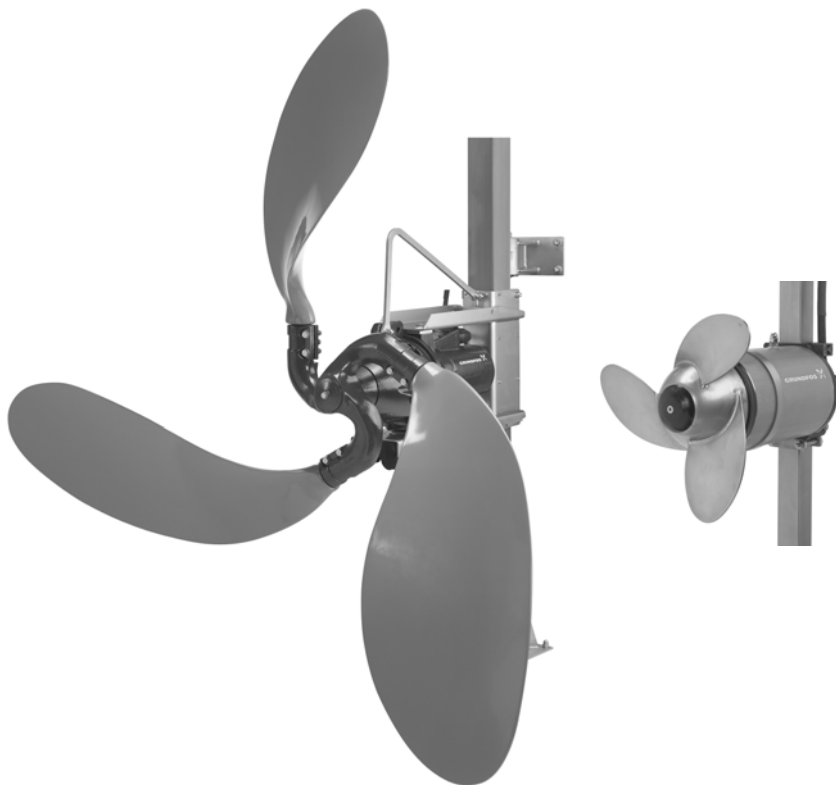

AMD, AMG, AFG

Installation and operating instructions

GB D F I E P GR NL S DK PL
RU H SI HR HR RO CZ SK EE



(GB) Declaration of Conformity

We **Grundfos** declare under our sole responsibility that the products **AMD, AMG and AFG**, to which this declaration relates, are in conformity with the Council Directives on the approximation of the laws of the EC Member States relating to

- **Machinery (98/37/EC)**
Standards used: EN ISO 12100: 2003 and EN 294: 1992.
- **Electrical equipment designed for use within certain voltage limits (73/23/EEC)**
Standards used: EN 60034 and EN 60204.
- **Electromagnetic compatibility (89/336/EEC)**
Standards used: EN 61000-6-2 and EN 61000-6-3.
- **ATEX 94/9/EC (AMD, AMG, AFG, relay ALR-20/A Ex)**
Applies only to products intended for use in potentially explosive environments and equipped with the separate ATEX approval plate and EC-type examination certificate. Further information, see below.

(F) Déclaration de Conformité

Nous **Grundfos** déclarons sous notre seule responsabilité que les produits **AMD, AMG et AFG** auxquels se réfère cette déclaration sont conformes aux Directives du Conseil concernant le rapprochement des législations des Etats membres CE relatives à

- **Machines (98/37/CE)**
Standards utilisés: EN ISO 12100: 2003 et EN 294: 1992.
- **Matériel électrique destiné à employer dans certaines limites de tension (73/23/CEE)**
Standards utilisés: EN 60034 et EN 60204.
- **Compatibilité électromagnétique (89/336/CEE)**
Standards utilisés: EN 61000-6-2 et EN 61000-6-3.
- **ATEX 94/9/CE (AMD, AMG, AFG, relais ALR-20/A Ex)**
S'applique uniquement aux pompes utilisées dans des environnements potentiellement explosifs équipées d'une plaque séparée avec norme ATEX et d'un certificat d'examen type EC. Pour plus d'informations, voir ci-après.

(E) Declaración de Conformidad

Nosotros **Grundfos** declaramos bajo nuestra única responsabilidad que los productos **AMD, AMG y AFG** a los cuales se refiere esta declaración son conformes con las Directivas del Consejo relativas a la aproximación de las legislaciones de los Estados Miembros de la CE sobre

- **Máquinas (98/37/CE)**
Normas aplicadas: EN ISO 12100: 2003 y EN 294: 1992.
- **Material eléctrico destinado a utilizarse con determinadas límites de tensión (73/23/CEE)**
Normas aplicadas: EN 60034 y EN 60204.
- **Compatibilidad electromagnética (89/336/CEE)**
Normas aplicadas: EN 61000-6-2 y EN 61000-6-3.
- **ATEX 94/9/CE (AMD, AMG, AFG, relé ALR-20/A Ex)**
Se aplica sólo a productos concebidos para su utilización en entornos potencialmente explosivos equipados con una placa independiente de homologación ATEX y certificado de prueba tipo EC. Para información adicional, ver más abajo.

(D) Konformitätserklärung

Wir **Grundfos** erklären in alleiniger Verantwortung, dass die Produkte **AMD, AMG und AFG**, auf die sich diese Erklärung bezieht, mit den folgenden Richtlinien des Rates zur Angleichung der Rechtsvorschriften der EG-Mitgliedstaaten übereinstimmen

- **Maschinen (98/37/EG)**
Normen, die verwendet wurden: EN ISO 12100: 2003 und EN 294: 1992.
- **Elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen (73/23/EWG)**
Normen, die verwendet wurden: EN 60034 und EN 60204.
- **Elektromagnetische Verträglichkeit (89/336/EWG)**
Normen, die verwendet wurden: EN 61000-6-2 und EN 61000-6-3.
- **ATEX 94/9/EG (AMD, AMG, AFG, Relais ALR-20/A Ex)**
Gilt nur für Produkte, die für den Gebrauch in potentiell explosiver Umgebung bestimmt und mit einem separaten ATEX-Typenschild und einem EG-Prüfzeugnis ausgestattet sind. Weitere Informationen, siehe unten.

(I) Dichiarazione di Conformità

Noi **Grundfos** dichiariamo sotto la nostra esclusiva responsabilità che i prodotti **AMD, AMG e AFG** ai quali questa dichiarazione se riferisce sono conformi alle Direttive del Consiglio concernente il ravvicinamento delle legislazioni degli Stati membri CE relative a

- **Macchine (98/37/CE)**
Standard usati: EN ISO 12100: 2003 e EN 294: 1992.
- **Materiale elettrico destinato ad essere utilizzato entro certi limiti di tensione (73/23/CEE)**
Standard usati: EN 60034 e EN 60204.
- **Compatibilità elettromagnetica (89/336/CEE)**
Standard usati: EN 61000-6-2 e EN 61000-6-3.
- **ATEX 94/9/CE (AMD, AMG, AFG, relé ALR-20/A Ex)**
Si riferisce solo ai prodotti per uso in ambienti potenzialmente esplosivi con targa di approvazione ATEX a parte e certificato tipo EC. Per ulteriori informazioni, vedere oltre.

(P) Declaração de Conformidade

Nós **Grundfos** declaramos sob nossa única responsabilidade que os produtos **AMD, AMG e AFG** aos quais se refere esta declaração estão em conformidade com as Directivas do Conselho das Comunidades Europeias relativas à aproximação das legislações dos Estados Membros respeitantes à

- **Máquinas (98/37/CE)**
Normas utilizadas: EN ISO 12100: 2003 e EN 294: 1992.
- **Materiais eléctricos destinados a ser utilizados dentro de certos limites de tensão (73/23/CEE)**
Normas utilizadas: EN 60034 e EN 60204.
- **Compatibilidade electromagnética (89/336/CEE)**
Normas utilizadas: EN 61000-6-2 e EN 61000-6-3.
- **ATEX 94/9/CE (AMD, AMG, AFG, relé ALR-20/A Ex)**
Aplica-se apenas a produtos cuja utilização é em ambientes potencialmente explosivos, Ex II 2G, equipados com uma chapa de aprovação ATEX e certificado tipo EC. Para mais informações consulte abaixo.

Product	Certificate No	Standards used
AMD, AMG, AFG	SEV 05 ATEX 0109 X SEV 05 ATEX 0111 X	EN 1127-1: 1997, EN 50014: 1997, EN 50018: 2000, EN 50019: 2000, EN 50020: 2002, EN 13463-1: 2001, EN 13463-5: 2003 and EN 13463-8: 2003.
ALR-20/A Ex	SEV 05 ATEX 0131	EN 1127-1: 1997, EN 50014: 1997 and EN 50020: 2002.

Notified body: Electrosuisse. No. 1258. Luppenstrasse 1, CH-8320 Fehraltorf, Switzerland.

Manufacturer: ARNOLD AG, A Grundfos Company, Industrie Nord 12, CH-6105 Schachen, Switzerland.

(GR) Δήλωση Συμμόρφωσης

Εμείς η Grundfos δηλώνουμε με αποκλειστικά δική μας ευθύνη ότι τα προϊόντα **AMD, AMG** και **AFG** συμμορφώνονται με την Οδηγία του Συμβουλίου επί της σύγκλισης των νόμων των Κρατών Μελών της Ευρωπαϊκής Ένωσης σε σχέση με τα

- **Μηχανήματα (98/37/EC)**
Πρότυπα που χρησιμοποιήθηκαν: EN ISO 12100: 2003 και EN 294: 1992.
- **Ηλεκτρικές συσκευές σχεδιασμένες για χρήση εντός ορισμένων ορίων ηλεκτρικής τάσης (73/23/EEC)**
Πρότυπα που χρησιμοποιήθηκαν: EN 60034 και EN 60204.
- **Ηλεκτρομαγνητική συμβατότητα (89/336/EEC)**
Πρότυπα που χρησιμοποιήθηκαν: EN 61000-6-2 και EN 61000-6-3.
- **ATEX 94/9/EC (AMD, AMG, AFG, rel. ALR-20/A Ex)**
Ισχύει μόνο για προϊόντα που απευθύνονται για χρήση σε δυνητικά εκρηκτικά περιβάλλοντα εφοδιασμένα με τη χωριστή πινακίδα έγκρισης ATEX και πιστοποιητικό εξέτασης τύπου EC. Για πρόσθετες πληροφορίες, βλέπε κατωτέρω.

(S) Försäkran om överensstämmelse

Vi Grundfos försäkrar under ansvar, att produkterna **AMD, AMG** och **AFG**, som omfattas av denna försäkran, är i överensstämmelse med Rådets Direktiv om inbördes närmande till EU-medlemsstaternas lagstiftning, avseende

- **Maskinell utrustning (98/37/EC)**
Använda standarder: EN ISO 12100: 2003 och EN 294: 1992.
- **Elektrisk utrustning avsedd för användning inom vissa spänningsgränser (73/23/EC)**
Använda standarder: EN 60034 och EN 60204.
- **Elektromagnetisk kompatibilitet (89/336/EEC)**
Använda standarder: EN 61000-6-2 och EN 61000-6-3.
- **ATEX 94/9/EC (AMD, AMG, AFG, rel. ALR-20/A Ex)**
Gäller endast produkter avsedda att användas i explosionsfarlig miljö utrustade med separat ATEX-godkännandeskylt och EG-typkontrollintyg. För ytterligare information, se nedan.

(PL) Deklaracja zgodności

My, Grundfos, oświadczamy z pełną odpowiedzialnością, że nasze wyroby **AMD, AMG** oraz **AFG**, których deklaracja niniejsza dotyczy, są zgodne z następującymi wytycznymi Rady d/ujednoczenia przepisów prawnych krajów członkowskich EG:

- **Maszyny (98/37/EG)**
EN ISO 12100: 2003 and EN 294: 1992.
- **Wyposażenie elektryczne do stosowania w określonym zakresie napięć (73/23/EWG)**
Zastosowane normy: EN 60034 i EN 60204.
- **Zgodność elektromagnetyczna (89/336/EWG)**
Zastosowane normy: EN 61000-6-2 i EN 61000-6-3.
- **ATEX 94/9/EG (AMD, AMG, AFG, przekaźnik ALR 20/A Ex)**
Dotyczy tylko produktów przeznaczonych do pracy w środowisku potencjalnie zagrożonym wybuchem wyposażonych w oddzielną tabliczkę znamionową ATEX i certyfikat typu EC (examination certificate) Więcej informacji na ten temat, patrz poniżej.

(NL) Overeenkomstigheidsverklaring

Wij Grundfos verklaren geheel onder eigen verantwoordelijkheid dat de producten **AMD, AMG** en **AFG** waarop deze verklaring betrekking heeft in overeenstemming zijn met de Richtlijnen van de Raad inzake de onderlinge aanpassing van de wetgevingen van de Lid-Staten betreffende

- **Machines (98/37/EG)**
Normen: EN ISO 12100: 2003 en EN 294: 1992.
- **Elektrisch materiaal bestemd voor gebruik binnen bepaalde spanningsgrenzen (73/23/EEG)**
Normen: EN 60034 en EN 60204.
- **Elektromagnetische compatibiliteit (89/336/EEG)**
Normen: EN 61000-6-2 en EN 61000-6-3.
- **ATEX 94/9/EG (AMD, AMG, AFG, relais ALR-20/A Ex)**
Is alleen van toepassing op pompen welke gebruikt worden in een explosie gevaarlijke omgeving met een afzonderlijke ATEX-goedkeurings plaatje en EC-type onderzoeks-certificaat. Voor verdere informatie, zie onderstaand.

