

FINISHED PLAN

DE014

COSFLYING LAKE

INSTRUCTION BOOK FOR OIL PURIFIERS (2/3)

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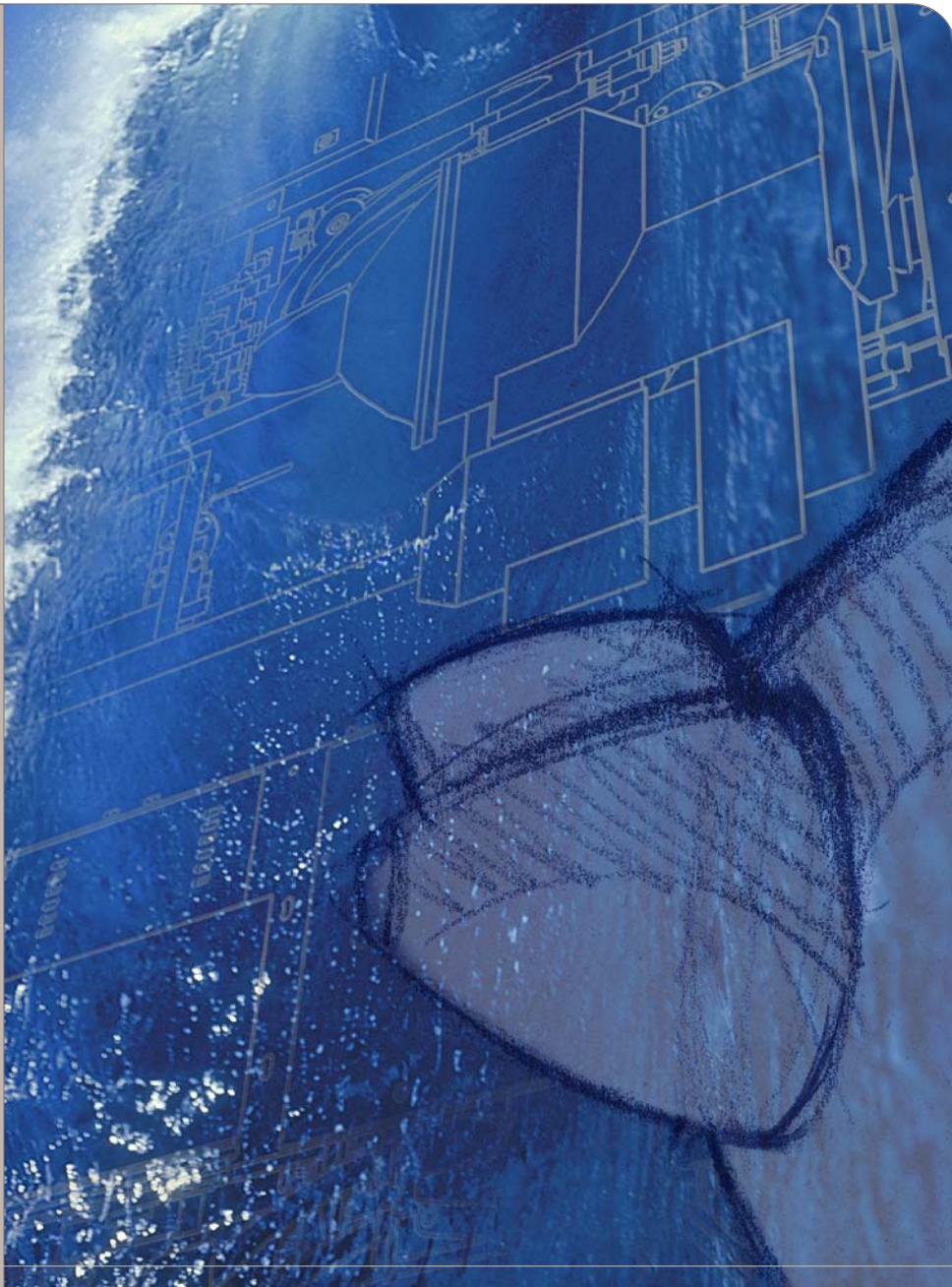
DALIAN CHINA

SHEETS (INCL. COVER)



S 936 Flex Separation System

System Manual - English



S 936 Flex Separation System

System Manual

English



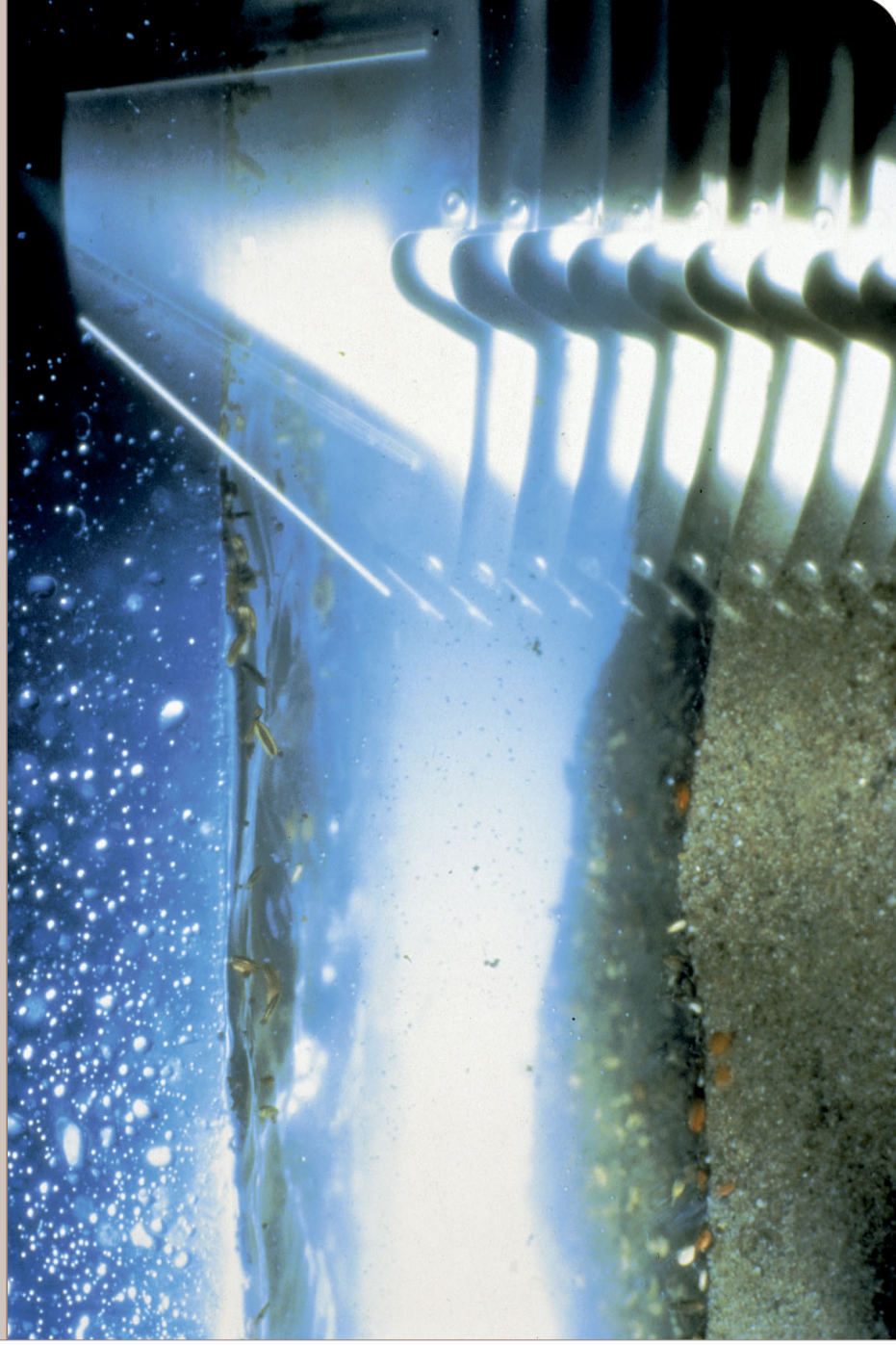
Alfa Laval in brief
Alfa Laval is a leading global provider of specialized products and engineered solutions.
Our equipment, systems and services are dedicated to helping customers to optimize the performance of their processes. Time and time again.
We help our customers to heat, cool, separate and transport products such as oil, water, chemicals, beverages, foodstuff, starch and pharmaceuticals.
Our worldwide organization works closely with customers in almost 100 countries to help them stay ahead.

How to contact Alfa Laval
Up to date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com



Separator Manual High Speed Separator

S 936



Specification No. 881202-10-01
Book No. 593823-02, rev.3

S 936

S 936

Spare Parts Catalogue



Specification No. 881202-10-01/1

Book No. 595092 02 Rev. 2

Spare parts catalogue

Reservdelskatalog

Ersatzteilkatalog

Catalogue de pièces de
rechange

Catalogue de piezas de
recambio

Каталог запасных
частей

Catalogo parti di ricambio

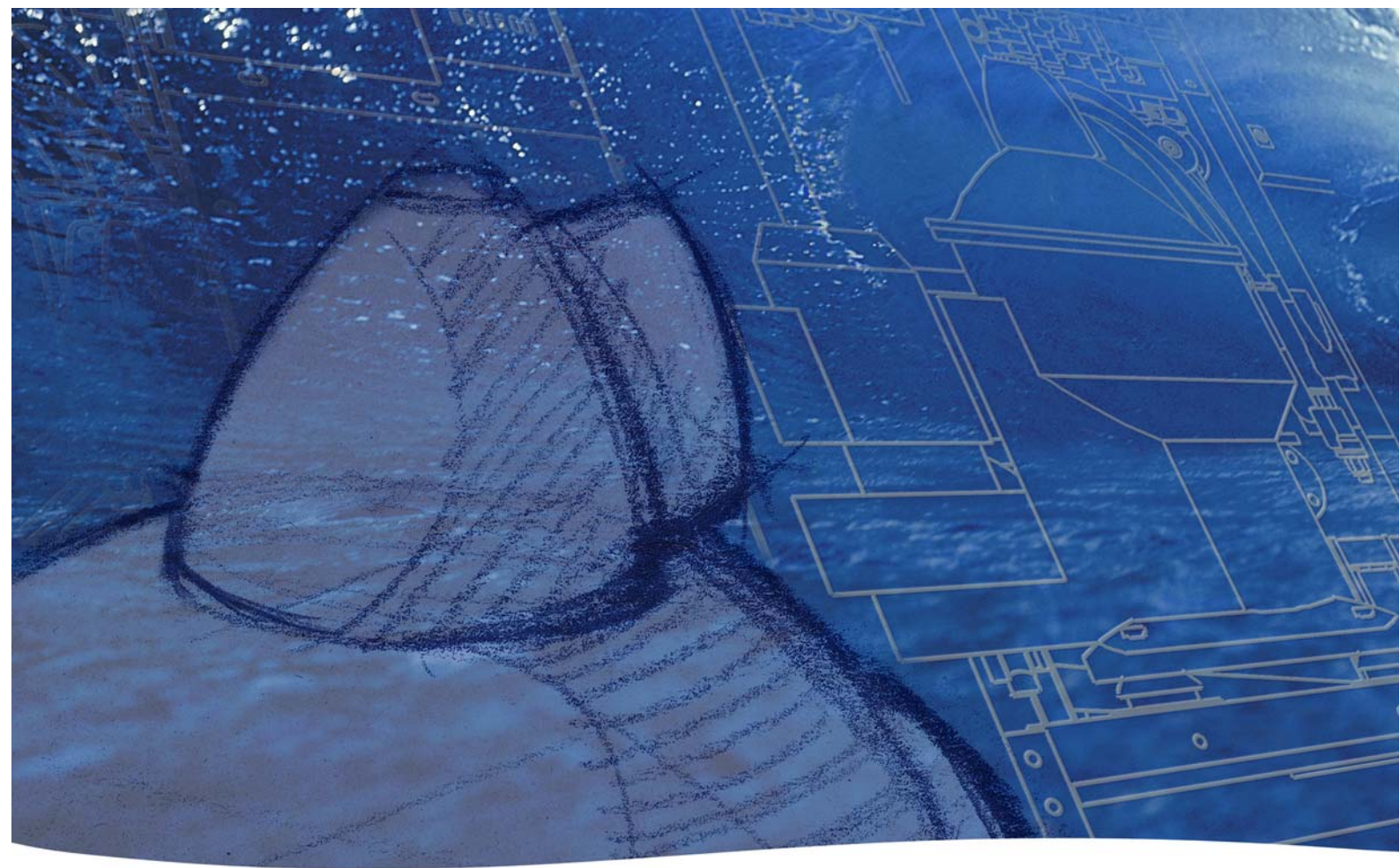
Catalogo de peças sobressalentes

Varaosaluettelo

Καταλογος ανταλλακτικων

Reserveonderdelen-catalogus

Reservedelskatalog



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Original instructions

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1 Read this first



en

The name plate - the guide for finding the correct spare part numbers. See also Warnings in chapter "1.1 General information" on page 7.

sv

Maskinskylden - en guide till det rätta reservdelsnumret. Se även Varningar i kapitel "1.1 Allmän information" på sidan 8.

de

Das Typenschild - ein Hinweis zur korrekten Ersatzteilnummer. Siehe auch Warnhinweise in Kapitel "1.1 Allgemeine Informationen" auf Seite 9.

fr

La plaque de la machine - un guide pour trouver le numéro de pièce de rechange correct. Voir à ce propos les mises en garde du chapitre "1.1 Informations générales" en page 10.

es

La placa-marca de la máquina - guía del número correcto del repuesto. Consulte también las Advertencias del capítulo "1.1 Información General" en la página 11.

ru

Фирменная табличка машины — указатель правильного номера запасной части. См. также предупреждения в главе "1.1 Общие сведения" на странице 12.

it

La targhetta della macchina - guida al corretto numero dei ricambi. Vedere anche le Avvertenze nel capitolo "1.1 Informazioni generali" a pagina 13.

pt

A placa do fabricante da máquina - um guia do número correto das partes sobressalentes. Consultar também os Avisos no capítulo "Informação Geral 1.1" da página 14.

fi

Konekilpi - opastin oikeaan varaosanumeroon. Katso myös kappaleessa 1.1 sivulla 15 olevaa kohtaa "Yleiset tiedot".

el

Η πινακίδα της μηχανής είναι ο οδηγός του σωστού ανταλλακτικού. Δείτε επίσης τις προειδοποιήσεις του κεφαλαίου "1.1 ΓΕΝΙΚΕΣ ΠΛΗΡΟΦΟΡΙΕΣ", στη σελίδα 16.

nl

Het gegevensplaatje - een wegwijzer naar het juiste onderdeelnummer. Zie ook Waarschuwingen in hoofdstuk "1.1 Algemene informatie", op blz. 17.

da

first Typeskiltet - en guide til det rette reservedelsnummer. Se også under Advarsler i kapitel "1.1 Generelle oplysninger" på side 18.

1.1 General information

en

Safeguard your commitment to quality by always using genuine Alfa Laval spare parts.

Remember, Alfa Laval cannot accept responsibility for the failure of separator equipped with non-original spare parts. We guarantee the quality and reliability of our products.



WARNING B

When changing certain parts in the separator bowl assembly, the vibration level may increase. This can result in shorter life time of components like rolling bearings and gears. If severe unbalance occurs, the rotating bowl assembly can come into contact with the frame causing damage to equipment and injuries to personnel. It is strongly recommended that the exchange of parts is **supervised by an Alfa Laval service engineer**. Alfa Laval assumes no liability for damage to property or injury to personnel resulting from unauthorized installation of those parts.



WARNING C

Certain bowl parts carry milling marks from the balancing of the complete separator bowl. These parts must not be replaced without rebalancing the complete bowl. The rebalancing should be made by an Alfa Laval service shop.

SV

Följ ditt kvalitetstänkande genom att endast använda Alfa Laval originalreservdelar.

Kom ihåg att Alfa Laval inte tar något ansvar för fel på en separator som innehåller icke-originaldelar. Vi garanterar kvaliteten och driftsäkerheten hos våra egna produkter.



VARNING B

Om vissa delar i separatorkulan byts ut, kan vibrationsnivån komma att öka. Detta kan i sin tur leda till förkortad livslängd på t.ex. lager och växlar. Om kraftiga vibrationer uppstår, kan den roterande kulan komma att slå i stativets delar, vilket kan medföra allvarlig maskin- och personskada. Det är därför av stor vikt att utbyte av kulans delar **övervakas av en serviceingenjör från Alfa Laval**. Alfa Laval tar inget ansvar för maskin- eller personskador som kan uppkomma på grund av att delar bytts ut av icke auktoriserad personal.



VARNING C

Vissa av separatorkulans delar har urfrästa spår som resultat av balansering av hela kulan. Dessa delar kan inte bytas ut utan att en ombalansering av kulan görs. För att bästa resultat ska uppnås, ska den kompletta kulan sändas till en Alfa Laval serviceverkstad för ombalansering.

de

Sichern Sie sich Ihren Anspruch auf Qualität durch ausschließliche Verwendung von original Alfa Laval Ersatzteilen.

Beachten Sie bitte, daß Alfa Laval keine Verantwortung für den Ausfall eines Separators übernimmt, der mit Nicht-Originalteilen ausgestattet ist. Wir garantieren für die Qualität und Zuverlässigkeit unserer Produkte.



WARNUNG B

Durch den Austausch bestimmter Teile in der Separatortrommel-Baugruppe, kann ihr Schwingungspegel steigen. Dies kann zu einer kürzeren Lebensdauer von Teilen, wie z.B. Wälzlagern und Getrieben, führen. Bei einer schweren Unwucht kann die rotierende Trommelbaugruppe in Kontakt mit dem Gestell kommen, was zu Beschädigungen der Ausrüstung oder Personenverletzungen führen kann. Es wird dringend empfohlen, **den Austausch von einem Alfa Laval Service-Ingenieur beaufsichtigen zu lassen**. Alfa Laval übernimmt keine Haftung für eine Gerätebeschädigung oder Personenverletzung aufgrund einer ungenehmigten Montage dieser Teile.



WARNUNG C

Bestimmte Trommelteile haben Fräsmarken vom Auswuchten der kompletten Separatortrommel. Diese Teile dürfen nicht ohne eine Neuauswuchtung der kompletten Trommel ausgetauscht werden. Die Neuauswuchtung sollte in einer Alfa Laval Service-werkstatt erfolgen.

fr

Respectez votre engagement de qualité en utilisant toujours des pièces de rechange d'origine Alfa Laval.

Attention, Alfa Laval décline toute responsabilité en cas de panne d'un séparateur équipé de pièces de rechange qui ne sont pas d'origine. Nous garantissons la qualité et la fiabilité de nos produits.



AVERTISSEMENT B

Le remplacement de certaines pièces du bol du séparateur risque d'augmenter le niveau de vibrations, et donc de réduire la durée de vie des composants tels que les paliers à roulements et les engrenages. En cas de déséquilibre trop important, le bol en rotation risque d'entrer en contact avec des pièces du bâti, provoquant ainsi des détériorations de l'équipement et des blessures du personnel. Nous vous incitons fortement à faire réaliser le remplacement **sous la surveillance d'un technicien de maintenance Alfa Laval**. Alfa Laval n'assume aucune responsabilité en cas de détérioration du matériel ou de blessure du personnel résultant d'une installation non approuvée de ces pièces.



AVERTISSEMENT C

Certaines pièces du bol présentent des marques de repérage effectuées lors de l'équilibrage du bol du séparateur. Il ne faut pas remplacer ces pièces sans avoir au préalable procédé à un nouvel équilibrage de l'ensemble du bol. Cet équilibrage doit être réalisé dans un atelier de réparation Alfa Laval.

es

Proteja su compromiso con la calidad utilizando siempre repuestos originales Alfa Laval.

Recuerde que Alfa Laval no acepta ninguna responsabilidad por el fallo de una separadora equipada con repuestos no originales. Alfa Laval garantiza la calidad y la fiabilidad de sus productos.



ADVERTENCIA B

Cuando se cambian ciertas piezas del conjunto del rotor de la separadora, puede que se produzca un aumento del nivel de vibraciones, lo que puede provocar un desgaste de algunos componentes, como los rodamientos de rodillos y los engranajes. Si se produce un desequilibrio importante, el conjunto del rotor en movimiento puede rozar con el bastidor, causando serios daños al equipo y al personal. Se recomienda encarecidamente que el cambio sea **supervisado por un técnico de mantenimiento de Alfa Laval**. Alfa Laval no se hace responsable de los daños materiales o daños personales provocados por la instalación no autorizada de esas piezas.



ADVERTENCIA C

Algunas piezas del rotor llevan marcas estampadas para el equilibrado del rotor completo de la separadora. Siempre que se cambien estas piezas se debe equilibrar de nuevo todo el rotor, operación que debe ser realizada por un experto de un centro de servicio Alfa Laval.

ru

Для обеспечения качества работы вашего оборудования используйте только подлинные запасные детали компании Alfa Laval.

Помните: компания Alfa Laval не несет ответственность за нарушения работы сепаратора, на котором установлены не подлинные запасные детали. Мы гарантируем качество и надежность нашей продукции.



ПРЕДУПРЕЖДЕНИЕ В

В случае замены некоторых частей устройства барабана сепаратора может повыситься уровень вибрации. Это может привести к сокращению срока службы компонентов, таких как подшипники и привод. В случае значительного дисбаланса, устройство вращающегося барабана может войти в контакт со станиной, что приведет к серьезному повреждению оборудования и травмам обслуживающего персонала. Настоятельно рекомендуется, чтобы замена была **проконтролирована инженером по обслуживанию компании Alfa Laval**. Компания Alfa Laval не несет никакой ответственности за повреждения собственности или травмы персонала в результате неразрешенной установки этих деталей.



ПРЕДУПРЕЖДЕНИЕ С

На некоторых частях барабана поставлены отметки после балансировки барабана сепаратора полностью. Эти части не могут быть заменены без повторной балансировки всего устройства барабана сепаратора. Повторная балансировка должна быть произведена в ремонтном центре Alfa Laval.

it

Salvaguardate la qualità del vostro separatore utilizzando sempre ricambi originali Alfa Laval.

Ricordate che la Alfa Laval non accetta alcuna responsabilità in caso di difetti al separatore dovuti all'utilizzo di ricambi non originali. La Alfa Laval garantisce la qualità e l'affidabilità esclusivamente dei propri prodotti.



AVVERTENZA B

In seguito alla sostituzione di alcune parti del tamburo del separatore, il livello di vibrazioni può aumentare. Questo può comportare la riduzione della vita utile di componenti quali cuscinetti a rulli ed ingranaggi. In caso di elevato spostamento, il tamburo può entrare a contatto con le parti del telaio provocando seri danni all'attrezzatura e lesioni alle persone. Si raccomanda caldamente di far **controllare la sostituzione da un tecnico di assistenza Alfa Laval**. La Alfa Laval non assume alcuna responsabilità per danni alle cose o lesioni al personale dovuti all'installazione non autorizzata delle suddette parti.



AVVERTENZA C

Alcune parti del tamburo dipendono dal bilanciamento complessivo del tamburo del separatore. Le suddette parti non possono essere sostituite senza procedere ad un nuovo bilanciamento. Per ottenere i migliori risultati, rivolgersi ad un centro assistenza Alfa Laval per il ribilanciamento dell'intero gruppo.

pt

Preserve o seu compromisso com a qualidade utilizando sempre peças originais Alfa Laval.

Não se esqueça de que a Alfa Laval não assume quaisquer responsabilidades pela avaria dum separador que não esteja equipado com peças originais. Por isso, asseguramos a garantia da qualidade e fiabilidade dos nossos produtos.



AVISO B

Ao mudar determinadas peças no conjunto do rotor da separadora, poderá provocar um aumento da vibração. Tal poderá originar a redução do tempo de duração dos componentes, tais como rolamentos de roletes e engrenagens. Caso se verifique um desequilíbrio acentuado, o conjunto do rotor giratório poderá entrar em contacto com a estrutura, vindo a provocar danos no equipamento e ferimentos pessoais. Recomenda-se vivamente que a substituição de peças seja **vistoriada por um técnico de serviço da Alfa Laval**. A Alfa Laval não assume qualquer responsabilidade por danos em bens ou ferimentos pessoais resultantes da instalação não autorizada daquelas peças.



AVISO C

Determinadas partes do rotor contêm marcas de atrito do balanceamento do rotor do separador completo. Estas peças não devem ser substituídas sem reequilibrar o rotor completo. O reequilíbrio deve ser executado por uma centro de assistência Alfa Laval.

fi

Varmista käyttämiesi tuotteiden laatu käyttämällä aina aitoja ja alkuperäisiä Alfa Laval -varaosia.

Muista, ettei Alfa Laval voi vastata sellaisen separaattorin toimintahäiriöstä, jossa on käytetty muita kuin alkuperäisiä varaosia. Me takaamme omien tuotteidemme laadun ja luotettavuuden.



VAROITUS B

Kun separaattorin kuula-asennelman tiettyjä osia vaihdetaan, sen tärinän taso voi kasvaa. Tämä voi johtaa joidenkin osien, kuten vierintälaakereiden ja hammasvaihteiden, käyttöiän lyhenemiseen. Jos asennelma joutuu pahasti epätasapainoon, pyörivä kuula-asennelma voi koskettaa runkoa ja aiheuttaa laite- ja henkilövahinkoja. Suosittelemme, että **Alfa Lavalin huoltoinsinööri valvoo** vaihtoa. Alfa Laval ei ota vastuuta omaisuudelle tai henkilökunnalle aiheutuneista vahingoista, mikäli ne johtuvat näiden osien väärin suoritetusta asennuksesta.



VAROITUS C

Tietyissä kuulan osissa on merkinnät koko separaattorikuulan tasapainotuksesta. Näitä osia ei saa vaihtaa ilman, että koko kuula tasapainotetaan. Tasapainotus on annettava Alfa Laval -korjaamon hoidettavaksi.

el

Διασφαλίστε τη δέσμευσή σας για ποιότητα χρησιμοποιώντας πάντοτε γνήσια ανταλλακτικά Alfa Laval.

Σας υπενθυμίζουμε ότι η Alfa Laval δεν αναλαμβάνει ευθύνη για τη βλάβη διαχωριστήρα που δεν είναι εξοπλισμένος με αυθεντικά ανταλλακτικά. Εγγυώμαστε την ποιότητα και την αξιοπιστία των προϊόντων μας.



ΠΡΟΣΟΧΗ Β

Όταν αλλάζετε ορισμένα εξαρτήματα στο σύστημα του τυμπάνου του διαχωριστήρα, η στάθμη κραδασμών μπορεί να αυξηθεί. Αυτό μπορεί να έχει σαν αποτέλεσμα μικρότερη διάρκεια ζωής των εξαρτημάτων, όπως ρουλεμάν και γρανάζια. Σε περίπτωση σοβαρής έλλειψης ζυγοστάθμισης, το περιστρεφόμενο σύστημα του τυμπάνου μπορεί να έλθει σε επαφή με το πλαίσιο, προκαλώντας ζημιές στο μηχάνημα και τραυματισμό του προσωπικού. **Οι οποιοσδήποτε αλλαγές εξαρτημάτων πρέπει να γίνονται υπό την επίβλεψη μηχανικού της Alfa Laval.** Η Alfa Laval δεν φέρει καμία ευθύνη για υλικές ζημιές ή για τραυματισμό του προσωπικού λόγω τοποθέτησης αυτών των εξαρτημάτων από μη εξουσιοδοτημένα άτομα.



ΠΡΟΣΟΧΗ C

Ορισμένα εξαρτήματα του τυμπάνου φέρουν ίχνη φρεζαρίσματος από τη ζυγοστάθμιση ολόκληρου του συστήματος του τυμπάνου του διαχωριστήρα. Αυτά τα εξαρτήματα δεν πρέπει να αντικατασταθούν χωρίς να ξαναγίνει ζυγοστάθμιση ολόκληρου του συστήματος του τυμπάνου του διαχωριστήρα. Η επαναζυγοστάθμιση πρέπει να γίνει σε κάποιο από τα επισκευαστικά κέντρα της Alfa Laval.

nl

Doe geen concessies aan kwaliteit en gebruik altijd originele Alfa Laval-reserveonderdelen.

Wij wijzen u erop, dat Alfa Laval geen verantwoordelijkheid kan aanvaarden voor defecten aan een separator die is uitgerust met nietoriginele reserveonderdelen. Wij garanderen de kwaliteit en de betrouwbaarheid van onze producten.



WAARSCHUWING B

Als er bepaalde onderdelen van de separatortrommel worden vervangen, kan het trillingsniveau veranderen. Dit kan leiden tot een verkorte levensduur van onderdelen als rollagers en tandwielen. Als er sprake is van een ernstige mate van onbalans, kan de roterende trommel in contact komen met het frame, wat kan leiden tot ernstige schade aan goederen of tot persoonlijk letsel. Het is dan ook ten sterkste aan te raden om onderdelen te laten vervangen **onder supervisie van een onderhoudstechnicus van Alfa Laval**. Alfa Laval aanvaardt geen enkele aansprakelijkheid voor schade aan goederen of persoonlijk letsel als gevolg van onoordeelkundige installatie van die onderdelen.



WAARSCHUWING C

Op bepaalde onderdelen van de trommel zitten freesmarkeringen van het uitbalanceren van de gehele separatortrommel. Deze onderdelen mogen niet worden vervangen zonder dat de gehele trommel opnieuw wordt uitgebalanceerd. Het opnieuw uitbalanceren moet gebeuren in een onderhoudswerkplaats van Alfa Laval.

da

Beskyt din investering i kvalitet ved altid at anvende originale reservedele fra Alfa Laval.

Husk at Alfa Laval påtager sig intet ansvar for fejl i separatorer, der er udstyret med uoriginale reservedele. Vi indestår for vore produkters kvalitet og driftssikkerhed.



ADVARSEL B

Ved udskiftning af visse dele i separatorkuglen, kan vibrationsniveauet blive forøget. Dette kan forkorte levetiden for komponenter som kuglelejer og tandhjul. I tilfælde af kraftige vibrationer kan den roterende separatorkugle komme i kontakt med rammedele, hvilket kan medføre alvorlig beskadigelse af udstyr og personskade. Det anbefales på det kraftigste, at udskiftningen sker **under tilsyn af en servicetekniker fra Alfa Laval**. Alfa Laval påtager sig intet ansvar for ting- eller personskade som følge af ikke-autoriseret montering af disse dele.



ADVARSEL C

Visse kugledele er forsynet med mærker fra afbalanceringen af den samlede separatorkugle. Ved udskiftning af disse dele skal der foretages en ny afbalancering af den samlede kugleenhed. Afbalanceringen bør foretages af et Alfa Laval-servicecenter.

1.2 Translation list

Översättningslista
Übersetzungsliste
Liste de traduction
Lista de traducciones

en	sv	de	fr	es
Part no.	Reservdelsnummer	Teil-Nr.	Numéro de pièce	Pieza No.
Qty	Antal	Anzahl	Quantité	Cantidad
Description	Benämning	Bezeichnung	Dénomination	Descripción
Notes	Anmärkingar	Anmerkungen	Remarques	Notas
Machine type	Maskintyp	Maschinentyp	Type de machine	Tipo de máquina
Product no.	Produktnr	Produktnummer	Numéro de produit	Número de producto
Machine unit description	Maskinblocksbenämning	Bezeichnung des Maschinenblocks	Dénomination de partie de machine	Descripción de sección de la máquina
Machine unit no.	Maskinblocksnr	Maschinenblock Nr.	Partie de machine n°	No. de sección de máquina
Subassembly description	Undergruppsbenämning	Bezeichnung der Untergruppe	Dénomination de sous-ensemble	Descripción de subconjunto
Subassembly no.	Undergruppsnr	Untergruppe Nr.	N° de sous-ensemble	Número de subconjunto
See page	Se sidan	Siehe Seite	Voir page	Véase la página
Fig. ref.	Figurhänvisning	Bildhinweise	Réf. de fig.	Referencia de figura
Product name	Produktnamn	Produktname	Nom du produit	Nombre del producto
Exchange necessitates rebalancing of bowl	Utbyte nödvändiggör ombalansering av kulan	Austausch erfordert Wiederauswuchtung der Trommel	Le remplacement nécessite le rééquilibrage du bol	El racmbio requiere el reequilibrado del rotor
See separate spare parts list	Se separat reservdelslista	Siehe separate Ersatzteilliste	Voir liste séparée des pièces de rechange	Véase la lista de piezas separada
Not delivered as spare part	Levereras ej som reservdel	Nicht als Ersatzteil geliefert	Non livré comme pièce de rechange	No se entrega como pieza de recambio

Словарь перевода
Lista traduzioni
Lista para tradução
Käännösluettelo

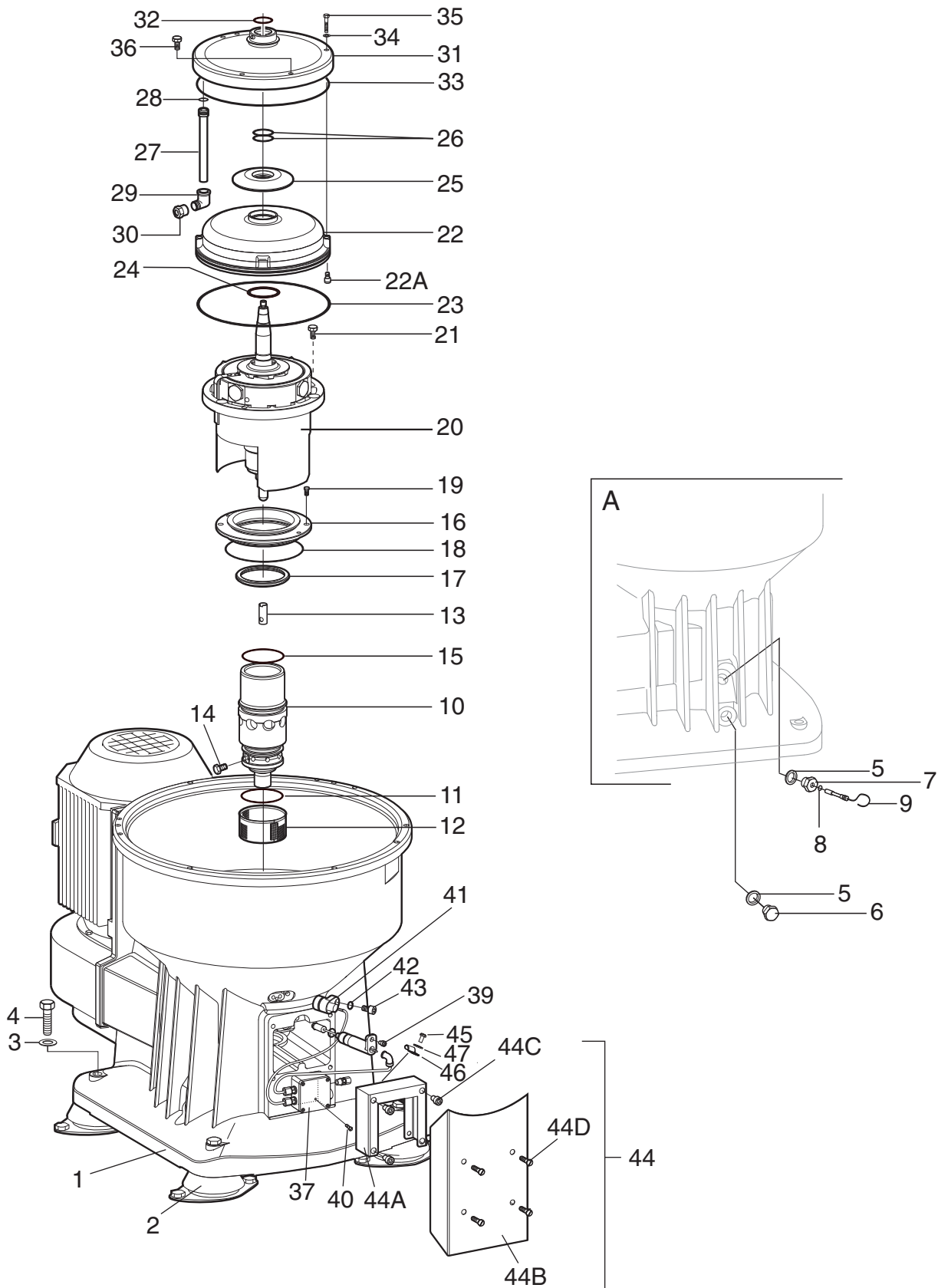
en	ru	it	pt	fi
Part no.	Деталь №	Nr. parte	Numero de peca	Varaosanumero
Qty	Кол—во	Quantita	Quantidade	Lukumäärä
Description	Наименование	Descrizione	Descricao	Nimitys
Notes	Примечания	Note	Notas	Huomautuksia
Machine type	Машина тнпа	Tipo macchina	Tipo de maquina	Konetyyppi
Product no.	Артикул №	Nr.prodotto	No. do produto	Tuotteen no
Machine unit description	Наименование блока машины	Descrizione unita macchina	Descricao da unidade da maquina	Koneenosan nimitys
Machine unit no.	Блок машины №	Nr. unita macchina	Numero de unidade da maquina	Koneenosan no
Subassembly description	Наименование группы	Descrizione sottogruppo	Descricao do subconjunto	Alaryhmän nimitys
Subassembly no.	Группа №	Nr. sottogruppo	Número de subconjunto	Alaryhmän no
See page	См. страницу	Vedi pagina	Véase la página	Ks sivu
Fig. ref.	Ссылка на эскиз	Rif. fig.	Referencia de figura	Kuvaviite
Product name	Наименование артикула	Nome prodotto	Nombre del producto	Tuotteen nimi
Exchange necessitates rebalancing of bowl	Замена требует балансировки барабана	La sostituzione comporta la equilibratura del tamburo	El racmbio requiere el reequilibrado del rotor	Vaihdettaessa kuula tasapainoitettava uudelleen
See separate spare parts list	См. отдельный перечень запасных частей	Vedi lista separata delle parti di ricambio	Véase la lista de piezas separada	Katso erillistä varaosaluetteloa
Not delivered as spare part	Не поставлена вместе с запасными частями	Non fornito come parte di ricambio	No se entrega como pieza de recambio	Ei toimiteta varaosana

ΓΛΩΣΣΑΡΙ
Vertaallijst
Oversættelseliste

en	el	nl	da
Part no.	Αριθμός ανταλλακτικού	Onderdeelnr.	Reservedelsnummer
Qty	Σύνολο	Hoeveelheid	Antal
Description	Περιγραφή	Beschrijving	Betegnelse
Notes	Παρατηρήσεις	Opmerkingen	Bemaerkninger
Machine type	Τύπος μηχανήματος	Machinetype	Maskintype
Product no.	Αριθμός προϊόντος	Produktnr.	Produktnr.
Machine unit description	Περιγραφή συγκροτήματος μηχανής	Machineblokbenaming	Maskinbetegnelse
Machine unit no.	Αριθμός συγκροτήματος μηχανής	Machineblokbenamning	Maskinnr.
Subassembly description	Περιγραφή υποσυγκροτήματος	Subgroepbenamning	Undergruppsbetegnelse
Subassembly no.	Αριθμός υποσυγκροτήματος	Subgroeprnr.	Undergruppenr.
See page	Βλέπε σελίδα	Zie blz.	Se side
Fig. ref.	Παραπομπή σε εικόνα	Afb. ref.	Figurhenviisning
Product name	Ονομασία προϊόντος	Produktnaam	Produktnavn
Exchange necessitates rebalancing of bowl	Ανταλλαγή απαιτεί επαναρρύθμιση ισορροπίας του τύμπανου	Vervangning vereist herbalanceren van de kogel	Udskriftning kraever afbalcering af kuglen
See separate spare parts list	Βλέπε ειδική λίστα ανταλλακτικών	Vervangning vereist van de kogel	Se spaat reservedelsliste
Not delivered as spare part	Δεν παραδίδεται ως ανταλλακτικό	Niet geleverd als reserveonderdeel	Levereres ikke som reservedel

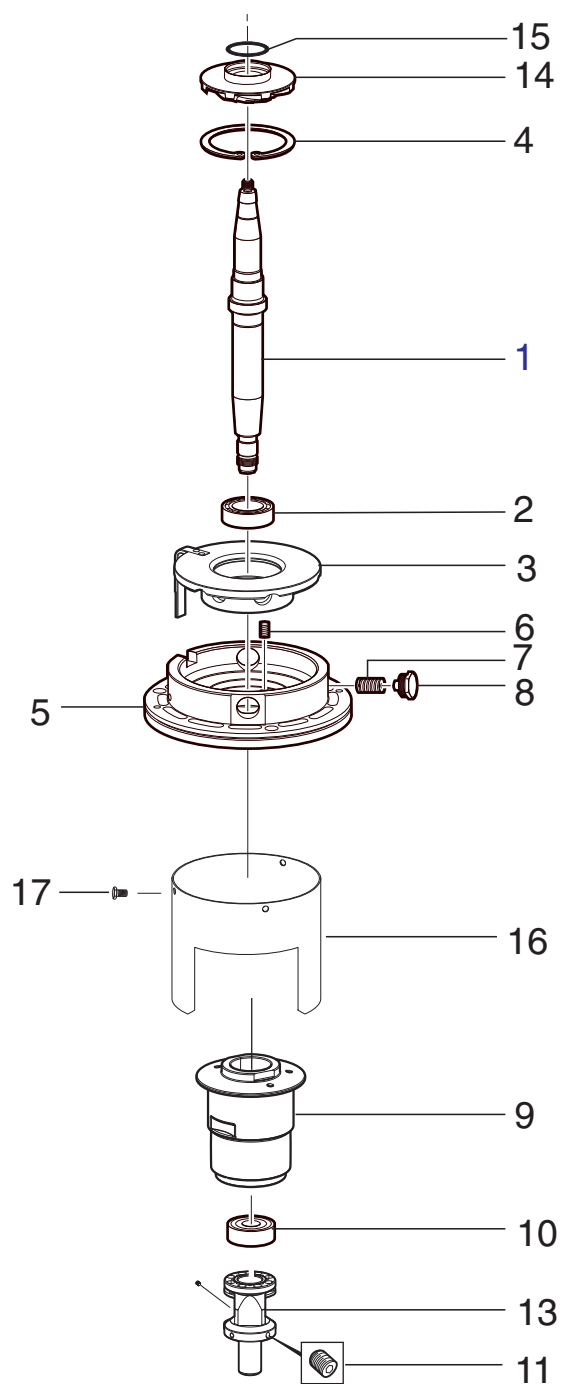
2 Machine bottom part

			Machine unit number or Subassembly description 572704-				
Ref	Part No	Description	-04	Quantity			Notes
1	562993 81	Frame bottom part	1				
2	560131 02	Frame support	4				
3	70490	Washer	4				
4	2210462 32	Screw	4				
5	552766 07	Washer	2				
6	526350 04	Plug	1				
7	565378 01	Plug	1				
8	223404 05	O-ring	1				
9	571743 80	Oil pin	1				
10	590137 01	Bottom bearing holder	1				
11	2234121 38	O-ring	1				
12	562091 01	Strainer	1				
13	589704 01	Pipe	1				
14	221706 03	Screw	1				
15	2234121 40	O-ring	1				
16	562094 01	Labyrinth ring holder	1				
17	562095 02	Labyrinth ring	1				
18	223412 23	O-ring	1				
19	221716 23	Screw	2				
20	592493 80	Driving device vertical	1				See page 24
21	221721 24	Screw	3				
22	571405 80	Neck bearing cover	1				
22A	221711 18	Screw	1				
23	223412 46	O-ring	1				
24	566788 21	Seal ring	1				
25	592072 01	Deflector ring	1				
26	223406 28	O-ring	2				
27	560202 01	Pipe	1				
28	223404 20	O-ring	1				
29	539418 02	Elbow	1				
30	526352 06	Bushing	1				
31	564493 02	Operating water cover	1				
32	566788 05	Seal ring	1				
33	223412 46	O-ring	1				
34	41456	Washer	3				
35	221040 46	Screw	3				
36	221040 08	Screw	2				
37	566718 81	Monitoring kit	1				See page 26
39	221716 23	Screw	1				
40	17812	Screw	2				
41	561773 03	Plug	1				Stainless Steel
41	561773 07	Plug	1				Brass
42	74067	O-ring	1				
43	221716 23	Screw	1				
44	578019 80	Front casing	1				
44A	578017 02	Holder	1				
44B	578019 01	Front casing	1				
44C	221716 22	Screw	4				
44D	221721 37	Screw	4				
45	221126 04	Screw	1				
47	223101 94	Washer	1				



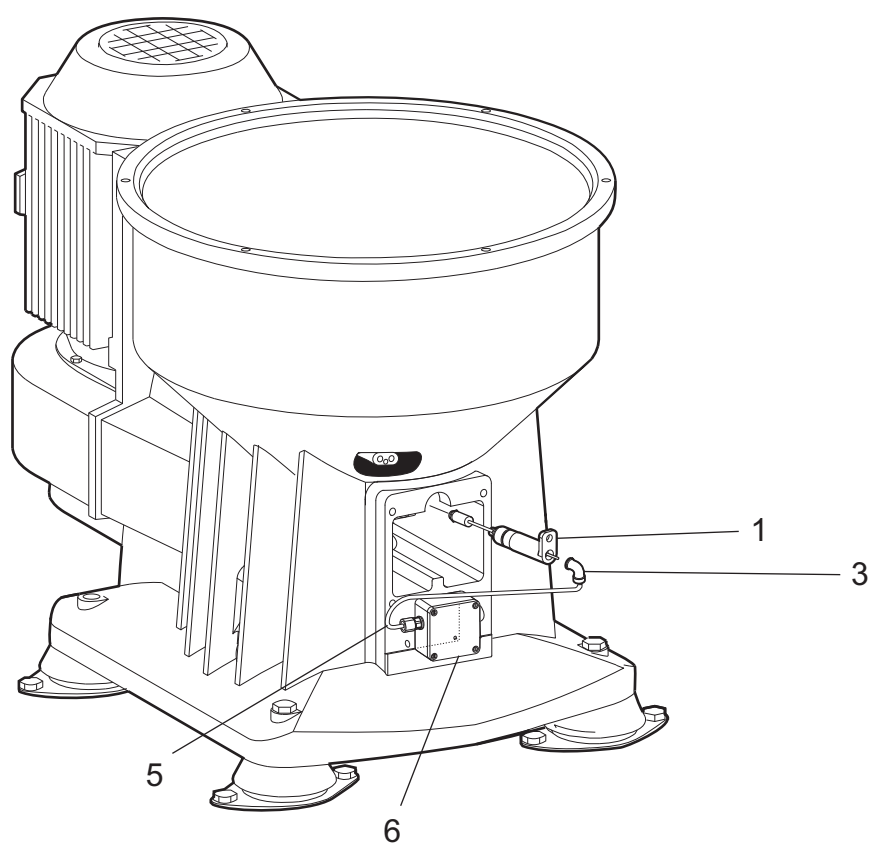
2.1 Driving device vertical

			Machine unit number or Subassembly description 592493-					
Ref	Part No	Description	-80	Quantity				Notes
1	560134 01	Bowl spindle	1					
2	548747 08	Ball bearing	1					
3	584048 80	Top bearing seat	1					
4	223642 36	Snap ring	1					
5	580051 02	Top bearing housing	1					
6	562109 03	Helical spring	3					
7	562110 02	Composite spring	4					
8	560406 01	Plug	4					
10	548744 03	Self-align roller bearing	1					
11	545869 03	Nozzle Ø 1,5 mm	2					
13	590138 01	Oil mist generator	1					
14	571453 02	Fan	1					
15	580049 01	Air deflector	1					
16	221716 22	Screw	3					
17	223406 30	O-ring	1					



2.2 Monitoring kit

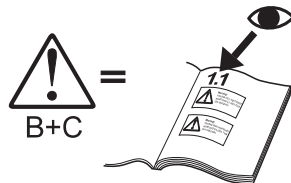
			Machine unit number or Subassembly description 566718-					
Ref	Part No	Description	-81	Quantity				Notes
1	562902 81	Sensor with support	1					
3	552870 41	Tube gland, angle 90 degris	1					
5	556416 13	Protective tube	1					
6	566692 80	Junction box	1					

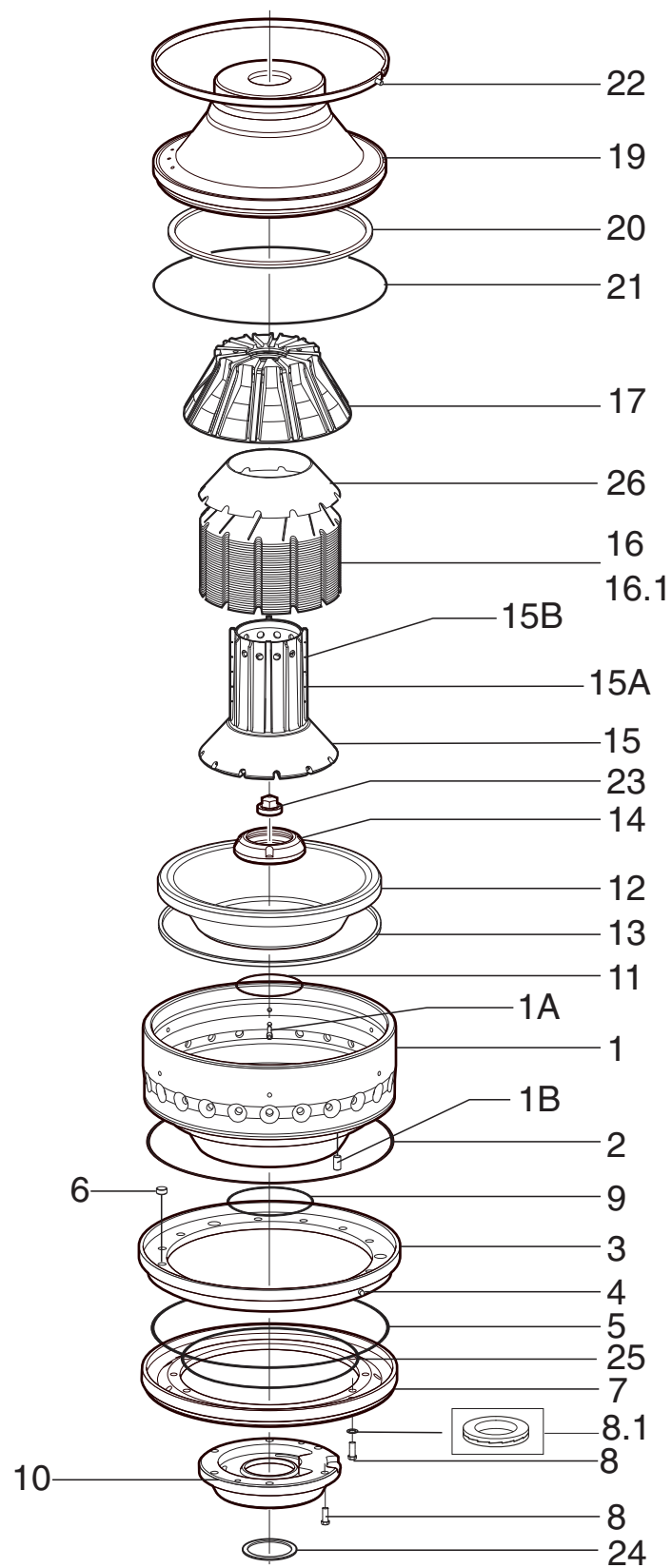


3 Separator bowl

Slotted disc stack, caulks 0,5 mm

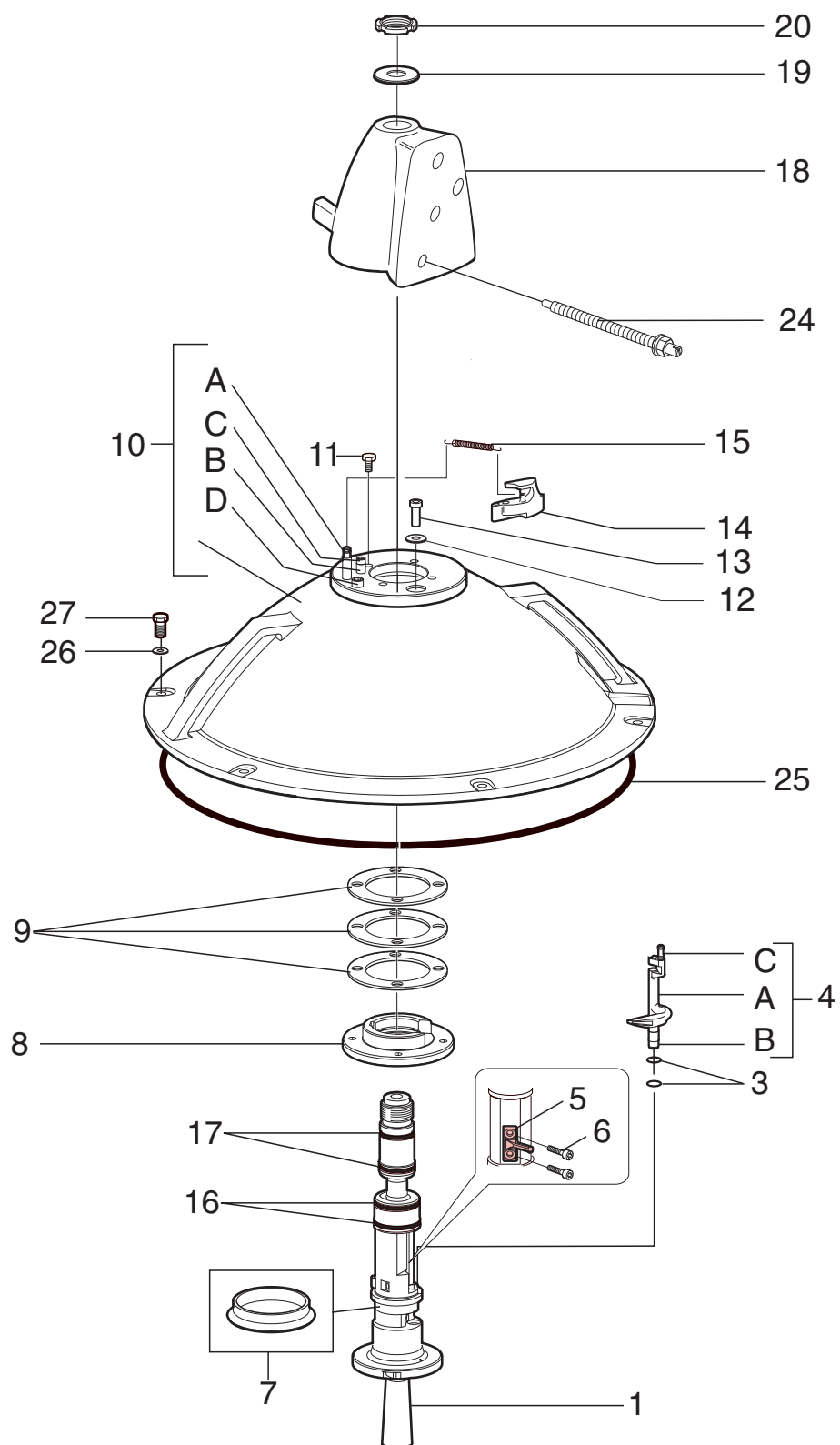
			Machine unit number or Subassembly description 560626-					
Ref	Part No	Description	-03	Quantity				Notes
1	560634 80	Bowl body	1					
1A	560637 01	Guide lug	1					
1B	64416	Cylindrical pin	1					
2	560638 01	Rectangular ring	1					
3	560639 01	Operating slide	1					
4	545869 03	Nozzle Ø 1,5 mm	1					
5	560638 01	Rectangular ring	1					
6	564478 01	Valve plug	3					
7	565217 01	Holder	1					
8	576173 01	Hexagon head screw	12					
8.1	576279 01	Lock washer	6					
9	223406 39	O-ring	1					
10	579323 02	Operating water ring	1					
11	260104 05	O-ring	1					
12	574226 01	Discharge slide	1					
13	565295 01	Rectangular ring	1					
14	560649 01	Nut	1					
15	586119 80	Distributor	1				B	
15A	560652 01	Guide rib	1					
15B	73103	Grooved pin	4					
16	563089 80	Bowl disc	82					
16.1	563089 80	Bowl disc	2					
17	563067 02	Top disc	1					
19	564401 01	Bowl hood	1					
20	564403 01	Seal ring	1					
21	260247 02	O-ring	1					
22	560661 80	Lock ring	1					
23	561298 01	Cap nut	1					
24	566788 15	Seal ring	1					
25	223403 61	O-ring	1					
26	563089 01	Bowl disc	1					





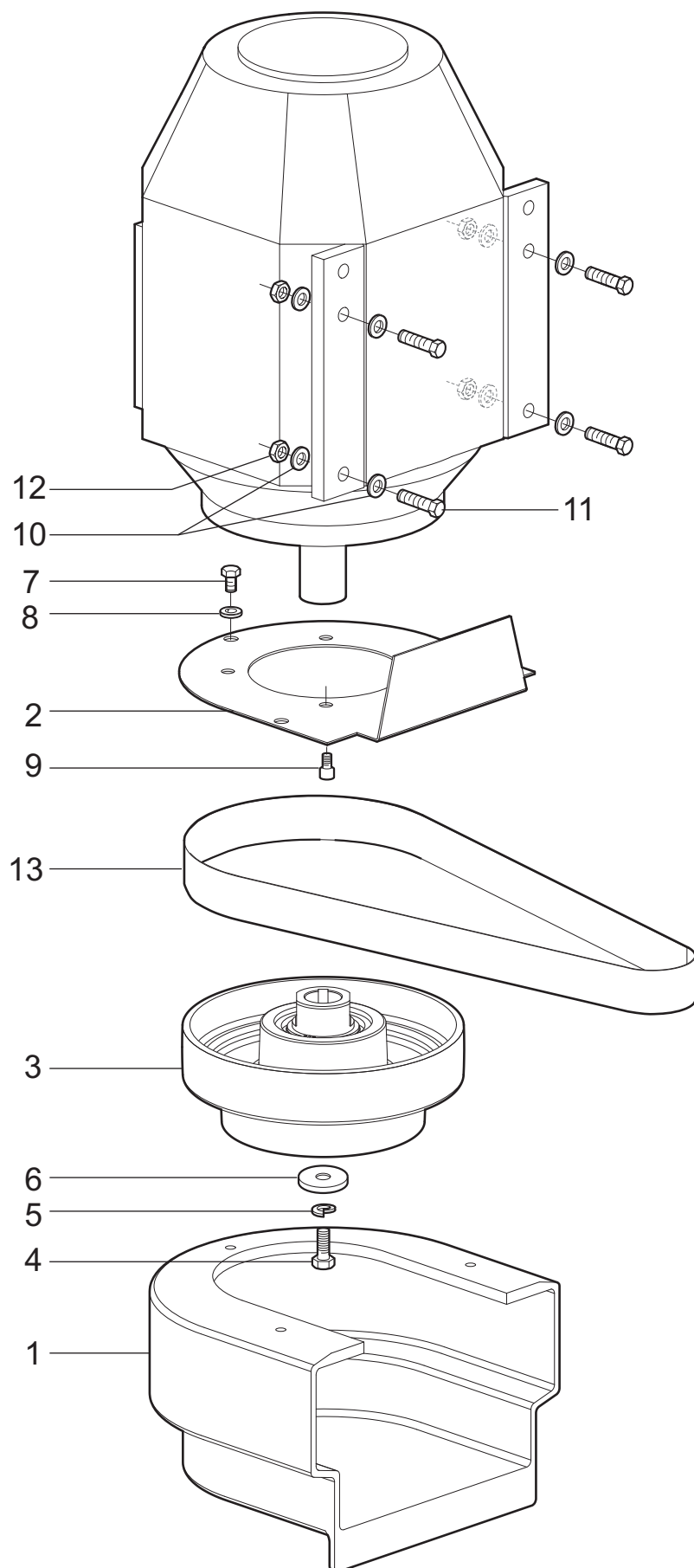
4 Inlet and outlet device

			Machine unit number or Subassembly description 563041-					
Ref	Part No	Description	-01	Quantity				Notes
1	563367 80	Inlet and outlet pipe	1					
3	223403 55	O-ring	2					
4	566642 80	Paring tube	1					
4A	566642 02	Paring tube	1					
4B	566408 02	Plain bearing bushing	2					
4C	561386 01	Tolerance ring	1					
5	562586 02	Axial support	1					
6	221701 15	Screw	2					
7	563316 01	Splash sealing	1					
8	562583 01	Support ring	1					
9	561957 01	Height adjusting ring	3					
10	562751 80	Frame hood	1					
10A	562587 01	Spring holder	1					
10B	561960 01	Support sleeve	1					
10C	221711 13	Screw	1					
10D	221716 09	Screw	1					
11	221036 01	Screw	4					
12	561966 01	Washer	3					
13	221716 13	Screw	1					
14	562582 80	Arm	1					
15	566407 02	Spring	1					
16	223406 27	O-ring	2					
17	74067	O-ring	2					
18	562584 80	Connecting housing	1					
19	561962 01	Washer	1					
20	562343 02	Locking nut	1					
24	561389 82	Purifier screw	1					
25	521127 05	O-ring	1					
26	41456	Washer	6					
27	221040 05	Screw	6					



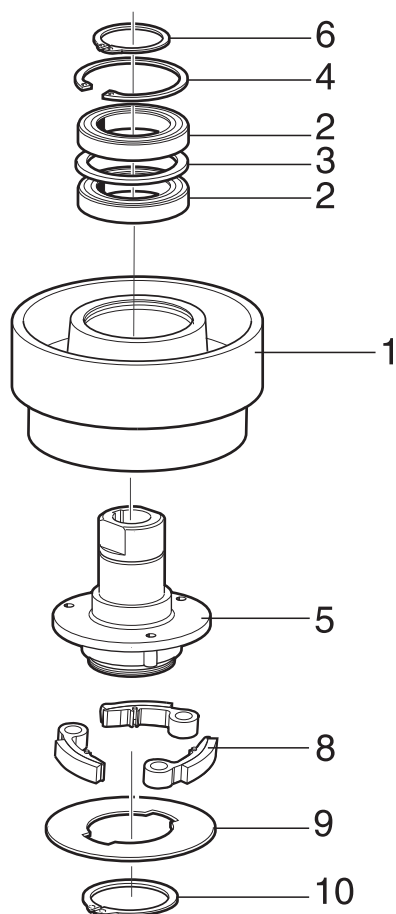
5 Belt driving device

			Machine unit number or Subassembly description 561118-				
Ref	Part No	Description	-01 -02				Notes
			Quantity				
		50 Hz	↓				
		60 Hz		↓			
1	577705 80	Clutch cover	1	1			
2	561114 01	Cover support	1	1			
3	564095 80	Centrifugal clutch		1			See page 34
3	564095 81	Centrifugal clutch	1				See page 34
4	221045 60	Screw	1	1			
5	223107 35	Spring washer	1	1			
6	547837 01	Washer	1	1			
7	221040 42	Screw	3	3			
8	41456	Washer	3	3			
9	221721 37	Screw	4	4			
10	41456	Washer	8	8			
11	221040 58	Screw	4	4			
12	35120	Nut	4	4			
13	563464 01	Flat belt	1				
13	563467 01	Flat belt		1			



5.1 Centrifugal clutch

			Machine unit number or Subassembly description 564095-				
Ref	Part No	Description	-81 -80				Notes
			Quantity				
		50 Hz	↓				
		60 Hz		↓			
1	560426 04	Motor belt pulley	1				
2	548051 49	Ball bearing	2	2			
3	547833 01	Spacing ring	1	1			
4	66251	Snap ring	1	1			
5	564089 80	Coupling hub		1			
5	564100 80	Coupling hub	1				
6	223641 18	Snap ring	1	1			
8	564075 80	Friction block	5	3			
9	549325 01	Cover	1	1			
10	223641 20	Snap ring	1	1			



6 Set of plates

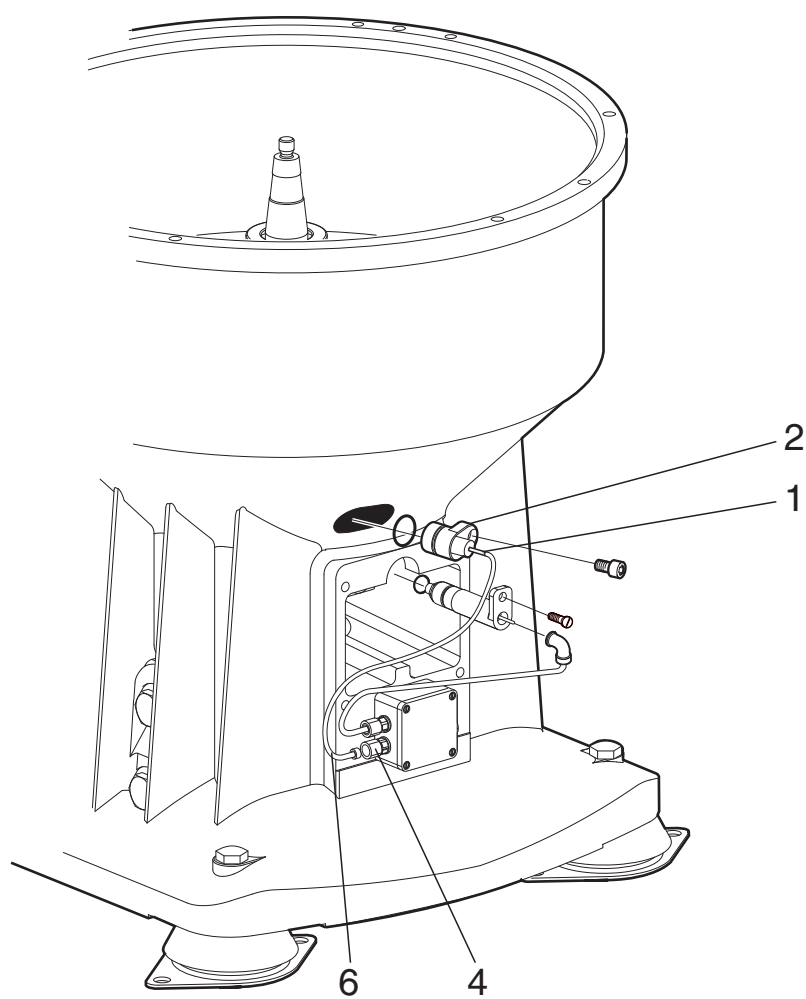
			Machine unit number or Subassembly description 549572-				
Ref	Part No	Description	-84	Quantity			Notes
3	1270019	Set of safety labels	1				For GL approval, see order DNV approval, see order
4	577802 01	Name sign	1				
4	591263 01	Name sign	1				
5	66169	Drive screw	4				
6	553171 01	Label 50 Hz	1				
6	553272 01	Label 60 Hz	1				
7	555529 01	Plate with arrow	1				
8	1270001	Lifting instruction	1				
9	554214 02	Cable tie	1				

1	2	3,3A-S Read the instruction manually before installation, operation and maintenance. Consider inspection intervals. Failure to strictly follow instructions can lead to fatal injury. WARNING If excessive vibration occurs, stop separator and keep bowl filled with liquid during run-down. Out of balance vibration will become worse if bowl is not full. Separator must stop rotating before any dismantling work is started.
4	5	6 50 Hz 60 Hz
7	8 1. Read instruction manual before lifting. Vor dem Heben immer erst Anleitungen im Handbuch lesen! Prima di sollevare il separatore, leggere il manuale d'istruzioni. Lea el manual de instrucciones antes de levantar la separadora. Oooodrandyeykuk noombaq! qe hloperetuhin Lue klyitichyeet annen nostamista. Lesenstruktionsmanualen, inden separatoren løftes op. 2. Lire le manuel d'instructions avant de lever le séparateur. Las instruksjonsboken före lyft. Forsatt het produkt wordt opgeleid, eerst de instructiehandleiding lezen. Leia o manual de instruções antes da operação do elevação. 取り出す前に説明書をお読み下さい。 Ezútlósra te egrendőle át az odleges ítemek Bepárlés dí működési ágot te követnie. Art. No. 1270001 Rev. 2	9

7 Monitoring kit

Unbalance sensor

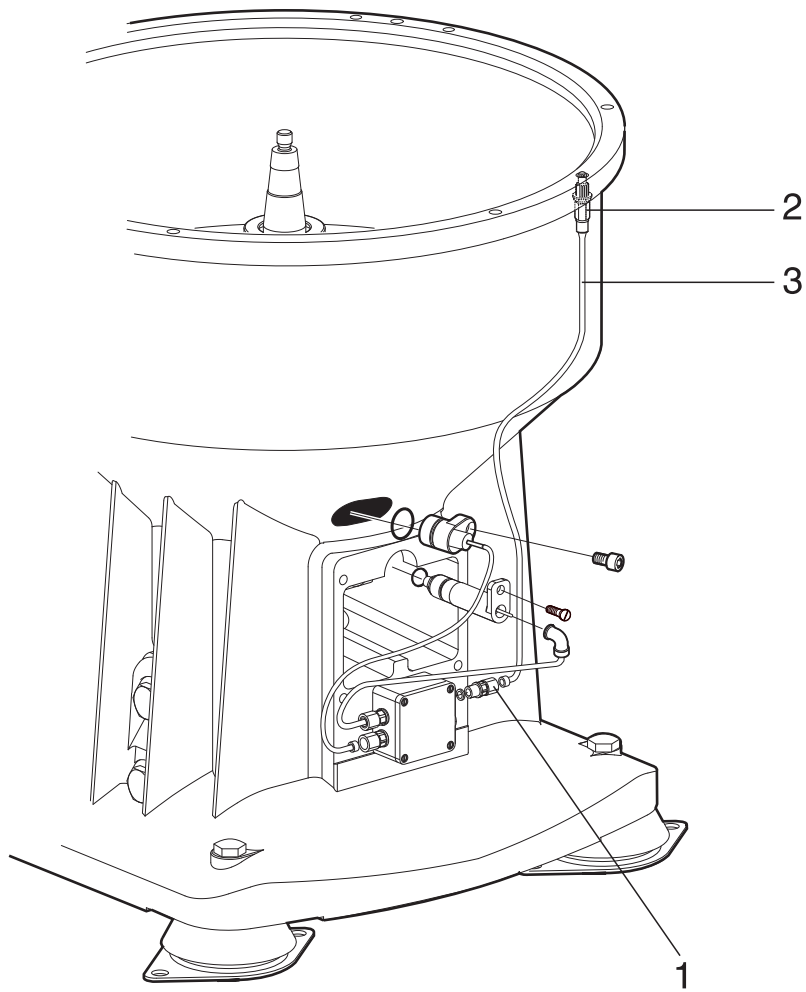
			Machine unit number or Subassembly description 566727-					
Ref	Part No	Description	-02					Notes
				Quantity				
1	570142 01	Inductive analogue sensor	1					Stainless steel Brass
2	561773 04	Sensor holder	1					
2	561773 08	Sensor holder	1					
4	552870 21	Tube gland, straight	1					
6	556416 17	Protective tube	1					



8 Cover interlocking kit

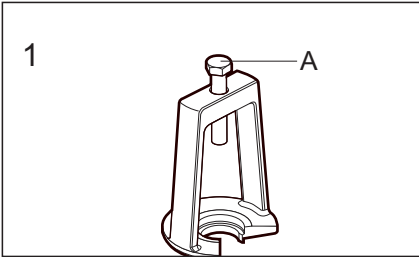
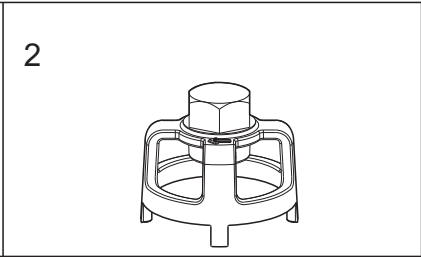
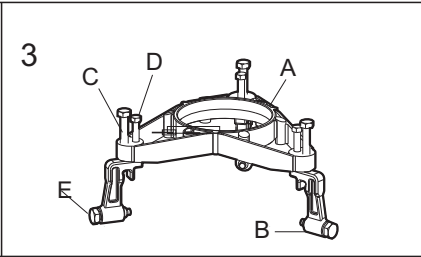
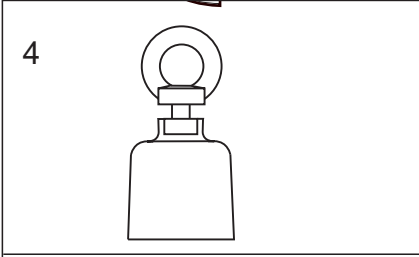
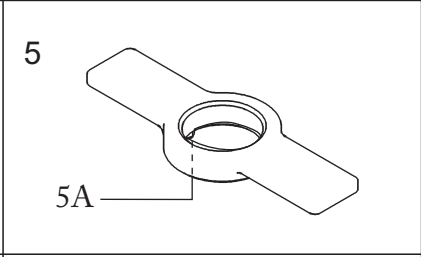
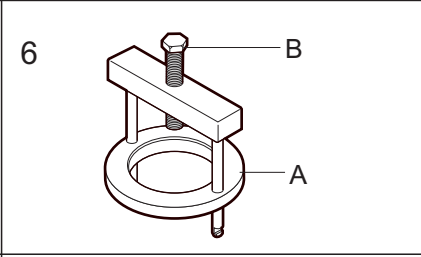
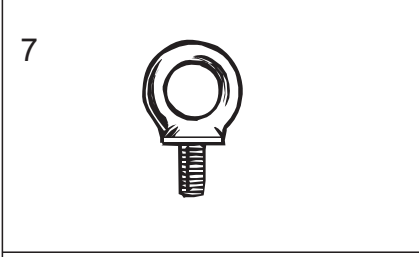
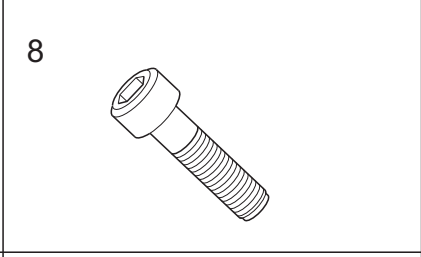
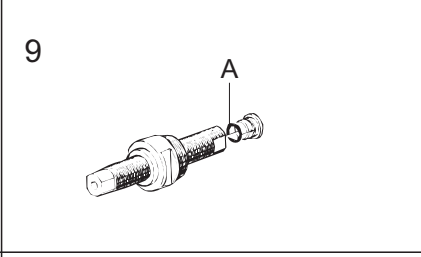
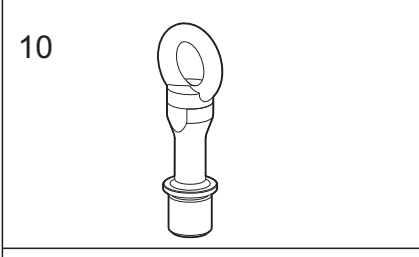
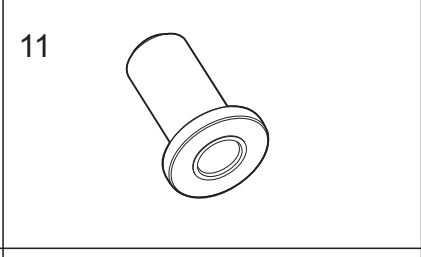
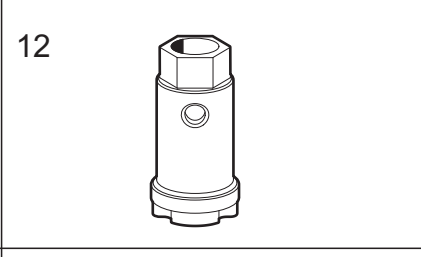
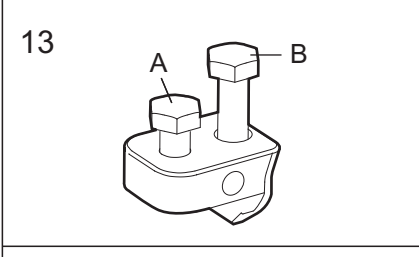
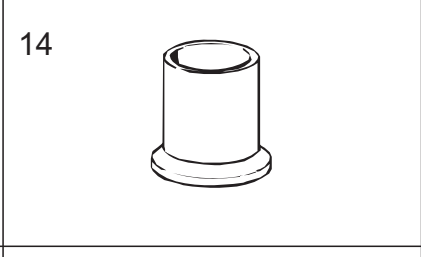
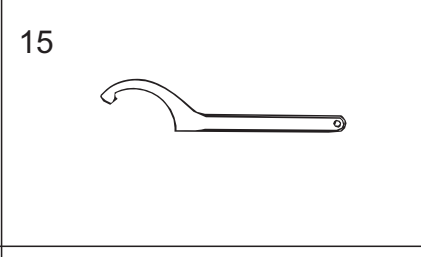
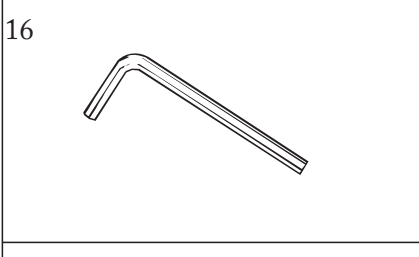
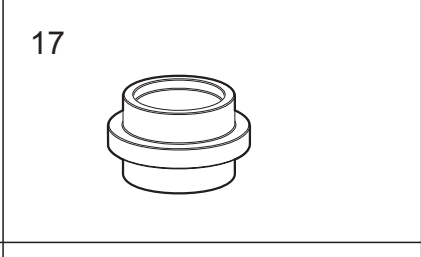
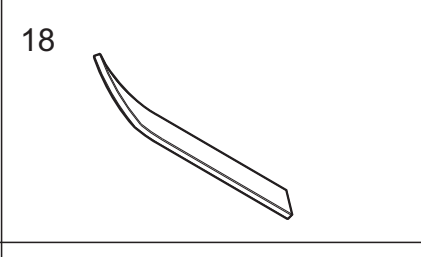
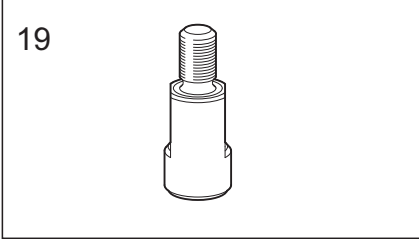
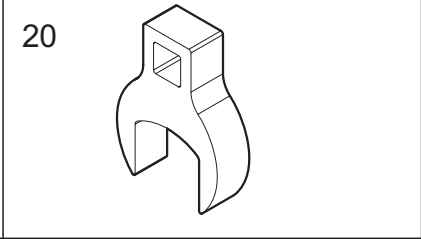
"Junction box kit" required

			Machine unit number or Subassembly description 570819-					
Ref	Part No	Description	-02					Notes
1	552870 21	Tube gland, straight	1					
2	566054 01	Limit switch	1					
3	556416 24	Protective tube	1					



9 Set of tools

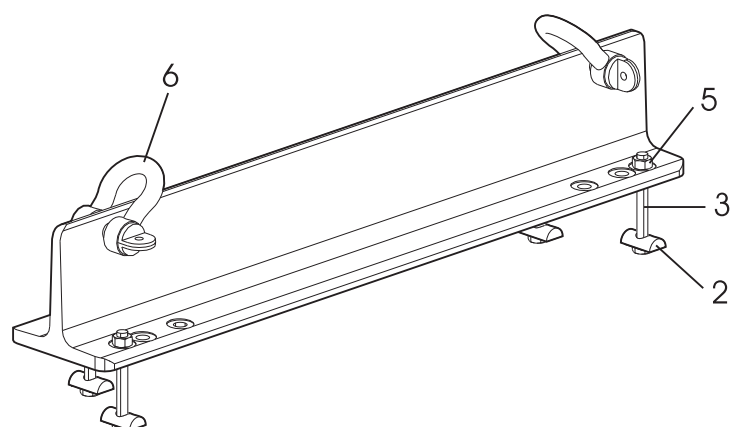
			Machine unit number or Subassembly description 561614-				
Ref	Part No	Description	-14	Quantity			Notes
1	561593 80	Puller	1				Spindle pulley/ Neck bearing
1A	561829 01	Screw	1				
2	561369 02	Spanner for nut	1				Nut/ Discharge slide Disc stack
3	575055 81	Compressing tool	1				
3A	575055 80	Compressing tool	1				
3B	575083 02	Clamp	3				
3C	575098 01	Screw	3				
3D	221045 52	Screw	3				
3E	561551 02	Screw	3				
4	561584 80	Puller	1				Bowl body Fan
5	572730 80	Pin spanner	1				
5A	260121 56	Cylindrical pin	2				
6	561607 80	Puller	1				Discharge slide
6A	561610 01	Support ring	1				
6B	221040 43	Screw	1				
7	260154 01	Lifting eye bolt	2				
8	221706 05	Screw	6				Lock ring/ Bowl body Motor/ Coupling
9	548457 80	Tool for belt pulley	1				
10	567008 80	Lifting tool	1				Distributor/ Bowl spindle Bottom bearing
11	561439 01	Drift	1				
12	589776 01	Key	1				Bottom bearing housing Neck bearing cover
13	563084 80	Puller	2				
13A	221040 05	Screw	1				
13B	221035 46	Screw	1				
14	548043 01	Mounting tool	1				Coupling bearing Nut/ Inlet and outlet pipe
15	527395 11	Hook spanner	1				
16	66414	Hexagon socket head key	1				Lock ring/ Bowl body Neck bearing
17	566441 01	Sleeve	1				
18	566614 01	Chisel	1				Seal ring Distributor
19	567009 01	Pin	1				
19	567009 02	Pin	1				Distributor Oil mist generator
20	585810 01	Crowfoot wrench head	1				
99	588053	Exploded view	1				

1 	2 	3 
4 	5 	6 
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16 	17 	18 
19 	20 	21 

10 Lifting tool

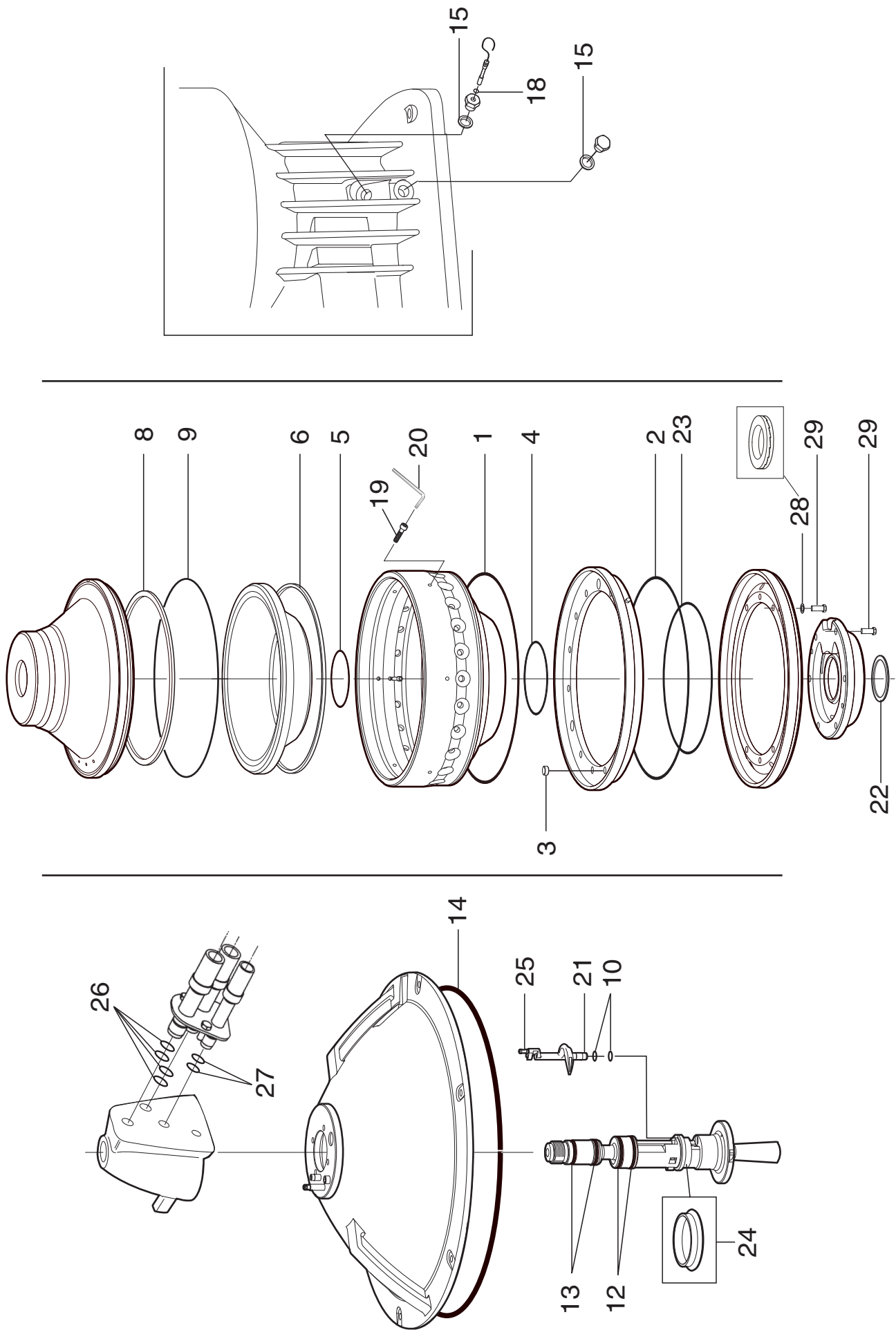
Separator

			Machine unit number or Subassembly description				
Ref	Part No	Description	563453- -80				Notes
			Quantity				
2	563454 01	Lug	4				
3	221035 53	Screw	4				
5	27345	Nut	4				
6	260236 03	Shackle	2				



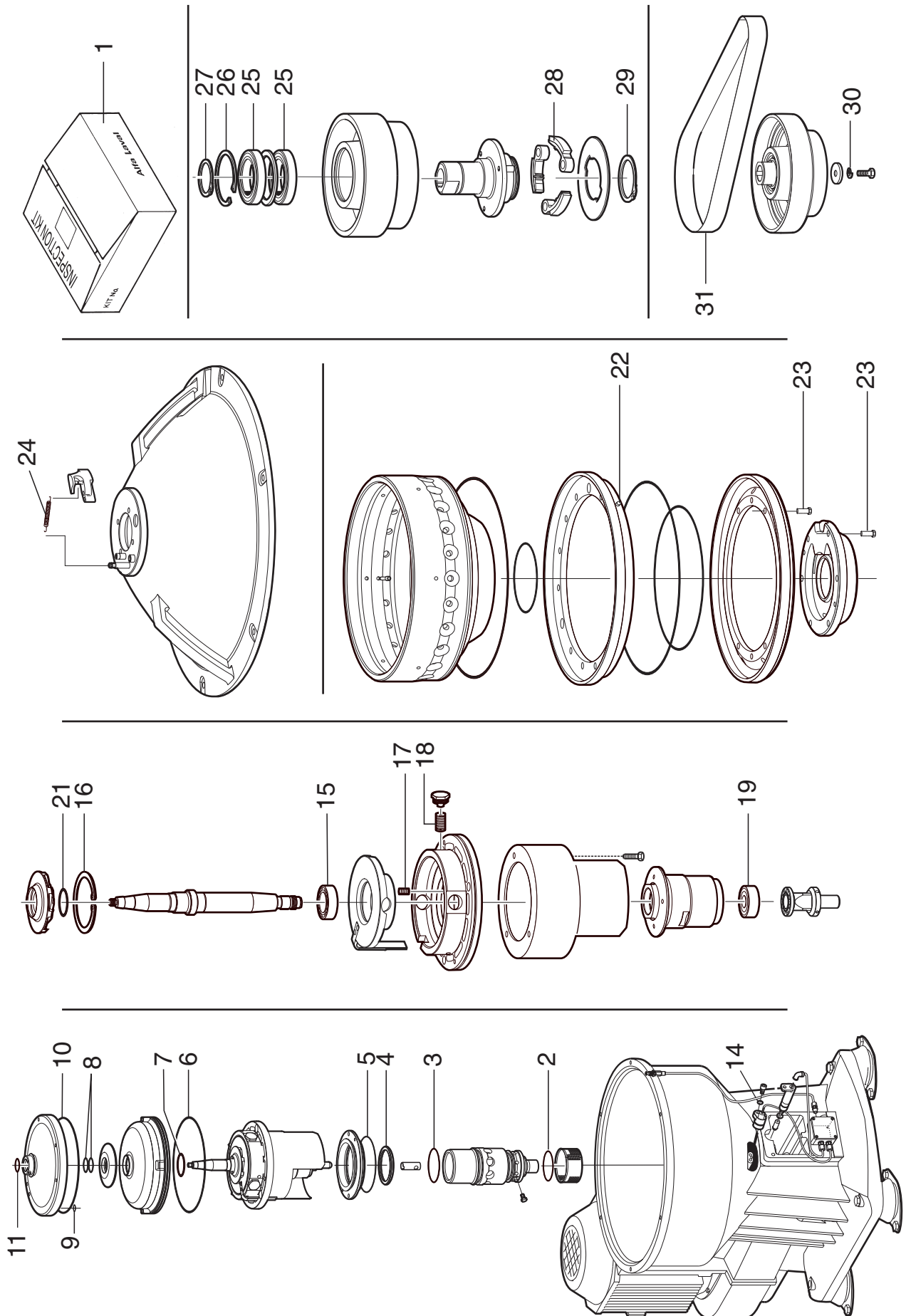
11 Inspection kit

			Machine unit number or Subassembly description 563859-				
Ref	Part No	Description	-01	Quantity			Notes
1	560638 01	Rectangular ring	1				Bowl body/ Operating slide
2	560638 01	Rectangular ring	1				Operating slide/ Holder
3	564478 01	Valve plug	3				Operating slide/ Bowl body
4	223406 39	O-ring	1				Bowl body/ Operating water ring
5	260104 05	O-ring	1				Bowl body/ Discharge slide
6	565295 01	Rectangular ring	1				Discharge slide/ Bowl body
8	564403 01	Seal ring	1				Bowl hood/ Discharge slide
9	260247 02	O-ring	1				Bowl hood/ Bowl body
10	223403 55	O-ring	2				Paring tube/ Inlet and outlet pipe
12	223406 27	O-ring	2				Inlet and outlet pipe
13	74067	O-ring	2				Inlet and outlet pipe/ Connecting housing
14	521127 05	O-ring	1				Frame hood/ Frame bottom part
15	552766 07	Washer	2				Frame bottom part/ Plug
16	537086 06	Lubricating paste G-n Plu	1				
17	539474 03	Silicone grease	1				
18	223404 05	O-ring	1				Oil pin/ Plug
19	221706 05	Screw	6				Lock ring
20	66414	Hexagon socket head key	1				Lock ring
21	566408 02	Plain bearing bushing	2				Paring tube
22	566788 15	Seal ring	1				Operating water cover
23	223403 61	O-ring	1				Bowl body/ Holder
24	563316 01	Splash sealing	1				Inlet pipe
25	561386 01	Tolerance ring	1				Paring tube/ Arm
26	260104 22	O-ring	4				Oil pipe/ Connecting housing
27	223404 51	O-ring	2				Water pipe/ Connecting housing
28	576279 01	Lock washer	6				Bowl body/ Holder
29	576173 01	Hexagon head screw	12				Bowl body/ Holder operating water ring
30	535586 80	Anti-friction coating	1				
98	575600	Separator checkpoints	1				
99	572272	Exploded view	1				



12 Overhaul kit

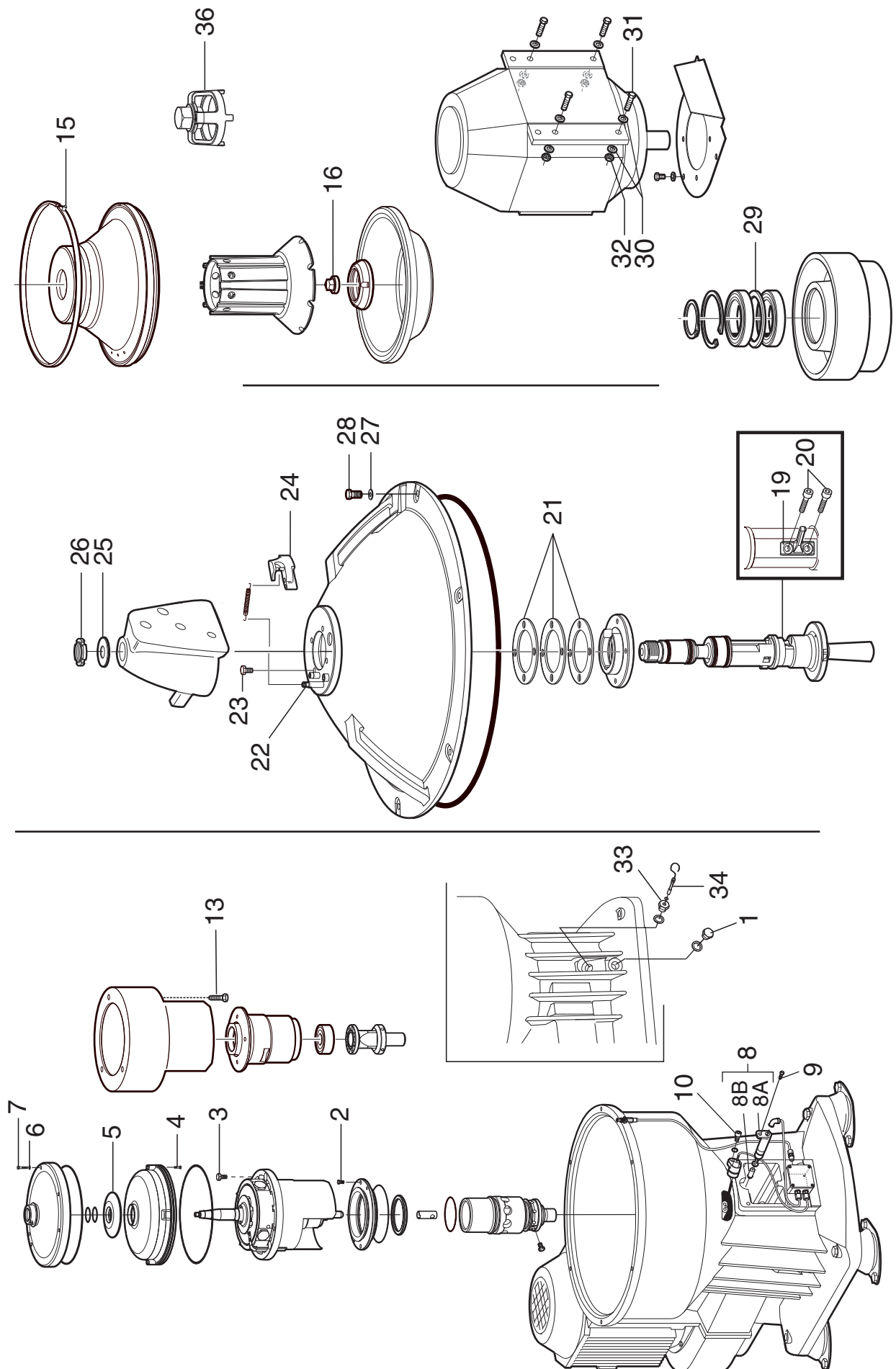
Ref	Part No	Description	Machine unit number or Subassembly description				Notes
			563869-				
			-09 -10				
			Quantity				
		50 Hz	↓				
		60 Hz		↓			
1	563859 01	Inspection kit	1	1			See page 46
2	2234121 38	O-ring	1	1			Strainer/ Bottom bearing housing
3	2234121 40	O-ring	1	1			Bottom bearing housing
4	562095 02	Labyrinth ring	1	1			Labyrinth ring holder/ Spindle pulley
5	223412 23	O-ring	1	1			Labyrinth ring holder/ Frame bottom part
6	223412 46	O-ring	1	1			Neck bearing cover/ Frame bottom part
7	566788 21	Seal ring	1	1			Neck bearing cover/ Fan
8	223406 28	O-ring	2	2			Deflector ring/ Bowl spindle
9	223404 20	O-ring	1	1			Pipe/ Operating water cover
10	223412 46	O-ring	1	1			Operating water cover
11	566788 05	Seal ring	1	1			Bowl spindle/ Operating water cover
12	544465 10	Locking liquid	1	1			Bottom bearing holder
14	74067	O-ring	1	1			Plug/ Frame bottom part
15	548747 08	Ball bearing	1	1			Bowl spindle/ Top bearing seat
16	223642 36	Snap ring	1	1			Top bearing seat/ Ball bearing
17	562109 03	Helical spring	3	3			Top bearing seat/ Top bearing housing
18	562110 02	Composite spring	4	4			Top bearing seat/ Plug
19	548744 03	Self-align roller bearing	1	1			Bowl spindle/ Bottom bearing housing
21	223406 30	O-ring	1	1			Bowl spindle/ Fan
22	545869 03	Nozzle Ø 1,5 mm	1	1			Operating slide
24	566407 02	Spring	1	1			Arm
25	548051 49	Ball bearing	2	2			Coupling hub/ Motor belt pulley
26	66251	Snap ring	1	1			Motor belt pulley/ Ball bearing
27	223641 18	Snap ring	1	1			Coupling hub/ Ball bearing
28	564075 80	Friction block	5	3			Coupling hub/ Motor belt pulley
29	223641 20	Snap ring	1	1			Coupling hub/ Cover
30	223107 35	Spring washer	1	1			Motor shaft/ Screw
31	563464 01	Flat belt	1				Motor belt pulley/ Spindle puley
31	563467 01	Flat belt		1			Motor belt pulley/ Spindle puley
99	592620	Exploded view	1	1			



13 Support kit

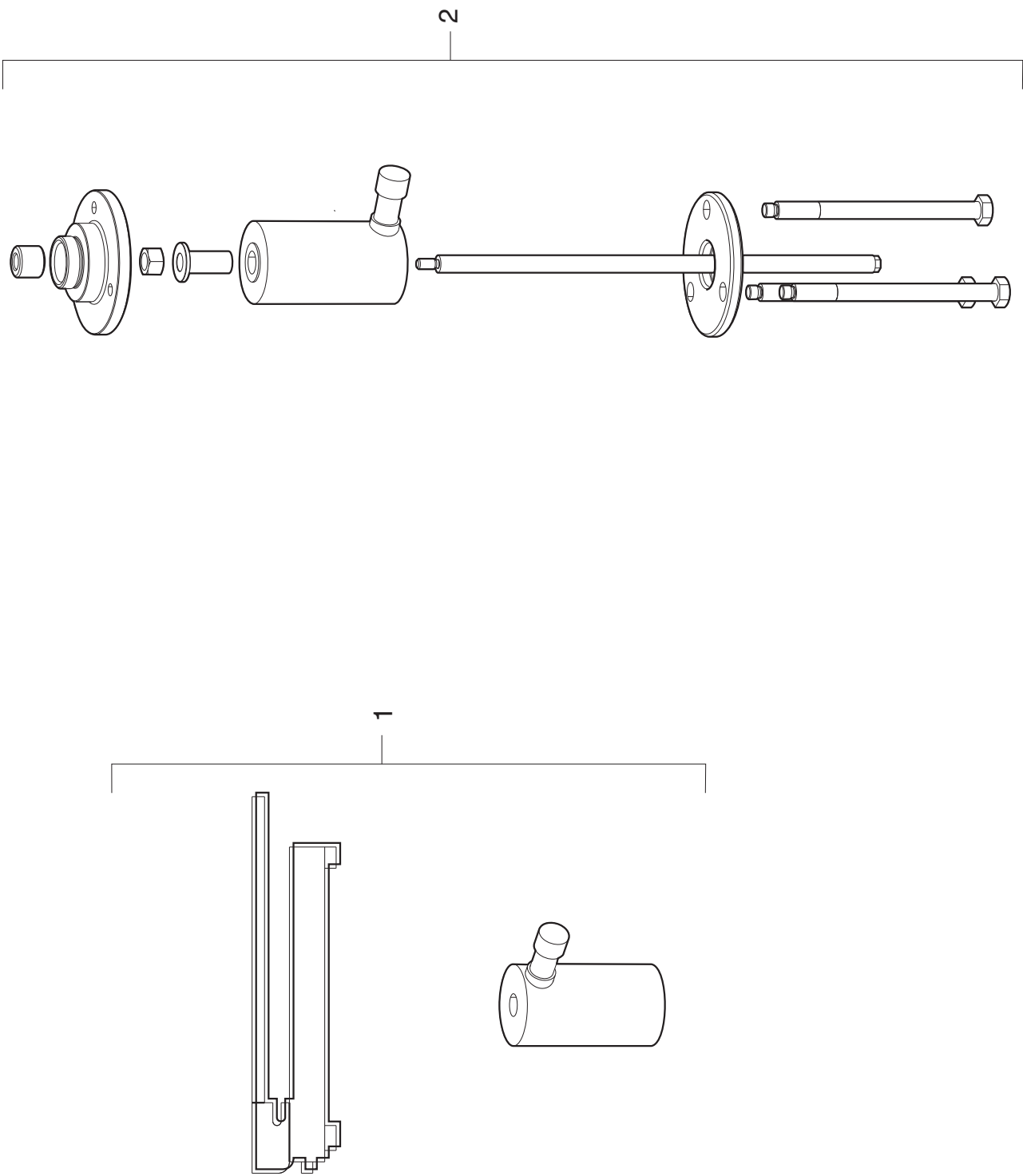
Spare part not included in service kit

Ref	Part No	Description	Machine unit number or Subassembly description 563877- -04	Quantity	Notes
1	526350 04	Plug	1		Frame bottom part
2	221716 23	Screw	2		Labyrinth ring holder
3	221721 24	Screw	3		Top bearing housing
4	221711 18	Screw	1		Neck bearing cover
5	592072 01	Deflector ring	1		Bowl spindle
6	41456	Washer	3		Screw/ Operating water cover
7	221040 46	Screw	3		Operating water cover
8	562902 80	Sensor with support	1		Frame bottom part
9	221716 23	Screw	1		Frame bottom part/ Sensor support
10	221716 23	Screw	1		Frame bottom part/ Plug
13	221040 41	Screw	3		Top bearing housing/ Air deflector
15	560661 80	Lock ring	1		Bowl body/ Bowl hood
16	561298 01	Cap nut	1		Bowl spindle/ Bowl body
19	562586 02	Axial support	1		Inlet and outlet device/ Pipe
20	221701 15	Screw	2		Inlet and outlet device/ Axial support
21	561957 01	Height adjusting ring	3		Frame hood/ Support ring
22	562587 01	Spring holder	1		Frame hood
23	221036 01	Screw	4		Frame hood/ Height adjusting ring
24	562582 80	Arm	1		Frame hood/ Paring tube
25	561962 01	Washer	1		Inlet pipe/ Connecting housing
26	562343 02	Locking nut	1		Inlet pipe/ Connecting housing
27	41456	Washer	6		Frame hood/ Frame bottom part
28	221040 05	Screw	6		Frame hood/ Frame bottom part
29	547833 01	Spacing ring	1		Ball bearing/ Ball bearing
30	41456	Washer	8		Motor/ Frame bottom part
31	221040 58	Screw	4		Motor/ Frame bottom part
32	35120	Nut	4		Motor/ Frame bottom part
33	565378 01	Plug	1		Frame bottom part
34	571743 80	Oil pin	1		Frame bottom part/ Plug
36	561369 02	Spanner for nut	1		Nut/ Discharge slide
99	592619	Exploded view	1		



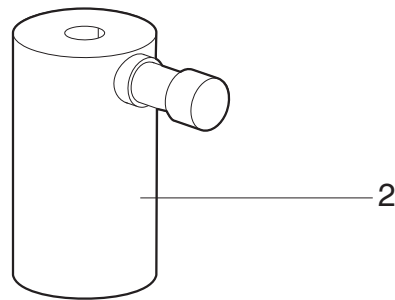
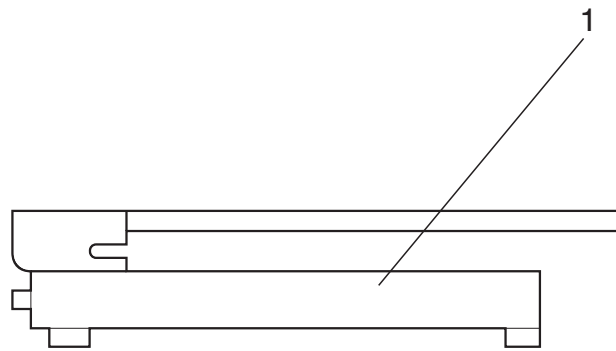
14 Hydraulic tool kit

Ref	Part No	Description	Machine unit number or Subassembly description 574986-				Notes
			-04	Quantity			
1	574618 80	Hydraulic components	1				See page 54
2	574626 82	Hydraulic tool	1				See page 56



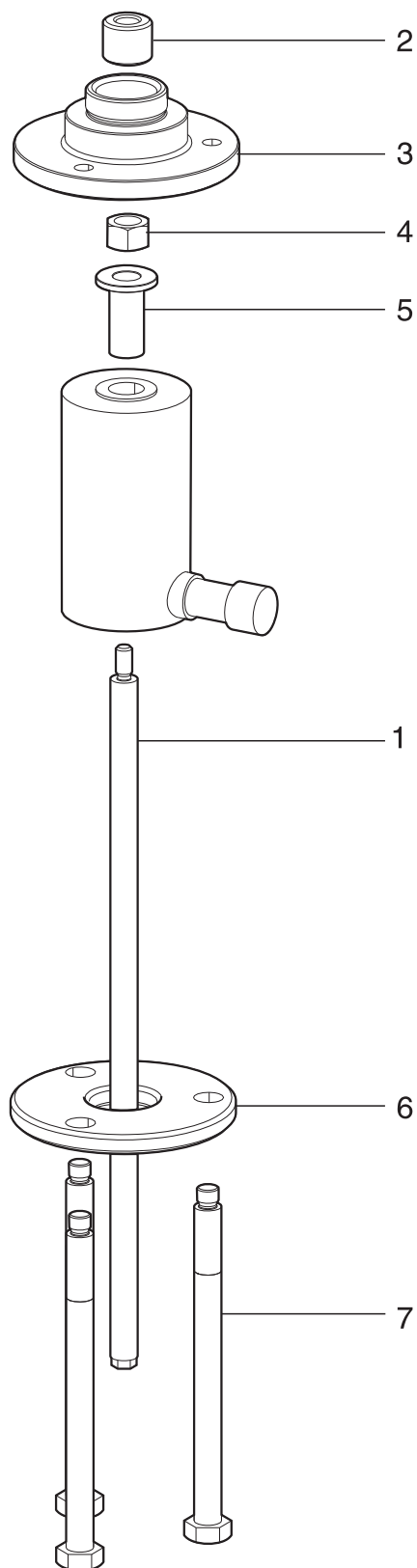
14.1 Hydraulic components

Ref	Part No	Description	Machine unit number or Subassembly description				Notes
			574618-80				
1	574618 01	Pump with hose	1				
2	574618 02	Hydraulic cylinder	1				



14.2 Hydraulic tool

			Machine unit number or Subassembly description 574626-					
Ref	Part No	Description	-82					Notes
				Quantity				
1	571628 01	Stud bolt	1					
2	574627 03	Sleeve	1					
3	571627 01	Holder	1					
4	221803 35	Nut	1					
5	574954 01	Sleeve	1					
6	571620 01	Plate	1					
7	571622 01	Screw	3					
7A	260001 45	Screw	1					



15 Cross reference list

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1270019	36	3	223403 61	46	23	521127 05	46	14
17812	22	40	223404 05	46	18	526350 04	50	1
221035 46	42	13B	223404 05	22	8	526350 04	22	6
221035 53	44	3	223404 20	48	9	526352 06	22	30
221036 01	30	11	223404 20	22	28	527395 11	42	15
221036 01	50	23	223404 51	46	27	535586 80	46	30
221040 05	30	27	223406 27	30	16	537086 06	46	16
221040 05	42	13A	223406 27	46	12	539418 02	22	29
221040 05	50	28	223406 28	48	8	539474 03	46	17
221040 08	22	36	223406 28	22	26	544465 10	48	12
221040 41	50	13	223406 30	48	21	545869 03	48	22
221040 42	32	7	223406 30	24	17	545869 03	24	11
221040 43	42	6B	223406 39	46	4	545869 03	28	4
221040 46	50	7	223406 39	28	9	547833 01	34	3
221040 46	22	35	223412 23	22	18	547833 01	50	29
221040 58	32	11	223412 23	48	5	547837 01	32	6
221040 58	50	31	223412 46	22	23	548043 01	42	14
221045 52	42	3D	223412 46	48	6	548051 49	34	2
221045 60	32	4	223412 46	48	10	548051 49	48	25
2210462 32	22	4	223412 46	22	33	548457 80	42	9
221126 04	22	45	2234121 38	22	11	548744 03	48	19
221701 15	30	6	2234121 38	48	2	548744 03	24	10
221701 15	50	20	2234121 40	22	15	548747 08	48	15
221706 03	22	14	2234121 40	48	3	548747 08	24	2
221706 05	42	8	223641 18	34	6	549325 01	34	9
221706 05	46	19	223641 18	48	27	552766 07	46	15
221711 13	30	10C	223641 20	34	10	552766 07	22	5
221711 18	22	22A	223641 20	48	29	552870 21	38	4
221711 18	50	4	223642 36	48	16	552870 21	40	1
221716 09	30	10D	223642 36	24	4	552870 41	26	3
221716 13	30	13	260001 45	56	7A	553171 01	36	6
221716 22	22	44C	260104 05	46	5	553272 01	36	6
221716 22	24	16	260104 05	28	11	554214 02	36	9
221716 23	22	19	260104 22	46	26	555529 01	36	7
221716 23	50	2	260121 56	42	5A	556416 13	26	5
221716 23	50	9	260154 01	42	7	556416 17	38	6
221716 23	50	10	260236 03	44	6	556416 24	40	3
221716 23	22	39	260247 02	46	9	560131 02	22	2
221716 23	22	43	260247 02	28	21	560134 01	24	1
221721 24	22	21	27345	44	5	560202 01	22	27
221721 24	50	3	35120	32	12	560406 01	24	8
221721 37	32	9	35120	50	32	560426 04	34	1
221721 37	22	44D	41456	30	26	560634 80	28	1
221803 35	56	4	41456	32	8	560637 01	28	1A
223101 94	22	47	41456	32	10	560638 01	46	1
223107 35	32	5	41456	50	6	560638 01	46	2
223107 35	48	30	41456	50	27	560638 01	28	2
223403 55	30	3	41456	50	30	560638 01	28	5
223403 55	46	10	41456	22	34	560639 01	28	3

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560652 01	28	15A	563067 02	28	17	567009 02	42	19
560661 80	50	15	563084 80	42	13	570142 01	38	1
560661 80	28	22	563089 01	28	26	571405 80	22	22
561114 01	32	2	563089 80	28	16	571453 02	24	14
561298 01	50	16	563089 80	28	16.1	571620 01	56	6
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561369 02	42	2	563316 01	46	24	571627 01	56	3
561369 02	50	36	563367 80	30	1	571628 01	56	1
561386 01	30	4C	563454 01	44	2	571743 80	50	34
561386 01	46	25	563464 01	32	13	571743 80	22	9
561389 82	30	24	563464 01	48	31	572272	46	99
561439 01	42	11	563467 01	32	13	572730 80	42	5
561551 02	42	3E	563467 01	48	31	574226 01	28	12
561584 80	42	4	563859 01	48	1	574618 01	54	1
561593 80	42	1	564075 80	34	8	574618 02	54	2
561607 80	42	6	564075 80	48	28	574618 80	52	1
561610 01	42	6A	564089 80	34	5	574626 82	52	2
561773 03	22	41	564095 80	32	3	574627 03	56	2
561773 04	38	2	564095 81	32	3	574954 01	56	5
561773 07	22	41	564100 80	34	5	575055 80	42	3A
561773 08	38	2	564401 01	28	19	575055 81	42	3
561829 01	42	1A	564403 01	46	8	575083 02	42	3B
561957 01	30	9	564403 01	28	20	575098 01	42	3C
561957 01	50	21	564478 01	46	3	575600	46	98
561960 01	30	10B	564478 01	28	6	576173 01	46	29
561962 01	30	19	564493 02	22	31	576173 01	28	8
561962 01	50	25	565217 01	28	7	576279 01	46	28
561966 01	30	12	565295 01	46	6	576279 01	28	8.1
562091 01	22	12	565295 01	28	13	577705 80	32	1
562094 01	22	16	565378 01	50	33	577802 01	36	4
562095 02	22	17	565378 01	22	7	578017 02	22	44A
562095 02	48	4	566054 01	40	2	578019 01	22	44B
562109 03	48	17	566407 02	30	15	578019 80	22	44
562109 03	24	6	566407 02	48	24	579323 02	28	10
562110 02	48	18	566408 02	30	4B	580049 01	24	15
562110 02	24	7	566408 02	46	21	580051 02	24	5
562343 02	30	20	566441 01	42	17	584048 80	24	3
562343 02	50	26	566614 01	42	18	585810 01	42	20
562582 80	30	14	566642 02	30	4A	586119 80	28	15
562582 80	50	24	566642 80	30	4	588053	42	99
562583 01	30	8	566692 80	26	6	589704 01	22	13
562584 80	30	18	566718 81	22	37	589776 01	42	12
562586 02	30	5	566788 05	48	11	590137 01	22	10
562586 02	50	19	566788 05	22	32	590138 01	24	13
562587 01	30	10A	566788 15	46	22	591263 01	36	4
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S 936 Flex system

S 936 Flex system

Spare Parts Catalogue



Specification No.	881501-01-02/2	Config No.	107841
Book No.	9011683 02 Rev. 1	Product No.	881501 02 02

Spare parts catalogue

Reservdelskatalog

Ersatzteilkatalog

Catalogue de pièces de
rechange

Catalogue de piezas de
recambio

Каталог запасных
частей

Catalogo parti di ricambio

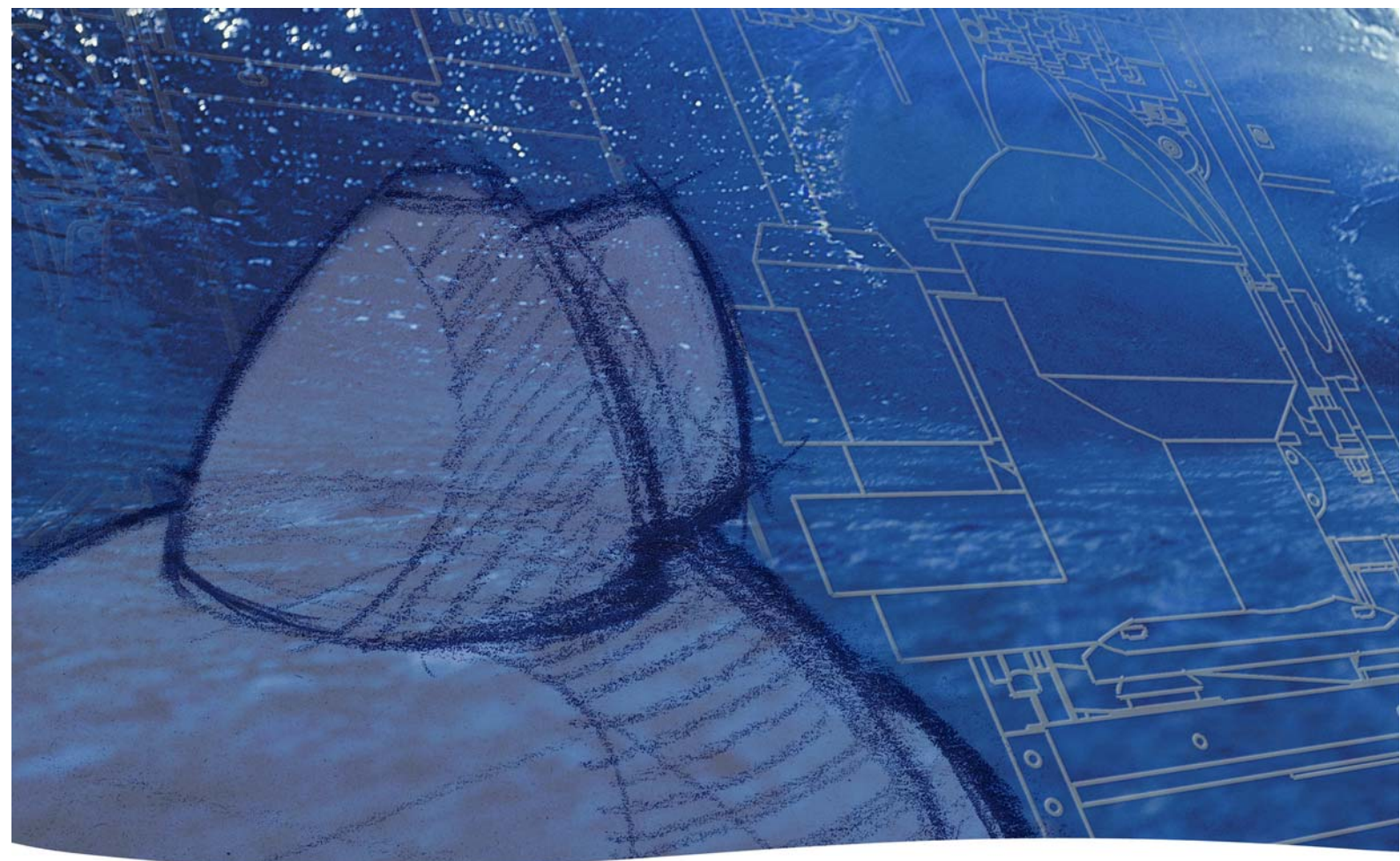
Catalogo de peças sobressalentes

Varaosaluettelo

Καταλογος ανταλλακτικων

Reserveonderdelen-catalogus

Reservedelskatalog



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1 Read this first



en

Check the machine unit number on the name-plate before using this catalogue

sv

Kontrollera maskinenhetens nummer på maskinskylden innan du använder katalogen

de

Das Typenschild - ein Hinweis zur korrekten Ersatzteilnummer

fr

La plaque de la machine, un guide pour trouver le numéro de pièce de rechange correct

es

La placa-marca de la máquina - guía del número correcto del repuesto

ru

Фирменная табличка машины — указатель правильного номера запасной части

it

La targhetta della macchina - guida al corretto numero dei ricambi

pt

La placa do fabricante da máquina - um guia do número correto das partes sobressalentes

fi

Konekilpi - opastin oikeaan varaosanumeroon

el

Η πινακίδα της μηχανής είναι ο οδηγός του σωστού ανταλλακτικού

nl

Het gegevensplaatje - een wegwijzer naar het juiste onderdeelnummer

da

Typeskiltet - en guide til det rette reservedelsnummer

使用目录前，检查铭牌上的机器部件号。

1.1 General information

en

Safeguard your commitment to quality by always using genuine Alfa Laval spare parts.

Remember, Alfa Laval cannot accept responsibility for the failure of a separator equipped with non-original spare parts. We guarantee the quality and reliability of our products.

sv

Följ ditt kvalitetstänkande genom att endast använda Alfa Laval originalreservdelar.

Kom ihåg att Alfa Laval inte tar något ansvar för fel på en separator, som innehåller icke-originaldelar. Vi garanterar kvaliteten och driftsäkerheten endast hos våra egna produkter.

de

Aus Rücksicht auf Ihr Bestreben um beste Qualität sollten Sie nur Alfa Laval Originalersatzteile benutzen.

Vergessen Sie nicht, Alfa Laval kann keine Verantwortung für das Versagen eines Separators übernehmen, der nicht mit Originalersatzteilen versehen ist. Wir garantieren Qualität und Zuverlässigkeit unserer Produkte.

fr

Préservez la qualité de vos équipements en n'employant que des pièces de rechange Alfa Laval.

N'oubliez pas q'Alfa Laval décline toute responsabilité en cas de panne d'un séparateur non équipé de pièces de rechange d'origine. Nous garantissons la qualité et la fiabilité de nos produits.

es

Mantenga su compromiso con la calidad, al usar siempre piezas de repuesto Alfa Laval auténticas.

Recuerde que Alfa Laval no acepta responsabilidad por el fallo de una separadora equipada con piezas de repuesto no originales. Garantizamos la calidad y fiabilidad de nuestros productos.



ru

Гарантируйте надежность качества всегда используя подлинные запасные части фирмы Alfa Laval.

Запомните, что Alfa Laval не несет ответственности за повреждение сепаратора, оснащенного неподлинными запчастями. Мы гарантируем качество и надежность наших изделий.

it

Salvaguardate la vostra garanzia di qualità facendo sempre uso di parti di ricambio Alfa Laval autentiche.

Tenete presente che la Alfa Laval non può accettare responsabilità per avaria ad un separatore attrezzato con parti di ricambio non originali. Noi garantiamo la qualità l'affidabilità dei nostri prodotti.

pt

Proteja o seu cometimento a qualidade usando sempre peças sobressalentes genuínas Alfa Laval.

Não esqueça que Alfa Laval não aceita responsabilidade por falha de uma separadora equipada com peças sobressalentes não genuínas. Nós garantimos a qualidade e a confiança dos nossos produtos.

fi

Varmistakaa vastuunne laadusta käyttämällä aina alkuperäisiä Alfa Laval varaosia.

Muistakaa, Alfa Laval ei voi hyväksyä vastuuta ei-alkuperäisillä varaosilla varustetun separaattorin vaurioista. Me takaamme tuotteidemme laadun ja käyttövarmuuden.

el

Εξασφαλίστε υψηλή ποιότητα χρησιμοποιώντας μόνο γνήσια ανταλλακτικά της Alfa Laval.

Έχετε υπόψην ότι η Alfa Laval δεν αναλαμβάνει καμιά ευθύνη για βλάβες βουτυρομηχανής, στην οποία έχουν εφαρμοστεί μη γνήσια ανταλλακτικά. Εγγυόμαστε ποιότητα και καλή λειτουργία μόνο για τα δικά μας προϊόντα.



nl

Streef naar een zo hoog mogelijke kwaliteit en gebruik uitsluitend originele Alfa Laval reserveonderdelen. Streef naar een zo hoog mogelijke kwaliteit en gebruik uitsluitend originele Alfa Laval reserveonderdelen.

Vergeet niet dat Alfa Laval niet verantwoordelijk is voor een defecte separator die niet-originele onderdelen bevat. Wij garanderen de kwaliteit en betrouwbaarheid van onze eigen produkten.

da

Hold Dem til den kvalitet, De har valgt at satse på, ved altid at anvende ægte Alfa Laval reservedele.

Husk, at Alfa Laval ikke kan påtage sig noget ansvar for fejl på en separator, som indeholder uoriginale dele. Vi kan kun garantere kvalitet og driftsikkerhed på vore egne produkter.

