



80446693
Revision B
August 2013

NX Blowers



Installation, Operation and Maintenance

- EN Installation, Operation and Maintenance
- ES Instalación, operación y mantenimiento
- FR Installation, fonctionnement et entretien
- DE Installation, Betrieb und Wartung
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DECLARATION OF INCORPORATION
(as defined by the EU Machinery Directive 2006/42/EC Appendix II 1B)

DÉCLARATION D'INCORPORATION
(comme définie par la directive européenne 2006/42/CE appendice II 1B relative aux machines)

WE, / NOUS,

INGERSOLL RAND AIR SOLUTIONS HIBON

*Declare that, under our sole responsibility, the partly completed machinery:
Déclarons que, sous notre seule responsabilité, la presque-machine :*

Description : **Air Positive Displacement Blower Air End**
Year of Manufacturing : **2013**

Model	Serial Number
NX 2	From 14151171 To 14159999
NX 3	From 14160901 To 14169999
NX 5	From 14170104 To 14179999
NX 8	From 15151260 To 15159999
NX 12	From 15170891 To 15179999
NX 18	From 16150103 To 16159999
NX 26	From 16170996 To 16179999

Has been designed, manufactured and tested in accordance with the requirements of directive 2006/42/EC and the relevant technical documentation is compiled in accordance with annex VII B:

A été conçue, fabriquée et testée en accord avec les exigences de la directive 2006/42/CE et que le dossier technique relatif a été construit en accord avec l'annexe VII B:

This partly completed machinery must not be put in service until the final machinery into which is to be incorporated has been declared in conformity with the provisions of this directive

Cette presque-machine ne doit pas être mise en service tant que l'ensemble dans lequel elle doit être intégrée n'a pas été déclaré conforme aux dispositions de la directive ci-dessus

The partly completed machinery to which this declaration relates is also in conformity with the following principal standards / normative:

La Presque-machine à laquelle se réfère cette déclaration est également conforme aux principaux standards et normes suivants:

EN 1012-1

EN 1012-2

EN ISO 12100:2010

We undertake to transmit, in response to a reasoned request by national authorities, relevant information on the partly completed machinery to which this declaration relates.

Nous nous engageons à transmettre, en réponse à une demande adéquatement motivée des autorités nationales, les informations appropriées concernant la Presque-machine à laquelle se réfère cette déclaration.

Wasquehal, 01st June 2013

Judicaël DE MEYERE

The signer of this Declaration of Incorporation is also the person authorized to compile the relevant technical documentation.

Le signataire de cette Déclaration d'Incorporation est aussi la personne autorisée à élaborer le dossier technique approprié.

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1. INTRODUCTION

1.1 Scope and definitions

This manual provides installation, operation and maintenance instructions for the **Ingersoll Rand** NX Blowers, which may be abbreviated to “blowers” in the remainder of this manual. You must use the blowers as specified in this manual.

Read this manual before you install and operate your blower. Important safety information is highlighted as WARNING and CAUTION instructions; you must obey these instructions. The use of WARNINGS and CAUTIONS is defined below.

WARNING

Warnings are given where failure to observe the instruction 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.

The identification and rating plate (Figure 1, item 13) provides specific details about the blower, such as its Item Number and so on.

The following warning symbols may be fitted to the blower or associated equipment:



Warning – refer to accompanying documentation.



Warning – hot surfaces.



Ear defenders must be worn.

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

Equivalent values in imperial units are also included.

1.2 Description

1.2.1 Introduction

Refer to Figure 1. The NX blowers are positive displacement blowers, which incorporate two three-lobe rotors (8). One of the rotors is driven by the drive shaft (5). The other rotor is maintained in the correct phase relation by timing gears. The timing gears and the bearings on the rotors and drive shaft are lubricated by oil in the drive end cover (4) and non-drive end cover (12).

The blowers are supplied in ‘bareshaft’ form. You must connect your own coupling or belt drive system (see Section 3.6) to the drive shaft (5) in order to operate the blower.

The blowers are available in eight different positions depending:

- Flow direction
- Shaft position
- Direction of rotation

Refer to Section 2.7 and figure 2 for the Item Numbers of the different blower versions.

1.2.2 Principle of operation

During operation, the inlet gas stream to be pumped/compressed enters the blower at the inlet (2).

As the two contra-rotating rotors turn, the inlet gas is trapped in the chambers formed between the rotors and the blower-body, and is eventually forced out of the blower at the outlet (3).

1.3 Applications

All of the NX blowers are suitable for pressure or vacuum operation.

The blowers are suitable for pumping/compressing ambient air, and non-flammable gases, gas mixtures and dusts. The blowers are **not** suitable for pumping/compressing flammable or pyrophoric gases, gas mixtures and dusts.

The materials of construction of the blowers are specified in Section 2.6. Before you use the blower, you must ensure that these materials are compatible with the gases and vapours which you will pump/compress or which may exist in the external atmosphere.

You must ensure that your blower is suitable for your application.

If you have any doubts as to the suitability of the blower for your application, contact your supplier or **Ingersoll Rand** for advice.

1. INTRODUCTION

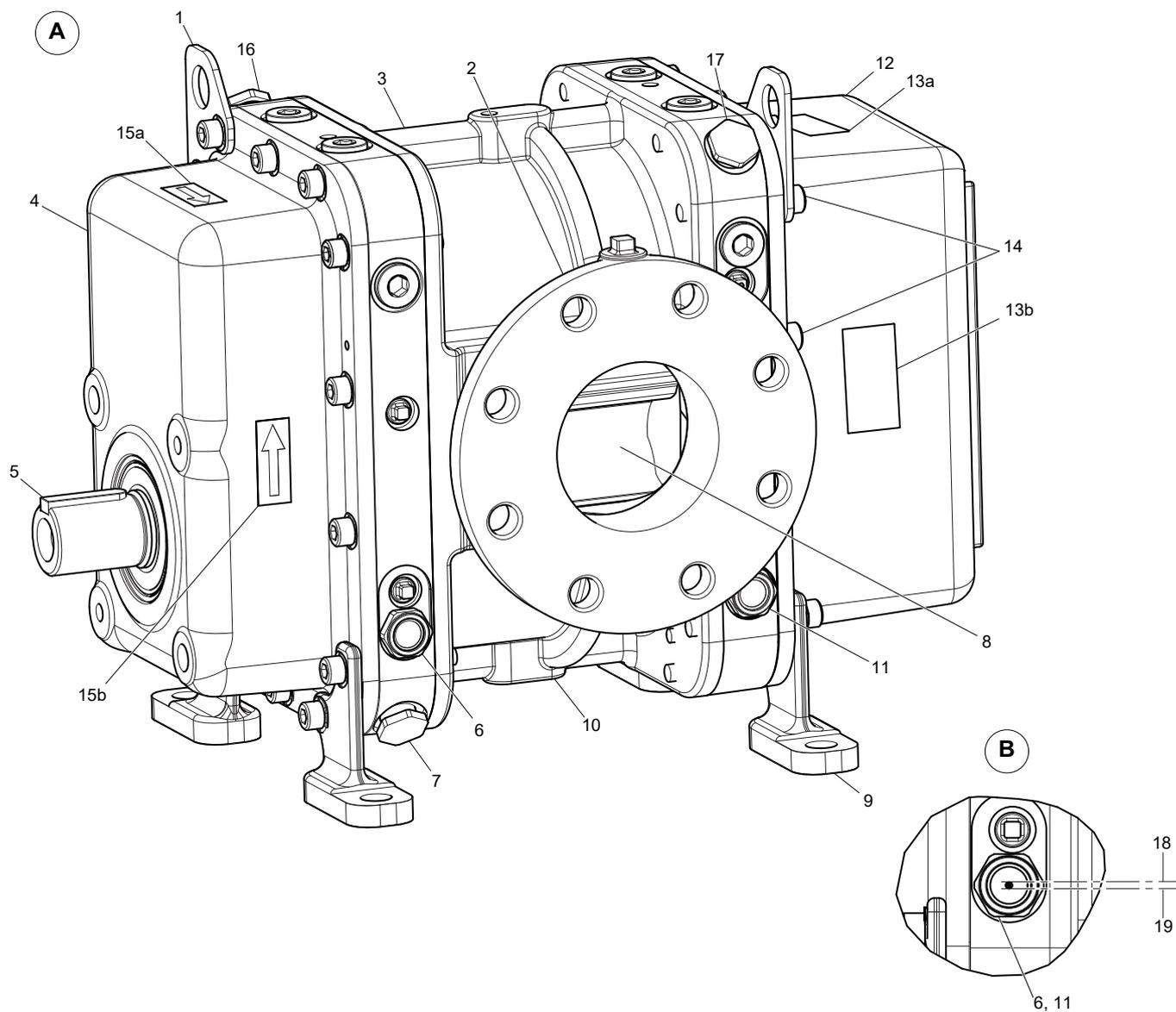


Figure 1 – Components of the NX blower

- | | |
|--------------------------------------------------|------------------------------------------------------------|
| 1. Lifting lugs | 12. Nondrive end cover |
| 2. Inlet | 13a. Identification and rating plate (vertical position) |
| 3. Outlet (behind blower) | 13b. Identification and rating plate (horizontal position) |
| 4. Drive end cover | 14. Head plate bolts |
| 5. Drive shaft | 15a. Direction of rotation arrow (vertical position) |
| 6. Oil level sight glass (drive head plate) | 15b. Direction of rotation arrow (horizontal position) |
| 7. Drive end oil drain plug | 16. Oil filler plug (drive head plate) |
| 8. Rotors | 17. Oil filler plug (non drive head plate) |
| 9. Mounting feet | 18. Maximum oil level |
| 10. Nondrive end oil drain plug (behind blower) | 19. Minimum oil level |
| 11. Oil level sight glass (non drive head plate) | |

2. TECHNICAL DATA

2.1 Operating and storage conditions

Ambient operating temperature range	-20 to 40 °C, -4 to 104 °F
Ambient storage temperature range	-20 to 80 °C, -4 to 176 °F
Maximum ambient operating humidity	90%
Maximum operating altitude	3000 m, 9842 ft
Maximum particle size (in pumped/compressed gases)	25 µm, 0.00098 inch
Maximum dust to gas ratio (in pumped/compressed gases)	200 mg/m ³ , 0.25 oz ft ⁻³

Table 1 – Operating and storage conditions

For operating data above the values indicated in table 1, please contact **Ingersoll Rand**.

