

SCREWLINE

Dry Compressing Screw Vacuum Pump
for Industrial Applications

DURADRY

Dry Compressing Vacuum Pump
for Photovoltaic and
Semi-conductors Applications

CHEMROVAC

Dry Vacuum Pump
for Chemical and Pharmaceutical Applications

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Product Section C05

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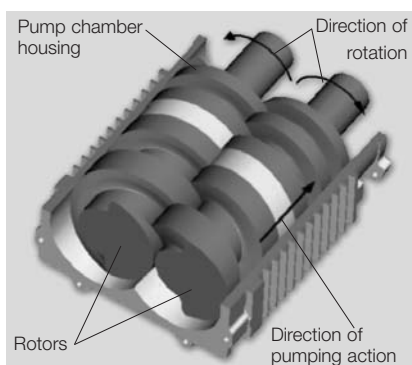
Product SCREWLINE

Dry Compressing Screw Vacuum Pump SCREWLINE

General

Principle of Operation

SCREWLINE vacuum pumps are dry compressing backing pumps, the operation of which is based on the screw principle. The pumping chamber of the pump is formed by two synchronised positive displacement rotors and the housing enclosing these. Since the rotors rotate in opposite directions, the chambers move steadily from the intake to the exhaust side of the pumps thereby resulting in a smooth pumping action (see figure below). Since with a single SCREWLINE rotor pair a multi-stage compression process is implemented, the component count in the pumping path is very low. In this way maintenance and servicing work is much simplified.



Principle of operation of the SCREWLINE pumps

Properties

The direct pumping path without multiple deflections for the medium make the SCREWLINE vacuum pumps highly insensitive to foreign materials. This ensures a high uptime in industrial processes.

The two non-contacting shaft-seals are practically wear-free, which allows for very long maintenance intervals.

For standard applications no purge gas is required. However, a purge gas supply can be connected as an option to purge the seals, should the application process require this.

Because of the cantilevered bearing arrangement for the SCREWLINE rotors, a potential source of failure (i.e. a bearing on the intake side) is entirely eliminated. On the one hand, no lubricants from the bearings can enter into the vacuum process, and the other hand also an impairment of the bearing by aggressive process media can be excluded.

A further benefit of the cantilevered bearing arrangement is the easy accessibility of the pump chamber. This innovative design feature allows the removal of the pump housing without time-consuming and costly disassembly of the bearings. Thus on-site cleaning of all surfaces in contact with the medium is possible. In particular, if the processes involved considerable amounts of contaminants this is a significant advantage which ensures a long uptime.



SP250 with silencer (horizontal)

Besides the integrated oil cooling arrangement for the rotors, the SCREWLINE pumps are air-cooled from the outside. Here rotor and housings are thermally linked via the oil cooler. Thus, SCREWLINE pumps adapt themselves ideally to the ambient conditions under changing operating situations.

A water-cooled version is offered as SCREWLINE SP630 F. This product version is intended for operation in air-conditioned rooms.

The SCREWLINE portfolio is completed through ATEX-certified variants.

Moreover, the SCREWLINE portfolio also includes pump versions suited for pumping pure oxygen (O₂).



Oil/water cooling unit SP630 F

Maintenance and Monitoring

During the development of the SCREWLINE pumps, special emphasis was placed on a particularly simple maintenance concept. This has been implemented through the cantilevered bearing arrangement, with all maintenance components and controls having been located on the so-called service side for easy accessibility. Thus, the space requirement which needs to be taken into account during planning has been optimized. The lower space requirement gives the user more flexibility during installation of the pump.

The monitoring system SP-GUARD was developed especially for constant real-time monitoring of the operational status of the SCREWLINE vacuum pumps. The operating parameters are constantly acquired and processed.

This enables the user to introduce preventive actions early enough so as

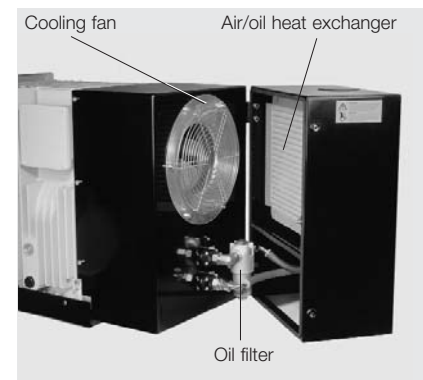
to ensure trouble-free operation of his SCREWLINE vacuum pumps. The key current operating parameters can be read off from a local display. Moreover, connection to a PLC and remote monitoring is possible. Maintenance of the SCREWLINE pumps will generally be limited to a regular visual inspection of the pump and the annual change of gear oil and oil filter. The oil fill ports as well as the filters are readily accessible and can be easily exchanged.

With the aid of a flushing kit (optional) it is possible to clean the pump chamber, while the pump is operating without process. Deposits due to the process can thus be removed effectively and quickly without the need of having to disassemble the housing.

Also, cleaning of the air/oil heat exchanger can be done simply on-site by blowing out the heat exchanger with compressed air.

Accessories

SCREWLINE vacuum pumps offer to the user a high degree of flexibility. Inlet and exhaust connections are made through universal flanges, respectively clamped flanges, permit simple integration within the system. Through the accessories which are available, the pump can be optimally adapted to the individual requirements of differing applications.



Oil/water cooling unit SP630

The New Dry Compressing Screw Vacuum Pump for Industrial Applications



Pump system SCREWLINE SP630 with RUVAC WAU 2001

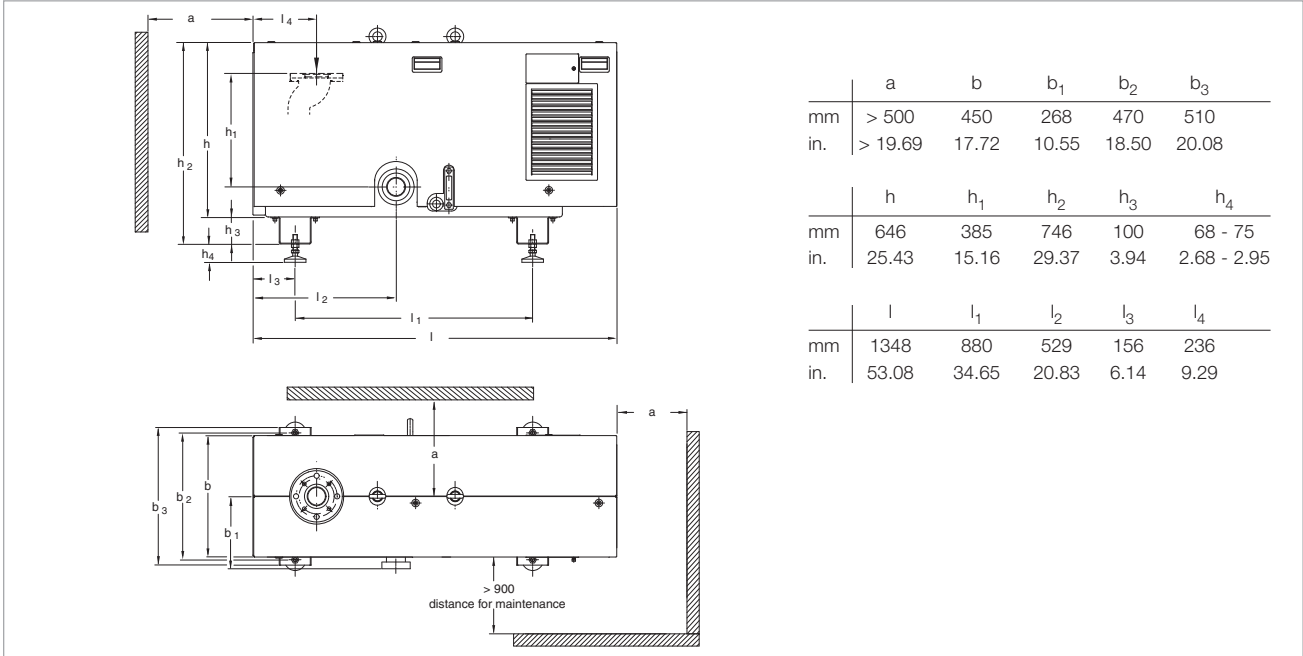
The SCREWLINE pumps were developed in view of the special requirements of industrial applications. The innovative design allows these pumps to be used whenever reliable, compact and low maintenance vacuum solutions are required.

