



Wilo-Sub TWI 4..., TWI 4-...-QC

D	Einbau- und Betriebsanleitung	HU	Beépítési és üzemeltetési utasítás
US	Installation and operating instructions	PL	Instrukcja montażu i obsługi
F	Notice de montage et de mise en service	CZ	Návod k montáži a obsluze
E	Instrucciones de instalación y funcionamiento	RUS	Инструкция по монтажу и эксплуатации
I	Istruzioni di montaggio, uso e manutenzione	LT	Montavimo ir naudojimo instrukcija
NL	Inbouw- en bedieningsvoorschriften	SK	Návod na montáž a obsluhu
GR	Οδηγίες εγκατάστασης και λειτουργίας	BG	Инструкция за монтаж и експлоатация
TR	Montaj ve kullanma kılavuzu	RO	Instrucțiuni de montaj și exploatare
S	Monterings- och skötselanvisning	UA	Інструкція з монтажу та експлуатації
HR	Upute za ugradnju i uporabu		

Fig. 1

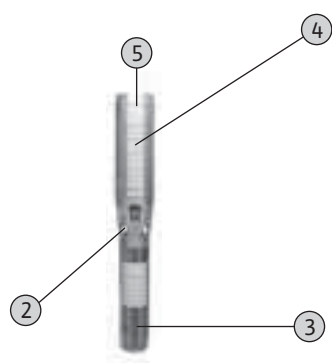


Fig. 2

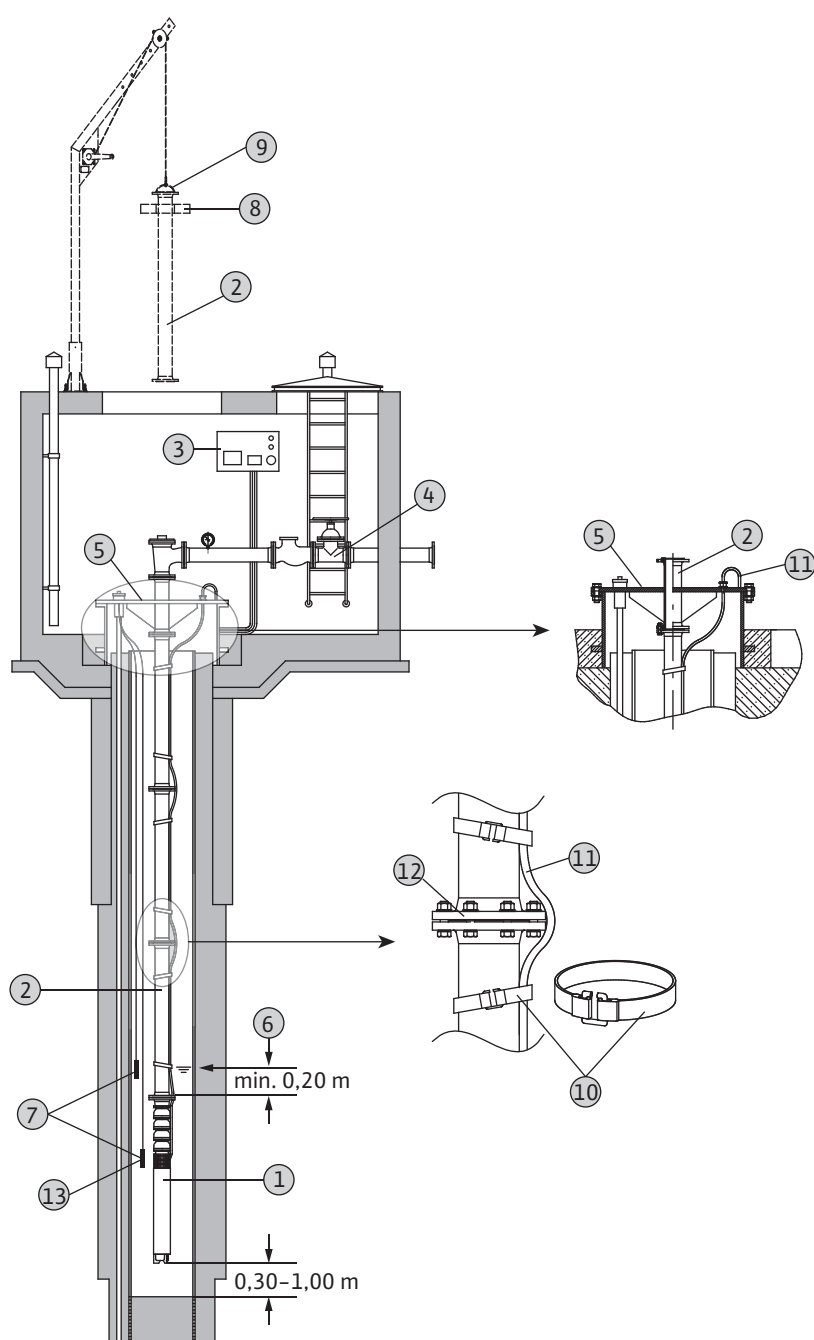
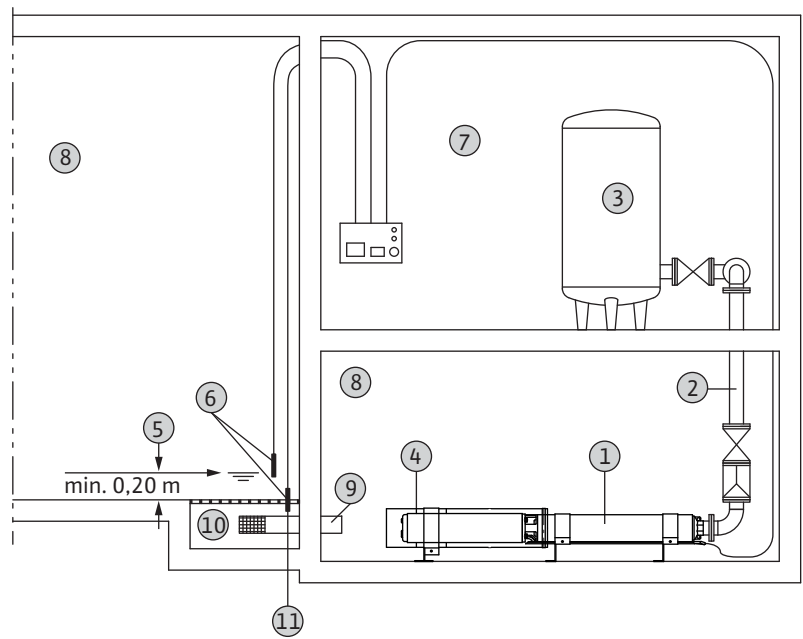
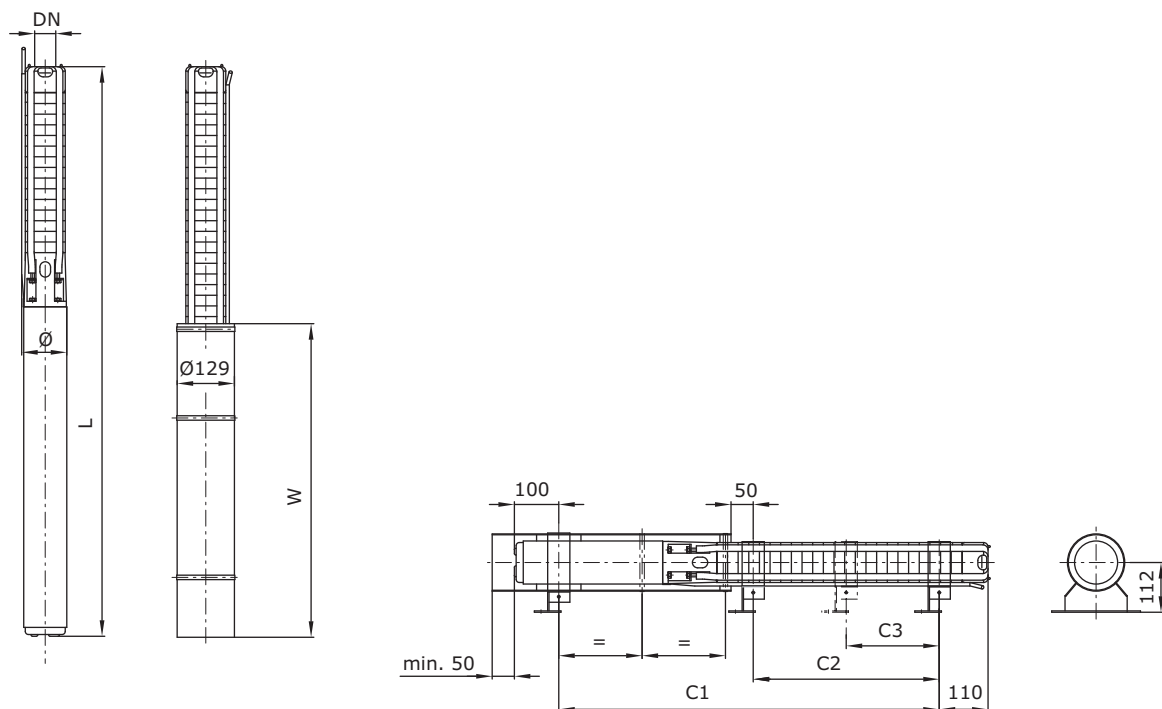


