

**PARTS LIST
OPERATING AND
SERVICE MANUAL**

Gardner
Denver

**RFW
150-260**

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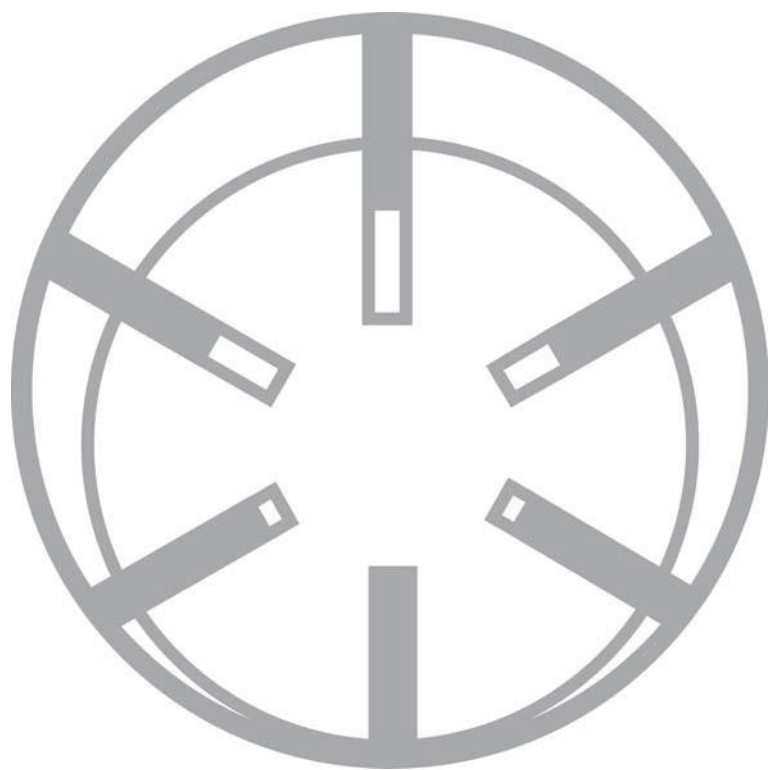


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Dear customer,

Your new rotary compressor/compressor and vacuum pump is the product of intensive development, based on decades of experience in the construction of rotary compressors and compressor and vacuum pumps. Our modern production methods, combined with the fulfillment of the highest quality standards and stringent testing, ensure reliability, high availability and a long service life for your appliance.

This machine naturally requires correct handling, especially under difficult operating conditions. Initial operation, normal operation and maintenance must therefore only be performed by properly trained and authorized personnel.

These operating instructions contain all necessary information, and they apply to all personnel who bear responsibility with regard to the appliance. Only thorough adherence to these instructions will ensure that the appliance works correctly over a long operating period. The complete operating instruction manual must therefore be kept near the appliance. We are sure you will appreciate that we are unable to accept any liability for damage caused by not adhering to these instructions.

Please ensure also that repairs are only carried out by authorized service centers, using original spare parts, as our guarantee otherwise loses its validity.

We wish you much satisfaction with the rotary compressor or compressor and vacuum pump that has been supplied to you by Gardner Denver. If your questions are not satisfactorily answered, we will be pleased to assist you at any time

Yours sincerely,

Gardner Denver Compressor Division

1800 Gardner Expressway

Quincy, Illinois 62305-9364

Phone: (217) 222-5400

Fax: (217) 221-8780

Or Visit: www.gardnerdenver.com



The first digit of illustration reference numbers refers to the chapter in which the illustration is to be found. Within each chapter the illustrations are numbered in their order of occurrence. The last digit of the illustration reference number refers to the item number within the illustration. Thus, for example, the reference (7.2/3) refers to the second illustration in chapter 7, item number 3.



Operational safety

Indicates possible danger to people. Operational safety demand and thus indicated instructions are to be followed exactly. All users must be familiar with the safety notes.



Environmental protection

Indicates, that attention must be paid to environmental protection regulations.



Attention

Indicates guidelines and regulations which prevent damage to the machine.



Information

Indicates information, which is of special importance to the user of the compressor.

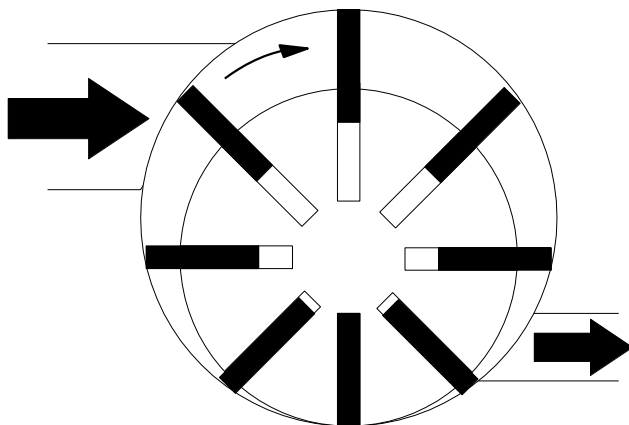
Operating Principle

Rotary vane compressor/vacuum pumps are multi-cell compressors that work on the displacement principle. They provide a constant, low-pulsation supply.

The single-phase machines have a cylindrical bored casing. The rotor, which is also cylindrical, is mounted eccentrically in the casing, forming a crescent-shaped working chamber. Moveable rotor vanes are fitted in the longitudinal grooves of the rotor; centrifugal force causes them to glide along the side of the casing when the rotor turns.

The vanes divide the crescent-shaped working chamber into cells of varying sizes. When the rotor turns, the cell volume on the suction side increases, and the resulting under pressure draws air into the cell, which is open to the suction nozzle. Upon further turning, the cell closes and the cell volume decreases. The enclosed air is thereby compressed and pushed out on the discharge side through the delivery nozzle.

In accordance with this operating principle, the machine works with polytropic compression. The achievable compression ratio P_{OUT}/P_{IN} is limited by the final compression temperature.



The operating principle of a rotary vane compressor or a compressor vacuum pump

Machine versions

The various versions differ in their method of lubrication and of cooling

- Oil-lubricated machines are fed by means of an automatic lube oil pump in the oil well. The rotor shaft directly drives the lubricating pump.
- Dry-running compressors for compressed air that is absolutely oil free operate with absolutely no oiling the compression chamber. The rolling bearings in these machines have permanent lubrication (permanent grease unit) or automatic lubricant input.
- In air-cooled machines, two ventilators on the rotor shaft feed the coolant air axially via the casing ribbing.
- Water-cooled machines have a water sleeve inside the casing. The coolant water circulates in a forced circulation system driven by a circulation pump.

Type code

	RF	W	260	DVR
Rotary vane compressor (vacuum pump) with fresh oil lubrication	= RF			
Casing cooled by				
- Air cooling		= L		
- Water cooling		= W		
Size of the compressor (of the vacuum pump)				
Additional designations				
- Compression operation		= D		
- Suction operation		= V		
- Clockwise operation		= R		



The RFW series includes, therefore, water-cooled and fresh-oil lubricated machines for operation as compressor/Vacuum pumps.

1. Technical data

- 1.1 Machine data
- 1.2 Dimensions
- 1.3 Lubrication
- 1.4 Water cooling
- 1.5 Drive methods

1.1 Machine data

The compressor/Vacuum pumps in the series RFW are water-cooled, fresh-oil lubricated rotary vane compressors.

On the rating plate of each machine you will find, in addition to the machine number, the most important data.

GARDNER DENVER®		305 North State Fair Blvd Sedalia, MO 65301 USA		Type		Medium	
Wittig®		Assembled in the USA		No.		Year	
Weight		[lbs]					
Discharge Press. (max. over pr.)	(psig)	Power	(hp)	Volume flow	(cfm)	Speed	(rpm)
Max. Suction under pressure	("Hg)	Power	(hp)	Volume flow	(cfm)	at	("Hg)

Figure 1-1: Rating Plate of RFW 150...260

Data for the type series

Rotary Compressor & Vacuum Pump	Type	RFW 150 DV	RFW 200 DV	RFW 260 DV
Nominal Vacuum	mbar _{abs}	400	400	400
Operating Vacuum for continuous operation ¹⁾	mbar _{abs}	200	200	200
Max. permitted vacuum (short-term, up to 15 min. per hour)	mbar _{abs}	100	100	100
Max. operating pressure (gauge)				
– in compressor operation ²⁾		2.0	2.0	2.0
– in compressor operation with V-belt drive ²⁾	bar _g	2.0	1.5	0.5
Max. Power requirement at max. operating pressure (gauge)	kw	50	70	92
Suction pressure 400 mbar _{abs}				
– Volume flow	m ³ /h	820	1180	1540
– Final overpressure	bar _g	0.0	0.0	0.0
– Power requirement at drive shaft	kW	23.0	34.0	41.0
Suction pressure 1000 mbar				
– Volume flow	m ³ /h	850	1210	1570
– Final overpressure	bar _g	0.5	0.5	0.5
– Power requirement at drive shaft	kW	30.0	45.0	58.0
Nominal speed	min ⁻¹	1500	1500	1500
Mass moment of inertia	kgm ²	0.52	0.73	0.95
Sound pressure level at a distance of 7m. at 400 mbar / 0.5 bar over pressure	db (A)	71/74	75/79	76/82
Weight with back pressure valve	kg	220	280	360



¹⁾ Protect with a ventilating valve!

²⁾ Protect with a safety valve!

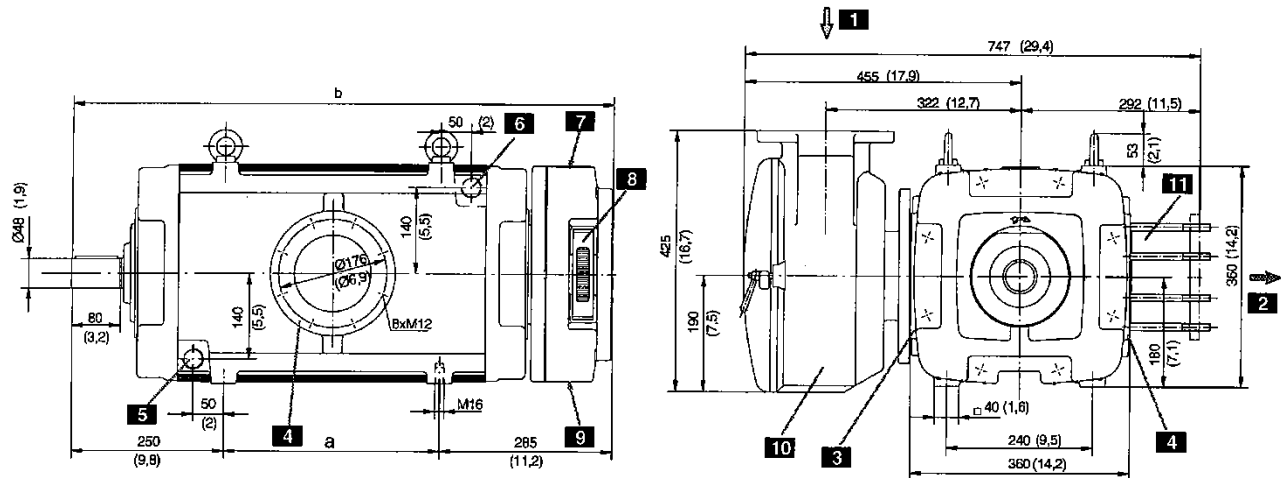
Data and illustrations accurate as of 01.04.1993. Subject to alterations

1. Technical data

1.2 Dimensions

Type	Unit	a	b
RFW 150	mm	200	735
RFW 200	mm	350	885
REF 260	mm	500	1035

Suction flange and pressure flange, connection for tanker flange according to DIN 28 461



- | | | |
|--|-----------------------------|---|
| 1. Suction end | 5. Cooling water inlet R1" | 10. Vacuum intake filter/suction filter point |
| 2. Discharge end | 6. Cooling water outlet R1" | 11. Non-return valve |
| 3. Suction flange according to DIN 28461 | 7. Oil filler point | |
| 4. Discharge flange according to DIN 28461 | 8. Oil level indicator | |
| | 9. Oil drain cock | |

Figure 1-2: Dimensions RFW 150 – RFW 260

1.3 Lubrication

Lubrication is carried out by the built-in fixed drive lube oil pump.