(DK) Overensstemmelseserklæring

Vi Grundfos erklærer under ansvar, at produkterne **AMD, AMG** og **AFG**, som denne erklæring omhandler, er i overensstemmelse med Rådets direktiver om indbyrdes tilnærmelse til EF medlemsstaternes lovgivning om

- **Maskiner (98/37/EF)**
Anvendte standarder: EN ISO 12100: 2003 og EN 294: 1992.
- **Elektrisk materiel bestemt til anvendelse inden for visse spændingsgrænser (73/23/EØF)**
Anvendte standarder: EN 60034 og EN 60204.
- **Elektromagnetisk kompatibilitet (89/336/EØF)**
Anvendte standarder: EN 61000-6-2 og EN 61000-6-3.
- **ATEX 94/9/EG (AMD, AMG, AFG, rel. ALR-20/A Ex)**
Gælder kun produkter til explosionsfarlige omgivelser med et separat ATEX-godkendelseskit og EF-typeprøvningscertifikat. Yderligere oplysninger, se nedenfor.

(RU) Декларация о соответствии

Мы, фирма Grundfos, со всей ответственностью заявляем, что изделия **AMD, AMG** и **AFG**, к которым и относится данное свидетельство, отвечают требованиям следующих указаний Совета ЕС об унификации законодательных предписаний стран-членов ЕС:

- **Машиностроение (98/37/ЕС)**
Применявшиеся стандарты: EN ISO 12100: 2003 и EN 294: 1992.
- **Электрические машины для эксплуатации в пределах определенного диапазона значений напряжения (73/23/ЕЭС)**
Применявшиеся стандарты: EN 60034 и EN 60204.
- **Электромагнитная совместимость (89/336/ЕЭС)**
Применявшиеся стандарты: Евростандарт EN 61000-6-2 и EN 61000-6-3.
- **ATEX 94/9/ЕС (AMD, AMG, AFG, реле ALR-20/A Ex)**
Действительно только для изделий, разрешённых для использования в потенциально взрывоопасных условиях с маркировкой ATEX на фирменной табличке и Сертификатом (свидетельством) типовой проверки ЕС. Подробная информация представлена ниже.

Product	Certificate No	Standards used
AMD, AMG, AFG	SEV 05 ATEX 0109 X SEV 05 ATEX 0111 X	EN 1127-1: 1997, EN 50014: 1997, EN 50018: 2000, EN 50019: 2000, EN 50020: 2002, EN 13463-1: 2001, EN 13463-5: 2003 and EN 13463-8: 2003.
ALR-20/A Ex	SEV 05 ATEX 0131	EN 1127-1: 1997, EN 50014: 1997 and EN 50020: 2002.

Notified body: Electrosuisse. No. 1258. Luppmenstrasse 1, CH-8320 Fehraltorf, Switzerland.

Manufacturer: ARNOLD AG, A Grundfos Company, Industrie Nord 12, CH-6105 Schachen, Switzerland.

(H) Konformitási nyilatkozat

Mi, a **Grundfos**, egyedüli felelősséggel kijelentjük, hogy az **AMD, AMG** és **AFG** termékek, amelyekre jelen nyilatkozat vonatkozik, megfelelnek az Európai Unió tagállamainak jogi irányelveit összehangoló tanács alábbi irányelveinek:

- **Gépek (98/37/EK)**
Alkalmazott szabványok: EN ISO 12100: 2003 és EN 294: 1992.
- **Meghatározott feszültség határokön belül használt elektromos eszközök (73/23/EGK)**
Alkalmazott szabványok: EN 60034 és EN 60204.
- **Elektromágneses összeférhetőség (89/336/EGK)**
Alkalmazott szabványok: EN 61000-6-2 és EN 61000-6-3.
- **ATEX 94/9/EG (AMD, AMG, AFG, ALR-20A Ex relé)**
Azon szivattyú típusokra vonatkozik, melyek potenciónálisan robbanásveszélyes környezetben telepíthetők és el vannak látva egy további ATEX jelzésű adattáblával, valamint rendelkeznek EC típusú vizsgálati bizonylattal is. További információ, lásd lejjebb.

(HR) Izjava o usklađenosti

Mi, **Grundfos**, izjavljujemo uz punu odgovornost, da su proizvodi **AMD, AMG** i **AFG**, na koje se ova izjava odnosi, sukladni smjernicama Savjeta za prilagodbu propisa država-članica EZ:

- **Strojevi (98/37/EZ)**
Korištene norme: EN ISO 12100: 2003 i EN 294: 1992.
- **Električni pogonski uređaji za korištenje unutar određenih granica napona (73/23/EEZ)**
Korištene norme: EN 60034 i EN 60204.
- **Elektromagnetska kompatibilnost (89/336/EEZ)**
Korištene norme: EN 61000-6-2 i EN 61000-6-3.
- **ATEX 94/9/EZ (AMD, AMG, AFG, relej ALR-20/A Ex)**
Odnosi se samo na proizvode namijenjene uporabi u potencijalno eksplozivnom okruženju opremljene s dodatnom ATEX pločicom i certifikatom EC o ispitivanju. Više informacija potražite niže u tekstu.

(RO) Declarație de conformitate

Noi, **Grundfos**, declarăm asumându-ne întreaga responsabilitate că produsele **AMD, AMG, AFG** la care se referă această declarație sunt în conformitate cu Directivale Consiliului în ceea ce privește alinierea legislațiilor Statelor Membre ale CE, referitoare la:

- **Utilaje (98/37/CE)**
Korišćeni standardi: EN ISO 12100: 2003 și EN 294: 1992.
- **Echipamente electrice destinate utilizării între limite exacte de tensiune (73/23/CEE)**
Standarde aplicate: EN 60034 și EN 60204.
- **Compatibilitate electromagnetică (89/336/CEE)**
Standarde aplicate: EN 61000-6-2 și EN 61000-6-3.
- **ATEX 94/9/CE (AMD, AMG, AFG, releu ALR-20/A Ex)**
Se aplică doar produselor care se pot folosi în medii cu potențial explozibil și sunt conțin plăcuță separată de certificare ATEX și certifi cat de examinare de tip EC. Mai multe informații, vezi mai jos.

(SI) Izjava o ustreznosti

Mi, **Grundfos**, pod polno odgovornostjo izjavljamo, da so izdelki **AMD, AMG** in **AFG**, na katere se ta izjava nanaša, v skladu z naslednjimi smernicami Sveta za uskladitev pravnih predpisov držav članic Evropske skupnosti:

- **Stroji (98/37/EG)**
Uporabljeni normi: EN ISO 12100: 2003 in EN 294: 1992.
- **Električna pogonska sredstva za uporabo v določenih napetostnih mejah (73/23/EWG)**
Uporabljeni normi: EN 60034 in EN 60204.
- **Elektromagnetna kompatibilnost (89/336/EWG)**
Uporabljeni normi: EN 61000-6-2 in EN 61000-6-3.
- **ATEX 94/9/EG (AMD, AMG, AFG, rele ALR-20/A Ex)**
Velja samo za proizvode namenjene uporabi v potencialno eksplozivnih okoljih opremljene z dodatno tipsko ploščico z ATEX odobritvijo in certifikatom ES o skladnosti tipa. Za več informacij glejte spodaj.

(SER) Izjava o konformitetu

Mi, **Grundfos**, izjavljujemo pod potpunom odgovornošću da su proizvodi **AMD, AMG** i **AFG** na koje se odnosi ova izjava u saglasnosti sa smernicama i uputstvima Saveta za usaglašavanje pravnih propisa članica Evropske unije:

- **Mašine (98/37/EG)**
Korišćeni standardi: EN ISO 12100: 2003 i EN 294: 1992.
- **Električna oprema razvijena za korišćenje unutar određenih naponskih granica (73/23/EWG)**
Korišćeni standardi: EN 60034 i EN 60204.
- **Elektromagnetna usaglašenost (89/336/EWG)**
Korišćeni standardi: EN 61000-6-2 i EN 61000-6-3.
- **ATEX 94/9/EG (AMD, AMG, AFG, relej ALR-20/A Ex)**
Primenjuje se samo na proizvode namenjene upotrebi u potencijalno eksplozivnim okolinama opremljene sa dodatnom ATEX pločicom i EC-tip ispitnim certifikatom. Više informacija potražite u tekstu dole.

(CZ) Prohlášení o konformitě

My firma **Grundfos** prohlašujeme na svou plnou odpovědnost, že výrobky **AMD, AMG** a **AFG** na něž se toto prohlášení vztahuje, jsou v souladu s ustanoveními směrnice Rady pro sblížení právních předpisů členských států Evropského společenství v oblastech:

- **Strojirenství (98/37/EG)**
Použitě normy: EN ISO 12100: 2003 a EN 294: 1992.
- **Provozování spotřebičů v toleranci napětí (73/23/EWG)**
Použitě normy: EN 60034 a 60204.
- **Elektromagnetická kompatibilita (89/336/EWG)**
Použitě normy: EN 61000-6-2 a EN 61000-6-3.
- **ATEX 94/9/EG (AMD, AMG, AFG, relej ALR-20/A Ex)**
Platí pouze pro výrobky určené pro použití v potenciálně výbušném prostředí opatřené samostatným typovým štítkem s označením ATEX a certifikátem o zkoušce typu EC. Další informace jsou uvedeny níže.

Product	Certificate No	Standards used
AMD, AMG, AFG	SEV 05 ATEX 0109 X SEV 05 ATEX 0111 X	EN 1127-1: 1997, EN 50014: 1997, EN 50018: 2000, EN 50019: 2000, EN 50020: 2002, EN 13463-1: 2001, EN 13463-5: 2003 and EN 13463-8: 2003.
ALR-20/A Ex	SEV 05 ATEX 0131	EN 1127-1: 1997, EN 50014: 1997 and EN 50020: 2002.

Notified body: Electrosuisse, No. 1258, Luppmenstrasse 1, CH-8320 Fehraltorf, Switzerland.

Manufacturer: ARNOLD AG, A Grundfos Company, Industrie Nord 12, CH-6105 Schachen, Switzerland.

(SK) Prehlásenie o konformite

My firma **Grundfos**, na svoju plnú zodpovednosť prehlasujeme, že výrobky **AMD, AMG, AFG**, na ktoré sa toto prehlásenie vzťahuje, sú v súlade s nasledovnými smernicami Rady pro zblíženie právnych predpisov členských zemí Európskej únie:

- **Stroje (98/37/EG)**
Použité normy: EN ISO 12100: 2003 a EN 294: 1992.
- **Elektrické prevádzkové prostriedky, použité v určitom napätovom rozsahu (73/23/EWG)**
Použité normy: EN 60034 a EN 60204.
- **Elektromagnetická kompatibilita (89/336/EWG)**
Použité normy: EN 61000-6-2 a EN 61000-6-3.
- **ATEX 94/9/EG (AMD, AMG, AFG, relé ALR-20/A Ex)**
Platí iba pre výrobky určené pre použitie v potenciálne výbušnom prostredí vybavené samostatným typovým štítkom s označením ATEX a certifikátom o skúške typu EC. Ďalšie informácie sú uvedené nižšie.

(EE) Vastavuse deklaratsioon

Meie **Grundfos** deklareerime enda ainuvastutusel, et toode **AMD, AMG** ja **AFG**, mille kohta käesolev juhend käib, on vastavuses EL nõukogu Direktiividega EMÜ liikmesriikide seaduste ühitamise kohta, mis käsitlevad:

- **Masinad (98/37/EC)**
Kasutatud standardid: EN ISO 12100: 2003 ja EN 294: 1992.
- **Madalapinge-elektriseadmed (73/23/EEC)**
Kasutatud standardid: EN 60034 ja 60204.
- **Elektrimagnetilist ühilduvust (89/336/EEC)**
Kasutatud standardid: EN 61000-6-2 ja EN 61000-6-3.
- **ATEX 94/9/EC (AMD, AMG, AFG, relé ALR-20/A Ex)**
Kehtib ainult toodetele, mis on mõeldud kasutamiseks potentsiaalselt plahvatusohtlikus keskkonnas ja varustatud eraldi ATEX tunnustuse sildikuga ja EC-tüüpi kontrollsertifikaadiga. Täiendav info, vaata alla.

Bjerringbro, 15th December 2006



Peter Jungklas Nybo
Technical Manager

Product	Certificate No	Standards used
AMD, AMG, AFG	SEV 05 ATEX 0109 X SEV 05 ATEX 0111 X	EN 1127-1: 1997, EN 50014: 1997, EN 50018: 2000, EN 50019: 2000, EN 50020: 2002, EN 13463-1: 2001, EN 13463-5: 2003 and EN 13463-8: 2003.
ALR-20/A Ex	SEV 05 ATEX 0131	EN 1127-1: 1997, EN 50014: 1997 and EN 50020: 2002.

Notified body: Electrosuisse. No. 1258. Luppenstrasse 1, CH-8320 Fehraltorf, Switzerland.

Manufacturer: ARNOLD AG, A Grundfos Company, Industrie Nord 12, CH-6105 Schachen, Switzerland.