Fig. 3





Art.-No.	Type	DN	Ø	C1	C2	C3	L	W
			mm	mm	mm	mm	mm	mm
TWI 4.01...; 1~230 V, 50 Hz								
6043566	TWI 4.01-09-B	Rp 1¼	98	405	-	-	598	500
6043567	TWI 4.01-14-B	Rp 1¼	98	539	208	-	732	500
6043568	TWI 4.01-18-B	Rp 1¼	98	633	302	-	816	500
6043569	TWI 4.01-21-B	Rp 1¼	98	714	355	-	907	500
6043570	TWI 4.01-28-B	Rp 1¼	98	918	502	-	1082	750
6043571	TWI 4.01-36-B	Rp 1¼	98	1121	705	-	1273	750
6043572	TWI 4.01-42-B	Rp 1¼	98	1275	831	-	1428	750
TWI 4.02...; 1~230 V, 50 Hz								
6042682	TWI 4.02-09-B	Rp 1¼	98	434	-	-	627	500
6042684	TWI 4.02-13-B	Rp 1¼	98	546	-	-	739	500
6042685	TWI 4.02-18-B	Rp 1¼	98	708	292	-	872	750
6042686	TWI 4.02-23-B	Rp 1¼	98	813	397	-	977	750
6042687	TWI 4.02-28-B	Rp 1¼	98	946	502	-	1111	750
6042688	TWI 4.02-33-B	Rp 1¼	98	1051	607	-	1239	750
6042693	TWI 4.02-40-B	Rp 1¼	98	1309	789	-	1490	750
6042695	TWI 4.02-48-B	Rp 1¼	98	1477	957	-	1658	750
TWI 4.03...; 1~230 V, 50 Hz								
6042696	TWI 4.03-06-B	Rp 1¼	98	371	-	-	564	500
6042697	TWI 4.03-09-B	Rp 1¼	98	462	-	-	655	500
6042698	TWI 4.03-12-B	Rp 1¼	98	582	-	-	746	750
6042699	TWI 4.03-15-B	Rp 1¼	98	645	229	-	809	750
6042900	TWI 4.03-18-B	Rp 1¼	98	736	292	-	901	750
6042901	TWI 4.03-22-B	Rp 1¼	98	820	376	-	985	750

Art.-No.	Type	DN	Ø	C1	C2	C3	L	W
			mm	mm	mm	mm	mm	mm
6042902	TWI 4.03-25-B	Rp 1¼	98	959	439	-	1152	750
6042903	TWI 4.03-29-B	Rp 1¼	98	1043	523	-	1236	750
6042904	TWI 4.03-33-B	Rp 1¼	98	1127	607	-	1343	750
TWI 4.05...; 1~230 V, 50 Hz								
6042905	TWI 4.05-04-B	Rp 1½	98	329	-	-	522	500
6043573	TWI 4.05-06-B	Rp 1½	98	371	-	-	564	500
6042906	TWI 4.05-08-B	Rp 1½	98	441	-	-	634	500
6043574	TWI 4.05-12-B	Rp 1½	98	610	-	-	775	750
6042907	TWI 4.05-17-B	Rp 1½	98	791	-	-	984	750
6042908	TWI 4.05-21-B	Rp 1½	98	875	355	-	1068	750
6042909	TWI 4.05-25-B	Rp 1½	98	959	439	-	1152	750
TWI 4.09...; 1~230 V, 50 Hz								
6042910	TWI 4.09-05-B	Rp 2	98	553	-	-	742	750
6042911	TWI 4.09-07-B	Rp 2	98	637	-	-	823	750
6042912	TWI 4.09-10-B	Rp 2	98	791	292	-	978	750
6043575	TWI 4.09-12-B	Rp 2	98	951	376	-	1166	750
6042913	TWI 4.09-15-B	Rp 2	98	1077	502	-	1292	750
TWI 4.14...; 1~230 V, 50 Hz								
6042914	TWI 4.14-05-B	Rp 2	98	756	-	-	965	750
6042915	TWI 4.14-07-B	Rp 2	98	886	-	-	1095	750
TWI 4.01...; 3~400 V, 50 Hz								
6043546	TWI 4.01-09-B	Rp 1¼	98	393	-	-	586	500
6043547	TWI 4.01-14-B	Rp 1¼	98	539	230	-	710	500
6043548	TWI 4.01-18-B	Rp 1¼	98	633	324	-	794	500
6043549	TWI 4.01-21-B	Rp 1¼	98	692	355	-	885	500
6043550	TWI 4.01-28-B	Rp 1¼	98	867	502	-	1060	500
6043551	TWI 4.01-36-B	Rp 1¼	98	1070	705	-	1251	500
6043552	TWI 4.01-42-B	Rp 1¼	98	1225	831	-	1406	500
TWI 4.02...; 3~400 V, 50 Hz								
6042944	TWI 4.02-09-B	Rp 1¼	98	434	-	-	605	500
6042945	TWI 4.02-13-B	Rp 1¼	98	524	187	-	717	500
6042946	TWI 4.02-18-B	Rp 1¼	98	657	292	-	850	500
6042947	TWI 4.02-23-B	Rp 1¼	98	762	397	-	955	500
6042948	TWI 4.02-28-B	Rp 1¼	98	896	502	-	1089	500
6042949	TWI 4.02-33-B	Rp 1¼	98	1001	607	-	1217	500
6042950	TWI 4.02-40-B	Rp 1¼	98	1211	789	-	1392	750
6042951	TWI 4.02-48-B	Rp 1¼	98	1379	957	-	1560	750
TWI 4.03...; 3~400 V, 50 Hz								
6042952	TWI 4.03-06-B	Rp 1¼	98	371	-	-	542	500
6042953	TWI 4.03-09-B	Rp 1¼	98	440	-	-	633	500
6042954	TWI 4.03-12-B	Rp 1¼	98	531	-	-	724	500
6042955	TWI 4.03-15-B	Rp 1¼	98	594	229	-	787	500
6042956	TWI 4.03-18-B	Rp 1¼	98	686	292	-	879	500
6042957	TWI 4.03-22-B	Rp 1¼	98	770	376	-	963	500
6042958	TWI 4.03-25-B	Rp 1¼	98	861	439	-	1054	750

Art.-No.	Type	DN	Ø	C1	C2	C3	L	W
			mm	mm	mm	mm	mm	mm
6042959	TWI 4.03-29-B	Rp 1¼	98	945	523	-	1138	750
6042960	TWI 4.03-33-B	Rp 1¼	98	1029	607	-	1245	750
6042961	TWI 4.03-39-B	Rp 1¼	98	1327	753	-	1523	750
6042962	TWI 4.03-45-B	Rp 1¼	98	1468	894	-	1649	750
6042963	TWI 4.03-52-B	Rp 1¼	98	1655	1041	-	1834	750
TWI 4.05...; 3~400 V, 50 Hz								
6042964	TWI 4.05-04-B	Rp 1½	98	329	-	-	500	500
6043553	TWI 4.05-06-B	Rp 1½	98	371	-	-	542	500
6042965	TWI 4.05-08-B	Rp 1½	98	419	-	-	612	500
6043554	TWI 4.05-12-B	Rp 1½	98	560	-	-	753	500
6042966	TWI 4.05-17-B	Rp 1½	98	693	271	-	886	750
6042967	TWI 4.05-21-B	Rp 1½	98	777	355	-	970	750
6042968	TWI 4.05-25-B	Rp 1½	98	861	439	-	1054	750
6042969	TWI 4.05-33-B	Rp 1½	98	1181	607	-	1382	750
6042970	TWI 4.05-38-B	Rp 1½	98	1367	753	-	1525	750
6042971	TWI 4.05-44-B	Rp 1½	98	1508	858	-	1689	750
TWI 4.09...; 3~400 V, 50 Hz								
6042972	TWI 4.09-05-B	Rp 2	98	502	-	-	717	750
6042973	TWI 4.09-07-B	Rp 2	98	586	-	-	801	750
6042974	TWI 4.09-10-B	Rp 2	98	741	292	-	956	750
6043555	TWI 4.09-12-B	Rp 2	98	853	376	-	1068	750
6042975	TWI 4.09-15-B	Rp 2	98	979	502	-	1194	750
6042976	TWI 4.09-18-B	Rp 2	98	1257	628	-	1472	750
6042977	TWI 4.09-21-B	Rp 2	98	1423	754	-	1636	1000
6042978	TWI 4.09-25-B	Rp 2	98	1591	922	-	1804	1000
6042979	TWI 4.09-30-B	Rp 2	98	1951	1132	566	2166	1000
6042980	TWI 4.09-37-B	Rp 2	98	2245	1426	713	2457	1000
TWI 4.14...; 3~400 V, 50 Hz								
6042981	TWI 4.14-05-B	Rp 2	98	658	-	-	867	750
6042982	TWI 4.14-07-B	Rp 2	98	788	291	-	997	750
6042983	TWI 4.14-10-B	Rp 2	98	1135	486	-	1344	750
6042984	TWI 4.14-13-B	Rp 2	98	1406	681	-	1615	1000
6042985	TWI 4.14-18-B	Rp 2	98	1845	1006	-	2054	1000
6042986	TWI 4.14-25-B	Rp 2	98	2376	1461	711	2585	1000

1 Introduction

1.1 About this document

The language of the original operating manual is German. All other language versions are translations of the original German manual.

