

S pumps, ranges 34 and 42

S1, SV

1.65 - 5.0 kW, 50/60 Hz

Installation and operating instructions

GB D F I E P GR NL S FIN DK
PL RU H SI HR YU RO BG CZ SK TR



GB Declaration of Conformity

We **Grundfos** declare under our sole responsibility that the products **S1** and **SV, 1,65 - 5 kW** 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).
- Electrical equipment designed for use within certain voltage limits (73/23/EEC) [95].
Standards used: EN 60335-1: 2002 and EN 60335-2-41: 2003.
- Electromagnetic compatibility (89/336/EEC).
Standards used: EN 61000-6-2 and EN 61000-6-3.
- Construction products (89/106/EEC).
Standard used: EN 12050-1/-2.
- ATEX 94/9/EC (ATEX 100) (applies only to products with the ATEX mark on the nameplate).
Standards used: EN 60079-0, EN 60079-1, EN 13463-1 and EN 13463-5.

F Déclaration de Conformité

Nous **Grundfos** déclarons sous notre seule responsabilité que les produits **S1** et **SV, 1,65 - 5 kW** 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).
- Matériel électrique destiné à employer dans certaines limites de tension (73/23/CEE) [95].
Standards utilisés: EN 60335-1: 2002 et EN 60335-2-41: 2003.
- Compatibilité électromagnétique (89/336/CEE).
Standards utilisés: EN 61000-6-2 et EN 61000-6-3.
- Produits de construction (89/106/CEE).
Norme utilisée: EN 12050-1/-2.
- ATEX 94/9/CE (ATEX 100) (s'applique uniquement aux produits avec norme ATEX citée sur la plaque signalétique).
Normes utilisées: EN 60079-0, EN 60079-1, EN 13463-1 et EN 13463-5.

E Declaración de Conformidad

Nosotros **Grundfos** declaramos bajo nuestra única responsabilidad que los productos **S1** y **SV, 1,65 - 5 kW** 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).
- Material eléctrico destinado a utilizarse con determinadas límites de tensión (73/23/CEE) [95].
Normas aplicadas: EN 60335-1: 2002 y EN 60335-2-41: 2003.
- Compatibilidad electromagnética (89/336/CEE).
Normas aplicadas: EN 61000-6-2 y EN 61000-6-3.
- Productos de construcción (89/106/CEE).
Norma aplicada: EN 12050-1/-2.
- ATEX 94/9/CE (ATEX 100) (se refiere sólo a productos con la marca ATEX en la placa de características).
Normas aplicadas: EN 60079-0, EN 60079-1, EN 13463-1 y EN 13463-5.

GR Δήλωση Συμμόρφωσης

Εμείς η **Grundfos** δηλώνουμε με αποκλειστικά δική μας ευθύνη ότι τα προϊόντα **S1** και **SV, 1,65 - 5 kW** συμμορφώνονται με την Οδηγία του Συμβουλίου επί της σύγκλισης των νόμων των Κρατών Μελών της Ευρωπαϊκής Ένωσης σε σχέση με τα

- Μηχανήματα (98/37/ΕC).
- Ηλεκτρικές συσκευές σχεδιασμένες για χρήση εντός ορισμένων ορίων ηλεκτρικής τάσης (73/23/ΕΕC) [95].
Πρότυπα που χρησιμοποιήθηκαν: EN 60335-1: 2002 και EN 60335-2-41: 2003.
- Ηλεκτρομαγνητική συμβατότητα (89/336/ΕΕC).
Πρότυπα που χρησιμοποιήθηκαν: EN 61000-6-2 και EN 61000-6-3.
- Προϊόντα κατασκευών (89/106/ΕΕC).
Πρότυπο που χρησιμοποιήθηκε: EN 12050-1/-2.
- ATEX 94/9/ΕC (ATEX 100) (εφαρμόζεται μόνο σε προϊόντα με το σήμα ATEX στην πινακίδα τους).
Πρότυπα που χρησιμοποιήθηκαν: EN 60079-0, EN 60079-1, EN 13463-1 και EN 13463-5.

D Konformitätserklärung

Wir **Grundfos** erklären in alleiniger Verantwortung, daß die Produkte **S1** und **SV, 1,65 - 5 kW**, auf die sich diese Erklärung bezieht, mit den folgenden Richtlinien des Rates zur Angleichung der Rechtsvorschriften der EG-Mitgliedstaaten übereinstimmen:

- Maschinen (98/37/EG).
- Elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen (73/23/EWG) [95].
Normen, die verwendet wurden: EN 60335-1: 2002 und EN 60335-2-41: 2003.
- Elektromagnetische Verträglichkeit (89/336/EWG).
Normen, die verwendet wurden: EN 61000-6-2 und EN 61000-6-3.
- Bauprodukte (89/106/EWG).
Norm, die verwendet wurde: EN 12050-1/-2.
- ATEX 94/9/EG (ATEX 100) (gilt nur für Produkte mit der ATEX-Kennzeichnung auf dem Leistungsschild).
Normen, die verwendet wurden: EN 60079-0, EN 60079-1, EN 13463-1 und EN 13463-5.

I Dichiarazione di Conformità

Noi **Grundfos** dichiariamo sotto la nostra esclusiva responsabilità che i prodotti **S1** e **SV, 1,65 - 5 kW** ai quali questa dichiarazione si riferisce sono conformi alle Direttive del Consiglio concernente il ravvicinamento delle legislazioni degli Stati membri CE relative a

- Macchine (98/37/CE).
- Materiale elettrico destinato ad essere utilizzato entro certi limiti di tensione (73/23/CEE) [95].
Standard usati: EN 60335-1: 2002 e EN 60335-2-41: 2003.
- Compatibilità elettromagnetica (89/336/CEE).
Standard usati: EN 61000-6-2 e EN 61000-6-3.
- Prodotti da costruzione (89/106/CEE).
Norma usata: EN 12050-1/-2.
- ATEX 94/9/CE (ATEX 100) (si applica solo ai prodotti che riportano la sigla ATEX sull'etichetta).
Norme usate: EN 60079-0, EN 60079-1, EN 13463-1 e EN 13463-5.

P Declaração de Conformidade

Nós **Grundfos** declaramos sob nossa única responsabilidade que os produtos **S1** e **SV, 1,65 - 5 kW** 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).
- Material eléctrico destinado a ser utilizado dentro de certos limites de tensão (73/23/CEE) [95].
Normas utilizadas: EN 60335-1: 2002 e EN 60335-2-41: 2003.
- Compatibilidade electromagnética (89/336/CEE).
Normas utilizadas: EN 61000-6-2 e EN 61000-6-3.
- Produtos de construção (89/106/CEE).
Norma utilizada: EN 12050-1/-2.
- ATEX 94/9/CE (ATEX 100) (apenas aplicável a produtos com a inscrição ATEX gravada na chapa de características).
Normas utilizadas: EN 60079-0, EN 60079-1, EN 13463-1 e EN 13463-5.

