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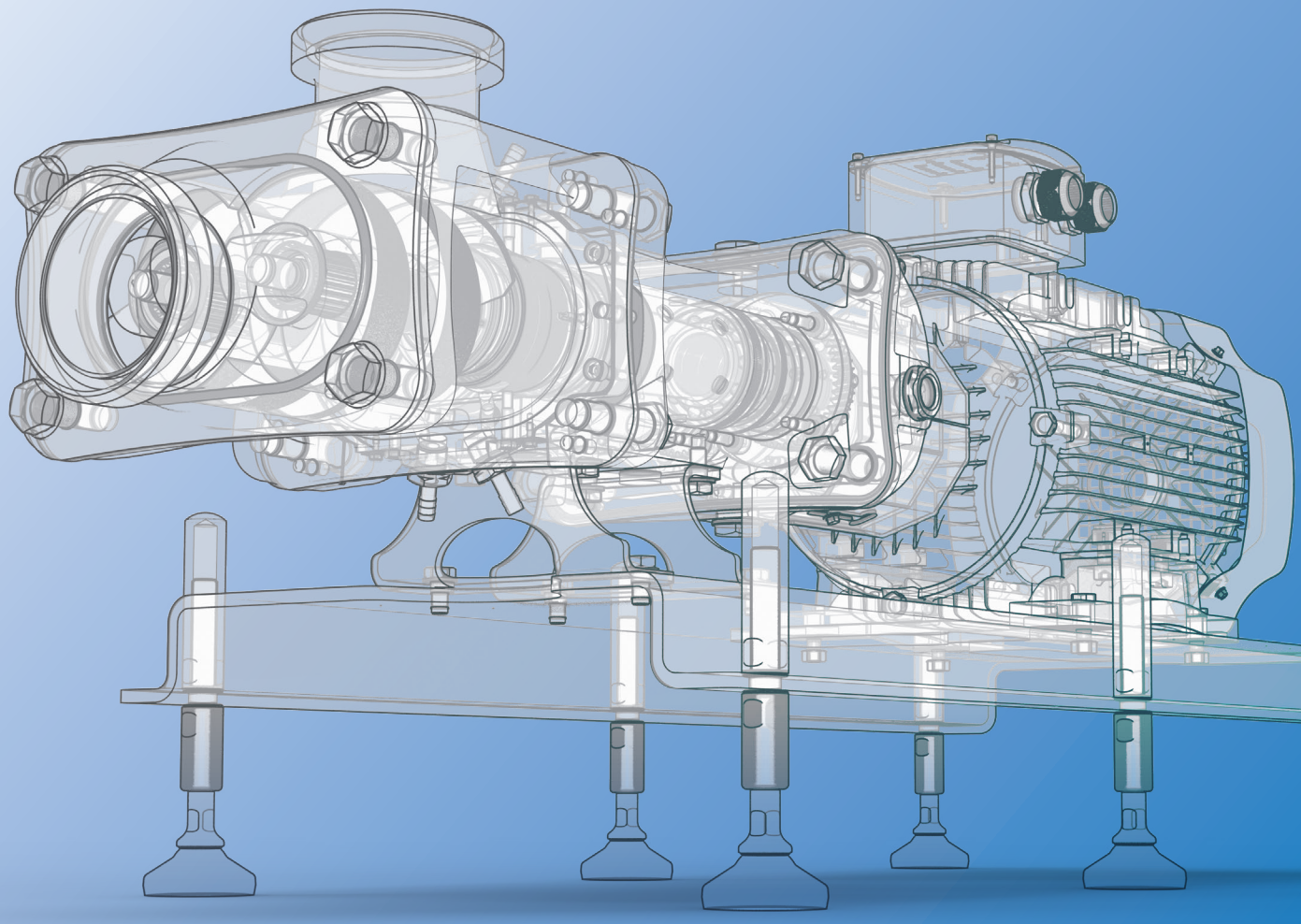
WANGEN PUMPEN



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Operating and assembly instructions

S/N: UP900181

Type: WANGEN Twin NG 70 / 104 /130 3A

Content

Werksbescheinigung gemäß DIN EN 10204 Absatz 2.1

Certificate of compliance with the order according to DIN EN 10204 section 2.1
Attestation de conformité à la commande selon la norme DIN EN 10204 Paragraphe 2.1
Dichiarazione di conformità all'ordine secondo DIN EN 10204 comma 2.1
Fabriekscertificaat conform DIN EN 10204 Paragraaf 2.1

Hiermit bestätigt die Pumpenfabrik Wangen GmbH, dass das Produkt den in der Bestellung genannten Anforderungen entspricht.

- The Pumpenfabrik Wangen hereby confirms that the product is in compliance with the specifications of the order.
- La société Pumpenfabrik Wangen GmbH certifie que la pompe fournie définie ci-dessus est conforme aux conditions spécifiées dans l'ordre.
- La Pumpenfabrik Wangen GmbH conferma che il prodotto soddisfa i requisiti specificati nell'ordine.
- Pumpenfabrik Wangen GmbH bevestigt hiermee dat het product voldoet aan de in de bestelling gespecificeerde eisen.

Produkt	Product / Produit Prodotto / Product	Exzenterschneckenpumpe Progressive cavity pump / Pompe à vis excentrique Pompa a vite eccentrica / Excentrische wormpomp Schraubenspindelpumpe Screw pump / Pompe à broche hélicoïdale / Pompa a vite / Schroefspindelpom
Baureihe	Type series La série La serie Bouwreeks	**..A;** **BD50;** **GL..F, GL..S;** **HYLINE;** **KB..R, KB..S, KB..SK, KB..SL, KB..T;** **KL..R, KL..R BIO-MIX, KL..RF, KL..RL, KL..RQ,** **KL..RS, KL..R Triplex, KL..RÜ;** **KL..S, KL..SL, KL..SK, KL..S BIO-FEED;** **KL..T, KL..T Elephant, KL..TL;** **MX..F, MX..R, MX..RS, MX..S, MX..T;** **Twin NG..; VarioTwin NG..;** **XPRESS..**
Seriennummer	Serial number Numéro de série Numero di serie Serienummer	**P900000-P999999**

Wangen, 17.01.2023/V11

de/en/fr/it/nl

i.V. A. Getze
Dokumentationsbevollmächtigter
Commissioner for Documentation /
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Gevolmachtigde documentatie

Pumpenfabrik Wangen GmbH Simoniusstrasse 17 88239 Wangen im Allgäu Germany
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EG-Konformitätserklärung nach Maschinenrichtlinie 2006/42/EG Anhang IIA

EC Declaration of Conformity according to Machinery Directive 2006/42/EC Annex IIA
Déclaration de conformité CE selon la Directive Machines 2006/42/CE Annexe IIA
Dichiarazione di conformità CE secondo la Direttiva Macchine 2006/42/CE Allegato IIA
EG-conformiteitsverklaring van overeenstemming volgens Machinerichtlijn 2006/42/EG Bijlage IIA

Hiermit erklärt die Pumpenfabrik Wangen GmbH, dass das Produkt den folgenden Normen/ Richtlinien/Verordnungen entspricht - bei Änderung der Maschine verliert diese Erklärung ihre Gültigkeit:

- The Pumpenfabrik Wangen hereby certifies that the product is in accordance with the following guidelines/ directives/regulations - the declaration may not be valid any longer in case of modification:
- Par la présente, la société Pumpenfabrik Wangen GmbH déclare que le produit est conforme aux normes/directives/décrets - en cas de modification de la machine, cette déclaration n'est plus valable.
- La Pumpenfabrik Wangen GmbH dichiara che il prodotto è conforme alle norme/direttive/regolamenti seguenti - questa dichiarazione perde la sua validità se la macchina viene modificata:
- Pumpenfabrik Wangen GmbH verklaart hierbij dat het product voldoet aan de volgende normen/richtlijnen/ voorschriften - deze verklaring verliest haar geldigheid bij wijziging van de machine:

Produkt	Product / Produit Prodotto /Product	Exzenterschneckenpumpe Progressive cavity pump / Pompe à vis excentrique Pompa a vite eccentrica / Excentrische wormpomp Schraubenspindelpumpe Screw pump / Pompe à broche hélicoïdale / Pompa a vite / Schroefspindelpom
Baureihe	Type series La série La serie Bouwreeks	**..A;** **BD50;** **GL..F, GL..S;** **HYLINE;** **KB..S, KB..SL, KB..T;** **KL..S, KL..SL, KL..T, KL..TL;** **MX..F, MX..RS, MX..S, MX..T;** **Twin NG..;** **XPRESS..;**
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- DIN EN ISO 12100:2011-03

Sicherheit von Maschinen - Allgemeine Gestaltungsleitsätze - Risikobeurteilung und Risikominderung

- Safety of machinery - General principles for design - Risk assessment and risk reduction
- Sécurité des machines - Principes généraux de conception - Appréciation du risque
- Sicurezza del macchinario - Principi generali di progettazione - Valutazione e riduzione del rischio
- Veiligheid van machines - Basisbegrippen voor ontwerp - Risicobeoordeling en risicoreductie

- DIN EN 809:2012-10

Pumpen und Pumpenaggregate für Flüssigkeiten - Allgemeine sicherheitstechnische Anforderungen

- Pumps and pump units for liquids - Common safety requirements
- Pompes et groupes motopompes pour liquides – Prescriptions communes de sécurité
- Pompe e gruppi pompa per liquidi - Requisiti generali di sicurezza
- Pompen en pompeenheden voor vloeistoffen - Algemene veiligheidseisen

- Maschinenrichtlinie - Richtlinie 2006/42/EG

des Europäischen Parlaments und des Rates vom 17. Mai 2006 über Maschinen und zur Änderung der Richtlinie 95/16/EG (Neufassung)

- Machinery directive - Directive 2006/42/EC of the European parliament and of the council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast)
- Pour les machines - Directive 2006/42/CE du Parlament Européen et du Conseil du 17 mai 2006 relative aux machines et modifiant la directive 95/16/CE (refonte)
- Direttiva Macchine - Direttiva 2006/42/CE del Parlamento Europeo e del Consiglio del 17 maggio 2006 sulle macchine e sull'emendamento della Direttiva 95/16/CE (nuovo testo)
- Machinerichtlijn - Richtlijn 2006/42/EG van het Europees Parlement en de Raad van 17 mei 2006 betreffende machines en tot wijziging van de Richtlijn 95/16/EG (herziening)

Wangen, 17.01.2023/V11

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UK-Declaration of Conformity
SMR 2008 No. 1597 (as amended)

The Pumpenfabrik Wangen hereby declares under its sole responsibility that the product is in accordance with the following UK statutory instruments - the declaration may not be valid any longer in case of modification:

Health and Safety

The Supply of Machinery (Safety) Regulations 2008

Product	Progressive cavity pump Screw pump
Type series	**..A;** **BD50;** **GL..F, GL..S;** **HYLINE;** **KB..S, KB..SL, KB..T;** **KL..S, KL..SL, KL..T, KL..TL;** **MX..F, MX..RS, MX..S, MX..T;** **Twin NG..;** **XPRESS..;**
Serial number	**P900000-P999999**

The following designated standards were applied:

- SMR 2008 no. 1597

The Supply of Machinery (Safety) Regulations 2008, No. 1597

- EN ISO 12100:2011

Safety of machinery - General principles for design - Risk assessment and risk reduction

- EN 809:2012

Pumps and pump units for liquids - Common safety requirements

Manufacturer's authorised representative:
Samphire Cargo Limited
First Floor Offices, Unit 2 Hollow Wood Road
Dover, Kent, CT17 0UB
United Kingdom

Wangen, 08 September 2022
/V2

i.V. A. Getze
Commissioner for Documentation

Einbauerklärung für unvollständige Maschinen – Maschinenrichtlinie 2006/42/EG Anhang II 1 B

Declaration of Incorporation for partly completed machinery –
Machinery Directive 2006/42/EC Annex II 1 B
Déclaration d'incorporation pour quasi-machines – Directive Machines 2006/42/CE annexe II 1 B
Dichiarazione di incorporazione per quasi-macchine – Direttiva Macchine 2006/42/CE Allegato II 1 B
Inbouwverklaring voor onvolledige machines – Machinerichtlijn 2006/42/EG bijlage II 1 B

Hiermit erklärt die Pumpenfabrik Wangen GmbH, dass die nachstehend bezeichnete unvollständige Maschine in der von uns gelieferten Ausführung, soweit es vom Lieferumfang her möglich ist, folgenden grundlegenden Anforderungen entspricht.

- The Pumpenfabrik Wangen certifies that the following described partly completed machinery in the design delivered by us, to the extent possible by the scope of delivery, complies with the following basic requirements.
- Pumpenfabrik Wangen GmbH déclare par la présente que la quasi-machine désignée ci-après est conforme aux exigences essentielles suivantes dans sa version livrée par nos soins, dans la mesure où le volume de la livraison le permet.
- La Pumpenfabrik Wangen GmbH dichiara che la quasi-macchina descritta qui di seguito nella versione da noi fornita è conforme ai seguenti requisiti essenziali, nella misura in cui ciò sia possibile in base alla fornitura.
- Hierbij verklaart Pumpenfabrik Wangen GmbH dat de hierna aangeduide onvolledige machine in de door ons geleverde uitvoering, voor zover het qua leveringsomvang mogelijk is, aan de volgende fundamentele eisen voldoet.

Produkt	Product / Produit Prodotto /Product	Exzenterschneckenpumpe Progressive cavity pump / Pompe à vis excentrique Pompa a vite eccentrica / Excentrische wormpomp Schraubenspindelpumpe Screw pump / Pompe à broche hélicoïdale / Pompa a vite / Schroefspindelpom
Baureihe	Type series La série La serie Bouwreeks	**..A;** **BD50;** **GL..F, GL..S;** **HYLINE;** **KB..R, KB..S, KB..SK, KB..SL, KB..T;** **KL..R, KL..R BIO-MIX, KL..RF, KL..RL, KL..RQ,** **KL..RS, KL..R Triplex, KL..RÜ;** **KL..S, KL..SL, KL..SK, KL..S BIO-FEED;** **KL..T, KL..T Elephant, KL..TL;** **MX..F, MX..R, MX..RS, MX..S, MX..T;** **Twin NG..; VarioTwin NG..;** **XPRESS..;**
Seriennummer	Serial number Numéro de série Numero di serie Serienummer	**P900000-P999999**

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Folgende grundlegende Sicherheits- und Gesundheitsschutzanforderungen nach Anhang I der Maschinenrichtlinie 2006/42/EG sind angewandt und eingehalten:

- The following basics safety and sanitary requirements pursuant to Annex I of the Machinery Directive 2006/42/EC are implemented and adhered to:
- Les exigences de sécurité et de santé de base suivantes ont été appliquées et sont respectées conformément à l'annexe I de la directive relative aux machines 2006/42/CE :
- I seguenti requisiti base di sicurezza e salute secondo l'allegato I della direttiva macchine 2006/42/CE sono applicati e rispettati:
- De volgende fundamentele veiligheids- en gezondheidsvereisten conform bijlage I van de Machinerichtlijn 2006/42/EG zijn toegepast en in acht genomen:

- Artikel 1.1.2: Grundsätze für die Integration der Sicherheit/
  - Article 1.1.2 Principles of safety integration
  - Artikel 1.1.2 : Principes d'intégration de la sécurité
  - Articolo 1.1.2: Principi per l'integrazione della sicurezza
  - Artikel 1.1.2: Principes voor de integratie van de veiligheid
- Artikel 1.1.3: Materialien und Produkte/
  - Article 1.1.3 Materials and products
  - Artikel 1.1.3 : Matériaux et produits
  - Articolo 1.1.3: Materiali e prodotti
  - Artikel 1.1.3: Materialen en producten
- Artikel 1.1.5: Konstruktion der Maschine im Hinblick auf die Handhabung/
  - Article 1.1.5 Design of machinery to facilitate its handling
  - Artikel 1.1.5 : Conception de la machine en vue de sa manutention
  - Articolo 1.1.5: Costruzione della macchina in merito all'utilizzo
  - Artikel 1.1.5: Constructie van de machine met het oog op de bediening
- Artikel 1.3.1: Risiko des Verlusts der Standsicherheit/
  - Article 1.3.1 Risk of loss of stability
  - Artikel 1.3.1 : Risque de perte de stabilité
  - Articolo 1.3.1: Rischio di perdita della stabilità
  - Artikel 1.3.1: Risico van het verlies van de stabiliteit
- Artikel 1.3.2: Bruchrisiko beim Betrieb/
  - Article 1.3.2 Risk of break-up during operation
  - Artikel 1.3.2 : Risque de rupture en service
  - Articolo 1.3.2: Rischio di rottura durante il funzionamento
  - Artikel 1.3.2: Breekrisico bij de werking
- Artikel 1.3.4: Risiken durch Oberflächen, Kanten und Ecken/
  - Article 1.3.4 Risks due to surfaces, edges or angles
  - Artikel 1.3.4 : Risques dus aux surfaces, aux arêtes ou aux angles
  - Articolo 1.3.4: Rischi dovuti a superfici, bordi e angoli
  - Artikel 1.3.4: Risico's door oppervlakken, randen en hoeken
- Artikel 1.5.8: Lärm/
  - Article 1.5.8 Noise
  - Artikel 1.5.8 : Bruit
  - Articolo 1.5.8: Rumore
  - Artikel 1.5.8: Geluid
- Artikel 1.5.9: Vibrationen
  - Article 1.5.9 Vibrations
  - Artikel 1.5.9 : Vibrations
  - Articolo 1.5.9: Vibrazioni
  - Artikel1.5.9: Trillingen

- Artikel 1.6: Instandhaltung
  - Article 1.6 Maintenance
  - Artikel 1.6 : Entretien
  - Articolo 1.6: Riparazione
  - Artikel 1.6: Onderhoud
- Artikel 1.7.1: Informationen und Warnhinweise an der Maschine/
  - Article 1.7.1 Information and warnings on the machinery
  - Artikel 1.7.1 : Informations et avertissements sur la machine
  - Articolo 1.7.1: Informazioni e avvertenze sulla macchina
  - Artikel 1.7.1: Informatie en waarschuwingen op de machine/
- Artikel 1.7.3: Kennzeichnung der Maschinen/
  - Article 1.7.3 Marking of machinery
  - Artikel 1.7.3 : Marquage des machines
  - Articolo 1.7.3: Marcatura delle macchine
  - Artikel 1.7.3: Markering van de machine

Die Pumpenfabrik Wangen GmbH weist ausdrücklich darauf hin, dass Restrisiken durch bewegliche Teile an Pumpen bestehen können (gem. Anhang I, Artikel 1.3.7 der Maschinenrichtlinie). Der Kunde ist dafür verantwortlich, die Restrisiken zu minimieren oder vollständig zu beseitigen.

- The Pumpenfabrik Wangen GmbH expressly points out that there can be residual risks by moving parts of pumps (according to Annex I, Article 1.3.7 of the Machinery Directive). The customer is responsible to minimize the residual risks or to eliminate entirely.
- Pumpenfabrik Wangen GmbH déclare ici explicitement que des risques résiduels peuvent exister liés aux pièces mobiles sur les pompes (conformément à l'annexe I, Artikel 1.3.7 de la directive relative aux machines). Il relève de la responsabilité du client de minimiser ou d'éliminer complètement ces risques résiduels.
- La Pumpenfabrik Wangen GmbH dichiara espressamente che possono esistere rischi residui a causa di parti mobili sulle pompe (secondo l'allegato I, articolo 1.3.7 della direttiva macchine).
- Il cliente è responsabile di ridurre al minimo o eliminare completamente i rischi residui.
- Pumpenfabrik Wangen GmbH wijst er uitdrukkelijk op dat er restrisico's kunnen bestaan door bewegende delen aan pompen (cf. bijlage I, artikel 1.3.7 van de Machinerichtlijn).
- De klant is verantwoordelijk voor het minimaliseren van de restrisico's of deze volledig te verhelpen.

Zu beachten sind dabei folgende Normen:

- The following standards must be observed
- Il faut alors observer les normes suivantes:
- Le seguenti norme devono essere altresì rispettate:
- Daarbij moeten de volgende normen in acht worden genomen:

- DIN EN ISO 14120:2016-05
  Sicherheit von Maschinen - Trennende Schutzeinrichtungen - Allgemeine Anforderungen an Gestaltung und Bau von feststehenden und beweglichen trennenden Schutzeinrichtungen (ISO 14120:2015)
  - Safety of machinery - Guards - General requirements for the design and construction of fixed and movable guards (ISO 14120:2015)
  - Sécurité des machines – Protecteurs – Prescriptions générales pour la conception et la construction des protecteurs fixes et mobiles (ISO 14120:2015)
  - Sicurezza del macchinario - Ripari - Requisiti generali per la progettazione e la costruzione di ripari fissi e mobili (ISO 14120:2015)
  - Veiligheid van machines - Afschermingen - Algemene eisen aan vormgeving en bouw van vaststaande en beweegbare afschermingen (ISO 14120:2015)

- DIN EN ISO 13857:2008-06
  Sicherheit von Maschinen - Sicherheitsabstände gegen das Erreichen von Gefährdungsbereichen mit den oberen und unteren Gliedmaßen (ISO 13857:2008)
  - Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)
  - Sécurité des machines - Distances de sécurité empêchant les membres supérieurs et inférieurs d'atteindre les zones dangereuses (ISO 13857:2008)
  - Sicurezza del macchinario - Distanze di sicurezza per impedire il raggiungimento di zone pericolose con gli arti superiori e inferiori (ISO 13857:2008)
  - Veiligheid van machines - Veiligheidsafstanden tegen het bereiken van risicogebieden met de bovenste en onderste ledematen (ISO 13857:2008)

Die unvollständige Maschine (Pumpe) ist nur dazu bestimmt, in andere Maschinen (auch gebrauchte) oder in andere unvollständige Maschinen oder Ausrüstungen eingebaut oder mit ihnen zusammengefügt zu werden, um zusammen mit ihnen eine Maschine im Sinne der Maschinenrichtlinie zu bilden.

- The partly completed machinery (pump) is only intended to be incorporated into or assembled with other machinery (also used ones) or other partly completed machinery or equipment, thereby forming machinery to which this Directive applies.
- La quasi-machine (pompe) est uniquement destinée à être incorporée ou assemblée à d'autres machines (même d'occasion) ou à d'autres quasi-machines ou équipements en vue de constituer une machine à laquelle la directive relative aux machines s'applique.
- La quasi-macchina (pompa) è destinata solo ad essere incorporata in o assemblata con altre macchine (anche usate) o altre quasi-macchine o attrezzature, al fine di formare una macchina ai sensi della direttiva macchine.
- De onvolledige machine (pomp) is uitsluitend ervoor bestemd om in andere machines (ook gebruikte) of in andere onvolledige machines of uitrustingen ingebouwd of daarmee samengevoegd te worden, om samen daarmee een machine in de zin van de Machinerichtlijn te vormen.

Die Pumpenfabrik Wangen GmbH erklärt, dass für diese unvollständige Maschine die speziellen technischen Unterlagen nach Anhang VII B erstellt wurden und verpflichtet sich, diese auf Verlangen den Aufsichtsbehörden digital zu übermitteln. Die Inbetriebnahme der unvollständigen Maschine wird solange untersagt, bis sie in eine Maschine eingebaut wurde und die gesamte Maschine der Maschinenrichtlinie 2006/42/EG entspricht.

- The Pumpenfabrik Wangen certifies that the special technical documentation for this partly completed machinery pursuant to Annex VII B has been prepared and agrees to transfer it digitally when requested to do so by oversight authorities. Initial operation of the partly completed machinery is prohibited until it is installed in another machinery and the entire machinery complies with the Machinery Directive 2006/42/EC.
- Pumpenfabrik Wangen GmbH déclare que les documents techniques spéciaux ont été créés pour cette quasi-machine selon l'annexe II B et s'engage à les transmettre sous forme numérique aux autorités de contrôle sur demande. La mise en service de la quasi-machine est interdite tant qu'elle n'a pas été intégrée dans une machine et que l'ensemble de la machine ne répond pas à la directive relative aux machines 2006/42/CE.
- La Pumpenfabrik Wangen GmbH dichiara che la documentazione tecnica speciale ai sensi dell'allegato VII B è stata preparata per questa quasi-macchina e si impegna a trasmetterla digitalmente alle autorità di controllo su richiesta. La messa in funzione della quasi-macchina è vietata fino a quando non è stata incorporata in una macchina e l'intera macchina non è conforme alla direttiva macchine 2006/42/CE.
- Pumpenfabrik Wangen GmbH verklaart dat de speciale technische documentatie voor deze onvolledige machine conform bijlage VII B is opgemaakt en verplicht zich ertoe om deze op verzoek digitaal aan de toezichthoudende autoriteiten te doen toekomen. De inbedrijfstelling van de onvolledige machine wordt zolang verboden, totdat deze in een machine is ingebouwd en de complete machine aan de Machinerichtlijn 2006/42/EG voldoet.

Weiterhin erklärt die Pumpenfabrik Wangen GmbH, dass das Produkt den folgenden Normen/Richtlinien/Verordnungen entspricht - bei Änderung der Maschine verliert diese Erklärung ihre Gültigkeit:

- Furthermore, the Pumpenfabrik Wangen certifies that the product is in accordance with the following guidelines/directives/regulations - the declaration may not be valid any longer in case of modification:
- Par ailleurs, Pumpenfabrik Wangen GmbH déclare par la présente que le produit répond aux normes/directives/ordonnances - en cas de modification de la machine, cette déclaration perd sa validité :
- La Pumpenfabrik Wangen GmbH dichiara inoltre che il prodotto è conforme alle norme/direttive/regolamenti seguenti - questa dichiarazione perde la sua validità se la macchina viene modificata:
- Pumpenfabrik Wangen GmbH verklaart verder dat het product voldoet aan de volgende normen/richtlijnen/voorschriften - deze verklaring verliest zijn geldigheid bij wijziging van de machine:

- DIN EN ISO 12100:2011-03
  Sicherheit von Maschinen - Allgemeine Gestaltungsleitsätze - Risikobeurteilung und Risikominderung
  - Safety of machinery - General principles for design - Risk assessment and risk reduction
  - Sécurité des machines - Principes généraux de conception - Appréciation du risque
  - Sicurezza del macchinario - Principi generali di progettazione - Valutazione e riduzione del rischio
  - Veiligheid van machines - Basisbegrippen voor ontwerp - Risicobeoordeling en risicoreductie

- DIN EN 809:2012-10
  Pumpen und Pumpenaggregate für Flüssigkeiten - Allgemeine sicherheitstechnische Anforderungen
  - Pumps and pump units for liquids - Common safety requirements
  - Pompes et groupes motopompes pour liquides – Prescriptions communes de sécurité
  - Pompe e gruppi pompa per liquidi - Requisiti generali di sicurezza
  - Pompen en pompeenheden voor vloeistoffen - Algemene veiligheidseisen

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UK-Declaration of Conformity
SMR 2008 No. 1597 (as amended)
Annex II B: Declaration of Incorporation of partly completed machinery

The Pumpenfabrik Wangen GmbH declares under its sole responsibility that the following described partly completed machinery in the design delivered by us, to the extent possible by the scope of delivery, complies with the following basic requirements.

Product	Progressive cavity pump Screw pump
Type series	**..A;** **BD50;** **GL..F, GL..S;** **HYLINE;** **KB..R, KB..S, KB..SK, KB..SL, KB..T;** **KL..R, KL..R BIO-MIX, KL..RF, KL..RL, KL..RQ, KL..RS, KL..R Triplex, KL..RÜ;** **KL..S, KL..SL, KL..SK, KL..S BIO-FEED;** **KL..T, KL..T Elephant, KL..TL;** **MX..F, MX..R, MX..RS, MX..S, MX..T;** **Twin NG..; VarioTwin NG..;** **XPRESS..;**
Serial number	**P900000-P999999**

The following basics safety and sanitary requirements pursuant to Annex I of the Supply of Machinery (Safety) Regulations 2008 are implemented and adhered to:

- Article 1.1.2: Principles of safety integration
- Article 1.1.3: Materials and products
- Article 1.1.5: Design of machinery to facilitate its handling
- Article 1.3.1: Risk of loss of stability
- Article 1.3.2: Risk of break-up during operation
- Article 1.3.4: Risks due to surfaces, edges or angles
- Article 1.5.8: Noise
- Article 1.5.9: Vibrations
- Article 1.6: Maintenance
- Article 1.7.1: Information and warnings on the machinery
- Article 1.7.3: Marking of machinery

Pumpenfabrik Wangen GmbH Simoniusstrasse 17 88239 Wangen im Allgäu Germany
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The Pumpenfabrik Wangen GmbH expressly points out that there can be residual risks by moving parts of pumps (according to Annex I, Article 1.3.7 of the Supply of Machinery (Safety) Regulations 2008). The customer is responsible to minimize the residual risks or to eliminate entirely.

Please note: the following standards must be observed:

- BS EN ISO 14120:2015

Safety of machinery - Guards - General requirements for the design and construction of fixed and movable guards

- BS EN ISO 13857:2008

Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs. The partly completed machinery (pump) is only intended to be incorporated into or assembled with other machinery (also used ones) or other partly completed machinery or equipment, thereby forming machinery to which this Directive applies.

The Pumpenfabrik Wangen GmbH certifies that the special technical documentation for this partly completed machinery pursuant to Annex VII B has been prepared and agrees to transfer it digitally when requested to do so by oversight authorities. Initial operation of the partly completed machinery is prohibited until it is installed in another machinery and the entire machinery complies with the Supply of Machinery (Safety) Regulations 2008.

Furthermore, the Pumpenfabrik Wangen GmbH certifies that the product is in accordance with the following guidelines/directives/regulations – the declaration may not be valid any longer in case of modification:

- BS EN ISO 12100:2010

Safety of machinery - General principles for design - Risk assessment and risk reduction

- EN 809:2012-10

Pumps and pump units for liquids - Common safety requirements

Manufacturer's authorised representative:
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Wangen, 08 September 2022
/V2

i.V. A. Getze
Commissioner for Documentation

Table of Contents

Annex

1. About this assembly and operating manual

This operating manual[1] is a part of the pump.

- Keep this operating manual safely during the pump's service life
- Ensure that this operating manual can always be accessed by your operating and maintenance personnel
- Pass on this operating manual and declarations of conformity as well as any other certificates to any subsequent owner or user of this pump
- Always update this operating manual with each supplement received from the manufacturer

The original operating or original assembly instructions are in German. Operating or assembly instructions that are not in German are translations of the original text. If there are doubts about the correctness of the translation, then the original German assembly or operating instructions are the authoritative instructions.

1.1 Warnings

Warnings are used in this operating manual to warn you about the risk of personal injuries or damaging the equipment.

- Always read and abide by these warnings
- Follow all actions marked with a warning symbol and a warning word

Warning symbols and warning words	Meaning	Consequences if ignored
⚠ **DANGER!**	Dangerous to people: Imminent danger	Death or severe personal injuries
⚠ **WARNING**	Dangerous to people: Potentially dangerous situation	Death or severe personal injuries
⚠ **BEWARE!**	Dangerous to people: Potentially dangerous situation	Minor bodily injuries
TAKE NOTE!	Possible equipment damage	Equipment damage

Tab. 1.1: Warnings

1 This operating manual refers to the: Assembly and operating instructions

1.2 Symbols and indicators

Symbol	Meaning
▫	Bullet point, not included in a specific sequence
▶	Activity consisting of several steps, but not in a specific sequence
1. **2. ..**	Activity consisting of several steps to be completed in a specific sequence
	Useful hint, makes the activity easier
☑	Activity completed – condition for the following activity
	Information to be especially adhered to for pumps certified under the 3-A standard

Tab. 1.2: Symbols and indicators

1.3 Abbreviations

Abbreviation	Meaning
Bh	Operating hours
CIP	Cleaning In Place
COP	Cleaning Out of Place
cST	Centistokes
dH	German hardness
EPDM	Elastomer material: Ethylene propylene diene (monomer) rubber
FKM	Elastomer material: Fluoro rubber
NBR	Acrylonitrile butadiene rubber
SIP	Sterilization In Place

Tab. 1.3: Abbreviations list

1.4 Accompanying documents

The following additional documents are – where applicable – an integral part of this operating manual (see Tab. 1.4):

Document	Description/Content
Technical data sheet	Technical data, performance and operating limits, operating conditions
Dimensions sheet	Dimensional pump drawing with attachment points

Certificates	▫ Declaration of Conformity / Incorporation
	▫ UKCA
	▫ ATEX/UKEX
	▫ Test certificates as per DIN EN10204:
	  ▫ Manufacturer's certificate 2.1
	  ▫ Manufacturer's certificate 2.2 (optional)
	  ▫ Acceptance test certificates 3.1 / 3.2 (optional)
	▫ Food certification according to 1935/2004/EU or FDA (optional)

Accessories documentation	Assembly/operating instructions for the accessories (optional)
Drive documentation	Assembly/operating instructions for the drive (optional)
Decontamination declaration	Sending the pump for repair (upon request)

Tab. 1.4: Accompanying documents

2. Safety instructions

The pump is designed to be safe and it does not pose a hazard if used as intended. Nevertheless, ignoring the operating instructions might result in danger to personnel or equipment damage.

- ▶ Only use the pump for its intended purpose and if it is in perfect technical condition
- ▶ Only use the pump with its safety devices fitted
- ▶ Abide by the limit values and all other specifications as per the technical data sheet
- ▶ Stop the pump immediately and eliminate the problem in the event of malfunctions or operating changes
- ▶ Carry out all specified cleaning and maintenance activities

2.1 Intended use

The pump is intended for the following uses:

- ▫ Use in these commercial sectors:
  - ▫ Food industry (food, beverage, dairy)
  - ▫ Cosmetics
  - ▫ Chemicals
  - ▫ Pharmaceutics
- ▫ Conveying the pumped media specified in the technical data sheet
- ▫ Operating within the operating points (temperature, flow rate, direction of flow, pressure, speed, viscosity) specified in the technical data sheet
- ▫ 3-A certified pump must only be operated with a single-acting mechanical seal
- ▫ An EHEDG certified pump may be operated with a single-acting or a double-acting mechanical seal

Changing the pumping conditions (e.g. flow rate, conveying path, flow direction, pressure level, pipe diameter, throttling devices, etc.) might result in greatly changed operating conditions.

1. If the pumping conditions were changed, you should compare the new operating conditions with the specifications listed in the technical data sheet
2. Contact the manufacturer if the changed conditions go beyond the information given in the technical data sheet

The storage tank is used solely as a non-pressurized quench medium storage tank.
The sealing pressure tank acts solely as a pressurized quench medium storage tank.

2.2 Foreseeable misuse

The following usage is **not** allowed:

- ▫ Changing the specified pumped medium (see technical data sheet) without prior consultation with Pumpenfabrik Wangen GmbH.
- ▫ Carrying out service work during pump operation – especially loosening screw connections for the coupling protector, pipe connections, etc.
- ▫ Operating the pump without guards and covers fitted – the pump must be properly installed and fully functional
- ▫ Using the pump as a climbing aid or loading objects on it
- ▫ When stopped: Using it as a shut-off device
- ▫ Operating it against closed pressure lines
- ▫ Fitting double-acting mechanical seals in 3-A certified pumps
- ▫ Use in potentially explosive areas – unless the manufacturer has approved the device and marked it as Ex on the nameplate

- Exceeding the 12 bar pressure limit when changing the medium's pumping direction (conveying against the cover or left/right pump rotation) without prior consultation with the manufacturer

2.3 Noise emissions

The rated continuous sound pressure level is usually < 70 dB(A). Drive and piping are not included here. Cavitation-free operation and correct pump fastening are assumed.

2.4 Personnel qualifications and operating phases

2.4.1 Special requirements

Activities	Required personnel qualifications
Mechanical work:	
▫ Design ▫ Mechanical installation ▫ Starting and stopping ▫ Troubleshooting ▫ Repairs ▫ Service	▫ Trained mechanics specialist ▫ Familiar with the mechanical activities involved in each operating phase ▫ Knows this operating manual ▫ Trained by Pumpenfabrik Wangen GmbH ▫ For fitting a shaft seal: In-depth shaft sealing knowledge
Electro-technical work:	
▫ Installation ▫ Starting and stopping ▫ Troubleshooting ▫ Repairs	▫ Qualified electrician, e.g. electrician or mechatronics technician ▫ Knows this operating manual ▫ Familiar with the electrical work on the pump ▫ Trained by Pumpenfabrik Wangen GmbH
All other work:	
▫ Transport ▫ Storage ▫ Operation ▫ Operating ▫ Cleaning ▫ Disposal	▫ Instructed by a responsible person from the operating company ▫ Knows this operating manual

Tab. 2.1: Special requirements

2.4.2 Basic requirements

- ▶ Ensure that the following basic requirements for personnel are met:
  - Personnel have been instructed with regard to the operating instructions
  - Minimum age is 16 years
  - Young people or trainees must always be supervised by a qualified person when working

2.5 Personal protective equipment

The following personal protective equipment is required:

- Safety goggles
- Protective gloves
- Safety shoes
- Protective clothing

2.6 Conversions, modifications and spare parts

Unauthorized modifications to the pump or unsuitable spare parts are a safety hazard. Serious or even fatal injuries might occur during all operating phases.

- ▶ Never convert or modify the pump without first consulting the manufacturer
- ▶ Only use original spare parts from the manufacturer

2.7 Residual risks

2.7.1 Rotating and moving machine parts

There is a risk of limbs being pulled in, crushed or even sheared when working on the pump. The risk is especially high if the pump has stopped due to a fault and it starts up again unexpectedly after the fault has been rectified. Typical faults include electromagnetic interference, voltage surges in the power supply or a power failure.
This might result in serious or even fatal injuries.

- ▶ Before starting any cleaning, repair or service work on the pump:
  - ▶ Switch off the pump
  - ▶ Disconnect the drive or controller from the power supply
  - ▶ Secure the drive or controller with a padlock against unauthorized switching back on
  - ▶ Depressurize the system
  - ▶ Only use a suitable tool to remove the protective cover over the drive components
- ▶ Refit all of the safety devices after you have finished working on the pump

2.7.2 Pressurized pump

There is a risk that parts of the system will burst if the entire system (pipeline, flange or sealing pressure tank, etc.) is not designed for the corresponding pump pressure during operation. This might result in severe injuries or even death.

- The internal pressures in the Twin NG 70, 104 and 130 models must be as follows:
  - 20 bar maximum during continuous operation
  - 25 bar maximum during brief operation
- There are other pressure limits for all models that depend on the connecting pieces/flanges being used
  - ▶ Note the standard specified for the connection pieces/flanges in the technical data sheet

- The piping and flanges must be dimensioned for the corresponding pressure:
  - Ensure that the pumping pressure listed in the technical data sheet is not exceeded with regard to the pipeline's pressure resistance.
  - For example, when using a sealing pressure tank approved for 25 bar pressure, the pump's maximum operating pressure can be 23 – 24 bar (see Chapter 5.13.2)

2.7.3 Pressurized hot/dangerous liquids

The pumped medium inside the pump and the quench medium can be under pressure during operation. In particular, the pressure can be up to 25 bar, but this depends on the sealing pressure tank being used. Incorrect handling might result in pumped medium or quenching medium spraying out and causing serious or fatal injuries.

Possible danger sources:

- Risk of pipes and flanges that were not designed for the pressure bursting.
- Incorrectly connected pipelines
- Pump running against closed shut-off devices. The built up pressure can be a multiple of the permitted system pressure
- Working on the pump when the pump is still pressurized
- Hose lines bursting due to pressure pulses

Risk prevention:

- Ensure that the system is rated for the appropriate pressure
- Provide an overpressure protection device
- Ensure that the pumping pressure as per the technical data sheet is not exceeded
- Only qualified personnel are allowed to connect up the pipelines
- Before switching on the pump:
  - Connect all processing connections correctly
  - Wear safety goggles
- Ensure that the pump will not be running against closed shut-off devices
- Before starting any cleaning, repair or service work on the pump or the sealing pressure tank:
  - Switch off the pump
  - Depressurize the system
  - Leave the pump to cool down
  - In the event of a fault: empty the pump if possible
- When troubleshooting: Always check the system before restarting

2.7.4 Live electrical parts

The risk of an electric shock always exists if you touch live parts.

- Only a qualified electrician is allowed to connect up the pump
- Ensure that no voltage is present before making the electrical connection
- Ensure that the circuit information on the motor's nameplate matches the circuit diagram in the terminal box
- Before starting any cleaning, repair or service work on the pump:
  - Switch off the pump
  - Secure the drive or controller with a padlock against unauthorized switching back on
- Provide an EMERGENCY STOP device to be able to stop the pump in dangerous situations

2.7.5 Manipulating the safety devices

Manipulating the safety devices is a safety risk. Serious or even fatal injuries might occur during all operating phases.

- Ensure that the pump will only be operated with the safety devices fitted
- Never modify the safety devices
- Inform your supervisor if you suspect that the safety devices have been manipulated
- Never use spare controls or spare keys

2.7.6 Suspended loads during transport

Incorrect transport might cause the pump to tip over or drop down. The risk is intensified if the drive unit makes the pump top-heavy. Personnel might be crushed or hit by the falling load. This might result in serious or even fatal injuries.

- Note the pump's center of gravity and maximum weight
- Use suitable lifting equipment to lift and transport the pump
- Only use suitable slings with sufficient load-bearing capacity
- Only suspend the pump from the provided lifting points
  - Do not lift the pump solely by the ring bolts of the drive unit/pump housing
    - These suspension points are only intended for the motor and/or gears or pump housing
- The pump must always be transported in a horizontal position
- Never stand underneath a suspended load
- Never stand between fixed objects (floor/wall) and the suspended pump
- Ensure that there are no other people in the danger area

2.7.7 Danger of being crushed

Certain pump components are very heavy. A danger of being crushed exists when assembling or dismantling the pump.

- Always wear protective gloves during troubleshooting, service or repair work
- Note the weight of the separate components
- Use suitable tools
- Use suitable supports to put the pump and drive down on

2.7.8 Hot surfaces

The pump can become hot due to dry running or unfavorable conditions. The risk of being burnt exists if you touch its surface.

- Avoid unfavorable conditions: In particular you must ensure adequate cooling and lubrication, compliance with the permitted speed range as well as adequate ventilation
- Ensure that there is a permanent pumped medium supply
- Switch off the pump and allow it to cool down before touching it
- Touch hot surfaces only if you are wearing protective gloves

2.7.9 Slippery surfaces caused by leaks

Leaks in seals, e.g. in mechanical seals, gear oil, quench medium or leaking lines can cause slippery surfaces. People might slip over and injure themselves. Take the following measures in the event of leaks:

- Eliminate the leaks
- Replace any defective seals
- Wipe up any spilled liquid immediately and dispose of it correctly

2.7.10 Pumps with a heating jacket: Exceeding the nominal pressure

Hot water vapor might escape if the permitted nominal pressure is exceeded in pumps with heating jackets. Personnel might be burned.

- ▶ Use suitable pressure limiting devices
- ▶ Ensure that the overpressure can be released safely through the depressurizing opening if the pressure limiting device activates
- ▶ Never install any shut-off devices in the release opening area
- ▶ Operate the heating/cooling circuit solely with water. Never exceed the heating jacket casing's permitted nominal pressure
  - ▫ The housing is normally designed for an overpressure of 6 bar
- ▶ Always wear safety goggles during start-up

2.7.11 Sharp-edged components and foreign objects

The risk of being cut exists when working on the pump.

