

hibon

OPERATION MANUAL

Multistage Centrifugal Blower

PERFORMER and **HIGH PERFORMANCE** series



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Ingersoll Rand
Industrial Technologies

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1 INTRODUCTION


1.1 Scope

This manual provides installation, operation and maintenance instructions for the Ingersoll Rand centrifugal blower referenced as "blowers" throughout the remainder of the manual. The blowers must be used as specified in this manual. Read this manual before installing and operating the blower.











Important safety information is highlighted as WARNING and/or CAUTION instructions which must be followed. The use of WARNINGS and/or CAUTIONS is defined below.

The units used throughout this manual conform to SI international system of measurement.

In accordance with the recommendations of IEC1010, the following warning symbols are on the blower:

	WARNING Warnings are given where failure to observe the instructions could result in injury or death to people.
---	---

CAUTION Cautions are given where failure to observe the instruction could result in damage to the equipment, associated equipment and process.
--

	Warning, refer to accompanying documentation.		Warning use appropriate lifting equipment.
	Warning risk of electric shock.		Warning hot surfaces.
	Warning, do not step.		Warning trip hazard.
	Warning rotating fan.		Warning use hearing protection.
	Warning, do not operate with guards removed.		Warning rotating parts.

1.2 ATEX Directive Implications

The blowers are not designed to meet ATEX requirements.

1.3 Description

The blower is suitable for use with air only. The blower is not intended for use with internal potentially explosive atmospheres.



WARNING

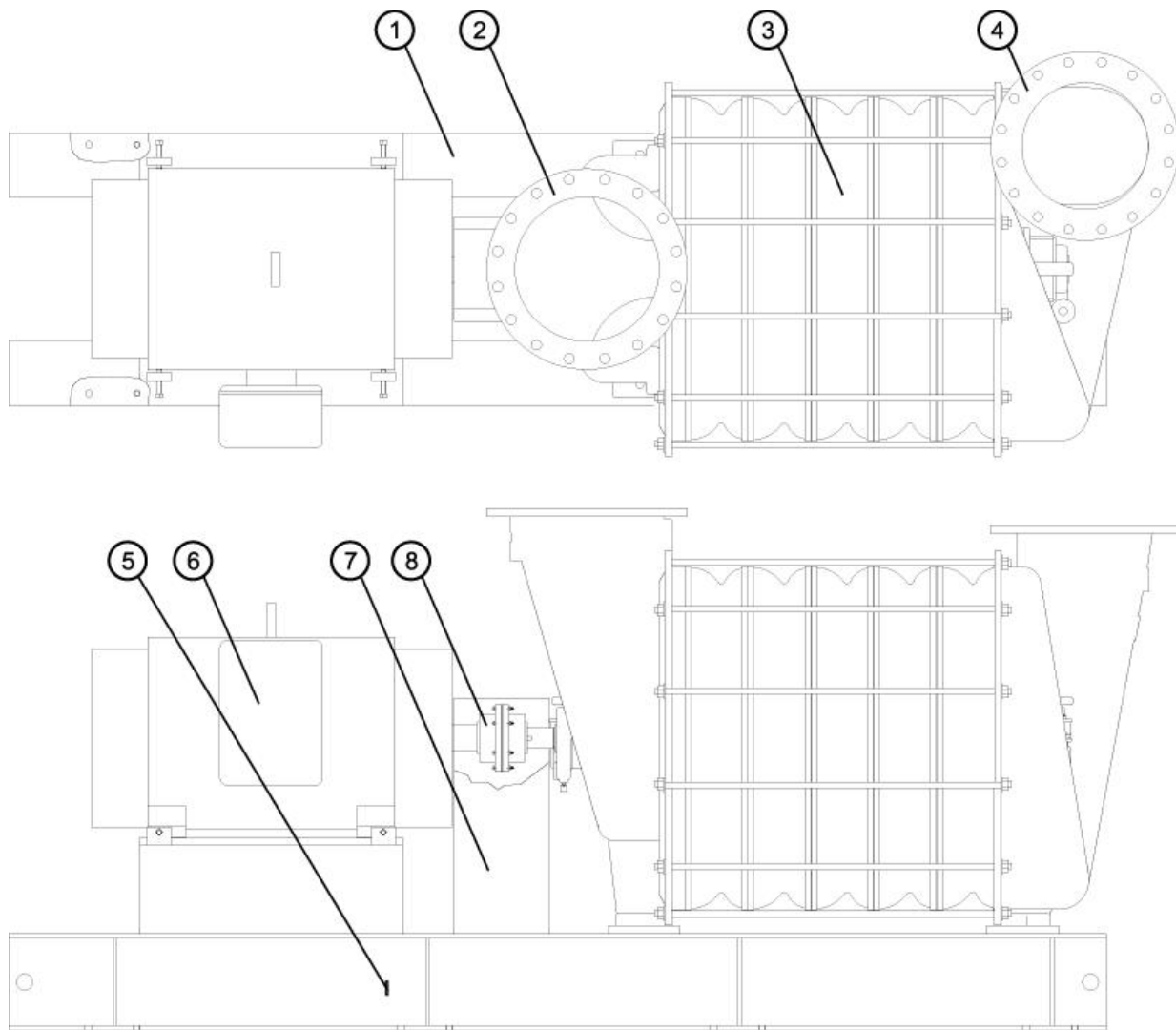
The blower must not be used in external potentially explosive atmospheres. If this service is required, consult Ingersoll Rand for advice.

The blower (See Figure 1) is a dynamic radial compressor that creates pressure by accelerating the fluid in a set of impellers and then decelerating the fluid by means of a long radius and high efficiency diffuser. A suction side valve has been designed into allow modulation of air flow while maintaining a constant pressure. A variable frequency drive can be used as an alternative for specific applications.

The blower has been designed to provide a low vibration compact and complete unit. A full range of accessories are available which include: controller; inlet filter/silencer; modulating inlet/discharge valve; flexible couplings, and; check valves (See Figure 2 and refer to Section 7 for descriptions).

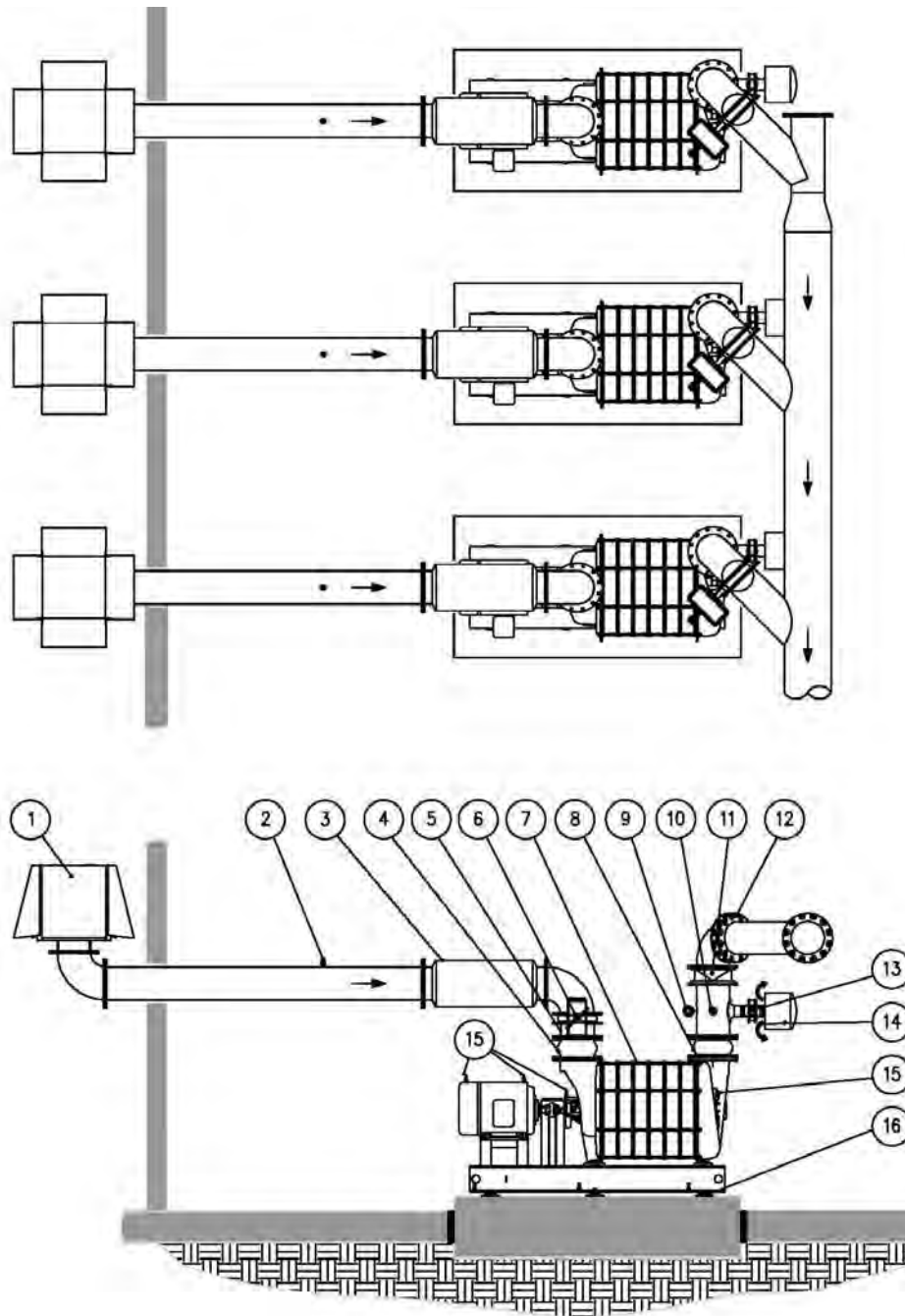
The functional design of each unit allows it to be equipped with a PLC based control panel that incorporates an operator interface for a user-friendly operation. The controller operates with Ingersoll Rand software, optimized and adapted for specific applications. Commercially available components can be controlled through the unit.

The blowers are designed to meet the most demanding industrial/municipal requirements for vibration, noise and efficiency. The blowers can deliver 1300 m³/h - 53000 nm³/h (900 - 34000 scfm) of dry clean air without fluctuations, at pressures up to 1.38 bar (20 psig).



N°	Description	N°	Description
1	Structural Base	5	Ground
2	Inlet Flange	6	Motor
3	Centrifugal Blower	7	Coupling Guard
4	Discharge Flange	8	Grid Coupling

Figure 1 - General arrangement



N°	Description	N°	Description
1	Inlet Filter	9	Outlet Pressure Gauge
2	Restriction Gauge	10	Temperature Indicator
3	Inlet Silencer	11	Outlet Check Valve
4	Inlet Flexible Connector	12	Isolation Valve
5	Inlet Spool	13	Vent Valve
6	Modulating Valve	14	Vent Silencer
7	Centrifugal Blower	15	Vibration Transmitters
8	Outlet Flexible Connector	16	Vibration Isolators

Figure 2 – Typical System Configuration

1.3.1 Theory of Operation

Pressure

Operation as a centrifugal blower (See Figure 3) is characterized by a constant intake pressure and variable discharge pressure, depending on capacity. The lower capacity limit is defined by the surge limit and occasionally the temperature limit of the gas. The upper limit is defined by the size of the motor, which must not be over loaded.