Lubricating oil specification: Single-grade oils of the following classes:

API:	CC/SF	CD/SF
MIL-L:	2104 B	2104 C

See [section 5.8](#), Lubrication Oils, or the lubrication oil selection table.

Rotary vane compressor / vacuum pumps	Type	RFW 150 DV	RFW 200 DV	RFW 260 DV
Oil tank capacity	l	7.5	7.5	7.5
Oil consumption	l/h	0.33	0.40	0.48
Add oil after operating hours	h	22,5	18.5	15.5
Oil level checks per day		once	once	once

1. Technical data

Additional lubrication

For vehicles subject to extreme operating conditions¹⁾ additional lubrication may be necessary as illustrated in [Figure 1-3](#). If your machine is equipped with this type of auxiliary lubrication feature, it must be used as follows when the specified conditions exist:

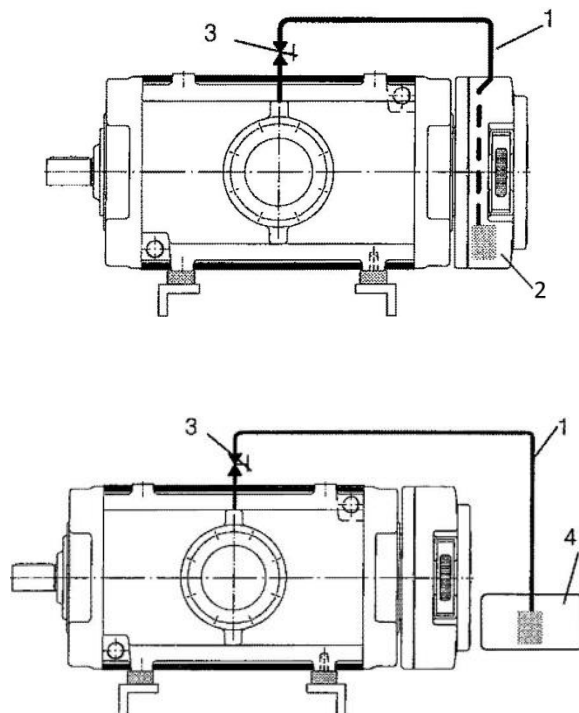
- Open the regulating tap in the oil line of the auxiliary lubricating device
- Leave the regulating tap open until ca. ¼ litre oil has been drawn into the machine.

Note the noises produced by the machine!

The additional oil intake volume of ¼ litre has been reached when the oil level in the oil sight glass has fallen ca. 1 cm.

¹⁾ Extreme operating conditions exist, for example in the following circumstances:

- Surrounding temperature 35°C
- Continuous operation (3 hours and more) of the machine at 200 mbar operating vacuum or 2 bar operating overpressure
- Suction or compression of aggressive substances (e.g., solvents, solvent vapors, acidic substances, etc.)



- | | |
|-------------------|--------------------------|
| 1. Suction line | 2. Oil well |
| 3. Regulating tap | 4. Additional oil vessel |

Figure 1-3: Additional Lubrication

1. Technical data

1.4 Water cooling

See [section 4.5](#) for information about recooling the cooling water. This process should be carried out in the vehicle by means of a forced-circulation cooling system with rotary pumps and coolers.

Rotary Compressor and Vacuum Pump	Type	RFW 150 DV	RFW 200 DV	RFW 260 DV
Heat to be dissipated				
– at 0.5 bar overpressure		11.5	19.0	24.0
– at 2.0 bar overpressure		14.5	20.0	28.0
– at 400 mbar vacuum	kW	11.0	17.0	19.0
Required pumping capacity of water pump, at least				
– at 0.5 bar overpressure		15	25	35
– at 2.0 bar overpressure		20	29	40
– at 400 mbar vacuum	l/min	15	24	28
Pipework dimensions		R1	R1	R1
Recommended equalizing tank	l	10	10	10

These data apply for:

- Surrounding temperature 30°C
- Continuous operation
- Winter operation with anti-freezing compound
- Summer operation without anti-freezing compound

If the anti-freezing compound remains in the cooling system during summer operation, it is necessary to increase the volume flow of the cooling water by ca. 15%. Otherwise the lower heat dissipation presents the danger of overheating.



Max. Permissible cooling water temperature in the cooling water circuit is 60°C.

1.5 Drive methods

From the vehicle engine:

- By auxiliary drive and drive shaft
- By V belt; the drive belt disk being mounted onto the free end of the drive shaft
- By a pneumatic shift clutch

By a hydromotor

From a diesel or electric engine

- By an elastic coupling

For exact details see [4.6, drive](#).

2. Safety rules and notes on danger

- 2.1 Designated usage
 - 2.2 Acceptance and monitoring
 - 2.3 Operational safety
 - 2.4 Environmental protection
 - 2.5 ATTENTION
 - 2.6 Information
 - 2.7 Points to note
-

2.1 Designated usage

The rotary compressor or compressor and vacuum pump is designed entirely for compression and/or suction of filtered air. Any other or additional usage is not deemed to be part of the designated usage.

Designated usage also includes adherence to the operating data and the maintenance stipulations given in the operating instructions.

2.2 Acceptance and monitoring

The machine itself is not subject to any general acceptance and monitoring requirements.

If specific legal requirements apply at the site of operation of the rotary compressor/compressor and vacuum pump, the operator is responsible for observation of these requirements.

In every case, the safety and accident prevention regulations of the local working safety authorities must be adhered to.

2.3 Operational safety



This symbol indicates possible dangers for personal safety. Working safety requires exact observation of instructions so marked. Safety instructions must be known to all persons who use the machine!

2.4 Environmental protection



This symbol shows that environment protection regulations must be observed.

2.5 ATTENTION



“ATTENTION” designates regulations and instructions which are designed to prevent damage to the machine Information

2.6 Information



This symbol indicates information of particular interest to the operator of the machine!

2.7 Points to note



The rotary compressor/compressor and vacuum pump has been constructed according to the latest technological standards and safety regulations. However, during use of the machine it is still possible that the health and life of the operator or other persons may be endangered, or that damage to the machine or to other property may be caused.

- Only use the machine when it is in a technically perfect condition; such use must be carried out in accordance with the designated usage and with due regard for safety. In particular, any faults which are relevant to the safety of the machine must be repaired immediately.
- Alterations, attachments or modifications to the rotary compressor/compressor and vacuum pump which may affect the safety of the machine are not permissible without consulting the manufacturer.
- All warning notices on the machine must be observed, and care must be taken that all such notices are always in a legible condition.
- Attention must be paid to fire detection and firefighting features.
- Work on electrical devices must be carried out by a qualified electrician in accordance with the electrical and technical regulations.



All personnel who are required to work with the machine must read the operating instructions, especially the safety instructions, before commencing such work. **When working on the machine, it is too late!**

- Work on the machine must only be carried out when the machine is at a standstill.
- Before such work begins, measures must be taken to prevent the drive from being switched on.
- During such work, the machine must not be subject to excess pressure or under pressure.

2. Safety rules and notes on danger

- On the vehicle side: close the shut-off slide.
- Bleed or vent the pressure pipe between the machine and the shut-off slide.
- Release over pressure manually at the safety valve, or vent the machine at the ventilation valve.
- Pay attention to the manometer!
- The drive prevention device must only be removed when the machine is at a standstill.
- The contact prevention guard must only be removed when the machine and the pressure pipe are cool.
- Before switching on the machine, ensure that all safety devices are correctly in place.



For the sake of environmental protection, all liquids which come from the machine during maintenance work, e.g. lubricating oil, must be collected and disposed of in a way that does not impair the environment.



ATTENTION

"SURFACE TEMPERATURE MAX 150°C!"

3. Transport, storage, delivery contents

3.1 Transport

3.2 Storage

3.3 Delivery contents

Symbols on the packaging:

Top



Fragile



Protect from rain



3.1 Transport

During transport it is essential that violent impact, the use of force and careless loading and unloading should be avoided. The machine must only be suspended by means of the eyebolts that are firmly screwed in.

Any transport protection mechanisms must be removed.

3.2 Storage

Before assembly the machine should be stored in a dry, heated room. The covers on the pressure nozzle should remain in place until the machine is finally installed.

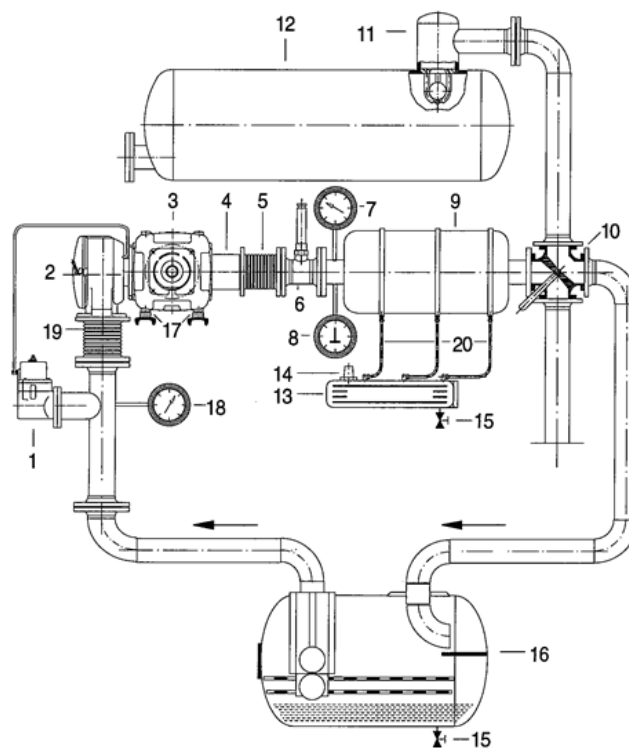
The protective coating on the bare parts remains effective for approximately 1 year. If the machine is stored for a longer period, it must be renewed.

3.3 Delivery contents

The contents of the consignment are listed on the delivery note. Please check it immediately for completeness. Claims for transport damage and errors can only be accepted if they are reported immediately in writing.

4. Installation

4.1	Installation location and attachment	4.4.4	Non-return valve
4.2	Prevention of suction intake of dirt and residue	4.4.5	Thermometer
4.2.1	Suction pipe	4.4.6	Safety valve
4.2.2	Vacuum filter	4.4.7	Manometer
4.2.3	Safety dome	4.4.8	Contact prevention
4.2.4	Safety vessel	4.4.9	Oil level monitoring
4.3	Noise suppression (low noise installation)	4.4.10	Rotation speed monitoring
4.3.1	Air noise suppression by noise suppressing oil separator	4.5	Water cooling
4.3.2	Body noise isolation	4.6	Drive
4.4	Safety and monitoring features	4.6.1	Hydromotor drive
4.4.1	Vacuum meter	4.6.2	Drive by flexible coupling
4.4.2	Vacuum filter	4.6.3	Drive by drive shaft
4.4.3	Ventilation valve	4.6.4	V-belt drive



- | | | |
|-------------------------------|---|--|
| 1. Ventilation valve | 8. Thermometer | 15. Draining tap |
| 2. Vacuum filter | 9. Silencer/oil separation vessel | 16. Safety vessel with floating valve |
| 3. Compressor and vacuum pump | 10. Four-way tap | 17. Elastic mounting |
| 4. Non-return valve | 11. Safety dome with floating valve | 18. Vacuum meter |
| 5. Compensator | 12. Vehicle tank | 19. Compensator |
| 6. Safety valve | 13. Collection tank | 20. Oil drain pipes with covers, 4 mm diameter |
| 7. Manometer | 14. Ventilation silencer on collection tank | |

Figure 4-1: Machine diagram with a compressor and vacuum pump

4. Installation

Notes

Figure 4-1 shows an example of a completely installed compressor & vacuum pump of the RFW series.