Advantages to the User

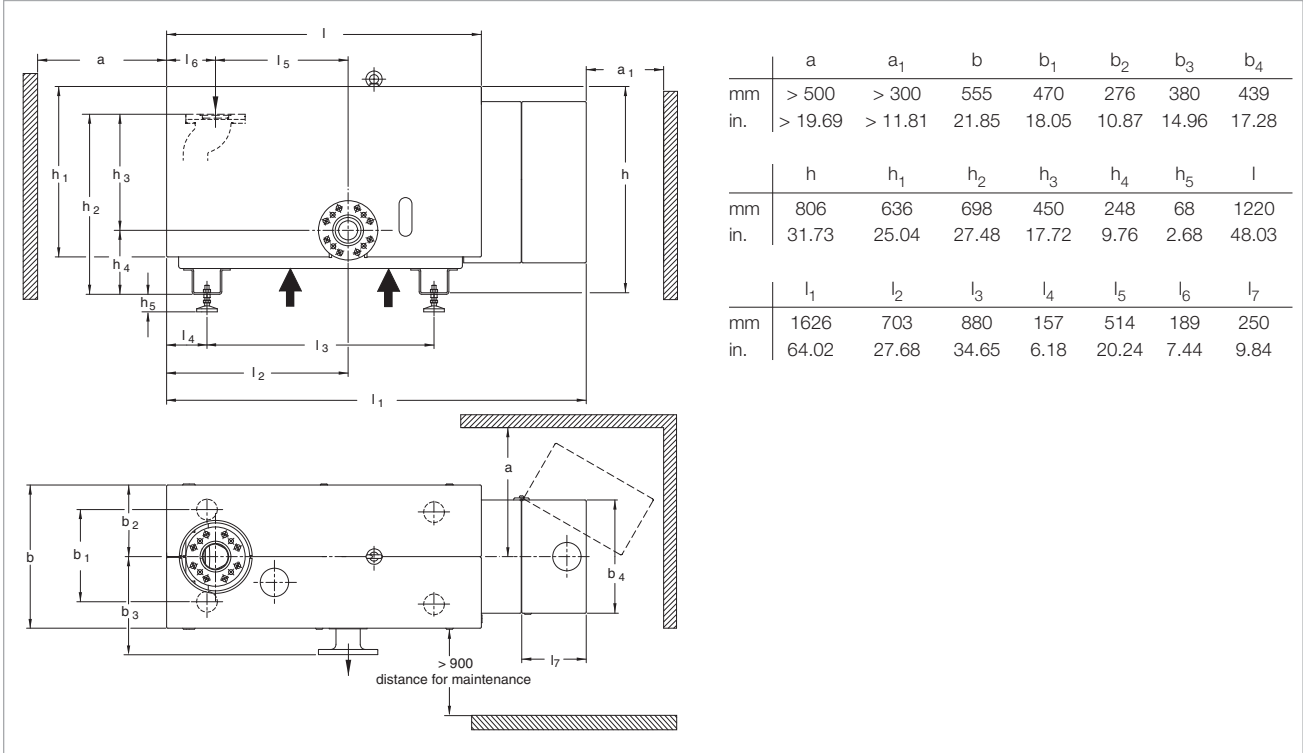
- Minimum downtimes, maximum availability, highly rugged
 - The only vacuum pump with a cantilevered bearing arrangement in the industrial market
 - Monitoring through SP-GUARD
 - Highly tolerant of particles and vapours
- Low cost of ownership
 - No purge gas and no cooling water is required for standard applications
 - Low power consumption
 - No contaminated waste oil, no waste disposal costs
- Long maintenance intervals and low servicing complexity
 - Easy and rapid accessibility of all maintenance components and controls
 - Only an annual change of the gear oil is necessary
 - On-site cleaning of the rotors is easy to perform
- Highly flexible
 - Accessories are available for most demanding processes
 - The modular concept allows easy adaptation of the pumping speed of up to 2000 m³/h by combination with RUVAC Roots vacuum pumps
 - Connections provided through universal flanges, respectively clamped flanges allow for simple and flexible integration within systems
 - Basic models plus accessories allow the pumps to be equipped according to specific requirements
- High pumping speed at low ultimate pressure
- Excellent suitability for the short cycles of load lock chambers or similar applications

Typical Applications

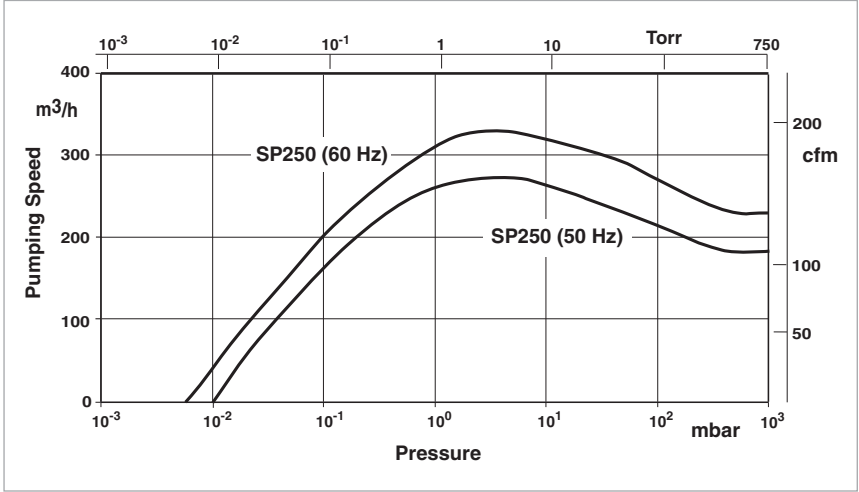
- Industrial furnaces
- Coating technology
- Load lock chambers
- Metallurgical systems
- Packaging technology
- Drying processes
- Degassing
- Research and development
- Lamps and tubes manufacture
- Automotive industry
- Packaging industry
- Space simulation
- Electrical engineering
- Energy research



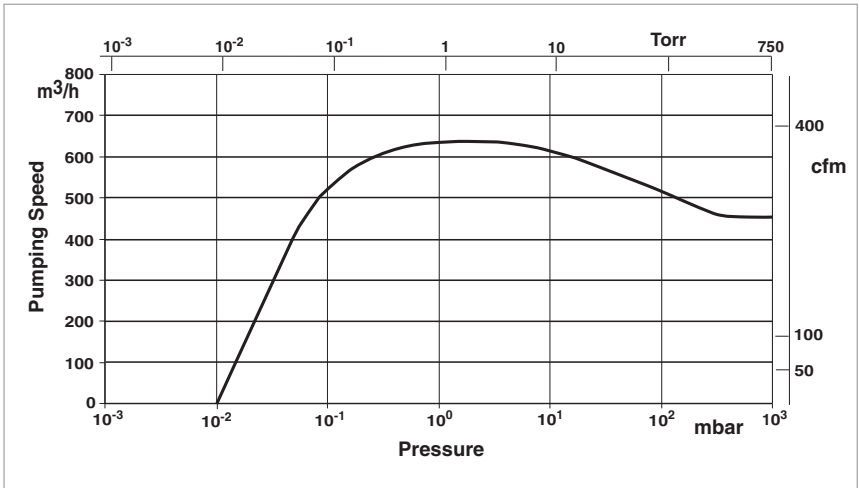
Dimensional drawing for the SCREWLINE SP250



Dimensional drawing for the SCREWLINE SP630



Effective pumping speed of the SCREWLINE SP250 for air, without gas ballast (50/60 Hz)



Effective pumping speed of the SCREWLINE SP630 for air, without gas ballast

Products

Technical Data

SCREWLINE SP250

		50 Hz	60 Hz
Effective pumping speed	m ³ x h ⁻¹ (cfm)	270 (≥ 157)	330 (≥ 194)
Ultimate pressure, total	mbar (Torr)	≤ 0.01 (≤ 0.0075)	≤ 0.005 (≤ 0.0038)
Permissible intake pressure, max.	mbar (Torr)	1030 (773)	1030 (773)
Maximum exhaust pressure with reference to the ambient pressure		$p_{ex} = p_{amb} + 200 \text{ mbar (150 Torr)}$ $- 50 \text{ mbar (37 Torr)}$	$p_{ex} = p_{amb} + 200 \text{ mbar (150 Torr)}$ $- 50 \text{ mba (37 Torr)}$
Noise level ¹⁾	dB(A)	67	72
Permissible ambient temperature	°C (°F)	+10 to +40 (+50 to +104)	+10 to +40 (+50 to +104)
Contamination degree ²⁾		3	3
Water vapour tolerance (with gas ballast)	mbar (Torr)	60 (45)	75 (56)
Water vapour capacity (with gas ballast)	kg x h ⁻¹ (gal x h ⁻¹)	10 (2.7)	18 (4.9)
Relative humidity of the ambient air ³⁾	%	max. 95	max. 95
Installation location		up to 3000 metres (9.800 feet) (above sea level)	up to 3000 metres (9.800 feet) (above sea level)
Cooling		Air	Air
Power supply at operating voltage	ΔΔ Δ	32.0 A / 200 V (cos phi 0.88) 16.0 A / 400 V (cos phi 0.88)	31.5 A / 210 V (cos phi 0.88) 15.5 A / 460 V (cos phi 0.88)
3-ph. nominal current at operating voltage	Δ	14.5 A / 500 V (cos phi 0,88)	–
Nominal power	kW (HP)	7.5 (10.0)	11.5 (15.6)
Power consumption at ultimate pressure	kW (HP) kW (HP)	5.9 (8.0) at 3-ph. 200 V / 400 V 6.5 (8.8) at 3-ph. 500 V	7.2 (9.8) –
Motor rotational speed	rpm	2920	3505
Type of protection	IP	55	55
Thermal protection class		F	F
Lubricant filling (ANDEROL 555)	l	7	7
Intake flange, standard			
Clamping flange		ISO 1609-1986 (E)-63 (DN 63 ISO-K) ⁴⁾	ISO 1609-1986 (E)-63 (DN 63 ISO-K) ⁴⁾
Bolt flange		ASME B 16.5 NPS 3 class 150	ASME B 16.5 NPS 3 class 150
Bolt flange		EN 1092-2-PN 6 - DN 65	EN 1092-2-PN 6 - DN 65
Exhaust flange, standard			
Clamping flange		ISO 1609-1986 (E)-63 (DN 63 ISO-K)	ISO 1609-1986 (E)-63 (DN 63 ISO-K)
Exhaust flange, optional			
Clamping flange		ISO 1609-1986 (E)-63 (DN 63 ISO-K) ⁴⁾	ISO 1609-1986 (E)-63 (DN 63 ISO-K) ⁴⁾
Bolt flange		ASME B 16.5 NPS 3 class 150	ASME B 16.5 NPS 3 class 150
Bolt flange		EN 1092-2-PN 16 - DN 65	EN 1092-2-PN 16 - DN 65
Bolt flange		EN 1092-2-PN 6 - DN 65	EN 1092-2-PN 6 - DN 65
Materials (components in contact with the gas)		Aluminum, aluminum anodic oxidised, C steel, CrNi steel, grey cast-iron, FPM (FKM) (Viton))	Aluminum, aluminum anodic oxidised, C steel, CrNi steel, grey cast-iron, FPM (FKM) (Viton))
Weight, approx.	kg (lbs)	450 (992)	450 (992)
Dimensions (W x D x H)	mm (in.)	1350 x 530 x 880 (53.1 x 20.9 x 34.6)	1350 x 530 x 880 (53.1 x 20.9 x 34.6)