Possible danger sources:

- ▫ Remove any sharp-edged foreign bodies found on the screw spindle.
- ▫ Sharp-edged components during pump assembly/dismantling

Risk prevention

- ▶ Always wear protective gloves during troubleshooting, service or repair work

2.7.12 Dangerous substances

Cleaning agents can cause caustic or irritating effects, depending on the concentration being used. This can result in serious eye and skin injuries. Contact between the pumped medium and unsuitable gear oil or unsuitable quenching medium can damage your health.

- ▶ Abide by the instructions given in the safety data sheets for the cleaning agents being used
- ▶ Wear suitable protective clothing, protective gloves and protective goggles when cleaning
- ▶ Only use gear oil and a quenching medium that has been approved for use in the food industry

2.7.13 High temperatures during the cleaning process

When cleaning the pump or cleaning the pump's separate components, the cleaning solution being used (e.g. water; water with cleaning agents) can have high temperatures. In general, cleaning at higher temperatures ($50 < x < 100$ °C) gives better results than at lower temperatures. Higher temperatures are used when using cleaning machines for industrial parts or when cleaning specific components manually.

There is a risk of being burnt or scalded if you come into contact with hot liquids or vapor.

Risk prevention:

- ▶ Wear personal protective equipment
- ▶ Wear suitable heat-protection gloves for the cleaning
- ▶ If high temperatures are not needed: Reduce the temperature in the cleaning bath

2.8 Danger to equipment

2.8.1 Fat

Fat causes the EPDM material in a mechanical seals and seals to swell. This can cause equipment damage.
Pumped media containing fat can cause the EPDM material to swell, depending on the fat concentration and the temperature. EPDM swells even at low temperatures in a very fatty environment. The resistance of the sealing materials can no longer be guaranteed.

- ▶ Ensure that the milk fat content in the pumped medium never exceeds 8 %

2.8.2 Acidic and alkaline cleaning agents

Acidic and basic cleaning agents cause the FKM material to swell in mechanical seals and seal rings. This can cause equipment damage.

- ▶ For pumps with seal rings and mechanical seals made from FKM: Ensure that acidic and alkaline cleaning agents never exceed a maximum concentration of 3 %.

2.8.3 Aggressive materials

Aggressive liquids, oils and the effects of ozone change the physical properties of the elastomer star in the coupling.

- ▶ Protect the elastomer from external effects caused by aggressive substances
- ▶ Fit the coupling guard correctly

2.8.4 Unsuitable lubricants

The pump can be damaged by unsuitable lubricants.

- ▶ Do not mix gear oils with different properties and/or those from different manufacturers
- ▶ Never mix mineral and synthetic gear oils
- ▶ Use only gear oil and lubricants approved for use in the food industry:
  - FDA (21CFR178.3570)
  - NSF-H1 / USDA_H1 / INS-H1

2.8.5 Mechanical risks

Mechanical risks such as excessive force, torques, pressures or vibrations can damage the pump, heating jacket casing, gears, coupling and seals.

The following danger sources are also critical:

- Incorrect lifting during transport
- Unsuitable foundations (e.g. cracks)
- Coupling aligned deficiently, e.g. after maintenance or servicing work
- Incorrect alignment, mounting and pump assembly, articulated foot, components and pipelines.
- Using the pump as a climbing aid (especially the coupling protection) or loading objects on it
- Wrong rotational direction
- Exceeding the permitted speed
- Constantly alternating load (change of rotational direction and starting-up under increased torque)
- Dirt and scratches on shaft seal rings, shaft seals and bearings
- Excessive pressure – excessive pressures can occur in the following situations:
  - Static internal pressure >25 bar Twin NG 70 and Twin NG 104
  - Static internal pressure >20 bar Twin NG 130
  - Pressures from the system – in which the pump is integrated – that act on the pump
  - Pressures > 12 bar against the cover when the medium is being pumped in the flow direction or when the pump is running clockwise/counterclockwise see Chapter 6
- Pumped medium or quench medium pressure is too high
- Grain sizes and the proportion of solids in the pumped medium is too large

- Pumps with a heating jacket: Heating circuit pressure is too high
- Vapor or gas bubbles can form in the sealing chamber if the speed is too fast
  - Bubbles will settle in front of the gap in the mechanical seal and block access by the quenching medium
  - The mechanical seal has been damaged due to a lack of lubrication and cooling

2.8.6 Avoiding damage during assembly/mounting/installation

- ▶ Ensure that the foundations meet all the requirements listed in this operating manual
- ▶ Ensure that the pump is correctly secured in accordance with this operating manual
- ▶ For pumps with a mobile stand: Ensure that its position does not change
- ▶ Assemble the pipelines free of any forces and torques and do not support them on the pump
- ▶ Note the correct nozzle orientation
- Double-acting mechanical seals:
  - ▶ Connect the mechanical seal to the storage/sealing pressure tank
  - ▶ Use a suitable quench medium
  - ▶ Ensure that there is a quench medium supply available
  - ▶ Vent the sealing chamber
  - ▶ Ensure that the shaft seals on the product and atmosphere sides are lubricated with the quenching medium
- When using storage/sealing pressure tanks:
  - ▶ Route the supply and return lines so that they drop or rise continuously. In particular, you must ensure that **no** kinks form in the hose lines
    - Otherwise, the natural convection current will be interrupted
    - Supply liquid cooling will no longer occur or it will be severely restricted
  - ▶ Prevent line narrowing or lines of unequal length
  - ▶ Fill the storage/sealing pressure tank so that it is bubble-free
  - ▶ Ensure that the quench medium filling level is between minimum and maximum
  - ▶ In the event of unusually high quench medium consumption or the storage tank overflows: Inspect the shaft seal for wear

2.8.7 Avoiding damage during operation

- ▶ Operate the pump in compliance with the permitted limit values
- ▶ Pump with heating jacket: Apply a maximum of 6 bar to the housing
- ▶ Never operate the pump continuously under changing loads
- ▶ Prevent dry running
- ▶ Ensure that the grain size and proportion of solids in the pumped medium never exceed the defined limit values
- ▶ Ensure that no foreign objects (e.g. metal parts or stones) get into the pump
- ▶ Never use the pump and coupling guard as a climbing aid or load objects on them

2.8.8 Avoiding damage during assembly/dismantling

- Ensure that the installation site is free of dust and dirt
- Note the correct nozzle orientation
  - Incorrect nozzle orientation in relation to the screw spindle orientation will result in performance losses during pump operation
- Handle the shaft seal (mechanical seal) with care
  - Scratches on the separate parts of the mechanical seal will result in the complete mechanical seal being damaged
  - Ensure that the contact surfaces of the slide rings and counter rings are clean
  - The springs are loose in the mechanical seal's gland and can they can fall out during assembly/dismantling
  - **Never** operate the mechanical seal with missing springs
- Ensure that the positioning pin arrangement matches the rotational direction
  - An incorrect positioning pin arrangement and rotational direction combination will result in the pump housing and the spindles being damaged
- Assemble the coupling correctly in accordance with this operating manual
  - **Never** use a hammer to mount the coupling on the drive shaft
  - Use an industrial heat gun for the heating (650 °C)
  - Ensure that you comply with the coupling's maximum permitted displacement values
- Ensure that the shaft seals, shafts and housing bore-holes are clean
- Be careful when installing the shaft seals:
  - Ensure that the shaft seal ring is seated in a parallel plane to the shaft
  - **Do not** tilt the shaft seal ring or use a hammer to push it in
  - Ensure the press-in force is applied close to the outer diameter
  - **Do not** damage the sealing lip during assembly
  - Use an assembly cone (see Chapter 15.1)
- Always loosen the shaft nut's grub screw before you dismantle the shaft nut
  - The drive shaft's thread will be damaged if you do not do this first.
- Note the following points when fitting the bearings:
  - Ensure that the separate parts of the bearing are clean
  - Precisely align the spacer sleeve/rings, shaft sleeve and angular ball bearing
    - This will prevent any damage from occurring when the input/output shafts are pressed in
- Ensure that the pump/drive/separate components are supported by suitable supports (e.g. blocks of wood) and that they are secured against accidental tipping over
- Use suitable lifting gear, e.g. for the drive or for heavy pump housings made from solid material

2.8.9 Non-permitted electrical parameters

The pump's service life will be reduced if incorrect drive data is used.

The following danger sources are also critical:

- Drive data listed on the nameplate does not match the local conditions
- Starting currents are too high
- Ensure that the mains voltage and frequency match the local conditions
- Ensure that the phase sequence is correct for the motor's rotational direction
- Connect the gearing motor's PTC thermistor sensor to the PTC tripping device/frequency converter for the PTC input.
- Ensure that the soft starters or frequency converters are suitable for use with high starting currents.
  - Use oversized devices for heavy starting
- Provide an emergency-stop device

2.8.10 Thermal risks

Temperatures that are too high can reduce the durability of the mechanical seal, gears, bearings and elastomer in the coupling.

The following danger sources are also critical:

- Displacement is too high
- Dry running
- Inadequate quench medium cooling due to the lack of a convection flow
  - There is a risk that the quench medium will reach boiling temperature at the seal's gap inlet
- Lack of quench medium
- Bubbles forming in the storage/sealing pressure tank
- Gum forming or insufficient lubrication, especially when starting up after a long stoppage
- Unsuitable gear oil
- Temperature too high or exposure to vapor was too long during cleaning

▶ Plan for enough space to ensure adequate drive motor ventilation

▶ Prevent the heated exhaust air from adjacent units from being sucked back in

▶ Ensure that the lubrication is correct

▶ In particular, route the supply and return lines so that they drop or rise continuously – ensure that no kinks form if hose lines are being used

▶ Never exceed the maximum permitted temperatures and exposure time during cleaning
  - Higher temperatures together with cleaning agents can damage the workpiece surface of the separate components (corrosion, etching)
  - Higher temperatures can create more residue on the workpiece surface as the liquid will evaporate when single components are removed from the hot bath
- When starting up after a long stoppage:
  ▶ Rotate the screw spindles manually
    - This lubricates the mechanical seals
  ▶ Start up the pump slowly

▶ Use a suitable quench medium
  - The quench medium must never exceed the boiling point

2.9 Danger of hygiene risks

2.9.1 Defective elastomer (O-rings)

The following can occur if elastomers (O-rings) in contact with the product fail and no longer seal reliably as intended:

- Quench medium get into the pumped medium
- Pumped medium get into spaces, gaps, grooves or the quench medium

Elastomer failure, e.g. due to:

- Mechanical loads
- Changing environmental effects
- Thermomechanical stress
- Radiation
- Moisture and/or chemical substances (e.g. from cleaning)
- Thermo-oxidative aging: Elastomer softens or hardens
- Elastomer swells
- Aging
- Incorrect storage or handling
- A combination of the above points

Consequences:

- Pumped food/material is adulterated/contaminated by the quench medium.
- Pump components that do not primarily come into contact with the pumped material are adulterated/contaminated by the pumped material
- If defective elastomers or impurities/contaminants are not detected, then microorganisms such as spores or endospore-forming bacteria, yeasts or molds and their toxic metabolic products (mycotoxins) can form
- Unrecognized impurities/contaminants can "break through"
- Mycotoxins and pathogenic microorganisms can be ingested by humans through food and cause mycotoxicoses (diarrhea, vomiting, adversely affect the immune system, damaged kidneys and liver or promote the development of cancer, etc.) or cause severe to fatal food poisoning and cause diseases in humans and animals

Risk prevention:

- ▶ Failure of elastomers in contact with the product must be prevented
  - ▶ Use a product-compatible quench medium see Chapter 5.13.4
  - ▶ Pay attention to the cleaning of special components see Chapter 8.5
  - ▶ During maintenance and repair work, clean the components that come into contact with the product before installation and replace them if necessary see Chapters 8.4 and 8.5
  - ▶ During maintenance and repair work, the O-rings that come into contact with the product should be replaced as a precaution see Chapters 8.5 and 9.6
  - ▶ Note and comply with the inspection and maintenance intervals for elastomers that come into contact with the product see Chapters 9.4 and 9.5
    - ▶ Adapt the inspection and maintenance intervals to the specific system if necessary.
  - ▶ Note the cleaning and sterilization processes see Chapters 8 and 14
  - ▶ Inspect the components that came into contact with the product for signs of damage, replace as necessary
  - ▶ Document the cleaning, maintenance and repair work on components that come into contact with the product
  - ▶ Validate the cleaning and sterilization work defined by the operator or 3-A standard or EHEDG specifications and adapt to meet the system-specific requirements if necessary

3. Description

3.1 Twin NG 70 main components

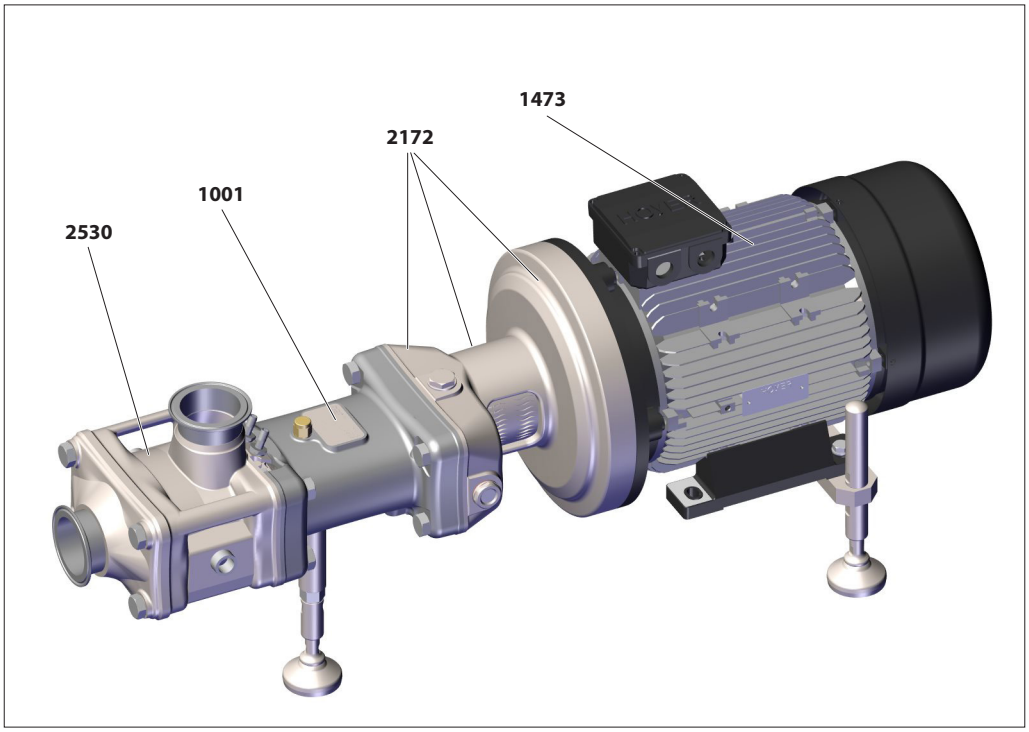


Fig. 3.1: View of a Twin NG 70 (tripod array; articulated foot as per the 3-A standard)

A Twin NG 70 consists of the following main components:

Twin NG 70 main components	
1001	Bearing housing
(1400)	Baseplate (not shown here)
1473	Drive
2172	Gearbox housing*
2530	Pump housing (with heating jacket, optional)

* The gearbox housing and the clutch guard are combined into a single component on a Twin NG 70

Tab. 3.1: Twin NG 70 main components (see Fig. 3.1)

3.2 Twin NG 104/130 main components

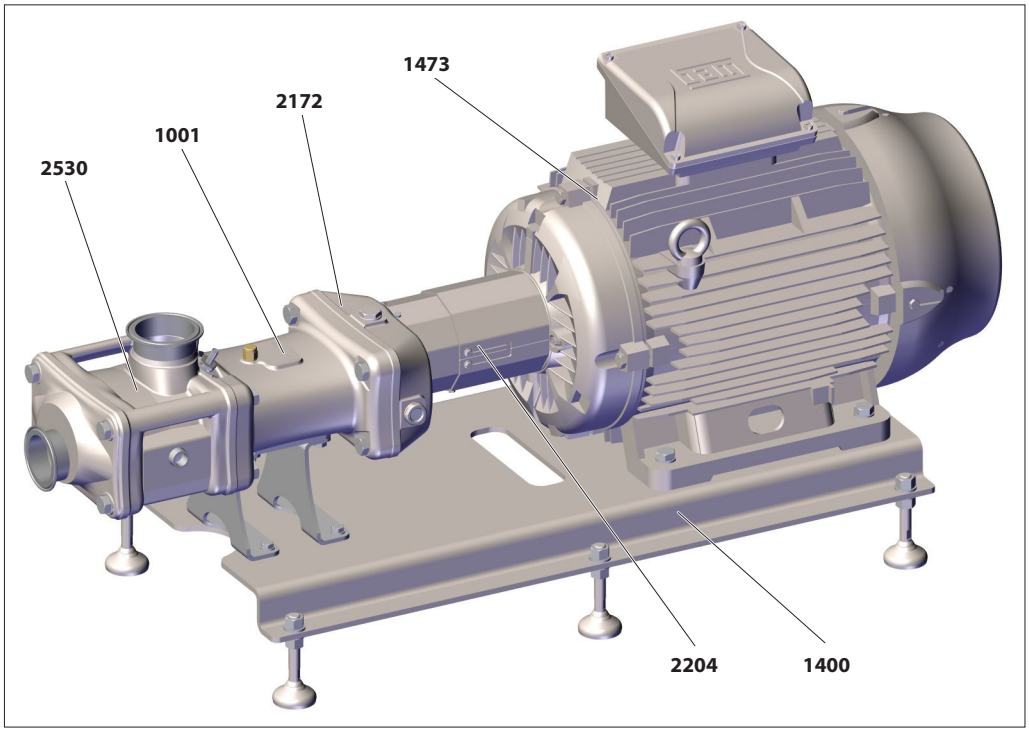


Fig. 3.2: View of a Twin NG with a coupling guard (standard version)

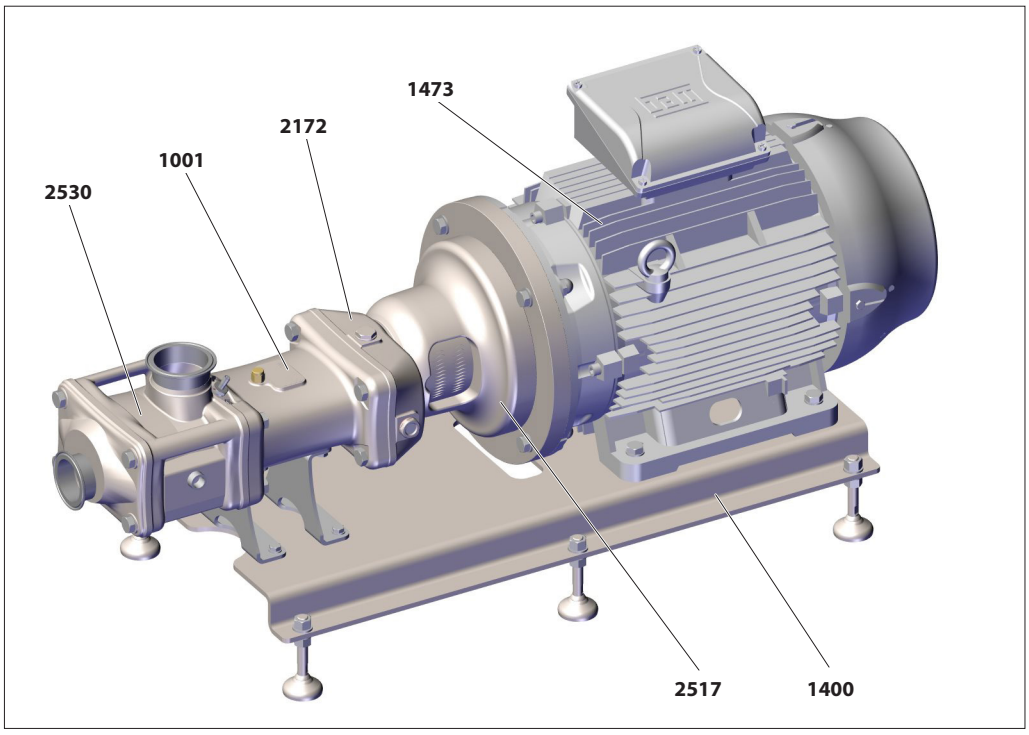


Fig. 3.3: View of a Twin NG with a "Lantern" coupling housing

A Twin NG 104/130 consists of the following main components:

Twin NG 104 / 130 main components	
1001	Bearing housing
1400	Baseplate
1473	Drive
2172	Gearbox housing
2204	Coupling and coupling guard (standard version)
2530	Pump housing (with heating jacket, optional)
2517	“Lantern” coupling housing (optional)

Tab. 3.2: Twin NG main components (see Fig. 3.2 and Fig. 3.3)

3.3 General description

Screw pumps are rotating positive-displacement pumps for pumping low to high-viscosity media used in the commercial sector.
A Twin NG has two spindles. The spindles are rotated by intermeshing gears (see Fig. 3.4). Use the gears to set up the backlash needed for the spindles.
The input and output shafts are installed outside the pumping chamber and they do not come into contact with the pumped medium during normal operation.

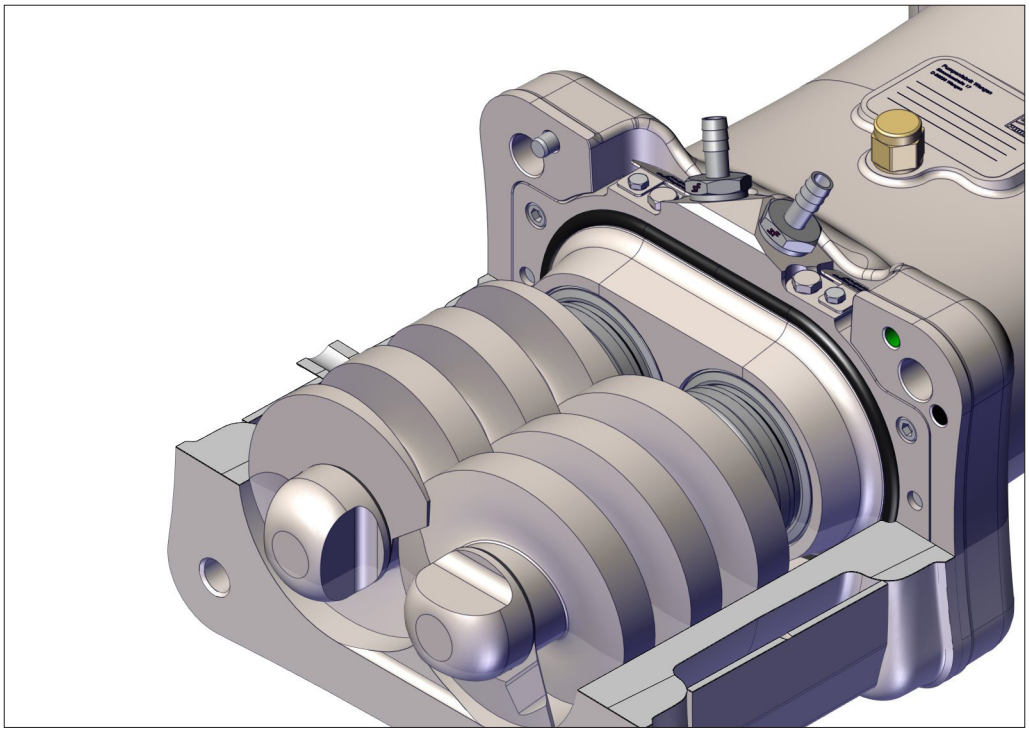


Fig. 3.4: Helical screw spindles

3.4 Pump operating principle

A screw spindle pump consists of two counter-rotating rotors enclosed inside a housing. The shape of a displacer on a rotor resembles that of a spindle screw with left-hand and right-hand threads. The counter-rotating displacer on the rotors mesh with the helical gears (see Fig. 3.4).
The cavity between the rotors and the housing forms a closed pumping chamber that is sealed off by gap seals. The pumping chamber moves as the rotor rotates and it transports the pumped medium axially from the suction side (inlet) to the pressure side (outlet).

4. Transport, packaging and storage

⚠ WARNING!

Risk of being crushed by a falling and/or a tipping load due to the pump being handled incorrectly during transport.
Death or severe personal injuries

- *Only use suitable lifting equipment (chains, ropes, slings) with sufficient load-bearing capacity for transporting and lifting the load*
- *Determine the load's weight and center of gravity*
- *Lift the pump as shown schematically*
  ***Never** lift the pump solely by the eyebolts on the drive unit or those on the pump casing. These suspension points are only intended for the motor and/or the transmission unit.*
- *A maximum sling angle of $_{max.}$ < 60° must never be exceeded*
  - *The angle formed from the direction of one line from the sling and an imaginary vertical line is called the sling angle*
- *Never stand beneath the suspended pump or between fixed objects (floor/wall)*
- *The pump must always be transported in a horizontal position*
- *Ensure that there are no other people in the danger area*

4.1 Transport

- Suspend the pump from the recommended suspension points

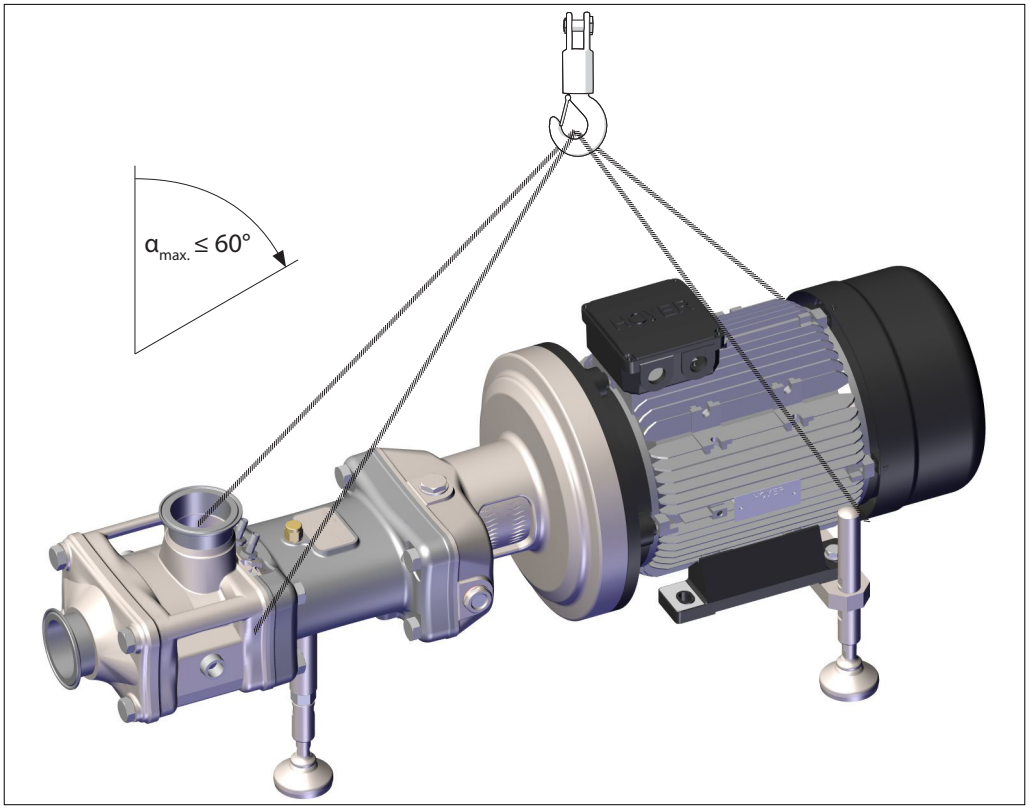


Fig. 4.1: Suspension option for transporting a Twin NG 70

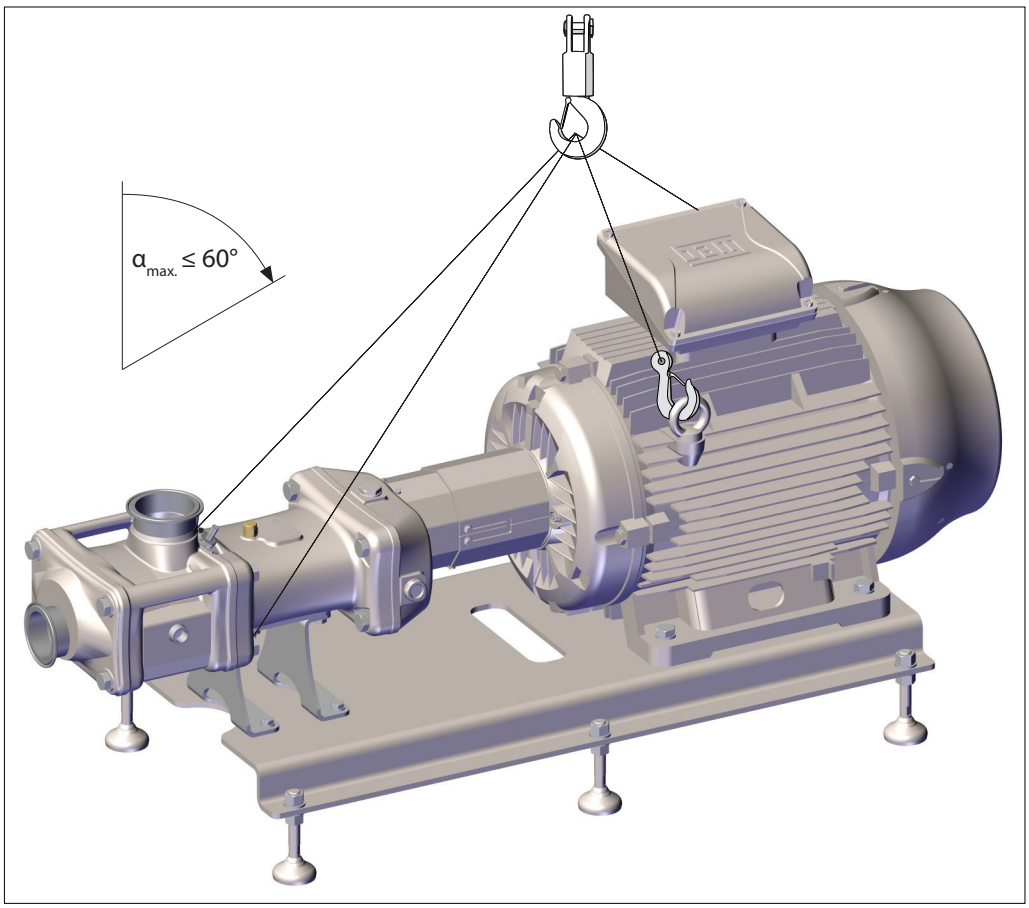


Fig. 4.2: Suspension option for transporting a Twin NG 104 or Twin NG 130

▶ *Report any transport damage immediately to the transport company*

4.2 Packaging

Pumps are shipped in disposable packaging.

4.3 Storage

Pumps are adequately preserved for normal ambient conditions.

For longer storage please note:

- ▶ Store the pump in a dry place
- ▶ Always protect the pump from dust, dirt, moisture, heat (direct sunlight, radiators or other heat sources), frost and other harmful environmental conditions
- ▫ If you were using water as the quench medium for the shaft seal
  - ▶ Drain the water
- ▫ If the downtime will exceed six months:
  - ▶ Rotate the screw spindles manually to keep the shaft seals lubricated

5. Positioning/securing and integrating

5.1 General information

- A torsionally rigid baseplate is recommended for mounting and securing the screw spindle pump
- Use the hole diameter in the base plate and the holes in the housing foot as orientation for securing the pump (screw connection, suitable anchor dowels)

▶ Note the maximum tightening torques defined for the pump components (see Chapter 15.2.1)

▶ Note the maximum tightening torques for securing the pump to the concrete (see Chapter 15.2.2)

5.2 Space needed for operating and servicing

- ▶ Provide adequate space to allow for service work without having to remove the entire pump (see Tab. 5.1)
- ▶ Use assembly fitting pieces and shut-off devices on the pressure and suction lines to simplify assembling/dismantling the pump in/from the system
- ▶ Plan for enough space to ensure adequate drive ventilation (see Tab. 5.2)
- ▶ Prevent the heated exhaust air from adjacent units from being sucked back in

Space needed for the operating and service work	Recommended space
By the drive	At least 1 x the length of the drive
Each side of the pump	At least 0.8 m

Tab. 5.1: Recommended clearance for carrying out service work on the pump

Space for drive's waste heat during operation	Recommended minimum distances
Fan cover drive – wall	At least 0.3 m (1.0 m)*
Top of drive – ceiling	At least 1.0 m
* A minimum distance of 1.0m is recommended with higher engine power.	

Tab. 5.2: Recommended clearance for the waste heat from the drive

5.3 Twin NG connection in a 3-A/EHEDG certified system

The Twin NG only conforms in connection with the flange and seal combinations according to:

- *3-A Sanitary Standards* or the reference contained in the EHEDG position paper [Chapter 6.3 Service; Chapter 7.1 Harmonization, page 52]
- the *Position Paper from the EHEDG Working Group Certification: "Easy cleanable pipe couplings and process connections"*

in their currently valid versions.

The operator is responsible for complying with and implementing the specifications:

- ▶ Adjust the flange and seals on the pressure and suction nozzles accordingly

5.4 Pressure conditions in the pump housing

- ▶ Take note of the pressure conditions in the pump housing and in the system when integrating the pump in the system
- ▫ The internal pressures in the Twin NG 70, 104 and 130 models must be as follows:
  - ▫ 20 bar maximum during continuous operation
  - ▫ 25 bar maximum during brief operation
- ▫ The pump's maximum permitted internal pressure might be further reduced depending on the connection nozzles being used on the suction and pressure sides
  - ▶ Note the standard specified for the connection pieces/flanges in the technical data sheet
- ▶ Design the entire system (pump, pipelines, flanges, sealing pressure tank, etc.) for the corresponding pressure
  - ▫ For example, when using a sealing pressure tank approved for a pressure of 25 bar, the pump's maximum operating pressure can be 23 – 24 bar (see Chapter 5.13.2)
- ▶ Note the maximum permitted delivery pressure of ≤ 12 bar if the pumped medium is supplied against the pump cover (2528, see Chapter 13.17) or if the pump is operated counterclockwise/clockwise (see Chapter 6)
  - ▫ Load cases in which a delivery pressure > 12 bar is needed when pumping against the pump cover must be assessed and approved separately by the application engineering department at Pumpenfabrik Wangen GmbH
    - ▶ Contact the manufacturer

5.4.1 Pump housing with heating jacket

A heating jacket is optionally available for the Twin NG. Supplying an externally heated or cooled liquid enables the pumped medium to be heated or cooled and kept at a constant temperature.
The pump housing and the heating jacket form a single unit.

Nozzles fitted on the heating jacket:
- ▫ 2 nozzles at both ends: Inlet and outlet opening connections for heating/cooling liquid
- ▫ 1 nozzle at top: Optional use (e.g. venting or pressure measuring)
- ▫ 1 nozzle at bottom: Drainage opening for heating/cooling liquid

Permitted operating conditions with a heating jacket	
Heating medium	Water, Water vapor
Pressure $_{maximum}$	6 bar
Temperature $_{maximum}$	150 °C
Lower/upper temperature range	Depends on the elastomer being used (O-rings)

Tab. 5.3: Heating jacket operating conditions

5.5 Pipelines

Correct dimensioning of the pressure-side pipeline is crucial for avoiding an unnecessary pressure build-up when pumping viscous media. The dimensions of the pump flanges provide orientation.

- ▶ Never exceed the delivery pressure with regard to the pipeline's pressure resistance
- ▶ Note the space requirement details see Tab. 5.1
- ▶ Flush the pipeline system and supply devices before installing them
- ▶ Remove any impurities
- ▶ Avoid dry running during start-up by installing the suction line so that it cannot run dry when the pump is stopped (shut-off devices, siphon, etc.). Flange the pump to the pipeline using elastic seals/compensators so that a tight connection is created and no undue forces can act on the pump
  - ▶ Note the EHEDG/3-A Sanitary Standard specifications as necessary
- ▶ Install the pipeline so that it is **not** supported by the pump
- ▶ Provide shut-off devices and adapters in the pressure and suction lines for removing and servicing the pump
- ▶ Provide safety or pressure monitoring valves directly downstream from the pump on the pressure side
- ▶ Provide additional safety or pressure monitoring valves on the suction side if needed
- ▶ Never load screwed connections with torques that will result in the pump loosening or tightening

5.6 Installing and securing the pumps

A Twin NG is installed and secured horizontally and sizes 70, 104 and 130 can be mounted:

- On a baseplate
- As a tripod installation
- On a mobile stand

- ▶ Note the maximum tightening torques for securing it in concrete
- ▶ Note the maximum tightening torques defined for the pump components
- ▶ Ensure that the foundations can absorb its own weight and all of the operating forces
- ▶ Ensure that the pump is will always be stable
- ▶ Ensure that the foundation is firm, level and horizontal (e.g. with an adequately dimensioned level concrete slab or a torsionally rigid, vibration-free and level steel structure)
- ▶ Provide the number of screw connections and suitable (concrete) anchoring dowels that correspond with the diameter and number of drill holes at the foot of the housing/baseplate
- With mobile stand:
  - ▶ Use a level concrete slab
  - ▶ Check the pump's position at least 1 x per week
  - ▶ The pump must be re-installed on a base plate or tripod array if position changes are seen
- ▶ Use suitable tools to align the pump or baseplate horizontally
- ▶ If necessary, use standard articulated foot or articulated foot as per the 3-A standard
- ▶ Connect the pump securely and firmly to all the holes provided on the baseplate/concrete slab/torsion-resistant steel structure

5.7 Standard articulated foot array

The standard articulated foot goes from the baseplate to the thread so that the articulated foot can be easily cleaned. The embedded rubber on the articulated foot is FDA-compliant and this means that it is permitted for use in the food sector. Unevenness and sloping floors or equipment of up to 10° can be compensated by using articulated foot.

- ▶ Do not use the articulated foot to bridge cracks in the floor or any crack-like unevenness during the installation
- ▶ Seal any cracks in the installation site before the installation
- ▶ Use suitable tools to lift the baseplate and pump to fit the articulated foot
  - ▶ Take note the pump's weight
- ▶ Lightly lubricate the threads with fat before fitting the articulated foot
  - ▶ Remove excess fat after fitting them
- ▫ Twin NG tripod array:
  - ▶ Use a nut and spacer under the pump housing to fit the standard articulated foot (see Fig. 5.1 (1))
    - ▫ a spacer for positioning
    - ▫ a nut for securing and locking
  - ▶ Under the motor traverse drive and the standard articulated foot (see Fig. 5.1 (2))
    - ▫ one pair each (nut/washer) above/below the motor traverse for positioning and securing or locking
- ▫ Installing the Twin NG with a baseplate:
  - ▶ Use standard articulated foot with two nuts and two washers each (see Fig. 5.1 (2)):
    - ▫ One pair each (nut/washer) above/below the motor traverse for positioning and securing or locking
- ▶ Use a wrench to complete the vertical positioning or horizontal alignment
  - ▶ Note the dimensions as per Tab. 5.4
- ▶ Place the baseplate/pump on the floor/foundation after you have installed all of the articulated foot:
  - ▶ Make any fine adjustments that are needed
  - ▶ Ensure that all of the articulated foot are seated on the floor/foundation so that the weight of the base plate and pump is evenly distributed over all of the articulated foot
  - ▶ Tighten the locking nuts

Dimensions Articulated foot	**α** Minimum length [mm]	**β** Maximum length [mm]	**γ** Total length [mm]	**δ** Max. compensation height [mm]
Standard version	73	157	170	139
Spacer D	--	--	126	--

Tab. 5.4: Standard articulated foot dimensions

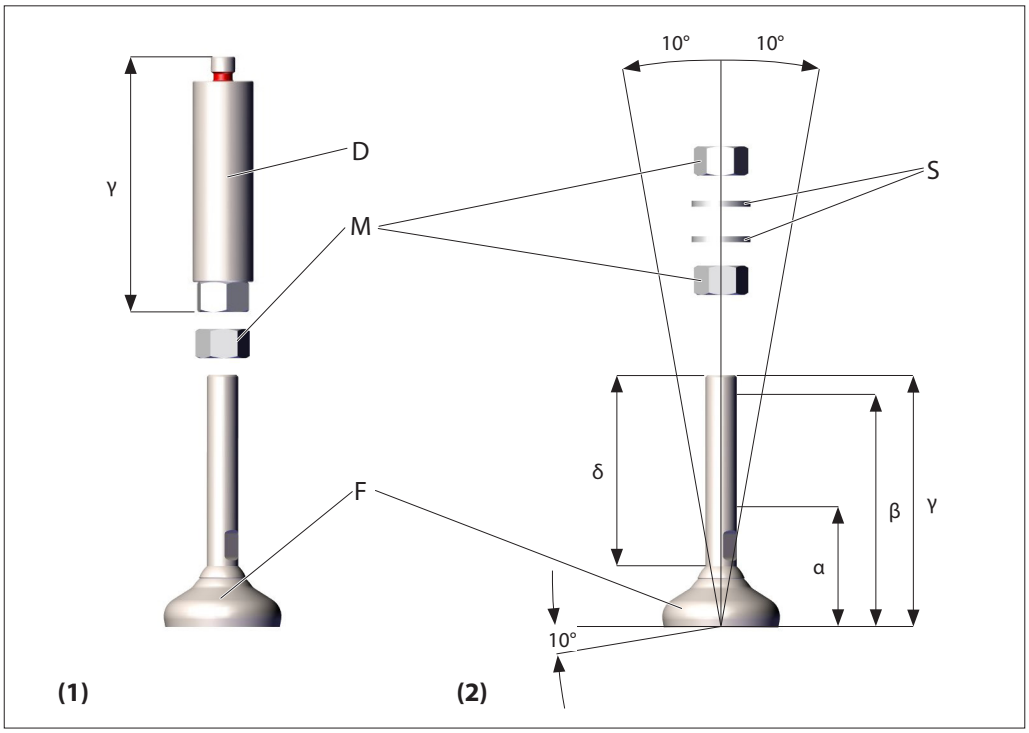


Fig. 5.1: Standard articulated foot – O-ring on spacer is not shown
(1) Articulated foot on the pump housing
(2) Articulated foot on the motor or baseplate
D: Space F: Articulated foot M: Nut S: Washer;
α, β, γ, δ Dimensions see Tab. 5.4 (see Chapters 13.1 to 13.6)

5.8 Installing an articulated foot as per the 3-A Standard or EHEDG

The articulated foot is certified according to 3-A standard "88-00" and EHEDG type EL-Class 1.

The sleeve encloses the thread, seals with an O-ring on the bottom and top and acts as a locking nut. The top sleeve seals the thread turns above the baseplate or above the motor traverse with an O-ring (see Fig. 5.3).

The spacer has an O-ring on the top and it seals the spacer on the pump housing. The bottom of the spacer is sealed by the O-ring that sits on the sleeve on the articulated foot. O-rings are not shown in Fig. 5.3.

Unevenness and sloping floors or equipment of up to 10° can be compensated by using articulated foot.

