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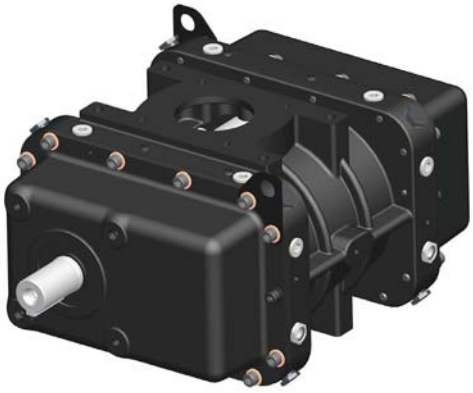
Revision B
January 2014

PTB Blowers

PTB 8, PTB 13



Installation, Operation and Maintenance

- EN Installation, Operation and Maintenance
- ES Instalación, operación y mantenimiento
- FR Installation, fonctionnement et entretien
- DE Installation, Betrieb und Wartung
- IT Installazione, funzionamento e manutenzione

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Ingersoll Rand

FRASERWOODS FABRICATION & MACHINING LTD.
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

CE

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
PTB 8	From 15510395 to 15519999
PTB 13	From 15520288 to 15529999

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 concue, 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 motive des autorités nationales, les informations appropriées concernant la Presque-machine à laquelle se réfère cette déclaration.

Wasquehal, 01st July 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.

CONTENTS

1. INTRODUCTION

1.1 Scope and definitions

This manual provides installation, operation and maintenance instructions for the **Ingersoll Rand** PTB 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 PTB 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 PTB 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 vapors 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