¹⁾ With sealed off lines at ultimate pressure (in accordance with ISO 4871)

²⁾ In accordance with EN 50178

³⁾ In accordance with EN 60721-3-3

⁴⁾ This flange is required when ISO-K flanges are to be connected (Part No. 267 47)

Ordering Information

SCREWLINE SP250

	Standard	ATEX	O ₂
SCREWLINE SP250 (50/60 Hz) with SP-GUARD and manual gas ballast	Part No. 115 001	-	-
with SP-GUARD and electromagnetic gas ballast	Part No. 115 002	-	-
with manual gas ballast	Part No. 115 004	-	-
with electromagnetic gas ballast	Part No. 115 005	-	-
with SP-GUARD, purge gas unit, castors and manual gas ballast valve	Part No. 115 006	-	-
with SP-GUARD, electromagnetic gas ballast and purge gas unit Category 3GD IIC 160 °C inside	-	Part No. 115 003 ¹⁾	-
with SP-GUARD, special gaskets, electromagnetic gas ballast and purge gas unit Category 3GD IIC 160 °C inside	-	Part No. 115 009	-
with SP-GUARD, electromagnetic gas ballast and purge gas unit Category 3GD IIC 160 °C inside / Category 3GD Ex nA IIC 160 °C outside	-	Part No. 115 010	-
with SP-GUARD, electromagnetic gas ballast and purge gas unit Category 2G3D b IIC 135 °C inside / Category 3GD Ex nA IIC 160 °C outside (50 Hz only)	-	Part No. 115 011	-
Category 2Gb IIC T4 3D T 130 °C X inside / Category 2Gb IIC T4 3D T 130 °C X outside electropneumatic gas ballast, purge gas unit, sensors, wired including junction box (3-ph. only, 400 V, 50 Hz; DN 65 PN 16)	-	Part No. 115 013	-
Category 2Gb IIC T4 3D T 130 °C X inside / Category 2Gb IIC T4 3D T 130 °C X outside electropneumatic gas ballast, sensors, wired including junction box, purge gas unit (3-ph. only, 500 V, 50 Hz; DN 65 PN 16) ²⁾	-	Part No. 115 015	Part No. 115 019
Exhaust silencer	Part No. 119 002	Part No. 119 002	Part No. 119 002
Exhaust non-return valve (DN 65 PN 6)	Part No. 119 011	-	-
Adaptor for RUVAC 501/1001	Part No. 119 022	Part No. 119 022	Part No. 119 022
Purge gas retrofit kit	Part No. 119 031	-	-
Inlet filter adapter DN 63 ISO-K	Part No. 119 019	Part No. 119 019	-
Dust filter	Part No. 951 68	-	-
Flushing kit	Part No. 119 015	Part No. 119 015	-
Transportation drawbar (upon request)	Part No. 119 017	-	-
Maintenance kit, level 1	Part No. EK 110000820	Part No. EK 110000820 ³⁾	Part No. EK 110000820
Maintenance kit, level 2	Part No. EK 110000821	Part No. EK 110000821 ³⁾	Part No. EK 110000821
Seal kit, level 1	Part No. EK 110000837	Part No. EK 110000837 ³⁾	Part No. EK 110000837
Purge gas connection servicing kit	Part No. EK 110000834	Part No. EK 110000834 ³⁾	-
Filter for gas ballast	Part No. E 110000980	Part No. E 110000980 ³⁾	Part No. E 110000980
Filter for purge gas valve unit	Part No. E 110000850	Part No. E 110000850	Part No. E 110000850
Absorbing felt	Part No. E 110002435	Part No. E 110002435	Part No. E 110002435

¹⁾ ATEX Category 3 as standard (Directive 94/9/EG)

²⁾ T4 with max. $p_{ex} = p_{amb} + 200 \text{ mbar}$
 $+ 050 \text{ mbar}$

³⁾ Spare Parts can only be used for Part No.115 003, 115 010 and 115 011

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Technical Data

SCREWLINE SP630

		50 Hz	60 Hz
Pumping speed	m ³ x h ⁻¹ (cfm)	630 (371)	630 (371)
Ultimate total pressure	mbar (Torr)	≤ 0.01 (≤ 0.0075)	≤ 0.01 (≤ 0.0075)
Maximum exhaust pressure with reference to the ambient pressure		$p_{ex} = p_{amb} + 200 \text{ mbar (150 Torr)}$ $- 50 \text{ mbar (37 Torr)}$	$p_{ex} = p_{amb} + 200 \text{ mbar (150 Torr)}$ $- 50 \text{ mbar (37 Torr)}$
Intake pressure limits, max.	mbar (Torr)	1030 (773)	1030 (773)
Noise level ¹⁾	dB(A)	73	75
Permissible ambient temperature	°C (°F)	+10 to +40 (+50 to +104)	+10 to +40 (+50 to +104)
Contamination degree ²⁾		3	3
Water vapour tolerance (with gas ballast)	mbar (Torr)	40 (30)	40 (30)
Water vapour capacity (with gas ballast)	kg x h ⁻¹ (gal x h ⁻¹)	14 (3.7)	14 (3.7)
Relative humidity of the ambient air ³⁾	%	max. 95	max. 95
Installation location		up to 3000 metres (9.800 feet) (above sea level)	up to 3000 metres (9.800 feet) (above sea level)
Cooling		Air	Air
Power supply	△△ △	56 A / 200 V 28 A / 400 V	52 A / 210 V 24 A / 460 V
cos φ		0.89	0.90
Nominal power	kW (HP)	15 (20)	15 (20)
Power consumption at ultimate pressure	kW (HP)	< 11 (< 15)	< 11 (< 15)
Motor rotational speed	rpm	2930	3530
Type of protection	IP	55	55
Thermal protection class		F	F
Lubricant filling (ANDEROL 555)	l	15	15
Intake flange and exhaust flange compatible with bolt flanges		EN 1092-2 - PN 6 - DN 100 EN 1092-2 - PN 16 - DN 100 ISO 1609-1986 (E)-100 (DN 100 ISO-K) ⁴⁾ ASME B 16.5 NPS4 class 150	EN 1092-2 - PN 6 - DN 100 EN 1092-2 - PN 16 - DN 100 ISO 1609-1986 (E)-100 (DN 100 ISO-K) ⁴⁾ ASME B 16.5 NPS4 class 150
Materials (components in contact with the gas)		Aluminum, aluminium anodic oxidised, C steel, CrNi steel, grey cast-iron, FPM (FKM) (Viton))	Aluminum, aluminium anodic oxidised, C steel, CrNi steel, grey cast-iron, FPM (FKM) (Viton))
Weight, approx.	kg (lbs)	530 (1166)	530 (1166)
Dimensions (W x D x H)	mm (in.)	1630 x 660 x 880 (64 x 26 x 35)	1630 x 660 x 880 (64 x 26 x 35)

¹⁾ With sealed off lines at ultimate pressure (in accordance with ISO 4871)

²⁾ In accordance with EN 50178

³⁾ In accordance with EN 60721-3-3

⁴⁾ This flange is required when ISO-K flanges are to be connected (P/N 267 50)

Additional Technical Data**SCREWLINE SP630 F**

		50 Hz	60 Hz
Cooling		Water	Water
Water connection	G	1/2" ISO 228-1	1/2" ISO 228-1
Water temperature	°C (°F)	+5 to +35 (+41 to +95)	+5 to +35 (+41 to +95)
Minimum water feed pressure			
	bar (psi, gauge)	2 (15)	2 (15)
Nominal flow at a water feed temperature of 25° C (77 °F)			
	l/min (gal/min)	12 (3)	12 (3)
Noise level ¹⁾	dB(A)	71	71