- ▶ Do not use the articulated foot to bridge cracks in the floor or any crack-like unevenness during the installation
- ▶ Seal any cracks in the installation site before the installation
- ▶ Use suitable tools to lift the baseplate and pump to fit the articulated foot
  - ▶ Take note the pump's weight
- ▶ Lightly lubricate the threads with NSFH1 approved fat before fitting the articulated foot
  - ▶ Remove excess fat after fitting them

- Twin NG tripod array:
  - ▶ Use spacers and sleeves on the 3-A standard articulated foot fitted under the pump housing (see Fig. 5.3 (1))
    - a spacer for positioning
    - a sleeve for securing and locking
  - ▶ Under the motor traverse drive and the 3-A standard articulated foot (see Fig. 5.3 (2)) use:
    - The top sleeve for positioning above the motor traverse
    - The sleeve for securing and locking below the motor traverse
- Installing the Twin NG with a baseplate:
  - ▶ For the articulated foot as per 3-A standard with sleeve and top sleeve (see Fig. 5.3 (2)) use:
    - Top sleeve for positioning
    - a sleeve for securing and locking

▶ Use a wrench to complete the vertical positioning or horizontal alignment
  ▶ Note the dimensions as per Tab. 5.5
▶ Ensure that all of the sleeves completely cover the thread up to the baseplate
  ▶ If not, realign the entire baseplate
▶ Place the baseplate/pump on the floor/foundation after installing all of the articulated foot
  ▶ Make any fine adjustments that are needed
  ▶ Ensure that all of the articulated foot are seated on the floor/foundation so that the weight of the base plate and pump is evenly distributed over all of the articulated foot
  ▶ Tighten sleeve and top sleeve

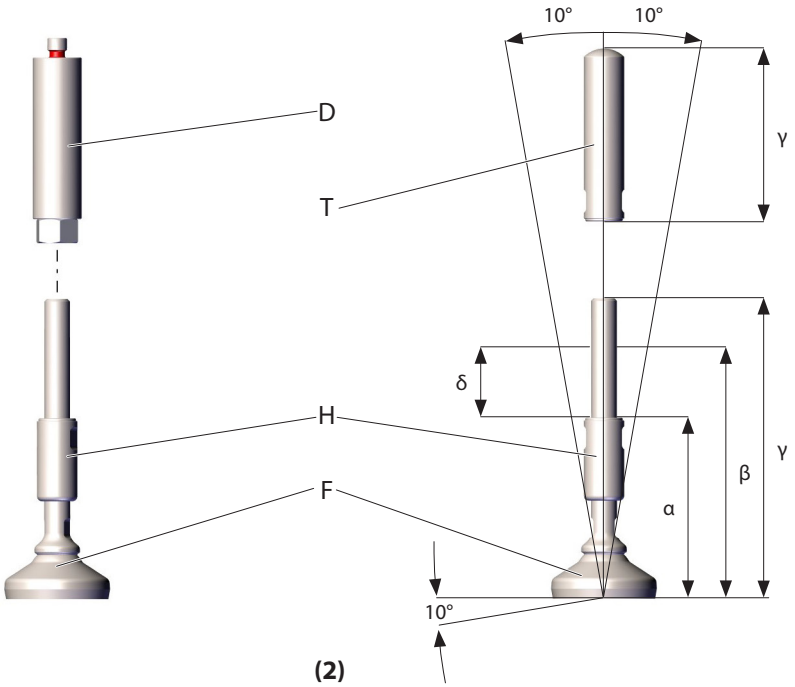


Fig. 5.2: 3-A standard articulated foot – O-ring on spacer is not shown
(1) Articulated foot on the pump housing
(2) Articulated foot on the motor or baseplate
H: Sleeve T: Top sleeve D: Spacer F: Articulated foot;
α, β, γ, δ – Dimensions see Tab. 5.5 (see Chapters 13.1 to 13.6)

Dimensions	α Minimum length [mm]	β Maximum length [mm]	γ Total length [mm]	δ Max. compensation height [mm]
Articulated foot 3-A standard	104	140	178	36
Top sleeve 3-A standard	--	--	100	--

Tab. 5.5: Articulated foot dimensions as per the 3-A standard

5.9 Electrical connection

⚠ Danger!

Live parts can cause a fatal electric shock

☑ Take note of the instructions in Chapters 2.7.4 and 2.8.9

☑ Generally applicable installation regulations for low-voltage electrical equipment always apply when installing electrical systems
☑ Abide by the motor manufacturer's operating instructions
☑ The wiring instructions in the frequency converter's operating manual must also be applied with converter-fed motors

- ▶ Only qualified personnel are allowed to connect up the pump
- ▶ Lock and secure the main switch
- ▶ Secure the pump against it being switched back on unintentionally
- ▶ Compare the drive data on the nameplate with the circuit diagram in the terminal box and the local conditions:
  - ▶ Ensure that the mains voltage and frequency match
  - ▶ If in doubt, contact your local energy supply company
  - ▶ Comply with the local and national regulations on site
- ▶ Check the phase sequence for the motor's rotational direction
  - ▶ Ensure that the pump runs in the stipulated rotational direction (see technical data sheet)
- ▶ Connect the gearing motor's PTC thermistor sensor to the PTC tripping device or frequency converter for the PTC input (available as an option)
- ▶ Design the soft starter or frequency converter for high starting currents – use oversized devices for heavy starting
- ▶ Provide an EMERGENCY STOP device to be able to stop the pump in dangerous situations

Terminal box connections

The following connection versions are commonly used in the EU:

	Mains frequency		Frequency converter			
Winding voltage	50 Hz	60 Hz	50 Hz	87 Hz	60 Hz	104 Hz
230/400V	Y	Y	Y	Δ	Y	Δ
400/690V	Δ	Δ	Δ	-	Δ	-
	Y = star connection		Δ = delta connection			

Tab. 5.6: Usage options for motors

- ▶ Abide by the instructions given in the drive manufacturer's operating manual when using outside the EU

5.10 Assembling the drive and coupling components

5.10.1 Drive

The pump is normally delivered fully assembled, i.e. it includes the drive.

- ▶ Note the following information if the drive has to be retrofitted
- ▶ Use a coupling to connect the drive to the pump's drive shaft

⚠ WARNING!

The pump and drive can be both heavy and top-heavy.

- ▶ *Use suitable lifting gear*
- ▶ *To avoid the risk of tipping by placing wooden blocks underneath*

5.10.2 Fitting the coupling components

The pump's drive shaft is connected to the drive via a flexible claw coupling that includes an elastomer star. To a certain extent this allows for axial, radial and angular displacements (misalignment) as well as sudden loads or unwanted vibrations.
The elastomer star's relatively wide compressed area keeps the surface pressure low. This means that the elastomer star can often be overloaded without it wearing out or losing its initial loading.

- ▶ For permanent and trouble-freecoupling operation you must ensure that the coupling is suitable for the application (power, speed or maximum permitted speed, starting frequency and starting torque changes, etc.)
- ▶ To assemble the coupling, use a pulling device or heat the coupling half to approx. 80 °C (remove the elastomer star beforehand)
  - ▶ Mount the hot coupling on both drive shafts:
    - ▫ Pump's input shaft
    - ▫ Input shaft from drive

5.10.3 Assembling the pump (coupling components) and drive

☑ Use a suitable hoist/wooden blocks to secure the pump in place
☑ Coupling component mounted on the pump's input shaft
☑ Coupling component mounted on the input shaft from the drive

▶ Insert the elastomer star between the two halves of the coupling before assembling the pump/drive
▶ When assembling the pump and drive, you must comply with the maximum permitted displacement values ⓐ (axial displacement), ⓑ (angular displacement) and ⓒ (radial displacement) as per Fig. 5.3 or Tab. 5.7
  ▫ These are maximum values that must not occur simultaneously. If radial and angular displacement occur simultaneously, then the permitted displacement values are only to be used proportionally:

For example: Maximum displacement$_{Total}$ = 30 %$_{Angular\ displacement}$ + 70 %$_{Radial\ displacement}$

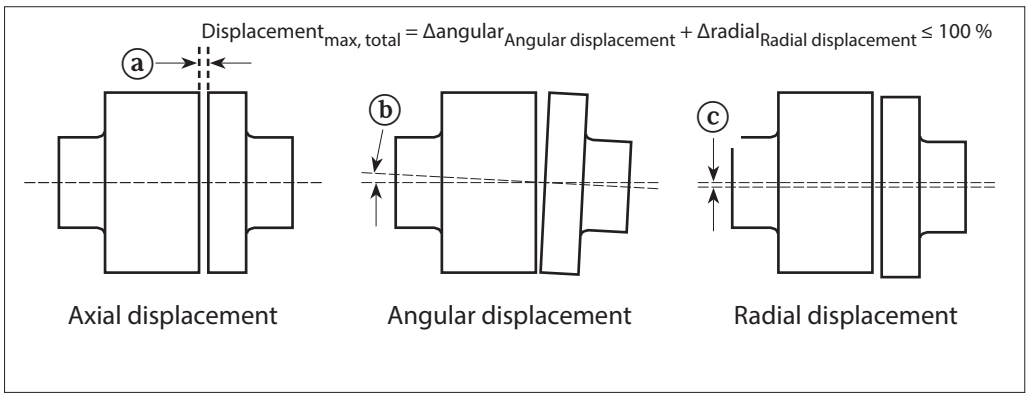


Fig. 5.3: Displacement options and maximum permitted proportional displacement value calculation

Maximum permitted displacement values when assembling the pump/drive couplings and information about the wear limit (applies to 1,500 rpm and for elastomer stars with a hardness of 92 Shore A):

	Type name/ Max. permitted hub borehole diameter		28, 28/38	38, 38/45	42	48	55
ⓐ	Max. axial displacement	[mm]	1.5	1.5	2.0	2.0	2.0
ⓑ	Max. angular displacement	[°]	1.0	1.0	1.0	1.0	1.0
ⓒ	Max. radial displacement	[mm]	0.25	0.25	0.32	0.32	0.38
	Max. elastomer star wear limit (abrasion)	[mm]	3	3	4	4	5

Tab. 5.7: Maximum permitted displacement values

Displacement of the coupling parts relative to each other can result from imprecise alignment during assembly, machine frames that are too soft or thermal expansion and shaft deflection.

- Increase the service life of damping rubber parts (elastomer star) by keeping the compensated displacement values low
- Prevent permanently high temperatures
- Prevent contact with aggressive liquids/oils, exposure to ozone, too high/low ambient temperatures
- We recommend that you visually inspect the coupling at least once a year
  - Pay special attention to the condition of the coupling cams
- Ensure that both halves of the coupling are aligned with each other after you have assembled the pump and drive:
  - Pumpenfabrik Wangen GmbH recommends using a laser-assisted shaft alignment tool (to be provided by the operator)
  - The displacement value tolerance ranges for the angle and the offset of 0.35 mm/100 mm already provide sufficiently accurate results
  - Abide by the operating instructions for the shaft alignment system being used

5.11 Contact or coupling guard

The input shaft and the claw coupling rotate at high speed when the pump is running. These drive components must be covered with a coupling guard that prevents access to the rotating drive shaft.

- Fit a contact /coupling guard before starting the pump
- Ensure that the hex or Savetix bolts on the contact/coupling guard are tight and secure
- Ensure that the contact/coupling guard can only be removed using a tool

5.12 Shaft seal

- Note the information in the technical data sheet for more details about the shaft seal mounted in the pump
- Abide by the specifications as per the 3-A standard or the EHEDG specifications for shaft sealing

- Ensure that the following points are complied with:
  - The person who assembles the shaft seal (mechanical seal cartridge) has in-depth knowledge about how it works
  - Do not exceed the limits or operating conditions specified in the technical data sheet for the selected shaft seal
  - Carry out the assembly carefully
  - Ensure that the sliding surfaces are not damaged nor do they have any burrs or scratches
  - Ensure that the installation site is free of dust and dirt

The single-acting mechanical seal cartridge essentially consists of a slide ring and a counter ring, which are pressed together axially by a spring. A liquid-filled sealing gap (< 1 µm), forms between the slide ring's and counter ring's two sealing surfaces and this acts as a lubricating film.
The double-acting mechanical seal consists of two single-acting mechanical seals connected in series.

5.12.1 Mechanical seal cartridge – single-acting

- The single-acting mechanical seal cartridge's lubricating film is formed from the pumped medium inside the pump
- Dry running will occur if this lubricating film stops – dry running will destroy the mechanical seal cartridge within a few seconds
- Lubrication by the pumped medium fulfills two important tasks:
  - Reduces friction between the slide ring and the counter ring
  - Acts as a coolant that dissipates the frictional heat
- Sliding surface wear is automatically compensated for by moving up. This makes the mechanical seal cartridge service-free.

5.12.2 Mechanical seal cartridge – double-acting

- A quench medium is required in the sealing chamber[1] of the double-acting mechanical seal cartridge
- Quench medium sealing – in the direction of the product space (pumped medium) and the atmosphere – is created by the rotating slide ring and the stationary counter ring
- The lubricating film between the two mechanical seals at the product and the atmosphere ends is formed by the clean quenching medium
- Lubrication by the pumped medium fulfills two important tasks:
  - Reduces friction between the slide ring and the counter ring
  - Acts as a coolant that dissipates the frictional heat
- A product leak into the atmosphere is excluded during normal operation

▶ Replace the sealing screws with the supplied hose nozzles before starting the pump
▶ Connect the double-acting mechanical seal cartridge to the storage/sealing pressure tank
▶ Fill the double-acting mechanical seal cartridge or storage/sealing pressure tank with quenching medium
▶ Ensure that the quench medium is product compatible
▶ Vent the sealing chamber through the storage/sealing pressure tank (see Chapter 9.10.2) before starting the pump
▶ Put the quenching medium in the sealing chamber of the double-acting mechanical seal cartridge under the required pressure if necessary
▶ Ensure that the quench medium pressure is approx. 1 – 2 bar higher than the back-pressure on the pumped medium side

1 Sealing chamber: Space between the two single-acting mechanical seals

5.12.3 Leaks

Leaks are the most important criterion regarding shaft sealing. It is usually significantly higher during running-in than afterwards during steady operation.

Even small leaks are unacceptable with regard to toxic liquids or liquids that are harmful to health and the environment. Leaks must be continually monitored to protect the environment. Defects on secondary seals or sliding surfaces will become visible if a leak test is run during a standstill. Results from the standstill tests cannot be transferred to the operating conditions.

- Use double-acting mechanical seals with sealing pressure with toxic liquids or liquids that are harmful to health or the environment
- Continuously monitor for leaks
- Run a stopped leak test if all secondary leak possibilities are to be ruled out
- Regularly check and/or replace the visible O-ring in the mechanical seal cartridge during maintenance and inspection intervals or repairs to prevent a leak situation from arising (see Chapter 9.5.1)

5.12.4 Loss and circulation flushing

Double-acting mechanical seals can be operated with loss or circulation flushing for better cooling.

- Make the connection as shown in Fig. 5.4 and Fig. 5.5

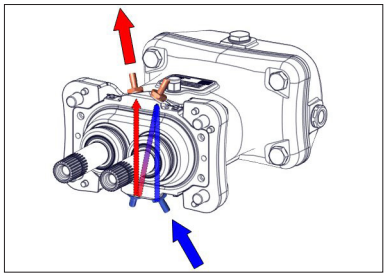


Fig. 5.4: Loss flushing

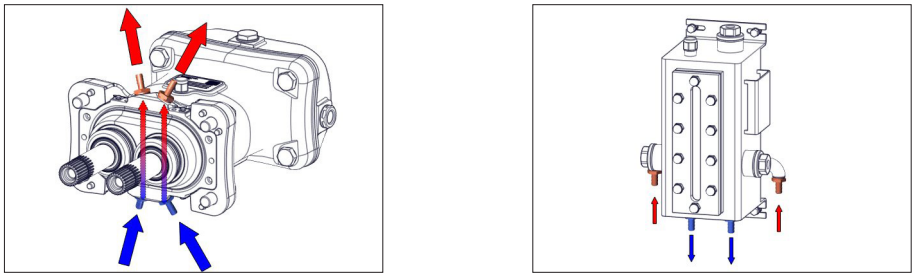


Fig. 5.5: Circulation flushing and connection to storage or sealing pressure tank

5.13 Shaft seal accessories

5.13.1 Storage tank

Function

The storage tank (see Fig. 5.6) is used to supply double-acting mechanical seals or double-acting mechanical seal cartridges. It acts as a reservoir (unpressurized) for the stored liquid (quench medium) on site. The purpose of the quench medium is to lubricate, cool or heat the mechanical seal as well as flushing out primary leaks.

- ▶ See the technical data sheet for operating and design data

Design

Tank (standard fitting):

- ▫ Inspection glass for monitoring the filling level
- ▫ Refilling opening
- ▫ Connections

Connections

The return flow connection (from the mechanical seal into the storage tank) is made through the connections on the side of the storage tank. The seal's supply connection (feed from the storage tank into the mechanical seal) is fitted at the bottom of the storage tank. The liquid exchange between the storage tank and the mechanical seal occurs as a result of the natural thermal convection flow.

- ▶ Run the checks and cleaning through these connections
- ▫ **Attention!** Connections V1 and R1 as well as V2 and R2 are on the housings of the Twin NG's two supply chambers that are independent from each other

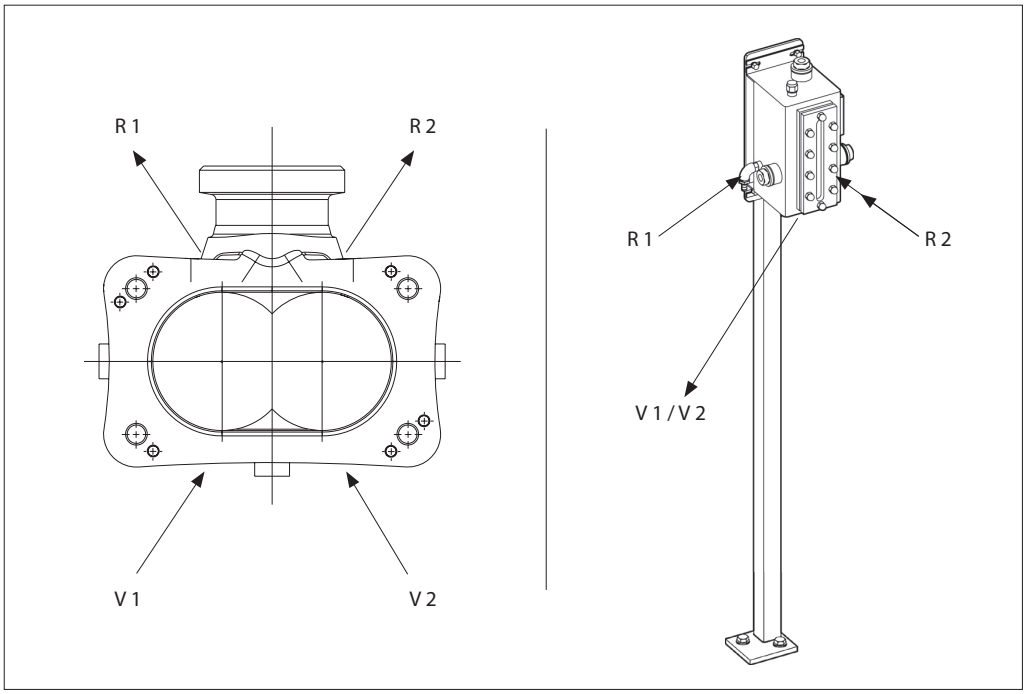


Fig. 5.6: Quench medium connections for the mechanical seals are on the Twin NG and storage tank housings
V1 and V2: Supply connection from storage tank to mechanical seal
R1 and R2: Return connection from mechanical seal to storage tank
Arrow direction: Correct quench medium flow direction

Scope of delivery
The storage tank is supplied as a complete unit. Accessories are pre-fitted. It has not been filled with a quench medium.
- ▶ The quench medium must be filled and adjusted on site by a technician
- ▶ Ensure that the storage liquid is suitable for foodstuffs or compatible with the product

5.13.2 Sealing pressure tank

Function
The sealing pressure tank (see Fig. 5.7) is used to supply double-acting mechanical seals or double-acting mechanical seal cartridges. It acts as a storage tank (unpressurized) for the sealing liquid (quench medium) on site. The purpose of the quench medium is to lubricate, cool or heat the mechanical seal as well as minimizing leaks.

Design
Tank (standard fitting):
- ▫ Inspection glass for monitoring the filling level
- ▫ Refilling opening
- ▫ Connections

Connections

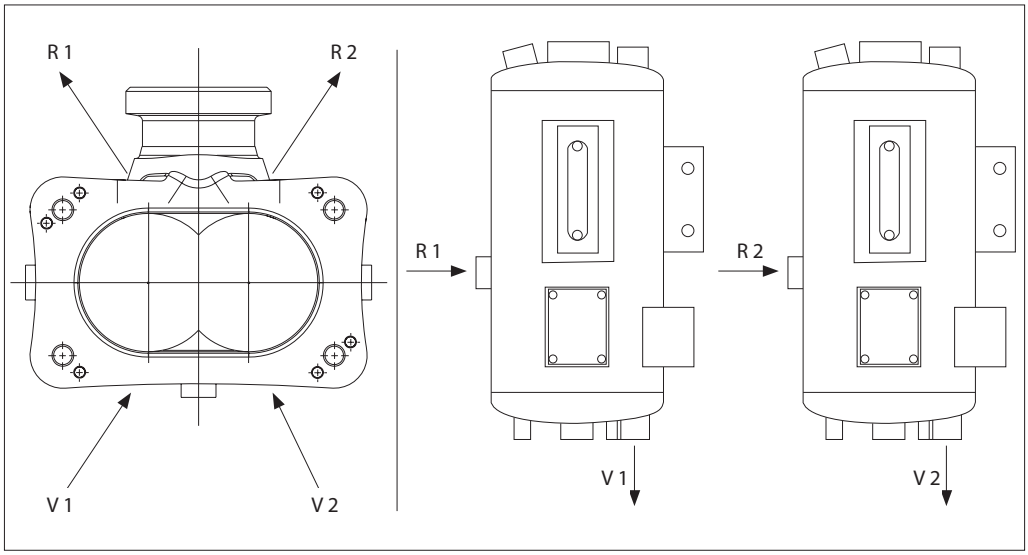


Fig. 5.7: Quench medium connections for the mechanical seals are on the Twin NG and sealing pressure tank housings

V1 and V2:	Supply connection from sealing pressure tank to mechanical seal
R1 and R2:	Return connection from mechanical seal to sealing pressure tank
Arrow direction:	Correct quench medium flow direction

The return flow connection (from the mechanical seal into the sealing pressure tank) is made through the connections at the end of the sealing pressure tank. The seal's supply connection (feed from the sealing pressure tank into the mechanical seal) is fitted at the bottom of the sealing pressure tank. The liquid exchange between the sealing pressure tank and the mechanical seal occurs as a result of the natural thermal convection flow.
- ▶ Run the checks and cleaning through these connections
- ▫ **Attention!** Connections V1 and R1 as well as V2 and R2 are on the housings of the Twin NG's two supply chambers that are independent from each other

If only one sealing pressure tank is available, then several mechanical seals can be connected to a sealing pressure tank via a T-piece. However, errors can occur that might cause the mechanical seal to fail prematurely:

- The natural convection flows can interfere with each other
- Lines of unequal length can result in one of the two mechanical seal cartridges being poorly cooled

▶ When using a T-piece: Connect the V1 supply connection on the sealing pressure tank to the two V1 and V2 supply connections on the mechanical seal through the T-piece

▶ Provide sealing pressure that is approx. 1 – 2 bar higher than the pressure in the pumped medium

  ▶ Take any pressure fluctuations into consideration

Scope of delivery

The sealing pressure tank is supplied as a complete unit. Accessories are pre-fitted. It has not been filled with a quench medium.

▶ The quench medium must be filled and adjusted on site by a technician

▶ Ensure that the sealing liquid is suitable for foodstuffs or compatible with the product

5.13.3 Fitting the storage/sealing pressure tank

- The connection between the storage/sealing pressure tank and the mechanical seal is made with hoses or pipes (preferably made of stainless steel), depending on the temperature and quenching medium being used
- Each seal must be connected to the T-piece on the storage tank with its own lines so that a natural convection current can develop
- No significant additional stresses such as vibrations or connection forces are allowed to act on the storage/sealing pressure tank and the mechanical seal
- The seals can be connected in series if forced convection currents with cooling (e.g. external pump or water management system) are to be used. The distance between the storage/sealing pressure tank can then be reduced
- The manufacturer recommends cooling the sealing chamber/quench medium using an external cooler or a sealing pressure tank with an integrated cooling coil. Increasing the sealing chamber pressure is not recommended

▶ See Fig. 5.7 for connecting the mechanical seal to the sealing pressure tank

▶ Note the permitted pressure and temperature specifications on the nameplate and in the technical data sheet

▶ Mount the storage/sealing pressure tank 1 – 2 m above and a maximum of 1 m to the side of the pump (with floor/baseplate support; without wall support)

▶ Route the supply and return lines so that they drop or rise continuously (prevent sagging)

▶ Ensure that the supply and return lines have a minimum nominal diameter of 8 mm

▶ Route bends at 45° angles (radius > 100 mm; avoid kinks or narrowing)

5.13.4 Quench medium as storage liquid – sealing liquid

Quench medium properties:

- Cooling
- Lubricating
- Food or product compatibility

Examples of quench media used in the factory and their properties:

Quench medium	Mixture	
	Glycerin-water	Glycol-water
Positive property	Good cooling and lubrication	
Azeotropic substance mixture	Yes	
Boiling point (pure substance) $_{\text{at 1013.25 hPa}}$	Glycerin 290 °C; disintegrates	Glycol 190 °C
Boiling point Substance and water mixture	Boiling point is significantly lower - Note boiling point curve	
Note the quench medium's mass ratio	Yes	
In continuous operation	Water content evaporates, regular refilling	
Usage	Up to a maximum of 150 °C	
Food compatibility	Yes	

Tab. 5.8: Quench medium: Azeotropic substance mixture

Quench medium	Distilled water	Tap water
Positive property	Excellent cooling	
Negative property	Poor lubrication	
Boiling point $_{\text{bei 1013,25 hPa}}$	100 °C	
Continuous operation	Evaporates, regular refilling	
Food compatibility	Yes	

Tab. 5.9: Quench medium: Distilled water and tap water

Only quench media suitable for use with food are used in the factory (see Tab. 5.8 and Tab. 5.9). The system operator must determine which quench medium will be used.

- ▶ Replace and renew the quench medium at regular intervals
- ▶ Ensure that the quench medium being used never exceeds its boiling point

If the quench medium used in the mechanical seals exceeds its boiling point, then (gas) bubbles will form and this will interrupt or completely prevent the mechanical seal from being lubricated.

Some of the quench media used are so-called azeotropic substance mixtures (see Tab. 5.8). If azeotropic substance mixtures (e.g. water-glycerin) are used, the boiling temperature of the substance mixture will be lower or higher than the boiling temperature of the pure starting components at a specific molar ratio (and given pressure). These relationships are determined empirically and they are shown in phase diagrams or boiling point curves.

5.13.5 Requirements when tap water is used as the quench medium

☑ Water hardness: max. 10 dH (1 dH corresponds to 0.1783 mmol/l $CaCO_3$ or 0.357 mval/l)

Under unfavorable conditions, a higher $CaCO_3$ or $MgCO_3$ content will result in limescale deposits, which can cause increased wear and/or mechanical seal failures. Increased wear occurs with 2 – 5 µm particle sizes. Deposits from these particle sizes can settle in the sealing gap in the mechanical seals.
Implement the following measures if tap water is to be used as the quench medium:

- Ensure that the tap water complies with the regional regulations for drinking water, e.g. the German Drinking Water Act
- Ensure that the drinking water and all of the components used in the drinking water installation are hygienically safe
- Ensure that there are no microbiological, chemical and/or physicochemical changes in the drinking water

6. Medium's flow direction

The mediums flow direction depends on several factors (see Fig. 6.1):
- Direction of the screw pump's rotation drive (see Chapter 6.1)
- Nozzle orientation on the pump housing (see Chapter 6.2)
- Positioning of the positioning pins on the pump housing (see Chapter 6.3)
- Spindle orientation (see Chapters 6.4 and 6.5)

The interaction between these factors determines the flow direction of the medium that will be transported (see Fig. 6.2, Fig. 6.3 and Fig. 6.4) as well as the pressure or suction side.

The specified rotational direction, the correct spindle arrangement, the nozzle orientation and the flow direction are all listed in the technical data sheet.

Attention!
- A wrong positioning pin arrangement and pump rotational direction combination will damage the pump housing and the spindles
- A change in the medium's flow direction (i.e. when the pumped medium is pumped against the cover or when the pump rotates left/right) can result in the 12 bar maximum permitted pumping pressure being exceeded and this will damage the bearing
- Load cases where a pumping pressure > 12 bar is needed when pumping against the pump cover must be assessed and approved separately by Pumpenfabrik Wangen GmbH's application engineering department
  - ▶ Contact the manufacturer

6.1 Rotational direction of the screw spindle pump drive

The pump drive's rotational direction determines the flow direction:
- Left
- Left and right
- Right

The pumping direction is always towards the pressure side.

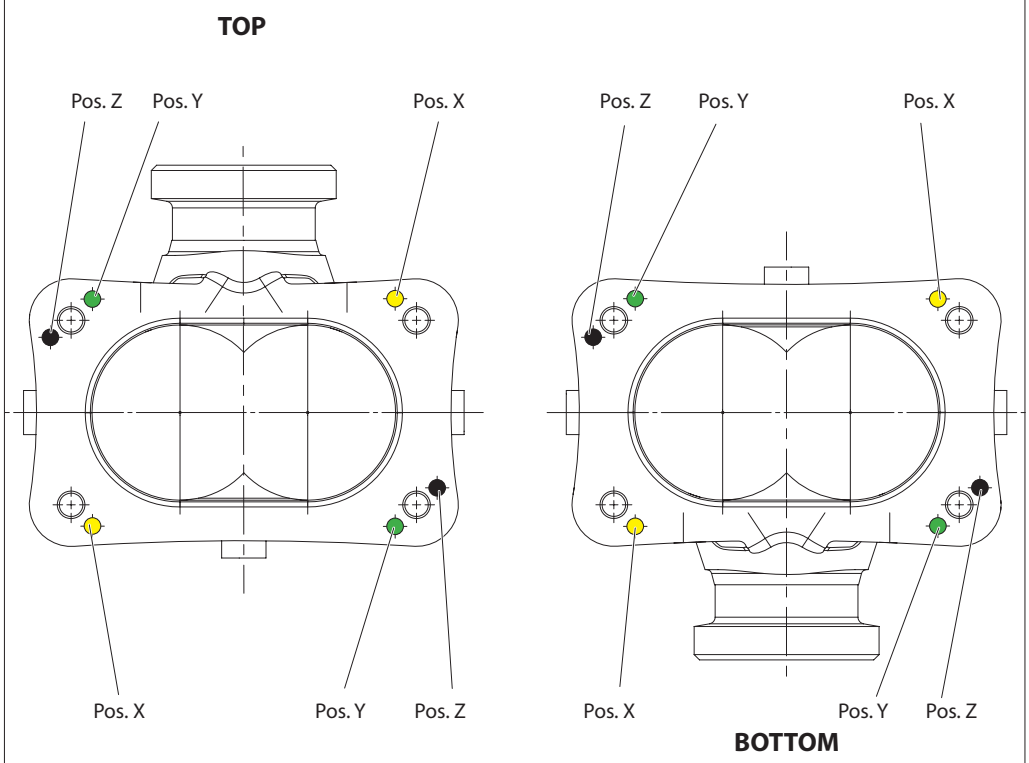
6.2 Nozzle orientation on the pump housing

Incorrect nozzle orientation will result in a reduced output.
- ▶ Select the nozzle orientation on the pump housing (see Fig. 6.1)
  - TOP position
  - BOTTOM position

6.3 Position pin arrangement on the pump housing

- ▶ Choosing the positioning pin arrangements on the pump housing (see Fig. 6.1)
  - Position X
  - Position Y
  - Position Z

Pump housing nozzle orientation	"**TOP**" orientation or "**BOTTOM**" orientation
Positioning pin arrangement on the pump housing	Permitted positioning pin arrangement: Yellow = Position X Black = Position Z Green = Position Y



			Housing nozzle position	
			TOP	**BOTTOM**
Drive rotational direction	Left		Position X	Position Y
or	Left/Right		Position Z	Position Z
Drive spindle	Right		Position Y	Position X

Fig. 6.1: Factors that affect the flow direction of the medium that will be transported

6.4 Twin NG 70 spindle orientation

- Selecting input and output spindle orientation (see Fig. 6.2):
  - A spindle orientation
  - B spindle orientation

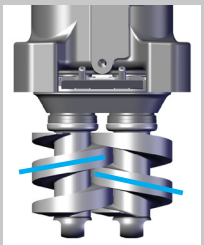
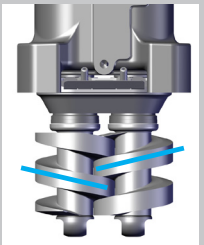
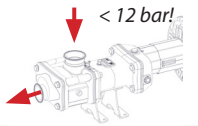
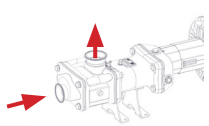
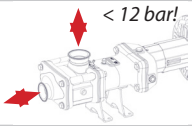
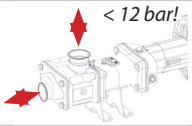
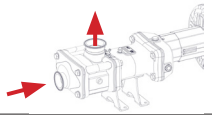
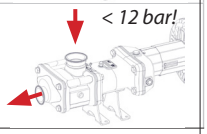
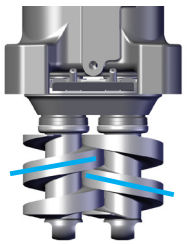
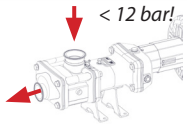
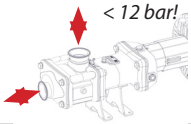
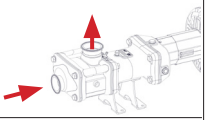
Size #70				Spindle orientation	
				A	B
Nozzle connecti-on size on the pump housing	DN 40/1 ½" DN 65/2 ½"				
Rotational direction Drive	Nozzle orientation on the pump housing Permitted			Flow direction	
	Top	Bottom			
Left	Pos. X	Pos. Y	Pin position		
left / right	Pos. Z	Pos. Z			
Right	Pos. Y	Pos. X			
< 12 bar! Note the 12 bar pressure limit when the pumped medium's flow direction is against the cover					

Fig. 6.2: A and B spindle orientations for a Twin NG 70

6.5 Twin NG 104/130 spindle orientations

- Selecting the input and output spindle orientations:
  - A spindle orientation (see Fig. 6.3)
  - B spindle orientation (see Fig. 6.4)

Size #104/#130	A – spindle orientation				
Nozzle connection size on the pump housing	#104: DN 65/2 ½“		#104: DN 80/3˝		
	#130: DN 100/4“		#130: DN 125/5˝		
	Nozzle orientation on the pump housing Permitted		Nozzle orientation on the pump housing		
Rotational direction Drive	Top	Bottom	Prohibited Top	Permitted Bottom	Flow direction
Left	Pos. X	Pos. Y	--	Pos. Y	
left / right	Pos. Z	Pos. Z	--	Pos. Z	
Right	Pos. Y	Pos. X	--	Pos. X	

Pin position

-- Prohibited nozzle orientation

< 12 bar! Note the 12 bar pressure limit when the pumped medium's flow direction is against the cover

Fig. 6.3: A spindle orientation for Twin NG 104 and Twin NG 130

Size #104/#130	B spindle orientation				
Nozzle connection size on the pump housing	#104: DN 65/2 ½“ #130: DN 100/4“			#104: DN 80/3˝ #130: DN 125/5˝	
	Nozzle orientation on the pump housing Permitted			Nozzle orientation on the pump housing	
Rotational direction Drive	Top	Bottom	Pin position	Permitted Top	Prohibited Bottom	Flow direction
Left	Pos. X	Pos. Y		Pos. X	--	
left / right	Pos. Z	Pos. Z		Pos. Z	--	< 12 bar!
Right	Pos. Y	Pos. X		Pos. Y	--	< 12 bar!

-- Prohibited nozzle orientation

< 12 bar! Note the 12 bar pressure limit when the pumped medium's flow direction is against the cover

Fig. 6.4: B spindle orientation for Twin NG 104 and Twin NG 130

7. Starting and stopping

7.1 Starting

Condition upon delivery:

- Fully assembled pump
- There is lubricating fat in the angular ball bearing
- Transmission and bearing housings are filled with gear oil
- No quenching medium in double-acting mechanical seal
  - In the event of adverse weather conditions: No quench medium in the sealing unit
- Storage/sealing pressure tank is neither fitted nor filled with a quench medium

7.1.1 Preparing the pump for its initial start-up

Preliminary activities

1. Wear personal protective equipment
2. Inspect the pump and all pump parts for signs of damage (visual inspection)
3. Clean the pump and its accessories before the initial start-up
4. Ensure that all of the safety devices (covers, limit switches, safety valve, level indicator, etc.) are installed correctly and that they are working
5. Ensure that the pump is designed for its intended use (see operating conditions in the technical data sheet)
6. Ensure that the pump is securely affixed to the baseplate
7. Check that the pressure, suction and slider valves are fully open

Working steps on the bearing/gear housings

1. Check that the venting screw on the bearing housing is correctly seated
2. Check the oil level indicator on the gearbox housing and top up if necessary through the sealing screw (2233)

Working steps on the sealing unit

- A single-acting mechanical seal has been installed if the mechanical seal cartridge was supplied with a plastic sealing screw:
  - ▶ Compare it with the technical data sheet
  - The connection to a storage/sealing pressure system is not needed
- A double-acting mechanical seal has been installed if there are hose nozzles on the seal retainer:
  - ▶ Compare it with the technical data sheet
  - ▶ Either connect a loss flushing system to the seal retainer/hose nozzles (see Fig. 5.4)
  - ▶ Or connect a storage/sealing pressure tank to the seal retainer/hose nozzle (see Fig. 5.5)

3. Check the sealing unit for correct filling and level: Quench medium (see technical data sheet)
4. If necessary, use the sealing pressure tank (sealing liquid pressure: approx. 1 – 2 bar higher than the back-pressure on the pumped medium side) to apply the required pressure to the quenching medium in the sealing chamber in the double-acting mechanical seal
5. Vent the sealing chamber and lines

Working steps on the storage/sealing pressure tank

1. Inspect for any damage
2. Check for leaks (especially after prolonged storage)
3. Flush the storage/sealing pressure tank to remove any contaminants
4. Check any additionally-attached measuring devices and monitoring units
5. Attach the supply and return connections
6. Fully open the shut-off valve if necessary
7. Fill with a product-compatible quenching medium – note the filling level
8. Use the storage/sealing pressure tank to vent the lines and sealing chamber
9. Set up the sealing pressure for the double-acting shaft seal on the sealing pressure tank: 1 – 2 bar above the operating pressure (see technical data sheet)
10. If you are using an external forced circulation system:
    - ▶ Ensure that the correct rotational direction (correct flow direction) is set up for the quench medium
    - ▫ The pipe that heats up during the start-up must go to the return connection on the storage/sealing pressure tank

7.1.2 Starting the pump

☑ The pump's rotational direction is set correctly
☑ The pump is filled with pumped medium
☑ The medium's flow direction is set in the correct flow direction
☑ Install an overpressure protection device if necessary

Working steps when starting up

1. Fully open the valves/sliders on the pressure and suction sides
2. The initial start-up: Run the pump at nominal pressure (see technical data sheet for the operating settings)
3. When starting up after a long downtime:
    - ▫ Rotate the pump manually to keep the shaft seals lubricated
    - ▫ Run the pump slowly (lowest speed)
4. Check the pump and pipes for leaks
5. Create a start-up report if necessary

7.2 Stopping the pump

7.2.1 Stopping the pump

1. Use the system controller to stop the pump's drive (switch it off)
2. If a nonreturn valve has not been installed: Close the shut-off valves (pressure and suction sides) after the rotor has stopped turning
3. If necessary:
    - ▫ Empty the pump
    - ▫ Depressurize the pump
    - ▫ Depressurize the sealing pressure tank
    - ▫ Disconnect the pump from the power supply
    - ▫ Lock and secure the main switch
    - ▫ Leave the pump to cool down
    - ▫ Clean the pump
4. Follow the drive manufacturer's instructions

7.2.2 Depressurizing the pump

Use the sliders or valves to release the pressure inside the pump via the upstream/downstream system sections (suction/pressure sides).

1. Slowly open the upstream and downstream sliders/valves
2. Release the pressure carefully
3. Always shut the slider/valve after depressurizing

7.2.3 Emptying the pump

1. Open the shut-off devices on the suction side so that the pump can only suck in air after it has been switched on again
2. Open the shut-off devices on the pressure side
3. Allow the pump to run for a few more revolutions until the pumping chambers have been emptied
4. Close the shut-off devices on the pressure and suction sides again

7.2.4 Disconnecting the pump

Preliminary activities

- ▶ Only start the necessary work after the pump has stopped
- ▶ Ensure that the pump and its auxiliary systems have been depressurized before opening it
- ▶ Disconnect the pump from the power supply and secure it against it being switched back on
- ▶ Abide by the drive manufacturer's instructions

Working steps when disconnecting the pump

1. Shut off the valves/sliders on the pressure and suction sides
2. Depressurize the pump
3. Empty the pump, collect the escaping liquid and dispose of it correctly
4. Leave the pump to cool down
5. Clean the pump immediately in the following cases:
   - ▫ For food pumps
   - ▫ If the pumped liquid tends to settle/harden
   - ▫ If the pumped medium hardens due to a chemical reaction
   - ▫ The pumped liquid might freeze if the pump is stored outdoors
6. Shut down the pump and remove it from the system
7. Have the electrics disconnected by qualified personnel
8. Disconnect the connections from the auxiliary systems and accessories (storage/sealing pressure tank, temperature sensor, pressure sensor, etc.)
9. Collect and correctly dispose of any escaping quench medium
10. If necessary, drain the gear oil and dispose of it correctly
11. Disconnect the pump from the pipeline system
12. Install suitable connecting pieces in the system
13. Open the pump cover to dry it out

8. Cleaning process for screw spindle pumps

- *For more detailed information about the cleaning processes* *see Chapter 14*
- *If in doubt, contact the manufacturer to ensure that the pump is suitable to undergo the selected cleaning process and, if necessary, any additional sterilization processes*
- *Take note of the maximum elastomer temperatures* *see Chapter 14.4.3*

The pumps, which are used to convey food, cosmetic, chemical or pharmaceutical products, must be cleaned before they are started up and before each production run.
How the pump is to be cleaned depends on the type of pumped medium used and the production conditions. This is why the operator should define a repeatable cleaning process.
Cleaning should be undertaken by well-trained cleaning personnel who are well-aware of the problems associated with microorganisms, cleaning processes and cleaning agents as well as their effects on elastomers/metal surfaces and they are kept up to date with the latest technology/science.

Cleaning / sterilization process options
- COP cleaning process (Cleaning Out of Place)
- CIP cleaning process (Cleaning In Place)
- SIP sterilization process (Sterilization In Place)

8.1 Before carrying out the cleaning work

- ☑ Always wear personal protective equipment *see Chapter 2.5*
- ☑ Shut down the pump and let it cool down *see Chapter 7.2.1*
- ☑ Depressurize the pump *see Chapter 7.2.2*
- ☑ Empty the pump *see Chapter 7.2.3*
- ☑ Depressurize the sealing pressure tank /system if necessary *see Chapter 9.10.6*
- ☑ Use suitable cleaning tools (e.g. do not use a brush that is too soft or too hard, a scraper, etc.)
- ☑ Always clean and disinfect the cleaning tools before starting the cleaning work

- ▶ Disconnect it from the power supply
- ▶ Lock the main switch in place against unintentional restarting
- ▶ Take note of the danger warnings and the safety data sheets for the cleaning agents being used
- ▶ Follow the detergent manufacturer's recommendations
- ▶ Only use cleaning agents that will not damage the sealing materials
- ▶ Clean and disinfect the cleaning tools before and after cleaning to prevent contamination
- ▶ Inspect the cleaning tools regularly for signs of damage or wear
- ▶ Replace a damaged or worn cleaning tool

8.2 Cleaning the external surfaces

☑ Use a commercial alkaline foam cleaner (with food approval)
(pH value: > 7, concentration: 2.0 to 5.0 %)
☑ Only use cleaning agents that will not damage the sealing materials

1. Rinse the pump's outer surfaces with water (approx. 40 °C)
2. Spray the pump with an alkaline foam cleaner and leave the cleaner on it for 5 to 20 minutes
3. Rinse the foam cleaner off using hot water (max. 100 °C)
4. Use a steam jet at low to medium pressure until the impurities are removed (distance from nozzle/pump: 200 to 300 mm)
5. Use a soft brush or a soft plastic scraper to remove any persistent impurities

8.3 Cleaning/sterilizing the internal surfaces

The CIP cleaning/SIP sterilization processes will have a severe affect on the elastomers. Therefore the cleaning agents used must match each other with regard to acidity/leach concentration, reaction time and temperature. The suitability of the cleaning agents to be used must be assessed for the relevant application.

