

MS 120 Major Maintenance

Model:

X3702-64000

X3702-64010

X3702-64100

G2571-64000

Service and Repair Manual

87-900-155-01 (A.00)

02/2021



Agilent Technologies

Notices

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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 120 Major Maintenance

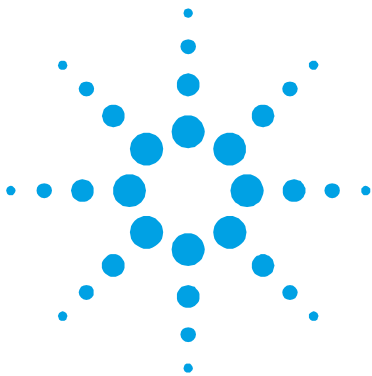


MS 120 Major Maintenance

Contents

1	Introduzione	7
	Informazioni Generali	8
	Prescrizioni di sicurezza	11
2	Gebrauchsanleitung	15
	Allgemeine Hinweise	16
	Sicherheitsvorschriften	20
3	Mode d'emploi	25
	Indications générales	26
	Prescriptions de sécurité	29
4	Instructions for Use	33
	General Information	34
	Safety rules	37
5	Major Maintenance	41
	Necessary Tooling	42
	Troubleshooting	43
	MS120 Special Maintenance Tool Kit	45
	Procedure	46
	Final Test	98
	Spare Parts List	100

Contents



1 Introduzione

Informazioni Generali 8
Simboli usati 10
Prescrizioni di sicurezza 11



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.

Nessun altro tipo di operazione dovrà essere fatto senza aver prima contattato il Servizio Assistenza Agilent. Le informazioni fornite non intendono sostituire, integrare o modificare qualsiasi norma, prescrizione, decreto, direttiva o legge a carattere specifico in vigore nel luogo in cui avviene l'installazione.

I consigli rivolti al personale addetto all'installazione e alla manutenzione presuppongono che lo stesso sia esperto e preparato nell'affrontare qualsiasi problematica di manutenzione, sia meccanica che elettrica. Per qualsiasi dubbio o informazioni non riportate su questo manuale si prega di contattare il nostro servizio assistenza, comunicando sempre: modello (Model), numero di serie (Serial), anno di costruzione, riportati sulla targhetta di identificazione.

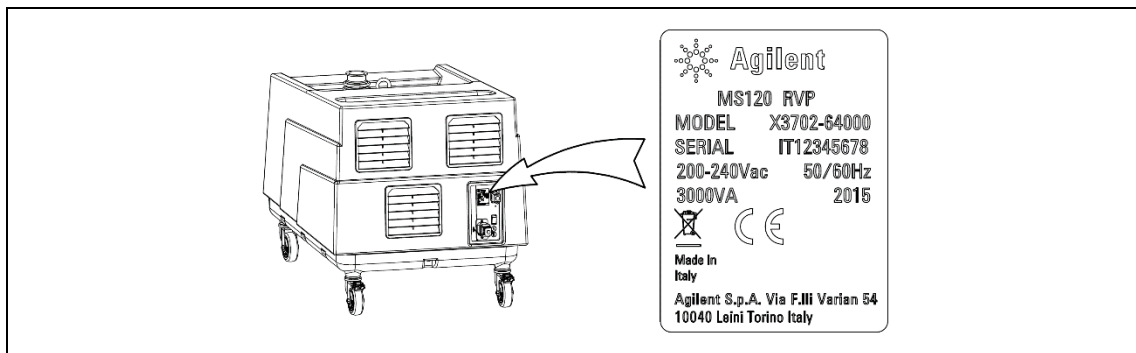


Figura 1

Targhetta di identificazione

Le MS120 Single Stage Rotary Vane Pumps sono delle pompe rotative monostadio a palette, a tenuta in bagno d'olio, azionate da motore elettrico pilotato da inverter. Queste pompe da alto vuoto sono adatte esclusivamente al pompaggio di aria e piccole quantità di vapor d'acqua. L'aspirazione di altri tipi di gas o di vapori deve essere preventivamente dichiarata alla Agilent che, se del caso, rilascerà la conformità all'impiego specifico.

Il motore elettrico flangiato è accoppiato a mezzo di giunto elastico. Il raffreddamento viene assicurato da una potente ventola centrifuga.

In aspirazione è presente un filtro a rete per proteggere la pompa da corpi solidi di diametro maggiore di 4,7 mm. Inoltre, una valvola di ritegno integrata impedisce la risalita dell'olio ed il rientro dell'aria nella camera da svuotare durante la fase d'arresto.

Nel serbatoio è inserito un sistema di separazione delle nebbie d'olio dall'aria di scarico (residuo max. 2PPM/ peso equivalenti a 2,4 mg/m³).

L'olio abbattuto viene recuperato in modo automatico dalla pompa.

Lo zavorratore, impedisce la condensazione all'interno della pompa quando si aspirano piccole quantità di vapore.

Nei paragrafi seguenti sono riportate tutte le informazioni necessarie a garantire la sicurezza dell'operatore durante l'utilizzo dell'apparecchiatura.

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.

Simboli usati

I seguenti simboli sono utilizzati in modo coerente in tutte le illustrazioni:

Simboli	Descrizione	Simboli	Descrizione
	Superficie calda “Pericolo di scottature se vengono toccate le parti calde”		Sicurezza elettrica
	Emissione di sostanze nocive		Pericolo di incendio
	Non disperdere nell’ambiente		Leggere il manuale d’uso
	Attacco in aspirazione		Attacco allo scarico

Prescrizioni di sicurezza

AVVERTENZA!



Nonostante le precauzioni prese in fase di progetto, esistono elementi di rischio che si presentano durante le operazioni che si eseguono in fase di uso e manutenzione.

AVVERTENZA!



SUPERFICI CALDE.

Durante le operazioni di manutenzione si toccano superfici che possono superare la temperatura di 80°C. Adottare idonei mezzi di protezione in modo da evitare scottature da contatto fortuito.
È buona norma, prima di effettuare qualsiasi intervento sulla pompa, attendere il suo raffreddamento.

AVVERTENZA!



EMISSIONI DI SOSTANZE NOCIVE

L'aria di scarico della pompa contiene tracce di nebbie d'olio (residuo max. 2PPM/ peso equivalenti a 2,4 mg/m³). Verificare la compatibilità con l'ambiente di lavoro. Garantire un corretto ricambio d'aria oppure portare lo scarico della pompa all'esterno. Un guasto o l'usura delle tenute possono provocare perdite d'olio lubrificante. Evitare la dispersione nel terreno e l'inquinamento di altri materiali.

Nel caso di aspirazione d'aria contenente sostanze pericolose (esempio agenti biologici o microbiologici), adottare dei sistemi di abbattimento prima della pompa per vuoto.

ATTENZIONE!



NON DISPERDETE NELL'AMBIENTE

Gli oli esausti provenienti dalla pompa devono essere smaltiti secondo le normative vigenti nel Paese d'utilizzo della pompa.

AVVERTENZA! PERICOLO GENERATO DA DEPRESSIONE



Il contatto con punti in depressione può essere causa di infortuni. Evitare il contatto con l'attacco aspirazione della pompa durante il funzionamento. Immettere aria nel circuito di aspirazione prima di ogni intervento.

AVVERTENZA! PERICOLO GENERATO DA PRESSIONE



Il serbatoio della pompa è pressurizzato. Non aprire e non dimenticare aperti i tappi di carico o scarico durante il funzionamento.

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.



Al termine ripristinare i dispositivi di sicurezza.

AVVERTENZA!



SICUREZZA ELETTRICA

Nell'equipaggiamento elettrico esistono parti sottoposte a tensione che, al contatto, possono provocare gravi danni a persone e cose.

AVVERTENZA!



PERICOLO DI INCENDIO

L'utilizzo della pompa per impieghi non previsti o proibiti da questo manuale, oppure la mancanza di una corretta manutenzione, possono provocare anomalie di funzionamento con rischio di surriscaldamento e incendio. In caso di incendio non usare acqua per spegnere le fiamme. Utilizzare estintori a polvere o CO₂ od altri mezzi compatibili con la presenza di equipaggiamenti elettrici ed oli lubrificanti.

Prescrizioni di sicurezza



2 Gebrauchsanleitung

Allgemeine Hinweise	16
Verwendete Symbole	19
Sicherheitsvorschriften	20



Allgemeine Hinweise

Das Gerät ist für den professionellen Gebrauch bestimmt. Das Bedienungspersonal muss das vorliegende Handbuch und alle zusätzlichen Informationen von Agilent aufmerksam lesen, bevor das Gerät in Betrieb genommen wird. Agilent übernimmt keinerlei Verantwortung für Schäden, die durch die vollständige oder partielle Nichtbeachtung der Instruktionen entstanden sind, durch unsachgemäße Bedienung durch nicht geschultes Personal, durch nicht autorisierte Eingriffe oder durch eine Verwendung, die den vor Ort geltenden Vorschriften zuwiderläuft.

Ein abweichender Betrieb ist nur nach vorheriger Rücksprache mit dem Kundendienst von Agilent zulässig. Die bereitgestellten Informationen stellen keine Ersetzung, Ergänzung oder Abänderung von Vorschriften, Richtlinien oder Gesetzen dar, die am Betriebsort gelten.

Die Ratschläge für das mit Installation und Wartung betraute Personal setzen voraus, dass dieses Personal kompetent und darauf vorbereitet ist, bei Problemen, wie sie bei der Wartung von Mechanik und Elektrik auftreten können, angemessen zu reagieren. Bei Unklarheiten oder wenn festgestellt wird, dass bestimmte Informationen in diesem Handbuch fehlen, wenden Sie sich bitte an unseren Kundendienst. Nennen Sie dabei immer Modell, Seriennummer und Baujahr. Sie finden diese Angaben auf dem Typenschild.

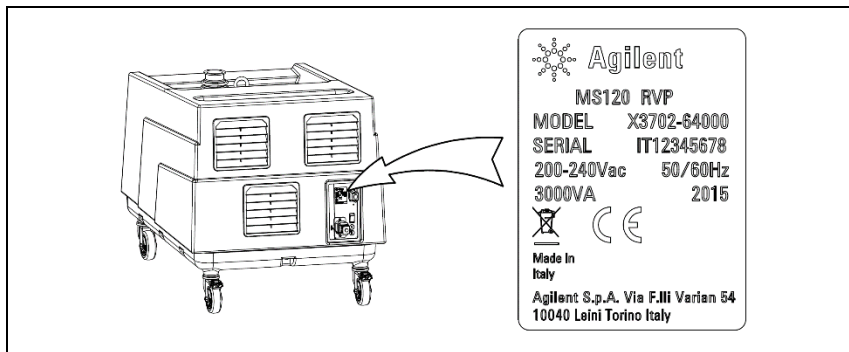


Abbildung 1 Typenschild

Die Pumpe Modell MS120 Single Stage Rotary Vane Pump ist eine Einstadium-Rotationsflügelpumpe im Ölbad, die von einem Elektromotor inverter angetrieben. Die Pumpe Modell MS120 Single Stage Rotary Vane Pump ist eine Einstadium-Rotationsflügelpumpe im Ölbad, die von einem durch einen Inverter gesteuerten Elektromotor angetrieben wird. Die Ansaugung anderer Arten von Gas oder Dämpfen muss zuvor Agilent gemeldet werden. Agilent kann dann die entsprechende Verwendung gestatten.