The operating manual contains a copy of the EC Declaration of Conformity.

Any unauthorized or unapproved changes made to the constructions specified therein will nullify this declaration.

1.2 Layout of the manual

The manual is divided into individual chapters. Each chapter has a heading which clearly describes the content of that chapter.

The table of contents also serves as a brief reference, since all the important sections have their own headers.

All the important operating and safety instructions are highlighted. For detailed information on the structure of these texts, see "Safety" in Chapter 2.

1.3 Personnel qualifications

All personnel who work on or with the product must be qualified for such work; electrical work, for example may only be carried out by a qualified electrician. All personnel must be of legal age.

Operating and maintenance personnel must also observe national accident prevention regulations.

It must be ensured that personnel has read and understood the instructions in this operating and maintenance handbook; if necessary, this manual must be ordered from the manufacturer in the required language.

This product is not intended to be used by persons (including children) with limited physical, sensory or mental abilities or without experience and/or without knowledge, unless they are supervised by a person responsible for their safety and receive instructions from this person as to how the product is to be used.

Children must be supervised in order to ensure that they do not play with the product.

1.4 Abbreviations and technical terms

Various abbreviations and technical terms are used in this operating and maintenance manual.

1.4.1 Abbreviations

- p.t.o = please turn over
- approx. = approximately
- i.e. = that is
- incl. = included
- min. = minimum
- max. = maximum
- etc. = and so on
- s.a. = see also
- e.g. = for example

1.4.2 Terms

Dry run

The product is running at full speed, however, there is no liquid to be pumped. A dry run is to be strictly avoided. If necessary, a safety device must be installed!

Dry-run protection

The dry-run protection is designed to automatically shut down the product if the water level falls below the minimum water coverage value of the product. This is made possible by installing a float switch or level sensor, for example.

Level control

The level control is designed to switch the product on or off at various filling levels. This is made possible by installing either one or two float switches.

1.5 Copyright

This operation and maintenance manual has been copyrighted by the manufacturer. The operation and maintenance handbook is intended for use by assembly, operating, and maintenance personnel. It contains technical specifications and diagrams which may not be reproduced or distributed, either completely or in part, or used for any other purpose without the expressed consent of the manufacturer.

1.6 Rights of alteration

The manufacturer reserves the right to make technical alterations to systems or components. This operating and maintenance manual refers to the product indicated on the title page.

1.7 Warranty

This chapter contains the general information on the warranty. Contractual agreements have the highest priority and are not superseded by the information in this chapter!

The manufacturer is obliged to correct any defects found in the products it sells, provided that the following requirements have been fulfilled:

1.7.1 General

- The defects are caused by the materials used or the way the product was manufactured or designed.
- The defects were reported in writing to the manufacturer within the agreed warranty period.
- The product was used only as prescribed.
- All safety and control devices were connected and inspected by qualified personnel.

1.7.2 Warranty period

If no other provisions have been made, the warranty period applies to the first 12 months after initial start-up or to a max. period of 18 months after the delivery date. Other agreements must be made in writing in the order confirmation. These will remain valid at least until the agreed warranty period of the product has expired.

1.7.3 Spare parts, add-ons and modifications

Only original spare parts as supplied by the manufacturer may be used for repairs, replacements, add-ons and modifications. Only these parts guarantee a long working life and the highest level of safety. These parts have been specially designed for our products. Unauthorized add-ons and modifications or the use of non-original spare parts can seriously damage the product and/or injure personnel.

1.7.4 Maintenance

The prescribed maintenance and inspection work should be carried out regularly. This work may only be carried out by qualified, trained and authorized personnel. Repairs not listed in this operation and maintenance manual and all types of repair work may only be performed by the manufacturer and authorized service centers.

1.7.5 Damage to the product

Damage as well as malfunctions that endanger safety must be eliminated immediately by trained personnel. The product should only be operated if it is in proper working order. During the agreed warranty period, the product may only be repaired by the manufacturer or an authorized service workshop! The manufacturer reserves the right to have the damaged product delivered by the operator to the factory for inspection!

1.7.6 Exclusion from liability

No liability will be assumed for product damage if one or more of the following points applies:

- A construction by the manufacturer based on faulty and/or incorrect information provided by the operator or customer
- Non-compliance with the safety instructions, the regulations and requirements in terms of German law and/or the applicable local laws, as well as this operating and maintenance manual
- Improper use
- Incorrect storage and transport
- Improper assembly/dismantling
- Insufficient maintenance
- Unqualified repairs
- Faulty construction site and/or construction work
- Chemical, electrochemical and electrical influences
- Wear

This means the manufacturer's liability excludes all liability for personal, material or financial injury.

2 Safety

This chapter lists all the generally applicable safety instructions and technical information. Furthermore, each remaining chapter contains specific safety instructions and technical information. All instructions and information must be observed and followed during the various phases of the product's life cycle (installation, operation, maintenance, transport etc.)! The operator is responsible for ensuring that personnel follow these instructions and guidelines.

2.1 Instructions and safety information

This manual uses instructions and safety information for preventing injury and damage to property. To uniquely identify these for personnel, the instructions and safety information are differentiated as follows:

2.1.1 Instructions

An instruction is displayed in "bold". Instructions contain text that refers to the previous text or particular sections of chapters, or highlights short instructions.

Example:

Note that products stored with drinking water must be protected from frost!

2.1.2 Safety information

Safety information is slightly indented and displayed in "bold". It always commences with a signal word.

Information that only refers to material damage is printed in gray, without safety symbols.

Information that refers to personal injury is printed in black and is always accompanied by a safety symbol. Danger, prohibition or instruction symbols are used as safety symbols.

Example:



Danger symbol: General hazard



Danger symbol, for example, electrical current



Prohibition symbol, for example, Keep out!



Instruction symbol, for example, wear protective clothing

The safety symbols used conform to the generally valid directives and regulations, such as DIN and ANSI.

Each safety instruction begins with one of the following signal words:

- **Danger**
This can result in serious or fatal injuries!
- **Warning**
Serious injuries can occur!
- **Caution**
Injuries can occur!
- **Caution** (Instruction without symbol)
Substantial material damage can occur. Irreparable damage is possible!

Safety instructions begin with a signal word and description of the hazard, followed by the hazard source and potential consequences, and end with advice on prevention.

Example:

Beware of rotating parts!

The rotating rotor can crush and sever limbs.

Switch off the product and let the rotor come to a stop.

2.2 General safety

- When installing or removing the product, never work alone in rooms and shafts. A second person must always be present.
- The product must always be switched off before any work is performed on it (assembly, dismantling, maintenance, installation). The product must be disconnected from the electrical system and secured against being switched on again. All rotating parts must have come to a stop.
- The operator should inform his/her superior immediately should any defects or irregularities occur.
- It is of vital importance that the system be shut down immediately by the operator if any problems arise which may endanger safety of personnel. Problems of this kind include:
 - Failure of the safety and/or control devices
 - Damage to important parts
 - Damage to electric installations, cables, and insulation.
- Tools and other objects should be kept in a place reserved for them so that they can be found quickly.
- Sufficient ventilation must be provided in enclosed rooms.
- When welding or working with electronic devices, ensure that there is no danger of explosion.
- Only use fastening devices which are legally defined as such and officially approved.
- The fastening devices should be kept safely and must be suitable for the conditions of use (weather, hooking system, load, etc).
- Mobile working apparatus for lifting loads should be used in a manner that ensures their support stability during operation.
- When using mobile working apparatus for lifting non-guided loads, preventive measures should be taken to avoid tipping and sliding etc.
- Measures should be taken to ensure that no person is ever directly beneath a suspended load. Furthermore, it is also prohibited to move suspended loads over workplaces where people are present.
- If a mobile working apparatus is used for lifting loads, a second person should be present to coordinate the procedure, if required (for example, if the operator's field of vision is blocked).
- The load to be lifted must be transported in such a manner that nobody can be injured in the case of a power outage. Additionally, when working outdoors, such procedures must be interrupted immediately if weather conditions worsen.

These instructions must be strictly observed. Non-observance can result in injury or substantial material damage.

2.3 Directives used

This product is subject

- various EC directives
- various harmonized standards
- and various national standards.

Please consult the EU Declaration of Conformity for the precise information and the guidelines and norms in effect.

Also, various national standards are also used as a basis for using, assembling and dismantling the product. These include the German accident prevention regulations, VDE regulations, German Equipment Safety Law etc.

2.4 CE marking

The CE marking is found either on the type plate or near the type plate. The type plate is attached to the motor casing or to the frame.

2.5 Electrical work

Our electrical products are operated with alternating or three-phase current. The local regulations (e.g. VDE 0100) must be observed. The chapter entitled "Electrical connection" must be observed when connecting the product. The technical specifications must be strictly adhered to!

If the product has been switched off by a protective device, it must not be switched on again until the error has been corrected.



Beware of electrical current!

Incorrectly performed electrical work can result in fatal injury! This work may only be carried out by a qualified electrician.

Beware of moisture!

Moisture penetrating the cable damages both the product and cable. Never immerse cable ends in the pumped liquid or other liquids. Unused wires must be insulated!