NL Overeenkomstigheidsverklaring

Wij **Grundfos** verklaren geheel onder eigen verantwoordelijkheid dat de producten **S1** en **SV, 1,65 - 5 kW** 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).
- Elektrisch materiaal bestemd voor gebruik binnen bepaalde spanningsgrenzen (73/23/EEG) [95].
Normen: EN 60335-1: 2002 en EN 60335-2-41: 2003.
- Elektromagnetische compatibiliteit (89/336/EEG).
Normen: EN 61000-6-2 en EN 61000-6-3.
- Bouwproducten (89/106/EEG).
Norm: EN 12050-1/-2.
- ATEX 94/9/EG (ATEX 100) (alleen van toepassing voor producten met de ATEX markering op de typeplaat).
Normen: EN 60079-0, EN 60079-1, EN 13463-1 en EN 13463-5.

S Försäkran om överensstämmelse

Vi **Grundfos** försäkrar under ansvar, att produkterna **S1** och **SV, 1,65 - 5 kW**, som omfattas av denna försäkran, är i överensstämmelse med Rådets Direktiv om inbördes närmande till EU-medlemsstaternas lagstiftning, avseende

- Maskinell utrustning (98/37/EC).
- Elektrisk material avsedd för användning inom vissa spänningsgränser (73/23/EC) [95].
Använda standarder: EN 60335-1: 2002 och EN 60335-2-41: 2003.
- Elektromagnetisk kompatibilitet (89/336/EC).
Använda standarder: EN 61000-6-2 och EN 61000-6-3.
- Produkter för bygg och anläggning (89/106/EC).
Använd standard: EN 12050-1/-2.
- ATEX 94/9/EC (ATEX 100) (endast för produkter med ATEX-märkning på typeskylten).
Använda standarder: EN 60079-0, EN 60079-1, EN 13463-1 och EN 13463-5.

DK Overensstemmelseserklæring

Vi **Grundfos** erklærer under ansvar, at produkterne **S1** og **SV, 1,65 - 5 kW**, som denne erklæring omhandler, er i overensstemmelse med Rådets direktiver om indbyrdes tilnærmelse til EF medlemsstaternes lovgivning om

- Maskiner (98/37/EF).
- Elektrisk materiel bestemt til anvendelse inden for visse spændingsgrænser (73/23/EØF) [95].
Anvendte standarder: EN 60335-1: 2002 og EN 60335-2-41: 2003.
- Elektromagnetisk kompatibilitet (89/336/EØF).
Anvendte standarder: EN 61000-6-2 og EN 61000-6-3.
- Byggevarer (89/106/EØF).
Anvendt standard: EN 12050-1/-2.
- ATEX 94/9/EF (ATEX 100) (gælder kun for produkter med ATEX-mærkning på typeskiltet).
Anvendte standarder: EN 60079-0, EN 60079-1, EN 13463-1 og EN 13463-5.

RU Свидетельство о соответствии требованиям

Мы, фирма **Grundfos**, со всей ответственностью заявляем, что изделия **S1** и **SV, 1,65 - 5 kW**, к которым относится данное заявление, соответствуют следующим предписаниям Совета Евросоюза об унификации законодательных предписаний стран-членов ЕС, касающимся:

- Машиностроение (98/37/EC).
- Электрические машины для эксплуатации в пределах определенного диапазона значений напряжения (73/23/ЕЭС) [95].
Применявшиеся стандарты: Евростандарт EN 60335-1: 2002 и EN 60335-2-41: 2003.
- Электромагнитная совместимость (89/336/ЕЭС).
Применявшиеся стандарты: Евростандарт EN 61000-6-2 и EN 61000-6-3.
- Строительные изделия (89/106/ЕЕС).
Применявшиеся стандарты: EN 12050-1/-2.
- ATEX 94/9/EC (ATEX 100) (действительно только для изделий с маркировкой ATEX на фирменной табличке с техническими данными).
Применявшиеся стандарты: EN 60079-0, EN 60079-1, EN 13463-1 и EN 13463-5.

SI Izjava o ustreznosti

Mi, **Grundfos**, pod svojo izključno odgovornostjo izjavljamo, da so izdelki **S1** in **SV, 1,65 - 5 kW**, na katere se ta izjava nanaša, skladni z Direktivami sveta o približevanju zakonodaji držav članic EG glede:

- Stroji (98/37/EG).
- Električna pogonska sredstva za uporabo v določenih napetostnih mejah (73/23/EWG) [95].
Uporabljeni normi: EN 60335-1: 2002 in EN 60335-2-41: 2003.
- Elektromagnetna kompatibilnost (89/336/EWG).
Uporabljeni normi: EN 61000-6-2 in EN 61000-6-3.
- Izdelek gradnje (89/106/EEC).
Uporabljena norma: EN 12050-1/-2.
- ATEX 94/9/EG (ATEX 100) (velja samo za izdelke z oznako ATEX na tipski ploščici).
Uporabljena standarda: EN 60079-0, EN 60079-1, EN 13463-1 in EN 13463-5.

FIN Vastaavuusvakuutus

Me **Grundfos** vakuutamme yksin vastuullisesti, että tuotteet **S1** ja **SV, 1,65 - 5 kW**, jota tämä vakuutus koskee, noudattavat direktiivejä jotka käsittelevät EY:n jäsenvaltioiden koneellisia laitteita koskevien lakien yhdenmukaisuutta seur.:

- Koneet (98/37/EY).
- Määrättyjen jänniterajoitusten puitteissa käytettävät sähköiset laitteet (73/23/EY) [95].
Käytetyt standardit: EN 60335-1: 2002 ja EN 60335-2-41: 2003.
- Elektromagneettinen vastaavuus (89/336/EY).
Käytetyt standardit: EN 61000-6-2 ja EN 61000-6-3.
- Rakennustuotteet (89/106/EY).
Käytetty standardi: EN 12050-1/-2.
- ATEX 94/9/EY (ATEX 100) (soveltuu vain tuotteisiin, joissa on ATEX-merkintä arvokilvessä).
Käytetyt standardit: EN 60079-0, EN 60079-1, EN 13463-1 ja EN 13463-5.

PL Deklaracja zgodności

My **Grundfos**, oświadczamy z pełną odpowiedzialnością, że nasze wyroby **S1** i **SV, 1,65 - 5 kW**, których deklaracja niniejsza dotyczy, są zgodne z następującymi wytycznymi Rady d/s ujednolicenia przepisów prawnych krajów EG:

- maszyny (98/37/EG).
- wyposażenie elektryczne do stosowania w określonym zakresie napięć (73/23/EWG) [95],
zastosowane normy: EN 60335-1: 2002 i EN 60335-2-41: 2003.
- zgodność elektromagnetyczna (89/336/EWG),
zastosowane normy: EN 61000-6-2 i EN 61000-6-3.
- budowa wyrobu (89/106/EEC),
zastosowana norma: EN 12050-1/-2.
- ATEX 94/9/EG (ATEX 100) (dotyczy tylko wyrobów ze znakiem ATEX na tabliczce znamionowej),
zastosowane normy: EN 60079-0, EN 60079-1, EN 13463-1 i EN 13463-5.