请始终使用阿法拉伐真品备件以保证您产品的质量。

请注意，阿法拉伐对使用非原装备件的分离设备的故障不承担责任。我们保证我们产品的质量与可靠性。



1.2 Translation list

Översättningslista
Übersetzungsliste
Liste de traduction
Lista de traducciones

en	sv	de	fr	es
Part no.	Reservdelsnummer	Teil-Nr.	Numéro de pièce	Pieza No.
Qty	Antal	Anzahl	Quantité	Cantidad
Description	Benämning	Bezeichnung	Dénomination	Descripción
Notes	Anmärkingar	Anmerkungen	Remarques	Notas
Machine type	Maskintyp	Maschinentyp	Type de machine	Tipo de máquina
Product no.	Produktnr	Produktnummer	Numéro de produit	Número de producto
Machine unit description	Maskinblocksbenämning	Bezeichnung des Maschinenblocks	Dénomination de partie de machine	Descripción de sección de la máquina
Machine unit no.	Maskinblocksnr	Maschinenblock Nr.	Partie de machine n°	No. de sección de máquina
Subassembly description	Undergruppsbenämning	Bezeichnung der Untergruppe	Dénomination de sous-ensemble	Descripción de subconjunto
Subassembly no.	Undergruppsnr	Untergruppe Nr.	N° de sous-ensemble	Número de subconjunto
See page	Se sidan	Siehe Seite	Voir page	Véase la página
Fig. ref.	Figurhänvisning	Bildhinweise	Réf. de fig.	Referencia de figura
Product name	Produktnamn	Produktname	Nom du produit	Nombre del producto
Exchange necessitates rebalancing of bowl	Utbyte nödvändiggör ombalansering av kulan	Austausch erfordert Wiederauswuchtung der Trommel	Le remplacement nécessite le rééquilibrage du bol	El racmbio requiere el reequilibrado del rotor
See separate spare parts list	Se separat reservdelslista	Siehe separate Ersatzteilliste	Voir liste séparée des pièces de rechange	Véase la lista de piezas separada
Not delivered as spare part	Levereras ej som reservdel	Nicht als Ersatzteil geliefert	Non livré comme pièce de rechange	No se entrega como pieza de recambio

Словарь перевода
Lista traduzioni
Lista para tradução
Käännösluettelo

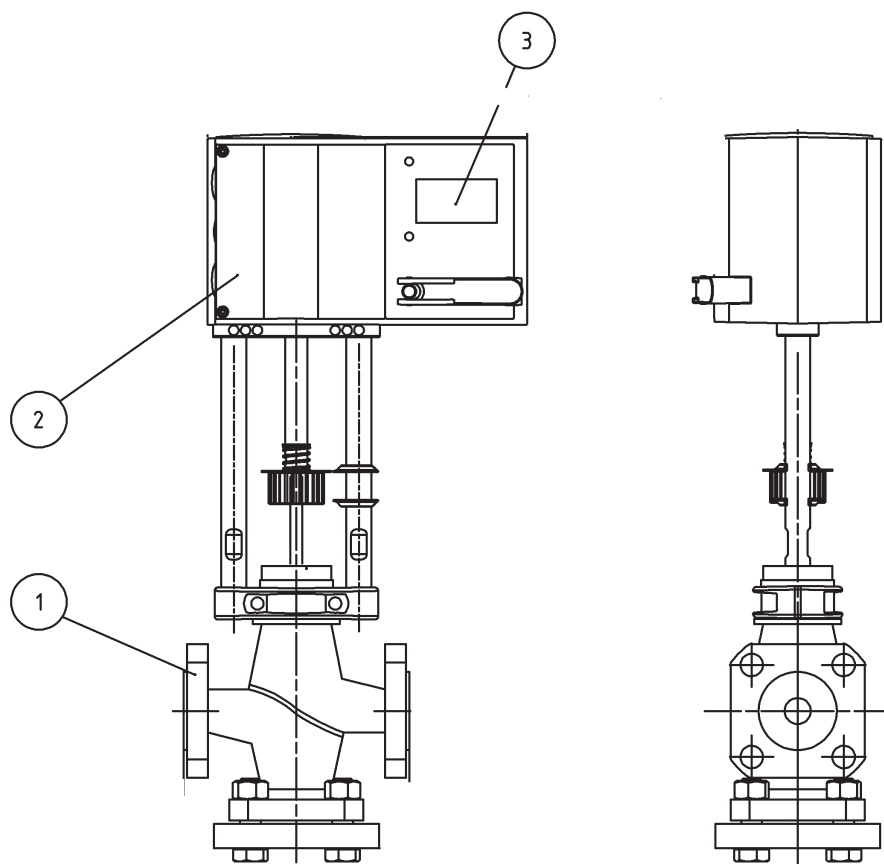
en	ru	it	pt	fi
Part no.	Деталь №	Nr. parte	Numero de peca	Varaosanumero
Qty	Кол—во	Quantita	Quantidade	Lukumäärä
Description	Наименование	Descrizione	Descricao	Nimitys
Notes	Примечания	Note	Notas	Huomautuksia
Machine type	Машина тнпа	Tipo macchina	Tipo de maquina	Konetyyppi
Product no.	Артикул №	Nr.prodotto	No. do produto	Tuotteen no
Machine unit description	Наименование блока машины	Descrizione unita macchina	Descricao da unidade da maquina	Koneenosan nimitys
Machine unit no.	Блок машины №	Nr. unita macchina	Numero de unidade da maquina	Koneenosan no
Subassembly description	Наименование группы	Descrizione sottogruppo	Descricao do subconjunto	Alaryhmän nimitys
Subassembly no.	Группа №	Nr. sottogruppo	Número de subconjunto	Alaryhmän no
See page	См. страницу	Vedi pagina	Véase la página	Ks sivu
Fig. ref.	Ссылка на эскиз	Rif. fig.	Referencia de figura	Kuvaviite
Product name	Наименование артикула	Nome prodotto	Nombre del producto	Tuotteen nimi
Exchange necessitates rebalancing of bowl	Замена требует балансировки барабана	La sostituzione comporta la equilibratura del tamburo	El racmbio requiere el reequilibrado del rotor	Vaihdettaessa kuula tasapainoitettava uudelleen
See separate spare parts list	См. отдельный перечень запасных частей	Vedi lista separata delle parti di ricambio	Véase la lista de piezas separada	Katso erillistä varaosaluettelo
Not delivered as spare part	Не поставлена вместе с запасными частями	Non fornito come parte di ricambio	No se entrega como pieza de recambio	Ei toimiteta varaosana

ΓΛΩΣΣΑΡΙ
Vertaallijst
Oversættelseliste
翻译列表、

en	el	nl	da	
Part no.	Αριθμός ανταλλακτικού	Onderdeelnr.	Reservedelsnummer	部件号
Qty	Σύνολο	Hoeveelheid	Antal	数量
Description	Περιγραφή	Beschrijving	Betegnelse	说明
Notes	Παρατηρήσεις	Opmerkingen	Bemaerkninger	注释
Machine type	Τύπος μηχανήματος	Machinetype	Maskintype	机器类型
Product no.	Αριθμός προϊόντος	Produktnr.	Produktnr.	产品编号
Machine unit description	Περιγραφή συγκροτήματος μηχανής	Machineblokbenaming	Maskinbetegnelse	机器说明
Machine unit no.	Αριθμός συγκροτήματος μηχανής	Machineblokbenaming	Maskinnr.	机器部件号
Subassembly description	Περιγραφή υποσυγκροτήματος	Subgroepbenaming	Undergruppsbetegnelse	子装置说明
Subassembly no.	Αριθμός υποσυγκροτήματος	Subgroeprnr.	Undergruppenr.	子装置编号
See page	Βλέπε σελίδα	Zie blz.	Se side	请参阅页
Fig. ref.	Παραπομπή σε εικόνα	Afb. ref.	Figurhenviisning	图片参考
Product name	Ονομασία προϊόντος	Produktnaam	Produktnavn	产品名
Exchange necessitates rebalancing of bowl	Ανταλλαγή απαιτεί επαναρρύθμιση ισορροπίας του τύμπανου	Vervanging vereist herbalanceren van de kogel	Udskriftning kraever afbalcering af kuglen	更换前应校准转鼓平衡
See separate spare parts list	Βλέπε ειδική λίστα ανταλλακτικών	Vervanging vereist van de kogel	Se spaat reservedelsliste	参见备件清单
Not delivered as spare part	Δεν παραδίδεται ως ανταλλακτικό	Niet geleverd als reserveonderdeel	Levereres ikke som reservedel	未作为备件提供

2 Regulating valve with drive

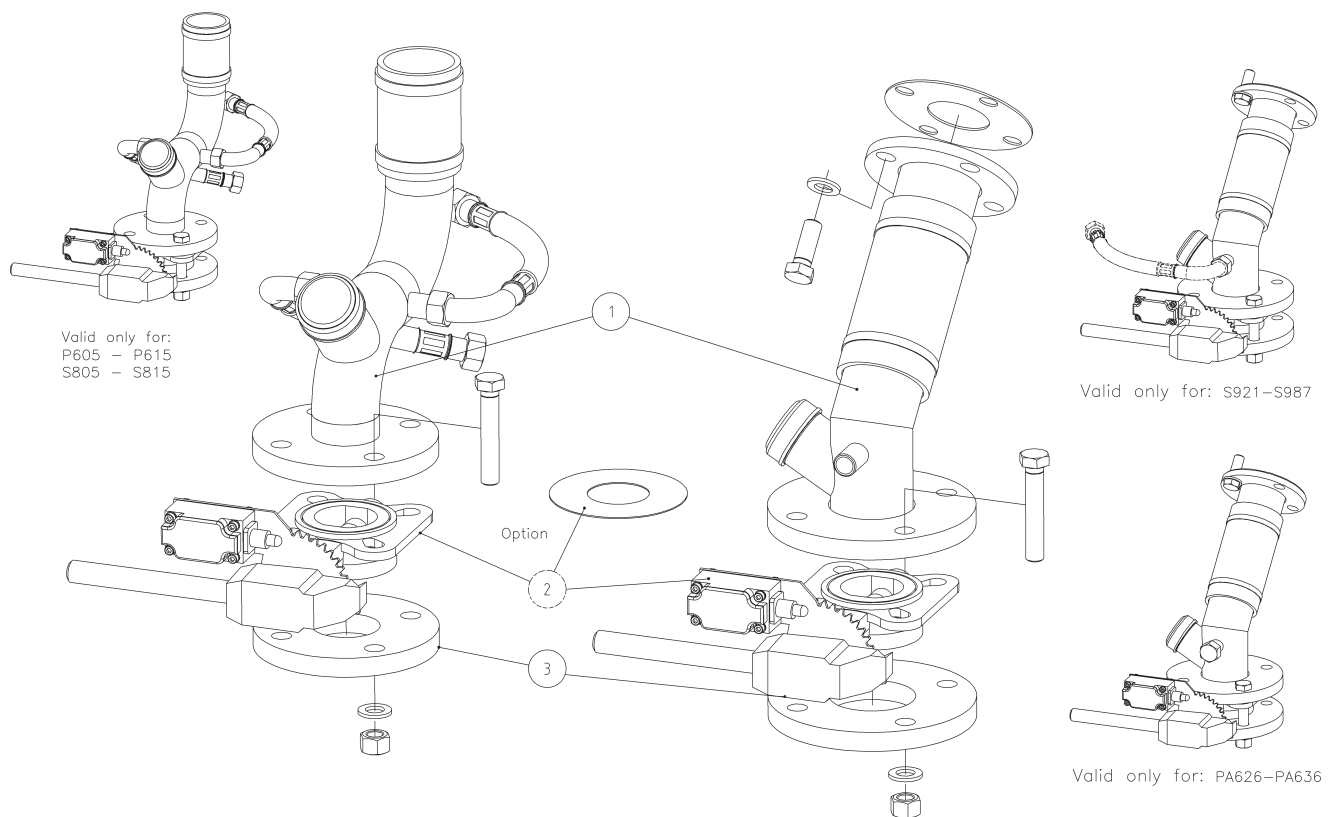
			Machine unit number or Subassembly description 578787-					
Ref	Part No	Description	-06	Quantity				Notes
1	578784 06	Regulating valve	1					
2	578785 01	Valve drive	1					
3	539436 01	Article number sign	1				Marked with article No for valve with drive	



3 Sludge outlet block

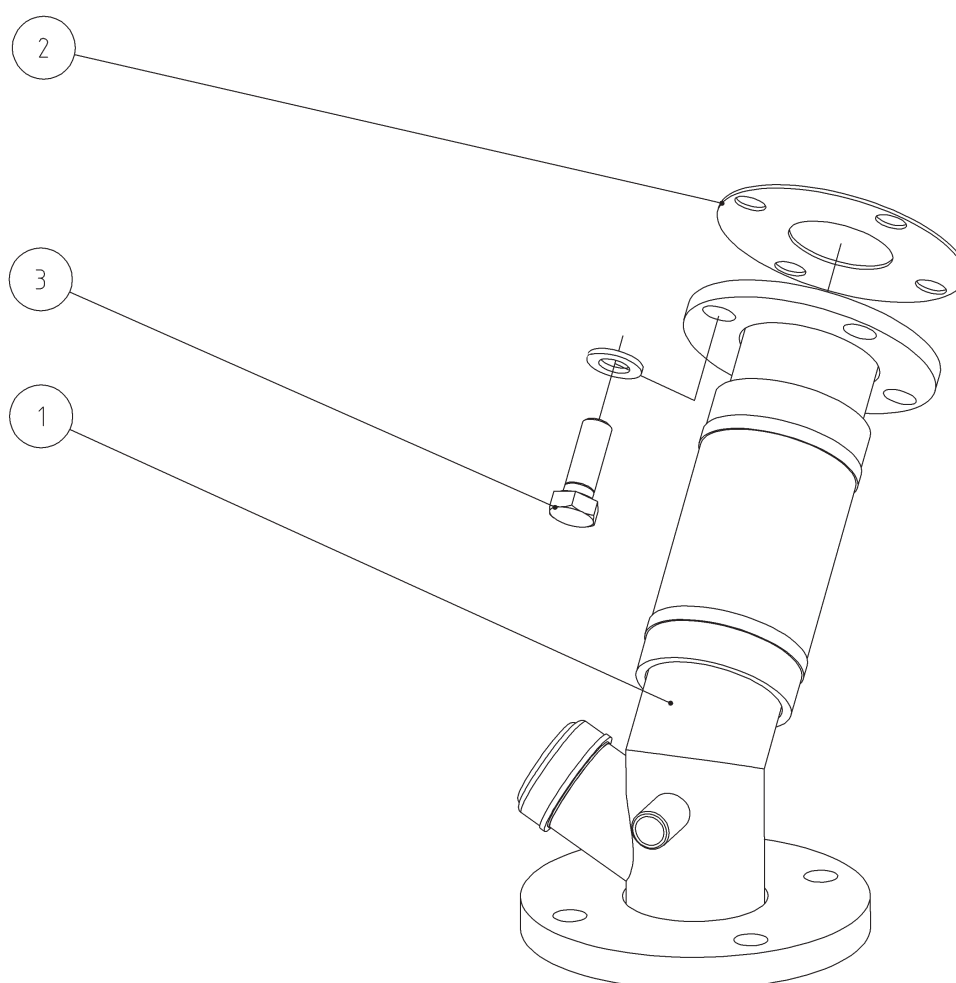
* This is an internal number and cannot be ordered. Use numbers from the item list below when ordering.

Ref	Part No	Description	Machine unit number or Subassembly description 9000351- -AA*				Notes
1	599048 81	Sludge outlet	1		Quantity		See page 16



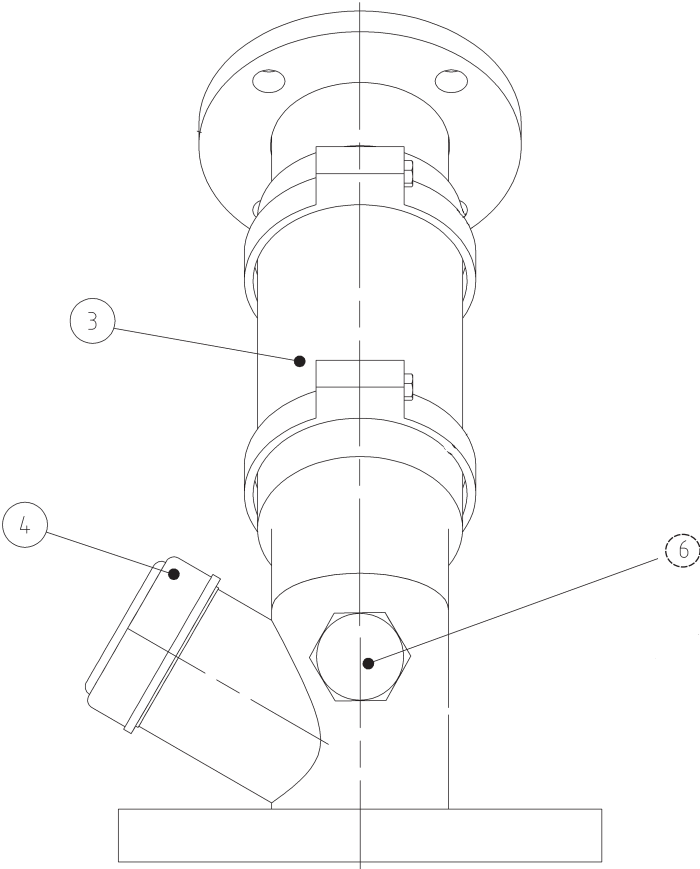
3.1 Sludge outlet

			Machine unit number or Subassembly description					
Ref	Part No	Description	-81	599048-				Notes
1	582592 80	Sludge outlet	1	Quantity				See page 18
2	561339 01	Gasket	1					
3	221040 08	Screw	4					



3.1.1 Sludge outlet

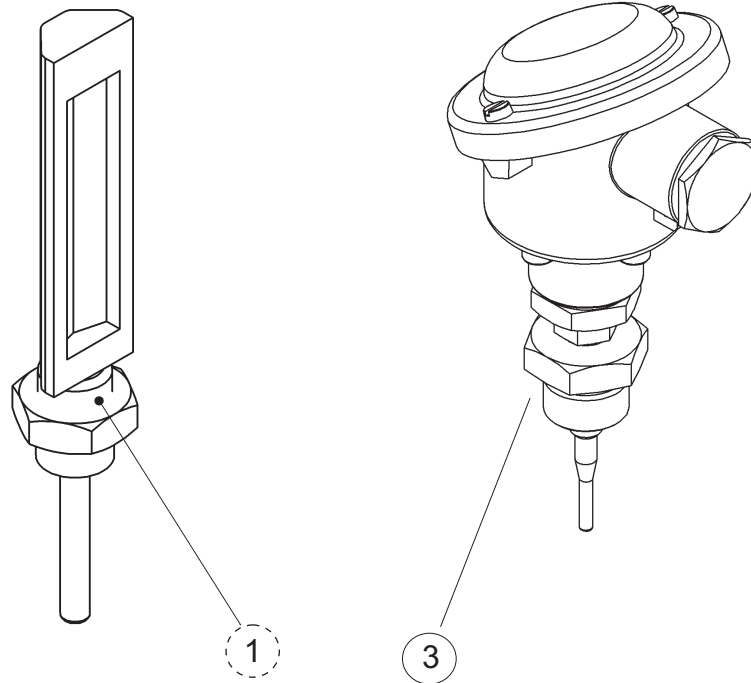
Ref	Part No	Description	Machine unit number or Subassembly description					Notes	
			582592-						
			-80	Quantity					
3	1762017 06	Hose	1						
4	1766096 01	Plug	1						



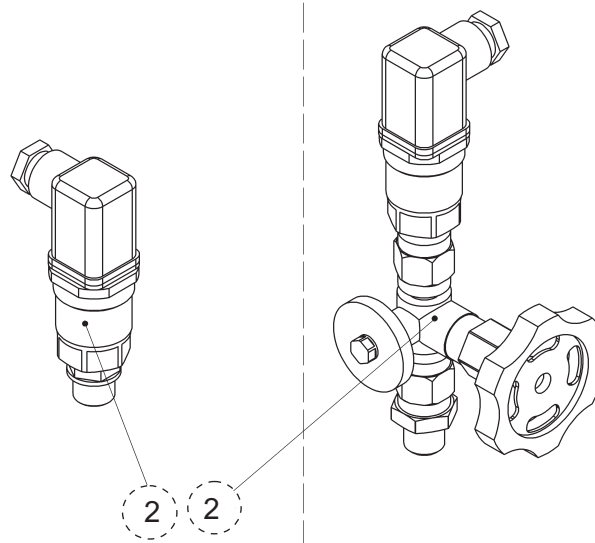
4 Feed supervision block

* This is an internal number and cannot be ordered. Use numbers from the item list below when ordering.

Ref	Part No	Description	Machine unit number or Subassembly description 9000152- -AA*	Notes
2	582752 81	Pressure transmitter	1	See page 22
3	597256 01	Temperature sensor	1	

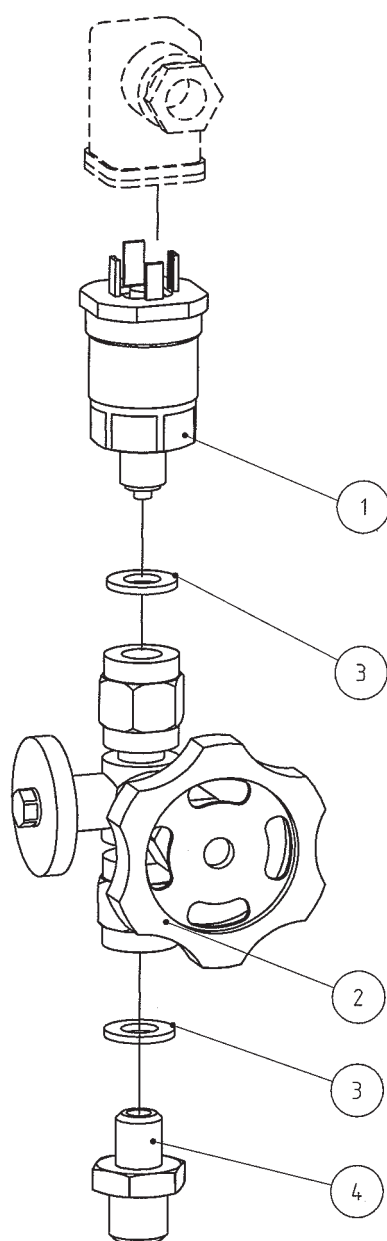


Optional



4.1 Pressure transmitter

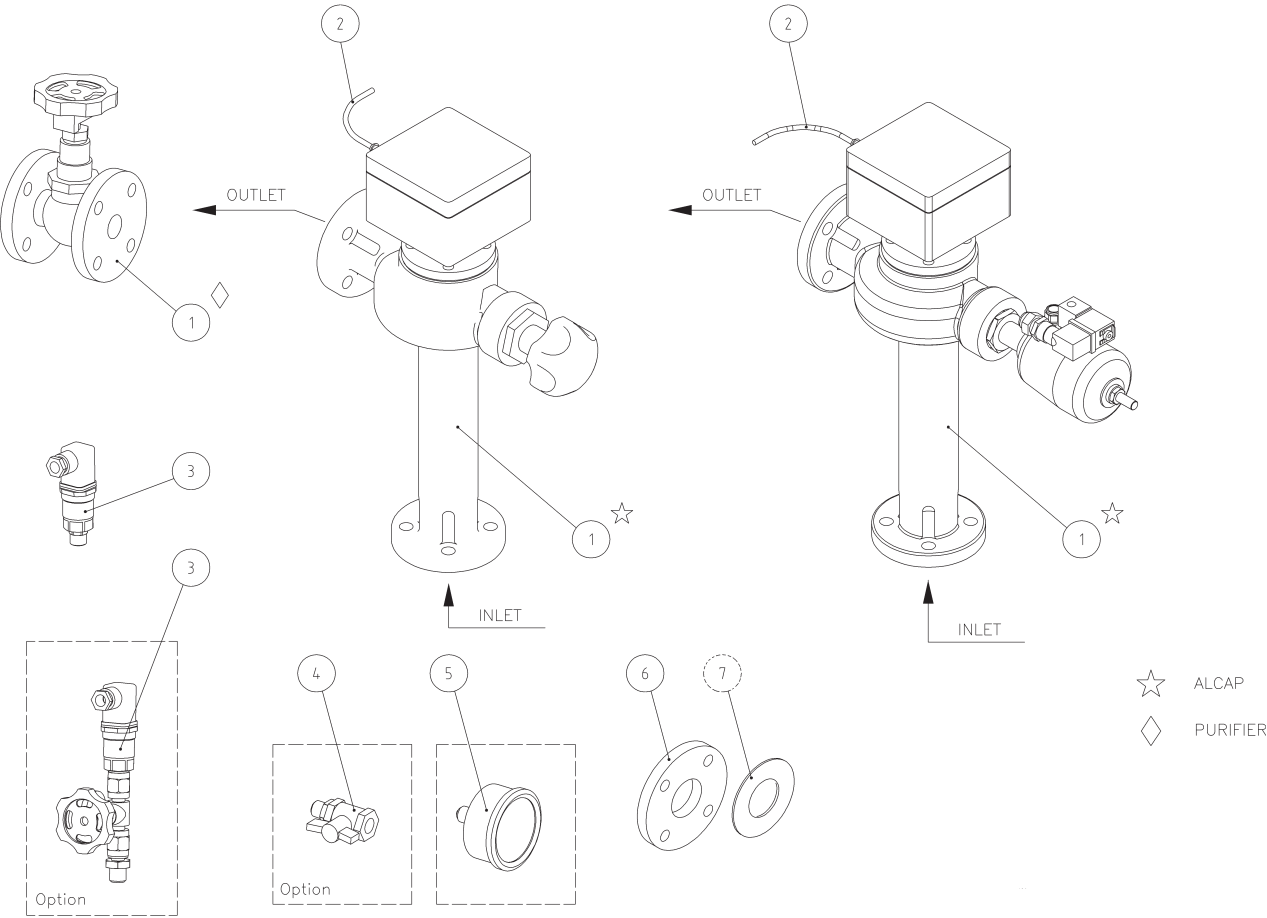
			Machine unit number or Subassembly description 582752-					
Ref	Part No	Description	-81	Quantity				Notes
1	597255 01	Pressure transmitter	1					Range 0 to 6 bar
2	1763903 03	Needle valve	1					
3	53551716 02	Washer	2					
4	1765082 09	Nipple	1					



5 Light phase regulating BI

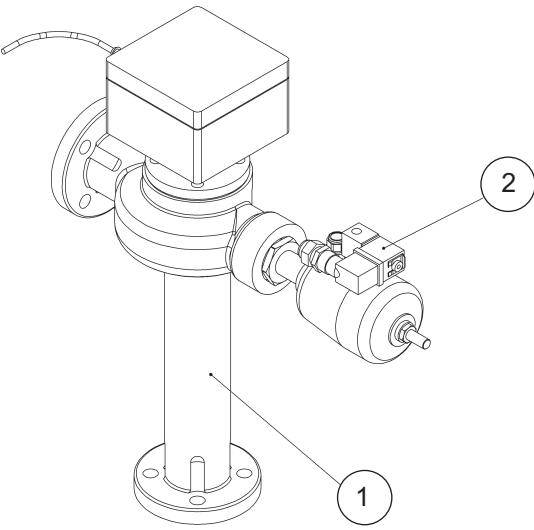
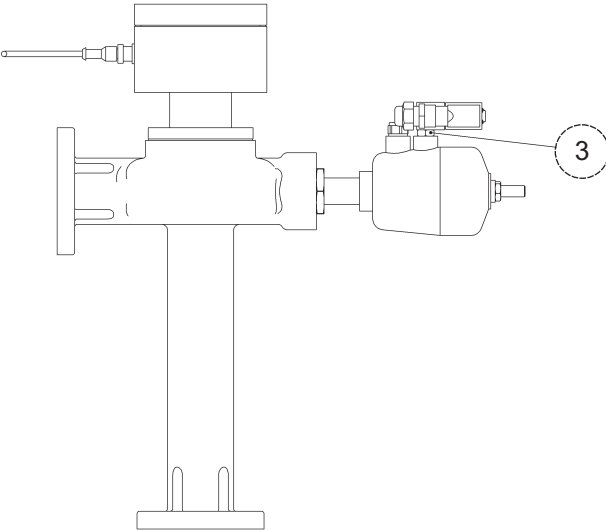
* This is an internal number and cannot be ordered. Use numbers from the item list below when ordering.

Ref	Part No	Description	Machine unit number or Subassembly description 9000158- -AA*	Notes
1	598547 80	Water transducer kit DN25	Quantity	See page 26
3	582752 81	Pressure transmitter	1	See page 22



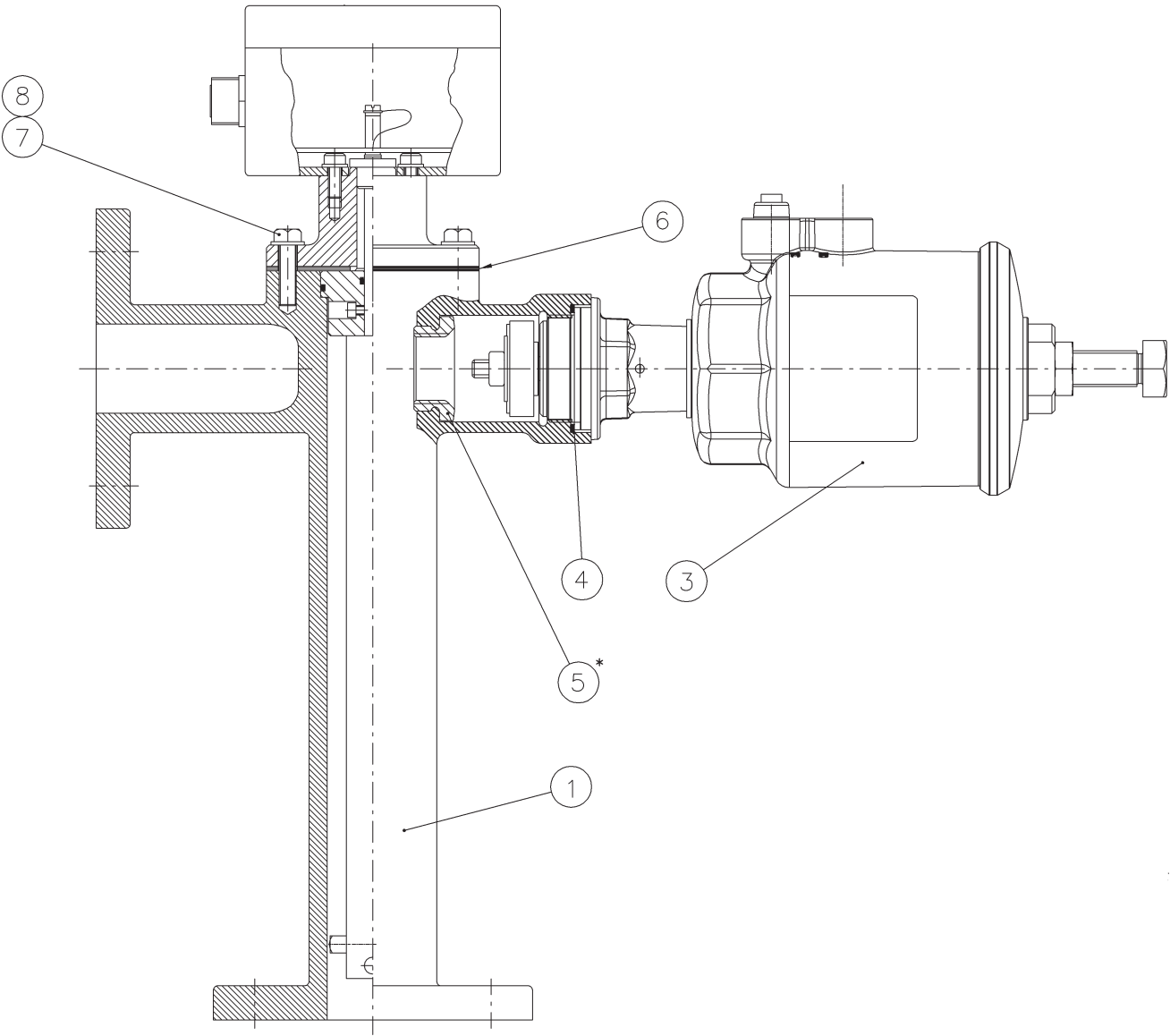
5.1 Water transducer kit DN25

			Machine unit number or Subassembly description 598547-					
Ref	Part No	Description	-80	Quantity				Notes
1	582551 80	Water transducer DN25	1				See page 28	
2	1763491 01	Nipple	1					
3	574409 83	3-way solenoid valve	1					



5.1.1 Water transducer DN25

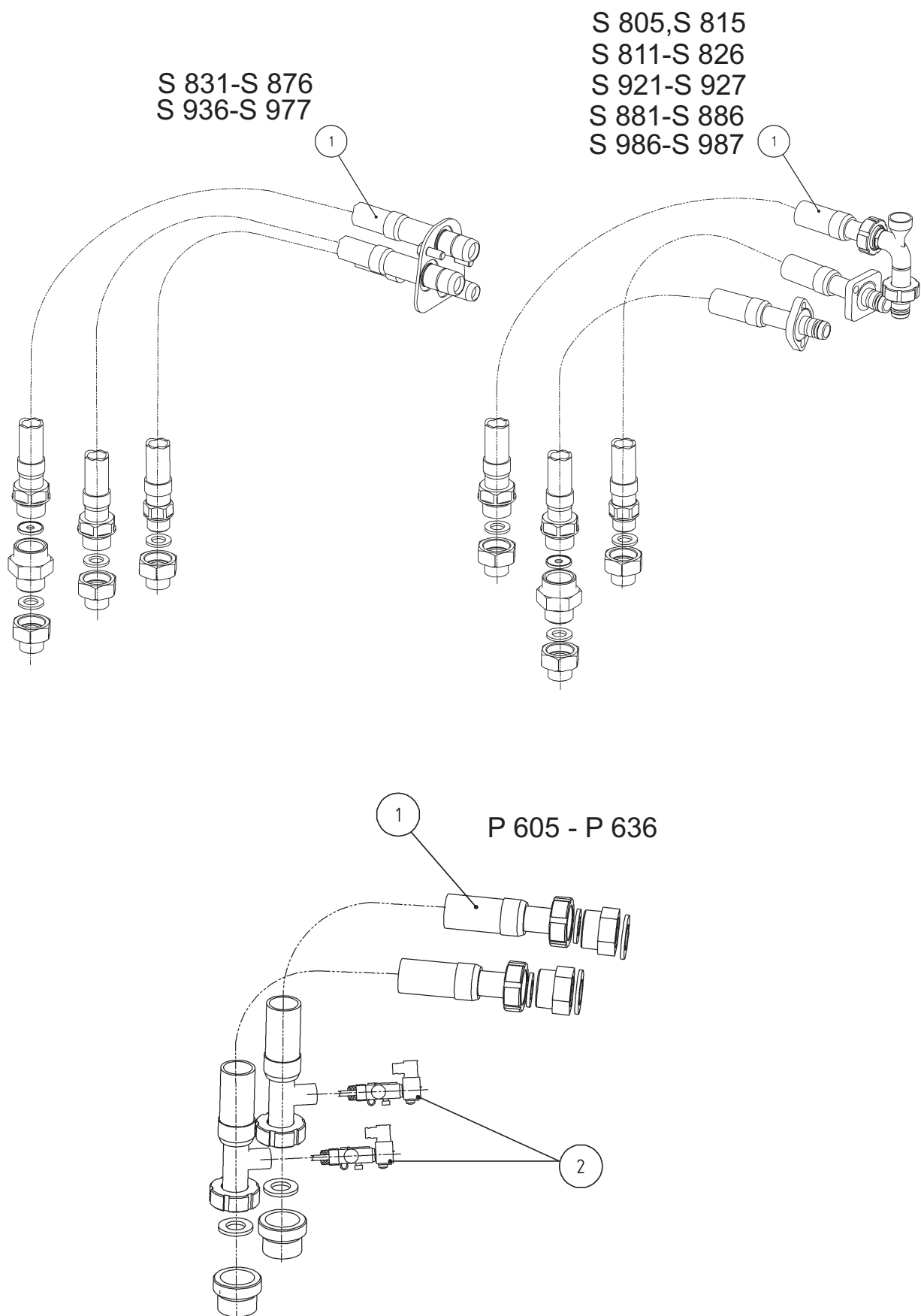
			Machine unit number or Subassembly description 582551-					
Ref	Part No	Description	-80	Quantity				Notes
1	581384 01	Valve Body	1					DN25
3	582584 01	Pneumatic Actuator DN25	1					DN25
4	586248 03	Gasket	1					DN25
5	582554 01	Valve seat	1					DN25
6	1765130 01	Gasket	1					DN25
7	221040 08	Screw	4					
8	223107 06	Spring washer	4					



6 Flexible hose block

* This is an internal number and cannot be ordered. Use numbers from the item list below when ordering.

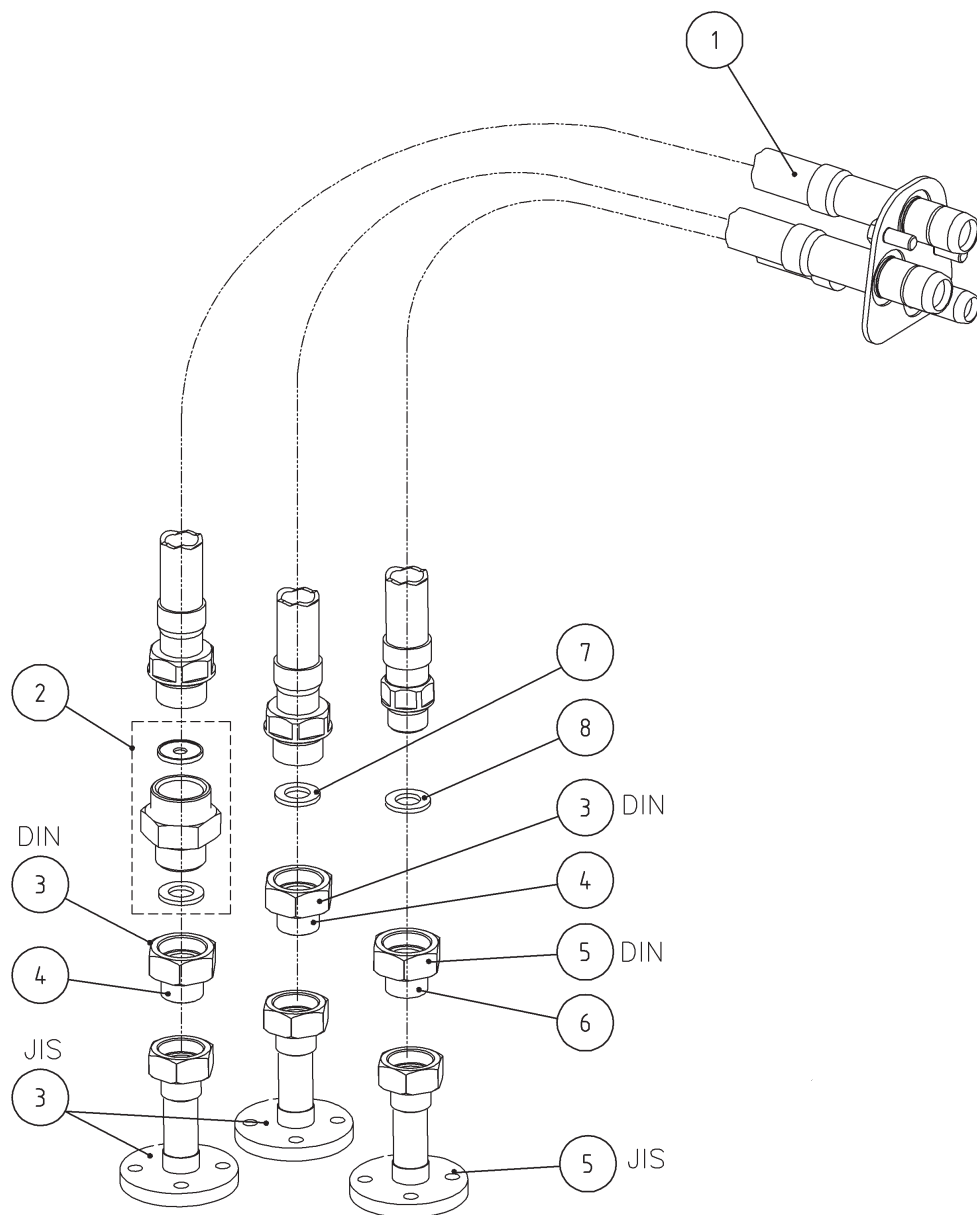
Ref	Part No	Description	Machine unit number or Subassembly description 9000428- -AA*				Notes
1	9000188 17	Flexible hose kit	1	Quantity			See page 32



6.1 Flexible hose kit

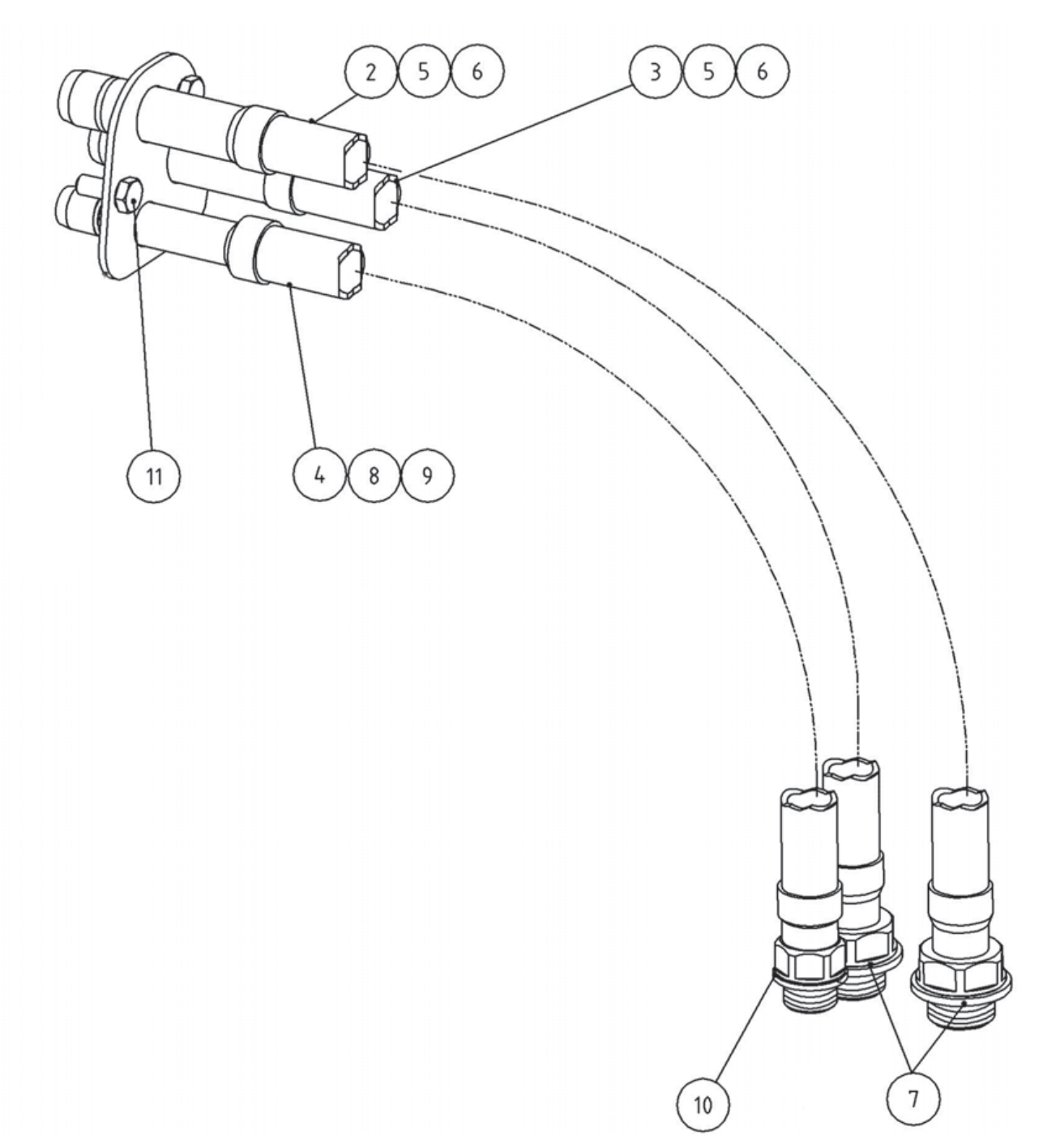
			Machine unit number or Subassembly description 9000188-					
Ref	Part No	Description	-17	Quantity				Notes
1	580671 80	Flexible hose kit	1					See page 34
2	582476 10	Throttle washer block kit	1					See page 36
3	1760924 08	Sleeve	2					
4	534240 01	Coupling nut	2					
5	1760924 02	Sleeve	1					
6	2521501 03	Coupling nut	1					
7	546229 35	Rectangular ring	2					
8	567996 02	Gasket	1					

Alt. S831 – S876
S936 – S977



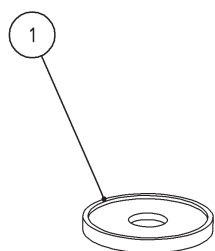
6.1.1 Flexible hose kit

			Machine unit number or Subassembly description 580671-					
Ref	Part No	Description	-80	Quantity				Notes
2	580667 80	Flexible hose	1					Oil Inlet Oil outlet Water outlet
3	590686 80	Oil outlet S83x-S84x	1					
4	580668 80	Flexible hose	1					
5	260104 22	O-ring	2					
6	223641 14	Snap ring	2					
7	581402 01	Rubber steel washer	2					
8	223404 51	O-ring	1					
9	223641 03	Retaining ring	1					
10	581402 02	Rubber steel washer	1					
11	221040 08	Screw	1					



6.1.2 Throttle washer block kit

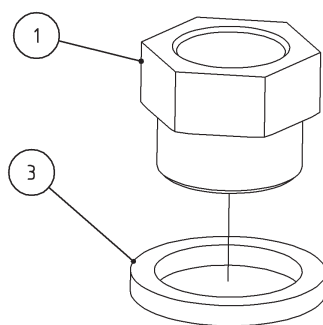
			Machine unit number or Subassembly description 582476-					
Ref	Part No	Description	-10	Quantity				Notes
1	1766811 17	Throttle washer	1					
2	582542 01	Nipple	1					
3	546229 04	Rectangular ring	1					



Alt. 1

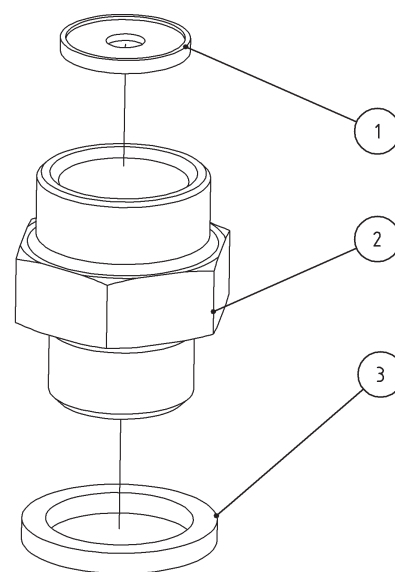
PA- Separators
with or without oil block

S- Separators
with oil block



Alt. 2

P605 and P615 Separators
with or without oil block



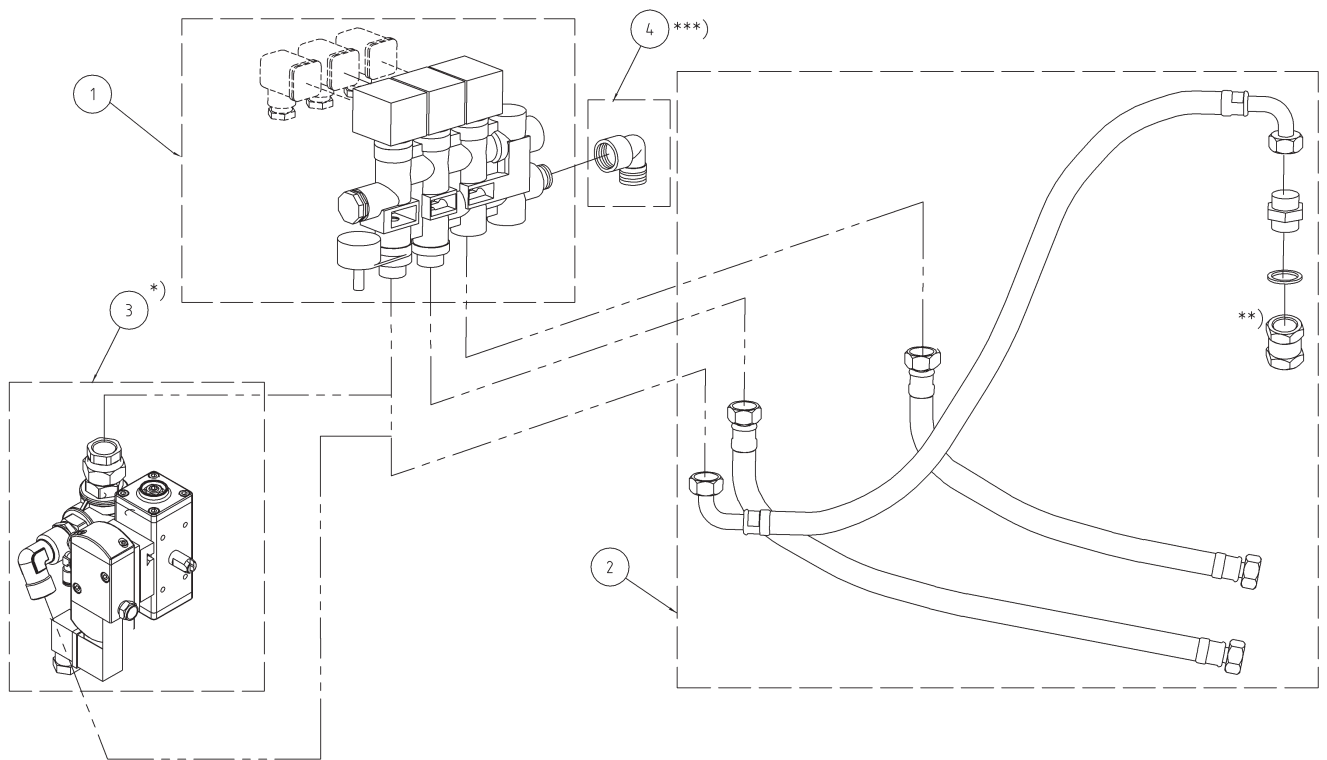
Alt. 3

S- Separators
without oil block

7 Operating water valve BI

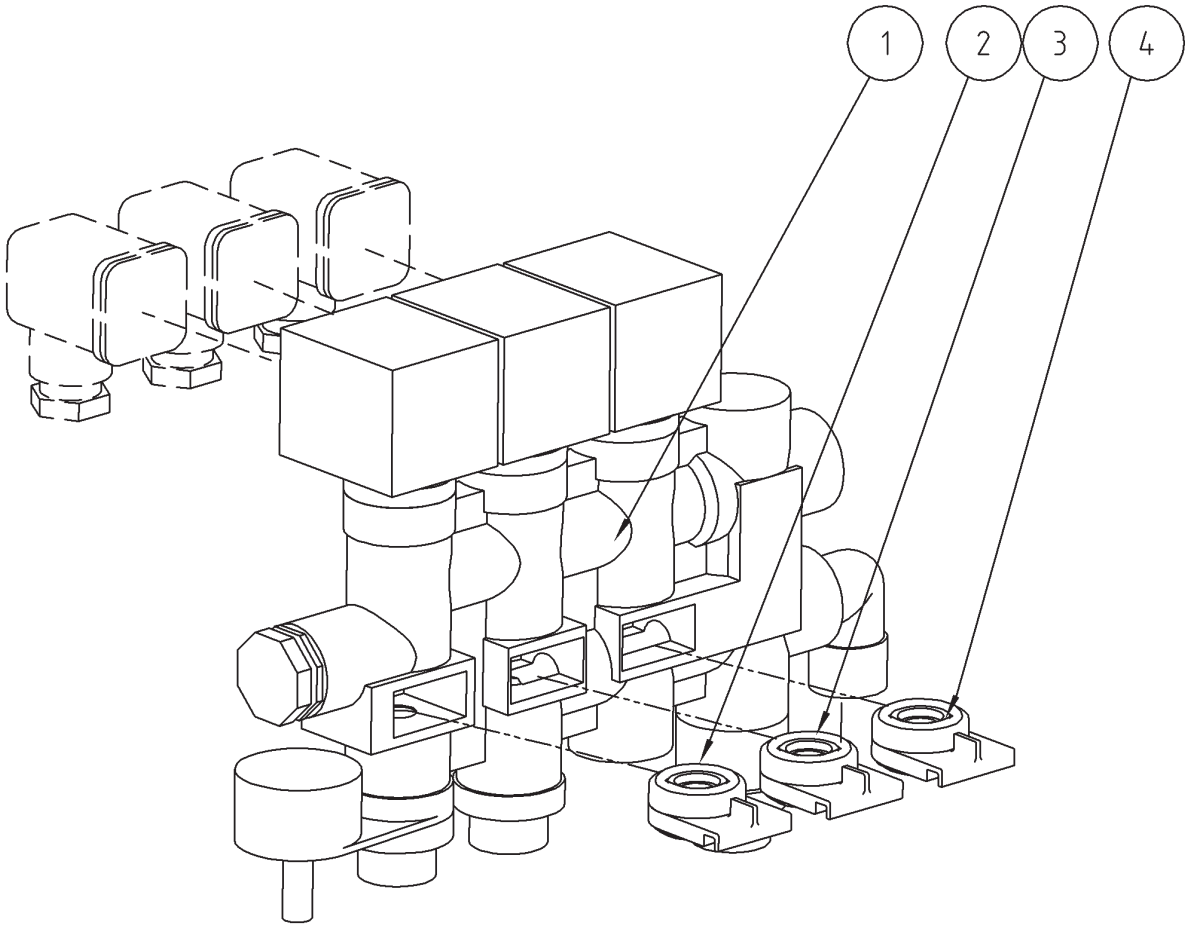
* This is an internal number and cannot be ordered. Use numbers from the item list below when ordering.

			Machine unit number or Subassembly description 9000340-				
Ref	Part No	Description	-AA*				Notes
			Quantity				
1	598371 04	Valve block water	1				See page 40
2	598372 03	Flexible connection kit	1				See page 42
4	571395 03	Elbow coupling G1/2	1				
Z	1765993 87	Water block spare parts					See page 52



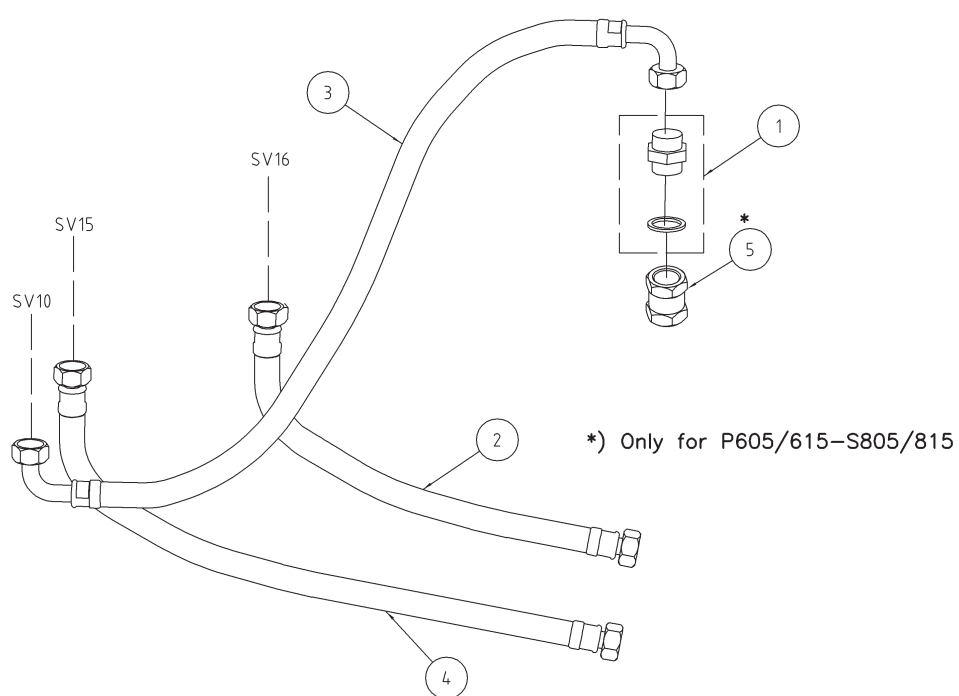
7.1 Valve block water

			Machine unit number or Subassembly description 598371-					
Ref	Part No	Description	-04	Quantity				Notes
1	582496 80	Valve block water	1					
2	1766037 07	Flow valve, 1.6 l/min	1					
3	1766037 02	Flow valve, 11.0 l/min	1					
4	1766037 03	Flow valve, 2.8 l/min	1					



7.2 Flexible connection kit

			Machine unit number or Subassembly description 598372-					
Ref	Part No	Description	-03	Quantity				Notes
1	1767071 80	Non return valve kit	1					
3	1765936 02	Flexible connection wate	1					
4	1765937 01	Flexible connection	1					

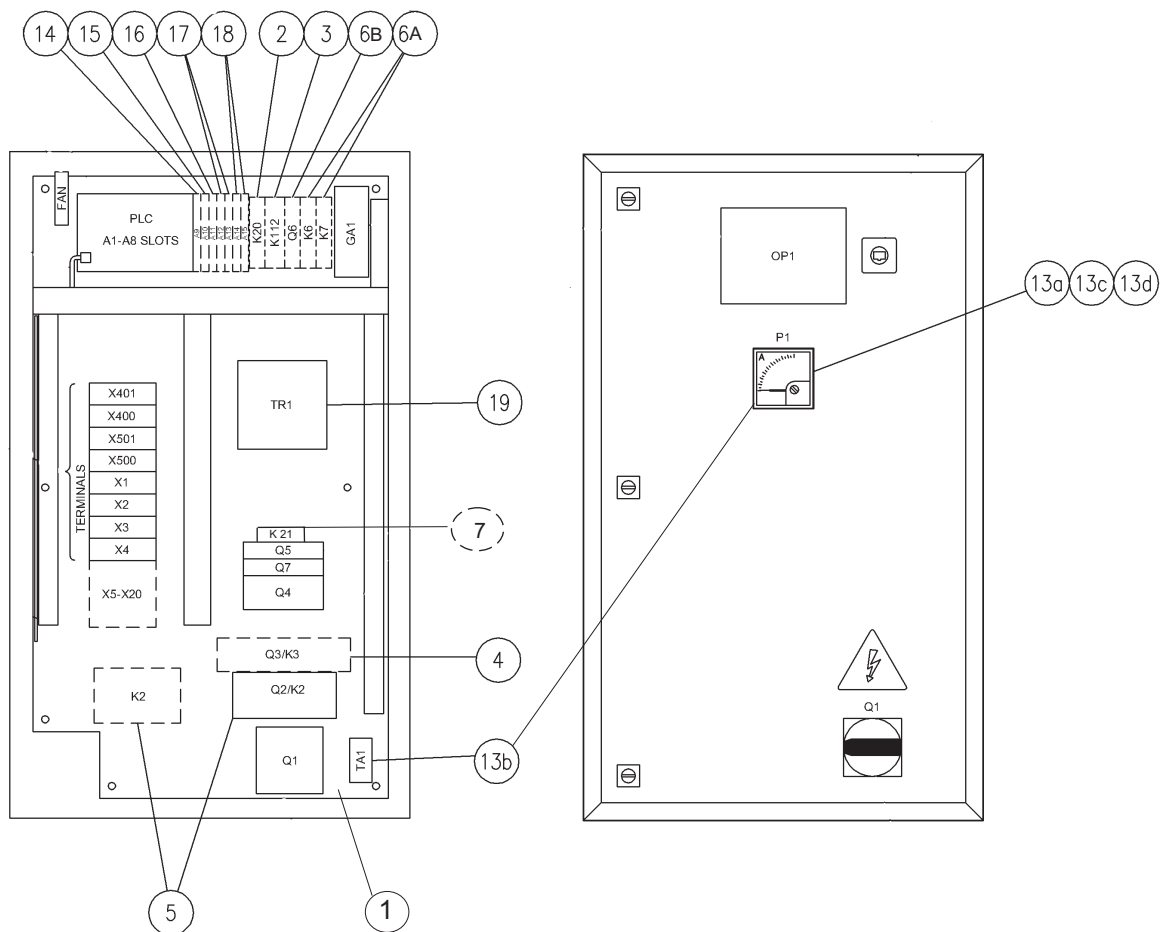


8 Control_Unit excl.Starter

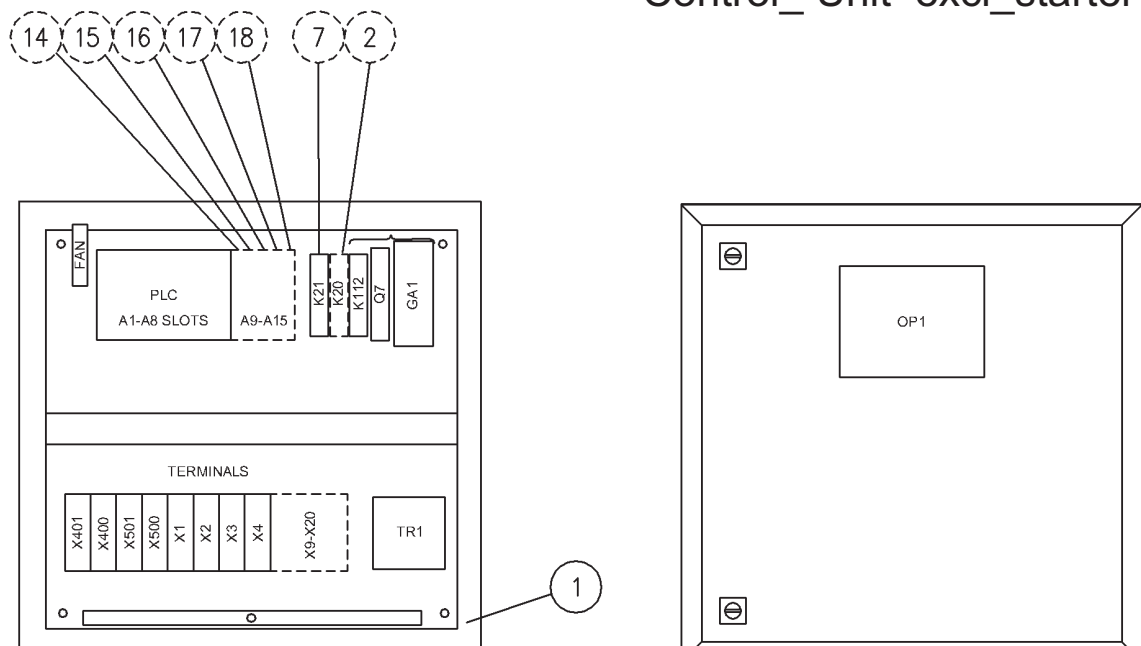
* This is an internal number and cannot be ordered. Use numbers from the item list below when ordering.

Ref	Part No	Description	Machine unit number or Subassembly description 9000238- -AA*				Notes
			Quantity				
1	581043 84	Control Cabinet	1				See page 46
15	581045 80	Speed sensor kit	1				
22	9004096 80	Wall Mounting Kit	1				See page 50

Control_Unit incl_starter

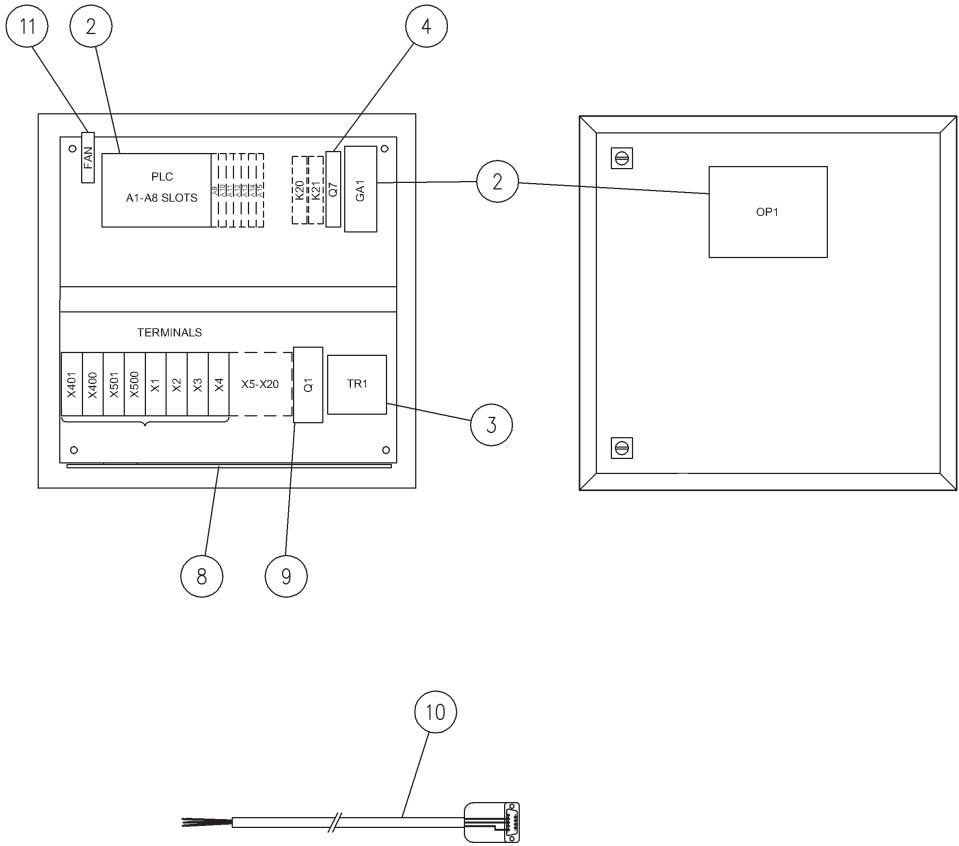


Control_Unit excl_starter



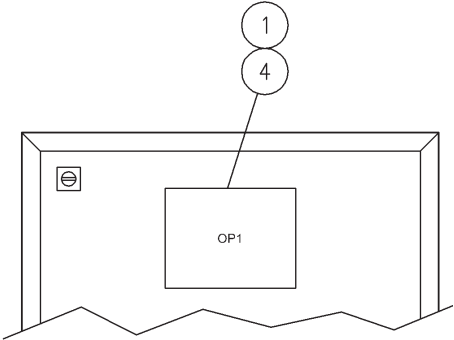
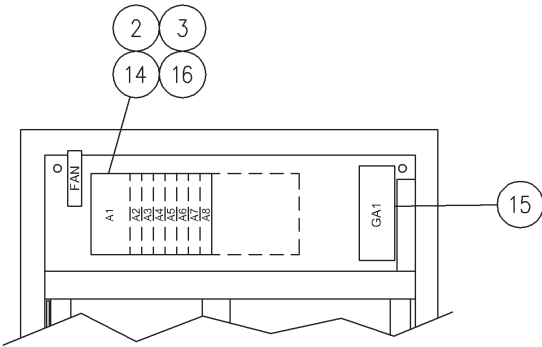
8.1 Control Cabinet

			Machine unit number or Subassembly description				
Ref	Part No	Description	581043-				Notes
			-84	Quantity			
2	580999 80	PLC standard kit	1				See page 48
3	580993 03	Transformer	1				
4	580992 26	Circuit Breaker	1				
8	580994 01	Copper plait	1				
9	580992 25	Circuit Breaker	1				
10	580936 01	Cable	1				
11	581016 01	Fan	1				

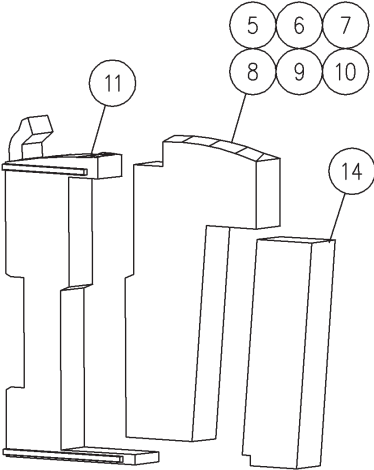


8.1.1 PLC standard kit

			Machine unit number or Subassembly description 580999-					
Ref	Part No	Description	-80					Notes
				Quantity				
1	580986 01	Operator panel	1					4B1260.00-K07
2	580986 02	CPU	1					X20CP0292
3	580986 14	Supply module	1					X20PS9500
4	580986 26	Terminal block	1					0TB103.91
5	580986 04	6 Digital input	1					X20DI6371
6	580986 05	2 Relay output	1					X20DO2649
7	580986 06	6 Relay output	1					X20DO6529
8	580986 07	4 Relay output	1					X20DO4529
9	580986 08	4 Analogue input	1					X20AI4622
10	580986 09	2 Analogue input	1					X20AT2222
11	580986 17	Bus module	6					X20BM11
140	580986 16	Terminal block 12-pin	7					X20TB12
150	580986 03	Power supply	1					0AC524.9
160	580986 18	Bus module for CPU	1					X20BB22

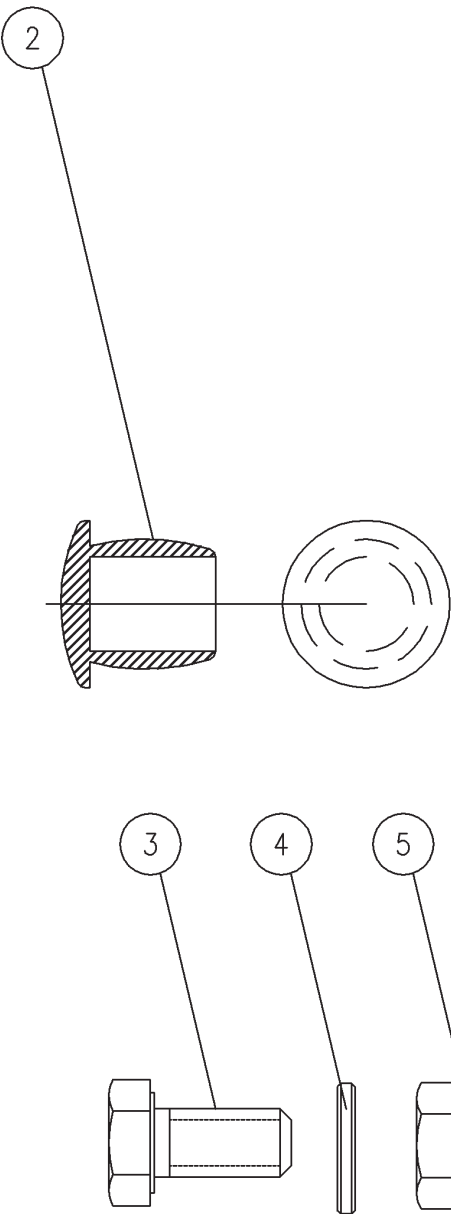


A2-A8



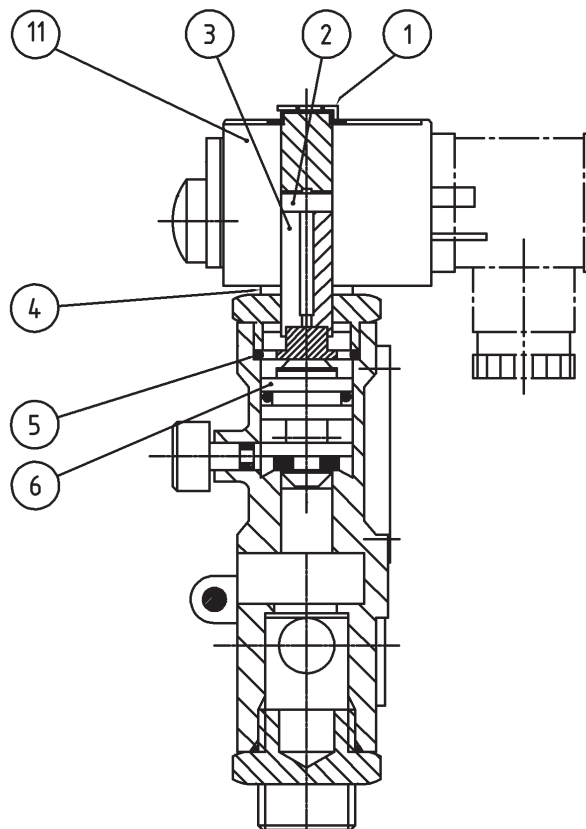
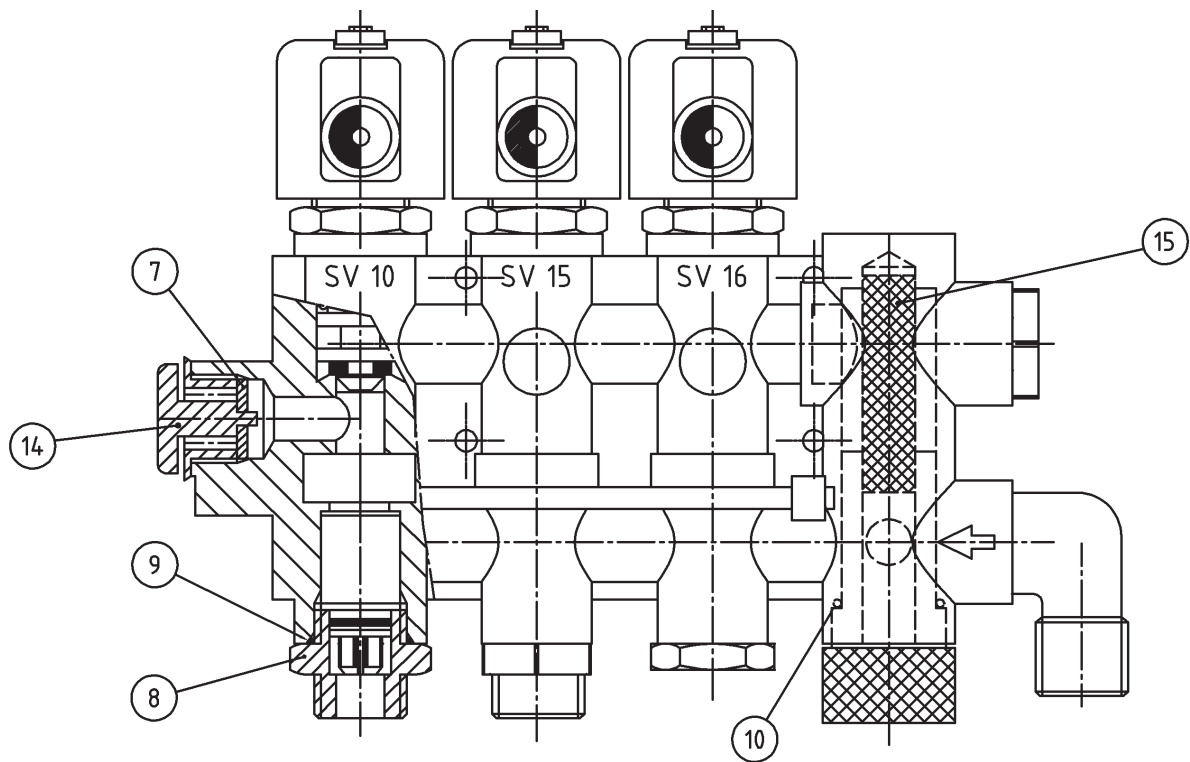
8.2 Wall Mounting Kit

			Machine unit number or Subassembly description 9004096-					
Ref	Part No	Description	-80	Quantity				Notes
2	9004092 01	Plug	8					
3	221031 21	Screw	8				Screw M6x16	
4	223101 32	Washer	8				Washer M6	
5	221803 28	Nut	8				Nut M6	



9 Water block spare parts

			Machine unit number or Subassembly description 1765993-				
Ref	Part No	Description	-87	Quantity			Notes
1	1765993 01	Retaining clip	1				
2	1765993 02	Spring	1				
3	1765993 03	Core	1				
4	1765993 04	Spring washer	1				
5	1765993 05	O-ring	1				
6	1765993 06	Piston	1				
7	1765993 07	Disc	1				
8	1765993 08	Non-return valve	1				
9	1765993 09	O-ring	1				
10	1765993 10	O-ring	1				
11	1765993 11	Coil, 24 V	1				
14	1765993 13	Drain valve	1				
15	1765993 16	Strainer	1				

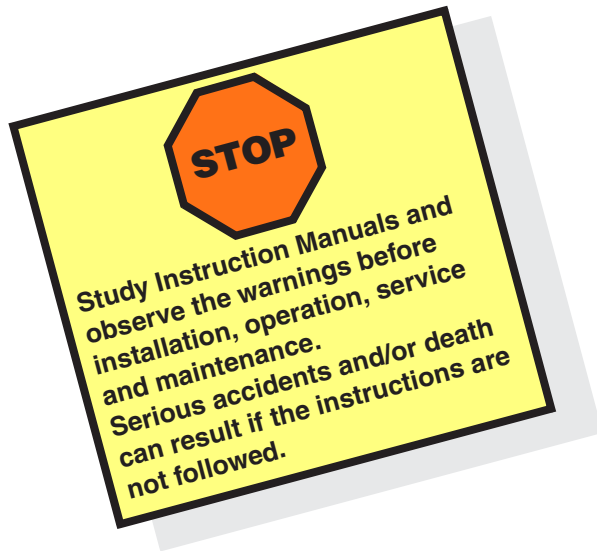


10 Cross reference list

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1765993 87	38	Z	580993 03	46	3			
1766037 02	40	3	580994 01	46	8			
1766037 03	40	4	580999 80	46	2			
1766037 07	40	2	581016 01	46	11			
1766096 01	18	4	581043 84	44	1			
1766811 17	36	1	581045 80	44	15			
1767071 80	42	1	581384 01	28	1			
221031 21	50	3	581402 01	34	7			
221040 08	28	7	581402 02	34	10			
221040 08	34	11	582476 10	32	2			
221040 08	16	3	582496 80	40	1			
221803 28	50	5	582542 01	36	2			
223101 32	50	4	582551 80	26	1			
223107 06	28	8	582554 01	28	5			
223404 51	34	8	582584 01	28	3			
223641 03	34	9	582592 80	16	1			
223641 14	34	6	582752 81	20	2			
2521501 03	32	6	582752 81	24	3			
260104 22	34	5	586248 03	28	4			
534240 01	32	4	590686 80	34	3			
53551716 02	22	3	597255 01	22	1			
539436 01	12	3	597256 01	20	3			
546229 04	36	3	598371 04	38	1			
546229 35	32	7	598372 03	38	2			
561339 01	16	2	598547 80	24	1			
567996 02	32	8	599048 81	14	1			
571395 03	38	4	9000188 17	30	1			
574409 83	26	3	9004092 01	50	2			



S and P Flex Separation



Only foreseeable conditions have been taken into consideration. No warnings are given for situations arising from unintended usage of the system components and tools.

Marine & Diesel Equipment

Printed Jun 2008

Document No. 587876-02

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S and P Flex Separation



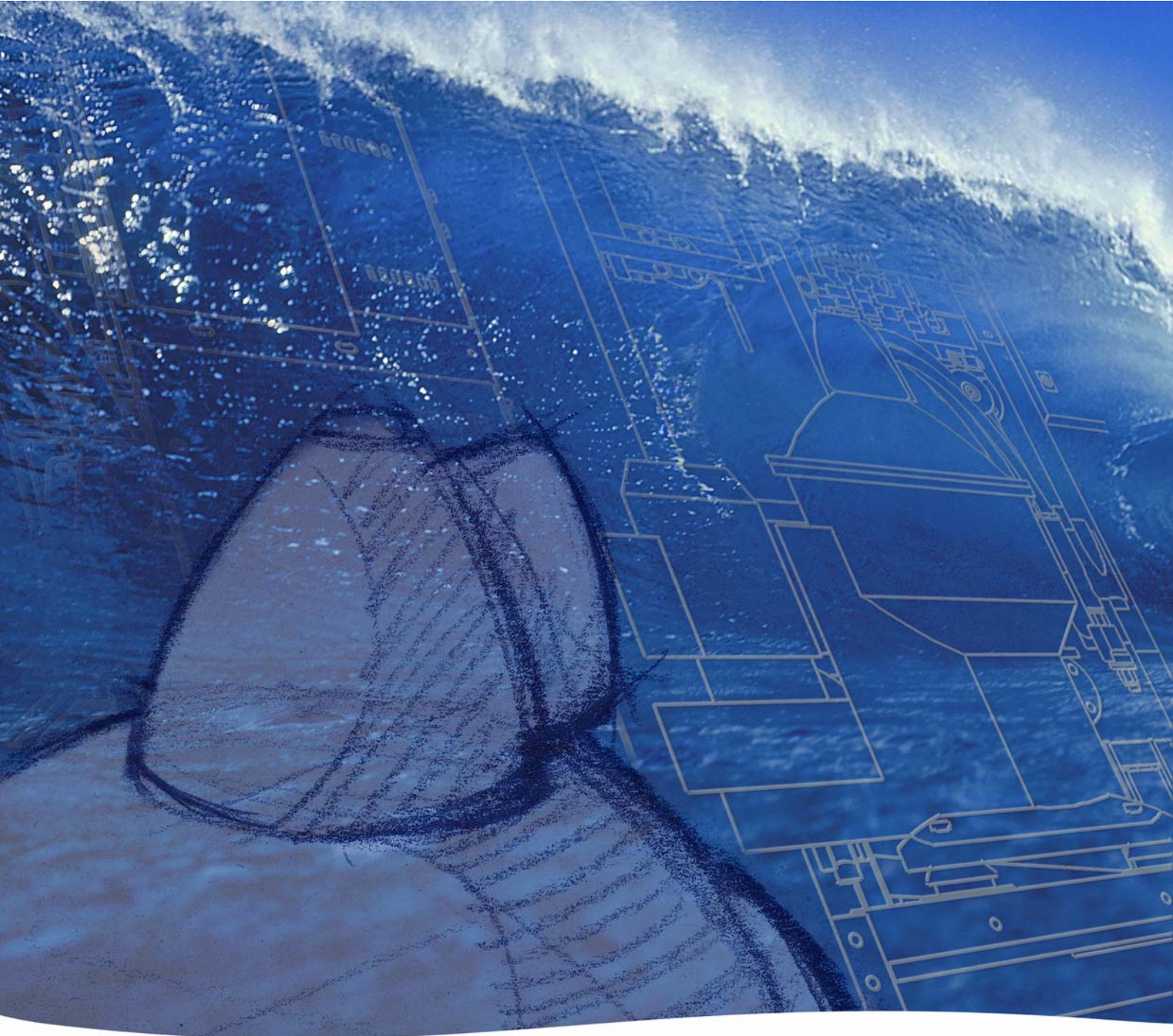
Safety

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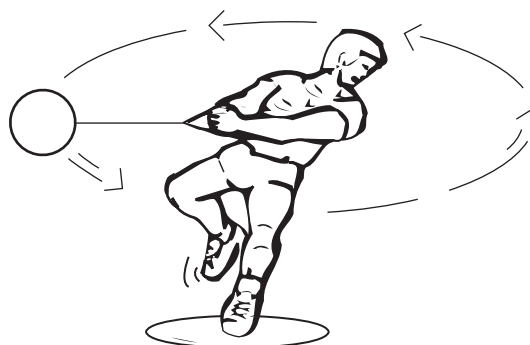
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1 Safety Instructions

Important – read this!

The centrifugal separator includes parts that rotate at very high speeds, generating huge forces. It is therefore essential for the safe operation of this separator system that you read and understand this manual, including the warning signs and safety precautions presented in this manual. Failure to do so may cause a fatal accident.



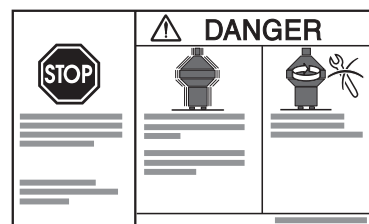
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1.1 Key Factors for Safe Operation

The separation system is designed and supplied for a specific function (type of liquid, rotational speed, temperature, density, etc.). The system must be used for this function only, and strictly within Alfa Laval's specifications.

Incorrect operation or maintenance may result in a heavy unbalance, reduction of material strength, etc. that could lead to serious breakdown with fatal injury or damage to property.

For safe operation, strictly follow the instructions for installation, operation and maintenance in this manual.



P003623A

The following is compulsory for safe operation:

- 1** Never start up a separator before the bowl is completely assembled, and all fastenings securely tightened.
- 2** Never discharge a vibrating separator. Always stop with the emergency stop button.
- 3** Never begin to disassemble a separator before it has come to a complete standstill.
- 4** Always set the discharge intervals according to instructions in the instruction book.
- 5** Never ignore alarms. Always eliminate the cause before resuming operation.
- 6** Never use the separator for other liquids than those specified by Alfa Laval.
- 7** Never operate a separator with a different power supply frequency than stated on the machine plate.
- 8** Clean the operating system regularly to avoid sludge discharge malfunction.
- 9** Ensure that personnel are fully trained and competent in installation, operation, maintenance, and emergency procedures.
- 10** Use only Alfa Laval genuine spare parts and the special tools supplied.

1.2 Warning Sign Definitions

Below are definitions of the warning signs used.

Danger – serious injury or death

This type of safety sign or instruction indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

Example:



Entrapment hazard

Make sure that rotating parts have come to a complete standstill before starting any dismantling work.

Warning – serious injury or death

This type of safety sign or instruction indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

Example:



Disintegration hazard

If unusually strong vibration occurs, press the Emergency Stop button and leave the room. Do not enter the room after an emergency stop while the separator is still rotating.

Caution – minor or moderate injury

This type of safety sign or instruction indicates a situation which, if not avoided, could result in minor or moderate injury.

Example:



‘CAUTION’ used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, could result in equipment damage.

Burn hazard

Various machine surfaces can be hot and cause burns.

1.3 Summary of Safety Hazards

Below follows a selection of the warnings which have been used in the text of this instruction manual to ensure safe installation, start-up, operation, stop, and maintenance. Further warnings are to be found in the appropriate places throughout the manual.

Start-up

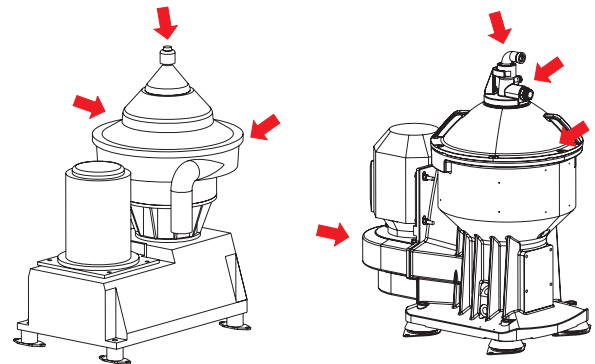
Check that the separator is correctly assembled and connected to power supply of correct voltage and frequency. The control panel must be ON.

Be specially observant during start-up. If there is any abnormal vibration, immediately stop the separator and investigate the cause. Clean the bowl if it contains sediment.



Breakdown hazard

Assemble the separator completely before start. All couplings, covers, and guards must be in place and properly tightened. Failure to do so may lead to breakdown.



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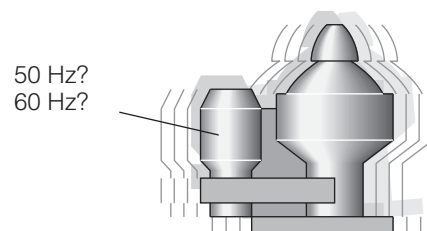
Electrical hazard

Follow local regulations for electrical installation and earthing (grounding).



Breakdown hazard

Check that the power frequency is in agreement with the machine plate. If incorrect, resulting overspeed may cause breakdown.



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Use the separation system for the purpose, and within the limits, specified by Alfa Laval. Failure to do so could cause a violent breakdown.



If power cable polarity has been reversed, the separator will rotate in reverse, and vital rotating parts can loosen.



Check the oil level before start. Top up when necessary. Do not overfill.

Operation



Excessive vibration

If vibration increases, or continues at full speed, keep bowl filled and stop the separator.

The cause of the vibration must be determined and corrected before starting again!

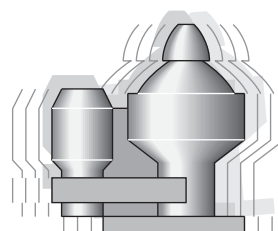
Excessive vibration may be due to incorrect assembly or insufficient cleaning of the bowl.



Breakdown hazard

If strong vibration occurs, press the emergency stop button and evacuate the room.

Never discharge a vibrating separator. Vibration may then become violent and result in breakdown.



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Disintegration hazard

After an emergency stop, the cause of the fault must be identified.

If all parts have been checked and the cause not found, contact Alfa Laval for advice before restarting the separator.



Burning hazard

Lubricating oil and various machine surfaces can be hot and cause burns.



Noise hazard

Use ear protection if noise levels are high.

**Breakdown hazard**

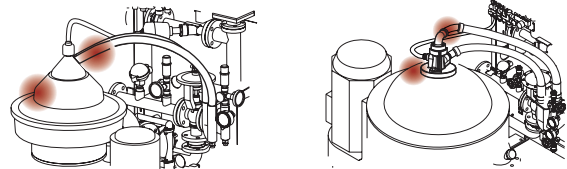
Never reset an alarm without first finding and remedying the cause.

**Disintegration hazard**

Do not discharge a vibrating separator. Vibration can increase if solidified sludge is only partially discharged.

**Burn hazard**

Avoid contact with hot surfaces. Process pipes, various machine surfaces, and processed liquid can be hot and cause burns.

**Slip hazard**

Check all connections for leakage.
Oil leakage may make the floor slippery.

If speed or starting power is not correct:



Stop and change the belt transmission to suit the power supply frequency.

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Stop**Breakdown hazard**

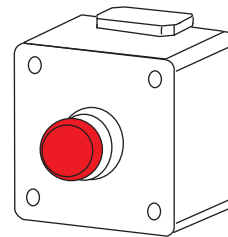
Stop the separator by means of the control unit, and not by turning off the motor.

Never attempt to clean the bowl by manual discharge in connection with stop.

Emergency stop**Disintegration hazard**

If unusually strong vibration occurs, press the Emergency Stop button and leave the room

Do not enter the room after an emergency stop while the separator is still rotating.



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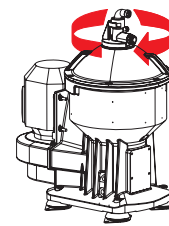
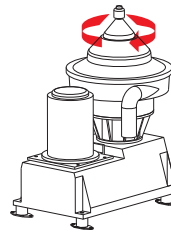
**Disintegration hazard**

Do not start the separator after an emergency stop without first remedying the cause of the emergency.

Make sure that the bowl is clean before restart.

After emergency stop**Entrapment hazard**

Make sure that rotating parts have come to a complete standstill before starting any dismantling work. The rotation indicator lamp, where applicable, must be off.



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**Entrapment hazard**

To avoid accidental start, switch off and lock power supply before starting any dismantling work.

Make sure that separator has come to a complete standstill before starting any dismantling work

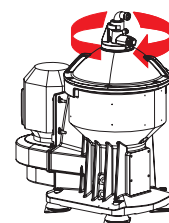
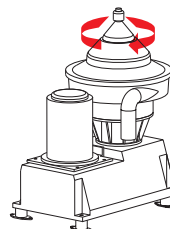
**Disintegration hazard**

Do not start the separator after an emergency stop without first remedying the cause of the emergency.

Make sure that the bowl is clean before restart.

Maintenance**Entrapment hazard**

Make sure that rotating parts have come to a complete standstill before starting any dismantling work. The rotation indicator lamp, where applicable, must be off.



X024764A



Disintegration Hazards

Separator parts that are either missing, worn beyond their safe limits or incorrectly assembled, may cause severe damage or fatal injury.



Burn and Corrode Hazards

Escaping hot and/or corroding process material, which can be hazardous, may still remain in the separator after stop.



Disintegration hazards

Use of imitation spare parts may cause severe damage.



Entrapment hazard

To avoid accidental start, switch off and lock power supply before starting any dismantling work.

Make sure that the separator has come to a complete standstill before starting any dismantling work.



The nut must not be removed before the separator has stopped.



Crush hazard

The top disc can adhere to the bowl hood when lifting. Be careful not to accidentally drop it.

**Risk for eye injury from flying seal ring parts**

The seal ring breaks when removed from the bowl hood.

**Crush hazard**

The distributor and disc stack can adhere to the top disc. Separate them from the top disc so that they do not accidentally drop.

**Cut hazard**

Sharp edges on the separator discs may cause cuts

**Crush hazard**

The ring on the lifting tool must be pushed down against the discharge slide, otherwise the discharge slide may come loose from the tool.

**Crush hazard**

Support the bowl body when turning to prevent it from rolling.

**Crush hazard**

The motor will come off if the screws are unscrewed.

**Crush hazard**

Do not rotate the spindle assembly during lifting.
The spindle assembly may otherwise come loose from the lifting tool.

**Risk for eye injury from flying snap ring**

Use the correct pliers for dismantling of snap ring to avoid accidental release.

**Crush hazard**

If not supported, the motor with coupling will drop when removing the screws.

**Electrical hazard**

If the cables are not disconnected during lifting procedures, they may become damaged.

**Inhalation hazard**

When handling friction blocks/pads wear a mask to avoid inhalation of dust.
DO NOT USE COMPRESSED AIR TO REMOVE DUST. Remove dust using vacuum or a damp cloth.

**Crush hazard**

The centrifugal clutch is heavy and can fall, causing injury, when loosened from the motor shaft.

**Electrical hazard**

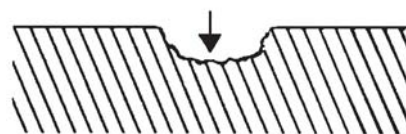
Never wash down a separator with a direct water stream.

Never play a water jet on the motor. Totally enclosed motors can be damaged by direct hosing to the same extent as open motors, resulting in short-circuit and internal corrosion.

**Disintegration hazards**

Always contact your Alfa Laval representative if you suspect that the depth of the corrosion damage exceeds *0.5 mm (0.2 mm for bowl body and bowl hood)* or if cracks have been found. Do not continue to use the separator until it has been inspected and given clearance for operation by Alfa Laval.

Max. 0,2 mm

**Disintegration hazard**

Pits and spots forming a line may indicate cracks beneath the surface.

All forms of cracks are a potential danger and are totally unacceptable.

Replace any part where corrosion can be suspected of affecting its strength or function.

**Disintegration hazard**

All forms of cracks are potentially dangerous as they reduce the strength and functional ability of components.

Always replace a part if cracks are present.

**Disintegration hazard**

Erosion damage weakens parts by reducing the thickness of the material.

Pay special attention to the pillars between the sludge ports in the bowl wall.

Replace parts if erosion is suspected of affecting strength or function.

**Disintegration Hazard**

If the belt pulley must be renewed, check that the new pulley has the correct diameter. An incorrect pulley will cause the separator bowl to run at either an excessive or insufficient speed.

**Burn hazard**

Use protective gloves when handling any heated parts.

**Risk for eye injury from flying snap ring**

Use the correct pliers for assembly of snap ring to avoid accidental release.

**Cut hazard**

Do not put fingers between the frame and air deflector while lowering the assembly.

**Disintegration hazard**

Impact marks may cause the separator to vibrate while running.

**Crush hazard**

The ring on the lifting tool must be pushed home against the discharge slide, otherwise it may come loose from the tool.



The number of discs may have to be increased to adjust the disc stack pressure. Always check before operating the separator.

**Crush hazards**

A falling separator can cause accidents resulting in serious injury and damage.

Never lift the separator by any other method than described in this manual.

**Crush hazards**

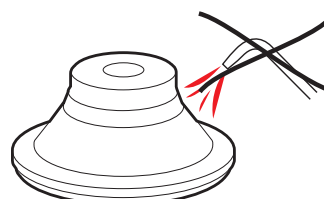
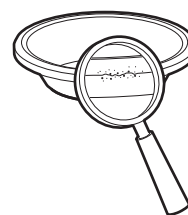
Use correct lifting tools and follow lifting instructions.

**Disintegration hazard**

Separator parts that are either missing, worn beyond their safe limits, or incorrectly assembled, may cause severe damage or fatal injury.

**Disintegration hazard**

Do not weld nor heat parts that are subject to high-speed rotation.

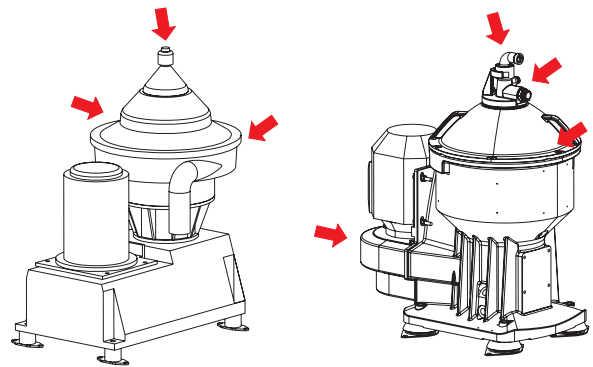


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Separator reassembled**Breakdown hazard**

Assemble the separator completely before restart. All couplings, covers, and guards must be in place and properly tightened. Failure to do so may lead to breakdown.



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Cleaning in place**Health Risk**

Do not forget to disconnect the CIP equipment and re-connect connections.



Use only Alfa Laval recommended CIP liquids.

1.4 Optional Heaters

1.4.1 CBM heaters

**Burn Hazard**

The heater must not be used without the insulated protection cover. This shields the hot surfaces and also acts as a safety cover in the unlikely event of leakage.

**Burn Hazard**

To prevent pressure or heat shocks in the system, adjustment of the flow rate must be carried out slowly. The heater can otherwise be damaged.

**Burn Hazard**

Shut off the oil flow and the heating medium flow before starting maintenance.

**Corrosion Hazard**

Pay strict attention to the safety instructions for the cleaning liquid used.

**Burn Hazard**

Make sure that the relief valve outlet leads into a collecting tank or below floor level.

1.4.2 Electric heaters



Electrocution Risk

Switch off the main power before opening the heater junction box, or dismantling the heater.



It is very important that the correct heater element is installed.

S-separator Flex separation



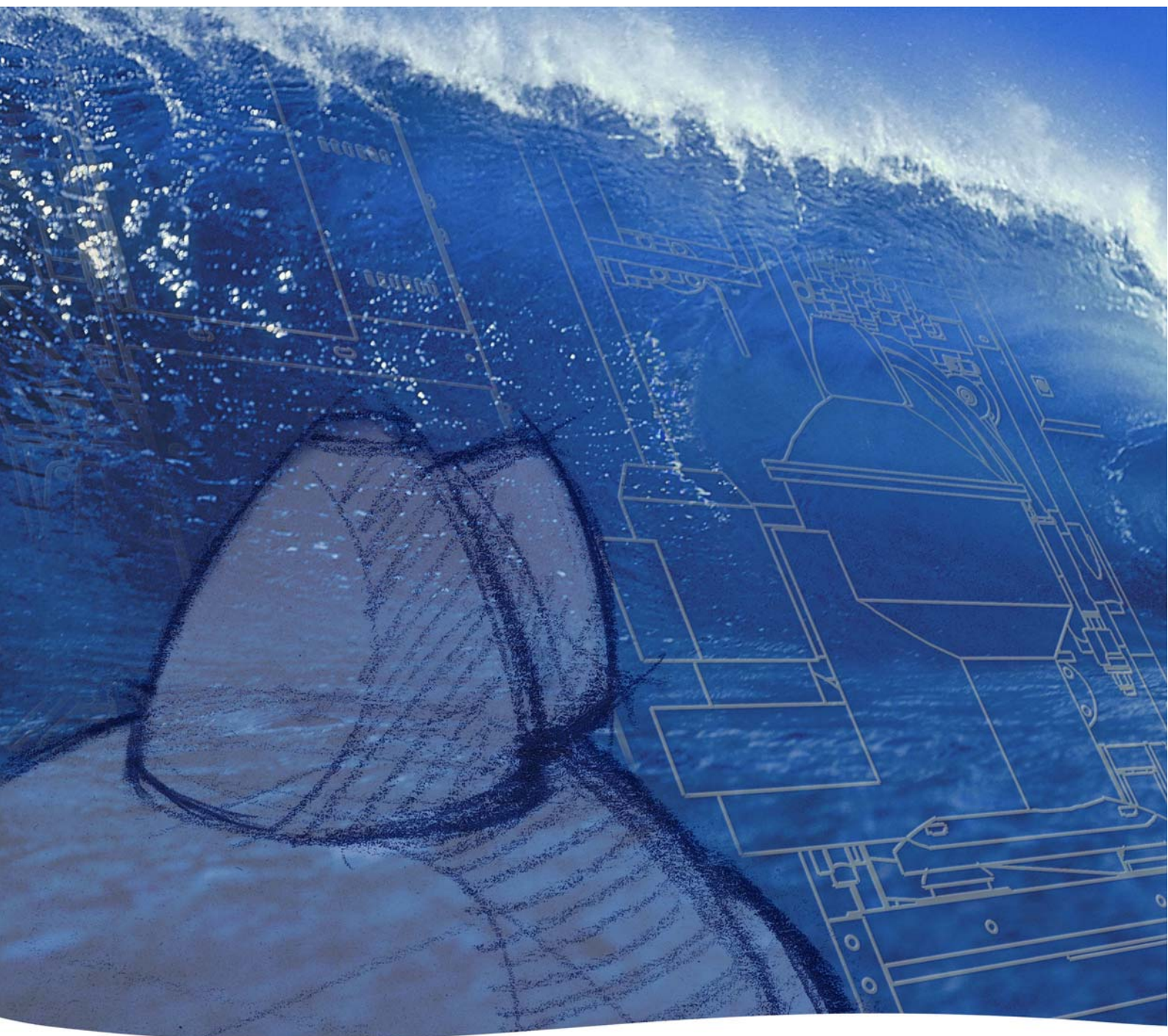
System description

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1 *System Overview*

The S-Type Separation System is designed for cleaning of fuel and lube oils for diesel engines, and fuel oil for gas turbine engines, in marine and power applications.

In the process, heated oil is fed through the separator to clean the oil from solid particles and water.

The basic separation unit comprises:

- A separator.
- Ancillary equipment including control unit.
- Optional equipment such as, butterfly valve, vibration switch, etc.

During the process, the cleaned oil leaves the separator through the oil outlet while separated water and sludge accumulate at the periphery of the rotating separator bowl.

The control unit supervises the entire operation of the separation system, performing monitoring, control, and alarm functions.

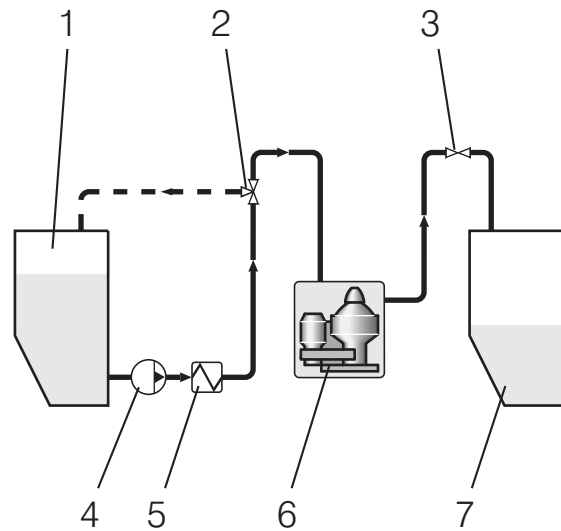
The process adapts automatically to certain changes in conditions, such as increased water content in the unprocessed oil, high or low oil feed temperature, etc.

1.1 Oil Flow

The unprocessed oil is fed through a heater by a feed pump, operating at a constant flow.

A change-over valve directs the oil to the separator. The cleaned oil is pumped from the separator to either the daily service tank (fuel oil), or back to the engine (lube oil).

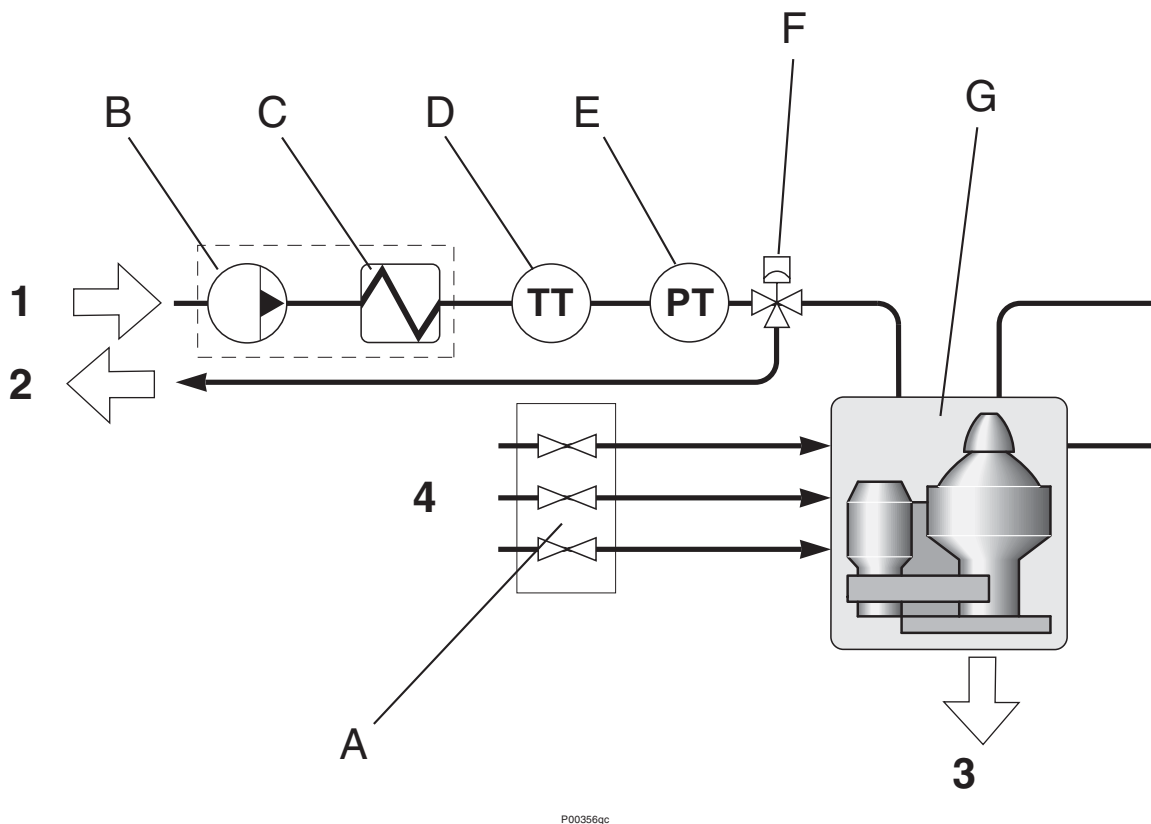
During separator start and stop procedures, during alarm conditions, or if the oil temperature is outside the preset range, the oil is directed by the change-over valve to a return line back to the engine sump or settling tank.



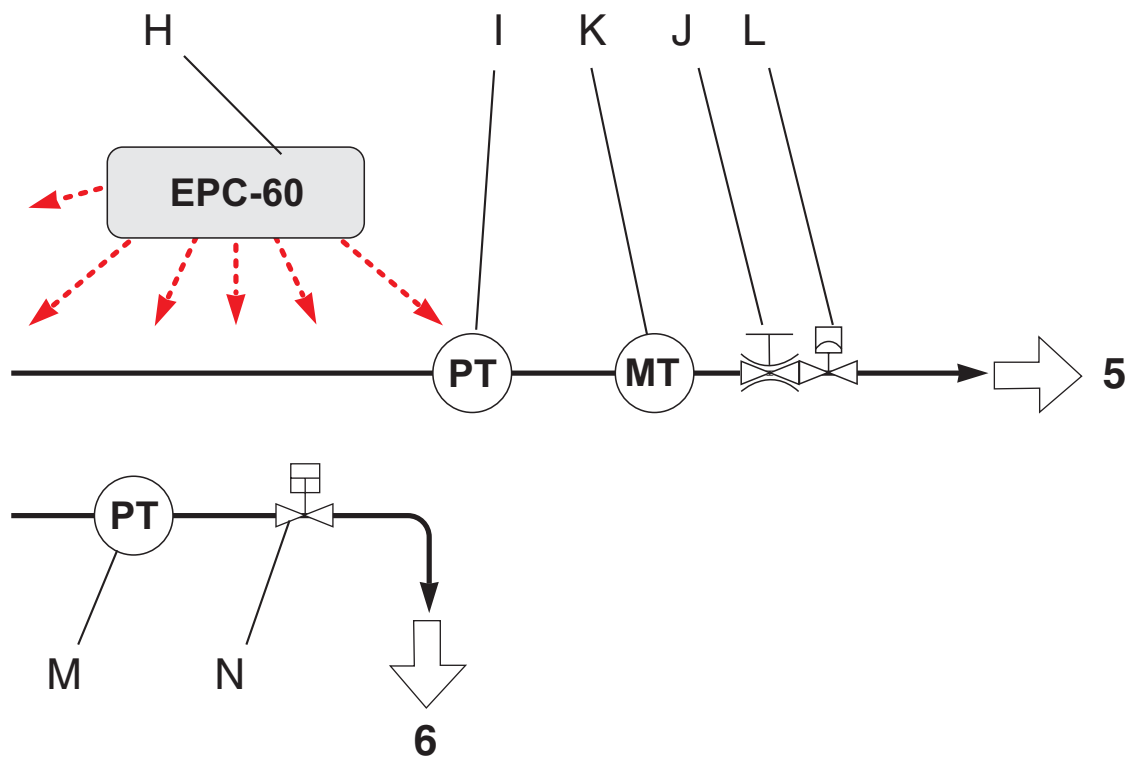
P003714B

1. *Settling tank*
2. *Change-over valve*
3. *Backpressure regulating valve*
4. *Pump*
5. *Heater*
6. *Separator*
7. *Daily service tank*

1.2 System Layout



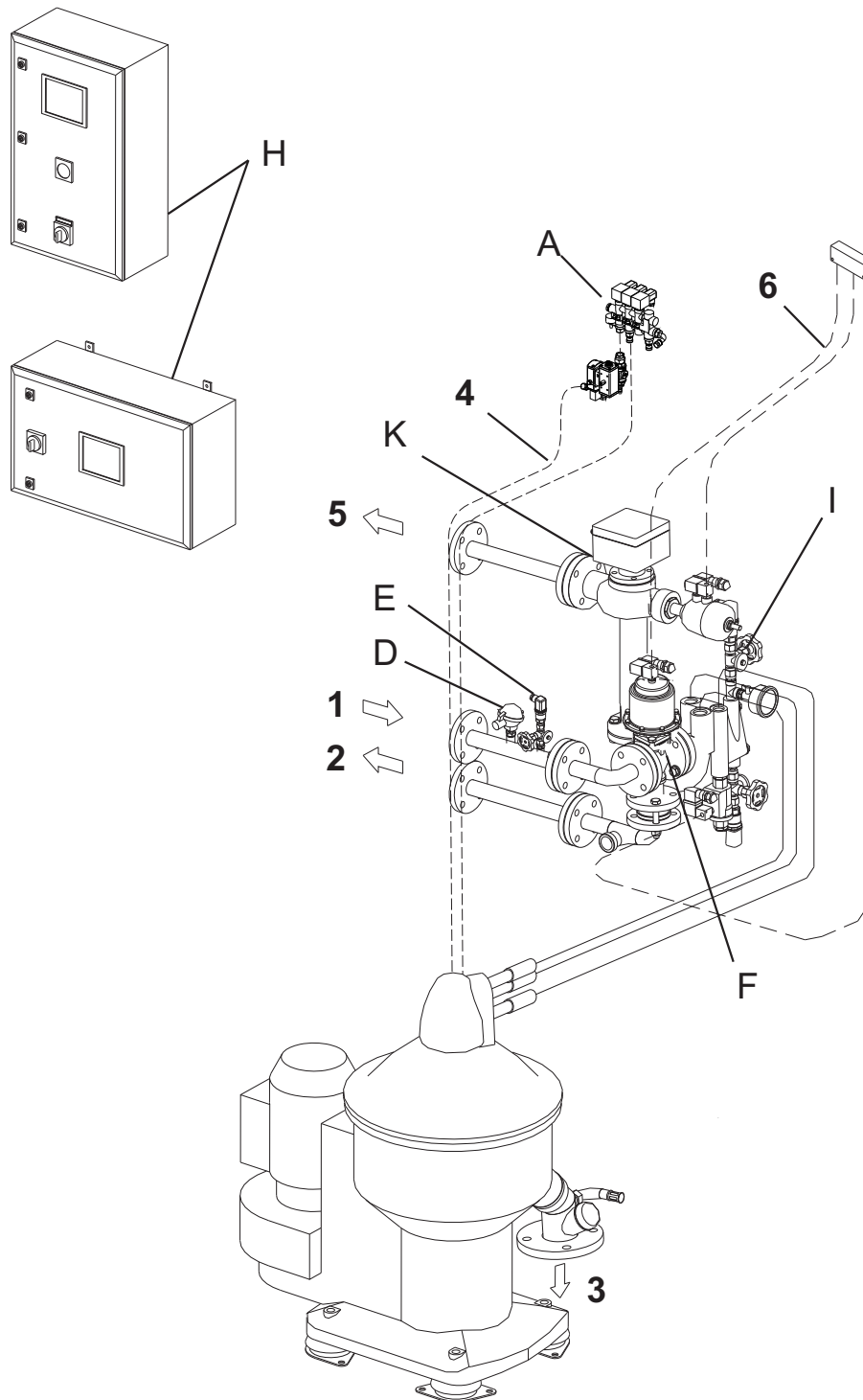
1. Unprocessed oil inlet
 2. Oil return
 3. Sludge outlet
 4. Water inlet
 - A. Solenoid valve block, water : Distributes separator opening/closing water, and conditioning water.
 - B. Feed pump : Feeds unprocessed oil to the separator.
 - C. Heater : Heats unprocessed oil to separation temperature.
 - D. Temperature transmitter (TT1, TT2) : Measures the oil temperature and signals the control unit.
 - E. Pressure transmitter, oil (PT1) : Measures the pressure in the oil inlet, and signals the control unit.
 - F. Pneumatically controlled change-over valve (V1) : Directs the unprocessed oil to the separator, or back to the settling tank (recirculation – fuel oil only).
 - G. Separator : Cleans the oil by removing water and solid particles.
- - - Optional equipment not part of the basic S Flex Separation System



P003566e

- 5. Clean oil outlet to service tank
- 6. Water drain
- H. Control unit : Supervises the separation system.
- I. Pressure transmitter, oil (PT4) : Measures the pressure in the oil outlet, and signals the control unit.
- J. Regulating valve (RV4) : To manually regulate the back-pressure in the clean oil outlet
- K. Water transducer (MT60) : Measures change in water content in the cleaned oil, and signals the control unit.
- L. Pneumatically controlled shut-off valve (V4) : Closes the clean oil outlet.
- M. Pressure transmitter, water (PT5) : Measures the pressure in the water drain outlet, and signals the control unit.
- N. Drain valve (V5) : Opens to drain separated water from the separator.

1.3 System Components



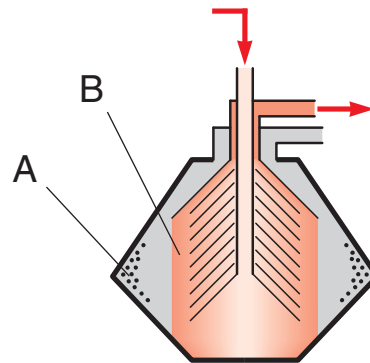
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-
1. Oil inlet	E. Pressure transmitter (PT1)
2. Oil recirculation	F. Change-over valve
3. Sludge and water outlet	H. EPC 60 Control unit
4. Operating water	I. Pressure transmitter (PT4)
5. Clean oil outlet	J. Back pressure valve (RV4)
A. Safety valve SV10A (lube oil only)	K. Water transducer (MT60)
D. Temp transmitter (TT1, TT2)	

2 The Process

2.1 Principle

During the separation process, sludge and water accumulate at the periphery of the separator bowl.

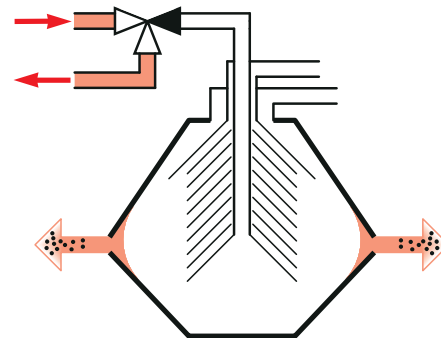


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- A. Sludge and water
- B. Oil

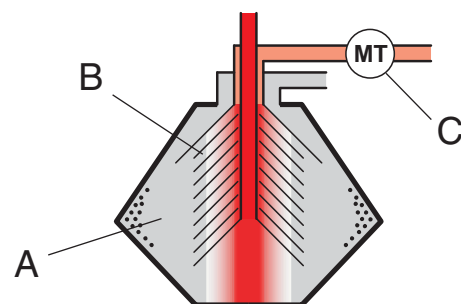
Sludge and water are discharged at preset time intervals. During discharge, the oil inlet is closed.

Excessive water can also be drained from the separator bowl between discharges.



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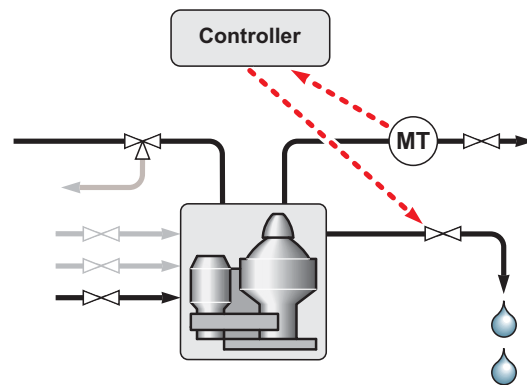
The cleaned oil leaving the separator is tested for traces of water. Any increase in water is detected by the water transducer.



P00356DC

- A. Water
- B. Disc stack
- C. Water transducer

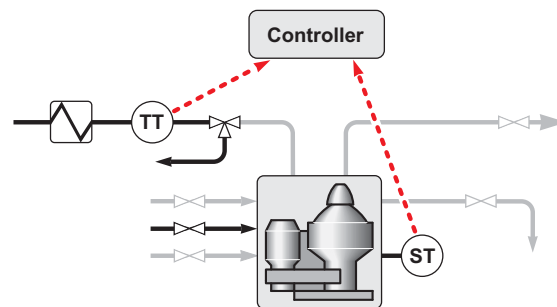
The signal from the water transducer is continuously transmitted to the control unit, in which a reference value is stored. The control unit compares the transducer signal with the reference value. A significant deviation from the reference value will cause draining of water.



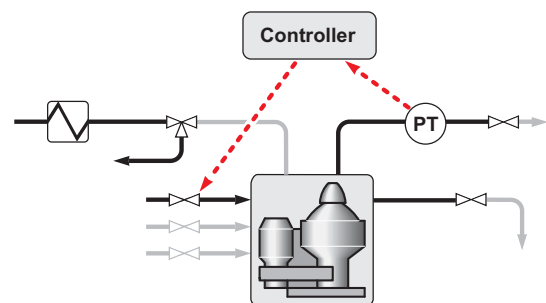
2.2 Process Cycle Start

First the oil pump, separator, and heater are started.

The temperature transmitter (TT) and the speed transmitter (ST) signal the EPC-60 control unit continuously. When the correct separator speed and the correct temperature are reached, a sludge discharge is carried out to ensure the bowl is empty. The control unit then starts the process cycle.

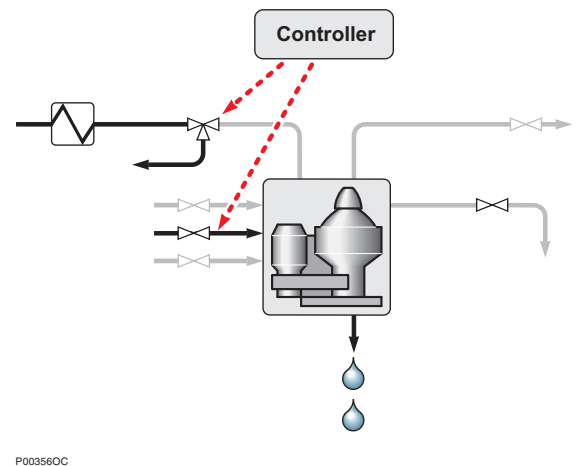


1. The change-over valve directs the oil to the recirculation line. Conditioning water is added to the separator bowl until the pressure sensor in the oil outlet senses pressure and signals the control unit.

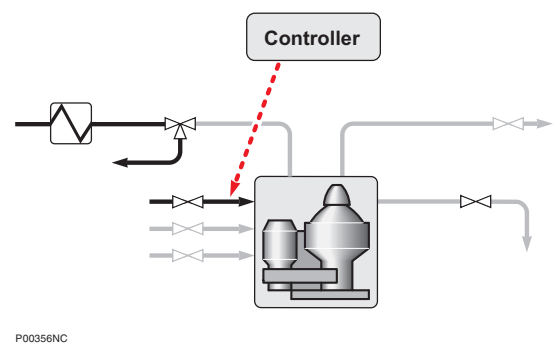


2. The control unit registers the time taken for water addition. This water flow reference value is later used to calculate the correct amount of conditioning water and displacement water to be added.

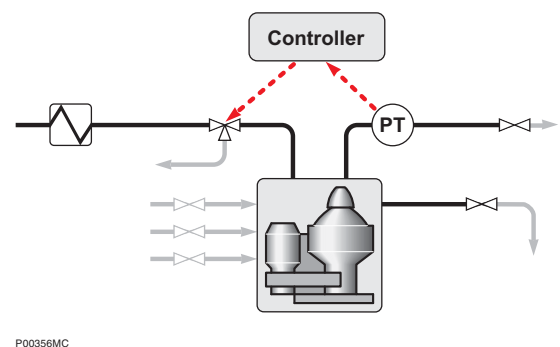
3. The separator discharges.



4. Using the flow rate calculated in paragraph 2 above, the control unit signals the solenoid valve to open so that the correct amount of conditioning water is added to the separator bowl.



5. The change-over valve opens so that oil is directed to the separator bowl. When pressure in the oil outlet is sensed, the pressure sensor (PT) signals the control unit. The control unit calculates and stores the time taken to add oil to the bowl.

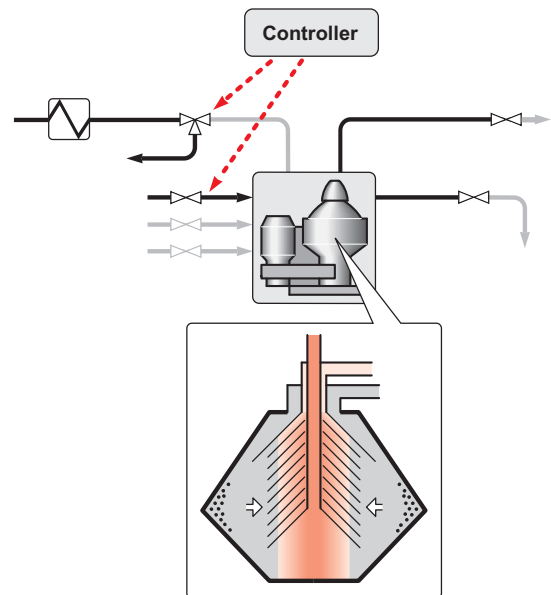


The cleaning process is now running. Unprocessed oil is fed to the separator, and clean oil is pumped from the separator.

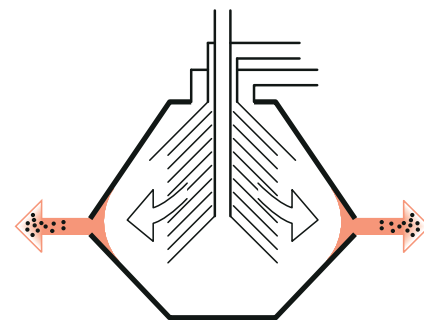
2.3 Discharge

The separator discharges after a preset time has elapsed. The following sequence takes place:

1. The change-over valve changes to oil recirculation.
2. The control unit signals the solenoid valve to open so that displacement water is added to push the oil towards the disc stack.
3. After the time for displacement water addition has elapsed, the separator discharges.
4. Conditioning water is then added, and a new separation cycle begins.



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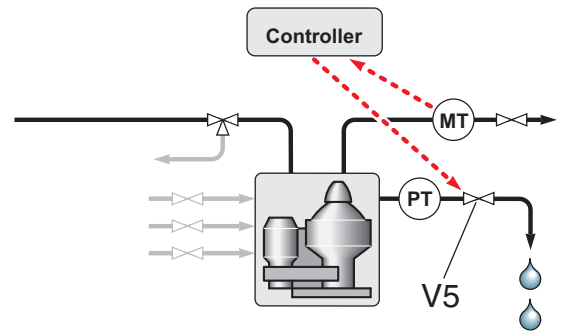


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2.4 Increased Water Content

If the water transducer senses increased water content in the oil, the following takes place:

1. The water drain valve (V5) opens for a number of seconds.
2. The water drain valve closes again, and the transducer signal is evaluated.
3. If there is still an increase in water content, the drain valve opens again. If the water content is still high after the drain valve has opened five times, a discharge is initiated.
4. If the water content has decreased, the separation cycle returns to normal.



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S and P Flex Separation



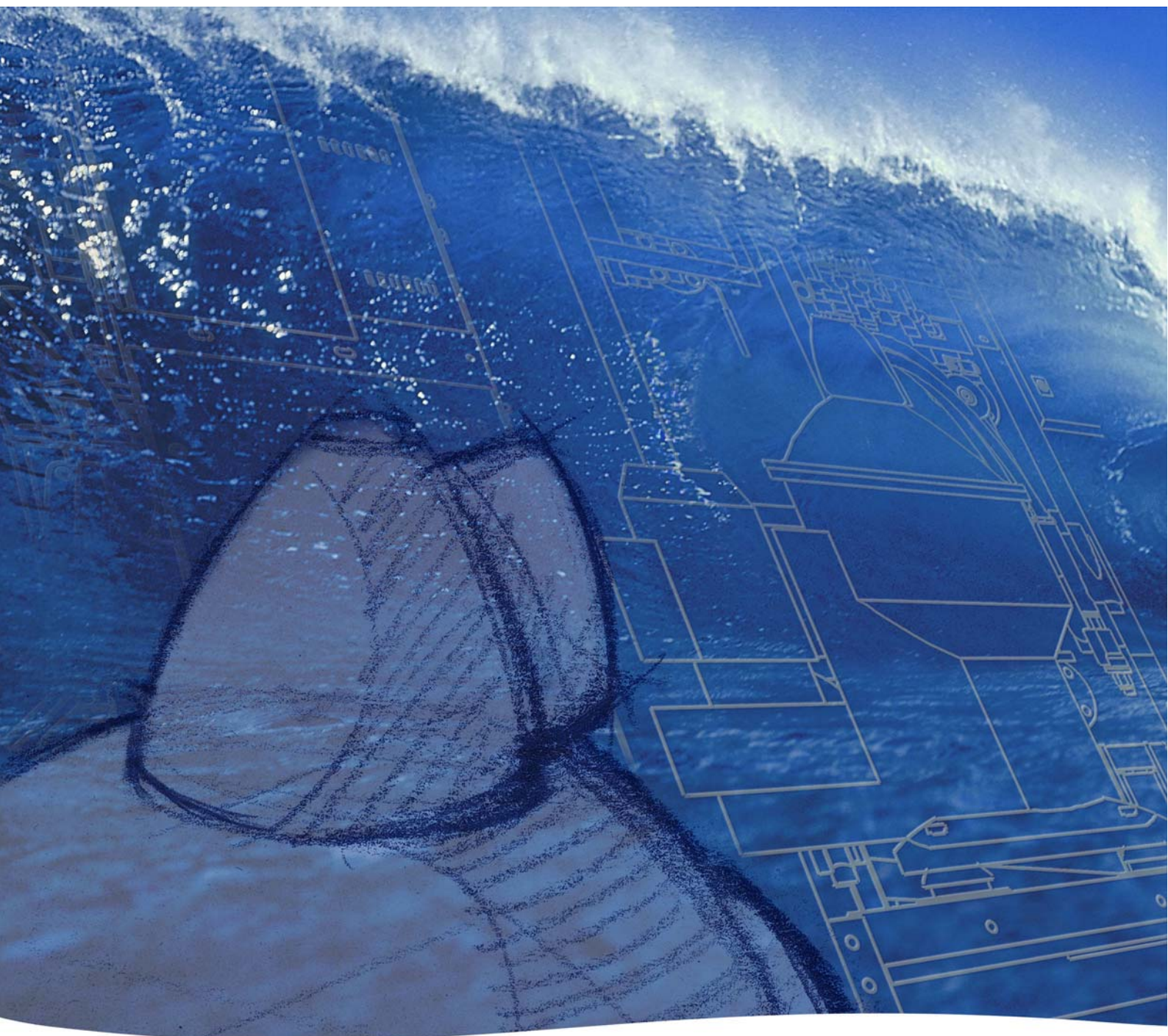
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1 Operating

1.1 Before First Startup

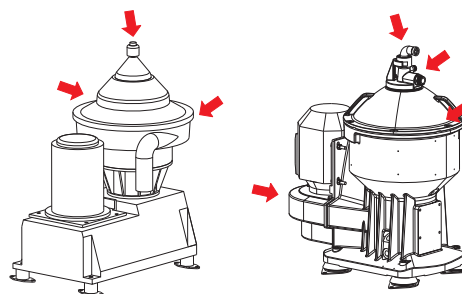
The Control Panel must be configured to suit the system components.

1. Check that the separator is correctly assembled and connected to power supply of correct voltage and frequency. The control panel must be ON.



Breakdown hazard

Assemble the separator completely before start. All couplings, covers and guards must be in place and properly tightened. Failure to do so may lead to breakdown.



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Electrical hazard

Follow local regulations for electrical installation and earthing (grounding).

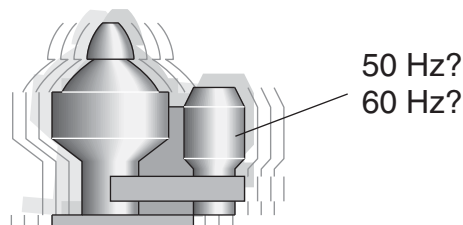


Check that the Emergency Stop Box is properly installed and functioning correctly.



Breakdown hazard

Check that the power frequency is in agreement with the machine plate. If incorrect, resulting overspeed may cause breakdown.



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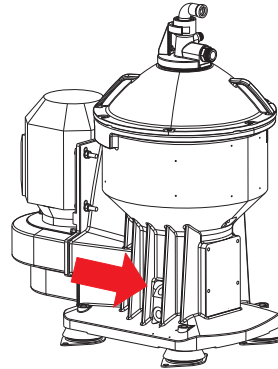


Use the separation system for the purpose, and within the limits, specified by Alfa Laval. Failure to do so could cause a violent breakdown.

2. Check the oil sump level. If necessary, top up until oil starts to run from the oil-filling hole.



Too much or too little oil can damage the separator bearings.