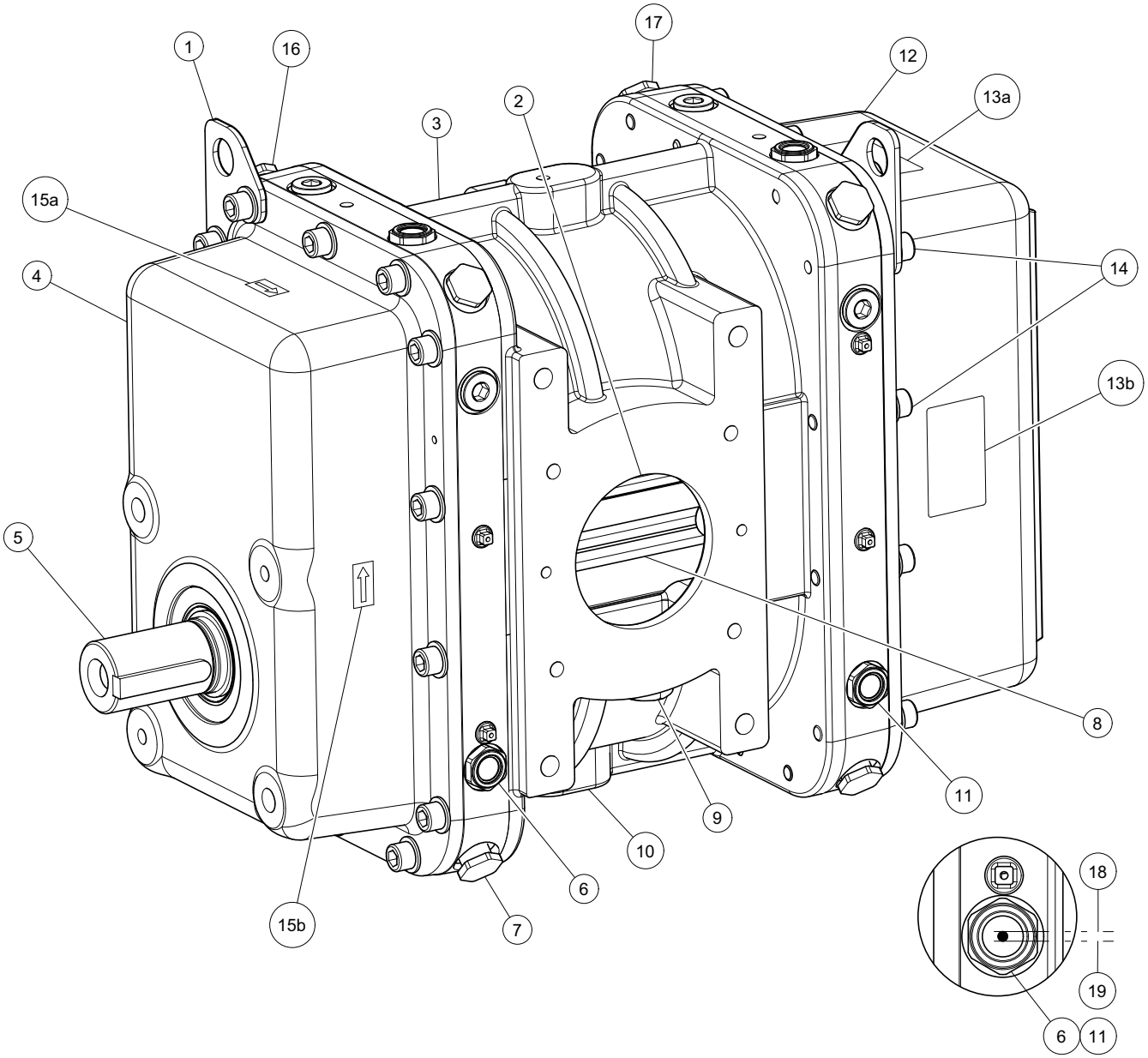

Figure 1 – Components of the PTB blower

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

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	
Mass	**PTB 8**	**PTB 13**
	190 kg	230 kg
	419 lb	507 lb

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.

"Maximum differential pressure (inlet/outlet)"	1200 mbar, 1.2 x 105 Pa, 900 Torr (continuous operation)
	1400 mbar, 1.4 x 105 Pa, 1050 Torr (intermittent operation)
Pressure performance	See table 4
Rotational speed range	See table 4
Nominal shaft power	See table 4
"Maximum absorbed shaft power (pressure operation)"	70.2 kW / 94.1 hp (PTB 8)
	85.9 kW / 115.2 hp (PTB 13)

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											
		500 mbar		600 mbar		800 mbar		1000 mbar		1200 mbar		1400 mbar**	
		5 x 10^4 Pa		6 x 10^4 Pa		8 x 10^4 Pa		10 x 10^4 Pa		12 x 10^4 Pa		14 x 10^4 Pa	
		m^3/h	kW	m^3/h	kW	m^3/h	kW	m^3/h	kW	m^3/h	kW	m^3/h	kW
PTB 8 (1702 m^3/h)*	1800	573	13.3	552	15.9	517	21.2	478	26.5	436	31.8	-	-
	2200	758	16.2	737	19.5	704	25.9	668	32.4	628	39.0	589	45.4
	2600	943	19.3	923	23.1	891	30.7	857	38.4	819	46.0	782	53.7
	3000	1127	21.6	1108	26.5	1078	35.4	1046	44.3	1011	53.1	976	61.9
	3400	1311	25.1	1294	30.1	1265	40.1	1236	50.2	1202	60.2	1169	70.2
PTB 13 (2723 m^3/h)*	1800	964	21.3	945	25.5	902	34.0	867	42.5	826	51.0	-	-
	2200	1227	25.9	1213	31.1	1172	41.5	1138	51.9	1099	62.3	1074	72.7
	2600	1494	30.7	1481	36.8	1441	49.1	1409	61.4	1373	73.6	1350	85.9
	3000	1764	35.4	1749	42.5	1710	56.6	1680	70.8	1647	85.0	-	-
	3400	2033	40.1	2017	48.1	1980	64.2	1951	80.2	-	-	-	-

Blower	"rpm/ r.min^{-1}"	Throughput (cfm) and absorbed power (h.p.) at given pressure at 14,7 psi and 68°F											
		7.25 psi		8.7 psi		11.6 psi		14.5 psi		17.4 psi		20.3 psi**	
		CFM	hp	CFM	hp	CFM	hp	CFM	hp	CFM	hp	CFM	hp
PTB 8 (1002 CFM)*	1800	337	17.8	325	21.3	305	28.5	282	35.6	257	42.7	-	-
	2200	446	21.7	434	26.1	414	34.7	393	43.5	370	52.3	347	60.9
	2600	555	25.8	543	30.9	524	41.2	504	51.4	482	61.7	460	71.9
	3000	663	29.0	652	35.6	634	47.5	616	59.4	595	71.3	574	83.0
	3400	772	33.6	761	40.4	744	53.8	727	67.3	707	80.7	688	94.1
PTB 13 (1603 CFM)*	1800	567	28.5	556	34.2	531	45.6	510	57.0	486	68.4	-	-
	2200	722	34.7	714	41.7	690	55.7	670	69.6	647	83.5	632	97.5
	2600	879	41.2	872	49.3	848	65.8	829	82.3	808	98.7	794	115.2
	3000	1038	47.5	1030	57.0	1007	75.9	989	94.9	969	114.0	-	-
	3400	1196	53.8	1187	64.5	1165	86.1	1148	107.5	-	-	-	-