¹⁾ With sealed off lines at ultimate pressure (in accordance with ISO 4871)

Ordering Information

SCREWLINE SP630/SP630 F

50 Hz

60 Hz

SCREWLINE SP630 air cooled, with adapter for RUVAC 2001, SP-GUARD and electromagnetic gas ballast	Part No. 117 005	Part No. 117 006
with SP-GUARD and manual gas ballast	Part No. 117 007	Part No. 117 008
with SP-GUARD and electromagnetic gas ballast	Part No. 117 009	Part No. 117 010
with adaptor for RUVAC 2001, SP-GUARD and manual gas ballast	Part No. 117 011	Part No. 117 012
with electromagnetic gas ballast	Part No. 117 021	Part No. 117 022
with manual gas ballast	Part No. 117 023	Part No. 117 024
SCREWLINE SP630 F water cooled, with adapter for RUVAC 2001, SP-GUARD and electromagnetic gas ballast	Part No. 117 105	Part No. 117 106
with SP-GUARD and manual gas ballast	Part No. 117 107	Part No. 117 108
with SP-GUARD, purge gas kit and manual gas ballast	Part No. 117 113	Part No. 117 114
SCREWLINE SP630 S1 water cooled, with adapter for RUVAC 2001, castors, SP-GUARD, purge gas kit and electromagnetic gas ballast	Part No. 117 117	Part No. 117 118
SCREWLINE SP630 FK water cooled, with adapter for RUVAC 1001, castors, SP-GUARD, purge gas kit and electromagnetic gas ballast	Part No. 117 125	-
Exhaust silencer	Part No. 119 001	Part No. 119 001
Roots pump adapter for RUVAC 1001 ¹⁾ for RUVAC 2001	Part No. 500 003 173 Part No. 119 021	Part No. 500 003 173 Part No. 119 021
Dust filter ²⁾ Elbow 90° (DN 100 ISO-K) Clamping screws for DN 63-250 ISO-K Centering ring for DN 100 ISO-K	Part No. 951 72 Part No. 887 26 Part No. 267 01 Part No. 268 06	Part No. 951 72 Part No. 887 26 Part No. 267 01 Part No. 268 06
Inlet filter adapter DN 100 ISO-K	Part No. 119 020	Part No. 119 020
Gas ballast, manual	Part No. 119 051	Part No. 119 051
Gas ballast, 24 V DC (DN 16 KF) ³⁾	Part No. 119 052	Part No. 119 052
SP-GUARD kit, complete ⁴⁾	Part No. EK 110 000 809	Part No. EK 110 000 809
Non-return valve (DN 100 PN 6)	Part No. 119 010	Part No. 119 010
Purge gas retrofit kit ³⁾	Part No. 119 030	Part No. 119 030
Flushing kit / air inlet kit ⁵⁾	Part No. 119 015 and 119 016	Part No. 119 015 and 119 016
Transportation drawbar for Part No. 117 117 / 117 118	Part No. 119 017	Part No. 119 017
Maintenance kit, level 1	Part No. EK 110000792	Part No. EK 110000792
Maintenance kit, level 2	Part No. EK 110000793	Part No. EK 110000793
Seal kit, level 1	Part No. EK 110000814	Part No. EK 110000814
Purge gas connection servicing kit	Part No. EK 110000827	Part No. EK 110000827
Filter for gas ballast	Part No. E 110000980	Part No. E 110000980
Filter for purge gas valve unit	Part No. E 110000850	Part No. E 110000850
Water filter maintenance kit for SP630 F	Part No. EK 110000813	Part No. EK 110000813

¹⁾ Must mount to adapter Part No. 119 021

²⁾ For information on the dust filter please refer to the Product Section C02, Section "Accessories"

³⁾ Not for ATEX pumps

⁴⁾ Can only be installed as a service provided by Oerlikon Leybold Vacuum

⁵⁾ Flushing kit / air inlet kit used together

Ordering Information

SCREWLINE SP630 / SP630 F ATEX

50 Hz

60 Hz

SCREWLINE SP630 with SP-GUARD, purge gas kit and manual gas ballast Category 3G IIC (160 °C) inside	Part No. 117 017	Part No. 117 018
with SP-GUARD, purge gas kit and electromagnetic gas ballast Category 3G IIC (160 °C) inside	Part No. 117 019	Part No. 117 020
SCREWLINE SP630 F, water cooled Category 2G3D IIC (160 °C) Category 3G IIC T3 (160 °C) with purge gas monitor, SP-GUARD, adapter for RUVAC 2001 and electromagnetic gas ballast	Part No. 117 111	Part No. 117 112
Category 3G IIC 160 °C inside SP-GUARD, purge gas kit and electromagnetic gas ballast	Part No. 117 115	Part No. 117 116
Exhaust silencer	Part No. 119 001	Part No. 119 001
Roots pump adapter for RUVAC 1001 ¹⁾ for RUVAC 2001	Part No. 500 003 173 Part No. 119 021	Part No. 500 003 173 Part No. 119 021
Inlet filter adapter DN 100 ISO-K	Part No. 119 020	Part No. 119 020
Non-return valve (DN 100 PN 6)	Part No. 119 010	Part No. 119 010
Flushing kit / air inlet kit ²⁾ Category 2G Ex em II T5	Part No. 119 015 and 119 016	Part No. 119 015 and 119 016
Maintenance kit, level 1	Part No. EK 110000792	Part No. EK 110000792
Maintenance kit, level 2	Part No. EK 110000793	Part No. EK 110000793
Seal kit, level 1	Part No. EK 110000814	Part No. EK 110000814
Purge gas connection servicing kit	Part No. EK 110000827	Part No. EK 110000827
Filter for gas ballast	Part No. E 110000980	Part No. E 110000980
Water filter maintenance kit for SP630 F	Part No. EK 110000813	Part No. EK 110000813

Ordering Information

SCREWLINE SP630 O₂

50 Hz

60 Hz

SCREWLINE SP630 with SP-GUARD, purge gas monitor and electromagnetic gas ballast	Part No. 117 039	Part No. 117 040
Exhaust silencer	Part No. 119 001	Part No. 119 001
Roots pump adapter for RUVAC 1001 ¹⁾ for RUVAC 2001	Part No. 500 003 173 Part No. 119 021	Part No. 500 003 173 Part No. 119 021
Maintenance kit, level 1	Part No. EK 110000792	Part No. EK 110000792
Maintenance kit, level 2	Part No. EK 110000793	Part No. EK 110000793
Seal kit, level 1	Part No. EK 110000814	Part No. EK 110000814
Purge gas connection servicing kit	Part No. EK 110000827	Part No. EK 110000827
Filter for gas ballast	Part No. E 110000980	Part No. E 110000980
Filter for purge gas valve unit	Part No. EK 110000850	Part No. EK 110000850

¹⁾ Must mount to adapter Part No. 119 021

²⁾ Flushing kit / air inlet kit used together

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Accessories

SP-GUARD



The monitoring system SP-GUARD was specially developed for constantly monitoring the operational status of the screw vacuum pump SCREWLINE SP630 in real-time.

The operational parameters are constantly collected and evaluated.

In this way a high degree of reliability is attained.

Technical Data

SP-GUARD

Power supply through power supply unit	V DC	24
Current consumption	A	0.2

Ordering Information

SP-GUARD

SP-GUARD kit, complete ¹⁾	Part No. EK 110 000 809
Supply 24 V DC, 230/120 V AC, 50/60Hz for SP-GUARD	Part No. 152 50

¹⁾ Can only be installed as a service provided by Oerlikon Leybold Vacuum

Miscellaneous

Vacuum Pump Oils

Lubricating oils for vacuum pumps must meet tough requirements. They need to have excellent lubricating properties and resistant against thermal decomposition and increased mechanical stress.

The vacuum pump oil ANDEROL 555 detailed below was qualified for usage in the SCREWLINE line of pumps through a comprehensive series of experiments under application conditions in our own factory laboratories.

Our oils are subjected to an involved qualification process with respect to their technical suitability in our vacuum pumps.

Our warranty commitment is dependent on the usage of lubricating oils which are qualified by us.

No liability will be assumed for any damage caused by the use of types of oil which have not been qualified or which are unsuitable.

Safety data sheets are available to professional users from:

E.mail "documentation.vacuum@oerlikon.com" or Internet "www.oerlikon.com/leyboldvacuum".

Application Data

ANDEROL 555

Type of oil	Diester oil
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Ordering Information

Maintenance Kit for changing the Gear Oil

Maintenance kit stage 1 SP250 for changing the gear oil 7 l ANDEROL 555, oil filter cartridge and gaskets	Part No. EK 110 000 820
SP630 for changing the gear oil 15 l ANDEROL 555, oil filter cartridge and gaskets	Part No. EK 110 000 792
Oil ANDEROL 555 1 liter (1.1 qt) 5 liters (5.3 qt) 20 liters (21.1 qt)	Part No. EK 200 10 272 Part No. EK 200 10 891 Part No. EK 200 00 193

Product DURADRY

Dry Compressing Vacuum Pumps for Photovoltaic and Semi-conductor Applications

General

Application

Pumps	DURADRY 105	DURADRY 255
Process		
Load lock chamber	■	■
Transfer chamber	■	■
Inspection	■	■
Etch	■	■
Metallic film deposition		
PVD	■	■
CVD-W, WSi, WN	■	■
CVD-Ti, TiN	■	■
CVD-Al	■	■
ALD	■	■
Dielectric film deposition		
LP CVD	■	■
PE CVD	■	■
ALD	■	■

Operating Principle

The dry compressing DURADRY vacuum pump has been designed for operation in connection with processes related to the production of semiconductor chips, displays and solar modules.