Der geflanschte Elektromotor ist über eine elstatische Verbindung angeschlossen. Die Kühlung erfolgt über ein starkes Lüfterrad.

An der Ansaugung befindet sich ein Netzfilter zum Schutz der Pumpe vor festen Fremdkörpern mit Durchmessern über 4,7 mm. Außerdem verhindert ein integriertes Rückhalteventil das Aufsteigen des Öls und das Eintreten der Luft in die beim Anhalten zu leerende Kammer.

Im Tank sitzt ein System zur Trennung der Ölnebel von der ausgestoßenen Luft (max. 2 PPM, entsprechend einem Gewicht von 2,4 mg/m³).

Das aufgefangene Öl wird von der Pumpe automatisch zurückgeführt.

Der Gas-Ballast verhindert die Kondensation in der Pumpe, wenn kleine Mengen von Wasserdampf angesaugt werden.

In den folgenden Abschnitten finden Sie alle Informationen, die nötig sind, um die Sicherheit während des Betriebs zu gewährleisten.

Dieses Handbuch verwendet folgende Symbole::

WARNUNG!



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

Allgemeine Hinweise

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.

Verwendete Symbole

Folgende Symbole wurden durchgängig in allen Illustrationen verwendet:

Symbole	Beschreibung	Symbole	Beschreibung
	Heiße Oberfläche “Gefahr von Verbrennungen beim Berühren der heißen Teile”		Elektrische Sicherheit
	Emission von schädlichen Substanzen		Brandgefahr
	Nicht in die Umwelt gelangen lassen		Betriebshandbuch lesen
	Anschluss an die Ansaugung		Anschluss an den Ausgang

Sicherheitsvorschriften

WARNUNG!



Trotz allen in der Planungsphase ergriffenen Vorsichtsmaßnahmen sind Betrieb und Wartung noch mit einigen Risikofaktoren behaftet.

WARNUNG!



HEISSE OBERFLÄCHEN.

Bei den Wartungsarbeiten müssen Oberflächen berührt werden, deren Temperatur über 80 °C betragen kann. Schützen Sie sich angemessen, um Verbrennungen durch versehentlichen Kontakt zu vermeiden.
Es ist üblich, vor allen Eingriffen an der Pumpe abzuwarten, bis diese sich abgekühlt hat.

WARNUNG!**EMISSIONEN SCHÄDLICHER SUBSTANZEN**

Die aus der Pumpe austretende Luft enthält Spuren von Ölnebel (max. 2 PPM, entsprechend einem Gewicht von 2,4 mg/m³). Vergewissern Sie sich, dass das mit den Umständen der Arbeitsumgebung vereinbar ist. Sorgen Sie für einen geeigneten Luftaustausch oder leiten Sie die aus der Pumpe austretende Luft nach außen. Ein Defekt oder Verschleiß an den Dichtungen kann zum Austritt von Schmieröl führen. Dieses darf nicht in den Boden gelangen oder zu anderen Formen von Verschmutzung führen. Wenn Luft mit gefährlichen Substanzen angesaugt wird (beispielsweise biologische oder mikrobiologische Wirkstoffe), bauen Sie vor der Pumpe Systeme ein, die diese unschädlich machen.

VORSICHT!**NICHT IN DIE UMWELT GELANGEN LASSEN**

Das Altöl aus der Pumpe muss nach den in dem jeweiligen Land geltenden Vorschriften entsorgt werden.

WARNUNG!**GEFAHR DURCH UNTERDRUCK**

Der Kontakt mit Unterdruck kann Ursache von Unfällen sein. Vermeiden Sie den Kontakt mit der Ansaugöffnung, während die Pumpe läuft. Leiten Sie vor jedem Eingriff Luft in den Ansaugkreislauf.

WARNUNG!



GEFAHR DURCH DRUCK

Der Tank der Pumpe steht unter Druck.

Öffnen Sie die Deckel zum Laden und Entladen nicht während des Betriebs und lassen Sie sie nicht versehentlich unverschlossen.

WARNUNG!



Klemmen Sie die Pumpe immer von der Versorgung ab, bevor Sie

Wartungsarbeiten durchführen. Stellen Sie beim Stromversorgungsschalter

Warnschilder auf: **GERÄT WIRD GEWARTET – STROM NICHT EINSCHALTEN!**

Aktivieren Sie die Sicherheitsvorrichtungen nach dem Ende der
Wartungsarbeiten wieder.

WARNUNG!



ELEKTRISCHE SICHERHEIT

Einige Teile der Elektrik stehen unter Strom. Bei Kontakt kann es zu schweren
Sach- und Personenschäden kommen.

WARNUNG!



BRANDGEFAHR

Die Verwendung der Pumpte für andere als die in diesem Handbuch genannten oder für verbotene Zwecke sowie eine nicht ausreichende Wartung können zu Funktionsstörungen führen und bergen die Gefahr von Überhitzung und Brand. Verwenden Sie im Brandfall kein Wasser zum Löchen. Nehmen Sie Feuerlöscher mit Pulver oder CO₂ oder andere Löschmittel, die mit elektrischen Komponenten oder mit Schmieröl verträglich sind.

Sicherheitsvorschriften



3 Mode d'emploi

Indications générales 26

Symboles utilisés 28

Prescriptions de sécurité 29



Indications générales

Cet appareil est destiné à un usage industriel. Utilisateur doit lire attentivement ce manuel d'instruction et tout autre information supplémentaire fournie par la société Agilent avant l'utilisation de l'appareil. La société Agilent décline toute responsabilité éventuelle en cas de non-observation totale ou partielle des instructions, d'usage impropre de la part d'un personnel non formé, d'interventions non-autorisées ou d'un usage contraire aux réglementations nationales spécifiques.

Aucun autre type d'opération ne devra être effectué sans avoir préalablement contacté le Service d'Assistance Agilent. Les informations fournies ne peuvent en aucun cas remplacer, compléter ou modifier toute norme, prescription, décret ou loi à caractère spécifique, en vigueur sur le lieu d'installation.

Les conseils s'adressent à un personnel préposé à l'installation et à l'entretien expert et préparé pour affronter tout problème d'entretien, mécanique et électrique. En cas de doute ou d'informations ne figurant pas dans ce manuel, veuillez contacter notre service d'assistance en communiquant toujours le modèle (Model), le numéro de série (Serial), l'année de construction indiqués sur la plaque d'identification.

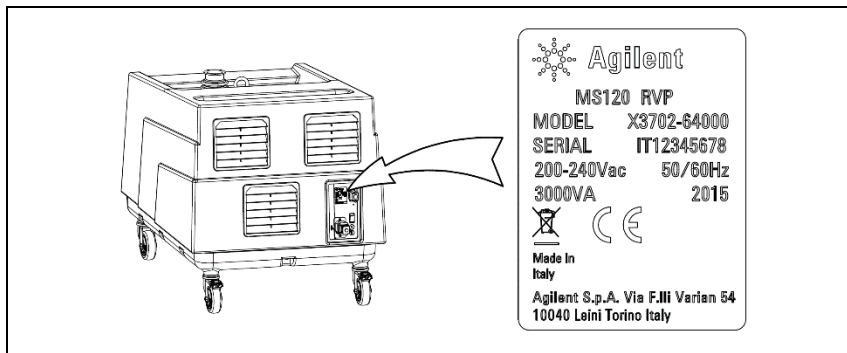


Figure 1 Plaques d'identifications

Les MS120 Single Stage Rotary Vane Pumps sont des pompes rotatives à simple étage à palettes, étanches à bain d'huile, actionnées par un moteur électrique commandé par inverter. Ces pompes à vide poussé sont exclusivement indiquées pour le pompage de l'air et de petites quantités de vapeur d'eau. L'aspiration d'autres types de gaz ou de vapeur doit être préalablement déclarée à la société Agilent qui délivrera au besoin la conformité à l'usage spécifique.

Le moteur électrique bridé est accouplé par l'intermédiaire d'un joint élastique. Le refroidissement est assuré par un ventilateur centrifuge puissant.

À l'aspiration, un filtre à crépine protège la pompe contre les corps solides d'un diamètre supérieur à 4,7 mm. En outre, un clapet de retenue intégré empêche la remontée de l'huile et le retour de l'air dans la chambre à vide au cours de la phase d'arrêt.

Dans le réservoir, un système de séparation des brouillards d'huile de l'air d'extraction (résidu max. 2PPM/ poids équivalant à 2,4 mg/m³).

L'huile éliminée est automatiquement récupérée par la pompe.

Le dispositif de lest empêche la condensation à l'intérieur de la pompe lorsqu'on aspire de petites quantités de vapeur.

Les paragraphes suivants fournissent toutes les informations nécessaires pour garantir la sécurité de l'opérateur durant l'utilisation de l'appareil.

Ce manuel utilise les conventions suivantes:

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.

Indications générales

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.

Symboles utilisés

Les symboles suivants sont utilisés dans les différentes illustrations:

Symboles	Description	Symboles	Description
	Surface chaude "Danger de brûlure en cas de contact avec les parties chaudes"		Sécurité électrique
	Émission de substances nocives		Danger d'incendie
	Ne pas déverser dans l'environnement		Lire le manuel d'utilisation
	Raccord d'aspiration		Raccord d'évacuation

Prescriptions de sécurité

AVERTISSEMENT!


Malgré les précautions prises en phase de projet, il existe des éléments de risque qui se présentent durant les opérations effectuées durant l'utilisation et l'entretien.

AVERTISSEMENT!

SURFACES CHAUDES.

Durant les opérations d'entretien, on touche des surfaces dont la température peut dépasser 80°C. Adopter des moyens de protection appropriés pour éviter les brûlures dues à un contact fortuit.

On recommande d'attendre le refroidissement de la pompe avant toute intervention sur cette dernière.

AVERTISSEMENT!