H Konformitási nyilatkozat

Grundfos teljes felelősséggel kijelenti, hogy a **S1** és **SV, 1,65 - 5 kW** típusú szivattyúk, amelyre ezen nyilatkozat vonatkozik, megfelelnek az Európai Unió tagállamainak jogi irányelveit összehangoló tanács alábbi előírásainak:

- Gépek (98/37/EK).
- Meghatározott feszültség határokon belül használt elektromos eszközök (73/23/EGK) [95].
Alkalmazott szabványok: EN 60335-1: 2002 és EN 60335-2-41: 2003.
- Elektromágneses összeférhetőség (89/336/EGK).
Alkalmazott szabványok: EN 61000-6-2 és EN 61000-6-3.
- Összeépített berendezések (89/106/EEC).
Alkalmazott szabványok: EN 12050-1/-2.
- ATEX 94/9/EK (ATEX 100) (csak az ATEX jelzéssel ellátott termékekre vonatkozik).
Alkalmazott szabvány: EN 60079-0, EN 60079-1, EN 13463-1 és EN 13463-5.

HR Izjava o usklađenosti

Mi, **Grundfos**, izjavljujemo uz punu odgovornost, da su proizvodi **S1** i **SV, 1,65 - 5 kW**, na koje se ova izjava odnosi, skladni sljedećim smjernicama Savjeta za prilagodbu propisa država članica EZ:

- Strojevi (98/37/EZ).
- Električni pogonski uređaji za korištenje unutar određenih granica napona (73/23/EEZ) [95].
Korištene norme: EN 60335-1: 2002 i EN 60335-2-41: 2003.
- Elektromagnetska kompatibilnost (89/336/EEZ).
Korištene norme: EN 61000-6-2 i EN 61000-6-3.
- Građevni proizvodi (89/106/EEZ).
Korištena norma: EN 12050-1/-2.
- ATEX 94/9/EZ (ATEX 100) (vrijedi samo za proizvode s ATEX-znakom na natpisnoj pločici).
Korištene norme: EN 60079-0, EN 60079-1, EN 13463-1 i EN 13463-5.

YU Izjava o konformitetu

Mi, **Grundfos**, izjavljujemo pod potpunom odgovornostju da su proizvodi **S1** i **SV, 1,65 - 5 kW**, na koje se odnosi ova izjava, u saglasnosti sa smernicama i uputstvima Saveta za usaglašavanje pravnih propisa članica Evropske Unije:

- mašine (98/37/EG).
- električna oprema razvijena za korišćenje unutar određenih naponskih granica (73/23/EWG) [95], korišćeni standardi: EN 60335-1: 2002 i EN 60335-2-41: 2003.
- elektromagnetna usaglašenost (89/336/EWG), korišćeni standardi: EN 61000-6-2 i EN 61000-6-3.
- konstruktivni proizvodi (89/106/EEC), korišćeni standardi: EN 12050-1/-2.
- ATEX 94/9/EG (ATEX 100) (odnosi se samo na proizvode sa natpisom ATEX na natpisnoj pločici), korišćeni standardi: EN 60079-0, EN 60079-1, EN 13463-1 i EN 13463-5.

BG Декларация за съответствие

Ние, фирма **Grundfos** заявяваме с пълна отговорност, че продуктите **S1** и **SV, 1,65 - 5 kW**, за които се отнася настоящата декларация, отговарят на следните указания на Съвета за уеднаквяване на правните разпоредби на държавите членки на ЕО:

- Машини (98/37/ЕО).
- Електрически машини и съоръжения за употреба в рамките на определени граници на напрежение на електрическия ток (73/23/ЕИО) [95].
Приложени норми: EN 60335-1: 2002 и EN 60335-2-41: 2003.
- Електромагнетична поносимост (89/336/ЕИО).
Приложени норми: EN 61000-6-2 и EN 61000-6-3.
- Конструктивни продукти (89/106/ЕИО).
Приложена норма: EN 12050-1/-2.
- АТЕХ 94/9/ЕО (АТЕХ 100) (отнася се само за продукти със символа АТЕХ върху табелата с данни).
Приложени норми: EN 60079-0, EN 60079-1, EN 13463-1 и EN 13463-5.

SK Prehlásenie o konformite

My, firma **Grundfos**, prehlasujeme na svoju plnú zodpovednosť, že výrobky **S1** a **SV, 1,65 - 5 kW**, na ktoré sa toto prehlásenie vzťahuje, zodpovedajú ustanoveniam nasledujúcich smerníc Rady EÚ pre harmonizáciu právnych predpisov členských zemí Európskych spoločenstiev:

- Stroje (98/37/EG).
- Elektrické prevádzkové prostriedky, použité v určitom napäťovom rozsahu (73/23/EWG) [95].
Použité normy: EN 60335-1: 2002 a EN 60335-2-41: 2003.
- Elektromagnetická kompatibilita (89/336/EWG).
Použité normy: EN 61000-6-2 a EN 61000-6-3.
- Konštrukčné výrobky (89/106/EEC).
Použitá norma: EN 12050-1/-2.
- ATEX 94/9/EG (ATEX 100) (týka sa iba výrobkov nesúcich na typovom štítku značku ATEX).
Použité normy: EN 60079-0, EN 60079-1, EN 13463-1 a EN 13463-5.

RO Declarație de conformitate

Grundfos declară pe propria răspundere că produsele **S1** și **SV, 1,65 - 5 kW**, la care se referă această declarație sunt în conformitate cu Directivele Consiliului și legile Statelor membre CE, referitoare la:

- Utilaje (98/37/CE).
- Echipamente electrice destinate utilizării între limite exacte de tensiune (73/23/CEE) [95].
Standarde aplicate: EN 60335-1: 2002 și EN 60335-2-41: 2003.
- Compatibilitate electromagnetă (89/336/CEE).
Standarde aplicate: EN 61000-6-2 și EN 61000-6-3.
- Construcția produselor (89/106/EEC).
Standard aplicat: EN 12050-1/-2.
- ATEX 94/9/CE (ATEX 100) (se aplică numai la produsele cu marca ATEX pe plăcuța de înmatriculare).
Standarde folosite: EN 60079-0, EN 60079-1, EN 13463-1 și EN 13463-5.

CZ Prohlášení o shodě

My, firma **Grundfos**, prohlašujeme na svou plnou odpovědnost, že výrobky **S1** a **SV, 1,65 - 5 kW**, na něž se toto prohlášení vztahuje, odpovídají ustanovením následujících směrnic Rady EU pro harmonizaci právních předpisů členských zemí Evropských společenství:

- strojřrenství (98/37/EG).
- provozování spotřebičů v toleranci napětí (73/23/EWG) [95], použité normy: EN 60335-1: 2002 a EN 60335-2-41: 2003.
- elektromagnetická kompatibilita (89/336/EWG), použité normy: EN 61000-6-2 a EN 61000-6-3.
- Konstrukční výrobky (89/106/EEC), použitá norma: EN 12050-1/-2.
- ATEX 94/9/EG (ATEX 100) (týká se pouze výrobků nesoucích na typovém štítku značku ATEX), použité normy: EN 60079-0, EN 60079-1, EN 13463-1 a EN 13463-5.

