AGILENT
ROTARY VANE PUMPS

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AGILENT ROTARY VANE PUMPS FEATURES AND BENEFITS

A reliable line of pumps to cover the most demanding industrial and scientific applications

- Thanks to a very simple and highly reliable design, these field proven rotary vane pumps provide excellent vacuum performance. Agilent’s quality and manufacturing standards ensure that the DS Rotary Vane Pumps provide high pumping stability for light gases, low noise, minimal oil backstreaming, and a long operating life.
- Agilent’s DS Rotary Vane Pumps conform with CE and RoHS requirements, and all pumps are UL and CSA approved. Agilent’s world class technical support organization makes the DS Rotary Vane Pump cost-effective and well suited for a wide range of applications.

The new MS 40+ Mono Stage Rotary Vane Pump
- High capacity pumping speed with the smallest footprint
- Proven inverter technology
- Ideal for mass spectrometry and electron microscopy
- Lowest noise, highest throughput

The new HS Series “smart” pumps with green technology
- In 2004 Varian, now Agilent, introduced the first rotary vane pumps with truly “smart” capabilities
- Employ an innovative frequency inverter technology to deliver optimal and consistent performance
- Encompass the worldwide range of voltage and frequency conditions
- Environmentally friendly thanks to reduced power requirements and low start-up current

Dual Stage Pumps
- DS Series: the two stage design allows:
  • Low 10⁻³ mbar operation
  • Low operating temperature
  • Minimal backstreaming at low pressure
  • Good pumping efficiency and gas ballast in the low 10⁻² mbar region

Worldwide Motors
- Pump motors, available as 1-phase or 3-phase, are suitable for all voltages and frequencies worldwide
- Operational voltages are easily selectable, allowing greater flexibility, easy planning and inventory reduction

Anti-suckback Valve and Vent Device
- This valve isolates the pump should it stop or be idle
- Prevents inadequate venting and oil contamination of the vacuum system when the pump is switched off, or in case of power fail

HS Series “smart” pumps with green technology
- The dedicated oil circulation gear pump ensures efficient and reliable lubrication of the pump from atmospheric pressure throughout the entire vacuum operating range

Forced Oil Circulation
- The dedicated oil circulation gear pump ensures efficient and reliable lubrication of the pump from atmospheric pressure throughout the entire vacuum operating range

Built-in Oil Shield
- This feature minimizes the oil mist at the pump exhaust
- Drastically reduces the oil consumption over long periods of operation
- Reduction of air pollution limiting the impact on the environment

Forced Air Ventilation
- The cooling fan between the motor and the pump:
  • Reduces the pump operating temperature
  • Lowers the oil vapor partial pressure
  • Minimizes oil backstreaming and vacuum system contamination

Alignment Pins on Pump Module
- The pump module components are assembled and positioned by built-in alignment pins
- These speed up the assembling and maintenance process, avoiding any error

Forced Oil Circulation
- The dedicated oil circulation gear pump ensures efficient and reliable lubrication of the pump from atmospheric pressure throughout the entire vacuum operating range

Gas Ballast Valve
- The opening of this valve injects dry air into the second stage of the pump
- This action increases the temperature of the module which facilitates the outgassing and clean up of water vapor or other condensable gases from the oil

Socket Type IEC320
- Permits use of standard power cable
- Eliminates the need to open box and wire the motor

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AGILENT ROTARY VANE PUMPS TYPICAL APPLICATIONS

Rotary Vane Pumps are the most common primary vacuum pumps used on GC-MS, LC-MS, ICP-MS, and MALDI-TOF Instruments. GC-MS typically uses our smallest pump, the DS42: the pump is needed to rough the system and back the high vacuum Turbo or Diffusion pump. LC-MS and ICP-MS use a medium capacity pump on the sample injection/system interface, typically a DS402 or a DS602, and a smaller pump to back the system Turbo pumps. MALDI-TOF depending on system size, uses the DS102 to the DS602 as roughing or interface pumps. Nowadays high-end instruments, such as LC-MS and ICP-MS, can take advantage of the benefits of HS 452, HS 652 and MS 40+: • Large pumping capacity • Consistent worldwide performance thanks to universal voltage and frequency • Single phase • Low power requirements and start up current • Remote control and diagnostic • Adjustable performance, low noise • Green technology

Analytical Instruments and Mass Spectrometry

Electron Microscopes
Small pumps, typically the DS202 and the DS302, are still used in competition with dry pumps to rough the system and the high vacuum Turbo or Diffusion pump. condensable vapor.

Leak Detection
Pumps in the DS102, DS202 and DS302 range are typically used to back the Helium Mass Spectrometer Turbo or Diffusion pump. The roughing pump is usually bigger, typically up to the DS402/DS602, and can still be installed on the Leak Detector itself, while bigger pumps can be used to pump down high throughput Leak Detection systems.

Industrial Vacuum Processes
Vacuum coatings, Metallurgy Vacuum Furnaces, Lamps and TV Tube manufacture, Sterilizers, Freeze Dryers, Glove Boxes, High Speed Centrifuges, and Flywheels (for energy storage) represent the main Industrial applications for Dual Stage Rotary Vane pumps. In the first four fields of application the Rotary Pumps are used as roughing and backing pumps for High Vacuum Turbo or Diffusion pumps, while in the others the Rotary Pumps are typically the only vacuum pumps on the system.

