

MS-631FL High Capacity Rotary Vane Pumps

**Models: X3753-64000, X3753-64002,
X3753-64004, X3753-64006, X3753-64090,
X3753-64091, X3753-64092, X3753-64093**

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

**87-900-142-01(A)
01/2014**



Agilent Technologies

Notices

© Agilent Technologies, Inc. 2013

No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Agilent Technologies, Inc. as governed by United States and international copyright laws.

Manual Part Number

Publication Number: 87-900-142-01(A)

Edition

Edition 01/2014

Printed in ITALY

Agilent Technologies Italia S.p.A.

Vacuum Products Division

Via F.lli Varian, 54

10040 Leini (TO)

ITALY

Warranty

The material contained in this document is provided “as is,” and is subject to being changed, without notice, in future editions. Further, to the maximum extent permitted by applicable law, Agilent disclaims all warranties, either express or implied, with regard to this manual and any information contained herein, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Agilent shall not be liable for errors or for incidental or consequential damages in connection with the furnishing, use, or performance of this document or of any information contained herein. Should Agilent and the user have a separate written agreement with warranty terms covering the material in this document that conflict with these terms, the warranty terms in the separate agreement shall control.

Technology Licenses

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

Restricted Rights Legend

If software is for use in the performance of a U.S. Government prime contract or subcontract, Software is delivered and licensed as “Commercial computer software” as defined in DFAR 252.227-7014 (June 1995), or as a “commercial item” as defined in FAR 2.101(a) or as “Restricted computer software” as defined in FAR 52.227-19 (June 1987) or any equivalent agency regulation or

contract clause. Use, duplication or disclosure of Software is subject to Agilent Technologies’ standard commercial license terms, and non-DOD Departments and Agencies of the U.S. Government will receive no greater than Restricted Rights as defined in FAR 52.227-19(c)(1-2) (June 1987). U.S. Government users will receive no greater than Limited Rights as defined in FAR 52.227-14 (June 1987) or DFAR 252.227-7015 (b)(2) (November 1995), as applicable in any technical data.

Trademarks

Windows and MS Windows are U.S. registered trademarks of Microsoft Corporation.

Safety Notices

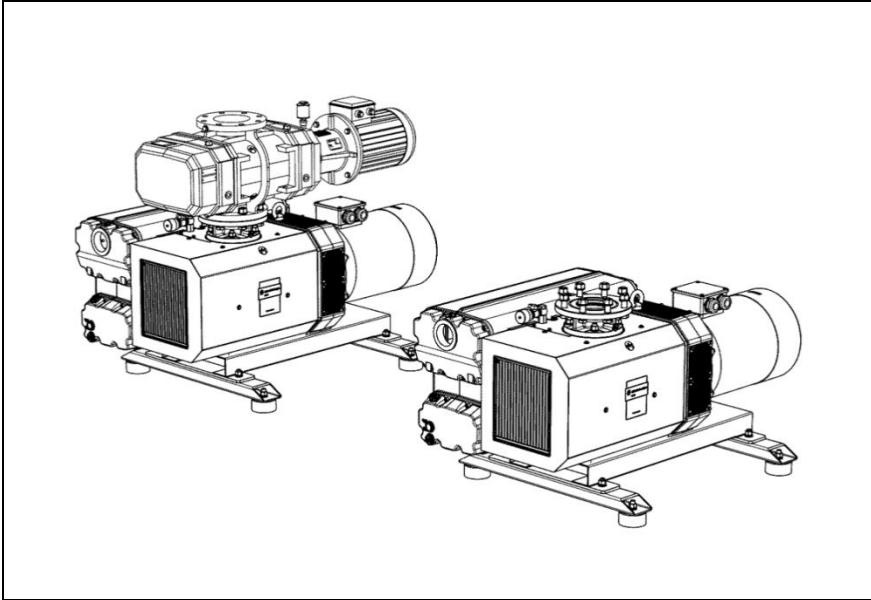
CAUTION

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.

MS-631FL High Capacity Rotary Vane Pumps



MS-631FL High Capacity Rotary Vane Pumps

Contents

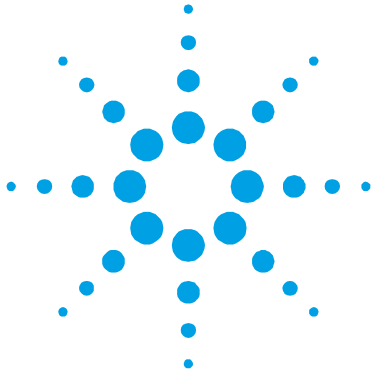
1	Istruzioni per l'uso	9
	Informazioni Generali	10
	Immagazzinamento	12
	Preparazione per l'installazione	12
	Installazione	14
	Trasformazione MS-631 in MS-631FL	16
	Uso	17
	Manutenzione	18
	Smaltimento	20
2	Gebrauchsanleitung	21
	Allgemeine Informationen	22
	Lagerung	24
	Vor der Installation	24
	Installation	26
	Umwandlung MS-631 in MS-631FL	28
	Gebrauch	29
	Wartung	30
	Entsorgung	32

Contents

3	Mode d'emploi	33
	Information Générale	34
	Emmagasinage	36
	Preparation pour l'installation	36
	Installation	38
	Transformation de la MS-631 en MS-631FL	40
	Utilisation	41
	Maintenance	42
	Mise au rebut	44
4	Instructions for Use	45
	General Information	46
	Storage	48
	Preparation for Installation	48
	Installation	50
	MS-631 to MS-631FL Transformation	52
	Use	53
	Maintenance	54
	Disposal	56
5	Technical Information	57
	Section I	59
	Technical Description	59
	Technical Data	61

Dimensions	65
Safety Precautions	75
Transport and Handling	77
Section II	80
Installation and Operation	80
MS-631 to MS-631FL Transformation	83
Use	94
Stopping the Pump	96
Safety Rules	97
Warning Notes	98
Caution Notes	100
Maintenance Actions	101
Lubricants	103
Section III	105
Servicing	105
Spare Parts	117
De-Commissioning	119
Return for Repair	119
Troubleshooting	121

Contents



1

Istruzioni per l'uso

Informazioni Generali	10
Immagazzinamento	12
Preparazione per l'installazione	12
Installazione	14
Trasformazione MS-631 in MS-631FL16	
Uso	17
Manutenzione	18
Smaltimento	20

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-631FL 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 esclusivamente al pompaggio di aria e piccole quantità di vapore d'acqua.

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 -15 °C a 50 °C
- umidità relativa: 0 – 95 % (non condensante)

Preparazione per l'installazione

AVVERTENZA!



La pompa MS-631FL è progettata per sostenere mediante la propria flangia di aspirazione le pompe Root Agilent denominate RP1401, RP2001 e RP3001. Il posizionamento di pompe root di taglia diversa o con diversa denominazione sulla flangia di aspirazione della pompa RVP può generare condizioni di pericolo per le apparecchiature e gli operatori.

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 dipende dal tipo di pompa e può essere;

- di circa 600 Kg se è presente il motore a 50Hz,
- di circa 650 Kg se è presente il motore a 60Hz,
- di circa 430 Kg se è non presente il motore.

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 Imballo

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 +5 °C a +40 °C
- umidità relativa: 0 – 95 % (non condensante)

AVVERTENZA!



Per proteggere contro cortocircuiti 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'olio non deve superare 1,5 bar (assoluta). L'inosservanza di queste precauzioni può causare danni alla pompa ed all'operatore.

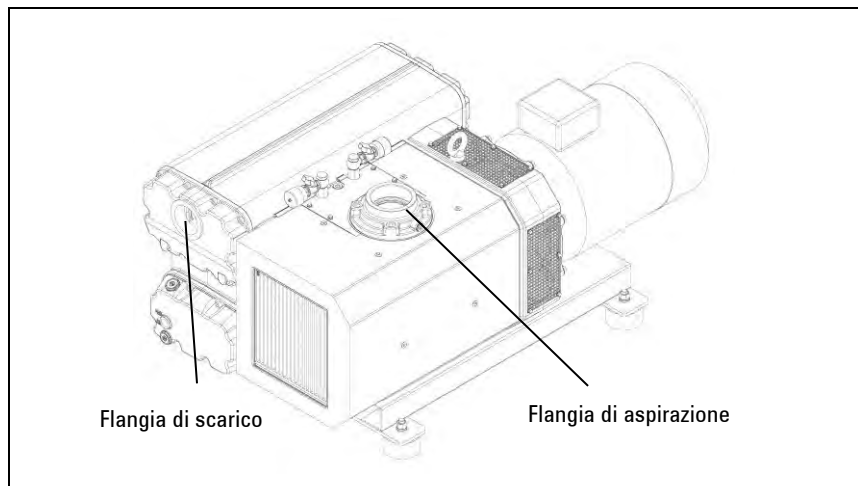


Figura 2 MS-631FL

ATTENZIONE!

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

Collegare la pompa all'alimentazione.

Trasformazione MS-631 in MS-631FL

La pompa MS-631 può essere trasformata nella versione MS-631FL, ovvero predisposta per l'installazione di una pompa Roots, mediante un Kit di trasformazione, fornibile da Agilent. Informazioni dettagliate sono fornite nell'appendice "Technical Information".

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 "Request for Return" allegata al presente manuale di istruzioni. Copia della stessa deve essere inserita nell'imballo della pompa prima della spedizione.

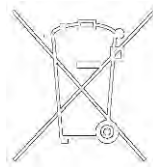
Qualora una pompa dovesse essere rottamata, procedere alla sua eliminazione nel rispetto delle normative nazionali specifiche.

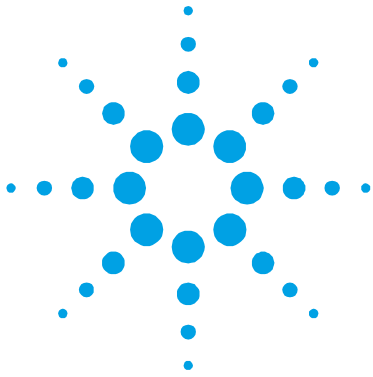
Smaltimento

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	24
Vor der Installation	24
Installation	26
Umwandlung MS-631 in MS-631FL	28
Gebrauch	29
Wartung	30
Entsorgung	32

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 MS-631FL High Capacity Rotary Vane Pumps sind dichte ölbadgeschmierte 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: -15 °C bis +50 °C
- Relative Feuchtigkeit: 0 – 95 % (niederschlagsfrei)

Vor der Installation

WARNUNG!



Die Pumpe MS-631FL wurde so entwickelt, dass über den Saugflansch die Rootspumpen von Agilent vom Typ RP1401, RP2001 und RP3001 angeschlossen werden können.

Der Anschluss von Rootspumpen mit anderen Abmessungen oder anderen Bezeichnungen am Saugflansch der RVP-Pumpe stellt eine Gefahr für Menschen und Material dar.

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

Das Verpackungsgewicht hängt vom Typ der Pumpe ab:

- ca. 600 kg bei einem 50-Hz-Motor,
- ca. 650 kg bei einem 60-Hz-Motor,
- ca. 430 kg ohne Motor.

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

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: +5 °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.

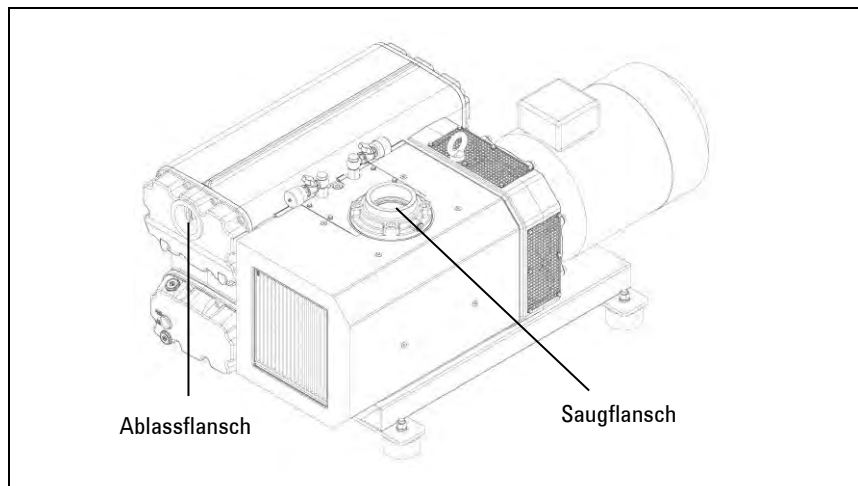


Abbildung 2 MS-631FL

VORSICHT!

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

Die Pumpe an das Versorgungsnetz anschließen.

Umwandlung MS-631 in MS-631FL

Die Pumpe MS-631 kann in die Version MS-631FL umgewandelt werden. Dabei wird sie durch ein von Agilent zu lieferndes Kit für die Installation einer Roots Pumpe eingerichtet. Detaillierte Informationen finden sich im Anhang “Technische Informationen”.

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 "Request for Return" in der Anlage zum vorliegenden Handbuch auszufüllen und der lokalen Verkaufsstelle zuzustellen. Eine Kopie des Formulars ist der Pumpenverpackung vor dem Versand beizulegen.

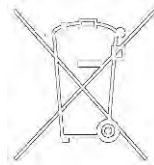
Bei eventueller Verschrottung einer Pumpe ist diese entsprechend der einschlägigen nationalen Vorschriften zu entsorgen.

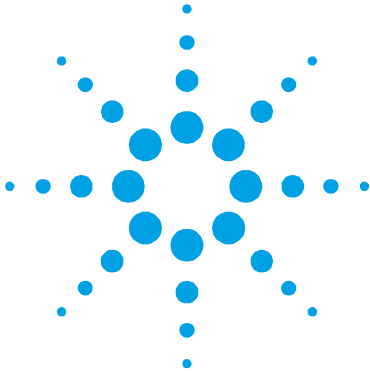
Entsorgung

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	36
Préparation pour l'installation	36
Installation	38
Transformation de la MS-631 en MS-631FL	40
Utilisation	41
Maintenance	42
Mise au rebut	44

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-631FL 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 -15 °C à +50 °C
- humidité relative: 0 – 95 % (sans condensation)

Preparation pour l'installation

AVERTISSEMENT!



La pompe MS-631FL est conçue pour soutenir les pompes Root Agilent RP1401, RP2001 et RP3001 à travers la bride d'aspiration. L'installation de pompes Root de taille ou de désignation différente sur la bride d'aspiration de la pompe RVP comporte des risques de dommage aux équipements et de blessure aux opérateurs.