☑ Only use cleaning agents that will not damage the sealing materials
☑ Use a commercial alkaline foam cleaner (with food approval)
(pH value: > 7, concentration: 2.0 to 5.0 %)
☑ SIP sterilization process: The pump that will be used must have been designed and approved for a SIP sterilization process (see technical data sheet)
☑ SIP sterilization process: The pump that will be used must be fitted with a pressure monitoring device that will immediately switch the system off if the pressure drops by 0.5 bar

1. Clean the pump according to the appropriate cleaning process see Chapter 14
2. After successful cleaning, sterilize the pump using the appropriate SIP sterilization process if necessary

8.4 Cleaning specific components after dismantling

▶ Clean the following components after dismantling:
  ▫ Thread and mating thread
  ▫ O-ring grooves
  ▫ Round and flat seal seating positions
▶ Proceed as follows to clean a component:
  ▶ If necessary, soak a component's contaminated areas with a cleaning agent
  ▶ Clean contaminated areas mechanically using a soft brush
  ▶ Rinse the cleaned areas
  ▶ Ensure that the cleaned areas are clean
  ▶ Repeat the cleaning if necessary

8.5 Cleaning special components

If one of the two or both of the **O-rings (9 and 2194**; see Fig. 8.1) on the input / output shafts fail or no longer seal reliably, then:

- The quench medium can get into the pumped medium and adulterate or contaminate the pumped medium
- The quench medium can get into the gaps in the pump and adulterate or contaminate the following components:
  - Spindle screw (2180) and threaded bolt (2180)
  - Input/output shafts (1000/2171)
  - Screw spindle (2200/2201)
  - Mechanical seal cartridge (2535)

▶ Failure of both O-rings must be prevented

▶ Note the maintenance intervals

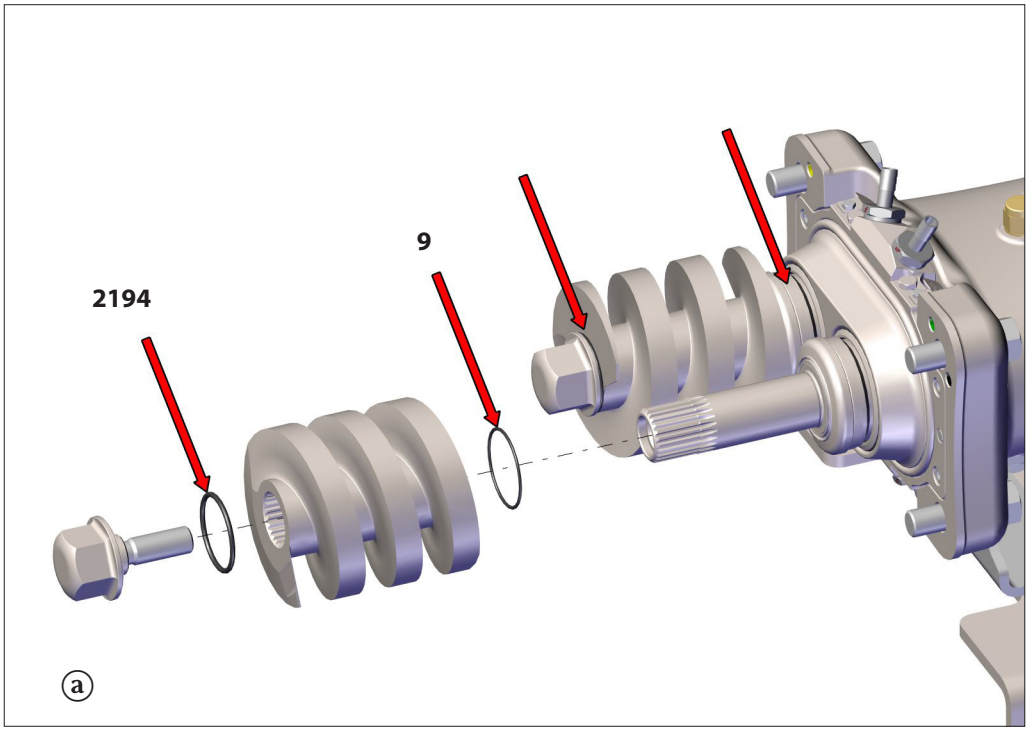


Fig. 8.1: Cleaning special components: Failure of O-ring 2194 and O-ring 9 on the input and output spindles

The following steps will be required in the event that these O-rings fail:

Dismantling and cleaning (see Fig. 8.2)**:**

1. Remove the cover (2528) from the pump housing — see Chapters 11.10 and 11.11
2. Dismantle the pump housing (2530) — see Chapters 11.10 and 11.11
3. Dismantle the spindle screw (2180) with the O-ring (2194) — see Chapter 11.12.1
   ▶ Dismantle the spindle screw's head and the threaded screw if necessary
   - The threaded screw is glued into the spindle screw's head by a high-strength thread-locking paste
4. Dismantle the screw spindle (2200 or 2201) — see Chapter 11.12.1
5. Dismantle the mechanical seal cartridge (2535) — see Chapter 11.15.2

6. Dismantle the seal retainer (2188) see Chapter 11.15.2
7. Manually clean all of the dismantled parts (Nos. 1 – 6) as well as the input/output shafts (1000/2171) – validated cleaning as per 3-A standard specifications
see Chapters 14.2 and 14.3

Assembling:

- ▶ Assembling is carried out in the reverse sequence to dismantling see Chapter 11.15.3
- ▶ Replace the O-rings
- ▫ Spindle screw (2180):
  - ▫ If the spindle screw head and threaded screw cannot be dismantled and cleaned:
    - ▶ Replace the spindle screw
  - ▫ If the spindle screw head and threaded screw can be dismantled and cleaned:
    - ▶ Glue the thread into spindle screw's head using high-strength thread-locking paste

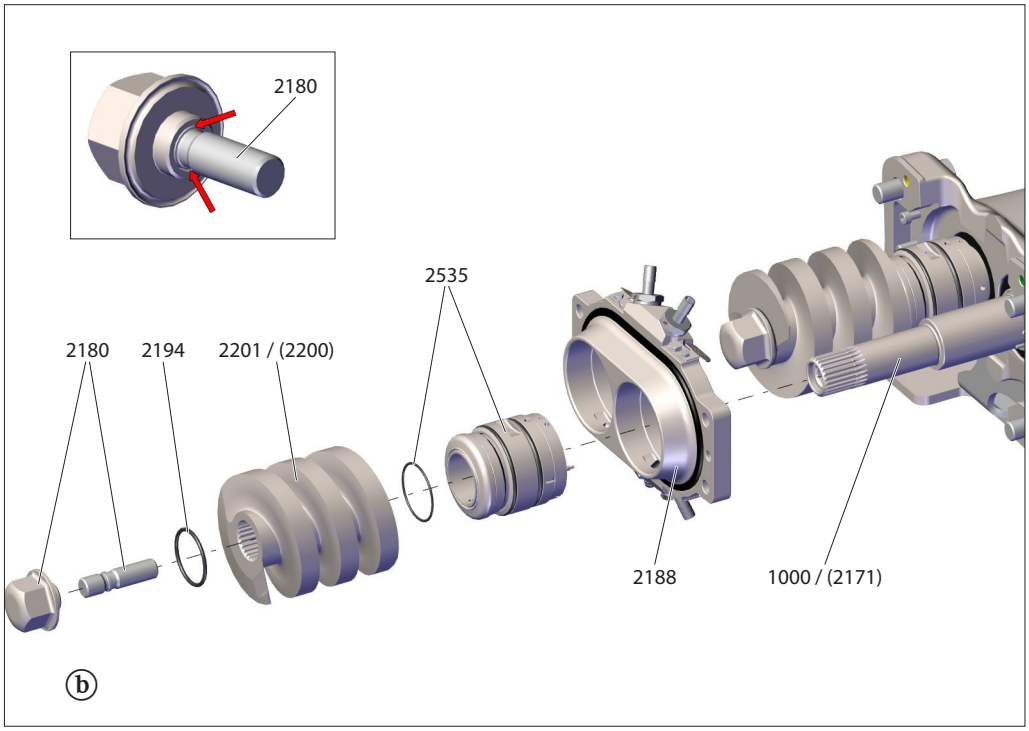


Fig. 8.2: Cleaning special components: Spindle screw, screw spindle, mechanical seal cartridge, seal retainer and input or output spindles

8.6 Cleaning the storage/sealing pressure tank

8.6.1 Cleaning the outside

▶ Cleaning the outer surfaces see Chapter 8.2

8.6.2 Cleaning the internal surfaces/lines

☑ Rinsing medium must be compatible with the quench medium
☑ Abide by the operator's specifications

1. Drain the quench medium
2. Clean the internal surfaces using a suitable cleaning agent (will depend on the quenching medium being used)
3. Rinse the internal surfaces

9. Service and repairs

9.1 Preliminary activities

The following steps must be completed before starting any inspection or service work:

- Always wear personal protective equipment
  see Chapter 2.5
- Stop the pump see Chapter 7.2.1
  - Disconnect it from the power supply
  - Lock and secure the main switch
  - Depressurize the pressurized sealing pressure tank
  - Completely empty and clean the pump for all service work (except for work on the storage/sealing pressure tank)

9.2 Requirements

9.2.1 General requirements

- Only use original spare parts
- Document all of the inspection and service work

9.2.2 Gear oil

The gearbox and bearing housing were filled with food-grade high-performance oil in the factory.

- Only use oil that is approved for use in the food industry
  - (FDA guideline 21 CFR 178.3570 – Approval: NSF-H1/USDA-H1/InS-H1)
- Never mix mineral and synthetic oils
- Never mix and use oils with different properties and/or oils from different manufacturers

Brand	Gear oil	Viscosity
Castrol (used in the factory)	Optileb Hy 68	ISO VG 68
AVIA (alternative)	AVIAFOOD GEAR 68	ISO VG 68
Mobil (alternative)	Mobil DTE FM 68	ISO VG 68

Tab. 9.1: Gear oil used at the factory or alternatives with H1 approval

The manufacturer recommends using the following filling quantities for the gearbox and bearing housing:

Pump sizes	Filling quantity of gear oil for gearbox and bearing housings [l]
Twin NG 70	0.4
Twin NG 104	0.7
Twin NG 130	1.2

Tab. 9.2: Gear oil filling quantity

9.2.3 Drive bearing lubricant

- See drive documents provided by the manufacturer

9.2.4 Thread locking paste

- Ensure compatibility between the cleaner and the thread locking paste. If the parts were cleaned with an aqueous cleaning solution prior to the thread locking paste being applied, then the hardening or the thread locking paste's properties might be affected
- If metal surfaces are inactive or the hardening rate is too slow: Spray all threads with a suitable activator and allow them to dry
- For through holes: Apply several drops to the bolt where the nut will sit
- For blind holes: Apply several drops along the inside of the thread to the bottom of the hole
- For sealing applications: Apply thread locking paste as a 360° ring to the start of the external thread. Leave the first thread turn free
- For larger threads and gaps: Proportion the thread locking paste quantity accordingly
- Use sealant and adhesive remover to loosen any hardened thread locking paste and then use mechanical cleaning to remove it

The manufacturer recommends that the following thread locking pastes should be used:

Brand	Anaerobic	Harde-ning	Viscosity	Thread connection up to
Weiconlock AN 302-70	Anaerobic	High	Medium viscosity	M20
Loctite 2400	Anaerobic	Medium	Medium viscosity	M36
Weiconlock AN 302-72	Anaerobic	High	High viscosity	M56

Tab. 9.3: Thread locking pastes used in the factory

9.3 Preventing premature elastomer wear

- Avoid frequent product changes
- Avoid using temperatures that are too high see Chapter 14.4.3
- The cleaning process, concentration, temperature and cleaning agent's reaction time must be precisely matched to each other
- Replace the seals (O-rings and shaft seals) as a precaution during regular service work
- Avoid too long and incorrect storage

9.4 Inspection intervals

- Inspection intervals must adapted to the specific system

Inspection interval	Assembling	Work to be carried out
Weekly	Gearbox housing	Visual inspection: ▶ Check oil level and oil quality ▶ Top up with gear oil if necessary ▶ Replace dark and almost opaque oil
	Bearing	▶ Listen for unusual noises
	Mechanical seal	Visual inspection: ▶ Listen for noises ▶ Look for leaks ▶ Consult the manufacturer or replace the mechanical seal if severe leaks occur
	Pump	Visual inspection: ▶ Document the pumping rate ▶ Compare the pumping rate with the technical data sheet
	Pump with mobile stand	▶ Check the position of the pump ▶ For position changes: Pump should be fitted with a permanent baseplate and/or fit articulated foot
	All screw connections	▶ Check screw connections and retighten as necessary
	Shaft seal ring / O-rings	Visual inspection: ▶ Look for leaks ▶ Consult the manufacturer or replace the mechanical seal rings/O-rings if severe leaks occur
	Storage/sealing pressure tank	Visual inspection: ▶ Check for constant set sealing pressure ▶ 1 – 2 bar pressure difference from the nominal pressure in the pump housing ▶ Check for loss of quench medium (filling level) and top up with quench medium if necessary ▶ Check for contaminated quench medium and replace the quench medium if necessary ▶ Check the mechanical seal, connections and pipelines for leaks

Tab. 9.4: Inspection intervals

9.5 Service intervals

- Service intervals must adapted to the specific system

Service interval	Assembling	Work to be carried out
After 50 operating hours	All screw connections	▶ Check screw connections and retighten as necessary
	Storage/sealing pressure tank	▶ Change the quench medium
After the first 250 operating hours, then every 3,000 operating hours / 1 year at the latest	Gearbox housing	▶ Change the gear oil ▶ Note the product compatibility
Monthly	Pump housing	▶ Check the spindle screw torque (2180)
Monthly To be set by the operator depending on the pumped medium / operating conditions	Screw spindles	▶ Check the gap size ▶ Replace screw spindles if pumping capacity is too low ▶ Replace screw spindles if damaged
Monthly / after 6 months at the latest	Shaft seal (mechanical seal) and storage/sealing pressure tank	▶ Change the quench medium ▶ Replace the quench medium if impurities are found ▫ If quench medium is contaminated: ▶ Check the shaft seal for dirt or replace it
After 500 cleaning cycles	Pump housing and mechanical seal	▶ Replace O-rings ▶ Check for contamination ▶ Service the mechanical seal if necessary
After 1 year	Shaft seal / O-rings	▶ Replace the shaft seal ring ▶ Replace the O-rings
After 5 years	Storage/sealing pressure tank	▶ Complete internal and external inspections (manufacturer's recommendation) ▶ Inspect all of the accessory parts
After 10,000 operating hours / shorten the intervals under difficult operating conditions	Gears and bearing	▶ Change the gears ▶ Replace the bearing
As per the drive manufacturer's instructions	Drive	▶ Inspect for wear ▶ Lubricate the bearing

Tab. 9.5: Service intervals

9.5.1 Service intervals for elastomers that are in contact with the product

- Service intervals must adapted to the specific system

Maintenance interval	Elastomer	Work to be carried out
After 100 operating hours/ 6 months at the latest	O-rings (2194 and 9) on the spindle screw and mechanical seal	▶ Check drive for dirt or leaks ▶ Replace the O-rings and spindle screw if necessary ▶ Clean as necessary
After 500 cleaning cycles		▶ Replace the O-rings ▶ Check for contamination ▶ Service the mechanical seal if necessary
After 1 year		▶ Replace the O-rings

Tab. 9.6: Service intervals for elastomers that are in contact with the product

9.6 Servicing the spindle screw and O-rings

☑ Preliminary activities must have been completed see Chapter 9.1

1. Remove all parts that come into contact with the pumped medium (both spindles, spindle screws with O-rings)
2. Clean and disinfect each part
3. Clean and disinfect the exposed input and output shafts
4. Undertake the cleaning procedure defined by the operator see Chapters 8 and 14
5. Replace any part showing signs of corrosion or scoring
6. Renew the O-rings on the spindle screws

9.7 Drain or replace the gear oil

☑ Preliminary activities must have been completed see Chapter 9.1

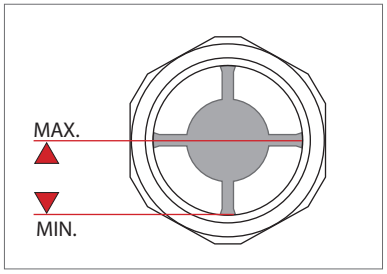


Fig. 9.1: Oil filling level glass

1. Place a suitable drip tray under the gearbox housing
2. Open the sealing screw (2233) (top of gear housing)
3. Open the sealing screw (2233) (bottom of gear housing)
4. Fully drain the gear oil from the gear and bearing housings
5. Clean both screw plugs (magnetic pin)
6. Screw in and tighten the lower sealing screw
7. Refill with new gear oil up to the maximum level indicator
8. Screw in and tighten the top sealing screw

9.8 Refilling with gear oil

☑ Preliminary activities must have been completed see Chapter 9.1

1. Wait approx. 3 min until the oil has collected in the tray
2. Read the filling level
3. Open sealing screw (top of gear housing)
4. Fill with gear oil up to the maximum level indicator
5. Clean the sealing screw (magnetic pin), screw back in and tighten

9.9 Servicing the mechanical seal

☑ Preliminary activities must have been completed see Chapter 9.1
▶ See Chapters 11.15 to 11.17
▶ See exploded drawings in Chapters 13.21 to 13.23

The pump is delivered with either a single-acting or double-acting mechanical seal cartridge (see technical data sheet).

Note the following specifications for the mechanical seals:
- Only single-acting mechanical seals are to be used in 3-A certified pumps
  - Double-acting mechanical seals are not permitted
- Single-acting or double-acting mechanical seals can be used in EHEDG certified pumps

▶ Remove a defective mechanical seal and replace it with a new one

or:

1. Mechanical seal cartridge
2. Dismantle the mechanical seal cartridge down to its separate parts
3. Carefully clean and disinfect the mechanical seal cartridge's separate parts
4. Carry out the cleaning procedure defined by the operator
5. Replace all of the O-rings in the mechanical seal cartridge
6. Replace any parts showing signs of corrosion or scoring

Single-acting mechanical seal

- Approved for use in both rotational directions
- Sliding surface wear is automatically compensated for through moving up
- Service-free

Double-acting mechanical seal

- Approved for use in both rotational directions
- Quench medium (storage/sealing liquid) is needed in the sealing chamber
- Sliding surface wear is automatically compensated for through moving up
- Service-free
- Leaks are impossible during normal operation

1. Check the double-acting mechanical seal's connections (hose nozzle) for correct seating and connections
2. Fill the sealing chamber with a product-compatible quench medium
3. Check the level in the storage/sealing pressure tank and top up if necessary
4. Pressurize the quenching medium from the sealing pressure tank if necessary
   ▶ Check the sealing liquid pressure (approx. 1 – 2 bar higher than the back-pressure on the pumped medium side)
5. Always vent after completing the service work on the shaft seal (sealing chamber and lines)

9.10 Servicing the storage/sealing pressure tank

WARNING!

Sealing pressure tank can be pressurized up to 25 bar!

☑ Preliminary activities must have been completed see Chapter 9.1

The manufacturer recommends that a level switch should be used to monitor the level, a manometer for the pressure and a thermometer for the temperature.
The manufacturer recommends using the optional manual refilling pump.

Note the following specifications for the storage/sealing pressure tank:

☑ Open the existing shut-off valves (ball valves) if necessary
☑ Quench medium in the storage/sealing pressure tank must be above the minimum filling level

- The viscosity of the quench medium should be < 10 cSt[1] (at operating temperature), to create a natural convection flow
  - The viscosity should be < 20 cSt with a forced convection flow
- The quench medium's temperature must be at least 40 °C below its boiling point
  - ▶ Cool the quench medium if necessary
- Fill the storage/sealing pressure tank so that it is bubble-free
- High quenching medium consumption or storage tank overflowing indicates slide ring wear or damaged secondary seals
- Only use original spare parts
- Only qualified specialist personnel are allowed to carry out repairs to the storage/sealing pressure tank.
- Welding on the storage/sealing pressure tank and any work that will result in the wall thickness being reduced is prohibited

9.10.1 Checking the minimum / maximum filling levels

The quench medium filling level must always be above the minimum filling level during operation, otherwise convection flow circulation will be interrupted (see Fig. 9.1, Fig. 9.2 and Fig. 9.3).

- ▶ Use the level indicator to check whether the quench medium is between the minimum and maximum levels
- ▶ Refill the storage/sealing pressure tank as necessary

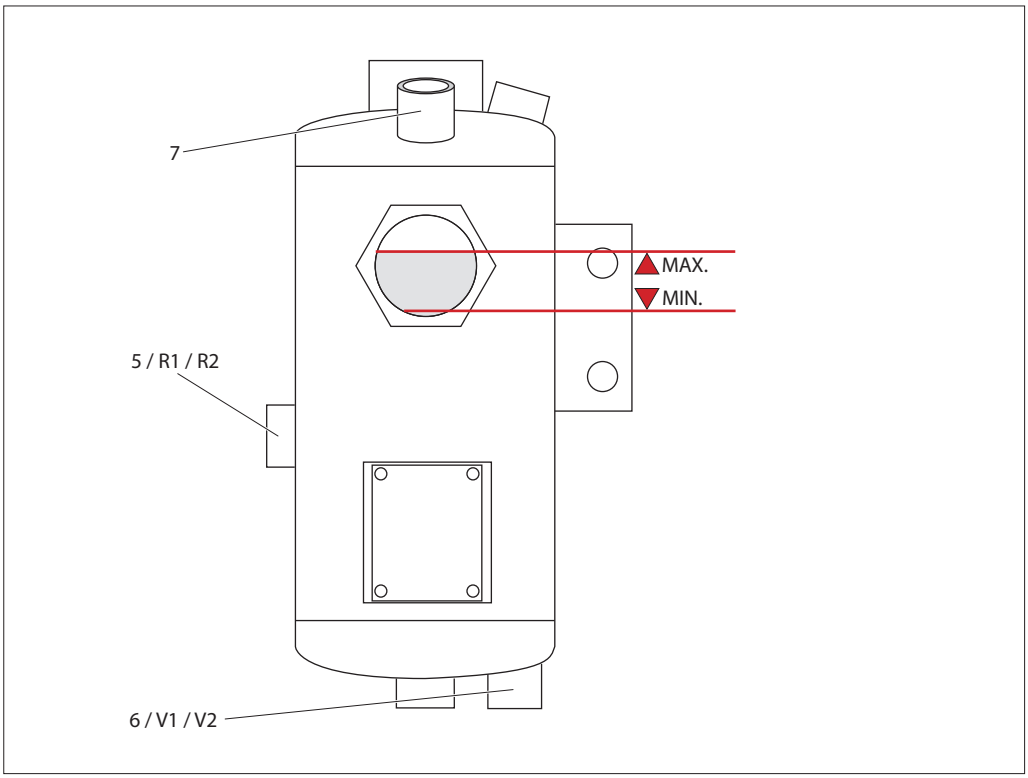


Fig. 9.2: Sealing pressure tank with connection options – Front view. See Chapter 13.24 for full list of spare part names

1 Stokes (St) = unit of kinematic viscosity. Statutory SI unit: m^2/s; but the cSt (centistokes) unit is used in practice.
Conversion: 1 St = 10^{-4} m^2/s = 1 cm^2/s
1 cSt = 10^{-6} m^2/s = 1mm^2/s

9.10.2 Venting the storage/sealing pressure tank, pipelines and sealing chamber

☑ Preliminary activities must have been completed see Chapter 9.1

Venting the sealing chamber and pipelines through the storage tank (see Fig. 9.2 and Fig. 9.3):

1. Open the venting screw (7) on the storage/sealing pressure tank
2. Vent the pipeline using the (open) venting screw
3. Open the venting valve on the sealing unit if necessary
4. Shut the venting screw on the storage/sealing pressure tank
5. If these activities do not produce the required result: see Chapter "9.10.3 Filling and venting the storage/sealing pressure tank/entire system"

9.10.3 Filling and venting the storage/sealing pressure tank/entire system

☑ Preliminary activities must have been completed see Chapter 9.1

Fully vent the entire system (sealing chamber/mechanical seal/pipelines) and refill so that it is bubble-free (see Fig. 9.2 and Fig. 9.3):

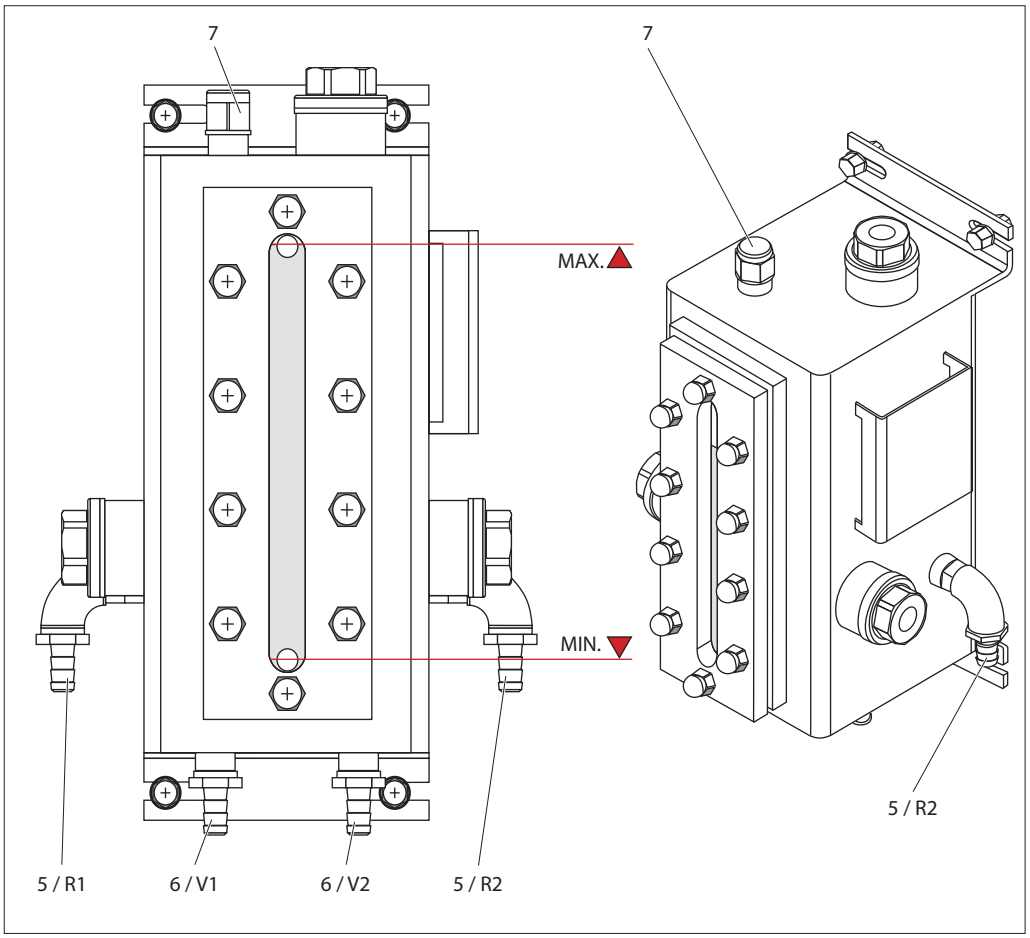


Fig. 9.3: Storage tank with connection options – Front and oblique views. See Chapter 13.25 for full list of spare part names

1. Undo the return connection (R1 or R2) on the storage/sealing pressure tank
   ▶ Open venting screw (7) or the venting valve on the sealing unit if necessary
2. Slowly fill in the quench medium via the filling connection (9) until
   - it either starts to escape from the sealing unit
     ▶ Close the sealing unit's venting valve
   - or continue topping up until it comes out at the end of the return line (connection to R1 or R2)
3. Screw the pipeline (R1 or R2) onto the storage/sealing pressure tank
4. Continue filling the storage/sealing pressure tank with quench medium up to the maximum fill level
5. Shut the venting screw (7) if necessary
6. Apply the required pressure to the sealing pressure tank

9.10.4 Fixing leaks

☑ Preliminary activities must have been completed see Chapter 9.1

1. Shut down the storage/sealing pressure tank
2. Retighten the screwed connections when it is in the depressurized state
3. Remove O-rings/seals if necessary
4. Clean the sealing surfaces
5. Fit new O-rings/seals
6. Tighten all of the screw connections

9.10.5 Apply the required pressure to the sealing pressure tank

▶ See Fig. 9.2
▶ Use the manual pump (optional) to apply the pressure

or:

1. Connect up a gas supply (inert gas, e.g. nitrogen)
2. Open the filling nozzle or the venting screw (7)
3. Blow in nitrogen to blow out air from the sealing pressure tank through the filling nozzle or venting screw
4. Shut the opening
5. Use the pressure regulator to set the nitrogen to the required pressure

9.10.6 Depressurizing the pressurized sealing pressure tank

▶ Use the pressure regulator to release the gas pressure

9.10.7 Pressure drop at the sealing pressure tank during operation

Pressure drop – Pressure in the sealing pressure tank equals the pressure on the pumped medium side

▶ Complete the working steps as described in Chapter 9.10.5

Pressure drop – Pressure on the pumped medium side is higher than the pressure in the sealing pressure system

☑ Preliminary activities must have been completed see Chapter 9.1

If, during a pressure drop, the pressure on the pumped medium side is higher than the pressure displayed on the sealing pressure tank, then the pumped medium can enter the sealing chamber and contaminate the quench medium.

Carry out the following working steps:
1. Drain the quench medium from the sealing pressure tank, pipeline and shaft seal and dispose of it correctly
2. Servicing the mechanical seal (see Chapter 9.9)
3. Fit a new or cleaned mechanical seal
4. Connect up the supply connections on the mechanical seal
5. Apply the required pressure to the mechanical seal from the sealing pressure tank

9.11 Sending a pump for repair

The pump can be sent to the manufacturer for repair.

Carry out the following working steps before returning it:
1. Contact the manufacturer and inform them about the shipping
2. Fully empty the pump and then clean it thoroughly
3. Seal all of the openings
4. Send the pump with the fully completed decontamination declaration to Pumpenfabrik GmbH. The decontamination declaration is available from the manufacturer upon request.

Address:	Wangen America 925 Cambridge Drive Elk Grove Village, IL 60007 USA
Tel.:	
Fax:	+49 7522 9970
E-mail:	+49 7522 997108 mail@wangen.com

10. Trouble shooting

Before starting any troubleshooting:
☑ Preliminary activities must have been completed see Chapter 9.1

10.1 Possible causes of shaft seal leaks

The shaft seal will not be working as intended in the event of major leaks. The following causes can be responsible for this:

- Dry running
- Counter ring installed lopsidedly
- Deposits on sliding surfaces
- Dirt, fat or oil on sliding surfaces
- Product layer build-up in front of and/or under the secondary seal
- The secondary seal sticks on the counter-sliding surface when the pump is started up after a long rest period
- Wear/damage to the secondary seal
- Wear/damage on the sliding surfaces
- Corrosion on the sliding surfaces or springs
- Incorrect assembly
- Vibrations are affecting the pump
- Lack of rigidity in the pump foundation
- Thermal shock loading
- Mechanical shock loading
- Axis misalignment / bearing damage

10.2 Electrical faults

▶ See the drive manufacturer's operating and maintenance manual

10.3 Pump malfunctions

Fault type	Possible cause	Elimination
Drive does not start	Power supply missing	▶ Check power supply
	Drive is defective	▶ Check drive
	Motor protection switch has tripped out	▶ Check electrical lines and drive for short circuits
Motor protection switch trips out	Drive is defective	▶ Check drive, replace drive if necessary
	Pressure is too high	▶ Reduce the pressure
	Blockage caused by impurities or a sticky pumped medium	▶ Remove any impurities
	Incorrect connection type	▶ Check that the connection is per the manufacturer's specifications
Pump does not start	Blocked by impurities	▶ Remove the impurities
	Deposits build up during a standstill	▶ Clean the pump immediately after a standstill
	Pumped medium hardens (due to temperature/chemical conditions)	
	Solids content is too high	▶ Check pumping conditions, change the project work if necessary
	System pressure is too high	▶ Compare the pump's nominal pressure against the system conditions, change the project work if necessary
Flow rate decreases or is no longer reached	Shut-off devices partially closed	▶ Fully open the shut-off devices
	Pipeline is blocked	▶ Clear the blockage
	Screw spindle is worn	▶ Check the gap size ▶ Replace screw spindle if necessary
	Air pockets in the pumped medium	▶ Check suction line, media supply and mechanical seal
	Defective mechanical seal	▶ Replace mechanical seal

Tab. 10.1: Possible malfunctions, causes and their elimination

Fault type	Possible cause	Elimination
Defects in the pump casing	Cavitation	▶ Ensure that there is a constant pumped medium inflow ▶ Check whether shut-off devices are fully open during pump operation
Loud pump noise	Damaged bearing	▶ Replace the angular ball bearing ▶ Replace the needle bearing ▶ Inspect the pump for damage
	Impurities in the pumped medium	▶ Remove any impurities ▶ Inspect the pump for damage
	Cavitation, speed too high or suction pipe too narrow/ clogged	▶ Check project work, select a lower speed if necessary ▶ Increase pipe cross-section ▶ Clear the blockage
Pump is not sucking in	Wrong rotational direction	▶ Correct the rotational direc-tion, note the direction arrow
	Screw spindles installed incorrectly	▶ Install the screw spindle (spindle orientation) as per the operating manual
	Suction line is clogged	▶ Clean the suction line
	Suction line is drawing in air	▶ Seal the line ▶ Check the filling level, e.g. in the tank
	Dry running	▶ Ensure there is a pumped medium supply
Mechanical seal is leaking	Worn O-ring or mechanical seal	▶ Replace O-ring or mechanical seal
	Pressure inside the pump casing is too high	▶ Reduce the pressure
	Pumped medium settles in the mechanical seal's spring and this prevents any mechanical seal adjustment	▶ Clean the mechanical seal regularly
	Pumped medium builds up on the mechanical seals	

Tab. 10.1 continued: Possible malfunctions, causes and their elimination

10.4 Storage / sealing pressure tank malfunctions

Fault type	Possible cause	Elimination
High quench medium consumption	Mechanical seal is worn	▶ Inspect the mechanical seal for damage, replace if necessary
	Improper pressure difference between sealing pressure tank and pumped medium	▶ Check sealing pressure, adjust if necessary
Storage/sealing pressure tank overflows	Mechanical seal is worn	▶ Inspect the mechanical seal for damage, replace if necessary
Quench medium is contaminated	Defective mechanical seal	▶ Replace mechanical seal
Insufficient pressure on the manometer	Leaks or high quench medium consumption	▶ Refill the sealing pressure tank with quench medium ▶ Check sealing pressure, adjust if necessary ▶ Inspect the mechanical seal
The temperature displayed on the sealing pressure tank is too high	Quench medium is below minimum filling level	▶ Refill the storage/sealing pressure tank with quench medium – level indicator must be between minimum and maximum
	Convection circulation interrupted by trapped air or a kink in the braided hose	▶ Vent the braided hose ▶ Eliminate the kink in the braided hose ▶ Fasten the braided hose so that it is monotonously dropping or rising
	Defective mechanical seal	▶ Inspect the mechanical seal, replace if necessary
	Temperature in pumped medium or ambient temperature is too high	▶ Connect an additional cooling circuit to the sealing pressure tank

Tab. 10.2: Possible malfunctions, causes and their elimination

10.5 Ordering spare parts

- The manufacturer recommends that you only use original spare parts

The information needed for ordering spare parts can be found on the machine's name plate, in the associated operating manual or in the technical data sheet.

▶ Always state the following information when ordering spare parts:
  - Pump's serial number
  - Spare part number (see Chapter 13)

Contact options for ordering spare parts:

Spare parts hotline:	+49 7522 997896
E-mail address for spare parts:	spareparts@wangen.com
Homepage – Spare parts service:	http://www.wangen.com/de/ersatzteile-zubehoer

Address:	Wangen America 925 Cambridge Drive Elk Grove Village, IL 60007 USA
Tel.:	+49 7522 9970
Fax:	+49 7522 997108
E-mail:	mail@wangen.com

11. Assembling and dismantling

The following apply in general to assembling/dismantling:

- Clean the components and inspect for signs of damage before assembling the pump
- Never use damaged components
- Provide suitable lifting equipment to lift or secure the pump, pump housing and drive
- Any eyelets attached to the drive are only intended for lifting the drive – not for lifting the entire pump
- Use suitable supports (e.g. wooden blocks) to support the pump/pump housing/drive/ separate components and secure them against tipping over
- Replace the O-rings and shaft seals
- Collect the oil from the gear and bearing housings and dispose of it correctly

11.1 Preliminary activities

The following steps must be completed before starting any inspection or service work:

1. Always wear personal protective equipment see Chapter 2.5
2. Stop the pumped medium supply
3. Stop the pump see Chapter 7.2.1
   - Disconnect it from the power supply
   - Lock and secure the main switch
4. Fully depressurize the pressure in the sealing pressure tank/sealing unit see Chapter 9.10.6
5. Fully depressurize the pressurized pump see Chapter 7.2.2
6. Fully empty and clean the pump see Chapter 7.2.3
7. Carrying out the assembling/dismantling work

11.2 Tools needed

Special tools are needed for the assembling and dismantling.

They are identified in the following chapters by the letter "T" (for Tool) and a four-digit tool number, e.g. T0038. If different tools are needed for the different pump versions, then the tool numbers are separated by a slash "/":

- Twin NG 70: First tool number
- Twin NG 104: Second tool number
- Twin NG 130: Third tool number

Information about the tool's number and name as well as a corresponding image of the tool can be found in the annex (see Chapter 15).
You can order these tools from Pumpenfabrik Wangen GmbH by stating the tool number.

- *Note the maximum tightening torques defined for the pump components* *see Chapter 15.2.1 in annex*
- *Note the torques for the general screw connections* *see Chapter 15.2.3 in annex*

11.3 Handling elastomers

- ▶ Elastomers (O-rings, shaft seals, etc.) that might come into contact with the food must be replaced during repair or servicing work
- ▶ Dispose of old elastomer in accordance with your local regulations
- ▶ Document when elastomers are renewed
- ▶ In the event of damaged elastomers (e.g. due to abrasion, mechanical damage, etc.) clean each part of the pump located behind the shaft seal

TAKE NOTE!