High Energy Physics and Research Laboratories
In these applications the Rotary Vane pumps are mainly used in combination with Turbo pumps. The combination is typically used to rough and pump High Vacuum experimental chambers or to start Ion Pumps in ultra high vacuum systems.
### AGILENT ROTARY VANE PUMP MODELS

<table>
<thead>
<tr>
<th></th>
<th>DS 40M</th>
<th>DS 102</th>
<th>DS 202</th>
<th>DS 302</th>
<th>DS 402</th>
<th>DS 602</th>
<th>HS 452</th>
<th>HS 652</th>
<th>MS 40+</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Free air displacement</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60 Hz (l/min (cfm))</td>
<td>36 (1.27)</td>
<td>114 (4)</td>
<td>192 (6.8)</td>
<td>285 (10)</td>
<td>410 (14.5)</td>
<td>605 (21.4)</td>
<td>456 (16.1)</td>
<td>672 (23.8)</td>
<td>828 (29.2)</td>
</tr>
<tr>
<td>50 Hz (l/min (m³/h))</td>
<td>43 (2.56)</td>
<td>95 (0.7)</td>
<td>140 (0.8)</td>
<td>237 (14.2)</td>
<td>342 (20.5)</td>
<td>504 (30.2)</td>
<td>456 (27.3)</td>
<td>672 (40.3)</td>
<td>828 (48.7)</td>
</tr>
<tr>
<td><strong>Pumping speed</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60 Hz (cfm)</td>
<td>1.27</td>
<td>3.5</td>
<td>5.8</td>
<td>8.2</td>
<td>12.3</td>
<td>17.6</td>
<td>13</td>
<td>19</td>
<td>23.5</td>
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<tr>
<td>50 Hz (m³/h)</td>
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<td>5</td>
<td>8.3</td>
<td>11.6</td>
<td>17.4</td>
<td>25</td>
<td>22</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>–</td>
<td>10⁻⁴</td>
<td>10⁻⁴</td>
<td>10⁻⁴</td>
<td>10⁻⁴</td>
<td>10⁻⁴</td>
<td>10⁻⁴</td>
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<tr>
<td><strong>Ultimate total pressure</strong></td>
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<td></td>
<td></td>
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<tr>
<td>(mbar)</td>
<td>6.7 x 10⁻²</td>
<td>2 x 10⁻²</td>
<td>2 x 10⁻²</td>
<td>2 x 10⁻²</td>
<td>2 x 10⁻²</td>
<td>2 x 10⁻²</td>
<td>2 x 10⁻²</td>
<td>N/A</td>
<td></td>
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<tr>
<td><strong>Ultimate total pressure with gas ballast</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(mbar)</td>
<td>–</td>
<td>2 x 10⁻²</td>
<td>2 x 10⁻²</td>
<td>2 x 10⁻²</td>
<td>2 x 10⁻²</td>
<td>2 x 10⁻²</td>
<td>2 x 10⁻²</td>
<td>N/A</td>
<td>No gas ballast port</td>
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<tr>
<td><strong>Water vapor tolerance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(mbar)</td>
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<td>15</td>
<td>20</td>
<td>30</td>
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<tr>
<td>(g/h)</td>
<td>–</td>
<td>68</td>
<td>100</td>
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<td>350</td>
<td>550</td>
<td>350</td>
<td>550</td>
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<tr>
<td><strong>Oil capacity min/max (l)</strong></td>
<td>0.37 (max)</td>
<td>0.2/0.5</td>
<td>0.2/0.6</td>
<td>0.25/0.6</td>
<td>0.5/1</td>
<td>0.5/1</td>
<td>0.5/1</td>
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<td></td>
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<tr>
<td><strong>Motor rating 1 ph</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60 Hz (kW)</td>
<td>0.1</td>
<td>0.45</td>
<td>0.45</td>
<td>0.45</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td>0.50</td>
<td>0.50</td>
</tr>
<tr>
<td>50 Hz (kW)</td>
<td>0.1</td>
<td>0.38</td>
<td>0.38</td>
<td>0.38</td>
<td>0.75</td>
<td>0.75</td>
<td>0.75</td>
<td>0.75</td>
<td>0.75</td>
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<tr>
<td><strong>Motor rating 3 ph</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60 Hz (kW)</td>
<td>0.90</td>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
<td>0.75</td>
<td>0.75</td>
</tr>
<tr>
<td>50 Hz (kW)</td>
<td>0.50</td>
<td>0.75</td>
<td>0.75</td>
<td>0.75</td>
<td>0.75</td>
<td>0.75</td>
<td>0.75</td>
<td>0.75</td>
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</tr>
<tr>
<td><strong>Nominal rotation speed</strong></td>
<td>2300</td>
<td>1800</td>
<td>1800</td>
<td>1800</td>
<td>1800</td>
<td>1800</td>
<td>2000</td>
<td>2000</td>
<td>1450</td>
</tr>
<tr>
<td>60 Hz (rpm)</td>
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<td>1600</td>
<td>1600</td>
<td>1600</td>
<td>1600</td>
<td>2000</td>
<td>2000</td>
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</tr>
<tr>
<td>50 Hz (rpm)</td>
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<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>2000</td>
<td>2000</td>
<td></td>
</tr>
<tr>
<td><strong>Weight kg (lbs)</strong></td>
<td>9.3 (20.5)</td>
<td>22 (48)</td>
<td>25 (55)</td>
<td>25 (55)</td>
<td>36 (77)</td>
<td>36 (77)</td>
<td>33 (73)</td>
<td>33 (73)</td>
<td>33 (73)</td>
</tr>
</tbody>
</table>

*According to PNEUROP 6602
Agilent DS 40M

Technical Specifications

- Free air displacement
  - 60 Hz: 36 l/min (1.27 cfm)
  - 50 Hz: 43 l/min (2.58 m³/h)
- Pumping speed
  - 60 Hz: 1.27 cfm
  - 50 Hz: 1.8 m³/h
- Ultimate partial pressure
  - 60 Hz: 1.14 Torr
  - 50 Hz: 0.92 Torr
- Ultimate total pressure
  - 60 Hz: 0.858 mbar
  - 50 Hz: 0.383 mbar
- Noise level
  - 60 Hz: 46 dB(A)
  - 50 Hz: 45 dB(A)
- Oil capacity max
  - 60 Hz: 0.37 l
  - 50 Hz: 0.37 l
- Motor rating 1ph
  - 60 Hz: 0.1 kW
  - 50 Hz: 0.1 kW
- Nominal rotation speed
  - 60 Hz: 3300 rpm
  - 50 Hz: 2600 rpm
- Weight
  - 9.3 kg (20.5 lbs)
- Inlet flange
  - 16KF DN
- Exhaust flange
  - 16KF DN