Other installation variations are also possible.

- Installation and start-up operation must only be carried out by instructed personnel. If faults should occur that are caused by operating errors, Gardner Denver are not liable for guarantee claims
- The machine is delivered ready-to-be-connected. There must not be any damages due to transport.
- Please make sure, that the rotor shaft can be turned by hand; if not, contact our after-sales office.
- The machine may only transported by means of the securely fitted eye bolts.

4.1 Installation location and attachment

The installation location on the vehicle must:

- be easily accessible,
- be protected from dirt, gravel impact and water splashes,
- provide enough space for the connection of the suction and pressure pipes,
- provide easy access for maintenance (oil inlet screw, oil monitoring window).

The machine is mounted by means of the 4 feet (screw thread M12) at the top or bottom. The machine can be screwed directly to the chassis or to the traverse units.

The drive shaft of the rotary compressor/compressor and vacuum pump must be mounted horizontally (maximum permitted deviation when the vehicle is stationary: 5°).

The compressor/compressor and vacuum pump can be mounted in steps of 90° around the longitudinal axis. The oil reservoir must then be disconnected and turned so that the inlet opening is at the top and the draining tap at the bottom. It must also be ensured that the oil pump draws in oil at the lowest point of the oil reservoir. It may be necessary to use a different oil intake suction pipe. Please contact us - your after-sales service center will be pleased to help you adapt the appliance to your installation requirements.

Traverse mountings on the vehicle chassis must be strong enough; thin profiles and flat metal sheets must not be used.

The mounting points (supports for the machine feet) must be exactly balanced. For dimensions and weights see [chapter 1, Technical data](#).

4.2 Prevention of suction intake of dirt and residue

4.2.1 Suction pipe

The pipe must be non-corroding on the inside. Before installation it must be cleaned from the inside; weld globules, burn residue and rust must be carefully removed.

The suction pipe must slope upwards to the machine joint, so that condensate flows away from the machine. For compressor/vacuum pumps and dedicated vacuum pumps, a safety tank with a draining tap must be fitted at the lowest point.



The suction pipe must be of a sufficient size. Its diameter should be **at least** as given in the following table.

Otherwise the machine will be overloaded.



If the suction pipe is of an incorrect size, any guarantee provided by Gardner Denver loses its validity.

Rotary compressor & vacuum pump	Required minimum diameter for suction pipe
RFW 150	DN 100
RFW 200	DN 125
RFW 260	DN 125

4.2.2 Vacuum filter (4.1/2)

The vacuum filter is fitted directly before the machine. It protects it from contamination and suppresses the suction noise.

When fitting the filter unit, the flow direction must be taken into account. For maintenance purposes it must be possible to remove the filter element.

4.2.3 Safety dome (4.1/11)

The safety dome on the vehicle tank must include not only a floating valve, but also a swell protection device to avoid liquid from being drawn off when the liquid surges up.

4. Installation

4.2.4 Safety vessel (4.1/16)

The safety vessel (at the lowest point of the suction pipe) must be so constructed that

- incoming air does not directly flow onto the liquid surface,
- there is a sufficiently large settling space,
- the filter element never dips into the liquid (even filters of non-absorbent material fill up with liquid due to capillary action).

When a vacuum filter of the type SFA-F is used, a filter element is not necessary in the safety vessel.

The following diagram shows an optimized gravity separator. The function must be checked as follows.

When the water volume to be separated is sucked in,

- the volume must remain in the vessel,
- in atmospheric suction, not more than 1 litre per hour must be drawn in.



We will be pleased to support you in the calculation and testing of your safety vessel.

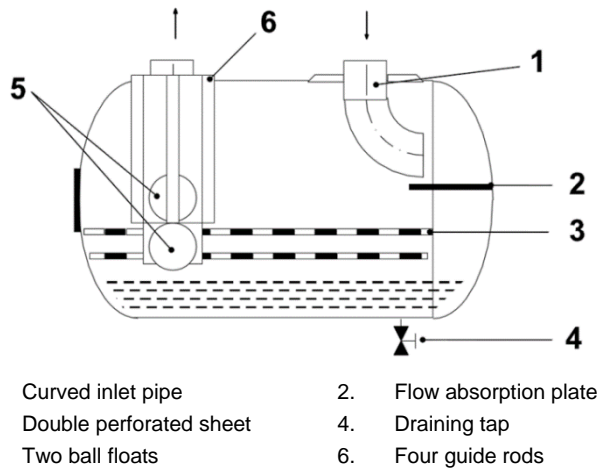


Figure 4-2: Safety vessel

4.3 Noise suppression (low noise installation)

The noise level of the rotary compressors/ compressors and vacuum pumps of the RFW series is far below the value permitted for commercial vehicles. To preserve these values when the machine is installed, the low noise installation is necessary.

4.3.1 Air noise suppression by noise suppressing oil separator (4.1/9)

The combined silencer and oil separator suppresses the exhaust noise of the compressor and vacuum pump, and it also removes 80% to 90% of the lubricating oil.

The silencer is installed between the machine and the four-way tap, or in the exhaust pipe.

The noise suppressing oil separator must be permissible for the maximum possible operating pressure (e.g. 2 bar excess pressure if the machine is used as a compressor).

The de-oiling element is connected by 2 or 3 oil draining pipes to a ventilated collecting tank with a capacity of at least 10 litres. The ventilation diameter should be at least 1".

In the draining pipes between the oil separator and the collecting tank, covers of 4 mm diameter are fitted. The collecting tank must have a draining point for condensate.



When mounting the silencer, the flow direction must be taken into account; the oil draining outlet must point vertically downwards.

4. Installation

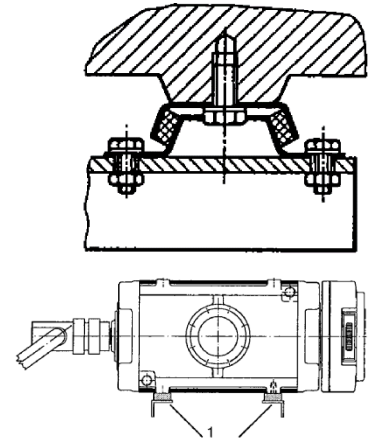
4.3.2 Body noise isolation

Anti-vibration elements for the elastic mounting of the machine on the traverse units have the effect of insulating the body noise.

Rubber-metal cup element

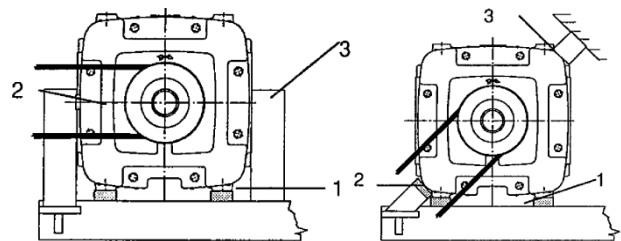
Low-noise installation with universal drive

1. Rubber metal cup element



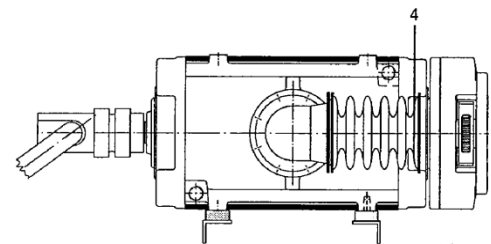
Low-noise installation with V-belt drive

1. Rubber-metal cup element
2. Buffer stop
3. Counterstop

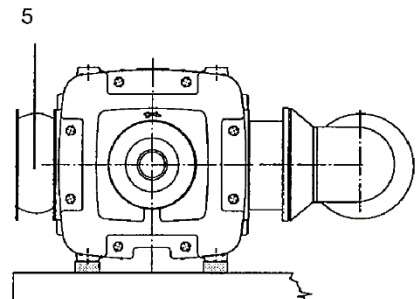


Compensators in the suction line and in the pressure line effect the isolation of the body noise and prevent thermal stresses.

4. Compensator for pressure line Kompaflex axial compensator type F, temperature and compression-proof
DN 100 – PN 16 for RFW 150
DN 125 – PN 16 for RFW 200 and 260
Type W for high-grade steel pipelines for welding into the line



5. Compensator for suction line ERV-pipe connector
Type TAS with Teflon coating and vacuum support ring
DN 100 for Typ. RFW 150
DN 125 for Typ. RFW 200 and 260



Cooling water lines

Flexible hoses as cooling water lines effect sufficient noise isolation.

4. Installation

4.4 Safety and monitoring features

The operating safety of the machine, i.e. operation without danger, requires the following safety and monitoring devices:

Suction side

- Vacuum filter
- Ventilation valve
- Vacuum meter

Pressure side

- Safety valve
- Non-return valve
- Thermometer
- Manometer

Contact protection

- Protection against rotating parts and burns

Machine protection

- Speed monitor
- Maintenance indicator on the combination air filter
- Oil level safety feature



If these notes are not adhered to, the guarantee loses its validity.

4.4.1 Vacuum meter (4.1/18)

For adherence to the permitted operating vacuum. Fitted in the suction pipe directly in front of the suction nozzle

4.4.2 Vacuum filter (4.1/2))

The vacuum-sealed filter protects the machine from mechanical contamination. Fitted in the suction pipe.

When fitting, pay attention to the direction of flow and the space required to replace the filter element.



Vacuum filter type SFA is not suitable for excess pressure.

Vacuum filters of the series SFD are pressure shock-proof up to 11 bar.

4.4.3 Ventilation valve (4.1/1)

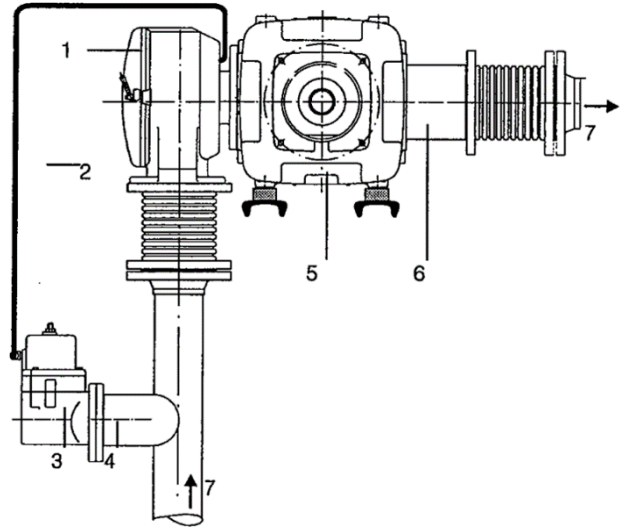
The ventilation valve is the regulator for the appliance and the safety feature in the suction pipe. It is absolutely essential.

If the intake suction vacuum falls below the pre-set

minimum value, the ventilation valve opens and the machine draws in atmospheric air. This serves to limit the suction pressure to the permitted minimum pressure, e.g. 200 mbar.



If the ventilation valve is mounted or fitted incorrectly or interfered with, an increase of the vacuum and the temperature could **CAUSE AN EXPLOSION!**



- | | |
|-------------------------------|----------------------|
| 1. Vacuum filter SFA or SFD | 2. Servo-pipe 10x1.5 |
| 3. Ventilation valve BV-DN | 4. Flange fitting |
| 5. Compressor and vacuum pump | 6. non-return valve |
| 7. To/from four-way tap | |

Figure 4-3: Installation of the servo-controlled ventilation valve

The servo-controlled vacuum regulation and limitation valve from Gardner Denver achieves the highest standard of functional reliability and operating precision. The setting is not dependent on the flow rate. The compact construction facilitates simple, space-saving installation.