2.6 Electrical connection

The operator is required to know where the machine is supplied with current and how to cut off the supply. The installation of an earth leakage circuit breaker (RCD) is recommended.

The governing national directives, standards and regulations as well as the requirements of the local public utility company must be observed.

When the product is connected to the electrical control panel, particularly when electronic devices such as soft startup control or frequency drives are used, the relay manufacturer's specifications must be followed to comply with the electromagnetic compatibility (EMC) requirements. Special separate shielding measures (e.g. shielded cables, filters, etc.) may be necessary for the power supply and control cables.

The connections may only be made if the relays meet the harmonized EU standards. Mobile radio

equipment may cause malfunctions in the system.



Beware of electromagnetic radiation!

Electromagnetic radiation can pose a fatal risk for people with pacemakers. Put up appropriate signs and make sure anyone affected is aware of the danger!

2.7 Ground connection

Our products (unit including protective devices and control station, auxiliary hoisting gear) must always be grounded. If there is a possibility that people can come into contact with the product and the pumped liquid (e.g. at construction sites), the connection must be additionally equipped with an earth leakage protection device.

The pump units are submersible and conform to protection class IP 68 in terms of the applicable standards.

The protection class of the installed switching devices can be found on the device housing and corresponding operation manual.

2.8 Safety and monitoring devices

Our products can be equipped with mechanical (e.g. intake strainer) and/or electrical (e.g., thermo sensors, moisture sensors, etc.) safety and monitoring devices. These devices must be attached or connected.

Electrical devices such as thermo sensors, float switches, etc. must be connected and checked by an electrician for proper functioning before start-up.

Please note that certain devices require a relay to function properly, e.g. PTC thermistor and PT100 sensor. This relay can be obtained from the manufacturer or an electrical supply dealer.

Personnel must be informed of the installations used and how they work.

Caution!

Never operate the product if the safety and monitoring devices have been removed or damaged, or if they do not work.

2.9 Safety rules during operation

When operating the product, always follow the locally applicable laws and regulations for work safety, accident prevention and handling electrical machinery. To help to ensure safe working practice, the responsibilities of employees should be clearly set out by the owner. All personnel are responsible for ensuring that regulations are observed.

The product has moving parts. During operation, these parts turn to pump the fluid. Certain materials in the

pumped fluid can cause very sharp edges to form on the moving parts.

Beware of rotating parts!

The rotating parts can crush and sever limbs. Never reach into the hydraulics or the moving parts during operation. Switch off the product and let the moving parts come to a stop before maintenance or repair work!



2.10 Pumped liquids

Each pumped liquid differs in respect of composition, corrosiveness, abrasiveness, dry matter content and in many other aspects. Generally, our products can be used for many applications. Please note that if requirements change (density, viscosity or general composition), this can also affect many parameters of the product.

When using or replacing the product in a different pumped liquid, observe the following points:

- When used in drinking water applications, all the parts that come into contact with the fluid must be suitable for use with drinking water. This must be checked according to local laws and regulations.
- Products that have been operated in dirty waste water must be cleaned thoroughly before being used for other pumped liquids.
- Products that have been operated in sewage water and/or fluids that are hazardous to health must be decontaminated before being used with other pumped liquids.

It must be clarified, whether the product can be used at all with another pumped liquid.

- If a product is operated with a lubricant or cooling fluid (such as oil), the pumped liquid can be contaminated by these substances if the mechanical shaft seal is defective.
- It is strictly prohibited to pump explosive or highly flammable liquids in pure form!

Danger – explosive liquids!

It is strictly prohibited to pump explosive liquids (gasoline, kerosene, etc.). The products are not designed for these liquids!



2.11 Sound pressure

Depending on the size and capacity (kW), the products produce a sound pressure of approximately 70 dB (A) to 110 dB (A).

The actual sound pressure, however, depends on several factors. These include, for example, the installation depth, configuration, fastening of accessories and pipeline, operating point, immersion depth, etc.

Once the product has been installed, we recommend that the operator make an additional measurement under all operating conditions.

Caution: Wear ear protectors!

In terms of the applicable laws and regulations, ear protection must be worn if the sound pressure is greater than 85 dB (A)! The operator is responsible for ensuring compliance with these regulations!



3 Transport and storage

3.1 Delivery

Upon receipt of the delivery, it is immediately checked for damage and completeness. If any parts are damaged or missing, the transport company or the manufacturer must be informed on the day of delivery. Claims made after this date cannot be recognized. Damage to parts must be noted on the delivery or freight documentation.

3.2 Transport

Only the appropriate and approved fastening devices, transportation means and lifting gear may be used. These must have sufficient load-bearing capacity to ensure that the product can be transported safely. If chains are used they must be secured against slipping.

The personnel must be qualified for the tasks and must follow all national safety regulations in effect during the work.

The product is delivered by the manufacturer / shipping agency in suitable packaging. This normally precludes the possibility of damage occurring during transport and storage. The packaging should be stored in a safe place for reuse if the product is frequently used at different locations.

Beware of frost!

If drinking water is used as a coolant/lubricant, the product must be protected against frost during transport. If this is not possible, the product must be drained and dried out!

3.3 Storage

Newly supplied products are prepared so that they can be stored for at least 1 year. The product should be cleaned thoroughly before it is put into temporary storage!

The following should be taken into consideration for storage:

- Place the product on a firm surface and secure it against slipping and falling over. Submersible motor pumps can be stored vertically and horizontally. Ensure that they cannot bend if stored horizontally.

Otherwise, excessive bending tension may arise, which can damage the product.



Danger from falling over!

Never set down the product unsecured. If the product falls over, injury can occur!

- Our products can be stored at temperatures down to -15°C . The store room must be dry. We recommend a frost-protected room for storage with a temperature between 5°C and 25°C .

Products that are filled with drinking water can be stored in frost-free rooms at temperatures up to 3°C for up to 4 weeks. If longer storage is intended, the products should be emptied and dried out beforehand.

- The product may not be stored in rooms where welding work is conducted as the resulting gases and radiated heat can damage the elastomer parts and coatings.
- Any suction or discharge ports should be closed tightly before storage to prevent impurities.
- The current supply cables should be protected against kinking, damage, and moisture.



Beware of electrical current!

Damaged power supply cables can cause fatal injury! Defective cables must be replaced by a qualified electrician immediately.

Beware of moisture!

Moisture penetrating the cable damages both the product and cable. Therefore, never immerse cable ends in the pumped liquid or other liquids.

- The machine must be protected from direct sunlight, heat, dust, and frost. Heat and frost can cause considerable damage to rotors and coatings!
- If the product has been stored for a long period of time it should be cleaned of impurities such as dust and oil deposits before start-up. Rotors should be checked for smooth operation. The housing coatings should be checked for damage.

Before start-up, the filling levels (oil, motor filling, etc) should be checked and topped up, if necessary. Products filled with drinking water should be completely filled before start-up!

Beware of damaged coatings!

Damaged coatings can lead to irreparable damage to the unit (e.g. rust formation)! Therefore, damaged coatings must be repaired immediately. Repair sets are available from the manufacturer.

Only a coating that is completely intact fulfills the criteria for intended usage!

If these rules are observed, your product can be stored for a longer period. Please remember that elastomer parts and coatings become brittle over time. If the product is to be stored for longer than 6 months, we recommend checking these parts and replacing them as necessary. If this is the case, please consult the manufacturer.

3.4 Returning to the product

Products that are returned to the factory must be properly packaged. In this context, properly means that impurities have been removed from the product and that it has been decontaminated, if it was used with fluids that are hazardous to health. The packaging must protect the product from damage during transportation. If you have any questions please contact the manufacturer!

4 Product description

The product has been manufactured with great care and is subject to constant quality controls. Trouble-free operation is guaranteed if it is installed and maintained correctly.

4.1 Proper use and fields of application

The submersible motor pumps are suitable for:

- Potable and non-potable water supplies from drilled holes and cisterns
- Domestic water supplies
- Communal water supplies, sprinkler and flood irrigation
- Booster stations
- Lowering the water table
- Pumping water for industrial uses
- Pumping water without long-fibered and abrasive components

The submersible motor pumps **must not be used** for pumping the following:

- Waste water
- Sewage/feces
- Raw sewage

Beware of electrical current

When using the product in swimming pools or other accessible pools, there is a risk of fatal injury due to electrical current. Note the following information:

Use is strictly forbidden if any persons are in the pool!

If the pool is unoccupied, protective measures must be taken according to DIN VDE 0100-702.46 (or the appropriate national regulations).



Proper use also includes observation of these instructions. Any other use is regarded as improper.

4.1.1 Pumping of drinking water

When using to pump drinking water, the locally applicable guidelines/laws/regulations should be reviewed as to whether the product is suitable for this purpose.

4.2 Construction

The Wilo-Sub TWL... is a water-proof submersible motor pump which can be operated vertically and horizontally in a stationary position.

Fig. 1: Description

1	Cable	4	Hydraulic housing
2	Intake port	5	Discharge port
3	Motor housing		

4.2.1 Hydraulics

Multistage hydraulics with radial or semi-radial rotors in a sectional design. The hydraulic housing, the pump shafts and the rotors are made of stainless steel. The discharge side connection is designed as a vertical

threaded flange with inner thread and integrated back-flow preventer.