2.2 Mechanical data

Dimensions							
Left and Right Hand blowers				See Figure 3			
Top and Bottom Shaft blowers				See Figure 4			
	NX 2	NX 3	NX 5	NX 8	NX 12	NX 18	NX 26
Mass	114 kg	129 kg	147 kg	211 kg	255 kg	421 kg	498 kg
	251 lbs	284 lbs	324 lbs	465 lbs	562 lbs	928 lbs	1098 lbs

Table 2 – Mechanical data

2.3 Performance

Notes: The “given pressures” specified in Tables 4 and 5 are the differential pressures across the blower (that is, the differential pressures between the blower inlet and outlet)

The “r.p.m/r min⁻¹” rotation speeds specified in Tables 4 and 5 are provided for information only, to identify blower performance at the specified speed. During operation, the rotation speed of the blowers need not be limited to these specified speeds.

The maximum vacuum values given in Table 3 are for a flow through the blower.

All of the throughput and power values given in Table 3 have a tolerance of ± 5%.

You must not exceed these values, otherwise the blower may be damaged and/or seize.

	1100 mbar, 1.1 x 10 ⁵ Pa, 825 Torr (NX 2)
“Maximum differential pressure (inlet/outlet)”	1050 mbar, 1,05 x 10 ⁵ Pa, 787 Torr (NX 3, NX 8, NX 18)
	1000 mbar, 1.0 x 10 ⁵ Pa, 750 Torr (NX 5, NX 12, NX 26)
Pressure performance	See table 4
Rotational speed range	See table 4
Nominal shaft power	See table 4
“Maximum absorbed shaft power (pressure operation)”	19 kW, 25,5 hp (NX 2)
	29 kW, 38,9 hp (NX 3)
	44 kW, 60,3 hp (NX 5)
	54 kW, 72,4 hp (NX 8)
	83 kW, 111,3 hp (NX 12)
	104 kW, 139,5 hp (NX 18)
	120 kW, 161,2 hp (NX 26)

Table 3 – Performance data

2. TECHNICAL DATA

Blower	rpm/ r.min ⁻¹	Throughput (m ³ /h) and absorbed power (kW) at given pressure at 1013 mbar and 20°C												Maximum vacuum		
		300 mbar		500 mbar		700 mbar		850 mbar		1000 mbar		1050 mbar				
		3 x 10 ⁴ Pa		5 x 10 ⁴ Pa		7 x 10 ⁴ Pa		8.5 x 10 ⁴ Pa		10 x 10 ⁴ Pa		10.5 x 10 ⁴ Pa		mbar	m ³ /h	kW
		m ³ /h	kW	m ³ /h	kW	m ³ /h	kW	m ³ /h	kW	m ³ /h	kW	m ³ /h	kW			
NX 2 (617 m ³ /h)	2000	167	2,5	143	3,6	124	5	-	-	-	-	-	-	400§	128	2,9
	3000	281	3,7	255	5,4	234	7,6	220	9,2	208	10,8	-	-	500≠	209	5,4
	4000	396	4,9	367	7,2	344	10,1	329	12,2	315	14,4	311	15,1	500≠	316	7,2
	5000	510	6,1	479	9	454	12,6	437	15,3	422	18	417	18,9	500≠	424	9
NX 3 (1028 m ³ /h)	2000	304	3,9	270	6,1	243	8,6	-	-	-	-	-	-	400§	248	4,9
	3000	499	5,9	461	9,2	430	12,9	410	15,6	391	18,4	-	-	500≠	393	9,2
	4000	694	7,9	652	12,2	618	17,1	595	20,8	574	24,5	568	25,7	500≠	576	12,2
	4900	870	9,7	824	15	786	21	761	25,5	739	30	-	-	500≠	759	15,3
NX 5 (1570 m ³ /h)	2000	493	6	447	9,5	409	13,4	384	16,2	-	-	-	-	400§	416	7,6
	3000	797	8,9	743	14,3	699	20	671	24,3	644	28,6	-	-	500≠	647	14,3
	4000	1100	11,9	1039	19,1	990	26,7	958	32,4	928	38,2	-	-	500≠	931	19,2
	4800	1343	14,3	1277	22,9	1223	32,1	1187	38,9	-	-	-	-	500≠	1214	23,8
NX 8 (1952 m ³ /h)	1500	558	7,2	502	10,8	456	15,2	-	-	-	-	-	-	400§	465	8,7
	2300	957	11	901	16,6	855	23,3	825	28,3	797	33,3	-	-	500≠	799	16,6
	3100	1356	14,8	1299	22,4	1253	31,4	1223	38,1	1195	44,8	1186	47,1	500≠	1197	22,4
	3900	1756	18,7	1698	28,2	1652	39,5	1621	47,9	1593	56,4	-	-	500≠	1596	28,2
NX 12 (2823 m ³ /h)	1500	890	11,3	825	16,1	772	22,5	738	27,4	-	-	-	-	400§	782	12,9
	2300	1483	17,3	1417	24,7	1364	34,5	1329	42	1297	49,4	-	-	500≠	1299	24,7
	3050	2039	22,9	1972	32,7	1919	45,8	1883	55,6	1851	65,4	-	-	500≠	1854	32,7
	3800	2594	28,5	2528	40,8	2473	57,1	2438	69,3	-	-	-	-	500≠	2408	40,8

§ = 4 x 10⁴ Pa ≠ = 5 x 10⁴Pa

2. TECHNICAL DATA

Blower	rpm/ r.min ⁻¹	Throughput (cfm) and absorbed power (h.p.) at given pressure at 14,7 psi and 68°F												Maximum vacuum		
		4,5 psi		7,5 psi		10,5 psi		13 psi		14,5 psi		15 psi				
		CFM	hp	CFM	hp	CFM	hp	CFM	hp	CFM	hp	CFM	hp	inch hg	CFM	hp
NX 2 (363 CFM)	2000	98	3,4	84	4,8	73	6,7	-	-	-	-	-	-	11,8	75	3,9
	3000	165	5,0	150	7,2	138	10,2	129	12,3	122	14,5	-	-	14,9	123	7,2
	4000	233	6,6	216	9,7	202	13,5	194	16,4	185	19,3	183	20,2	14,9	186	9,7
	5000	300	8,2	282	12,1	267	16,9	257	20,5	248	24,1	245	25,3	14,9	250	12,1
NX 3 (605 CFM)	2000	179	5,2	159	8,2	143	11,5	-	-	-	-	-	-	11,8	146	6,6
	3000	294	7,9	271	12,3	253	17,3	241	20,9	230	24,7	-	-	14,9	231	12,3
	4000	408	10,6	384	16,4	364	22,9	350	27,9	338	32,8	334	34,5	14,9	339	16,4
	4900	512	13,0	485	20,1	463	28,2	448	34,2	435	40,2	-	-	14,9	447	20,5
NX 5 (924 CFM)	2000	290	8,0	263	12,7	241	18,0	226	21,7	-	-	-	-	11,8	245	10,2
	3000	469	11,9	437	19,2	411	26,8	395	32,6	379	38,3	-	-	14,9	381	19,2
	4000	647	16,0	612	25,6	583	35,8	564	43,4	546	51,2	-	-	14,9	548	25,7
	4800	790	19,2	752	30,7	720	43,0	699	52,1	-	-	-	-	14,9	715	31,9
NX 8 (1149 CFM)	1500	326	9,8	293	15	266	21,1	-	-	-	-	-	-	11,8	274	11,7
	2300	561	15,1	528	23,1	500	32,3	480	40	469	44,6	-	-	14,9	470	22,3
	3100	796	20,3	762	31,1	735	43,5	715	53,9	703	60,1	700	62,2	14,9	705	30,0
	3900	1031	25,5	997	39,1	969	54,7	949	67,8	938	75,6	-	-	14,9	939	37,8
NX 12 (1661 CFM)	1500	522	15,3	483	22,3	451	31,2	428	38,7	-	-	-	-	11,8	460	17,3
	2300	871	23,5	831	34,2	799	47,9	776	59,3	763	66,2	-	-	14,9	765	33,1
	3050	1198	31,1	1158	45,4	1126	63,5	1102	78,7	1090	87,7	-	-	14,9	1091	43,8
	3800	1525	38,8	1485	56,5	1452	79,2	1429	98	-	-	-	-	14,9	1417	54,7

Table 4 – Pressure performance data

2.4 Noise and vibration data

Note: The noise and vibration data values given below are maximum values. The actual values are given according to our test bench and will depend on the installation and the operating conditions.