* According to PN67/0602

Ordering Information

Dual Stage Rotary Vane Pump  Part Number
DS 40M 100-120 Vac - 50/60Hz  X3703-64000
DS 40M 200-240 Vac - 50/60Hz  X3703-64001

Oil and Accessories  Part Number
Rotary vane fluid, AVF 20S type, 0.5 liter  X3703-64006
DS 40M oil mist trap 3/4 G  X3703-64003
DS 40M oil mist trap cartridge (pkg. of 2)  X3703-64004
DS 40M maintenance kit  X3703-64005
DS 40M oil drain extension  X3703-64007
NW 16 centering ring viton  KQ16AV
NW 16 aluminum clamp  KQ16AWP
AGILENT ROTARY VANE PUMP MODELS

Agilent DS 102

Technical Specifications

- Free air displacement: 60 Hz: 114 l/min (4 cfm), 50 Hz: 95 l/min (6.7 m³/h)
- Pumping speed*: 60 Hz: 5.5 cfm, 50 Hz: 5 m³/h
- Ultimate partial pressure*: 10⁻³ mbar
- Ultimate total pressure*: 2 x 10⁻¹ mbar
- Ultimate total pressure with gas ballast*: 2 x 10⁻² mbar
- Water vapor tolerance: 15 mbar
- Water vapor capacity: 60 g/h
- Oil capacity min/max: 0.2/0.5 l
- Motor rating 1ph: 60 Hz: 0.55 kW, 50 Hz: 0.45 kW
- Nominal rotation speed: 60 Hz: 1800 rpm, 50 Hz: 1500 rpm
- Weight: 22 kg (48 lbs)
- Inlet flange: 25KF DN
- Exhaust flange: 25KF DN

* According to PNEUROP 6602

Ordering Information

- Dual Stage Rotary Vane Pump with 1 phase worldwide motor* Part Number: 9499315
  * 1 phase motors (100-120 / 200-230) V ±10%, 50/60 Hz
- Minor Maintenance Kit Part Number: 9499370
  Contains all the valves, O-rings and seals to refurbish the pump to vacuum integrity
- Major Maintenance Kit Part Number: 9499380
  Includes all the items of the minor kit plus the vanes

Dimensions: millimeters (inches)

Ordering Information

- Oil and Accessories
  - Rotary vane fluid, DS19 type, 1 liter Part Number: 9499390
  - Oil mist eliminator Part Number: 9499395
  - Oil mist replacement cartridge (pkg. of 2) Part Number: 9499394
  - NW 25 oil exhaust filter Part Number: 9499392
  - Oil return kit Part Number: 9499374
  - Oil drain extension Part Number: 9499375
  - NW 25 aluminum clamp Part Number: KQ25AWP
  - European plug power cable 2 meters 1 ph Part Number: 9499398
  - USA plug power cable 2 meters 1 ph Part Number: 9499397
  - UK plug power cable 2 meters 1 ph Part Number: 9499398

- Oil and Accessories
  - NW 25 centering ring Viton Part Number: KC25AV
  - NW 25 aluminum clamp Part Number: KG25AVP

* When these pumps are used in Leak Detectors applications, we recommend the use of Rotary Vane Fluid (Elite-Z mechanical), P/N 695409005 as it features a lower vapor pressure.
AGILENT ROTARY VANE PUMP MODELS

Agilent DS 202

Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>60 Hz</th>
<th>50 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free air displacement</td>
<td>192 l/min (6.8 cfm)</td>
<td>160 l/min (5.6 cfm)</td>
</tr>
<tr>
<td>Pumping speed</td>
<td>5.8 cfm</td>
<td>9.6 m³/h</td>
</tr>
<tr>
<td>Ultimate partial pressure</td>
<td>10⁻¹ mbar</td>
<td></td>
</tr>
<tr>
<td>Ultimate total pressure</td>
<td>2 x 10⁻¹ mbar</td>
<td></td>
</tr>
<tr>
<td>Ultimate total pressure with gas ballast</td>
<td>2 x 10⁻² mbar</td>
<td></td>
</tr>
<tr>
<td>Water vapor tolerance</td>
<td>15 mbar</td>
<td></td>
</tr>
<tr>
<td>Water vapor capacity</td>
<td>100 g/h</td>
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<tr>
<td>Oil capacity min/max</td>
<td>0.25/0.6 l</td>
<td></td>
</tr>
<tr>
<td>Motor rating 1ph</td>
<td>0.55 kW</td>
<td>0.45 kW</td>
</tr>
<tr>
<td>Nominal rotation speed</td>
<td>1800 rpm</td>
<td>1500 rpm</td>
</tr>
<tr>
<td>Weight</td>
<td>25 kg (55 lbs)</td>
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<td>Inlet flange</td>
<td>25KF DN</td>
<td></td>
</tr>
<tr>
<td>Exhaust flange</td>
<td>25KF DN</td>
<td></td>
</tr>
</tbody>
</table>

* According to PNEUROP 6602

Dimensions: millimeters (inches)

212 (8.3) 3 (0.12) 30 (1.18)
30 (1.18) 104 (4.1) (2) 245 (9.6) (1) 105 (4.13)
205 (8.1) 132 (5.2) 467 (18.4)
35 (1.38)

Alternative mounting holes are also available, with (1) = 226 (8.9) and (2) = 98 (3.8), with hole Ø = 7 (0.27)

Ordering Information

Dual Stage Rotary Vane Pump

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
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<tbody>
<tr>
<td>DS 202</td>
<td>9499320</td>
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</table>

* 1 phase motors (100-120 / 200-230) V ±10%, 50/60 Hz. All motors comply with CE and UL/CSA standards.