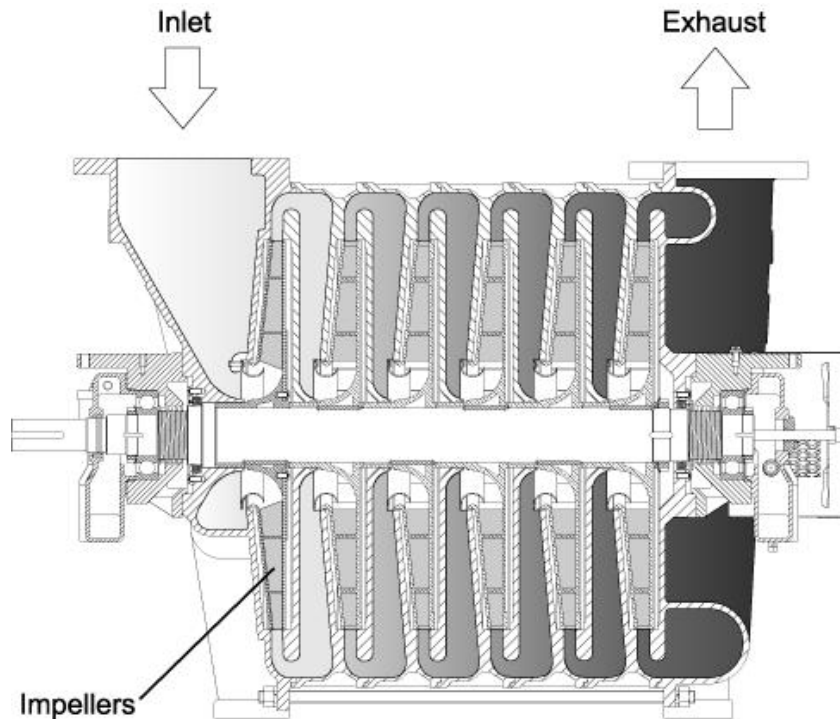


Figure 3 – Blower Sectional View

Changes in pressure and temperature at intake affect the density of the gas processed and can produce substantial reductions in the mass capacity where the volumetric capacity remains the same.

In processes where it is necessary to ensure the quantity of oxygen, it is essential to take account of the maximum ranges of temperature and pressure at intake and the humidity which results in a change in the apparent molecular weight of the fluid. If left to operate with a completely free intake, the centrifugal blower provides the performance given on its throttle curve, thus drawing in the volume corresponding to the discharge pressure applied on the outlet opening and absorbing the energy shown on the curve for this capacity.

The density of the fluid drawn in is constant at any value of volume and discharge pressure. Changes in discharge pressure on the outlet causes the capacity and power absorption to change precisely along the throttle curve.

Therefore, changing the discharge pressure, achieved for example by means of a butterfly valve, can constitute a valid method of controlling machine capacity. See Figure 4.

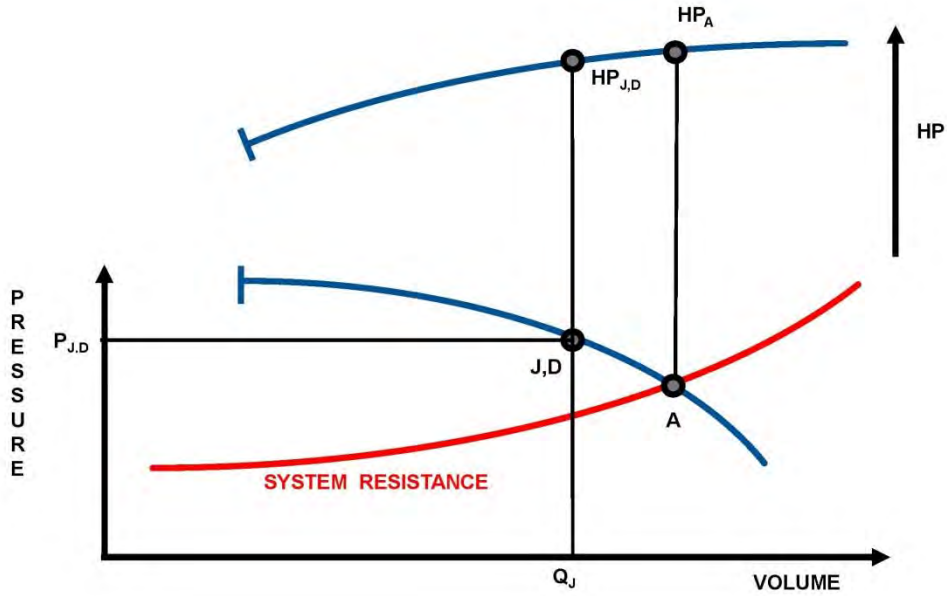


Figure 4 – Outlet Regulation Curves

If a pressure drop is introduced at the inlet, the inlet pressure is reduced and is variable depending on the capacity drawn in. The density of the fluid drawn in varies as the volume varies, if the volumetric capacity remains the same, resulting in a reduction in mass capacity. Discharge pressure also falls due to the effect of the increase in the compression ratio following the reduction in the inlet pressure. A new throttle curve is created which starts close to the previous one but shifts farther away as the volume increases.

The greater the scale of the pressure drop introduced at intake, the more rapid the new curve shift. Similarly to the new throttle curve, a new lower power absorption curve is also produced. Changing the inlet pressure with a butterfly valve can constitute a valid method of controlling machine capacity. See Figure 5.

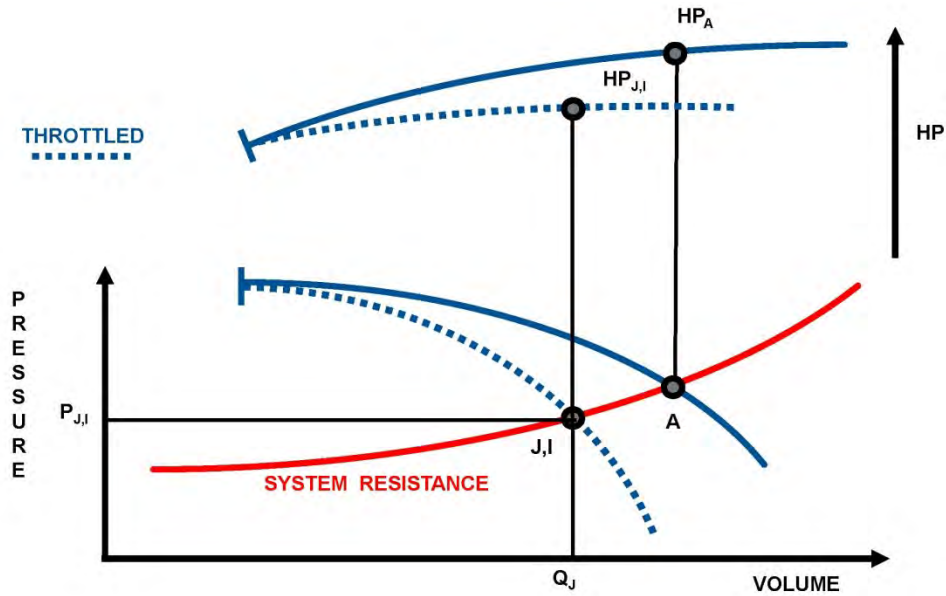


Figure 5 – Inlet Regulation Curves

It is also possible to control the flow of the blower with a variable frequency drive (VFD). This method is the most efficient way of controlling a centrifugal blower. However it is the most expensive one due to the higher cost of the VFD compare to a standard motor control center. It also requires a special control system and the turn down is reduces compare to the inlet throttling method. See Figure 6.

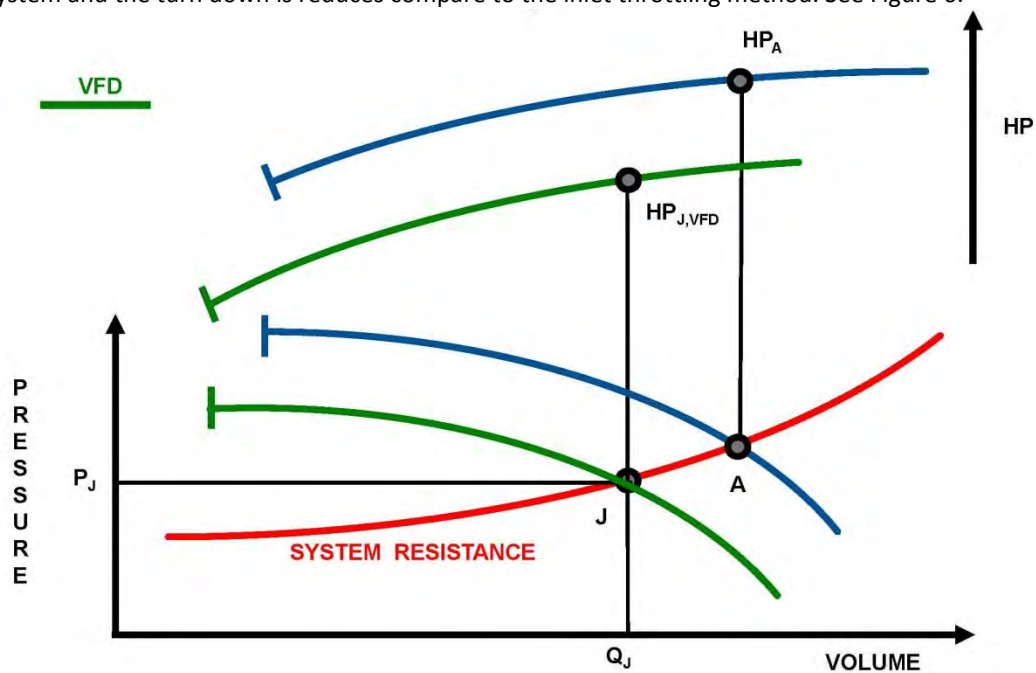


Figure 6 – VFD Regulation Curves

The choice of the type of regulation is generally determined by the characteristics of the application; however, where possible, regulations at the inlet and with a VFD are preferred as it allows for greater energy economy. This is because outlet regulation reduces the power absorption shown in the basic curve whereas with inlet regulation, the power absorption curve obtained is lower than that of the standard curve. See Figures 7.

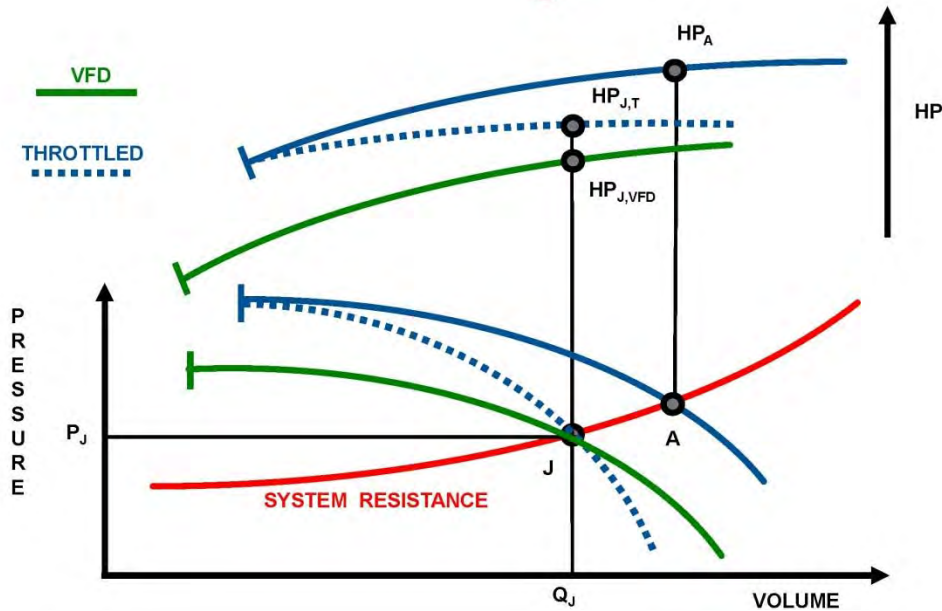


Figure 7 – VFD vs Inlet Throttling

Surge Limit

Centrifugal blowers are characterized by limit capacity. Below this limit, required pressure is unable to develop for transferring gas from the environment at a lower pressure to a higher pressure. Below this capacity, a flow reversal develops which affects the pressures of the two environments and enables the machine to operate until a similar condition is reached. The phenomenon repeats itself cyclically, generally with a very low frequency, depending on the installation, until action is taken to increase the capacity. Operation under these conditions must be avoided since, when the flow reverses, there is a reversal in the axial thrust on the shaft which subjects the bearing on the inlet side to fatigue.