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 de l'emballage dépend du type de pompe, il est :

- d'environ 600 Kg avec le moteur de 50Hz,
- d'environ 650 Kg avec le moteur de 60Hz,
- d'environ 430 Kg sans moteur.

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

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 +5 °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.

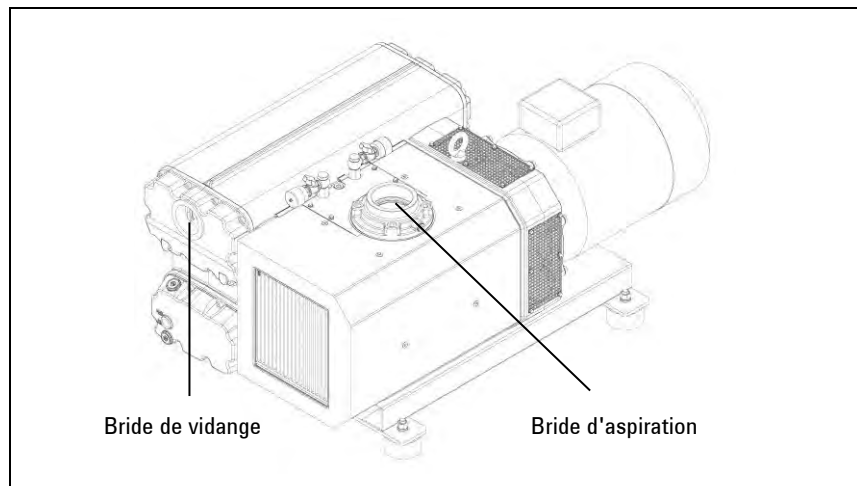


Figure 2 MS-631FL

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.

3 Mode d'emploi

Transformation de la MS-631 en MS-631FL

Transformation de la MS-631 en MS-631FL

La pompe MS-631 peut être transformée en pompe MS-631FL, c'est-à-dire préparée pour l'installation d'une pompe Roots avec un kit de transformation fourni par Agilent. Les informations techniques détaillées sont fournies dans l'annexe "Technical Information" (Informations techniques).

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 "Request for Return" 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.

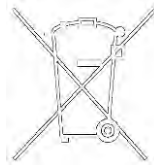
Mise au rebut

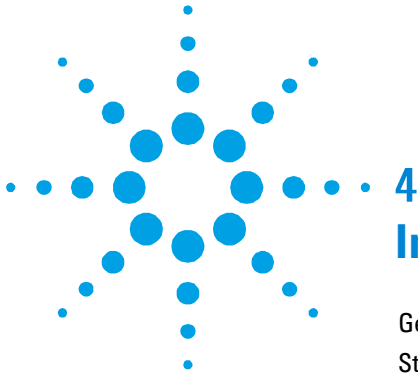
Signification du logo "WEEE" figurant sur les étiquettes.

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	48
Preparation for Installation	48
Installation	50
MS-631 to MS-631FL Transformation	52
Use	53
Maintenance	54
Disposal	56

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 MS-631FL 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 -15° to +50 °C
- relative humidity: 0 – 95 % (non-condensing)

Preparation for Installation

WARNING!



MS-631FL pumps are designed to support Root Agilent RP1401, RP2001 and RP3001 pumps by means of its intake flange. Positioning Root pumps of other size or different denomination on the RVP pump intake flange may be dangerous for devices and operators.

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 weight of the packing depends on the pump type and may be:

- approximately 600 kg if a 50Hz motor is fitted,
- approximately 650 kg if a 60Hz motor is fitted,
- approximately 430 kg if no motor is present.

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

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 +5 °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.

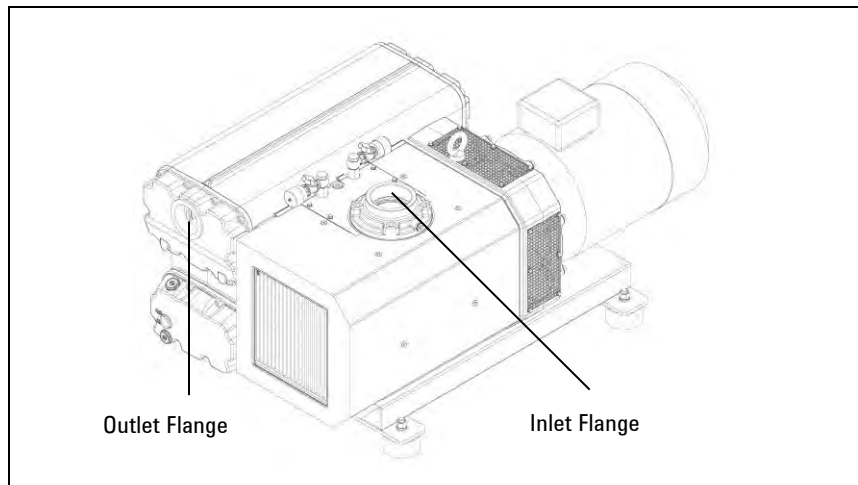


Figure 2 MS-631FL

CAUTION!

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

Connect the pump to the power supply.

4 Instructions for Use
MS-631 to MS-631FL Transformation

MS-631 to MS-631FL Transformation

MS-631 pumps may be turned into MS-631FL units, i.e. they are ready for installing a Roots pump using a transformation kit, supplied by Agilent. See “Technical Information” for detailed information.

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 "Request for Return" 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.

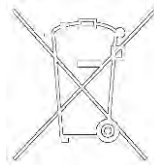
If a pump is to be scrapped, it must be disposed of in accordance with the specific national standards.

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	65
Safety Precautions	75
Transport and Handling	77
Lifting	77
Unpacking and Components Control	78
Storage	79
Section II	80
Installation and Operation	80
Assembling	80
MS-631 to MS-631FL Transformation	83
Assembly of the pumping monobloc	84
Positioning	86
Connection to the Vacuum System	89
Discharge Air Pipe Line Installation	89
Electrical Connection	90
Suggestions for Use	92
Water Vapour Suction	93

Original Instructions



5 Technical Information

Disposal

Use	94	
Intended use	94	
Operation in automatic mode	95	
Operation in manual mode	95	
Stopping the Pump	96	
Safety Rules	97	
Warning Notes	98	
Caution Notes	100	
Maintenance Actions	101	
Lubricants	103	
Section III	105	
Servicing	105	
General Information	105	
Pump Parts for MS-631FL	111	
Spare Parts	117	
Spares Necessary for Normal Servicing	117	
How to Order Spare Parts	117	
Orderable Parts	118	
De-Commissioning	119	
Return for Repair	119	
Troubleshooting	121	

Section I

Technical Description

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

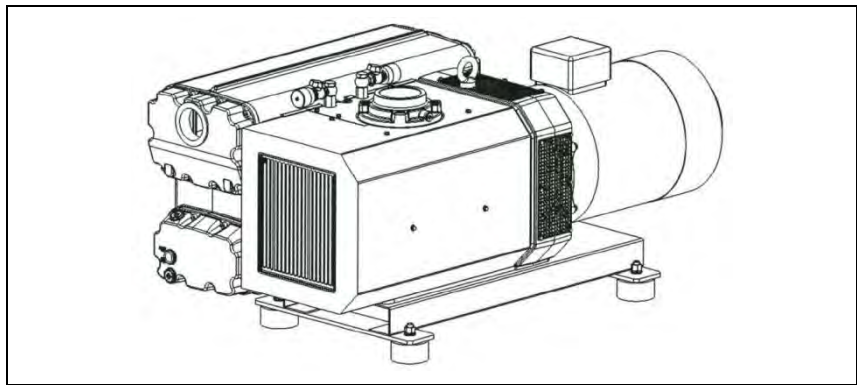


Figure 3 MS-631FL

MS-631FL pumps are designed for installing a Roots pump using a transformation kit, by means of its intake flange RPS, to compose a Root Agilent compact pumping unit volume (monobloc) called RP1401, RP2001 and RP3001 pumps.

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

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/m³).

5 Technical Information

Technical Description

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 MS-631FL pumps.

Tab. 1 Technical Data

Technical Data		Units	MS-631
NOMINAL SPEED*		m ³ /h (at 50 Hz)	660
		m ³ /h (at 60 Hz)	790
ULTIMATE TOTAL PRESSURE WITH GAS BALLAST VALVE CLOSED*		mbar	≤ 0,1
		Pascal	≤ 10
ULTIMATE TOTAL PRESSURE WITH GAS BALLAST VALVE OPEN*		mbar	≤ 0.5
		Pascal	≤ 50
MOTOR POWER/ROTATIONAL SPEED** (3ph)		kW (rpm) at 50 Hz	15 (1000 min ⁻¹)
		kW (rpm) at 60 Hz	18.5 (1200 min ⁻¹)
ELECTRICAL MOTOR CHARACTERISTICS		at 50 Hz	IM B5 Δ400/Y690 V
		at 60 Hz	IM B5 Δ460 V
			IM B5 YY230/Y460 V
			IM B5 Δ220/Y380 V
NOISE PRESSURE LEVEL (without gas ballast valve) (According to UNI EN ISO 2151 standard)		dB(A) at 50 Hz	71
		dB(A) at 60 Hz	73
WATER VAPOUR TOLERANCE		mbar	30
WATER VAPOUR PUMPING CAPACITY		Kg/h	13
OIL CAPACITY	min	l	19
	max	l	25
	nominal	l	22
WEIGHT	with 3 ph 50 Hz motor	Kg (lb)	591 (1301.79)
	with 3 ph 60 Hz motor	Kg (lb)	643 (1416.33)
	without motor (approx.***)	Kg (lb)	419 (922.93)
OPERATING TEMPERATURE RANGE		°C	12 – 40

* According to PNEUROP standard 6602

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

*** Depending from motor

5 Technical Information

Technical Data

The following table lists the main technical data of RPS2001-631FL pumps.

Tab. 2 Technical Data

Technical Data	Units	RPS2001-631FL	
NOMINAL SPEED*	m ³ /h (at 50 Hz)	2045	
	m ³ /h (at 60 Hz)	2444	
ULTIMATE TOTAL PRESSURE WITH GAS BALLAST VALVE CLOSED* (absolute)	mbar	$\leq 7 \cdot 10^{-3}$	
	Pascal	$\leq 7 \cdot 10^{-1}$	
ULTIMATE TOTAL PRESSURE WITH GAS BALLAST VALVE OPEN* (absolute)	mbar	$\leq 2 \cdot 10^{-2}$	
	Pascal	≤ 2	
START UP PRESSURE RP2001 (absolute)	mbar	< 80	
FITTED MOTOR POWER ** (MS + RP)	kW at 50 Hz	15 + 7.5 (400 V)	
	kW at 60 Hz	18.5 + 7.5 (460 V)	
NOISE PRESSURE LEVEL (According to UNI EN ISO 2151 standard)	dB(A) at 50 Hz	77	
	dB(A) at 60 Hz	78	
OIL CAPACITY (MS + RP) nominal	l	22 + 2,5	
WEIGHT	with 3 ph 50 Hz motor	Kg (lb)	920 (2026.48)
	with 3 ph 60 Hz motor	Kg (lb)	986 (2171.85)

* According to PNEUROP standard 6602

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

The following table lists the main technical data of RPS1401-631FL pumps.

Tab. 3 Technical Data

Technical Data	Units	RPS1401-631FL	
NOMINAL SPEED*	m ³ /h (at 50 Hz)	1430	
	m ³ /h (at 60 Hz)	1720	
ULTIMATE TOTAL PRESSURE WITH GAS BALLAST VALVE CLOSED* (absolute)	mbar	≤ 7 * 10 ⁻³	
	Pascal	≤ 7 * 10 ⁻¹	
ULTIMATE TOTAL PRESSURE WITH GAS BALLAST VALVE OPEN* (absolute)	mbar	≤ 2 * 10 ⁻²	
	Pascal	≤ 2	
START UP PRESSURE RP1401 (absolute)	mbar	< 130	
FITTED MOTOR POWER ** (MS + RP)	kW at 50 Hz	15 + 5,5 (400 V)	
	kW at 60 Hz	18.5 + 5.5 (460 V)	
NOISE PRESSURE LEVEL (According to UNI EN ISO 2151 standard)	dB(A) at 50 Hz	75	
	dB(A) at 60 Hz	76,5	
OIL CAPACITY (MS + RP) nominal	l	22 + 1,5	
WEIGHT	with 3 ph 50 Hz motor	Kg (lb)	868 (1911.94)
	with 3 ph 60 Hz motor	Kg (lb)	937 (2063.92)

* According to PNEUROP standard 6602

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

5 Technical Information

Technical Data

The following table lists the main technical data of RPS3001-631FL pumps.