- ▶ *Ensure that the O-ring is not pushed in or out of the groove during assembly*

11.4 Storage and sealing pressure tank

Conditions:

☑ Preliminary activities must have been completed see Chapter 11.1

11.4.1 Dismantling

1. Depressurize the pressurized sealing pressure tank
2. Close any shut-off valves between the storage/sealing pressure tank and the pump
   - ▫ Quench medium will escapes if there are no shut-off valves
   - ▶ Collect and correctly dispose of any escaping quench medium
3. Disconnect the return lines (R1 and R2 from pump to storage/sealing pressure tank) at the top of the seal retainer
4. Disconnect the supply connections (V1 and V2 from storage/sealing pressure tank to sealing unit) at the bottom of the seal retainer
5. Collect and correctly dispose of any escaping quench medium
6. Shut off the hose or pipe connections correctly to avoid completely draining the storage/sealing pressure tank

11.4.2 Assembling

1. Mount a storage/sealing pressure tank according to DIN EN ISO 21049 approx. 1 – 2 m above the pump for optimum natural convection
   - ▫ If forced convection flows with cooling will be used, e.g. from an external pump or water management system, then the mechanical seals can be connected in series. The distance from the storage/sealing pressure tank can then be reduced
2. Connect the storage/sealing pressure tank and sealing unit using hoses or pipeline connections (preferably made of stainless steel) with a minimum nominal diameter of 8 mm, depending on the temperature and storage liquid being used
3. To ensure natural convection flow:
   - ▶ Connect each seal with its own line to its own storage/sealing pressure tank
   - ▶ Route the supply and return lines so that they drop or rise continuously
   - ▶ In particular, you must ensure that no kinks form in the hose lines
   - ▶ Ensure that no significant additional stresses act on the storage/sealing pressure tank (e.g. vibrations or connection forces)
4. Connect the V1 and V2 supply connections between the storage/sealing pressure tank and the sealing unit at the bottom of the seal retainer
5. Connect the R1 and R2 return connections between the storage/sealing pressure tank and the sealing unit at the top of the seal retainer

6. Open any shut-off valves between the storage/sealing pressure tank and the pump
7. Renew or refill with quench medium
8. Fully vent and check the mechanical seal/hose line/pipeline connection from the storage/sealing pressure tank
9. Apply the sealing pressure to the sealing pressure tank

11.5 Coupling guard and gear housing

Twin NG 70:

- The coupling guard and the gear housing are combined into a single component in the standard version (cast iron)
- The coupling guard and gear housing are designed as two parts In the special version (stainless steel) (see Chapter 11.7)

Tools:

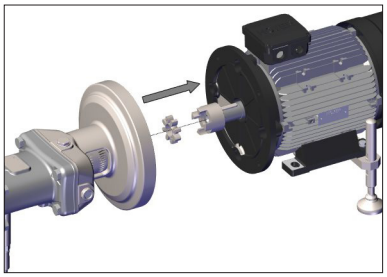
☑ Use a suitable base for supporting the drive and the pump (e.g. wooden blocks)
☑ T0046

Conditions:

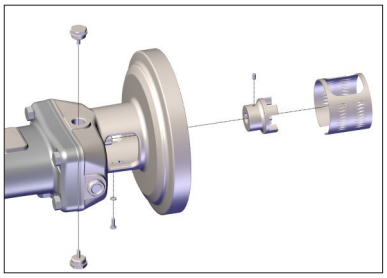
☑ Preliminary activities must have been completed see Chapter 11.1

▶ Standard version: see exploded-view drawing in Chapter 13.8
▶ Special version: see exploded-view drawing in Chapter 13.9

11.5.1 Dismantling

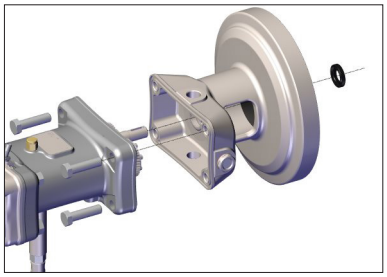


1. **Warning!** Danger of tipping over – Secure the pump and drive (e.g. use wooden blocks)
2. Undo the connections from the pump to the system's pipelines
3. If necessary, loosen the pump or drive connections with the baseplate
4. Undo the screw connections between the drive and the coupling guard/gear housing



5. Pull out the drive with the coupling claw and elastomer star (arrow)
6. Place the pump/drive on a suitable base (e.g. wooden blocks)
7. Drain and collect the oil from the gear and bearing housings – do this by loosening and removing both sealing screws (2233) on the gear housing

8. Remove the contact guard by loosening the hexagonal screw and washer on the coupling guard/gear housing
9. Turn the coupling claw until the grub screw appears in the window on the coupling guard/gear housing
   ▶ Undo the grub screw and then pull the coupling claw off of the drive shaft
10. Turn drive shaft so that the key can be lifted out of the drive shaft
11. **For special versions only:** Undo the cylinder screws (2520) on the coupling guard (2517) and then remove it together with the positioning pins (2516) from the gear housing (2172)
12. Undo the hexagon screws in the bearing housing – coupling guard/gear housing
13. Pull the coupling guard/gear housing with shaft seal ring off of the drive shaft
    ▫ This will destroy the shaft seal ring



14. Press the shaft seal ring out of its seat in the coupling guard/gear housing
15. Remove O-ring from gear housing
16. Remove the O-rings on the hexagon screws

11.5.2 Assembling

Assembling is carried out in the reverse sequence to dismantling:

▶ Lightly apply fat to the shaft sealing ring and carefully press it into the gear housing using a mounting cone (T0046)
  ▫ The shaft seal ring's tension spring points into the gear housing
▶ Slide the gear housing over the drive shaft and then insert the cylinder pins
  ▫ Use the cylinder pins to adjust the gear housing
▶ Fill the gear and bearing housings with gear oil

11.6 Drive and coupling guard

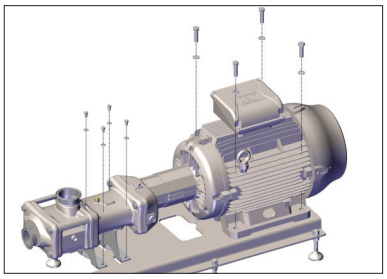
Twin NG 104 and Twin NG 130:
Drive and coupling guard standard version

Tools:
☑ Use a suitable base for supporting the drive and the pump (e.g. wooden blocks)

Conditions:
☑ Preliminary activities must have been completed see Chapter 11.1

▶ See exploded-view drawing in Chapter 13.11

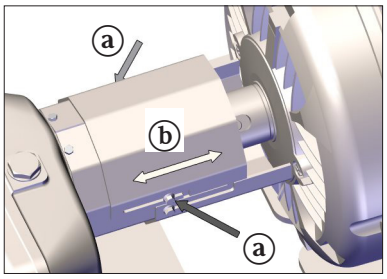
11.6.1 Dismantling



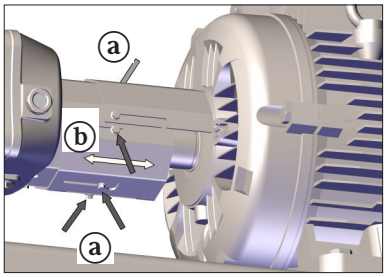
1. **Warning:** Danger of tipping over – Secure the pump and drive (e.g. use wooden blocks)

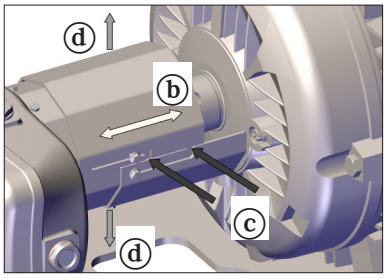
2. Undo the connections from the pump to the system's pipelines

3. If necessary, loosen the pump or drive connections with the baseplate
   ▶ When loosening the drive, mark the drive's contact surface insulations (2266) to help you aligning the shafts (drive/pump) according to their positions later on



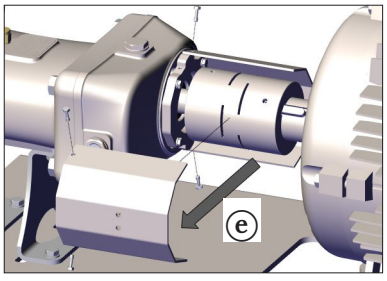
4. Only loosen the screws on the side of the coupling guard (top and bottom; arrow ⓐ), so that the coupling guard can be moved (arrow ⓑ)
   ▶ Do not fully unscrew the screws





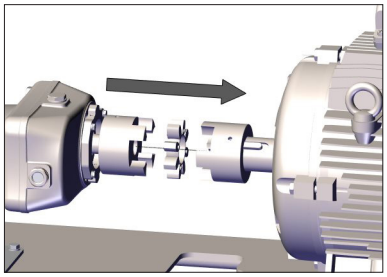
5. Slide the clutch guard up to the stop (arrow ⓒ)

6. Lift off the top and bottom of the coupling guard (arrow ⓓ)



7. Undo the screw connections in the non-movable coupling guard (side shells) at the top and bottom

8. Remove the side shells (arrow ⓔ)



9. Remove the drive from the pump
10. Place the pump/drive on a suitable base (e.g. wooden blocks)
11. Remove and store the elastomer star

11.6.2 Assembling

Assembling is carried out in the reverse sequence to dismantling:

1. Insert the elastomer star in the coupling (replace if necessary)
2. Connect the drive to the pump
3. Align the drive to the pump (see Chapter 5.10)
4. Tighten screw connections (pump and drive)
5. Fit the coupling guard
    6. Side shells (non-movable)
    7. Coupling guard (movable)
    8. Tighten the side screws
9. Screw pump and drive onto the baseplate if necessary

11.7 Drive and "Lantern" coupling guard

Twin NG 104 and Twin NG 130:

Tools:

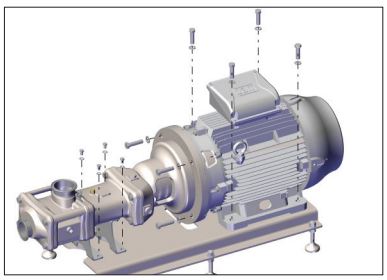
☑ Use a suitable base for supporting the drive and the pump (e.g. wooden blocks)

Conditions:

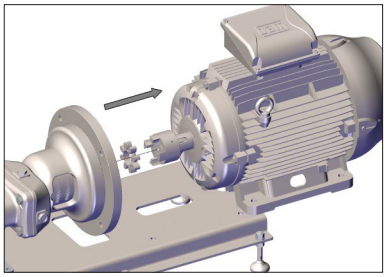
☑ Preliminary activities must have been completed see Chapter 11.1

► See exploded-view drawing in Chapter 13.10

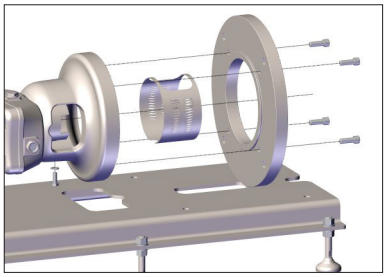
11.7.1 Dismantling



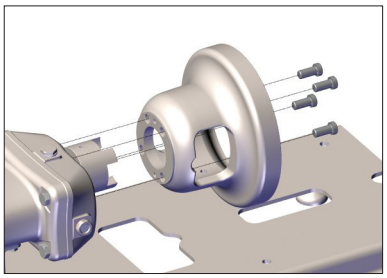
1. **Warning:** Danger of tipping over – Secure the pump and drive (e.g. use wooden blocks)
2. Undo the connections from the pump to the system's pipelines
3. If necessary, loosen the pump or drive connections with the baseplate
    ► When loosening the drive, mark the drive's contact surface insulations (2266) to help you aligning the shafts (drive/pump) according to their positions later on



4. Undo the screw connections between the drive and the drive flange
5. Move the drive away from the pump (violet arrow)
6. Place the pump/drive on a suitable base (e.g. wooden blocks)



7. Remove and store the elastomer star
8. Undo the cylinder screws on the drive flange and remove the flange adapter
9. Remove the contact guard by loosening the hexagonal screw on the "Lantern" coupling guard



10. Undo the cylinder screws inside the "Lantern" coupling guard going to the gear cover
11. Remove the "Lantern" coupling guard

11.7.2 Assembling

- *It is not necessary to align the pump to the drive with a "Lantern" version*

Assembling is carried out in the reverse sequence to dismantling:

1. Screw the "lantern" coupling guard onto the gear housing
2. Insert the elastomer star in the coupling (replace if necessary)
3. Connect the drive to the pump
   - ▶ Claw coupling: Set up the axial displacement by positioning the claw coupling
     see Chapter 5.10.3
4. Connect and tighten the screw connection between the drive and the pump

11.8 Coupling

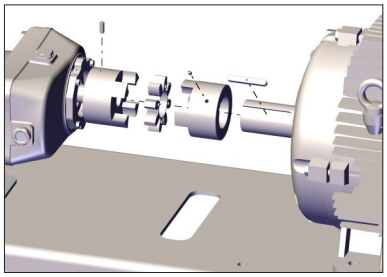
Twin NG 104 and Twin NG 130:

Tools:
☑ Puller
☑ Winder

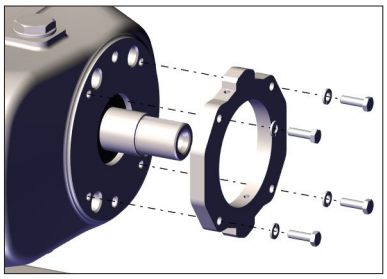
Conditions:
☑ Preliminary activities must have been completed — see Chapter 11.1
☑ Dismantle the drive — see Chapters 11.6 and 11.7

▶ See exploded drawings in Chapters 13.10 to 13.11

11.8.1 Dismantling



1. Rotate the drive shaft until you can access the grub screws in the clutch claw
2. Undo the threaded pins in both clutch claws
3. Use the puller to detach the clutch claws from the drive shafts



4. Press both keys off of the drive shaft using screws that can be screwed in and then remove them
5. Undo the hexagon screws in the flange plate (coupling guard)
6. Remove the flange plate

11.8.2 Assembling

Assembling is carried out in the reverse sequence to dismantling:

1. Screw the flange plate onto the gear housing
2. Insert the key in the drive shaft
3. Lightly apply fat to the drive shaft
4. Slide the coupling guard onto the drive shaft
   - ▶ Either use a winder or
   - ▶ Heat the coupling half to approx. 80 °C (remove the elastomer beforehand) and assemble

TAKE NOTE!

- ▶ *Never use a mallet to mount the coupling on the input shaft*
- ▶ *Ensure that the coupling halves are aligned with each other*

5. Screw the threaded pins into the coupling element and tighten
6. Fit the drive and coupling guard

11.9 Gearbox housing

Twin NG 104 and Twin NG 130:

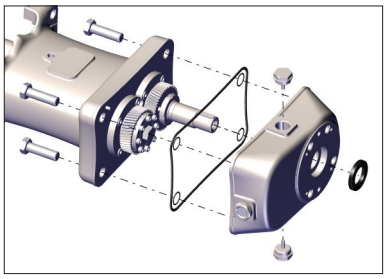
Tools:
☑ Rubber mallet
☑ T0047 / T0088

Conditions:
☑ Preliminary activities must have been completed — see Chapter 11.1
☑ Drive dismantled — see Chapters 11.6 and 11.7
☑ Coupling dismantled — see Chapter 11.8

▶ See exploded-view drawing in Chapter 13.12

▫ *We recommend that you inspect or replace the shaft seal ring during service work on the gear housing*

11.9.1 Dismantling



1. Fully drain the oil from the gear and bearing housing
   ▶ Open the upper and lower sealing screws (2233) with sealing rings on the gear housing
   ▶ Collect and correctly dispose of any escaping oil
2. Undo and remove the hexagon screws on the bearing housing
3. Carefully pull the gear housing off of the bearing housing
   ▶ Tap lightly with a rubber mallet if necessary
   ▫ Gear housing is adjusted by the cylinder pins
4. Remove O-ring from gear housing
5. Remove the O-rings on the hexagon screws
6. Press shaft sealing ring out of the gear housing
   ▫ This will destroy the shaft seal ring

11.9.2 Assembling

Assembling is carried out in the reverse sequence to dismantling:

1. Clean the sealing surfaces on the bearing and gear housings
2. Clean shaft seal ring seat and the drive shaft
3. Lightly apply fat to the shaft seal ring and then carefully press it into the gear housing using a mounting cone (T0047 / T0088)
   ▫ The shaft seal ring's tension spring points into the gear housing

TAKE NOTE!

- *Ensure that the shaft seal ring sits plane-parallel to the input shaft*
- *Do not tilt it when pressing it in*
- *Do not use mallet taps to press in the shaft seal ring*
- *Ensure the press-in force is applied close to the outer diameter*
- *Do not damage the sealing lip during assembly*

4. Place the O-ring on the gear housing
5. Place the hexagon screw O-rings on the gear housing
6. Slide the gear housing over the drive shaft and onto the cylinder pins
   - Use the cylinder pins to adjust the gear housing
7. Screw the hexagon screws into the gear housing and tighten them crosswise
8. Screw the lower sealing screw with a new seal into the gear housing and tighten – note the torque (see Tab. 15.1)
9. Refill the gear and bearing housings with oil
10. Screw the upper sealing screw with a new seal into the gear housing and tighten – note the torque

11.10 Cover and pump housing

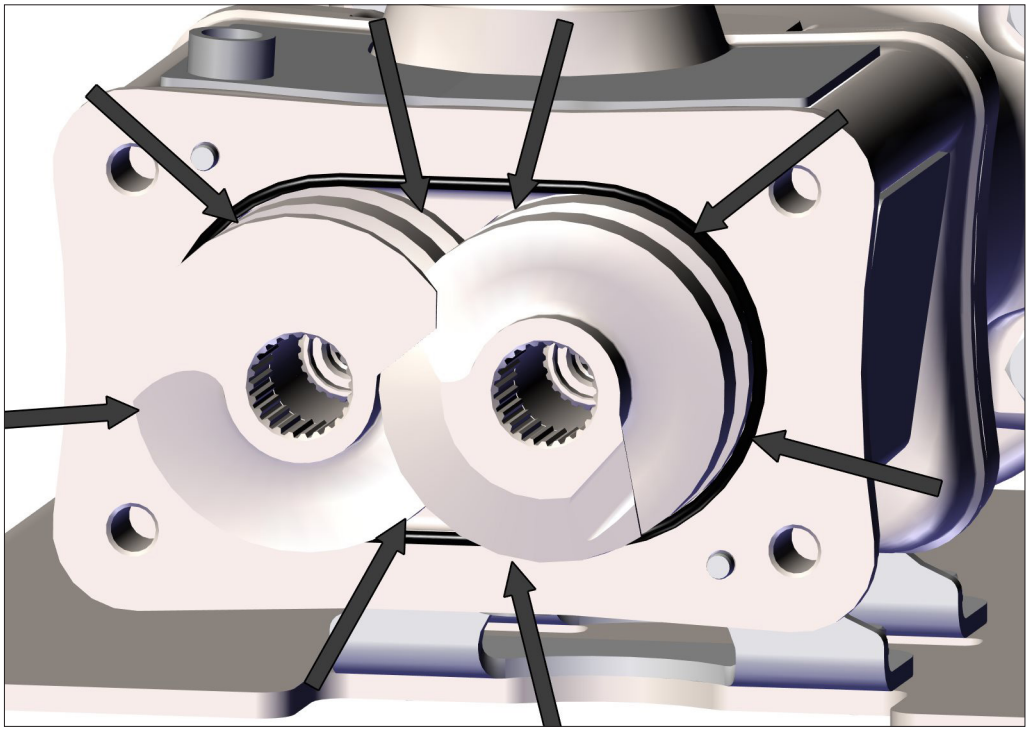


Fig. 11.1: Put protective film around screw spindles during the assembling and dismantling work

▶ *We recommend that you insert a protective foil (provided by the operator) between the pump housing and the screw spindles when carrying out assembling or dismantling work*
- *This will prevent any abrasive marks (forming on screw spindles and the inner surface of the pump housing)*

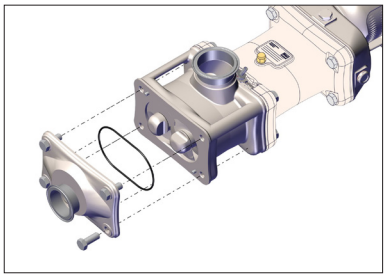
Tools:
☑ Suitable lifting gear
☑ Use a suitable base for supporting the pump housing (e.g. wooden blocks)
☑ Rubber mallet

Conditions:
☑ Preliminary activities must have been completed see Chapter 11.1
☑ Pump removed from the system / connecting pipe in front of the pump

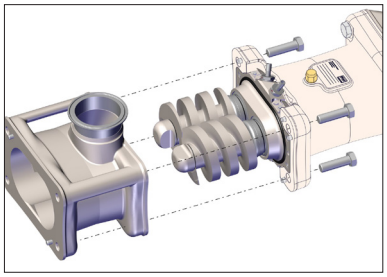
Pump housing sizes	Connecting flange size	Weight [kg] Cast metal housing	Weight [kg] Solid material
Twin NG 70	DN40	12	20
Twin NG 70	DN65	12	20
Twin NG 104	DN65	18	32
Twin NG 104	DN80	18	32
Twin NG 130	DN100	26	50
Twin NG 130	DN125	25	46

Tab. 11.1: Different pump housing weights

11.10.1 Dismantling



1. Undo the screw connection on the pump housing's cover
2. Remove the cover and O-ring from the pump housing
   ▶ Tap lightly with a rubber mallet if necessary
   - Cover is adjusted by the cylinder pins
3. Slide the protective film inbetween the pump housing and the screw spindles
4. Undo the screw connections between the bearing and pump housings
5. **Warning!** Danger of tipping – support the pump housing or use lifting gear to secure it against tipping over



6. Remove the pump housing
   - ▶ Tap lightly with a rubber mallet if necessary
   - ▫ Pump housing is adjusted by the key pins
7. Remove O-ring

11.10.2 Assembling

Assembling is carried out in the reverse sequence to dismantling:

1. Clean cover and seal seat
2. Insert the O-ring in the cover
3. Clean the pump housing (inside)
4. Push the pump housing (with protective film) over the screw spindles and screw it onto the bearing housing
5. Remove the protective film
6. Place the cover on the appropriate positioning pins on the pump housing (see Chapter 6)
7. Screw in the hexagon screws (1016 and 2527) and tighten them crosswise – note the torque (see Tab. 15.1; see Chapter 13.17)

11.11 Solid pump housing

☑ Note the weight see Tab. 11.1

There is a hexagon screw with seal at both ends of a "solid pump housing"The following working steps must be completed before the pump housing can be dismantled and lifted safely:

1. Undo the hexagon screw with seal
2. Screw a suitable eyebolt into the thread (operator's side)
3. Attach a suitable sling to the solid pump housing and then use a suitable lifting device
4. Other dismantling/assembling see Chapter 11.10
5. Replace the eyebolts with hexagonal screws with seals after dismantling/assembling

11.12 Screw spindles

Tools:
- ☑ T0036 / T0038 / T0038 for non-hexagon spindle screws (older pump models)
- ☑ T0162 / T0163 /T0163 for hexagon spindle screws (newer pump models)
- ☑ Steel mandrel

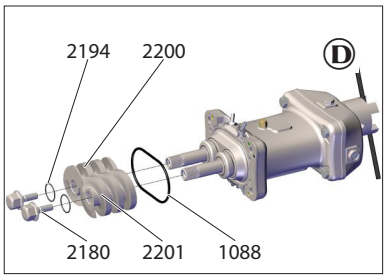
Conditions:
- ☑ Preliminary activities must have been completed — see Chapter 11.1
- ☑ Pump removed from the system / connecting pipe in front of the pump

Twin NG 70 (standard cast iron version):
- ☑ Drive dismantled — see Chapter 11.5
- ☑ Coupling guard / gear housing and coupling dismantled — see Chapter 11.5

Twin NG 70 (special stainless steel version) and Twin NG 104/130):
- ☑ Drive and coupling guard dismantled — see Chapter 11.6 or Chapter 11.7
- ☑ Coupling dismantled — see Chapter 11.8
- ☑ Gear housing dismantled — see Chapter 11.9

Conditions for continuing (for all versions)
- ☑ Cover and pump housing dismantled — see Chapter 11.10

11.12.1 Dismantling



1. Undo the spindle screws (2180) and then unscrew them (T0036 / T0038 / T0038 or T0162 / T0163 / T0163)
   - ▶ Lock the drive shaft with a steel mandrel Ⓓ, do this by inserting the steel mandrel inbetween the claws on the pump-end coupling
2. Remove the O-rings (2194) from the spindle screws
3. Remove the O-ring (1088) on the seal retainer
4. Pull the screw spindles (2200 and 2201) off of the input/output shafts.
5. Inspect the screw spindles, shafts and pump housing for damage and clean – replace if necessary.

11.12.2 Assembling

- ▶ *Always push the screw spindles onto the shafts in pairs.*
- ▶ *Ensure that the spindles are arranged correctly and that the correct conveying direction will be used (see Chapter 6 as well)*
- ▶ *Screw spindles might have to be synchronized using the drive gears*

Assembling is carried out in the reverse sequence to dismantling:

Conditions:

☑ Screw spindles, spindle screws, seal retainer, mechanical seal cartridge, input/output shafts, cover and pump housing were all cleaned

1. Renew both O-rings (2194) on the spindle screws
2. Place the O-Rings (2194) in the grooves in the spindle screws

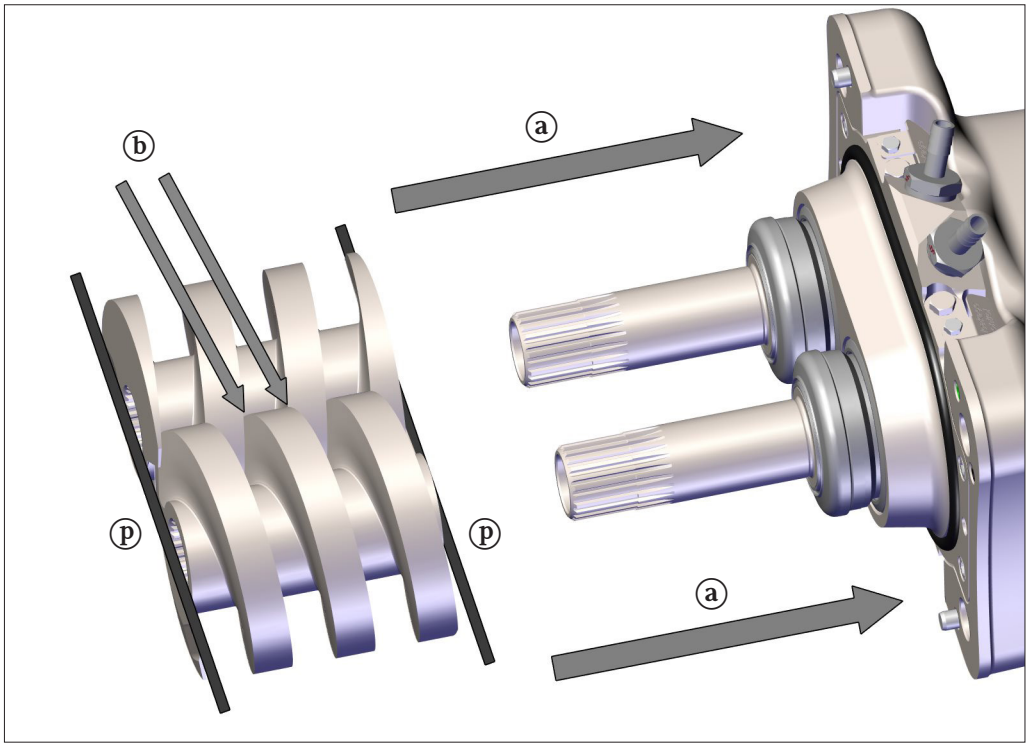


Fig. 11.2: The screw spindles are pushed on in pairs

3. Push the screw spindles in pairs onto the input/output shafts (arrow ⓐ in Fig. 11.2)
4. Tighten the spindle screws (2180) by hand.
   - When they stop against the screw spindles:
     - ▶ Tighten alternately with "feeling" using wrenches (T0036 / T0038 / T0038 or T0162 / T0163 / T0163)
     - ▶ Ensure that the screw spindles do not press against each other and scratch each other
5. If both screw spindles are lying flat (ⓟ marks in Fig. 11.2) on both mechanical seal cartridges and there is also a gap (arrow ⓑ in Fig. 11.2) between the two screw spindles:
   - ▶ Tighten both spindle screws (2180) on the input and output shafts (T0036 / T0038 / T0038 or T0162 / T0163 / T0163) – note the torque (see Tab. 15.1)
   - ▶ Use a steel mandrel Ⓓ to lock the input shaft (see Fig. in Chapter 11.12.1)
   - ▶ Do this by inserting a steel mandrel between the claws on the pump-end coupling
   - ▶ Use a feeler gage to check the gap on the screw spindle flanks
6. If only one of the two screw spindles is lying flat against the mechanical seal cartridge and the other screw spindle has a gap between the mechanical seal cartridge and the screw spindle:
   - ▶ Synchronize the screw spindles (see Chapter 11.13)
   - ▶ Check the gap between the spindles

- If the values have changed compared to the documented values:
  - ► Repeat the synchronization process (see Chapter 11.13)

7. Insert the O-ring (1088) in the groove in the seal retainer
   - ► Ensure that it is seated correctly
8. Slide the pump housing over the screw spindles and onto the positioning pins
   - ► Check the positioning of the positioning pins (see Chapter 6.3)

11.13 Synchronizing the screw spindles

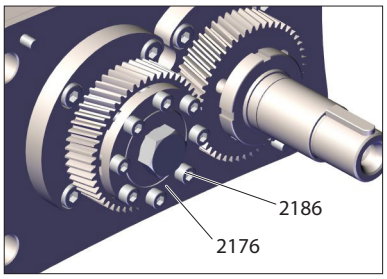
Tools:
☑ Feeler gage

Conditions:
☑ Preliminary activities must have been completed — see Chapter 11.1
☑ Pump removed from the system / connecting pipe in front of the pump

Twin NG 70 (standard cast iron version):
☑ Drive dismantled — see Chapter 11.5
☑ Coupling guard / gear housing and coupling dismantled — see Chapter 11.5

Twin NG 70 (special stainless steel version) and Twin NG 104/130):
☑ Drive and coupling guard dismantled — see Chapter 11.6 or Chapter 11.7
☑ Coupling dismantled — see Chapter 11.8
☑ Gear housing dismantled — see Chapter 11.9

Conditions for continuing (for all versions)
☑ Cover and pump housing dismantled — see Chapter 11.10



1. Arrange the interlocking screw spindles in pairs so that they are at one level (Ⓟ markings in Fig. 11.2)

2. Push the two screw spindles together onto the input/output shafts (arrow ⓐ in Fig. 11.2)
   - ► Pay attention to how the screw spindles are arranged

3. Secure both spindle screws on the input and output shafts:
   - ► Ensure that the screw spindles do not touch
     4. Screw in the spindle screws
     5. Tighten alternately by hand
     - ► Do this by holding both shafts and spindles in your hands
6. Lock the cylinder screws (2186) so that the hub (2176) can be moved
7. Use a feeler gage to set the gap between the spindles on the two screw spindles. (arrow ⓑ in Fig. 11.2)
   - Default gap: 0.2 mm
8. Check and document the gaps on all of the screw spindle flanks that are almost touching
9. Fit the synchronization clamping ring (2515) and fasten it with the cylinder screw (2186)
   - ► Tighten the cylinder screws alternately by hand

10. Tighten the cylinder screws (2186) crosswise after setting the gaps as stipulated – note the torque (see Tab. 15.1)
11. Repeat working step 8
    - Synchronizing the screw spindles has been successfully completed when both screw spindles lie flat against the two mechanical seals
    - Carry out the following working steps if there is still a gap between the mechanical seal cartridge and the screw spindle after or during synchronization

If the output shaft's spur gear must be offset:

12. Mark the tooth on the output spur gear and the corresponding counterpoint on the bearing cover (1227) with a marker pen to create a reference point for offsetting the spur gear
13. Remove the key from the input shaft
14. Undo the output shaft's hexagon screw (2177) and remove it with the washer (2178).
    - ▶ Place the socket wrench (T0039 / T0040 / T0041) on the output shaft (on the screw spindle end) to hold it in place
15. Only pull off the output spur gear (2184) and hub (2176) (T0009 / T0112 / T0113) until the two spur gears (2183 and 2184) no longer mesh
16. Offset the output spur gear by one tooth (in the left or right direction)
17. Use a rubber mallet to drive the output spur gear and hub back onto the output shaft
18. Repeat work steps 7 to 9
    - Synchronizing the screw spindles has been successfully completed when both screw spindles lie flat against the two mechanical seals
    - Repeat steps 15 to 18 if there is still a gap between the mechanical seal cartridge and the screw spindle
19. Fit the synchronization clamping ring (2515) and fasten it with the cylinder screw (2186)
    - ▶ Tighten the cylinder screws alternately by hand
20. Repeat working step 10

11.14 Pump housing arrangement

The orientation of the nozzle housing and the arrangement of the positioning pins on the pump housing are also responsible for the pumped medium's flow direction.

▶ *Note the conveying direction specifications (see Chapter 6)*

11.15 Mechanical seal cartridge / seal retainer

The following instructions apply to both single-acting and double-acting mechanical seal cartridges (Chapters 11.15.1 – 11.15.3).

11.15.1 Preparing a new mechanical seal cartridge

When a new mechanical seal cartridge is delivered, it has a transport lock fitted to it. Three brackets are attached with hexagon socket screws on the end facing away from the product. The transport lock must be removed before this mechanical seal cartridge can be used.

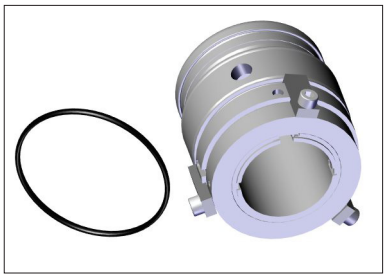
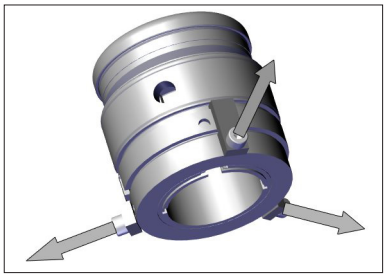
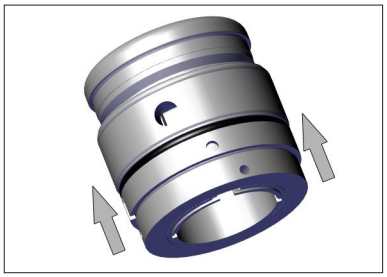


Fig. 11.3: Delivery condition of a new mechanical seal cartridge (single-acting / double-acting)



1. Undo the hexagon socket screws (3 x)
2. Remove the screws and the transport lock

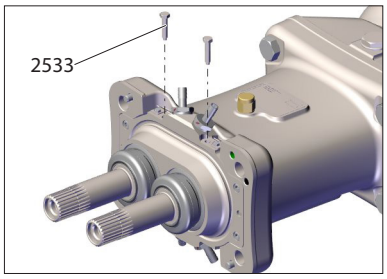


3. Insert the O-ring in the groove where the transport lock was attached

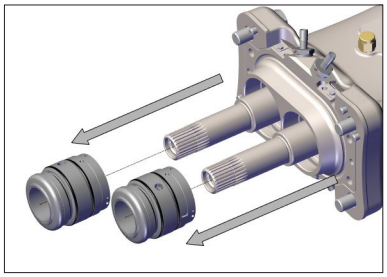
11.15.2 Dismantling the mechanical seal cartridge / seal retainer

Tools:
- ☑ T0081 / T0085 / T0089
- ☑ Steel mandrel

Conditions:
- ☑ Preliminary activities must have been completed — see Chapter 11.1
- ☑ Pump removed from the system / connecting pipe in front of the pump
- ☑ Cover and pump housing dismantled — see Chapter 11.10
- ☑ Screw spindle dismantled — see Chapter 11.12
- ☑ Drive shaft locked with a steel mandrel (10 – 12 mm) through a hole in the pump end's coupling claw

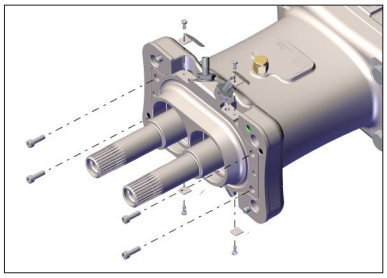


1. Undo the fixing screws (2533) on the seal retainer

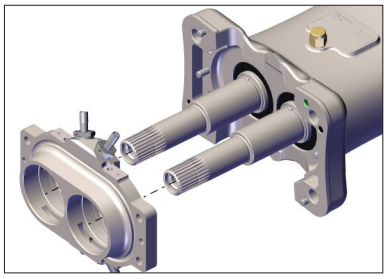


2. Pull both mechanical seal cartridges off the input/output shafts and out of the seal retainer
   - ▫ If the mechanical seal cartridge jams in the seal retainer:
     - ▶ Dismantle the mechanical seal cartridge together with the seal retainer
     - ▶ Push out the mechanical seal cartridge from the back of the seal retainer

Complete the following working steps to fully dismantle the seal retainer



3. Undo the Savetix screws (2532) on the seal retainer
4. Remove the Savetix hexagon screws and the contact guard (2286)
5. Loosen and remove the cylinder screws in the seal retainer



6. Remove the seal retainer
7. Clean the seal retainer, mechanical seal cartridges, input/output shafts and bearing housing

11.15.3 Assembling the mechanical seal cartridge / seal retainer

Assembling is carried out in the reverse sequence to dismantling or use the alternative assembly working steps:

Conditions:

☑ Input and output shafts, seal retainer and bearing housing have been cleaned
☑ Replace the mechanical seal cartridge if necessary

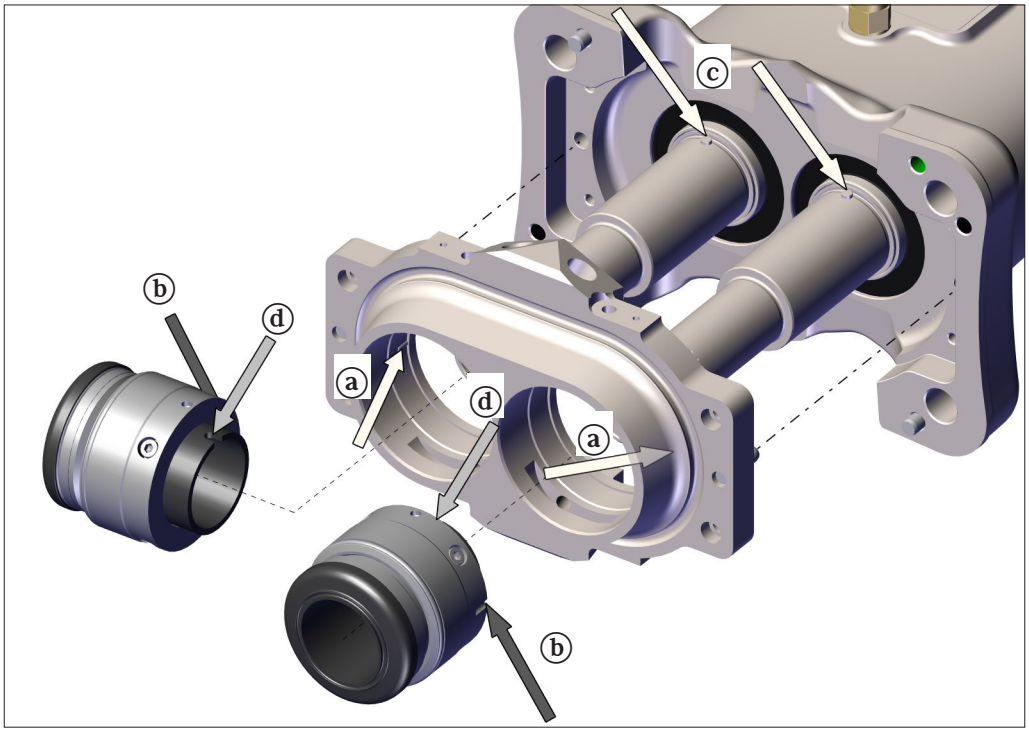
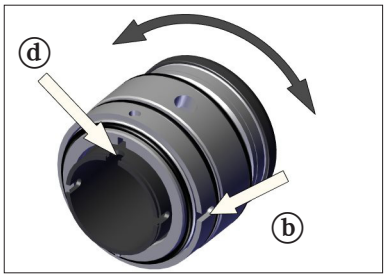


Fig. 11.4: Positioning pin ⓐ, Positioning groove ⓑ, Drive pin ⓒ and Drive nut ⓓ

1. Lightly apply fat to the input/output shafts and the seal retainer using an approved lubricant
2. Insert the seal retainer in the bearing housing
   ► Positioning is realized using the aligning pin 2536 (see Chapter 13.21)
3. Use the cylinder screws (2259) to fasten the seal retainer onto the bearing housing



4. Turn the mechanical seal cartridges manually (turning arrow) so that the positioning pin 2538 (see Chapter 13.21; arrow ⓐ in Fig. 11.4) in the seal retainer engages with the positioning groove (arrow ⓑ) in the mechanical seal cartridge. Ensure that the driver pin 2541 (arrow ⓒ) for the input/output shafts slides into the drive groove (arrow ⓓ) in the mechanical seal cartridge

5. Carefully push the adjusted mechanical seal cartridges over the input and output shafts
   ▶ Take note of the correct orientation of the mechanical seal cartridges
      ▫ The end with the drive groove points in bearing housing direction

- ▫ *The drive pins on the input/output shafts engage the drive grooves in the inner rotating slide rings*
- ▫ *Positioning pins that engage the positioning grooves (long groove) in the outer stationary slide rings always sit on the outside of the seal retainer in the 9 o'clock/3 o'clock positions*
- ▫ *The positioning pins make it easy to find the correct position on the outer stationary slide rings to screw in the fixing screws*
  - ▫ *The holes for the fixing screws point upwards*
- ▶ *When fitting the mechanical seal cartridge, you should align the positioning groove in the outer stationary mechanical seal to the outside and then slide it onto the shaft*

6. Press in the mechanical seal cartridge (T0081 / T0085 / T0089)
   ▫ Positioning/drive groove and position/drive pin should visibly engage in each other
7. Use the fixing screws to secure and tighten the position of the mechanical seal cartridge
8. Fit the Savetix hexagon screws (2532) and contact guard (2546 / 2547) on the seal retainer

Alternative assembly working steps: Insert the mechanical seal cartridge into the non-installed seal retainer

1. Lightly apply fat to the input/output shafts and the seal retainer using an approved lubricant
2. Turn the mechanical seal cartridges manually (turning arrow) so that when the mechanical seal cartridge is being inserted in the seal retainer, positioning pin 2538 (see Chapter 13.21; arrow ⓐ in Fig. 11.4) in the seal retainer engages with the positioning groove (arrow ⓑ) in the mechanical seal cartridge
   ▶ Take note of the correct orientation of the mechanical seal cartridges and the seal retainer
   ▶ Insert the mechanical seal cartridges into the seal retainer and press them in (T0081 / T0085 / T0089)
3. Push the pre-assembled seal retainer (with both mechanical seal cartridges) over the input and output shafts and up to the bearing bracket stop
   ▫ Drive groove and drive pin should visibly engage in each other
4. Use the fixing screws to secure and tighten the position of the mechanical seal cartridge
5. Fit the Savetix hexagon screws (2532) and contact guard (2546 / 2547) on the seal retainer

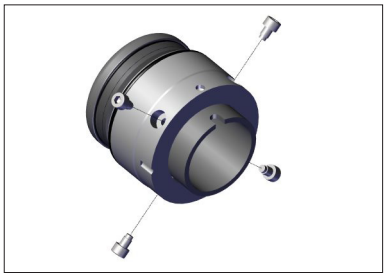
11.16 Dismantling a single-acting mechanical seal cartridge

TAKE NOTE!

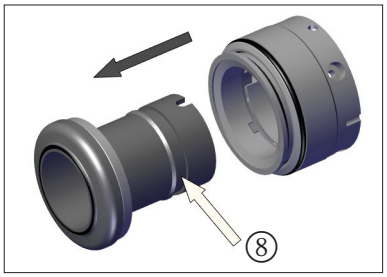
- *Ensure that separate parts of the mechanical seal cartridges are not scratched or damaged*
- *Avoid any contamination, e.g. dust, fingerprints, etc.*
- **Never** *operate mechanical seals with missing springs or without their springs*

▶ See exploded-view drawing in Chapter 13.22

11.16.1 Dismantling

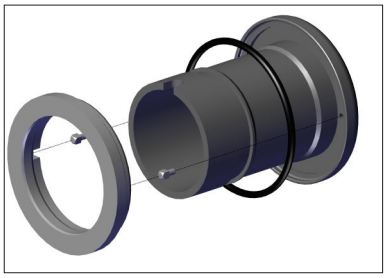


1. Undo the cylinder screws
   - As locking paste was applied to the cylinder screws, the locking paste will be destroyed when they are unscrewed
   - The cylinder screws engage in the groove in the shaft sleeve ⑧, but they are not firmly connected to it
   - The shaft sleeve can be turned



2. Completely remove the locking paste from the cylinder screw's thread and where the cylinder screw was seated

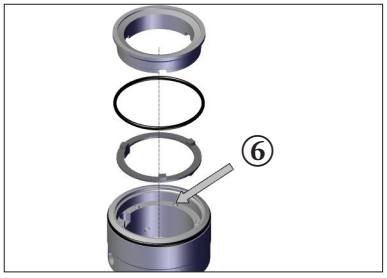
3. Press the shaft sleeve and rotating slide ring out of the gland



4. Separate the rotating slide ring from the shaft sleeve
   - The two pins that position the rotating slide ring are loosely seated in the square notches in the rotating slide ring or in the shaft sleeve

5. Remove the pins

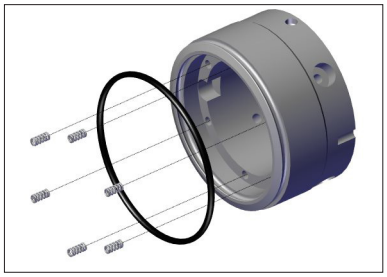
6. Remove the O-rings from the shaft sleeve or the rotating slide ring



7. Prevent the springs ⑥ from falling out of the gland in an uncontrolled way by placing the mechanical seal cartridge in an upright position

8. Remove the stationary counter ring from the gland

9. Remove the O-ring from the stationary counter ring or remove it from the gland



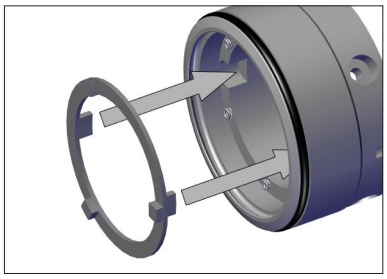
10. Remove the pressure ring from the gland

11. Take the springs out of the gland
    - The springs are loose in the gland

12. Remove the O-ring from the gland's outer rim

11.16.2 Assembling

Reassembling the single-acting mechanical seal cartridge is carried out in the reverse order to dismantling it.
The following points must also be noted:



1. Clean all of the parts before assembling them

2. Replace the O-rings

3. Replace the slide ring and counter ring as necessary

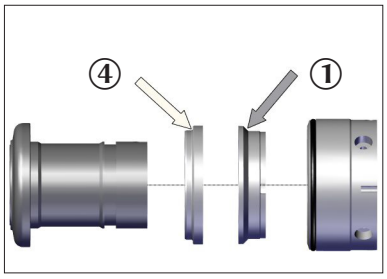
4. Take note of the correct orientation of the pressure ring:
    - The two lugs must point towards the inside of the gland
    - The two lugs on the pressure ring sit in the two notches during assembly

- *The slide ring and counter ring can be made from different materials, depending on the design*

▶ *Ensure that the slide ring and counter ring are correctly arranged in the mechanical seal cartridge*

Rotating slide ring properties:
- *Stepped profile ④*
- *Smaller than a counter ring*

Stationary slide ring properties:
- *Slanted profile ①*
- *Three notches that engage with the lugs on the pressure ring*
- *Wider than a slide ring*



5. Ensure that the arrangement is correct when installing the stationary counter ring ① or a rotating slide ring ④

6. Apply medium-strength locking paste to the cylinder screw and then screw it in

11.17 Dismantling a double-acting mechanical seal cartridge

- *The manufacturer recommends using a suitable clamping device/assembly aid when dismantling the mechanical seal cartridge*
- *Two people will be needed for the following working steps if this is not available*

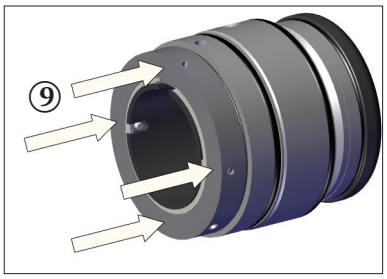
Tools:
☑ Clamping device/assembly aid see Chapter 16
☑ Circlip pliers

▶ See exploded-view drawing in Chapter 13.23

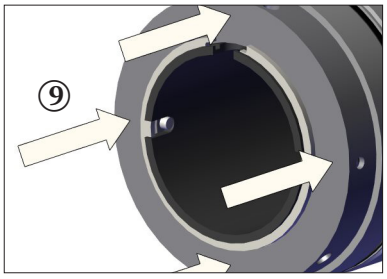
TAKE NOTE!

