

MS-301, MS-631 High Capacity Rotary Vane Pumps

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X3752-64017, X3752-64018, X3752-64019,
X3752-64020, X3752-64021, X3752-64022,
X3752-64023, X3753-64073, X3753-64074,
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X3753-64078, X3753-64079, X3753-64080

Manuale di Istruzioni
Bedienungshandbuch
Notice de Mode D'Emploi
User Manual

87-900-136-01 (C)

09/2014



Agilent Technologies

Notices

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CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

WARNING

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

High Capacity Rotary Vane Pumps MS-301



MS-631

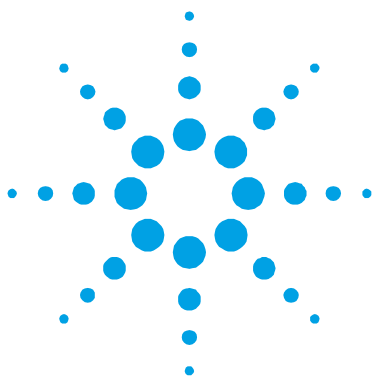


Contents

| | |
|----------------------------------|-----------|
| 1 Istruzioni per l'uso | 9 |
| Informazioni Generali | 10 |
| Immagazzinamento | 11 |
| Preparazione per l'installazione | 11 |
| Installazione | 13 |
| Uso | 16 |
| Manutenzione | 17 |
| Smaltimento | 19 |
| 2 Gebrauchsanleitung | 21 |
| Allgemeine Informationen | 22 |
| Lagerung | 23 |
| Vor der Installation | 23 |
| Installation | 25 |
| Gebrauch | 28 |
| Wartung | 29 |
| Entsorgung | 31 |
| 3 Mode d'emploi | 33 |
| Information Générale | 34 |
| Emmagasinage | 35 |

| | |
|---------------------------------|-----------|
| Preparation pour l'installation | 35 |
| Installation | 37 |
| Utilisation | 40 |
| Maintenance | 41 |
| Mise au rebut | 43 |
| 4 Instructions for Use | 45 |
| General Information | 46 |
| Storage | 47 |
| Preparation for Installation | 47 |
| Installation | 49 |
| Use | 52 |
| Maintenance | 53 |
| Disposal | 55 |
| 5 Technical Information | 57 |
| Section I | 59 |
| Technical Description | 59 |
| Technical Data | 61 |
| Dimensions | 63 |
| Safety Precautions | 69 |
| Transport and Handling | 71 |
| Section II | 73 |
| Installation and Operation | 73 |

| | |
|--|-----|
| Connections to the Inlet and Exhaust Flanges | 77 |
| Stopping the Pump | 83 |
| Safety Rules | 84 |
| Warning Notes | 85 |
| Caution Notes | 87 |
| Maintenance Actions | 88 |
| Lubricants | 90 |
| Section III | 93 |
| Servicing | 93 |
| Spare Parts | 121 |
| De-Commissioning | 124 |
| Return for Repair | 124 |
| Troubleshooting | 125 |



1

Istruzioni per l'uso

| | |
|----------------------------------|----|
| Informazioni Generali | 10 |
| Immagazzinamento | 11 |
| Preparazione per l'installazione | 11 |
| Installazione | 13 |
| Uso | 16 |
| Manutenzione | 17 |
| Smaltimento | 19 |

Traduzione delle istruzioni originali



Informazioni Generali

Questa apparecchiatura è destinata ad uso professionale. L'utilizzatore deve leggere attentamente il presente manuale di istruzioni ed ogni altra informazione addizionale fornita dalla Agilent prima dell'utilizzo dell'apparecchiatura. La Agilent si ritiene sollevata da eventuali responsabilità dovute all'inosservanza totale o parziale delle istruzioni, ad uso improprio da parte di personale non addestrato, ad interventi non autorizzati o ad uso contrario alle normative nazionali specifiche.

Le MS-301 e MS-631 High Capacity Rotary Vane Pumps sono delle pompe rotative monostadio a palette, a tenuta in bagno d'olio, azionate da un motore elettrico trifase.

Queste pompe da alto vuoto sono adatte al pompaggio di gas non corrosivi. Nei paragrafi seguenti sono riportate tutte le informazioni necessarie a garantire la sicurezza dell'operatore durante l'utilizzo dell'apparecchiatura. Informazioni dettagliate sono fornite nell'appendice "Technical Information".

Questo manuale utilizza le seguenti convenzioni:

AVVERTENZA!



I messaggi di avvertenza attirano l'attenzione dell'operatore su una procedura o una pratica specifica che, se non eseguita in modo corretto, potrebbe provocare gravi lesioni personali.

ATTENZIONE!

I messaggi di attenzione sono visualizzati prima di procedure che, se non osservate, potrebbero causare danni all'apparecchiatura.

NOTA

Le note contengono informazioni importanti estrapolate dal testo.

Immagazzinamento

Durante il trasporto e l'immagazzinamento delle pompe non devono essere superate le seguenti condizioni ambientali:

- § temperatura: da -20 °C a 70 °C
- § umidità relativa: 0 – 95 % (non condensante)

Preparazione per l'installazione

La pompa viene fornita in un imballo protettivo; se si presentano segni di danni, che potrebbero essersi verificati durante il trasporto, contattare l'ufficio vendite locale.

Il peso dell'imballo comprensivo della pompa è di circa 200 Kg per la MS-301 e di circa 640 Kg per la MS-631.

Durante l'operazione di disimballaggio, prestare particolare attenzione a non lasciar cadere la pompa e a non sottoporla ad urti o vibrazioni.

Non disperdere l'imballo nell'ambiente. Il materiale è completamente riciclabile e risponde alla direttiva CEE 85/399 per la tutela dell'ambiente.

NOTA

La pompa non può essere danneggiata rimanendo semplicemente esposta all'atmosfera. Si consiglia comunque di mantenerla chiusa fino al momento dell'installazione sul sistema onde evitare eventuale inquinamento da polvere.



Figura 1



Figura 2

Installazione

Non installare e/o utilizzare la pompa in ambienti esposti ad agenti atmosferici (pioggia, gelo, neve), polveri, gas aggressivi, in ambienti esplosivi o con elevato rischio di incendio.

Durante il funzionamento è necessario che siano rispettate le seguenti condizioni ambientali:

§ temperatura: da +12 °C a +40 °C

§ umidità relativa: 0 – 95 % (non condensante)

AVVERTENZA!



Per proteggere contro corto-circuiti o sovraccarichi, è necessario installare un interruttore automatico sulla linea d'alimentazione principale verso la pompa, di capacità adeguata. La capacità dell'interruttore deve essere compatibile con i dati indicati sulla targhetta del motore effettivamente installato e deve essere scelto da chi effettua l'installazione. Il collegamento deve essere effettuato adottando tutte le vigenti norme applicabili.

ATTENZIONE!

Prima di avviare la pompa occorre procedere al rifornimento di olio lubrificante, poiché la pompa viene fornita scarica.

AVVERTENZA!



Togliere i tappi di protezione posti sulle flange di aspirazione e scarico prima di ogni operazione. L'aria contenuta all'interno della pompa, in caso di accensione involontaria, può proiettarli violentemente contro l'operatore e ferirlo.

AVVERTENZA!



Durante l'installazione, prestare la massima attenzione che la flangia di aspirazione sia collegata alla camera da evacuare e che la flangia di scarico non sia tappata (vedere le figure seguenti). Prestare la massima attenzione a non invertire lo scarico con la mandata. La massima pressione interna al contenitore dell'o-lío non deve superare 1,5 bar (assoluta). L'inosservanza di queste precauzioni può causare danni alla pompa ed all'operatore.

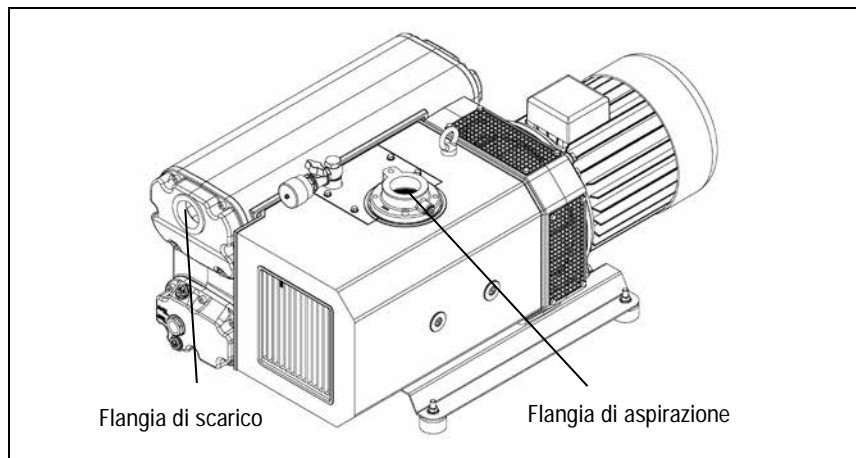


Figura 3 MS-301

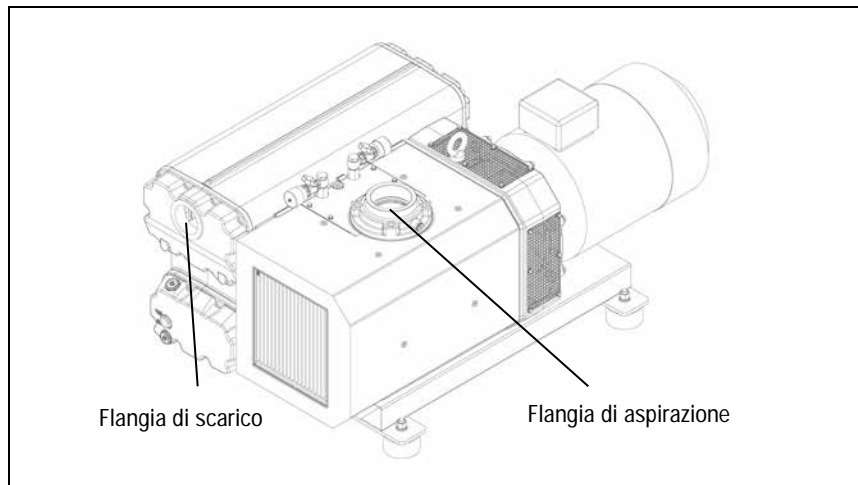


Figura 4 MS-631

ATTENZIONE!

Controllare che la tensione di alimentazione corrisponda al campo di valori indicati sulla targhetta del motore.

Collegare la pompa all'alimentazione.

Uso

L'accensione della pompa non richiede particolari manovre; è sufficiente collegarla all'alimentazione elettrica perché la pompa inizi ad operare.

Per il corretto collegamento fare riferimento allo schema elettrico fornito con la pompa.

AVVERTENZA!



La pompa è progettata per operare con fluidi neutri o non corrosivi. È assolutamente vietato l'impiego con sostanze potenzialmente esplosive o infiammabili.

ATTENZIONE!

Nei motori trifase, un'inversione di polarità provoca l'inversione del senso di rotazione della pompa, con conseguenti possibili danni di natura meccanica.

Manutenzione

Il personale addetto alla condotta ed alla manutenzione della pompa deve essere ben addestrato e deve avere un'approfondita conoscenza delle norme antinfortunistiche.

AVVERTENZA!



Le alte tensioni possono causare morte al contatto. Operare sempre con la massima cautela e secondo le norme antinfortunistiche in vigore.

AVVERTENZA!



Quando la macchina è alimentata prestare attenzione per la presenza di parti in movimento e di alta tensione.

AVVERTENZA!



Nel caso si debba procedere ad operazioni di manutenzione della pompa al termine di un prolungato periodo di esercizio, è necessario lasciarla raffreddare, poiché la temperatura esterna può superare gli 80 °C.

AVVERTENZA!



Escludere sempre l'alimentazione della pompa prima di compiere operazioni di manutenzione. Apporre specifici cartelli di avvertenza: **APPARECCHIATURA IN MANUTENZIONE - NON INSERIRE L'ALIMENTAZIONE**, in corrispondenza dell'interruttore di alimentazione. Al termine ripristinare i dispositivi di sicurezza.

AVVERTENZA!



Non effettuare la sostituzione dell'olio subito dopo l'arresto della macchina, in quanto la temperatura dello stesso può essere elevata.

NOTA

Prima di rispedire al costruttore una pompa per riparazioni è indispensabile compilare e far pervenire al locale ufficio vendite la scheda "Health and Safety Certification" allegata al presente manuale di istruzioni. Copia della stessa deve essere inserita nell'imballo della pompa prima della spedizione.

Qualora una pompa dovesse essere rottamata, procedere alla sua eliminazione nel rispetto delle normative nazionali specifiche.

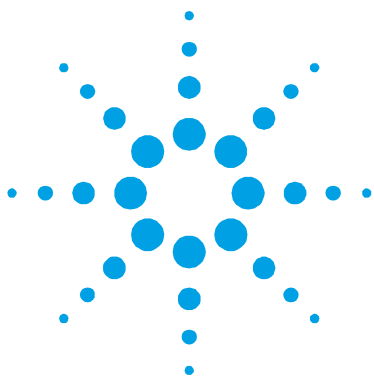
Smaltimento

Significato del logo "WEEE" presente sulle etichette.

Il simbolo qui sotto riportato è applicato in ottemperanza alla direttiva CE denominata "WEEE". Questo simbolo (**valido solo per i paesi della Comunità Europea**) indica che il prodotto sul quale è applicato, **NON** deve essere smaltito insieme ai comuni rifiuti domestici o industriali, ma deve essere avviato ad un sistema di raccolta differenziata.

Si invita pertanto l'utente finale a contattare il fornitore del dispositivo, sia esso la casa madre o un rivenditore, per avviare il processo di raccolta e smaltimento, dopo opportuna verifica dei termini e condizioni contrattuali di vendita.





2 Gebrauchsanleitung

| | |
|--------------------------|----|
| Allgemeine Informationen | 22 |
| Lagerung | 23 |
| Vor der Installation | 23 |
| Installation | 24 |
| Gebrauch | 28 |
| Wartung | 29 |
| Entsorgung | 31 |

Übersetzung der Originalanleitungen



Allgemeine Informationen

Dieses Gerät ist für den professionellen Gebrauch bestimmt. Vor dem Gebrauch soll der Benutzer dieses Handbuch sowie alle weiteren von Agilent mitgelieferten Zusatzinformationen genau lesen. Bei vollständiger bzw. teilweiser Nichtbeachtung der enthaltenen Hinweise, unsachgemäßem Gebrauch durch ungeschultes Personal, nicht autorisierten Eingriffen und Benutzung unter Missachtung der nationalen Bestimmungen übernimmt Firma Agilent keinerlei Haftung.

Die Pumpen-301 e MS-631 High Capacity Rotary Vane Pumps sind dichte ölbadeschmierte einstufige Flügelzellenpumpen, die von einem Dreiphasenstrommotor betätigt werden.

Diese Hochvakuumpumpen eignen sich für das Pumpen von nicht korrosiven Gasen. In den folgenden Abschnitten sind alle erforderlichen Informationen für die Sicherheit des Bedieners bei der Verwendung des Geräts aufgeführt. Detaillierte technische Informationen sind im Anhang "Technical Information" enthalten.

In dieser Gebrauchsanleitung werden Sicherheitshinweise folgendermaßen hervorgehoben:

WARNUNG!



Diese Warnung weist auf gefährliche Arbeitsschritte hin, die bei unsachgemäßer Durchführung das Risiko von Personenschäden bergen.

VORSICHT!

Diese Warnung weist auf Arbeitsschritte hin, die das Risiko von Schäden am Gerät bergen.

HINWEIS

Die Hinweise enthalten wichtige Informationen, die aus dem Text hervorgehoben werden.

Lagerung

Während des Transports und der Lagerung der Pumpen sollen die folgenden Umgebungsbedingungen gegeben sein:

- § Temperatur: -20 °C bis +70 °C
- § Relative Feuchtigkeit: 0 – 95 % (niederschlagsfrei)

Vor der Installation

Die Pumpe wird in einer Schutzverpackung geliefert. Eventuelle Transportschäden sind der zuständigen örtlichen Verkaufsstelle zu melden.

Das Gewicht der Verpackung einschließlich der Pumpe beträgt zirka 200 kg im Falle des Modells MS-301 und zirka 640 kg im Falle des Modells MS-631.

Beim Auspacken ist darauf zu achten, dass die Pumpe nicht fallengelassen oder Stößen oder Vibrationen ausgesetzt wird. Das Verpackungsmaterial ist ordnungsgemäß zu entsorgen. Es ist vollständig recyclebar und entspricht der EG-Richtlinie 85/399 für den Umweltschutz.

HINWEIS

Die Pumpe kann, wenn sie einfach der Atmosphäre ausgesetzt ist, nicht beschädigt werden. Sie sollte jedoch bis zur Installation an der Anlage geschlossen bleiben, um Verunreinigungen durch Staub zu vermeiden.



Abbildung 1



Abbildung 2

Installation

Die Pumpe darf nicht in Umgebungen installiert und/oder benutzt werden, die ungeschützt vor Witterungsbedingungen (Regen, Frost, Schnee), Staub und aggressiven Gasen sind und in denen Explosions- oder erhöhte Brandgefahr besteht.

Während des Betriebs sollen die folgenden Umgebungsbedingungen gegeben sein:

- § Temperatur: +12 °C bis +40 °C
 - § Relative Feuchtigkeit: 0 – 95 % (niederschlagsfrei)
-

WARNUNG!



Um vor Kurzschlüssen oder Überlastungen zu schützen, muss ein automatischer Schalter an der Hauptspeisungsleitung zur Pumpe hin mit einer geeigneten Kapazität installiert werden. Die Kapazität des Schalters muss mit den auf dem Schild des effektiv installierten Motors angegebenen Daten übereinstimmen und von dem Installateur gewählt werden. Der Anschluss muss bei Einhaltung aller geltenden diesbezüglichen Vorschriften erfolgen.

VORSICHT!

Vor dem Pumpenstart muss die Pumpe mit Schmieröl gefüllt werden, da sie ohne geliefert wird.

WARNUNG!



Vor Aufnahme jeglicher Arbeiten sind die Schutzkappen an den Saug- und Druckflanschen zu entfernen. Die im Pumpeninnern enthaltene Luft könnte diese bei unbeabsichtigter Einschaltung gegen den Bediener schleudern.

WARNUNG!



Bei der Installation ist unbedingt darauf zu achten, dass der Saugflansch an die zu entleerende Kammer angeschlossen ist und der Ablassflansch nicht verschlossen ist (siehe folgende Abbildungen). Bitte sehr darauf achten, dass der Ablass nicht mit der Ansaugung verwechselt wird. Der Druck im Ölbehälter darf nicht größer als 1,5 bar (abs) sein. Bei Nichtbeachtung dieser Anweisungen besteht Schadensgefahr für die Pumpe und die Bedienperson.

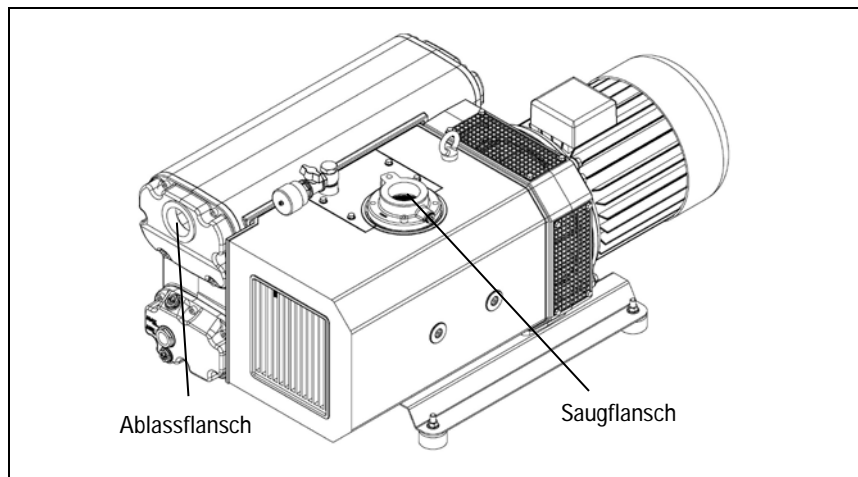


Abbildung 3 MS-301

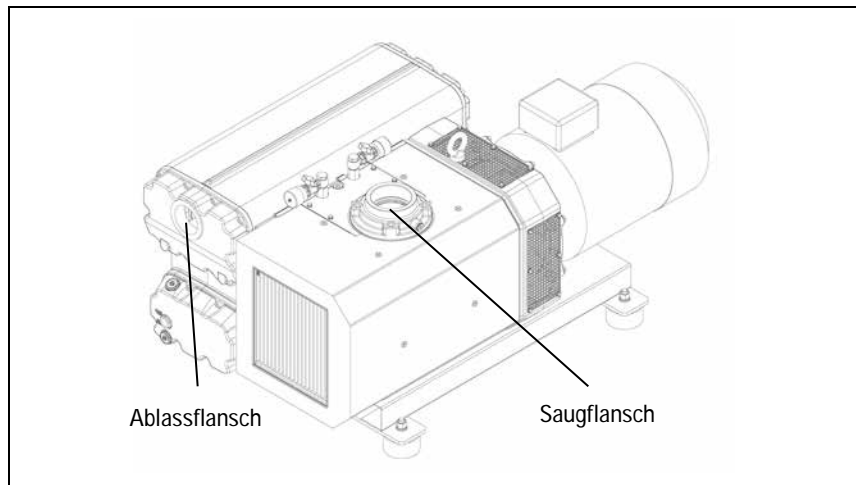


Abbildung 4 MS-631

VORSICHT!

Vergewissern Sie sich, dass die Versorgungsspannung mit dem Wertbereich auf dem Typenschild des Motors übereinstimmt.

Die Pumpe an das Versorgungsnetz anschließen.