ÉMISSIONS DE SUBSTANCES NOCIVES

L'air d'extraction de la pompe contient des traces de brouillards d'huile (résidu max. 2PPM/ poids équivalant à 2,4 mg/m³). Vérifier la compatibilité avec le milieu de travail. Garantir un renouvellement correct de l'air ou amener l'évacuation de la pompe à l'extérieur. Une défaillance ou l'usure des garnitures peut provoquer des fuites du huile lubrifiante. Éviter le déversement sur le terrain et la pollution d'autres matériaux.

En cas d'aspiration d'air contenant des substances dangereuses (comme des agents biologiques ou microbiologiques), prévoir des systèmes de captage avant la pompe à vide.

ATTENTION!



NE PAS DÉVERSER DANS L'ENVIRONNEMENT

Les huiles usées provenant de la pompe doivent être éliminées conformément aux réglementations en vigueur dans le pays d'utilisation.

AVERTISSEMENT!



DANGER GÉNÉRÉ PAR LA DÉPRESSION

Le contact avec des points en dépression peut provoquer des accidents. Éviter le contact avec le raccord d'aspiration de la pompe durant le fonctionnement. Injecter de l'air dans le circuit d'aspiration avant toute intervention.

AVERTISSEMENT!



DANGER GÉNÉRÉ PAR LA PRESSION

Le réservoir de la pompe est pressurisé. Ne pas ouvrir et ne pas oublier de fermer les bouchons de remplissage et de vidange durant le fonctionnement.

AVERTISSEMENT!



Toujours exclure l'alimentation de la pompe avant d'effectuer des opérations d'entretien. Appliquer des pancartes spécifiques d'avertissement : **ENTRETIEN EN COURS SUR L'APPAREIL - NE PAS METTRE SOUS TENSION**, au niveau de l'interrupteur d'alimentation. Rétablir les dispositifs de sécurité au terme de l'opération.

AVERTISSEMENT!



SÉCURITÉ ÉLECTRIQUE

L'équipement électrique comprend des pièces sous tension qui, en cas de contact, peuvent provoquer des dommages corporels et matériels graves.

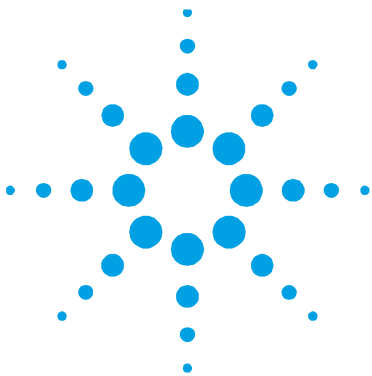
AVERTISSEMENT!



DANGER D'INCENDIE

L'utilisation de la pompe pour des usages non prévus ou interdits dans ce manuel ou un entretien incorrect peuvent provoquer des anomalies de fonctionnement et générer un risque de surchauffe et d'incendie. Ne pas éteindre les flammes avec de l'eau en cas d'incendie. Utiliser des extincteurs à la poudre ou au CO₂ ou d'autres moyens compatibles avec la présence d'équipements électriques et d'huiles lubrifiantes.

Prescriptions de sécurité



4 Instructions for Use

General Information	34
Symbols used	36
Safety rules	37



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.

Do not attempt any other type of operation without having first contacted our Service Department. The information provided herewith does not intend to replace, integrate or change any rules, regulations, law by decree, directive or law of specific character in force in the Country where the installation takes place.

The suggestions given to the staff engaged in the installation and servicing assumes that the personnel is expert and prepared in facing any problem of servicing, both mechanical and electrical. For any questions or information not included in this manual, please contact our Service Department, always providing: model (Model), serial number (Serial), year of manufacture, stated on the pump name plate.

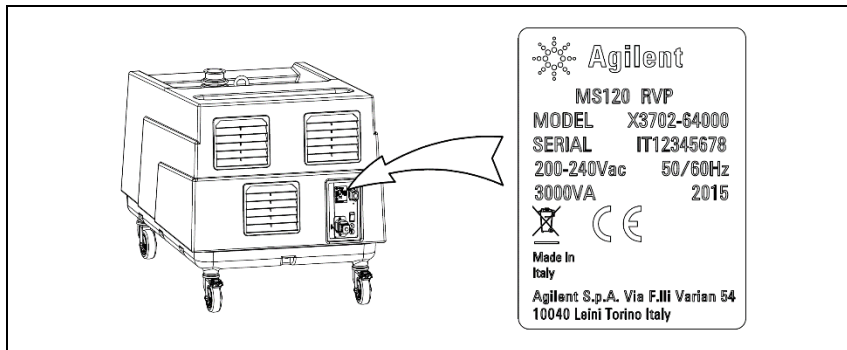


Figure 1 Plate

The MS120 Single Stage Rotary Vane Pumps are single-stage, rotary vane pumps oil sealed, driven by an electric motor controlled by an inverter. These high vacuum pumps are suitable for pumping air and small quantity of water vapour only. Pumping of other types of gas or vapours must be declared in advance to Agilent Technologies that will give the conformity to the specific use.

The flanged electric motor is coupled by means of an elastic coupling. The cooling is ensured by a powerful centrifugal fan.

At the pump inlet there is a mesh filter in order to protect it from solid parts having diameter larger than 4.7 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 2PPM/weight corresponding to 2.4 mg/m³).

The separated oil is recovered automatically by the pump.

The gas ballast valves prevent condensation inside the pump when pumping down small quantity of vapour.

The following paragraphs contain all the information necessary to guarantee the safety of the operator when using the equipment.

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.

Symbols used

The following symbols are used consistently throughout in all illustration:

Symbols	Description	Symbols	Description
	Hot surfaces “Danger of burns if hot parts are touched”		Electric safety
	Harmful substances emissions		Fire hazard
	Do not dispose into the environment		Read the operating instructions
	Inlet port		Exhaust port

Safety rules

WARNING!

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

WARNING!**HOT SURFACES.**

The pump surfaces may exceed the temperature of 80°C. Adopt the necessary safeguards to avoid burns due to chance contact.

Before carrying out any maintenance on the pump, be sure the pump is cool.

WARNING!**HARMFUL SUBSTANCES EMISSIONS**

The discharged air contains part of traces of oil mist (maximum residual 2PPM/weight corresponding to 2.4 mg/m³). Check the compatibility with the environment. Make sure a correct air change is allowed otherwise convey the pump discharge outside. A failure or the seals 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.

CAUTION!



DO NOT DISPOSE INTO THE ENVIRONMENT

Used discharged oil from the pump must be disposed in accordance with the regulations in force in the Country of use.

WARNING!



HAZARD CAUSED BY VACUUM

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

WARNING!



HAZARD CAUSED BY PRESSURE

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

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!



ELECTRIC SAFETY

Some components of the electric equipment are electrically charged during operation. Any contact may cause serious injuries to persons or objects.

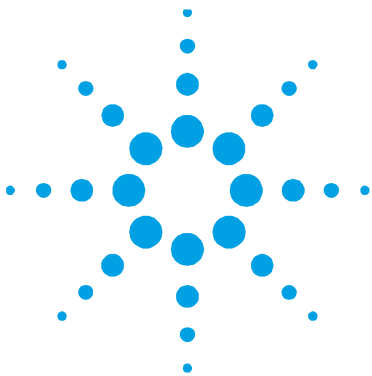
WARNING!



FIRE HAZARD

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 electrical equipment and lubricating oil.

Safety rules



5 Major Maintenance

Necessary Tooling	42
Troubleshooting	43
MS120 Special Maintenance Tool Kit	45
Procedure	46
Final Test	98
Spare Parts List	100



Necessary Tooling

NOTE

Weight of the pump 106 kg.

To perform technical activities on MS120 following standard tools are suggested:

- Crane (minimum load 200 Kg)
- Allen key 2.5 mm
- Allen key 3 mm
- Allen key 4 mm
- Allen key 5 mm
- Allen key 8 mm
- Allen key 10 mm
- Phillips screwdriver
- Flat-blade screwdriver
- 7 mm Wrench Hex
- 8 mm Wrench Hex
- 10 mm Wrench Hex
- 13 mm Wrench Hex
- 15 mm Wrench Hex
- 17 mm Wrench Hex
- 19 mm Wrench Hex
- 35 mm Wrench Hex
- 40 mm Wrench Hex
- Two arms extractor
- MS120 Special Maintenance Tool Kit P/N X3702-67000
- Tongs
- Torque wrench 5/35 Nm
- Internal extractor (30 mm)
- Plastic hammer
- Pliers for seeger

Troubleshooting

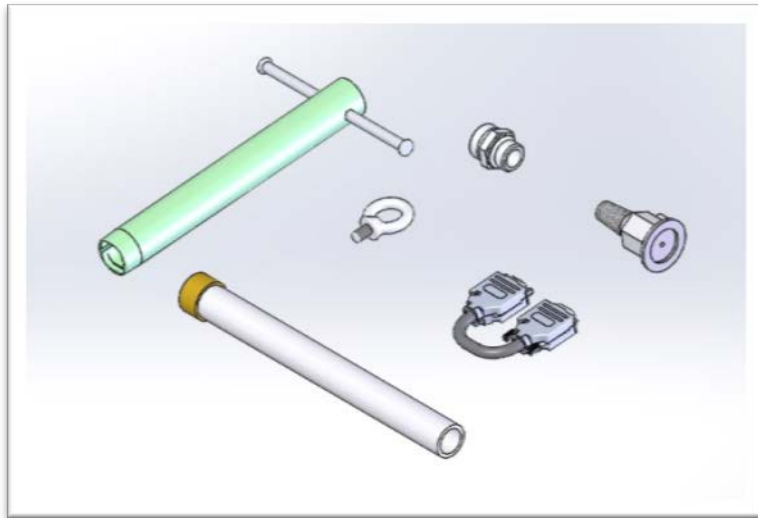
TROUBLE	CAUSE	REMEDY
Drop in performances	Inlet pipes or machine are leaking	Identify leaking point and seal it
	No lubrication	Check oil level and oil conditions. Fill with oil to the right oil level or change the oil
	Supply Voltage too low (< 200 Vac)	Connect the pump to a mains with the correct voltage and use a cable with the appropriate size
Anomalous noise	No lubrication	See previous point
	Coupling element worn	Replace
	Motor bearings damaged	Replace
	Pump Bushing damaged	Pump overhaul (Customer Service)
	Damaged vanes	Pump overhaul (Customer Service)
	Damaged contact surfaces	Pump overhaul (Customer Service)
Oil leak	Shaft oil seal rings worn	Pump overhaul (Customer Service)
	Oil filling/discharge plugs are leaking	Check the plug has been closed / replace the gasket
	Inefficient oil recovery system	Pump overhaul (Customer Service)
Motor protection is tripping	Blocked exhaust filters	Replace exhaust filters
	No lubrication	Oil level filling up
	Pump seizure and jam	Pump overhaul (Customer Service)
	Broken vane	Pump overhaul (Customer Service)