Tab. 4 Technical Data

Technical Data	Units	RPS3001-631FL	
NOMINAL SPEED*	m ³ /h (at 50 Hz)	2890	
	m ³ /h (at 60 Hz)	3465	
ULTIMATE TOTAL PRESSURE WITH GAS BALLAST VALVE CLOSED* (absolute)	mbar	$\leq 7 \cdot 10^{-3}$	
	Pascal	$\leq 7 \cdot 10^{-1}$	
ULTIMATE TOTAL PRESSURE WITH GAS BALLAST VALVE OPEN* (absolute)	mbar	$\leq 2 \cdot 10^{-2}$	
	Pascal	≤ 2	
START UP PRESSURE RP3001 (absolute)	mbar	< 36	
FITTED MOTOR POWER ** (MS + RP)	kW at 50 Hz	15 + 11 (400 V)	
	kW at 60 Hz	18.5 + 11 (460 V)	
NOISE PRESSURE LEVEL (According to UNI EN ISO 2151 standard)	dB(A) at 50 Hz	77,5	
	dB(A) at 60 Hz	78,5	
OIL CAPACITY (MS + RP) nominal	l	22 + 2,5	
WEIGHT	with 3 ph 50 Hz motor	Kg (lb)	1052 (2317.23)
	with 3 ph 60 Hz motor	Kg (lb)	1140 (2511.07)

* According to PNEUROP standard 6602

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

Dimensions

The following drawing show the pumps layout, dimensions and rotational direction relevant to the MS-631FL pump:

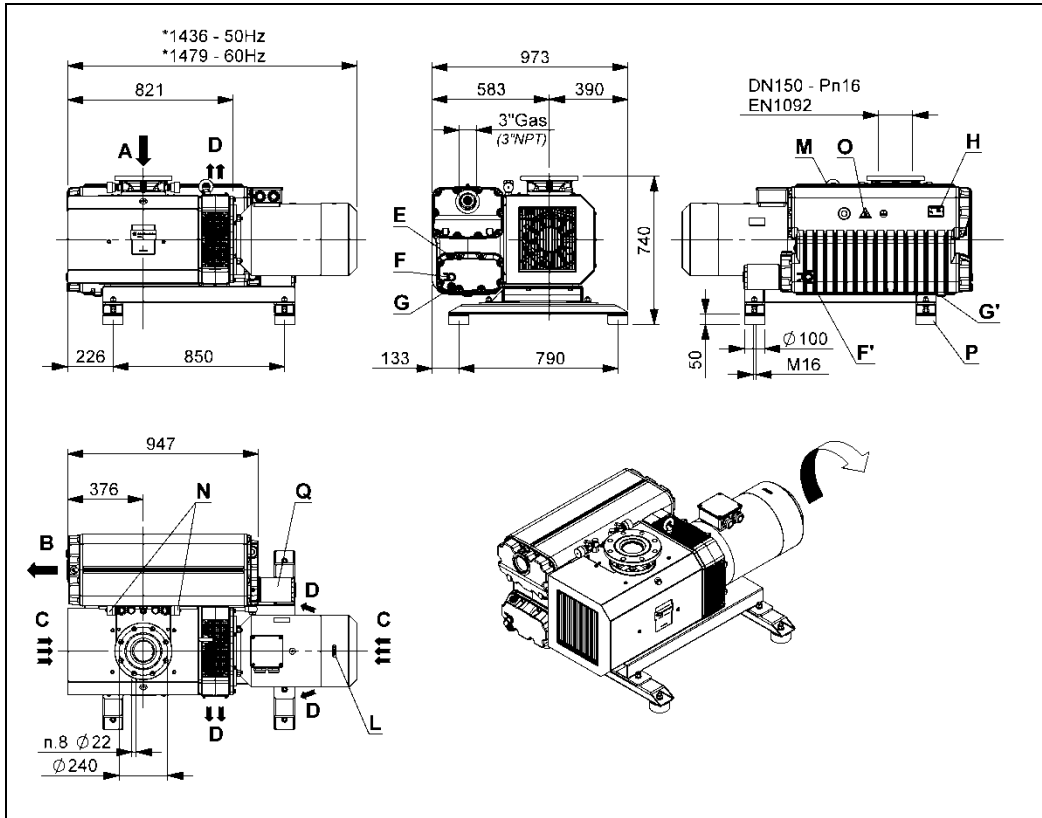


Figure 4 Dimension of MS-631FL pumps

Dimensions subject to changes (depending on motor brand)

5 Technical Information
Dimensions

Tab. 5 Legend of MS-631FL pumps

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

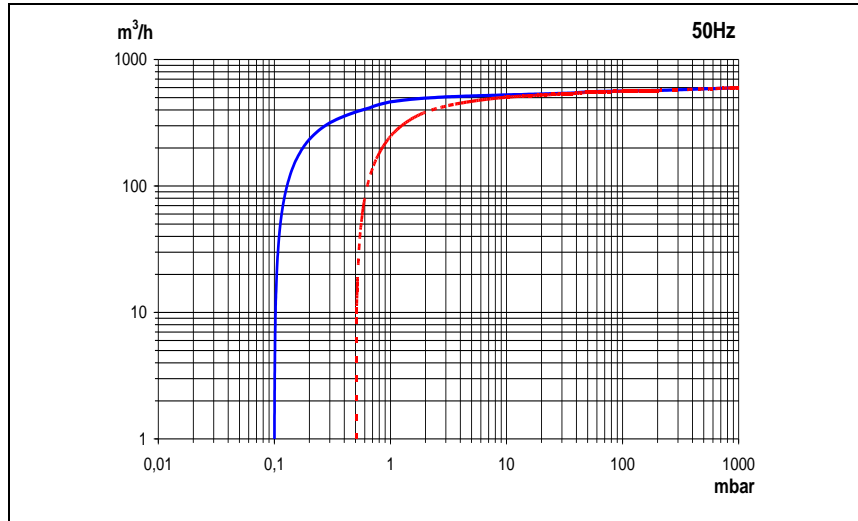


Figure 5 MS-631FL Graph of delivery capacity vs inlet pressure with 50 Hz motor (— without gas ballast valve) (----- with gas ballast)

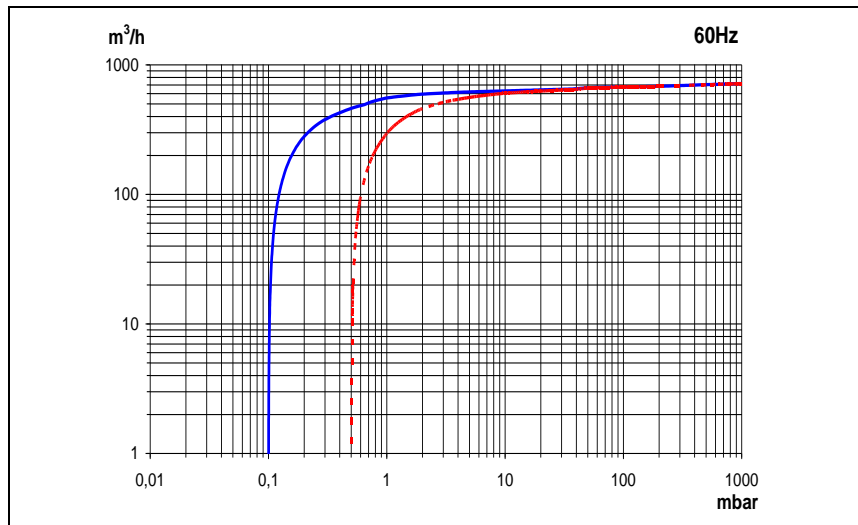


Figure 6 MS-631FL Graph of delivery capacity vs inlet pressure with 60 Hz motor (— without gas ballast valve) (----- with gas ballast)

5 Technical Information

Dimensions

The following drawing show the pumps layout and dimensions relevant to the RPS2001-631FL pumps:

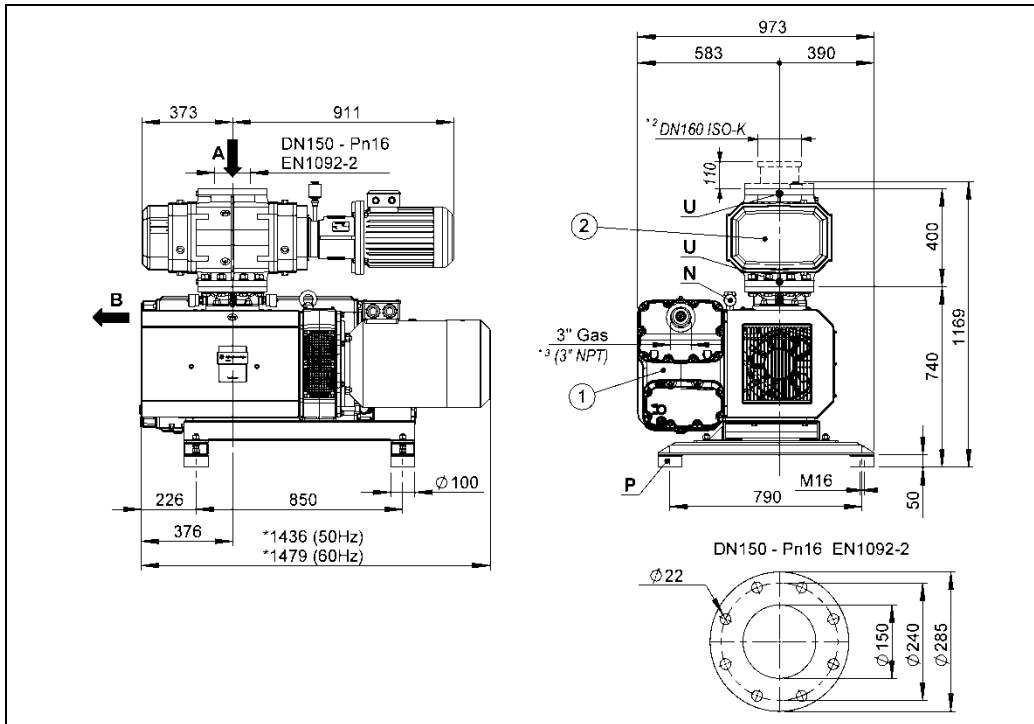


Figure 7 Dimension of RPS2001-631FL pumps

Dimensions subject to changes (depending on motor brand)

Tab. 6 Legend of RPS2001-631FL pumps

1	Vane pump MS-631FL
2	Roots pump RP2001
A	Inlet
B	Exhaust
P	Vibration damper
N	Gas ballast valve
U	Vacuum port

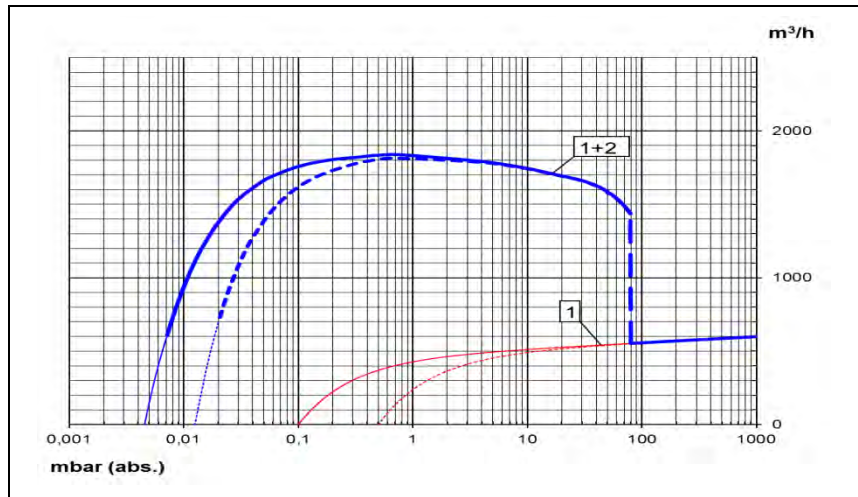


Figure 8 RPS2001-631FL Graph of delivery capacity vs inlet pressure with 50 Hz motor
(——— without gas ballast valve) (----- with gas ballast)

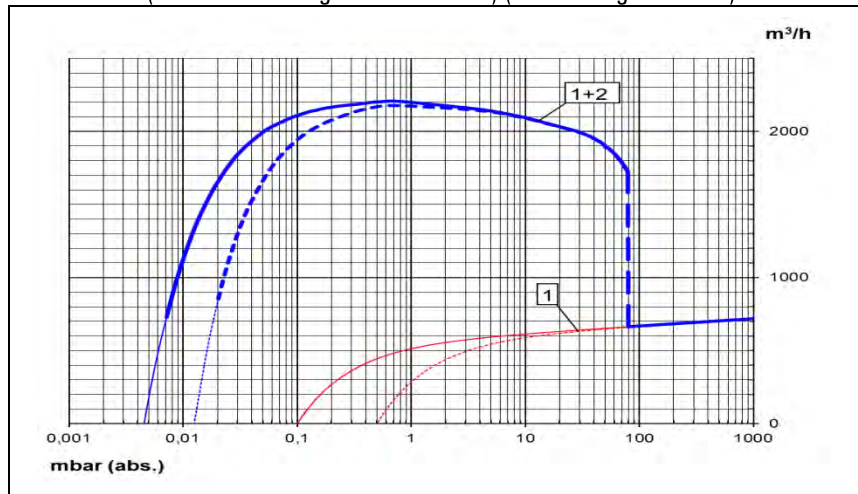


Figure 9 RPS2001-631FL Graph of delivery capacity vs inlet pressure with 60 Hz motor
(——— without gas ballast valve) (----- with gas ballast)

1 = Vane Pump MS-631FL

2 = Roots pump RP2001

5 Technical Information

Dimensions

The following drawing show the pumps layout and dimensions relevant to the RPS1401-631FL pumps:

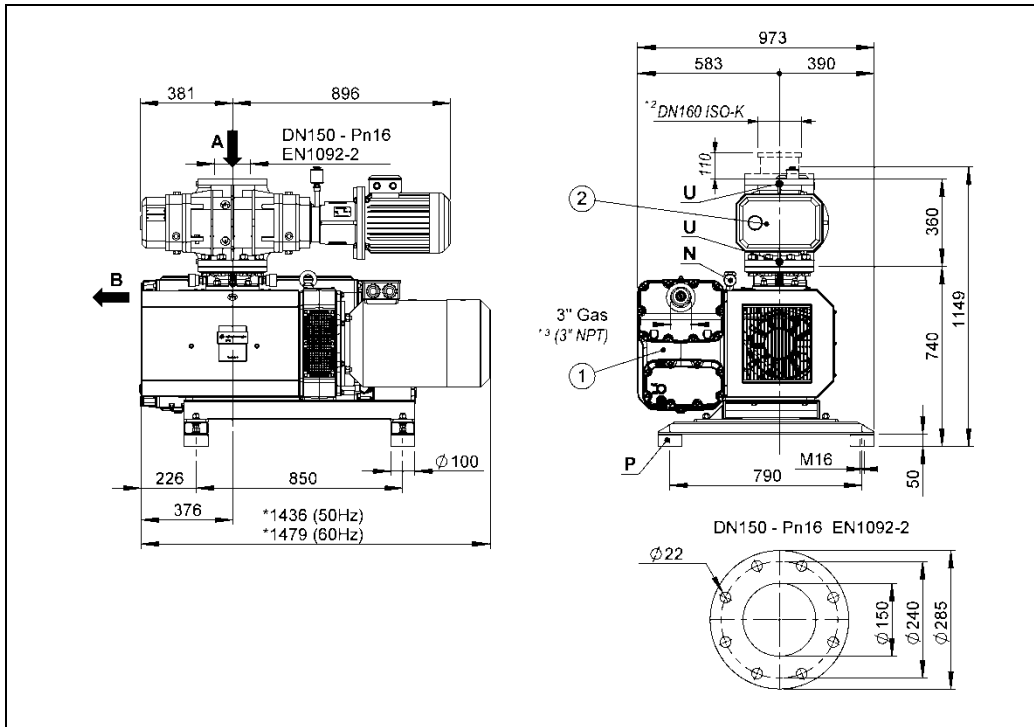


Figure 10 Dimension of RPS1401-631FL pumps

Dimensions subject to changes (depending on motor brand)

