

Agilent Dual Stage Rotary Vane Pumps
DS102 1Ph, DS202 1Ph, DS302 1Ph, DS402 1Ph,
DS402 3Ph, DS602 1Ph, DS602 3Ph

User Manual



Notices

Manual Part Number

87-900-937-01
Edition T.00, February 2026

Copyright

© Agilent Technologies, Inc. 2026

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.

Agilent Technologies Italia S.p.A.
Vacuum Products Division
Via F.lli Varian, 54
10040 Leini (TO)
ITALY

www.agilent.com

Instrument Manufacturing

Agilent Technologies LDA Malaysia
Sdn Bhd Bayan Lepas
Free Industrial Zone 11900 Bayan Lepas,
Penang Malaysia

Printed in Italy

Operating Temperature

Operating Temperature: 12÷40°C
Storage Temperature: -20÷70°C

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

U.S. Government Restricted Rights. Software and technical data rights granted to the federal government include only those rights customarily provided to end user customers. Agilent provides this customary commercial license in Software and technical data pursuant to FAR 12.211 (Technical Data) and 12.212 (Computer Software) and, for the Department of Defense, DFARS 252.227-7015 (Technical Data - Commercial Items) and DFARS 227.7202-3 (Rights in Commercial Computer Software or Computer Software Documentation).

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.

Contents

| | |
|---|-----------|
| 1 Istruzioni per l'uso | 13 |
| Informazioni su questo manuale | 14 |
| Validità | 14 |
| Definizioni e terminologia | 15 |
| Definizione di Attenzione, Avvertenza e Nota | 15 |
| Simboli di avvertenza | 16 |
| Sicurezza | 18 |
| Uso corretto | 18 |
| Uso improprio | 19 |
| Note di Avvertenza | 20 |
| Note di Attenzione | 21 |
| Convogliamento aria di scarico | 21 |
| Attrezzatura di protezione | 22 |
| Linee guida di sicurezza per pompe rotative a palette a doppio stadio | 24 |
| Trasporto & Immagazzinamento | 25 |
| Descrizione del prodotto | 25 |
| Installazione delle pompe rotative bistadio a palette | 26 |
| Preparazione per l'installazione | 26 |
| Installazione | 27 |
| Apertura | 31 |
| Fissaggio della pompa rotativa bistadio a palette | 32 |
| Collegamento delle flange di aspirazione e delle connessioni di scarico | 32 |

Contents

| | |
|---|-----------|
| Avvio e funzionamento della pompa rotativa bistadio a palette | 35 |
| Arresto della pompa rotativa bistadio a palette | 36 |
| Manutenzione | 36 |
| Pulizia | 39 |
| Smaltimento | 40 |
| Servizio Post Vendita | 41 |
| 2 Betriebsanleitung | 42 |
| Informationen über diese Betriebsanleitung | 43 |
| Gültigkeit | 43 |
| Definitionen und Terminologie | 44 |
| Definition von Vorsicht, Warnung und Hinweis | 44 |
| Warnsymbole | 45 |
| Sicherheit | 47 |
| Korrekte Verwendung | 47 |
| Unsachgemäße Anwendung | 48 |
| Warnungen | 49 |
| Vorsichtshinweise | 50 |
| Umleitung der Abgasluft | 50 |
| Persönliche Schutzausrüstung | 51 |
| Sicherheitsrichtlinie für zweistufige Drehschieberpumpen | 53 |
| Transport & Lagerung | 54 |
| Beschreibung des Produkts | 54 |
| Installation von zweistufigen Drehschieberpumpen | 55 |
| Vorbereitung der Installation | 55 |
| Installation | 56 |
| Öffnung | 60 |

Contents

| | |
|--|-----------|
| Montage einer zweistufigen Drehschieberpumpe | 61 |
| Anschluss der Saugflansche und der Ablaufverbindungen | 61 |
| Start und Betrieb der zweistufigen Drehschieberpumpe | 64 |
| Ausschaltung der zweistufigen Drehschieberpumpe | 65 |
| Wartung | 65 |
| Reinigung | 68 |
| Entsorgung | 69 |
| Service | 70 |
| 3 Manuel d'utilisation | 71 |
| Informations concernant ce manuel | 72 |
| Validité | 72 |
| Définitions et terminologie | 73 |
| Signification des messages d'attention, d'avertissement et des notes | 73 |
| Symboles d'avertissement | 74 |
| Sécurité | 76 |
| Utilisation correcte | 76 |
| Utilisation non prévue | 77 |
| Messages D'Avertissement | 78 |
| Messages d'Attention | 79 |
| Acheminement de l'air d'extraction | 79 |
| Équipements de protection individuelle | 80 |
| Consignes de sécurité pour les pompes rotatives à deux stades à palettes | 82 |
| Transport et stockage | 83 |
| Description de l'appareil | 83 |

Contents

| | |
|---|------------|
| Installation des pompes rotatives à deux stades à palettes | 84 |
| Préparation de l'installation | 84 |
| Installation | 85 |
| Ouverture | 89 |
| Fixation de la pompe rotative à deux stades à palettes | 90 |
| Raccordement des brides d'aspiration et des raccords d'évacuation | 90 |
| Démarrage et fonctionnement de la pompe rotative à deux stades à palettes | 93 |
| Arrêt de la pompe rotative à deux stades à palettes | 94 |
| Maintenance | 94 |
| Nettoyage | 97 |
| Élimination | 98 |
| Service | 99 |
| 4 Instrucciones de uso | 100 |
| Acerca de este manual | 101 |
| Validez | 101 |
| Definiciones y terminología | 102 |
| Definición de Precaución, Advertencia y Nota | 102 |
| Símbolos de advertencia | 103 |
| Seguridad | 105 |
| Uso correcto | 105 |
| Uso incorrecto | 106 |
| Notas de advertencia | 107 |
| Notas de precaución | 108 |
| Conductos de aire de escape | 108 |
| Equipo de protección | 109 |

Contents

| | |
|--|------------|
| Pautas de seguridad para bombas de paletas rotativas de doble etapa | 111 |
| Transporte y mantenimiento | 112 |
| Descripción del producto | 112 |
| Instalación de bombas de paletas rotativas de doble etapa | 113 |
| Preparación para la instalación | 113 |
| Instalación | 114 |
| Preparación | 118 |
| Montaje de la bomba de paletas rotativas de doble etapa | 119 |
| Observe las conexiones de admisión y descarga | 119 |
| Encendido y funcionamiento de la bomba de paletas rotativas de doble etapa | 122 |
| Detención de la bomba de paletas rotativas de doble etapa | 123 |
| Mantenimiento | 123 |
| Limpieza | 126 |
| Eliminación | 127 |
| Servicio | 128 |
| 5 使用说明 | 129 |
| 关于本手册 | 130 |
| 有效性 | 130 |
| 定义与术语 | 131 |
| 小心、警告和注意的定义 | 131 |
| 警告符号 | 132 |

Contents

| | |
|---------------------------------------|-----|
| 安全 | 134 |
| 正确使用 | 134 |
| 不当使用 | 135 |
| 警告注释 | 136 |
| 小心注释 | 137 |
| 防护设备 | 138 |
| 双级旋片式真空泵安全指南 | 139 |
| 运输与存放 | 140 |
| 产品说明 | 140 |
| 旋片式 Dual Stage Rotary Vane pumps 泵的安装 | 141 |
| 安装准备工作 | 141 |
| 安装 | 142 |
| 安装 | 146 |
| Dual Stage Rotary Vane pumps 安装 | 147 |
| 入口和排出管路 | 147 |
| 启动和运行 Dual Stage Rotary Vane pumps | 150 |
| Dual Stage Rotary Vane pumps 的关机 | 151 |
| 维护 | 151 |
| 清洁 | 154 |
| 處置 | 155 |
| 服務 | 156 |

Contents

| | | |
|----------|--|------------|
| 6 | 取扱説明書 | 157 |
| | この説明書について | 158 |
| | 有効期限 | 158 |
| | 定義と用語 | 159 |
| | 注意、警告および注記の定義 | 159 |
| | 警告記号 | 160 |
| | 安全性 | 162 |
| | 適切な取扱い | 162 |
| | 不適切な取扱い | 163 |
| | 警告メモ | 164 |
| | 注意メモ | 165 |
| | 排気管の設置 | 165 |
| | 防具 | 166 |
| | デュアルステージロータリーベーンポンプの安全ガイドライン | 168 |
| | 搬送と保管 | 169 |
| | 製品説明 | 169 |
| | ロータリーベーン Dual Stage Rotary Vane pumps ポンプの設置 | 170 |
| | 設置準備 | 170 |
| | 設置 | 171 |
| | セットアップ | 175 |
| | Dual Stage Rotary Vane pumps 取付 | 176 |
| | 吸入・排出接続部への接続。 | 176 |
| | Dual Stage Rotary Vane pumps の起動と稼働 | 179 |

Contents

| | |
|--|------------|
| Dual Stage Rotary Vane pumps の停止 | 180 |
| メンテナンス | 180 |
| 清掃 | 183 |
| 処分 | 184 |
| サービス | 185 |
| 7 Instructions for Use | 186 |
| About this manual | 187 |
| Validity | 187 |
| Definitions and terminology | 188 |
| Definition of Caution, Warning and Note | 188 |
| Warning Symbols | 189 |
| Safety | 191 |
| Proper use | 191 |
| Improper use | 192 |
| Warning notes | 193 |
| Caution notes | 194 |
| Discharge air pipe line installation | 194 |
| Protective equipment | 195 |
| Safety guideline for Dual Stage Rotary Vane pumps | 197 |
| Transport & Storage | 198 |
| Product description | 198 |
| Installation of Rotary Vane Dual Stage Rotary Vane pumps | 199 |
| Preparation for installation | 199 |
| Installation | 200 |
| Set-up | 204 |

Contents

| | |
|--|------------|
| Dual Stage Rotary Vane Pump mounting | 205 |
| Connections to the inlet and exhaust connections | 205 |
| Starting and running the Dual Stage Rotary Vane Pump | 208 |
| Stop of Dual Stage Rotary Vane pump | 209 |
| Maintenance | 209 |
| Cleaning | 212 |
| Disposal | 213 |
| Service | 214 |
| | |
| 8 Technical Information | 215 |
| Description of the Dual Stage Rotary Vane Pump | 216 |
| Lubrication | 218 |
| Vacuum Seals | 218 |
| Anti-Suck back Device | 218 |
| Gas Ballast Valve | 219 |
| Technical specifications | 224 |
| Dimensions | 226 |
| Pump operations | 228 |
| Starting and Running the Pump | 228 |
| Stopping the Pump | 229 |
| Oil and Filter Cartridge Replacement Procedures | 229 |
| Oil Change Procedure | 229 |

Contents

| | |
|---|-----|
| Electrical Motors | 230 |
| Single Phase Universal Motors | 230 |
| Single-Phase Universal Motors Voltage Setting | 232 |
| Three Phase Universal Motors | 234 |
| Electrical Connections of Three-Phase World Wide Motors | 235 |
| Connections to the Inlet and Exhaust Flange | 236 |
| Lubricants | 238 |
| Scheduled Maintenance Cards | 242 |
| Troubleshooting and Corrective Action | 292 |
| Accessories and Spare Parts | 295 |

1 Istruzioni per l'uso

| | |
|--|----|
| Informazioni su questo manuale | 14 |
| Validità | 14 |
| Definizioni e terminologia | 15 |
| Definizione di Attenzione, Avvertenza e Nota | 15 |
| Simboli di avvertenza | 16 |
| Sicurezza | 18 |
| Uso corretto | 18 |
| Uso improprio | 19 |
| Note di Avvertenza | 20 |
| Note di Attenzione | 21 |
| Convogliamento aria di scarico | 21 |
| Attrezzatura di protezione | 22 |
| Linee guida di sicurezza per pompe rotative a palette a doppio stadio | 24 |
| Trasporto & Immagazzinamento | 25 |
| Descrizione del prodotto | 25 |
| Installazione delle pompe rotative bistadio a palette | 26 |
| Preparazione per l'installazione | 26 |
| Installazione | 27 |
| Apertura | 31 |
| Fissaggio della pompa rotativa bistadio a palette | 32 |
| Collegamento delle flange di aspirazione e delle connessioni di scarico | 32 |
| Avvio e funzionamento della pompa rotativa bistadio a palette | 35 |
| Arresto della pompa rotativa bistadio a palette | 36 |
| Manutenzione | 36 |
| Pulizia | 39 |
| Smaltimento | 40 |
| Servizio Post Vendita | 41 |

Informazioni su questo manuale

Validità

Questo manuale elenca le istruzioni per gli utenti delle pompe rotative bistadio a palette, con particolare riferimento alle nozioni relative a sicurezza, funzionamento e manutenzione di primo livello, limitatamente alle operazioni di manutenzione di cui l'utente è responsabile.

Le operazioni di manutenzione, illustrate nelle sezioni specifiche, con disposizioni specifiche relative al livello più elevato di manutenzione (personale appositamente addestrato per le operazioni di manutenzione) non devono essere eseguite dall'utente.

Per una corretta installazione e avvio/arresto, consultare il capitolo "Installazione".
Per un uso tecnico più dettagliato, consultare il capitolo "Technical Information".

Per ulteriori dettagli sull'utilizzo tecnico, consultare il capitolo "Technical Information".

NOTE

- 1 Questo manuale contiene informazioni utili affinché tutto il personale che utilizza le pompe rotative bistadio a palette possano utilizzarle in sicurezza e garantire la perfetta efficienza, per tutta la sua durata.
 - 2 Conservare questo manuale, insieme a tutte le pubblicazioni ad esso correlate, in un luogo accessibile, conosciuto da tutti gli operatori/personale di manutenzione.
-

Definizioni e terminologia

Definizione di Attenzione, Avvertenza e Nota

Alcuni riferimenti importanti di questo manuale sono evidenziati e incorniciati in colori contrastanti.

ATTENZIONE

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

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.

NOTA

Le note contengono informazioni importanti e forniscono maggiori dettagli su passaggi specifici.

Simboli di avvertenza

Di seguito è riportato un elenco di simboli che sono visualizzati insieme alle avvertenze sulle pompe rotative bistadio a palette. Viene descritto anche il pericolo correlato. Un simbolo triangolare indica un'avvertenza. I significati dei simboli che possono apparire accanto alle avvertenze nella documentazione o sul prodotto stesso sono riportati qui di seguito. Il seguente simbolo può essere usato sulle etichette di avvertenza applicate sul prodotto. Quando viene visualizzato questo simbolo, consultare il relativo manuale operativo o di servizio per la procedura corretta a cui fa riferimento l'etichetta di avvertenza.



| | |
|---|-------------------------------------|
|  | Presenza di tensioni pericolose |
|  | Presenza di superfici surriscaldate |
|  | Pericolo generico |
|  | Flangia d'aspirazione |
|  | Flangia di scarico |
|  | Riempimento con liquido d'esercizio |
|  | Zavorratore |
|  | Sito di produzione |
|  | Presenza di sostanze pericolose |
|  | Pericolo di schiacciamento |

Istruzioni per l'uso

| | |
|---|---|
|  | Pericolo di taglio |
|  | Indossare guanti protettivi |
|  | Indossare attrezzatura di protezione personale |
|  | Indossare scarpe antinfortunistiche |
| I | Accensione |
| O | Spegnimento |
|  | Bottiglia olio |
| CE | Certificazione CE |
|  | Certificazione CSA |
|  | Certificazione RoHS Cina |
|  | Rifiuti di Apparecchiature Elettriche ed Elettroniche |

Sicurezza

Questa sezione contiene le informazioni, prescritte dalla Direttiva Macchine 2006/42/EC, che sono essenziali per la conformità e il rispetto delle norme di sicurezza sia in generale che in relazione all'uso specifico della macchina.

La mancata osservanza di queste istruzioni e delle altre istruzioni contenute nel presente manuale può rendere inefficaci le condizioni di sicurezza previste in fase di progettazione e causare incidenti a chi utilizza la macchina.

Agilent Technologies declina ogni responsabilità per danni alla macchina o per la sicurezza fisica dell'operatore o di terzi derivanti dal mancato rispetto delle norme di sicurezza indicate nella documentazione tecnica.

Uso corretto

Questo manuale contiene importanti avvertenze e istruzioni di sicurezza da osservare affinché l'unità funzioni in sicurezza.

Il prodotto descritto in questo manuale è destinato esclusivamente all'ambito specificato nelle istruzioni. Il manuale fornisce inoltre indicazioni relative ai requisiti essenziali per l'applicazione e il funzionamento del prodotto, nonché le misure di sicurezza che possono essere adottate per garantire un funzionamento regolare. Agilent Technologies non fornisce alcuna garanzia né si assume alcuna responsabilità per applicazioni diverse da quelle descritte nel presente manuale o in cui i requisiti essenziali e le misure di sicurezza non siano rispettati. Il prodotto deve essere utilizzato solo da personale qualificato in grado di adottare le misure di sicurezza necessarie in condizioni che non causano danni o lesioni. Gli accessori e le attrezzature utilizzati con il prodotto devono essere forniti o approvati da Agilent Technologies.

Qualsiasi operazione di regolazione o manutenzione deve essere eseguita da un tecnico professionista informato dei rischi.

Le riparazioni sul prodotto devono essere eseguite esclusivamente da personale autorizzato Agilent.

Istruzioni per l'uso

Uso improprio

Agilent Technologies declina ogni responsabilità derivante dall'uso improprio delle pompe rotative bistadio a palette.

L'uso improprio comporterà la perdita di tutti i reclami per responsabilità e garanzie.

Il personale responsabile del funzionamento e della manutenzione della pompa deve essere ben addestrato e conoscere le norme antinfortunistiche. Le precauzioni per la prevenzione degli infortuni contenute in questo capitolo devono essere sempre rispettate durante il funzionamento e la manutenzione della pompa per evitare danni agli operatori e alla pompa. Queste precauzioni sono fornite sotto forma di note di AVVERTENZA e ATTENZIONE.

AVVERTENZA



Procedure operative, informazioni tecniche e precauzioni che, se non rispettate e/o attuate correttamente, possono causare danni agli operatori.

NOTA

Utilizzare la Molla Di Ritenuta per fissare il cavo di alimentazione nella presa IEC320.

ATTENZIONE

Procedure operative, informazioni tecniche e precauzioni che, se non rispettate e/o implementate correttamente, possono causare danni alla pompa.

Note di Avvertenza

- Il contatto con alte tensioni può provocare la morte. Prestare sempre la massima attenzione e osservare le norme antinfortunistiche in vigore.
- Prima di eseguire interventi di manutenzione, scollegare sempre il cavo di rete dall'alimentatore alla pompa. Posizionare un segnale di avvertimento speciale sull'interruttore dell'alimentazione: MACCHINA IN MANUTENZIONE - NON ACCENDERE.
- Se si esegue la manutenzione dopo che la pompa è rimasta in funzione per un tempo considerevole, attendere che si raffreddi perché la temperatura della superficie esterna potrebbe superare i 60 °C.
- Il mancato collegamento della protezione di terra alla pompa può causare gravi danni agli operatori. Accertarsi sempre che sia presente una connessione di terra e che sia conforme agli standard.
- Durante la pulizia della pompa e dei suoi componenti, evitare l'uso di solventi infiammabili o tossici. La raccomandazione è di usare una soluzione di acqua e sapone, preferibilmente nelle lavatrici a ultrasuoni, avendo cura di asciugare tutte le parti pulite a temperature inferiori a 100 °C per eliminare l'umidità residua.
- Sovraccarichi o guasti prolungati possono causare il surriscaldamento del motore elettrico e la fuoriuscita di fumi nocivi; togliere immediatamente l'alimentazione per precauzione e non avvicinarsi alla pompa prima di aver predisposto una ventilazione adeguata per espellere i fumi. Fare attenzione a non inalare i fumi rimasti all'interno della pompa durante i lavori di riparazione.
- In caso di incendio, non gettare acqua sulla pompa. Spegnerne l'alimentazione e utilizzare estintori a CO₂.
- Ispezionare attentamente le flange per assicurarsi che non vi siano polvere, olio, sporco o difetti delle superfici di accoppiamento, prima di effettuare i collegamenti richiesti.
- Assicurarsi che tutti i giunti e gli accoppiamenti siano bloccati correttamente prima di riavviare la pompa dopo aver effettuato lavori di riparazione.
- Non indossare oggetti che potrebbero impigliarsi nei meccanismi e/o agire come conduttori (catene, bracciali, ecc.).
- Assicurarsi che gli strumenti da utilizzare siano in perfette condizioni ed abbiano impugnature isolanti, ove necessario. Verificare che il materiale isolante dei cavi e che i conduttori delle apparecchiature di prova non presentino segni di danneggiamento.
- Non sostituire l'olio immediatamente dopo l'arresto della macchina poiché l'olio potrebbe essere ancora ad alta temperatura.

Note di Attenzione

- Prima di rimettere in funzione la pompa dopo un guasto, ispezionarla e controllare attentamente eventuali altri segni di danneggiamento.
- Utilizzare solo strumenti perfettamente funzionanti e appositamente progettati per lo scopo; l'uso di strumenti inappropriati o inefficaci può causare gravi danni.
- Eseguire le riparazioni in aree pulite e, ove possibile, prive di polvere. Proteggere tutti gli spazi liberi dei punti di collegamento con appositi tappi di plastica e coprire le superfici lavorate di tutte le parti smontate fino al loro rimontaggio sulla pompa.
- Controllare sempre il lubrificante e che sia correttamente distribuito attraverso la pompa; una lubrificazione inadeguata può danneggiare seriamente la pompa.
- Assegnare alle parti una forma di marcatura mentre vengono rimosse per assicurarsi di rimontarle nell'ordine corretto.
- Controllare che non vi siano graffi o scanalature sugli alberi, nelle loro sedi all'interno della pompa o sulle superfici della macchina. Lievi graffi e abrasioni possono essere eliminati con carta smerigliata molto fine o con una leggera smerigliatura.
- Prima di mettere insieme un gruppo, spargere sempre un po' d'olio sulle parti interne e sulle superfici di accoppiamento. Sostituire tutte le guarnizioni con pezzi di ricambio originali prima di rimontare i componenti.
- Non avviare la pompa se le piastre laterali di protezione (rif. 11 e 81 della figura Vista della pompa) non sono correttamente posizionate.

Convogliamento aria di scarico

Nel caso di un insufficiente ricambio d'aria nel locale pompa è possibile convogliare l'aria di scarico in altri ambienti o all'esterno.

Utilizzare tubazioni di diametro uguale alla bocca di scarico del serbatoio per una lunghezza massima di 15 m.

Per lunghezze superiori aumentare il diametro del tubo. Il peso delle tubazioni non deve gravare sulla pompa.

Utilizzare nel tratto finale raccordi o tubi flessibili.

AVVERTENZA

Questa tubazione deve essere discendente per evitare il rientro di condensa nel serbatoio della pompa.



ATTENZIONE Non inserire rubinetti in questa tubazione. Non ostruire l'uscita.

Attrezzatura di protezione

L'attrezzatura di protezione degli operatori che stanno operando o eseguendo la manutenzione del sistema di pompaggio deve essere sempre adeguata al tipo di operazione da eseguire. Inoltre, deve soddisfare i requisiti di sicurezza della legislazione in vigore nel paese in cui viene utilizzata la macchina.

In generale, l'operatore deve indossare scarpe antinfortunistiche durante la manipolazione delle pompe rotative bistadio a palette e durante l'installazione.

AVVERTENZA



Pericolo per la salute a causa di sostanze pericolose durante la manutenzione o l'installazione.



- A seconda della peculiarità del processo, le pompe per vuoto, i componenti o i fluidi di funzionamento possono essere contaminati da sostanze tossiche, reattive o radioattive.



- Indossare attrezzatura di protezione adeguata durante la manutenzione e le riparazioni o in caso di reinstallazione.
-

AVVERTENZA

Rischio di lesioni dovute alla caduta di oggetti



Durante il trasporto manuale delle pompe per vuoto, sussiste il pericolo che i carichi scivolino e cadano.



- Trasportare pompe per vuoto di piccole e medie dimensioni a due mani.
- Qualsiasi attrezzatura più pesante di 20 kg deve essere trasportata utilizzando un dispositivo di sollevamento adatto.



- Indossare scarpe antinfortunistiche con puntale in acciaio secondo la direttiva EN 347.
-

ATTENZIONE



Rischio di lesioni a causa di spigoli vivi

- Prima di riparare la pompa o prima di qualsiasi azione di montaggio/smontaggio della pompa del sistema, attendere l'arresto completo della pompa.
- Non operare direttamente all'interno della pompa.
- Se necessario, indossare guanti protettivi secondo la EN 420.

Linee guida di sicurezza per pompe rotative a palette a doppio stadio

Le pompe rotative a palette lubrificate ad olio possono raggiungere elevate temperature di esercizio. Si raccomanda quindi di lasciare raffreddare la pompa prima di eseguire qualsiasi tipo di manutenzione.

- Se l'apparecchiatura viene utilizzata in un modo non specificato dal produttore, la protezione fornita dall'apparecchiatura potrebbe essere compromessa.
- Trasportare sempre la pompa mediante gli occhielli chiusi di cui è provvista.
- La pompa deve essere messa in posizione prestando la massima attenzione al fine d'evitare cadute accidentali.

AVVERTENZA



Nel caso in cui sia necessario maneggiare la pompa dopo un periodo di funzionamento, è necessario lasciarla prima raffreddare poiché la temperatura della superficie esterna può superare i 60 °C.

AVVERTENZA



Per evitare danni alle apparecchiature e per prevenire lesioni al personale operativo, è necessario seguire scrupolosamente le istruzioni di installazione fornite nel presente manuale!

Trasporto & Immagazzinamento

Le pompe vengono spedite al cliente all'interno di scatole di cartone.

Il peso totale della confezione, inclusa la pompa, è compreso tra 30 Kg e 40 Kg a seconda dei diversi modelli di pompa.

L'involucro deve essere maneggiato con cura, utilizzando idonee attrezzature di sollevamento.

ATTENZIONE

Quando si sposta l'involucro, assicurarsi che sia saldamente legato alle attrezzature di sollevamento e che queste siano sufficientemente robuste da sostenere il peso.

L'ambiente di lavoro della pompa è un normale ambiente industriale. È preferibile evitare siti con vapori corrosivi o calore eccessivo.

La temperatura di utilizzo dovrebbe essere compresa tra 12 °C e 40 °C. Se la temperatura non rientra in questo intervallo, consultare l'assistenza tecnica Agilent per le modifiche necessarie.

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

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

Descrizione del prodotto

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. L'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 pompe DS102 1Ph, DS202 1Ph, DS302 1Ph, DS402 1Ph, DS402 3Ph, DS602 1Ph e DS602 3Ph sono pompe rotative bistadio a palette, sigillate in olio, azionate da un motore elettrico monofase o trifase.

Informazioni dettagliate sono fornite nella sezione "Technical Information".

Installazione delle pompe rotative bistadio a palette

Preparazione per l'installazione

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

Il peso della pompa, senza imballaggio, è compreso tra 22 e 36 kg.

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 94/62 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.

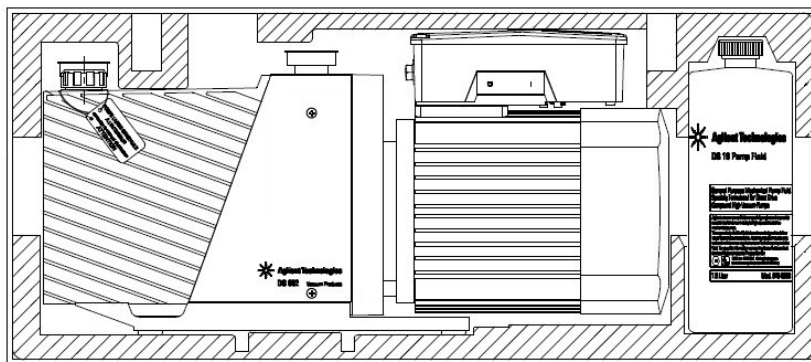


Figura 1 Imballaggio delle pompe rotative bistadio a palette

Istruzioni per l'uso

Installazione

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

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

- temperatura: da +12 °C a +40 °C
- umidità relativa: 0 ÷ 95 % (non condensante)

AVVERTENZA



Per proteggere contro corto-circuiti o sovraccarichi, si deve installare un interruttore automatico di Tipo C sulla linea d'alimentazione principale verso i dispositivi Agilent, di capacità adeguata (vedere la tabella seguente):

| P/N | 110 Vac | 220 Vac | 380 Vac |
|---------|---------|---------|---------|
| 9499315 | 10 A | 6 A | |
| 9499320 | 10 A | 6 A | |
| 9499325 | 10 A | 6 A | |
| 9499330 | 16 A | 7.5 A | |
| 9499331 | | 6 A | 6 A |
| 9499335 | 16 A | 7.5 A | |
| 9499336 | | 6 A | 4 A |

Istruzioni per l'uso

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

ATTENZIONE L'olio deve essere versato nell'involucro attraverso l'apposito foro filettato e **NON** attraverso la linea di aspirazione.

NOTA È importante che il livello dell'olio rimanga tra i valori MIN e MAX visualizzati dall'indicatore di livello posto sul lato della pompa.

ATTENZIONE È obbligatorio lasciare ampio spazio libero tutto intorno alla pompa al fine di consentire una corretta circolazione d'aria; inserire la pompa in un volume chiuso senza ricircolo d'aria non è consentito. Per un sistema di sicurezza interno, la pompa superata la temperatura ambiente di 40 °C, potrebbe manifestare un errore.

AVVERTENZA



Mantenere i tappi posti sulle flange di aspirazione e scarico e non accendere la pompa finché gli stessi non vengono appropriatamente collegati rispettivamente allo strumento ed alla linea di scarico.

AVVERTENZA



Durante l'installazione, prestare la massima attenzione che la flangia di aspirazione sia collegata alla camera da evacuare e che la connessione di scarico non sia tappata (vedere la figura seguente). La pompa non deve essere usata come compressore. L'inosservanza di queste precauzioni può causare danni alla macchina ed all'operatore.

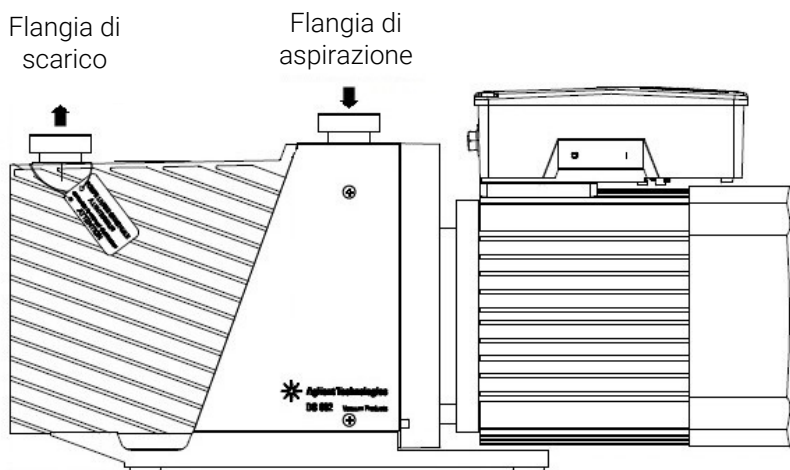


Figura 2 Flange e connessioni

AVVERTENZA



Allo scopo di garantire che la pressione interna al contenitore dell'olio non superi mai il valore massimo ammissibile di 1.7 bar (abs), sulla pompa è installato un dispositivo di sicurezza indicato dalla freccia rossa nella figura sottostante. Trattandosi di dispositivo di sicurezza, questo tappo non va in alcun modo sostituito, danneggiato o manomesso. È ammessa la sua momentanea rimozione (tramite svitamento) per consentire la carica dell'olio nella pompa quando necessario. È responsabilità dell'utente riavvitare il dispositivo nella sua posizione originaria dopo l'avvenuta carica dell'olio e prima dell'avvio della pompa.

L'inosservanza di queste precauzioni può causare danni alla macchina ed all'operatore.

Nel caso in cui la pressione del contenitore dell'olio superi i valori limite ammessi (ad esempio per scarico ostruito) una miscela di gas aspirati e olio fuoriuscirà dal tappo di sicurezza. Questa fuoriuscita continuerà fino allo spegnimento della pompa e/o alla rimozione della causa di sovrappressione (ad esempio rimozione dell'ostruzione dello scarico).



Figura 3

Istruzioni per l'uso

ATTENZIONE Controllare che la tensione e la frequenza di alimentazione corrisponda al campo di valori indicati sulla piastra del motore.

Collegare la pompa all'alimentazione.

ATTENZIONE Prestare particolare attenzione al motore trifase, dove un'inversione di polarità provoca l'inversione del senso di rotazione della pompa con conseguenti possibilità di danni meccanici.

Cavo di alimentazione per pompe monofase. Il cavo corretto per il cablaggio elettrico è un cavo a tre fili (Fase+N+Terra). La sezione del cavo deve essere di almeno 0,75 mm² (AWG18).

La pompa deve essere utilizzata con il cavo di alimentazione fornito con la pompa (disponibile anche come accessorio).

Apertura

Prima di avviare la pompa, rabboccare con olio lubrificante poiché le pompe vengono consegnate vuote.

NOTA

Nella confezione è inclusa una lattina di olio.

Per i dettagli su come effettuare il rifornimento, consultare la Scheda di manutenzione programmata 01.

ATTENZIONE L'olio deve essere versato nel carter attraverso l'apposito foro filettato e NON attraverso la linea di aspirazione.

AVVERTENZA



Rimuovere i tappi di protezione sulle flange di aspirazione e di scarico prima di fare qualsiasi altra cosa. In caso di avvio accidentale, l'aria all'interno della pompa potrebbe espellere violentemente i cappucci protettivi e danneggiare l'operatore.

Fissaggio della pompa rotativa bistadio a palette

Il posizionamento della pompa deve essere eseguito come segue:

- Pompa appoggiata a terra. Non ci sono istruzioni speciali per questo tipo di installazione, tranne per il fatto che il pavimento deve essere il più piatto possibile e adatto a sopportare il peso della pompa (dovrebbe idealmente essere un pavimento in cemento) e degli eventuali accessori montati su di essa. È da considerare che la pompa è stabile sulla sua base e non dovrebbe essere necessario ancorarla al pavimento con bulloni e viti; anche le vibrazioni da e verso la pompa sono notevolmente ridotte dall'uso di piedini in gomma.
- Pompa sollevata da terra. In questo caso, l'utente deve progettare una struttura di supporto adeguata, ricordando i seguenti punti:
 - il piano che supporta la pompa deve essere perfettamente orizzontale;
 - la struttura deve essere adeguatamente rigida;
 - devono essere adottate le precauzioni di sicurezza applicabili.

Considerare inoltre che la pompa deve essere fissata alla struttura di supporto dopo aver sostituito i piedini in gomma con speciali piedini antivibranti, da avvitare alla base della pompa e al piano di supporto.

Dopo aver rimosso la pompa dalla confezione, si consiglia di effettuare i seguenti controlli:

- a Accertarsi che la pompa non abbia subito danni durante il trasporto.
- b Controllare che le protezioni siano montate correttamente e che non vi siano parti scoperte o allentate.

Collegamento delle flange di aspirazione e delle connessioni di scarico

Rimuovere i cappucci protettivi da entrambe le porte. Collegare il sistema da evacuare alla flangia d'aspirazione, utilizzando un anello di centraggio con OR e un morsetto di serraggio.

Istruzioni per l'uso

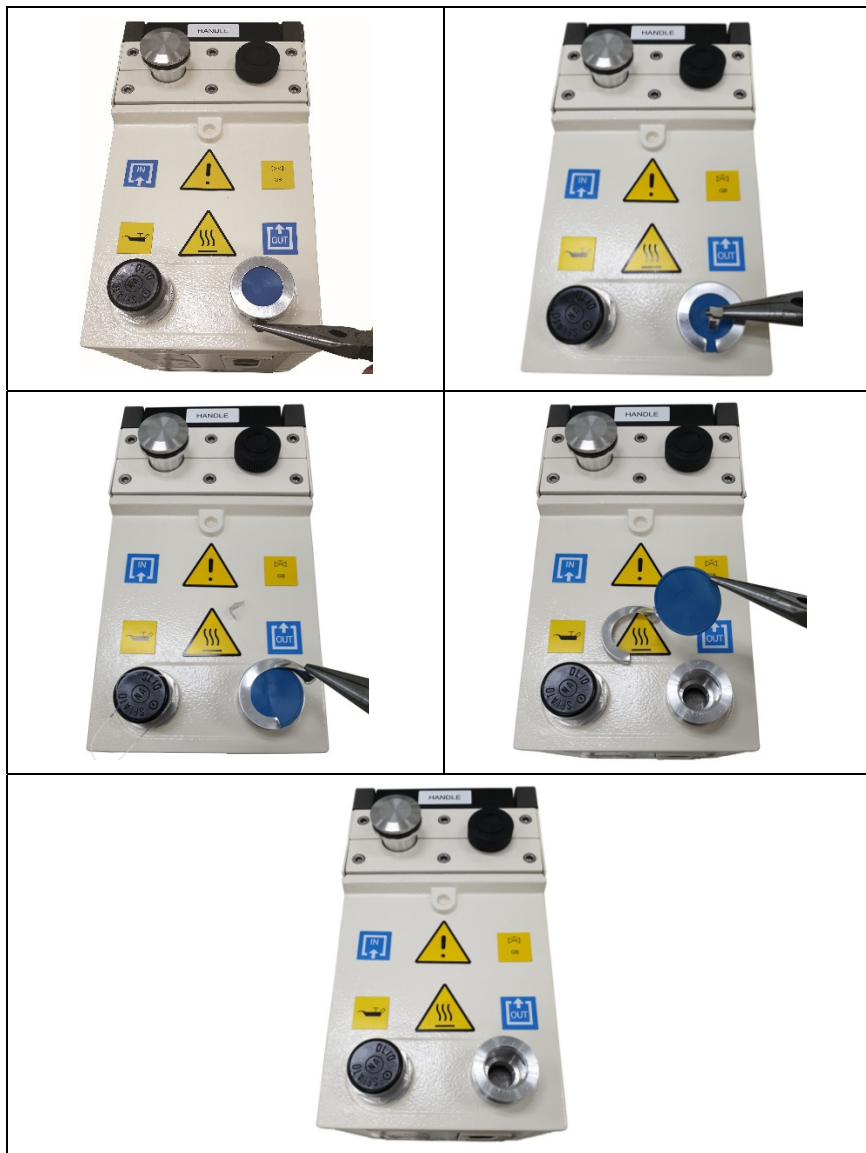


Figura 4

NOTA

Per garantirsi una tenuta affidabile, utilizzare una guarnizione NBR oppure FKM.

Il condotto di ingresso è dotato di un filtro a setaccio che impedisce alle parti solide di entrare e danneggiare la pompa.

Istruzioni per l'uso

NOTA

Quando i gas da pompare contengono polvere, si consiglia di inserire un filtro antipolvere prima della flangia d'aspirazione.

NOTA

Quando i gas da pompare contengono grandi quantità di vapore, è consigliabile includere un separatore di condensa prima della flangia d'aspirazione.

Per sfruttare al meglio la capacità della pompa, utilizzare solo tubazioni corte e dritte, con un diametro non inferiore a quello della flangia d'aspirazione.

NOTA

Se si utilizzano tubazioni rigide, è buona norma utilizzare un giunto flessibile per evitare forzature indebite della connessione sulla pompa.

I gas di scarico devono essere convogliati all'esterno collegando la connessione di scarico ad una tubazione dedicata.

NOTA

Un eliminatore di nebbia d'olio interno evita l'inquinamento dell'atmosfera circostante da parte dell'olio presente nel condotto di scarico durante il funzionamento della pompa.

ATTENZIONE

Non bloccare mai la linea di scarico della pompa. Ciò provocherebbe una sovrappressione nell'involucro con il rischio di rompere il serbatoio dell'olio.

Avvio e funzionamento della pompa rotativa bistadio a palette

Prima della messa in servizio, per raggiungere il vuoto massimo, la pompa deve essere lasciata in funzione per circa un'ora con la valvola zavorratrice aperta. Questo eliminerà l'umidità presente nell'olio.

Non sono previste procedure particolari per l'accensione della pompa; è sufficiente collegarla alla rete elettrica tramite l'interruttore bipolare (versione con motore monofase) o l'interruttore multipolare (versione con motore trifase).

AVVERTENZA



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

NOTA

Se la pompa viene avviata con olio freddo, inizialmente si sentirà rumore più del normale; questo durerà solo pochi minuti fino a quando l'olio raggiunge la sua temperatura di lavoro.

Non ci sono istruzioni speciali per il normale funzionamento della pompa, che viene spedita dopo il completamento di un ciclo di funzionamento in fabbrica.

NOTA

Per cicli di lavoro ripetitivi, con brevi intervalli di tempo, è meglio non arrestare la pompa.

Arresto della pompa rotativa bistadio a palette

Non sono previste procedure particolari per lo spegnimento della pompa; è sufficiente scollegarla dalla rete elettrica tramite l'interruttore bipolare (versione con motore monofase - vedere sezione MODELLI CON MOTORI UNIVERSALI MONOFASE) o l'interruttore multipolare (versione con motore trifase - vedere sezione MODELLI CON MOTORI UNIVERSALI TRIFASE).

A pompa ferma, il dispositivo antiritorno permette di mantenere il vuoto nel serbatoio collegato alla flangia di aspirazione della pompa.

Se si prevede un fermo prolungato della pompa, o comunque se ha pompato grandi quantità di vapori, è buona norma farla funzionare con la zavorra di gas aperta e la linea di aspirazione chiusa per alcuni minuti prima dello spegnimento, al fine di limitare il rischio di corrosione o incrostazioni dovute all'inquinamento dell'olio da parte dei vapori condensati.

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 periodo di esercizio, è necessario lasciarla raffreddare, poiché la temperatura esterna può superare i 60 °C.

Istruzioni per l'uso

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.

ATTENZIONE

In fase di sostituzione di pezzi, operare con attenzione. In particolare nel caso di adozione di motore trifase, una inversione di polarità provoca l'inversione del verso di rotazione della pompa, con conseguenti possibili danni di natura meccanica.

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.

La manutenzione può essere considerata come la totalità di tutti i lavori di manutenzione programmati e non programmati.

- **MANUTENZIONE PROGRAMMATA:** mantenimento dello stato nominale di funzionamento.
- **MANUTENZIONE NON PROGRAMMATA:** ripristino dello stato nominale di funzionamento.

NOTA

La frequenza con cui vengono eseguite le riparazioni dipende dal processo e dalla presenza di sostanze che riducono la durata della pompa (polvere, abrasivi, solventi, acqua, sostanze chimicamente aggressive).

Istruzioni per l'uso

Utilizzare solo la quantità di lubrificante strettamente necessaria; un eccesso di olio lubrificante, come la sua assenza, può talvolta compromettere il corretto funzionamento della pompa.

Utilizzare esclusivamente i lubrificanti raccomandati o oli lubrificanti con caratteristiche simili e qualità nota e sperimentata.

Il cambio dell'olio deve essere effettuato con l'olio a una temperatura sufficientemente elevata, dopo aver lasciato raffreddare la pompa per alcuni minuti dopo l'uso.

I tappi di scarico e riempimento non devono essere lasciati aperti più a lungo di quanto strettamente necessario. Quando si esegue la manutenzione, cercare tutti i segnali che possono precedere un guasto, in particolare:

- tracce di corrosione;
- perdite d'olio;
- giunti o accoppiamenti allentati.

I tecnici della manutenzione devono:

- essere a conoscenza di tutte le direttive nazionali applicabili in materia di prevenzione degli incidenti durante i lavori sulle pompe azionate da motore elettrico e dovrebbe conoscerne l'applicazione;
- aver letto e compreso tutti i paragrafi sulla "Sicurezza"
- conoscere le caratteristiche essenziali del design e il funzionamento della pompa;
- sapere come utilizzare e consultare la documentazione della pompa;
- essere interessato al corretto funzionamento della pompa;
- annotare eventuali irregolarità nel funzionamento della pompa e, se del caso, adottare le misure necessarie.

Istruzioni per l'uso

Utilizzare pezzi di ricambio originali. Per tutti i problemi che si presentano o per ordinare pezzi di ricambio, contattare il nostro servizio assistenza.

Agilent Technologies Italia S.p.A.
Vacuum Products Division
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

Le procedure da adottare per il cambio dell'olio e la sostituzione della cartuccia del filtro della Dual Stage Rotary Vane pumps sono descritte nella sezione "Technical Information".

Pulizia

ATTENZIONE Non usare alcool per la pulizia dei componenti in plastica o gomma della pompa.

Durante la pulizia della pompa e dei suoi componenti, evitare l'uso di solventi infiammabili o tossici, come benzina, benzolo, etere o alcol.

La raccomandazione è di usare una soluzione di acqua e sapone, preferibilmente nelle lavatrici a ultrasuoni, avendo cura di asciugare tutte le parti pulite a temperature inferiori a 100 °C per eliminare l'umidità residua.

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.