Minor Maintenance Kit

<table>
<thead>
<tr>
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<th>Description</th>
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</thead>
<tbody>
<tr>
<td>9499370</td>
<td>Contains all the valves, O-rings and seals to refurbish the pump to vacuum integrity</td>
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</table>

Major Maintenance Kit

<table>
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<tr>
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<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9499381</td>
<td>Includes all the items of the minor kit plus the vanes</td>
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Oil and Accessories

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9499390</td>
<td>Rotary vane fluid, DS19 type, 1 liter</td>
</tr>
<tr>
<td>K751601</td>
<td>Rotary vane fluid, DS19 type, 1 liter (USA)</td>
</tr>
<tr>
<td>K751602</td>
<td>Rotary vane fluid, DS19 type, 1 gallon (USA)</td>
</tr>
<tr>
<td>9499393</td>
<td>Oil mist eliminator</td>
</tr>
<tr>
<td>9499394</td>
<td>Oil mist replacement cartridge (pkg. of 2)</td>
</tr>
<tr>
<td>9499395</td>
<td>NW 25 oil exhaust filter</td>
</tr>
<tr>
<td>9499396</td>
<td>NW 25 oil exhaust replacement cartridge</td>
</tr>
<tr>
<td>9499397</td>
<td>Oil return kit</td>
</tr>
<tr>
<td>9499398</td>
<td>Oil drain extension</td>
</tr>
<tr>
<td>9499399</td>
<td>European plug power cable 2 meters 1 ph</td>
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<tr>
<td>9499400</td>
<td>USA plug power cable 2 meters 1 ph</td>
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<tr>
<td>9499401</td>
<td>UK plug power cable 2 meters 1 ph</td>
</tr>
<tr>
<td>9499402</td>
<td>NW 25 centering ring Viton</td>
</tr>
<tr>
<td>9499403</td>
<td>NW 25 aluminum clamp</td>
</tr>
</tbody>
</table>

When these pumps are used in Leak Detectors applications, we recommend the use of Rotary Vane Fluid (Elite-Z mechanical), P/N 695409005 as it features a lower vapor pressure.
AGILENT ROTARY VANE PUMP MODELS

Agilent DS 302

Technical Specifications

Free air displacement
60 Hz: 285 l/min (10 cfm) 50 Hz: 237 l/min (14.2 m³/h)
Pumping speed* 60 Hz: 8.2 cfm 50 Hz: 11.6 m³/h
Ultimate partial pressure* 10⁻^4 mbar
Ultimate total pressure* 2 x 10⁻¹ mbar
Ultimate total pressure with gas ballast* 2 x 10⁻¹ mbar
Water vapor tolerance 20 mbar
Water vapor capacity 160 g/h
Oil capacity min/max 0.25/0.6 l
Motor rating 1hp 60 Hz: 0.55 kW 50 Hz: 0.45 kW
Nominal rotation speed 60 Hz: 1800 rpm 50 Hz: 1500 rpm
Weight 25 kg (55 lbs)
Inlet flange 25KF DN
Exhaust flange 25KF DN

Ordering Information

Dual Stage Rotary Vane Pump Part Number
DS 302 with 1 phase worldwide motor* 9499325

Minor Maintenance Kit Part Number
Contains all the valves, O-rings and seals to refurbish the pump to vacuum integrity 9499370

Major Maintenance Kit Part Number
Includes all the items of the minor kit plus the vanes 9499381

Oil and Accessories Part Number
Rotary vane fluid, DS19 type, 1 liter 9499390

Oil mist eliminator 9499399

Oil mist replacement cartridge (pkg. of 2) 9499394

NW 25 oil exhaust filter 9499392

NW 25 oil exhaust replacement cartridge 9499342

Oil return kit 9499374

Oil drain extension 9499375

European plug power cable 2 meters 1 ph 9499398

USA plug power cable 2 meters 1 ph 9499397

UK plug power cable 2 meters 1 ph 9499398

NW 25 centering ring Viton 949934

NW 25 aluminum clamp 949934

* According to PNEUROP 6602

Dimensions: millimeters (inches)

Rotary Vane Pumps

DS 302 - Pumping Speed Curve

Ordering Information

Dual Stage Rotary Vane Pump Part Number
DS 302 with 1 phase worldwide motor* 9499325

Minor Maintenance Kit Part Number
Contains all the valves, O-rings and seals to refurbish the pump to vacuum integrity 9499370

Major Maintenance Kit Part Number
Includes all the items of the minor kit plus the vanes 9499381

Oil and Accessories Part Number
Rotary vane fluid, DS19 type, 1 liter 9499390

Oil mist eliminator 9499399

Oil mist replacement cartridge (pkg. of 2) 9499394

NW 25 oil exhaust filter 9499392

NW 25 oil exhaust replacement cartridge 9499342

Oil return kit 9499374

Oil drain extension 9499375

European plug power cable 2 meters 1 ph 9499398

USA plug power cable 2 meters 1 ph 9499397

UK plug power cable 2 meters 1 ph 9499398

NW 25 centering ring Viton 949934

NW 25 aluminum clamp 949934

* When these pumps are used in Leak Detectors applications, we recommend the use of Rotary Vane Fluid (Elite-Z mechanical), P/N 695409005 as it features a lower vapor pressure.
**Technical Specifications**