Tab. 7 Legend of RPS1401-631FL pumps

1	Vane pump MS-631FL
2	Roots pump RP1401
A	Inlet
B	Exhaust
P	Vibration damper
N	Gas ballast valve
U	Vacuum port

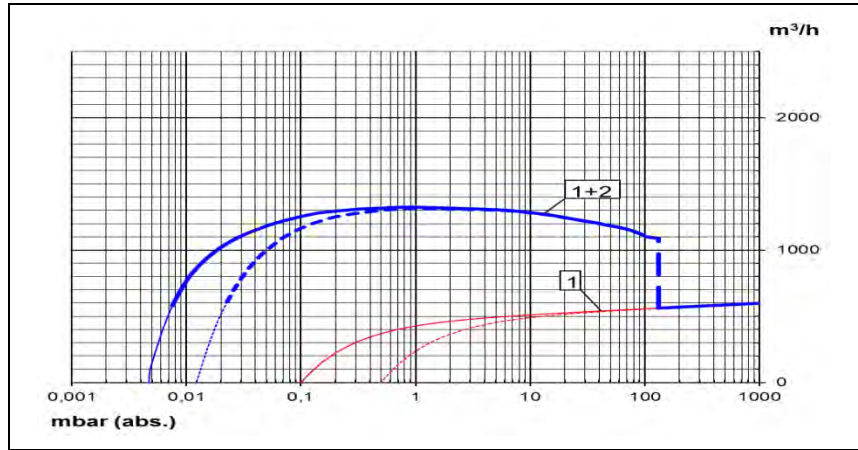


Figure 11 RPS1401-631FL Graph of delivery capacity vs inlet pressure with 50 Hz motor
(——— without gas ballast valve) (----- with gas ballast)

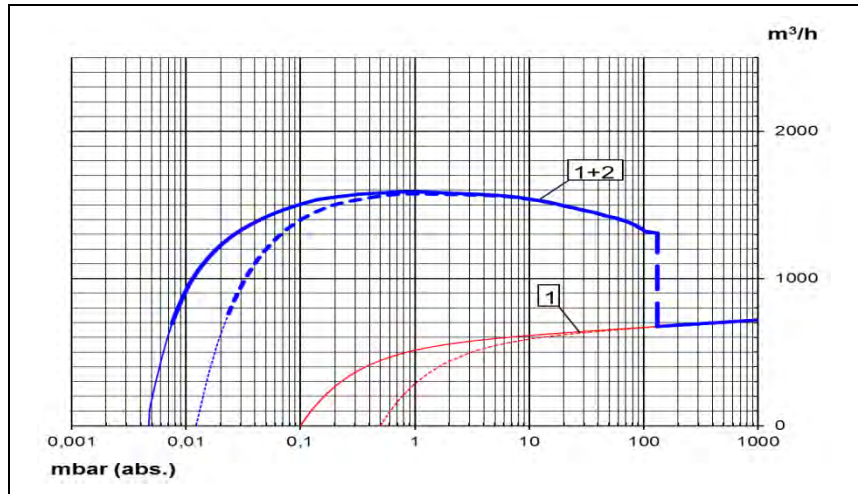


Figure 12 RPS1401-631FL Graph of delivery capacity vs inlet pressure with 60 Hz motor
(——— without gas ballast valve) (----- with gas ballast)

1 = Vane Pump MS-631FL

2 = Roots pump RP1401

5 Technical Information
Dimensions

The following drawing show the pumps layout and dimensions relevant to the RPS3001-631FL pumps:

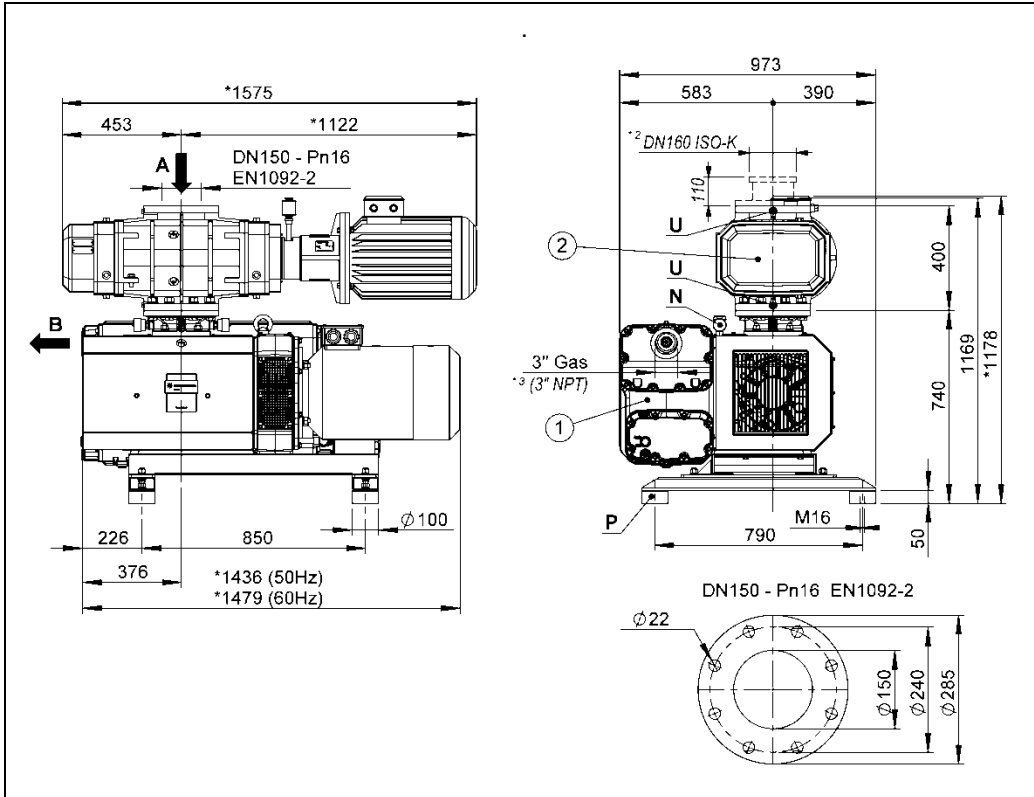


Figure 13 Dimension of RPS3001-631FL pumps

Dimensions subject to changes (depending on motor brand)

Tab. 8 Legend of RPS3001-631FL pumps

1	Vane pump MS-631FL
2	Roots pump RP3001
A	Inlet
B	Exhaust
P	Vibration damper
N	Gas ballast valve
U	Vacuum port

5 Technical Information
Dimensions

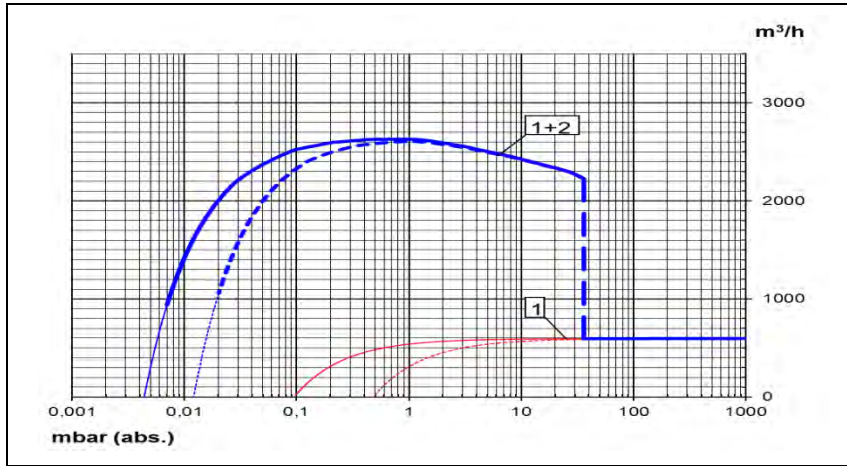


Figure 14 RPS3001-631FL Graph of delivery capacity vs inlet pressure with 50 Hz motor
 (—— without gas ballast valve) (----- with gas ballast)

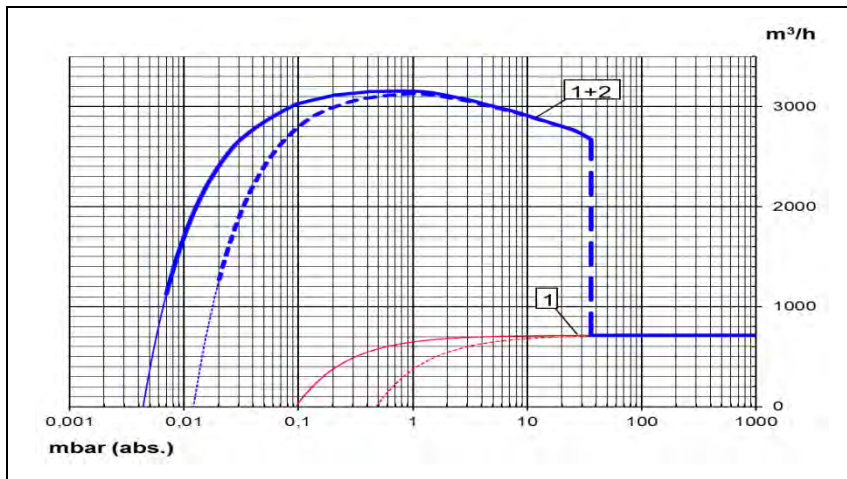


Figure 15 RPS3001-631FL Graph of delivery capacity vs inlet pressure with 60 Hz motor
 (—— without gas ballast valve) (----- with gas ballast)

1 = Vane Pump MS-631FL

2 = Roots pump RP3001

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.

5 Technical Information

Safety Precautions

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 by skilled personnel with the pump idle, disconnected from the electrical supply. Make sure to cold and vented to atmospheric pressure and 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).

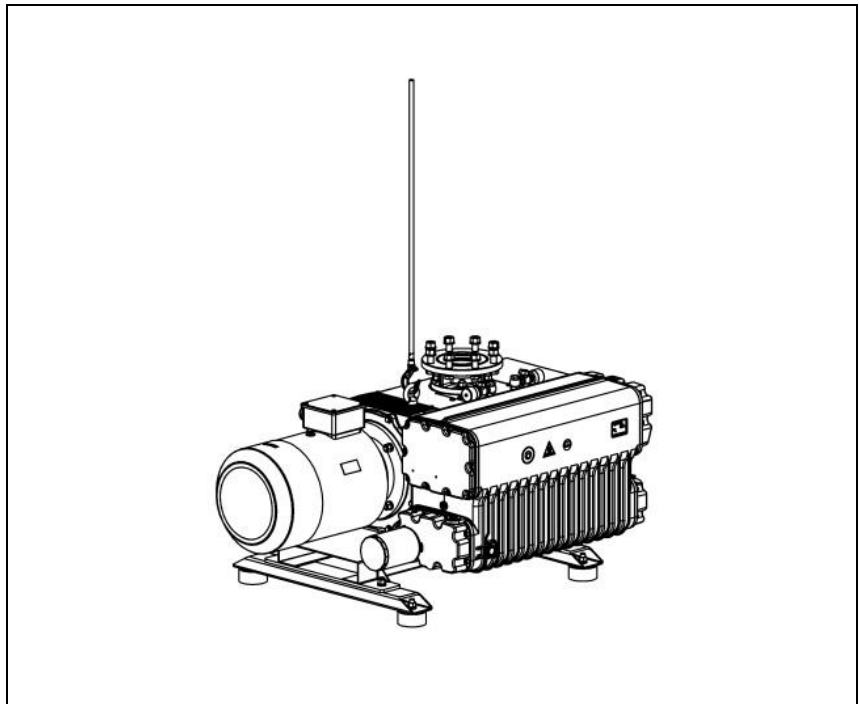


Figure 16

5 Technical Information

Transport and Handling

Tab. 9

WEIGHT	UNITS	MS-631FL
With 3 ph 50 Hz motor (approx. depending from motor mounted)	Kg (lb)	600 (132.61)
With 3 ph 60 Hz motor (approx. depending from motor mounted)	Kg (lb)	650 (1431.75)
Without motor	Kg (lb)	430 (947.16)

WARNING!



During handling, clear the area of operations in order to avoid injury to people or damage to property. The personnel should use the most appropriate personal protective equipment.

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 -15 °C and +50 °C
- humidity rate: 0 – 95 % (non condensing)

The inlet flange and the threaded connection to the exhaust must be protected against dust entry.

The pump is shipped from Agilent equipped with special protective plugs sealing the input of the pump (inlet and outlet).

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.

- 1 Mount the motor flange (Item 130) on the electric motor (Item 137), using the 4 stud bolts (Item 139), the nuts (Item 107) and the relevant washers (Item 105-106).
- 2 Mount the fan-coupling (Item 132-133-134-135-136-120) on the shaft of the electric motor using a hydraulic press or similar equipment that will not damage the motor bearings.

WARNING!

Check that the distance between the fan and the motor flange is about 7mm.



-
- 3 Tighten the sock stud bolt (Item 140) in the driver coupling half.
 - 4 Insert the elastic coupling insert (Item 30) into the coupling half pump side (Item 29).
 - 5 Mount the motor (Item 132-133-134-135-136-120-131-137) on the fan cover sleeve (Item 122) using the 8 screws TE (Item 131) making sure that the elastic coupling insert (Item 30) remains in place.

WARNING!

Check that the distance between the two coupling halves is 3.5 ± 1 mm.



WARNING!

Through the window on the sleeve verify that the distance between the fan (Item 133) and the sleeve (Item 122) is approximately 6mm.



WARNING!

Failure to observe the installation dimensions can cause serious damage to operators and/or the pump.