Figura 5 Logo "WEEE"

Per maggiori informazioni consultare:

<http://www.agilent.com/environment/product/index.shtml>

Servizio Post Vendita

Nel caso in cui un cliente necessitasse di un servizio di sostituzione o riparazione avanzato, si prega di contattare il distributore locale o scrivere direttamente a:

vpt-customer@agilent.com

vpl-customer@agilent.com

È necessario completare il modulo "Richiesta di ritorno" per restituire il prodotto ad Agilent per l'assistenza (fornito alla fine di questo manuale).

2

Betriebsanleitung

| | |
|--|----|
| Informationen über diese Betriebsanleitung | 43 |
| Gültigkeit | 43 |
| Definitionen und Terminologie | 44 |
| Definition von Vorsicht, Warnung und Hinweis | 44 |
| Warnsymbole | 45 |
| Sicherheit | 47 |
| Korrekte Verwendung | 47 |
| Unsachgemäße Anwendung | 48 |
| Warnungen | 49 |
| Vorsichtshinweise | 50 |
| Umleitung der Abgasluft | 50 |
| Persönliche Schutzausrüstung | 51 |
| Sicherheitsrichtlinie für zweistufige Drehschieberpumpen | 53 |
| Transport & Lagerung | 54 |
| Beschreibung des Produkts | 54 |
| Installation von zweistufigen Drehschieberpumpen | 55 |
| Vorbereitung der Installation | 55 |
| Installation | 56 |
| Öffnung | 60 |
| Montage einer zweistufigen Drehschieberpumpe | 61 |
| Anschluss der Saugflansche und der Ablaufverbindungen | 61 |
| Start und Betrieb der zweistufigen Drehschieberpumpe | 64 |
| Ausschaltung der zweistufigen Drehschieberpumpe | 65 |
| Wartung | 65 |
| Reinigung | 68 |
| Entsorgung | 69 |
| Service | 70 |

Informationen über diese Betriebsanleitung

Gültigkeit

Diese Betriebsanleitung enthält die Anweisungen für die Benutzer der zweistufigen Drehschieberpumpen (Dual Stage Rotary Vane) mit besonderer Bezugnahme auf die Begriffe für Sicherheit, Betrieb und Wartung auf der ersten Ebene, auf die Wartungsarbeiten beschränkt, für die der Benutzer verantwortlich ist.

Die in den spezifischen Abschnitten dargestellten Wartungsarbeiten mit spezifischen Verordnungen hinsichtlich der höheren Wartungsebene (entsprechend geschultes Personal für die Wartungsarbeiten) dürfen nicht durch den Benutzer ausgeführt werden.

Für eine korrekte Installation und Start/Stopps das Kapitel „Installation“ konsultieren. Für eine detailliertere technische Verwendung das Kapitel „Technical Information“ konsultieren.

Für weitere Details über die technische Verwendung das Kapitel „Technical Information“ konsultieren.

HINWEIS

- 1 Diese Betriebsanleitung enthält nützliche Informationen, damit alle Bediener der zweistufigen Drehschieberpumpen diese sicher bedienen und über die gesamte Lebensdauer hinweg eine einwandfreie Funktion gewährleisten können.
 - 2 Diese Betriebsanleitung muss zusammen mit allen mit dieser zusammenhängenden Veröffentlichungen an einem zugänglichen Ort, der allen Bedienern/Wartungspersonal bekannt ist, aufbewahrt werden.
-

Definitionen und Terminologie

Definition von Vorsicht, Warnung und Hinweis

Einige wichtige Bezüge dieser Betriebsanleitung werden durch Kontrastfarben hervorgehoben und eingerahmt.

VORSICHT

Die Vorsichtshinweise werden vor Verfahren angezeigt, die Schäden am Gerät verursachen könnten, wenn sie nicht beachtet werden.

WARNUNG



Die Warnhinweise lenken die Aufmerksamkeit des Bedieners auf ein Verfahren oder einen spezifischen Vorgang, der schwere Verletzungen von Personen zur Folge haben könnte, wenn er nicht korrekt ausgeführt wird.

HINWEIS

Die Hinweise enthalten wichtige Informationen und liefern weitere Details über spezifische Arbeitsschritte.













Warnsymbole

Es folgt eine Liste von Symbolen, die in Verbindung mit Warnhinweisen auf den zweistufigen Drehschieberpumpen erscheinen. Es wird auch die von diesen beschriebene Gefahr gezeigt. In dreieckiges Symbol zeigt einen Warnhinweis an. Die Bedeutungen der Symbole, die neben den Warnhinweisen in der Dokumentation erscheinen können, sind Folgende. Das folgende Symbol kann auf den am Gerät angebrachten Warnschildern verwendet werden. Wenn dieses Symbol angezeigt wird, die entsprechende Betriebs- oder Bedienungsanleitung für das korrekte Verfahren konsultieren, auf die sich dieses Warnschild bezieht.



| | |
|---|---|
|  | Vorhandensein gefährlicher Spannungen |
|  | Vorhandensein von überhitzten Oberflächen |
|  | Allgemeine Gefahr |
|  | Herstellungsdatum |
|  | Saugflansch |
|  | Ablassflansch |
|  | Betriebsflüssigkeiten auffüllen |
|  | Gasballastventil |
|  | Vorhandensein von Gefahrstoffen |

Betriebsanleitung

| | |
|---|--|
|  | Quetschgefahr |
|  | Schnittgefahr |
|  | Schutzhandschuhe tragen |
|  | Persönliche Schutzausrüstung tragen |
|  | Unfallschutzschuhe tragen |
|  | Einschaltung |
|  | Ausschaltung |
|  | Ölflasche |
|  | CE-Zertifizierung |
|  | CSA-Zertifizierung |
|  | China RoHS-Zertifizierung |
|  | Abfälle elektrischer und elektronischer Geräte |

Sicherheit

Dieser Abschnitt enthält die Informationen der Maschinenrichtlinie 2006/42/EG, die grundlegend für die Übereinstimmung und die Beachtung der Sicherheitsvorschriften sowohl im Allgemeinen als auch für die spezifische Verwendung der Maschine sind.

Die Nichtbeachtung dieser Anweisungen und der anderen in der vorliegenden Betriebsanleitung enthaltenen Anweisungen kann die in der Projektphase vorgesehenen Sicherheitsbedingungen unwirksam machen und Unfälle des Personals, das die Maschine verwendet, verursachen.

Agilent Technologies weist jede Verantwortung für Schäden an der Maschine oder für die körperliche Sicherheit des Bedieners oder Dritter aufgrund der Nichtbeachtung der Sicherheitsvorschriften, die in der technischen Dokumentation angegeben werden, zurück.

Korrekte Verwendung

Diese Betriebsanleitung enthält wichtige Warnhinweise und Sicherheitsvorschriften, die zu beachten sind, damit die Einheit in Sicherheit funktioniert.

Das in dieser Betriebsanleitung beschriebene Produkt ist ausschließlich für den in den Anweisungen angegebenen Bereich bestimmt. Die Betriebsanleitung liefert außerdem Angaben für die grundlegenden Anforderungen für die Anwendung und den Betrieb des Produkts sowie die Sicherheitsmaßnahmen, die ergriffen werden können, um einen ordnungsgemäßen Betrieb zu garantieren. Agilent Technologies bietet keine Garantie und übernimmt auch keine Verantwortung für andere als die in der vorliegenden Betriebsanleitung beschriebenen Anwendungen oder bei Nichtbeachtung der grundlegenden Anforderungen und Sicherheitsmaßnahmen. Das Produkt darf nur von Fachpersonal verwendet werden, das fähig ist, die notwendigen Sicherheitsmaßnahmen in Bedingungen anzuwenden, die keine Schäden oder Verletzungen verursachen. Das Zubehör und die mit dem Produkt verwendeten Ausstattungen müssen von Agilent Technologies geliefert oder genehmigt werden.

Jede Einstellung oder Wartungsarbeit muss von einem Fachtechniker ausgeführt werden, der über die Risiken informiert ist.

Die Reparaturen am Produkt müssen ausschließlich durch autorisiertes Personal von Agilent ausgeführt werden.

Unsachgemäße Anwendung

Agilent Technologies lehnt jegliche Verantwortung ab, die sich aus der unsachgemäßen Verwendung der zweistufigen Drehschieberpumpen ergibt.

Die unsachgemäße Anwendung führt zum Verlust für das Recht aller Reklamationen hinsichtlich der Verantwortung und der Garantien.

Das verantwortliche Personal für den Betrieb und die Wartung der Pumpe muss gut geschult sein und die Unfallschutzvorschriften kennen. Die Vorsichtsmaßnahmen für die Vorbeugung von Unfällen, die in diesem Kapitel enthalten sind, müssen immer während des Betriebs und der Wartung der Pumpe beachtet werden, um Schäden der Bediener und der Pumpe zu vermeiden. Diese Vorsichtsmaßnahmen werden in Form von WARNHINWEISEN und VORSICHT angezeigt.

WARNUNG



Betriebsverfahren, technische Informationen und Vorsichtsmaßnahmen, die Schäden der Bediener verursachen können, wenn sie nicht beachtet und/oder korrekt angewendet werden.

HINWEIS

Die Rückhaltefeder für die Befestigung des Stromkabels in der Steckdose IEC320 verwenden.

VORSICHT

Betriebsverfahren, technische Informationen und Vorsichtsmaßnahmen, die Schäden der Pumpe verursachen können, wenn sie nicht beachtet und/oder korrekt implementiert werden.

Warnungen

- Der Kontakt mit Hochspannungen kann zum Tod führen. Immer mit der größten Vorsicht vorgehen, und die geltenden Sicherheitsvorschriften beachten.
- Vor der Ausführung von Wartungseingriffen immer das Netzkabel vom Netzteil der Pumpe abziehen. Ein spezielles Warnsignal auf dem Stromschalter positionieren: MASCHINE WIRD GEWARTET - NICHT EINSCHALTEN.
- Wenn die Wartung ausgeführt wird, nachdem die Pumpe für eine beachtliche Zeit in Betrieb gewesen ist, warten, bis sie abgekühlt ist, weil die Temperatur der Außenfläche 60 °C überschreiten könnte.
- Die fehlende Erdverbindung der Pumpe kann schwere Schäden der Bediener verursachen. Immer sicherstellen, dass eine Erdverbindung vorhanden ist und dass sie den Standards entspricht.
- Während der Reinigung der Pumpe und ihrer Bestandteile die Verwendung von entflammbaren oder giftigen Lösungsmitteln vermeiden. Es wird empfohlen, eine Lösung aus Wasser und Seife, vorzugsweise in Ultraschallwaschmaschinen, zu verwenden und darauf zu achten, alle sauberen Bestandteile bei Temperaturen von unter 100 °C abzutrocknen, um die restliche Feuchtigkeit zu entfernen.
- Längere Überlastung oder Störungen können zu einer Überhitzung des Elektromotors und zur Freisetzung von giftigem Rauch führen. Schalten Sie die Stromzufuhr vorsorglich sofort ab und nähern Sie sich der Pumpe erst, nachdem Sie für ausreichende Belüftung gesorgt haben, um den Rauch abzuführen. Achten Sie darauf, die im Inneren der Pumpe verbleibenden Dämpfe während der Reparaturarbeiten nicht einzuatmen.
- Im Falle eines Brandes kein Wasser auf die Pumpe spritzen. Die Stromversorgung ausschalten, und CO₂-Löscher verwenden.
- Die Flansche aufmerksam untersuchen, um sicherzustellen, dass kein Staub, Öl, Schmutz oder Mängel an den Verbindungsflächen vorhanden sind, bevor die erforderlichen Verbindungen ausgeführt werden.
- Sicherstellen, dass alle Kupplungen und Verbindungen korrekt blockiert sind, bevor die Pumpe wiedergestartet wird, nachdem die Reparaturarbeiten ausgeführt wurden.
- Keine Gegenstände tragen, die sich in den Mechanismen verfangen und/oder als Leiter wirken könnten (Ketten, Armbänder usw.).
- Sicherstellen, dass die zu verwendenden Geräte in perfektem Zustand sind und, wo erforderlich, Isoliergriffe haben. Sicherstellen, dass das Isoliermaterial der Kabel und Leiter der Prüfungsgeräte keine Zeichen einer Beschädigung aufweist.
- Das Öl nicht unmittelbar nach der Ausschaltung der Maschine wechseln, da das Öl noch eine hohe Temperatur haben könnte.

Vorsichtshinweise

- Vor der Inbetriebnahme der Pumpe nach einer Störung diese untersuchen, und aufmerksam etwaige weitere Zeichen einer Beschädigung kontrollieren.
- Nur perfekt funktionierende und eigens für diesen Zweck entwickelte Geräte verwenden; die Verwendung von unangemessenen oder unwirksamen Geräten kann schwere Schäden verursachen.
- Führen Sie Reparaturen in sauberen und möglichst staubfreien Bereichen durch. Schützen Sie alle Verbindungsstellen mit geeigneten Kunststoffkappen und decken Sie die bearbeiteten Oberflächen aller demontierten Teile ab, bis diese wieder an der Pumpe montiert werden.
- Immer kontrollieren, ob das Schmiermittel korrekt durch die Pumpe verteilt wird; eine unangemessene Schmierung kann die Pumpe ernsthaft beschädigen.
- Den Bestandteilen eine Form von Kennzeichnung zuordnen, während sie entfernt werden, um sicherzustellen, sie in der korrekten Reihenfolge wieder einzubauen.
- Kontrollieren, ob Kratzer oder Rillen an den Wellen, in ihren Aufnahmen in der Pumpe oder auf den Oberflächen der Maschine vorhanden sind. Leichte Kratzer oder Abrieb können mit sehr feinem Schmirgelpapier oder durch leichtes Schmirgeln entfernt werden.
- Vor der Zusammensetzung des Aggregats immer etwas Öl auf den Innenteilen und den Auflageflächen verteilen. Vor dem Einbau der Bestandteile alle Dichtungen durch Originalersatzteile ersetzen.

Umleitung der Abgasluft

Wenn der Luftaustausch im Pumpenraum unzureichend ist, kann die austretende Luft in andere Räume oder nach außen geleitet werden.

Verwenden Sie Leitungen, die den gleichen Durchmesser haben wie der Ausgang des Tanks bei maximaler Länge von 15 m.

Wenn die Leitungen länger sind, vergrößern Sie den Durchmesser. Das Gewicht der Leitungen darf die Pumpe nicht beschweren.

Verwenden Sie im letzten Abschnitt Schläuche oder flexible Leitungen.

WARNUNG

Diese Leitung muss ein Gefälle haben, damit kein Kondenswasser in den Tank der Pumpe gelangt.



VORSICHT

Stecken Sie diese Leitung nicht auf Hähne. Blockieren Sie den Ausgang nicht.

Persönliche Schutzausrüstung

Die persönliche Schutzausrüstung der Bediener, die am Pumpsystem arbeiten oder die Wartung ausführen, muss immer dem Typ der auszuführenden Arbeit entsprechen. Außerdem muss es die Sicherheitsanforderungen der gültigen Gesetzgebung im Anwendungsland der Maschine erfüllen.

Generell muss der Bediener beim Umgang mit den zweistufigen Drehschieberpumpen und während der Installation Sicherheitsschuhe tragen.

WARNUNG



Gesundheitsgefahr durch gefährliche Stoffe bei Wartung oder Installation

- Vakuumpumpen, Komponenten oder Betriebsflüssigkeiten können je nach Prozessbesonderheit mit giftigen, reaktiven oder radioaktiven Stoffen verunreinigt sein.
- Tragen Sie bei Wartungs- und Reparaturarbeiten oder bei einer erneuten Installation angemessene Schutzausrüstung.

WARNUNG

Verletzungsgefahr durch herunterfallende Gegenstände



Beim Transport von Vakuumpumpen von Hand besteht die Gefahr, dass Lasten verrutschen und herunterfallen.

- Tragen Sie kleine und mittlere Vakuumpumpen mit zwei Händen.
- Alle Geräte, die schwerer als 20 kg sind, sollten mit einer geeigneten Hebevorrichtung transportiert werden.
- Sicherheitsschuhe mit Stahlkappe gemäß Richtlinie EN 347 tragen.

VORSICHT



Verletzungsgefahr durch scharfe Kanten

- Warten Sie vor der Wartung der Pumpe oder vor dem Ein- und Ausbau der Pumpe vom System bis zum vollständigen Stillstand der Pumpe.
- Nicht direkt im Hochvakuumflansch betreiben.
- Gegebenenfalls Schutzhandschuhe nach EN 420 tragen.

Sicherheitsrichtlinie für zweistufige Drehschieberpumpen

Ölgeschmierte Drehschieberpumpen können hohe Betriebstemperaturen erreichen. Daher wird empfohlen, die Pumpe vor jeglichen Wartungsarbeiten abkühlen zu lassen.

- Wenn das Gerät auf eine nicht vom Hersteller angegebene Art und Weise verwendet wird, könnte der vom Gerät gebotene Schutz beeinträchtigt werden.
- Die Pumpe immer durch die geschlossenen Ösen, mit denen sie ausgestattet ist, transportieren.
- Die Pumpe muss mit hoher Aufmerksamkeit in ihre Position gebracht werden, um versehentliche Stürze zu vermeiden.

WARNUNG



Falls die Pumpe nach der Betriebszeit gehandhabt werden muss, ist es notwendig, diese vorher abkühlen zu lassen, da die Temperatur der Außenfläche 60 °C überschreiten kann.

WARNUNG



Um Schäden an den Geräten zu vermeiden und um Verletzungen des Bedienpersonals zu verhindern, ist es notwendig, die in dieser Betriebsanleitung ausgehändigten Installationsanweisungen strengstens zu befolgen.

Transport & Lagerung

Die Pumpen werden dem Kunden in Kartonverpackungen geliefert.

Das Gesamtgewicht der Kartonverpackung inklusive Pumpe liegt je nach Pumpenmodell zwischen 30 kg und 40 kg.

Das Gehäuse muss mit Vorsicht mit Verwendung entsprechender Hebwerkzeuge gehandhabt werden.

VORSICHT

Wenn das Gehäuse verstellt wird, sicherstellen, dass es fest an den Hebwerkzeugen befestigt ist und dass diese robust genug sind, um das Gewicht zu tragen.

Die Arbeitsumgebung der Pumpe ist eine normale Industrieumgebung. Vorzugsweise sind Standorte mit korrosiven Dämpfen und übermäßiger Hitze zu vermeiden.

Die Raumtemperatur sollte zwischen 12 °C und 40 °C liegen. Wenn die Temperatur nicht in diesem Intervall liegt, den technischen Kundendienst von Agilent für die notwendigen Änderungen konsultieren.

Während des Transports und der Lagerung der Pumpen dürfen die folgenden Umgebungsbedingungen nicht überschritten werden:

- Temperatur: von -20 °C bis 70 °C
- Relative Feuchtigkeit: 0 ÷ 95 % (ohne Niederschlag)

Beschreibung des Produkts

Dieses Gerät ist für eine professionelle Anwendung bestimmt. Der Benutzer muss die vorliegende Betriebsanleitung und alle von Agilent vor der Anwendung des Geräts weiteren zusätzlichen Informationen aufmerksam durchlesen. Agilent betrachtet sich als von jeder Haftung für die vollständige oder teilweise Nichtbeachtung der Anweisungen, für die unsachgemäße Anwendung durch ungeschultes Personal, für unbefugte Eingriffe oder für eine Verwendung, die gegen spezifische nationale Vorschriften verstößt, befreit.

Die Pumpen DS102 1Ph, DS202 1Ph, DS302 1Ph, DS402 1Ph, DS402 3Ph, DS602 1Ph und DS602 3Ph sind zweistufige Drehschieberpumpen mit Ölabdichtung, die von einem einphasigen oder dreiphasigen Elektromotor angetrieben werden.

Detaillierte Informationen werden im Abschnitt „Technical Information“ gegeben.

Installation von zweistufigen Drehschieberpumpen

Vorbereitung der Installation

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

Das Gesamtgewicht der Pumpe ohne Verpackung liegt zwischen 22 und 36 kg.

Während dem Auspacken besonders darauf achten, die Pumpe nicht fallen zu lassen und diese nicht Stößen oder Vibrationen auszusetzen.

Das Verpackungsmaterial ist umweltgerecht zu entsorgen. Das Material ist vollständig recycelbar und entspricht der EWG-Richtlinie 94/62 für den Umweltschutz.

HINWEIS

Die Pumpe kann, wenn sie einfach der Atmosphäre ausgesetzt wird, nicht beschädigt werden. Es wird jedoch empfohlen, sie bis zum Zeitpunkt der Installation auf dem System geschlossen zu lassen, um eine mögliche Verschmutzung durch Staub zu vermeiden.

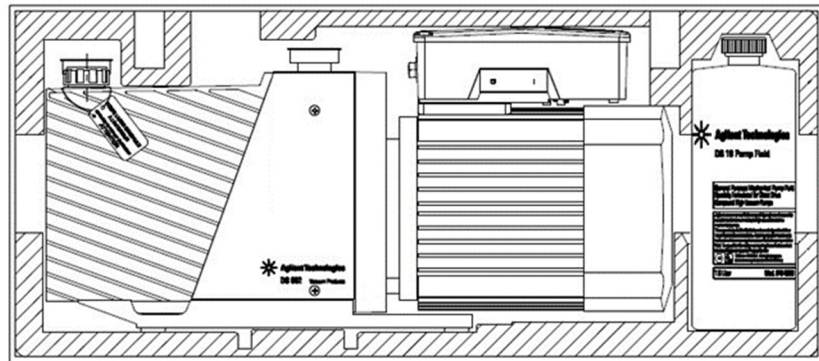


Abbildung 6 Verpackung von zweistufigen Drehschieberpumpen

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 beachtet werden:

- Temperatur: von +12 °C bis +40 °C
- Relative Feuchtigkeit: 0 ÷ 95 % (ohne Niederschlag)

WARNUNG



Zum Schutz vor Kurzschlüssen oder Überlastungen, muss ein automatischer Schalter Typ C in die Hauptspeisungsleitung zu den Agilent-Vorrichtungen installiert werden (siehe folgende Tabelle):

| P/N | 110 Vac | 220 Vac | 380 Vac |
|---------|---------|---------|---------|
| 9499315 | 10 A | 6 A | |
| 9499320 | 10 A | 6 A | |
| 9499325 | 10 A | 6 A | |
| 9499330 | 16 A | 7.5 A | |
| 9499331 | | 6 A | 6 A |
| 9499335 | 16 A | 7.5 A | |
| 9499336 | | 6 A | 4 A |

Betriebsanleitung

VORSICHT Die Pumpe ist vor ihrer Inbetriebnahme mit Schmieröl zu füllen, da sie leer geliefert wird.

VORSICHT Das Öl muss durch die entsprechende Gewindebohrung und NICHT durch die Saugleitung in das Gehäuse gefüllt werden.

HINWEIS Es ist wichtig, dass der Ölstand konstant zwischen den MIN- und MAX-Werten auf der Füllstandanzeige auf der Seite der Pumpe angezeigt wird.

VORSICHT Es ist Pflicht, im Umkreis der Pumpe einen großen Raum freizulassen, um eine korrekte Luftzirkulation zu ermöglichen; es ist nicht zulässig, die Pumpe in ein geschlossenes Volumen ohne Luftzirkulation einzuführen. Wegen einem internen Sicherheitssystem könnte die Pumpe einen Fehler anzeigen, wenn die Raumtemperatur von 40 °C überschritten wird.

Betriebsanleitung

WARNUNG



Die Schutzkappen an den Saug- und Ablassflanschen lassen, und die Pumpe nicht einschalten, bis diese entsprechend am Gerät mit der Ablaufleitung verbunden werden.

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 nachstehende Abbildung). Die Pumpe darf nicht als Verdichter verwendet werden. Die Nichtbeachtung dieser Vorsichtsmaßnahmen kann Schäden der Maschine und des Bedieners verursachen.

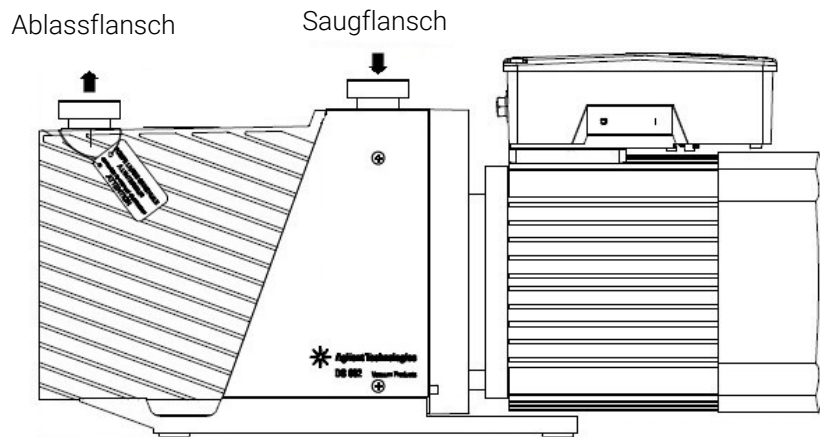


Abbildung 7 Flansche und Anschlüsse

WARNUNG



An der Pumpe ist eine Sicherheitsvorrichtung (im Bild unten mit einem roten Pfeil gekennzeichnet) installiert, die sicherstellt, dass der Druck im Ölbehälter den maximal zulässigen Wert von 1,7 bar (abs) nicht überschreitet. Da es sich um eine Sicherheitsvorrichtung handelt, darf der Verschluss nicht ausgetauscht, beschädigt oder manipuliert werden. Zum Befüllen der Pumpe mit Öl darf er bei Bedarf kurzzeitig durch Abschrauben entfernt werden. Der Benutzer ist dafür verantwortlich, die Vorrichtung nach dem Befüllen und vor dem Starten der Pumpe wieder in ihre ursprüngliche Position zu schrauben.

Die Nichtbeachtung dieser Vorsichtsmaßnahmen kann zu Schäden an der Maschine und zu Verletzungen des Bedieners führen.

Wenn der Druck im Ölbehälter die zulässigen Grenzwerte überschreitet (z. B. durch einen verstopften Auspuff), tritt ein Gemisch aus Ansauggas und Öl aus dem Sicherheitsverschluss aus. Dieser Ausstoß hält an, bis die Pumpe gestoppt wird und/oder die Ursache des Überdrucks beseitigt ist (z. B. Beseitigung einer Verstopfung im Auspuff).



Abbildung 8

Betriebsanleitung

VORSICHT

Prüfen Sie, ob die Spannung und Frequenz Ihres Stromnetzes dem auf dem Typenschild des Motors angegebenen Bereich entsprechen.

Die Pumpe an das Versorgungsnetz anschließen.

VORSICHT

Bei Dreiphasenstrommotoren bewirkt eine Polumkehrung die Umkehrung des Drehsinns der Pumpe, was Schäden an der Mechanik zur Folge haben kann.

WARNUNG



Die Pumpe muss so installiert werden, dass die Stromversorgung leicht unterbrochen werden kann.

Stromkabel für einphasige Pumpen: Für den Anschluss muss ein dreipoliges Kabel verwendet werden (Außenleiter + Neutral + Masse). Der Kabelquerschnitt muss mindestens $0,75 \text{ mm}^2$ betragen (AWG18).

Die Pumpe muss mit dem Stromkabel verwendet werden, das zusammen mit der Pumpe geliefert wird (auch als Zubehör erhältlich).

Öffnung

Vor Inbetriebnahme der Pumpe muss Schmieröl eingefüllt werden, da die Pumpen leer geliefert werden.

HINWEIS

Im Lieferumfang ist eine Dose Öl enthalten.

VORSICHT

Das Öl muss durch die spezielle Gewindeöffnung in das Gehäuse eingefüllt werden und NICHT durch die Saugleitung.

WARNUNG



Vor Aufnahme jeglicher Arbeiten sind die Schutzkappen an den Saug- und Ablaufflanschen zu entfernen. Die im Pumpeninneren enthaltene Luft könnte die Schutzkappen bei unbeabsichtigter Einschaltung herausschleudern und dem Bediener Schaden zufügen.

Montage einer zweistufigen Drehschieberpumpe

Die Positionierung der Pumpe muss wie folgt ausgeführt werden:

- Auf dem Boden liegende Pumpe. Es gibt keine speziellen Anweisungen für diese Art von Installation, außer der Tatsache, dass der Boden so eben wie möglich und geeignet sein muss, um das Gewicht der Pumpe (idealerweise sollte es ein Zementboden sein) und der etwaigen Zubehörteile zu tragen, die auf dieser montiert sind. Es ist zu berücksichtigen, dass die Pumpe stabil auf ihrer Basis steht, und es sollte nicht notwendig sein, diese am Boden mit Bolzen und Schrauben zu verankern; auch die Vibrationen von und in Richtung der Pumpe werden durch die Verwendung von Gummistützfüßen deutlich reduziert.
- Vom Boden angehobene Pumpe. In diesem Fall muss der Benutzer eine angemessene Trägerstruktur entwickeln und dabei folgende Punkte berücksichtigen:
 - Die Fläche, die die Pumpe trägt, muss perfekt horizontal sein;
 - Die Struktur muss entsprechend fest sein;
 - Es müssen die anwendbaren Vorsichtsmaßnahmen ergriffen werden.

Außerdem ist zu berücksichtigen, dass die Pumpe an der Trägerstruktur befestigt werden muss, nachdem die Gummistützfüße durch spezielle Antivibrationsfüße ersetzt wurden, die an der Basis der Pumpe und an der Auflagefläche angeschraubt werden müssen.

Nachdem die Pumpe aus der Verpackung entnommen wurde, wird empfohlen, die folgenden Kontrollen auszuführen:

- a Sicherstellen, dass die Pumpe keine Transportschäden erlitten hat.
- b Prüfen Sie, ob die Schutzvorrichtungen korrekt montiert sind und ob keine Teile unbedeckt oder lose sind.

Anschluss der Saugflansche und der Ablaufverbindungen

Entfernen Sie die Schutzkappen von beiden Anschlüssen. Verbinden Sie das zu evakuierende System mithilfe eines Zentrierrings mit OR-Anschluss und eines Klemmflansches mit dem Einlassflansch.

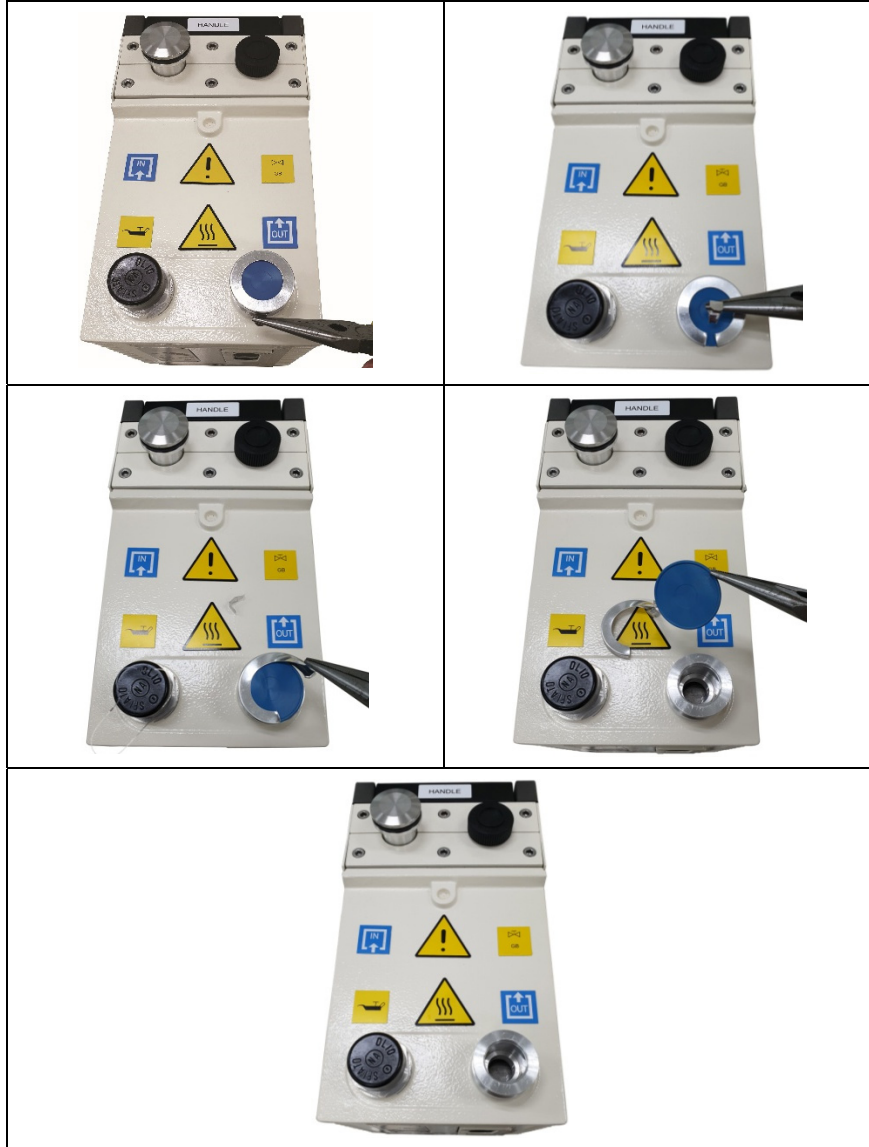


Abbildung 9

HINWEIS

Um eine zuverlässige Dichtheit zu garantieren, eine O-Ringdichtung aus NBR oder FKM verwenden.

Die Einlaufleitung ist mit einem Siebfilter ausgestattet, der verhindert, dass Festkörper eintreten und die Pumpe beschädigen.

Betriebsanleitung

HINWEIS Wenn die zu pumpenden Gase Staub enthalten, wird empfohlen, einen Staubschutzfilter vor dem Saugflansch einzusetzen.

HINWEIS Wenn die zu pumpenden Gase große Dampfmengen enthalten, empfiehlt es sich, einen Kondensatabscheider vor dem Saugflansch einzuschließen.

Um die Kapazität der Pumpe bestens zu nutzen, nur kurze und gerade Leitungen mit einem Durchmesser, der nicht kleiner als der Durchmesser der Saugflansch ist, verwenden.

HINWEIS Wenn feste Leitungen verwendet werden, empfiehlt sich die Verwendung einer flexiblen Kupplung, um unpassende Forcierungen der Verbindung auf die Pumpe zu vermeiden.

Die Abgase müssen nach außen geleitet werden, indem die Ablaufverbindung mit einer entsprechenden Leitung verbunden wird.

HINWEIS Ein interner Ölnebelabscheider verhindert die Verschmutzung der Atmosphäre im Umkreis durch das in der Ablaufleitung während des Betriebs der Pumpe vorhandene Öl.

VORSICHT **Niemals die Ablaufleitung der Pumpe blockieren. Das würde zu einem Überdruck im Gehäuse mit dem Risiko, den Öltank zu zerbrechen, führen.**

Start und Betrieb der zweistufigen Drehschieberpumpe

Durch Aktivieren des Stromschalters startet die Pumpe nach einer kurzen Autotestphase automatisch. Um sie auszuschalten, genügt es, den Schalter auszuschalten.

Alternativ dazu ist es möglich, die Einschaltung und die Ausschaltung der Pumpe fernliegend durch serielle Kommunikation nach vorhergehender Einstellung in der Modalität SERIAL durch die entsprechende Steuerung, die immer durch die serielle Kommunikation RS232/485 erteilt werden muss, zu steuern.

WARNUNG



Die Pumpe wurde entwickelt, um mit Inertgasen oder nicht korrosiven Gasen zu arbeiten. Die Verwendung von potenziell explosionsfähigen oder entflammenden Stoffen ist absolut verboten.

HINWEIS

Wenn die Pumpe mit kaltem Öl eingeschaltet wird, ist sie anfangs lauter als normal, das dauert nur wenige Minuten, bis das Öl seine Betriebstemperatur erreicht.

Es gibt keine speziellen Anweisungen für den normalen Betrieb der Pumpe, die nach Beendigung eines Betriebszyklus im Werk gesendet wird.

HINWEIS

Für sich wiederholende Betriebszyklen mit kurzen Zeitintervallen ist es besser, die Pumpe nicht auszuschalten.

Ausschaltung der zweistufigen Drehschieberpumpe

Für das Abschalten der Pumpe sind keine besonderen Verfahren erforderlich; sie muss lediglich mittels des Bipolarschalters (Ausführung mit Einphasenmotor – siehe Abschnitt „Modelle mit Einphasen-Universalmotoren“) oder des Multipolarschalters (Ausführung mit Drehstrommotor – siehe Abschnitt „Modelle mit Drehstrom-Universalmotoren“) vom Stromnetz getrennt werden.

Im Stillstand der Pumpe sorgt die Rücksaugvorrichtung für die Aufrechterhaltung des Vakuums im an den Pumpeneinlassflansch angeschlossenen Behälter.

Sollte die Pumpe längere Zeit stillstehen oder hat sie große Mengen an Dämpfen gefördert, empfiehlt es sich, sie vor dem Abschalten einige Minuten mit geöffnetem Gasballast und geschlossener Einlassleitung laufen zu lassen. Dies minimiert das Risiko von Korrosion oder Ablagerungen durch kondensierte Dämpfe im Öl.

Wartung

Das zuständige Wartungspersonal der Pumpe muss gut geschult sein und eine tiefe Kenntnis der Unfallschutzvorschriften haben.

WARNUNG



Hochspannungen können bei Kontakt tödliche Folgen haben. Immer mit der größten Vorsicht und nach den geltenden Sicherheitsvorschriften vorgehen.

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 die Außentemperatur 60 °C überschreiten kann.

Betriebsanleitung

WARNUNG



Vor Wartungsarbeiten ist die Pumpe stets energiefrei zu schalten. Spezifische Warnschilder am Stromschalter anbringen: **GERÄT WIRD GEWARTET - STROMVERSORGUNG NICHT EINSCHALTEN**. Nach Beendigung die Sicherheitsvorrichtungen wieder anbringen.

WARNUNG



Keinen Ölwechsel unmittelbar nach Ausschaltung des Geräts vornehmen, da die Öltemperatur sehr hoch sein kann.

VORSICHT

Beim Austausch eines Teils ist größte Sorgfalt geboten. Besondere Aufmerksamkeit sollte dem Drehstrommotor gewidmet werden, da eine Verpolung die Drehrichtung der Pumpe umkehrt und somit mechanische Schäden verursachen kann.

HINWEIS

Bevor dem Hersteller eine Pumpe zur Reparatur zurückgesandt wird, ist das Formular „Request for return“ in der Anlage zur vorliegenden Betriebsanleitung auszufüllen und der lokalen Verkaufsstelle zuzustellen. Eine Kopie des Formulars ist der Pumpenverpackung vor dem Versand beizulegen.

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

Unter Instandhaltung versteht man die Gesamtheit aller geplanten und ungeplanten Instandhaltungsarbeiten.

- **PROGRAMMIERTE WARTUNG:** Erhaltung des normalen Betriebsstatus.
- **NICHT PROGRAMMIERTE WARTUNG:** Wiederherstellung des normalen Betriebsstatus.

HINWEIS

Die Häufigkeit, mit der die Reparaturen ausgeführt werden, hängt vom Prozess und dem Vorhandensein von Stoffen ab, die die Betriebsdauer der Pumpe reduzieren (Staub, Scheuermittel, Lösungsmittel, Wasser, chemisch aggressive Stoffe).

Betriebsanleitung

Verwenden Sie nur die unbedingt notwendige Schmiermittelmenge. Ein Überschuss an Schmieröl, beispielsweise bei fehlendem Öl, kann die ordnungsgemäße Funktion der Pumpe beeinträchtigen.

Verwenden Sie ausschließlich die empfohlenen Schmierstoffe oder Schmieröle mit ähnlichen Eigenschaften und bekannter, geprüfter Qualität.

Ölwechsel müssen mit ausreichend warmem Öl durchgeführt werden, nachdem die Pumpe nach dem Betrieb einige Minuten abgekühlt ist.

Die Ablauf- und Einfüllverschlüsse dürfen nicht länger als unbedingt erforderlich offen gelassen werden. Wenn die Wartung ausgeführt wird, alle Signale suchen, die einer Störung vorausgehen können, insbesondere:

- Korrosionsspuren;
- Öllecks;
- Gelockerte Kupplungen oder Verbindungen.

Die Wartungstechniker müssen:

- alle anwendbaren nationalen Richtlinien hinsichtlich der Vorbeugung von Unfällen während der Arbeiten an den Pumpen, die durch einen Elektromotor angetrieben werden, und deren Anwendung kennen;
- alle Abschnitte über die „Sicherheit“ durchgelesen und verstanden haben;
- die wesentlichen Design- und Betriebseigenschaften der Pumpe kennen;
- wissen, wie die Dokumentation der Pumpe verwendet und konsultiert werden muss;
- auf den korrekten Betrieb der Pumpe achten;
- einen etwaigen nicht ordnungsgemäßen Betrieb der Pumpe notieren und bei Bedarf die notwendigen Maßnahmen ergreifen.

Betriebsanleitung

Originalersatzteile verwenden. Für alle Probleme, die auftreten sollten, oder für die Bestellung von Ersatzteilen unseren technischen Kundendienst kontaktieren.

Agilent Technologies Italia S.p.A.
Vacuum Products Division
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

Die für den Ölwechsel und den Wechsel der Filterkartusche der Dual Stage Rotary Vane pumps anzuwendenden Verfahren werden im Kapitel „Technical Information“ beschrieben.

Reinigung

VORSICHT

Keinen Alkohol für die Reinigung der Bestandteile aus Kunststoff oder Gummi der Pumpe verwenden.

Bei der Reinigung der Pumpe und ihrer Bauteile ist die Verwendung von brennbaren oder giftigen Lösungsmitteln wie Benzin, Benzol, Ether oder Alkohol zu vermeiden.

Es wird empfohlen, eine Lösung aus Wasser und Seife, vorzugsweise in Ultraschallwaschmaschinen, zu verwenden und darauf zu achten, alle sauberen Bestandteile bei Temperaturen von unter 100 °C abzutrocknen, um die restliche Feuchtigkeit zu entfernen.

Entsorgung

Bedeutung des „WEEE“ Logos auf den Schildern

Das folgende Symbol ist in Übereinstimmung mit der EG-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 Haushalts- oder Industiemüll 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.



Abbildung 10 Logo „WEEE“

Für weitere Informationen siehe:

<http://www.agilent.com/environment/product/index.shtml>

Service

Sollte ein Kunde einen erweiterten Austausch- oder Reparaturservice benötigen, wenden Sie sich bitte an den örtlichen Händler oder direkt an die Email-Adresse:

vpt-customer@agilent.com

vpl-customer@agilent.com

Das Ausfüllen des "Request for Return" formulars ist erforderlich, um das Produkt zur Wartung an Agilent zurückzusenden (am Ende dieses Handbuchs angegeben).

3 Manuel d'utilisation

| | |
|---|----|
| Informations concernant ce manuel | 72 |
| Validité | 72 |
| Définitions et terminologie | 73 |
| Signification des messages d'attention, d'avertissement et des notes | 73 |
| Symboles d'avertissement | 74 |
| Sécurité | 76 |
| Utilisation correcte | 76 |
| Utilisation non prévue | 77 |
| Messages D'Avertissement | 78 |
| Messages d'Attention | 79 |
| Acheminement de l'air d'extraction | 79 |
| Équipements de protection individuelle | 80 |
| Consignes de sécurité pour les pompes rotatives à deux stades à palettes | 82 |
| Transport et stockage | 83 |
| Description de l'appareil | 83 |
| Installation des pompes rotatives à deux stades à palettes | 84 |
| Préparation de l'installation | 84 |
| Installation | 85 |
| Ouverture | 89 |
| Fixation de la pompe rotative à deux stades à palettes | 90 |
| Raccordement des brides d'aspiration et des raccords d'évacuation | 90 |
| Démarrage et fonctionnement de la pompe rotative à deux stades à palettes | 93 |
| Arrêt de la pompe rotative à deux stades à palettes | 94 |
| Maintenance | 94 |
| Nettoyage | 97 |
| Élimination | 98 |
| Service | 99 |

Informations concernant ce manuel

Validité

Le présent manuel contient les instructions destinées aux utilisateurs des pompes rotatives à deux stades à palettes, notamment celles relatives à la sécurité, au fonctionnement et à la maintenance de premier niveau, dans la limite des activités de maintenance incombant à l'utilisateur.

Les opérations de maintenance décrites dans des paragraphes spécifiques qui contiennent des dispositions relevant d'un niveau de maintenance plus élevé (personnel spécialement formé aux opérations de maintenance) ne doivent pas être effectuées par l'utilisateur.

Pour une installation et une mise en marche/arrêt correctes, consultez le chapitre « Installation ». Pour une utilisation technologique plus détaillée, consultez le chapitre « Technical Information ».

Pour plus de précisions sur l'utilisation technologique, consultez le chapitre « Technical Information ».

NOTE

- 1 Ce manuel contient des informations utiles pour que l'ensemble du personnel puisse utiliser les pompes rotatives à deux stades à palettes en toute sécurité et pour garantir un fonctionnement parfait pendant toute sa durée de vie.
 - 2 Veuillez conserver ce manuel et tous les documents connexes dans un lieu accessible connu de tous les opérateurs et du personnel de maintenance.
-

Définitions et terminologie

Signification des messages d'attention, d'avertissement et des notes

Dans ce manuel, certaines informations importantes sont surlignées et encadrées avec des couleurs voyantes.