Oerlikon Leybold Vacuum has revolutionised the dry compressing screw technology through the introduction of an innovative double flow pump. The pump unit consists of two screw rotors with a centre inlet. The rotors revolve in opposite directions thereby conveying the gas from the centre of the rotor to both ends of the vacuum housing.

PFPE (perfluoropolyether) oil is used to lubricate both bearings which support the shaft ends of both rotors. Also the gear through which the rotors are driven is lubricated with the PFPE oil. A well tried and tested piston ring seal ensures a reliable separation of the gear chamber from the pump chamber of the pump and prevents the ingress of PFPE oil.

By cooling the pump housing with water and by cooling the rotors with oil, the temperature can be optimally matched to differing applications. Cooling of the rotors allows for very low surface temperatures which, in particular when pumping thermally unstable gases is of great advantage. Owing to the use of a purge gas, the formation of particles as well as the condensation of vapours can be effectively prevented.

Advantages to the User

- The short gas passage from the inlet of the pump to its exhaust reduces the dwell time of the gas thereby also reducing the formation of particles within the pump
- The double flow design minimises wear on the bearings thereby extending the intervals between servicing
- The bearings which are constantly lubricated with oil extend bearing service life by a factor of 3 compared to grease lubricated bearings
- The oil cooled rotors ensure a uniform temperature spread within the pump and permit the temperature of the pump to be controlled within a wide temperature range
- The well tried and tested non-contact piston ring seals offer an unlimited service life
- The integrated electronics and sensors allow the pump to be easily integrated within the system controller
- Your expectations:
 - Pumping of reactive process gases
 - Integrated monitoring and control
 - Compact pump systems
 - Simple matching to different process requirements
- Your expectations:
 - Pumping speed of 100 and 225 m³/h
 - Pump combinations up to 1800 m³/h
 - Integrated monitoring of all important operating parameters
 - Adjustable temperature and purge gas flow
 - Controller for the Roots pump integrated within the electronics

Typical Applications

- Coating technology for the semiconductor industry, for displays and photovoltaic systems

Accessories

For faultless operation of the DURADRY in connection with different processes, Oerlikon Leybold Vacuum has developed a variety of accessories.

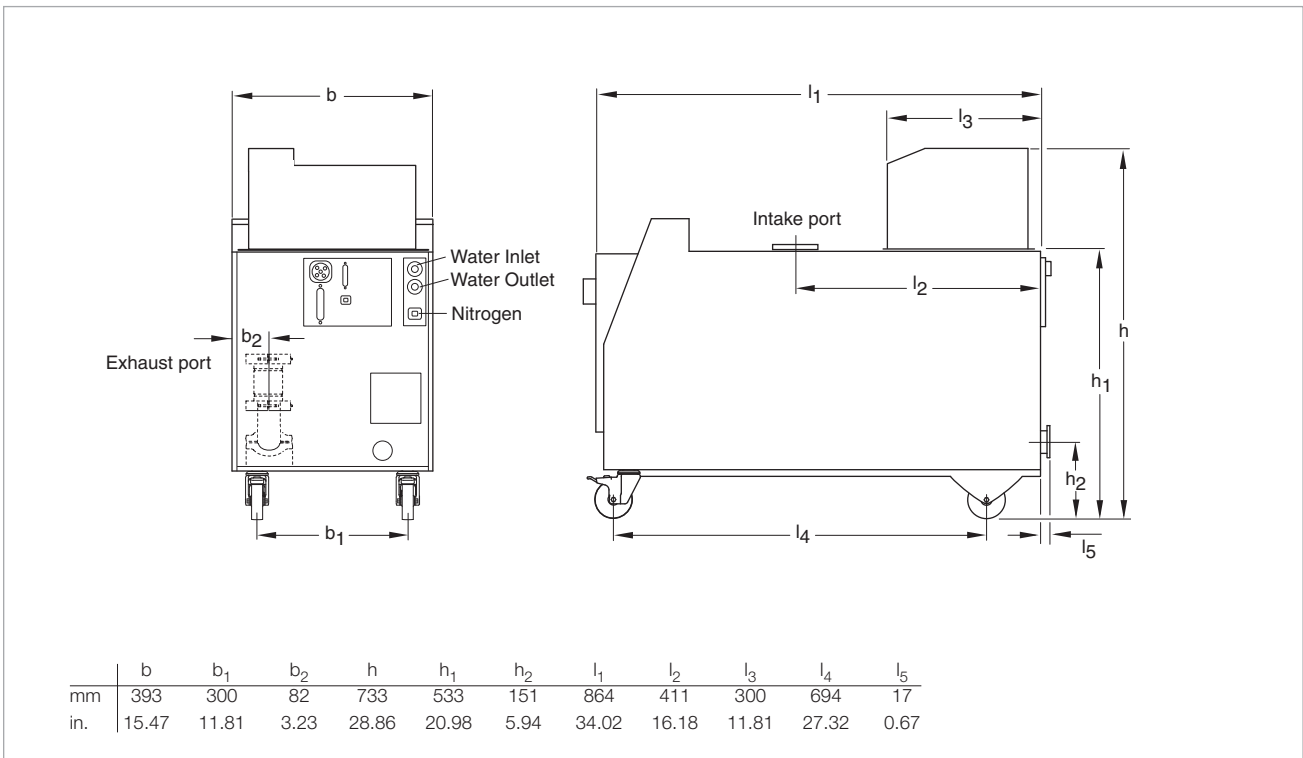
- For processes involving a high particle count, Oerlikon Leybold Vacuum offers particle filters both for the intake and also for the exhaust side.
- For pumping of thermally unstable substances we recommend to install on the intake side a heated trap, and by means of an additional cooling unit the surface temperature of the pump can be reduced.
- Heating the exhaust line can effectively prevent any condensation of humidity and other condensable gases.

Accessories matched to specific customer requirements are available upon request.

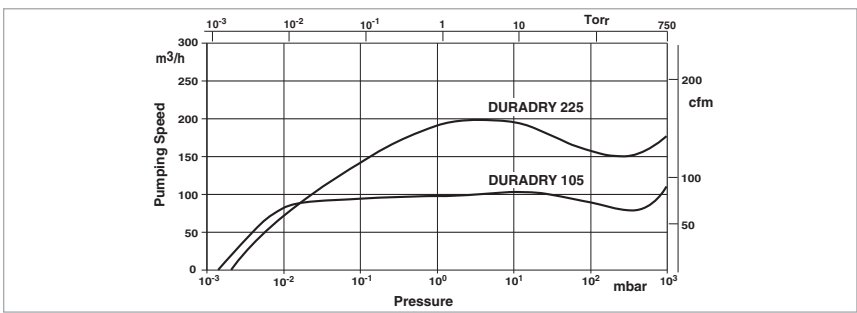
DURADRY 105 und 255



DURADRY 105



Dimensional drawing for the DURADRY 105; 255 identical



Pumping speed curves for the DURADRY 105 and 255

Technical Data

DURADRY 105

DURADRY 255

Pumping speed 60 Hz operation	$\text{m}^3 \times \text{h}^{-1}$ (cfm)	105 (62)	255 (150)
Ultimate pressure with full CVD purge, 60 Hz operation	mbar (Torr)	7×10^{-3} (5.0×10^{-3})	5×10^{-3} (3.75×10^{-3})
Maximum intake pressure in continuous operation	mbar (Torr)	1000 (760)	1000 (760)
Maximum exhaust pressure	bar (psig)	1.5 (7.2)	1.5 (7.2)
Nitrogen supply pressure	bar	4 to 8 (43 to 100 psig), (400 to 800 KPa), (4 to 8 kg/cm ²)	4 to 8 (43 to 100 psig), (400 to 800 KPa), (4 to 8 kg/cm ²)
Internal purge gas pressure	bar (psig)	3 (29)	3 (29)
Nitrogen consumption			
Etch	slm	12	12
CVD	slm	50	50
Nitrogen connection	NPT	3/8" with 1/4" tube connector	3/8" with 1/4" tube connector
Cooling water requirements, approx.			
Cooling water flow	l/min	1.8 to 2.8	1.8 to 2.8
Cooling water temperature	°C (°F)	15 to 30 (59 to 86)	15 to 30 (59 to 86)
Cooling water pressure at ΔP_1 bar (15 psig)	bar (psig)	3.5 to 9 (36 to 116)	3.5 to 9 (36 to 116)
Cooling water connection	NPT	1/2" with 3/8" tube connector	1/2" with 3/8" tube connector
Intake port	DN	63 ISO-K	63 ISO-K
Exhaust port	DN	40 KF	40 KF
Dimensions (W x H x L)	mm (in.)	400 x 596 x 987 (15.75 x 23.46 x 38.86)	400 x 596 x 987 (15.75 x 23.46 x 38.86)
Weight	kg (lbs)	278 (612)	278 (612)
Maximum ambient temperature	°C (°F)	40 (104)	40 (104)
Minimum ambient temperature	°C (°F)	10 (50)	10 (50)
Typical power consumption	kW (HP)	4.0 (5.4)	4.0 (5.4)
Typical motor power	kW (HP)	5.0 (6.8)	5.0 (5.4)
Supply voltage - Multi voltage motor ¹⁾		200/208/230/460/480 V ($\pm 10\%$), 3-ph, 60 Hz ¹⁾ or 210/415 V ($\pm 10\%$), 3-ph, 50 Hz ¹⁾	200/208/230/460/480 V ($\pm 10\%$), 3-ph, 60 Hz ¹⁾ or 210/415 V ($\pm 10\%$), 3-ph, 50 Hz ¹⁾
Motor rotation speed (nominal) 60 Hz	U/min (rpm)	3600 (3600)	3600 (3600)
Short circuit interrupt capacity (SCIC)	kA	100	100
PFPE oil quantity in gear box	l	1.1	1.1

¹⁾ The DURADRY models are voltage specific for either low voltage (200-230 V) or high voltage (380-460 V) and are not to be field configured from the factory preset voltage operation.