- **Free air displacement**
  - 60 Hz: 410 l/min (14.5 cfm)
  - 50 Hz: 342 l/min (12.5 m³/h)
- **Pumping speed**
  - 60 Hz: 12.3 cfm
  - 50 Hz: 17.4 m³/h
- **Ultimate partial pressure**
  - 10⁻¹ mbar
- **Ultimate total pressure**
  - 2 x 10⁻¹ mbar
- **Ultimate total pressure with gas ballast**
  - 1 x 10⁻¹ mbar
- **Water vapor tolerance**
  - 30 mbar
- **Water vapor capacity**
  - 250 g/h
- **Oil capacity min/max**
  - 0.5/1 l
- **Motor rating 1ph**
  - 60 Hz: 0.55 kW
  - 50 Hz: 0.75 kW
- **Motor rating 3ph**
  - 60 Hz: 0.90 kW
  - 50 Hz: 0.75 kW
- **Nominal rotation speed**
  - 60 Hz: 1800 rpm
  - 50 Hz: 1500 rpm
- **Weight**
  - 35 kg (77 lbs)
- **Inlet flange**
  - 25KF DN
- **Exhaust flange**
  - 25KF DN

* According to PNEUROP 6602

---

**Ordering Information**

- **Dual Stage Rotary Vane Pump**
  - Part Number: DS 402 with 1 phase worldwide motor
  - Part Number: DS 402 with 3 phase worldwide motor

- **Minor Maintenance Kit**
  - Part Number: Contains all the valves, O-rings and seals to refurbish the pump to vacuum integrity

- **Major Maintenance Kit**
  - Part Number: Includes all the items of the minor kit plus the vanes

- **Oil and Accessories**
  - Part Number: Rotary vane fluid, DS19 type, 1 liter
  - Part Number: Rotary vane fluid, DS19 type, 1 liter (USA)
  - Part Number: Oil mist eliminator
  - Part Number: Oil mist replacement cartridge (pkg. of 2)
  - Part Number: NW 25 oil exhaust filter
  - Part Number: NW 25 oil exhaust replacement cartridge
  - Part Number: Oil return kit
  - Part Number: Oil drain extension
  - Part Number: European plug power cable 2 meters 1 ph
  - Part Number: USA plug power cable 2 meters 1 ph
  - Part Number: UK plug power cable 2 meters 1 ph
  - Part Number: NW 25 centering ring Viton
  - Part Number: NW 25 aluminum clamp

* When these pumps are used in Leak Detectors applications, we recommend the use of Rotary Vane Fluid (Elite-Z mechanical), P/N 695409005 as it features a lower vapor pressure.
AGILENT ROTARY VANE PUMP MODELS

Agilent DS 602

Technical Specifications

- Free air displacement:
  - 60 Hz: 605 l/min (21.4 cfm)
  - 50 Hz: 504 l/min (18.2 m³/h)
- Pumping speed:
  - 60 Hz: 17.6 cfm
  - 50 Hz: 25 m³/h
- Ultimate partial pressure:
  - 60 Hz: 10⁻⁴ mbar
  - 50 Hz: 10⁻³ mbar
- Ultimate total pressure:
  - 60 Hz: 10⁻² mbar
  - 50 Hz: 10⁻¹ mbar
- Effective pumping speed:
  - 50 Hz: 0.75 kW
  - 60 Hz: 0.90 kW
- Water vapor tolerance:
  - 60 Hz: 30 mbar
  - 50 Hz: 50 mbar
- Oil capacity min/max:
  - 0.5/1 l
- Motor rating 1ph:
  - 60 Hz: 0.90 kW
  - 50 Hz: 0.75 kW
- Nominal rotation speed:
  - 60 Hz: 1800 rpm
  - 50 Hz: 1500 rpm
- Weight:
  - 35 kg (77 lbs)
- Inlet flange:
  - 25KF DN
- Exhaust flange:
  - 25KF DN

* According to PNEUROP 66-02

Ordering Information

- Dual Stage Rotary Vane Pump
  - Part Number: 9499335
  - 1 phase motors (100-120 / 200-230) V ±10%, 50/60 Hz.
- DS 602 with 3 phase worldwide motor:
  - Part Number: 9499336
  - 3 phase motors (200-220 / 380-415) V ±10% at 50 Hz or (200-230 / 460) V ±10% at 60 Hz

Minor Maintenance Kit

- Part Number: 9499371
- Contains all the valves, O-rings and seals to refurbish the pump to vacuum integrity

Major Maintenance Kit

- Part Number: 9499382
- Includes all the items of the minor kit plus the vanes

Oil and Accessories

- Part Number: 9499390
- Rotary vane fluid, DS19 type, 1 liter
- Part Number: 9499391
- Rotary vane fluid, DS19 type, 1 liter (USA)
- Part Number: 9499392
- Rotary vane fluid, DS19 type, 1 gallon (USA)
- Part Number: 9499393
- Oil mist eliminator
- Part Number: 9499394
- Oil mist replacement cartridge (pkg. of 2)
- Part Number: 9499395
- NW 25 oil exhaust filter
- Part Number: 9499396
- NW 25 oil exhaust replacement cartridge
- Part Number: 9499376
- Oil return kit
- Part Number: 9499377
- Oil drain extension
- Part Number: 9499378
- European plug power cable 2 meters 1 ph
- Part Number: 9499379
- USA plug power cable 2 meters 1 ph
- Part Number: 9499380
- UK plug power cable 2 meters 1 ph
- Part Number: 9499381
- NW 25 centering ring Viton
- Part Number: KC25AV
- NW 25 aluminum clamp
- Part Number: KQ25AVP

* When these pumps are used in Leak Detectors applications, we recommend the use of Rotary Vane Fluid (Elite-Z mechanical), P/N 695409005 as it features a lower vapor pressure.

