

# HOPE

HA16048E

TYPE WTB  
TURBO BLOWER  
INSTRUCTION MANUAL



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Thank you very much for your purchase of WTB type turbo blower.

Please read this manual for the perfect capability to be assured and also for its maintenance and inspection.

Please be sure to deliver this instruction manual not only to the contractor but also to the end user.

## ■ Inspection confirmation at the time of purchase

Please check with the nameplate of the blower and the specification table below to see if it is the product you ordered.

Especially depending on the area, there is a distinction of 50 · 60 Hz so please check.

Also please check for damage etc. during transportation.

## ■ Outline

The HOPE WTB turbo blower is a high grade blower of the latest design, intended to blow air for combustion of liquid and gas fuels or agitation or cooling of liquids, as well as for use with air curtains or air conveyors. Backed up by a precise structure and logical design, the blower especially features is compact size and light weight , high working efficiency, and noise-free running as compared with a one-stage blower. Complete balance is maintained between the blower body of iron casting and the two impellers of special light alloy. As it is installed directly to the long-shaft motor, it is free from vibration and guarantees a semi-permanent life of bearings. Because of the compact and light-weighted construction, the blower may be easily and conveniently installed and requires a minimum of floor space. Air can be delivered from the blower in any one of the nine directions which may be selected by the user as desired.

## ■ Precautions when using IE 3 (high efficiency motor)

Because IE 3 (high efficiency motor) suppresses generation loss, rotation speed generally becomes faster than IE 1 (standard motor). When IE1 (standard motor) is replaced with IE3 (high efficiency motor), the output of the motor increases as this rotational speed increases. Motor efficiency is high, but as the output increases, power consumption may increase.

Also, since the (primary and secondary) resistors are lowered to reduce copper losses, the starting current is higher for IE1 (standard motor), and it is necessary to change wiring breaker, electromagnetic switch, thermal relay, etc. It may become.

■ Specification IE 3 (high efficiency motor)

【Standard type · · · WTB-S】 50Hz/60Hz

Type	Air quantity (m <sup>3</sup> /min)	Static pressure (kPa)	Motor power (kW)	Rated current (A)	Connection	Revolution per minute (min <sup>-1</sup> )	Weight (kg)
2S	3/3	6.0/6.0	1.0	4.2/4.2	50A	2885/3455	117
3S	5/6	6.0/6.0	1.5	6.2/6.2	80A	2890/3460	128
4S	10/10	6.0/6.5	2.2	9.2/9.0	100A	2875/3445	145
5S	16/16	6.5/6.5	3.7	14.4/14.2	125A	2910/3490	196
6S	25/25	6.5/6.5	5.5	21.4/21.0	150A	2920/3500	252
8S	36/36	6.5/6.5	7.5	29.8/28.6	200A	2920/3505	282
10S	50/50	6.0/7.0	11.0	44.0/43.0	250A	2940/3520	350
12S	70/75	7.0/6.5	15.0	58.8/56.8	300A	2940/3525	474
12SH	80/80	7.0/7.0	18.5	72.4/71.0	300A	2940/3525	490
12SHH	90/95	7.0/7.0	22.0	85.6/82.8	300A	2960/3550	555




【High pressure type · · · WTB-H】 50Hz/60Hz

Type	Air quantity (m <sup>3</sup> /min)	Static pressure (kPa)	Motor power (kW)	Rated current (A)	Connection	Revolution per minute (min <sup>-1</sup> )	Weight (kg)
2H	-/3	-/8.0	1.5	-/6.2	50A	-/3460	123
3H	-/5	-/8.5	2.2	-/9.0	80A	-/3445	140
4H	-/10	-/9.5	3.7	-/14.2	100A	-/3490	156
5H	-/16	-/10.0	5.5	-/21.0	125A	-/3500	212
6H	-/25	-/9.0	7.5	-/28.6	150A	-/3505	252
8H	-/36	-/9.5	11.0	-/43.0	200A	-/3520	330
10H	-/50	-/9.5	15.0	58.8/56.8	250A	-/3525	369
12H	60/60	9.5/10.0	18.5	72.4/71.0	300A	2940/3525	480
12HH	70/75	10.0/10.0	22.0	85.6/82.8	300A	2960/3550	545




## ■ Safety precautions

Be sure to thoroughly read this instruction manual and other attached documents before installation work, test operation adjustment, maintenance and inspection, familiarize all about equipment knowledge, safety information, and precautions before using. In this instruction manual, the rank of safety precautions is classified as "danger", "warning", "caution".







