

A large, stylized graphic of a blower impeller, rendered in various shades of blue and teal, occupies the left side of the page. It features multiple curved blades radiating from a central hub, with a sense of motion suggested by curved lines in the background.

# GM Blower

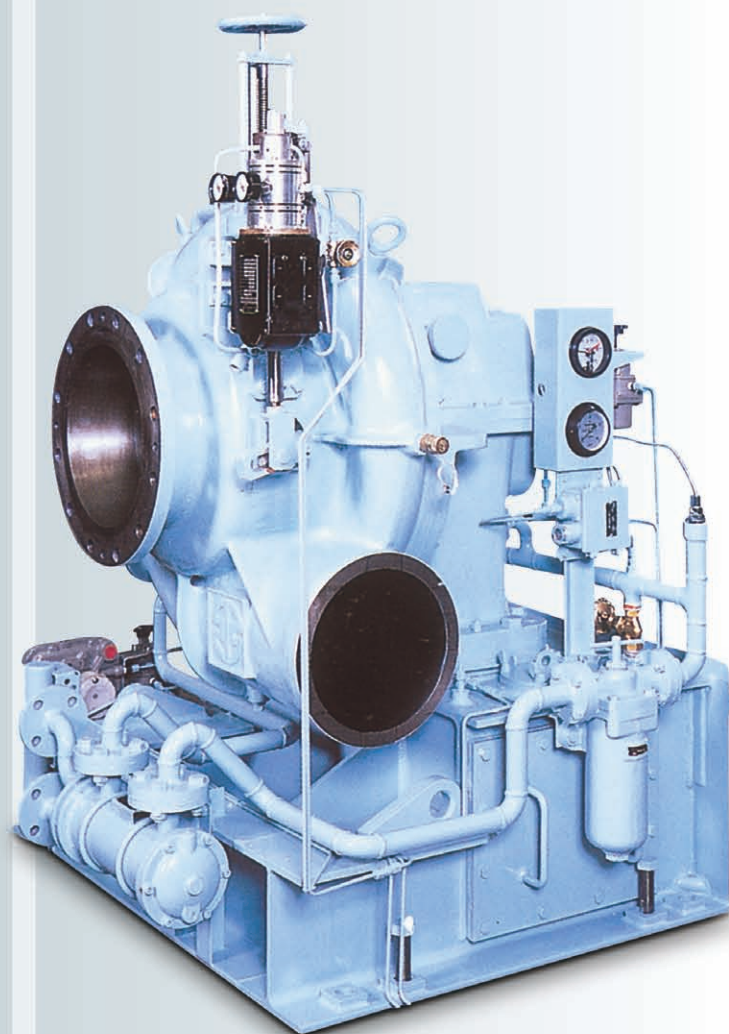
Gear-Increased Single-Stage Mixed-Flow Blower

# Single-Stage Mixed-Flow Blower

## Saves energy through improved aerodynamic performance and higher efficiency of speed-increasing gear

# GM Blower

Gear-Increased  
Single-Stage  
Mixed-Flow Blower



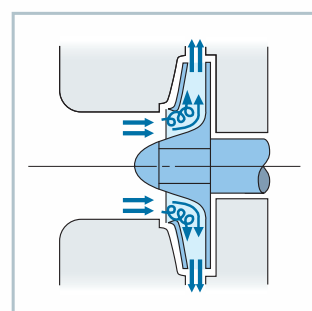
### Features

#### High efficiency

Kawasaki's unique mixed-flow design impeller makes gas to flow smoothly, reduces vortex flow and is more efficient than centrifugal design impellers.

##### Centrifugal impeller

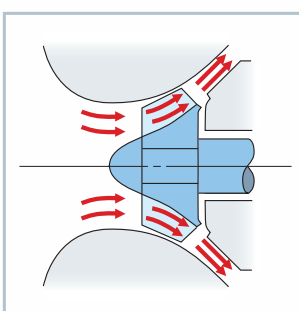
Air flow changes direction by 90°



Axial flow suddenly changes into radial flow resulting in flow disturbance and increased bend loss.