Noise level	NX 2	NX 3	NX 5	NX 8	NX 12	NX 18	NX 26
		93	94	95	98	102	99
Vibration level	4,5 mm.s ⁻²	4,5 mm.s ⁻²	4,5 mm.s ⁻²	5,5 mm.s ⁻²	5,5 mm.s ⁻²	6,5 mm.s ⁻²	6,5 mm.s ⁻²
	0,18 inch.s ⁻²	0,18 inch.s ⁻²	0,18 inch.s ⁻²	0,22 inch.s ⁻²	0,22 inch.s ⁻²	0,26 inch.s ⁻²	0,26 inch.s ⁻²

Table 5 – Noise and vibration data

2. TECHNICAL DATA

2.5 Lubrication data

On standard applications, you can use an oil which complies with the 'standard use' specification given in Table 6. You must use an oil which complies with the 'special use' specification in Table 6:

- If you use the blower with an acoustic enclosure.
- If you use the blower in ambient temperatures of 0 °C (32 °F) or below.
- If you use the blower with a power input that exceeds 2 / 3 of the maximum power input (see Table 3).

Parameter	Standard use	Special use
Density (at 15 °C, 59 °F)	0.89	0.86
Mean pour point	21 °C (70 °F)	45 °C (113 °F)
Mean flash point	224 °C (435 °F)	260 °C (500 °F)
Viscosity: at 20 °C (68 °F)	8.09 x 10 ⁻⁴ m ² s ⁻¹ (809 cSt)	6.04 x 10 ⁻⁴ m ² s ⁻¹ (640 cSt)
at 40 °C (104 °F)	2.2 x 10 ⁻⁴ m ² s ⁻¹ (220 cSt)	2.18 x 10 ⁻⁴ m ² s ⁻¹ (218 cSt)
at 100 °C (212 °F)	1.8 x 10 ⁻⁵ m ² s ⁻¹ (18 cSt)	2.7 x 10 ⁻⁵ m ² s ⁻¹ (27 cSt)
Mean viscosity index	93	149
Recommended oil	Hibon Lub	Contact factory

Table 6 – Lubricating oil specifications

	NX 2	NX 3	NX 5	NX 8	NX 12	NX 18	NX 26
Drive end cover	0,83 litres	0,83 litres	0,83 litres	1,50 litres	1,50 litres	2,41 litres	2,41 litres
	0,22 US gal	0,22 US gal	0,22 US gal	0,40 US gal	0,40 US gal	0,64 US gal	0,64 US gal
Non-drive end cover	1,12 litres	1,12 litres	1,12 litres	2,10 litres	2,10 litres	3,84 litres	3,84 litres
	0.30 US gal	0.30 US gal	0.30 US gal	0.55 US gal	0.55 US gal	1.01 US gal	1.01 US gal

Table 7 – Left and Right Hand blower oil capacities

	NX 2	NX 3	NX 5	NX 8	NX 12	NX 18	NX 26
Drive end cover	0,5 litres	0,5 litres	0,5 litres	0,9 litres	0,9 litres	1,45 litres	1,45 litres
	0,13 US gal	0,13 US gal	0,13 US gal	0,24 US gal	0,24 US gal	0,38 US gal	0,38 US gal
Non-drive end cover	0,75 litres	0,75 litres	0,75 litres	1,30 litres	1,30 litres	2,3 litres	2,3 litres
	0,20 US gal	0,20 US gal	0,20 US gal	0,34 US gal	0,34 US gal	0,61 US gal	0,61 US gal

Table 8 – Top and Bottom Shaft blower oil capacities

2.6 Materials of construction

Head Plates and End Covers	EN GJL 200 grey cast iron
Casings	EN GJL 200 grey cast iron (NX 2, NX 3, NX 5, NX 8, NX 12)
	EN GJL 250 grey cast iron (NX 18, NX 26)
Rotors	EN GJS 400-15 spheroidal graphite cast iron
Bearings	100Cr6 steel
Piston rings	Cast iron
Piston rings holder	C 45E Steel
Gaskets	Klingerit® C4430
O-rings	Nitrile