AMD, AMG, AFG

Installation and operating instructions	8	GB
Montage- und Betriebsanleitung	29	D
Notice d'installation et d'entretien	52	F
Istruzioni di installazione e funzionamento	74	I
Instrucciones de instalación y funcionamiento	95	E
Instruções de instalação e funcionamento	117	P
Οδηγίες εγκατάστασης και λειτουργίας	138	GR
Installatie- en bedieningsinstructies	161	NL
Monterings- och driftsinstruktion	182	S
Monterings- og driftsinstruktion	202	DK
Instrukcja montażu i eksploatacji	222	PL
Руководство по монтажу и эксплуатации	245	RU
Szerelési és üzemeltetési utasítás	274	H
Navodila za montažo in obratovanje	296	SI
Montažne i pogonske upute	317	HR
Montažne i pogonske upute	339	HR
Instrucțiuni de instalare și utilizare	362	RO
Montážní a provozní návod	383	CZ
Návod na montáž a prevádzku	405	SK
Paigaldus- ja kasutusjuhend	428	EE

CONTENTS

GB

	Page
1. General description	8
1.1 Applications	8
1.2 Technical data	9
1.3 Potentially explosive environments	9
2. Type key and nameplates	10
2.1 Type key	10
2.2 Nameplate	10
2.3 Ex certification and classification	10
3. Safety	11
3.1 General safety instructions	11
3.2 Explosion-proof versions	11
4. Transportation and storage	12
4.1 Transportation	12
4.2 Storage	12
5. Installation	12
5.1 Positioning	12
5.2 Installation instructions	14
6. Electrical connection	16
6.1 Motor protection	17
6.2 Gearbox/shaft seal housing protection	17
6.3 Overload relays	18
6.4 Starting method	18
6.5 Wiring diagrams	19
6.6 Block diagram	20
6.7 Direction of rotation	20
6.8 Protection from electro-chemical corrosion	20
7. Frequency converter operation (AMD.xx.45.xxx.E)	20
8. Start-up	22
9. Service	22
9.1 Explosion-proof mixers and flowmakers	22
9.2 Contaminated mixer or flowmaker	22
9.3 Service chart	23
9.4 Oil	24
9.5 Oil change	25
10. Fault finding	25
10.1 Fault finding chart	26
11. Technical data	28
11.1 Motor	28
11.2 Gearbox	28
11.3 Shaft seals	28
11.4 Propeller	28
11.5 Sound pressure level	28
12. Disposal	28



Prior to installation, read these installation and operating instructions. Installation and operation must comply with local regulations and accepted codes of good practice.

1. General description

This booklet includes instructions for installation, operation and maintenance of Grundfos AMD and AMG mixers and AFG flowmakers which are designed for applications involving the mixing, i.e. the homogenization and suspension, of liquids of low to medium viscosity (≤ 500 mPas).

The mixers are fitted with motors of 1.5 to 18.5 kW.

The flowmakers are fitted with motors of 1.5 to 4.0 kW.

This booklet also includes specific instructions for explosion-proof mixers and flowmakers.

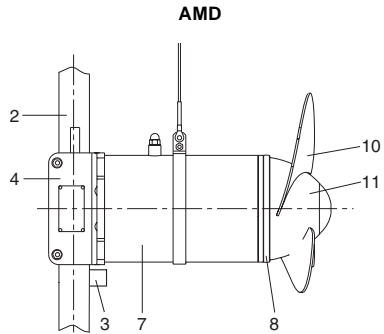


Fig. 1

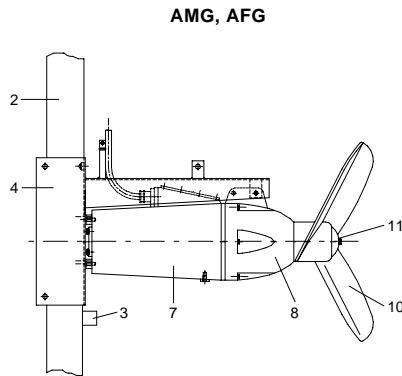


Fig. 2

Pos.	Description
2	Column profile tube
3	Depth blocker
4	Motor bracket
7	Motor housing
8	AMD: Shaft seal housing AMG, AFG: Gearbox
10	Propeller
11	Hub

1.1 Applications

Grundfos mixers and flowmakers are designed for mixing applications in:

- municipal and industrial wastewater treatment,
- industrial processes,
- sludge treatment,
- agriculture.

In order not to overload the mixers and flowmakers and expose them to corrosion, the following liquid limitations must be observed.

Liquid temperature	5 to 40°C
pH value	4 to 10
Maximum sludge index	125 ml/g
Maximum dynamic viscosity	500 mPas
Maximum density	1060 kg/m ³
Chloride content	≤200 mg/l (for stainless steel 1.4306)
Chloride content	≤1000 mg/l (for stainless steel 1.4404)

For the mixing of liquids with a dry solids content (DS) exceeding the values stated below, please contact Grundfos.

Mixers:

Mixers are suitable for applications involving sludge with a typical dry solids content as stated in the table below. Mixers are also suitable for a wide range of other applications involving similar liquids such as slurry and paper pulp.

Activated sludge	0.5% DS
Selector zones	0.5% DS
Anoxic zones	0.5% DS
Bivalent zones	0.5% DS
Anaerobic zones	0.5% DS
Primary sludge	≤3% DS
Secondary sludge	≤6% DS
Digested sludge	≤8% DS
Pump sump without screen	≤2% DS
Pump sump with sand	≤2% DS

Flowmakers:

Flowmakers are suitable for activated sludge with a typical dry solids content of 0.5 to 1.0% and for other liquids with a dry solids content of maximum 1.5%.

1.2 Technical data

Voltage tolerance	+6/–10% of nameplate value Ex-versions: ±5%
Enclosure class	IP 68
Insulation class	F
Maximum installation depth	20 metres below liquid level
Maximum number of starts per hour	20
Supply cable length	8 metres (standard)
Wire length on all winches	8 metres (standard)

The mixers and flowmakers are designed for continuous operation (S1).

1.3 Potentially explosive environments

Use explosion-proof Grundfos mixers or flowmakers in potentially explosive environments.



The explosion protection classification of the mixer or flowmaker is EEx de IIC T4 or EEx e ck IIC T3.

The classification of the installation must in each individual case be approved by the local authorities.



If the mixer or flowmaker is used in environments requiring temperature class T4, the mixer or flowmaker must not be dismantled until it has been off circuit for at least 30 minutes.

Type	Ex class
AMD.15.45B.710.E	
AMD.25.45B.690.E	
AMD.35.45B.705.E	
AMD.45.45B.675.E	EEx de IIC T4
AMD.20.45.700.E	
AMD.30.45.710.E	
AMD.40.45.695.E	
AMG.15.40.340.E	
AMG.22.45.336.E	
AMG.30.47.338.E	
AMG.40.52.334.E	
AMG.55.50.344.E	
AMG.75.58.343.E	
AMG.110.68.342.E	
AMG.150.73.355.E	
AMG.185.78.356.E	
AFG.15.130.79.E	
AFG.22.130.78.E	EEx e ck IIC T3
AFG.30.130.95.E	
AFG.40.130.94.E	
AFG.13.180.30.E	
AFG.18.180.34.E	
AFG.24.180.39.E	
AFG.37.180.46.E	
AFG.15.230.23.E	
AFG.22.230.26.E	
AFG.30.230.30.E	
AFG.40.230.34.E	

2. Type key and nameplates

2.1 Type key

Example	A	M	G	.22	.45	.325
Type range						
Version: M = Mixer F = Flowmaker						
Drive: D = Direct G = Gear						
Power output, P_2 [kW] x 10						
Propeller diameter [cm] = Biology and sludge B = Biology*						
Propeller speed [min^{-1}] E = Explosion-proof version						

* Only for liquids with a dry solids content $\leq 1.5\%$.

2.2 Nameplate

All mixers and flowmakers can be identified by means of the nameplate on the motor housing. The details on the nameplate are required for ordering of spare parts.

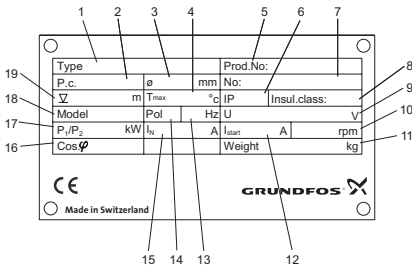


Fig. 3

TM03 0315 4804

Pos. Description

- 1 Type designation
- 2 Production code
- 3 Propeller diameter
- 4 Maximum temperature
- 5 Product number
- 6 Enclosure class according to IEC
- 7 Serial number
- 8 Insulation class
- 9 Rated voltage
- 10 Rated speed (propeller)
- 11 Weight
- 12 Locked-rotor current
- 13 Frequency
- 14 Number of poles
- 15 Rated current
- 16 Power factor
- 17 Motor power, P_1/P_2
- 18 Model
- 19 Maximum installation depth

The additional nameplate supplied with the mixer/flowmaker should be fixed in a visible position at the installation site.

2.3 Ex certification and classification

The mixers and flowmakers designed for application in potentially explosive environments (Ex versions) are supplied with a nameplate with certification details.

Figure 4 shows the nameplate of explosion-proof direct-driven mixers.

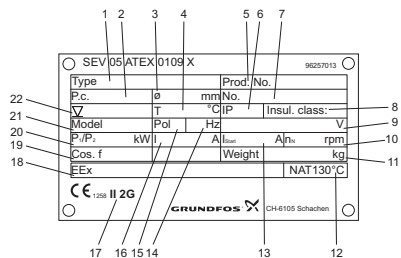


Fig. 4

Figure 5 shows the nameplate of explosion-proof gear-driven mixers and flowmakers.

TM03 1719 2805

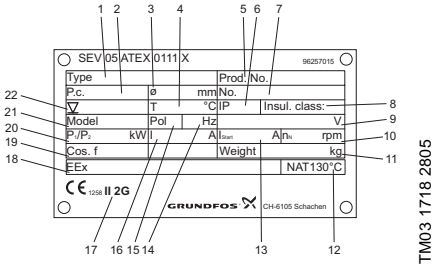


Fig. 5

Pos.	Description
1	Type designation
2	Production code
3	Propeller diameter
4	Maximum temperature
5	Product number
6	Enclosure class according to IEC
7	Serial number
8	Insulation class
9	Rated voltage
10	Rated speed (propeller)
11	Weight
12	Maximum surface temperature
13	Locked-rotor current
14	Frequency
15	Number of poles
16	Rated current
17	ATEX category
18	ATEX approval class
19	Power factor
20	Motor power, P ₁ /P ₂
21	Model
22	Maximum installation depth

Key to certification details:

EEEx	Motor explosion-proof according to European standard
e	For increased safety according to EN 50 019
o	For oil immersion according to EN 50 015
II	Designed for application in potentially explosive environments, except for mines
T1	Maximum surface temperature of the motor is 435°C/300°C
T2	Maximum surface temperature of the motor is 300°C
T3	Maximum surface temperature of the motor is 200°C
T4	Maximum surface temperature of the motor is 135°C

3. Safety

3.1 General safety instructions



These safety instructions as well as the instructions in each individual section must be followed when transporting, storing, handling and operating the mixer or flowmaker.

The mixer or flowmaker must be installed, connected, started up and serviced by qualified persons. Beware of rotating parts.

It must be ensured that persons cannot accidentally fall into the tank, e.g. by installing a cover or railing.

3.2 Explosion-proof versions



When using explosion-proof mixers or flowmakers, the following safety regulations must also be observed.

Equipotential bonding:

If two or more mixers or flowmakers are installed in the same tank, they must be interconnected by means of a copper cable of min. 4 mm² via the equipotential bonding terminals on the back of the motors. The cable must be fixed in such a way that it cannot be caught in the propeller during operation.

Leak sensor:

Together with the Grundfos relay, type ALR-20/A, the leak sensor forms the basis of the Ex approval. The relay must therefore always be installed together with explosion-proof mixers and flowmakers. The relay must be ordered separately.

Part number: 96489569.

The leak sensor is oil-encapsulated and not intrinsically safe. Therefore, it must **not** be connected via blue leads.

Temperature monitoring:

The motor temperature must always be monitored via the built-in PTC sensors.

Supply cable:

The factory-fitted supply cable must not be shortened.

Soft starter and frequency converter:

Soft starters and frequency converters must not be used. The motor must only be operated on mains supply.

Accessories:

The mixer or flowmaker must only be used together with accessories supplied and approved by Grundfos.

Maintenance, service and repair:

The mixer or flowmaker must only be dismantled by Grundfos or an authorized service workshop. This also applies to the cable entry.

It is only allowed to use components produced by Grundfos for repair purposes.

Service log

Spare parts etc. must be registered in a service log in order to have a 100 percent traceability during the product life.

4. Transportation and storage**4.1 Transportation**

The individual components of the mixer or flowmaker must be packed carefully to prevent any damage to the surface protection during transportation.

4.2 Storage

Mixers or flowmakers must be stored in a dry location in which the temperature is not subject to major fluctuations.

If the mixer or flowmaker has to be stored for more than one year, the gearbox oil must be changed. The oil must be changed even if the unit has never been in use. This is necessary because of natural aging of mineral oil lubricants.

5. Installation

During installation, the mixer or flowmaker must only be lifted when using the suspension point.

The lifting equipment supplied with the unit as well as the chain or wire used for lifting and lowering the mixer or flowmaker into the tank must not be used as universal lifting equipment.

Note: Never hang the mixer or flowmaker by the supply cable. See section 11. *Technical data* for details about weight.

5.1 Positioning

Correct positioning of mixers and flowmakers is essential to ensure trouble-free operation and long life.

The following guidelines must be observed:

Mixers:

The mixer should be submerged as deep as possible.

- The mixer should be placed in such a way that a good mixing of the liquid in the entire tank is obtained. If more mixers are installed in the same tank, the mixers must not generate opposite flows.
- The distance between the propeller tip and the bottom of the tank should be 20-40 cm, H_{MIN} in fig. 6.
- The distance from the propeller tip to the liquid surface should be at least half the propeller diameter, H_{ABOVE} in fig. 6.
- The distance between the propeller tip and the wall behind the mixer must be at least twice the propeller diameter, L_{MIN} in fig. 6.

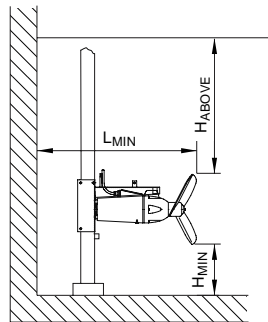
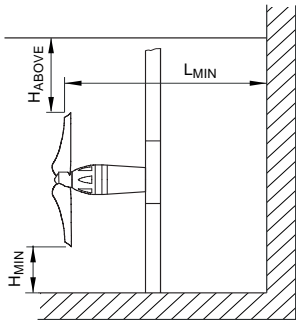


Fig. 6

Flowmakers:

The flowmaker should be submerged as deep as possible.