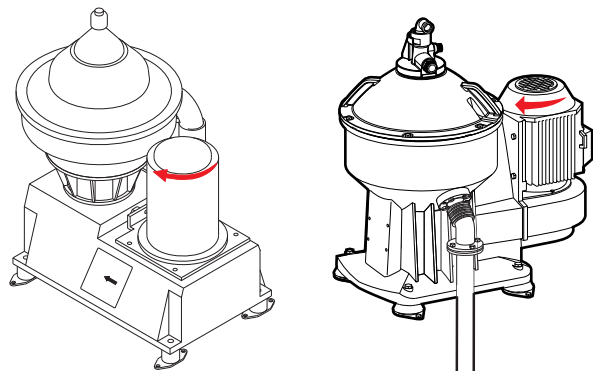
X024762A

Rotation Direction

Check the rotation of the bowl using the I/O test function. See [1.16 I/O Test Function on page 47](#). The motor fan must rotate in a clockwise direction.



If power cable polarity has been reversed, the separator will rotate in reverse, and vital rotating parts can loosen.



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Operating Air Pressure

Check that the air supply is correct (500 – 800 kPa or 5 – 8 Bar).

Operating Water Pressure

Check that the operating water pressure is sufficient (200 – 800 kPa or 2 – 8 Bar).

NOTE

The LEDs on the water block and connectors indicate that the valve has power on. They do not indicate if the valve is clogged (an alarm is given if this is the case).

Emergency Stop Push Box

Check that the Emergency Stop Box is located close to the separator system and electrically connected to the Control Panel

NOTE

If the Emergency Stop Box is not connected, the system will not start.

1.2 Control Panel

To start the Control Panel, switch on the main power switch on the control cabinet.

General

The Control Panel has three main lists.

- Operation
- Alarms
- Setting

Operation List

To access the Operation List at any time during the operation process press the 'Return button' repeatedly until the Operation List is reached.

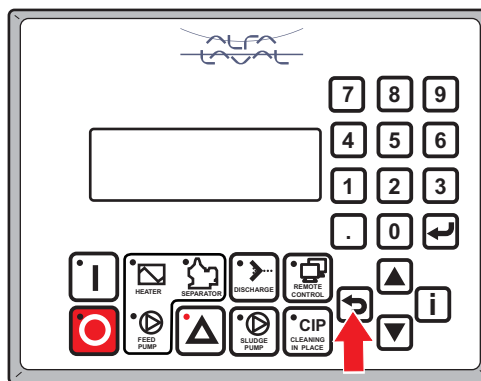
The list gives information on the following where installed:

- Feed Flow
- Time to discharge, min
- Speed (SS), rpm
- Pressure (PT1, PT4, PT5)
- Temperature (TT1, TT2)
- Vibration (VIB)
- Transducer value

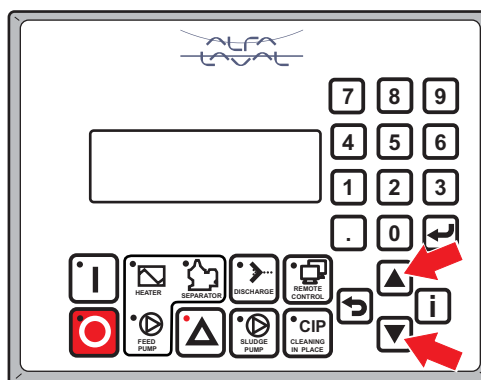
Press the arrow buttons to go up or down in the list.

NOTE

During operation, the 'Operation' list is active on the display. The present stage of operation, for example 'SEPARATION', shows on display together with operating information such as present temperature. Press the downward 'Arrow' button to go down the list.



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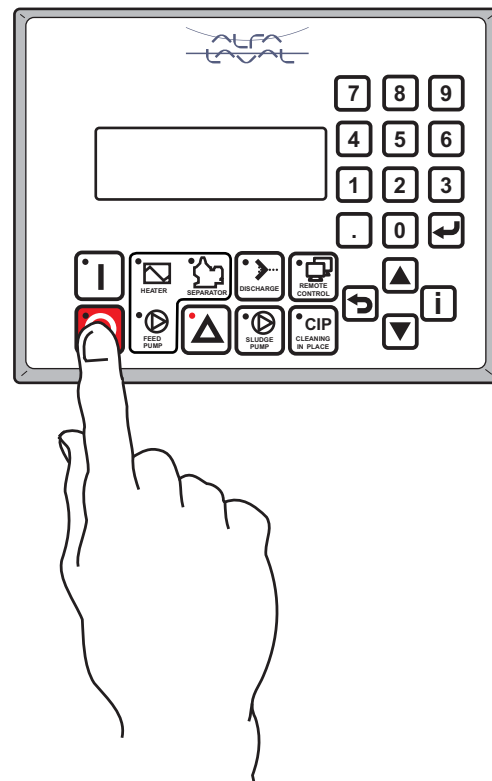


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For further information regarding alarms, see the *Alarms and Fault Finding* booklet.

For further information regarding parameters, see the *Parameter List* booklet

At any time during operation, the operator can initiate a STOP sequence by pressing the 'Stop' button.



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NOTE

If control panel black screen appear.
See "Alarms & Fault finding" manual.

1.3 Manual Start from Standstill

Press the 'Start' button. The operator can select to start the system manually by setting parameter P130 to 'stepwise'.

NOTE

First start-up is always manual and not dependant on P130 setting.

A rotation test must be carried out using the I/O test function prior to first start-up.

NOTE

First start-up after power off should always be carried out manually!

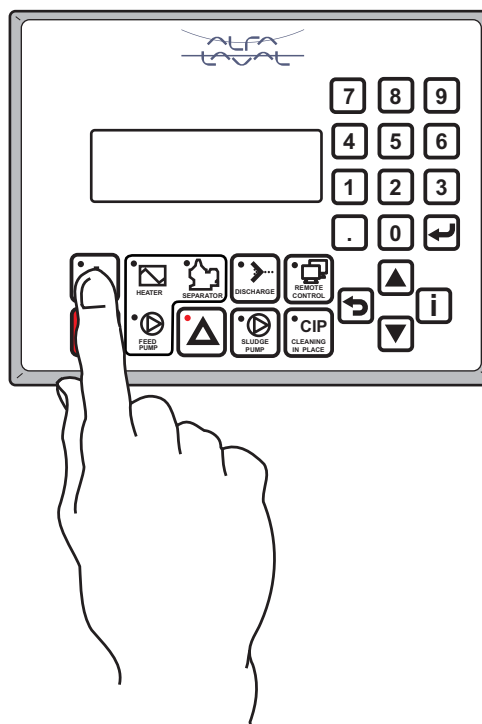
NOTE

If a butterfly valve is installed, it must be opened manually before that the system can start.

CAUTION

If power cable polarity has been reversed, the separator will rotate in reverse, and vital rotating parts can loosen.

If speed sensor, vibration sensor, and frame cover switch are installed (P113, P114, and P115 = yes), the operator can select to start the system automatically by setting parameter P130 to 'automatic'.

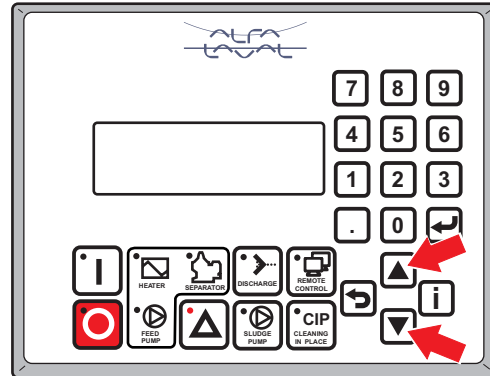


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If the power has been off and/or the separator bowl cover has been removed a number of questions which have to be answered before the system can be started are shown on the display:

'Has the bowl been dismantled? YES, NO'
(S-type separator only)

Use the 'arrow' buttons to move to the alternative you want.



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When the alternative you want is blinking, press the 'Enter' button.

1. If the bowl has been dismantled choose 'YES' Manual start only is possible. If no work has been carried out on the bowl, choose 'NO'. For S-type separators 'Proceed without calibration' appears on the display. Stepwise/automatic start is possible (set using parameter P 130). For P-type separators the system then goes to Standstill.



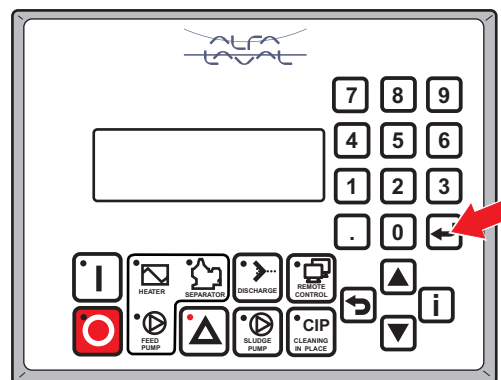
If this is the first start, answer 'YES'.

'Assembled according to manual? YES, NO'

2. If the bowl has been dismantled and assembled according to the instructions in the *Service Manual*, choose 'YES'. (If 'NO' is chosen, the system goes to 'STANDSTILL').

'Bowl cleaned? YES, NO'
(S-type separator only)

3. If the bowl has been cleaned choose 'YES'. 'Proceed with calibration' appears on the display. Local manual start only possible. If the bowl has not been cleaned, choose 'NO'. 'Proceed without calibration' appears on the display. Stepwise/automatic start is possible (set using parameter P 130).



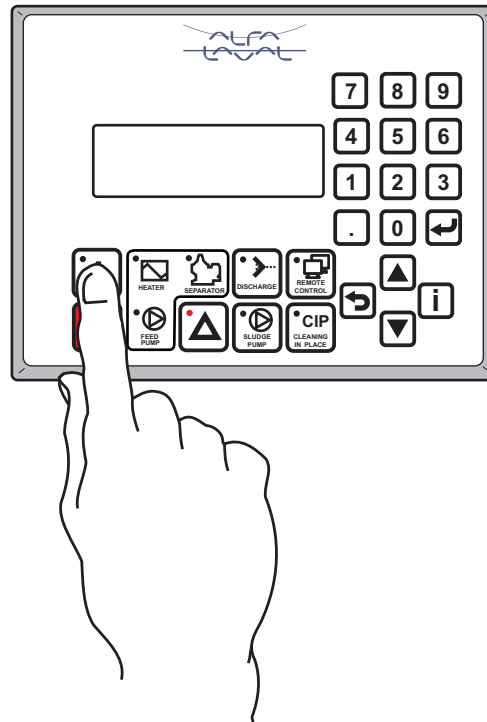
X023913A

Start

1. The feed pump (if installed) starts.

The LED on the start button flashes, the LED for the feed pump lights, and text 'Starting feed pump' shows on the display.

The start button LED shines steadily and the display shows either 'To start heater, press start button', or 'To start separator, press start button'.



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2. Press the start button a second time.

The heater (if installed) starts.

The LED on the start button flashes, the LED for the heater lights, and text “Starting heater” shows on the display.

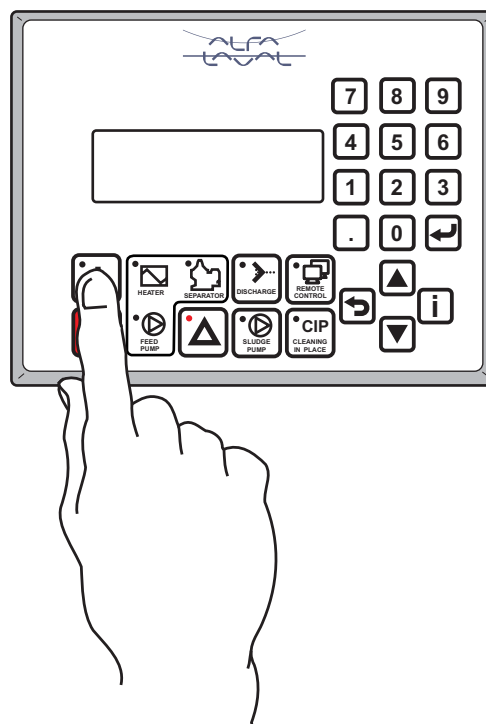
Wait for increasing temperature.

Cold Start Function

If the viscosity of the oil is high (low temperature), a smooth heater start-up is preferred. The temperature up to which the cold-start gain factor P126 is active is set in parameter P125. Above this temperature the normal P-constant P123 is used.

If the temperature has not reached the value in parameters P184 (HFO/LO low temperature limit) within the time specified in parameter P169 (alarm delay), alarm ‘A24 Temperature increase too slow’ will show on the display.

If the temperature feedback is correct (reading on temperature sensor TT1 above value in parameter P184), the start button LED shines steadily and the display shows ‘To start separator, press start button’.



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3. Press the start button a third time.

The separator motor starts.

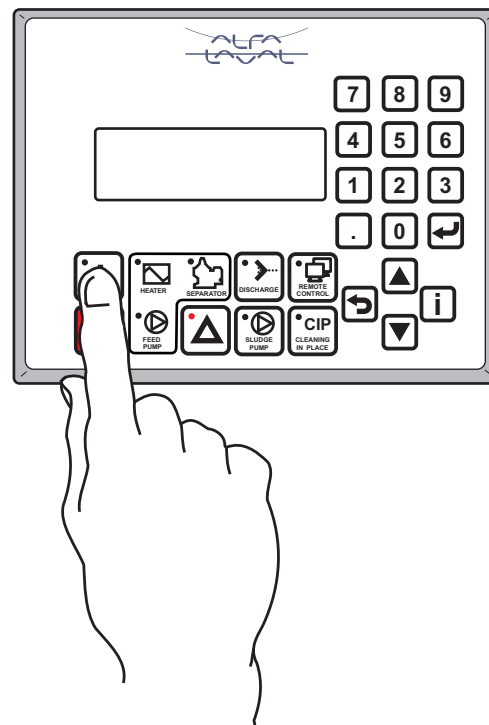
The LED on the start button flashes, the LED for the separator lights, and text 'Starting separator' shows on the display.

Wait for speed feedback (if speed sensor installed), or until the separator max. start time (4 minutes) has elapsed.

If the speed has not increased to over 90 rpm within 10 seconds after contactor K2 response, alarm 'A96 Slow start acceleration' shows on the display.

If the low speed limit value in parameter P180 has not been reached before the separator max. start time has elapsed, alarm 'A95 Separator motor run-up time too long' shows on the display.

If the separator is running above the low speed limit, the start button LED shines steadily, and the display shows the heading 'RECIRCULATION' and text 'To start separation, press start button'.



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4. Press the start button a fourth time.

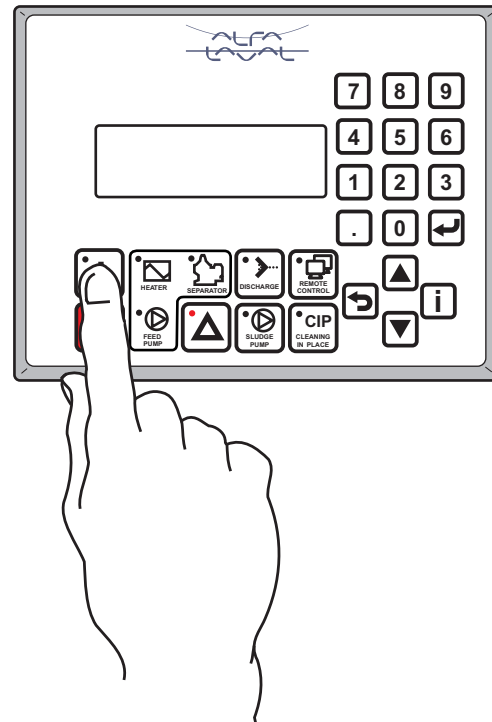
If the feed temperature is below the value in P184, the controller stays in RECIRCULATION mode. The LED on the start button flashes, and text 'Waiting in RECIRCULATION for separation temperature' shows on the display.

If the correct feed temperature is reached, the controller changes automatically to SEPARATION mode via a transition sequence which is shown on the display. The start button LED shines steadily, and the display shows the heading 'TRANSITION'.

If speed sensor not installed (P113 = no) or disabled (P148 = 0), change over to RECIRCULATION/SEPARATION takes place when the separator max. start time has elapsed.

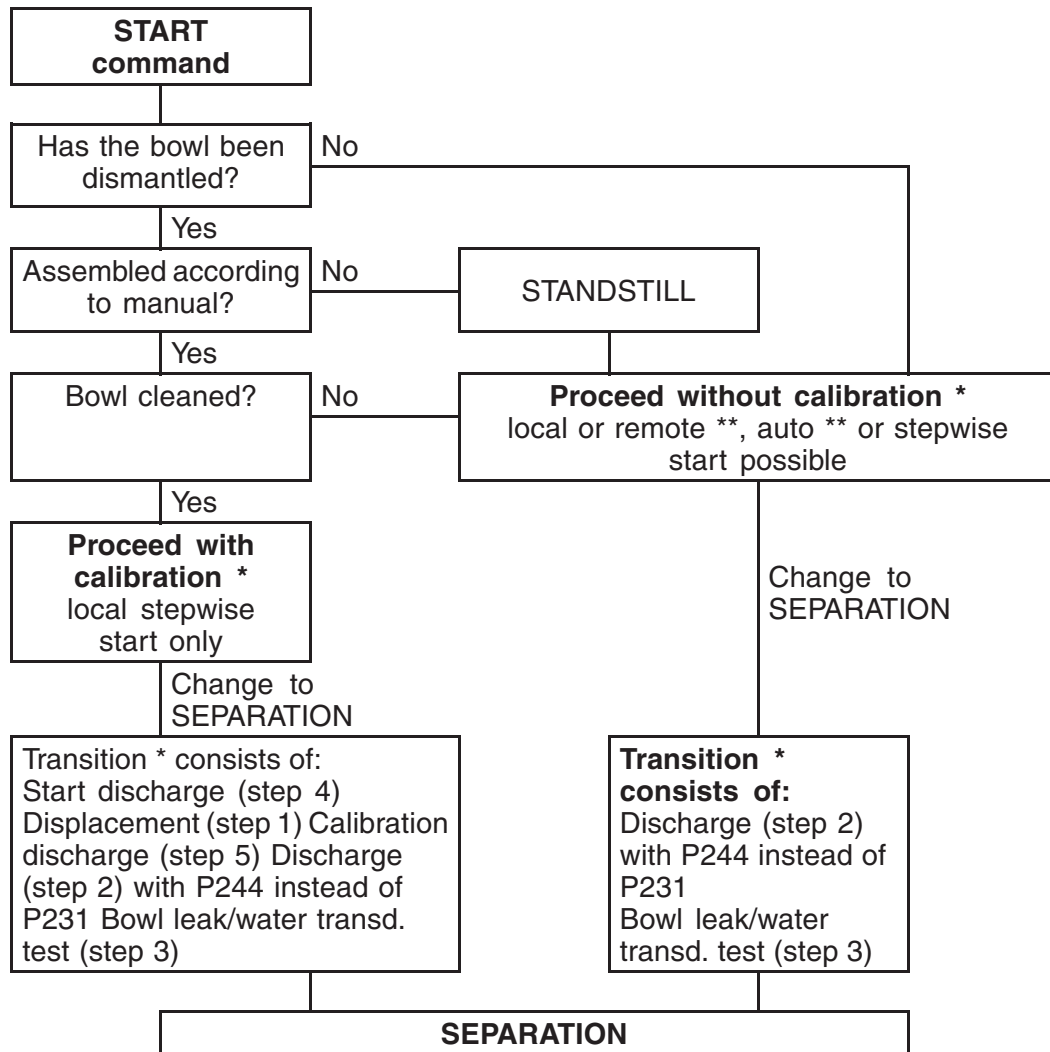


The time in 'RECIRCULATION' is limited by timer P178 to avoid overheating of the separator.

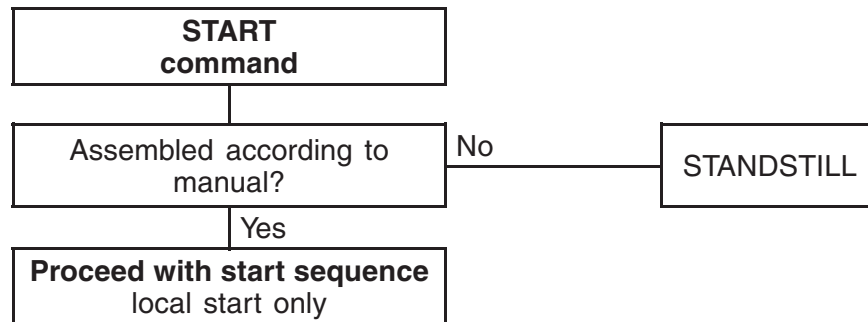


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Start S-type separator start sequence



Start P-type separator start sequence



1.4 Automatic Start from Standstill

The operator can select to start the system automatically by setting parameter P130 to 'automatic'.

The control panel automatically goes through the same procedure as described under *Manual Start from Standstill*.

If the bowl has not been dismantled or cleaned, the previously calculated filling time (parameter P233) is used, a discharge sequence and a bowl leakage/water transducer test are run, and the system goes into SEPARATION mode.

The following equipment must be installed for automatic start:

- Vibration monitor
- Speed sensor
- Frame cover switch

1.5 During Separation

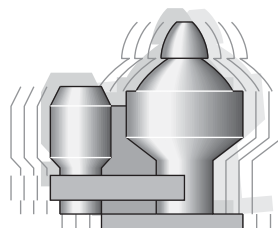
Observe information on the control panel display. The times in each sequence are shown in the bottom left-hand corner of the display



Breakdown hazard

If strong vibration occurs, press the emergency stop button and evacuate the room.

Never discharge a vibrating separator. Vibration may then become violent and result in breakdown.



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Noise hazard

Use ear protection if noise levels are high.



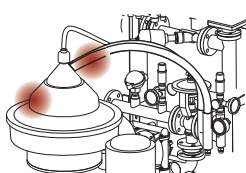
Breakdown hazard

Never reset an alarm without first finding and remedying the cause.

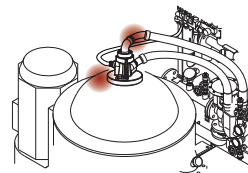


Burn hazard

Avoid contact with hot surfaces. Process pipes, various machine surfaces, and processed liquid can be hot and cause burns.



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Slip hazard

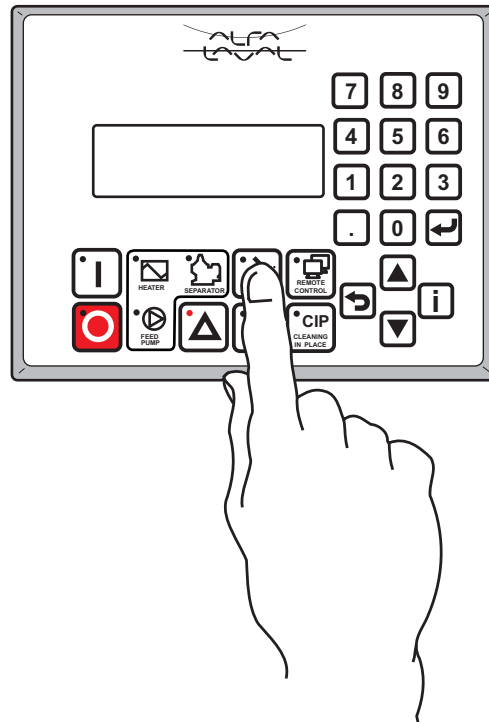
Check all connections for leakage.

Oil leakage may make the floor slippery.

1 Operating

Discharge sequences run automatically at preset intervals (timer P220).

Discharge sequence can also be run manually by pressing the 'Discharge' button.

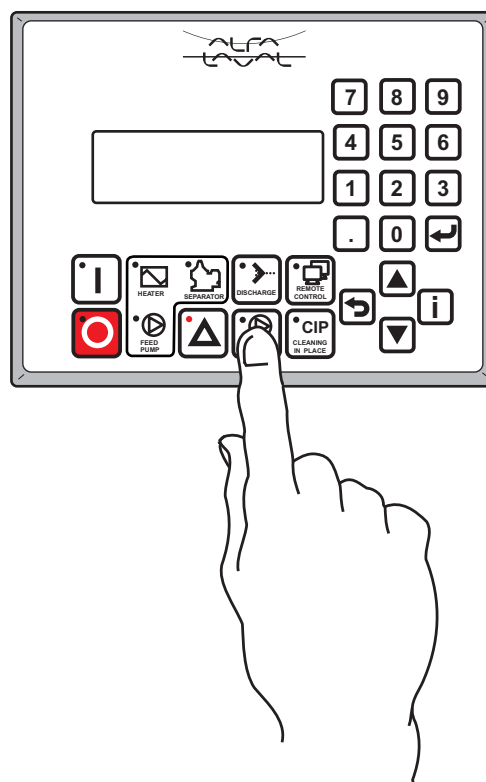


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The Sludge Pump runs during discharge or when there is high level in the sludge tank, or can be started manually by pressing the 'Sludge Pump' button on the control panel.

NOTE

Do not run the sludge pump longer than necessary. If the pump is run while dry it can be damaged.



X023922A

In SEPARATION mode, the feed pump is running, the feed has reached separation temperature (the heater is working) and the separator is running at full speed.

Feed valve V1 is open to the separator inlet.

1.6 Stop



Breakdown hazard

Stop the separator by means of the control unit, and not by turning off the power.



Never attempt to clean the bowl by manual discharge in connection with stop.

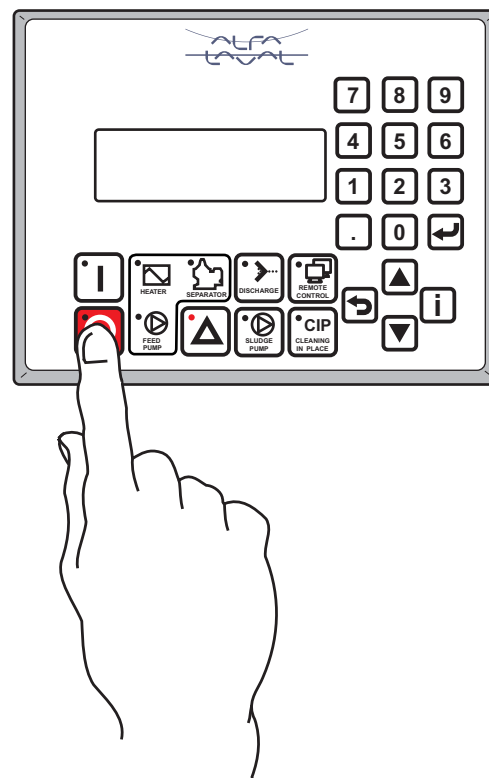
To stop the system:

The operator can stop the system when in the 'START', RECIRCULATION', or 'SEPARATION' modes.

1. Stop the system by pushing the 'Stop' button on the control panel. The following sequence takes place:
 - A stop discharge and flushing sequence are initiated (does not apply to stop from 'START').



Filling and flushing are not performed if the discharge feedback has not been received



X023920A

- The separator motor is turned off and the stop timer starts running. At the same time, the heater is turned off (see [1.13.4 Heater shut down on page 42](#)). The system waits for the feed temperature and speed to decrease.
- If the speed limit in P180 (low speed limit) is not reached within 3 minutes, alarm 'A94 Bowl speed high during STOP' is given.
- When the bowl speed has reached 4000 rpm, closing water valve SV16 is activated for 1 second in order to keep the bowl closed.
- If speed sensor not installed (P113 = no) or disabled (P148 = 0), SV16 opens for 1 second 5 minutes after the separator motor has been turned off.
- When 3 minutes has elapsed, the feed pump is turned off.
- The system waits for the speed sensor (if installed) to indicate zero speed. When the bowl has been still for 60 seconds, 'STAND STILL' shows on the display.
- If speed sensor not installed (P113 = no) or disabled (P148 = 0), 'STAND STILL' is shown when the stop timer has elapsed.
- The sludge pump runs for 10 seconds after STAND STILL is reached if stopped from SEPARATION mode or RECIRCULATION mode.
- All equipment except the sludge pump (which can still be run manually) is now deactivated.

NOTE

If the system is switched off, it can in most cases be switched on again without waiting for the separator to slow down. See [1.3 Manual Start from Standstill on page 10](#), and the *Alarms and Fault Finding* booklet.

WARNING

Breakdown hazard

The system must not be restarted with the separator rotating if high vibration alarm has been given.

1.7 Emergency Stop

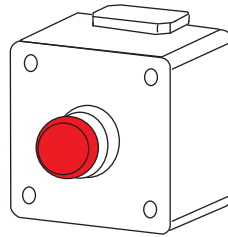


Disintegration hazard

If an emergency situation or unusually strong vibration occurs, press the Emergency Stop button and evacuate the room.

If oil spray, feed pump is stopped by emergency stop button.

Do not enter the room after an emergency stop while the separator is still rotating.



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The following sequence occurs:

- The power to heater pump and separator motor is shut-down immediately.
- Stop timer starts.
- If a steam heater is installed, the steam shutoff valve is forced to close.
- Closing water valve SV16 opens for 15 seconds.
SV10 is open for 15 seconds if the speed is supervised and the speed is over P255, or if there is no speed supervision.
- All other equipment is deactivated.



In order to be able to restart, the system must be at standstill.

1.8 After Emergency Stop

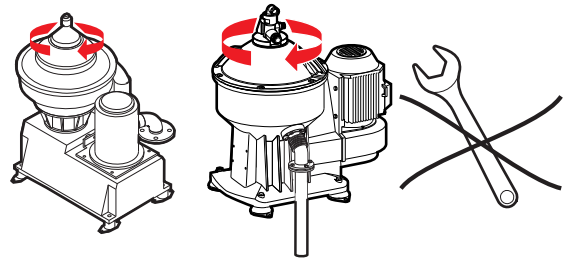
Separator standstill

Dismantling work must not be started before all rotating parts have come to a complete standstill.



Entrapment hazard

Make sure that rotating parts have come to a complete standstill before starting any dismantling work. The rotation indicator lamp, where applicable, must be off.



I00293CD

Avoid accidental start



Entrapment hazard

To avoid accidental start, switch off and lock power supply before starting any dismantling work. Make sure that separator has come to a complete standstill before starting any dismantling work.

Remedy the cause

The cause of the emergency must be remedied before attempting to restart the separator. If the cause is not found, an overhaul must be performed on the separator, and all moving parts thoroughly checked.



Disintegration hazard

Do not start the separator after an emergency stop without first remedying the cause of the emergency. Make sure that the bowl is clean before restart.

Separator reassembled

The separator must be fully reassembled with all covers and guards in place and tightened before unlocking the power supply and starting the system.



Breakdown hazard

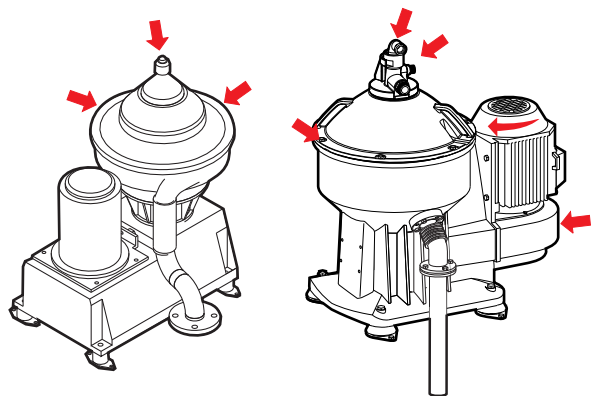
Assemble the separator completely before restart. All couplings, covers, and guards must be in place and properly tightened. Failure to do so may lead to breakdown.



Check that the Emergency Stop Box is properly installed and functioning correctly.



Check that all ancillary equipment, in particular the heater, is functioning correctly.



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1.9 Separator Emergency Operation

If the Control System has a total failure, the Separator and Feed Pump can be run manually. Jumpers or pushbuttons can be connected between terminals X1:113 - 114 (for separator) and X1:115 - 116 (for feed pump). Separator and Feed Pump will start immediately when these terminals are bridged, but can be stopped with the Emergency Stop pushbutton.

NOTE

- No supervision of the separator is performed, as the Control System is deactivated.
- The system must be manually supervised by trained operator when running.
- All actions must be performed by trained operator, such as closing bowl, discharge, sludge pump running and it is done on the manual actuators on the valves.

1.10 Cleaning In Place

The use of Cleaning In Place (CIP) equipment is recommended for best separation results. For further information on the CIP equipment, see the CIP booklet, bookno. 1817261.

1.10.1 CIP Start

CIP can be selected from STAND STILL only, and only from a local control panel.

Press the CIP button to select CIP.

NOTE

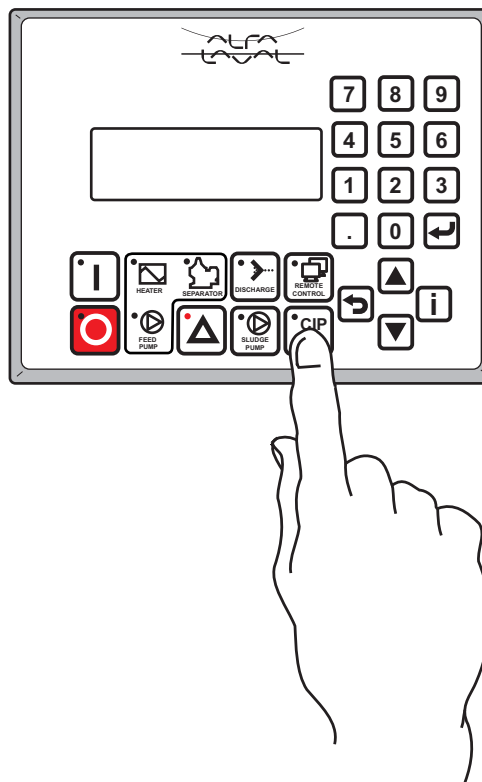
During CIP the separator is running at full speed, but feed pump, heater, process valves, temperature and pressure supervision and water transducer MT60 are neither controlled nor supervised.

CAUTION

Avoid accidental start of feed pump

To avoid accidental start, switch off and lock power supply for feed pump.

Leakage of Hot oil may occur if feed pump is accidentally started.



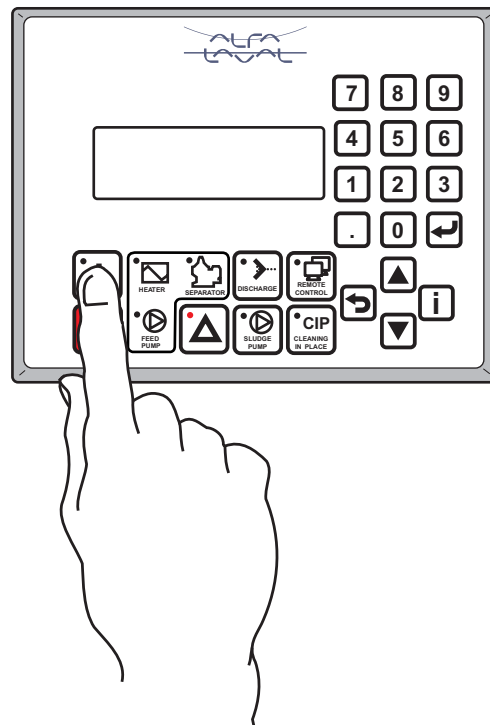
X023921A

Connect hoses for CIP liquid before pressing “start” button.

With CIP selected from STAND STILL, press the ‘START’ button to start the separator motor. The motor starts unless the system prevents start, or alarms are active.

Wait for speed feedback.

- Speed has to increase to above 90 rpm within 10 seconds after contactor K2 response, otherwise alarm ‘A96 Slow start acceleration’ will be shown on the display.
- Speed limit in parameter P180 has to be reached within 4 minutes, otherwise alarm ‘A95 Separator motor run-up time too long’ will be shown on the display.
- When the separator is running above low speed limit (P180), or 4 minutes has elapsed if speed sensor not installed (P113 = no) or disabled (P148 = 0), a message to start the cleaning liquid supply is given to the operator.



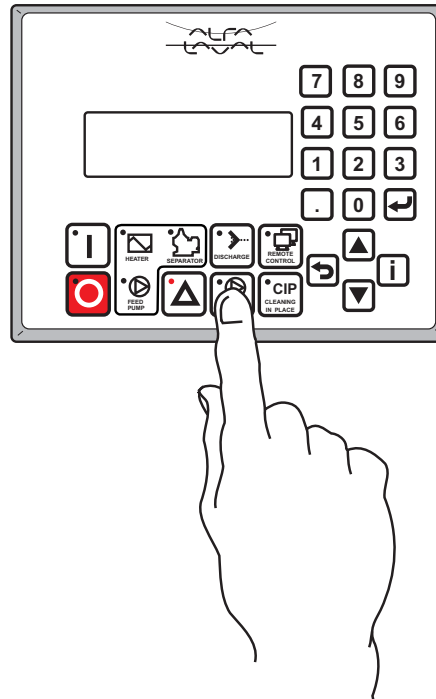
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1.10.2 CIP Running

NOTE

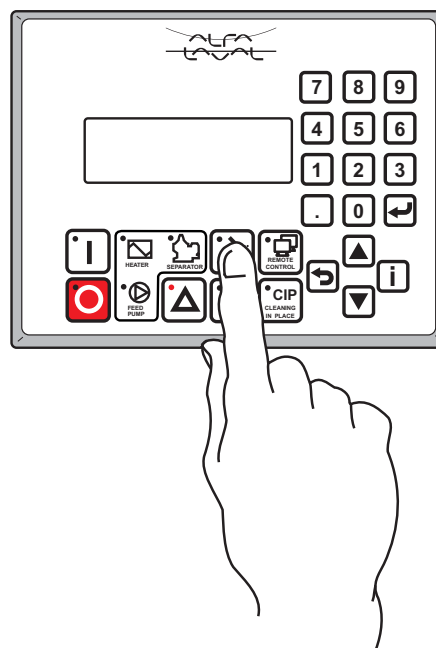
When the bowl has reached normal speed, a bowl closing procedure will be performed.

While the CIP system is running, closing water valve SV16 opens for 2 seconds and closes for the time set in parameter P228 (pulse interval) repeatedly. The sludge pump runs when there is high level in the sludge tank or when activated by pressing the 'SLUDGE PUMP' button on the control panel.



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A discharge can be activated manually during the CIP process by pressing the 'DISCHARGE' button on the control panel.

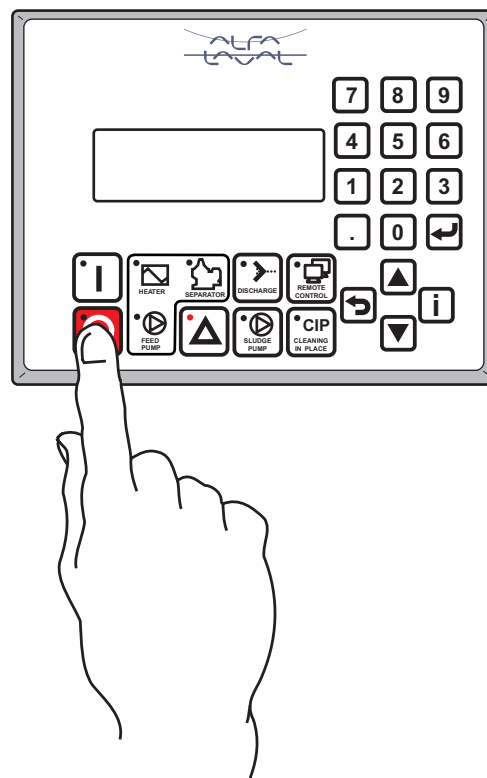


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1.10.3 CIP Stop

Stop the CIP process by pressing the 'Stop' button on the control panel. The CIP process can be restarted.

- The separator motor is turned off. Alarm delay (3 minutes) starts, and stop timer starts. If the speed limit in parameter P180 (alarm limit bowl speed low) is not reached within 3 minutes, alarm 'A9 Bowl speed high during STOP' is given.
- When the bowl speed has reached 4000 rpm, closing water valve SV16 is activated for 1 second in order to keep the bowl closed.
- If there is no speed sensor installed (parameter P113 = no) or disabled (parameter P148 = 0), SV16 opens for 1 second 5 minutes after the separator motor has been turned off.
- The system waits for the speed sensor (if installed) to indicate zero speed. When the bowl has been still for 60 seconds, 'STAND STILL' shows on the display.
- If there is no speed sensor installed (parameter P113 = no) or if speed sensor disabled (parameter P148 = 0), 'STAND STILL' is shown when stop timer has elapsed.
- If the bowl speed has been above P180, or the start timer has elapsed, the sludge pump runs for 10 seconds after 'STANDSTILL'.
- Hold the 'CIP' button pressed for 5 seconds to leave CIP mode.



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After cleaning:

1. Open the heater drain valve until the flushing water has drained.
2. Close the drain valve.
3. Remove the CIP connections.
4. Return the turnable connections to their former positions and re-tighten.
5. Re-open the valves before and after the heater.



Health Risk

Do not forget to disconnect the CIP equipment and re-connect the process connections.

1.11 Check if separator bowl is clogged

Valid for Purifiers (not Alcap or Clarifiers)

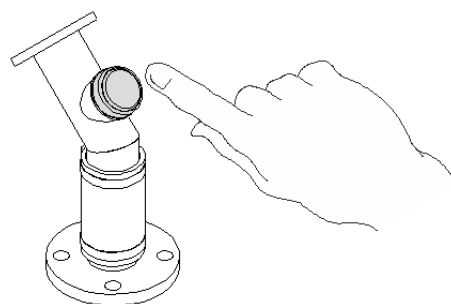
Purifiers have no automatic indication if the bowl is clogged or filled with too much solids.

Recommendation is to check each Bunker analyze report and determine if there is any risk for a higher than normal sludge production.

The time between each sludge discharge should then be reduced accordingly.

From time to time , and especially when a new Bunker is introduced ,it is advisable to do as follows :

- Introduce water into the bowl by open manually the SV10 solenoid valve , on the Operating Water Block.
- Check that this water is coming out from the bowl by unscrewing the Inspection Plug on the sludge pipe.
Please however ,make sure that the machine is not about to make a discharge!
Splash hazard.



X027007A

If water is seen flowing in the pipe, turn off SV10 and keep operating as before.
The bowl is not clogged.

If no water is seen , then the bowl is clogged.
Make a discharge.

If still the water is not seen in the Inspection plug ,turn off SV 10 and shut down the Purifier system.

Open and clean up the bowl.

NOTE

By opening the Inspection Plug without adding any water , it can also be verified that no small oil leakage is escaping from the bowl during operation.

1.12 Intervals Between Sludge Discharges

(Valid for P 625/635/626/636 only)

1.12.1 Background



Disintegration hazard

Experience has shown that if intervals between sludge discharges are too long, a compact and hard sludge cake can accumulate. On discharge, this cake may break up and be discharged unevenly causing imbalance in the bowl. If imbalance is excessive, there is risk for serious mechanical damage and injury to personnel.

Recommendations are given regarding initial intervals between sludge discharges for different applications. The setting may subsequently have to be changed after actual inspection of the bowl.

1.12.2 Recommended intervals between sludge discharges

Many factors influence accumulation and hardening of sludge between the discharges, so the appropriate interval depends on local conditions. However, in order to have a reasonable starting point the following table shows recommended initial discharge intervals and operating times to first inspection.

1.12.3 Fuel oil cleaning

Type of fuel	Recommendations	
	Initial intervals between discharges	Time to first bowl inspection
Distillate (1.5 – 6 cSt/40 °C)	4 hours	1 week
Marine Diesel Oil (max. 14cSt/40 °C)	2 hours	1 week
Heavy Fuel Oil (Max interval)	1 hour (2 hours)	2 days

Conditions may change completely when bunkers are changed. Therefore, great care must be given to the discharge interval setting for each new bunker. In case the actually used discharge interval exceeds the recommended initial value, the interval setting has to be reduced, according to the table above, when a new, unfamiliar bunker is separated. Use of unstable fuel or mixing of incompatible fuel oils may give precipitation of sludge and overloading of the separator.

1.12.4 Lubricating oil cleaning

Continuous operation:

In a new lubricating oil system the oil is initially clean but as it gets dirtier the interval between discharges will have to be shortened until a “steady state” is reached. Following information refers to systems in “steady state”.

Type of fuel	Recommended intervals for Crosshead and Trunk	
	Initial intervals between discharges	Time to first bowl inspection
Main lubricating oil system	1 - 2 hours	1 week

If separator has been out of operation:

If the separator has been out of service for 24 hours or longer, while the engine has been running, the interval between discharges has to be shortened. In this case the recommendation is:

- Discharge interval 5 minutes until the whole oil volume has passed twice through the separator.
- After that resume normal discharge interval.

Intermittent operation:

For installations where one separator serves one engine which is temporarily stopped the following recommendations apply: If the engine is to be stopped for 24 hours or less:

- Keep the separator in operation for 8 hours after the engine is stopped.
- Start the separator 8 hours before the engine is started again.

Doing so most of the suspended particles and water condensate will be removed from the system and not settle in the sump tank. For installations where one separator serves more than one engine the following recommendations apply:

- Continuous use of the separator whenever possible.
- Frequent switches between the engine systems to be cleaned. In a typical case with one separator serving 2–4 auxiliary engines switching after maximum 24 hours of cleaning.

Discharge interval:

Engine has been in operation with-out cleaning of the system oil	Engine has not been in operation since last cleaning of system oil
Discharge interval 5 min.	Normal discharge interval
Duration until the whole oil volume has passed twice through the separator	
After that resume to normal discharge interval	

1.12.5 Bowl inspection

To check if the initially selected interval is appropriate, the bowl should be inspected after a short test period shown in the previous tables.

If sludge space is clean:

Interval may be prolonged with steps of 15 minutes, but it must not exceed three times the recommended initial interval.

“Sludge space is clean” means that no noticeable amount of hard sludge remains in the sludge space.

If sludge space is dirty:

Interval has to be shortened.

When the bowl is opened for routine cleaning, the sludge space should always be inspected and evaluated. If necessary, the interval between discharges should then be changed accordingly.

NOTE

Alfa Laval assumes no responsibility for the actual choice of discharge intervals, as these entirely depend on local conditions.

1.13 Heater Control (optional)

The temperature in the feed inlet is normally supervised via TT1, and can be controlled by a heater via TT2. Supervision and control are active even if one of the sensors is disabled. TT2 can be used by the customer; no alarm is given. TT2 is disabled in this case.

The heater is controlled according to temperature setpoint P249 using a PI-regulator with output:

$$Y(k) = Y(k+1) + P + I$$

where the proportional part

$$P = K_p * (e(k) - e(k-1))$$

and integral part

$$I = K_i * e(k) / T_i$$

The error $e = \text{SetValue} - \text{ActualValue}$, is the difference between the desired value (P249) and the actual value (reading on TT) where k = point of time

The tuning of the regulator is done by modifying the amplification

$K_p = K_i = 100/P123$ (P123 is known as the proportional band width) and integral time $T_i = P124$.

Every second a new output Y is calculated, i.e. the interval between each k is 1s.

With P119 it is possible to select heater control mode:

- no (no heater controlled)
- electric (electric heater controlled, P120 active)
- steam (steam heater controlled, P121 active)
- external (start/stop request via programmable output, heater not controlled)

Cold start function

If the viscosity of the oil is high (low temperature), a faster start-up of the heater might be favourable (a higher K_p). The temperature, up to which the cold-start gain factor P126 is active, is set in P125. Above this temperature the normal P-band P123 is used.

Example: P123 = 30, P126 = 40 results in a P-band of $0.40 \times 30 = 12$ as long as the temperature is below P125.

1.13.1 Control of the electric heater (optional)

P119 = electric. The following parameters should not be displayed in the parameter list: P121, P122.

Five outputs and one input are used to control the electric heater:

- three relay outputs to up to three fixed power steps depending on the heater size (P120)
- one variable load output
- one output "heater on"
- one input "heater fault" (see A05)

The total heater capacity (100%) is the sum of the power available at the three fixed steps, plus the power available via the variable load output (always 16 kW nominal).

This means, if the output signal to the heater is 100%, all available power steps and the variable load output have to be activated continuously.

Output signal 0% means that all outputs are deactivated.

If the output signal is a value between 0 and 100%, the activation pattern of the outputs has to be calculated using the table below.

Output power (in % of the total available power)				
Heater size (kW nominal, selected with P120)	Power step 1 %	Power step 2 %	Power step 3 %	Variable load output %
7, 8	0	0	0	10 x 10
14, 16	0	0	0	10 x 10
22, 24	33,5	0	0	10 x 6,6
36, 40	20	40	0	10 x 4
50, 56	14,3	28,5	28,5	10 x 2,9
65, 72	11	22	45	10 x 2,2
100	14,3	28,5	28,5	10 x 2,9
130	11	22	45	10 x 2,2

For each value of P120 the contribution of each power step to the total available heater capacity is given in percent. First use the fixed power steps to fill the power requirement as far as possible, then use the variable load output to fine adjust the output.

NOTE

It is important that the fixed power steps are working continuously when activated. Use an established method e.g. delay drop out.

As a new output signal is calculated every second, the variable load output is activated for parts (0.1) of a second.

0.1 s activates 1/10 of the available power on the output = 1.6 kW.

0.5 s means 8 kW and so on.

Example 1: Heater size 72 kW and output signal to the heater 50%. Activate step 3 (for 1s) and activate variable output for 0.2s.

Example 2: Heater size 16 kW and output signal to the heater 88%. Activate variable output for 0.9s.

Example 3: Heater size 130 kW and output signal to heater 88%. Activate steps 1, 2, and 3 (for 1s).

To prevent problems with too heavy momentary load at start of the heater, only one output can be activated per second during the first 6 seconds. After that time all outputs can be used simultaneously.

1.13.2 Control of the CBM heater (optional)

P119 = steam. In this case alarm A05 is not supervised.

The steam heater is controlled using three relay outputs:

- increment steam valve
- decrement steam valve
- steam shut-off valve (hold signal)

The position of the valve is not supervised.

The transition time of the steam valve is set in P121 (time from fully open to fully closed position and vice versa). The controller function defines if the valve should be opened (incremented) or closed(decremented) in relation to its actual position.

The signal to the steam valve is pulsed with an on-time corresponding to the temperature controller output. *Example:* output = +50% means the increment steam valve output is activated for 0.50 s/s.

When the heater is stopped, the decrement steam valve signal is on for the time set in P121. The hold signal is off if the start of the heater is interlocked (e.g. on alarms A01, A20).

1.13.3 If heater not controlled or external

It is possible to run the system *without heater control* (P119 = no).

In this case alarms A05, A24 and A25 are not supervised.

It is also possible to run the system *with external heater* (P119 = external). The 'heater on' signal is given via a programmable output.

In this case alarm A05 is not supervised.

The description for the system with external heater is also valid if one of the temperature sensors is disabled or on sensor error (A22/A30).

1.13.4 Heater shut down

The system waits for the feed temperature to decrease (5 degrees or below P184). If the time in P173 has elapsed and the temperature feedback was not received, alarm 'A25 Temperature not decreasing' is given.

When the temperature feedback has been received, or P173 has elapsed, P256 is started. When P256 has elapsed, the feed pump (if running) is turned off. If the feedback signal from the pump contactor is not received within 5 seconds, alarm 'A01 Pump starter failure' is given.

NOTE

Heater shutdown is also initiated at STOP request during START if feed pump and heater are on but the separator is not running.

1.14 Cross connection/serial operation

Valid for P-type separators

It might be desirable to cross-connect two separator modules, or operate them in series. For that purpose the EPC60s must be able to communicate via Ethernet.

1.14.1 Set up communication

The EPC60s may communicate over any customer defined network or be connected directly to each other ¹⁾.

The IP-addresses of the EPC60s must be set so there are no IP-conflict since all EPC60s are normally delivered with the same default address.

The node and IP addresses have to be set as follows:

Master IP 192.168.0.1

Master node 6.

Slave IP 192.168.0.2

Slave node 4

The node address cannot be modified.

¹⁾ Direct connection requires a crossover twisted pair cable to be used since the EPC60 does not have automatic MDI/MDI-X configuration.

1.14.2 Configure parameters

The parameter to select desired function is P145.

The following values are possible:

- disabled (default)
- cross master
- cross slave
- serial master
- serial slave

The adjustment of P145 is only possible, if both systems are in STAND STILL.

The communication between the two control systems is supervised. At communication error an alarm (A136) is given and both systems will go to STOP if running.

1.14.3 Cross connection

One separator module can use the feed pump and heater of the other one.

- P145 is set to “cross master” in the system which separator is used. The heater/feed pump of this system is automatically disabled. The display shows CROSS CONNECTION MASTER in STANDSTILL.
- P145 is set to “cross slave” in the system which heater/feed pump is used. The separator of this system is automatically disabled. The display shows CROSS CONNECTION SLAVE.

After adjustment of P145, only stepwise local start from resp. panel is possible.

The separator is started/stopped and the separator system is supervised from the master panel as if heater and feed pump were not installed. Temperature readings from the master are transferred to the slave panel.

Heater and feed pump are started/stopped and controlled from the slave panel. Alarms for the heater and feed pump are generated in the slave panel.

1.14.4 Serial operation

This function is required when two separators should operate in series, i.e. the oil coming from the first separator (usually a purifier) is further purified in the second one (usually a clarifier, but may be a purifier).

- P145 is set to “serial master” in the first system. The display shows SERIAL CONNECTION MASTER in STANDSTILL.
- P145 is set to “serial slave” in the second system. The display shows SERIAL CONNECTION SLAVE in STAND STILL.

After adjustment of P145, both systems are started individually. The discharge interval is set with P220 in the master system. The slave's automatic discharge initiation is disabled. Instead the master initiates a discharge in the slave system every (P262) time after the own discharge has been completed.

1.15 Programmable Inputs and Outputs

An extra I/O kit is available as an option. This kit contains two boards, one with six programmable digital inputs and one with six programmable relay outputs. The customer can select an optional function for each of these inputs and outputs from a list of alternatives (see below).

1.15.1 Inputs

See parameters 139 to 144

	Alternative	Comments
0	None	default
1	Remote start	enter automatic start, only if REMOTE selected on operator panel (pushbutton) Closed (pulse) = start
2	Remote stop	enter stop sequence, works with REMOTE button in any position Closed (pulse) = stop
3	Remote start feed pump	the same as first push at stepwise start. Closed (pulse) = start
4	External alarm	used for e.g. a level switch in a tank. See alarm A123. Closed = alarm
5	Remote recirculation	Request Recirculation, only if REMOTE selected on operator panel (pushbutton) Closed = recirculation
6	New temperature set point	EPC 60 uses temperature set point P250 during start when the separator is switched off

1.15.2 Outputs

See parameters P133 to P138.

altId	Alternative	Comments
0	None	default
1	Indication heater on/ start external heater	program request "heater function on" Closed = heater on
2	Indication separator motor on	program request "separator motor on" Closed = motor on
3	Stand still indication	when stand still flag on Closed = stand still
4	Indication alarm A20	if alarm "Oil feed temp. high" active Closed = alarm
5	Indication alarm A21	if alarm "Oil feed temp. low" active Closed = alarm
6	Indication alarm A51	if alarm "Oil backpressure PT4 low" active Closed = alarm
7	Indication feed pump on	program request "feed pump on" Closed = feed pump on
8	Remote start allowed	allowed to start the system Closed = start allowed

altId	Alternative	Comments
9	Remote enabled	remote button activated Closed = remote activated
10	Valve in sludge outlet	controlled if pneumatic valve, see P131 and <i>Activation diagram Closed = open or close valve (set with P131)</i>
11	Common alarm	Alternative Common alarm, Closed = no alarm, also see separate description
12	Indication V1	Position of valve V1, Closed = feed on to separator

1.15.3 Common alarm indication

There are two separate outputs for indicating status of the alarms. One is standard and the other is available through the programmable outputs.

Standard output

When there is no alarm active the contact is closed. When an alarm is triggered the contact opens. If another alarm is triggered the contact will close for 0.5s and then open again. When all alarms have been acknowledged by the operator the contact will close.

Programmable output

Programmable output When there is no alarm active the contact is closed. When an alarm is triggered the contact opens. When all alarms have been acknowledged by the operator and reset (the fault that triggered the alarm no longer persists) the contact will close.

1.16 I/O Test Function

Activity	Reference/Limits
If system has active alarms, check and take actions before starting the I/O test.	
Press button F-step backwards and related arrows up (C) and down (E) for Log –in into the I / O test.	Acc. to IB(s)
Follow the list of I/O's (item 25-72) to check status of all el. connections of the system including the operating function of individual components.	Acc. to IB(s)
OUTPUTS	
K2 - Separator motor Check the operation and rotation of the separator motor. The output will only be activated for a short time. Also check that the correct led is activated on the operating panel.	Valid for: All S and P types
If no operation, check jumpers according to electrical diagram.	
K3 – Feed pump Check the operation and rotation of the feed pump. Also check that the correct led is activated on the operating panel.	Optional Valid for: All S and P types
If no operation, check jumpers according to electrical diagram.	
V1 – 3 way valve Verify the operation of the valve, see also that the green diode on the valve connector is lit.	Valid for: All S and P types
V4 – Oil outlet valve Verify the operation of the valve, see also that the green diode on the valve connector is lit.	Valid for: All S and P types
Cabinet fan Verify the operation of the fan mounted inside the electrical cabinet.	Valid for: All S and P types
 WARNING Electrocution Hazard This operation require tests to be made with cabinet door open and with power on. Beware of live parts.	
Steam shutoff valve Verify the operation of the valve, see also that the green diode on the valve connector is lit.	Optional Valid for: All S and P types
V5 - Drain valve Verify the operation of the valve, see also that the green diode on the valve connector is lit.	Valid for: All S and P types
Hold/reset vibration switch Ensure that the vibration switch is reset when this output is activated	Optional Valid for: P605/615
SV10 – Displacement water valve Verify the operation of the valve, see also that the green diode on the valve connector is lit.	Valid for: All S and P types

SV15 Discharge valve Verify the operation of the valve, see also that the green diode on the valve connector is lit.	Valid for: All S and P types
SV16 – Closing water valve Verify the operation of the valve, see also that the green diode on the valve connector is lit.	Valid for: All S and P types
Steam decrease – Closing of steam valve Verify that the valve is moving towards closing position. Note that if the valve is already closed, an opening operation (see below) needs to be done prior to this test.	Optional Valid for: All S and P types
Steam increase – Opening of steam valve Verify that the valve is moving towards opening position.	Optional Valid for: All S and P types
Programmable output 1 Not to be tested	
Programmable output 2 Not to be tested	
Programmable output 3 Not to be tested	
Programmable output 4 Not to be tested	
Programmable output 5 Not to be tested	
Programmable output 6 Not to be tested	
Electric heater test Optional	
Before the electric heater i/o-test, please ensure that the electric power to the electric heater cabinet is turned OFF! The operating voltage for the relays is supplied from control cabinet.	
Elheatvar – Variable output Check that the diodes on the 2 triacs inside the electric heater cabinet are lit.	Optional Valid for: All S and P types
Heater on signal Check that the relay KA11 (diode, see picture below) and K11 (mechanical indication) in the electric heater cabinet is activated. Note, leave this output activated (indicating 1 on display) when proceeding with the tests of the fixed power steps below!	Optional Valid for: All S and P types
ElheatPS1 – Power step 1 Check that the relay KA12 (diode, see picture below) and K12 (mechanical indication) in the electric heater cabinet is activated. Optional Valid for: All S and P types	
ElheatPS2 – Power step 2 Check that the relay KA13 (diode, see picture below) and K13 (mechanical indication) in the electric heater cabinet is activated.	Optional Valid for: All S and P types
ElheatPS3 Power step 3 Check that the relay KA14 (diode, see picture below) and K14 (mechanical indication) in the electric heater cabinet is activated.	Optional Valid for: All S and P types

INPUTS	
Heater fault signal Check that this input is 1 as long as the output "Heater on" is activated. If not ok, check settings of over temperature device Go back to "Heater on" Item no. 47 and deactivate (0 on display), then go back to this section and verify that "Heater fault" is 0.	Optional Valid for: All S and P types
Estop – Emergency stop This input should be 1 when emergency stop button is not pushed. Press emergency stop button and check that it goes to 0.	Valid for: All S and P types
Feedback feedpump – Not to be tested	
Feedback separator - Contactor feedback Not to be tested	
Sludge tank level switch If not installed , check that the input is 1, if not? check if jumper is installed according to electrical diagram. If installed , manually operate the level switch, the input should be 0 when high level.	Optional Valid for: All S and P types
Cover switch on separator frame Manually operate the cover switch, the input should be 1 when switch (and cover) is closed	Optional Valid for: All S and P types
Sludge valve interlock Manually operate the sludge valve, the input should be 1 when the valve is closed.	Optional Valid for: All S and P types
Programmable input 1 Not to be tested	
Programmable input 2 Not to be tested	
Programmable input 3 Not to be tested	
Programmable input 4 Not to be tested	
Programmable input 5 Not to be tested	
Programmable input 6 Not to be tested	
ANALOGUE INPUTS	
PT5 – Water outlet pressure transmitter Check that the indication shows approx 0 bar. Note that if pipes are connected to the system, pressure might not be 0 bar.	4-20mA Input Valid for: All S types
MT – Water transducer, MT60 Check that the indication shows 30 pF ± 5 . Note that this value is only correct when sensor is in air (no media in pipes).	4-20mA Input Valid for: All S types
PT1 – Oil inlet pressure transmitter Check that the indication shows approx 0 bar. Note that if pipes are connected to the system, pressure might not be 0 bar.	4-20mA Input Valid for: All S and P types

PT4 – Oil outlet pressure transmitter Check that the indication shows approx 0 bar. Note that if pipes are connected to the system, pressure might not be 0 bar.	4-20mA Input Valid for: All S and P types
TT1 – Oil inlet temperature sensor 1 Check that the indication shows a relevant temperature.	PT100 input Valid for: All S and P types
TT2 – Oil inlet temperature sensor 2 Check that the indication shows a relevant temperature. Note that the temperature should not deviate from TT1 with more than 2 °C	PT100 input Valid for: All S and P types
Speed sensor In order to test this input, use the “Separator motor”, K2, sect 1, I/O-test to start the separator (for a few seconds), then go back to this input and check the value, it shall be higher then 0 rpm.	Namur input Optional Valid for: All S and P625/626, P635/636 types
Vibration switch Check that this input goes to 0 when the switch is in tripped position	Optional Valid for: P605/615 types
Vibration sensor Check that the indication shows approx 3.5 mm. (Sensor should be installed with 3.5 mm from the axel)	4-20mA Input Optional Valid for: All S and P625/626, P635/636 types

1.17 Operation without all sensors (Emergency operation)

If a sensor is malfunctioning it is possible to disable it temporarily until it can be fixed or replaced.

1.17.1 System Without Speed Sensor

It is possible to run the system without speed sensor (P113 = no).

In this case system control and supervision are much more basic.

Alarms A90 – A97 are not supervised.

Remote start is not allowed.

The separator is started within 4 minutes and stopped with stop timer.

This also applies if the speed sensor is disabled (P148 = 0) or on alarm 'A92, Bowl speed sensor error'.

1.17.2 System Without Vibration Sensor

It is possible to run the system without vibration sensor (P114 = no).

In this case alarms A100 – A103 are not supervised.

Remote start is not allowed.

This also applies if the vibration sensor is disabled (P132 = yes) or on alarm 'A102, Vibration sensor error'.

1.17.3 System Without Cover Switch

It is possible to run the system without cover switch (P115 = no).

In this case alarms A110 – A111 are not supervised.

Remote start is not allowed.

This also applies if the cover switch is disabled (P116 = yes).

1.17.4 System With PT1 Disabled

It is possible to run the system with PT1 disabled (P157 = 0).

In this case alarms A40 – A42 and A44 are not supervised.

This also applies on alarm 'A42, Feed pressure sensor PT1 error'.

1.17.5 System With PT4 Disabled

It is possible to run the system with PT4 disabled (P153 = 0).

In this case alarms A50 – A52 and A54 – A59 are not supervised.

As a result, calibration of the water flow is not possible. The old values are used for displacement and conditioning water. Cold start function is disabled. Bowl leakage test is disabled.

This also applies on alarm 'A52, Oil pressure sensor PT4 error'.

1.17.6 System With PT5 Disabled (S-separator only)

It is possible to run the system with PT5 disabled (P155 = 0).

In this case alarms A70 – A72 and A74 are not supervised.

This also applies on alarm 'A72, Water pressure sensor PT5 error'.

1.17.7 System With TT1/TT2 Disabled

It is possible to disable one of the temperature sensors TT1 or TT2 with parameter P146. The readings normally taken from the disabled sensor is then replaced with the readings from the other sensor in all sequences.

When a temperature transmitter is disabled the corresponding sensor error alarm, A22 or A31, is blocked.

Alarms A20, A21, A24 & A25 that normally are triggered by TT1 readings should be triggered by TT2 when TT1 is disabled.

When the system has a Modbus connection (P129=Modbus TCP or Modbus RTU) it is possible to use Modbus registers to receive temperature readings. Both TT1 and TT2 are then disabled and alarms A22, A23, A30 & A31 are blocked. This mode is activated when P146=Modbus. It is not possible select this mode if the system is controlling a heater (P119=steam or electric).

If P146=TT2 custom then all alarm from TT2 is blocked. It is intended for installations where TT2 is permanently not connected to the EPC60.

1.17.8 Control of Sludge Pump, Level in Sludge Tank, and Butterfly Valve

The sludge accumulated in the bowl can be discharged into an optional small sludge tank with level switch. At high level signal a sludge pump (P118 = yes) is running until the signal is normal + 10 seconds . Otherwise see alarm A120.

The level switch can be disabled (P159 = 0). In this case A120 is blocked and the sludge pump is running for 30 seconds at discharge (instead of P234, see below).

The sludge pump is also activated during certain timers. These running times are always terminated by an extra pump running time (e.g. during P234, or 5 seconds as in the drain sequence). Note that this extra time is independent of the other timers which may be running simultaneously.

See also the Sequence diagram for other occasions when the sludge pump is activated, if selected (Parameter List chapter '2.2 Discharge') .

The separator sludge outlet can contain a manual butterfly valve which is used to close the outlet when the separator is standing still.

Select with P131 (no, manual).

If P131 = no, alarm A122 is blocked.

1.17.9 System Without Feed Pump

It is possible to run the system without feed pump (P127 = no).

In this case alarms A01 and A44 are not supervised.

Remote start is not allowed.

1.17.10 System Without Water Transducer (S-separator only)

It is possible to run the system without water transducer (P117 = no).

In this case alarms A80 - A85 and A74 are not supervised.

There is no calibration of the water flow. In separation, automatic discharges are initiated every 15 minutes (overrides P220). SV10 is never activated (this means no displacement before discharge and no conditioning water). Water draining from the bowl is not allowed.

This also applies if the water transducer is disabled (P128 = standby) or on alarm 'A85, MT60 fault'.

1.17.11 Purifier Operation (only valid for S 805 and S 815)

If the water transducer should malfunction, the separator can be converted to purifier operation as long as the feed density is below 991 kg/m³.

Stop the separator and change the standard gravity disc to a larger one suitable for the density of the oil used.

Change Parameter P147 to 'Purifier'.

Change Parameter P117 to 'No'.

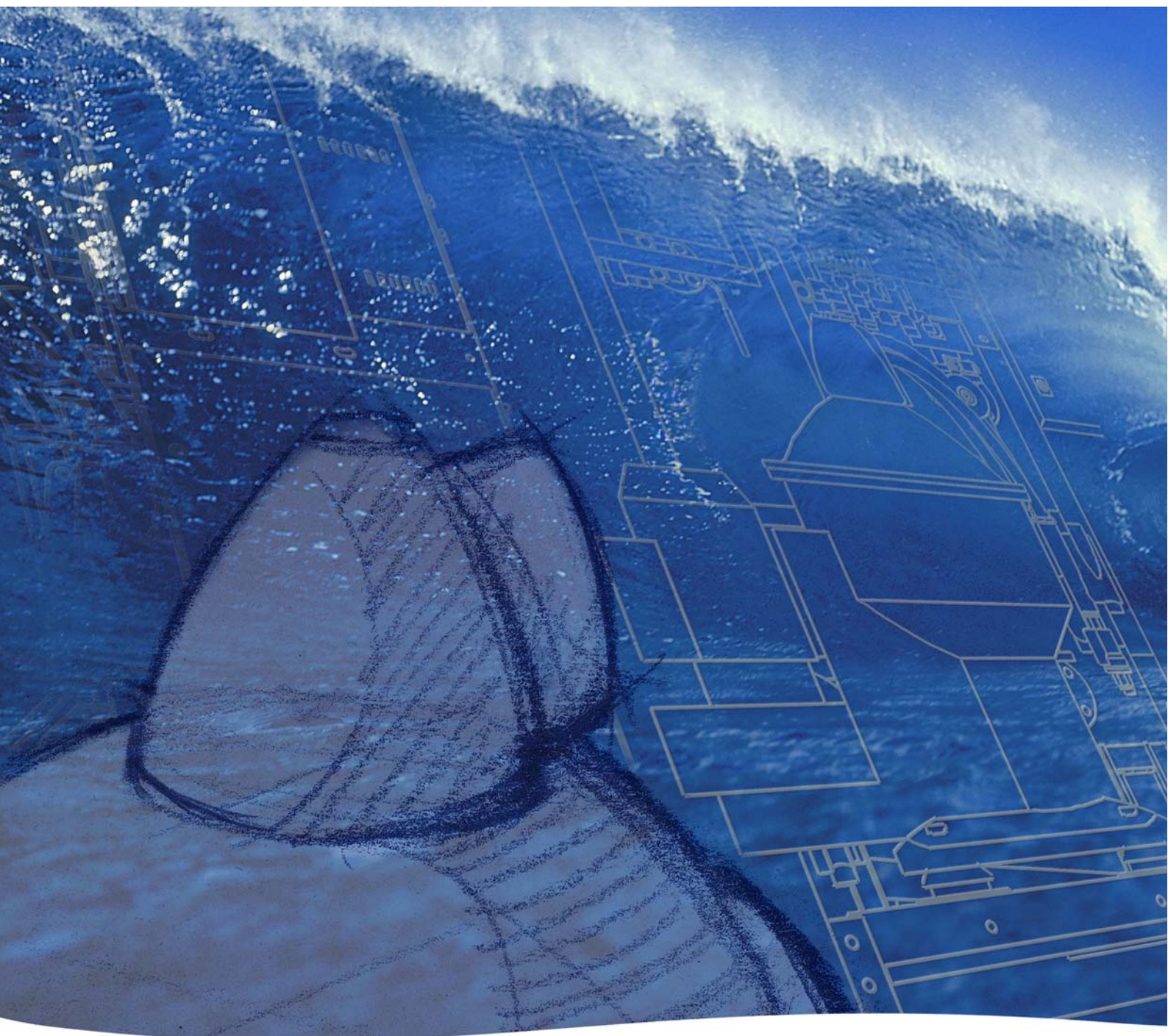
The system can now be restarted and run as a purifier system.

S Flex Separation



Parameter List

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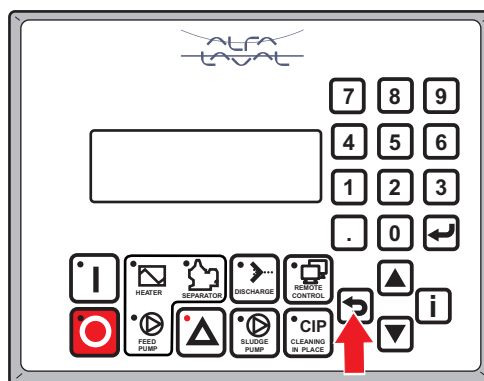
1 Parameter list

1.1 Setting List

To access the Setting List at any time during the operation process press the 'Return button' repeatedly until the Setting List is reached.

NOTE

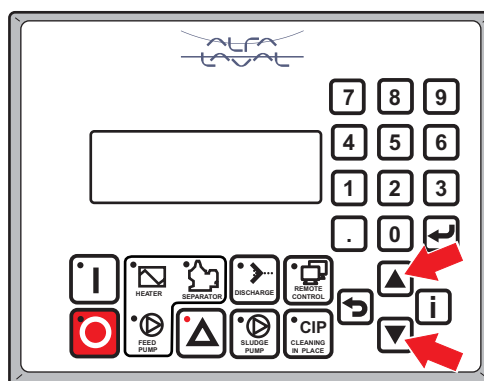
Relevant parameters only are shown on the display.



X023912A

Press the arrow buttons to go up or down in the list. The list consists of the following:

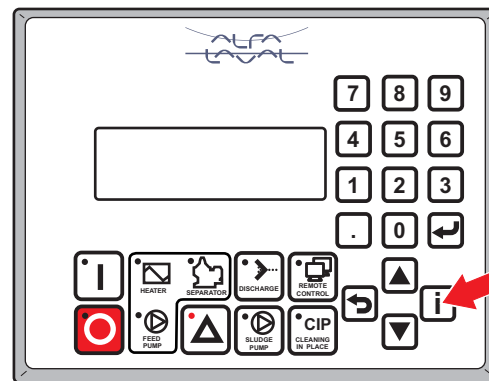
1. Parameter menu – List of all parameters. Password protected.
To go directly to a parameter, enter the parameter number.
2. Time settings – For setting date, time, etc. Password protected.
To go directly to a parameter, enter the parameter number.
3. Operation time – Different counters and timers can be read.
4. I/O Test – Here it is possible to activate all outputs and to read the status for all inputs, for testing purposes.
5. Alarm history – List of alarms which have been rectified. The latest alarm shows at the top of the list.
6. System info
7. IP settings
8. Password / Login
9. Set contrast



X023914A

When in the Parameter Menu a list item is blinking, you can press the 'Information' button for help and information. Press the 'Information' button again to return to your previous position.

You can also change this setting – see below.

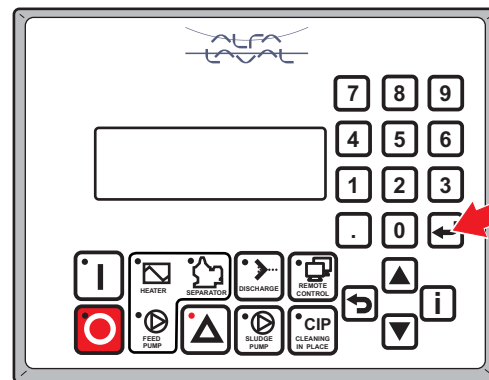


X023915A

When a list item is blinking, its value can be changed. Changes can be made either by using the number buttons to write in a value, or by choosing a value from the list. Save any change by pressing the 'Enter' button.

NOTE

Certain parameters can only be changed by the factory, the chief engineer, or an Alfa Laval service engineer



X023913A

Parameters are divided into three password levels:

Level 0 – No password needed.

Level 1 – Possible to protect with password.

Level 2 – Alfa Laval password protected.

@ = These configuration parameters can only be adjusted while the system is in STAND STILL (not visible on the HMI in all other modes). The present configuration is displayed in menu "System info".

Parameter	Pass-word level	Denomination	Default value	Unit	Min. value	Max. value
P100	0	Display language: English/ German/ Spanish/ French/ Italian/ Portuguese/ Finnish/ Swedish	English			
P101	0	Selection of temp. presentation Celsius/Fahrenheit	°C			
P102	0	Selection of feed flow rate presentation m3/h or USG/h	m3/h			
P103	0	Selection of pressure presentation kPa, bar, psi	bar			
User password required for all following parameters if activated!						
System configuration						
P107	1	Flow correction factor. If P107=0, the flow is not visible on the HMI	1.00		0,00	2,00
P111	1 @	Separator size	0		See Parameters depending on the setting of P111, page 12.	
P112	1	Oil type	HF380		See Parameters depending on the setting of P112, page 14.	
P114	1 @	Vibration sensor installed yes/no	no		Can be changed in even in STOP. See also "System without vibration sensor" in the Operating instructions manual.	
P115	1 @	Frame cover switch installed yes/no	no		Can be changed in even in STOP. See also "System without frame cover switch" in the Operating instructions manual.	
P116	1	Frame cover switch disabled yes/no (if P115 = yes)	no		See also "System without frame cover switch" in the Operating instructions manual.	
P117		Not used				
P118	1 @	Sludge pump installed yes/no	no		Can be changed in even in STOP.	

Parameter	Pass-word level	Denomination	Default value	Unit	Min. value	Max. value
P119	1 @	Heater installed no/electric/steam/external	no		Can be changed in even in STOP. See also "Control of Heater" in the Operating instructions manual.	
P120	1 @					
	1	If P119 = electric: heater size	16	kW	7	130
P121	1	If P119 = steam: steam valve transition time	120	s	0	999

Parameter	Pass-word level	Denomination	Default value	Unit	Min. value	Max. value
P122	1	Deadband heater	0.5	°C (P101)	0	5
P123	1	P-constant heater (if heater controlled) see also P125/P126 (cold start)	75		10	500
P124	1	I-constant heater (if heater controlled)	0.4	min	0.1	10.0
P125	1	Breakpoint cold start (if heater controlled)	0	°C (P101)	0	99
P126	1	Gain factor cold start (if heater controlled)	40		1	100
P127	1 @	Feed pump controlled yes/no	no		Can be changed in even in STOP.	
P128	1	MT60 on/standby. Standby = MT60 disabled. Discharge every 15 min. (overrides P220). SV10 not activated. No drain sequence.	on			
P129	1	Selection of remote control method digital inputs Modbus	digital inputs			
P130	1	Selection of automatic or stepwise start	step-wise		auto-matic	step-wise
P131	1 @	Valve in sludge outlet installed no, manual	no		Can be changed in even in STOP.	
P132	1	Vibration sensor disabled yes/no	no			

Parameter	Password level	Denomination	Default value	Unit	Min. value	Max. value
P133	1	Optional output 1 (Relay)			See also "Programmable in- and outputs" in the Operating instructions manual for all alternatives	
P134	1	Optional output 2 (Relay)				
P135	1	Optional output 3 (Relay)				
P136	1	Optional output 4 (Relay)				
P137	1	Optional output 5 (Relay)				
P138	1	Optional output 6 (Relay)				
P139	1	Optional input 1				
P140	1	Optional input 2				
P141	1	Optional input 3				
P142	1	Optional input 4				
P143	1	Optional input 5				
P144	1	Optional input 6				
P145	1	Cross connection/serial operation	disabled		see also "Cross connection/serial operation"	
P146	1	Temperature sensor disabled no, TT1, TT2, TT2 custom	no			
P148	1	Speed sensor disabled.	no			
P149	1	Level switch disabled. Run sludge pump 30 s at discharge (overrides P234).	no			

Parameter	Password level	Denomination	Default value	Unit	Min. value	Max. value
Alarm related parameters: delays, limits etc.						
P151		Not used				
P152	1	Power failure alarm used yes/no	yes			
P153	1	High oil pressure limit (PT4), 0.0 = pressure sensor disabled	3,0	bar	0,0	6,0
P154	1	Low oil pressure limit (PT4)	1,2	bar	0,0	6,0
P155	1	High water pressure limit (PT5), 0.0 = water pressure sensor disabled	5,5	bar	0,0	6,0
P156	1	Low water pressure limit (PT5)	0,2	bar	0,0	6,0
P157	1	Alarm limit high feed pressure (PT1), 0.0 = feed pressure sensor disabled	3,0	bar	0,0	6,0
P158	1	Alarm limit low feed pressure (PT1)	0,2	bar	0,0	6,0
P160	1	Alarm limit "A131 Sludge in bowl"	20	%	0	100
P161	1	Alarm limit "A97 Discharge feedback error"	300	rpm	0	2000
P162	2	Alarm limit "A81 Transducer value low"	70	pF	0	320

1 Parameter list

Parameter	Password level	Denomination	Default value	Unit	Min. value	Max. value
P163	2	Alarm limit "A57 Oil leaking from bowl"	1,0	bar	0	4
P164	2	High oil pressure limit (PT4) during leakage test	3,0	bar	0,0	6,0
P165	2	Low oil pressure limit (PT4) during leakage test	1,0	bar	0,0	4,0
P167	1	Not used				
P169	1	Alarm delay "A24 Temperature increase too slow"	15	min	0	60
P173	1	Alarm delay "A25 Temperature not decreasing" 0 = no temperature supervision	5	min	0	30
P175	2	Alarm delay "A59 PT4 pressure high after cold start"	5	s	0	60
P177	1	Alarm limit "A32 Difference TT1/TT2 too large"	10	°C (P101)	0	30
P178	1	Time limit in RECIRCULATION	10	min	0	30
Setpoints						
P220	1	Discharge interval	120	min	1	300
P222	1	V5 open time at drain sequence	25	s	0	250
P224	1	MT60 limit stop draining	70	%	0	100
P225	2	Test of MT60 signal frequency (every xxx discharge), 0 = test disabled	5		0	40
P226	2	MT60 low trigger limit at transducer test	250	%	0	900
P227	2	Flush of drain outlet after displacement (every xx discharge)	20		0	100
P228	1	SV16 pulse interval in SEPARATION	5	min	1	30
P229		Not used				

Parameter	Password level	Denomination	Default value	Unit	Min. value	Max. value
P231	1	SV15 opening time	3,0	s	0,1	30,0
P232	1	Draining of operating water	15	s	0	30
P233	1	Filling time conditioning water (calculated during calibration)xxx (120 initially)		s	0	120
P234	1	Sludge pump additional/manual running time	15	s	0	60
P236	2	Water drain time during STOP	10	s	0	30
P237	1	Sludge pump running and V5 opening time before discharge	10	s	0	30
P238	2	Feed on after discharge and test of water content in oil outlet	60	s	0	90
P239	2	Time for stabilization of the transducer signal	60	s	0	300
P242	2	Test of calibration value, interval (no. of discharges)	60		0	100
P256	1	Feed pump stop delay at normal STOP	3	min	0	30

Parameters depending on the setting of P111

Separator size (P111, default 0)												
Param- eter	Pass- word level	Description	S 811 S 816 S 200 S 821 S 826 S 921 S 926 S 927	S 820 S 825 S 300 S 830 S 831 S 835 S 836 S 936 S 937	S 400 S 840 S 841 S 845 S 846 S 946 S 947	S 500 S 850 S 851 S 855 S 856 S 956 S 957	S 600 S 860 S 861 S 865 S 866 S 966 S 967	S 700 S 870 S 871 S 875 S 876 S 976 S 977	S 800 S 880 S 881 S 885 S 886 S 986 S 987	Min. value	Max. value	Unit
P180	2	Alarm limit bowl speed low	83	90	90	89	82	82	81	0	100	% of max speed
P181	2	Alarm limit high vibration shutdown	0,3	0,3	0,5	0,5	0,5	0,5	0,5	0,0	2,5	mm
P182	1	Alarm limit high vibration warning	0,2	0,2	0,3	0,3	0,3	0,3	0,3	0,0	2,5	mm
P240	1	Filling time displacement water, initial value (calculated during calibration, see also P254)	77	63	108	48	80	61	72	0	150	s
		SV10, constant flow orifice	0,9	1,6	1,6	5,5	5,5	11,0	15,0			l/min
P243	1	SV16 open after dis-charge	15 s	15 s	15 s	15 s	25 s	25 s	60 s	0	120	s
P244	1	SV15 open for priming water during start-up	10 s	10 s	10 s	10 s	15 s	25 s	25 s	0,1	30,0	s
P245	2	V4 closed during bowl leakage test	10	10	10	10	10	10	10	0	30	s
P247	1	V4 closing delay at bowl leakage test	2	2	4	6	8	10	10	0	15	s
P248	2	Delay of PT4 pressure reference value registration at bowl leakage test	5	5	5	10	10	10	10	0	15	s

NOTE

If $P111 = 0$ (default value), the operator is automatically forced to go through a system configuration procedure to setup the system.

Parameters depending on the setting of P112

Oil type (selected with P112)											
Parameter	Password level	Description	GO	MDO	IF30 IF40 IF60 IF100	HF180 HF380 HF460 HF600 HF700	LO TP Trunk	LO CH Cross head	Min. value	Max. value	Unit
P183	1	High temperature limit	40		105		100	100	0	115	°C (P101)
P184	1	Low temperature limit	20		85		90	85	0	115	°C (P101)
P249	1	Temperature set-point	30		98		95	90	0	110	°C (P101)
P187	2	Number of drainings before alarm "A84 High water content"	5				2		0	20	
P251		MT60 trigger factor (corresponds to 100% increase of the transducer signal)	3,0				0,6		0,1	10,0	pF
P252	1	MT60 trigger limit	100		100		100		0	250	%
P189	2	Alarm limit "A80 Transducer value high"	110				85	78	0	320	pF
P254	2	Reduction of P240 if DO Calculated as P240 * P254	1,0						0,0	1,0	

2 Operation Modes

2.1 Change-over Sequence

This sequence is run through when the system changes operation mode from RECIRCULATION to SEPARATION after start (supervision similar as in RECIRCULATION).

This transition phase may include calibration of the water flow via SV10, if the operator answers “yes” to all three questions during the start-sequence (see ‘Manual Start from Standstill’ in the *Operating instructions manual*). If “no” to first or third question, the previously calculated filling time (P233) is used.

2.1.1 Change-over without calibration

A discharge sequence (step 2) and bowl leakage/water transducer test (step 3) is run through (see 2.2 Discharge, page XX).

The opening time of SV15 is in this case set with P244 (not P231). Finally the system ends up in SEPARATION.

2.1.2 Calibration of the water flow via SV10

During 170 seconds, the oil outlet valve V4 is closed and the bowl is filled with water through SV10 until the pressure on PT4 has increased by 0.2 bar.

The conditioning water flow rate is then calculated as the known bowl volume divided by the time needed to fill the bowl.

If the feedback signal from PT4 was not received until 170 seconds has elapsed, the alarm “A55 No PT4 pressure feedback at conditioning water calibration” is given. The bowl is emptied (P231, P232, P243) and the calibration is repeated when the alarm has been acknowledged.

Test of calibration

The calibration is repeated at every (P242) discharge. The measured time to fill the bowl is then compared with the saved time used to calculate the SV10 flow rate (the old value is not changed).

If the **time to fill the bowl has decreased** with the relative value in P160, the alarm 'A131 Sludge in bowl' is given and the system goes to STOP. Restart is not possible.

2.2 Discharge

During discharge three different sequences are run through:

- displacement sequence (step 1)
- discharge sequence (step 2)
- bowl leakage/water transducer test (step 3)

The following diagram shows the equipment which is activated during the sequences, the activation pattern and the corresponding timers.

Sequence Diagram

If a combination of low PT4 pressure (P154) and low speed (P180) is detected when the feed is on, the system will go to STOP immediately without waiting the time in P238. Alarm 'A57 Oil leaking from bowl'.

Vibration supervision blocked					----	----	----					
SV15, discharge					P2 31 ----	P23 2						
SV16, closing water							P2 43 ----					
SV10, conditioning, displacement		P1 72 ----	P2 40 ----	a) ----				P2 33 ----				
V4, clean oil outlet (NO)		----								P2 45 ----		
V1, feed inlet (deactiv. = recirculation)	----	P17 1*							P2 38 ----		P2 39 ----	----
V5, water drain (NC)				a) ----								
Sludge pump (optional)				P2 37 ----			P2 34 ----	----	--		----	
	Sep- ara- tion	Displacement sequence (Step 1)			Discharge sequence (Step 2)				Bowl leakage/water transducer test (Step 3)			Sep- ara- tion
	Discharge initiation											
	- - - = activated											
	= deacti- vated											
	* Timer interrupted when feedback signal received.											
	a) optional, frequency selected with P227.											

S Flex Separation



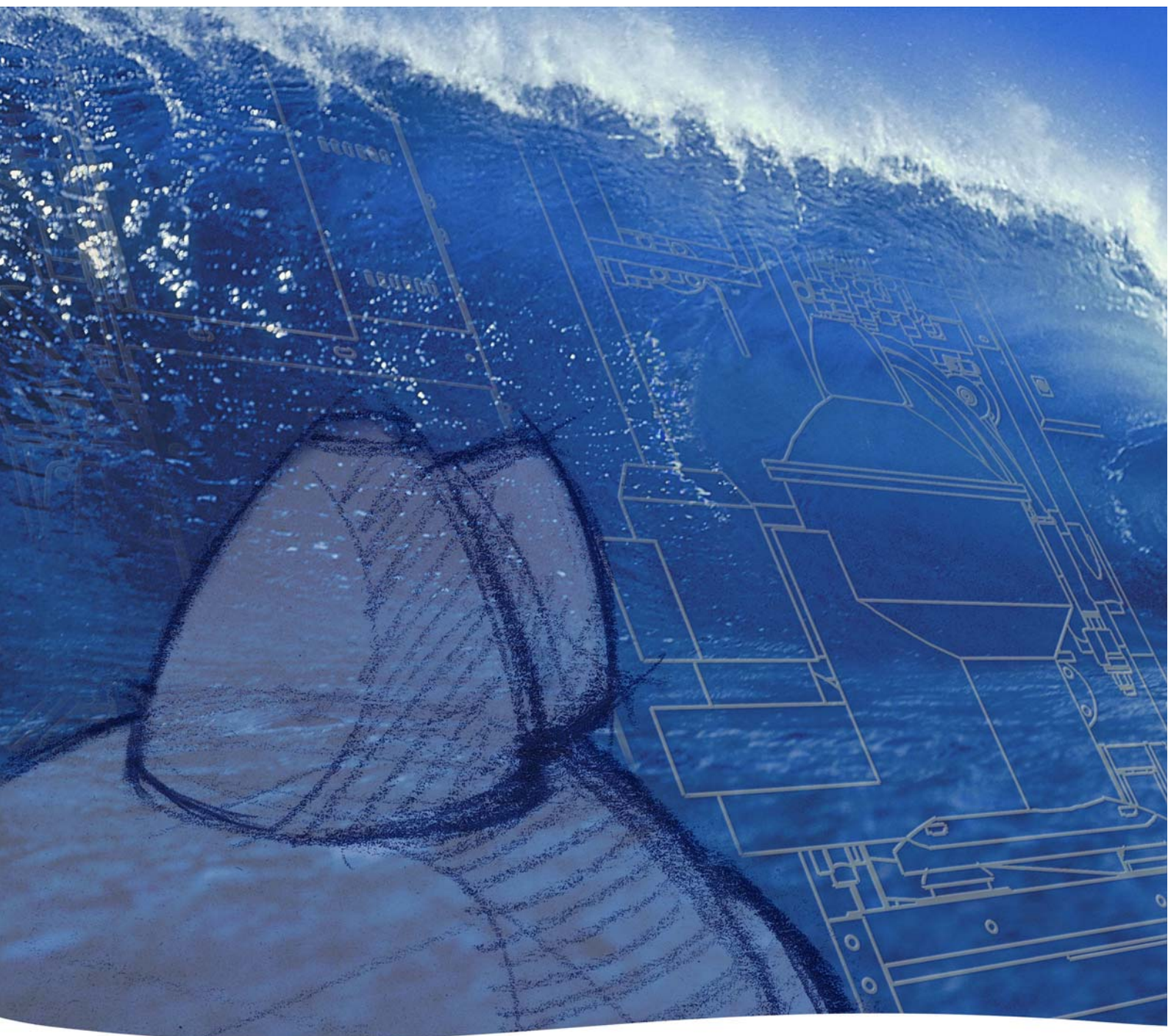
Alarms and Fault Finding

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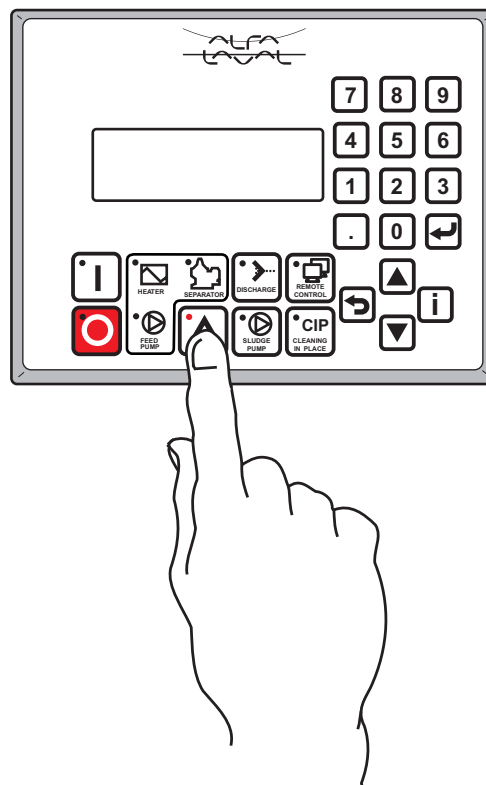
1 Alarms

1.1 Alarms List

To access the Alarms List press the 'Alarm Button'.

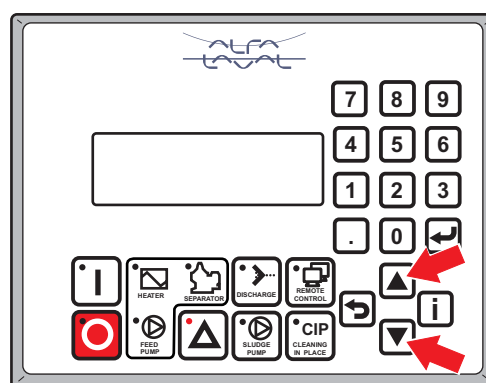
NOTE

The latest 50 alarms are stored in the Alarm History List. See below.



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Press the arrow buttons to go up or down in the list.

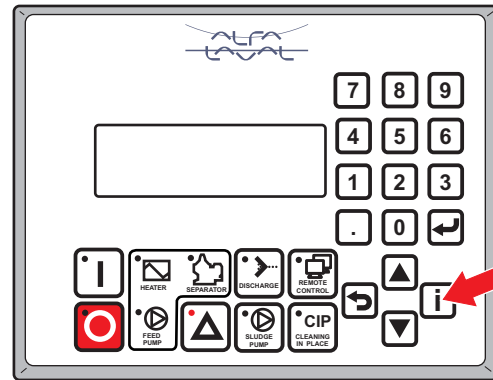


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1 Alarms

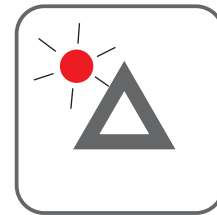
For each item in the list you can press the 'Information' button for help and information. Press the 'Information' button again to return to your previous position.

You can also acknowledge and/or reset this alarm.



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If the system has a fault, the alarm LED blinks. Press the 'Alarm' button once. The alarm shows on the display. Press the 'Alarm' button again to acknowledge the alarm. To go through the alarm list, press the 'Arrow' buttons.



X023919A

NOTE

After acknowledging an alarm, go through the alarm list to make sure that there are no other unacknowledged alarms!

If after all alarms have been acknowledged fault(s) remain in the system, the alarm LED stops blinking and remains on. An 'A' appears at the end of an alarm which has not been rectified.

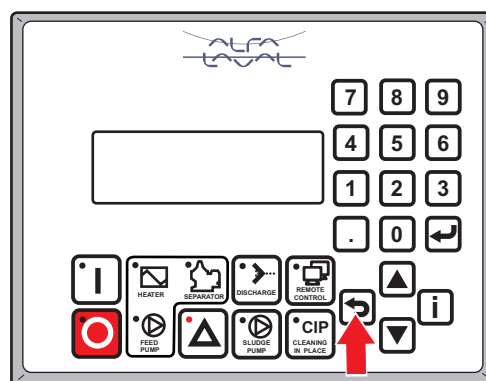
The alarms disappear automatically when the fault is rectified.

When all the alarms have been rectified, the alarm LED goes out.

For safety reasons, certain alarms must not only be acknowledged, but also rectified before the system can continue in operation, for example alarm A122 'Butterfly valve in sludge outlet closed'.

Also for safety reasons, some alarms will set the system into recirculation or stop. These alarms must be rectified before the operator can put the system into operation.

Press the 'Return' button to leave the list.



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1.2 Alarm History List

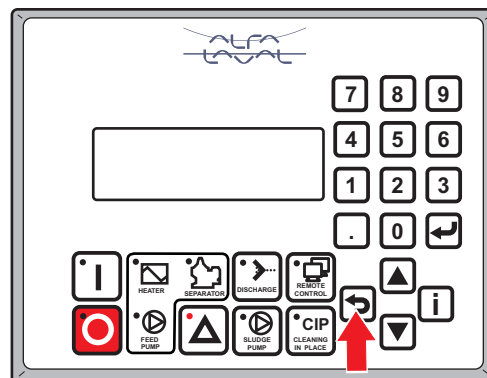
To access the Alarm History List at any time during the operation process press the 'Return button' repeatedly until the Alarm History List is reached.

NOTE

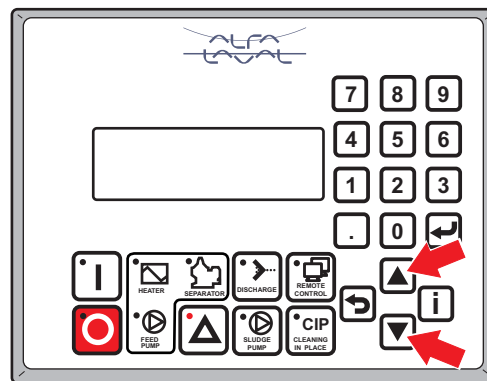
Relevant parameters only are shown on the display

Press the arrow buttons to go up or down in the list. The list consists of the following:

1. Parameter menu – List of all parameters. Password protected.
To go directly to a parameter, enter the parameter number.
2. Time settings – For setting date, time, etc. Password protected.
To go directly to a parameter, enter the parameter number.
3. Operation time – Different counters and timers can be read.
4. I/O Test – Here it is possible to activate all outputs and to read the status for all inputs, for testing purposes.
5. Alarm history – List of alarms which have been rectified. The latest alarm shows at the top of the list.
6. System info
7. IP settings
8. Password / Login
9. Set contrast

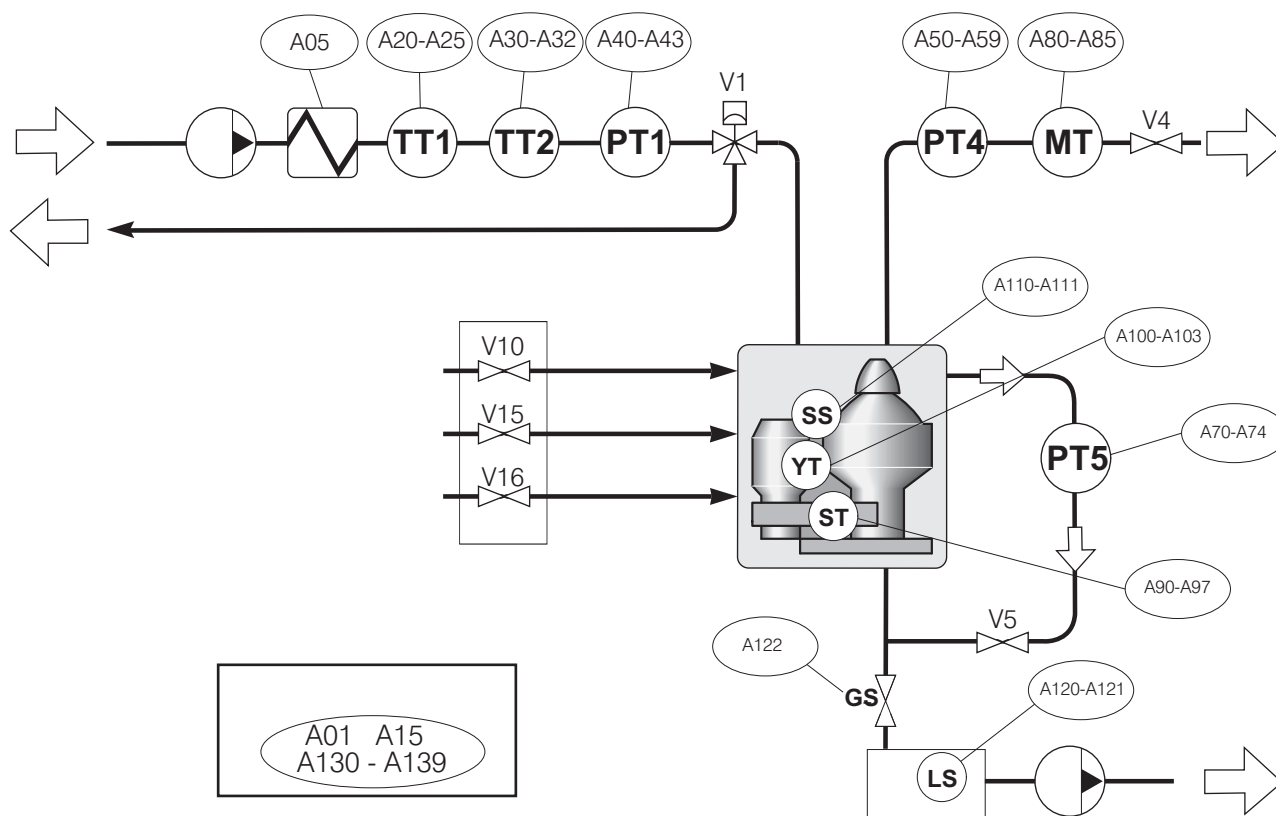


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X023914A

2 Display Alarms and Actions



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Alarm code	Alarm text	Conditions	Why?	What to do
Feed pump (if P127 = yes)				
A01	Pump starter failure	Delayed by P168.	Feedback signal from contactor K3 missing.	Check the contactor function. Check input terminal in the PLC.
A05	Heater fault (electric)	Delayed 2 s.	Power to heater interrupted. High temp. switch released	Check the power supply to the heater. Check temp. setpoint in the control unit. Check the heater and clean if necessary. When the temperature decreases, the switch is automatically reset.

Alarm code	Alarm text	Conditions	Why?	What to do
Heater, electric (if P119 = electric)				
A15	Separator starter failure	Delayed 2s.	Feedback signal from contactor missing.	Check the contactor function. Check input terminal in the PLC
Temperatur transmitter feed inlet TT1				
A20	Oil feed temperature high	Delayed by P150. Limit in P183.	Steam supply valve faulty	Investigate cause and remedy.
			Faulty triac module(s) in the power unit or faulty controller in the control unit. (electric heater).	
			Broken wiring or defective heater resistance, or faulty controller in the control unit.	
A21	Oil feed temperature low	Delayed by P150. Limit in P184	Heater clogged	Investigate cause and remedy.
			Steam supply insufficient	Investigate cause and remedy.
			Steam trap faulty	Investigate cause and remedy.
			Steam supply valve insufficient	Investigate cause and remedy.
			Faulty fuses or burned contactors (electric heater)	Check and renew broken fuses. Reset overcurrent protection (applicable for 8/7 - 24/22 kW power unit). Check wiring and contactor coils.
			Broken wiring or defective heater resistance (electric heater)	Check wiring and heater resistance of each block or heater element.
A22	Temperature alarm sensor error (TT1)	Delayed by P150	Short circuit / broken sensor or cable.	Disconnect cable at sensor. Measure resistance between 1-3. Resistance shall be within 100-142 ohms = 0-110 C/32-230 F. Replace sensor if broken. If no spare sensor available, set parameter P146 = TT1 to be able to run the system.

Alarm code	Alarm text	Conditions	Why?	What to do
A23	Temperature alarm sensor disabled	Reminder only, if P146 = TT1		
A24	Temperature increase too slow	Delayed by P169. Limit in P184.	Insufficient heating during start.	Check heater function.
A25	Temperature not decreasing	Delayed by P173. Limit in P184. Stop sequence continues after alarm reset. Disabled if P173 = 0.	Heating on during stop sequence.	Check heater function.
			Recirculating oil not cooling.	Reset alarm to continue.
Temperatur transmitter heater control TT2				
A30	Temperature control sensor error (TT2)	Delayed by P150.	Short circuit / broken sensor or cable.	Disconnect cable at sensor. Measure resistance between 1-3. Resistance shall be within 100-142 ohms = 0-110 C/32-230 F. Replace sensor if broken. If no spare sensor available, set parameter P146 = TT2 to be able to run the system
A31	Temperature control sensor disabled	Reminder only, if P146 = TT2		
A32	Difference TT1/TT2 too large	Delayed by P176. Alarm limit in P177. Blocked if A22, A23, A30, or A31		
Pressure transmitter feed inlet PT1				
A40	Feed pressure PT1 high	Delayed by P150. Limit in P157	Pipe restricted.	Check recirculation for restriction.
A41	Feed pressure PT1 low	Delayed by P150. Limit in P158.	Pump not working	Check pump.
			Pressure in feed line too low	Check feed line and flow regulation. Check heater for fouling.
A42	Feed pressure sensor PT1 error	Delayed by P150.	Sensor or cable damaged.	Check cable connections. Replace sensor. If no spare sensor available, set parameter P157 = 0.
A43	PT1 disabled	Reminder only, if P157 = 0.		
Pressure transmitter oil outlet PT4				
A50	Oil backpressure PT4 high	Delayed by P150. Alarm limit in P153.	Increased throughput	Check. Reduce backpressure.
			Regulating valve too restricted	Adjust valve.

Alarm code	Alarm text	Conditions	Why?	What to do
A51	Oil backpressure PT4 low	Delayed by P150. Alarm limit in P154.	Decreased throughput	Check feed pump and adjust flow.
			Regulating valve open too much	Adjust back pressure valve
			Change over valve V1 in recirculation position	Check air pressure, solenoid valve SV1 and output from EPC 60.
			Bowl opens unintentionally during operation because:	
			Strainer and piping in the operating water supply is clogged.	Clean the strainer and check the whole system fore limestone deposits.
			Too little or no water in the operating water system.	Measure the water flow in the three hoses from the water block and compare with correct values.
			Hoses between the supply valves and separator are incorrectly fitted.	Fit hoses correctly.
			Nozzle in bowl body clogged	Clean the nozzle.
			Rectangular ring in discharge slide is defective.	Renew the rectangular ring.
			Valve plugs are defective.	Renew all plugs.
			Supply valves SV15 and SV 16 are leaking.	Rectify the leak.
A52	Oil pressure sensor PT4 error	Delayed by P150.	Sensor or cable damaged.	Check cable connections. Replace sensor. If no spare sensor available, set parameter P153 = 0.
A53	PT4 disabled	Reminder only, if P153 = 0.		
A54	Oil pressure PT4 high at discharge	Delayed by P171. Alarm limit in P221.	No decrease in oil pressure at discharge.	Check function of change-over valve V1.
A55	No PT4 pressure feedback at conditioning water calibration	Delayed by P170. Alarm limit in P221.	No increase in oil pressure at calibration.	Check supply of displacement water (SV10).
A56	No PT4 pressure feedback at displacement	Delayed by P172. Alarm limit in P221.	No increase in oil pressure at displacement.	Check supply of displacement water (SV10).

Alarm code	Alarm text	Conditions	Why?	What to do
A57	Oil leaking from bowl	Delayed by P245. Alarm limit in P163.	Bowl periphery sealing damaged	Change seal ring in bowl hood. Check/change rubber rings and valve plugs.
			Leakage somewhere in oil outlet	Check for leakage.
			Closing water leaking	Check/change sealings and plugs.
A58	Leak test failure	Limit in P164. No. of attempts in P166.		
A59	PT4 pressure high during Transition	Delayed by P175. Alarm limit in P154		
Pressure transmitter water drain PT5				
A70	Pressure in water outlet PT5 high	Delayed by P150. Limit in P155.	Paring tube not moving correctly.	Check that movement is not impeded by friction.
A71	Pressure in water outlet PT5 low	Delayed by P150. Limit in P156.	Paring tube not moving correctly.	Check that movement is not impeded by friction.
A72	Water pressure sensor PT5 error	Delayed by P150.	Sensor or cable damaged.	Check cable connections. Replace sensor. If no spare sensor available, set parameter P155 = 0.
A73	PT5 disabled	Reminder only, if P155 = 0.		
A74	Water outlet restricted	Delayed 3s.	V5 not opening or line restricted.	Check V5 function. Clean the outlet pipe.
Water transducer MT60				
A80	Transducer value high	Delayed by P150. Limit in P189.	Extremely high water content.	Check where the water is coming from.
			Fouling in the MT60.	Dismantle and clean with detergent.
A81	Transducer value low	Delayed by P150. Limit in P162.	Too much air in oil outlet.	Check oil backpressure.
A82	MT60 in standby more than 24 hours	Reminder only, if P128 = standby more than 24h.		
A83	Transducer no response	Limit in P226.	MT60 test failure.	Check water supply. Check SV10.

Alarm code	Alarm text	Conditions	Why?	What to do
A84	High water content	Number of drainings in P187. Limit in P224.	Too much water in oil outlet.	Investigate cause and remedy.
			Much water in the feed.	Check where the water is coming from.
			Paring tube not moving properly.	Check that movement is not impeded by friction.
A85	MT60 fault	Delayed by P150.	Sensor or cable damaged.	Check cable connections. Replace sensor. If no spare sensor available, set parameter P128 = standby.
Speed sensor separator (if P113 = yes)				
A90	Bowl speed high	Delayed 5 s. Limit in P179.	High power (net) frequency.	Check power supply before restart.
			Incorrect transmission parts (50 Hz belt pulley and belt for 60 Hz power supply).	 WARNING Disintegration hazard Stop and change the belt transmission to suit the power supply frequency.
A91	Bowl speed low	Delayed 5 s. Limit in P180.	Slipping belt	Change belt.
			Worn coupling pads	Check / change pads.
			Bowl not properly closed	Check closing water supply (valve SV 16). Check bowl operating system for leakage. Check nozzle.
			Bowl not properly assembled	Check that the lock ring is in place.
			Low power net frequency	Check power.
			Motor failure	Repair the motor.
			Bearing(s) damaged	Renew all bearings.
			Incorrect transmission parts (60 Hz belt pulley and belt for 50 Hz power supply).	 WARNING Disintegration hazard Stop and change the belt transmission to suit the power supply frequency.

Alarm code	Alarm text	Conditions	Why?	What to do
A92	Bowl speed sensor error	Delay 4s. Timer stop.	Sensor or cable damaged.	Replace sensor. If no spare sensor available, set parameter P179 = 0 to be able to run the system.
A93	A93 Speed sensor disabled	Reminder only, if P148 = yes.		
A94	Bowl speed high during STOP	Delayed by P174. Alarm limit in P180.	Power still on to the motor	Check reason and remedy.
A95	Separator motor run-up time too long	Delayed by P230. Limit in P180.	Separator friction blocks slipping	Check the friction blocks.
			Belt slipping	Check the belt.
			Height position of paring disc is incorrect.	Stop. Check and adjust the height.
			Motor failure	Repair the motor.
			Bearing(s) damaged or worn in coupling or spindle drive.	Renew all bearings.
A96	Slow start acceleration	Speed < 90 rpm 10s after response from motor contactor.		
A97	Discharge feedback error	Alarm limit in P161. Test during P232, one extra discharge before alarm.	Strainer in the operating water supply is clogged.	Clean the strainer.
			Water flow too low.	Check opening water flow (SV 15) into the bowl.
			Hoses between the supply valves and separator are incorrectly fitted.	Fit hoses correctly.
			Rectangular ring in the operating slide is defective.	Replace the rectangular ring.

Alarm code	Alarm text	Conditions	Why?	What to do
Vibration sensor separator (if P114 = yes)				
A100	High vibration warning	Delayed by P150. Alarm limit in P182.	Sludge remaining in part of the bowl	Dismantle, clean and check the bowl before restart.  Disintegration hazard The separator bowl must be manually cleaned before starting up again.
			Bowl wrongly mounted.	Check assembly.
			Disc stack compression incorrect.	Check assembly.
			Bowl assembled with parts from other separators.	Check assembly.
			Height position of paring disc is incorrect	Stop the separator, measure and if necessary adjust the height.
			Bowl spindle bent	Renew the bowl spindle
			Bearing(s) damaged or worn	Renew all bearings.
			The frame feet are worn out.	Renew the frame feet.
			Spindle top bearing spring broken.	Renew all springs.

Alarm code	Alarm text	Conditions	Why?	What to do
Frame cover switch separator (if P115 = yes)				
A110	Frame cover open	Delay 1s. Start not possible.	Separator not properly assembled	Assemble the separator according to instructions.
			Faulty frame cover switch	Replace cover switch. If no spare switch available, set parameter P116 = yes to be able to run the system.
A111	Cover switch disabled	Reminder only, if P116 = yes.		
Sludge handling				
A120	Sludge tank level high	At high level: Start not possible. Sludge pump running until level signal normal + 10s. Alarm delay and max pump running time 60s in all modes without feed flow, P159 in Separation. Discharge blocked.	Pump has not drained the tank	Check the pump function.
A121	Level switch disabled	Reminder only, if P149 = yes.		
A122	Valve in sludge outlet closed Discharge not possible. Start not possible.	Delayed by P150.	Valve closed.	Open manual valve.
A123		External alarm. Delay 2 s		
System				
A130	Emergency stop button pushed	Delay 1s. No restart.	Emergency stop button pushed	Check for the cause. Reset pushbutton.
A131	Sludge in bowl	Alarm limit in P160.	Too much sludge in bowl	This alarm is given if the bowl is extremely dirty and cannot be acknowledged. The separator will be stopped. Wait until STAND STILL is indicated. Investigate cause and remedy.
A132	Power failure	Disabled with P152 = no.	Black-out has occurred during operation	Check plant conditions and restart.
A133	Too long time in RECIRCULATION	Delayed by P178. System goes to STOP.	Time in RECIRCULATION expired.	

Alarm code	Alarm text	Conditions	Why?	What to do
A136	Communication error			
A137	Cabinet over temperature	Reminder only		
A138	Too many start attempts		Contactor activated 5 times within last 60 minutes.	
A139	EPC60 internal failure	Delay 2 s	IO-card status or PLC status not OK PLC has detected an IO-configuration that does not exist	Check IO cards have no red LEDs Check if IO-configuration is right or verify electrical drawings
A140	Too long time out of operation	IO-card status or PLC status not OK	Alarm is created if the separator has been out of operation for one month or more. It is reset if the separator has been running for at least 5 hours.	Pre-lubricate spindle bearings. After service always run the separator continuously for at least 5 hours to ensure proper lubrication.
A141	Permanent variables have not been correctly backed-up			Check the CPU is well mounted Check EMC connections
A142	Restore the memory			
A143	Permanent variables have been successfully restored			
A145	Panel communication error			Check wiring
A149	Parameter is out of range			Enter a new parameter value within the correct range.
A150	Parameter level 3 has been changed.			The parameter will revert to its original value.

3 *EPC 60 Control panel*

Fault	Remedy
Black screen	Press and hold Enter button and adjust contrast with up and down button. This can be done regardless of which page is currently displayed.

Separator Sizes S 831 - S 947, P 635/636



Flex Separation System

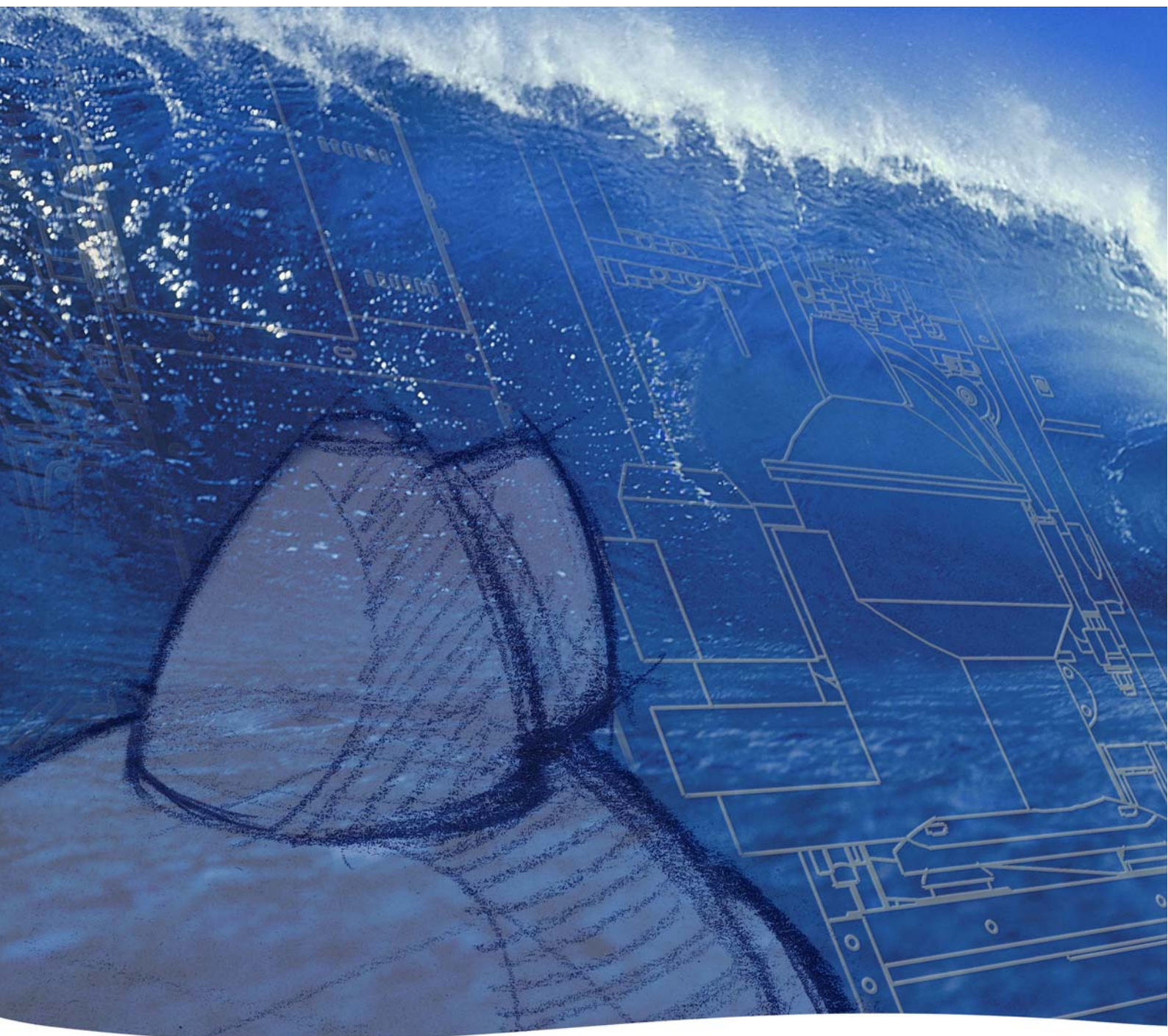
Installation System Reference

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Original instructions

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1 Technical Data

1.1 Demand Specifications Water

Alfa Laval ref. 574487 Rev. 1

Poor quality of the operating water may with time cause erosion, corrosion and/or operating problems. The water shall be treated to meet certain demands.

The following requirements are important:

1. Turbidity-free water, solids content <0,001% by volume.
Max. particle size 50 µm.
Deposits shall not be allowed to form in certain areas in the system.
2. Total hardness less than 180 mg CaCO₃ per litre, which corresponds to 10 °dH or 12,5 °E.
Hard water may with time form deposits in the operating mechanism. The precipitation rate is accelerated with increased operating temperature and low discharge frequency. These effects become more severe the harder the water is.
3. Chloride content max. 100 ppm NaCl (equivalent to 60 mg Cl/l). Chloride ions contribute to corrosion on surfaces in contact with the operating water. Corrosion is a process that is accelerated by increased separating temperature, low pH, and high chloride ion concentration.
4. 6,5 < pH < 9
Bicarbonate content (HCO₃) min. 70mg HCO₃ per litre, which corresponds to 3,2 °dKH.
5. Pressure 200 – 800 kPa (2 – 8 bar).

NOTE

Alfa Laval accepts no liability for consequences arising from unsatisfactorily purified operating water supplied by the customer.

1.2 Demand Specifications Air

Specific requirements regarding the quality of air

1. Pressure 500 – 800 kPa (5 – 8 bar).
2. Free from oil, and solid particles larger than 0.01 mm.
3. Dry, with dew point min. 10 °C below ambient temperature.

NOTE

Electrical interconnections must be made by qualified electricians.

Mechanical interconnections must be made by qualified mechanical technicians.

1.3 System Data

Application

Cleaning of fuel and lubricating oils	
Min. density	820 kg/m ³ at 15°C
Max. density	1010 Kg/m ³ at 15°C in ALCAP mode 991 kg/m ³ at 15°C in Purifier mode
Max. viscosity	55 cSt at 100°C (700 cSt at 50°C)
Feed temperature	5°C to 100°C
Ambient temperature	5°C to 55°C
Feed capacity	In accordance with the separator size capacity table

Media inlet/outlet data at separator connections

Pressure	
Oil inlet	Max. 2 bar at separator inlet
Oil outlet	Max. 2.5 bar
Sludge outlet from separator	without pressure
Sludge outlet from sludge pump	Max. 5 bar at 6 bar air pressure
Separated water	Max. 4 bar (if not diverted into sludge outlet)
Temperature	According to capacity table, depending on oil viscosity ± 2 °C Max. 100 °C

Sludge Removal kits (optional)

The systems can be equipped with their own sludge tank for collecting the sludge discharge from the separator.

Sludge Removal Kit tank volumes: 11.5 Litres.

Auxiliary systems	
Operating water	
- Operating water flow S 831, S 836, S 841, S 846 S 936, S 937, S 946, S 947	SV 10: 1.6 l/m SV 15: 11.0 l/m SV 16: 2.8 l/m
- Operating water flow P 635, P 636	SV 10: 15 l/m SV 15: 11 l/m SV 16: 2.8 l/m
	For further details see “1.1 Demand Specifications Water on page 7” .
Quality	
Pressure	2 – 8 bar
Temperature	5 °C – 55 °C (unheated water)
Air	
Quality	Instrument air
Pressure	5 – 8 bar (an optional pressure reducer is available for above 8 bar)
Consumption	
Air operated valves	10 N l/h
Sludge pump (pneumatic)	1000 N l/h at max. 1l/s For further details see “1.2 Demand Specifications Air on page 7” .
Mechanical design part:	
Oil and heating media piping	
Design pressure	Max. 6 bar (for steam / condensate Max. 9 bar)
Test pressure	Max. 9 bar (for steam/condensate Max. 14 bar)
Design temperature	5 °C – 180 °C
Flange connections	PN 16 DIN 2573/2633
Pipe data	Material ; ASTM A 106 gr. B seamless schedule 40 thickness. Sizes ; from ½” upto 4”
Auxiliary media - Operating water	
Design pressure	Max. 6 bar
Design temp.	5 °C – 55 °C
Auxiliary media - Air	
Design pressure	Max 10 bar
Material	Nitrile rubber-steel braided hose or PTFE pipes where possible.
Drip tray volume	Max. 19 litres
Drip tray Material	Steel sheet laser cut and welded parts
Drip tray Drain connection size	2 x 1” G (internally threaded)
Frame Baseplate Material	Steel sheet laser cut and welded parts
Electrical design	

Auxiliary systems	
Mains supply	
Voltage	3x 230 /400V/ 440V / 480V / 575V / 690V $\pm$ 10 %
Frequency	50 / 60 Hz
Separator el.motor	In accordance with the separator size selected and related data sheet
Separator el motor power range	From 7.5 kW up to 11 kW
Feed Pump el. Motor	In accordance with the pump size selected and related data sheet
Feed Pump el motor power range	from 1.1 kW up to 4 kW
EPC	
Voltage	24 V DC (internal)
Control voltage, operating supply	24 V AC (from internal transformer)
Frequency	50 or 60 Hz $\pm$ 5 %
Control cabinet	
Enclosure class	IP 55
Material	Steel sheet
Ambient temp.	Max 55 °C

Planned Maintenance Kits (not including wear items)								
Hours	Period	Separation	Module	Sludge pump	Feed pump	Control cabinet	El. heater	CBM
1000								
2000								
4000	6 months	Inspection						
12000	18 months	Overhaul		Overhaul				
24000	3 years	Overhaul	Overhaul	Overhaul	Overhaul			
As necessary		CIP	Repair (components)				Repair	CIP
With delivery		Inspection Tools						
Backup		Support				Support		

NOTE

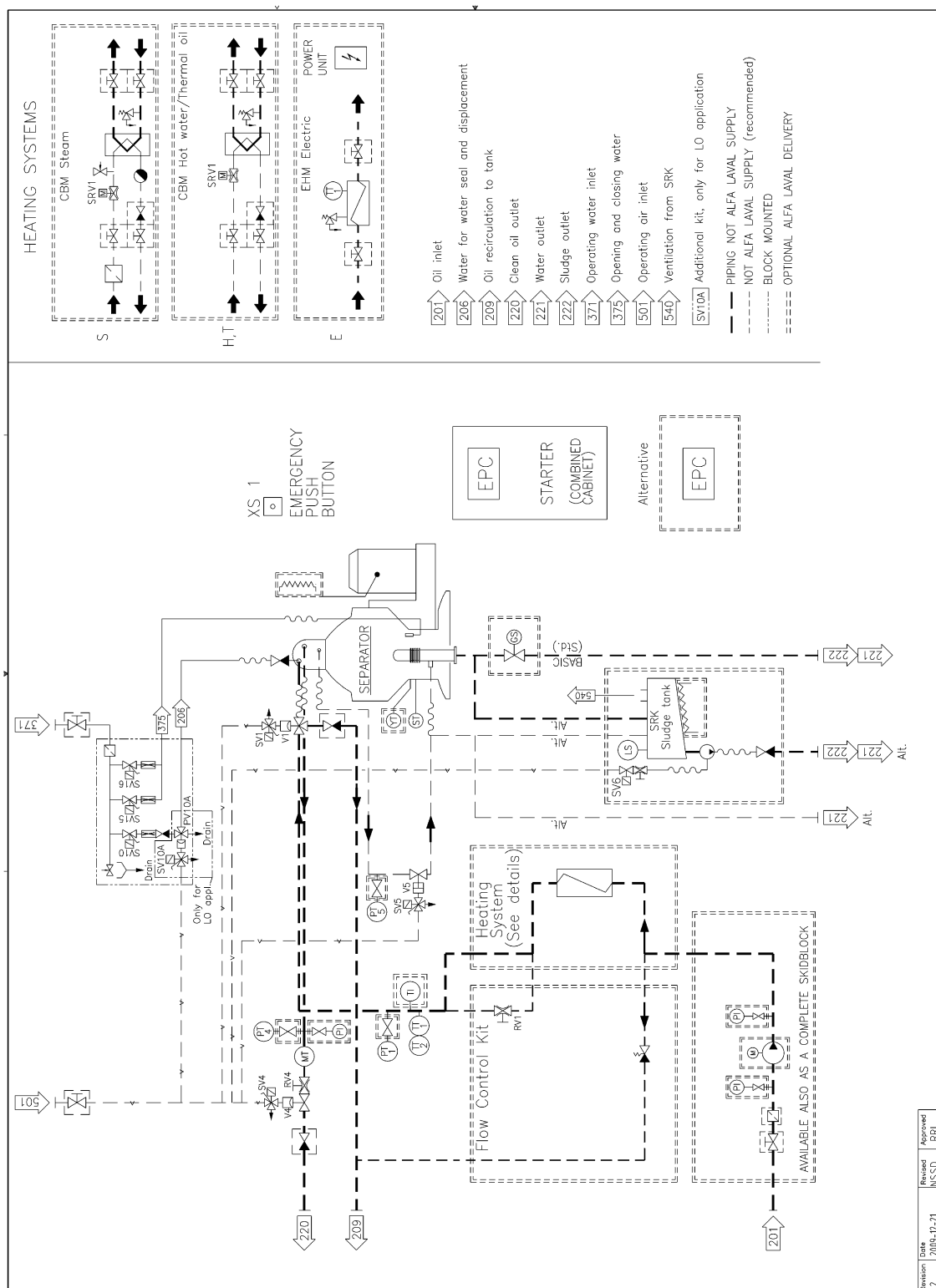
The lifespan of wear items, such as friction blocks and main seal ring, depends on the number of startups, as well as plant and feed conditions. Check wear items regularly and change when necessary.