In large blowers with high compression ratios, surging can be violent enough to produce irreversible damage to impellers and piping. A safety circuit or by-pass must be provided which can also be used when the blower is started.

Normal

The materials of construction of the blowers are specified in Section 2.4. Before using the blower, ensure that the materials are compatible with the gases and vapors which may exist in the external atmosphere.

Abnormal

Blowers are suitable for use in a wide range of applications. Ensure that the blower is suitable for the application.

Contact the supplier or Ingersoll Rand for application suitability.

1.3.2 Applications

The blowers are designed to withstand the most demanding applications and offer years of quiet, low vibration performance. The blowers are typically used for:

- Aeration (wastewater treatment)
- Combustion air
- Landfill gas boosting
- Filter scouring (water/wastewater treatment)
- Floatation air
- Agitation
- Drying
- Oxidation air (flue gas desulphurization)

2 TECHNICAL DATA

2.1 Operating and Storage Conditions

Ambient Operating Temperature Range	-30 à 40°C (-22 à 104°F)
Ambient Storage Temperature Range	-30 à 80 °C (-22 à 158 °F)
Maximum Ambient Operating Humidity	100 % HR

2.2 Performance

Maximum Operating Discharge Temperature	150 °C (302 °F)
Maximum Outlet (Discharge)	Pressure Atmospheric + Maximum Differential Pressure
Maximum Differential Pressure (Inlet-Outlet)	See Figure 8
Rotational Speed Range	Up to 4 300 RPM

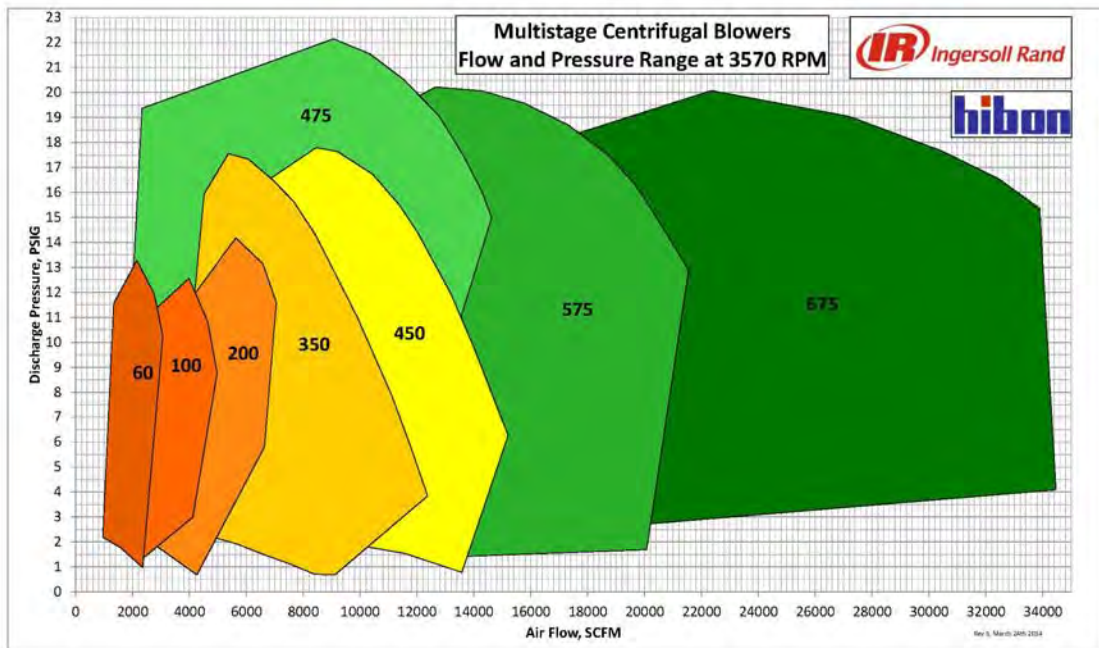


Figure 8 – Flow and Pressure Range

2.3 Blower Specifications

Blower dimensions are shown in Figure 9 and 10 and Table 1. Mass and noise level data are provided in Tables 2 and 3, respectively.