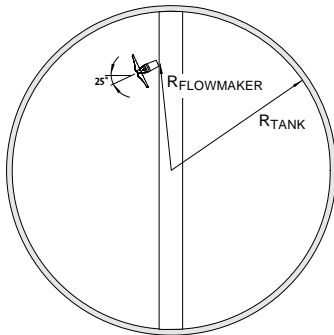
- The distance between the propeller tip and the bottom of the tank should be 40-50 cm, H_{MIN} in fig. 7.
- The distance from the propeller tip to the liquid surface should be at least 0.75 times the propeller diameter, H_{ABOVE} in fig. 7.
- The distance between the propeller tip and the wall behind the flowmaker must be at least twice the propeller diameter, L_{MIN} in fig. 7.
- The sideways distance between the propeller tip and the tank wall must be at least 0.5 metres.
- If more flowmakers are installed in parallel, the distance between their propellers must be larger than half the propeller diameter.
- The distance to tank bends should be at least twice the propeller diameter.
- The distance from the propeller to aeration areas should be at least 1-3 times the propeller diameter.



TM02 5417 4802

Fig. 7

- In round tanks, the flowmaker should be placed 30% of the tank radius, R_{TANK} , from the wall and it should be turned 25° from the radius, $R_{FLOW-MAKER}$, towards the centre, see fig. 8.



TM02 5422 3202

Fig. 8

5.2 Installation instructions

Two types of installation are possible:

- Open installation, i.e. without a cover on top of the tank.
- Sealed installation, i.e. with a cover on top of the tank.

Figure 9 shows an open installation.

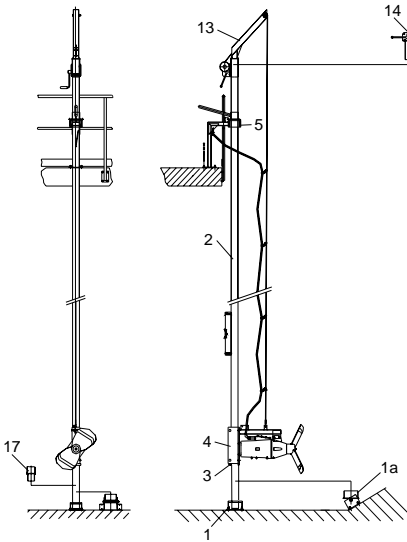


Fig. 9

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Figure 10 shows a sealed installation with pull and safety chain and crane with chain hoist.

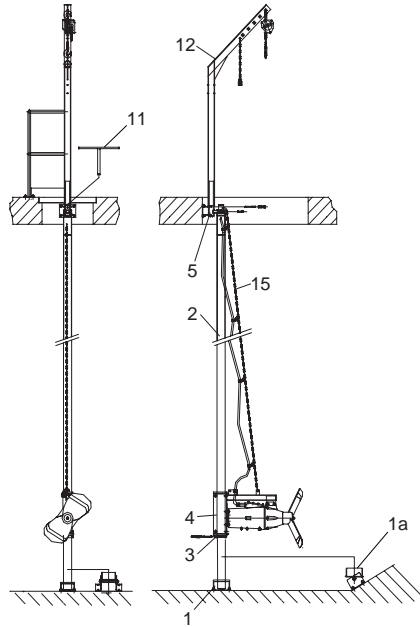


Fig. 10

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Explanation to figures 9 and 10:

Pos.	Description
1	Fixation base, horizontal
1a	Fixation base, inclined (0-90°)
2	Column profile tube
3	Depth blocker
4	Motor bracket
5	Top fixation bracket
11	Turning key for column profile tube
12	Crane with chain hoist
13	Crane boom with winch
14	Stand with winch
15	Pull and safety chain
17	Reduction piece (120 to 100 mm)

5.2.1 Torques

All nuts and screws used for the installation must be in AISI 316L. All stainless steel threads must be greased in advance, e.g. by an ALU-paste.

All stainless steel nuts and screws should be tightened to the following torques:

	Screws F-Class 70	Screws F-Class 80
M6	8.8 Nm	11.8 Nm
M8	21.4 Nm	28.7 Nm
M10	44 Nm	58 Nm
M12	74 Nm	100 Nm
M16	183 Nm	245 Nm
M20	370 Nm	494 Nm

5.2.2 AMD and AMG mixers

See fig. 9 or 10 and section 5.2.1 *Torques*.

Proceed as follows:

1. Drill the holes for the mounting screws for the top fixation bracket in the concrete.
2. Fit the top fixation bracket. Insert the screws, but leave loose.
3. Place the fixation base in the right position using a plummet.
4. Drill the holes for the mounting screws for the fixation base.
5. Fit the fixation base. Insert the screws, but leave loose.
6. Position and align the column profile tube.

Shorten it to the correct length:

In the case of an **open installation** with a railing and a crane boom with winch, cut the column profile tube approx. 600 mm above the railing.

In the case of an **open installation** with a railing and a stand with winch, cut the column profile tube approx. 300 mm above the railing.

In the case of a **sealed installation**, cut the column profile tube so that the collar of the epoxy insulator does not touch the top fixation bracket. Adapt the outside of the square epoxy insulator to the inside of the column profile tube. The epoxy insulator must fit tightly inside the column profile tube.

7. Fasten the depth blocker in the right position.
8. Tighten the screws for the top fixation bracket.
9. Align the column profile tube and tighten the screws for the fixation base.
10. Position the turntable for the column profile tube.
It must be ensured that the mixer cannot be turned so much that the propeller touches the tank wall.
11. Position the crane over the column profile tube (open installation) or in the top fixation bracket (sealed installation).

12. Lift the complete mixer (motor bracket with motor) with the crane, slide it over the column profile tube and tighten the fixing screws. Check that the fixing screws and spacing pipes are fitted correctly and tightened, see fig. 11.

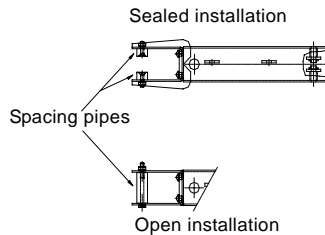


Fig. 11

Lifting equipment is absolutely essential for fitting the motor bracket onto the column profile tube. The weight of the individual unit can be found in the table on page 449.

13. Slowly lower the mixer into the tank using the crane and the pull and safety wire. Fit all the cable clamps and wire clamps one after the other. Attach the cable to the wire or chain at one-metre intervals. Attach the upper snap hook to the top fixation bracket.

Attach the supply cable to the wire or chain 800 mm above the mixer so that the cable cannot fall down and be caught in the propeller during operation.

- On the drum of the winch at least three turns of wire must remain, otherwise the wire may break loose from the drum fixation.
- The supply cable must under no circumstances be under tension. This also applies when the mixer is swung out.
- As a principle, the supply cable should be laid out in a large circle during installation to avoid sharp bends (breaking) of the cable.
- The pull and safety wire should be used as a relief for the supply cable. For this reason, it must always be pre-tensioned to approx. 250 N (~25 kg).

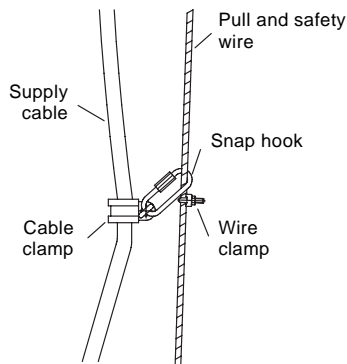


Fig. 12

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14. When the motor bracket rests on the depth blocker, the distance between the propeller and the wall and the bottom of the tank must be checked. The mixer must under no circumstances touch other installations, bottom or wall. This also applies when the mixer is swung out.
15. In the case of a **sealed installation**, position the mixer by fixing the turntable or tightening the screws of the clamp. For this installation type, 1.5 metres extra chain must be available for lifting the mixer.

5.2.3 AFG flowmakers

See fig. 9 or 10 and section 5.2.1 *Torques*.

Proceed as follows:

1. Drill the holes for the mounting screws for the top fixation bracket in the concrete.
2. Fit the top fixation bracket. Insert the screws, but leave loose.
3. Place the bottom plate in the right position using a plummet.
4. Drill the holes for the mounting screws for the bottom plate in the bottom of the tank and insert the screws.
5. Shorten the column profile tube to the correct length so that the collar of the epoxy insulator does not touch the top fixation bracket. Adapt the outside of the square epoxy insulator to the inside of the column profile tube. The epoxy insulator must fit tightly inside the column profile tube.
6. Place the depth blocker in the right position and weld it on the column profile tube in a workshop.
7. Install the column profile tube.
8. Tighten the screws for the top fixation bracket and the bottom plate.
9. Fit the top fixation bracket to the column profile tube by means of the clamps.
10. Fit the relief wire for the supply cable to the motor bracket.
11. Position the crane in the top fixation bracket.
12. Lift the complete flowmaker (motor bracket with motor), slide it over the column profile tube and check that the fixing screws have been tightened.

Lifting equipment is absolutely essential for fitting the motor bracket onto the column profile tube. The weight of the individual unit can be found in the table on page 449.

13. Slowly lower the flowmaker into the tank using the crane and the pull and safety wire. Fit all the cable clamps and wire clamps one after the other. Attach the cable clamps at approx. one-metre intervals.

- On the drum of the winch at least three turns of wire must remain, otherwise the wire may break loose from the drum fixation.
- The supply cable must under no circumstances be under tension.
- As a principle, the supply cable should be laid out in a large circle during installation to avoid sharp bends (breaking) of the cable.

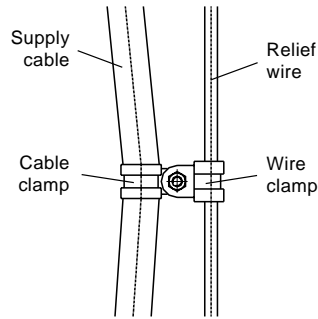


Fig. 13

14. When the motor bracket rests on the depth blocker, the distance between the propeller and the wall and bottom of the tank must be checked. See section 5.1 *Positioning*.

Note: Remember to remove the hook when the flowmaker has been submerged in the tank, as otherwise the wire might be caught by the flowmaker.

15. Fasten the relief wire to the top fixation bracket and pre-tension the wire to approx. 250 N (~25 kg).

6. Electrical connection

All electrical connections must be carried out by a qualified electrician in accordance with local regulations.

All currently valid national and local regulations relating to safety and accident prevention must be observed.



Before making any electrical connections, make sure that the fuses have been removed or the mains switch has been switched off. It must be ensured that the electricity supply cannot be accidentally switched on.



The explosion protection classification of the mixer or flowmaker is EEx de IIC T4 or EEx e ck IIC T3.

The classification of the installation must in each individual case be approved by the local authorities.

The safety instructions in section 3.2 *Explosion-proof versions* must be observed.

The supply voltage and frequency are marked on the mixer or flowmaker nameplate. Make sure that the mixer or flowmaker is suitable for the electricity supply available at the installation site.

The mixer or flowmaker is supplied complete with a mains supply cable of 8 metres (standard length, suitable for tanks up to 5 metres deep).

Note the following:

- If the motor is marked with 230/400 V, it must be connected in star if the mains voltage is 400 V.
- If the motor is marked with 400/690 V, it must be connected in delta if the mains voltage is 400 V.

Three-phase motors

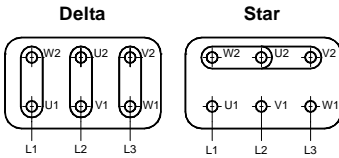


Fig. 14

6.1 Motor protection

The mixers and flowmakers are provided with the following type of motor protection:

Standard mixers incorporate three bimetallic PTO thermal switches (PTO = Protection Thermique à Ouverture), see fig. 18.

Explosion-proof mixers and all flowmakers incorporate three PTC sensors (temperature sensors) according to DIN 44 081, see fig. 19.

Function of thermal switches:

The motor is protected against overheating by three thermal switches connected in series, one switch in each winding.

When the maximum winding temperature is reached, the switch will open the circuit and stop the motor.

When the windings have cooled to normal temperature, the switch will close the circuit and the motor can be restarted. Manual restarting is necessary.

See wiring diagram in fig. 18, section 6.5 *Wiring diagrams*.

F6: Thermal switches:

- 2 leads (terminals 11 and 12).
- Maximum operating voltage of switch: 250 V.
- Maximum switching current: 2.5 A at $\cos \varphi = 1$.
- Cutting-out temperature: 130°C.

Function of PTC sensors:

When overheated, the motor will stop. Automatic restarting is not permitted in such cases. This requires a thermistor trigger unit with a reconnection suppressor in the control circuit of the motor contactor.

See wiring diagram in fig. 19, section 6.5 *Wiring diagrams*.

ϑ1, ϑ2, ϑ3: PTC sensors:

- 2 leads (terminals 31 and 32).
- Maximum voltage at the terminals: $U_{\max.} = 2.5 \text{ V}$ (AC/DC).
- Resistance between terminals 31 and 32:
 - at room temperature $R = 300$ to $750 \ \Omega$
 - at cutting-out temperature $R \geq 4000 \ \Omega$

Note: For transmission tests at terminals 31 and 32, the test voltage must not exceed 2.5 V (AC/DC). Use an ohmmeter for the test.



Explosion-proof mixers must be protected against too high temperature by means of PTC sensors. The sensors must be connected to a certified signal converter.

6.2 Gearbox/shaft seal housing protection

The gearbox/shaft seal housing is monitored for the ingress of water by a leak sensor incorporated in the gearbox/shaft seal housing.

If the monitoring function is required, the leak sensor must be connected to a Grundfos relay, type ALR-20/A. The ALR-20/A relay must be ordered separately. Part number: 96489569.