2 Mechanical Drawings

2.1 Flow Charts

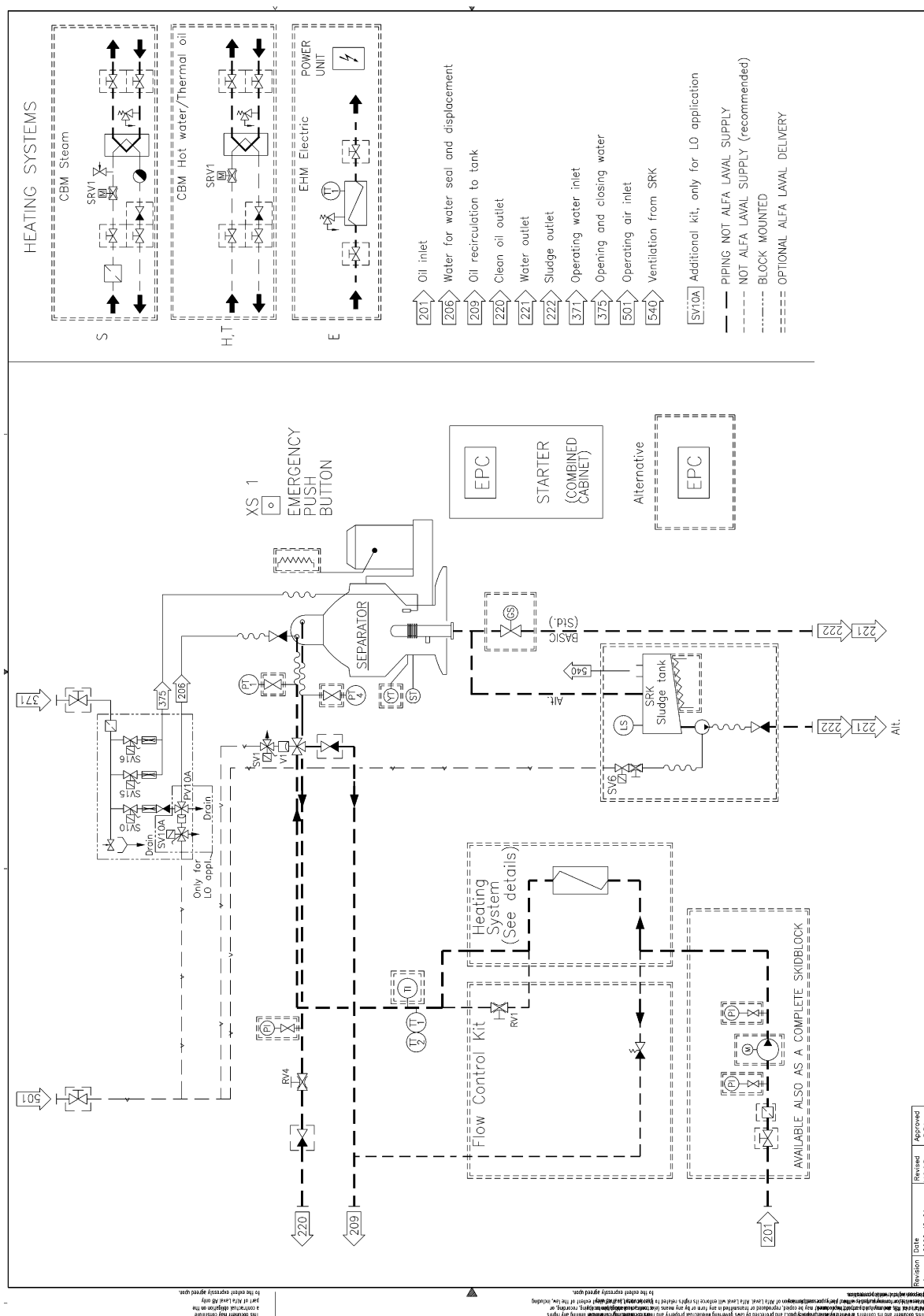
2.1.1 S-separator Basic and Optional Components

Alfa Laval ref. 584767 Rev. 2



2.1.2 P-Separator Basic and Optional Components

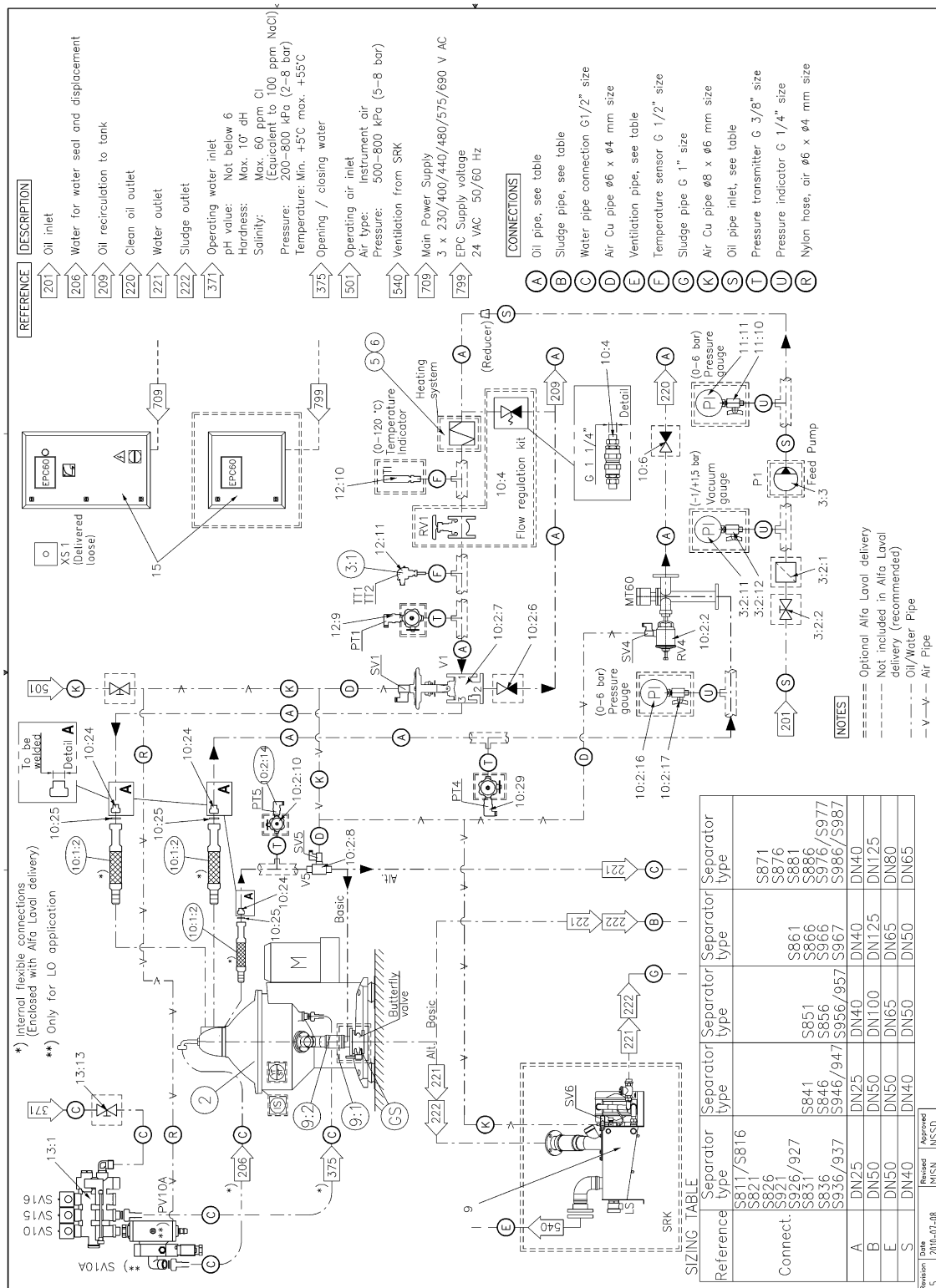
Alfa Laval ref. 584768 Rev. 4



2.2 Mounting Drawings

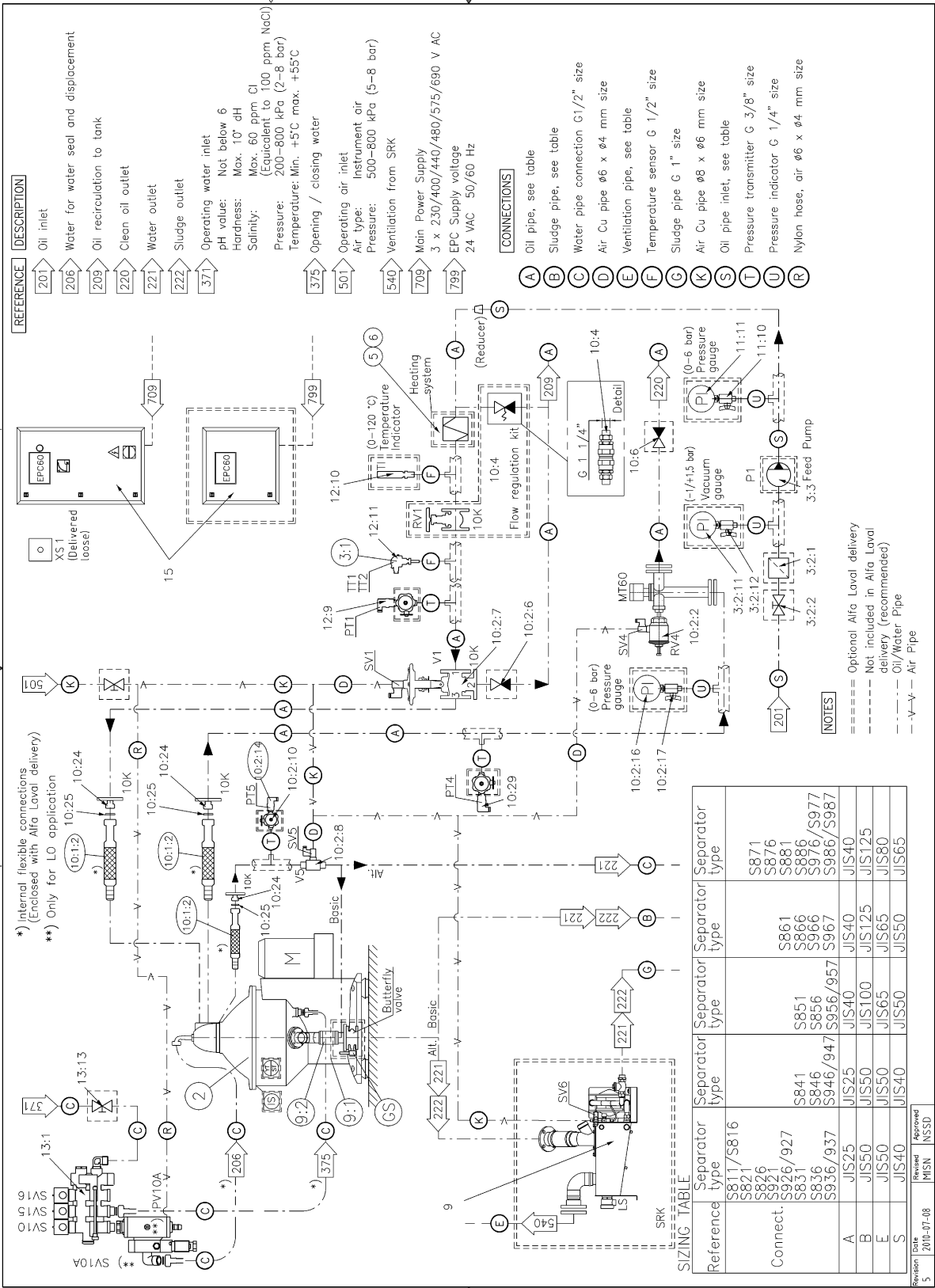
2.2.1 S-Separator DIN Mounting Drawing

Alfa Laval ref. 584354 Rev. 5



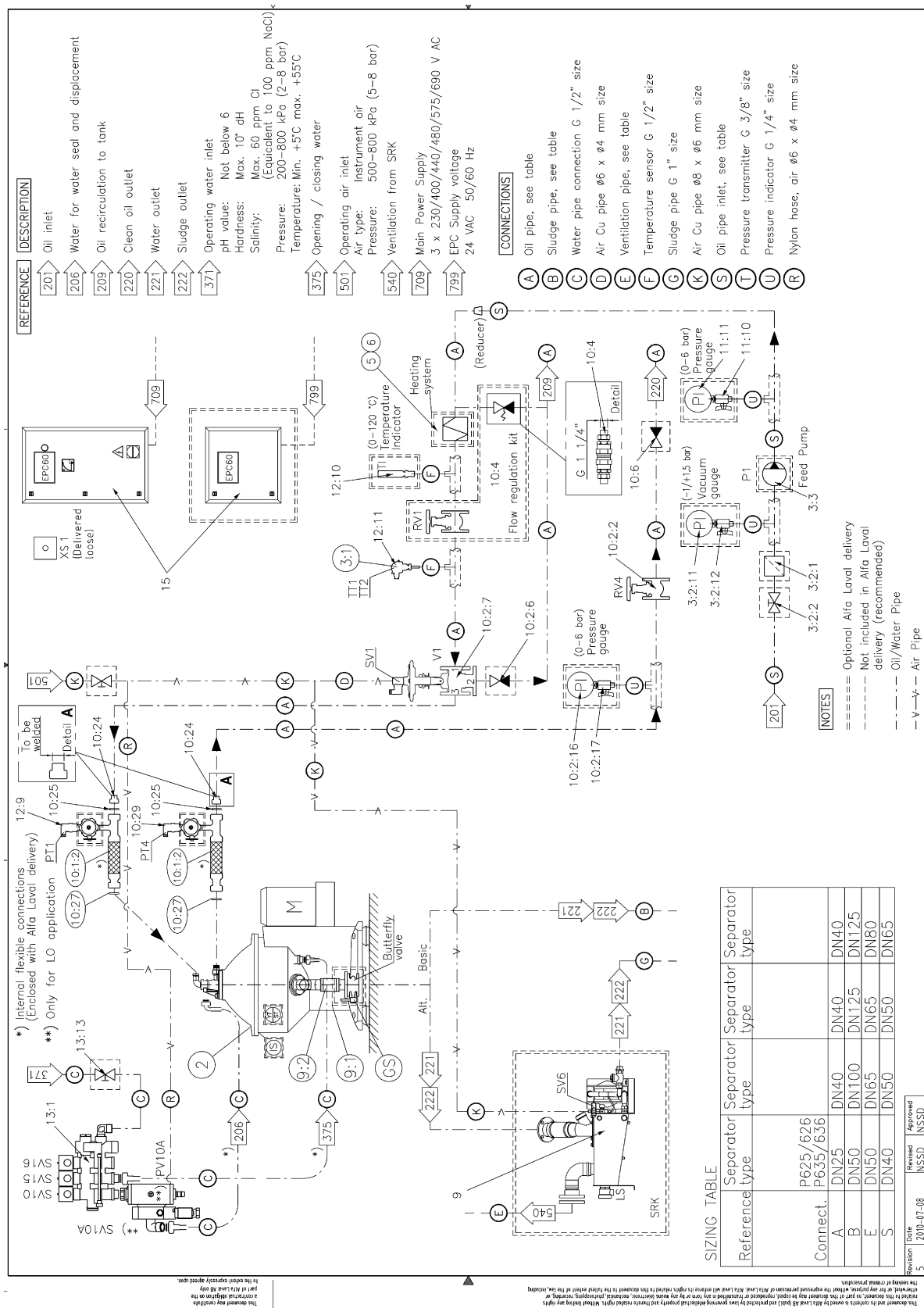
2.2.2 S-Separator JIS Mounting Drawing

Alfa Laval ref. 584355 Rev. 5



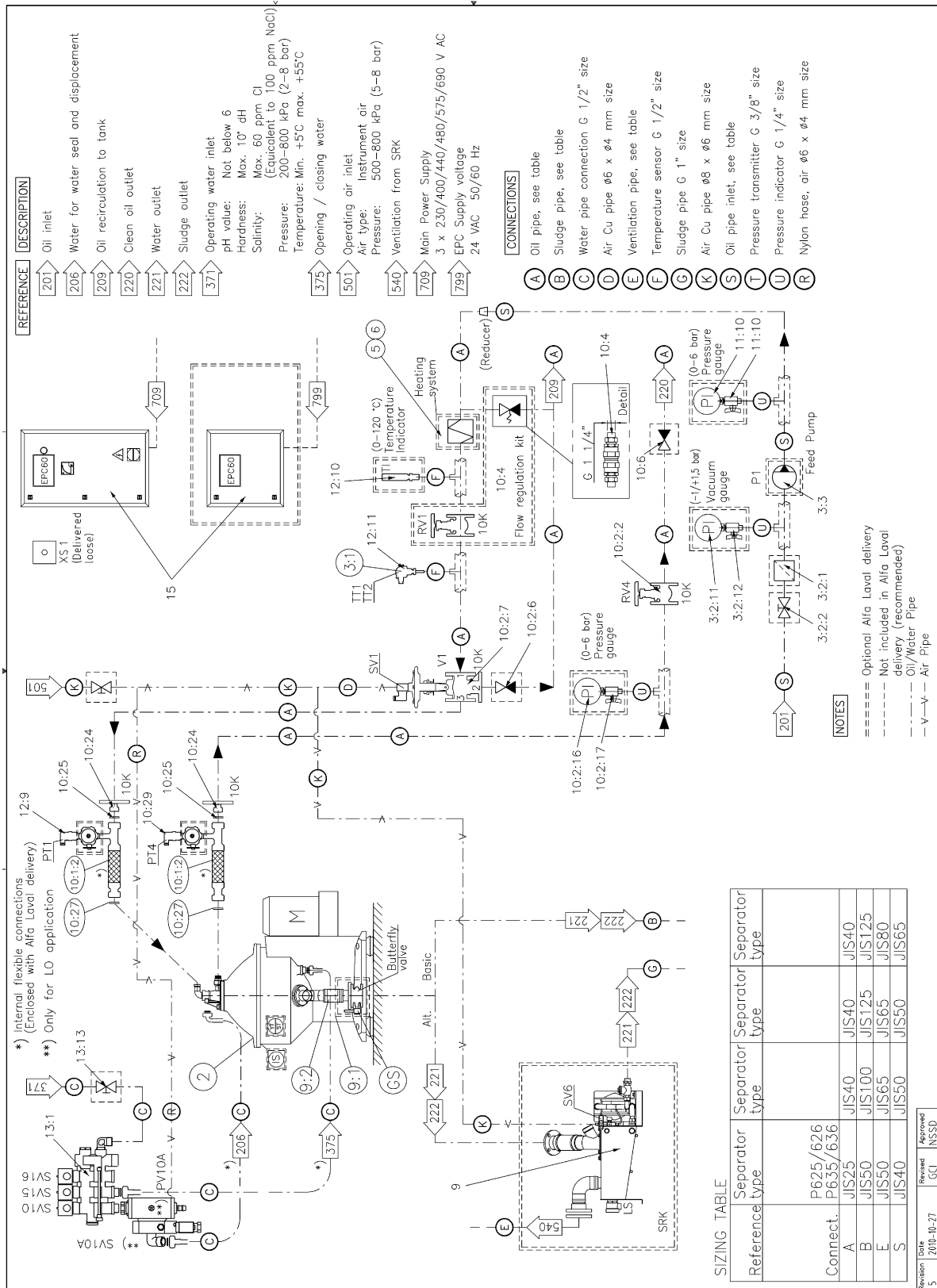
2.2.3 P-Separator DIN Mounting Drawing

Alfa Laval ref. 584356 Rev. 5



2.2.4 P-Separator JIS Mounting Drawing

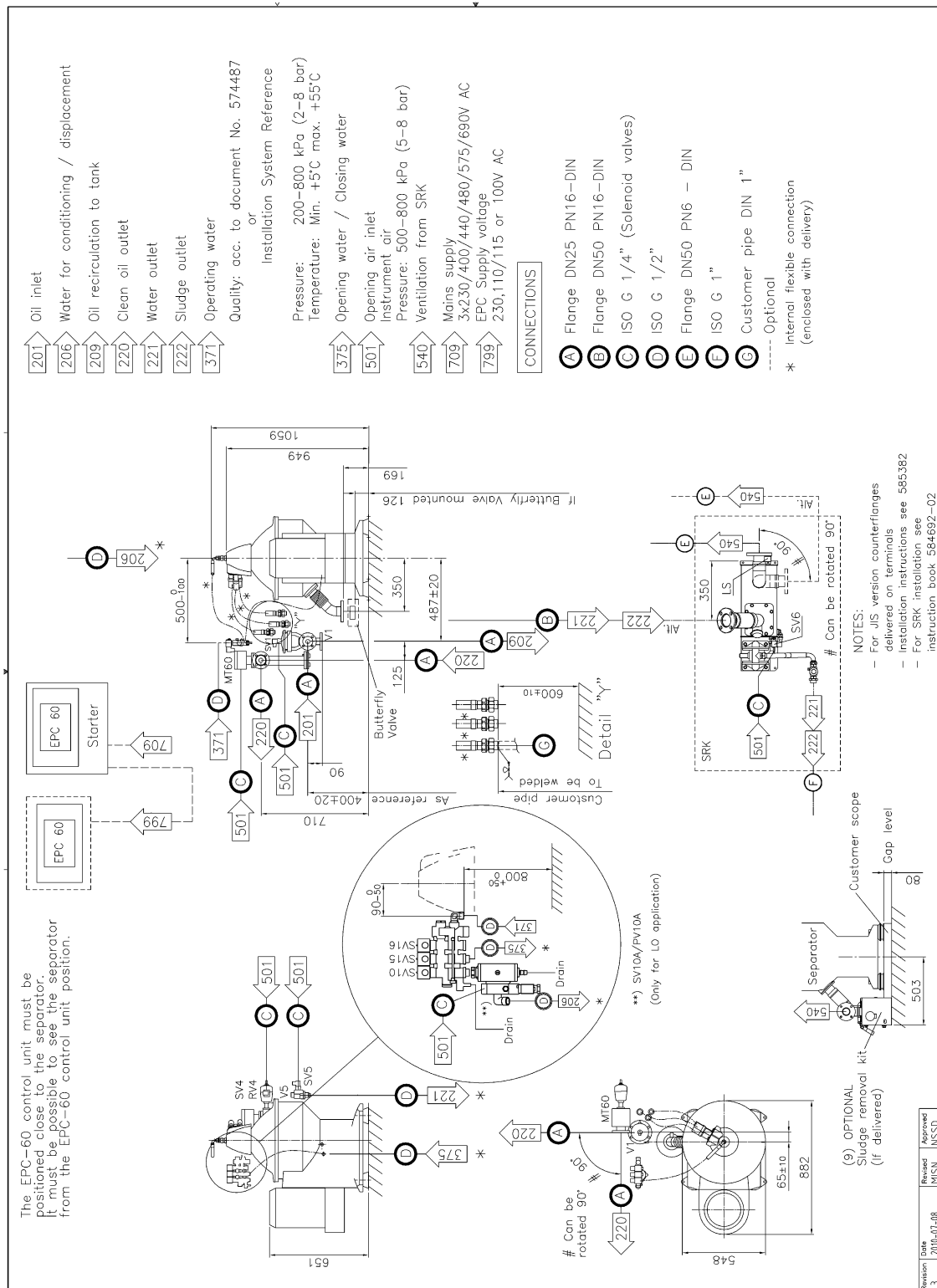
Alfa Laval ref. 584357 Rev. 5



2.3 Installation Drawings

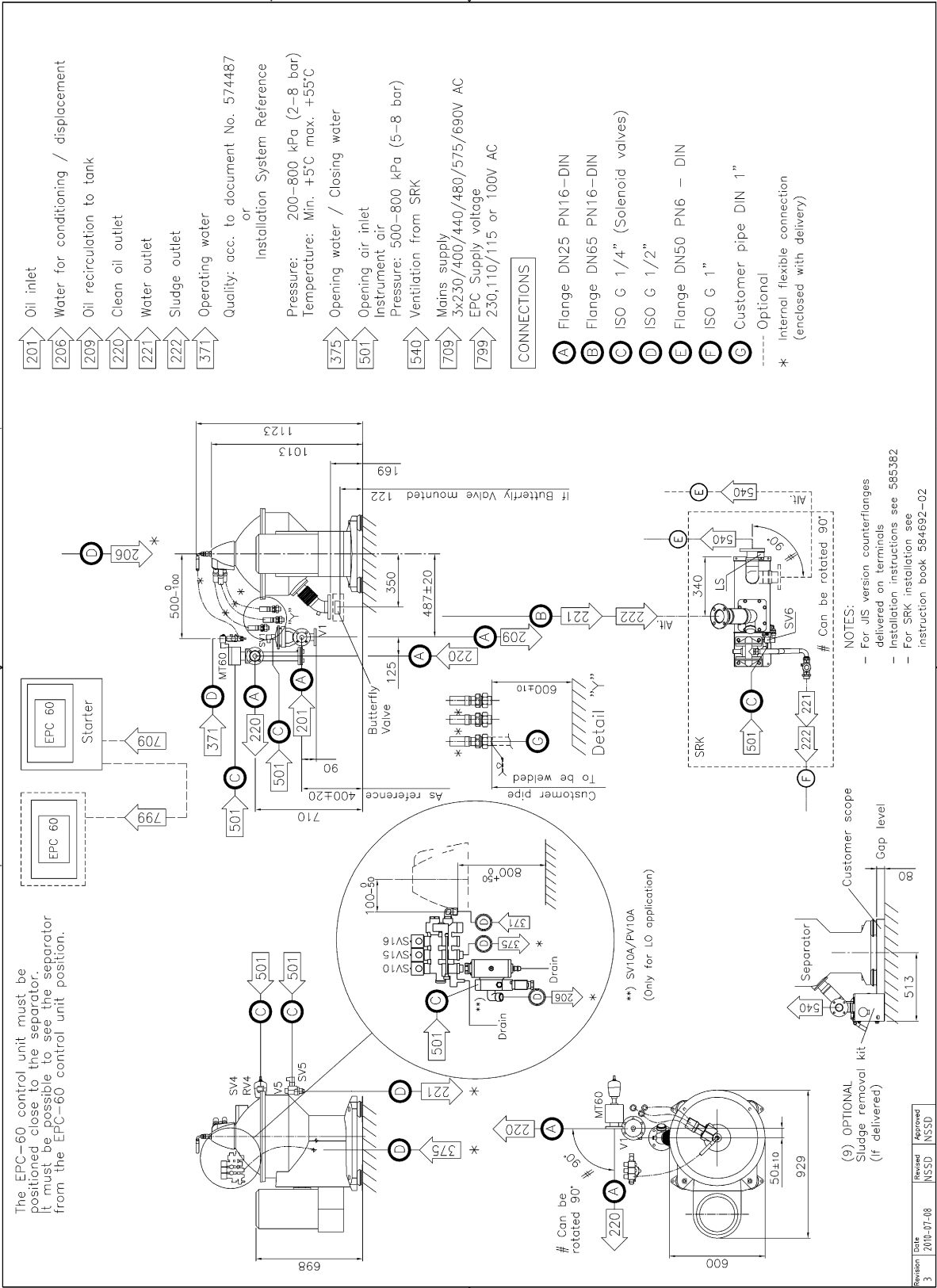
2.3.1 S 831 - S 937 Separator Installation Drawing

Alfa Laval ref. 585170 Rev. 3



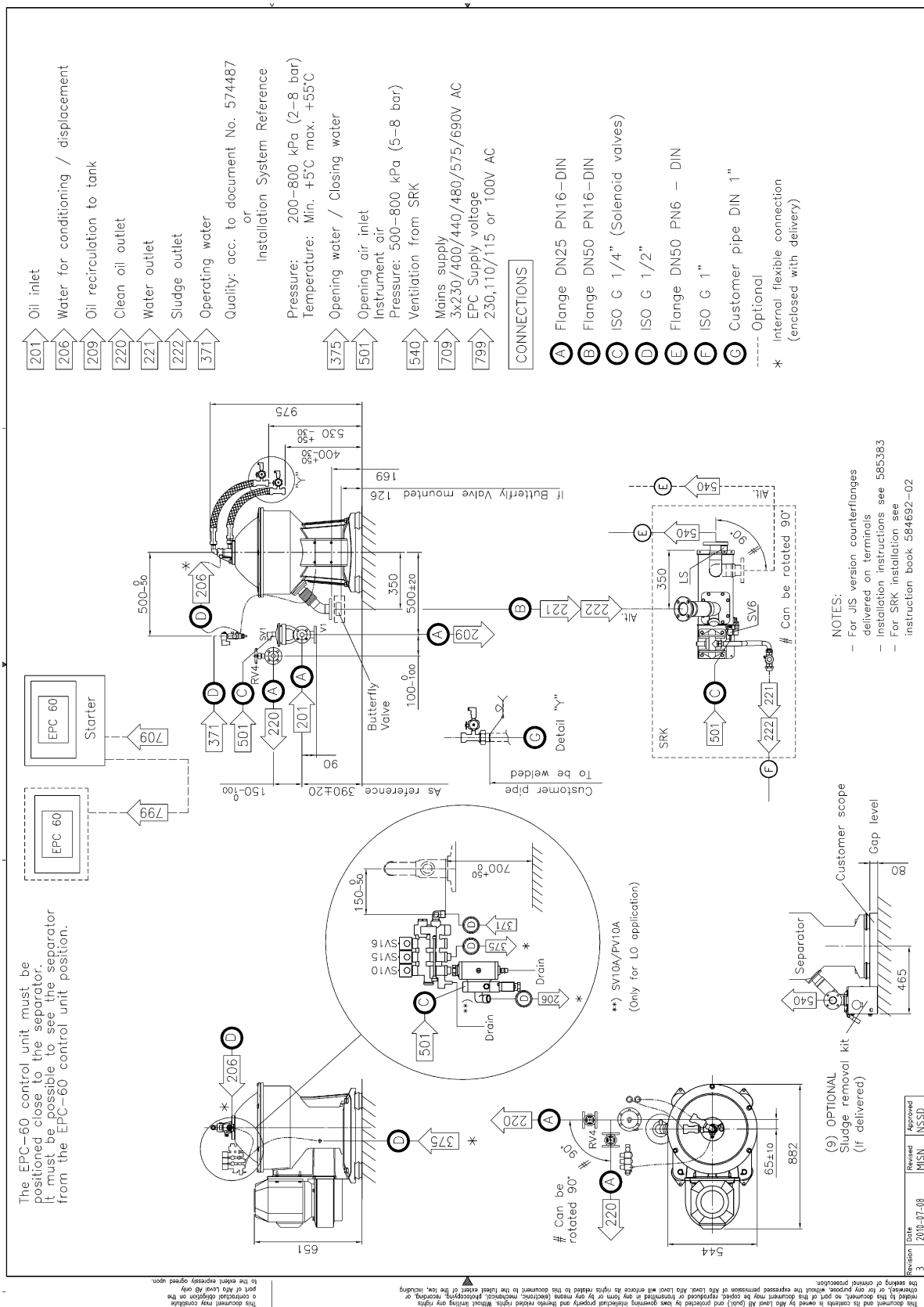
2.3.2 S 841 - S 947 Separator Installation Drawing

Alfa Laval ref. 585171 Rev. 3



2.3.3 P 635/636 Separator Installation Drawing

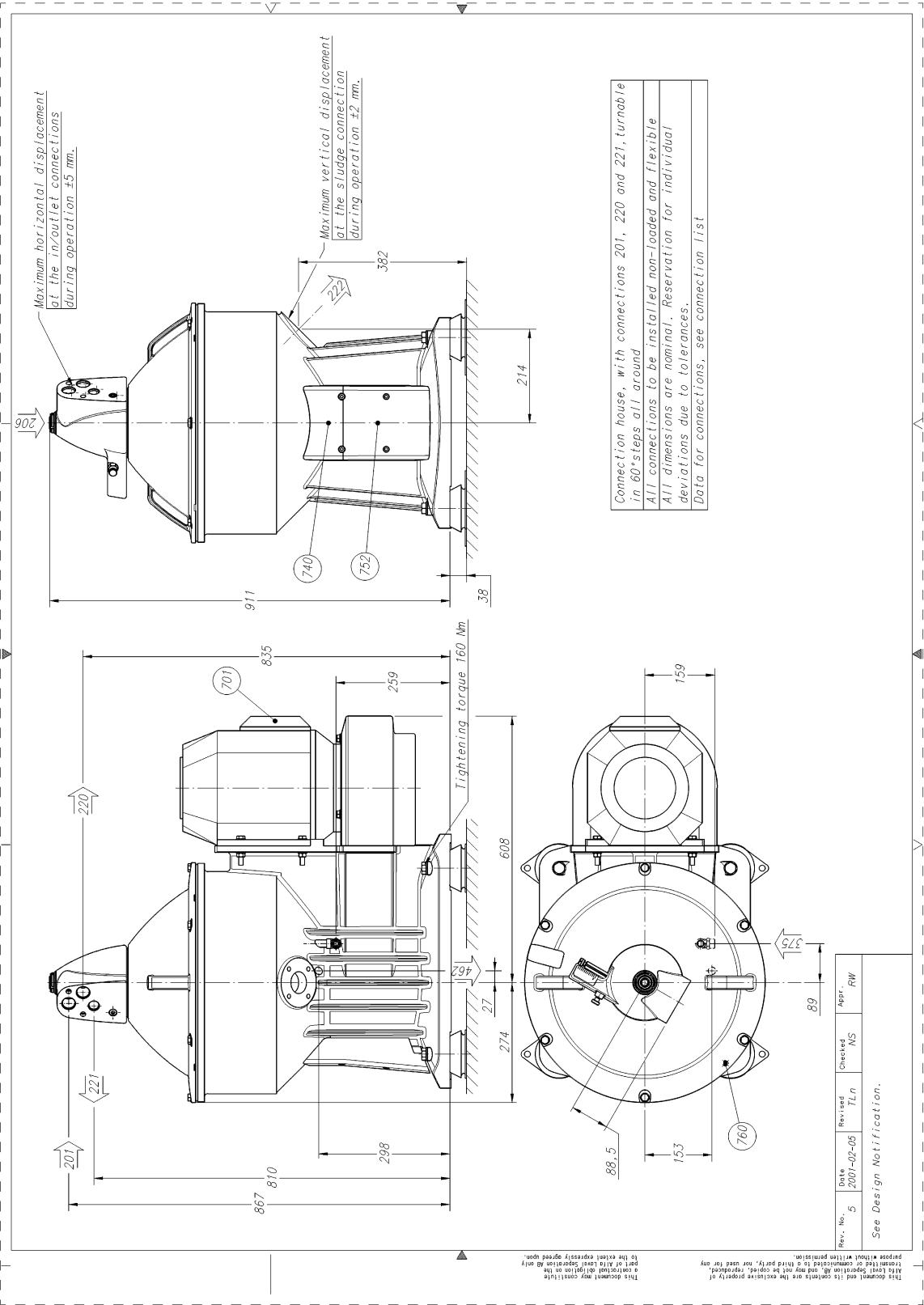
Alfa Laval ref. 585167 Rev. 3



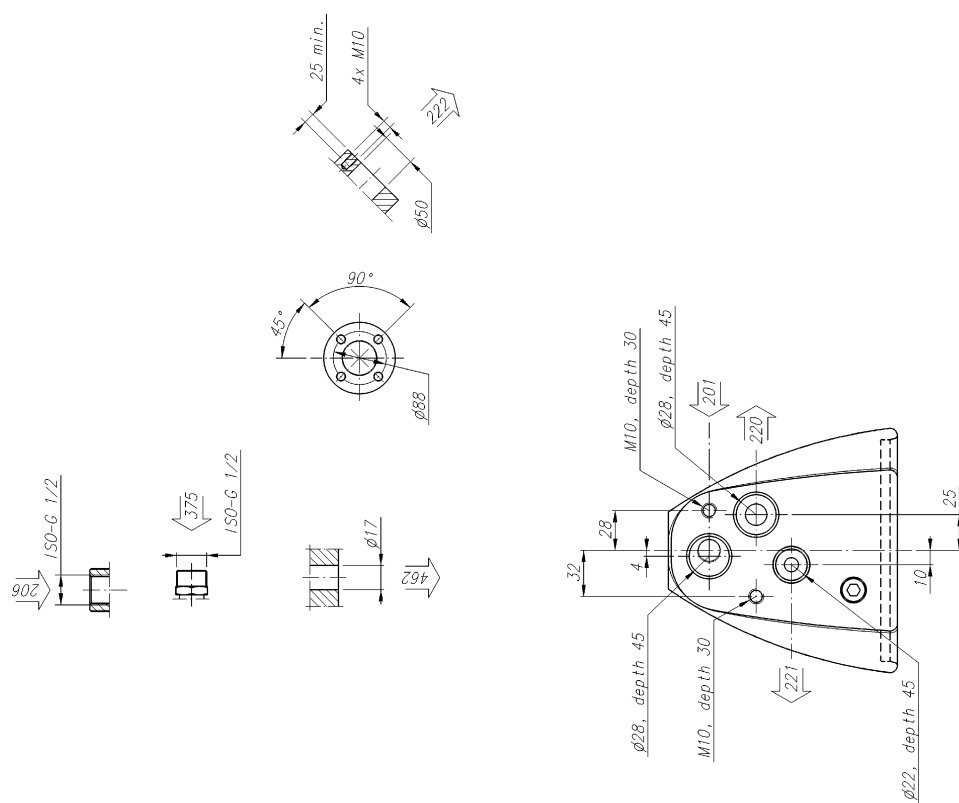
2.4 Basic Size Drawings

2.4.1 S 831 - S 937 Separator Basic Size Drawing

Alfa Laval ref. 561693 Rev. 5



Alfa Laval ref. 561693 Rev. 5

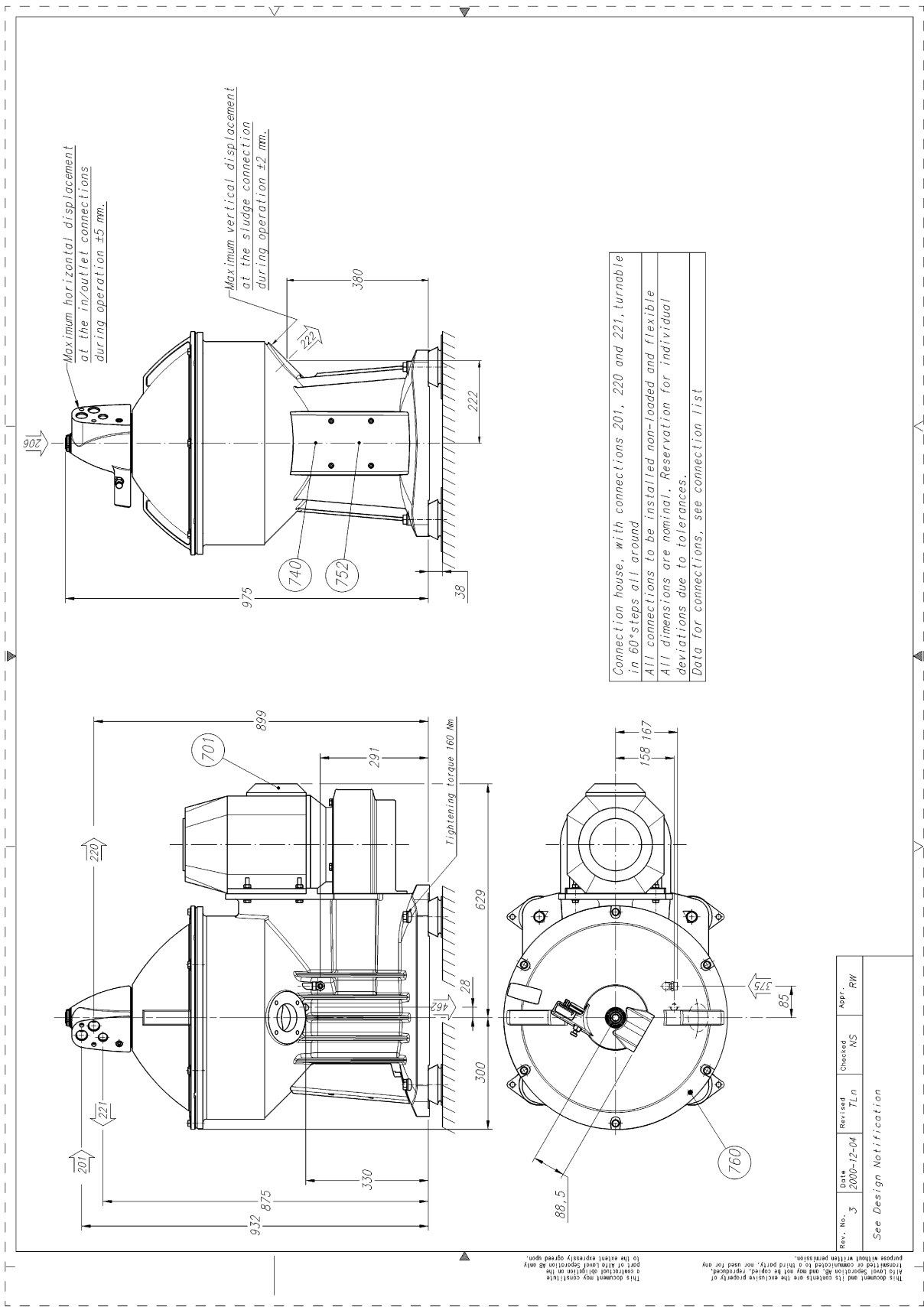


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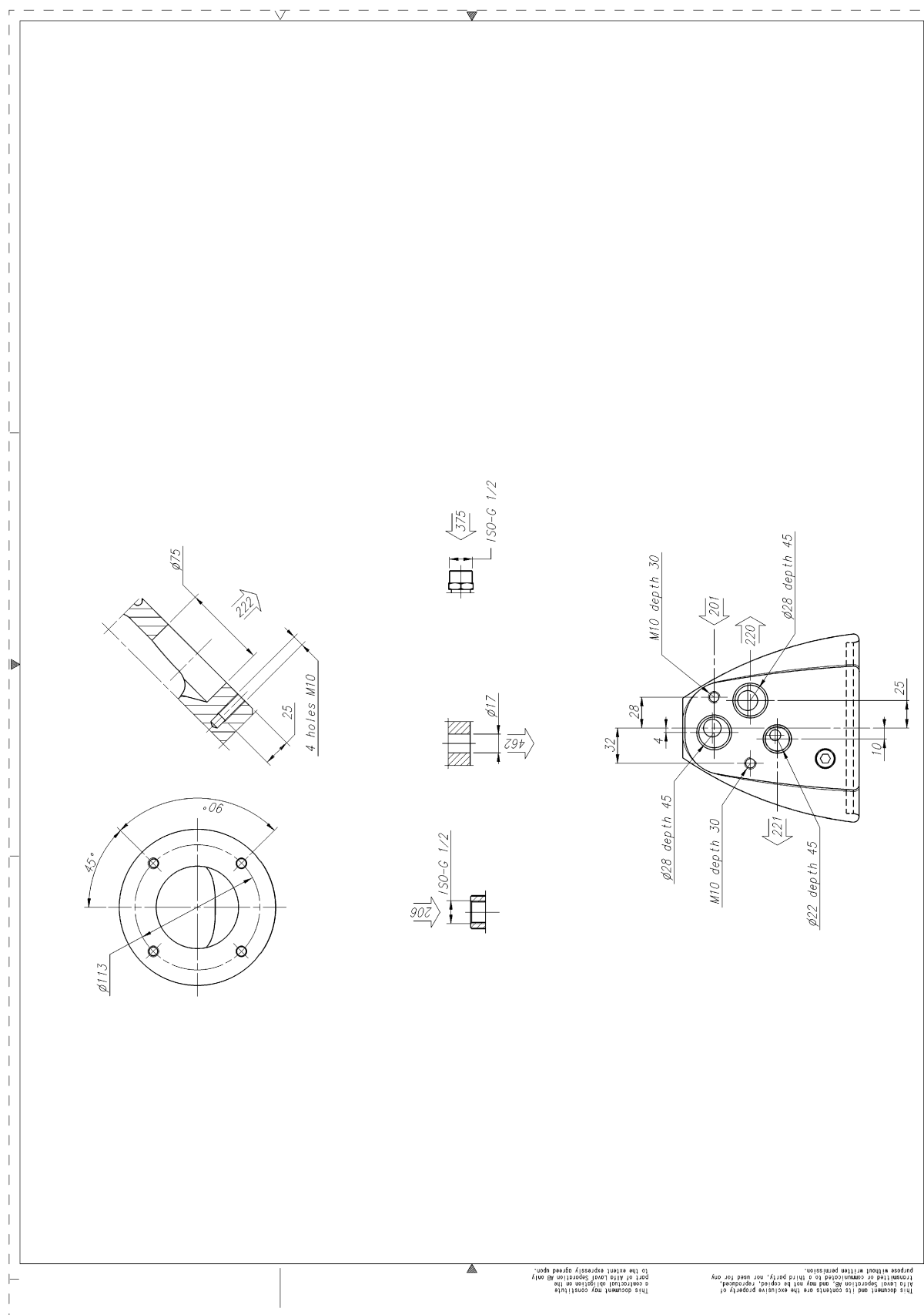
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2.4.2 S 841 - S 947 Separator Basic Size Drawing

Alfa Laval ref. 562557 Rev. 3

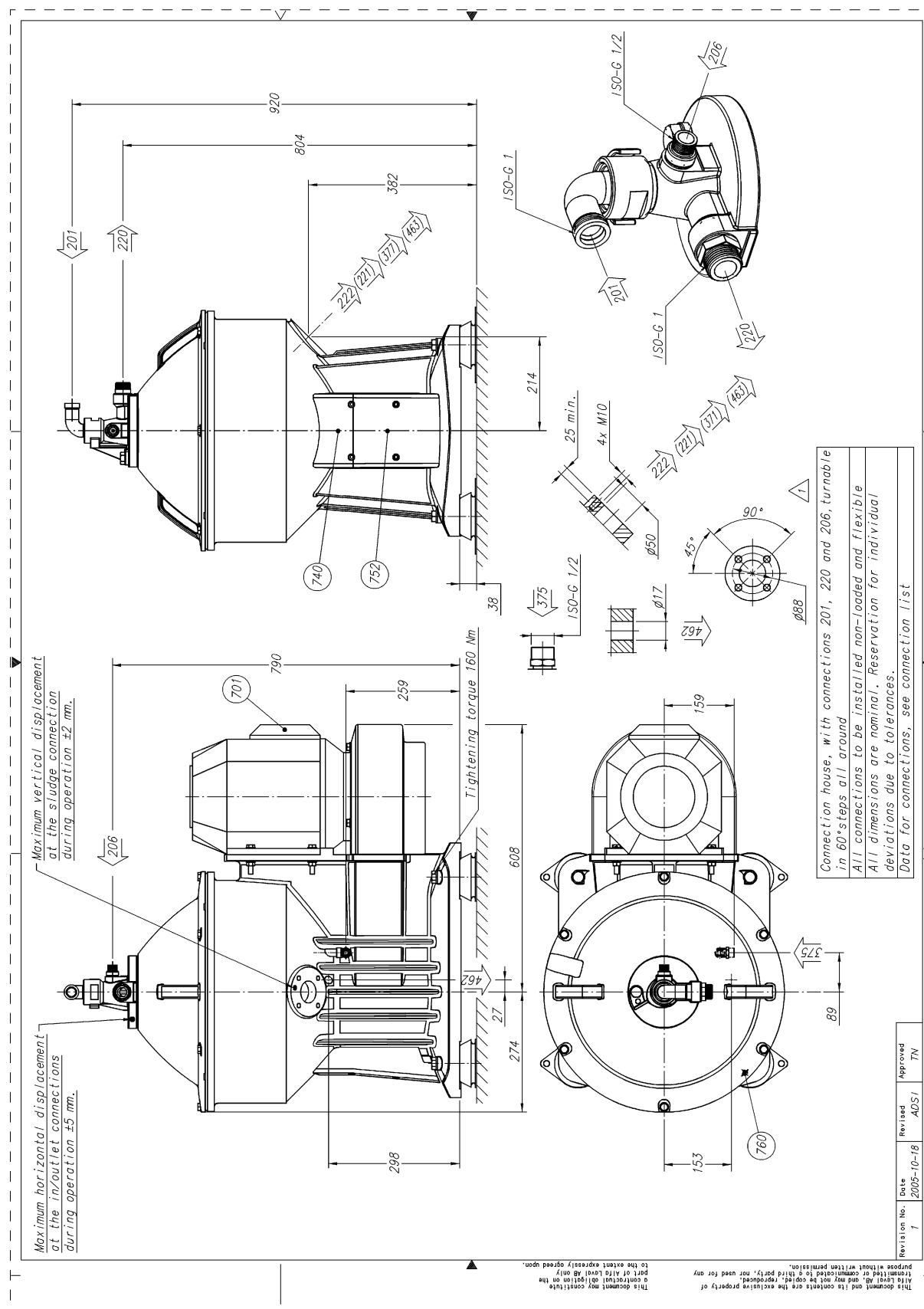


Alfa Laval ref. 562557 Rev. 3



2.4.3 P 635/636 Separator Basic Size Drawing

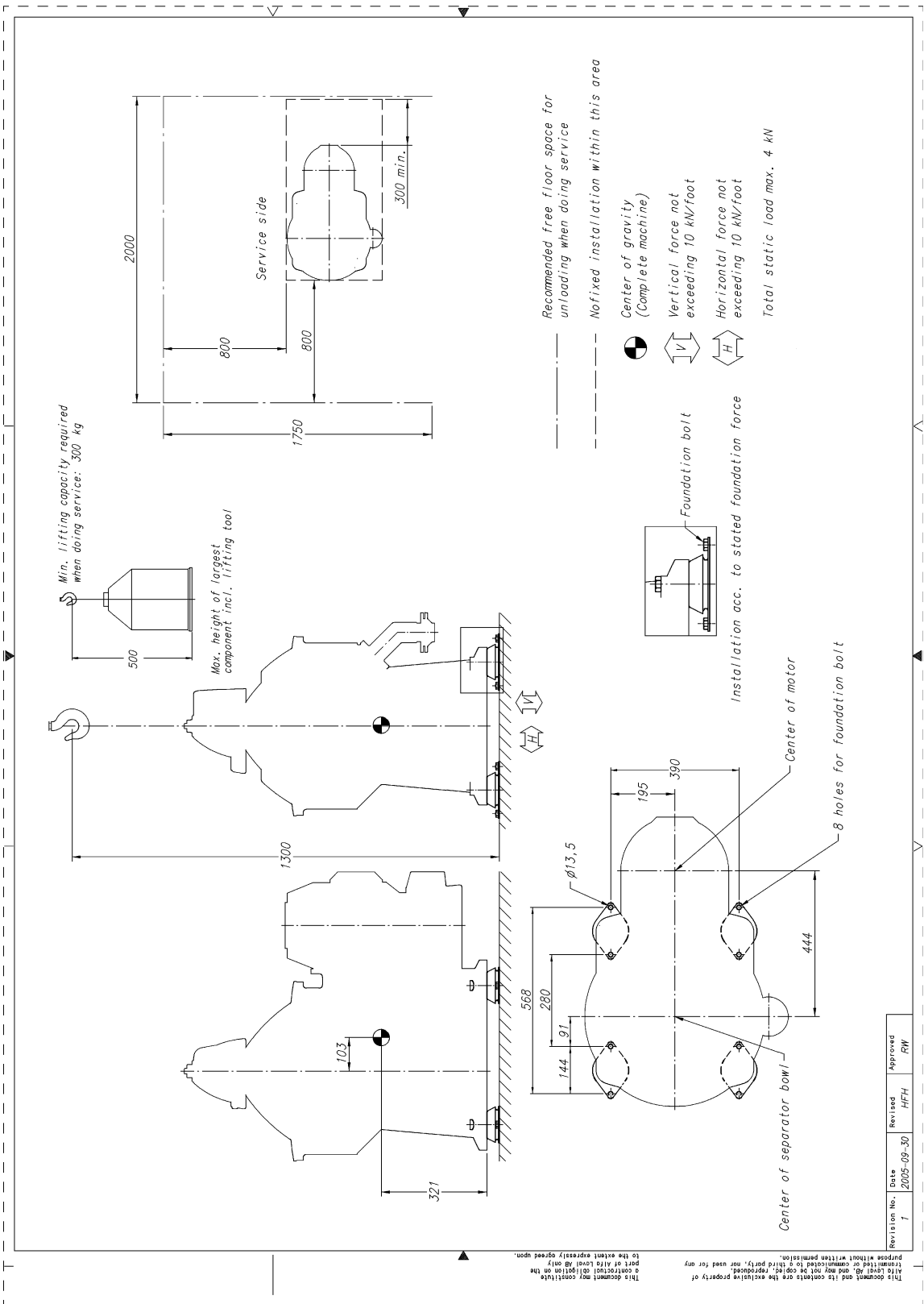
Alfa Laval ref. 578121 Rev. 1



2.5 Foundation Drawings

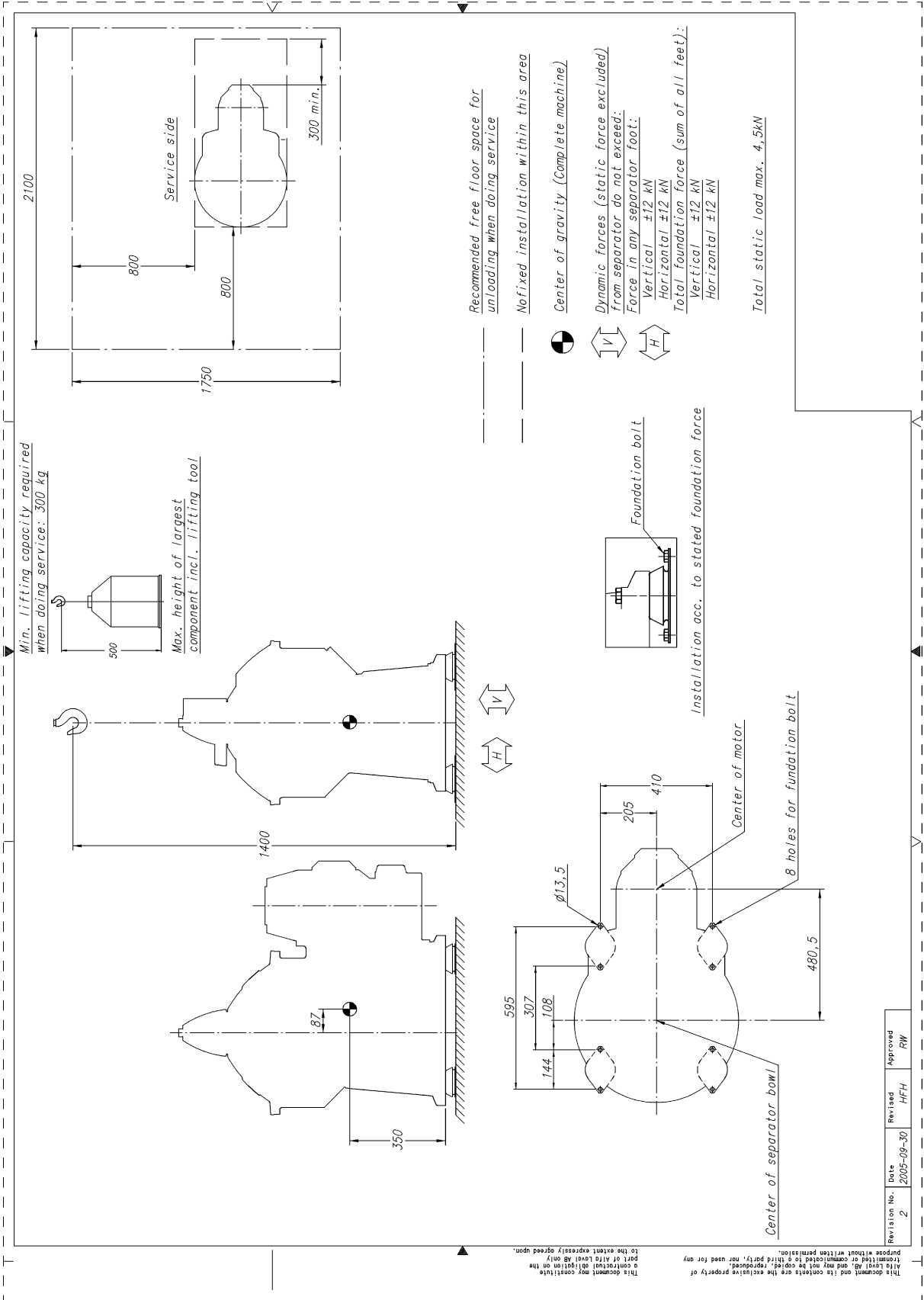
2.5.1 S 831 - S 937 Foundation Drawing

Alfa Laval ref. 561726 Rev. 1



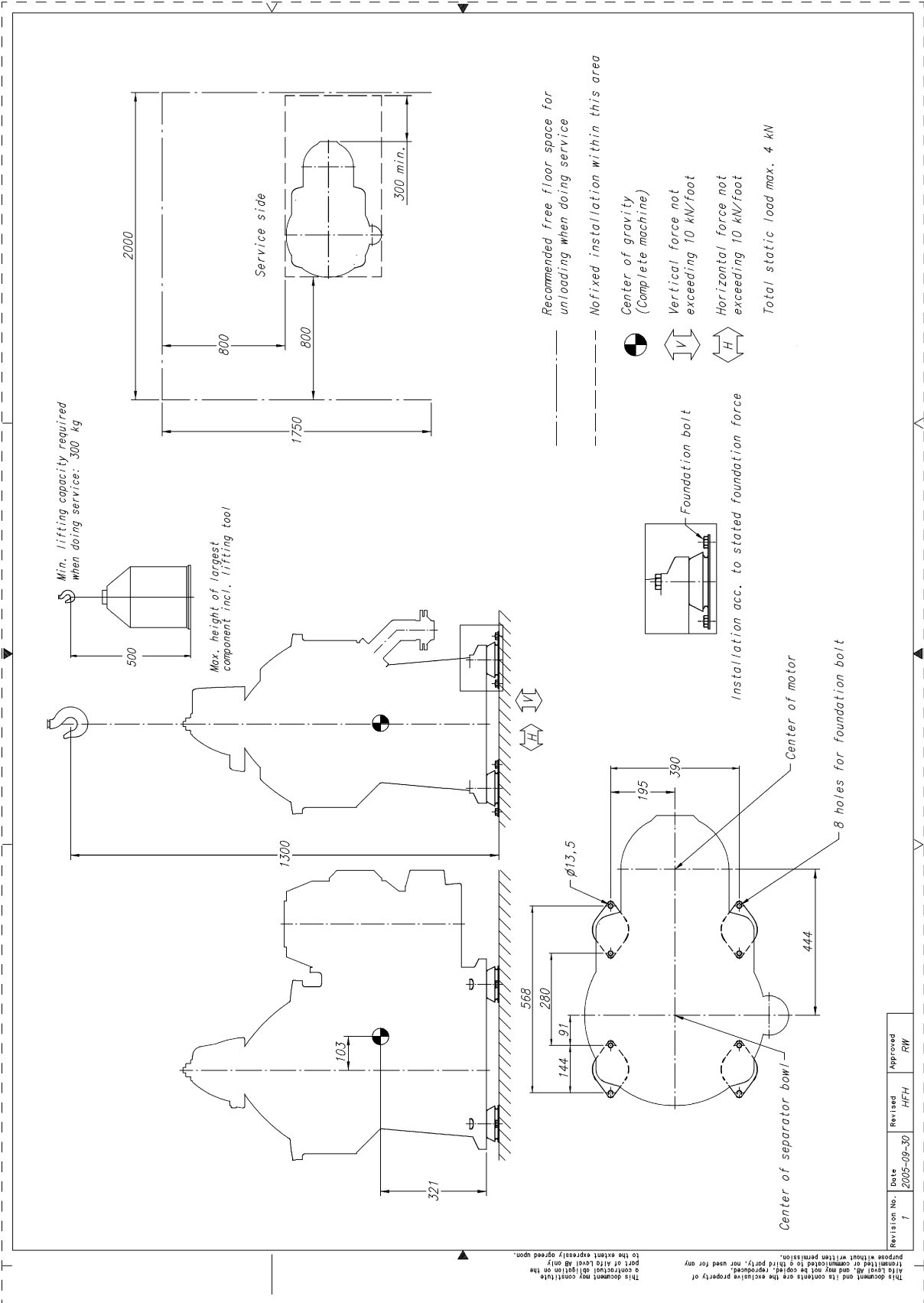
2.5.2 S 841 - S 947 Foundation Drawing

Alfa Laval ref. 562553 Rev. 2



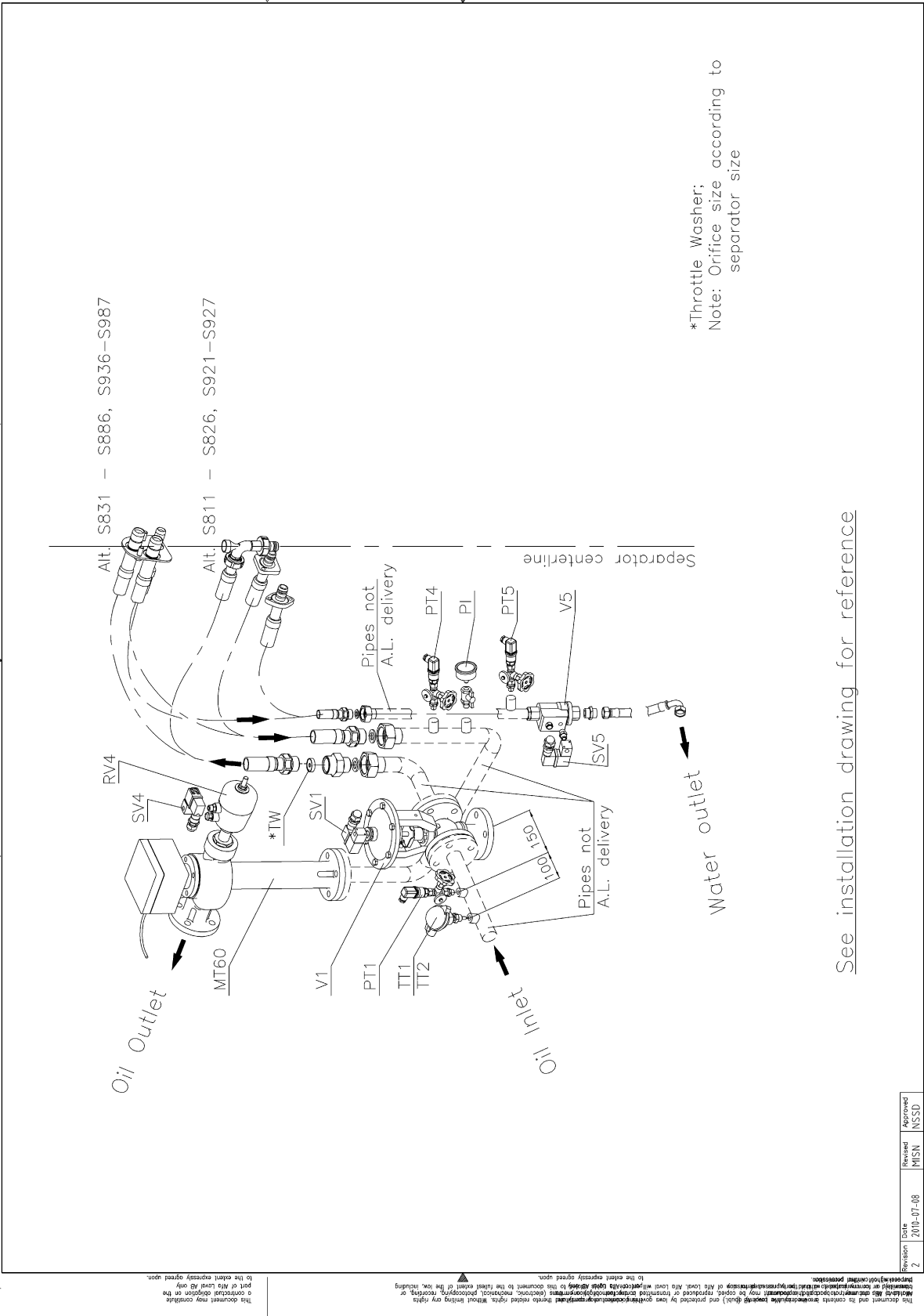
2.5.3 P 635/636 Foundation Drawing

Alfa Laval ref. 561726 Rev. 1



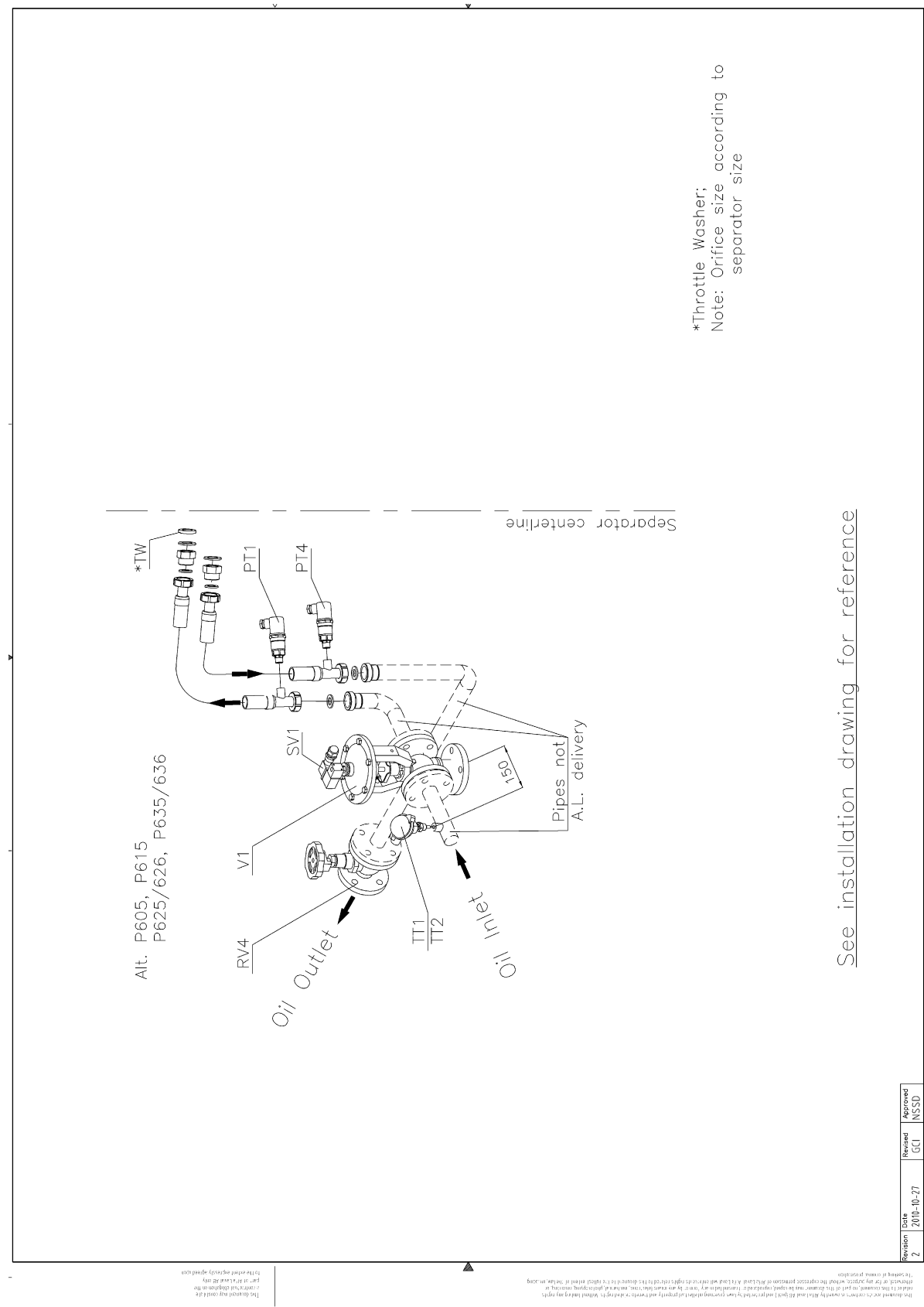
2.6 S-Separator Pipe Arrangement

Alfa Laval ref. 585382 Rev. 2



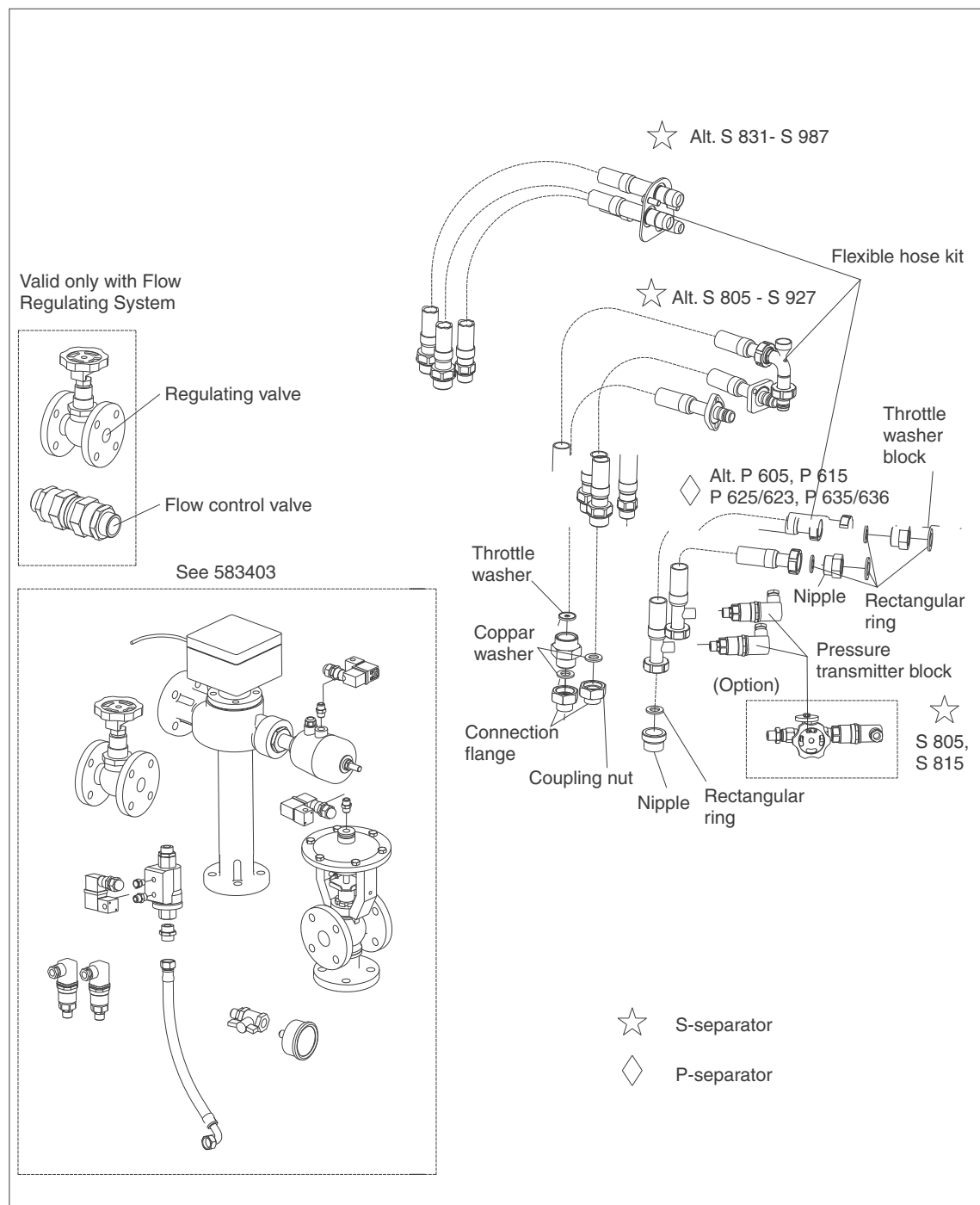
2.7 P-Separator Pipe Arrangement

Alfa Laval ref. 585383 Rev. 2



2.8 Valve Block Oil Assembly Drawing

Alfa Laval ref. 583476 Rev. 2

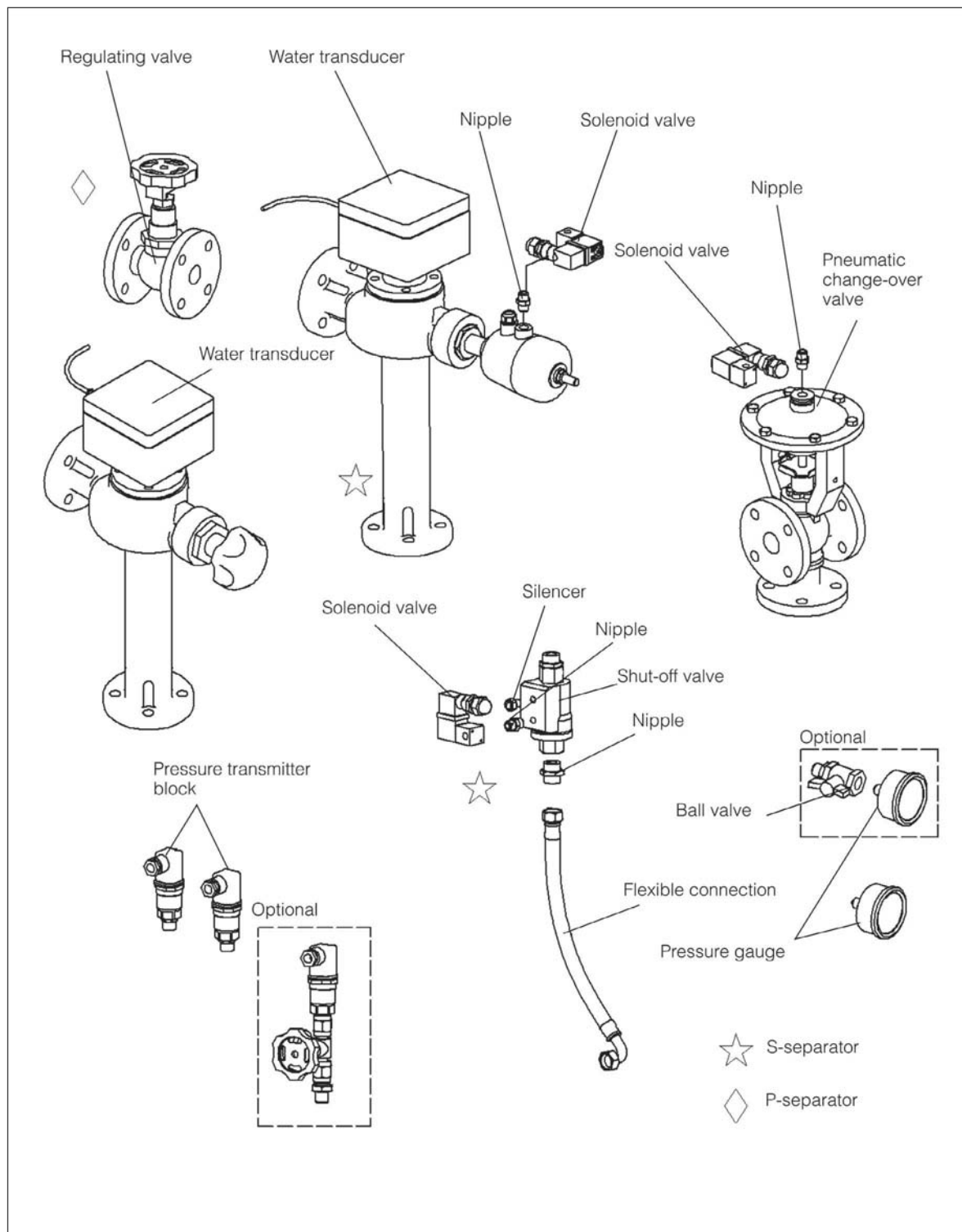


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Throttle washers		
	Oil type	Hole diam. (mm)
P 635/636	IF60, IF100, LOTP, LOXH, HFO180, HFO380, HFO460, HFO600	10.2
S 831 — S 937	LOTP, LOXH, HFO180, HFO380, HFO460, HFO600, HFO700	10.5
S 841 — S 947	LOTP, LOXH, HFO180, HFO380, HFO460, HFO600, HFO700	12.3

2.9 Valve Block Oil Assembly Drawing cont.

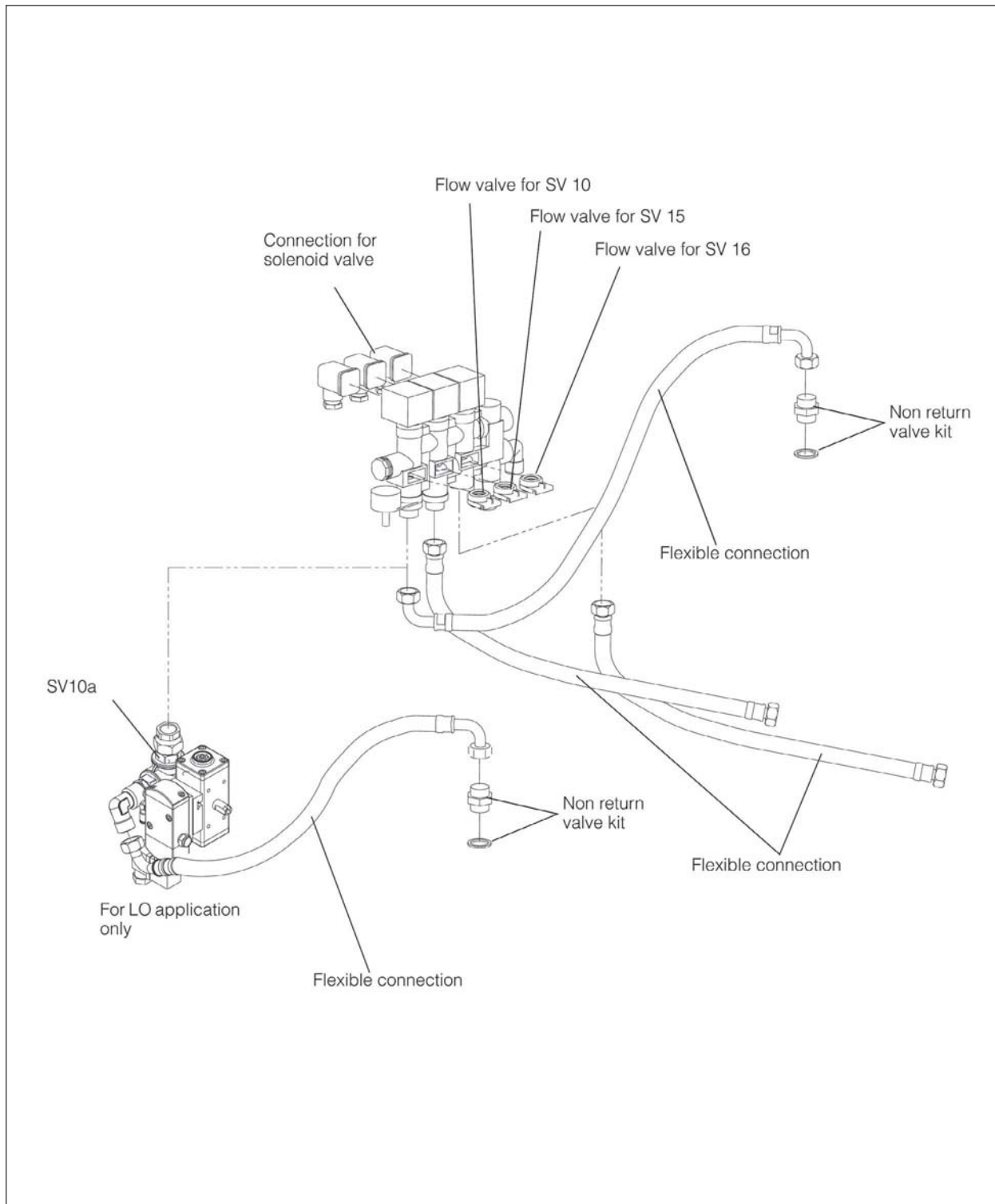
Alfa Laval ref. 583403 Rev. 2



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2.10 Valve Block Water Assembly Drawing

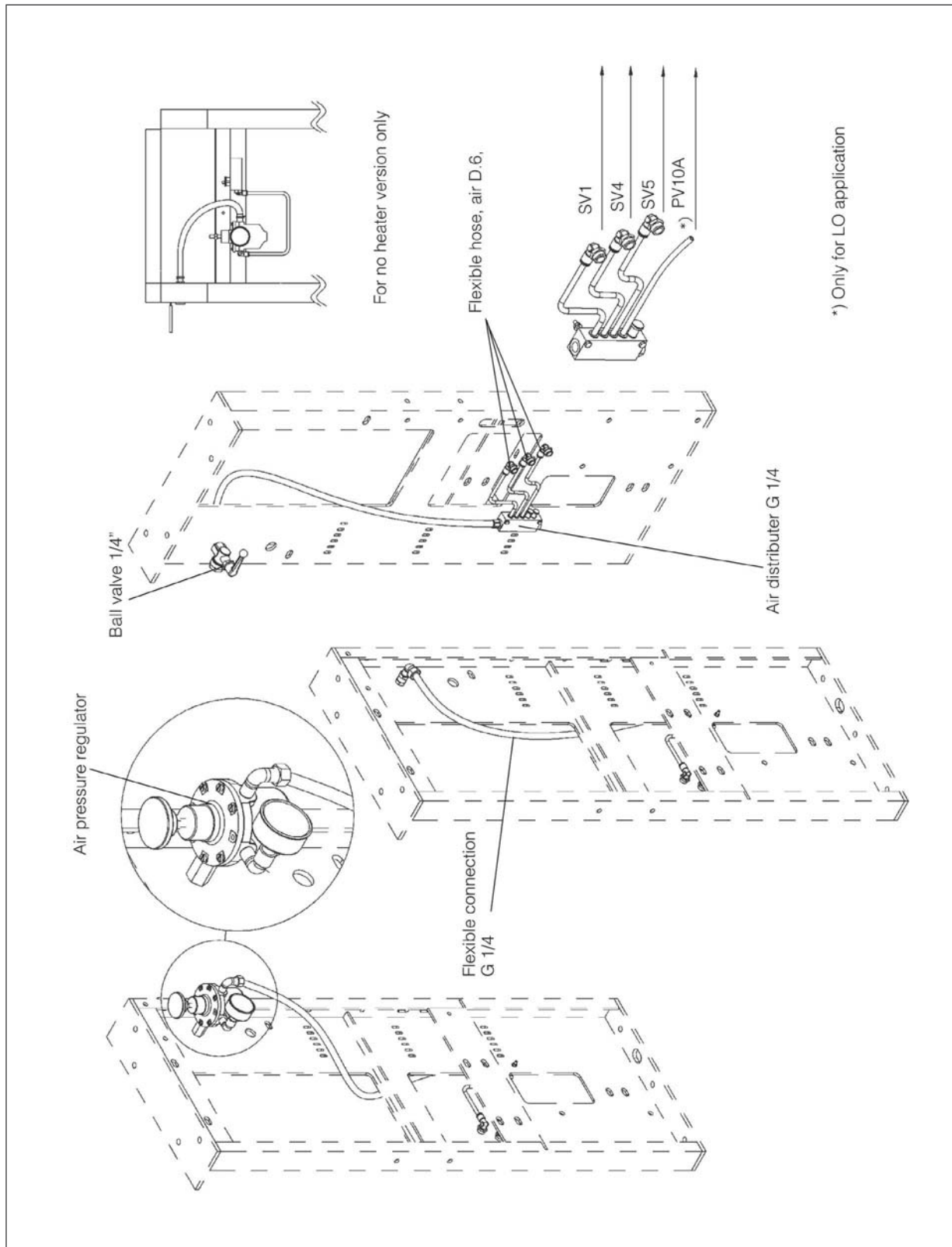
Alfa Laval ref. 583410 Rev. 1



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2.11 Air Distributer Kit

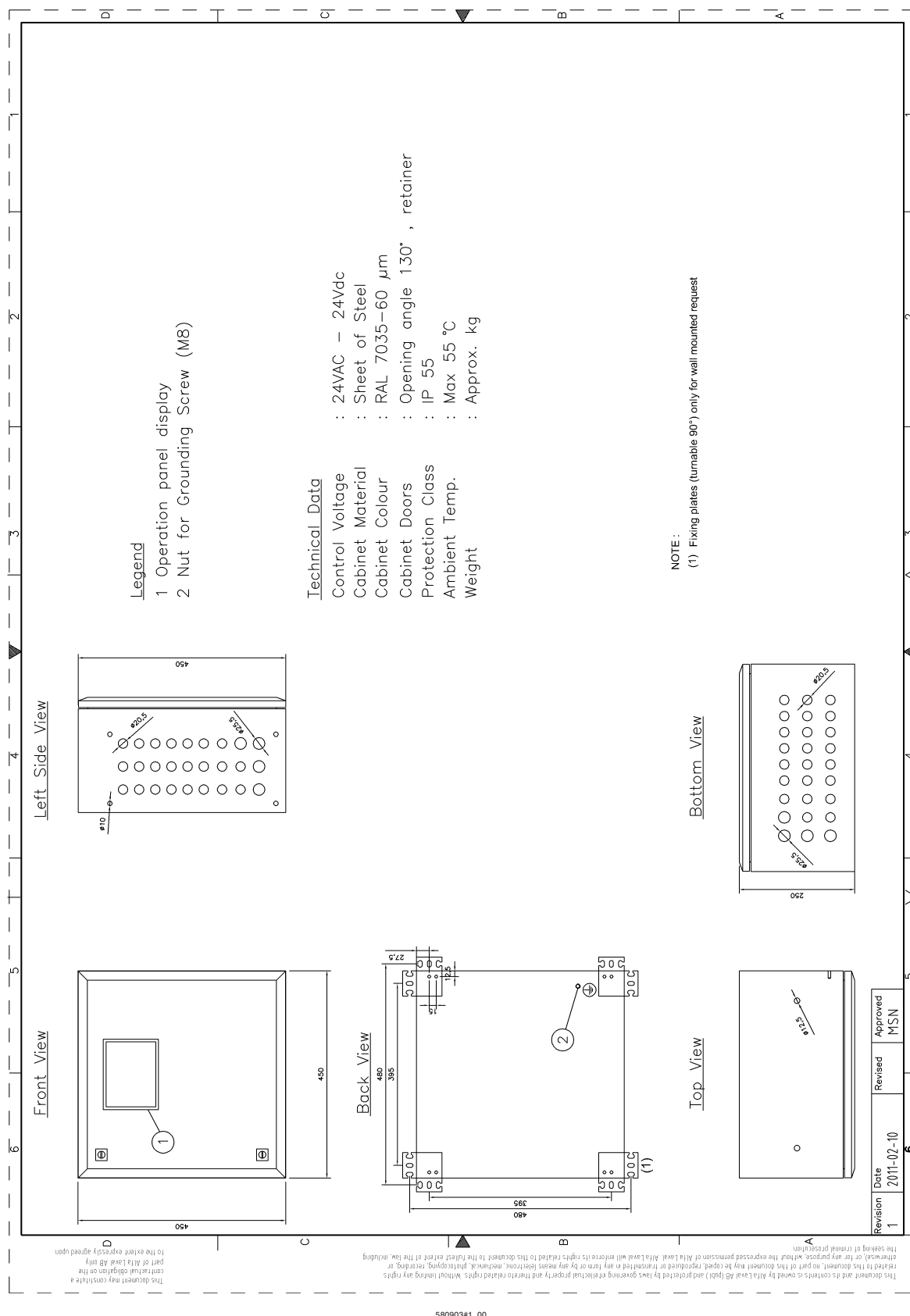
Alfa Laval ref. 582806 Rev. 3



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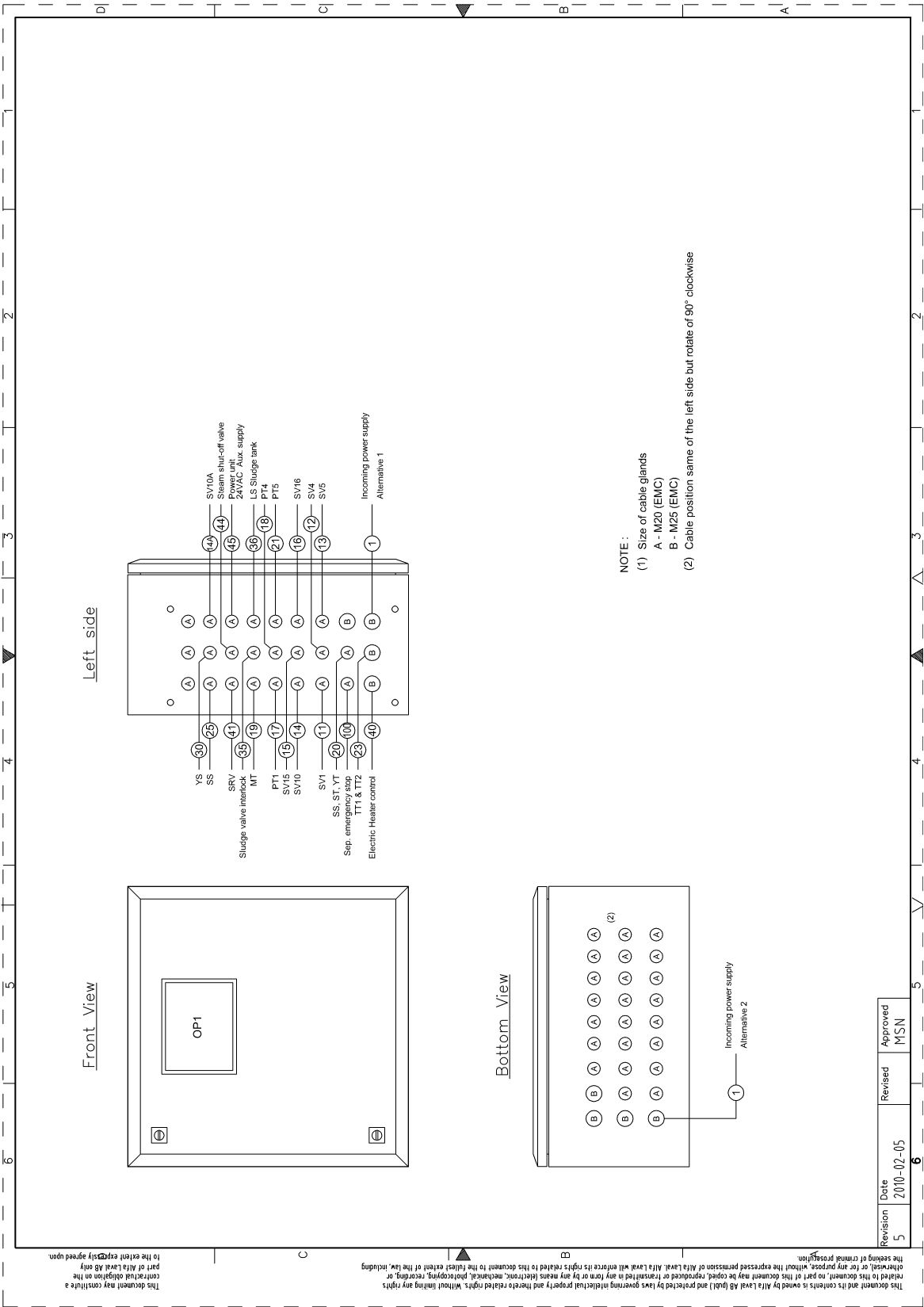
2.12 Control Cabinet Dimension Drawing

Alfa Laval ref. 580903 Rev. 1

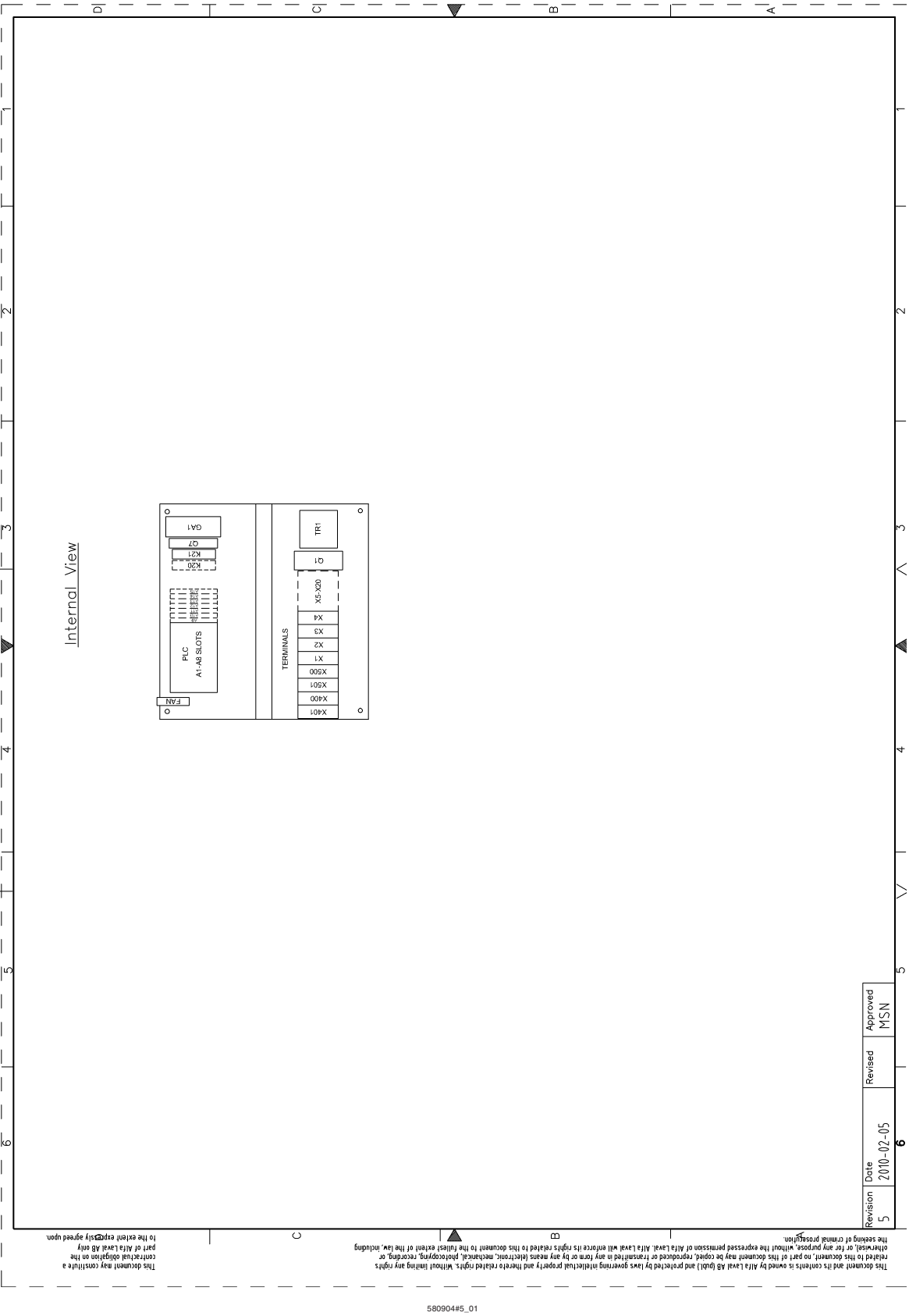


2.13 Control Cabinet Assembly Drawing, External

Alfa Laval ref. 580904 Rev. 5



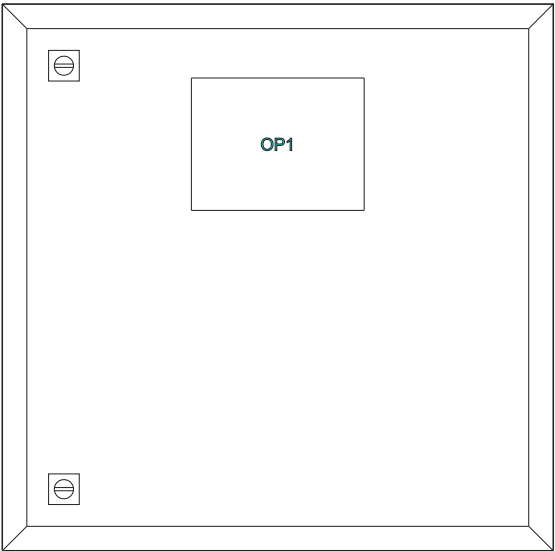
Alfa Laval ref. 580904 Rev. 5



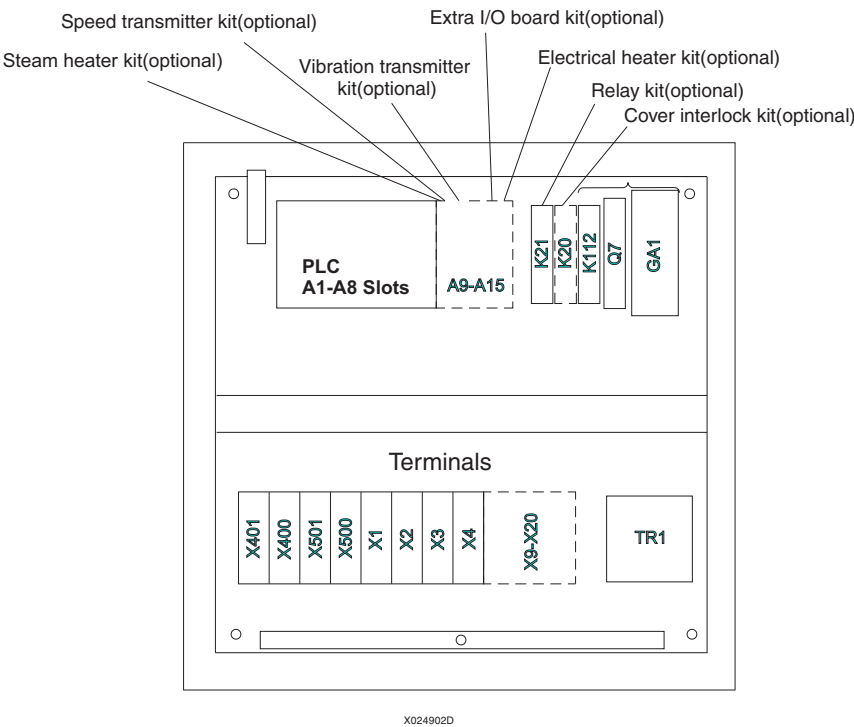
2.14 Control Cabinet Assembly Drawing, Internal

Alfa Laval ref. 581002 Rev. 6

Front view



Internal view



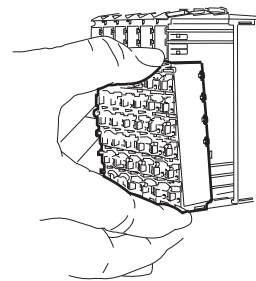
2.15 Change of EPC 60 Components

Operating Panel

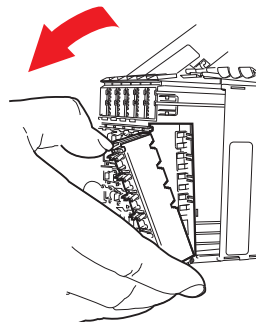
- Switch power off.
- Remove the connections on the reverse side of the panel.
- Unscrew the four screws holding the panel and remove the panel.
- Mount the new panel and connect in reverse order.

I/O-Board

- Switch power off.
- Hold down the plastic clip on the top of the cable terminal and pivot the cable terminal towards you.

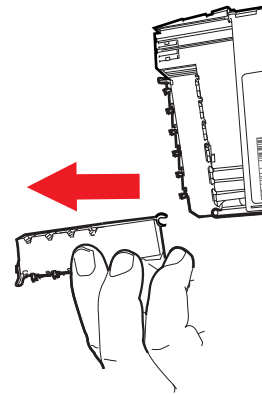


X025001A



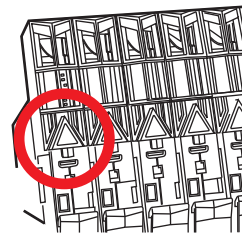
X025002A

- Pull away the cable terminal.



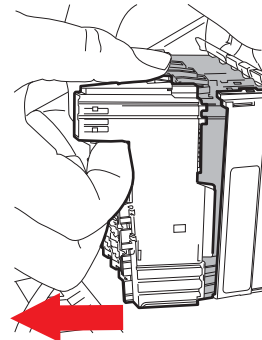
X025008A

- Hold down the triangle on the top of the I/O board and loosen the board.



X025003A

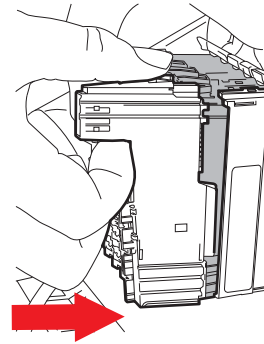
- Pull the board straight out (otherwise it can fasten in one of its guides)



X025004A

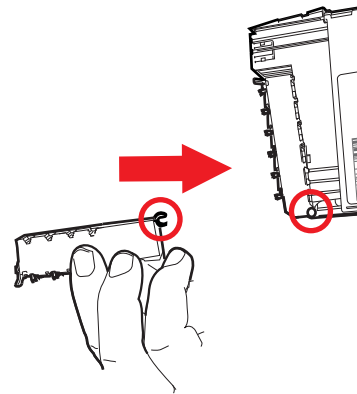
- Compare the part number of the new I/O board to the old board to make sure it is correct.
- If changing more than one board at a time, check with the electrical diagram to ensure that the boards are mounted in the right places.

- Mount the new I/O board by pressing it straight into place. Make sure the board is firmly in place otherwise it will be impossible to mount the cable terminal.



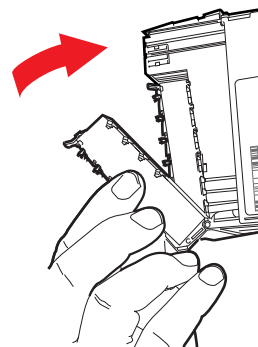
X025005A

- Remount the cable terminal. Make sure that the clip on the bottom of the terminal fastens properly in place on the axel on the bus holder.



X025007A

- Pivot the terminal on the axel until the clip on the terminal top fastens into place in the I/O board.

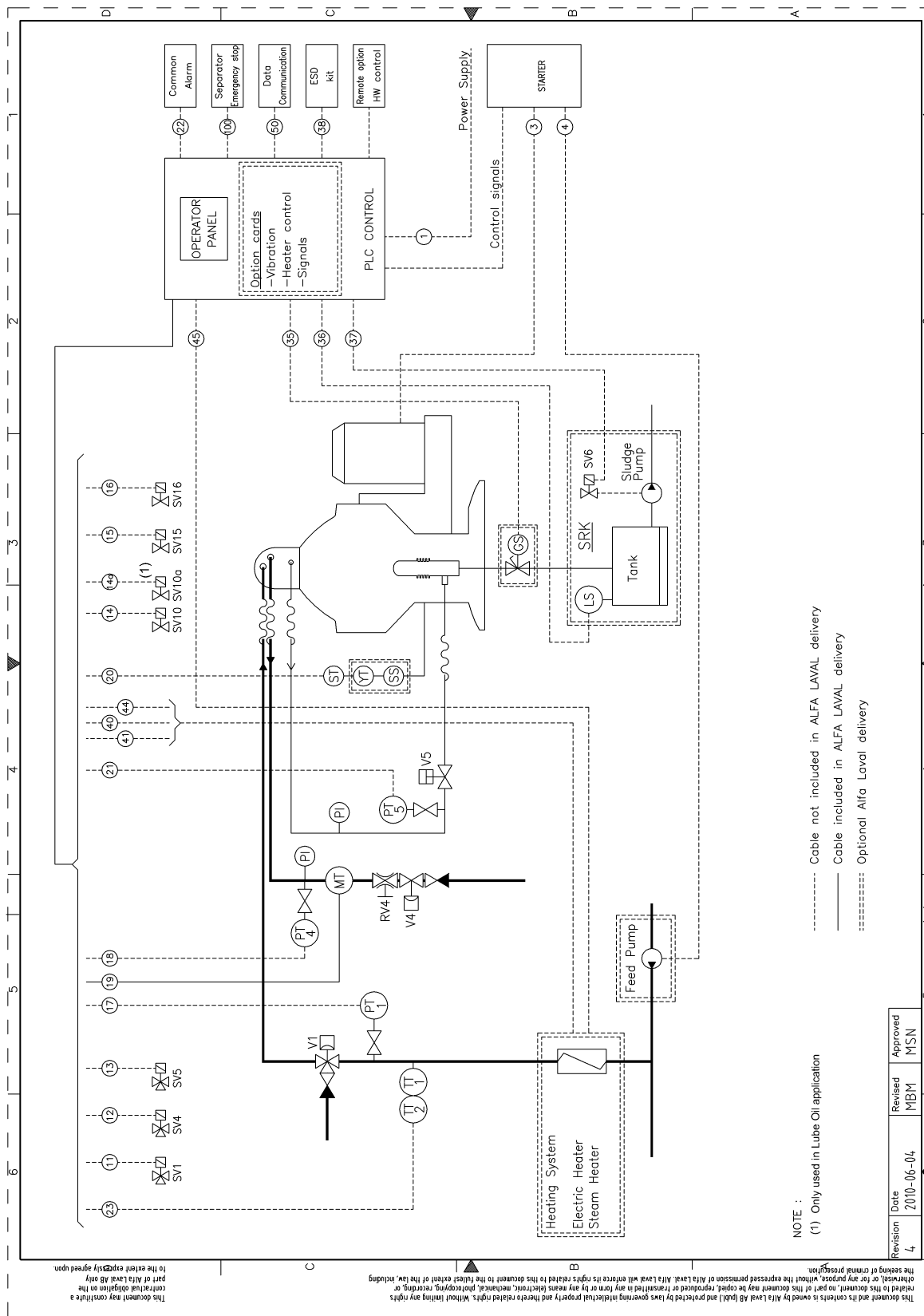


X025006A

3 *Electrical Drawings*

3.1 Electrical System Layout S 831 – S 947

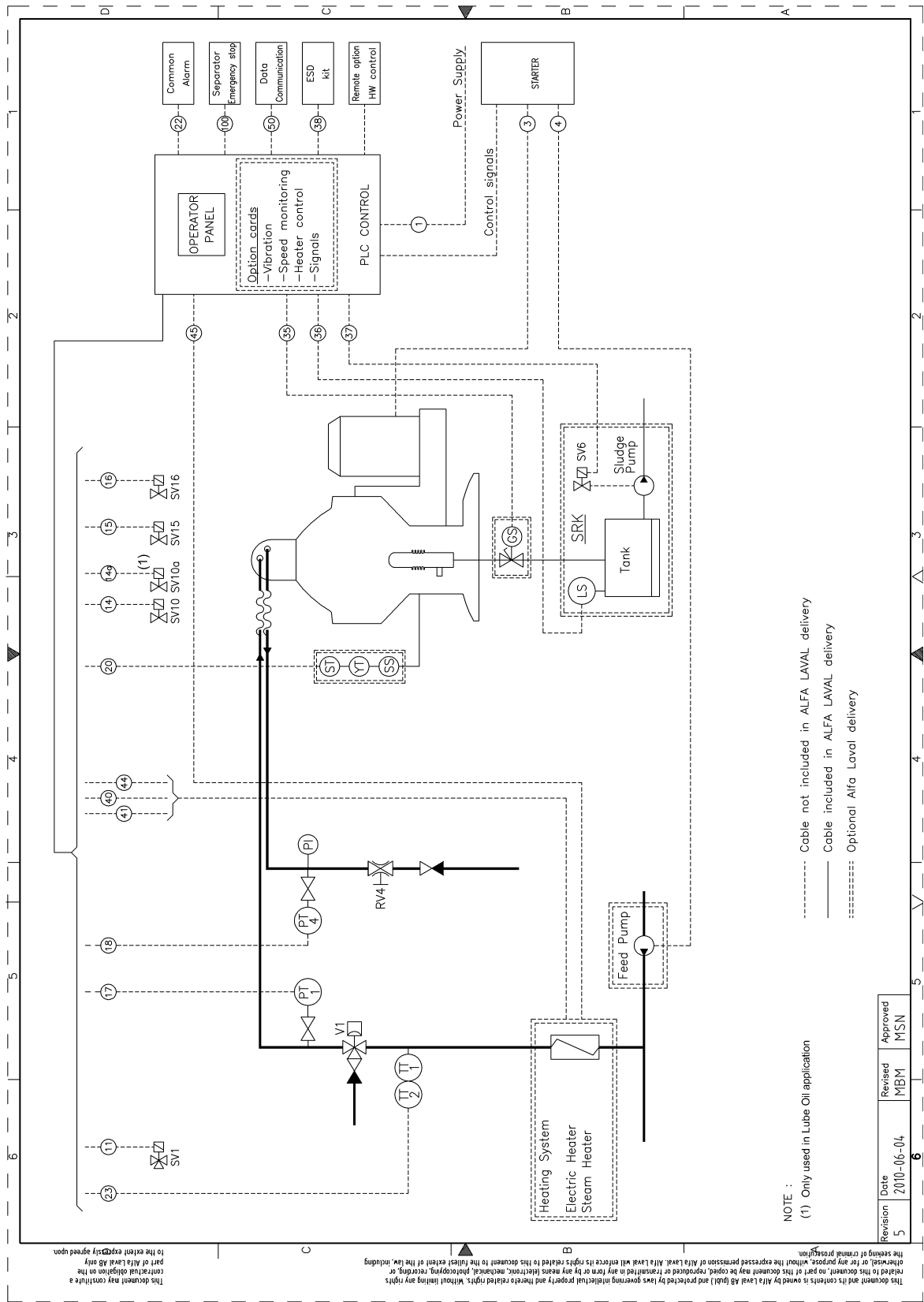
Alfa Laval ref. 580907 Rev. 4



580907#4_00

3.2 Electrical System Layout P 635/636

Alfa Laval ref. 580908 Rev. 5



3.3 Control and Starter Electrical Diagrams

3.3.1 Starter cable list

Alfa Laval ref. 580881 Rev. 7

No.	Type		Connection point A	Instruction	Connection point B	Remarks
Basic design (currents according to order)						
1	MPRXCX	3x4	Mains supply		Starter	¹⁾ Fuse 20 A
1	MPRXCX	3x10	Mains supply		Starter	¹⁾ Fuse 35A
1	MPRXCX	3x16	Mains supply		Starter	¹⁾ Fuse 50 A
1	MPRXCX	3x25	Mains supply		Starter	¹⁾ Fuse 63 A
1	MPRXCX	3x35	Mains supply		Starter	¹⁾ Fuse 80 A
2	MPRXCX	2x2m5	Supply		Starter	¹⁾ Fuse 16 A
3	MPRXCX	3x1,5	Starter	Marked 3A	Separator motor	4,0 – 6,3 A
3	MPRXCX	3x2,5	Starter	Marked 3B	Separator motor	6,3 – 16 A
3	MPRXCX	3x4	Starter	Marked 3C	Separator motor	16 – 20 A
3	MPRXCX	3x6	Starter	Marked 3D	Separator motor	20 – 25 A
3	MPRXCX	3x10	Starter	Marked 3E	Separator motor	25 – 32 A
3	MPRXCX	3x16	Starter	Marked 3F	Separator motor	32 – 45 A
3	MPRXCX	3x25	Starter	Marked 3G	Separator motor	45 – 63 A
Optional or customer's own feed pump (as ordered)						
4	MPRXCX	3x25	Starter		Feed pump	²⁾
Optional sludge handling (as ordered)						
35	RFE-HF	1x4x0,75	Starter		GS, Valve switch	
36	RFE-HF	1x2x0,75	Starter		LS, Sludge level	
37	RFE-HF	1x2x0,75	Starter		SV6, Solenoid valve	For pneumatic sludge pump
73	RFE-HF	2x0,75	Starter		Heatpac on tank	Included in heater element
Optional space heating (as ordered)						
71	MPRXCX	2x1,5	Starter		Separator pump	
73	MPRXCX	2x1,5	Starter		Feed pump	²⁾
Optional heat tracing (as ordered)						
74	MPRXCX	2x1,5	Starter		Thermostat	
75		3x1,5	Starter		Heating cable	

- 1) Cable not included in Alfa Laval delivery.
 2) Cable not included in Alfa Laval delivery except when feed pump ordered as part of a Module including Pumping and Heating Unit.

No.	Type		Connection point A	Instruction	Connection point B	Remarks
Signal cables (currents according to order)						
11	RFE-HF	1x2x0,75	EPC 60		SV1	
12	RFE-HF	1x2x0,75	EPC 60		SV4	
13	RFE-HF	1x2x0,75	EPC 60		SV5	S-type only
14	RFE-HF	1x2x0,75	EPC 60		SV10	
14A	RFE-HF	1x2x0,75	EPC 60		SV10A	Lube oil only
15	RFE-HF	1x2x0,75	EPC 60		SV15	
16	RFE-HF	1x2x0,75	EPC 60		SV16	
17	RFE-HF	1x2x0,75	EPC 60		PT1	¹⁾
18	RFE-HF	1x2x0,75	EPC 60		PT4	
19	RFE-HF	1x4x0,75	EPC 60		MT	S-type only
20	RFE-HF	4x2x0,75	EPC 60		ST, (YT, SS)	Not for P605, P615, S805, S815
21	RFE-HF	1x2x0,75	EPC 60		PT5	S-type only
22	RFE-HF	1x2x0,75	EPC 60		Common alarm	²⁾
23	RFE-HF	4x2x0,75	EPC 60		TT1/TT2	³⁾
Options (as ordered)						
25	RFE-HF	1x4x0,75	EPC 60		SS	²⁾ Only for P605, P615, S805, S815
30	RFE-HF	1x4x0,75	EPC 60		YS	²⁾ Only for P605, P615, S805, S815
38	MPRXCX	4x1,5	EPC 60		Syst. Emergency	^{2) 4)}
100	MPRXCX	4x1,5	EPC 60		Sep. Emergency stop	^{2) 4)}
Optional Electric Heater (as ordered)						
40	RFE-HF	4x2x0,75	Starter		Power unit	
45	RFE-HF	1x2x0,75	Starter		Power unit	
Optional heat tracing (as ordered)						
41	RFE-HF	1x4x0,75	EPC 60		Steam reg. valve	
44	RFE-HF	1x2x0,75	EPC 60		Shut-off valve	
50	RJ45		EPC 60 CPU		Client remote data communication	²⁾

- 1) Cable only included in the Alfa Laval delivery when PT1 is delivered mounted on Module.
- 2) Cable not included in Alfa Laval delivery
- 3) Cable only included in the Alfa Laval delivery when Electric Heater is delivered mounted on Module.
- 4) This cable cannot be longer than 25 m to avoid voltage drop.

Other equivalent and approved cables may be used.

Cable areas are calculated with correction factor 0.7.

Cables used are Shipboard Cables, designed according to IEC 60092-3.

Flame retardant according to IEC 60332-1-2 and IEC 60332-3-22.

Halogen-free according to IEC 60754 series.

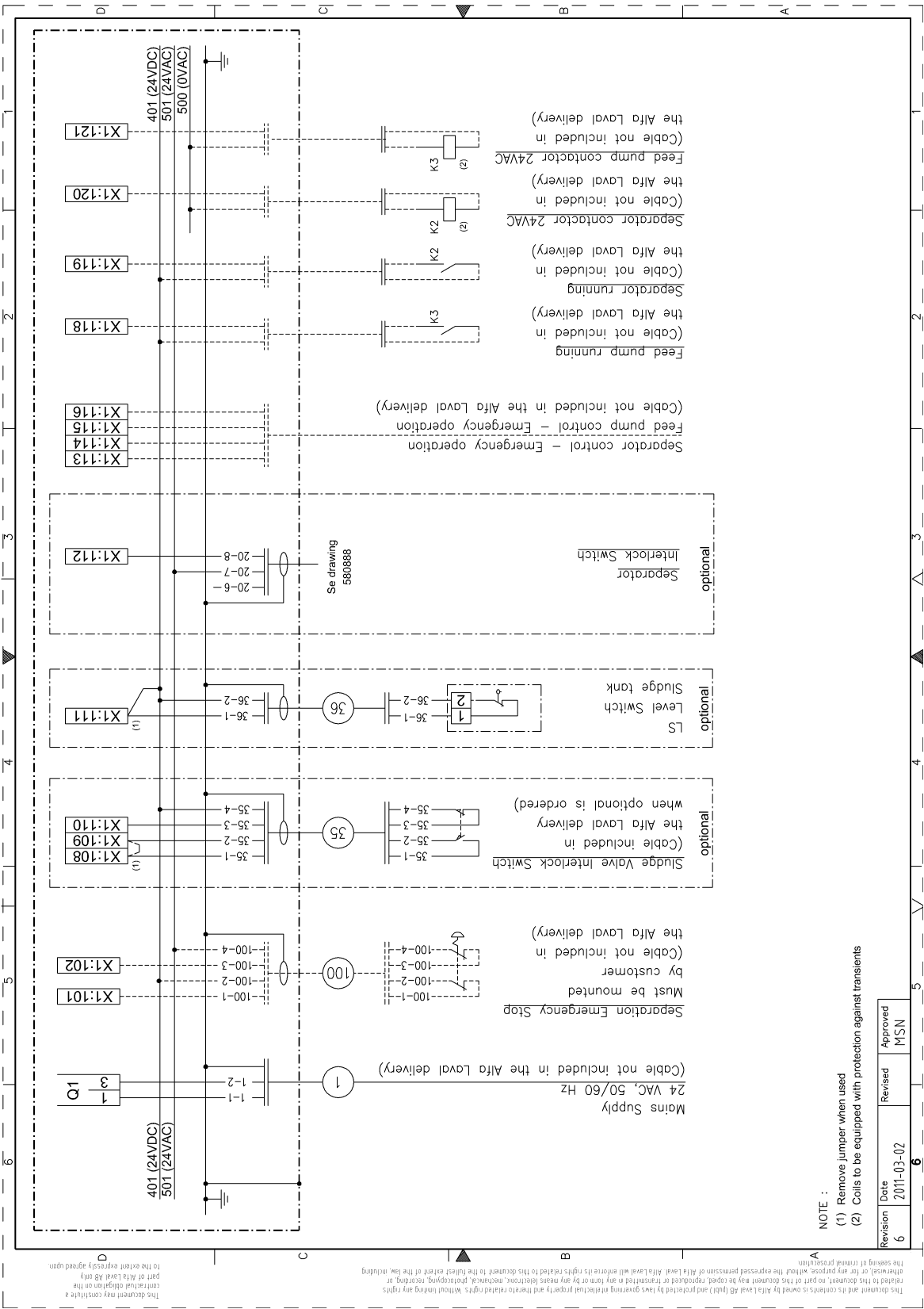
Smoke emission according to IEC 61034 series.

All power cables should be Signal Shielded Cables with the shield properly connected to earth as shown in the electrical drawings.

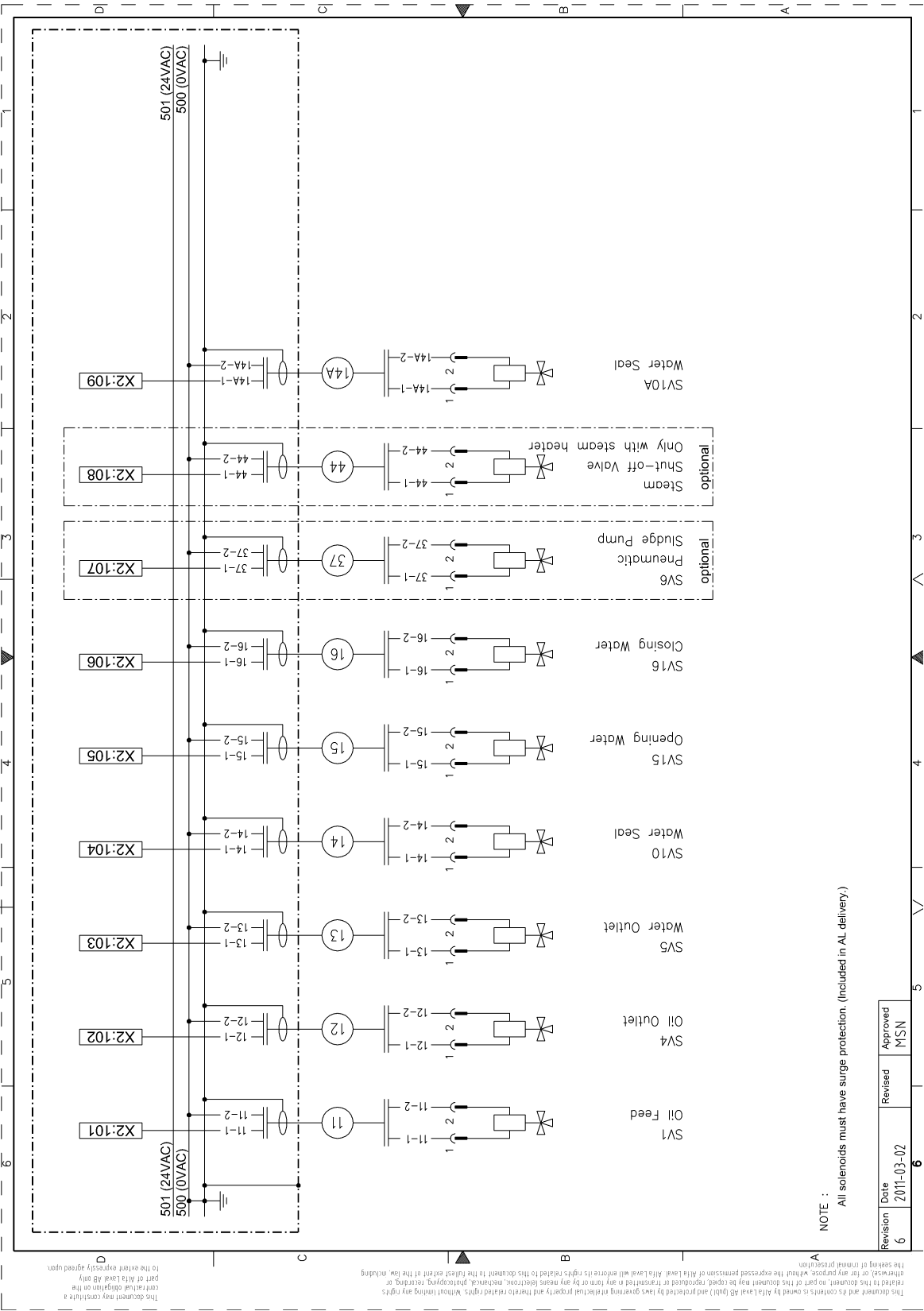
For armoured power cables, the armour must be connected to earth, as shown in the electrical drawings, and must give sufficient EMI protection. Copper wire armouring is normally used.