Dimensions: millimeters (inches)

Rotary Vane Pumps

DS 602 - Pumping Speed Curve

Effective Pumping Speed 50/60 Hz

Pressure (mbar) vs. Effective Pumping Speed (cfm)

Ordering Information

- Dual Stage Rotary Vane Pump
  - Part Number: 9499335
  - 1 phase motors (100-120 / 200-230) V ±10%, 50/60 Hz.
- DS 602 with 3 phase worldwide motor:
  - Part Number: 9499336
  - 3 phase motors (200-220 / 380-415) V ±10% at 50 Hz or (200-230 / 460) V ±10% at 60 Hz

Minor Maintenance Kit

- Part Number: 9499371
- Contains all the valves, O-rings and seals to refurbish the pump to vacuum integrity

Major Maintenance Kit

- Part Number: 9499382
- Includes all the items of the minor kit plus the vanes

Oil and Accessories

- Part Number: 9499390
- Rotary vane fluid, DS19 type, 1 liter
- Part Number: 9499391
- Rotary vane fluid, DS19 type, 1 liter (USA)
- Part Number: 9499392
- Rotary vane fluid, DS19 type, 1 gallon (USA)
- Part Number: 9499393
- Oil mist eliminator
- Part Number: 9499394
- Oil mist replacement cartridge (pkg. of 2)
- Part Number: 9499395
- NW 25 oil exhaust filter
- Part Number: 9499396
- NW 25 oil exhaust replacement cartridge
- Part Number: 9499376
- Oil return kit
- Part Number: 9499377
- Oil drain extension
- Part Number: 9499378
- European plug power cable 2 meters 1 ph
- Part Number: 9499379
- USA plug power cable 2 meters 1 ph
- Part Number: 9499380
- UK plug power cable 2 meters 1 ph
- Part Number: 9499381
- NW 25 centering ring Viton
- Part Number: KC25AV
- NW 25 aluminum clamp
- Part Number: KQ25AVP

* When these pumps are used in Leak Detectors applications, we recommend the use of Rotary Vane Fluid (Elite-Z mechanical), P/N 695409005 as it features a lower vapor pressure.
AGILENT ROTARY VANE PUMP ACCESSORIES

Exhaust Filters - Oil Mist Eliminator

The exhaust filters (below, left) and the oil mist eliminator (right), retain the oil vapors which would otherwise be expelled into the atmosphere during pumpdown and gas ballast operation. Some models feature an oil return line to allow condensed oil or fluid to return to the pump reservoir.

Foreline Roughing Traps

Agilent’s new traps are designed to prevent the backstreaming of mechanical pump fluids. Copper and stainless steel gauge inserts are designed to reduce oil backstreaming. Molecular sieve inserts are available for applications where it is desirable to increase water vapor pumping speed while eliminating backstreaming above the trap.

Ordering Information

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
<th>Shipping Weight lbs (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NW25 oil exhaust filter (left)</td>
<td>PN 9499392</td>
<td></td>
</tr>
<tr>
<td>Oil mist eliminator DS 452 - DS 602 (right)</td>
<td>PN 9499395</td>
<td></td>
</tr>
</tbody>
</table>

Agilent Oil, GP Type Mechanical Pump Fluid

Agilent GP Type Fluid is a mechanical pump fluid recommended for use in non-corrosive applications. As a result of molecular distillation, it has low vapor pressure and, therefore, backstreams less than undistilled refinery products.

Ordering Information

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
<th>Shipping Weight lbs (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 liter bottle</td>
<td>K7516301</td>
<td>3.5 (1.6)</td>
</tr>
<tr>
<td>1 gallon bottle</td>
<td>K7516302</td>
<td>14.0 (6.4)</td>
</tr>
</tbody>
</table>

AGILENT HS SERIES PUMPS

FEATURES AND BENEFITS

- Agilent’s HS 452 and HS 652 rotary vane pumps employ an innovative frequency inverter technology that delivers optimal and consistent performance throughout the worldwide range of voltage and frequency conditions.
- Operating with low power requirements, the microprocessor-controlled frequency inverter, combined with a 3-phase motor, is an efficient driving unit capable of delivering the high starting torque required for a dual-stage oil pump.
- Green technology: environmentally friendly thanks to reduced power requirements, low start up current, minimum oil mist at pump exhaust.

I/O and RS232/RS485 Communication

- Adjustable pumping speed from 45 to 68 Hz permits easy integration and reduces noise levels.
- Pump performance can be tailored to specific applications to reduces system costs.

Universal Input Voltage

- Truly universal single-phase voltage and frequency provide worldwide compatibility.
- Constant performance at different input frequencies.

Remote Diagnostics

- Remote monitoring and control of oil consumption, power and current.
- Reduces maintenance costs, improves uptime and offers higher reliability.

Reduced Power Requirements

- Inverter technology reduces the power required compared to traditional single phase motors.
- Circuit-breakers are no longer required, resulting in reduced system costs.

Higher Nominal Rotational Speed (2000 rpm)

- The pump is ideally suited for steady and high gas-load applications.
AGILENT ROTARY VANE PUMP MODELS

Agilent HS 452

The first rotary vane pumps with truly “smart” capabilities.
• Agilent’s HS 452 and HS 652 pumps employ an innovative frequency inverter technology that delivers optimal and consistent performance while encompassing the worldwide range of voltage and frequency conditions.
• Operating with low power requirements, the microprocessor controlled frequency inverter, combined with a 3-phase motor, is an efficient driving unit capable of delivering the high starting torque required of a dual-stage oil pump.
• HS 452 and HS 652 technology solves the common problems inherent in traditional single-phase motors. Smart Pumps start with inrush current about 7 times lower than that of equivalent traditional pumps.

• Unlike traditional pumps, Smart Pump’s software driven startup procedure recognizes faulty pumps within seconds, and so avoids uncontrolled load conditions. The result is very easy pump integration.
• The 3-phase inverter output is constant and independent of single-phase input frequencies and voltages. Motor efficiency and power factors remain optimal and as a result motor and pump will only drive the pump. Pump performance can be tailored by setting the rotational speed for specific applications. The software monitors and logs pump parameters making it possible to perform pump and system diagnostics.

Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free air displacement</td>
<td>27 m³/h (15 cfm)</td>
</tr>
<tr>
<td>Pumping speed</td>
<td>22 m³/h (13 cfm)</td>
</tr>
<tr>
<td>Ultimate total pressure*</td>
<td>2 x 10⁻¹ mbar</td>
</tr>
<tr>
<td>Ultimate total pressure with gas ballast*</td>
<td>1 x 10⁻⁰ mbar</td>
</tr>
<tr>
<td>Operating voltage</td>
<td>100-120/200-240 V ±5%, 50/60 Hz</td>
</tr>
<tr>
<td>Inverter maximum output power</td>
<td>780 W</td>
</tr>
<tr>
<td>Nominal rotation speed</td>
<td>2000 rpm</td>
</tr>
<tr>
<td>Weight</td>
<td>33 kg (73 lbs)</td>
</tr>
</tbody>
</table>

* According to PNEUROP 6002

Application Note

Steady state high gas load applications exploit the major benefits of the smart technologies. When operated at pressures lower than the auto-tuning pressure, the HS 452 and HS 652 outperform the equivalent traditional DS 402 and DS 602 pumps by 10% at 60 Hz and by 30% at 50 Hz. The Smart Pumps can run below auto-tuning pressure at their full speed of 2000 rpm. As shown in the pumping speed curve at top right, the HS 452 has an auto-tuning pressure of 100 mbar while the HS 652 has an auto-tuning pressure of 40 mbar. Despite the lower power requirements of 780 W max, the Smart Pumps deliver good performance in the roughing phase. Fast cycling or inrush applications need to be evaluated on a case by case basis with our application engineers.

Ordering Information

<table>
<thead>
<tr>
<th>Pump</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>HS 452 Smart Pump 1 phase worldwide motor</td>
<td>9499360</td>
</tr>
<tr>
<td>IP44 accessory connector Kit</td>
<td>9499367</td>
</tr>
</tbody>
</table>

Accessories

<table>
<thead>
<tr>
<th>Accessories</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>NW25 oil exhaust filter</td>
<td>9499392</td>
</tr>
<tr>
<td>Oil return kit</td>
<td>9499378</td>
</tr>
<tr>
<td>Oil drain extension</td>
<td>9499379</td>
</tr>
<tr>
<td>Rotary vane fluid, DS19 type, 1 liter</td>
<td>9499390</td>
</tr>
<tr>
<td>European plug power cable 2 meters 1 ph</td>
<td>9499396</td>
</tr>
<tr>
<td>USA plug power cable 2 meters 1 ph</td>
<td>9499397</td>
</tr>
<tr>
<td>UK plug power cable 2 meters 1 ph</td>
<td>9499398</td>
</tr>
<tr>
<td>Motor maintenance kit</td>
<td>9499371</td>
</tr>
<tr>
<td>Major maintenance kit</td>
<td>9499382</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Applications</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor maintenance kit</td>
<td>9499371</td>
</tr>
<tr>
<td>Major maintenance kit</td>
<td>9499382</td>
</tr>
</tbody>
</table>

Dimensions: millimeters [inches]
The first rotary vane pumps with truly “smart” capabilities.

- Agilent’s HS 452 and HS 652 pumps employ an innovative frequency inverter technology that delivers optimal and consistent performance while encompassing the worldwide range of voltage and frequency conditions.
- Operating with low power requirements, the microprocessor controlled frequency inverter, combined with a 3-phase motor, is an efficient driving unit capable of delivering the high starting torque required of a dual-stage oil pump.
- HS 452 and HS 652 technology solves the common problems inherent in traditional single-phase motors. Smart Pumps start with inrush current about 7 times lower than that of equivalent traditional pumps.

Technical Specifications

- Free air displacement: 46.3 m³/h (23.8 cfm)
- Pumping speed*: 32 m³/h (19 cfm)
- Ultimate total pressure*: 2 x 10⁻³ mbar
- Ultimate total pressure with gas ballast*: 1 x 10⁻¹ mbar
- Operating voltage: 100-120/200-240 V ±10%, 50/60 Hz
- Inverter maximum output power: 780 W
- Nominal rotation speed: 2000 rpm
- Weight: 33 kg (73 lbs)

* According to PNEUROP 6602

Application Note

Steady state high gas load applications exploit the major benefits of the smart technologies. When operated at pressures lower than the auto-tuning pressure, the HS 452 and HS 652 outperform the equivalent traditional DS402 and DS602 pumps by 10% at 60 Hz and by 30% at 50 Hz. The Smart Pumps can run below auto-tuning pressure at their full speed of 2000 rpm. As shown in the pumping speed curve at top right, the HS 452 has an auto-tuning pressure of 100 mbar while the HS 652 has an auto-tuning pressure of 40 mbar. Despite the lower power requirements of 780 W max, the Smart Pumps deliver good performance in the roughing phase. Fast cycling or inrush applications need to be evaluated on a case by case basis with our application engineers.
Mono Stage Rotary Vane Pump
Small Footprint, High Pumping Capacity

- Sophisticated Electronics and excellent mechanical design allow high pumping capacity and reduced dimensions.
- Suitable for steady and high gas throughput conditions at pressures below 10 Torr, in applications like Mass Spectrometry (including LC-MS, ICP-MS, GC-TOF-MS, etc.), Electron Microscopy, and other Scientific Instrumentation.

Please contact Agilent to qualify use in cyclic applications.