Table 9 – Construction materials data

2. TECHNICAL DATA

2.7 Item Numbers

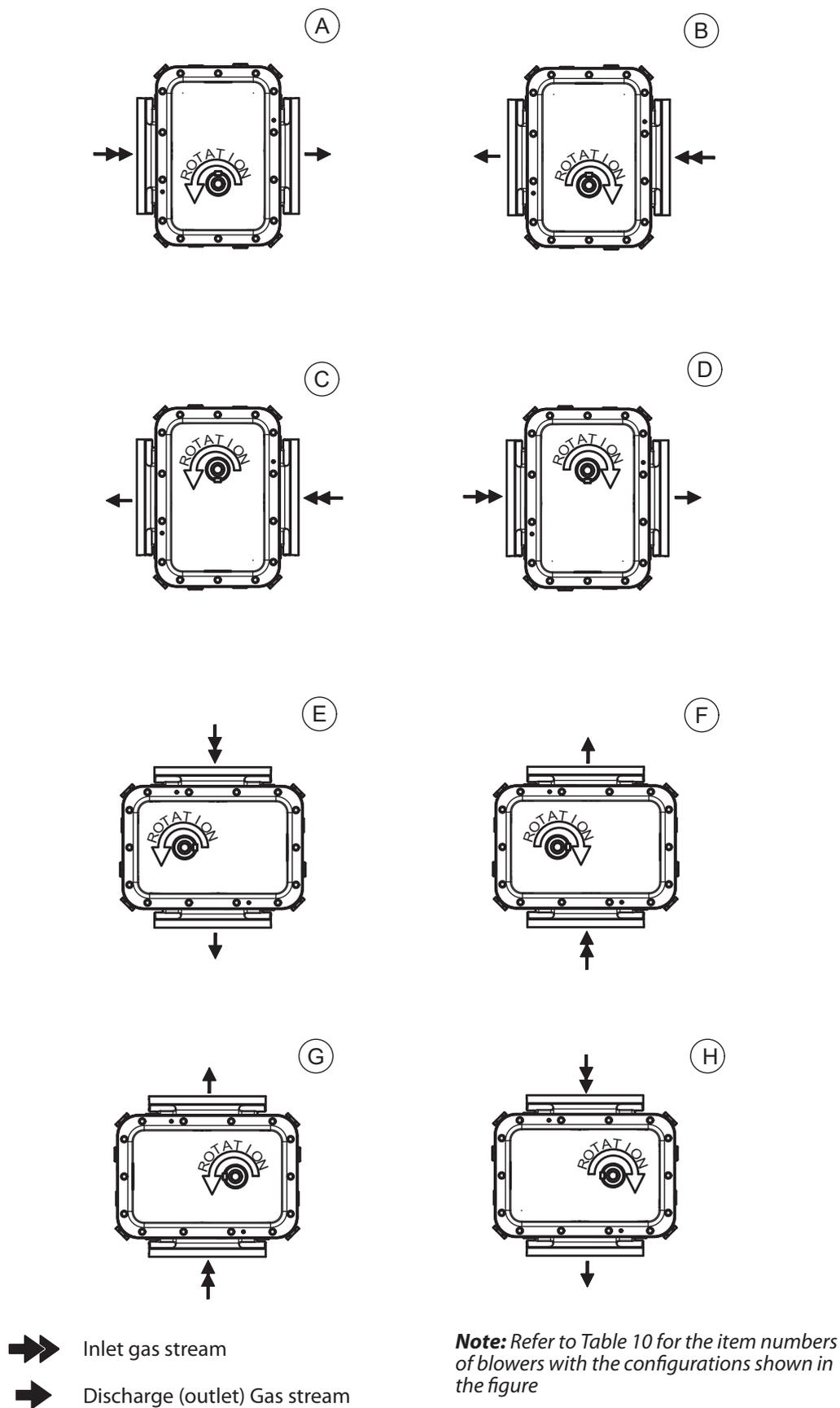


Figure 2 – Ordering configurations

2. TECHNICAL DATA

Blower model	Shaft position	Rotation direction	Standard blowers				"Configuration: See Figure 2"
			Item Number				
			Without Feet		With Feet		
NX 2	Bottom	Anticlockwise	F014150110	47005012	F0141501101	47005020	A
	Bottom	Clockwise	F014150111	47005038	F0141501111	47005046	B
	Top	Anticlockwise	F014150120	47005053	F0141501201	47005061	C
	Top	Clockwise	F014150121	47005079	F0141501211	47005087	D
	Left	Anticlockwise	F014150100	47004973	F0141501001	47004981	E
	Left	Clockwise	F014150101	47004999	F0141501011	47005004	F
	Right	Anticlockwise	F014150130	47005095	F0141501301	47005103	G
	Right	Clockwise	F014150131	47005111	F0141501311	47005129	H
NX 3	Bottom	Anticlockwise	F014160110	47005178	F0141601101	47005186	A
	Bottom	Clockwise	F014160111	47005194	F0141601111	47005202	B
	Top	Anticlockwise	F014160120	47005210	F0141601201	47005228	C
	Top	Clockwise	F014160121	47005236	F0141601211	47005244	D
	Left	Anticlockwise	F014160100	47005137	F0141601001	47005145	E
	Left	Clockwise	F014160101	47005152	F0141601011	47005160	F
	Right	Anticlockwise	F014160130	47005251	F0141601301	47005269	G
	Right	Clockwise	F014160131	47005277	F0141601311	47005285	H
NX 5	Bottom	Anticlockwise	F014170110	47005335	F0141701101	47005343	A
	Bottom	Clockwise	F014170111	47005350	F0141701111	47005368	B
	Top	Anticlockwise	F014170120	47005376	F0141701201	47005384	C
	Top	Clockwise	F014170121	47005392	F0141701211	47005400	D
	Left	Anticlockwise	F014170100	47005293	F0141701001	47005301	E
	Left	Clockwise	F014170101	47005319	F0141701011	47005327	F
	Right	Anticlockwise	F014170130	47005418	F0141701301	47005426	G
	Right	Clockwise	F014170131	47005434	F0141701311	47005442	H
NX 8	Bottom	Anticlockwise	F015100110	47001235	F0151001101	47001243	A
	Bottom	Clockwise	F015100111	47001250	F0151001111	47001268	B
	Top	Anticlockwise	F015100120	47001276	F0151001201	47001284	C
	Top	Clockwise	F015100121	47001292	F0151001211	47001300	D
	Left	Anticlockwise	F015150100	47001318	F0151501001	47001326	E
	Left	Clockwise	F015150101	47001334	F0151501011	47001342	F
	Right	Anticlockwise	F015150130	47001359	F0151501301	47001367	G
	Right	Clockwise	F015150131	47001375	F0151501311	47001383	H
NX 12	Bottom	Anticlockwise	F015120110	47001391	F0151201101	47001409	A
	Bottom	Clockwise	F015120111	47001417	F0151201111	47001425	B
	Top	Anticlockwise	F015120120	47001433	F0151201201	47001441	C
	Top	Clockwise	F015120121	47001458	F0151201211	47001466	D
	Left	Anticlockwise	F015170100	47001474	F0151701001	47001482	E
	Left	Clockwise	F015170101	47001490	F0151701011	47001508	F
	Right	Anticlockwise	F015170130	47001516	F0151701301	47001524	G
	Right	Clockwise	F015170131	47001532	F0151701311	47001540	H
NX 18	Bottom	Anticlockwise	F016150110	47005855	F0161501101	47005863	A
	Bottom	Clockwise	F016150111	47005871	F0161501111	47005889	B
	Top	Anticlockwise	F016150120	47005897	F0161501201	47005905	C
	Top	Clockwise	F016150121	47005913	F0161501211	47005921	D
	Left	Anticlockwise	F016150100	47005814	F0161501001	47005822	E
	Left	Clockwise	F016150101	47005830	F0161501011	47005848	F
	Right	Anticlockwise	F016150130	47005939	F0161501301	47005947	G
	Right	Clockwise	F016150131	47005954	F0161501311	47005962	H
NX 26	Bottom	Anticlockwise	F016170110	47006010	F0161701101	47006028	A
	Bottom	Clockwise	F016170111	47006036	F0161701111	47006044	B
	Top	Anticlockwise	F016170120	47006051	F0161701201	47006069	C
	Top	Clockwise	F016170121	47006077	F0161701211	47006085	D
	Left	Anticlockwise	F016170100	47005970	F0161701001	47005988	E
	Left	Clockwise	F016170101	47005996	F0161701011	47006002	F
	Right	Anticlockwise	F016170130	47006093	F0161701301	47006101	G
	Right	Clockwise	F016170131	47006119	F0161701311	47006127	H

Table 10 - Item Numbers

2. TECHNICAL DATA

2.8 Connections

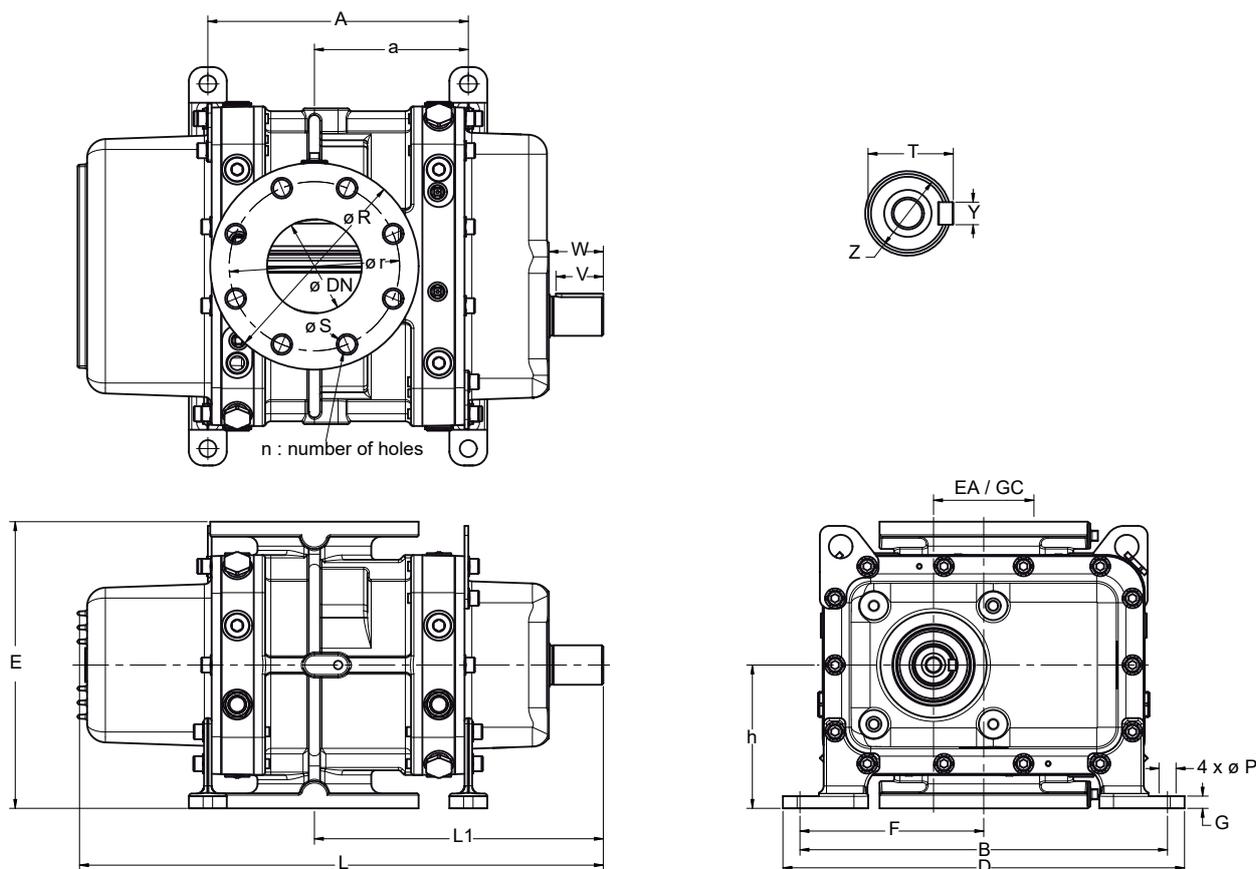


Figure 3 - Left and Right Hand blower dimensions

"Figure 3 Key"	Dimensions													
	NX 2		NX 3		NX 5		NX 8		NX 12		NX 18		NX 26	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
A	205	8.07	275	10.83	370	14.57	355	13.98	476	18.74	444	17.48	589	23.19
a	102.5	4.04	162.5	6.40	213	8.39	208	8.19	278	10.94	222	8.74	339.5	13.37
B	388	15.28	388	15.28	388	15.28	475	18.70	475	18.70	586	23.07	586	23.07
D	424	16.69	424	16.69	424	16.69	515	20.28	515	20.28	626	24.65	626	24.65
E	305	12.01	305	12.01	305	12.01	370	14.57	370	14.57	450	17.72	450	17.72
EA/GC	106	4.17	106	4.17	106	4.17	135	5.31	135	5.31	173	6.81	173	6.81
F	194	7.64	194	7.64	194	7.64	238	9.37	238	9.37	293	11.54	293	11.54
G	13	0.51	13	0.51	13	0.51	13	0.51	13	0.51	15	0.59	15	0.59
h	152.5	6.00	152.5	6.00	152.5	6.00	185	7.28	185	7.28	225	8.86	225	8.86
L	485	19.09	555	21.85	650	25.59	671	26.42	791	31.14	848	33.39	993.2	39.10
L1	245	9.65	305	12.01	356	14.02	385	15.16	454	17.87	441	17.36	559	22.01
T	45	1.77	45	1.77	45	1.77	51.5	2.03	51.5	2.03	69	2.72	69	2.72
V	50	1.97	50	1.97	50	1.97	70	2.76	70	2.76	90	3.54	90	3.54
W	60	2.36	57	2.24	58	2.28	81	3.19	80	3.15	102	4.02	102.2	4.02
Y	12	0.47	12	0.47	12	0.47	14	0.55	14	0.55	18	0.71	18	0.71
ØZ*	42	1.65	42	1.65	42	1.65	48	1.89	48	1.89	65	2.56	65	2.56
ØR	200	7.87	220	8.66	220	8.66	250	9.84	285	11.22	340	13.39	340	13.39
Ør	160	6.30	180	7.09	180	7.09	210	8.27	240	9.45	295	11.61	295	11.61
ØDN	80	3.15	100	3.94	100	3.94	125	4.92	150	5.91	200	7.87	200	7.87
ØP	18	0.71	18	0.71	18	0.71	18	0.71	18	0.71	22	0.87	22	0.87
ØS	18	0.71	18	0.71	18	0.71	18	0.71	22	0.87	22	0.87	22	0.87
n	8	0.31	8	0.31	8	0.31	8	0.31	8	0.31	8	0.31	8	0.31