3.3.2 Separator Interconnection Diagram

Alfa Laval ref. 580906 Rev. 6

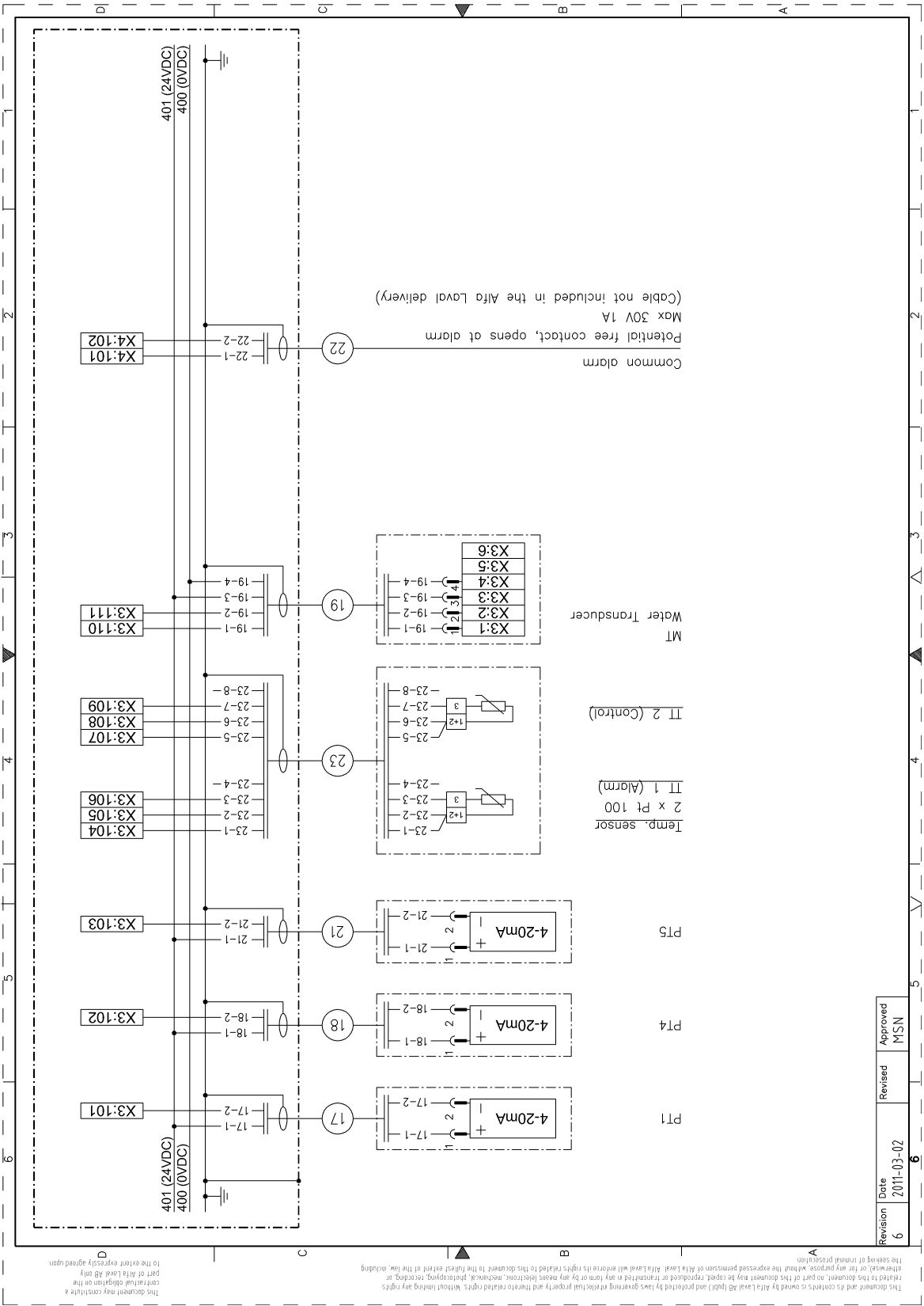


Alfa Laval ref. 580906 Rev. 6



580906#6_01

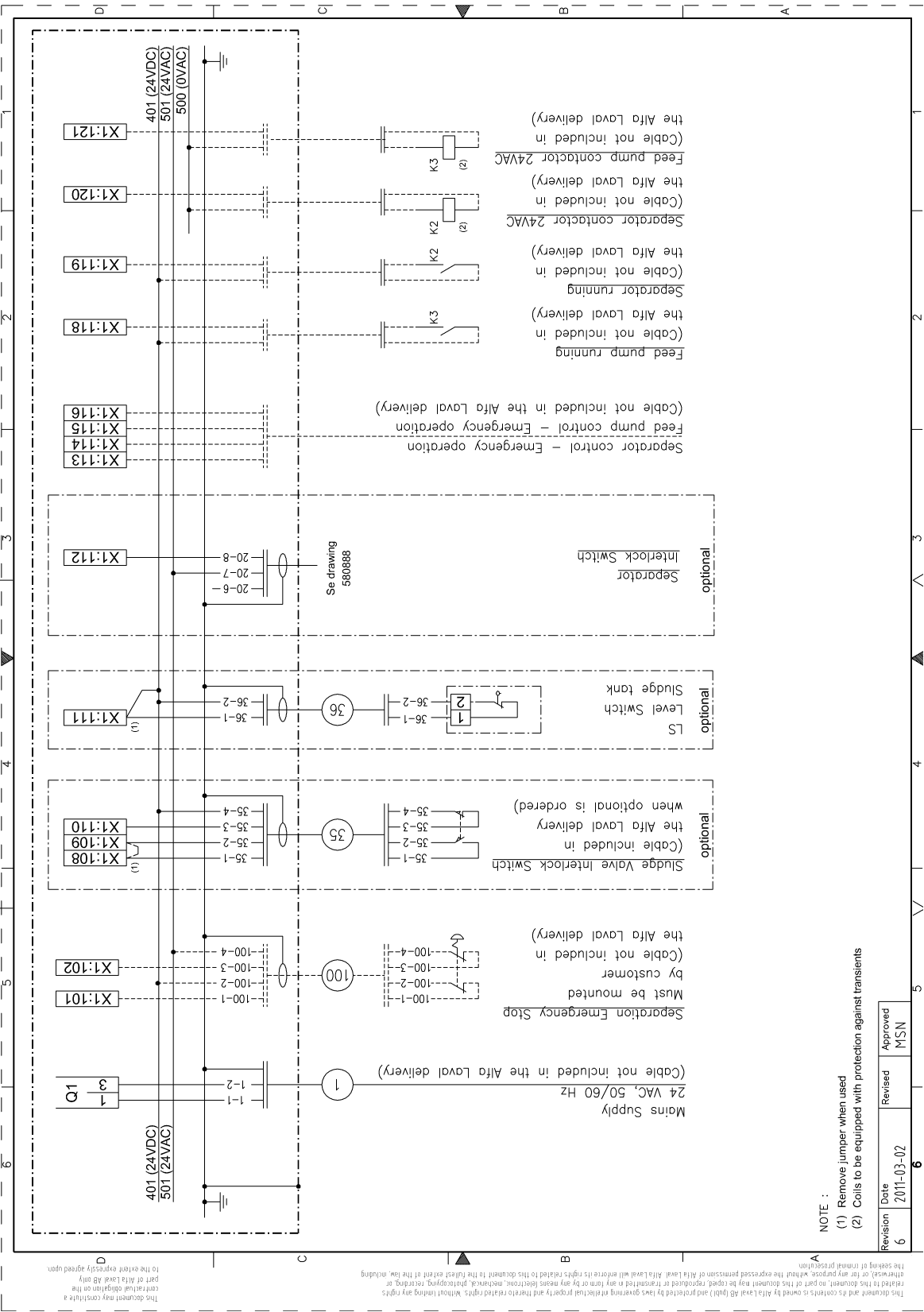
Alfa Laval ref. 580906 Rev. 6



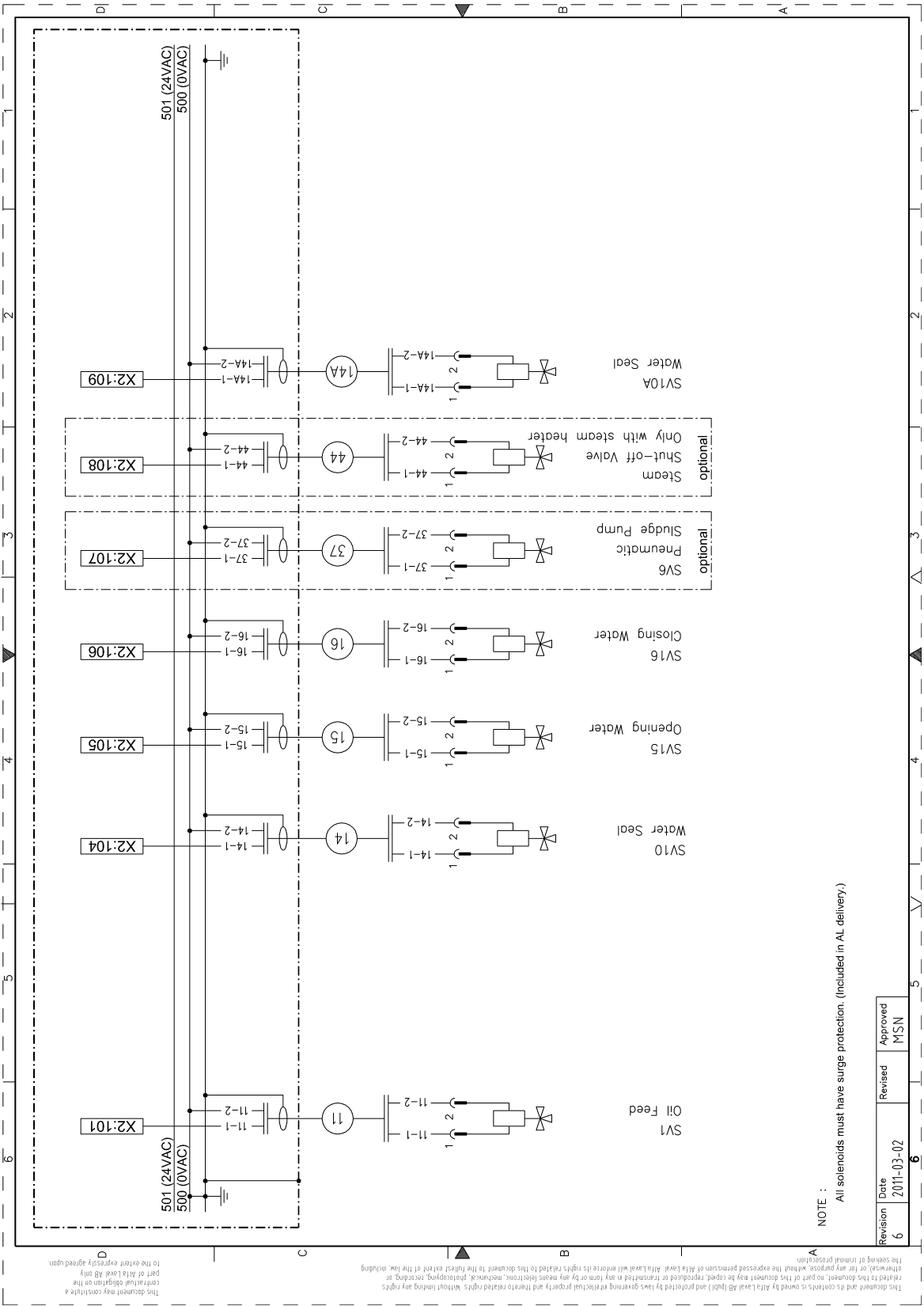
580906#02

3.3.3 Separator Interconnection Diagram

Alfa Laval ref. 581069 Rev. 6

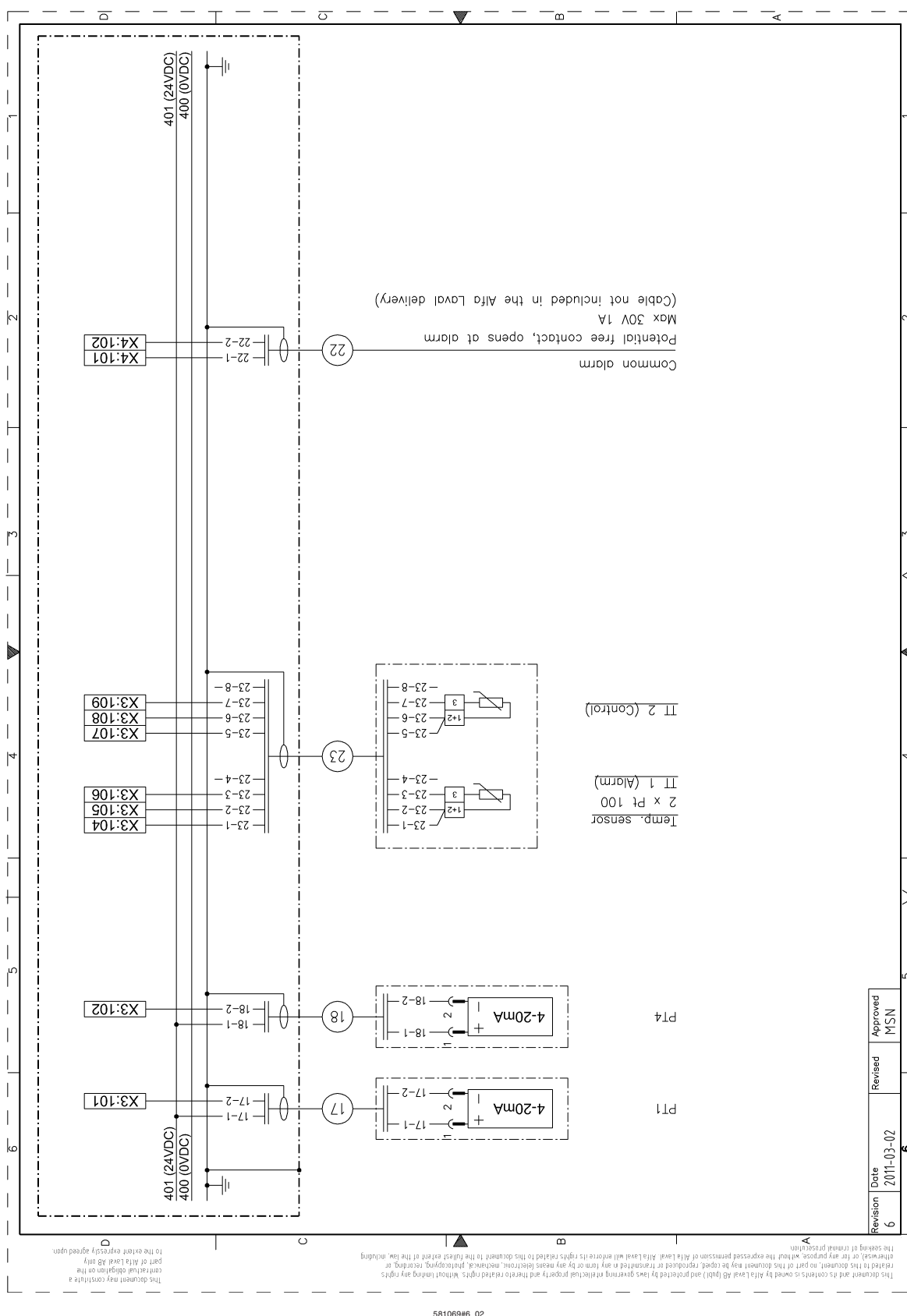


Alfa Laval ref. 581069 Rev. 6



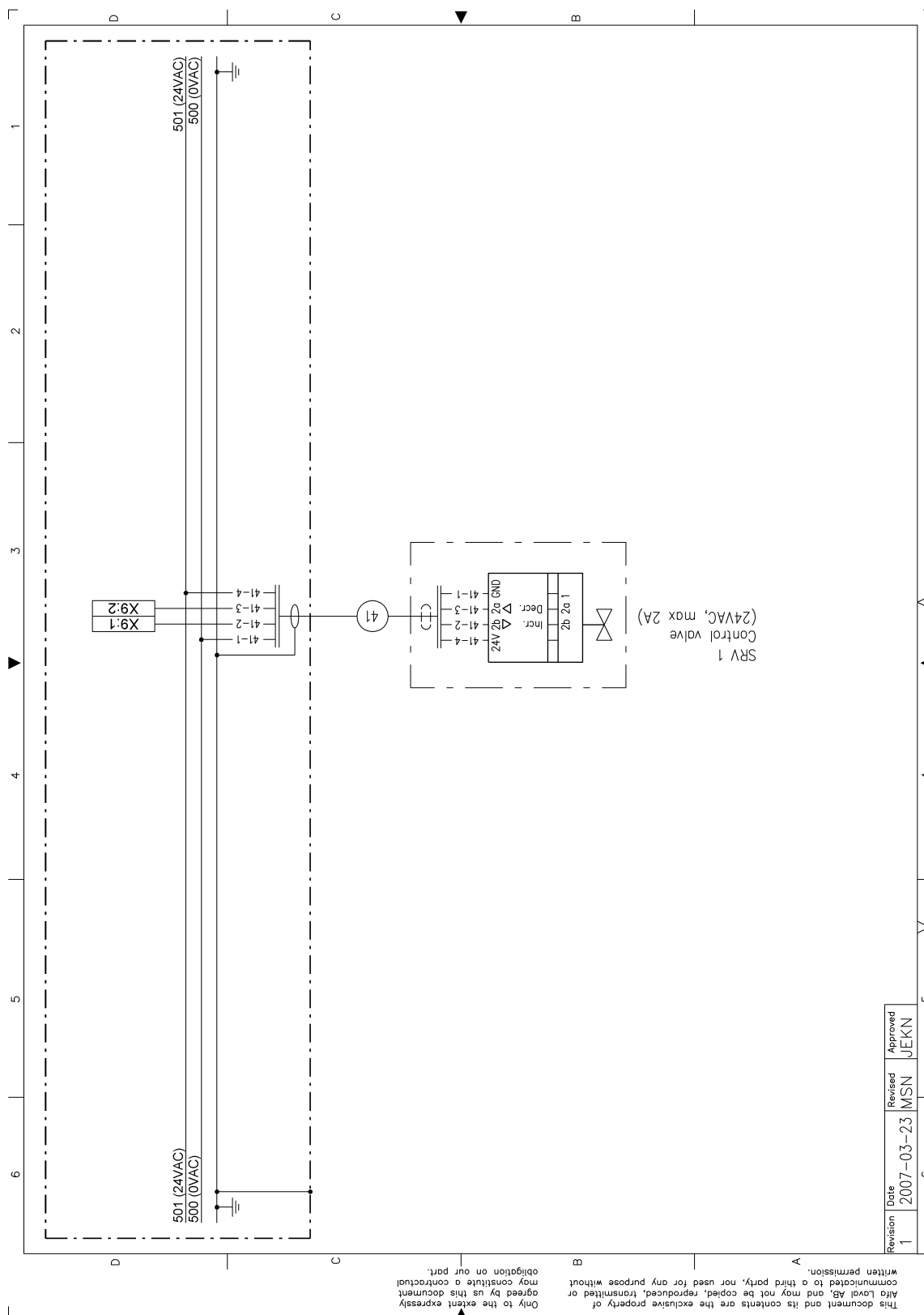
581069#01

Alfa Laval ref. 581069 Rev. 6



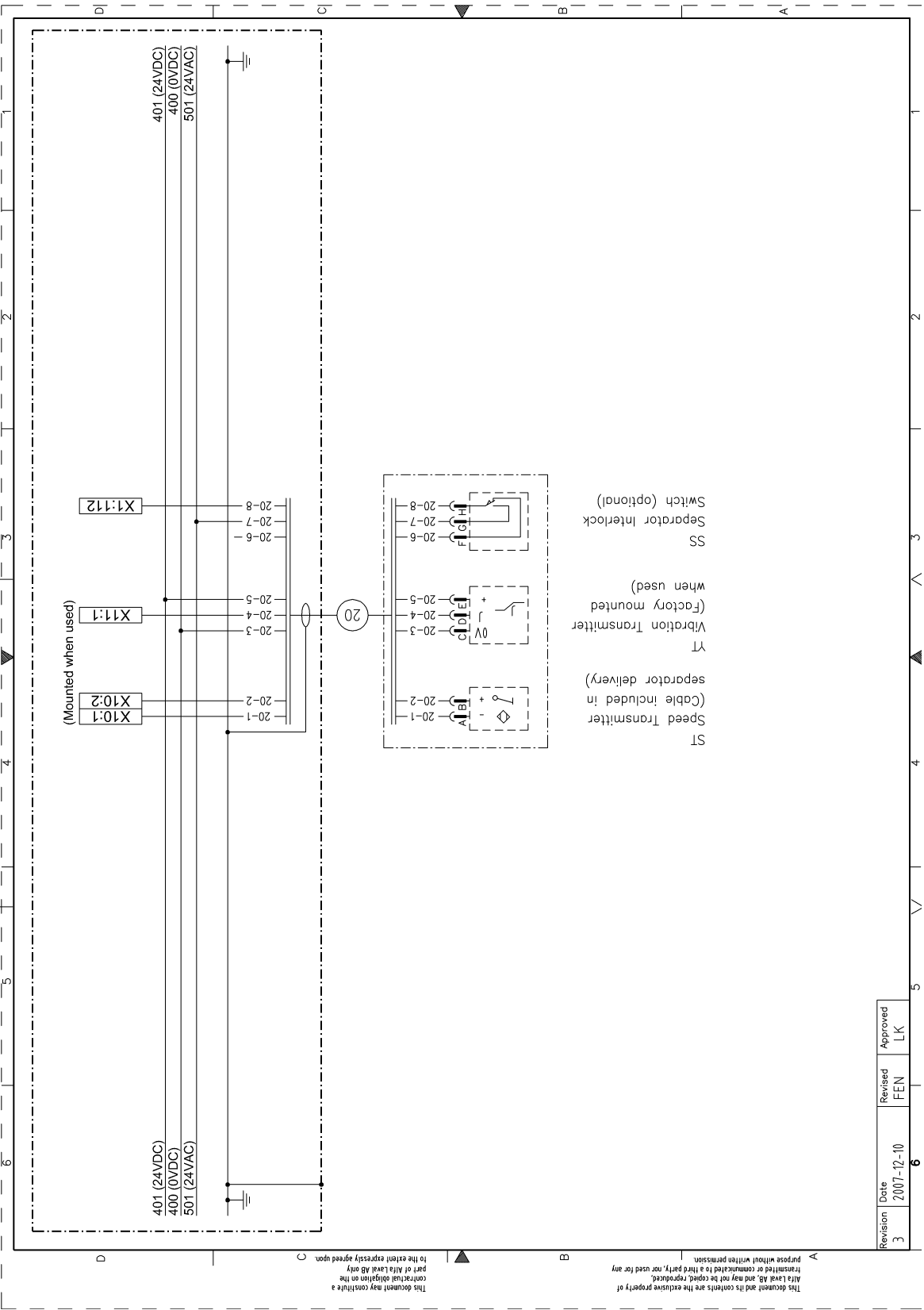
3.3.4 Steam Regulating Valve (optional) Interconnection Diagram

Alfa Laval ref. 580886 Rev. 1



3.3.5 Speed Transmitter (optional) Interconnection Diagram

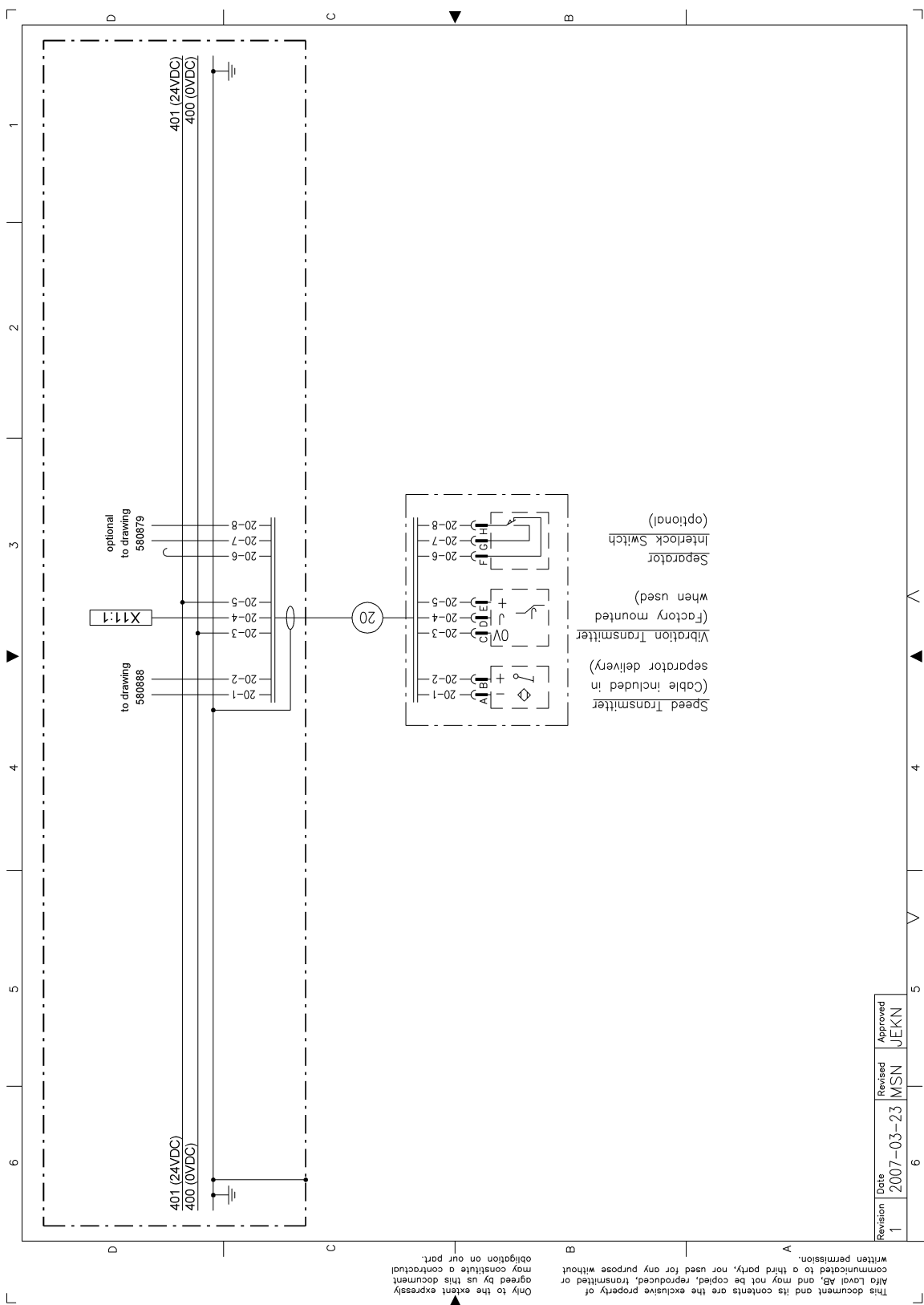
Alfa Laval ref. 580888 Rev. 3



580888#3_00

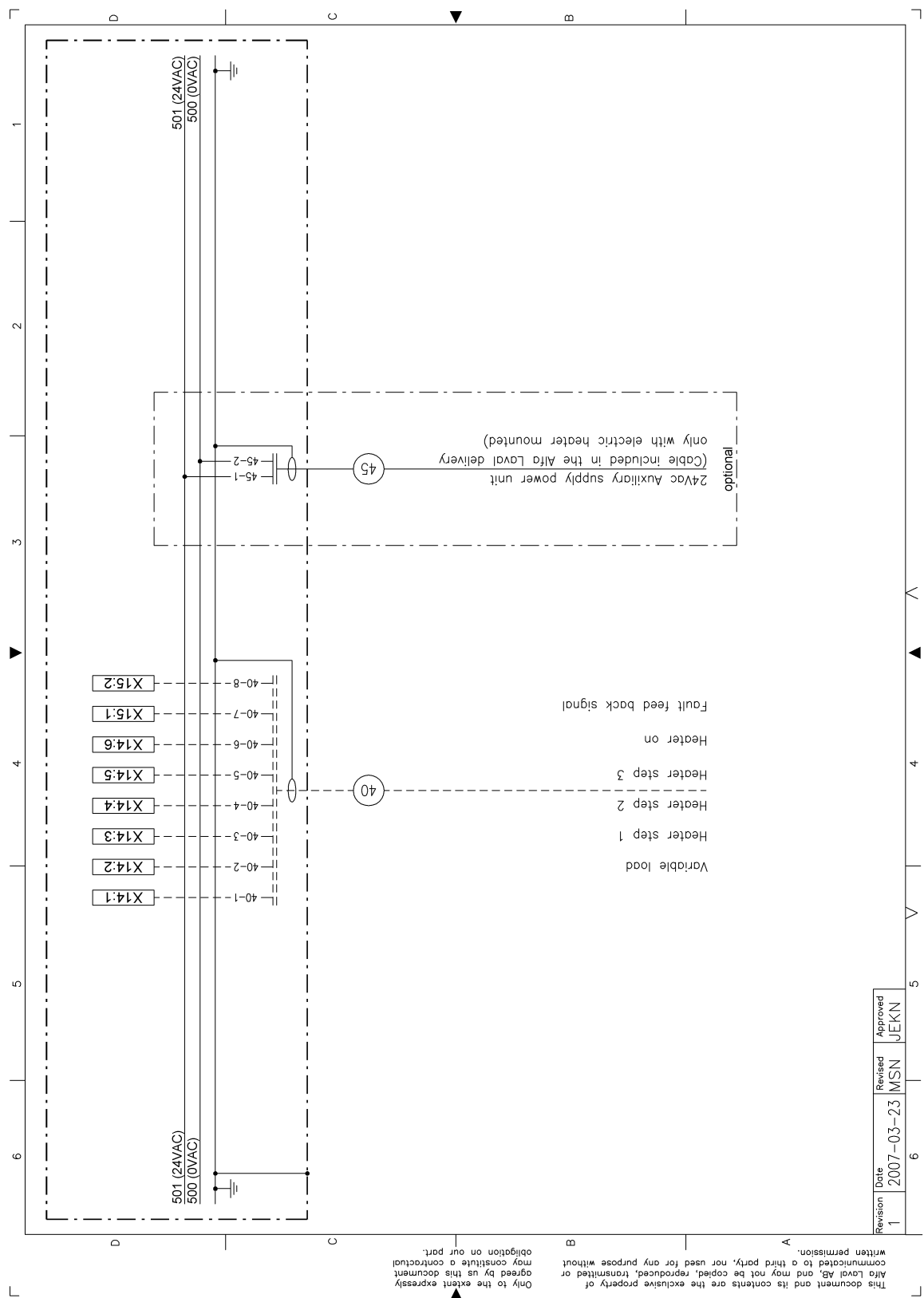
3.3.6 Vibration Transmitter (optional) Interconnection Diagram

Alfa Laval ref. 580890 Rev. 1



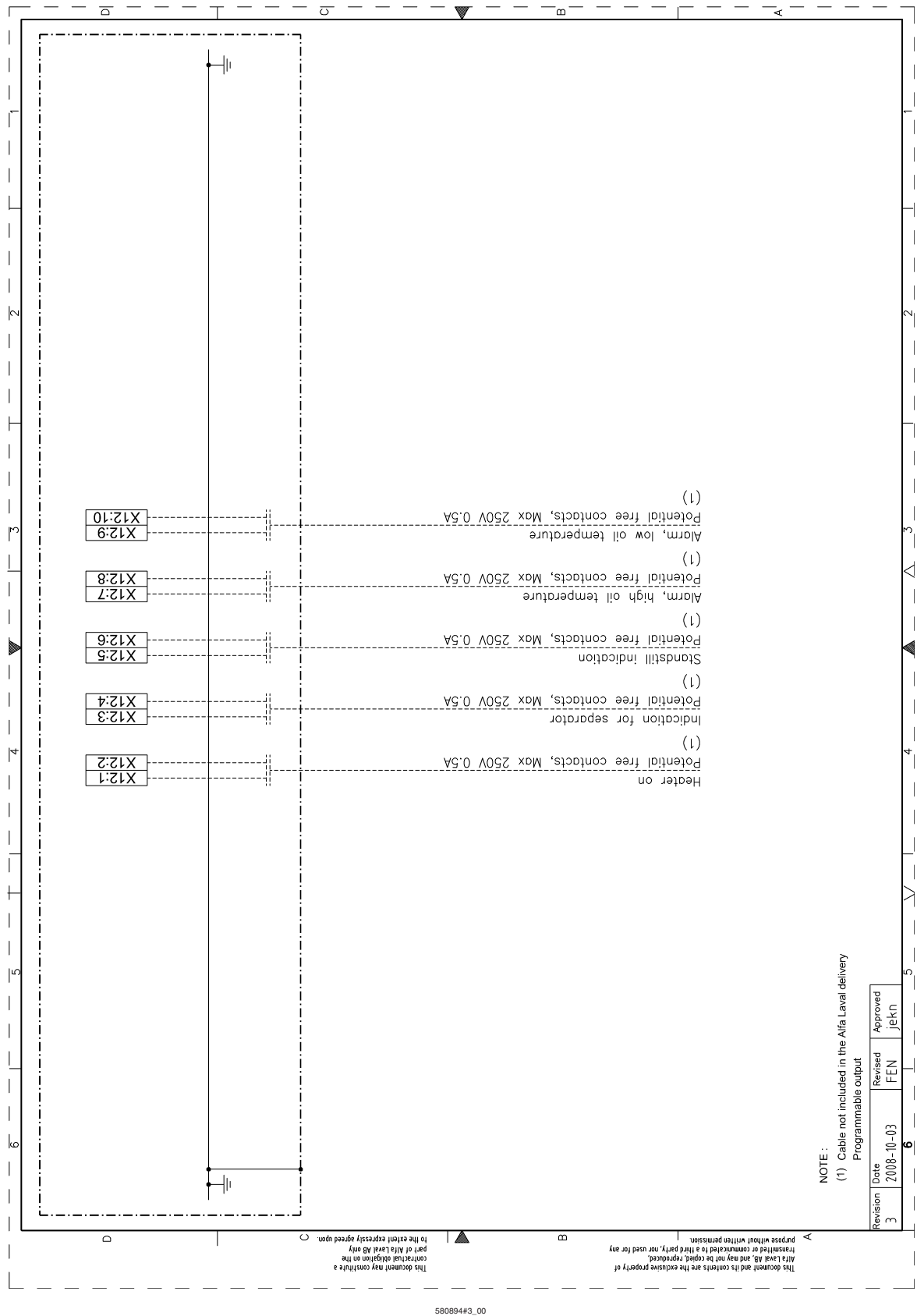
3.3.7 Electric Heater (optional) Interconnection Diagram

Alfa Laval ref. 580896 Rev. 1

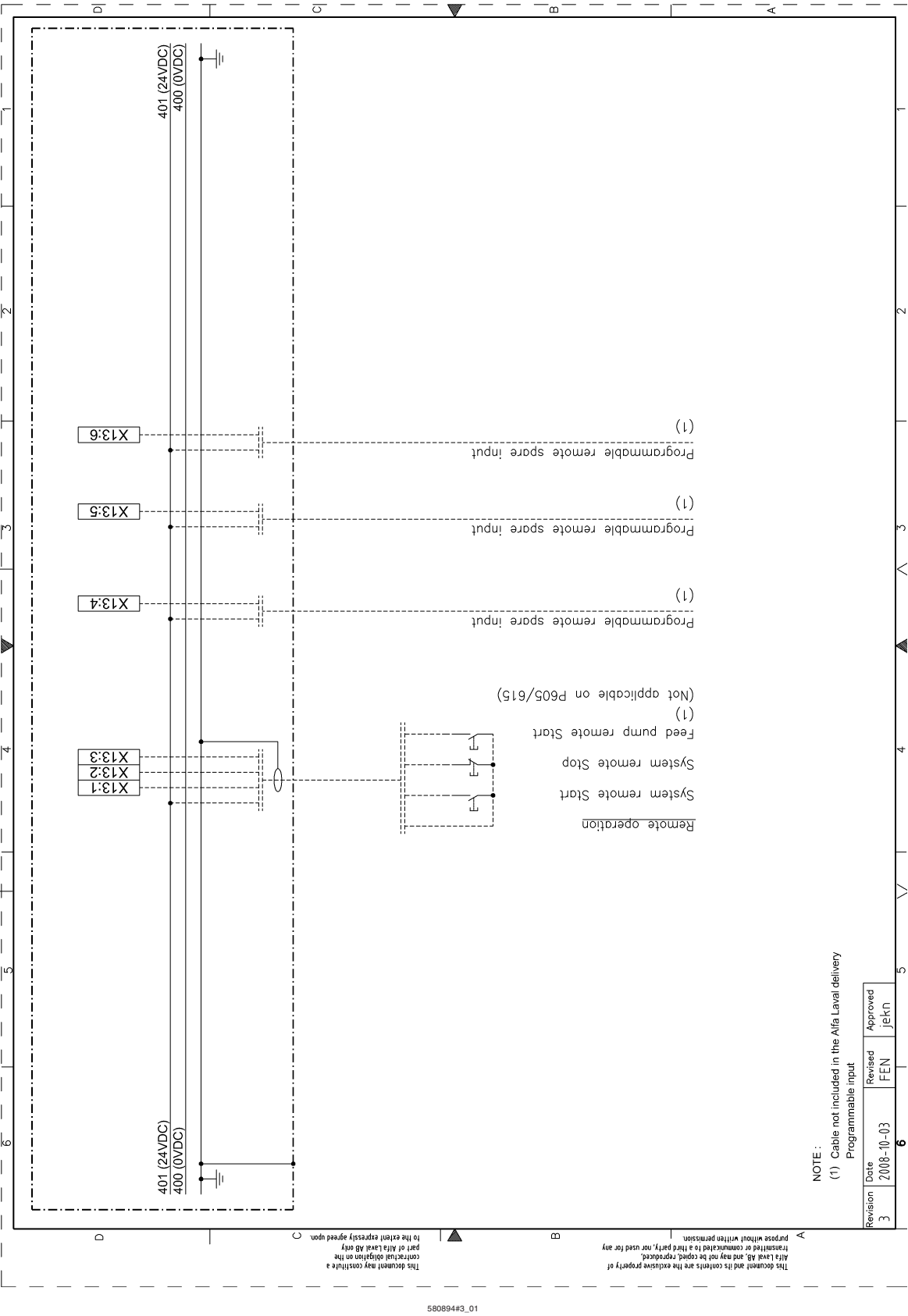


3.3.8 I/O (optional) Interconnection Diagram

Alfa Laval ref. 580894 Rev. 3

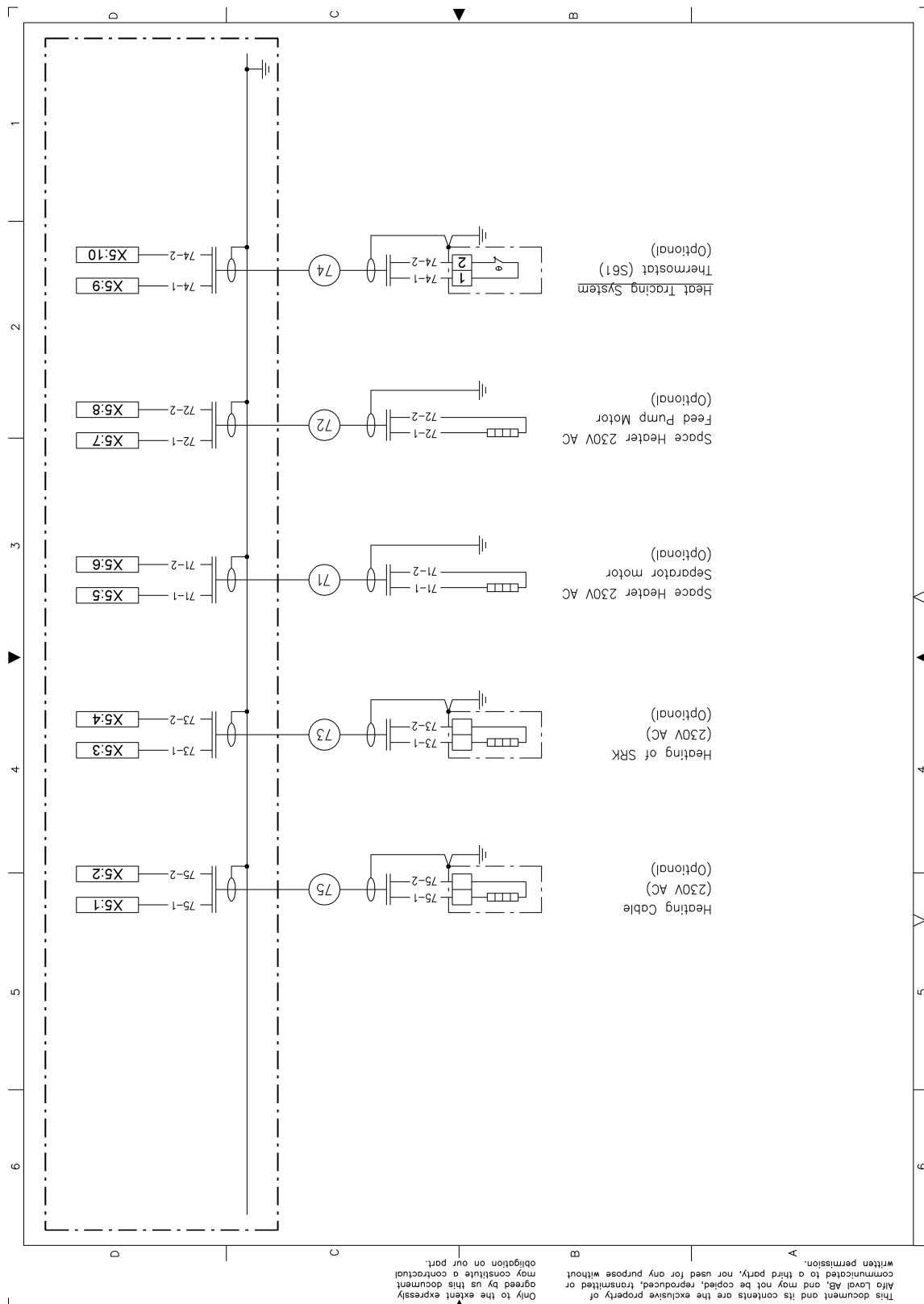


Alfa Laval ref. 580894 Rev. 3



3.3.9 Heat Tracing (optional) Interconnection Diagram

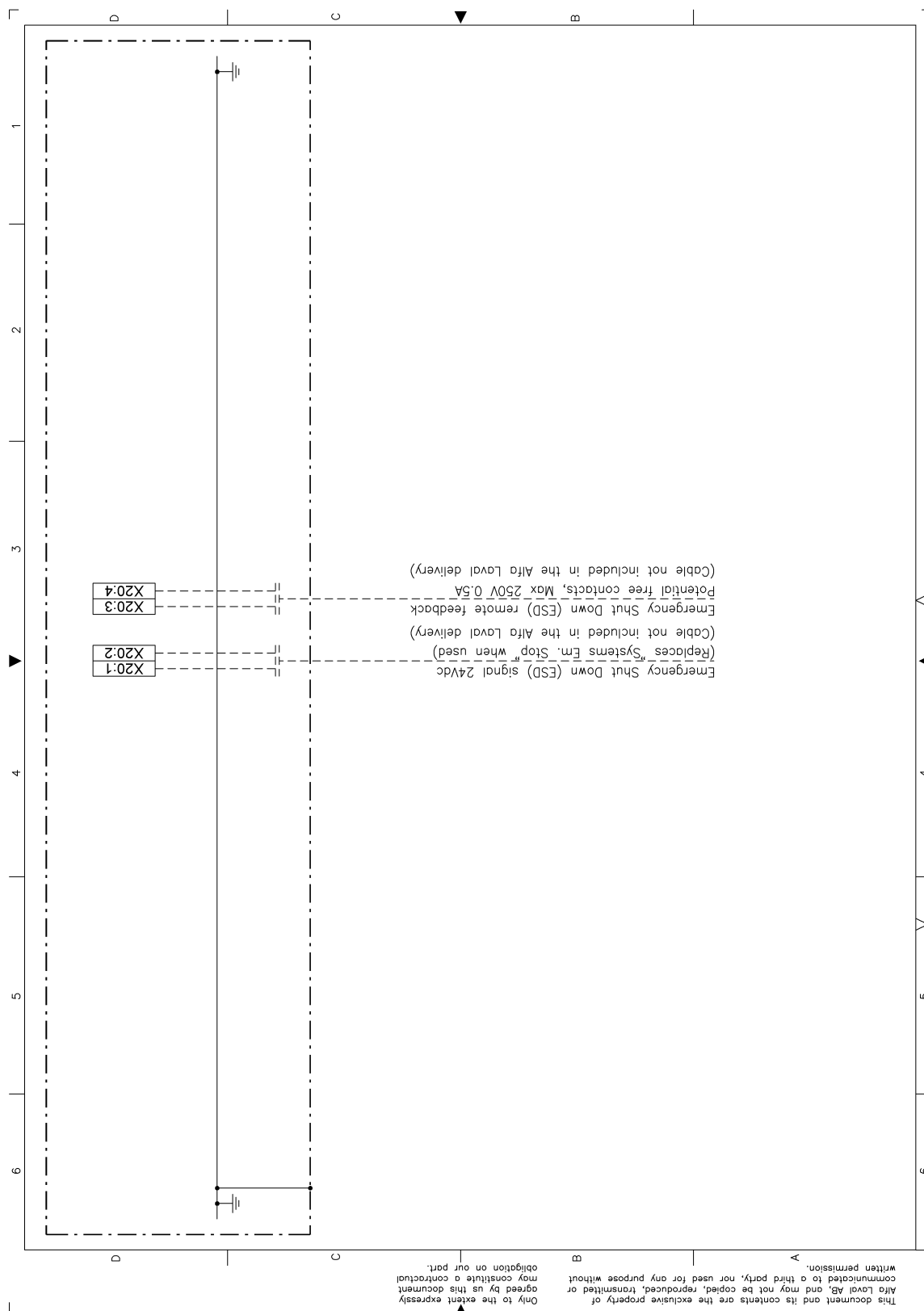
Alfa Laval ref. 580884 Rev. 0



580884 v0_00

3.3.10 Emergency Shutdown Interconnection Diagram

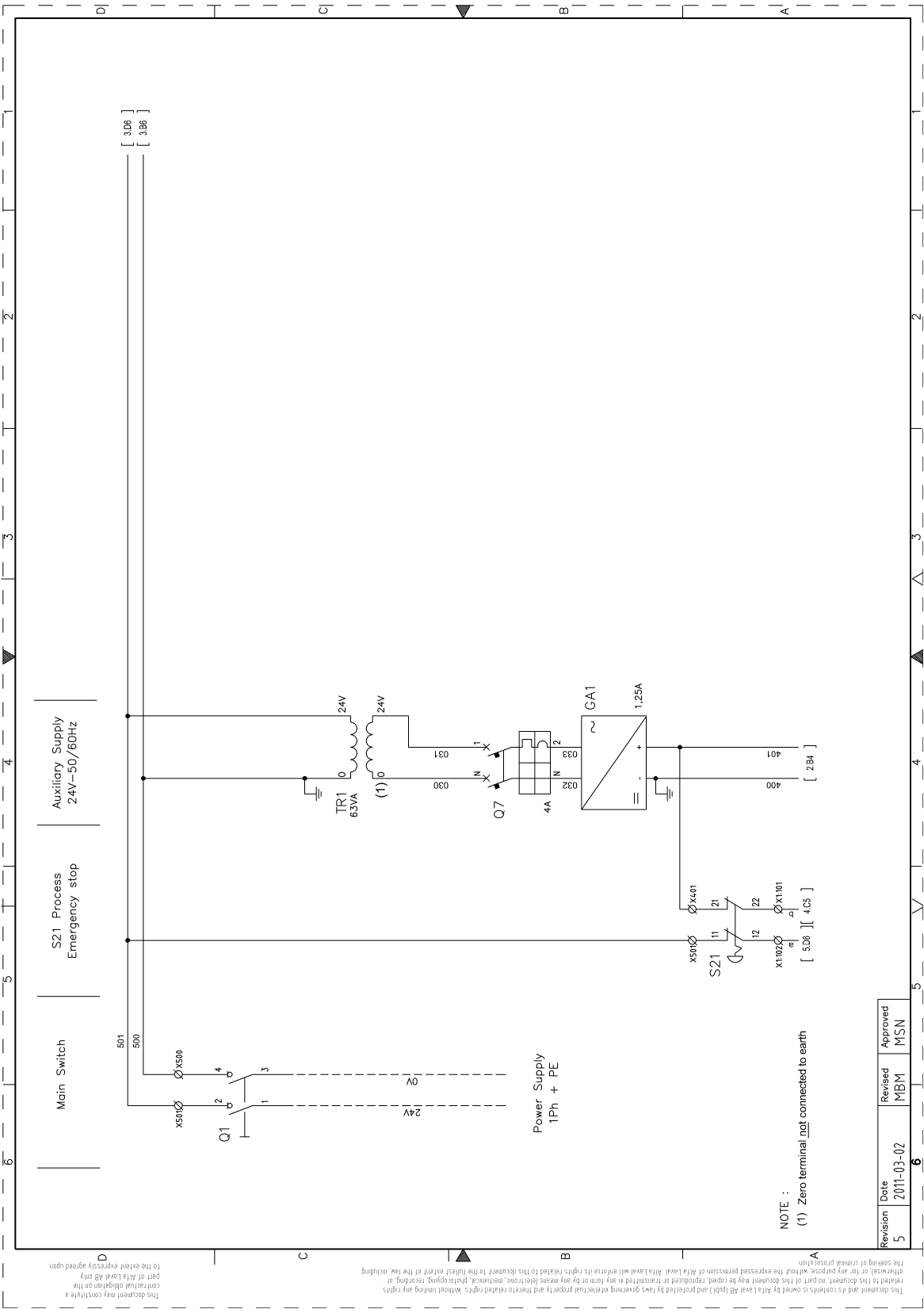
Alfa Laval ref. 580898 Rev. 0



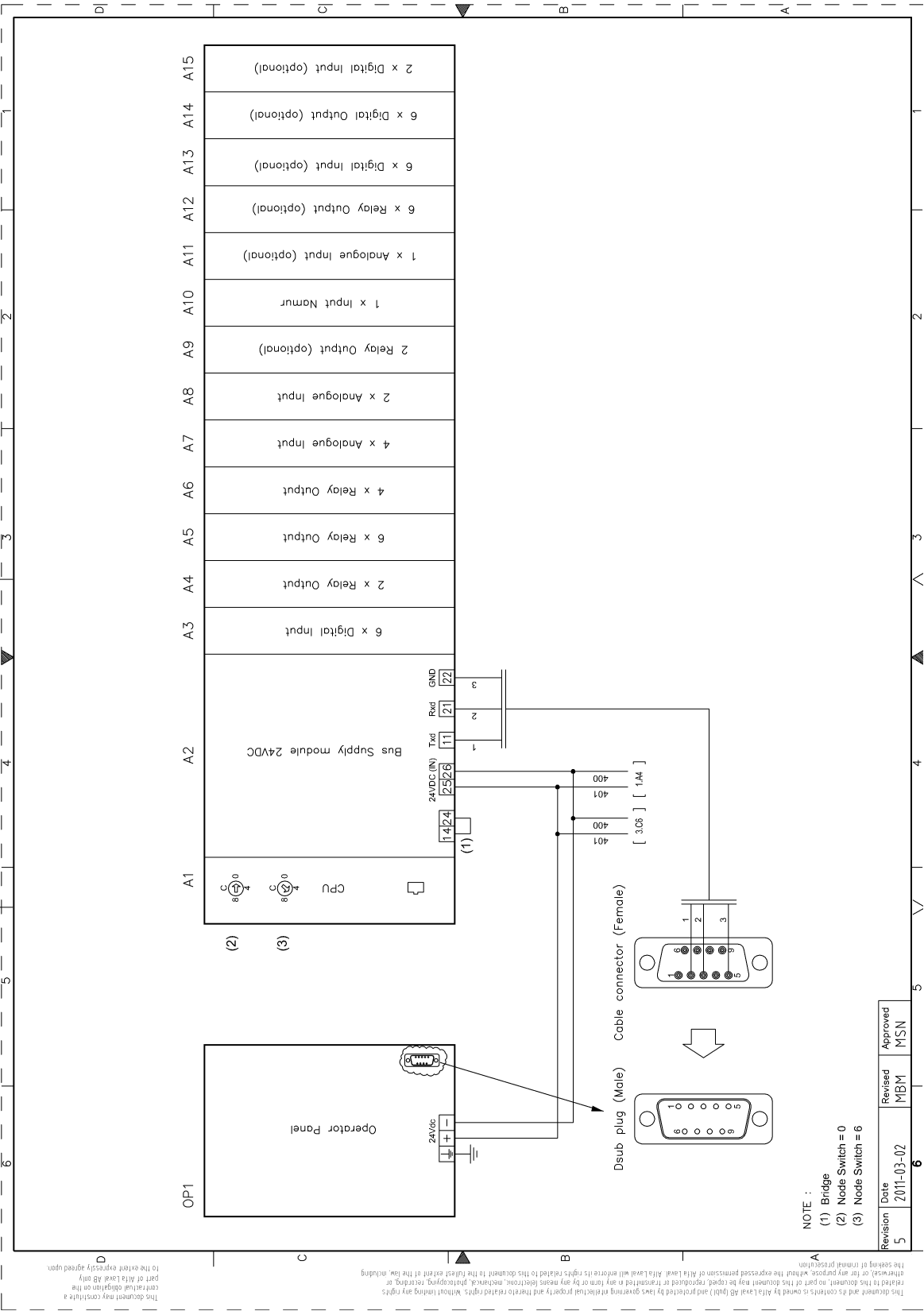
580898 v0_00

3.3.11 Circuit Diagram

Alfa Laval ref. 580905 Rev. 5

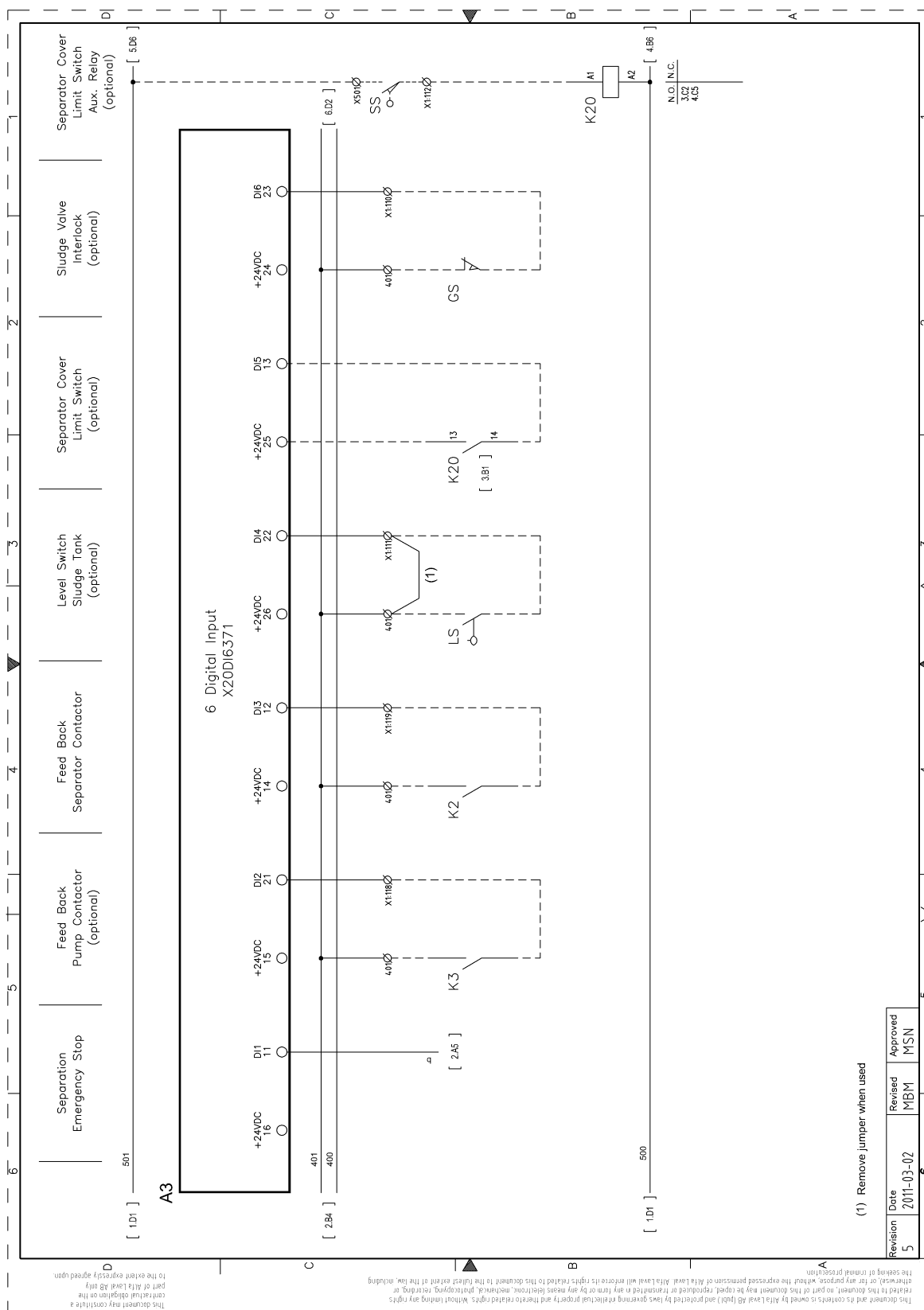


Alfa Laval ref. 580905 Rev. 5

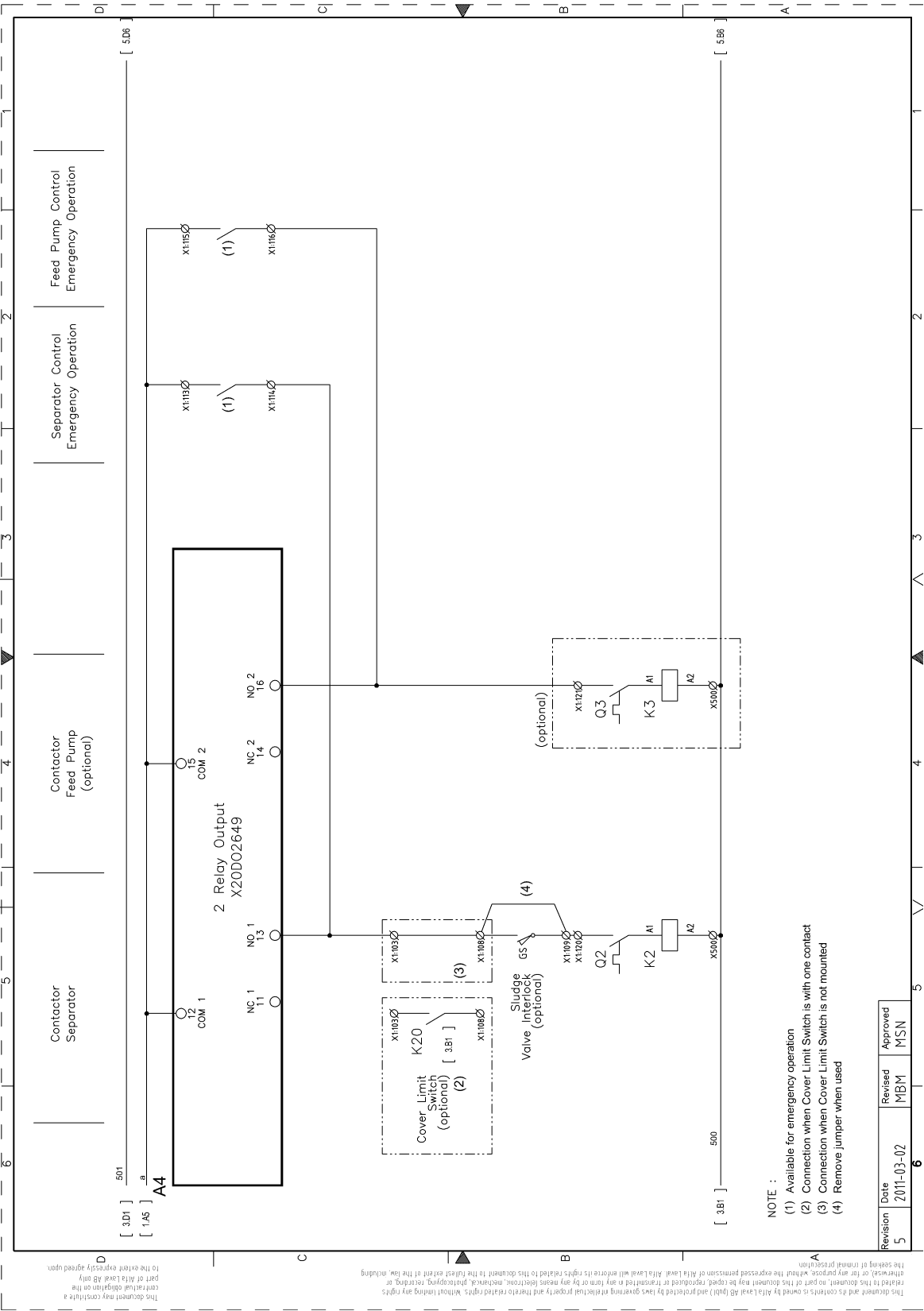


580905#5_01

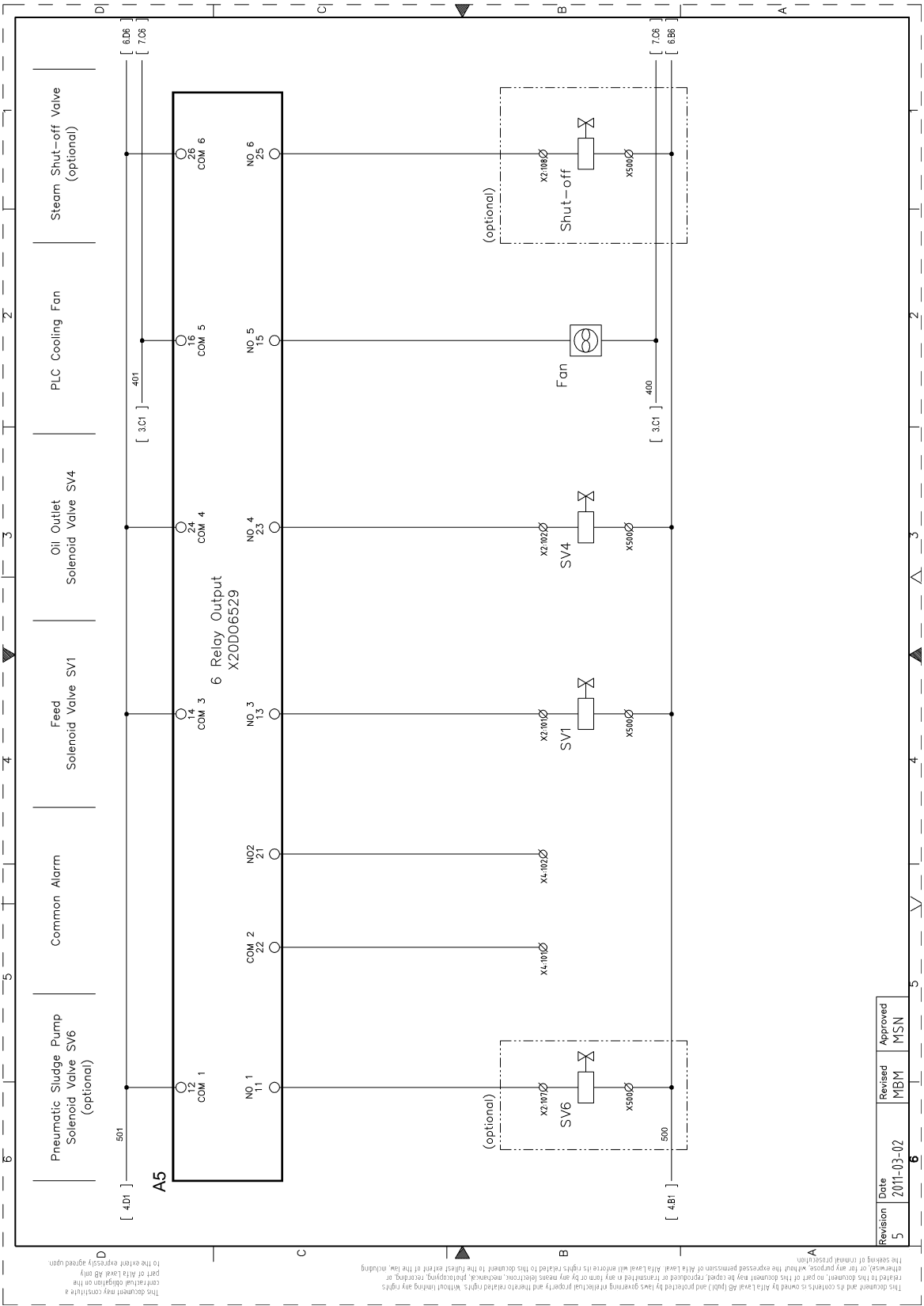
Alfa Laval ref. 580905 Rev. 5



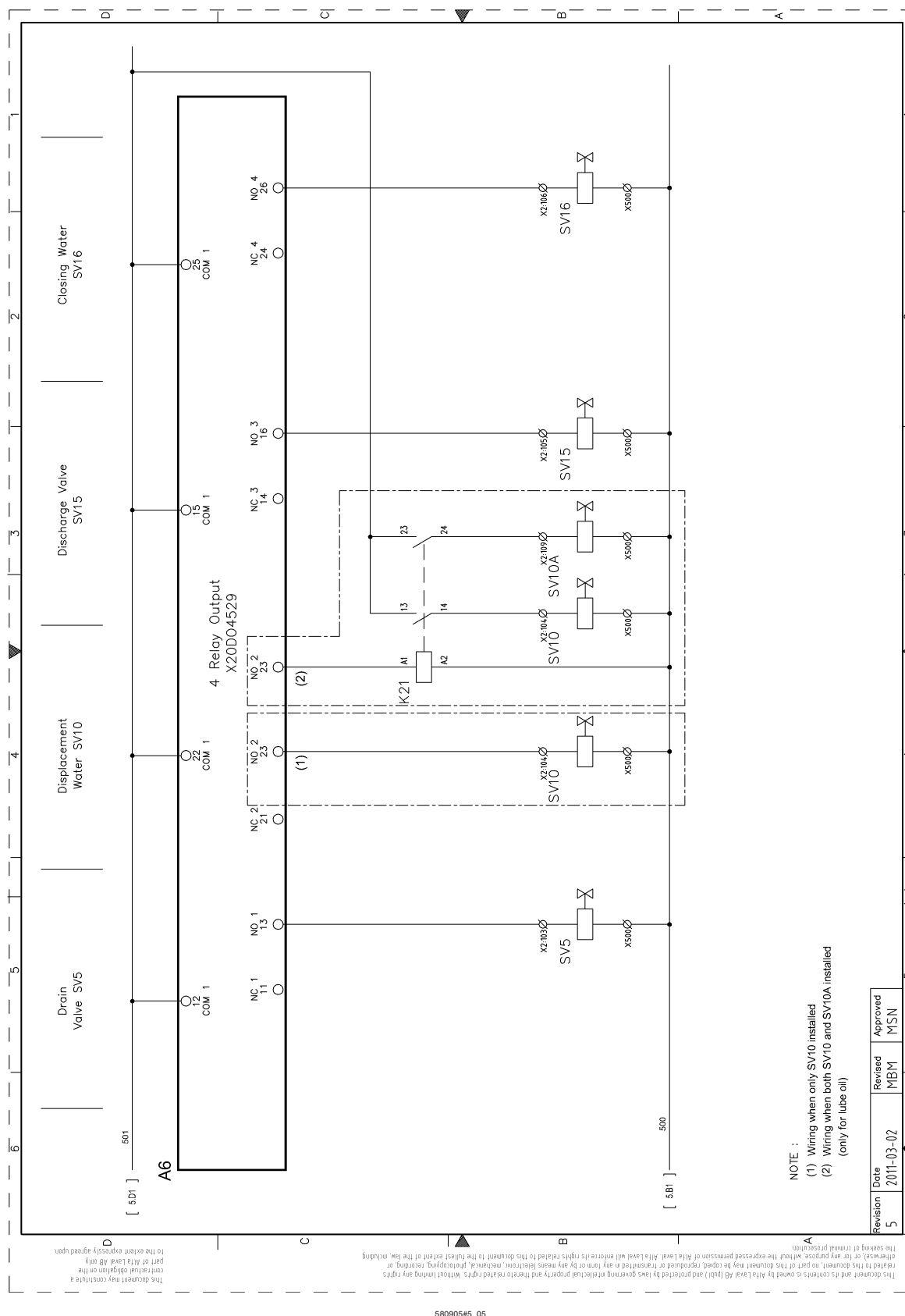
Alfa Laval ref. 580905 Rev. 5



Alfa Laval ref. 580905 Rev. 5

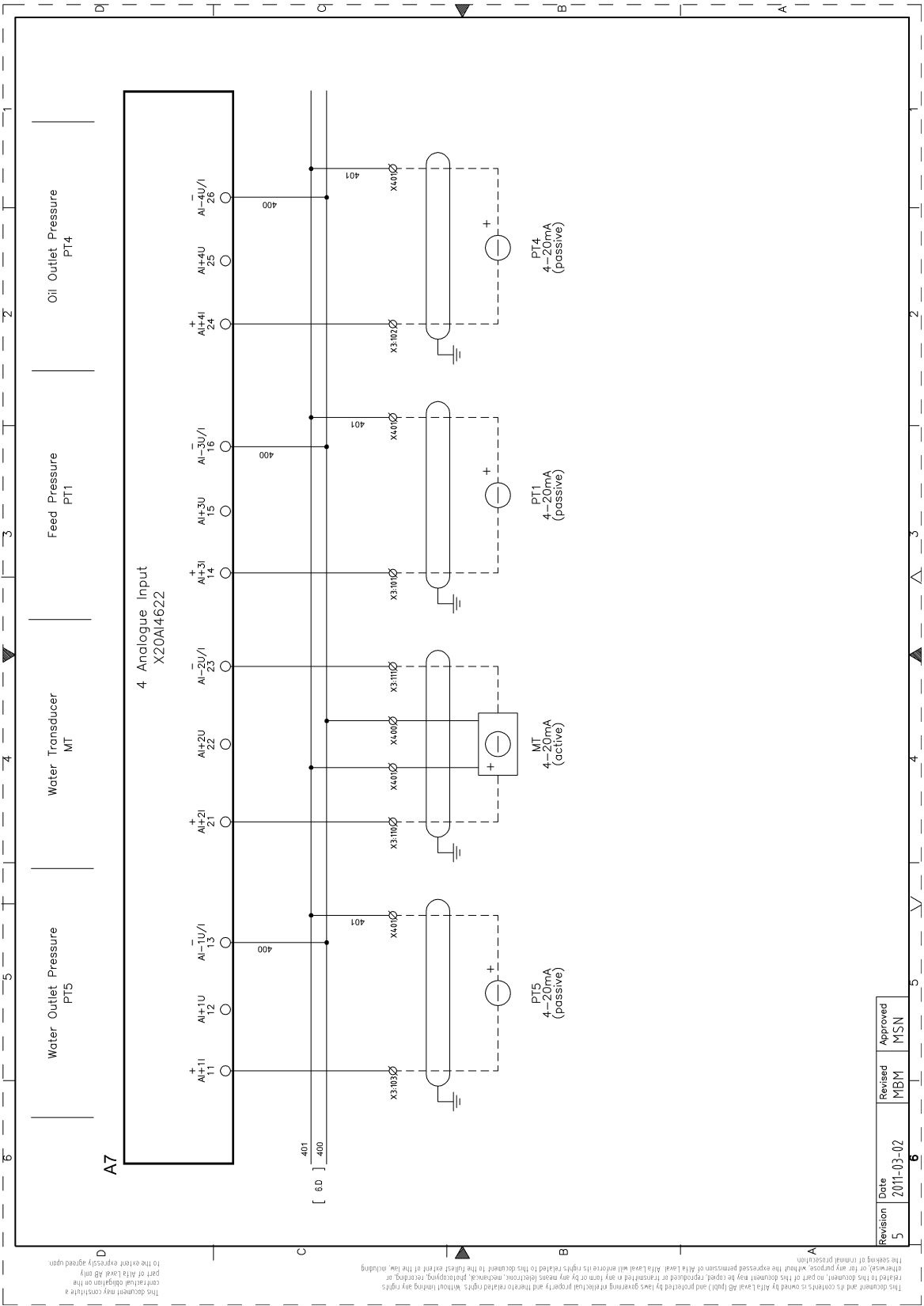


Alfa Laval ref. 580905 Rev. 5



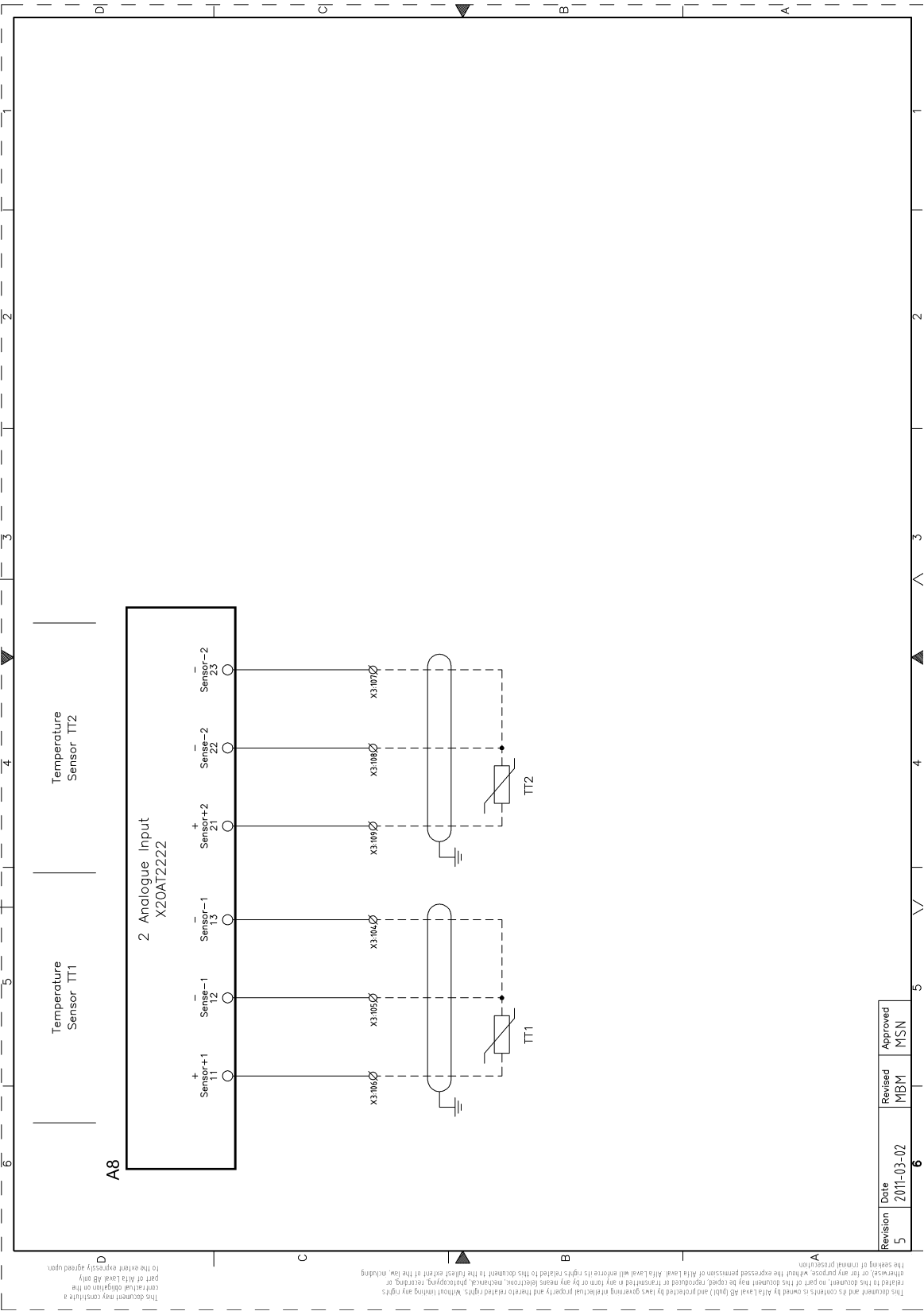
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Alfa Laval ref. 580905 Rev. 5



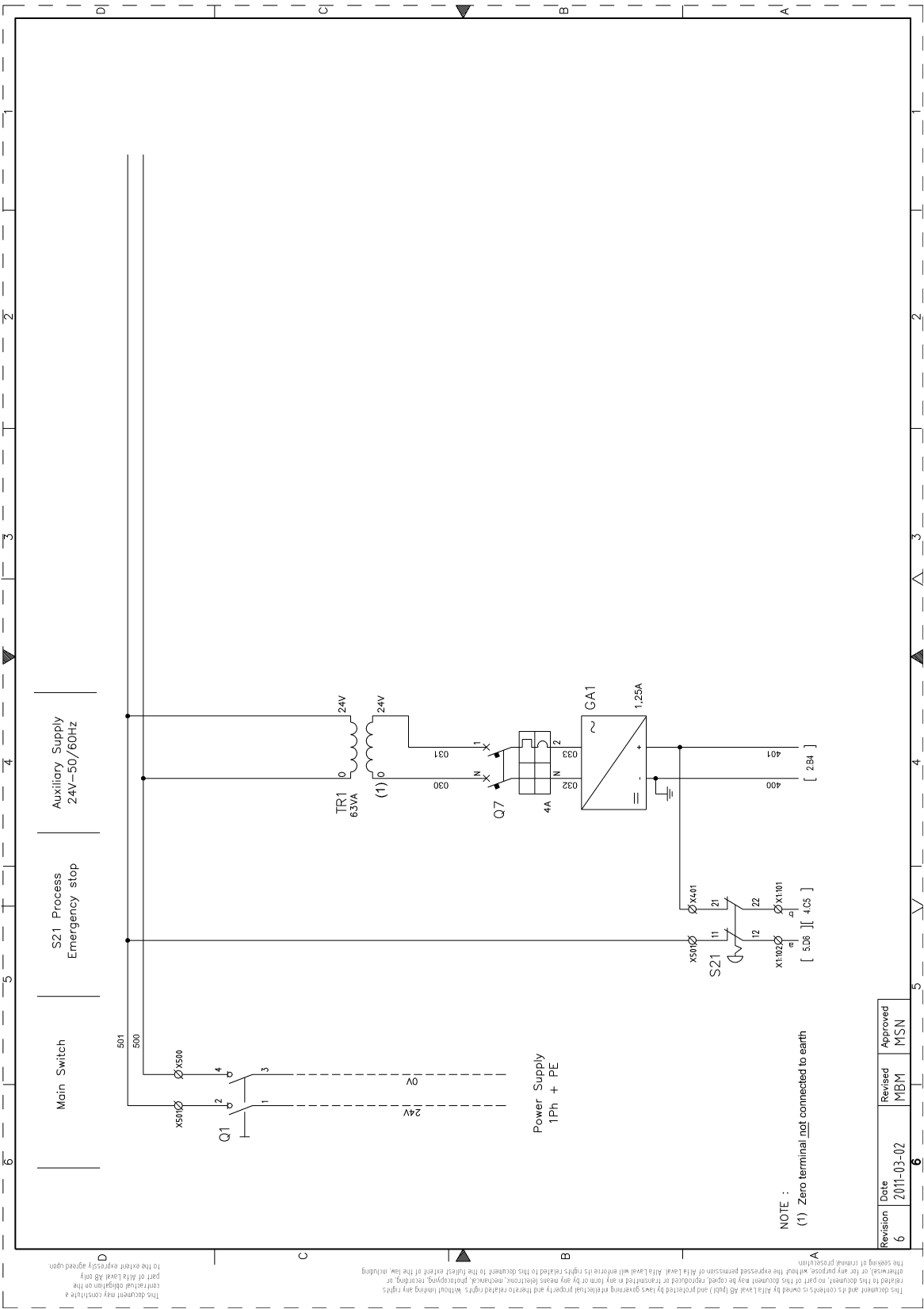
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Alfa Laval ref. 580905 Rev. 5

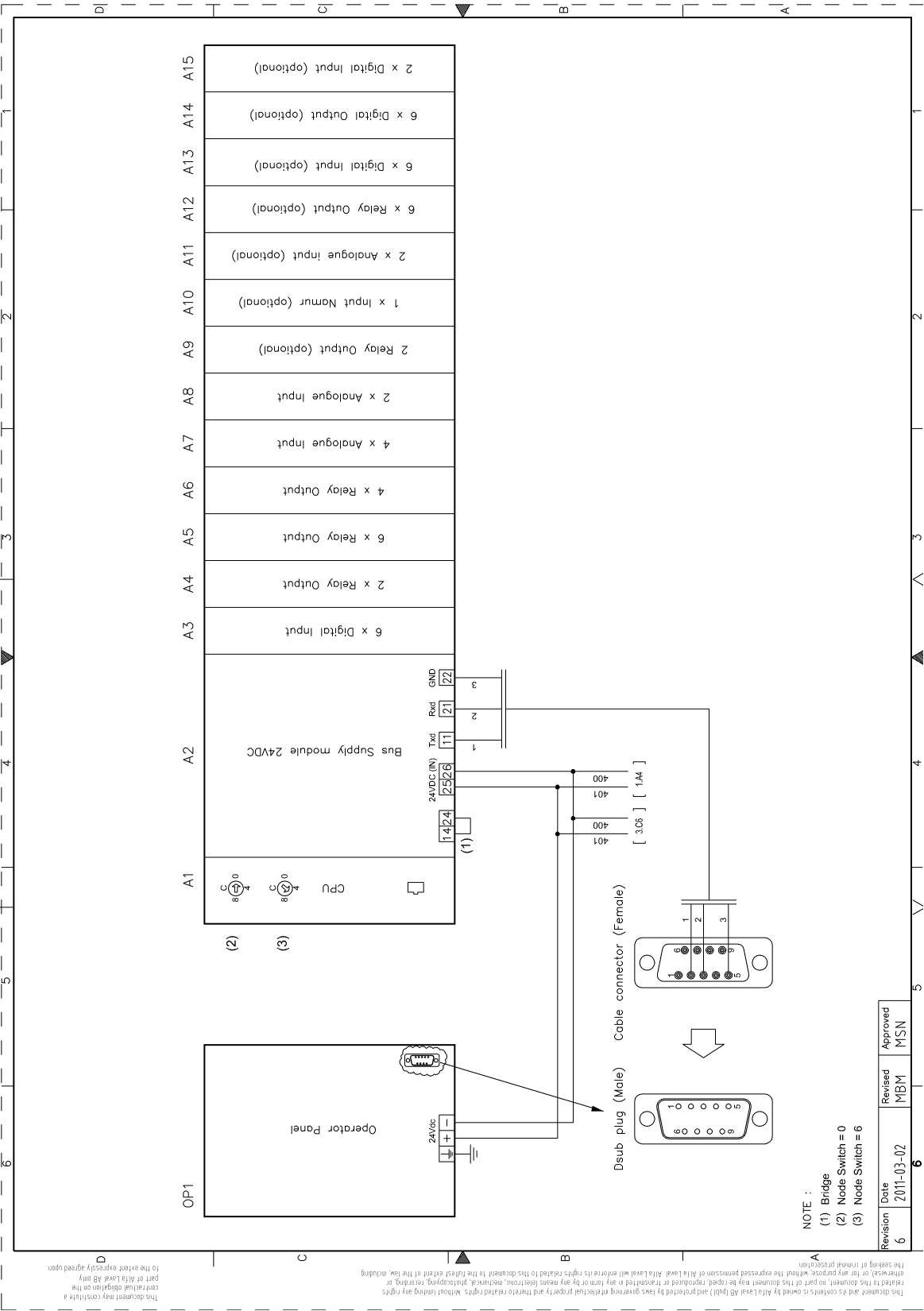


3.3.12 Circuit Diagram

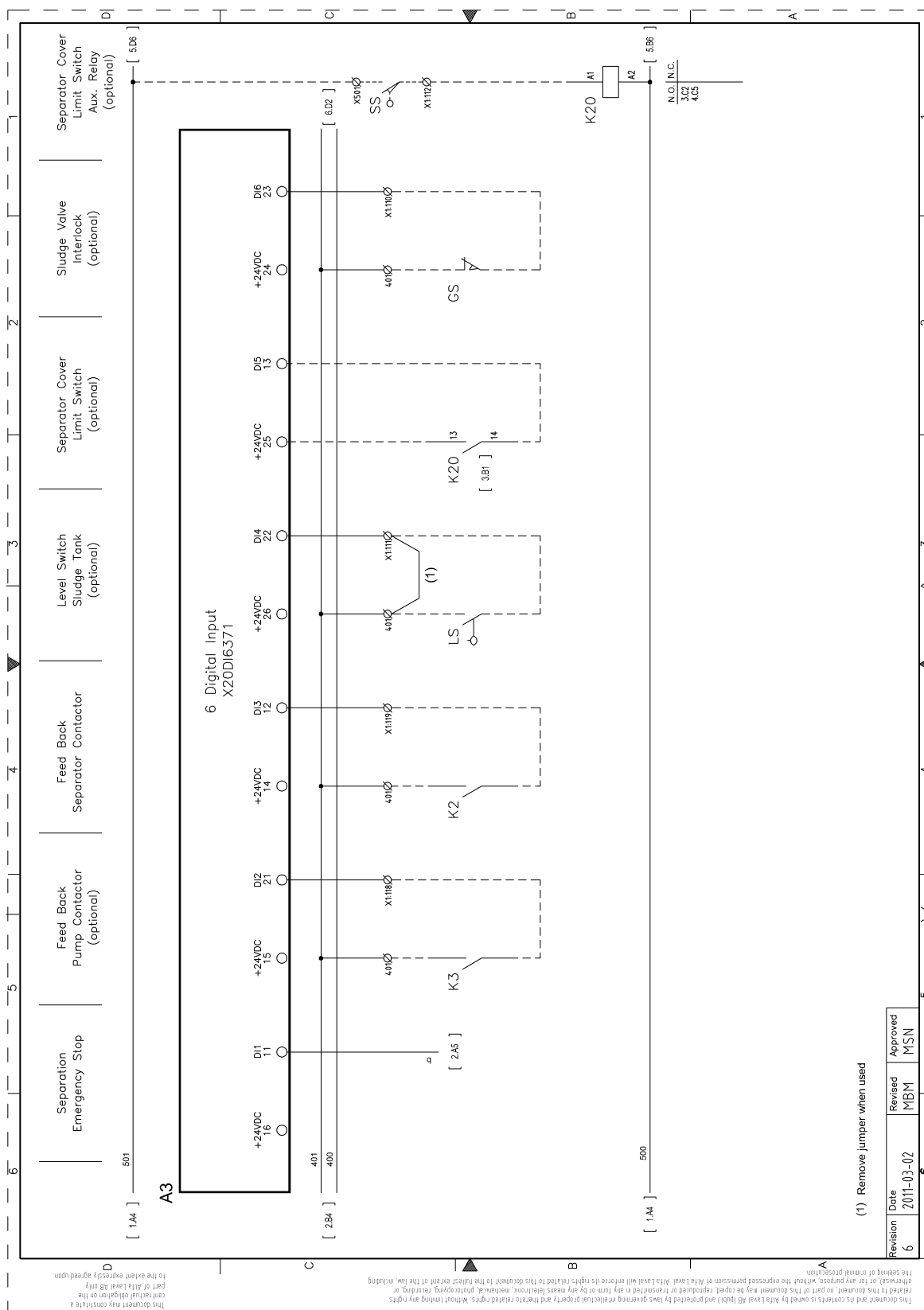
Alfa Laval ref. 581068 Rev. 6



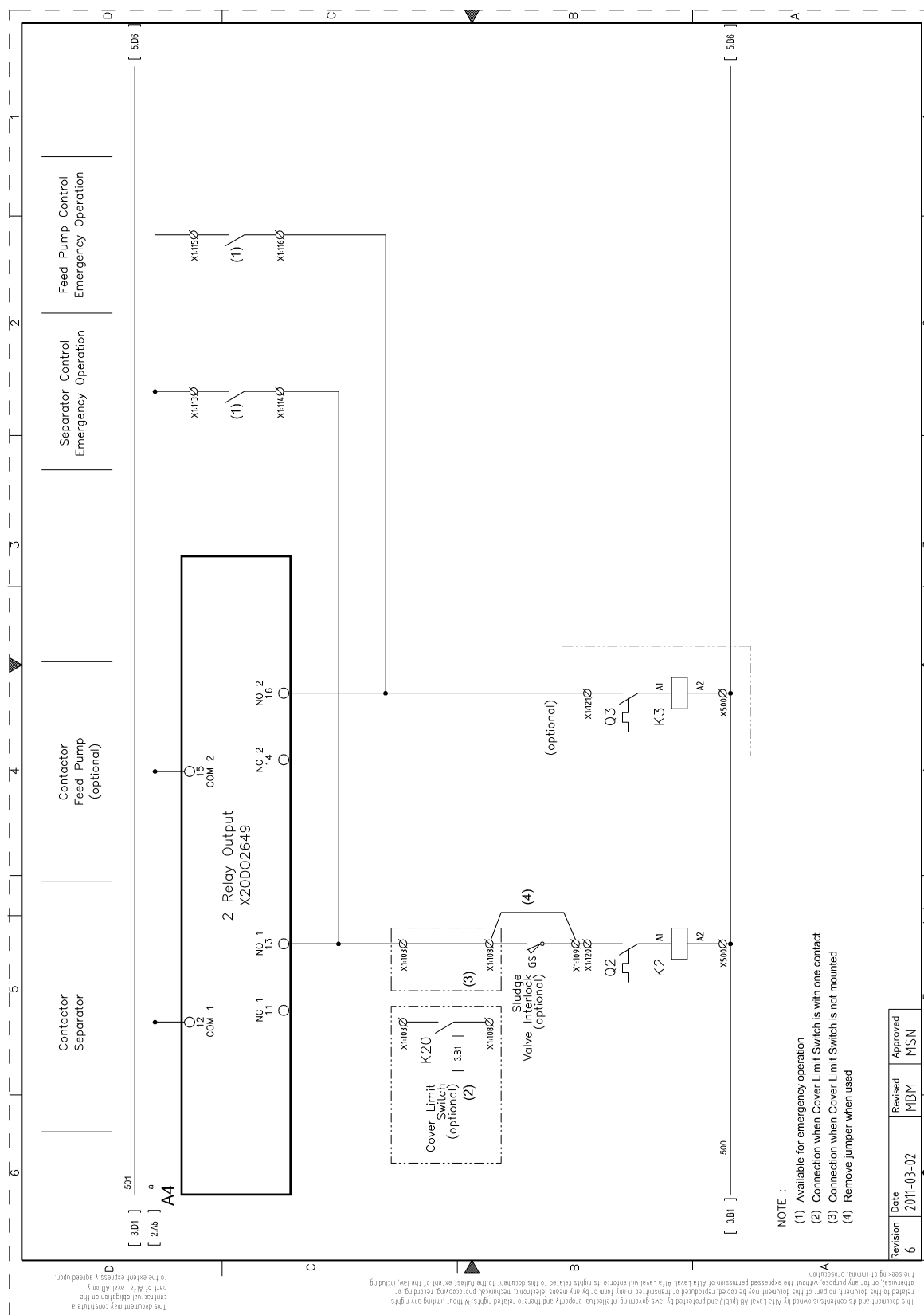
Alfa Laval ref. 581068 Rev. 6



Alfa Laval ref. 581068 Rev. 6

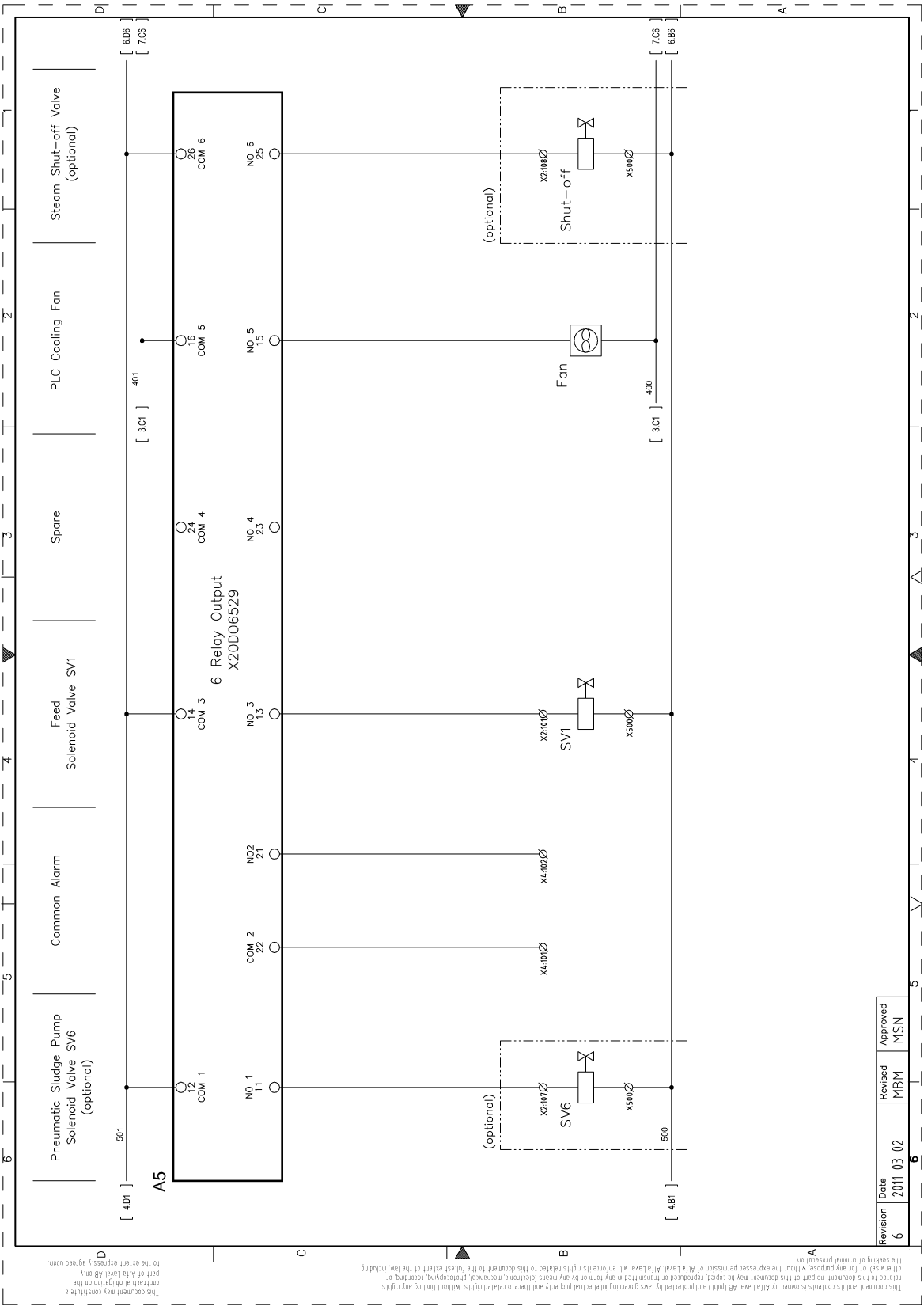


Alfa Laval ref. 581068 Rev. 6



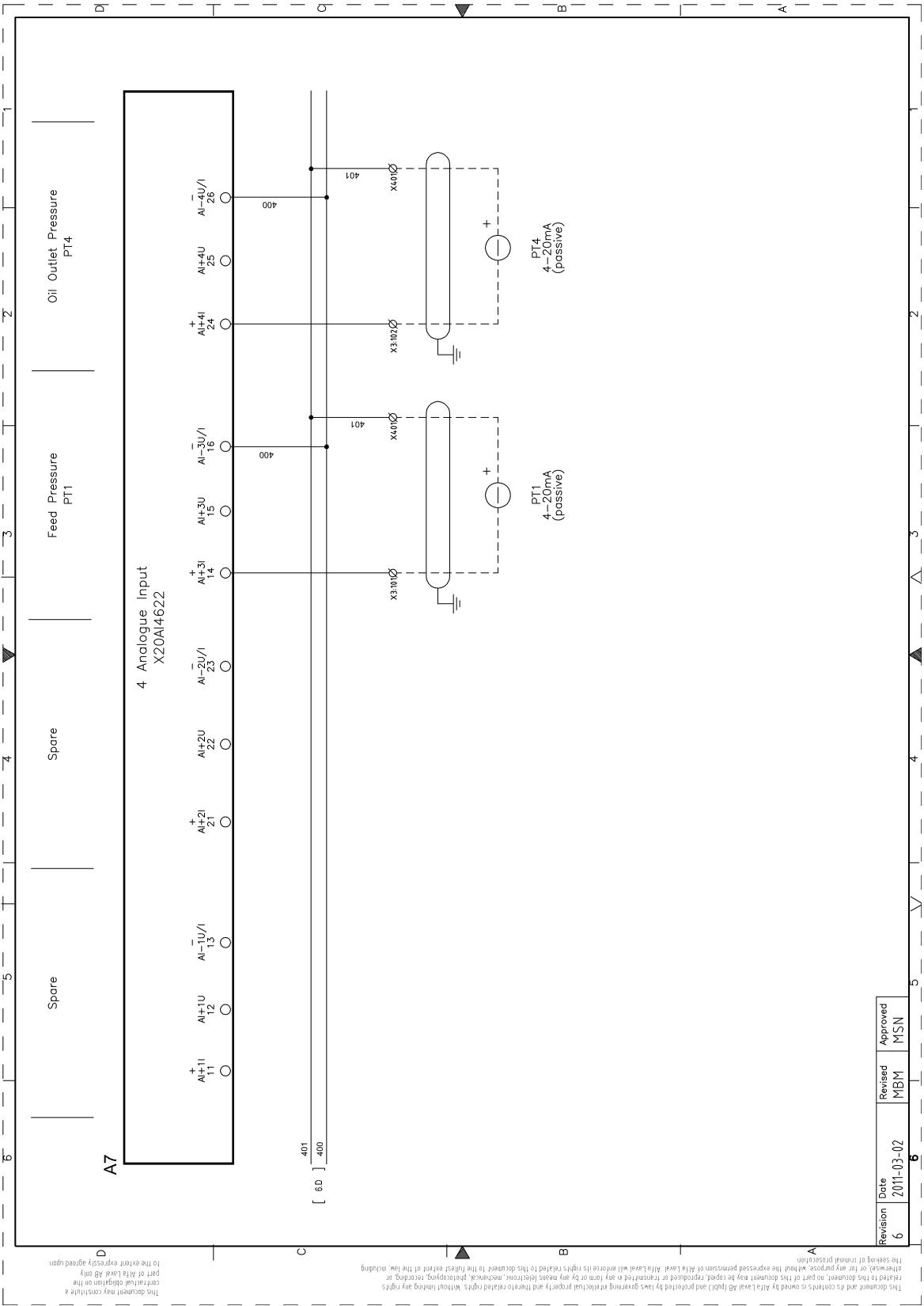
581068#6_03

Alfa Laval ref. 581068 Rev. 6

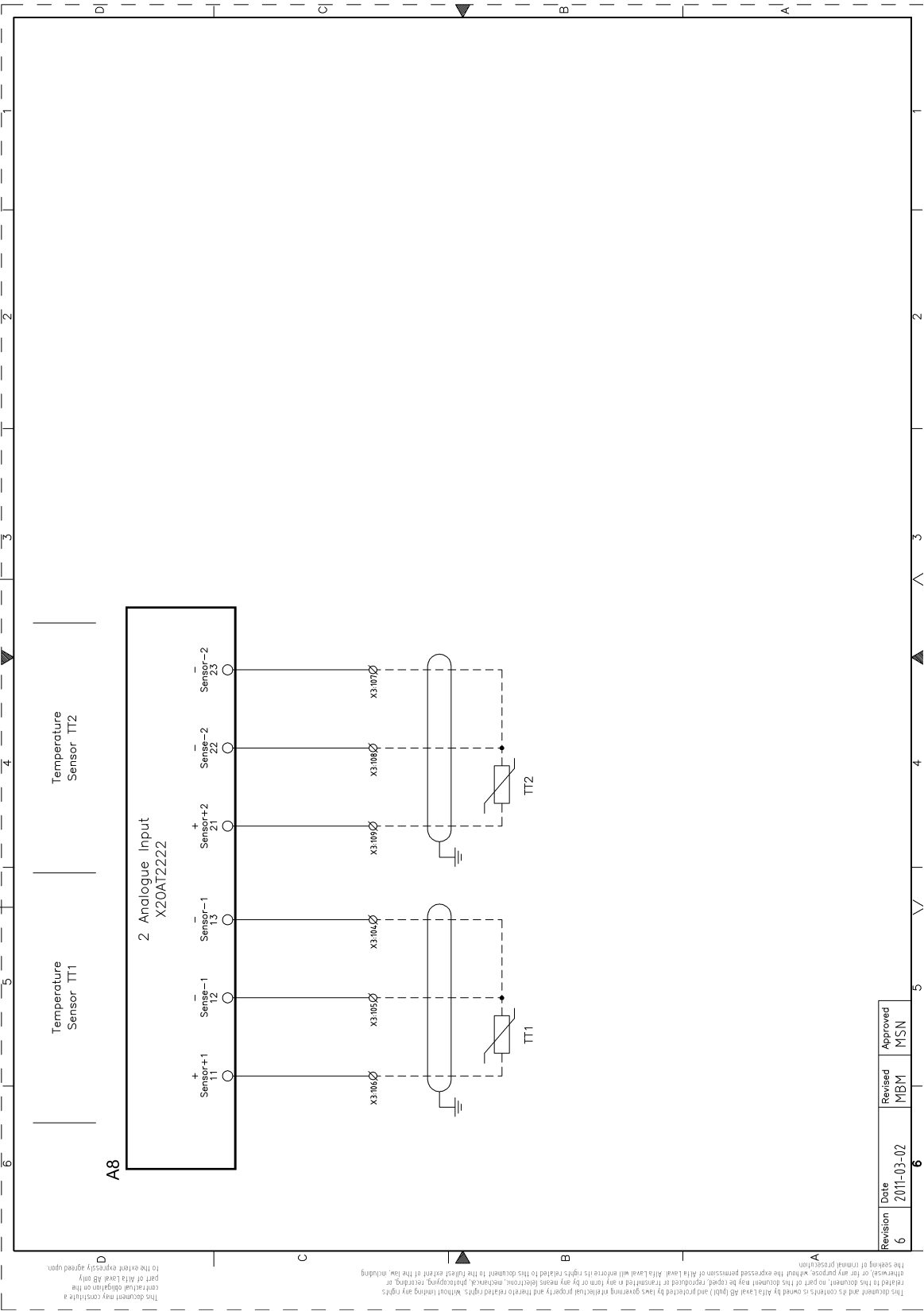


[illegible]

Alfa Laval ref. 581068 Rev. 6



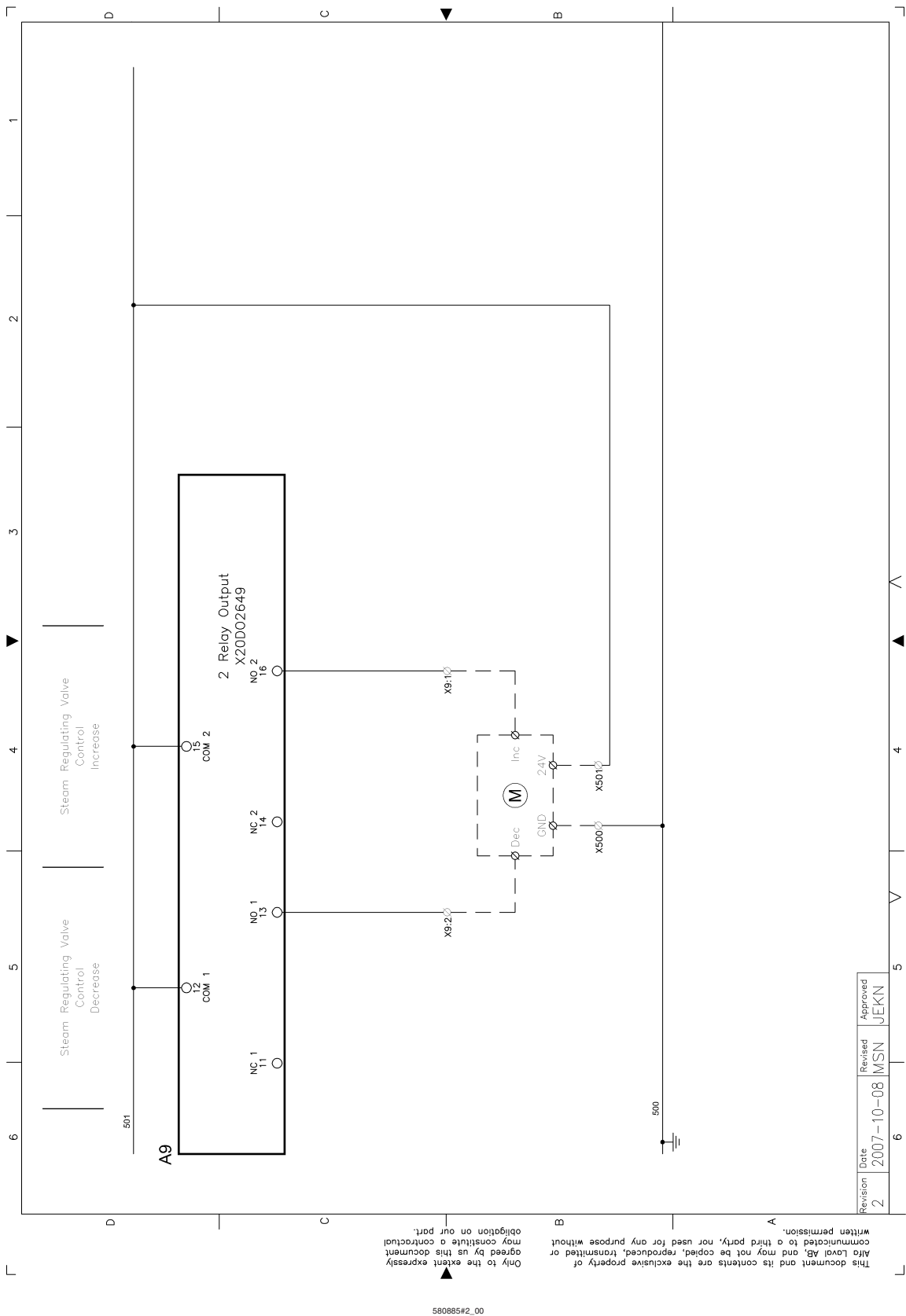
Alfa Laval ref. 581068 Rev. 6



581068#6_07

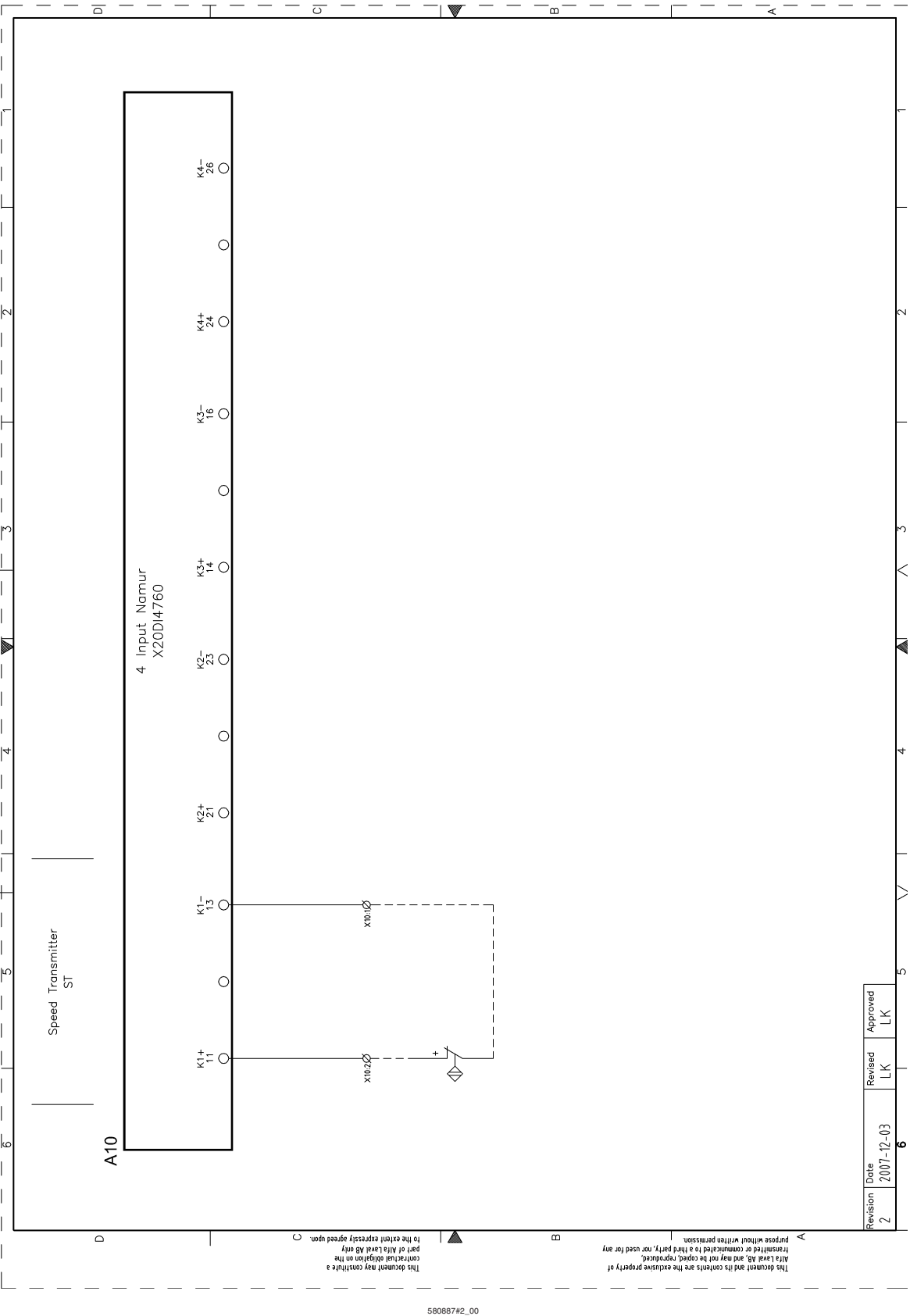
3.3.13 Steam Regulating Valve (optional) Circuit Diagram

Alfa Laval ref. 580885 Rev. 2



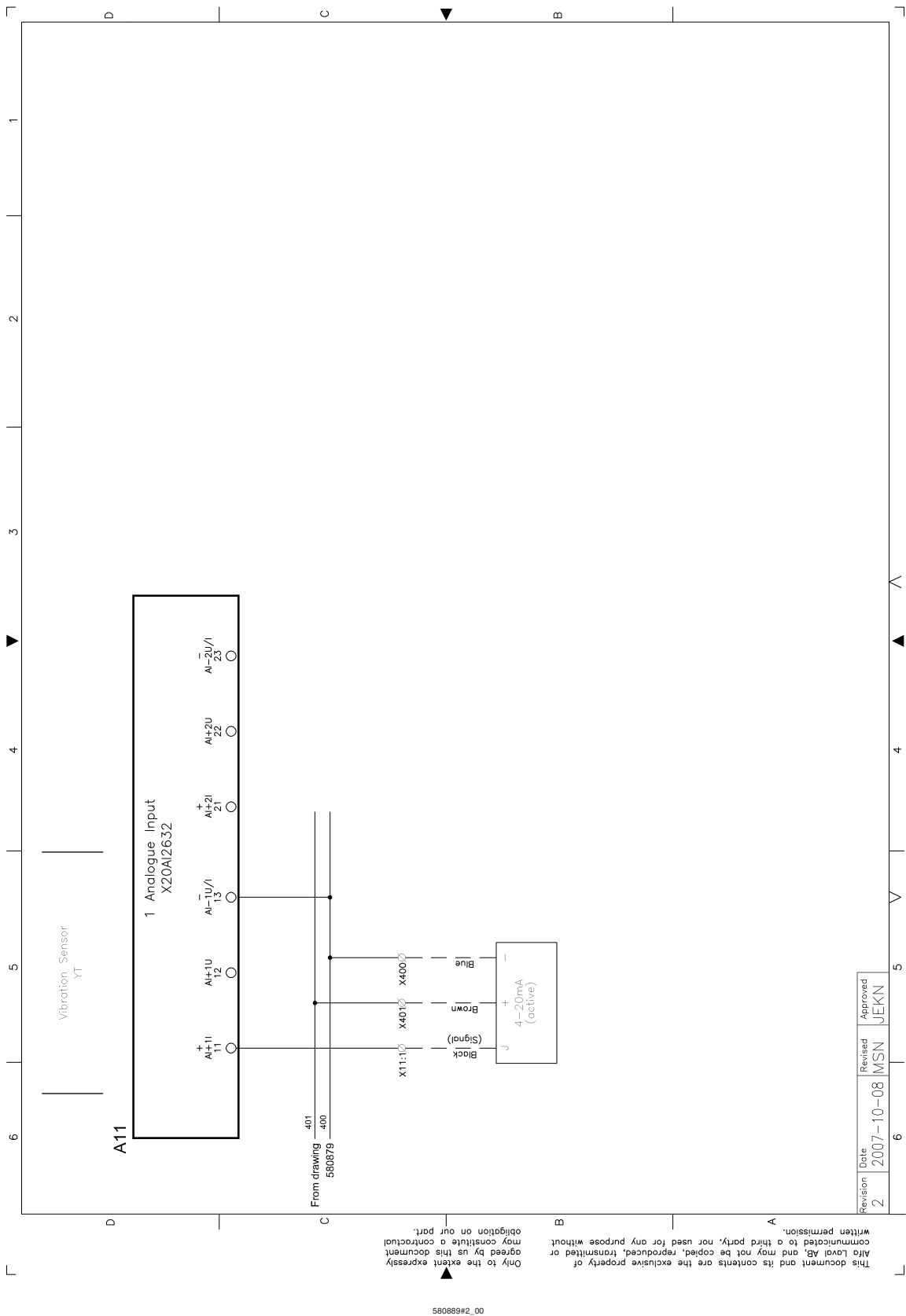
3.3.14 Speed Transmitter (optional) Circuit Diagram

Alfa Laval ref. 580887 Rev. 2



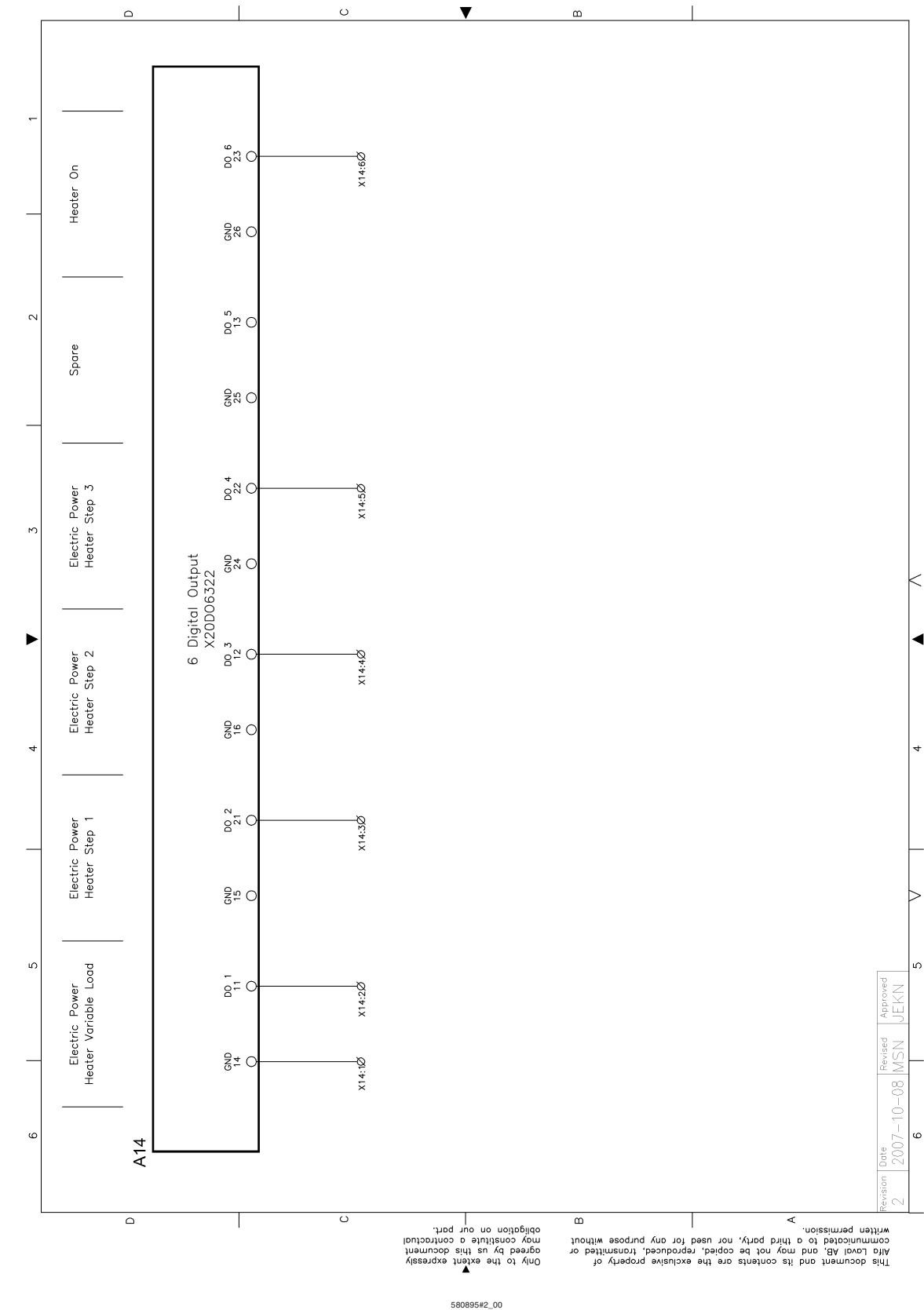
3.3.15 Vibration Transmitter (optional) Circuit Diagram

Alfa Laval ref. 580889 Rev. 2

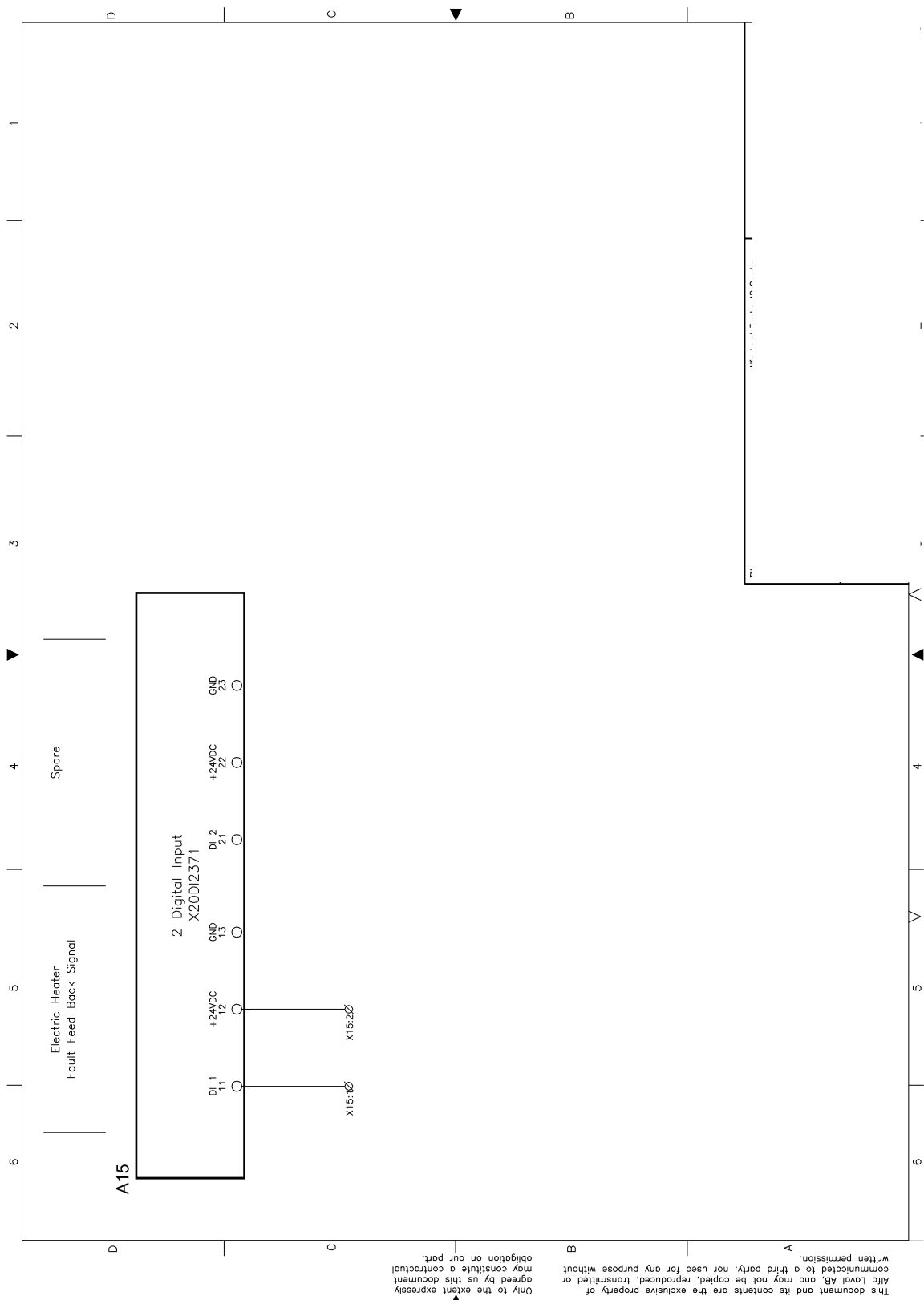


3.3.16 Electric Heater (optional) Circuit Diagram

Alfa Laval ref. 580895 Rev. 2



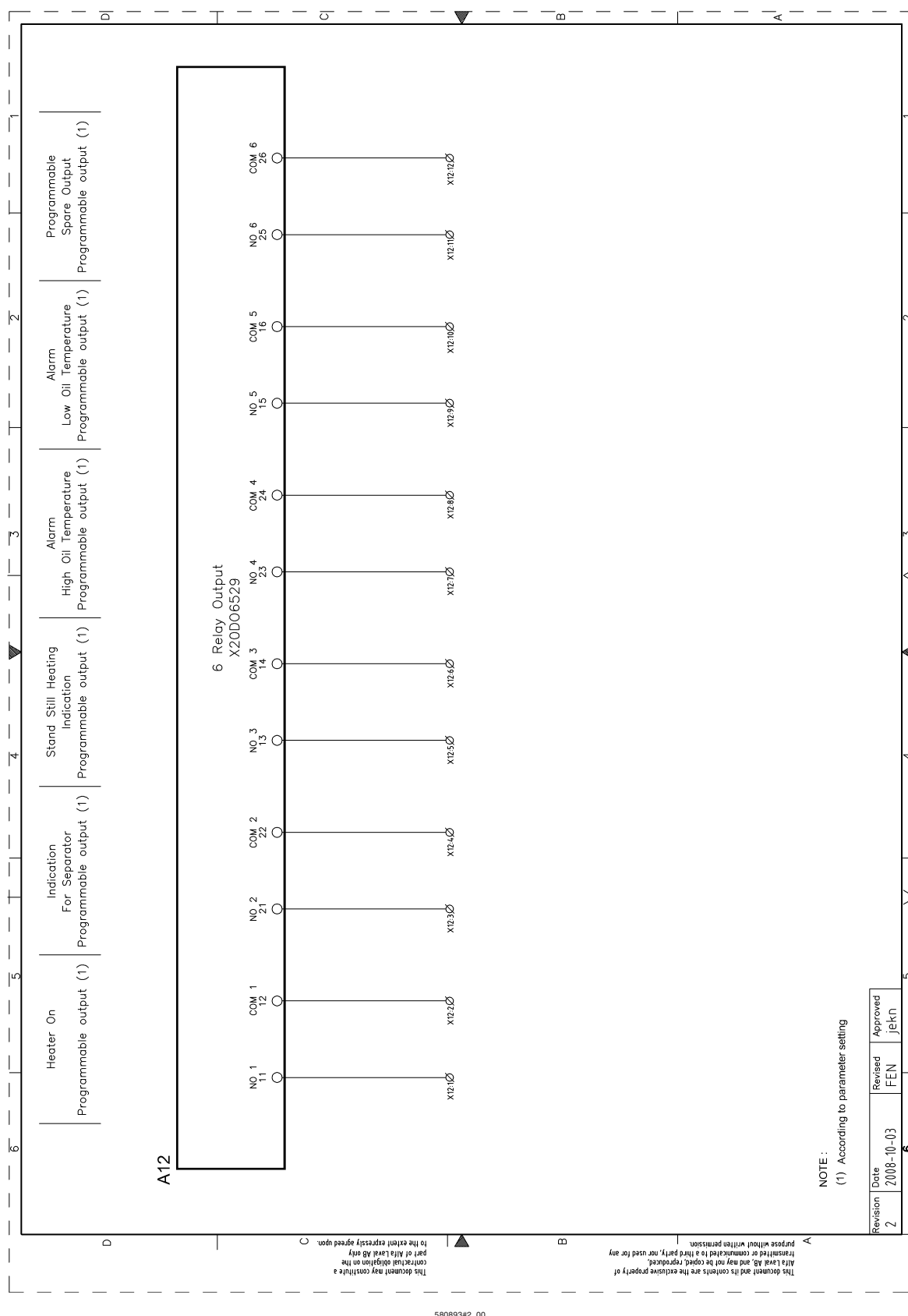
Alfa Laval ref. 580895 Rev. 2



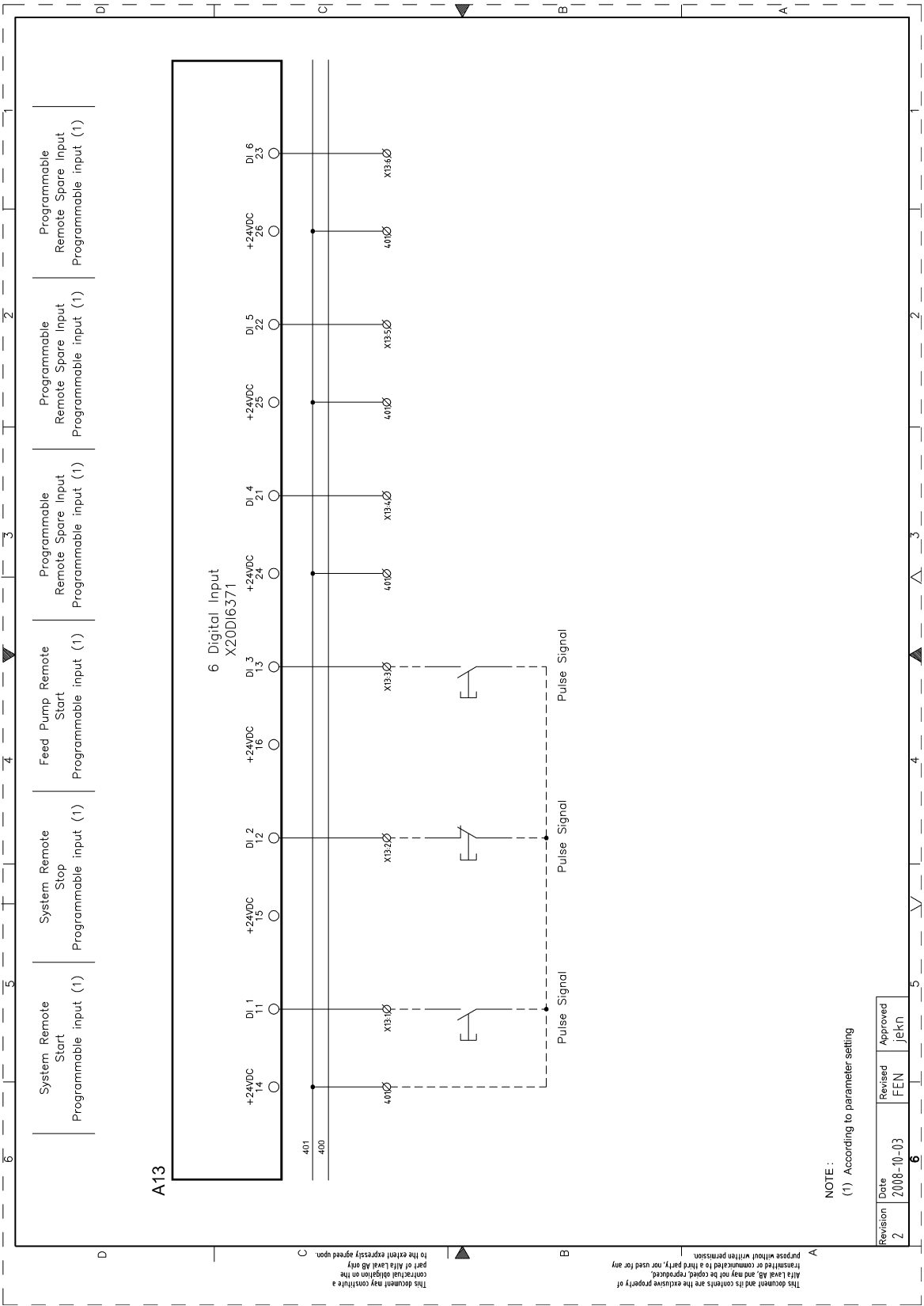
580895#2_01

3.3.17 I/O (optional) Circuit Diagram

Alfa Laval ref. 580893 Rev. 2

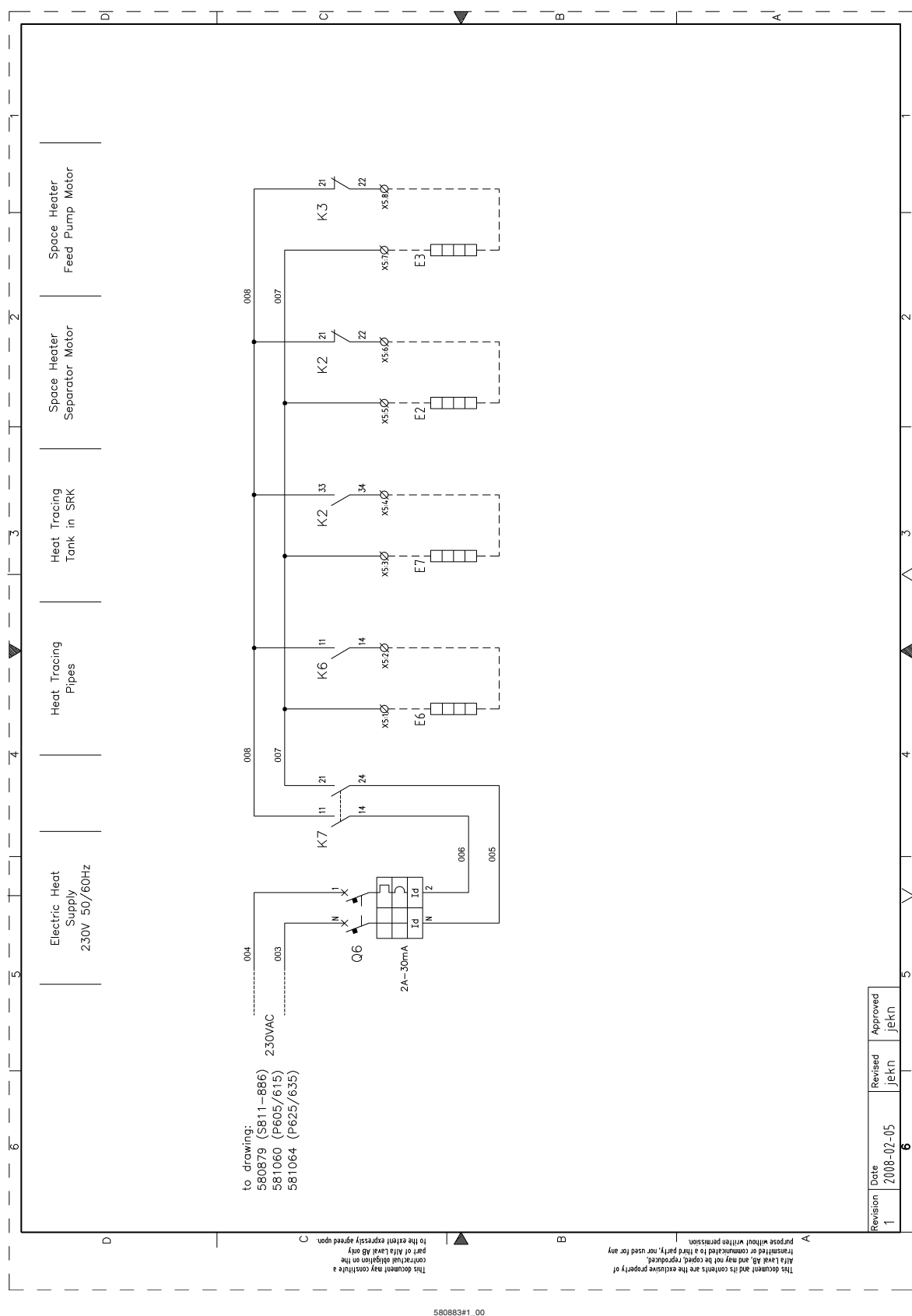


Alfa Laval ref. 580893 Rev. 2

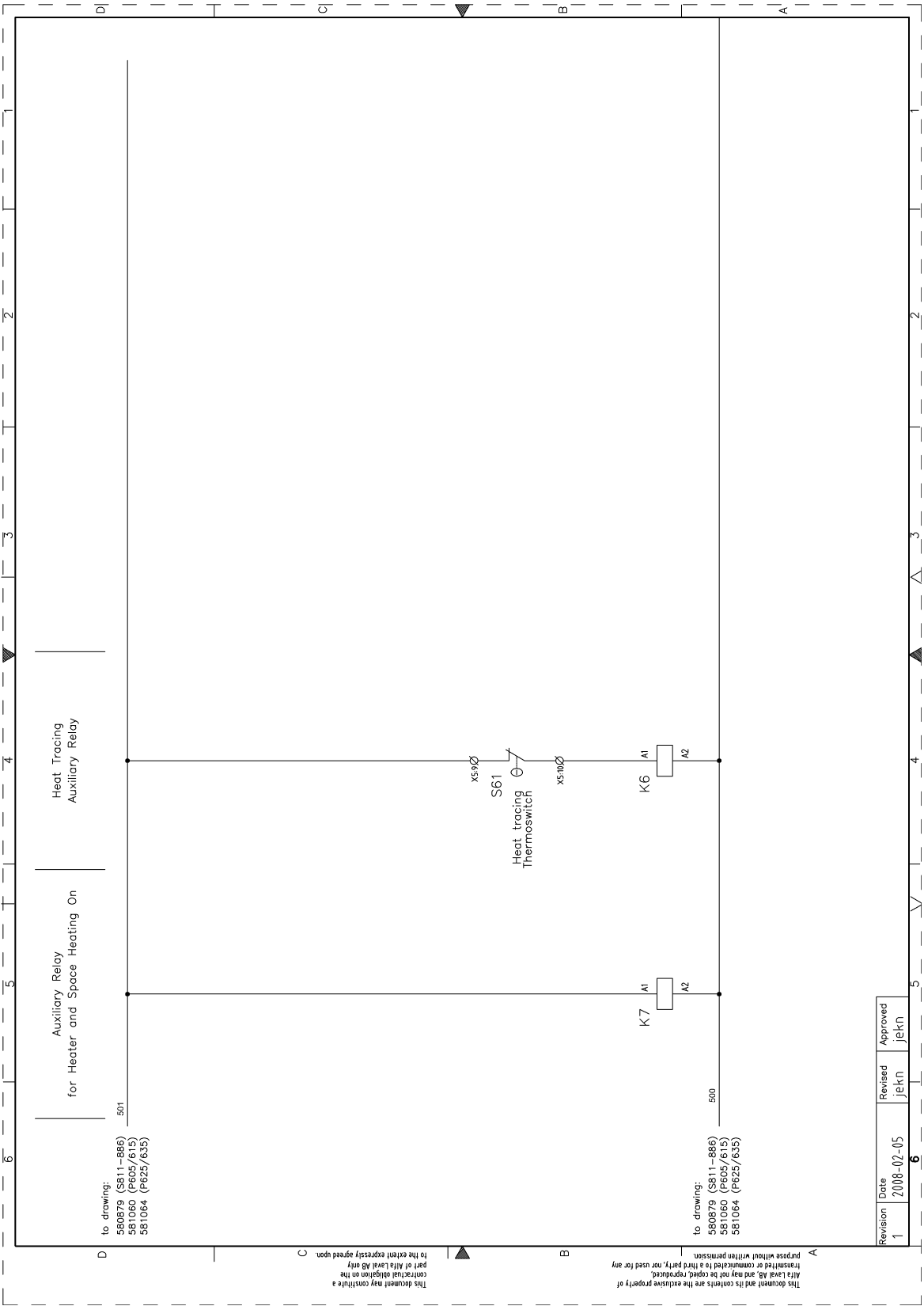


3.3.18 Heat Tracing (optional) Circuit Diagram

Alfa Laval ref. 580883 Rev. 1



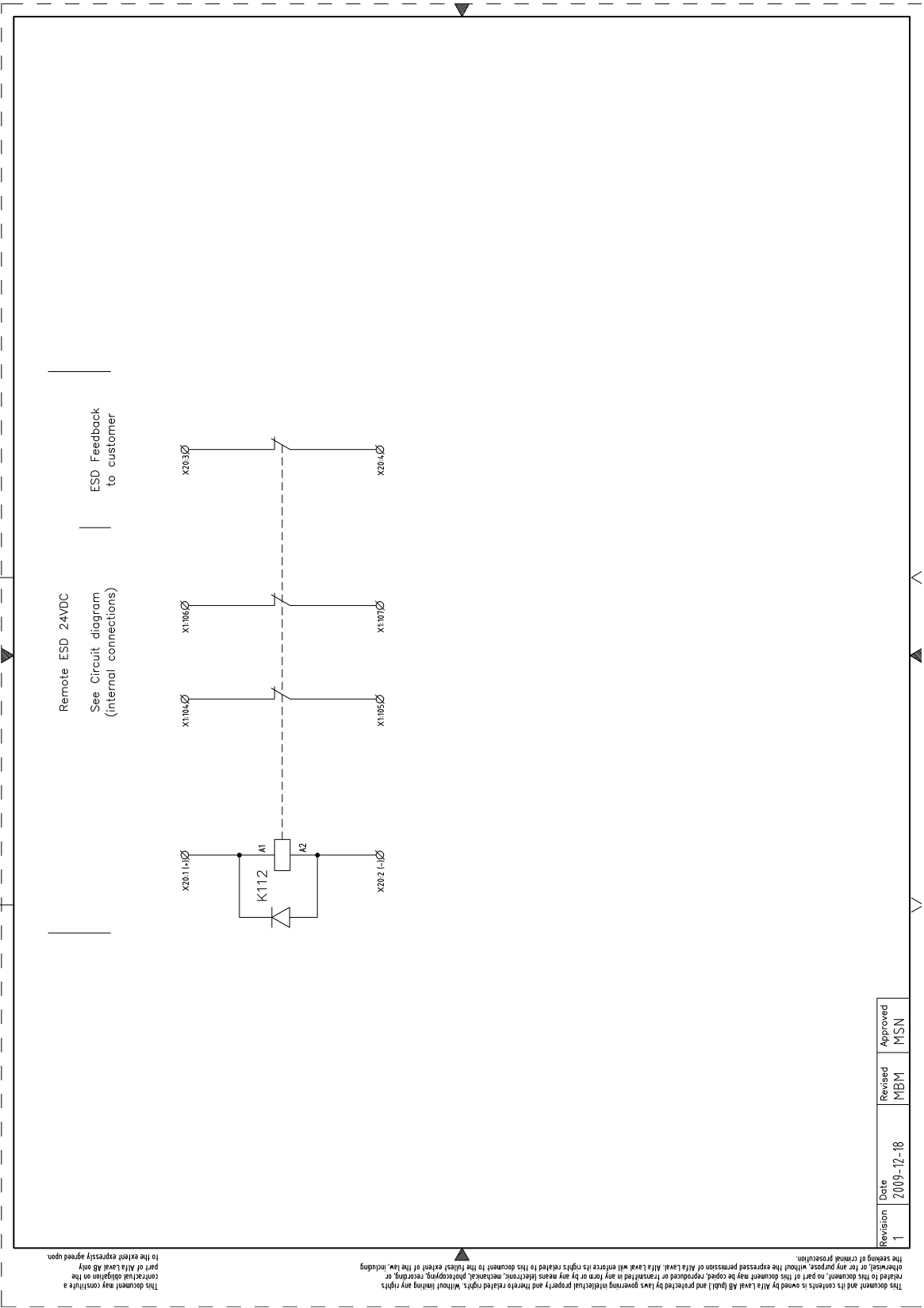
Alfa Laval ref. 580883 Rev. 1



580883#1_01

3.3.19 Emergency Shutdown Circuit Diagram

Alfa Laval ref. 580897 Rev. 1



4 *Specifications*

- Only qualified personnel are allowed to work with lifting of the module.
- Use only the lifting lugs as shown in the illustrations.
- Slings or wires used for lifting the Module must be adjusted so that the beam is located above the centre of gravity.
- Slings or wires used for lifting the Double Module must be of the same length to avoid instability.
- Slings/wires must be dimensioned locally depending on equipment used.
- For information on how to lift the separator, see the Separator Manual booklet.



