



HOFFMAN



LAMSON

by Gardner Denver

Revolution^{Plus}

High Speed Turbo Blowers & Compressors

REVOLUTION^{PLUS}



Turbo Blower HL-B Series
Turbo Compressors HL-C Series



Hoffman & Lamson Revolution^{Plus}

The one you want

Revolutionary Philosophy

The top of our operating philosophy is the customer. We strive to serve customers and their needs through a family dedicated to continue over 150 years of faithful service. We deliver industry leading products, through a highly skilled and experienced workforce. Our employees make it possible and are the corner stones of this support. The fabric of customer trust in our long line of successful product brands is woven with exceptional resources, value, and commitment. Our product innovation is ground breaking and delivered with high velocity. The Hoffman Revolution is a direct result of this philosophy, an example of our commitment to the environment and response to the voice of the customer.

Efficiency is priority one

We have many customers that count on us to help them reduce their carbon foot print, increase efficiency and improve their energy savings. Since 75% or more of the total life cycle

costs of operating aeration equipment is energy, energy efficiency is our number one priority. Technological improvements allows the footprint of the Revolution to be significantly smaller than the traditional blowers—reducing energy consumption—and reducing carbon foot print.

The Hoffman Revolution is the world’s most advanced blower energy management system. The cultivation of blower design and leadership delivers a new standard in efficiency and environmental protection. The first high speed centrifugal in its class. Through advanced technologies, the Revolution delivers up to 45% energy savings, provides increased reliability with little or no maintenance, and comes factory prewired and tested in an ergonomically designed sound enclosure for plug-and-play operation.





Product Turbo Blower

- High speed motor direct-coupled
- Centrifugal high pressure blower with air foil bearing