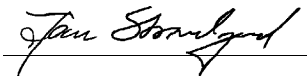
TR Uygunluk Bildirgesi

Biz **Grundfos** olarak, bu bildirmede belirtilen **S1** ve **SV, 1,65 - 5 kW** ürünlerin,

- Makina (98/37/EC).
- Belli voltaj sınırlarında kullanılmak üzere üretilmiş elektrik donanımı (73/23/EEC) [95].
Kullanılan standartlar: EN 60335-1: 2002 ve EN 60335-2-41: 2003.
- Elektromanyetik uyumluluk (89/336/EEC).
Kullanılan standartlar: EN 61000-6-2 ve EN 61000-6-3.
- Yapi ürünleri (89/106/EEC).
Kullanılan standartlar: EN 12050-1/-2.
- ATEX 94/9/EC (ATEX 100) (sadece bilgi etiketinde ATEX işareti bulunan ürünlere uygulanmaktadır).
Kullanılan standartlar: EN 60079-0, EN 60079-1, EN 13463-1 ve EN 13463-5.

ile ilgili olarak Avrupa topluluğu'na Üye Devletlerin yasalarında yer alan Belediye Yönetmeliklerine uygun olduğunu, tüm sorumluluğu bize ait olmak üzere beyan ederiz.

Bjerringbro, 1st September 2006



Jan Strandgaard
Technical Director

S pumps, ranges 34 and 42

S1, SV

1.65 - 5.0 kW, 50/60 Hz

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Before beginning installation procedures, these installation and operating instructions should be studied carefully. The installation and operation should also be in accordance with local regulations and accepted codes of good practice.

1. General description

This booklet includes instructions for installation, operation and maintenance of Grundfos submersible wastewater pumps, types S1 and SV, fitted with motors of 1.65 to 5 kW.

The booklet also includes specific instructions for the explosion-proof pumps.

1.1 Applications

The S1 and SV pumps are designed for the pumping of wastewater in a wide range of municipal, private and industrial applications.

The pumps are suitable for submerged or dry installation.

Maximum solids size: 80 mm or 100 mm.

1.1.1 Potentially explosive environments

In potentially explosive environments, the explosion-proof S1 and SV pumps must be used, see sections *1.5.1 Ex certification and classification* and *7.3 Explosion-proof S1 and SV pumps*.

Note: The explosion classification of the pump is Ex dIIB T3 or Ex dIIB T4. The installation must in each individual case be approved by the local fire-fighting authorities.

Note: Only pumps classified EXd IIB T3 may be used for frequency converter operation. The maximum frequency is 60 Hz, but the P1 value stated on nameplate must not be exceeded.

1.2 Operating conditions

1.2.1 pH value

All pumps can be used for pumping liquids with a pH value between 4 and 10.

1.2.2 Liquid temperature

0°C to +40°C.

1.2.3 Ambient temperature

-20°C to +40°C.

1.2.4 Density and viscosity of pumped liquid

Maximum density: 1000 kg/m³.

Maximum kinematic viscosity: 1 mm²/s (1 cSt).

Note: When pumping liquids with a density and/or a kinematic viscosity higher than the values stated above, motors with correspondingly higher outputs must be used.

1.2.5 Level of pumped liquid

In the case of submerged pump installation, the lowest stop level must always be above the pump housing.

- **Installation type S:**
The motor must always be covered by the pumped liquid.
- **Installation type C:**
The pump housing must always be covered by the pumped liquid.
- **Installation type D:**
No special requirements.



The pump must always be filled with the liquid to be pumped.

An additional level switch must be installed to ensure that the pump is stopped in case the stop level switch is not operating.

1.2.6 Operating mode

The pumps are designed for continuous operation or for intermittent operation with the maximum 25 starts per hour.

1.2.7 Enclosure class

IEC IP 68.

1.3 Sound pressure level

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

1.4 Type key

All S1 and SV pumps described in this booklet are identified by the type code stated in the confirmation of order and other documentation supplied with the pump. The code consists of 14 items as shown in the table below.

Please note that the pump types described in this booklet are not necessarily available in all variants. The shaded code items are stated on the pump nameplate.

Example SV024 CLU 50BZ		S	V	-	02	4	C	L	U	-	5	0B	Z
Type range S = GRUNDFOS submersible wastewater pumps													
Impeller type 1 = Single-channel V = SuperVortex													
Motor specification [] = Non-explosion-proof A = ATEX, 50 Hz A = ATEX, 60 Hz													
Motor power Motor power in kW													
Motor pole number		Motor speed [min⁻¹]											
			50 Hz	60 Hz									
2	2-pole		3000	3600									
4	4-pole		1500	1800									
Pump generation [] = 1st generation A = 2nd generation B = 3rd generation, etc. The generation code identifies pumps that differ in design but are similar in power rating													
Head [] = No classification E = Extra-low L = Low M = Medium H = High S = Superhigh													
Installation type S = Submerged installation on auto-coupling or portable C = Submerged installation on auto-coupling or portable. Motor cooling is independent of liquid level. D = Vertical or horizontal dry installation on base stand U = Universal, covers all installation types													
Interchangeability The letter (A, B, C...) indicates the interchangeability of parts between otherwise identical pumps. Pumps with no or the same letter have full interchangeability of parts and use the same spare parts catalogue.													
Number of phases [] = Three-phase 1 = Single-phase													
Frequency 5 = 50 Hz 6 = 60 Hz													
Voltage and starting method		50 Hz	0B	3 x 400-415 V, DOL	60 Hz	01	3 x 460 V, DOL	05	3 x 380 V, DOL	07	3 x 220 V, DOL		
Non-standard parts Z = See confirmation of order for further details													

Note: The pump types are not available in all variants.

1.5 Nameplates

All pumps can be identified by means of the nameplate on the motor top cover, see fig. 1.

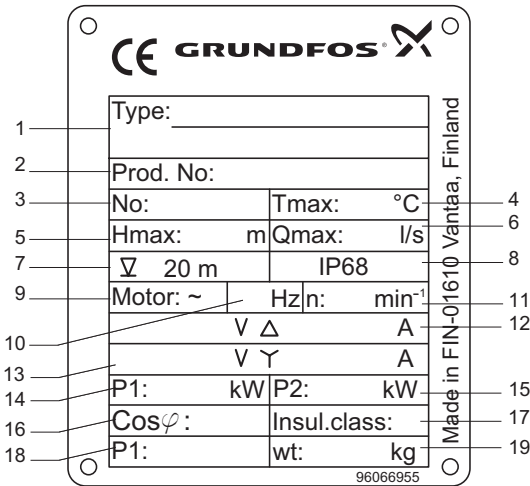


Fig. 1

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Pos.	Description
1	Type designation
2	SAP code
3	Serial number
4	Maximum liquid temperature
5	Maximum head
6	Maximum flow
7	Maximum installation depth
8	Enclosure class
9	Number of phases
10	Frequency
11	Rated speed
12	Voltage/current, delta connection
13	Voltage/current, star connection
14	Power input
15	Shaft power
16	Power factor
17	Insulation class
18	Production code, year/week
19	Weight of the pump

1.5.1 Ex certification and classification

Explosion-proof pumps have been approved by Baseefa (2001) Ltd. in conformity with the essential health and safety requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Council Directive 94/9/EC (ATEX).