Crush hazard

When lifting the Module, use only the lifting eyes specifically for this purpose. Always use a lifting beam.

4.1 Cables

Cable Identification

All cables are marked to simplify identification and fault finding.

Specifications

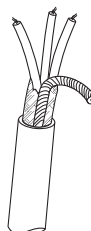
The following specifications apply to cables connected to and from Alfa Laval equipment. Follow the instructions given in the cable list. Examples of cable types that can be used:

- Steel armoured cable.



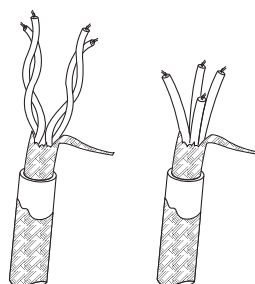
G032224A

- Copper armoured cable with a separate earth core.



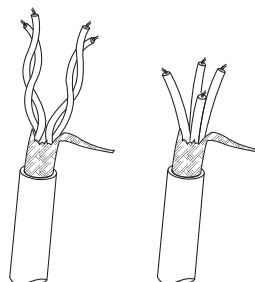
G032244A

- Steel armoured and shielded signal cable; pair twisted or parallel.



G032214A

- Shielded signal cable; pair twisted or parallel.



G032234A

4.2 Cable Routing

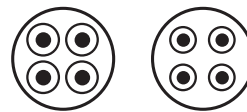
Recommendations

Power cables carry the power supply to motors, heaters, etc.

Any distance between signal and power cables reduces electrical noise transfer.

Examples of recommended routing of various cable types.

- Power cables and signal cables routed on a cable rack should be separated.
- Sattbus cables should be routed away from power cables.



G032273A

Left: Power Cables / Right: Signal cable

If the space is limited, cables can be routed in tubes.

4.3 Oil, Water, Steam, and Condensate Piping

For piping to and from Alfa Laval equipment, see the specifications below.

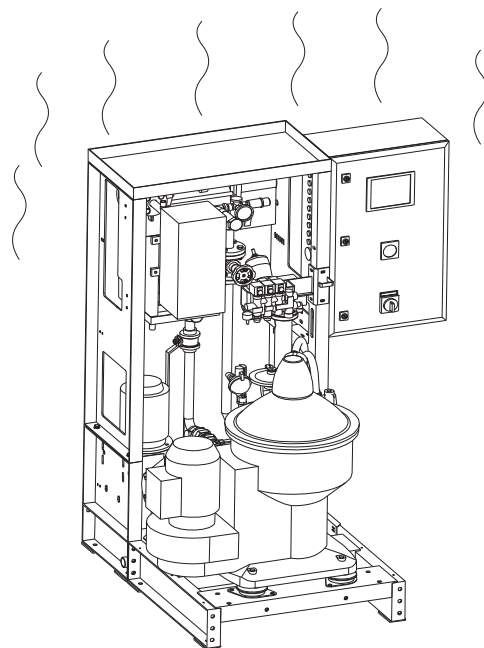
Specifications

- The correct pipe size must be used in the oil system.
- The number of bends in the oil pipes must be minimized.
- The suction height must be as low as possible.
- The oil feed pump must be of positive displacement type.
- The pump must be positioned close to the oil tank.
- The heater must be installed close to the separation module to maintain correct feed oil temperature.
- The recirculation line should be connected either directly to the settling tank (HFO) or to the oil outlet line from the separator (LO).
- The oil outlet line from the separator must be connected to the system tank for lube oil, or the service tank for fuel oil.

4.4 Ambient Temperature Limitation

Specification

Leading classification societies state in their regulations for engine room equipment that the maximum ambient temperature permissible is +55 °C. To meet this regulation, it is essential that electrical and electronic components have good ventilation, and temperature control.



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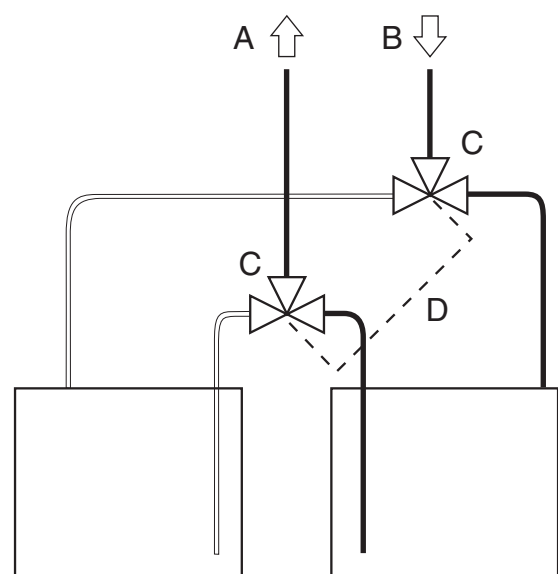
4.5 Heat Tracing and Insulation of Fuel Oil, Sludge, and Steam Pipes

Alfa Laval can, on request, supply modules which are heat traced and insulated, as optional equipment.

4.6 More than one Oil Tank

Recommendation

When one separator serves more than one oil tank, both the suction and the outlet lines should be fitted with change-over valves. To avoid oil transfer from one tank to another, these valves must be interlinked.



P000062B

- A. Unprocessed oil
- B. Clean oil
- C. Change over valve
- D. Interlink

4.7 Sludge Removal Kit (Optional Equipment)

If you have a Sludge Removal Kit, this must be connected to a ventilation pipe.

NOTE

The sludge removal pump must be set to the correct speed – circa 60 strokes/min, otherwise the lifetime of the diaphragm, valve balls, and air motor will be severely shortened.

WARNING

Health Risk

Oil mist and vaporized oil constituents from hot oily sludge may be dangerous to health and must not be inhaled.

A pipe or hose must be drawn from the flange to the nearest oil tank ventilation pipe.

The pipe/hose must have the same diameter as the flange opening.

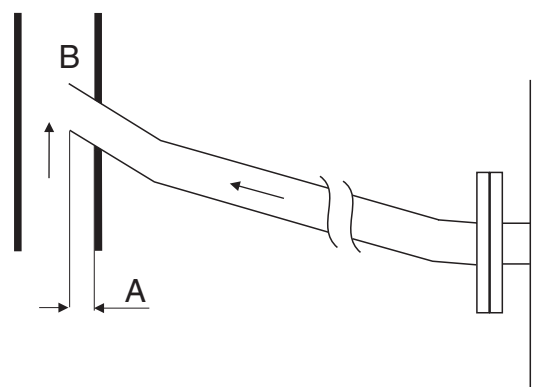
The pipe/hose must be as straight as possible, with a steady upward incline.

The connection to the oil tank ventilation pipe must point upwards as shown.

NOTE

For HFO separation, it is not recommended to make the connection to the separator room ventilation system.

For LO separation, connection to the separator room ventilation system should be made **only** if the separator room ventilation is adequate. Use the optional connection hose (part no. 568023-80, -81, or -82) for this purpose. This hose is designed to entrap oil drops in the vent hose, and lead the oil back to the Sludge Removal Kit tank.



P000063B

- A. ~5 mm
- B. Oil tank ventilation pipe

NOTE

**Impurities gather in the Sludge Removal Kit tank.
Regularly check the tank and level switch.
See instructions below.**

Proceed as follows:

- From the Control Panel, run the sludge pump manually for a few seconds.
- Undo the four screws connecting the sludge pump to the sludge tank and remove the sludge pump.
- If necessary, clean the level switch and the inside of the tank using diesel oil.
- Check the seals and gaskets, and change if necessary.
- Loosen the hose clip and check the inside of the ventilation hose. Clean if necessary.

To avoid breakdown of the Sludge Removal system, the sludge pump must be regularly overhauled as follows using spare parts kit specified in the spare parts catalogue.

- Replace the diaphragms and the O-rings with those delivered in the spare parts kit.
- Perform a 4000 hour Inspection Service.

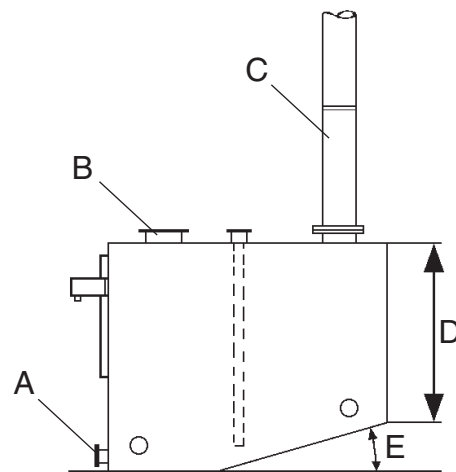
For Service and Overhaul intervals, see [1.3 System Data on page 8](#).

4.8 Sludge Tank

It is not necessary to have a sludge tank together with a Separation Module with sludge removal kit (for lube oil). If a sludge tank is required, follow the recommendations below:

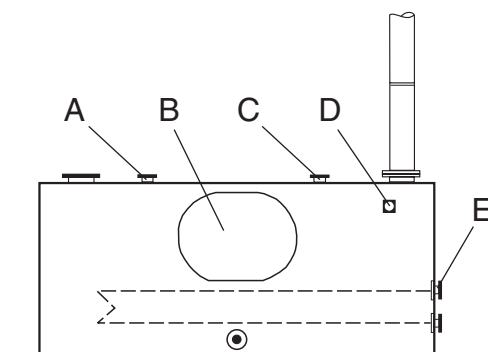
Recommendations

- Sludge tank volume per Separation Module should cover approximately up to 2 days storage at a discharge interval of 2 hours (for discharge volumes see technical data).
- A manhole should be installed for inspection and cleaning.
- The tank should be fitted with a sounding pipe.
- The tank floor, or most of it, should have a slope (B) of minimum 15°.
- The sludge outlet pump connection should be positioned in the lowest part of the tank.
- A high level alarm switch, connected to the sludge pump, should be installed.
- A heating coil should be used to keep the sludge warm and fluid while being pumped out.
- Tank ventilation must follow the classification rules for evacuation of gases.
- There should be a ventilation pipe to fresh air.
- The ventilation pipe should be straight. If this is not possible, any bends must be gradual.
- The ventilation pipe must not extend below the tank top.
- A sludge tank with partition walls must have ventilation pipes in all compartments, or cutouts in the upper edge, to allow vapours to travel through the tank.



G004273B

- A. Sludge outlet pump connection
- B. Sludge pipe connection
- C. Ventilation pipe
- D. Min. height 400 mm
- E. Min. slope 15°



G004270B

- A. Bowl casing drain connection
- B. Manhole
- C. Water drain connection
- D. High level alarm switch
- E. Heating coil

In retrofit applications, where an Alfa Laval Separation Module will share a common separator sludge tank with existing separators, it is recommended to install a Sludge Removal Kit.

The number of ventilation pipes, and their minimum dimension, depend on the size and number of separators connected to the same tank. See table below.

Type	1 module	2/3 modules	4 modules
P636, P636	1 x Ø 60 mm	1 x Ø 90 mm	1 x Ø 100 mm

Type	1 module	2/3 modules	4 modules
S831–S947	1 x Ø 60 mm	1 x Ø 90mm	1 x Ø 115 mm

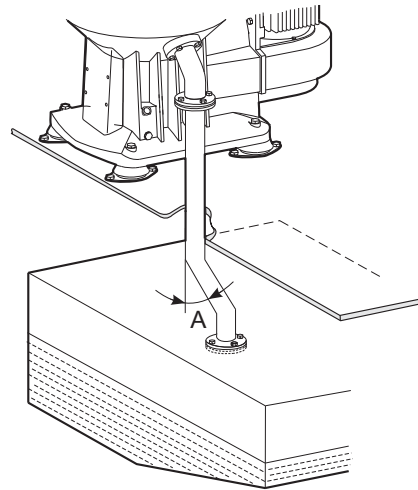
The Module generates almost no air during operation. At any discharge, the maximum volume of air produced is the same as the bowl volume (see technical data).

4.9 Sludge Piping

Specification

- The sludge pipe from the separator to the sludge tank should be vertical.

If a vertical pipe is not possible, the deviation (A) from the vertical line must not exceed 30°.

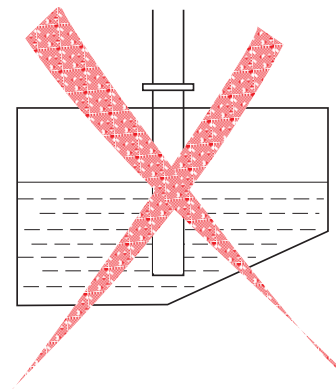


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- The sludge pipe must not extend below the tank top.

NOTE

An extended sludge pipe will obstruct ventilation and create back pressure that could cause separator problems.



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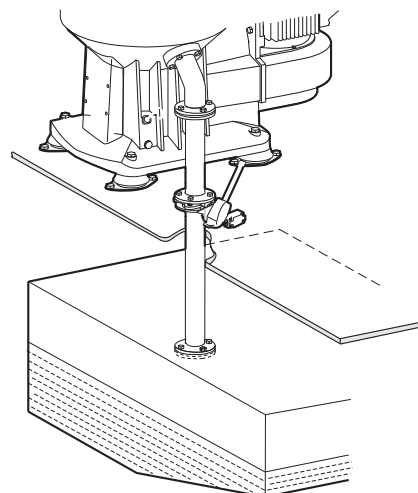
Recommendation

In cases where sludge tank ventilation is not adequate, and more than one separator is connected to the same sludge tank, we recommend that a butterfly valve is installed in each sludge pipe.

NOTE

If a butterfly valve is not used, the bowl and the operating system may be affected by corrosive fumes and sludge from the sludge tank.

- If a butterfly valve is used, it should be equipped with an interlocking switch (connected to the separator starter) to prevent the separator from being started when the valve is not fully open.



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5 Commissioning and Initial Start

5.1 Completion Check List

It is essential *before* starting up the separation system that all modules are in good operating condition and that all pipelines and control equipment are properly connected to assure correct operation.

Use this check list as a guide for completing the system installation:



Breakdown hazard

Check that the power frequency is in agreement with the machine plate. If incorrect, resulting overspeed may cause breakdown.

1. Check that transport seals are removed from all pipes.
2. Use flushing filters to prevent pipe work debris from being pumped into the separation module.



The flushing filters must be removed after initial flushing.

3. Check that all separators are in proper working condition. Follow the manufacturer's instructions.
4. Make sure that separators are lubricated in accordance with instructions.



Make sure that the spindle bearings are prelubricated



g0868711

Drop some frame oil onto the bearings

5. Separators are delivered without oil in the oil sump. For information on oil filling and oil type, see the *Separator Manual booklet*.

NOTE

Too much, or too little oil may result in damage to separator bearings.

Neglecting an oil change may result in damage to separator bearings.

6. Power on.
7. Check that the separator rotation direction corresponds with the arrow on the frame by doing a quick start/stop (1–2 seconds.) and looking at the motor fan rotation.

CAUTION

If power cables have been installed incorrectly, the separator will rotate in reverse, and vital rotating parts can unscrew.

8. Check the pump function and direction.
9. If a Sludge Removal Kit is used, check that the sludge pump speed is set to circa 60 strokes/min. If necessary, adjust the throttling valve (positioned after solenoid valve SV 6).

5.2 Initial Start-up

NOTE

After every start the separator must always be run continuously for a minimum of 1 hour to ensure proper lubrication.

Use this check list for initial system start up:

1. Check that there is oil in the feed oil tank.
2. Check water and air supply. See [1.3 System Data](#).
3. Check power supplies to the control unit and that the voltage is in accordance with data in [1.3 System Data](#).

4. Check all parameter settings in the control unit.
See *Installation Parameters* in the *Parameter List* booklet.
5. Check the separator.

NOTE

Always lubricate the bearings before start-up.

NOTE

The Separation module is supplied with standard configuration parameters. You may have to make some changes to suit your installation.

6. Start the separation system as described in the *Operating Instructions* booklet.
7. Start up step by step, checking that the machine and module function properly.
8. Establish system pressures. The delivery height pressure is the pressure in the oil pipe work down stream from the separation module, due to the pipe bends and the height (head) to the cleaned oil tank. If the cleaned oil tank is below the separation module the delivery height pressure may be very low. The oil paring disc pressure will have to be greater than the delivery height pressure for any oil to flow.
Proceed as follows:

- Ensure the valves in the oil system are in the correct positions.
- The oil should be at separation temperature.

For S-type separators:

- The paring tube should be able to move freely.
- Ensure that V5 is closed.
- Fully open the back pressure regulating valve RV4.
- The shut off valve V4 should be open.
- Open SV15 for 3 seconds to prime the operating slide.
- Open SV16 for 15 seconds to close the bowl.
- Open SV10 for 1 minute to put water into the bowl.
- Feed oil to the separator at the normal flow rate by opening SV1.

- Note the pressure in the oil outlet PT4, both on the pressure gauge and in the EPC 60 display. This pressure is P min.
- Gradually close the back pressure regulating valve RV4. The pressure on PT4 will increase. The water pressure (PT5) decreases slightly as the paring tube moves inwards. The water pressure will suddenly drop when oil passes from the oil paring chamber to the water paring chamber. Note the pressure of PT4 both on the pressure gauge and in the EPC 60 display. This pressure is P max.
- Open RV4.
- Stop the oil feed to the separator and note the pressure in the oil outlet. This is the delivery height pressure P del.
- Stop the heater.
- Stop the separator.
- Stop the feed pump when the heater has cooled.

For P-type separators:

- Fully open the back pressure regulating valve RV4.
- Open SV15 for 5 seconds to prime the operating slide.
- Open SV16 for 15 seconds to close the bowl.
- Open SV10 for 5 seconds to put water into the bowl.
- Feed oil to the separator at the normal flow rate by opening SV1.
- Note the pressure in the oil outlet PT4, both on the pressure gauge and in the EPC 60 display. This pressure is P min.
- Gradually close the back pressure regulating valve RV4. The pressure on PT4 will increase. The oil pressure will suddenly drop when oil passes over to the water outlet. Note the pressure of PT4 both on the pressure gauge and in the EPC 60 display. This pressure is P max.
- Open RV4.
- Stop the oil feed to the separator and note the pressure in the oil outlet. This is the delivery height pressure P del.
- Stop the heater.
- Stop the separator.
- Stop the feed pump when the heater has cooled.

5.2.1 Calculating Operating Pressure

- Calculate the normal back pressure level during operation as follows:

$$\frac{P_{\min} + P_{\max}}{2} = P_{\text{normal}}$$

- Calculate the value for low pressure alarm setting (Pr 11) as follows:

$$\frac{P_{\min} + P_{\text{normal}}}{2} = P_{\text{low press.}}$$

- Calculate the value for high pressure alarm setting (Pr 10) as follows:

$$\frac{P_{\text{normal}} + P_{\max}}{2} = P_{\text{high press.}}$$

Adjust the back pressure to P_{normal}

Set P154 to give alarm at pressure *decreasing* below the $P_{\text{low press.}}$ value.

Set P153 to give alarm at pressure *increasing* above the $P_{\text{high press.}}$ value.

6 Shut-down and Storage

Storage before Installation

If the separation system is stored before installation, the following safeguards must be taken:

Storage period	1 < 6 months	≥6 months	See
Action before storage			
Protect from dust, dirt, water, etc.	X	X	This chapter
Protect with anti-rust oil	X	X	This chapter
Action before installation			
Inspection service		X	<i>Service manual</i>
Overhaul service		X	<i>Service manual</i>

6.1 Shut-down after Use

If the separation system is going to be shut down for a period of time, the following safeguards must be taken:

Shut-down period	1 < 6 months (stand-by)	6 – 18 months	> 18 months	See
Action before storage				
Remove bowl	X	X	X	<i>Dismantling and Assembly in the Service Manual</i>
Protect from dust, dirt, water, etc.	X	X	X	This chapter
Protect with anti-rust oil	X	X	X	This chapter
Inspection service		X	X	<i>Service manual</i>
Overhaul service			X	<i>Service manual</i>

6.2 Protection and Storage

All system equipment, both the separator and the ancillary equipment, must be stored indoors at 5 – 55°C, if not delivered in water-resistant box for outdoor storage.

If there is a risk for condensation of water, the equipment must be protected by ventilation and heating above dew point.

The following protection products are recommended:

- Anti-rust oil with long lasting effective treatment for external surfaces. The oil should prevent corrosion attacks and give a waxy surface.
- Anti-rust oil (Dinitrol 40 or equivalent) thin and lubricating for inside protection. It gives a lubricating transparent oil film.
- Solvent, e.g. white spirit, to remove the anti-rust oil after the shut-down.
- Moist remover to be packed together with separator equipment.
- If the storage time exceeds 12 months, the equipment must be inspected every 6 months and, if necessary, the protection be renewed.

Modules

- Clean unpainted steel parts with solvent and treat external surfaces with anti-rust oil (type 112).
- If necessary, clean other equipment on the module with solvent.
- Treat the equipment with anti-rust oil by following the description above accordingly.
- Bolts, nuts and other external steel components should be treated with anti-rust oil (type 112).

Rubber Parts

- Gaskets, O-rings and other rubber parts should not be stored for more than two years. After this time, they should be replaced.

Separator

Dismantle the separator bowl and take out the O-rings. Clean the bowl with oil and reassemble without the O-rings. Place in a plastic bag with silica dessicant bags and seal the plastic bag.

Grease the spindle.

Valves, Pipes and Similar Equipment

- Components such as valves need to be cleaned with solvent and treated with anti-rust oil (type 112).
- Water pipes should be drained and treated with anti-rust oil (type 112).
- Articles made of rubber or plastics (e.g. seals) must *not* be treated with anti-rust oil.

Electric Heater

- Fill the heater with a non-corrosive lubricating oil.
- Place a number of bags of silica gel inside the connection box to absorb humidity. Steam Heater • Drain the condensed water from the steam valve and the steam trap.
- Drain all condensed water from the heater.
- Fill the oil part of the heater with a non-corrosive lubricating oil.

Pump

- Clean the pump housing outside from oil and grease with solvent.
- Protect the pump by filling it with non-corrosive lubricating oil.
- Apply anti-rust oil on the pump housing outside.
- Fill the pump screws with lubricating oil to prevent rust.

6.3 Reassembly and Start up

- Clean away the anti-rust oil with white spirit.
- Remove the silica gel bags from all modules.
- Pre-lubricate the separator spindle bearings
- If stored for 6 months or longer, perform an inspection service (including change of oil in the separator sump).
- Follow all relevant instructions in this booklet and in the Separator Manual.
- Before operating the heater:
 - Check by lifting the safety valve handle that it functions correctly.
 - Follow the start-up check list for the heater in the manufacturer's instructions.
 - For plate heat exchangers: check the bolt connections to ensure that all gaskets are tight.

NOTE

Always lubricate the bearings before start-up.

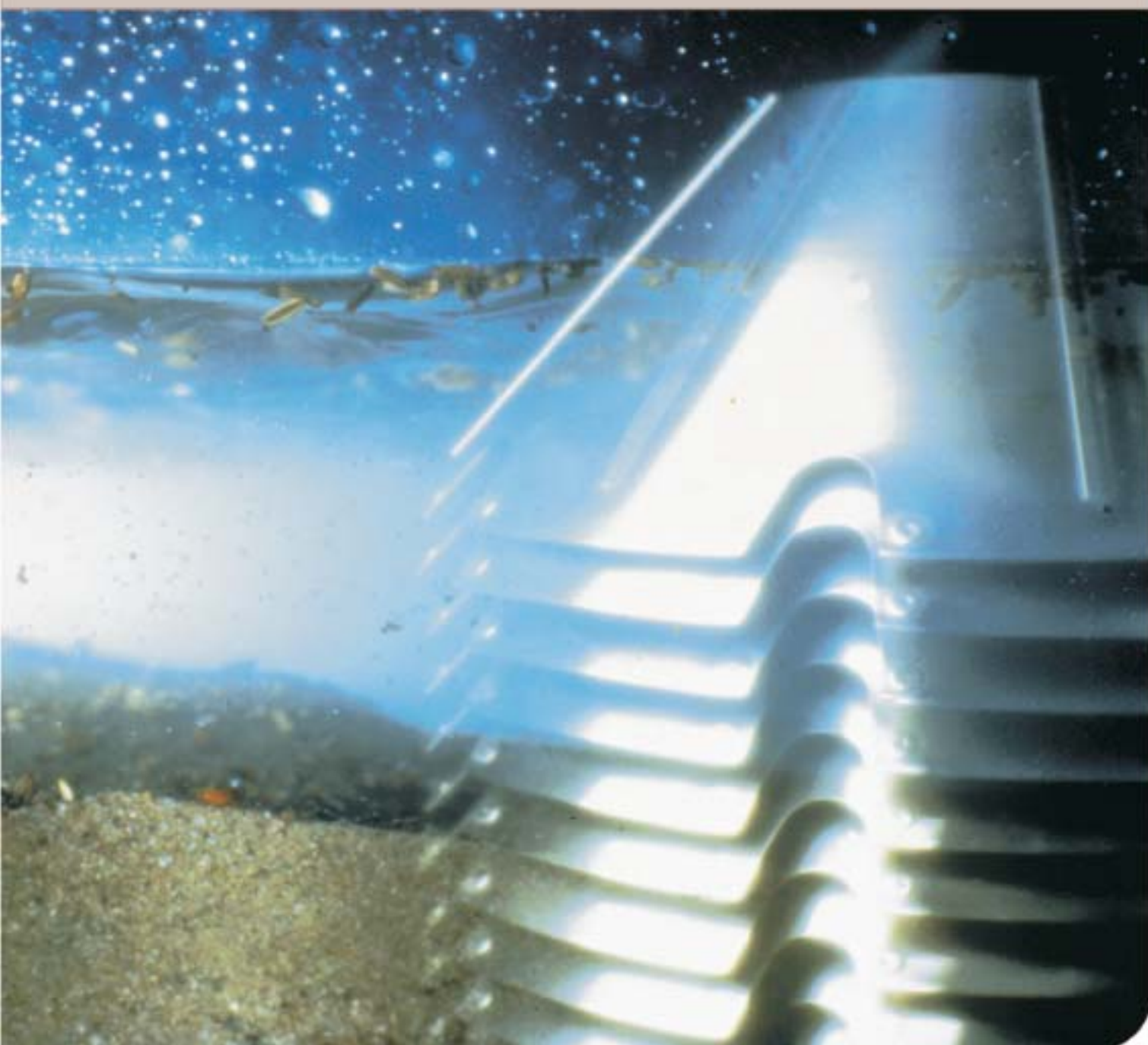
NOTE

After every start the separator must always be run continuously for a minimum of 1 hour to ensure proper lubrication.



Separator Manual High Speed Separator

S 936



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Study instruction manuals and observe the warnings before installation, operation, service and maintenance.

Not following the instructions can result in serious accidents.

In order to make the information clear only foreseeable conditions have been considered. No warnings are given, therefore, for situations arising from the unintended usage of the machine and its tools.



1 *Read This First*

This manual is designed for operators, maintenance personnel and service engineers working with the Alfa Laval separator

If the separator has been delivered and installed by Alfa Laval as a part of a processing system, this manual should be viewed as part of the System Documentation. Study carefully all instructions in any System Documentation.

In addition to this Separator Manual a Spare Parts Catalogue, SPC is supplied.

The Separator Manual consists of:

Safety Instructions

Pay special attention to the safety instructions for the separator. Accidents causing damage to equipment and/or serious injury to persons or personnel can result if the safety instructions are not followed.

Basic Principles of Separation

This chapter describes the purpose of separation and separation principles.

Design and function

This chapter contains a description of the separator.

Operating Instructions

This chapter contains operating instructions for the separator only.

Service, Dismantling, Assembly

This chapter gives instructions for the maintenance procedures. It also contains step-by-step instructions for dismantling and assembly of the separator for service and repair.

Fault Finding

Refer to this chapter if the separator functions abnormally.

If the separator has been installed as a part of a processing system, always refer to the trouble-tracing instructions, in the System Documentation.

Technical Reference

This chapter contains technical data concerning the separator and drawings.

Installation

This chapter contains specifications and recommendations concerning separator installation.



NOTE

A complete reading of this manual by personnel in contact with the machine is essential to safety.

Do not allow personnel to clean, assemble, operate or maintain the separator until they have read and fully understood this manual.

Ensure that all personnel who operate and service the separator are well-trained and knowledgeable concerning the machine and the work to be carried out.

2 *Safety Instructions*



The centrifuge includes parts that rotate at high speed. This means that:

- Kinetic energy is high
- Great forces are generated
- Stopping time is long

Manufacturing tolerances are extremely fine. Rotating parts are carefully balanced to reduce undesired vibrations that can cause a breakdown. Material properties have been considered carefully during design to withstand stress and fatigue.



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The separator is designed and supplied for a specific separation duty (type of liquid, rotational speed, temperature, density etc.) and must not be used for any other purpose.

Incorrect operation and maintenance can result in unbalance due to build-up of sediment, reduction of material strength, etc., that subsequently could lead to serious damage and/or injury.

The following basic safety instructions therefore apply:

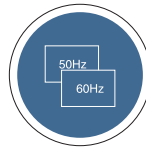
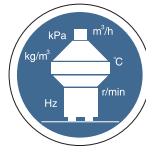
- **Use the separator only for the purpose and parameter range specified by Alfa Laval. Applies not only to the process but also to cleaning and service liquids.**
- **Strictly follow the instructions for installation, operation and maintenance.**
- **Ensure that personnel are competent and have sufficient knowledge of maintenance and operation, especially concerning emergency stopping procedures.**
- **Use only Alfa Laval genuine spare parts and the special tools supplied.**





Disintegration hazards

- When power cables are connected, always check direction of motor rotation. If incorrect, vital rotating parts could unscrew.
- If excessive vibration occurs, stop separator and keep bowl filled with liquid during rundown.
- Use the separator only for the purpose and parameter range specified by Alfa Laval.
- Check that the gear/pulley ratio is correct for power frequency used. If incorrect, subsequent overspeed may result in a serious break down.
- If the separator is run by a variable frequency drive, it is extremely important that the frequency does not exceed the allowed maximum, to avoid serious break down by too high speed.
- Wear on the large lock ring thread must not exceed safety limit. Φ -mark on lock ring must not pass opposite Φ -mark by more than specified distance.
- Welding or heating of parts that rotate can seriously affect material strength.
- Inspect regularly for **corrosion** and **erosion** damage. Inspect frequently if process or cleaning liquid is corrosive or erosive.





Entrapment hazards

- Make sure that rotating parts have come to a **complete standstill** before accessing parts inside the machine or starting **any** dismantling work.
- To avoid accidental start, switch off and lock power supply before starting **any** dismantling work. Assemble the machine **completely** before start. **All** covers, connections and guards must be in place.



Magnetic hazard

- The separator motor produces strong magnetic field even in standstill. This means a possible risk for persons with pacemaker. It also might mean risk for damage to watches, credit cards etc., tools can be trapped.



Electrical hazard

- Follow local regulations for electrical installation and earthing (grounding).
- To avoid accidental start, switch off and lock power supply before starting **any** dismantling work.



Crush hazards

- Use correct lifting tools and follow lifting instructions.
- Do **not** work under a hanging load.



**Noise hazards**

- Use ear protection in noisy environments.

**Burn hazards**

- Lubrication oil, machine parts and various machine surfaces can be hot and cause burns. Wear protective gloves.

**Skin irritation hazards**

- When using chemical cleaning agents, make sure you follow the general rules and suppliers recommendation regarding ventilation, personnel protection etc.
- Use of lubricants in various situations.

**Cut hazards**

- Sharp edges, especially on bowl discs and threads, can cause cuts. Wear protective gloves.

**Flying objects**

- Risk for accidental release of snap rings and springs when dismantling and assembly. Wear safety goggles.

**Health hazards**

- Risk for unhealthy dust when handling friction blocks/pads. Use a dust mask to make sure not to inhale any dust





Explosion hazard

- If the separator is used in a room containing explosive gases and/or if the process liquid emits vapor which together with air will form explosive gases, installation and operation of the separator must be in accordance with national and local safety regulations stipulated for installation in hazardous areas.
- To reduce the risk of ignition through sparking or static electricity the separator frame must be earthed.
- Feed rates must be supervised continually when separating liquids that can decompose or become dangerous because of excessive temperature conditions. An alarm that will be activated for both interruptions and reductions in the feed should be installed and appropriate action taken immediately.
- If the system or the room contains explosive gases, these gases must be evacuated before any work is carried out on the separator.





Explosion hazard

Additional measures if separator is equipped with inert gas system.

- The installation must always have an interlock preventing the separator from being started until it has been flushed and filled with inert gas to reach a safe oxygen level. The flushing time needed to displace the oxygen depends on the total volume of the system and must be calculated individually for each system.
- During operation, the flow-rate of the inert gas must be sufficient to keep a safely low oxygen level in the separator (bowl cover and drive unit) even if the process liquid contains some oxygen. The inert gas system should be monitored and an alarm given if a malfunction occurs.
- In many separators a liquid seal formed by a service liquid, prevents vapors from penetrating into the drive unit. The feed of this service liquid to the machine must not, therefore, be interrupted during operation.
- If a water trap is placed after the inert gas outlet on the frame, precautions should be taken that water is not sucked back when the separator cools down after it has been stopped.
- The ventilation outlet from the separation plant could contain explosive gases which should be piped to a safe area. This outlet must under no circumstances be blocked.
- It is essential to safety that the inert gas system works.
- The separator must be flushed thoroughly with air before it is dismantled for cleaning or servicing.





2.1 Warning signs in text

Pay attention to the safety instructions in this manual. Below are definitions of the three grades of warning signs used in the text where there is a risk for injury to personnel.



DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



NOTE indicates a potentially hazardous situation which, if not avoided, may result in property damage.



2.2 Environmental issues

Unpacking

Packing material consists of wood, plastics, cardboard boxes and in some cases metal straps.

Wood and cardboard boxes can be reused, recycled or used for energy recovery.

Plastics should be recycled or burnt at a licensed waste incineration plant.

Metal straps should be sent for material recycling.

Maintenance

During maintenance oil and wear parts in the machine are replaced.

Oil must be taken care of in agreement with local regulations.

Rubber and plastics should be burnt at a licensed waste incineration plant. If not available they should be disposed to a suitable licensed land fill site.

Bearings and other metal parts should be sent to a licensed handler for material recycling.

Seal rings and friction linings should be disposed to a licensed land fill site. Check your local regulations.

Worn out or defected electronic parts should be sent to a licensed handler for material recycling.



2.3 Requirements of personnel

Only **skilled** or **instructed** persons are allowed to operate the machine, e.g. operating and maintenance staff.

- **Skilled person:** A person with technical knowledge or sufficient experience to enable him or her to perceive risks and to avoid hazards which electricity/mechanics can create.
- **Instructed person:** A person adequately advised or supervised by a skilled person to enable him or her to perceive risks and to avoid hazards which electricity/mechanics can create.

In some cases special skilled personnel may need to be hired, like electricians and others. In some of these cases the personnel has to be certified according to local regulations with experience of similar types of work.

2.4 Remote start

If the separator is operated from a remote position where the separator cannot be seen or heard the power isolation device shall be equipped with an interlock device to prevent that a remote start command could result in liquid being fed to the separator when it is shut down for service.

The first start after the separator has been taken apart or been standing still for a long time shall always be manually supervised locally.



3 Basic Principles of Separation

3.1 Introduction

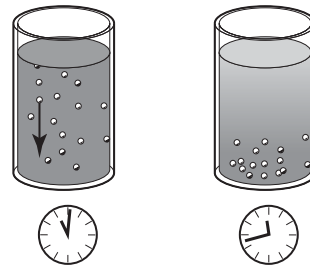
The purpose of separation can be:

- *to free a liquid of solid particles,*
- *to separate two mutually insoluble liquids with different densities while removing any solids presents at the same time,*
- *to separate and concentrate solid particles from a liquid.*

3.2 Separation by gravity

A liquid mixture in a stationary bowl will clear slowly as the heavy particles in the liquid mixture sink to the bottom under the influence of gravity.

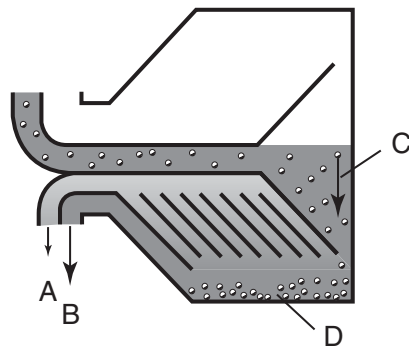
A lighter liquid rises while a heavier liquid and solids sink.



G0870111

Continuous separation and sedimentation can be achieved in a settling tank having inlet and outlet arranged according to the illustration.

Heavier particles in the liquid mixture will settle and form a sediment layer on the tank bottom.



G0870221

- A. Lighter liquid
- B. Heavier liquid
- C. Gravity
- D. Sediment layer of heavier particles

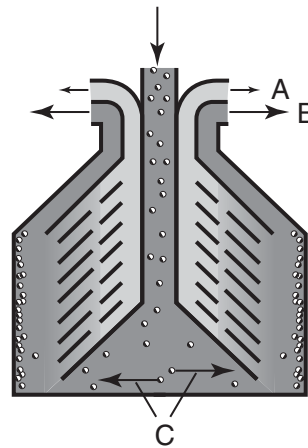
3.3 Centrifugal separation

In a rapidly rotating bowl, the force of gravity is replaced by centrifugal force, which can be thousands of times greater.

Separation and sedimentation is continuous and happens very quickly.

The centrifugal force in the separator bowl can achieve in a few seconds what takes many hours in a tank under influence of gravity.

The separation efficiency is influenced by changes in the viscosity, separating temperatures and in throughput.



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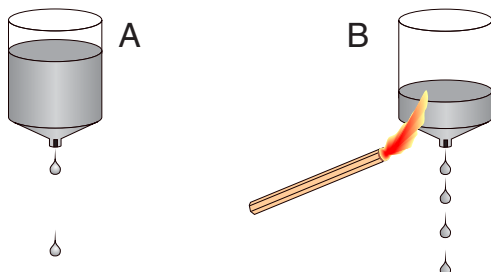
- A. Lighter liquid
- B. Heavier liquid
- C. Centrifugal force

3.4 Separating temperatures

For some types of process liquids a high separating temperature will normally increase the separation capacity. The temperature influences viscosity and density and should be kept constant throughout the separation.

Viscosity

Viscosity is a fluids resistance against movement. Low viscosity facilitates separation. Viscosity can be reduced by heating.

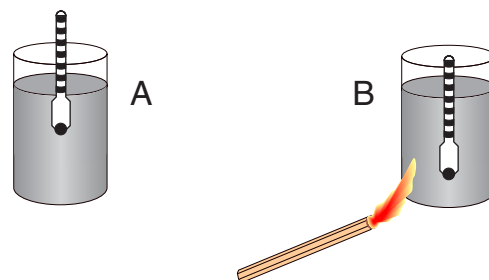


G10348k1

- A. High viscosity
- B. Low viscosity

Density difference

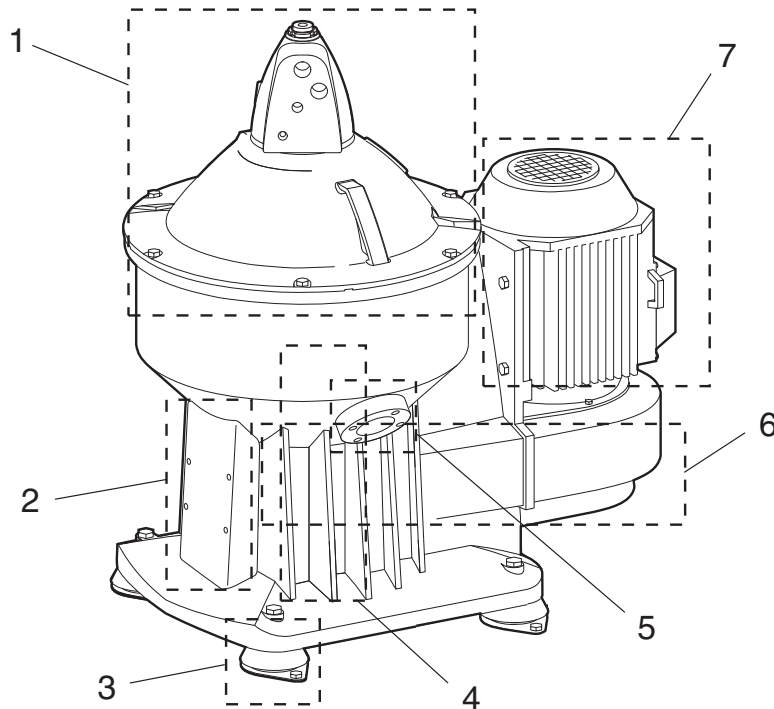
Density is mass per volume unit. The greater the density difference between the two liquids, the easier the separation. The density difference can be increased by heating.



G10348j1

- A. High density (with low temperature)
- B. Low density (with high temperature)

4 *Design and function*



G08706w1

1. **Process section**
The feed inlet and outlets are situated at the top of the separator. The liquid is cleaned in the rotating separator bowl inside the frame hood.
2. **Sensors**
The separator is monitored by a speed sensor. An unbalance sensor and an interlocking switch are optional.
3. **Frame feet**
The separator rests on vibration damping frame feet.
4. **Lubrication system**
Lubricates the bearings driven by the flat belt transmission.
5. **Sludge outlet**
Separated solids are discharged at preset intervals.
6. **Drive section**
The rotating separator bowl is driven by a flat belt transmission with friction coupling.
7. **Electric motor**
Rotating bowl is driven by the electric motor via a belt transmission.

4.1 Overview

The separator comprises a process section and a drive section powered by an electric motor.

The separator frame comprises a lower body and a frame hood. The motor is attached to the frame. The frame feet dampen vibration.

The bottom part of the separator contains a flat belt transmission, a centrifugal clutch and a vertical spindle. The lower body also contains an oil sump for lubrication of spindle bearings.

The frame hood contains the processing parts of the separator; the inlets, outlets and piping.

The process liquid is cleaned in the separator bowl. The bowl is fitted on the upper part of a vertical spindle and rotates at high speed inside the frame hood. The bowl also contains the discharge mechanism which empties the sludge during operation.

A speed sensor, and the optional unbalance sensor and lock switch, are parts of the equipment for monitoring the separator functions.

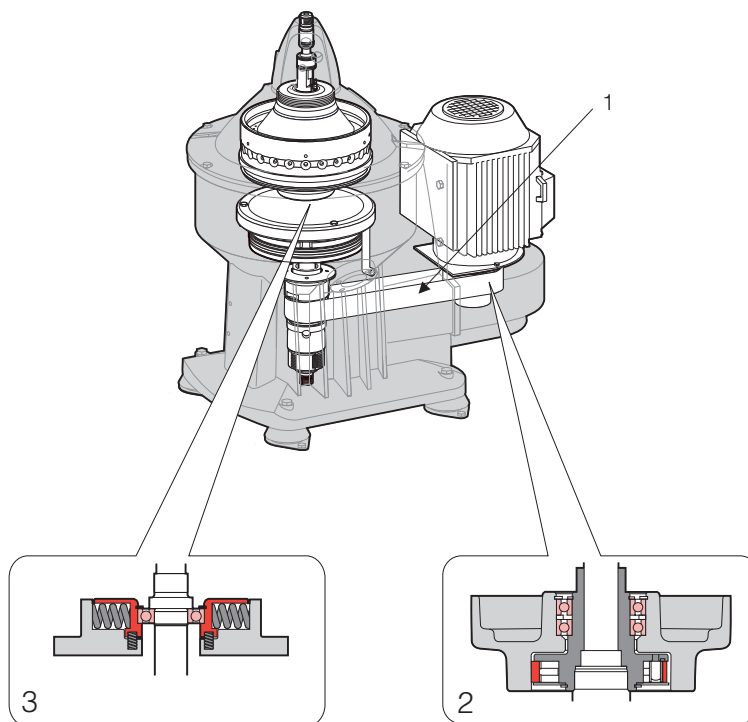
4.2 The Drive Section

The separator bowl is driven by an electric motor via a belt transmission. The belt pulley on the motor shaft includes a centrifugal clutch.

The centrifugal clutch (2) with friction pads ensures a gentle start and smooth acceleration, and at the same time prevents overloading of the belt and motor.

To reduce bearing wear and the transmission of bowl vibrations to the frame and foundation, the top bearing of the bowl spindle is mounted in a spring dampened bearing seat (3). The bearings on the spindle are lubricated by the oil spray produced by an oil mist generator mounted on the lower end of the spindle.

The flat belt (1) transmission has a ratio which increases the bowl speed several times compared with the motor speed.



1. Flat belt
2. Centrifugal clutch
3. Spring dampened bearing seat

4.3 The Process Section

The separation process takes place inside the rotating separator bowl. The feed and outlet of process liquid takes place in the in and outlet unit on top of the separator frame hood.

Inlet and outlet

The inlet and outlet unit consists of the following parts:

A connection house for pipe connections.

A pipe with a paring disc and a paring tube is located inside the connection house. The pipe has channels for incoming and outgoing process liquid.

The paring disc and paring tube pump the cleaned oil and water respectively out of the bowl.

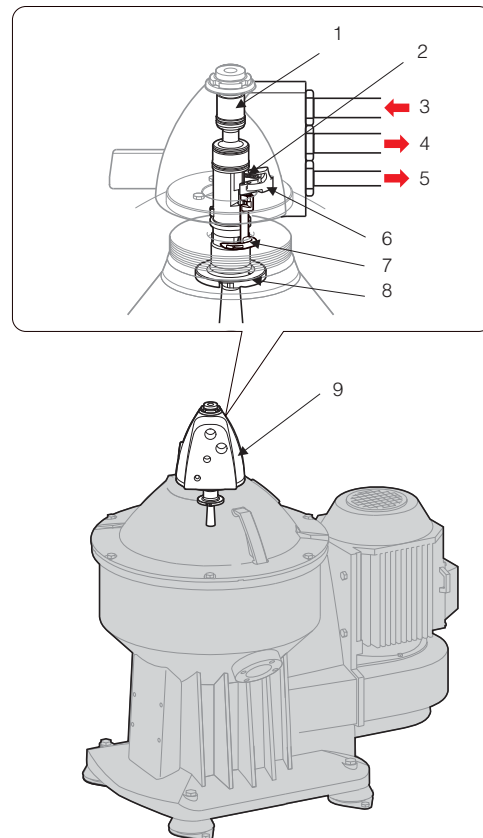
The paring tube can move radially. During separation it surfs on the liquid surface. It is balanced by a spring.

Under certain operating conditions, the paring tube radial position can be locked in place by two adjustable screws on the connection house.

The paring disc and tube are located inside and at the top of the separator bowl.

The inlet and outlet device is held together against the frame hood by a nut on the end of the inlet pipe.

Height adjusting rings determine the height position of the paring disc and paring tube relative to the bowl.



G0886191

1. Inlet pipe
2. Spring
3. Uncleaned oil
4. Cleaned oil
5. Separated water
6. Arm
7. Paring tube
8. Paring disc
9. Connecting housing

Separator bowl

The separator bowl, with its sludge discharge mechanism, is built-up as follows:

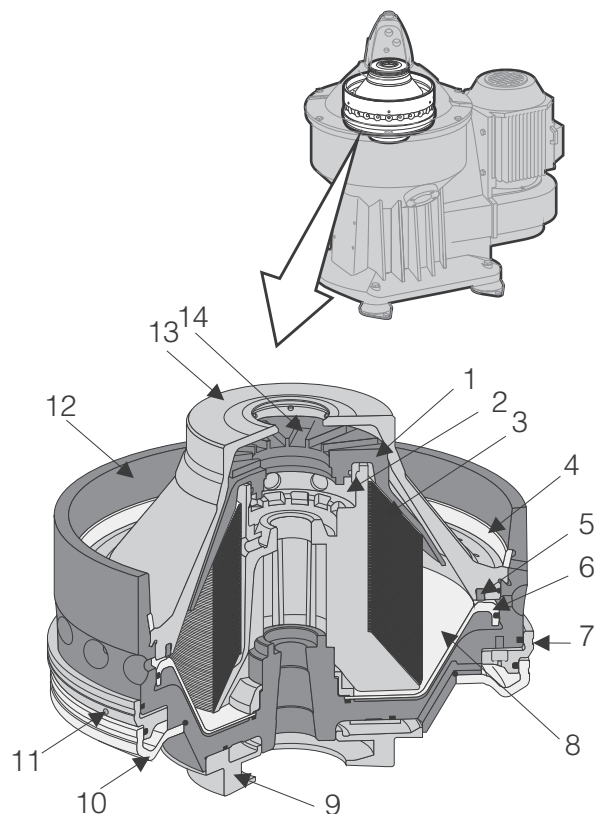
The bowl body and bowl hood are held together by a lock ring (Centrilock). Inside the bowl are the distributor and the disc stack. The disc stack is kept compressed by the bowl hood. The discharge slide forms a separate bottom in the bowl body.

The upper space between the bowl hood and the top disc forms the water paring chamber and contains the paring tube, which pumps the separated water out of the bowl. The oil paring chamber, with its paring disc, is located inside the top of the distributor. From here the cleaned oil is pumped out of the bowl.

The sludge space is in the bowl periphery. The bowl is kept closed by the discharge slide, which seals against a seal ring in the bowl hood.

At fixed intervals, decided by the operator, the discharge slide drops down to empty the bowl of sludge.

The sludge discharge mechanism, which controls the movement of the discharge slide, is comprised of an operating slide and an operating water device. Passive parts are: nozzle and valve plugs. The operating water cover, beneath the bowl, supplies operating water to the discharge mechanism via the operating water ring.



G08869a1

1. Top disc
2. Oil paring chamber
3. Disc stack
4. Lock ring
5. Seal ring
6. Discharge slide
7. Operating slide
8. Sludge space
9. Operating water ring
10. Holder
11. Nozzle
12. Bowl body
13. Bowl hood
14. Water paring chamber

4.4 Sensors and indicators

The separator is equipped with a speed sensor. As options, an unbalance sensor and an interlocking kit can be fitted.

Speed sensor (optional)

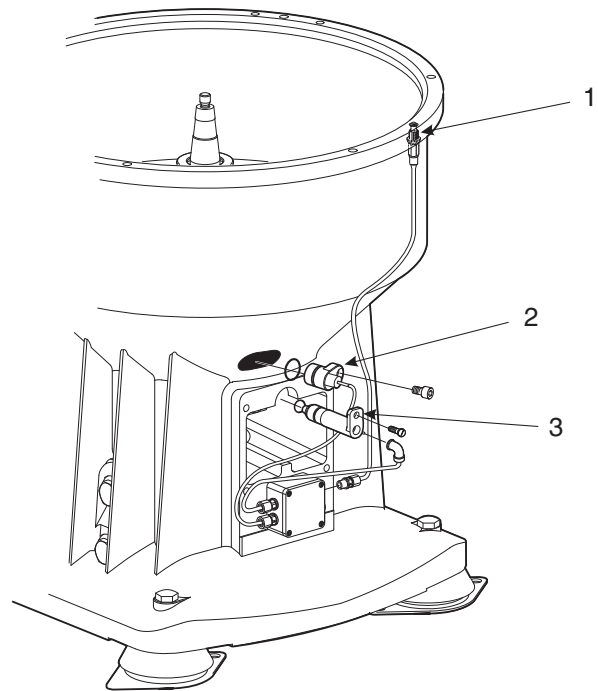
A speed sensor (3) indicates the speed of the separator. The correct speed is needed to achieve the best separating results and for reasons of safety. Refer to type plate for speed particulars.

Monitoring kit (optional)

For indication of any abnormal unbalance, the separator can be equipped with a sensor (2) monitoring the radial position of the bowl spindle.

Cover interlocking kit (optional)

When the cover is closed the interlocking circuit in the control system is closed (1) which makes it possible to start the separator.



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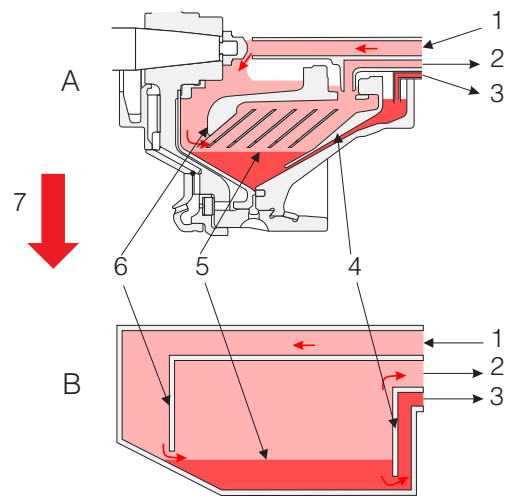
1. Cover interlocking switch
2. Unbalance sensor
3. Speed sensor

4.5 Separating function

The separator separates water and solids from the uncleaned oil. Water normally leaves the separator through the water outlet. During sludge discharge, solids (sludge) and water are removed through the discharge ports.

4.5.1 The liquid balance in the bowl

The liquid levels in the bowl depend on many factors (bowl geometry, liquid densities, flow rates etc.). To get a picture of how the liquids are distributed in the bowl, imagine that the bowl is at standstill and turned 90° (only influenced by gravity). The bowl can now be compared with a settling tank:



G0886481

- A. Separator bowl turned 90°
- B. Settling tank
- 1. Unseparated oil
- 2. Separated oil
- 3. Separated water
- 4. Top disc
- 5. Oil/water interface
- 6. Distributor
- 7. Gravity

4.5.2 Liquid flow

Unseparated oil is fed into the bowl through the inlet pipe and travels via the distributor towards the periphery of the bowl.

When the oil reaches slots in the distributor, it rises through the channels formed by the disc stack, where it is evenly distributed.

The oil is continuously cleaned as it travels towards the centre of the bowl. When the cleaned oil leaves the disc stack, it flows through a number of holes in the distributor and enters the oil paring chamber. From here it is pumped by the oil paring disc, and leaves the bowl through the oil outlet. Separated water, sludge and solid particles, which are heavier than the oil, are forced towards the periphery of the bowl and collect in the sludge space.

The space between the bowl hood and top disc, as well as the water paring chamber, is filled with oil, which is distributed over the entire circumference via the grooves in the top disc.

During normal operation-, the water drain valve in the water outlet is closed.

4.5.3 Discharge of sludge and water (ALCAP™ concept)

As the sludge space fills up and water enters the disc stack, traces of water will escape with the cleaned oil. The increase of water content in the cleaned oil is the sign of reduced separation efficiency.

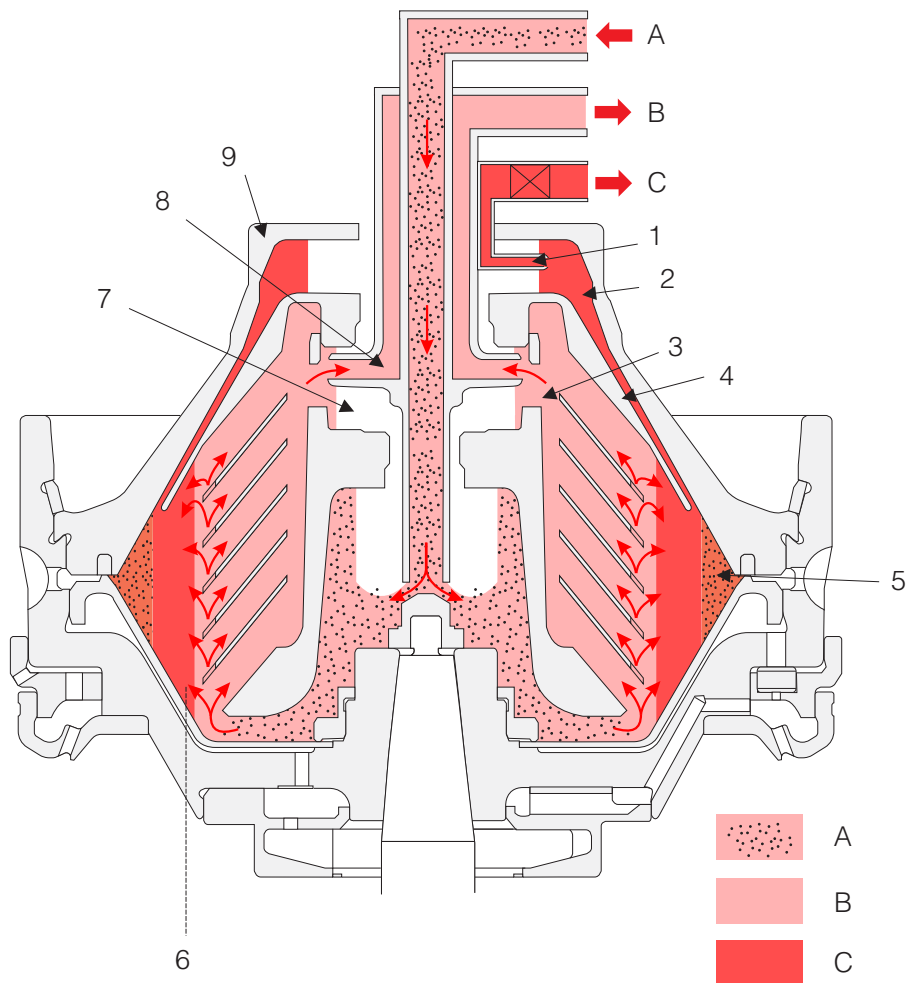
This condition is monitored by the process control system, and water is removed from the bowl when maximum levels are recorded.

The water is removed by either of two ways:

- The water drain valve opens and the water leaves the bowl through the water outlet.
- Through the sludge ports at sludge discharge.

Which way is decided by the process control system.

4.5.4 Discharge of water through water outlet



G08862b1

Discharge of water through water outlet

- A. Unseparated oil
- B. Separated oil
- C. Water
- 1. Water paring tube
- 2. Water paring chamber
- 3. Holes in distributor
- 4. Top disc
- 5. Sludge space
- 6. Oil/Water interface
- 7. Oil paring chamber
- 8. Oil paring disc
- 9. Bowl hood

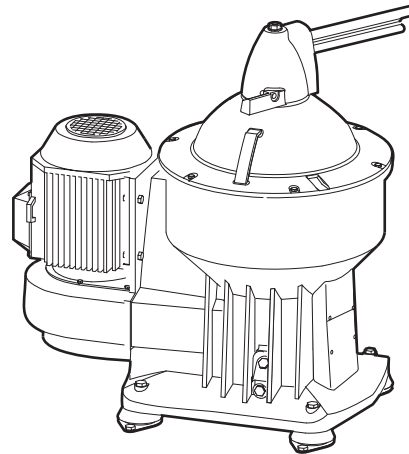
5 Operating Instructions

These operating instructions describe routine procedures to follow before and during the start, running and stopping sequences of the separator. If system documentation is available, always follow the operating instructions therein. If there is no system documentation, the instructions below are to be followed.

5.1 Before first start

Technical demands for connections and limitations for the separator are listed in Technical reference.

- *Technical data*
- *Connection list*
- *Interface description*
- *Operating water demands*
- *Basic size drawing*
- *Foundation drawing*



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Before first start:

- Ensure the machine is installed and assembled correctly and that feed lines and drains have been flushed clean.
- Fill oil in the oil bath. See oil change procedure in section [Oil change on page 161](#). For quality of oil, see section [Lubricating oils on page 168](#).

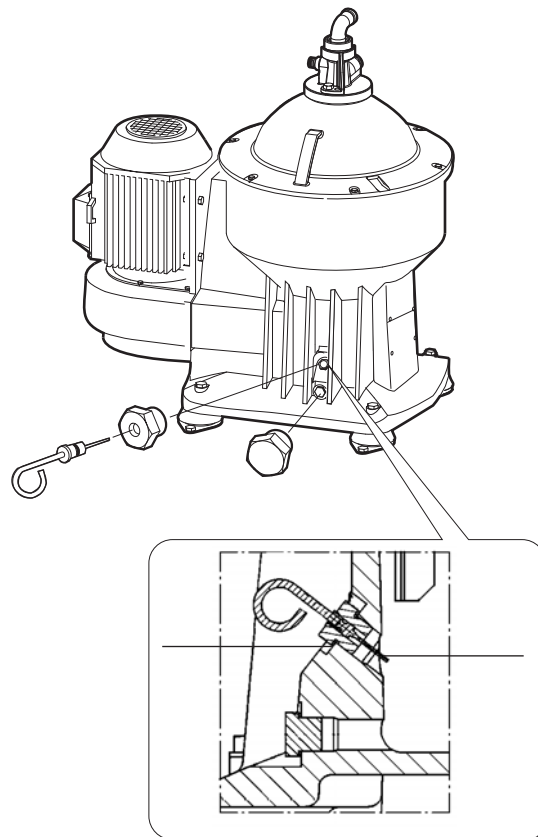
- Remove the oil pin and make sure that the oil level is above the lower end of the pin, see [Oil change on page 161](#).

NOTE

Too much or too little oil can damage the separator bearings.

NOTE

The separator should be level and at standstill when oil is filled.



g08687k1

- Make sure that the bearings on the spindle are pre-lubricated.
- Check the direction of rotation by doing a quick start/stop. The motor fan should rotate clockwise.

5.1.1 Start after service

Pay special attention to any unusual sounds or vibrations when starting the separator after a service. Different fault symptoms are listed in chapter 7 [Fault Finding on page 173](#).

5.2 Normal operation

5.2.1 Before normal start

To achieve the best separation results, the bowl should be in a clean condition.

1. Check:

- that all couplings and connections (1) are securely tightened to prevent leakages. Leaking hot liquid can cause burns.
- that the lock nut (2) is fully tightened. Do not forget the washer.
- that all frame hood bolts (3) as well as the clutch cover are fully tightened.
- the direction of rotation by doing a quick start/stop. The motor fan (4) should rotate clockwise
- the oil bath level and top up if necessary.

NOTE

The separator should be level and at standstill when oil is filled.

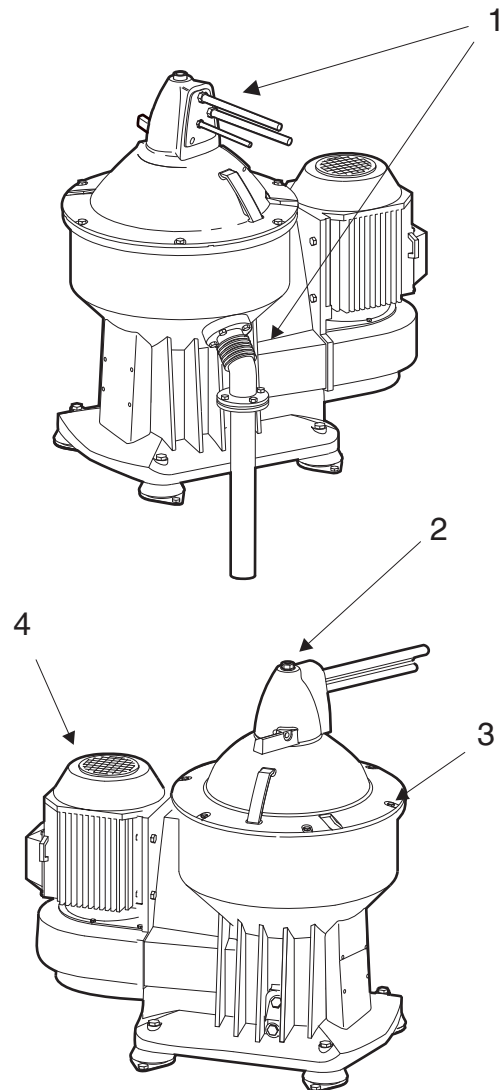
CAUTION

If power cable polarity has been reversed, the separator will rotate in reverse, and vital rotating parts can loosen.

CAUTION

Disintegration hazards

After change of feed the sludge discharge interval must be adjusted. Breakdown may result if the intervals between discharges are too long.



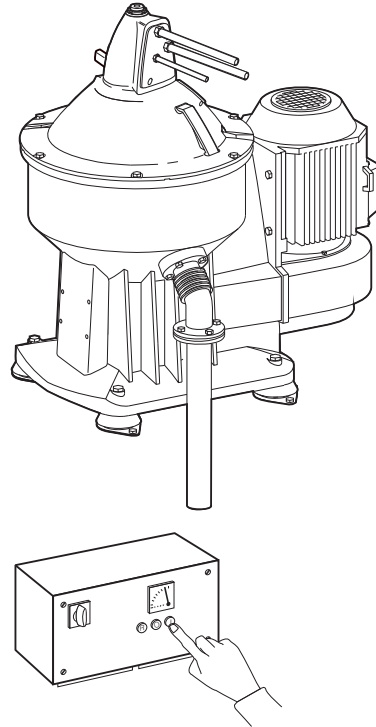
G0871491

5.2.2 Start

1. Start of separator:
 - a. Open the water supply valve.
 - b. Start the separator by pushing the start button at the starter unit.

NOTE

After every start the separator must always be run continuously for a minimum of 1 hour to ensure proper lubrication. Try to learn the vibration characteristics during the critical speeds.



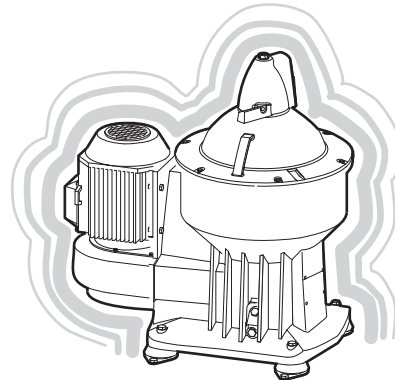
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2. Check the separator for vibration.

**Excessive vibration**

If vibration increases, or continues at full speed, keep bowl filled and stop the separator.

The cause of the vibration must be determined and corrected before starting again! Excessive vibration may be due to incorrect assembly or insufficient cleaning of the bowl.



G08718b1

NOTE**Normal vibration**

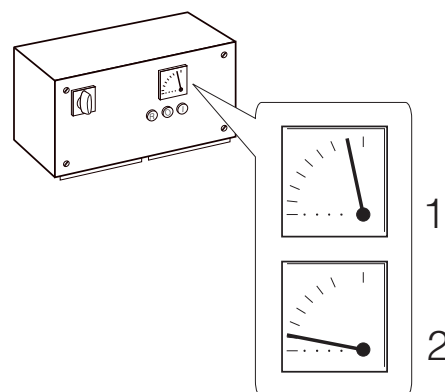
Vibration may occur during start up when passing critical speed. This is normal and should pass without danger.

3. Ensure that the separator is at full speed.

The time by full speed can be checked by studying the ammeter.

- Current increases during start (1).
- When full speed has been reached, the current decreases to a stable value (2).

For normal length of the start-up period, see [8.2 Technical data on page 181](#).



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4. Perform a “discharge” to fill up the operating water system.
 - a. Add opening water until a discharge sound is heard (10 seconds).
 - b. Wait 15 seconds.
 - c. Add closing water for 15 seconds.
5. Add some hot conditioning water.
6. Turn on the oil feed.



Before turning on the feed make sure that the oil has the correct temperature.

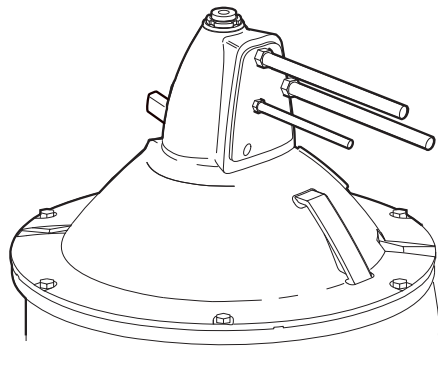
5.2.3 Operating

1. Checkpoints during operation.

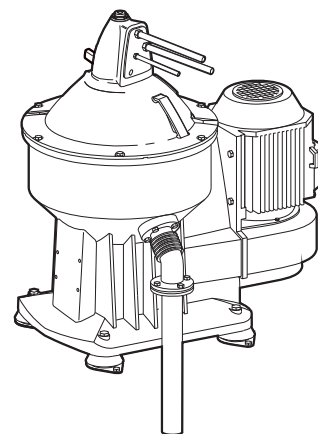
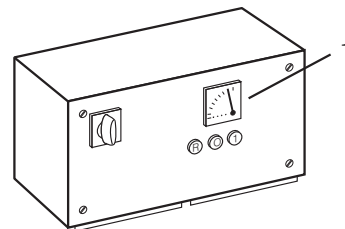
**Burning hazard**

Lubricating oil and various machine surfaces can be hot and cause burns.

- a. Check all connections for leakage.
- b. Check that the feed has correct flow and temperature.
- c. Check the back pressure.
- d. Check that the starter ammeter reading (1) is the normal low and steady value.
- e. Check for abnormal vibrations and sounds.

**Disintegration hazard**

Do not discharge a vibrating separator. Vibration can increase if solidified sludge is only partially discharged.



G08715c1

5.2.3.1 Sludge discharge

1. Turn off the oil feed.
2. Perform a displacement of the oil by adding hot water (not more than bowl volume).
3. Perform a sludge discharge.
 - a. Add opening water until a discharge sound is heard (max. 3 seconds).
 - b. Wait 15 seconds.
 - c. Add closing water for 15 seconds.
4. Turn on the oil feed.



Before turning on the feed, make sure that the oil has the correct temperature.

5.2.4 Stop

Stopping the separator.

1. Turn off the oil feed.
2. Perform a displacement of the oil by adding hot water (not more than bowl volume).
3. Perform a sludge discharge.
 - a. Add opening water until a discharge sound is heard (max. 3 seconds).
 - b. Wait 15 seconds.
 - c. Add closing water for 15 seconds.
4. Fill the bowl up with water and stop the separator.

NOTE

Keep the bowl filled during run-down to minimize the vibrations.

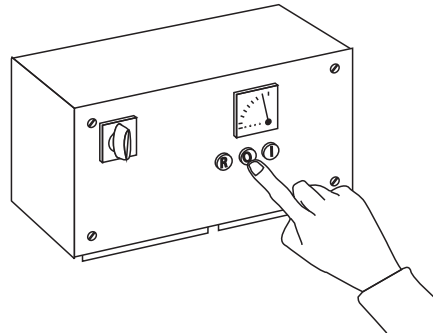
5. Wait until the separator has stopped (after about 30 minutes).

Check rotation of motor fan (1).

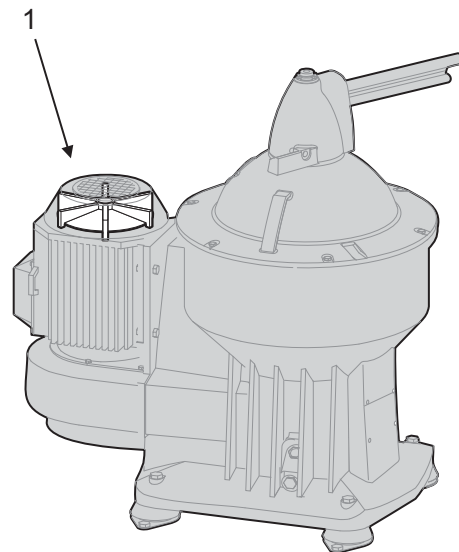


Entrapment hazard

Make sure that rotating parts have come to a complete standstill before starting any dismantling work.



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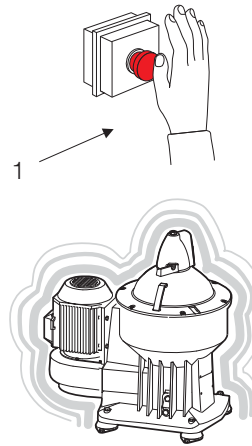
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5.3 Emergency stop

1. If the separator vibrates excessively push the emergency stop button (1).

NOTE

Keep the bowl filled during run-down to minimize the vibrations.



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2. Evacuate the room.



Disintegration hazard
Never discharge a vibrating separator.

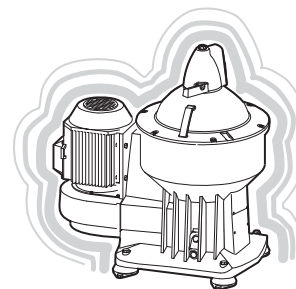


Entrapment hazard
Make sure that rotating parts have come to a complete standstill before starting any dismantling work.



Disintegration hazard
After an emergency stop, the cause of the fault must be identified.

If all parts have been checked and the cause not found, contact Alfa Laval for advice before restarting the separator.



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6 *Service, Dismantling, Assembly*

6.1 Periodic maintenance

Periodic (preventive) maintenance reduces the risk of unexpected stoppages and breakdowns. Follow the maintenance log in this chapter in order to facilitate the periodic maintenance.

6.1.1 Maintenance intervals

The following directions for periodic maintenance give a brief description of parts to be cleaned, checked and renewed at different maintenance intervals. The maintenance log for each maintenance interval, see page 47, gives a detailed list of actions to be performed.

Inspection [i]

An Inspection consists of an overhaul of the separator bowl, inlet/outlet and operating water device at max. 6 months or 4000 operating hours.

Seals in bowl and gaskets in inlet/outlet device are renewed.

Overhaul [o]

An Overhaul consists of an overhaul of the complete separator (including separator bowl, inlet/outlet and operating device) at max. 18 months or 12000 operating hours. Seals, bearings, friction blocks and flat belt in the separator are renewed.

Oil change

The oil should be changed every 4000 hours, or at least once every year if the total number of operating hours is less than 4000 hours/year.

Ancillary

Verify correct flow at inspection service overhaul water valveblock at least every 36 months.

6.1.2 Maintenance procedure

At each Inspection and/or Overhaul, take a copy of the maintenance log and use it to make notes during the service.

An inspection and overhaul should be carried out as follows:

1. Dismantle the parts as described in [6.3 Dismantling on page 50](#).

Place the separator parts on clean, soft surfaces such as pallets.

2. Inspect and clean the dismantled separator parts according to the maintenance log and description in [6.4 Actions before assembly on page 99](#).
3. Fit all the parts delivered in the service kit while assembling the separator as described in [6.5 Assembly on page 110](#).
4. When the separator is assembled, make final checks described in [6.5.7 Actions after assembly on page 159](#).



Disintegration Hazards

Separator parts that are either missing, worn beyond their safe limits or incorrectly assembled, may cause severe damage or fatal injury.



Burn and Corrode Hazards

Escaping hot and/or corroding process material, which can be hazardous, may still remain in the separator after stop.

The use of service symbols in the dismantling/assembly instructions

Parts that have to be renewed from the service kits (see below) are marked **[i]** and/or **[o]** in the assembly instructions.

Example

- a. Fit the O-ring **[i]**.

When dismantling and assembling between the service periods, some procedures do not have to be carried out. These procedures are marked **[i]** and/or **[o]**.

All symbols used in the instructions refer to activities mentioned in the maintenance logs.

6.1.3 Tightening of screws

Tightening all screws with the correct torque value is important.

These figures apply unless otherwise stated:

Torque						
Metric thread	Stainless steel			Carbon steel		
	Nm	kpm	lb.ft	Nm	kpm	lb.ft
M4	1,7	0,17	1,2	2,25	0,25	1,8
M5	3,4	0,34	2,5	4,9	0,49	3,6
M6	7	0,7	5	8	0,8	5,9
M8	17	1,7	13	20	2	14,7
M10	33	3,4	24	39	3,9	28,7
M12	57	5,8	42	68	6,9	50
M16	140	14	100	155	15,8	114
M20	270	28	200	325	33	239
M24	470	48	340	570	58	420

The figures apply to lubricated screws tightened with a torque wrench.

6.1.4 Service kits

Special service kits are available for Inspection and Overhaul.

For other services, a Support kit is available. Spare parts not included in the Support kit have to be ordered separately.

Note that the parts for Inspection **are** included in the Overhaul kit.

The contents of the kits are described in the Spare Parts Catalogue.

NOTE

Always use Alfa Laval genuine parts as otherwise the warranty may become invalid. Alfa Laval takes no responsibility for the safe operation of the equipment if non-genuine spare parts are used.

WARNING**Disintegration hazards**

Use of imitation spare parts may cause severe damage.

6.1.5 Cleaning

CIP (Cleaning In Place)

To prolong the intervals between manual cleaning of the separator the use of CIP together with repeated discharges can be used.

Some CIP liquids can be corrosive to brass- and aluminium alloy parts which are included in the separator.

CAUTION

Use only Alfa Laval recommended CIP liquids.

6.2 Maintenance logs

Name of ship/plant:	Local identification:
Separator:	Manufacture No./Year:
Total running hours.	Product No:
Date:	Signature:

Part	[i]	[o]	Check	Action	Page	Note
In and outlet device						
- All parts	x	x		Clean	99	
- All parts	x	x		Check for corrosion	101	
- All parts	x	x		Check for cracks	102	
- Connecting housing	x	x		Check for erosion damages	103	
	x	x		Renew O-rings for hoses	- - -	
- Frame hood		x		Renew O-ring	152	
		x		Control measure of paring disc height	152	
		x		Check height adjusting rings	152	
		x		Renew the spring	152	
- Inlet pipe thread	x	x		Lubricated	152	
Bowl						
- All parts	x	x		Clean	99	
- All parts	x	x		Check for corrosion	101	
- All parts	x	x		Check for cracks	102	
- All parts	x	x		Check for erosion damages	103	
- Bowl body	x	x		Check for impact marks and corrosion	56	
	x	x		Renew rectangular ring	56	
	x	x		Renew O-rings	56	
	x	x		Renew holder screws and washers	56	
- Operating slide	x	x		Renew rectangular ring	56	
	x	x		Renew valve plugs	56	
- Discharge slide	x	x		Renew rectangular ring	56	
- In and outlet pipe	x	x		Renew O-rings	56	
	x	x		Renew splash sealing	56	
- Paring tube	x	x		Renew O-rings and bearings	56	
- Lock ring	x			Check for deformations	56	
	x			Check for impact marks	56	
	x			Check pin not deformed or loose	56	
- Bowl hood	x	x		Renew seal ring	56	

Part	[i]	[o]	Check	Action	Page	Note
	x	x		Renew O-ring	56	
- Operating water ring	x	x		Renew seal ring and screws	56	
Frame						
- Frame feet				Renew frame feet (including washers and screws)	117	Has to be ordered separately
- Drain and oil filling holes	x	x		Renew washers	117	
- Oil pin	x	x		Renew O-ring	117	
Driving device						
- All parts		x		Clean	99	
- All parts		x		Check for corrosion	101	
- All parts		x		Check for cracks	102	
- Bottom bearing housing		x		Renew O-ring	117	
- Labyrinth ring holder		x		Renew labyrinth ring	117	
		x		Renew O-ring	117	
- Top bearing housing		x		Renew springs	117	
- Flat belt		x		Renew flat belt	117	
- Bowl spindle		x		Pre-lubricate and renew ball bearing	117	
		x		Pre-lubricate and renew self-aligning roller bearing	117	
		x		Lubricate the spindle	117	
		x		Measure the radial wobble	117	
- Neck bearing cover		x		Renew O-ring	117	
- Deflector ring		x		Renew O-ring	117	
- Water inlet pipe		x		Renew O-ring	117	
- Operating water cover		x		Renew seal ring and O-ring	117	
- Fan		x		Renew O-ring	117	
Coupling						
- All parts		x		Clean	99	
- All parts		x		Check for corrosion	101	
- All parts		x		Check for cracks	102	
- Coupling hub		x		Renew single row ball bearings	91	
		x		Renew snap rings	91	
- Friction block		x		Renew friction pads (if they are worn) or clean the pads if they are dirty	91	
Electrical motor						

Part	[i]	[o]	Check	Action	Page	Note
- Electrical motor		x		Lubricate if nipples are fitted. See sign on motor.	- - -	
- Bearings		x		Renew bearings	- - -	
Signs and on separator						
- Machine plate		x		Check attachment an legibility	159	
- Power supply frequency		x		Check attachment an legibility	159	
- Lifting instructions		x		Check attachment an legibility	159	
- Safety labels		x		Check attachment an legibility	159	
- Name plate		x		Check attachment an legibility	159	
- Representative label		x		Check attachment an legibility	159	

6.3 Dismantling

6.3.1 Introduction

The frame hood and heavy bowl parts must be lifted by means of a hoist. Position the hoist exactly above the bowl centre. Use a lifting sling and lifting hooks with safety catches.

The parts must be handled carefully. Don't place parts directly on the floor, but on a clean rubber mat, fiberboard or a suitable pallet.

NOTE

For safety reasons, it is essential that all personnel who work with the separator read this manual thoroughly and completely. Do not allow personnel to clean, assemble, operate or maintain the separator until they have read and fully understood this manual. Ensure that all personnel who operate and service the separator are well-trained and knowledgeable concerning the separator and the work to be carried out.

6.3.2 Tools

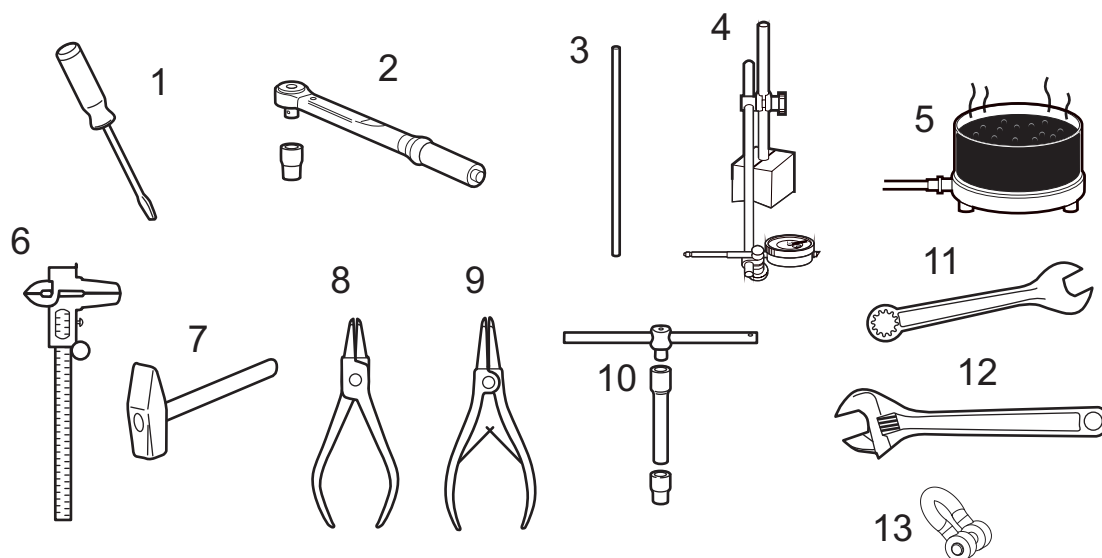
Special tools from the tool kit must be used for dismantling and assembly, as well as **Standard tools** (not included). The special tools are specified in the *Spare Parts Catalogue* and are illustrated at the beginning of each dismantling section.



Entrapment hazard

To avoid accidental start, switch off and lock-out power supply before starting any dismantling work.

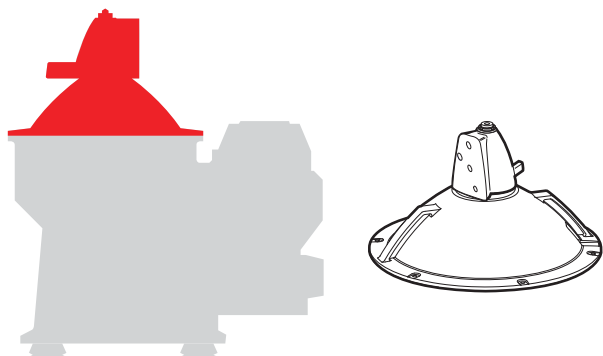
Make sure that machine has come to a complete standstill before starting any dismantling work (takes about 30 minutes from switch off).

Standard Tools

G09116a1

1. Screwdriver
2. Torque wrench (capacity 0-200 Nm)
3. Drift (Ø 4 mm)
4. Dial indicator with magnetic base
5. Heating equipment for bearings
6. Sliding calliper
7. Hammers (standard and soft-faced)
8. Pliers for internal snap rings
9. Pliers for external snap rings
10. T-handle with extension rod,
sockets (13, 16, 17, 18, 19, 27, 30 mm)
11. Spanners (various sizes)
12. Adjustable spanner
13. Shackle

6.3.3 Frame hood

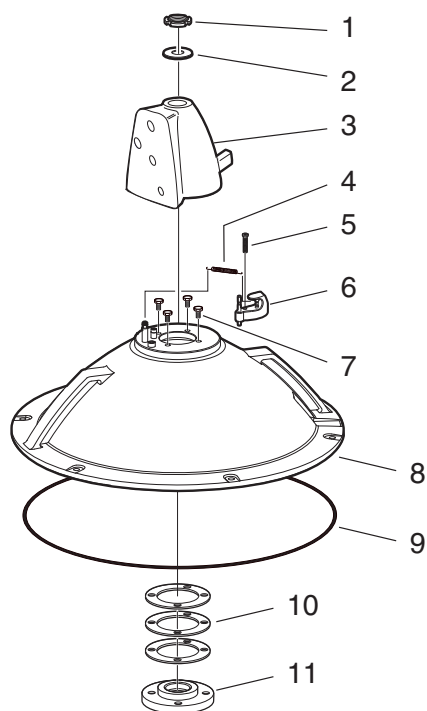


G0863331



G1019211

1. Hook spanner (for the lock nut)



G08634M1

1. Lock nut
2. Washer
3. Connecting housing
4. Spring
5. Screw
6. Arm
7. Screws
8. Frame hood
9. O-ring
10. Height adjusting rings
11. Support ring

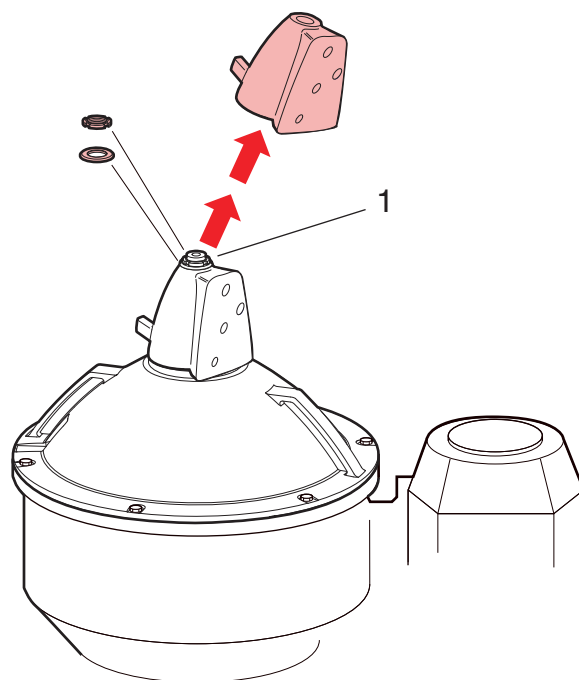
1. Removing the connecting housing.

- a. Remove connections before starting dismantling.
- b. Lubricate the inlet pipe thread
- c. Remove the lock nut, using the hook spanner, and the washer.



The nut must not be removed before the separator has stopped.

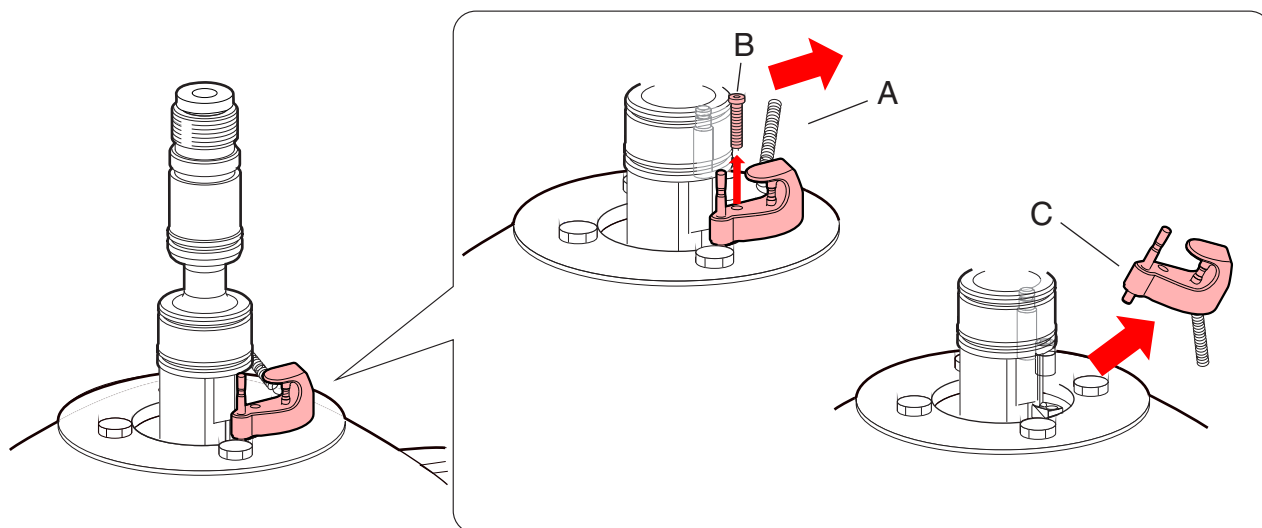
- d. Press the inlet pipe (1) down, with a soft material, to loosen the connecting housing.
- e. Remove the connecting housing.



G08635c1

1. Inlet pipe

2. Removing the spring and arm.



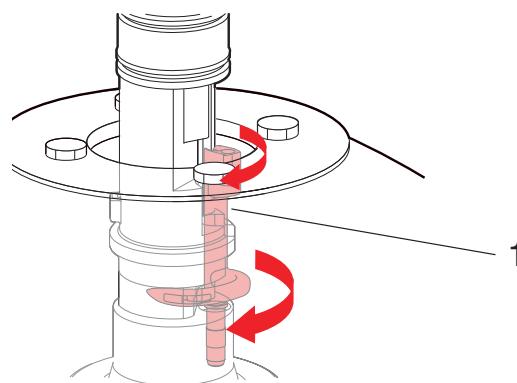
G08636H1

- A. Spring
- B. Screw
- C. Arm

- a. Remove the spring (A) from the pin on the hood.
- b. Remove the screw (B) from the arm.
- c. Remove the arm (C) together with the spring.
- d. Turn the paring tube (1) so that the frame hood can be removed upwards.

NOTE

To avoid the paring tube from being damaged and preventing the inlet pipe from sticking to the frame hood when lifting the hood, always turn the paring tube towards the pipe before lifting.



G08636J1

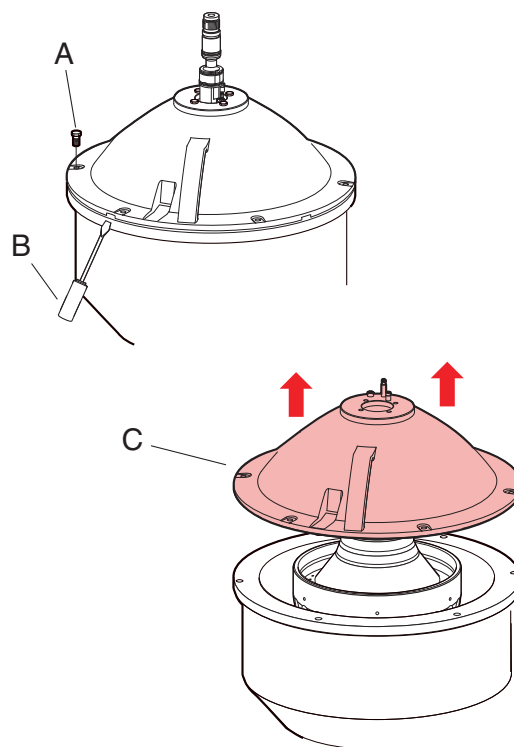
1. Paring tube

3. Removing the frame hood.

- a. Remove the screws (A) holding the frame hood.
- b. Loosen the hood by bending with a screwdriver (B) in all grooves in the hood.
- c. Lift off the frame hood.



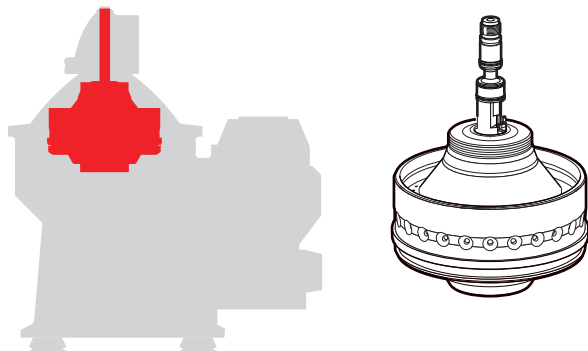
Do not place the hood upside down.



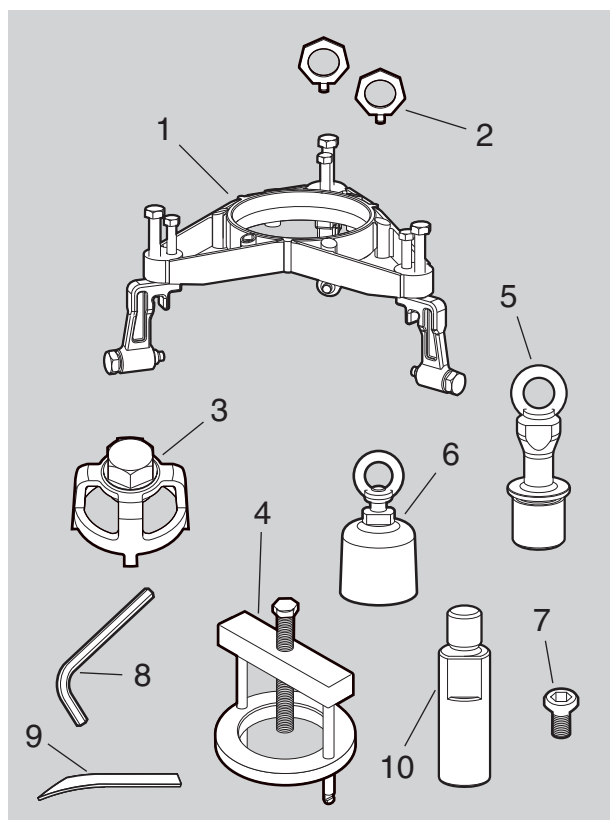
G0863611

- A. Screw
B. Screwdriver
C. Frame hood

6.3.4 Bowl

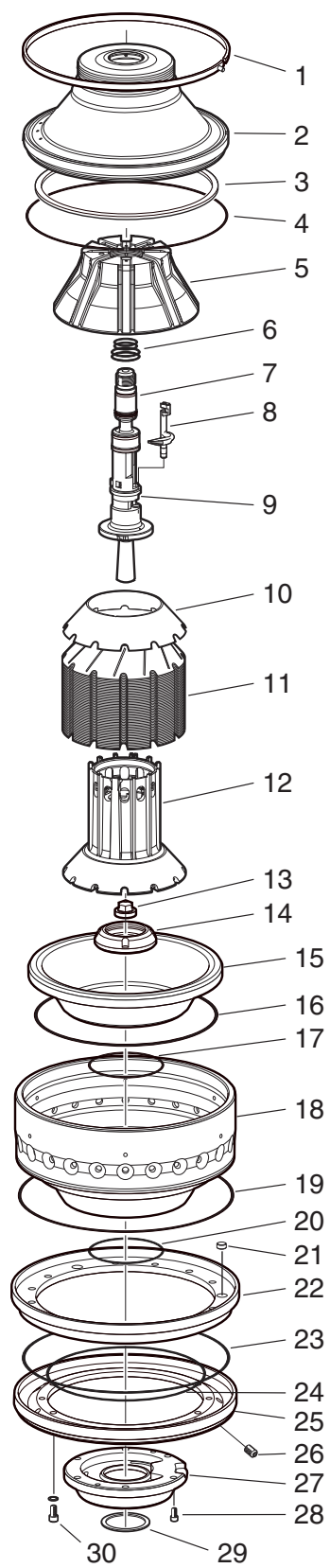


G0861621



G1019221

1. Compressing tool (lock ring)
2. Lifting eyes
3. Spanner for nut (nut/discharge slide)
4. Puller (discharge slide)
5. Lifting tool (distributor, spindle)
6. Puller (Bowl body)
7. Screw (lock ring) (M5)
8. Hexagon head key
9. Chisel (seal ring)
10. Pin (distributor/lifting tool)



G08626w1

1. *Lock ring*
2. *Bowl hood*
3. *Seal ring*
4. *O-ring*
5. *Top disc*
6. *O-rings*
7. *Inlet and outlet pipe*
8. *Paring tube*
9. *Splash sealing*
10. *Bowl disc (without caulks)*
11. *Bowl discs*
12. *Distributor*
13. *Cap nut*
14. *Nut*
15. *Discharge slide*
16. *Rectangular ring*
17. *O-ring*
18. *Bowl body*
19. *Rectangular ring*
20. *O-ring*
21. *Valve plugs*
22. *Operating slide*
23. *Rectangular ring*
24. *O-ring*
25. *Holder*
26. *Nozzle*
27. *Operating water ring*
28. *Screws*
29. *Seal ring*
30. *Screws & washers*

1. Removing the lock ring.

- a. Fit the compressing tool (A).
- b. Fit the clamps (C) and the screws (B) to stop.

NOTE

Be sure not to cover the threaded holes for the lock ring.

- c. Compress the disc stack by alternately tightening the inner screws (F) on the compressing tool in increments of 5 Nm up to a maximum of 20 Nm .

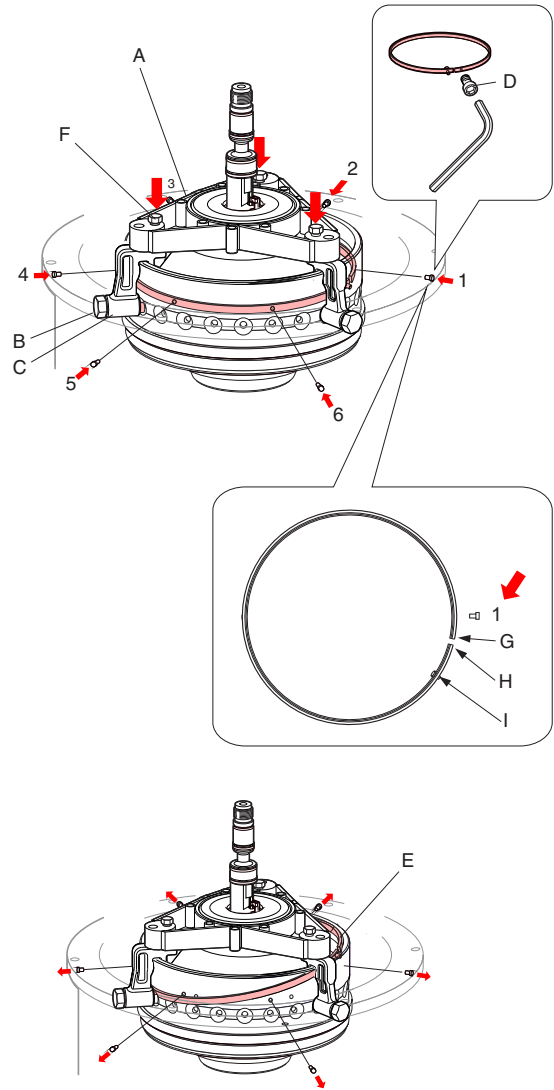
NOTE

If the separator have been out of operation and the bowl is cold, a higher compression torque might be required due to oil residue between bowl hood and bowl body. In these cases a compression torque up to 60 Nm can be used to open the bowl.

- d. Fit the dismantling screws (D) to the bowl body and press out the lock ring by tightening the screws successively according to the numbering in the illustration (1-6). Start with the screw (1) nearest to the lock ring end (G), the one without pin (I), and then continue around until the other end (H) is reached. The lock ring can be removed when it has passed the edge of the groove.
- e. Remove the lock ring (E) from the groove.

NOTE

Remove the dismantling screws.



G08627B2

- A. Compressing tool
- B. Screw
- C. Clamp
- D. Dismantling screw
- E. Lock ring
- F. Compressing screw
- G. Lock ring end without pin
- H. Lock ring end with pin
- I. Pin

2. Removing the bowl hood.

- a. Remove the compressing screws (A).
- b. Loosen the screws (B) on the clamp tool. Remove the tool. Remove the lock ring.



See removing the bowl hood with optional hydraulic tool (if purchased) on next page.

- c. Fit the compressing tool and the puller screws (C). Pull the bowl hood off by screwing the screws alternately (max. 1/2 turn) and gradually increase the momentum evenly until the bowl hood come loose.



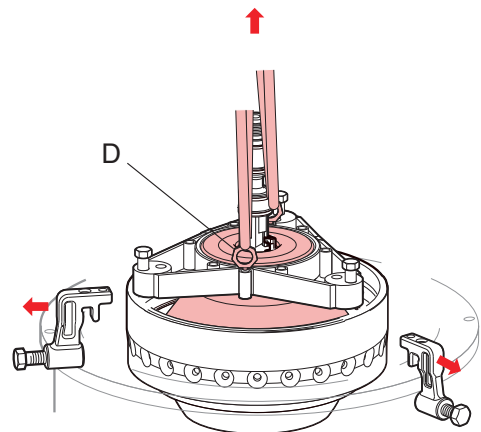
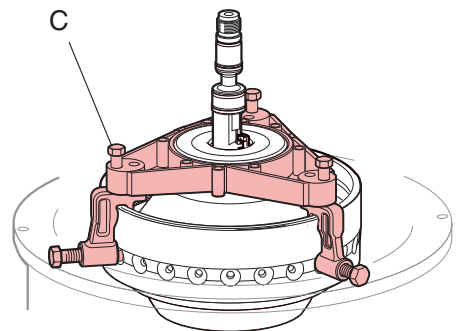
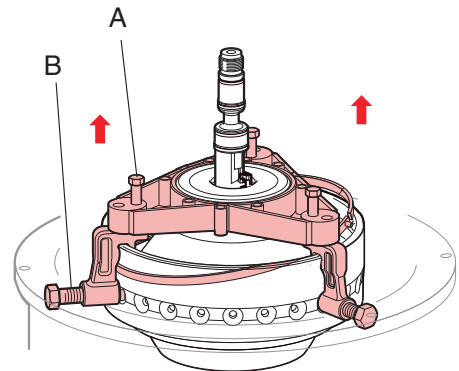
The bowl hood must be pulled off straight up, in order not to get stuck.

Recommendation: Take measurements with a calliper around the bowl, between the upper edge of the bowl body and the bowl hood, to check that the bowl hood is being pulled off straight up.

- d. Remove the clamps and attach lifting eyes (D) to the compressing tool and lift off the bowl hood.

**Crush hazard**

The top disc can adhere to the bowl hood when lifting. Be careful not to accidentally drop it.



G08628J1

- A. Compressing screw
- B. Screw
- C. Puller screw
- D. Lifting eye

3. Removing the bowl hood using the hydraulic tool (optional).

NOTE

First remove the lock ring according to instructions a-b, on previous page.

- a. Fit the larger stud bolt (A) into the in- and outlet pipe (must rest on the cap nut).
- b. Fit the nut (B) and the washer. Make sure that the nut is above the pipe.
- c. Fit the stud bolts (C) into the compressing tool (equal length).
- d. Fit the hydraulic piston (D) onto the bolt.
- e. Fit the holder (E) and fasten with nuts. Make sure that the holder is in a level position (the bowl hood must be pulled off straight up).
- f. Attach the hose from the hand pump to the hydraulic oil inlet (F).

Ease off the bowl hood by pumping the handle on the pump.

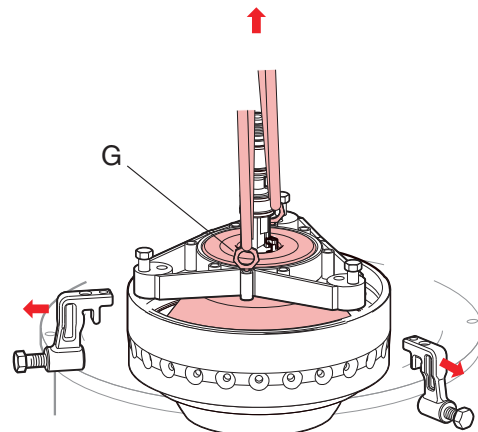
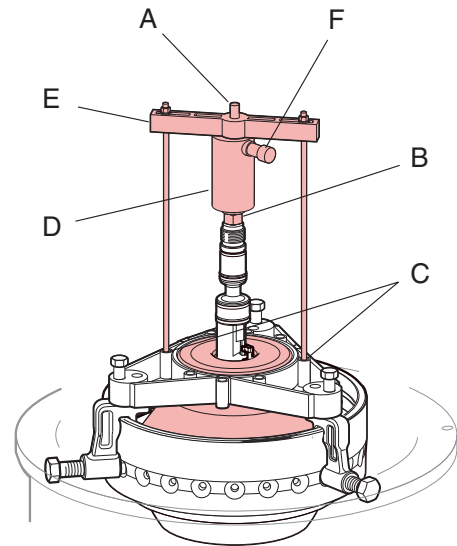
NOTE

The bowl hood must be pulled off straight up, in order not to get stuck.

9. Remove the hydraulic tool and clamps. Fit lifting eyes (G) and lift off the bowl hood using slings.

**Crush hazard**

The top disc can adhere to the bowl hood when lifting. Be careful not to accidentally drop it.



G08628K1

- A. Larger stud bolt
- B. Nut and washer
- C. Stud bolt
- D. Hydraulic piston
- E. Holder with nuts
- F. Oil inlet
- G. Lifting eye

4. Removing the seal ring.

- a. Place the bowl hood on a support and tap out a piece of the seal ring (A) using a drift in the holes.



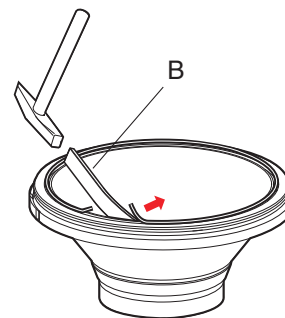
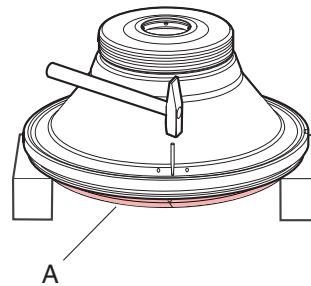
Risk for eye injury from flying seal ring parts or from splashing fluid

The seal ring breaks when removed from the bowl hood and may cause trapped fluid to splash. Wear safety goggles.

- b. Turn the bowl hood upside down and remove the seal ring by carefully knock pieces of the seal ring out of the groove, using the special chisel (B) tool.



It is very important not to damage the bottom of the groove!



G08624A1

A. Seal ring

B. Chisel

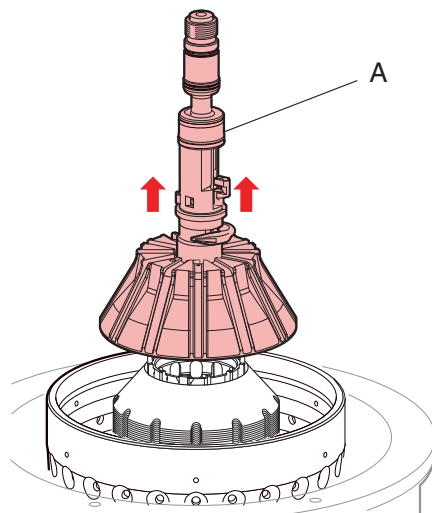
5. Removing the inlet/outlet pipe and top disc.

- a. Lift out the in- and outlet pipe together with the top disc.



Crush hazard

The distributor and disc stack can adhere to the top disc. Separate them from the top disc so that they do not accidentally drop.



G08629c1

A. Inlet/outlet pipe

6. Removing the paring tube.

- a. Remove the top disc (A) from the inlet and outlet pipe.

NOTE

To avoid damaging the paring tube, turn it towards the centre of the pipe.

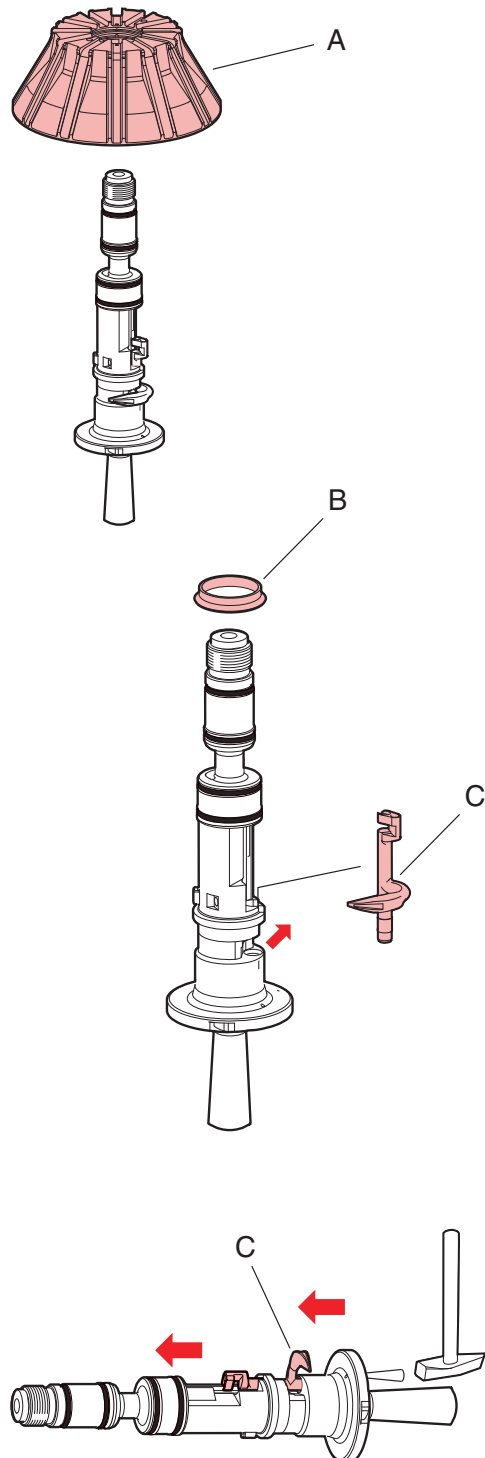
- b. Remove the splash sealing (B).
- c. Lift up and remove the paring tube (C).

NOTE

If the paring tube sticks, use a drift to carefully tap it out from the pipe.

Be careful not to damage the paring tube.

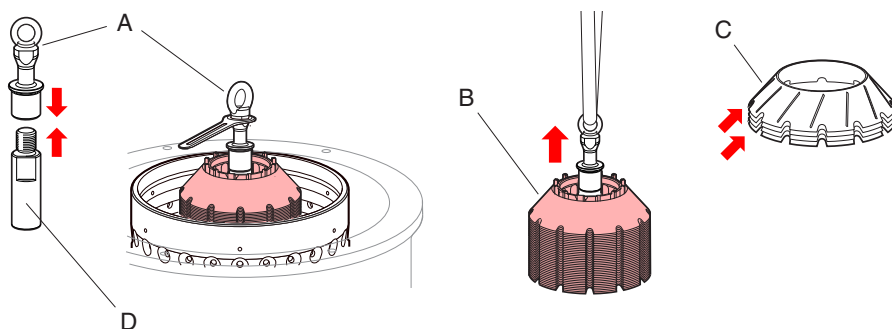
Turn the paring tube (C) upwards.



G08630H1

- A. Top disc
- B. Splash sealing
- C. Paring tube

7. Removing the disc stack and distributor.



G08631C1

- A. Lifting tool
- B. Disc stack
- C. Bowl discs
- D. Pin

- a. Assemble the lifting tool (A) with the pin (D).
- b. Fit the assembled tool into the distributor and ease off the disc stack using a spanner or wrench.
- c. Carefully lift off the disc stack (B) assembly.

**Cut hazard**

Sharp edges on the bowl discs (C) may cause cuts.

8. Removing the nut.

Before the nut can be loosened, the bowl body must first be secured to prevent it from rotating.

- a. Fit a lifting sling on one of the compressing tool clamps (A). Fit the clamp (A) to the bowl body.

NOTE

Make sure that the screw on clamp (A) is tightened and that clamp will not loosen.

- b. Fit one of the frame hood screws (D) to the frame.

NOTE

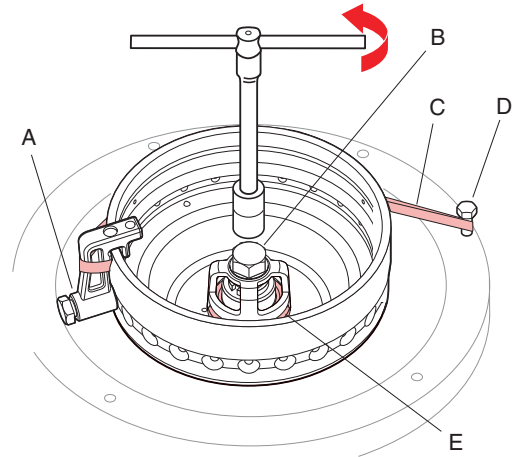
Make sure that the screw (D) in frame bottom part is sufficiently tightened so as not to loosen.

- c. Fasten the other end of the lifting sling (C) on the screw (D). Make sure that the lifting sling is fully tensed before starting to uncrew the nut.

NOTE

Make sure that the lifting sling is positioned below the head of the screw (D).

- d. Use the spanner (B) to remove the nut (E).



G0923871

- A. Clamp
- B. Spanner
- C. Lifting sling
- D. Screw
- E. Nut

9. Removing the discharge slide.

- a. Fit the lifting tool (A) by pressing the puller rods (E) towards each other and position them into the two slots on the bowl body (F).

Slide metal ring (D) down over bowl nave.

- b. Ease off the discharge slide (C) by turning the central screw (B).

NOTE

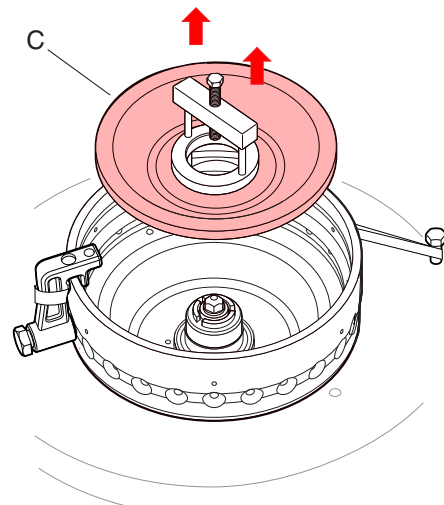
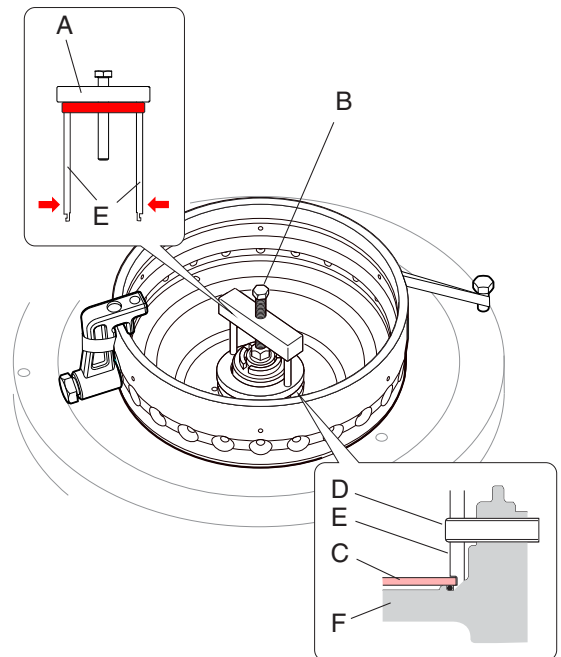
If discharge slide is difficult to remove, tap lightly on outside edge with a soft faced hammer.

- c. Lift out the discharge slide (C).

WARNING

Crush hazard

The ring on the lifting tool must be pushed down against the discharge slide, otherwise the discharge slide may come loose from the tool.



G0863291

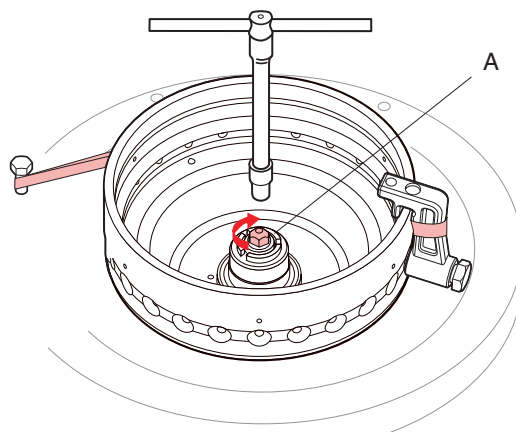
- A. Lifting tool
- B. Screw
- C. Discharge slide
- D. Ring
- E. Puller rod
- F. Bowl body

10. Removing the cap nut.

- a. Remove the cap nut (A).