Explosion-proof pumps must be connected to a Grundfos relay, type ALR-20/A Ex. Classification: EEx ib IIC.
110 V: Part no. 96257430.
230 V: Part no. 96257400.

Note: The cable between the relay and the mixer/flowmaker must be maximum 50 metres. An external alarm indicator, if any, must be connected to the potential-free output, terminals 1 and 3 or 4, respectively. Maximum load: 48 V, 1 A.

When the ALR-20/A relay is connected, a current of up to 10 mA will flow through the leak sensor (terminals 21 and 22) in case water penetrates into the oil chamber. The relay triggers an alarm signal and/or switches off the motor.

See wiring diagram in fig. 18 or 19, section 6.5 *Wiring diagrams*.

B: Leak sensor:

- 2 leads (terminals 21 and 22).
- Maximum operating voltage: Approx. 8.6 V.
- Maximum current: 1 to 10 mA.

To adjust the sensitivity of the ALR-20/A relay, proceed as follows:

1. Turn the adjusting screw on the relay (pos. a) until the indicator light (pos. b) illuminates.
2. Turn the adjusting screw in the opposite direction until the indicator light goes out.
3. Continue to turn the adjusting screw 60° (same direction as under point 2).

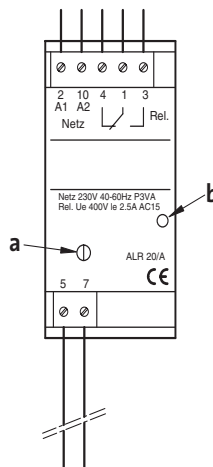


Fig. 15

TM02 8866 0904



Fig. 16

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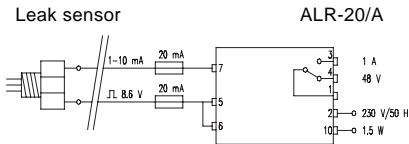


Fig. 17

TM02 4954 2002

Note: Do not check the leak sensor with an ohmmeter or other measuring instruments. The leak sensor is an electronic component.

6.3 Overload relays

The motor must be protected against overload via a thermal delay relay according to local regulations. The relay must be adjusted to the rated current stated on the nameplate.

In the case of star-delta starting, the adjustable value is to be $I_N \times 0.58$.

In all six mains leads (U_1, V_1, W_1 and U_2, V_2, W_2), electro-thermal all-pole triggers are to be incorporated.

6.4 Starting method

6.4.1 Mixers

Continuous operation:

Direct starting can be used for motors of 1.5 to 3.0 kW.

Star-delta starting is recommended for motors of 4.0 kW and up.

Intermittent operation:

Star-delta starting is mandatory throughout the entire power range.

6.4.2 Flowmakers

Flowmakers must be started via a softstarter.

6.5 Wiring diagrams

Three thermal switches (PTO)

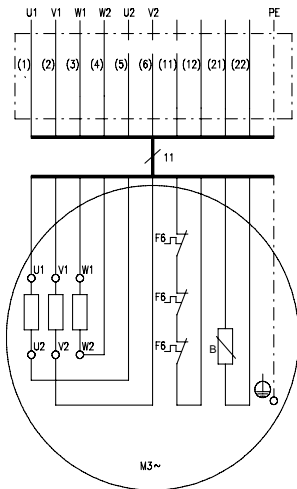


Fig. 18

Terminals	Description
1, 2, 3, 4,	Ends of the three stator windings
5, 6	(U1, U2, V1, V2, W1, W2)
11, 12	Thermal switches (F6)
21, 22	Leak sensor in gearbox (B)

TM02 4940 1802

Three PTC sensors

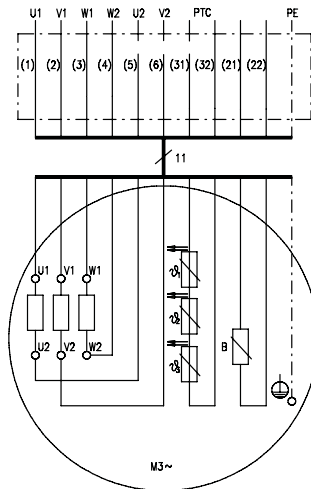


Fig. 19

Terminals	Description
1, 2, 3, 4,	Ends of the three stator windings
5, 6	(U1, U2, V1, V2, W1, W2)
31, 32	PTC sensors (according to DIN 44 081) (ø1, ø2, ø3)
21, 22	Leak sensor in gearbox (B)

TM02 4932 2002

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6.6 Block diagram

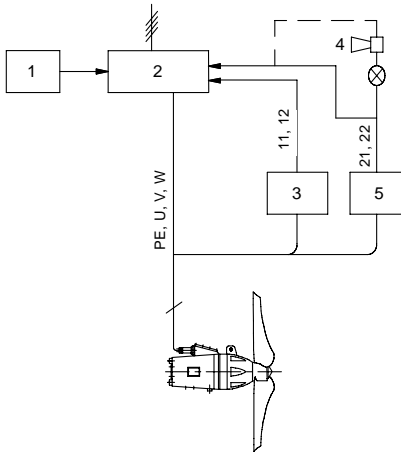


Fig. 20

Pos.	Description
1	Sensor, e.g. level sensor
2	Star or star-delta starting device
3	PTO thermal switches or PTC sensors
4	Contact for alarm signal and/or switching off the motor
5	Leak sensor in gearbox, see 6.2 Gearbox/shaft seal housing protection

6.7 Direction of rotation

When the electrical connections have been carried out, it must be ensured that the mixer or flowmaker propeller is rotating in the correct direction (when viewed from the motor, the propeller should rotate clockwise). An arrow on the motor housing shows the correct direction of rotation.

If the mixer or flowmaker propeller rotates in the wrong direction, interchange two phases of the mains supply (L1, L2, L3).

6.8 Protection from electro-chemical corrosion

Two different metals or alloys cause electro-chemical corrosion if they are connected by an electrolyte.

This applies if more than one mixer or flowmaker are installed in the same tank. The following additional protection is therefore recommended:

- galvanic separation of the earth lead from the neutral lead or
- galvanic separation of the mains supply by means of isolation transformer.

The earth lead must be separated in such a way as to ensure that no direct current can flow through it. It must still function as a protective lead. This can be achieved with a limiting unit (polarization cell or anti-parallel diode) or an isolation transformer.

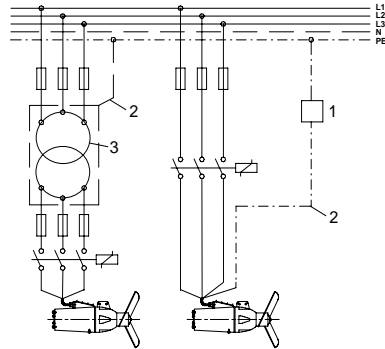


Fig. 21

Pos.	Description
1	Limiting unit
2	Earth lead
3	Isolation transformer



When using an isolation transformer, the ratio between starting current and rated current (I_A/I_N) must not be altered.

7. Frequency converter operation (AMD.xx.45.xxx.E)



Mixer types AMD.15.45B.710.E; AMD.35.45B.705.E; AMD.20.45.700.E and AMD.30.45.710.E can be controlled by frequency converters, provided the following conditions are observed:

- The motors are equipped with direct temperature monitoring via PTC for protection against too high motor temperature in case of operating disturbances. The PTC sensors in the windings must be connected to a suitable relay. The relay must be incorporated in the mixer controller.
- The motors may be connected to frequency converters with the settings and rated data stated in the following table.
- Set the frequency converter according to the rated motor data, especially the values of current, voltage, frequency and power. See the nameplate of the motor.
- The relation between voltage and frequency is selected lineary in the duty range from 30 to 50 Hz. At frequencies below the minimum operating frequency (start-up), the voltage may devi-

ate from the lineary relation, it may, however, not exceed value at the minimum operating frequency. At frequencies over 50 Hz, the voltage is constantly 400 V.

5. There must be no slip compensation.

Frequency converter settings

Lower frequency of duty range f_{\min} :	30 Hz
Nominal motor frequency f_n :	50 Hz
Upper frequency of duty range f_{\max} :	50 Hz
Lower voltage limit U_{\min} at f_{\min} :	240 V
Nominal motor voltage U_n at f_n :	400 V
Upper voltage limit U_{\max} at f_{\max} :	400 V
Frequency converter pulse frequency (constant) f_t :	4 kHz

Nominal data of frequency converter

Supply voltage:	400 V, 50 Hz or 380-480 V, 60 Hz
Nominal output power:	\geq Nominal mixer power
Maximum output current:	\geq Nominal mixer current
Maximum output voltage transients:	1000 V

8. Start-up

Before starting up the mixer or flowmaker, the oil level in the gearbox/shaft seal housing must be checked. Remove the oil level screw (pos. 3, fig. 22) and check the oil level.



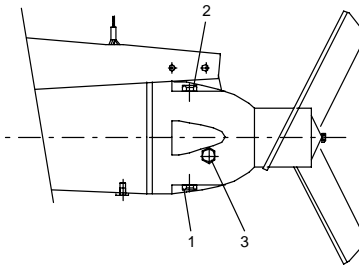
When slackening the oil level screw, note that pressure may have built up in the chamber. Do not remove the screw until the pressure has been fully relieved.

If required, fill oil into the gearbox/shaft seal housing through the oil filling hole (pos. 2).

For oil quality and quantity, see section 9.4 Oil.

It is necessary to remove the impeller of AMD to check the oil level.

If the mixer or flowmaker has been in stock for a period before start-up, see section 9.3 Service chart.



TM02 4937 1802

Fig. 22

Before start-up,

- check that the propeller is rotating in the correct direction, see section 6.7 *Direction of rotation*.
- make sure that the mixer or flowmaker is completely submerged in the liquid to be mixed.
Note: The mixer or flowmaker must always be submerged during operation.
- make sure that there are no solid objects in the tank.
- make sure that no persons can fall into the tank.

9. Service



Before starting any work on mixers or flowmakers, make sure that the fuses have been removed or the mains switch has been switched off. It must be ensured that the electricity supply cannot be accidentally switched on.

All rotating parts must have stopped moving.



All regulations applying to mixers or flowmakers installed in potentially explosive environments must be observed.

It must be ensured that no work is carried out in potentially explosive atmosphere.

Before starting any work on mixers or flowmakers used to handle liquids which could constitute a hazard to health, thorough cleaning/venting of mixer or flowmaker, tank, etc. must be carried out according to local regulations.

9.1 Explosion-proof mixers and flowmakers

Explosion-proof mixers or flowmakers must be serviced and repaired by Grundfos or by a service partner appointed by Grundfos.

9.1.1 Spare parts

Damaged mixer/flowmaker parts should always be replaced by new approved parts. Motor parts must not be reconditioned by machining, retapping, welding, etc.

9.2 Contaminated mixer or flowmaker

Note: If a mixer or flowmaker has been used for a liquid which is injurious to health or toxic, the mixer will be classified as contaminated.

If Grundfos is requested to service the mixer or flowmaker, Grundfos must be contacted with details about the liquid, etc. *before* the mixer or flowmaker is returned for service. Otherwise Grundfos can refuse to accept the mixer or flowmaker for service.

Possible costs of returning the mixer or flowmaker are paid by the customer.

However, any application for service (no matter to whom it may be made) must include details about the liquid if the mixer or flowmaker has been used for liquids which are injurious to health or toxic.

9.3 Service chart

	Type	Service instructions	Lubrication	Inspection
Electric motor	All	Keep the motor housing clean (otherwise cooling is affected). The motor housing may only be dismantled by Grundfos.	The roller bearings are maintenance-free. They should be replaced if they get noisy.	The motors are filled with dielectric oil*. No oil level check and oil change are required.
Supply cable	All			The supply cable must be checked twice a year for surface damage, strain, kinks, etc. If damaged, the cable must be replaced by Grundfos.
Shaft seal housing	AMD		Change the oil every 8,000 operating hours. Minimum every two years.	
Gearbox	All except AMD	Check the gearbox for leaks twice a year.	Change the oil after 500 operating hours. Then every 8,000 operating hours or after one year of operation.	Check the oil level twice a year, see section 9.4.3 <i>Oil quantity</i> . If refilling is required, see section 9.4.1 <i>Gearbox and shaft seal housing – oil quality</i> .
Propeller	All			Check the propeller blades regularly for wear and tear. Remove any material wound around the blades, such as ropes, threads, etc. which may cause uneven running and oscillation of the installation. In case of strong turbulence, cleaning is absolutely necessary.
Winch	All	Spray the winch with a protective coating of oil at regular intervals (to prevent corrosion).	The gear teeth and the bearing bushes must be lubricated twice a year with an all-purpose grease.	
Pull and safety wire	All	Regular oiling or greasing increases the life of the wire.		Check the wire regularly and always before using the winch. Replace the wire, if required.
Screws	All	Always check that all screws in the motor bracket are properly tightened. Check the screws in the fixation base/bottom plate every time the tank is empty.		

* Does not apply to AMD.xx.45.

9.4 Oil

9.4.1 Gearbox and shaft seal housing – oil quality

Gear oil, designation according to DIN 51 502.

AMD: ISO VG 150.

AMG, AFG: ISO VG 220.

9.4.2 Motor – oil quality

Shell Fluid 4600.

The motor oil should only be changed if the motor is dismantled for service or repair.