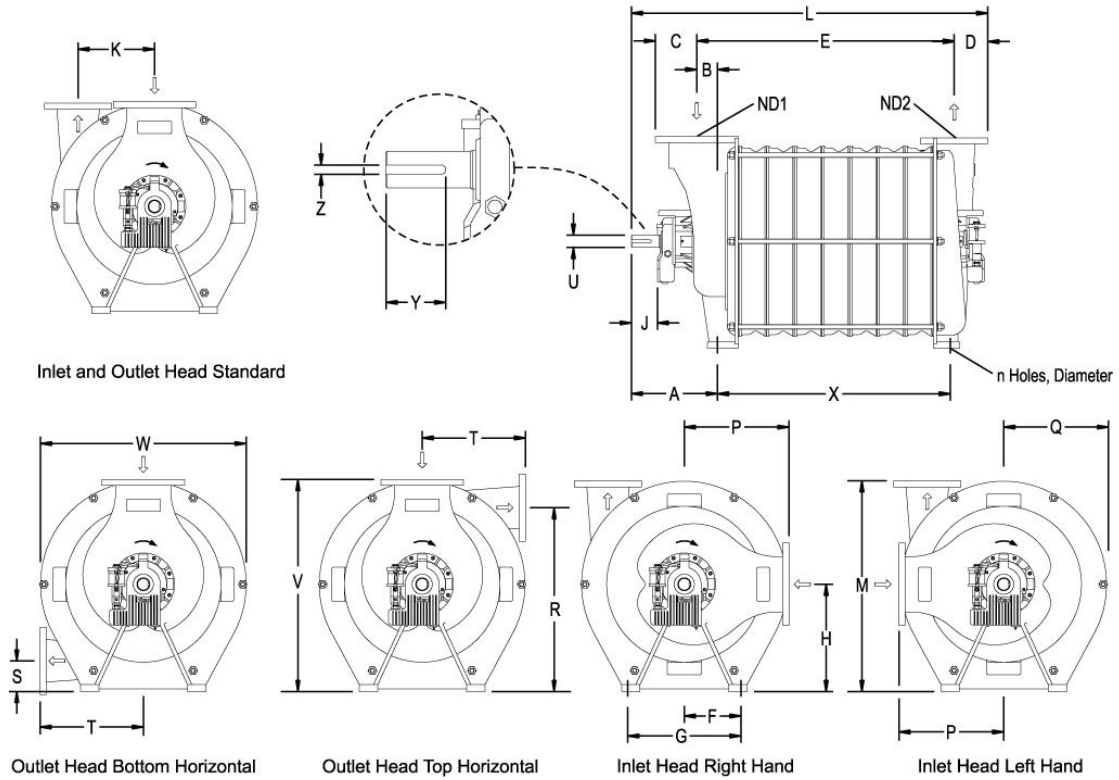


Figure 9 – Dimensions 60/100/200/350/450

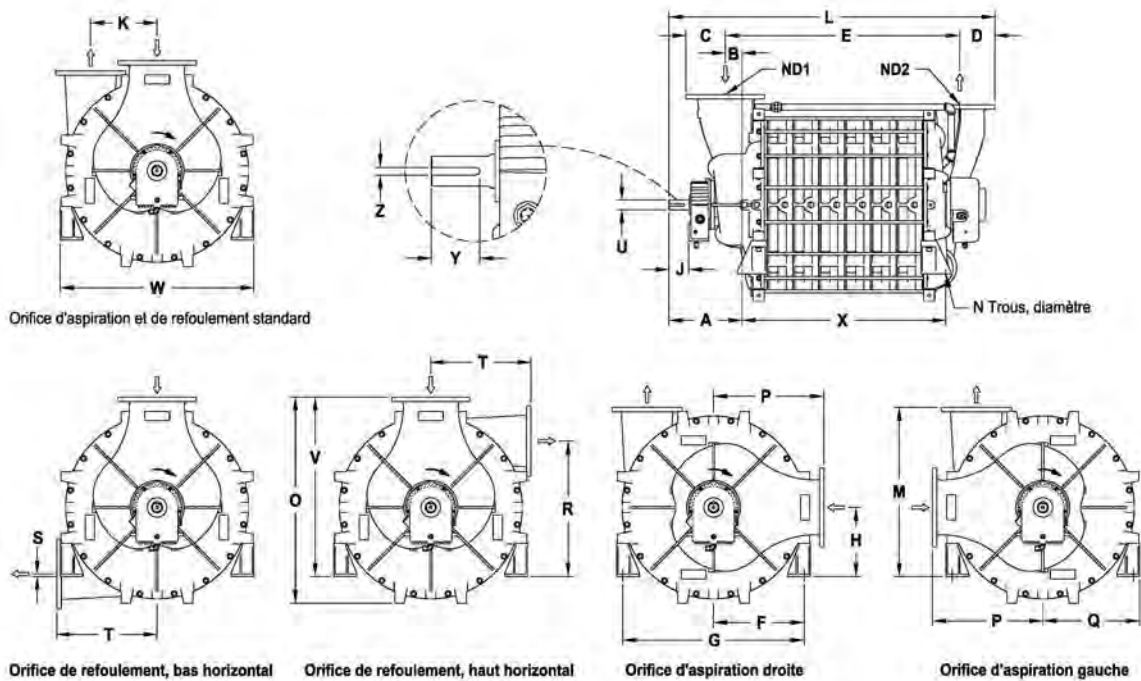


Figure 10 – Dimensions 475/575/675

	SME 60	SME 100	SME 200	SME 350	SME 450	SME 475	SME 575	SME 675
	mm (inches)	mm (inches)	mm (inches)	mm (inches)	mm (inches)	mm (inches)	mm (inches)	mm (inches)
A	357 [14,06]	365 [14,38]	375 [14,75]	471 [18,56]	436 [17,19]	555 [21.83]	581 [22.89]	750 [29.52]
B	86 [3,38]	105 [4,13]	143 [5,63]	151 [5,93]	168 [6,63]	128 [5.04]	192 [7.56]	254 [10.00]
C	171 [6,75]	203 [8,00]	241 [9,50]	298 [11,75]	318 [12,50]	298 [11.75]	349 [13.75]	406 [16.00]
D	140 [5,50]	171 [6,75]	241 [9,50]	270 [10,63]	298 [11,75]	267 [10.50]	318 [12.50]	349 [13.75]
E (1 Stage)	265 [10,42]	322 [12,67]	411 [16,17]	477 [18,79]	582 [22,93]	N/A	N/A	N/A
E (2 Stage)	380 [14,94]	452 [17,78]	562 [22,13]	655 [25,79]	782 [30,78]	798 [31.40]	930 [36.61]	1086 [42.75]
E (3 Stage)	494 [19,46]	581 [22,89]	713 [28,09]	833 [32,79]	981 [38,63]	995 [39.15]	1157 [45.53]	1346 [53.00]
E (4 Stage)	609 [23,98]	711 [28,00]	865 [34,05]	1011 [39,79]	1180 [46,46]	1191 [46.90]	1383 [54.46]	1607 [63.25]
E (5 Stage)	724 [28,50]	841 [33,11]	1016 [40,01]	1188 [46,79]	1379 [54,31]	1388 [54.65]	1610 [63.39]	1867 [73.50]
E (6 Stage)	839 [33,02]	971 [38,22]	1168 [45,97]	1366 [53,79]	1579 [62,15]	1585 [62.40]	1837 [72.31]	2127 [83.75]
E (7 Stage)	954 [37,54]	1101 [43,33]	1319 [51,93]	1544 [60,79]	1778 [70,00]	1782 [70.15]	2063 [81.24]	N/A
E (8 Stage)	1068 [42,06]	1230 [48,44]	1470 [57,89]	1722 [67,79]	1977 [77,84]	1979 [77.90]	2290 [90.17]	N/A
E (9 Stage)	1183 [46,58]	1360 [53,55]	1621 [63,85]	1900 [74,79]	N/A	2176 [85.65]	N/A	N/A
E(10 stage)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
E(11 Stage)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F	235 [9,25]	311 [12,25]	337 [13,25]	362 [14,25]	362 [14,25]	689.4[27.14]	746 [29.38]	883 [34.75]
G	470 [18,50]	622 [24,50]	673 [26,50]	724 [28,50]	724 [28,50]	1379 [54.29]	1492 [58.75]	1765 [69,50]
H	445 [17,50]	491 [19,35]	527 [20,75]	591 [23,25]	594 [23,38]	526 [20.69]	549 [21.63]	654 [25.75]

J	108 [4,25]	108 [4,25]	108 [4,25]	133 [5,25]	133 [5,25]	149 [5.9]	149 [5.9]	185 [7,25]
K	318 [12,50]	356 [14,00]	357 [14,06]	356 [14,00]	390 [15,34]	505 [19.88]	530 [20.88]	616 [24,25]
L (1 Stage)	675 [26,59]	753 [29,65]	883 [34,78]	1067 [42,02]	1149 [45,23]	N/A	N/A	N/A
L (2 Stage)	790 [31,11]	883 [34,76]	1035 [40,74]	1245 [49,02]	1348 [53,08]	1492 [58.7]	1637 [64.4]	1932 [76,1]
L (3 Stage)	905 [35,63]	1013 [39,87]	1186 [46,70]	1423 [56,02]	1548 [60,93]	1689 [66.5]	1864 [73.4]	2192 [86,3]
L (4 Stage)	1020 [40,15]	1142 [44,98]	1338 [52,66]	1601 [63,02]	1747 [68,77]	1885 [74.2]	2090 [82.3]	2452 [96,6]
L (5 Stage)	1135 [44,67]	1272 [50,09]	1489 [58,62]	1779 [70,02]	1946 [76,61]	2082 [82.0]	2317 [91.2]	2713 [106,8]
L (6 Stage)	1249 [49,19]	1402 [55,20]	1640 [64,58]	1956 [77,02]	2145 [84,46]	2279 [89.7]	2544 [100.2]	2973 [117,1]
L (7 Stage)	1364 [53,71]	1532 [60,31]	1792 [70,54]	2134 [84,02]	2344 [92,30]	2476 [97.5]	2771 [109.1]	N/A
L (8 Stage)	1479 [58,23]	1662 [65,42]	1943 [76,50]	2312 [91,02]	2544[100,1]	2673 [105.2]	2997 [118.0]	N/A
L (9 Stage)	1594 [62,75]	1791 [70,53]	2094 [82.46]	2489 [98.02]	N/A	2870 [113.0]	N/A	N/A
L(10 Stage)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
L(11 Stage)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
M	873 [34,38]	938 [36,94]	1041 [41,00]	1251 [49,25]	1267 [49,88]	1288 [50.69]	1489 [58.63]	1746 [68.75]
n holes	4	4	4	4	4	4	4	4
Holes Dia.	24 [15/16]	24 [15/16]	24 [15/16]	24 [15/16]	24 [15/16]	32 [1 1/4]	32 [1 1/4]	32 [1 1/4]
O	N/A	N/A	N/A	N/A	N/A	1568 [61.75]	1756 [69.14]	2032 [80.00]
P	435 [17,13]	474 [18,65]	506 [19,94]	660 [26,00]	727 [28,63]	838 [33.0]	964 [38.0]	1118 [44.0]
Q	427 [16,80]	480 [18,88]	516 [20,31]	584 [23,00]	600 [23,63]	736.4 [29.0]	793.6 [31.2]	883 [34,75]
R	762 [30,00]	847 [33,35]	884 [34,81]	946 [37,25]	983 [38,72]	1031 [40.6]	1079 [42.5]	1714 [67,5]
S	127 [5,00]	136 [5,35]	170 [6,69]	235 [9,25]	204 [8,04]	20.5 [0.81]	19.3 [0.76]	38 [1.5]
T	429 [16,88]	447 [17,59]	514 [20,25]	660 [26,00]	673 [26,50]	762 [30.0]	940 [37.0]	1092 [43.0]
U (mm)	50,80 /50,77	50,80 /50,77	50,80 /50,77	64,77 /64,74	64,77 /64,74	73.00 /73.03	73.00 /73.03	85,73 /85,70
U (inch)	2,000 /1,999	2,000 /1,999	2,000 /1,999	2,500 /2,499	2,500 /2,499	2.874 /2.875	2.874 /2.875	3,375 /3,374
V	880 [34,63]	965 [38,00]	1034 [40,69]	1251 [49,25]	1321 [52,00]	1364 [53.69]	1513 [59.58]	1772 [69.75]
W	853 [33,60]	959 [37,76]	1032 [40,63]	1168 [46,00]	1200 [47,25]	1473 [57.98]	1587 [62.48]	1889 [74.38]
X (1 Stage)	163 [6,42]	195 [7,66]	182 [8,71]	221 [7,16]	229 [9,02]	N/A	N/A	N/A
X (2 Stage)	278 [10,94]	324 [12,77]	333 [13,12]	399 [15,71]	428 [16,86]	565 [22.24]	586 [23.06]	630 [24.79]
X (3 Stage)	393 [15,46]	454 [17,88]	485 [19,08]	577 [22,71]	628 [24,71]	762 [29.99]	812 [31.99]	890 [35.04]
X (4 Stage)	508 [19,98]	584 [22,99]	636 [25,04]	755 [29,71]	827 [32,55]	959 [37.74]	1039 [40.91]	1150 [45.29]
X (5 Stage)	622 [24,50]	714 [28,10]	787 [31,00]	932 [36,71]	1026 [40,39]	1155 [45.49]	1266 [49.84]	1411 [55.55]
X (6 Stage)	737 [29,02]	844 [33,21]	939 [36,96]	1110 [43,71]	1225 [48,24]	1352 [53.24]	1493 [58.76]	1671 [65.80]
X (7 Stage)	852 [33,54]	973 [38,32]	1090 [42,92]	1288 [50,71]	1424 [56,08]	1549 [60.99]	1719 [67.69]	N/A
X (8 Stage)	967 [38,06]	1103 [43,43]	1242 [48,88]	1466 [57,71]	1624 [63,92]	1746 [68.74]	1946 [76.62]	N/A
X (9 Stage)	1082 [42,58]	1233 [48,54]	1393 [54.84]	1644 [64.71]	N/A	1943 [76.49]	N/A	N/A
X(10 Stage)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
X(11 Stage)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Y	83 [3,25]	83 [3,25]	83 [3,25]	95 [3,75]	95 [3,75]	117 [4.6]	117 [4.6]	138 [5.44]
Z	12,7 [1/2]	12,7 [1/2]	12,7 [1/2]	12,7 [1/2]	12,7 [1/2]	19 [3/4]	19 [3/4]	22 [7/8]
ND1	203 [8]	254 [10]	305 [12]	406 [16]	457 [18]	406 [16]	508 [20]	610 [24]
ND2	152 [6]	203 [8]	305 [12]	356 [14]	406 [16]	356 [14]	457 [18]	508 [20]

Table 1 – Blower Dimensions

Stage	SME 60 kg [lb]	SME 100 kg [lb]	SME 200 kg [lb]	SME 350 kg [lb]	SME 450 kg [lb]	SME 475 kg [lb]	SME 575 kg [lb]	SME 675 kg [lb]
1	341 [750]	432 [950]	500 [1100]	773 [1800]	909 [2000]	N/A	N/A	N/A
2	477 [1050]	591 [1300]	705 [1550]	1091 [2400]	1205 [2650]	2848 [4507]	2733 [6012]	4295 [9449]
3	614 [1350]	773 [1700]	955 [2100]	1364 [3000]	1545 [3400]	2515 [5533]	3464 [7621]	5374 [11823]
4	750 [1650]	955 [2100]	1227 [2700]	1636 [3600]	1886 [4150]	2982 [6560]	4195 [9229]	6453 [14197]
5	886 [1950]	1136 [2500]	1500 [3300]	1909 [4200]	2227 [4900]	3449 [7588]	4926 [10837]	7532 [16571]
6	1023 [2250]	1318 [2900]	1772 [3900]	2182 [4800]	2568 [5650]	3916 [8615]	5657 [12445]	8611 [18945]
7	1159 [2550]	1500 [3300]	2045 [4500]	2455 [5400]	2909 [6400]	4383 [9643]	6388 [14054]	N/A
8	1296 [2850]	1727 [3800]	2318 [5100]	2727 [6000]	3250 [7150]	4850 [10670]	7119 [15662]	N/A
9	1432 [3150]	1864 [4100]	2591 [5700]	3000 [6600]	N/A	5317 [11697]	N/A	N/A
10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 2 – Mass



WARNING

Proper ear protection must be worn if the noise level exceeds 85 dB(A).
Refer to Table 3 for noise levels.

Model	Number of stages									
	2 dB(A)	3 dB(A)	4 dB(A)	5 dB(A)	6 dB(A)	7 dB(A)	8 dB(A)	9 dB(A)	10 dB(A)	11 dB(A)
60	71	72	73	74	75	76	77	78	N/A	N/A
100	70	71	72	73	74	75	77	N/A	N/A	N/A
200	73	74	75	76	77	78	78	N/A	N/A	N/A
350	77	78	79	80	81	83	85	N/A	N/A	N/A
450	81	82	83	84	85	87	88	N/A	N/A	N/A
475	81	82	83	84	85	86	87	88	N/A	N/A
575	83	84	85	85	86	87	87	N/A	N/A	N/A
675	90	91	93	95	98	N/A	N/A	N/A	N/A	N/A

Table 3 – Noise levels

2.4 Materials of Construction

Item	Material
Inlet/Outlet Heads and Intermediate Sections	ASTM A 48 Class 30B (FGL 200) Cast Iron
Impellers	Cast or Riveted Alloy AA356.0
Shaft	SAE 1045 (C45), 4140 (41 CD 4) Steel
Ball Bearings	Type C3 Deep Groove, Single Row
Bearing Housing	ASTM A 48 Class 30B (FGL 200) Cast Iron
Bearing Housing Seals	Carbon Graphite, Labyrinth ZA-12

Table 4 – Construction Material Data

2.5 Electrical Data

Refer to the motor specification sheets supplied with the motor for electrical data.

