overloading protection of the agitation motor, protection equipment including a current restricting circuit and thermal protector are provided.

## Ft Series

In addition, the rotation speed and conversion torque are output as analog voltages from the output connector so that changes in viscosity can be measured using a recording meter during the agitation.

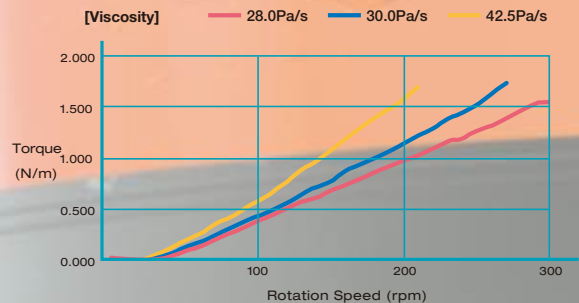
- During the agitating operation, one-switch operation allows the rotation direction to be changed, and the timer allows automatic forward/reverse rotation agitating to be carried out.
- The rotation speed and conversion torque values are output as analog voltages so that changes in the viscosity can be determined.

### Torque Measurement

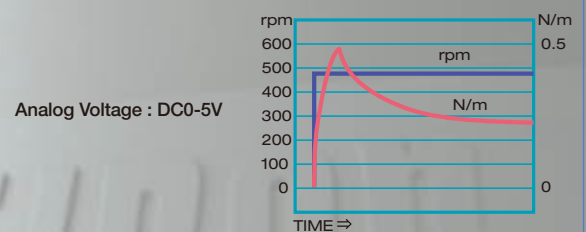
[Fig1] Disc Turbine 120mm Torque Measurements

Rotation Speed (rpm)	Torque (N/m)		
	28.0Pa/s	30.0Pa/s	42.5Pa/s
100	0.382	0.428	0.584
110	0.435	0.489	0.662
120	0.504	0.564	0.771
130	0.572	0.634	0.895
140	0.611	0.711	0.966
150	0.689	0.769	1.074
160	0.735	0.880	1.185
170	0.792	0.934	1.297
180	0.863	0.998	1.395
190	0.924	1.064	1.485
200	0.977	1.146	1.585

[Fig2] Disc Turbine 120mm Power Characteristic



### Output(Rotation Speed/Converted Torque)





Remote-controlled Agitators with External Input/Output

# BL-R Series

- BL-300R** High viscosity  
Rotation Speed / 5 - 300rpm      Rated To Torque / 0.9N/m (9.0Kgf/cm)
- BL-600R** Medium to high  
Rotation Speed / 10 - 600rpm      Rated To Torque / 0.5N/m (5.0Kgf/cm)
- BL-1200R** Medium to low  
Rotation Speed / 10 - 1200rpm      Rated To Torque / 0.3N/m (3.0Kgf/cm)

Motor / DC Brushless Motor B Type Insulation 35W  
 Rotation Meter / Display Unit: High Luminosity Fluorescent Color Dot Matrix Display, Digital 4 Digits  
 Measurement Units: Resolution 1rpm (when using the BL3000R), Measuring Gate Time 0.5 secs  
 Rotation Speed Input / Analog Voltage: DC0-5V  
 Power Supply and Consumption / Single Phase 100V±10% Joint Use 50/60Hz 88VA  
 Dimensions / Main unit: W125 x D172 x H196mm, Control Box:W118 x D220 x H80mm  
 Weight / Main unit: 2.2Kg, Control Box:750g  
 Option:Control Box Stand



High-power Remote-controlled Agitators with External Input/Output

# BLh-R Series

- BLh-300R** High viscosity  
Rotation Speed / 5 - 300rpm      Rated To Torque / 1.8N/m (18.0Kgf/cm)
- BLh-600R** Medium to high  
Rotation Speed / 10 - 600rpm      Rated To Torque / 1.0N/m (10.0Kgf/cm)
- BLh-1200R** Medium to low  
Rotation Speed / 10 - 1200rpm      Rated To Torque / 0.6N/m (6.0Kgf/cm)

Motor / DC Brushless Motor B Type Insulation 70W  
 Rotation Meter / Display Unit: High Luminosity Fluorescent Color Dot Matrix Display, Digital 4 Digits  
 Measurement Units: Resolution 1rpm (when using the BL3000R), Measuring Gate Time 0.5 secs  
 Rotation Speed Input / Analog Voltage: DC0-5V  
 Power Supply and Consumption / Single Phase 100V±10% Joint Use 50/60Hz 140VA  
 Dimensions / Main unit: W125 x D190.5 x H209mm, Control Box:W118 x D220 x H80mm  
 Weight / Main unit: 2.8Kg, Control Box:750g  
 Option:Control Box Stand