### Meaning of indication

Indication	Meaning of indication
 DANGER	Indicates contents that could result in death or serious injury if you handle it with the contents of this indication ignored.
 WARNING	Indicates contents that could result in serious injury if you handle it with the contents of this indication ignored.
 CAUTION	Indicates the possibility of being subject to moderate injury or minor injury, and handling that ignores the contents of this indication, and it is supposed to cause physical damage.

### Meaning of drawing

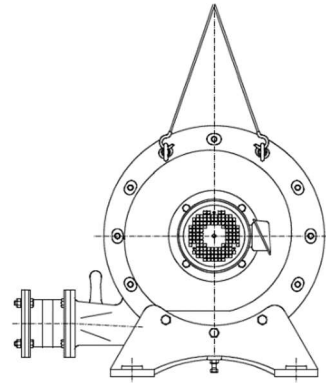
Drawing mark	Meaning of drawing
 INSTRUCTION	This is to tell that there is indication to instruct compulsorily your action. Contents of the instruction must be described definitely nearby.
 PROHIBITION	This is to tell the prohibited action. Specifically prohibited action are described.
 CAUTION	This is to tell that there is a thing to be attended. The specifically attended thing is described nearby.

■ Read without fail

 <b>DANGER</b>	
 PROHIBITION	<p><b>Do not drive beyond the capability of the equipment</b></p> <p>This machine is designed so that the current value does not exceed the rated current value during operation at the rated flow rate. If the discharge flow rate exceeds the rated flow rate due to, for example, no resistance at the outlet or downstream from the outlet, the overcurrent could cause failure or seizure of the motor. Be sure to use the burner in a manner that the rated current value and rated flow rate are not exceeded.</p>
 ELECTRIC SHOCK	<p><b>Electric shock attention</b></p> <p>When you remove the cover of a terminal box, please be sure to carry out after shutting off a former power supply.</p>
 COMPULSON	<p>Please fix a blower with an anchor bolt on the stable foundation.</p>
 COMPULSON	<p>To fix the piping from the blower be sure to provide independent supports.</p>
 PROHIBITION	<p>Do not use the attached gasket for sealing this blower.</p> <p>Put the replaced old gaskets pouch and throw away them according to the waste disposal regulation or 「the waste cleaning regulation」.</p> <p>Never burn up them.</p>

## ■ Transportation method

As for lifting, please use the eyebolt (2 places) which is assembled to the main body as shown on the right.



## ■ Installation

1. Secure a space at least 1m around the blower in consideration of disassembly cleaning and repair.
2. Please avoid the place described below.
  - Places sucking the corrosive gases.
  - Place with much dust.
  - Place that gets wet with rainwater.
  - Place where the circumference will be 40 °C or more.
3. Fix to the stable foundation firmly with an anchor bolt.

When you install on a steel-materials structure unavoidably, please use the rubber mount of an option.