2.6 Lubrication Information

Lubrication data for the blowers is provided in Table 5.

Lubrication capacity is provided in Table 6

Hibon Lube (Synthetic)	
Pouring Point	-38°C (-36.4°F)
Flash Point	249°C (480°F)
Viscosity	
cst 40 °C (104 °F)	220
cst 100 °C (212 °F)	27.5
Minimal viscosity	125
MANUFACTURER	Hibon-Ingersoll Rand
	CCN# LUBE-46086567
Oil must be Extreme Pressure (EP), non-detergent, antifoam, and antirust.	
Check lubricant's compatibility with the dealer before adding.	

Table 5 – Lubrication Data

Model	Inlet reservoir Liters (Ounces)	Outlet Reservoir Liters (Ounces)	Total Per Machine Liters (Ounces)
SME 60	1,00 (34)	1,00 (34)	2,00 (68)
SME 100	1,00 (34)	1,00 (34)	2,00 (68)
SME 200	1,00 (34)	1,00 (34)	2,00 (68)
SME 350	1,25 (42)	1,25 (34)	2,50 (84)
SME 450	1,25 (42)	1,25 (42)	2,50 (84)
SME 475	5.3 (179)	5.3 (179)	10.6 (358)
SME 575	5.3 (179)	5.3 (179)	10.6 (358)
SME 675	7,50 (253)	7,50 (253)	15,0 (507)

Table 6 – Lubrication Capacity

3 INSTALLATION

CAUTION

Ingersoll Rand accepts no responsibility or warranty claims if the installation includes modifications or additions to the blower without prior written approval of Ingersoll Rand, or incorrect installation.

3.1 Safety



WARNING

Obey the safety instructions listed throughout this manual and take note of appropriate precautions during installation.

Ensure that the blower is suitable for the application. Installation of the blower must be performed by a suitably trained and supervised technician. Obey the safety instructions listed below when the blower is installed, especially when connecting the blower into an existing system. Details of specific safety precautions are provided at the appropriate point in the instructions.

- Ensure that debris and dust does not enter the blower during installation.
- Check that all required components and tools are available and of the correct type before installation.
- Use new suitable gaskets/seals to connect the blower into the system. Never reuse old gaskets/seals.
- If the blower is being installed into an existing system, disconnect power from the drive system before the start of work to prevent accidental system operation.

3.2 System Design Considerations

CAUTION

Ensure that the maximum differential pressure across the blower cannot be exceeded.

The system must be suitably designed for correct operation of the blower. Consider the following points when designing the system:


- The blower must be fitted with a pressure gauge to measure the discharge pressure. The gauge is to be customer supplied but can be acquired through Ingersoll Rand (Refer to Section 7.0).
- The customer must fit a motor/drive and suitable guarding to the blower. Consult Ingersoll Rand for advice.
- Design a suitable pipeline to fit the blower inlet connection. Refer to Section 2.3 for inlet connection dimensions.
- Incorporate filters at the blower inlet. Refer to Section 7 for suitable filters and filter cartridges.
- Silencers should be used on the inlet..

- Ensure at least 150 mm (6.0 inches) of free space around the blower for adequate cooling air circulation.
- If required, install acoustic enclosures around the blower. Ensure that adequate space is provided for cooling air circulation.
- Provide guarding or protection to ensure personnel does not come in contact with the discharge.
- Discharge temperatures can reach 160°C (320°F).

The system design must ensure that when the blower is in its final operating location, that the oil level sight glass is visible and access to the oil filler drain plugs is maintained.

Ingersoll Rand recommends the use of an emergency stop facility which, once activated, must be manually reset before the blower can be operated again.

3.3 System Safety

	<p style="text-align: center;">WARNING Blowers must be installed in a system which complies with the requirements detailed in this section.</p>
---	---

- The system must be designed to ensure that the blower cannot be operated with the inlet or discharge pipelines obstructed.
- Gases which enter the blower must not contain solid particulates larger than 10 µm (0.0004 inch) in size. Incorporate suitable filters to prevent the ingress of solids into the blower.
- Gas temperatures entering the blower must not exceed the temperature rating of the blower.
- Ensure that the blower cannot operate with the incorrect direction of rotation.

3.4 Unpack and Inspect



WARNING

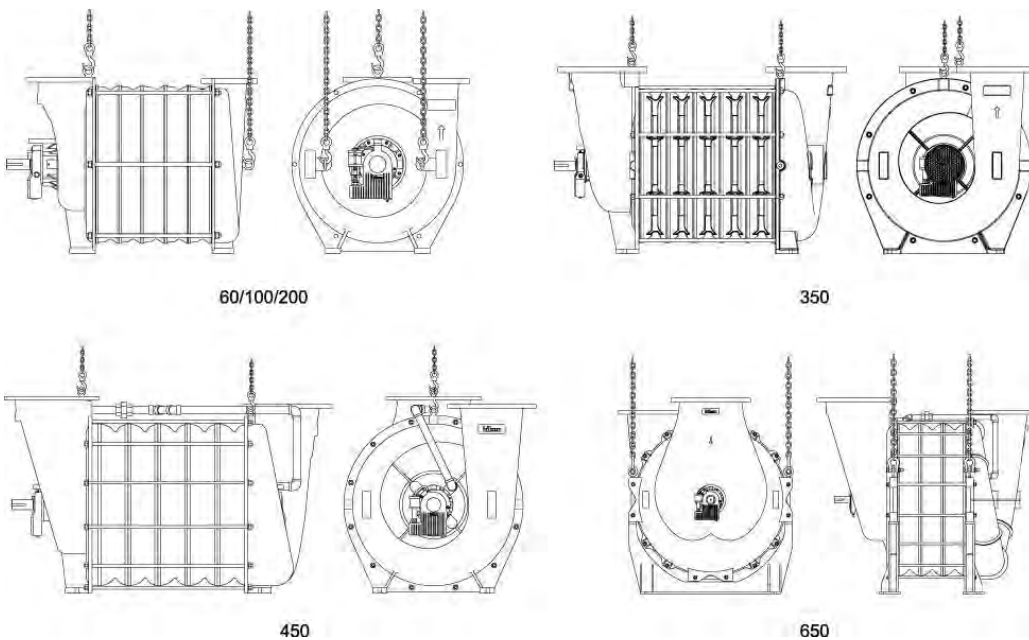
When positioning the blower use suitable lifting equipment to prevent injury to personnel.

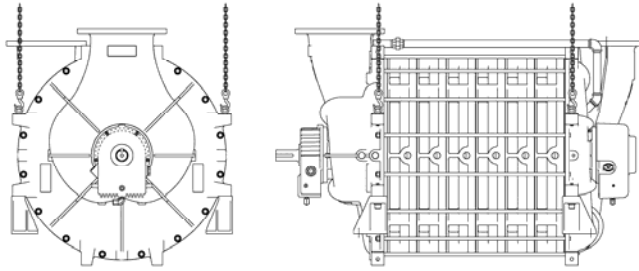
Injury to personnel and/or damage to equipment can result. Refer to Section 2 for blower mass information.

Remove all packing materials, remove the blower from its packing box, remove the protective covers from the inlet and exhaust ports and inspect the blower. If the blower is damaged, notify the supplier and carrier in writing within three days; state the item number of the blower together with the order number and supplier's in voice number. Retain all packing materials for inspection. Do not use the blower if damaged.

If the blower is not used immediately, replace the protective covers. Store the blower in suitable conditions as described in Section 6 of this manual.

- Use a suitable forklift or pallet truck to move the blower on its pallet, close to the installation site. The blower can be moved into place using the lifting eyes provided (See Figure 11 and 12). A spreader bar may be necessary to prevent the lifting equipment from touching the blower.





475 / 575 / 675

Figure 11 – Bare shaft Blower Recommended Lifting

- Ensure that all items on the packing slip have been received. If any item(s) are missing, notify the supplier and Ingersoll Rand in writing within three days.

Check the blower rating and identification tag for suitability with the system. If the blower is not suitable for use in the system, stop installation and contact the supplier and Ingersoll Rand.