4.4.4 Non-return valve (4.1/4)

The non-return valve prevents retro-flow when the machine is switched off. It is not completely gas-tight.

In machines of the RFW series, the non-return valve is mounted to the pressure nozzle.

Observe the direction of flow (arrow on the housing).

4. Installation

4.4.5 Thermometer (4.1/8)

The thermometer for monitoring the compression temperature must be positioned together with the non-return valve in the pressure pipe directly behind the pressure nozzle (attach threaded sleeve R ½" for this purpose). The thermometer must be inserted into the pipe to half the pipe diameter.



The indication range of the thermometer must cover the range from 0 to 200°C.

4.4.6 Safety valve (4.1/6)

After each compressor, a non-lockable safety valve must be fitted (accident prevention regulation VBG 16). The valve should be designed and adjusted so that pressures of more than 10% above the permitted operating pressure are prevented. It must be able to expel the entire transport capacity of the rotary compressor/compressor and vacuum pump. The valve must also be fitted with a manual ventilation facility.



If the ventilation valve is mounted or fitted incorrectly or interfered with, an increase of the vacuum and the temperature could
CAUSE AN EXPLOSION!

When fitting the safety valve, the following points must be observed:

- Installation directly behind the machine before any other shut-off mechanism (especially the shut-off slide),
- The setting must correspond to the maximum permitted operating pressure (cf. Machine data),
- The setting must be protected from unauthorized or accidental alteration,
- The valve must not be blocked,
- The safety valve must not be used to regulate the air volume in pressure operation.



Correct function must be checked each week by activating the manual ventilation.

4.4.7 Manometer (4.1/7)

For continuous pressure monitoring. Measurement range conforming to the operating pressure. Mounted directly behind the pressure nozzle.

4.4.8 Contact prevention

The drive of the machine and the hot pressure pipe must be provided with a contact prevention

mechanism. Accidental touching of rotating or moving machine parts must be impossible.

The surface temperature must not exceed 80°C.

4.4.9 Oil level monitoring

A monitoring device must be fitted in the oil reservoir to indicate when the oil level is too low.



The oil level monitoring device can be omitted if adherence to the minimum oil level is guaranteed by the operator in accordance with 6.2 (visual control at the oil level window).

4.4.10 Rotation speed monitoring

A rotation speed indicator on the machine and an indicator in the operating area are to be recommended. For the permitted rotation speed ranges, see [4.6, Drive](#).

4.5 Water cooling

A forced-circulation cooling system with air-cooled cooler and rotary pump is necessary for re-cooling the cooling water.

The rotary pump should be installed so that it operates only when the compressor is running.

A thermometer must be installed in the water return.

Rotary Compressor and Vacuum Pump	Type	RFW 150 DV	RFW 200 DV	RFW 260 DV
Heat to be dissipated				
– at 0.5 bar overpressure		11.5	19.0	24.0
– at 2.0 bar overpressure		14.5	20.0	28.0
– at 400 mbar vacuum	kW	11.0	17.0	19.0
Required pumping capacity of water pump, at least				
– at 0.5 bar overpressure		15	25	35
– at 2.0 bar overpressure		20	29	40
– at 400 mbar vacuum	l/min	15	24	28
Pipework dimensions		R1	R1	R1
Recommended equalizing tank	I	10	10	10

4. Installation

These data apply for:

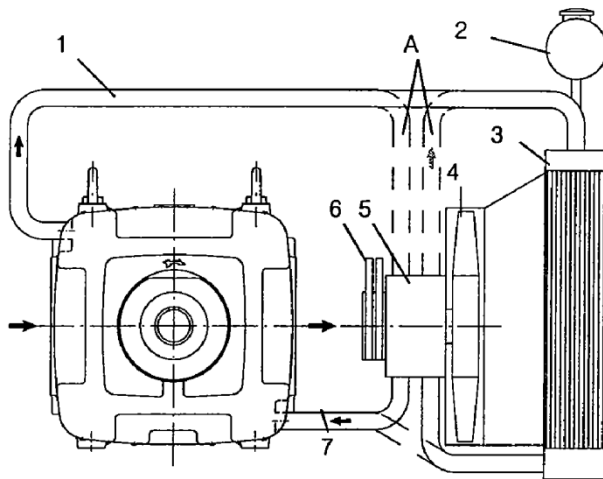
- Surrounding temperature 30°C.
- Continuous operation.
- Winter operation with anti-freezing compound
- Summer operation without anti-freezing compound



If the anti-freezing compound remains in the cooling system during summer operation, it is necessary to increase the volume flow of the cooling water by ca. 15%. Otherwise the lower heat dissipation presents the danger of overheating.



Max permissible cooling water temperature in the cooling water circuit is 60°C.



- | | | | |
|----|----------------------|----|-----------------|
| 1. | Return line | 2. | Equalizing tank |
| 3. | Cooler | 4. | Air fan |
| 5. | Water pump | 6. | Drive (V-belt) |
| A. | Alternative pipework | | |

Figure 4-4: Water cooling for a rotary vane compressor

4.6 Drive



The rotation direction must correspond to the direction arrow on the machine.

Permitted speed ranges:

- Drive by cardan shaft 1200...1500 min⁻¹ (rpm)
- Other drive systems 1000...1500 min⁻¹ (rpm)



It is essential to take account of the speed ratio and reduction ratio of the drive (V belt drive, vehicle auxiliary drive,...).



We recommend a rotation speed monitoring device on the machine with a display in the operating area.

In any case, the rotation speed must be monitored after the assembly of the rotary compressor/compressor and vacuum pump, and an operating notice must be fitted for the vehicle operator.

Drive by means of combustion engines must only be used with controlled rotation speed engines



Axial thrust from the drive must not be transferred to the rotor shaft.

The drive elements should be fitted to the rotor shaft with the existing thread M12.

The drive elements must not be hammered onto the rotor shaft.

4.6.1 Hydromotor drive

For the engine allocation recommended by us, kindly refer to our measurement sheet M 5689.3.



We will gladly supply you with the correct mounting flange and a coupling.



The compressor side coupling section is already mounted by us. After assembly, the engine side coupling section must not transfer any axial thrust to the compressor and vacuum pump.

4.6.2 Drive by flexible coupling

In the case of direct coupling with the drive, e.g. diesel engine, a flexible revolving coupling must be selected in accordance with the details supplied by the engine manufacturer. This coupling must largely compensate the cyclic irregularity of the drive.



The coupling must be adjusted in exact adherence to the details supplied by the manufacturer.

4. Installation

4.6.3 Drive by drive shaft

The drive shaft must

- be constructed as a splined shaft,
- be balanced
- have the smallest possible angle and be as short as possible.

The central axes of the drive shaft flanges must be parallel to each other.

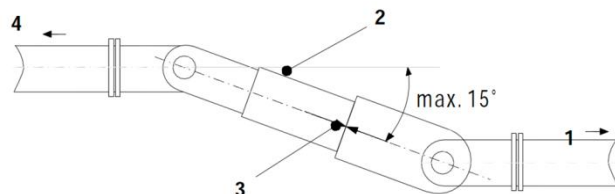
The drive shaft mounting flange must be fitted to the drive shaft of the rotary compressor/vacuum pump.

The splined shaft section of the drive shaft must be screwed to the mounting flange on the compressor shaft.

The resulting prop shaft angle must not exceed 15° at a rotation speed of 1500 min⁻¹.



Do not fit the drive shaft the wrong way round -pay attention to the markings.



- | | |
|---------------------|----------------------|
| 1. Drive | 2. Spline shaft |
| 3. Position marking | 4. Rotary compressor |

Figure 4-5: Cardan shaft

4.6.4 V-belt drive

If the engine speed must be geared up or down, a V belt drive is to be recommended. The rated engine speeds as in Machine data, must be observed!

The V belt pulleys listed in the following table can be fitted directly to the free end of the shaft.

Rotary compressor/ vacuum pump	Type	RFW 150 DV	RFW 200 DV	RFW 260 DV
Belt profile		SPB	SPB	SPB
Belt pulley diameter DW	mm	250	250	250
Max. operating pressure for V-belt drive	bar _g	2.0	1.5	0.5
Max. operating vacuum for V-belt drive	mbar	200	200	200
Number of belts		4	4	4



Between the V belt pulley and the housing at least 12 mm gap should be allowed, as the intake of cooling air is otherwise impaired.

Assembly of the V belt drive

- The parallel alignment of the axes in all planes must be executed carefully and exactly both for the shafts providing the drive power and for the shafts receiving the drive power.
- The belt grooves in the belt pulleys must not be misaligned.
- V belts of the correct lengths must be selected so that the belt tension is consistent.
- The belt tension is correct if the assembled and tensioned V belts can be pressed down with the thumb by 16 to 20 mm per 1000 mm axle span.



Because of the maximum torque, belt drive by electric motors is not permissible.

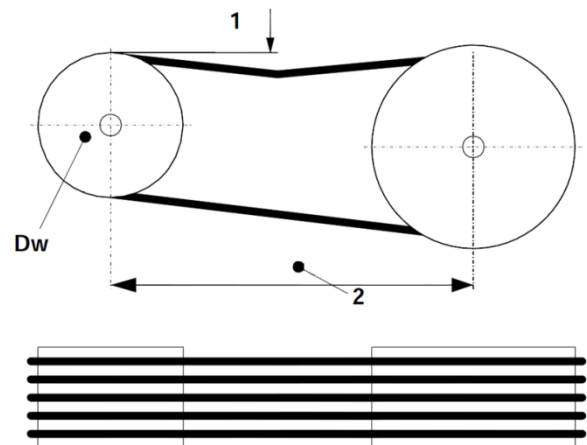


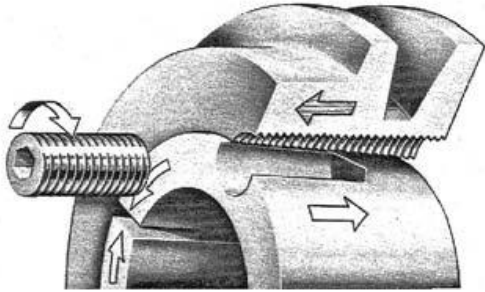
Figure 4-6: Correct V-belt tension

1. Deflection: 16 ... 20 mm for every 1000 mm axle spacing
2. Axle spacing
Dw Belt pulley diameter: min 200 mm (8 in)

4. Installation

Mounting of V belt disks with taper-lock clamping bushes

1. Clean and de-grease the bare surfaces. Place the disk and the bush inside each other. Align the holes and insert the screws loosely.



2. Push the disk with the bush onto the shaft, align it and tighten the screws evenly and tightly.

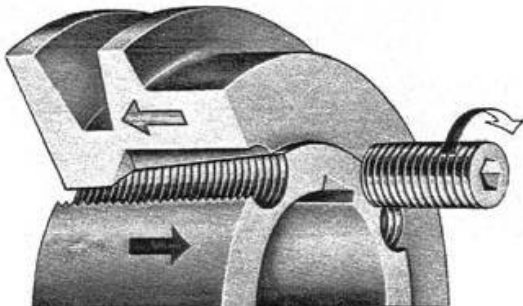


4. Remove the loose pulley unit by hand, without knocking it or damaging the machine.



Dismantling

3. Take out the screws, then screw one of them as a leverage screw into the hole with a half thread in the bush, and tighten it. This releases the taper-lock bush.