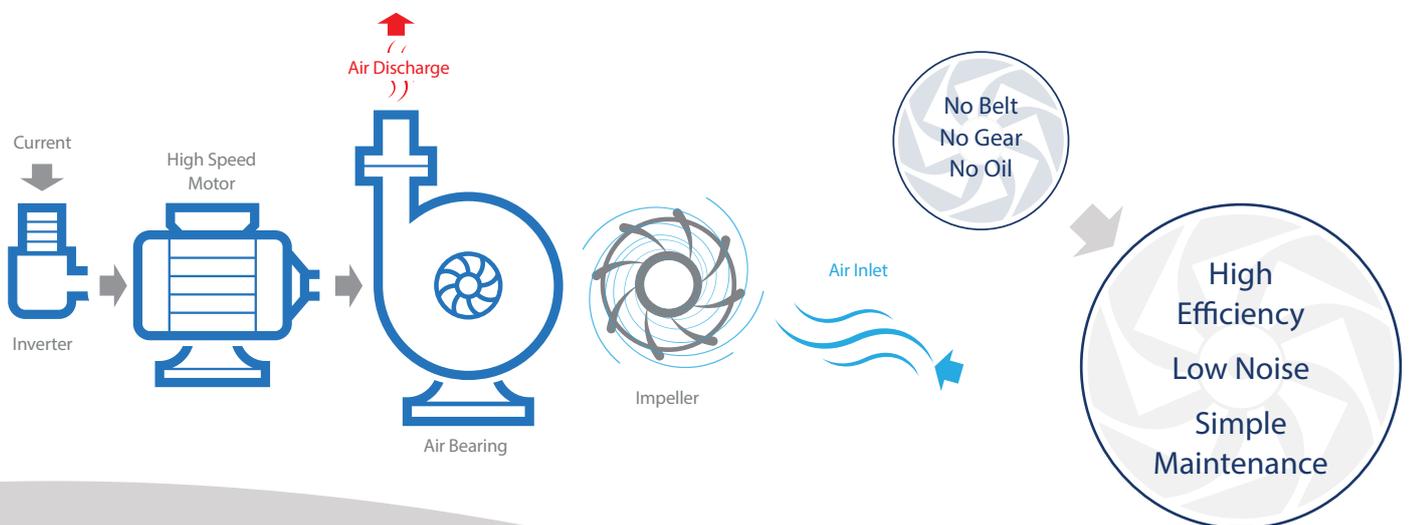


10-30Hp

50-150Hp

200-300Hp

400-700Hp



Application Area



Sewage Treatment Plant
for aeration



Chemical Factory
for air transfer



Cement Factory
for transfer



Power Plant
for supply oxygen



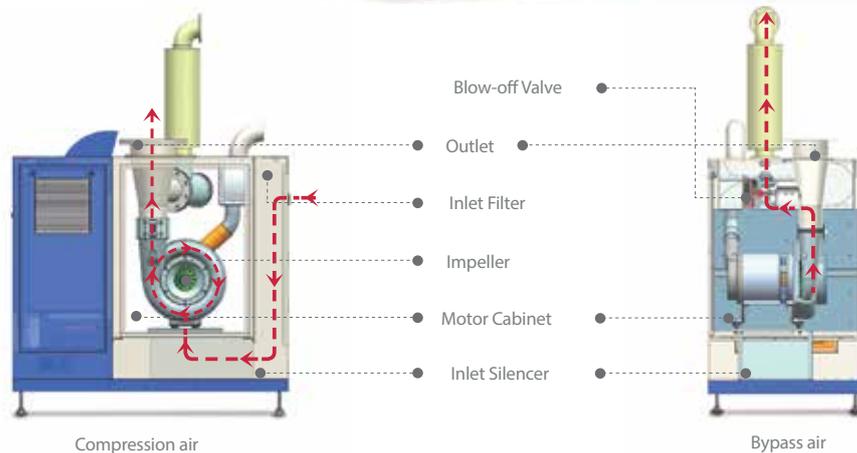
Structure & Components

Turbo Blower consists of a **compression unit** that compresses air, a **blow-off valve** that releases air to protect the compression unit during start and stop, an **inverter** that controls the rotating speed of a high-speed motor through the change of frequencies, a **PLC control unit** that allows a user to actively operate the product depending on field conditions and an **enclosure** that fixes all parts and prevents internal noise to the outside.



- 1 Touch Screen HMI
- 2 Inverter
- 3 PLC
- 4 Cooling air silencer
- 5 Blow-off valve
- 6 Air-end
- 7 Inlet silencer

Air Flow





Naming

- 1 **Touch Screen HMI**
 - Input driving signal
 - Monitoring operation condition
 - Change Settings condition
- 2 **Inverter**
 - Change the rotation speed of the high-speed motor according to PLC values
 - Change the flow rate and pressure
- 3 **PLC**
 - Transmits driving signals to the inverter
 - Transmits product status data to the touch-LCD
 - Communicates data with the HMI
- 4 **Cooling air silencer**
 - Reduce the boned from the Air-End
 - Have 2-path structure inside
- 5 **Blow-off valve**
 - Bypass air for protecting the Air-End when starting and stopping the blower
 - Pneumatic system using the compression air itself
- 6 **Air-end**
 - Compress ambient air and gas
 - Centrifugal compression using impeller and volute
 - Oil free because of using foil air bearing
 - Air cooling or water cooling
 - High efficiency motor
- 7 **Inlet silencer**
 - Reduce the noise released outside from Air-End through the inlet path
 - C-type shape

Core Components

Impeller / rotor

- Compress air
- Direct-coupled impeller with rotor
- Cooling fan assembled in another side



Air foil bearing

- Using air compressed by wedge effect
- Bump type
- Reliability test of 30,000 on/off