5 **Technical Information**
Installation and Operation

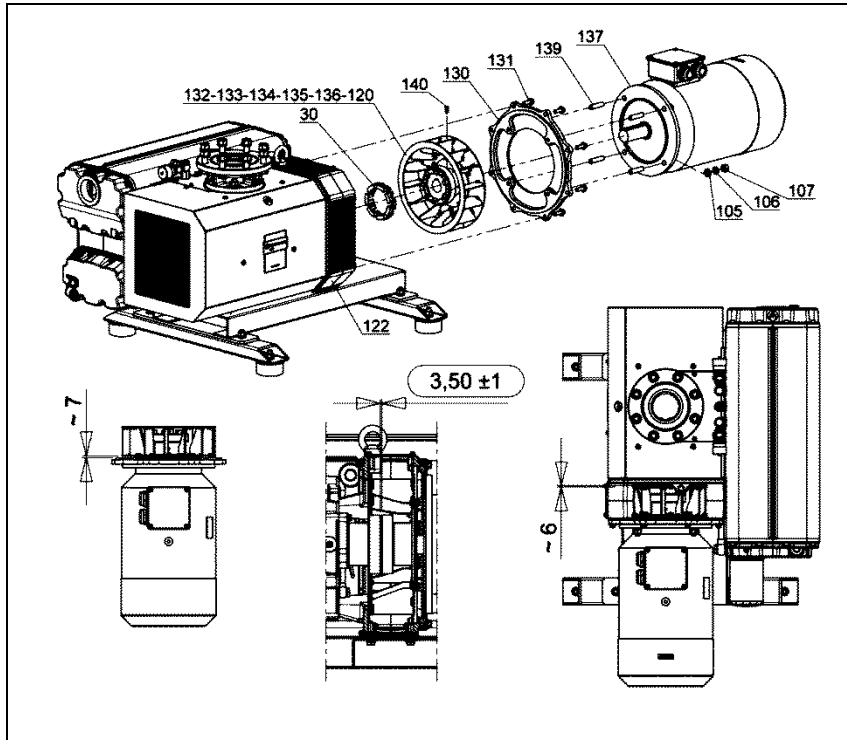


Figure 17 Electric motor assembling

MS-631 to MS-631FL Transformation

The pump MS-631 can be transformed in the version MS-631FL, designed for the installation of a Roots pump, by means of a conversion kit, available from Agilent.

- From the MS-631 pump disassemble the inlet flange (Item # 108) by removing 4 socket head screws (Item # 109).
- Remove the Inlet valve disk assembly (Item # 106) and its O-Ring (Item # 102 - # 107).

CAUTION!

Protect the pump inlet from accidental entrance of impurities.

- Remove the four Vibration damping feet (Item 179), removing the nuts (Item 107) and washers (Item 105-106).
- Replace the Vibration damping foets (Item 179) on the two Vibration damping feet extensions (Pos * 177) included in the Transformation kit, re-using nuts (Item 107) and washers (Item 105-106) previously removed.
- Install the Vibration damping feet extensions (Item 177 *) under the pump, using the bolts supplied in the kit (Item * 178 - * 105 - * 106 - * 107).
- Tighten the four captive screws M16 (Item * 104) on the inlet side of the pump.
- Fit the O-ring (Item 94 * - 103 *) in the headquarters of the intake manifold (Item * 98).
- Push the inlet manifold assembly (Item * 98 - * 99 - * 100 - * 101 - * 102) over the four studs (Item * 104) previously implanted on the pump.
- Close the intake manifold by tightening the nuts (Item * 107) and washers (Item * 106 - * 105) supplied with the kit Transformation. The maximum torque of the nuts is 32nm.

5 Technical Information

MS-631 to MS-631FL Transformation

- Mount the plug (Item * 109) and washer (Item 108 *) on the intake manifold.
- Place the bolts provided to anchor the roots (Item * 195 - * 196 - * 197 - * 198).
- Place the O-Ring (Item * 199) in place in the intake manifold (Item * 98).

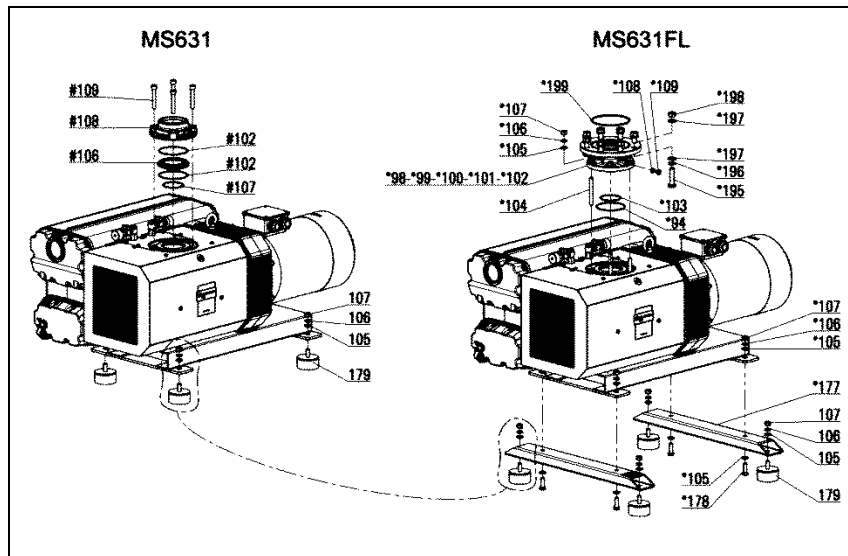


Figure 18

LEGENDA

* Components supplied in the kit Transformation

Item referenced to the exploded view of the MS-631 pump (refer to the specific manual, code 87-900-136-01)

Assembly of the pumping monobloc

The pump MS-631FL is designed to support Roots pumps with flanged DN150 - Pn16 EN1092 so as to compose a group of volumetric pumping (see following table).

Tab. 10

MS VANE PUMP	RP ROOTS PUMP	RPS PUMPING UNIT
MS-631FL	RP1401	RPS1401-631FL
	RP2001	RPS2001-631FL
	RP3001	RPS3001-631FL

The Roots pump is connected in series to MS631FL which rises through a collector disk. The suction is realized by the Roots pump, the sucked air then passes to the vane pump from which it is discharged.

The pumping unit must be assembled on site by the user following the instructions below;

- 1** Remove the caps of the pumps (Pos.11-12-13).
- 2** With suitable lifting equipment (see manual pump Roots), raise the Roots pump (Item 7) and remove the feet (Item 8) by unscrewing the 4 screws (Item 9).
- 3** Place the Roots pump (Item 7) on the vane pump (Item 1). Make sure that the O-ring (item 6) is positioned in its groove on the flange of the vane pump.
- 4** Insert the 8 screws M20 (Item 2-3-4) in the bottom flange and tighten the nuts (Pos. 5-4) on the upper flange. Tighten the torque for each screw M20 = 250 Nm.

5 **Technical Information**
MS-631 to MS-631FL Transformation

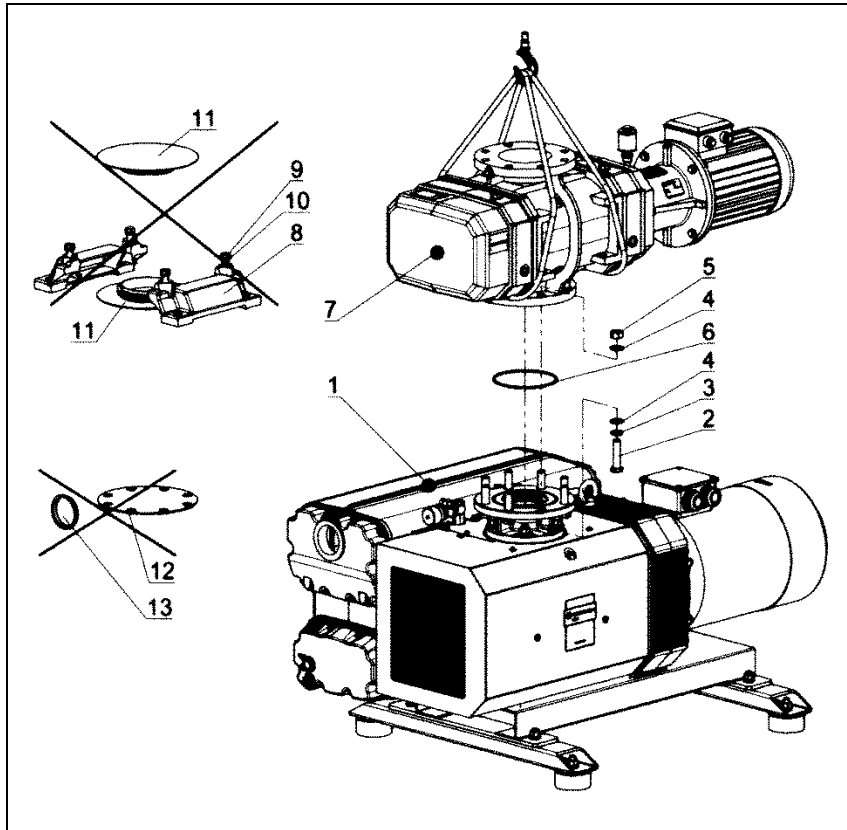


Figure 19 Assembling of the pump monoblock

Positioning

- The pumping unit 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).

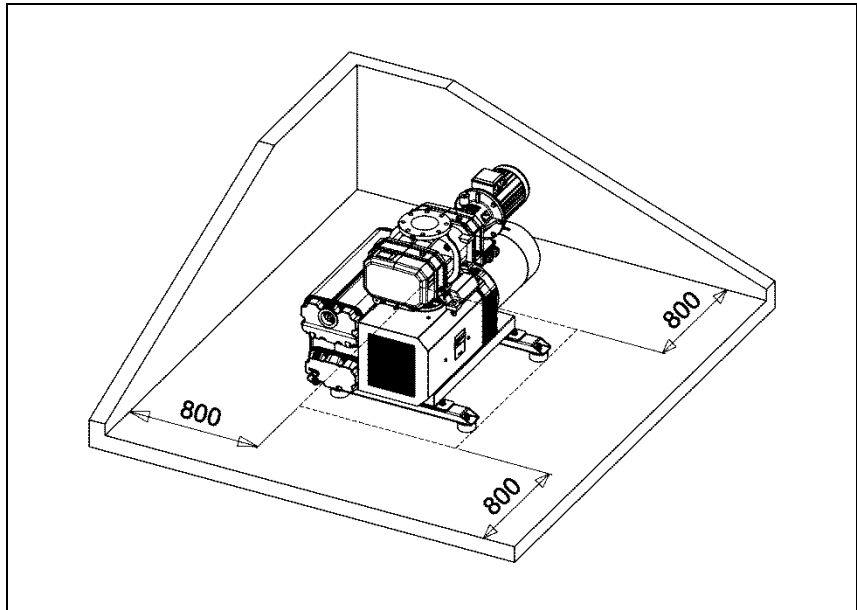


Figure 20 Positioning

- 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.

5 **Technical Information**
MS-631 to MS-631FL Transformation

WARNING!

Do not let hot air coming from the exhaust or cooling fans causing discomfort to personnel.



WARNING!

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



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.

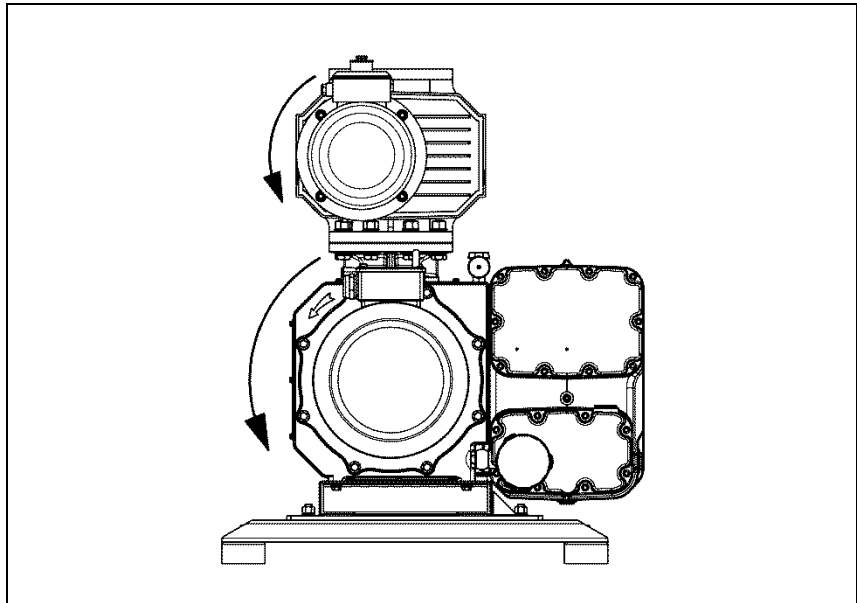


Figure 21 Direction of rotation

When the motors are equipped with protective devices such as temperature: thermostats, thermal protectors, thermistors etc. connect the leads to the device adjusted to obtain the correct operation.

CAUTION!

Run motors under nominal load for a certain period of time and compare the operating current with the one of the plates on the engines. The detected current must be less than the one reported on the data plate.

5 Technical Information

MS-631 to MS-631FL Transformation

WARNING! The pump is supplied without lubricating oil.



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

CAUTION! An amount of oil higher than necessary can cause oil separators clogs and damages to the vane pump or its electric motor.

Carry out the first oil filling following the instruction reported in the Instruction Manual of the relevant pump.

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.

Use

Carefully follow these instructions for proper management of the pumps.

CAUTION!

The RP roots pump can not work alone.

The RP roots pump should be initiated only after the MS vane pump reached the volume to be evacuated and the cut-in pressure shown on the data sheet of the pumping unit RPS.

In the range between the atmospheric pressure and the pressure of insertion exclusively the MS vane pump must be operative.

Check the insertion pressure of the Roots pump in the Technical data paragraph.

Intended use

Vacuum pumps MS-631FL described in this manual can aspire only small amounts of air and water vapor.

RP Roots should be connected to the MS-631FL pumps in series in order to compose a pumping unit volumetric RPS suitable evacuation of closed systems or to operate at a constant pressure of less than 5 mbar absolute (to be verified).

The pumping units RPS are suitable only for emptying medium-long cycles where the time of operation at an absolute pressure of less than 5 mbar prevails.

The ambient temperature and the inlet temperature must be between 5° and 40 °C.

WARNING!



In case of doubt or use over the limits or sucks of other types of gas/vapor, contact Agilent to obtain the authorization to the specific use.

Operation in automatic mode

For an automatic control is necessary to obtain a signal from a vacuum switch or absolute pressure transducer placed in the chamber to be evacuated.

In the event of continuous working cycles is necessary to install an automatic shut-off valve on the suction circuit. At its closure the Roots pump shall be automatically stopped to prevent the overloading of the next cycle.

In the event of longer pauses between one cycle and the next one you can also stop the MS vane pump.

WARNING!



It is necessary to stop the RP Roots pump in case of blocking of the MS vane pump.

Operation in manual mode

It is necessary to turn the pumps manually for the setup and maintenance phases.

In this mode it is recommended to predict the block operation of the RP Roots pump when the MS vane pump is not already running.

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 122 of fig. MS-631FL 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.

5 Technical Information

Maintenance Actions

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 Agilent 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 for MS Vane pumps and RP Roots pumps are reported in the relevant User Manual.

5 Technical Information

Lubricants

CAUTION!

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.

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 foreseen in the User Manual of the MS Vane pump or RP Roots pump used.

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.