Troubleshooting

TROUBLE	CAUSE	REMEDY
Discharge oil mist	Inefficient exhaust filters	Replace exhaust filters
	High temperature due to polluted oil	Oil change
	High operating temperature due to high ambient temperature	Decrease room temperature by allowing a better air exchange
Oil is found in the inlet	Inefficient inlet valve	Check the inlet valve is tight
		Clean the valve and change any damaged parts
Pump doesn't start	Supply Voltage out of the range	Connect the pump to a mains with the correct voltage
	Pump in REMOTE without START command	Connect pin 7 to pin 9 on J1 - I/O connector




MS120 Special Maintenance Tool Kit

- Floating Valve Extractor
- M8 Eyebolt
- Interlock adapter
- Oil drain hose
- Oil drain connection
- Flange for Final Test





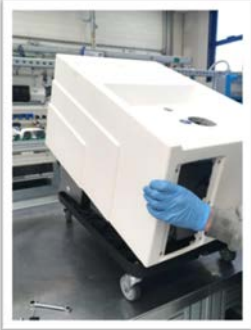
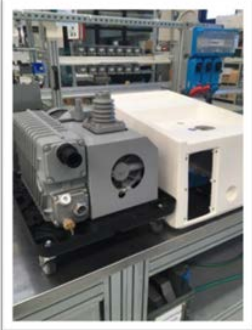

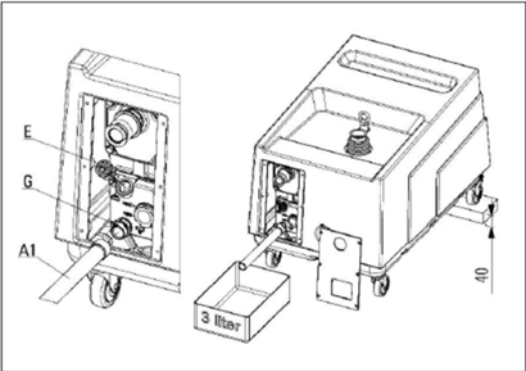



Procedure

Step	Description / Photo
1.	<p data-bbox="201 366 1086 435">Make sure that the pump is switched off, unplugged and cooled down. Using a crane, put the pump on a work bench and block the wheels using their brake.</p> <p data-bbox="201 482 605 517">CAUTION! Heavy weight lifting.</p> <div data-bbox="496 557 922 1072">A photograph of a white, rectangular industrial pump unit with a crane hook attached to its top. The unit is on a metal workbench in a workshop setting. The pump has a control panel on the front with a black knob, a blue indicator light, and a circular port. The background shows a typical industrial environment with shelves and equipment.</div>




Step	Description / Photo
2.	<p data-bbox="304 288 862 319">Disassemble the plastic cover plate (Allen key 3 mm).</p> <div style="display: flex; justify-content: space-around;">   </div>
3.	<p data-bbox="304 786 882 817">Disassemble the gas ballast lever (Phillips screwdriver).</p> <div style="text-align: center;">  </div>


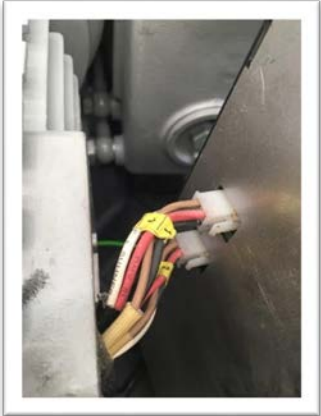


Procedure

Step	Description / Photo
4.	<p data-bbox="201 288 965 317">Unscrew the 6 nuts on the bottom of the basement (10 mm Wrench Hex).</p>  A photograph showing a close-up of a nut on the bottom of a basement, circled in red. The nut is a 10 mm Wrench Hex. The background shows a dark, textured surface, likely the interior of a basement, with a person visible in the distance.
5	<p data-bbox="201 973 476 1003">Remove the lifting eyebolt.</p>  A photograph showing a hand in a blue glove holding a lifting eyebolt. The eyebolt is a metal ring with a threaded stem. The background shows a workshop or maintenance area with various tools and equipment.






Step	Description / Photo
6.	<p>Remove the plastic cover and reassemble the M10 eyebolt.</p> <div style="display: flex; justify-content: space-around;">   </div>
7.	<p>Using the special device supplied with the pump, discharge the oil.</p> <div style="display: flex; justify-content: space-around;">   </div>
8.	<p>Remove the internal metallic cover (10 and 13 mm Wrench Hex).</p> <div style="display: flex; justify-content: space-around;">    </div>





Procedure

Step	Description / Photo
9.	<p data-bbox="201 288 1022 314">Disconnect the grounding cable from the electrical motor (Phillips screwdriver).</p> 
10.	<p data-bbox="201 734 905 760">Remove the four screws on the bottom of controller (8 mm wrench).</p>  



Step	Description / Photo
11	<p data-bbox="302 288 1310 352">Move the controller gently and disconnect the two power cables from the controller making sure the cables are properly labeled (see below, #1 up and #2 down), then remove the controller.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>
12.	<p data-bbox="302 831 1240 861">Remove the two screws of pump fixing brackets from the basement (13 mm Wrench Hex).</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>



Procedure

Step	Description / Photo
13.	<p data-bbox="201 291 1068 317">Remove the four pump body nuts on the bottom of basement (16 mm Wrench Hex).</p> <div data-bbox="308 366 739 699"></div> <div data-bbox="783 331 1110 699"></div>
14.	<p data-bbox="201 734 729 760">Using a crane, lift up the pump from the basement.</p> <div data-bbox="201 803 368 847">CAUTION!</div> <p data-bbox="389 803 604 829">Heavy weight lifting.</p> <div data-bbox="382 881 654 1242"></div> <div data-bbox="762 881 1033 1242"></div> <div data-bbox="548 1269 868 1503"></div>

Step	Description / Photo
15.	<p data-bbox="302 288 896 319">Turn the pump by 90° with the oil tank on the down side.</p> <div style="display: flex; justify-content: space-around;">   </div>
16.	<p data-bbox="302 822 1273 888">Remove the four screws of the electrical motor flange and remove the motor (13 mm Wrench Hex).</p> <div style="display: flex; justify-content: space-around;">   </div>



Procedure

Step	Description / Photo
17.	<p data-bbox="201 291 679 317">Remove the pump fan cover (Allen key 8 mm).</p>  <p data-bbox="536 331 882 791">A close-up photograph of a circular pump fan cover. Three screws are circled in red. One screw at the bottom is being removed with an Allen key.</p>
18.	<p data-bbox="201 826 651 852">Remove the oil pipes (19 mm Wrench Hex).</p>  <p data-bbox="504 869 918 1420">A photograph of a large industrial machine, possibly a generator or motor, with a metal frame. Four screws are circled in red, indicating the locations for removing oil pipes.</p>


Step	Description / Photo
19.	<p>Remove the gas ballast valve from the external cover (17 and 19 mm Wrench Hex).</p> 
20.	<p>Loosen and remove the four nuts of the connection between the pump body and tank (19 mm Wrench Hex).</p> 




Procedure

Step	Description / Photo
21.	<p data-bbox="201 291 1015 357">Screw the M8 eyebolt in to M8 hole on the upper side of bump body. Using a crane, lift up the pump body and remove it from the tank (eyebolt M8).</p> <p data-bbox="201 404 605 439">CAUTION! Heavy weight lifting.</p>
	



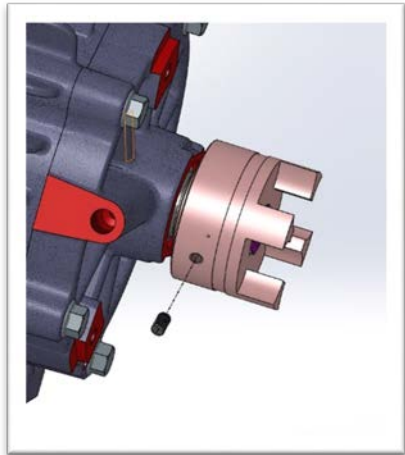

Step	Description / Photo
22.	<p data-bbox="304 288 731 317">Put the complete pump body on a bench.</p> 
23.	<p data-bbox="304 835 1036 864">Loosen and remove the four screws of inlet port (13 mm Wrench Hex).</p> 



Procedure

Step	Description / Photo
24.	Based on production date, pumps have been provided with two different versions of Inlet valve (a or b).
	Based on Inlet valve version, please follow dedicated step 24a or 24b
24a.	<p>For pumps provided with this anti-suck back valve system, remove the inlet valve assy (Figure 1) that is composed by the following components:</p> <ul style="list-style-type: none">• Inlet port• Inlet thermal insulation• Inlet valve• Inlet spring• Inlet support plate (with pin)• O-Rings. 



Step	Description / Photo
24b.	<p>For pumps provided with this anti-suck back valve system, remove the inlet valve assy (Figure 2, 3 and 4) that is composed by the following components.</p> <p>For pumps provided with this anti-suck back valve system, remove the inlet valve assy (Figure 1) that is composed by the following components:</p> <ul style="list-style-type: none"> • Inlet port • Inlet thermal insulation • Inlet disc • Inlet spring • O-Rings <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <div style="text-align: center; margin-top: 20px;">  </div>




Procedure

Step	Description / Photo
25.	<p data-bbox="197 291 1185 352">Loosen and remove the five screws of the plate support then remove the valve plate (Allen key 3 mm).</p> <div data-bbox="289 366 655 855">A close-up photograph of the pump body showing five screws on a support plate. A red oval highlights these screws, and an Allen key is shown inserted into the rightmost one.</div> <div data-bbox="765 366 1130 855">A photograph showing the valve plate being lifted away from the pump body. The plate is dark and has several holes. An Allen key is visible, having just been used to remove a screw.</div>
26.	<p data-bbox="197 890 1219 994">Remove the socket set stud from the pump body half coupling and then using a suitable two-arms extractor remove the pump body half coupling. (Allen key 3 mm Two arms extractor)</p> <div data-bbox="289 1034 689 1489">A 3D CAD model of the pump body half coupling assembly. It shows a blue pump body with a red half coupling attached. A socket set stud is visible on the coupling, and a small black pin is shown being inserted into it.</div> <div data-bbox="765 1012 1130 1489">A photograph showing a two-arms extractor being used to pull the pump body half coupling away from the pump body. The extractor is a metal tool with two long arms that grip the coupling.</div>