##### Mixed-flow impeller

Air flows diagonally



Air flows smoothly in gently curving diagonal directions with decreased loss.

#### Small Inertial Moment

Compared with conventional centrifugal types, the diameter of the mixed-flow impeller is 30 to 40% smaller, so that  $GD^2$  becomes smaller and a squirrel cage induction motor can be used. Also, if the power supply capacity allows, direct-on start is possible, enabling the use of less expensive electrical equipment with easier maintenance.

#### Compact size, light weight and easy installation

The blower is compact with its single-stage mixed-flow design that incorporates the integral speed-increasing gear and lubrication oil system. Since space required for installation is small, easy foundation and easy installation is possible with reasonable construction costs.

#### Low vibration, low noise

Vibration is extremely low due to the very precisely balanced lightweight rotor. Also, since the basic frequency of noise is high, attenuation is simple and noise can easily be eliminated.

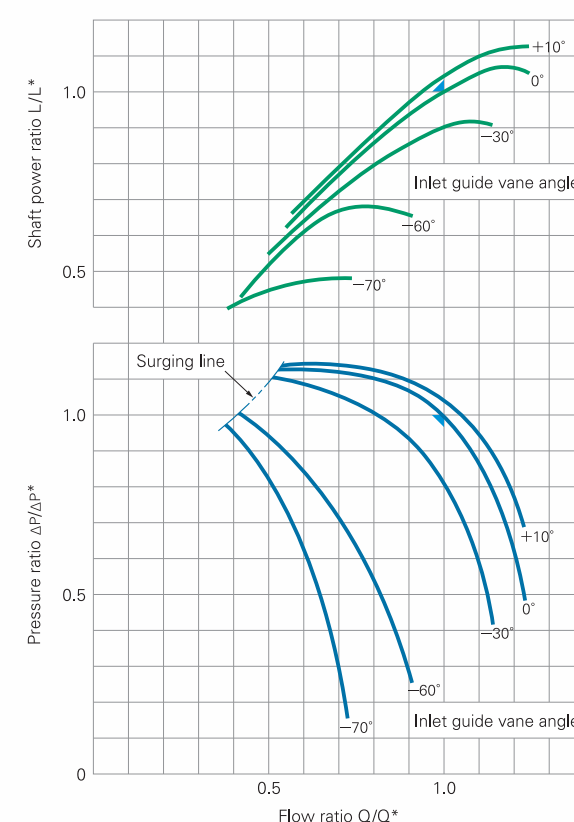
#### Completely oil free

Since over-hang type shaft is applied, there is no bearing on the suction side. Suction area completely separated from the oil system enables to supply oil free. Also, a dry gas seal system can be applied for special gas applications.

#### Saving energy

Energy-saving effects are obtained through superior pneumatic performance and inlet vane control even when operating at points other than specified.

##### ■ Estimated performance curve



(\*: shows the value at the specified point.)

#### Longer Operation Time

The structure is simple, with few parts, and with the rotor and bearing protected completely by oil film. Also, the lightweight rotor and tilting pad bearing with high vibration control mean that only small vibration occurs, enabling continuous operation for long periods.

#### High Reliability

The GM Blower is standardized product under the strict quality control at our factory to keep a high reliability and it has proven track record of more than 1,300 units supplied for aerial and various gas applications.

### Applications

#### 1 Air supply for chemical, oil and steel manufacturing equipment

For feed air supply, combustion processing, chemical reactions, blast furnaces, sulfur recovery plants, phthalic anhydride plants, maleic acid plants, acrylic acid plants, Carbon black plant, etc.

#### 2 Compression of various gas service

For circulating processing gas,  $CO_2$  gas,  $NH_3$  gas, formaline gas, off gas,  $Cl_2$  gas, coke oven gas, etc.

#### 3 For food and pharmaceutical manufacturing

For reactions, fermentation, pneumatic conveyers, waste liquid and waste water treatment, etc.

#### 4 For public works

For waste water treatment, flue gas desulfurization and denitration of thermal power plants, pressurizing air for shields, pressurizing air for caissons, supplying air to tunnel construction work, etc.