5 Technical Information
Servicing

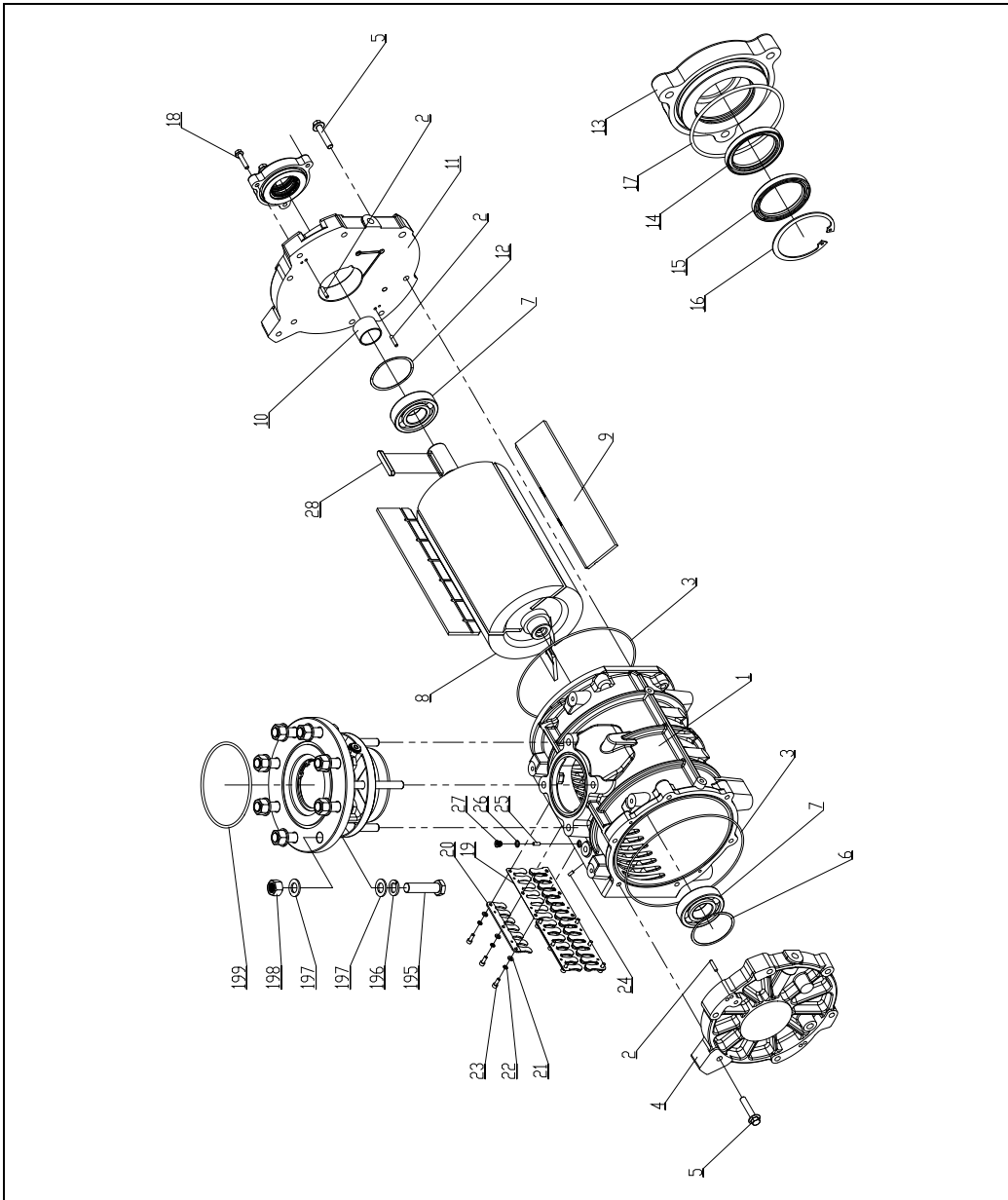


Figure 22 MS-631FL Pump parts – Exploded View (1 of 4)

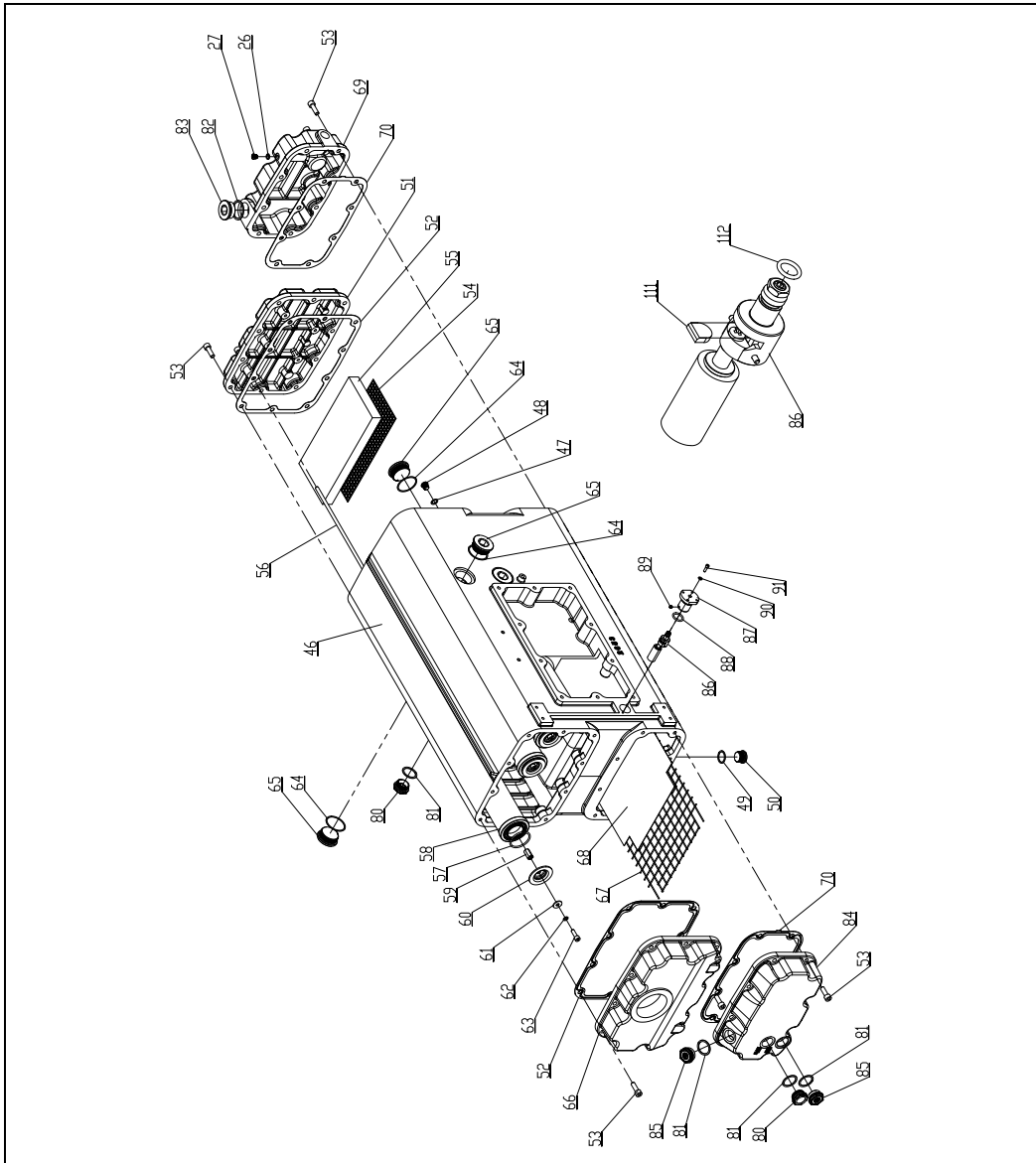


Figure 23 MS-631FL Pump parts – Exploded View (2 of 4)

5 Technical Information Servicing

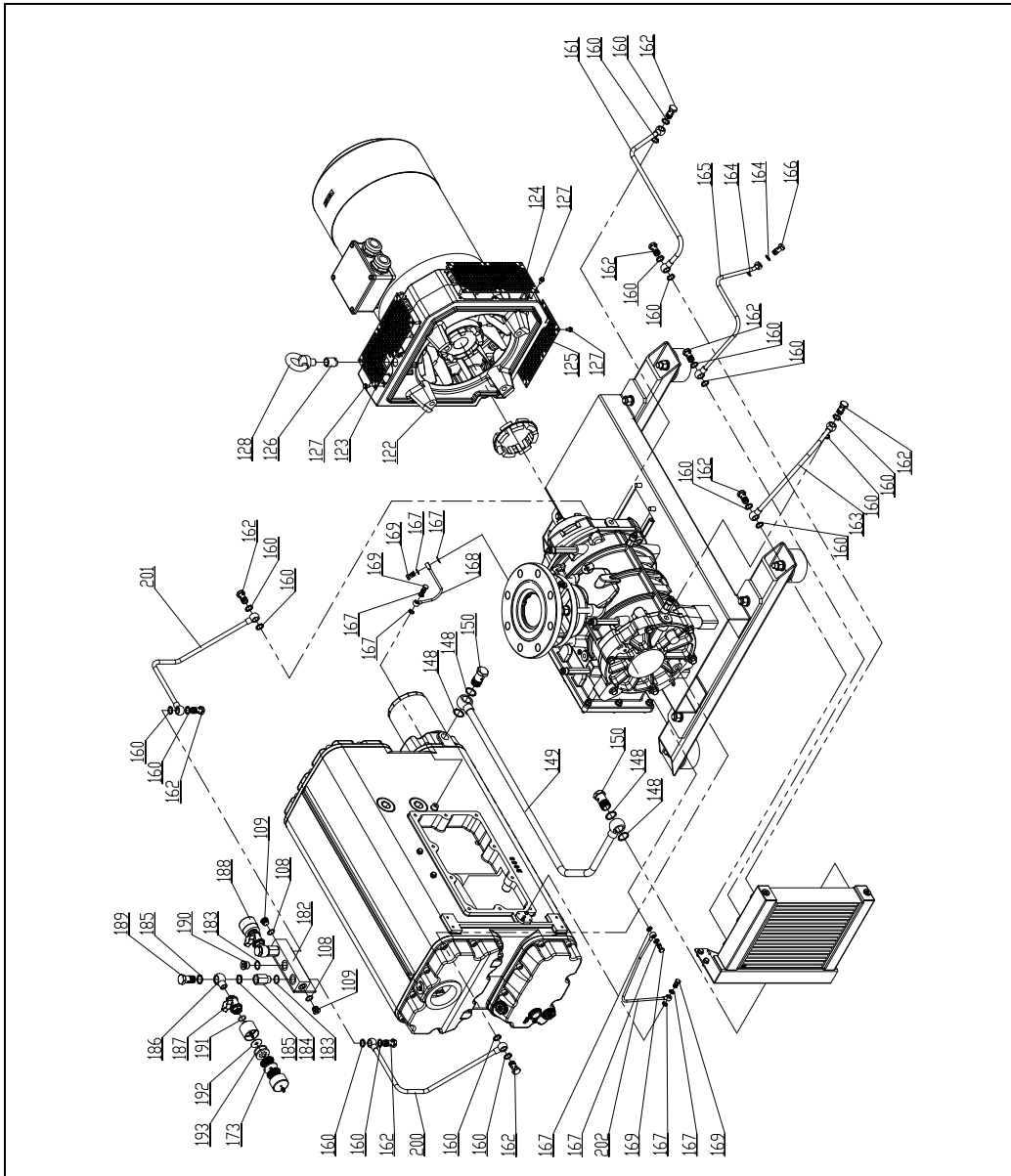


Figure 24 MS-631FL Pump parts – Exploded View (3 of 4)

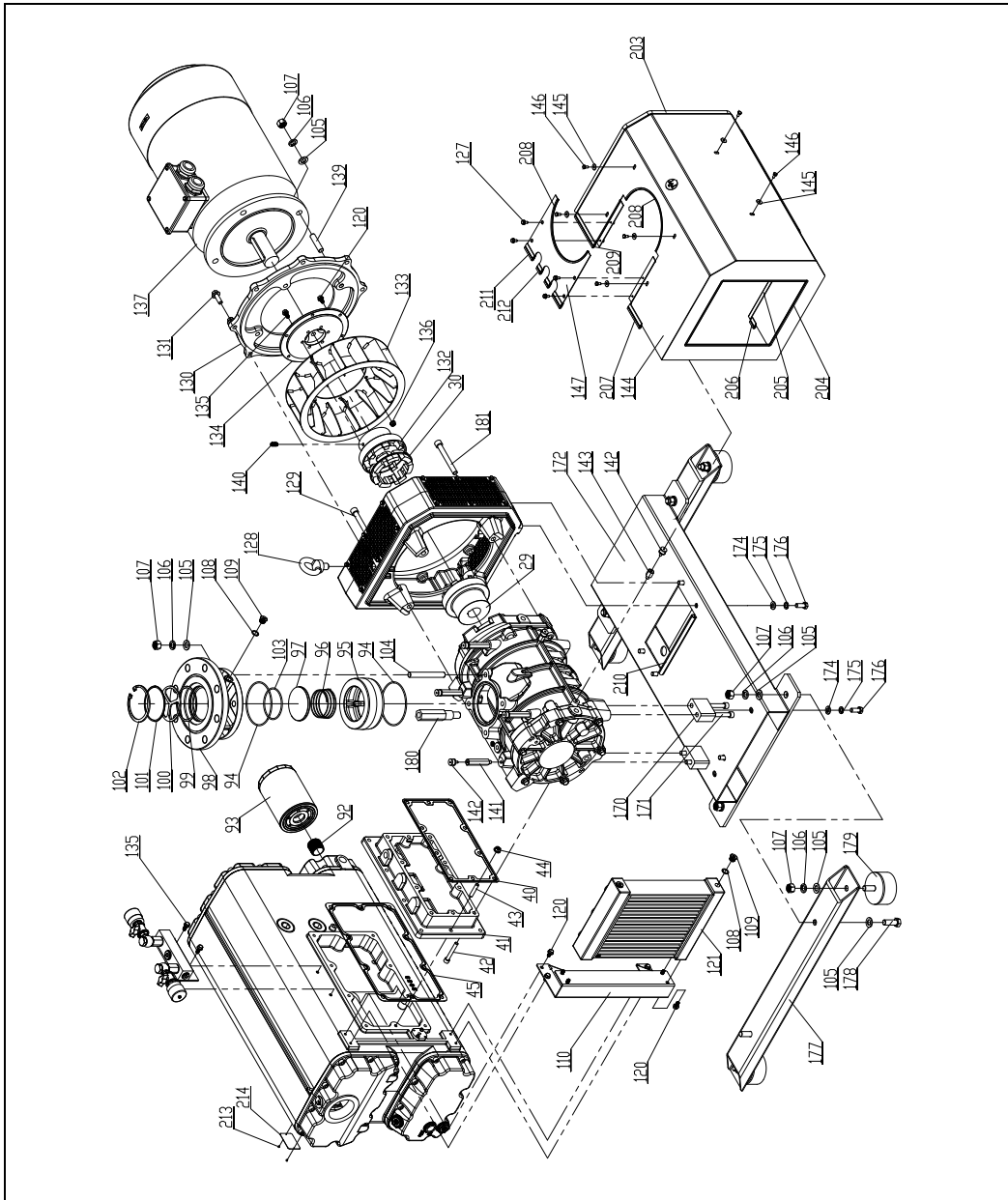


Figure 25 MS-631FL Pump parts – Exploded View (4 of 4)