Ordering Information**DURADRY 105****DURADRY 255**

DURADRY		
Load lock		
Low voltage	Part No. 280 000	-
High voltage	Part No. 280 001	-
P-Etch		
Low voltage	Part No. 280 010	-
High voltage	Part No. 280 011	-
P-CVD		
Low voltage	Part No. 280 013	-
High voltage	Part No. 280 014	-
High voltage with FU	Part No. 280 015	Part No. 280 045
Accessories	upon request	upon request

Only available for purchase in North and South America

Product CHEMROVAC AMR

Dry Vacuum Pump

for Chemical and Pharmaceutical Applications

General

Applications

Pumps	AMR 70	AMR 140	AMR 230	AMR 350	AMR 550
Typical Applications					
Pharmaceuticals	■	■	■	■	■
Fine chemicals	■	■	■	■	■
Flavours and fragrances	■	■	■	■	■
Fatty acids	■	■	■	■	■

The CHEMROVAC AMR pumps are not designed to the European ATEX directive (94/9/EC). They can therefore not be installed in Europe into flame

proof environments or be used to pump flammable materials. This has always to be considered if you want to export these pumps into

Europe or install it in accordance to European directives and legal requirements.

Operating Principle

The CHEMROVAC AMR pumps are 4-stage roots pumps. Each stage consists of two rotors rotating in opposite directions inside a casing (pumping chamber) and having slight clearances against the inside wall surface of the casing and also between the rotors. In the sequence from (1) to (4) in the figures on this page each phase of rotor rotation is shown. The light area in the figure shows inlet pressure regions of a stage whereas the slash area shows discharge pressure regions. The pumping principle of this pump is explained below, using a cold wall

type back flow mechanism, referring to left rotor in each figure.

As described above, compression takes place using the properly cooled gas of the same pressure as the discharge pressure, and therefore, the temperature rise inside the case is kept low. That means, gas discharged out of the discharge port A is cooled by the cold wall B, and a portion of this cooled gas is injected as a back flow cooling medium via the port C into the moving volume S for back flow compression. Therefore, the gas has a circulating flow of A-B-

C-S-A, and in the part of A-B-C the internal compression heat is continuously dissipated. By this a high-efficiency and a high pressure ratio are obtained.

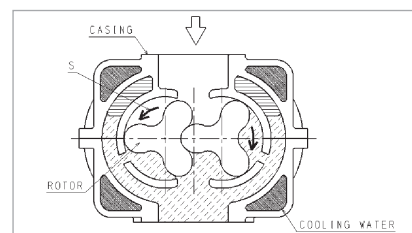


Fig. 1 This figure shows a condition just before the rotor catches the gas of the inlet pressure region into the moving volume S.

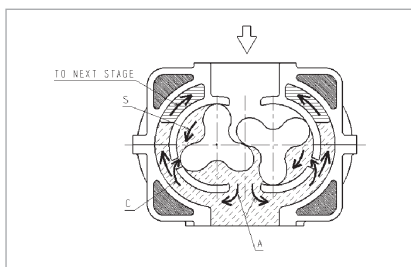


Fig. 2
In this figure, the rotor has completely caught the gas of the inlet pressure region into the moving volume S. Gas which is already discharged out at exit port A is properly cooled by the cold outside wall of the gas path B. One part of this gas flows back through the port C into the moving volume S. The other part of the cooled exhausted gas is flowing into the next stage of the pump.

Moreover, because the casing enclosing the rotors is not cooled directly, the clearances between the rotor and the casing is not reduced due to heat contraction, reducing the possibility of contact between both.

In some cases condensable gas can condense in the different stages according to its vapor pressu-

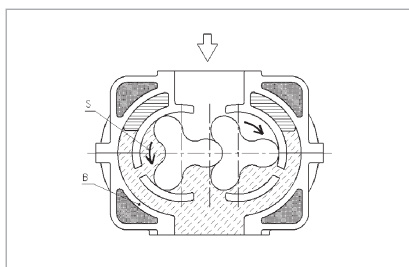


Fig. 3
As the rotor rotates further, the gas which has been cooled properly by the cold wall B flows sufficiently into the S cavity; the pressure in the chamber S is approaching the discharge pressure.

re. Condensate either condensed in the pump or as liquid carry over from the process will flow down with the gas stream and discharged to atmosphere in an exhaust drain tank.

The exhaust drain tank is mounted at the exhaust of the last pump stage. It is located either below the exhaust cooler (large pumps) or pump outlet flange (small pumps). It collects liquid condensed from the pump or the exhaust cooler.

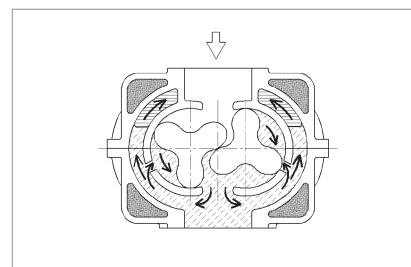


Fig. 4
In this condition the pressure in the moving volume portion S is approximately equal to the discharge pressure, and the discharge port A and the cavity S are just before opening to each other.

The larger pumps are equipped with a water cooled exhaust cooler as standard. The cooler is designed as shell and tube cooler. This reduces the exhaust gas temperature to an acceptable limit. Also vapors from the exhaust gas stream are partially condensed. Condensed liquid is drained into the exhaust drain tank below the condenser.

Advantages to the User

- Oil free compression
- Reliable separation between swept volume and gear box side (avoiding of oil back streaming)
- Motor not on gear box side, no oil leaking by motor shaft
- Safe separation of motor and gear box area by additional shaft seal purge
- Materials of construction suitable for most chemicals to be pumped
- Flat speed curve from atmosphere to 10 mbar (7.5 Torr)
- Good liquid handling because of vertical orientation
- Easy access of swept volume for cleaning
- Easy to equip with local certified flame proof motor
- Nearly no electrical control for standard operation needed

Typical Applications

- Distillation
- Drying
- Freeze drying
- Degassing
- Central house vacuum
- Crystallisation
- Evaporation

Accessories

As standard accessory an exhaust silencer is available for each pump.

The pumps can be combined with mechanical roots blowers to increase pumping speed and to achieve lower ultimate pressure.

CHEMROVAC AMR pumps can also be the basic part of a bespoke system that complies to special process requirements to customer's needs.

Supplied Equipment

The basic pump CHEMROVAC AMR is a pump without a motor. A suitable motor complying with the local regulations will normally be mounted by Oerlikon Leybold Vacuum. In this case the CHEMROVAC AMR is supplied ready for installation and connection.

In some cases the motor will be delivered and mounted by the end-user. In this case the user is responsible for correct selection and safe mounting of the motor. OLV will not take over any responsibility for the motor and motor mounting in such a case.

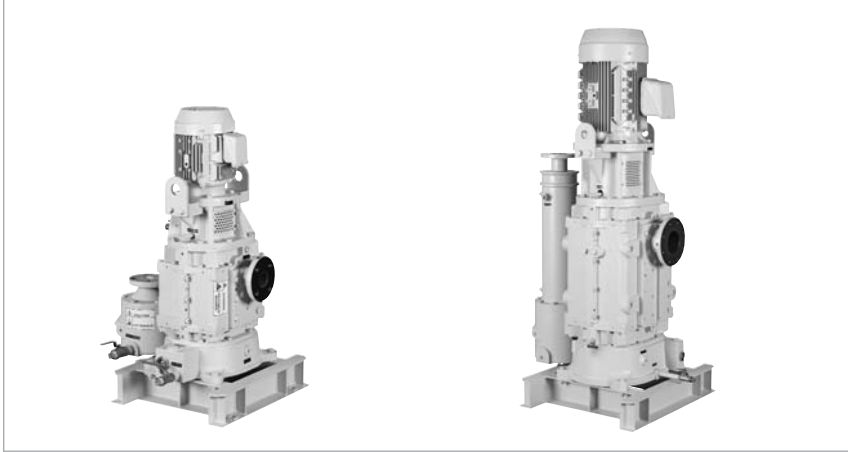
The electrical connections to the pump must be provided by suitably trained staff of the customer.