#### 5 For various operations

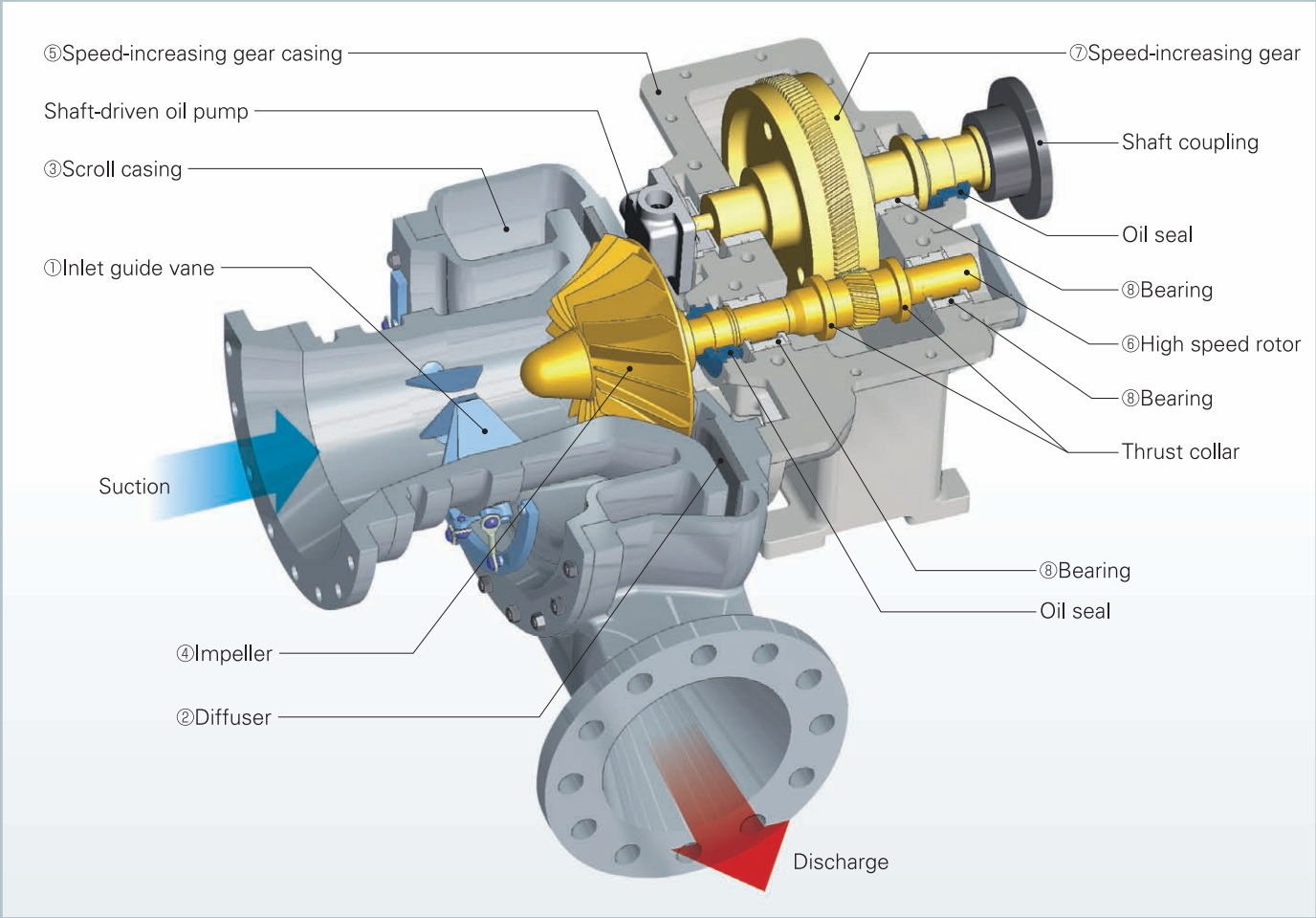
For air curtains, air knives, drying, etc.