The certified pumps (Ex-pumps) are supplied with an approval plate fixed in the visible place close to the nameplate.

Fig. 2 shows the approval plates for the pumps equipped optionally with the motors classified to T3 or T4 temperature class.

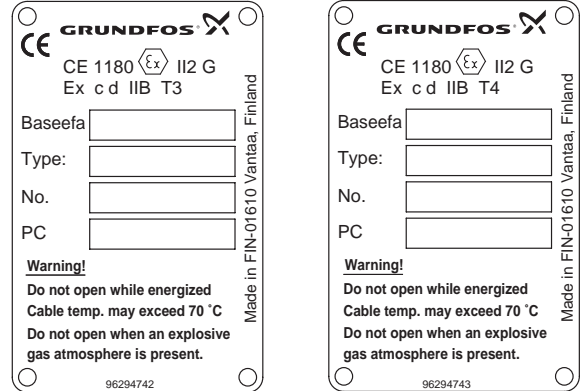


Fig. 2

The approval plate gives the following details:

CE	CE mark.
1180	Number of Quality Assurance notified body.
Ex	EU ex-symbol.
II	Equipment group (II = non-mining).
2	Equipment category (high protection).
G	Type of explosive atmosphere.
Ex	Motor explosion-proof according to European standard.
d	Motor withstands explosion pressure.
IIB	Gas Group.
T3	Maximum surface temperature of the motor is 200°C.
T4	Maximum surface temperature of the motor is 135°C.
c	Constructional safety.
Baseefa	Certificate number.
No.	HA.
PC	Production code.

2. Safety



Pump installation in pits must be carried out by specially trained persons.



Persons should not enter the installation area when an explosive atmosphere is present.

For safety reasons, all work in pits must be supervised by a person outside the pump pit.

Pits for submersible wastewater pumps contain wastewater with toxic and/or disease-causing substances. Therefore, all persons involved must wear appropriate personal protective equipment and clothing and all work on and near the pump must be carried out under strict observance of the hygiene regulations in force.

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3. Transportation and storage

The pump is supplied from the factory in proper packing in which it should remain until it is to be installed.

Make sure that the pump cannot roll or fall over.

All lifting equipment must be rated for the purpose and checked for damages before any attempts are made to lift the pump. The lifting equipment rating must under no circumstances be exceeded. The pump weight is stated on the pump nameplate.



Always lift the pump by its lifting bracket or by means of a fork-lift truck, **never** by means of the motor cable or the hose/pipe.

Note: Do not remove the protection from the free end of the supply cable until the electrical connections are to be made. The free cable end must never be exposed to moisture or water, whether it is protected or not. Non-compliance may involve the risk of damage to the motor.

For long periods of storage, the pump must be protected against moisture and heat.

Storage temperature: -30°C to +60°C.

After a long period of storage, the pump should be inspected before it is put into operation. Make sure that the impeller can rotate freely. Pay special attention to the condition of the shaft seals and the cable entry.

4. Installation

The loose nameplate supplied with the pump should be fixed at the installation site.

All safety regulations must be observed at the installation site, e.g. the use of blowers for fresh-air supply to the pit.



Do not put your hands or any tool into the pump suction or discharge port after the pump has been connected to the electricity supply, unless the pump has been switched off by removing the fuses or switching off the mains switch. It must be ensured that the electricity supply cannot be accidentally switched on.

Prior to installation, check the oil level in the oil chamber, see section 7.1 *Oil check and oil change*.

The S1 and SV pumps are designed for various installation versions.

The following types of submerged installation are possible:

Installation type	Description
S	Submerged installation on auto-coupling
C	Submerged installation on auto-coupling Motor cooling is independent of liquid level
S	Submerged installation, portable
C	Submerged installation, portable Motor cooling is independent of liquid level

Two types of dry installation is possible:

Installation type	Description
D	Vertical dry installation
	Horizontal dry installation

Pumps for dry installation are installed permanently in a pump room.

Figures 3 to 7 show the possible installation versions.

Pumps with "U" on the nameplate cover types S, C and D.

**Installation types S & C (U):
Submerged installation on auto-coupling**

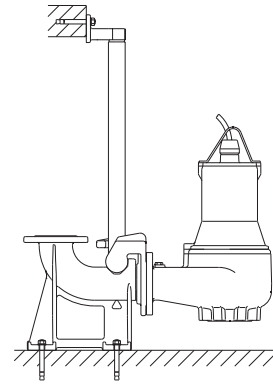


Fig. 3

Permanent installation in pit. The pump can easily be pulled out or lowered into the pit by means of the guide rails and the lifting chain. The liquid level can be set lower for type C than for type S.

**Installation type D (U):
Vertical dry installation with base stand**

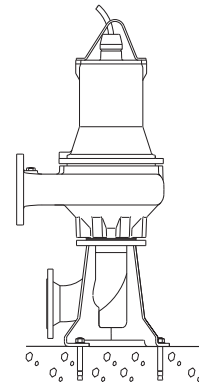


Fig. 4

Permanent installation in a pump room. The pump is bolted to the suction and discharge pipes by means of flange connections.

**Installation types S & C (U):
Submerged installation, portable**

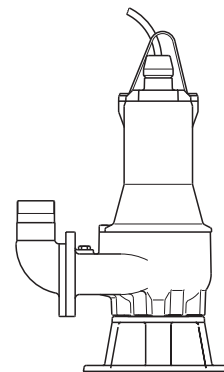


Fig. 5

For portable use in pit or temporary installation. The liquid level can be set lower for type C than for type S.

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TM03 0344 4804

Installation type D (U): Horizontal dry installation with base stand and bracket

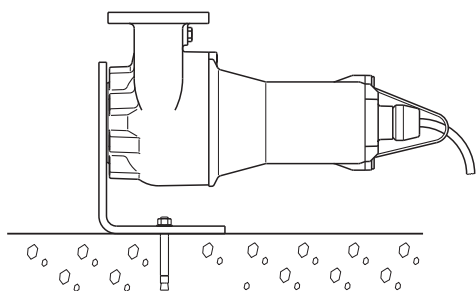


Fig. 6

Permanent installation in a pump room. The pump is bolted to the suction and discharge pipes by means of flange connections.

4.1 Submerged installation on auto-coupling

Pumps for permanent installation can be installed on a stationary auto-coupling and operated completely or partially submerged in the pumped liquid.