4. In order to prevent offset load, please install so that a blower axis becomes horizontal.

## ■ Piping

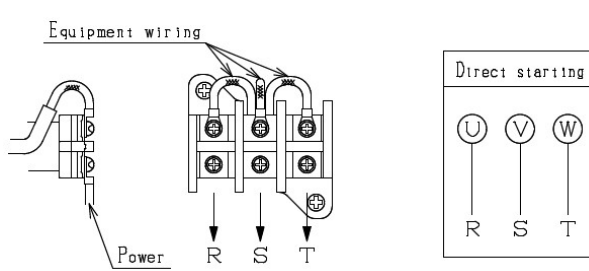
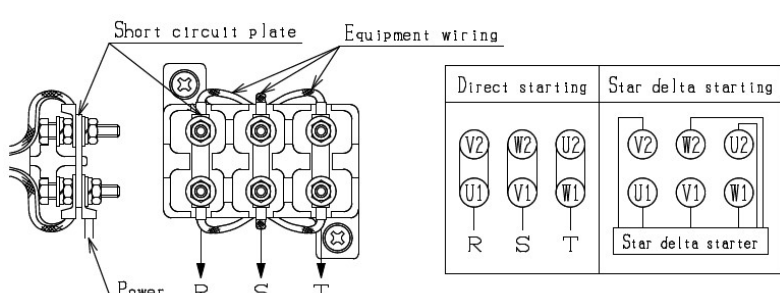
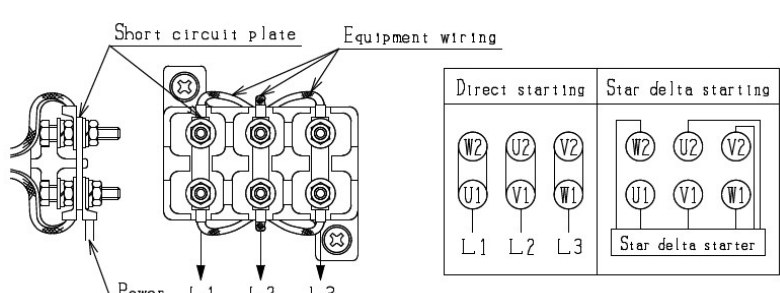
1. For the piping, be sure to provide independent supports for fixing, and use the accompanying rubber joints to protect the blower from the direct impact of load and vibration from the piping.
2. Piping size should be the same diameter as the blower, or larger size.
3. A straight part of a blower exit pipe more than three times longer than pipe diameter is required.

## ■ Wire connection of a Motor

Please check the specification of a motor with the name plate stuck on the external terminal box.

The standard motor is 3 ratings of 200V-50 Hz, 200V/220V-60 Hz of single voltage.

As a special motor, there is also different voltage, such as 380V, 400V, and 440V.

	Lead wire Number of terminals	Motor power kW	Lead wire connection method
Applicable standard JIS JEC	3	1.0 ) 3.7	
			
Applicable standard IEC	6	5.5 ) 22.0	

※Please connect so that there is no short circuit between wires.

※When connecting to the star delta starter please remove the short circuit plate.

(Star delta starting is possible for models with 5.5 kW or more)

※Ground the earth terminal securely.



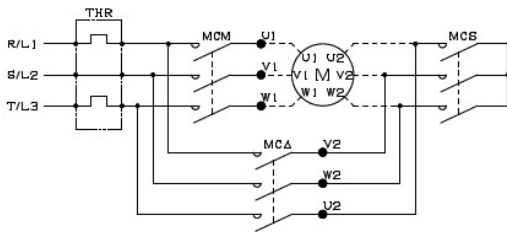
## ■ Star delta starting

### 1). Notes on star delta start

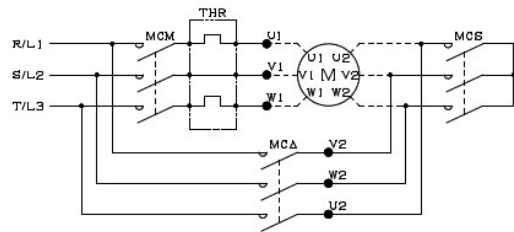
There are three electromagnetic contactor type and two magnetic contactor type in the star delta starting method. 2 Electromagnetic contactor type circuit is simple and economical, but since voltage is constantly applied to the windings of the motor even when the motor is stopped, safety during maintenance and inspection, dust and humidity are high Because it is necessary to pay attention to insulation degradation between the windings of each motor phase winding and winding to ground at the place, 3 electromagnetic contact type is recommended.