#### 6 Other applications

For air conveyance of trash, powder and grain, air supply to factories, incinerators, etc.

# Simple structure for high reliability and excellent performance

## Structure



### ①Inlet Guide Vane

Installed and pre-rotated the inlet gas just before the impeller for flow control with sufficient partial load efficiency.

### ②Diffuser

Optimum shaped diffuser is used. Dynamic pressure can be effectively converted into static pressure, further enhancing overall efficiency. A Variable Diffuser Vane (VDV) is applied for small capacity blower (GR type blower).

### ③Scroll casing

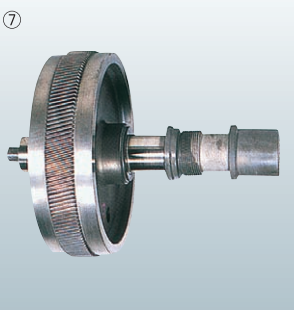
Air from the diffuser is collected here and effectively discharged by the smooth spiral volute.

### ④Impeller

The ideal impeller shape is selected by CFD to further increase efficiency. Also, bending stress due to centrifugal force is minimized with an impeller shape that allows high speed rotation. If required, the impeller can be tested at a speed of over 115% of the rated speed using a special spin tester to confirm its strength. The impeller is made of aluminum alloy, titanium alloy or stainless steel according to the application.

### ⑤Speed-increasing gear casing

The speed-increasing gear casing is constructed of an upper half and lower half and has sufficient rigidity and strength to support the speed-increasing gear through bearings. The upper casing can be removed independently and separately from other part, enabling easy maintenance and inspection of the speed-increasing gear.



### ⑥High-speed rotor

One-piece shaft is used as high-speed rotor & pinion and the impeller is assembled to the tip of that shaft. The rotor is made of chrome molybdenum steel which is heat treated for sufficient strength, and it is dynamically balanced by a special balancing machine to assure stable rotation with a minimum of vibration. The thrust of the impeller is transmitted to the low-speed shaft, so a thrust bearing for the high speed-shaft is not required, which greatly reduces the mechanical loss.

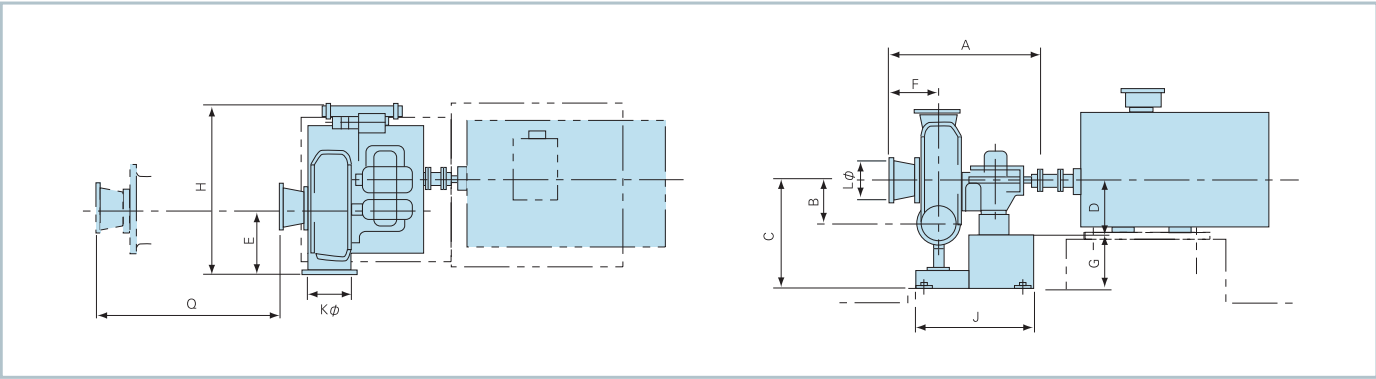
### ⑦Speed-increasing gear

A helical gear is used, which brings the motor speed up to the impeller rotation speed in a single stage. Both pinion and gear are ground to high-precision teeth, and surface hardening is applied. The speed-increasing gear features excellent stability at high-speed rotation with little vibration and noise, assuring a long service life.