Gebrauch

Das Einschalten der Pumpe fordert keine besonderen Vorgänge, es ist ausreichend, diese mit Strom zu verbinden, damit sie zu pumpen beginnt.

Für den korrekten Anschluss beziehen Sie sich bitte auf den mit der Pumpe gelieferten Schaltplan.

WARNUNG!



Die Pumpe ist für den Betrieb mit neutralen und nicht korrosiven Fluiden konzipiert. Der Einsatz mit potentiell explosions- oder feuergefährlichen Substanzen ist streng verboten.

VORSICHT!

In den Dreiphasenmotoren ruft eine Polaritätsumkehrung die Umkehrung der Pumpendrehrichtung hervor und kann somit eventuelle mechanische Schäden verursachen.

Wartung

Das für den Betrieb und die Wartung zuständige Personal soll geschult sein und über eine solide Kenntnis der Unfallschutzvorschriften verfügen.

WARNUNG!



Hochspannungen können bei Kontakt tödliche Folgen haben. Es ist stets mit größter Vorsicht und gemäß den geltenden Unfallschutzvorschriften vorzugehen.

WARNUNG!



Bei eingeschaltetem Gerät ist auf Bewegungs- und Hochspannungsteile zu achten.

WARNUNG!



Falls die Pumpe im Anschluss an den Betrieb gewartet werden soll, ist abzuwarten, bis sie abgekühlt ist, da ihre Oberfläche eine Temperatur von 80 °C überschreiten kann.

WARNUNG!



Vor Wartungsarbeiten ist die Pumpe stets energiefrei zu schalten. Am Netzschalter sind spezielle Warnschilder "INSTANDHALTUNG AM GERÄT – NICHT EINSCHALTEN" anzubringen. Nach Abschluss der Arbeiten sind die Sicherheitseinrichtungen wieder zu aktivieren.

WARNUNG!



Keine Ölwechsel unmittelbar nach Stillsetzung des Gerätes vornehmen, da die Öltemperatur sehr hoch sein kann.

HINWEIS

Bevor dem Hersteller eine Pumpe zur Reparatur zurückgesandt wird, ist das Formular "Sicherheit und Gesundheit" in der Anlage zum vorliegenden Handbuch auszufüllen und der lokalen Verkaufsstelle zuzustellen. Eine Kopie des Formulars ist der Pumpenverpackung vor dem Versand beizulegen.

Bei eventueller Verschrottung einer Pumpe ist diese entsprechend der einschlägigen nationalen Vorschriften zu entsorgen.

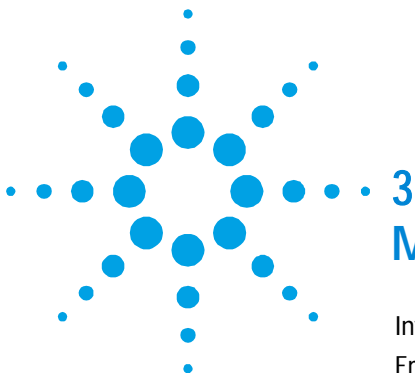
Entsorgung

Bedeutung des "WEEE" Logos auf den Etiketten.

Das folgende Symbol ist in Übereinstimmung mit der EU-Richtlinie WEEE (Waste Electrical and Electronic Equipment) angebracht.

Dieses Symbol (**nur in den EU-Ländern gültig**) zeigt an, dass das betreffende Produkt nicht zusammen mit Haushaltsmüll entsorgt werden darf sondern einem speziellen Sammelsystem zugeführt werden muss. Der Endabnehmer sollte daher den Lieferanten des Geräts - d.h. die Muttergesellschaft oder den Wiederverkäufer - kontaktieren, um den Entsorgungsprozess zu starten, nachdem er die Verkaufsbedingungen geprüft hat.





3

Mode d'emploi

| | |
|---------------------------------|----|
| Information Générale | 34 |
| Emmagasinage | 35 |
| Préparation pour l'installation | 35 |
| Installation | 37 |
| Utilisation | 40 |
| Maintenance | 41 |
| Mise au rebut | 43 |

Traduction de la mode d'emploi originale



Information Générale

Cet appareil a été conçu en vue d'une utilisation professionnelle. Il est conseillé à l'utilisateur de lire attentivement cette notice ainsi que toute autre information fournie par Agilent avant de l'utiliser. Agilent décline toute responsabilité en cas de non-respect total ou partiel des instructions fournies, d'utilisation incorrecte de la part du personnel non formé, d'opérations non autorisées ou d'un emploi contraire aux réglementations nationales spécifiques.

Les MS-301 et MS-631 High Capacity Rotary Vane Pumps sont des pompes rotatives monoétages, à palettes, étanches en bain d'huile, actionnées par un moteur électrique triphasé.

Ces pompes à haut vide sont adaptées au pompage de gaz non corrosifs.

Les paragraphes suivants fournissent toute l'information nécessaire pour garantir la sécurité de l'opérateur pendant l'utilisation de l'appareil. Des renseignements plus détaillés se trouvent dans l'appendice «Technical Information».

Cette notice utilise les signes conventionnels suivants:

AVERTISSEMENT!



Les messages d'avertissement attirent l'attention de l'opérateur sur une procédure ou une manœuvre spéciale dont la mauvaise exécution risque de provoquer de graves lésions.

ATTENTION!

Les messages d'attention apparaissent avant certaines procédures dont le non-respect pourrait endommager sérieusement l'appareil.

NOTE

Les notes contiennent des renseignements importants, isolés du texte.

Emmagasinage

Pendant le transport et l'emmagasinage des pompes, veiller à respecter les conditions environnementales suivantes:

- § température: de -20 °C à +70 °C
- § humidité relative: 0 – 95 % (sans condensation)

Preparation pour l'installation

La pompe est fournie dans un emballage de protection; si l'on constate des marques de dommages pouvant s'être produites pendant le transport, contacter aussitôt le bureau de vente local.

Le poids total de l'emballage avec la pompe est d'environ 200 Kg pour la MS-301 et d'environ 640 Kg pour la MS-631.

Pendant l'opération d'ouverture de l'emballage, veiller tout particulièrement à ne pas laisser tomber la pompe et à ne lui faire subir aucun choc ni aucune vibration.

Ne pas jeter l'emballage dans la nature. Le matériel est entièrement recyclable et il est conforme à la directive CEE 85/399 en matière de protection de l'environnement.

NOTE

La pompe ne peut être endommagée en restant simplement exposée à l'atmosphère. Il est de toute façon conseillé de la garder dans son emballage jusqu'au moment de sa mise en place sur le système afin d'éviter toute pollution due à la poussière.



Figure 1



Figure 2

Installation

Ne pas installer et/ou utiliser la pompe dans des milieux exposés aux agents atmosphériques (pluie, gel, neige), à des poussières, à des gaz agressifs ainsi que dans des milieux explosifs ou à risque élevé d'incendie.

Pendant le fonctionnement, il est nécessaire de respecter les conditions environnementales suivantes:

- § Température: de +12 °C à +40 °C
- § Humidité relative: 0 - 95 % (sans condensation)

AVERTISSEMENT!



Afin de prévenir les risques de courts-circuits ou de surcharge, il est nécessaire d'installer un interrupteur automatique sur la ligne d'alimentation principale de la pompe, d'une capacité appropriée. La capacité de l'interrupteur doit être compatible avec les données figurant sur la plaque signalétique du moteur effectivement installé et doit être sélectionné par l'installateur. Le branchement doit être effectué dans le respect des normes en vigueur.

ATTENTION!

Avant toute utilisation de la pompe, celle-ci doit être ravitaillée en huile car elle est livrée vide.

AVERTISSEMENT!



Avant toute autre opération, retirer les bouchons de protection placés sur les brides d'aspiration et de vidange. En cas de mise en marche inopinée de l'appareil, l'air contenu à l'intérieur de la pompe peut les projeter contre l'opérateur et le blesser.

AVERTISSEMENT!



Pendant l'installation, faire très attention à ce que la bride d'aspiration soit reliée à la chambre à vider et que la bride de vidange ne soit pas bouchée (voir les figures ci-après). Veiller attentivement à ne pas inverser l'entrée et la sortie de la pompe. La pression maximale à l'intérieur du réservoir d'huile ne doit pas dépasser 1,5 bar (abs). Le non-respect de ces précautions peut entraîner un danger pour l'opérateur et endommager la machine.

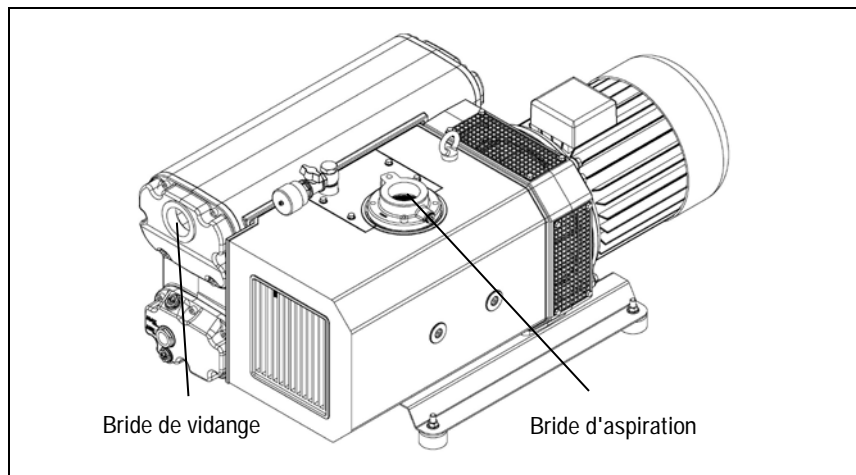


Figure 3 MS-301

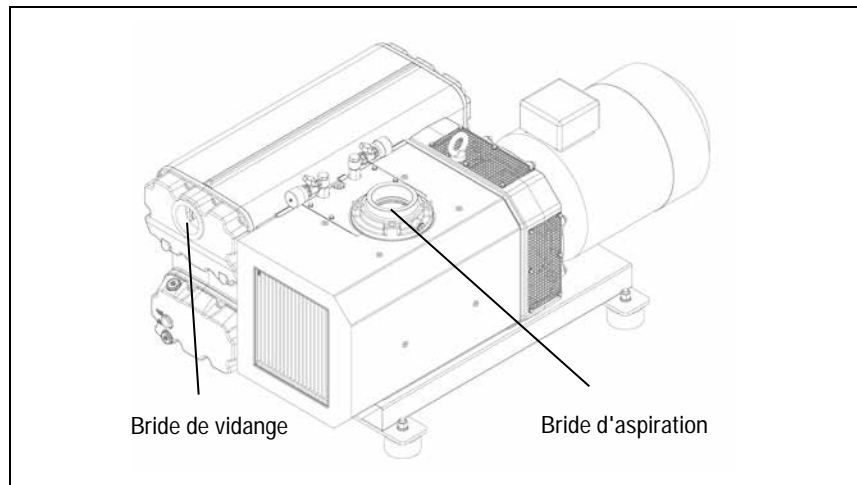


Figure 4 MS-631

ATTENTION! Contrôler que la tension d'alimentation correspond à la gamme de tensions indiquées sur la plaquette du moteur.

Brancher la pompe à la source d'alimentation.

Utilisation

La mise en marche de la pompe ne requiert aucune manœuvre particulière; il suffit de la brancher à l'alimentation électrique pour que la pompe démarre.

Pour un branchement correct, consultez le schéma électrique fourni.

AVERTISSEMENT!



La pompe a été conçue pour fonctionner avec des fluides neutres ou non corrosifs. L'emploi de substances potentiellement explosives ou inflammables est strictement interdit.

ATTENTION!

Sur les moteurs triphasés, une inversion des polarités entraîne une inversion du sens de rotation de la pompe et comporte des risques de dommages mécaniques.

Maintenance

Le personnel chargé de la conduite et de la maintenance de la pompe doit avoir la formation nécessaire et posséder une connaissance approfondie des normes de prévention des accidents du travail.

AVERTISSEMENT!



Les hautes tensions peuvent entraîner la mort par contact. Veiller à toujours opérer avec le maximum de prudence et dans le respect des normes de prévention des accidents du travail en vigueur.

AVERTISSEMENT!



Lorsque la machine est sous tension, faire attention à la présence d'organes en mouvement et de haute tension.

AVERTISSEMENT!



En cas de devoir procéder à des opérations de maintenance de la pompe au terme d'une longue période de fonctionnement, il est indispensable de la laisser refroidir car sa température extérieure peut dépasser 80 °C.

AVERTISSEMENT!



Avant toute opération de maintenance, il est impératif de toujours couper l'alimentation de la pompe. Placer les panneaux spécifiques d'avertissement: **APPAREIL EN COURS DE MAINTENANCE – NE PAS BRANCHER L'ALIMENTATION**, près de l'interrupteur d'alimentation. Au terme des opérations de maintenance, restaurer les dispositifs de sécurité.

AVERTISSEMENT!



Ne pas effectuer la substitution d'huile immédiatement après l'arrêt de la machine car la température de celle-là peut être élevée.

NOTE

Avant de retourner une pompe au constructeur pour réparation, il est indispensable de remplir et d'adresser au bureau local de vente la fiche "Health and Safety Certification" jointe à la présente notice. Une copie de celle-ci devra être mise dans l'emballage de la pompe avant expédition.

En cas de mise au rebut de la pompe, procéder à son élimination conformément aux réglementations nationales en la matière.

Mise au rebut

Signification du logo "WEEE" figurant sur les étiquettes.

Le symbole ci-dessous est appliqué conformément à la directive CE nommée "WEEE".

Ce symbole (**uniquement valide pour les pays de la Communauté européenne**) indique que le produit sur lequel il est appliqué NE doit PAS être mis au rebut avec les ordures ménagères ou les déchets industriels ordinaires, mais passer par un système de collecte sélective.

Après avoir vérifié les termes et conditions du contrat de vente, l'utilisateur final est donc prié de contacter le fournisseur du dispositif, maison mère ou revendeur, pour mettre en œuvre le processus de collecte et mise au rebut.





4 Instructions for Use

| | |
|------------------------------|----|
| General Information | 46 |
| Storage | 47 |
| Preparation for Installation | 47 |
| Installation | 49 |
| Use | 52 |
| Maintenance | 53 |
| Disposal | 55 |

Original Instructions



General Information

This equipment is destined for use by professionals. The user should read this instruction manual and any other additional information supplied by Agilent before operating the equipment. Agilent will not be held responsible for any events occurring due to non-compliance, even partial, with these instructions, improper use by untrained persons, non-authorized interference with the equipment or any action contrary to that provided for by specific national standards.

The -301 e MS-631 High Capacity Rotary Vane Pumps are single-stage, rotary vane pumps oil sealed, driven by a three-phase electric motor.

These high vacuum pumps are suitable for pumping non corrosive gases.

The following paragraphs contain all the information necessary to guarantee the safety of the operator when using the equipment. Detailed information is supplied in the appendix "Technical Information".

This manual uses the following standard protocol:

WARNING!



The warning messages are for attracting the attention of the operator to a particular procedure or practice which, if not followed correctly, could lead to serious injury.

CAUTION!

The caution messages are displayed before procedures which, if not followed, could cause damage to the equipment.

NOTE

The notes contain important information taken from the text.

Storage

When transporting and storing the pumps, the following environmental requirements should not be exceeded:

- § temperature: from -20° to +70 °C
- § relative humidity: 0 – 95 % (non-condensing)

Preparation for Installation

The pump is supplied in a protective packing. If this shows signs of damage which may have occurred during transport, contact your local sales office.

The total weight of the pack, including the pump, is approx. 200 Kg for the MS-301 and approx. 640 Kg for the MS-631.

When unpacking the pump, be sure not to drop it and avoid any kind of sudden impact or shock vibration to it.

Do not dispose of the packing materials in an unauthorized manner. The material is 100 % recyclable and complies with EEC Directive 85/399.

NOTE

Normal exposure to the environment cannot damage the pump. Nevertheless, it is advisable to keep it closed until it is installed in the system, thus preventing any form of pollution by dust.



Figure 1



Figure 2

Installation

Do not install or use the pump in an environment exposed to atmospheric agents (rain, snow, ice), dust, aggressive gases, or in explosive environments or those with a high fire risk.

During operation, the following environmental conditions must be respected:

§ temperature: from +12 °C to +40 °C

§ relative humidity: 0 – 95 % (non-condensing)

WARNING!



To ensure short-circuit or overload protection, an automatic circuit breaker of appropriate capacity must be installed on the main power line towards the pump. The capacity of the switch must be compatible with the rating plate data of the motor actually installed and must be chosen by the installer. Connect by adopting all the current applicable rules and regulations.

CAUTION!

Fill the pump with lubricating oil before starting it. The pump is supplied empty.

WARNING!



Take out the protective caps on the suction and exhaust flanges before doing anything else. In the event of an accidental start-up, the air inside the pump could violently expel the protective caps and harm the operator.

WARNING!



During installation, pay maximum attention that the suction flange is connected to the vacuum chamber and the exhaust flange is not closed (see figures below). Be very careful not to invert exhaust and suction. Maximum pressure inside the oil container must not exceed 1.5 bar (abs.) Non-observance of these precautions may be dangerous for the pump and the operator.

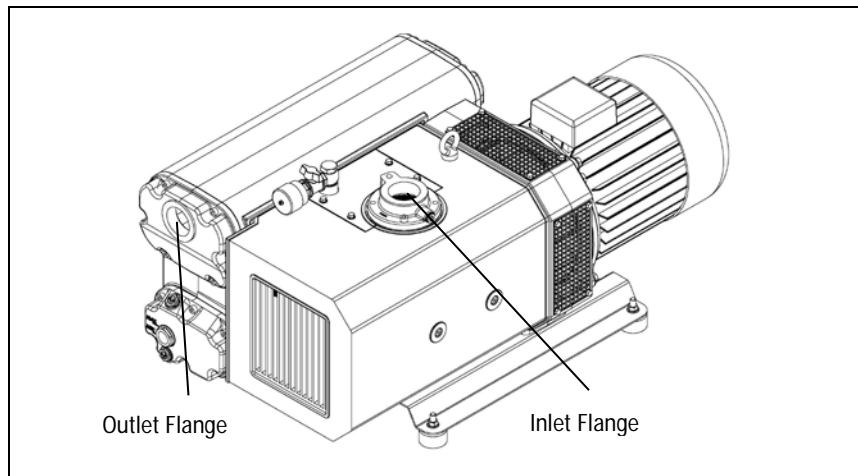


Figure 3 MS-301

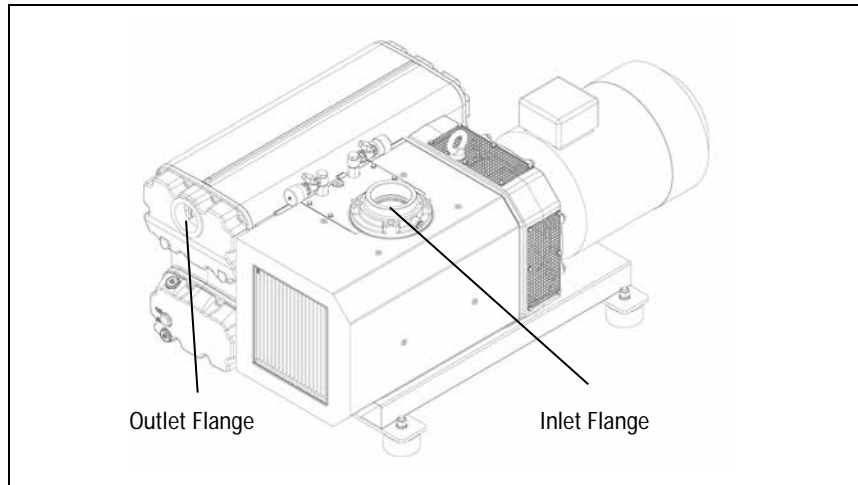


Figure 4 MS-631

CAUTION!

Check that your electrical mains voltage corresponds to the range indicated on motor label.

Connect the pump to the power supply.

Use

There are no special procedures for switching the pump on. Simply connect to the electrical power supply to start it running.

Refer to the wiring diagram supplied with the pump for correct connection.

WARNING!



The pump is designed for operation with neutral or non-corrosive fluids. It is absolutely forbidden to use potentially explosive or flammable substances.

CAUTION!

In three-phase motors, reversing the phase will reverse the sense of rotation of the pump. This may cause mechanical damage.

Maintenance

Personnel responsible for pump operation and maintenance must be well-trained and must be aware of the accident prevention rules.

WARNING!

Death may result from contact with high voltages. Always take extreme care and observe the accident prevention regulations in force.



WARNING!

When machine is powered take care on account of moving parts and high voltages.



WARNING!

If you have to perform maintenance on the pump after a considerable time in operation, leave it to cool as temperature of the outer surface may be in excess of 80 °C.



WARNING!



Always disconnect the power supply to the pump before starting maintenance work. Place a special warning signs over the power supply breaker switch: **MACHINE UNDERGOING MAINTENANCE - DO NOT POWER ON.** When finished, remove the safety warning.

WARNING!



Do not change the oil immediately after stopping the machine as the oil temperature may still be high.

NOTE

Before returning the pump to the constructor for repairs the "Health and Safety Certification" sheet attached to this instruction manual must be filled-in and sent to the local sales office. A copy of the sheet must be inserted in the pump package before shipping.

If a pump is to be scrapped, it must be disposed of in accordance with the specific national standards.

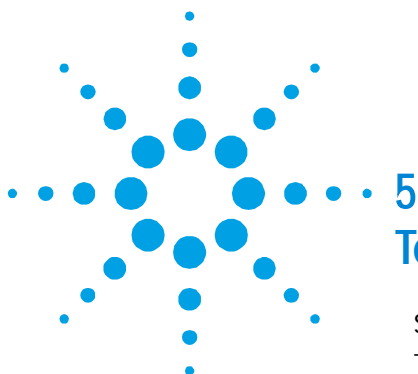
Disposal

Meaning of the "WEEE" logo found in labels

The following symbol is applied in accordance with the EC WEEE (Waste Electrical and Electronic Equipment) Directive.