The product is not self-priming, in other words, the pump medium must flow with primary pressure or taper automatically and a minimum level of submergence must always be ensured.

4.2.2 Motor

AC or three-phase motors filled with a water-glycol mixture are used for direct start-up. The motor housing is made of stainless steel. The motors have a 4" Nema connector.

The motor is cooled by the pumped medium. The motor must therefore always be submerged when operated. The thresholds for max. liquid temperature and minimum flow speed may not be exceeded.

The connection cable is longitudinally water-proof and fixedly connected to the motor. The version will depend on the particular type:

- TWI 4- ...: with free cable ends
- TWI 4-... QC: Connection cable with QuickConnect linkage for fast and easy installation of QuickConnect cable assembly kits; cables with free ends

Note the IP protection class of the switching device.

4.2.3 Sealing

The seal between motor and hydraulics is made by a rotary shaft seal, or a floating ring seal (for motors of 2.5 kW or greater).

4.3 Operating modes

4.3.1 Operating mode "S1" (continuous operation)

The pump can operate continuously at the rated load without exceeding the maximum permissible temperature.

4.4 Technical data

General data

- Mains supply: see type plate
- Rated motor capacity P_2 : see type plate
- Max. pump head: see type plate
- Max. pump flow: see type plate
- Activation type: direct
- Liquid temperature: 3 to 30 °C
- Protection class: IP 68
- Isolation class: B
- Speed: see type plate
- Max. submersion: 350 m
- Starts per hour: max. 20
- Max. sand content: 50 mg/m³
- Discharge port:
 - TWI 4-01...: Rp 1½
 - TWI 4-02...: Rp 1½
 - TWI 4-03...: Rp 1½
 - TWI 4-05...: Rp 1½
 - TWI 4-09...: Rp 2
 - TWI 4-14...: Rp 2
- Min. flow at the motor: 0.1 m/s
- Operating modes
 - Submerged: S1

- Emerged: –

4.5 Type code

Example: Wilo-Sub TWI 4-0207-x¹-x²

- **TWI** = submersible motor pump made of stainless steel
- **4** = diameter of the hydraulics in inches
- **02** = nominal flow volume in m³/h
- **10** = number of stages of the hydraulic system
- **x¹** = version:
 - without = standard pump
 - QC = with QuickConnect cable connection
- **x²** = series generation

4.6 Scope of delivery

Standard pump:

- Unit with 1.5 or 2.5 m cable (from motor upper edge)
- Installation and operation manual
- AC version with start-up device, thermic motor protection device, on/off switches and free cable ends
- DC version with free cable ends

QC version:

- Unit with 1.75 m QuickConnect cable with free cable ends
- Installation and operation manual

4.7 Accessories (optionally available)

- Cooling jacket
- Switching devices
- Level sensors
- QuickConnect cable sets
- Motor cable kits
- Encapsulating set for motor cable extension

5 Installation

In order to prevent damage to the product or serious injury during installation, the following points must be observed:

- Installation work – assembly and installation of the machine – may only be carried out by qualified persons. The safety instructions must be followed at all times.
- The machine must be inspected for transport damage before carrying out any installation work.

5.1 General

In cases where pumping is made through longer discharge pipes (especially on long ascents), attention is drawn to pressure surges.

Pressure surges can lead to destruction of the unit/system and noisy operation resulting from valve knocking. This can be avoided by taking appropriate measures (e.g. non-return valves with adjustable closure time or laying the discharge pipe in a special way).

After pumping water containing lime, flush out the product with clean water in order to prevent encrustation and subsequent breakdowns.

If you are using level control, make sure that the minimum water coverage is present. Air pockets in the

hydraulic housing or pipeline system must be avoided at all costs and must be removed using a suitable ventilation system. Protect the product from frost.

5.2 Types of installation

- Vertical stationary installation, submerged
- Horizontal stationary installation, submerged – only to be used together with a cooling jacket!

5.3 The operating area

The operating area must be clean, free of coarse solids, dry, frost-free and, if necessary, decontaminated. It must also be suitable for the respective product. The water supply must be sufficient for the maximum flow rate on the unit so that dry running and/or air entry is prevented.

When installed in wells or bore holes, ensure that the unit does not come into contact with the walls. Therefore, ensure that the outer diameter of the submersible motor pump is always smaller than the inner diameter of the well or bore hole.

When working in containers, wells or bore holes, a second person must always be present for safety reasons. If there is danger of poisonous or asphyxiating gases forming, the necessary countermeasures must be taken!

It must be ensured that hoisting gear can be fitted without any trouble, since this is required for assembly and removal of the product. It must be possible to reach the product safely in its operating and storage locations using the hoisting gear. The machine must be positioned on a firm foundation. For transporting the product, the load-carrying equipment must be secured to the appropriate fastening points.

Electric power cables must be laid out in such a way that safe operation and trouble-free assembly/disassembly are possible at all times. The product must never be carried or dragged by the power supply cable. When using switching devices, the corresponding protection class must be observed. Switching devices must always be mounted in such a way that they are protected from flooding.

The structural components and foundations must be of sufficient stability in order to allow the product to be anchored securely and functionally. The operator or the supplier is responsible for the provision of the foundations and their suitability in terms of dimensions, stability and strength!

Use guide and deflector plates for the pumped liquid intake. If the water jet reaches the surface of the water, air will be introduced into the pumped liquid. This will lead to unfavorable current and pumping conditions for the unit. As a result of cavitation, the product does not run smoothly and is subjected to increased wear.

5.4 Installation

Danger of falling!

When installing the product and its accessories, work is sometimes performed directly at the edge of the well or basin. Carelessness and/or wearing inappropriate clothing could result in a fall. There is a risk of fatal injury! Take all necessary safety precautions to prevent this.



The following information must be observed when installing the product:

- This work must be carried out by a qualified person and electrical work must be carried out by an electrician.
- Suitable fastening devices must always be used when transporting the unit, never the power supply cable. The fastening device must always be secured to the fastening points, using shackles when necessary. Fastening devices must be technically approved.
- Check that the available planning documentation (installation plans, layout of the operating area, intake ratios) is complete and correct.

Products of this type must always be submerged during operation to attain the necessary cooling. Always make sure that the minimum water coverage is guaranteed!

Never let the machine run dry. We recommend that dry-run protection be installed. If fluid levels deviate dramatically, a dry-run protection must be installed.

Check whether the cross section of the cable used is sufficient for the required cable length (see the catalog and planning documents or consult Wilo customer service for more information).

- Please observe all regulations, rules and legal requirements for working with and underneath heavy suspended loads.
- Wear appropriate protective clothing/equipment.
- Please also observe the applicable national accident prevention regulations and trade association safety provisions.
- The coating is to be examined before installation. If defects are found, these must be rectified before installation.

5.4.1 Motor filling fluid

The motor is already filled with a water/glycol mixture at the factory. This ensures that the product is protected from frost up to -15 °C.

The motor is designed to that it cannot be filled from the outside. Filling of the motor must be carried out by the manufacturer. The filling level must be checked after a long period in storage (> 1 year)!

5.4.2 Installing the Quick-Connect cable

On QC versions, the QC cable must be connected before installing the unit in the operating area.

Caution: This work must be carried out in a dry place. Ensure that both the plug and connection socket do not contain any moisture. Moisture penetration will destroy the cable and may damage the unit!

- Insert the Quick-Connect plug into the Quick-Connect socket on the connection cable of the unit.
- Pull the metal sleeve over the connection and screw both cable ends together.

5.4.3 Vertical installation

Fig. 2: Installation

1	Unit	8	Support clamp
2	Rising pipe	9	Mounting bracket
3	Switching device	10	Cable clamp
4	Check valve	11	Power supply line
5	Well head	12	Flange
6	Minimum water level	13	Dry-run protection
7	Level sensors		

With this type of installation, the product is installed directly on the rising pipe. The installation depth is determined according to the length of the rising pipe.

Do not place the product on the bottom of the pit, as this can lead to tension and mud accumulation in the motor. If the motor becomes blocked with mud, the heat discharge can no longer be ensured and the motor may overheat.

Additionally, the product should not be installed level with the filter pipe. Sand and other solids may be pumped through the suction flow, meaning the motor cooling can no longer be guaranteed. This would lead to increased wear on the hydraulics. To prevent this, a water guide shroud should be used when necessary, or the product should be installed next to blind pipes.

Installation with flanged pipes

Use hoisting gear with sufficient lifting capacity. Place two pieces of square timber across the well. The support clamp will later be placed on them, so they should have sufficient bearing capacity. If the well opening is narrow, a centering apparatus must be used, since the product may not touch the sides of the well.

- 1 Place the submersible motor pump vertically and secure it from falling over or slipping.
- 2 Attach the mounting brackets to the flange of the rising pipe, hang them on to the lifting gear and lift out the first pipe.
- 3 Fasten the free end of the rising pipe to the discharge port of the submersible motor pump. A seal must be placed between the connections. Always insert the bolts from below, so that the nuts can be screwed on from above. Also, always tighten the bolts in a cross pattern to avoid pressure on the seal from one side.
- 4 Fasten the cable with a cable clip slightly above the flange. If the drilled hole is narrow, the flanges of the rising pipes must be have notches for the cables to pass through.
- 5 Lift up the unit with the pipe, move it over the well and lower it until the support clamp on the rising pipe can be loosely connected. When doing this, make sure that the cable remains outside the support clamp, so that it does not get squeezed.
- 6 Then let the support clamp rest on the pieces of square timber that you put in beforehand. The system can

now be lowered further until the upper pipe flange rests on the attached support clamp.