- ▶ *Ensure that separate parts of the mechanical seal cartridges are not scratched or damaged*
- ▶ *Avoid any contamination, e.g. dust, fingerprints, etc.*
- ▶ **Never** *operate mechanical seals with missing springs or without their springs*

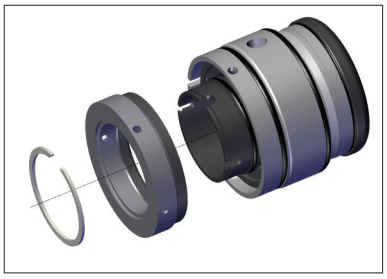
11.17.1 Dismantling



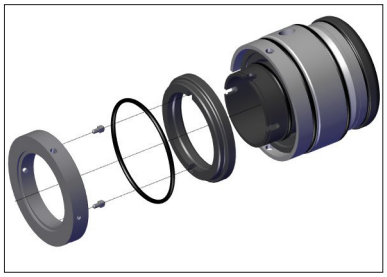
1. Press the mechanical seal cartridge's housing ⑨ together evenly (arrows) until the drive pin makes contact with the shaft sleeve
   - The locking ring will be exposed



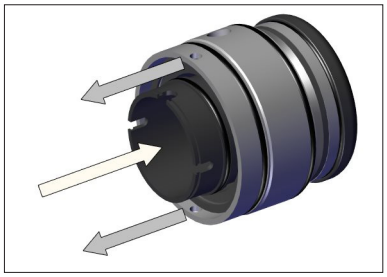
2. Use the circlip pliers to remove the circlip
3. Remove the mechanical seal cartridge from the assembly aid if necessary



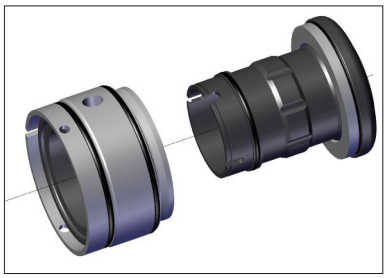
4. Remove the housing and the rotating slide ring



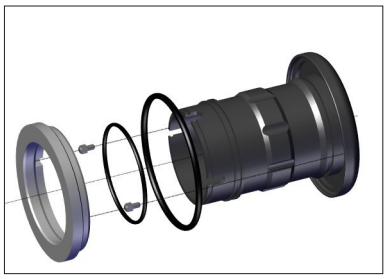
5. Separate the rotating slide ring from the housing
   - The two pins that position the rotating slide ring are loosely seated in the square notch in the rotating slide ring or in the housing
6. Remove the pins



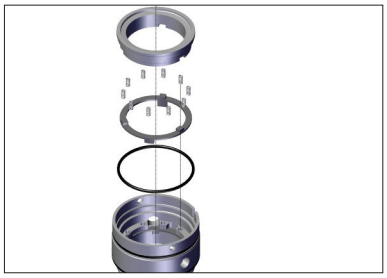
7. Remove the O-ring from the rotating slide ring
8. Press the shaft sleeve and rotating slide ring out of the gland



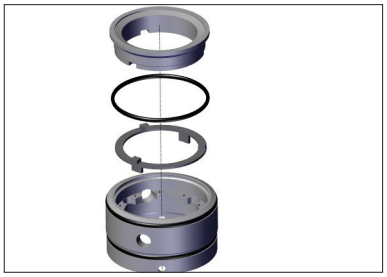
9. Separate the rotating slide ring from the shaft sleeve
   - The two pins that position the rotating slide ring are loosely seated in the square notches in the rotating slide ring or in the shaft sleeve

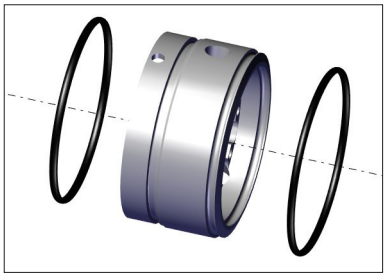


10. Remove the pins
11. Remove the O-rings from the shaft sleeve or the rotating slide ring



12. Prevent the springs from falling out of the gland in an uncontrolled way by placing the mechanical seal cartridge in an upright position
13. Remove the stationary counter ring and O-ring from the gland
14. Remove the O-ring from the stationary counter ring
15. Remove the pressure ring from the gland
16. Remove the springs
    - The springs are loose in the gland





17. Turn the mechanical seal cartridge by 180° and then place it in an upright position
18. Remove the stationary counter ring from the gland
19. Remove the O-ring from the gland's groove
20. Remove the pressure ring from the gland
21. Remove the O-rings on the outside of the gland

11.17.2 Assembling

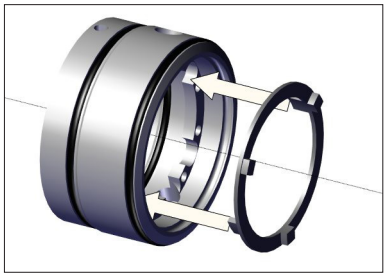
Reassembling the double-acting mechanical seal cartridge is carried out in the reverse order to dismantling it.
The following points must also be noted:

- *The slide ring and counter ring can be made from different materials, depending on the design*
- *The two slide rings are usually made from the same material and are identical in shape*

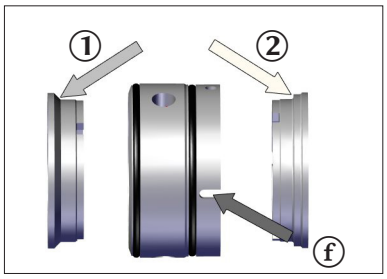
▶ *Ensure that the slide ring and counter ring are correctly arranged in the mechanical seal cartridge*

Rotating slide ring's properties ⑤:
- *Sits on the end facing the pumped medium or the atmospheric end*
- *Stepped profile*
- *Two square notches for the pins (see position number ⑭, Chapter 13.23)*

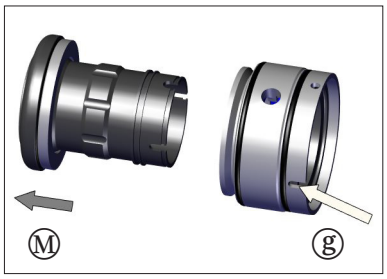
Properties of the two stationary counter rings ① and ②:
- *Sits on the end facing away from the pumped medium or the atmospheric end*
- *Stepped shape (②) and slanted profile (①)*
- *Three square notches for the pressure ring lugs*
- *Engages in the elongated notch in the gland (ⓕ)*



1. Clean all of the parts before assembling them
2. Replace the O-rings
3. Replace the slide ring and counter ring as necessary
4. Take note of the correct orientation of the pressure ring:
   - The two lugs must point towards the inside of the gland
   - The two lugs on the pressure ring sit as mirror images of each other in the two notches during assembly



5. Ensure that ey are arranged correctly when you install the two stationary counter rings (① and ②)
6. Ensure correct arrangement of the gland end
   - The end of the gland facing away from the pumped medium can be identified by the elongated notch on the gland (arrow ⓕ)



7. Ensure that the three notches on the stationary counter rings fit on the lugs on the pressure rings (arrow ⓖ)
8. When inserting the shaft sleeve, you must ensure that the shaft sleeve or gland is correctly oriented
   - End facing the pumped medium (arrow Ⓜ)

11.18 Gearing

Tools:
☑ T0009 / T0112 / T0113
☑ T0017 / T0029 / T0030
☑ T0039 / T0040 / T0041

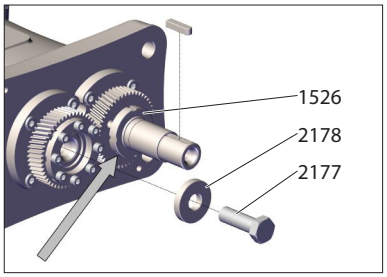
Conditions:
☑ Preliminary activities must have been completed — see Chapter 11.1
☑ Pump removed from the system / connecting pipe in front of the pump

Twin NG 70 (standard cast iron version):
☑ Drive dismantled — see Chapter 11.5
☑ Coupling guard / gear housing and coupling dismantled — see Chapter 11.5

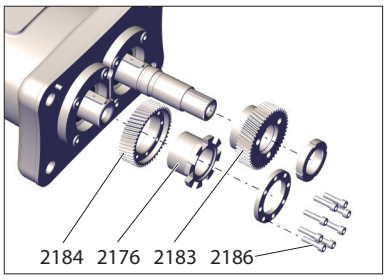
Twin NG 70 (special stainless steel version) and Twin NG 104/130):
☑ Drive and coupling guard dismantled — see Chapter 11.6 or Chapter 11.7
☑ Coupling dismantled — see Chapter 11.8
☑ Gear housing dismantled — see Chapter 11.9

Conditions for continuing (for all versions)
☑ Cover and pump housing dismantled — see Chapter 11.10
☑ Screw spindle dismantled — see Chapter 11.12
☑ Mechanical seal and seal retainer have been dismantled — see Chapter 11.15.2

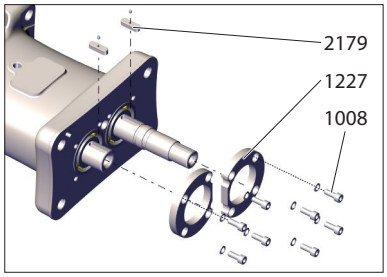
11.18.1 Dismantling



1. Remove the key from the input shaft
2. Place the socket wrench (T0039 / T0040 / T0041) on the output shaft (at the screw spindle end) to hold it in place and then undo hexagon screw (2177)
3. Undo hexagon screw (2177) on the output shaft
4. Remove hexagon screw (2177) and washer (2178).
5. Loosen the grub screw (gray arrow) on the shaft nut (1526):
   ▶ Unscrew by one or two turns



6. Use a socket wrench (T0017 / T0029 / T0030) to undo and remove the shaft nut from the input shaft
7. Undo the cylinder screws (2186)
8. Remove the cylinder screws (2186) and clamping ring
9. Use the puller (T0009 / T0112 / T0113) to pull the spur gear (2183) off of the input shaft
10. Pull the spur gear (2184) and hub (2176) off the output shaft (T0009 / T0112 / T0113)



11. Undo the cylinder screws (1008)
12. Remove the cylinder screws (1008), washers and bearing cover (1227)
13. Remove the keys (2179) from the input/output shafts

11.18.2 Assembling

Assembling is carried out in the reverse sequence to dismantling:

11.19 Bearing, input and output shafts

- *The Twin NG 70 and Twin NG 104 have a drive pin (2541) on the input and output shafts – they do not have to be dismantled*
  - *The Twin NG 130 does not have these two drive pins*
- *When dismantling the drive pins:*
  - ► *Completely remove all of the locking paste residue*
- *When installing the drive pins:*
  - ► *Use the high-strength thread-locking paste to glue in the drive pins*

Tools:

☑ Hooked puller
☑ Circlip pliers
☑ Puller
☑ T0010 / T0019 / T0020
☑ T0011 / T0031 / T0032
☑ T0012 / T0033 / T0034
☑ T0080 / T0084 / T0087
☑ T0091 / T0093 / T0094
☑ T0092 / T0095 / T0096

Conditions:

☑ Preliminary activities must have been completed — see Chapter 11.1
☑ Pump removed from the system / connecting pipe in front of the pump

Twin NG 70 (standard cast iron version):

☑ Drive dismantled — see Chapter 11.5
☑ Coupling guard / gear housing and coupling dismantled — see Chapter 11.5

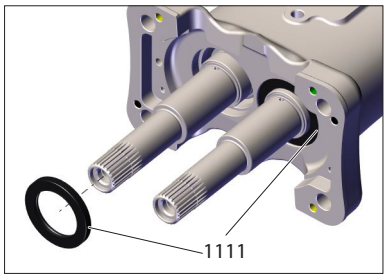
Twin NG 70 (special stainless steel version) and Twin NG 104/130):

☑ Drive and coupling guard dismantled — see Chapter 11.6 or Chapter 11.7
☑ Coupling dismantled — see Chapter 11.8
☑ Gear housing dismantled — see Chapter 11.9

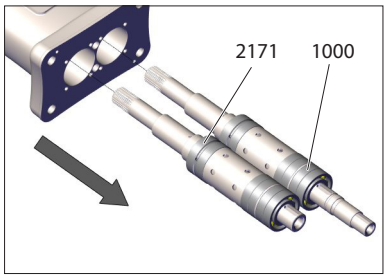
Conditions for continuing (for all versions)

☑ Cover and pump housing dismantled	see Chapter 11.10
☑ Screw spindle dismantled	see Chapter 11.12
☑ Mechanical seal and seal retainer have been dismantled	see Chapter 11.15.2
☑ Gears dismantled	see Chapter 11.18

11.19.1 Dismantling

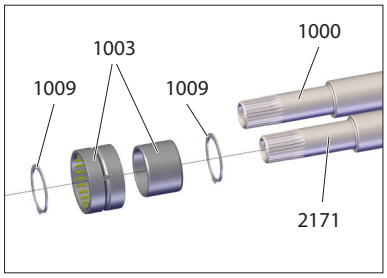


14. Use a hook puller to pull the shaft sealing rings (1111) out of the bearing housing
    - The shaft sealing rings will be destroyed by this process and they must be replaced



15. Using a press to press out the input shaft (1000) and output shaft (2171) one after the other in the drive direction

- *The input and output shafts are available in two versions:*
  - *up to 02/2020: without a removable shaft protection sleeve*
  - *from 02/2020: with a removable shaft protection sleeve*
- *In the version up to 02/2020, the shaft protection sleeve cannot be removed without destroying the shaft protection sleeve and the input and output shafts*
- *The dismantling process for the input and output shafts / with and without a removable shaft protection sleeve is identical and is described in the working steps 16 to 22 where the output shaft is used as the example*

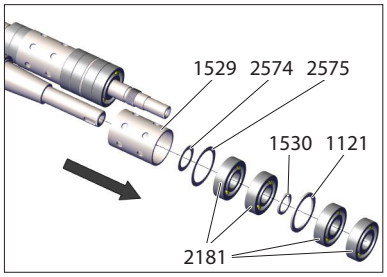


16. Use the circlip pliers to remove the outer circlip (1009)

17. Use a puller to pull the needle bearing's outer ring (1003) off of the output shaft

18. Use a puller to pull the needle bearing's inner ring (1003) off the output shaft

19. Remove the Inner circlip (1009)

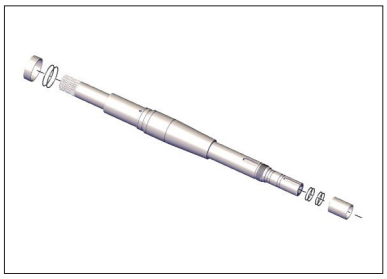


20. Using a press to press out each angular ball bearing (2181) and spacers (1121 and 1530) one after the other from the output shaft in the direction of the drive end

21. Remove shims 2574 and 2575:
    - Only fitted with Twin NG 70 (see Chapter 13.15)

22. Remove the spacer sleeve (1529) from the output shaft

Version: Removable shaft protection sleeve



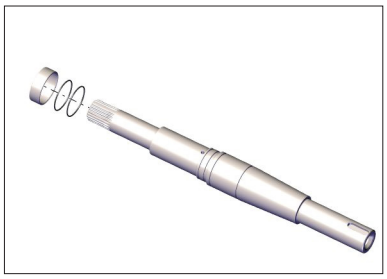
Input shaft:

23. Pull off the shaft protection sleeve on the input end

24. Remove the O-rings (4 x)

25. Pull off the shaft protection sleeve on the bearing end

26. Remove the O-rings (2 x)



Output shaft:

27. Pull off the shaft protection sleeve on the bearing end

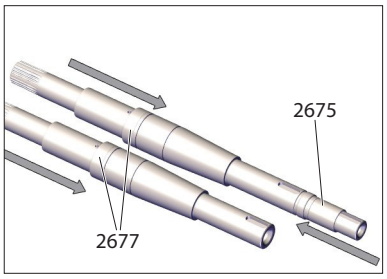
28. Remove the O-rings (2 x)

11.19.2 Assembling

Conditions:

☑ Dismantled parts and bearing housing have been cleaned
☑ Separate parts have been inspected for wear/damage, replaced if necessary
☑ Replace the shaft seal ring and the O-rings
☑ Replace the shaft seal ring and the O-rings
☑ Replace the shaft protection sleeve if necessary

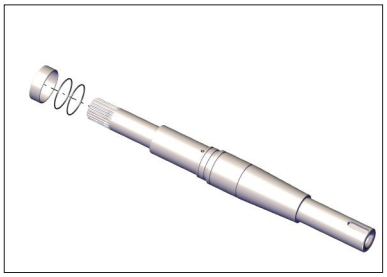
Version: Non-removable shaft protection sleeve



29. Heat the shaft protection sleeves (2675 and 2677) inductively to 120 °C

30. Push the shaft protection sleeves with assembly sleeves (T0091 / T00093 / T0095 or T0092 / T0094 / T0096) without any lubricant and without any gaps onto the input/output shafts up to the stop

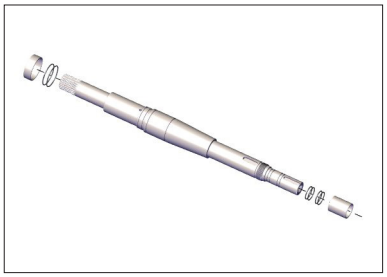
Version: Removable shaft protection sleeve



Output shaft:

1. Insert the O-rings in the groove at the bearing end (2 x)

2. Push the shaft protection sleeves without any lubricant and without any gaps up to the stop



Input shaft:

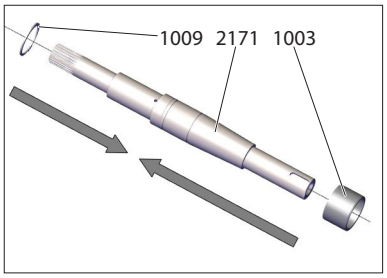
3. Insert the O-rings in the groove at the bearing end (2 x)

4. Pull off the shaft protection sleeve at the bearing end

5. Insert the O-rings in the groove at the drive end (2 x)

6. Push the shaft protection sleeves without any lubricant and without any gaps up to the stop at the drive end

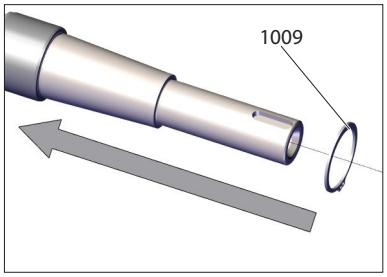
- *The assembly process for the input and output shafts / with and without a removable shaft protection sleeve is identical and is described in the following where the output shaft is used as the example*



7. Fit the outer circlip (1009) on the output shaft (2171)

8. Lightly apply fat to lubricate the output shaft

9. Use the pressure plate (T0010 / T0019 / T0020) to press the needle bearing inner ring (1003) onto the output shaft from the key side
   - ▶ or inductively heat the needle bearing's inner ring to 120 °C and slide it onto the output shaft



10. Fit the inner circlip (1009) on the output shaft

Take note!

- *Note the installation position of the angular ball bearings*
- *Install the angular ball bearings in an O arrangement*
  - This ensures that the moment load is absorbed better
- *Only press on the angular ball bearing's iinner ring when assembling*

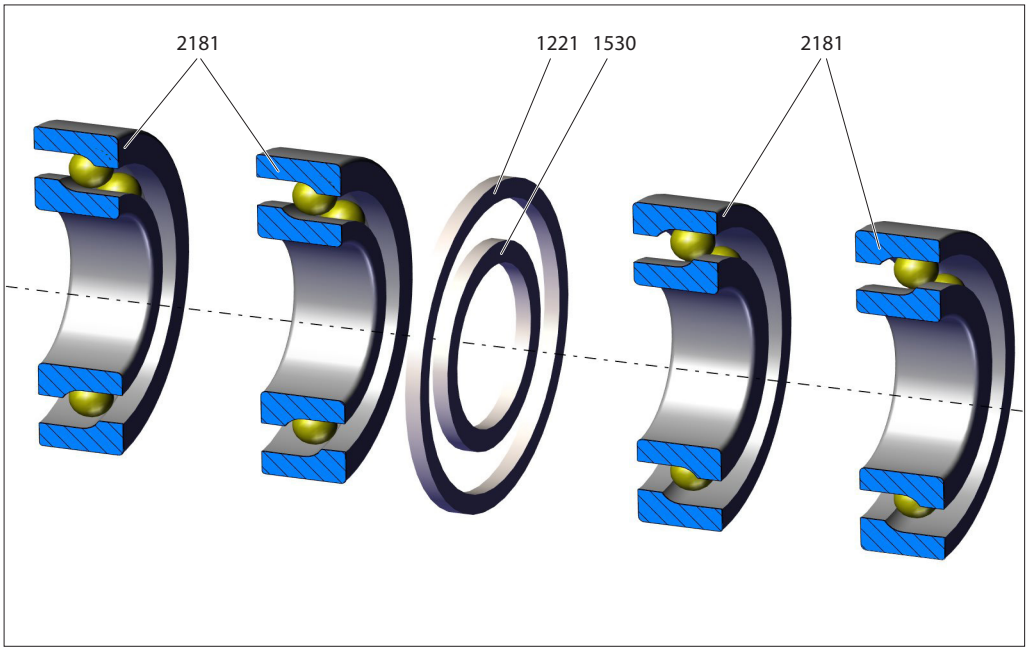
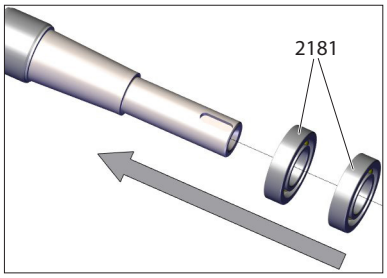
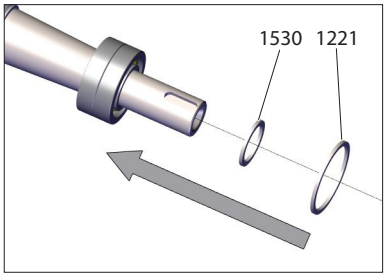


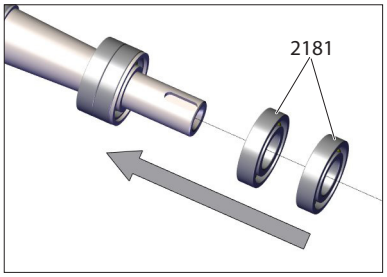
Fig. 11.5: Correct angular ball bearing arrangement: Double O arrangement or tandem O tandem arrangement
1221 Spacer; 1530 Spacer; 2181 Angular ball bearing



11. Use the pressure plate (T0012 / T0033 / T0034) to press the angular ball bearings (2181)) one after the other onto the output shaft (2 x)

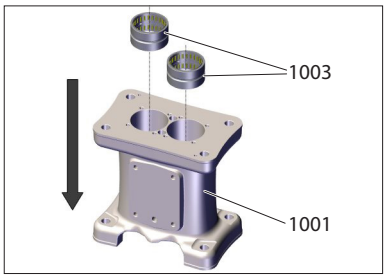


12. Slide the spacers (1530 and 1221) onto the output shaft



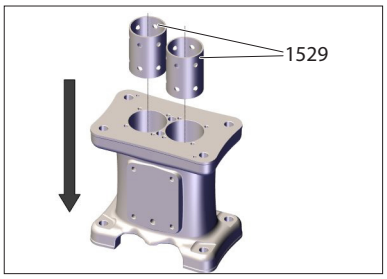
13. Use the pressure plate (T0012 / T0033 / T0034) to press the angular ball bearings (2181)) one after the other onto the output shaft (2 x)

14. Lightly apply fat to lubricate the bearing housings



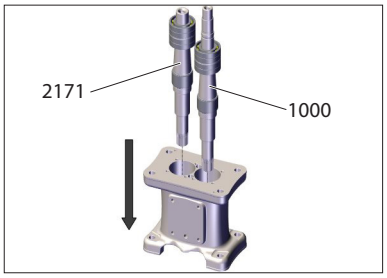
15. Stand the bearing housing vertically
    - ▫ Drive end points upwards

16. Insert the needle bearing (1003) with outer ring and mounting sleeve (T0011 / T0031 / T0032) carefully in the bearing housing (1001)
    - ► Insert the needle bearing and outer ring from the drive end



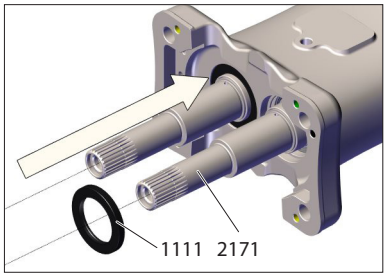
17. Insert the spacer sleeve (1529) carefully in the bearing housing

18. Use your finger to move all the needles in the needle bearing's outer ring outwards



19. Insert the output shaft carefully in the bearing housing and needle bearing's outer ring from the drive end
    - ► When inserting you must ensure that the needles are not tilted by the inner ring on the output shaft

20. Use a press to press the output shaft in up to the stop:
    - ▫ The last angular ball bearing protrudes approx. 1 mm from the bearing housing



21. Lubricate the shaft sealing ring (1111)

22. Slide the assembly sleeve (T0079 / T0083 / T0086) over the output shaft and up to the stop
    - The tapered end of the mounting sleeve points towards the drive

23. Carefully slide the shaft seal ring over the toothed ends of the shaft and onto the assembly sleeve (T0079 / T0083 / T0086)

24. Press the shaft seal ring with the assembly sleeve (T0080 / T0084 / T0087) into the bearing housing
    - The shaft seal ring's tension spring points towards the bearing housing

25. Remove both of the assembly sleeves after you have pressed it in

26. Refill the gear and bearing housings with oil

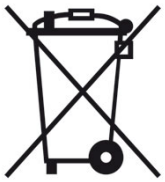
12. Disposal

The pump and its components must be disposed of in accordance with the following table:

Material		Dispose of as
Stainless steel	Complete pump (see Technical data sheet)	Scrap metal (recycling)
Steel	Complete pump (see Technical data sheet)	Scrap metal (recycling)
Plastic (Elastomer)	O-rings	Residual waste
	Shaft seal	Residual waste
Ceramics	Part of the mechanical seal cartridge (silicon carbide SiC)	Residual waste
Fat	Angular ball bearing	Abide by the local regulations
Oil	Gearbox housing	Abide by the local regulations

Tab. 12.1: Pump's materials and their disposal

12.1 Disposal as per WEEE Directive 2012/19/EU



The pump's electrical accessories are also subject to WEEE Directive 2012/19/EU. Dispose of them in accordance with your country's national regulations. You can obtain further information about this from your local branch office, authorized service partners or the field staff at Pumpenfabrik Wangen GmbH.
WEEE registration number: DE 76603041

An updated list of all branch offices and service partners can be found on our website:
- https://www.wangen.com/de/vertriebspartner/
- https://www.wangen.com/de/service/servicepartner.php

12.2 Recycling according to Packaging Directive 94/62/EU

Parts of the packaging used for the pump and its accessories are subject to European Packaging Directive 94/62/EU. Recycle them in accordance with your country's national regulations.

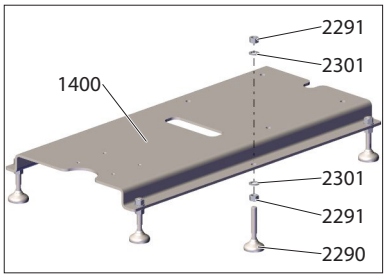
https://www.gruener-punkt.de/

Note about the German packaging law:
Pumpenfabrik Wangen GmbH is registered as a manufacturer in the LUCID German packaging register under the following number: DE3264622079629.

Annex

13. Exploded-view drawings – Spare parts list

13.1 Array with base plate – Standard version



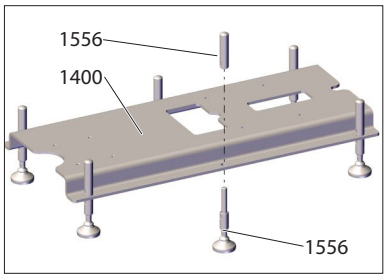
Number	Twin quantity		Array with base plate – Standard version
	NG70	NG104/130	
1400	1	1	Baseplate
2290	4	6	Articulated foot
2291	8	12	Nut
2301	8	12	Washer
Not shown:			**Pump support feet (for array with baseplate)**
2174	2		Pump support feet/tilting-foot part
2304	2		Spacer
2305	2		Hexagon screw
2306	2		Washer
Optional:			
1913	1		Cap
2268	4	6	Star-shaped nut

13.2 Tripod array – Standard version

Number	Quantity	Tripod array – Standard version
Not shown:		**Pump support foot**
2288	1	O-ring
2289	1	Spacer
2290	1	Articulated foot
2291	1	Nut
Not shown:		**Motor traverse**
2290	2	Articulated foot
2291	4	Nut
2292	1	Motor traverse

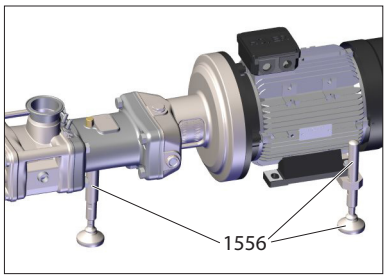
Tripod array only used in conjunction with coupling and gear housing (see Chapter 13.8) or coupling and optional "Lantern" coupling guard (see Chapter 13.10)

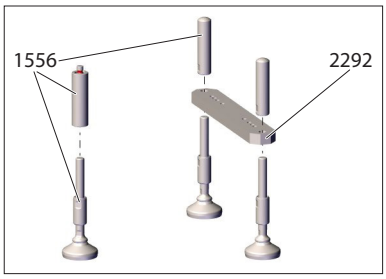
13.3 Array with baseplate – as per 3-A standard



Number	Twin quantity		Array with base plate – 3-A standard
	NG70	NG104/130	
1400	1	1	Baseplate
1556	4	6	Articulated foot (includes top sleeve)

13.4 Tripod array – as per 3-A standard

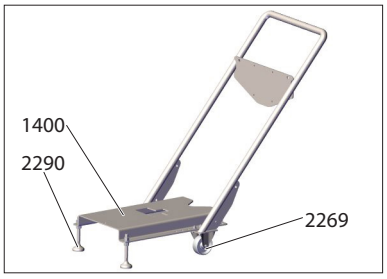




Number	Quantity	Tripod array 3-A standard
1556	2	Articulated foot (includes top sleeve)
1556	1	Pump articulated foot (includes spacer and O-ring)
2292	1	Motor traverse

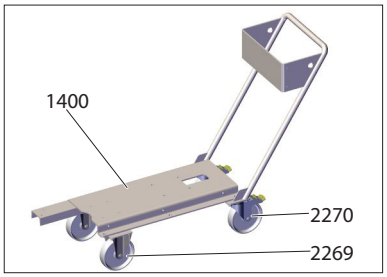
Tripod array only used in conjunction with coupling and gear housing (see Chapter 13.8) or coupling and optional "Lantern" coupling guard (see Chapter 13.10)

13.5 Array with movable baseplate – Twin NG 70



Number	Quantity	Movable array
1400	1	Baseplate (includes handle and frequency converter holder if needed)
2269	2	Fixed castor
2290	2	Articulated foot
Not shown:		**Pump support foot (for array with baseplate)**
2288	1	O-ring
2304	1	Spacer
2305	1	Hexagon screw
2306	1	Washer
See Fig. 13.1 and Fig. 13.2 for details		

13.6 Array with movable baseplate – Twin NG 104/130



Number	Quantity	Movable array
1400	1	Baseplate (includes handle and frequency converter holder if needed)
2269	2	Fixed castor
2270	2	Swiveling castor with lock
Not shown:		**Pump support foot (for array with baseplate)**
2174	2	Pump support feet/tilting-foot part
2205	2	Hexagon screw
See Fig. 13.1 for details		

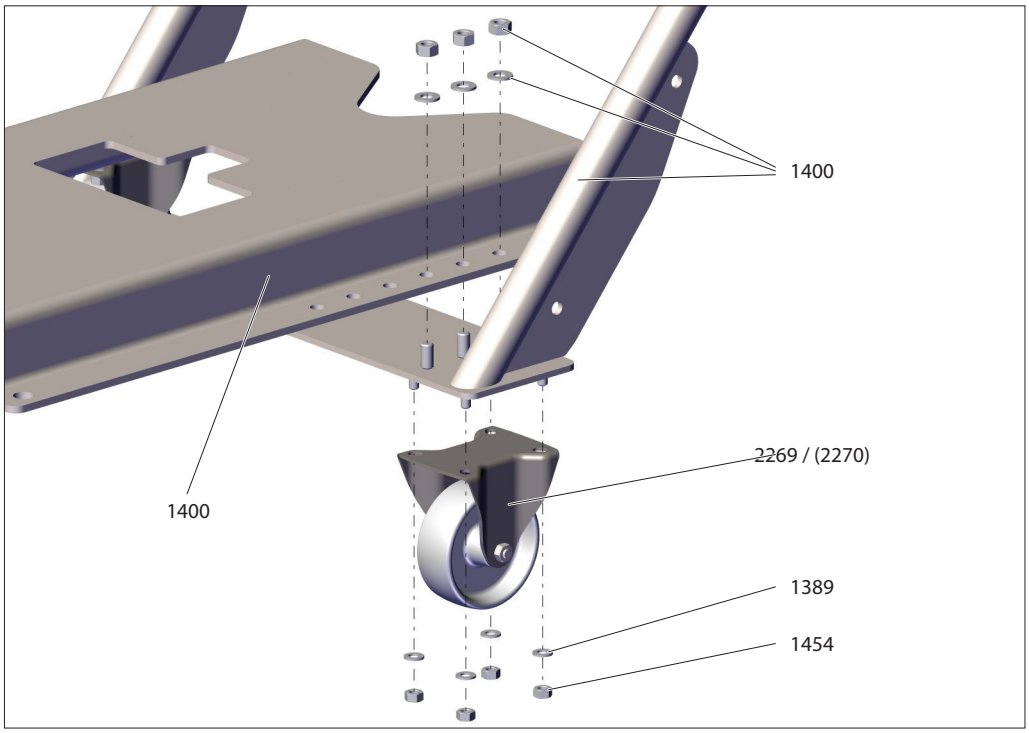


Fig. 13.1: Movable baseplate details (Twin NG 70, 104 and 130): Swiveling castor or fixed castor and handle

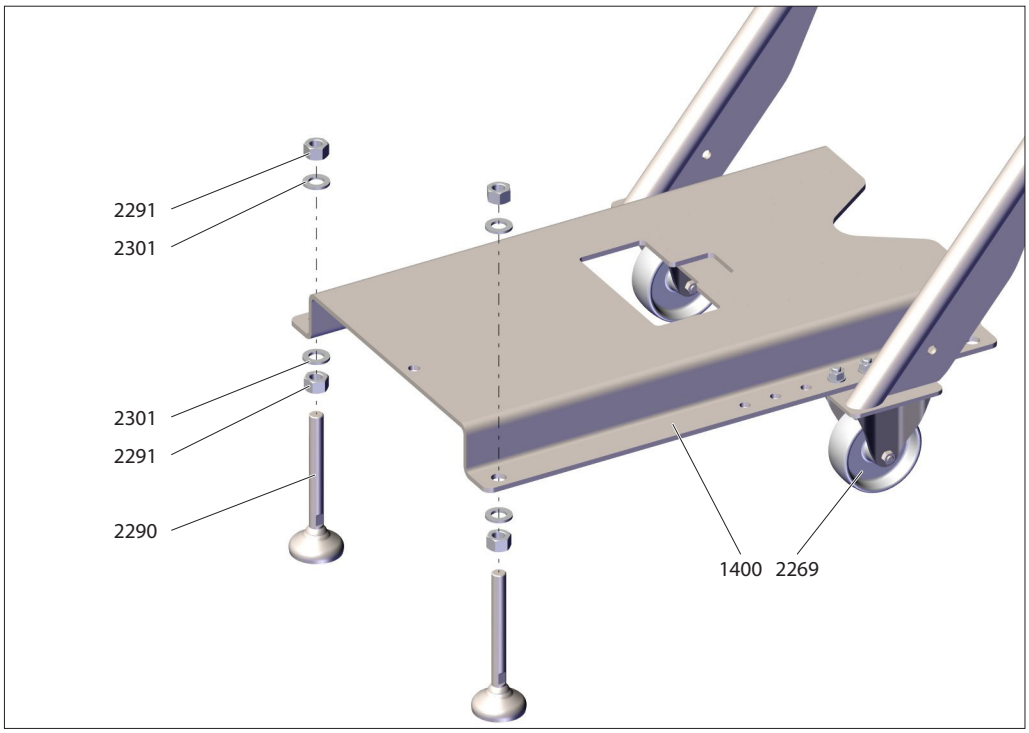
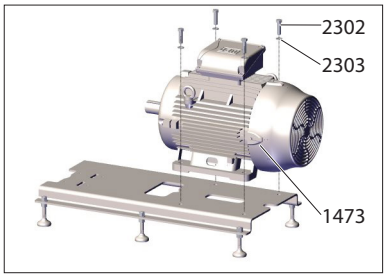


Fig. 13.2: Movable baseplate details (Twin NG 70): Articulated foot

Number	Quantity	Movable array baseplate
Baseplate:		
1400	1	Baseplate (includes handle and frequency converter holder if needed)
1400	6 – 12	Cap nut
1400	6 – 12	Washer
Fixed castor – swiveling castor		
1389	8 – 16	Washer
1454	8 – 16	Nut
2269	2	Fixed castor
2270	2	Swiveling castor
Articulated foot:		
2290	2	Articulated foot
2291	4	Nut
2301	4	Washer
Not shown:		
1913	1	Cover (optional)
2268	4 – 6	Star-shaped nut

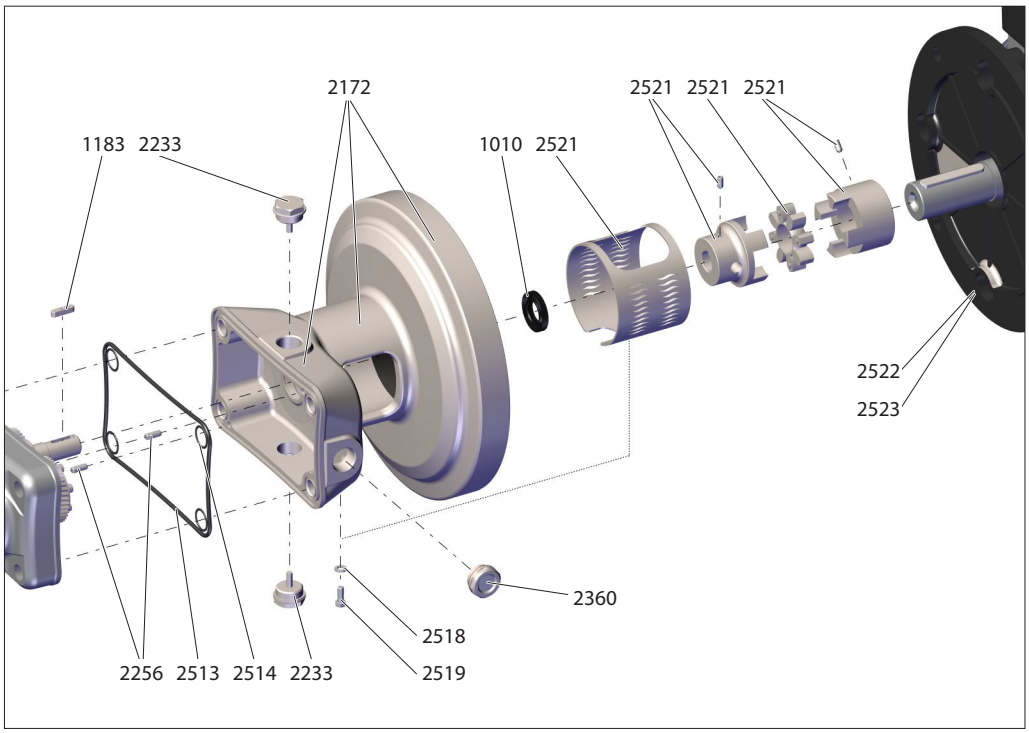
13.7 Drive



Number	Quantity	Drive
1473	1	Drive
2302	4	Hexagon screw
2303	4	Washer
For array with motor traverse		
2302	2	Hexagon screw
2303	2	Washer

13.8 Coupling and gearbox housing – Gray cast iron version

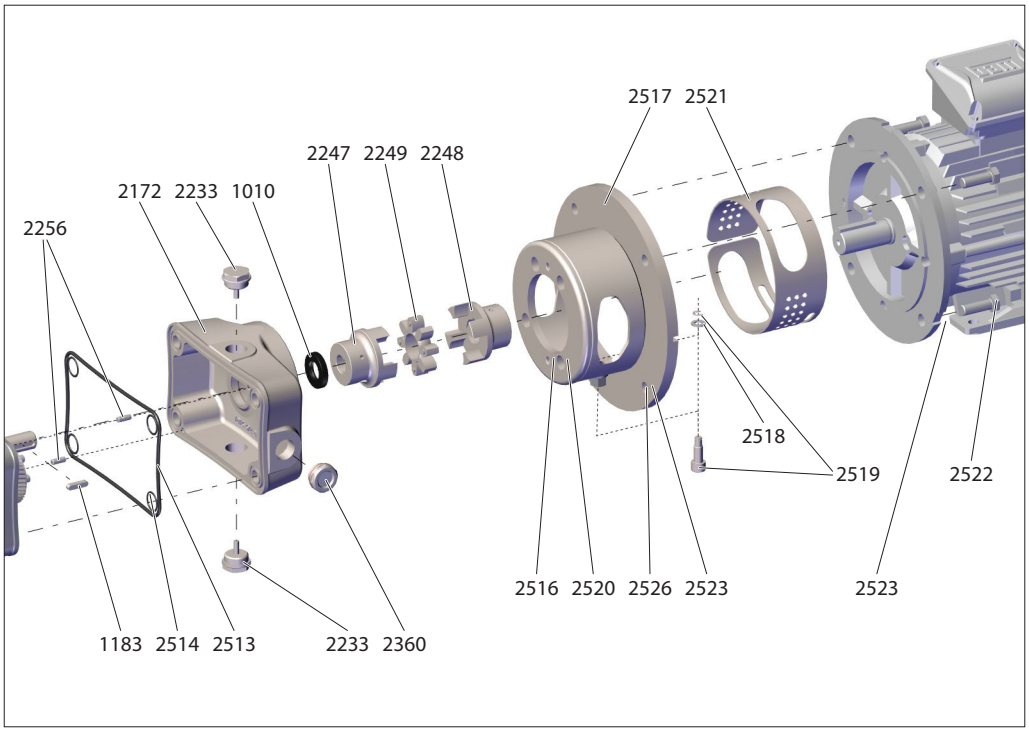
Twin NG 70 – Without a flange adapter [with flange adapter see Chapter 13.10]