1. Drill mounting holes for the guide rail bracket on the inside of the pit and fasten the guide rail bracket provisionally with two screws.
2. Place the auto-coupling base unit on the bottom of the pit. Use a plumb line to establish the correct positioning. Fasten the auto-coupling with expansion bolts. If the bottom of the pit is uneven, the auto-coupling base unit must be supported so that it is level when being fastened.
3. Assemble the discharge pipe in accordance with the generally accepted procedures and without exposing the pipe to distortion or tension.
4. Insert the guide rails into the rings of the auto-coupling base unit and adjust the length of the rails accurately to the guide rail bracket at the top of the pit.
5. Unscrew the provisionally fastened guide rail bracket. Fit the guide rails to the guide rail holder. Fasten the guide rail bracket on the inside of the pit.
6. Clean out debris from the pit before lowering the pump into the pit.
7. Fit the guide claw to the pump.
8. Slide the guide claw of the pump between the guide rails and lower the pump into the pit by means of a certified chain secured to the lifting bracket of the pump. When the pump reaches the auto-coupling base unit, the pump will automatically connect tightly.
9. Hang up the end of the chain on a suitable hook at the top of the pit and in such a way that the chain cannot come into contact with the pump housing.
10. Adjust the length of the motor cable by coiling it up on a relief fitting to ensure that the cable is not damaged during operation. Fasten the relief fitting to a suitable hook at the top of the pit. Make sure that the cables are not sharply bent or pinched.
11. Connect the motor cable and the monitoring cable, if any.

Note: The end of the cable must not be submerged, as water may penetrate through the cable into the motor.

4.2 Dry installation

Pumps in dry installation are installed permanently in a pump room.

The pump motor is enclosed and watertight and will not be damaged if the installation site is flooded with water.

1. Mark and drill mounting holes in the concrete floor.
2. Fit the bracket or base stand to the pump.
3. Fasten the pump with expansion bolts.
4. Check that the pump is vertical/horizontal.

In order to facilitate service on the pump, isolating valves should be fitted on either side of the pump.

5. Fit the suction and discharge pipes and isolating valves, if used, and ensure that the pump is not stressed by the pipe-work.
6. Adjust the length of the motor cable by coiling it up on a relief fitting to ensure that the cable is not damaged during operation. Fasten the relief fitting to a suitable hook. Make sure that the cables are not sharply bent or pinched.
7. Connect the motor cable and the monitoring cable, if any.

Note: It is recommended to use a reducer between the suction pipe and the pump in horizontal installations. The reducer must be of the eccentric type and must be installed so that the straight edge is pointing upwards. In this way, the accumulation of air in the suction pipe is avoided and the risk of disturbance of operation is eliminated, see fig. 7.

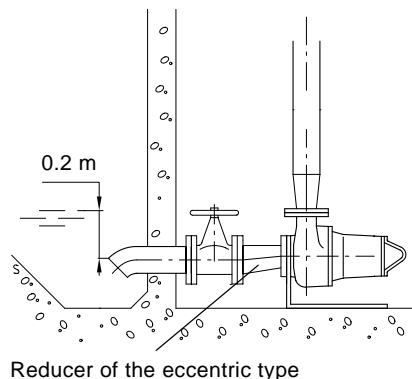


Fig. 7

4.3 Submerged installation, portable

1. Fit the ring stand to the pump suction flange.
2. Fit a 90° elbow to the pump discharge port and connect the discharge pipe/hose.

If a hose is used, make sure that the hose does not buckle and that the inside diameter matches that of the discharge port.

3. Lower the pump into the liquid by means of a certified chain secured to the lifting bracket of the pump. It is recommended to place the pump on a plane, solid foundation. Make sure that the pump is hanging from the chain and **not** the cable.
4. Hang up the end of the chain on a suitable hook at the top of the pit and in such a way that the chain cannot come into contact with the pump housing.
5. Adjust the length of the motor cable by coiling it up on a relief fitting to ensure that the cable is not damaged during operation. Fasten the relief fitting to a suitable hook. Make sure that the cables are not sharply bent or pinched.
6. Connect the motor cable and the monitoring cable, if any.

4.4 Pump controller

The S1 and SV pumps can be connected to a separate Grundfos pump controller for level control, which is available as an accessory:

- type LC for one-pump installations and
- type LCD for two-pump installations.

Depending on application, different types of level control equipment can be used.

The **LC** controller is fitted with two or three level switches: Two for start and stop of pump. The third level switch, which is optional, is for high-level alarm.

The **LCD** controller is fitted with three or four level switches: One for common stop and two for start of the pumps. The fourth level switch, which is optional, is for high-level alarm.

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When installing the level switches, the following points should be observed:

1. To prevent air intake and vibrations in submerged pumps, the **stop level switch** must be fitted in such a way that the pump is stopped before the liquid level is lowered below the top of the pump housing.
As a principal rule for pumps in dry installation, the lowest stop level must be at least 20 cm above the opening of the suction pipe, see fig. 7.
2. The **start level switch** should be installed in such a way that the pump is started at the required level; however, the pump must always be started before the liquid level reaches the bottom inlet pipe to the pit.
3. The **high-level alarm switch**, if installed, should always be installed about 10 cm above the start level switch; however, alarm must always be given before the liquid level reaches the inlet pipe to the pit.

Note: The pump controller must not be installed in potentially explosive environments.



Pumps installed in potentially explosive atmosphere must always be filled with the liquid to be pumped.
An additional level switch must be installed to ensure that the pump is stopped in case the stop level switch is not operating.

4.5 Thermal switches

All motors are equipped with thermal switches as standard.
Three bimetallic thermal switches are built into the stator windings, and a contact will open in case of overtemperature, i.e. 150°C.
The supply voltage to the thermal switches must be 12-230 VAC.
The thermal switches are connected to the monitoring cable, see section 5. *Electrical connection*, and must be connected to the safety circuit of the separate pump controller.

Note: The motor starter of the pump controller must include a circuit which automatically disconnects the electricity supply in case the protective circuit for the pump is opened.



The installer/user should provide an automatic device which disconnects the electricity supply in case the thermal switches or the moisture switches are not operating.

4.6 Moisture switches

All motors are equipped with moisture switches as standard.
Non-explosion-proof pumps have one moisture switch, which is fitted in the chamber below the motor top cover.

Explosion-proof pumps have two moisture switches connected in series, which are fitted in the chamber below the motor top cover.

The moisture switch is non-reversing and must be replaced after use.

The moisture switches are connected in series with the thermal switches and connected to the monitoring cable, see section 5. *Electrical connection*, and must be connected to the safety circuit of the separate pump controller.

Note: The motor starter of the pump controller must include a circuit which automatically disconnects the electricity supply in case the protective circuit for the pump is opened.

5. Electrical connection

The electrical connection should be carried out in accordance with local regulations.

The supply voltage and frequency are marked on the pump nameplate.

The voltage tolerance must be within $\pm 10\%$ of the rated voltage.

Make sure that the motor is suitable for the electricity supply available at the installation site.



The pump must be connected to an external mains switch with a contact separation of at least 3 mm in each pole.

The pump must be connected to a motor starter.

The wiring diagrams for direct-on-line starting and star-delta starting are shown in fig. 8 and fig. 9, respectively.

P1 and P2 are connected in series with the thermal switches and the moisture switches.