* Fitting tolerance range : m6

Table 11 - Left and Right hand blower dimensions

2. TECHNICAL DATA

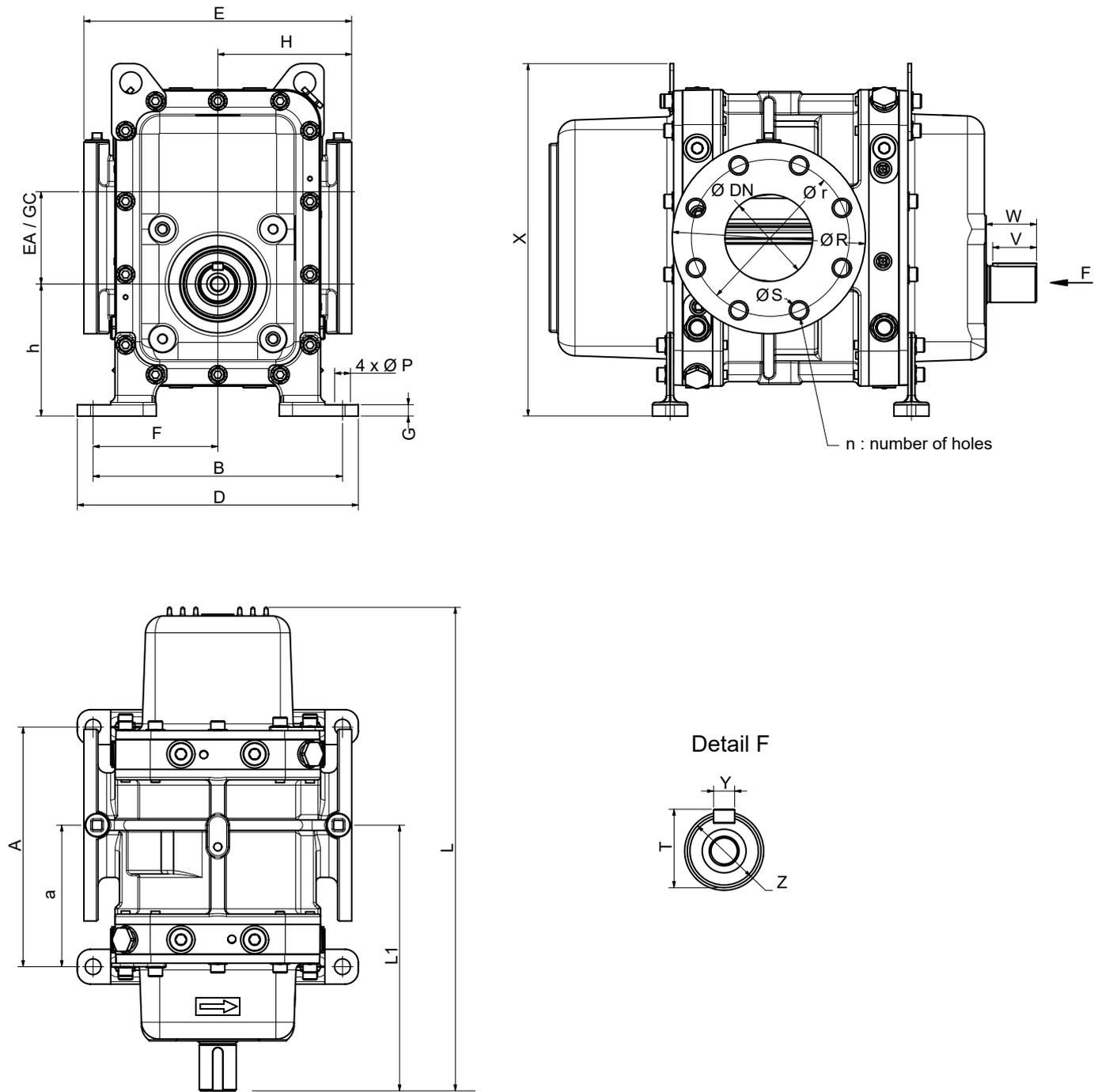


Figure 4 -Top and Bottom Shaft blower dimensions

2. TECHNICAL DATA

"Figure 4 Key"	Dimensions													
	NX 2		NX 3		NX 5		NX 8		NX 12		NX 18		NX 26	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
A	205	8.07	275	10.83	370	14.57	355	13.98	476	18.74	444	17.48	589	23.19
a	102.5	4.04	162.5	6.40	213	8.39	208	8.19	278	10.94	222	8.74	339.5	13.37
B	284	11.18	284	11.18	284	11.18	336	13.23	336	13.23	414	16.30	414	16.30
D	320	12.60	320	12.60	320	12.60	376	14.80	376	14.80	454	17.87	454	17.87
E	305	12.01	305	12.01	305	12.01	370	14.57	370	14.57	450	17.72	450	17.72
EA/GC	106	4.17	106	4.17	106	4.17	135	5.31	135	5.31	173	6.81	173	6.81
F	142	5.59	142	5.59	142	5.59	168	6.61	168	6.61	207	8.15	207	8.15
G	13	0.51	13	0.51	13	0.51	13	0.51	13	0.51	15	0.59	15	0.59
H	152.5	6.00	152.5	6.00	152.5	6.00	185	7.28	185	7.28	225	8.86	225	8.86
h	151.5	5.96	151.5	5.96	151.5	5.96	187	7.36	187	7.36	224.5	8.84	224.5	8.84
L	485	19.09	555	21.85	650	25.59	671	26.42	791	31.14	848	33.39	993.2	39.10
L1	245	9.65	305	12.01	356	14.02	385	15.16	454	17.87	441	17.36	559	22.01
T	45	1.77	45	1.77	45	1.77	51.5	2.03	51.5	2.03	69	2.72	69	2.72
V	50	1.97	50	1.97	50	1.97	70	2.76	70	2.76	90	3.54	90	3.54
W	60	2.36	57	2.24	58	2.28	81	3.19	80	3.15	102	4.02	102.2	4.02
X	404.5	15.93	404.5	15.93	404.5	15.93	499	19.65	499	19.65	589	23.19	589	23.19
Y	12	0.47	12	0.47	12	0.47	14	0.55	14	0.55	18	0.71	18	0.71
ØZ*	42	1.65	42	1.65	42	1.65	48	1.89	48	1.89	65	2.56	65	2.56
ØR	200	7.87	220	8.66	250	9.84	250	9.84	285	11.22	340	13.39	340	13.39
Ør	160	6.30	180	7.09	210	8.27	210	8.27	240	9.45	295	11.61	295	11.61
ØDN	80	3.15	100	3.94	125	4.92	125	4.92	150	5.91	200	7.87	200	7.87
ØP	18	0.71	18	0.71	18	0.71	18	0.71	18	0.71	22	0.87	22	0.87
ØS	18	0.71	18	0.71	18	0.71	18	0.71	22	0.87	22	0.87	22	0.87
n	8	0.31	8	0.31	8	0.31	8	0.31	8	0.31	8	0.31	8	0.31

* Fitting tolerance range: m6 unless otherwise stated above.

Table 12 -Top and Bottom Shaft blower dimensions

3. INSTALLATION

CAUTION

Ingersoll Rand will accept no liability or warranty claims if your installation includes any modifications or additions to the blower without the prior written approval of Ingersoll Rand, or if the blower is incorrectly installed.

3.1 Installation safety

WARNING

Obey the safety instructions listed below and take note of appropriate precautions when you install the blower.

- A suitably trained and supervised technician must install the blower.
- Ensure that debris and dust does not get into the blower or the system pipelines when you install the blower.
- Check that all of the required components and tools are available and of the correct type before you start to install the blower.
- Use suitable new gaskets/seals to connect the blower into your system. Do not re-use old gaskets/seals.
- If you will fit the blower into an existing system, disconnect the power from the drive system before you start installation, so that the drive system cannot be operated accidentally.

3.2 System design and safety

WARNING

Ensure that the maximum differential pressure across the blower specified in section 2.2 cannot be exceeded. If it is, the drive will trip and the blower will stop. Obey the safety instructions listed below when you design and build your system:

• 3.2.1 General requirements

Your system must be suitably designed for correct operation of the blower. *Note that:*

- You must design a suitable pipeline to fit the blower inlet/outlet connections. refer to Section 2.8 and to Figures 3 and 4 for the dimensions of the blower connections.
- Your system design must ensure that, when the blower is in its final operating location, you can see the oil-level sight-glasses and can access the oil filler and drain plugs.
- Your system must incorporate a suitable mounting platform: see Section 3.4 for more details.
- The blower must be sufficiently level for correct operation: see Section 3.4 for more details.
- There must be at least 150 mm (6 inches) of free space around the blower, for adequate cooling-air circulation.

- The gases which enter the blower must not contain solid particulates larger than 25 μm (9.84×10^{-5} inch) in size and must not contain more than 200 mg/m³ (1.37×10^{-5} lb/ft³) of dust. Incorporate suitable filters to prevent the ingress of solids into the blower.
- The temperature of the gases which enter the blower must not exceed the temperature rating of the blower.

• 3.2.2 System safety

- Your system design must ensure that the blower cannot be operated with the inlet or discharge (outlet) pipelines obstructed.
- Ensure that the blower cannot operate with the incorrect direction of rotation (see Section 3.7).
- We also recommend that your system incorporates an emergency stop facility which, once activated, must be manually reset before the blower can be operated again.
- Your system must incorporate non-return valves (check valves), to prevent reverse rotation of the blower when it is switched off.
- Your system must incorporate a pressure relief valve in the outlet pipeline (for pressure operation) and/or incorporate a vacuum relief valve in the inlet pipeline (for vacuum operation), to ensure that the design capability of the blower cannot be exceeded during operation. The relief valve(s) must be suitably rated/sized for the performance of the blower.
- We recommend that you incorporate silencers, to attenuate the pulsations in the inlet/outlet gas streams.
- If required, install your own acoustic enclosure around the blower or ensure that people wear suitable protective equipment (such as ear defenders) when they are close to the operating blower (See section 2.4). If you install an acoustic enclosure, ensure that there is sufficient space for cooling-air flow around the blower. See above
- Your design must ensure that people are protected from accidental contact with the blower or the outlet pipelines. During blower operation, the temperature of the blower and the outlet pipelines will be above 70 °C (158 °F). If necessary, fit suitable guards.
- Your design must ensure that materials or substances which are flammable at temperatures of 70 °C (158 °F) or above are not close to, or in contact with, the hot blower or outlet pipelines.
- If you pump/compress flammable or toxic gases, you must take suitable precautions to prevent the discharge of the gases to the surrounding atmosphere.