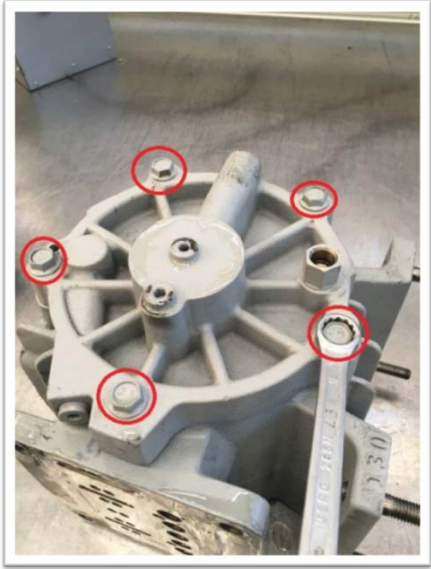

Step	Description / Photo
27.	<p data-bbox="304 288 1096 317">Loosen and remove the four screws of the front cover (13 mm Wrench Hex).</p> 
28.	<p data-bbox="304 904 715 933">Remove the key from the shaft (Tongs).</p> 


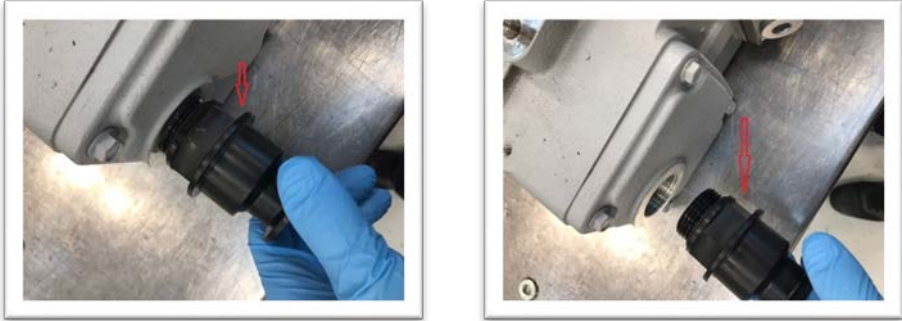

Procedure

Step	Description / Photo
29.	<p data-bbox="201 291 799 317">Remove the front cover by gently using a plastic hammer.</p> 
30.	<p data-bbox="201 916 392 942">Pull out the vanes.</p> 

Step	Description / Photo
31.	<p data-bbox="304 288 1076 357">Use the M8 eyebolt included in the tool kit and screw it on the rotor shaft. Using a crane pull out the rotor (M10 eyebolt).</p> <div style="display: flex; justify-content: space-around;">   </div>
32.	<p data-bbox="304 939 511 968">Remove the O-Ring.</p> <div style="text-align: center;">  </div>




Procedure

Step	Description / Photo
33.	<p data-bbox="201 291 1022 357">Turn the pump body upside down. Loosen and remove the five screws of the external cover (13 mm Wrench Hex).</p> 
34.	<p data-bbox="201 968 1068 994">Remove the external cover by gently using a plastic hammer and remove the O-ring.</p> 


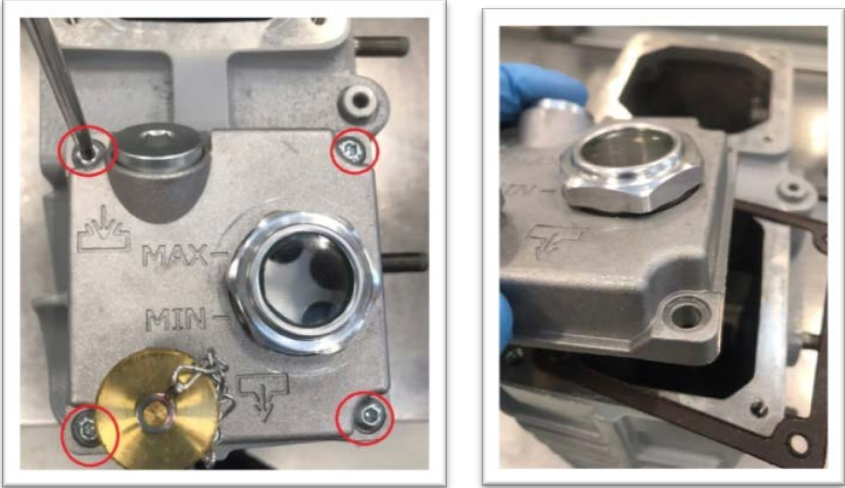
Step	Description / Photo
35.	<p>Remove the centering ring and its O-Ring from the pump body..</p> 
36.	<p>Take the oil tank, unscrew the outlet port manually..</p> 
37.	<p>Loosen and remove the four screws of the outlet cover (10 mm Wrench Hex).</p> 


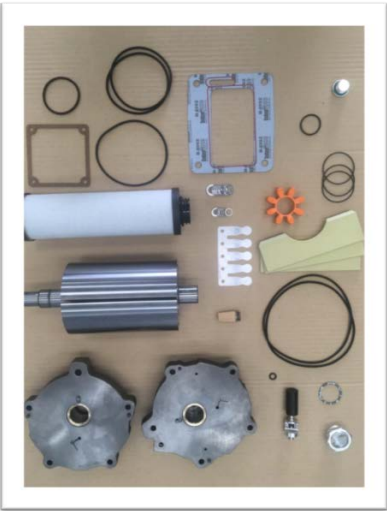
Procedure

Step	Description / Photo
38.	<p data-bbox="201 291 886 317">Remove the outlet cover, the O-Ring and extract the exhaust filter.</p> <div data-bbox="372 336 675 739"></div> <div data-bbox="753 348 1046 739"></div>
39.	<p data-bbox="201 777 715 803">Remove the front oil tank plug (Allen key 19 mm).</p> <div data-bbox="294 826 644 1291"></div> <div data-bbox="769 826 1119 1291"></div>



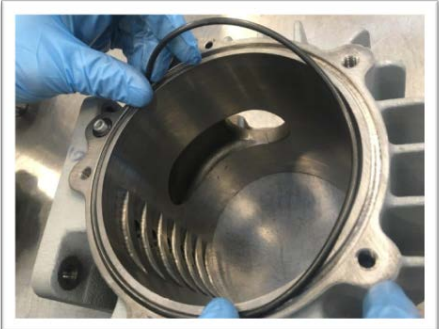
Step	Description / Photo
40.	<p data-bbox="304 288 911 319">Using floating valve extractor to remove the floating valve.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;">   </div> <div style="text-align: center; margin-top: 20px;">  </div>


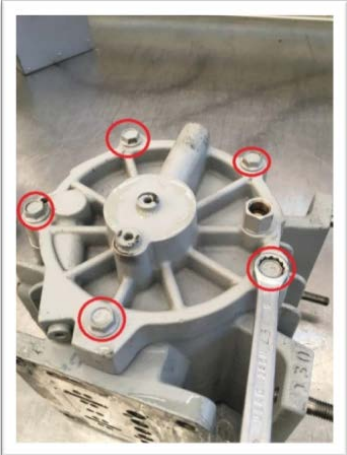

Procedure

Step	Description / Photo
41.	<p data-bbox="201 291 739 317">Remove the oil level indicator (Wrench Hex 40 mm).</p> 
42.	<p data-bbox="201 690 778 716">Remove the oil tank cover and gasket (Allen key 4 mm).</p> 




Step	Description / Photo
43.	<p>Remove the two oil tank plugs.</p> 
44.	<p>Before reassembling the pump, make sure that all parts and surfaces are clean. The cleaning can be done with compressed air and Alcohol or water-based solvents, to remove oil residues. All consumables like gaskets and O-rings are contained in the major maintenance kit. All used consumables should be disposed off following local rules and regulations.</p>
45.	<p>Take the Major Maintenance Kit P/N X3702-68202.</p> 

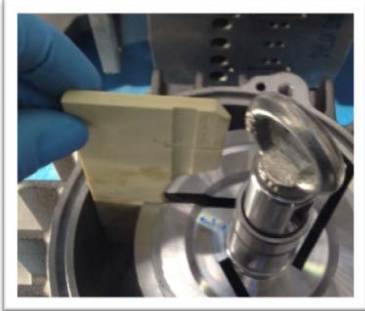

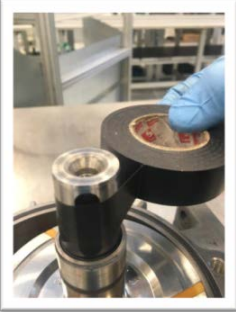


Procedure

Step	Description / Photo
46.	<p data-bbox="201 291 536 317">Take the pump body front cover.</p> 
47.	<p data-bbox="201 737 1051 763">Insert the centering ring and its O-Ring (OR ORM0080-25 Viton) in the pump body.</p> 
48.	<p data-bbox="201 1137 704 1163">Insert the O-Ring (OR 4587 FKM) on the housing.</p> 




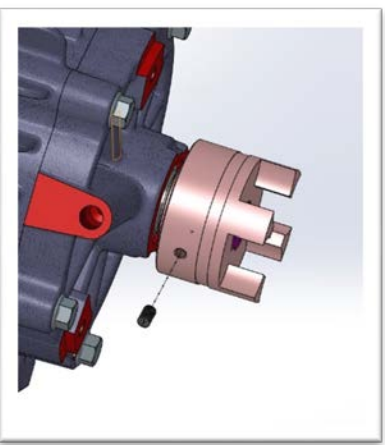
Step	Description / Photo
49.	<p data-bbox="304 288 1286 352">Assemble the external cover on the pump body and close the five Hex screws at 25 Nm torque (Torque Wrench 13 mm Hex).</p> <div style="display: flex; flex-direction: column; align-items: center;">    </div>


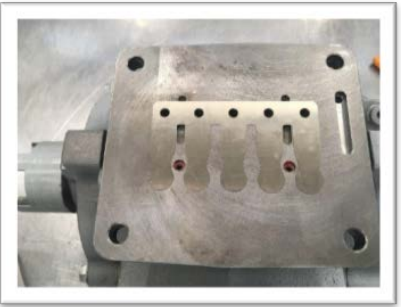
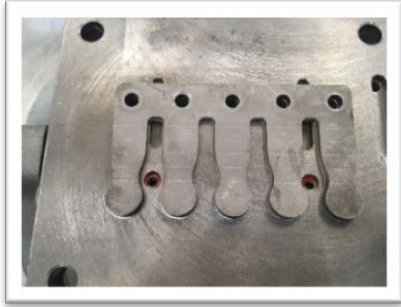

Procedure

Step	Description / Photo
50.	<p data-bbox="201 291 1193 387">Turn the pump body, lubricate the bushing using a small quantity of new pump lubricant. Screw the M8 eyebolt onto the motor side rotor shaft, insert the new rotor gently with a crane and remove the eyebolt once procedure is finished. (M8 Eyebolt).</p> <p data-bbox="201 435 604 470">CAUTION! Heavy weight lifting.</p> <div data-bbox="297 510 648 977"></div> <div data-bbox="772 513 1123 977"></div> <div data-bbox="539 1005 879 1456"></div>