Agitators with External Output

# Ft Series

- BL300Ft** High viscosity  
Rotation Speed / 5 - 300rpm      Rated To Torque / 0.9N/m (9.0Kgf/cm)
- BL600Ft** Medium to high  
Rotation Speed / 10 - 600rpm      Rated To Torque / 0.5N/m (5.0Kgf/cm)
- BL1200Ft** Medium to low  
Rotation Speed / 10 - 1200rpm      Rated To Torque / 0.3N/m (3.0Kgf/cm)

Motor / DC Brushless Motor B Type Insulation 35W  
 Chuck / dia.8mm Collet-type Hand-tightening chuck  
 Safety Equipment / Current Restricting Circuit, Thermal Protector: Motor Coil Temperature 90deg C, Safety Cover  
 Power Supply and Consumption / Single Phase 100V±10% Joint Use 50/60Hz 88VA  
 Dimensions / Main Unit: W125mm x D172mm x H196mm  
 Weight / 2.2Kg

**BL-R / BLh-R / Ft Series Common Specifications**

	BL-R Series	BLh-R Series	Ft Series
Rotation Control	Feedback Control, Forward/Reverse Rotation Switching (Timer mode, manual)		
Rotation Timer	5, 10, 20, 30, and 45 sec, 1'30, 2'00, 2'30, 3'00, 4'00, and 5'00		5,10,20,30,45 or 60 sec
Rotation Speed Output	Analog Voltage: DC 0-5V		
Converted Torque Output	Analog Voltage: DC 0-5V		
Chuck	dia.8mm Collet-type Hand-tightening Chuck		
Safety Equipment	Current Restricting Circuit, Thermal Protector: Motor Coil Temperature 90deg C, Safety Cover		
Power Cable	2m Power Cable with 2-pole Grounding Plug		
Standard Accessories	Clamp Holder(Type: 21 x 16) 1 piece, Safety Cover		

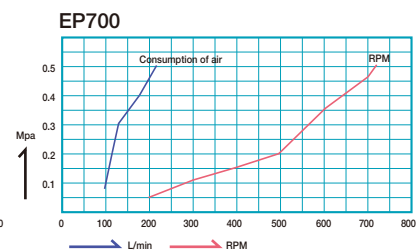
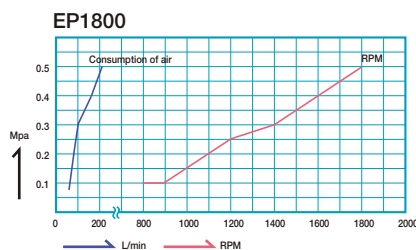


## Air Motor Agitators

## EP Series

These are completely explosion-proof agitators. Because the air pressure is adjusted using a needle valve attached to the air motor and the rotation speed and torque are controlled, these instruments can be safely used in laboratories where sources of fire are strictly prohibited.

- An oil-less motor is utilized, so that the trouble of supplying oil will not be necessary.
- Sound is eliminated using the silencer.
- Two types are available that can support a wide variety of agitation.



### EP1800

Rotation Speed / 1800rpm

Maximum Torque / 1.2N / m

Recommended Maximum Rotation Speed / 1300rpm

### EP700

Rotation Speed / 720rpm

Maximum Torque / 2.4N / m

Recommended Maximum Rotation Speed / 500rpm

#### EP1800/ EP700 Common Specifications

Maximum Output	0.48KW(0.5MPa)
Maximum Air Consumption	400L/min(0.5MPa)
Accessories	Silencer/Oil Mist Separator , Air Filter and Regulator Set, Clamp Holder (Type: 21 x 16) 1 piece , Safety Cover



## Circulating Stirrers

### Stirrer 100

These extremely durable circulating stirrers can also be safely used for long-period temperature distribution equalization work in constant-temperature tanks.

- Sturdy and Durable Stainless Steel Body
- Outstandingly Quiet
- Holder Allows Mounting on Various Types of Tanks

### Stirrer 100

#### Stirrer100 Specifications

		Stirrer100
Motor	Holder	Round Type and Square Type Joint Use
	Output	3W
	Current	0.2A
	Rated Torque	50Hz:0.025N/m (250gf/cm) 60Hz:0.021N/m (210gf/cm)
	Rated Rotation	50Hz:1200rpm/60Hz:1450rpm
	Temperature Rise	60deg C
	Stirring Temperature	Maximum 450deg C
	Material	SUS304
	Power Supply	Single-phase 100V±10% 50/60Hz
	Weight	1.7kg

## Torque Meter Unit Type:YT



## Vacuum Stirrer Type:24/K29



Type:K24 Applications/TS24  
 Type:K29 Applications/TS29  
 Grand Seal (Repair parts)

## Drill Chuck



Applications  
 BL Series, BLh Series, BL-R Series, Ft Series,  
 Z+ Series, BLh-R Series

## Safety Cover



Applications  
 BL Series, BLh Series, BL-R Series, Ft Series,  
 Z+ Series, BLh-R Series

## Air Purge



Applications  
 BL Series, BLh Series, Te Series, Ft Series,  
 Z+ Series

## Clamp Holder Type:21x16



Applications  
 BL Series, BLh Series, BL-R Series, Ft Series,  
 Z+ Series, BLh-R Series, BLW Series

## Assistant Pulley

Type:AP



## Option Collet



Type:CC-2 (dia.2mm) Type:CC-6 (dia.6mm)  
 Type:CC-4 (dia.4mm) Type:CC-8 (dia.8mm)



## Collapsible Stand

Type:CS/CS2

This H-shaped collapsible stand has its pole positioned at the most dynamically stable location for the four legs. One of the four legs has an adjusting screw to support undulations in the installation surface.