ATTENTION

Les messages d'attention sont affichés au début de procédures qui, si elles ne sont pas respectées, peuvent entraîner des dommages aux équipements.

AVERTISSEMENT



Les messages d'avertissement attirent l'attention de l'opérateur sur une procédure ou une pratique particulière qui, si elle n'est pas effectuée correctement, peut entraîner de graves blessures.

NOTE

Les remarques contiennent des informations importantes et fournissent des précisions sur certains passages particuliers.












Symboles d'avertissement

Une liste des symboles associés aux avertissements relatifs aux pompes rotatives à deux stades à palettes est reportée ci-dessous. Le danger qu'ils décrivent est également illustré. Le symbole triangulaire indique un avertissement. Les significations des symboles qui peuvent apparaître à côté des avertissements dans la documentation ou sur l'appareil lui-même sont les suivantes. Le symbole suivant peut être utilisé sur les étiquettes d'avertissement apposées sur l'appareil. Lorsque vous voyez ce symbole, reportez-vous au manuel d'utilisation ou d'entretien correspondant pour connaître la procédure correcte visée par cette étiquette d'avertissement.



| | |
|---|---|
|  | Présence de tension dangereuse |
|  | Présence de surfaces chaudes |
|  | Danger générique |
|  | Bride d'aspiration |
|  | Bride d'évacuation |
|  | Remplissage fluide de fonctionnement |
|  | Soupape de lest |
|  | Données de production |
|  | Emission de substances dangereuses |
|  | Risques de blessures par des arêtes vives |

Manuel d'utilisation

| | |
|---|--|
|  | Chute d'objets |
|  | Gants de protection |
|  | Chaussures de sécurité |
|  | Equipements de protection |
|  | Marche |
|  | Arrêt |
|  | Bouteille d'huile |
|  | Déclaration européenne de conformité |
|  | Certification CSA |
|  | Certification RoHS Chine |
|  | Déchets d'équipements électriques et électroniques |

Sécurité

Cette section contient les informations prescrites par la directive machines 2006/42/EC qui sont essentielles pour la conformité et le respect des normes de sécurité tant générales qu'en rapport avec l'utilisation spécifique de la pompe.

Le non-respect de ces instructions et de celles contenues dans le présent manuel peut compromettre les conditions de sécurité prévues pendant la phase de conception et exposer l'utilisateur de la pompe à des risques d'accident.

Agilent Technologies décline toute responsabilité en cas de dommage à la pompe ou de blessure des opérateurs ou de tiers dérivant d'un non-respect des normes, règles et consignes de sécurité indiquées dans la documentation technique.

Utilisation correcte

Ce manuel contient des avertissements et des consignes de sécurité importantes à respecter pour que l'appareil fonctionne en toute sécurité.

L'appareil décrit dans ce manuel est destiné exclusivement aux utilisations spécifiées dans le manuel d'utilisation. Le manuel contient également des indications concernant les exigences essentielles pour l'application et le fonctionnement de l'appareil, ainsi que les mesures de sécurité qui peuvent être adoptées pour garantir un fonctionnement régulier. Agilent Technologies ne fournit aucune garantie et décline toute responsabilité en cas d'utilisation de l'appareil à des fins diverses de celles décrites dans le présent manuel ou pour lesquelles les exigences essentielles et les mesures de sécurité ne sont pas respectées. L'appareil doit être utilisé uniquement par un personnel qualifié en mesure d'adopter les mesures de sécurité nécessaires pour prévenir les risques de dommage et de blessure. Les accessoires et les équipements utilisés avec l'appareil doivent être fournis ou agréés par Agilent Technologies.

Toute opération de réglage ou de maintenance doit être effectuée par un technicien professionnel informé des risques.

Les réparations de l'appareil doivent être effectuées exclusivement par un personnel agréé Agilent.

Utilisation non prévue

Agilent Technologies décline toute responsabilité dérivant d'une utilisation non prévue des pompes rotatives à deux stades à palettes.

Toute utilisation non prévue entraîne la déchéance des droits d'action en responsabilité et de garantie.

Le personnel responsable du fonctionnement et de la maintenance de la pompe doit être correctement formé et connaître les normes, règles et consignes de prévention des accidents. Les consignes de prévention des accidents contenues dans ce chapitre doivent être respectées en tout temps pendant le fonctionnement et la maintenance de la pompe afin d'éviter les blessures des opérateurs et les dommages à la pompe. Ces consignes sont présentées sous la forme de messages d'AVERTISSEMENT et d'ATTENTION.

AVERTISSEMENT



Procédures opérationnelles, informations techniques et précautions qui, si elles ne sont pas respectées ou mises en œuvre correctement, peuvent causer des blessures aux opérateurs.

NOTE

Utilisez le ressort de maintien pour immobiliser le câble d'alimentation dans la prise IEC320.

ATTENTION

Procédures opérationnelles, informations techniques et précautions qui, si elles ne sont pas respectées ou mise en œuvre correctement, peuvent causer des dommages à la pompe.

Messages D'Avertissement

- Tout contact avec une haute tension peut entraîner la mort. Agissez toujours avec la plus grande prudence et respectez les normes, règles et consignes de prévention des accidents en vigueur.
- Avant d'effectuer une intervention de maintenance, débranchez toujours le câble d'alimentation électrique de la pompe. Placez un signal spécial sur l'interrupteur électrique contenant le message suivant : MACHINE EN COURS DE MAINTENANCE - NE PAS METTRE EN MARCHÉ
- Si vous effectuez la maintenance après que la pompe a fonctionné pendant un temps particulièrement long, attendez qu'elle refroidisse car la température de la surface extérieure peut dépasser les 60 °C.
- En cas de défaut de raccordement de la pompe à la terre, les opérateurs sont exposés à des risques de blessure grave. Vérifiez que la pompe est effectivement raccordée à la terre et que le raccordement est conforme aux normes.
- Pendant le nettoyage de la pompe et ses composants, évitez d'utiliser des solvants inflammables ou toxiques. Il est recommandé d'utiliser un mélange d'eau et de savon, en particulier avec les machines à laver à ultrason, en ayant soin de sécher toutes les parties nettoyées à une température de moins de 100 °C pour éliminer l'humidité résiduelle.
- En cas de surcharge prolongée ou de panne, le moteur électrique peut surchauffer et dégager des fumées nocives. Par mesure de précaution, coupez immédiatement l'alimentation et n'approchez pas de la pompe tant que vous n'avez pas aéré la pièce pour évacuer les fumées. Veillez à ne pas inhaler les vapeurs résiduelles à l'intérieur de la pompe pendant les réparations.
- En cas d'incendie, ne projetez pas d'eau sur la pompe. Coupez l'alimentation électrique et utilisez des extincteurs à CO₂.
- Inspectez attentivement les brides pour vérifier qu'il n'y a pas de poussière, d'huile, de saleté ou de défaut sur les surfaces d'accouplement avant de procéder aux raccordements demandés.
- Vérifiez que tous les joints et les accouplements sont correctement serrés avant de redémarrer la pompe après avoir effectué les travaux de réparation.
- Ne portez pas de vêtements risquant de se coincer dans les mécanismes ou pouvant agir comme des conducteurs (chaînes, bracelets, etc.).
- Vérifiez que les instruments à utiliser sont en parfait état et qu'ils ont des poignées isolées lorsque cela s'avère nécessaire. Vérifiez que le matériau isolant des câbles et que les conducteurs des équipements d'essai ne présentent aucun signe de détérioration.
- Ne vidangez pas l'huile immédiatement après l'arrêt de la pompe car l'huile peut être encore très chaude.

Messages d'Attention

- Avant de remettre la pompe en marche après une panne, inspectez-la et repérez les éventuels signes de détérioration.
- Utilisez uniquement des instruments en parfait état de marche et spécialement conçus pour l'usage prévu. L'utilisation d'instruments inappropriés ou inefficaces peut causer des dommages graves.
- Effectuez les réparations dans des zones propres et, si possible, exemptes de poussière. Protégez tous les jeux des points de connexion avec des capuchons en plastique appropriés et couvrez les surfaces usinées de toutes les pièces démontées jusqu'à leur remontage sur la pompe.
- Contrôlez régulièrement le lubrifiant et vérifiez qu'il est correctement distribué par la pompe. Une lubrification inappropriée peut endommager sérieusement la pompe.
- Inscrivez des repères sur les composants démontés pour pouvoir les remonter dans l'ordre correct.
- Vérifiez que les arbres, leurs logements à l'intérieur de la pompe et les surfaces de la pompe sont exempts de rayures et de fissures. Les rayures et abrasions peu profondes peuvent être éliminées avec de la toile émeri très fine ou un polissage très léger.
- Avant d'assembler un groupe, enduisez d'huile les parties internes et les surfaces d'accouplement. Remplacez les joints avec des pièces de rechange d'origine avant de remonter les composants.
- Ne démarrez pas la pompe si les plaques latérales de protection (réf. 11 et 81 de la figure « Vue de la pompe ») ne sont pas correctement en place.

Acheminement de l'air d'extraction

En cas de renouvellement insuffisant de l'air dans le local de la pompe, on peut acheminer l'air d'extraction vers d'autres locaux ou à l'extérieur.

Utiliser des conduites du diamètre de la bouche d'évacuation du réservoir et d'une longueur maximale de 15 m.

Pour des longueurs supérieures, augmenter le diamètre du tube. Le poids des conduites ne doit pas peser sur la pompe.

Utiliser des raccords ou des tuyaux flexibles pour réaliser le segment final.

AVERTISSEMENT

Cette conduite doit être inclinée pour éviter le retour de la condensation dans le réservoir de la pompe.

**ATTENTION**

Ne pas installer de robinets sur cette conduite. Ne pas obstruer la sortie.

Équipements de protection individuelle

Les équipements de protection individuelle des opérateurs qui utilisent ou entretiennent le système de pompage doivent toujours être appropriés au type d'opération à effectuer. De plus, ils doivent satisfaire aux exigences de sécurité de la réglementation en vigueur dans le pays d'utilisation de l'appareil.

En règle générale, l'opérateur doit porter des chaussures de sécurité pendant la manipulation de la pompe Dual Stage Rotary Vane et pendant son installation.

AVERTISSEMENT



Danger pour la santé en raison de la présence de substances dangereuses pendant la maintenance ou l'installation.

- En fonction des caractéristiques du processus, les pompes à vide, les composants ou les fluides de fonctionnement peuvent être contaminés par des substances toxiques, réactives ou radioactives.
- Portez des équipements de protection individuelle appropriés pendant la maintenance, les opérations de réparation ou de réinstallation.

AVERTISSEMENT

Risques de blessure dus à la chute d'objets



Pendant le transport manuel des pompes à vide, il existe un risque de glissement et de chute de la charge.

- Transportez les pompes à vide de petite et moyenne dimension avec les deux mains.
- Tout objet de plus de 20 kg doit être transporté à l'aide d'un moyen de levage adapté.
- Portez des chaussures de sécurité à pointes en acier conformes à la directive EN 347.

ATTENTION

Risques de blessures par des arêtes vives ou tranchantes



- Avant de réparer la pompe et avant toute opération de montage/démontage de la pompe du système, attendez qu'elle soit complètement arrêtée.
- N'intervenez pas directement à l'intérieur de la pompe.
- Si nécessaire, portez des gants de protection conformes à la directive EN 420.

Consignes de sécurité pour les pompes rotatives à deux stades à palettes

Les pompes rotatives à palettes lubrifiées par huile peuvent atteindre une température de fonctionnement élevée. Il est par conséquent recommandé de laisser la pompe refroidir avant d'entreprendre tout type d'intervention.

- Si l'appareil est utilisé d'une manière non spécifiée par le fabricant, la protection fournie par l'appareil peut être altéré.
- Transportez toujours la pompe en utilisant les anneaux de manutention dont elle est pourvue.
- La pompe doit être positionnée avec la plus grande prudence afin d'éviter toute chute accidentelle.

AVERTISSEMENT



En cas de nécessité de manipuler la pompe après une longue période de fonctionnement, laissez-la d'abord refroidir car la température de la surface externe peut dépasser les 60 °C.

AVERTISSEMENT



Pour éviter d'endommager les équipements et prévenir les risques de blessure des opérateurs, respectez rigoureusement les instructions d'installation fournies dans le présent manuel.

Transport et stockage

Les pompes sont expédiées au client dans des caisses en carton.

Le poids total du colis, pompe comprise, est compris entre 30 et 40 kg selon les différents modèles de pompe.

Le corps doit être manipulé avec prudence au moyen d'équipements de levage appropriés.

ATTENTION

Pendant le déplacement du corps, veillez à ce qu'il soit solidement attaché au moyen de levage et que ce dernier soit suffisamment robuste pour soutenir le poids de la charge.

L'environnement d'utilisation de la pompe est un environnement industriel normal. Il est préférable d'éviter les sites présentant des vapeurs corrosives ou une chaleur excessive.

La température d'utilisation doit être comprise entre 12 °C et 40 °C. Si la température dépasse cet intervalle, contactez l'assistance technique Agilent pour les modifications nécessaires.

Pendant le transport et le stockage des pompes, les valeurs environnementales suivantes ne doivent pas être dépassées :

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

Description de l'appareil

Cet appareil est destiné à une utilisation professionnelle. L'utilisateur est tenu de lire attentivement le présent manuel d'utilisation et toute information supplémentaires fournie par Agilent avant d'utiliser l'appareil. Agilent décline toute responsabilité en cas de non-respect total ou partiel des instructions, d'utilisation non prévue de la pompe, d'utilisation par un personnel non formé, d'intervention non autorisée ou contraire à la réglementation nationale en vigueur.

Les pompes DS102 1Ph, DS202 1Ph, DS302 1Ph, DS402 1Ph, DS402 3Ph, DS602 1Ph et DS602 3Ph sont des pompes rotatives à deux stades à palettes, étanches à l'huile, entraînées par un moteur électrique monophasé ou triphasé.

Des informations détaillées sont fournies à la section «Technical Information».

Installation des pompes rotatives à deux stades à palettes

Préparation de l'installation

La pompe est livrée dans un emballage spécial. En présence de signes de dégradation qui pourraient être dus au transport, contactez le service après-vente.

Le poids total de la pompe, sans l'emballage, est compris entre 22 et 36 kg.

Pendant l'opération de déballage, faites particulièrement attention à ne pas laisser tomber la pompe et à ne pas l'exposer à des chocs ou des vibrations.

Ne jetez pas l'emballage dans la nature. Le matériau est entièrement recyclable et conforme à la directive CEE 94/62 relative à la protection de l'environnement.

NOTE

La pompe ne peut pas être endommagée en restant simplement exposée à l'atmosphère. Il est cependant conseillé de la conserver dans son emballage jusqu'au moment de l'installer dans le système afin d'éviter tout risque de pénétration de poussière.

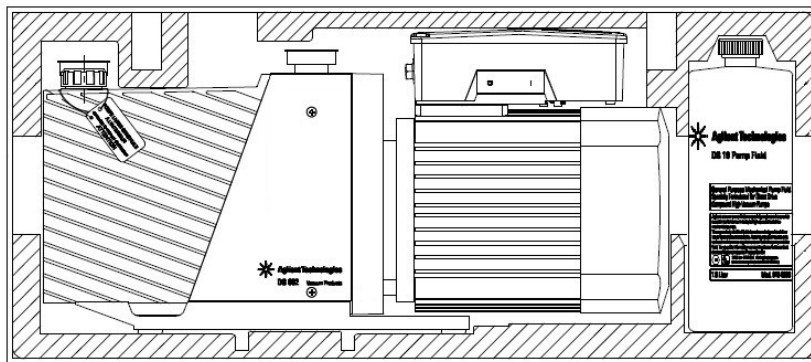


Figure 11 Emballage des pompes rotatives à deux stades à palettes

Installation

N'installez pas et n'utilisez pas la pompe dans un endroit exposé aux agents atmosphériques (pluie, gel, neige), à des poussières, des gaz agressifs, et dans un milieu explosif ou présentant un risque d'incendie important.

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

- température : de +12 °C à +40 °C.
- humidité relative : de 0 à 95 % (sans condensation)

AVERTISSEMENT



Pour protéger contre les court-circuits ou les surintensités, il faut installer un disjoncteur automatique Type C sur la ligne d'alimentation principale vers les dispositifs Agilent, de bonne capacité (voir tableau ci-dessous)

| P/N | 110 Vac | 220 Vac | 380 Vac |
|---------|---------|---------|---------|
| 9499315 | 10 A | 6 A | |
| 9499320 | 10 A | 6 A | |
| 9499325 | 10 A | 6 A | |
| 9499330 | 16 A | 7.5 A | |
| 9499331 | | 6 A | 6 A |
| 9499335 | 16 A | 7.5 A | |
| 9499336 | | 6 A | 4 A |

ATTENTION Avant de démarrer la pompe, procédez au ravitaillement d'huile de lubrification car la pompe est vide au moment de la livraison.

ATTENTION L'huile doit être versée dans le corps à travers l'orifice fileté prévu à cet effet et **NON** à travers la ligne d'aspiration.

NOTE Il est important que le niveau d'huile soit compris entre les repères MIN et MAX de la jauge située sur le côté de la pompe.

ATTENTION Il est obligatoire de laisser l'espace libre autour de la pompe pour permettre une bonne circulation de l'air. Il n'est pas autorisé d'installer la pompe dans un volume clos où l'air ne circule pas. En raison d'un dispositif de sécurité interne, une erreur peut se produire si la température ambiante de la pompe dépasse 40°C.

AVERTISSEMENT



Maintenez les bouchons en place sur les brides d'aspiration et d'évacuation et ne démarrez pas la pompe tant que celles-ci n'ont pas été correctement raccordées respectivement à l'instrument et au circuit d'évacuation.

AVERTISSEMENT



Pendant l'installation, veillez à ce que la bride d'aspiration soit raccordée à la chambre à évacuer et que le raccord d'évacuation n'est pas bouché (voir figure ci-dessous). La pompe ne doit pas être utilisée comme compresseur. Le non-respect de ces consignes peut causer des dommages à la pompe et à l'opérateur.

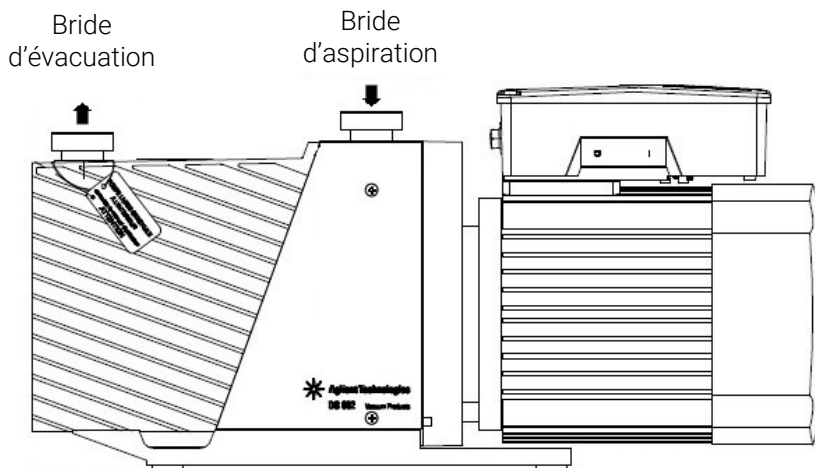


Figure 12 Brides et raccords

AVERTISSEMENT



Un dispositif de sécurité (indiqué par la flèche rouge sur la figure ci-dessous) est installé sur la pompe afin de garantir que la pression à l'intérieur du réservoir d'huile ne dépasse jamais la valeur maximale admissible de 1,7 bar (abs). Ce dispositif étant de sécurité, le bouchon ne doit en aucun cas être remplacé, endommagé ou altéré. Son retrait temporaire (par dévissage) est autorisé pour le remplissage d'huile de la pompe.

Il est de la responsabilité de l'utilisateur de revisser le dispositif dans sa position initiale après le remplissage et avant la mise en marche de la pompe.

Le non-respect de ces précautions peut endommager la machine et blesser l'opérateur.



Figure 13

ATTENTION Vérifiez que la tension et la fréquence de l'alimentation électrique correspondent aux valeurs indiquées sur la plaque du moteur.

Raccordez la pompe à l'alimentation électrique.

ATTENTION En cas de moteur triphasé, une inversion de polarité provoque l'inversion du sens de rotation de la pompe et peut entraîner des dommages de nature mécanique.

AVERTISSEMENT



La pompe doit être installée de manière à permettre une interruption rapide de l'alimentation électrique.

Câble d'alimentation pour pompes monophasées: le câble d'alimentation électrique doit être un câble à trois torons (Phase+Neutre+Terre). La section du câble doit être de 0,75 mm² minimum (AWG18).

La pompe doit être utilisée avec le câble d'alimentation fourni (disponible également comme accessoire).

Ouverture

Avant de mettre la pompe en marche, remplissez-la d'huile de lubrification car les pompes sont livrées vides.

NOTE

Une boîte d'huile est incluse dans l'emballage.

Pour plus de détails sur la façon de remplir, consultez la carte d'entretien programmé 01.

ATTENTION L'huile doit être versée dans le carter par l'orifice fileté spécial et NON par la conduite d'aspiration.

AVERTISSEMENT



Retirez les bouchons de protection des brides d'aspiration et d'évacuation avant d'entreprendre toute autre opération. En cas de démarrage accidentel, l'air se trouvant à l'intérieur de la pompe peut expulser violemment les bouchons de protection et blesser l'opérateur.

Fixation de la pompe rotative à deux stades à palettes

L'installation de la pompe doit être effectuée comme suit :

- Pompe posée au sol. Il n'y a pas de consigne spéciale concernant ce type d'installation, à l'exception du fait que le sol doit être le plus plat possible et en mesure de supporter le poids de la pompe (l'idéal est un sol en ciment) et des éventuels accessoires équipant la pompe. Il convient de considérer que la pompe est stable sur sa base et qu'il n'est pas nécessaire de l'ancrer au sol avec des boulons et des vis. Les vibrations émises et reçues par les pompes sont également considérablement réduites par les pieds en caoutchouc.
- Pompe au-dessus du sol. Dans ce cas, l'utilisateur doit concevoir une structure de support appropriée en gardant à l'esprit les points suivants :
 - le plan de support de la pompe doit être parfaitement horizontal;
 - la structure doit être suffisamment rigide;
 - les précautions de sécurité applicables doivent être prises.

En outre, la pompe doit être fixée à la structure de support après avoir remplacé les pieds en caoutchouc par des pieds spéciaux anti-vibration à visser dans la base de la pompe et le plan de support.

Après avoir sorti la pompe de l'emballage, il est conseillé d'effectuer les contrôles suivants :

- a Vérifiez que la pompe n'a subi aucun dommage pendant le transport.
- b Vérifiez que les protections sont correctement montées et qu'il n'y a pas de pièces découvertes ou mal fixées.

Raccordement des brides d'aspiration et des raccords d'évacuation

Retirez les bouchons de protection des deux portes. Raccordez le circuit à évacuer à la bride d'aspiration avec un anneau de centrage à joint torique et un collier de serrage.

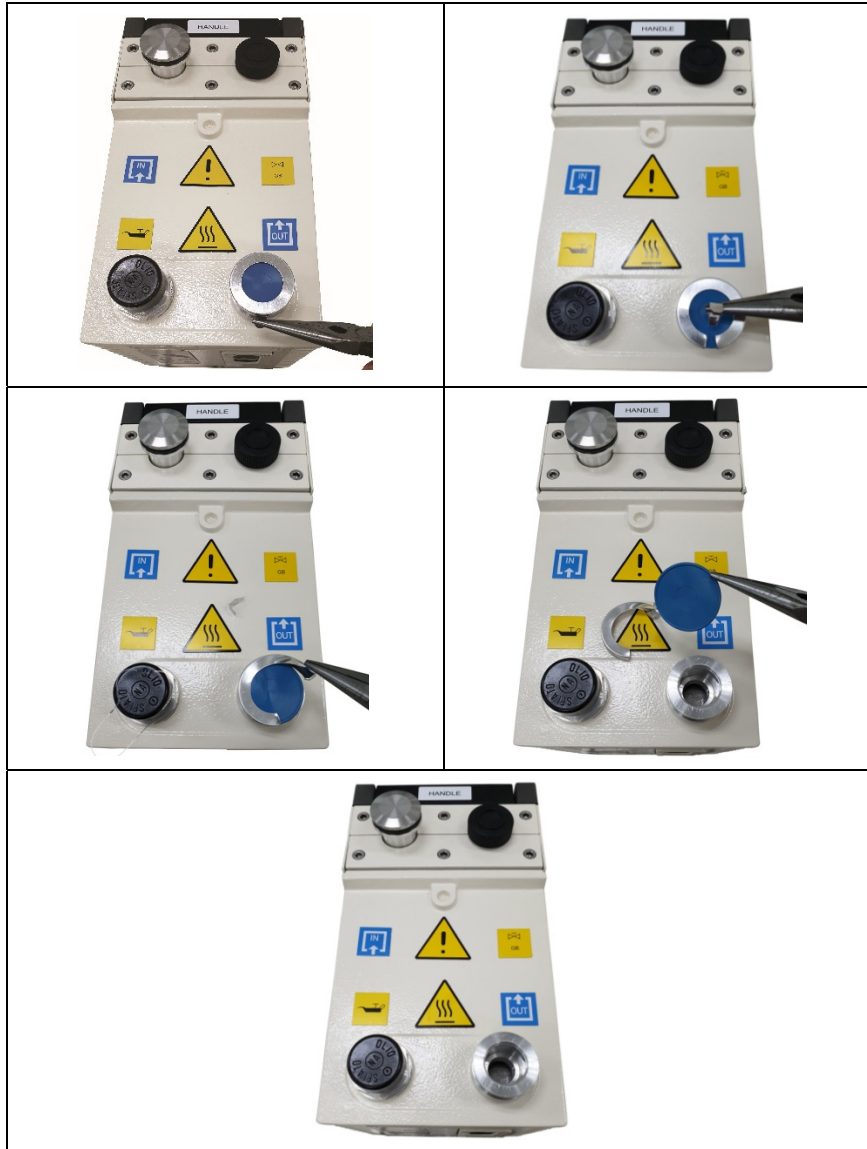


Figure 14

NOTE

Pour garantir une bonne étanchéité, utilisez un joint torique en NBR ou FKM.

Le conduit d'entrée est doté d'un filtre qui empêche les résidus solides de pénétrer et d'endommager la pompe.

NOTE

Si les gaz à pomper contiennent de la poussière, il est conseillé d'installer un filtre anti-poussière en amont de la bride d'aspiration.

NOTE

Si les gaz à pomper contiennent une grande quantité de vapeur, il est conseillé d'installer un séparateur de condensation en amont de la bride d'aspiration.

Pour exploiter au mieux la capacité de la pompe, utilisez des tuyaux courts et rectilignes d'un diamètre non inférieur à celui de la bride d'aspiration.

NOTE

Si vous utilisez des tubes rigides, il est recommandé d'utiliser un joint flexible pour éviter toute contrainte dommageable du raccord sur la pompe.

Les gaz évacués doivent être convoyés à l'extérieur en raccordant le raccord d'échappement à un tuyau dédié.

NOTE

Un suppresseur de brouillard d'huile interne évite la pollution de l'environnement par l'huile présente dans le conduit d'évacuation pendant le fonctionnement de la pompe.

ATTENTION

Ne bouchez jamais le circuit d'évacuation de la pompe. En cas d'obstruction de l'évacuation, une surpression se crée à l'intérieur du corps risquant de briser le réservoir d'huile.

Démarrage et fonctionnement de la pompe rotative à deux stades à palettes

Avant sa mise en service, afin d'atteindre le vide maximal, la pompe doit fonctionner pendant environ une heure avec la vanne de ballast de gaz ouverte. Ceci permettra d'éliminer toute trace d'humidité de l'huile.

La mise en marche de la pompe ne nécessite aucune procédure particulière ; il suffit de la raccorder à l'alimentation électrique au moyen de l'interrupteur bipolaire (version avec moteur monophasé) ou de l'interrupteur multipolaire (version avec moteur triphasé).

AVERTISSEMENT



La pompe est conçue pour fonctionner avec des gaz inertes ou non corrosifs. Il est rigoureusement interdit d'utiliser la pompe avec des substances potentiellement explosives ou inflammables.

NOTE

Si l'huile est froide au démarrage, la pompe émet plus de bruit que dans des conditions normales, mais ce phénomène ne dure que quelques minutes, jusqu'à ce que l'huile atteigne la température d'exercice.

Il n'y a aucune instruction particulière concernant le fonctionnement normal de la pompe ; celle-ci est expédiée après avoir subi un cycle de fonctionnement complet en usine.

NOTE

En cas de cycles de travail répétitifs séparés par de courts intervalles il est préférable de ne pas arrêter la pompe.

Arrêt de la pompe rotative à deux stades à palettes

Aucune procédure particulière n'est requise pour l'arrêt de la pompe ; il suffit de la déconnecter de l'alimentation électrique à l'aide de l'interrupteur bipolaire (version avec moteur monophasé – voir la section MODÈLES AVEC MOTEURS MONOPHASÉS UNIVERSELS) ou de l'interrupteur multipolaire (version avec moteur triphasé – voir la section MODÈLES AVEC MOTEURS TRIPHASÉS UNIVERSELS).

À l'arrêt de la pompe, le dispositif anti-retour permet de maintenir le vide dans le réservoir raccordé à la bride d'aspiration.

Si l'arrêt de la pompe est prévu pour une période prolongée, ou si elle a aspiré une grande quantité de vapeurs, il est recommandé de la faire fonctionner quelques minutes avec le ballast de gaz ouvert et la conduite d'aspiration fermée avant l'arrêt, afin de limiter les risques de corrosion ou d'entartrage dus à la contamination de l'huile par les vapeurs condensées.

Maintenance

Le personnel chargé de l'utilisation et de la maintenance de la pompe doit être correctement formé et avoir une connaissance approfondie des règles et normes de prévention des accidents.

AVERTISSEMENT



En cas de contact, la haute tension peut causer la mort. Agissez toujours avec la plus grande prudence et respectez les normes de prévention des accidents en vigueur.

AVERTISSEMENT



Quand la pompe est sous tension, faites attention aux organes en mouvement et aux composants sous haute tension.

AVERTISSEMENT



Avant d'entreprendre des opérations de maintenance de la pompe après une période de fonctionnement, laissez-la refroidir car la température externe peut dépasser 60 °C.

AVERTISSEMENT



Coupez toujours l'alimentation électrique de la pompe avant de procéder à des opérations de maintenance. Apposez des panneaux spéciaux indiquant : **APPAREIL EN COURS DE MAINTENANCE - NE PAS RÉTABLIR L'ALIMENTATION ÉLECTRIQUE**, à proximité de l'interrupteur marche/arrêt. Au terme de l'intervention rétablissez les dispositifs de sécurité qui ont été neutralisés.

AVERTISSEMENT



N'effectuez pas la vidange d'huile immédiatement après l'arrêt de la pompe car l'huile peut être très chaude.

ATTENTION

En phase de substitution de pièces, opérer avec le maximum d'attention. En particulier, en cas de moteur triphasé, une inversion de polarité provoque l'inversion du sens de rotation de la pompe et peut entraîner des dommages de nature mécanique.

NOTE

Avant de retourner la pompe au fabricant pour réparation, veuillez remplir le «Request for return» joint au présent manuel d'utilisation. Une copie du bordereau doit être jointe dans l'emballage de la pompe avant l'expédition.

Si la pompe doit être éliminée, procédez à son élimination dans le respect de la réglementation en vigueur.

La maintenance peut être considérée comme l'ensemble des travaux de maintenance planifiés et non planifiés.

- **MAINTENANCE PROGRAMMÉE** : maintien des conditions de fonctionnement nominal.
- **MAINTENANCE NON PROGRAMMÉE** : rétablissement de l'état de fonctionnement nominal.

NOTE

La fréquence des réparations effectuées varie en fonction du processus et de la présence de substances qui réduisent la durée de la pompe (poussières, abrasifs, solvants, eau, substances chimiques agressives).

Manuel d'utilisation

Utilisez uniquement la quantité strictement nécessaire de lubrifiant ; un excès, voire une absence totale, d'huile peut parfois compromettre le bon fonctionnement de la pompe.

Utilisez uniquement les lubrifiants recommandés, ou des huiles lubrifiantes aux caractéristiques similaires et à la qualité reconnue et éprouvée.

La vidange d'huile doit être effectuée lorsque l'huile est à une température suffisamment élevée, après avoir laissé la pompe refroidir quelques minutes après utilisation.

Les bouchons de vidange et de remplissage ne doivent pas restés ouverts plus que le temps strictement nécessaire. Pendant la maintenance, repérez les signes avant-coureurs d'une panne et en particulier :

- les traces de corrosion;
- les fuites d'huile;
- les joints et les raccords desserrés.

Le personnel chargé de la maintenance doit :

- connaître la réglementation nationale en vigueur en matière de prévention des accidents du travail applicable aux pompes actionnées par un moteur électrique, ainsi que son application;
- avoir lu et compris tous les paragraphes relatifs à la sécurité;
- connaître les caractéristiques essentielles de conception et de fonctionnement de la pompe;
- savoir comment utiliser et consulter la documentation relative à la pompe;
- maintenir constamment un fonctionnement correct de la pompe;
- prendre note des éventuelles anomalies de fonctionnement de la pompe et, le cas échéant, adopter les mesures nécessaires.

Manuel d'utilisation

Utiliser des pièces de rechange d'origine. Pour tous les problèmes qui se présentent ou pour commander des pièces d'origine, contactez notre service d'assistance.

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

Les procédures à suivre pour vidanger l'huile et remplacer la cartouche du filtre de la pompe la Dual Stage Rotary Vane sont décrites au chapitre «Technical Information».

Nettoyage

La pompe doit être nettoyée à intervalles réguliers.

ATTENTION

N'utilisez pas d'alcool pour le nettoyage des composants en plastique ou en caoutchouc de la pompe.

Lors du nettoyage de la pompe et de ses composants, évitez d'utiliser des solvants inflammables ou toxiques, tels que le benzène, le benzène, l'éther ou l'alcool.

Il est recommandé d'utiliser un mélange d'eau et de savon, en particulier avec les machines à laver à ultrason, en ayant soin de sécher toutes les parties nettoyées à une température de moins de 100 °C pour éliminer l'humidité résiduelle.

Élimination

Signification du logo « DEEE » présent sur les étiquettes

Le symbole représenté ci-dessous est apposé conformément à la directive CE dite « DEEE ».

Ce symbole (valable uniquement pour les pays de la Communauté européenne) indique que le produit sur lequel il est apposé NE DOIT PAS être éliminé avec des déchets ménagers ou industriels communs mais qu'il doit être confié à un centre de collecte sélective. L'utilisateur est donc invité à contacter le fournisseur du produit, qu'il s'agisse du fabricant ou d'un revendeur, pour donner lieu au processus de collecte et d'élimination, après avoir vérifié les conditions générales de vente.



Figure 15 Logo « DEEE »

Pour plus de précisions, veuillez consulter :
<http://www.agilent.com/environment/product/index.shtml>

Service

Si vous avez besoin d'un service d'échange ou de réparation avancé, veuillez contacter le distributeur local ou écrire directement à :

vpt-customer@agilent.com

vpl-customer@agilent.com

Vous devez remplir le formulaire de "Request for Return" pour retourner le produit à Agilent pour l'entretien (fourni à la fin du présent manuel).

4 Instrucciones de uso

| | |
|--|-----|
| Acerca de este manual | 101 |
| Validez | 101 |
| Definiciones y terminología | 102 |
| Definición de Precaución, Advertencia y Nota | 102 |
| Símbolos de advertencia | 103 |
| Seguridad | 105 |
| Uso correcto | 105 |
| Uso incorrecto | 106 |
| Notas de advertencia | 107 |
| Notas de precaución | 108 |
| Conductos de aire de escape | 108 |
| Equipo de protección | 109 |
| Pautas de seguridad para bombas de paletas rotativas de doble etapa | 111 |
| Transporte y mantenimiento | 112 |
| Descripción del producto | 112 |
| Instalación de bombas de paletas rotativas de doble etapa | 113 |
| Preparación para la instalación | 113 |
| Instalación | 114 |
| Preparación | 118 |
| Montaje de la bomba de paletas rotativas de doble etapa | 119 |
| Observe las conexiones de admisión y descarga | 119 |
| Encendido y funcionamiento de la bomba de paletas rotativas de doble etapa | 122 |
| Detención de la bomba de paletas rotativas de doble etapa | 123 |
| Mantenimiento | 123 |
| Limpieza | 126 |
| Eliminación | 127 |
| Servicio | 128 |

Acerca de este manual

Validez

Este manual enumera las instrucciones para los usuarios de bombas de paletas rotativas de doble etapa, con particular referencia a la información relacionada con la seguridad, la operación y el mantenimiento de primer nivel que está limitado a las operaciones de mantenimiento que son responsabilidad del usuario.

Las operaciones de mantenimiento, ilustradas en las secciones particulares, con disposiciones específicas relacionadas con el nivel más elevado de mantenimiento (personal específicamente capacitado para las operaciones de mantenimiento) no deben ser realizadas por el usuario.

Para una instalación y un encendido/apagado correctos, consulte la sección "Technical Information".

Para más información sobre el uso técnico, consulte la sección "Technical Information".

NOTA

- 1 Este manual contiene información útil para que todo el personal que utilice las bombas de paletas rotativas de doble etapa pueda operarlas de manera segura y garantizar un rendimiento perfecto, durante toda su vida útil.
 - 2 Guarde este manual, junto con todas las publicaciones relacionadas, en un lugar conocido y accesible para todos los operadores/personal de mantenimiento.
-

Definiciones y terminología

Definición de Precaución, Advertencia y Nota

Algunas referencias importantes de este manual están resaltadas y enmarcadas en color contrastante.

PRECAUCIÓN

Los mensajes de precaución se muestran antes de los procedimientos que, si no se respetan, pueden causar daños al equipo.

ADVERTENCIA



Los mensajes de advertencia llaman la atención del operador sobre un procedimiento o práctica específica que, si no se realiza correctamente, puede causar lesiones personales graves.

NOTA

Las notas están previstas para llamar la atención sobre información importante y proporcionar más detalles en relación con paos específicos.




Símbolos de advertencia

La siguiente es una lista de los símbolos que aparecen en conjunto con las advertencias en las bombas de paletas rotativas de doble etapa. También se muestra el peligro que describen. Un símbolo triangular indica una advertencia. Los significados de los símbolos que pueden aparecer junto a las advertencias en la documentación son los siguientes. El siguiente símbolo podría utilizarle en las etiquetas de advertencia fijadas al instrumento. Cuando vea este símbolo, consulte la operación relevante o el manual de servicio para el procedimiento referido por dicha etiqueta de advertencia.



| | |
|---|------------------------------------|
|  | Presencia de tensiones peligrosas |
|  | Presencia de superficies calientes |
|  | Riesgo genérico |
|  | Brida de succión |
|  | Brida de escape |
|  | Llenado de fluido de operación |
|  | Válvula de lastre de gas |
|  | Lugar de fabricación |
|  | Presencia de sustancias peligrosas |
|  | Riesgo de aplastamiento |

Instrucciones de uso

| | |
|---|--|
|  | Riesgo de corte |
|  | Usar guantes de protección |
|  | Usar equipo de protección personal |
|  | Usar zapatos antiaccidentes |
|  | Encendido |
|  | Apagado |
|  | Envase de aceite |
|  | Certificación CE |
|  | Certificación CSA |
|  | Certificación China RoHS |
|  | Residuos de aparatos eléctricos y electrónicos |

Seguridad

Esta sección contiene la información, prescrita por la Directiva de Máquinas 2006/42/CE, que es esencial para el cumplimiento y el respeto de las reglamentaciones de seguridad tanto en general como en relación con el uso específico del equipo.

El incumplimiento de estas instrucciones y de las demás instrucciones incluidas en este manual puede hacer que las condiciones de seguridad previstas en la fase de diseño resulten ineficaces y causar accidentes a los operadores del equipo.

Agilent Technologies declina toda responsabilidad por los daños producidos al equipo o por la seguridad física del operador o de terceros que se deriven del incumplimiento de las normas de seguridad indicadas en la documentación técnica.

Uso correcto

Este manual contiene importantes advertencias e instrucciones de seguridad que se deben cumplir para que la unidad funcione de manera segura.

El producto descrito en este manual está destinado exclusivamente al ámbito de aplicación especificado en las instrucciones. El manual también proporciona indicaciones relacionadas con los requisitos esenciales para la aplicación y el funcionamiento del producto como también las medidas de seguridad que pueden adoptarse para garantizar el funcionamiento normal. Agilent Technologies no otorga ninguna garantía ni asume responsabilidad alguna por aplicaciones diferentes a las descritas en este manual o cuando no se respeten los requisitos esenciales ni las medidas de seguridad.

El producto solo debe ser utilizado por personal calificado capaz de tomar las medidas de seguridad necesarias en condiciones que no causen daños ni lesiones. Todo accesorio y equipo utilizado con el producto debe ser suministrado o aprobado por Agilent Technologies.

Toda operación de ajuste o mantenimiento debe ser realizada por un técnico profesional informado sobre los riesgos.

Las reparaciones del producto deben ser realizadas exclusivamente por personal autorizado por Agilent.

Instrucciones de uso

Uso incorrecto

Agilent Technologies declina toda responsabilidad que se derive del uso incorrecto de las bombas de paletas rotativas de doble etapa..

El uso incorrecto causará la pérdida de todas las reclamaciones por responsabilidad y garantías.

El personal responsable del mantenimiento y de la operación de la bomba debe estar correctamente capacitado y debe conocer las normas de prevención de accidentes. Las precauciones para la prevención de accidentes incluidas en esta sección deben respetarse siempre durante el funcionamiento y el mantenimiento de la bomba para evitar daños a la bomba y lesiones a los operadores. Estas precauciones se proporcionan en forma de notas de ADVERTENCIA y PRECAUCIÓN.

ADVERTENCIA



Procedimientos operativos, información técnica y precauciones que, si no se cumplen y/o implementan correctamente, pueden causar lesiones físicas a los operadores.

NOTA

Utilice el resorte de retención para asegurar el cable de alimentación al tomacorriente IEC320.

PRECAUCIÓN

Procedimientos operativos, información técnica y precauciones que, si no se cumplen y/o implementan correctamente, pueden causar daños a la bomba.

Notas de advertencia

- El contacto con altas tensiones puede causar la muerte. Sea siempre extremadamente cuidadoso y cumpla las normas de prevención de accidentes en vigencia.
- Desconecte siempre el cable de la red de alimentación de la bomba antes de realizar tareas de mantenimiento. Coloque un cartel de advertencia especial sobre el disyuntor de alimentación: EQUIPO EN MANTENIMIENTO - NO ENCENDER.
- Si realiza el mantenimiento después de que la bomba haya estado en funcionamiento durante un tiempo considerable, espere a que se enfríe ya que la temperatura de la superficie exterior puede superar los 60 °C.
- No conectar la bomba correctamente a tierra puede causar graves lesiones a los operadores. Asegúrese siempre de que haya una conexión a tierra y que cumpla con las normas.
- Cuando limpie la bomba y sus componentes, evite el uso de solventes inflamables o tóxicos. Recomendamos usar una solución de agua y jabón, preferentemente en una lavadora ultrasónica; procure secar todas las piezas lavadas a temperaturas inferiores a 100 °C con el fin de eliminar la humedad residual.
- Las sobrecargas o averías prolongadas pueden provocar el sobrecalentamiento del motor eléctrico y la liberación de humos nocivos; desconecte la alimentación inmediatamente como medida de precaución y no se acerque a la bomba hasta que haya ventilado el motor para expulsar el humo. Tenga cuidado de no inhalar los humos que quedan en el interior de la bomba durante las reparaciones.
- En caso de incendio, no arroje agua sobre la bomba. Desconecte la alimentación y utilice extintores de CO₂.
- Inspeccione cuidadosamente las bridas para asegurar que no haya polvo, aceite, suciedad o defectos en las superficies de contacto, antes de realizar las conexiones requeridas.
- Asegúrese de que todas las juntas y acoplamientos estén correctamente ajustados antes de volver a encender la bomba después de realizar la reparación.
- No use accesorios que puedan enredarse en los mecanismos y/o actuar como conductores (cadenas, brazaletes, etc.).
- Asegúrese de que las herramientas que deba utilizar estén en perfectas condiciones de funcionamiento y cuenten con empuñaduras aislantes, cuando sea necesario. Verifique que el material aislante de los cables y los conductores de los equipos de pruebas no presenten signos de daños.
- No reemplace el aceite inmediatamente después de detener el equipo, ya que el aceite todavía puede estar a alta temperatura.