Step	Description / Photo
51.	<p>Insert the vanes in the rotor slots, ensure that the vanes are properly inserted watching the beside figures.</p> <div style="display: flex; justify-content: space-around;">   </div>
52.	<p>Cover the key housing with one layer of commercially available elastic tape in order to avoid damages on the new lip seal. Put a small quantity of synthetic grease (like Synth Polymer 402 or similar) on the external lip of lip seal and proceed to assemble the motor side cover, after inserting its O-Ring (OR 4587 FKM) in its housing.</p> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="display: flex; justify-content: space-around; width: 100%;">   </div>  </div>


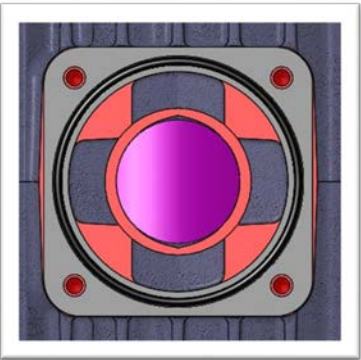
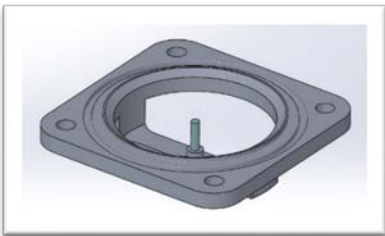
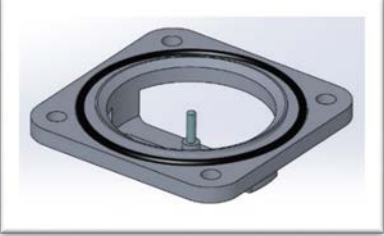
Procedure

Step	Description / Photo
53.	<p data-bbox="197 288 1186 388">Remove the plastic tape, insert the key on the shaft housing using a plastic hammer and close the four screws on the motor side cover at 25 Nm using a suitable torque wrench (Torque Wrench 13 mm Hex).</p> <div data-bbox="378 401 659 777">A close-up photograph showing a person's hand in a blue glove using a torque wrench to tighten one of the four screws on the motor side cover of a pump housing.</div> <div data-bbox="758 401 1043 777">A close-up photograph of the motor side cover with the key inserted into the shaft housing. The cover is secured with four screws.</div>
54.	<p data-bbox="197 808 1165 909">Insert the pump body hul coupling and then insert the socket set stud on the pump body half coupling. (Allen key 3 mm).</p> <div data-bbox="329 939 668 1385">A close-up photograph showing the pump body half coupling being inserted into the pump body. A wooden handle is used to push the coupling into place.</div> <div data-bbox="715 939 1096 1385">A 3D CAD model of the pump body half coupling and socket set stud. The coupling is shown in a light blue color, and the socket set stud is shown in a light red color.</div>

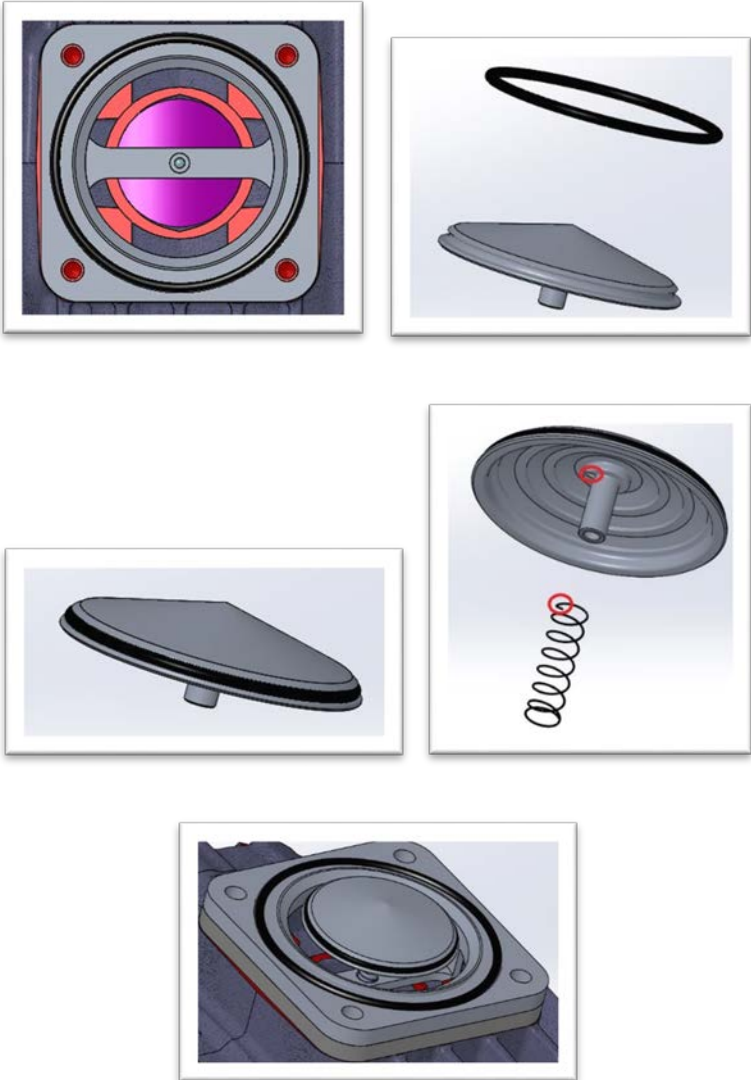
Step	Description / Photo
55.	<p data-bbox="302 288 1329 354">Take the pump body and assemble the new valve plate following the procedure in pictures (1 to 4) (Allen key 3 mm).</p> <div style="display: flex; flex-wrap: wrap; justify-content: space-around;">     </div>

Procedure

Step	Description / Photo
56.	Based on version of Inlet valve available (a or b), please, follow dedicated assembly step 56a or 56b .
56a.	For the pumps with the anti-suck back valve system composed by a spring and a plate, mount the system in this way: Put the inlet spring in the inlet housing. Insert the two O-Rings (OR 4375 Viton) on both sides of the Inlet Thermal Insulation. Put the inlet disc over the spring.
	

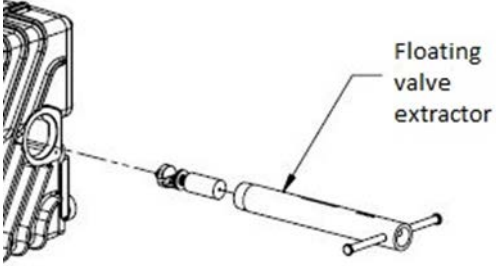


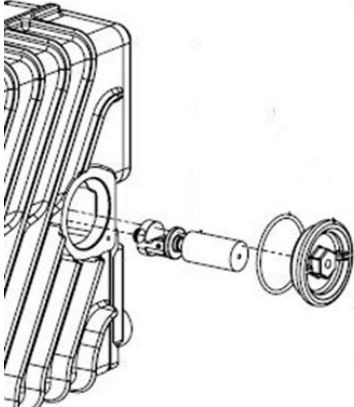
Step	Description / Photo
56b.	<p>For the pumps with the anti-suck back valve system composed by a support plate, a spring, a valve and a plate, mount the system in this way:</p> <p>Insert the two O-Rings (OR 4375 Viton) on both sides of the Inlet Thermal Insulation.</p> <p>Take the Support Plate with the pin inserted in it (verify if it is well inserted, if not use a hammer to insert it) and insert it on the Inlet Thermal Insulation.</p> <p>Insert the O-Ring OR 4375 Viton on the support plate.</p> <p>Take the Inlet Valve.</p> <p>Insert the consumable O-ring 2-141 VITON on the valve.</p> <p>Then insert spring on the valve, inserting the stem on the spring on the hole on the valve (encircled in red in the figure).</p> <p>Then place the spring plus the plate on the support plate on the pump body</p> <div style="display: flex; flex-wrap: wrap; justify-content: space-around; margin-top: 20px;">     </div>






Procedure

Step	Description / Photo
56b.	




Step	Description / Photo
57.	<p data-bbox="304 286 1329 352">Position the inlet port after positioning its O-Ring (OR 158 Viton) in the housing on it and close the four screws at 20 Nm (Torque Wrench 13 mm Hex).</p> <p data-bbox="304 395 1158 430">IMPORTANT! Note: remember to add the new plastic washer on the screws.</p> <div data-bbox="449 499 779 933"> </div> <div data-bbox="831 475 1179 933"> </div> <div data-bbox="449 968 802 1433"> </div> <div data-bbox="831 979 1179 1433"> </div>




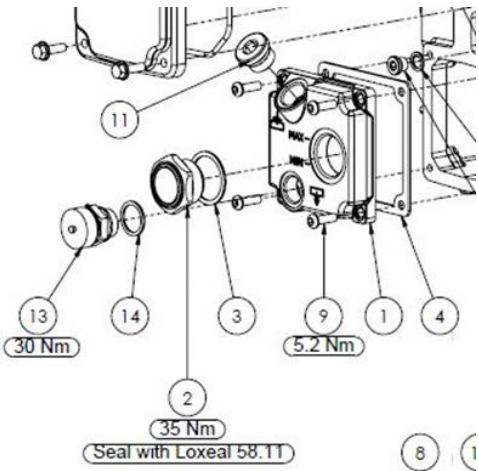
Procedure

Step	Description / Photo
58.	<p data-bbox="201 291 871 317">Take the new floating valve, put the liquid sealant on the thread.</p>  <p data-bbox="843 383 949 470">Floating valve extractor</p>   <p data-bbox="611 982 835 1003">Seal with Loxeal 58.11</p> 




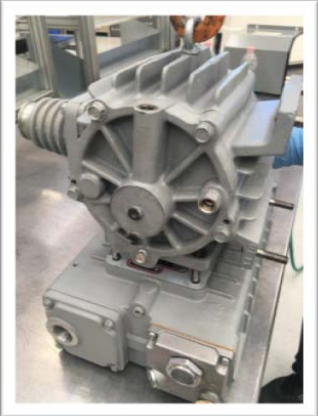
Step	Description / Photo
<p>59.</p>	<p>Turn the Floating Valve Extractor until the referral sign will be on the top of tank. Remove the extractor, fit the new O-Ring (OR 12086 Viton) and assemble the front oil tank plug. Close the plug at 20 Nm (torque wrench 19 mm Hex).</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <div style="text-align: center; margin-top: 20px;">  </div>
<p>60.</p>	<p>Turn the oil tank, insert the new MS120 Exhaust filter as shown in the picture.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>