5 Technical Information
Servicing

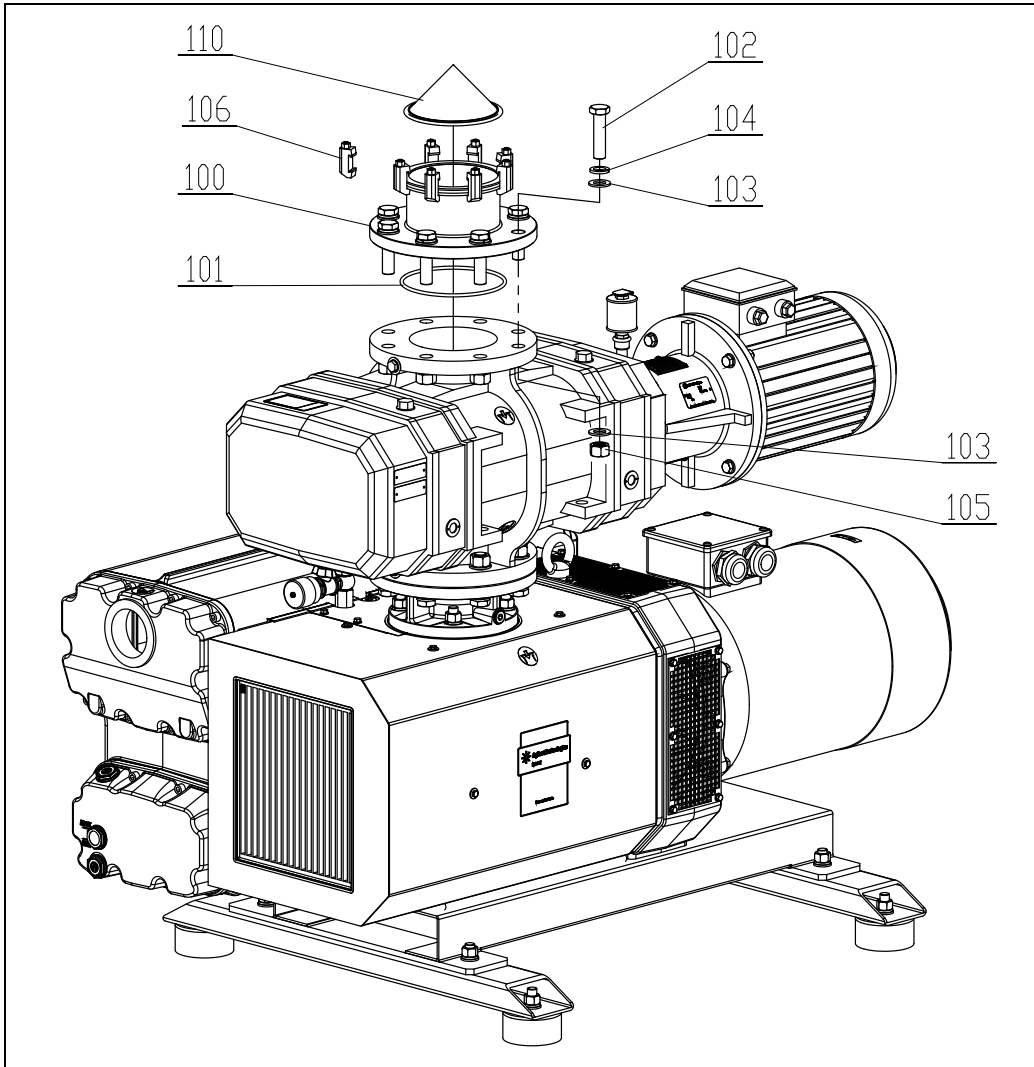


Figure 26 MS-631FL Pump accessories – Exploded View

Pump Parts for MS-631FL

Tab. 11 Pump Parts for MS-631FL

Pos.	Spare Parts P/N	Description	Q.Ty
1		Body of pump	1
2		Ø6x30 Pin	4
3	B G	O-Ring 41050	2
4		External side cover	1
5		M12x60 Hex. Screw (flanged and knurled)	11
6		Ø100 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 G	BABSL 50x65x7 Seal ring	1
15	B G	BAB 50x65x7 Seal ring	1
16		Ø68x2,5 Seeger	1
17	B G	O-Ring 4400	1
18		M8x40 Hex. Screw (flanged and knurled)	3
19		Plate	4
20		Plate support	4
21		Ø6 Washer	12
22		Ø6 Lock washer	12
23		M6x16 Hex. Socket head screw	12
24		M5x12 Hex. Socket screw	4
25		Ø2,5mm Adapter	4
26		1/8"G Al Washer	5
27		1/8"G Plug	5
28		A 12x8x70 Key	1
29		Coupling half pump side	1
30	B R	Elastic coupling insert	1
40	B G	Body of pump-spacer gasket	1
41		Pump-tank spacer	1
42		M10x70 Hex. Socket head screw	10
43		M10x35 Stud bolt	10
44		M10 Nut (flanged and knurled)	10

5 Technical Information Servicing

Pos.	Spare Parts P/N	Description	Q.Ty
45	B G	Tank-spacer gasket	1
46		Tank	1
47		1/4"G Al Washer	1
48		1/4"G Plug	1
49		3/4"G Al Washer	1
50		3/4"G Plug	1
51		Motor side upper cover	1
52	B R G	Upper cover gasket	2
53		M10x30 Hex. Socket head screw	36
54		Demister support mesh	1
55		Tank demister	1
56		Stay bolt for exhaust filter	5
57	B G	O-Ring 4200	10
58	B R G	Exhaust filter	5
59		Exhaust filter stay bolt sleeve	5
60		Disk for exhaust filter	5
61		Ø8/24 Washer	5
62		Al ø8.4/13x1 Washer	5
63		M8x25 Hex. Socket head screw	5
64		1"1/2 G Al Washer	6
65		1"1/2 G Plug	6
66		External side upper cover	1
67		Tank mesh	1
68		Tank micro-stretched sheet	1
69		Motor side lower cover	1
70	B G	Gasket for lower cover	2
80	R	1"G Oil sight glass	2
81		1"G Fibre washer	4
82		1"1/4G Al Washer	1
83		1"1/4G Plug	1
84		Ext. side tank cover	1
85		1"G Filling/discharge plug	2
86		Float valve	1
87		Float port	1
88	B G	O-Ring 4093	1
89		M4x8 Hex. Sock Stud bolt	1
90		Ø5 Washer	2
91		M5x16 Hex. Socket head screw	2
92		1"1/4G Nipple	1

Pos.	Spare Parts P/N	Description	Q.Ty
93	B R G	Oil filter	1
94	B G	O-Ring 4512	2
95		Inlet valve body	1
96		Helicoidal spring	1
97		Inlet valve plate	1
98		DN150 Intake manifold	1
99		Loop compensator	1
100	A	Support filtering	1
101	A	Inlet filtering baffle	1
102	A	Ø110x4 Seeger	1
103	B A G	O-Ring 4362	1
104	A	M16x110 Stud bolt	4
105	A	Ø16 Washer	20
106	A	Ø16 Lock washer	16
107		M16 Nut	16
108		3/8"G Al Washer	5
109		1/8" G Plug	5
110		Oil cooler support	1
111	G	Rubber sealing float valve	1
112	G	O-Ring 108	1
120		M8x16 Hex. Screw (flanged and knurled)	14
121		Oil cooler	1
122		Fan cover sleeve	1
123		Upper safety mesh	1
124		Frontal safety mesh	1
125		Lower safety mesh	1
126		M20 Threaded bushing	1
127		M6x12 Hex. Screw (flanged and knurled)	22
128		M20 Eyebolt	1
129		M14x90 Hex. Socket head screw	3
130		Motor flange	1
131		M12x35 Hex. Screw (flanged and knurled)	8
132		Motor side coupling half	1
133		Fan cover sleeve	1
134		Fan hub	1
135		M8x20 Hex. Screw (flanged and knurled)	8
136		M8 Nut (flanged and knurled)	6
137		Electric motor	1
139		M16x67 Stud bolt	4

5 Technical Information

Servicing

Pos.	Spare Parts P/N	Description	Q.Ty
140		M10x25 Hex. Sock Stud bolt	1
141		Vibration damping foot extension (long)	4
142		Vibration damping foot	6
143		Vibration damping foot extension (short)	2
144		Casing	1
145		Ø6 Washer	6
146		M6x12 Hex. head screw fully threaded	6
147		Casing cover	1
148		3/4"G Cu Washer	4
149		Oil cooler-tank oil pipe	1
150		Screw for 3/4"G fittings	2
160		3/8"G Cu Washer	18
161		Motor side lubrication pipe	1
162		Screw for 3/8"G fittings	9
163		Ext. side lubrication pipe	1
164		1/4"G Cu Washer	2
165		Central lubrication pipe	1
166		Screw for 1/4"G fittings	1
167		1/8"G Cu Washer	8
168		Oil pipe (outlet seal ring)	1
169		Screw for 1/8"G fittings	4
170		Pump body support	2
171		M12x60 Hex. Socket head screw	4
172		Base-plate	1
173	R G	Ø42/8x4 felt disk for gas ballast valve	2
174		Ø12 Washer	6
175		Ø12 Lock washer	6
176		M12x30 Hex. head screw fully threaded	6
177		Vibration damping foot extension	2
178		M16x45 Hex. Socket head screw	4
179		Ø100 Vibration damping foot	4
180		Eyebolt extension	1
181		M14x120 Hex. Socket head screw	1
182		Distributor for gas ballast valve	1
183		1/2"G Al Washer	3
184		M/F 1/2"G Extension	2
185		1/2"G Cu Washer	4
186		1/2"G Banjo male	2
187		1/2"G Ball valve	2

Pos.	Spare Parts P/N	Description	Q.Ty
188		1/2"G Gas ballast valve	2
189		Screw for 1/2"G fittings	2
190		1/2"G Plug	1
191	G	O-Ring 3075	2
192	G	Viton disk	2
193	G	O-Ring 3143	2
195		M20x80 Hex. head screw fully threaded	8
196		Ø20 Lock washer	8
197		Ø20/37 Washer	16
198		M20 Nut	8
199	G	O-Ring 6670	1
200		Gas ballast pipe (front side)	1
201		Gas ballast pipe (rear side)	1
202		Oil recovery pipe	1
203		Gasket 25X17,5 L=825 Gasket	1
204		Gasket 9X6 L=1200	1
205		Gasket 25X17,5 L=815	1
206		Gasket 22X10 L=28	1
207		Gasket 22X10 L=87	1
208		Gasket 9X6 L=345	2
209		Gasket 22X10 L=135	1
210		Gasket 25X17,5 L=250	1
211		Gasket 22X10 L=55	2
212		Gasket 22X10 L=25	2
213		ø1.85x5 Rivet	2
214		Pump name plate	1

NOTE

- (A) Connection Kit Dn160 ISO-K
- (B) Major maintenance kit
- (R) Minor maintenance kit
- (G) Gasket

5 Technical Information
5.1 Servicing

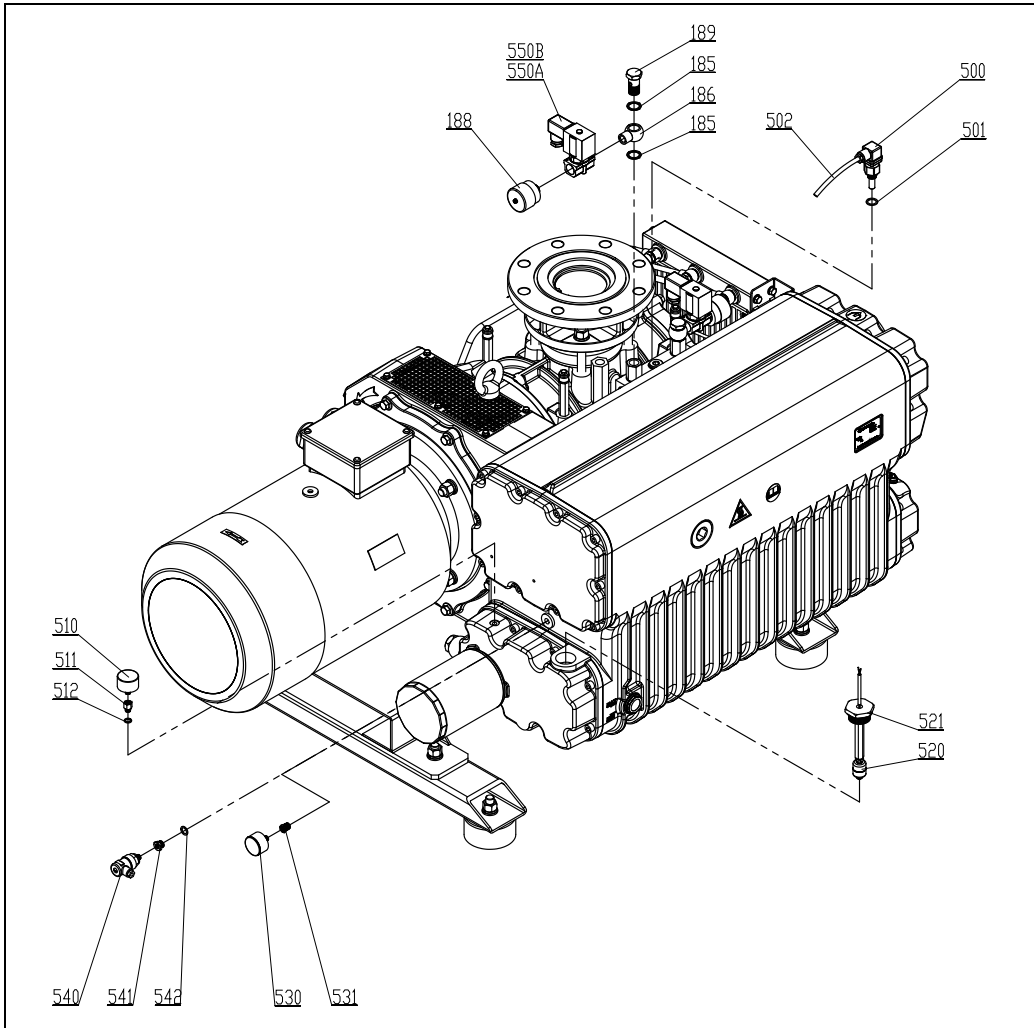


Figure 27 Pumps with full options

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 111 to 115 with (R) 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 111 to 115 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 Other spare parts, listed with (SR....) on the Pump Parts tables at pages 111 to 115 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. 12 Orderable parts

Description	Part number
X3753-64000	MS-631FL, 15kW, 400/690V, 50Hz, DN150
X3753-64002	MS-631FL, 18.5kW, DN150
X3753-64004	MS-631FL, 18.5kW, 230/460V, 60Hz, DN150
X3753-64006	MS-631FL, 18.5kW, 220/380V, 60Hz, DN150
X3753-64090	MS-631FL, 400/690V, 50Hz, Full Optional
X3753-64091	MS-631FL, Heavy Duty, Full Optional
X3753-64092	MS-631FL, 230/460V, 60Hz, Full Optional
X3753-64093	MS-631FL, 220/380V, 60Hz, Full Optional
X3753-64094	MS-631FL, without Motor, Full Optional
X3753-64089	Frameless upgrade kit for MS-631
X3760-64003	MS-01 Oil 22 lt
949-5087	Minor Spare Part Kit
949-5088	Major Spare Part Kit

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 on the User Manual of the relevant pump).