### ⑧Bearings

White metal lining is used on carbon steel for the bearings. A special profile (our original design) or a tilting pad is used to assure the stability during high-speed operation.

## Dimensions and weight

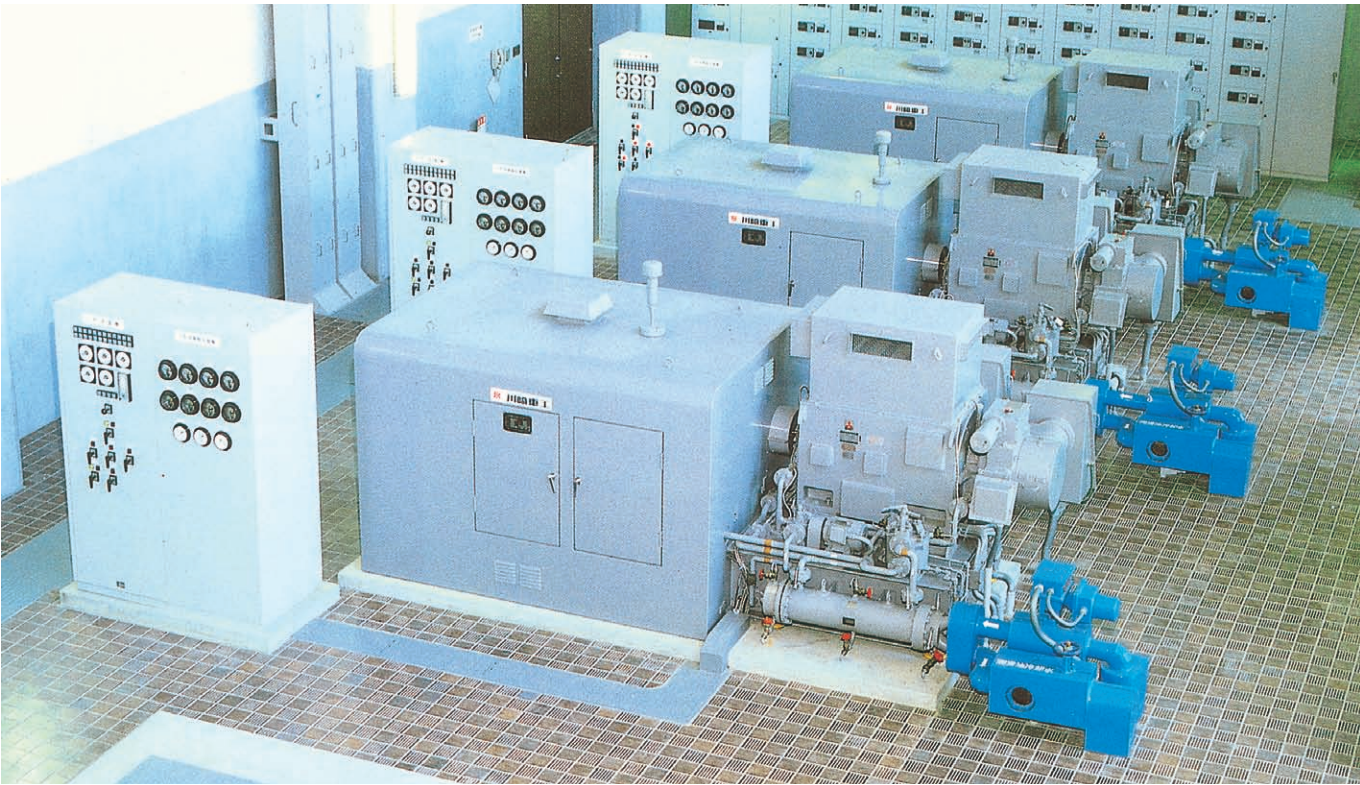
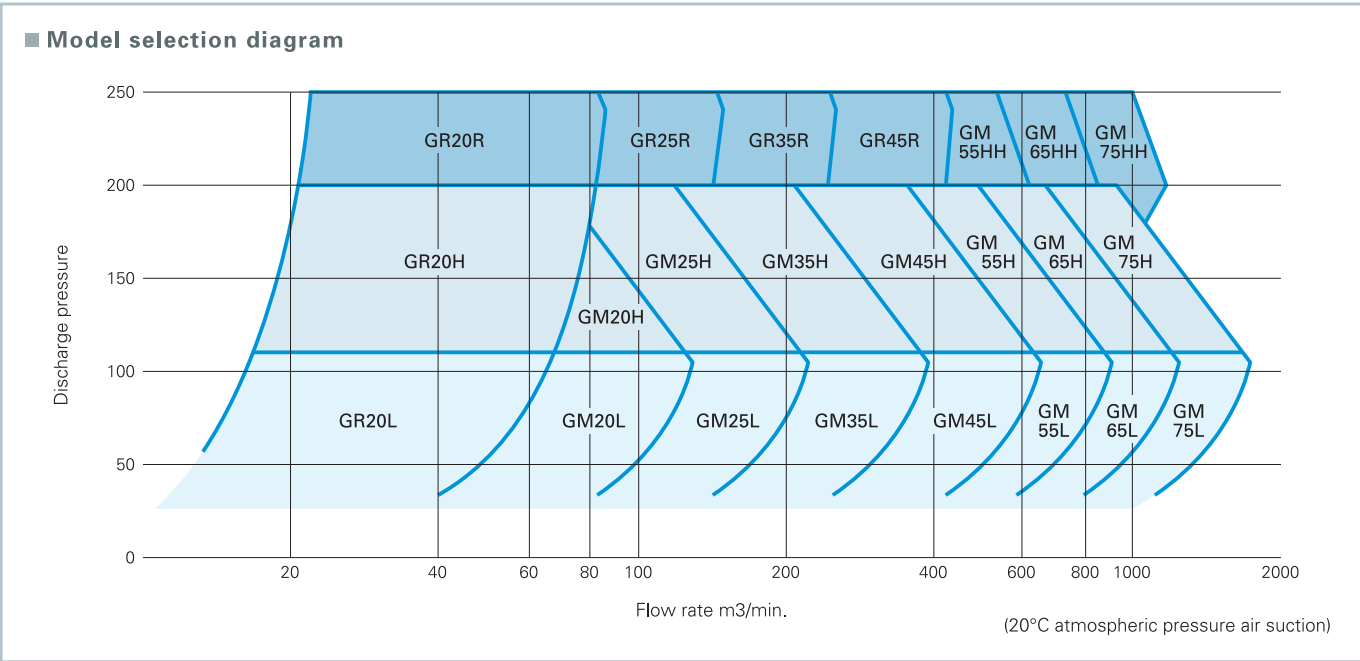