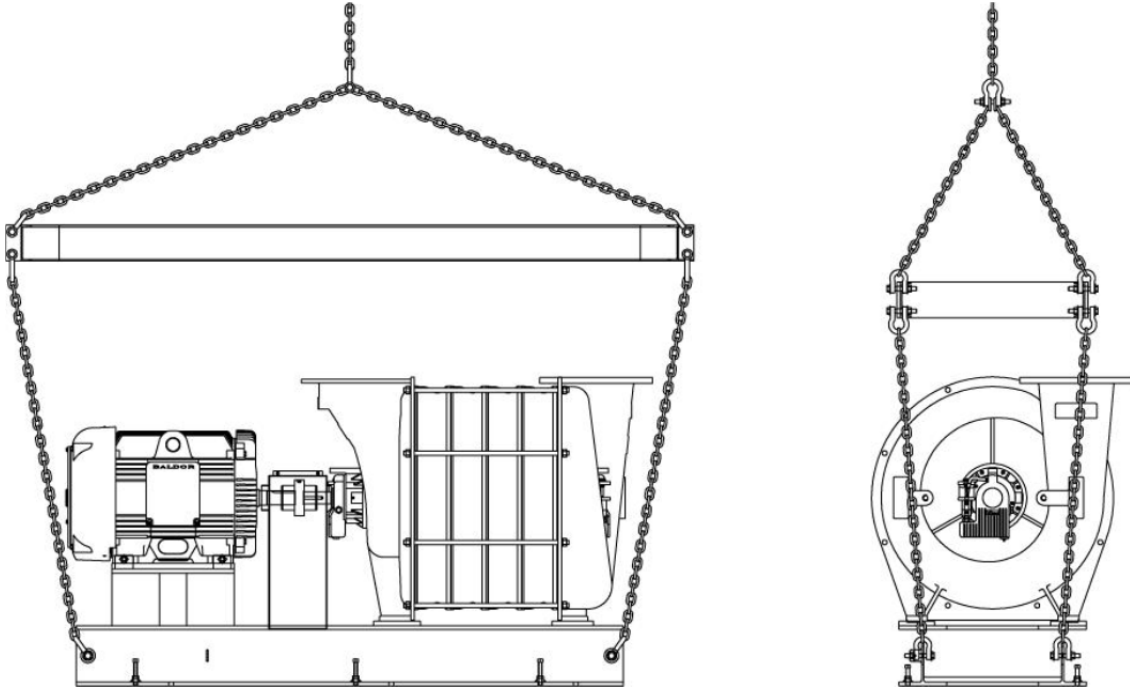


Figure 12 – Typical System Recommended Lifting

3.5 Locate the Blower



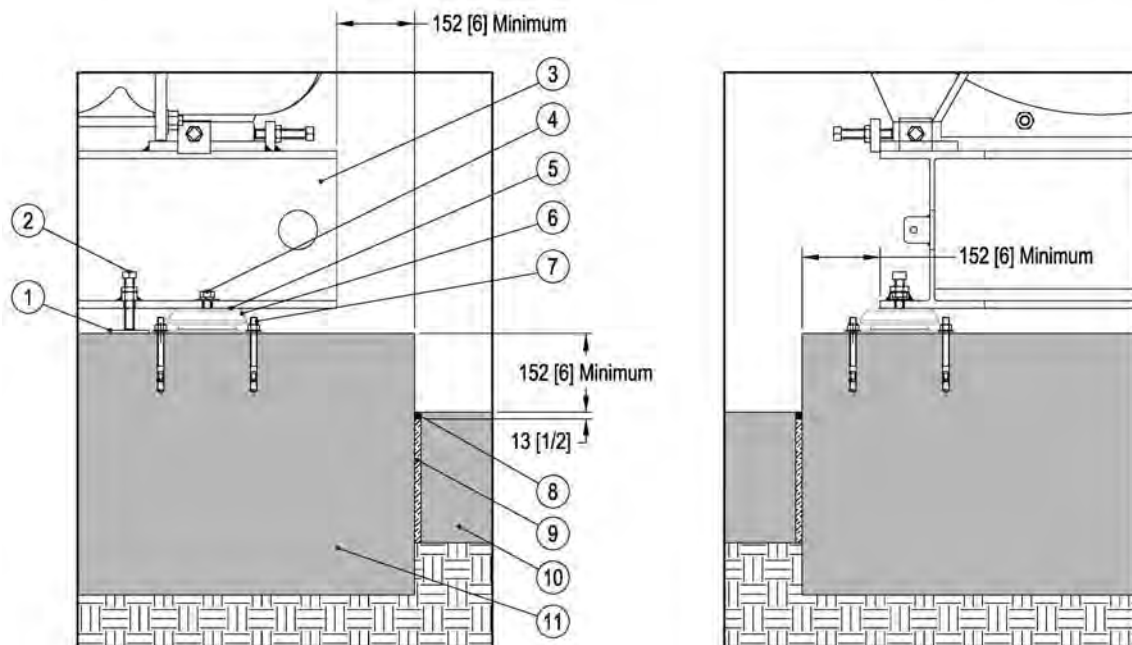
WARNING

Use suitable lifting equipment to move the blower. Failure to do so can result in injury to personnel and /or damage to equipment. Refer to Section 2 for blower mass in formation.

Provide adequate space around the blower for servicing and maintenance.

Mount the blower on a rigid foundation, such as a concrete pad or steel structure, and level with shims. Mount the blower to the foundation ensuring not to put strain or twist in the blower housing. See Figure 13 for foundation mounting dimensions.

- Disconnect the lifting equipment from the system.
- Secure the blower in position following the directions provided in Section 3.5.1.
- If installation methods not described in Section 3.5.1 is to be used, a detailed description should be submitted to Ingersoll Rand for approval.



N°	Description	N°	Description
1	Steel Plate	7	Anchor Bolts
2	Jacking Set-Screw	8	Polyurethane sealant
3	Blower Base	9	12.7 (0.5) Thick Elastomer
4	Vibration Isolator Bolt	10	Concrete Floor
5	Shim Location	11	Isolated Concrete Base
6	Vibration Isolator		

Remark : Isolated Concrete Base Weight Should be Equal to a Minimum of 1.5 Times the Weight of the Machinery (Package). Flatness of the concrete base must be below 1 mm/m [0.012po/pi].

Figure 13 – Isolated Concrete Pad Installation Diagram

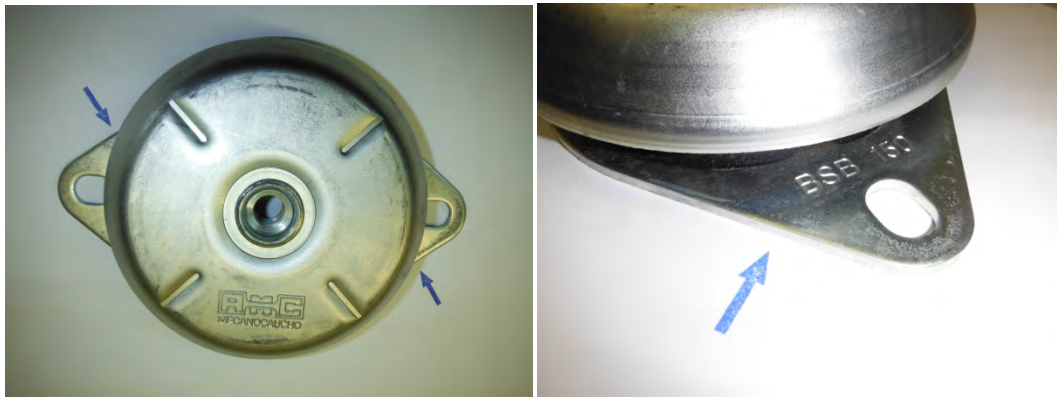


Figure 14– Vibration Isolators Identification

3.5.1 Isolated Concrete Pad, non-isolated or steel structure Installation

Ingersoll Rand recommends installation of the blower on an isolated concrete pad to prevent vibration transmission through the floor (Refer to Figure 13). Vibration isolators can be acquired through Ingersoll Rand or a recognized manufacturer. Installation should be performed according to the following recommendations:

- Ensure the pads are installed straight and level to reduce vibration levels. The flatness of the concrete foundation must be below 1 mm/m.
- The type, number, length and positioning locations of the resilient pads is dependent on the weight of the blower. Ingersoll Rand will select the appropriate pads for the application.
- If necessary, install metal shims for leveling.

3.6 Admissible static stress on flanges

Ingersoll Rand recommends avoiding loading the weight of fittings and piping onto machines.

The inlet and outlet can tolerate static stresses with forces and moments, with reference to the center of gravity, not exceeding the values provided in Tables 7 and 8 (See Figure 15).

Flanges with a non-vertical axis, or vertical axis that faces downward must not be stressed. If not correctly fitted, the fittings and piping can produce higher stresses than its weight due to the effect of expansion produced by the increase in temperature during operation.

Model	Inlet			Outlet		
	Fv kg (lb)	Fh kg (lb)	Fa kg (lb)	Fv kg (lb)	Fh kg (lb)	Fa kg (lb)
60	75 (165)	60 (132)	30 (66)	75 (165)	60 (132)	30 (66)
100	100 (220)	80 (176)	40 (88)	100 (220)	80 (176)	40 (88)
200	150 (330)	120 (269)	60 (132)	150 (330)	120 (269)	60 (132)
350/450	225 (496)	180 (397)	90 (198)	175 (386)	140 (309)	70 (154)
475	225 (496)	180 (397)	90 (198)	175 (386)	140 (309)	70 (154)
575	299 (668)	200 (440)	100 (220)	273 (600)	182 (400)	91 (200)
675	327 (720)	218 (480)	109 (240)	299 (660)	200 (440)	100 (240)

Table 7 – Admissible Forces on Vertical Flanges

Model	Inlet			Outlet		
	Mv kgm (lbft)	Mh kgm (lbft)	Ma kgm (lbft)	Mv kgm (lbft)	Mh kgm (lbft)	Ma kgm (lbft)
60	22 (159)	22 (159)	45 (325)	22 (159)	22 (159)	45 (325)
100	30 (217)	30 (217)	60 (434)	30 (217)	30 (217)	60 (434)
200	45 (325)	45 (325)	90 (651)	45 (325)	45 (325)	90 (651)
350/450	67 (485)	67 (485)	135 (967)	67 (485)	67 (485)	135 (967)
475	67 (485)	67 (485)	135 (967)	67 (485)	67 (485)	135 (967)
575	97 (700)	97 (700)	193 (1400)	83 (600)	83 (600)	166 (1200)
675	104 (750)	104 (750)	207 (1500)	97 (700)	97 (700)	193 (1400)

Table 8 – Admissible Moments on Vertical Flanges

3.7 Connecting the Blower to the System

Take note of the following when connecting the blower to the system:

- Ensure that the system pipelines are as short as possible for optimum performance.
 - Support the system pipelines and other components, to prevent loading of the inlet and discharge flanges.
 - Use flexible components in the system design to minimize noise and vibration.
 - Use gaskets/seals which are compatible with the operating conditions and gases to be compressed.
- Gaskets are not supplied with the blower.
- The leak tightness of the system connections must be in accordance with the requirements of the application.

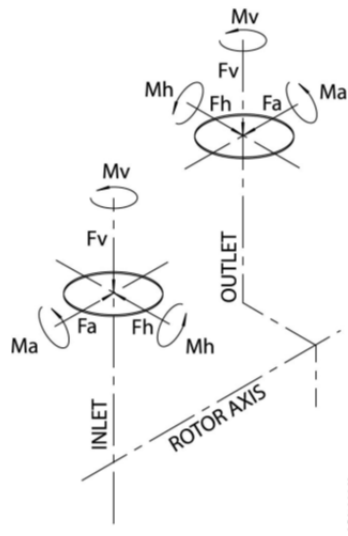


Figure 15 – Admissible Forces and Moments Diagram

3.8 Oil Filling

WARNING
Blowers are shipped without lubricating oil. Do not operate the blower before filling.

It will be necessary to fill the blower with oil. Ensure that same type oil is used when filling the reservoir. Models equipped with constant level oiler should be filled through the constant level oil feeder filling plug (See Figure 16). Refer to section 2.6 and Tables 6 for proper type and quantities of oil. To fill the blower, remove the fill. For models equipped with constant level oiler it takes several times until the reservoir is filled at the right level. A sight glass has been added to the blowers as a visual aid.