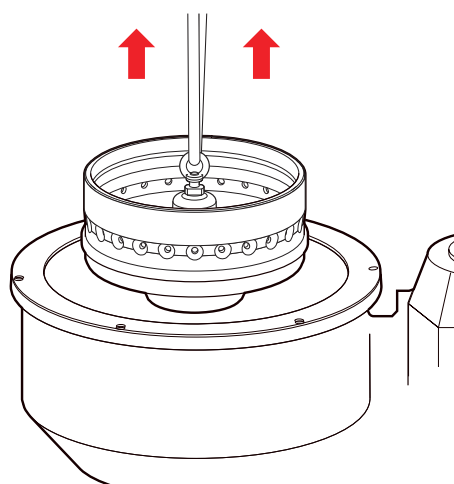
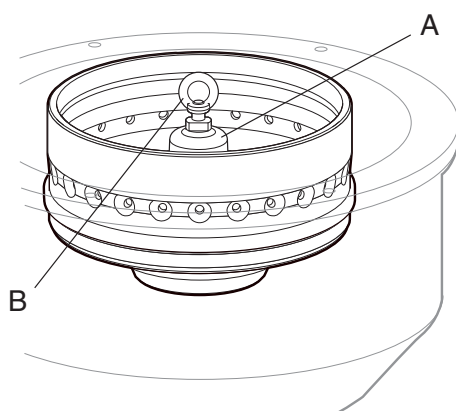
Left-hand thread!



G08606F1

A. Cap nut

11. Removing the bowl body.



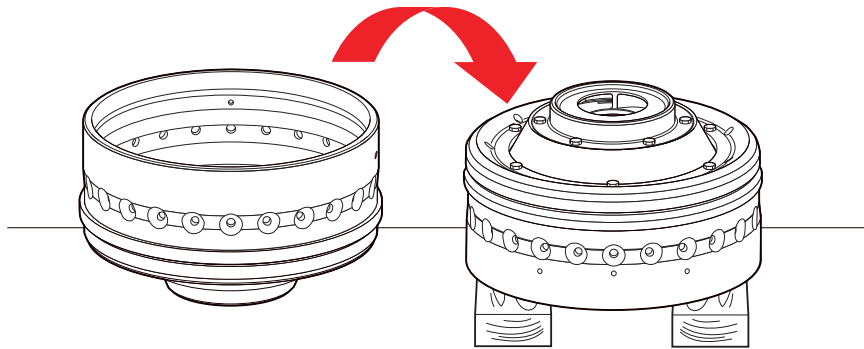
G0860741

A. Lifting tool

B. Lifting eye

- a. Fit the lifting tool (A) to the bowl body.
- b. Raise the bowl body off the spindle taper by turning the lifting eye (B) clock-wise.
- c. Lift off the bowl body.

12. Turn the bowl body upside down.



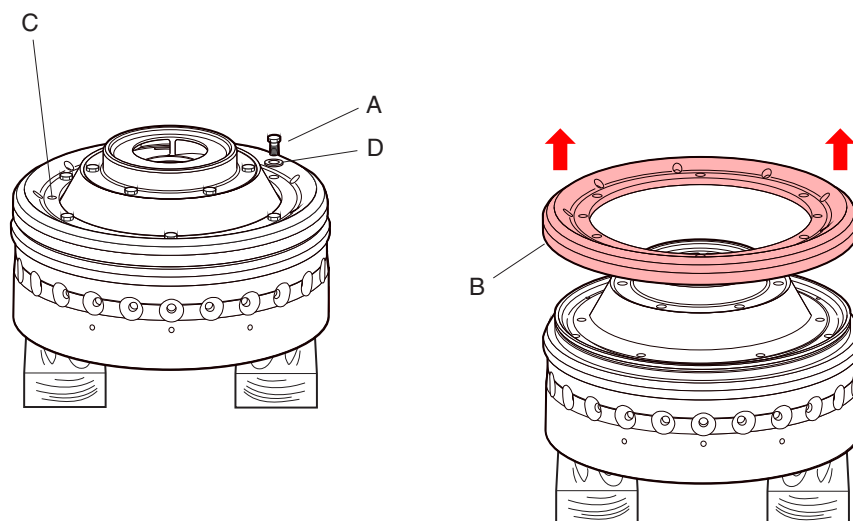
G0860841



Crush hazard

Support the bowl body when turning to prevent it from rolling.

13. Removing the holder.



G0860951

- A. Screw
- B. Holder
- C. Threaded hole
- D. Washer

- a. Remove and discard the screws (A) and washers (D). New screws and washers are included in the Inspection kit.
- b. Lift off the holder (B).

NOTE

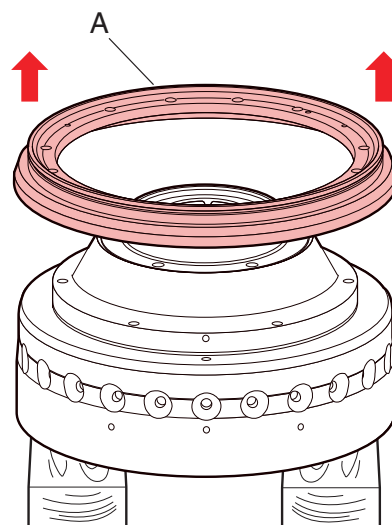
If the ring sticks, use two M8 screws in threaded holes (C) to raise the operating slide holder up and away from the bowl body.

14. Removing the operating slide.

- a. Lift off the operating slide.



If the ring sticks, use two M8 screws in threaded holes to raise the operating slide holder up and away from the bowl body.

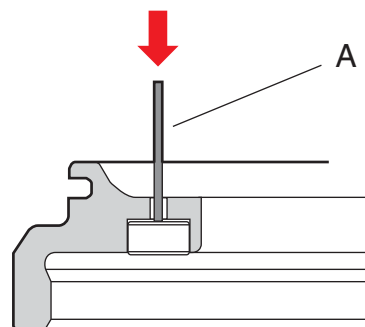


G08610M1

A. Operating slide

15. Removing the valve plugs from the operating slide.

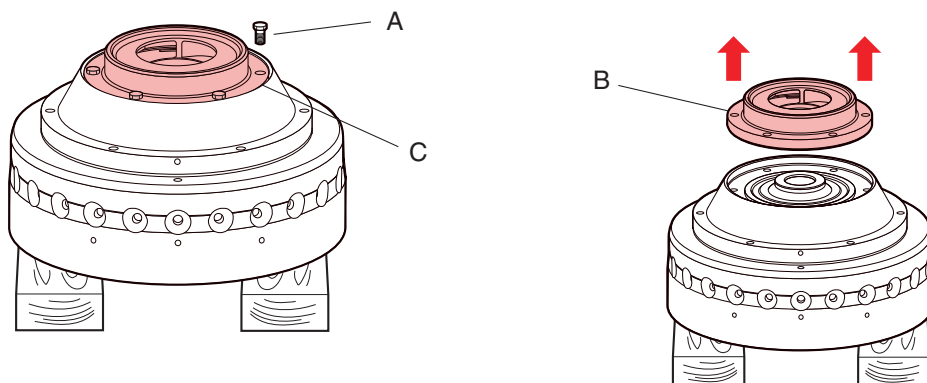
- a. Remove the valve plugs using a drift (A).



G0874891

A. Drift

16. Removing the operating water ring.



G0861141

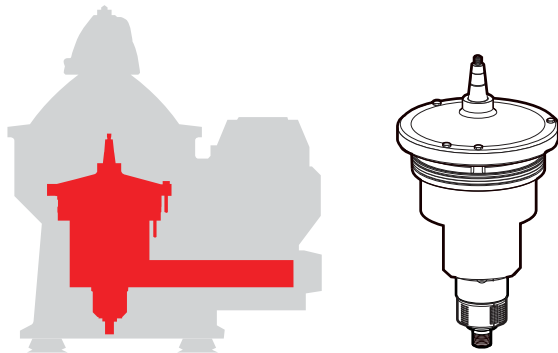
- A. Screw
- B. Ring
- C. Threaded hole

- a. Remove and discard the screws (A). New screws are included in the Inspection kit.
- b. Lift off the ring (B).

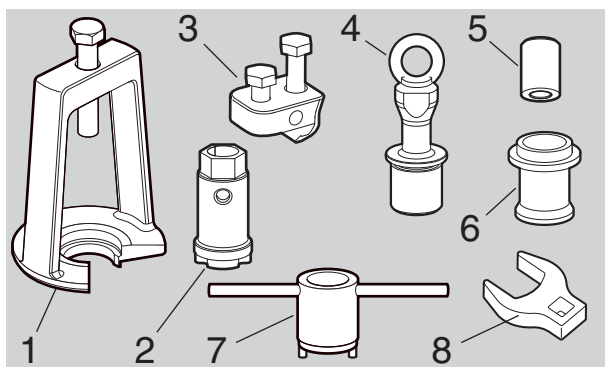
NOTE

If the ring sticks, use two M8 screws in threaded holes (C) to raise the operating slide holder up and away from the bowl body.

6.3.5 Driving device

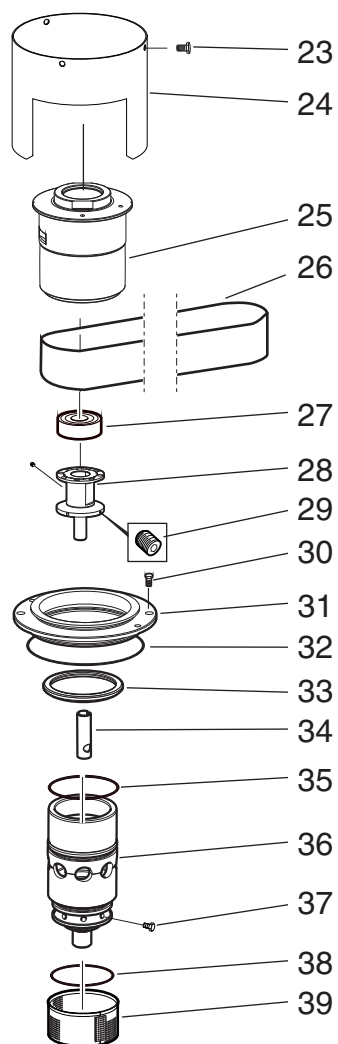
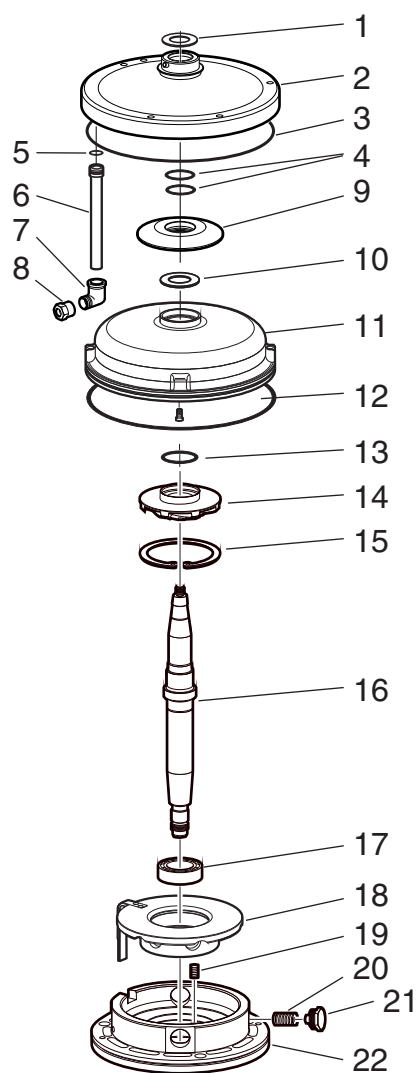


G0857821



G08579G1

1. Puller (spindle pulley, ball bearing)
2. Tool (bearing housing)
3. Cover puller (neck bearing cover)
4. Lifting tool (spindle assembly)
5. Drift (bottom bearing)
6. Sleeve (ball bearing in top bearing seat)
7. Pin spanner (fan)
8. Crowfoot wrench head (oil mist generator)

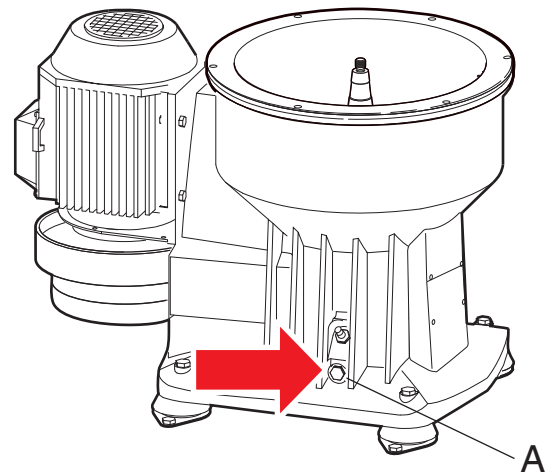


G08580K1

1. *Seal ring*
2. *Operating water cover*
3. *O-ring*
4. *O-rings*
5. *O-ring*
6. *Pipe*
7. *Elbow*
8. *Bushing*
9. *Deflector ring*
10. *Seal rings*
11. *Neck bearing cover*
12. *O-ring*
13. *O-rings*
14. *Fan*
15. *Snap ring*
16. *Bowl spindle*
17. *Ball bearing*
18. *Top bearing seat*
19. *Helical Spring*
20. *Composite spring*
21. *Plug*
22. *Top bearing housing*
23. *Screw*
24. *Air deflector*
25. *Spindle pulley*
26. *Belt*
27. *Self-aligning roller bearing*
28. *Oil mist generator*
29. *Nozzle*
30. *Screw*
31. *Labyrinth ring holder*
32. *O-ring*
33. *Labyrinth ring*
34. *Pipe*
35. *O-ring*
36. *Bottom bearing holder*
37. *Screw*
38. *O-ring*
39. *Strainer*

1. Empty the oil sump.

Unscrew the oil plug (A) and empty the oil sump.

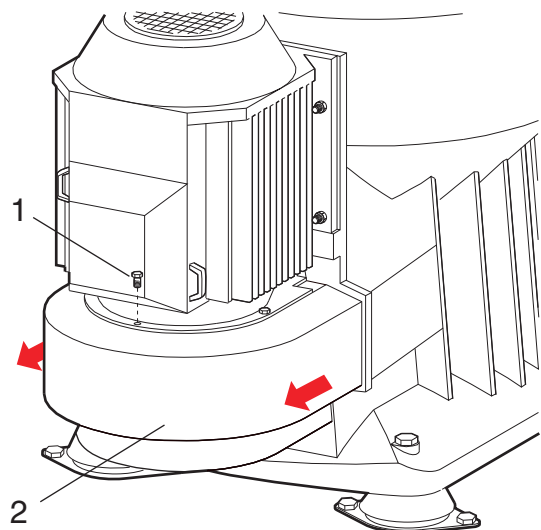


G0868581

A. Oil plug

2. Removing the clutch cover.

- a. Remove the screws (1).
- b. Remove the clutch cover (2).



G0858191

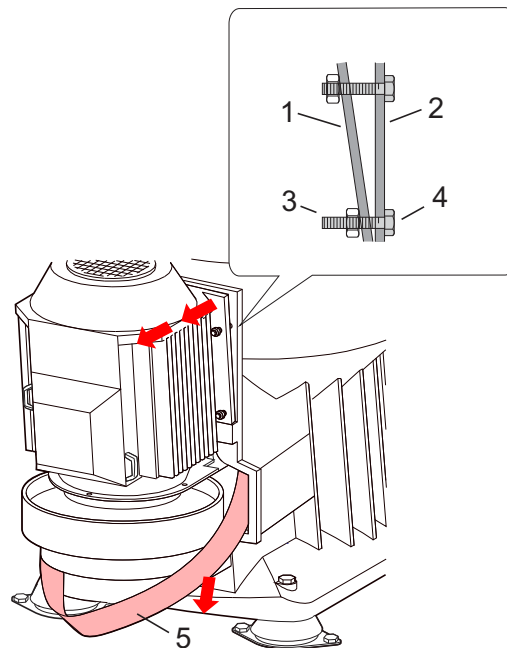
1. Screw
2. Clutch cover

3. Loosen the flat belt, by tilting the motor.
 - a. Loosen, but do not remove, the screws holding the motor. Start with the two screws (4) at the bottom.
 - b. Remove the two upper screws so that the motor can be tilted. Do not loosen more than shown in the illustration.

**Crush hazard**

The motor will come off if the screws are unscrewed.

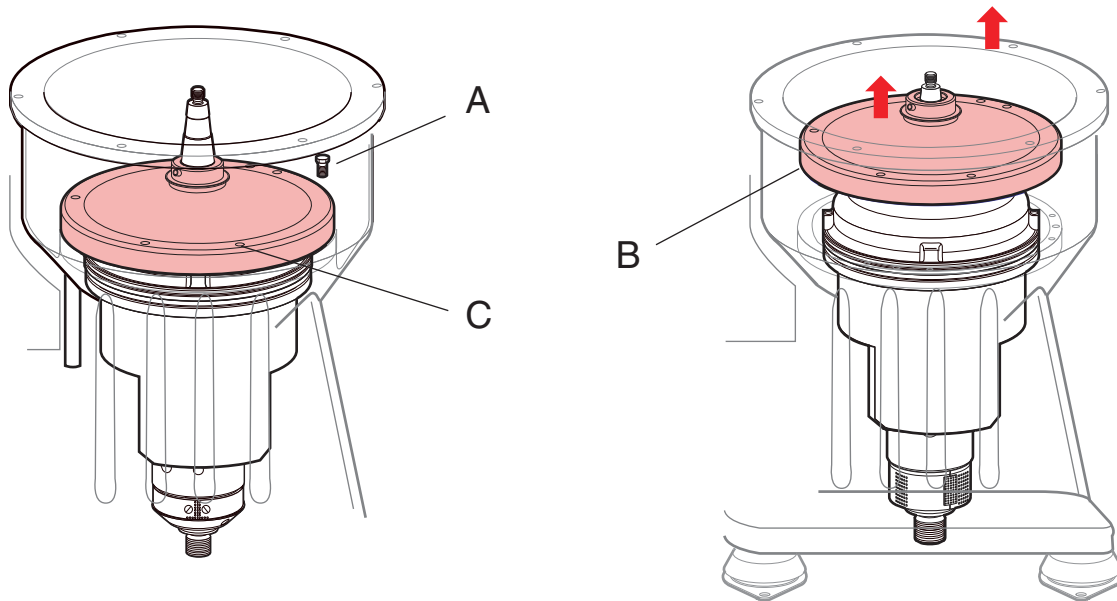
- c. Remove the flat belt (6) from the motor pulley.



G08588y2

1. Motor
2. Separator frame
3. Nut
4. Screw
5. Flat belt

4. Removing the operating water cover.



G0858951

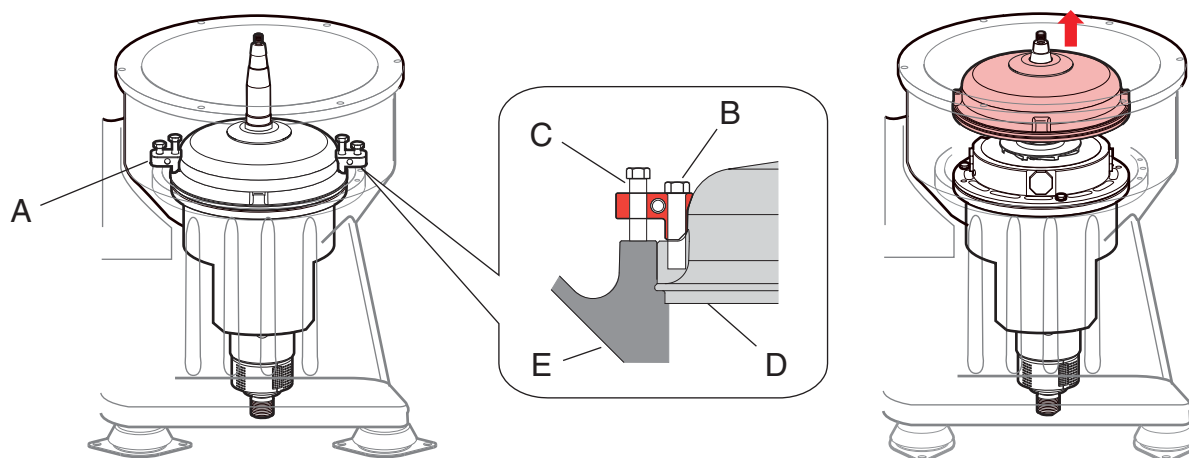
- A. Screw
- B. Operating water cover
- C. Threaded holes

- a. Remove the screws (A).
- b. Lift off the operating water cover (B).

NOTE

If the cover (B) sticks, fit two M10 screws to the threaded holes (C) and tighten.

5. Removing the neck bearing cover and deflector ring.



G0859081

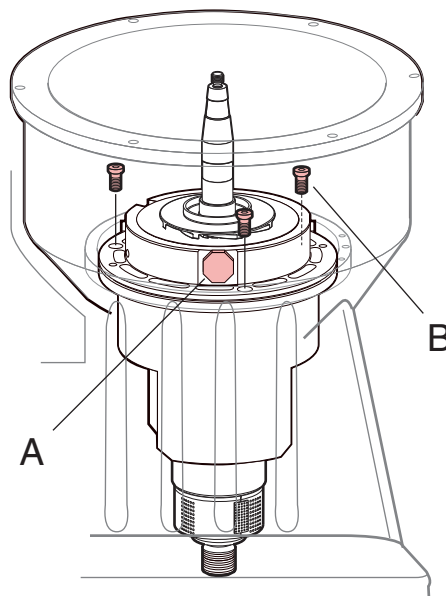
- A. Tool
- B. Mounting screw
- C. Screw
- D. Cover
- E. Frame

- a. Attach the tools (A).
- b. Fasten the tool to the cover using mounting screw (B).
- c. Ease off the cover (D) by tightening the screw (C).
- d. Lift off the neck bearing cover together with the deflector ring.

6. Prepare for removal of spindle assembly.
 - a. To facilitate later removal of the plugs, loosen (but do not remove) the plugs (A) on the bearing housing.
 - b. Remove the screws (B)

NOTE

If the housing sticks, fit two M10 screws to the threaded holes and tighten.



G0859181

- A. Plug
B. Screw

7. Lifting the spindle assembly from the frame.
 - a. Fit the lifting tool (1) to the spindle end.
 - b. Slowly raise and lift out the spindle assembly.

**Crush hazard**

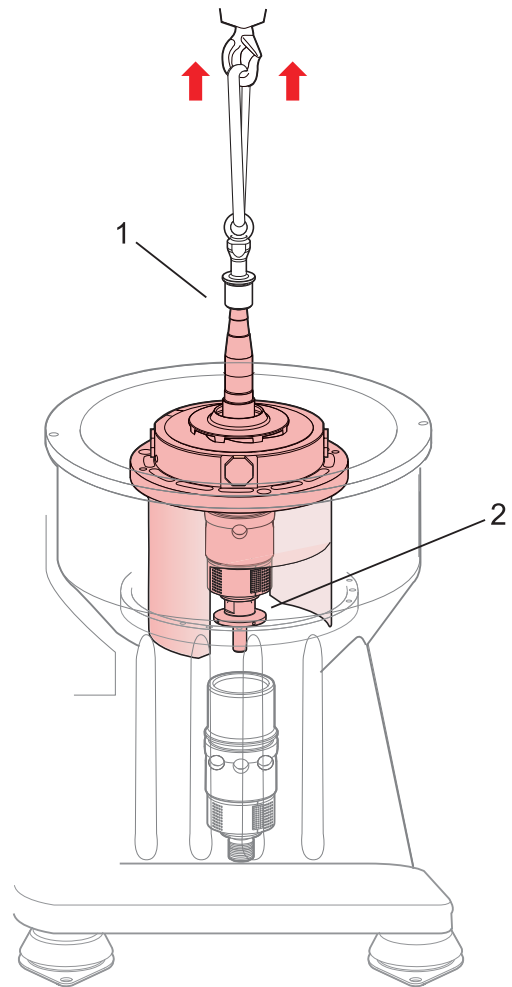
Do not rotate the spindle assembly during lifting.
The spindle assembly may otherwise come loose from the lifting tool.



Take care not to damage the oil mist generator (2).



Protect the inside of the frame by covering the hole.

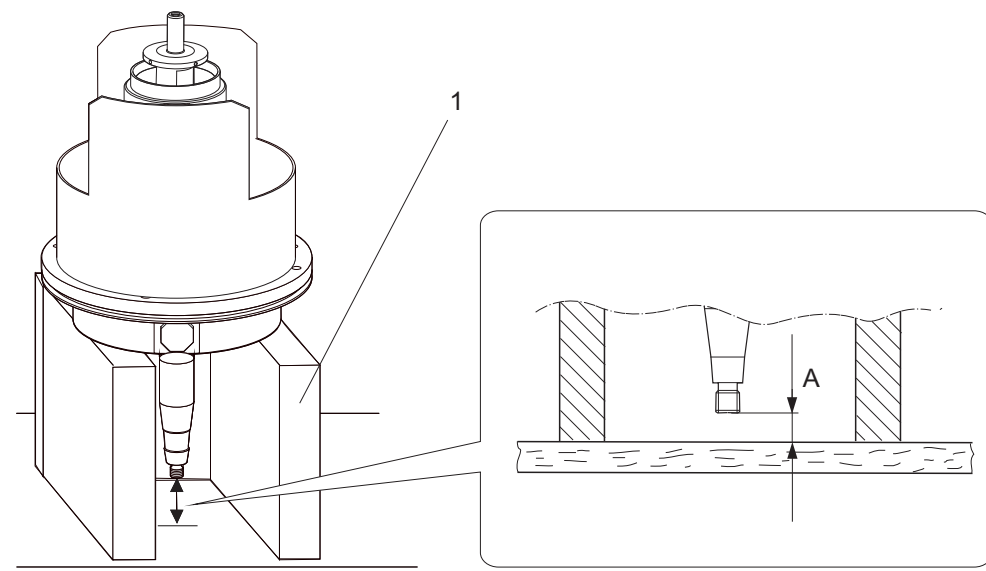


g0907861

1. Lifting tool
2. Oil mist generator

8. Place the spindle assembly upside down on a support.

Make a support (1) with a free space (A) between the spindle top and the floor.



G08592c1

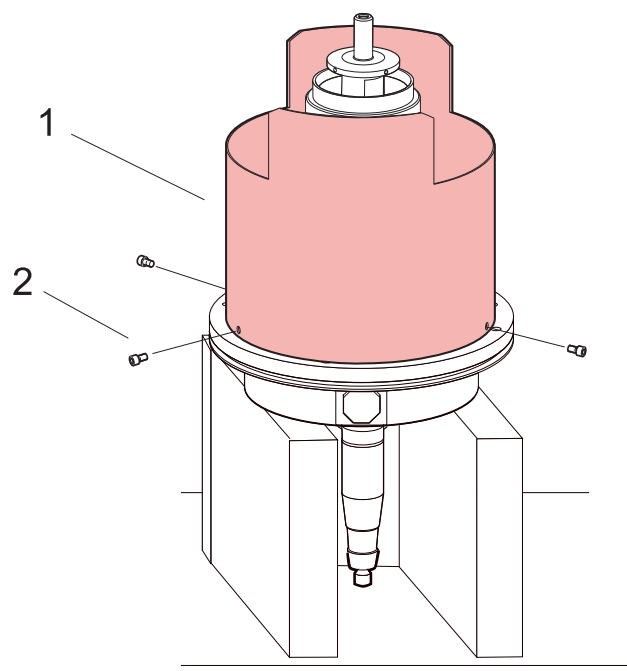
$A=5\text{ mm}$

NOTE

Always use a support as per this sketch when overhaul service is performed on the spindle assembly. It is very important that the top of the spindle does not touch the ground.

9. Removing the air deflector.

- a. Remove the screws (2) and the air deflector (1).

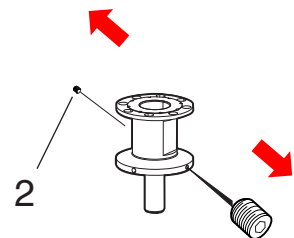
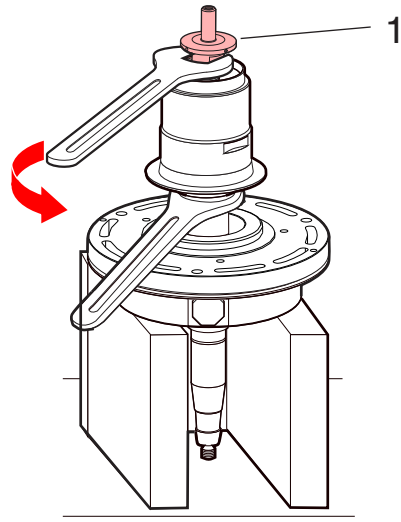


G08592b1

1. Air deflector
2. Screw

10. Removing the oil mist generator.

- a. Turn the spindle assembly up-side down and remove the oil mist generator (1) by using spanners.
- b. Remove the two nozzles (2) using an Allen key.



G1036811

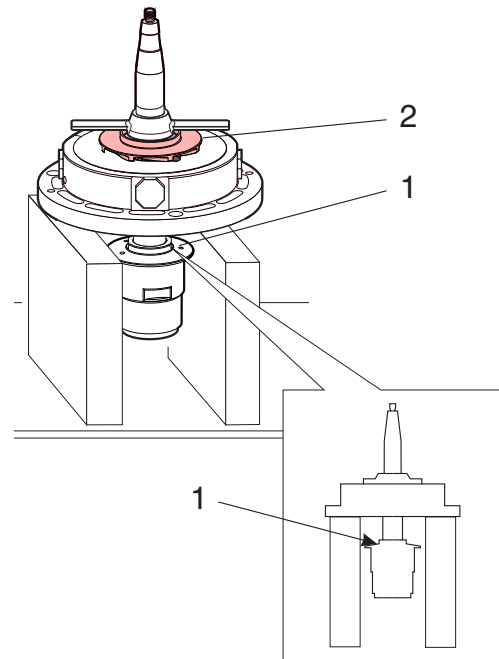
1. Oil mist generator
2. Nozzle

11. Removing the fan.

- a. Turn the spindle assembly the right way up.
- b. Place a spanner (or similar) on the spindle pulley key-grip (1), as holder-up.
- c. Fit the pin spanner and remove the fan (2).



Left-hand thread!



G0923991

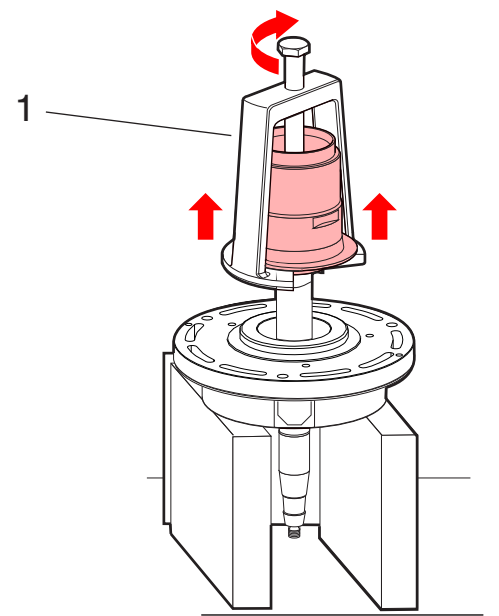
1. Key-grip
2. Fan

12. Removing the bottom bearing assembly.

- a. Turn the spindle assembly up-side down.
- b. Pull off the belt pulley and the self-aligning roller bearing using the puller tool (2).



Always discard a used bearing.

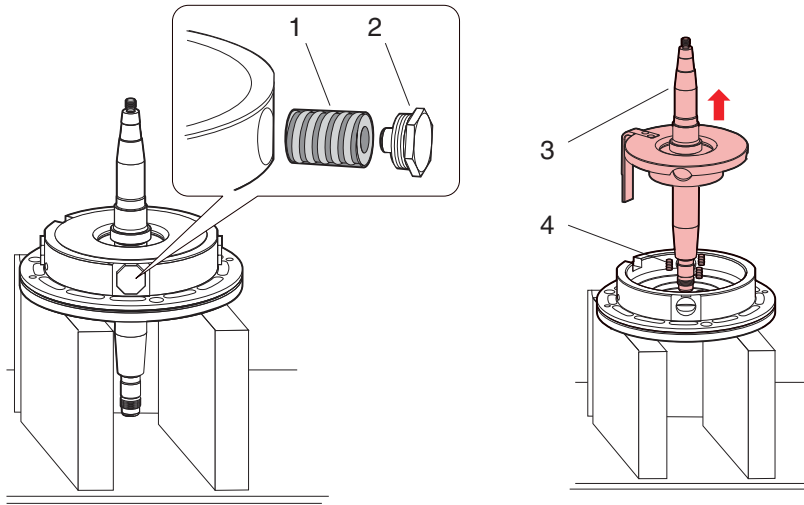


G1036821

1. Puller tool

13. Removing the top bearing housing.

- a. Turn the spindle assembly over.



G0858251

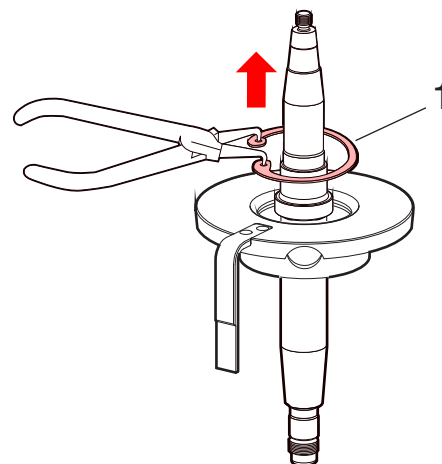
1. Composite spring
2. Plug
3. Spindle
4. Axial springs

- b. Remove the snap ring (1).



Risk for eye injury from flying snap ring
Use the correct pliers for dismantling of snap ring to avoid accidental release.

- c. Remove the plugs (2) and the composite springs (1).
- d. Carefully remove the spindle (3) and bearing seat from the top bearing housing.



g0858391



Be careful not to damage the vibration indicator.

- e. Collect the axial springs (4).

14. Removing the ball bearing.

- a. Fit the cap nut (1) on the spindle to protect the threads.
- b. Use the puller tool (2) to remove the top bearing seat from the spindle.

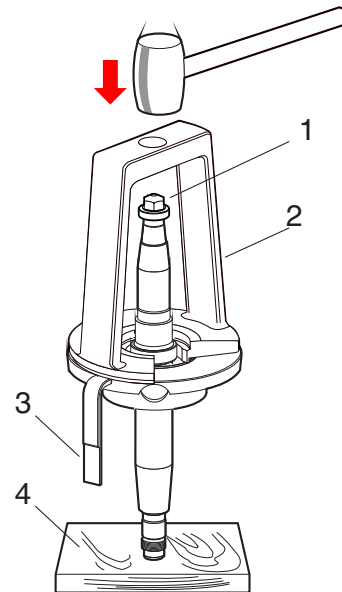
NOTE

Take care not to damage the vibration indicator (4) when separating the top bearing seat from the spindle.

NOTE

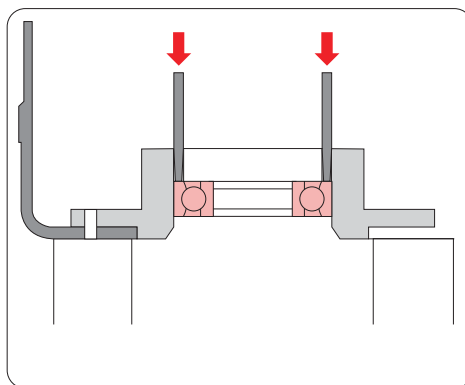
Do not damage threads on spindle.

- c. Place the top bearing seat (A) on a support to protect the vibration indicator. Remove the bearing. Use a drift in the two holes.

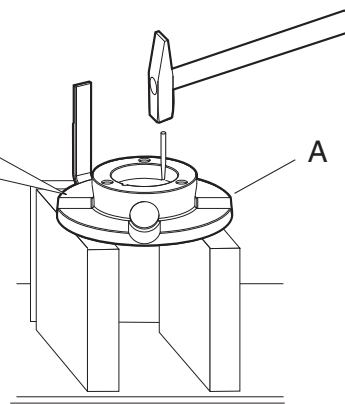


G0858381

1. Cap nut
2. Puller tool
3. Vibration indicator
4. Piece of wood to protect the spindle.



G0858371



A. Top bearing seat

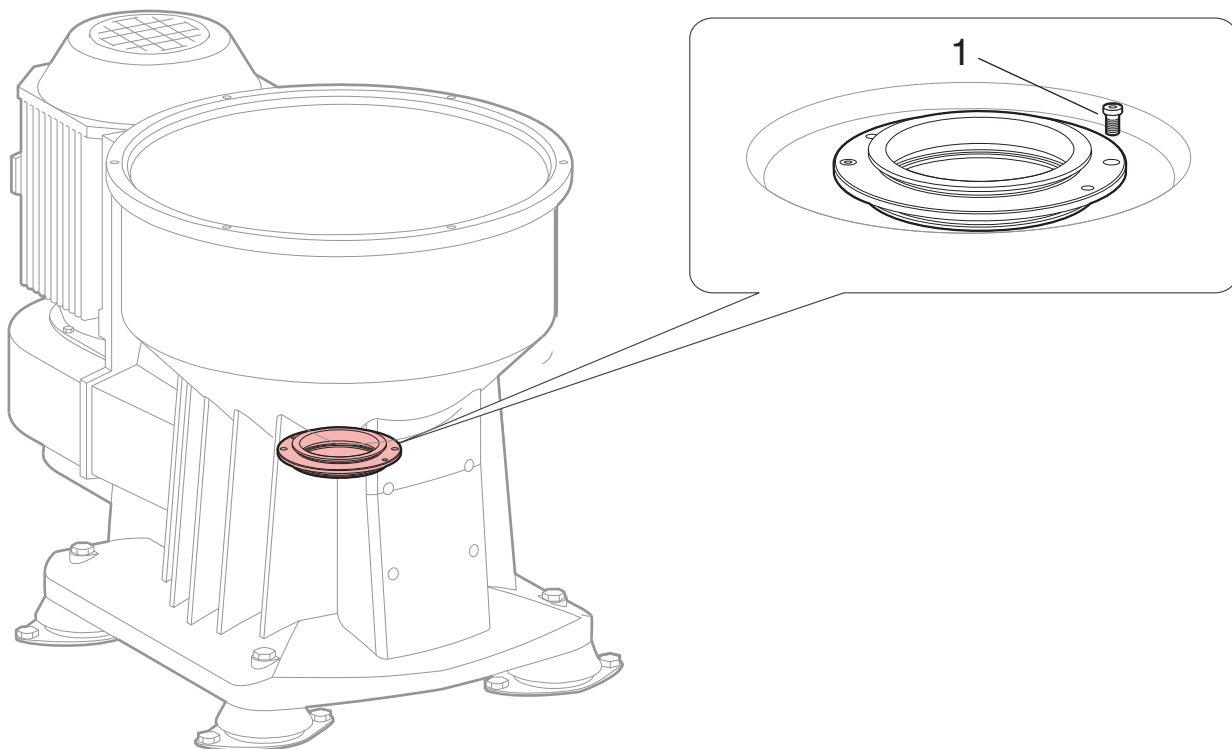
15. Removing the labyrinth ring holder.

- a. Remove the screws (1).

NOTE

If the holder sticks, fit two screws M8 to the threaded holes and tighten.

- b. Remove the O-ring and labyrinth ring.

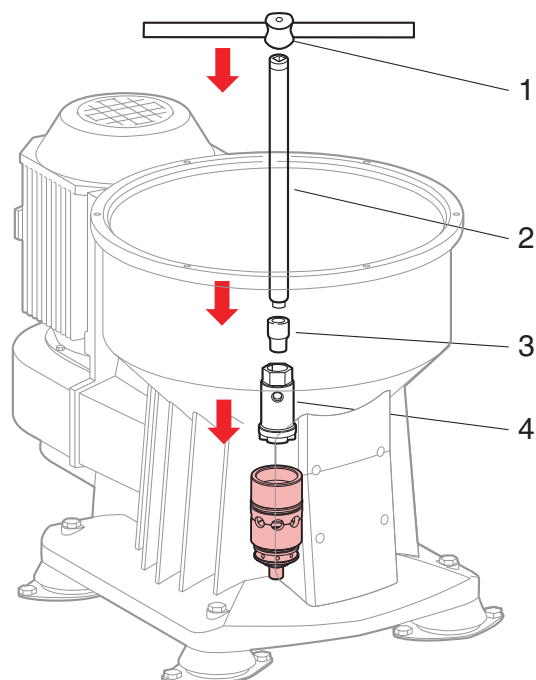


G08586G1

1. Screw

16. Removing the bottom bearing holder.

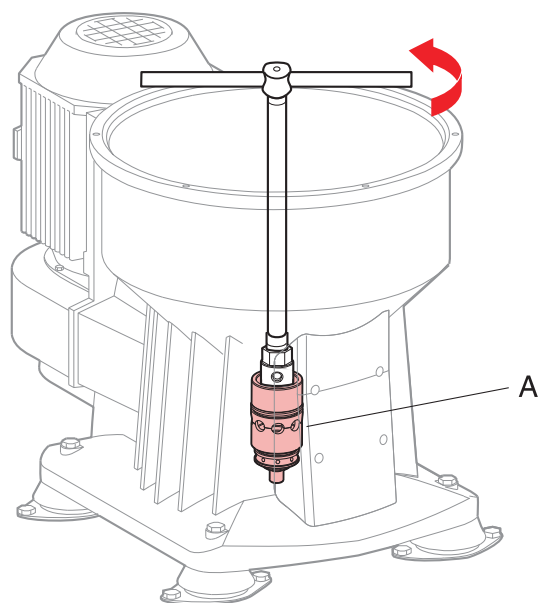
- a. Fit the tool (4) into the bottom bearing holder and attach the socket (3), extension rod (2) and T-handle (1).



G08586J1

1. T-handle
2. Extension rod
3. Socket
4. Tool

- b. Loosen the bottom bearing holder (A) by turning it counter clockwise. Remove it by hand.

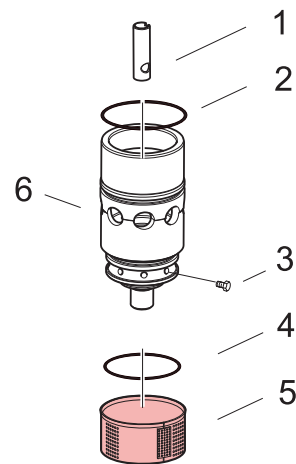


G08586K1

- A. Bottom bearing holder

17. Dismantling the bottom bearing holder (when necessary).

- a. Unscrew the screw (3).
- b. Remove the pipe (1), O-rings (2), (4) and strainer (5).



G1015731

1. Pipe
2. O-ring
3. Screw
4. O-ring
5. Strainer
6. Bottom bearing holder

6.3.6 Centrifugal clutch



G0864711



Entrapment hazard

To avoid accidental start, switch off and lock-out power supply before starting any dismantling work.

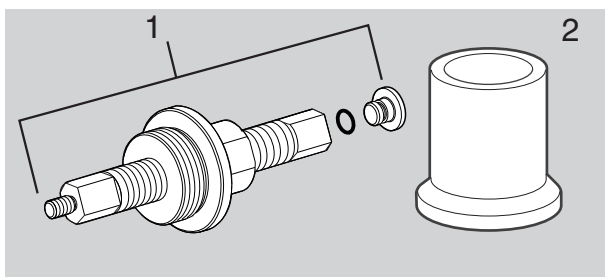
Make sure that machine has come to a complete standstill before starting any dismantling work (takes about 30 minutes from switch off).



50 Hz = 5 Friction blocks

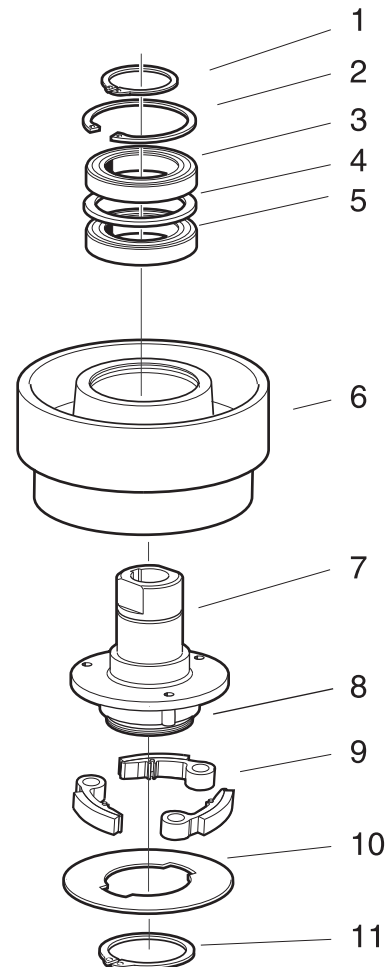
60 Hz = 3 Friction blocks

The illustration shows 50 Hz



G0865071

1. Mounting / dismantling tool (centrifugal clutch).
2. Mounting / dismantling tool (ball bearing).



G0865111

1. Snap ring
2. Snap ring
3. Ball bearing
4. Spacing ring
5. Ball bearing
6. Belt pulley
7. Coupling hub
8. Parallel pin
9. Friction blocks (3=60 Hz)
10. Cover
11. Snap ring

1. Removing the motor.

- a. Disconnect the electrical cables.

**Electrical hazard**

If the cables are not disconnected during lifting procedures, they may become damaged.

- b. Fit a sling to the motor using a shackle on the upper part.

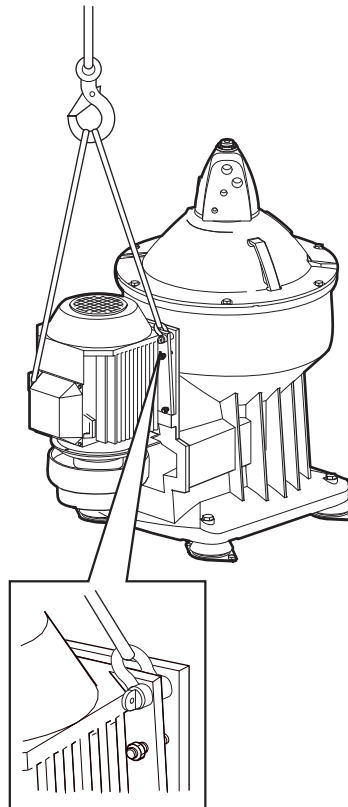
Weight of motor with coupling: approx. 84 kg.

- c. Tense the lifting sling to support the motor and remove the screws. Lift the motor while supported.

**Crush hazard**

If not supported, the motor with coupling will drop when removing the screws.

- d. Lower the motor onto a suitable pallet.



G08646B1

2. Removing the friction blocks.

- a. Remove the snap ring (3), cover (2) and friction blocks (1).

**Inhalation hazard**

When handling friction blocks/pads (1) wear a mask to avoid inhalation of dust.

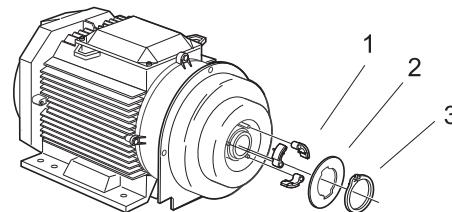
Do not use compressed air to remove dust.

Remove dust using vacuum or a damp cloth.



50 Hz = 5 Friction blocks

60 Hz = 3 Friction blocks



G08652g1

1. Friction blocks (3=60 Hz)
2. Cover
3. Snap ring

3. Checking the condition of the friction blocks. [o]

**Inhalation hazard**

When handling friction blocks/pads wear a mask to avoid inhalation of dust.

Do not use compressed air to remove dust.

Remove dust using vacuum or a damp cloth.

If the blocks are worn:

Fit new friction blocks.



Replace all blocks, even if only one is worn.



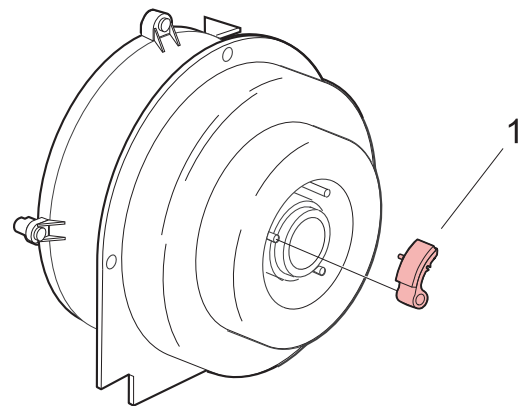
Be sure that the pins on the back of the blocks project into the grooves in the clutch hub.

- a. Clean the pins of coupling hub and apply a thin film of lubricating paste to the pins.



Make sure that there is no oil on the pads.

- b. If only friction block service is to be done, proceed to fitting the friction blocks on page [113](#).



G08653c1

1. Friction block

4. Removing the coupling from the motor (complete dismantling of centrifugal clutch).

- a. Attach a socket with extension rod and handle (1) to the screw. Place a piece of wood (2) according to the illustration. Push the handle to start the rotor moving, when the handle hits the piece of wood, the weight and movement of the rotor loosens the screw. Repeat until screw is loose.

Remove the screw (5), spring washer (4) and washer (3).

- b. Check that the brass plug (6) is mounted on the puller tool (8). Fit the tool to the friction clutch.
- c. Ease off the friction coupling.

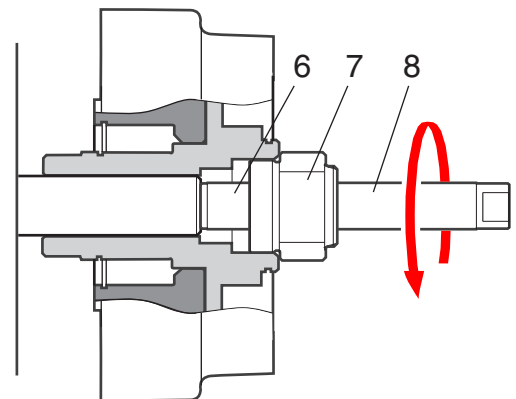
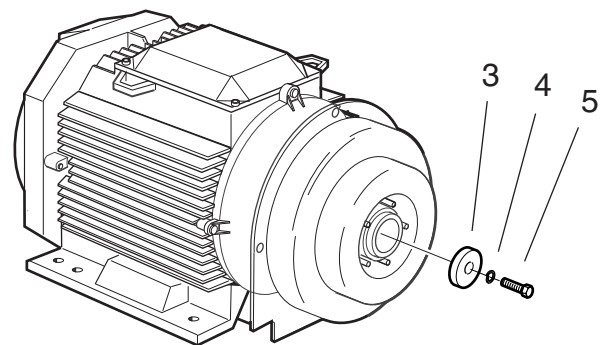
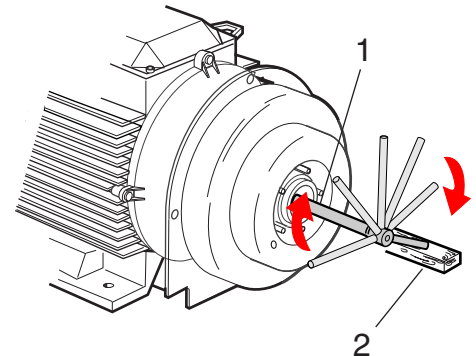


Crush hazard

The centrifugal clutch is heavy and can fall, causing injury, when loosened from the motor shaft.



See dismantling with optional hydraulic puller tool on page 96 (if purchased).



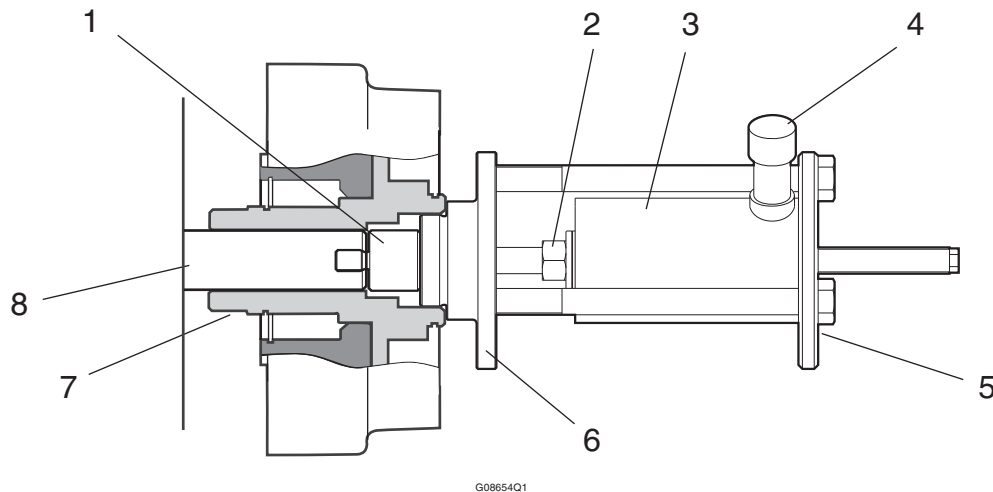
G08654y1

1. Socket with extension rod and handle
2. Piece of wood
3. Washer
4. Spring washer
5. screw
6. Brass plug
7. Flat area for spanner
8. Puller tool

5. Removing the coupling from the motor using the optional hydraulic tool.

NOTE

First remove the screw, spring washer and washer according to instructions a -b, on previous page.



1. Sleeve
2. Nut
3. Hydraulic cylinder
4. Hydraulic oil inlet
5. Plate
6. Holder
7. Coupling nave
8. Motor shaft

- a. Fit the sleeve (1) to the stud bolt.
Fit the stud bolt with sleeve to the motor shaft (8).
- b. Fit the holder (6) to the coupling nave (7).
- c. Fit nut (2) and sleeve to the stud bolt as shown.
- d. Fit hydraulic cylinder (3) as shown.
- e. Fit the plate (5) and fasten with screws through plate and holder.

- f. Attach the hose from the hand pump to the hydraulic oil inlet (4).

Ease off the friction coupling by pumping the handle on the pump until stop.

Release pressure on the hand pump and adjust the nut on the stud bolt.

Repeat until coupling is loose.



Crush hazard

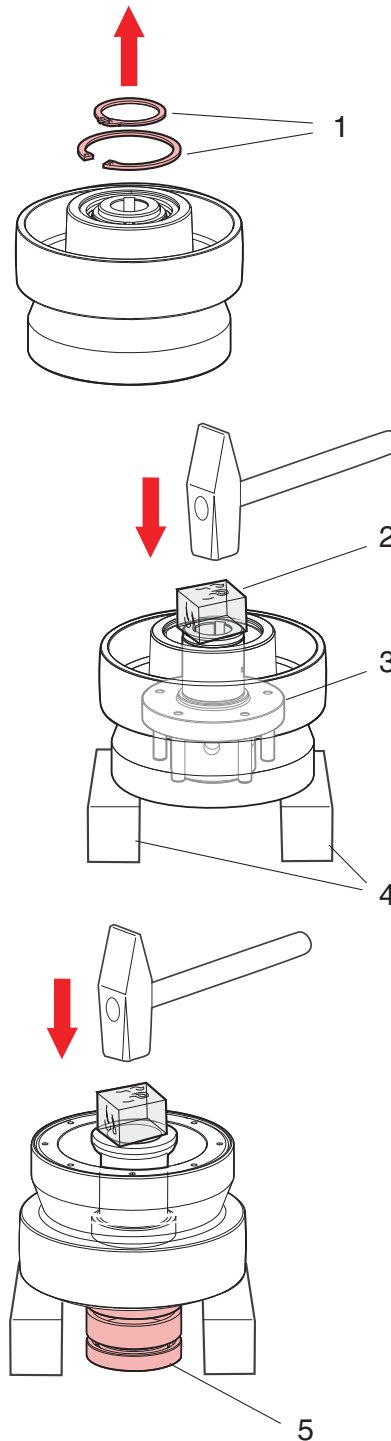
The centrifugal clutch is heavy and can fall, causing injury, when loosened from the motor shaft.

6. Dismantling of the coupling assembly.

- a. Remove the snap rings (1).
- b. Drive out the coupling hub (3).
- c. Turn the coupling the other way round and drive out the ball bearings (5) using the mounting tool.



Always discard used bearings.



G0865571

1. Snap ring
2. Wooden support
3. Coupling hub
4. Support
5. Ball bearing

6.4 Actions before assembly

6.4.1 Cleaning

[i], [o]

Clean the separator parts according to the diagram below. Afterwards, protect all cleaned carbon steel parts against corrosion by oiling.



Electrical hazard

Never wash down a separator with a direct water stream. Never play a water jet on the motor. Totally enclosed motors can be damaged by direct hosing to the same extent as open motors, resulting in short-circuit and internal corrosion.



Cut hazard

Sharp edges on the separator discs may cause cuts.

Part	Procedure	Cleaning agents
Frame and motor	The external cleaning of the frame and motor should be restricted to brushing, sponging or wiping while the motor is running or still is hot. Clean the inside of the frame with a clean cloth and remove visible particles.	Water and de-greasing agent.
Bowl Inlet/outlet	Cleaning of bowl discs Handle the bowl discs carefully in order to avoid damage to the surfaces during cleaning — Remove the bowl discs from the distributor and place them individually in the cleaning agent. — Allow the discs to remain in the cleaning agent until the deposits have been dissolved. This will normally take between two and four hours. — Lastly, clean the discs with a soft brush. Cleaning of holder for operating slide, operating water ring and operating slide with nozzle. Use 10% acetic acid solution to dissolve lime deposits. The acid should be heated to 80 °C. Clean the nozzle on the operating slide using a soft iron wire or a similar object.	A chemical cleaning agent must dissolve the deposits quickly without attacking the material of the separator parts. Use Alfa Laval bowl disc cleaning agent. Mix 1 part cleaning agent to 10 parts water. The temperature should be 60–80 °C. Fuel oil sludge mainly consists of complex organic substances such as asphaltenes. The most important property of a cleaning liquid for the removal of fuel oil sludge is the ability to dissolve these asphaltenes.
Driving device	Use a sponge or a soft brush and clean the oil mist generator and bearing holder thoroughly.	White spirit, cleaning-grade kerosene or diesel oil.
Centrifugal clutch	Use a sponge or a soft brush.	White spirit, cleaning-grade kerosene or diesel oil.
Belt pulley	Use a steel brush.	Solvent

6.4.2 Inspection for corrosion

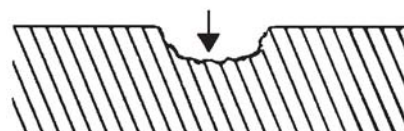
[i], [o]

Inspect the separator parts for corrosion. Evidence of corrosion attacks should be looked for and rectified each time the separator is dismantled.



Disintegration hazards

Always contact your Alfa Laval representative if you suspect that the depth of the corrosion damage exceeds 0,2 mm for bowl body and bowl hood (0,5 for other parts) or if cracks have been found. Do not continue to use the separator until it has been inspected and given clearance for operation by Alfa Laval.



G0205241

Material	Type of corrosive environment	Appearance	Measure
Non-stainless steel and cast iron parts	Water or dampness	Rust	If damage exceeds 0,5 mm, contact Alfa Laval.
Stainless steel	Chlorides or acidic solutions	Acidic solutions cause general corrosion. Chloride corrosion begins as small dark spots that can be difficult to detect, and goes on to local damage such as pitting, grooves or cracks.	Polish dark-coloured spots and other corrosion marks with a fine grain emery cloth. This may prevent further damage. If damage exceeds 0,5 mm (0,2 mm for bowl body and bowl hood) contact Alfa Laval.
Other metal parts	"Aggressive" environment	Possible corrosion damage can be in the form of pits and/or cracks.	If damage exceeds 0,5 mm, contact Alfa Laval.



Disintegration hazards

Pits and spots forming a line may indicate cracks beneath the surface.

All forms of cracks are a potential danger and are totally unacceptable.

Replace any part where corrosion can be suspected of affecting its strength or function.

6.4.3 Inspection for cracks

[i], [o]

Check the separator parts for cracks. It is particularly important to inspect for cracks in rotating parts, and especially the pillars between the sludge ports in the bowl wall.



Disintegration hazard

All forms of cracks are potentially dangerous as they reduce the strength and functional ability of components.

Always replace a part if cracks are present.

Cracks can occur from cyclic material stresses and corrosion. Keeping the separator and its parts clean and free from deposits will help to prevent corrosion attacks.



Disintegration hazards

Always contact your Alfa Laval representative if you suspect that the depth of the damage exceeds 0,2 mm for bowl body and bowl hood (0,5 for other parts).

Do not continue to use the separator until it has been inspected and given clearance for operation by Alfa Laval.

6.4.4 Inspection for erosion

[i], [o]

Erosion may occur when particles suspended in the process liquid slide along or strike against a surface.

Erosion is characterised by:

- a. Burnished traces in the material.
- b. Dents and pits having a granular and shiny surface.
1. Inspect the bowl and inlet/outlet parts for erosion damages.

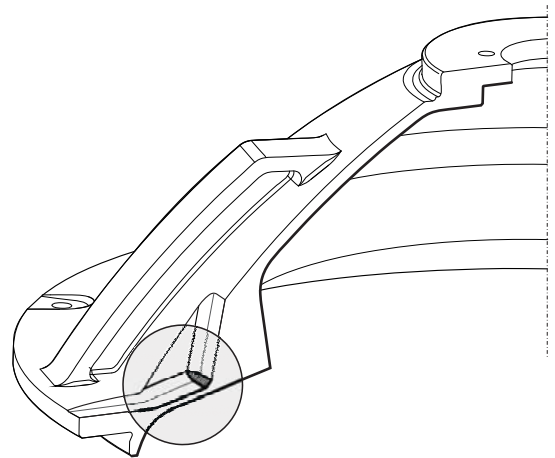
NOTE

Always contact your Alfa Laval representative if you suspect that the depth of the damage exceeds 0,2 mm for bowl body and bowl hood (0,5 for other parts). Do not continue to use the separator until it has been inspected and cleared for operation by Alfa Laval.

2. Inspect inside and outside of the frame hood.

NOTE

Pay extra attention at the groove.



G1034011

3. Replace parts if erosion is suspected.



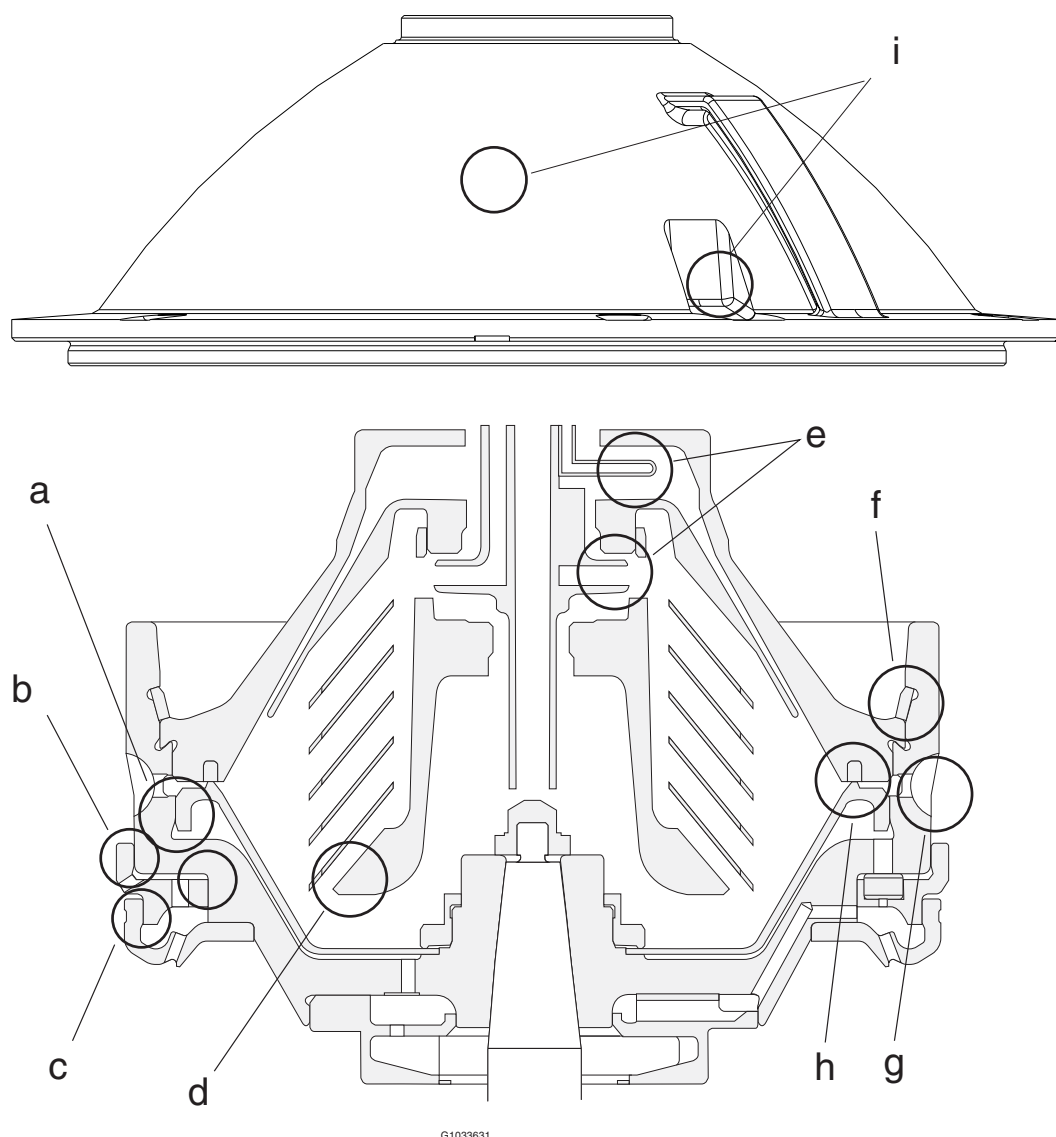
Disintegration hazard

Erosion damage weakens parts by reducing the thickness of the material.

Pay special attention to the pillars between the sludge ports in the bowl wall.

Replace parts if erosion is suspected of affecting strength or function.

Surfaces particularly subjected to erosion are:



- a. The sealing edge of the discharge slide.
- b. Bowl body and holder.
- c. Holder and operating slide.
- d. The underside of the distributor in the vicinity of the distribution holes and wings.
- e. Paring disc and paring tube.
- f. Lock ring.
- g. Pillars between the sludge ports in the bowl wall.
- h. The sealing edge of the discharge slide for the seal ring in the bowl hood.
- i. Groove in frame hood. (Inspect both the inside and outside of the frame hood.)

6.4.5 Exchange of frame feet

The frame feet have to be changed occasionally due to rubber deterioration from age.

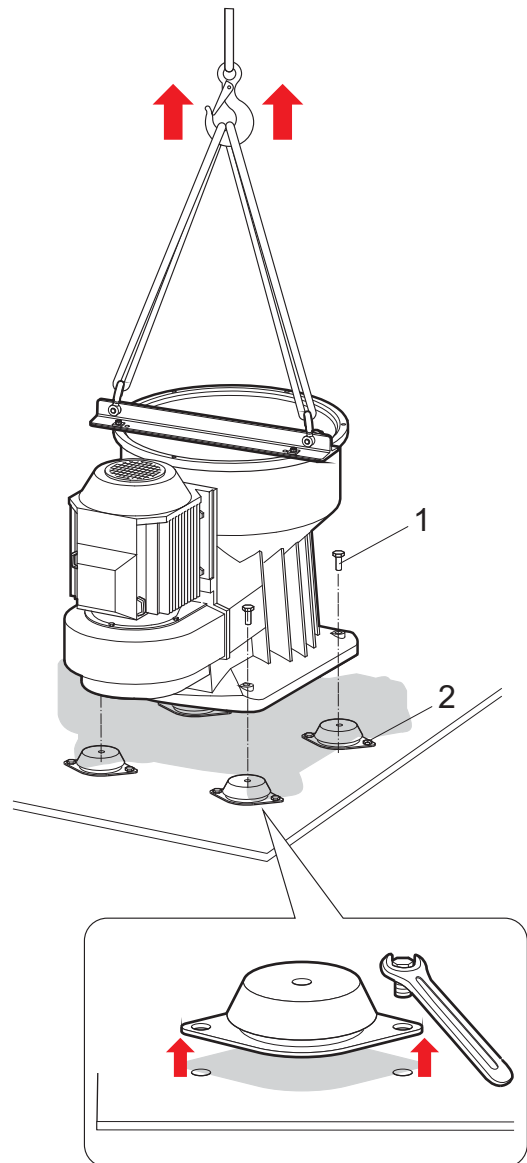
When replacing the frame feet, the separator must be lifted. Follow the instructions in [6.7 Lifting instructions on page 169](#).

- Loosen the central bolts (1) and prepare to remove the separator frame
- Lift the separator. See [6.7 Lifting instructions on page 169](#).
- Remove the existing screws (2), washers and frame feet.

NOTE

Discard the old frame feet, screws and washers.

- Fit the new feet, screws and washers.
- Place the separator in its original position and fasten the central mounting bolts (1). Tightening torque: *160 Nm*.

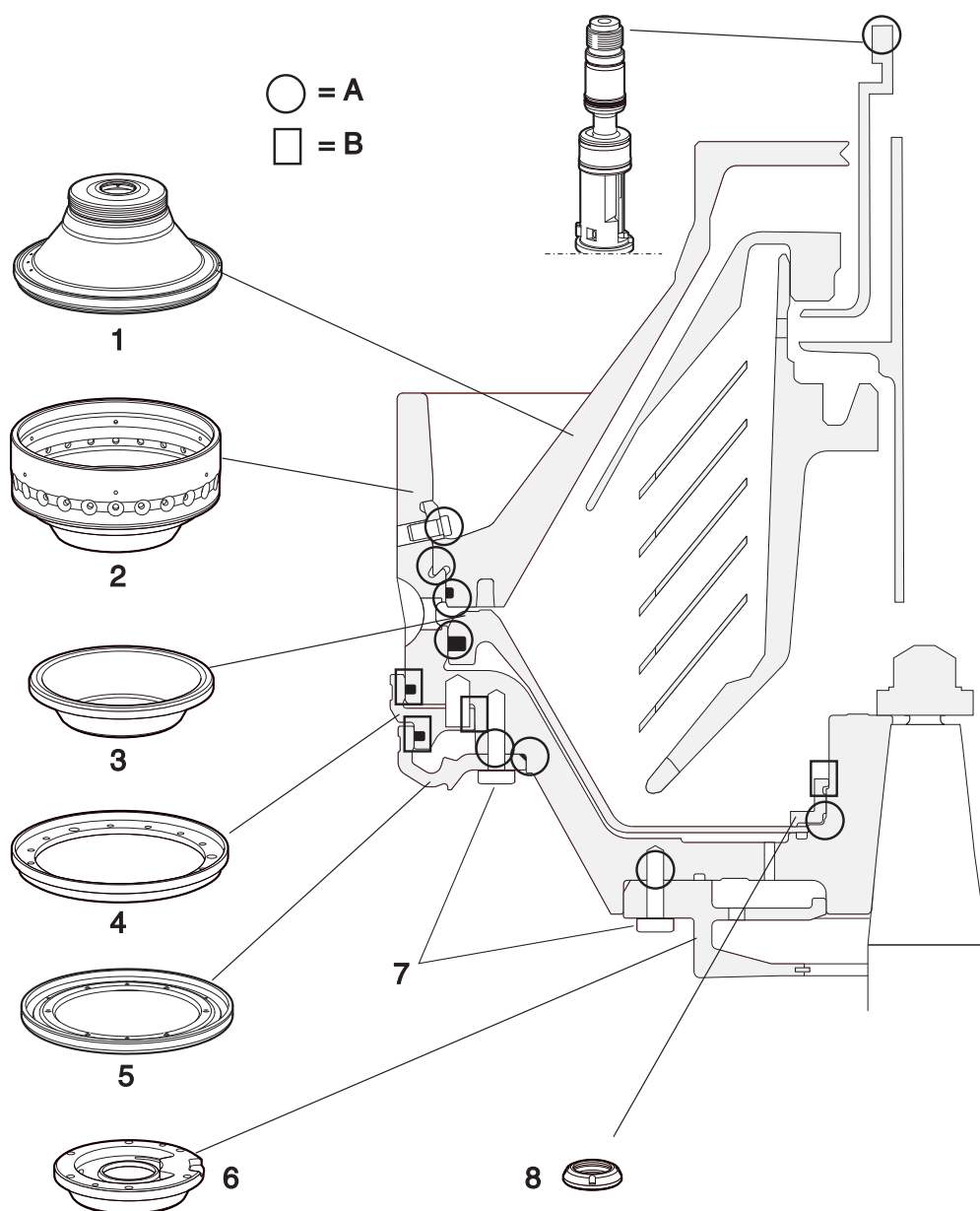


G0874481

6.4.6 Lubrication of bowl parts

Apply a thin layer of Molykote 1000, or equivalent lubrication, on **all** the contact surfaces shown in the illustration. In addition apply slide lacquer on

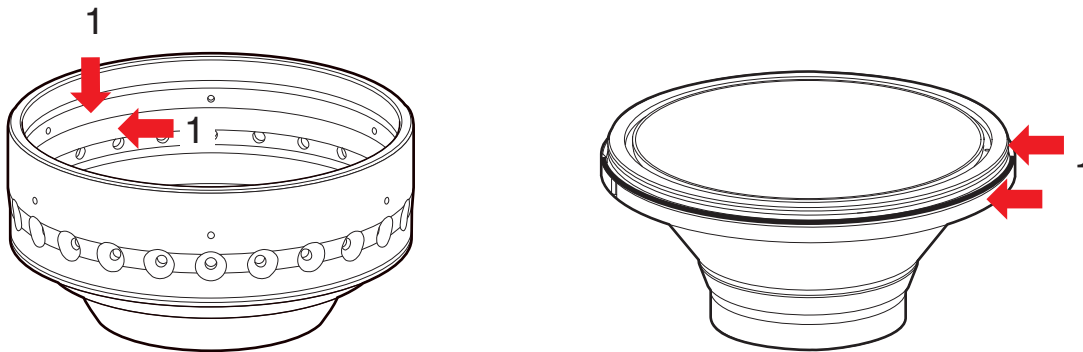
- operating slide
- bowl body
- guide pin
- bowl hood



G09117h1

- A. Molykote 1000
- B. Slide lacquer + Molykote 1000
- 1. Bowl hood (apply slide lacquer)
- 2. Bowl body (also apply slide lacquer on guide pin)
- 3. Discharge slide
- 4. Operating slide (apply slide lacquer)
- 5. Holder
- 6. Operating water ring
- 7. Screw
- 8. Nut

6.4.7 How to lubricate bowl parts with slide lacquer



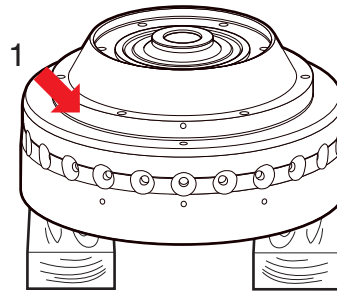
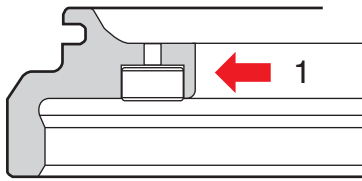
G08748A1

NOTE

This instruction is also valid for the operating slide and the holder.

- a. Carefully clean the contact surfaces (1) on bowl body and bowl hood.
- b. Apply slide lacquer with a sponge.
- c. Rub the slide lacquer on the surfaces to a thin, evenly distributed layer using the sponge.
- d. Polish the film to a shiny surface, the film should look like well-polished leather when properly done.
- e. Finish the treatment by lubricating the contact surfaces with Alfa Laval lubricating paste or Molykote 1000 paste. Use a well cleaned brush and rub it into the surface, do not leave any excessive paste.

6.4.8 Check for galling on operating slide and bowl body



G08748B1

If any friction marks are found on the guide surfaces (1) of operating slide and bowl body, proceed as follows:

- a. Clean the surface thoroughly with a degreasing agent, i.e. white spirit.
This is important!
- b. Using an emery cloth (e.g. No. 320) to smooth the metal edges.
- c. Finish by polishing the damaged spots with polishing paper (e.g. No. 600).
- d. Apply slide lacquer with a sponge.
- e. Rub the slide lacquer on the surfaces to a thin, evenly distributed layer using the sponge.
- f. Finish the treatment by lubricating the guiding surfaces with Alfa Laval lubricating paste or Molykote 1000 paste. Use a well cleaned brush. Rub it into the surface, do not leave any excessive paste.

NOTE

To avoid the risk of galling, the guiding surface of the operating slide should be primed with a slide lacquer at every inspection service.

6.5 Assembly

6.5.1 Centrifugal clutch

1. Assembly of the coupling.

- a. Slip the belt pulley (1) over the coupling hub and place them on a firm and level foundation.



Disintegration Hazard

If the belt pulley must be renewed, check that the new pulley has the correct diameter. An incorrect pulley will cause the separator bowl to run at either an excessive or insufficient speed.

d=292 mm 50 Hz

d=243 mm 60 Hz



Remove rust from the belt pulley using a steel brush.

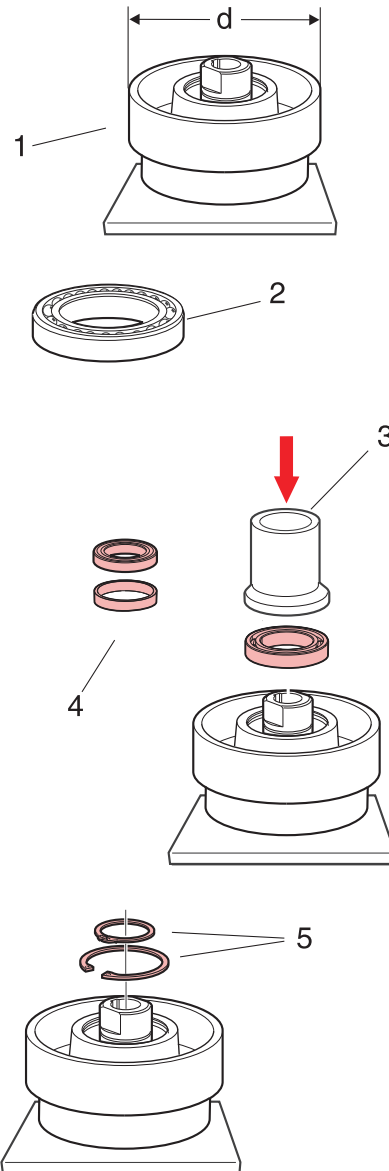
- b. Apply a thin film of oil onto the external and internal surfaces of the ball bearings (2). [o]
- c. Press the ball bearings (2) down one at a time into the coupling hub, preferably using a hydraulic press. Place the spacing ring (4) between them.



Never re-fit used ball bearings.

The ball bearings must not be heated as they are packed with grease and sealed with plastic membranes.

- d. Fit the snap rings (5). [o]



G08656a1

1. Belt pulley
2. ball bearing
3. Mounting tool
4. Spacing ring
5. Snap ring

2. Fitting the coupling to the motor.

NOTE

Make sure that the key (1) is in place on the motor shaft.

NOTE

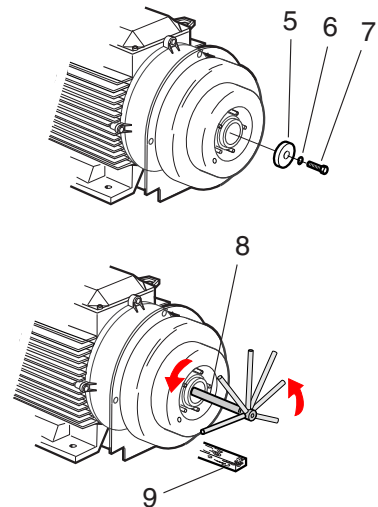
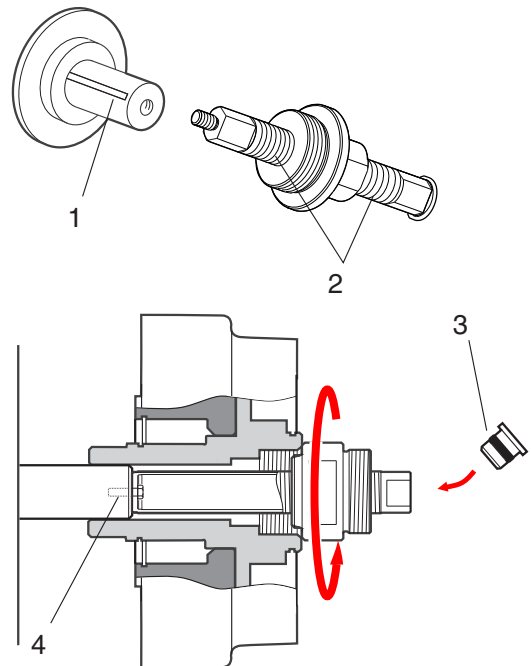
See mounting with optional hydraulic puller tool (if purchased) on next page.

- a. Clean the motor shaft and apply a thin oil film.
- b. Apply lubricating paste to the tool threads (2). Keep the threads lubricated.

NOTE

Left hand thread!

- c. Remove the brass plug (3).
- d. Fasten the sleeve of the tool to the motor shaft with the screw (4) on the tool.
- e. Use a spanner to turn the nut on the tool. This will press the centrifugal clutch on to the shaft. Remove the tool.
- f. Install and tighten the washer (5), spring washer (6) and screw (7).
- g. Attach a socket with extension rod and handle (8) to the screw.
- h. Place a piece of wood (9) according to the illustration.
- i. Push the handle to start the rotor moving. when the handle hits the piece of wood, the weight and movement of the rotor tightens the screw.
- j. Repeat until screw is fastened.



G08654Z1

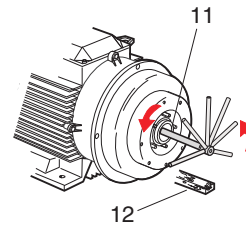
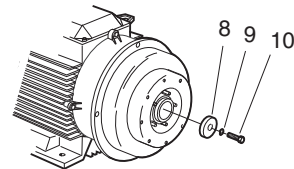
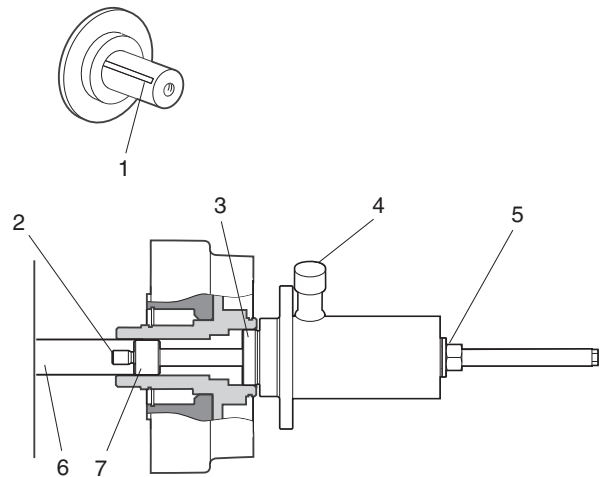
1. Key
2. Threads
3. Brass plug
4. Screw
5. Washer
6. Spring washer
7. Screw
8. Socket with extension rod, and handle
9. Piece of wood

3. Fitting the coupling to the motor with optional hydraulic tool.

NOTE

Make sure that the key (1) is in place on the motor shaft.

- a. Clean the motor shaft and apply a thin oil film.
- b. Fit the sleeve (7) to the stud bolt.
Fit the stud bolt (2) with sleeve to the motor shaft (6).
- c. Screw the holder (3) to the coupling nave.
- d. Fit hydraulic cylinder as shown.
- e. Fit the sleeve and secure with the nut (5).
- f. Attach the hose from the hand pump to the hydraulic oil inlet (4)
- g. Fit the friction coupling by pumping the handle on the pump until stop
- h. Release pressure on the hand pump and adjust the nut on the stud bolt
- i. Repeat procedure until coupling is mounted.
Note! The pressure on the hand pump should not exceed 200 bar.
- j. Remove the hydraulic tool.
- k. Install and tighten the washer (8), spring washer (9) and screw (10).
- l. Attach a socket with extension rod and handle (11) to the screw. Place a piece of wood (12) according to the illustration
- m. Push the handle to start the rotor moving. When the handle hits the piece of wood, the weight and movement of the rotor tightens the screw.
- n. Repeat until screw is fastened.



G08654S1

1. Key
2. Stud bolt
3. Holder
4. Hydraulic oil inlet
5. Nut
6. Motor shaft
7. Sleeve
8. Washer
9. Spring washer
10. Screw
11. Socket with extension rod, and handle
12. Piece of wood

4. Fitting the friction blocks.

- a. Fit the friction blocks (2) onto the guide pins (1).



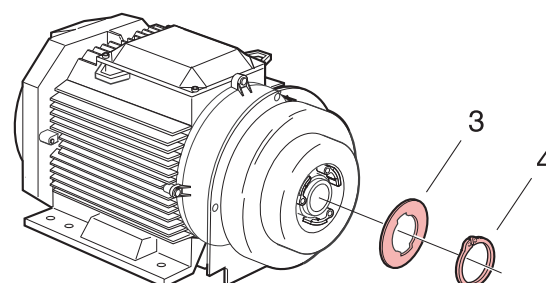
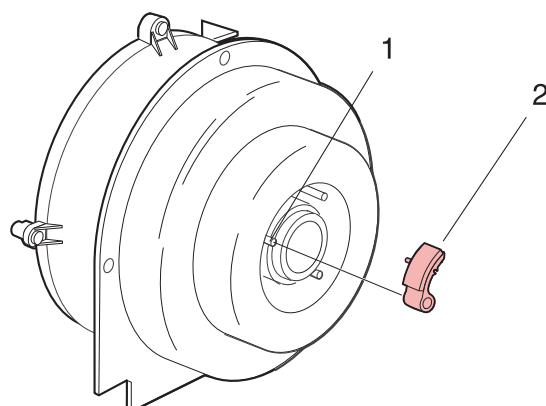
Be sure that the pins on the back of the blocks project into the grooves in the clutch hub.



50 Hz = 5 Friction blocks

60 Hz = 3 Friction blocks

- b. Place the cover (3) in position and secure it with the snap ring (4).



G08654x1

1. Guide pin
2. Friction block
3. Cover
4. Snap ring

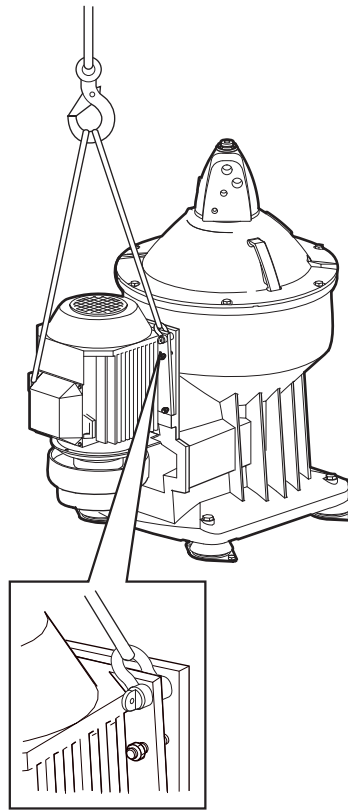
5. Fitting the motor.

- a. Fit a lifting sling to the motor. Use a shackle from the separator lifting tool. Weight of motor with coupling: approx. 84 kg.
- b. Lower the motor (while supported) on to the separator frame. It will set on the ledge.

**Crush hazard**

If not supported, the motor with coupling may drop when lifted.

- c. Fit the screws. Do not tighten until the belt has been mounted.
- d. Connect the electrical cables.



G08646b1

NOTE

If carrying out change of friction blocks only, continue with steps 6 to 8.

If carrying out a complete machine assembly, continue with [Driving device](#) instructions on page 117.

6. Fitting the flat belt.

NOTE

Clean the inside of the frame before fitting the flat belt, and make sure that there is no oil on the belt.

- a. Lift up the belt (1) to the middle (centre) of the spindle pulley.

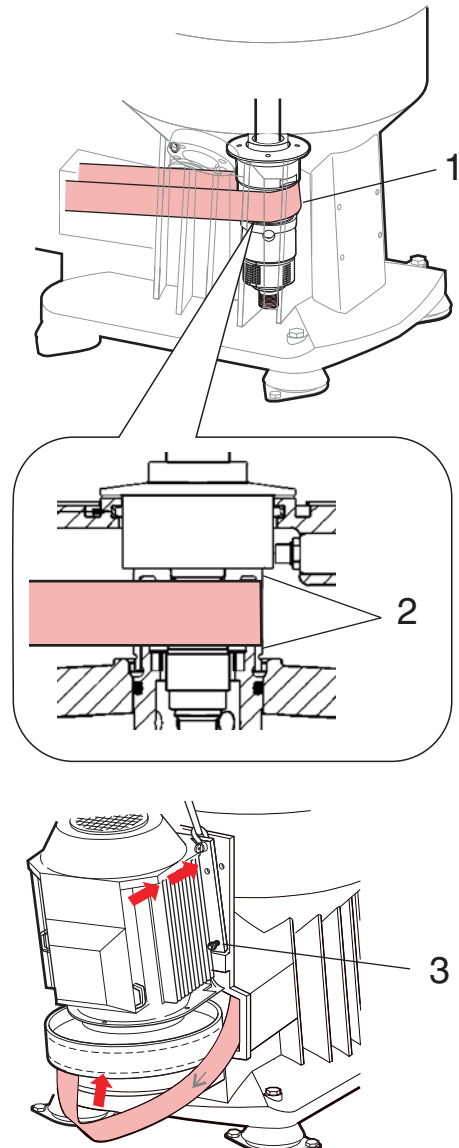
NOTE

For correct position, centre the belt on the spindle pulley camber.

- b. Fit the flat belt to the motor belt pulley.
- c. Tighten the two upper screws (3).
- d. Tighten all motor attachment screws (3).

NOTE

Do not turn the spindle until the motor is tightened properly to the frame.

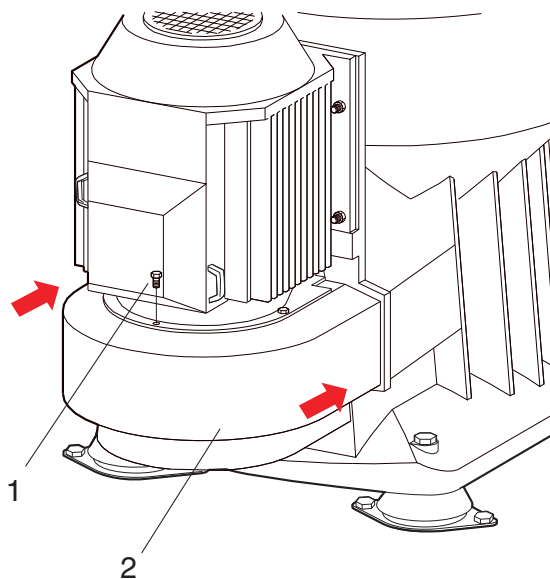


G08588T1

1. Flat belt
2. Clearance
3. Screw

7. Fitting the clutch cover.

- a. Fit the clutch cover.
- b. Tighten the screws.



G08581A1

1. Screw
2. Clutch cover

6.5.2 Driving device

1. Assembling the bottom bearing holder (where necessary)

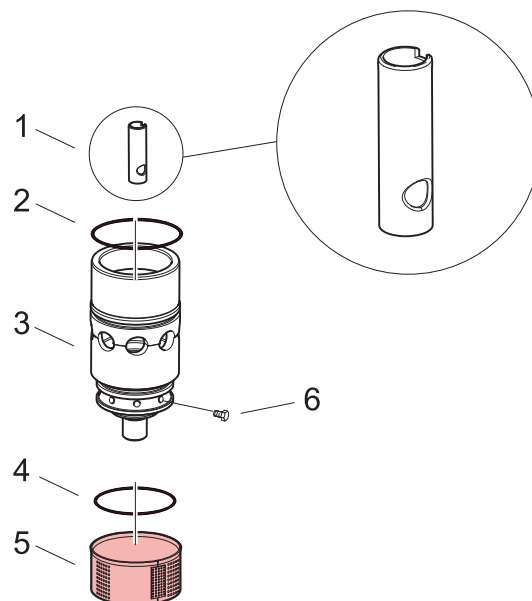


Clean the pipe and strainer before fitting.



Make sure to fit the pipe the right way up!

- a. Fit the pipe (1), O-rings (2,4) and strainer (5).
- b. Secure the pipe (1) with the screw (6) secured with Loctite 222.

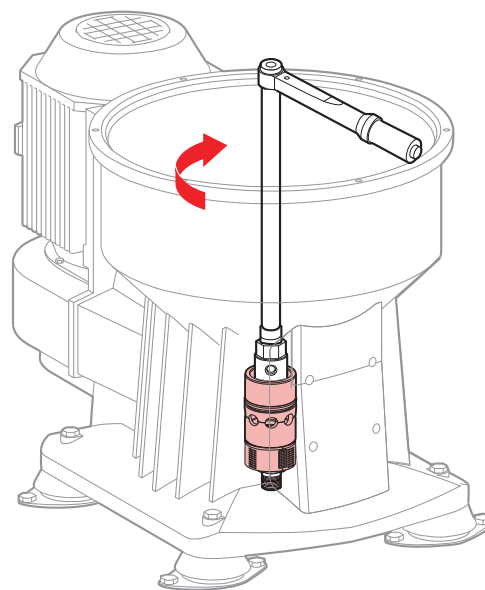
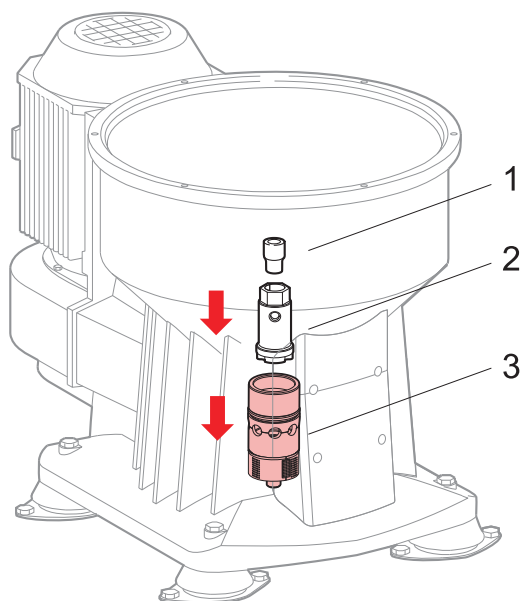


G1015741

1. Pipe
2. O-ring
3. Bottom bearing holder
4. O-ring
5. Strainer
6. Screw

2. Fitting the bottom bearing holder.

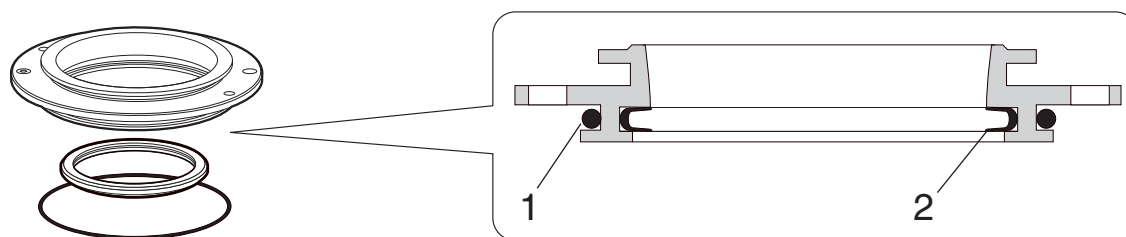
- a. To secure the bottom bearing holder (3) into the frame, apply Loctite 222 on the surfaces directly above the upper O-ring.
- b. Thread the bottom bearing holder (3) into the frame and fit the tool into the bottom bearing housing.
- c. Tighten the holder to a torque of *200 Nm*.



G10157051

1. *Socket*
2. *Tool*
3. *Bottom bearing holder*

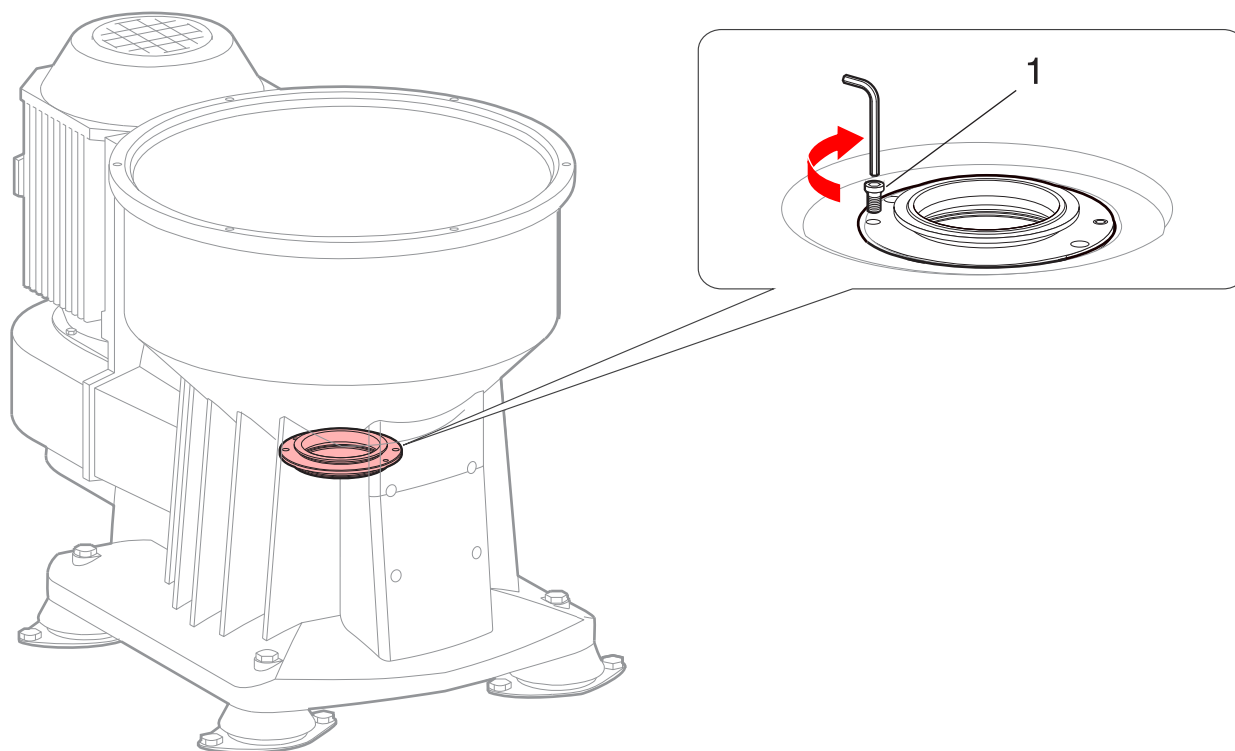
3. Fitting the labyrinth ring holder.



G0866381

1. O-ring
2. Labyrinth-ring

- a. Lubricate and fit the O-ring (1). [o]
- b. Lubricate and fit the labyrinth ring (2). [o]
- c. Fit the labyrinth ring holder into the frame.
Apply Loctite 222 to screws (1). Fit and tighten the screws.



G08663b1

1. Screw

4. Fitting the ball bearing to the top bearing seat. [o]

- a. Heat the top bearing seat (1) in oil to minimum 110 °C and maximum 125 °C, either using hot clean oil or induction heater (induction heater is recommended).



Burn hazard

Use protective gloves when handling any heated parts.

- b. Drop some oil onto the bearing and fit the bearing (2) into the top bearing seat.

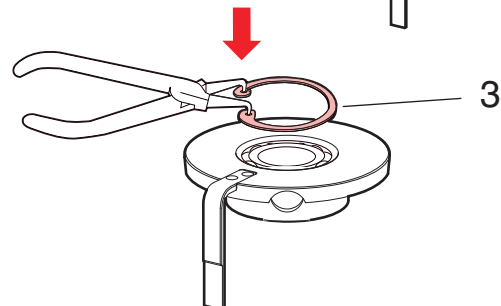
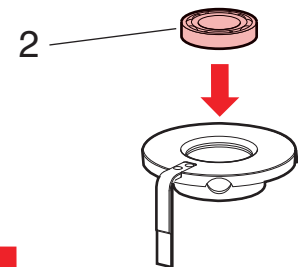
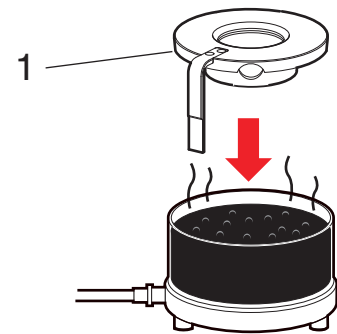


Always fit a new bearing.
Pre-lubricate before fitting.

- c. Fit the snap ring (3).



Risk for eye injury from flying snap ring
Use the correct pliers for assembly of snap ring to avoid accidental release.



G0904871

1. Top bearing seat
2. Ball bearing
3. Snap ring

5. Fitting the top bearing seat with bearing to the spindle.
- a. Heat the top bearing seat (1) and bearing to minimum 110 °C and maximum 125 °C, either using hot clean oil or induction heater.

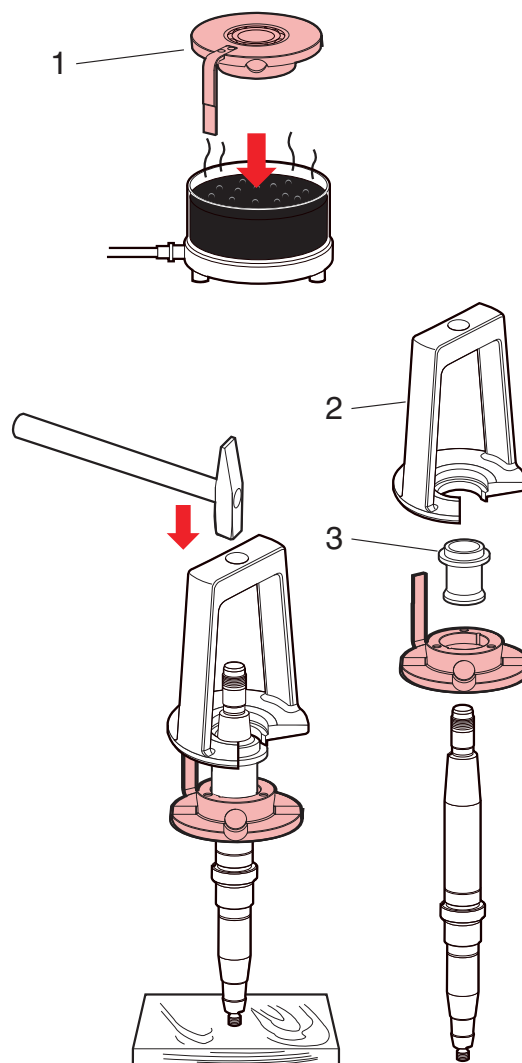
**Burn hazard**

Use protective gloves when handling any heated parts.

- b. Wipe off the spindle and fit the top bearing seat to the spindle using the sleeve (3) and puller (2).



Make sure to fit the bearing seat correctly or it might get stuck!

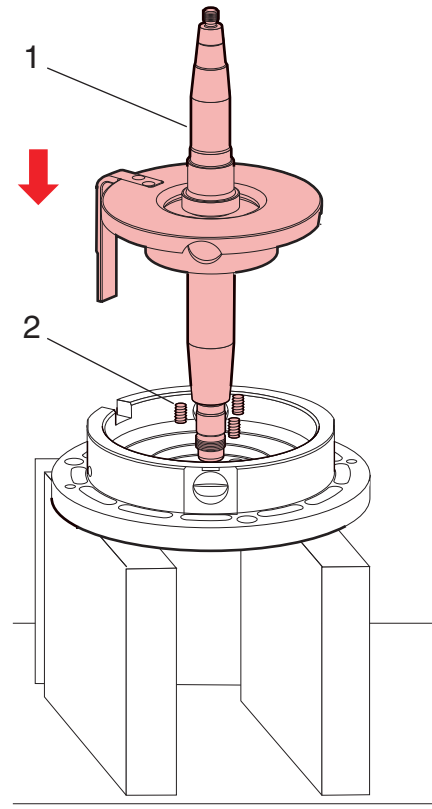


G0984881

1. Top bearing seat
2. Puller
3. Sleeve

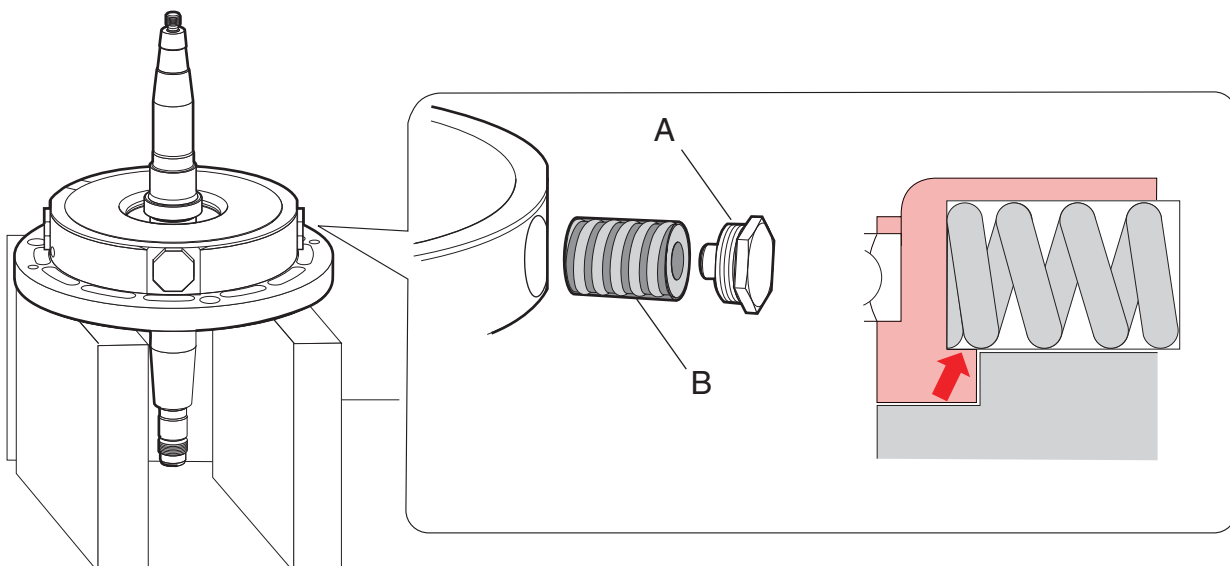
6. Fitting the top bearing housing.

- a. Fit the axial springs (2) to the top bearing housing. [o]
- b. Carefully lower the bowl spindle (1). Make sure that the springs enter the recesses on the top bearing seat.
- c. Lubricate the threads (A) and both ends of the composite springs (B) with oil before assembly.
- d. Fit the composite springs (B) and plugs to the top bearing housing. Do not tighten the plugs. Make sure that the springs enter the recesses in the top bearing seat. The plugs should be tightened when the spindle assembly is mounted into the frame. [o]



G0866651

1. Bowl spindle
2. Axial spring



G0866651

- A. Threads
- B. Composite spring

7. Fitting the spindle pulley.

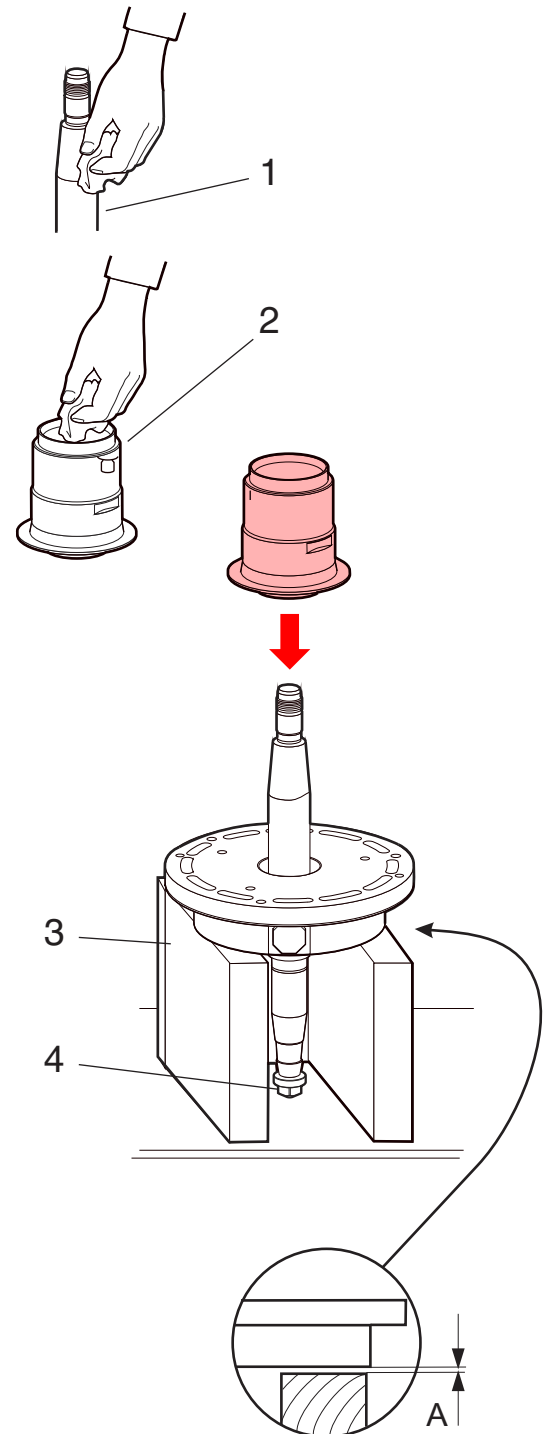
- a. Screw on the cap nut on the spindle.
- b. Turn the spindle assembly upside down and let the spindle rest on the cap nut.

NOTE

It is of utmost importance to use cap nut and the support as the neck bearing may be forced out of its position and damage the neck bearing when the bottom bearing is mounted otherwise.

The cartridge has to stand on the spindle top with a clearance of minimum 1 mm (A in the picture) between top bearing housing and the support.

- c. Wipe off the spindle pulley seat on the spindle (1) and nave bore in the spindle pulley (2) with a dry cloth.
- d. Fit the spindle pulley firmly on the bowl spindle.



G0866771

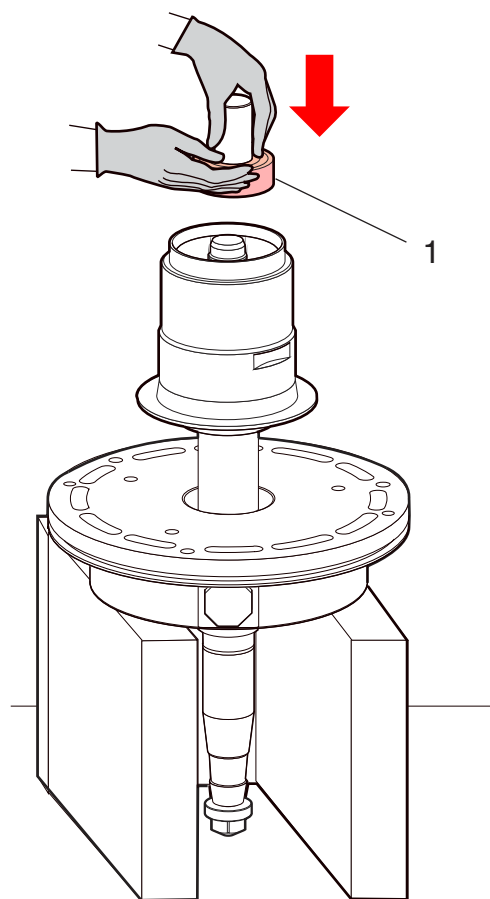
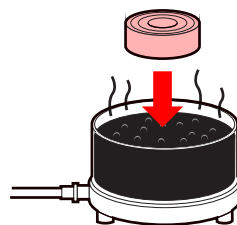
1. Spindle
2. Spindle pulley
3. Support
4. Cap nut
- A. Minimum 1 mm

8. Fitting the self-aligning roller bearing. [o]

- a. Lubricate the bearing with clean oil.
- b. Heat the bearing (1) to minimum 30 °C and maximum 50 °C.
- c. Lower the bearing onto the spindle and press down onto the spindle pulley using the special drift tool.



Always fit a new bearing.



G08668B1

1. Bearing

9. Fitting the fan.

- a. Turn the spindle assembly to up-right position.



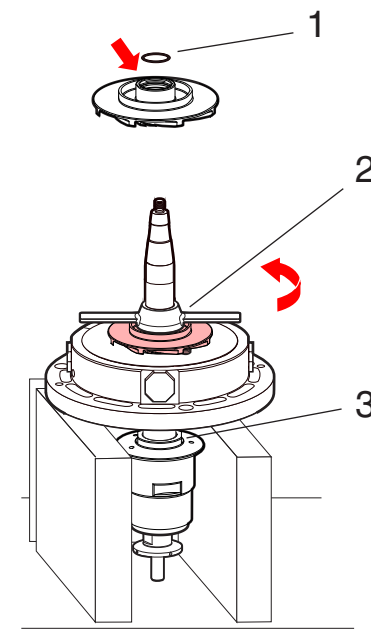
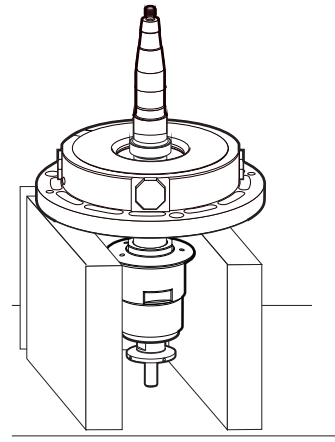
Ensure that the spindle is seated against the inner ring of the ball bearing.

- b. Apply a thin layer of oil and fit the O-ring (1) into the fan. [o]



Make sure that the bearing is pre lubricated before fitting the fan.

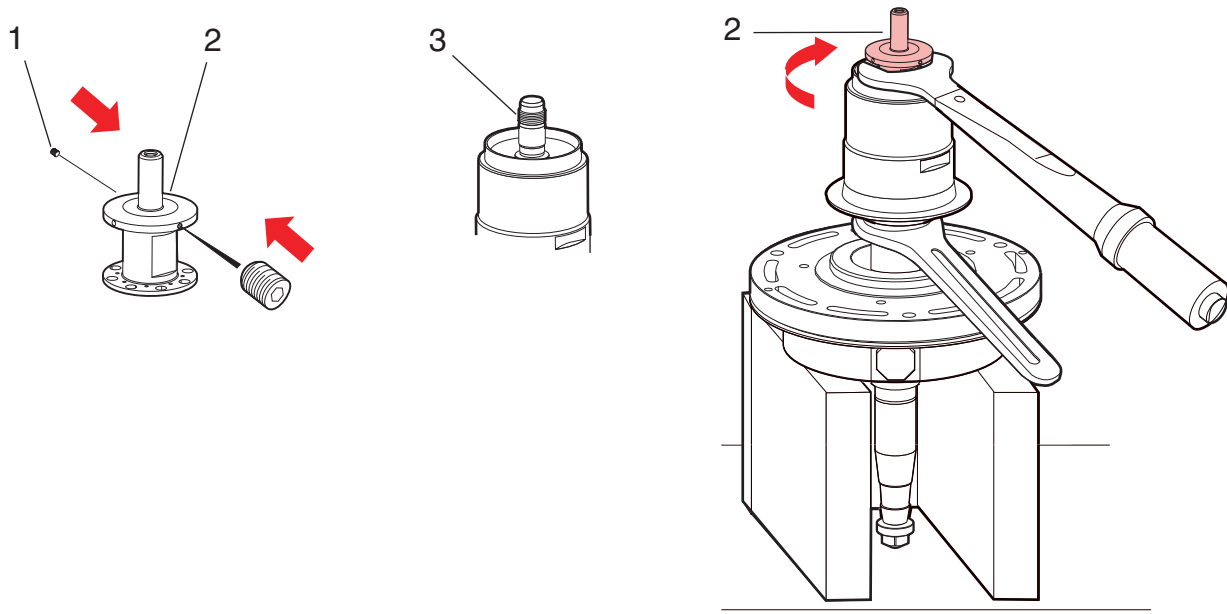
- c. Place a spanner (or similar) on the spindle pulley key-grip (3), as holder-up and fit the fan. Tighten firmly, by hand, with the pin spanner (2).



G0924011

1. O-ring
2. Pin spanner
3. Key-grip

10. Fitting the oil mist generator.



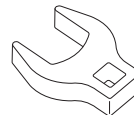
G08669f1

1. Nozzle
2. Oil mist generator
3. Threads

NOTE

Clean the oil mist generator and nozzles before assembly.

- a. Apply Loctite 222 and screw the two nozzles (1) into the pump (2) so that they lie level with the pump edge using an Allen key.
- b. Lubricate all threads (3) with a few drops of oil before assembly.
- c. Fit the oil mist generator. Use a spanner and a crowfoot wrench head together with a torque wrench handle. Tighten to *150 Nm*.

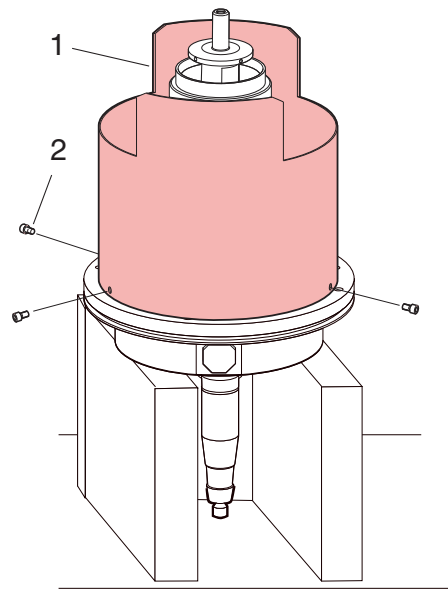


G08669g1

Crowfoot wrench head

11. Fitting the air deflector.

- a. Turn the spindle assembly up-side down and fit the air deflector (1).
- b. Tighten screws (2).



G08592A1

1. Air deflector
2. Screw

12. Lowering the spindle assembly into the frame.

- a. Turn the assembly and remove the cap nut from the spindle. Fit the lifting tool (1) to the spindle assembly and lift it.

**Crush hazard**

Do not rotate the spindle assembly during lifting. The spindle assembly may otherwise come loose from the lifting tool.



Check that the hole at the bottom of the oil mist generator (2) and nozzles are clean before lowering the assembly down.

- b. Position the flat belt (3) so that the spindle assembly can pass through when lowering. [o]



Check the direction arrows on the belt and the machine plate for correct position.

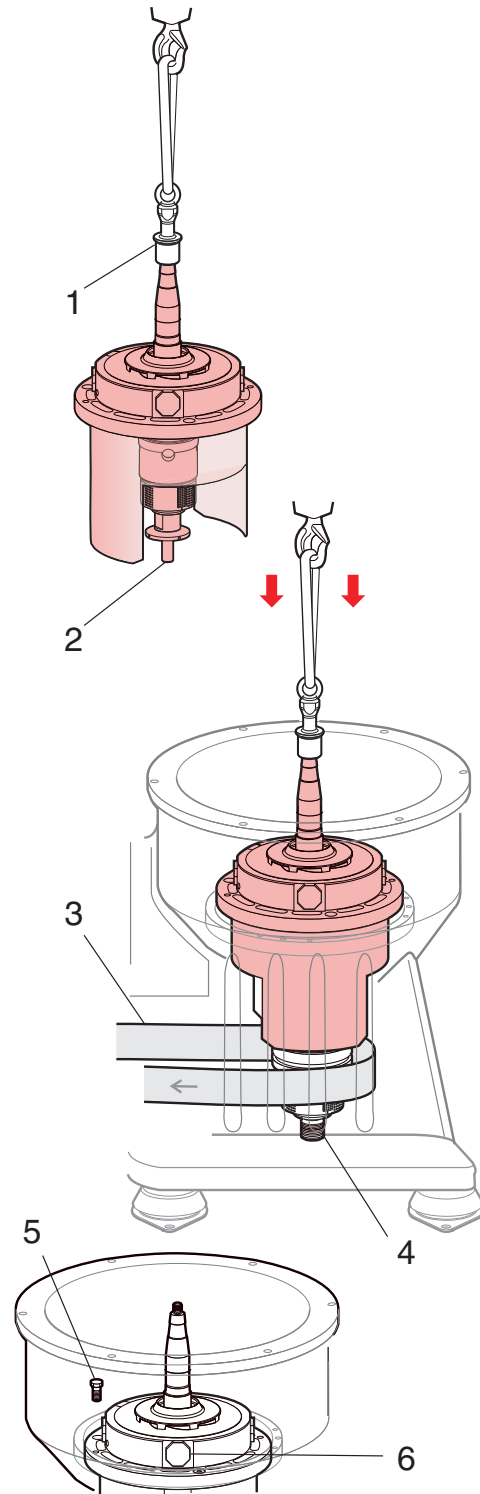
Make sure that the belt does not get smudged with oil or grease during handling.

- c. Carefully lower the spindle assembly and position the bolt holes over the threaded frame holes. Make sure that the bottom bearing, enters the bottom bearing holder (4) correctly. Do not use force.

**Cut hazard**

Do not put fingers between the frame and air deflector while lowering the assembly.

- d. Fit and tighten the screws (5).
- e. Tighten the plugs (6) firmly.



G0867981

1. Lifting tool
2. Oil mist generator
3. Flat belt
4. Bottom bearing holder
5. Screw
6. Plug

13. Fitting the flat belt.

NOTE

Clean the inside of the frame before fitting the flat belt, and make sure that the belt is clean.

- a. Lift up the belt (1) to the middle (centre) of the spindle pulley.

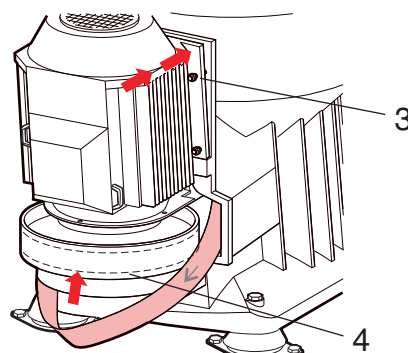
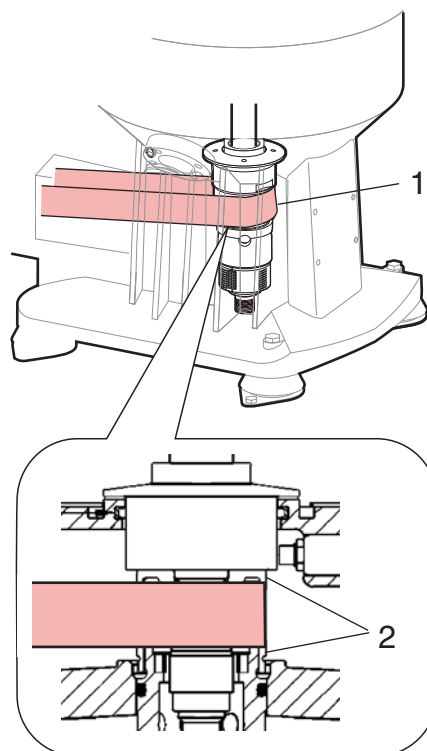
NOTE

For correct position, centre the belt on the spindle pulley camber.

- b. Fit the flat belt to the motor belt pulley (4).
- c. Tighten the two upper screws (3).
- d. Tighten all motor attachment screws (3).

NOTE

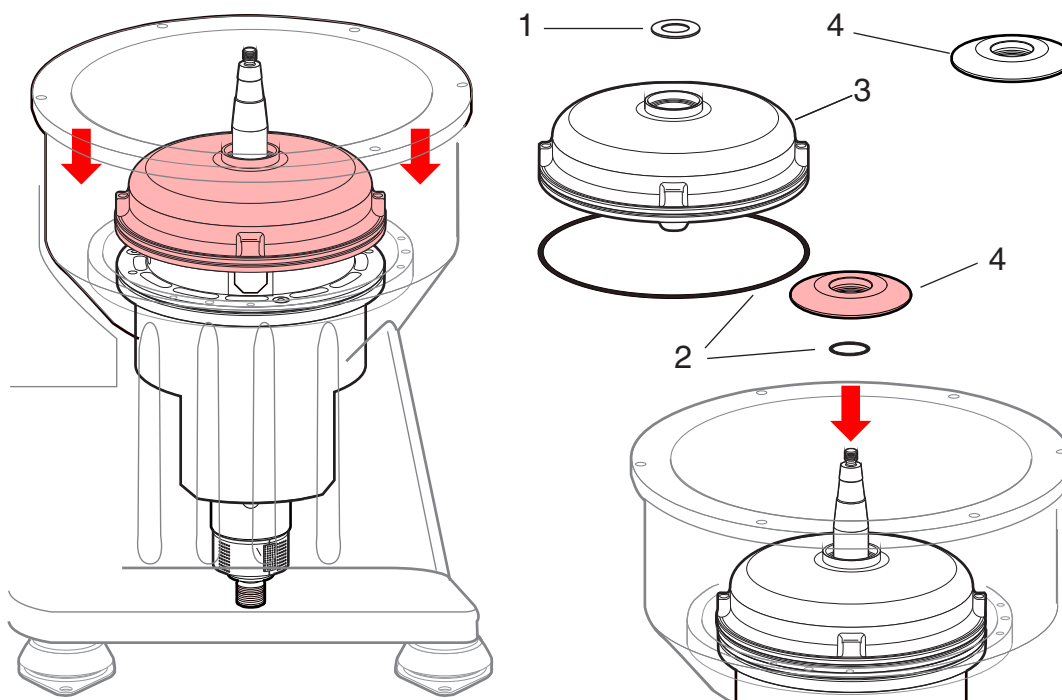
Do not turn the spindle until the motor is tightened properly to the frame.



G08588V1

1. Flat belt
2. Clearance
3. Screw
4. Belt pulley

14. Fitting the neck bearing cover and deflector ring.



G10348a1

- 1. Seal ring
- 2. O-ring
- 3. Neck bearing cover
- 4. Deflector ring

- a. Apply a thin layer of oil and fit the O-rings (2) and seal rings (1). [o]
- b. Fit the neck bearing cover (3).

NOTE

The guide pin on the cover should enter one of the two holes in the bearing housing.

- c. Push the deflector ring (4) down until it stops.

15. Fitting the operating water cover.

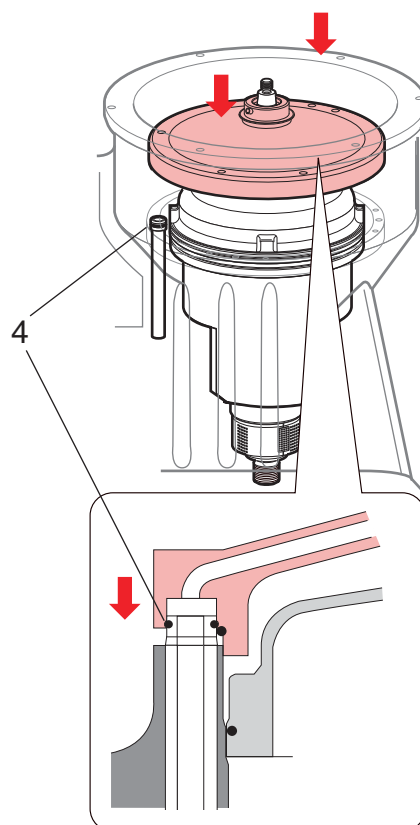
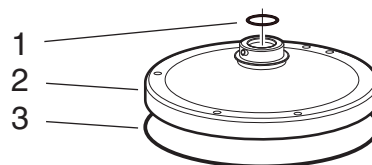
- a. Lubricate with oil and fit the seal ring (1) and O-ring (3) into the operating water cover (2).
[o]

Renew the O-ring (4). [o]

- b. Fit the operating water cover. Fit washers and tighten the screws.