Model	Size (mm)												Weight (kg) (excluding sound-proof cover and motor)
	A	B	C	D	E	F	G	H	J	Lφ	Kφ	Q	
GR20	780	180	850	390	250	190	460	1,175	700	125	150	180	900
GR25	915	235	940	390	330	245	550	1,220	800	175	200	230	1,100
GM20	818	190	850	390	300	210	460	1,175	700	200	200	210	900
GM25	945	250	940	390	395	278	550	1,265	800	250	250	250	1,100
GM35	1,178	325	1,100	530	520	362	570	1,512	925	300	300	310	1,600
GM45	1,503	430	1,400	650	680	472	750	1,878	1,150	400	400	390	2,700
GM55	1,668	500	1,050	500	800	551	550	1,998	1,250	500	500	440	3,200
GM65	2,063	590	1,200	600	940	651	600	2,330	1,550	600	600	500	4,600
GM75	2,257	695	1,350	650	1,100	776	700	2,490	1,700	700	700	570	6,000



# Selecting the optimal blower for the application from a wide lineup of models

## Model selection

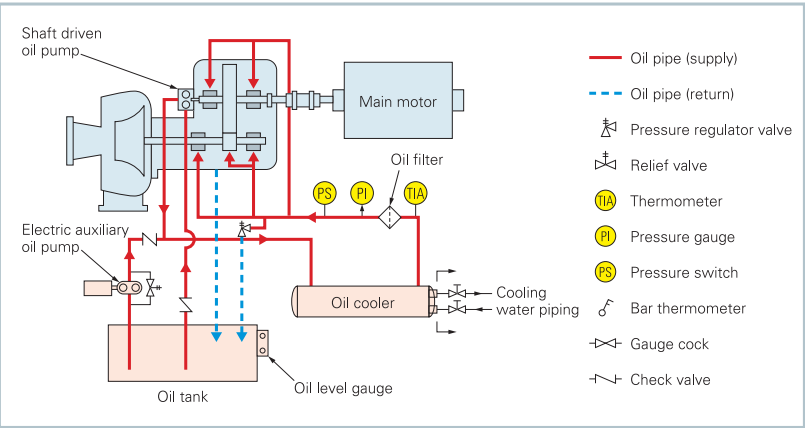


## Lubrication Oil system

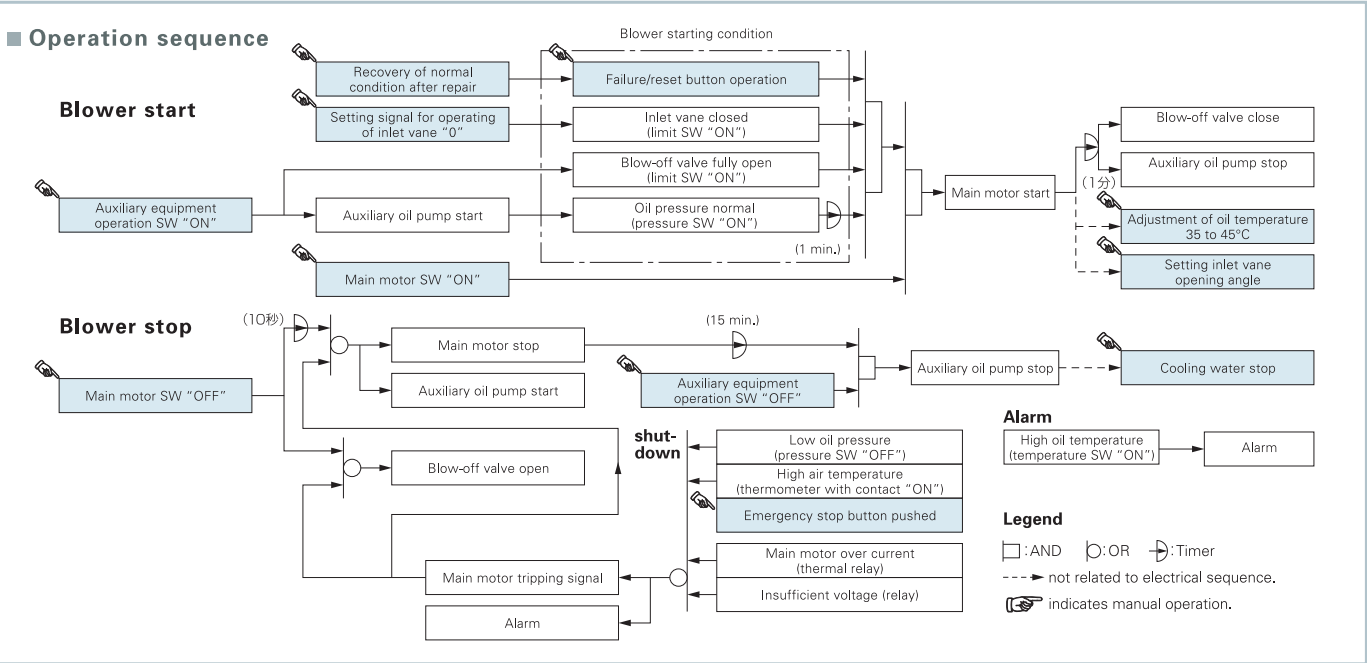
The GM blower adopts a shaft-driven oil pump. Lubrication components such as the oil tank, shaft-driven oil pump, electric auxiliary oil pump, oil cooler, oil filter and pressure regulator valve are all integrated compactly in the blower unit.