This symbol (**valid only in countries of the European Community**) indicates that the product it applies to must NOT be disposed of together with ordinary domestic or industrial waste but must be sent to a differentiated waste collection system. The end user is therefore invited to contact the supplier of the device, whether the Parent Company or a retailer, to initiate the collection and disposal process after checking the contractual terms and conditions of sale.





5 Technical Information

| | |
|--|----|
| Section I | 59 |
| Technical Description | 59 |
| Technical Data | 61 |
| Dimensions | 63 |
| Safety Precautions | 69 |
| Transport and Handling | 71 |
| Lifting | 71 |
| Unpacking and Components Control | 72 |
| Storage | 72 |
| Section II | 73 |
| Installation and Operation | 73 |
| Assembling | 73 |
| Gas Ballast | 74 |
| Positioning | 75 |
| Connections to the Inlet and Exhaust Flanges | 77 |
| Connection to the Vacuum System | 79 |
| Discharge Air Pipe Line Installation | 79 |
| Electrical Connection | 80 |
| Suggestions for Use | 82 |
| Water Vapour Suction | 83 |

Original Instructions



| | |
|--|-----|
| Stopping the Pump | 83 |
| Safety Rules | 84 |
| Warning Notes | 85 |
| Caution Notes | 87 |
| Maintenance Actions | 88 |
| Section III | 93 |
| Servicing | 93 |
| General Information | 93 |
| Pump Parts for MS-301 | 98 |
| Pump Parts for MS-631 | 109 |
| Oil Change Procedure | 116 |
| Float Valve Cleaning Procedure | 117 |
| Exhaust Filters Replacement Procedure | 118 |
| Oil Separator Change Procedure | 118 |
| Gas Ballast Felt Disk Change Procedure | 119 |
| Coupling Elastic Element Replacement Procedure | 120 |
| Pump Overhaul Procedure | 120 |
| Spare Parts | 121 |
| Spares Necessary for Normal Servicing | 121 |
| How to Order Spare Parts | 121 |
| Orderable Parts | 122 |
| De-Commissioning | 124 |
| Return for Repair | 124 |
| Troubleshooting | 125 |

Section I

Technical Description

The pumps series MS (MS-301 and MS-631) are single stage rotary vane vacuum pumps lubricated, with oil recirculation, driven by a flanged electrical motor, coupled by means of an elastic coupling.

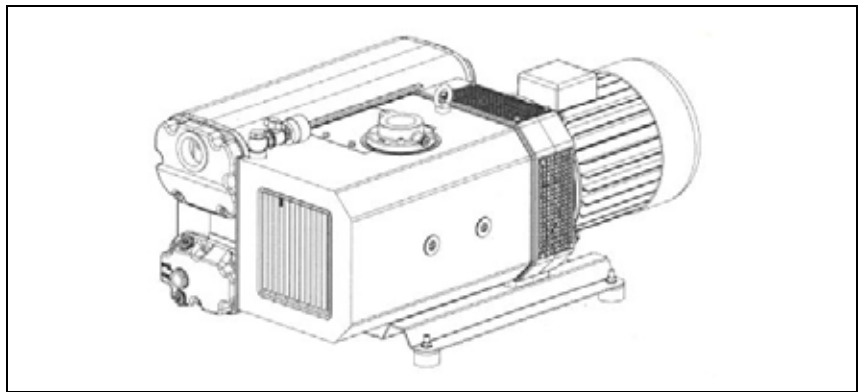


Figure 5 MS-301

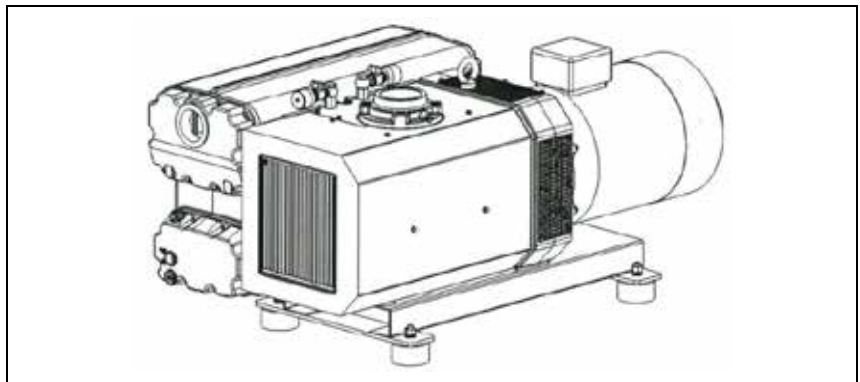


Figure 6 MS-631

These Agilent vacuum pumps are suitable for pumping non corrosive gases.

The pumps series MS can reach:

§ $\leq 8 \times 10^{-2}$ mbar (partial pressure) without gas ballast valve

§ ≤ 0.7 mbar (ultimate total pressure) with gas ballast valve.

Cooling is achieved by means of an air/oil cooler, cooled with a centrifugal fan. At the pump inlet there is a mesh filter in order to protect it from solid parts having diameter larger than 1.5 mm. Furthermore, an integrated non return valve prevents the oil coming back and the return of air in the chamber to be pumped down during the stop phase.

In the tank there is a system of oil smokes separation from the discharged air (maximum residual 2 PPM/weight corresponding to 2.4 mg/m^3).

The separated oil is recovered automatically by the pump.

A standard gas ballast valve prevents condensation inside the pump even when pumping down small quantity of vapour.

Here after are shown symbols used to identify the threaded ports;



§ This symbol identifies the inlet port



§ This symbol identifies the exhaust threaded port.

Technical Data

The following table lists the main technical data of the series MS High Capacity Rotary Vane Pumps.

Tab. 1 Accessories and Spare Parts

| Technical Data | Units | MS-301 | MS-631 |
|---|------------------------------|-------------------------------|-------------------------------|
| NOMINAL SPEED* | m ³ /h (at 50 Hz) | 290 | 660 |
| | m ³ /h (at 60 Hz) | 350 | 790 |
| ULTIMATE PRESSURE WITHOUT GAS BALLAST* (partial) | mbar | $\leq 8 \times 10^{-2}$ | $\leq 8 \times 10^{-2}$ |
| | Pascal | ≤ 8 | ≤ 8 |
| ULTIMATE PRESSURE WITH GAS BALLAST* (absolute) | mbar | ≤ 0.7 | ≤ 0.7 |
| | Pascal | ≤ 70 | ≤ 70 |
| MOTOR POWER/ROTATIONAL SPEED** (3ph) | kW (rpm) at 50 Hz | 5.5 (1450) | 15 (950) |
| | kW (rpm) at 60 Hz | 7.5 (1750) | 18.5 (1150) |
| ELECTRICAL MOTOR CHARACTERISTICS | at 50 Hz | IM B5 400/690 V $\pm 10\%$ | IM B5 400/690 V $\pm 10\%$ |
| | | IM B5 230/400 V $\pm 10\%$ | |
| | at 60 Hz | IM B5 480/828 V $\pm 10\%$ | IM B5 480/828 V $\pm 10\%$ |
| | | | |
| | at 50/60 Hz | IM B5 380/420/ 660-725 | IM B5 380-420/ 660-725 |
| | | | |
| NOISE PRESSURE LEVEL (According to UNI EN ISO 2151 standard) | dB(A) at 50 Hz | 72 | 71 |
| | dB(A) at 60 Hz | 76 | 73 |
| WATER VAPOUR TOLERANCE | 50 Hz | mbar | 30 |
| | 60 Hz | mbar | 40 |
| WATER VAPOUR PUMPING CAPACITY | 50 Hz | Kg/h | 5 |
| | 60 Hz | Kg/h | 7 |
| OIL CAPACITY | min | l | 6 |
| | max | l | 8 |
| | nominal | l | 7 |

| Technical Data | | Units | MS-301 | MS-631 |
|-----------------------------|----------------------------|---|-------------------------------|--------------------------------|
| WEIGHT | with 3 ph 50 Hz motor | Kg (lb) | 190 (418.50) | 575 (1266.52) |
| | with 3 ph 60 Hz motor | Kg (lb) | 192 (422.91) | 612 (1348.02) |
| | without motor (approx.***) | Kg (lb) | 140 (308.37) | 385 (848.02) |
| OPERATING TEMPERATURE RANGE | | °C | 12 – 40 | 12 – 40 |
| INLET FLANGE | | DN | 2" gas / DN63 ISO-K/2" NPT | 4" gas / DN100 ISO-K/4" NPT |
| EXHAUST FLANGE | | DN | 2" gas/2" NPT | 3" gas/3 " NPT |
| POWER SUPPLY VOLTAGE | 50 Hz | V | 230/400 ± 10 % | 400/690 ± 10 % |
| | | | 400/690 ± 10 % | |
| | 50/60 Hz | | 380-420/ 660-725 | 380-420/ 660-725 |
| | | | 60 Hz | V |
| MAX INPUT POWER | 50 Hz | VA (HP) | 5.5 (7.4) | 15 (20.1) |
| | 60 Hz | VA (HP) | 7.5 (10) | 18.5 (24.8) |
| COMPLIANCE WITH: | | EN 61010-1 2001 Safety requirements for electrical equipment for measurement control and laboratory use EN 61326-1 2006 Electrical equipment for measurement control and laboratory use EMC requirements EN 1012-2 2009 Compressors and vacuum pumps - Safety requirements - Part 2: vacuum pumps EN 12100-1 2005 Safety of machinery - Basic concepts, general principles for design – Part 1: basic terminology, methodology EN 12100-2 2005 Safety of machinery - Basic concepts, general principles for design – Part 2: technical principles | | |

According to PNMSROP standard 6602

** Valid for temperature up to 40 °C and altitudes lower than 1000 m

*** Depending from motor

Dimensions

The following drawings show the pumps layout, dimensions and rotational direction:

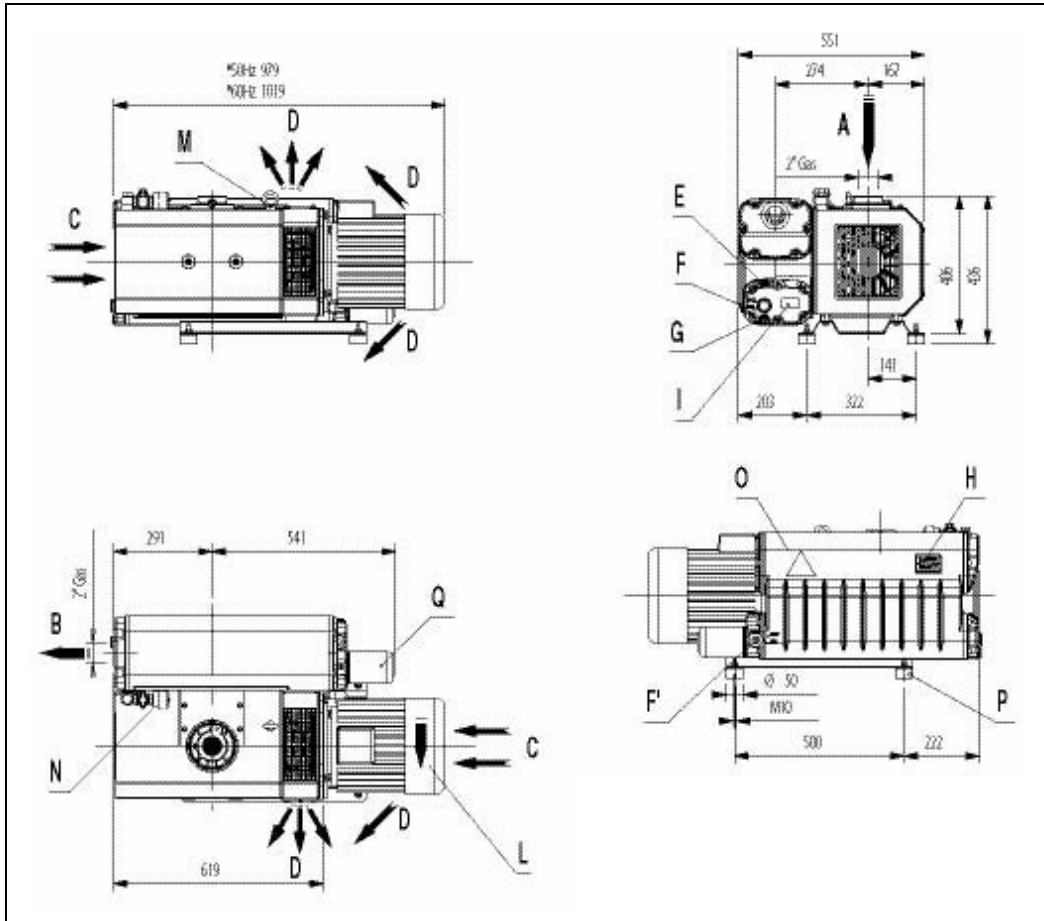


Figure 7

Dimensions subject to changes (depending on motor brand)

Tab. 2 Legend

| | |
|------|------------------------|
| A | Inlet |
| B | Exhaust |
| C | Cooling air inlet |
| D | Cooling air outlet |
| E | Oil filling plug |
| F-F1 | Oil sight glass |
| G | Oil drain plug |
| H | Pump name plate |
| I | Oil grade label |
| L | Rotation plate |
| M | Lifting eyebolt |
| N | Gas ballast valve |
| O | Hot surface name plate |
| P | Vibration damper |

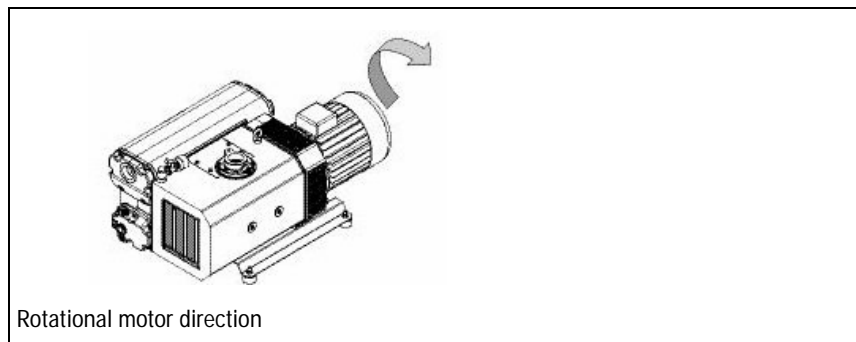


Figure 8 MS-301

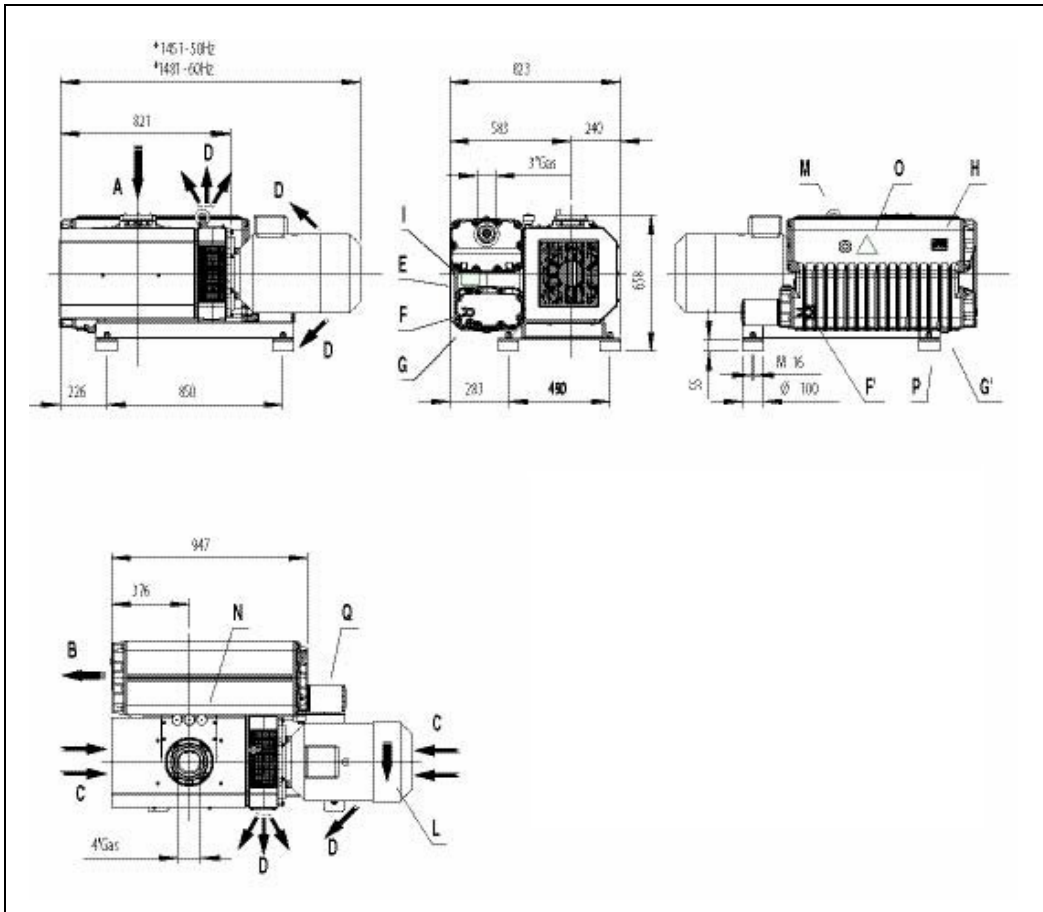


Figure 9

Dimensions subject to changes (depending on motor brand)

Tab. 3

| | |
|------|------------------------|
| A | Inlet |
| B | Exhaust |
| C | Cooling air inlet |
| D | Cooling air outlet |
| E | Oil filling plug |
| F-F1 | Oil sight glass |
| G-G1 | Oil drain plug |
| H | Pump name plate |
| I | Oil grade label |
| L | Rotation plate |
| M | Lifting eyebolt |
| N | Gas ballast valve |
| O | Hot surface name plate |
| P | Vibration damper |
| Q | Oil filter |

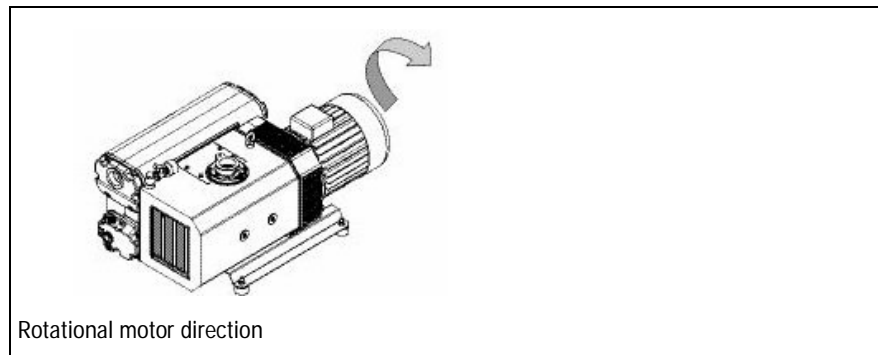


Figure 10 MS-631

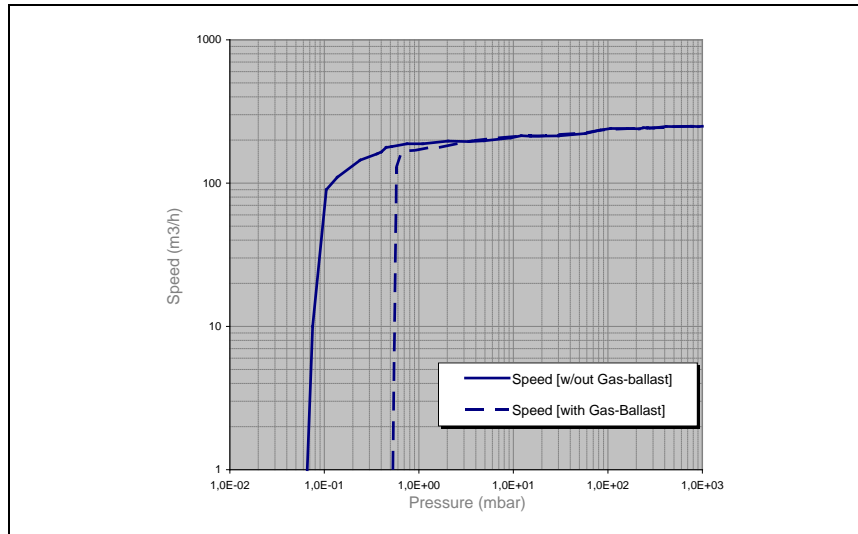


Figure 11 MS-301 Graph of delivery capacity vs inlet pressure with 50 Hz motor (____ without gas ballast valve) (----- with gas ballast)

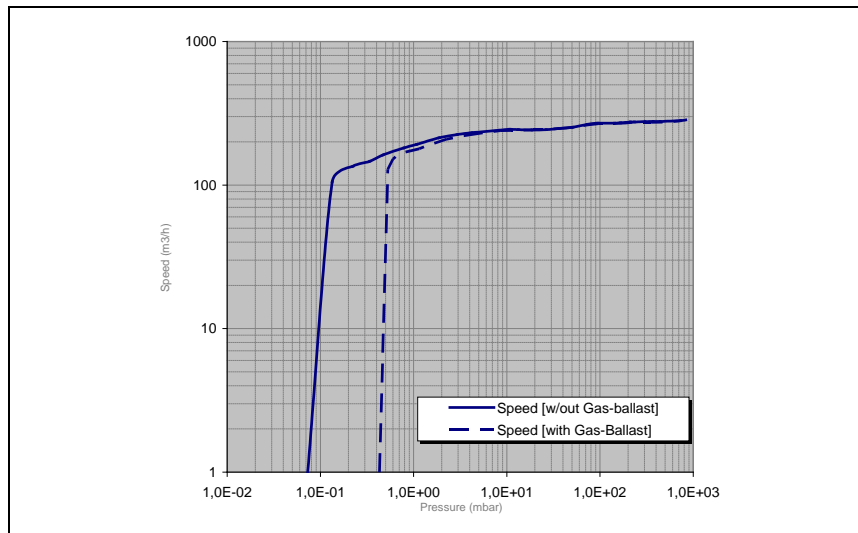


Figure 12 MS-301 Graph of delivery capacity vs inlet pressure with 60 Hz motor (____ without gas ballast valve) (----- with gas ballast)