* Volume displacement at maximum speed

** For intermittent use only (15 min / hour)

Table 4 – Pressure performance data

2. TECHNICAL 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.

	PTB 8	PTB 13
Noise level	100	104
Vibration level	5,5 $mm.s^{-2}$	5,5 $mm.s^{-2}$
	0,22 $inch.s^{-2}$	0,22 $inch.s^{-2}$

Table 5 – Noise and vibration 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)	8.09×10^{-4} $m^2 s^{-1}$ (809 cSt)	6.04×10^{-4} $m^2 s^{-1}$ (640 cSt)
at 40 °C (104 °F)	2.2×10^{-4} $m^2 s^{-1}$ (220 cSt)	2.18×10^{-4} $m^2 s^{-1}$ (218 cSt)
at 100 °C (212 °F)	1.8×10^{-5} $m^2 s^{-1}$ (18 cSt)	2.7×10^{-5} $m^2 s^{-1}$ (27 cSt)
Mean viscosity index	93	149
Recommended oil	Hibon Lub	Contact factory

Table 6 – Lubricating oil specifications

	PTB 8	PTB 13
Drive end cover	1,50 liters	1,50 liters
	0,40 US gal	0,40 US gal
Non-drive end cover	2,10 liters	2,10 liters
	0,55 US gal	0,55 US gal

Table 7 – Left and Right Hand blower oil capacities

	PTB 8	PTB 13
Drive end cover	0,9 liters	0,9 liters
	0,24 US gal	0,24 US gal
Non-drive end cover	1,30 liters	1,30 liters
	0,34 US gal	0,34 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
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