Drain the oil from the tank, plug the inlet and the exhaust 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.

Fill in the form "Request for Return" before shipping the pump.

WARNING!



Before shipping, the vacuum pump must be decontaminated. The contamination degree of the pumps must be declared.

CAUTION!

The pumping unit can not be shipped mounted. Separate the Vane pump from the Roots pump before shipping.

5 Technical Information

Return for Repair

Protect the inlet and exhaust flanges of the pumps with the relevant plugs (see figure below, Item 11-12-13) before shipping the pumps.

In the case of returning the pump Roots reassemble the feet (see following figure, Item 8) and fasten the pump on a pallet.

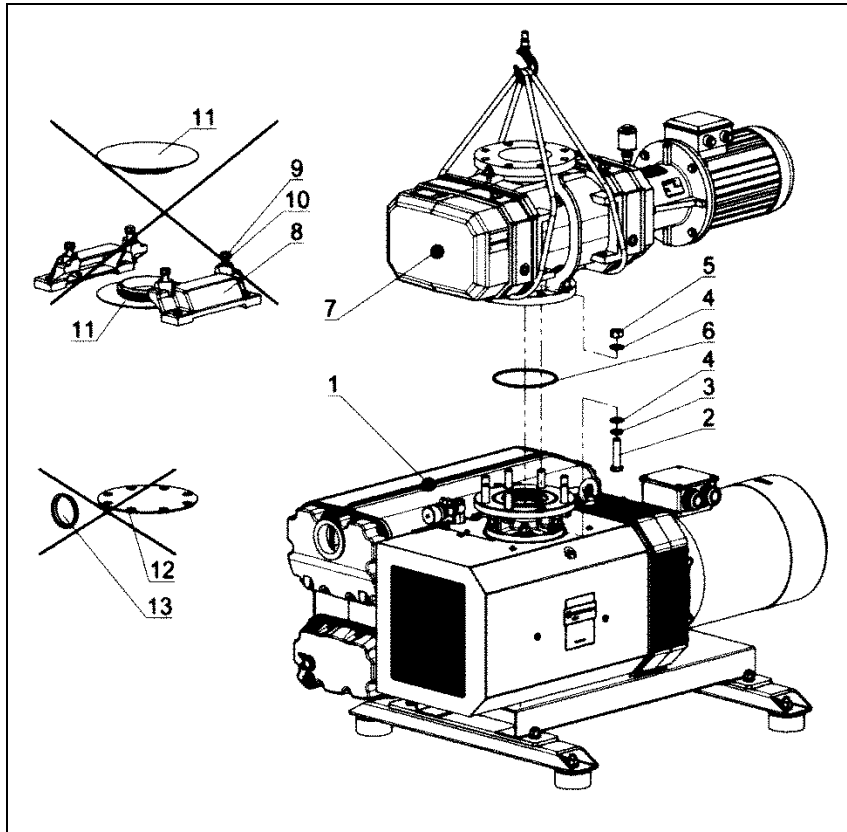


Figure 28

Troubleshooting

Refer to the MS Vane pumps and RP Roots pumps User Manuals for troubleshooting information.

5 Technical Information
Troubleshooting



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.Ili Varian, 54 – 10040 Leini (TO) – Italy

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

NAME	COMPANY	FUNCTION
<p>ADDRESS:</p> <p>TEL. N° : FAX N° :</p> <p>E-MAIL:</p>		
<p>PROBLEM / SUGGESTION :</p> <p>REFERENCE INFORMATION (model n°, serial n°, ordering information, time to failure after installation, etc.):</p> <p style="text-align: right;">DATE</p>		
<p>CORRECTIVE ACTION PLAN / ACTUATION (by AGILENT VPD)</p>		<p>LOG N°</p>

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

NORTH AMERICA:

Fax: 1 781 860 9252
Toll Free: 800 882 7426, Option 3

PACIFIC RIM:

Please visit our website for individual office information

vpt-customer@agilent.com

vpl-ra@agilent.com

<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.

Customer information		
Company :		Contact Name:
Address:	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
<input type="checkbox"/> Non Billable <input type="checkbox"/> Billable  New PO # (hard copy must be submitted with this form): _____ <input type="checkbox"/> Exchange <input type="checkbox"/> Repair <input type="checkbox"/> Upgrade <input type="checkbox"/> Demo <input type="checkbox"/> Calibration <input type="checkbox"/> Evaluation <input type="checkbox"/> Return for Credit

Health and safety	Substances (please refer to MSDS forms)																																																																																
The product has been exposed to the following substances: (by selecting 'YES' you MUST complete the table to the right)	* Agilent will not accept delivery of any product that is exposed to radioactive, biological, explosive substances or dioxins, PCB's without written evidence of decontamination.																																																																																
<table border="1"> <thead> <tr> <th></th> <th><input type="checkbox"/> YES</th> <th><input type="checkbox"/> NO</th> </tr> </thead> <tbody> <tr><td>Toxic</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>Harmful</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>Corrosive</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>Reactive</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>Flammable</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>Explosive (*)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>Radioactive (*)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>Biological (*)</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>Oxidizing</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>Sensitizer</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>Other dangerous substances</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> </tbody> </table>		<input type="checkbox"/> YES	<input type="checkbox"/> NO	Toxic	<input type="checkbox"/>	<input type="checkbox"/>	Harmful	<input type="checkbox"/>	<input type="checkbox"/>	Corrosive	<input type="checkbox"/>	<input type="checkbox"/>	Reactive	<input type="checkbox"/>	<input type="checkbox"/>	Flammable	<input type="checkbox"/>	<input type="checkbox"/>	Explosive (*)	<input type="checkbox"/>	<input type="checkbox"/>	Radioactive (*)	<input type="checkbox"/>	<input type="checkbox"/>	Biological (*)	<input type="checkbox"/>	<input type="checkbox"/>	Oxidizing	<input type="checkbox"/>	<input type="checkbox"/>	Sensitizer	<input type="checkbox"/>	<input type="checkbox"/>	Other dangerous substances	<input type="checkbox"/>	<input type="checkbox"/>	<table border="1"> <thead> <tr> <th>Trade name</th> <th>Chemical name</th> <th>Chemical Symbol</th> <th>CAS Number</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>	Trade name	Chemical name	Chemical Symbol	CAS Number																																								
	<input type="checkbox"/> YES	<input type="checkbox"/> NO																																																																															
Toxic	<input type="checkbox"/>	<input type="checkbox"/>																																																																															
Harmful	<input type="checkbox"/>	<input type="checkbox"/>																																																																															
Corrosive	<input type="checkbox"/>	<input type="checkbox"/>																																																																															
Reactive	<input type="checkbox"/>	<input type="checkbox"/>																																																																															
Flammable	<input type="checkbox"/>	<input type="checkbox"/>																																																																															
Explosive (*)	<input type="checkbox"/>	<input type="checkbox"/>																																																																															
Radioactive (*)	<input type="checkbox"/>	<input type="checkbox"/>																																																																															
Biological (*)	<input type="checkbox"/>	<input type="checkbox"/>																																																																															
Oxidizing	<input type="checkbox"/>	<input type="checkbox"/>																																																																															
Sensitizer	<input type="checkbox"/>	<input type="checkbox"/>																																																																															
Other dangerous substances	<input type="checkbox"/>	<input type="checkbox"/>																																																																															
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? <input type="checkbox"/> YES <input type="checkbox"/> NO If yes, which cleaning agent/method: _____
Has the product been drained from oil? <input type="checkbox"/> YES <input type="checkbox"/> NOT APPLICABLE I confirm to place this declaration on the outside of the shipping box. <input type="checkbox"/>

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:	Authorized Signature:
Position:	
Date:	

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.

Agilent Vacuum Products Division/Sales and Service Offices

United States

Agilent Technologies
121 Hartwell Avenue
Lexington, MA 02421 - USA
Tel.: +1 781 861 7200
Fax: +1 781 860 5437
Toll-Free: +1 800 882 7426
vpl-customerservice@agilent.com

Benelux

Agilent Technologies Netherlands B.V.
Groenelaan 5, 1186 AA Amstelveen
The Netherlands
Tel: +31 20 547 2000
Fax: +31 20 547 2093

Brazil

Agilent Technologies Brasil
Avenida Marcos Penteados de Ulhoa
Rodrigues, 939 - 6º andar
Castelo Branco Office Park
Torre Jacarandá - Tamboré
Barueri, Sao Paulo CEP: 06460-040
Toll free: 0800 728 1405

China

Agilent Technologies (China) Co. Ltd
No.3, Wang Jing Bei Lu, Chao Yang District
Beijing, 100102, China
Tel: +86 (0)10 64397888
Fax: +86 (0)10 64391318
Toll free: 800 820 3278
vacuum.cnmarketing@agilent.com
vpc-customerservice@agilent.com

France

Agilent Technologies
Parc Technopolis - Z.A. de Courtaboeuf
3, avenue du Canada - CS 90263
91978 Les Ulis cedex, France
Tel: +33 (0) 1 64 53 61 15
Fax: +33 (0) 1 64 53 50 01
vpf.sales@agilent.com

Germany and Austria

**Agilent Technologies
Sales & Services GmbH & Co. KG**
Lyoner Str. 20
60 528 Frankfurt am Main
GERMANY
Tel: +49 69 6773 43 2230
Fax: +49 69 6773 43 2250

India

Agilent Technologies India Pvt. Ltd.
Unit Nos 105-116
First Floor, Splendor Forum,
Plot No.-3, District Centre, Jasola
New Delhi-110025
Ph: +91 11 4623 7100
Fax: +91 4623 7105
Toll Free: 18001801517

Italy

Agilent Technologies Italia S.p.A.
Via F.lli Varian, 54
10040 Leini, (Torino) - Italy
Tel: +39 011 9979 111
Fax: +39 011 9979 350
Toll free: 00 800 234 234 00
vpt-customerservice@agilent.com

Japan

Agilent Technologies Japan, Ltd.
8th Floor Sumitomo Shibaura Building
4-16-36 Shibaura Minato-ku
Tokyo 108-0023 - Japan
Tel.: +81 3 5232 1253
Fax: +81 3 5232 1710
Toll-Free: 0120 655 040
vpj-customerservice@agilent.com

Korea

Agilent Technologies Korea, Ltd.
Shinsa 2nd Bldg. 2F, 966-5 Daechi-dong
Kangnam-gu, Seoul
Korea 135-280
Tel: +82 (0)2 2194 9449
Fax: +82 (0)2 3452 3947
Toll free: 080 222 2452
vpk-customerservice@agilent.com

Mexico

Agilent Technologies
Concepcion Beistegui No 109
Col Del Valle
C.P. 03100 – Mexico, D.F.
Tel.: +52 5 523 9465
Fax: +52 5 523 9472

Singapore

Agilent Technologies Singapore Pte. Ltd.
1 Yishun Avenue 7,
Singapore 768923
Tel : (65) 6215 8045
Fax : (65) 6754 0574
Toll free: 1 800 2762622
vps-customerservice@agilent.com

Southeast Asia

Agilent Technologies Sales Sdn Bhd
Unit 201, Level 2 uptown 2,
2 Jalan SS21/37, Damansara Uptown
47400 Petaling Jaya,
Selangor, Malaysia
Tel : +603 7712 6106
Fax: +603 6733 8121
Toll free: 1 800 880 805
vps-customerservice@agilent.com

Taiwan

Agilent Technologies Taiwan Limited
20 Kao-Shuang Road Ping-Chen City
Tao-Yuan Hsien,
32450 Taiwan, R.O.C.
Tel: +886 3 4959004
Toll free: 0800 018 768
vpw-customerservice@agilent.com

UK and Ireland

Agilent Technologies UK, Ltd.
6 Mead Road Oxford Industrial Park
Yarnton, Oxford OX5 1QU – UK
Tel.: +44 (0) 1865 291570
Fax: +44 (0) 1865 291571

Other Countries

Agilent Technologies Italia S.p.A.
Via F.lli Varian, 54
10040 Leini, (Torino) - Italy
Tel.: +39 011 997 9111
Fax: +39 011 997 9350
Toll-Free: 00 800 234 234 00

Customer Support & Service

NORTH AMERICA:

Toll Free: 800 882 7426
vpl-ra@agilent.com

EUROPE:

Toll Free: 00 800 234 234 00
vpt-customer-care@agilent.com

PACIFIC RIM:

please visit our website for individual office
information

<http://www.agilent.com/chem/vacuum>

Worldwide Web Site, Catalog and Order

On-line:

www.agilent.com/chem/vacuum

Representatives in most countries

© Agilent Technologies, Inc. 2013
Printed in ITALY
01/2014
Publication Number: 87-900-142-01(A)