Number	Quantity	Coupling and gearbox housing – Twin NG 70
1010	1	Shaft seal ring
1183	1	Key
2172	1	Coupling and gearbox housing
2233	2	Sealing screw
2247	1	Coupling claw including grub screw
2248	1	Coupling claw including grub screw
2249	1	Elastomer star coupling
2256	2	Cylinder pin
2360	1	Oil level glass
2513	1	O-ring
2514	4	O-ring
2518	1	Washer
2519	1	Hexagon screw
2521	1	Contact protection
Not shown:		
2522	4 – 8	Hexagon screw
2523	4 – 8	Washer

13.9 Coupling and gearbox – Stainless steel version

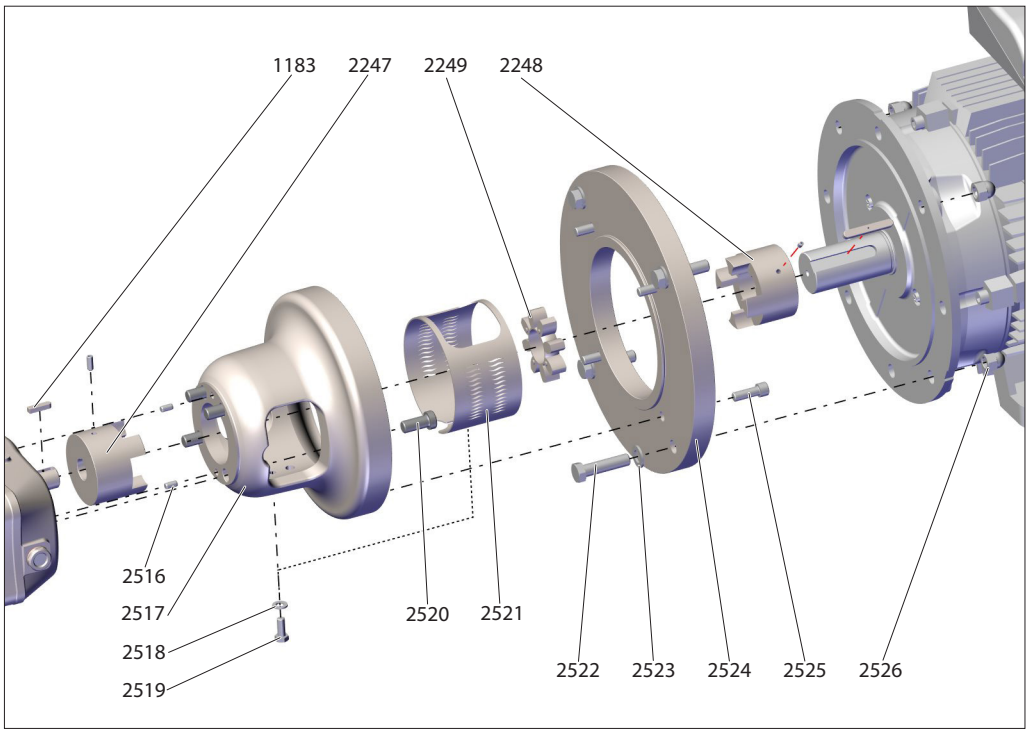
Twin NG 70 – Without a flange adapter [with flange adapter see Chapter 13.10]



Number	Quantity	Coupling and gearbox housing – Twin NG 70
1010	1	Shaft seal ring
1183	1	Key
2172	1	Gearbox housing
2233	2	Sealing screw
2247	1	Coupling claw including grub screw (pump side)
2248	1	Coupling claw including grub screw (input side)
2249	1	Elastomer star coupling
2256	2	Cylinder pin
2360	1	Oil level glass
2513	1	O-ring
2514	4	O-ring
2517	1	Coupling guard
2518	1	Washer
2519	1	Hexagon socket screw with locking washer
2521	1	Contact protection
2522	4	Hexagon screw
Not shown:		
2516	2	Positioning pin
2520	4	Cylinder screw
2523	4 – 8	Washer
2526	4	Nut

13.10 Coupling and "Lantern" coupling guard

Twin NG 104 and Twin NG 130 – With flange adapter

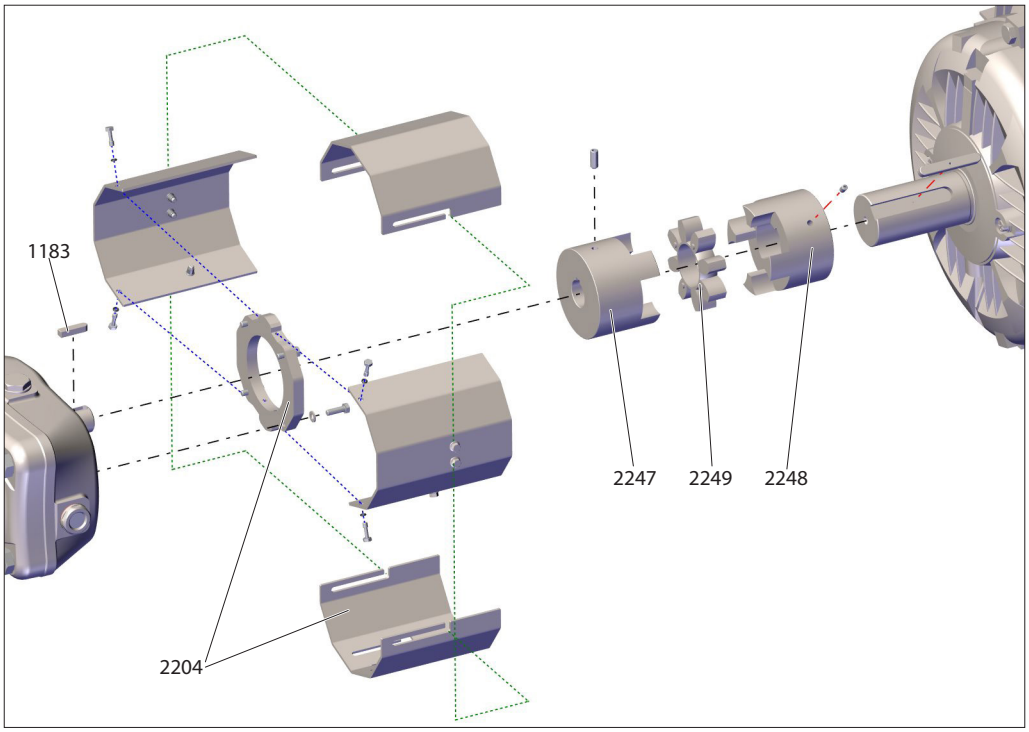


Number	Quantity	Flange adapter [depends on input size]. Twin NG 70, 104 and 130
2522	4	Hexagon screw
2523	4	Washer
2524	1	Flange adapter
2525	4	Cylinder screw
2526	4	Cap nut

Number	Quantity	Coupling and "Lantern" coupling guard Twin NG 104 and Twin NG 130
1183	1	Key
2247	1	Coupling claw including grub screw
2248	1	Coupling claw including grub screw
2249	1	Elastomer star coupling
2516	2	Positioning pin
2517	1	"Lantern" coupling guard
2518	1	Washer
2519	1	Hexagon screw
2520	4	Cylinder screw
2521	1	Contact protection

13.11 Coupling and coupling guard – Standard version

Twin NG 104 and Twin NG 130

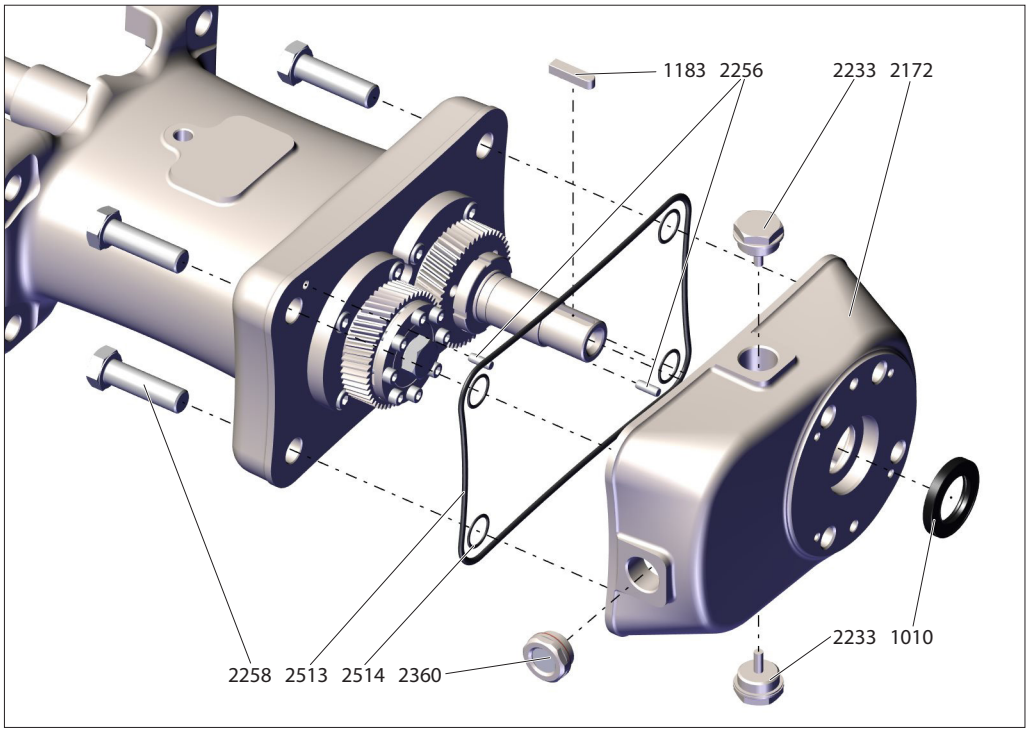


Number	Quantity	Coupling
1183	1	Key
2247	1	Coupling claw including grub screw
2248	1	Coupling claw including grub screw
2249	1	Elastomer star coupling

Number	Quantity	Coupling guard – standard version Twin NG 104 and Twin NG 130
2204	1 set	Coupling guard
	consisting of:	
	2	Fixed plates
	2	Movable plates
	1	Flange plate
	4	Savetix screws
	4	Washers
	4	Hexagon screws

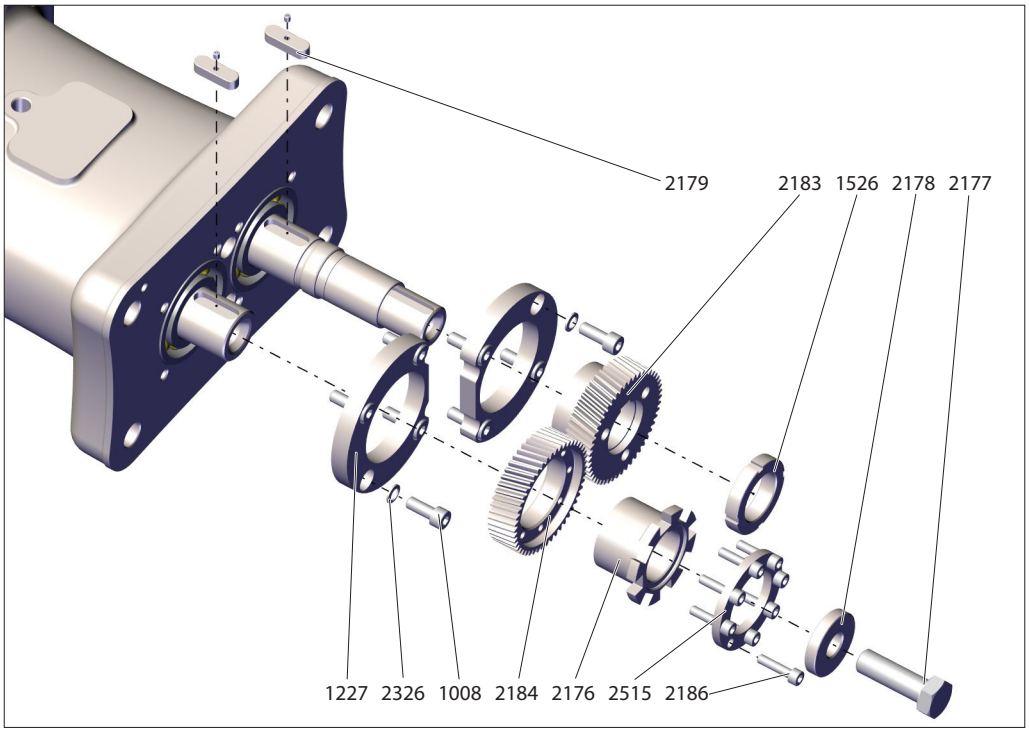
13.12 Gearbox housing

Twin NG 104 and Twin NG 130



Number	Quantity	Gearbox housing Twin NG 104 and 130
1010	1	Shaft seal ring
1183	1	Key
2172	1	Gearbox housing
2233	2	Sealing screw
2256	2	Cylinder pin
2258	4	Hexagon screw
2360	1	Oil level glass
2513	1	O-ring
2514	4	O-ring

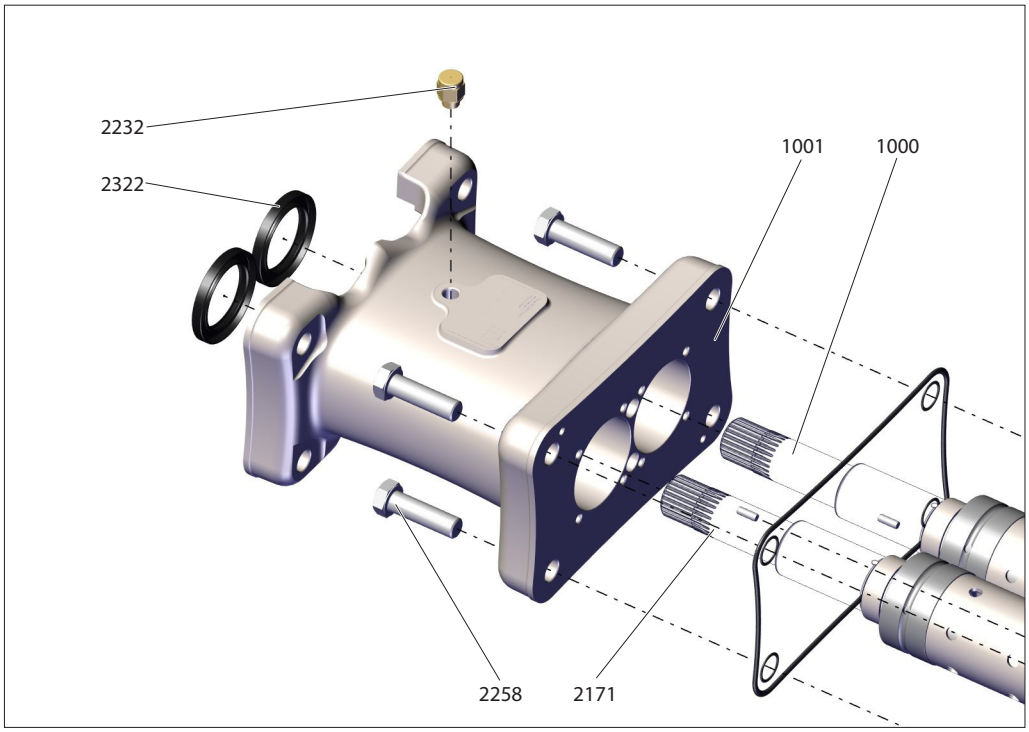
13.13 Gearing



Number	Quantity	Gearing
1008	8	Cylinder screws
1227	2	Bearing cover
1526	1	Shaft nut (with grub screw)
2176	1	Hub (for spur gear)
2177	1	Hexagonal screw (includes spring washer)
2178	1	Clamping washer
2179	2	Key
2183	1	Input spur gear
2184	1	Output spur gear
2186	8*	Cylinder screw
2326	8	Washer
2515	1	Synchronization clamping ring

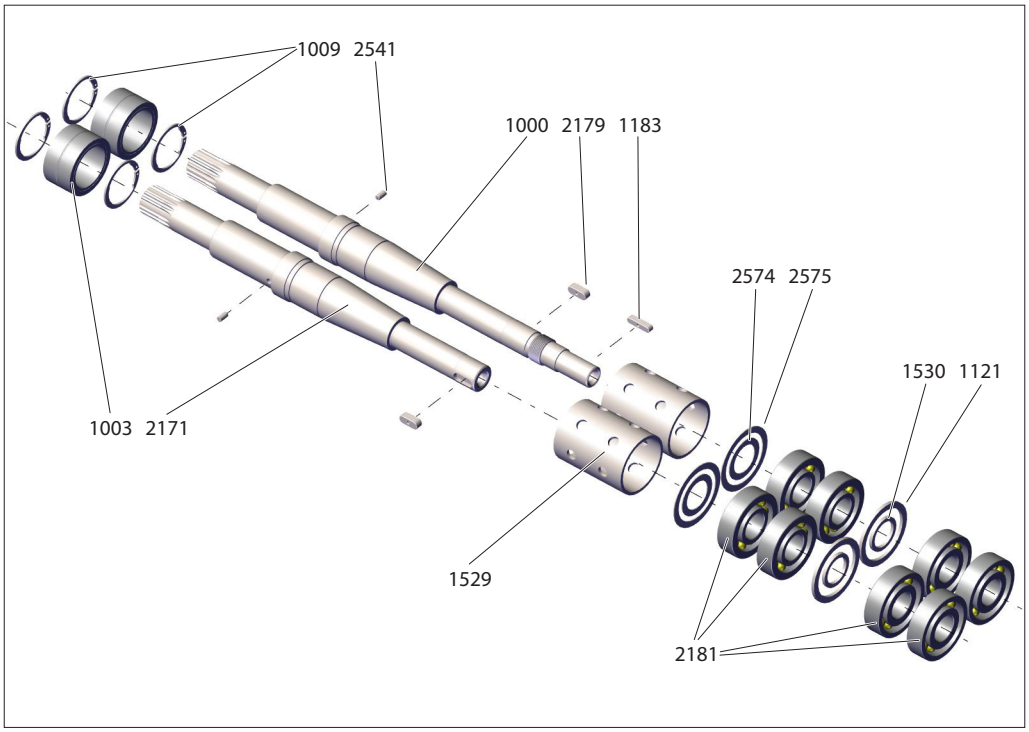
* Quantity of 6 – only with Twin NG 70

13.14 Bearing housing



Number	Quantity	Bearing housing
1000	1	Input shaft
1001	1	Bearing housing
2171	1	Output shaft
2232	1	Venting valve
2258	4	Hexagon screw
2322	2	Shaft seal ring
Not shown:		
2285	1	Dummy plug (for PT100)

13.15 Bearing

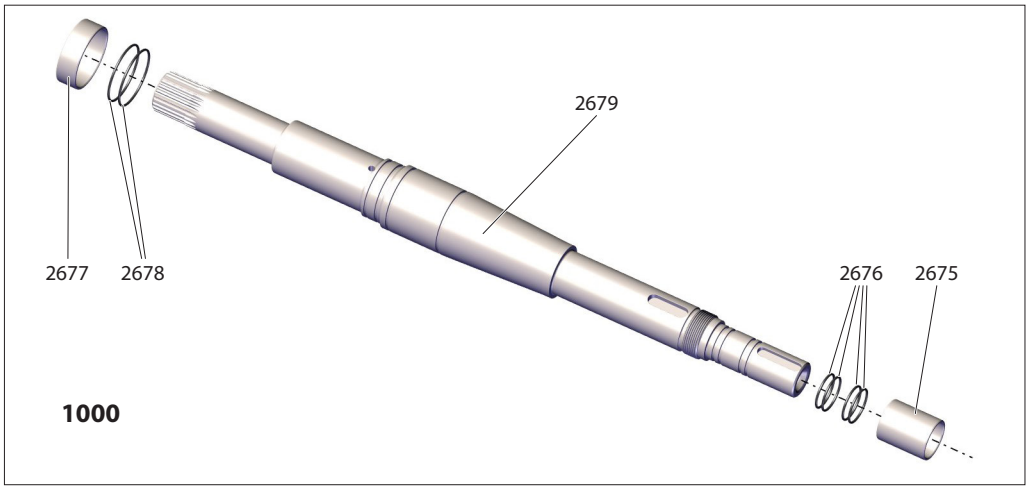


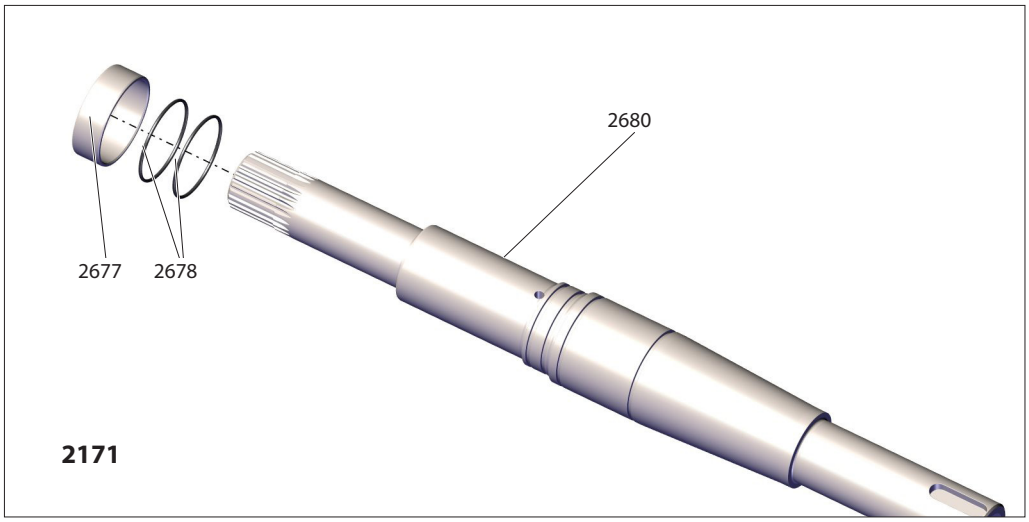
Number	Quantity	Bearing
1000	1	Input shaft (includes shaft sleeve and O-ring)
1003	2	Needle bearing (inner ring and outer ring)
1009	4	Circlip
1121	2	Spacer ring
1183	1	Key
1529	2	Spacer sleeve
1530	2	Spacer ring
2171	1	Output shaft (includes shaft sleeve and O-ring)
2179	2	Key
2181	8	Angular ball bearing
2541*	2	Drive pin
2574**	2	Shim
2575**	2	Shim

* Drive pin 2541– only with Twin NG 70 and Twin NG 104

** Shim 2574 and 2575 – only with Twin NG 70

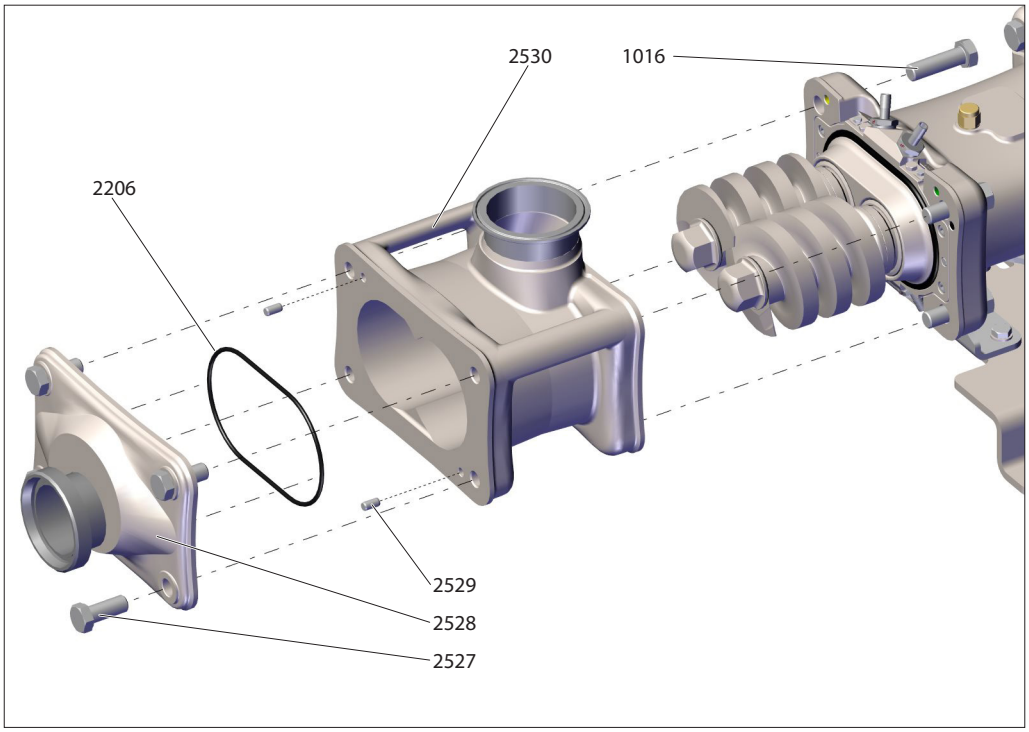
13.16 Input and output shafts





Number	Quantity	Input / output shafts
1000	1	**Input shaft** (includes shaft protection sleeve and O-ring)
consisting of:		
2675	1	Shaft protection sleeve
2676	4	O-ring
2677	1	Shaft protection sleeve
2678	2	O-ring
2679	1	Input shaft
2171	1	**Output shaft** (includes shaft protection sleeve and O-ring)
consisting of:		
2677	1	Shaft protection sleeve
2678	2	O-ring
2680	1	Output shaft
up to 02/2020: Input/output shafts with non-removable shaft protection sleeves / no O-rings		

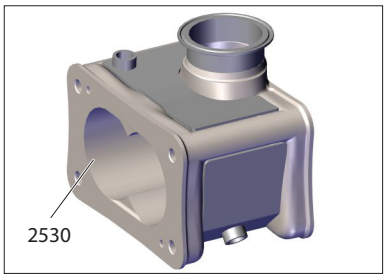
13.17 Pump housing



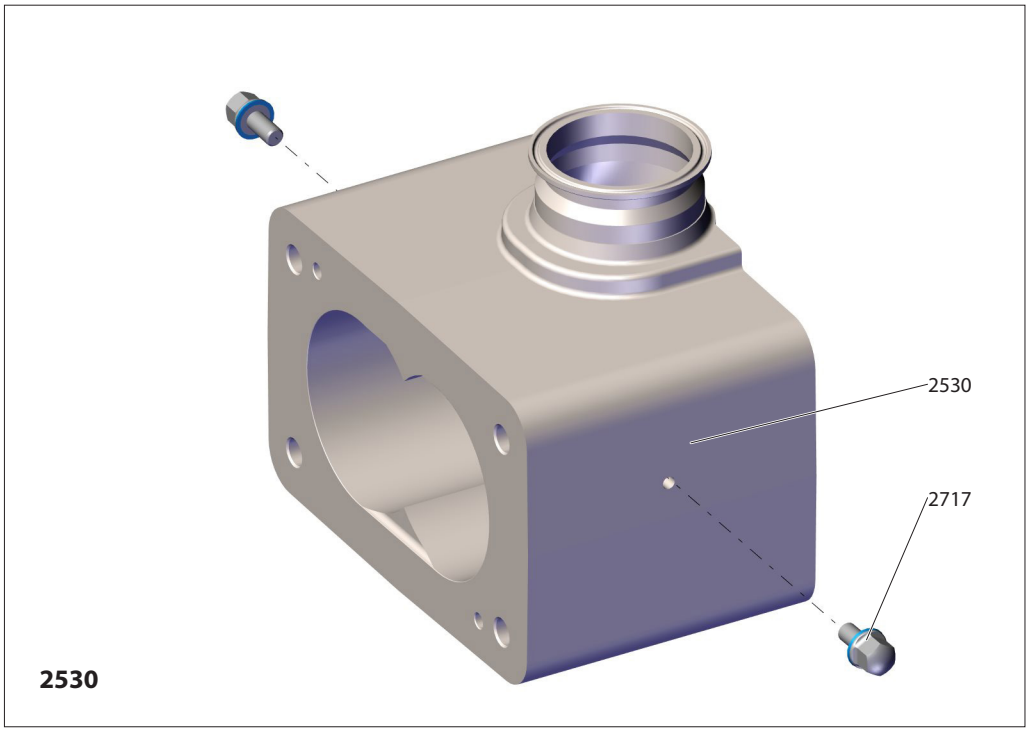
Number	Quantity	Pump housing
1016	4	Hexagon screw
2206	1	O-ring
2527	4	Hexagon screw
2528	1	Cover
2529	2	Positioning pin
2530	1	Pump housing / pump housing with heating jacket

13.18 Pump housing with heating / cooling jacket

- with side-mounted inflow and outflow connections for hot and cold water
- with bottom-mounted drainage screw
- with top-mounted pressure/temperature sensor connection

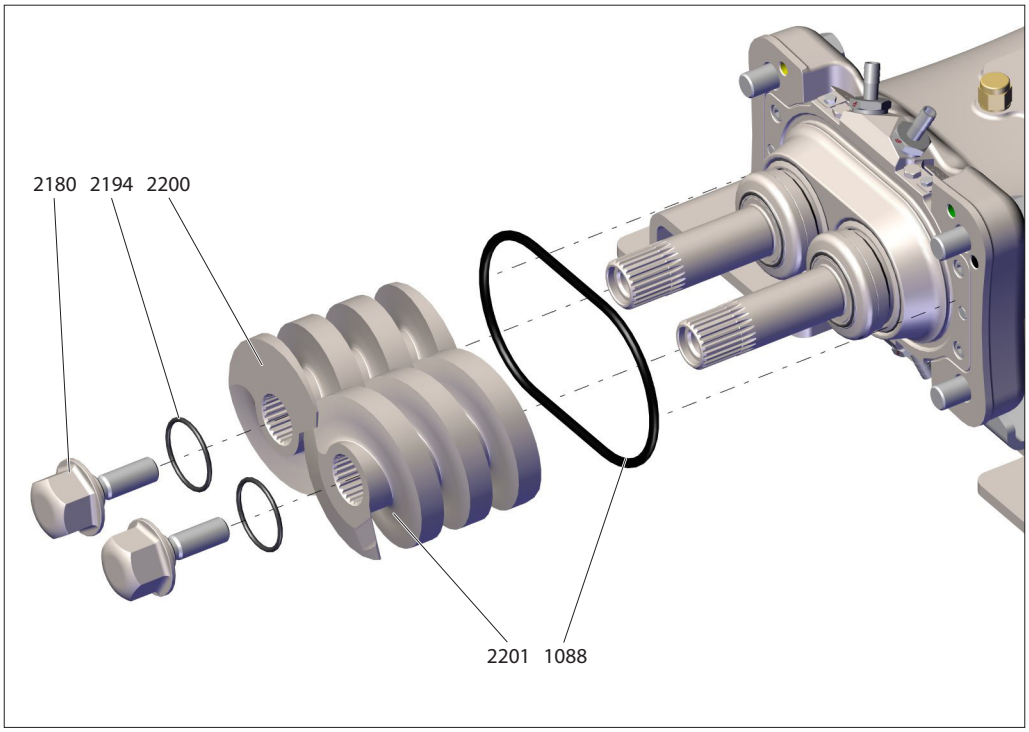


13.19 Solid pump housing



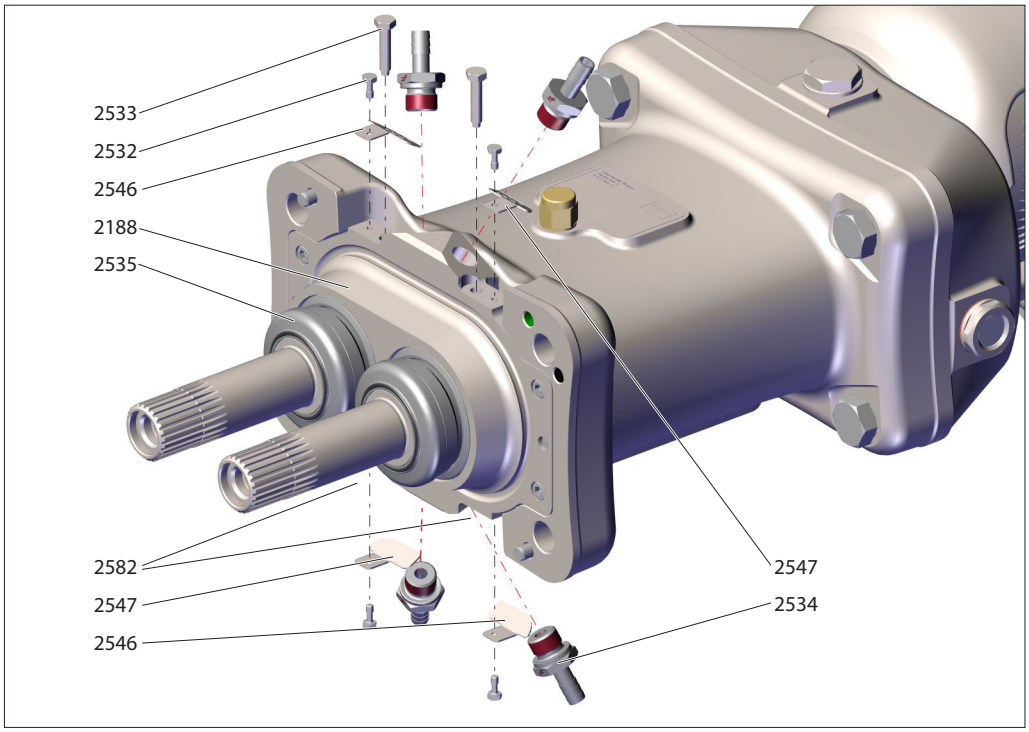
Number	Quantity	Solid pump housing
2530	1	Pump housing
consisting of:		
2530	1	Solid pump housing (with nozzles)
2717	2	Hexagon screw with seal

13.20 Pump set



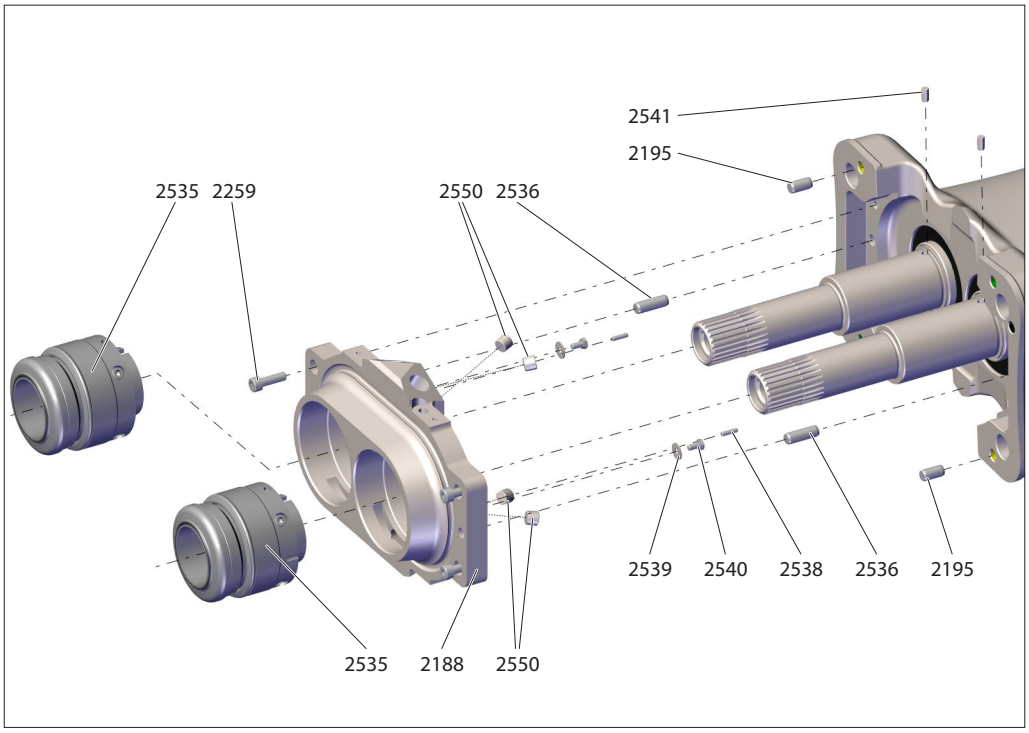
Number	Quantity	Pump housing
1088	1	O-ring
2180	2	Spindle screw
2194	2	O-ring
2200	1	Screw spindle, left turning
2201	1	Screw spindle, right turning

13.21 Seal retainer



Number	Quantity	Seal retainer
2188	1	Seal retainer
2195	2	Positioning pin (for flow direction)
2259	4	Cylinder screw
2532	4	Hexagon screw, Savetix
2533	2	Fixing screw
2534	4	Hose nozzle
2535	2	Mechanical seal cartridge
2536	2	Alignment pin
2538	2	Cylinder pin
2539	2	Washer
2540	2	Hexagon screw
2541*	2	Drive pin
2546	2	Contact protection, right
2547	2	Contact protection, left
2550	4	Sealing screw
Not shown:		
2582	2	Hexagon screw (at bottom of seal retainer)

* Drive pin 2541– only with Twin NG 70 and Twin NG 104



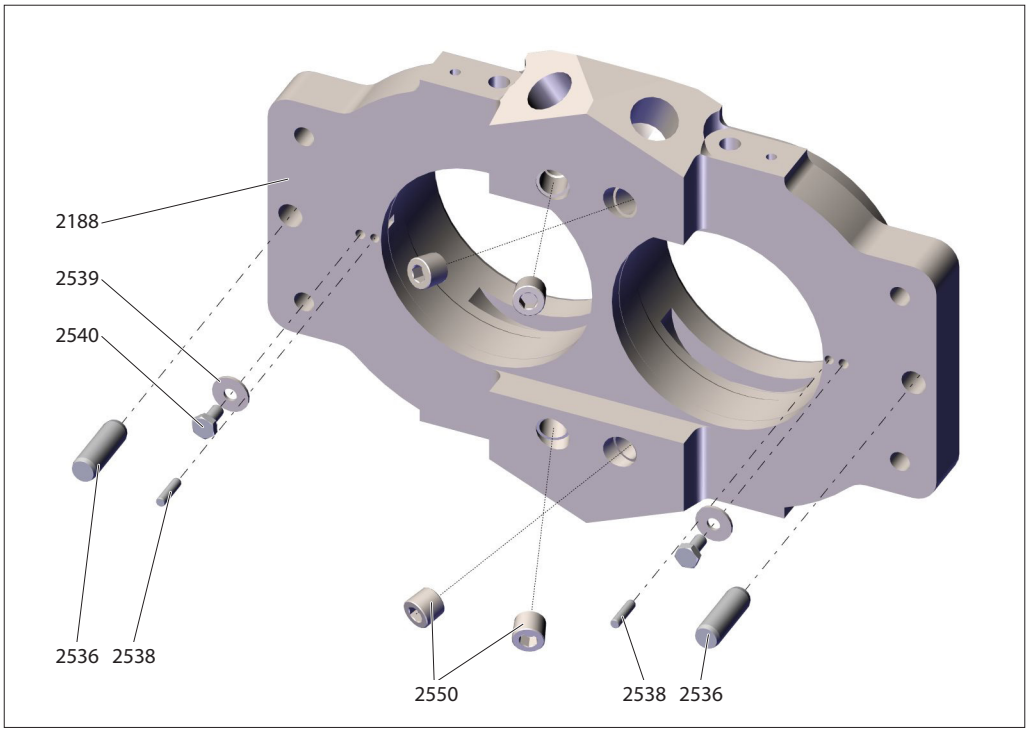
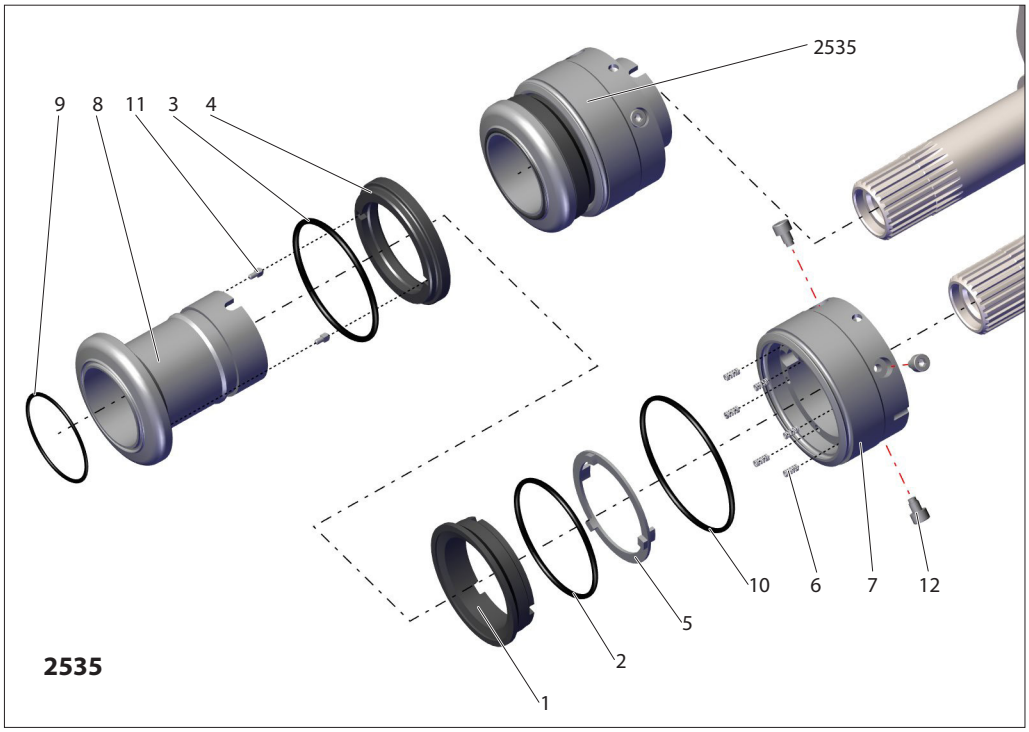