5. Initial operation

- 5.1 Checking the system
- 5.2 Cooling water
- 5.3 Lubricating oil
- 5.4 Shut-off slides and valves
- 5.5 Rotating direction
- 5.6 Drive
- 5.7 Checking the rotation speed, vacuum and pressure
 - 5.7.1 Rotation speed
 - 5.7.2 Vacuum at the vacuum meter
 - 5.7.3 Pressure at the manometer
- 5.8 Lubrication oils for rotary compressor/compressor vacuum pumps

5.1 Checking the system

Initial operation, and also the switching on of the system after a longer standstill period (more than 4 weeks) has a great influence on the effective functioning of the rotary compressor or the compressor and vacuum pump.

We urgently recommend that you take sufficient time for initial operation of the machine. Undue haste could lead to important steps being left out, thus causing possible damage to the machine.



For faults caused by incorrect initial operation, no guarantee claims can be accepted

Before initial operation

- Check the machine (transport damage, faulty assembly),
- Check that the drive protection and contact protection on the pressure side are correct,
- Check the operating data on the machine's name plate,
- Instruct the operating personnel,
- Pass on instructions for the operation and maintenance of the machine,
- Make sure that the rotor shaft can be turned by hand.

5.2 Cooling water

Fill cooling water only to the highest mark on the equalising tank or cooler. Determine the quantity according to the cooler volume and line volume. Use only clean tap water. Observe the instructions in [section 1.4, Water cooling!](#)



If frost danger exists, add antifreezing compound as instructed by the manufacturer (generally 33%).

5.3 Lubricating oil

- For the oil type, see [5.8, table of lubricating oils](#).

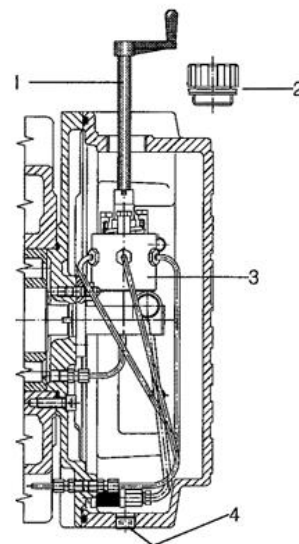


For the RFW series, single grade oils are prescribed. Use of multigrade oils can lead to damage to the machine.



Such use also causes the guarantee liability of Gardner Denver to lose its validity.

- Fill the oil reservoir to approximately 3 cm below the thread of the filling cap.
- Manual pre-lubrication of the machine is necessary
 - before initial startup
 - before restart after a stoppage lasting 4 weeks or more
 - after machine underwent excess vacuum
 - when the danger exists that the lubricant film in the compression chamber of the compressor/vacuum pump has been removed by components of the suction air
- For pre-lubrication, proceed as follows:
 - Insert hand crank (in mounting) through the open oil fill opening and place it onto the oil pump shaft. Press down on the crank until the driving pin snaps in. Pre-lubricate with 40 complete revolutions of the hand crank.
 - Return the hand crank to the mounting and screw on the screw plug.



- 1. Hand crank
- 3. Oil pump

- 2. Screw plug
- 4. Oil drain cock

Figure 5-1: Pre-lubricating with the hand crank

5. Initial operation

5.4 Shut-off slides and valves

Check the mounting direction of the non-return valve (see directional arrow).

Open all manually operated shut-off slides and valves.

Always turn the four-way tap until it clicks into position. An intermediate position is not possible

5.5 Rotating direction

In initial operation, turn on the drive briefly and check the direction of rotation. Take note of the rotation direction arrow on the machine housing!

5.6 Drive

Switch on the drive and check whether pressure/vacuum is created.

5.7 Checking the rotation speed, vacuum and pressure

5.7.1 Rotation speed

Permitted speed range

Drive by cardan shaft	1200...1500 min ⁻¹
Other drive systems	1000...1500 min ⁻¹

5.7.2 Vacuum at the vacuum meter

Permitted minimum suction pressures:

Continuous operating vacuum	200 mbar
Max. operating vacuum briefly (up to 15 min/h)	100 mbar

Make a manual check of the **venting valve**.

5.7.3 Pressure at the manometer

The maximum permissible value can be seen on the rating plate (cf. also Machine data).

Check manually whether **safety valve** expels air.

5.8 Lubrication oils for rotary compressor/compressor vacuum pumps

The permissible oils are single range oils of the specifications

API:	CD/SF or higher
MIL:	L2104 C or higher

Summer oils (SAE 40)

Make	Type
• ARAL	Basic Turboral
• BP	Vanellus C3
• DEA	Cronos Super
• ELF	Performance XR
• ESSO	Essolube X 301
• FUCHS	Titan Universal HD
• MOBIL	Delvac 1340
• SHELL	Rimulla X Monograde
• WINTERSHALL	Rekord

Winter oils (SAE 30)

Make	Type
• ARAL	Basic Turboral
• BP	Vanellus C3
• DEA	Cronos Super 30
• ELF	Performance XR
• ESSO	Essolube X 301
• FUCHS	Titan Universal HD
• MOBIL	Delvac 1330
• SHELL	Rimulla X Monograde
• WINTERSHALL	Rekord



For environmental or intake temperatures of 40°C and more, the next higher viscosity group should be used.

For environmental or intake temperatures of 5°C and less, the next lower viscosity group should be used.



For the RFW series, single grade oils are prescribed. Use of multi grade oils can lead to damage of the machine.



Such use also causes the guarantee liability of Gardner Denver to lose its validity.

If your machine is used for suction or compression of gases, the use of the above listed oils may not be permissible. Please contact us and ask about the correct oils to use!

6. Operation

- 6.1 Switching on
- 6.2 Regular checks
 - 6.2.1 Safety valve
 - 6.2.2 Ventilation valve
 - 6.2.3 Checking intervals
- 6.3 Possible operating errors
- 6.4 Precautions for long standstill periods
- 6.5 Rinsing after machine has over sucked
- 6.6 Procedure if faults occur

6.1 Switching on

Normal switching on of the rotary compressor or compressor & vacuum pump (referred to in the following text as the “machine”) is carried out as described in [chapter 5, “Initial operation”](#).

6.2 Regular checks

In pressure operation

Check operating excess pressure on the manometer (for the permissible pressure, see the machine’s rating plate).

In vacuum operation

Check the operating vacuum on the vacuum meter (for the permissible vacuum, see the machine’s rating plate).

Compression final temperature:

Read the final compression temperature. It is generally approximately as follows

Operating vacuum 400 mbar	140°C
Operating over pressure 0,5 bar	120°C
Suction temperature	20°C



Depending on the operating status, the final compression temperature may be significantly higher than the values given (up to approx. 200°C)!

Drain condensate

Drain the condensate from the condensate and safety tanks.



The tank must not be under pressure when the condensate is drained.



In the winter, the condensate may freeze.

Rotating speed

Check the operating rotation speed.

Permitted speed range

Drive by cardan shaft	1200...1500 min ⁻¹
Other drive systems	1000...1500 min ⁻¹

Cooling water temperature

Upon return to the cooler the maximum cooling water temperature is 60°C.

Oil level

Check the oil level on the window of the reservoir.

If the oil level reaches the red mark, add more lubrication oil.

For the lubrication oil specification see [5.8, lubricating oils](#).

6.2.1 Safety valve

A non-lockable safety valve must be installed in the pressure pipe after every compressor. It must be set so that a pressure greater than 10% above the maximum permitted operating pressure is prevented.



The setting of the valve must be safeguarded against unauthorized or erroneous alteration!

The safety valve must not be blocked, or otherwise manipulated in any way.



Expelling of the entire volume flow from the safety valve when the pressure pipe is closed must be avoided, as harmful pressure vibrations may be caused.



The safety valve must not be used as a pressure regulation instrument.

Check the functionality of the valve during initial operation, and thereafter once a week, by activating the manual ventilation with the machine operating system.

6. Operation

6.2.2 Ventilation valve

The ventilation valve is the regulator for a vacuum system.

When the pre-set vacuum is reached, it opens and allows the vacuum pump to draw in additional atmospheric air.

Check its functionality once a week by a test, with observation of the vacuum meter on the suction nozzle of the compressor & vacuum pump.

- Blocked vacuum filter.
- Blocked exhaust gas silencer.
- Suction intake of liquids.
- Foaming of the liquid as a consequence of the condensate from the safety vessels not being drained soon enough (e.g. due to freezing in winter)
- Lack of lubrication oil.
- Incorrect lubrication oil

6.2.3 Checking intervals

	See chapter	During operation every 10-20 min	After each operation	Daily	Weekly
Operating rotation speed	6.2	•			
Operating pressure (or) vacuum	name plate	•			
Air discharge temperature	6.2	•			
Cooling water temperature	6.2	•			
Drain condensate (contains oil!) <ul style="list-style-type: none">– silencer/ oil separator– safety tank	6.2		• •		
Check oil level	6.2, 5.8			•	
Actuate safety valve	6.2.1				•
Check ventilation valve	6.2.2				•
Clean machine					•
Clean inlet/outlet aperture for cooling air					•
Check fixing of ventilator cowl and covering plates					•



The vacuum must not fall below the permitted vacuum of 200 mbar (cf. [section 1.1](#))!



If faults should occur that are caused by operating errors, Gardner Denver is not liable for guarantee claims.

6.3 Possible operating errors

Operating errors can lead to machine failure.



The following must be avoided:

- Too low or too high rotation speed
- Too high pressure
- Expelling of the entire volume flow via the safety valve with the pressure pipe closed
- Too low vacuum
- Too high compressed air temperature (cf. [6.2](#))
- Poor cooling (cooling air/water supply impaired)

6.4 Precautions for long standstill periods

- Clean the machine thoroughly



If the machine is cleaned with high pressure water jets, there is a danger of water intrusion.

- After wet cleaning, allow the machine to warm up for a few minutes to prevent the rotor vanes from sticking.

If standstill period of rotary compressor/compressor and vacuum pump lasts more than one month, we recommend that the machine be switched on once a month for at least 15 minutes. By this means, all parts that may be subject to corrosion are supplied with fresh oil.

6.5 Rinsing after machine has over sucked

After over sucking (liquids or mud have come into the machine) proceed as follows:

- Remove locking screw at the intake flange (dis mount the pipe of the additional lubrication if necessary)
- Open the vehicle tank, so the machine can be operated without vacuum or pressure
- Switch machine on and with slightly reduced speed, fill in approx. ½ litre petrol, diesel or a diesel-oil-mixture through the bore hole in the intake flange
- Switch off machine, screw in the locking screw and maintain pre-lubrication according [section 5.3](#) before restarting the machine



Intermediate positions of the four-way changeover valve are not allowed during the rinsing. The dirt leaving the machine through the discharge flange could get on the suction side again.

6. Operation

6.6 Procedure if faults occur

Gardner Denver rotary compressors and compressor/vacuum pumps of the RFW series are characterized by the fact that the rotor vanes work with practically no wear under normal operating conditions.

If however any malfunctions should occur, the following overview gives you the possibility to find the cause and to solve the problem.