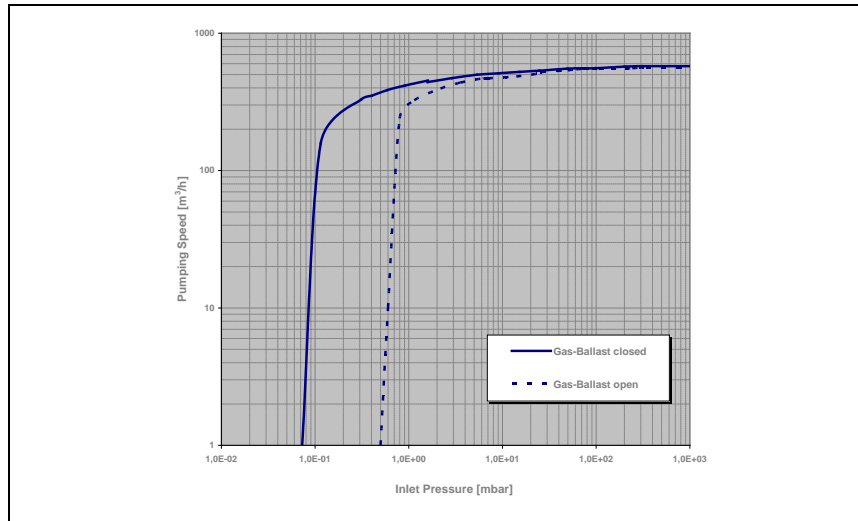


Figure 13 MS-631 Graph of delivery capacity vs inlet pressure with 50 Hz motor (____ without gas ballast valve) (----- with gas ballast)

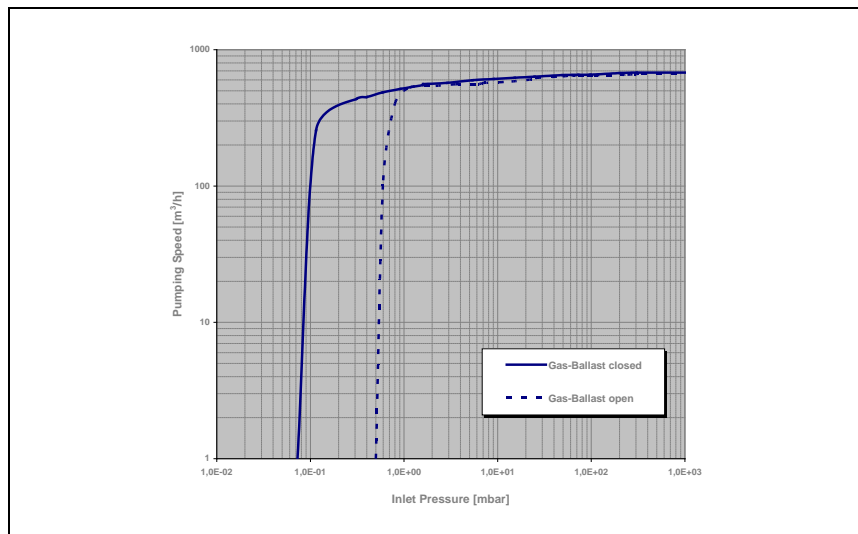


Figure 14 MS-631 Graph of delivery capacity vs inlet pressure with 60 Hz motor (____ without gas ballast valve) (----- with gas ballast)

Safety Precautions

CAUTION!

Despite of all the precautions adopted when designing the equipment, there are some risk elements that arise during operation and servicing.

WARNING!



The temperature of the pump surfaces may exceed 80 °C. Install the pump in a protected area accessible only by authorized personnel, to prevent possible personal injuries due to contact with hot surfaces. The pump can be placed inside other machines by adopting the necessary safeguards. Before carrying out any maintenance on the pump, be sure the pump is cold.

WARNING!



The discharged air contains part of traces of oil mist. Check the compatibility with the environment. A failure of the seal wear can cause an oil leakage. Avoid the dispersion to the ground and the pollution of other materials. In case that any air containing dangerous substances must be pumped down (for example biological or microbiological agents), make sure to adopt filtering systems before introducing air in the work environment. Used discharged oil from the pump must be disposed in accordance with the regulations in force in the Country of use.

WARNING!



Avoid any contact with the pump inlet port during the pump operation. Introduce air through the inlet port before every operation cycle. Any contact with parts under vacuum can cause injuries.

WARNING!



The pump tank is pressurized. Do not open the oil filling and discharge plugs during operation.

WARNING!



All maintenance operations must be carried out with the pump idle, disconnected from the electrical supply, make sure to cold and vented to atmospheric pressure. Prevent unexpected start-up (e.g. block the power switch with a lock).

WARNING!



Some components of the electrical equipment are electrically charged during operation. Any contact may cause serious injuries to persons or objects. Connections and controls of the electrical system must be carried out by skilled personnel only. The electrical equipment must comply with the EN 60204-1 standard and with any other laws in force in the Country of use. Besides, electrical equipment must comply with EN 61000-6-4 and EN 61000-6-2 standards concerning electromagnetic compatibility and electromagnetic immunity for industrial environment.

WARNING!



The use of the pump in situations unforeseen or not recommended by this manual, as well as lack of correct maintenance, may create high risks for overheating or fire. In case of a fire do not use water to extinguish, but use a powder CO₂ extinguisher or other means compatible with the electric equipment and lubricating oil.

Transport and Handling

Lifting

The orientation of the packed components must correspond to the instructions given by the pictograms on the external covering of the packaging.

For loading and unloading, use lifting equipment suitable for the pump weight. Use the suitable lifting eyebolts to lift the pump (see figure below).

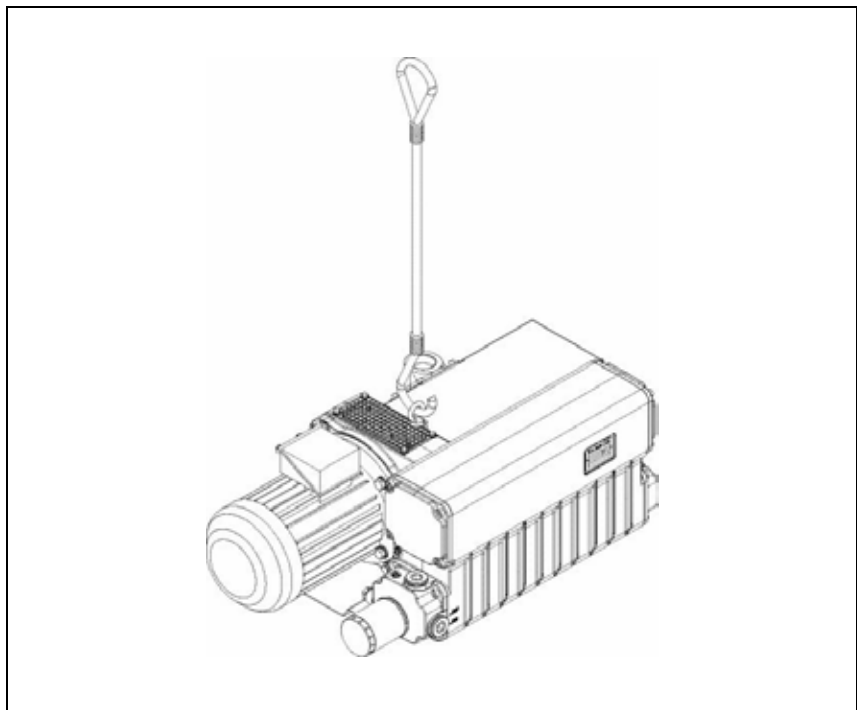


Figure 15

Tab. 4

| WEIGHT | UNITS | MS-301 | MS-631 |
|--|---------|--------------|---------------|
| With 3 ph 50 Hz motor (approx. depending from motor mounted) | Kg (lb) | 190 (418.50) | 575 (1266.52) |
| With 3 ph 60 Hz motor (approx. depending from motor mounted) | Kg (lb) | 192 (422.91) | 612 (1348.02) |
| Without motor | Kg (lb) | 140 (308.37) | 385 (848.02) |

Unpacking and Components Control

When receiving the pump check that the packaging is intact or shows any signs of damages occurred during transportation.

If there is no damage, proceed to the unpacking and check the pump further.

In case of damages are found, inform immediately Agilent and the carrier. A representative will contact you or may be dispatched to the site to inspect and file full damage report.

Storage

The pumps must be stored or transported without any oil and protected from the atmospheric agents at;

§ temperature: between -20 °C and +70 °C

§ humidity rate: 0 – 95 % (non condensing)

CAUTION!

Pay attention to perform all operation indicated in the following paragraphs before starting the pump, in order to prevent serious damages.

Section II

Installation and Operation

Assembling

If the pump is supplied without any electrical motor, install a motor whose characteristics are the same as stated on the technical sheet, constructive form IM B5.

WARNING!



Check that the distance between the two coupling halves is:

Type 1: $B = 3.5 \pm 1$ mm (see figure below)

Type 2: $B = 3.5 \pm 1$ mm (see figure below).

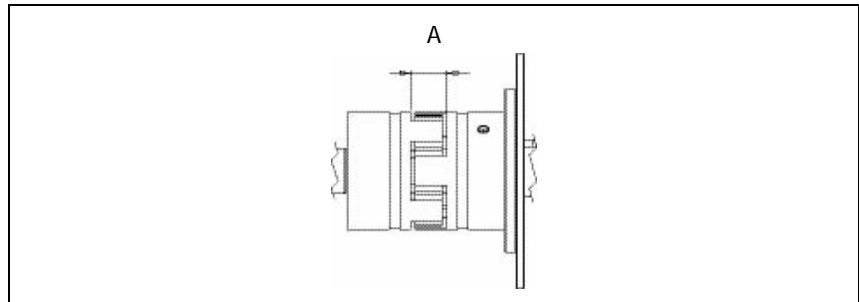


Figure 16 Type 1

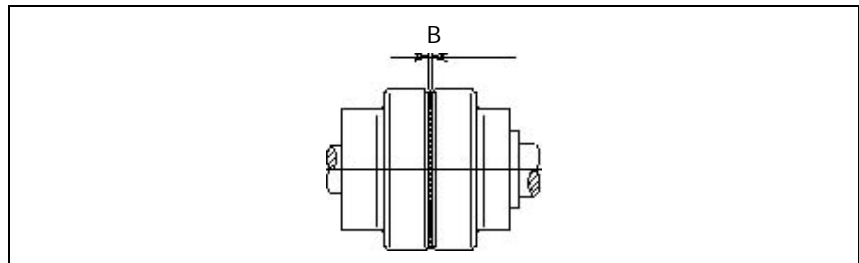


Figure 17 Type 2

Gas Ballast

Pumps of the MS series are fitted with a gas ballast valve in order to exhaust any water vapour present in the rotor. When the pump operates with the gas ballast open, please follow these instructions:

- § Position the selector switch in the flow direction (circuit is open).
- § The ultimate pressure in this kind of operation is better than 0.7 mbar.

When water vapour has been removed and the pump original conditions are to be reset:

- § Position the selector switch crossway with respect to the flow (circuit is closed)
- § In this kind of operation the ultimate pressure is better than 0.1 mbar.

§

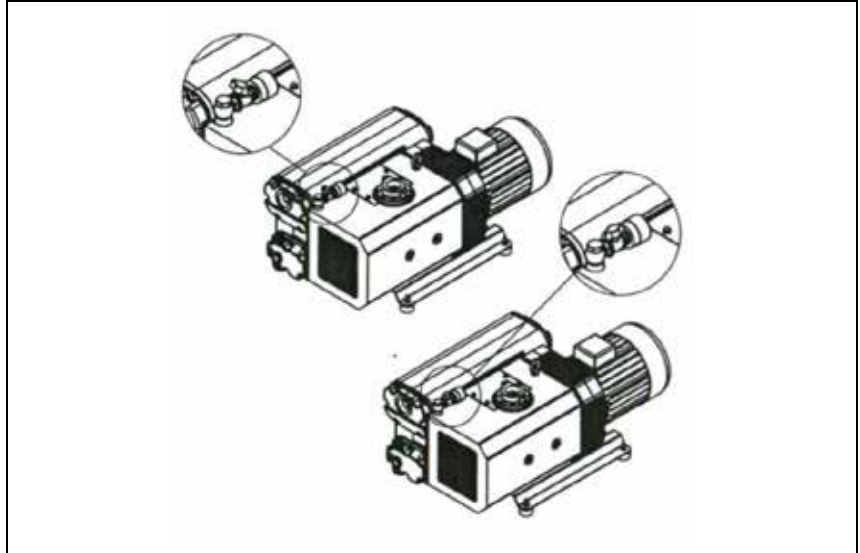


Figure 18

Positioning

- § The pump must be installed in a protected area (see “SAFETY PRECAUTIONS”).
- § It must be fastened with support feet on horizontal surface.
- § It must be accessible for correct and easy maintenance, by respecting the minimum distances from possible obstructions (see following figure and table).

§

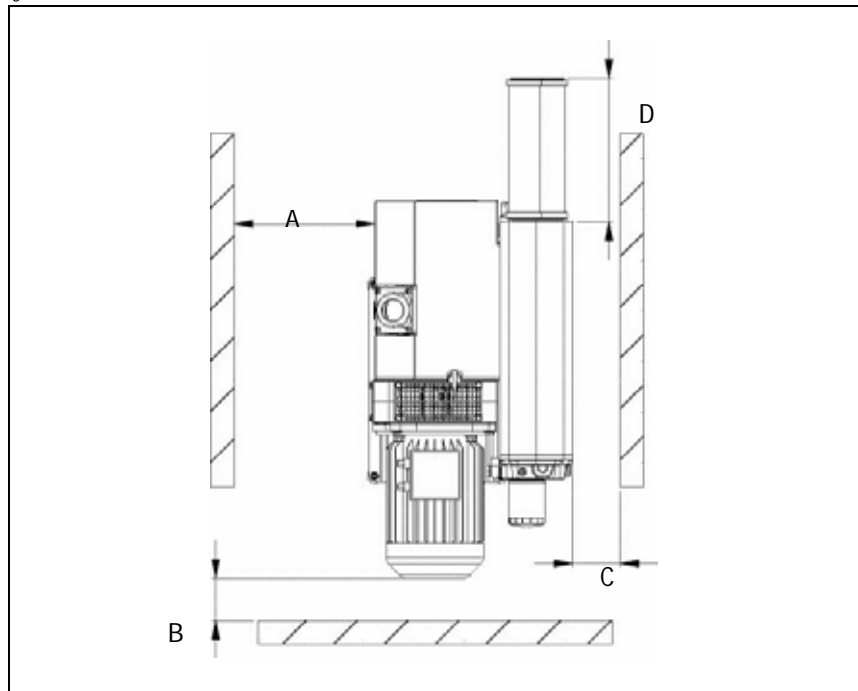


Figure 19

Tab. 5

| | A | B | C | D |
|--------|--------|--------|--------|--------|
| MS-301 | 300 mm | 300 mm | 100 mm | 350 mm |
| MS-631 | 500 mm | 150 mm | 100 mm | 660 mm |

- § It must be accessible to suitable lifting equipment.
- § Air change in the room or inside the machine where the pump has been installed must be ensured.

Avoid exceeding 40 °C ambient temperature.

- § The pump must be protected against jets or sprays of water that may penetrate the tank through the exhaust port.
 - § Whenever the pump is installed outside, it must be protected against atmospheric agents.
-

WARNING!



Do not install the pump in a dusty area or where other materials may block or quickly cover the cooling surfaces.

Connections to the Inlet and Exhaust Flanges

Remove the protective caps from both flanges. Connect the system to be evacuated to the inlet flange, using a centering ring with OR and a locking collar.

NOTE

For guaranteed reliable sealing, use an OR gasket in Perbunan or Viton.

The inlet duct is equipped with a sieve filter preventing solid particles from entering and damaging the pump.

NOTE

When the gases to be pumped out contain dust, it is advisable to insert a dust filter before the inlet flange.

NOTE

When the gases to be pumped out contain large quantities of vapor, it is advisable to include a condense separator before the inlet flange.

To make best use of the pump's capacity, use only short, straight piping, with a diameter not smaller than that of the inlet flange.

NOTE

If rigid piping is used, it is good practice to use a flexible joint in order to avoid undue forcing of the connection on the pump.

The exhaust duct must be connected to a pipe that will take away the pumped out gases.

NOTE

Application of an oil trap filter is necessary to avoid pollution of the surrounding atmosphere by the oil present in the exhaust duct during pump operation.

CAUTION! Never block the pump exhaust line. This would cause overpressure in the casing with the risk of breaking the glass window of the level indicator and/or expelling the oil seal gasket.

CAUTION! For proper operation, the filter (optional) must be mounted in HORIZONTAL position.

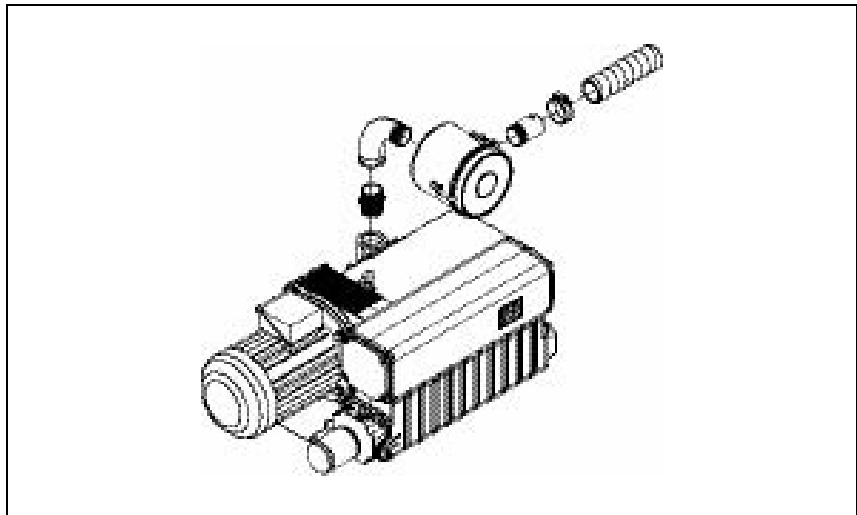


Figure 20

Connection to the Vacuum System

The connection to the chamber to be pumped down must be carried out by means of pipes of the same diameter as the inlet port.

Pipe weights and expansions, if any, must not rest on the pump.

It is advisable to make the final connection to the pump with flexible pipes or fittings.

It is important that all the pipes and the different fittings are tight and, if possible, check with an Agilent leak detector. Very long or small diameter pipes will decrease the pump performances.

Discharge Air Pipe Line Installation

- § When required, it is possible to pipe the pump discharge air to other rooms, or outside.
- § Use pipes with the same diameter as the tank discharge port with a maximum length of 15 m. For longer pipes increase pipe diameter. Pipe weights must not rest on the pump. In the final length use flexible pipes or pipe fittings.

WARNING!

This pipe must be descending, to avoid the condensate going back to the tank.



CAUTION!

Do not connect ball valves to this pipeline.

Electrical Connection

WARNING!

The control panel and electrical connections must be carried out by skilled personnel and conform to the EN 62204-1 rules or any other local regulations in the country of use.

CAUTION!

The electrical equipment must comply with EN 61000-6-4 and 61000-6-2 standards concerning electromagnetic compatibility, emission standard and immunity for industrial environments.

Check the main voltage and frequency in use to correspond to the data stamped on the motor name plate.

The electrical motor must be protected against overload. The full amperage on the motor name plate must be considered when sizing the electrical components and motor protection against overloading.

Make sure the grounding is correctly done.

Carry out the electric connection following the diagram shown on the motor terminal box.

Check direction of rotation by starting the pump for a short time (2 or 3 seconds). The correct direction is shown by the arrow on the pump (see figure below). In case of wrong rotation, it is necessary to change the motor rotation by exchanging position of two of the three connections in the motor terminal box.

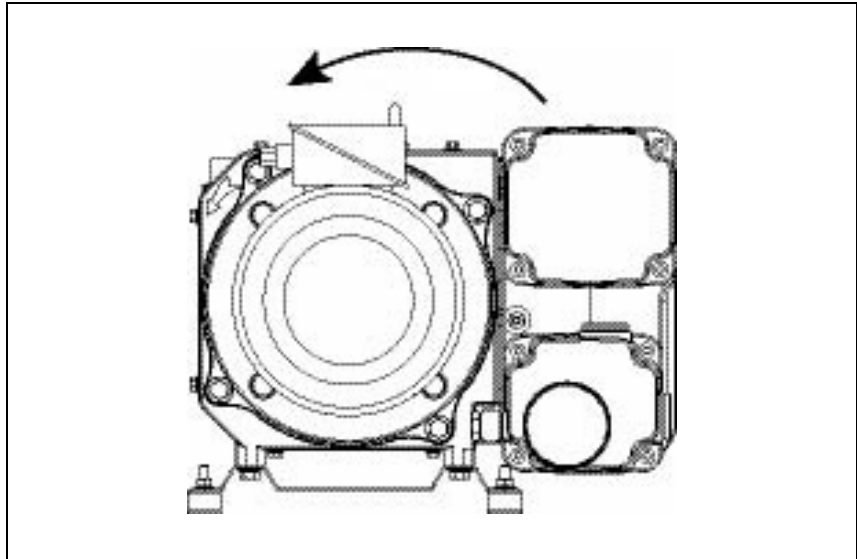


Figure 21

WARNING! The pump is supplied without lubricating oil.



CAUTION! The operation without oil causes big damages to the pump.