The basic CHEMROVAC AMR pump is delivered with:

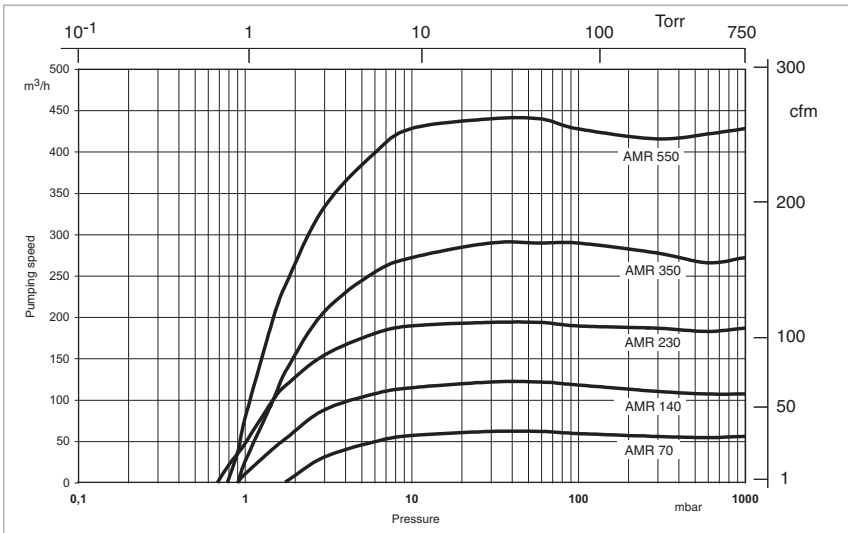
- Nitrogen shaft seal purge unit
- The required amount of gear oil (is supplied separately)
- 2 crane eyes for transporting the pump
- Operating Instructions

Products

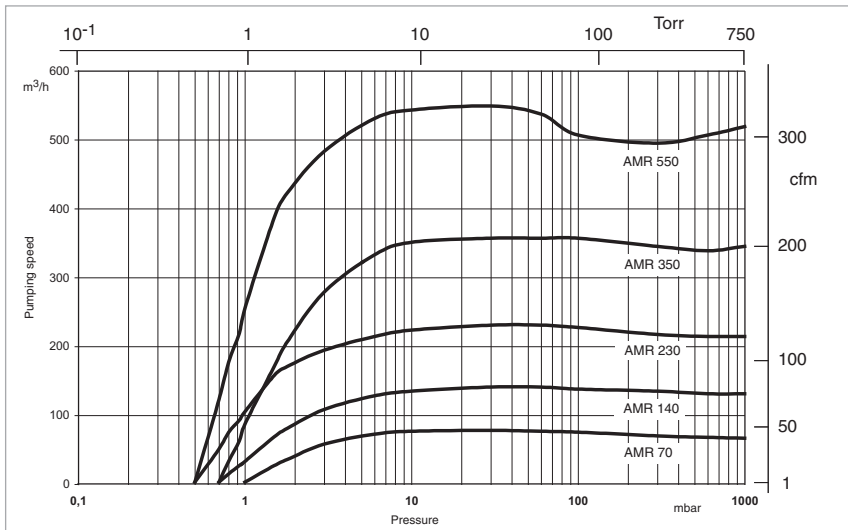
CHEMROVAC AMR 70 to 550



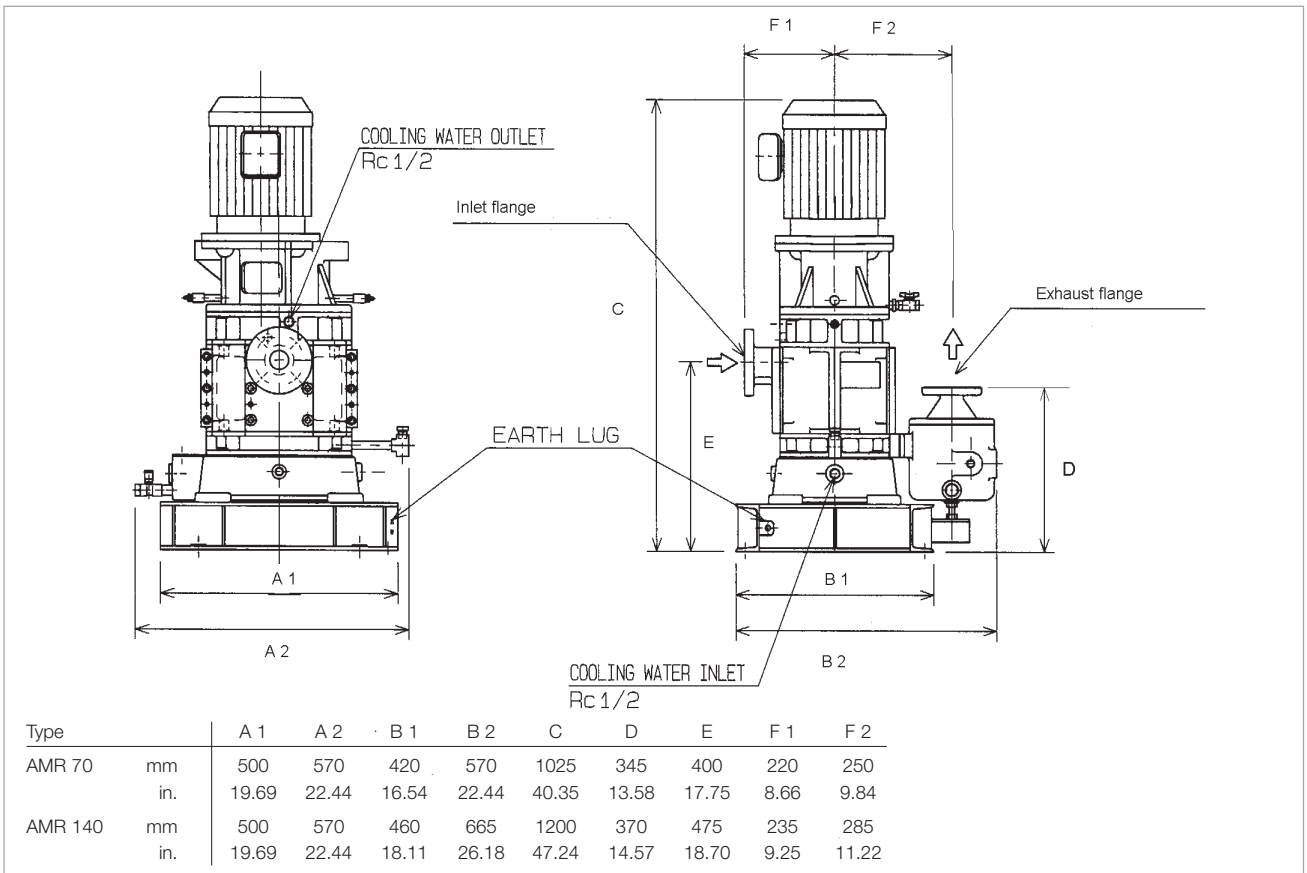
CHEMROVAC AMR 70 (left) and AMR 550 (right)



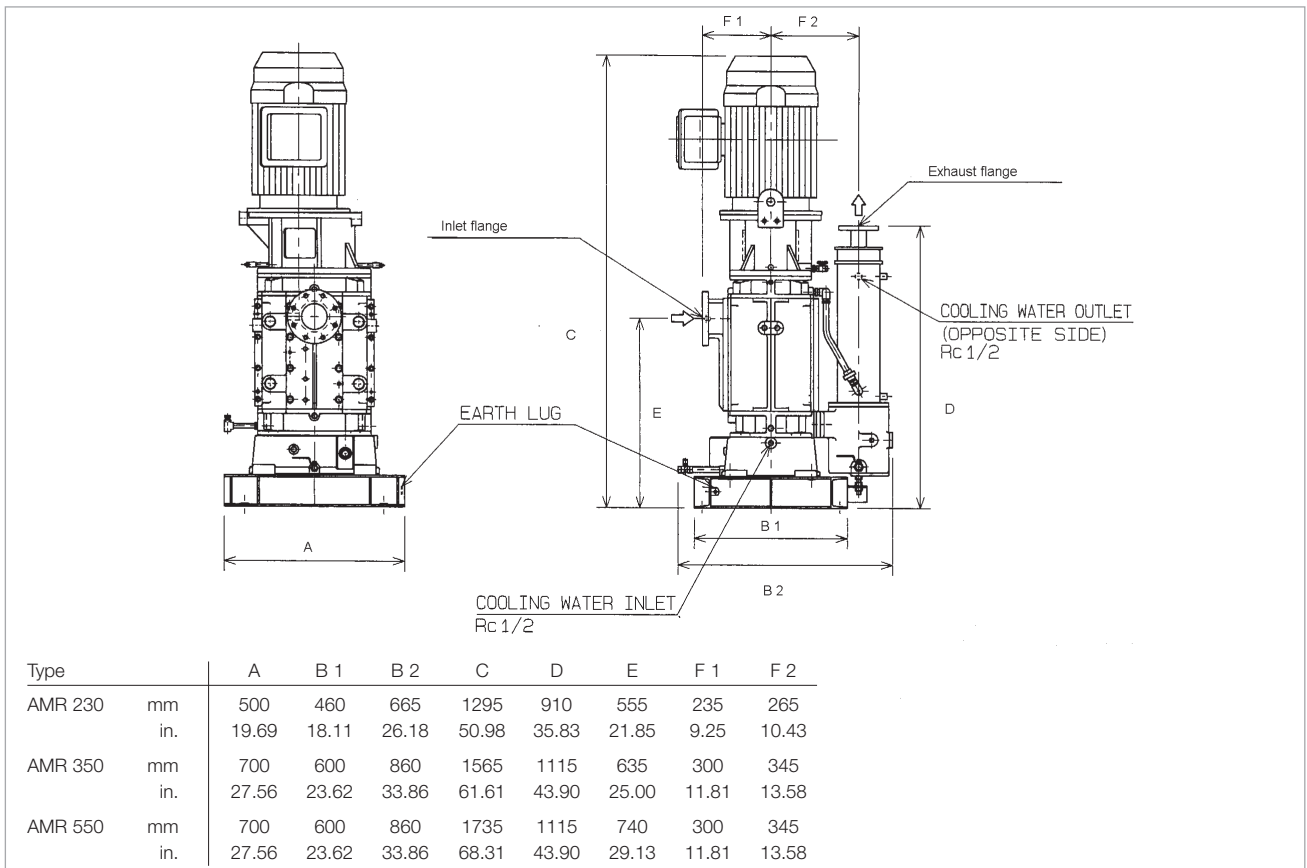
Pumping speed curves for the CHEMROVAC AMR at 50 Hz