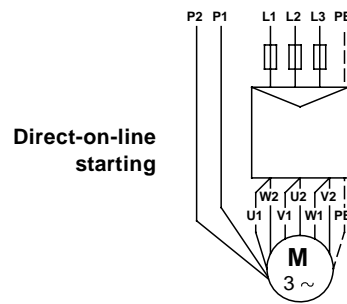


Fig. 8

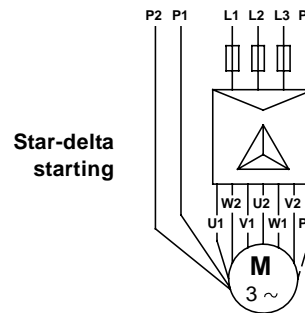


Fig. 9



The top cover of explosion-proof pumps is provided with an external earth terminal to ensure the connection to earth.



Before installation and the first start-up of the pump, the cable condition should be checked visually to avoid short circuits.

6. Start-up



Before manual starting or changeover to automatic control, make sure that no persons are working on or near the pump.

Proceed as follows:

1. Remove the fuses or switch off the mains switch.
2. Check the oil level in the oil chamber. See section 7.1 *Oil check and oil change*.
3. Check whether the impeller can rotate freely.
4. Check whether the monitoring units, if used, are operating satisfactorily.
5. Make sure that the pump is submerged in the liquid.
For pumps in dry installation, it must be ensured that there is liquid in the pit.



Make sure that the pump has been filled with the liquid to be pumped.
Pumps in dry installation must be vented by means of the vent plug in the pump housing.

6. Open the isolating valves, if fitted.
7. Check whether the system has been filled with liquid and vented.
8. Check the setting of the level switches.
9. Start the pump and check the pump operation for abnormal noise or vibrations.

Note: In case of abnormal noise or vibrations from the pump or other pump or supply failures, stop the pump immediately. Do not attempt to restart the pump before the cause of the fault has been found and the fault corrected.

10. After start-up, the actual pump duty point must be established as accurately as possible so that it can be checked whether the operating conditions are as desired.

Note: The pump may be started for a very short period without being submerged for checking of direction of rotation.

The operation of the pump should always take place in accordance with established routines with scheduled checks of pump monitoring equipment and accessories (valves, etc.). Make sure that the pump and equipment settings cannot be changed by unauthorized persons.

6.1 Checking the direction of rotation

An arrow cast in the pump housing indicates the correct direction of rotation. The pump must rotate **clockwise** when seen from the drive end. Observe the movement of the pump (jerk) when started. If the pump moves counter-clockwise, the direction of rotation is correct.

As an alternative, the direction of rotation can be checked as follows:

1. Start the pump and check the quantity of liquid or the discharge pressure.
2. Stop the pump and interchange two of the phases to the motor.
3. Restart the pump and check the quantity of liquid or the discharge pressure.
4. Stop the pump.
5. Compare the results taken under points 1 and 3. The connection which gives the larger quantity of liquid or the higher pressure is the correct direction of rotation.

Note: The pump must only run for a short period when suspended from a chain.

7. Maintenance and service



Before starting work on the pump, 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.

Maintenance and service must be carried out by specially trained persons.



The maintenance and service work on explosion-proof pumps must be carried out by Grundfos or a service workshop authorized by Grundfos.

Before carrying out maintenance and service, it must be ensured that the pump has been thoroughly flushed with clean water. Rinse the pump parts in water after dismantling.

Pumps running normal operation should be inspected every 2000 operating hours or at least once a year. If the pumped liquid is very muddy or sandy, the pump should be inspected every 1000 operating hours or every six months.

The following points should be checked:

- **Power consumption**
- **Oil level and oil condition**
When the pump is new or after replacement of the shaft seals, check the oil level after one week of operation. The oil becomes greyish white like milk if it contains water. This may be the result of a defective shaft seal. The oil should be changed if it contains water. See section 7.1 *Oil check and oil change*.
Note: Used oil must be disposed of in accordance with local regulations.
The oil chamber contains 0.35 to 0.9 litres of SAE 10 W 30 motor oil depending on pump size.
- **Cable entry**
Make sure that the cable entry is watertight and that the cables are not sharply bent or pinched.
- **Impeller clearance**
Check the impeller clearance. See section 7.2 *Inspection and adjustment of impeller clearance*.
- **Pump parts**
Check the pump housing, etc. for possible wear. Replace defective parts.
- **Ball bearings**
Check the shaft for noisy or heavy operation (turn the shaft by hand). Replace defective ball bearings.
A general overhaul of the pump is usually required in case of defective ball bearings or poor motor function. This work must be carried out by an authorized service workshop.



The ball bearings must be replaced at least every 25,000 operating hours.

Note: Out of consideration for the heat-conducting ability, the pump should be cleaned on the outside at regular intervals.

7.1 Oil check and oil change

Proceed as follows:

1. Place the pump in such a position that one of the inspection screws is pointing upwards.



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

2. Place a clean container under the pump to collect all the drained-off oil. Slacken the screw pointing to the side and observe the oil level. The drained-off quantity of oil indicates whether the lower mechanical shaft seal is leaking, which may be normal.
3. Turn the pump and allow all the oil to drain from the chamber into the container. Pour an oil sample into a glass container and observe the condition of the oil.
Clear oil can be reused.
Emulsified oil must be changed and disposed of.
Note: Used oil must be disposed of in accordance with local regulations.
Low oil level may indicate that the upper mechanical shaft seal is defective. Contact an authorized service workshop for further overhaul of the pump and repair, if required.
4. Fill the oil chamber with oil to the correct level. Replace the O-rings by new rings, insert the screws and tighten securely.



Use viscosity grade SAE 10 W 30 or ONDINA 917.

7.2 Inspection and adjustment of impeller clearance

Adjustment of the impeller clearance is only relevant for pumps with single-channel impellers (S1 pumps).

The correct impeller clearance is 0.7 mm \pm 0.2 mm. The clearance should be adjusted if it is worn to 1.2 mm or more.

The procedures for adjustment of the impeller clearance are different for pumps in submerged installation (type S and C) and pumps in dry installation (type D). Both procedures are described in the following.

7.2.1 Inspection of impeller clearance for pumps in submerged installation

1. Lay the pump flat on a work bench.
2. Locate the six fixing screws securing the pump housing to the motor and the three adjusting screws, see fig. 10.
3. Check the clearance between impeller and pump housing all the way round using a feeler gauge.
4. Turn the impeller by hand and check at several points, see fig. 11.

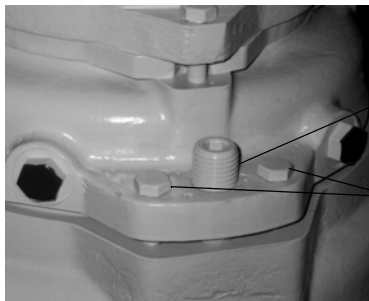


Fig. 10

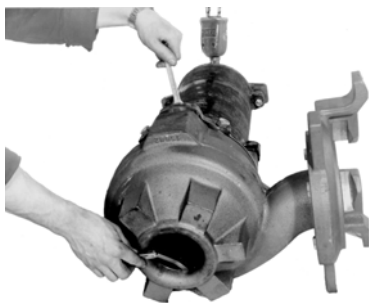


Fig. 11

If the impeller clearance needs adjustment, follow one of the procedures described below.