Procedure

Step	Description / Photo
61.	<p data-bbox="201 291 1215 395">Insert the new O-Ring (OR 4425) in the exhaust cover. Position the discharge cover on the oil tank closing the four screws at 25 Nm (torque wrench 10 mm Hex).</p> <div data-bbox="348 406 694 864">A close-up photograph showing a person's hand in a blue nitrile glove. The hand is carefully sliding a black O-ring onto a metal spring that is protruding from a metal plate. The metal plate has a central hole and four mounting points.</div> <div data-bbox="729 406 1071 864">A photograph showing the O-ring now seated on the metal spring. The metal plate is being positioned over a larger metal component, which is the oil tank. The O-ring is visible as a black ring around the central hole.</div> <div data-bbox="255 892 589 1338">A photograph showing the discharge cover being lowered onto the oil tank. A gloved hand is visible on the left, holding the cover. The cover is a grey, rectangular metal plate with four screws.</div> <div data-bbox="636 930 1165 1338">A photograph showing a torque wrench being used to tighten one of the screws on the discharge cover. The wrench is silver and has 'SI 0125' and '1187702A' printed on it. The cover is now fully seated on the oil tank.</div>





Step	Description / Photo
62.	<p data-bbox="304 291 1051 319">Using the new cork oil cover gasket, assemble the oil cover on the tank.</p> <p data-bbox="304 331 1296 392">Use new oil level sight glass with its new washer, new fill plugs during the assembly Torque 20 Nm (Allen torque key 4 mm).</p> <div style="display: flex; flex-wrap: wrap; justify-content: space-around;"> <div data-bbox="368 430 765 956" style="width: 48%;">  </div> <div data-bbox="846 406 1260 956" style="width: 48%;">  </div> <div data-bbox="351 986 746 1506" style="width: 48%;">  </div> <div data-bbox="819 1048 1293 1520" style="width: 48%;">  </div> </div>




Procedure

Step	Description / Photo
63.	<p data-bbox="201 291 1011 361">Insert the new O-Rings (OR 12086 Viton) and assemble the two oil-tank plugs. Close the plastic plugs at 20 Nm (torque wrench 19 mm Hex).</p> <div data-bbox="297 371 659 857"></div> <div data-bbox="772 383 1125 857"></div>
64.	<p data-bbox="201 895 1011 965">Screw the M8 eyebolt onto the pump body. Insert the new gasket on the tank. Using a crane, position the pump body on the tank.</p> <p data-bbox="201 1008 605 1043">CAUTION! Heavy weight lifting.</p> <div data-bbox="268 1135 743 1499"></div> <div data-bbox="839 1083 1153 1499"></div>


Step	Description / Photo
<p>65.</p>	<p>Close the four nuts fixing the pump body on the tank.</p> <p>Mounting Sequence:</p> <ul style="list-style-type: none"> 1 plain washer 2 split washer 3 nut <div style="display: flex; justify-content: space-around;">   </div>
<p>66.</p>	<p>Assemble the two oil pipes.</p> <p>New aluminum washer (wrench hex 19 mm).</p> <div style="text-align: center;">  </div>



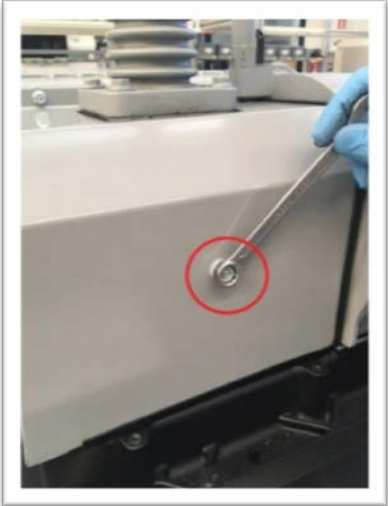
Procedure

Step	Description / Photo
67.	<p data-bbox="201 291 1001 317">Assemble the fan cover and the new elastic coupling insert (Allen key 8 mm).</p> <div data-bbox="297 331 646 795"></div> <div data-bbox="772 331 1122 795"></div>
68.	<p data-bbox="201 829 1205 890">Assemble the electric motor aligning the two half couplings and using a crane turn 90° the pump (wrench hex 13 mm).</p> <p data-bbox="201 939 604 973">CAUTION! Heavy weight lifting.</p> <div data-bbox="297 1012 661 1498"></div> <div data-bbox="772 1034 1122 1498"></div>



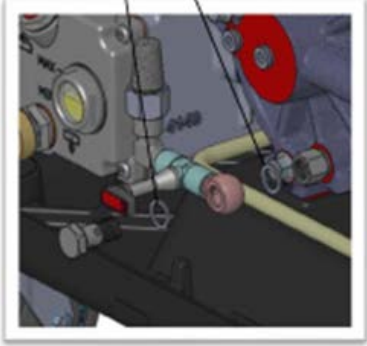
Step	Description / Photo
69.	<p data-bbox="304 288 1208 319">Using a crane, put the pump on the basement, close the four nuts under the basement.</p> <p data-bbox="304 361 708 395">CAUTION! Heavy weight lifting.</p> <div data-bbox="389 439 679 826">  </div> <div data-bbox="769 465 1243 826">  </div> <div data-bbox="561 852 1068 1242">  </div>

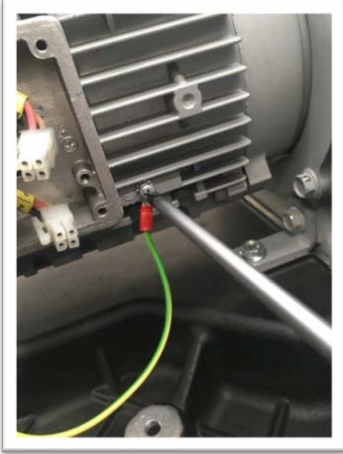
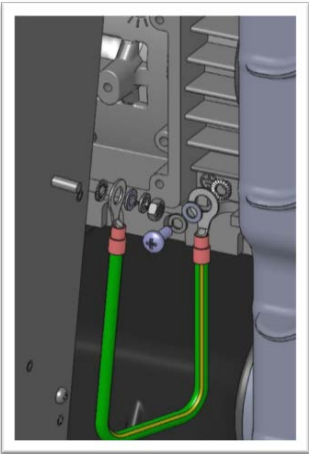
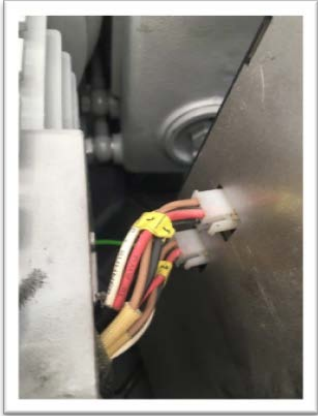
Procedure

Step	Description / Photo
70.	<p data-bbox="201 291 905 317">Assemble the two screws of pump fixing brackets on the basement.</p>  <p>The top photograph shows the underside of the pump housing with two screws being inserted into the basement. The bottom-left photograph shows a close-up of a screw being inserted into a bracket on the pump housing. The bottom-right photograph shows a close-up of a screw being inserted into a bracket on the side of the pump housing.</p>


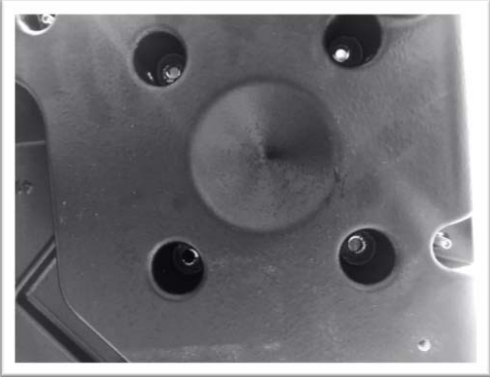
Step	Description / Photo
71.	<p data-bbox="304 291 1319 354">Assemble the internal metallic cover positioning the new plastic washers below the three screws (M6 and M8) highlighted in the picture (wrench hex 10 mm and 13 mm).</p> <div style="display: flex; flex-direction: column; align-items: center;">  <div style="display: flex; justify-content: space-around; width: 100%;">   </div> </div>

Procedure

Step	Description / Photo
72.	<p data-bbox="201 291 601 317">Replace the gas ballast filter manually.</p> 
73.	<p data-bbox="201 852 815 878">Assemble the gas- ballast pipeline using two new washers.</p>   <p data-bbox="758 904 929 947">New washers</p>

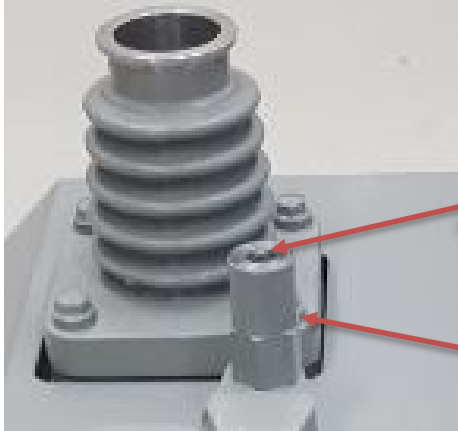
Step	Description / Photo
74.	<p>Bring the controller near the electric motor and connect the ground wire onto it.</p> <p>Verify that the right sequence of the fixing parts is properly done.</p> <ol style="list-style-type: none"> 1. Serrated lock washer 2. Earth ground eyelet terminal 3. Plain washer 4. Groover washer 5. Nut for controller side/Screw for electrical motor side <div style="display: flex; justify-content: space-around; align-items: center;">   </div>
75.	<p>Bring the controller near the electric motor and connect the two power cables.</p> <div style="text-align: center;">  </div>




Procedure

Step	Description / Photo
76.	<p data-bbox="201 291 1092 317">Fix the controller in its position and close the four screws on the bottom of basement.</p> <div data-bbox="229 369 668 708"></div> <div data-bbox="705 331 1190 708"></div>



Step	Description / Photo
77.	<p data-bbox="304 361 458 401">CAUTION!</p> <p data-bbox="304 286 639 315">Protective Earth continuity test</p> <p data-bbox="496 340 1336 543">Using a tester/ohmmeter verify that the isolation is provided between the protective (earthing) conductor terminal and the accessible conductive parts of the unit that are required to be connected to the protective conductor terminal is below 0.1 Ohm. One probe (terminal pin) of the tester must be in contact with the middle pin of control socket (earth connection) [1], the other probe (terminal pin) of the tester must be in contact with a not painted part of the pump like the upper side of the eyebolt fixing adapter [2] (highlighted in the second picture).</p> <hr data-bbox="304 560 1336 564"/> 

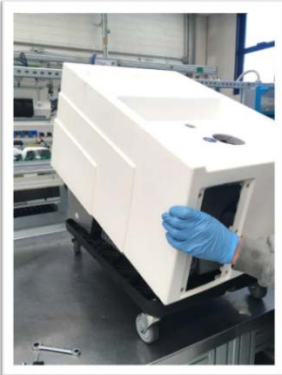

Procedure

Step	Description / Photo
77.	 <p data-bbox="725 477 1129 569">Upper part: not painted → OK for the test</p> <p data-bbox="725 631 1129 723">External part: painted → NOT OK for the test</p>
78.	Open the oil refill cap, insert the adapter and then the oil drain hose.