- 7 Remove the mounting bracket from the flange and attach it to the next pipe. Lift up the rising pipe, move it over the well and flange-bolt the free end to the rising pipe. Place another seal between the connections.



Beware of serious crush injuries!

After the support clamp is removed, the hoisting gear bears the entire weight of the system and the pipe sags. This can lead to serious crush injuries! Before removing the support clamp, ensure that the holding cable in the hoisting gear is taut!

- 8 Remove the support clamp, then fasten the cable slightly above and below the flange with a cable clip. For heavy, large-diameter cables, it is advisable to attach a cable clip every 2 to 3 meters. If several cables are used, each must be fastened separately.
- 9 Lower the rising pipe so that the flange is in the well, put the support clamp back on and lower the rising pipe until the next flange touches the support clamp.

Repeat steps 7 to 9 until the rising pipe reaches the required depth.

- 10 On the last flange, remove the mounting bracket and attach the well cover.
- 11 Attach the lifting gear to the well cover and raise it slightly. Remove the support clamp, feed the cable out through the well cover and lower the cover on to the well.
- 12 Bolt the well cover fast.

Installation with threaded connections

The procedure is almost the same as for installation with flanged pipes. However, please note the following:

- 1 The pipes are joined by means of threaded connections. The threaded pipes must be screwed tight to each other without leaks. This means the pipe ends must be wound with oakum or Teflon tape.
- 2 When screwing the pipes together, make sure that they are in line, so that the thread is not damaged.
- 3 Note the direction of rotation on the unit. Use a pipe with the correct thread (right or left-handed) so that the pipe cannot become unscrewed by accident.
- 4 The threaded pipe must be secured against accidental loosening.
- 5 The support clamp required during installation must always be **firmly** mounted directly below the pipe connection bell. Tighten the screws evenly until the clamp is firmly touching the pipeline (the arms of the support clamp may not touch each other).

5.4.4 Horizontal installation

Fig. 3: Installation

1	Unit	7	Operating area
2	Discharge pipe	8	Water tank
3	Pressure vessel	9	Intake
4	Cooling jacket	10	Intake filter
5	Minimum water level	11	Dry-run protection
6	Level sensors		

This installation type is only permitted when used together with a cooling jacket. The unit is installed directly in the water tank/reservoir/container and flanged onto the discharge pipe. The cooling jacket supports must be mounted at the distances specified to prevent the unit from distorting.

The connected pipeline must be self-supporting, i.e. it may not be supported by the product.

When installed horizontally, the pipe and unit are mounted separately. Make sure that the discharge port of the unit and the pipeline are level.

On this type of installation, the product must be installed with a cooling jacket.

- 1 Drill the fastening holes for the supports on the floor of the operating area (container/reservoir). You will find specifications for the anchor bolts, distances between holes and their sizes in the corresponding instructions. Make certain that the screws and plugs are sufficiently stable.
- 2 Fasten the supports to the floor and bring the product into the correct position using a suitable hoisting gear.
- 3 Fasten the product to the supports using the supplied fastening materials. Ensure that the type plate points upwards!
- 4 Once the unit is firmly mounted, you can install the piping system or flange-connect a piping system which is already in place. Ensure that the discharge ports are level.
- 5 Connect the discharge pipe to the discharge port. A seal must be placed between the flanges of the pipeline and the unit. Tighten the fastening bolts in a cross pattern to avoid damaging the seal. Please note that the pipe system is mounted so that there is no vibration or tension (use elastic connection pieces, when necessary).
- 6 Lay the cables in such a manner that no-one (maintenance personnel etc.) will be endangered by them at any time (operation, quick repairs). Do not damage the power supply lines. The electrical connection must be carried out by an authorized technician.

5.5 Dry-run protection

Make sure that no air enters the hydraulic housing. The product must therefore always be submerged in the pumped liquid up to the top edge of the pump housing. For optimum reliability, we recommend installing a dry-run protection system.

Correct running is ensured by float switches or electrodes. The float switch or electrode is fixed in the shaft and switches off the machine when the water level falls below the minimum coverage level. If the dry-run protection is put into effect with only one float or electrode whilst the filling levels fluctuate strongly, there is a danger that the unit will turn on and off constantly!

This can result in the maximum number of motor start-ups (switching cycles) being exceeded and the motor overheating.

5.5.1 Corrective measures for avoiding excessive switching cycles

Manual reset – The motor is switched off when the water level falls below the minimum coverage level and switched back on when a sufficient water level is reached.

Separate reactivation point – A second switching point (additional float or electrode) is used to obtain a sufficient difference between the activation and deactivation points. This prevents constant switching. This function can be put into effect with a level control relay.

5.6 Electrical connection



Risk of fatal injury due to electrical current!

There is a risk of fatal electric shocks caused by improper electrical connections. Electrical connections may only be carried out by a qualified electrician who is approved by the local power supplier, in accordance with locally applicable regulations.

- Mains current and voltage must correspond to the details on the type plate.
- Connect the power supply cable in accordance with the applicable standards and regulations and according to the wire assignment.
- Any available monitoring equipment, e.g. for the motor temperature, must be connected and tested to ensure that it is working properly.
- For three-phase current motors, a clockwise rotating field must be available.
- Ground the product properly.
Products that are permanently installed must be grounded in compliance with nationally applicable standards. If a separate grounding conductor is available, it must be connected to the marked hole or grounding terminal (⊕) using a suitable screw, nut, toothed washer and flat washer. The cross section of the cable for the grounding conductor connection must correspond to the local regulations.
- **A motor protection switch must be used.** We recommend using an earth leakage circuit breaker (RCD)
- Switching devices are to be purchased as accessories.

5.6.1 Technical details

- Activation type: Direct
- Power supply fuse: 10 A
- Cable cross section 4 x 1.5

Only slow-blow fuses or K characteristic automatic cut-outs may be used for pre-fusing.

5.6.2 AC motor

The AC version is delivered with a factory-installed start-up device. For connection to the mains, the power supply cable is connected to the start-up device (terminals L and N).

Electrical connections may only be made by a qualified electrician!

5.6.3 Three-phase current motor

The three-phase current version is supplied with free cable ends. The connection to the mains is made at the switch box terminals.

Electrical connections may only be made by a qualified electrician!

The wires of the connection cable are assigned as follows:

4-wire connection cable	
Wire color	Terminal
black	U
brown	V
blue or gray	W
green/yellow	PE

5.6.4 Monitoring device connections

The Wilo-Sub TWI series with AC motor has an integrated thermic motor protection device. If the motor becomes too hot, the unit is automatically shut down. Once the motor has cooled down, the unit automatically switches back on.

The customer must install a motor protection switch.

The Wilo-Sub TWI series with three-phase motor has no integrated monitoring devices.

The customer must install a motor protection switch.

5.7 Motor protection and activation types

5.7.1 Motor protection

The minimum requirement is a thermal relay/motor protection switch with temperature compensation, differential triggering and an anti-reactivation device in accordance with VDE 0660 or the appropriate national regulations.

If the product is connected to electrical systems in which faults frequently occur, we recommend installing additional protective devices at the customer (overvoltage, undervoltage or phase failure relays, lightning protection etc.). We also recommend installing an earth leakage circuit breaker.

Local and national regulations must be adhered to when connecting the product.

5.7.2 Activation types

Direct activation

At full load, the motor protection should be set to the rated current at the operating point (see type plate). At partial load, we recommend that the motor protection be set 5% above the current measured at the operating point.

Starting transformer/soft start

- At full load, the motor protection should be set to the rated current at the operating point. At partial load, we

recommend that the motor protection be set 5% above the current measured at the operating point.

- The minimum required cooling flow speed must be guaranteed at all operating points.
- The current consumption must be less than the rated current during the entire operation period.
- The ramp time for start/stop processes between 0 and 30 Hz must be set to max. 1 second.
- The ramp time between 30 Hz and the rated frequency must be set to max. 3 seconds.
- The voltage at the start must measure at least 55% of the rated motor voltage (recommended: 70%).
- To avoid power losses during operation, bypass the electronic starter (soft start) after normal operation has been established.

Operation with frequency transformers

- Continuous operation can only be guaranteed between 30 Hz and 50 Hz.
- To ensure the bearings remain lubricated, a pump output of 10% of the rated pump output must be maintained!
- The ramp time for start/stop processes between 0 and 30 Hz must be set to max. 2 seconds.
- A period of at least 60 seconds is recommended between a pump stop and restart to allow the motor winding to cool down.
- Never exceed the rated current on the motor.
- Maximum voltage peak: 1000 V
- Maximum voltage rise speed: 500 V/ μ s
- Additional filters are required when the required control voltage exceeds 400 V.

Products with plugs/switching devices

Insert the plug into the plug socket and press the on/off switch or let the product switch on/off automatically by means of the attached level control system.

Switching devices can be ordered as accessories for products with free cable ends. In this case, also observe the instructions enclosed with the switching device.