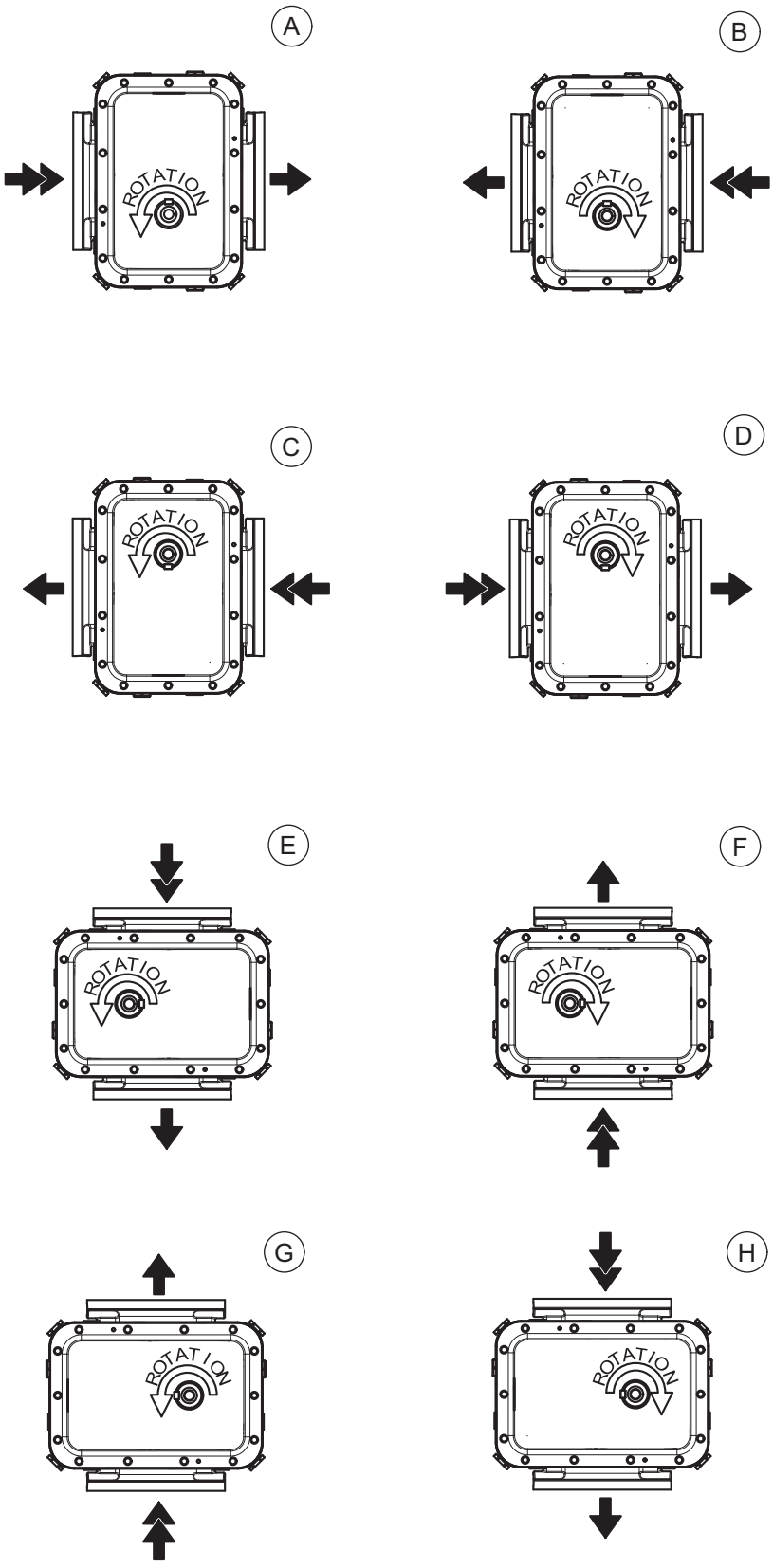

Figure 2 – Ordering configurations

Inlet gas stream

Discharge (outlet) Gas stream

Note: *Refer to Table 10 for the item numbers of blowers with the configurations shown in the figure*

2. TECHNICAL DATA

Blower model	Shaft position	Rotation direction	Standard blowers		
			Item Number		"Configuration: See Figure 2"
			Hibon Number	CCN	
PTB 8	Bottom	Anticlockwise	F015510112	47007596	A
	Bottom	Clockwise			B
	Top	Anticlockwise	F015510122	47007604	C
	Top	Clockwise			D
	Left	Anticlockwise	F015510102	47007588	E
	Left	Clockwise			F
	Right	Anticlockwise	F015510132	47007612	G
	Right	Clockwise			H
PTB 13	Bottom	Anticlockwise	F015520112	47007638	A
	Bottom	Clockwise			B
	Top	Anticlockwise	F015520122	47007646	C
	Top	Clockwise			D
	Left	Anticlockwise	F015520102	47007620	E
	Left	Clockwise			F
	Right	Anticlockwise	F015520132	47007653	G
	Right	Clockwise			H