9.4.3 Oil quantity

Non-explosion-proof mixers and flowmakers

Type	Gearbox/ shaft seal housing [l]	Motor [l]	
AMD.18.32.950	0.25	1.7	
AMD.28.39.930			
AMD.15.45B.710	0.3	-	
AMD.25.45B.690			
AMD.35.45B.705			
AMD.45.45B.675			
AMD.20.45.700			
AMD.30.45.710	0.7	2.5	
AMD.40.45.695			
AMG.15.40.325		2.5	
AMG.22.45.325			
AMG.30.47.328		2.0	
AMG.40.52.326			
AMG.55.50.335		1.5	6.5
AMG.75.58.336			
AMG.110.68.334			
AMG.150.73.354		2.5	7.0
AMG.185.78.351			
AFG.15.130.76	2.5		
AFG.22.130.77			
AFG.30.130.92	1.0	2.0	
AFG.40.130.93			
AFG.13.180.30	1.0	2.5	
AFG.18.180.34			
AFG.24.180.39		2.0	
AFG.37.180.46			
AFG.15.230.22	1.9	2.5	
AFG.22.230.25			
AFG.30.230.29		2.0	
AFG.40.230.35			

Explosion-proof mixers and flowmakers

Type	Gearbox/ shaft seal housing [l]
AMD.15.45B.710.E	0.3
AMD.25.45B.690.E	
AMD.35.45B.705.E	
AMD.45.45B.675.E	
AMD.20.45.700.E	
AMD.30.45.710.E	0.7
AMD.40.45.695.E	
AMG.15.40.340.E	
AMG.22.45.336.E	
AMG.30.47.338.E	1.5
AMG.40.52.334.E	
AMG.55.50.344.E	
AMG.75.58.343.E	2.5
AMG.110.68.342.E	
AMG.150.73.355.E	1.0
AMG.185.78.356.E	
AFG.15.130.79.E	
AFG.22.130.78.E	1.0
AFG.30.130.95.E	
AFG.40.130.94.E	
AFG.13.180.30.E	
AFG.18.180.34.E	1.0
AFG.24.180.39.E	
AFG.37.180.46.E	
AFG.15.230.23.E	1.9
AFG.22.230.26.E	
AFG.30.230.30.E	
AFG.40.230.34.E	

9.5 Oil change

AMD

To change the oil in the haft seal housing, proceed as follows:

1. Remove the propeller.
2. Remove the filling and oil drain screws.
3. Let the oil stand in a glass for approx. 10 minutes and check if it contains water.
If the oil contains water, the shaft seal must be replaced.

Note: Used oil must be disposed of in accordance with local regulations.

4. Fill with oil, see 9.4.3 *Oil quantity*.
5. Fit the propeller.

AMG, AFG

To change the oil in the gearbox, proceed as follows:

1. Place the mixer or flowmaker in a horizontal position on supports and place a pan underneath to collect the oil.



When slackening the oil level screw, note that pressure may have built up in the chamber. Do not remove the screw until the pressure has been fully relieved.

2. Slacken and remove the screw (pos. 2), see fig. 23.
3. Slacken and remove the oil drain screw (pos. 1) and allow the oil to drain from the chamber.
Let the oil stand in a glass for approx. 10 minutes and check if it contains water.
If the oil contains water, the shaft seal must be replaced.
Note: Used oil must be disposed of in accordance with local regulations.
4. Slacken and remove the oil level screw (pos. 3).
5. Refit the oil drain screw (pos. 1).
6. Fill oil into the oil chamber through the filling hole (pos. 2) until it is level with the oil level screw (pos. 3).
See also sections 9.4.1 *Gearbox and shaft seal housing – oil quality* and 9.4.3 *Oil quantity*.
7. Refit the screw (pos. 2) and the oil level screw (pos. 3).

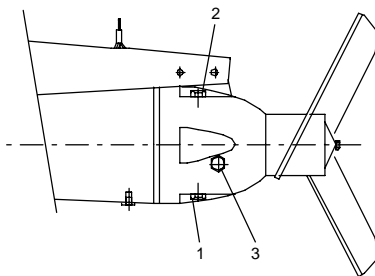


Fig. 23

TM02 4937 1802

10. Fault finding



Before starting any work on mixers or flow-makers, make sure that the fuses have been removed or the mains switch has been switched off. It must be ensured that the electricity supply cannot be accidentally switched on.

All rotating parts must have stopped moving.



All regulations applying to mixers or flow-makers installed in potentially explosive environments must be observed.

It must be ensured that no work is carried out in potentially explosive atmosphere.

Keep a service log.

10.1 Fault finding chart

GB

Fault	Cause	Remedy
1. Mixer or flow-maker does not start.	a) No electricity supply or supply failure.	Check the electrical installation. Call in an electrician.
	b) Supply cable is faulty.	Call in an electrician.
	c) Control system is faulty.	Call in an electrician.
	d) Propeller not free to rotate.	Clean the propeller blades and check manually that the propeller can rotate freely.
	e) Stator windings are faulty.	Contact Grundfos.
	f) Motor cut out because of overheating.	Wait until the motor has cooled and attempt to restart the mixer or flowmaker.
	g) Different phase voltages.	Call in an electrician.
	h) Overload relay is set too low or is faulty.	Check the overload relay. Set the relay to the rated current, see section 6.3 <i>Overload relays</i> .
	i) Leak sensor has cut out the mixer or flowmaker.	Contact Grundfos.
	j) Humidity in motor.	Contact Grundfos.
2. Mixer or flow-maker starts but stops immediately.	a) Stator windings are faulty.	Contact Grundfos.
	b) Different phase voltages.	Call in an electrician.
	c) Overload relay is set too low or is faulty.	Check the overload relay. Set the relay to the rated current, see section 6.3 <i>Overload relays</i> .
	d) Leak sensor has cut out the mixer or flowmaker.	Contact Grundfos.
	e) Humidity in motor.	Contact Grundfos.
3. No or inadequate circulation produced even if the motor is running.	a) Propeller rotates in the wrong direction.	Interchange two phases of the mains supply.
	b) Mixer or flowmaker runs on two phases.	Replace faulty fuses. Call in an electrician. Check the electrical connections.
	c) Internal parts are worn.	Contact Grundfos.
	d) Propeller blades are dirty or damaged.	Clean the blades and inspect for any wear.
4. Mixer or flow-maker runs unevenly and is noisy.	a) Internal parts are worn.	Contact Grundfos.
	b) Propeller blades are dirty or damaged.	Clean the blades and inspect for any wear.
	c) Faulty motor or gearbox roller bearings.	Contact Grundfos.
	d) Oscillations caused by the installation (resonance).	Check installation design.

Fault	Cause	Remedy
5. High current and power consumption.	a) Wrong voltage supply or supply failure.	Check the electrical installation. Call in an electrician.
	b) Supply cable is faulty.	Call in an electrician.
	c) Control system is faulty.	Call in an electrician.
	d) Propeller not free to rotate.	Clean the propeller blades and check manually that the propeller can rotate freely.
	e) Stator windings are faulty.	Contact Grundfos.
	f) Mixer or flowmaker runs on two phases.	Replace faulty fuses. Call in an electrician. Check the electrical connections.
	g) Internal parts are worn.	Contact Grundfos.
	h) Faulty motor or gearbox roller bearings.	Contact Grundfos.

11. Technical data

11.1 Motor

AMD, AMG and AFG	
Protective system:	IP 68 to 20 m
Insulation class:	F
Sealing:	Radial shaft seal ring
Material, motor housing:	Cast iron, grade 25 (EN-GJL-250) AMD: Stainless steel (AISI 316)

11.2 Gearbox

AMG and AFG	
Type:	Planetary gearbox
Gears:	Hardened and ground steel
Seal monitoring:	Leak sensor incorporated in gearbox
Drive end bearings:	2 taper roller bearings
Material, gear casing:	Cast iron, grade 25 (EN-GJL-250)

11.3 Shaft seals

Sealing against ingress of surrounding liquid	
AMD	Mechanical shaft seal made of SiC/SiC
AMG and AFG	2 lip seals and 1 mechanical shaft seal made of tungsten carbide/tungsten carbide

11.4 Propeller

AMD	
Number of blades:	3
Propeller diameter:	320, 390 and 450 mm
Propeller design:	Self-cleaning, optimum flow design with end fins
Material, propeller:	Stainless steel
Material, hub:	

AMG	
Number of blades:	2
Propeller diameter:	417, 452, 480, 505, 525, 580, 680, 730 and 780 mm
Material, propeller with hub:	Stainless steel

AFG.xx.130

Number of blades:	2
Propeller diameter:	1300 mm
Material, propeller with hub:	Ductile moulded polyamide with stainless steel hub

AFG.xx.180, AFG.xx.230

Number of blades:	2: 1.3/1.5/1.8/2.2/2.4/3.7 kW 3: 3.0/4.0 kW
Propeller diameter:	AFG.xx.180: 1800 mm AFG.xx.230: 2300 mm
Material, hub:	Cast iron (EN-GJS-400-15)
Material, propeller blades:	Epoxy resin (Baydur) with cast iron reinforcement

11.5 Sound pressure level

The sound pressure level of the mixer or flowmaker is lower than the limiting values stated in the EC Council Directive 98/37/EEC relating to machinery.

12. Disposal

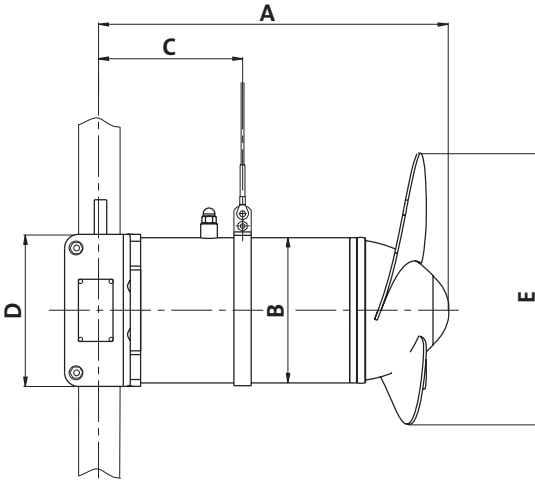
This product or parts of it must be disposed of in an environmentally sound way:

1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.

Subject to alterations.

Dimensions

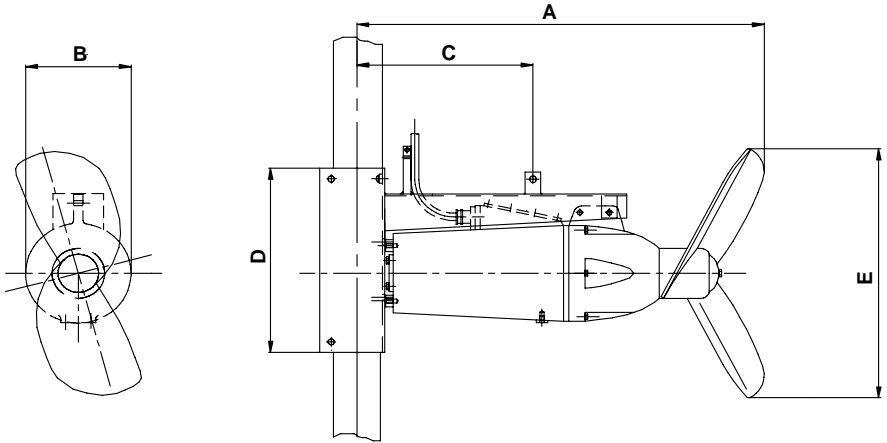
AMD



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Type	Nominal rating [kW]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	Weight incl. bracket [kg]
AMD.18.32.950	1.8	587	210	315	300	320	62
AMD.28.39.930	2.8					390	63
AMD.15.45B.710	1.5	456		175			50
AMD.25.45B.690	2.5						
AMD.35.45B.705	3.5	491	210	193	210	450	59
AMD.45.45B.675	4.5						
AMD.20.45.700	2.0	456		175			50
AMD.30.45.710	3.0						
AMD.40.45.695	4.0	491		193			59

AMG, AFG

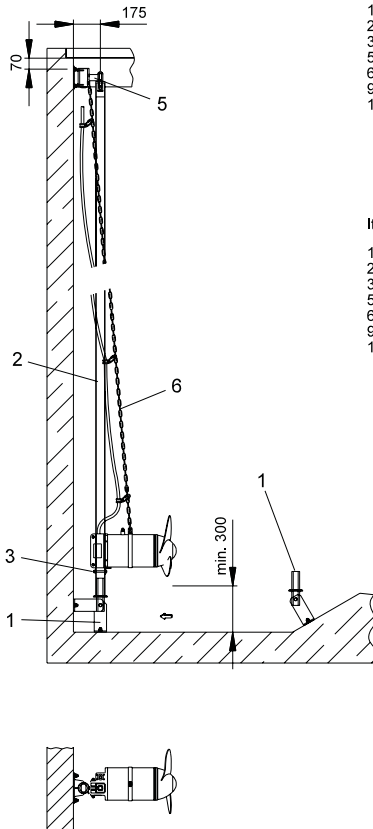
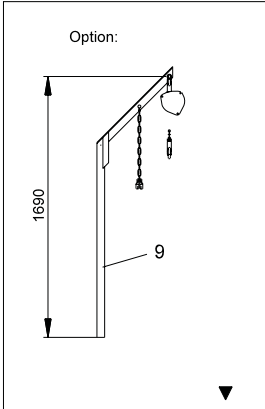


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Type	Nominal rating [kW]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	Weight incl. bracket [kg]
AMG.15.40.325	1.5	720				417	78
AMG.22.45.325	2.2	735				452	78
AMG.30.47.328	3.0	750	200	305	400	480	85
AMG.40.52.326	4.0	760				525	85
AMG.55.50.335	5.5	980				505	166
AMG.75.58.336	7.5	990	270		500	580	168
AMG.110.68.334	11.0	1010		455		680	177
AMG.150.73.354	15.0	1160				730	275
AMG.185.78.351	18.5	1180	315		630	780	280
AFG.15.130.76	1.5						100
AFG.22.130.77	2.2						100
AFG.30.130.92	3.0	795	200	353	500	1300	105
AFG.40.130.93	4.0						105
AFG.13.180.30	1.3						190
AFG.18.180.34	1.8						190
AFG.24.180.39	2.4	1100	302	540	450	1800	198
AFG.37.180.46	3.7						198
AFG.15.230.22	1.5						200
AFG.22.230.25	2.2						200
AFG.30.230.29	3.0	1100	302	540	450	2300	233
AFG.40.230.35	4.0						233