Pumping speed curves for the CHEMROVAC AMR at 60 Hz



Dimensional drawing of the CHEMROVAC AMR 70 and 140



Dimensional drawing of the CHEMROVAC AMR 230 to 550

CHEMROVAC

Technical Data

AMR 70
AMR 140
AMR 230
AMR 350
AMR 550

Max. pumping speed (+/- 10%)						
60 Hz	m ³ x h ⁻¹ (cfm)	75 (44)	138 (81)	228 (134)	354 (208)	546 (321)
50 Hz	m ³ x h ⁻¹ (cfm)	60 (36)	120 (71)	192 (113)	288 (170)	438 (258)
Ultimate total pressure, abs.						
60 Hz	mbar (Torr)	1.0 (0.75)	0.7 (0.53)	0.5 (0.38)	0.7 (0.53)	0.5 (0.38)
50 Hz	mbar (Torr)	1.8 (1.35)	0.9 (0.68)	0.7 (0.53)	0.9 (0.68)	0.8 (0.60)
Max. permissible exhaust back pressure, abs.						
	mbar (Torr)	900 to 1200 (575 to 900)	900 to 1200 (575 to 900)	900 to 1200 (575 to 900)	900 to 1200 (575 to 900)	900 to 1200 (575 to 900)
Max. permissible inlet pressure, abs.						
	mbar (Torr)	1050 (788)	1050 (788)	1050 (788)	1050 (788)	1050 (788)
Max. permissible inlet temperature						
	°C (°F)	50 (122)	50 (122)	50 (122)	50 (122)	50 (122)
Permissible ambient temperature for constant operation ¹⁾						
	°C (°F)	-20 to +40 (-4 to +104)	-20 to +40 (-4 to +104)	-20 to +40 (-4 to +104)	-20 to +40 (-4 to +104)	-20 to +40 (-4 to +104)
Max. relative ambient moisture						
	%	up to 90	up to 90	up to 90	up to 90	up to 90
Max. permissible installation height						
	m (ft)	up to 1000 (up to 3280)	up to 1000 (up to 3280)	up to 1000 (up to 3280)	up to 1000 (up to 3280)	up to 1000 (up to 3280)
Sound pressure with silencer at ultimate (± 3 dB(A))						
60 Hz	dB(A)	76	79	81	81	82
50 Hz	dB(A)	73	75	77	78	79
Process flange size						
inlet	ANSI / lb ff	1 1/2" / 125	2" / 125	2 1/2" / 125	3" / 125	4" / 125
outlet	ANSI / lb ff	1 1/2" / 125	1 1/2" / 125	2 1/2" / 125	2 1/2" / 125	2 1/2" / 125
Cooling water flange size						
inlet	Rc	1/2"	1/2"	1/2"	1/2"	1/2"
outlet	Rc	1/2"	1/2"	1/2"	1/2"	1/2"
Shaft seal purge gas size						
	Rc	3/8"	3/8"	3/8"	3/8"	3/8"
Recommended shaft seal purge flow						
gear side	l/min (gallon/min)	3.0 (0.8)	5.0 (1.3)	5.0 (1.3)	6.0 (1.6)	6.0 (1.6)
motor side	l/min (gallon/min)	0,5 (0.15)	1.0 (0.3)	1.0 (0.3)	2.0 (0.6)	2.0 (0.6)
Type of gas						
		nitrogen	nitrogen	nitrogen	nitrogen	nitrogen
Dew point of supply gas						
	°C (°F)	-15 (+5)	-15 (+5)	-15 (+5)	-15 (+5)	-15 (+5)
Maximum particle size in gas						
	µm	3	3	3	3	3
Weight without motor						
	kg (lbs)	180 (397)	235 (520)	280 (617)	535 (1180)	590 (1300)
Assumed weight with motor						
	kg (lbs)	235 (520)	319 (705)	396 (875)	708 (1560)	816 (1800)

¹⁾ If you operate the pump in an ambient temperature between -20 and +5 °C (-4 to +41 °F) we recommend that you leave the pump constantly operating and only shut down the pump for maintenance purposes. The pump must be pre-warmed if you want to start it in an ambient temperature range between -20 and +5 °C (-4 to +41 °F).

CHEMROVAC

Additional Technical Data

AMR 70
AMR 140
AMR 230
AMR 350
AMR 550

Motor flame proof protection		to local standards, e.g. class 1, division 1, C&D, or Ex d IIB				
Start-up method		direct on line or via frequency converter				
Voltage	V	depending on local requirements				
Installed power						
60 Hz	kW (HP)	3.7 (5.0)	5.5 (7.5)	7.5 (10.0)	15.0 (20.0)	18.5 (25.0)
50 Hz	kW (HP)	3.7 (5.0)	5.5 (7.5)	7.5 (10.0)	15.0 (20.0)	18.5 (25.0)
Absorbed power at ultimate pressure						
60 Hz	kW (HP)	2.1 (2.8)	3.3 (4.4)	4.8 (6.4)	9.0 (12.1)	12.5 (16.8)
50 Hz	kW (HP)	1.8 (2.4)	3.0 (4.0)	4.1 (5.5)	7.0 (9.4)	10.0 (13.4)
Motor frame size	NEMA IEC	184TC 112 M	213TC 132 S	215TC 132 S	256TC 160 M	284TSC 160 L
No. of phases		3	3	3	3	3
No. of poles		2	2	2	2	2
Motor frequency	Hz	50 or 60, depending on local conditions				
Operating frequency	Hz	26 to 60				
Nominal revolution	1/min	3000 or 3600, depending on motor frequency				
Cooling		water, direct without temperature control valve				
Minimum cooling water consumption (at 25 °C (77 °F) inlet temperature)						
60 Hz	l/min (gallon/min)	5.0 (1.3)	7.0 (1.9)	10.0 (2.7)	20.0 (5.3)	28.0 (7.4)
50 Hz	l/min (gallon/min)	5.0 (1.3)	7.0 (1.9)	10.0 (2.7)	20.0 (5.3)	28.0 (7.4)
Cooling water temperature	°C (°F) °C (°F)	+10 to +35 (+50 to +95)	+10 to +35 (+50 to +95)	+10 to +35 (+50 to +95)	+10 to +35 (+50 to +95)	+10 to +35 (+50 to +95)
Cooling water supply pressure, abs.	bar (psi)	3 to 7 (44 to 102)	3 to 7 (44 to 102)	3 to 7 (44 to 102)	3 to 7 (44 to 102)	3 to 7 (44 to 102)
Lubrication bearing motor side (grease) gear side (oil)	ml	100	200	200	260	260
		depends on oil capacity				
Oil type for gear box		LVO 130	LVO 130	LVO 130	LVO 130	LVO 130
Volume gear box oil	l (gallon)	1.0 (0.3)	1.0 (0.3)	1.0 (0.3)	4.0 (1.1)	4.0 (1.1)

Ordering Information

CHEMROVAC

AMR 70
AMR 140
AMR 230
AMR 350
AMR 550

	Part No.	Part No.	Part No.	Part No.	Part No.
Dry vacuum pump for chemical and pharmaceutical application					
CHEMROVAC AMR (without motor)	134 101	134 102	134 103	134 104	134 105
CHEMROVAC AMR (with NEMA motor Class 1, Div. 1, Group C & D, 230/460 V, 60 Hz)	134 201 V	134 202 V	134 203 V	134 204 V	134 205 V
Accessories					
Exhaust silencer, filled with mineral wool	134 121	134 121	134 122	134 122	134 122

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