Since the blower is completely cleaned at the factory before shipment, no oil piping work or flushing is required at the installation site. No overhead tank nor accumulator, etc. for oil supply in the case of emergency shut down is required because of the short coast-down time (due to the small inertial moment of the rotator) and because sufficient oil can be supplied by shaft-driven oil pump until the blower comes to a complete stop.

The auxiliary oil pump stays off during blower operation and operates temporarily only when the blower is starting and stopping.



## Operation system



### Safety equipment

GM Blower is equipped with the safety devices listed in the table for safe operation.

Table of GM Blower Safety Devices	Alarm	Stop	Detector
Low Oil pressure		○	Pressure switch
High Oil temperature	○		Temperature switch
High Air temperature		○	Temperature switch

## Standard supplies

1. Blower (with integral speed-increasing gear)
2. Base plate (with oil tank)
3. Lubrication Oil System  
Shaft-driven main oil pump, electric auxiliary oil pump, oil cooler, oil filter, pressure regulator valve, oil level gauge, lubrication oil piping
4. Instruments  
Oil pressure gauge, Oil pressure switch, Oil thermometer, dial thermometer with contact (Oil temperature x 1, Gas temperature x 1)
5. Shaft coupling
6. Foundation bolts, liners
7. Commissioning spare parts (gasket)
8. Special tools
9. Export Packing

## Optional supplies

- |  |   |
|--|---|
| 1. Main driver (motor, steam turbine)                        | 12. Suction filter  |
| 2. High-pressure start panel, control panel, operation stand | 13. After-cooler  |
| 3. Wiring and terminal box in blower unit                    | 14. Suction and discharge flexible joints                                   |
| 4. Flow control device, pressure control device              | 15. Pipes and valves  |
| 5. Anti-surge control device                                 | 16. Coupling cover  |
| 6. Dry gas seal system                                       | 17. Companion flanges (with bolts, nuts and gaskets)                        |
| 7. Special controlling device                                | 18. Spare bearings  |
| 8. Vibration monitoring device                               | 19. Sole plate for main motor   |
| 9. Special instruments                                       | 20. Common bed  |
| 10. Sound-proof cover  | 21. Installation parts<br>(template, packer liners, rubber shock absorbers) |
| 11. Suction-discharge and blow-off silencer                  | 22. Witness inspection/test by the customer at our factory                  |

# KAWASAKI HEAVY INDUSTRIES. LTD.

## Machinery Division

<http://www.khi.co.jp>

### Tokyo Head Office

World Trade Center Bldg., 4-1, Hamamatsu-cho 2-chome, Minato-ku, Tokyo 105-6116, Japan  
Turbo Machinery Sales Dept. Blower Section  
Phone: +81-3-3435-2355 Fax: +81-3-3435-2022

### Kobe Works

1-1, Higashikawasaki-cho 3-chome, Chuo-ku, Kobe, Hyogo 650-8670, Japan  
Aerodynamic Machinery Dept. Blower Section  
Phone: +81-78-682-5351 Fax: +81-78-682-5552

### Beijing Office

Room No.2602, China World Tower, China World Trade Center, No.1, Jian Guo Men Wai Avenue, Beijing 100004, Peoples Republic of China  
Tel : +86-10-6505-1350 Fax : +86-10-6505-1351

### Taipei Office

15th Floor, Fu-Key Bldg., 99 Jen-Ai Road, Section 2, Taipei, Taiwan  
Tel : +886-2-2322-1752 Fax : +886-2-2322-5009

### KAWASAKI HEAVY INDUSTRIES MIDDLE EAST FZE

P.O.BOX 54878, DUBAI, UAE

#### Notes:

- \*Please understand that the content of this catalog is subject to change for improvement without prior notice.
- \*Colors and attached instruments shown in catalog photographs may differ from actual items.



#### Safety notes:

For safe usage, please be sure to read the "Instruction Manual" before operating the product.  
Incorrect handling of the product may cause an accident, fire, electric shock or trouble, which may result in injury or death.