	Possible cause	Elimination
Volume flow performance of compressor/vacuum pump deteriorates	<ul style="list-style-type: none">* Vacuum filter contaminated* Leaking suction pipe* Leaking fittings* Rotation speed too low* Premature wear to vane; perhaps contamination (water, dirt etc.) has entered the machine (e.g. by excess suction).	<ul style="list-style-type: none">✓ Clean filter, if necessary replace filter element✓ Find and seal leaks✓ Replace fittings✓ Adhere to rotation range✓ Replace rotor vanes or have machine overhauled in authorized repair workshop
Abnormal noise level	<ul style="list-style-type: none">* Machine poorly balanced* Bearing worn out* Too little lubrication oil* Unsuitable lubrication oil* Rotor vanes knock due to lateral wear* Housing bore has grooves or undulations due to dirt intake* Incorrect rotation speed* Altered pressure* Altered vacuum	<ul style="list-style-type: none">✓ Balance machine exactly✓ Have bearing replaced✓ Refill with oil; clean oil reservoir and suction filter✓ Fill out oil in accordance with 5.8, lubrication oil table✓ Replace rotor vanes✓ Have housing re-bored and honed in authorized repair workshop. If intake air is strongly contaminated, fit a fine filter✓ Adhere to rotation speed limitations✓ Adhere to nominal pressure✓ Adhere to nominal vacuum
Compressed air temperature too high	<ul style="list-style-type: none">* Discharge pressure too high* Exhaust silencer blocked* Four-way tap in wrong position* Poor cooling* Valve plate in non-return valve jammed* Vacuum filter blocked* Vacuum too low/counter-pressure too high	<ul style="list-style-type: none">✓ Adhere to nominal pressure✓ Replace exhaust silencer✓ Turn four-way tap to correct position✓ Add cooling water, clean cooler and cooling water chamber✓ Clean non-return valve✓ Clean filter✓ Adhere to nominal vacuum / check exhaust gas system, clean if necessary
Operating pressure / vacuum is not reached	<ul style="list-style-type: none">* Manometer or vacuum meter gives incorrect reading* Drive belts slips* Four-way tap in wrong position* Condensate draining tap open	<ul style="list-style-type: none">✓ Replace manometer or vacuum meter✓ Check belt tension, tighten if necessary✓ Turn four-way tap to correct position✓ Close condensate draining tap

6. Operation

	Possible cause	Elimination
Cooling water temperature exceeds 60°C	<ul style="list-style-type: none"> ✖ Too little cooling water in cooling system ✖ Cooler contaminated or cooling water chamber on condenser has dirt accumulation 	<ul style="list-style-type: none"> ✓ Refill with cooling water ✓ Clean cooler or cooling water chamber on condenser
Mud or liquid has got into the machine	<ul style="list-style-type: none"> ✖ Excess suction into vehicle 	<ul style="list-style-type: none"> ✓ At lowest permissible rotation speed, without pressure or vacuum, rinse with diesel-oil mixture; then add lubrication oil as in 5.3 "Lubricating oil".
Power requirement too high	<ul style="list-style-type: none"> ✖ Rotation speed too high ✖ Discharge pressure too high ✖ Manometer gives incorrect reading ✖ Exhaust silencer blocked 	<ul style="list-style-type: none"> ✓ Adhere to rotation speed limitations ✓ Adhere to nominal pressure; activate or check safety valve ✓ Replace manometer ✓ Replace exhaust silencer
Lack of lubrication oil although oil tank is full	<ul style="list-style-type: none"> ✖ Suction filter in oil tank blocked 	<ul style="list-style-type: none"> ✓ Clean oil tank and suction filter
Safety valve blows out air	<ul style="list-style-type: none"> ✖ Closed valves in pressure pipe ✖ Blockage in pressure system ✖ Blockage in exhaust silencer 	<ul style="list-style-type: none"> ✓ Open valves ✓ Remove blockage ✓ Replace exhaust silencer
Ventilation valve is activated	<ul style="list-style-type: none"> ✖ Closed valves in suction pipe ✖ Suction filter blocked 	<ul style="list-style-type: none"> ✓ Open valves ✓ Clean suction filter, replace cartridge if necessary
Compressed air blows from shaft end and oil leaks	<ul style="list-style-type: none"> ✖ Seals are damaged 	<ul style="list-style-type: none"> ✓ Have radial shaft seal rings in cover plate replaced
Smell of rubber (with belt drive)	<ul style="list-style-type: none"> ✖ V belts slip due to insufficient belt tension ✖ Discharge pressure too high 	<ul style="list-style-type: none"> ✓ Check belt tension, tighten or replace if necessary ✓ Adhere to nominal pressure
Tilting of drive belts	<ul style="list-style-type: none"> ✖ Low belt tension ✖ Worn V belts ✖ Disks not aligned ✖ Belt disks worn 	<ul style="list-style-type: none"> ✓ Check belt tension, tighten or replace if necessary ✓ Fit new V belts ✓ Align disks ✓ Replace disks

If the problem is not solved (or not fully solved) by the above measures, please contact our after-sales service department.



Only start the machine up again when there is no doubt that the fault has been completely cleared!

7. Maintenance

7.1	Guarantee
7.2	Maintenance, maintenance plan
7.2.1	Water cooling/cooler
7.2.2	Rotary compressor/compressor and vacuum pump
7.2.3	Vacuum filter
7.2.4	V belts and V belt tension
7.2.5	Cleaning oil reservoir
7.2.6	Non-return valve
7.2.7	Ventilation valve
7.2.8	Rotor vane height wear

7.1 Guarantee

We are sure you will appreciate that we can accept no liability for damage caused by non-observance of the installation and operating instructions.

Please note that repairs to the rotary compressors or the compressors and vacuum pumps must only be carried out by authorized repair workshops, using only original spare parts, as the guarantee otherwise loses its validity. A list of our after-sales service centres is part of the complete documentation.

7.2 Maintenance, maintenance plan



In maintenance and inspection work the safety regulations ([chapter 2](#)) must be adhered to.

Operational failures due to insufficient or incorrect maintenance can cause extremely high repair costs and long machine standstill periods. Regular maintenance is therefore essential.

Operational reliability and the service life of the machine depend largely on correct maintenance.

The below table contains timing, checking and maintenance information for normal operation of the machine.

The maintenance intervals given are based on an operating time of approx. 5 hours per day. If this operating time is not reached, the maintenance intervals can be extended accordingly.

Because of the differing operating conditions it cannot be predicted how often checks of wear and tear, repair, maintenance and inspection work are necessary. On the basis of your operating conditions it is recommended that an inspection plan to suit your circumstances is drawn up.



After work is completed, all protective devices must be fitted again.



When disposing of oil, grease, cleansing solvents or components, e.g. filter cartridges, the environmental protection regulations must be observed.

7.2.1 Water cooling/cooler

The cooling water must be able to circulate freely.

- Clean cooler weekly of dirt and dust.
- Check cooling water level.

Maintenance plan	Type of work	See chapter	Maintenance intervals		
			1 week	1 month	3 months
Cooling unit / water cooler	check, clean	7.2.1	•		
Compressor/vacuum pump	clean	7.2.2	•		
Vacuum filter	clean	7.2.3	•		
Safety valve	check	6.2.1	•		
Ventilation valve	check	6.2.2	•		
Drive belts, drive belt tension	Check /tighten	7.2.4			•
Oil tank	clean	7.2.5			•
Non-return valve	check	7.2.6			•
Rotor vane	check wear (via inlet flange)	7.2.8			•

7. Maintenance

7.2.2 Rotary compressor/compressor and vacuum pump

- The machine must be cleaned weekly.



When washing or spraying with high pressure water jets there is a danger of water penetration which can cause foaming, and thus lead to a machine failure.

- Carefully clean the oil level monitoring window.
- After wet cleaning the machine should be run warm for a few minutes to prevent the rotor vanes from sticking.

7.2.3 Vacuum filter

Clean the filter, depending on the degree of dirt, every day, but at least once per week.



When the ventilation valve activates, the vacuum filter should always be cleaned.

The filter element consists of high grade steel netting or a fine filter cartridge.

To open the filter

- Loosen or unscrew the cone or cross clamps (7.1/2, 3). In the SFA type, turn the cover (7.1/1) anti-clockwise by about 15° out of the stud bolts, and pull the cover out of the housing. In the SFD type, the cover can simply be taken off.

To clean the filter



Rinse the filter housing with petrol or cold degreasing solvent.

- Filter elements of high grade steel netting can be rinsed with petrol or cold de-greasing solvent.
- Filter elements with a fine filter cartridge can be blown through from the inside to the outside with a steam jet. Check the fine filter cartridge for damage. Damaged cartridges must be replaced.



When cleaning the filter housing, under no circumstances must dirt, cleaning pad remnants or liquid be allowed to get into the compressor/vacuum pump. This can cause the vanes to fracture.

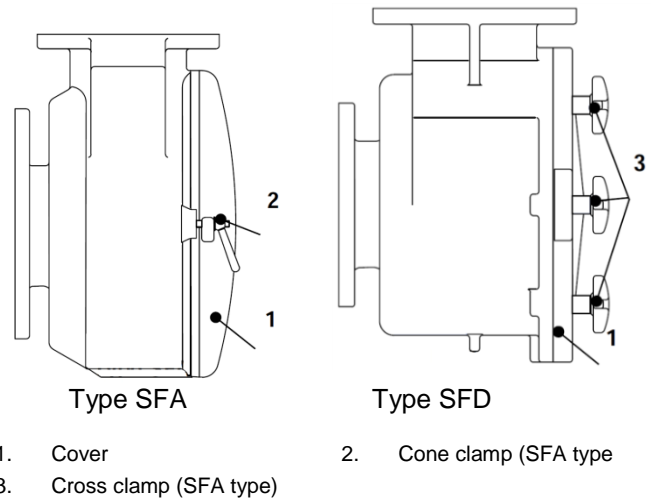


Figure 7-1: Vacuum filter SFA and SFD

Assembly of the filter

- Insert the filter cartridge.
- Place the seal or sealing ring in the cover (7.1/1). Press the washers to the outside against the cone or cross clamps (7.1/2,3).
- Press the cover (7.1/1) into the housing (in the SFA type, twist the cover clockwise into the stud bolts).
- Tighten the cover with the cone clamps or cross clamps (7.1/2,3).

7.2.4 V belts and V belt tension



Drive protection devices must only be removed when the machine is at a standstill and the vehicle engine is switched off.

V belts and the V belt tension must be checked every week and, if necessary, tightened or replaced; cf. 4.6.4.

Damaged V belts must only be replaced by a complete set of belts of the appropriate assorted lengths.

7.2.5 Cleaning oil reservoir

The oil reservoir must be cleaned every 3 months. Drain the lubricating oil when the machine is at a standstill. Rinse the oil reservoir with rinsing oil.



The oil reservoir must not be rinsed with solvent or cold cleaning liquid.

Before switching on the machine again, do not forget the preliminary lubrication! See chapter 5, "Initial operation".

7. Maintenance

7.2.6 Non-return valve

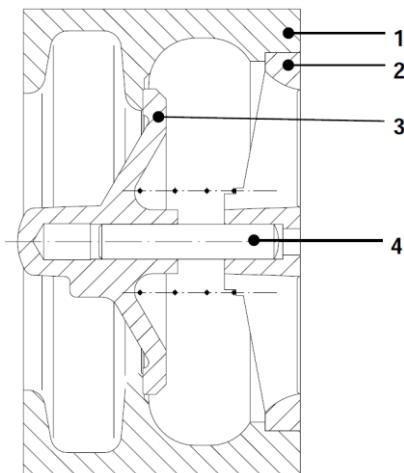
No maintenance of the non-return valve is necessary.

We recommend an initial check after 300 hours of operation.

The valve must be checked for oil carbon deposit, and depending on its condition, the interval for the next check must be fixed. The layer of oil carbon must not exceed 1 mm in thickness.



Sealing and sliding surfaces must be free from oil carbon deposits so that the function of the non-return valve is preserved.



- | | |
|------------------|-----------------|
| 1. Valve housing | 2. Guide plate |
| 3. Valve plate | 4. Cylinder pin |

Figure 7-2: Non-return valve

If cleaning should be necessary, the valve must first be removed.

- Remove the mounting screws, and pull out the non-return valve between the mounting flanges.
- To dismantle the valve, press down the valve plate (7.3/3) until it touches the guide plate (7.3/2), then remove the latter carefully from the valve housing centre (7.3/1) with a press.
- After thorough cleaning, check the valve seating for the quality of the seal. If there is a leak, grind the valve seating afresh with grinding paste.
- Before assembly, which is carried out in reverse order, the sliding surfaces of the cylinder pin (4) should be coated with MOLYKOTE oil, type M 55 (manufacturer: DOW CORNING).