For the BLW Series, it is advisable to use the CS-II stand which has increased stability.

### Collapsible Stand

Type:CS Applications:BL & BLh Series  
 Type:CS2 Applications:BLW Series

### 200mm extension pole

Applications:Type CS  
 Applications:Type CS2

### 400mm extension pole

Applications:Type CS  
 Applications:Type CS2

## General Purpose Agitator Blades



### 1 Butterfly

SUS316 Tips  
With SUS316 Bosses

### 2 Propeller R

SUS316 Tips  
With SUS316 Bosses  
Titanium Tips

### 3 Fan

SUS316 Tips

### 4 Turbine

SUS316 Tips  
With SUS316 Bosses  
Titanium Tips

### 5 Square Cross R

SUS316 Tips  
With SUS316 Bosses  
Titanium Tips

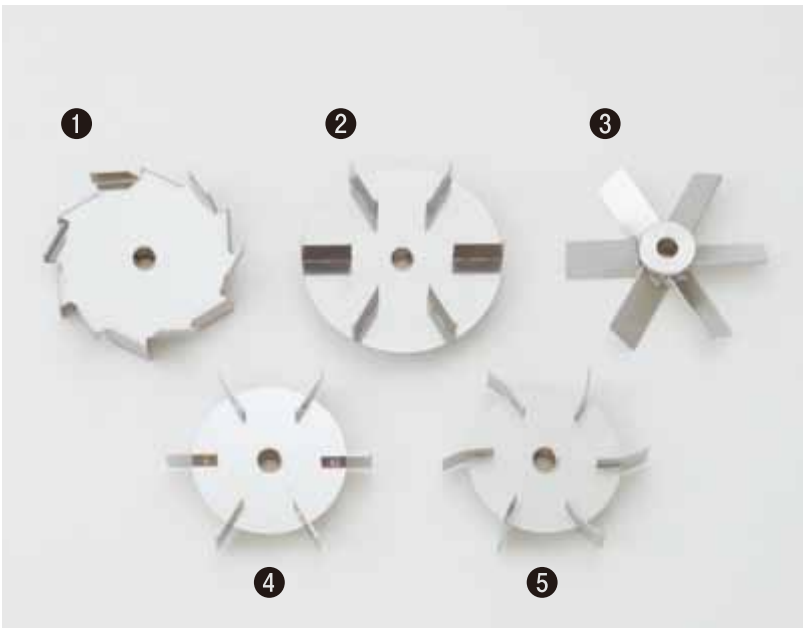
### 6 Soft Cross

SUS316 Tips  
With SUS316 Bosses

### 7 Helicopter

SUS316 Tips

## Handmade Agitator Blades



### 1 Disperser

Blade Diameter 40mm  
Blade Diameter 60mm  
Blade Diameter 80mm  
Blade Diameter 100mm

### 2 Blade Turbine

Blade Diameter 40mm  
Blade Diameter 80mm

### 3 Tilted Paddles

Blade Diameter 40mm  
Blade Diameter 80mm  
Blade Diameter 100mm  
Blade Diameter 120mm

### 4 Disc Turbine

Blade Diameter 40mm  
Blade Diameter 80mm  
Blade Diameter 100mm  
Blade Diameter 120mm

### 5 Curved Disc Turbine

Blade Diameter 40mm  
Blade Diameter 80mm

## Agitator Blade Sets

### Type : FS-7 7-item General Purpose Set

Fan, Propeller R, Soft Cross, Square Cross R, Butterfly, Turbine, Helicopter Agitating Shaft 500mm, Nut

### Type : FS-5 5-item Set with Bosses

Propeller R with Boss, Soft Cross with Boss, Square Cross R with Boss, Butterfly with Boss, Turbine with Boss Agitating Shaft 500mm, Nut

### Type : FS-3T 3-item Titanium Set

Propeller L, Square Cross L, Turbine Agitating Shaft 500mm, Nut

## Blade Types



### ℓ 500mm

SUS316-made  
Titanium-made

### ℓ 600mm

SUS316-made

### ℓ 700mm

SUS316-made

### ℓ 800mm

SUS316-made

### ℓ 1000mm

SUS316-made

# HEIDON

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