Installation

Sealed installation, AMD.xx.45 with chain hoist

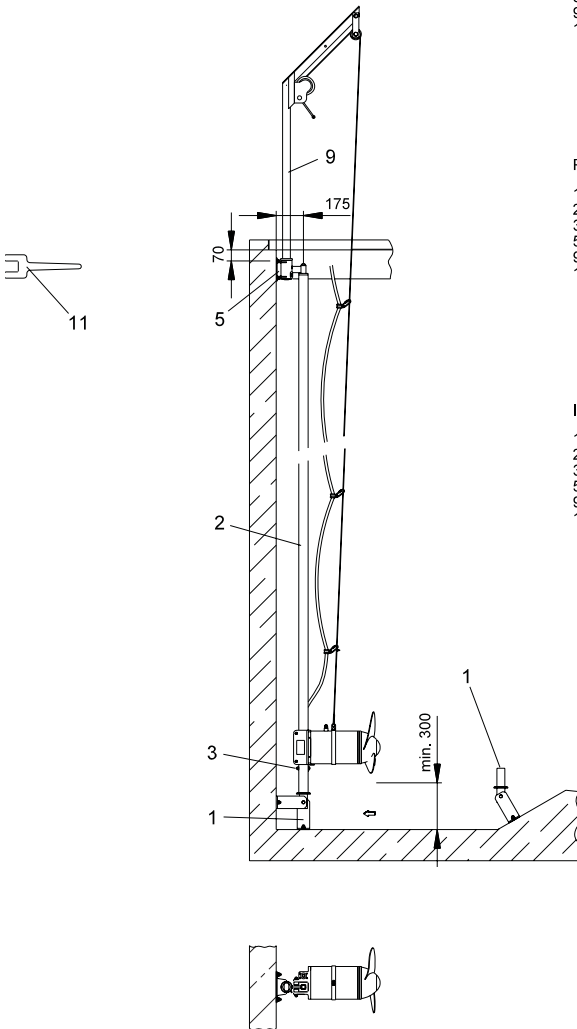


Pos.	Bezeichnung
1)	Bodenlager dreh-schwenkbar (0-90°)
2)	Führungsrohr
3)	Tiefenanschlag
5)	Obere Halterung
6)	Zug- und Sicherungskette
9)	Service-Steckkran
11)	Drehschlüssel

Pos.	Désignation
1)	Palier de fond pivotant-abaisable (0-90°)
2)	Barre de guidage
3)	Butée de fond
5)	Support supérieur
6)	Chaîne de traction et de sécurité
9)	Potence de service
11)	Clé

Item	Designation
1)	Bottom fixation, horizontal-inclined (0-90°)
2)	Column profile tube
3)	Depth blocker
5)	Top fixation
6)	Pull and safety chain
9)	Crane with chain hoist
11)	Turning key

Standard installation, AMD.xx.45 with winch



Pos.	Bezeichnung
1)	Bodenlager dreh-schwenkbar (0-90°)
2)	Führungsrohr
3)	Tiefenanschlag
5)	Obere Halterung
9)	Service-Steckkran
11)	Drehschlüssel

Pos.	Désignation
1)	Palier de fond pivotant-abaisable (0-90°)
2)	Barre de guidage
3)	Butée de fond
5)	Support supérieur
9)	Potence avec treuil
11)	Clé

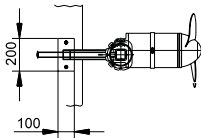
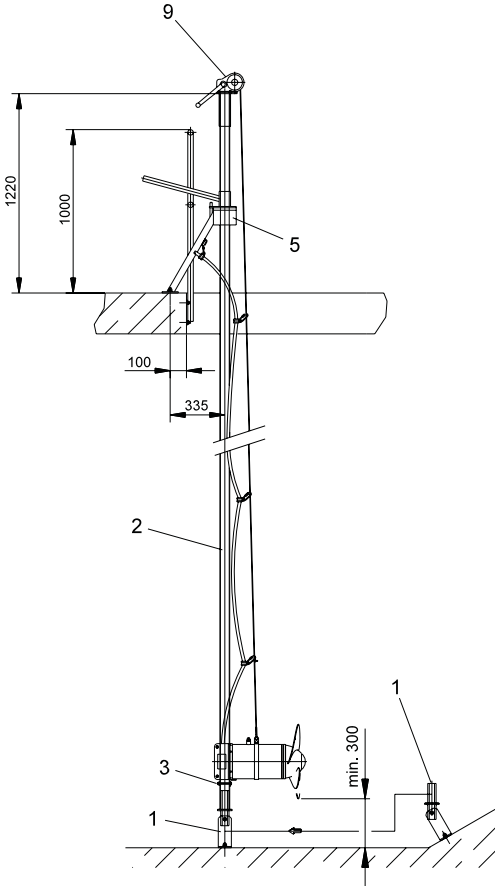
Item	Designation
1)	Bottom fixation, horizontal-inclined (0-90°)
2)	Column profile tube
3)	Depth blocker
5)	Top fixation
9)	Crane with winch
11)	Turning key

Standard installation, AMD.xx.45

- | Pos. | Bezeichnung |
|------|------------------------------------|
| 1) | Bodenlager dreh-schwenkbar (0-90°) |
| 2) | Führungsrohr |
| 3) | Tiefenanschlag |
| 5) | Obere Halterung |
| 9) | Halterung mit Seilwinde |

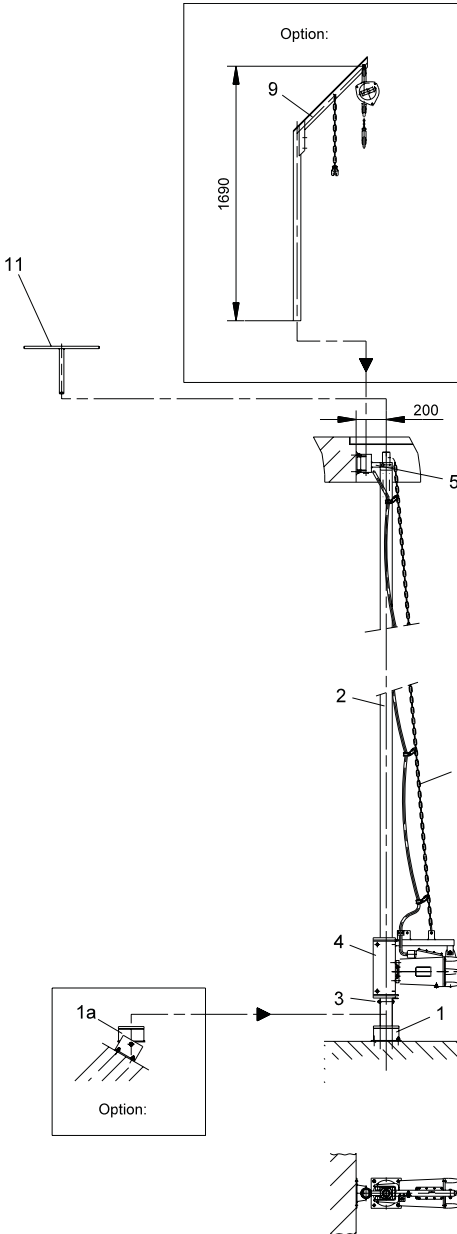
- | Pos. | Désignation |
|------|---|
| 1) | Palier de fond pivotant-abaisable (0-90°) |
| 2) | Barre de guidage |
| 3) | Butée de fond |
| 5) | Support supérieur |
| 9) | Fixation avec treuil |

- | Item | Designation |
|------|--|
| 1) | Bottom fixation, horizontal-inclined (0-90°) |
| 2) | Column profile tube |
| 3) | Depth blocker |
| 5) | Top fixation |
| 9) | Stand with winch |



TM03 4803 2806

Sealed installation, AMG.15-40

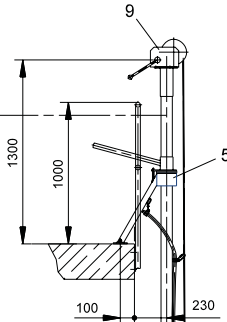
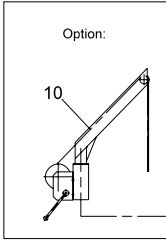


- | Pos. | Bezeichnung |
|------|------------------------------------|
| 1) | Bodenlager drehbar |
| 1a) | Bodenlager dreh-schwenkbar (0-90°) |
| 2) | Führungsrohr |
| 3) | Tiefenanschlag |
| 4) | Motorkonsole |
| 5) | Obere Halterung |
| 6) | Zug- und Sicherungskette |
| 9) | Service-Steckkran |
| 11) | Drehsteckschlüssel |

- | Pos. | Désignation |
|------|--|
| 1) | Palier de fond pivotant |
| 1a) | Palier de fond pivotant-abaissable (0-90°) |
| 2) | Barre de guidage |
| 3) | Butée de fond |
| 4) | Console du moteur |
| 5) | Support supérieur |
| 6) | Chaîne de traction et de sécurité |
| 9) | Potence de service |
| 11) | Cle |

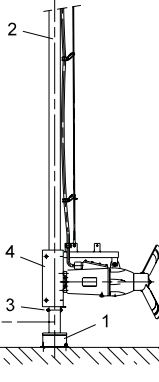
- | Item | Designation |
|------|--|
| 1) | Bottom fixation, horizontal |
| 1a) | Bottom fixation, horizontal-inclined (0-90°) |
| 2) | Column profile tube |
| 3) | Depth blocker |
| 4) | Motor bracket |
| 5) | Top fixation |
| 6) | Pull and safety chain |
| 9) | Crane with chain hoist |
| 11) | Turning key |

Standard installation, AMG.15-40

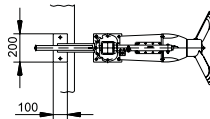
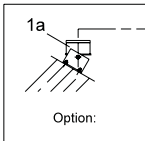


Pos.	Bezeichnung
1)	Bodenlager drehbar
1a)	Bodenlager dreh-schwenkbar (0-90°)
2)	Führungsrohr
3)	Tiefenanschlag
4)	Motorconsole
5)	Obere Halterung
9)	Halterung mit Seilwinde
10)	Kranarm mit Seilwinde

Pos.	Désignation
1)	Palier de fond pivotant
1a)	Palier de fond pivotant-abaissable (0-90°)
2)	Barre de guidage
3)	Butée de fond
4)	Console du moteur
5)	Support supérieur
9)	Fixation avec treuil
10)	Potence avec treuil

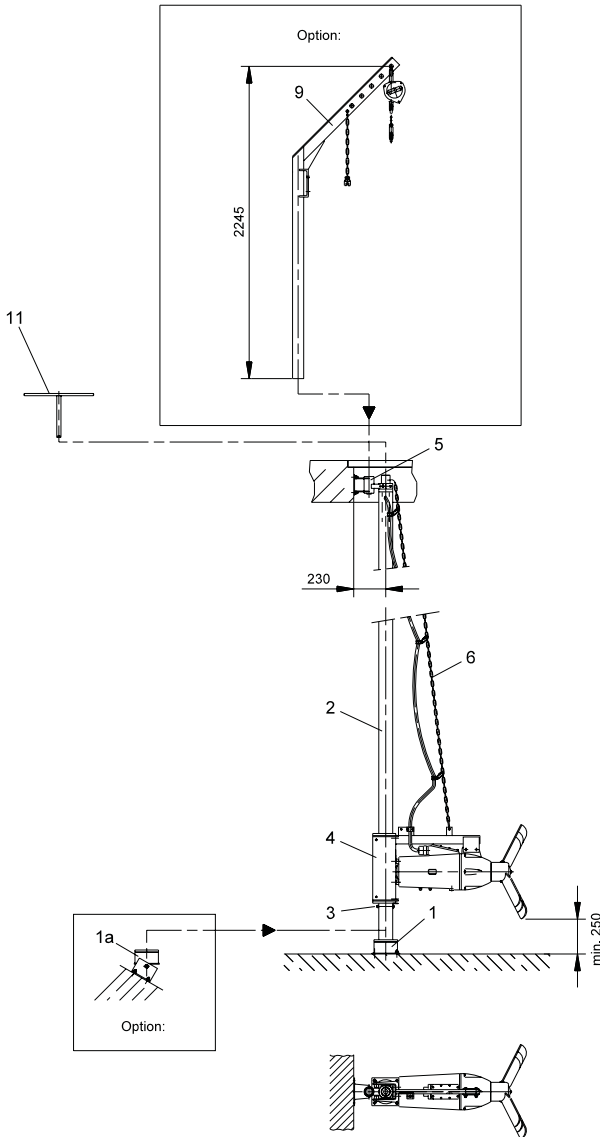


Item	Designation
1)	Bottom fixation, horizontal
1a)	Bottom fixation, horizontal-inclined (0-90°)
2)	Column profile tube
3)	Depth blocker
4)	Motor bracket
5)	Top fixation
9)	Stand with winch
10)	Crane boom with winch



TM03 4805 2806

Sealed installation, AMG.55-110

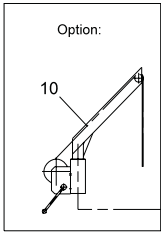


Pos.	Bezeichnung
1)	Bodenlager drehbar
1a)	Bodenlager dreh-schwenkbar (0-90°)
2)	Führungsrohr
3)	Tiefenanschlag
4)	Motorconsole
5)	Obere Halterung
6)	Zug- und Sicherungskette
9)	Service-Steckkran
11)	Drehsteckschlüssel

Pos.	Désignation
1)	Palier de fond pivotant
1a)	Palier de fond pivotant-abaissable (0-90°)
2)	Barre de guidage
3)	Butée de fond
4)	Console du moteur
5)	Support supérieur
6)	Chaîne de traction et de sécurité
9)	Potence de service
11)	Clé