7.2.7 Ventilation valve

If incorrectly installed the vent hole C, used for pressure compensation of the ventilation valve may block and reduce the function of the ventilation valve.

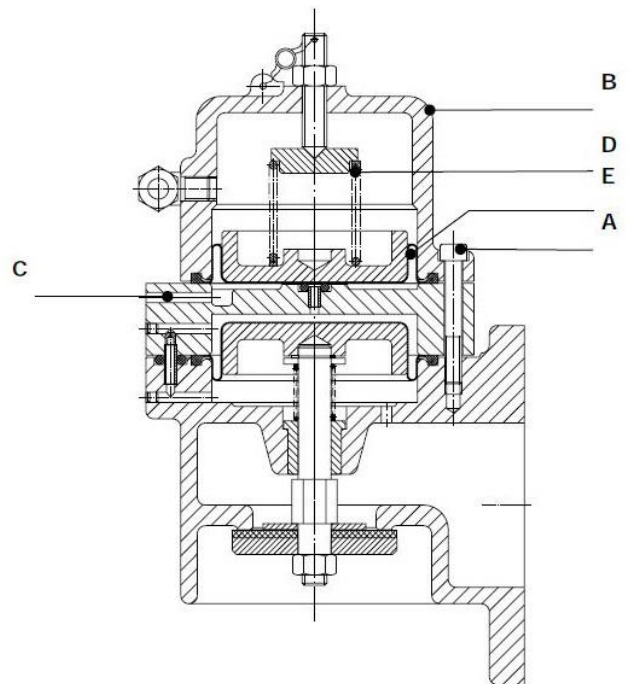


Figure 7-3: Ventilation valve

To avoid this carry out a visual check of the ventilation valve regularly (at least every 3 months and, if necessary, dismantle the ventilation valve, clean the dirt and blow out the bore hole for pressure compensation with compressed air.

Proceed as follows for dismantling:

- Unscrew fixing screws (7.4/A).
- Remove upper valve part (7.4/B) and clean valve interior.
- Blow out the vent hole for pressure compensation (7.4/C) with compressed air from the inside to the outside.
- Reassemble in reverse order.



Watch for correct centering of the pressure spring (7.4/D) and correct seat of the rolling diaphragm (7.4/E) during assembly.

7. Maintenance

7.2.8 Rotor vane height wear

To inspect the rotary vane for height wear, remove the combination air filter and suction line, resp.

Press the rotary vane in the rotor gap through the oblong hole which becomes visible. Measure the depth to the rotor surface by means of a depth gauge (see [Figure 7-4](#)).

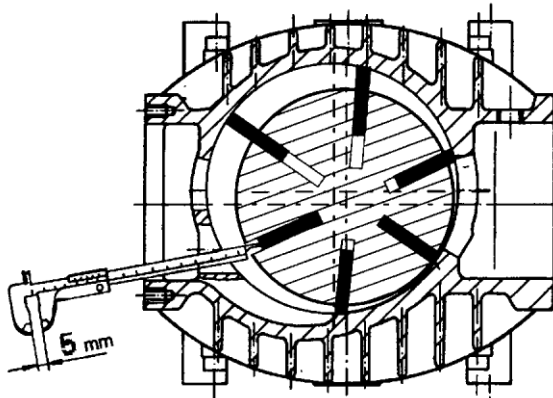


Figure 7-4: Check rotor vanes for height wear



The depth must not be more than 5 mm!

If the wear limit of 5 mm is reached, the rotor vanes must be replaced. (See the separate instruction manual).

Make the first wear check after about 6 months, then every 3 months (if the machine run time is about 3 - 4 hours daily).

8. Spare parts and after sales service

8.1 Spare parts 8.2 Wearing parts

When ordering spare parts, please give the following information:

8.1 Spare Parts

A supply of the most important spare parts (maintenance and wearing parts) at the installation site is an important prerequisite for constant function and availability of the compressor/vacuum pump.

To order spare parts, please use the following parts list.

We can only provide a guarantee for original spare parts supplied by us.

When spare parts and additional appliances not supplied by us are fitted or attached, the guarantee provided by Gardner Denver loses its validity. Please take into consideration that there are often specific manufacture and delivery requirements for our own parts and parts supplied by third parties, and that we always offer you spare parts in keeping with the latest state of the technology and the latest legal requirements.

Example

* Commission No.	77 303 793
* Year of construction	1993
* Machine type	RFW 260 DVR
* Machine No.	961 016/9
Parts list No	ETB-40.01.0
Item No	5
Order No.	342 607 00
Quantity	6
Designation	Rotor vanes

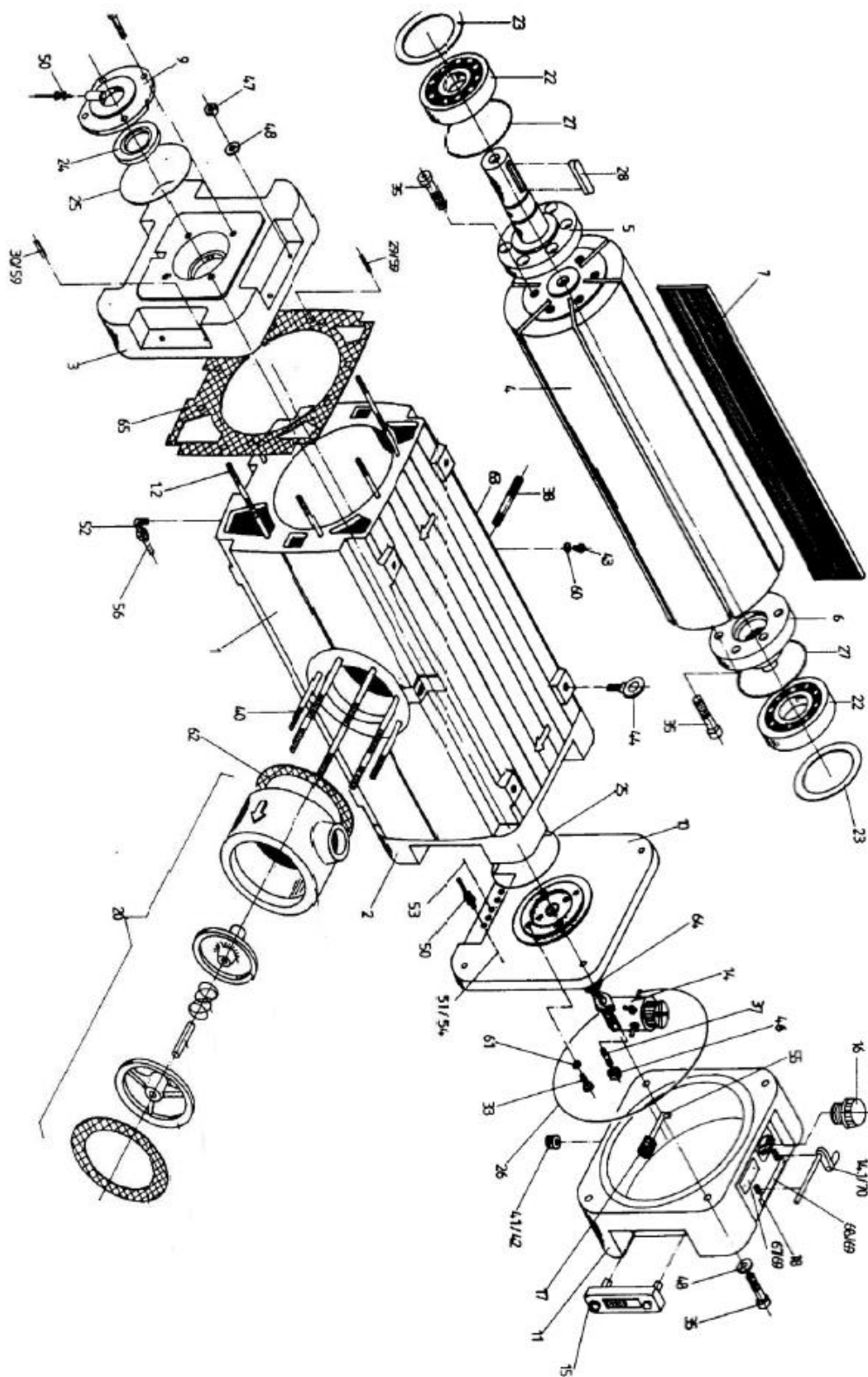
The information marked with * can be found on the machine's rating plate.

8.2 Wearing parts

We recommend storage of the following spare parts:

Order number for type					
Item No.	RFW 150	RFW 200	RFW 260	Quantity	Designation
7	342 657 00	342 658 00	342 659 00	6	Rotor vane
15	426 406 00	426 406 00	426 406 00	1	Oil level sight glass
22	411 230 00	411 230 00	411 230 00	2	Cylinder roller bearing 55/120x29
24	461 054 00	461 054 00	461 054 00	2	Shaft seal ring BA 50/72x8
25	463 659 00	463 659 00	463 659 00	2	Round seal ring 120x3 B
26	463 700 00	463 700 00	463 700 00	1	Round seal ring 330x5 B
62	464 540 00	464 540 00	464 540 00	1	Seal DN100 PN16
64	465 635 00	465 635 00	465 635 00	1	Oil pump seal 28/38x0.25
65	465 290 00	465 290 00	465 290 00	2 each	Casing seals 0.3 mm thick
	465 291 00	465 291 00	465 291 00		0.4 mm thick
	465 292 00	465 292 00	465 292 00		0.5 mm thick
	465 293 00	465 293 00	465 293 00		0.6 mm thick

Figure 9-1:
RFW exploded view



9. Parts List

RFW 150

ITEM	QTY	PART #	DESCRIPTION
1	1	90395200	HOUSING
#12	16	44614800	STUD-DOUBLE END
1-3*	1	44486600	LOCKING SCREW
4	1	90395600	ROTOR
7	6	34265700	ROTOR VANE
14	1	42561400	PUMP-OIL
50	5/6/6	42542300	CONNECTOR
51	5	42542000	SCREW FITTING W/NON RETURN VALVE
52	3/4/4	42516700	PIPE CONNECTION
53	1	44486000	PLUG/M OIL TANK DRAIN
54	1	42516900	SCREW FITTING W/ NON-RETURN VALVE
56	1	06200300-S	PIPE
57	1	34400400	HOSE LINE
58	8/10	42543100	SLEEVE
2	1	90399400	COVER, RFW "B" END PLATE
3	1	90399300	COVER, RFW "A" END PLATE
5	1	90399700	FLANGE, SHAFT
6	1	90398900	FLANGE B
9	1	98230700	COVER PLATE
10	1	90399500	INTERMEDIATE OIL TANK
11	1	90399600	OIL TANK
15	2	42640600	GLASS-SIGHT
16	1	47201900	CAP-OIL FILL
17	1	42537300	SLEEVE, SUCTION
18	2	51055100	TUBE CLIP
20	1	99355900	VALVE, NON-RETURN
22	2	41123000	BEARING
23	2	45189000	WASHER
24	2	46105400	SEAL, SHAFT
25	2	46365900	O-RING
26	1	46370000	O-RING
27	2	45169800	WASHER
28	1	45451900	SHAFT KEY
29	2	44901900-S	STRAIGHT PIN
30	2	44843100	PIN-TAPER
33	8	44505300	BOLT
35	16	44509600	BOLT
37	2	44606900	STUD-DOUBLE END