Carry out the first oil filling through the plug (E) up to the half of the sight glass (F) and close the plug (E) (see following figure).

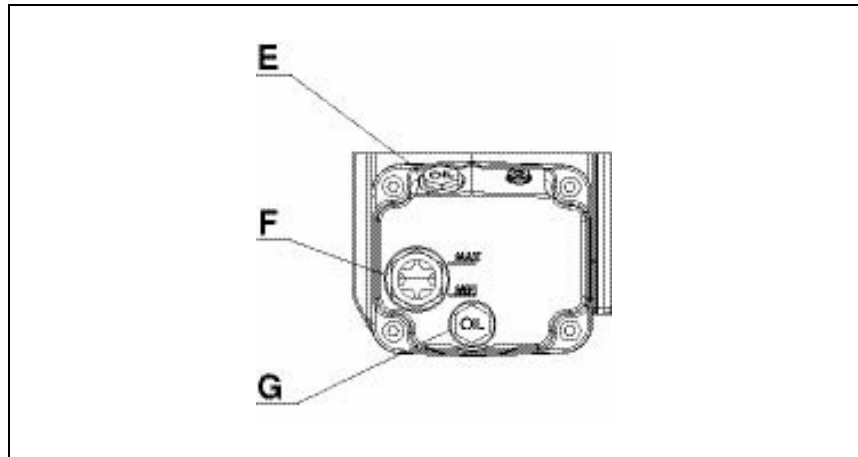


Figure 22 Oil change parts identification

Start the pump and let it run at least 2 minutes. Stop the pump, check again the oil level and add some additional oil, if necessary, in order to get the correct oil level.

Suggestions for Use

When the room temperature is lower than 10 °C, it is a good practice to let the pump operate (at maximum vacuum level) for about 5 minutes. During this period the pump may not reach the stated pressure limits.

CAUTION!

Avoid operating the pump for long periods with inlet port vented to atmospheric pressure. This will cause a heavy oil loss.

CAUTION!

Avoid frequent stop-start cycles, as this will lead to premature coupling elastic element wear. It is advisable not to exceed 10 cycles/hour. For more frequent cycles, it is recommended to install a progressive starter (soft starter) or a star/delta starter. When using a star/delta starter, the vacuum pump can start exclusively with the inlet vented to atmospheric pressure.

Water Vapour Suction

In order to pump down any water vapour, it is essential to bring the pump temperature to its operating value. In case there are other condensates in the oil, let the pump run for at least thirty minutes with the gas ballast valves in position “open”, at the end of the working cycle.

It is advisable to carry out this operation before stopping the pump for a long time. The gas ballast valve will allow the elimination of water condensate from lubricating oil.

NOTE

For repetitive work cycles, with brief time intervals in between, it is better not to stop the pump.

Stopping the Pump

There are no special procedures for switching the pump off; it needs only to be disconnected from the electric power.

When the pump is stopped, the anti-suckback device makes it possible to maintain vacuum in the vessel connected on the inlet flange of the pump.

If the pump is expected to be stopped for a lengthy period, or in any case if it has pumped in large amounts of vapors, it is good practice to run it with the gas ballast open and the inlet line closed for a few minutes before switching off in order to limit the risk of corrosion or scaling due to pollution of the oil by condensed vapors.

Safety Rules

Personnel responsible for pump operation and maintenance must be well-trained and must be aware of the accident prevention rules.

The accident prevention precautions contained in this section must be respected at all times during operation and maintenance of the pump to avoid damage to operators and to the pump.

These precautions are provided in the form of WARNING and CAUTION notes.

WARNING!



Operating procedures, technical information and precautions which, if not respected and/or implemented correctly may cause body harm to operators.

CAUTION!

Operating procedures, technical information and precautions, which, if not respected and/or implemented correctly, may cause damage to the pump.

Warning Notes

- a Death may result from contact with high voltages. Always take extreme care and observe the accident prevention regulations in force.
- b Always disconnect the power supply to the pump before maintenance work. Place a special warning signs over the power supply breaker switch: MACHINE UNDERGOING MAINTENANCE - DO NOT POWER ON.
- c If you are performing maintenance after the pump has been operating for a considerable time, allow sufficient time for it to cool as the external surface temperature may be in excess of 80 °C.
- d Failure to provide the pump with an earth connection may cause serious damage to operators. Always ensure that there is an earth connection and that it complies with the standards.
- e When cleaning the pump and its component parts, avoid the use of flammable or toxic solvents, such as benzin, benzol, ether or alcohol. The recommendation is to use a soap and water solution, preferably in ultrasound washing machines, taking care to dry all the cleaned parts at temperatures under 100 °C in order to eliminate residual moisture.
- f Prolonged overloads or breakdowns may cause the electric motor to overheat, and to release noxious smoke; remove the power immediately as a precaution and do not approach the pump at least until you have provided ventilation to drive out the smoke. Take care not to breathe in the fumes remaining inside the pump in the course of repair work.
- g In case of fire, do not throw water on the pump. Switch the power off and use CO₂ extinguishers.
- h Carefully inspect the flanges to ensure that there is no dust, oil, dirt or defects of the mating surfaces, before making the required connections.
- i Ensure that all joints and couplings are locked correctly before starting the pump again after repair work.

- j Do not wear any objects that may become entangled in the mechanisms and/or act as conductors (chains, bracelets, etc.).
- k Ensure that the tools to be used are in perfect working condition and have insulating grips, where necessary. Check that the insulating material of the cables and that the conductors of the test equipment do not show any signs of damage.
- l Do not replace the oil immediately after stopping the machine as the oil may still be at high temperature.
- m Perform repairs in clean and, where possible, dust-free areas. Protect all the clearances of connection points with suitable plastic caps and cover the machined surface areas of all parts stripped down until they are put back on the pump again.
- n Do not start the pump if the fan cover sleeve (reference 81 of fig. MS-301 Pump parts – Exploded View and 82 of fig. MS-631 Pump parts – Exploded View) is not properly in place.

Caution Notes

- a Before putting the pump back into operation after a breakdown, inspect it and check carefully for any other signs of damage.
- b Use only tools that are in perfect working order and specially designed for the job; use of inappropriate or ineffective tools may cause serious damage.
- c Perform repairs in clean and, where possible, dust-free areas. Protect all the clearances of connection points with suitable plastic caps and cover the machined surface areas of all parts stripped down until they are put back on the pump again.
- d Always check the lubricant and that it is properly distributed through the pump; inadequate lubrication may damage the pump seriously.
- e Give the parts some form of marking as you strip them down to ensure that you reassemble them again in the proper order.
- f Check that there are no scratches or grooves on the machined shafts, in their seats inside the pump or on machine-ground surfaces. Slight scratches and abrasions may be eliminated with very fine emery paper or by a little light grinding.
- g Before putting a group together, always spread a little oil over inner parts and mating surfaces. Replace all seals with original spare parts before reassembling components.

Maintenance Actions

Maintenance may be seen as the totality of all scheduled and unscheduled maintenance work.

Maintenance includes:

1. **SCHEDULED MAINTENANCE:** Maintaining the nominal state of operation.
2. **UNSCHEDULED MAINTENANCE:** Restoring the nominal state of operation

NOTE

The frequency with which repairs are performed depends on the process and presence of substances that shorten pump life (dust, abrasives, solvents, water, chemically aggressive substances).

The pump must be cleaned at regular intervals of time.

CAUTION!

Do not clean with Alcohol the plastic or rubber components of the pump.

Use only the strictly necessary amount of lubricant; an excess of lubricating oil, like when there is none, may sometimes compromise proper operation of the pump.

Only the recommended lubricants, or lubricating oils with similar characteristics and known and experimented quality, should be used. Oil changes must be made with the oil at a sufficiently high temperature, after leaving the pump to cool for a few minutes following operation.

The drain and filler plugs must not be left open any longer than is strictly necessary.

When performing maintenance, look out for all signals that may precede a breakdown, in particular:

- § traces of corrosion;
- § oil leaks;
- § slack joints or couplings.

Maintenance technicians must:

- § be aware of all applicable national directives concerning accident prevention during work on motor-driven pumps and should know how to apply them;
- § have read and understood all the sections on "Safety Rules";
- § be familiar with the essential design features and operation of the pump;
- § know how to use and consult the pump documentation;
- § be concerned about proper operation of the pump;
- § make a note of any irregularities in operation of the pump and take the necessary action, where appropriate.

Use original spare parts wherever possible and repair a broken part as best as possible on site or send it back to the manufacturer for repairs. For all problems arising, or to order spare parts, refer to our service department.

Lubricants

It will be readily understood how important adequate lubrication is to high technology pumps like the Agilent vacuum pumps. Correct use of appropriate lubricants makes a significant contribution to achieving best performance and warding off defects.

When handling lubricants, the following sanitary protection measures should be observed at all times:

- § Avoid prolonged, excessive or repeated contact of the skin with products for lubrication, and also avoid directly inhaling the fumes or vapors of such products.
- § Protect the skin by wearing appropriate clothes and equipment (e.g. special suits, glasses or, where permitted by the safety regulations, gloves) or by applying a special protective product.
- § Clean the skin carefully after contact with the lubricants by washing freely with water and soap.
- § Apply a skin cream after washing.
- § Take off and change clothes or shoes on which oil has been spilled.
- § Never put rags dripping with oil into the pockets of your clothes.

When disposing of waste lubricants, observe the following environment protection regulations:

- § The lubricants risk contaminating the water and the ground! Therefore never pour lubricating products on to the ground, into water or in the sewage system. All violations of these rules are liable to persecution as provided for by law. When using lubricants always keep oil can nearby.
- § Take care in draining off waste oils. In disposal of these products respect all regulations in force concerning waste oil disposal.

The recommended lubricating oil is the Agilent Rotary Vane Fluid MS1 Type. The Rotary Vane Fluid MS1 Type is a general purpose mechanical pump fluid specifically engineered to provide superior performance in high speed direct drive mechanical pumps. These precisely distilled fluids (100 % solvent refined neutral paraffinic oil) deliver lower base pressure capability, faster pump-down cycles, and reduced maintenance requirements on both the pump and the fluid.

It is absolutely necessary to continue using the lubricants initially used to fill the tank. If this is not possible for organizational or business reasons, use only products with the same characteristics as the previous oils. Only use of lubricants of suitable quality will guarantee safe operation of the pumps.

CAUTION!

Mineral oils and the PFPE oil are incompatible. To change from one type to another, the pump must be stripped down completely and all parts washed carefully to eliminate all oil residues.

If you expect to have to use other lubricants, first find out if the two products are compatible. In cases of doubt, the lubricant used up to that time must be flushed out by way of a pump flushing procedure.

CAUTION!

To avoid the risk of contaminating the oil, absolute cleanliness of the pump and surrounding area must be ensured during the lubrication procedures.

Pumps must be filled with MS-1 Agilent oil only.

Tab. 6 Recommended fluid

| Ambient temperature | Grade | Agilent fluid |
|---------------------|---------|---------------|
| +12 – 40 °C | ISO 100 | MS-01 |

For ambient temperature outside the stated range, please get in touch with our Customer Service department.

Tab. 7 Agilent Rotary Vane Fluid MS-1 Type characteristics

| Property | Unit of measure | Rotary Vane Fluid MS-1 type |
|-----------------------------------|------------------------|-----------------------------|
| Vapour pressure @ 38 °C | Torr | 8.4·10 ⁻¹² |
| Vapour pressure @ 66 °C | Torr | 8.3·10 ⁻⁹ |
| Vapour pressure @ 93 °C | Torr | 1.0·10 ⁻⁶ |
| Viscosity @ 40 °C (DIN 51550) | cSt | 98.32 |
| Viscosity @ 100 °C (DIN 51550) | cSt | 2.41 |
| Viscosity index (ASTM D2270) | | 202 |
| Density @ 15 °C | g/ml | 0.865 |
| Pour point (DIN ISO 3016) | °C (°F) | -48 (-118.4) |
| Flash point C.O.C. (DIN 51376) | °C (°F) | 271 (519.8) |
| Coefficient of Thermal Expansion: | 1/°F | 0.00041 |
| Specific Heat @ 38 °C | BTU/lb°F | 0.51 |
| Specific Heat @ 66 °C | BTU/lb°F | 0.53 |
| Specific Heat @ 93 °C | BTU/lb°F | 0.56 |
| Thermal Conductivity @ 38 °C | BTU/hr ft ² | 0.092 |
| Thermal Conductivity @ 66 °C | BTU/hr ft ² | 0.091 |
| Thermal Conductivity @ 93 °C | BTU/hr ft ² | 0.090 |

Section III

Servicing

General Information

Before every maintenance operation:

- § Ensure that the pump motor is disconnected from the electrical network so that it can't automatically start.
- § Make sure the pump has reached an ambient temperature.
- § Introduce air in the inlet port.

In order to keep the pump operating at a high efficiency level, it is mandatory to follow all periodical service points listed in the table below. However, more frequent service operations may be necessary depending on what the pump is used for (suction of condensable vapours, suction of powders or polluting substances). For such cases, only direct experience can indicate the correct service frequency needed. Please contact Agilent Technical Support for further details. The exhausted oil and replaced spare parts must be considered as special waste products and handled according to the local regulations in the country of use.

Tab. 8

| Service frequency | Description of the operation | Authorized personnel |
|----------------------|--|----------------------|
| 24 hours/every day | Check oil level before starting | Operator |
| 100 hours/every week | Clean the external inlet element with a blast of air (refer to "Pumps Major Parts" figure, position A) | Operator |
| | Clean the cooling surfaces of the pump, of oil cooler and the electrical motor with a blast of air | |

| Service frequency | Description of the operation | Authorized personnel |
|----------------------------|--|-----------------------------------|
| 2000 hours/every 6 months | Replace the lubricating oil and oil filter (refer to "Pumps major parts" figure, position C). Doesn't use car air filter but with anti suck back valve. See "Oil Change Procedure" at page 116 | Skilled worker |
| | Clean the float valve. See "Float Valve Cleaning Procedure" at page 117 | |
| | If the pressure gauge is fitted to the pump, check the oil separator (max 0.6 bar); if necessary, replace it. See "Oil Separator Change Procedure" at page 118 | |
| | Replace the gas ballast felt disk (refer to "Pumps Major Parts" figure, position E. See "Gas Ballast Felt Disk Change Procedure" procedure at page 119 | |
| | Replace the exhaust filter (refer to "Pumps Major Parts" figure, position B). See "Exhaust Filters Replacement Procedure" at page 118 | |
| 8000 hours/every 2 years | Check and if necessary replace the coupling elastic insert (refer to "Pumps Major Parts" figure, position D). See "Coupling Elastic Element Replacement Procedure" procedure at page 120 | Skilled worker |
| | Check the electrical connections | |
| | Grease the electrical motor bearings | AGILENT service |
| 30,000 hours/every 5 years | Pump overhaul | AGILENT service or Skilled worker |

The first oil change has to be done after 500 hours of operation. Next oil change must be done within 2000 hours.

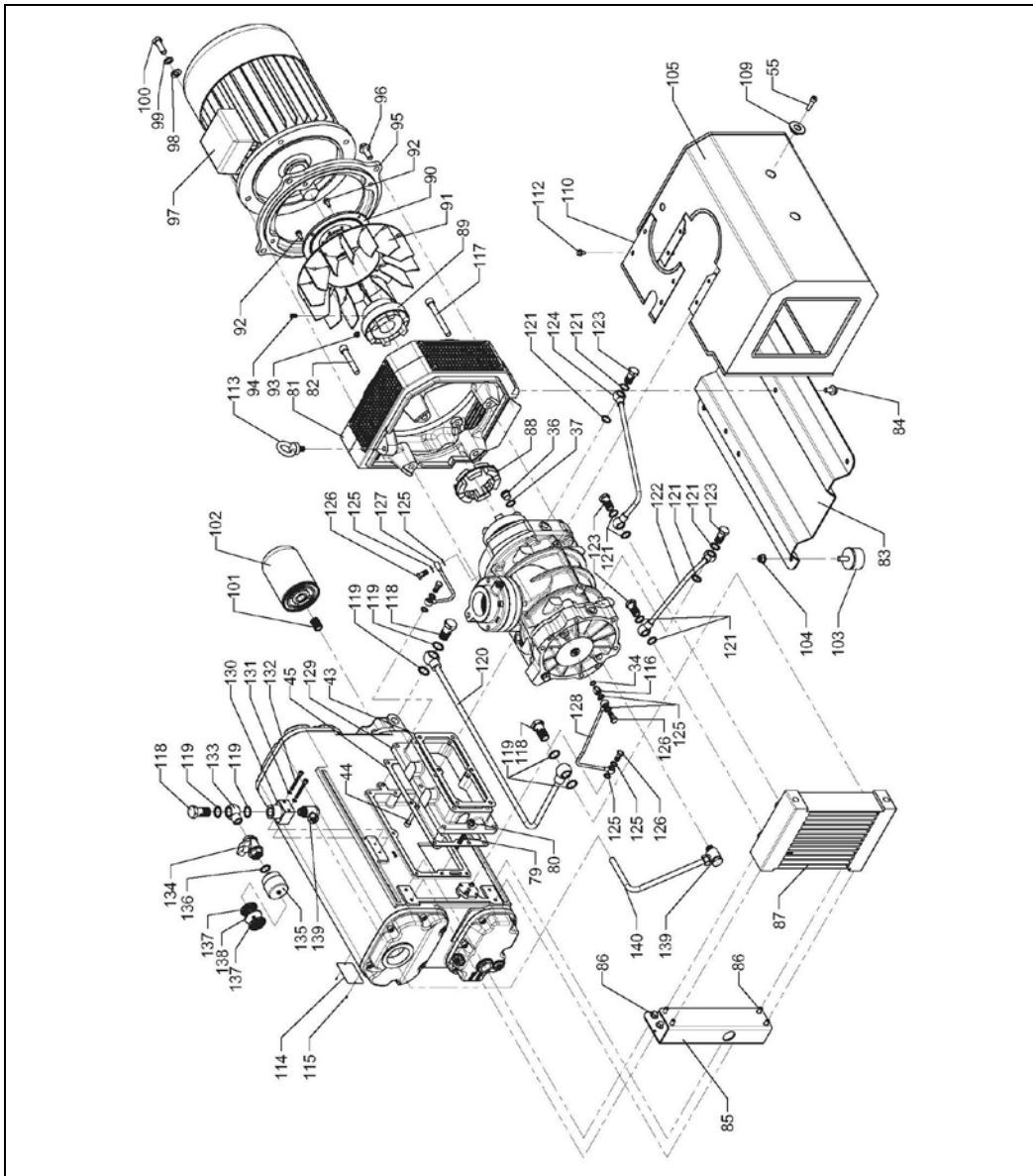


Figure 23 MS-301 Pump parts – Exploded View (1 of 2)

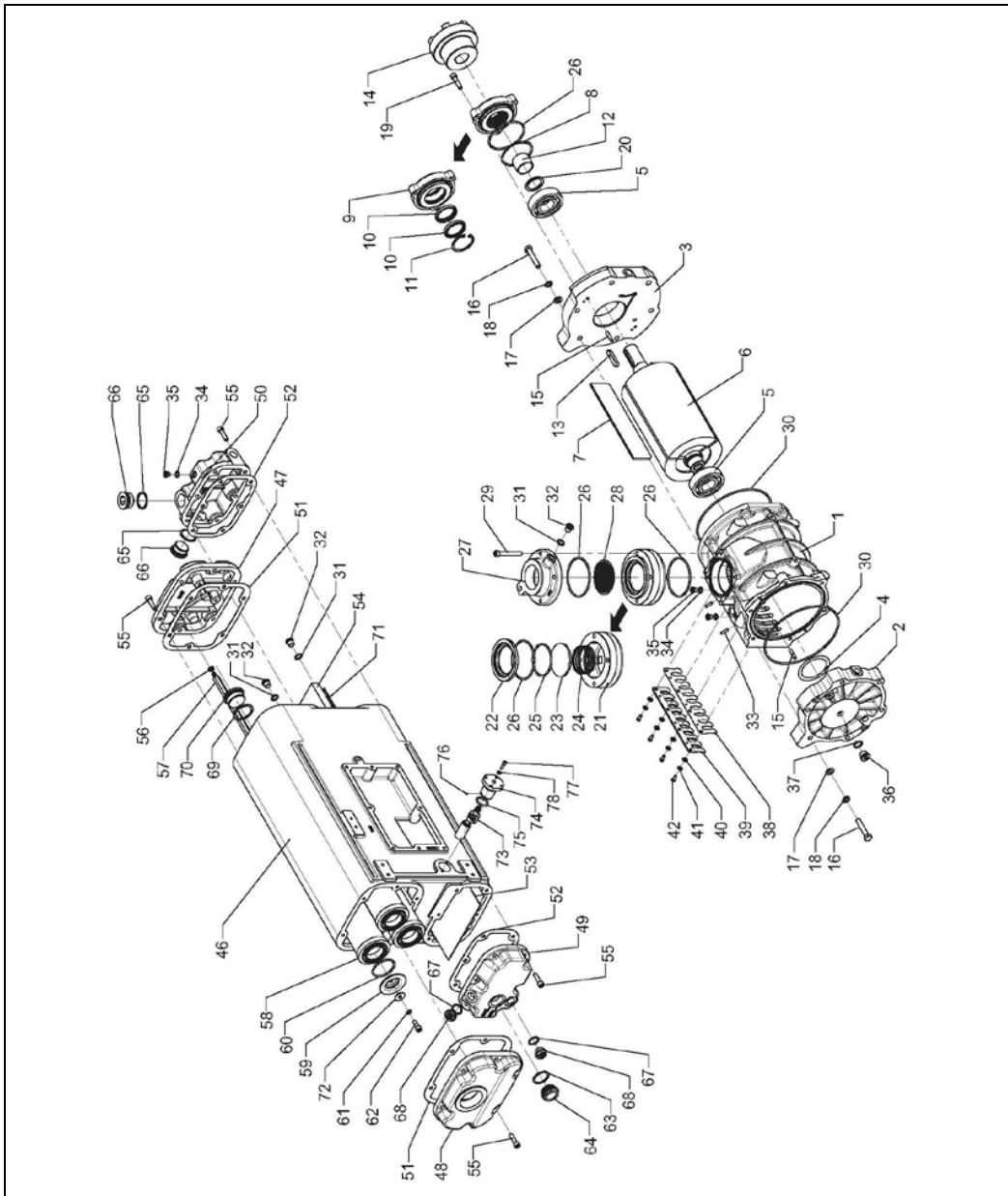


Figure 24 MS-301 Pump parts – Exploded View (2 of 2)