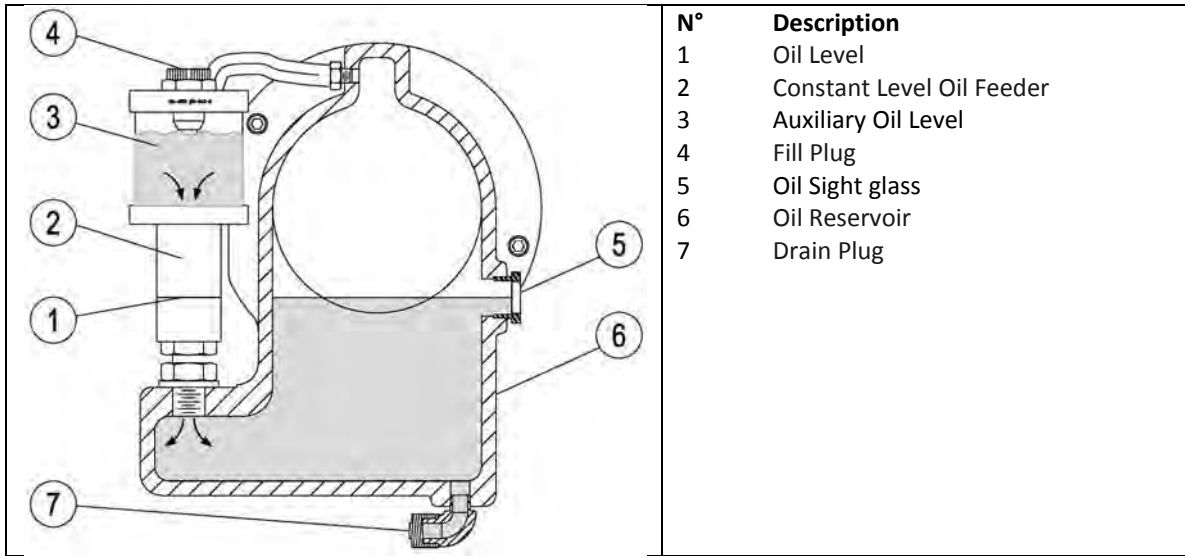


Figure 16 – Oil Fill, 60/100/200/350/450

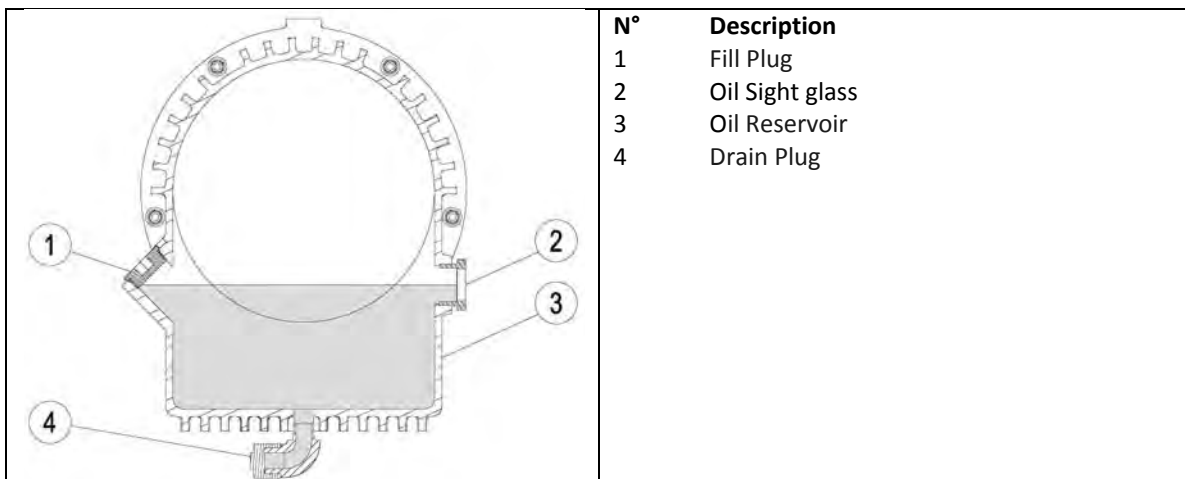


Figure 17 – Oil Fill, 475/575/675

3.9 Electrical Connections



WARNING

Install electrical cables while ensuring not to create a trip hazard that could result in injury to personnel.



WARNING

Installation of the electrical connections should be performed by a competent technician familiar with pressure systems and controls. The system should be wired as to not create a hazard due to power loss or reinitializing the blower after a power loss. If a power loss occurs, the system should have a manual reset for controls before restart

There are two types of connections and three modes of start-up which can be used for the motor. Star and delta connections can be used to connect the customer supply to the blower (See Figure 18). Direct, star/delta, VFD and reduced voltage are the four means to start-up the blower.



WARNING

Ensure that the motor is properly grounded using the grounding lug on the structural base (Refer to Figure 1). Failure to do so can result in over heating or sparking.

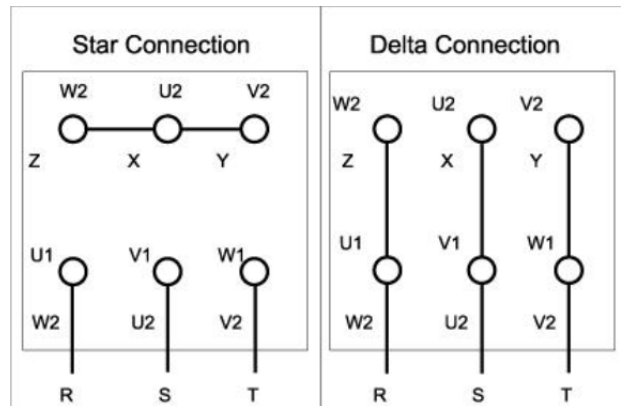


Figure 18 – Electrical Connections

3.9.1 Star Connection

The star connection is used when the line voltage matches the larger of the two voltages indicated on the information plate. If the direction of rotation is incorrect, swap any two of the three supply cables R, S and T. Consult Ingersoll Rand and the motor manufacturer before connecting the blower.

3.9.2 Delta Connection

The delta connections is used when the line voltage is the same or lower than the smaller of the two voltages indicated on the information plate (Refer to Figure 18). If the direction of rotation is incorrect, swap any two of the three supply cables R, S and T.

3.9.3 Direct Start-up

Direct start-up is achieved when the power is supplied to the motor directly at the normal operating voltage.

The motor develops the maximum acceleration torque which minimizes the time required to reach the nominal speed of rotation.

3.9.4 Star/Delta Start-up

Star/delta start-up is occasionally used to reduce supply load and contain absorption peaks for power over 7.5 kW. Start-up consists of powering the motor at a voltage lower than the normal operation value until the speed of rotation is close to nominal (few seconds) then switching to full voltage. This can only be done if the line voltage matches the lower voltage on the identification plate.

Mode 1 is set to the star configuration where the line voltage is 1.73 times lower than the nominal supply voltage.

Current absorption and acceleration torque are approximately one-third the maximum value resulting in an increased time to reach nominal speed of rotation then using the direct start-up method.

Mode 2 has a delta connection where the line voltage is equal to the nominal supply voltage. Maximum absorption and acceleration torque can be achieved with the machine already close to nominal speed of rotation and requiring a small final acceleration.

3.9.5 Reduced Voltage Start-up

The reduced voltage start-up is the same as the star/delta start-up except the delta connection motor is powered in the two modes at two different voltages, with the lower voltage achieved with an autotransformer. Contact Ingersoll Rand and the motor manufacturer before connecting the blower to ensure this method is acceptable for the application.

3.9.6 VFD Start-up

Start-up with a variable frequency drive is similar to the reduced voltage procedure. Please refer to section 3.9.5.

3.10 Alternate Drivers

Steam turbine, internal combustion or hydraulic motors are alternate means of driving the blowers. Instructions for each method will be supplied separately.

3.11 Direction of Rotation

The machine shaft must rotate clockwise when facing the inlet head (See Figure 19). High power electric motors should be checked connecting the motor and electrical equipment to the supply source. The direction of rotation can also be checked when the motor is uncoupled.

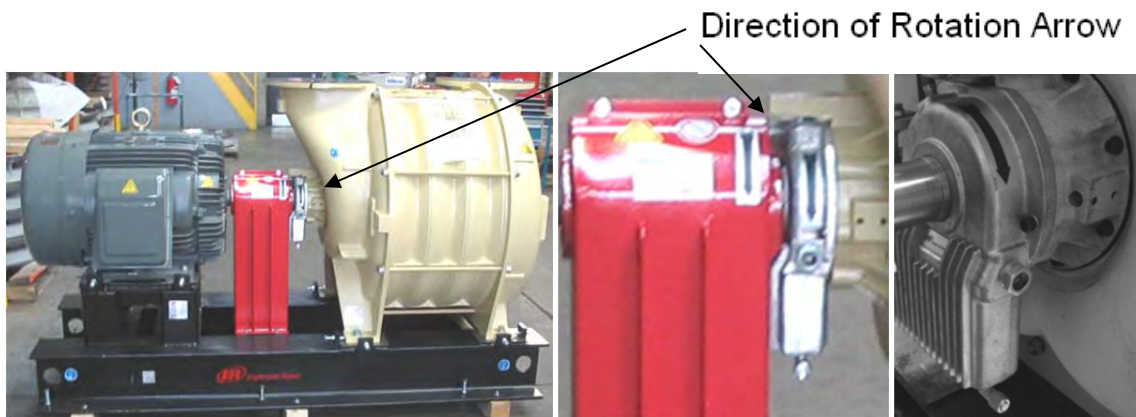


Figure 19 – Direction of Rotation

3.12 Cooling Water

Cooling water is required if a heat exchanger is used to cool the lubricating fluid and/or bearing housings. The machine will need to be connected to a supply and drain system.

An isolation valve must be installed in the supply line which will only allow water to circulate to the machine in operation. Ingersoll Rand recommends the use of a normally-open electric valve or designing an alarm and cutoff system in case of failure.

Drains must be free-flowing with back-up. An up-stream valve must be fitted to the exchanger or housing to keep the capacity under pressure during operation.

4 OPERATION

CAUTION

Ingersoll Rand accepts no responsibility or warranty claims if the installation includes modifications or additions to the blower without prior written approval of Ingersoll Rand or incorrect installation.

4.1 Operational Safety

- Do not operate the blower when the cooling air flow around the blower is restricted. Failure to do so can result in over heating of the blower.
- Do not operate the blower with the inlet or discharge connections open to atmosphere. Failure to do so can result in trapped fingers, body parts or clothing.
- Do not operate the blower with the guards removed from the blower shaft, coupling or drive system. Failure to do so can result in trapped fingers, body parts or clothing.
- Prevent accidental contact with the hot blower and do not place flammable materials on the blower. The temperature of external parts can exceed 70°C (158°C) during operation.
- Never disconnect connecting pipelines when the blower is in operation.
- During pressure operation, prevent accidental contact with the discharge gas stream. The gas stream will be at high pressure, will be hot and can cause burn injury.
- Do not attempt to use the blower to pump/compress liquids. The blowers are not designed for this application.
- Do not step on the machine or guards.
- Do not operate the blower with guards removed.
- Do not place fingers in or around cooling fan.

4.2 System Preparation

- Clean the inlet and discharge piping internally to prevent foreign material from entering the blower.
- Remove the fitting closest to the inlet and discharge openings, ensuring that the protective tape, plastic cover or sheet metal discs for the openings remain in place.
- Carefully remove all material trapped by the protective covers.
- Remove the protective covers and any hygroscopic bags from the blower.
- Install a stainless steel start-up sieve with 1 mm₂ (0.039 in₂) mesh.
- Remove any hygroscopic material from the bearing housing opening.
- Align the transmission couplings according to Manufacturer's specifications
- Ensure oil levels are correct.

4.3 Pre-Start Checks

- Check that the base-plate of the blower and motor has been installed correctly.
- Check the alignment of transmission couplings. (It is recommended to do it again when the blower is hot)
- Check that the supply voltage is correct.
- Check the connections on the electric motor and any electrical powered accessories.
- Check that all accessories are properly connected.
- Check that all service fluid connections are correct.
- Check that the inlet/out let piping lines have been fitted correctly and connections are secure.
- Check that any alignment brackets and/or gauges are removed.
- Check that all oil levels are correct.
- Check that there is grease inside the grid couplings, if applicable.
- Check that the shaft on the machine and motor can be rotated by hand.
- Check that all protective guards have been fitted correctly.

4.4 Valve Settings

All valves in the system must be checked and set as follows:

- Manual isolation and regulation valves for any service fluids must be opened and settled.
- Isolation valves for any instruments used must be open.

Valves affecting the flow of fluid processed must be adjusted for purposes of:

- Controlling the flow of gas processed, depending on the specific requirements of the system served.
- Allowing the machine to be started in the shortest possible time.
- Preventing the machine from surge operation (Refer to Section 1.3.1).

4.4.1 Inlet Butterfly Valve

- The amount the valve is opened determines the capacity value. During this time the overflow (if present) is closed, and the discharge valve is left open.
- To ensure a minimum start-up time, set the valve to the minimum opening between 15-30°.
- Excessive closing of the valve causes the machine to go into surge operation. The valve should be opened / closed slowly. Rapid movement can cause surge and/or overload conditions.
- Small blowers can be started with the valve closed as they are characterized by non-violent surging.
- Medium and large blowers must be started with the inlet valve set for a capacity, slightly greater than that provided for surging. This setting can only be determined experimentally, the first start-up should be with an opening of 15° and subsequently modified.

4.4.2 By-pass valve

The by-pass valve is found in systems with protection against surge operation and is actuated automatically by an appropriate electrical circuit.

4.4.3 Outlet Butterfly Valve

In the first start-up phase, it is advisable to use a butterfly valve at the inlet to control capacity; however, this outlet valve must be kept open if the system served can take the gas processed; otherwise an overflow to the atmosphere or an appropriate by pass must be provided.