Note: Filters, pressure/vacuum relief valves, non-return (check) valves, acoustic enclosures and silencers are available from **Ingersoll Rand**: contact your supplier or **Ingersoll Rand** for advice.

3. INSTALLATION

3.3 Unpack and inspect

WARNING

Use suitable lifting equipment to move the blower. If you do not, you can injure yourself or damage the blower. Refer to Section 2.2 for the mass of the blower.

1. Use a suitable fork-lift truck or pallet truck to move the blower, on its pallet, close to where you will install it.
2. Remove all packing materials and protective covers and check the blower. If the blower is damaged, notify your supplier and the carrier in writing within two days; state the Item Number of the blower together with your order number and your supplier's invoice number. Retain all packing materials for inspection. Do not use the blower if it is damaged.
3. Check that you have received the items. If any item is missing, notify your supplier in writing within two days
4. Look at the blower rating and identification plate (Figure 1, item 13) and check that the blower is suitable for use in your system. If the blower is not suitable for use in your system, do not continue to install the blower: contact your Supplier or **Ingersoll Rand**.

If the blower is not to be used immediately, replace the protective covers. Store the blower in suitable conditions, as described in Section 6.1.

3.4 Prepare, locate and connect the blower

• 3.4.1 Introduction

Take note of the following when you locate the blower and connect it into your system:

- For optimum performance, ensure that the system pipelines connected to the blower are as short as possible.
- Support your system pipelines and other components, to prevent loading of the inlet and outlet ports on the blower.
- Incorporate flexible components in your system, to minimise noise and vibration.
- Where necessary, use gaskets/seals which are compatible with the gases which will be pumped/compressed, and with the operating conditions.
- The leak tightness of your system connections must be in accordance with the requirements of your applications.

Note that blowers can be:

- Installed directly in your system. You must ensure that your system pipelines can support the blower. Prepare, locate and connect blower as described in Section 3.4.2.
- Supported by mounting feet; prepare, locate and connect blowers as described in Section 3.4.3.

Note that the blowers are supplied with either lifting bolts fitted (as shown in Figure 1) or with lifting lugs fitted. Where necessary in Sections 3.4.2 or 3.4.3, attach your lifting equipment to these lifting bolts/lugs.

• 3.4.2 Prepare, locate and connect blowers installed directly in your system

WARNING

Use suitable lifting equipment to move the blower. If you do not, you can injure yourself or damage the blower. Refer to Section 2.2 for the mass of the blower.

Note: The following procedure assumes that your system inlet pipeline will support the blower. If your blower will be supported by your system outlet pipeline, reverse Steps 4 and 5 below.

Use the following procedure to prepare, locate and connect blower:

1. Use a suitable cleaning solution (such as alcohol or white spirit) to clean the rotors:
 - Moisten a suitable clean, lint-free cloth with the cleaning solution.
 - Clean the rotors (Figure 1, item 8) which are visible through the inlet port.
 - Turn the blower drive shaft as necessary to access the other rotors.
2. Refer to Figure 1. Attach suitable lifting equipment to the blower, then use the lifting equipment to move the blower to its required operating location.
3. While it is supported by the lifting equipment, adjust the position of the blower so that the blower inlet and outlet are correctly aligned with the connections in your system inlet and outlet pipelines.
4. Fit a suitable gasket/seal* to the blower inlet (Figure 1, item 2), then use the correct number and size of bolts to connect the blower inlet flange to your system inlet pipeline.
5. Fit a suitable gasket/seal* to your system outlet pipeline, then use the correct number and size of bolts to connect the blower outlet flange to your system outlet pipeline.
6. Disconnect your lifting equipment from the blower.

***Note:** Gaskets are available from **Ingersoll Rand**: Contact your supplier or **Ingersoll Rand** for advice

3. INSTALLATION

- 3.4.3 Prepare, locate and connect a blower supported by mounting feet

WARNING

Use suitable lifting equipment to move the blower. If you do not, you can injure yourself or damage the blower. Refer to Section 2.2 for the mass of the blower.

You must provide a firm, level platform for the blower. Ensure that the operating location is clean and free from debris and oil.

You must ensure that when the blower is in its required operating location, all of the mounting feet (1, 2 or 4, depending on the blower model) are flat on the mounting platform to within 0.1 mm.m^{-1} ($0.0013 \text{ inch.ft}^{-1}$).

Use the following procedure to prepare, locate and connect the blower:

- Refer to Figure 1. Attach suitable lifting equipment to the four lifting-bolts (1), then use the lifting equipment to move the blower to its required operating location.
- Disconnect your lifting equipment from the blower. If required, remove the lifting-bolts from the blower.
- Fit suitable bolts through the fixing holes in the mounting feet (Figure 1, items 9), to secure the blower in position.
- Clean the rotors: refer to Step 1 of Section 3.4.2.
- Use a suitable gasket/seal* to connect your inlet pipeline to the blower inlet (Figure 1, item 2).
- Use a suitable gasket/seal* to connect your outlet pipeline to the blower outlet (Figure 1, item 3).

***Note:** Gaskets are available from **Ingersoll Rand**. Contact your supplier or **Ingersoll Rand** for advice

3.5 Fill the blower with oil

CAUTION

Ensure that you use the correct grade of oil and that the oil levels in the blower are correct. If you do not, the blower will probably be damaged during operation, or its performance may be affected.

- Drain the protective oil from the drive end and non-drive end covers: refer to Section 5.5.
- Refer to Figure 1. Fill the drive end cover (4) with oil: refer to Section 5.5.1.
- Fill the non-drive end cover (12) with oil: refer to Section 5.5.2.

3.6 Fit the drive/transmission

WARNING

You must fit suitable guards to protect people from rotating/moving parts.

CAUTION

Your drive and transmission system design must ensure that the maximum blower rotational speeds specified in Section 2.3 cannot be exceeded, otherwise the blower will be damaged, or may not operate correctly.

You must use a suitable coupling or a belt drive and transmission system to connect your drive to the blower.

Your drive and transmission system design must ensure that the radial and axial loadings on the blower drive shaft are as low as possible.

Note: For this, the blower pulley diameter must be above diameters specified in Table 13, linear speed of belts should not exceed 31 m/s and transmission safety factor should be between 1,4 and 1,7.

Connect the components of the drive and transmission system to the blower drive shaft (Figure 1, item 5) as described in the manufacturer's instructions supplied with the components.

Blower	Minimum pulley diameter for specified differential pressure : mm (inch)							
	"300 mbar $3 \times 10^4 \text{ Pa}$ 4,35 psi"	"400 mbar $4 \times 10^4 \text{ Pa}$ 5,8 psi"	"500 mbar $5 \times 10^4 \text{ Pa}$ 7,25 psi"	"600 mbar $6 \times 10^4 \text{ Pa}$ 8,7 psi"	"700 mbar $7 \times 10^4 \text{ Pa}$ 10,15 psi"	"800 mbar $8 \times 10^4 \text{ Pa}$ 11,6 psi"	"900 mbar $9 \times 10^4 \text{ Pa}$ 13,05 psi"	"1000 mbar $1 \times 10^5 \text{ Pa}$ 14,5 psi"
NX 2	100 (3.94)	100 (3.94)	100 (3.94)	100 (3.94)	100 (3.94)	112 (4.41)	112 (4.41)	125 (4.92)
NX 3	100 (3.94)	100 (3.94)	100 (3.94)	112 (4.41)	112 (4.41)	125 (4.92)	125 (4.92)	150 (5.90)
NX 5	125 (4.92)	125 (4.92)	125 (4.92)	150 (5.90)	150 (5.90)	160 (6.30)	170 (6.69)	180 (7.09)
NX 8	140 (5.51)	140 (5.51)	150 (5.90)	160 (6.30)	170 (6.69)	180 (7.09)	180 (7.09)	200 (7.87)
NX 12	170 (6.69)	170 (6.69)	180 (7.09)	200 (7.87)	212 (8.35)	212 (8.35)	224 (8.82)	224 (8.82)
NX 18	150 (5.90)	150 (5.90)	160 (6.30)	170 (6.69)	180 (7.09)	200 (7.87)	200 (7.87)	224 (8.82)
NX 26	170 (6.69)	170 (6.69)	180 (7.09)	200 (7.87)	212 (8.35)	212 (8.35)	224 (8.82)	250 (9.84)

Table 13 - Minimum drive shaft pulley diameters

3. INSTALLATION

3.7 Check the direction of rotation

WARNING

If you remove a guard during the following procedure, ensure that you do not come into contact with the shaft, the coupling/belt or the drive system when you operate the blower.

If you do, you may be injured by the rotating components.

CAUTION

Ensure that the blower rotates in the correct direction. If it does not, your system will not operate correctly.