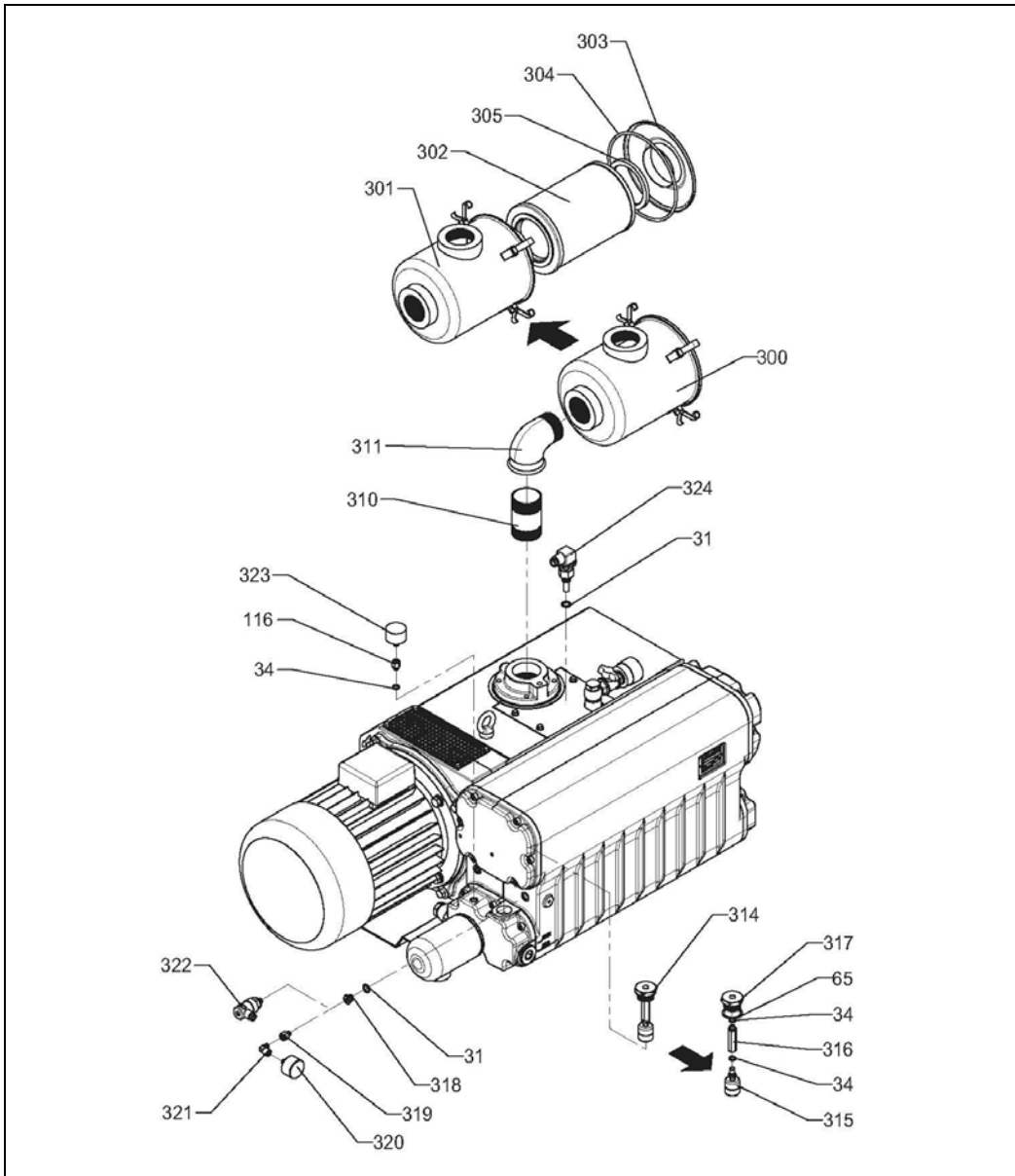


Figure 25 MS-301 Pump accessories – Exploded View

Pump Parts for MS-301

Tab. 9 Pump Parts for MS-301

| Pos. | Spare Parts P/N | Description | Q.Ty |
|------|-----------------|--------------------------------------|------|
| 1 | | Body of pump | 1 |
| 2 | | External side cover | 1 |
| 3 | | Motor side cover | 1 |
| 4 | | 63x80 Space washer | 1 |
| 5 | (B) | 6307 Bearing | 2 |
| 6 | | Rotor | 1 |
| 7 | (B) | Vane | 3 |
| 8 | | Shim ring | 1 |
| 9 | | Oil seal ring cover | 1 |
| 10 | (B) | BABSL 40x52x7 Seal ring | 2 |
| 11 | | l53 Seeger | 1 |
| 12 | (B) | IR 35X43X30 Ring | 1 |
| 13 | | 10x8x50 Key | 1 |
| 14 | SR03705716 | Pump side coupling half | 1 |
| 15 | | Ø6x30 Pin | 4 |
| 16 | | M10x55 Partially threaded Hex. Screw | 11 |
| 17 | | Ø10 Washer | 11 |
| 18 | | Ø10 Lock washer | 11 |
| 19 | | M8x35 Hex. Socket head screw | 3 |
| 20 | | Ø35/45x3 Spacer | 1 |
| 21 | | Inlet valve body | 1 |
| 22 | | Inlet valve disk | 1 |
| 23 | (C) | Inlet valve plate | 1 |
| 24 | (C) | Helicoidally spring | 1 |
| 25 | (C) | O Ring 173 | 1 |
| 26 | (C) | O Ring 4337 | 4 |
| 27 | | 2"G Inlet flange | 1 |
| 28 | | Inlet filtering baffle | 1 |

| Pos. | Spare Parts P/N | Description | Q.Ty |
|------|-----------------|--------------------------------|------|
| 29 | | M8x65 Hex. Socket head screw | 4 |
| 30 | (B) | O Ring 4725 | 2 |
| 31 | | 1/4"G Al washer | 3 |
| 32 | | 1/4" Al Hex. Socket head plug | 3 |
| 33 | | Ø2mm Adapter | 2 |
| 34 | | 1/8"G Al washer | 4 |
| 35 | | 1/8"G Hex. Socket head plug | 3 |
| 36 | | 3/8"G Hex. Socket head plug | 2 |
| 37 | | 3/8"G Al washer | 2 |
| 38 | (B) | Plate (thickness = 0,25) | 1 |
| 39 | | Plate support | 1 |
| 40 | | Ø6 Washer | 4 |
| 41 | | Ø6 Lock washer | 4 |
| 42 | | M6x12 Hex. Screw | 4 |
| 43 | (B) | Body of pump-spacer gasket | 1 |
| 44 | | M8x55 Hex. Socket head screw | 6 |
| 45 | (B) | Spacer-tank gasket | 1 |
| 46 | | Tank | 1 |
| 47 | | Motor side upper tank cover | 1 |
| 48 | | External side upper tank cover | 1 |
| 49 | | External side lower tank cover | 1 |
| 50 | | Motor side lower tank cover | 1 |
| 51 | (A) (B) | Gasket for upper tank covers | 2 |
| 52 | (B) | Gasket for lower tank covers | 2 |
| 53 | | Tank micro-stretched sheet | 1 |
| 54 | | 192x122x20 tank demister | 1 |
| 55 | | M8x30 Hex. Socket head screw | 26 |
| 56 | | Ø8 Lock washer | 3 |
| 57 | | Stay bolt for exhaust filter | 3 |
| 58 | (A) (B) | Exhaust filter | 3 |
| 59 | | Disk for exhaust filter | 3 |

| Pos. | Spare Parts P/N | Description | Q.Ty |
|------|-----------------|---|------|
| 60 | (A) (B) | O Ring 4200 | 6 |
| 61 | | Ø8.4/13x1 Al washer | 3 |
| 62 | | M8x20 Hex. Socket head screw | 3 |
| 63 | | 1"G Fiber washer | 1 |
| 64 | | 1"G Oil sight glass | 1 |
| 65 | | 1"G Al washer | 2 |
| 66 | | 1"G Hex. Socket head plug | 2 |
| 67 | | 1/2"G Fiber washer | 2 |
| 68 | | 1/2"G Filling-discharge plug | 2 |
| 69 | | 1" 1/4G Al washer | 1 |
| 70 | | 1" 1/4G Hex. Socket head plug | 1 |
| 71 | | Demister-tank support mesh | 1 |
| 72 | | Ø8/24 Washer | 3 |
| 73 | (B) | Float (oil recovery) | 1 |
| 74 | | Float port | 1 |
| 75 | (B) | O Ring 4093 | 1 |
| 76 | | M4x8 Hex. Socket Stud Bolt | 1 |
| 77 | | M5x16 Hex. Socket head screw | 2 |
| 78 | | Ø5 Washer | 2 |
| 79 | | M8x30 Stud bolt | 8 |
| 80 | | M8 Nut (flanged and knurled) | 8 |
| 81 | | Fan cover sleeve | 1 |
| 82 | | M12x70 Hex. Socket head screw | 3 |
| 83 | | Base-plate | 1 |
| 84 | | M10x20 Hex. Screw (flanged and knurled) | 4 |
| 85 | | Oil cooler support | 1 |
| 86 | | M8x16 Hex. Screw (flanged and knurled) | 8 |
| 87 | | Air/oil cooler | 1 |
| 88 | SR03705719 | Elastic coupling insert | 1 |
| 89 | SR03705718 | Motor side coupling half | 1 |
| 90 | | Fan hub | 1 |

| Pos. | Spare Parts P/N | Description | Q.Ty |
|------|-----------------|--|------|
| 91 | | Ø280x73 Fan | 1 |
| 92 | | M6x16 Hex. Screw (flanged and knurled) | 10 |
| 93 | | M6 Nut (flanged and knurled) | 4 |
| 94 | | M8x16 Hex. Socket Stud Bolt | 1 |
| 95 | | Motor flange | 1 |
| 96 | | M12x30 Hex. Screw flanged and knurled | 4 |
| 97A | SR03705592 | Electric motor M132 B5 4P 5.5kW 50Hz | 1 |
| 97B | SR03705721 | Electric motor M132 B5 4P 7.5kW 60Hz | 1 |
| 98 | | Ø12 Washer | 4 |
| 99 | | Ø12 Lock washer | 4 |
| 100 | | M12x35 Hex. Screw | 4 |
| 101 | | UNF 3/4"-16 Nipple | 1 |
| 102 | (A) (B) | Oil filter | 1 |
| 103 | | Ø50x30 M10x27 Vibration-damping foot | 4 |
| 104 | | M10 Nut (flanged and knurled) | 4 |
| 105 | | Casing | 1 |
| 109 | | Disk (for casing) | 2 |
| 110 | | Casing cover | 1 |
| 112 | | Hex. (Screw flanged and knurled) | 4 |
| 113 | | M12 Eyebolt | 1 |
| 114 | | Pump name plate | 1 |
| 115 | | Ø1.85x5 Rivet | 2 |
| 116 | | A5/Z M-F 1/8"-1/8" Extension | 1 |
| 117 | | M12x100 Hex. Socket head screw | 1 |
| 118 | | Screw for 1/2" G fittings | 3 |
| 119 | | 1/2" G Cu Washer | 6 |
| 120 | | Oil cooler inlet pipe | 1 |
| 121 | | 3/8" G Cu Washer | 8 |
| 122 | | Oil pipe (external side) | 1 |
| 123 | | Screw for 3/8" G fittings | 4 |
| 124 | | Oil pipe (motor side) | 1 |

| Pos. | Spare Parts P/N | Description | Q.Ty |
|------|-----------------|--|------|
| 125 | | 1/8"G Cu Washer | 8 |
| 126 | | Screw for 1/8"G fittings | 4 |
| 127 | | Oil pipe (outlet seal rings) | 1 |
| 128 | | Oil recovery pipe (H-series) | 1 |
| 129 | | Pump-tank spacer | 1 |
| 130 | | Gas ballast support | 1 |
| 131 | | Ø6 Lock washer | 2 |
| 132 | | M6x50 Hex. Socket head screw | 2 |
| 133 | | 1/2"G Banjo male | 1 |
| 134 | | 1/2"G F-F Ball valve | 1 |
| 135 | | 1/2"G Gas ballast valve | 1 |
| 136 | | O Ring 3075 | 1 |
| 137 | | Micro-stretched sheet disk | 2 |
| 138 | (A) (B) | Ø42/8x4 Felt disk | 1 |
| 139 | | 3/8" G Banjo coupling with allow screw | 2 |
| 140 | | Gas ballast pipe (H-series) | 1 |

Tab. 10

| Pos. | Spare Parts P/N | Optionals | Ms301 |
|------|-----------------|------------------------------|-------|
| 31 | | 1/4"G Al washer | 2 |
| 34 | | 1/8"G Al washer | 3 |
| 65 | | 1"G Al washer | 1 |
| 116 | | A5/Z M-F 1/8"-1/8" Extension | 1 |
| 300 | | Inlet filter F300 (complete) | 1 |
| 301 | | Filter housing | 1 |
| 302 | | Filter element | 1 |
| 303 | | Filter cover | 1 |
| 304 | | O Ring M. Ø185 c=5 | 1 |
| 305 | | V Gasket | 2 |
| 310 | | M M 2"G Pipe fitting | 1 |

| Pos. | Spare Parts P/N | Optionals | Ms301 |
|------|-----------------|--------------------------------|-------|
| 311 | | A4 2"G Elbow union | 1 |
| 314 | | Oil level switch (complete) | 1 |
| 315 | | Oil level switch | 1 |
| 316 | | Oil level switch extension | 1 |
| 317 | | Oil level switch port | 1 |
| 318 | | A4/Z M-F 1/4"-1/8" Adapter | 1 |
| 319 | | A5 M-F 1/8"-1/8" extension | 1 |
| 320 | | PVR pressure gauge | 1 |
| 321 | | A10 M-F 1/8"-1/8" fitting | 1 |
| 322 | | Adjustable pressure switch | 1 |
| 323 | | Oil filter condition indicator | 1 |
| 324 | | Safety temperature switch | 1 |

NOTE

- (A) Part of MS-301 Minor Maintenance Kit (P/N 949-5020)
- (B) Part of MS-301 Major Maintenance Kit (P/N 949-5021)
- (C) Part of MS-301 Inlet Valve Kit (P/N SR03705715)

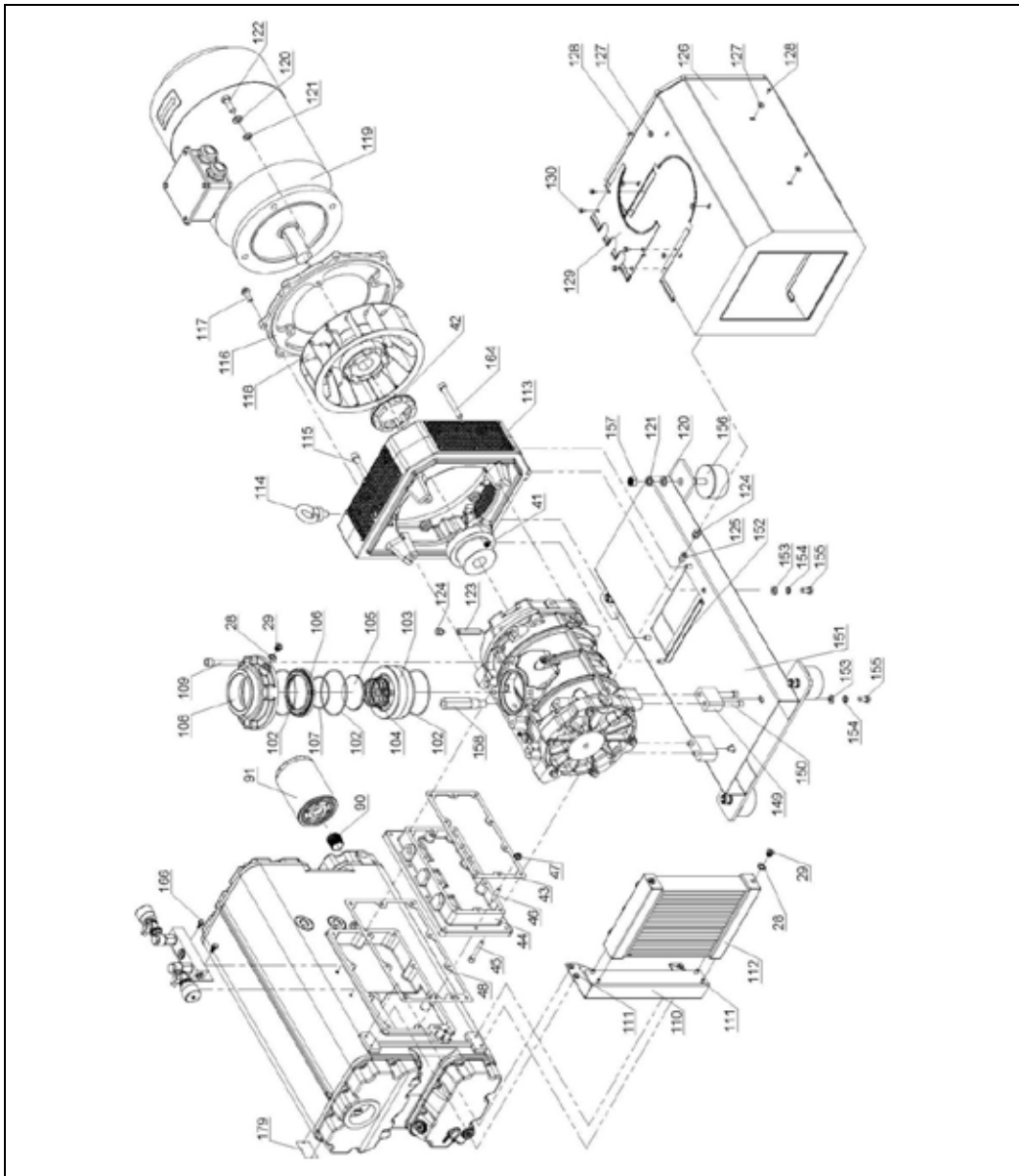


Figure 26 MS-631 Pump parts – Exploded View (1 of 4)

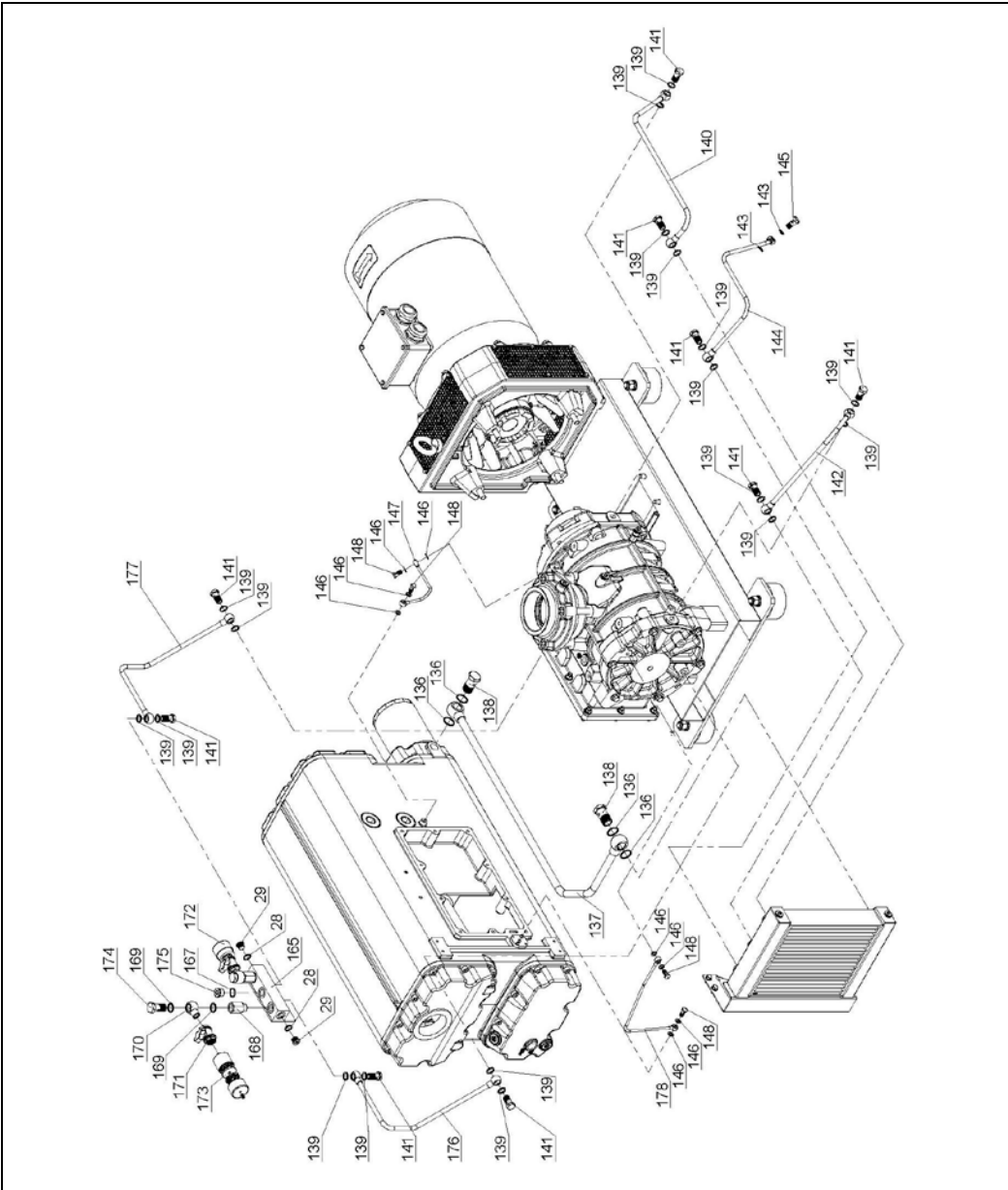


Figure 27 MS-631 Pump parts – Exploded View (2 of 4)