Notas de precaución

- Antes de volver a poner la bomba en funcionamiento después de una avería, inspecciónela y verifique cuidadosamente que no haya otros signos de daño.
- Utilice solamente herramientas que estén en perfecto estado de funcionamiento y especialmente diseñadas para el trabajo; el uso inadecuado o ineficaz de herramientas puede causar graves daños.
- Realice las reparaciones en áreas limpias y, siempre que sea posible, sin polvo. Proteja todos los espacios libres de los puntos de conexión con tapones de plástico adecuados y cubra las superficies mecanizadas de todas las piezas desmontadas hasta que se vuelvan a instalar en la bomba.
- Verifique siempre el lubricante y que esté adecuadamente distribuido dentro de la bomba; la lubricación inadecuada puede causar graves daños a la bomba.
- Marque las piezas de alguna manera cuando las desarme para asegurarse de poder volver a montarlas en el orden correcto.
- Verifique que no haya rayones ni hendiduras en los ejes mecanizados, en sus asientos dentro de la bomba ni en las superficies del equipo. Los rayones y abrasiones leves se pueden eliminar con papel de lija fino o mediante una ligera amoladura.
- Antes de volver a ensamblar un grupo, esparza un poco de aceite sobre las piezas internas y las superficies de contacto. Sustituya todas las juntas con repuestos originales antes de volver a montar los componentes.
- No ponga en marcha la bomba si las placas laterales de protección (refs. 11 y 81 de la figura "Vista de la bomba") no están correctamente colocadas.

Conductos de aire de escape

En caso de un intercambio de aire insuficiente en la sala de bombas, es posible conducir el aire de escape a otras habitaciones o al exterior.

Utilizar tuberías de diámetro igual a la salida del tanque por una longitud máxima de 15 m.

Para longitudes más largas aumente el diámetro del tubo. El peso de las tuberías no debe pesar sobre la bomba.

Utilice racores o mangueras flexibles en el tramo final.

ADVERTENCIA

Esta tubería debe ser descendente para evitar que la condensación regrese al tanque de la bomba.



PRECAUCIÓN No inserte grifos en esta tubería. No bloquee la salida.

Equipo de protección

El equipo de protección de los operadores que usan la bomba o realizan su mantenimiento siempre debe ser adecuado para el tipo de operación que realizan. Además, debe cumplir con los requisitos de seguridad de la legislación vigente en el país en donde se utiliza el equipo.

En general, el operador debe usar zapatos antiaccidentes durante la instalación y manipulación de la bomba Dual Stage Rotary Vane pumps.

ADVERTENCIA



Peligro para la salud debido a la presencia de sustancias peligrosas durante el mantenimiento o la instalación.

- Dependiendo de la peculiaridad del proceso, las bombas de vacío, los componentes o los fluidos de funcionamiento pueden estar contaminados con sustancias tóxicas, reactivas o radioactivas.
 - Use el equipo de protección adecuado durante el mantenimiento y las reparaciones o en caso de volver a instalar el equipo.
-

ADVERTENCIA

Riesgo de lesiones debido a la caída de objetos



Cuando se transportan las bombas de vacío manualmente, existe el peligro de que las cargas se resbalen y caigan.

- Traslade las bombas de vacío de tamaño pequeño y mediano con las dos manos.
 - Todo equipo de más de 20 kilos de peso debe ser transportado con un dispositivo de elevación adecuado.
 - Use zapatos de seguridad con puntera de acero que cumplan con la Directiva EN 347.
-

PRECAUCIÓN



Riesgo de lesiones debido a la presencia de cantos vivos

- Antes de realizar el servicio técnico o antes del montaje/desmontaje de la bomba del sistema, espere a que la bomba se detenga por completo.
 - No trabaje directamente dentro de la brida de alto vacío.
 - Si es necesario, use guantes de protección que cumplan con la norma EN 420.
-

Pautas de seguridad para bombas de paletas rotativas de doble etapa

Las bombas rotativas de paletas lubricadas con aceite pueden alcanzar altas temperaturas de funcionamiento. Por lo tanto, se recomienda dejar enfriar la bomba antes de realizar cualquier tipo de mantenimiento.

- Si el equipo se utiliza de una manera no especificada por el fabricante, puede verse afectada la protección provista en el equipo.
- Siempre traslade la bomba mediante el cáncamo provisto.
- La bomba debe colocarse en posición con el mayor cuidado posible a fin de evitar caídas accidentales.

ADVERTENCIA



En caso de que sea necesario manipular la bomba después de un periodo de funcionamiento, se la debe dejar enfriar, ya que la temperatura de la superficie exterior puede superar los 60 °C.

ADVERTENCIA



Para evitar daños al equipo y prevenir lesiones al personal operativo, se deben cumplir estrictamente las instrucciones de instalación indicadas en este manual.

Transporte y mantenimiento

Las bombas se envían al cliente dentro de cajas de cartón.

El peso total del embalaje, con la bomba incluida, es entre 30 Kg y 40 Kg según los diferentes modelos de bomba.

La caja se debe manipular con cuidado, utilizando el equipo de elevación adecuado.

PRECAUCIÓN

Cuando mueva la caja, asegúrese de que esté firmemente sujeta al equipo de elevación y que este equipo sea lo suficientemente fuerte como para soportar el peso.

El entorno de funcionamiento de la bomba debe ser el ambiente industrial tradicional. Es preferible evitar los lugares con vapores corrosivos o con calor excesivo.

La temperatura ambiente ideal debe oscilar entre 12 °C y 40 °C. Si la temperatura no se encuentra dentro de este rango, consulte al servicio técnico de Agilent para que se realicen las modificaciones necesarias.

Cuando transporte y almacene las bombas, no se deben superar las siguientes condiciones ambientales:

- temperatura: entre -20 °C y +70 °C
- humedad relativa: 0 ÷ 95 % (sin condensación)

Descripción del producto

El equipo debe ser utilizado por profesionales. El usuario debe leer el manual de instrucciones y toda otra información adicional suministrada por Agilent antes de operar el equipo. Agilent no se responsabiliza por ningún acontecimiento que se produzca debido a la falta de cumplimiento, incluso parcial, de estas instrucciones, el uso incorrecto por parte de personas no capacitadas, la interferencia no autorizada con el equipo o cualquier acción contraria a lo descrito en las normas locales específicas.

Las bombas DS102 1Ph, DS202 1Ph, DS302 1Ph, DS402 1Ph, DS402 3Ph, DS602 1Ph y DS602 3Ph son bombas de paletas rotativas de doble etapa selladas con aceite, impulsadas por un motor eléctrico monofásico o trifásico.

La información detallada se indica en la sección "Technical Information".

Instalación de bombas de paletas rotativas de doble etapa

Preparación para la instalación

La bomba se suministra en un embalaje de protección especial. Si muestra signos de daños que pueden haber ocurrido durante el transporte, comuníquese con su oficina de ventas local.

El peso total de la bomba, sin el embalaje, es entre 22 y 36 Kg.

Cuando desembale la bomba, asegúrese de no dejarla caer y evite toda clase de impacto brusco o vibración.

No deseche los materiales de embalaje de manera no autorizada. Este material es un 100 % reciclable y cumple con la Directiva CEE 94/62.

NOTA

La exposición normal al ambiente no puede dañar la bomba. Sin embargo, se recomienda mantenerla cerrada hasta instalarla en el sistema y, de ese modo, evitar que se contamine por la presencia de polvo.

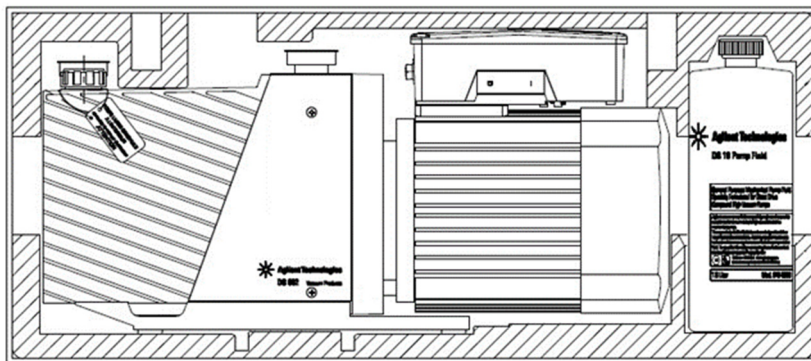


Figura 16 Embalaje de bombas de paletas rotativas de doble etapa

Instrucciones de uso

Instalación

No instale ni use la bomba en ambientes expuestos a agentes atmosféricos (lluvia, nieve, hielo), polvo, gases agresivos o en ambientes explosivos o con un alto riesgo de incendio.

Durante el funcionamiento, se deben respetar las siguientes condiciones ambientales:

- temperatura: entre +12 °C y +40 °C
- humedad relativa: 0 ÷ 95 % (sin condensación)

ADVERTENCIA



Protéjase contra cortocircuitos y sobrecargas instalando en la línea eléctrica principal del dispositivo Agilent un disyuntor automático tipo C de capacidad adecuada (consulte la siguiente tabla):

| P/N | 110 Vac | 220 Vac | 380 Vac |
|---------|---------|---------|---------|
| 9499315 | 10 A | 6 A | |
| 9499320 | 10 A | 6 A | |
| 9499325 | 10 A | 6 A | |
| 9499330 | 16 A | 7.5 A | |
| 9499331 | | 6 A | 6 A |
| 9499335 | 16 A | 7.5 A | |
| 9499336 | | 6 A | 4 A |

Instrucciones de uso

PRECAUCIÓN Antes de encender la bomba, llénela con aceite lubricante, dado que se entrega vacía.

PRECAUCIÓN El aceite debe verterse en la carcasa a través del orificio roscado especial y **NO** a través de la línea de aspiración.

NOTA Es importante que el nivel de aceite se mantenga entre los niveles MÍN y MÁX que se muestran en el indicador de nivel del lateral de la bomba.

PRECAUCIÓN Es obligatorio dejar un amplio espacio libre alrededor de la bomba para permitir la correcta circulación de aire; no se permite colocar la bomba en un lugar cerrado sin circulación de aire. Por un sistema de seguridad interno, cuando se excede la temperatura ambiente de 40 °C, la bomba puede mostrar un error.

ADVERTENCIA



Mantenga los tapones de protección colocados en las conexiones de admisión y descarga y no encienda la bomba hasta que esté correctamente conectada al equipo y a la línea de descarga respectivamente.

ADVERTENCIA



Durante la instalación, preste máxima atención a que la brida de aspiración esté conectada a la cámara de vacío y que la conexión de descarga no esté cerrada (ver la siguiente figura). No se debe utilizar la bomba como compresor.

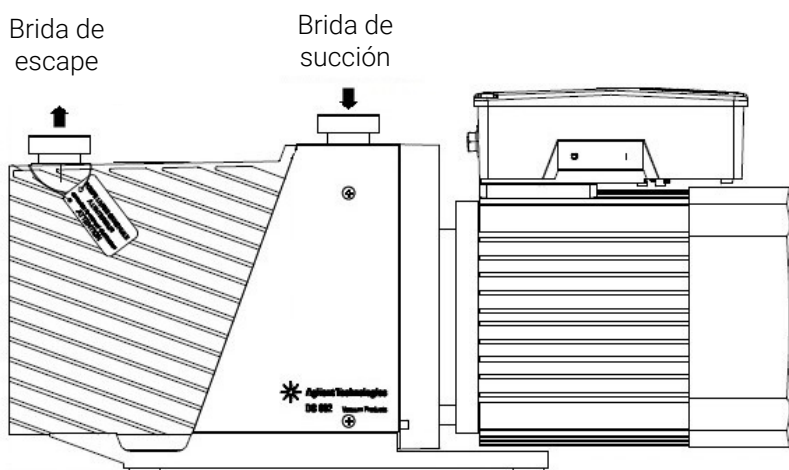


Figura 17 Bridas y conexión

ADVERTENCIA



La bomba cuenta con un dispositivo de seguridad (indicado por la flecha roja en la figura inferior) que garantiza que la presión dentro del depósito de aceite nunca supere el valor máximo permitido de 1,7 bar (abs). Se trata de un dispositivo de seguridad, por lo que el tapón no debe sustituirse, dañarse ni manipularse. Se permite su extracción temporal (desenroscándolo) para rellenar la bomba con aceite cuando sea necesario. El usuario es responsable de volver a enroscar el dispositivo en su posición original después del llenado y antes de poner en marcha la bomba.

El incumplimiento de estas precauciones puede causar daños a la máquina y lesiones al operador.

Si la presión en el depósito de aceite supera los valores límite permitidos (por ejemplo, si el escape está obstruido), saldrá una mezcla de gas de admisión y aceite del tapón de seguridad. El flujo continuará hasta que se detenga la bomba o se elimine la causa de la sobrepresión (por ejemplo, si se elimina la obstrucción del escape).



Figura 18

PRECAUCIÓN Verifique que la tensión eléctrica y la frecuencia correspondan al rango indicado en la placa del motor.

Conecte la bomba a la alimentación eléctrica.

PRECAUCIÓN Preste especial atención al motor trifásico, donde una inversión de polaridad provoca la inversión del sentido de giro de la bomba con las consiguientes posibilidades de daños mecánicos.

ADVERTENCIA



La bomba se debe instalar de manera tal que permita una interrupción fácil de la línea de alimentación eléctrica.

Cable de alimentación para bombas monofásicas. El cable correcto para el cableado eléctrico es un cable de tres hilos (fase + neutro + tierra). La sección del cable debe ser de al menos 0,75 mm² (AWG18).

La bomba se debe utilizar con el cable de alimentación suministrado con la bomba (disponible también como accesorio).

Preparación

Antes de poner en marcha la bomba, llénela con aceite lubricante, ya que las bombas se entregan vacías.

NOTA

Se incluye en el embalaje una lata de aceite.

Para obtener detalles sobre cómo llenar, consulte la Tarjeta de Mantenimiento Programado 01.

PRECAUCIÓN El aceite debe verterse en la carcasa a través del orificio roscado especial y **NO** a través de la línea de succión.

ADVERTENCIA



Retire los tapones de protección de las conexiones de aspiración y descarga antes de realizar cualquier otra cosa. En el caso de encendido accidental, el aire que se encuentra dentro de la bomba puede expulsar violentamente los tapones de protección y lesionar al operador.

Montaje de la bomba de paletas rotativas de doble etapa

La colocación de la bomba en posición debe hacerse de la siguiente manera:

- Bomba apoyada en el piso. No hay instrucciones especiales para este tipo de instalación, excepto que el piso debe ser lo más nivelado posible y adecuado para soportar el peso de la bomba con todos los accesorios (es ideal que sea de concreto). Fíjese que la bomba esté estable sobre su placa base; no debería ser necesario anclarla al piso con pernos y tornillos; además, se reducen mucho las vibraciones con el uso de las patas de goma.
- Bomba alejada del piso. En este caso, el usuario debe diseñar una estructura de soporte adecuada, teniendo en cuenta los siguientes puntos:
 - el plano en donde se apoya la bomba debe ser perfectamente horizontal;
 - la estructura debe tener la rigidez adecuada;
 - se deben aplicar las precauciones de seguridad correspondientes.

Tenga en cuenta también que la bomba debe estar fijada a la estructura de soporte después de reemplazar las patas de goma con patas antivibración especiales, que se deben atornillar a la base de la bomba y al plano de soporte.

Después de retirar la bomba de su embalaje, se recomienda realizar las siguientes verificaciones:

- b** Asegúrese de que la bomba no haya sufrido daños durante el envío.
- c** Compruebe que las protecciones estén montadas correctamente y que no haya piezas sueltas o descubiertas.

Observe las conexiones de admisión y descarga

Retire los tapones de protección de ambos puertos. Conecte el sistema que se debe evacuar a la brida de admisión, utilizando un anillo de centrado con junta tórica y una brida abrazadera.

Instrucciones de uso

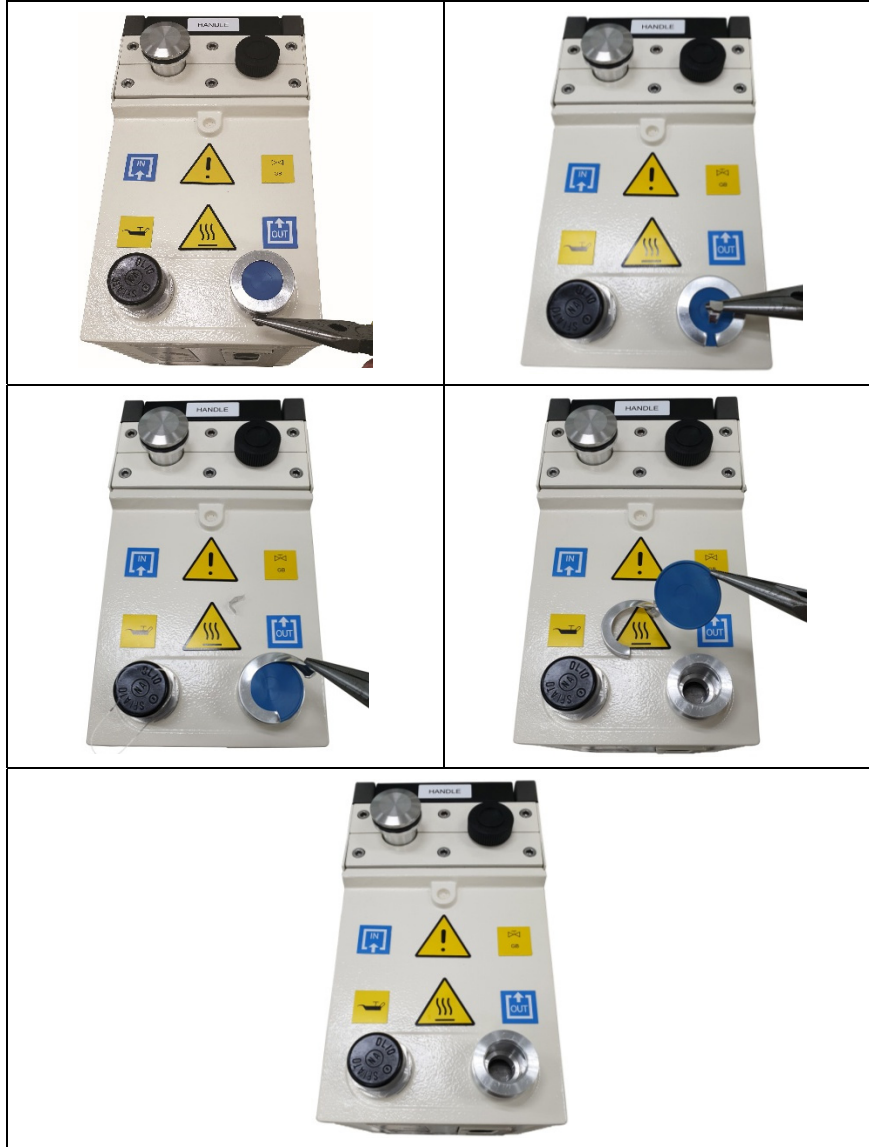


Figure 19

NOTA

Para asegurar un sellado confiable, use una junta tórica en NBR o FKM.

El tubo de admisión está equipado con un filtro tamizador que evita que los sólidos ingresen a la bomba y la dañen.

Instrucciones de uso

NOTA

Cuando los gases que se deben evacuar contienen polvo, es recomendable incorporar un filtro de polvo antes de la brida de admisión.

NOTA

Cuando los gases que se deben evacuar contienen grandes cantidades de vapor, es recomendable incorporar un separador de condensación antes de la brida de admisión.

Para aprovechar mejor la capacidad de la bomba, utilice tubos cortos y rectos, con un diámetro igual o superior a la brida de admisión.

NOTA

Si se utilizan tubos rígidos, resulta una buena práctica usar una junta flexible con el fin de evitar que se fuerce la conexión de la bomba.

Los gases de descarga se deben trasladar hacia el exterior conectando el puerto de descarga a una tubería específica.

NOTA

El eliminador interno de niebla de aceite evita la contaminación de la atmósfera circundante debido al aceite presente en el tubo de descarga durante el funcionamiento de la bomba.

PRECAUCIÓN

No obstruya nunca la línea de descarga de la bomba. Esto puede causar un exceso de presión en la carcasa con el riesgo de romper el tanque de aceite.

Encendido y funcionamiento de la bomba de paletas rotativas de doble etapa

Antes de su puesta en servicio, para alcanzar el vacío máximo, la bomba debe funcionar durante aproximadamente una hora con la válvula de lastre de gas abierta. Esto eliminará la humedad del aceite.

No hay procedimientos especiales para encender la bomba; solo es necesario conectarla a la red eléctrica mediante el interruptor bipolar (versión con motor monofásico) o el interruptor multipolar (versión con motor trifásico).

ADVERTENCIA



La bomba está diseñada para funcionar con fluidos inertes o no corrosivos. Está absolutamente prohibido usar sustancias potencialmente explosivas o inflamables.

NOTA

Si la bomba se enciende con el aceite frío, inicialmente, se oirá más ruido de lo normal; esto durará unos pocos minutos solamente hasta que el aceite alcance su temperatura de funcionamiento.

No hay instrucciones especiales para el funcionamiento normal de la bomba, que se entrega después de completar un ciclo de funcionamiento en fábrica.

NOTA

Para ciclos de trabajo repetitivos, con breves intervalos de tiempo entre ellos, es mejor no detener la bomba.

Detención de la bomba de paletas rotativas de doble etapa

No existen procedimientos especiales para apagar la bomba; basta con desconectarla de la red eléctrica mediante el interruptor bipolar (versión con motor monofásico; consulte la sección "MODELOS CON MOTORES UNIVERSALES MONOFÁSICOS") o el interruptor multipolar (versión con motor trifásico; consulte la sección "MODELOS CON MOTORES UNIVERSALES TRIFÁSICOS").

Al detener la bomba, el dispositivo antirretorno permite mantener el vacío en el depósito conectado a la brida de entrada de la bomba.

Si se prevé que la bomba permanecerá parada durante un período prolongado, o si ha bombeado grandes cantidades de vapores, se recomienda hacerla funcionar con el lastre de gas abierto y la línea de entrada cerrada durante unos minutos antes de apagarla para limitar el riesgo de corrosión o incrustaciones debido a la contaminación del aceite por vapores condensados.

Mantenimiento

El personal responsable del mantenimiento y de la operación de la bomba debe estar correctamente capacitado y debe conocer las normas de prevención de accidentes.

ADVERTENCIA



El contacto con altas tensiones puede causar la muerte. Sea siempre extremadamente cuidadoso y cumpla las normas de prevención de accidentes en vigencia.

ADVERTENCIA



Cuando el equipo está encendido, preste atención a la presencia de piezas móviles y alta tensión.

ADVERTENCIA



Si debe realizar el mantenimiento después de que la bomba haya estado en funcionamiento durante un tiempo considerable, déjela enfriar ya que la temperatura de la superficie exterior puede superar los 60 °C.

ADVERTENCIA



Desconecte siempre la alimentación de la bomba antes de comenzar las tareas de mantenimiento. Coloque un cartel de advertencia especial sobre el disyuntor de alimentación: **EQUIPO EN MANTENIMIENTO - NO ENCENDER**. Cuando termine, retire la advertencia de seguridad.

ADVERTENCIA



No cambie el aceite inmediatamente después de detener el equipo, ya que el aceite todavía puede tener una alta temperatura.

PRECAUCIÓN

Al sustituir una pieza, tenga mucho cuidado. Preste especial atención al motor trifásico, ya que una inversión de polaridad provoca la inversión del sentido de rotación de la bomba, con la consiguiente posibilidad de daños mecánicos.

NOTA

Antes de devolver la bomba al fabricante para su reparación, debe completar la hoja "Request for return" adjunta en este manual de instrucciones y enviarla a la oficina de ventas local. Se debe colocar una copia de la hoja en el embalaje de la bomba antes de enviarla.

Cuando se deba desechar la bomba, proceda a eliminarla de acuerdo con las normas nacionales específicas.

- **MANTENIMIENTO PROGRAMADO:** Mantenimiento del estado nominal de funcionamiento.
- **MANTENIMIENTO NO PROGRAMADO:** Restablecimiento del estado nominal de funcionamiento.

NOTA

La frecuencia con la que se realizan las reparaciones depende del proceso y de la presencia de sustancias que acortan la vida útil de la bomba (polvo, abrasivos, solventes, agua, sustancias químicamente agresivas).

Instrucciones de uso

Utilice solo la cantidad estrictamente necesaria de lubricante; un exceso de aceite lubricante, como la falta de este, puede comprometer el correcto funcionamiento de la bomba.

Solo deben utilizarse los lubricantes recomendados o aceites lubricantes con características similares y calidad comprobada.

Los cambios de aceite deben realizarse con el aceite a una temperatura suficientemente alta, tras dejar enfriar la bomba durante unos minutos después de su funcionamiento.

Los tapones de los tubos de drenaje y llenado no se deben dejar abiertos durante más tiempo que el estrictamente necesario. Cuando realice el mantenimiento, preste atención a los signos que pueden preceder una avería, en particular:

- rastros de corrosión;
- fugas de aceite;
- juntas o acoplamientos flojos.

Los técnicos de mantenimiento deben:

- conocer todas las directivas locales pertinentes relacionadas con la prevención de accidentes durante el trabajo con bombas accionadas por motor eléctrico y deben saber cómo aplicarlas;
- haber leído y comprendido todas las secciones de las "Normas de seguridad";
- estar familiarizados con las características esenciales de diseño y operación de la bomba;
- saber cómo usar y consultar la documentación de la bomba;
- conocer el funcionamiento correcto de la bomba;
- tomar nota de cualquier irregularidad en el funcionamiento de la bomba y tomar las medidas necesarias, cuando corresponda.

Instrucciones de uso

Usar repuestos originales. Si surgen problemas o necesita solicitar repuestos, consulte a nuestro departamento de servicios.

Agilent Technologies Italia S.p.A.
Vacuum Products Division
Via F.lli Varian 54
10040 Leini, (Torino) – Italia
Tel.: +39 011 997 9111 Fax: +39 011 997 9350
Sin cargo: 00 800 234 234 00

Los procedimientos correctos para el cambio de aceite y filtro de bombas de paletas rotativas de doble etapa se describen en la sección "Technical Information".

Limpieza

PRECAUCIÓN No limpie con alcohol los componentes de goma o plástico de la bomba.

Al limpiar la bomba y sus componentes, evite el uso de disolventes inflamables o tóxicos, como bencina, benzol, éter o alcohol.

Recomendamos usar una solución de agua y jabón, preferentemente en una lavadora ultrasónica; procure secar todas las piezas lavadas a temperaturas inferiores a 100 °C con el fin de eliminar la humedad residual.

Eliminación

Significado del logo “WEEE” que se encuentra en las etiquetas

El siguiente símbolo se aplica de acuerdo con la Directiva WEEE (Residuos de Aparatos Eléctricos y Electrónicos, por sus siglas en inglés) de la CE.

Este símbolo (válido solo en los países de la Comunidad Europea) indica que el producto en el que se aplica NO debe desecharse con la basura doméstica o industrial común, sino que debe enviarse a un sistema de recolección diferenciada. Se invita al usuario final a comunicarse con el proveedor del dispositivo, ya sea directamente con la Casa Matriz o con un revendedor, para iniciar el proceso de recolección y eliminación después de verificar las condiciones contractuales de venta.



Figura 20 Logotipo “WEEE”

Para más información, consulte:

<http://www.agilent.com/environment/product/index.shtml>

Servicio

Si un cliente necesita un servicio de intercambio avanzado o reparación, contacte con un distribuidor local o escriba un correo electrónico directamente a:

vpt-customer care@agilent.com

vpl-customer care@agilent.com

Es obligatorio completar la "Request for Return" para devolver el producto a Agilent para mantenimiento (proporcionada al final del presente manual).

5

使用说明

| | |
|---------------------------------------|-----|
| 关于本手册 | 130 |
| 有效性 | 130 |
| 定义与术语 | 131 |
| 小心、警告和注意的定义 | 131 |
| 警告符号 | 132 |
| 安全 | 134 |
| 正确使用 | 134 |
| 不当使用 | 135 |
| 警告注释 | 136 |
| 小心注释 | 137 |
| 防护设备 | 138 |
| 双级旋片式真空泵安全指南 | 139 |
| 运输与存放 | 140 |
| 产品说明 | 140 |
| 旋片式 Dual Stage Rotary Vane pumps 泵的安装 | 141 |
| 安装准备工作 | 141 |
| 安装 | 142 |
| 安装 | 146 |
| Dual Stage Rotary Vane pumps 安装 | 147 |
| 入口和排出管路 | 147 |
| 启动和运行 Dual Stage Rotary Vane pumps | 150 |
| Dual Stage Rotary Vane pumps 的关机 | 151 |
| 维护 | 151 |
| 清洁 | 154 |
| 處置 | 155 |
| 服務 | 156 |

关于本手册

有效性

本手册列出 Dual Stage Rotary Vane pumps (双级旋片泵) 用户说明，特别注意与安全、操作和一级维护有关的注意事项，受用户负责的维护操作限制。

维护操作在特定章节中说明，对于更高等级的维护设有具体规定（接受过维护操作专门培训的人员），用户不得执行此类操作。

要正确安装和启动/停止，请参考“Technical Information”章节。

有关更详细的技术使用，请参考“Technical Information”章节。

注意

- 1 本手册包含有用信息，确保所有使用 Dual Stage Rotary Vane pumps 的人员可以安全操作，在设备整个寿命期内发挥完美效率。
 - 2 将本手册和所有相关出版物放在所有操作员、维护人员方便访问的位置。
-

定义与术语

小心、警告和注意的定义

本手册的一些重要参考内容用背景色突出显示。

小心

程序开始前，提示小心讯息，如果不遵守製程指示，可能導致設備損壞。

警告



警告讯息提醒操作員注意特定流程或做法，如果執行錯誤，可能導致人員重傷。

注意

注意旨在引起注意重要信息，提供具體步驟的更多詳細信息。

警告符号

下面是 Dual Stage Rotary Vane pumps 警告与符号标志，及对应的危险描述。三角形标志表示警告。本文档中，警告对应的符号标志含义如下. 仪器上的警告标签可能会有以下标志。如果看到该符号标志，请参考相关操作或维护手册，了解该警告标志所指示的正确操作。



| | |
|---|-----------|
|  | 危险电压 |
|  | 高温表面 |
|  | 普通危险 |
|  | 简体中文 吸气法兰 |
|  | 排气法兰 |
|  | 加注工作液 |
|  | 气镇阀 |
|  | 生产现场 |
|  | 存在危险物质 |
|  | 挤压危险 |
|  | 割伤危险 |

使用说明

| | |
|---|------------|
|  | 佩戴防护手套 |
|  | 佩戴个人防护装备 |
|  | 穿防事故鞋 |
|  | 電源開關 |
|  | 電源關閉 |
|  | 油瓶 |
|  | CE 认证 |
|  | CSA 认证 |
|  | 中国 RoHS 认证 |
|  | 废电子电气设备 |

安全

本节包含机械指令 2006/42/EC 规定的信息，这些信息对于遵守常规安全法规以及机器特定用途相关安全法规至关重要。

不遵守这些说明或本手册的其他说明，将导致设计阶段设想的安全条件无效，操作员可能发生事故。

对于不遵守技术文档中的安全规定而导致的机器损坏或者操作员或第三方人身伤害，Agilent Technologies 不承担任何责任。

正确使用

本手册包含机器安全工作需要遵守的重要警告和安全说明。

本手册所述产品仅用于本手册指定的应用领域。手册还规定了产品应用和操作基本要求相关的说明，以及可确保正常运行的安全措施。对于将产品用于非本手册介绍的用途或者产品使用过程中不遵守基本要求和安全措施，Agilent Technologies 不承担任何责任。

必须由能够采取必要安全措施，不会导致损坏或受伤的具备资质人员使用产品。产品的配套配件和设备必须由 Agilent Technologies 提供或授权使用。

必须由了解相关风险的专业技术人员执行任何调整或维护操作。

必须由 Agilent 授权人员执行产品维修。

使用说明

不当使用

对于 Dual Stage Rotary Vane pumps 的不当使用，Agilent Technologies 不承担任何责任。

不当使用将导致所有责任和质保失效。

负责泵操作和维护的人员必须接受过充分培训，了解事故预防规定。操作和维护泵时必须始终遵守事故预防规定，以避免给操作员和泵造成损失。通过“警告”和“小心”注释提供防范措施。

警告



如果不遵守和/或正确实施操作过程、技术信息和注意事项，可导致操作员人身伤害。

注意

使用固定弹簧将主线缆固定在 IEC320 插座中。

小心

如果不遵守和/或正确实施操作过程、技术信息和注意事项，可导致泵损坏。

警告注释

- 接触高电压可导致死亡。始终要特别小心，遵守现行事故预防法规。
- 进行维护工作前，务必断开电源与泵之间的连接线。在电源断路器上放置一个特别警告标志：机器正在维护 – 请勿开启电源。
- 执行维护时，如果泵已经过长时间运行，待充分冷却后再开始，因为表面温度可能超过 60 °C。
- 如果不为泵提供接地连接可能导致操作员重伤。始终确保有接地连接，并且符合标准。
- 清洁泵及其组件时，避免使用易燃或有毒溶剂。建议使用肥皂水溶液和超声波清洗机，在低于 100° C 的温度下干燥所有已清洁的部件，去除表面水分。
- 长时间过载或故障可能导致电动机过热，并释放有害烟雾；作为预防措施，应立即切断电源，并在提供通风以排出烟雾之前不要靠近泵。在进行维修作业时，注意不要吸入泵内残留的烟雾。
- 如果发生火灾，不要对泵喷水。切断电源，使用 CO₂ 灭火器灭火。
- 小心检查法兰，确保对接表面无粉尘、油污或缺陷，然后再进行所需连接。
- 维修后工作务必确保所有接头和连接件正确锁紧，然后才能再次启动泵。
- 不得佩戴任何可能卷入机械装置和/或可以导电的饰品（项链、手镯等）。
- 确保将使用的工具完好无任何破损，必要时应配备绝缘握把。检查线缆绝缘材料和测试设备的导线没有任何损坏迹象。
- 机器停机后，不要马上就更换油，因为此时油温非常高。

小心注释

- 停机后恢复泵使用前，仔细检查是否有任何损坏迹象。
- 只能使用完好无损、作业专用工具；使用不合适或无效的工具可导致严重损坏。
- 在清洁且尽可能无尘的区域进行维修。用合适的塑料盖保护各连接点的间隙，并在重新装回泵之前覆盖所有拆卸部件的加工表面区域
- 始终检查润滑油，确保其在整个泵内合理分布；润滑不充分可导致泵严重损坏。
- 拆下的零部件，可以做一些标记，这样，再次组装时可以按正确的顺序操作。
- 检查加工轴、泵内的底座或机器精磨表面没有划痕或凹槽。可以用极细砂纸略微打磨，去除小划痕和磨损。
- 组合前，始终在内部件和对接表面涂抹少量油。重新组装部件前，用原厂备件更换所有密封。
- 如果防护侧板（参见图“泵视图”中的标号11和81）未正确安装，请勿启动泵。

排气管路安装

如果泵安装在空气交换不良的房间内，可以将泵排气通过管道排到其他房间或室外。

使用与水箱排出口直径相同的管道，最大长度为 15 米。

对于较长的管道，增加管道直径。管道重量不得压在泵上。

在最终长度中使用柔性管道或管件。

警告



该管道必须呈坡度下降，以避免冷凝水回流到水箱。

小心

请勿将球阀连接到此管道。请勿堵塞出口。

防护设备

泵系统操作或维护人员的防护设备必须适合执行的操作类型。此外，还必须符合机器使用所在国家的现行法规要求。

通常，操作员在操作和安装 Dual Stage Rotary Vane pumps 时必须穿防事故鞋。

警告



維護或安裝時危險物質會導致健康危險。



- 根據製程特性，真空幫浦、組件或工作流體可能有毒、反應性或原料污染。
- 維護維修或重新安裝時，請配戴適當的防護設備。



警告



物體造成損壞的風險



手動運送真空幫浦時，有重物緩慢且不易發生的危險。



- 手工搬運中小型真空幫浦。
- 若設備重量超過 20 公斤，應使用適當的起吊設備運送。
- 穿著符合指令 EN 347，並搭配鐵鞋頭的安全鞋。

小心



鋒利邊緣導致風險受損

- 在維修幫浦之前，或在幫浦從系統執行任何安裝/操作之前，等待幫浦完全停止。
- 不要直接在高空法蘭內操作。
- 如有必要，請依照 EN 420 戴上防護手套。

双级旋片式真空泵安全指南

油润滑旋转叶片泵工作时可产生高温。因此建议等待泵充分冷却，然后执行维护。

- 如果不按照制造商的指定方式操作设备，设备所提供的安全保护功能就不会起到应有的安全保护作用。
- 始终通过提供的有环螺栓搬运泵。
- 固定泵时必须格外小心，避免意外掉落。

警告



如果需要在运行后搬运泵，必须先等待其冷却，因为外部温度可能超过 60 °C。

警告



为避免损坏设备和操作人员受伤，应严格遵守本手册的安装说明！

运输与存放

泵用纸板箱包装，运送到客户。

包装总重量（包括泵）根据不同的泵型号在 30 kg 至 40 kg 之间。

必须使用合适的起吊设备，小心搬运包装箱。

小心

移动包装箱时，确保牢固固定至起吊设备，并且设备足以支撑重量。

泵的工作环境是传统工业环境。最好避免在腐蚀性蒸气或过高热量的地方工作。

室内温度最好在 12 °C 到 40 °C 之间。如果温度不在此范围内，请咨询 Agilent 技术服务，进行更换。

运输和存放泵时，不得超过以下环境要求：

- 温度：-20 °C 至 +70 °C
- 相对湿度：0 ~ 95 % (无冷凝)

产品说明

本设备供专业人员使用。操作设备前，用户应阅读本说明手册，以及 Agilent 提供的任何其他信息。对于不遵守或部分不遵守说明、未经培训人员的不当使用、未经授权干扰设备，或者违反特定当地标准的操作导致的任何后果，Agilent 不承担任何责任。

DS102 1Ph、DS202 1Ph、DS302 1Ph、DS402 1Ph、DS402 3Ph、DS602 1Ph 和 DS602 3Ph 泵为双级旋片式油封真空泵，由单相或三相电动机驱动。

“Technical Information” 章节提供详细信息。

旋片式 Dual Stage Rotary Vane pumps 泵的安装

安装准备工作

泵在运输过程中采用专用防护包装。如果包装出现运输过程中导致的损坏迹象，请联系当地销售办事处。

泵的总重量（不含包装）在 22 kg 至 36 kg 之间。

打开泵包装时，务必不要掉落，避免任何突然撞击或冲击振动。

不要以未经授权的方式处置包装材料。材料完全可再生，符合 EEC 指令 94/62。

注意

正常环境暴露不会损坏泵，但仍然建议安装到系统之前，保持密闭，从而避免粉尘导致的任何污染。

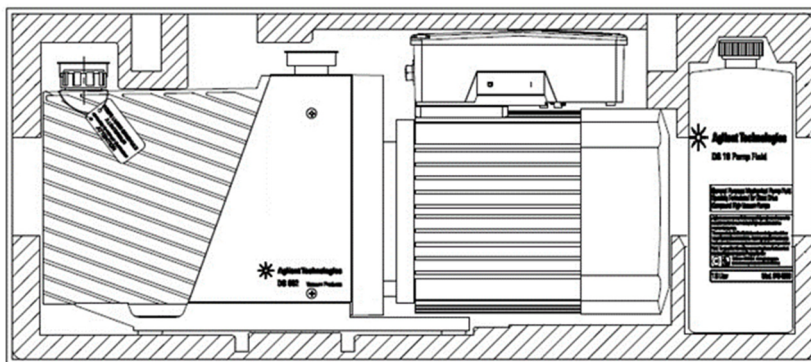


图 21 Dual Stage Rotary Vane pumps 包装

使用说明

安装

不得在存在空气传播物质（雨、雪、冰）、粉尘、腐蚀性气体的环境，或者爆炸性环境或高火灾风险环境中安装或使用泵。

工作时，必须满足以下环境条件：

- 温度：+12 °C 至 +40 °C
- 相对湿度：0 ~ 95 % (无冷凝)

警告



通过在 Agilent 设备的电源主线上安装适当容量的“C”型自动断路器，以防止短路和过载（见下表）。

| P/N | 110 Vac | 220 Vac | 380 Vac |
|---------|---------|---------|---------|
| 9499315 | 10 A | 6 A | |
| 9499320 | 10 A | 6 A | |
| 9499325 | 10 A | 6 A | |
| 9499330 | 16 A | 7.5 A | |
| 9499331 | | 6 A | 6 A |
| 9499335 | 16 A | 7.5 A | |
| 9499336 | | 6 A | 4 A |

小心

泵启动前，装满润滑油，因为运输时泵内油箱空置。

小心

必须通过专用螺纹插孔将油注入外壳，不得通过吸入管路。

注意

务必确保油液位保持在泵侧液位计指示的 MIN 和 MAX 范围之间。

小心

必须在泵周围留足空气循环的空间；不允许将泵安装在空气不循环的密闭空间内。当泵超过 40 °C 的环境温度时，内部安全系统可能显示错误。

警告



保留管路入口和出口的保护盖，正确连接仪器和排出管路后再开启泵。

警告



安装时，尤其注意吸入法兰连接真空腔，排出管路未闭合（参见下图）。不得将泵用作压缩机。

不遵守这些注意事项将对机器和操作员造成危险。

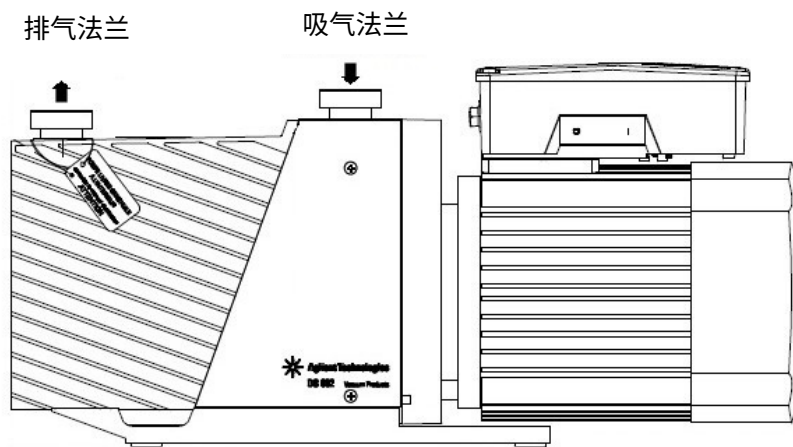


图 22 法兰和管路

警告



泵上安装有一个安全装置（如下图红色箭头所示），以确保油箱内的压力不会超过 1.7 bar（绝对压力）的最大允许值。该装置为安全装置，因此其盖帽不得更换、损坏或擅自改动。如有需要，可临时通过拧下盖帽向泵内加油。用户有责任在加油后并在启动泵之前，将该装置重新拧回原位。未遵守这些预防措施可能会导致机器损坏并对操作人员造成伤害。

如果油箱内的压力超过允许的极限值（例如排气受阻），吸入气体与油的混合物将从安全盖处排出。该流动将持续，直到泵停止运行和/或过压原因被消除（例如排气口的堵塞被清除）。



图 23

小心

检查您的电源电压和频率是否与电机铭牌上标示的范围一致。

将泵连接到电源。

小心

特别注意三相电机，极性接反会导致泵的旋转方向反转，从而可能造成机械损坏。

警告



安装泵时必须方便切断线路电压。

单相泵的电源电缆。正确的电气接线电缆应为三芯电缆（Ph+N+接地）。导线截面积至少为 0.75 mm²（AWG18）。

必须对泵使用随泵提供的电源线（也可作为配件提供）。

安装

在启动泵之前，请加注润滑油，因为泵在交付时是空的。

注意

包装中包含一罐油。

有关如何加注的详细信息，请参见《定期维护卡 01》。

小心

机油必须通过专用螺纹加油孔注入泵壳内，而不是通过吸气管线。

警告



进行任何操作前，取下吸入和排出管路的保护盖。如果意外启动，泵内空气可能会迫使保护盖喷出来，给操作员造成危险。

Dual Stage Rotary Vane pumps 安装

应如下所述安装泵：

- 将泵放在地上。此类安装没有特别说明，唯一例外是地面应尽可能平坦，适合承受泵（最好在混凝土地面上）及任何安装配件的重量。注意，泵在底板上稳定，应无需通过螺栓和螺丝固定至地面；使用橡胶支撑脚还可极大减少泵振动。
- 泵离开地面。在此情况下，用户必须设计出一个合适的支撑结构，记住以下要点：
 - 支撑泵的平面应处于完全水平位置；
 - 结构坚固；
 - 应采取相应安全措施。