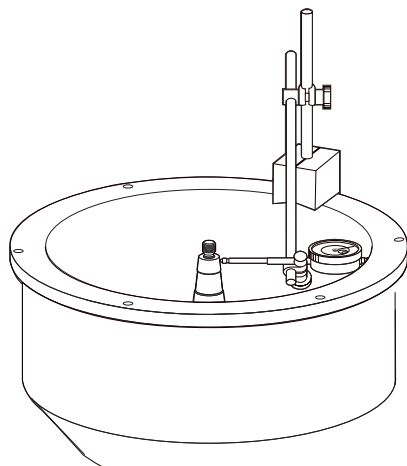
The water pipe in the frame should enter the hole in the cover.



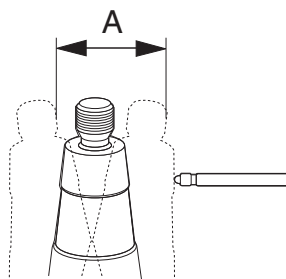
G086811

1. Seal ring
2. Operating water cover
3. O-ring
4. O-ring

16. Measuring the radial wobble of the bowl spindle.



G0858721

 $A = \text{max. } 0,04 \text{ mm}$

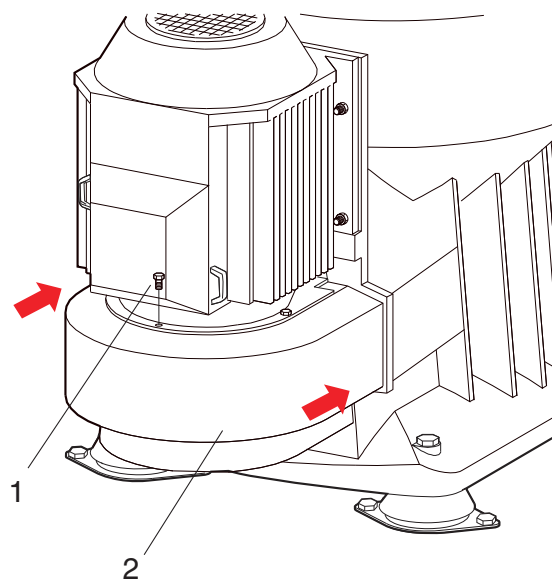
- a. Fit a dial indicator in a support and fasten it in position as illustrated. Use the flat belt to turn the spindle.

NOTE

Permissible radial wobble: max. 0,04 mm. If the spindle wobble exceeds this value, contact an Alfa Laval representative.

17. Fitting the clutch cover.

- a. Fit the clutch cover (2).
- b. Tighten the screws (1).



G08581A1

1. Screw
2. Clutch cover

18. Fill oil in the oil sump.

NOTE

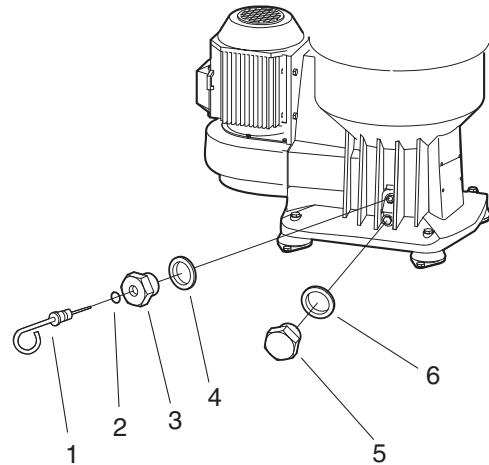
The separator should be level and at standstill when oil is filled.

- a. Remove the oil pin (1), plug (3) and washer (4).
- b. Fit new washer (6) and refit the drain plug (5). [i]
- c. Fill with new oil until oil flows out from the filler hole. For correct oil volume see "Lubricating oil volume" on page 181.

NOTE

For grade and quality of oil see [6.6.6 Lubricating oils on page 168](#).

- d. Fit new O-ring (2) onto the oil pin. [i]
- e. Refit the plug (3) with new washer (4). [i]
- f. Fit the oil pin (1).



G08687Z1

1. Oil pin
2. O-ring
3. Plug
4. Washer
5. Drain plug
6. Washer

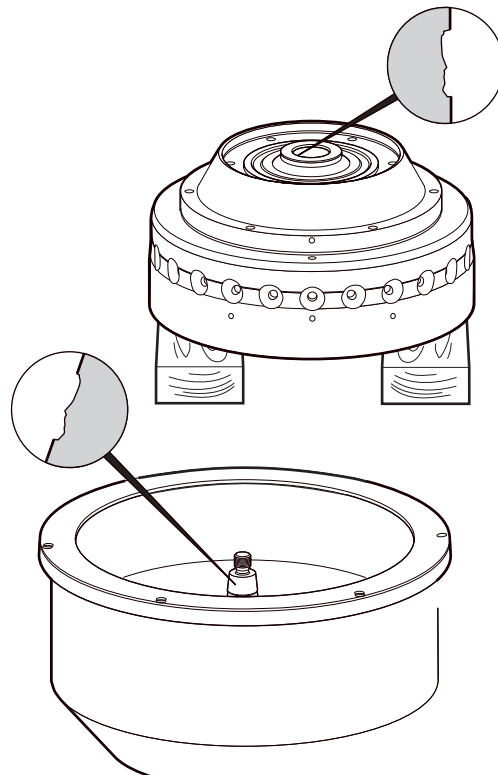
6.5.3 Bowl

1. Check for impact marks and corrosion in bowl body nave and on spindle taper.[i], [o]
 - a. Remove any impact marks using a scraper and/or a whetstone.

**Disintegration hazard**

Impact marks may cause the separator to vibrate while running.

- b. Rust can be removed by using a fine-grain emery cloth (e.g. No. 320).
 - c. Finish with polishing paper (e.g. No. 600).
 - d. Lubricate to prevent further corrosion.



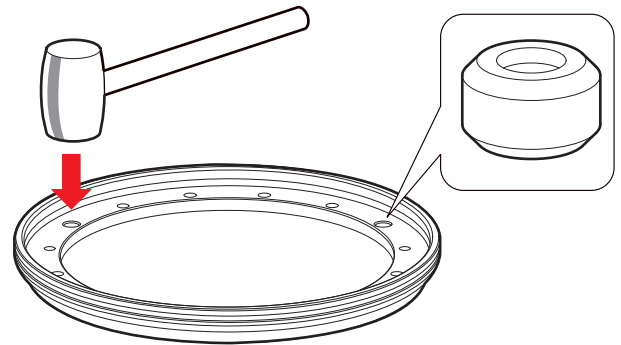
G0874621

2. Fitting new valve plugs on the operating slide. [i]

- a. Carefully tap in new valve plugs, using a clean, soft-faced hammer.



Make sure that the plugs are fitted as described in the illustration.



G0874871

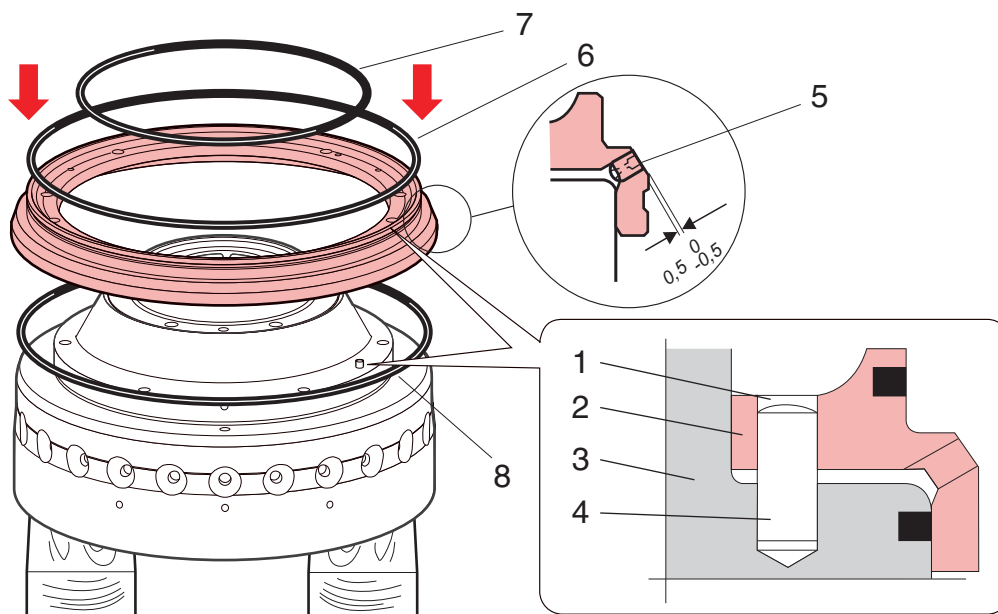
3. Fitting the operating slide.

- a. Apply a thin layer of silicone grease and fit the rectangular ring (6) on the operating slide and the rectangular ring (8) and O-ring (7) on the bowl body (3). [i],[o]
- b. Fit the operating slide (2).

NOTE

The guide pin (4) in the bowl body (3) should enter the hole (1) in the operating slide (this hole is marked with a drill mark).

Nozzle (5) secured with Loctite 243



G0861251

1. Alignment hole
2. Operating slide
3. Bowl body
4. Guide pin
5. Nozzle
6. Rectangular ring
7. O-ring
8. Rectangular ring

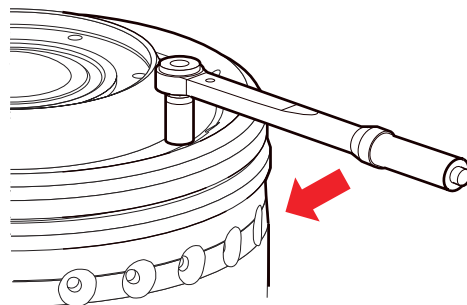
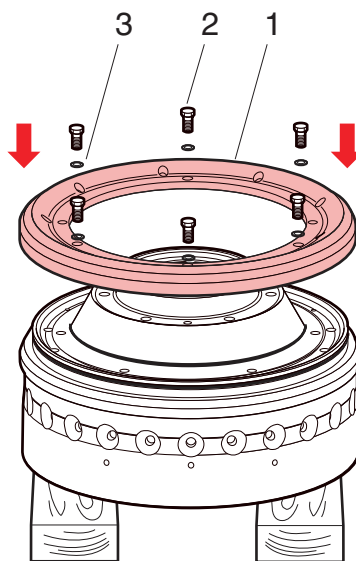
4. Fitting the operating slide holder.

- a. Fit the holder (1) over the operating slide.
- b. Apply a thin layer of molykote grease and fit and tighten new screws (2) and washers (3) to a torque of $30 \pm 2 \text{ Nm}$. [i], [o]

NOTE

It is very important NOT to refit used screws and washers. Always fit new ones included in the Inspection kit!

Every washer (3) consists of two parts which must be correctly locked together.



G0861351

1. Holder
2. Screw
3. Washer

5. Fitting the operating water ring.

- a. Assemble the seal ring (5) into the operating water ring (2). [i], [o]

NOTE

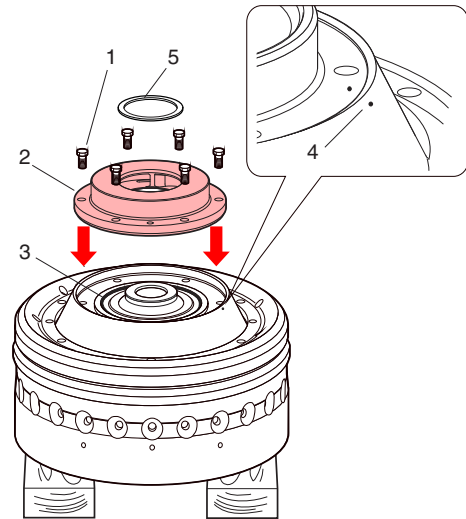
It is very important not to refit used screws.
Always fit new ones included in the Inspection kit!

- b. Apply a thin layer of silicone grease and fit the O-ring (3). [i], [o]
- c. Fit the ring (2) with screws (1) onto the bowl body. [i], [o]

NOTE

The drilled assembly mark (4) on the water ring (2) should face the corresponding mark on the bowl body.

- d. Grease, fit and tighten the screws (1) to a torque of $30 \pm 2 \text{ Nm}$.



G0861461

1. Screw
2. Operating water ring
3. O-ring
4. Drill mark
5. Seal ring

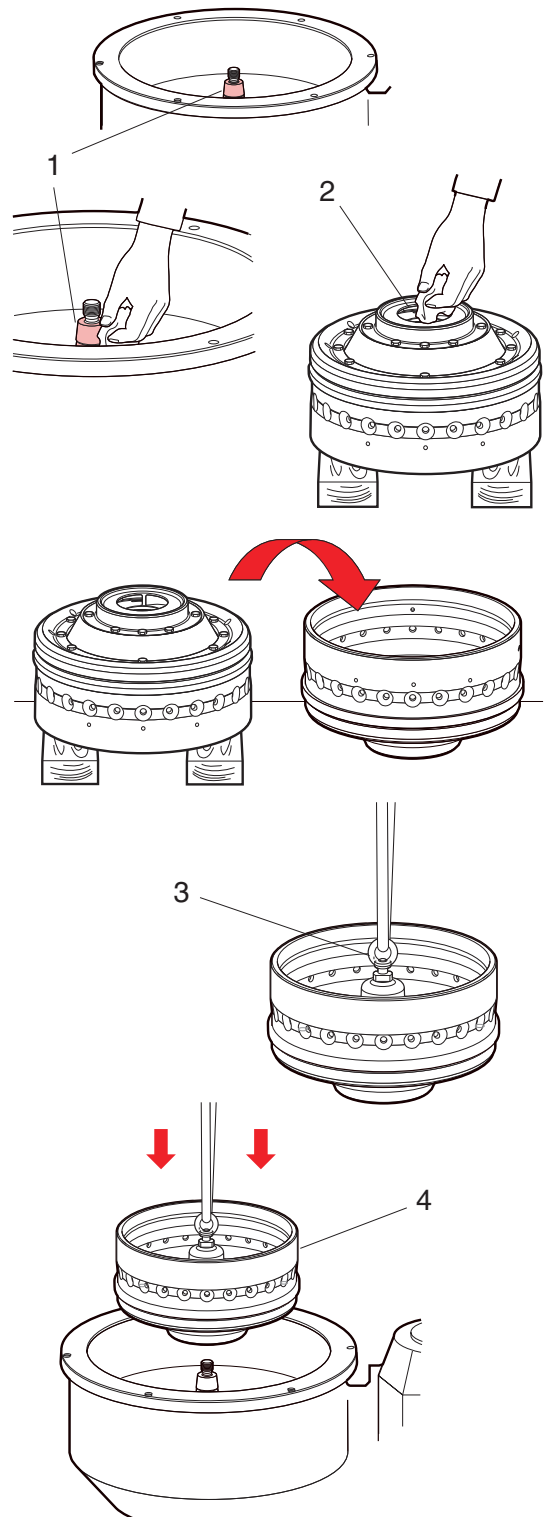
6. Lifting the bowl body onto the spindle taper.
 - a. Put a drop of oil on the spindle taper (1).
 - b. Wipe off the spindle taper (1) and nave bore (2) with a dry cloth.
 - c. Turn the bowl body over.



Crush hazard

Support the bowl body when turning to prevent it from rolling.

- d. Fit the lifting tool (3) and lift the bowl body.
- e. Carefully lower the bowl body (4) onto the spindle taper.
- f. Remove the lifting tool.

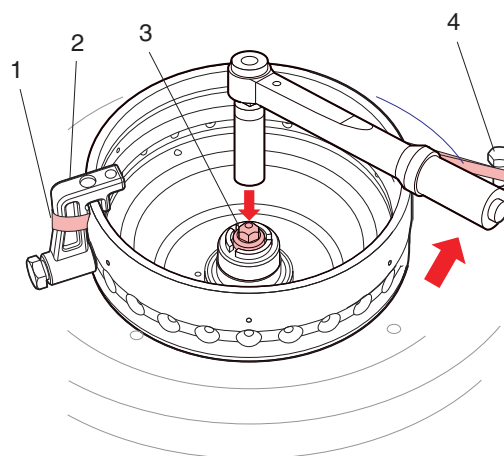


G0861741

1. Spindle taper
2. Nave bore
3. Lifting tool
4. Bowl body

7. Fitting and tightening the cap nut.

- a. To prevent the bowl body from rotating when fitting the cap nut; Fit one of the clamps (2) to the bowl body and one of the screws (4) for the frame hood in the frame. Fasten a sling (1) between the clamp and the screw around the bowl body.
- b. Apply a thin layer of molykote grease. Fit and tighten the cap nut (3) to a torque of 50 Nm.

NOTE**Left-hand thread!**

G0861891

1. Sling
2. Clamp
3. Cap nut
4. Screw

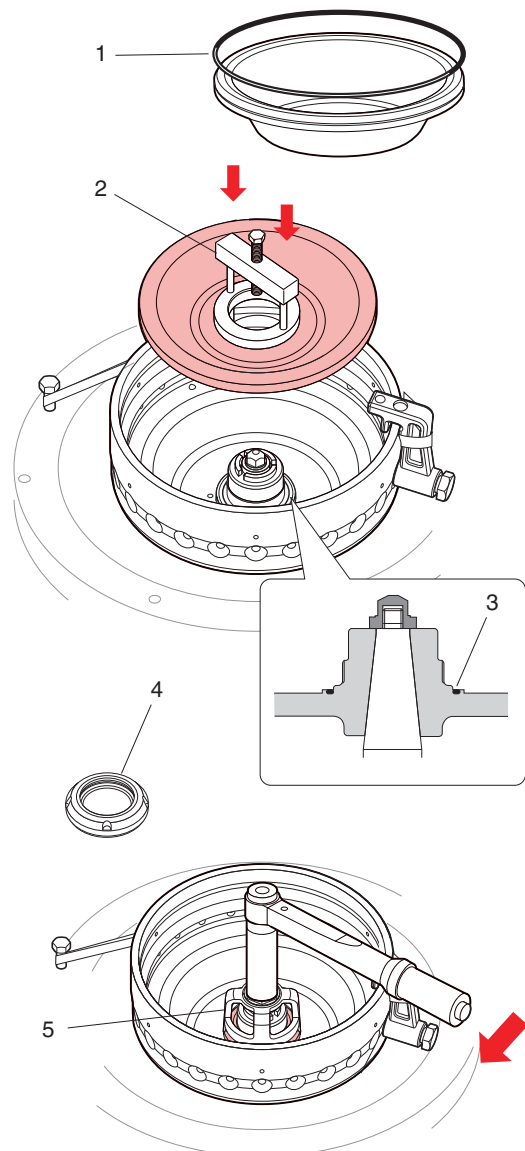
8. Fitting the discharge slide.

- a. Apply a thin layer of silicone grease and fit the rectangular ring (1). [i], [o]
- b. Apply a thin layer of silicone grease and fit the O-ring (3). [i], [o]
- c. Fit the lifting tool (2) and lower the discharge slide into the bowl.

**Crush hazard**

The ring on the lifting tool must be pushed down against the discharge slide, otherwise it may come loose from the tool.

- d. Remove the lifting tool.
- e. Fit the nut (4).
- f. Fit the spanner for nut (5) and tighten the nut with a torque wrench to a torque of min. 200 Nm.
- g. Remove the spanner for nut.



G0861981

1. Rectangular ring
2. Lifting tool
3. O-ring
4. Nut
5. Spanner for nut

9. Assembly of the disc stack.

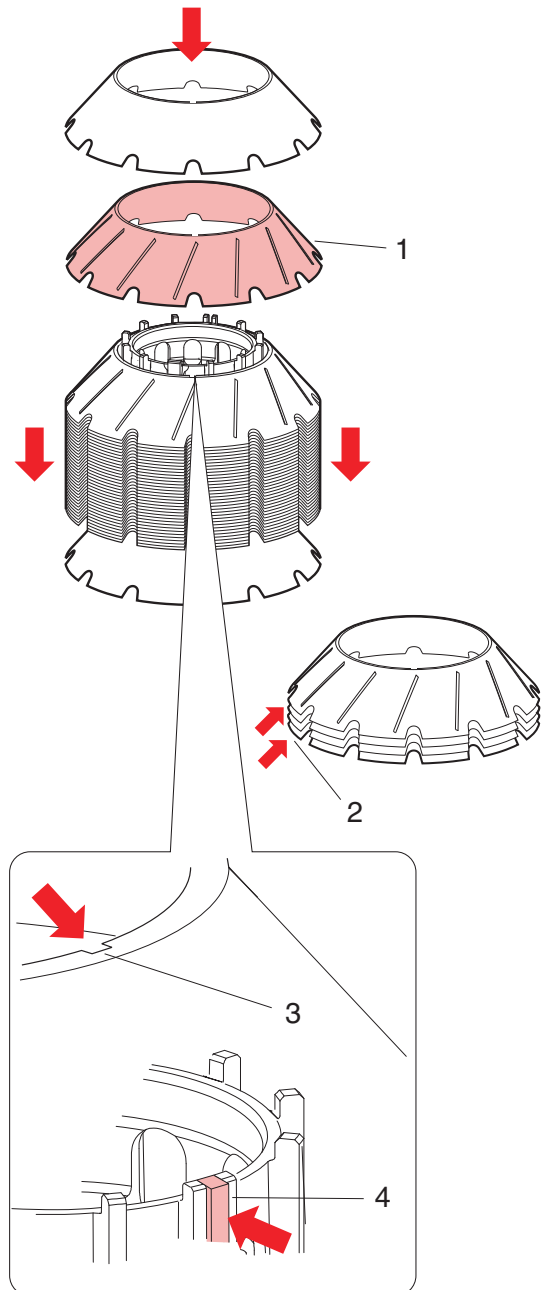
- a. Fit the discs (1) one by one onto the distributor. The distributor has a guide rib (4) for the correct positioning of the bowl discs. Always end with the disc without caulks.



The number of discs may have to be increased to adjust the disc stack pressure. Always check before operating the separator. See "Checking the disc stack pressure" on page 151.

**Cut hazard**

Sharp edges (2) on the bowl discs may cause cuts.



G0862081

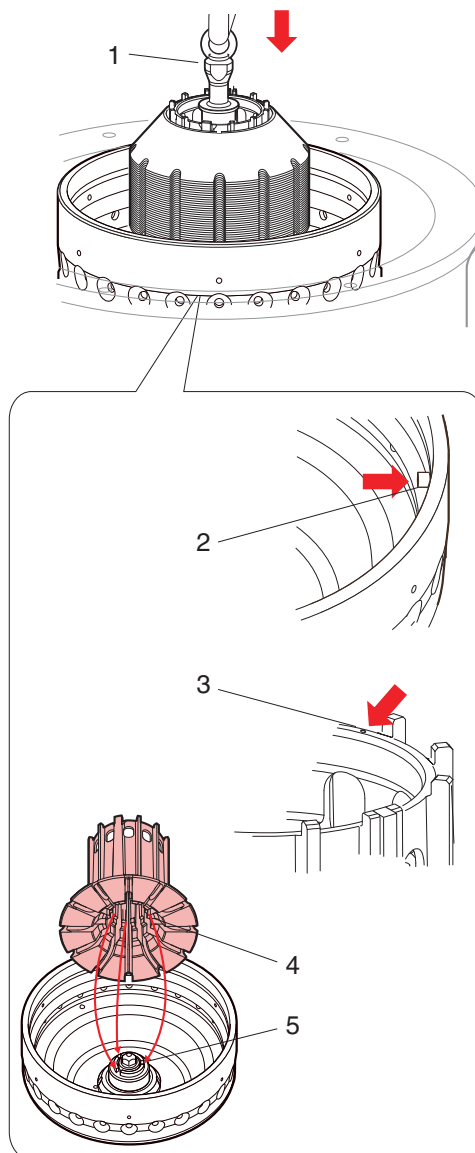
1. Bowl disc
2. Sharp edge
3. Recess on bowl disc
4. Guide rib on distributor

10. Fitting the disc stack assembly to the bowl body.

- a. Fit the lifting tool (1) into the distributor.
- b. Lower the disc stack into the bowl.

NOTE

The guide pin (2) on the bowl body should face the drill mark (3) on the distributor. The guide ribs (4) inside the distributor will then fit the recesses (5) on the bowl body nave in the right way.

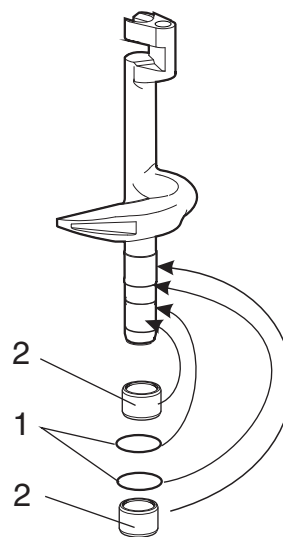


G08621D1

1. Lifting tool
2. Guide pin on bowl body
3. Drill mark on distributor
4. Guide ribs inside the distributor
5. Recesses on bowl body nave

11. Assembling the paring tube. [i]

- a. Apply a thin layer of silicone grease to the O-rings (1). Fit the O-rings (1) and bearings (2) to the paring tube. [i], [o]

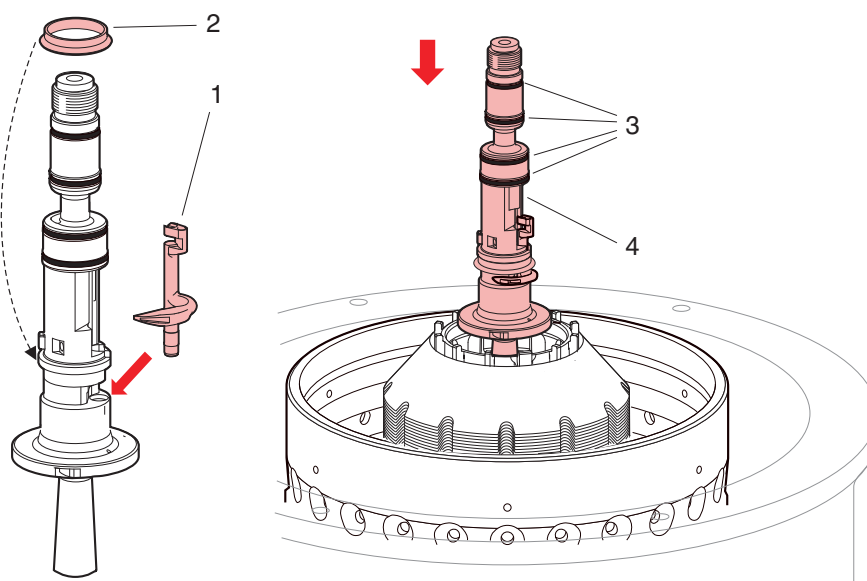


G09849G1

1. O-ring
2. Bearing

12. Mounting the paring tube and fitting the inlet and outlet pipe.

- a. Insert the paring tube (1) to the inlet and outlet pipe.
- b. Apply a thin layer of silicone grease and mount the splash sealing (2). **[i], [o]**
- c. Apply a thin layer of silicone grease and fit the O-rings (3). **[i], [o]**
- d. Carefully lower the inlet and outlet pipe assembly into the top of the distributor.



G08622N1

1. Paring tube
2. Splash seal
3. O-ring
4. Inlet and outlet pipe

13. Fitting the top disc.

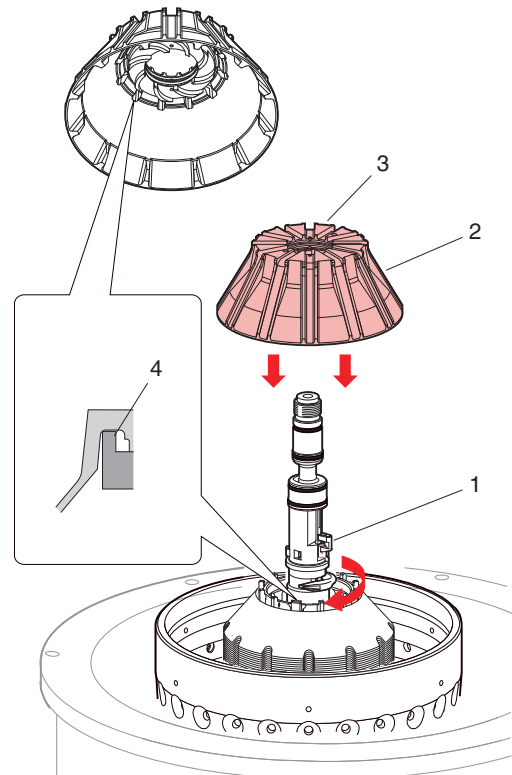
- a. Move the paring tube (1) to the centre.

NOTE

To avoid damaging the paring tube, turn it towards the centre of the pipe.

- b. Lower the top disc (2). The drill mark (3) on the top disc should face the guide pin on the bowl body.

The guide rib (4) on the distributor should enter one of the two larger recesses on the top disc.

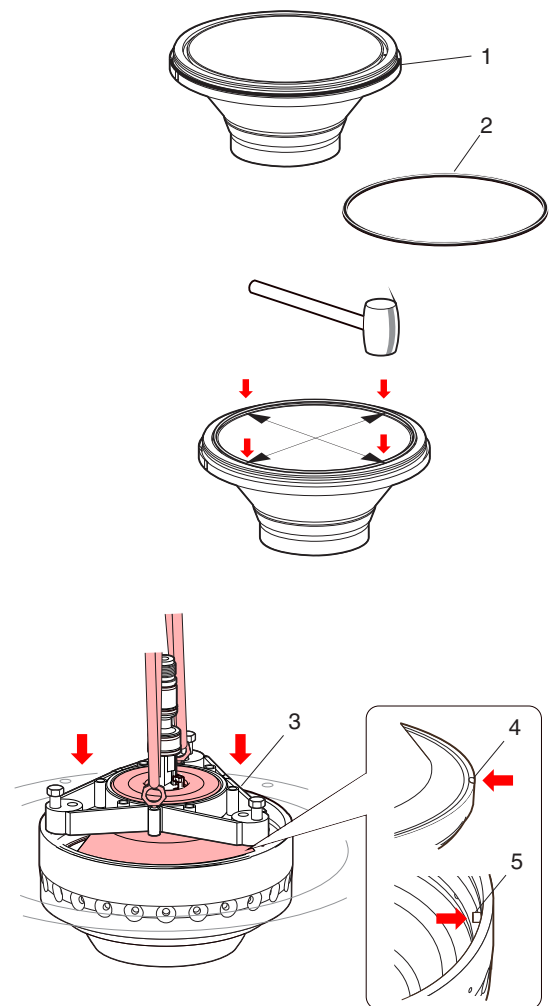


G08623D1

- 1. Paring tube
- 2. Top disc
- 3. Drill mark
- 4. Guide rib

14. Fitting the bowl hood.

- a. Apply a thin layer of silicone grease and fit the O-ring (1). [i], [o]
- b. Fit the seal ring (2). Press the ring down evenly into the groove all around. [i], [o]
- c. Gently tap down the seal ring crosswise with a soft rubber mallet, until the entire ring is fitted all the way around.
- d. Fit the compressing tool (3) and attach lifting eyes. Lower the bowl hood so that its recess (4) fits into the guide pin (5) in the bowl body.
- e. Remove the compressing tool.



G08624D1

1. O-ring
2. Seal ring
3. Lifting tool
4. Recess in bowl hood
5. Guide pin on bowl body

15. Fitting the lock ring.

- a. Place the lock ring (1) on the bowl hood (4) with its guide pin (5) close to the corresponding hole (6) in the bowl body (2).

NOTE

Make sure that the groove in the bowl body which retains the lock ring is clean.

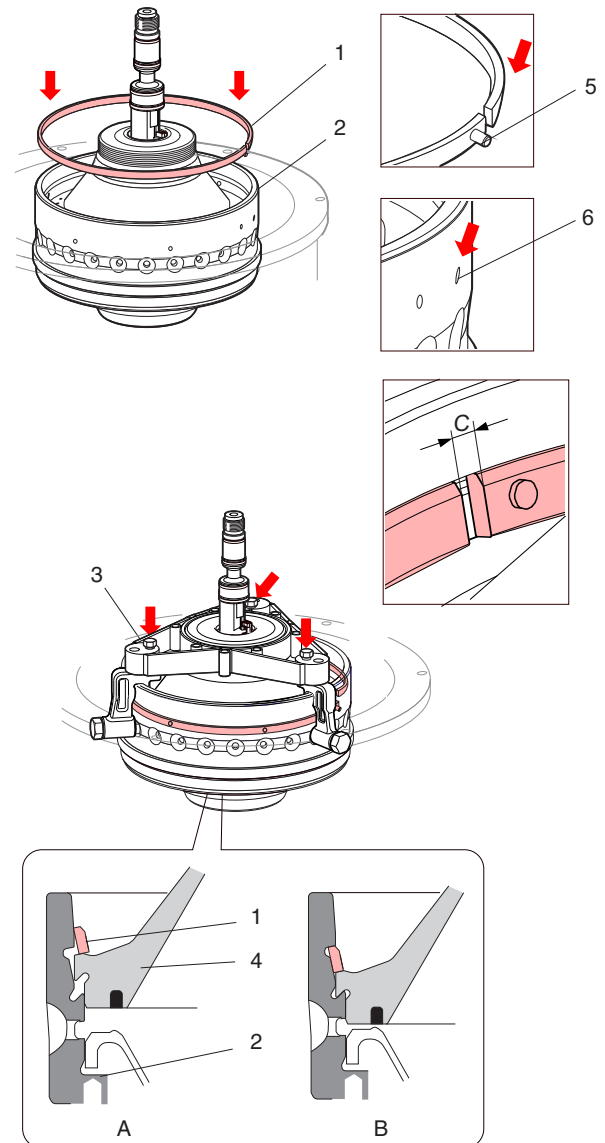
- b. Fit the compressing tool and compress the disc stack by tightening the screws (3) alternately in increments of 5 Nm up to a maximum of 15 Nm until the lock ring fits into the bowl body. Do not use excessive force or any tool to knock the lock ring into the groove. It must be possible to fit by hand.

For correct disc stack pressure see page 151.

- c. Make sure that the lock ring is fully engaged over its full length in the groove and does not flex anywhere. The lock ring ends must be facing each other with a gap between them. The lock ring ends must not be flush or overlap each other.

NOTE

If there is not a gap between the lock ring ends, the lock ring is damaged and must be replaced with a new one immediately



G08625a1

1. Lock ring
2. Bowl body
3. Compressing tool screw
4. Bowl hood
5. Guide pin
6. Hole for guide pin
- A. Before compressing
- B. Lock ring in position
- C. Gap

- d. Measure the gap C of the lock ring and make sure that it does not exceed 3 mm. If the lock ring gap is greater than 3 mm, the

lock ring is damaged and must be replaced with a new one immediately.

**Health hazard**

Welding of the lock ring is not allowed, as this can seriously affect the material strength. If the Lock ring is either worn beyond the safety limits or incorrectly assembled it may cause severe damage or fatal injury.

**Health hazard**

Never remove any material from the lock ring. This may cause severe damage or fatal injury.

- e. Release the pressure on the compressing tool and remove it.

16. Checking the disc stack pressure. [i]

- a. Remove bowl hood, top disc and inlet and outlet pipe.
- b. Add one disc (1) to the disc stack.
- c. Refit the disc without caulks (2), the top disc and bowl hood.

NOTE

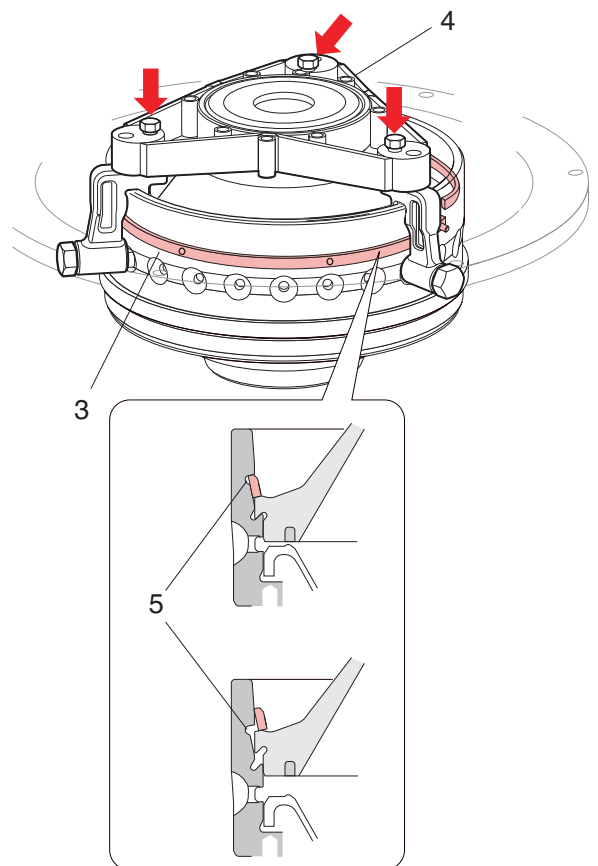
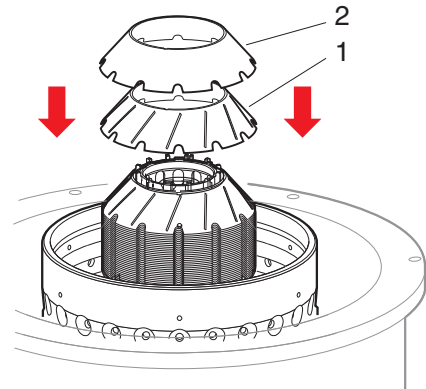
Always refit the disc without caulks on top of the disc stack!

- d. Fit the lock ring (3) and fully compress the disc stack with the compressing tool (4).

NOTE

Tighten the screws alternately in increments of 5 Nm up to a maximum of 15 Nm.

- e. If the lock ring enters the groove (5), repeat step a-d until the lock ring does not enter the groove.
- f. Dismantle the bowl and remove one disc to get the correct disc stack pressure.
- g. Assemble the bowl with inlet and outlet pipe.



G0874981

1. Bowl disc
2. Disc without caulks
3. Lock ring
4. Compressing tool
5. Groove

6.5.4 In and outlet device

1. Fitting the frame hood. [i], [o]
 - a. Turn the paring tube (1) so that the frame hood (2) can pass the paring tube.
 - b. Apply a thin layer of silicone grease and fit the O-ring (3) onto the frame hood . [i], [o]
 - c. Lower the frame hood.

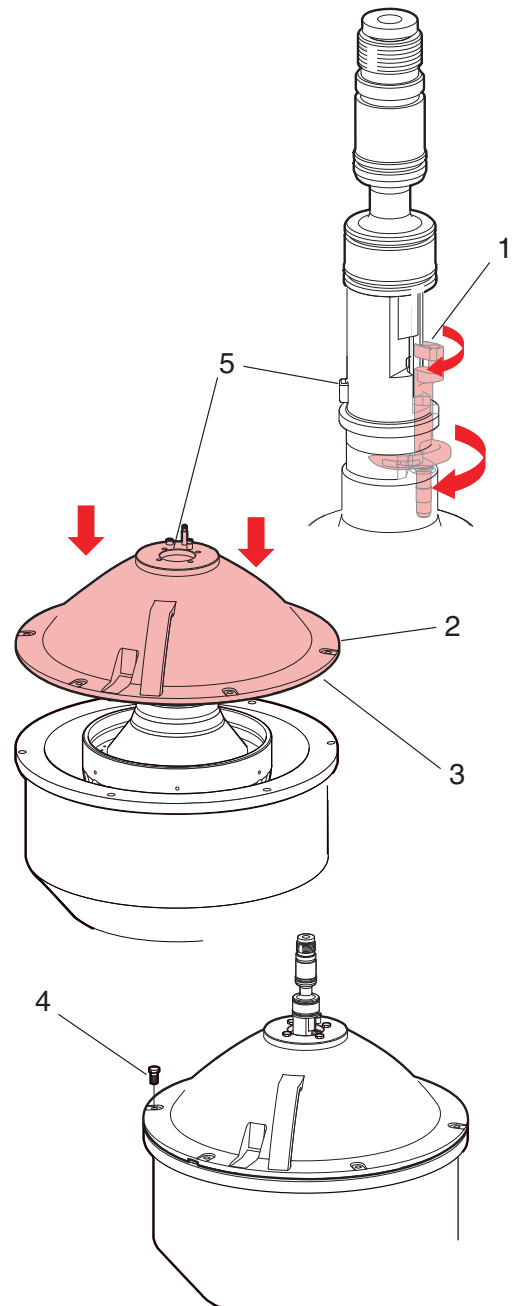
NOTE

Make sure to fit the frame hood groove into the projection of the pipe (5).

NOTE

Make sure that the frame hood is mounted in its correct position according to the piping arrangement.

- d. Fit and tighten the screws (4).



G08637K1

1. Paring tube
2. Frame hood
3. O-ring
4. Screw
5. Frame hood groove / Projection of pipe

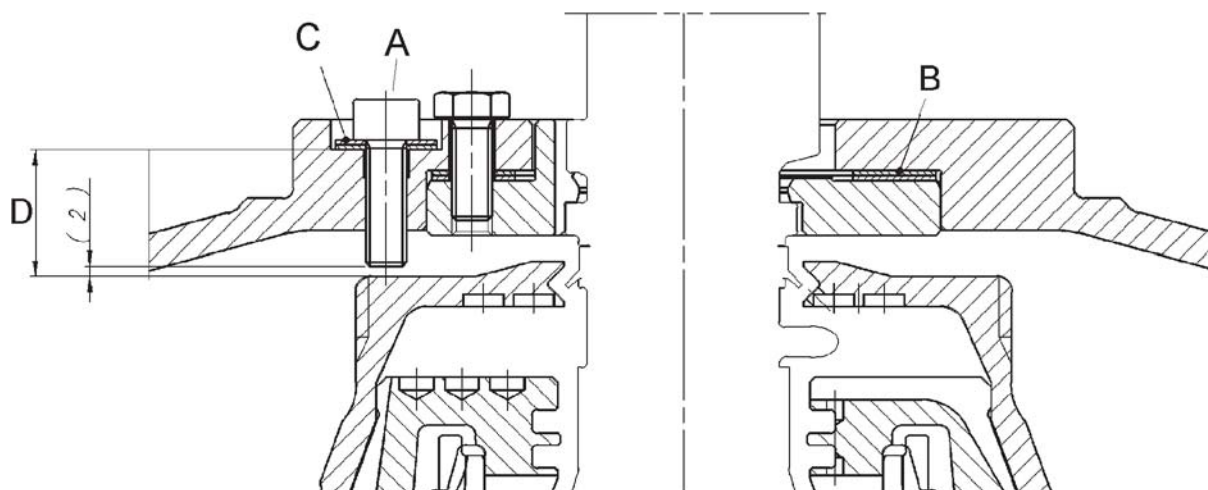
2. Control measurement of paring disc height. [o]

- a. Remove the guide screw (A).
- b. Measure the distance **D** through the screw hole.

Assemble the correct number of height adjusting rings (B) and washers (C) according to the list.

- $26 \pm 0,5$ mm, 3 height adjusting rings, 1 washer
- $25 \pm 0,5$ mm, 2 height adjusting rings, 2 washers
- $24 \pm 0,5$ mm, 1 height adjusting ring, 3 washers

- c. Refit the guide screw (A)

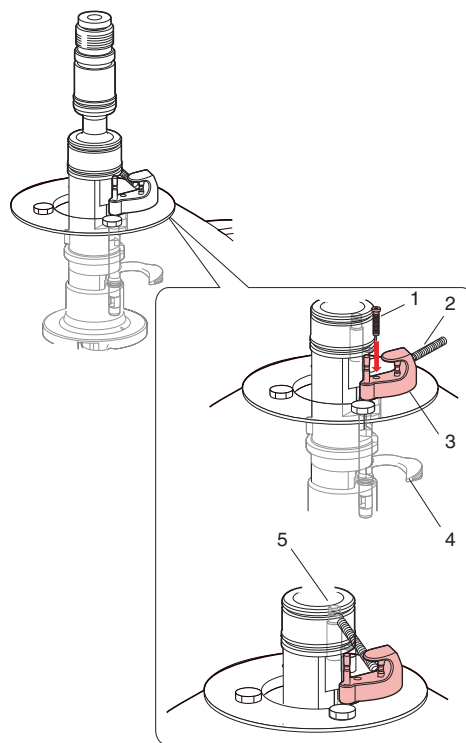


G09115w1

- A. Guide screw
B. Height adjusting rings
C. Washers

3. Fitting the spring and arm. [o]

- a. Fit the spring (2) on the arm (3) and fit the arm to the top of the paring tube end (4) with the screw (1).
- b. Fit the spring to the pin (5) on the frame hood and make sure that it is properly attached on both ends.



G08637L1

1. Screw
2. Spring
3. Arm
4. Paring tube
5. Pin

4. Fitting the connecting housing.

- a. Lubricate the inlet pipe thread.
- b. Fit the connecting housing (1) over the inlet/outlet pipe.

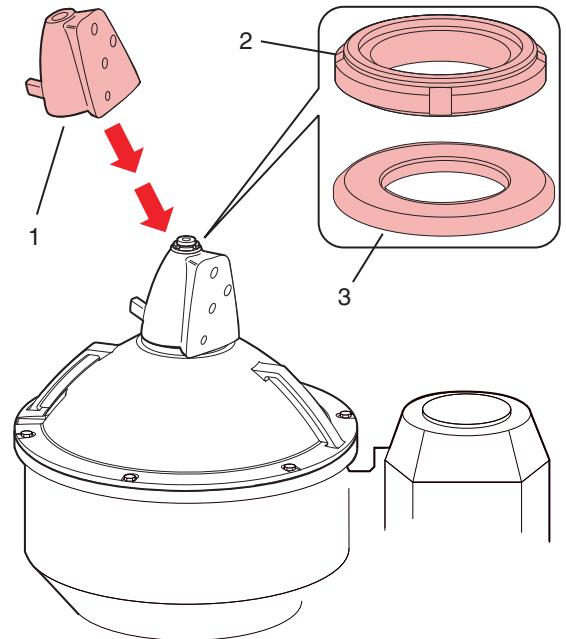
NOTE

Make sure that the screw, on top of the frame hood, enters the guide hole at the underside of the connecting housing.

- c. Lubricate the lock nut threads.
- d. Fit the washer (3) and the lock nut (2) using the hook spanner.

NOTE

Fine threads on the pipe. Make sure that the lock nut has entered the pipe threads correctly before tightening with the hook spanner.



G0863981

1. Connecting housing
2. Lock nut
3. Washer

6.5.5 Unbalance sensor (optional)

1. Fitting the unbalance sensor holder.

- a. Remove the cover (1).
- b. Fit the O-ring (3) on the holder (2).

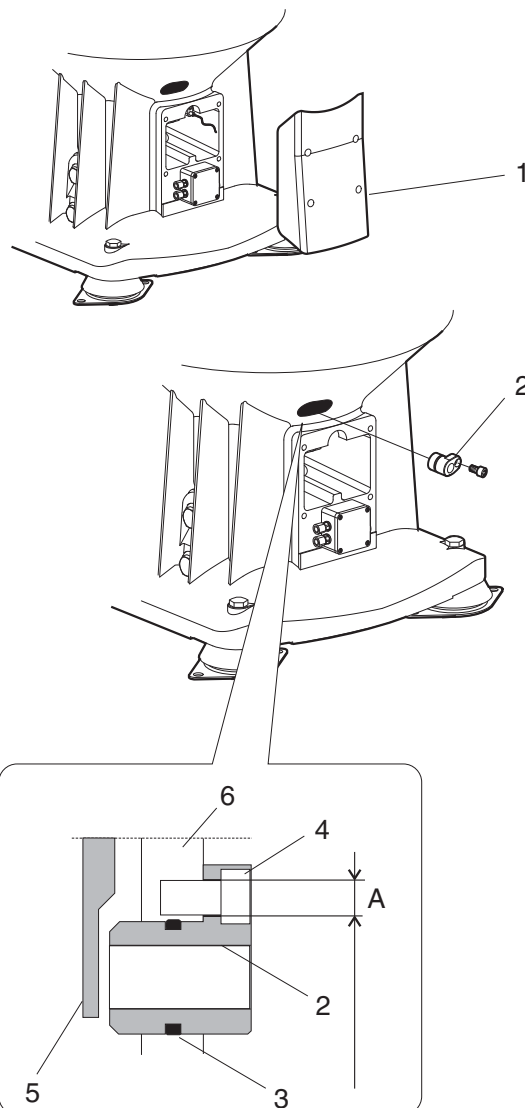
Fit the screw (4) into the holder and mount the holder into the separator frame (6).

NOTE

If removing the sensor holder; use a M10 screw as a puller.

NOTE

See next page for fitting and correct adjustment of the sensor.

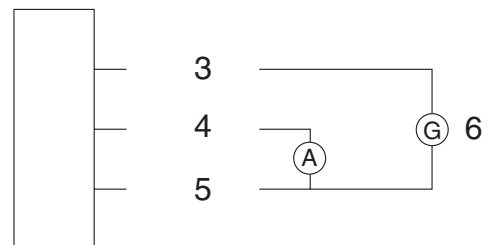
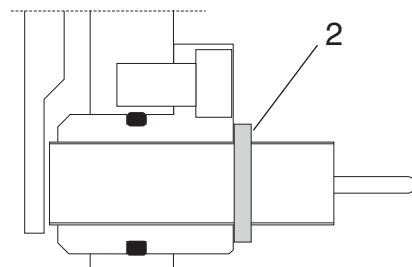
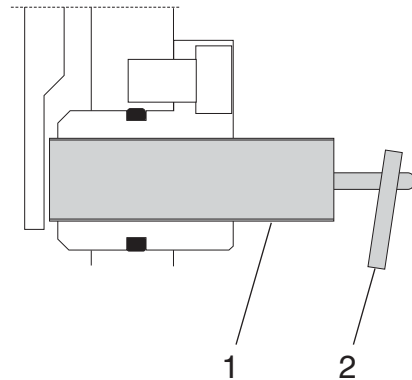


G08734G1

1. Cover
2. Sensor holder
3. O-ring
4. Screw M8
5. Sensor arm
6. Frame
- A. M10

2. Adjusting the unbalance sensor

- a. Fit the sensor (1) into the holder. Do not forget the nut (2).
- b. Adjust the sensor so that a value of 1,5 appears on the display.
- c. When correct distance is achieved tighten the nut against the holder. Fit the cover (see previous page).

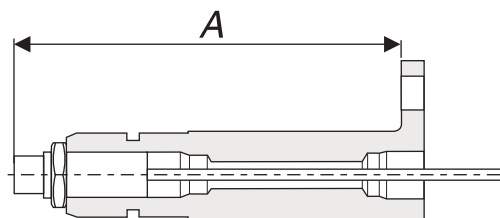


G08734H1

1. Sensor
2. Nut
3. + = brown or red
4. J = black or white
5. OV = blue
6. 24 V DC

6.5.6 Speed sensor (optional)

1. Adjusting the speed sensor.
 - a. Adjust the speed sensor. Distance $A = 81 \pm 0,1$ mm.
 - b. Fit the sensor to the frame, see [4.4 Sensors and indicators on page 28](#).



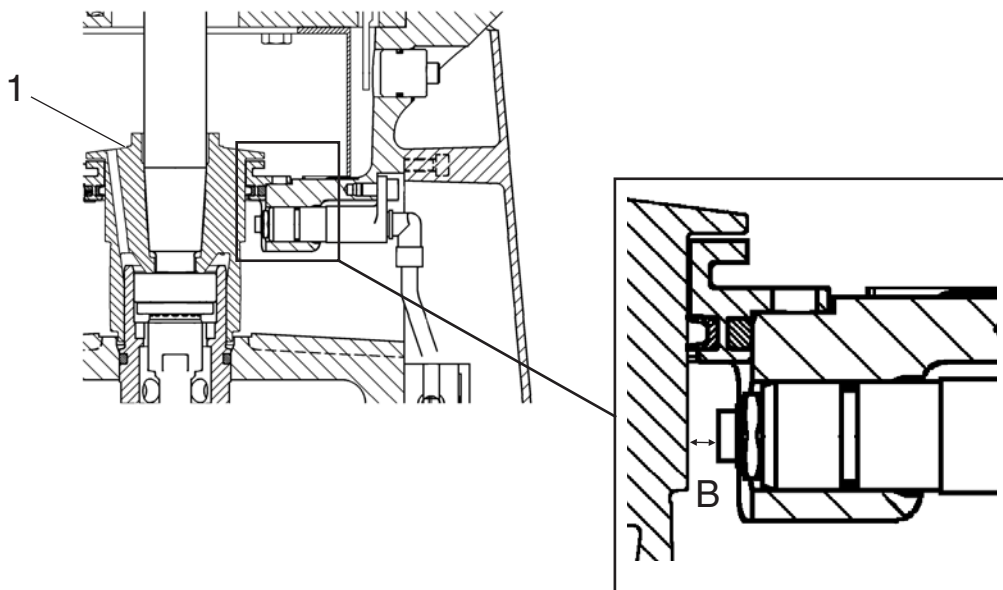
G08734E1

A. Speed sensor distance

NOTE

If the sensor does not work properly, check the distance between the sensor and the spindle belt pulley.

Adjust the sensor to achieve measure (B) shown below.



G08588W1

1. Spindle belt pulley
- B. Distance between sensor and pulley

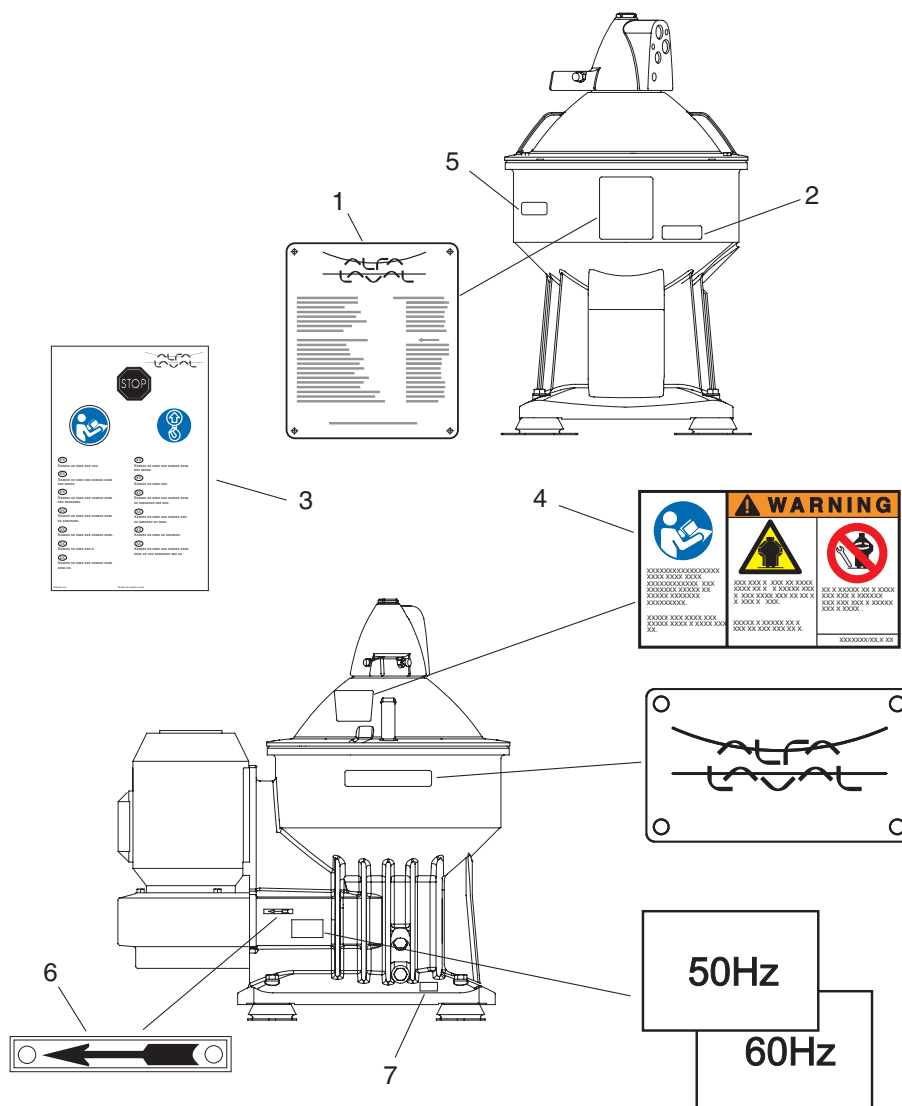
NOTE

The distance (B) between the sensor and the spindle belt pulley (1) must be $2,5 \pm 0,5$ mm.

6.5.7 Actions after assembly

6.5.7.1 Control of machine plates and safety labels

1. Check that the following signs are attached.[o].



1. Machine plate
2. Space for label indicating representative
3. Lifting instructions
4. Safety label
5. Space for additional label for numbering of separator and function
6. Indicating direction of rotation of horizontal driving device
7. Oil type plate

2. Check legibility.

Following texts should be read on the labels.

Machine plate

Separator type

Serial No / Year

Product No

Main group no

Configuration no

Designation

Max. allowed speed (bowl)

Direction of rotation (bowl)

Speed motor shaft

El. current frequency

Recommended motor power

Max. density of feed

Max. density of sediment

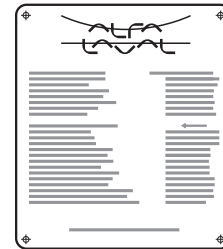
Max. density of operating liquid

Process temperature min./max.

Inside diameter of bowl body

Manufacturer

Service enquiries: www.alfalaval.com

**Safety label**

Text on label: **Warning**

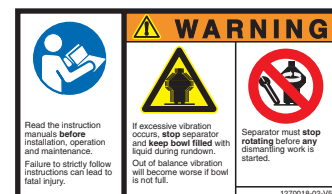
Read the instruction manuals **before** installation, operation and maintenance. Consider inspection intervals.

Failure to strictly follow instructions can lead to fatal injury.

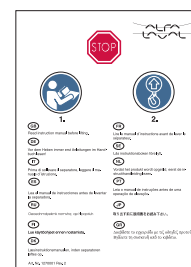
If excessive vibration occurs, **stop** separator and **keep bowl filled** with liquid during rundown.

Out of balance vibration will become worse if bowl is not full.

Separator must **stop rotating** before **any** dismantling work is started.

**Lifting instructions**

Text on label: Read instruction manual before lifting.



6.6 Oil change

NOTE

The separator should be level and at standstill when oil is filled or the oil level is checked

6.6.1 Lubricating oil

Do not mix different oil brands.

Always use clean vessels when handling lubricating oil.

Great attention must be paid not to contaminate the lubricating oil. Of particular importance is to avoid mixing of different types of oil. Even a few drops of motor oil mixed into a synthetic oil may result in severe foaming.

Any presence of black deposits in a mineral type oil is an indication that the oil base has deteriorated seriously or that some of the oil additives have precipitated. Always investigate why black deposits occurs.

If changing from one oil brand to another it is recommended to do this in connection with an overhaul of the separator. Clean the oil bath housing and the spindle parts thoroughly and remove all deposits before filling the new oil.

NOTE

Always clean and dry parts (also tools) before lubricants are applied.

CAUTION

Check the oil level before start. Top up when necessary. For correct oil volume, see “Lubricating oil” in the table on page 181.

It is of utmost importance to use the lubricants recommended in our documentation.

This does not exclude, however, the use of other brands, provided they have equivalently high quality properties as the brands recommended. The use of other oil brands and lubricants than recommended, is done on the exclusive responsibility of the user or oil supplier.

Applying, handling and storing of lubricants

Always be sure to follow lubricants manufacturer's instructions.

6.6.2 Check oil level

1. Remove the oil pin and make sure that the oil level is above the lower end of the pin.

6.6.3 Oil change procedure

1. Remove the oil pin, plug and washer (B).
2. Place a vessel under the drain plug (C).
3. Remove the drain plug.



Burn hazard

The lubricating oil and various machine surfaces can be sufficiently hot to cause burns.

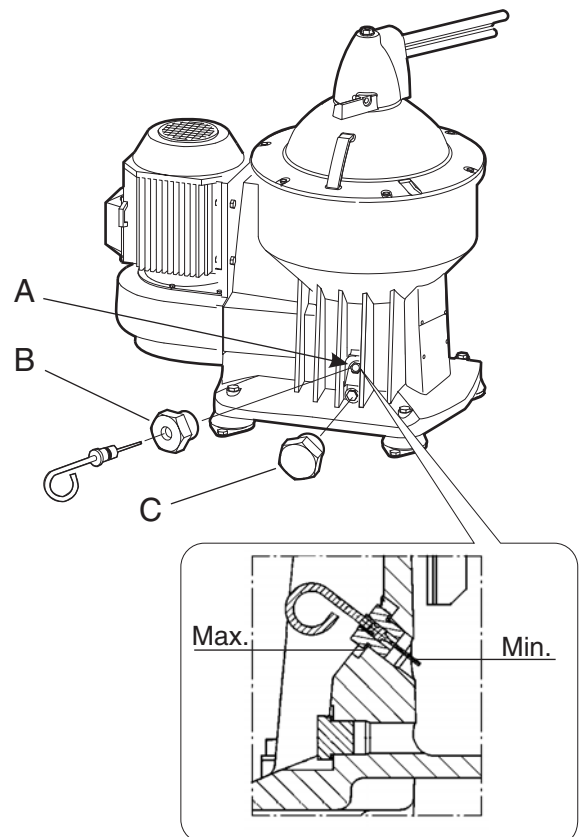
4. Collect the oil in the vessel.
5. Fit and tighten the drain plug (C).
6. Fill with new oil until oil flows out of oil filler hole (A).



For grade and quality of oil, see [6.6.6 Lubricating oils on page 168](#).

For correct oil volume, see "Lubricating oil" in the table on page [181](#).

7. Fit the washer and the oil filling plug (B). Tighten the plug.
8. Fit the oil pin.

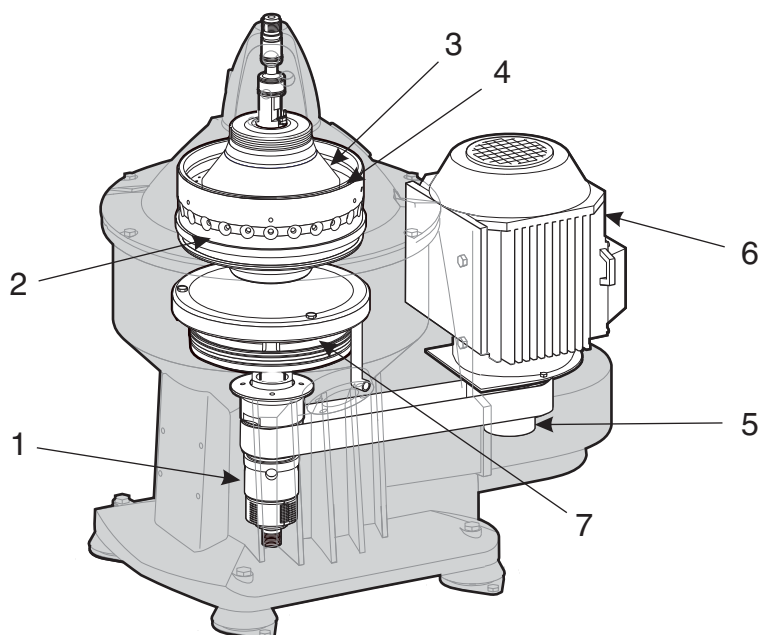


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- A. Oil fill
- B. Plug and washer
- C. Oil drain plug

6.6.4 Lubrication chart

Alfa Laval ref. 567329-02 Rev. 2



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1. Bowl spindle bearings
2. Bowl spindle taper
3. Bowl
4. Rubber seal rings
5. Friction clutch bearings
6. Electric motor
7. Plug thread

Lubricating points	Type of lubricant	Interval
1 Bowl spindle bearings Bowl spindle bearings are lubricated by oil mist from the oil bath.	See 6.6.6 Lubricating oils on page 168 . Volume: 8.2 Technical data on page 181 . Ambient temperature: Between 0 to +55 °C	Oil change: <i>Continuous operation:</i> 4000 hours <i>Seasonal operation:</i> before every operating period <i>Short periods operation:</i> 12 months even if total numbers of operating hours is less than stated above
2 Bowl spindle taper	Lubricating oil, only a few drops for rust protection.	At assembly
3 Bowl: Sliding contact surfaces, thread of lock nut and cap nut.	Pastes specified in 6.6.5 Recommended lubricants on page 165 .	At assembly
4 Rubber seal rings.	Grease as specified in 6.6.5 Recommended lubricants on page 165 .	At assembly

	Lubricating points	Type of lubricant	Interval
5	Friction clutch bearings	The bearings are pre-lubricated with grease.	No need for extra lubrication.
6	Electric motor	Follow the manufacturer's instructions.	Follow the manufacturer's instructions.
7	Plug thread (neck bearing assembly)	Lubricating oil.	At assembly

NOTE

Check and pre-lubricate new spindle bearings and bearings that have been out of service for six months or longer.

If the ambient temperature is below 25 °C at start-up, the spindle bearings that have been out of service for a shorter period than six months must also be pre-lubricated.

If not otherwise specified, follow the suppliers instructions about applying, handling and storing of lubricants.

CAUTION

Check the oil level before start.
Top up when necessary.
Do not overfill.
Do not check the oil level when separator is running.

6.6.5 Recommended lubricants

Alfa Laval ref. 553217-01 Rev. 11

NOTE

The data in below tables is based on supplier information in regards to lubrication properties. Trade names and designations might vary from country to country. Please contact your local supplier for more information.

Brands with Alfa Laval article numbers are approved and recommended for use.

Pastes for non-food applications

Manufacturer	Designation	Alfa Laval No.
Dow Corning	Molykote 1000 (Paste) Molykote 1000 (Paste) Molykote G-rapid plus (Paste)	537086-02 (1000 g) 537086-03 (100 g) 537086-04 (50 g)
Fuchs Lubritech	Gleitmo 705 Gleitmo 805K	
Klüber	Wolfracoat C (Paste)	
Rocol	Dry Moly Paste MT-LM	

Bonded coatings:

Manufacturer	Designation	Alfa Laval No.
Fuchs Lubritech	Gleitmo 900 (Varnish or spray)	
Dow Corning	Molykote D321R (Spray)	535586-01 (375 g)

Silicone grease for rubber rings:

Manufacturer	Designation	Hygienic comment	Alfa Laval No.
Dow Corning	(Molykote) 111 (Compound)	Conform to the FDA regulations (21 CFR 178.3570) for occasional food contact. Certified: National Water Council UK and WRC, UK. Certified: food industry as per Chemical Testing Laboratory Dr. Böhm, Munich.	539474-02 (100 g) 539474-03 (25 g)
	Molykote G-5032	NSF Registered H1 (3 June 2005)	569415-01 (50 g)
Bremer & Leguil, Fuchs Lubritech	Chemplex 750	DVGW approved according to the German KTW-recommendations for drinking water.	
	Geralyn SG MD 2	NSF Registered H1 (30 March 2007)	
Klüber	Unisilikon L 250 L	Complies with German Environmental Agency on hygiene requirements for tap water. Certified by DVGW-KTW, WRC, AS4020, ACS.	
	Paraliq GTE 703	NSF Registered H1 (25 Feb 2004) Complies with LMBG and the European standard EN 1672, part 2.	
Bel-Ray	No-Tox Silicone Valve Seal	NSF Registered H1 (19 June 2002)	
MMCC	ALCO 220	NSF Registered H1 (25 March 2002)	
Rocol	Foodlube Hi-Temp	NSF Registered H1 (18 April 2001)	

Greases for ball and roller bearings:**NOTE**

Always follow the specific recommendation for lubrication as advised by the manufacturer.

Manufacturer	Designation	Hygienic comment
BP	Energrease MP-MG2 Energrease LS2 Energrease LS-EP2	
Castrol	APS 2 Spheerol EPL 2	
Chevron	Chevron Dura-Lith Grease EP2 Texaco Multifak AFB 2	
Dow Corning	Molykote G-0101 Molykote Multilub	
ExxonMobil	Beacon EP2	
	Unirex N2 Mobilith SHC 460 Mobilux EP2	
Fuchs Lubritech	Lagermeister EP2	
Q8/Kuwait Petroleum	Rembrandt EP2	
Shell	Alvania EP 2 Albida EP2	
SKF	LGEP 2 LGMT 2 LGFB 2	NSF Registered H1 (14 Sept 2005)
Total	Multis EP2	
BP	Energrease MP-MG2 Energrease LS2 Energrease LS-EP2	

6.6.6 Lubricating oils

Alfa Laval ref. 567330-01 Rev. 4

Paraffinic mineral lubricating oil, category (ISO-L-) HM 68.

Viscosity grade (ISO 3448/3104) VG 68.

The oil shall follow the requirements in one of the standards below.

Standard	Designation
DIN 51524 part 2 or 3* (German standard)	DIN 51524 – HLP or HVLP* 68
ISO 11158 (International standard)	ISO-L-HM or HV* 100 Viscosity index (ISO 2909) VI >95

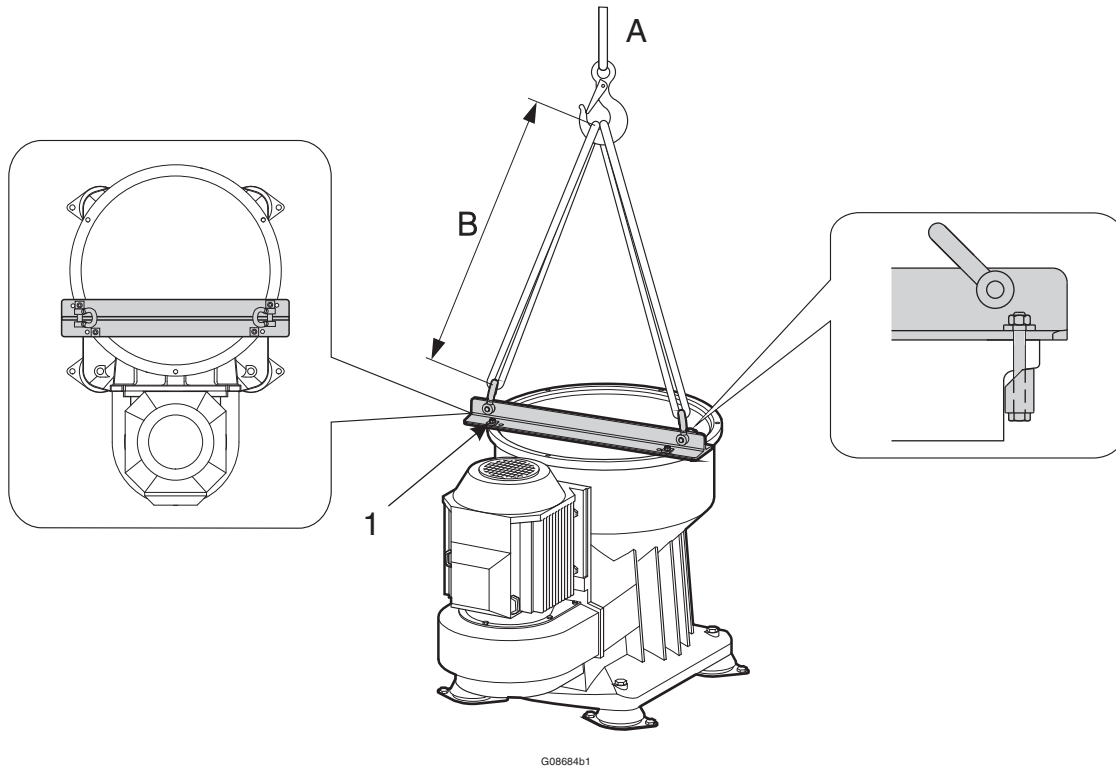
The following is the list of recommended oil brands. Trade names and designations might vary from country to country. Other oil brands may be used as long as they follow the above standards, and have equivalent high quality as the recommended oil brands. For use of other oil brands, please contact the considered oil company for their advice of the correct choice of oil.

Manufacturer	Designation
Alfa Laval	567334-01 1 litre 567334-02 4 litres
BP	Bartran 68 Bartran HV 68 * Energol SHF-HV 68 *
Castrol	Hyspin AWS 68 Hyspin AWH(-M) 68 *
Chevron	Hydraulic oil AW 68 Rando HD 68 (H2) Rando HDZ 68 (H2) * Rykon Premium 68 (H2) *
ExxonMobil	Nuto H 68 Univis N 68* Mobil DTE 26 (ISO VG 68) Mobil DTE 10 Excel 68 *
Q8/Kuwait Petroleum	Haydn 68 Handel 68 *
Shell	Tellus Oil 68 Tellus Oil S 68 Tellus Oil T 68 *
Statoil	HydraWay HMA 68 HydraWay HVXA 68 *
Total	Azolla AF 68 Azolla ZS 68 Equivis ZS 68 * Elf Lubmarine Visga 68 *
* These oils should be used at cold start, i.e. when the ambient temperature is below 20 °C. Note! All oils can be used at ambient temperatures above 20 °C.	

6.7 Lifting instructions

Alfa Laval ref. 561708 Rev. 2

6.7.1 Lifting the separator



A. Weight to lift: 320 kg

B. Sling length: Min. 750 mm

1. Bolts, Tightening torque 35-45 Nm

1. Remove the inlet and outlet device, the frame hood and the bowl according to the instructions in [6.3 Dismantling on page 50](#).

NOTE

Never lift or transport the separator with the bowl still inside.

2. Disconnect all connections.
3. Fit the lifting tool (not included in set of tools). All four bolts on the lifting tool must be fastened to the frame.
4. Unscrew the foundation bolts.
5. Use two lifting slings to lift the separator. Total length of each loop: minimum 1,5 metres.

6. When lifting and moving the separator, follow normal safety precautions for lifting large heavy objects.

**Crush hazards**

A falling separator can cause accidents resulting in serious injury and damage.

Never lift the separator by any other method than described in this manual.



When lifting parts without weight specifications, always use lifting straps with the capacity of at least 500 kg.

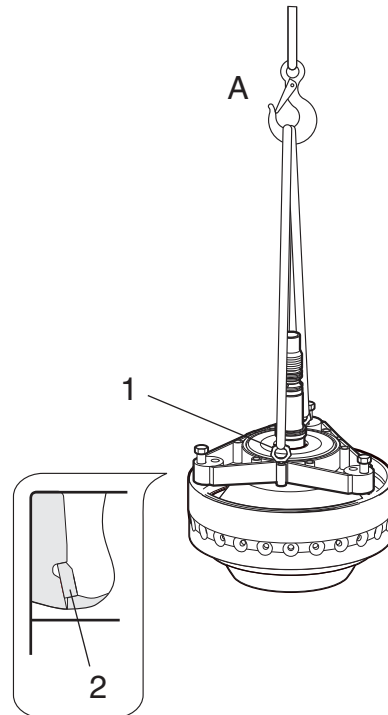
6.7.2 Lifting the bowl

When lifting and moving an assembled bowl, always follow these instructions.

1. Fit the lifting tool with lifting eyes to the bowl assembly.
2. Check that the lock ring is mounted correctly before lifting the complete bowl.
3. Lift the bowl using a sling with the proper rating.

NOTE

Never try to lift the bowl while it is still in the frame. The bowl body is fastened to the frame with the cap nut.



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- A. Weight to lift: 50 kg
1. Lifting eye, Tightening torque 40 ± 5 Nm
2. Lock ring (Make sure that lock ring is fitted.)

7 Fault Finding

These fault finding instructions are for the separator only. If a fault occurs, study the System Documentation fault finding section (if applicable).

7.1 Mechanical Functions

7.1.1 Separator vibration



Disintegration hazards

If excessive vibration occurs, stop separator and keep bowl filled with liquid during rundown.

The cause of the vibration must be identified and corrected before the separator is restarted.



Some vibration is normal during the starting and stopping sequences when the separator passes through its critical speed.

Cause	Corrective action
Bowl out of balance due to: - poor cleaning - incorrect assembly - incorrect disc stack compression - bowl assembled with parts from other separators	Dismantle the separator and check the assembly and cleaning.
Uneven sludge deposits in the sludge space.	Dismantle and clean the separator bowl.
Height position of paring disc is incorrect.	Stop the separator, measure, and if necessary, adjust the height.
Bowl spindle bent.	Renew the bowl spindle.
Bearing(s) damaged or worn.	Renew all bearings.
The frame feet are worn out.	Renew the frame feet.
Spindle top bearing spring broken.	Renew all springs.

7.1.2 Smell

Cause	Corrective action
Normal occurrence during start while the friction blocks are slipping.	None. If smell continues when separator is at full speed, stop the separator and replace friction blocks.
Oil level in oil sump too low.	Check oil level and add oil if necessary.

7.1.3 Noise

Cause	Corrective action
Height position of paring disc is incorrect.	Stop the separator, measure and adjust the height.
Bearing(s) damaged or worn.	Renew all bearings.

7.1.4 Speed too low

Cause	Corrective action
Friction blocks are oily or worn.	Clean or renew friction blocks.
Bowl is not closed or leaking.	Dismantle the bowl and check.
Motor failure.	Repair the motor.
Bearing(s) damaged.	Renew all bearings.
Incorrect transmission parts (60 Hz belt pulley for 50 Hz power supply).	 Stop and change the belt transmission to suit the power supply frequency.

7.1.5 Speed too high

Cause	Corrective action
Incorrect transmission parts (50 Hz belt pulley for 60 Hz power supply).	 Stop and change the belt transmission to suit the power supply frequency.

7.1.6 Starting power too high

Cause	Corrective action
Incorrect transmission parts (60 Hz belt pulley for 50 Hz power supply).	 Stop and change the belt transmission to suit the power supply frequency.
Wrong direction of rotation.	Change electrical phase connections to the motor.

7.1.7 Starting power too low

Cause	Corrective action
Incorrect transmission parts (50 Hz belt pulley for 60 Hz power supply).	 Stop and change the belt transmission to suit the power supply frequency.
Friction blocks are oily or worn.	Clean or renew friction blocks.
Motor failure.	Repair the motor.

7.1.8 Starting time too long

Cause	Corrective action
Friction blocks are oily or worn.	Renew or clean friction blocks.
Height position of paring disc is incorrect.	Stop, check and adjust the height.
Motor failure.	Repair the motor.
Bearing(s) damaged or worn.	Renew all bearings.

7.2 Separating functions

7.2.1 Bowl opens accidentally during operation

Cause	Corrective action
Strainer in the operating water supply is clogged.	Clean the strainer.
No water in the operating water system.	Check the operating water system and make sure the valve(s) are open.
Hoses between the supply valves and separator are incorrectly fitted.	Correct.
Nozzle in operating slide clogged.	Clean the nozzle.
Rectangular ring in discharge slide is defective.	Renew the rectangular ring.
Valve plugs are defective.	Renew all plugs.
Supply valve for opening water is leaking.	Rectify the leak.

7.2.2 Bowl fails to open for sludge discharge

Cause	Corrective action
Strainer in the operating water supply is clogged.	Clean the strainer.
Water flow too low.	Check the water flow
Hoses between the supply valves and separator are incorrectly fitted.	Correct.
Nozzle in operating slide missing.	Fit the nozzle.
Rectangular ring in the operating slide or bowl body is defective.	Renew the rectangular rings.

7.2.3 Unsatisfactory separation result

Cause	Corrective action
Incorrect separation temperature.	Adjust.
Throughput too high.	Adjust.
Disc stack is clogged.	Clean disc stack.
Sludge space in bowl is filled.	Clean and reduce the time between sludge discharges.
Bowl speed too low.	Examine the motor and power transmission including the belt transmission (clutch).
Bowl rotates i wrong direction.	Check the electrical connections to the motor.

7.2.4 Bowl fails to close

Cause	Corrective action
Nozzle in operating slide clogged.	Clean nozzle.
Hoses reversed.	Adjust.
Rectangular ring in discharge slide is defective	Renew rectangular ring.
Valve plugs in operating slide missing or defective.	Renew valve plugs.
No water.	Turn on water supply.
	Renew operating water ring

8 Technical Reference

8.1 Product description

Alfa Laval ref. 594185 Rev. 0

NOTE

The separator is a component operating in an integrated system including a monitoring system. If the technical data in the system description does not agree with the technical data in this instruction manual, the data in the system description is the valid one.

Product specification:	881202 10 01
Commercial name:	S936
Application:	Cleaning of fuel oil and lube oil.
Technical Design:	Intended for marine- and land installations. Total discharge. Centrilock® lock ring .
Directives and standards:	8.1.1 Directives and standards on page 180.
Operational limits:	
Feed temperature:	0 °C to 100 °C
Ambient temperature:	5 °C to 55 °C
Maximum allowed speed:	10700 r/min.
Discharge intervals:	Min. 2 minutes max. 4 hours.
Maximum allowed density of operating liquid:	1000 kg/m ³ .
Viscosity max.:	700 cSt at 50 °C.

Not to be used for liquids with flashpoint below 60 °C.

Risk for corrosion and erosion have to be investigated in each case by the application centre.

Remote restart allowed under certain conditions, see Interface description.

8.1.1 Directives and standards

Alfa Laval ref. 589764 Rev. 2

Declaration of Incorporation of partly completed Machinery.

The machinery complies with the relevant, essential health and safety requirements of the
2006/42/EC Machinery Directive

To meet these requirements the following standard has been used

EN 12547 Centrifuges-Common safety requirements.
(including several other EN- standards).

Declaration of Conformity

The machinery complies with the following Directives

2004/108/EC Electromagnetic Compatibility

To meet these requirements the following standards have been used

EN 61000-6-4 Electromagnetic compatibility (EMC)
Part 6-4: Generic standards – Emission standard for industrial environments.

EN 61000-6-2 Electromagnetic compatibility (EMC)
Part 6-2: Generic standards – Immunity for industrial environments.

EN 60204-1 Electrical equipment of machines
Part 1: General requirements.

EN ISO 12100 General principles for design – Risk assessment and risk reduction.

8.2 Technical data

Alfa Laval ref. 561760 Rev. 10

Subject	Value	Unit
General technical data:		
Motor power:	7,5 / 8,6	kW 50Hz/60Hz
Jp reduced to motor	6,5/ 4,5	kgm ² 50Hz/60Hz
Gear ratio: 50 Hz	292 / 82	
Gear ratio: 60 Hz	243 / 82	
Alarm levels for vibration monitor, connection 752, 1st/2nd:	0,2 / 0,3	mm
Max. bowl inner diameter:	237	mm
Min./Max. discharge interval:	2 / 240	minutes
Max. density of operating liquid:	1000	kg/m ³
Max. density feed/sediment:	1100 / 2659	kg/m ³
Min./Max. feed temperature:	0 / 100	°C
Max. running time without flow, bowl empty/filled:	60 / 60	minutes
Bowl material:	AL 111 2377-02	
Operating data:		
Bowl speed, synchronous: 50 Hz / 60 Hz	10683 / 10668	r/min
Motor speed, synchronous: 50 Hz / 60 Hz	3000 / 3600	r/min
Maximum allowed speed:		r/min
Max. power consumption, start-up:	11	kW
Power consumption, idling/max. capacity:	2,3 / 5,4	kW
Starting time min./max.:	1 / 2,5	minutes
Stopping time min./max.:	15 / 30	minutes
Stop time without brake, average:	22	minutes
Sound power:	9,2	Bel(A)
Sound pressure:	78	dB(A)
Max. vibration level, separator in use:	9,1	mm/second (r.m.s)
Volume and Capacity data:		
Maximum hydraulic capacity, bowl:	8,5	m ³ /h
Bowl liquid volume:	2,6	litres
Fixed discharge volume:	2,4	litres
Sludge volume, efficient/total:	0,35 / 1,1	litres
Lubricating oil volume:	2,2	litres
Weight information:		
Motor drive weight:	70	kg
Bowl weight:	48	kg
Separator total:	371	kg

8.3 Connection list

Alfa Laval ref. 561759 Rev. 6

Connection No.	Description	Requirements/limits
201	Inlet for process liquid - Max. Allowed density - Allowed flow - Allowed temperature	See 8.2 Technical data on page 181 . Max. 6,3 m³/h Min. 0°C Max. 100°C
206	Inlet for conditioning and displacement Liquid - Instantaneous flow	Fresh water 1,6 litres/min
220	Outlet for light phase, clarified liquid - Counter pressure	0-250 kPa
221	Outlet for heavy phase - Counter pressure	No counter pressure
222	Outlet for solid phase - Small discharge - Large discharge - Discharge frequency	The outlet from the cyclone must always be arranged to prevent the cyclone from being filled up with sludge. Solids are discharged by gravity. Total discharge Max. 24 discharge/h
375	Inlet for discharge and make-up liquid - Quality requirements - Max. density - Pressure Make-up liquid - Flow (momentary) - Consumption - Interval - Time Discharge liquid - Flow - Consumption - Time Closing liquid - Flow - Consumption - Time Start up closing liquid - Flow - Time	See "Demand specification water" 1000 kg/m³ min. 150 kPa 2,8 litres/min 1,7 litres/h 5 min 3 seconds 11 litres/min 0,55 litres/discharge 3 seconds 2,8 litres/min 0,7 litres/discharge 15 seconds 11 litres/min 5 seconds
462	Drain of frame top part, lower	

Connection No.	Description	Requirements/limits
701	Motor for separator - Allowed frequency variation (momentarily during 5 seconds)	$\pm 5\%$ $\pm 10\%$
740	Speed sensor for bowl spindle - Type - Supply voltage, nominal - With sensor activated (near metal) - With sensor not activated (far from metal) - Number of pulses per revolution	See 8.4 Interface Description on page 184 . Inductive proximity switch 8 V • 1,2 mA • 2,1mA 1
752	Position transducer for bearing holder - Type - Supply voltage - Operation range (mild steel) - Output current analog - Load resistance, R_L	See interface description Inductive analogue sensor 15 to 30 V DC 3,5 mm $\pm$ 0,25 mm 4 to 20 mA 1 kOhm max.
760	Cover interlocking switch - Type - Switch rating, resestive load, max:	Mechanical limit switch 3 A (at 48 V DC) 1 A (at 220 V AC)

8.4 Interface Description

Alfa Laval ref. 564834 Rev. 3

8.4.1 Scope

This document gives information, requirements, and recommendations about operational procedures and signal processing for safe and reliable operation of the separator. It is intended to be used for designing auxiliary equipment and control systems for the separator.

8.4.2 References

This Interface Description is one complementary document to the separator. Other such documents that contain necessary information and are referred to here are:

- Interconnection Diagram
- Connection List
- Technical Data

Standards referred to are:

- EN 418 Safety of machinery - Emergency stop equipment, functional aspects - Principles of design
- EN 1037 Safety of machinery - Prevention of unexpected start-up
- EN 954-1 Safety of machinery - Safety related parts of control systems - Part 1 General principles for design.

8.4.3 Definitions

For the purpose of this document, the following definitions apply:

- Synchronous speed: The speed the machine will attain when it is driven by a three phase squirrel-cage induction motor and there is no slip in the motor and the drive system.
- Full speed: The synchronous speed minus normal slip.

8.4.4 Goal

To eliminate situations that can cause harm, i.e. injury, damage to health or property and unsatisfactory process result are e.g.:

Situation	Effect
Unbalance caused by uneven sediment accumulation in the bowl.	Too high stress on bowl and bearing system which might cause harm.
Too high bowl speed.	Too high stress on bowl which might cause harm.
Access to moving parts.	Can cause injury to person who accidentally touches these parts.
Insufficient cleaning of separator.	Unsatisfactory product quality.
Bowl leakage.	Product losses.

Information and instructions given in this document aim at preventing these situations.

Control and supervision can be more or less comprehensive depending on the type of used control equipment. When a simple control unit is used it would be impossible or too expensive to include many of the functions specified here while these functions could be included at nearly no extra cost when a more advanced control unit is used. For this reasons functions that are indispensable or needed for safety reasons to protect the machine and/or personnel are denoted with *shall* while other functions are denoted with *should*.

8.4.5 Description of separator modes

For control purposes the operation of the separator should be divided into different modes. The normally used modes are described below but other modes might exist. It is assumed that:

- The separator is correctly assembled.
- All connections are made according to Connection List, Interconnection Diagram and Interface Description.
- The separator control system is activated.

If above conditions are not fulfilled the separator will be in *SERVICE* mode.

Stand still means:

- The power to the separator motor is off
- The bowl is not rotating.

Starting means:

- The power to the separator motor is on.
- The bowl is rotating and accelerating.

Running means:

- The power to the separator motor is on.
- The bowl is rotating at full speed.
- *RUNNING* is a collective denomination for a number of sub modes which e.g. can be:
 - *STAND BY*: Separator is in a waiting mode and not producing.
 - *PRODUCTION*: Separator is fed with product and producing.
 - *CLEANING*: Separator is fed with cleaning liquids with the intention to clean the separator.

Stopping means:

- The power to the separator motor is off.
- The bowl is rotating and decelerating.
- *STOPPING* is a collective denomination for a number of sub modes which e.g. can be:
 - *NORMAL STOP*: A manually or automatically initiated stop.
 - *SAFETY STOP*: An automatically initiated stop at too high vibrations.
 - *EMERGENCY STOP*: A manually initiated stop at emergency situations. This stop will be in effect until it is manually reset.

8.4.6 Remote start

This machine may be started from a remote location under the following conditions;

- First start after any kind of service or manual cleaning must be supervised locally in order to ensure that no mistakes has been made during assembly.
- The unbalance sensor is mandatory for remote start.
- The installation must include equipment to prevent unintentional start-up from remote location when the machine is disassembled.
- The installation must include equipment to prevent unintentional start of process flow from remote location when the machine is not properly connected to the piping.

8.4.7 Handling of connection interfaces

Electrical connections

701 Separator motor.

The separator is equipped with a 3-phase DOL - (direct on line) started motor. The separator can also be started by a Y/D starter, but then the time in Y-position must be maximized to 5 seconds.

There shall be an emergency stop circuit designed according to EN 418 and a power isolation device according to EN 1037.

There shall be a start button close to the separator that shall be used for first start after assembly of the separator.

There should be a counter to count number of running hours.

There should be a current transformer to give an analogue signal to the control unit about the motor current.

740 Speed sensor

A proximity sensor of inductive type according to Namur standard is giving a number of pulses per revolution of the bowl (see *Connection List*).

Signal processing in *STARTING*:

- The separator should be stopped automatically according to *NORMAL STOP* procedure and an alarm should be given when the accumulated time for acceleration is longer than the maximum time specified in *Technical Data*. An abnormal start time indicates some malfunction of the separator equipment and should be investigated.
- If the speed exceeds "Bowl speed, synchronous" in *Technical Data* with more than 5% the separator shall be stopped automatically by *NORMAL STOP* and a high speed alarm shall be given.
- The speed monitoring system shall be checked continuously (e.g. by checking that pulses are coming). In case of failure indication the separator shall be stopped automatically by *NORMAL STOP* with a timer controlled stop sequence and an alarm for speed monitoring system failure shall be given.
- The acceleration should be supervised to ensure that a certain speed (e.g. 250 r/min.) has been reached within a certain time (e.g. 30 seconds).

Signal processing in *RUNNING*:

- If the speed exceeds “Bowl speed, synchronous” in *Technical Data* with more than 5% for a period longer than 1 minute or momentarily during maximum 5 seconds more than 10% the separator shall be stopped automatically by *NORMAL STOP* and a high speed alarm shall be given.
- If the speed falls more than 10% below the synchronous speed for a period longer than 1 minute or 15% during more than 5 seconds a low speed alarm should be given. Low speed indicates some malfunction of the separator equipment and shall be investigated.
- The speed monitoring system shall be checked continuously (e.g. by checking that pulses are coming). In case of a failure indication an alarm for speed monitoring system failure shall be given. If there is a risk of too high speed the separator shall be stopped by *NORMAL STOP*.
- The speed drop during *DISCHARGE*, compared to the measured speed immediately before, should be between 3-8% which will indicate a proper discharge.

Signal processing in *STOPPING*:

- *STAND STILL* shall be indicated when no pulses are detected within 30 seconds.
- Stopping the separator when alarm for speed monitoring system failure is active, shall cause a timer controlled stop. (See “Stop time” in [8.2 Technical data on page 181](#).)

752 Unbalance sensor (optional).

For indication of any abnormal unbalance and to be able to perform appropriate countermeasures, the separator has been equipped with an inductive analogue sensor monitoring the radial position of the Top bearing seat on the separator frame. The signal from the sensor shall be monitored and two alarm levels according to the vibration alarm levels in [Technical data on page 181](#) should be set.

The vibration level shall be high for 3 seconds to generate an alarm. The first level is only used to generate an alarm while the second level shall stop the machine.

The vibration monitor shall include self check function to be performed at least at initiation of *STARTING*.

If vibrations exceed the second alarm level the separator shall be stopped the quickest way possible and it shall not be restarted until the reasons for the unbalance have been found and measures to remove them have been taken.

Signal processing in *STARTING*:

If vibrations exceed the second alarm level the separator shall be stopped automatically by *SAFETY STOP*.

If the self check system triggers, an alarm shall be given and an automatic stop by *NORMAL STOP* shall be initiated.

Signal processing in *RUNNING*:

- If vibrations exceed the first alarm level an alarm should be given. Vibrations of this magnitude will reduce the expected life time of the bearings and should therefore be eliminated.
- If vibrations exceed the second alarm level the separator shall be stopped automatically by *SAFETY STOP*.
- If the self check system triggers, an alarm shall be given.

Signal processing in *STOPPING*:

- If the self check system triggers, an alarm shall be given.

Signal processing in *NORMAL STOP*:

- If vibrations exceed the second level the system shall turn over automatically to *SAFETY STOP*.

760 Cover interlocking switch (optional)

The separator is equipped with a interlocking switch to detect if the cover is mounted.

Signal processing in *STAND STILL*:

- The circuit is closed when the cover of the separator is mounted.
- The interlocking switch should be connected in such a way that starting of the motor is prevented when the separator cover is not mounted.

Signal processing in *STARTING*, *RUNNING* and *CLEANING*:

- If the circuit is broken the separator should be stopped automatically by NORMAL STOP. This is to minimise the risk of having access to moving parts.

Fluid connections

Complementary information is given in the document Connection List.

201 Inlet

Processing in *STAND STILL*:

- Shall be closed.

Processing in *STARTING*:

- Should be closed. Bowl will be open and empty or closed and filled depending on if start is done from *STAND STILL* or *STOPPING*.

Processing in *RUNNING*:

- Could be closed or open.

Processing in *CLEANING*:

- A sequence of cleaning liquids should be fed to the separator. The flow rate should be as high as possible and preferably not less than the production flow rate.

Processing in *NORMAL STOP* or *EMERGENCY STOP*:

- Could be closed or open but the bowl should be filled unless the stop is initiated in *STARTING*.

Processing in *SAFETY STOP*:

- Could be closed or open but the bowl shall be filled unless the stop is initiated in *STARTING*.

206 Inlet for conditioning and displacement liquid

- According to process

220, 221 and 222 Outlets

Processing in *STAND STILL*:

- Could be closed or open.

Processing in other modes:

- Shall be open.

375 Inlet for discharge and make-up liquid

Processing in all modes:

- It is recommended to supervise the supply pressure. If pressure is too low (see Connection List), start should be interlocked and if it happens in *PRODUCTION* or *CLEANING* turn over to *STAND BY* should take place.

Signal processing in *STARTING*:

- Below 85 % of synchronous bowl speed no water supply may be made.
- When coming from *PRODUCTION* a discharge shall be initiated to remove sediment from bowl to avoid problems due to solidification, see Connection List.

Signal processing in *PRODUCTION*:

- Automatic discharges shall be initiated by timer or ALCAP system.

Signal processing in *CLEANING*:

- Automatic discharges shall be initiated by timer or CIP-control system.

Signal processing in *NORMAL STOP*:

- Discharges should not be made.

Signal processing in *SAFETY STOP* and *EMERGENCY STOP*:

- Discharges should not be made.

8.5 Demand specification water

Alfa Laval ref. 574487 Rev. 1

Poor quality of the operating water may with time cause erosion, corrosion and/or operating problems. The water shall be treated to meet certain demands.

1. Turbidity-free water, solids content <0,001% by volume.
Max. particle size 50 µm.
Deposits shall not be allowed to form in certain areas in the system.
2. Total hardness less than 180 mg CaCO₃ per litre, which corresponds to 10 °dH or 12,5 °E.
Hard water may with time form deposits in the operating mechanism. The precipitation rate is accelerated with increased operating temperature and low discharge frequency. These effects become more severe the harder the water is.
3. Chloride content max. 100 ppm NaCl (equivalent to 60 mg Cl/l). Chloride ions contribute to corrosion on surfaces in contact with the operating water. Corrosion is a process that is accelerated by increased separating temperature, low pH, and high chloride ion concentration.
4. 6,5 < pH < 9
Bicarbonate content (HCO₃) min. 70 mg HCO₃ per litre, which corresponds to 3,2 °dKH.

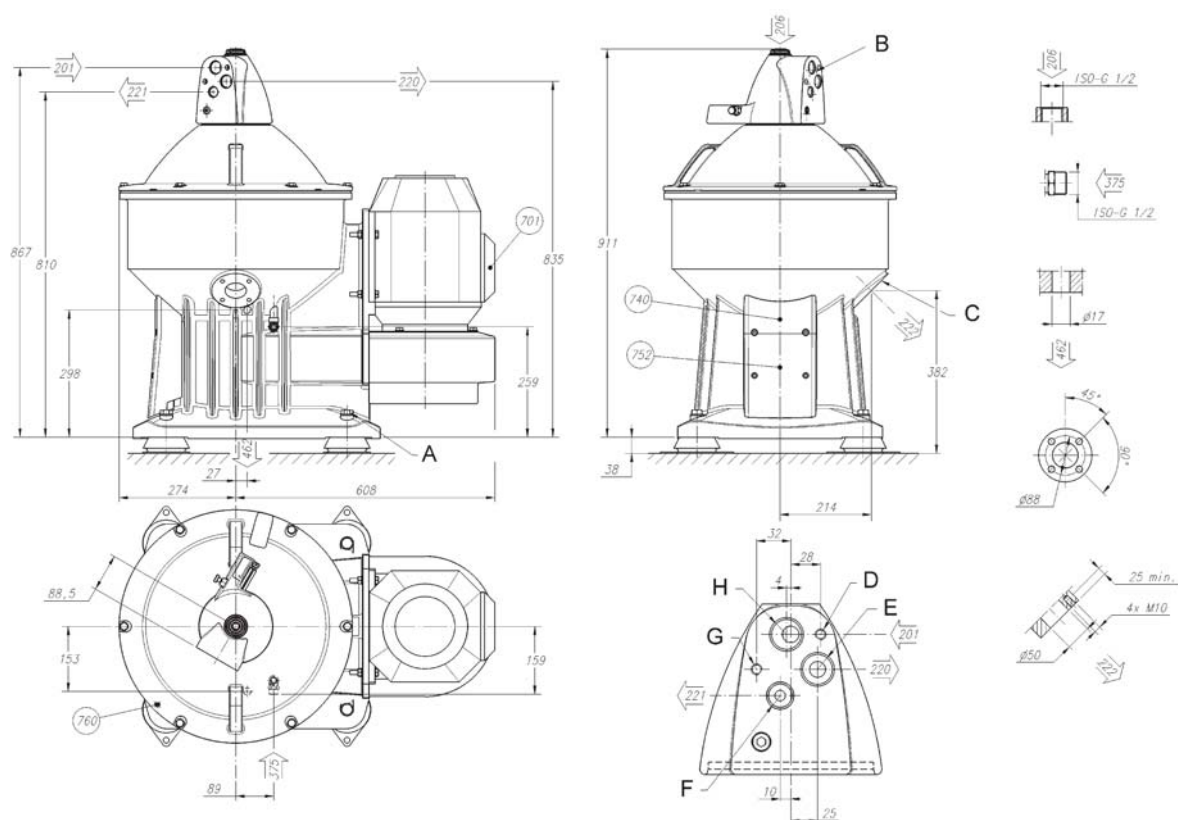
NOTE

Alfa Laval accepts no liability for consequences arising from unsatisfactorily purified operating water supplied by the customer.

8.6 Drawings

8.6.1 Basic size drawing

Alfa Laval ref. 561693 Rev. 5



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Connection house, with connections 201, 220 and 221, turnable in 60° steps all around.

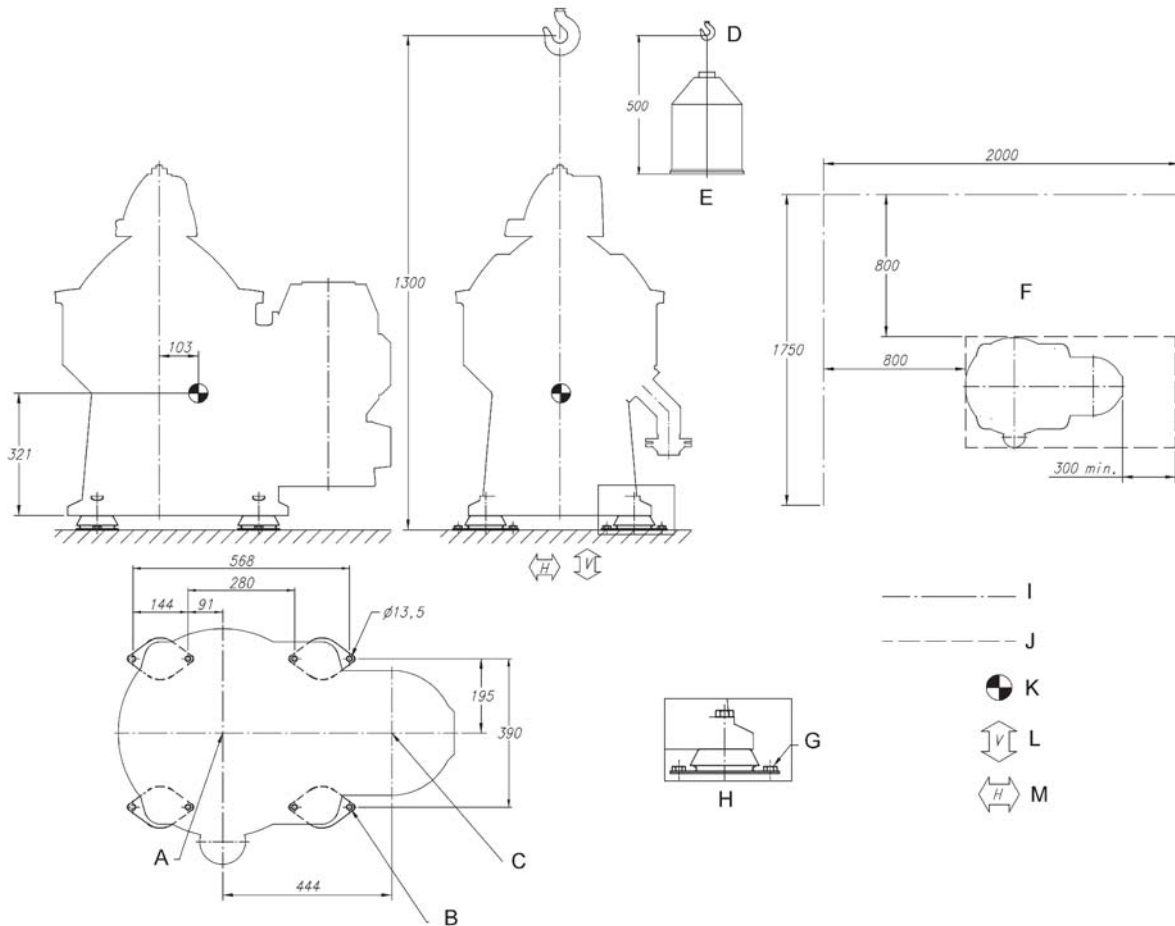
All connections to be installed non-loaded and flexible.

All dimensions are nominal. Reservation for individual deviations due to tolerances.

- A. Tightening torque 160 Nm.
- B. Maximum horizontal displacement at the inlet and outlet connections during operation ± 5 mm.
- C. Maximum vertical displacement at the sludge connection during operation ± 2 mm.
- D. M10, depth 30
- E. $\varnothing 28$, depth 45
- F. $\varnothing 22$, depth 45
- G. M10, depth 30
- H. $\varnothing 28$, depth 45

8.6.2 Foundation drawing

Alfa Laval ref. 561726 Rev. 1



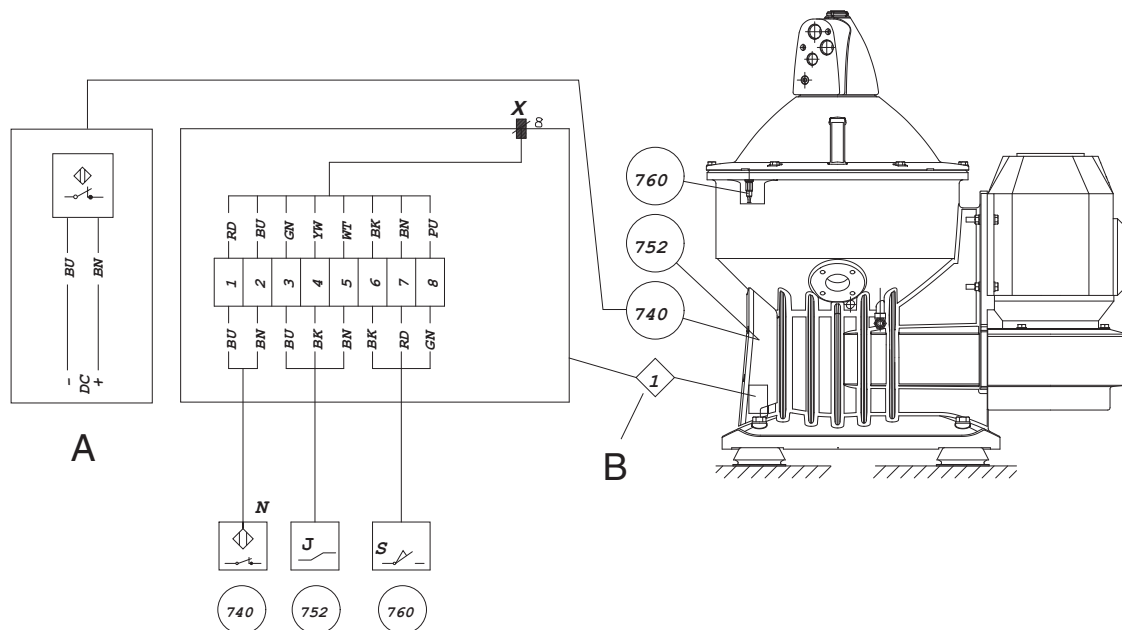
G1028721

- A. Centre of separator bowl.
- B. Holes for foundation bolts (8x).
- C. Centre of motor.
- D. Min. lifting capacity required during service: 300 kg.
- E. Max. height of largest component incl. lifting tool.
- F. Service side.
- G. Foundation bolts.
- H. Installation according to stated foundation force. Foundation turnable 360°
- I. Recommended free floor space for unloading when doing service.
- J. No fixed installation within this area.
- K. Centre of gravity (complete machine).
- L. Vertical force not exceeding 10 kN/foot.
- M. Horizontal force not exceeding 10 kN/foot.

Total static load max 4kN.

8.6.3 Interconnection diagram

Alfa Laval ref. 561786 Rev. 5



G1019311

- A: Wiring without junction box
 B: Junction box
 740: Speed sensor, (bowl speed)
 752: Unbalance sensor, (position trans. for bearing holder)
 760: Interlocking switch (frame top part)

Wiring of connector "X":

RD=A
 BU=B
 GN=C
 YW=D
 WT=E
 BK=F
 BN=G
 PU=H

Wire colour codes:

BK=Black
 BN=Brown
 BU=Blue
 RD=Red
 GN=Green
 PU=Purple
 YW=Yellow
 WT=White

Demand specification wire

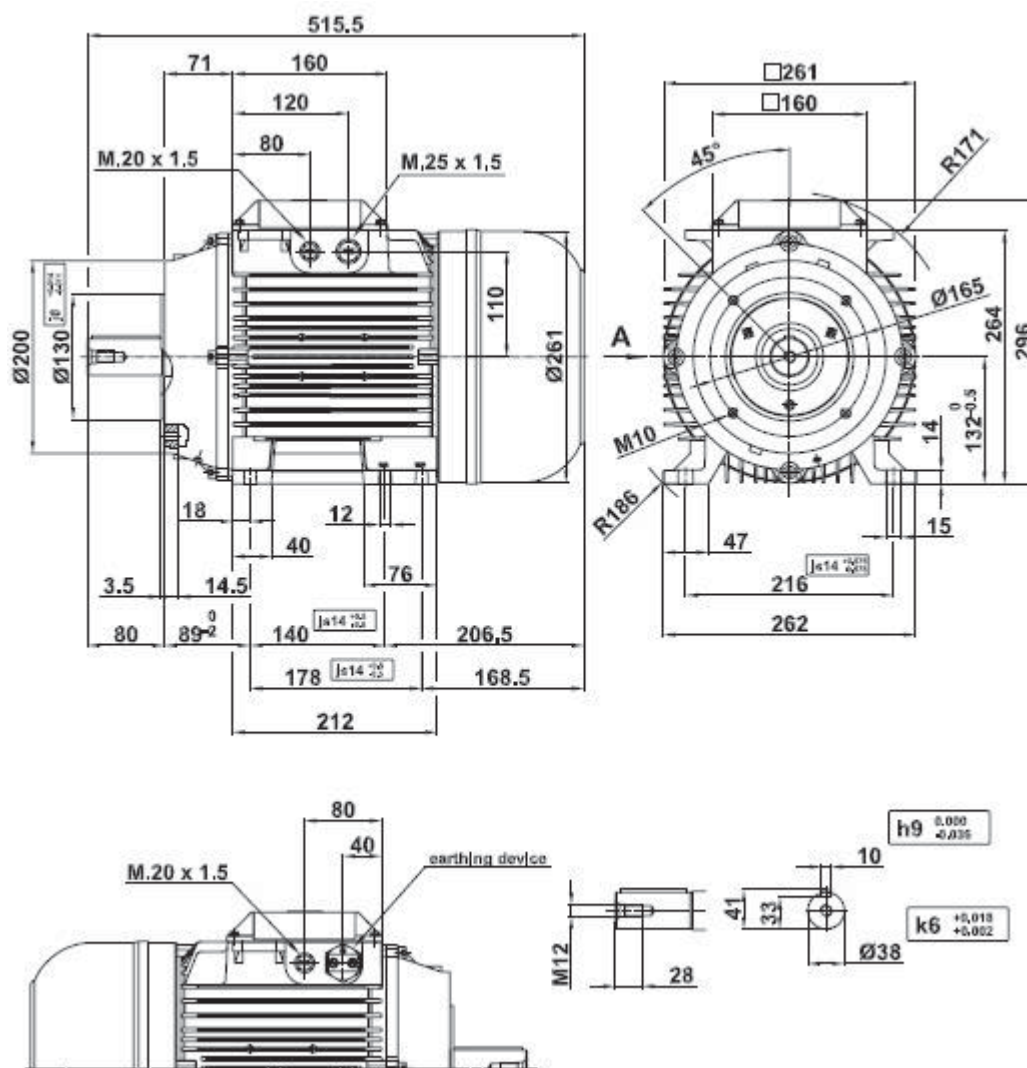
Approval: UL 1007/1569
 CSA TR-64

Area acc. to AWG 18

Items showed in this document are not included in all separators. See product specification.

8.6.4 Electric motor

Alfa Laval ref. 599763 Rev. 1



G1039411

Manufacturer: ABB
Type: M3AA132SC2
Poles: 2

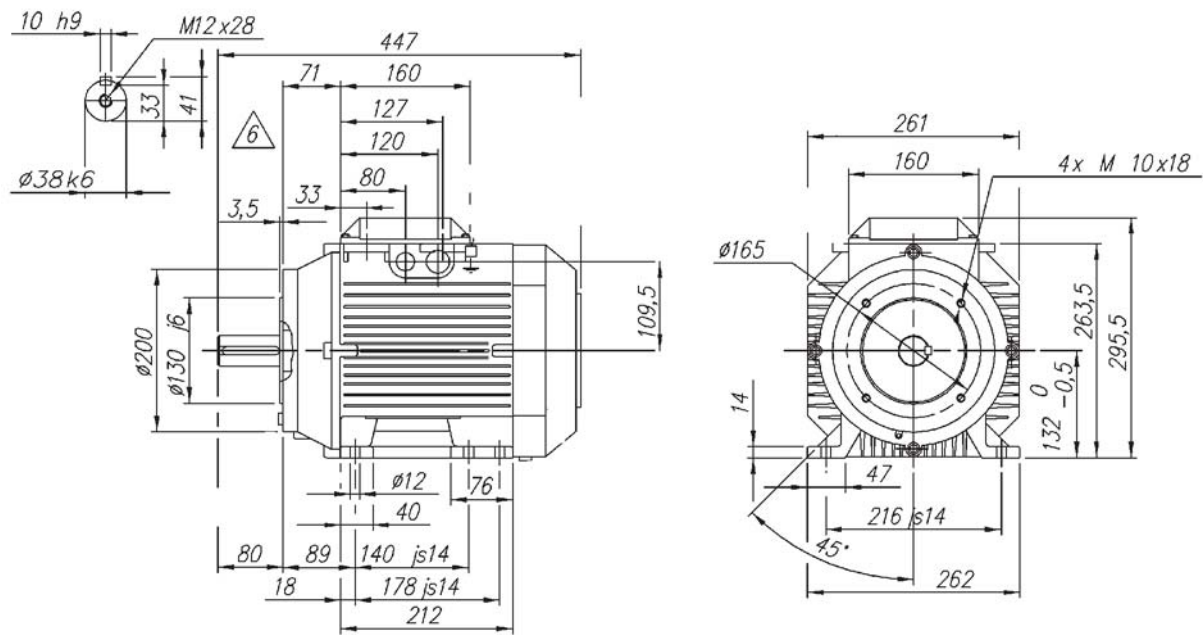
Bearings D-end 6308-2Z/C3
 N-end 6206-2Z/C3

Type of mounting IEC 34-7		Degree of protection IEC 34-5
 G0541421	IM2111	IP 55

NOTE

For complete information about motor variants, please contact your Alfa Laval representative.

Alfa Laval ref. 561356 Rev. 10



Manufacturer: ABB Motors

Type: M2AA 132 SB2

Poles: 2

Bearings: D-end 6208-2Z/C3
N-end 6208-2Z/C3

Type of mounting		Degree of protection
IEC 34-7		IEC 34-5
	IM 2111	IP 55

NOTE

For complete information about motor variants, please contact your Alfa Laval representative.

9 *Installation*

9.1 Introduction

The installation instructions are specifications, which are compulsory requirements.

Any specific requirements from classification societies or other local authorities must be followed.

NOTE

If the specifications are not followed, Alfa Laval can not be held responsible for any malfunctions related to the installation.

9.2 Upon arrival at the storage area

Ensure that the separator delivered is suitable for the application.

9.2.1 Transport

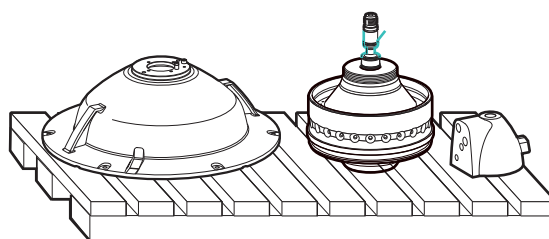
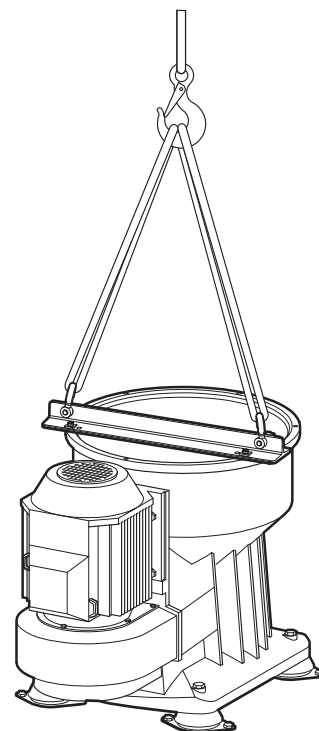
1. When lifting the separator, make sure that tools and lifting devices are fastened securely. See [6.7.1 Lifting the separator on page 169](#).



Crush hazards

Use correct lifting tools and follow lifting instructions.

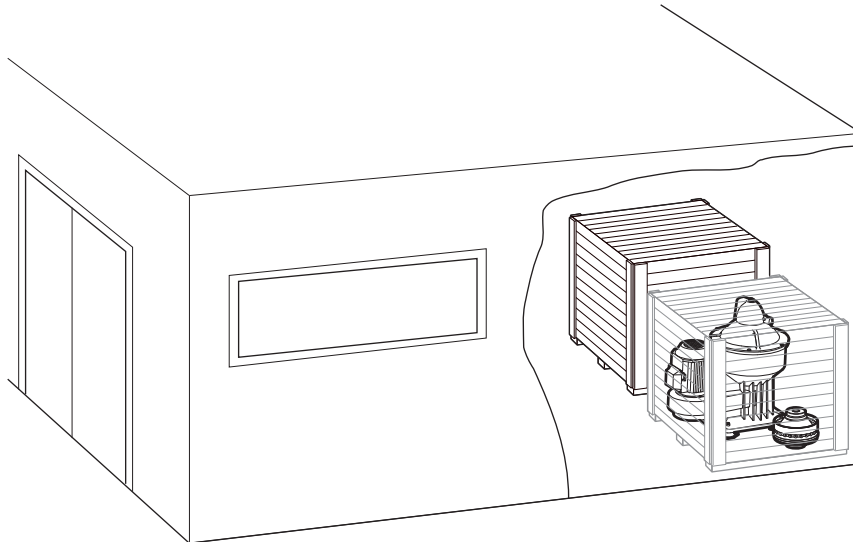
2. When lifting the bowl see [6.7.2 Lifting the bowl on page 171](#).
3. During transport of the separator, the in- and outlet device, frame hood and bowl must always be removed.



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9.2.2 Protection and storage of goods

1. The separator must be stored indoors at 5 - 55 °C, if not delivered in a water-resistant box, designated for outdoor storage.



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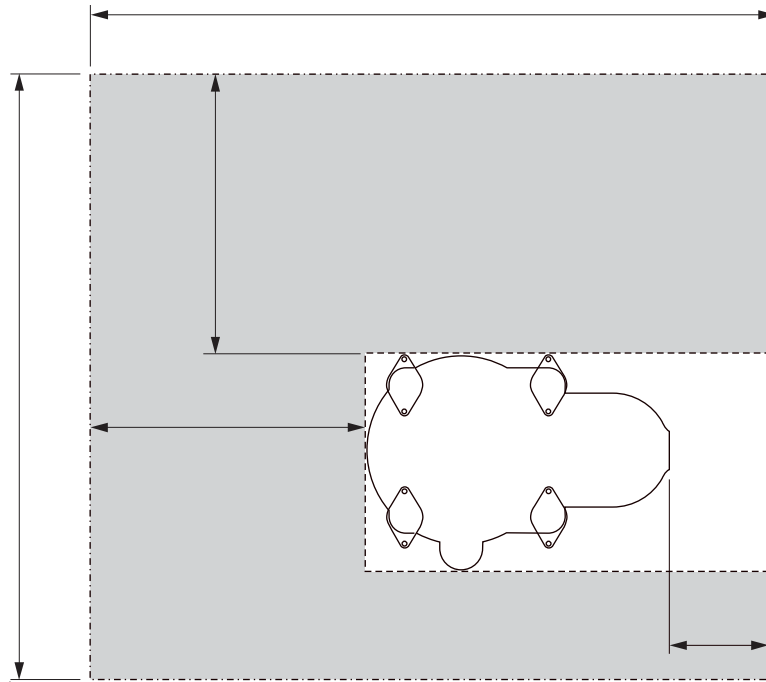
2. If there is a risk for water condensation, the equipment must stand well ventilated and at a temperature above dew point.
3. If the storage time exceeds 12 months, the equipment must be inspected every 6 months and, if necessary, the protection be renewed.

The following protection products are recommended:

1. Anti-rust oil (Dinitrol 112 or equivalent) with long lasting effective treatment for external surfaces. The oil should prevent corrosion attacks and leaves a waxy surface.
2. Anti-rust oil (Dinitrol 40 or equivalent) is a thin lubricant for inside protection. It gives a lubricating transparent oil film.
3. Solvent, e.g. white spirit, to remove the anti-rust oil after the storage period.
4. Moist remover to be packed together with the separator equipment.

9.3 Planning of Installation

9.3.1 Important measurements



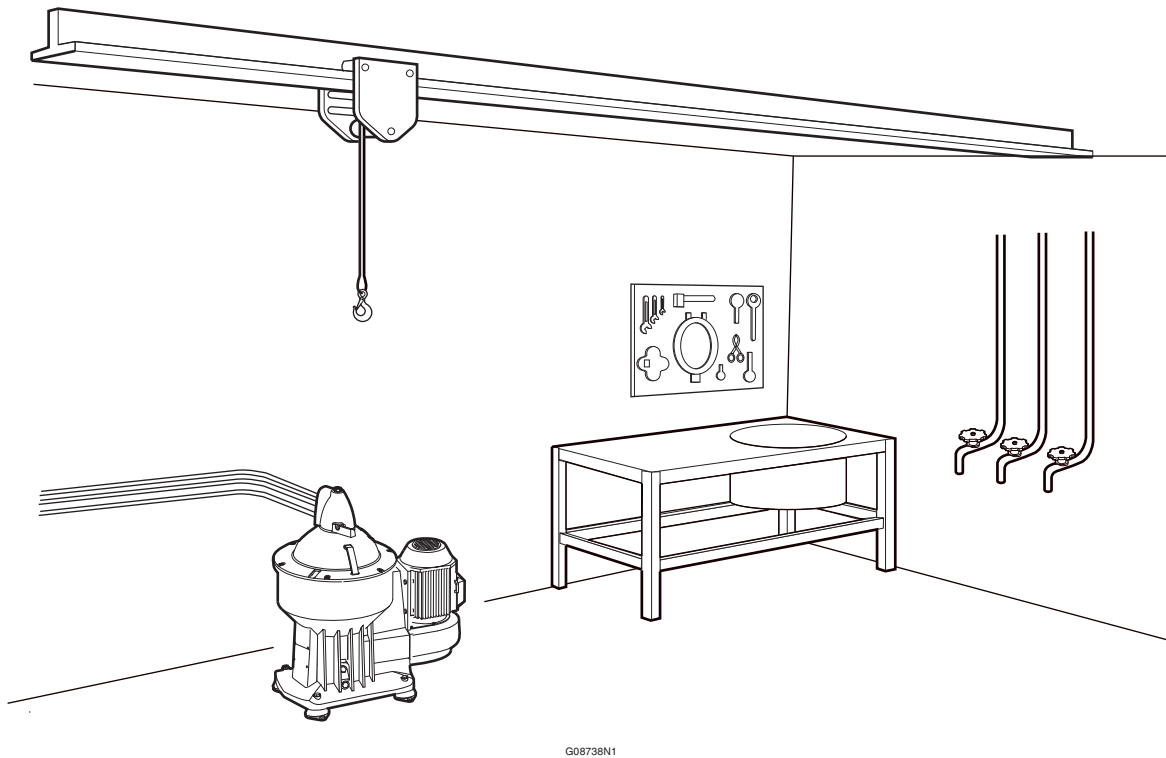
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Important measurements are:

- minimum lifting height for lifting bowl parts
- shortest distance between driving motor and wall
- space for control and operation
- free passage for dismantling and assembly
- space for maintenance work
- space on floor for machine parts during maintenance work

For more detailed information, see [8.6.1 Basic size drawing on page 194](#) and [8.6.2 Foundation drawing on page 196](#).

9.3.2 Maintenance service



A work bench should be installed in the separator room.

Hot water, compressed air and diesel oil should be available near the work bench to make maintenance work easier.

An overhead hoist with capacity of 300 kg is required for transport of bowl parts to the working bench. Lifting point should be above the centre of the separator.

NOTE

When two or more separators are installed, the lifting height should be increased to enable bowl parts from one separator to be lifted and moved over an adjoining separator.

See [8.6.2 Foundation drawing on page 196](#).

9.3.3 Connections to surrounding equipment

Local safety regulations

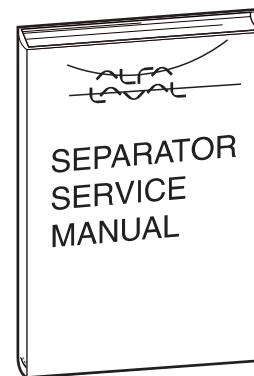
If the local safety regulations prescribe that the installation has to be inspected and approved by responsible authorities before the plant is put into service, consult with such authorities before installing the equipment and have the projected plant design approved by them.



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Service media

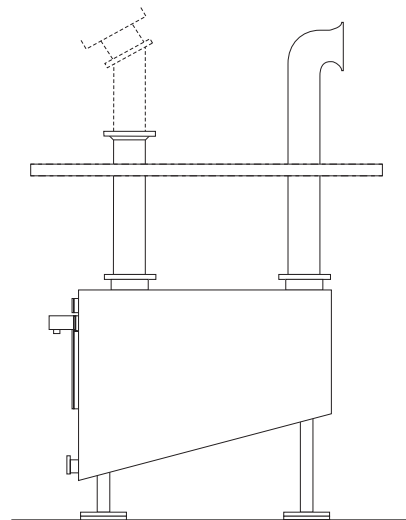
Ensure that all service media (electric power, operating and safety liquids etc.) required for the separator have the correct quality and capacity.



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Sludge discharge tank

If the sediment from the separator is discharged into a tank, this tank must be sufficiently ventilated. The connection between the separator and the tank must be of the size and configuration specified. If the solids are discharged from the separator bowl casing into a closed system, ensure that this system cannot be overfilled or closed in such a way that the solids cannot leave the bowl casing. This could cause a hazardous situation.



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9.4 Storage at out of operation

If the separator is out of operation for more than **1 month**:

1. Lift out the bowl.
2. Protect the spindle taper from corrosion by lubricating it with oil.
3. Keep the separator and bowl well stored, dry and protected from mechanical damage.

For details see [9.2.2 Protection and storage of goods on page 203](#).

9.5 Before start-up

If the separator has been out of operation for:

1 months or longer

- Pre-lubricate the spindle bearings if the ambient temperature at start up is below 25°C

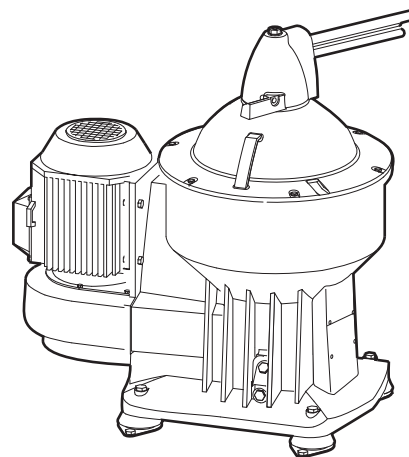
6 months or longer

- Perform an Inspection service [i] and make sure to pre-lubricate the spindle bearings.
- Change the oil before starting.

18 months or longer

- Perform an Overhaul service [o] and make sure to pre-lubricate the spindle bearings.
- Change the oil before starting.

See [6.6.4 Lubrication chart on page 163](#).



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