Table 10 - Item Numbers

2. TECHNICAL DATA

2.8 Connections

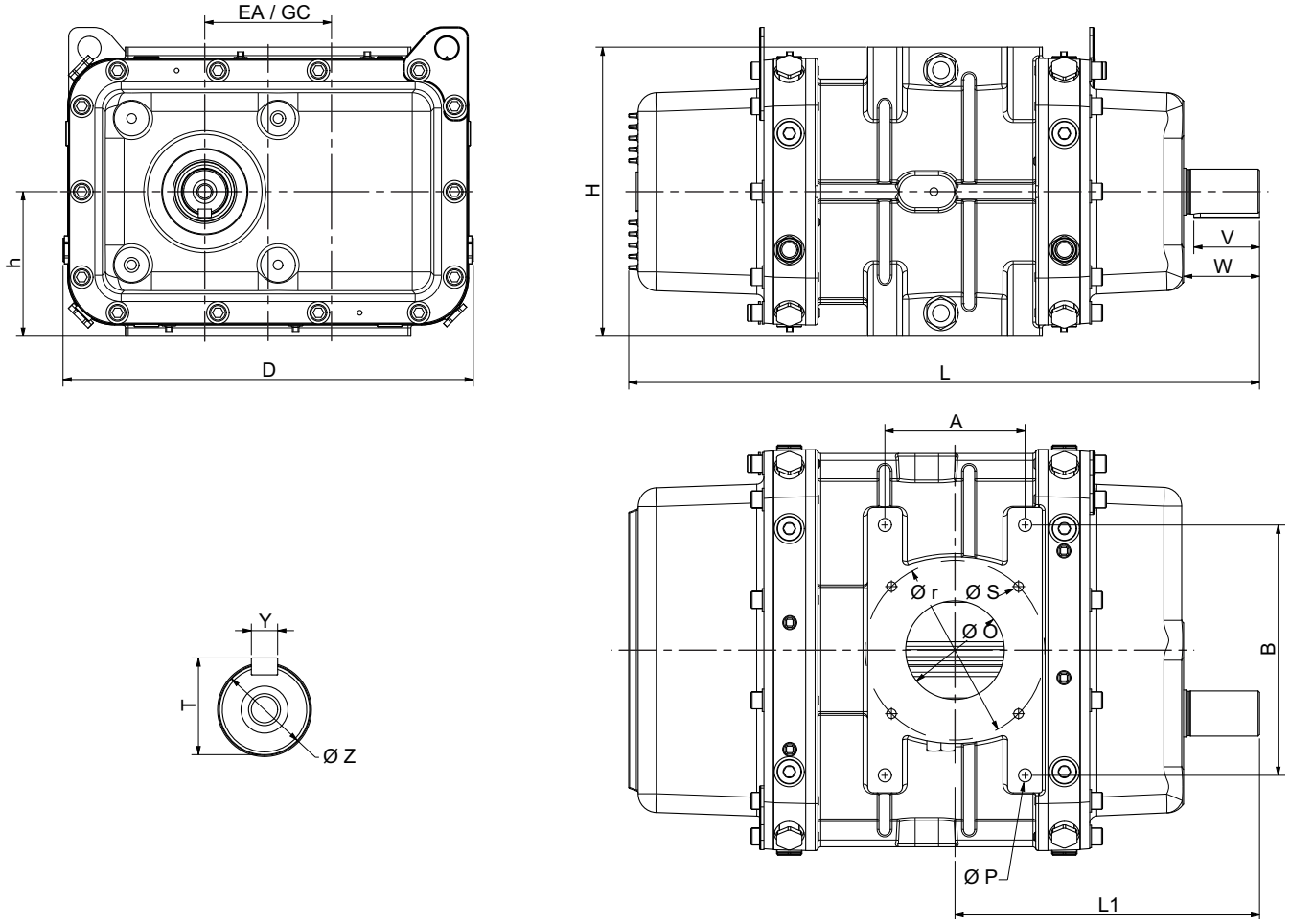

Figure 3 - Left and Right Hand blower dimensions

Key	Dimensions			
	PTB 8		PTB 13	
	mm	inch	mm	inch
A	149.35	5.88	149.35	5.88
B	266.7	10.50	266.7	10.50
D	437	17.20	437	17.20
EA/GC	135	5.32	135	5.32
H	308	12.13	308	12.13
h	154	6.06	154	6.06
L	672	26.46	822	32.36
L1	324	12.76	341.4	13.44
T	51.5	2.03	51.5	2.03
V	70	2.76	70	2.76
W	81	3.19	81	3.19
Y	14	0.55	14	0.55
ØZ*	48	1.89	48	1.89
Ør	191.5	7.54	191.5	7.54
ØO	105	4.13	105	4.13
ØP	4 x M16	4 x M16	4 x M16	4 x M16
ØS	4 x M12	4 x M12	4 x M12	4 x M12