还应注意，将橡胶支撑脚更换为特殊防振支撑脚后，应使用螺丝固定至泵底座和支撑平面，将泵与支撑结构连接在一起。

将泵取出包装箱后，建议进行以下检查：

- a 确保泵在运输途中未发生任何损坏。
- b 检查防护装置是否正确安装，并确保没有未覆盖或松动的部件。

入口和排出管路

取下两个口的保护盖。使用带 OR 的对中环和夹法兰，将待排空系统连接到入口法兰。

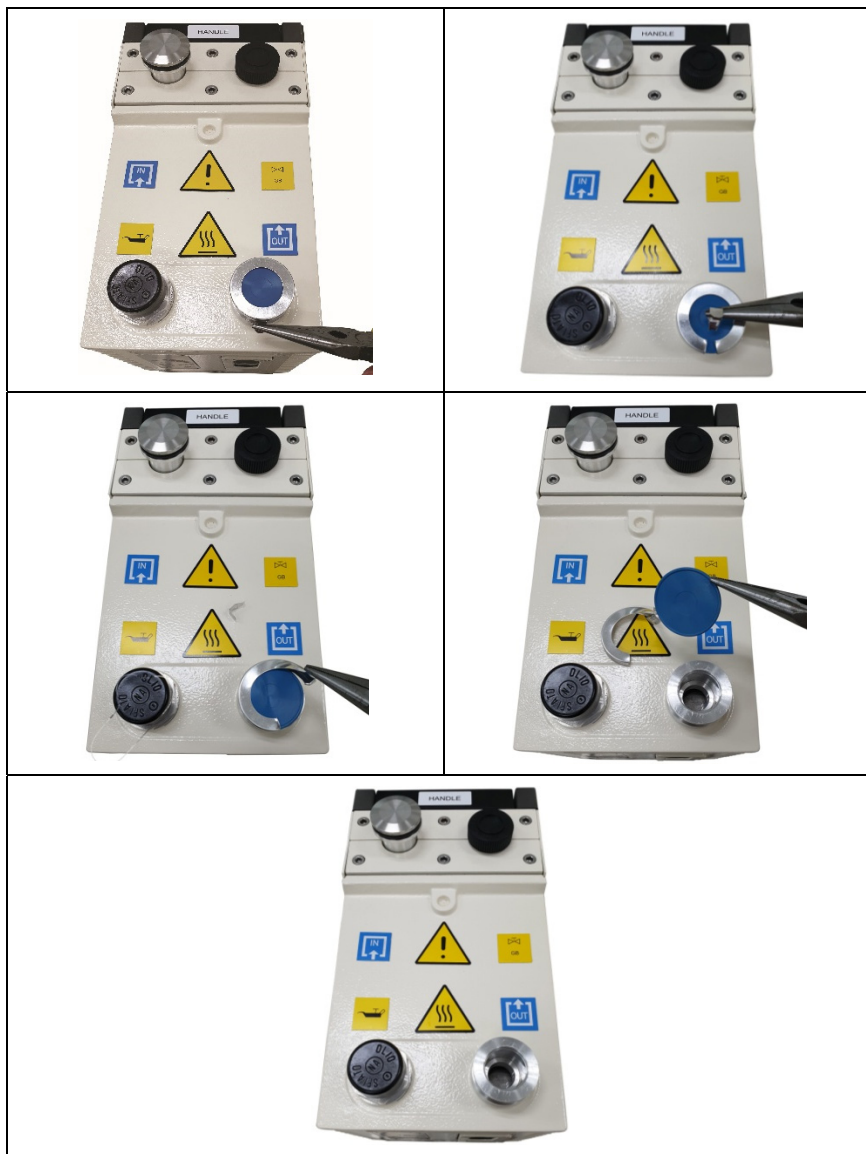


图 24

注意

要确保可靠密封，请使用 NBR 或 FKM 材料的 OR 垫圈。

入口管道配备过滤筛，防止固体进入并损坏泵。

使用说明

注意

如果泵出的气体含有粉尘，建议在入口法兰前插入滤尘网。

注意

如果泵出的气体含有大量蒸气，建议在入口法兰前安装冷凝液分离器。

要充分发挥泵的性能，请仅使用直径不小于入口法兰直径的直短管道。

注意

如果使用刚性管道，最好使用柔性接头以避免对泵管路造成不应有的力。

应将排气口连接到专用管道，将废气排出到外界。

注意

内部油雾消除装置可避免泵运行时排出管道内的油污染周围大气。

小心

不得堵塞泵排出管路，否则可导致外壳压力过大，存在油箱破裂的风险。

启动和运行 Dual Stage Rotary Vane pumps

在投入使用之前，为达到最大真空度，必须在气镇阀开启的情况下让泵运行约一小时。这样可以消除油中的任何湿气。

启动泵无需特殊操作；只需通过双极开关（单相电机版本）或多极开关（三相电机版本）将其连接到电源即可。

警告



泵设计用于惰性和非腐蚀性流体。严禁用于潜在爆炸性或易燃物质。

注意

如果用低温油启动泵，最初将听到超过正常水平的噪声；此噪声仅持续数分钟，直到油达到工作温度。

泵在交付前已在工厂完成一次运行循环，没有关于正常运行的特别说明。

注意

对于短暂间隔时间的反复工作循环，最好不要让泵关机。

Dual Stage Rotary Vane pumps 的关机

关闭泵无需特殊操作；只需通过双极开关（单相电机版本——参见“单相通用电机型号”章节）或多极开关（三相电机版本——参见“三相通用电机型号”章节）将其与电源断开即可。

当泵停止时，防回吸装置可以使连接在泵进气法兰上的容器保持真空。

如果预计泵将长时间停止运行，或者在任何情况下泵抽取了大量蒸汽，建议在关闭之前让泵在气镇阀开启且进气管线关闭的情况下运行几分钟，以减少由于蒸汽冷凝污染油而引起的腐蚀或结垢风险。

维护

负责泵操作和维护的人员必须接受过充分培训，了解事故预防规定。

警告



接触高电压可导致死亡。始终特别小心，遵守现行事故预防法规。

警告



机器通电后，小心移动部件和高电压。

警告



如果长时间运行后对泵执行维护，请等待其冷却，因为外表面温度超过 60 °C。

警告



开始维护工作前，始终断开泵电源。在电源切断开关上放置一个特别警告标志：机器正在维护 - 请勿开启电源。完成后，取下安全警告。

警告



停止机器后不可马上更换油，因为此时油温非常高。

小心

更换部件时必须格外小心。特别注意三相电机，极性接反会导致泵的旋转方向反转，从而可能造成机械损坏。

注意

将泵送回制造商进行维修前，必须填写泵说明手册附带的“Request for return”表并送至当地销售办事处。发货前，必须将该表的复印件放在泵包装内。

如果要报废泵，则必须按照特定国家标准进行处理。

维护可以理解为所有计划维护和非计划维护工作的总和。

- 计划维护：维持正常工作状态。
- 非计划维护：恢复正常工作状态。

注意

维修频率取决于流程和是否存在缩短泵使用寿命的物质（粉尘、研磨性物质、溶剂、水、化学腐蚀性物质）。

使用说明

只使用严格必要量的润滑剂；润滑油过多或不足，有时都会影响泵的正常运行。

只能使用推荐的润滑剂，或具有类似特性且质量可靠、经过验证的润滑油。

更换油时，应在油温足够高的情况下进行，并在泵运行后先让其冷却几分钟。

排出和注入塞的打开时间不得超过严格需要的时间。执行维护时，注意可能导致损坏的任何迹象，尤其是：

- 腐蚀迹象；
- 漏油；
- 接头或连接件松动。

维护技术人员必须：

- 了解与电机驱动泵工作事故预防有关的所有适用当地规定，并知道如何运用；
- 已经阅读并理解“安全规定”的所有章节；
- 熟悉泵的重要设计特性和工作；
- 了解如何使用和参考泵文档；
- 了解泵的正确运行；
- 记录泵运行过程中的任何异常，采取必要措施。

使用说明

使用原厂备件。对于出现的所有问题，或订购备件，请咨询我们的服务部门。

Agilent Technologies Italia S.p.A.
Vacuum Products Division
Via F.lli Varian 54
10040 Leini, (Torino) – Italy
电话: +39 011 997 9111 传真: +39 011 997 9350
免费电话: 00 800 234 234 00

“Technical Information”章节介绍 Dual Stage Rotary Vane pumps 换油和滤筒更换的正确过程。

清洁

小心

不得用酒精清洁泵的塑料或橡胶组件。

在清洁泵及其部件时，避免使用易燃或有毒的溶剂，如汽油、苯、乙醚或酒精。

建议使用肥皂水溶液和超声波清洗机，在低于 100 °C 的温度下干燥所有已清洁的部件，去除表面水分。

處置

標籤中的「WEEE」確實意義重大

根據EC WEEE（廢電子電氣設備）指令應用以下符號。

此符號（僅在歐盟國家有效）表示所適用的產品不能與家庭或工業或一起丟棄，必須送至專門的物資回收系統。銷售合約條款後啟動回收和支付流程。



圖 25 “WEEE” 標誌

有關更多信息，請參考：

<http://www.agilent.com/environment/product/index.shtml>

服務

客戶如需要升級的更換或維修服務，請聯絡當地經銷商，或直接發送電子郵件至：

vpt-customer@agilent.com

vpl-customer@agilent.com

需要填寫「要求退貨」表格才能將幫浦恢復到Agilent維修部門（在本手冊末尾會提供）。

6

取扱説明書

| | |
|--|-----|
| この説明書について | 158 |
| 有効期限 | 158 |
| 定義と用語 | 159 |
| 注意、警告および注記の定義 | 159 |
| 警告記号 | 160 |
| 安全性 | 162 |
| 適切な取扱い | 162 |
| 不適切な取扱い | 163 |
| 警告メモ | 164 |
| 注意メモ | 165 |
| 排気管の設置 | 165 |
| 防具 | 166 |
| デュアルステージロータリーベーンポンプの安全ガイドライン | 168 |
| 搬送と保管 | 169 |
| 製品説明 | 169 |
| ロータリーベーン Dual Stage Rotary Vane pumps ポンプの設置 | 170 |
| 設置準備 | 170 |
| 設置 | 171 |
| セットアップ | 175 |
| Dual Stage Rotary Vane pumps 取付 | 176 |
| 吸入・排出接続部への接続。 | 176 |
| Dual Stage Rotary Vane pumps の起動と稼働 | 179 |
| Dual Stage Rotary Vane pumps の停止 | 180 |
| メンテナンス | 180 |
| 清掃 | 183 |
| 処分 | 184 |
| サービス | 185 |

この説明書について

有効期限

本説明書には、特に安全、操作手順およびユーザーに必要なメンテナンス手順のみの簡易メンテナンスに関連する考え方を参考に、Dual Stage Rotary Vane pumps (二段ロータリーベーンポンプ) の使用方法をユーザーに説明します。

高度なメンテナンス（メンテナンス手順の個別訓練を受けた人員）に関連した各条項とあわせて、各セクションで説明するメンテナンス手順は、ユーザーは行わないでください。

正しい取付および始動/停止については、「Technical Information」セクションを参照してください。

技術的な使用方法に関する詳細は、「Technical Information」セクションを参照してください。

注記

- 1 本説明書には、Dual Stage Rotary Vane pumps を使用する人員がすべて安全に使用でき、また機器使用寿命中に効率よく使用できるのに、役立つ情報が記載されていません。
 - 2 本説明書は、関連するすべての刊行物とあわせて、オペレータ/メンテナンス要員に分かりやすい、取り扱いしやすい場所に保管してください。
-

定義と用語

注意、警告および注記の定義

本説明書の重要な参照項目のいくつかは、対比しやすい色で協調表示し、枠組みで囲っています。

注意

「注意」のメッセージは、もし監視されていない場合に装置に損害が生じる可能性を示しています。

警告



「警告」のメッセージは、もし正しく操作されない場合に、重大な人身障害につながる可能性がある特定の操作や実行への操作者の注意の必要性を示しています。

注記

「注」は、重要な情報への注意喚起と特定の工程に関してのより詳細な情報を提供しています。

警告記号

下記は、Dual Stage Rotary Vane pumps に関する警告と関連して表示される記号一覧です。各記号が示す危険事項もあわせて表示されます。三角記号は、警告を表します。文書中に警告とあわせて表示される記号の意味は、次のとおりです。以下の記号は、機器に貼付する警告ラベルに使用される場合があります。この記号を使用する場合は、警告ラベルが示す正しい手順について、関連する操作または保守説明書を参照してください。



| | |
|---|-----------|
|  | 危険電圧 |
|  | 表面が熱い |
|  | 一般的な危険 |
|  | 吸気フランジ |
|  | 排気フランジ |
|  | 作動液の充填 |
|  | ガスバラストバルブ |
|  | 製造所 |
|  | 危険物質がある |
|  | 圧搾の危険 |

取扱説明書

| | |
|---|------------------|
|  | 切断の危険 |
|  | 保護手袋着用 |
|  | 個人防護装置装着 |
|  | 事故防止靴着用 |
| I | 電源オン |
| O | 電源オフ |
|  | オイルボトル |
| CE | CE 認定 |
|  | CSA 認定 |
|  | RoHS 中国認定 |
|  | 電気電子機器廃棄物 (WEEE) |

安全性

本セクションには、一般的に、および機械の各使用状況に関連して準拠および順守に必要な機械類指令 2006/42/EC での規定事項が記載されています。

ここでの記載事項および本説明書に記載のその他手順に準拠しない場合、デザインフェーズで規定の安全条件が非効率となり、機械の操作担当者に事故が発生する原因となる場合があります。

Agilent Technologies では、技術説明書に記載の安全規則に準拠しない結果発生する、オペレータまたは第三者による機械破損あるいは身体への安全に対して全責任を免責とします。

適切な取扱い

本説明書には、機器が安全に作動するたえに順守が必要な重要警告事項および安全事項が記載されています。

本説明書に記載の製品は、手順で説明した用途部分専用です。本説明書では、本製品の使用および操作に関する必須要件および安定動作上必要な安全対策も示しています。Agilent Technologies では、本説明書に記載した以外の用途、あるいは必須要件と安全対策を順守しない用途については一切保証しません。また一切責任を負いかねます。

本製品は、破損または個人の怪我の原因とならない状態で必要な安全対策を講じることができる、有資格要員のみが使用してください。本製品で使用するアクセサリおよび設備はいずれも、Agilent Technologies が提供または承認したものでなければなりません。

調節またはメンテナンス操作はいずれも、リスクを熟知した専門技術者が実施しなければなりません。

本製品の修理はいずれも、Agilent 公認要員が専属で実施しなければなりません。

不適切な取扱い

Agilent Technologies では、Dual Stage Rotary Vane pumps を不適切に取り扱ったことに起因する責任を一切放棄します。

取扱いが不適切な場合、責任ならびに保証請求はすべて、無効とする原因となります。

ポンプ操作およびメンテナンス担当要員は十分な訓練を受け、事故防止規則を認識している必要があります。本セクションで記載する事故防止に関する注意事項は、オペレータの損傷およびポンプへの破損を避けるため、ポンプの操作およびメンテナンス中は常に順守してください。これらの注意事項は、警告および注意メモの形で表示されます。

警告



操作手順、技術情報および注意事項は、正しく順守および/または実行されない場合、オペレータ個人が怪我を負う原因となる場合があります。

注記

リテンションスプリングを使用して、主電源ケーブルを IEC320 ソケットに固定します。

注意

操作手順、技術情報および注意事項は、正しく順守および/または実行されない場合、ポンプが破損する原因となる場合があります。

警告メモ

- 高電圧に接触すると、死に至る場合があります。常に特別な注意の上、有効な事故防止規制を順守してください。
- 電源コードは常に、メンテナンス作業前に、電源装置からポンプに接続してください。電源装置ブレーカースイッチ上には、特別警告記号を貼付してください。機械メンテナンス中 - 電源をオンにしないでください。
- ポンプを相当長時間稼働した後でメンテナンス作業を実施する場合、外装面の温度が 60 °C を超えている場合があるため、十分な時間をかけ温度を下げてください。
- ポンプを保護接地に接続しないと、オペレータが重度の怪我を負う原因となる場合があります。接地が接続されているか、規格を準拠しているかを常に確認してください。
- ポンプおよびその構成部品を掃除する場合は、引火性または有毒溶剤の使用は避けてください。できれば、超音波洗浄機で石鹼水を使用し、残留水分をすべて除去するため、洗浄部品すべてを 100°C 以下の温度で注意ながら乾燥させることを推奨します。
- 長時間の過負荷または故障は電動モーターの過熱を引き起こし、有害な煙を放出するおそれがあります。予防措置として直ちに電源を切り、煙を排出するための換気を行うまではポンプに近づかないでください。修理作業中は、ポンプ内部に残っている煙を吸い込まないように注意してください。
- 火災が発生した場合、ポンプに水をかけないでください。電源をオフにして、CO₂ 消火器を使用してください。
- フランジを慎重に点検し、嵌合せ面に埃、オイル、汚れまたは欠損がないかを確認してから、必要な接続を行ってください。
- 修理作業が終了したら、接合部と継手が正しくロックされているかを確認してから、ポンプを再始動してください。
- 機構に巻き込まれる可能性がある、および/または伝導体（チェーン、プレスレットなど）として作用する可能性があるものは着用しないでください。
- 使用する工具は完全に作動している状態か、また必要な場合は、絶縁グリップがあるかを確認してください。ケーブルの絶縁物およびテスト設備の伝導体に破損の兆候がないかをチェックしてください。
- オイルがまだ高温状態のままである可能性があるため、機械オイルは、停止直後に交換しないでください。

注意メモ

- ポンプが故障した後で、再起動する場合は、起動前にポンプを点検し、破損の兆候がないかを丁寧にチェックしてください。
- 正常に作動し、各作業専用の工具のみを使用してください。使用する工具が不適切あるいは効果的ではない場合、重度の損傷を負う原因となる場合があります。
- 修理作業は清潔で、可能な限り無塵の場所で行ってください。すべての接続箇所のすき間を適切なプラスチックキャップで保護し、取り外したすべての部品の機械加工面は、それらが再びポンプに取り付けられるまで覆ってください。
- 潤滑油を常時チェックし、ポンプ全体に適切に分配されているかを確認してください。潤滑が不十分な場合、ポンプが大きく破損する場合があります。
- 部品を取り外す場合は、再組立のときに適切な順序で組み立てられるように、何かのマークを付けてください。
- ポンプ内部のシート、また機械研磨面の加工済シャフトに引っかき傷や溝がないかチェックしてください。多少の引っかき傷や研磨は、非常に微細なエメリー紙または軽く研磨して、解消することができます。
- グループをまとめる前に、内部と嵌合せ面上にオイルを少し広げます。すべてのシールを元の予備品と交換してから、コンポーネントをもう一度組み立てます。
- 保護側板（ポンプの図の参照11および81）が正しく所定の位置に取り付けられていない場合は、ポンプを始動しないでください。

排気管の設置

ポンプが空気の換気が不十分な部屋に設置されている場合は、ポンプの排気を他の部屋または屋外に配管することができます。

タンクの排出口と同じ直径のパイプを使用してください。最大の長さは15mです。

パイプが長い場合は、パイプの直径を大きくします。パイプの重量がポンプにかからないようにしてください。

最終的な長さには、フレキシブルパイプまたはパイプ継手を使用してください。

警告



凝縮水がタンクに戻るのを防ぐため、このパイプは下向きにしてください。

注意

このパイプラインにボールバルブを接続しないでください。排出口を詰まらせないでください。

防具

ポンプシステムのメンテナンス操作をしている、または実施しているオペレータの防具は常に、実施中の操作タイプに十分対応できなければなりません。また、機械を使用する国の政府官庁による安全要件を順守しなければなりません。

通常、オペレータは Dual Stage Rotary Vane pumps の取扱い中、および設置作業中、事故防止靴を着用しなければなりません。

警告



メンテナンスまたは取り付け時に、有害物質による健康への危険。



- 過程の異常な点により、真空ポンプ、構成部分、または操作液は、有害物質、反応性物質、もしくは放射性物質に汚染される場合があります。



- メンテナンスや修理、もしくは再度取り付け時には適切で十分な保護装備を着用してください。

警告



装置の落下による損傷のリスク。



真空ポンプを手で運搬する場合、荷重が滑り落ちる危険があります。



- 両手で小型・中型の真空ポンプを運んでください。
 - 20 kg 以上のいかなる装置も、適切なリフトの機器を使用して運搬されなければなりません。
 - 指令 EN 347 にしたがって、爪先が鋼製の安全長靴を着用してください
-

注意



鋭い縁による損傷のリスク。

- ポンプを修理する前、またはシステムからポンプのいかなる取り付け/取り外しをする前に、ポンプの完全な静止をお待ちください。
- 高真空フランジ内で直接操作しないでください。
- 必要に応じて、指令 EN 420 に従った保護手袋を着用してください。

デュアルステージロータリーベーンポンプの安全ガイドライン

オイル潤滑した回転翼ポンプは、作動温度が高温になる可能性があります。そのため、どのようなタイプのメンテナンスでも、作業前に、ポンプの温度が下げられることを推奨します。

- メーカー指定以外の方法で器具を使用する場合、当該器具による保護の効果がなくなる場合があります。
- ポンプは常に、所定のリングボルトを使用して、搬送してください。
- ポンプは正位置に設定し、偶発的な不具合が発生しないように、十全の注意を払ってください。

警告



操作後にポンプを取り扱い必要がある場合、外装面の温度が **60 °C** を超えている場合があるため、先に時間をかけて温度を下げてください。

警告



器具への破損を避け、また作業員の怪我を防止するため、本説明書に記載の設置方法を厳守してください!

搬送と保管

ポンプは、段ボール箱に入れて顧客向けに出荷されます。

ポンプを含む梱包の総重量は、ポンプのモデルに応じて30kgから40kgの間です。

ケースは、適切なリフティング器具を使用して、慎重に取り扱ってください。

注意

ケースを移動させるときは、リフティング器具にしっかり固定されていること、および同器具の強度が本製品の重量を支えるのに十分であることを確認してください。

ポンプの動作環境は、従来型の産業環境です。当然、腐食性蒸気または過熱がある場所はもっとも避けます。

最適な室温は 12 °C ~ 40 °C です。温度がこの範囲に収まらない場合は、必要な変更について、Agilent 技術サービスまでご連絡ください。

ポンプの搬送および保管時は、下記の環境要件を超えないようにしてください。

- 温度： -20° ~ +70 °C
- 相対湿度： 0 ÷ 95 % (結露なし)

製品説明

この機器は、専門家による使用を対象としています。ユーザーは Agilent 提供の本取扱説明書およびその他追加情報をよく読んでから、本機器を操作してください。Agilent は、一部であっても、本説明書に準拠しないことにより発生する事象、訓練を受けていない者による不適切な取扱い、本機器に関する未承認の干渉あるいは各地域の規格での規定事項に反した行動が原因の事象には一切責任を負いかねます。

DS102 1Ph、DS202 1Ph、DS302 1Ph、DS402 1Ph、DS402 3Ph、DS602 1Ph および DS602 3Ph ポンプは、単相または三相電動モーターによって駆動される、油封式デュアルステージロータリーベーンポンプです。

詳細は、「Technical Information」セクションに記載されています。

ロータリーベーン Dual Stage Rotary Vane pumps ポンプの設置

設置準備

ポンプは特別保護パックに入れて提供します。搬送中に発生した可能性がある破損の兆候が見えた場合は、地域の販売事務所にお問い合わせください。

ポンプの総重量は、梱包を除いて22kgから36kgの間です。

ポンプを開封する場合は必ず、落下させないでください。またポンプへの急激な衝撃あるいは衝撃による振動を避けてください。

梱包材を認定外の方法で廃棄処分しないでください。材料は 100 % 再生可能で、EEC 指令 94/62 に準拠しています。

注記

通常環境で使用しているかぎり、ポンプが破損することはありません。ただ、どのような形であれ埃で汚れるのを防止するため、システム内に設置するまでは開封しないで保管することをお勧めします。

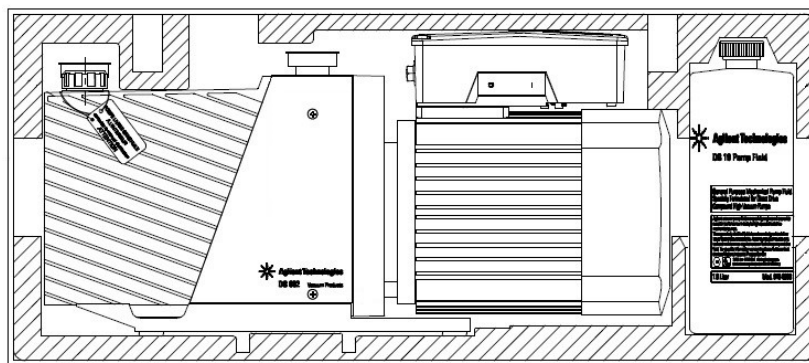


図 26 Dual Stage Rotary Vane pumps パッケージ

設置

ポンプは大気中物質（雨、雪、氷）、埃、侵襲性気体、または爆発雰囲気あるいは火災リスクが高い環境には設置または使用しないでください。

操作中、下記の環境条件を順守してください。

- 温度: +12 °C ~ +40 °C
- 相対湿度: 0 ÷ 95 % (結露なし)

警告



短絡および過負荷から保護するため、Agilent Device の電源主ラインに適切な容量のタイプ C 自動サーキットブレーカーを設置してください（下表参照）。

| P/N | 110 Vac | 220 Vac | 380 Vac |
|---------|---------|---------|---------|
| 9499315 | 10 A | 6 A | |
| 9499320 | 10 A | 6 A | |
| 9499325 | 10 A | 6 A | |
| 9499330 | 16 A | 7.5 A | |
| 9499331 | | 6 A | 6 A |
| 9499335 | 16 A | 7.5 A | |
| 9499336 | | 6 A | 4 A |

注意

ポンプは空の状態配送されますので、起動前に、潤滑油を充填してください。

注意

オイルは、特殊ネジ留めプラグホールからケースに注入し、注入に吸入ラインは使用しないでください。

注記

オイルレベルが、ポンプ側部の水準器が示す最小値と最大値の範囲にあることが重要です。

注意

空気が適切に循環できるように、ポンプ周辺はすべて広い空きスペースを確保することが義務付けられています。空気循環のない、密閉状態にポンプを挿入しないでください。内蔵安全システムにより、ポンプは周囲温度 **40 ° C** を超えた場合は、エラーが発生する可能性があります。

警告



保護キャップは、吸入・排出接続部に取り付けた状態にし、当該部がそれぞれ、機器および排出ラインに適切に接続されるまで、ポンプの電源をオンにしないでください。

警告



設置中は、吸引フランジが真空チャンバーに接続され、排出接続部が閉じていないか、最大の注意を払ってください（次図を参照してください）。ポンプは、コンプレッサとして使用しないでください。以上の注意事項を順守しない場合、機械とオペレータに危険が及ぶ可能性があります。

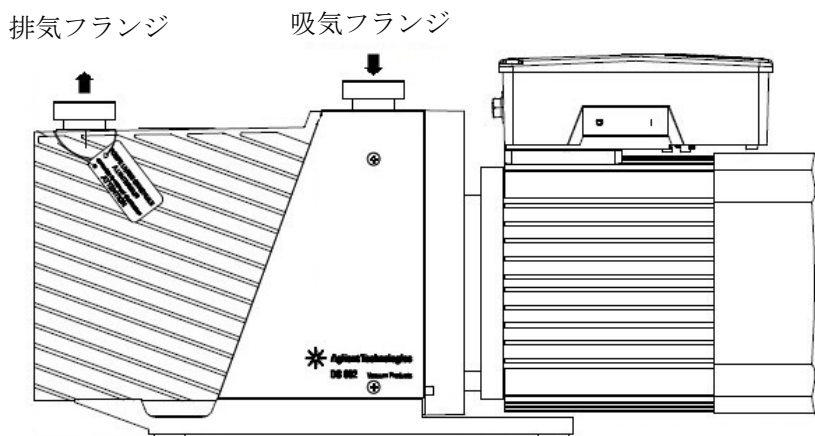


図 27 フランジと接部

警告



安全装置（下図の赤い矢印で示されています）は、油槽内の圧力が最大許容値である 1.7 bar (abs) を決して超えないことを保証するためにポンプに取り付けられています。これは安全装置であるため、この理由からキャップを交換したり、損傷させたり、改変したりしてはなりません。必要に応じてポンプに油を充填するために、一時的な取り外し（ねじを外すことによる）は許可されています。使用者は、油の充填後およびポンプを始動する前に、この装置を元の位置にねじ戻す責任があります。これらの注意事項を守らないと、機械の損傷および作業者の負傷を引き起こす可能性があります。油槽内の圧力が許容限界値（例：排気の閉塞）を超えると、吸入ガスと油の混合物が安全キャップから排出されます。流れは、ポンプが停止するまで、および／または過圧の原因が取り除かれるまで（例：排気の閉塞が除去されるまで）続きます。



図 28

注意

電源電圧および周波数がモーター銘板に表示された範囲に対応していることを確認してください。

ポンプを電源装置に接続します。

注意

三相モーターでは、極性の反転によりポンプの回転方向が逆転し、その結果として機械的損傷が発生する可能性があるため、特に注意してください。

警告



ポンプは、ライン電圧を干渉しやすいように設置してください。

単相ポンプ用の電源供給コード。電気配線に適した正しいケーブルは三線（Ph+N+Earth）ケーブルです。導線断面は少なくとも0.75 mm²（AWG18）でなければなりません。

ポンプは、同ポンプに付属のメインケーブルとあわせて使用してください（アクセサリとしても利用可）。

セットアップ

ポンプを始動する前に、ポンプは空の状態でお届けされているため、潤滑油を充填してください。

注記

梱包にはオイル缶が含まれています。

充填方法の詳細については、定期保守カード01を参照してください。

注意

オイルは吸入ラインからではなく、専用のねじ付きプラグ穴からケーシング内に注入しなければなりません。

警告



他の操作をする場合は、その前に、吸引・排出接続部の保護キャップを外してください。偶発的に起動した場合、ポンプ内の空気が暴発して保護キャップを押し上げ、オペレータが怪我をする場合があります。

Dual Stage Rotary Vane pumps 取付

ポンプを正しく設置する手順は以下のとおりです。

- ポンプを地面に置く。このタイプの設置については、特に手順はありません。ただし、床面（最適なのはコンクリート床）はできるかぎり平らで、ポンプ重量およびその上に取り付けたアクセサリへの耐用に適している必要があります。ポンプが基台上で安定していること、床面にボルトとネジで固定する必要がないこと、およびゴム脚部を使用すると、ポンプへの振動およびポンプからの振動が大幅に抑えられることに留意してください。
- 地面から離して置く。この場合、ユーザーは、適切な支持構造物を設計し、次のポイントに注意してください。
 - ポンプを支える面が完全に水平でなければならないこと。
 - 構造物の強度が十分頑丈であること。
 - 関連する安全上に注意事項を適用すること。

ポンプは、ゴム脚部を、ポンプ台と支持面にネジ留めが必要な特殊振動防止脚部に交換した後、支持構造物に取り付ける必要がありますので、注意してください。ポンプ梱包ケースから取り出した後、下記項目をチェックすることをお勧めします。

- a 出荷後、ポンプに破損がないかの確認。
- b ガードが正しく取り付けられていること、および覆われていない部分や緩んだ部品がないことを確認してください。

吸入・排出接続部への接続。

両ポートからの保護キャップの取外し。OR 付きセンタリングリングとクランプフランジを使用した、吸入フランジから排出するシステムの接続。

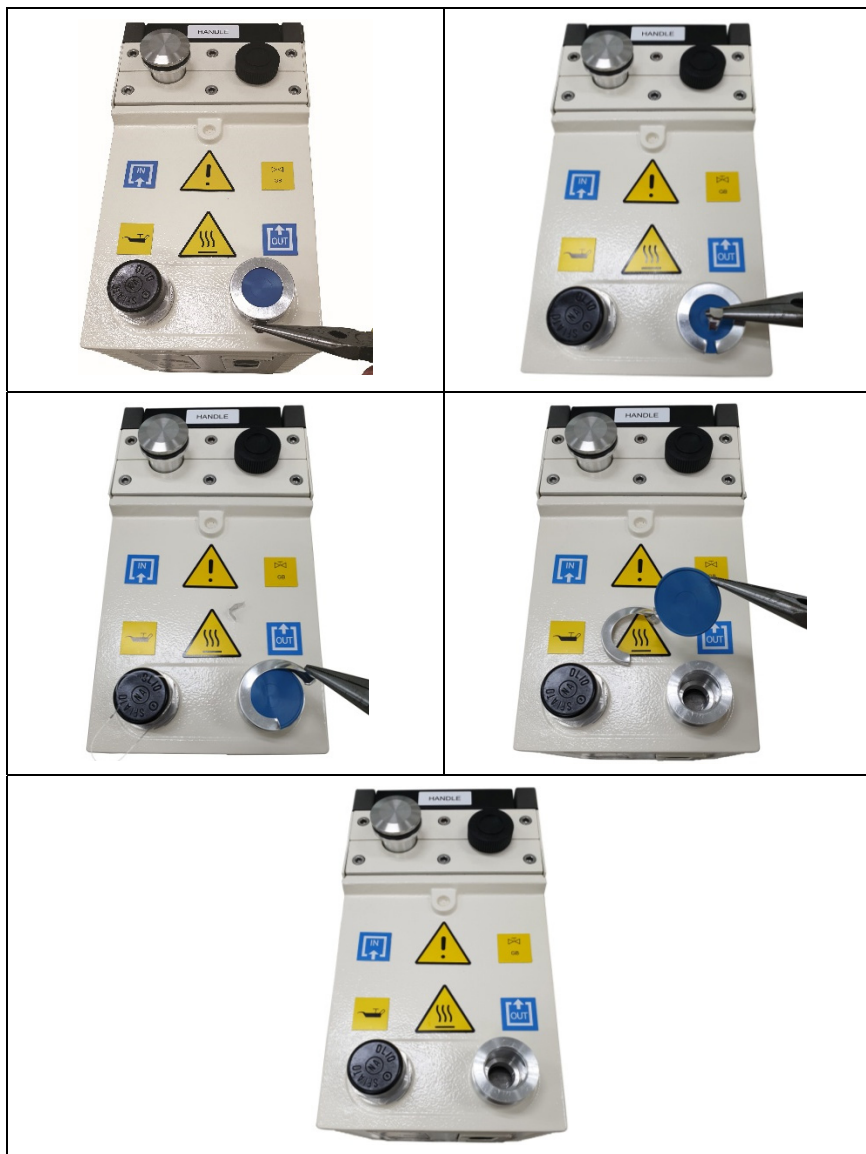


図 29

注記

高信頼のシーリング保証がある場合は、またはNBR またはFKM にORガスケットを使用します。

吸入ダクトには囲込みフィルターが付き、固体部がポンプに侵入して破損するのを防止します。

注記

吸い出す気体に埃が含まれている場合、吸入フランジ前に埃フィルターを差し込むことをお勧めします。

注記

吸い出す気体に多量の蒸気が含まれている場合、吸入フランジ前に、凝縮セパレータを入れることをお勧めします。

ポンプ機能を最大限活用するには、直径が吸入フランジより小さくない、短い、直線パイプのみを使用します。

注記

硬質パイプを使用する場合は、ポンプの接続部が不当に加圧されないように、フレキシブルな接合部を使用するのがよいでしょう。

排気ガスは、排出ポートから専用パイプに接続して、外部に取り出してください。

注記

内部オイルミストエリミネーターは、ポンプ作動中の排出ダクトにあるオイルにより、周囲大気内の汚染を防ぎます。

注意

ポンプの排出ラインは絶対塞がないでください。ケースが過剰に加圧される原因となり、オイルタンクが破損するおそれがあります。

Dual Stage Rotary Vane pumps の起動と稼働

最大真空に到達するため、運転開始前にポンプをガスバラストバルブを開いた状態で約1時間運転させてください。これによりオイル中の湿気が除去されます。

ポンプの起動に特別な手順はありません。バイポーラスイッチ（単相モーター仕様）またはマルチポーラスイッチ（三相モーター仕様）を介して電源に接続するだけで作動します。

警告



ポンプは、慣性または非侵蝕性液体で作動するように設計されています。爆発性または引火性物質の可能性のあるものの使用は厳禁です。

注記

ポンプを冷温オイルで起動した場合、初回は通常以上のノイズが発生しますが、この状態が継続するのは、ポンプが作動温度になるまでの数分程度です。

工場での稼働サイクル完了後にお客様に配送されるポンプは、通常作動については特段手順はありません。

注記

途中短い間隔をあげ、作業サイクルを繰り返す場合、ポンプは停止しないほうがよいでしょう。

Dual Stage Rotary Vane pumps の停止

ポンプを停止するための特別な手順はありません。バイポーラススイッチ（単相モーター仕様 — 「単相ユニバーサルモーター搭載モデル」セクション参照）またはマルチポーラススイッチ（三相モーター仕様 — 「三相ユニバーサルモーター搭載モデル」セクション参照）を介して電源から切り離すだけです。

ポンプが停止すると、アンチサックバック装置により、ポンプの吸気フランジに接続された容器内の真空を維持することが可能になります。

ポンプを長時間停止させる予定がある場合、または大量の蒸気を排気した場合には、凝縮蒸気によるオイル汚染に起因する腐食やスケール形成のリスクを抑えるため、停止する前にガスバラストを開き、吸入ラインを閉じた状態で数分間運転することが推奨されます。

メンテナンス

ポンプ操作およびメンテナンス担当要員は十全な訓練を受け、事故防止規則を認識している必要があります。

警告



高電圧に接触すると、死に至る場合があります。常に特別な注意の上、有効な事故防止規制を順守してください。

警告



機械に通電したら、可動部と高電圧に注意してください。

警告



長時間稼働した後でポンプのメンテナンスが必要な場合は、外面の温度が 60°C を超えている場合があるため、そのまま置いて温度を下げてください。

警告



メンテナンス作業を開始する場合は、その前に必ず、ポンプを電源装置を外してください。電源装置ブレーカースイッチ上には、特別警告記号を貼付してください。機械メンテナンス中 - 電源をオンにしないでください。終了したら、安全警告を外します。

警告



オイル温度がまだ高い場合があるため、機械の停止直後は、オイル交換を行わないでください。

注意

部品を交換する際は、十分に注意してください。三相モーターでは、極性の反転によりポンプの回転方向が逆転し、その結果として機械的損傷が発生する可能性があるため、特に注意してください。

注記

ポンプを修理のため製作者に返却する場合は、その前に、本説明書に付属の「Request for return」シートに記入し、地域の販売事務所に送付してください。出荷前に、ポンプパッケージのシートのコピーを挿入してください。

ポンプをスクラップにする場合は、各国の規定にしたがって処分してください。メンテナンスとは、すべての計画された保守作業および計画外の保守作業の総体とみなすことができます。

- 予約メンテナンス：公称操作状態の維持。
- 予約なしメンテナンス：公称作動状態の復元。

注記

修理実施回数は、ポンプ寿命を縮めるプロセスと物質の有無によって異なります（埃、研磨物、溶剤、水、化学浸襲性物質）。

取扱説明書

潤滑油は厳密に必要な量だけ使用してください。潤滑油が多すぎる場合も、全くない場合と同様に、ポンプの正常な運転を損なうことがあります。

使用する潤滑油は、推奨されているもの、または同様の特性を持ち、品質が確認および実証されている潤滑油のみとしてください。

オイル交換は、ポンプの運転後に数分間冷却させた後、オイルが十分に高い温度にある状態で行わなければなりません。

ドレンとフィラープラグは、必要以上に開放状態にしないでください。メンテナンスを実施する場合、特に、下記のものなど、故障前に発生している可能性がある信号をすべて確認してください。

- 腐食の痕跡;
- オイル漏れ;
- スラック接合部または継手。

メンテナンス技術者には以下が求められます。

- モーター駆動ポンプで作業中の事故防止に関して適用されるすべての地域指令を確認し、その適用方法を知っている。
- 「安全規則」のセクションをすべて読んで理解している。
- ポンプの必須設計機能と操作を熟知している。
- ポンプ取り扱い説明書の使用方法および参照方法を知っている。
- ポンプが適切に作動しているかを気にする。
- ポンプの作動中、異常な点をメモし、適切なところで、必要な措置を講じる。

取扱説明書

正規の予備品を使用する。発生する問題のすべて、および予備品の注文は、当社サービス部までお問い合わせください。

Agilent Technologies Italia S.p.A.

真空製品部門

Via F.lli Varian 54

10040 Leini, (Torino) – Italy

電話: +39 011 997 9111 Fax: +39 011 997 9350

フリーコール: 00 800 234 234 00

Dual Stage Rotary Vane pumps オイル交換およびフィルターカートリッジ交換の正しい手順は、「Technical Information」セクションに記載してあります。

清掃

注意

ポンプのプラスチックまたはゴム部分はアルコールで清掃しないでください。

ポンプおよびその構成部品を清掃する際は、ベンジン、ベンゾール、エーテル、またはアルコールなどの可燃性または有毒な溶剤の使用を避けてください。

できれば、超音波洗浄機で石鹼水を使用し、残留水分をすべて除去するため、洗浄部品すべてを 100° C 以下の温度で注意ながら乾燥させることを推奨します。

処分

ラベルに記載の "WEEE" ロゴの意味

下記の記号は、EC WEEE（電気電子機器廃棄物）指令にしたがって適用されません。

この記号（EC 諸国内のみで有効）は、この記号が適用される製品は、通常の家
庭ゴミとあわせて処分してはいけないこと、また個別廃棄物回収システムに送付
しなければならないことを表します。そのため、エンドユーザーは、親会社か小
売業者かに関係なく、当該機器のサプライヤに連絡の上、契約上の販売条件の確
認後、回収および処分プロセスを開始することが求められます。



図 30 ロゴ "WEEE"

詳細は、下記サイトを参照してください。

<http://www.agilent.com/environment/product/index.shtml>

サービス

お客様が最新交換サービスまたは修理サービスが必要な場合は、現地代理店もしくは下記まで直接ご連絡ください：

vpt-customer care@agilent.com

vpl-customer care@agilent.com

“Request for Return”の申請の完了には、サービス提供のためにお客様のポンプをAgilentへ返送する必要があります。（このマニュアルの最後に提供されています）。

7

Instructions for Use

| | |
|--|-----|
| About this manual | 187 |
| Validity | 187 |
| Definitions and terminology | 188 |
| Definition of Caution, Warning and Note | 188 |
| Warning Symbols | 189 |
| Safety | 191 |
| Proper use | 191 |
| Improper use | 192 |
| Warning notes | 193 |
| Caution notes | 194 |
| Discharge air pipe line installation | 194 |
| Protective equipment | 195 |
| Safety guideline for Dual Stage Rotary Vane pumps | 197 |
| Transport & Storage | 198 |
| Product description | 198 |
| Installation of Rotary Vane Dual Stage Rotary Vane pumps | 199 |
| Preparation for installation | 199 |
| Installation | 200 |
| Set-up | 204 |
| Dual Stage Rotary Vane Pump mounting | 205 |
| Connections to the inlet and exhaust connections | 205 |
| Starting and running the Dual Stage Rotary Vane Pump | 208 |
| Stop of Dual Stage Rotary Vane pump | 209 |
| Maintenance | 209 |
| Cleaning | 212 |
| Disposal | 213 |
| Service | 214 |

About this manual

Validity

This manual lists the instructions for the users of the Dual Stage Rotary Vane pumps, with particular reference to the notions relating to safety, operation and first level maintenance, limited to maintenance operations for which the user is responsible.

The maintenance operations, illustrated in the specific sections, with specific provisions relating to the higher level of maintenance (personnel specifically trained for maintenance operations) must not be carried out by the user.

For a correct installation and start/stop, please refer to "Technical Information" section.

For more detailed technical use, please refer to "Technical Information" section.

NOTE

- 1 This manual contains useful information so that all personnel using the Dual Stage Rotary Vane pumps can operate it safely and guarantee perfect efficiency, for its entire life span.
 - 2 Keep this manual, together with all the related publications, in an accessible place known to all operators/maintenance personnel.
-

Definitions and terminology

Definition of Caution, Warning and Note

Some important references of this manual are highlighted and framed in contrasting color.

CAUTION

Caution messages are displayed before procedures which, if not observed, could cause damage to the equipment.

WARNING

Warning messages draw the operator's attention to a specific procedure or practice which, if not performed correctly, could result in serious personal injury.











NOTE

Notes are intended to call attention to important information and provide more detail regarding specific steps.


Warning Symbols

The following is a list of symbols that appear in conjunction with warnings on the Dual Stage Rotary Vane pumps. The hazard they describe is also shown. A triangular symbol indicates a warning. The meanings of the symbols that may appear alongside warnings in the documentation are as follows. The following symbol may be used on warning labels attached to the instrument. When you see this symbol, refer to the relevant operation or service manual for the correct procedure referred to by that warning label.



| | |
|---|----------------------------------|
|  | Dangerous voltages |
|  | Hot surface |
|  | Generic hazard |
|  | Suction flange |
|  | Exhaust flange |
|  | Filling up operating fluid |
|  | Gas Ballast valve |
|  | Manufacturing site |
|  | Presence of dangerous substances |
|  | Crushing hazard |

Instructions for Use

| | |
|---|---|
|  | Cutting hazard |
|  | Wear protective gloves |
|  | Wear personal protective equipment |
|  | Wear accident-prevention shoes |
| I | Power ON |
| O | Power OFF |
|  | Oil bottle |
| CE | CE certification |
|  | CSA certification |
|  | RoHS China certification |
|  | Waste Electrical and Electronic Equipment |

Safety

This section contains the information, prescribed by the Machinery Directive 2006/42/EC, which is essential for the compliance and observance of the safety regulations both generally and in relation to the specific use of the machine.