Plugs and switching devices are not flood-proof. Note the IP protection class. Always install switching devices in such a way that they are protected from flooding.

6 Startup

The "Start-up" chapter contains all the important instructions for the operating personnel for starting up and operating the product safely.

The following constraints must be adhered to and monitored:

- Type of installation
 - Operating mode
 - Minimum water coverage / max. submersion
- If the machine has not been operated for an extended period, these constraints must also be checked and any discovered faults rectified.**

This manual must always be kept either by the product or in a place specially reserved for it, where it is accessible for the entire operating personnel at all times.

In order to prevent damage or serious injury when starting up the product, the following points must always be observed:

- The product may only be started up by qualified, trained persons. The safety advice must be followed at all times.
- All persons working on or with the product must have received, read and understood this operating and maintenance manual.
- All safety devices and emergency cut-outs are connected and have been checked to ensure that they work properly.
- Electrical and mechanical settings must be made by specialist staff.
- The product is suitable for use under the specified operating conditions.
- The work area of the product is not a recreational area and is to be kept free of people! No persons are allowed in the work area during switching on and/or during operation.
- A second person must be present when working in shafts. Adequate ventilation must be ensured if there is danger of poisonous gases forming.

6.1 Electrical system

The product is connected and the power supply cables installed in terms of the "Installation" chapter as well as the VDE guidelines and the applicable national regulations.

The product is protected and grounded properly.

Pay attention to the direction of rotation. If the direction of rotation is incorrect, the unit will not perform as specified and can sustain damage.

All monitoring devices are connected and have been checked to ensure that they work properly.

Beware of electrical current!

Electrical current can cause fatal injuries if not handled correctly! All products with free cable ends (i.e. without plugs) must be connected by a qualified electrician.



6.2 Check the direction of rotation

The product is checked and adjusted in the factory to ensure that the direction of rotation is correct. The connection must be made according to the wiring code information.

Before submerging, the product must be checked to ensure that the rotation direction is correct.

A test run should only be performed under general operating conditions. Switching on a unit that has not been submerged is strictly forbidden!

6.2.1 Checking the rotation direction

The rotation direction must be checked with a rotating field tester by a local electrician. For the correct rotation direction, a clockwise rotating field must be available.

The product is not approved for operation with a counter-clockwise rotating field.

6.2.2 If the direction of rotation is not correct

When using Wilo switching devices

Wilo switching devices are designed so that the connected products are driven in the right direction. If the rotation direction is wrong, 2 phases/leads of the mains supply to the switching device must be replaced.

With switching devices provided by the customer:

If the rotation direction is wrong, with direct start motors, 2 phases must be swapped. In the case of star-delta start-up motors, the connections of two windings must be swapped e.g. U1 with V1 and U2 with V2.

6.3 Adjusting the level-control device

For correct adjustment, please see the installation and operation manual for the level control device.

Please observe the information on the minimum water coverage of the product!

6.4 Startup

The work area of the unit is not a recreational area and is to be kept free of persons! No persons are allowed in the work area during switching on and/or during operation.

Before switching on for the first time, the installation must be checked as described in the "Installation" chapter and an isolation check must be carried out according to the "Maintenance" chapter.

When using switching devices and/or plugs, the corresponding IP protection classes must be observed.

6.4.1 Before switching on

The following points must be checked before switching on the submersible motor pump:

- Cable guidance – no loops, slightly taut.
- Check the temperature of the pumped liquid and the submersion depth – see technical data.
- The product machine is fixed securely – vibration-free operation must be assured.
- The accessories – pedestal, cooling jacket etc. are securely fixed.
- The suction chamber of the pump sump and the pipelines must be completely free of dirt.
- Flush out the pipeline and the product before connecting them to the supply network.
- Carry out an insulation check. For details on this, see the "Maintenance" chapter.
- The hydraulic housing must be flooded, i.e. it should be completely full of fluid, with no air in it at all. Bleeding can be carried out using a suitable bleeding device in the system, or, if available, with bleeder screws on the discharge port.
- The sliders on the pressure side should be half opened during commissioning so that the pipeline can be bled.
- You can use an electrically actuated check valve to reduce or prevent water impact. The unit can be switched on in a throttled or closed slider position. **However, do not operate for long periods (> 5 minutes) with the slider closed or nearly closed, and do not run the machine dry.**

- Check all level control and dry-run protection systems.

6.4.2 After starting up

The rated current is briefly exceeded during the start-up procedure. Once the start-up procedure has completed, the operating current may no longer exceed the rated current.

If the motor does not start immediately after the unit is switched on, it must be switched off without delay. The start pauses specified in the "Technical data" chapter must be adhered to before starting up again. If the fault recurs, the unit must be switched off again immediately. The unit may only be restarted, once the fault has been rectified.

6.5 Safety rules during operation

When operating the product, always follow the locally applicable laws and regulations for work safety, accident prevention and handling electrical machinery. To help to ensure safe working practice, the responsibilities of employees should be clearly set out by the owner. All personnel are responsible for ensuring that regulations are observed.

The product has moving parts. During operation, these parts turn to pump the fluid. Certain materials in the pumped fluid can cause very sharp edges to form on the moving parts.

Beware of rotating parts!

The rotating parts can crush and sever limbs. Never reach into the hydraulics or the moving parts during operation. Switch off the product and let the moving parts come to a stop before maintenance or repair work!



The following must be checked at regular intervals:

- Operating voltage (permissible deviation $\pm 5\%$ of the rated voltage)
- Frequency (permissible deviation $\pm 2\%$ of the rated frequency)
- Current consumption (permissible deviation between phases is a maximum of 5%)
- Voltage difference between the individual phases (max. 1%)
- Starts and stops per hour (see technical data)
- Air entry in the intake, a guide plate or deflector plate should be fitted if necessary
- Minimum water immersion level, level control unit, dry-run protection
- Smooth, low vibration running
- Shut-off valves in the intake and discharge pipes must be open.

7 Shut-down/disposal

All work must be carried out with the greatest care.

Proper protective clothing must be worn.

When carrying out work in basins and/or containers, the respective local protection measures must be observed in all cases. A second person must be present for safety reasons.

Only hoisting gear that is in a technically perfect condition and load-carrying equipment that has been officially approved may be used for lowering and raising the product.



Risk of fatal injury due to malfunctions!

Load-carrying equipment and hoisting gear must be in a perfect technical condition. Work may only commence if the hoisting gear has been checked and found to be in perfect working order. If it is not inspected, danger to personnel may result!

7.1 Temporary shutdown

For this type of shutdown, the product remains installed and is not cut off from the electricity supply. For temporary shutdown, the product must remain completely submerged so that it is protected from frost and ice. Ensure that the temperature of the pumped liquid and in the operating area does not fall below +3 °C.

This ensures that the product will be ready for operation at all times. During longer shutdown periods, carry out a regular (monthly to quarterly) function run for a period of 5 minutes.

Caution!

Only carry out a function run under the proper operating and usage conditions. Never run the machine dry! This can result in irreparable damage!

7.2 Final shutdown for maintenance work or storage

The system must be switched off and the product must be disconnected from the mains by an electrician and secured against being switched on again without permission. Units with plugs must be unplugged (do not pull the cable). Work on removing the product, maintenance and storage can then commence.



Beware of poisonous substances!

Products that pump fluids which are hazardous to health must always be decontaminated before undertaking any other work! There is otherwise a risk of fatal injury! Wear the necessary protective clothing for this work!



Beware of burns!

The housing parts can heat up to well above 104 °F (40 °C). There is a danger of burns! After switching off, let the product cool down to ambient temperature.

7.2.1 Removal

When installed vertically, the removal must be made in the same way as the installation:

- Remove the well head.
- Remove the rising pipe and unit in reverse order to the installation sequence.

When planning the appropriate dimensions and selecting the lifting gear, consider that the complete weight of the pipes, unit (including power

supply cable) and water column must all be lifted during removal!

When installed horizontally, the water tank/container must be completely emptied. The product can then be disconnected from the discharge pipe and removed.

7.2.2 Return delivery/storage

For shipping, the parts must be packed and sealed in sufficiently large, non-tearing plastic sacks to prevent leakages. Shipping must be carried out by carriers who have been briefed accordingly.

In this regard, please also refer to the chapter "Transport and storage".

7.3 Starting up again

Clean the product of dust and oil deposits before starting up again. Then carry out all the maintenance tasks as described in the chapter entitled "Maintenance".

Once this work has been completed, the product can be installed and connected to the electricity supply by an electrician. This work must be carried out in accordance with the "Installation" chapter.

The product must be switched on as described in the "Start-up" chapter.

The product may only be restarted if it is in perfect condition and ready for operation.

7.4 Disposal

7.4.1 Lubricants

Oils and lubricants must be collected in appropriate containers and properly disposed of in terms of EC Directive 75/439/EEC as well as in compliance with the provisions of sections 5a and 5b of the German Waste Act or the applicable local laws.

Mixtures of water and glycol are classified as a class 1 water hazard in terms of the German Water Hazard Regulations (VwVwS) of 1999. The requirements of DIN 52 900 (in respect of propanediol and propylene glycol) or the applicable local regulations must be observed in the disposal.