7.2.2 Adjustment of impeller clearance for pumps in submerged installation

Procedure:

1. Slacken all fixing screws and adjusting screws between pump housing and motor.
2. Tap on the pump housing at several points using a rubber mallet to loosen the pump housing from the motor.
3. Close the impeller clearance by tightening three of the fixing screws until the impeller touches the pump housing. Do not use unnecessary force.
4. Slacken the fixing screws and open the clearance to $0.7 \text{ mm} \pm 0.2 \text{ mm}$ by tightening the three adjusting screws, see fig. 12. Check that the clearance is equal all around the suction opening.
5. Tighten all fixing screws and check that the clearance is still equal all around the suction opening.

7.2.3 Adjustment of impeller clearance for pumps in dry installation

The impeller clearance can be adjusted while the pump is mounted on the base stand and connected to the pipework.

Procedure:

1. Slacken all fixing screws and adjusting screws between pump housing and motor.
2. Tap on the pump housing at several points using a rubber mallet to loosen the pump housing from the motor.
3. Close the impeller clearance by tightening three of the fixing screws until the impeller touches the pump housing. Do not use unnecessary force.
4. Measure the distance X between the shaft seal housing and the pump housing at three points using a slide caliper, see fig. 12.

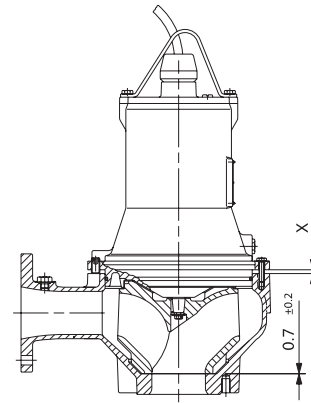


Fig. 12

5. Slacken the fixing screws and pull the motor $0.7 \text{ mm} \pm 0.2 \text{ mm}$ out by tightening the three adjusting screws and using the distance X as reference.
6. Tighten all fixing screws and check that the distance X at the three reference points is equal, see fig. 12.

7.3 Explosion-proof S1 and SV pumps



The maintenance and service work on explosionproof pumps must be carried out by Grundfos or a service workshop authorized by Grundfos.

Overhauled and repaired explosion-proof motors are marked with a repair plate giving the following information:

- The repair symbol R.
- Name or registered trade mark of the repairing workshop.
- Workshop reference number relating to the repair.
- Date of overhaul or repair.

In the event of subsequent repairs, the existing plate should be replaced by a new updated plate and earlier markings are recorded.

The repairing workshop must keep records of performed overhauls and repairs together with records of all previous overhauls, repairs and possible modifications. Copies of the repairing workshop's detailed records should be filed by the owner or operator together with the original type certificate of the explosion-proof motor in question.

7.3.1 Motor cable

Only cables which are approved by the manufacturer and suitable for the cable entry as to diameter, number of leads, conductor cross section and sheath material may be used for the motor.

7.3.2 Cable entry

Only Exd cable entry parts corresponding to the cable diameter may be used. The corresponding cable dimension marking is stamped on the inlet or the cable entry.

7.3.3 Spare parts

Damaged motor parts, such as top cover and cable entry, should always be replaced by new and approved parts manufactured and marked by Grundfos. Motor parts must not be reconditioned by machining, re-tapping, welding, etc.

7.4 Contaminated pumps

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

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

Possible costs of returning the pump are paid by the customer. However, any application for service (no matter to whom it may be made) must include details about the pumped liquid if the pump has been used for liquids which are injurious to health or toxic.

TM02 2393 4201

TM02 2394 4201

TM03 0370 4904

8. Fault finding chart



Before attempting to diagnose any fault, 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.

The safety instructions in section 2. *Safety* must be read and observed.

Fault	Cause	Remedy
1. Pump does not start or stops without visible cause.	a) No electricity supply.	Check electricity supply and fuses. Start the pump manually and check contactor operation.
2. Pump does not start or stops. The control panel of the controller indicates that the motor starter or protection equipment has tripped out.	a) Missing phase.	Check electricity supply and fuses.
	b) Pump momentarily overloaded.	If the fault does not disappear automatically, find the cause.
	c) Impeller blocked by impurities.	Check impeller and clean as required.
	d) Motor starter not set correctly.	Check and set as required according to rated current.
	e) Thermal switches tripped out. Insufficient motor cooling.	Allow the motor to cool. Ensure adequate cooling by lowering the pump into the liquid, versions 1 and 4.
	f) Moisture switch in motor tripped out.	Contact authorized service workshop.
	g) Motor cable defective.	Check for visual damages. Contact authorized service workshop.
	h) Fluctuating voltage.	Check voltage. Permissible deviation is $\pm 5\%$.
3. Pump runs but does not deliver the rated flow.	a) Wrong direction of rotation.	Check the direction of rotation and possibly interchange two phases to the motor.
	b) Impeller loose or worn.	Check impeller and adjust as required.
	c) Pump or pipework blocked by impurities.	Check pump and pipework and clean as required.
	d) Pump head too high.	Check by measuring the pressure and reinstall discharge pipe or install new pump.
	e) Valves closed or blocked. Non-return valve not operating.	Check valve position and clean as required.
	f) Air in pump or suction pipe.	Vent the pump and suction pipe. Increase the stop level in the pit or reinstall suction pipe.
	g) Pumped liquid too dense.	Dilute the liquid or change the process.
	h) Pump not properly connected to auto-coupling.	Pump down the liquid level in pit. Lift out the pump and relocate the pump on the auto-coupling.
	i) Leakage in pipework.	Check pipework for leaks and make tight as required.
	j) Pump pit flushing system inadvertently activated.	Check function and repair as required.
4. Pump starts, but stops immediately.	a) Clogged pump causes motor starter to trip out.	Check pump and clean as required.
	b) Overheated motor causes thermal switches to trip out.	Allow pump to cool. Check for cause as above.
	c) Level switch out of adjustment or defective.	Clean or set level switch or replace as required.
5. Pump vibrating or emitting excessive noise.	a) Pump partly choked by impurities.	Check pump and clean as required.
	b) Wrong direction of rotation.	Check the direction of rotation and possibly interchange two phases to the motor.
	c) Pump operates outside specified operating range.	Check operating conditions.
	d) Pump defective.	Check pump for damages. Repair the pump or contact an authorized workshop, if necessary.
	e) Pump not properly connected to auto-coupling.	Pump down the liquid level in pit. Lift out the pump and relocate the pump on the auto-coupling.
	f) Pump cavitates.	Check pump for partial suction blockage and clean as required. Check duty point and adjust as required.
g) Base stand, auto-coupling, ring stand or guide rails not installed correctly.	Check installation and tighten bolts where necessary.	
6. Oil watery or emulsified.	a) Lower mechanical seal leaking.	Contact authorized service workshop.
7. Low oil level.	a) Upper mechanical seal leaking.	Contact authorized service workshop.

9. Disposal

Disposal of this product or parts of it must be carried out according to the following guidelines:

1. Use the local public or private waste collection service.
2. In case such waste collection service does not exist or cannot handle the materials used in the product, please deliver the product or any hazardous materials from it to your nearest Grundfos company or service workshop.

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