* Fitting tolerance range : m6

Table 11 - Left and Right hand blower dimensions

2. TECHNICAL DATA

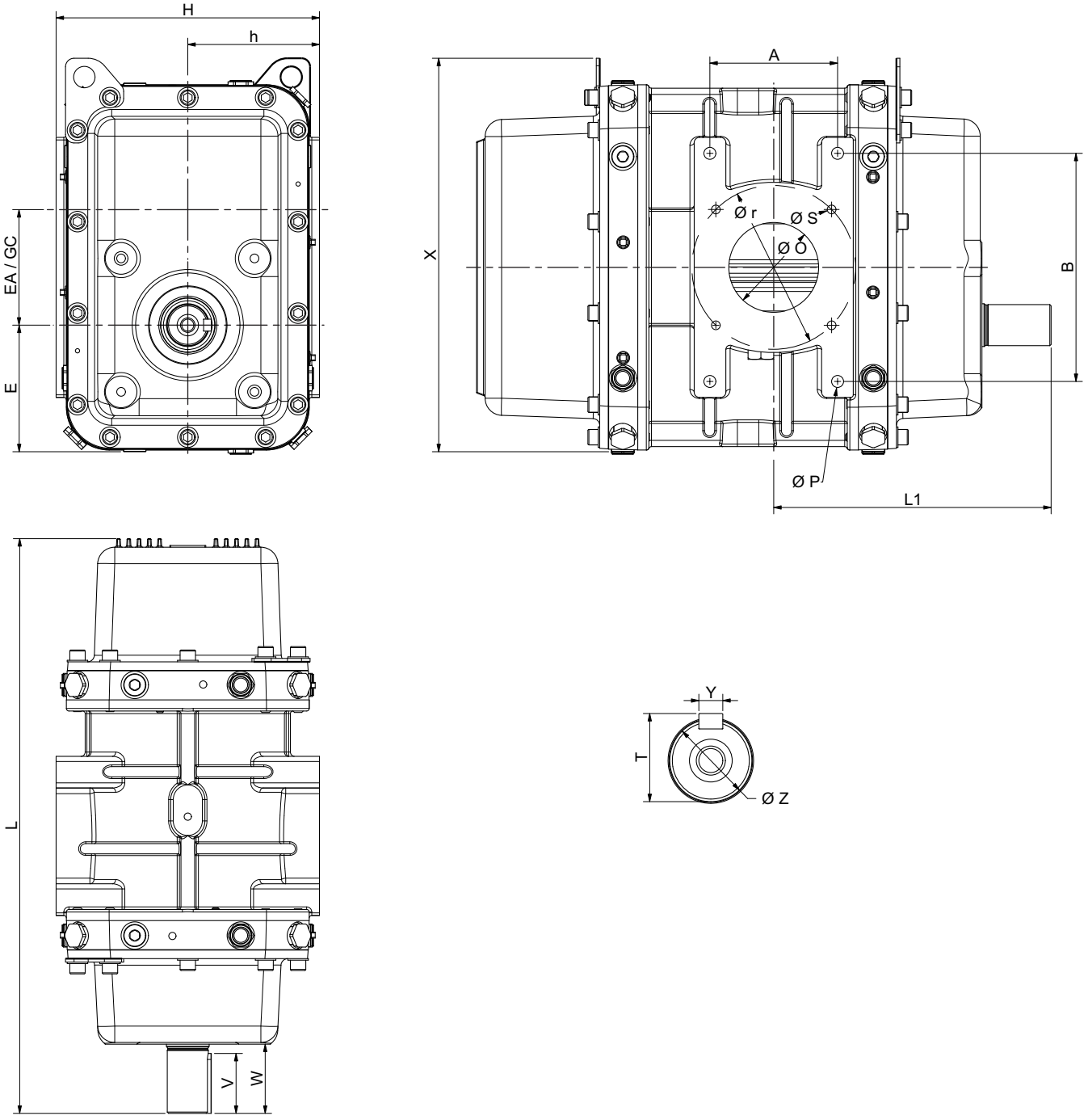

Figure 4 -Top and Bottom Shaft blower dimensions

2. TECHNICAL DATA

Key	Dimensions			
	PTB 8		PTB 13	
	mm	inch	mm	inch
A	149.35	5.88	149.35	5.88
B	266.7	10.50	266.7	10.50
E	148	5.83	148	5.83
EA/GC	135	5.32	135	5.32
H	308	12.13	308	12.13
h	154	6.06	154	6.06
L	672	26.46	822	32.36
L1	324	12.76	341.4	13.44
T	51.5	2.03	51.5	2.03
V	70	2.76	70	2.76
W	81	3.19	81	3.19
X	460	18.11	460	18.11
Y	14	0.55	14	0.55
ØZ*	48	1.89	48	1.89
Ør	191.5	7.54	191.5	7.54
ØO	105	4.13	105	4.13
ØP	4 x M16	4 x M16	4 x M16	4 x M16
ØS	4 x M12	4 x M12	4 x M12	4 x M12

* 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 x 10-5 inch) in size and must not contain more than 200 mg/m3 (1.37 x 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 minimize 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 inch.ft $^{-1}$).

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

1. 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.
2. Disconnect your lifting equipment from the blower. If required, remove the lifting-bolts from the blower.
3. Fit suitable bolts through the fixing holes in the mounting feet (Figure 1, items 9), to secure the blower in position.
4. Clean the rotors: refer to Step 1 of Section 3.4.2.
5. Use a suitable gasket/seal* to connect your inlet pipeline to the blower inlet (Figure 1, item 2).
6. 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.

1. Drain the protective oil from the drive end and non-drive end covers: refer to Section 5.5.
2. Refer to Figure 1. Fill the drive end cover (4) with oil: refer to Section 5.5.1.
3. 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 x 10^4 Pa 4,35 psi"	"400 mbar 4 x 10^4 Pa 5,8 psi"	"500 mbar 5 x 10^4 Pa 7,25 psi"	"600 mbar 6 x 10^4 Pa 8,7 psi"	"700 mbar 7 x 10^4 Pa 10,15 psi"	"800 mbar 8 x 10^4 Pa 11,6 psi"	"900 mbar 9 x 10^4 Pa 13,05 psi"	"1000 mbar 1 x 10^5 Pa 14,5 psi"	"1100 mbar 1,1 x 10^5 Pa 15,95 psi"	"1200 mbar 1,2 x 10^5 Pa 17,4 psi"
PTB 8	140 (5.51)	140 (5.51)	150 (5.90)	150 (5.90)	160 (6.30)	170 (6.69)	180 (7.09)	180 (7.09)	200 (7.87)	200 (7.87)
PTB 13	150 (5.90)	170 (6.69)	180 (7.09)	180 (7.09)	200 (7.87)	200 (7.87)	212 (8.35)	212 (8.35)	224 (8.82)	224 (8.82)

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 corne 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.