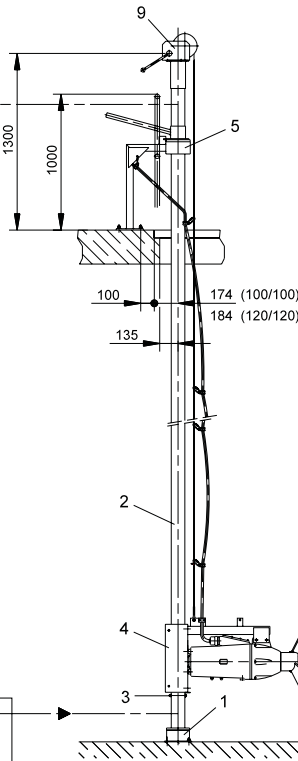
Item	Designation
1)	Bottom fixation, horizontal
1a)	Bottom fixation, horizontal-inclined (0-90°)
2)	Column profile tube
3)	Depth blocker
4)	Motor bracket
5)	Top fixation
6)	Pull and safety chain
9)	Crane with chain hoist
11)	Turning key

Standard installation, AMG.55-110



Option:

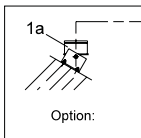
10



- | Pos. | Bezeichnung |
|------|------------------------------------|
| 1) | Bodenlager drehbar |
| 1a) | Bodenlager dreh-schwenkbar (0-90°) |
| 2) | Führungsrohr |
| 3) | Tiefenanschlag |
| 4) | Motorconsole |
| 5) | Obere Halterung |
| 9) | Halterung mit Seilwinde |
| 10) | Kranarm mit Seilwinde |

- | Pos. | Désignation |
|------|---|
| 1) | Palier de fond pivotant |
| 1a) | Palier de fond pivotant-abaisable (0-90°) |
| 2) | Barre de guidage |
| 3) | Butée de fond |
| 4) | Console du moteur |
| 5) | Support supérieur |
| 9) | Fixation avec treuil |
| 10) | Potence avec treuil |

- | Item | Designation |
|------|--|
| 1) | Bottom fixation, horizontal |
| 1a) | Bottom fixation, horizontal-inclined (0-90°) |
| 2) | Column profile tube |
| 3) | Depth blocker |
| 4) | Motor bracket |
| 5) | Top fixation |
| 9) | Stand with winch |
| 10) | Crane boom with winch |

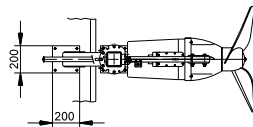
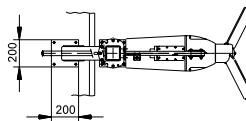


Option:

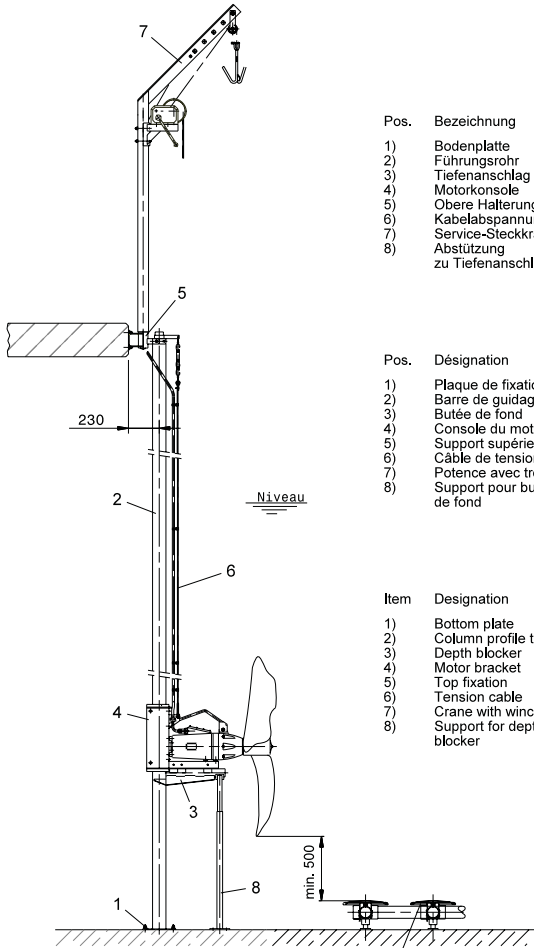
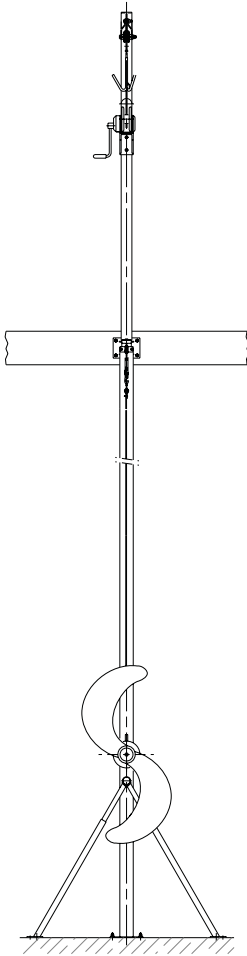
1a

MD(X) 160
AMG.55-110.xx.yyy. (E)

MD(X) 250
AMG.150-185.xx.yyy. (E)



TM03 4807 2806

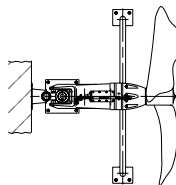


Pos.	Bezeichnung
1)	Bodenplatte
2)	Führungsrohr
3)	Tiefenanschlag
4)	Motorkonsole
5)	Obere Halterung
6)	Kabelabspannung
7)	Service-Steckkran
8)	Abstützung zu Tiefenanschlag

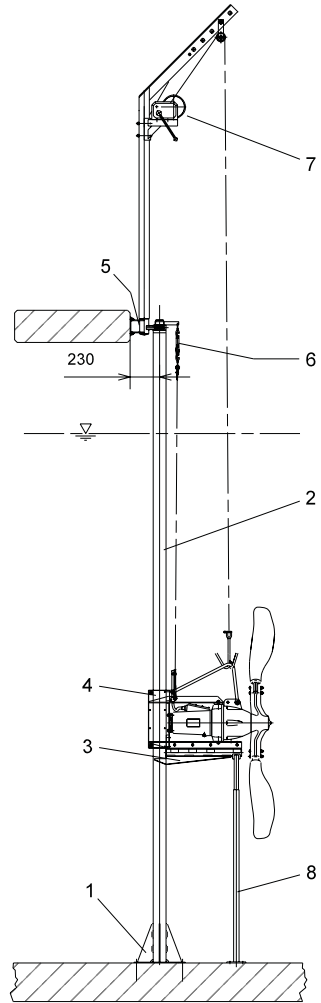
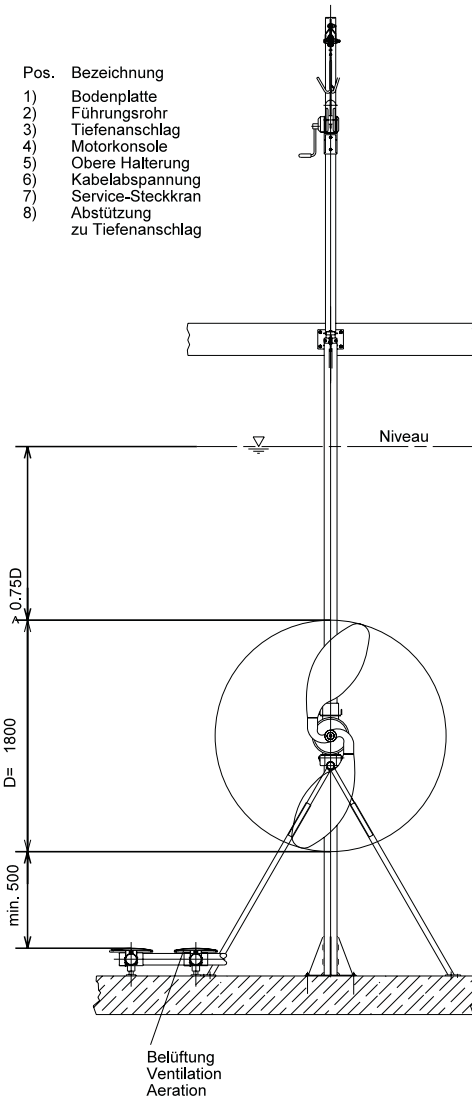
Pos.	Désignation
1)	Plaque de fixation
2)	Barre de guidage
3)	Butée de fond
4)	Console du moteur
5)	Support supérieur
6)	Câble de tension
7)	Potence avec treuil
8)	Support pour butée de fond

Item	Designation
1)	Bottom plate
2)	Column profile tube
3)	Depth blocker
4)	Motor bracket
5)	Top fixation
6)	Tension cable
7)	Crane with winch
8)	Support for depth blocker

Belüftung
Ventilation
Aeration

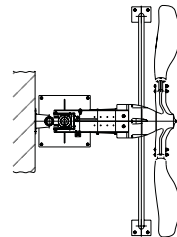


- | | |
|------|------------------------------|
| Pos. | Bezeichnung |
| 1) | Bodenplatte |
| 2) | Führungsrohr |
| 3) | Tiefenanschlag |
| 4) | Motorkonsole |
| 5) | Obere Halterung |
| 6) | Kabelabspannung |
| 7) | Service-Steckkran |
| 8) | Abstützung zu Tiefenanschlag |

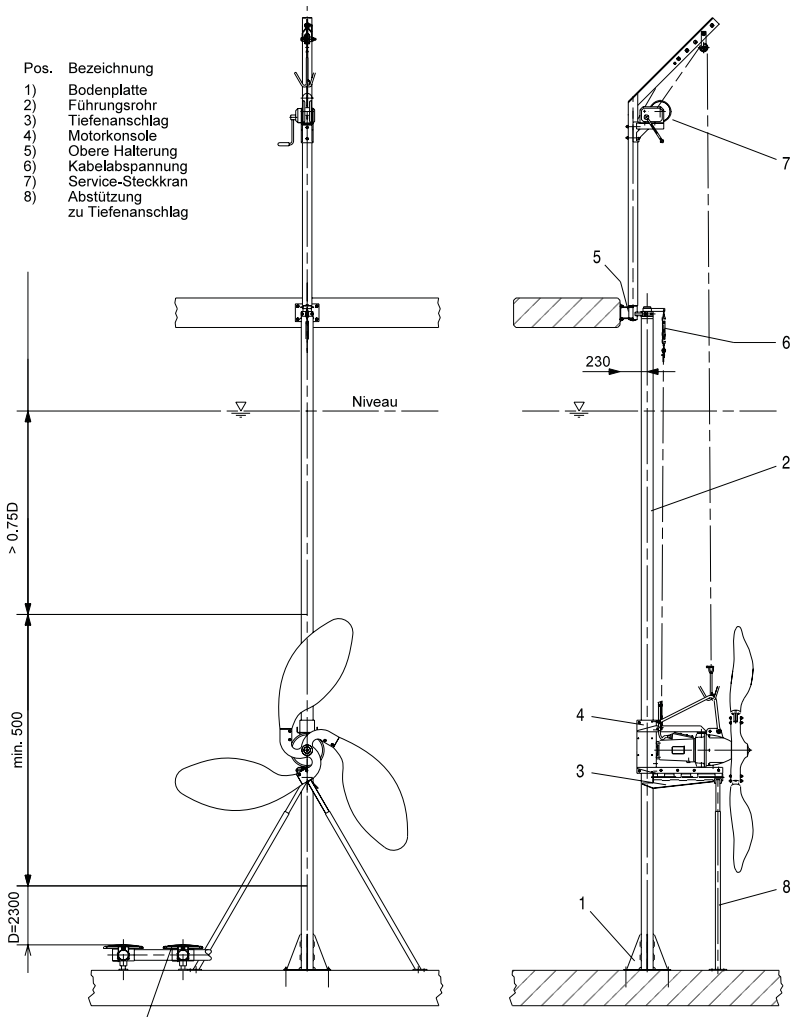


- | | |
|------|---------------------------|
| Item | Designation |
| 1) | Bottom plate, fixed |
| 2) | Column profile tube |
| 3) | Depth blocker |
| 4) | Motor bracket |
| 5) | Top fixation |
| 6) | Tension cable |
| 7) | Crane with winch |
| 8) | Support for depth blocker |

- | | |
|------|----------------------------|
| Pos. | Désignation |
| 1) | Plaque de fixation |
| 2) | Barre de guidage |
| 3) | Butée de fond |
| 4) | Console du moteur |
| 5) | Support supérieur |
| 6) | Câble de tension |
| 7) | Potence avec treuil |
| 8) | Support pour butée de fond |



TM03 4810 2806

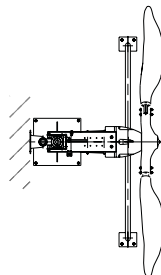


- Pos. Bezeichnung
- 1) Bodenplatte
 - 2) Führungsrohr
 - 3) Tiefenanschlag
 - 4) Motorkonsole
 - 5) Obere Halterung
 - 6) Kabelabspannung
 - 7) Service-Steckkran
 - 8) Abstützung zu Tiefenanschlag

Belüftung
Ventilation
Aeration

- Item Designation
- 1) Bottom plate, fixed
 - 2) Column profile tube
 - 3) Depth blocker
 - 4) Motor bracket
 - 5) Top fixation
 - 6) Tension cable
 - 7) Crane with winch
 - 8) Support for depth blocker

- Pos. Désignation
- 1) Plaque de fixation
 - 2) Barre de guidage
 - 3) Butée de fond
 - 4) Console du moteur
 - 5) Support supérieur
 - 6) Câble de tension
 - 7) Potence avec treuil
 - 8) Support pour butée de fond



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