### 2). Current detection method of thermal relay

As shown in the figure below, the thermal relay at the star delta start has the line current detection method and the phase current detection method, and the selection of the heater rating is different. In the line current detection method, the heater rating is selected based on the motor full load current. On the other hand, in the phase current detection method, the heater rating is selected based on the current of  $1 / \sqrt{3}$  of the full load current of the motor. In this method, the frame size of the thermal relay can be made smaller than that of the line current detection method, but since the wiring size of the motor circuit does not change in any detection method, in the case of the phase current detection method, Since it is necessary to consider whether wire connection is possible or not, the line current detection method is recommended.



Line current detection method



Phase current detection method

## ■ Startup current and startup time (Voltage AC200V)

### 1). Standard specification

WTB Type	Motor power (kW)	Frequency (Hz)	Starting current (A)		Start time (s)	
			Direct	Star delta	Direct	Star delta
2S	1.0	50	28.6	-	11.81	-
		60	29.8	-	9.64	-
3S	1.5	50	44.8	-	7.70	-
		60	42.2	-	7.01	-
4S	2.2	50	62.4	-	8.25	-
		60	57.7	-	5.11	-
5S	3.7	50	96.5	-	5.11	-
		60	88.7	-	4.78	-
6S	5.5	50	146.2	72.8	3.91	15.4
		60	145.5	63.0	3.41	14.8
8S	7.5	50	213.2	106.1	3.07	11.5
		60	199.3	86.3	2.53	10.1
10S	11.0	50	278.7	138.8	2.80	11.4
		60	291.1	126.0	3.02	13.5
12S	15.0	50	418.1	208.2	2.06	8.0
		60	404.2	175.0	2.22	9.3
12SH	18.5	50	490.4	244.1	1.79	6.8
		60	455.5	197.2	1.86	7.5
12SHH	22.0	50	626.6	312.0	2.32	9.0
		60	603.1	261.1	2.41	10.1

### 2). High pressure specification

WTB Type	Motor power (kW)	Frequency (Hz)	Starting current (A)		Start time (s)	
			Direct	Star delta	Direct	Star delta
2H	1.5	60	44.3		12.4	
3H	2.2	60	59.9	-	9.54	-
4H	3.7	60	94.6	-	7.39	-
5H	5.5	60	143.4	62.1	5.88	25.5
6H	7.5	60	193.3	83.7	3.52	14.1
8H	11.0	60	299.6	129.7	4.39	19.6
10H	15.0	60	390.7	169.1	2.69	11.3
12H	18.5	50	512.7	255.3	2.19	8.3
		60	491.9	212.9	2.09	8.5
12HH	22.0	50	618.4	307.9	2.48	9.6
		60	585.2	253.3	2.29	9.6

## ■ About electromagnetic contactor, switch, thermal relay

※ Compared with conventional motors, the IE3 motor increases the starting current by 15 to 30%.

The startup time also tends to become longer.

1). Main circuit voltage 200 to 220 V direct startup (by Fuji Electric)

※ Please use late type thermal relay for thermal relay.

※ When the thermal relay trips, increase the set value of the thermal relay to 5%

We recommend you to.

WTB Type	Motor power (kW)	Electromagnetic switch type	Thermal type	Settling range (A)
2S	1.0	SW-03/2L Main circuit AC□V 1kW Coil AC□V 1a(1b)	TR-0NL	4~6(4)
2H 3S	1.5	SW-0/2L Main circuit AC□V 1.5kW Coil AC□V 1a(1b)	TR-0NL	5~8(5)
3H 4S	2.2	SW-0/2L Main circuit AC□V 2.2kW Coil AC□V 1a(1b)	TR-0NL	7~11(7)
4H 5S	3.7	SW-4-1/2L Main circuit AC□V 3.7kW Coil AC□V 1a(1b)	TR-5-1NL	12~ 18(12)
5H 6S	5.5	SW-N1/2L Main circuit AC□V 5.5kW Coil AC□V 2a2b	TR-N2L	18~ 26(18)
6H 8S	7.5	SW-N2/2L Main circuit AC□V 7.5kW Coil AC□V 2a2b	TR-N2L	24~ 36(24)
8H 10S	11.0	SW-N2S/2L Main circuit AC□V 11kW Coil AC□V 2a2b	TR-N3L	34~ 50(34)
10H 12S	15.0	SW-N3/2L Main circuit AC□V 15kW Coil AC□V 2a2b	TR-N3L	45~ 65(45)
12SH 12H	18.5	SW-N4/2L Main circuit AC□V 18.5kW Coil AC□V 2a2b	TR-N5L	53~ 80(53)
12SHH 12HH	22.0	SW-N5/2L Main circuit AC□V 22kW Coil AC□V 2a2b	TR-N5L	65~ 95(65)