Interface Capabilities
- I/O and RS323/RS485 enable adjustment of operating parameters simplifying system integration
- Remote diagnostic allow the control of:
  - Oil level
  - Temperature
  - Power
  - Current

T-Plus Software
- T-Plus software allows control of pump parameters via PC, improving uptime and reliability; and reducing maintenance costs

Worldwide Service Capability
- Three levels of Product Support
  - 24h Advance Exchange
  - Factory Repair
  - Upgrade Program
- allow global coverage of service needs to maximize productivity and uptime

Inverter Technology
- Proven on-board electronics allow constant performance worldwide
- Single phase
- Inverter electronics enable tailoring pumping speed to each application

Smallest Dimensions
- The smallest single stage 40 m³/h pump in the market. 287 x 418 x 225 mm (11.5 x 16.46 x 8.86 inches)
- Including on-board electronics, anti suck-back valve, integrated exhaust filter and oil return kit
- Easier system integration
- Simple maintenance
- Allows smaller overall instrument design, therefore reducing costs

Highest Performances / Size Ratio
- Base pressure below 5 x 10⁻² mbar (3.75 x 10⁻² Torr)
- High pumping speed over a wide range, from atmosphere to 1 mbar (0.75 Torr)
- Inverter technology allows to manage pumping speed to more than 45 m³/h (26.5 cfm)
- Best noise level, with the highest throughput

Green Technology
- Environmentally friendly and cost-effective due to reduced power requirements, low start-up current (< 10 A) and stand by mode
AGILENT ROTARY VANE PUMP MODELS

Agilent MS 40+

Technical Specifications

<table>
<thead>
<tr>
<th>9499225</th>
<th>9499240</th>
<th>9499241</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free air displacement</td>
<td>828 l/min (29.2 cfm; 49.7 m³/h)</td>
<td>828 l/min (29.2 cfm; 49.7 m³/h)</td>
</tr>
<tr>
<td>Pumping speed (at 5 mbar inlet pressure)</td>
<td>40 m³/h</td>
<td>40 m³/h</td>
</tr>
<tr>
<td>Ultimate total pressure(^1)</td>
<td>5 x 10(^{-2}) mbar</td>
<td>5 x 10(^{-2}) mbar</td>
</tr>
<tr>
<td>Oil capacity min/max</td>
<td>1 l</td>
<td>1 l</td>
</tr>
<tr>
<td>Motor rating(^1)</td>
<td>0.75 kW</td>
<td>0.75 kW</td>
</tr>
<tr>
<td>Motor rating (1)ph</td>
<td>0.75 kW</td>
<td>0.75 kW</td>
</tr>
<tr>
<td>Noise level with gas ballast closed</td>
<td>≤ 62 dB(A)</td>
<td>≤ 62 dB(A)</td>
</tr>
<tr>
<td>Oil temperature (pump operating)</td>
<td>60 °C</td>
<td>60 °C</td>
</tr>
<tr>
<td>Oil temperature (1)</td>
<td>140 °F</td>
<td>140 °F</td>
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<tr>
<td>IP Value</td>
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<td>Installation category</td>
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<tr>
<td>Pollution degree</td>
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<td></td>
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<tr>
<td>Operating temperature range</td>
<td>12-40 °C</td>
<td>12-40 °C</td>
</tr>
<tr>
<td>Nominal rotation speed</td>
<td>1450 rpm</td>
<td>1450 rpm</td>
</tr>
<tr>
<td>Weight</td>
<td>33 kg (73 lbs)</td>
<td>33 kg (73 lbs)</td>
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<tr>
<td>Inlet flange</td>
<td>25KF DN</td>
<td>40KF DN</td>
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<tr>
<td>Exhaust flange</td>
<td>25KF DN</td>
<td>25KF DN</td>
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<tr>
<td>Dimensions: - length</td>
<td>418 mm</td>
<td>418 mm</td>
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<tr>
<td>- width</td>
<td>297 mm</td>
<td>297 mm</td>
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<tr>
<td>- height</td>
<td>228 mm</td>
<td>228 mm</td>
</tr>
<tr>
<td>Nominal Input Voltage</td>
<td>200-240 V</td>
<td>200-240 V</td>
</tr>
<tr>
<td>Input frequency</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Max input power</td>
<td>1200 VA</td>
<td>1200 VA</td>
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<tr>
<td>Internal Main Fuse (1)</td>
<td>12.5 A</td>
<td>12.5 A</td>
</tr>
</tbody>
</table>

\(^1\) According to PNEUROP 6602 - No gas ballast port

Ordering Information

Dual Stage Rotary Vane Pump

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9499225</td>
<td>MS 40+ RVP, 25KF Inlet Flange, with I/O and RS232/485 Interface, without Oil Level Sensor</td>
</tr>
<tr>
<td>9499240</td>
<td>MS 40+ RVP, 40KF Inlet Flange, Full Optional with I/O and RS232/485 Interface, with Oil Level Sensor</td>
</tr>
<tr>
<td>9499241</td>
<td>MS 40+ RVP, 40KF Inlet Flange, Base Version</td>
</tr>
</tbody>
</table>

Oil and Accessories

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9499201</td>
<td>MS 40+ Exhaust Filter</td>
</tr>
<tr>
<td>9499202</td>
<td>MS 40+ 1 Litre Oil Tank</td>
</tr>
<tr>
<td>9499203</td>
<td>MS 40+ Maintenance Kit</td>
</tr>
<tr>
<td>9499396</td>
<td>Power cable EU</td>
</tr>
<tr>
<td>9499398</td>
<td>208Vac US Power cable</td>
</tr>
<tr>
<td>9499399</td>
<td>Power cable UK</td>
</tr>
<tr>
<td>9499398</td>
<td>Power cable IEC320</td>
</tr>
<tr>
<td>9499983</td>
<td>T-PLUS Navigator SW (w/serial cable)</td>
</tr>
</tbody>
</table>

MS 40+ Pumping Speed Curve

<table>
<thead>
<tr>
<th>Speed</th>
<th>Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torr</td>
<td>mbar</td>
</tr>
<tr>
<td>10(^{-1})</td>
<td>10(^{1})</td>
</tr>
<tr>
<td>10(^{2})</td>
<td>10(^{3})</td>
</tr>
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