After you have connected the drive/transmission, check the direction of rotation of the blower as follows:

1. Ensure that isolation valves in the blower inlet and outlet pipelines are in the correct 'open' positions.
2. If necessary (that is, to make it easier to see the blower drive shaft), temporarily remove guard over the drive coupling or belt.
3. Refer to Figure 1. Watch the blower drive shaft (5) while you start up the blower (refer to Section 4.2), then shut down the blower (refer to Section 4.3) after two seconds.
4. Check that the blower drive shaft (5) rotated correctly in the expected direction. (This depends on your application and installation configuration: see Figure 1 item 15a or b)
5. If the direction of rotation was incorrect:
 - Check the installation of the drive and transmission system and reconfigure as appropriate.
 - Perform the direction of rotation check from Step 2 again, to ensure that the blower now rotates in the correct direction.
6. If you have removed the guard over the drive coupling or belt (as in Step 1 above), refit the guard.

3.8 Commissioning the blower

After you have installed the blower, use the following procedure to commission it and prepare it for subsequent operation:

1. Ensure that isolation valves in the blower inlet and outlet pipelines are in the correct 'open' positions.
2. Ensure that all other components in the system pipelines (such as filters) have been correctly installed and configured for operation.
3. Engage your drive and transmission system to start the blower.
4. Operate the blower, with no gas load, for at least 15 minutes. During this time:
 - Monitor the external surfaces of the blower and check for 'hot spots' (that means, areas which are unusually hot).
 - If any hot spots persist at the end of the 15 minutes, contact your supplier or **Ingersoll Rand** for advice.
5. Continue to operate the blower with a representative gas load, and check that it operates correctly and provides the required performance. If necessary, refer to Section 5.7 if any fault conditions occur.
6. Disengage your drive and transmission system to stop the blower.
7. Wait until you can hear that the blower has stopped before you close any isolation valves in the blower inlet and outlet pipelines.

The blower is now ready for normal operation.

4. OPERATION

WARNING

Ingersoll Rand will accept no liability or warranty claims if your blower is used on applications or in a way prohibited in this manual, or not specified in this manual.

4.2 Start-up

CAUTION

Ensure that the oil levels in the blower are correct. If you do not, the blower will probably be damaged during operation, or its performance may be affected.

4.1 General operational safety

WARNING

Obey the safety instructions and precautions listed below. If you do not, there may be a risk of injury or death to people, or damage to the blower.

- Do not expose any part of your body to vacuum. If you do, you may be injured.
- Do not operate the blower when the cooling-air flow around the blower is restricted (see Section 3.2). If you do, the blower may overheat.
- Do not operate the blower with the blower inlet or outlet ports open to the atmosphere. If you do, your fingers or other parts of your body or clothing may get trapped, and you may be injured by the rotating mechanisms in the blower.
- Do not operate the blower with the guards removed from the blower drive shaft, the coupling/belt or the drive system. If you do, your fingers or other parts of your body or clothing may get trapped, and you may be injured by the rotating components.
- Never disconnect any of the connecting pipelines (for example, the pipeline connected to the inlet) when the blower is operating.
- Prevent accidental contact with the hot blower, and do not place flammable materials on the blower. During operation, the temperature of external parts of the blower can exceed 70° C (158° F).
- Do not attempt to use the blower to pump/compress liquids. The blowers are not designed for this application.
- Where necessary (for example, if you have not fitted an acoustic enclosure), wear suitable ear defenders. The blower can be noisy during operation (refer to Section 2.4).
- During pressure operation, prevent accidental contact with the discharged (outlet) gas stream. This gas stream will be at high pressure and will be hot and cause burn injury.

1. Ensure that any isolation valves in the blower inlet and outlet pipelines are in the correct 'open' positions.
2. Check the oil-levels in the blower: refer to Section 5.3.
3. Engage your drive and transmission system to start the blower.

You can now use the blower as required in your application.

4.3 Shut-down

1. Disengage the drive and transmission system to stop the blower.
2. Wait until you can hear that the blower has stopped before you close any isolation valves in the blower inlet and outlet pipelines.

5. MAINTENANCE

5.1 Safety information

WARNING

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

- A suitably trained and supervised technician must maintain the blower. Obey your 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.
- Allow the blower to cool to a safe temperature before you start maintenance work.
- Isolate the blower from the drive system so that it cannot be operated accidentally.
- Recheck the blower rotation direction (see Section 3.7) if the drive and transmission system has been disconnected and then reconnected.
- Take care to protect the inlet/outlet port sealing faces from damage.
- Do not re-use seals/gaskets if they are damaged.
- Check the tightness of the system connections after maintenance work is complete if you have connected or disconnected any suction inlet or discharge (outlet)/injection joints. The tightness of the system connections must be in accordance with the requirements of your applications.

5.2 Maintenance plan

The plan in Table 14 details the maintenance operations required to maintain the blower in normal operation. Instructions for each operation are given in the section shown.

Note that:

- If you use a mineral oil in the blower: you must change the oil every 2000 hours of operation or once a year.
- If you use a synthetic oil in the blower, you must change the oil every 12 months.
- If you use a Hibon Lube in the blower and you operate the blower with a discharge (outlet) temperature above 120 °C (248 °F), you must change the oil every 12 months.
- If you use a Hibon Lube in the blower and you operate the blower with a discharge (outlet) temperature below 120 °C (248 °F), you must change the oil every two years.

When you maintain the blower, use **Ingersoll Rand** spares: refer to Section 7.3.

Operation	Frequency	Refer to Section
Check the oil levels	Weekly	5.3
Inspect the system installation	Monthly	5.4
Change the oil	See Section 5.2	5.5
Overhaul the blower	4 yearly	5.6

After blower installation, the oil must be changed after 200 hours of running.

Table 14 – Maintenance plan

5.3 Check the oil levels

CAUTION

Ensure that you use the correct grade of oil and that the oil levels in the blower are correct. If you do not, the blower will probably be damaged during operation, or its performance may be affected.

• 5.3.1 Inspect the oil-level sight-glasses

1. Refer to Figure 1. Look at the oil-level sight-glass (6) on the drive head plate (4):
 - If the sight-glass is dirty, use a suitable cloth to wipe it clean.
 - If the sight-glass is damaged (that is, scratched, cracked or corroded), or if there are signs of oil leakage from the sight-glass, you must replace it: contact your supplier or **Ingersoll Rand**.
2. Look at the oil-level sight-glass (11) on the non-drive head plate (12):
 - If the sight-glass is dirty, use a suitable cloth to wipe it clean.
 - If the sight-glass is damaged (that is, scratched, cracked or corroded), or if there are signs of oil leakage from the sight-glass, you must replace it: contact your supplier or **Ingersoll Rand**.

• 5.3.2 Drive Head Plate

1. Refer to Figure 1, detail B. Look at the oil level in the sight-glass (6) on the drive head plate (4):
 - If the oil level is below the minimum level mark (19), continue at Step 2 to add more oil.
 - If the oil level is above the maximum level mark (18), drain oil from the blower until the level is correct: refer to Section 5.5.
2. Refer to Figure 1. Remove the oil filler-plug (16) from the filler port on the top of the drive head plate (4).
3. For new oil of the correct type (see Section 2.6) through the filler port and into the head plate until the oil-level reaches the maximum level mark (detail B, item 18). If the oil level goes above the maximum level mark (18), drain oil from the blower until the level is correct: refer to Section 5.5.
4. Refit the oil filler-plug (16) to the filler port on the top of the drive head plate (4).

5. MAINTENANCE

5.3.3 Non-drive Head Plate

1. Refer to Figure 1, detail B. Look at the oil level in the sight-glass (11) on the non-drive head plate (12):
 - If the oil level is below the minimum level mark (19), continue at Step 2 to add more oil.
 - If the oil level is above the maximum level mark (18), drain oil from the blower until the level is correct: refer to Section 5.5.
2. Refer to Figure 1. Remove the oil filler-plug (17) from the filler port on the top of the non-drive head plate (12).
3. For new oil of the correct type (see Section 2.6) through the filler port and into the head plate until the oil-level reaches the maximum level mark (detail B, item 18). If the oil level goes above the maximum level mark (18), drain oil from the blower until the level is correct: refer to Section 5.5.
4. Refit the oil filler-plug (17) to the filler port on the top of the non-drive head plate (12).

5.4 Inspect the system installation

Note: Where possible, we recommend that you investigate the cause of any damage or corrosion, and implement corrective measures to prevent any future damage of components.

Use the following procedure to inspect the system connections:

1. Inspect all of the system pipelines and connections and check that they are not damaged or corroded and that they are sufficiently leak-tight. Repair or replace any damaged or corroded component and seal any leak found.
2. Inspect the drive/transmission system and adjust, repair or replace as necessary: refer to the manufacturer's instructions supplied with your drive/transmission system.

5.5 Change the oil

CAUTION

Ensure that you use the correct grade of oil and that the oil levels in the blower are correct. If you do not, the blower will probably be damaged during operation, or its performance may be affected.

WARNING

You must take care about the oil temperature. Please wait at least two hours after the last running of the blower to empty the oil casings to let the oil cool -down.

5.5.1 Drive Head Plate

1. Refer to Figure 1. Remove the oil filler-plug (16) from the filler port on the top of the drive head plate (4).
2. Refer to Figure 1. Place a suitable container under the drain plug (7) on the drive head plate. The container must have a maximum capacity as specified in Table 7 or Table 8.
3. Remove the oil drain plug (7) from the end cover, and allow the oil to drain from the end cover into the container.
4. Refit the oil drain plug (7) to the drive head plate (4).
5. Dispose of the oil: refer to Section 6.2.
6. Fill the drive end cover with new oil of the correct type and grade: refer to Section 5.3.1.