7.4.2 Protective clothing

Protective clothing worn for cleaning and maintenance work is to be disposed of in accordance with the German Waste Code TA 524 02 and EC Directive 91/689/EEC.

7.4.3 Product

Proper disposal of this product avoids damage to the environment and risks to personal health.

- Make use of the services or the advice of public or private waste disposal companies for the disposal of the product as well as parts thereof.
- More information about proper disposal can be obtained from the urban administration, the waste disposal authorities or from the supplier from whom the product was purchased.

8 Maintenance

Before performing maintenance or repair work, switch off and dismount the product as described in the chapter entitled “Final shutdown/disposal”.

After completing maintenance or repair work, the product must be installed and connected according to the “Installation” chapter. The product must be switched on as described in the “Start-up” chapter

Maintenance or repair work must be carried out by an authorized service center, Wilo customer service or a qualified specialist.

Maintenance or repair work and/or constructional changes that are not listed in this operating and maintenance manual may only be carried out by the manufacturer or by authorized service centers.

Risk of fatal injury due to electrical current!

There is a risk of fatal electric shocks when performing work on electrical devices. With all maintenance or repair work, the unit must be disconnected from the mains and secured against being switched on again without permission. Damage to the power supply cable may only be rectified by a qualified electrician.



Note the following information:

- This manual must be available to the maintenance personnel and its instructions must be followed. Only the repair and maintenance measures listed here may be performed.
- All maintenance, inspection and cleaning work on the machine and the system may only be carried out by trained specialists exercising extreme care in a safe workplace. Proper protective clothing is to be worn. The machine must be disconnected from the electrical system and secured against being switched on again. It must be prevented from being switched on inadvertently.
- When carrying out work in basins and/or containers, the respective local protection measures must be observed in all cases. A second person must be present for safety reasons.
- Only hoisting gear that is in a technically perfect condition and load-carrying equipment that has been officially approved may be used for lowering and raising the product.

Make sure that all fastening devices, ropes and safety devices of the hoisting gear are in a technically perfect condition. Work may only commence if the hoisting gear is in perfect working order. If it is not inspected, fatal injuries may result.

- Electrical work on the product and system must be carried out by an electrician. Defective fuses must be replaced. Under no circumstances are they to be repaired. Only fuses at the specified current and of the prescribed type may be used.
- When working with inflammable solvents and cleaning agents, fires, unshielded lighting and smoking are prohibited.
- Products that circulate fluids hazardous to health, or that come into contact with these fluids, must be

decontaminated. It must be ensured that no dangerous gases can form or are present.

If injuries involving hazardous pumping liquids or gases occur, first-aid measures must be performed in accordance with the notices in the workplace and a doctor must be called immediately.

- Ensure that all necessary tools and materials are available. Tidiness and cleanliness guarantee safe and trouble free operation of the product. After working on the unit, all cleaning materials and tools should be removed from it. All materials and tools should be stored in an appropriate place.
- Lubricants, such as oil and grease, must be collected in suitable vessels and disposed of properly (in accordance with the 75/439/EEC directive and with §§5a, 5b AbfG). Appropriate protective clothing is to be worn for cleaning and maintenance jobs. This is to be disposed of in accordance with waste code TA 524 02 and EC Directive 91/689/EEC.

Also observe the local laws and regulations!

- Only lubricants expressly recommended by the manufacturer may be used. Oils and lubricants should not be mixed.
- Only use genuine parts made by the manufacturer.

8.1 Lubricants

The motor is filled with a water-glycol mixture, which is biodegradable. Inspection of the mixture and filling level must be performed by the manufacturer.

8.2 Maintenance intervals

Overview of the maintenance intervals needed:

8.2.1 Before initial start-up or after a longer period of storage

- Check the insulation resistance
- Functional inspection of safety and control devices

8.3 Maintenance tasks

8.3.1 Checking the insulation resistance

To check the insulation resistance, the power supply cable must be disconnected. The resistance can then be measured with an insulation tester (measuring voltage = 1,000 V). The following values may not be exceeded:

- For the initial start-up: Minimum insulation resistance 20 MΩ.
- For further measurements: Value must be greater than 2 MΩ.

If the insulation resistance is too low, moisture may have penetrated the cable and/or the motor. Do not connect the machine, consult manufacturer!

8.4 Functional inspection of safety and monitoring devices

Monitoring devices include temperature sensors in the motor, sealed volume monitors, motor protection relays, overvoltage relays, etc.

Motor protection relays, overvoltage relays and other tripping devices can generally be triggered manually for test purposes.

9 Troubleshooting and possible solutions

In order to prevent damage or injury while rectifying product faults, the following points must be observed in all cases:

- Only attempt to rectify a fault if you have qualified staff. This means that each job must be carried out by trained specialist staff. For example, electrical work must be performed by a trained electrician.
- Always secure the product against an accidental restart by disconnecting it from the mains. Take appropriate safety precautions.
- Always have a second person on hand to ensure that the product has been switched off for safety.
- Secure moving parts to prevent injury.
- Unsanctioned changes to the product are made at the operator's own risk and release the manufacturer from any warranty obligations.

9.0.1 Fault: The unit will not start

- 1 Electricity supply interrupted, short circuit or earth fault in the cable or motor windings
 - Have the motor and wires checked by a specialist and replaced if necessary.
- 2 Fuses, the motor protection switch and/or monitoring devices are triggered
 - Have a specialist inspect the connections and correct them as necessary.
 - Have the motor protection switches and fuses installed or adjusted according to the technical specifications, and reset monitoring equipment.
 - Check that the impeller runs smoothly. Clean or free it as necessary.

9.0.2 Fault: The unit starts, but the motor protection switch triggers shortly after start-up

- 1 The thermal trigger on the motor protection switch is incorrect/set incorrectly
 - Have a specialist compare the selection and setting of the trigger with the technical specifications and correct if necessary
- 2 Increased power consumption due to major voltage drop
 - Have an electrician check the voltage on each phase and rewire if necessary
- 3 Two-phase operation
 - Have a specialist inspect the connection and correct it as necessary
- 4 Excessive voltage differences on the three phases
 - Have a specialist inspect the connection and the switching system and correct if necessary
- 5 Incorrect direction of rotation
 - Swap the 2 phases from the mains supply
- 6 Impeller impeded by adhesive material, blockages and/or solid matter, increased current consumption
 - Switch off the unit, secure it against being switched on again and free the impeller or clean the intake port
- 7 The pumped liquid is too dense
 - Contact the manufacturer

9.0.3 Fault: Unit runs but does not pump

- 1 No pumped liquid
 - Open the container intake or sliders
- 2 Intake blocked
 - Clean the intake, slider, intake port or intake strainer
- 3 Impeller blocked or obstructed
 - Switch off the unit, secure it against being switched on again and free the impeller
- 4 Defective hose or pipeline
 - Replace defective parts
- 5 Intermittent operation (cycles)
 - Check the control panel

9.0.4 Fault: The unit runs, but not at the stated operating levels

- 1 Intake blocked
 - Clean the intake, slider, intake port or intake strainer
- 2 Slider in the discharge pipe closed
 - Open the slider and constantly monitor the power consumption
- 3 Impeller blocked or obstructed
 - Switch off the unit, secure it against being switched on again and free the impeller
- 4 Incorrect direction of rotation
 - Replace two phases on the mains supply
- 5 Air in the system
 - Check the pipelines, pressure shroud and/or hydraulics, and bleed if necessary
- 6 Unit is pumping against excessive pressure
 - Check the slider in the discharge pipe and open it completely if necessary, use a different impeller or contact the factory
- 7 Signs of wear
 - Replace worn parts
 - Check for solids in the pumped liquid
- 8 Defective hose or pipeline
 - Replace defective parts
- 9 Inadmissible levels of gas in the pumped liquid
 - Contact the factory
- 10 Two-phase operation
 - Have a specialist inspect the connection and correct it as necessary
- 11 Excessive decrease in the water table during operation
 - Check the supply and capacity of the system, and inspect the level control settings and functionality

9.0.5 Fault: The unit does not run smoothly and is noisy

- 1 Unit is running in an inadmissible operation range
 - Check the operational data of the unit and correct if necessary and/or adjust the operating conditions
- 2 The intake port, strainer and/or impeller is blocked
 - Clean the intake port, strainer and/or impeller
- 3 The impeller is impeded
 - Switch off the unit, secure it against being switched on again and free the impeller
- 4 Inadmissible levels of gas in the pumped liquid
 - Contact the factory
- 5 Two-phase operation
 - Have a specialist inspect the connection and correct it as necessary
- 6 Incorrect direction of rotation
 - Replace two phases on the mains supply
- 7 Signs of wear
 - Replace worn parts
- 8 Defective motor bearing

- Contact the factory

9 The unit is installed under mechanical strain

- Check the installation, use rubber spacers if necessary

9.0.6 Further steps for troubleshooting

If the points listed here do not rectify the fault, contact our customer service. They can help you as follows:

- Telephone or written support from customer service
- On-site support from customer service
- Inspection or repair of the unit at the factory

Please note that you may be charged for some services provided by our customer support. For more details, please contact customer service.

10 Spare parts

Spare parts can be ordered from the manufacturer's customer service. To avoid queries and incorrect orders, the serial and/or article number must always be supplied.

Technical changes reserved!