Failure to comply with these instructions and the other instructions contained in this manual may render the safety conditions envisaged in the design phase inefficient and cause accidents to those operating the machine.

Agilent Technologies declines all responsibility for damage to the machine or for the physical safety of the operator or third parties deriving from the non-observance of the safety rules indicated in the technical documentation.

Proper use

This manual contains important warnings and safety instructions to be observed in order for the unit to work safely.

The product described in this manual is intended exclusively for the area of application specified in the instructions. The manual also provides indications regarding the essential requirements for the application and operation of the product as well as the safety measures that can be adopted to guarantee regular operation. Agilent Technologies does not provide any guarantee or assume any responsibility for applications other than those described in this manual or in which the essential requirements and safety measures are not respected.

The product must only be used by qualified personnel who are able to take the necessary safety measures under conditions that do not cause damage or injury. Any accessories and equipment used with the product must be supplied or approved by Agilent Technologies.

Any adjustment or maintenance operation must be performed by a professional technician informed about the risks.

Repairs on the product must be carried out exclusively by Agilent authorized personnel.

Instructions for Use

Improper use

Agilent Technologies declines all responsibility, deriving from the improper use of the Dual Stage Rotary Vane pumps.

Improper use will cause all claims for liability and warranties to be forfeited.

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 continuously respected 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.

NOTE

Use the Retention Spring to secure the mains cable into the IEC320 socket.

CAUTION

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

Warning notes

- Death may result from contact with high voltages. Always take extreme care and observe the accident prevention regulations in force.
- Always disconnect the power cord from the power supply to the pump before maintenance work. Place a special warning sign over the power supply breaker switch: MACHINE UNDERGOING MAINTENANCE - DO NOT POWER ON.
- 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 60 °C.
- Failure to provide the pump with a protection earth connection may cause serious damage to operators. Always ensure that there is an earth connection and that it complies with the standards.
- When cleaning the pump and its component parts, avoid the use of flammable or toxic solvents. 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.
- 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.
- In case of fire, do not throw water on the pump. Switch the power off and use CO₂ extinguishers.
- Carefully inspect the flanges to ensure that there is no dust, oil, dirt or defects of the mating surfaces, before making the required connections.
- Ensure that all joints and couplings are locked correctly before starting the pump again after repair work.
- Do not wear any objects that may become entangled in the mechanisms and/or act as conductors (chains, bracelets, etc.).
- 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.
- Do not replace the oil immediately after stopping the machine as the oil may still be at high temperature.

Instructions for Use

Caution notes

- Before putting the pump back into operation after a breakdown, inspect it and check carefully for any other signs of damage.
- 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.
- 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.
- Always check the lubricant and that it is properly distributed through the pump; inadequate lubrication may damage the pump seriously.
- Give the parts some form of marking as you strip them down to ensure that you reassemble them again in the proper order.
- 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.
- 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.
- Do not start the pump if the protective sideplates (refs. 11 and 81 of figure View of the pump) are not properly in place.

Discharge air pipe line installation

If the pump has been installed in a room with poor air exchange, 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. Do not clog the outlet.

Protective equipment

The protective equipment of the operators who are operating or executing the maintenance of the pumping system must always be adequate for the type of operation being executed. Furthermore, it must comply with the safety requirements of the legislation in force in the country in which the machine is used.

In general, the operator must wear accident-prevention shoes while handling the Dual Stage Rotary Vane pumps and during installation.

Instructions for Use

WARNING

Danger to health by hazardous substances during maintenance or installation.



- Depending on the process peculiarity, vacuum pumps, components or operating fluids can be contaminated by toxic, reactive or radioactive substances.
- Wear adequate protective equipment during maintenance and repairs or in case of reinstallation.

WARNING

Risk of injury through falling objects



When transporting vacuum pumps by hand, there is a danger through loads slipping and falling down.

- Carry small and mid-size vacuum pumps two-handed.
- Any equipment heavier than 20 kg should be transported using a suitable lifting device.
- Wear safety shoes with steel toe cap according to directive EN 347.

Instructions for Use

CAUTION



Risk of injury through sharp edges

- Before servicing the pump or before any mounting/ dismounting action of the pump from the system, wait for the complete standstill of the pump.
- Do not operate directly inside the high vacuum flange.
- If necessary, wear protective gloves according to EN 420.

Safety guideline for Dual Stage Rotary Vane pumps

Oil-lubricated rotary vane pumps can reach high operating temperatures. It is therefore recommended to let the pump cool down before performing any type of maintenance.

- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- Always carry the pump by means of the ring-bolt provided.
- The pump must be set in position taking the upmost care in order to avoid accidental falls.

WARNING



In case of a need to handle the pump after a period of operation, it must be left to cool first as the external surface temperature may be in excess of 60 °C.

WARNING



To avoid damage to equipment and to prevent injuries to operating personnel the installation instructions as given in this manual should be strictly followed!

Transport & Storage

The pumps are shipped to the customer inside cardboard boxes.

Total weight of the pack, including the pump, is between 30 Kg. and 40 Kg. according to the different pump models.

The case must be handled with care, using appropriate lifting equipment.

CAUTION

When moving the case, ensure that it is securely bound to the lifting equipment and that the equipment is strong enough to support the weight.

The pump's working environment is a traditional industrial environment. Naturally sites with corrosive vapors or excessive heat are best avoided.

Operating temperature should ideally be between 12 °C and 40 °C. If the temperature is not inside this range, consult Agilent technical service for the changes required.

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

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

Product description

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 local standards.

The DS102 1Ph, DS202 1Ph, DS302 1Ph, DS402 1Ph, DS402 3Ph, DS602 1Ph and DS602 3Ph pumps are Dual Stage Rotary Vane pumps oil sealed, driven by a single-phase or three-phase electric motor.

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

Detailed information is supplied in the "Technical Information" section.

Installation of Rotary Vane Dual Stage Rotary Vane pumps

Preparation for installation

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

Total weight of the pump, without the packaging, is between 22 and 36 Kg.

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 94/62.

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.

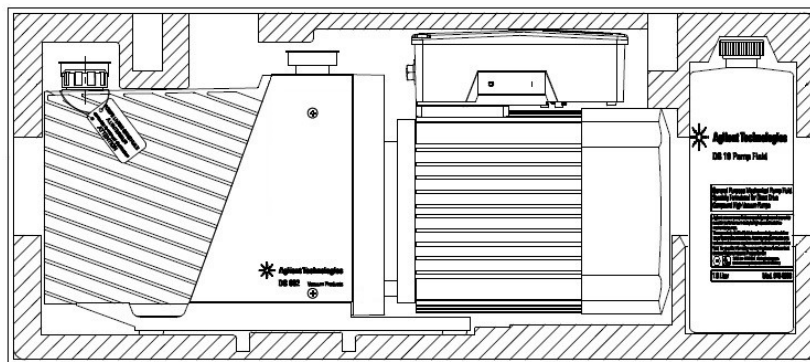


Figure 31 Dual Stage Rotary Vane pumps packaging

Instructions for Use

Installation

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

During operation, the following environmental conditions must be respected:

- temperature: from +12 °C to +40 °C
- relative humidity: 0 ÷ 95 % (non-condensing)

WARNING



Protect against short circuits and overload by installing on Agilent Device electrical main line an automatic circuit breaker Type C of proper capacity (see table here below):

| P/N | 110 Vac | 220 Vac | 380 Vac |
|---------|---------|---------|---------|
| 9499315 | 10 A | 6 A | |
| 9499320 | 10 A | 6 A | |
| 9499325 | 10 A | 6 A | |
| 9499330 | 16 A | 7.5 A | |
| 9499331 | | 6 A | 6 A |
| 9499335 | 16 A | 7.5 A | |
| 9499336 | | 6 A | 4 A |

Instructions for Use

CAUTION

Before starting the pump, fill up with lubricating oil as the pump is delivered empty.

CAUTION

Oil must be poured into the casing through the special threaded plughole and NOT through the suction line.

NOTE

It is important that the oil level stays within the range MIN and MAX that is indicated by the level gauge on the side of the pump.

CAUTION

It is mandatory to leave ample free space all around the pump in order to allow proper air circulation; inserting the pump in a closed volume without air circulation is not allowed. For an internal safety system, the pump exceeded the ambient temperature of 40 °C, could show an error.

WARNING



Keep the protective caps placed on the inlet and exhaust connections and do not switch on the pump until they are properly connected to the instrument and the exhaust line respectively.

WARNING



During installation, pay maximum attention that the suction flange is connected to the vacuum chamber and the exhaust connection is not closed (see the following figure). The pump must not be used as a compressor. Non-observance of these precautions may be dangerous for the machine and the operator.

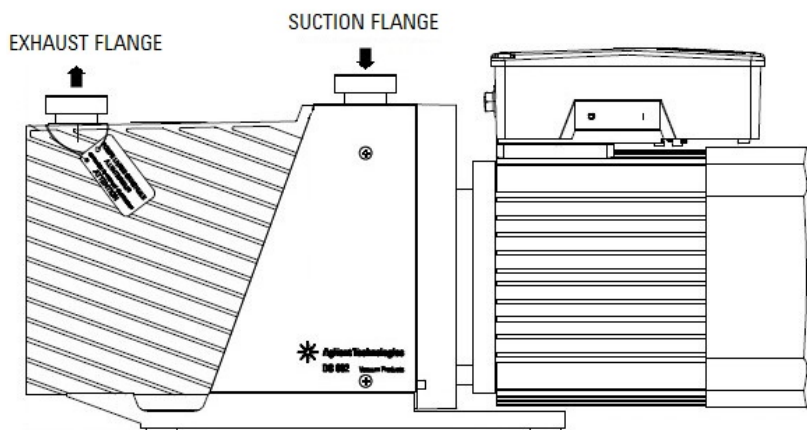


Figure 32 Flanges and connection

Instructions for Use

WARNING



A safety device (indicated by the red arrow in the figure below) is installed on the pump to guarantee that the pressure inside the oil vessel never exceeds the maximum permitted value of 1.7 bar (abs). This is a safety device and for this reason the cap must not be replaced, damaged or tampered with. Temporary removal (by unscrewing) is allowed to fill oil into the pump when needed. Users are responsible for screwing the device back in its original position after filling and before starting the pump.

Failure to respect these precautions may cause damage to the machine and injury to the operator.

A mixture of intake gas and oil will issue from the safety cap if the pressure in the oil vessel exceeds the allowed limit values (e.g. obstructed exhaust). The flow will continue until the pump is stopped and/or the cause of overpressure is removed (e.g. obstruction is removed from exhaust).



Figure 33

Instructions for Use

CAUTION

Check that your electrical mains voltage and frequency corresponds to the range indicated the motor's plate.

Connect the pump to the power supply.

CAUTION

Pay special attention to the three-phase motor, where an inversion of polarity causes inversion of the direction of rotation of the pump with consequent possibilities of mechanical damage.

WARNING



The pump must be installed in a way that allows an easy interruption of the line voltage.

Power supply cord for single-phase pumps. The correct cable for electrical wiring is a three wires (Ph+N+Earth) cable. The wire section has to be at least 0.75 mm² (AWG18).

The pump must be used with the mains cable supplied with the pump (also available as an accessory).

Set-up

Before starting the pump, fill up with lubricating oil as the pumps are delivered empty.

NOTE

A tin of oil is included in the packing.

For details on how to fill up, see Scheduled Maintenance Card 01.

CAUTION

Oil must be poured into the casing through the special threaded plughole and NOT through the suction line.

WARNING



Take out the protective caps on the suction and exhaust connections 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.

Dual Stage Rotary Vane Pump mounting

Setting the pump in position should be performed as follows:

- Pump laid on the ground. There are no special instructions for this type of installation, except that the floor should be as flat as possible and suited to bear the weight of the pump (it should ideally be a concrete floor) and of any accessories mounted on it. Note that the pump is stable on its base plate and it should not be necessary to anchor it to the floor with bolts and screws; also vibrations to and from the pump are greatly reduced by the use of rubber feet.
- Pump off the ground. In this case, the user must design a suitable support structure, remembering the following points:
 - the plane supporting the pump must be perfectly horizontal;
 - the structure should be adequately rigid;
 - the relevant safety precautions should be applied.

Note also that the pump should be attached to the supporting structure after replacing the rubber feet with special anti-vibration feet, which should be screwed to the pump base and to the supporting plane.

After taking the pump out of its packing case, you are advised to make the following checks:

- a** Ensure that the pump has not suffered any damage during shipping.
- b** Check that the guards are mounted correctly and that there are no uncovered or loose parts.

Connections to the inlet and exhaust connections

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

Instructions for Use

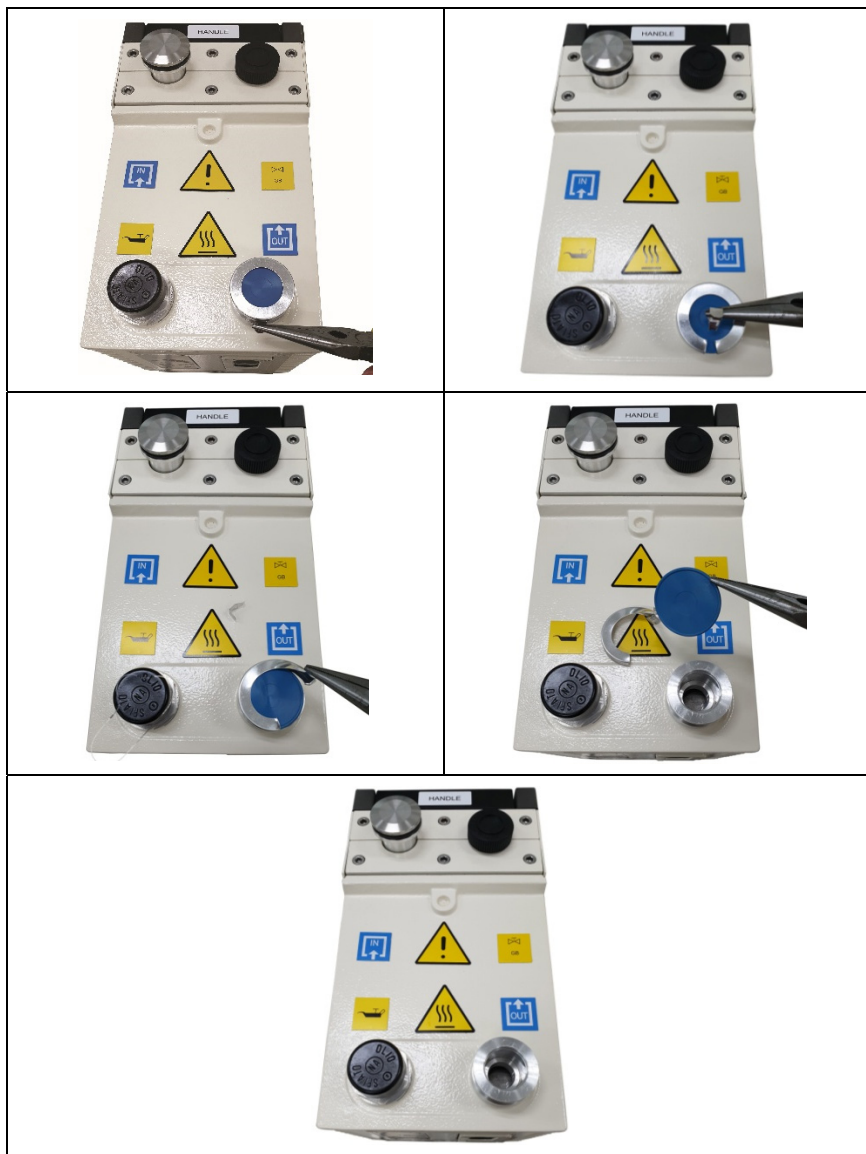


Figure 34

NOTE

For guaranteed reliable sealing, use an OR gasket in NBR or FKM.

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

Instructions for Use

NOTE

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

NOTE

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

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

NOTE

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

The exhaust gases must be conveyed to the outside by connecting the exhaust port to a dedicated pipe.

NOTE

An internal oil mist eliminator avoids pollution of the surrounding atmosphere by the oil present in the exhaust duct during pump operation.

CAUTION

Never block the pump exhaust line. This would cause overpressure in the casing with the risk of breaking the oil tank.

Starting and running the Dual Stage Rotary Vane Pump

Before being put into service, in order to reach maximum vacuum, the pump must be left running for about an hour with the gas ballast valve open. This will eliminate any humidity from the oil.

There are no special procedures for switching the pump on; it needs only to be connected to the electric power by means of the bipolar switch (version with single-phase motor) or of the multipolar switch (version with three-phase motor).

WARNING



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

NOTE

If the pump is started with cold oil, initially more than normal noise will be heard; this will last for a few minutes only until the oil reaches its working temperature.

There are no special instructions for normal operation of the pump, which is delivered to you after completion of a running cycle in the factory.

NOTE

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

Stop of Dual Stage Rotary Vane pump

There are no special procedures for switching the pump off; it needs only to be disconnected from the electric power by means of the bipolar switch (version with single-phase motor - see section MODELS WITH SINGLE-PHASE UNIVERSAL MOTORS) or of the multipolar switch (version with three-phase motor - see section MODELS WITH THREE-PHASE UNIVERSAL MOTORS).

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.

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 60 °C.



Instructions for Use

WARNING



Always disconnect the power supply to the pump before starting maintenance work. Place a special warning sign 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.

CAUTION

When replacing a part, take great care. Pay special attention to the three-phase motor, where an inversion of polarity causes inversion of the direction of rotation of the pump with consequent possibilities of mechanical damage.

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.

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

- **SCHEDULED MAINTENANCE:** Maintaining the nominal state of operation.
- **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).

Instructions for Use

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

Only the recommended lubricants, or lubricating oils with similar characteristics and known and experimented quality, should be used.

Oil changes must be made with the oil at a sufficiently high temperature, after leaving the pump to cool for a few minutes following operation.

The drain and filler plugs must not be left open any longer than is strictly necessary. When performing maintenance, look out for all signals that may precede a breakdown, in particular:

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

Maintenance technicians must:

- be aware of all applicable local 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.

Instructions for Use

Use original spare parts. For all problems arising, or to order spare parts, refer to our service department.

Agilent Technologies Italia S.p.A.
Vacuum Products Division
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

The correct procedures for Dual Stage Rotary Vane pumps Oil Change and Filter Cartridge Replacement are described in “Technical Information” section.

Cleaning

The pump must be cleaned at regular intervals of time.

CAUTION

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

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.

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.



Figure 35 Logo "WEEE"

For more information refer to:

<http://www.agilent.com/environment/product/index.shtml>

Service

Should a customer need an advanced exchange or repair service, please contact local distributor or directly e-mail to:

vpt-customer@agilent.com

vpl-customer@agilent.com

Completion of the "Request for Return" form is required to return your pump to Agilent for service (provided at the end of this manual).

8 Technical Information

| | |
|---|-----|
| Description of the Dual Stage Rotary Vane Pump | 216 |
| Lubrication | 218 |
| Vacuum Seals | 218 |
| Anti-Suck back Device | 218 |
| Gas Ballast Valve | 219 |
| Technical specifications | 224 |
| Dimensions | 226 |
| Pump operations | 228 |
| Starting and Running the Pump | 228 |
| Stopping the Pump | 229 |
| Oil and Filter Cartridge Replacement Procedures | 229 |
| Oil Change Procedure | 229 |
| Electrical Motors | 230 |
| Single Phase Universal Motors | 230 |
| Single-Phase Universal Motors Voltage Setting | 232 |
| Three Phase Universal Motors | 234 |
| Electrical Connections of Three-Phase World Wide Motors | 235 |
| Connections to the Inlet and Exhaust Flange | 236 |
| Lubricants | 238 |
| Scheduled Maintenance Cards | 242 |
| Troubleshooting and Corrective Action | 292 |
| Accessories and Spare Parts | 295 |

Description of the Dual Stage Rotary Vane Pump

The DS102 1Ph, DS202 1Ph, DS302 1Ph, DS402 1Ph, DS402 3Ph, DS602 1Ph and DS602 3Ph pumps are dual-stage rotary vane pumps oil sealed, driven by a single-phase or three-phase electric motor.

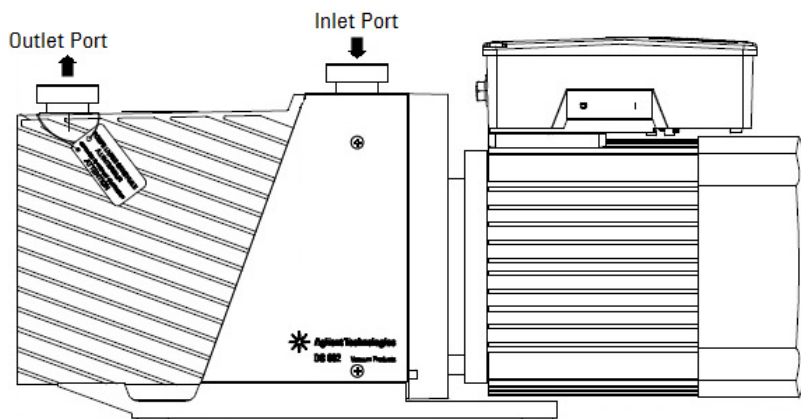


Figure 36

Dual Stage Rotary Vane Pump models are:

- 9499315 DS102 1PH ROTARY VANE PUMP
- 9499320 DS202 1PH ROTARY VANE PUMP
- 9499325 DS302 1PH ROTARY VANE PUMP
- 9499330 DS402 1PH ROTARY VANE PUMP
- 9499331 DS402 3PH ROTARY VANE PUMP
- 9499335 DS602 1PH ROTARY VANE PUMP
- 9499336 DS602 3PH ROTARY VANE PUMP

This vacuum pump is suitable for pumping non corrosive gases.

The main features are:

- all parts in direct contact with the fluid pumped are free of copper alloys;
- all materials are carefully selected to provide extended life;
- a high capacity gas ballast device allow to pump condensable vapors;

Technical Information

- all the parts composing the pump are fully replaceable due to the close machining tolerances and to the centering obtained by using reference pins;
- due to its design features and low number of gaskets, the pump requires little maintenance, disassembly and reassemble are easy and require minimal time.

The pump works with force-feed lubrication, provided by an auxiliary gear-pump driven by the rotor of the vacuum pump itself. This ensures proper lubrication even when pressures are close to atmospheric.

The entire pump functional block is immersed in the oil contained in the casing. The oil guarantees perfect sealing of the discharge valves, enters the pump to ensure lubrication and sealing of the parts inside, facilitates heat dissipation and reduces pump noise.

The pump is equipped with a special anti-suckback device which automatically isolates the vacuum system when the pump stops. This avoids rises in pressure or oil flow in the vacuum system while air is allowed back into the stator chambers.

The air entering the pump after the anti-suckback device has closed prevents the oil in the casing from filling the stator chambers.

The inner seals are achieved by the lubricating oil, thanks to the close machining tolerances.

There is only one oil seal on the rotor shaft, the one preventing oil from seeping out of the pump. This seal acts on a bushing fitted onto the shaft. Simple replacement of this seal grants the rotor a practically unlimited life (pumps DS402 1Ph, DS402 3Ph, DS602 1Ph, DS602 3Ph). On the DS102 1Ph, DS202 1Ph and DS302 1Ph pumps, this seal acts on a surface-hardened area of the shaft guaranteeing long rotor life.

The vacuum pumps are connected directly to the electric motor through a flexible coupling, so that motion is transmitted even in case of poor alignment.

A fan fitted on the joint and housed in the pump support produces a forced air flow over the finned surfaces of the casing to avoid oil overheating.

Lubrication

The pump's lubricating system is force-feed type.

Oil circulation is obtained by means of a gear pump connected to the rotor shaft.

The oil is drawn through a gauze filter to prevent any foreign bodies from entering the pump.

Shunt-mounted on the delivery line is a hydraulic piston which, besides actuating the anti-suckback device (see ANTI-SUCKBACK DEVICE), also regulates pressure by discharging excess oil flow directly into the tank.

The required flow of oil under pressure passes through ducts that are drilled in the walls of the pump and lubricates the bushings and the inside parts.

Vacuum Seals

A special feature of this pump is the low number of gaskets that are employed.

The seals in the circuit are obtained by means of VITON gaskets.

The careful surface finish of the various parts of the pump means that vacuum sealing of the functional block is ensured by the film of oil separating metal surfaces. Sealing of the rotor shaft is guaranteed by a rotating gasket with dust-guard lip.

The suction flange and duct are sealed by mean of OR gaskets.

Anti-Suck back Device

The pump is equipped with a special anti-suck back device to avoid air pressure rises and/or oil back-flow towards the evacuated chamber when the pump is switched off. This device has a shutter which automatically closes the suction duct.

In this way the pump and vacuum system are completely isolated from each other and air can enter the pump without any risk for the vacuum produced in the system.

The device includes some special features, namely:

- drive obtained avoiding any form of contamination of the inlet duct by fluids (oil and/or air). Thanks to this, when the pump is started again, the pump down to vacuum conditions is extremely fast as these contaminants are not present and no degassing is therefore required.
- suction flange maintained closed even when the pump is idle, so that pollutants cannot enter from the environment and no oil can overflow from the pump.

Technical Information

Gas Ballast Valve

When the pump sucks in vapors, these condense during compression and mix with the oil, forming an emulsion (an aqueous vapor, for example) or a solution (organic solvent vapors, for example).

A number of problems arise from this, such as the impossibility of obtaining high vacuums, the alteration of the properties of the oil, could cause scaling on parts of the pump.

To avoid this, during compression at the second stage, atmospheric air is let into the pump through an adjustable valve, or "gas ballast valve", located at the top of the pump.

In this way, the discharge valve of the second stage opens through the effect of the atmospheric air before the partial pressure of the vapor reaches saturation point, thus preventing condensation from occurring.

The vapors are expelled mixed with air.

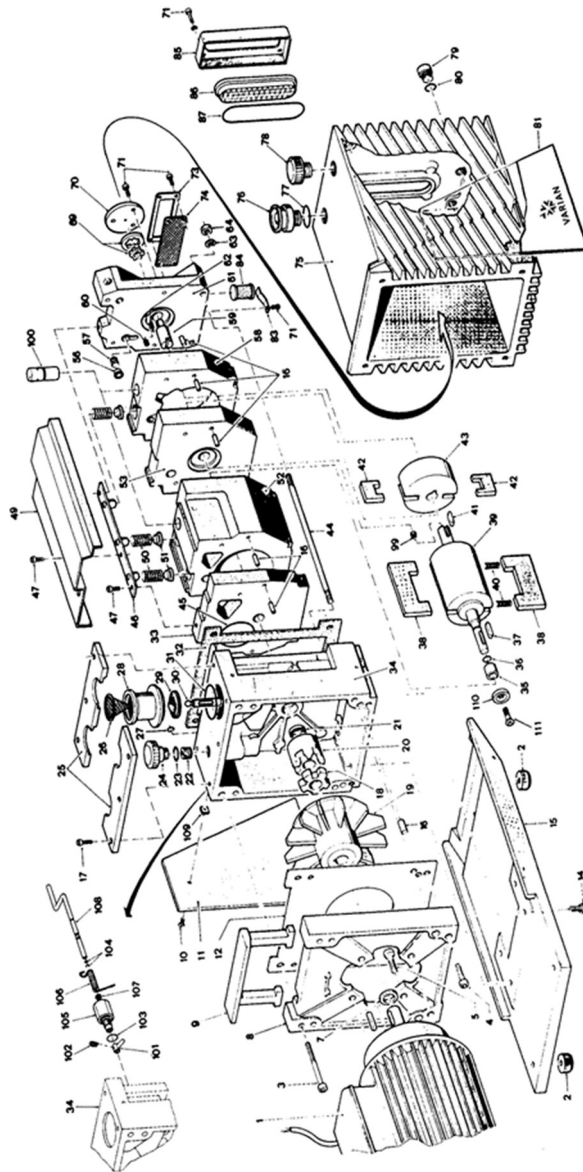


Figure 37 View of the pump

Technical Information

Table 1

| N° | Description | DS102 | DS202 | DS302 | DS402 | DS602 |
|----|-------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| 1 | Electric motor | SR03700702 | SR03700702 | SR03700702 | SR03700703 | SR03700703 |
| 1A | Electric motor 370-450W | SR03700865 | SR03700865 | SR03700865 | | |
| 1B | Three phase electric motor | SR03700922 | SR03700922 | SR03700922 | SR03700704 | SR03700704 |
| 2 | Rubber foot | | | | | |
| 3 | Screw | | | | | |
| 4 | Screw | | | | | |
| 5 | Screw | | | | | |
| 7 | Spacer | | | | | |
| 8 | Motor support | | | | | |
| 9 | Handle | | | | | |
| 10 | Screw | | | | | |
| 11 | Right sideplate | | | | | |
| 12 | Board | | | | | |
| 14 | Screw | | | | | |
| 15 | Support plate | | | | | |
| 16 | Cylindrical pin | (4) - (1) | (4) - (2) | (4) - (2) | (5) - (3) | (5) - (3) |
| 17 | Screw | | | | | |
| 18 | Rubber crown | (6) - (4) - (1) | (6) - (4) - (2) | (6) - (4) - (2) | (7) - (5) - (3) | (7) - (5) - (3) |
| 19 | Half-joint with fan | (6) | (6) | (6) | (7) | (7) |
| 20 | Half-joint (pump side) | (6) | (6) | (6) | (7) | (7) |
| 21 | Oil-seal ring | (4) - (1) | (4) - (2) | (4) - (2) | (5) - (3) | (5) - (3) |
| 22 | Special screw | | | | | |
| 23 | OR gasket | (4) - (1) | (4) - (2) | (4) - (2) | (5) - (3) | (5) - (3) |
| 24 | Gas Ballast Valve knob | SR03700219 | SR03700219 | SR03700219 | SR03700219 | SR03700219 |
| 25 | Half-plate | | | | | |
| 26 | Inlet screen | SR03700237 | SR03700237 | SR03700237 | SR03700237 | SR03700237 |
| 27 | OR gasket | (4) - (1) | (4) - (2) | (4) - (2) | (5) - (3) | (5) - (3) |
| 28 | Suction flange | | | | | |
| 29 | Anti-suckback shutter | (4) - (1) | (4) - (2) | (4) - (2) | (5) - (3) | (5) - (3) |

Technical Information

| N° | Description | DS102 | DS202 | DS302 | DS402 | DS602 |
|-----|--------------------------|--------------|--------------|--------------|--------------|--------------|
| 30 | Piston | | | | | |
| 31 | OR gasket | (4) - (1) | (4) - (2) | (4) - (2) | (5) - (3) | (5) - (3) |
| 32 | Casing gasket | (4) - (1) | (4) - (2) | (4) - (2) | (5) - (3) | (5) - (3) |
| 33 | Inner plate | SR03700260 | SR03700260 | SR03700260 | SR03700362 | SR03700362 |
| 34 | Pump support | | | | | |
| 35 | Anti-wear bushing | | | | SR03700370 | SR03700370 |
| 36 | OR gasket | (4) - (1) | (4) - (2) | (4) - (2) | (5) - (3) | (5) - (3) |
| 37 | Kei motor side | SR8999980101 | SR8999980101 | SR8999980101 | SR8999980301 | SR8999980301 |
| 38 | First stage vane | (1) | (2) | (2) | (3) | (3) |
| 39 | First stage rotor | SR03700273 | SR03700319 | SR03700319 | SR03700371 | SR03700371 |
| 40 | Spring | (4) - (1) | (4) - (2) | (4) - (2) | (5) - (3) | (5) - (3) |
| 41 | Tongue | SR8999980001 | SR8999980001 | SR8999980001 | SR8999980401 | SR8999980401 |
| 42 | Second stage vane | (1) | (2) | (2) | (3) | (3) |
| 43 | Second stage rotor | SR03700269 | SR03700269 | SR03700269 | SR03700367 | SR03700367 |
| 44 | Tie-rod | SR03700209 | SR03700308 | SR03700308 | SR03700335 | SR03700335 |
| 45 | OR gasket | (4) - (1) | (4) - (2) | (4) - (2) | (5) - (3) | (5) - (3) |
| 46 | Bracket | | | | | |
| 47 | Screw | | | | | |
| 49 | Valve cover plate | | | | | |
| 50 | Valve spring | (4) - (1) | (4) - (2) | (4) - (2) | (5) - (3) | (5) - (3) |
| 51 | Valve gasket | (4) - (1) | (4) - (2) | (4) - (2) | (5) - (3) | (5) - (3) |
| 52 | First stage stator | SR03700261 | SR03700316 | SR03700495 | SR03700363 | SR03700419 |
| 53 | Middle plate | SR03700262 | SR03700262 | SR03700262 | SR03700421 | SR03700421 |
| 56 | GasBallast Valve shutter | (4) - (1) | (4) - (2) | (4) - (2) | (5) - (3) | (5) - (3) |
| 57 | GasBallast Valve spring | (4) - (1) | (4) - (2) | (4) - (2) | (5) - (3) | (5) - (3) |
| 58 | Second stage stator | SR03700321 | SR03700321 | SR03700321 | SR03700364 | SR03700364 |
| 59 | Oil pump joint | SR03700280 | SR03700280 | SR03700280 | SR03700390 | SR03700390 |
| 60 | Special screw | | | | | |
| 61 | End plate | SR03700285 | SR03700285 | SR03700285 | SR03700391 | SR03700391 |
| 62 | Tongue | | | | | |
| 63 | Washer | | | | | |
| 64 | Nut | | | | | |
| 69A | External oil pump gear | SR03700281 | SR03700281 | SR03700281 | SR03700281 | SR03700281 |
| 69B | Internal oil pump gear | SR03700277 | SR03700277 | SR03700277 | SR03700277 | SR03700277 |

Technical Information

| N° | Description | DS102 | DS202 | DS302 | DS402 | DS602 |
|-----|-----------------------|------------|------------|------------|-------------|-------------|
| 70 | Oil pump cover | | | | | |
| 71 | Screw | | | | | |
| 73 | Plate | | | | | |
| 74 | Filter | | | | | |
| 75 | Casing | | | | | |
| 76 | Exhaust flange | | | | | |
| 77 | OR gasket | (4) - (1) | (4) - (2) | (4) - (2) | (5) - (3) | (5) - (3) |
| 78 | Oil fill plug | SR03701218 | SR03701218 | SR03701218 | SR03701218 | SR03701218 |
| 79 | Oil drain plug | SR03700256 | SR03700256 | SR03700256 | X3700-60017 | X3700-60017 |
| 80 | Oil drain plug gasket | SR03700256 | SR03700256 | SR03700256 | X3700-60017 | X3700-60017 |
| 81 | Left sideplate | | | | | |
| 83 | Spring | | | | | |
| 84 | Filter | | | | | |
| 85 | Flange | | | | | |
| 86 | Sight glass | SR03701326 | SR03701326 | SR03701326 | SR03701326 | SR03701326 |
| 87 | OR gasket | (4) - (1) | (4) - (2) | (4) - (2) | (5) - (3) | (5) - (3) |
| 99 | Special screw | | | | | |
| 100 | Piston | | | | | |
| 101 | Arm | | | | | |
| 102 | Spring | (1) | (2) | (2) | (3) | (3) |
| 103 | OR gasket | (4) - (1) | (4) - (2) | (4) - (2) | (5) - (3) | (5) - (3) |
| 104 | OR gasket | (4) - (1) | (4) - (2) | (4) - (2) | (5) - (3) | (5) - (3) |
| 105 | Sleeve | | | | | |
| 106 | Spring | (1) | (2) | (2) | (3) | (3) |
| 107 | Ring | (4) - (1) | (4) - (2) | (4) - (2) | (5) - (3) | (5) - (3) |
| 108 | Arm | | | | | |
| 109 | Insert | | | | | |
| 110 | Special washer | | | | | |
| 111 | Screw | | | | | |

NOTES

| | |
|---|---|
| 1 | Part of DS 102 Major Maintenance Kit (P/N 9499380) |
| 2 | Part of DS 202-302 Major Maintenance Kit (P/N9499381) |
| 3 | Part of DS 402-602 Major Maintenance Kit (P/N 9499382) |
| 4 | Part of DS 102-202-302 Minor Maintenance Kit (P/N 9499370) |
| 5 | Part of DS 402-602 Minor Maintenance Kit (P/N 9499371) |
| 6 | Part of DS102-DS202-DS302 Minor Maintenance Kit (P/N 9499370M002) |
| 7 | Part of DS402-DS602 Minor Maintenance Kit (P/N 9499371M002) |

Technical specifications

The following table lists the main technical data of the DS102 1Ph, DS202 1Ph, DS302 1Ph, DS402 1Ph, DS402 3Ph, DS602 1Ph and DS602 3Ph pumps.

Table 2 Technical specifications

| Technical Data | Hz | Units | DS102 | DS202 | DS302 | DS402 | DS602 |
|---|-------|---------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| FREE AIR DISPLACEMENT | 60 | l/min (cfm) | 114 (4) | 192 (6,8) | 285 (10) | 410 (14,5) | 605 (21,4) |
| | 50 | l/min (m ³ /h) | 95 (5,7) | 160 (9,6) | 237 (14,2) | 342 (20,5) | 540 (30,2) |
| PUMPING SPEED* | 60 | cfm | 3,5 | 5,8 | 8,2 | 12,3 | 18,3 |
| | 50 | m ³ /h | 5 | 8,3 | 11,6 | 17,4 | 26 |
| ULTIMATE PARTIAL PRESSURE* | | mbar | 10 ⁻⁴ | 10 ⁻⁴ | 10 ⁻⁴ | 10 ⁻⁴ | 10 ⁻⁴ |
| ULTIMATE TOTAL PRESSURE* | | mbar | 2·10 ⁻³ | 2·10 ⁻³ | 2·10 ⁻³ | 2·10 ⁻³ | 2·10 ⁻³ |
| ULTIMATE TOTAL PRESSURE WITH GAS BALLAST* | | mbar | 2·10 ⁻² | 2·10 ⁻² | 2·10 ⁻² | 1·10 ⁻² | 1·10 ⁻² |
| WATER VAPOR TOLERANCE | | mbar | 15 | 15 | 20 | 30 | 30 |
| WATER VAPOR CAPACITY | | g/h | 60 | 100 | 160 | 350 | 550 |
| OIL CAPACITY min/max | | l | 0,3/0,5 | 0,4/0,6 | 0,4/0,6 | 0,6/1 | 0,6/1 |
| MOTOR RATING 1ph | 50/60 | kW | 0.72 | 0.72 | 0.72 | 1.1 | 1.1 |
| MOTOR RATING Vac 3 ~ | | kW | | | | | |
| Y 380-415 | 50 | | | | | 0.6 | 0.6 |
| Y 460 | 60 | | | | | 0.5 | 0.5 |
| Δ 200-230 | 50 | | | | | 0.5 | 0.5 |
| Δ 200-230 | 60 | | | | | 0.3 | 0.3 |
| NOMINAL ROTATION SPEED | 50 | rpm | 1500 | 1500 | 1500 | 1500 | 1500 |
| | 60 | rpm | 1800 | 1800 | 1800 | 1800 | 1800 |
| OIL TEMPERATURE (pump operating)** | | °C | 50 | 50 | 52 | 70 | 72 |
| | | °F | 122 | 122 | 126 | 158 | 162 |
| Internal use Only | | | | | | | |

Technical Information

| Technical Data | Hz | Units | DS102 | DS202 | DS302 | DS402 | DS602 |
|--|----|-------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Max Altitude 2000m | | | | | | | |
| Installation category | II | | | | | | |
| Pollution degree | 2 | | | | | | |
| OPERATING TEMPERATURE RANGE | | °C | 12 - 40 | 12 - 40 | 12 - 40 | 12 - 40 | 12 - 40 |
| WEIGHT | | Kg | 22 | 24 | 24 | 36 | 36 |
| | | lb | 48 | 53 | 53 | 79 | 79 |
| INLET FLANGE | | DN | 25KF | 25KF | 25KF | 25KF | 25KF |
| EXHAUST FLANGE | | DN | 25KF | 25KF | 25KF | 25KF | 25KF |
| Dimensions (cf. also next table): | | | | | | | |
| - length, 1ph | | mm | 454 | 491 | 491 | 530 | 530 |
| - width | | mm | 134 | 134 | 134 | 164 | 164 |
| - height | | mm | 212 | 212 | 212 | 242 | 242 |
| Input single phase versions *** | | | | | | | |
| Nominal voltages: | 50 | V | <u>100</u> 200-230 | <u>100</u> 200-230 | <u>100</u> 200-230 | <u>100</u> 200-230 | <u>100</u> 200-230 |
| | 60 | V | <u>100-120</u> 200-230 | <u>100-120</u> 200-230 | <u>100-120</u> 200-230 | <u>100-120</u> 200-230 | <u>100-120</u> 200-230 |
| Maximum currents: | 50 | A | <u>8,8</u> 5,4 | <u>8,8</u> 5,4 | <u>8,8</u> 5,4 | <u>11,8</u> 6,2 | <u>11,8</u> 6,2 |
| | 60 | A | <u>8,8</u> 4,4 | <u>8,8</u> 4,4 | <u>8,8</u> 4,4 | <u>12,8</u> 6,4 | <u>1,8</u> 6,4 |

* According to PNEUROP 6602

** At ultimate total pressure, 20 °C (68 °F) room temperature

*** For more details about the electrical motors see pages from 17 to 20

Dimensions

Table 3 Dimensions

| Model | Units | A | B | C | D | H | L | M | N | P | R | W |
|-------|-------|------|------|------|------|-----|------|------|-----|-----|-----|-----|
| DS102 | mm | 30 | 30 | 35 | 3 | 212 | 430 | 250 | 100 | 105 | 165 | 132 |
| | inch | 1,18 | 1,18 | 1,38 | 0,12 | 8,3 | 16,9 | 9,8 | 3,9 | 4,1 | 6,5 | 5,2 |
| DS202 | mm | 30 | 30 | 35 | 3 | 212 | 467 | 250 | 100 | 105 | 205 | 132 |
| | inch | 1,18 | 1,18 | 1,38 | 0,12 | 8,3 | 18,4 | 9,8 | 3,9 | 4,1 | 8,1 | 5,2 |
| DS302 | mm | 30 | 30 | 35 | 3 | 212 | 467 | 250 | 100 | 105 | 205 | 132 |
| | inch | 1,18 | 1,18 | 1,38 | 0,12 | 8,3 | 18,4 | 9,8 | 3,9 | 4,1 | 8,1 | 5,2 |
| DS402 | mm | 40 | 40 | 40 | 6 | 242 | 541 | 261 | 130 | 100 | 230 | 164 |
| | inch | 1,57 | 1,57 | 1,57 | 0,24 | 9,5 | 21,3 | 10,3 | 5,1 | 3,9 | 9,1 | 6,5 |
| DS602 | mm | 40 | 40 | 40 | 6 | 242 | 541 | 261 | 130 | 100 | 230 | 164 |
| | inch | 1,57 | 1,57 | 1,57 | 0,24 | 9,5 | 21,3 | 10,3 | 5,1 | 3,9 | 9,1 | 6,5 |

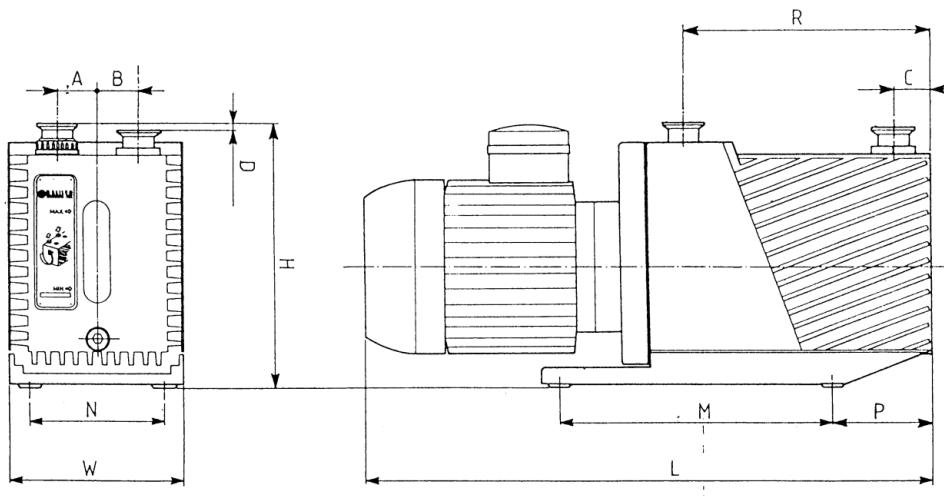


Figure 38 Pump dimensions

Technical Information

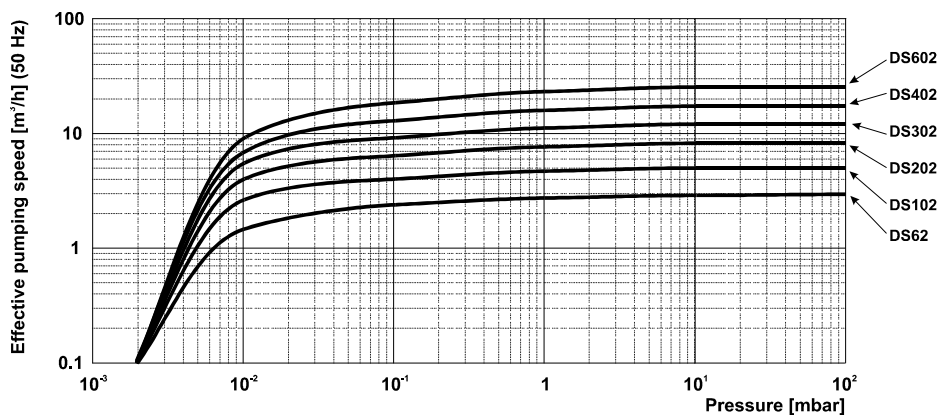


Figure 39 Typical Performance Curves

Pump operations

Starting and Running the Pump

Before being put into service, in order to reach maximum vacuum, the pump must be left running for about an hour with the gas ballast valve open. This will eliminate any humidity from the oil.