4.5 Commissioning



WARNING

Proper ear protection must be worn if the noise level exceeds 85 dB(A).
Refer to Table 3 for noise levels.

Start-up the blower to ensure the circulation of service fluids (lubricating oil, cooling water, compressed air, etc.).

For the first few seconds after starting the blower, check for abnormal noises and/or high levels of vibration.

Stop the machine immediately and carry out the necessary checks if detected.

Check the start-up time to optimize timer regulation for changeover to delta in the case of star/delta start-up.

Check power absorption and correct as follows:

- If power absorption is unstable, the machine is in surge operation and volume must be increased using the valves.
- If power absorption is excessive, the volume needs to be reduced by a valve regulation.

Let the machine run for approximately 30 minutes, then check the vibration level and temperatures (See section 5.0).

If everything is normal, run the blower for an additional 30 minutes and stop.

CAUTION

When the blower is operational, remove the protective screen installed at the inlet. The screen must be removed with care in order to avoid dropping any foreign material or dirt into the blower inlet.

4.6 Shutdown

The motor and blower can spin a few minutes after losing power or under normal shutdown conditions. Do not attempt to re-start the blower within 20 minutes. Consult the motor company for appropriate time delays for the specific motor.

5 MAINTENANCE

5.1 Safety Information



WARNING

Obey the safety instructions given below and take note of appropriate precautions. If not, injury to people and damage to equipment can occur.


- Ensure that maintenance is performed by a suitably trained and supervised technician. Obey local and national safety requirements.
- Ensure that the maintenance technician is familiar with the safety procedures which relate to the gases pumped/compressed by the system in which the blower is installed.
- Check that all the required parts are available and correct type before work is started.
- Isolate the blower and other components from the electrical supply so that they cannot be operated accidentally.
- Allow the blower to cool before maintenance work is started.
- Do not reuse seals/gaskets if damaged.
- After maintenance is complete, recheck the direction of blower rotation if the electrical supply has been disconnected.
- If necessary, maintain the motor as specified in the manufacturer's information supplied with the motor.
- Check the leak tightness of the system connections after maintenance work is complete. The leak tightness of the system connections must be in accordance with the requirements of the application. Contact Ingersoll Rand for information.

5.2 Leak Detection

A leak test should be performed if the anticipated pressure can not be achieved. A proper leak test will isolate sections of the piping until the leak-source is found. The typical system piping is shown in Figure 2. The use of a leak detector will speed the process for detecting leaks. Contact a Ingersoll Rand representative for advice.

5.3 Maintenance Plan

A typical maintenance plan for the blower is provided in Table 9.

	<p>WARNING</p> <p>Lock out and tagout the power source prior to performing any maintenance on the pump. Failure to do so can result in accidental startup and injury to personnel.</p>
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Operation	Frequency
Inspect oil level	Daily
Bearing Housing Vibration Level	Daily
Replace Oil	Application Dependent
Motor Bearing Lubrication	Refer to Motor Manufacturer's Manual
Initial Oil Change	After 200 Hours of Operation
Oil Change (Severe Conditions)	* Every 2,000 Hours
Oil Change (Normal Conditions)****	Every 8,000 Hours
	Every 4,000 Hours (If Discharge Temperature Greater Than 120°C (253°F))
Bearing Replacement	Every 100,000 Hours or As Needed

* Severe Conditions: Continuous service (24hour/day); operation in a humid, dusty or chemically aggressive environment, and/or; outdoor installation.,.

** Normal conditions: Clean and protected environment.

Table 9 – Maintenance Plan

5.4 Oil Change

- Lockout all energy sources connected to the blower.

	<p>WARNING</p> <p>Oil will be hot if blower was just operating. Allow sufficient time for the blower to cool prior to changing oil.</p>
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- Using the drain cap, drain the oil into a suitable container for disposal and replace cap. Use only Ingersoll Rand recommended oils when refilling the blower. Refer to Section 2.6 for fluid type and quantities. Remove the filling plug on the auxiliary oil reservoir and fill until flow to the oil reservoir stops. Continue filling until the auxiliary reservoir is completely filled. Replace the fill plug. For models, 475, 575 and 675, there is no auxiliary oil reservoir.
- Check the blower and system for potential hazardous conditions. Restore energy sources.

5.5 Oil Level Check

- Check oil level daily. The oil level should be in the middle of the oil sight glass during operation.

5.6 Bearing Replacement

In the case of damage to the bearings, repair can involve more than simple replacement of the bearing and in some cases, involve the replacement of the shaft or overhaul of the blower. This is beyond the scope of this manual.

Contact Ingersoll Rand or the supplier for information.

5.7 Troubleshooting

A list of fault conditions and possible causes is provided in Table 10. If unable to rectify the fault using the table, call your nearest Ingersoll Rand Service Center for help.

Symptoms	Probable cause	Recommended Solution
Reduction of Performance	Inlet filter dirty	Replace filter element.
	Inlet/discharge valves improperly adjusted	Check and correct.
	Inlet/discharge piping obstructed	Check and correct.
	Improper direction of rotation following maintenance	Check and correct.
	Impeller/diffuser cavity blockage	Probable general machine overhaul.
Pulsing Noise	Surge operation	Increase capacity.
Presence of High Frequency Components	Ball bearing deterioration	Replace bearings.
Increased Vibration Level Following Maintenance	Incorrect alignment	Correct alignment.
	Improper foot contact	Correct machine or motor feet.
	Improper base plate contact	Correct base plate contact with supporting damping blocks.
Increased Vibration	Bearing broke, excessive operating temperatures or presence of extraneous matter in fluid processed	General overhaul.
Excessive Discharge Temperature	Increase in inlet temperature	Check and correct.
	Decrease in process gas capacity	Increase capacity.
Excessive Bearing Temperature	Increased discharge temperature	Check and correct.
	Excess lubricant or not enough oil	Check and correct.

Excessive Power Absorption	Inlet/discharge valves improperly adjusted	Check and correct.
	Change in inlet conditions	Reduce capacity..
	Inlet/discharge valves completely open	Check and correct.
	Presence of liquid inside blower (starting problem)	Open drain plugs.
High Vibration Level	Bearing deterioration	Replace bearings..
	Poor contact between machine and motor to base following maintenance	Check spacing and correct with shims.
	Blower motor misalignment or defective coupling	Realign and/or check coupling (replace if necessary).
	Rotor imbalance due to clogging/ oxidation of the wheels	Complete machine disassembly to clean or replace wheels.

Table 10 – Troubleshooting Guide

5.8 High Vibration Level

Vertical, horizontal and axial vibration values should be measured on the bearing housing at the places prescribed on the casting. The range of vibration severity is shown in Table 11. Causes and origins can be identified by vibration analysis through the use of appropriate equipment. Consult Ingersoll Rand for diagnostic assistance.

Classification	Quadratic speed in mm/sec (in/sec)	
	Min	Max
A- Excellent	0	4.5 (0.18)
B- Good	4.5 (0.18)	9 (0.35)
C- To Check	9 (0.35)	22.4 (0.88)
D- Do not run the blower	22.4 (0.88)	and more

Table 11 – Range of Vibration Severity on vibration isolators

6 STORAGE AND DISPOSAL

6.1 Storage

CAUTION

Observe the storage temperature limits stated in Section 2. Storage below -30° C (-22° F) could permanently damage the blower seals.

Use the following procedure to store the blower:

- Shut down the blower as described in Section 4.
- Disconnect the blower from the electrical supply.
- Place and secure protective covers on the inlet and discharge flanges.
- Using suitable lifting equipment, move the blower to its storage area (Refer to Section 3.5).
- Store the blower in clean, dry conditions in a well ventilated location that is free from vibration or shocks.

When required, prepare and install the blower as described in Section 3.

6.2 Disposal

Dispose of the blower or any components removed from it safely in accordance with local and national safety and environmental requirements.

Do not incinerate fluoroelastomer seals and O-rings.

7 SPARES AND ACCESSORIES

7.1 Introduction

Order spare parts and accessories from the nearest Ingersoll Rand company or distributor.

When ordering, provide the following information:

- Model and Item Number of equipment.
- Serial number.
- Item number and description of part.

7.2 Service

Ingersoll Rand products are supported by a worldwide network of Ingersoll Rand Service Centers. Each Service

Center offers a wide range of options including: service exchange; repair; rebuild and testing to factory specifications. Equipment which has been serviced, repaired or rebuilt is returned with a full warranty.

The local Service Center can also provide Ingersoll Rand engineers to support on-site maintenance, service or repair of your equipment.

For more information about service options, contact the nearest Service Center or other Ingersoll Rand company.

7.3 Spares

The following is a list of spares that can be purchased by contacting Ingersoll Rand.

Item	SME 60	SME 100	SME 200	Qty
Carbon Seal Ring	25-12-00-000-0-F			1
	23-13-00-000-0-F			1
Carbon Seal Ring		25-12-00-000-0-F	25-12-00-000-0-F	2
Oil Gasket (Oring)	25-37-00-000-0-F	25-37-00-000-0-F	25-37-00-000-0-F	2
Ball Bearing	25-17-00-000-0-F	25-17-00-000-0-F	25-17-00-000-0-F	2
Ball Bearing Locknut	25-25-00-000-0-F	25-25-00-000-0-F	25-25-00-000-0-F	2
Ball Bearing Lock Washer	25-26-00-000-0-F	25-26-00-000-0-F	25-26-00-000-0-F	2

Item	SME 350	SME 450	Qty
Carbon Seal Ring	78-12-00-000-0-F	78-12-00-000-0-F	2
Oil Gasket (Oring)	78-37-00-000-0-F	78-37-00-000-0-F	2
Ball Bearing	78-1-700-000-0-F	78-17-00-000-0-F	2
Ball Bearing Locknut	78-25-00-000-0-F	78-25-00-000-0-F	2
Ball Bearing Lock Washer	78-26-00-000-0-F	78-26-00-000-0-F	2

Item	SME 475	SME 575	SME 675	Qty
Air seal (O'Ring) 2-262	78-33-00-000-H-F	78-33-00-000-H-F	N/A	4
Oil Seal (O'Ring) 2-453	78-37-00-000-H-F	78-37-00-000-H-F	N/A	2
Oil Seal (O'Ring) 2-238	78-38-00-000-H-F	78-38-00-000-H-F	N/A	2
Oil Seal (O'Ring) 2-167	78-39-00-000-H-F	78-39-00-000-H-F	N/A	2
Air Seal (O'Ring) 2-268	N/A	N/A	90-33-00-000-B-F	4
Oil Seal (O'Ring) 2-456	N/A	N/A	90-37-00-000-B-F	2
Oil Seal (O'Ring) 2-241	N/A	N/A	90-38-00-000-B-F	2
Oil Seal (O'Ring) 2-170	N/A	N/A	90-39-00-000-B-F	2
Main Bearing	78-17-00-000-J-F	78-17-00-000-J-F	90-17-00-000-C-F	2
Main Bearing Lock Washer	78-26-00-000-H-F	78-26-00-000-H-F	90-26-00-000-B-F	2
Main Bearing Lock Nut	78-25-00-000-H-F	78-25-00-000-H-F	90-25-00-000-B-F	2

Table 12 – List of spare parts

7.4 Accessories

Control panels, gauges, valves, silencers, flexible connectors, vibration detectors, temperature probes, electrical motors, and other accessories can be purchased by contacting Ingersoll Rand.



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