4.1 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 can cause burn injury.

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.

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

⚠ 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 nondrive 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.	Are the rotors touching ?	Check the rotor clearances and adjust as necessary.
	Has the blower been overloaded ?	Check the required operating conditions and specified performance of the blower (see Section 2).
	Has debris or foreign material entered the blower ?	Strip down, clean and repair the blower as necessary.
	Is the drive/transmission system faulty ?	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.
The blower is noisy during operation.	Are the rotors touching ?	Check the rotor clearances and adjust as necessary.
	Are the gear and/or bearing clearances incorrect ?	Check the clearances and adjust as necessary.
	Are the rotors unbalanced ?	Clean the rotors and rotor housing, then check the rotor clearances and adjust as necessary.
The blower overheats.	Is the inlet filter blocked ?	Clean or replace the filter.
	Is the differential pressure across the blower too high ?	Check that your system design complies with the requirements of Section 3.2, and that the blower is suitable for use in your application.
	Is an oil level too high, or has the incorrect grade of oil been used ?	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).
	Are the rotor or rotor/casing clearances incorrect ?	Contact your supplier or **Ingersoll Rand** for advice.
	Is there inadequate clearance around the blower ?	Ensure that there is sufficient clearance around the blower to provide for free circulation of ambient cooling air.
The blower overheats (continued).	Does your enclosure provide inadequate cooling ?	If you have fitted an acoustic enclosure around the blower:
		Ensure that the enclosure cooling vents/ louvers are unobstructed.
		Ensure that the enclosure cooling/extraction fan is operating correctly.
		Ensure that there is sufficient clearance for cooling air flow around the blower: refer to Section 3.2.
There is oil in the gas stream from the blower.	Is an oil level too high ?	Check the oil levels and if necessary drain oil from the blower: refer to Section 5.3.
	Have the sealing rings failed ?	Contact your supplier or **Ingersoll Rand** for advice.

5. MAINTENANCE

Symptom	Check	Actions
There is a low volume flow through the blower.	Is the inlet filter blocked ?	Clean or replace the filter.
	Is the blower worn or damaged ?	Contact your supplier or **Ingersoll Rand** for advice.
	Is the blower unsuitable for your application ?	If necessary, redesign your system to comply with the capabilities of the blower, or fit a different blower which provides the necessary performance.
Absorbed power is too high.	Is the blower unsuitable for your application ?	If necessary, redesign your system to comply with the capabilities of the blower, or fit a different blower which provides the necessary performance.
	Is the inlet filter blocked ?	Clean or replace the filter.
The blower rotates in reverse direction when you stop it.	Is the nonreturn valve defective ?	If you have fitted a nonreturn valve in your outlet pipeline, check that the nonreturn valve operates correctly. Repair or replace as necessary.
-	-	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.

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 centers 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.

7.2 Service

Ingersoll Rand products are supported by a world-wide network of **Ingersoll Rand** Service Centers. Each Service Centre 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.

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

For more information about service options, contact your nearest Service Centre or other **Ingersoll Rand** company.

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 liters (0.53 US gal)	LUB0000002
Hibon Lube: 5 liters (1.32 US gal)	LUB0000005

Table 17 – Spares Item Numbers

Blower	Standard maintenance kit		Piston Ring Holder Kit		Gears		Fuse plugs	
	Hibon number	CCN	Hibon number	CCN	Hibon number	CCN	Hibon number	CCN
PTB 8	R015210100	47002258	R015092100	47002266	P158502042	47004957	R015110100	47007661
PTB 13								

Table 18 – Repair Kits Item Numbers

RETURN OF Ingersoll Rand EQUIPMENT - PROCEDURE

Introduction

Before you return your equipment you must warn your supplier if the substances you used (and produced) in the equipment can be dangerous. You must do this to comply with health and safety at work laws.

You must complete the Declaration on the next page and send it to your supplier before you dispatch the equipment. If you do not, your supplier will assume that the equipment is dangerous and he will refuse to accept it. If the Declaration is not completed correctly, there may be a delay in processing your equipment.