2). Main circuit voltage 200 to 220 V Star delta starting (by Fuji Electric)

For the selection in the table below, the thermal relay uses line current detection and the star electromagnetic switch is selected by the star short circuit method.

※ Please use late type thermal relay for thermal relay.

※ When the thermal relay trips, increase the set value of the thermal relay to 5%

We recommend you to.

WTB Type	Motor power (kW)	Electromagnetic switch type	Thermal type	Settling range (A)
5H 6S	5.5	MCM:SC-4-0 Coil AC□V 1a MC△:SC-4-0 Coil AC□V 1b MCS:SC-5-1 Coil AC□V 1a1b	TR-N2LH	18~ 26(18)
6H 8S	7.5	MCM:SC-4-1 Coil AC□V 1a MC△:SC-4-1 Coil AC□V 1b MCS:SC-N1 Coil AC□V 2a2b	TR-N2LH	24~ 36(24)
8H 10S	11.0	MCM:SC-N2 Coil AC□V 2a2b MC△:SC-N2 Coil AC□V 2a2b MCS:SC-N1 Coil AC□V 2a2b	TR-N2LH	34~ 50(34)
10H 12S	15.0	MCM:SC-N2 Coil AC□V 2a2b MC△:SC-N2 Coil AC□V 2A2b MCS:SC-N2 Coil AC□V 2a2b	TR-N3LH	45~ 65(45)
12SH 12H	18.5	MCM:SC-N2S Coil AC□V 2a2b MC△:SC-N2S Coil AC□V 2a2b MCS:SC-N2 Coil AC□V 2a2b	TR-N3LH	53~ 80(53)
12SHH 12HH	22.0	MCM:SC-N3 Coil AC□V 2a2b MC△:SC-N3 Coil AC□V 2a2b MCS:SC-N2S Coil AC□V 2a2b	TR-N3LH	65~ 95(65)

MCM: Electromagnetic contactor for power

MC △: Electromagnetic contactor for delta

MCS: Electromagnetic contactor for star (star short circuit)

## ■ Before starting operation

<Starting operation>

1. Make sure of the blower rotating direction prior to the start of operation.
2. Close the delivery port air butterfly valve fully before starting the blower.
3. If the blower vibrates abnormally or emits abnormal sound, stop it immediately and make the following checks. Restart the machine after making sure that it can run normally.
  - a) Are the anchor bolts clamped tightly?
  - b) Are clamping bolts in each position tightened securely?
  - c) Is the duct load on the blower?
  - d) Are there any alien substances in the duct or blower?
4. Operate the air butterfly valve at the delivery port with care not to allow the motor current to increase above the rating (on the ammeter) after the blower reaches its normal r.p.m.
5. If the operating air quantity is reduced excessively, a surging phenomenon (pressure fluctuation like waving) may occur. If such phenomenon occurs, it is advisable to provide a vent valve on the delivery side.
6. Close the air butterfly valve fully after stopping the machine (If the valve is kept open, the combustion exhaust gas will run reversely contaminating the interior of the blower severely.)

## ■ Maintenance inspection

Please inspection and maintenance in the following way.