STATOR

- Assembled by cooling pin
- Insulation grade : H-CLASS



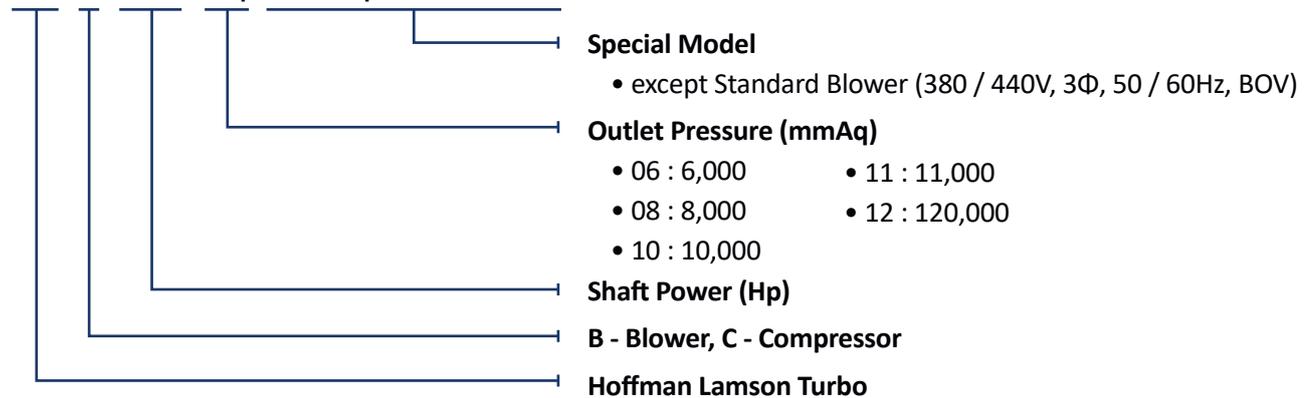


Turbo Blower / Compressor

Gardner Denver produces from 10 to 700 horse blowers / compressors globally.

Model name

HL-B-100-06 [special option]



Model Specification

mm/Aq m ³ /min	10Hp	20Hp	30Hp	50Hp	75Hp	100Hp	125Hp	150Hp	200Hp	250Hp	300Hp	350Hp	400Hp	500Hp	600Hp	700Hp
6,000	7	13	21	34	49	70	85	102	124	160	198	227	245	317	375	440
7,000	-	-	19	30	42	58	72	86	106	142	167	192	202	278	316	370
8,000	-	-	17	27	38	54	67	80	96	130	156	179	189	259	295	345
9,000	-	-	-	24	33	48	60	70	87	113	136	158	169	220	260	302
10,000	-	-	-	22	31	45	55	66	80	104	128	147	160	208	246	285
11,000	-	-	-	20	28	40	50	62	72	95	117	134	144	187	221	259
12,000	-	-	-	19	25	36	45	58	65	85	105	121	135	175	207	243
Weight (kg)	120	370	390	390	550	770	790	830	880	1450	1450	1500	2540	2900	2900	3100
pipe (mm)	80	125	150	150	200	250	250	250	300	350	350	350	400	500	500	500
size (mm)	W	650	800	800	800	920	1020	1020	1020	1020	1300	1300	1300	1700	1800	1800
	D	650	1150	1150	1150	1350	1600	1600	1600	1600	1950	1950	1950	2800	3500	3500
	H	1020	1350	1350	1350	1500	1575	1575	1775	1775	1900	1900	1900	2035	2180	2180

Ambient Conditions: 101.325 kPa (a), 20°C, 65% RH. Tolerances : Air Flow ±5%, Power ±5%. Compliant with ISO 5389, ASME PTC 10
The specification of the product may change for improvement of performance without notice.



Impeller / Diffuser

Impeller

During a design process, the quantity of flow and pressure of an impeller are decided according to the customer's needs, an impeller can be manufactured by two methods depending on the customer's choice.

The one is processing by 100% using 5-Axis machine, another one is making precisely cast figures and processing outside diameter.



Diffuser

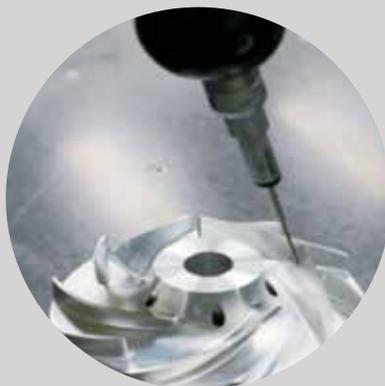
The diffuser changes the velocity energy of air inhaled through an impeller at high speed into pressure energy, and precisely designed by aerodynamic combination with an impeller.