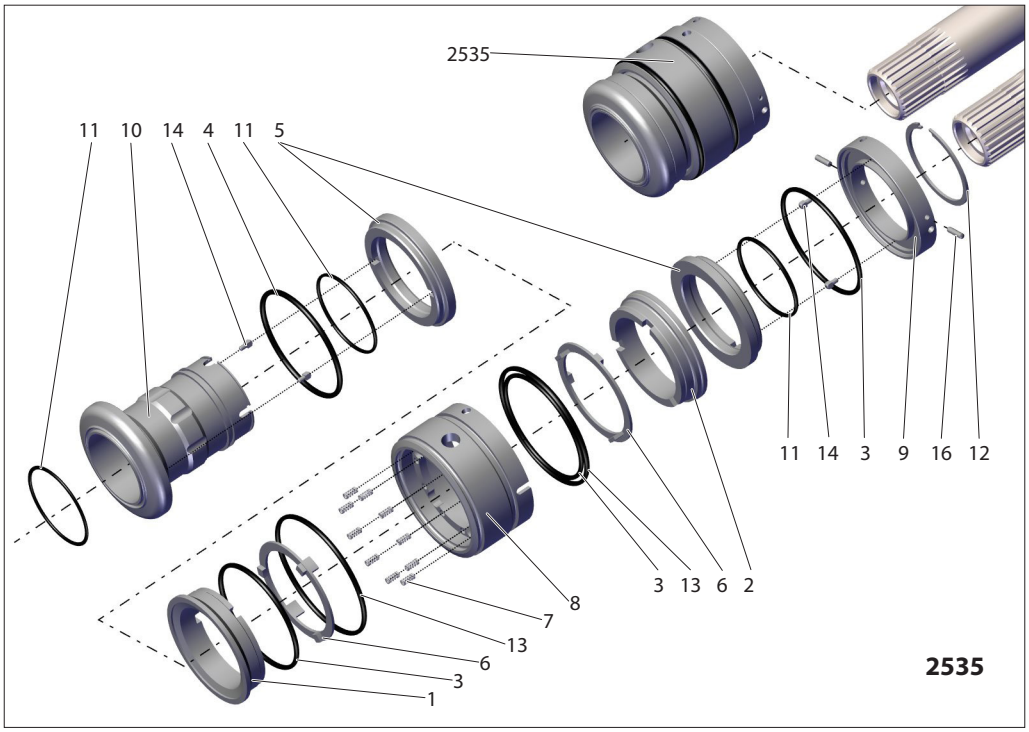
Fig. 13.3: Rear seal retainer 2188

13.22 Mechanical seal cartridge – Single-acting



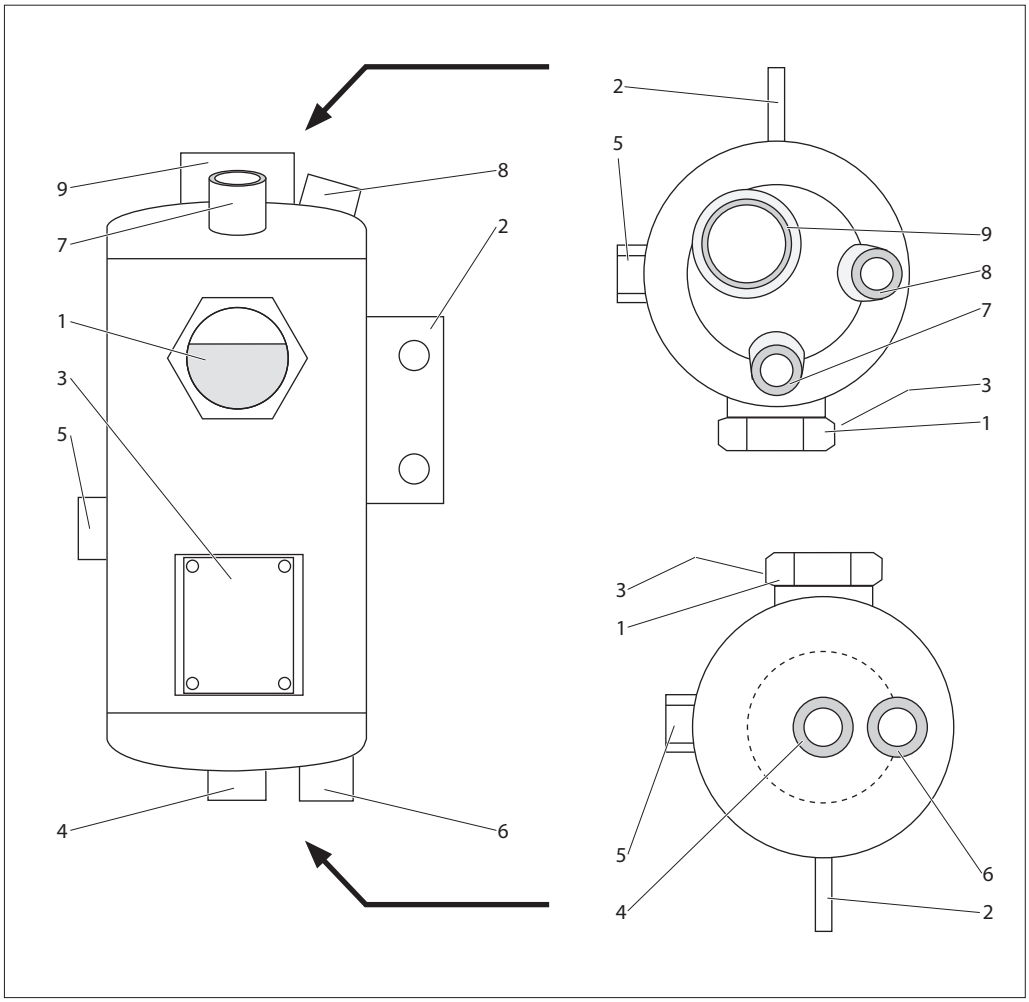
Number	Quantity	**Mechanical seal cartridge (single acting)** as per accompanying assembly instructions **Twin NG 70, 104 and 130**
2535	2	Mechanical seal cartridge
consisting of:		
1	1	Counter ring, stationary
2	1	O-ring
3	1	O-ring
4	1	Slide ring, rotating
5	1	Pressure ring
6	6	Spring
7	1	Latch
8	1	Shaft sleeve
9	1	O-ring
10	1	O-ring
11	2	Pin
12	4	Cylinder screw

13.23 Mechanical seal cartridge – Double-acting



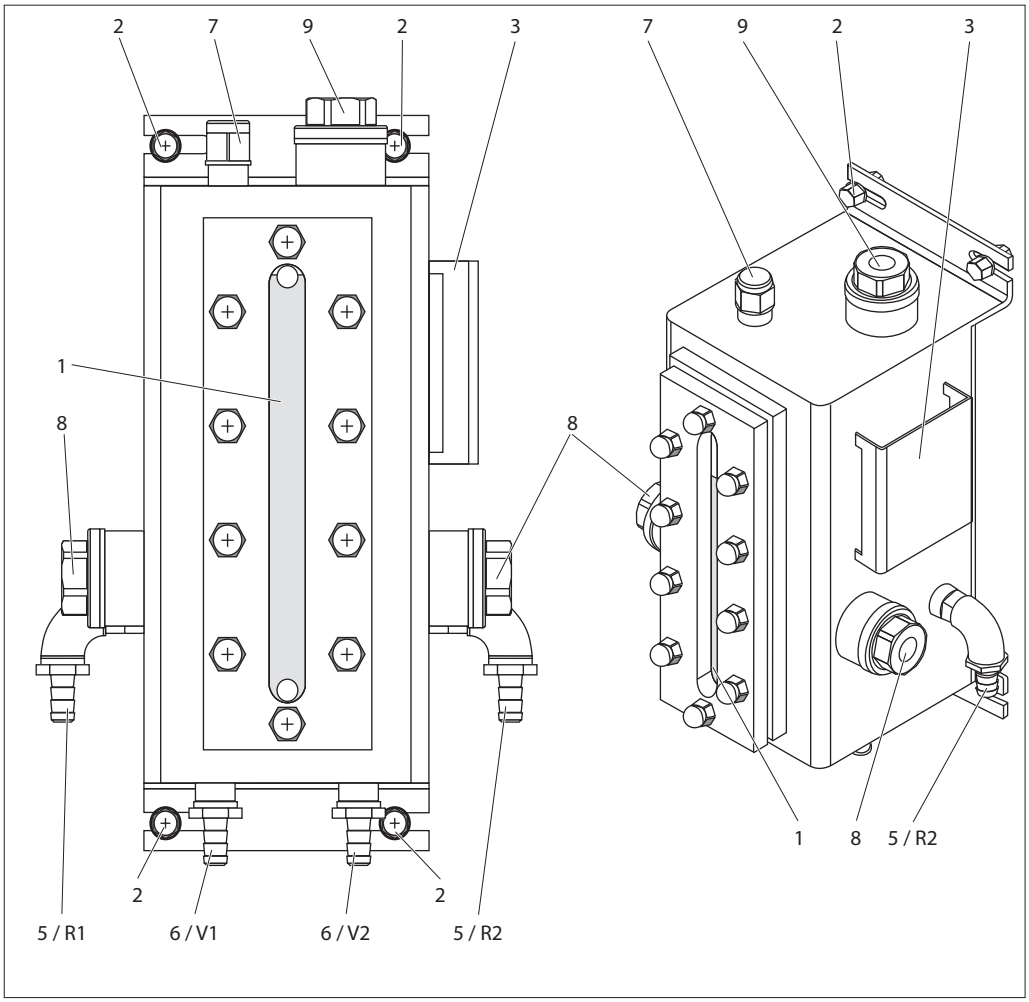
Number	Quantity	**Mechanical seal cartridge (double-acting)** as per accompanying assembly instructions **Twin NG 70, 104 and 130**
2535	2	Mechanical seal cartridge
consisting of:		
1	1	Counter ring, stationary
2	1	Counter ring, stationary
3	3	O-ring
4	1	O-ring
5	2	Slide ring, rotating
6	2	Pressure ring
7	6	Spring
8	1	Latch
9	1	Casing
10	1	Shaft sleeve
11	3	O-ring
12	1	Circlip
13	2	O-ring
14	4	Pin
16	2	Drive pin
--	3	Transport safety device with cylinder screws (not shown)

13.24 Sealing pressure tank



Number	Quantity	Sealing pressure tank
1	1	Level indicator glass
2	2	Securing piece
3	1	Name plate
4	1	Emptying
5 / R1 / R2	1	Return connection
6 / V1 / V2	1	Supply connection
7	1	Venting
8	1	Pressurization
9	1	Level switch connection

13.25 Storage tank



Number	Quantity	Storage tank
1	1	Level indicator glass
2	2	Securing piece
3	1	Name plate
4	–	–
5 / R1 / R2	1	Return connection
6 / V1 / V2	1	Supply connection / emptying
7	1	Venting
8	2	Reserve connection
9	1	Level switch connection / Filling connection

14. Cleaning / sterilization processes

14.1 General information

The following cleaning and sterilization processes can be used for cleaning the pumps:

- COP cleaning process (Cleaning Out of Place)
- CIP cleaning process (Cleaning In Place)
- SIP sterilization process (Sterilization In Place)

The pumps must always be cleaned before they are started and before each production run. How the pump is to be cleaned depends on the type of pumped medium that was used and its production conditions.
According to operating specifications, the operator must define a repeatable cleaning process (cleaning agents to be used, pressure, temperature, duration time, concentration and flow rate). COP/CIP cleaning processes or SIP sterilization processes are continuously optimized through validation, monitoring and documenting the process/results.

14.2 COP cleaning process

The pump must be dismantled down to its separate parts. The separate parts are to be either washed manually using suitable cleaning agents or fed into an industrial parts cleaning machine, e.g. in a (hot water) parts washing machine/ultrasonic machine.
Renewed contamination must be avoided when reassembling or else the cleaning process will have to be repeated. Sterilizing the separate parts can take place after the COP cleaning process has been completed, e.g. in an autoclave.

- ▶ Use the COP cleaning process to “clean special components” (see Chapter 8.5)
- ▶ See Chapter “14.5 COP cleaning process sequence”

14.3 CIP cleaning process

The pump and its associated piping are not dismantled but cleaned in place. This is done automatically in processing plants. The cleaning liquid flows through the system in a separate cleaning circuit in this case. The operator must define the cleaning sequence steps (see Chapter 14.6).

A CIP cleaning process must be carried out in the following situations:
- Before using the pump for the first time
- Inbetween two production runs or batch changes
- After installing new contact-making spare parts
- After using it before a known long stoppage
- Before restarting after a longer stoppage

Two concepts are used in the CIP cleaning process:
- "Lost cleaning": The cleaning agents must be discarded immediately after use. This method is mainly used with heavy contamination. The cleaning solution is always fresh when you start cleaning.
- "Batch cleaning": The cleaning solution is reused after the first cleaning cycle. Less cleaning agent is used during cleaning solution recovery so the water and power consumptions are reduced.

14.3.1 Cleaning-relevant parameters

Four parameters are relevant for the cleaning effect ("Sinner's circle") and they are explained in greater detail in Chapters 14.3.2 to 14.3.5. All four parameters are interconnected and dependent on each other. The four parameters do not have to act equally in order to realize a good cleaning result. If one parameter is changed, then the other three parameters might have to be adjusted in order to realize a comparable cleaning effect.

14.3.2 Mechanical cleaning effects

Cleaning through the shear force exerted by the flow or wall shear stress. The flow transports the cleaning solution into the contaminated area (surface), reacts with it, loosens the contamination (structural dirt and covering dirt) and then transports it out of the pump.

Flows that encounter a widening point, e.g. in a pipe, will lose their flow velocity. This will create a swirling zone. The shearing force and shearing stress will be reduced as a result of this. A flow rate that is too low might cause cleaning problems.

Flow requirements:

- The flow must be turbulent
- Optimum flow rate: $1.5 \leq v \leq 2.1$ m/s

14.3.3 Chemical cleaning effects

Using chemical agents to clean surfaces. Cleaning agents must be dosed carefully so that an optimum cleaning result is realized. It is vital that you always comply with the manufacturer's dosage instructions. Overdosing or underdosing will result in an unsatisfactory cleaning result.

Chemical cleaning agents:

- Pure chemicals: e.g. sodium hydroxide, nitric acid and phosphoric acid
- Commercially prepared cleaning agents have a complex composition
- Pure chemicals plus additives

14.3.4 Thermal cleaning effects

Cleaning using thermal power or heat. Heat increases the cleaning effect because the molecules in the water/cleaning solution move faster and are deposit themselves on the dirt particles. Adhesive dirt can be removed by heat.
Denaturation can occur if the cleaning temperatures are too high and this makes it difficult to remove contaminants. The pump should be cleaned at the same temperature that was used when the food/products were processed.

14.3.5 Time

Duration to be used for the cleaning process. Any failings in the mechanical, chemical or thermal parameters can be compensated for during the duration of the cleaning process.

14.4 SIP sterilization process:

The pump must be sterilized/disinfected. Pump sterilization is carried out according to the CIP cleaning process and it is usually run using the same "separate" circuit. Microorganisms that are still active are killed by saturated pure vapor at high temperatures. The cleaning effect can be increased by adding chemical disinfectants. Use sterile air to dry the pump.

14.4.1 General sterilization information

- A CIP cleaning process must have been run successfully before you start the sterilization process
- Sterilization/disinfection only removes specific microorganisms and they are only removed to a certain extent
- The same conditions must prevail at every point within the pump during the sterilization process
- A universal sterilization process does not exist. Choosing which process to use will depend on the type and extent of the microbial contamination
- 99 % sterilization is the maximum that can be realized
- Moist heat is significantly more effective at the same temperature as compared to dry heat. Air is a poorer heat conductor than water vapor. This is why higher temperatures and longer reaction times are needed for dry-state sterilization
- The initial bacterial count is an important factor in sterilization, especially the initial bacterial count of the heat-resistant endospores in the bacteria. The number of microorganisms will be reduced if a CIP cleaning process (germ count reduction) is successfully run beforehand
- A pH value in the 6 – 8 range is generally considered to be optimum with regard to the heat tolerance of microorganisms. Bacteria show the highest tolerance to heat at a pH value of 6 – 7, whereas yeasts and molds do so at a pH value of 3 – 6. The sensitivity of the microorganisms to heat increases above and below these optimum values. This means that the residence time needed to kill them at the same temperature will be shorter
- The effect of heat tolerance as a function of pH is most evident at low temperatures and it generally decreases as the temperature increases – with the exception of endospores. The effect of the pH value on endospores can be clearly seen at temperatures of 120° – 130 °C

Heat resistance of some organisms		
Organism	**Temperature [°C]**	**Time [min]**
Pathogenic streptococci, listeria, polio viruses	61.5	30
Majority of vegetative bacteria, yeasts, molds, all viruses (except hepatitis B)	80	30
Hepatits B viruses, most fungal spores	100	5 – 30
Bacillus anthracis spores (anthrax pathogens)	105	5
Geobacillus stearothermophilus-spores	121	15
Prions (proteins)	132	60

Tab. 14.1: Heat resistance of some organisms depends on temperature and time

- It must be ensured that the endospores are actually killed. This is the reason why the sterilization parameters have to be adjusted to work with the most stable endospores that are currently known. They are considered to be so-called "key microbes or test microbes" for successful sterilization processes. According to current knowledge, these include the endospores in:

  "Geobacillus stearothermophilus"

Temperature:	121 °C
Time:	15 min
Pressure:	1 bar

14.4.2 SIP sterilization specifications

The pump operator is responsible for validating the effectiveness of the SIP sterilization process.

Relevant process aspects:

- The pump must have been designed and approved for the SIP sterilization process
- The pump must have a pressure monitoring device fitted to it for the SIP sterilization process. It must shut down the system immediately if the pressure drops by 0.5 bar
- Any special material resistance features must always be taken into consideration (cleaning agent, temperature)
- The entire system must be heated with saturated pure vapor The pure vapor must be introduced in a way that ensures that air pockets are excluded
- Suitable aids for draining the condensate must be used to prevent water from accumulating. The pump does not have its own condensate drain
- The pure vapor must be free of condensate. Moisture promotes microbial growth
- Sterile air or nitrogen (or other suitable gases) must be introduced at a defined overpressure to replace the collapsing vapor in order to complete the SIP sterilization process. This replacement process will prevent the creation of a vacuum that would cause a pressure drop in the system
- The pump must be sterilized again if a pressure drop is detected (see Chapter 14.4.3)
- Sterile air or nitrogen is used for cooling and drying the system
- Temperature sensors must be placed on the pump/system to monitor the sterilization conditions. For the sterilization process, a temperature of 121 °C (key microbe: *Geobacillus stearothermophilus*) must be maintained at all points for 20 minutes
- The cleaning agents used in the CIP cleaning and SIP sterilization processes must be safely separated from each other. The possibility of recontamination by cleaning agents from a pump/pipe that has already been cleaned and sterilized must be eliminated

14.4.3 A pressure drop during a SIP sterilization process

WANGEN pumps must always be sterilized after a pressure drop occurs during a SIP sterilization process. The following parameters must be noted:

Duration of sterilization	t:	10 – 30 min
Steam pressure	p_{Vapor}:	2.2 – 3.2 bar
Maximum SIP temperature:		
▫ EPDM elastomer material:	T_{SIP} max.:	121 °C
▫ FKM elastomer material:	T_{SIP} max.:	135 °C
Drying	T_{min}:	83 °C
Drying period	T_{min}:	20 min

- *Vapor pressure and temperature must correlate with each other, the limiting factor remains the maximum SIP temperature $T_{SIP\,max}$*
- *The maximum temperature at which the elastomer begins to chemically decompose is usually exceeded during a SIP sterilization process. Thermal wear affects the elastomer. The elastomer's (O-ring) service life will be reduced by every CIP/SIP process*
- *Damage to seals and O-rings caused by SIP processes needs careful analysis* in order to correctly assess and prevent errors when using or handling elastomers
- *Pumpenfabrik Wangen GmbH recommends using suitable elastomer materials for the intended application*

14.5 COP cleaning process sequence

14.5.1 Conditions

Temperature parameter:	to be defined by the operator
Time parameter:	to be defined by the operator
Cleaning agent:	to be defined by the operator
Concentration parameter	to be defined by the operator/note the parameters given by the cleaning agent manufacturer

☑ Wear personal protective equipment
☑ Wear suitable heat-protective gloves for the cleaning

⚠ WARNING!

There is a risk of being burnt or scalded if you come into contact with hot liquids or vapor

14.5.2 COP cleaning process

1. Soak a contaminated component
   - Product residues will be loosened (structural dirt and covering dirt)
   - Use a suitable cleaning agent
   - Temperature range: normally 10 – 20 °C, max. 70 °C
   - Time parameter: to be defined by the operator

2. Use a soft brush or sponge to clean a contaminated component
   - Product residues are to be removed (structural dirt and covering dirt)
   - ▶ Never use a wire brush or hard material for the cleaning
   - ▶ Avoid scratching or damaging the dirty component
   - ▶ Continue the cleaning procedure until the contamination is no longer visible

3. Use drinking water to rinse off the cleaned component
   - The dissolved contamination will be removed
   - Temperature range: max. 70 °C
   - Time parameter: 1 – 2 min

4. Use NaOH to rinse an alkaline
   - Sugar, fat, proteins and adhesive dirt will be removed
   - Concentration parameter: 1 – 2 % weight
   - Temperature range: 60° – 80 °C
   - Time parameter: 10 – 20 min

5. Rinse using drinking water
   - Leach and dissolved contamination will be removed
   - Temperature range: max. 70 °C
   - Time parameter: 5 – 10 min

6. Rinse with an acid cleaner (CH_3COOH, HNO_3 or H_3PO_4)
   - Repeat rinsing if necessary
   - Mineral deposits and lime scale will be removed
   - Concentration parameter: 0.5 – 1.5 % weight
   - Temperature range: 50° – 70 °C
   - Time parameter: 5 – 10 min

7. Rinse using drinking water
   - Acidity and dissolved contamination will be removed
   - Temperature range: normally 10° – 20 °C, max. 70 °C
   - Time parameter: 5 – 10 min
   - ▶ Ensure that all of the cleaning agent residues are removed
   - ▶ Ensure that there is only drinking water in the pump/system
   - ▶ Ensure that recontamination cannot be caused by unsatisfactory water quality

8. Dry using hot air
   - Cleaned components will be dried

14.6 CIP cleaning / SIP sterilization process sequences

14.6.1 Conditions

Temperature parameter:	to be defined by the operator
Time parameter:	to be defined by the operator
Turbulent flow velocity	$v_{optimum}$: 1.5 – 2.1 m/s
Concentration parameter	to be defined by the operator/note the parameters given by the cleaning agent manufacturer

14.6.2 CIP cleaning process

1. Complete the production cycle by flushing out the pump and pipes with drinking water
   - ▫ Product residues are to be removed (structural dirt and covering dirt)
   - ▫ Temperature range: normally 10° – 20 °C, max. 70 °C

2. Use NaOH to rinse an alkaline
   - ▫ Sugar, fat, proteins and adhesive dirt will be removed
   - ▫ Concentration parameter: 1 – 2 % weight.
   - ▫ Temperature range: 60° – 80 °C
   - ▫ Time parameter: 10 – 20 min

3. Rinse using drinking water
   - ▫ Leach and dissolved contamination will be removed
   - ▫ Temperature range: max. 70 °C
   - ▫ Time parameter: 5 – 10 min

4. Rinse with an acid cleaner (HNO_3 or H_3PO_4)
   - ▶ Repeat rinsing if necessary
   - ▫ Mineral deposits and lime scale will be removed
   - ▫ Concentration parameter: 0.5 – 1.5 % weight
   - ▫ Temperature range: 50° – 70 °C
   - ▫ Time parameter: 5 – 10 min

5. Rinse using drinking water
   - ▫ Acidity and dissolved contamination will be removed
   - ▫ Temperature range: normally 10° – 20 °C, max. 70 °C
   - ▫ Time parameter: 5 – 10 min
   - ▶ Ensure that all of the cleaning agent residues are removed
   - ▶ Ensure that there is only drinking water in the pump/system
   - ▶ Ensure that recontamination cannot be caused by unsatisfactory water quality

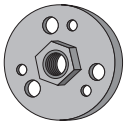
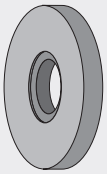
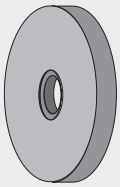
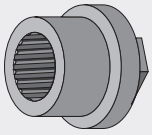
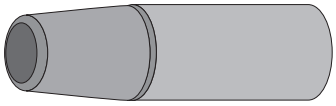
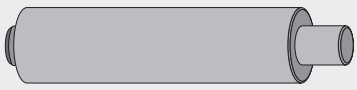
14.6.3 SIP sterilization process

6. Run a sterilization
   - ▫ The operator must determine the type of sterilization process to be used
   - ▫ Any microorganisms still present will be killed by saturated pure vapor (or hot water)

7. Dry using hot air
   - ▫ The cleaned pump will be dried

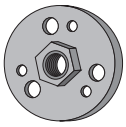
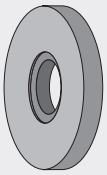
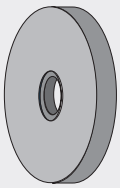
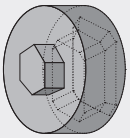
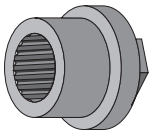
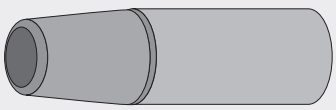
15. Tool list and tightening torques

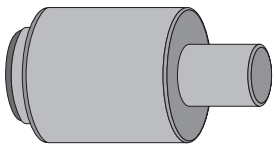
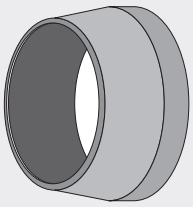
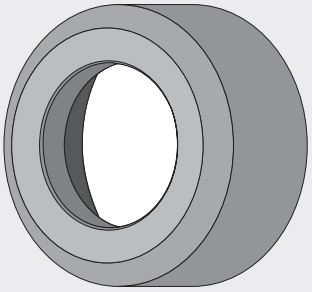
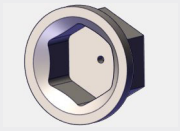
15.1 Twin NG 70, 104 and 130 tool table

Tool number	Tool	Description	Pump type Twin
T0009 T0112 T0113		Puller: Helical gear	70 104 130
T0010 T0019 T0020		Pressure plate: Needle bearing inner ring	70 104 130
T0011 T0031 T0032		Mounting bush: Needle bearing outer ring	70 104 130
T0012 T0033 T0034		Pressure plate: Ball bearing	70 104 130
T0017 T0029 T0030		Socket spanner: Groove nut	70 104 130
T0039 T0040 T0041		Socket spanner: Input shaft / output shaft	70 104 130
T0046 T0047 T0088		Mounting cone: Shaft seal ring gear housing	70 104 130
T0055		Press-fitting mandrel: Shaft seal ring	70

15. Tool list and tightening torques

15.1 Twin NG 70, 104 and 130 tool table

Tool number	Tool	Description	Pump type Twin
T0009 T0112 T0113		Puller: Helical gear	70 104 130
T0010 T0019 T0020		Pressure plate: Needle bearing inner ring	70 104 130
T0011 T0031 T0032		Mounting bush: Needle bearing outer ring	70 104 130
T0012 T0033 T0034		Pressure plate: Ball bearing	70 104 130
T0017 T0029 T0030		Socket spanner: Groove nut	70 104 130
T0036 T0038		Spindle wrench*	70 104 /130
T0039 T0040 T0041		Socket spanner: Input shaft / output shaft	70 104 130
T0046 T0047 T0088		Mounting cone: Shaft seal ring gear housing	70 104 130
T0055		Press-fitting mandrel: Shaft seal ring	70

Tool number	Tool	Description	Pump type Twin
T0082 T0077		Press-fitting mandrel: Shaft seal ring	104 130
T0079 T0083 T0086		Mounting cone: Shaft seal ring bearing housing	70 104 130
T0080 T0084 T0087		Mounting bush: Shaft seal ring bearing housing	70 104 130
T0081 T0085 T0089		Mounting bush: mechanical seal cartridge	70 104 130
T0091 T0093 T0095		Mounting bush: Shaft protection sleeve	70 104 130
T0092 T0094 T0096		Mounting bush: Shaft protection sleeve	70 104 130
T0097 T0098 T0099		Mounting bush: Shaft seal ring	70 104 130
T0162 T0163		Spindle wrench*	70 104 / 130

* T0036 (70), T0038 (104 /130) Spindle wrench for non-hexagonal spindle screws on older pump models

15.2 Tightening torques

15.2.1 Tightening torques for specified components

▶ *See Chapter 13 for more detailed information about the specified F-numbers*

The following screw connection torques are defined for specific components:

Tightening torques for specified components		[Nm]		
F-number	**Specified component**	Size 70	Size 104	Size 130
1008	Bearing cap cylinder screw	20	20	20
1016	Bearing housing hexagon screw	120	150	150
1526	Shaft nut	60	150	190
2177	Output shaft hexagon screw	60	200	250
2180	Spindle screw	100	150	150
2205	Pump foot hexagon screw	44	44	44
2233	Gear housing sealing screw	10	10	10
2258	Gear housing hexagon screw	70	100	100
2259	Seal retainer hexagon socket screw	15	15	15
2186	Hub (helical gear) cylindrical screw	8	8	8
(1526)	Shaft nut threaded pin	8	4	8
2520	Coupling casing cylindrical screw	70	100	100
2527	Cover hexagon screw	120	150	150
2534	Hose nozzle	35	45	45

Tab. 15.1: Tightening torques defined for the components

15.2.2 Tightening torques for screw connections in concrete

(values as per DIN EN 24014)

Dimensions	Friction coefficient	Strength class	Tightening torque [Nm]
M10	0.14	8.8	50
M12	0.14	8.8	90
M16	0.14	8.8	220
M20	0.14	8.8	430

Tab. 15.2: Tightening torques for screw connections in concrete

15.2.3 Tightening torques for general screw connections

(values as per DIN EN 24014)

Dimensions	Friction coefficient	Strength class	Tightening torque [Nm]
M8	0.14	8.8	25
M10	0.14	8.8	49
M12	0.14	8.8	85
M16	0.14	8.8	210
M20	0.14	8.8	425

Tab. 15.3: Tightening torques for ISO screw connections

16. Assembly aid for a mechanical seal cartridge

16.1 Tools T0114 / T0120 / T0121

The tool is used to make assembling/dismantling of double-acting mechanical seal cartridges easier. It consists of lower and upper sections. Both sections are screwed together.

Tool number	Description	Pump type
T0114	Montagehilfe Gleitringdichtungs-Patrone Assembly aid for mechanical seal cartridge	70
T0120		104
T0121		130

16.2 Mechanical seal cartridge inside the tool

Inserting the mechanical seal cartridge inside the tool

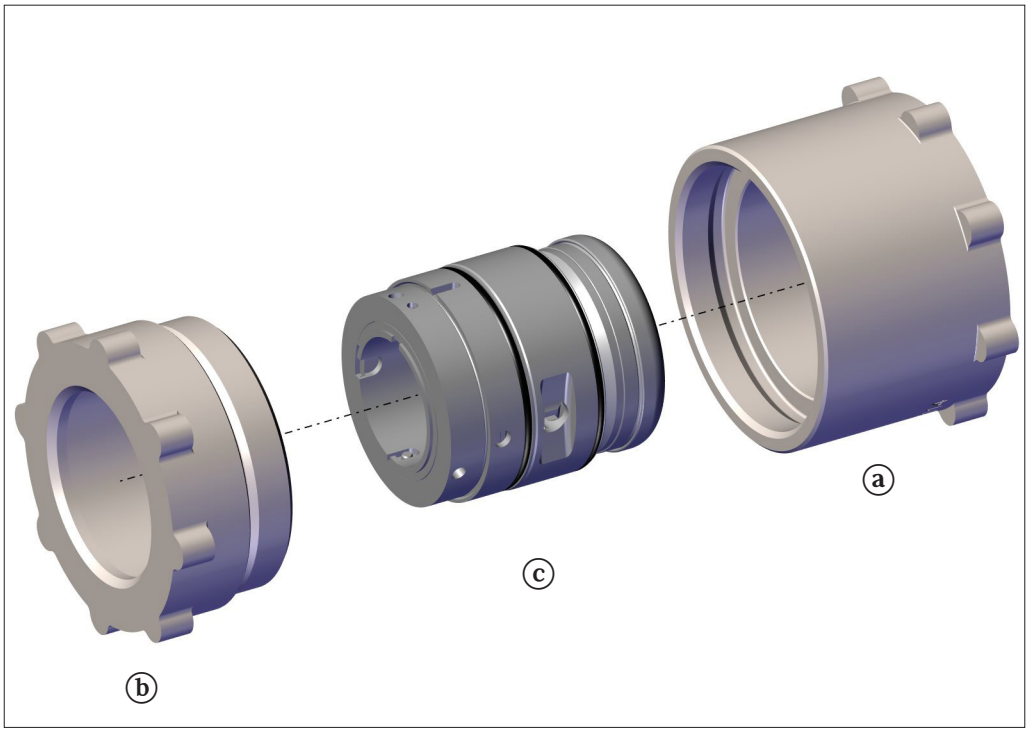
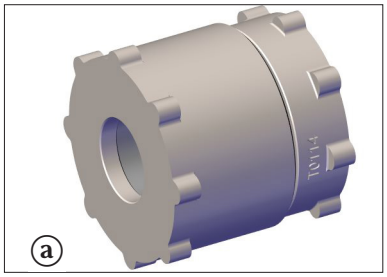


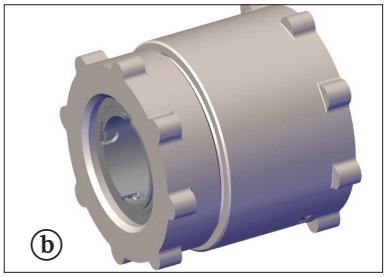
Fig. 16.1: Inserting the mechanical seal cartridge correctly in the assembly aid
ⓐ Lower tool section ⓑ Upper tool section ⓒ Mechanical seal cartridge

16.3 View of the tool

View of the tool with correctly inserted mechanical seal cartridge:



View from bottom



View from top

16.4 Handling the assembly aid

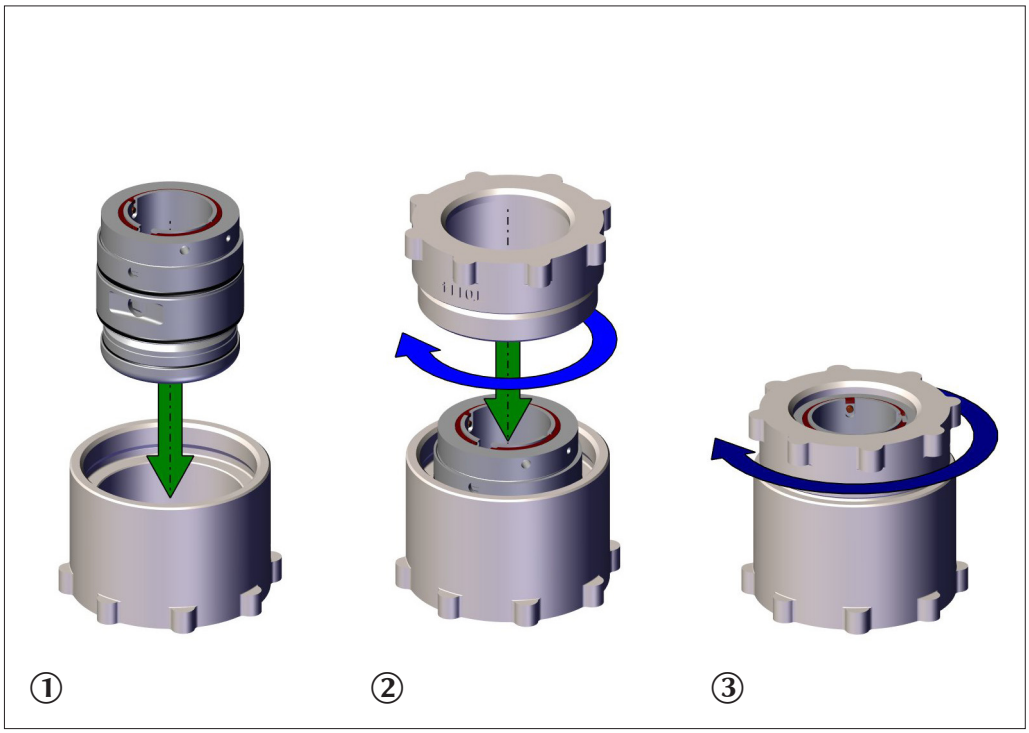


Fig. 16.2: Using the assembly aid to dismantle a mechanical seal cartridge

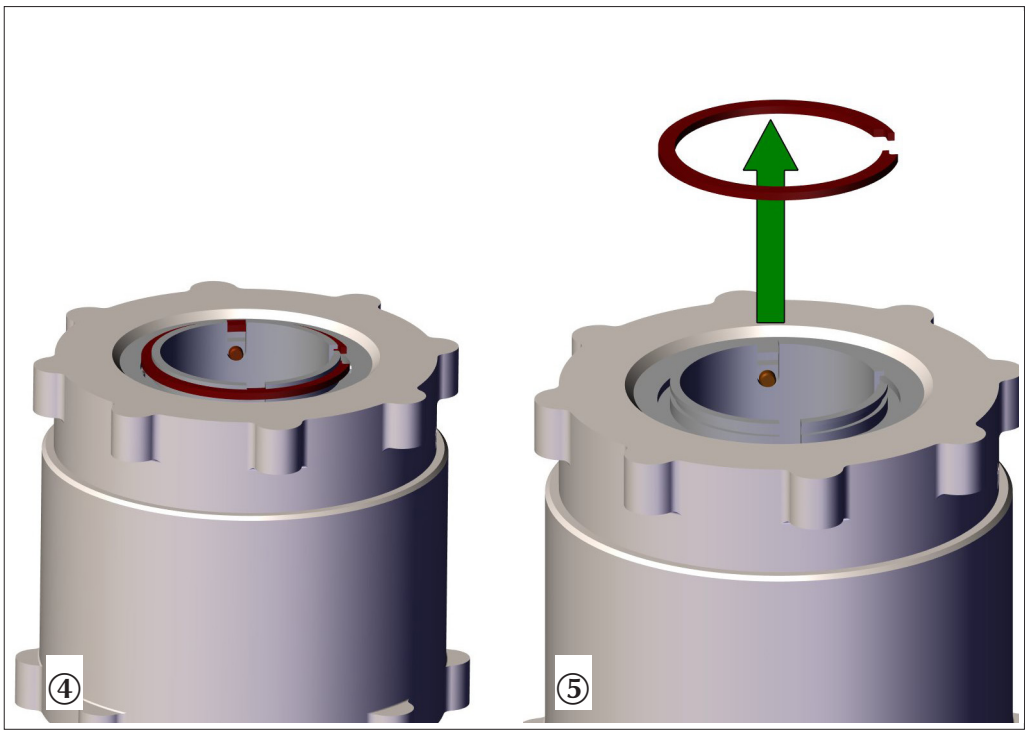


Fig. 16.2 continued: Using the assembly aid to dismantle a mechanical seal cartridge

After correctly inserting the mechanical seal cartridge into the assembly aid's lower section, screwing down the upper section will compress the mechanical seal cartridge so that the mechanical seal cartridge's retaining ring can be easily removed or inserted.

1. Do this by screwing the upper section onto the lower section down to the stop (drive pin/ casing in the shaft sleeve's groove)
2. Now loosen both tool sections from each other and remove the dismantled or fully assembled mechanical seal

17. Accessories (optionally available)

17.1 Pump accessories

Optionally available accessories	
Speed measuring device	Pressure indicator
Dry running protection device	Level indicator
Temperature sensor and temperature display	Level switch
Accessories must be installed in accordance with the enclosed operating instructions.	

Tab. 17.1: Pump accessories

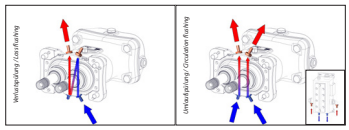
17.2 Accessories for storage and sealing pressure tank

Optionally available accessories for storage and sealing pressure tank	
External pump	▫ Is connected between mechanical seal cartridge and storage/sealing pressure tank ▫ Forces a convection flow (convection flow resulting from pressure differences) ▫ In-series connection of mechanical seal cartridges (1 – 2 m distance from storage/sealing pressure tank above pump, can also be less)
External cooling/heating coil	▫ Cools/heats the quench medium
Storage/sealing pressure tank with integrated cooling/heating coil	▫ Cools/heats the quench medium within the storage/sealing pressure tank
Heat exchanger	▫ Cools the quench medium
Water management system	▫ Adjusts the optimum flow through the mechanical seals
Manual refilling pump	▫ Tops up the quench medium during operation ▫ Prevents unnecessary downtimes
Accessories must be installed in accordance with the enclosed operating instructions	

Tab. 17.2: Optionally available accessories for storage and sealing pressure tank

18. Markings on the pump

The following markings can be found on the pump:

Item Number	Symbol	Symbol's meaning
1 / 2		Danger of being pulled in unexpectedly (de/en)
3		Danger of being pulled in unexpectedly (ANSI)
4		Hot surface
8		Grounding
22		Loss and circulation flushing
23		Pumped medium's flow direction
26		24 h service hotline [Only for Austria, Germany and Switzerland]
27		WANGEN quality

Tab. 18.1: Markings on the pump

Item Number	Symbol	Symbol's meaning
29	WANGEN PUMPEN	Wangen Logo_de
30	WANGEN PUMPEN	Wangen America Logo_en
44	Pumpenfabrik Wangen GmbH Simoniusstraße 17 88239 Wangen Tel.: +49(0)7522/997-0 Nr.: P969 ... Typ: Twin NG 104.54-1 Baujahr: 2023 Gewicht (kg): ____	Twin NG name plate

Tab. 18.1 continued: Markings on the pump

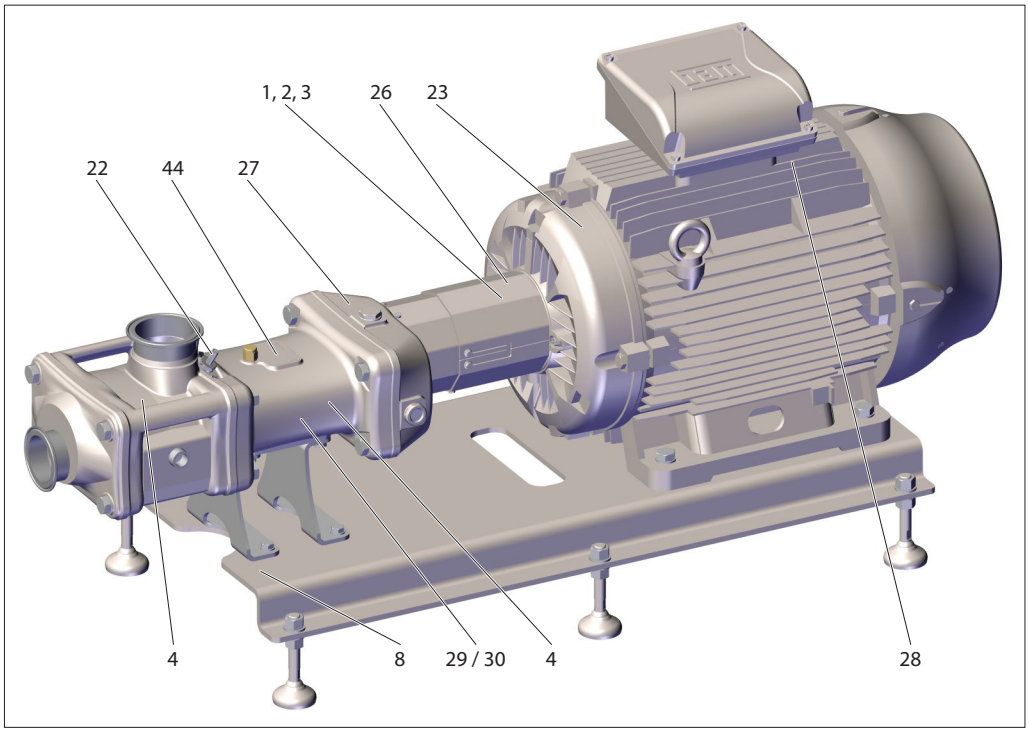


Fig. 18.1: Markings on the pump