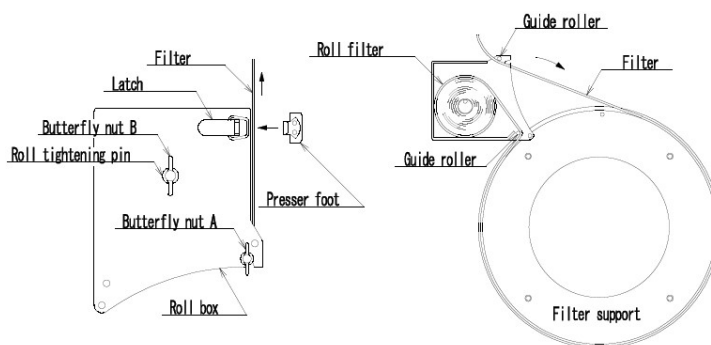
1. Even if there is not abnormality, please do the inspection in the main body of impeller and blower once a year.
2. Occasionally check the tightening of the bolts of each part.
3. Always pay attention to the abnormal sound, vibration, overheat of the blower body and any other abnormality.
4. For cleaning of the suction filter, please blow it out with a compressor or the like, or remove the dust with a brush.  
(Roll filter should be wound up according to dirt condition and always new)

### ● Roll filter

Please check the filter periodically, and before it starts decreased pressure by the clog of dust etc., Rolling up a roll filter.

The roll filter is supposed to be replaced by rolling up once every week or so, but this replacement frequency may be adjusted according to the usage and the environment. One roll filter lasts for about one year.

● Detailed view of roll filter



● Rolling up the roll filter

1. Loosen the wing nut B.
2. Release the latch to open the presser foot.
3. Rolling up one circumferential amount of the filter.
4. Put the presser foot back to the former state with the latch.
5. Cut off the soiled portion of the filter.
6. Tighten the wing nut B.

● Exchange of a roll filter

1. Loosen the wing nut A and open the roll box.
2. Remove the wing nut B and pull out the roll receiving pin.
3. Insert a new roll filter and insert the roll receiving pin.
4. Tighten with the wing nut B and fix.
5. Pass the tip of the filter through the inside of the guide roller as shown in the figure.
6. Return the roll box to its original position.
7. Tighten the wing nut A and fix the roll box

● A filter kind and pressure loss

There are 3 filter types as listed below Please use properly according to usage environment.

As of shipping from our facilities, the filter of medium roughness (RF-M) type has been provided.

Type	Model	Sieve opening (mm)	Pressure loss (Maximum) ※
Coarse mesh	RF-□□-L	2.5	Less than 0.06kPa
Medium mesh	RF-□□-M	1.3	Less than 0.10kPa
Fine mesh	RF-□□-S	0.6	Less than 0.20kPa

※Pressure loss (Maximum) is a value at the time of the maximum air quantity in each model. When ordering, make an entry in the □□ spaces as follows.

- WTB - 3 ~ 5 →
- WTB - 6 ~ 10 →
- WTB - 12 →

## ■ Disassembly

< Blower body inside side >

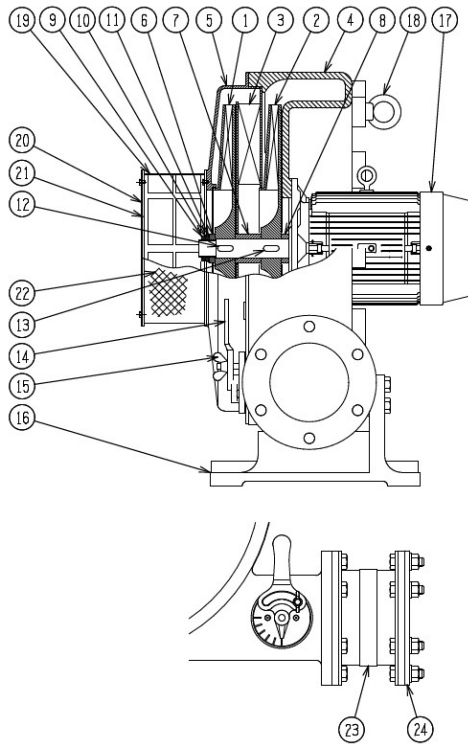
1. Remove the lid ⑤ from the blower body ④ by loosening the hexagon socket head bolt.
2. Return the fixed teeth of the bearing washer ⑪ and remove the bearing nut A ⑨, the bearing nut B ⑩, and the bearing washer ⑪ from the motor shaft.
3. Remove the first stage impeller B ① and remove the first stage key ⑫.
4. Remove the rectifying plate ③ and remove the intermediate collar ⑦.
5. Remove the second stage impeller A ②, remove the second stage key ⑬, and remove the positioning collar ⑧.
6. Remove the motor ⑰ from the blower body ④ by loosening the hexagon bolt.
7. The disassembly repair of impeller and motor relation is completed with the above.  
In the case of assembly, please do it in reverse order as above.