Manufacturing



5-Axis Machine



3-Dimension Measure



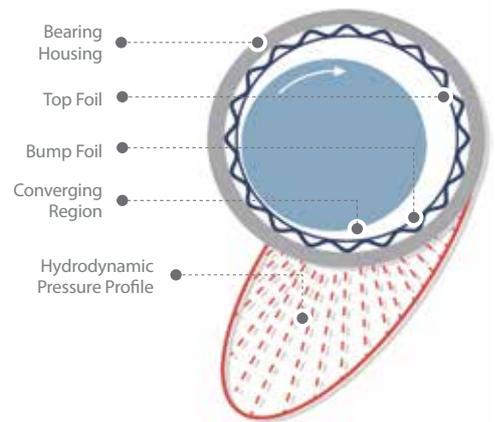
Dynamic Balancing



Air Foil Bearing

Principle

When two surfaces form a wedge, and one surface moves relative to the other surface, pressure is generated between the surfaces due to the hydrodynamic action of the fluid which carries load. Eccentricity occurs at the center of the rotor and the bearing by self-load of the rotor, thereby production Converging Region. Hydrodynamic pressure is produced in the converging region by the rotational force of the rotor. The airfoil bearing supports the rotor by using that. The rotor emerges and rotates at 2,000 rpm or higher, and the friction loss that occurs during operation is close to zero.



Journal bearing

Even though, the principle of an air bearing is simple, but application is complex. Usually running radial clearance between the shaft and the bearing is less than 0.012mm for a 50mm diameter shaft running at 30,000 rpm. But the shaft growth due to temperature and centrifugal force could be 0.05mm. Hence a bearing can not be made to work at various speeds and temperatures. In addition, damping is required to suppress any whirl instability, and there could be misalignment between various rotating parts and stationary parts. These problems are resolved by foil bearings.



Thrust bearings

Thrust bearings withstand axial loads in a rotating machinery. In a journal bearing the wedge action comes from eccentricity between the center of the rotating shaft and the center of the bearing itself, whereas in a thrust bearing the wedge is built in taking into account any deflection due the axial load. There are multiple radial springs which transfer the load to the housing. Foils between the springs deflect under pressure forming the wedge required for the hydrodynamic action.





High Speed Motor

Why choose a high-speed motor?

The motor output is decided in proportion to the rotor capacity and rotation velocity. High rotation velocity enables the design of a high output motor. A high capacity motor is operated by greater rotational velocity to obtain a high output, which leads to the reduction of volume – it is therefore possible to make the motor smaller and lighter which is an obvious advantage.

Motor comparison

Aluminium rotor induction motor

Principle

- Rotary power generated by the interaction between the magnetic force from stator coil current and another current flowing through a rotor bar (Aluminum)

Merits/demerits

- Sturdy structure, long lifespan
- Excellent for mass-production
- Power factor declines at high-speed operation



Copper rotor induction motor

Principle

- Rotary power generated by the interaction between the magnetic force from the stator coil current and another current flowing through a rotor bar (copper)

Merits/demerits

- High efficiency, long lifespan, low noise, low vibration
- Hard to manufacture; excellent for attaining high output
- Excellent efficiency because of the decrease in rotor copper loss



Permanent magnet synchronous motor

Principle

- Rotary power generated by the magnetic force from the stator coil current and drawing force of a rotor permanent magnet