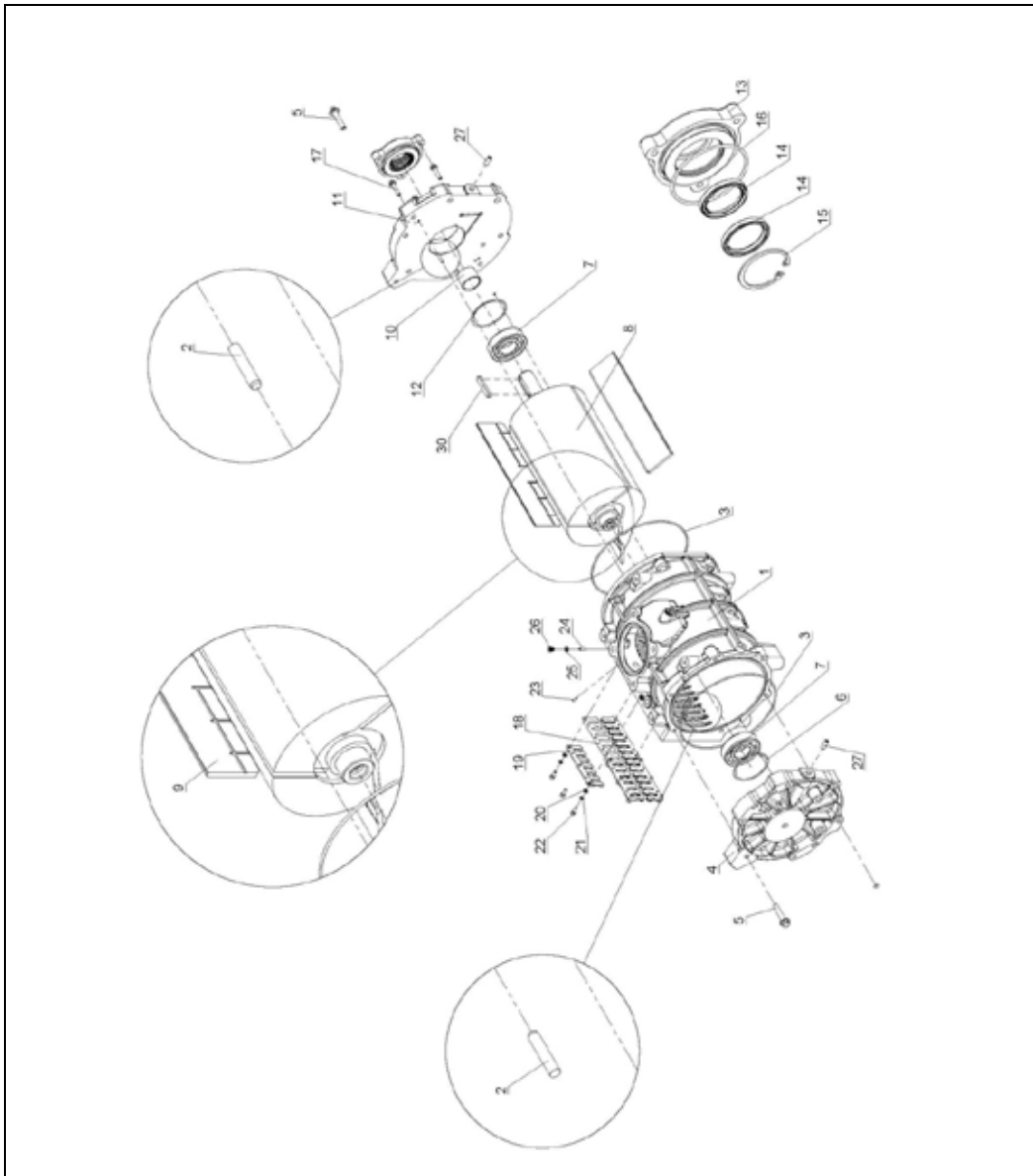


Figure 28 MS-631 Pump parts – Exploded View (3 of 4)

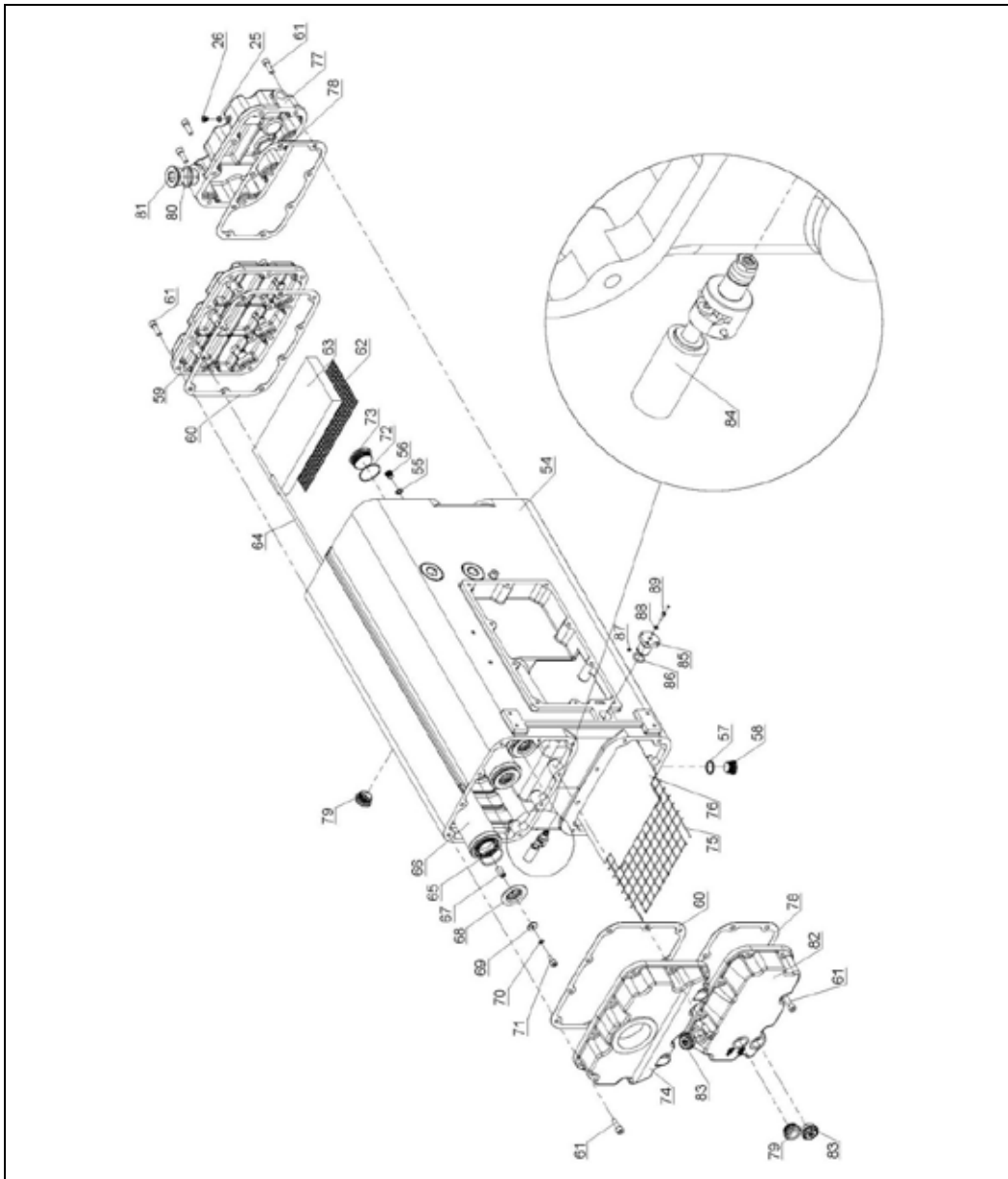


Figure 29 MS-631 Pump parts – Exploded View (4 of 4)

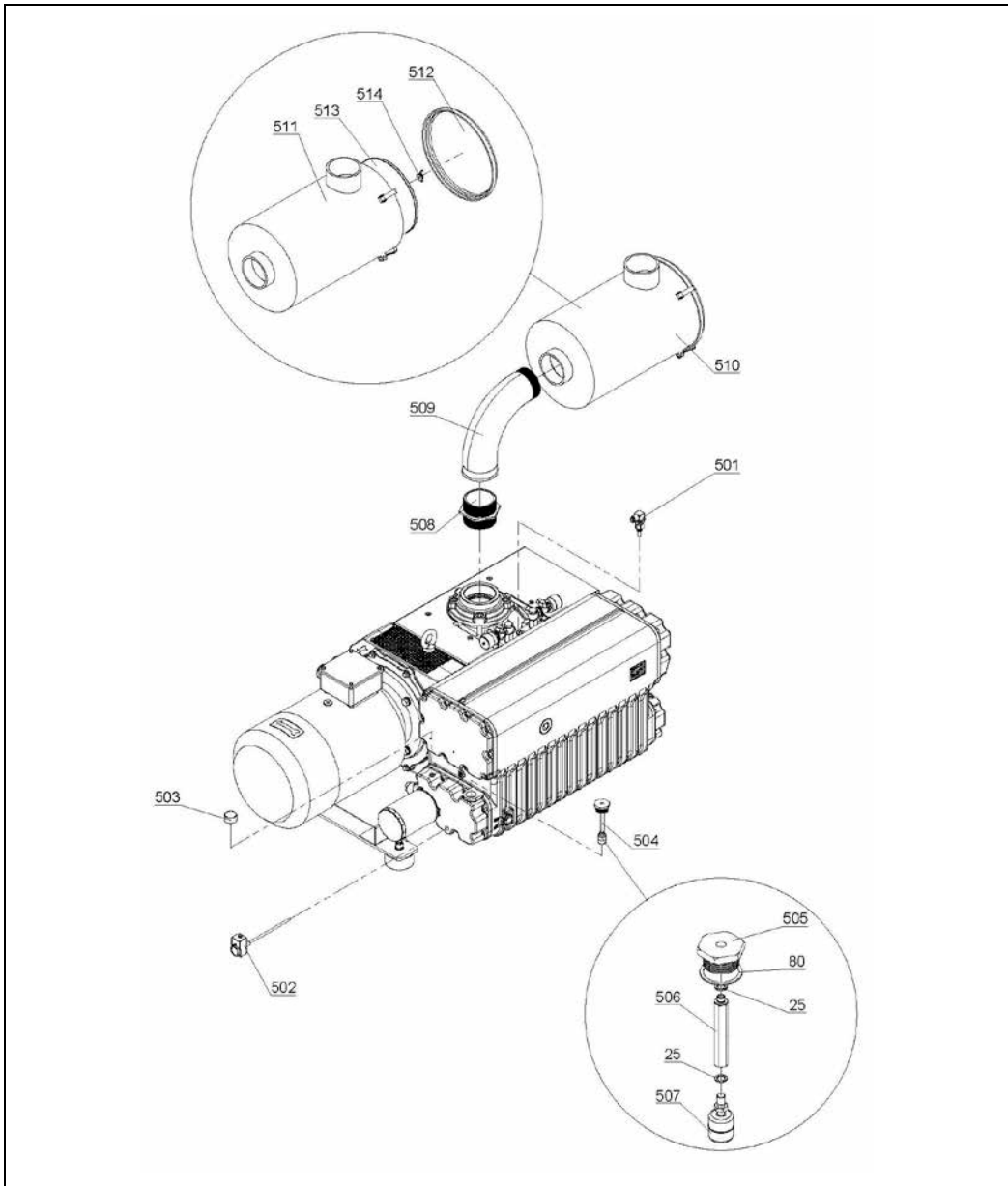


Figure 30 MS-631 Pump accessories – Exploded View

Pump Parts for MS-631

Tab. 11 Pump Parts for MS-631

| Pos. | Spare Parts P/N | Description | Q.Ty |
|------|-----------------|---|------|
| 1 | | Pump Body | 1 |
| 2 | | Ø6x30 Pin | 4 |
| 3 | (B) | O Ring 41050 | 2 |
| 4 | | External side cover | 1 |
| 5 | | M12x60 Hex. Screw (flanged and knurled) | 11 |
| 6 | | D100 Space washer | 1 |
| 7 | (B) | 6309 Ball bearing | 2 |
| 8 | | Rotor | 1 |
| 9 | (B) | Vane | 3 |
| 10 | (B) | IR 45x50x35 Bushing | 1 |
| 11 | | Motor side cover | 1 |
| 12 | | Shim ring | 1 |
| 13 | | Oil seal ring cover | 1 |
| 14 | (B) | BABSL 50x65x7 Seal ring | 2 |
| 15 | | Seeger | 1 |
| 16 | (B) | O Ring 4400 | 1 |
| 17 | | M8x40 Hex. Screw (flanged and knurled) | 3 |
| 18 | (B) | Plate | 4 |
| 19 | | Plate support | 4 |
| 20 | | Ø6 Washer | 12 |
| 21 | | Ø6 Lock washer | 12 |
| 22 | | M6 x 16 Hex. Socket head screw | 12 |
| 23 | | M5x12 Hex. Socket set screw | 6 |
| 24 | | M6x16 Hex. Socket set screw | 4 |
| 25 | | 1/8"G Al Washer | 7 |
| 26 | | 1/8"G Plug | 5 |
| 27 | | M10x25 Slotted headless set screw | 2 |
| 28 | | 3/8"G Al Washer | 7 |

| Pos. | Spare Parts P/N | Description | Q.Ty |
|------|-----------------|---------------------------------|------|
| 29 | | 3/8"G Plug | 7 |
| 30 | | A 12x8x70 Key | 1 |
| 41 | SR03705723 | Pump Side Half Coupling | 1 |
| 42 | (A) (B) | Elastic coupling insert | 1 |
| 43 | (B) | Pump Body Spacer Gasket | 1 |
| 44 | | Pump-tank spacer | 1 |
| 45 | | M10x70 Hex. Socket head screw | 10 |
| 46 | | M10x35 Stud bolt | 10 |
| 47 | | M10 Nut (flanged and knurled) | 10 |
| 48 | (B) | Tank-spacer gasket | 1 |
| 54 | | Tank | 1 |
| 55 | | 1/4"G Al Washer | 1 |
| 56 | | 1/4"G Plug | 1 |
| 57 | | 3/4"G Al Washer | 1 |
| 58 | | 3/4"G Plug | 1 |
| 59 | | Motor Side Upper Cover | 1 |
| 60 | (A) (B) | Upper cover gasket | 2 |
| 61 | | M10 x 35 Hex. Socket head screw | 36 |
| 62 | | Demister support mesh | 1 |
| 63 | | Tank demister | 1 |
| 64 | | Stay bolt for exhaust filter | 5 |
| 65 | (A) (B) | O Ring 4200 | 10 |
| 66 | (A) (B) | Exhaust filter | 5 |
| 67 | | Exhaust filter stay bolt sleeve | 5 |
| 68 | | Disk for exhaust filter | 5 |
| 69 | | Ø8/24 Washer | 5 |
| 70 | | Al ø8.4/13x1 Washer | 5 |
| 71 | | M8 x 20 Hex. Socket head screw | 5 |
| 72 | | 1"1/2 G Al Washer | 6 |
| 73 | | 1"1/2 Gas Plug | 6 |
| 74 | | External side upper cover | 1 |

| Pos. | Spare Parts P/N | Description | Q.Ty |
|------|-----------------|--|------|
| 75 | | Tank mesh | 1 |
| 76 | | Tank micro-stretched sheet | 1 |
| 77 | | Motor side lower cover | 1 |
| 78 | (B) | Gasket for lower cover | 2 |
| 79 | | 1" Oil sight glass | 2 |
| 80 | | 1" 1/4G Al Washer | 2 |
| 81 | | 1"1/4G Plug | 1 |
| 82 | | Ext. side lower tank cover | 1 |
| 83 | | 1"G Filling/discharge plug | 2 |
| 84 | | Float (oil recovery) | 1 |
| 85 | | Float port | 1 |
| 86 | (B) | O Ring 4093 | 1 |
| 87 | | M4x8 Hex. Sock. Stud bolt | 1 |
| 88 | | Ø5 Washer | 2 |
| 89 | | M5x16 Hex. Socket head screw | 2 |
| 90 | | 1"1/4G Nipple | 1 |
| 91 | (A) (B) | Oil filter | 1 |
| 102 | (B) (C) | O Ring 4512 | 3 |
| 103 | | Inlet valve body | 1 |
| 104 | (C) | Helicoidally spring | 1 |
| 105 | (C) | Inlet valve plate | 1 |
| 106 | | Inlet valve disk assembly | 1 |
| 107 | (B) (C) | O Ring 4362 | 1 |
| 108 | | Inlet flange | 1 |
| 109 | | M16x95 Hex. Socket head screw | 4 |
| 110 | | Oil cooler support | 1 |
| 111 | | M8x16 Hex. screw (flanged and knurled) | 8 |
| 112 | | Oil cooler | 1 |
| 113 | | Sleeve | 1 |
| 114 | | M20 Eyebolt | 1 |
| 115 | | M14 x 90 Hex. Socket head screw | 3 |

| Pos. | Spare Parts P/N | Description | Q.Ty |
|------|-----------------|--|------|
| 116 | | Motor flange | 1 |
| 117 | | M12x35 Hex. Screw (flanged and knurled) | 8 |
| 118 | | Fan assembly | 1 |
| 119A | SR03705726 | Electrical Motor M180L B5 6P 15kW 50Hz | 1 |
| 119B | SR03705727 | Electrical Motor M200LA B5 6P 158.5kW 60Hz | 1 |
| 120 | | Ø16 Washer | 8 |
| 121 | | Ø16 Lock washer | 8 |
| 122 | | M16x45 Hex. screw | 4 |
| 123 | | Vibration damping foot extension (long) | 4 |
| 124 | | Vibration damping foot | 6 |
| 125 | | Vibration damping foot extension (short) | 2 |
| 126 | | Casing assembly | 1 |
| 127 | | Ø6 Washer | 6 |
| 128 | | M6x12 Hex. head screw fully threaded | 6 |
| 129 | | Casing cover | 1 |
| 130 | | M6x12 Screw (flanged and knurled) | 4 |
| 136 | | 3/4"Gas Cu washer | 4 |
| 137 | | Oil cooler-tank oil pipe | 1 |
| 138 | | 3/4"G Hollow bolt | 2 |
| 139 | | 3/8"G Cu washer | 18 |
| 140 | | Motor side lubrication pipe | 1 |
| 141 | | 3/8"G Hollow bolt | 9 |
| 142 | | Ext. Side lubrication pipe | 1 |
| 143 | | 1/4"G Cu washer | 2 |
| 144 | | Central lubrication pipe | 1 |
| 145 | | 1/4"G Hollow bolt | 1 |
| 146 | | 1/8"G Cu washer | 8 |
| 147 | | Oil pipe (outlet seal ring) | 1 |
| 148 | | 1/8"G Hollow bolt | 4 |
| 149 | | Pump body support | 2 |

| Pos. | Spare Parts P/N | Description | Q.Ty |
|------|-----------------|--|------|
| 150 | | M12x60 Hex. Socket head screw | 4 |
| 151 | | Base-plate | 1 |
| 152 | | Casing sheath | 1 |
| 153 | | Ø12 Washer | 6 |
| 154 | | Ø12 Lock washer | 6 |
| 155 | | M12x25 Hex. head screw fully threaded | 6 |
| 156 | | Ø100 Vibration damping foot | 4 |
| 157 | | M16 Nut | 4 |
| 158 | | Eyebolt extension | 1 |
| 164 | | M14 x 120 Hex. Socket head screw | 1 |
| 165 | | Distributor for gas ballast valve | 1 |
| 166 | | M8x20 Hex. Screw (flanged and knurled) | 2 |
| 167 | | 1/2"G Al Washer | 3 |
| 168 | | M/F 1/2" Extension | 2 |
| 169 | | 1/2"G Cu washer | 4 |
| 170 | | 1/2"G Banjo male | 170 |
| 171 | | 1/2"G Ball valve | 171 |
| 172 | | 1/2"G Gas ballast valve | 172 |
| 173 | | 1/2"G felt disk for gas ballast valve | 173 |
| 174 | | 1/2"G Hollow bolt | 174 |
| 175 | | 1/2"G Plug | 175 |
| 176 | | Gas ballast pipe (front side) | 176 |
| 177 | | Gas ballast pipe (rear side) | 177 |
| 178 | | Oil recovery pipe | 178 |
| 179 | | Pump name plate | 179 |

Tab. 12

| Pos. | Spare Parts | Optionals | Q.Ty |
|------|-------------|-------------------------------|------|
| 501 | | Safety temperature switch | 1 |
| 502 | | Adjustable temperature switch | 1 |
| 503 | | Vacuum gauge | 1 |
| 504 | | Oil level switch assembly | 1 |
| 505 | | Oil level switch port | 1 |
| 506 | | Oil level switch extension | 1 |
| 507 | | Oil level switch | 1 |
| 508 | | 4"G N8 Nipple | 1 |
| 509 | | 4"G M-F G4 Union fitting | 1 |
| 510 | | Complete inlet filter | 1 |
| 511 | | Filter housing | 1 |
| 512 | | Filter cover | 1 |
| 513 | | Filter element | 1 |
| 514 | | Wing nut | 1 |