WARNING



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

NOTE

If the pump is started with cold oil, initially more than normal noise will be heard; this will last for a few minutes only until the oil reaches its working temperature.

There are no special instructions for normal operation of the pump, which is delivered to you after completion of a running-in cycle in the factory. The maintenance operations for a pump in working condition may be found on the Scheduled Maintenance Cards.

If the pump is sucking in environments with liquids or vapors, it is important to leave it to run with the gas ballast open so as to avoid condensation of the vapors and contamination of the lubricating oil as a result. When there is no danger of the oil being contaminated, the gas ballast valve should be closed to reduce the pump's power absorption.

The gas ballast valve will prove useful in the cold season when, due to the lower room temperatures, it takes longer for the pump to reach rated temperature when switched on. Compression of the air forced in by the gas ballast valve develops heat, which in turn increases temperature of the oil faster.

NOTE

If gases without vapors are sucked in, you are advised to open the gas ballast device from time to time in order to eliminate the traces of humidity they contain.

NOTE

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

Stopping the Pump

There are no special procedures for switching the pump off; it needs only to be disconnected from the electric power by means of the bipolar switch (version with single-phase motor - see section MODELS WITH SINGLE-PHASE UNIVERSAL MOTORS) or of the multipolar switch (version with three-phase motor - see section MODELS WITH THREE-PHASE UNIVERSAL MOTORS).

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.

Oil and Filter Cartridge Replacement Procedures

WARNING



Always disconnect the power supply to the pump before starting maintenance work. Place a special warning sign 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.

Oil Change Procedure

WARNING



Remove the inlet and outlet pipes before opening the oil drain plug.

Electrical Motors

Single Phase Universal Motors

They are world wide motors, dual voltages and dual frequencies, and they are in accordance with major international standards (UL, CSA, CE). On the table below are shown the technical specifications of the different motors.

CAUTION

Before connecting to the mains, check the position of the voltage selector situated inside the electrical box (see next paragraph).

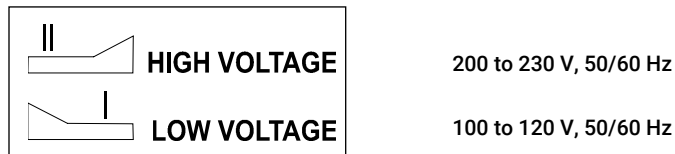


Figure 40

The motor has a main on/off bipolar switch.

The motor includes a thermal protection against overloads. If the motor is switched off by this relay, it can be started again after a few minutes.

Consult the trouble shooting section in order to understand and remove the overload cause.

NOTE

Fuses installed as part of the building installation must be in accordance with the table below.

Technical Information

If you start a pump at low temperature, the current absorbed by the motors will be for several seconds higher than the nominal one, for this reason the fuse on the line must be of the slow-blow type.

Table 4

| PUMP | NOMINAL VOLTAGE [V] | HZ | RPM | KW | START UP CURRENT [A] | FULL LOAD CURRENT [A] | MAXIMUM FUSE RATING [A] |
|----------------------------|---------------------|----|------|------|----------------------|-----------------------|-------------------------|
| DS 102 DS 202 DS 302 | 100 | 50 | 1450 | 0.45 | 44 | 8.8 | 10 |
| | 100 to 120 | 60 | 1730 | 0.55 | 42 | 8.8 | 10 |
| | 200 to 230 | 50 | 1450 | 0.45 | 27 | 5.4 | 8 |
| | 200 to 230 | 60 | 1730 | 0.55 | 24 | 4.4 | 6 |
| DS 402 DS 602 | 100 | 50 | 1450 | 0.75 | 75 | 11.8 | 16 |
| | 100 to 120 | 60 | 1730 | 0.90 | 82 | 12.8 | 16 |
| | 200 to 230 | 50 | 1450 | 0.75 | 43 | 6.2 | 8 |
| | 200 to 230 | 60 | 1730 | 0.90 | 39 | 6.4 | 8 |

Technical Information

Single-Phase Universal Motors Voltage Setting

CAUTION

Before connecting to the mains, check that your electrical mains voltage corresponds to the motor voltage setting.

WARNING



Disconnect the motor from the mains before opening the electrical box.

The motors are factory set to operate at 200-230 V (50/60 Hz) nominal voltages.

To modify the voltage setting, change the position of the voltage selector situated inside the motor electrical box.

To confirm the change of the voltage setting from High Voltage to Low Voltage, glow the orange label above the yellow label positioned on the electrical box cover.

WARNING



Close the motor electrical box cover before connecting to the main.

Technical Information

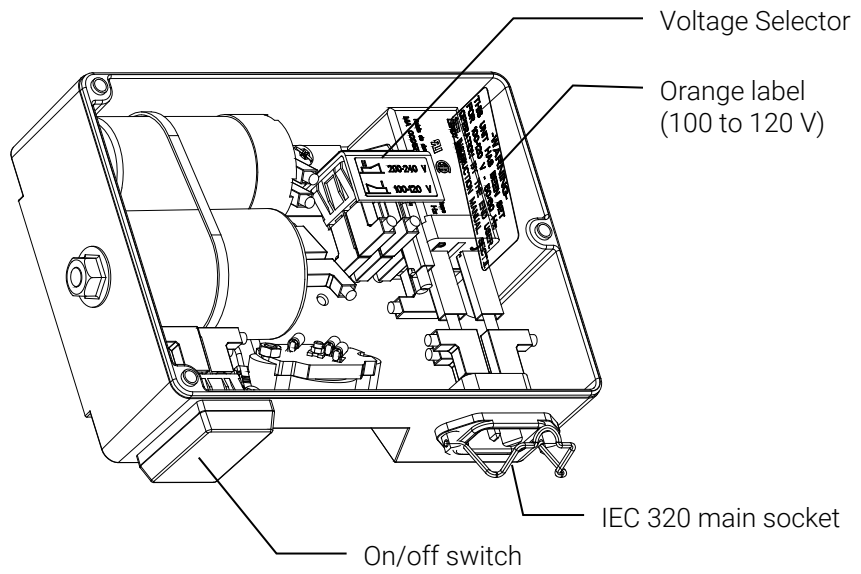


Figure 41 Motor Electrical box

Technical Information

Three Phase Universal Motors

They are world wide motors in accordance with major international standards (UL, CSA, CE). On the table below are shown the technical specifications of the different motors.

CAUTION

Before starting the pump, give a short activation to the power switch, in order to check that the motor turns in the direction indicated by the arrow on the motor body. Should it rotate in the opposite direction, invert the connection of any two phases on the motor terminals.

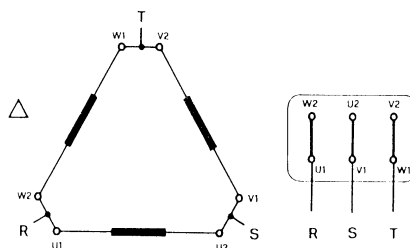


Figure 42 LOW VOLTAGE CONNECTION for power supply of 220V to 230 V 50 - 60 Hz
DELTA CONNECTION

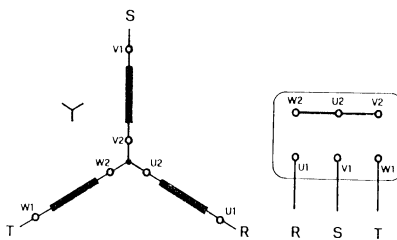


Figure 43 HIGH VOLTAGE CONNECTION for power supply 380V to 460V 50 - 60 Hz
STAR CONNECTION

Technical Information

Electrical Connections of Three-Phase World Wide Motors

DS302 Power supply cord: The correct cable for electrical wiring is a four wires (R+S+T+Earth) cable. The wire section has to be at least 0.8 mm² (AWG18) 105°C AWG18.

DS402, DS602 Power supply cord: The correct cable for electrical wiring is a four wires (R+S+T+Earth) cable. The wire section has to be at least 1.6 mm² (AWG14) 105°C AWG14.

To connect the motor to the three-phase mains, follow the wiring diagram on the motor plate or on the inside of the terminal strip.

Install a multipolar switch on the power line, with contact spacing of at least 3 mm. A magneto-thermal switch must be installed downstream of this switch, tripping at 130-140 % of the nominal current Type C.

Table 5

| Connection | Freq. [HZ] | Nominal Voltages [V] | Power [KW] | Start Up Current [A] | Current [A] | Max Fuse Rating [A] |
|------------|------------|----------------------|------------|----------------------|-------------|---------------------|
| STAR | 50 | 380 to 415 | 0.75 | 15 | 2.6 | 4 |
| STAR | 60 | 460 | 0.90 | 14 | 2.4 | 4 |
| DELTA | 50 | 200 to 230 | 0.75 | 26 | 4.4 | 6 |
| DELTA | 60 | 200 to 230 | 0.90 | 21 | 4.8 | 6 |

CAUTION

It is recommended to connect the pump to the power supply through a dedicated switch on the main electrical panel of the installation, or in proximity of the power supply connection point the circuit breaker has to be type C.

CAUTION

In order to easily identify which disconnecting device related is used for the DS Pump, the Circuit Breaker must to be marked to Marked.

CAUTION

Only electrically trained staff may install the 3Ph models and may change the connection from STAR to DELTA or from DELTA to STAR.

Before starting the pump, give a short activation to the power switch, in order to check that the motor turns in the direction indicated by the arrow on the motor body. Should it rotate in the opposite direction, invert the connection of any two phases on the motor terminals.

One of the most effective method to verify the rotational way of the motor, it is to start the pump with a sheet of paper on the pump inlet. If the paper is sucked by the pump then the motor runs in the right way.

Connections to the Inlet and Exhaust Flange

Remove the protective caps from both flanges. Remove protective cap from inlet flange. Remove metallic cap and rubber membrane from exhaust flange as explained in the Installation chapter. Connect the system to be evacuated to the inlet flange, using a centering ring with OR and a locking collar.

NOTE

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

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

Technical Information

NOTE

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

NOTE

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

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

NOTE

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

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

NOTE

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

CAUTION

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

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.

Technical Information

The recommended lubricating oil is the Agilent Rotary Vane Fluid AVF Silver formerly called DS19 Type. The Rotary Vane Fluid AVF Silver formerly called DS19 Type is a general purpose mechanical pump fluid specifically engineered to provide superior performance in high speed direct drive mechanical pumps.

These precisely distilled fluids (100 % solvent refined neutral paraffinic oil) deliver lower base pressure capability, faster pump-down cycles, and reduced maintenance requirements on both the pump and the fluid.

It is absolutely necessary to continue using the lubricants initially used to fill the tank. If this is not possible for organizational or business reasons, use only products with the same characteristics as the previous oils.

Only use of lubricants of suitable quality will guarantee safe operation of the pumps.

CAUTION

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

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

CAUTION

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

Table 6

| Property | Unit of Measure | AVF Silver Formerly Called DS19 Type |
|---------------------------|-----------------|--------------------------------------|
| Vapor pressure @ 25 °C | Torr | 1·10 ⁻⁵ |
| Boiling point @ 0,01 torr | °C (°F) | 112 (233) |
| Viscosity @ 40 °C | cSt (SUS) | 55 (258) |
| Viscosity @ 100 °C | cSt (SUS) | 8,1 (52,7) |
| Pour point | °C (°F) | -15 (5) |
| Flash point | °C (°F) | 213 (415) |
| Fire point | °C (°F) | 244 (472) |
| Density @ 25 °C | g/ml | 0,87 |

Technical Information

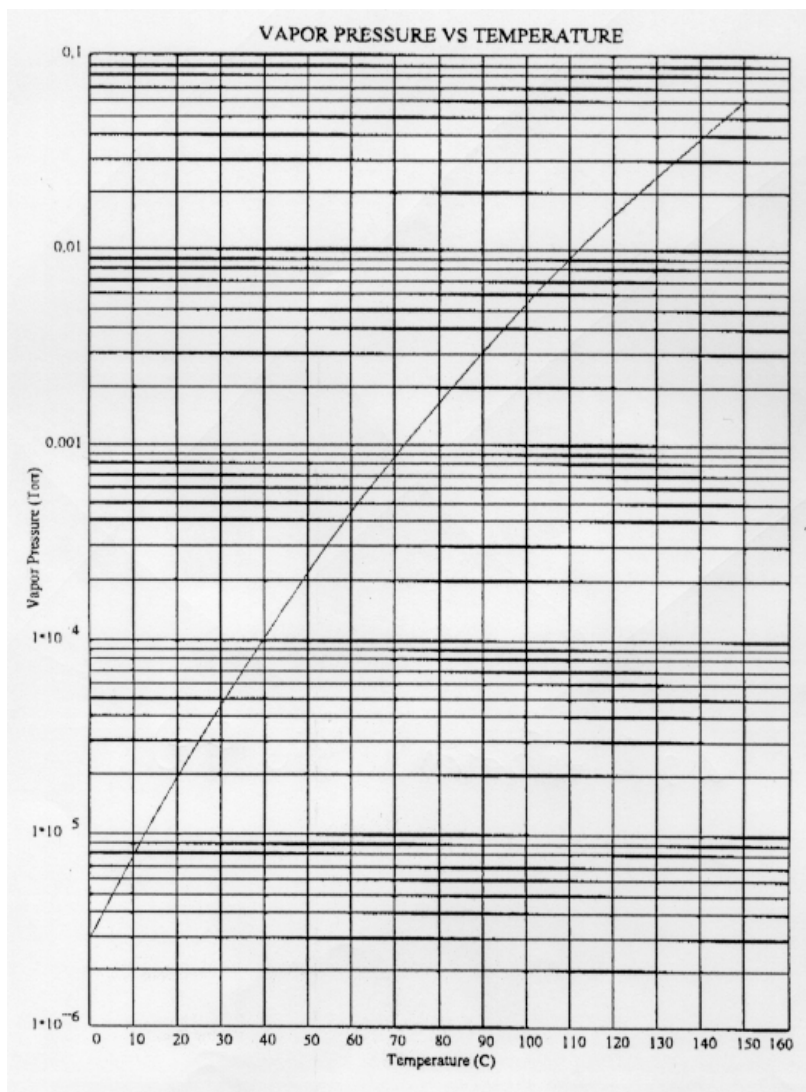


Figure 44

Technical Information

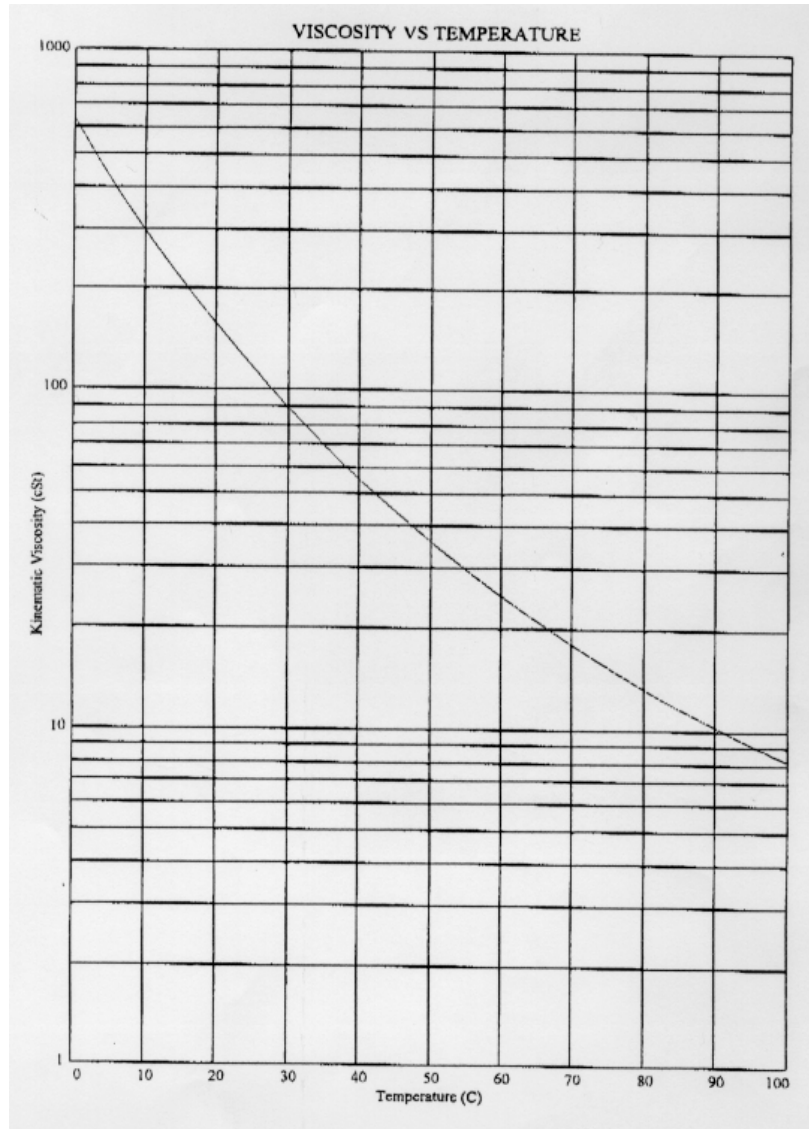


Figure 45

Scheduled Maintenance Cards

Table 7

| No. | Frequency | Pump Status (*) | Operation |
|-----|--------------|-----------------|---------------------------|
| 01 | MONTHLY | R | OIL LEVEL CHECKING |
| 02 | TWICE YEARLY | S | CLEANING THE INLET FILTER |

(*) R=RUNNING S=STOPPED

NOTE

When the pump is equipped with:

- a filter for dust on the inlet side
- a condensation separator on the inlet side

these items must also be maintained, by following the Manufacturer's instructions.

NOTE

The numbers used in the drawings on the Scheduled Maintenance Cards are those used in Figure View of the pump.

Technical Information

Table 8

| Scheduled Maintenance | | Card No. 01 |
|---------------------------|---|----------------------------|
| Pump type: | DS102 1Ph, DS202 1Ph, DS302 1Ph, DS402 1Ph, DS402 3Ph, DS602 1Ph, DS602 3Ph | |
| Frequency: Monthly | Time: 5 min | Machine status: S R |
| Type of action: | LUBRICATION | |
| Item: | LUBRICATING OIL 9499390 | |

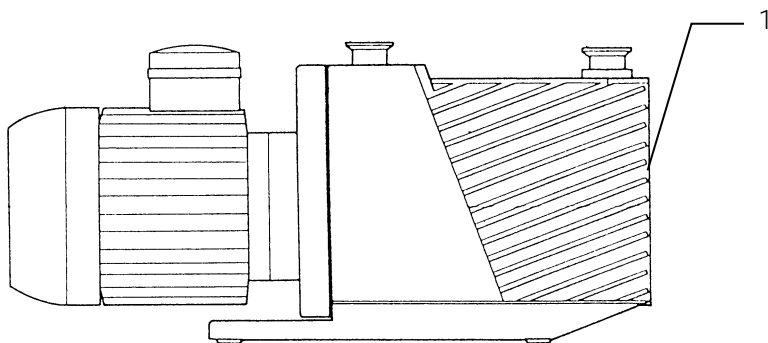


Figure 46

Table 9

| No. | Description | Time | Equipment | Materials |
|-----|--|-------|---|-----------------|
| 1 | Check the oil level and top up if necessary. | 5 min | <ul style="list-style-type: none"> • Cleaning rags • Liquid detergent | Oil P/N 9499390 |

WARNING



Machine 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 60 °C.

- 1 Check the oil level through the sight glass: there are two clearly visible arrows indicating maximum and minimum levels for proper pump operation.

NOTE

The amount of oil consumed depends on the type of work, particularly on the volume being evacuated and on the frequency of the vacuum cycles.

- 2 If necessary, open the pump filling plug on the top plane of the pump and add oil.

NOTE

Before starting the procedure, check that the quality and type of oil used corresponds to the indications of Table Agilent Rotary Vane Fluid AVF Silver formerly called DS19 Type characteristics of this manual.

Technical Information

CAUTION

Take great care to avoid oily residues or dust from entering the pump and jeopardizing proper operation.

- 3 Close the fill plug and, using cotton or other suitable material rags, clean thoroughly the outer surface of the top plane of the pump.

CAUTION

Never mix lubricants of different brands or quality. To change from one oil to another, the pump must be stripped down and all parts washed carefully, taking care to eliminate oil residues.

- 4 Open the gas ballast valve to purify the oil.

Technical Information

Table 10

| Scheduled Maintenance | | Card No. 02 |
|--------------------------------|---|----------------------------|
| Pump type: | DS102 1Ph, DS202 1Ph, DS302 1Ph, DS402 1Ph, DS402 3Ph, DS602 1Ph, DS602 3Ph | |
| Frequency: Twice Yearly | Time: 10 min | Machine status: S R |
| Type of action: | CLEANING | |
| Item: | INLET FILTER | |

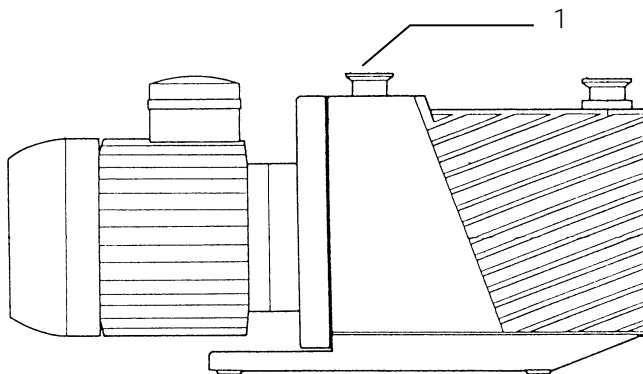


Figure 47

Table 11

| No. | Description | Time | Equipment | Materials |
|-----|--|--------|---|-----------------|
| 1 | Check the oil level and top up if necessary. | 10 min | <ul style="list-style-type: none"> • Cleaning rags • Liquid detergent | Oil P/N 9499390 |

Technical Information

WARNING



Machine safety: disconnect all power lines. Hang the card “MACHINE UNDERGOING MAINTENANCE - DO NOT POWER ON” from the main breaker switch. When finished, remove the safety warning.

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 60 °C.

- 1 Remove the filter (26) from the inlet flange (28).
- 2 Clean the filter using an aqueous solution and dry with hot air.
- 3 Put the filter back in place.

CAUTION

The filter element is designed to prevent solid particles in the air from entering the inside of the pump and if it is not working properly, serious damage could be caused the pump's inner parts. In such cases, it may be worthwhile installing a large surface area filter in the pump's suction line to improve effectiveness and reduce maintenance frequency.

If the pump sucks in gases and vapors that contain large quantities of solid particles, the filter must be checked and cleaned more often than indicated here

Technical Information

Table 12 Unscheduled Maintenance Cards

| No. | Subject | Frequency |
|-----|---|----------------------------------|
| 101 | General Warnings | |
| 102 | Changing the oil | Whenever necessary (see NOTE) |
| 103 | Disassembly of oil level indicator | When damaged |
| 104 | Disassembly of anti-suckback device shutter | When damaged |
| 105 | Disassembly of electric motor and joint | When damaged |
| 106 | Disassembly of discharge valve | When damaged |
| 107 | Disassembly of oil circulating pump | When damaged |
| 108 | Disassembly of anti-suckback valve | When damaged |
| 109 | Disassembly of pump body | When damaged |
| 110 | Replacement of oil seal ring/wear bushing | When damaged |
| 111 | Disassembly of functional block rotors | When damaged |

NOTE

Normally oil is clear and transparent. If the oil darkens, it should be changed. As best practice, in case of 24/7 operation, we suggest to change the oil every 4500 hr (6 month).

NOTE

The numbers used in the drawings on the Unscheduled Maintenance Cards are those used in Figure View of the pump.

Technical Information

Table 13

| Scheduled Maintenance | | Card No. 101 |
|--------------------------------|---|------------------------|
| Pump type: | DS102 1Ph, DS202 1Ph, DS302 1Ph, DS402 1Ph, DS402 3Ph, DS602 1Ph, DS602 3Ph | |
| Frequency: Twice Yearly | Time: 10 min | Machine status: |
| Type of action: | GENERAL WARNINGS | |
| Item: | | |

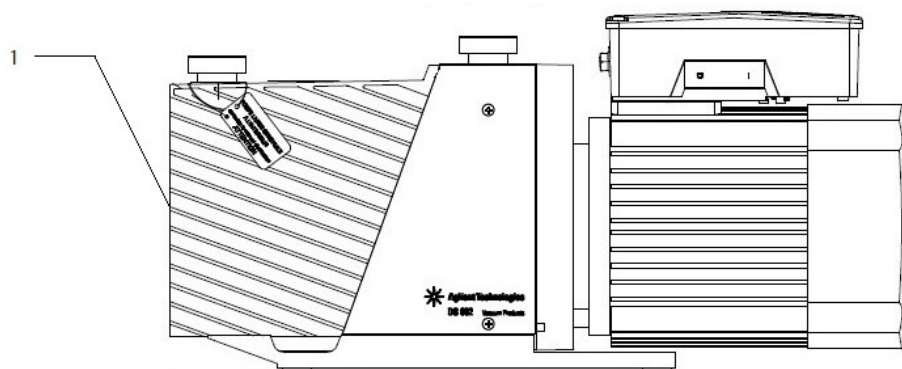


Figure 48

1. Pump disassembly and reassembly require some basic operations and use of tools found in most workshops.

Technical Information

NOTE

The pump's component parts are modular and therefore fully interchangeable. Whenever parts have to be replaced, please specify in the order:

Pump type

Serial number (marked on pump identification plate).

Reference number on the detailed diagram, name and part number as indicated on the spare parts and accessories list (section SPARE PARTS LIST of this manual).

To simplify maintenance work, two kits have been devised.

The Gaskets Kit, containing all the gaskets recommended for substitution after disassembly of the pump and the most commonly used removable parts.

You are advised to keep this kit in a dry room, away from heat and light (sun and UV rays) in order to prevent hardening of the elastomer parts.

The Maintenance Kit, including, as well as the Gaskets Kit, the 1st and 2nd stage vanes and other parts that it may be necessary to replace when overhauling the pump completely. These parts have a life of approx. two years under conditions of normal operation.

Technical Information

Table 14

| KIT | Pump Type | | | | | Order Code |
|-----------------|-----------|-----------|-----------|------------------------|------------------------|------------|
| | DS102 1Ph | DS202 1Ph | DS302 1Ph | DS402 1Ph DS402 3Ph | DS602 1Ph DS602 3Ph | |
| GASKETS KIT | X | X | X | | | 9499370 |
| GASKETS KIT | | | | X | X | 9499371 |
| MAINTENANCE KIT | X | | | | | 9499380 |
| MAINTENANCE KIT | | X | X | | | 9499381 |
| MAINTENANCE KIT | | | | X | X | 9499382 |
| GASKETS KIT | X | X | X | | | 9499370 |

- 2 Before reassembling the pump, all parts must be cleaned thoroughly with a soap and water solution and rinsed with demineralized water.

CAUTION

Particular care must be taken in cleaning the lubrication ducts and oil passage nozzles, which must always be kept free of impurities.

CAUTION

Take care that the soap and water solution does not remain in the various cavities and recesses of the pump, in the blind holes in particular.

- 3 Then dry the parts, by heating where possible but without using compressed air (it generally contains polluting substances), taking care not to exceed a temperature of 80 °C.
- 4 The sequence of reassembly is the inverse of the disassembly operation. Take the same precautions:

Technical Information

- Spread some clean oil of the same type as used to lubricate the pump over the different parts, in particular the inner lip of the oil seal, the bushings and vanes.
- If the oil seal has the dust-block lip, 2/3 fill the area between the two lips with ISOFLEX TOPAS NB5051 grease.

CAUTION

Do not allow the grease into the area of the circumferential spring.

- Lock without forcing the nuts on the four tie-rods (44) connecting the parts of the pump block. Before locking, check that all parts are touching as required.
- Before putting the springs and shutters of the discharge valves back in, pour a little oil into the stators through the holes in the valves.

CAUTION

Before hooking the recall spring to the anti-suckback command bar, make sure you have put the bar all the way into the sleeve of the rotary feedthrough to avoid bending the tapered part of the bar.

NOTE

On DS102 1Ph, DS202 1Ph and DS302 1Ph pumps, fit the joint on the motor shaft after careful removal of grease from the surfaces and application of LOCTITE 242.

Technical Information

Table 15

| | Unscheduled Maintenance | Card No. 102 |
|-------------------------------|---|----------------------------|
| Pump type: | DS102 1Ph, DS202 1Ph, DS302 1Ph, DS402 1Ph, DS402 3Ph, DS602 1Ph, DS602 3Ph | |
| Frequency: AS REQUIRED | Time: 30 min | Machine status: S R |
| Type of action: | CHANGING OIL (see NOTE) | |
| Item: | LUBRICANT 9499390 | |

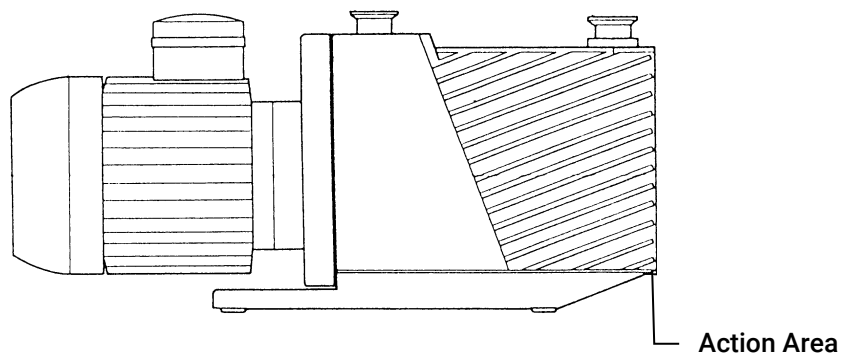


Figure 49

NOTE

Normally oil is clear and transparent. If the oil darkens, it should be changed. As best practice, in case of 24/7 operation, we suggest to change the oil every 4500 hr (6 month).

NOTE

Replace drain plug gasket each time in order to avoid oil leaks due to damaged gaskets.

Technical Information

| Materials required: | Equipment required: |
|---|---|
| <ul style="list-style-type: none">Agilent Rotary Vane Fluid AVF Silver formerly called DS19 Type (1 liter) P/N 9499390.Drain plug gasket. A kit of three OR gaskets is provided along with the pump. | <ul style="list-style-type: none">Fixed wrench for oil exhaust.Tank to collect oil.Cotton (or other suitable material) rags for cleaning.Soap and water solution for cleaning. |

WARNING



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

WARNING



Machine safety: disconnect all power lines. Hang the card “MACHINE UNDERGOING MAINTENANCE - DO NOT POWER ON” from the main breaker switch. When finished, remove the safety warning.

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 60 °C.

Technical Information

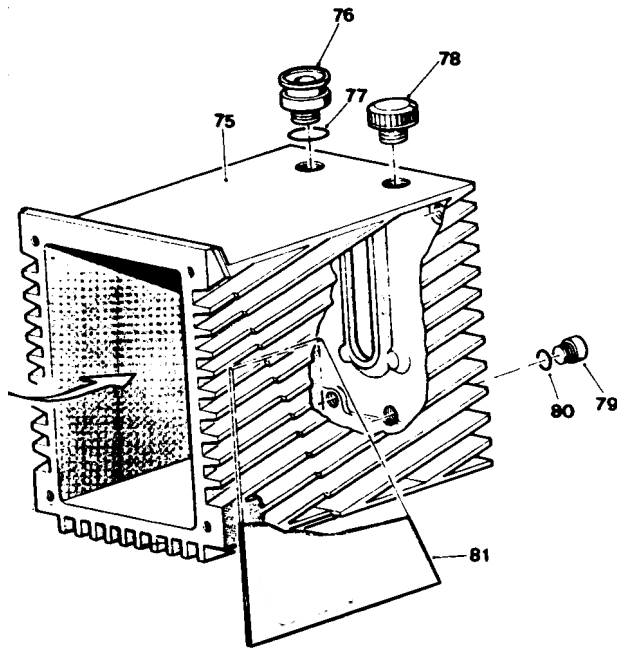


Figure 50

NOTE

The oil has to be replaced:

- 1 when it has become particularly dirty due to the presence of contaminants in the environments being evacuated;
- 2 when the degree of vacuum achieved by the pump is no longer satisfactory, even after running for one hour with the gas ballast device open.

- 1 Place a tank for the waste oil under the oil drain plug (79).

Technical Information

NOTE

You are advised to empty the pump before it cools down completely so that the oil flows out more easily.

NOTE

The pump contains up to 1 liter of oil - make sure the tank you use for the waste oil can hold this amount.

- 2** Open the oil drain plug (79) slowly; let the oil flow out by opening the fill plug (78) located at the top of the pump. In the meantime, clean the inside of the drain plug (magnetic plug).
- 3** After closing the drainage hole with its plug, make the pump perform a number of turns, giving it a brief current pulse, so as to let residual oil in the pump chambers flow out. Then drain off the residual oil again.
- 4** After all the oil has been drained, close the drain plug tight; take the tank of waste oil away and clean thoroughly, using rags of cotton or other suitable material to dry.
- 5** Clean thoroughly the pourer lip of the new oil tin; pour the oil slowly into the pump through the filler plug (78).

NOTE

Monitor through the sight glass at the front of the pump that you are not exceeding the maximum oil level permitted.

CAUTION

For disposal of waste oil, it is strictly necessary to respect the currently applicable legislation on this matter.

- 6** To achieve a good vacuum level again, run the pump for one hour with the gas ballast open.

Technical Information

Table 16

| | Unscheduled Maintenance | Card No. 103 |
|--------------------------------|--|----------------------------|
| Pump type: | S102 1Ph, DS202 1Ph, DS302 1Ph, DS402 1Ph, DS402 3Ph, DS602 1Ph, DS602 3Ph | |
| Frequency: WHEN DAMAGED | Time: 30 min | Machine status: S R |
| Type of action: | DISASSEMBLY | |
| Item: | SIGHT GLASS | |

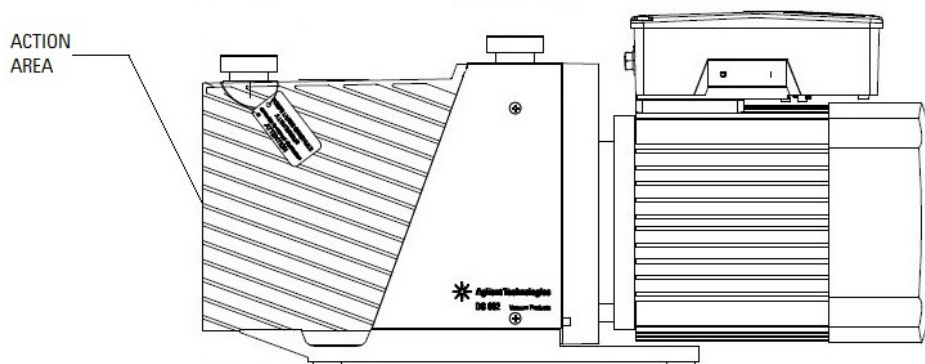


Figure 51

| Materials required: | Equipment required: |
|---|--|
| <ul style="list-style-type: none"> ▪ OR gaskets ▪ (for pumps DS102 1Ph, DS202 1Ph and DS302 1Ph Gaskets kit P/N 9499370) (for pumps DS402 1Ph, DS402 3Ph, DS602 1Ph and DS602 3Ph Gaskets kit P/N 9499371) ▪ Sight glass | <ul style="list-style-type: none"> ▪ Mechanical tools |

Technical Information

WARNING



Machine safety: disconnect all power lines. Hang the card "MACHINE UNDERGOING MAINTENANCE - DO NOT POWER ON" from the main breaker switch. When finished, remove the safety warning.

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 60 °C.

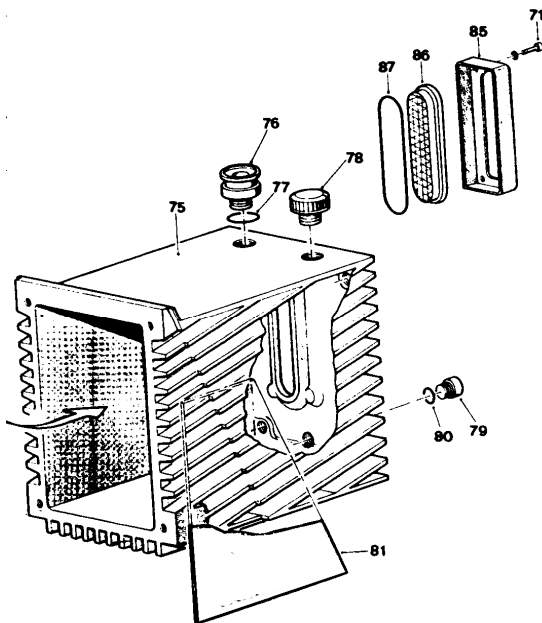


Figure 52

Technical Information

- 1 Drain off the oil from the pump

NOTE

For a description of how to drain off the oil, see the Unscheduled Maintenance Card No. 102.

- 2 Unscrew the securing screws (71) and disconnect the flange (85) from the casing.
- 3 Take out the OR gasket (87) and the sight glass (86).

NOTE

When reassembling, replace the gaskets that you have stripped down.

CAUTION

When reassembly is complete, proceed to fill the pump with oil again following the instructions of Unscheduled Maintenance Card No. 102.

Technical Information

Table 17

| | Unscheduled Maintenance | Card No. 104 |
|--------------------------------|---|----------------------------|
| Pump type: | DS102 1Ph, DS202 1Ph, DS302 1Ph, DS402 1Ph, DS402 3Ph, DS602 1Ph, DS602 3Ph | |
| Frequency: WHEN DAMAGED | Time: 30 min | Machine status: S R |
| Type of action: | REPLACEMENT | |
| Item: | ANTI-SUCKBACK DEVICE SHUTTER | |

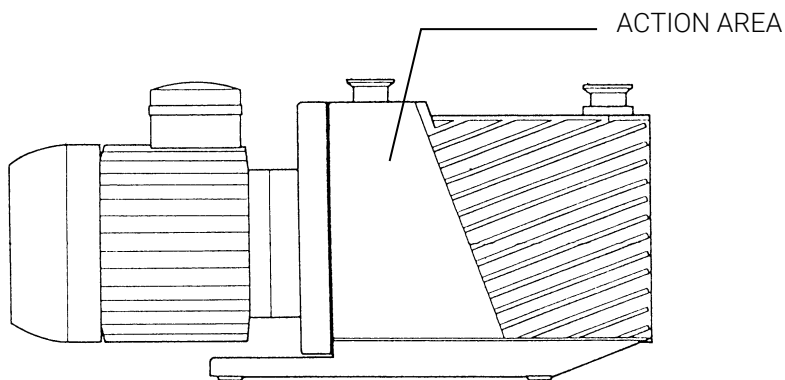


Figure 53

| Materials required: | Equipment required: |
|---|--|
| <ul style="list-style-type: none"> ▪ Shutter | <ul style="list-style-type: none"> ▪ Mechanical tools |

WARNING



Machine safety: disconnect all power lines. Hang the card “MACHINE UNDERGOING MAINTENANCE - DO NOT POWER ON” from the main breaker switch. When finished, remove the safety warning.

Technical Information

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 60 °C.

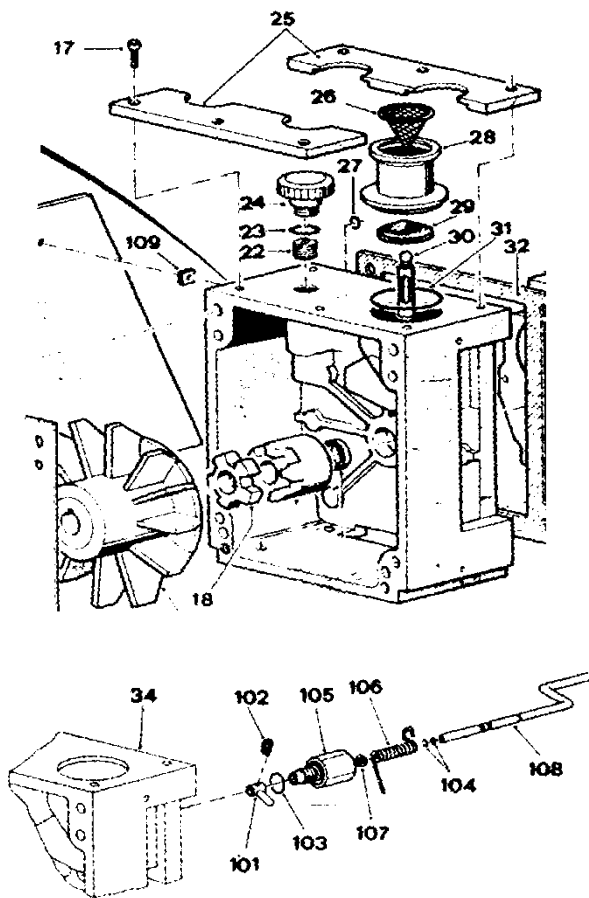


Figure 54

Technical Information

- 1 Disconnect the flange (28) from the inlet pipe line.
- 2 Remove the 6 securing screws (17) and remove the two half-plates (25) pressing the suction flange (28) into its seat.
- 3 Remove the flange (28) and take out the piston (30) with the shutter (29) of the anti-suckback device, disengage it by exerting force on arm (101). Separate the shutter (29) from the piston rod (30) simply by pulling.

CAUTION

Be careful not to scratch the sealing surface of the shutter (29).

- 4 Reassemble by proceeding in the inverse order.

Technical Information

Table 18

| | Unscheduled Maintenance | Card No. 105 |
|--------------------------------|---|----------------------------|
| Pump type: | DS102 1Ph, DS202 1Ph, DS302 1Ph, DS402 1Ph, DS402 3Ph, DS602 1Ph, DS602 3Ph | |
| Frequency: WHEN DAMAGED | Time: 30 min | Machine status: S R |
| Type of action: | REPLACEMENT | |
| Item: | ELECTRIC MOTOR AND JOINT | |

ACTION AREA

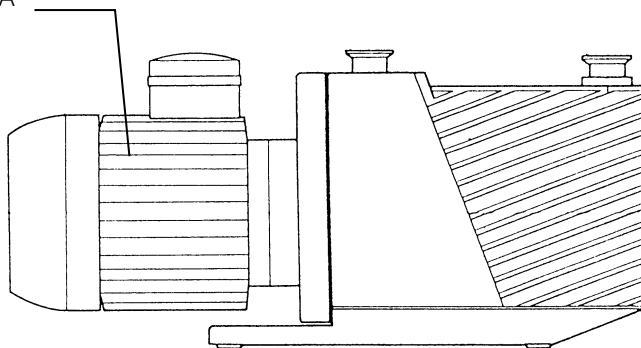


Figure 55

Effective for all pump models DS102, DS202, DS302, DS402, and DS602 manufactured after November 2025, there has been a design change that impacts serviceability. Field service and maintenance for the ELECTRIC MOTOR AND JOINT replacement are no longer permitted. Impacted spare part : Motor [SR03700865, SR03700703 and SR03700704].

For any service or maintenance related to these components, please contact the Agilent Customer Contact Center for assistance and authorized support.

Technical Information

| Materials required: | Equipment required: |
|--|--|
| <ul style="list-style-type: none">▪ Electric motor | <ul style="list-style-type: none">▪ Mechanical tools |

WARNING



Machine safety: disconnect all power lines. Hang the card “MACHINE UNDERGOING MAINTENANCE - DO NOT POWER ON” from the main breaker switch. When finished, remove the safety warning.

Technical Information

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 60 °C.