9. Parts List

ITEM	QTY	PART #	DESCRIPTION
38	8	44614500	STUD-DOUBLE END
40	8	44616100	DOUBLE END STUD
41	1	42172100	GASKET
42	1	44487400	SCREW-LOCKING
43	2	44489700	LOCKING SCREW
44	2	44480400	RINGBOLT
46	2	45019000	NUT-HEX
47	16	45019300	NUT-HEX
48	16	45113200	WASHER
55	1	6200700	PIPE, OIL INTAKE LINE
59	4	58741500	CONICAL STOPPER
60	2	42171600	RING SEALING
61	4	42170300	SEALING RING
62	1	46454000	GASKET
63*	1	46454200	GASKET, INTAKE FLANGE
64	1	46563500	GASKET
65	2	46629000	CASING GASKET
67	1	45588600	NAME PLATE FOR OIL TYPES
68	1	45589900	NAME PLATE
69	4	45301900	TRUSS HEAD RIVET
70	2	44331700	BOLT, CHEESE HEAD
+		SP9039502	KIT-SERVICE
+		300FWA6010	KIT-SERVICE - W/O BEARINGS

* ITEMS NOT SHOWN IN DRAWING

9. Parts List

RFW 200

ITEM	QTY	PART #	DESCRIPTION
1	1	90396200	HOUSING
#12	16	44614800	STUD-DOUBLE END
1-3*	1	44486500	LOCKING SCREW
4	1	90396600	ROTOR
7	6	34265800	ROTOR VANE
14	1	42562100	PUMP-OIL
50	5/6/6	42542300	CONNECTOR
51	5	42542000	SCREW FITTING W/NON RETURN VALVE
52	3/4/4	42516700	PIPE CONNECTION
53	1	44486000	PLUG/M OIL TANK DRAIN
54	1	42516900	SCREW FITTING W/ NON-RETURN VALVE
56	1	06200300-S	PIPE
57	1	34400400	HOSE LINE
58	8/10	42543100	SLEEVE
2	10	90399400	COVER, RFW "B" END PLATE
3	1	90399300	COVER, RFW "A" END PLATE
5	1	90399700	FLANGE, SHAFT
6	1	90398900	FLANGE B
9	1	98230700	COVER PLATE
10	1	90399500	INTERMEDIATE OIL TANK
11	1	90399600	OIL TANK
15	2	42640600	GLASS-SIGHT
16	1	47201900	CAP-OIL FILL
17	1	42537300	SLEEVE, SUCTION
18	2	51055100	TUBE CLIP
20	1	99355900	VALVE, NON-RETURN
22	2	41123000	BEARING
23	2	45189000	WASHER
24	2	46105400	SEAL, SHAFT
25	2	46365900	O-RING
26	1	46370000	O-RING
27	2	45169800	WASHER
28	1	45451900	SHAFT KEY
29	2	44901900-S	STRAIGHT PIN
30	2	44843100	PIN-TAPER
33	8	44505300	BOLT
35	16	44509600	BOLT
37	2	44606900	STUD-DOUBLE END

9. Parts List

ITEM	QTY	PART #	DESCRIPTION
38	8	44614500	STUD-DOUBLE END
40	8	44616100	DOUBLE END STUD
41	1	42172100	GASKET
42	1	44487400	SCREW-LOCKING
43	2	44489700	LOCKING SCREW
44	2	44480400	RINGBOLT
46	2	45019000	NUT-HEX
47	16	45019300	NUT-HEX
48	16	45113200	WASHER
55	1	6200700	PIPE, OIL INTAKE LINE
59	4	58741500	CONICAL STOPPER
60	2	42171600	RING SEALING
61	4	42170300	SEALING RING
62	1	46454000	GASKET
63*	1	46454200	GASKET, INTAKE FLANGE
64	1	46563500	GASKET
65	2	46629000	CASING GASKET
67	1	45588600	NAME PLATE FOR OIL TYPES
68	1	45589900	NAME PLATE
69	4	45301900	TRUSS HEAD RIVET
70	2	44331700	BOLT
+		SP9039502	KIT-SERVICE
+		300FWA6010	KIT-SERVICE - W/O BEARINGS

* ITEMS NOT SHOWN IN DRAWING

9. Parts List

RFW 260

ITEM	QTY	PART #	DESCRIPTION
1	1	90397200	HOUSING
#12	16	44614800	STUD-DOUBLE END
1-3*	1	44486600	LOCKING SCREW
4	1	90397600	ROTOR
7	6	34265900	ROTOR VANE
14	1	42562100	OIL PUMP
50	5/6/6	42542300	CONNECTOR
51	5	42542000	SCREW FITTING W/NON RETURN VALVE
52	3/4/4	42516700	PIPE CONNECTION
53	1	44486000	PLUG/M OIL TANK DRAIN
54	1	42516900	SCREW FITTING W/ NON-RETURN VALVE
56	1	06200300-S	PIPE
57	1	34400400	HOSE LINE
58	8/10/1	42543100	SLEEVE
2	1	90399400	COVER, RFW "B" END PLATE
3	1	90399300	COVER, RFW "A" END PLATE
5	1	90399700	FLANGE, SHAFT
6	1	90398900	FLANGE B
9	1	98230700	COVER PLATE
10	1	90399500	INTERMEDIATE OIL TANK
11	1	90399600	OIL TANK
15	2	42640600	GLASS-SIGHT
16	1	47201900	CAP-OIL FILL
17	1	42537300	SLEEVE, SUCTION
18	2	51055100	TUBE CLIP
20	1	99355900	VALVE, NON-RETURN
22	2	41123000	BEARING
23	2	45189000	WASHER
24	2	46105400	SEAL, SHAFT
25	2	46365900	O-RING
26	1	46370000	O-RING
27	2	45169800	WASHER
28	1	45451900	SHAFT KEY
29	2	44911900-S	STRAIGHT PIN
30	2	44843100	PIN-TAPER
33	8	44505300	BOLT
35	16	44509600	BOLT
37	2	44606900	STUD-DOUBLE END

9. Parts List

ITEM	QTY	PART #	DESCRIPTION
38	8	44614500	STUD-DOUBLE END
40	8	44616100	DOUBLE END STUD
41	1	42172100	GASKET
42	1	44487400	SCREW-LOCKING
43	2	44489700	LOCKING SCREW
44	2	44480400	RINGBOLT
46	2	45019000	NUT-HEX
47	16	45019300	NUT-HEX
48	16	45113200	WASHER
55	1	6200700	PIPE
59	4	58741500	CONICAL STOPPER
60	2	42171600	RING SEALING
61	4	42170300	SEALING RING
62	1	46454000	GASKET
63*	1	46454200	GASKET, INTAKE FLANGE
64	1	46563500	GASKET
65	2	46629000	CASING GASKET
67	1	45588600	NAME PLATE FOR OIL TYPES
68	1	45589900	NAME PLATE
69	4	45301900	TRUSS HEAD RIVET
70	2	44331700	BOLT
+		SP9039702	KIT-SERVICE
+		300FWD6010	KIT-SERVICE - W/O BEARINGS

* ITEMS NOT SHOWN IN DRAWING

RFW Series Vacuum Pump Accessories

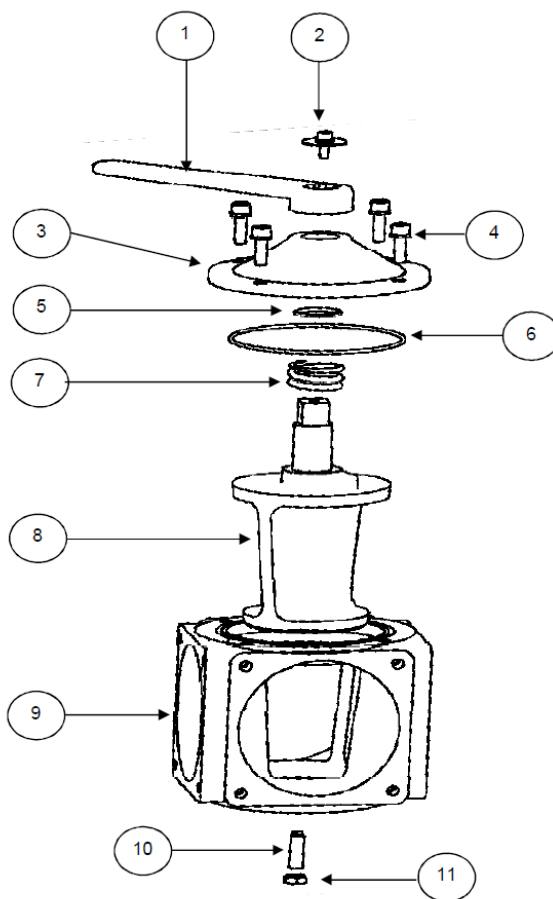


Figure 9-2: RFW Series Vacuum Pump Accessories

ITEM	PART #	DESCRIPTION
	301FLA238	VALVE, 4-WAY
1	300FLA345	HANDLE-USED WITH 4-WAY VALVE
2	CALL FACTORY	CAPSCREW AND WASHER FOR HANDLE
3	CALL FACTORY	COVER
4	CALL FACTORY	CAPSCREW AND WASHER FOR COVER (4 REQ.)
5	522001245	O-RING, STEM, BUNA
6	522001244	O-RING, COVER, BUNA
7	CALL FACTORY	SPRING
8	CALL FACTORY	INTERNAL VANE
9	CALL FACTORY	VALVE BODY
10	CALL FACTORY	TOGGLE SCREW
11	CALL FACTORY	SEAL NUT

RFW Series Vacuum Pump Accessories

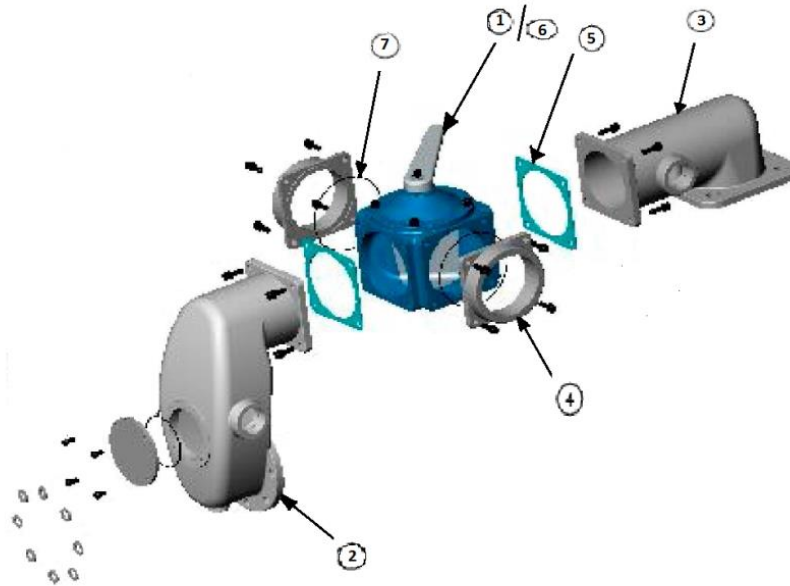


Figure 9-3: RFW Series Vacuum Pump Accessories

ITEM	PART #	DESCRIPTION
	300FWA286	MANIFOLD KIT
1	301FLA238	VALVE, 4-WAY
2	302FWA286	MANIFOLD KIT W/O 4-WAY VALVE
3	303FWA286	MANIFOLD, INTAKE SIDE
4	301FLA6017	KIT-VALVE,4-WAY W/(2) 4"NPT FLANGES
5	300FLA715	GASKET, MANIFOLD TO 4-WAY VALVE
6	300FLA345	HANDLE
7	300FLA578	O-RING
8*	540033209	MANIFOLD ACCESS PLATE KIT W/HDWR
9*	300FLA1100	HARDWARE KIT 286
10*	46482900	GASKET, FILTER TO MANIFOLD

* ITEMS NOT SHOWN IN DRAWING



For additional information, contact your local representative or

Gardner Denver Compressor Division

1800 Gardner Expressway

Quincy, Illinois 62301

Customer Service Department:

Phone: (800) 682-9868

Fax: (217) 221-8780

Visit our web site: www.gardnerdenver.com

E-mail: pdblowers@gardnerdenver.com