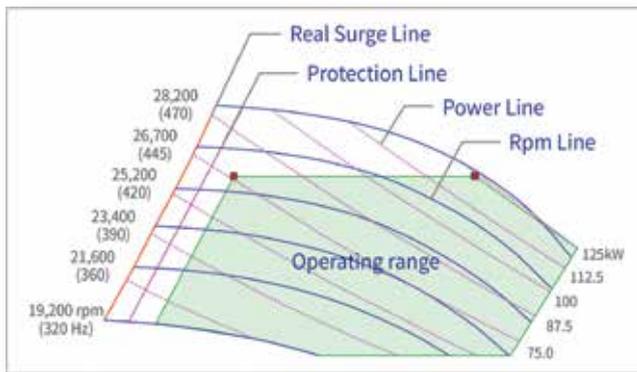
Merits/demerits

- High efficiency, low noise, compact structure; high manufacturing cost
- Risk of demagnetisation of the permanent magnet





User Friendly



Simple touch design

- Adopt the 32-bit collar LCD
- Convenient network setting

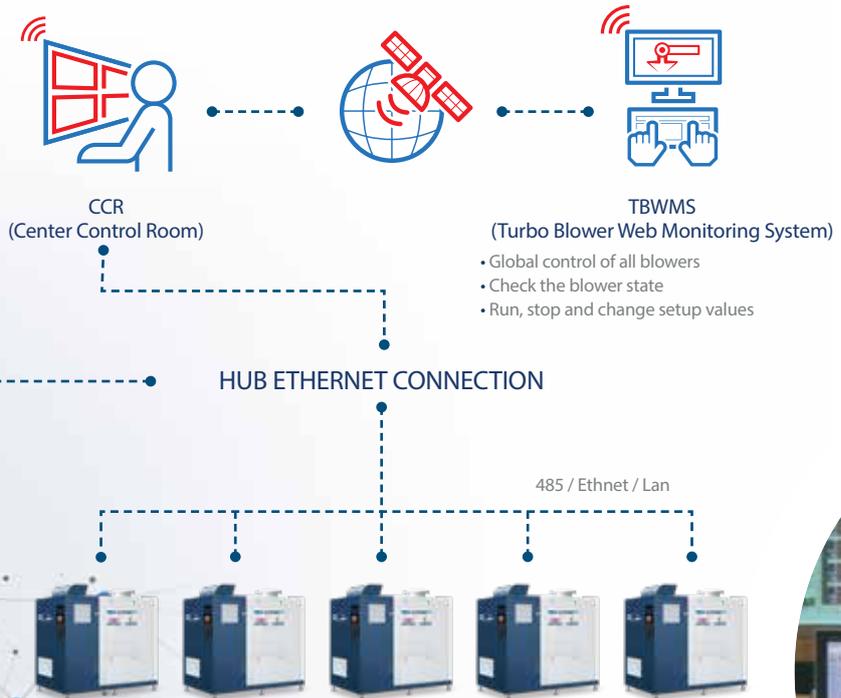
Wide operating range

- Supply active control suitable for the site
- Supply variable operating modes

Integrate control

MOP (MAIN OPERATING PANNEL)

- Remote / Local Operation
- Automatic on/off according to the site





Easy maintenance

- Change the inlet filter (Recommended to be done after blower has stopped)



Open Door



Change Filler



Close Door

Periodical inspection: Once every 3 years

- Clean product and change electric supplies
- Check AIR-END components
- Check the balance of rotating parts
- Check the drives and controllers

Reference

- Variable application in the world



The Revolution^{Plus}

D-E-L-I-V-E-R

Differentiate	<i>D</i>	State of the art “air - foil bearings”, <85 dBa sound rating, extended warranty
Evolve	<i>E</i>	Over 150 years of industry-leading brands that others try to copy, Blower Evolution—Hoffman Revolution
Listen	<i>L</i>	Voice of the customer to increase efficiency, make carbon footprint smaller, and simplify operation and controls
Innovate	<i>I</i>	Advanced technologies that optimise aerodynamic and motor efficiencies with proprietary real surge, not predicted surge
Velocity	<i>V</i>	Technology product pull-through of manufacturing and testing provides a new standard in performance
Execute	<i>E</i>	Engineering prowess created and delivered on-time, a break through product technology setting new industry standards
Results	<i>R</i>	A product design achieving up to 45% savings with a significantly reduced carbon footprint

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