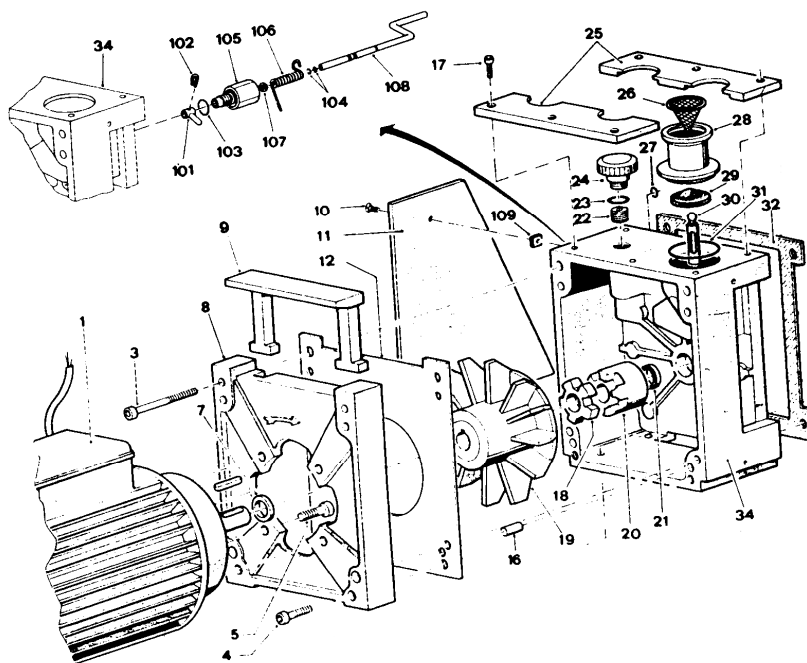


Figure 56

- 1 Disconnect the motor bearing plate (8) from the support (34) by removing the four screws (4).
- 2 Remove the half-joint/fan (19) from the support, together with the motor (1), the plate (8) and the plate (12) (for the DS402 1Ph, DS402 3Ph, DS602 1Ph and DS602 3Ph only).

Technical Information

- 3 Slacken the nut blocking the half-joint (19) to the motor shaft and take it out, using leverage between the plate (8) and the back of the joint.
- 4 Remove the four screws (5) and separate the plate (8) from the motor (1).
- 5 Reassemble by proceeding in the inverse order.

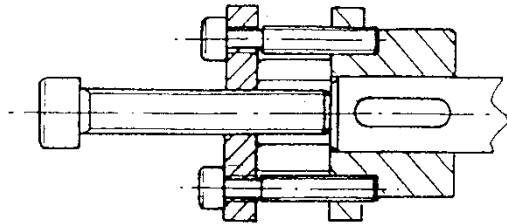


Figure 57 Extractor

Technical Information

Table 19

| | Unscheduled Maintenance | Card No. 106 |
|--------------------------------|---|----------------------------|
| Pump type: | DS102 1Ph, DS202 1Ph, DS302 1Ph, DS402 1Ph, DS402 3Ph, DS602 1Ph, DS602 3Ph | |
| Frequency: WHEN DAMAGED | Time: 1 hour | Machine status: S R |
| Type of action: | DISASSEMBLY | |
| Item: | DISCHARGE VALVES | |

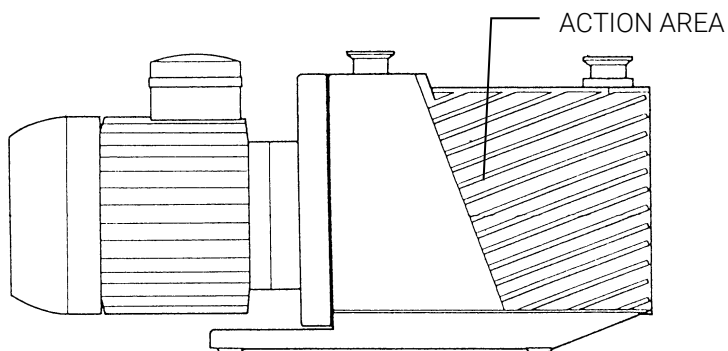


Figure 58

Effective for all pump models DS102, DS202 and DS302 manufactured after November 2025, there has been a design change that impacts serviceability. Field service and maintenance for the DISCHARGE VALVES replacement are no longer permitted. Impacted spare part.

Valve gasket [3700296] and Spring Valves [3700295].

For any service or maintenance related to these components, please contact the Agilent Customer Contact Center for assistance and authorized support.

Technical Information

| Materials required: | Equipment required: |
|--|--|
| <ul style="list-style-type: none">▪ Valves (Gaskets kit) | <ul style="list-style-type: none">▪ Mechanical tools |

WARNING



Machine safety: disconnect all power lines. Hang the card “MACHINE UNDERGOING MAINTENANCE - DO NOT POWER ON” from the main breaker switch. When finished, remove the safety warning.

Technical Information

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 60 °C.

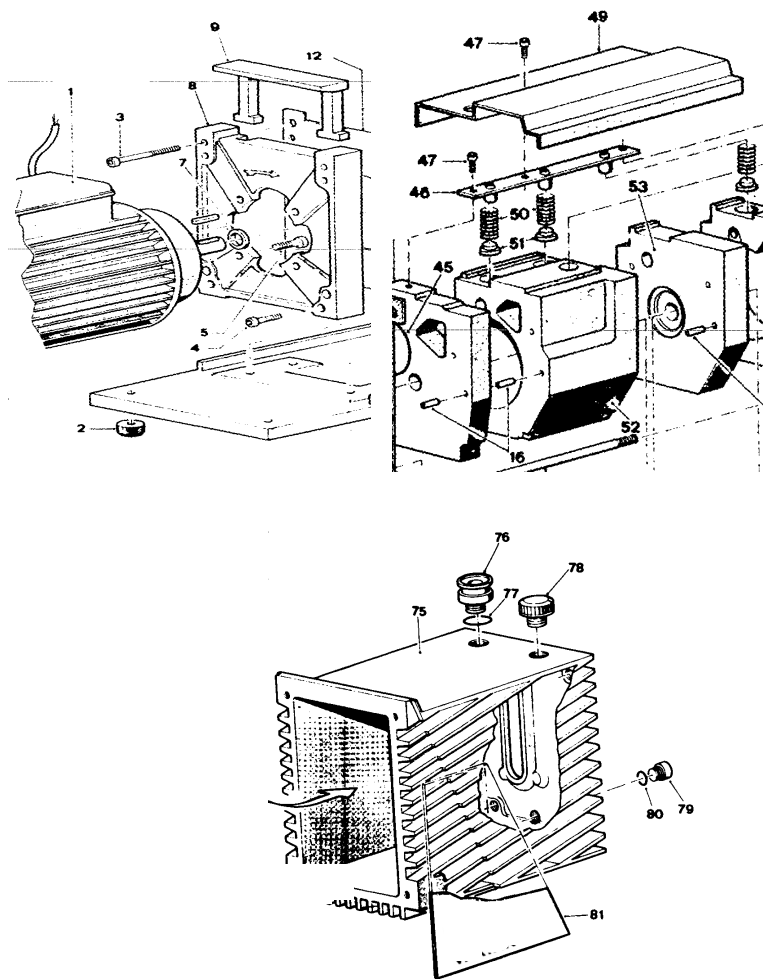


Figure 59

Technical Information

- 1 Drain off all the oil from the pump.

NOTE

For a description of how to drain off the oil, see the Unscheduled Maintenance Card No. 102.

- 2 Disconnect the discharge flange from its piping.
- 3 Remove the nuts (3) and remove the pump casing (75).
- 4 Remove the securing screw (47) holding the splash guard (49) and remove it.
- 5 Remove the two screws (47) on the valve press-bracket (46) and remove the bracket (46), the springs (50) and the shutters (51).
- 6 Reassemble by proceeding in the inverse order.

NOTE

When reassembling, replace all the gaskets stripped down.

CAUTION

When reassembly is complete, proceed to fill the pump with oil following the instructions of Unscheduled Maintenance Card No. 102.

Technical Information

Table 20

| | Unscheduled Maintenance | Card No. 107 |
|--------------------------------|---|----------------------------|
| Pump type: | DS102 1Ph, DS202 1Ph, DS302 1Ph, DS402 1Ph, DS402 3Ph, DS602 1Ph, DS602 3Ph | |
| Frequency: WHEN DAMAGED | Time: 1 hour | Machine status: S R |
| Type of action: | DISASSEMBLY | |
| Item: | OIL CIRCULATION PUMP 9499390 | |

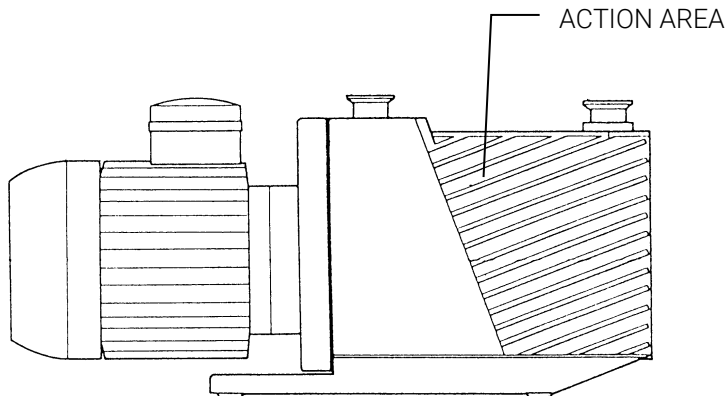


Figure 60

Effective for all pump models DS102, DS202 and DS302 manufactured after November 2025, there has been a design change that impacts serviceability. Field service and maintenance for the OIL CIRCULATION PUMP 9499390 replacement are no longer permitted. Impacted spare part:

Internal gear [3700277] and External gear [3700281].

For any service or maintenance related to these components, please contact the Agilent Customer Contact Center for assistance and authorized support.

Technical Information

| Materials required: | Equipment required: |
|--|--|
| <ul style="list-style-type: none">Oil circulating pump P/N 9499390 | <ul style="list-style-type: none">Mechanical tools |

WARNING



Machine safety: disconnect all power lines. Hang the card “MACHINE UNDERGOING MAINTENANCE - DO NOT POWER ON” from the main breaker switch. When finished, remove the safety warning.

Technical Information

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 60 °C.

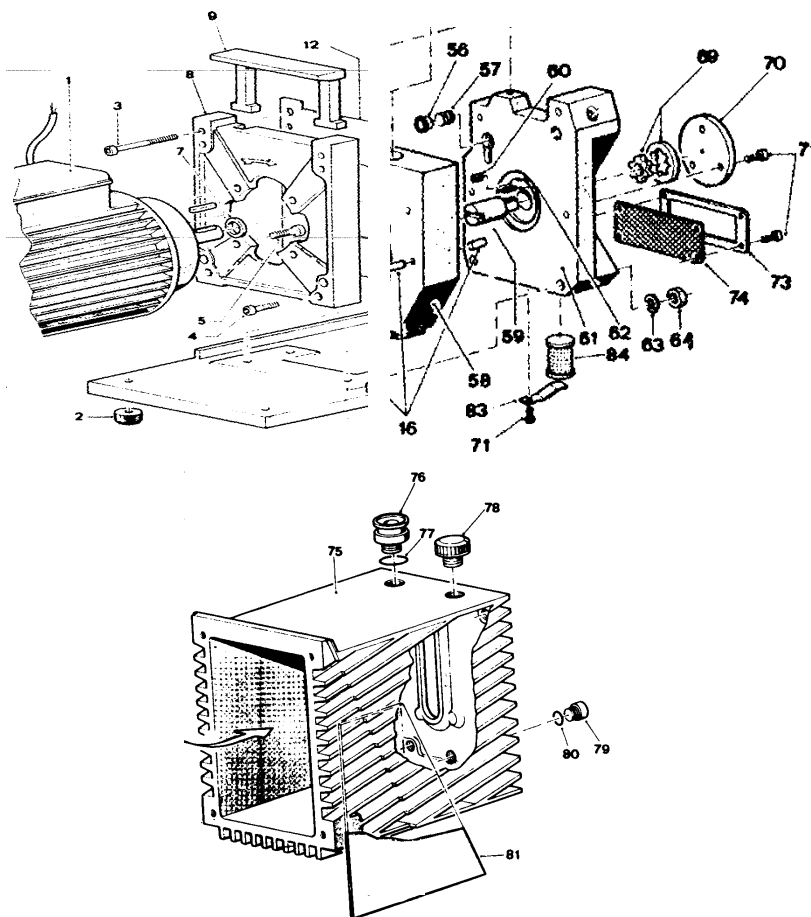


Figure 61

Technical Information

- 1 Drain off all the oil from the pump.

NOTE

For a description of how to drain off the oil, see the Unscheduled Maintenance Card No. 102.

- 2 Disconnect the discharge flange from its piping.
- 3 Remove the nuts (3) and remove the casing from the pump (75).
- 4 Remove the three screws (71) connecting the closing plate (70) to the side and take it out.
- 5 Remove the pump gear-wheels (69).

NOTE

A magnet may be used to remove the gear-wheels.

- 6 Reassemble by proceeding in the inverse order.

NOTE

When reassembling, replace all the gaskets you have stripped down.

CAUTION

When reassembly is complete, proceed to fill the pump with oil again following the instructions of Unscheduled Maintenance Card No. 102.

Technical Information

Table 21

| | Unscheduled Maintenance | Card No. 108 |
|--------------------------------|---|----------------------------|
| Pump type: | DS102 1Ph, DS202 1Ph, DS302 1Ph, DS402 1Ph, DS402 3Ph, DS602 1Ph, DS602 3Ph | |
| Frequency: WHEN DAMAGED | Time: 1 hour | Machine status: S R |
| Type of action: | DISASSEMBLY | |
| Item: | ANTI-SUCKBACK DEVICE | |

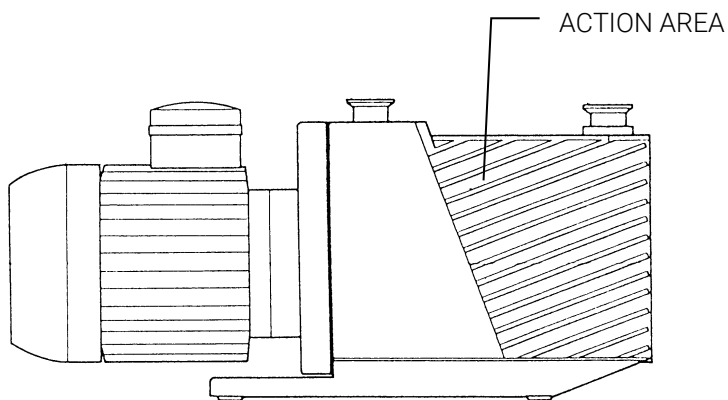


Figure 62

Effective for all pump models DS102, DS202 and DS302 manufactured after November 2025, there has been a design change that impacts serviceability. Field service and maintenance for the ANTI-SUCKBACK DEVICE replacement are no longer permitted. Impacted spare part: Retainer Ring [2267860001], O-rings [2740005401, 3700311] and Level Spring [3700240].

For any service or maintenance related to these components, please contact the Agilent Customer Contact Center for assistance and authorized support.

Technical Information

| Materials required: | Equipment required: |
|--|--|
| <ul style="list-style-type: none">▪ Gasket kit | <ul style="list-style-type: none">▪ Mechanical tools |

WARNING



Machine safety: disconnect all power lines. Hang the card “MACHINE UNDERGOING MAINTENANCE - DO NOT POWER ON” from the main breaker switch. When finished, remove the safety warning.

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 60 °C.

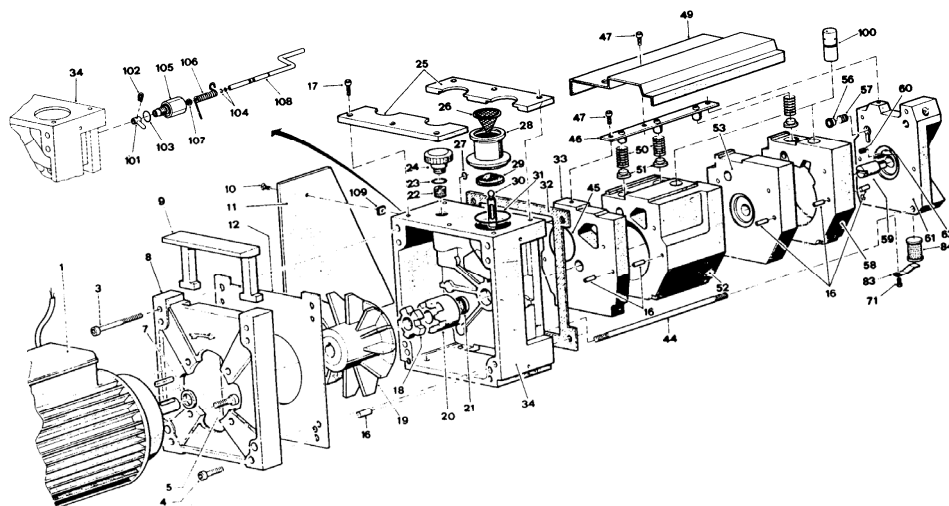


Figure 63

- 1 Drain off all the oil from the pump

NOTE

For a description of how to drain off the oil, see the Unscheduled Maintenance Card No. 102.

- 2 Disconnect the discharge flanges from their piping.
- 3 Remove the locking nuts (3) and remove the casing (75) from the pump.

Technical Information

- 4 Remove the securing screw (47) and remove the splash guard (49).
- 5 Remove the shutter from the anti-suckback device.

NOTE

For more details on how to remove the anti-suckback device, see *Unscheduled Maintenance Card No. 104*.

- 6 Remove the screw (102), take out the arm (101) from the rod.
- 7 Release the spring (106) from the rod arm (108).
- 8 Pull the rod (108) out of the rotary feedthrough (105) sleeve.
- 9 Remove the two OR gaskets (104) from the rod (108) using a screwdriver, if necessary. Be careful not to bend the rod in doing so.
- 10 Remove the sleeve (105) and remove it from the support (34) together with its OR gasket (103).
- 11 Remove the hydraulic piston (100) from its seat in the body.
- 12 Reassemble by proceeding in the inverse order.

NOTE

When reassembling, replace all the gaskets stripped down.

CAUTION

When reassembly is complete, proceed to fill the pump with oil again following the instructions of *Unscheduled Maintenance Card No. 102*.

Technical Information

Table 22

| | Unscheduled Maintenance | Card No. 109 |
|--------------------------------|---|----------------------------|
| Pump type: | DS102 1Ph, DS202 1Ph, DS302 1Ph, DS402 1Ph, DS402 3Ph, DS602 1Ph, DS602 3Ph | |
| Frequency: WHEN DAMAGED | Time: 1 hour | Machine status: S R |
| Type of action: | DISASSEMBLY | |
| Item: | PUMP BODY | |

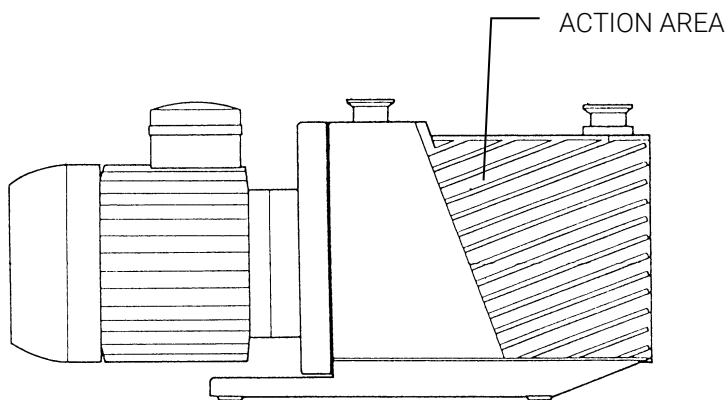


Figure 64

Effective for all pump models DS102, DS202 and DS302 manufactured after November 2025, there has been a design change that impacts serviceability. Field service and maintenance for the PUMP BODY replacement are no longer permitted. Impacted spare part: first stage body [3700261, 3700316, 3700495] and second stage body [3700321].

For any service or maintenance related to these components, please contact the Agilent Customer Contact Center for assistance and authorized support.

Technical Information

| Materials required: | Equipment required: |
|--|--|
| <ul style="list-style-type: none">▪ Gasket kit | <ul style="list-style-type: none">▪ Mechanical tools |

WARNING



Machine safety: disconnect all power lines. Hang the card “MACHINE UNDERGOING MAINTENANCE - DO NOT POWER ON” from the main breaker switch. When finished, remove the safety warning.

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 60 °C.

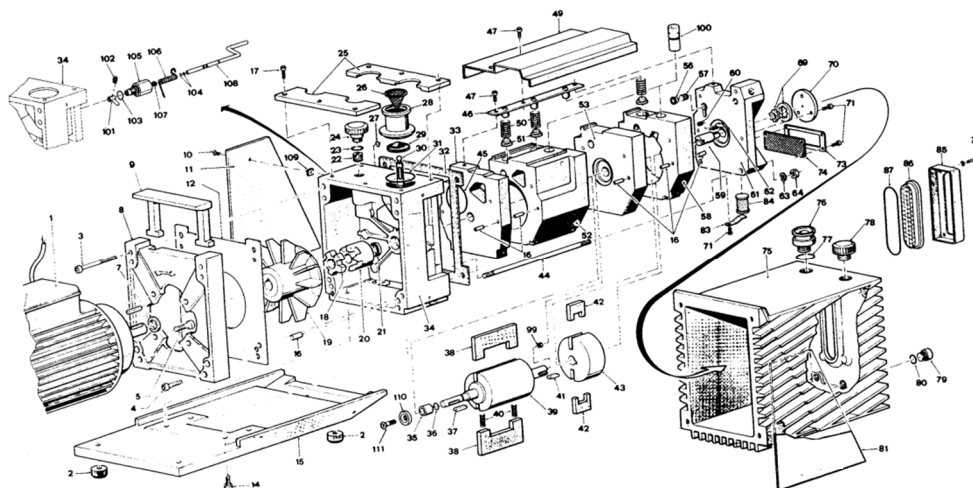


Figure 65

- 1 Drain off all the oil from the pump.

NOTE

For a description of how to drain off the oil, see the Unscheduled Maintenance Card No. 102.

- 2 Disconnect the discharge flanges from their piping.
- 3 Disconnect the electric motor (1) complete with half-joint.

Technical Information

NOTE

For a description of how to disassemble the electric motor, see the *Unscheduled Maintenance Card No. 105*.

- 4 On DS402 1Ph, DS402 3Ph, DS602 1Ph and DS602 3Ph: remove the screw (111) and remove the seal (110)). Slacken the nut locking the half-joint (20) to the shaft of the rotor (39) and take out the half-joint. Remove the tongue (37) with it as well.
- 5 Unscrew the securing screw (47) and remove the valve screen (49).
- 6 Slacken the four nuts (64) and take out the tie-rods (44) and the complete functional block (76), lifting it from the pump support (34) and take out the OR gaskets (27) and (45), from the gas ballast line and suction line respectively.

NOTE

Be careful not to cut the lip of the oil seal with the sharp edges of the shaft key seat.

- 7 Remove the screw (102), take out the arm (101) from the rod.

NOTE

When reassembling, replace all the gaskets stripped down.

CAUTION

When reassembly is complete, proceed to fill the pump with oil again following the instructions of *Unscheduled Maintenance Card No. 102*.

Technical Information

Table 23

| | Unscheduled Maintenance | Card No. 110 |
|--------------------------------|---|----------------------------|
| Pump type: | DS102 1Ph, DS202 1Ph, DS302 1Ph, DS402 1Ph, DS402 3Ph, DS602 1Ph, DS602 3Ph | |
| Frequency: WHEN DAMAGED | Time: 1 hour and 15 min. | Machine status: S R |
| Type of action: | REPLACEMENT | |
| Item: | OIL SHAFT SEAL / ANTI-WEAR BUSHING | |

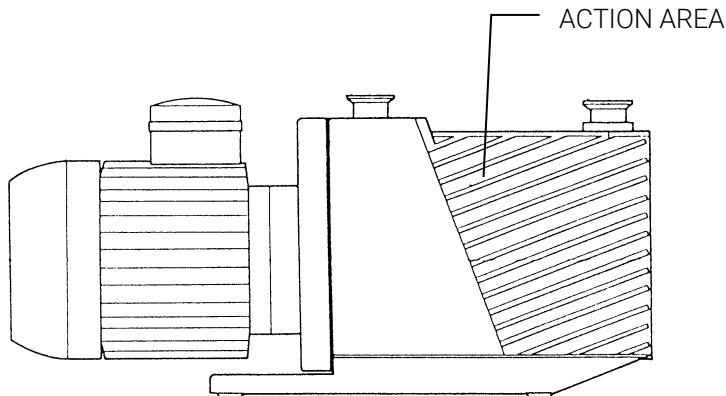


Figure 66

Effective for all pump models DS102, DS202, DS302, DS402, and DS602 manufactured after November 2025, there has been a design change that impacts serviceability. Field service and maintenance for the OIL SHAFT SEAL / ANTI-WEAR BUSHING replacement are no longer permitted. Impacted spare part: Radial shaft [2740001401] and DS Ring [3700370].

For any service or maintenance related to these components, please contact the Agilent Customer Contact Center for assistance and authorized support.

Technical Information

| Materials required: | Equipment required: |
|--|--|
| <ul style="list-style-type: none">▪ Oil shaft seal▪ Anti-wear bushing▪ Gaskets kit | <ul style="list-style-type: none">▪ Mechanical tools |

WARNING



Machine safety: disconnect all power lines. Hang the card “MACHINE UNDERGOING MAINTENANCE - DO NOT POWER ON” from the main breaker switch. When finished, remove the safety warning.

Technical Information

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 60 °C.

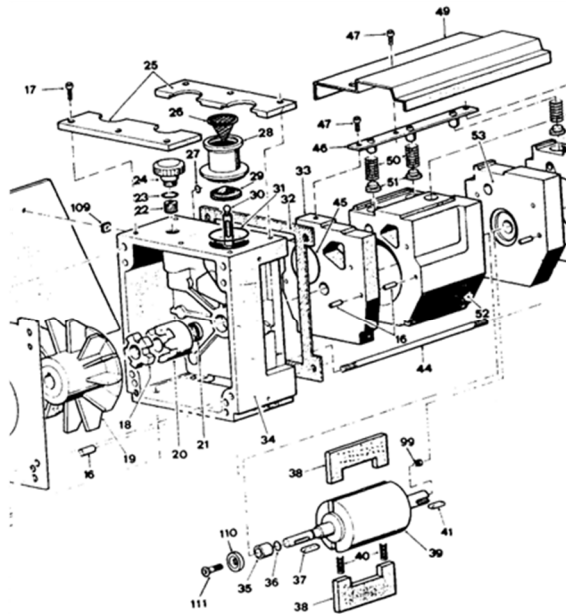


Figure 67

Technical Information

- 1 Drain off all the oil from the pump.

NOTE

For a description of how to drain off the oil, see the Unscheduled Maintenance Card No. 102.

- 2 Remove the worn out oil shaft seal (21) from the pump support (34) using a screwdriver for leverage and taking care not to scratch the seat.

NOTE

For a description of how to separate the functional block from the support, see the Unscheduled Maintenance Card No. 109.

- 3 Remove the worn out oil shaft seal (21) from the pump support (34) using a screwdriver for leverage and taking care not to scratch the seat.
- 4 Take the anti-wear bushing (35) off the shaft and take out the OR Gasket (36).

NOTE

For assembly of the new oil shaft seal, a special tool is needed.

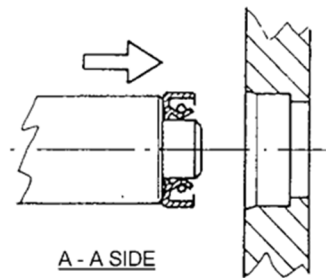


Figure 68

Technical Information

- 5 After applying silicone grease to the external diameter of the oil seal, engage it on the tool and push it into its seat.
- 6 Reassemble by proceeding in the inverse order.

NOTE

When reassembling, replace all the gaskets stripped down.

CAUTION

When reassembly is complete, proceed to fill the pump with oil again following the instructions of Unscheduled Maintenance Card No. 102.

Technical Information

Table 24

| | Unscheduled Maintenance | Card No. 111 |
|--------------------------------|---|----------------------------|
| Pump type: | DS102 1Ph, DS202 1Ph, DS302 1Ph, DS402 1Ph, DS402 3Ph, DS602 1Ph, DS602 3Ph | |
| Frequency: WHEN DAMAGED | Time: 2 hours | Machine status: S R |
| Type of action: | DISASSEMBLY | |
| Item: | FUNCTIONAL BLOCK ROTORS | |

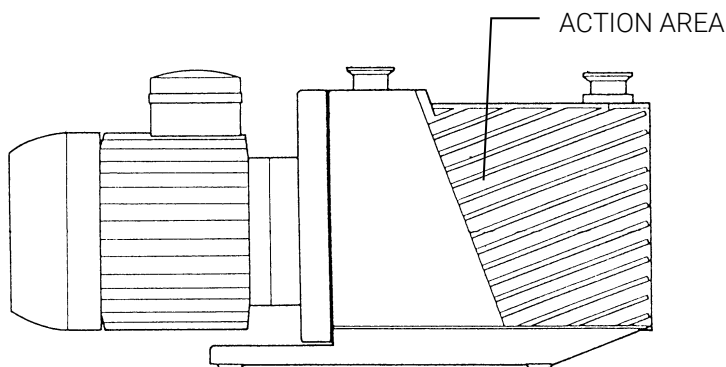


Figure 69

Effective for all pump models DS102, DS202 and DS302 manufactured after November 2025, there has been a design change that impacts serviceability. Field service and maintenance for the FUNCTIONAL BLOCK ROTORS replacement are no longer permitted.

Impacted spare part for DS102, DS202 and DS302 : Radial shaft [2740001401], Blade spring [3700270], gasket [3700210], Gas ballast shutter [3700263], O-Rings [2740005001,2740005601], Gas ballast spring [3700264], Roller [2114001001] and Blade [3704740, 3704739, 3704741]. Impacted spare part for DS402 and DS602 : Radial shaft [2740001201], DS Ring [3700370], Roller [2114001001] and O-Rings [2740005801, 2740005901, 2740006001].

For any service or maintenance related to these components, please contact the Agilent Customer Contact Center for assistance and authorized support.

Technical Information

| Materials required: | Equipment required: |
|--|--|
| <ul style="list-style-type: none">▪ Oil shaft seal ring▪ Anti-wear bushing▪ OR gaskets▪ 1st stage vanes▪ 2nd stage vanes▪ Gas Ballast shutter▪ (the above items of material are included in the Major Maintenance kit) | <ul style="list-style-type: none">▪ Mechanical tools |

WARNING



Machine safety: disconnect all power lines. Hang the card “MACHINE UNDERGOING MAINTENANCE - DO NOT POWER ON” from the main breaker switch. When finished, remove the safety warning.

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 60 °C.

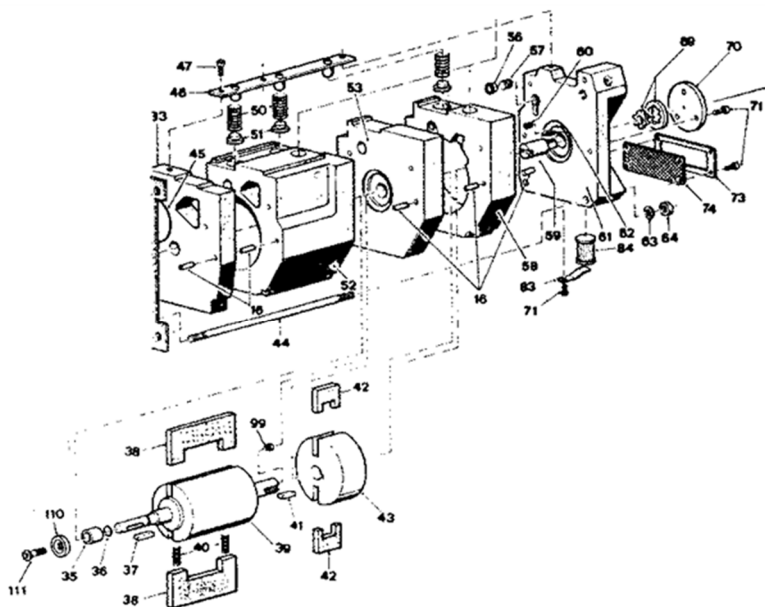


Figure 70

- 1 Drain off all the oil from the pump

NOTE

For a description of how to drain off the oil, see the Unscheduled Maintenance Card No. 102.

- 2 Detach the entire functional block from the pump support.

NOTE

For a description of how to separate the functional block from the support, see the Unscheduled Maintenance Card No. 109.

- 3 Disassemble the discharge valves.

Technical Information

NOTE

For a description of how to disassemble the discharge valves, see the Unscheduled Maintenance Card No. 106.

- 4** Detach the end plate (61) from the rest of the pump body, exerting leverage if necessary on the reference notches between the parts. This will give you access to the retaining valve (56) and associated spring (57) at the gas ballast inlet.
- 5** Disconnect the 2nd stage stator (58), remove the two vanes (42), take the 2nd stage rotor (43) off the shaft and take out the key (41).
- 6** Remove the partition wall (53) from between the 1st and 2nd stages.
- 7** Detach the 1st stage stator (52) from the inner side (33), pressing back on the springs (40) of the vanes (38) to avoid the vanes from touching against the sharp corners of the body and becoming damaged.
- 8** Take out the 1st stage rotor (39), the vanes (38) and the springs (40).
- 9** Reassemble by proceeding in the inverse order.

NOTE

When reassembling, replace all the gaskets stripped down.

CAUTION

After reassembly is complete, proceed to fill the pump again with oil following the instructions of Unscheduled Maintenance Card No. 102.

Troubleshooting and Corrective Action

NOTE

If the pump breaks down or does not work well, first check thoroughly that all the standards rules listed in the sections relevant installation and operation are currently observed.

If you cannot get sufficiently low pressure, the problem may lie with the system connected to the pump, i.e. the vacuum chamber and inlet line.

Even when the design sizes are correct, the problems listed below are still fairly frequent:

- a) faulty seals: check that the seals are fitted, are in good working order and are clean; check all joints, taps, sight glasses, weld joints, etc.
- b) unsuitable materials: avoid the use of rubber, plastic or even metal parts that are porous or permeable.
- c) volatile substances: as far as possible, eliminate humidity, grease, dirt, rust, solvents (even small traces).

Table 25

| No. | SYMPTOM | PROBABLE CAUSE | SUGGESTED REMEDY | CARD REF. |
|-----|---|--|--|-----------|
| 1 | The pump does not start (or stops immediately). | A) The motor-pump coupling is defective. | Check state of the elastic joint and replace the parts as needed. | 105 |
| | | B) Viscosity of the oil has increased. | Examine the oil and change if necessary (find out why it has deteriorated). | 102 |
| | | C) Excessive friction inside pump. | Test the resistance to rotation, by turning the joint by hand. If the rotors are blocked, disassemble the pump body and check state of the parts inside. | 111 |
| | | D) Electrical protections not set. | Adjust the protections. | |
| | | E) Oil too viscous because of low room temperature. | Heat the oil up to a temperature of 20 °C or use an oil recommended for low temperatures. | 102 |
| | | F) Direction of rotation inverted (only 3-phase motors). | Change over two phase wires of the electric power supply. | |
| 2 | The pump stops (stalls). | A) Seizure of some internal parts. | Proceed as at 1-C. | |
| | | B) Oil very dirty. | Proceed as at 1-B. | |

Technical Information

| No. | SYMPTOM | PROBABLE CAUSE | SUGGESTED REMEDY | CARD REF. |
|-----|---|--|---|---|
| 3 | The pump overheats. | A) Too much friction inside. | Proceed as at 1-C. | |
| | | B) Oil ducts clogged inside. | Try changing the oil, otherwise disassemble the pump and clean it well. | 102 111 |
| 4 | Too much oil drained off by the exhaust. | A) Gas Ballast device broken (always open). | Check the device to ensure the gas ballast is properly adjusted. | 111 |
| | | B) Heavy duty work (high suction pressures or very frequent cycles). | Check condition of the oil trap filter. | |
| | | C) Leak in system. | Check the system (see "Note"). | |
| 5 | The pump is loosing oil. | A) Seal on shaft defective. | Replace the oil seal and the anti-wear bushing. | 110 Refer to the card related to involved item |
| | | B) Other gaskets defective. | Identify the areas where seeping occurs and check the associated gaskets. | |
| | | C) Oil level window broken | Replace the oil level window. | |
| 6 | The pump is very noisy even at steady operating conditions. | A) Exhaust valves damaged. | Inspect the valves. | 106 |
| | | B) High suction pressure, or gas ballast device is open. | Check the system and the gas ballast valve (see items 4-A and 4-B). | |
| | | C) Elastic star of joint is damaged. | Check and replace if necessary. | |
| | | D) A screw of the joint has become loose. | Lock the screw after application of Loctite 222 (for slack threads). | |
| 7 | When the pump is stopped, the inlet pressure rises rapidly. | A) The anti-suckback device is defective. | Disassemble and check the anti-suckback device. | 108 |
| | | B) The cause of the problem is not with the pump. | See "Note". | |
| 8 | The pump does not produce a sufficient vacuum. | A) Not enough oil, or oil contaminated. | Check level and appearance of the oil. Open the Gas Ballast for half an hour at least; change the oil whenever necessary. | 01 102 |
| | | B) Oil ducts clogged inside. | Proceed as at 3-B. | |
| | | C) Direction of rotation inverted. | Proceed as at 3-C. | |
| | | D) OR gaskets communicating with the inlet line defective. | Replace the gaskets. | 109 |
| | | E) Exhaust valves damaged or out of place. | Proceed as at 6-A. | |

Technical Information

| No. | SYMPTOM | PROBABLE CAUSE | SUGGESTED REMEDY | CARD REF. |
|-----|---------|--|---|------------|
| | | F) Insufficient oil pressure in the lubricating circuit, preventing the anti-suckback device from opening. | Inspect the gears of the oil pump and check that it is working. | 107 |
| | | G) Internal moving parts worn. | Disassemble the pump, and replace any worn parts. | 111 |
| | | H) Pump working with gas ballast device open. | Close the gas ballast device. | |
| | | I) Anti-suckback valve fails to open. | Disassemble the suction flange and check the device. | 104 108 |
| | | J) Parts of the functional block not in perfect contact because of deposits of dirt or failure to put a plug on the service holes. | Disassemble and check condition of the part surfaces and that plugs have been used. | 111 |
| | | K) The cause of the problem is not with the pump. | See "Note". | |

Accessories and Spare Parts

Table 26 Accessories and Spare Parts

| OTHER SPARE PARTS | DS102 1Ph | DS202 1Ph | DS302 1Ph | DS402 1Ph DS402 3Ph | DS602 1Ph DS602 3Ph | P/N |
|----------------------------|-----------|-----------|-----------|------------------------|------------------------|-------------|
| MINOR MAINTENANCE KIT (*) | X | X | X | | | 9499370 |
| MINOR MAINTENANCE KIT (*) | | | | X | X | 9499371 |
| MAJOR MAINTENANCE KIT (**) | X | | | | | 9499380 |
| MAJOR MAINTENANCE KIT (**) | | X | X | | | 9499381 |
| MAJOR MAINTENANCE KIT (**) | | | | X | X | 9499382 |
| COUPLING KIT (***) | X | X | X | | | 9499370M002 |
| COUPLING KIT (***) | | | | X | X | 9499371M002 |

(*) Contains all the valves, O-rings and seals to refurbish the pump to vacuum integrity.

(**) Includes all the items of the minor maintenance kit plus the vanes.

(***) Includes items 18, 19 and 20 shown in the exploded view of page 283.

Technical Information

Table 27

| ACCESSORY ITEM ON EXHAUST | DS102 1Ph | DS202 1Ph | DS302 1Ph | DS402 1Ph DS402 3Ph | DS602 1Ph DS602 3Ph | P/N |
|--------------------------------|-----------|-----------|-----------|------------------------|------------------------|---------|
| OIL MIST ELIMINATOR KF25 | X | X | X | X | X | 9499395 |
| OIL MIST CARTRIDGE (Q.ty 2) | X | X | X | X | X | 9499394 |

Table 28

| RECOMMENDED OIL | P/N | Q.TY |
|---|----------|----------|
| Agilent Rotary Vane Fluid AVF Silver formerly called DS19 Type (Europe) | 9499390 | 1 liter |
| Agilent Rotary Vane Fluid AVF Silver formerly called DS19 Type (USA) | K7516301 | 1 liter |
| Agilent Rotary Vane Fluid AVF Silver formerly called DS19 Type (USA) | K7516302 | 1 gallon |

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
Toll Free: 00 800 234 234 00

vpt-customer@agilent.com

NORTH AMERICA:

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

vpl-ra@agilent.com

PACIFIC RIM:

Please visit our website for
individual office information

<http://www.agilent.com>



TERMS AND CONDITIONS

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

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



Vacuum Products Division
Request for Return Form

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

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

Type of return
Non Billable
Billable
Exchange
Repair
Upgrade
Demo
Calibration
Evaluation
Return for Credit
New PO # (hard copy must be submitted with this form):

Health and safety
Substances (please refer to MSDS forms)
The product has been exposed to the following substances:
Toxic
Harmful
Corrosive
Reactive
Flammable
Explosive (*)
Radioactive (*)
Biological (*)
Oxidizing
Sensitizer
Other dangerous substances
Trade name
Chemical name
Chemical Symbol
CAS Number

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

I declare that the above information is true and complete to the best of my knowledge and belief.
I understand and agree to the terms and conditions on page 2 of this document.

Name:
Position:
Date:
Authorized Signature:

NOTE: If a product is received at Agilent which is contaminated with a toxic or hazardous material that was not disclosed, the customer will be held responsible for all costs incurred to ensure the safe handling of the product, and is liable for any harm or injury to Agilent employees as well as to any third party occurring as a result of exposure to toxic or hazardous materials present in the product.

Agilent Vacuum Products Division/Sales and Service Offices

United States

Agilent Technologies

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

Netherlands

Agilent Technologies Netherlands B.V.

Customer Contact Center
Laan van Langerhuize 1, toren A-8
1186 DS Amstelveen
Tel. +31 020 547 2600
Fax +31 020 654 5748
customer-care_netherlands@agilent.com

Belgium

Agilent Technologies Belgium S.A./N.V.

Customer Contact Center
Pegasus Park
De Kleetlaan 12A bus 12
B-1831 Diegem
Tel. +32 2 404 92 22
Fax +32 2 626 46 30
customer-care_belgium@agilent.com

Brazil

Agilent Technologies Brasil

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

China

Agilent Technologies Co. Ltd (China)

No.3, Wang Jing Bei Lu, Chao Yang District
Beijing, 100102, China
Tel: +86 (0)10 64397888
Fax: +86 (0)10 64397666
Toll free: 400 8203278 (mobile)
Toll free: 800 8203278 (landline)
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

Southeast Asia

Agilent Technologies Sales Sdn Bhd

Unit 201, Level 2 uptown 2,
2 Jalan SS21/37, Damansara Uptown
47400 Petaling Jaya, Selangor, Malaysia
Ph. +603 7712 6181
Fax: +603 7727 1239
Toll free: 1 800 880 805
vps-customerservice@agilent.com

India (Sales)

Agilent Technologies India Pvt. Ltd.

Unit Nos 110- 116, & Part of 101 & 109
First Floor, Splendor Forum,
Plot No.-3 , District Centre, Jasola
New Delhi-110025
Ph. +91 11 4623 7100
Fax: +91 4623 7105
Toll Free: 1 800 180 1517

Italy

Agilent Technologies Italia S.p.A.

Via F.Ili 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.

9-1 Takakura-cho Hachioji-city,
Tokyo, Japan
Tel.: +81- 3-5232-1253
Fax: +81-120-565-154
Toll-Free: +81-120-477-111
jp-vvt-sales.pdl-ext@agilent.com

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

Korea

Agilent Technologies Korea, Ltd.

Ilshin Building 4F
Yongsan-gu Hannam-daero
Seoul Korea 04418
Tel: +82 (0)2 2194 9449
Fax: +82 (0)2 2194 9853
Toll free: 080 222 2452
vpc-customerservice@agilent.com

UK and Ireland

Agilent Technologies LDA UK Limited

Lakeside Cheadle Royal Business Park
Cheadle, Cheshire SK8 3GR,
United Kingdom
Ph. +44 01865291570
Fax +44 01865291571
Toll free: 00 800 234 234 00
Toll free fax: 00 800 345 345 00
vpt-customer-care@agilent.com

© Agilent Technologies, Inc. 2022
10/2022

India (Service)

Agilent Technologies India Pvt. Ltd.
C-Block, RMZ Centennial Plot Number- 8A, 8B, 8C,
8D,
Doddanakundi Industrial Area, ITPL Road,
Mahadevapura Post, Bangalore- 560048
Ph. +91 80 40614000
Fax: +91 80 40148991

Taiwan

Agilent Technologies Taiwan Limited

No. 20 Gao-shuang Road, Ping-zhen Dist
Tao-Yuan City
32450 Taiwan
Tel: +886 3 4959004
Toll free: 0800 018 768
vpw-customerservice@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

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

Other Countries

Agilent Technologies Italia S.p.A.

Via F.Ili Varian, 54
10040 Leini, (Torino) - Italy
Tel.: +39 011 997 9111
Fax: +39 011 997 9350
Toll-Free: 00 800 234 234 00
vpt-customer-care@agilent.com

Customer Support & Service

NORTH AMERICA:

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

In This Book

The manual describes the following:

- Istruzioni per l'uso
- Bedienungshandbuch
- Notice de mode d'emploi
- Manual de instrucciones
- 用户手册
- ユーザーマニュアル
- Instruction for Use
- Technical information

This information is subject to change without notice.

© Agilent Technologies, Inc. 2026

Agilent Technologies LDA Malaysia
Sdn Bhd Bayan Lepas
Free Industrial Zone 11900 Bayan Lepas,
Penang Malaysia



87-900-937-01

Edition T.00
February 2026