## ● Precautions for assembly

1. Be sure to install the first stage impeller B to the suction side and the second stage impeller A to the motor side.
2. Never scratch or bruise the shafts and meshing parts.
3. Apply high quality machine oil to the shaft, etc., after cleaning.
4. Tighten the bearing nuts firmly and fix them bending the pawls of the bearing washers.
5. Clean the parts, such as impeller and suction filter, completely.  
Due to clogging of garbage etc., the performance of the blower cannot be maximized.
6. Upon completion of assembly turn the blower shaft by a hand to confirm that it moves as smoothly as before disassembly.

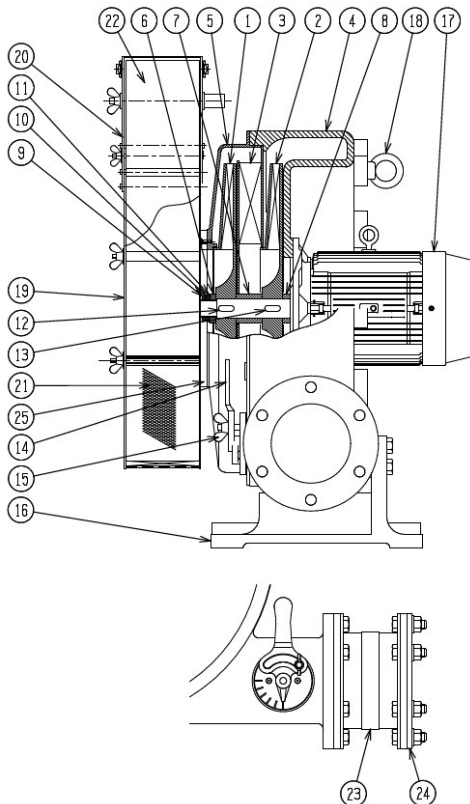
## ■ Structure drawing

### ● Wire mesh type



1	The 1st step impeller B	13	The 2nd step key
2	The 2nd step impeller A	14	Butterfly handle
3	Current plate	15	Fixed butterfly handle
4	Blower body	16	Base
5	Body cover	17	Motor
6	Press collar	18	Eye bolt
7	Intermediate collar	19	Filter support
8	Spacer	20	Press fittings
9	Bearing nut A	21	Punching metal
10	Bearing nut B	22	Wire mesh
11	Bearing washer	23	Rubber joint
12	The 1st step key	24	Mate flange

### ● Roll filter type



1	The 1st step impeller B	14	Butterfly handle
2	The 2nd step impeller A	15	Fixed butterfly handle
3	Current plate	16	Base
4	Blower body	17	Motor
5	Body cover	18	Eye bolt
6	Press collar	19	Filter support
7	Intermediate collar	20	Roll box
8	Spacer	21	Punching metal
9	Bearing nut A	22	ロールフィルター
10	Bearing nut B	23	Rubber joint
11	Bearing washer	24	Mate flange
12	The 1st step key	25	Liner
13	The 2nd step key	26	

Specifications are subject to change without notice for improvement.

2019.4