NOTE

- (A) Part of MS-631 Minor Maintenance Kit (P/N 949-5087)
- (B) Part of MS-631 Major Maintenance Kit (P/N 949-5088)
- (C) Part of MS-631 Inlet Valve Kit (P/N SR03705717)

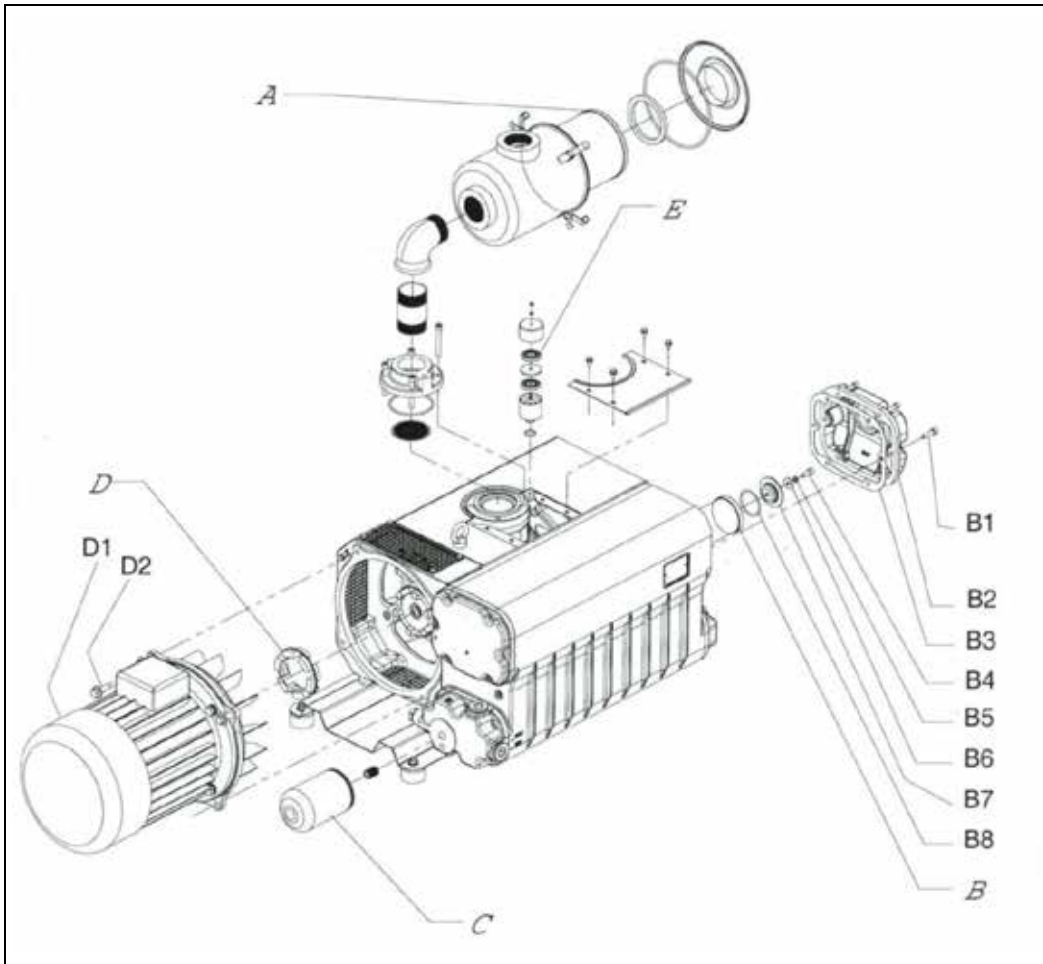


Figure 31 Pumps Major Parts

Oil Change Procedure

Oil change must be performed when the pump is still warm.

WARNING!

Use protective gloves to avoid any injury caused by heat.



Please refer to Figure “Oil change parts identification“, (page 22).

Unscrew the oil filling plug (E) and the discharge plug (G) only after having placed underneath the pump tank a suitable container (proper size and shape), for collecting the total amount of oil.

Once the oil in the tank has completely been discharged, tighten both plugs “E” and “G” and let the pump run for about one minute, so that the lubricating/cooling line gets emptied as any oil residual inside the pump. Then remove the plugs and discharge the rest of the oil.

If the oil is polluted or if some water is in the oil, clean the pump by letting it run at maximum vacuum level with about 2 liters of fresh oil for at least 5 minutes for the MS-301 and 14 liters of fresh oil at least 5 minutes for the MS-631.

Change again the lubricating oil.

Before filling the pump with fresh oil, replace the oil filter. Please remember to grease the filter gasket with fresh oil. Then screw the new oil filter.

Fill the pump with fresh oil (please see “Recommended oil” table).

Float Valve Cleaning Procedure

If the float valve for oil recovery doesn't operate well, there could be oil carry out from the discharge port.

To clean the float valve, follow these instructions;

- 1 Remove the cover (position B2, refer to page 40), unscrewing the screws (position B1, refer to page 40).
- 2 Remove the float valve (position F of the following figure) from its grub-screw (position F1 of the following figure).
- 3 Clean the float valve, and its internal reduction fitting, with compressed air by blowing the opposite direction with respect to the normal oil flow
- 4 Fit the float valve in its housing.
- 5 Fit the discharge cover.

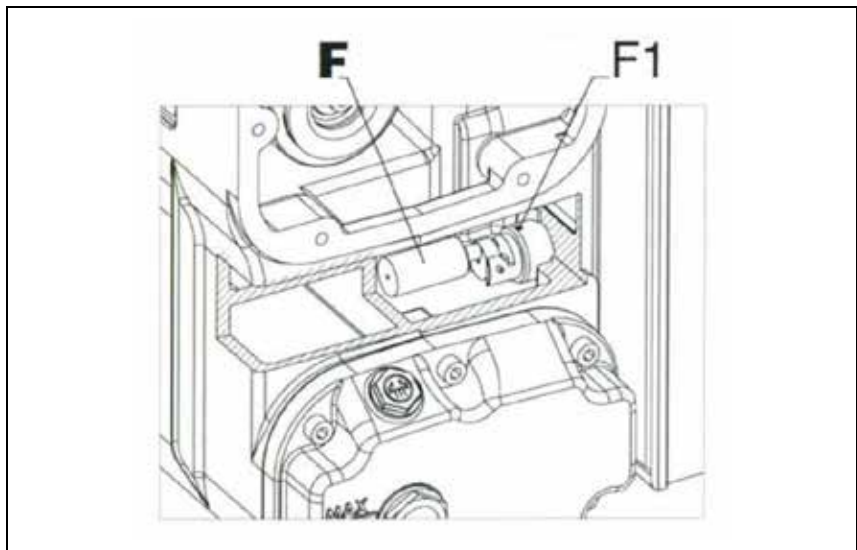


Figure 32

Exhaust Filters Replacement Procedure

Very dirty exhaust filters may cause a considerable pump temperature increase and in extreme cases oil lubricant spontaneous ignition. Maximum allowed pressure in the tank is 0.7 bar measured at the maximum capacity, when the pump is working with the inlet open to atmospheric pressure. If a pressure gauge has been fitted on the tank, check the exhaust filter blockage with the pump warm.

To replace the filter apply the following instructions;

- 1 Remove the cover (position B2, refer to page 40) by unscrewing its screws (position B1, refer to page 40).
- 2 Unscrew the screw (position B4, refer to page 40), remove the washer (position B5-B6, refer to page 40) and then the fixing cartridge disk (position B7, refer to page 40), the washer and tighten the screws.
- 3 Reassemble the discharge cover. If necessary, replace the gasket (position B3, refer to page 40).

Oil Separator Change Procedure

If the oil filter is clogged, the oil circulating from the tank through the pump could be dirt and cause a severe damage to the pump.

To change the oil filter (position C, refer to page 40), follow these instructions:

- 1 Be sure that the oil inside the pump has been completely discharged (for further information see the “Oil change procedure”);
- 2 Unscrew the oil filter with by means of a chain wrench from the oil-tank;
- 3 Clean the contact surface between the oil tank and the filter;
- 4 Screw the oil filter by hands to the oil tank.

Gas Ballast Felt Disk Change Procedure

If the gas ballast felt disk is clogged, an insufficient amount of air flows through the pump and consequently the pump may not discharge the water vapor properly.

To change the gas ballast felt disk, follow these instructions:

- 1 Remove the gas ballast;
- 2 Unscrew its cap;
- 3 Remove the upper micro-stretched sheet disk;
- 4 Substitute the felt disk with a new one;
- 5 Reassembly the gas ballast and then screw it using a new o-ring directly on the Ball valve.

Coupling Elastic Element Replacement Procedure

Please refer to figure “Pumps Major Parts” on page 40.

Remove the motor assembly (position D1, refer to page 40) unscrewing the screws (position D2, refer to page 40). Check the elastic element (position D, refer to page 40) conditions. If necessary, replace it. Reassemble by means of the screws.

CAUTION!

Use suitable lifting equipment to lift the motor;

§ Motor weight for MS-301: approximately 55 kg

§ Motor weight for MS-631: approximately 190 kg

WARNING!



The operation with damaged elastic element causes an anomalous pump noise, especially when starting the pump and may lead to coupling and pump shaft failure.

Pump Overhaul Procedure

For this operation please require the proper instructions and direct any questions to our Customer Service department.

The overhaul consists of a complete disassembly, cleaning of all components as well as replacement of parts that are subject to wear (pump and motor bearings, vanes and gaskets).

Spare Parts

Spares Necessary for Normal Servicing

Agilent recommends the use of spare parts as follows;

- 1 Spare parts included in the “Minor Maintenance Kit” listed on pages 32 and 39 with (A) and indicated in the relevant Pump Parts tables. These parts are needed for ordinary maintenance operations to be performed by users or by Agilent personnel.
- 2 Spare parts included in the “Major Maintenance Kit” listed on pages 32 and 39 with (B) and indicated in the relevant Pump Parts tables. These parts are needed for more complex maintenance operations to be performed mostly by Agilent personnel.
- 3 Spare parts included in the “Inlet Valve Kit” listed on pages 32 and 39 with (C) and indicated in the relevant Pump Parts tables. These parts are needed in case of antisuckback valve maintenance.
- 4 Other spare parts, listed with (SR....) on the Pump Parts tables at pages 31 and 38 are available for sales to Agilent customers.

How to Order Spare Parts

When ordering spare parts, always state the pump model (type), serial number, year of production, electric motor characteristics (three-phase, power, voltage, frequency), position reference on the spare parts list, description and quantity needed.

Orderable Parts

Tab. 13 Orderable parts

| Description | Part number |
|---|-------------|
| Major Spare Parts Kit (for MS-301 models) | 949-5021 |
| Minor Spare Parts Kit (for MS-301 models) | 949-5020 |
| Inlet Valve Kit (for MS-301 models) | SR03705715 |
| Major Spare Parts Kit (for MS-631 models) | 949-5088 |
| Minor Spare Parts Kit (for MS-631 models) | 949-5087 |
| Inlet Valve Kit (for MS-631 models) | SR03705717 |
| Oil filter (for MS-301 models) | 949-5070 |
| Oil filter (for MS-631 models) | 949-5090 |
| Inlet Air Filter with Polyester Cartridge (for MS-301 models) | 949-5083 |
| Inlet Air Filter with Polyester Cartridge for 2" gas connection (for MS-301 models) | 949-5059 |
| Inlet Air Filter with Polyester Cartridge with DN 63 ISO-K flange connection (for MS-301 models) | 949-5159 |
| Connection Fitting Kit, for 2" Gas connection (for MS-301 models) | 949-5065 |
| Connection Fitting Kit, DN 63 ISO-K flange connection (for MS-301 models) | 949-5165 |
| Oil Level Protection Switch (for MS-301 models) | 949-5078 |
| Inlet Air Filter with Polyester Cartridge (for MS-631 models) | 949-5089 |
| Inlet Air Filter with Polyester Cartridge for 4" gas connection (for MS-631 models) | 949-5062 |
| Inlet Air Filter with Polyester Cartridge with DN 100 ISO-K flange connection (for MS-631 models) | 949-5162 |
| Connection Fitting Kit, for 4" Gas connection (for MS-631 models) | 949-5066 |

| Description | Part number |
|---|-------------|
| Connection Fitting Kit, DN 100 ISO-K flange connection (for MS-631 models) | 949-5166 |
| Oil Level Protection Switch (for MS-631 models) | 949-5079 |
| Pump Thermal Protection Switch | 949-5076 |
| Oil Separator Control Pressure Switch | 949-5077 |
| Pump side coupling half (for MS-301) | SR03705716 |
| Elastic coupling insert (for MS-301) | SR03705719 |
| Motor side coupling half (for MS-301) | SR03705718 |
| Electric motor M132 B5 4P 5.5 kW 50 Hz (for MS-301) | SR03705592 |
| Electric motor M132 B5 4P 7.5 kW 60 Hz (for MS-301) | SR03705721 |
| Pump side Coupling half (for MS-631) | SR03705723 |
| Electric motor M180L B5 6P 15 kW 50 Hz (for MS-631) | SR03705726 |
| Electric motor M200LA B5 6P 18.5 kW 60 Hz (for MS-631) | SR03705727 |
| Electric motor M132 B5 4P 7.5 kW, 50/60 Hz, 380-420/660-725 V | SR03706172 |
| Electric motor M200LA B5 6P 18.5 kW, 50/60 Hz, 380-420/660-725 V | SR03706632 |

De-Commissioning

Drain the oil from the pump prior to the removal.

If the oil is polluted, flush the pump with fresh oil (see “Oil change procedure” paragraph).

Drain the oil from the tank, plug the inlet and the discharge ports and store the pump without oil.

In case of pump disposal, separate the pump parts by materials and trash the parts in accordance with the local regulations in the Country of use.

Return for Repair

In case of pump return for repair to Agilent, please provide a list of substances which have come in contact with the pump and advice the risks involved in handling, if any. Drain the lubricant from the pump prior to shipping the pump back.

Troubleshooting

Tab. 14 Accessories and Spare Parts

| Trouble | Cause | Remedy | Who |
|------------------------------|--|--|-----------------|
| Drop in performances | Inlet filters are dirty | Clean or replace | Customer |
| | Inlet pipes or machine are leaking | Identify leaking point and seal it. | Customer |
| | No or low lubrication | Check oil level and oil conditions Fill with oil to the right level or change the oil | Customer |
| Anomalous noise | No lubrication | See previous point | Customer |
| | Worn out coupling element | Replace it following the supplied instructions | Customer |
| | Motor or pump bearings damaged | Call Agilent Technical support | Agilent Service |
| Oil leak | Worn out vanes | Call Agilent Technical support | Agilent Service |
| | Worn out shaft oil seal rings | Replace oil seal rings | Agilent Service |
| | Oil recovery system leak | Check and clean oil recovery pipe | Customer |
| Motor protection is tripping | Blocked exhaust filters | Replace exhaust filters | Customer |
| | No or low lubrication | Oil level filling up | Customer |
| | Pump seizure and jelly oil | Pump overhaul | Agilent Service |
| Discharge oil mist | Clogged exhaust filters | Replace exhaust filters | Customer |
| | High temperature due to polluted oil | Oil change | Customer |
| | High operating temperature due to high ambient temperature | Decrease room temperature by allowing a better change of air | Customer |



Vacuum Products Division

Dear Customer,

Thank you for purchasing an Agilent vacuum product. At Agilent Vacuum Products Division we make every effort to ensure that you will be satisfied with the product and/or service you have purchased.

As part of our Continuous Improvement effort, we ask that you report to us any problem you may have had with the purchase or operation of our products. On the back side you find a Corrective Action request form that you may fill out in the first part and return to us.

This form is intended to supplement normal lines of communications and to resolve problems that existing systems are not addressing in an adequate or timely manner.

Upon receipt of your Corrective Action Request we will determine the Root Cause of the problem and take the necessary actions to eliminate it. You will be contacted by one of our employees who will review the problem with you and update you, with the second part of the same form, on our actions.

Your business is very important to us. Please, take the time and let us know how we can improve.

Sincerely,

A handwritten signature in black ink, appearing to read "Giampaolo LEVI".

Giampaolo LEVI

*Vice President and General Manager
Agilent Vacuum Products Division*

Note: Fax or mail the Customer Request for Action (see backside page) to Agilent Vacuum Products Division (Torino) – Quality Assurance or to your nearest Agilent representative for onward transmission to the same address.

CUSTOMER REQUEST FOR CORRECTIVE / PREVENTIVE / IMPROVEMENT ACTION

TO: AGILENT VACUUM PRODUCTS DIVISION TORINO – QUALITY ASSURANCE FAX

N°: XXXX-011-9979350

ADDRESS: AGILENT TECHNOLOGIES ITALIA S.p.A. – Vacuum Products Division –

Via F.lli Varian, 54 – 10040 Leini (TO) – Italy

E-MAIL: vpd-qualityassurance_pdi-ext@agilent.com

| NAME | COMPANY | FUNCTION |
|--|---------|----------|
| ADDRESS: | | |
| TEL. N° : | | FAX N° : |
| E-MAIL: | | |
| PROBLEM / SUGGESTION : | | |
| REFERENCE INFORMATION (model n°, serial n°, ordering information, time to failure after installation, etc.): | | |
| | | DATE |
| CORRECTIVE ACTION PLAN / ACTUATION (by AGILENT VPD) | | LOG N° |

XXX = Code for dialing Italy from your country (es. 01139 from USA; 00139 from Japan, etc.)



Vacuum Products Division Instructions for returning products

Dear Customer,

Please follow these instructions whenever one of our products needs to be returned.

Complete the attached **Request for Return form** and send it to Agilent Technologies (see below), taking particular care to include the completed **Health and Safety** declaration Section. No work can be started on your unit until we receive a completed copy of this form.

After evaluating the information, Agilent Technologies will provide you with a **Return Authorization (RA) number** via email or fax, as requested. Note: Depending on the type of return, a Purchase Order may be required at the time the **Request for Return** is submitted. We will quote any necessary services (evaluation, repair, special cleaning, eg).

Product preparation

- Remove all accessories from the core product (e.g. inlet screens, vent valves).
- Prior to shipment and if applicable for your product, drain any oils or other liquids, purge or flush all gasses, and wipe off any excess residue.
- If ordering an Advance Exchange product, please use the packaging from the Advance Exchange to return the defective product.
- Seal the product in a plastic bag, and package product carefully to avoid damage in transit. You are responsible for loss or damage in transit.
- Include a copy of the Health and Safety Declaration in the shipping documentation on the outside of the shipping box of your returning product.
- Clearly label package with RA number. Using the shipping label provided will ensure the proper address and RA number are on the package. Packages shipped to Agilent without a RA clearly written on the outside cannot be accepted and will be returned.
- Return only products for which the RA was issued.

Shipping

- Ship to the location specified on the printable label, which will be sent, along with the RA number, as soon as we have received all of the required information. Customer is responsible for freight charges on returning product.
- Return shipments must comply with all applicable Shipping Regulations (IATA, DOT, ADR, etc.) and carrier requirements.

RETURN THE COMPLETED REQUEST FOR RETURN FORM TO YOUR NEAREST LOCATION:

EUROPE:

Fax: 00 39 011 9979 330
Fax Free: 00 800 345 345 00
Toll Free: 00 800 234 234 00
vpt-customer@agilent.com

NORTH AMERICA:

Fax: 1 781 860 9252
Toll Free: 800 882 7426
vpl-ra@agilent.com

PACIFIC RIM:

please visit our website for individual
office information
<http://www.agilent.com>



TERMS AND CONDITIONS

Please read the terms and conditions below as they apply to all returns and are in addition to the Agilent Technologies Vacuum Product Division – Products and Services Terms of Sale.

- Unless otherwise pre-negotiated, customer is responsible for the freight charges for the returning product. Return shipments must comply with all applicable **Shipping Regulations** (IATA, DOT, etc.) and carrier requirements.
- Agilent Technologies is not responsible for returning customer provided packaging or containers.
- Customers receiving an Advance Exchange product agree to return the defective, rebuildable part to Agilent Technologies within **15 business days**. Failure to do so, or returning a non-rebuildable part (crashed), will result in an invoice for the non-returned/non-rebuildable part.
- Returns for credit toward the purchase of new or refurbished Products are subject to prior Agilent approval and may incur a restocking fee. Please reference the original purchase order number.
- Units returned for evaluation will be evaluated, and a quote for repair will be issued. If you choose to have the unit repaired, the cost of the evaluation will be deducted from the final repair pricing. A Purchase Order for the final repair price should be issued within 3 weeks of quotation date. Units without a Purchase Order for repair will be returned to the customer, and the evaluation fee will be invoiced.
- Products returned that have not been drained from oil will be disposed.
- A Special Cleaning fee will apply to all exposed products
- If requesting a calibration service, units must be functionally capable of being calibrated.



Vacuum Products Division
Request for Return Form

Customer information
Company :
Address:
Contact Name:
Tel:
Fax:
Email:

Equipment
Product description
Agilent PartNo
Agilent Serial No
Original Purchasing Reference
Failure description
Type of process (for which the equipment was used)

Type of return
Non Billable
Billable
Exchange
Repair
Upgrade
Consignment/Demo
Calibration
Evaluation
Return for Credit

Health and safety
The product has been exposed to the following substances:
Substances (please refer to MSDS forms)
Trade name
Chemical name
Chemical Symbol
CAS Number

Goods preparation
If you have replied YES to one of the above questions. Has the product been purged?
If yes, which cleaning agent/method:
Has the product been drained from oil?
I confirm to place this declaration on the outside of the shipping box.

I declare that the above information is true and complete to the best of my knowledge and belief.
I understand and agree to the terms and conditions on page 2 of this document.
Name:
Position:
Date:
Authorized Signature:
NOTE: If a product is received at Agilent which is contaminated with a toxic or hazardous material that was not disclosed, the customer will be held responsible for all costs incurred to ensure the safe handling of the product, and is liable for any harm or injury to Agilent employees as well as to any third party occurring as a result of exposure to toxic or hazardous materials present in the product.

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12/13

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