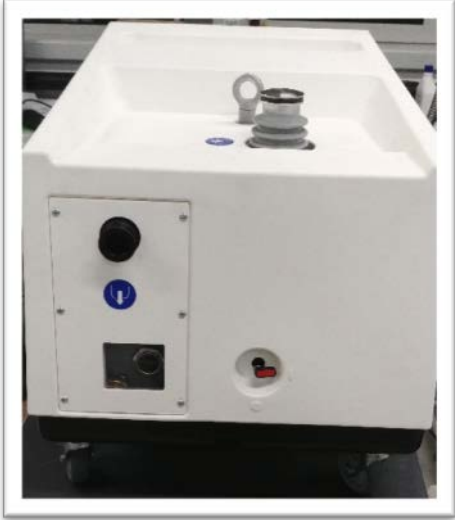
Step	Description / Photo
	<p data-bbox="304 282 536 310">Close the oil refill cap.</p> <p data-bbox="304 322 1082 350">Assemble the exhaust port manually using the new O-Ring (OR 3118 FKM).</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <div style="text-align: center; margin-top: 20px;">  </div>

Procedure

Step	Description / Photo
79.	<p data-bbox="201 291 1200 352">Connect the main cable, insert the interlock cable as per the instructions in the user manual and blank off the inlet.</p> <p data-bbox="201 366 586 392">Switch on the pump for few minutes.</p> <div data-bbox="277 409 665 927"></div> <div data-bbox="752 409 1143 927"></div>

Step	Description / Photo
80.	<p data-bbox="304 288 1172 357">Switch off the pump and reassemble the plastic cover, close the nut on the bottom. Reassemble the gas ballast knob and the plastic cover.</p> <div data-bbox="489 369 768 744">  </div> <div data-bbox="868 383 1139 744">  </div> <div data-bbox="489 769 768 1135">  </div> <div data-bbox="868 782 1139 1135">  </div> <div data-bbox="691 1159 933 1482">  </div>

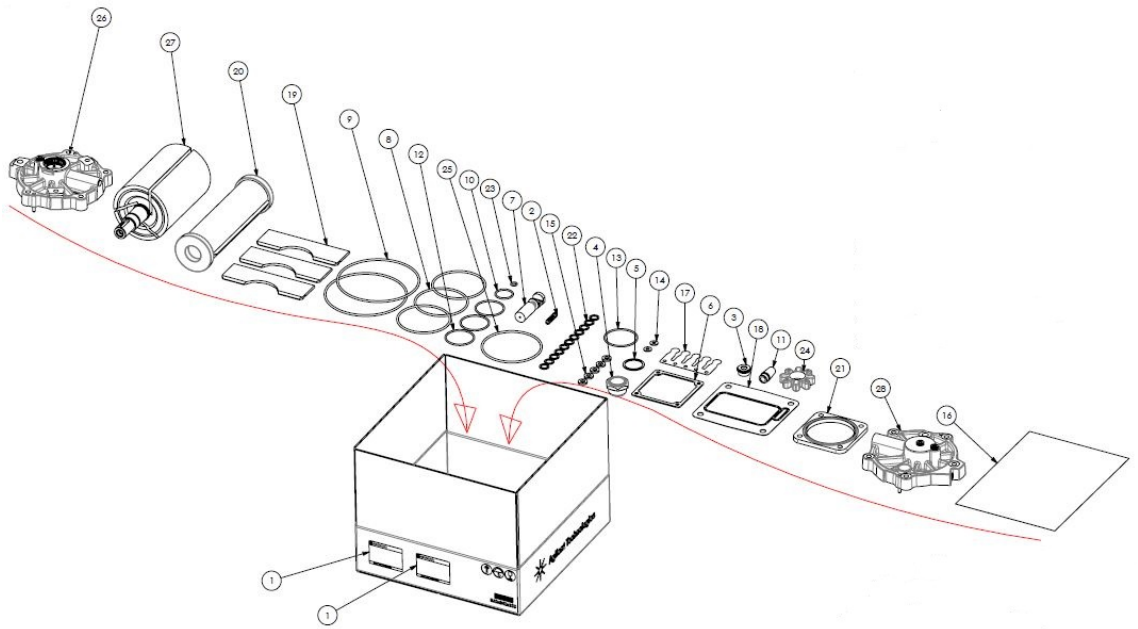
Final Test

Step	Description / Photo																																			
81.	<p data-bbox="197 366 1213 534">Connect the main cable, insert the interlock cable (supplied in the MS120 Special Maintenance Tool Kit) as per the instructions in the user manual. Install the calibrated orifice valve supplied in the major maintenance tool kit on the inlet in closed position, open the gas ballast valve and switch on the pump for 30 minutes. Close the gas ballast and open the orifice valve, leave the pump running for 2 hours. Stop the pump, remove the orifice valve and install a low vacuum range gauge and measure the final vacuum.</p> <div style="display: flex; justify-content: space-around;">   </div> <p data-bbox="197 1246 468 1489">The limit values for the ultimate pressure, for the pressure with gas ballast, for the pressure with the orifice and for the power are reported in the table on the right.</p> <p data-bbox="504 1255 739 1281">Limits for MS120 pumps</p> <table border="1" data-bbox="504 1298 1189 1411"> <thead> <tr> <th>MS Model</th> <th>PN Inverter.</th> <th>Ultimate P</th> <th>P gas ballast</th> <th>P with orifice</th> <th>P(W)</th> <th>f(Hz)</th> </tr> </thead> <tbody> <tr> <td>G2571-69000</td> <td>X3702-60022</td> <td>≤9.0E-02mbar</td> <td>2.0E-01 mbar</td> <td>≤1,6mbar</td> <td>1850</td> <td>58</td> </tr> <tr> <td>X3702-69000</td> <td>X3702-60002</td> <td>≤8.0E-02mbar</td> <td>2.0E-01 mbar</td> <td>≤1,8mbar</td> <td>1700</td> <td>50</td> </tr> <tr> <td>X3702-69100</td> <td>X3702-60002</td> <td>≤8.0E-02mbar</td> <td>2.0E-01 mbar</td> <td>≤2,1mbar</td> <td>1400</td> <td>41</td> </tr> <tr> <td>X3702-69010</td> <td>X3702-60042</td> <td>≤9.0E-02mbar</td> <td>2.0E-01 mbar</td> <td>≤1,6 mbar</td> <td>2020</td> <td>55</td> </tr> </tbody> </table>	MS Model	PN Inverter.	Ultimate P	P gas ballast	P with orifice	P(W)	f(Hz)	G2571-69000	X3702-60022	≤9.0E-02mbar	2.0E-01 mbar	≤1,6mbar	1850	58	X3702-69000	X3702-60002	≤8.0E-02mbar	2.0E-01 mbar	≤1,8mbar	1700	50	X3702-69100	X3702-60002	≤8.0E-02mbar	2.0E-01 mbar	≤2,1mbar	1400	41	X3702-69010	X3702-60042	≤9.0E-02mbar	2.0E-01 mbar	≤1,6 mbar	2020	55
MS Model	PN Inverter.	Ultimate P	P gas ballast	P with orifice	P(W)	f(Hz)																														
G2571-69000	X3702-60022	≤9.0E-02mbar	2.0E-01 mbar	≤1,6mbar	1850	58																														
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X3702-69010	X3702-60042	≤9.0E-02mbar	2.0E-01 mbar	≤1,6 mbar	2020	55																														

Step	Description / Photo
82.	<p data-bbox="304 291 1286 392">Before to assemble the front panel assy, screw again the four screws (highlighted in red in the figure at right) on the tank low plate at 5.2 Nm. (Allen torque key 4 mm Allen key 3 mm)</p> <div data-bbox="411 453 801 968">A photograph showing the internal components of the tank low plate assembly. The white plastic housing is open, revealing a black cylindrical component, a white circular component, and a brass-colored component. Four screws are visible, securing the housing to the internal plate.</div> <div data-bbox="833 453 1223 968">A photograph showing the external view of the tank low plate assembly. The white plastic housing is closed. A black cylindrical component is visible at the top, and a blue circular component with a white arrow pointing down is visible in the center. Four screws are visible, securing the housing to the internal plate. The screws are highlighted in red in the original image.</div>

Spare Parts List

Object description	Part Number	Notes
MS120 Major Maintenance Kit	X3702-68202	
N° 2 Oil charge	X3760-64005	
MS120 Special Maintenance Tool Kit	X3702-67000	
User Manual	87-900-150-01	



Spare Parts List

ITEM	Q.TY	DESCRIPTION OR MATERIAL	PART NUMBER
1	2	Packaging Adhesive Label	NA
2	1	RVP MS40+ Spring	NA
3	1	RVP MS40+ 1/2G Male Plug	NA
4	1	RVP MS40+ Level Oil Indicator 1G	NA
5	1	RVP MS40+ Fasit Washer	NA
6	1	RVP MS40+ Gasket Oil Cover	NA
7	1	Float valve	NA
8	3	O-Ring 4375 FKM	NA
9	2	O-Ring 4587 FKM	NA
10	1	O-Ring 3118 FKM	NA
11	1	3/8" Gas Silencer	NA
12	3	O-Ring Parker 12086 FKM	NA
13	1	O-Ring Parker 2-141 FKM	NA
14	2	Plastic Washer for M6 screw	NA
15	5	Plastic Washer for M8 screw	NA
16	1	MS 120 Rebuild. Procedure	NA
17	1	Plate	X3702-00211
18	1	MS 120 Pump-Tank gasket	X3702-00222
19	3	MS 120 Vane	X3702-20213
20	1	MS 120 Exhaust filter	X3702-20217
21	1	MS 120 Inlet Thermal Insulation	X3702-20229
22	11	1/4"G Al Washer 1.5TK	X3702-20257
23	1	O-Ring ORM0080-25 FKM	X3702-40251
24	1	Elastic Coupling Insert	X3702-40262
25	1	O-Ring 4425	X3702-40264
26	1	MS 120 Motor side cover assy for pump rebuid	X3702-60210
27	1	MS 120 Rotor + bushings	X3702-60211
28	1	MS 120 Ext. cover + bushing	X3702-60213



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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.

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Sincerely,

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

Giampaolo LEVI

*Vice President and General Manager
Agilent Vacuum Products Division*

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