Guidelines

Take note of the following guidelines:

- Your equipment is '**uncontaminated**' if it has not been used or if it has only been used with substances that are not dangerous. Your equipment is '**contaminated**' if it has been used with any dangerous substances.
- If your equipment has been used with radioactive substances, you must decontaminate it before you return it to your supplier. You must send independent proof of decontamination (for example a certificate of analysis) to your supplier with the Declaration (HS2). Phone your supplier for advice.
- We recommend that contaminated equipment is transported in vehicles where the driver does not share the same air space as the equipment.

PROCEDURE

Use the following procedure:

1. Contact your supplier and obtain a Return Authorization Number for your equipment.
2. Turn to the next page(s), photocopy and then complete the Declaration.
3. Remove all traces of dangerous gases: pass an inert gas through the equipment and any accessories which will be returned to your supplier. Drain all fluids and lubricants from the equipment and its accessories.
4. Disconnect all accessories from the equipment. Safely dispose of the filter elements from any oil mist filters.
5. Seal up all of the equipment's inlets and outlets (including those where accessories were attached). You may seal the inlets and outlets with blanking flanges or heavy gauge PVC tape.
6. Seal contaminated equipment in a thick polythene bag. If you do not have a polythene bag large enough to contain the equipment, you can use a thick polythene sheet.
7. If the equipment is large, strap the equipment and its accessories to a wooden pallet. Preferably, the pallet should be no larger than 510mm x 915mm (20" x 35"); contact your supplier if you cannot meet this requirement.
8. If the equipment is too small to be strapped to a pallet, pack it in a suitable strong box.
9. If the equipment is contaminated, label the pallet (or box) in accordance with laws covering the transport of dangerous substances.
10. Fax or email of the Declaration to your supplier. The Declaration must arrive before the equipment.
11. Give a copy of the Declaration to the carrier. You must tell the carrier if the equipment is contaminated.
12. Seal the original Declaration in a suitable envelope; attach the envelope securely to the outside of the equipment package. **WRITE YOUR RETURN Authorization NUMBER CLEARLY ON THE OUTSIDE OF THE ENVELOPE OR ON THE OUTSIDE OF THE EQUIPMENT PACKAGE.**

RETURN OF Ingersoll Rand EQUIPMENT - DECLARATION

	Return Authorization Number:

You must:

Know about all of the substances which have been used and produced in the equipment before you complete this Declaration

- Read the Procedure on the previous page before you attempt to complete this Declaration
- Contact your supplier to obtain a Return Authorization Number and to obtain advice if you have any questions
- Send this form to your supplier before you return your equipment

SECTION 1 : EQUIPMENT

Equipment model _____

Serial Number _____

Has the equipment been used, tested or operated?

Yes ☐ Go to Section 2 No ☐ Go to Section 4

FOR SEMICONDUCTOR APPLICATIONS ONLY :

Tool Reference Number _____

Process _____

Failure Date _____

Serial Number of Replacement Equipment _____

SECTION 2 : SUBSTANCES IN CONTACT WITH THE EQUIPMENT

Are any of the substances used or produced in the equipment

- Radioactive ☐
- Biologically active ☐
- Dangerous to human health and safety? ☐

If you have answered 'no' to all of these questions, go to Section 4.

Your supplier will not accept delivery of any equipment that is contaminated with radioactive substances, unless you:

- Decontaminate the equipment
- Provide proof of decontamination

YOU MUST CONTACT YOUR SUPPLIER FOR ADVICE BEFORE YOU RETURN SUCH EQUIPMENT

SECTION 3 : LIST OF SUBSTANCES IN CONTACT WITH THE EQUIPMENT

Substance name	Chemical symbol	Precautions required (for example, use protective gloves, etc.)	Action required after spillage or human contact
1.			
2.			
3.			
4.			
5.			
6.			

SECTION 4 : RETURN INFORMATION

Reason for return and symptoms of malfunction: _____

_____

If you have a warranty claim:

- Who did you buy the equipment from ? _____
- give the supplier's invoice number _____

SECTION 5 : DECLARATION

Print your name: _____ Print your job title: _____

Print your organization _____

Print your address _____

_____

Telephone number : ____ _____ Date of equipment delivery: _____

I have made reasonable enquiry and I have supplied accurate information in this Declaration. I have not withheld any information. I have followed the Return of Ingersoll Rand Equipment Procedure on the previous page.

Signed: _____ Date: _____

Ingersoll Rand

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FRASERWOODS
FABRICATION & MACHINING LTD.

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