5.5.2 Non-drive Head Plate

1. Refer to Figure 1. Remove the oil filler-plug (17) from the filler port on the top of the non-drive head plate (12).
2. Refer to Figure 1. Place a suitable container under the drain plug (10) on the non-drive head plate. The container must have a maximum capacity as specified in Table 7 or Table 8.
3. Remove the oil drain plug (10) from the end cover, and allow the oil to drain from the head plate into the container.
4. Refit the oil drain plug (10) to the non-drive head plate (12).
5. Dispose of the oil: refer to Section 6.2.
6. Fill the non-drive end cover with new oil of the correct type and grade: refer to Section 5.3.2.

5.6 Overhaul the blower

The blower must be regularly overhauled, as specified in Table 14. As part of the overhaul, the bearings in the blower must be replaced.

We recommend that you contact your supplier or **Ingersoll Rand** to arrange for an overhaul of the blower.

5. MAINTENANCE

5.7 Fault finding

A guide to fault conditions and their possible causes is provided in Table 15 to assist you in basic fault finding.

If you are unable to rectify a fault when you use this guide, call your supplier or your nearest **Ingersoll Rand** Service Centre for advice.

Note: If you have been approved to carry out strip-down, repair and reassembly of your blower, refer to the Service Manual supplied separately for detailed procedures.

Symptom	Check	Actions
The blower will not start, or seizes during operation.	<p>Are the rotors touching ?</p> <p>Has the blower been overloaded ?</p> <p>Has debris or foreign material entered the blower ?</p> <p>Is the drive/transmission system faulty ?</p>	<p>Check the rotor clearances and adjust as necessary.</p> <p>Check the required operating conditions and specified performance of the blower (see Section 2).</p> <p>Strip down, clean and repair the blower as necessary.</p> <p>Check that your drive and transmission system is operating correctly, and that it is correctly fitted to the blower: refer to Section 3.6 and to the manufacturer's instructions.</p>
The blower is noisy during operation.	<p>Are the rotors touching ?</p> <p>Are the gear and/or bearing clearances incorrect ?</p> <p>Are the rotors unbalanced ?</p>	<p>Check the rotor clearances and adjust as necessary.</p> <p>Check the clearances and adjust as necessary.</p> <p>Clean the rotors and rotor housing, then check the rotor clearances and adjust as necessary.</p>
The blower overheats.	<p>Is the inlet filter blocked ?</p> <p>Is the differential pressure across the blower too high ?</p> <p>Is an oil level too high, or has the incorrect grade of oil been used ?</p> <p>Are the rotor or rotor/casing clearances incorrect ?</p> <p>Is there inadequate clearance around the blower ?</p>	<p>Clean or replace the filter.</p> <p>Check that your system design complies with the requirements of Section 3.2, and that the blower is suitable for use in your application.</p> <p>Check the oil levels (refer to Section 5.3) or drain the blower and fill with the correct grade of oil (refer to Section 5.5).</p> <p>Contact your supplier or Ingersoll Rand for advice.</p> <p>Ensure that there is sufficient clearance around the blower to provide for free circulation of ambient cooling air.</p>
The blower overheats (continued).	<p>Does your enclosure provide inadequate cooling ?</p>	<p>If you have fitted an acoustic enclosure around the blower:</p> <p>Ensure that the enclosure cooling vents/louvres are unobstructed.</p> <p>Ensure that the enclosure cooling/extraction fan is operating correctly.</p> <p>Ensure that there is sufficient clearance for cooling air flow around the blower: refer to Section 3.2.</p>
There is oil in the gas stream from the blower.	<p>Is an oil level too high ?</p> <p>Have the sealing rings failed ?</p>	<p>Check the oil levels and if necessary drain oil from the blower: refer to Section 5.3.</p> <p>Contact your supplier or Ingersoll Rand for advice.</p>

5. MAINTENANCE

Symptom	Check	Actions
There is a low volume flow through the blower.	<p>Is the inlet filter blocked ?</p> <p>Is the blower worn or damaged ?</p> <p>Is the blower unsuitable for your application ?</p>	<p>Clean or replace the filter.</p> <p>Contact your supplier or Ingersoll Rand for advice.</p> <p>If necessary, redesign your system to comply with the capabilities of the blower, or fit a different blower which provides the necessary performance.</p>
Absorbed power is too high.	<p>Is the blower unsuitable for your application ?</p> <p>Is the inlet filter blocked ?</p>	<p>If necessary, redesign your system to comply with the capabilities of the blower, or fit a different blower which provides the necessary performance.</p> <p>Clean or replace the filter.</p>
The blower rotates in reverse direction when you stop it.	<p>Is the nonreturn valve defective ?</p>	<p>If you have fitted a nonreturn valve in your outlet pipeline, check that the nonreturn valve operates correctly. Repair or replace as necessary.</p>
-	-	<p>If you have made the checks/actions as described above and you still cannot identify the cause of a fault, or if you cannot rectify a fault, contact your supplier or Ingersoll Rand for advice.</p>

Table 15 – Fault finding

6. STORAGE AND DISPOSAL

6.1 Storage

6.1.1 Preparation

WARNING

Use suitable lifting equipment to move the blower. If you do not, you can injure yourself or damage the blower. Refer to Section 2.2 for the mass of the blower.

1. Shut down the blower as described in Section 4.3.
2. If necessary, disconnect the drive and transmission system from the blower drive shaft: refer to the manufacturer's instructions supplied with your transmission system.
3. If necessary, purge your system and the blower with dry air, and disconnect the blower from your system pipelines.
4. Place and secure protective covers over the blower inlet and outlet connections.
5. Use suitable lifting equipment to move the blower to its storage area.
6. If you will store the blower for longer than six weeks, refer to the requirements in Section 6.1.2.
7. Store the blower in clean, dry conditions in a well-ventilated place that is free from vibration or shocks.

6.1.2 Long-term storage

WARNING

When driveshaft of the blower (refer item 5 Figure 1) is manually rotated, keep away from flanges (items 2 and 3 figure 1) your fingers or other parts of your body or clothing may get trapped, and you may be injured by the rotating components.

WARNING

Use suitable lifting equipment to move the blower. If you do not, you can injure yourself or damage the blower. Refer to Section 2.2 for the mass of the blower.

If the blower is to be stored for longer than six weeks:

1. Drain the oil from the drive end and non-drive end covers: refer to Section 5.5.
2. Fill the drive end and non-drive end covers with a suitable protective oil (see Table 16): use the method in Section 5.3.
3. Turn the blower drive shaft by hand through three or four revolutions, to turn the blower and prevent seizure.
4. Spray a suitable protective oil (see Table 16) through the inlet and into the blower.
5. If required, spray a suitable protective oil (see Table 16) on the outer surfaces of the blower, to inhibit corrosion.

During storage, every 6 weeks or less, turn the blower drive shaft by hand through a quarter of a revolution, to turn the blower and prevent seizure or degradation of the bearings.

External components	Internal components
Rust Ban 324 (Esso)	Mobilarma 523/524 (Mobil)
V Product 9703 (Shell)	Esso Lub MZ 20E/20 (Esso)
Mobilarma 778 (Mobil)	Ensis Motor Oil 20 (Shell)

Table 16 – Suitable protective oils

When required for use after storage:

1. Drain the protective oil from the drive end and non-drive end covers, then fill the end covers with new oil: refer to Section 5.5.
2. Use a suitable cleaning solution (such as alcohol or white spirit) to clean the rotors:
 - Moisten a suitable clean, lint-free cloth with the cleaning solution.
 - Clean the rotors which are visible through the inlet port.
 - Turn the blower drive shaft as necessary to access the other rotors.
3. Prepare and install the blower as described in Section 3.

6.2 Disposal

WARNING

Ensure that you wear the appropriate Personal Protective Equipment (PPE) when you handle contaminated oil or contaminated components.

Safely dispose of the blower, used oil, cleaning materials, and any components in accordance with all local and national safety and environmental requirements.

Take particular care with the following:

- Used oil that has been contaminated with dangerous substances.
- Components that have been contaminated with dangerous substances.

7. SERVICE AND SPARES

7.1 Introduction

Ingersoll Rand products, spares and accessories are available from **Ingersoll Rand** companies in Belgium, Brazil, China, France, Germany, Israel, Italy, Japan, Korea, Singapore, United Kingdom, U.S.A and a world-wide network of distributors. The majority of these centres employ Service Engineers who have undergone comprehensive **Ingersoll Rand** training courses.

Order spare parts and accessories from your nearest **Ingersoll Rand** company or distributor. When you order, state for each part required:

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

7.3 Spares and repair kits

The spares and repair kits available for the blowers are shown in Tables 17 and 18.

Spare	Item Number
Hibon Lube: 2 litres (0.53 US gal)	LUB0000002
Hibon Lube: 5 litres (1.32 US gal)	LUB0000005

Table 17 – Spares Item Numbers

Blower	Standard maintenance kit		Piston Ring Holder Kit		Gears	
	Hibon number	CCN	Hibon number	CCN	Hibon number	CCN
NX 2	R014210100	47002407	R014092100	47002449	P148502042	47004692
NX 3	R014210100	47002407	R014092100	47002449	P148502042	47004692
NX 5	R014210100	47002407	R014092100	47002449	P148502042	47004692
NX 8	R015210100	47002258	R015092100	47002266	P158502042	47004957
NX 12	R015210100	47002258	R015092100	47002266	P158502042	47004957
NX 18	R016210100	47003348	R016092100	47003355	P168502042	47004700
NX 26	R016210100	47003348	R016092100	47003355	P168502042	47004700

Table 18 – Repair Kits Item Numbers



Authorized Hibon Distributor, Service & Repair Facility
 120 – 10293 276 ST, Acheson, Alberta, Canada T7X 6A5
 T: 780.962.1827 F: 780.962.1830 E: sales@fraserwoods.ca
www.fraserwoods.ca